Operating and installation instructions

REMKO WSP series

Brine-heat pump
Instructions for Technicians

WSP 80, WSP 110, WSP 140, WSP 180
WSP 140 Duo, WSP 180 Duo

0176-2021-04 Edition 2, en_GB

Read the instructions prior to performing any task!

CE

Read these operating instructions carefully before commissioning / using this device!

These instructions are an integral part of the system and must always be kept near or on the device.

Subject to modifications; No liability accepted for errors or misprints!

Translation of the original

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1 Safety and usage instructions

1.1 Special safety notes

Always pay attention to all of the following safety notes and stipulations.

- The device can only be installed as a complete unit together with all items of safety equipment.
- Personnel responsible for on-site construction, commissioning, operation, maintenance, inspection and installation must be able to demonstrate that they hold a qualification which proves their ability to undertake the work.
- Electrical installation and installation of the device must always be carried out by a trade specialist who is responsible for compliance with applicable specifications during the installation and initial commissioning.
- The hot water storage tank is at normal mains water pressure. If no diaphragm expansion valve is installed, the expansion water can drip out of the safety valve while it is heating up. After the heating process, if water still drips out of the safety valve, notify your trade technician.
- Protective covers (grills) over moving parts must not be removed from units that are in operation.
- Safety devices may not be modified or bypassed.
- Always pay attention to the notes defining the danger area that you will find in the 'Assembly' chapter.

⚠ DANGER!

Risk of suffocation

Rooms in which refrigerant may escape shall be adequately aerated and ventilated. Otherwise there is danger of suffocation.

⚠ CAUTION!

Risk of combustion and injury

Contact with equipment parts or components can lead to burns or injury.

⚠ CAUTION!

Maintain a safe distance from hazardous materials

The units and components must be kept at an adequate distance from flammable, explosive, combustible, abrasive and dirty areas or atmospheres.

⚠ CAUTION!

This device can be used by children above the age of 8, as well as by people with impaired physical, sensory or mental capabilities or a lack of experience and knowledge if they are supervised or have received instruction in the safe operation of the device, and if they understand the associated potential hazards. Children must never play with the device. Cleaning and user maintenance must not be carried out by unsupervised children.

1.2 General safety notes

Carefully read the operating manual before commissioning the units for the first time. It contains useful tips and notes such as hazard warnings to prevent personal injury and material damage. Failure to follow the directions in this manual not only presents a danger to people, the environment and the system itself, but will void any claims for liability.

Keep this operating manual and the refrigerant data sheet near to the units.

1.3 Identification of notes

This section provides an overview of all important safety aspects for proper protection of people and safe and fault-free operation.The instructions and safety notes contained within this manual must be observed in order to prevent accidents, personal injury and material damage.

Notes attached directly to the units must be observed in their entirety and be kept in a fully legible condition.

Safety notes in this manual are indicated by symbols. Safety notes are introduced with signal words which help to highlight the magnitude of the danger in question.

DANGER!

Contact with live parts poses an immediate danger of death due to electric shock. Damage to the insulation or individual components may pose a danger of death.

DANGER!

This combination of symbol and signal word warns of a situation in which there is immediate danger, which if not avoided may be fatal or cause serious injury.

WARNING!

This combination of symbol and signal word warns of a potentially hazardous situation, which if not avoided may be fatal or cause serious injury.

CAUTION!

This combination of symbol and signal word warns of a potentially hazardous situation, which if not avoided may cause injury or material and environmental damage.

NOTICE!

This combination of symbol and signal word warns of a potentially hazardous situation, which if not avoided may cause material and environmental damage.

This symbol highlights useful tips and recommendations as well as information for efficient and fault-free operation.

1.4 Personnel qualifications

Personnel responsible for commissioning, operation, maintenance, inspection and installation must be able to demonstrate that they hold a qualification which proves their ability to undertake the work.

1.5 Dangers of failure to observe the safety notes

Failure to observe the safety notes may pose a risk to people, the environment and the units. Failure to observe the safety notes may void any claims for damages.

In particular, failure to observe the safety notes may pose the following risks:

- The failure of important unit functions.
- The failure of prescribed methods of maintenance and repair.
- Danger to people on account of electrical and mechanical effects.

1.6 Safety-conscious working

The safety notes contained in this manual, the existing national regulations concerning accident prevention as well as any internal company working, operating and safety regulations must be observed.

1.7 Safety notes for the operator

The operational safety of the units and components is only assured providing they are used as intended and in a fully assembled state.

- The units and components may only be set up, installed and maintained by qualified personnel.
- Protective covers (grille) over moving parts must not be removed from units that are in operation.
- Do not operate units or components with obvious defects or signs of damage.
- Contact with certain unit parts or components may lead to burns or injury.
- The units and components must not be exposed to any mechanical load, extreme levels of humidity or extreme temperature.
- Spaces in which refrigerant can leak sufficient to load and vent. Otherwise there is danger of suffocation.

- All housing parts and device openings, e.g. air inlets and outlets, must be free from foreign objects, fluids or gases.
- The units must be inspected by a service technician at least once annually. Visual inspections and cleaning may be performed by the operator when the units are disconnected from the mains.

1.8 Safety notes for installation, maintenance and inspection

- Appropriate hazard prevention measures must be taken to prevent risks to people when performing installation, repair, maintenance or cleaning work on the units.
- The setup, connection and operation of the units and its components must be undertaken in accordance with the usage and operating conditions stipulated in this manual and comply with all applicable regional regulations.
- The heat pump must be connected to the heat source and heating or cooling system in accordance with the relevant regulations.
- Regional regulations and laws as well as the Water Ecology Act (WHG) must be observed.
- The power supply should be adapted to the requirements of the units.
- Units may only be mounted at the points provided for this purpose at the factory. The units may only be secured or mounted on stable structures, walls or floors.
- Mobile units must be set up securely on suitable surfaces and in an upright position. Stationary units must be permanently installed for operation.
- The units and components should not be operated in areas where there is an increased risk of damage. Observe the minimum clearances.
- The units and components must be kept at an adequate distance from flammable, explosive, combustible, abrasive and dirty areas or atmospheres.
- Safety devices may not be modified or bypassed.

1.9 Unauthorised modification and changes

Modifications or changes to units and components are not permitted and may cause malfunctions. Safety devices may not be modified or bypassed. Original replacement parts and accessories authorised by the manufactured ensure safety. The use of other parts may invalidate liability for resulting consequences.

1.10 Intended use

Depending on the model, the equipment and the additional fittings with which it is equipped is only intended to be used as an air-conditioner for the purpose of cooling or heating the air in an enclosed room.

Any different or additional use shall be classed as non-intended use. The manufacturer/supplier assumes no liability for damages arising from such use. The user bears the sole risk in such cases. Intended use also includes working in accordance with the operating and installation instructions and complying with the maintenance requirements.

Under no circumstances should the threshold values specified in the technical data be exceeded.

1.11 Warranty

For warranty claims to be considered, it is essential that the ordering party or its representative complete and return the "certificate of warranty" to REMKO GmbH & Co. KG at the time when the units are purchased and commissioned.

The warranty conditions are detailed in the "General business and delivery conditions". Furthermore, only the parties to a contract can conclude special agreements beyond these conditions. In this case, contact your contractual partner in the first instance.

1.12 Transport and packaging

The devices are supplied in a sturdy shipping container. Please check the equipment immediately upon delivery and note any damage or missing parts on the delivery and inform the shipper and your contractual partner. For later complaints can not be guaranteed.

⚠ WARNING!

Plastic films and bags etc. are dangerous toys for children!

Why:

- Leave packaging material are not around.

- Packaging material may not be accessible to children!

1.13 Environmental protection and recycling

Disposal of packaging

All products are packed for transport in environmentally friendly materials. Make a valuable contribution to reducing waste and sustaining raw materials. Only dispose of packaging at approved collection points.

Disposal of equipment and components

Only recyclable materials are used in the manufacture of the devices and components. Help protect the environment by ensuring that the devices or components (for example batteries) are not disposed in household waste, but only in accordance with local regulations and in an environmentally safe manner, e.g. using certified firms and recycling specialists or at collection points.

2 Technical data

2.1 Unit data WSP 80/110/140/180

Series		WSP 80	WSP 110	WSP 140	WSP 180
System		Brine/water			
Function		Heating/hot water			
Cooling		Optionally passive			
Compressor technology		Scroll			
Heat pump manager		Smart Control Touch			
Temperature operating limit brine (heat source, heating)	°C	-10 - +25			
Temperature operating limit brine (heat sink, cooling)	°C	+5 - +18			
Antifreezing agent		Glycol			
Minimal brine concentration	°C	- 13			
Min. heat source capacity	kW	5.0	7.0	9.0	15.0
Cooling capacity heat pump	kW	5.0	7.0	9.0	15.0
Inlet temp. Heating water, max.	°C	+60			
Passive cooling (source) operating limit	°C	+5 - +18			
Min. inlet temperature, cooling water	°C	+15			
Electrical auxiliary heater / heating capacity	kW	optional/9.0			
Domestic hot-water heating (changeover valve)		optional outdoor			
Connection oil / gas boiler		optional outdoor			
Heating capacity, ErP	kW	5.0	8.0	9.0	17.0
Heating capacity/COP [1)] for B0/W35	kW/COP	5.7/4.7	7.9/4.8	10.8/4.9	17.2/5.2
Heating capacity/COP [1)] for B0/W55	kW/COP	5.2/2.6	6.9/2.7	9.2/2.8	15.0/2.8
Heating capacity/COP [1)] for W10/W35	kW/COP	7.6/5.8	9.7/6.0	14.1/6.3	22.6/6.5
Heating capacity/COP [1)] for W10/W55	kW/COP	6.6/3.2	8.4/3.2	11.9/3.5	19.2/3.5
Power consumption for B0/W35 [4)]	kW	1.2	1.7	2.2	3.3
Power consumption for B0/W55 [4)]	kW	2.0	2.6	3.3	5.4
Power consumption for W10/W35 [4)]	kW	1.3	1.6	2.2	3.5
Power consumption for W10/W55 [4)]	kW	2.1	3.2	3.4	5.5

REMKO WSP series

Series		WSP 80	WSP 110	WSP 140	WSP 180
Cooling capacity/EER [2] for B5/W18	kW/EER	10.0		12.0	
Refrigerant		R410A [2]			
Basic filling quantity, heat pump	kg	1.0	1.4	2.6	2.8
CO_2 equivalent	t	2.1	2.9	5.4	5.8
Cooling cycle		Hermetically sealed			
Heat pump compressor power supply	V/Ph/Hz	400V/3~/50Hz			
Heat pump control power supply	V/Ph/Hz	230V/1~/50Hz			
Power supply electrical heating coil	V/Ph/Hz	400V/3~/50Hz			
Rated current consumption for B0/W35 (pro Phase)	A	2.35	2.85	3.60	5.40
Electrical power consumption source pump/heating circ. pump	W	70/35	90/45	100/55	110/65
Max. power consumption	kW	3.75	4.99	6.25	7.50
Max. starting current	A	28	40	48	62
Power factor (cosφ)	--	0.78	0.77	0.81	0.80
Fuse protection provided by the customer heat pump without heating coil	A slow-acting	3x16		3x20	
Nominal medium flow rate, water (heating) (accord. to EN 14511, at Δt 5 K)	m^3/h	0,90	1,4	1,6	2,5
Nominal medium flow rate, heat source (glycol)	m^3/h	1,2	1,9	2,1	4,0
Volume of the evaporator	l	<1.4	1.8	2.3	2.3
Evaporator material		Brazed stainless steel/copper			
Max. external pressure loss (heating system)	kPa	50	40	80	60
Max. pressure loss, heat source with glycol	kPa	70	60	60	60
Max. operating excess pressure (heat source)	bar	3			
Switch-off pressure brine pressure switch (excess pressure)	bar	0.5			
Max. operating pressure, water	bar	3			
Hydraulic connection inlet/ return flow, flat-sealing , heat source /heating	Inches	1" / 1"		1 1/4" / 1 1/4"	

Series		WSP 80	WSP 110	WSP 140	WSP 180
Copper pipe dimension to be provided by the customer	mm	28		35	
Heat pump water volume	l	2.30	2.58	3.73	3.73
Refrigerant oil	Type	Synthetic Oil FV50S			
Sound power level, heat pump	dB(A)	42	44	45	45
Sound pressure level LpA, heat pump [3)]	dB(A)	34	39	40	40
Heat pump dimensions					
Height	mm	1065			
Width	mm	650			
Depth	mm	650			
Weight, heat pump	kg	175	185	200	210

[1)] COP = coefficient of performance (heating coefficient) per EN 14511 (applies on a unit with clean heat transmission)

[2)] Contains greenhouse gas according to Kyoto protocol, GWP 2088

[3)] Quarter spherical propagation, distance 1 m

[4)] In accordance with EN 14511

Information provided without guarantee! We reserve the right to make technical changes within the framework of technical advancement.

