Hoval

CATALOGUE

Hoval Thermalia® dual

Brine/water-water/water heat pump
Thermalia® dual (55-140)
Thermalia® dual H (35-90)
Thermalia® dual R (55-140)

Table of contents

Hoval Thermalia® dual

Brine/water-water/water heat pump

- Compact unit with high energy efficiency
- Extremely quiet running thanks to 3-bearing construction
- Stable steel frame structure, a ground plate including vibration-free machine adjustable feet
- Removable, powder-coated sheet steel side panels and front doors with quick-release fasteners
- All casing parts are sound-insulated and thermally insulated
- Colour of side panels, ceiling and rear side: brown red (RAL 3011)
- Colour of doors: flame red (RAL 3000)
- 2 spiral (scroll) compressors
- With plate heat exchanger (condenser and evaporator) made of stainless steel (1.4401), soldered
- Two separate refrigeration circuits with electronic expansion valves, filter dryer with sight glass, liquid receivers and high-pressure and low-pressure sensors
- Electronic initial current limiter with rotating field and phase monitoring
- Integrated brine pressure monitoring
- Two output levels
- Refrigerants
  Thermalia® dual, dual R (55-140) with 410A
  Thermalia® dual H (35-90) with R134a
- Heat pump wired and ready to connect
- Operating side on front with integrated TopTronic® E controller

Electrical connections
- Connection at rear

Delivery
- Heat pump pre-assembled and packed

TopTronic® E controller

Control panel
- Colour touchscreen 4.3 inch
- Heat generator blocking switch for interrupting operation
- Fault signalling lamp

TopTronic® E control module
- Simple, intuitive operating concept
- Display of the most important operating statuses
- Configurable start screen
- Operating mode selection
- Configurable day and week programmes
- Operation of all connected Hoval CAN bus modules
- Commissioning wizard
- Service and maintenance function
- Fault message management
- Analysis function
- Weather display (with online HovalConnect)
- Adaptation of the heating strategy based on the weather forecast (with online HovalConnect)

Model range

Thermalia® dual type	Water/water 35 °C	Water/water 55 °C	Brine/water 35 °C	Brine/water 55 °C	Refrigerant	Flow min. °C	Flow max. °C	Heat output B0W35 kW	Heat output W10W35 kW	Cooling capacity B17W9 kW	Cooling capacity B25W18 kW
(55)	A+++	A+++	A+++	A++	2 x R410A	-	62	57.9	76.9	-	-
(70)			A+++	A++	2 x R410A	-	62	73.2	97.2	-	-
(85)					2 x R410A	-	62	84.8	112.8	-	-
(110)					2 x R410A	-	62	113.4	149.1	-	-
(140)					2 x R410A	-	62	137.8	181.1	-	-
H (35)	A+++	A+++	A+++	A++	2 x R134a	-	70	34.9	49.3	-	-
H (50)	A+++	A+++	A+++	A++	2 x R134a	-	70	52.5	71.8	-	-
H (70)			A+++	A++	2 x R134a	-	70	70.9	97.1	-	-
H (90)					2 x R134a	-	70	87.3	119.5	-	-
R (55)	A+++	A+++	A+++	A++	2 x R410A	7	62	57.9	76.7	64.7	81.1
R (70)			A+++	A++	2 x R410A	7	62	73.2	97.2	86.2	108.3
R (85)					2 x R410A	7	62	84.8	112.8	107.0	127.7
R (110)					2 x R410A	7	62	113.4	149.1	138.1	165.0
R (140)					2 x R410A	7	62	137.8	181.1	156.9	183.9
	A+++ → D	A+++ → D	A+++ → D	A+++ → D							

Energy efficiency class of the compound system with control

TopTronic® E basic module heat generator TTE-WEZ
- Control functions integrated for
  - 1 heating/cooling circuit with mixer
  - 1 heating/cooling circuit without mixer
  - 1 hot water charging circuit
  - bivalent and cascade management
- Outdoor sensor
- Immersion sensor (calorifier sensor)
- Contact sensor (flow temperature sensor)
- RAST 5 basic plug set

Options for TopTronic® E controller
- Can be expanded by max. 1 module expansion:
  - module expansion heating circuit or
  - module expansion Universal
  - module expansion heat balancing
- Can be networked with a total of up to 16 controller modules:
  - heating circuit/hot water module
  - solar module
  - buffer module
  - measuring module

Number of modules that can be additionally installed in the heat generator:
- 1 module expansion and 1 controller module
  or
- 2 controller modules

The supplementary plug set must be ordered in order to use expanded controller functions.

Further information about the TopTronic® E
see "Controls"

EnergyManager PV smart
Feature to increase self-generated power consumption in use with HovalConnect.

If a HovalConnect gateway is used together with the heat pump, the EnergyManager PV smart feature is available. This allows the heat pump to be operated preferentially at times of higher solar radiation. The feature uses online weather data on the current solar radiation for this purpose and can be adjusted by means of an associated threshold value. The self-consumption of electricity from an existing photovoltaic plant is thus increased and the purchase of grid electricity is reduced. This results in a lasting and significant cost-saving potential without further investment costs for the customer

Hoval Integrate
For seamless integration into intelligent home automation and energy management systems
With Hoval Integrate, Hoval heat pumps with TopTronic® E control can be integrated into home automation and energy management systems via open, standardised interfaces.
Predefined templates, plugins and Smart Grid integrations simplify implementation and enable intelligent decisions.
Functions such as PV surplus utilisation, dynamic electricity tariffs, grid-friendly control, load management or simple visualisations for analysis purposes can be created and operated individually.
System integrators are free to choose their desired system and benefit from broad compatibility and future-proof sector coupling.
Thanks to integrated building automation, end customers benefit from operating cost savings and cross-system functions.
Practical guide videos provide additional support for integration and commissioning – step by step and with a practical orientation.

Notice
Only available in Austria, Germany and Switzerland

Brine/water or water/water heat pump

Hoval Thermalia® dual

Refrigerant R410A, 2 circuits

Max. flow temperature 62 °C

Thermalia® dual type	Heat output B0W35 kW	Heat output W10W35 kW	Part No.
(55)	57.9	76.9	7018 997
(70)	73.2	97.2	7018 998
(85)	84.8	112.8	7018 999
(110)	113.4	149.1	7014 294
(140)	137.8	181.1	7014 295

Hoval Thermalia® dual H

Refrigerant R134a, 2 circuits.

Max. flow temperature 70 °C

Thermalia® dual H type	Heat output B0W35 kW	Heat output W10W35 kW	Part No.
H (35)	34.9	49.3	7019 003
H (50)	52.5	71.8	7019 004
H (70)	70.9	97.1	7019 005
H (90)	87.3	119.5	7014 299

Hoval Thermalia® dual R

Refrigerant R410A, 2 circuits

Max. flow temperature 62 °C

Thermalia® dual R type	Cooling capacity [1)] B17W9 kW	Cooling capacity [1)] B25W18 kW	Part No.
R (55)	64.7	81.1	7019 000
R (70)	86.2	108.3	7019 001
R (85)	107.0	127.7	7019 002
R (110)	138.1	165.0	7016 553
R (140)	156.9	183.9	7016 554

[1)] Heat output: see Hoval Thermalia® dual

EnergyManager PV smart
Feature to increase self-generated power consumption in use with HovalConnect.

Further information
see "Description"

Further accessories can be found under the following rubrics:

- Calorifiers/buffer storage tanks:
  - Calorifiers
  - Buffer storage tanks
  - Combination storage tanks
  - Electric heating elements
- Heating armature groups/heating distributors
- Various system components:
  - 2-way and 3-way valves
  - 3-way mixers
  - 2-way and 3-way ball valves
  - Motor drives and butterfly valves
  - Diaphragm pressure expansion tanks
  - Fittings
  - Plate heat exchangers
- Circulating pumps

Installation
The heat pump may be tilted by a maximum of 30° during transportation and installation.

Notice
Only available in Austria, Germany and Switzerland

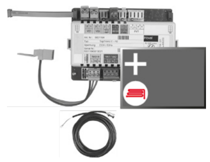
Hoval Integrate
For seamless integration into intelligent home automation and energy management systems

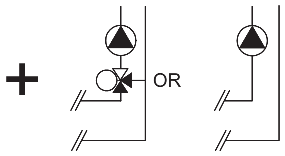
Further information
see "Description"

Part No.

TopTronic® E module expansions

for TopTronic® E basic module heat generator





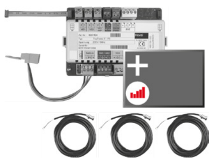
TopTronic® E module expansion heating circuit TTE-FE HK

Part No. 6034 576

Expansion to the inputs and outputs of the basic module heat generator or the heating circuit/domestic hot water module for implementing the following functions:
- 1 heating/cooling circuit without mixer or
- 1 heating/cooling circuit with mixer

Consisting of:
- Fitting accessories
- 1 contact sensor ALF/2P/4/T, L = 4.0 m
- Basic plug set FE module

> **Notice**
> The supplementary plug set may have to be ordered to implement functions differing from the standard!



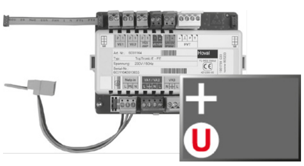
TopTronic® E module expansion heating circuit incl. energy balancing TTE-FE HK-EBZ

Part No. 6037 062

Expansion to the inputs and outputs of the basic module heat generator or the heating circuit/domestic hot water module for implementing the following functions:
- 1 heating/cooling circuit without mixer or
- 1 heating/cooling circuit with mixer incl. energy balancing in each case

Consisting of:
- Fitting accessories
- 3 contact sensors ALF/2P/4/T, L = 4.0 m
- Plug set FE module

> **Notice**
> Suitable flow rate sensors (pulse sensors) must be provided on site.



TopTronic® E module expansion Universal TTE-FE UNI

Part No. 6034 575

Expansion to the inputs and outputs of a controller module (basic module heat generator, heating circuit/domestic hot water module, solar module, buffer module) for implementing various functions

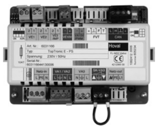
Consisting of:
- Fitting accessories
- Plug set FE module

> **Further information**
> see “Controls” – “Hoval TopTronic® E module expansions” chapter

> **Notice**
> Refer to the Hoval System Technology to find which functions and hydraulic arrangements can be implemented.

Accessories for TopTronic® E

		Part No.



TopTronic® E controller modules

		Part No.
TTE-HK/WW	TopTronic® E heating circuit/ hot water module	6034 571
TTE-SOL	TopTronic® E solar module	6037 058
TTE-PS	TopTronic® E buffer module	6037 057
TTE-MWA	TopTronic® E measuring module	6034 574

Supplementary plug set

	Part No.
for basic module heat generator TTE-WEZ	6034 499
for controller modules and module expansion TTE-FE HK	6034 503

TopTronic® E room control modules

		Part No.
TTE-RBM	TopTronic® E room control modules	
	easy white	6037 071
	comfort white	6037 069
	comfort black	6037 070

Enhanced language package TopTronic® E — 6039 253

one SD card required per control module
Consisting of the following languages:
HU, CS, SL, RO, PL, TR, ES, HR, SR, JA, DA, NL

HovalConnect

	Part No.
HovalConnect LAN	6049 496
HovalConnect WLAN	6049 498
HovalConnect Modbus	6049 501
HovalConnect KNX	6049 593

TopTronic® E interface modules

	Part No.
GLT module 0-10 V	6034 578

TopTronic® E sensors

		Part No.
AF/2P/K	Outdoor sensor H x W x D = 80 x 50 x 28 mm	2055 889
TF/2P/5/6T	Immersion sensor, L = 5.0 m	2055 888
ALF/2P/4/T	Contact sensor, L = 4.0 m	2056 775
TF/1.1P/2.5S/6T	Collector sensor, L = 2.5 m	2056 776

Bivalent switch

for various release or switching functions

	Part No.
Bivalent switch 1-piece	2056 858
Bivalent switch 2-piece	2061 826

System casing

	Part No.
System casing 182 mm	6038 551
System casing 254 mm	6038 552

TopTronic® E wall casing

		Part No.
WG-190	Wall casing small	6052 983
WG-360	Wall casing medium	6052 984
WG-360 BM	Wall casing medium with control module cut-out	6052 985
WG-510	Wall casing large	6052 986
WG-510 BM	Wall casing large with control module cut-out	6052 987

Further information
see “Controls”

Accessories

Part No.

Hose set SPCH50-50-10-4
for Thermalia® dual (55-85),
dual H (35-70), dual R (55-85)
Consisting of:
- 4 reinforced hoses PN 10 DN 50 2″ IT
insulated for brine and heating side
flat-sealing with union nut,
diffusion-proof
- Length: 1.0 m
- Seals

6058 825

Set of sound attenuation feet 65/75
for Thermalia® dual (55,70),
dual H (35,50), dual R (55,70)
for reducing the transmission of
solid-borne noise
Set consisting of 4 vibration-damping
adjustable feet, threaded rod and
locknut
Elastomer part material: NR, black
Casing material: galvanised steel,
chromated

6045 228

Set of sound attenuation feet 45/55
for Thermalia® dual (85-140),
dual H (70,90), dual R (85-140)
for reducing the transmission of
solid-borne noise
Set consisting of 4 vibration-damping
adjustable feet, threaded rod and
locknut
Elastomer part material: NR, black
Casing material: galvanised steel,
chromated

6045 229

Accessories water/water and passive cooling

Flange compensator set DN 80 PN 6
for Thermalia® dual (110-140),
dual H (90), dual R (110-140)
for reducing the transmission of
solid-borne and fluid-borne noise
Set consisting of 4 flange compensators
DN 80 PN 6 without fittings
Structural length: 130 mm

6040 025

Bimetallic thermometer
Used for brine/ground water
Flow and return
Class 1 acc. to DIN 16203
Nominal size 63 x 63 mm
Display range: −20 ... 40 °C
Protective sleeve PN 40,
G ½″ B x 9 mm BS
Price per item

2030 440

Float body flow meter
Bistable Reed contact as NC contact
Nominal pressure: 10 bar
Installation length: 335 mm

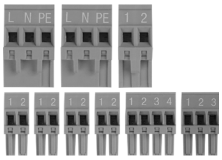
Area of application l/h	°C	Connection	Part No.
1500-15000	0 ... 80	Rp 2″	2040 709
3000-30000	0 ... 80	DN 65	2064 164
8000-60000	0 ... 80	DN 65	2064 165

For active cooling, the installation of a flow controller is mandatory!

Part No.

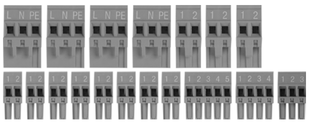
Flow rate sensor DN 50 2-1000 l/min
G 2½" incl. connection cable 1 metre
For water + glycol mix
kvs 226.8 m³/h
0.5-4.5 V: output (2-1000 l/min)
Pulse output: 20 pulses/litre
Medium temperature −20 ... 110 °C < 5 min
Ambient temperature: −20 ... 80 °C
IP44, max. 25 bar
Brass casing
H x W x D: 93.9 x 107.5 x 170 mm
Seal not included in
delivery (70 x 59 x 2 mm)
During installation,
take account of settling section
5 x ID (inlet) and 1 x ID (outlet)

2084 981



Expansion connector set
for the automatic heat pump device ECR461
Use for additional function:
- Flow monitor
- Crankcase bottom heating
- Condensation drain heating
- Heat quantity metering
Plugs:
- 1 230 V digital input
- 2 230 V outputs
- 4 low-voltage inputs
- 1 ratio. Input
- 1 4-pin low-voltage input

6032 509



Universal plug set
for automatic heat pump device ECR461
Plugs:
- 3 digital 230 V inputs
- 4 230 V outputs
- 6 low-voltage inputs
- 2 low-voltage outputs
- 1 ratio. input
- 1 electronic expansion valve
- 1 4-pin low-voltage input

6032 510

Frost protection temperature switch 270XT-95068
to heat source ground water
Type of protection: IP40
Area of application: −24 ... 18 °C

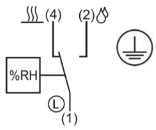
2007 313

Part No.

Necessary at boiler room temperatures < 10 °C

Crankcase heater — 6019 718
for Belaria® twin I/IR (20-30),
Thermalia® comfort (8-17),
Thermalia® comfort H (7,10)
(1 piece required per heat pump)

Thermalia® twin (20-42),
Thermalia® twin H (13-22),
Thermalia® dual, dual H, dual R
(2 pieces required per heat pump)



Dewpoint monitor (TPW) — 2070 911
for monitoring the formation of condensation in a compartment, with gold contacts, can be installed as required for pipes up to Ø 50 mm
The installation location must be selected in such a way that a representative humidity measurement is guaranteed i.e. the room air must flow unhindered through the slots in the housing to the measuring element inside the casing.
The TPW does not require supply voltage or auxiliary energy and should be mounted in an air flow with an air velocity of at least 0.2 m/s.
Control range: 50 ... 90 % RH
Max. switch power: 100 mA/250 V AC
Operating temperature: 0 … 60 °C
Dimensions: 85 x 55 x 33 mm
Weight: approx. 92 g
Type of protection: IP20

Notice
The dewpoint monitor is the only safety equipment in cooling systems and is always mandatory, to prevent damage caused by condensing water in surface cooling systems (floor, wall, ceiling cooling)!
This applies to both active and passive cooling systems.

Part No.

Services

Services and associated scope of services
see separate catalogue “Hoval Services”

Commissioning by Hoval customer service is a prerequisite for warranty/guarantee activation.

Thermalia® dual (55-140) with R410A

Type		(55)	(70)	(85)	(110)	(140)
Brine/water application B0W35						
• Energy efficiency class of the compound system with control (A+++ → D)	35 °C/55 °C	A+++/A++	A+++/A++	-	-	-
• Room heating energy efficiency “moderate climate” 35 °C ηS	%	195	193	194	194	193
• Room heating energy efficiency “moderate climate” 55 °C ηS	%	143	140	142	141	141
• Seasonal coefficient of performance moderate climate (brine) 35 °C/55 °C	SCOP	5.1/3.7	5.0/3.7	5.1/3.7	5.1/3.7	5.0/3.7
Water/water application W10W35						
• Energy efficiency class of the compound system with control (A+++ → D)	35 °C/55 °C	A+++/A+++	-	-	-	-
• Room heating energy efficiency “moderate climate” 35 °C ηS	%	257	249	250	242	245
• Room heating energy efficiency “moderate climate” 55 °C ηS	%	185	180	181	177	178
• Seasonal coefficient of performance moderate climate (brine) 35 °C/55 °C	SCOP	6.6/4.8	6.4/4.7	6.5/4.7	6.2/4.6	6.3/4.7
Max. performance data heating in acc. with EN 14511						
• Heat output B0W35	kW [1)]	57.9	73.2	84.8	113.4	137.8
• Coefficient of performance B0W35	COP	4.63	4.6	4.63	4.62	4.61
• Heat output W10W35	kW	76.9	97.2	112.8	149.1	181.1
• Coefficient of performance W10W35	COP	6.1	5.9	5.9	5.7	5.8
Sound data according to EN 12102						
• Sound power level	dB(A)	57.2	55.7	57.2	64.2	64.2
Hydraulic data brine/water B0W35						
• Maximum flow temperature	°C	62	62	62	62	62
• Maximum operating pressure	bar	16	16	16	6	6
• Heating water spread	K	5	5	5	5	5
• Required volume flow	m^3/h	9.9	12.6	14.6	19.5	23.7
• Pressure drop, condenser	kPa	5.7	6.2	5.4	7.6	8.1
• Condenser connections	R (ext. thread)	2″	2“	2″	DN 80/PN 6	DN 80/PN 6
• Brine spread	K	3	3	3	3	3
• Required volume flow	m^3/h	14.8	18.7	21.7	28.9	35.2
• Pressure drop, evaporator	kPa	15.8	15.8	18	20.1	24.7
• Evaporator connections	R (ext. thread)	2″	2″	2″	DN 80/PN 6	DN 80/PN 6
Hydraulic data water/water W10/W35 (intermediate circuit)						
• Maximum flow temperature	°C	62	62	62	62	62
• Maximum operating pressure	bar	16	16	16	6	6
• Heating water spread	K	5	5	5	5	5
• Required volume flow	m^3/h	13.2	16.7	19.4	25.6	31.1
• Pressure drop, condenser	kPa	9.8	10.6	9.3	12.6	13.4
• Condenser connections	R (ext. thread)	2″	2″	2″	DN 80/PN 6	DN 80/PN 6
• Brine spread in intermediate circuit [2)]	K	3	3	3	3	3
• Required volume flow GW	m^3/h	18.4	23.1	26.9	35.3	43
• Pressure drop, evaporator	kPa	28.3	28.3	32.8	36.8	41.9
• Evaporator connections	R (ext. thread)	2″	2″	2″	DN 80/PN 6	DN 80/PN 6

Type		(55)	(70)	(85)	(110)	(140)
Refrigerating data						
• Compressor		2	2	2	2	2
• Refrigerant		R410A	R410A	R410A	R410A	R410A
• Refrigerant filling quantity	kg	2 x 6.0	2 x 7.4	2 x 8.2	2 x 10.0	2 x 10.7
• Type of compressor oil		DAPHNE HERMETIC OIL FVC32D	Emkarate RL 32HB/160SZ/160Z	Emkarate RL 32HB/160SZ/160Z	Emkarate RL 32HB/160SZ/160Z	Emkarate RL 32HB/160SZ/160Z
• Compressor oil filling quantity	l	2 x 2.5	2 x 3.3	2 x 3.6	2 x 6.7	2 x 6.7
Electrical data						
• Power supply	V			3+N~400 V/50 Hz		
• Max. power consumption (without pumps)	kW	24.8	30.4	34.6	46.6	56.6
• Max. operating current (without pumps)	A	45.6	51.0	58.2	75.6	93.2
• Max. starting current	A	85.3	100.5	114.1	160.3	186.6
• Main current fuse (on site)	A	C63	C63	C80	C100	C125
• Control current fuse (on site)	A	16	16	16	16	16
Dimensions/weight						
• Dimensions (H x W x D)	mm		1907 x 1066 x 774		1907 x 1316 x 774	
• Minimum size of the installation room (without ventilation) [3]	m^3	27.3	33.6	37.3	45.5	48.6
• Weight	kg	560	620	700	770	820

[1] kW = standard values according to EN 14511; values for B0W35 with 25 % monopolypropylene

[2] ∆T in accordance with regional regulations. The temperature difference is adjustable from 3 to 6 kelvin. The pump regulates the volumetric current to the set temperature difference.

[3] If the installation room is smaller than the required minimum size, it must be designed as a machine room in accordance with EN 378.