REMKO WSP series

2.2 Unit data WSP 140/180 Duo

Series		WSP 140 Duo	WSP 180 Duo
System		Brine/water	
Function		Heating/hot water	
Cooling		Optionally passive	
Compressor technology		Scroll	
Heat pump manager		Smart-Control Touch	
Temperature operating limit brine (heat source, heating)	°C	-10 - +25	
Temperature operating limit brine (heat sink, cooling)	°C	+5 - +18	
Antifreezing agent		Glycol	
Minimal brine concentration	°C	- 13	
Min. heat source capacity	kW	9,0	15,0
Cooling capacity heat pump	kW	9,0	15,0
Inlet temp. Heating water, max.	°C	+60	
Passive cooling (source) operating limit	°C	+5 - +18	
Min. inlet temperature, cooling water	°C	+15	
Electrical auxiliary heater / heating capacity	kW	optional / 9,0	
Domestic hot-water heating (changeover valve)		optional outdoor	
Connection oil / gas boiler		optional outdoor	
Heating capacity, ErP	kW	18,0	17,0
Heating capacity/COP [1)] for B0/W35	kW/COP	21,6/4,9	17,2/5,2
Heating capacity/COP [1)] for B0/W55	kW/COP	18,4/2,8	15,0/2,8
Heating capacity/COP [1)] for W10/W35	kW/COP	28,2/6,3	22,6/6,5
Heating capacity/COP [1)] for W10/W55	kW/COP	23,8/3,5	19,2/3,5
Power consumption for B0/W35 [4)] per indoor unit	kW	2,2	3,3
Power consumption for B0/W55 [4)] per indoor unit	kW	3,3	5,4
Power consumption for W10/W35 [4)] per indoor unit	kW	2,2	3,5
Power consumption for W10/W55 [4)] per indoor unit	kW	3,4	5,5

Series		WSP 140 Duo	WSP 180 Duo
Cooling capacity/EER [2)] for B5/W18	kW/EER	24,0	
Refrigerant		R410A [2)]	
Basic filling quantity, heat pump per indoor unit	kg	2,6	2,8
CO_2 equivalent per indoor unit	t	5,4	5,8
Cooling cycle per indoor unit		Hermetically sealed	
Heat pump compressor power supply per indoor unit	V/Ph/Hz	400V/3~/50Hz	
Heat pump control power supply per indoor unit	V/Ph/Hz	230V/1~/50Hz	
Power supply electrical heating coil per indoor unit	V/Ph/Hz	400V/3~/50Hz	
Rated current consumption for B0/W35 (pro Phase) per indoor unit	A	3,60	5,40
Electrical power consumption source pump/heating circ. pump per indoor unit	W	100/55	110/65
Max. power consumption per indoor unit	kW	6,25	7,50
Max. starting current per indoor unit	A	48	62
Power factor (cosφ)	--	0,81	0,80
Fuse protection provided by the customer heat pump without heating coil per indoor unit	A slow-acting	3x20	
Nominal medium flow rate, water (heating) (accord. to EN 14511, at Δt 5 K) per indoor unit	m^3/h	1,6	2,5
Nominal medium flow rate, heat source (glycol) per indoor unit	m^3/h	2,1	4,0
Volume of the evaporator per indoor unit	l	2,3	2,3
Evaporator material per indoor unit		Brazed stainless steel/copper	
Max. external pressure loss (heating system) per indoor unit	kPa	80	60
Max. pressure loss, heat source with glycol per indoor unit	kPa	60	60
Max. operating excess pressure (heat source) per indoor unit	bar	3	
Switch-off pressure brine pressure switch (excess pressure) per indoor unit	bar	0,5	
Max. operating pressure, water	bar	3	
Hydraulic connection inlet/return flow, flat-sealing , heat source/heating per indoor unit	Inches	1 1/4" / 1 1/4"	

REMKO WSP series

Series		WSP 140 Duo	WSP 180 Duo
Copper pipe dimension to be provided by the customer	mm	35	
Heat pump water volume	mm	54	64
Refrigerant oil	l	3,73	3,73
Sound power level, heat pump	Typ	Synthetic oil FV50S	
Sound pressure level LpA, heat pump [3] per indoor unit	dB(A)	45	45
Sound pressure level LpA, heat pump [3] per indoor unit	dB(A)	40	40
Heat pump dimensions			
Height	mm	1065	
Width	mm	650	
Depth	mm	650	
Weight, heat pump per indoor unit	kg	200	210

[1] COP = coefficient of performance (heating coefficient) per EN 14511 (applies on a unit with clean heat transmission)

[2] Contains greenhouse gas according to Kyoto protocol, GWP 2088

[3] Quarter spherical propagation, distance 1 m

[4] In accordance with EN 14511

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2.3 Product data

Product data WSP 80-180

Average condition (moderate temperature periods)

Series		WSP 80	WSP 110	WSP 140	WSP 180
Energy efficiency ratio, heating 35 °C/55 °C		A+++/A+++			A+++/A++
Nominal heating power P rated 35 °C/55 °C	kW	6,0/5,0	8,0/7,0	11,0/9,0	17,0/15,0
Room heating energy efficiency ηs 35 °C/55 °C	%	175/153	180/157	201/178	224/138
Contribution to seasonal room heating energy efficiency of the REMKO Smart Control	%	4			
Yearly energy consumption Q_{HE} 35 °C/ 55 °C [1)]	kWh	2665/2687	3473/3607	4308/4087	6136/8476
Sound power level L_{WA} (heat pump)	dB(A)	42	44	45	

[1)] The specified value is based on results from standard testing.
The actual consumption depends on the use and location of the unit.

Product data WSP 140/180 Duo

Average condition (moderate temperature periods)

Series		WSP 140 Duo	WSP 180 Duo
Energy efficiency ratio, heating 35 °C/55 °C		A+++/A+++	A+++/A++
Nominal heating power P rated 35 °C/55 °C	kW	22,0/18,0	34,0/30,0
Room heating energy efficiency ηs 35 °C/55 °C	%	201/178	224/138
Contribution to seasonal room heating energy efficiency of the REMKO Smart Control	%	4	4
Yearly energy consumption Q_{HE} 35 °C/ 55 °C [4)]	kWh	8616/8174	12272/16952
Sound power level L_{WA} (heat pump)	dB(A)	45	45

[1)] The specified value is based on results from standard testing.
The actual consumption depends on the use and location of the unit.

2.4 Unit dimensions, heat pump

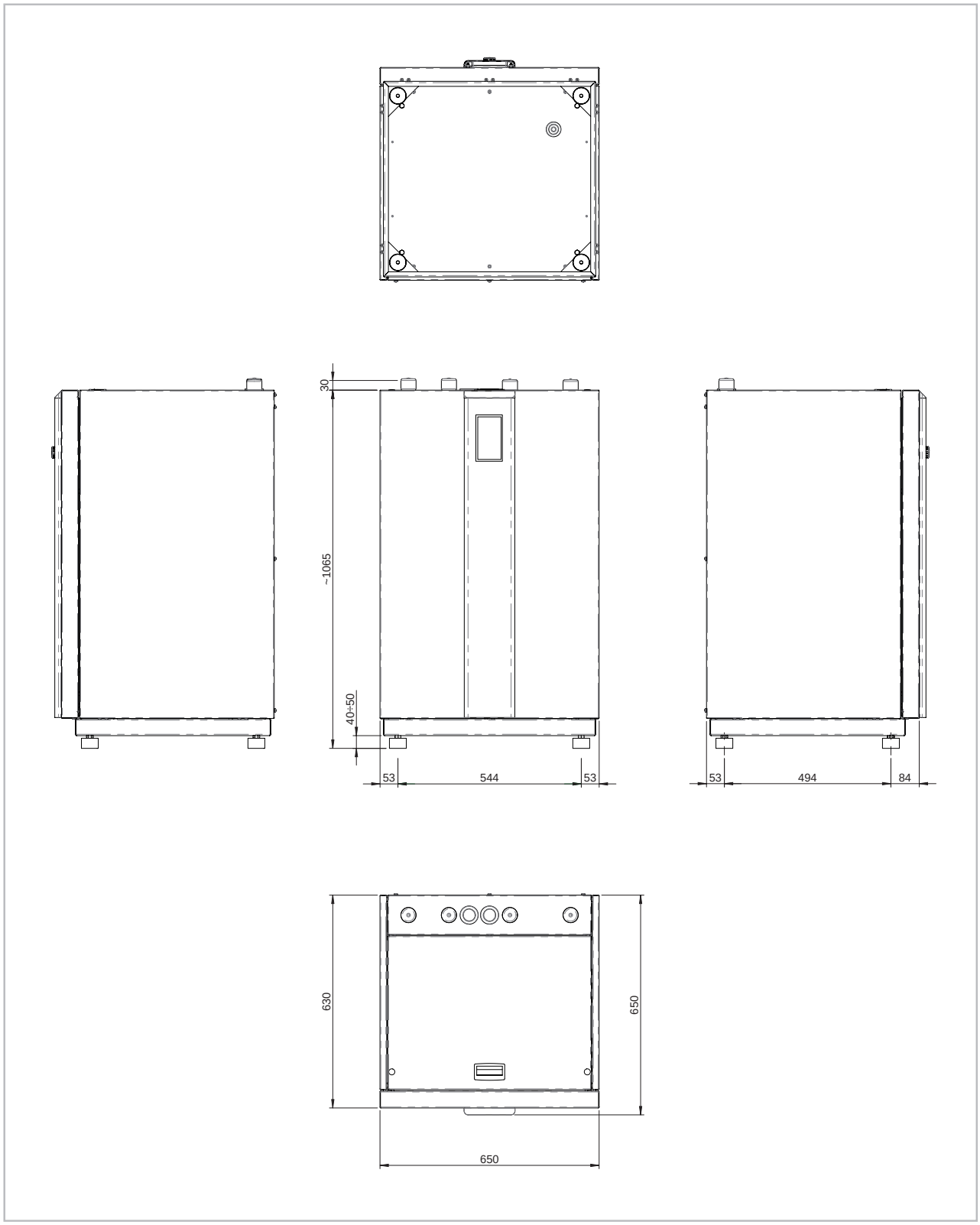


Fig. 1: Heat pump dimensions

Designations of pipe connections on the heat pump

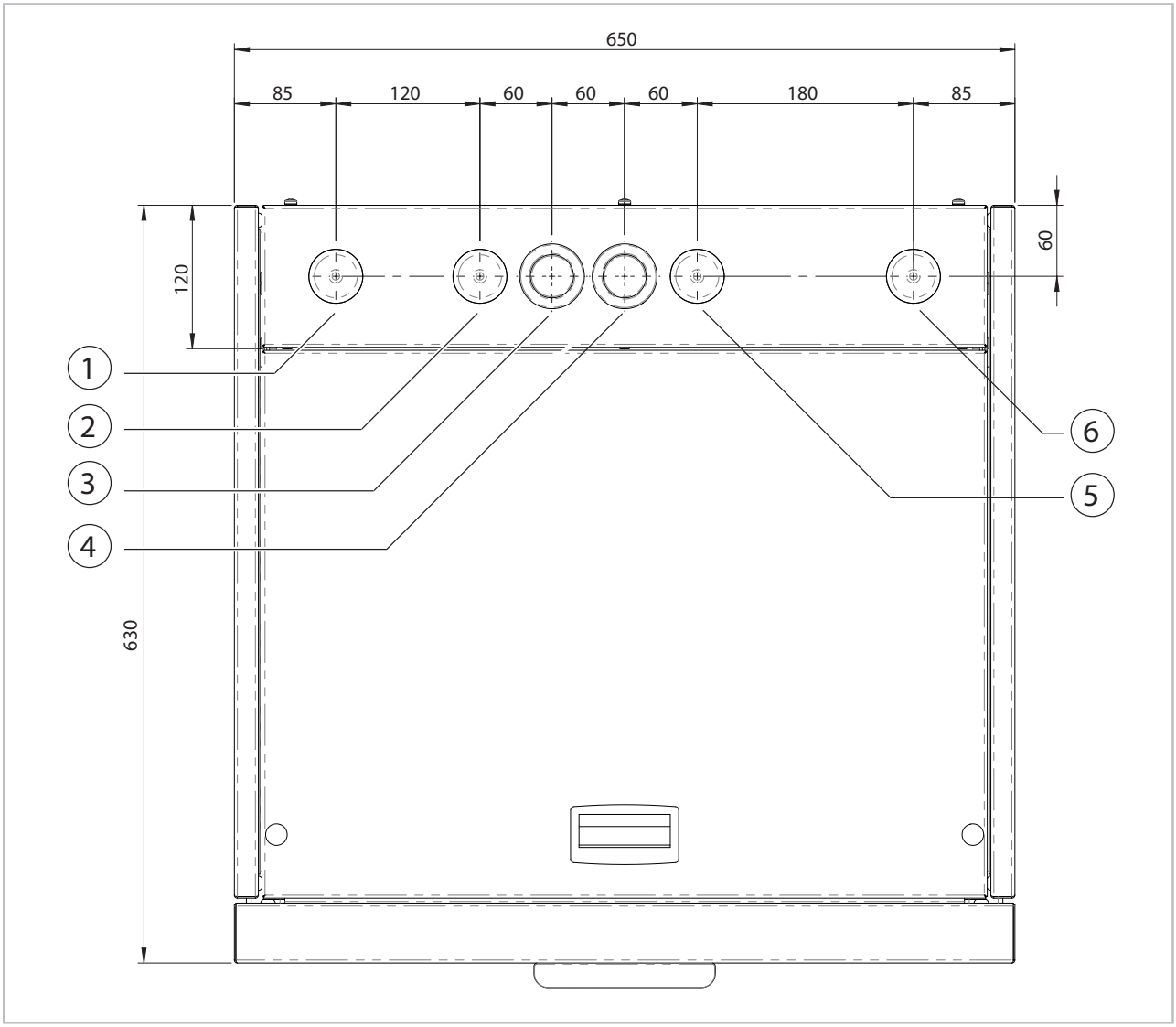


Fig. 2: Designations of pipe connections, plan view

1: Inlet heat source
2: Return flow heat source
3: Mains connection inlet = ø 36 mm
4: Probe and signal inlet = ø 36 mm
5: Heating water, inlet
6: Heating water, return flow

Dimensioning of piping (all details in inches)

	WSP 80/110/140/180
Inlet for heat source	1" OT
Return flow for heat source	1" OT
Heating water, inlet (surface sealing)	1 1/4" OT
Heating water, return flow (surface sealing)	1 1/4" OT

2.5 Diagram, cooling cycle

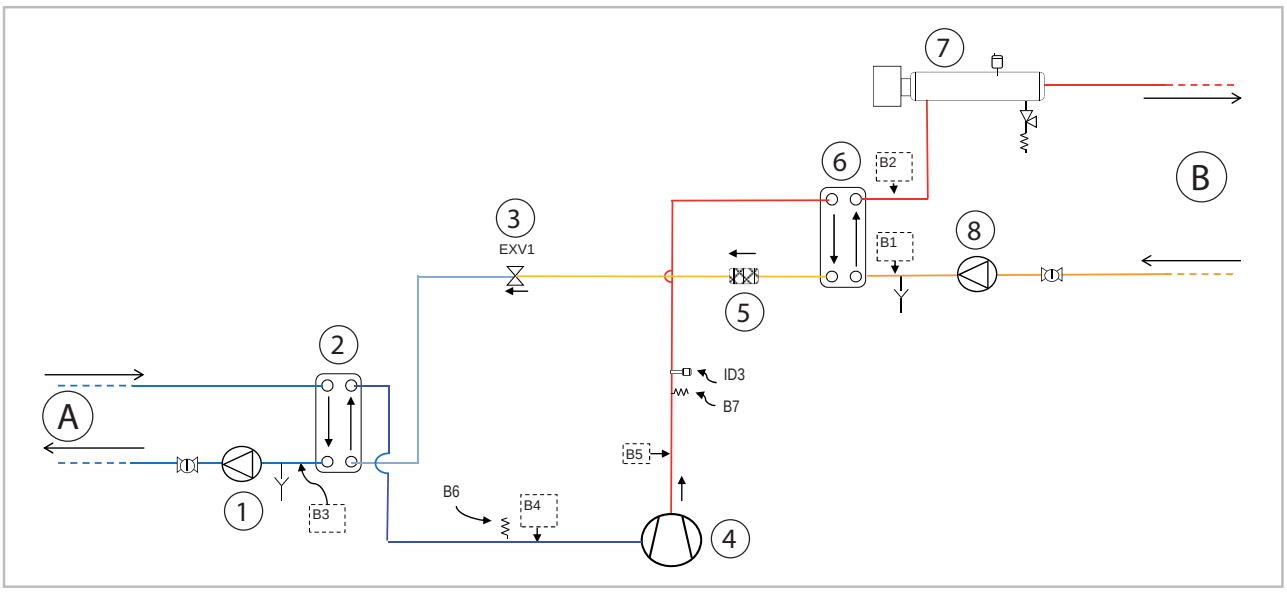


Fig. 3: Diagram, cooling cycle

A: Heat source
B: Heating system
1: Circulation pump heat source
2: Plate heat exchanger evaporator heat source
3: Electronic expansion valve
4: Compressor
5: Filter dryer refrigerant cycle
6: Plate heat exchanger condenser
7: Electrical heating coil
8: Heating circulation pump
B1: Heating return flow probe
B2: Heating inlet probe
B3: Heat source inlet probe/heat pump outlet
B4: Suction gas temperature probe
B5: Hot gas temperature probe

2.6 Heat pump usable limits in monovalent operation

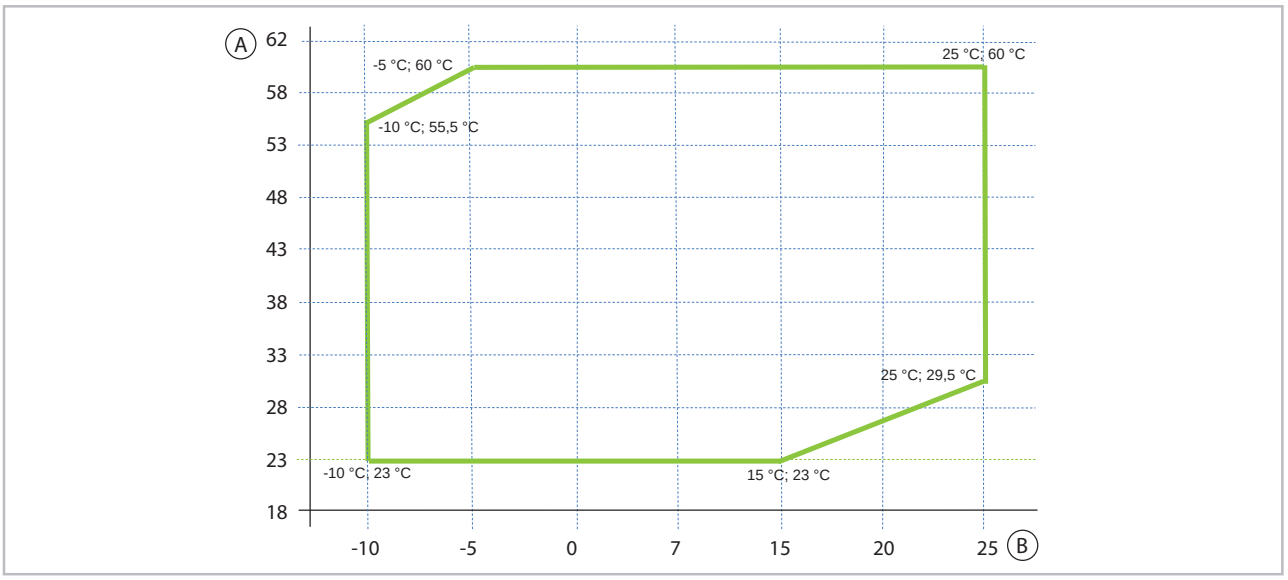


Fig. 4: Usable limits and measuring points

A: Water temperature [°C] / B: Air temperature [°C]

2.7 Pump characteristic curves

Heating pump, heat pump WSP 80-180

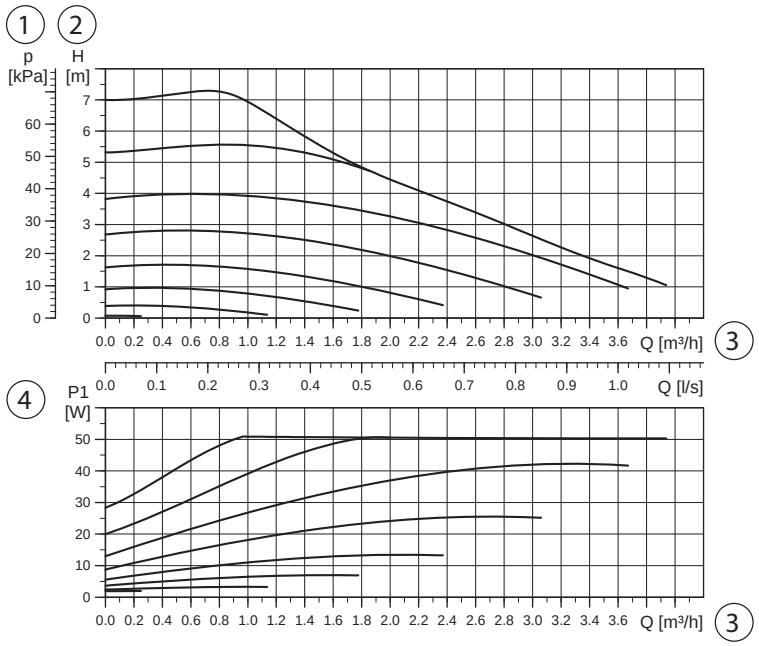


Fig. 5: Circulation pump: Grundfoss UPM 3 25-70 130 - capacity range

1: Pressure [kPa]
2: Height [m]
3: Medium flow rate [m^3/h]
4: Speed

External control via analogue-In PWM signal

The tolerances of each curve are in acc. with EN 1151-1:2006

Stage	Effective power consumption [W]	Current consumption [A]	Motor protection
min.	2	0.04	blocking current resistant
max.	52	0.52	blocking current resistant

Heat source pump, heat pump WSP 80-110

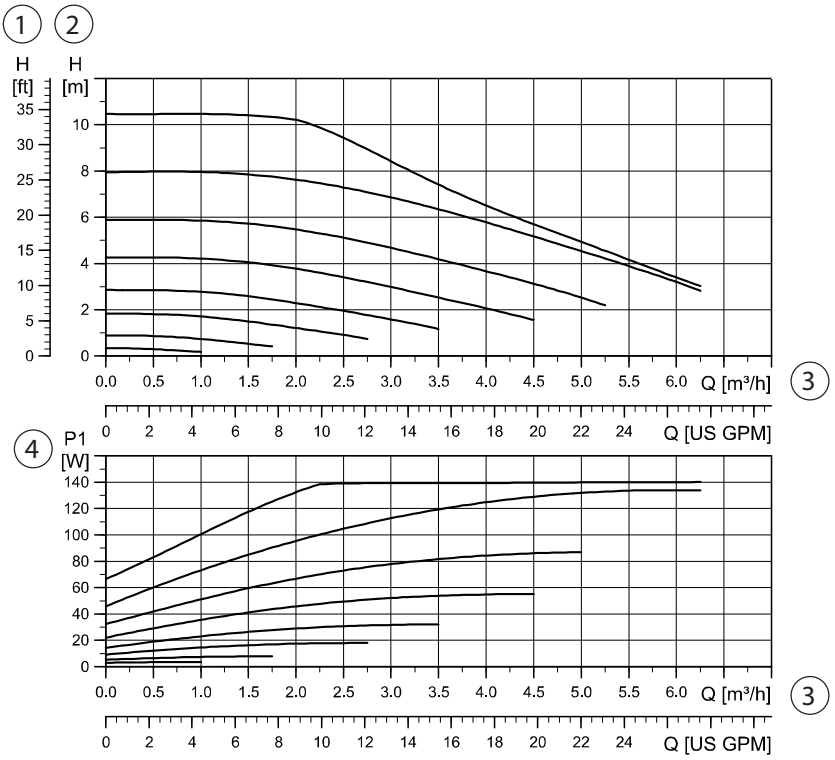


Fig. 6: Circulation pump: Grundfoss UPMUPML 15-105 - capacity range

1: Height [ft]
2: Height [m]
3: Medium flow rate [m³/h]
4: Speed

External control via analogue-In PWM signal

The tolerances of each curve are in acc. with EN 1151-1:2006

Stage	Effective power consumption [W]	Current consumption [A]	Motor protection
min.	3	0,04	blocking current resistant
max.	140	1,1	blocking current resistant

Heat source pump, heat pump WSP 80-110

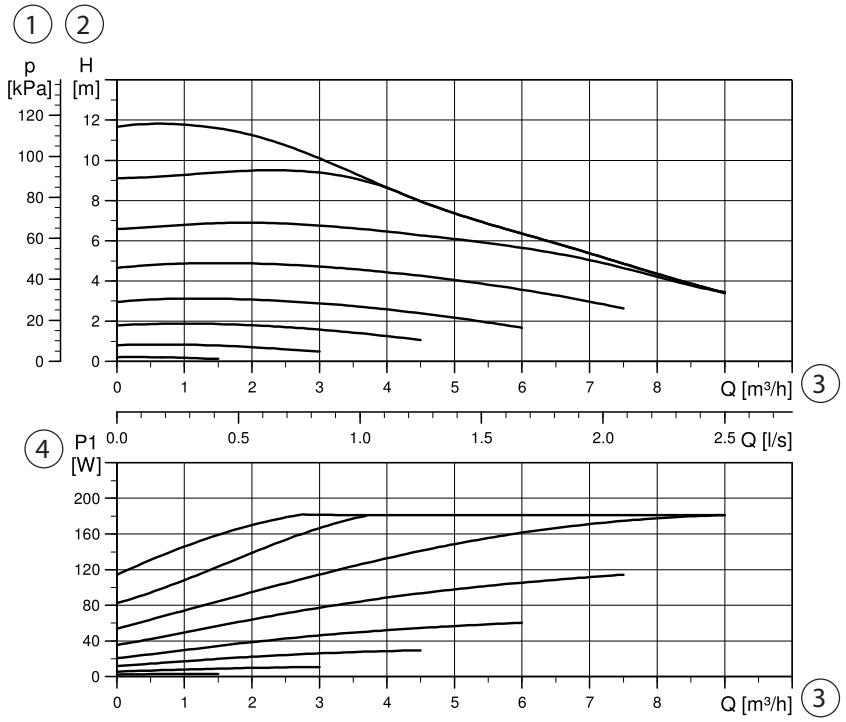


Fig. 7: Circulation pump: Grundfoss UPMXXL 25-120 - capacity range

1: Pressure [kPa]
2: Height [m]
3: Medium flow rate [m^3/h]
4: Speed

External control via analogue-In PWM signal

The tolerances of each curve are in acc. with EN 1151-1:2006

Stage	Effective power consumption [W]	Current consumption [A]	Motor protection
min.	3	0,04	blocking current resistant
max.	180	1,42	blocking current resistant

3 Design and function

3.1 The heat pump in general

Arguments for heat pumps from REMKO

- Heat pumps make a contribution to environmental protection.
- Lower CO_2 emissions in comparison to oil and gas heating.
- All models are able to cool as well as heat.
- Flexible installation due to split system design.
- Negligible maintenance costs.
- No noise in outdoor area
- Max. efficiency through the use of geothermal energy

Fig. 8: Free heat

* The ratio can vary depending on source temperature and operating conditions.

Economical and environmentally conscious heating

The burning of fossil-based energy sources in order to generate power creates severe consequences for the environment. A high percentage of fossil fuels is also problematic due to the limited resources of oil and gas and the price increases resulting from this. For this reason, many people today are thinking both economically and environmentally-consciously in terms of heating. The application of heat pump technology enables both of these concepts to be combined. It makes use of the energy which is permanently available in the air, water and soil and converts it into usable heating energy by means of inputting electrical energy. Yet in order to generate heat equivalent to 4 kWh, only about 1 kWh of electricity is required. The rest is made available free-of-charge by the environment.

Heat source

There are essentially three heat sources from which heat pumps can derive energy: air, soil and groundwater.

Brine heat pumps extract energy from the soil. This is achieved through serpentine pipe networks which are laid approx. 1 m deep or placed by means of drilling.

Air heat pumps have the advantage that air as a source heat is available everywhere in **unlimited** quantities that can be used **free of charge**. A disadvantage is that the outside air is at its coldest when the heat requirement is greatest.

Water heat pumps require **two wells** in order to obtain heat from the groundwater, one supply well and one dry well. The development of this source is not possible everywhere. It is expensive and requires planning permission.

3.2 Brine heat pump

Function of the geothermal heat source

A heat pump is a unit which makes use of a working medium to absorb ambient heat under low temperatures and transports this heat to a place where it can be of use for heating purposes. Heat pumps work according to the same principles as a refrigerator. The difference is that heat, the by-product of the refrigerator, is the goal of the heat pump.

How the heat pump works

The soil stores heat obtained from the sun, wind and rain. This geothermal energy is absorbed by the brine at a low temperature in the geothermal collector, the geothermal probe or similar. A circulation pump then conveys the “heated” brine into the evaporator of the heat pump. There, this heat is transferred to the refrigerant in the refrigeration circuit. The brine cools down again so that it can absorb heat energy again in the brine circuit. The refrigerant is drawn in by the electrically driven compressor, compressed and “pumped” to a higher temperature level. The electrical drive power supplied during this process is not lost, but is largely supplied to the refrigerant. The refrigerant then enters the condenser and transfers its heat energy to the heating water. Depending on the operating point, the heated heating water heats up to 60 °C.

Smart Control is used for regulation, and it assures the independent operation of all safety devices. The WSP series heating system heat pump includes a regulated heating cycle pump, regulated heat source pump, 2 plate heat exchangers for source and heating, dirt trap, compressor, electric expansion valve, safety valve, pressure gauge, filling and draining valve, automatic bleeding valve and flow switch.

A 3-way changeover valve, overflow protection valve and other probes are available as accessories.

Emergency-heat operation

The heat pump can optionally be equipped with a Smart-Serv electric heating coil. This can be used for screed drying as well as for emergency-heat operation. The Smart-Serv can be switched on automatically via the Smart Control. Furthermore, an anti-freeze function is implemented in the event of faults.

Cooling mode

A cooling function can also be implemented with the cooling mode available as an accessory via a panel heating system. The changeover valves installed in the cooling mode allow direct heat transfer from the heating system to the brine system without compressor use. The thermal energy of the heating system is therefore transferred directly to the “cold” brine and thus cooled. The cool heating water is then pumped into the panel heating system and ensures the correct temperature in the living rooms. At the same time, the heat energy regenerates the soil.

Cooling can take place via silent or dynamic cooling.

Passive cooling

Passive cooling refers to the absorption of heat via cooled floors, walls or ceiling surfaces. In doing so, water-carrying pipes make the structural sections into thermally effective heat exchangers. In order to achieve this, the refrigerant temperature has to lie above the dew point, in order to avoid the formation of condensation. Dew-point monitoring is required for this purpose.

Dynamic cooling

With dynamic cooling the refrigerating capacity is actively transferred to the indoor air. This is achieved by means of water-based fan convectors. In doing so, it is desirable that the inlet temperatures are under the dew point, in order to transfer a higher refrigerating capacity and to dehumidify the indoor air.

We recommend dynamic cooling with fan convectors, in order to achieve increased cooling capacity and in order to dehumidify the air on muggy summer days. You will find corresponding devices in the KWD, KWK and WLT-S series on our website: “www.remko.de”. The advantage here is that dew point monitoring is not required.