Thermalia® dual H (35-90) with R134a

Type		H (35)	H (50)	H (70)	H (90)
Brine/water application B0W35					
• Energy efficiency class of the compound system with control (A+++ → D)	35 °C/55 °C	A+++/A++	A+++/A++	A+++/A++	-
• Room heating energy efficiency “moderate climate” 35 °C ηS	%	184	182	190	178
• Room heating energy efficiency “moderate climate” 55 °C ηS	%	135	140	136	131
• Seasonal coefficient of performance moderate climate (brine) 35 °C/55 °C	SCOP	4.8/3.6	4.8/3.7	5.0/3.6	4.7/3.5
Water/water application W10W35					
• Energy efficiency class of the compound system with control (A+++ → D)	35 °C/55 °C	A+++/A+++	A+++/A+++	-	-
• Room heating energy efficiency “moderate climate” 35 °C ηS	%	256	246	245	240
• Room heating energy efficiency “moderate climate” 55 °C ηS	%	180	179	177	174
• Seasonal coefficient of performance moderate climate (brine) 35 °C/55 °C	SCOP	6.6/4.7	6.3/4.7	6.3/4.6	6.2/4.6
Max. performance data heating in acc. with EN 14511					
• Heat output B0W35	kW [1)]	34.9	52.5	70.9	87.3
• Coefficient of performance B0W35	COP	4.3	4.4	4.4	4.3
• Heat output W10W35	kW	49.3	71.8	97.1	119.5
• Coefficient of performance W10W35	COP	6.0	5.8	5.8	5.7
Sound data according to EN 12102					
• Sound power level	dB(A)	55.2	60.2	63.2	63.2
Hydraulic data brine/water B0W35					
• Maximum flow temperature	°C	70	70	70	70
• Maximum operating pressure	bar	16	16	16	6
• Heating water spread	K	5	5	5	5
• Required volume flow	m^3/h	6.0	9.0	12.2	15.0
• Pressure drop, condenser	kPa	4.2	3.3	3.9	4.7
• Condenser connections	R (ext. thread)	2″	2″	2″	DN 80/PN 6
• Brine spread	K	3	3	3	3
• Required volume flow	m^3/h	8.7	13.2	17.7	21.7
• Pressure drop, evaporator	kPa	8.9	9.1	8.3	8.8
• Evaporator connections	R (ext. thread)	2″	2″	2″	DN 80/PN 6
Hydraulic data water/water W10/W35 (intermediate circuit)					
• Maximum flow temperature	°C	70	70	70	70
• Maximum operating pressure	bar	16	16	16	6
• Heating water spread	K	5	5	5	5
• Required volume flow	m^3/h	8.5	12.3	16.7	20.5
• Pressure drop, condenser	kPa	7.8	6.0	7.0	8.4
• Condenser connections	R (ext. thread)	2″	2″	2″	DN 80/PN 6
• Brine spread in intermediate circuit [2)]	K	3	3	4	4
• Required volume flow GW	m^3/h	11.8	17.1	23.0	28.2
• Pressure drop, evaporator	kPa	18.2	16.8	15.2	15.9
• Evaporator connections	R (ext. thread)	2″	2″	2″	DN 80/PN 6

Type		H (35)	H (50)	H (70)	H (90)
Refrigerating data					
• Compressor		2	2	2	2
• Refrigerant		R134a	R134a	R134a	R134a
• Refrigerant filling quantity	kg	2 x 5.4	2 x 8.0	2 x 8.2	2 x 9.0
• Type of compressor oil		Emkarate RL 32HB/160SZ/160Z	Emkarate RL 32HB/160SZ/ 160Z	Emkarate RL 32HB/160SZ/ 160Z	Emkarate RL 32HB/160SZ/ 160Z
• Compressor oil filling quantity	l	2 x 3.3	2 x 6.2	2 x 8.0	2 x 8.0
Electrical data					
• Power supply	V	3+N~400 V/50 Hz			
• Max. power consumption (without pumps)	kW	17.4	25.6	34.8	44.2
• Max. operating current (without pumps)	A	32.0	45.6	58.6	75.8
• Max. starting current	A	76.0	107.8	151.8	182.9
• Main current fuse (on site)	A	C50	C63	C80	C100
• Control current fuse (on site)	A	16	16	16	16
Dimensions/weight					
• Dimensions (H x W x D)	mm	1907 x 1066 x 774		1907 x 1316 x 774	
• Minimum size of the installation room (without ventilation) [3]	m^3	43	64	66	72
• Weight	kg	670	700	770	800

[1] kW = standard values according to EN 14511; values for B0W35 with 25 % monopolypropylene

[2] ∆T in accordance with regional regulations. The temperature difference is adjustable from 3 to 6 kelvin. The pump regulates the volumetric current to the set temperature difference.

[3] If the installation room is smaller than the required minimum size, it must be designed as a machine room in accordance with EN 378.

Thermalia® dual R (55-140) with R410A

Type		R (55)	R (70)	R (85)	R (110)	R (140)
Brine/water application B0W35						
• Energy efficiency class of the compound system with control (A+++ → D)	35 °C/55 °C	A+++/A++	A+++/A++	-	-	-
• Room heating energy efficiency “moderate climate” 35 °C ηS	%	195	193	194	194	193
• Room heating energy efficiency “moderate climate” 55 °C ηS	%	143	140	142	141	141
• Seasonal coefficient of performance moderate climate (brine) 35 °C/55 °C	SCOP	5.1/3.7	5.0/3.7	5.1/3.7	5.1/3.7	5.0/3.7
Water/water application W10W35						
• Energy efficiency class of the compound system with control (A+++ → D)	35 °C/55 °C	A+++/A+++	-	-	-	-
• Room heating energy efficiency “moderate climate” 35 °C ηS	%	257	249	250	242	245
• Room heating energy efficiency “moderate climate” 55 °C ηS	%	185	180	181	177	178
• Seasonal coefficient of performance moderate climate (brine) 35 °C/55 °C	SCOP	6.6/4.8	6.4/4.7	6.5/4.7	6.2/4.6	6.3/4.7
Max. performance data heating and cooling in acc. with EN 14511						
• Heat output B0W35	kW [1]	57.9	73.2	84.8	113.4	137.8
• Coefficient of performance B0W35	COP	4.63	4.6	4.63	4.62	4.61
• Heat output W10W35	kW	76.9	97.2	112.8	149.1	181.1
• Coefficient of performance W10W35	COP	6.07	5.87	5.91	5.73	5.79
• Cooling capacity B17W9	kW	64.7	86.2	107	138.1	156.9
• Energy efficiency ratio B17W9	EER	6.12	6.6	7.21	6.51	6.05
• Cooling capacity B25W18	kW	81.1	108.3	127.7	165	183.9
• Energy efficiency ratio B25W18	EER	6.44	6.71	6.95	6.31	6.04
Sound data according to EN 12102						
• Sound power level	dB(A)	57.2	55.7	57.2	64.2	64.2
Hydraulic data brine/water B0W35						
• Maximum flow temperature	°C	62	62	62	62	62
• Maximum operating pressure	bar	16	16	16	6	6
• Heating water spread	K	5	5	5	5	5
• Required volume flow	m^3/h	9.9	12.6	14.6	19.5	23.7
• Pressure drop, condenser	kPa	8.9	9.3	8	11	11.6
• Condenser connections	R (ext. thread)	2″	2“	2″	DN 80/PN 6	DN 80/PN 6
• Brine spread	K	3	3	3	3	3
• Required volume flow	m^3/h	14.8	18.7	21.7	28.9	35.2
• Pressure drop, evaporator	kPa	15.5	15.5	17.9	21.4	25.3
• Evaporator connections	R (ext. thread)	2″	2″	2″	DN 80/PN 6	DN 80/PN 6
Hydraulic data water/water W10/W35 (intermediate circuit)						
• Maximum flow temperature	°C	62	62	62	62	62
• Maximum operating pressure	bar	16	16	16	6	6
• Heating water spread	K	5	5	5	5	5
• Required volume flow	m^3/h	13.2	16.7	19.4	25.6	31.1
• Pressure drop, condenser	kPa	15.4	16.2	13.7	18.5	19.6
• Condenser connections	R (ext. thread)	2″	2″	2″	DN 80/PN 6	DN 80/PN 6
• Brine spread in intermediate circuit [2]	K	3	3	3	3	3
• Required volume flow GW	m^3/h	18.4	23.1	26.9	35.3	43
• Pressure drop, evaporator	kPa	29.6	29.5	34.4	40.1	47.9
• Evaporator connections	R (ext. thread)	2″	2″	2″	DN 80/PN 6	DN 80/PN 6

Type		R (55)	R (70)	R (85)	R (110)	R (140)
Refrigerating data						
• Compressor		2	2	2	2	2
• Refrigerant		R410A	R410A	R410A	R410A	R410A
• Refrigerant filling quantity	kg	2 x 6.0	2 x 7.4	2 x 8.2	2 x 10.0	2 x 10.7
• Type of compressor oil		DAPHNE HERMETIC OIL FVC32D	Emkarate RL 32HB – 160SZ – 160Z	Emkarate RL 32HB – 160SZ – 160Z	Emkarate RL 32HB – 160SZ – 160Z	Emkarate RL 32HB – 160SZ – 160Z
• Compressor oil filling quantity	l	2 x 2.5	2 x 3.3	2 x 3.6	2 x 6.7	2 x 6.7
Electrical data						
• Power supply	V			3+N~400 V/50 Hz		
• Max. power consumption (without pumps)	kW	24.8	30.4	34.6	46.6	56.6
• Max. operating current (without pumps)	A	45.6	51.0	58.2	75.6	93.2
• Max. starting current	A	85.3	100.5	114.1	160.3	186.6
• Main current fuse (on site)	A	C63	C63	C80	C100	C125
• Control current fuse (on site)	A	16	16	16	16	16
Dimensions/weight						
• Dimensions (H x W x D)	mm		1907 x 1066 x 774		1907 x 1316 x 774	
• Minimum size of the installation room (without ventilation) [3]	m^3	27.3	33.6	37.3	45.5	48.6
• Weight	kg	560	620	700	770	820

[1] kW = standard values according to EN 14511; values for B0W35 with 25 % monopolypropylene

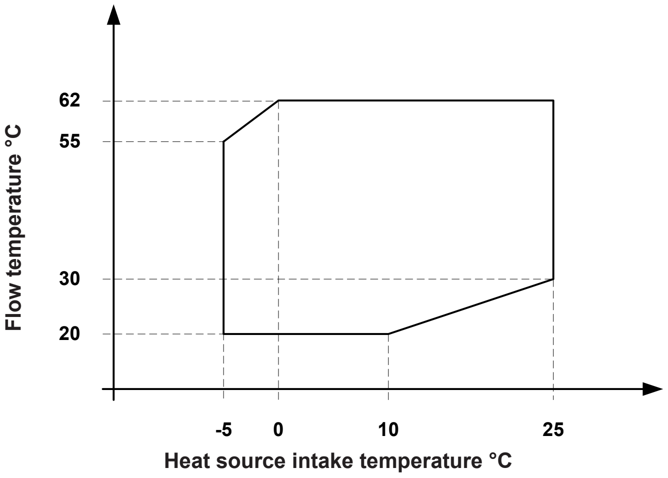
[2] ΔT in accordance with regional regulations. The temperature difference is adjustable from 3 to 6 kelvin. The pump regulates the volumetric current to the set temperature difference.

[3] If the installation room is smaller than the required minimum size, it must be designed as a machine room in accordance with EN 378.

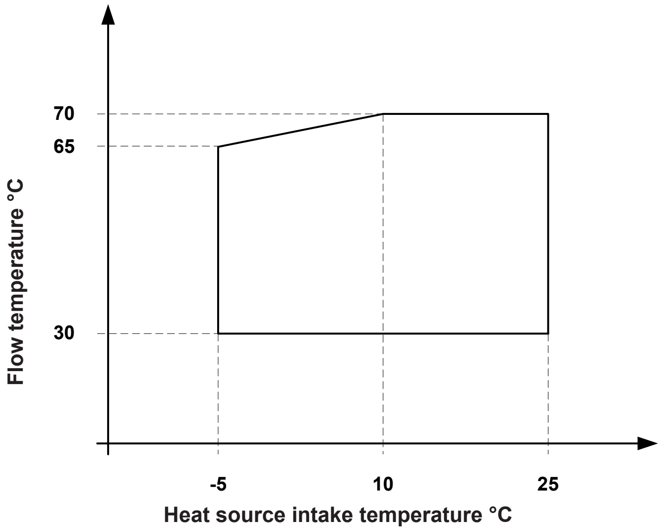
Diagrams of areas of application

Heating and hot water

Thermalia® dual (55-140), dual R (55-140)

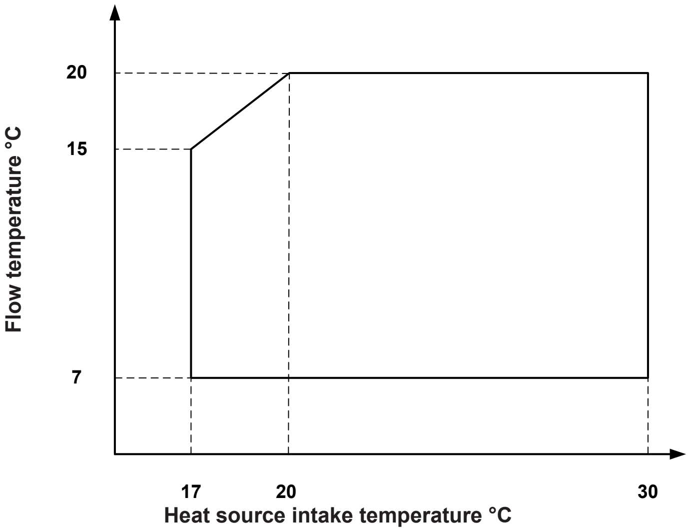


Thermalia® dual H (35-90)



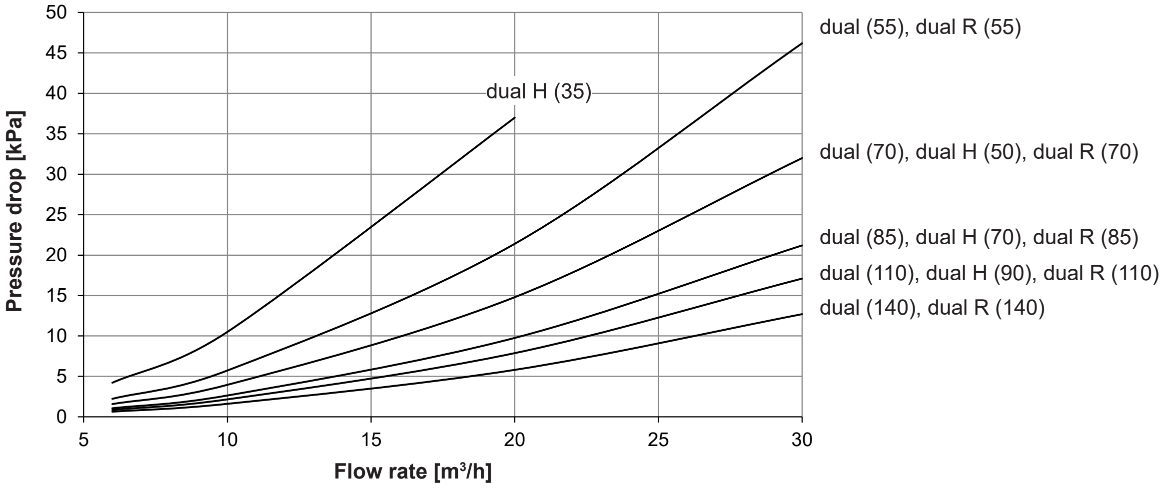
Cooling

Thermalia® dual R (55-140)



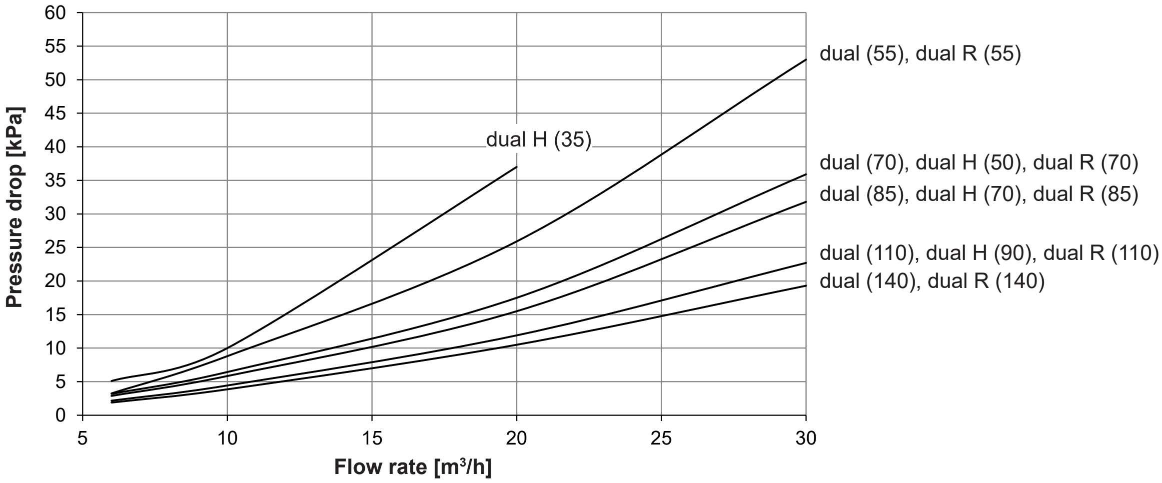
Heating

Pressure drop condenser
with water



Heat source

Pressure drop evaporator
with ethylene glycol 25 %
(antifrogen N)



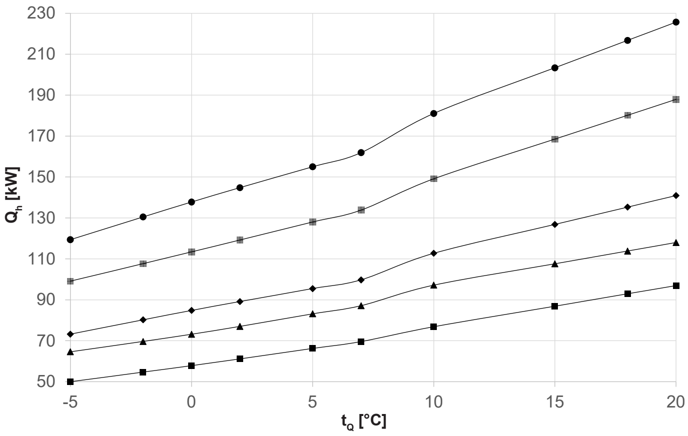
Performance data – heating

Maximum heat output

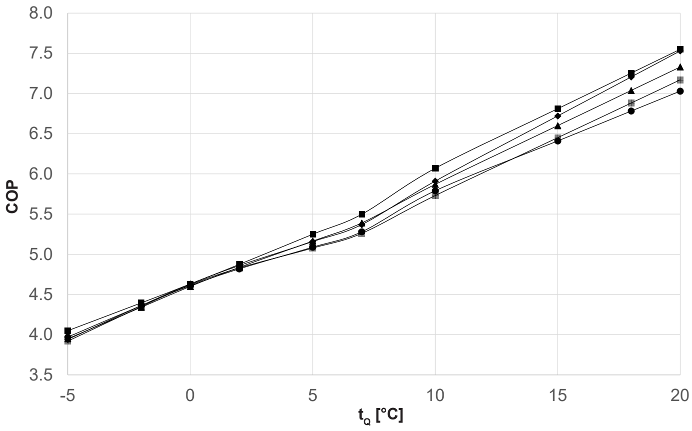
Thermalia® dual (55-140), dual R (55-140) with R410A

Data according to EN 14511

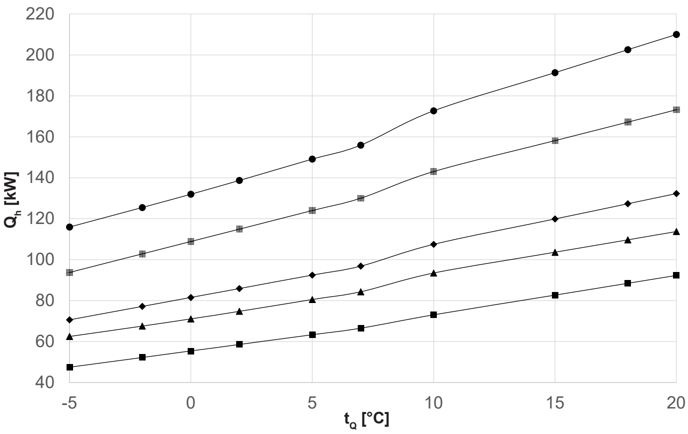
Heat output – t_{VL} 35 °C



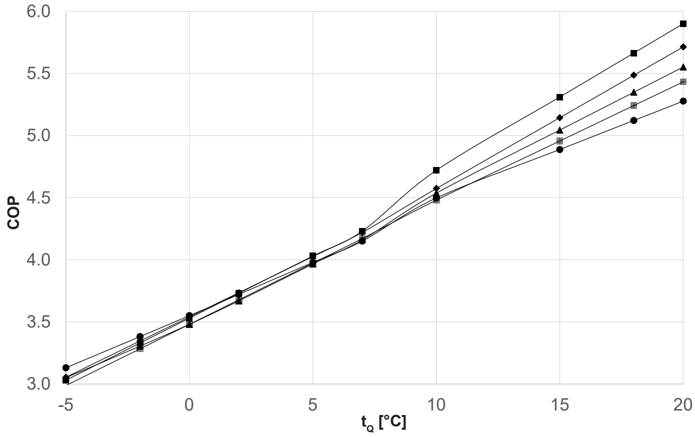
Coefficient of performance – t_{VL} 35 °C



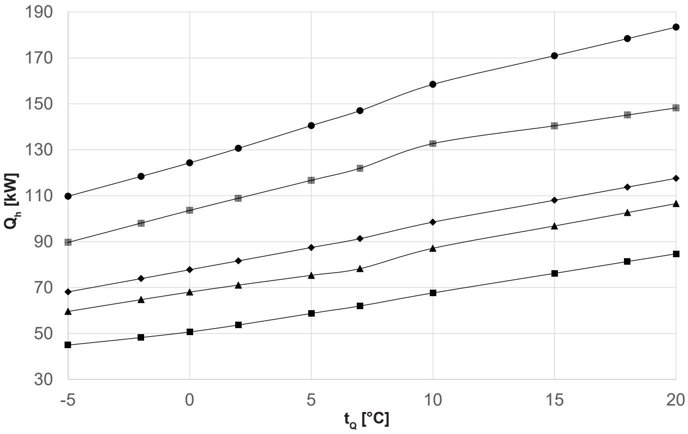
Heat output – t_{VL} 45 °C



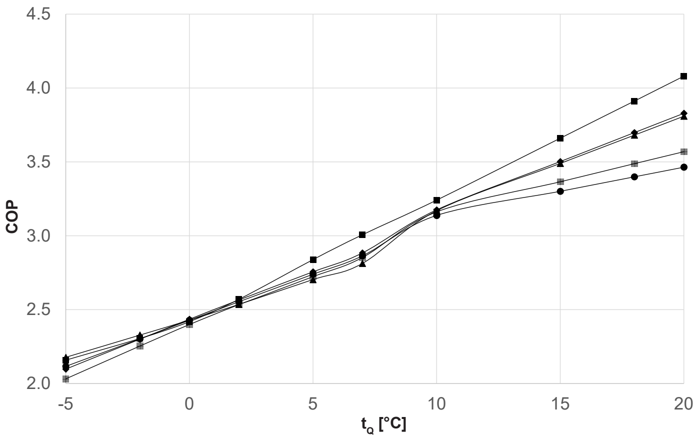
Coefficient of performance – t_{VL} 45 °C