3.3 Unit description

Installing the heat pump

The WSP heat pumps are equipped with an additional cooling function to ensure a comfortably cool indoor climate in your living rooms in summer mode when outside temperatures are high.

The weather-compensated Smart Control of the heat pump can control the following functions:

- an unmixed heating cycle with an activatable cooling function,
- two mixed heating cycles with an activatable cooling function,
- a separate cooling cycle, i.e. cooling cycle pump and changeover valve,
- changeover valve for hot water preparation,
- circulation pump, temperature- or pulse-controlled (probe or pulse generator available as accessories)

The mixing cycles are set by the specialist technician via the controller.

Fig. 9: Unit overview

1: Smart-Control Touch controller

Heat pump operating mode

Heat pumps can work in various operating modes.

Monovalent

The heat pump the only heat generator for the building all year round. This mode is particularly suitable for heating plants with low supply-water temperatures and is primarily used in combination with brine/water and water/water heat pumps.

Monoenergetic

The heat pump has an electrical heater to handle peak loads. The heat pump covers the majority of the required heating capacity. Occasionally, when outside temperatures are extremely low, an electrical booster-heating system switches on as required in order to support the air/water heat pump.

Bivalent alternative

The heat pump provides the entire heating energy down to a predetermined outside temperature. If the outside temperature drops below this value, a second heat generator switches on to support the heat pump, which shuts down at this point. There is a distinction to be made here between **alternative operation** with oil or gas heating and **regenerative operations** with solar energy or wood-fired heating. This operating mode is possible for all heating systems.

The switchover point depends either on the required heating capacity or on the required inlet temperature.

Automatic function

Brine shortage protection

This function constantly monitors the brine pressure to prevent a possible brine shortage. A pressure sensor switches the heat pump off when the brine pressure falls below the limit. An error is displayed in the error memory until the cause of the error is eliminated. The heat pump switches on again automatically when the brine pressure rises and the error message goes out.

Layout

A precise calculation of the building's heating load according to EN 12831 is required for the design and dimensioning of a heating system. However, approximate requirements can be determined based on the year of construction and the type of building. This table *on page 25* provides an approximate specific heating load for a few types of building. The required heating system output can be calculated by multiplying the area to be heated with the given values.

For a precise calculation, various factors must be considered. The transmission heat requirement, the infiltration heat loss and an allowance for water heating and blocking times comprise the total heating capacity which the heating system must provide.

The total area of the floor surfaces, exterior wall windows, doors and roofing is required in order to determine the transmission heat requirement. In addition, information about the materials used in the building is required, as well as about the different thermal transmission coefficients (known as the K value). Also required are the room temperature and the standard outside temperature, that is, the lowest outside temperature on average that will occur during the year. The equation for determining the thermal transmission requirement is $Q=A \times U \times (t_R-t_A)$ and must be calculated for all enclosed room floor areas.

The infiltration heat requirement takes into consideration how often the heated room air is exchanged for cold external air. The room volume (V), the air exchange frequency (n) and the specific heat capacity (c) of the air is also required in addition to the room temperature and average low temperature. The equation is: $Q=V \times n \times c \ (t_R-t_A)$
An approximate addition for the preparation of domestic water per person amounts in acc. with VDI 2067: 0.2 kW.

Design example

- By way of a design example, a residential home with a living area of 150 m^2 and a heating requirement of approx. 35 W/m^2 was selected. A total of five persons live in the house. The heat load amount to 5.3 kW. Adding a drinking water allowance of 0.2 kW results in a required heating capacity of 6.3 kW. Depending on the power company, an additional charge must then be made in order to factor in any service time-out periods that may apply. The rating and determination of the heat pump's balance-point temperature derives graphically from the heat pump's inlet temperature specific heat-output diagram (in this example 35 °C for underfloor heating). Next, the heat load for the standard outdoor temperature (the lowest temperature of the year locally) and the heat threshold are marked on the graph. The outside-temperature-dependent heating requirement, (Fig. 10) simplified here as a straight-line relationship between heat-load and the start of the heating season, is recorded in the graph of heat-load curves. The intersection of the two straight lines with the rated heat-load curve is plotted on the X axis, where the balance-point temperature is read (in this example approx. -3 °C). The minimum performance of the 2nd heat source is the difference between heat load and the heat pump's maximum heating capacity on these days (in this example, the required power required to cover peak load requirements is approx. 3 kW).

Building type	Specific heating capacity in W/m^2
Passive energy house	10
Low-energy house built in 2002	40
According to energy conservation order regarding heat insulation 1995	60
Modern building constructed around 1984	80
Partially-renovated old building constructed pre-1977	100
Non-renovated old building constructed pre-1977	200

Selection of the brine heat pump WSP

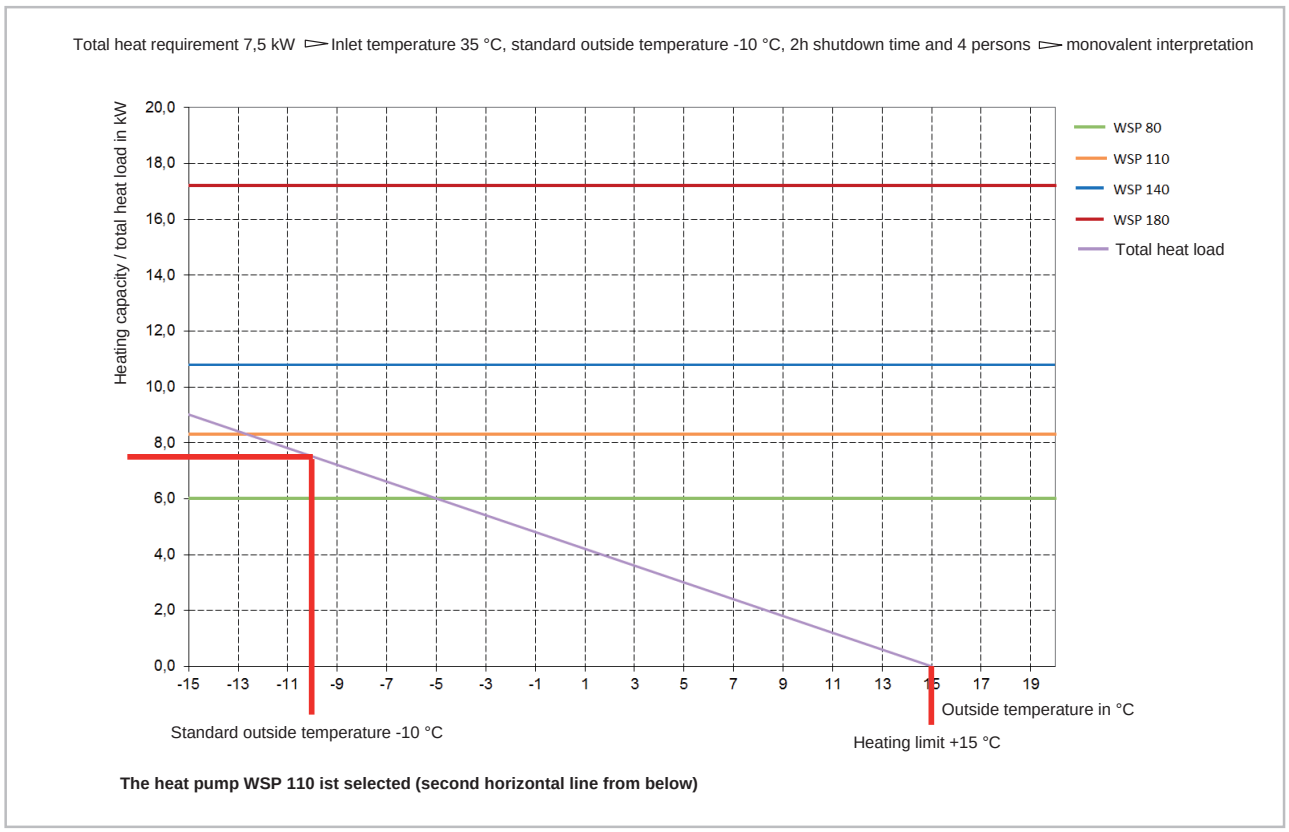


Fig. 10: Selection of the brine heat pump WSP

The comfort zone in the illustration below shows which values for temperature and humidity are considered comfortable for people. This range should ideally be met when heating or air-conditioning buildings.

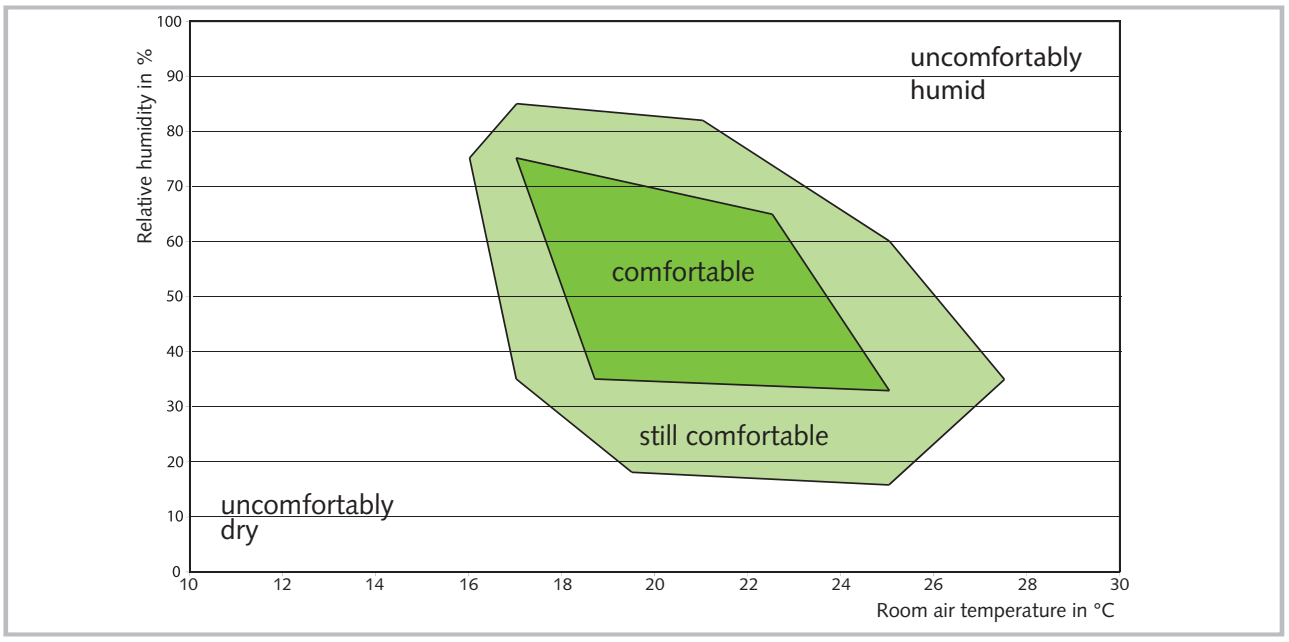


Fig. 11: Comfort zone

4 Assembly

4.1 System layout

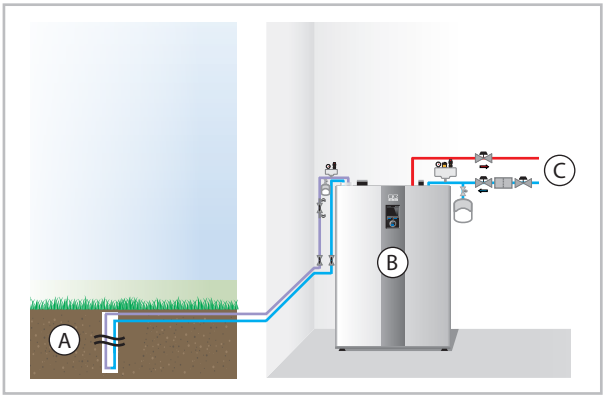


Fig. 12: System layout WSP 80/110

A: Brine cycle
B: Refrigerant cycle
C: Heating cycle

WARNING!

All electric lines are in accordance VDE regulations to dimension and to lay.

4.2 General installation notes

- These instructions are to be observed when installing the heat pump.
- The unit should be delivered as near as possible to the site of installation in its original packaging in order to avoid transport damage.
- The unit is to be checked for visible signs of transport damage. Possible faults are to be reported immediately to the contractual partner and the haulage company.
- Suitable sites for installation are to be selected with regard to machinery noise and the set-up process.
- Establish all electrical wiring in accordance with the relevant DIN and VDE standards.
- The electrical power cables must always be fastened to the electrical terminals in the proper manner. Otherwise there is a risk of fire.
- Ensure that no pipes that carry water pass through living or sleeping areas.

DANGER!

The connection of refrigerant pipes and the handling of refrigerant may be only be carried out by qualified personnel (competence category I).

DANGER!

All electrical installation work must be done by an electrician.

Wall opening

- The required wall cutout of the heat source in the building must be measured in accordance with the protective pipe used so that the building wall can be properly sealed. The wall opening should created with a 10 mm incline from the inside to the outside.
- To prevent damage, the interior of the wall opening should be padded or, for example, lined with PVC pipe (see figure).
- After installation has been completed, use a suitable sealing compound to close off the wall opening, taking account of fire protection regulations (provided by the customer).

4.3 Layout, assembly of heat pump

NOTICE!

The unit is intended for installation in rooms other than damp rooms.

- Depending on local conditions, the noise emission level of the heat pump should be taken into account, and where necessary acoustic insulation measures should be adopted.
- Do not set the unit down under or next to bedrooms.
- Feed through walls and ceilings with structural sound insulation.

The room in which the unit is to be installed must meet the following requirements:

- it must be free of frost
- The room must not be at risk of explosion from dust, gases or vapours.
- If the unit is installed in a boiler room together with other heaters, make sure that the operation of the other heaters is not impaired.
- The minimum volume of the installation room must be 15 m^3.
- The ground must have a sufficient load-bearing capacity.

When installing the heat pump, observe the following points:

- Ensure that the wall bracket is installed level. The heat pump can be aligned precisely by means of the adjustment screws on the back of the housing.
- The heat pump is to be mounted in such a way that sufficient space is available on all sides for purposes of installation and maintenance. It is equally important that there is sufficient space above the device for installing the safety assembly, dirt traps etc.

NOTICE!

Frost or temperatures higher than 35 °C must not occur in the installation room at any time of the year.

Decoupling from building

In order to minimize vibrations and noise in the building, heat pumps must be decoupled from the building to the greatest extent possible. In general, the installation of heat pumps on light weight ceilings/floors is to be avoided. Good sound insulation is achieved by means of a concrete foundation slab with an underlying rubber mat. If a screed floor is laid, the screed and impact sound insulation should be removed from around the heat pump (see illustration below).

Conventional “boiler platforms” are not suitable as soundproofing measures for heat pumps due to the resonance effect.

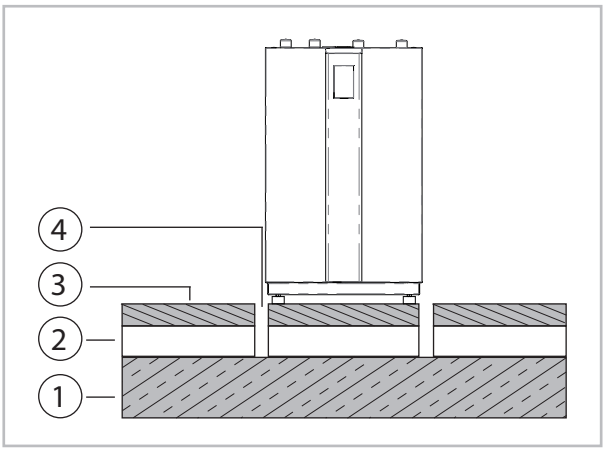
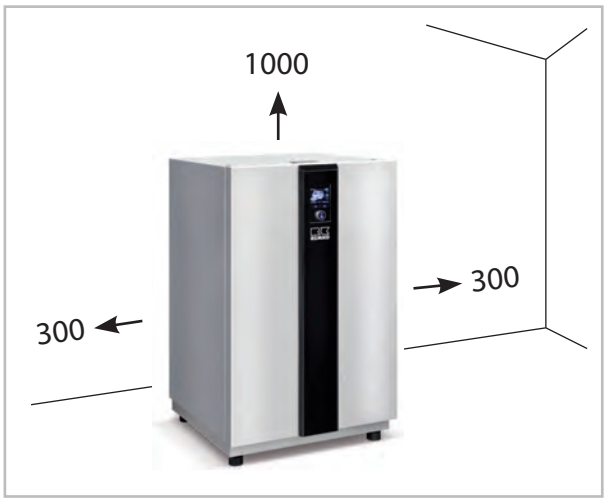


Fig. 13: Decoupling from concrete slab floor

1: Concrete slab floor / 2: Footfall sound insulation
3: Floating screed / 4: Cutout

Recommended minimum spacing for heat pump (figures in mm)



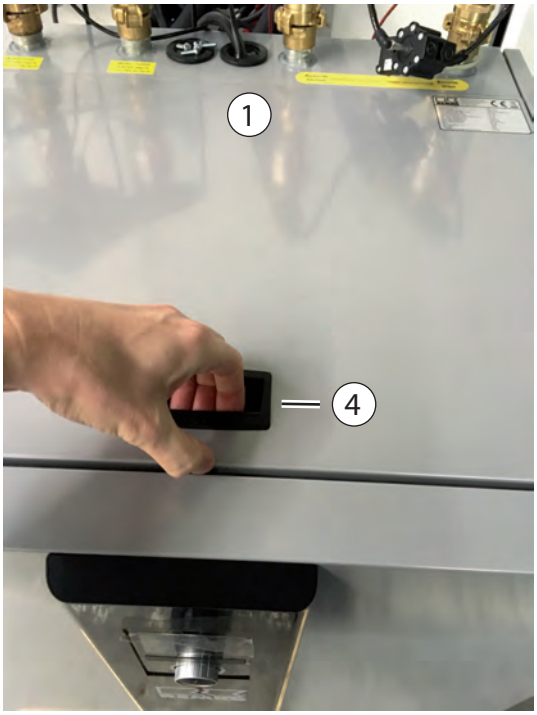
4.4 Opening the unit

Open the unit as follows:

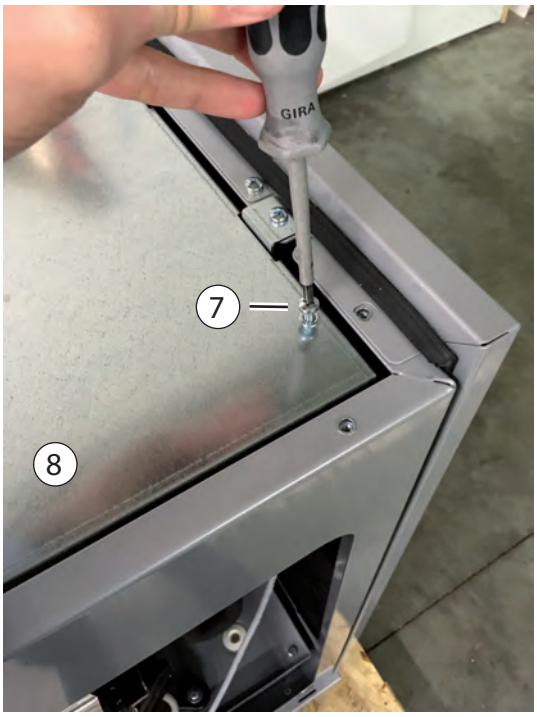
A. Open the unit and switch box cover

1. Remove both cover caps [2] and loosen the two screws [3] on the left and right edges of the cover [1].

2. Remove the cover [1] of the heat pump by pressing it upwards and pulling it forwards out of the rear groove whilst holding the grip [4].



4. Then loosen the screws [7] of the switch box cover [8] and remove it.



B. Opening the front door

1. Loosen the three upper screws [6] behind the front door [5].

2. Then tilt the front door [5] forward and remove it carefully.

4.5 For connection to the brine cycle

When establishing the connection, proceed as follows:

- Flush the pipe system thoroughly before connecting the heat pump to the heat source circuit. Foreign bodies such as rust, sand and sealing material impair the operational safety of the heat pump.
- Connect the brine line to the heat pump's flow and return flow heat source.
- Observe the hydraulic diagrams.

! NOTICE!

A dirt trap must be installed in the heat source inlet of the heat pump to protect the evaporator against contamination.

In addition, a micro-bubble separator must be installed in the heat source system.

Brine filling

The brine must be produced before the system is filled.

The brine volume in the heat pump under operating conditions can be found in the data table (see "Technical Data").

The total volume corresponds to the required brine quantity to be mixed from undiluted ethylene glycol and water. The chloride content of the water shall not exceed 300 ppm.

The brine concentration must be at least 25%. This guarantees frost resistance down to -13 °C. Only monoethylene glycol-based antifreeze must be used. The heat source system must be bled and checked for leaks.

Mixing ratio

The brine concentration varies when using a ground collector or a geothermal probe as a heat source. Refer to the table below for the mixing ratio.

	Ethylene glycol	Water	Anti-freeze protection
Geo-thermal probe	25%	75%	- 13 °C
Soil collector	33%	67%	- 20 °C

NOTICE!

Make the heat insulation of the brine pipes diffusion-proof.

NOTICE!

The brine must consist of at least 25% anti-freeze protection based on monoethylene glycol and must be mixed before filling.

Filling the brine

The built-in diaphragm expansion vessel provided by the customer is open and sealed at the factory.

- Check the inlet pressure (set pressure: 0.5 bar) of the brine-side diaphragm pressure expansion vessel.
- Adjust the pre-pressure if necessary.

The brine/water heat pump is equipped with a brine/water flow switch in the brine cycle. The brine flow switch prevents brine from entering the ground in the event of a leakage in the brine cycle.

If the pressure in the brine cycle falls below 0.7 bar, the brine pressure switch available as an accessory switches the heat pump off. In order for the heat pump to be released again, the pressure must be increased to at least 1.5 bar when the heat pump is at a standstill. To prevent the brine pressure switch from switching off the heat pump without leakage, the heat source side of the heat pump must be filled with a minimum pressure of >1.5 bar during installation.

Checking the brine concentration:

Determine the density of the ethylene glycol-water mixture, for example with an hydrometer. On the basis of the measured density and temperature you can read off the existing concentration from the diagram.

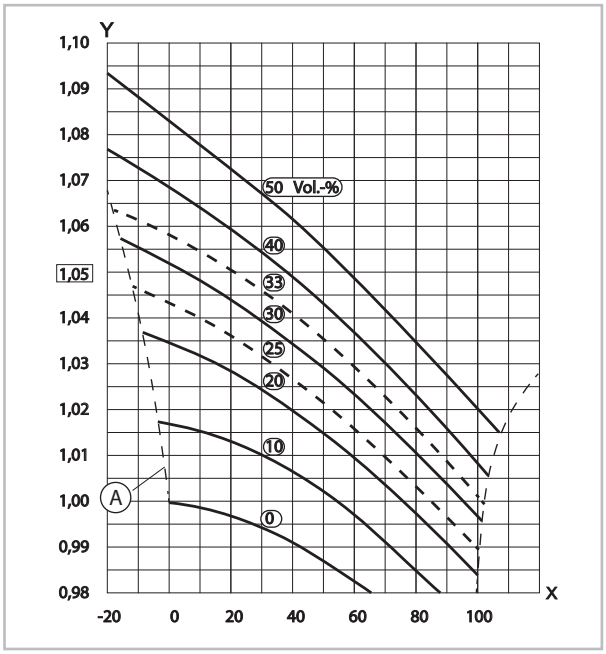


Fig. 14: Determining brine concentration

A: Frost resistance [°C]
X: Temperature [°C]
Y: Density [g/cm^3]

5 Hydraulic connection

A separate interpretation of nominal flow rate must be made for every system (see technical data).

- We recommend installing a buffer tank as a hydraulic compensator for hydraulic isolation of the heating cycle.
  Hydraulic isolation is required when:
  - different inlet temperatures need to be achieved, e.g. underfloor heating / radiators
  - the pressure drop in the heating distribution system is greater than the max. pressure drop stated in the technical data
  - the use of other heat generators, e.g. combustible burner for solid fuel, solar or bivalent (dual-fuel) systems
- Make a pipe-network calculation before installing the heat pump. After installing the heat pump, it is necessary to perform a hydraulic balancing of the heating circuit.
- Protect underfloor heating systems mechanically against excessively high inlet temperatures.
- In cooling mode, the surface heating must be protected against falling below the dew point.
- Do not reduce pipe diameters for the inlet and return flow connections to the heat pump before connecting a buffer tank or floor distributor.
- Plan for air bleed valves and drain-off taps at appropriate places.
- Flush the system's entire pipe network before connecting the heat pump.
- One or, where necessary, several expansion vessels must be designed and installed for the entire hydraulic system.

! NOTICE!

For the WSP device series, a buffer tank must be provided in the return flow pipe to increase the volume.

! NOTICE!

A min. water volume of 3 l/kW heating capacity is required.

- The system pressure of the entire pipe network is to be matched to the hydraulic system and must be checked when the heat pump is turned off.
- As delivered, the safety assembly consists of a pressure gauge, a bleeding valve and a safety valve. A T-piece must be installed between the heat pump connection and the shut-off cock provided. The cap of the quick-bleed device in the safety assembly must be closed when the heat pump is operating!
  The stop cocks supplied are to be positioned accordingly in the supply and return flow of the heating cycle.
- A dirt trap must be fitted outside the heat pump in the return flow. Ensure that the dirt trap remains accessible for inspection and that it can be locked.
- Be sure to position one gate valve upstream and another downstream of the dirt trap. This ensures that the dirt trap can be checked at any time without loosing water.
- The dirt trap must be checked during every maintenance of the system.
- Additionally, an automatic bleeder is installed in the unit for additional bleeding of the heat pump.
- All exposed metallic surfaces must be additionally insulated.
- For cooling mode operation via the heating cycle, a complete vapour density insulation along the entire length of the pipework is recommended.
- All outgoing heating cycles, including the connections for water heating, are to be secured against the ingress of circulating water by means of check valves.
- Before being placed in service, the system must be thoroughly flushed. Conduct a leak test and perform a thorough bleeding of both the heat pump and the entire system - repeatedly, if necessary, in acc. with DIN standards.
- To prevent structure-borne transmission, we advise you to install additional compensators in the inlet line and return flow.

Up-to-date circuit diagrams for hydraulic integration can be found on the internet at www.remko.de

! NOTICE!

Before the first filling of the system, all removable heat pump screw connections and the components delivered by us must be checked to ensure that they are correctly sealed. Damage that results from non-compliance is not covered by the guarantee!

! NOTICE!

Heat pump systems and components from REMKO must be filled and operated with deionised water (completely desalinated). We also recommend the use of the complete heating protection unit available from us. Full protection with glycol should be used in cooling systems. The system water should be tested each time the plant is serviced, but at least once a year. Damage that results from non-compliance is not covered by the guarantee. Below you will find a suitable form for documenting the filling of the system.

Also refer to the chapter on “Corrosion protection”.

REMKO WSP series

Hydraulic diagram for heat pump assembly WSP Mannheim

Functions: Heating and hot water incl. Smart-Serv emergency heating coil

This hydraulic cycle diagram serves solely to assist in planning activities;
the customer-provided hydraulic system on site must be planned and installed by the installation contractor!

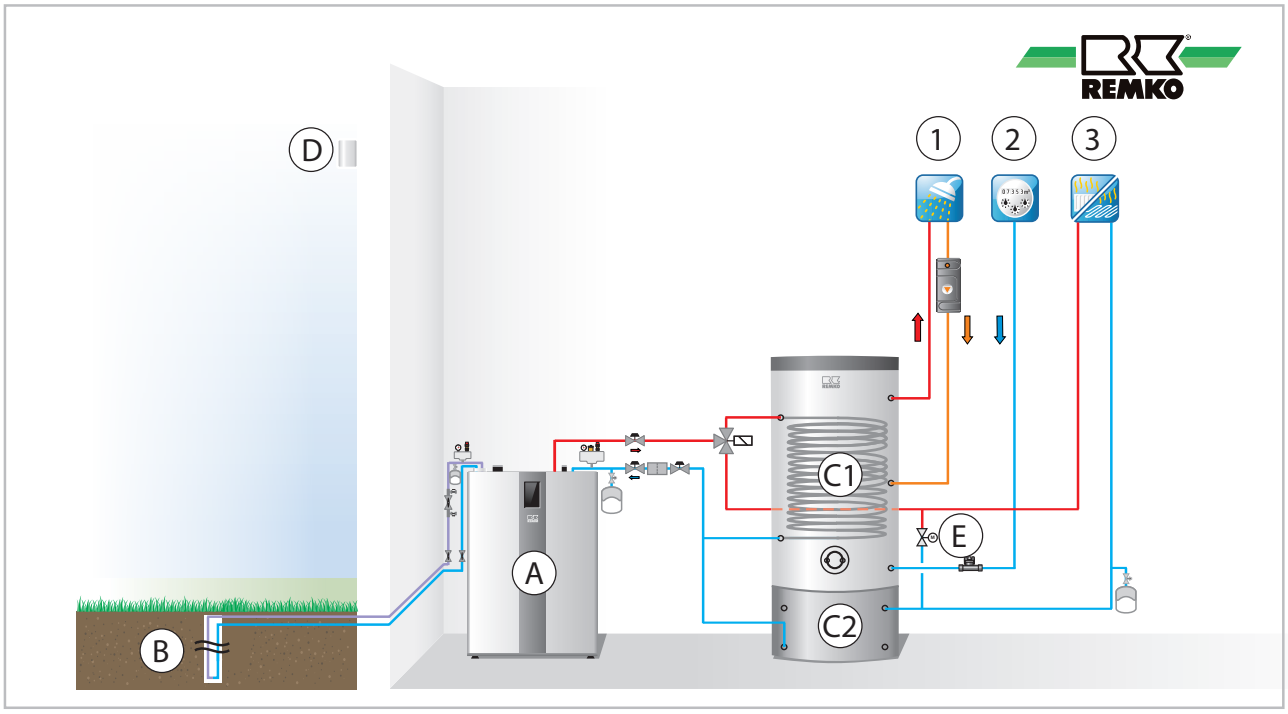


Fig. 15: Example hydraulic cycle diagram WSP_KWS_011217_J

A: Heat pump
B: Heat source
C1: Hot water storage tank
C2: Buffer tank in return flow
D: External probe
E: Electronic overflow valve
1: Hot water
2: Cold water
3: Heating cycle

WSP compact heat pump models are ideal for use in new or in existing buildings, where the heat pump is the sole heat generator.