Heat output – t_{VL} 62 °C



Coefficient of performance – t_{VL} 62 °C



t_{VL} = heating flow temperature (°C)
t_Q = source temperature (°C)
Q_h = heat output at full load (kW), measured in accordance with standard EN 14511
COP = Coefficient of Performance for the overall unit in accordance with standard EN 14511

- ■ Thermalia® dual, dual R (55)
- ▲ Thermalia® dual, dual R (70)
- ◆ Thermalia® dual, dual R (85)
- ■ Thermalia® dual, dual R (110)
- ● Thermalia® dual, dual R (140)

Performance data – heating

Thermalia® dual (55-140), dual R (55-140)

Data according to EN 14511

t_{VL} °C		t_Q °C	(55), R (55) Stage 2 Q_h kW	P kW	COP	(70), R (70) Stage 2 Q_h kW	P kW	COP	(85), R (85) Stage 2 Q_h kW	P kW	COP	(110), R (110) Stage 2 Q_h kW	P kW	COP	(140), R (140) Stage 2 Q_h kW	P kW	COP
30	Brine	−5	50.6	10.9	4.7	65.6	14.3	4.6	74.0	15.6	4.7	100.1	21.2	4.7	121.5	25.4	4.8
		−2	55.9	10.9	5.1	70.6	13.8	5.1	81.2	15.5	5.2	109.0	20.9	5.2	132.6	25.3	5.2
		0	59.3	11.0	5.4	74.1	13.6	5.5	86.0	15.5	5.6	115.0	20.8	5.5	139.9	25.4	5.5
		2	62.6	11.0	5.7	78.2	13.5	5.8	90.5	15.5	5.8	121.1	20.9	5.8	147.0	25.5	5.8
		5	67.6	11.2	6.1	84.9	13.7	6.2	97.1	15.7	6.2	130.3	21.5	6.1	157.5	26.0	6.1
		7	70.9	11.2	6.3	89.2	13.8	6.5	101.5	15.8	6.4	136.5	21.7	6.3	164.5	26.2	6.3
	Water	10	78.4	11.0	7.1	99.1	14.5	6.8	115.4	16.9	6.8	152.2	23.1	6.6	185.3	27.7	6.7
		15	88.8	11.2	7.9	109.6	14.2	7.7	130.3	16.7	7.8	173.7	23.2	7.5	209.4	28.0	7.5
		18	95.0	11.3	8.4	115.9	14.0	8.3	139.3	16.5	8.4	186.7	23.3	8.0	223.9	28.2	7.9
		20	99.2	11.3	8.8	120.1	13.8	8.6	145.3	16.5	8.8	195.3	23.4	8.4	233.5	28.3	83
35	Brine	−5	50.0	12.3	4.1	64.6	16.4	4.0	73.2	18.6	3.9	99.1	25.3	3.9	119.4	30.1	4.0
		−2	54.7	12.4	4.4	69.7	16.1	4.3	80.2	18.4	4.4	107.7	24.8	4.3	130.5	29.9	4.4
		0	57.9	12.5	4.6	73.2	15.9	4.6	84.8	18.3	4.6	113.4	24.6	4.6	137.8	29.9	4.6
		2	61.2	12.6	4.9	77.0	15.9	4.8	89.2	18.4	4.9	119.2	24.7	4.8	144.8	30.0	4.8
		5	66.3	12.6	5.3	83.2	16.1	5.2	95.5	18.5	5.2	128.0	25.2	5.1	155.0	30.5	5.1
		7	69.6	12.7	5.5	87.2	16.2	5.4	99.8	18.6	5.4	133.9	25.4	5.3	161.9	30.7	5.3
	Water	10	76.9	12.7	6.1	97.2	16.6	5.9	112.8	19.1	5.9	149.1	26.0	5.7	181.1	31.3	5.8
		15	86.9	12.8	6.8	107.6	16.3	6.6	126.8	18.9	6.7	168.5	26.1	6.5	203.4	31.7	6.4
		18	92.9	12.8	7.3	113.8	16.1	7.0	135.3	18.8	7.2	180.2	26.2	6.9	216.7	32.0	6.8
		20	97.0	12.9	7.6	118.0	16.0	7.3	140.9	18.7	7.5	187.9	26.2	7.2	225.7	32.2	7.0
40	Brine	−5	48.9	14.0	3.5	63.7	18.4	3.5	72.2	20.9	3.5	96.8	28.4	3.4	117.8	33.6	3.5
		−2	53.5	14.0	3.8	68.8	18.2	3.8	78.9	20.7	3.8	105.6	28.0	3.8	128.1	33.5	3.8
		0	56.6	14.1	4.0	72.2	18.1	4.0	83.4	20.6	4.0	111.4	27.8	4.0	135.0	33.4	4.0
		2	59.8	14.1	4.2	76.0	18.1	4.2	87.7	20.6	4.3	117.3	27.8	4.2	141.9	33.6	4.2
		5	64.8	14.1	4.6	81.9	18.1	4.5	94.1	20.7	4.5	126.1	28.2	4.5	152.2	33.9	4.5
		7	68.1	14.2	4.8	85.7	18.2	4.7	98.3	20.7	4.7	131.9	28.3	4.7	159.0	34.1	4.7
	Water	10	75.0	14.1	5.3	95.3	18.6	5.1	110.1	21.3	5.2	146.1	29.0	5.0	176.9	34.8	5.1
		15	84.8	14.2	6.0	105.6	18.4	5.7	123.4	21.1	5.8	163.3	29.0	5.6	197.4	35.4	5.6
		18	90.7	14.3	6.4	111.8	18.3	6.1	131.3	21.0	6.3	173.7	29.0	6.0	209.6	35.8	5.9
		20	94.7	14.3	6.6	115.9	18.3	6.3	136.6	20.9	6.5	180.6	29.1	6.2	217.8	36.0	6.1
45	Brine	−5	47.5	15.7	3.0	62.5	20.5	3.1	70.6	23.1	3.1	93.7	31.4	3.0	115.9	37.0	3.1
		−2	52.2	15.7	3.3	67.6	20.4	3.3	77.2	23.1	3.3	102.8	31.3	3.3	125.5	37.1	3.4
		0	55.4	15.7	3.5	71.1	20.4	3.5	81.5	23.0	3.5	108.9	31.3	3.5	132.0	37.2	3.6
		2	58.6	15.7	3.7	74.8	20.4	3.7	85.9	23.0	3.7	114.9	31.2	3.7	138.7	37.3	3.7
		5	63.3	15.7	4.0	80.5	20.3	4.0	92.5	23.0	4.0	124.0	31.2	4.0	149.1	37.5	4.0
		7	66.5	15.7	4.2	84.3	20.3	4.2	96.8	22.9	4.2	130.0	31.2	4.2	155.9	37.6	4.2
	Water	10	73.1	15.5	4.7	93.5	20.6	4.5	107.5	23.5	4.6	143.0	31.9	4.5	172.7	38.4	4.5
		15	82.7	15.6	5.3	103.6	20.5	5.0	119.9	23.3	5.1	158.1	31.9	5.0	191.3	39.2	4.9
		18	88.5	15.6	5.7	109.7	20.5	5.3	127.3	23.2	5.5	167.2	31.9	5.2	202.5	39.6	5.1
		20	92.3	15.7	5.9	113.8	20.5	5.6	132.3	23.1	5.7	173.2	31.9	5.4	210.0	39.9	5.3
50	Brine	−5	47.1	17.1	2.8	61.8	22.5	2.8	70.3	26.1	2.7	93.5	35.5	2.6	114.2	41.9	2.7
		−2	51.1	17.2	3.0	66.9	22.5	3.0	76.6	25.9	3.0	102.2	35.0	2.9	123.7	41.6	3.0
		0	53.9	17.2	3.1	70.3	22.6	3.1	80.8	25.8	3.1	107.9	34.8	3.1	130.1	41.5	3.1
		2	57.0	17.2	3.3	73.7	22.6	3.3	84.9	25.7	3.3	113.5	34.7	3.3	136.8	41.6	3.3
		5	62.1	17.1	3.6	78.9	22.6	3.5	91.0	25.7	3.5	121.8	34.8	3.5	146.9	41.8	3.5
		7	65.3	17.1	3.8	82.3	22.5	3.7	95.1	25.7	3.7	127.4	34.9	3.7	153.6	41.9	3.7
	Water	10	71.7	17.2	4.2	91.6	22.6	4.1	104.8	25.7	4.1	140.0	34.9	4.0	168.5	42.0	4.0
		15	80.9	17.2	4.7	101.6	22.7	4.5	116.4	25.5	4.6	152.9	34.8	4.4	185.3	42.9	4.3
		18	86.4	17.2	5.0	107.6	22.7	4.7	123.3	25.4	4.8	160.7	34.7	4.6	195.4	43.4	4.5
		20	90.1	17.2	5.2	111.6	22.7	4.9	127.9	25.3	5.0	165.9	34.7	4.8	202.2	43.8	4.6

t_{VL} = heating flow temperature (°C)
t_Q = source temperature (°C)
Q_h = heat output at full load (kW), measured in accordance with standard EN 14511
P = power consumption of the overall unit (kW)
COP = Coefficient of Performance for the overall unit in accordance with standard EN 14511

Further performance data – heating
see next page

Observe daily power interruptions!
see “Engineering heat pumps general”

Performance data – heating

Thermalia® dual (55-140), dual R (55-140)

Data according to EN 14511

			(55), R (55) Stage 2			(70), R (70) Stage 2			(85), R (85) Stage 2			(110), R (110) Stage 2			(140), R (140) Stage 2		
t_{VL} °C		t_Q °C	Q_h kW	P kW	COP	Q_h kW	P kW	COP	Q_h kW	P kW	COP	Q_h kW	P kW	COP	Q_h kW	P kW	COP
55	Brine	−5	46.5	18.6	2.5	62.1	24.2	2.6	70.5	28.3	2.5	92.8	38.5	2.4	113.7	45.5	2.5
		−2	49.9	18.7	2.7	66.8	24.2	2.8	76.6	27.7	2.8	101.7	37.4	2.7	122.0	44.4	2.7
		0	52.5	18.7	2.8	70.0	24.1	2.9	80.6	27.4	2.9	107.4	36.8	2.9	127.8	43.9	2.9
		2	55.5	18.7	3.0	73.2	24.1	3.0	84.4	27.3	3.1	112.8	36.7	3.1	134.2	43.9	3.1
		5	60.7	18.6	3.3	77.9	24.1	3.2	90.1	27.3	3.3	120.5	37.0	3.3	144.5	44.3	3.3
		7	64.0	18.5	3.5	81.1	24.1	3.4	93.9	27.3	3.4	125.7	37.1	3.4	151.2	44.5	3.4
	Water	10	70.2	18.8	3.7	89.7	24.6	3.6	102.2	27.9	3.7	136.9	37.8	3.6	164.3	45.5	3.6
		15	79.0	18.8	4.2	99.6	24.8	4.0	112.9	27.7	4.1	147.7	37.7	3.9	179.3	46.6	3.9
		18	84.4	18.8	4.5	105.5	24.9	4.2	119.3	27.6	4.3	154.2	37.6	4.1	188.3	47.2	4.0
		20	87.9	18.7	4.7	109.5	24.9	4.4	123.6	27.6	4.5	158.5	37.5	4.2	194.3	47.6	4.1
62	Brine	−5	45.0	20.8	2.2	59.6	27.4	2.2	68.1	32.5	2.1	89.6	44.1	2.0	109.8	51.9	2.1
		−2	48.2	20.9	2.3	64.7	27.8	2.3	73.9	32.1	2.3	98.0	43.5	2.3	118.4	51.4	2.3
		0	50.7	20.9	2.4	68.0	28.0	2.4	77.8	31.9	2.4	103.6	43.2	2.4	124.3	51.2	2.4
		2	53.7	20.9	2.6	71.0	28.0	2.5	81.6	31.8	2.6	108.9	43.0	2.5	130.6	51.2	2.6
		5	58.7	20.7	2.8	75.3	27.9	2.7	87.4	31.7	2.8	116.7	42.8	2.7	140.5	51.3	2.7
		7	62.0	20.6	3.0	78.2	27.8	2.8	91.3	31.6	2.9	121.9	42.7	2.9	147.0	51.3	2.9
	Water	10	67.6	20.9	3.2	87.1	27.5	3.2	98.5	31.0	3.2	132.7	42.0	3.2	158.4	50.5	3.1
		15	76.2	20.8	3.7	96.8	27.7	3.5	108.0	30.8	3.5	140.4	41.7	3.4	170.9	51.8	3.3
		18	81.3	20.8	3.9	102.6	27.9	3.7	113.7	30.7	3.7	145.1	41.6	3.5	178.4	52.5	3.4
		20	84.7	20.7	4.1	106.5	28.0	3.8	117.5	30.7	3.8	148.2	41.5	3.6	183.4	53.0	3.5

t_{VL} = heating flow temperature (°C)
t_Q = source temperature (°C)
Q_h = heat output at full load (kW), measured in accordance with standard EN 14511
P = power consumption of the overall unit (kW)
COP = Coefficient of Performance for the overall unit in accordance with standard EN 14511

Observe daily power interruptions!
see “Engineering heat pumps general”

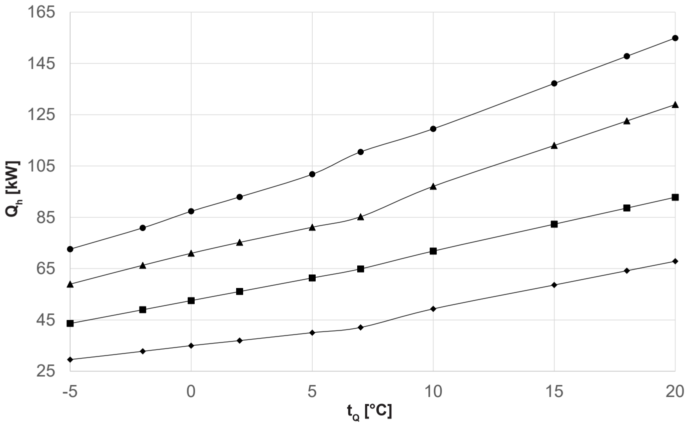
Performance data – heating

Maximum heat output

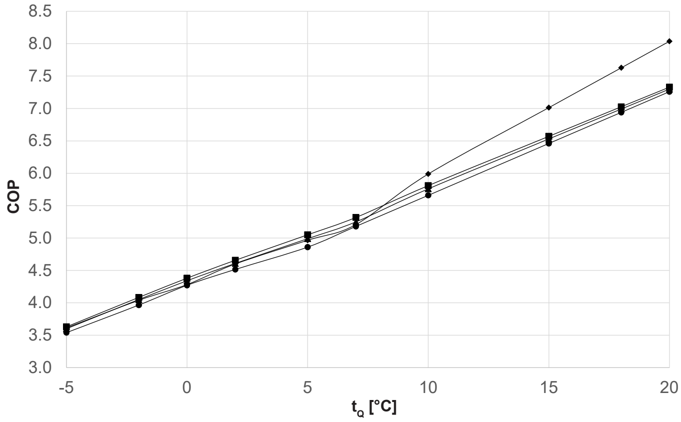
Thermalia® dual H (35-90) with R134a

Data according to EN 14511

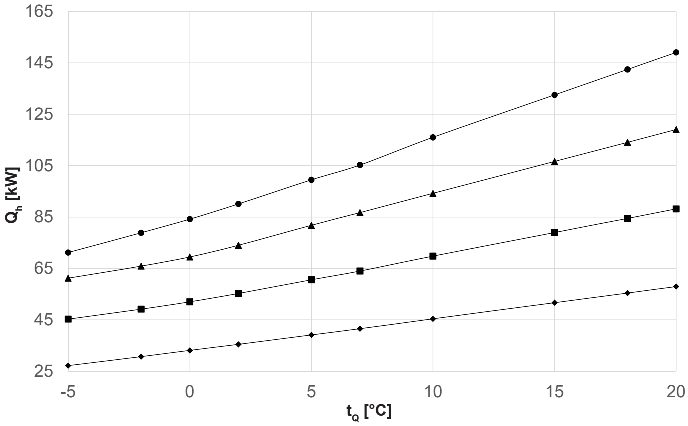
Heat output – t_{VL} 35 °C



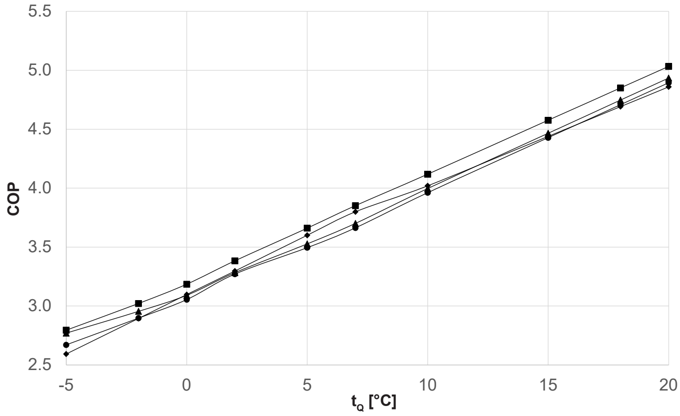
Coefficient of performance – t_{VL} 35 °C



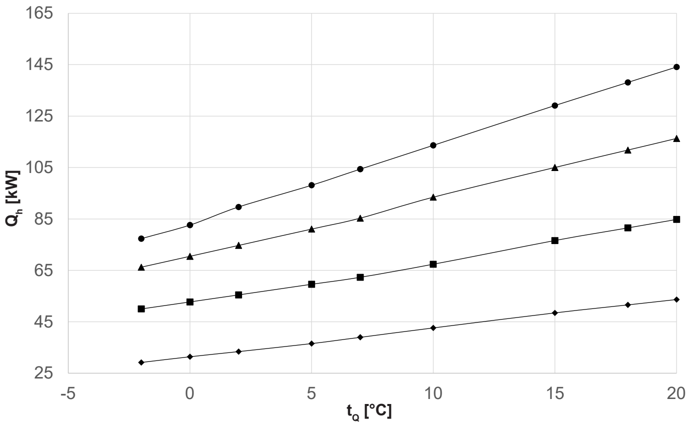
Heat output – t_{VL} 50 °C



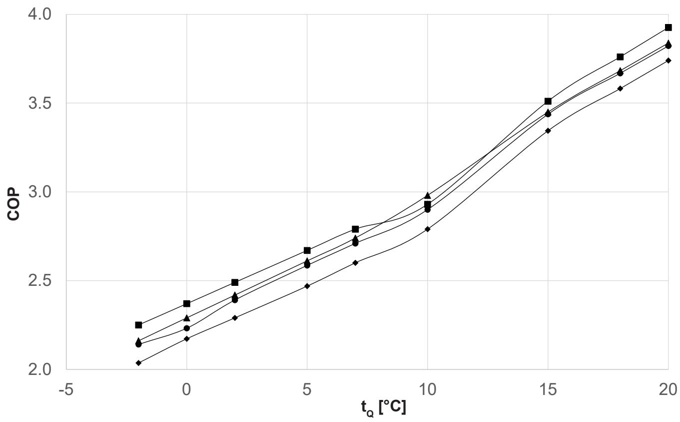
Coefficient of performance – t_{VL} 50 °C



Heat output – t_{VL} 65 °C



Coefficient of performance – t_{VL} 65 °C



t_{VL} = heating flow temperature (°C)
t_Q = source temperature (°C)
Q_h = heat output at full load (kW), measured in accordance with standard EN 14511
COP = Coefficient of Performance for the overall unit in accordance with standard EN 14511

Thermalia® dual H (35)
Thermalia® dual H (50)
Thermalia® dual H (70)
Thermalia® dual H (90)

Performance data – heating

Thermalia® dual H (35-90)

Data according to EN 14511

t_{VL} °C		t_Q °C	Q_h kW	H (35) Stage 2 P kW	COP	Q_h kW	H (50) Stage 2 P kW	COP	Q_h kW	H (70) Stage 2 P kW	COP	Q_h kW	H (90) Stage 2 P kW	COP
35	Brine	−5	29.5	8.2	3.6	43.6	12.0	3.6	59.0	16.4	3.6	72.6	20.5	3.5
		−2	32.8	8.1	4.0	49.0	12.0	4.1	66.3	16.4	4.1	80.9	20.4	4.0
		0	35.0	8.2	4.3	52.5	12.0	4.4	71.0	16.4	4.3	87.4	20.5	4.3
		2	37.0	8.0	4.6	56.1	12.0	4.7	75.2	16.3	4.6	92.9	20.6	4.5
		5	40.0	8.1	5.0	61.4	12.2	5.1	81.2	16.3	5.0	101.8	20.9	4.9
		7	42.1	8.1	5.2	64.9	12.2	5.3	85.2	16.2	5.3	110.5	21.3	5.2
	Water	10	49.3	8.2	6.0	71.8	12.4	5.8	97.1	16.9	5.8	119.5	21.1	5.7
		15	58.6	8.4	7.0	82.3	12.6	6.6	113.0	17.5	6.5	137.2	21.3	6.5
		18	64.2	8.5	7.6	88.6	12.7	7.0	122.6	17.8	7.0	147.8	21.4	6.9
		20	67.9	8.6	8.0	92.8	12.8	7.3	129.0	18.0	7.3	154.9	21.4	7.3
40	Brine	−5	28.7	9.0	3.2	44.4	13.2	3.4	60.0	18.0	3.3	71.9	22.4	3.2
		−2	32.1	9.1	3.6	49.1	13.2	3.7	66.1	18.0	3.7	80.2	22.4	3.6
		0	34.5	9.1	3.8	52.4	13.3	3.9	70.2	18.1	3.9	86.1	22.5	3.8
		2	36.7	9.0	4.1	55.8	13.3	4.2	74.6	18.1	4.1	91.7	22.4	4.1
		5	40.1	9.0	4.5	61.0	13.5	4.5	81.4	18.5	4.4	100.4	23.3	4.3
		7	42.4	9.1	4.7	64.5	13.5	4.8	85.9	18.6	4.6	107.2	23.6	4.5
	Water	10	47.5	9.2	5.2	71.2	13.7	5.2	95.8	19.0	5.0	118.1	23.7	5.0
		15	50.8	9.1	5.6	76.2	13.7	5.6	102.3	19.1	5.3	127.0	23.9	5.3
		18	56.4	9.1	6.2	84.5	13.6	6.2	113.0	19.4	5.8	141.8	24.2	5.9
		20	58.6	9.1	6.5	87.9	13.6	6.5	117.3	19.5	6.0	147.7	24.4	6.1
45	Brine	−5	27.8	9.7	2.9	45.1	14.6	3.1	61.0	19.9	3.1	71.4	24.4	2.9
		−2	31.5	9.8	3.2	49.7	14.7	3.4	66.0	19.9	3.3	79.5	24.7	3.2
		0	33.9	9.9	3.4	52.8	14.7	3.6	69.7	19.9	3.5	85.0	24.9	3.4
		2	36.4	9.9	3.7	55.8	14.8	3.8	74.0	20.2	3.7	90.8	25.3	3.6
		5	40.1	10.2	3.9	60.3	14.9	4.0	81.2	20.9	3.9	99.6	25.8	3.9
		7	42.6	10.3	4.1	63.3	15.0	4.2	85.8	21.2	4.0	105.5	26.1	4.0
	Water	10	46.6	10.2	4.6	70.4	15.3	4.6	94.6	21.4	4.4	116.9	26.4	4.4
		15	53.1	10.1	5.2	80.6	15.6	5.2	108.0	21.8	5.0	134.2	27.1	5.0
		18	57.0	10.1	5.6	86.7	15.8	5.5	116.0	22.1	5.3	144.5	27.5	5.3
		20	59.6	10.1	5.9	90.7	16.0	5.8	121.4	22.3	5.5	151.4	27.7	5.5
50	Brine	−5	27.1	10.5	2.6	45.3	16.2	2.8	61.2	22.1	2.8	71.2	26.7	2.7
		−2	30.7	10.6	2.9	49.1	16.3	3.0	65.9	22.3	3.0	78.9	27.2	2.9
		0	33.1	10.7	3.1	52.0	16.3	3.2	69.5	22.5	3.1	84.2	27.6	3.1
		2	35.5	10.8	3.3	55.2	16.3	3.4	74.0	22.5	3.3	90.1	27.5	3.3
		5	39.1	10.9	3.6	60.6	16.5	3.7	81.8	23.2	3.5	99.5	28.5	3.5
		7	41.5	10.9	3.8	64.0	16.6	3.9	86.7	23.4	3.7	105.3	28.7	3.7
	Water	10	45.4	11.3	4.0	69.8	16.9	4.1	94.2	23.6	4.0	116.0	29.3	4.0
		15	51.7	11.7	4.4	79.0	17.3	4.6	106.6	24.0	4.5	132.5	30.1	4.4
		18	55.4	12.0	4.7	84.5	17.6	4.9	114.1	24.2	4.7	142.5	30.6	4.7
		20	57.9	12.1	4.9	88.2	17.7	5.0	119.0	24.3	4.9	149.1	30.9	4.9

t_{VL} = heating flow temperature (°C)
t_Q = source temperature (°C)
Q_h = heat output at full load (kW), measured in accordance with standard EN 14511
P = power consumption of the overall unit (kW)
COP = Coefficient of Performance for the overall unit in accordance with standard EN 14511