The highly efficient primary pump inside the unit is used as the heating cycle pump. The combination buffer tank consists of an enamelled 300 l hot water tank [C1] and a 100 l vapour diffusion-tight buffer tank for increasing the volume [C2] which is integrated into the return flow of the heating system. The buffer tank can also serve as a hydraulic compensator if the pressure losses of the heating system are too high (see “Technical Data”).

- The heating cycles connected must be hydraulically balanced.
- The pressure drop between heat pump and storage tank must not exceed 40 kPa.
- A minimum water flow volume of 20 l/KW must be assured.
- The pipe cross sections of the lines from the heat pump to the storage tank may not be reduced.
- The min. water volume with active cooling must be observed.

Hydraulic diagram for heat pump assembly WSP Cologne

Functions: Heating or cooling, operating mode: monoenergetic or bivalent alternative

**This hydraulic cycle diagram serves solely to assist in planning activities;
the customer-provided hydraulic system on site must be planned and installed by the installation contractor!**

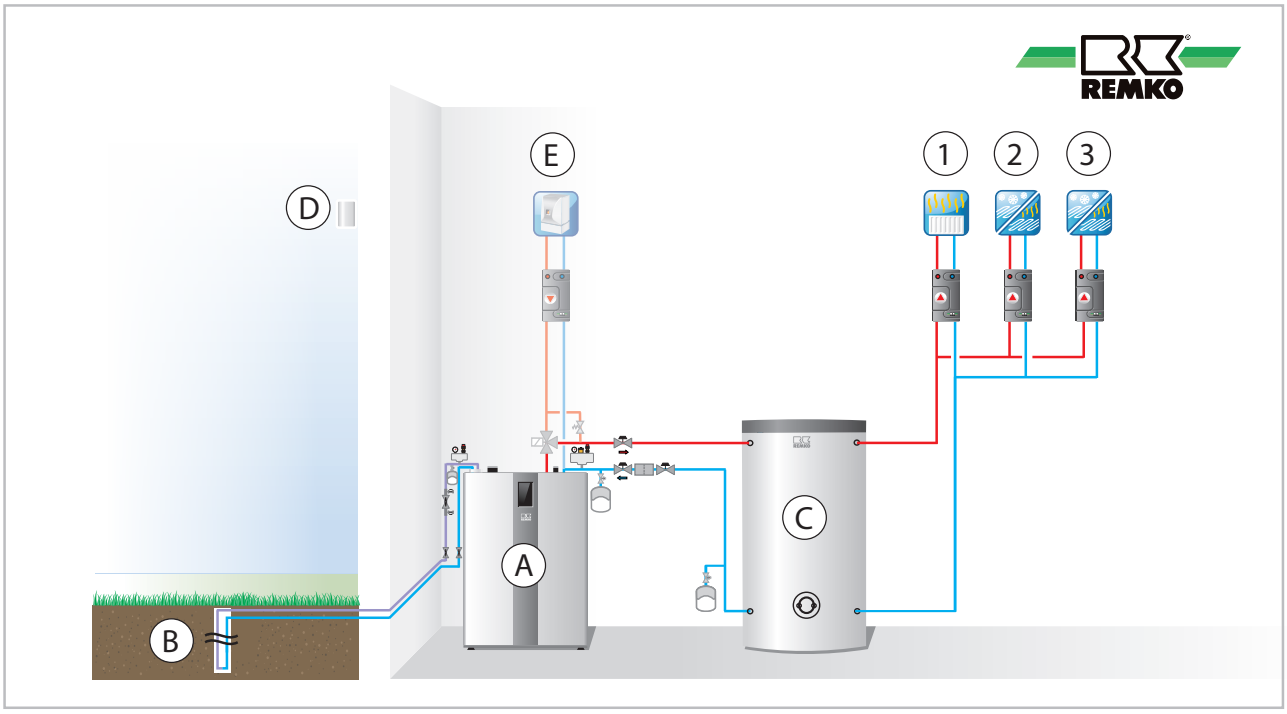


Fig. 16: Example hydraulic cycle diagram WSP_KPS_011217_J

A: Heat pump
B: Heat source
C: Buffer tank
D: External probe
E: Boiler/wall heating device
1: Mixed heating cycle
2: Unmixed heating cycle 1
3: Unmixed heating cycle 2

WSP compact heat pump models are ideal for use in new or in existing buildings, where the heat pump is the sole heat generator. In emergencies, a 2nd heat generator can be connected. This may be the REMKO Smart-Serv auxiliary heater or even a condensing boiler or regular boiler.

The highly efficient primary pump in the unit is used in this package as a circulation pump for storage tank in heat pump operation and is speed-controlled. A REMKO heating cycle group unmixed HGU type and a mixed heating cycle group HGM type are then available.

The KPS 300 buffer tank is used for hydraulic decoupling of the heating system in the event of high pressure losses or volume flows as well as in heating cycles with different inlet temperatures.

- The heating cycles connected must be hydraulically balanced.
- The pressure drop between heat pump and storage tank must not exceed 40 kPa.
- A minimum water flow volume of 20 l/KW must be assured.
- The pipe cross sections of the lines from the heat pump to the storage tank may not be reduced.
- The min. water volume with active cooling must be observed.

REMKO WSP series

Hydraulic diagram for heat pump assembly WSP Frankfurt

Functions: Heating and hot water, operating mode: monoenergetic or bivalent alternative

**This hydraulic cycle diagram serves solely to assist in planning activities;
the customer-provided hydraulic system on site must be planned and installed by the installation contractor!**

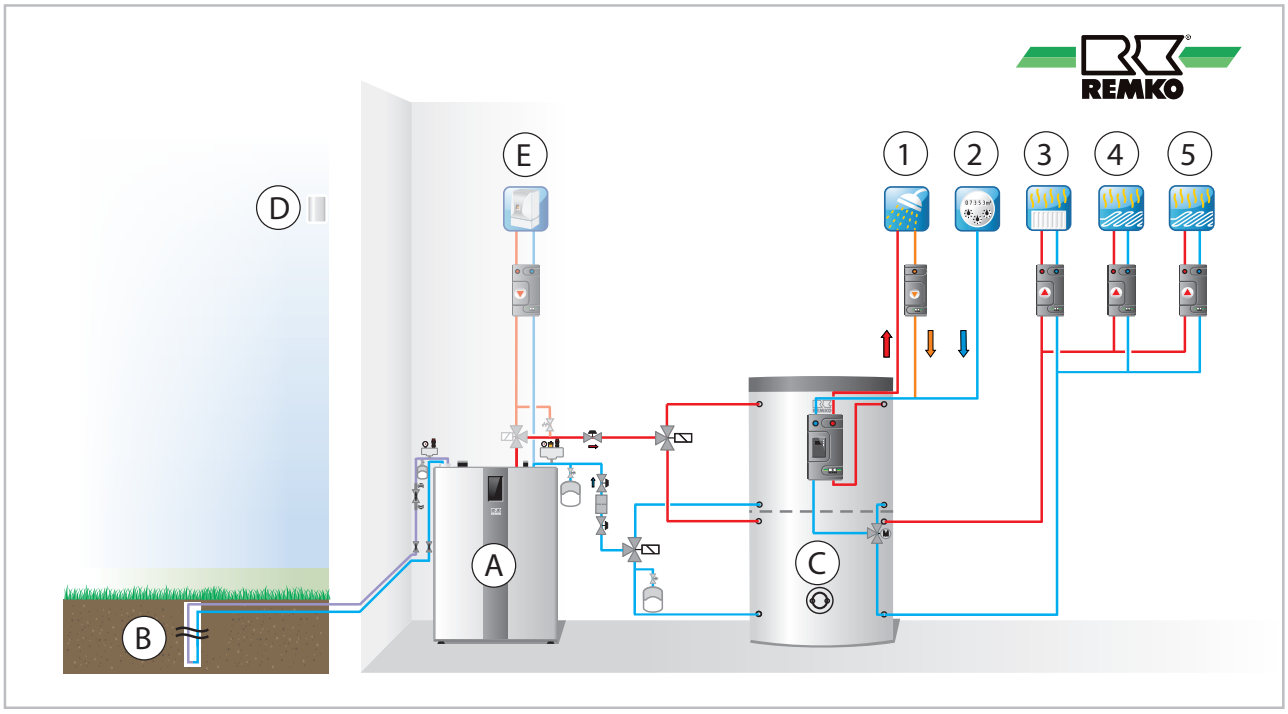


Fig. 17: Example hydraulic cycle diagram WSP_MPS_011217_J

A: Heat pump
B: Heat source
C: Buffer tank
D: External probe
E: Boiler/wall heating device

1: Hot water
2: Cold water
3: Unmixed heating cycle
4: Heating cycle 1 mixed
5: Heating cycle 2 mixed

WSP compact heat pump models are ideal for use in new or in existing buildings, where the heat pump is the sole heat generator. In emergencies, a 2nd heat generator can be connected (bivalent alternative design) via the Smart Control.

The highly efficient primary pump in the unit can be used as a circulation pump for storage tank in heat pump operation and is speed-regulated. A REMKO heating cycle group unmixed HGU type and a mixed heating cycle group HGM type are then available.

The REMKO storage tank, type MPS 800 or 1000, is a combination storage tank for the preparation for domestic water via a fresh water station and a buffer tank for the heating system. The additionally required external three-way changeover valves are switched over by the Smart Control to provide hot water. In a bivalent alternative application the boiler or condensing boiler can be connected after the unit. The external Smart BVT set is available for this as an accessory.

- The pressure drop between heat pump and storage tank must not exceed 40 kPa.
- A minimum water flow volume of 20 l/KW must be assured
- The pipe cross sections of the lines from the heat pump to the storage tank may not be reduced.

Hydraulic diagram for heat pump assembly WSP Frankfurt Solar

Functions: Heating and hot water, operating mode: monoenergetic, bivalent alternative or solar

This hydraulic cycle diagram serves solely to assist in planning activities;
the customer-provided hydraulic system on site must be planned and installed by the installation contractor!

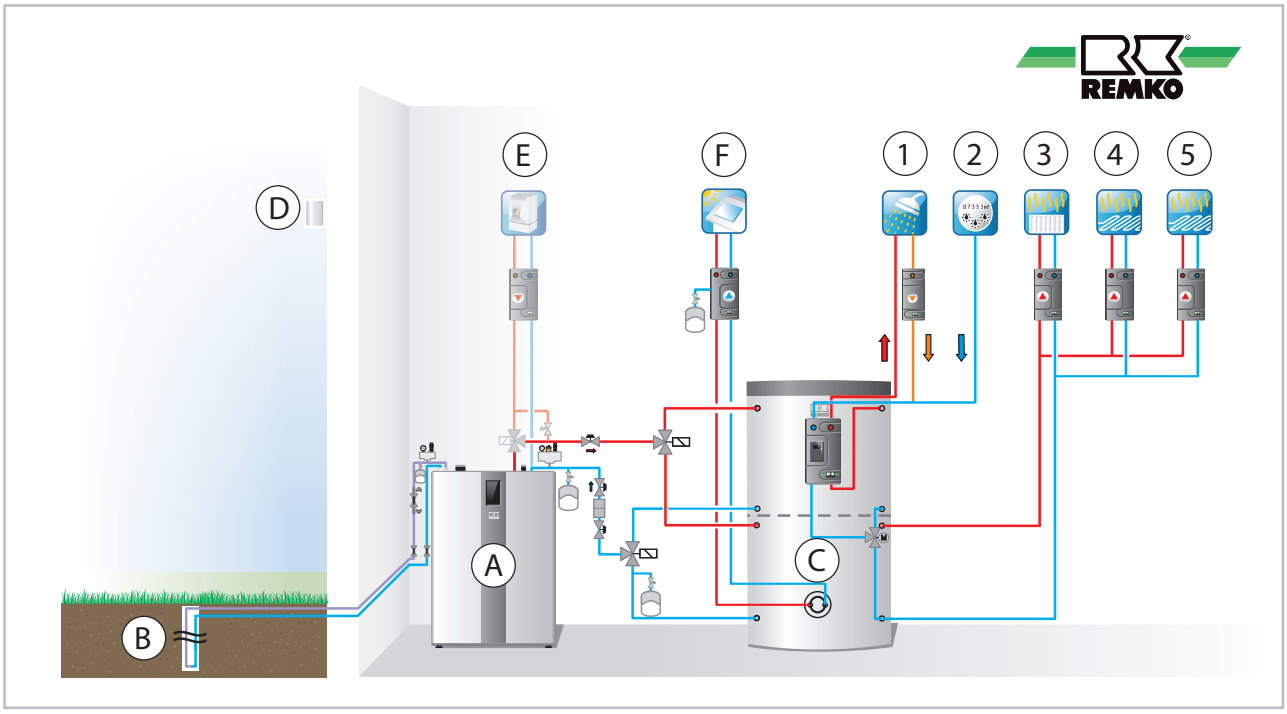


Fig. 18: Example hydraulic cycle diagram WSP_Solar_MPS_011217_J

A: Heat pump
B: Heat source
C: Buffer tank
D: External probe
E: Boiler/wall heating device
F: Solar

1: Hot water
2: Cold water
3: Unmixed heating cycle
4: Heating cycle 1 mixed
5: Heating cycle 2 mixed

WSP compact heat pump models are ideal for use in new or in existing buildings, where the heat pump is the sole heat generator. In emergencies, a 2nd heat generator can be connected (bivalent alternative design) via the Smart Control.

The solar plant included in this package should have a collector surface of approx. 10 m^2 and support hot water and heating.

The primary pump in the unit can be used as a circulation pump for storage tank in heat pump operation and is speed-regulated. A REMKO heating cycle group unmixed HGU type and a mixed heating cycle group HGM type are then available.

The REMKO storage tank, type MPS 800 or 1000, is a combination storage tank for the preparation for domestic water via a fresh water station and a buffer tank for the heating system. The additionally required external three-way changeover valves are switched over by the Smart Control to provide hot water. In a bivalent alternative application the boiler or condensing boiler can be connected after the unit. The external Smart BVT set is available for this as an accessory.

- The pressure drop between heat pump and storage tank must not exceed 40 kPa.
- A minimum water flow volume of 20 l/KW must be assured
- The pipe cross sections of the lines from the heat pump to the storage tank may not be reduced.

REMKO WSP series

Hydraulic diagram for heat pump assembly WSP Mannheim Solar

Functions: Heating and hot water incl. Smart-Serv emergency heating coil

This hydraulic cycle diagram serves solely to assist in planning activities;
the customer-provided hydraulic system on site must be planned and installed by the installation contractor!

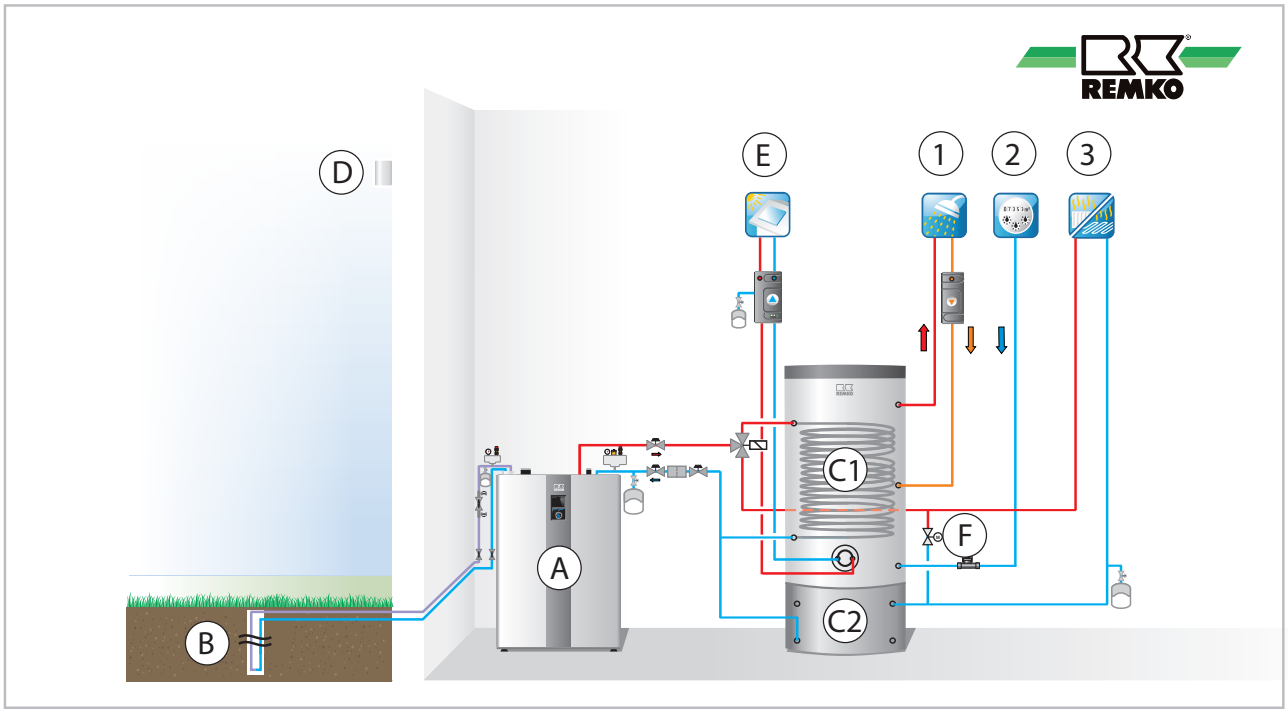


Fig. 19: Example hydraulic cycle diagram WSP_Solar_KWS_011217_J

A: Heat pump
B: Heat source
C1: Hot water storage tank
C2: Buffer tank in return flow
D: External probe
E: Solar
F: Electronic overflow valve
1: Hot water
2: Cold water
3: Heating cycle

WSP compact heat pump models are ideal for use in new or in existing buildings, where the heat pump is the sole heat generator.

The highly efficient primary pump inside the unit is used as the heating cycle pump. The combination buffer tank consists of an enamelled 300 l hot water tank [C1] and a 100 l vapour diffusion-tight buffer tank for increasing the volume [C2] which is integrated into the return flow of the heating system. The buffer tank can also serve as a hydraulic compensator if the pressure losses of the heating system are too high (see “Technical Data”).

The solar plant depicted in this hydraulic system should have a collector surface of approx. 5 m^2 and support hot water preparation.

- The heating cycles connected must be hydraulically balanced.
- The pressure drop between heat pump and storage tank must not exceed 40 kPa.
- A minimum water flow volume of 20 l/KW must be assured.
- The pipe cross sections of the lines from the heat pump to the storage tank may not be reduced.
- The min. water volume with active cooling must be observed.

6 Electrical heating coil

6.1 Layout and function of the electrical heating coil

Layout of the electrical heating coil

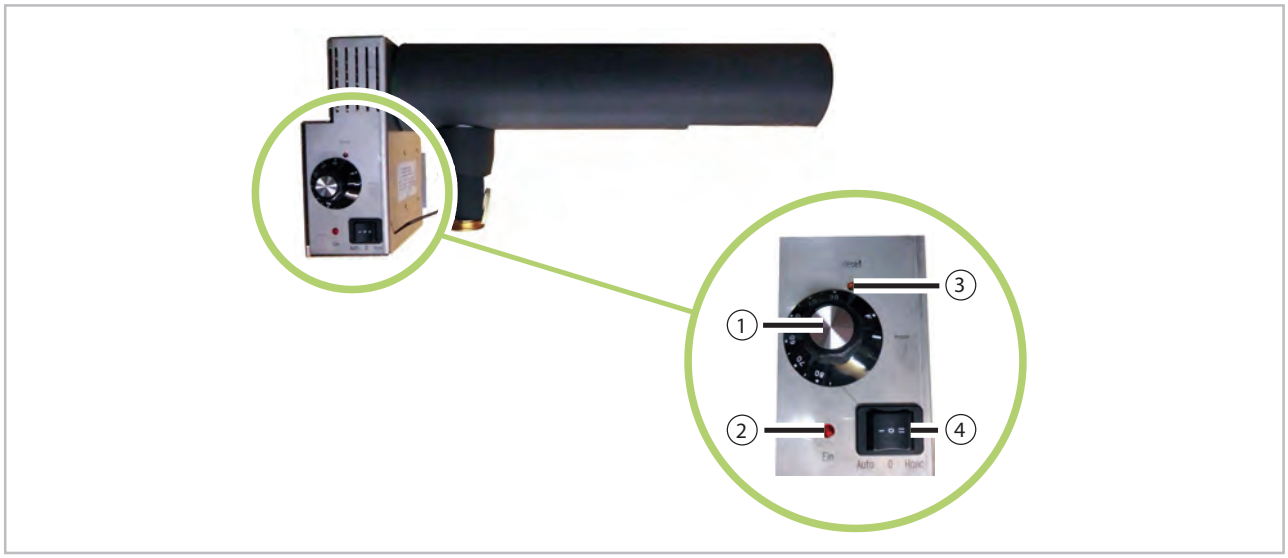


Fig. 20: Electrical heating coil, layout

1: Thermostat including safety temperature limiter (STB)
2: Operating LED (On/Off)
3: Reset STB
4: Operating mode switch (0 = off, I = automatic, II = manual mode)

Operating mode switch:

Automatic mode (I)

When the automatic mode is switched on, the heating coil, in accordance with the set bivalence point or the building heating load and selected inlet temperature, is engaged after a time lag and assists the heat pump in parallel operating mode.

Monoenergetic operation is not necessary for the WSP series, as the heat source can guarantee year-round operation with the heat pump if the system is appropriately rated. The heating rod can be used for emergency heating, floor drying or anti-freeze protection.

Manual operation (II)

When manual operation is engaged, the heating coil is engaged directly, regardless of the parameters in the Smart Control.

This function can be used in the emergency-heat operation, or for the pre-heating of non-installed or operationally capable outdoor units. The temperature is then set using the thermostat on the housing.

In the manual mode of auxiliary heater, the circulation pump in the hydraulic module of the heat pump must be in operation.

! NOTICE!

Pumps and changeover valves must be activated separately in manual operation.
It is not permitted to operate the heating coil without the corresponding medium flow rate!

LED red (On):

This LED indicates if the heating coil is being activated or not.

Reset STB (Reset):

If the overheating of the heating coil has triggered the safety temperature limiter (STL), it can be reset after cooling down again by pressing this button. However, the reason for it being triggered must be analysed and remedied.

6.2 Emergency-heat operation

Should you experience faults with the Smart-Control or the outdoor module during operation of your heat pump system, it is possible to activate a manual emergency-heat operation. To do so, the electric heating coil, internal primary pump, and if necessary the circulation pumps heating cycle must be switched on manually.

To activate **emergency-heat operation if the Smart-Control fails**, proceed as follows:

1. Open the front panel (door).
2. Set the black knob of the electrical terminal box (located on the left-hand side) for the auxiliary heater to "position 2".
3. Set the thermostat on the electrical terminal box of the auxiliary heater to the desired temperature, e.g. floor heating 35 °C, heating element 50 °C.
4. Remove the control line plug of the internal circulation pump in the indoor unit of the heat pump. By pulling out the control line, the circulation pump runs at full load in manual mode.
5. If you are using external heating cycle groups (pumps), adjust these using the handwheel on the front.
6. If you are using external heating cycle groups (pumps), HGU or HGM from Remko, you should also set the rotating wheel on the front of the pump to the "5 o'clock" position.
7. Remove the servo motor of the three-way changeover valve by pulling out the safety split pin between motor and valve body (see separate "Three-way changeover valve" operating instructions).
8. Pull the motor away from the valve body.
9. Turn the cylindrical ball valve in the direction of Outlet B using the round side (FBH heating side or heating element).

To switch to providing hot water, proceed as follows:

1. Turn the cylindrical ball valve in the direction of Outlet A using the round side (drinking water storage tank).
2. Set the thermostat on the electrical terminal box of the booster heater to the desired temperature, e.g. 50 °C.

The following directions of flow must be realised manually:

Valve connection B - Heating

Valve connection A - Drinking water storage tank

The respective operating modes must be switched manually!

To activate **emergency-heat operation if the compressor fails**, proceed as follows:

1. Pressing the menu key (---) of the Smart-Control for approx. 5 seconds takes you to the "Expert" level. Enter the password "0321".
2. Deactivate the heat pump in the "Settings - Basic settings - System configuration" menu point of the expert level. After the heat pump has been switched off, the auxiliary heating will be released.
3. The electric heating element is then activated.
4. Check the set temperature on the thermostat of the electric heating element.
5. If necessary set it above the max. desired temperature (HW target temperature), e.g. if HW target temperature = 45 °C, then heating element = 50 °C.
6. The Smart-Control takes full control of heat regulation and the activation of the heating element.

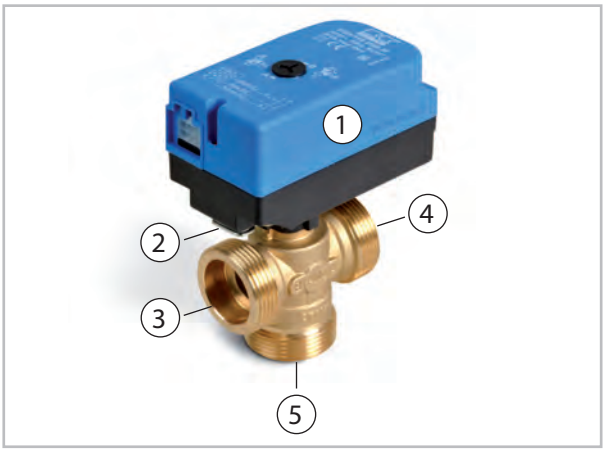


Fig. 21: 3-way switching valve

1: Servo motor
2: Safety split pin
3: Connection A, Drinking water storage tank
4: Connection B, Heating
5: Connection AB

7 Cooling of the heat pump

Cooling via the heating cycle floor (surface heating cycle)

If the WSP heat pump series is to be cooled via the cooling mode available as an accessory, this is possible via the mixed heating cycle. The hydraulic connection is identical to the connection for the heating cycle. If the cycle is used for heating and cooling, it is connected as shown in Fig. 16. The probes S12 and S11 measure the inlet and return temperatures.

Cooling via a separate cooling circuit

If a separate cooling circuit should be used with the system in addition to the heating cycles, then a changeover valve (A14), which is activated with 230 V, must be installed in the inlet pipe. This is attached to the controller on A14. In cooling mode, the valve is switched to the cooling circuit AB/A. If no cooling mode is operated, the valve is de-energised at AB/B heating cycle.

Dewpoint control via the Smart Control cable remote control

If the series WSP heat pump is to be used to implement surface cooling, the Smart Control cable remote control must be installed in the selected reference room (e.g. living room). It is recommended to mount it on an accessible wall in the living area. In doing so it must be ensured that the room air can freely flow over the remote control. The remote control measures the room temperature and room humidity. From these it calculates the nominal dewpoint and correspondingly adjusts the cooling water temperature with a sufficient safety margin so that the temperature on the activated room surface as well as the exposed pipes does not fall below the dewpoint.

The water temperature in the pipes is maintained above the nominal dewpoint temperature by the controller, in order to prevent the formation of condensation on the exposed pipes as well as those concealed under the plaster we recommend the use of a dew point monitor (accessory).

It is also recommended to install a 230 V dewpoint monitor with the associated pipe humidity sensors to the feed pipes outside the heat pump. The location should be selected so that it does not favour the temperature falling below the dewpoint. The switching contact of the dew point monitor must be connected electrically in such a way that, depending on the system layout, it interrupts the power supply of the individual room controllers and the heating cycle pumps or switches the valves of the cooling mode.

Cooling without installed cable remote control in the room

If no additional remote control apart from the heat pump is to be installed in the room, the regulation of the minimum inlet temperature is via the outside temperature minus 6 K. It is then essential to mount an additional 230 V dewpoint monitor with associated pipe humidity sensors on the inlet pipes. The location should be selected so that it does not favour the temperature falling below the dewpoint. The dewpoint monitor is wired so that it divides the connector in the feed line to the utility company switch to the controller (input S16) in order to switch of the heat pump.

Cooling via a parallel buffer tank as a system limit

If the system is operated using a parallel buffer tank that acts as a system limit on the consumer circuit, no remote control must be installed in the living room if the regulation of the consuming cooling circuit is operated via a third-party controller.

Cooling via setpoint

If no additional remote control is installed in the room, the cooling system can be operate at a setpoint that is above the dewpoint. It is recommended to avoid inlet temperatures below 20 °C.

! NOTICE!

Minimum water volume

If the system/water volume in the cooling circuit provided by the customer is less than 5L/kW cooling capacity, an additional buffer tank is recommended to increase the volume. This can be incorporated as a serial buffer in the return flow or as a hydraulic compensator. The KPS series buffer tank can be supplied by REMKO for this.