Further performance data – heating
see next page

Observe daily power interruptions!
see "Engineering heat pumps general"

Performance data – heating

Thermalia® dual H (35-90)

Data according to EN 14511

t_{VL} °C		t_Q °C	H (35) Stage 2 Q_h kW	P kW	COP	H (50) Stage 2 Q_h kW	P kW	COP	H (70) Stage 2 Q_h kW	P kW	COP	H (90) Stage 2 Q_h kW	P kW	COP
55	Brine	−5	26.4	11.5	2.3	45.1	18.0	2.5	61.0	24.5	2.5	71.2	29.1	2.5
		−2	29.9	11.7	2.6	48.6	18.0	2.7	65.8	25.0	2.6	78.3	30.0	2.6
		0	32.2	11.8	2.7	51.3	18.1	2.8	69.5	25.3	2.8	83.5	30.5	2.7
		2	34.5	11.9	2.9	54.8	18.2	3.0	74.2	25.5	2.9	89.7	30.9	2.9
		5	38.1	12.0	3.2	60.8	18.3	3.3	82.2	25.6	3.2	99.9	31.3	3.2
		7	40.4	12.1	3.4	64.6	18.4	3.5	87.3	25.7	3.4	106.5	31.5	3.4
	Water	10	44.8	12.5	3.6	69.0	18.8	3.7	94.1	25.9	3.6	115.4	32.2	3.6
		15	47.9	12.5	3.8	73.9	18.7	4.0	100.4	26.1	3.8	124.1	32.5	3.8
		18	53.2	12.4	4.3	82.0	18.6	4.4	111.0	26.4	4.2	138.6	32.9	4.2
		20	55.3	12.4	4.5	85.2	18.6	4.6	115.2	26.5	4.4	144.4	33.1	4.4
65	Brine	−5	-	-	-	-	-	-	-	-	-	-	-	-
		−2	29.2	14.3	2.0	50.0	22.2	2.2	66.2	30.6	2.2	77.3	36.1	2.1
		0	31.4	14.5	2.2	52.7	22.2	2.4	70.5	30.8	2.3	82.6	37.0	2.2
		2	33.4	14.6	2.3	55.5	22.3	2.5	74.7	30.9	2.4	89.6	37.5	2.4
		5	36.5	14.8	2.5	59.6	22.3	2.7	81.0	31.0	2.6	98.1	37.9	2.6
		7	39.0	15.0	2.6	62.3	22.3	2.8	85.3	31.1	2.7	104.4	38.5	2.7
	Water	10	42.6	15.3	2.8	67.4	23.0	2.9	93.5	31.4	3.0	113.6	39.2	2.9
		15	48.4	14.5	3.3	76.6	21.8	3.5	105.0	30.4	3.4	129.1	37.6	3.4
		18	51.6	14.4	3.6	81.5	21.7	3.8	111.8	30.4	3.7	138.1	37.6	3.7
		20	53.6	14.3	3.7	84.8	21.6	3.9	116.3	30.3	3.8	144.1	37.7	3.8
70	Water	13	46.2	15.6	3	73	23.5	3.1	100.5	32.6	3.1	122.7	40	3.1
		15	48.3	15.5	3.1	76.3	23.4	3.3	105	32.4	3.2	128.7	39.9	3.2
		18	51.4	15.4	3.4	81.2	23.1	3.5	111.8	32.2	3.5	137.6	39.9	3.5
		20	53.5	15.3	3.5	84.5	23	3.7	116.3	32	3.6	143.6	39.8	3.6
		25	58.6	15.1	3.9	92.7	22.7	4.1	127.6	31.7	4	158.6	39.7	4

t_{VL} = heating flow temperature (°C)
t_Q = source temperature (°C)
Q_h = heat output at full load (kW), measured in accordance with standard EN 14511
P = power consumption of the overall unit (kW)
COP = Coefficient of Performance for the overall unit in accordance with standard EN 14511

Observe daily power interruptions!
see “Engineering heat pumps general”

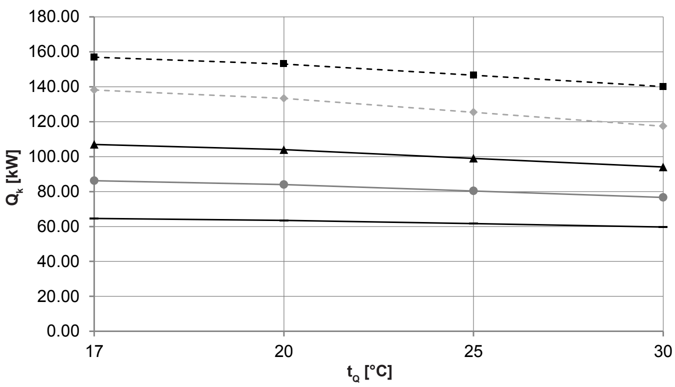
Performance data – cooling

Maximum cooling capacity

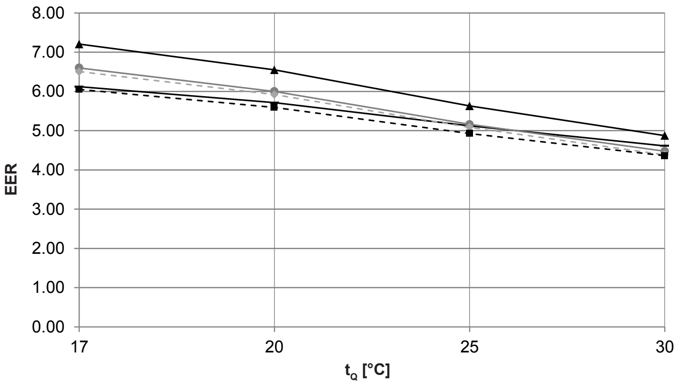
Thermalia® dual R (55-140) with R410A

Data according to EN 14511

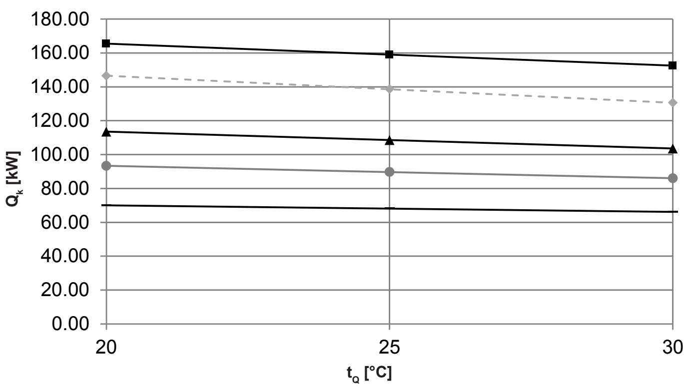
Cooling capacity – t_{VL} 9 °C



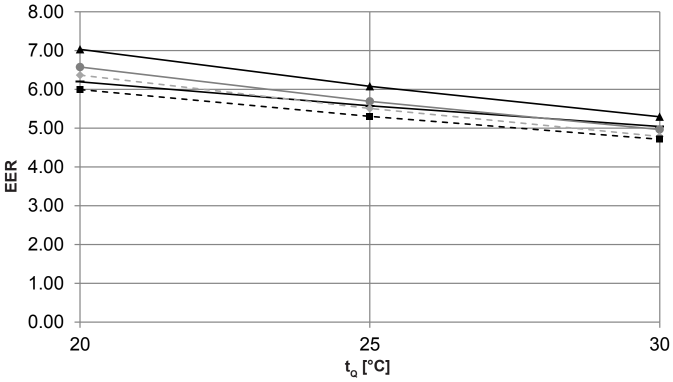
Energy efficiency ratio – t_{VL} 9 °C



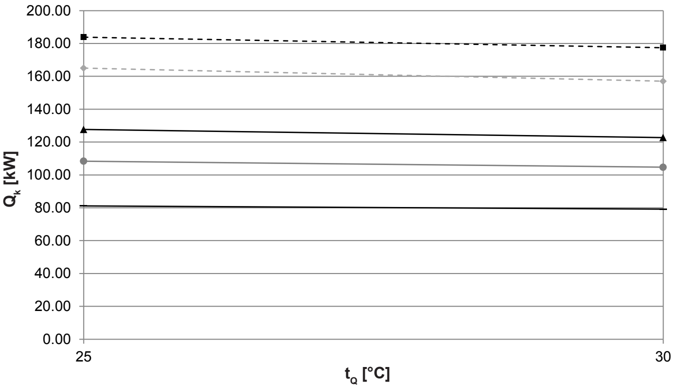
Cooling capacity – t_{VL} 12 °C



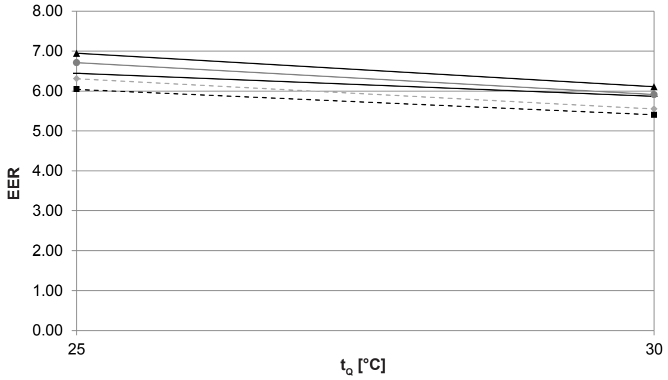
Energy efficiency ratio – t_{VL} 12 °C



Cooling capacity – t_{VL} 18 °C



Energy efficiency ratio – t_{VL} 18 °C



t_{VL} = cooling water flow temperature (°C)
t_Q = source temperature (°C)
Q_k = cooling capacity (kW), measured in accordance with standard EN 14511
EER = Energy Efficiency Ratio for the overall unit in accordance with standard EN 14511

- Thermalia® dual R (55)
- Thermalia® dual R (70)
- Thermalia® dual R (85)
- Thermalia® dual R (110)
- Thermalia® dual R (140)

Performance data – cooling

Thermalia® dual R (55-140)

Data according to EN 14511

t_{VL} °C	Heat source Medium t1	t_Q °C	R (55) Stage 2 Q_k kW	P kW	EER	R (70) Stage 2 Q_k kW	P kW	EER	R (85) Stage 2 Q_k kW	P kW	EER	R (110) Stage 2 Q_k kW	P kW	EER	R (140) Stage 2 Q_k kW	P kW	EER
9	Brine (Sole)	17	64.7	10.6	6.1	86.2	13.1	6.6	107.0	14.8	7.2	138.1	21.2	6.5	156.9	25.9	6.1
		20	63.5	11.1	5.7	84.0	14.0	6.0	104.0	15.9	6.6	133.3	22.5	5.9	153.0	27.4	5.6
		25	61.6	12.0	5.1	80.3	15.6	5.2	99.0	17.6	5.6	125.4	24.7	5.1	146.6	29.7	4.9
		30	59.7	12.9	4.6	76.7	17.1	4.5	94.0	19.3	4.9	117.4	26.8	4.4	140.1	32.1	4.4
12	Brine (Sole)	20	70.0	11.3	6.2	93.3	14.2	6.6	113.6	16.1	7.0	146.5	23.0	6.4	165.5	27.6	6.0
		25	68.1	12.2	5.6	89.7	15.8	5.7	108.6	17.9	6.1	138.6	25.2	5.5	159.0	30.0	5.3
		30	66.2	13.1	5.0	86.0	17.3	5.0	103.6	19.6	5.3	130.6	27.3	4.8	152.5	32.4	4.7
15	Brine (Sole)	25	74.6	12.4	6.0	99.0	16.0	6.2	118.2	18.1	6.5	151.8	25.7	5.9	171.4	30.2	5.7
		30	72.7	13.3	5.5	95.3	17.5	5.4	113.2	19.8	5.7	143.8	27.8	5.2	165.0	32.6	5.1
18	Brine (Sole)	25	81.1	12.6	6.4	108.3	16.2	6.7	127.7	18.4	7.0	165.0	26.2	6.3	183.9	30.4	6.0
		30	79.2	13.5	5.9	104.7	17.7	5.9	122.7	20.1	6.1	157.0	28.3	5.6	177.4	32.8	5.4

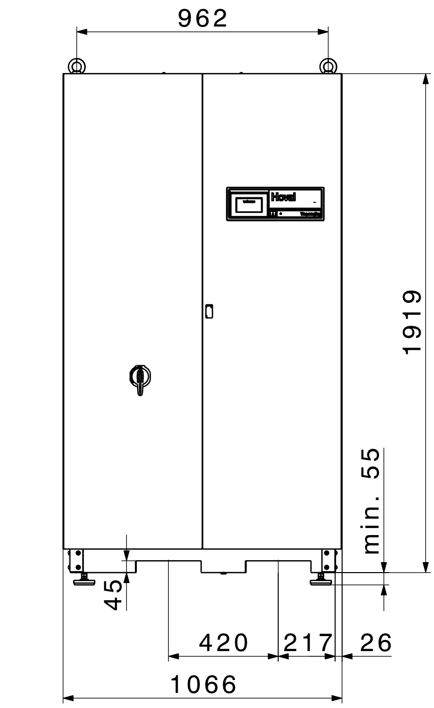
t_{VL} = cooling water flow temperature (°C)
t_Q = source temperature (°C)
Q_k = cooling capacity (kW), measured in accordance with standard EN 14511
P = power consumption of the overall unit (kW) incl. high-efficiency pump, measured in accordance with EN 14511
EER = Energy Efficiency Ratio for the overall unit in accordance with standard EN 14511

Observe daily power interruptions!
see “Engineering heat pumps general”

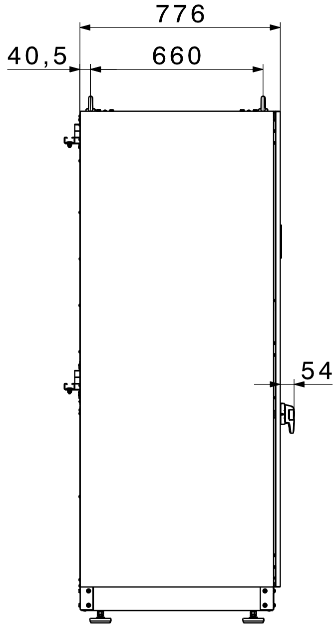
Thermalia® dual (55-85), dual H (35), dual R (55-85)

(Dimensions in mm)

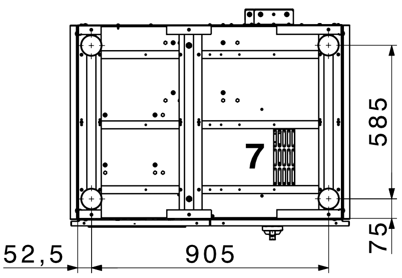
Front view



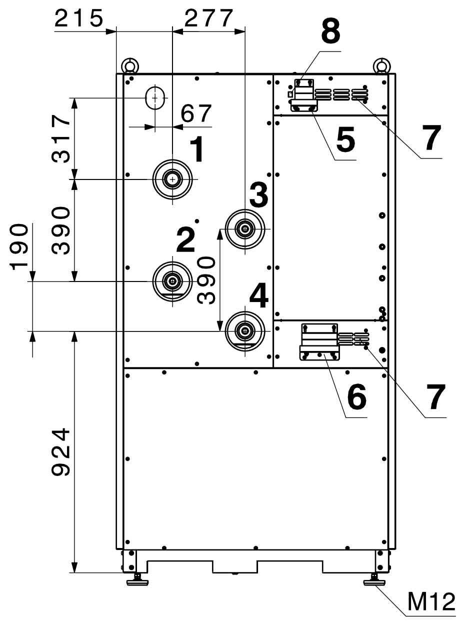
Side view



View from below



Rear view

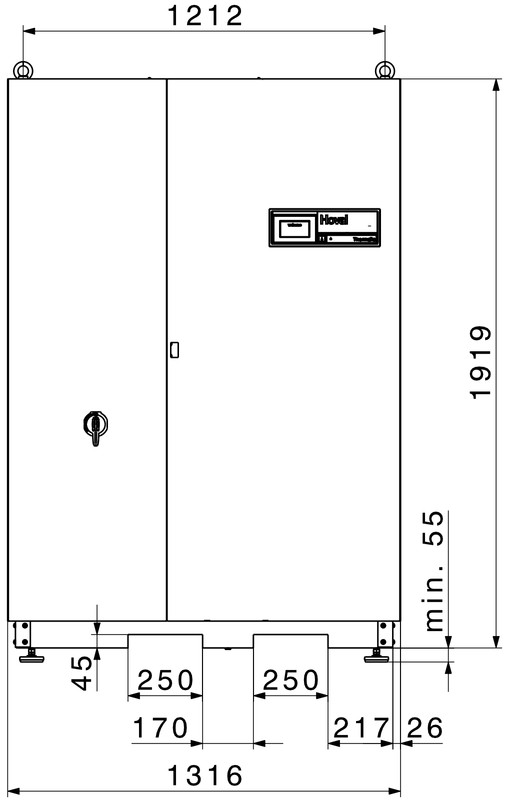


1 Flow heating or storage tank Rp 2″
2 Return heating or storage tank Rp 2″
3 Brine or ground water inlet Rp 2″
4 Brine or ground water outlet Rp 2″
5 Cable feedthrough
for sensors and actuators
6 Cable feedthrough
for the mains supply and connection
to the main circuit
7 Vent opening
8 LAN interface

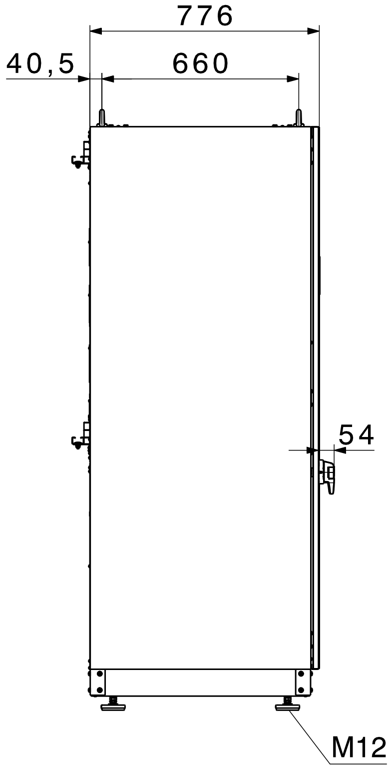
Thermalia® dual (110-140), dual H (50-90), dual R (110-140)

(Dimensions in mm)

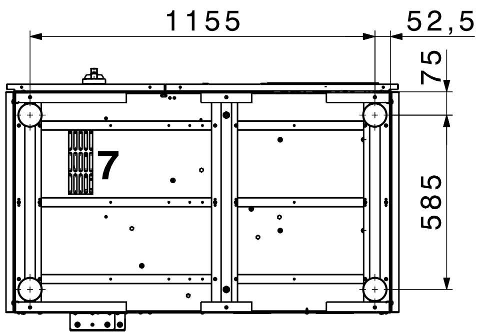
Front view



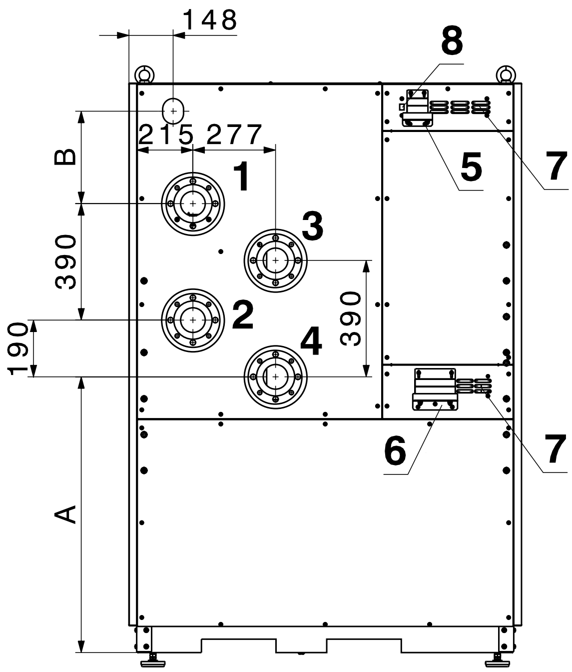
Side view



View from below



Rear view



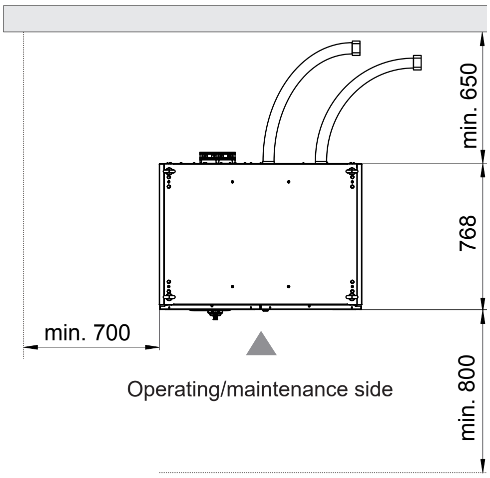
1. Flow heating or storage tank
   Thermalia® dual H (50,70) Rp 2″
   Thermalia® dual, dual R (110,140), dual H (90) flange DN 80/PN 6
2. Return heating or storage tank
   Thermalia® dual H (50,70) Rp 2″
   Thermalia® dual, dual R (110,140), dual H (90) flange DN 80/PN 6
3. Brine or ground water inlet Rp 2″
   Thermalia® dual H (50,70) Rp 2″
   Thermalia® dual, dual R (110,140), dual H (90) flange DN 80/PN 6
4. Brine or ground water outlet Rp 2″
   Thermalia® dual H (50,70) Rp 2″
   Thermalia® dual, dual R (110,140), dual H (90) flange DN 80/PN 6
5. Cable feedthrough
   for sensors and actuators
6. Cable feedthrough
   for the mains supply and connection to the main circuit
7. Vent opening
8. LAN interface

Type	A	B
Thermalia dual/dual R (110,140)	924	311
Thermalia dual H (50-90)	1044	-

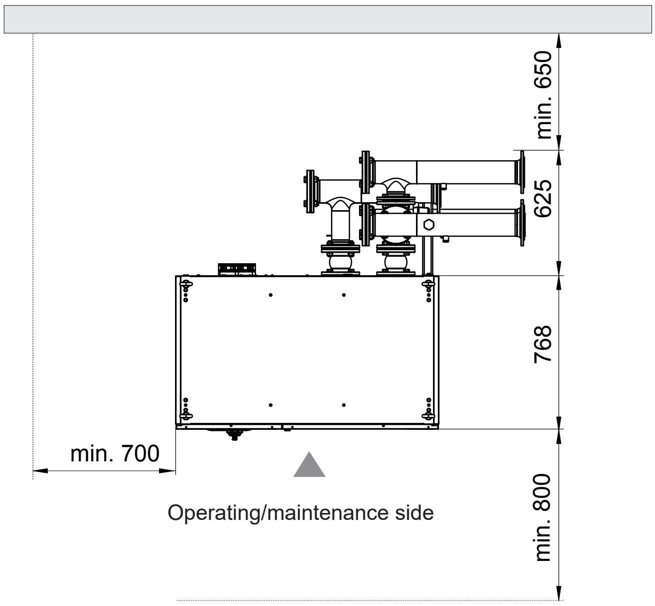
Space requirement

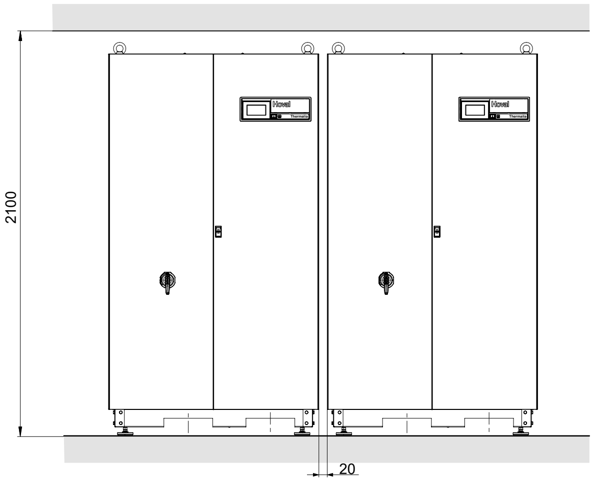
Required wall clearance for operation and maintenance
(Dimensions in mm)

Thermalia® dual (55-85), dual H (35-70), dual R (55-85)



Thermalia® dual (110-140), dual H (90), dual R (110-140)





Requirements and directives

The following requirements and directives must be complied with:

- Technical information and assembly instructions from Hoval
- Hydraulic regulations and those pertaining to instrumentation and control
- Building regulations
- Fire protection regulations
- Regulations of the local power station
- VDI 4640: Thermal use of the underground
- DIN EN 1736: Refrigerating systems and heat pumps
- DIN EN 378: Refrigerating systems and heat pumps – Safety and environmental requirements
- DIN EN 13313: Refrigerating systems and heat pumps – Competence of personnel
- VDI Directive 2035: Protection against corrosion and boiler scale in heating and domestic hot water systems.
- EN 12828: Heating systems in buildings – Design of hot water heating systems
- EN 12831: Heating systems in buildings – Method for calculation of the design heat load
- EN 15450: Heating systems in buildings – Design of heat pump heating systems

Switzerland:

Environment

- Chemical risk reduction ordinance (CRRV), Appendix 2.10 ff
- Instructions for using heat from water and ground (Buwal)
- Instructions for using heat with closed geothermal probes (Buwal)
- Noise abatement regulations (LSV)
- SN 253 120 (refrigerant definitions)
- Cantonal and local regulations
- SIA 384/1: Heating systems in buildings

Electrical connection

- VSE recommendations for connecting heat pump systems for heating and domestic water heating to the network of electricity companies (2.29d, September 1983)
- Regulations of the local power station
- Do not attach any rigid connections (e.g. cable duct) to the heat pump casing

Planning and design

- Cantonal and local fire prevention authority regulations as well as state-specific regulations
- SWKI directive 92-1 hydraulic circuit of heat pump heating systems
- FWS and GKS regulations and codes of practice
- SWKI HE301-01 guidelines “Safety engineering installations for heating systems”
- Bivalent systems: special engineering guidelines for the corresponding supplementary heat generator must be observed
- SIA 384/6 Geothermal probes

Austria:

Environment

- ÖWAV code of practice 207: Thermal use of underground water and the underground – heating and cooling
- ÖNORM S 5021: Basic acoustical principles for town, regional and physical planning
- ÖAL Directive no. 3: Assessment of noise emissions in the neighbouring area

Electrical connection

- Country-specific and regional regulations and laws, in particular ÖVE directives

Planning and design

- OIB Directive no. 4: Safety in use and barrier-free access
- ÖNORM B3417: Safety equipment for roofs
- ÖNORM H 12828: Design of hot water central heating systems with or without water heating
- ÖNORM H 5195-1 and -2: Heat transfer media for building services systems
- ÖNORM M 7755: Heat pump heating systems

Germany:

Environment

- DIN 8901: Refrigerating systems and heat pumps – Protection of soil, ground and surface water
- TA-Lärm: Requirements on the installation location
- LAI acoustic guidelines
- ISO 9613-2

Electrical connection

- VDE directives
- Technical connection condition (TAB 2019) for connecting to the low voltage grid
- DIN 8947: Heat pumps; heat pump units with electric driven compressors for heating of water
- §14a Energy Industry Act: Grid-serving connection (operation as controllable consumption appliance)

Planning and design

- Building Energy Act GEG
- Drinking Water Ordinance (TrinkwV)
- DVGW worksheets W 551 and W 553
- DIN EN 15450: Heating systems in buildings – Design of heat pump heating systems
- VDI 4640
- VDI 4650
- VDI 6044 Heating water
- VDI 4645 Heating systems in buildings – Design of heat pump heating systems

Buffer storage tank

A buffer storage tank ensures optimal operating conditions for the heat pump.

- Hydraulic decoupling of the various volumetric flows from the heat pump and heat distribution system (heating)
- Absorbs the power reserves of the heat pump and reduces the switch-on frequency (cycling)
- Allows several heating circuits to be connected

A buffer storage tank is mandatory for Hoval air/water heat pumps (defrost energy).

A buffer storage tank can be dispensed with if a direct heating or cooling circuit with storage capacity is involved, and there is always a constant flow rate (⅔ must be unblockable).

For Hoval heat pumps, the following minimum sizes of the buffer storage tank (EnerVal) must be observed. The minimum running times of the heat pumps are taken into account.
For air/water heat pumps, the energy required for defrosting the heat pump is included.

The volumes for power company off-periods shall be added on a project-by-project basis in accordance with local regulations.

Recommeded minimum sizes of buffer storage tank

	EnerVal type	DuoVal E/C (100/300)
UltraSource® B comfort C (8)	**100**	•
UltraSource® B compact C (8/200)	**100**	
UltraSource® B comfort C (11)	**100**	•
UltraSource® B compact C (11/200)	**100**	
UltraSource® B comfort C (17)	**300**	
Belaria® pro comfort (8)	**100**	•
Belaria® pro comfort (13)	**100**	•
Belaria® pro comfort (15)	**300**	
Belaria® pro (20)	**500**	
Belaria® pro (25)	**500**	
Belaria® pro (40)	**1000**	
Belaria® pro (50)	**1000**	
Belaria® comfort ICM (8)	**100**	•
Belaria® comfort ICM (13)	**100**	•
Belaria® twin I/IR (20)	**500**	
Belaria® twin I/IR (25)	**500**	
Belaria® twin I/IR (30)	**800**	
Daikin Altherma (14)	**100**	•
Daikin Altherma (18)	**100**	•
Belaria® fit (8)	**300**	
Belaria® fit (13)	**500**	
Belaria® fit (20)	**800**	
Belaria® fit (26)	**1000**	
Belaria® fit (40)	**2000**	
Belaria® fit (53)	**2000**	
Belaria® fit (70)	**1500 + 1500**	

	EnerVal type	DuoVal E/C (100/300)
UltraSource® T comfort (8)	**100**	•
UltraSource® T compact (8/200)	**100**	
UltraSource® T comfort (13)	**100**	•
UltraSource® T compact (13/200)	**100**	
UltraSource® T comfort (17)	**200**	
Thermalia® comfort (8)	**300**	
Thermalia® comfort (10)	**500**	
Thermalia® comfort (13)	**500**	
Thermalia® comfort (17)	**800**	
Thermalia® comfort H (7)	**300**	
Thermalia® comfort H (13)	**500**	
Thermalia® twin (20)	**500**	
Thermalia® twin (26)	**500**	
Thermalia® twin (36)	**800**	
Thermalia® twin (42)	**1000**	
Thermalia® twin H (13)	**300**	
Thermalia® twin H (19)	**300**	
Thermalia® twin H (22)	**500**	
Thermalia® dual (55)	**1500**	
Thermalia® dual (70)	**1500**	
Thermalia® dual (85)	**2000**	
Thermalia® dual (110)	**1500 + 1000**	
Thermalia® dual (140)	**1500 + 1500**	
Thermalia® dual H (35)	**800**	
Thermalia® dual H (50)	**1000**	
Thermalia® dual H (70)	**1500**	
Thermalia® dual H (90)	**2000**	
Thermalia® dual R (55)	**1500**	
Thermalia® dual R (70)	**1500**	
Thermalia® dual R (85)	**2000**	
Thermalia® dual R (110)	**1500 + 1000**	
Thermalia® dual R (140)	**1500 + 1500**	

Notice
Check the availability of the respective units in different countries

Off-periods by power companies

If the power supply for the heat pump is temporarily shut down by the power company (for example due to special tariffs), this has to be taken into account in the design of the heat pump. The daily heat quantity must then be produced when electricity is available. The heat pump must be designed for the maximum off-period in accordance with the energy supply contract.
With radiator heating systems, the loss of radiant heat if the electricity is switched off by the energy company is seen as a nuisance, even though the room temperature may not in fact drop significantly. This must be taken into consideration in the design process. A larger buffer storage tank can only bring a limited improvement as with a heat pump, the temperature elevation is kept to a minimum for a better COP.

The volumes for power company off-periods shall be added to the minimum sizes of the buffer storage tanks on a project-by-project basis in accordance with local regulations.

Set-up

In the case of floating screed or underlay, a recess should be cut in the screed and the impact sound insulation around the heat pump.

- The installation location must be selected in accordance with the valid requirements and directives. Rooms with high air humidity, for example laundry rooms, etc. are not suitable installation locations (dewpoint < 10 °C)
- The heat pumps installed inside can be mounted on the floor in the boiler room
- The installation location must be free from dust or other foreign matter which could lead to contamination
- Access for the purpose of operation and maintenance must be ensured
- Penetrations and openings in the masonry must be created proficiently (cold bridges, etc. on the outside wall must be avoided at all costs)
- Concrete shafts and light wells by means of which the air is drawn in or blown out must be provided with drainage
- If the ambient temperature of the heat pump is less than 10 °C, it must be equipped with a crankcase heater for each compressor. This applies to heat pumps whether they are set up indoors or outdoors

Indoors

- **Where possible, the installation location should be outside noise-sensitive areas of the building and equipped with a sound-absorbing door**
- Access for the purpose of operation and maintenance must be ensured
- The installation room must be frost-free
- The space around the indoor unit must allow for adequate air circulation
- If water is discharged through the safety valve, precautions must be taken to ensure that this water is drained away
- The indoor unit is not allowed to be installed where there could be a potentially explosive atmosphere
- The heat pump must not be installed in a room that is also used as a workplace or workshop. If construction work which generates a lot of dust is carried out in the installation room of the heat pump, the unit must be switched off and covered
- If the noise level is measured under the actual installation conditions, this will be higher than specified in the unit specification. This is because of reflected noise from the surroundings
- Take precautions so that no damage can be caused by leaking water if there is a leak at the installation location and in the vicinity
- The floor must withstand the weight of the indoor unit. It must be level so that no vibration and noise is created and the unit stands securely
- Do not place objects on the unit
- Do not climb onto, sit on or stand on the unit
- Make sure that adequate precautions are or will be taken according to the particular local and national regulations in the event that there is a leak in the refrigerant circuit

It is imperative that a sludge separator is installed in the heating return upstream from the heat pump.

Outdoors

The outdoor unit is installed outdoors. The installation location must be selected carefully. It is essential that the following ancillary conditions are met:

- The subsoil in the installation location must be sufficiently stable to bear the weight of the unit and its vibration in operation
- The location must have adequate space for installation, maintenance and cleaning of the unit (see “Dimensions/Space requirements”)
- As condensate flows out of the outdoor unit, a gravel bed to absorb the condensate must be installed under it. Do not place anything under the outdoor unit that is sensitive to moisture
- Due to the sound emissions, the installation location should not be beneath living-room or bedroom windows and be far enough away from neighbouring buildings (perform calculation)
- The selected location should be such that the air blown out by the unit does not bother occupants of the building or neighbours
- No parts and systems at risk of frost damage are allowed to be on the exhaust side
- It is essential to avoid air short-circuiting. The space necessary for intake and exhaust must always be provided (see “Space required”)
- The installation location must be selected so that the air intake and exhaust are not blocked or obstructed by snow, leaves, etc.
- Installation in wall niches is not recommended (air short circuit, sound reflection)
- Several units must not be installed directly one above the other
- Install the units, the mains cables and the branch wiring at least 3 m away from TV sets and radios. This should prevent interference with picture and sound
- The intake air must be completely free of aggressive substances such as ammonia, sulphur, chlorine etc.
- Install the outdoor unit so that the intake side faces the wall and is not directly exposed to the wind
- Never install the outdoor unit in a place where the intake side is directly exposed to the wind
- The outdoor unit must be protected from heavy snowfall
- Install the unit at sufficient height above the ground to ensure that the unit is not covered by snow and freezing condensate cannot impair operation (see separate base plans)

Sound emissions

Indoor installation

The effective sound pressure level in the installation room depends on various factors such as room size, absorption capacity, reflection, free sound propagation, etc. For this reason, it is important to ensure that where possible, the boiler room is outside noise-sensitive areas of the building and equipped with a sound-absorbing door.
If air/water heat pumps are set up indoors, the intake and exhaust air openings or the installation location must be selected so that the sound emissions are not perceived as a disruptive. The openings in the masonry for intake and exhaust air or the installation location must be made in the less frequented area of the building (not below or adjacent to living rooms and bedrooms).
Air ducts made of concrete have unfavourable acoustic properties and often magnify noise emissions. It is therefore advisable to equip the air ducts with a sound-absorbing, weatherproof lining or with sound attenuation splitters.

Outdoor installation

When air/water heat pumps are set up outdoors, optimum planning of the installation location is particularly important, since the noise not only affects the building in question but also often adjacent buildings or properties. The installation location must be selected so that there are no living rooms and bedrooms in the noise emission area. In many cases, selecting the set-up location on the “noisy side” facing the road or street has proven to be ideal.
When it comes to noise emissions, local conditions and individual noise sensitivity play a significant role, which means it is recommended for a specialist (acoustic engineer) to be consulted with regard to finding a solution. No rigid connections (e.g. cable ducts) are allowed to be attached to heat pumps, in order to avoid solid-borne noise.

Design of the heat source
An earthbound heat source (flat collector, depth probe) must be designed for the total energy requirement. The total energy requirement is the sum of the energy requirements for room heating, water heating and, where applicable, special applications.

Hot water supply
If the domestic hot water is heated using the heating heat pump, this must be taken into account when designing the heat pump.
One and two-family home:
0.25 kW per person needs to be added to the heat output. This corresponds to a domestic hot water requirement of about 50 litres at 45 °C per day.

Multi-family home:
In the multi-family home, the design is carried out according to DIN EN 15450 taking account of the hygiene requirements as stated in the Drinking Water Ordinance as well as DVGW worksheets W 551 and W 553. Accordingly, it is first necessary to calculate the maximum domestic hot water requirement and the consumption behaviour. As a rule of thumb, a daily average domestic hot water requirement of 1.45 kWh per person can be assumed. At a storage temperature of 60 °C, this corresponds to a water quantity of 25 l per person.
In the case of increased domestic hot water requirement (large tubs, monsoon showers, etc.) the required bulk output and the daily domestic hot water requirement must be calculated and taken into consideration when dimensioning the heat pump or heat source.
Ideally, calorifiers with large inlying plain tube heat exchangers (CombiVal ESR and ESSR) are used.

The maximum heat output of the heat pump is decisive for setting the size of the heat exchanger surface area:
- Heat exchanger surface area = 0.3-0.4 m^2 per kW max. heat pump heat output during the operating time of the system (air/water heat pumps with A20/W55)
- In 2-stage heat pumps, the output of the first stage can be used

Power requirement for special applications
If the heat pump is also used, for example, to heat swimming pools, it is important to take the greatly increased energy requirement into consideration in the design phase.
In the case of an outdoor swimming pool which is only heated outside the heating season, the increased annual runtimes mean that the heat source needs to be correspondingly enlarged (only for geothermal heat).
If an indoor swimming pool is heated all year round, the required output for room heating and heating of the water in the pool must be added to the total output, in addition to the increased runtime.

Installation
The system must be filled in accordance with the applicable standards.
Where copper is used as an installation material, damage to the rubber tubes used with heat pumps to reduce the structure-borne sound level may occur. As an alternative, corrugated stainless steel tubing can be used (on site). However, such pipes bring less reduction of structure-borne sound.
An air separator must be installed in the flow pipe.
A sludge separator must be installed in the return line to the heat pump.

Baking out
The baking out of buildings and floors (underlays) must not be done with Hoval heat pumps. If this instruction is not observed, the additional load can lead to irreparable damage to the heat source. Failure to do so may result in losses of guarantee/warranty. Alternative heat sources should thus be used for the baking out.
However, mobile heaters running on electricity, oil or gas can also be used.

Operating modes
Monovalent:
As a stand-alone heat generator, the heat pump covers all heat demands at all times. For the monovalent operating mode, ensure that the maximum achievable flow temperature of the heat pump is greater than the maximum required flow temperature of the heating.

Bivalent parallel and single energy source:
The heat pump alone heats until the switch-on point (bivalent point) is reached. An additional heat generator then heats the water in parallel to this. If this additional heat generator is an electric heating element, then the operating mode is monoenergetic. For a bivalent parallel operating mode, ensure that the maximum achievable flow temperature of the heat pump is greater than the maximum required flow temperature of the heater.

Bivalent alternative:
The heat pump alone heats until the switching point (bivalent point) is reached. An additional heat generator then heats the water alone. For the alternative bivalent operating mode, ensure that the maximum achievable flow temperature of the heat pump is greater than the maximum flow temperature of the heater. Higher temperatures are thereafter possible with the additional heat generator.

Bivalent semi-parallel:
The heat pump alone heats until the switch-on point (bivalent point) is reached. An additional heat generator then heats in parallel to this until the switch-off point of the heat pump.
The heat pump can be switched off in this case either based on efficiency or energy cost criteria, taking account of the necessary flow temperature.

Performance data
The standard points for specifying the relevant values are clearly defined. The following conditions apply to heat pump systems:
Air/water A2W35
Brine/water B0W35
Water/water W10/W35

Heat source:
- A2 = air inlet temperature 2 °C
- B0 = brine inlet temperature 0 °C
- W10 = water inlet temperature 10 °C

Heat utilisation (heating):
- W35 = water outlet temperature 35 °C

Electrical data
The grid operators require the following information in order to grant approval:

Imax (A)	=	max. current consumption of the heat pump. Used for setting the dimensions of the feeder cable and fusing.
Starting current (A)	=	current consumption on direct starting with external starting current limiter
cos φ	=	power factor; used for setting the dimensions of any power factor correction

This information specific to heat pumps is listed for the specific products in the Hoval catalogue and on the heat pump rating plate.

Switzerland:
The required clarifications and the approval request must be made during the planning phase of the system. The approval of the responsible grid operator must have already been obtained when the heat pump is ordered!

If the inrush current exceeds the maximum values defined by the grid operator (system), a frequency converter must be supplied or installed by the client.

Water quality in heating systems
Filling and replacement water, heating water

The following applies:
- For Germany VDI 2035
- For Austria ÖNORM H5195
- In addition, the EN 14868 standard must be applied, **as well as the manufacturer-specific specifications**

Manufacturer-specific specifications

Filling and replacement water
The filling and replacement water can be both fully demineralised and also merely softened.

Heating water
- In the case of full demineralisation of the filling and replacement water, the electrical conductivity of the heating water must not exceed the value of 100 µS/cm.
- In the case of softening the filling and replacement water, the following conditions must be complied with:
  - Electrical conductivity of the heating water for operation with water containing salts: > 100 µS/cm to ≤ 1500 µS/cm
  - pH value of the heating water for systems without aluminium alloy as water-side material 8.2 to 10.0 (measurement 10 weeks after commissioning at the earliest)
- The sum of the chloride, nitrate and sulphate contents in the heating water must not exceed 50 mg/l in total.

Additional notices
- Hoval heat pumps and calorifiers are suitable for heating systems without significant oxygen intake (system type I in accordance with EN 14868.)
- Systems with continual oxygen intake (e.g. underfloor heating without diffusion-proof plastic piping) or intermittent oxygen intake (e.g. requiring frequent topping-up) must be equipped with a system separation.
- If only the heat pump is replaced in an existing system, it is not recommended for the entire heating system to be refilled, provided that the heating water already contained in the system complies with the relevant directives or standards.
- Before filling new systems and, where necessary, existing heating systems containing heating water that does not comply with the directives or standards, the heating system must be professionally cleaned and flushed. The heat pump must not be filled until the heating system has been flushed.

Water composition

Water quality
Heating water:
- The requirements of European standard EN 14868 and the SWKI directive BT 102-01 must be met
- Hoval heat generators are suitable for heating systems without significant oxygen intake (system type I in accordance with EN 14868)
- Systems with
  - **continuous** oxygen intake (e.g. underfloor heating systems without diffusion-proof plastic piping) or
  - **intermittent** oxygen intake (e.g. requiring frequent topping-up)

  must be equipped with **separate circuits**
- Treated heating water must be tested at least once every year, or more frequently if specified by the manufacturer of the inhibitor
- In the case of existing systems (e.g. replacing the heat generator), if the water quality of the existing heating water meets the requirements of BT 102-01, re-filling the system is not recommended
- Before filling new systems and, where necessary, existing systems, the heating system must be professionally cleaned and flushed! The heat generator must not be filled until the heating system has been flushed
- Parts of the heat generator/calorifier which come into contact with water are made of copper and stainless steel
- The pH value of the heating water should be between 8.2 and 10.0 after 6-12 weeks of heating operation to avoid obstruction of the flow as a result of deposits of corrosion products from other heating system materials

Filling and replacement water:
- As a rule, the best filling and replacement water for a system with Hoval heat generator is untreated domestic water. The requirements of EN 14868 must be met in this context
- To maintain the high efficiency of the heat generator, the water content of the system and the maximum flow temperature should not exceed the values in the tables, based on the output of the heat generator (smallest heat generator for systems with more than one heat generator)
- The total quantity of filling and replacement water added to the heat generator over its service life must not be higher than three times the system water content
- SWKI BT 102-01 applies to the protection of the heating system, and it makes the exact specifications for the filling water quality.

Engineering checklist for heat pump systems

- Definition of hydraulic diagram according to Hoval standard for heating, possibly hot water and cooling
- Dimensions of heat pump type selected according to Qh, flow temperature and operating method and application limits (tables/heat output curves/bivalence point)
- Define minimum size of buffer storage tank
- Observe placement and bringing in possibility of heat pump, buffer storage tank and calorifier
- Configuration of calorifier with corresponding size and required heat register size according to table
- Clarification of electrical supply with energy supply company (conditions/off-periods/connected load)
- Clarification of subsidy amounts and ancillary conditions

Air/water heat pumps
Split version
- Installation location of outdoor unit/position: air exhaust and intake must be clear
- No parts and systems at risk of frost damage are allowed to be on the exhaust side
- The necessary clearance (see “Dimensions/space required”) and accessibility must be assured
- Noise development requires minimum distances from sensitive rooms in adjacent buildings. These must be complied with (country-specific requirements)
- There must be a condensate drain for the outdoor unit
- The indoor unit must be positioned so the necessary clearances are complied with
- Pipes (refrigerant) must be routed in accordance with the specifications in the installation instructions
- Avoid direct connection to the heating network, and if this is not possible, then only by differential pressure relief valve (minimum flow rate) and intermediate tank (minimum water volume)
- Possible selection of type with cooling function
- Cooling with fan convectors (caution: condensate drain for fan convectors)

Brine/water heat pumps
Clarification of heat source
- Installation location (not under bedroom)
- Dimensioning of geothermal probe/flat collector (domestic hot water supplement/number of probes/pressure drop calculation (aim for minimum current consumption of brine pump))

Air/water heat pumps
Monoblock
- Installation location (indoor or outdoor). Air exhaust and intake must be clear. Comply with notes on air guidance
- No parts and systems at risk of frost damage are allowed to be on the exhaust side
- The necessary clearance (see “Dimensions/space required”) and accessibility must be assured
- Noise development (not under bedrooms)
- Noise development requires minimum distances from sensitive rooms in adjacent buildings. These must be complied with (country-specific requirements). Provide damping measures if required
- There must be a condensate drain

Ground water heat pumps
Clarification of ground water approval
- Geological water inspection report
- Ground water temperatures summer + winter/quantity in l/min or m³/h
- Installation location (not under bedroom)
- Connection of ground water only via separating heat exchanger (intermediate carrier circuit). Separating heat exchanger is configured according to the heat pump type (table). Caution: intermediate carrier circuit: read out heat output and flow temperature at brine/water 7 °C)
- Design of ground source heat pump and possible intermediate circuit pump according to nominal flow rates and pressure drops
- The intermediate circuit is filled with frost protection agent for frost protection of −15 °C

Notice
In ground water applications, the ground water pump (submersible pump) cannot be directly connected in the heat pump.
Here, corresponding connections must be provided on site.

Version and commissioning

Clarify which installation location and which system concept are provided, and contact Hoval in case anything is unclear.

Checks before installation
The following checks are required before installation:
- Consult the installation, operating and maintenance instructions of the Hoval heat pumps
- Access for the purpose of operation and maintenance
- Dimensions and position of the masonry openings
- Position of heating connections and condensate drain
- Position of the condensate drain
- Drainage of the air ducts or set-up area for the heat pump and acoustic insulation of the air ducts
- Setting up the heat pump (clearances, minimum distances)

Hydraulics
- Check the hydraulic piping of the system according to be selected hydraulic schematic
- Clarify any open issues before installation
- The wiring diagram does not serve as a hydraulic schematic, but merely for positioning of sensors, valves, pumps and thermostats, etc.
- Fittings and instruments must be installed according to the corresponding engineering documents

Electrical installation
- The electrical connection cables to the heat pump must be installed in accordance with Hoval's and the country's specific regulations. Do not attach any rigid connections (e.g. cable duct) to the heat pump casing
- The information on the system diagram must be complied with
- Quality and routing regulations for the sensor cables must be complied with
- The low-voltage cables must be routed separately (not in the same cable duct as 230 V or 400 V cables)
- Comply with the connection requirements of the grid operator (TAB 2019)
- If a frequency converter is required (starting current), it must be supplied by the client

Checks before commissioning
The following items must be checked before notifying Hoval that the system is ready for commissioning:
- Hydraulic piping
- Positioning and installation of the instruments and fittings
- Positioning and installation of the sensors according to the corresponding wiring diagram or project diagram
- Electrical connections for heat pump, control systems, sensors, pumps, motorised valves, etc.
- Functions of the complete heat source system
- Flushing, filling and venting of the complete system

Geothermal probe systems/surface collectors
Comply with the following in geothermal probe systems that are filled with a mixture of frost protection agent and water:
- Fully demineralised water must be used
- The concentration of frost protection agent must be selected at least so as to ensure protection against frost down to −15 °C and so that the required minimum concentration stipulated by the frost protection agent manufacturer is maintained (protection against sludge formation and corrosion). However, the frost protection concentrations should be kept as low as possible with a view to improved heat transmission and lower pump output
- The frost protection agent and the water must be mixed in the required concentration prior to filling. Filling with ready-mixed solution that meets the aforementioned requirements is recommended

Caution!
The condenser and evaporator of a heat pump are sensitive to blockage, as a result of which the system must be flushed carefully on the heating and source sides before the heat pump is connected. The heat exchanger should not have any flow during the flushing procedure. The heating water must be treated according to the recommendations of the professional associations.

Hydraulic balancing/setting the flow rates
- The flow rates are calibrated by the installer. This should the based on the recommended nominal flow rate of the heat pump
- In systems with a buffer storage tank, the flow rate in the fully opened heat circuit must not be greater than the flow rate in the buffer circuit, otherwise the colder heating water return will overflow through the buffer storage tank, leading to mixed temperatures in the flow to the heating system.

Notice for commissioning
The registration form should be sent to Hoval 14 days in advance.

- The commissioning should be carried out during the heating period, the best time is during the transitional period
- Temporary electrical installations as well as systems operating in the building carcass are exposed to hazards (electrical power cuts, incorrect operation by third parties, etc.) which can lead to damage to the heat pump and the entire system
- In systems in the building carcass, it is not possible to maintain the boundary conditions such as installation location without frost risk, minimum required return temperature, etc. for the heat pump in practical terms, meaning that no correct operation is assured

Caution!
- *Air/water heat pumps*
  The heat output of the air/water heat pump is significantly dependent on the outdoor temperature, as a result of which no commissioning activities should be undertaken at temperatures close to the freezing point (provide buffer storage tank with an electric heating element). The heat pump is not allowed to be used in the building carcass for drying out of the structure or for routing underfloor heating pipes (provide buffer storage tank with an electric heating element for example).
  Split pipes can only be evacuated properly at a temperature above 8 °C, as a result of which the equipment room must have a room temperature of at least 15 °C. Due to the risk of moisture entering the refrigeration circuit, the outdoor unit cannot be connected in rainy weather. During commissioning, the room temperature of the heated rooms must be at least 15 °C. If a buffer storage tank is provided, its heating water temperature is not allowed to be less than 17 °C during commissioning.
- *Brine/water heat pumps*
  The brine/water heat pumps with geothermal probes as the heat source are not suitable for drying out the building carcass or for laying underfloor heating pipes, due to the output/load mixing ratio. The long running times of the heat pump can lead to excessive use of the geothermal probes and thus long-term damage as well as a lower utilisation temperature and even the establishment of permafrost. On commissioning, the technical room should have a temperature of more than 15 °C and the return temperature should be at least 12 °C.

Commissioning
It is used for checking and setting the definitive operating values of the system as well as for instructing the operating personnel.
During commissioning, the engineering setpoints of the system must be known, and the following persons must be present:
- The installer to inspect the heating-side installation
- The electrician to inspect the electrical installation
- Hoval Service
- The building owner or the person responsible for operation. Hoval service only prepares the commissioning protocol of the heat pump or the system parts supplied by Hoval. The operating instructions for the Hoval heat pumps and the accessories supplied by Hoval are delivered with the articles or handed over during commissioning.

Caution!
If Hoval is required to undertake commissioning in uninhabited building carcasses without the required general conditions and proficiently undertaken electrical and heating installation of the system incl. bleeding, Hoval will not accept liability for operation. The system is operated at the owner's own risk. The required visits to the system will be invoiced separately.

The installer/planner of the system is responsible for the operating instructions and for providing instruction in third-party products and/or the entire system!
All Hoval hydraulic schematics and engineering guidelines serve as aids during planning. The planner/installer of the system is responsible for its correct functioning.

Heat sources
The heat source (with the exception of the temperature level of the heating system) significantly determines the efficiency, the operational safety and efficiency of a heat pump system. The most important factors are
- unrestricted availability during the utilisation period
- temperature level of the heat source during the utilisation period
- energy required for transporting the heat source
- chemical and physical safety of the heat source (working safety, maintenance work involved)

Proficient planning and undertaking of the heat source use are amongst the most important tasks for the planning and installer.

Heat sources that are predominantly used for heating living areas are natural and renewable heat sources such as:
- Fresh air
- Ground
- Ground water, waste water
- Surface water (lakes, rivers)

Waste heat utilisation with heat pumps involves using the heat pump for heat recovery in which the planning must take account not only of the usual criteria such as temperature level, type (waste water, extract air, exhaust gas), chemical and mechanical cleanliness, etc. but also the simultaneity of availability and heat use. A precise analysis is absolutely essential.

Fresh air
Fresh air is available everywhere. The following aspects must be considered when planning with fresh air as the heat source:
- Area of application of the heat pump
- Output fluctuations of the heat pump due to temperature fluctuations of the heat source
- Defrosting losses of the heat pump
- Sound emission
- Condensation formation
- In coastal regions or other areas with salty air, corrosion can decrease the lifetime of the evaporator

Heat pumps have clearly defined application limits, which means it is essential to consider the application limits when designing the system.

Ground
Setting up and operating geothermal probes and ground source collectors requires official approval. The heat capacity and thermal conductivity of the soil depend on its composition and water content. It is possible to use it in two different ways
- Vertically with geothermal probes
- Horizontally with ground collectors

Observe the following:
- The heat withdrawn must always be significantly less than can be replenished naturally
- In bivalent systems, the dimensions of the heat source system must be suitable with regard to the amount of heat withdrawn (90 kWh per metre of geothermal probe length)

Geothermal probes
The planning criteria are:
- The specific heat extraction rate which depends on the thermal conductivity (λ) of the underground; a specific cooling capacity of max. 47 W/m probe length can be assumed as guidance values
- The max. heat extraction per year should not exceed 90-100 kWh per metre of geothermal probe length

In addition, the following aspects need to be considered:
- The lowest possible total hydraulic resistance through optimisation of the number of geothermal probes, probe diameter and depth
- **A certified, specialist drilling company must be used for planning and undertaking the geothermal probe system**

Ground collectors
The energy that is used for compensating for the heat deficit or heat surplus comes almost exclusively from solar radiation and percolating water (rain, snow meltwater). A ground collector is, so to speak, as climate collector which is significantly influenced by weather events. The latent heat exploitation when there is a change of state in the water in the moist soil has a positive influence when it comes to calculating the balance. This means the evaporating temperature of the heat pump remains relatively constant over a long time. VDI 4640 must be taken into account during the design, as well as:

for the soil surface
- the climate zone and the aspect of the building
- the thermal conductivity of the soil and the effective number of operating hours

for the ground collector system
- the lowest possible total resistance
- by optimisation of the number of lines and line length
- If there is insufficient floorspace available, an alternative heat source must be sought

For further details see:
Heat source use/ground collectors.

Ground water
If the temperature of the ground water is below 8 °C in the seasonal profile, this must be taken into account in the planning.

Using ground water as a heat source requires official approval. Ground water is a very good heat source because of its high heat capacity and heat transfer properties.
Connection of ground water only via a separating heat exchanger (intermediate carrier circuit).
System-based clarifications are mandatory.
The most important criteria are:
- Hydro-geological report
- Water analysis
- Official approval/concession

In addition, the following aspects must be considered for the planning:
- The min. heat source temperature during the utilisation period
- The min. permitted evaporator outlet temperature of the selected heat pump
- The specifications of the authorities, such as the type of use, the design of the withdrawal and return well, etc.
- A qualified specialist company must be contacted for planning and installing the heat source system

In addition, the following aspects must be considered for the planning:
- VDI 4640
- Min. heat source temperature and flow rate during the utilisation period
- Official regulations such as type of use, configuration of the withdrawal and return well, etc.
- Possibility of infiltration through water from rivers or lakes
- The design must be based on reliable temperature data
- A certified, specialist drilling company must be used for planning and undertaking the system of ground water boreholes

The heat source must be free of chemical or mechanical contamination.

Surface water
If the temperature of the surface water is below 8 °C in the seasonal profile, this must be taken into account in the planning.

Planning a heat source system with sweet/river water, etc. as the heat source is a challenging task and demands great experience from the planner. Surface water use must be via an intermediate carrier circuit (separating heat exchanger). Under favourable conditions, for example close to the bank, it is possible to provide a filtering well (as with ground water) as well as an intermediate circuit (indirect use).

Use is not advised without reliable long-term information about the min./max. temperature of the heat source and chemical/mechanical safety.

A feasibility analysis and estimating the maintenance work involved are preconditions for implementation.

The dimensions of the heat exchanger for indirect use are as for ground water.

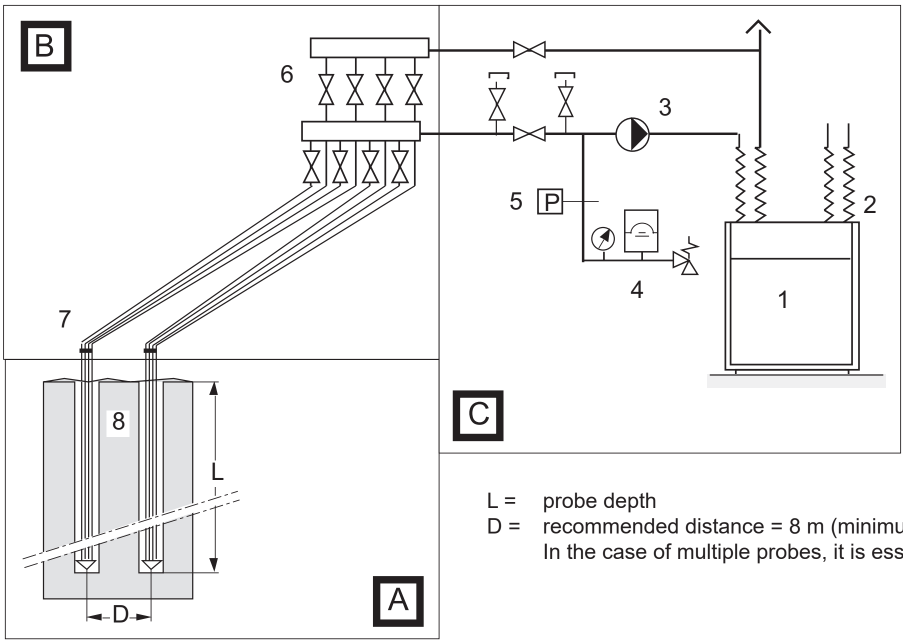
Using public surface water must be reported to the responsible water resources authority, as in the case of ground water use.

A qualified specialist company must be contacted for planning and installing the heat source system.

Heat sources

Geothermal probes

Schematic diagram heat sources/geothermal probes
- Geothermal probe system



Field A) Geothermal probes
Drilling of geothermal probes including delivery and installation of the probe pipes. Backfilling with bentonite.

Field B) Connections
Manifolds/collectors, connection lines, making penetrations in walls and trenching.

Field C) Heat pump connection
Connecting pipes between manifold/collector and heat pumps incl. heat source feed pump, safety devices and fittings.

L = probe depth
D = recommended distance = 8 m (minimum 5 m)
In the case of multiple probes, it is essential to clarify the placement.

Legend		Field	Delivery	Installation
1	Heat pump	C	Hoval	Installer
2	Flexible connections	C	Hoval	Installer
3	Heat source feed pump (Cold water version)	C	Hoval	Installer
4	Diaphragm pressure expansion tank	C	Hoval	Installer
5	Pressure monitor	C	Hoval	Installer
6	Distributor/collector (PVC/C)	B	Installer	Installer
7	Connecting line (HDPE 32 or 40 mm Ø)	B	Drilling company or installer	on behalf of the installer
8	Geothermal probes	A	Certified drilling company	Drilling company on behalf of the client

If the heat source system is filled with water only, it must be specially dimensioned. It is mandatory to install a flow monitor and a frost protection thermostat.

Heat sources

Ground water

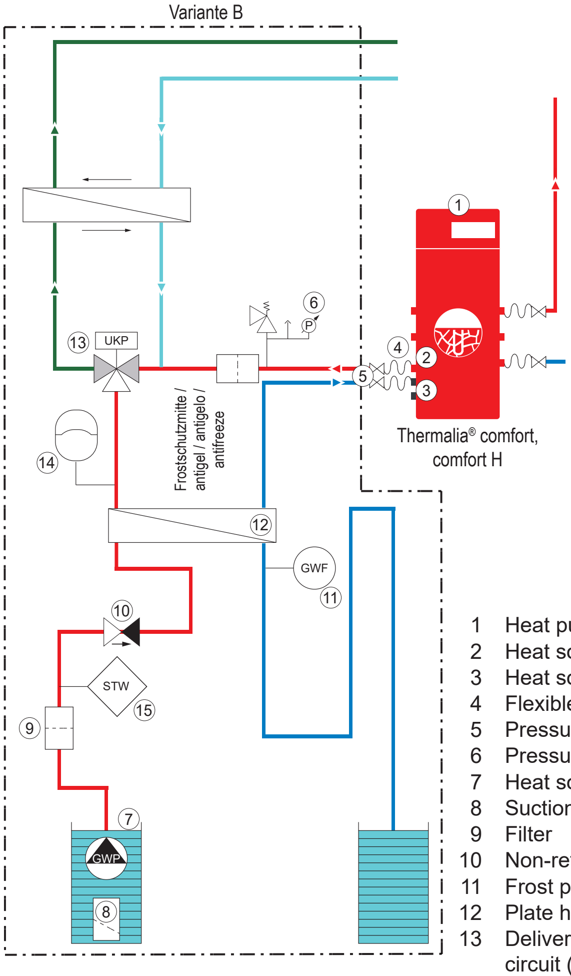
Preliminary information required
- Suitability regarding quantities and temperatures (t ≥ 6 °C)
- Official approval
- Hydro-geological report
- Water analysis
- The effective minimum ground water temperature

Indirect utilisation with ground water
- The minimum ground water temperature during the utilisation period determines the tapping volume (required flow rate)
- In the case of river or sweet water, it is imperative to determine the precise temperature progression during the heating period
- The intermediate heat exchanger must be suitable for use with river or sweet water. Strainers and, if necessary, backwash filters are necessary to protect against contaminating particles such as sand. It must be possible to clean the heat exchangers.
- A filter must be installed upstream of the plate heat exchanger
- The hydraulic piping of the system must be carried out according to the selected hydraulic schematic.
- The intermediate circuit is filled with frost protection agent according to the engineering guidelines. The output of the heat pump can thus be read off for brine 5 °C.
- The intermediate circuit pump must be planned in a cold-water design

Direct utilisation of ground water
State-of-the-art evaporator design (soldered plate heat exchangers) makes applications with a direct throughflow of ground water inadvisable
- These evaporators have very narrow flow channels and are extremely sensitive to even very fine dirt particles such as those abundant in ground water
- If individual channels become blocked, they can freeze, resulting in leakage towards the refrigeration circuit. This can cause irreparable damage to a machine
- Flow monitors and frost protection thermostats cannot detect obstructions, as the deviations are too slight to be registered
- Upstream fine filters can only solve the problem of obstructions to a certain extent, and need frequent cleaning
- The somewhat lower performance coefficient is more than compensated for by the high operational reliability
- In such cases, Hoval will not accept liability for damage to the evaporator

Notices:
- The ground water temperature varies according to location.
- The design must be based on reliable temperature data
- The heat source system, (withdrawal and return well) must be installed by a specialist company

The heat source must be free of chemical or mechanical contamination.



1 Heat pump
2 Heat source inlet
3 Heat source outlet
4 Flexible connections
5 Pressure measurement nozzle ⅜"
6 Pressure monitor
7 Heat source feed pump
8 Suction filter
9 Filter
10 Non-return valve
11 Frost protection temperature monitor
12 Plate heat exchanger
13 Delivery pump in heat source intermediate circuit (cold-water design)
14 Diaphragm pressure expansion tank
15 Flow monitor

Other recommended components:
- Flow jacket (when in use)
- Securing/recovery rope
- Rope clamp
- Dry running protection
- Wall anchor
- Water quantity meter
- Vacuum breaker or pressure holding valve

Notice
In the case of systems without an intermediate heat exchanger, Hoval accepts no liability for damage caused by soiling or freezing of the evaporator!

Heating

Heat utilisation system (heat sink)

Heating
The heat pump is a compression cooling machine and behaves very dynamically.
This requires suitable flow rates through the heat exchangers of the heat pump on both the heat source and heat utilisation side. Since the heat exchangers of the heat pump have very low water contents, the constantly changing heat output demand of the system (predominant time of the heating period!) leads to excessive switching frequencies. However, short intervals mean insufficient time for stabilisation of the refrigeration circuit (loss of efficiency) on the one hand, and can lead to compressor failures on the other. In addition, there is the requirement of the electricity companies, which limit the switching frequency to 3 times per hour due to grid stability considerations.
Therefore, suitable measures must be taken or the system must be planned in such a way that the boundary conditions of the heat pump and the requirement of the electricity company can be met at all times.
The most important criteria for meeting the boundary conditions are:

- Correct flow rate through the heat pump during the entire time of use
- Sufficient storage capacity and a minimum water volume of the heat utilisation side (heating)

Underfloor heating systems without thermostatic valves can meet these requirements in most cases.
If the boundary conditions cannot be met, the heat pump must be hydraulically decoupled from the heat utilisation system (heating). A buffer storage tank is required for this. The buffer storage tank ensures that the boundary conditions of the heat pump can be met in any load condition of the system.

Water heating
Generous dimensioning of the calorifier in terms of heat exchanger and drinking water volume is recommended. The maximum heat output of the heat pump is decisive for setting the size of the heat exchanger.

- Recommended heat exchanger area 0.3-0.4 m^2 per kW max. heat output of the heat pump during the operating time of the system (air/water heat pumps at A20/W50)
- Min. drinking water volume = daily requirement
- In two-stage heat pumps, the output of the first stage can be used.

Example Heating

System example:
Brine/water and water/water heat pumps without buffer storage tank

Application
Underfloor heating with heat storage capacity, low temperature heating system with heating group without thermostatic valves

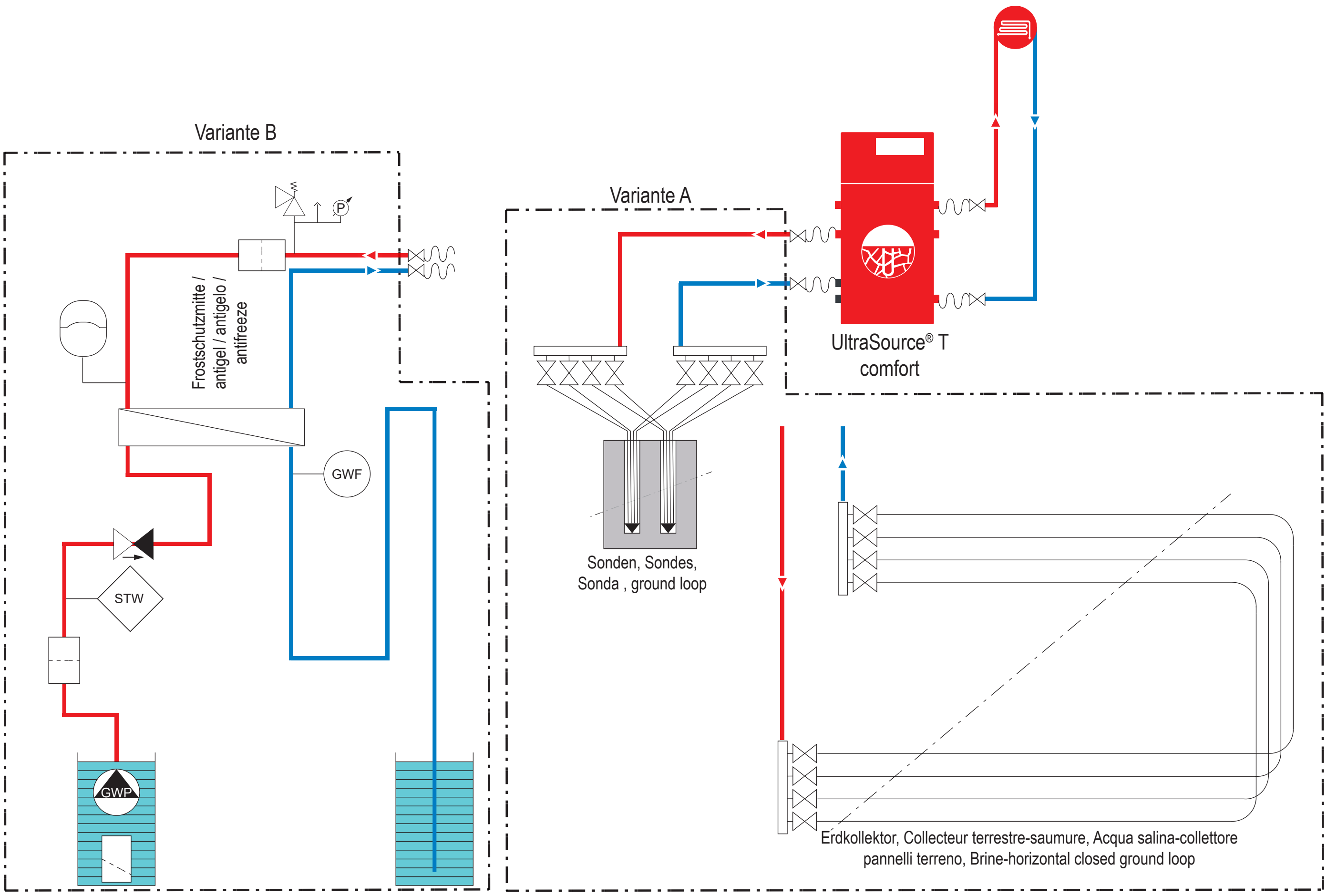
Heat pump function
The heat pump works in dependence on the outdoor temperature (2-point regulator) with continuously controlled operating mode. The underfloor heating balances unfavourable output/load ratios.

The heat pump is put into operation when the temperature level in the return falls below a preset level. Switch-on and switch-off command via return sensor.
The switching difference is adjustable.
The additional re-switching delay allows a maximum of 3 starts per hour.
The switching function is controlled by a microprocessor, allows long runtimes and ensures a higher annual coefficient of performance for the heat pump.

Heating controller
The weather-controlled heating controller (2-point controller) guarantees a good heat supply to the heating system and works in a user-defined manner.

Ensure a minimum system water content.

If the heating circuits are equipped with thermostatic valves, a bypass with a relief valve must be installed.



Notice
The example schematics merely show the basic principle and do not contain all information required for installation. The installation must be done according to local conditions, dimensioning and regulations.

Example Heating

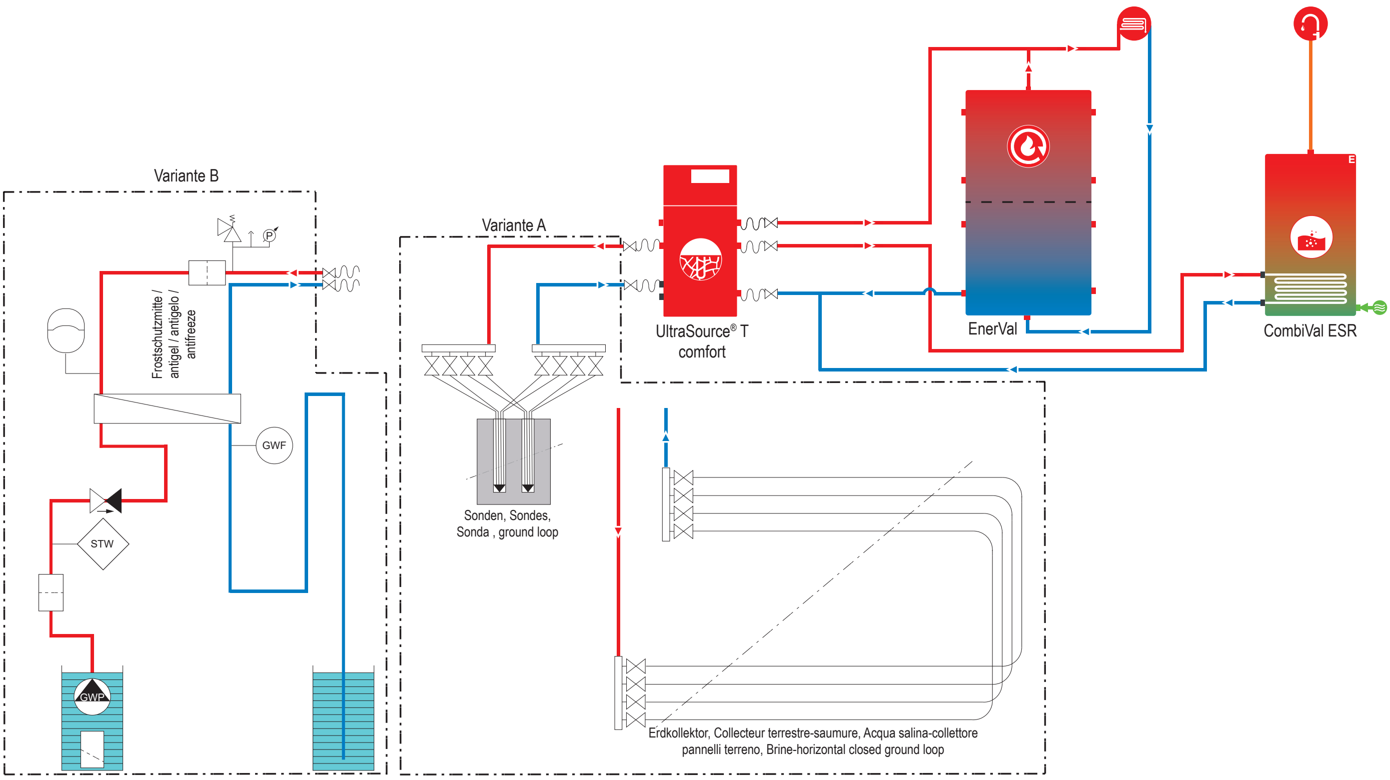
System example:
Brine/water and water/water heat pumps with buffer storage tank and calorifier

Application
Low temperature heating system with max. 2 heating groups, one buffer storage tank and one calorifier

Heat pump function
The heat pump works in dependence on the outdoor temperature (2-point regulator) with continuously controlled operating mode. The buffer storage tank balances unfavourable output/load ratios, allows energy-efficient and user-defined discharge and has a positive influence on the service life of the heat pump.

The heat pump is only put into operation when the temperature level in the buffer storage tank no longer meets heating system requirements and is taken out of operation when the additional output can no longer be absorbed by the buffer storage tank.
The switching difference is adjustable and allows long runtimes.
The additional re-switching delay allows a maximum of 3 start-ups per hour and guarantees a long service life. The switching functions are controlled by a microprocessor, ensuring long runtimes and a high annual Coefficient of Performance for the heat pump.

Heating controller
The weather-controlled heating controller (3-point controller) as a discharge control guarantees an optimum heat supply to the heating system and works in a user-defined manner for maximum convenience.



Notice
The example schematics merely show the basic principle and do not contain all information required for installation. The installation must be done according to local conditions, dimensioning and regulations.

1 Explanation
To use the geothermal heat, depth probes (preferably 2-circuit probes) are inserted into the ground to a max. depth of 200 m per bore hole. The collector pipes contain a mixture of water and frost protection agent which is circulated by means of a circulating pump. The energy is transferred to an intermediate heat exchanger, which is where the evaporation takes place.
A letter of approval is required from the authorities to lay a heat pump unit with depth probe.

2 Dimensioning of the deep borehole
The quick guide offers guide values for planning and is not intended as a substitute for geological evaluation.
In the case of special applications which do not increase the output of the heat pump (e.g. outdoor swimming pool), the heat source must be enlarged if the annual runtime is extended (greater annual extraction).

3 Laying/drilling depth
The boreholes are made according to calculation and the probes are inserted by the drilling company. If the subsoil actually hit differs from the projected geology, the depth of the borehole(s) must be adjusted to the new situation!
The connection pipes are laid in trenches at a depth of approx. 1.2 m.

4 Laying/drilling spacing
Centre of deep borehole to centre of deep borehole min. 7 m (depending on the approval from the authorities, other distances can be stipulated). Larger distances between the boreholes reduce the additional allowance made for the total borehole metres.
The connection pipes are to be laid in a sand bed with a minimum distance of 50 cm.

5 Laying/drilling area
The surface must be undeveloped and even, and have only a minimal slope. The drilling points must be accessible with a drilling device (approx. 20 t in weight, approx. 3 m wide). The position of the depth probes and connection pipes is to be drawn on a plan, which remains on the heat pump.

6 Bringing in the depth probes
The drilling company makes the borehole, inserts and backfills the probe and performs a pressure test. Ensure that the probe is properly and sufficiently backfilled from bottom to top.
It is recommended to use 2-circuit (duplex) probes. Water and electricity are needed to make the borehole. The drilling mud must be capable of being stored at the borehole (skip or container). Buildings should possibly be protected against splash water from the drilling.
If several boreholes are required, ensure that the boreholes all have the same depth and that the connection pipes are all the same length in order to ensure equal rock pressure conditions. Otherwise, flow rate indicators have to be installed. It is recommended to lay warning tapes approx. 50 cm above the connection pipes.
The brine circuit is to be filled with a water-frost protection agent mixture with a frost protection of −15 °C (when using the 33 % in vol. Hoval frost protection concentrate). Practical guide: Use water that has been preheated to 30 °C when mixing so that a lasting mixture is ensured and a sound measurement of frost protection is possible.

7 Safety distances
Between the boreholes: min. 7 m.
To water pipes, ducts, buildings, walls and area borders: min. 3 m.
Depending on the approval from the authorities, other distances can be stipulated.

8 Connection pipe to heating house
It is recommended to join the collector circuits to a shaft (preferably Hoval geothermal heat shaft), so that only two pipes have to be fed to the heating house. The geothermal heat shaft must be rainwater-tight and it is essential that it is drained (gravel layer, drainage, etc.). The connection pipes are also to be laid in a sand bed.

Configuration of the connection pipe according to applicable standards of the country in question.

The following dimensions are recommended (material PE-HD PN 10):

UltraSource® T (8), Thermalia® comfort (8-10), comfort H (7,10): DA 40
UltraSource® T (13,17), Thermalia® comfort (13,17), twin H (13): DA 50
Thermalia® twin (20,26), twin H (19,22): DA 63
Thermalia® twin (36-42), dual (55), dual H (35,50), dual R (55): DA 75
Thermalia® dual (70,85), dual H (50-90), dual R (70,85): DA 90

The specified dimensions are sufficient for connection pipes with a length of approx. 25 m (one direction). For longer connection pipes, choose a larger pipe diameter.

9 Curing time
Standard cement-bentonite mixtures for the grouting of the depth probes have a curing time of 28 days. Within this time period, the depth probe cannot be operated yet. Ask the drilling company about this.

10 Commissioning
Commissioning of the heat pump is carried out exclusively by Hoval customer service. The heat pump must be electrically connected and the system filled, well flushed and vented. After commissioning, the customer receives a completion certificate.

1 Explanation
To use the ground water heat, pumping and injection wells are mounted. A submerged pump pumps the ground water through an intermediate heat exchanger. This intermediate circuit, which is filled with frost protection agent, transfers the energy to a heat exchanger in the heat pump, which is where evaporation takes place. A letter of approval is required from the authorities to mount a water/water heat pump unit.

2 Direct utilisation of ground water (without intermediate circuit)
The design of modern evaporators (brazed plate heat exchangers with very narrow plate spacing for high transfer rates) is such that applications with direct ground water throughflow are not allowed. These evaporators have very narrow flow channels and are extremely sensitive to even very fine dirt particles such as those abundant in ground water. If individual channels become blocked, they can freeze, resulting in leakage. This can cause irreparable damage to the heat pump. Flow monitors and temperature monitoring devices cannot be used, as the deviations are so slight that they are not registered. Upstream fine filters provide only a partial solution to the problem and need frequent cleaning.

Notice
In the case of systems without an intermediate heat exchanger (direct utilisation of ground water), Hoval accepts no liability for any damage caused by soiling or freezing of the evaporator!

3 Indirect utilisation of ground water (with intermediate circuit)
The somewhat lower performance coefficient is more than compensated for by the high operational reliability. Even with indirect use, ground water analysis is essential to allow selection of the appropriate intermediate heat exchanger and in order to identify problems caused by iron or manganese in combination with oxygen. Ideally, a separating heat exchanger in gasketed design should be used. Such heat exchangers can be dismantled for cleaning and have wider plate spacing. The hydraulic **piping** of the system must be carried out according to the selected hydraulic schematic. The intermediate circuit is filled with frost protection agent for frost protection of −15 °C (corresponds to 33 % in vol. Hoval frost protection concentrate). The output of the heat pump can thus be read off for brine 7 °C.

4 Ground water
A pump trial run of at least 3 days must be performed in order to ascertain the effectiveness and in order to “clean” the production well. The minimum permissible temperature of the returned ground water is 5 °C.

For the intermediate heat exchanger, the following limit values must be observed during the entire operating time of the heat pump (groundwater analyses are essential, the water quality can change constantly):

ph-value	7-9
Sulphates	< 100 mg/l
Chlorides	< 50 mg/l
Nitrates	< 100 mg/l
Phosphates	< 2 mg/l
Free chlorides	< 0.5 mg/l
Free carbonic acid	< 20 mg/l
Ammonia	< 2 mg/l
Iron	< 0.2 mg/l [1]
Manganese	< 0.1 mg/l [1]
Oxygen	< 2 mg/l [1]
Electric conductivity	50-600 µS/cm

[1] If the limit value for iron or manganese is exceeded, the presence of oxygen leads to silting up of the heat exchanger or formation of iron and manganese oxide deposits in the injection well.

5 Wells
Two bored wells are ideally mounted. However, where the geology permits this, the injection well can also be used as an absorbing well. Chiselled wells are to be avoided. The injection well should be at least 10 to 15 m away from the ground water flow (depending on the ground water situation, greater distances may be necessary).

6 Connection pipe
The supply and drainage pipes must be laid so that they are protected against frost at a minimum depth of 1.5 m. Ensure that there is a slight slope to the well.
From the production well, a feed pipe is to be laid for the electrical supply pipe of the pump. A backflushable fine filter with a maximum mesh size of 0.5 mm must be placed in the supply pipe, upstream of the heat pump.

A flow monitor is to be installed in the drainage pipe, upstream from the heat pump, to protect the heat pump (observe the installation instructions). After the flow monitor, a throttle valve is to be installed to adjust the flow rate. The connection pipes are also to be laid in a sand bed.

The following dimensions are recommended (material PE-HD PN 10):

UltraSource® T (8), Thermalia® comfort (8-10), comfort H (7,10): DA 40
UltraSource® T (13,17), Thermalia® comfort (13,17), twin H (13): DA 50
Thermalia® twin (20,26), twin H (19,22): DA 63
Thermalia® twin (36-42), dual (55), dual H (35,50), dual R (55): DA 75
Thermalia® dual (70,85), dual H (50-90), dual R (70,85): DA 90

The specified dimensions are sufficient for connection pipes with a length of approx. 25 m (one direction). For longer connection pipes, choose a larger pipe diameter.

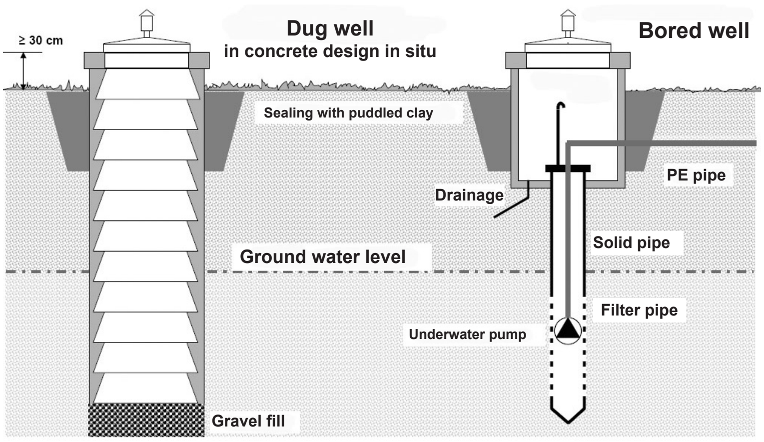
7 Design of the well pump

$$m_W = \frac{(Q_K \times 3600)}{(c \times \Delta T)} \quad \text{[kg/h]}$$

m_W = mass flow [kg/h] (corresponds approx. to a water flow rate [l/h])
Q_K = refrigerating capacity of the heat pump = heat output – electrical output [kW]
c = specific thermal capacity [kJ/kg.K] (c = 4.187 kJ/kg.K)
ΔT = temperature difference [K] (cooling down of the ground water)
3600 = conversion factor (1 kWh = 3600 kJ)

Rule of thumb: 200 l/h per kW heat pump heat output with a temperature difference of 4 K. Underwater pumps with an integrated non-return flap must be used.

8 Commissioning
Commissioning of the heat pump is carried out exclusively by Hoval customer service. The heat pump must be electrically connected and the system filled, well flushed and vented. After commissioning, the customer receives a commissioning report.



Active/passive cooling

- The low temperature can be output into the room using various systems.
- Structural conditions (underfloor heating) and requirements on the room air status (dehumidification, room air temperature) must be taken into account when selecting the system.
- It is a good idea to plan a separate cooling circuit for cooling. It can, for example, be combined with a cooling ceiling or a ventilation system.
- For lower comfort requirements where a cooling effect suffices, heating via underfloor heating or partial cooling via fan convectors is also possible.
- Special thermostatic valves are required that are suitable for heating and cooling operations. Standard thermostatic valves for heating systems close at low room temperatures.

Cooling via panel heating

- In panel cooling, the surfaces enclosing the room (ceilings, floors or walls) are cooled by the following systems:
  - Underfloor heating, wall heating
  - Cooling ceilings
  - Concrete core temperature control
- In all panel cooling systems, the temperature at the surfaces is not allowed to fall below the dewpoint temperature so that condensation will not form.
- The fixed value of 18 °C is not allowed to be reduced by the user.
- Dehumidification of the room air is not possible with panel cooling systems, and must be performed using additional systems if required.
- If the room air is not dehumidified, the relative humidity will increase as the room temperature falls – which can lead to a reduction in comfort.
- A plate heat exchanger is installed in the brine circuit (passive cooling).
- The minimum cooling temperature (dewpoint temperature) is regulated by a 3-way motorised mixer.
- A dewpoint monitor is required so as to avoid condensation formation (dropping below the dewpoint) on the cooling surfaces.

Cooling by fan convectors

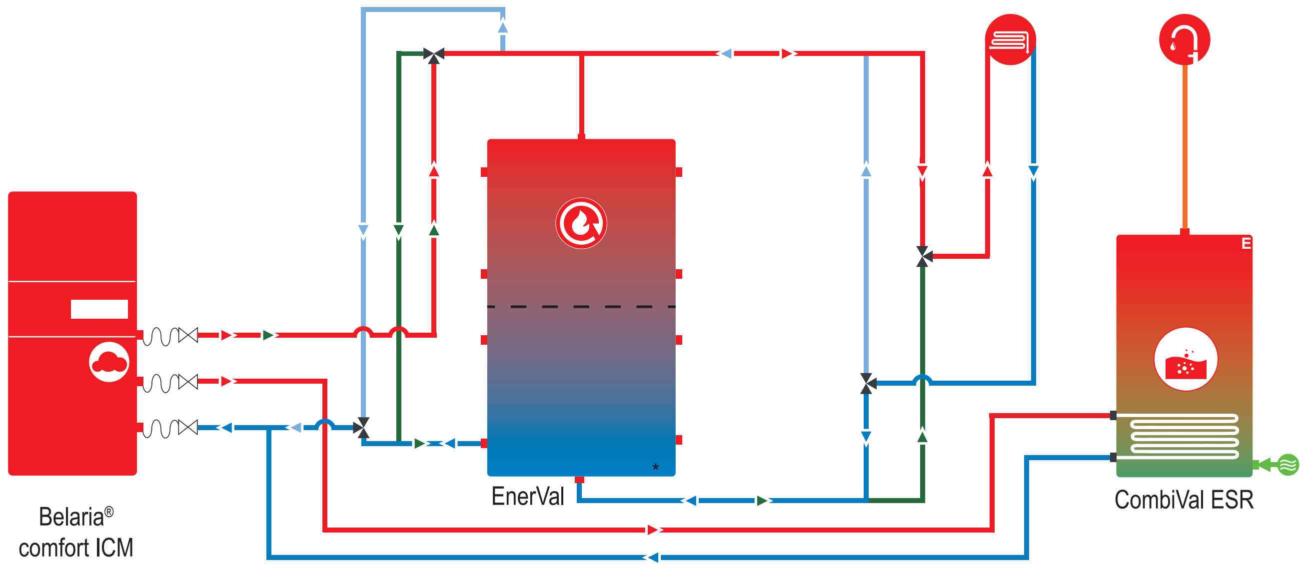
- Recommended use only with active cooling
- The heat pump must be equipped with a flow monitor.
- Fan convectors can cool and dehumidify the room air. This increases the comfort level
- In fan convectors, cold water flows in the cooling circuit at a temperature below the dewpoint. The resulting condensation must be drained away.
- The connection pipes to the fan convector must be insulated to prevent vapour diffusion and avoid any condensation forming on them.

Pipe systems

- Materials resistant to corrosion must be used, such as plastic, chromium steel or a steel that has been treated to resist corrosion.
- Galvanised pipes or fittings are not allowed to be used.
- In the building, the network of pipes including storage tanks and fittings must be insulated to prevent vapour diffusion and avoid any condensation forming.

■ Examples

Active cooling



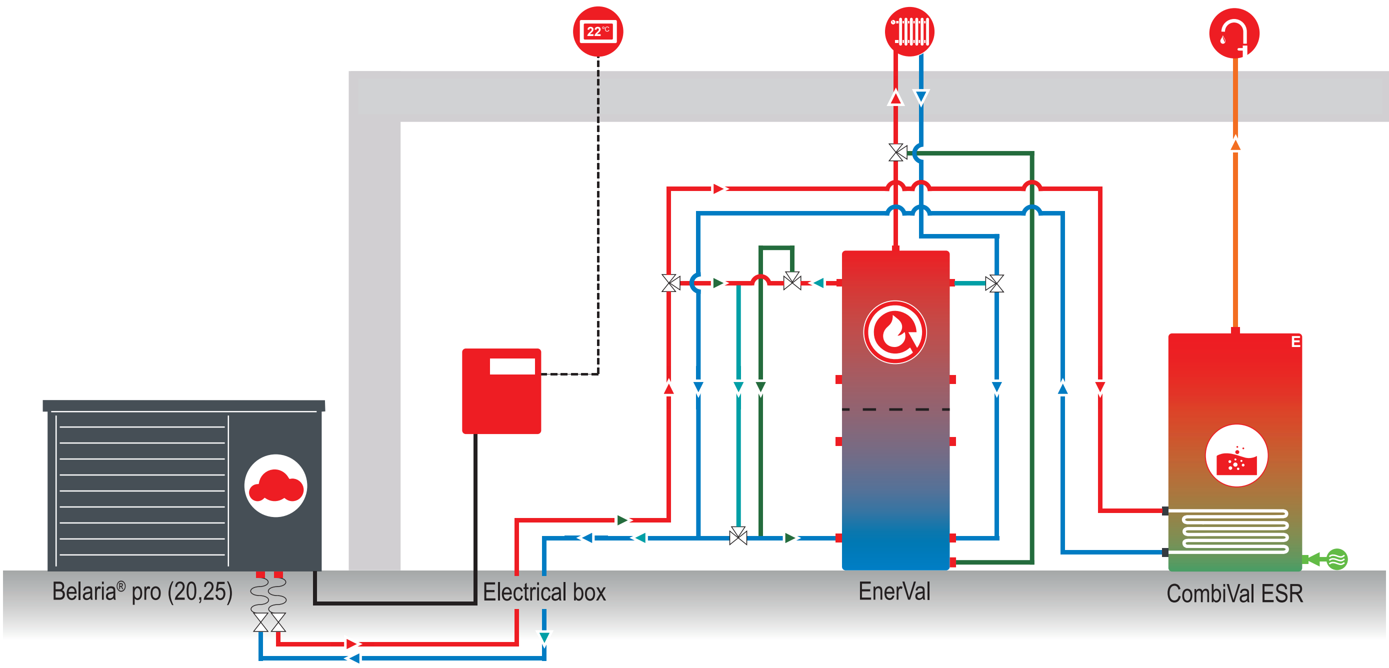
Notice
The example schematics merely show the basic principle and do not contain all information required for installation. The installation must be done according to local conditions, dimensioning and regulations.

Example Cooling

Active cooling
The cooling energy is produced actively with the heat pump for the purpose of cooling. To achieve this, process reversal is carried out in cooling operation. In this case, the heat utilisation side (condenser) becomes the heat absorption side (evaporator). In contrast to passive cooling, the compressor energy must be produced additionally. Cooling/heating operation cannot take place simultaneously. To ensure that the heat pump does not receive too many on/off switching and switchover commands to water heating, we recommend the use of a cooling buffer tank in every case. Depending on the system concept, the buffer storage tank can also be used as a cooling storage tank.

General notes on cooling
- Cooling operation must always be monitored. If the room temperature is cooled in an unlimited manner, condensation will form. This, in turn, can damage components. We recommend monitoring the flow temperature in combination with the moisture (dewpoint limit thermostat).
- It is of advantage to plan a separate cooling circuit for cooling. It can, for example, be combined with a cooling ceiling or a ventilation system. For lower comfort requirements where a cooling effect suffices, heating via underfloor heating or partial cooling via fan convectors is also possible.
- The water flow must be guaranteed, otherwise no cooling can take place. In case of cooling via the heating surfaces, individual thermostatic controls must be used, which can be switched to cooling mode. Otherwise the valves are closed in the summer and cooling cannot take place.

Planning
- Hydraulic integration is ideally via a cooling buffer.
- A mixer is required for adjustment of the cooling load of the rooms to the outdoor temperature.
- To prevent the formation of condensation, the buffer and all brine and cold water pipes must be rendered vapour-impermeable and thermally insulated in accordance with recognised engineering practices.
- Cooling mode is switched on or off manually
- To protect against frost damage in the condenser, it is mandatory to install a flow monitor in the pump circuit (see schematic).



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Example Cooling

Passive cooling via geothermal probes

Increasingly, at our latitudes, cooling of living areas is offered with the geothermal probe via the panel heating (underfloor or wall heating). The following instructions should be followed for careful planning and also to ensure that the user is fully aware of the limitations of this equipment technology, and operates the system correctly.

Planning

- The dewpoint in the floor or wall must not be undershot at any time.
- This is achieved by a fixed value regulation of the flow temperature.
- The fixed value must be set high enough to ensure that the dewpoint is not undershot.
- The flow temperature setpoint is limited to min. 18 °C.
- The cooling must be switched on and off manually.

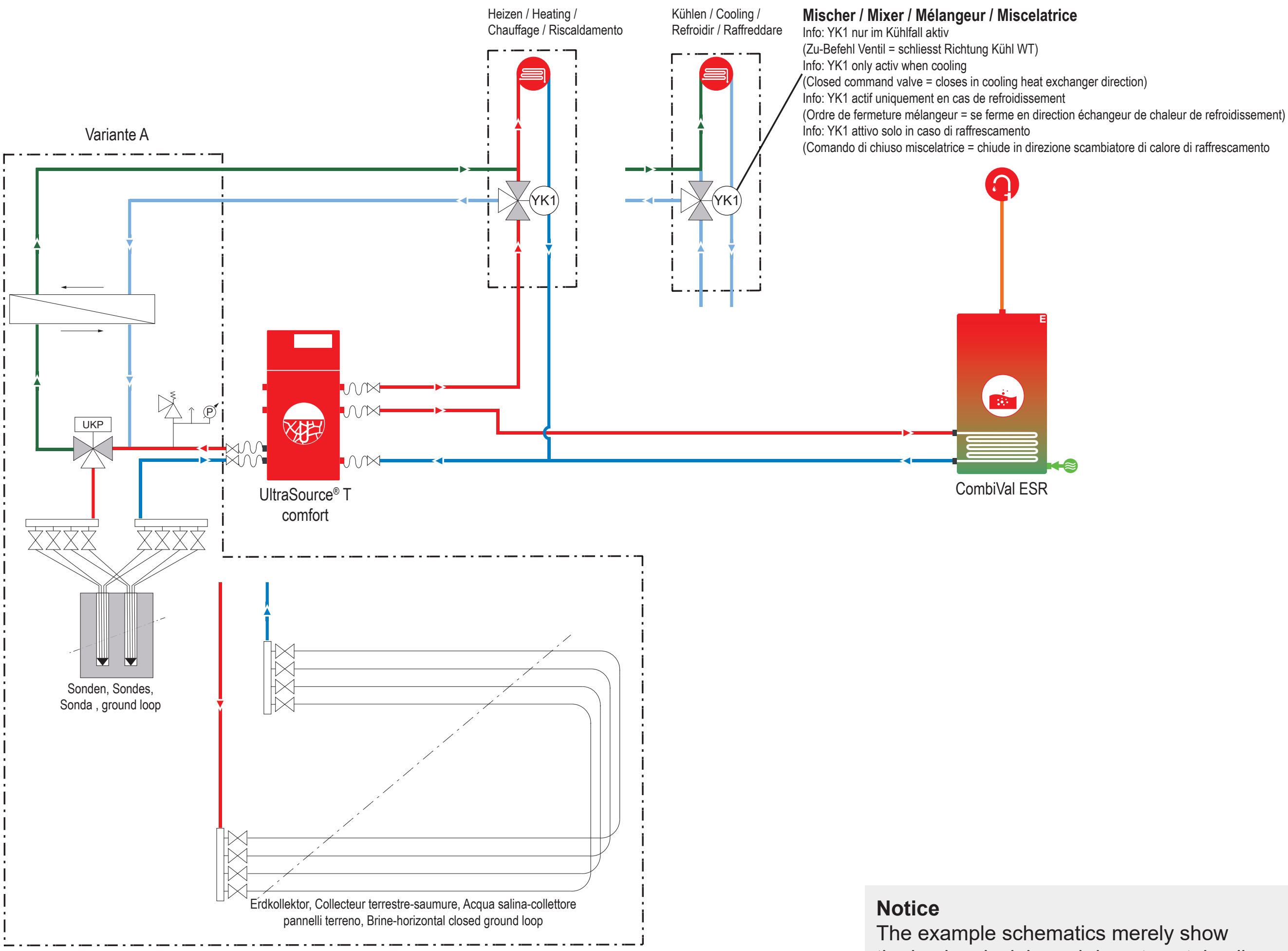
The following must be observed for systems with cooling by floor or wall surfaces:

- The cold remains largely on the floor.
- This temperature distribution can be perceived as uncomfortable: the occupant has cold feet and a warm head.
- The temperature difference between the cooling surface and the air is very small.
- No guaranteed cooling capacity can be specified.
- Like panel heating, panel cooling also responds slowly.
- No condensate is discharged; thus the relative humidity in the room increases.
- The lower room temperature combined with the high relative humidity scarcely improves comfort. A humid climate is created.
- The minimum limit of 18 °C is not allowed to be reduced by the user.

Note the following in comparison with a small air conditioner:

- The energy savings compared to the air conditioner are small.
- An air conditioner dehumidifies the air; a humid climate is not created.
- An air conditioner delivers a cooling effect rapidly after being switched on.
- The costs of an air conditioner are comparatively low.

Comparison with other cooling systems:
Surface cooling systems are also used in some cases for cooling office buildings. However, these are usually ceiling cooling systems in conjunction with ventilation. So it is a combination of cooling by radiation (ceiling) and bringing in cool air (with dehumidification). This convenient system technology is usually too complicated and expensive for residential use. Ventilation convectors with condensate drip tray represent another option for air conditioning. Cooled and dehumidified air is introduced at certain places via the convectors (there should be no draughts). In this case, a reversible heat pump that can provide active cooling can also be used.



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Smart Grid (PV function)

Load management with heat pumps

Heat pumps are currently the most efficient method of storing electricity from volatile generation (electricity from renewable sources such as: wind power, photovoltaic systems or even from combined heat and power).
Smart Grid in this context refers to an intelligent power system.
In contrast to earlier electricity connections that only operate in one direction, the Smart Grid features many distributed electricity generation and consumption systems.
It is obvious that it makes most sense to consume the electricity close to where it is generated. This reduces the grid system load and the public grid system predominantly functions as a balancing mechanism.

The following conditions must be met by the system for efficient and convenient operation:
- Smart meter electricity tariff or the building's own PV system/small wind turbine with Smart Grid-capable inverter or PV load manager (own electricity consumption)
- Heat pump
- TopTronic® E
- Sufficiently large buffer storage tank
- Mixer circuit
- Possibly additional electrical heating

The heat pump is switched on and off or controlled depending on atmospheric conditions. Moreover, it is switched on when a particular green electricity surplus is reached and charges the buffer storage tank and any calorifiers to a higher temperature.
At times when no green electricity is available any longer, the heating is supplied from the charged buffer storage tank. The heat pump needs to be operated less frequently during periods when no or only a little internal current is being generated.

SG Ready standard:
This defines the following 4 functions depending on the PV surplus:
- Normal operation (no influence)
- Heat pump inhibit
- Preferential operation (increased operation)
- Forced acceptance (max. operation)

This is implemented using 2 digital inputs on the TopTronic® E. A 4-core signal cable from the inverter/PV load manager or from the Smart Meter to the heat pump is required for this. The information must be provided potential-free.

0-10 V control:
An on-site energy manager provides a 0-10 V signal which is dependent on the PV surplus. Preferential operation (increased operation) and forced acceptance (max. operation) are activated by adjustable thresholds in the TopTronic® E depending on the available electrical output (PV surplus).

Hoval EnergyManager PV smart:
In addition to the remote monitoring function, the online connection (HovalConnect) of the heat pump system also has the Hoval EnergyManager PV smart integrated in it.
The Hoval EnergyManager PV smart operates with the solar radiation indicated in the weather forecast, and acts either on the preferential operation (increased operation) or forced acceptance (max. operation).

Belaria® air/water heat pumps

Material	Calorifier type			Heating surface [m²]	UltraSource® B comfort C (8)	UltraSource® B comfort C (11)	UltraSource® B comfort C (17)	Belaria® pro comfort (8)	Belaria® pro comfort (13)	Belaria® pro comfort (15)	Daikin Altherma 3 H HT W (14)	Daikin Altherma 3 H HT W (18)	Belaria® pro (20)	Belaria® pro (25)	Belaria® pro (40)	Belaria® pro (50)	Belaria® comfort ICM (8)	Belaria® comfort ICM (13)	Belaria® twin I, twin IR (20)	Belaria® twin I, twin IR (25)	Belaria® twin I, twin IR (30)
Enamel	CombiVal (= CV)	ER	200	0.95	■												■				
			300	1.45	■	■		■									■				
			400	1.80		■		■	■								■	■			
			500	1.90		■	■	■	■									■			
			800	3.70			■			■		■									
			1000	4.50																	
		ESR	200	1.80	■	■		■	■								■	■			
			300	2.60	■	■	■	■	■	■	■	■					■	■			
			400	3.80		■	■	■	■	■	■	■					■	■			
		ESSR	500	5.90		■	■	■	■	■	■	■	■	■	■	■		■	■	■	■
			800	7.00			■			■		■	■	■	■	■			■	■	■
			1000	9.15									■	■	■	■			■	■	■
	MultiVal (= MV)	ERR	300	0.80	■												■				
			400	1.00	■												■				
			500	1.30	■	■											■				
		ESRR	500	4.30	■	■	■	■	■	■	■	■					■	■			
			800	5.20		■	■	■	■	■	■	■	■	■	■	■		■	■	■	
			1000	6.10		■	■		■	■	■	■	■	■	■	■		■	■	■	■
Stainless steel	CombiVal (= CV)	CR	200	1.28	■	■											■				
			300	1.28	■	■											■				
			500	1.70		■		■	■									■			
			800	2.63			■			■		■									
			1000	2.63																	
		CSR	300	2.56	■	■	■	■	■	■	■	■					■	■			
			400	3.40		■	■	■	■	■	■	■					■	■			
			500	5.26		■	■	■	■	■	■	■	■	■	■	■		■	■	■	
			800	6.30			■			■		■	■	■	■	■			■	■	■
			1000	10.00									■	■	■	■			■	■	■
			1250	10.00									■	■	■	■				■	■
			1500	11.30																■	■
			2000	12.70																	

The allocation of the calorifiers to the heat pumps is based on the heating surface of the storage tank coil, heat output of the heat pump for domestic hot water charging, maximum duration of domestic hot water charging and other parameters. For this reason, this allocation table only contains standard values.

Notice
The suggested combinations of heat pump with calorifier are a recommendation according to the suitable coil size and duration of domestic hot water charging (120 minutes). It is possible to deviate from the recommended combinations depending on how the customer uses it.

Notice
For higher comfort requirements or a higher hot water requirement, we recommend the storage tank series with larger heating coils: series ESR and ESSR (or CSR).

Thermalia® brine/water heat pumps

					UltraSource® T comfort			Thermalia® comfort, comfort H						Thermalia® twin, twin H							Thermalia® dual, dual H, dual R								
Heat generator type					(8)	(13)	(17)	(8)	(10)	(13)	(17)	H (7)	H (10)	(20)	(26)	(36)	(42)	H (13)	H (19)	H (22)	(55)	(70)	(85)	(110)	(140)	H (35)	H (50)	H (70)	H (90)
Mate-rial	Calorifier type			Heating surface [m²]																									
Enamel	CombiVal (= CV)	ER	200	0.95	■	■																							
			300	1.45	■	■	■																						
			400	1.80		■	■											■											
			500	1.90		■	■											■											
			800	3.70			■							■					■	■									
			1000	4.50										■	■														
		ESR	200	1.80	■	■	■											■											
			300	2.60	■	■	■	■										■											
			400	3.80		■	■	■	■			■	■	■				■	■	■									
		ESSR	500	5.90		■	■		■	■	■		■	■	■	■		■	■	■						■			
			800	7.00			■				■			■	■	■	■		■	■						■			
			1000	9.15							■			■	■	■	■				■					■	■		
	MultiVal (= MV)	ERR	300	0.80	■																								
			400	1.00	■	■																							
			500	1.30	■	■	■																						
		ESRR	500	4.30	■	■	■	■	■	■		■	■	■	■			■	■	■									
			800	5.20		■	■		■	■			■	■	■			■	■	■									
			1000	6.10		■	■		■	■	■			■	■	■		■	■	■						■			
Stainless steel	CombiVal (= CV)	CR	200	1.28	■	■	■																						
			300	1.28	■	■	■																						
			500	1.70		■	■											■											
			800	2.63			■																						
			1000	2.63																									
		CSR	300	2.56	■	■	■	■				■						■											
			400	3.40		■	■	■	■				■	■				■	■	■									
			500	5.26		■	■		■	■			■	■	■			■	■	■									
			800	6.30			■				■			■	■	■			■	■						■			
			1000	10.00							■			■	■	■	■				■					■	■		
			1250	10.00											■	■	■				■					■	■		
			1500	11.30												■	■				■	■				■	■		
			2000	12.70													■				■	■					■	■	

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Thermalia® water/water heat pumps

					UltraSource® T comfort			Thermalia® comfort, comfort H						Thermalia® twin, twin H							Thermalia® dual, dual H, dual R								
Heat generator type					(8)	(13)	(17)	(8)	(10)	(13)	(17)	H (7)	H (10)	(20)	(26)	(36)	(42)	H (13)	H (19)	H (22)	(55)	(70)	(85)	(110)	(140)	H (35)	H (50)	H (70)	H (90)
Mate-rial	Calorifier type			Heating surface [m²]																									
Enamel	CombiVal (= CV)	ER	200	0.95	■	■																							
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			500	1.90		■	■																						
			800	3.70		■	■							■				■	■										
			1000	4.50			■							■	■				■	■									
		ESR	200	1.80	■	■	■																						
			300	2.60	■	■	■					■						■											
			400	3.80	■	■	■	■	■			■	■	■				■	■	■									
		ESSR	500	5.90		■	■	■	■	■			■	■	■			■	■	■									
			800	7.00		■	■			■	■			■	■	■		■	■	■									
			1000	9.15			■				■			■	■	■	■		■	■						■			
	MultiVal (= MV)	ERR	300	0.80																									
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		ESRR	500	4.30	■	■		■	■			■	■	■				■	■	■									
			800	5.20	■	■	■	■	■	■		■	■	■	■			■	■	■									
			1000	6.10	■	■	■		■	■	■		■	■	■	■		■	■	■									
Stainless steel	CombiVal (= CV)	CR	200	1.28		■	■																						
			300	1.28	■	■																							
			500	1.70	■	■																							
			800	2.63		■	■											■											
			1000	2.63		■	■																						
		CSR	300	2.56			■					■						■											
			400	3.40	■	■	■	■				■						■	■										
			500	5.26	■	■	■	■	■	■			■	■	■			■	■	■									
			800	6.30		■	■			■	■			■	■	■		■	■	■									
			1000	10.00		■	■				■			■	■	■	■		■	■						■			
			1250	10.00			■							■	■	■	■			■						■			
			1500	11.30											■	■	■									■			
			2000	12.70												■	■				■					■	■		

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Hoval quality.
You can count on us.

Hoval

Hoval is one of the leading international companies for heating and indoor climate solutions. Drawing on more than 80 years of experience and benefiting from a close-knit team culture, the Hoval Group delivers exciting solutions and develops technically superior products. This leadership role requires a sense of responsibility for energy and the environment, which is expressed in an intelligent combination of different heating technologies and customised indoor climate solutions.

Hoval also provides personal consultations and comprehensive customer service. With around 2500 employees in 15 companies around the world, Hoval sees itself not as a conglomerate, but as a large family that thinks and acts globally.
Hoval heating and indoor climate solutions are currently exported to more than 50 countries.

Responsibility
for energy and environment

Your Hoval partner

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