8 Corrosion protection

Oxygen always plays a role if metal materials in a heating system corrode. pH values and the salt content also play a major role. The challenge: A licenced plumber who would like to be able to guarantee his customers a hot water heating system not at risk of corrosion from oxygen - without the use of chemicals - must pay attention to the following:

- Correct system design by the heating contractor/planner and
- subject to the installed materials: filling the heating system with demineralised softwater or fully deionised water, checking the pH value after 8 to 12 weeks.

VDI 2035 applies for the system types listed below. If the guide values for filling, replenishment and circulation water are exceeded, the water must be pre-conditioned.

Scope of application of VDI 2035:

- Domestic hot-water heating systems as per DIN 4753 (sheet 1 only)
- Water heating systems as per DIN EN 12828 inside the building up to an inlet temperature of 100°C
- Systems that serve building complexes and with a replenishment water volume during their service life that is a maximum of twice the filling water volume

See the following table for the requirements in accordance with VDI 2035 Part 1 with regard to total hardness.

	Total hardness [°dH] subject to the specific system volume		
Overall output in kW	<20 l/kW	≥20 l/kW and <50 l/kW	≥50 l/kW
to 50 kW	≤16,8 °dH	≤11,2 °dH	≤0,11 °dH

The following table provides the allowed oxygen content in connection with the salt content.

Reference values for the hot water in accordance with VDI 2035 Part 2			
		low-salt	salline
Electrical conductivity at 25°C	µS/cm	< 100	100-1500
Oxygen content	mg/l	< 0,1	< 0,02
pH value at 25°C		8,2 - 10,0 *)	

*) For aluminium and aluminium alloys the pH value range is limited: the pH value at 25°C is 8.2-8.5 (max. 9.0 for aluminium alloys)

Water treatment with chemicals

Adding chemicals to treat water should only be done as an exception. VDI 2035 Part 2 requires explicitly under Point 8.4.1 that all water treatment be explained and documented in the system log book. This has reasons:

- The improper use of chemicals often leads to the failure of elastomer materials
- To blockages and deposits because of sludge formation
- To defective floating seals in pumps
- To the formation of biofilm which can cause microbial influenced corrosion or significantly impair heat transfer.

In low-salt water and the correct pH for a short time even to oxygen concentrations up 0.5 mg / l are tolerated.

! NOTICE!

Heat pump systems and components from REMKO must be filled and operated with deionised water (completely desalinated). We also recommend the use of the complete heating protection unit available from us. Full protection with glycol should be used in cooling systems. The system water should be tested each time the plant is serviced, but at least once a year. Damage that results from non-compliance is not covered by the guarantee. Below you will find a suitable form for documenting the filling of the system.

Filling of heating system with completely deionised water

	Initial filling	Year 2	Year 3	Year 4
Filled on				
System volume [litres]				
°dH value				
pH value				
Conductivity [µS/cm]				
Conditioning agent (name and quantity)				
Molybdenum content [mg/l]				
Signature				

Your heating contractor:

VDI directive 2035

Perform annual control measurement!

Fig. 22: Form for logging filling with completely deionised water

Media conveyed by the pumps

Grundfos pump

The pump is suitable for conveying the following media:

- Clean, thin, non-aggressive and non- explosive media without any solid or long-fibred components
- Cooling liquids that are free of mineral oil
- Soft water

The kinematic viscosity of water is ϑ = 1 mm2/s (1 cSt) at 20 °C. If the pump is used to convey liquids that have a different viscosity, the conveying capacity of the pump is reduced.

Example:

A water-glycol mixture with a 50 % glycol ratio has a viscosity of approx. 10 mm2/s (10 cSt) at 20 °C. This reduces the conveying capacity by approx. 15 %. Additives that could impair the functionality of the pump must not be added to the water. The viscosity of the conveyed medium must be taken into consideration when designing the pump.

Wilo pump

The pump can be used to convey water- glycol mixtures with a glycol ratio of up to 50 %. Example of a water-glycol mixture:

Maximum permissible viscosity: 10 to 50 cSt. This corresponds to a water-ethylene glycol mixture with a glycol ratio of approx. 50 % at -10 °C. The pump is controlled by a performance-limiting function that protects against overloading.

The conveyance of glycol mixtures has an impact on the MAX characteristic curve because the conveying performance is reduced in line with the glycol content and the temperature of the media. Temperatures above the nominal temperature specified for the medium in question should be avoided so that the effect of the glycol is not diminished.

As a general rule, operating times should be kept to a minimum if media temperatures are high. It is essential that the plant be cleaned and rinsed before adding the glycol mixture.

To prevent corrosion or precipitates, the glycol mixture must be checked regularly and replaced if necessary. If the glycol mixture needs to be thinned out, follow the instructions of the glycol manufacturer.

9 Electrical wiring

9.1 Important notes

You can find information on the electrical connections of the indoor and outdoor unit, on the terminal assignment of the I/0 module, as well as on the circuit diagrams in the separate "Electrical wiring" operating instructions

NOTICE!

For an existing block the heat pump by the utility (utility switching) must be used the control contact S 16 of the Smart-Control.

10 Before commissioning

Initial commissioning

It is recommended that initial commissioning be carried out by a REMKO service technician or a technician authorised by REMKO. We also recommend that you complete the commissioning report and send it to REMKO by post or e-mail within eight days. In addition, the following requirements for commissioning must be met.

> **! NOTICE!**
>
> Before commissioning, the complete system hydraulics must be flushed and filled in accordance with standards. If a drinking water storage tank is installed, this must likewise be filled before commissioning.

Heating system

- Fill the heating system with demineralised water in accordance with VDI 2035. We recommend the addition of REMKO full heating protection (see *Chapter 8 'Corrosion protection' on page 42*).
- Flush, clean and bleed the entire heating system (incl. hydraulic adjustment).
- To determine possible pressure loss, perform a pressure test. Eliminate leaks to prevent oxygen from entering the piping system.
- Adjust the pre-pressure in the expansion vessel to the static pressure of the system.
- The type of design and the static height of the system determine the operating pressure. The pressure can be read off the pressure gauge.
- Make sure that all valves of the heating system and the distributors are open to guarantee the free medium flow rate.
- Check the direction of flow of the heating cycle (indicated on the heat pump).

Source system (brine-water closed system)

- To determine possible pressure loss, perform a pressure test. Eliminate leaks to prevent oxygen from entering the piping system.
- Adjust the pre-pressure in the expansion vessel to the static pressure of the system.
- Fill the source system completely with brine (water with antifreeze concentration of at least 25%) and bleed it.
- The type of design and the static height of the system determine the operating pressure. The pressure can be read off the pressure gauge.
- Make sure that all valves of the source system and the distributors are open to guarantee the free medium flow rate.
- Check the direction of flow of the source system (indicated on the heat pump).

Source system (water-water system)

- Perform a leak test of the system.
- Ensure that the underwater pump or another pump is pumping water. In some cases the source pump must be bled and filled with water.
- Make sure that all valves of the source system and the distributors are open to guarantee the free medium flow rate.
- Check the direction of flow of the source system (indicated on the heat pump).

11 Commissioning

11.1 Operating panel and notes about commissioning

Before commissioning

> **! NOTICE!**
> Before commissioning, the complete system hydraulics must be flushed and filled in accordance with standards. If a drinking water storage tank is installed, this must likewise be filled before commissioning.

The Smart Control Touch is used to operate and control the complete heating system. The Smart Control Touch is operated via the touch display.

- The unit is pre-installed at the factory. After a reset of the Smart Control, the default parameters are loaded.
- An intensive visual inspection is to be carried out before the actual commissioning.
- Switch on the power supply.
- Then the preinstalled data is loaded and the parameters can be set with the help of the commissioning wizard or in the system configuration. You can find information on this in the separate operating instructions of the Smart Control.

> *Additional information on the functional and operation, refer to the Smart-Control manual.*

12 Care and maintenance

Regular care and maintenance assure fault-free operation and long service life for the heat pump system.

Care

- The heat pump must be kept free of dirt and other deposits.
- The unit is to be cleaned with a damp cloth. In doing so, ensure that no caustic, abrasive or solvent-based cleaning products are used. Use of powerful water jets is to be avoided.

Cleaning the heat source site

> **! NOTICE!**
> A dirt trap must be installed in the heat source inlet of the heat pump to protect the evaporator against contamination.

The filter screen of the dirt trap should be cleaned one day after commissioning. Further checks should be determined according to the level of pollution. If no more impurities are visible, the filter of the dirt trap can be removed to reduce the pressure losses.

Maintenance

- To perform the statutory leak test where applicable, it is necessary to arrange a yearly maintenance contract with an appropriate specialist firm.

Leak test

According to Regulation (EC) No. 842/2006, all refrigeration systems containing a refrigerant filling quantity of at least 2.4 kg, with “hermetically sealed” refrigeration systems of at least 4.7 kg, must be checked for leaks by the operator yearly. The leak test must be documented and kept for at least 5 years. The checks must be carried out by certified personnel in accordance with Regulation (EC) No. 1516/2007.

> **! NOTICE!**
> If the refrigerant capacity of 2.4 or 4.7 kg is exceeded, an annual leak testing must be made of the refrigerant circuit by a firm specialising in this field. A heat pump should always be serviced yearly. Therefore, we recommend arranging for a service contract that includes the leak inspection.

NOTICE!

Country-specific laws may differ from Regulation (EC) 842/2006. The respective national laws for leak testing of heat pumps must be observed.

Checking the filling level and filling pressure of the brine cycle

NOTICE!

Leaks in the brine cycle can lead to brine leaking and damage. For this purpose, switch off the automatic circuit breakers of the heat pump.

- Switch off the heat pump if there are leaks in the brine cycle.
- Have leaks repaired by your specialist technician.

NOTICE!

If the brine level is too low, the heat pump may be damaged.

- After initial operation, check the brine level daily for one week and half-yearly thereafter.
- Have your specialist refill the brine liquid.

If the brine level drops slightly in the first month after the system is commissioned, this is normal. The level can also vary depending on the temperature of the heat source. However, it must never sink so far that it is no longer visible in the brine expansion tank, as otherwise air will enter the brine cycle. Check the brine level or filling pressure of the brine cycle and the pre-pressure of the diaphragm expansion vessel at regular intervals.

You can read the filling pressure of the brine cycle (“pressure heat source”) in the heat pump controller.

The filling pressure should be between 1 and 2 bar. If the filling pressure drops below 0.2 bar, the heat pump is automatically switched off and an error message is displayed.

13 Temporary shutdown

The system may not be switched off at the mains power supply even if the heat pump is not used for heating purposes over an extended period (e.g. holidays)!

- The system is to be switched to "Stand-by" mode for heating during temporary shutdowns and for hot water it should be switched to "Off" mode.
- Heating phases can be programmed for the duration of the period of absence.
- The previous operating mode has to be switched back on when the shutdown phase is over.
- Instructions for changing the mode appear in the corresponding chapter of the heat-pump manager's manual.

NOTICE!

In "Standby" , the heat pump is in standby mode. Of the entire system, only the frost-protection function s activated.

14 Troubleshooting and customer service

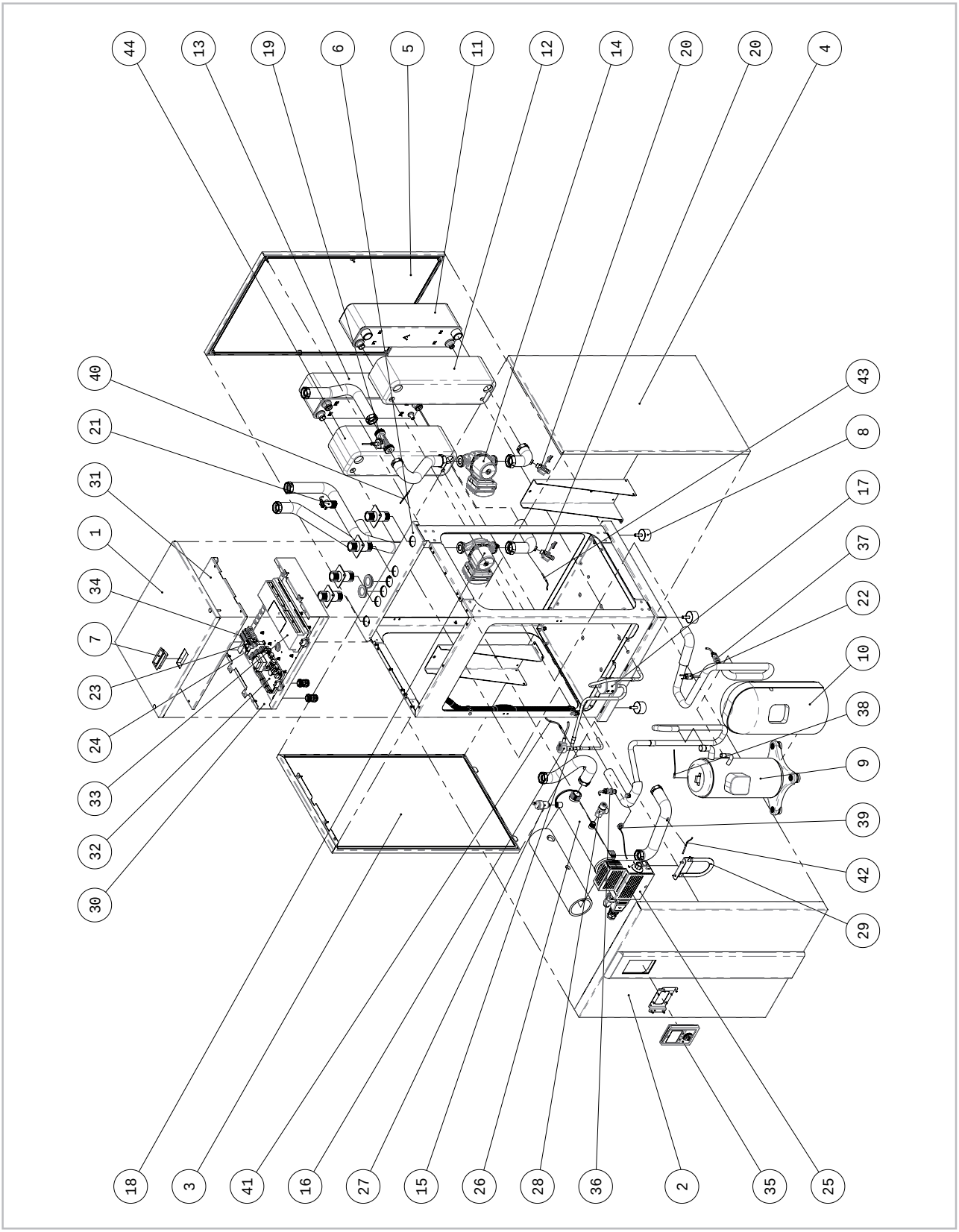
14.1 General troubleshooting

The unit has been manufactured using state-of-the-art production methods and has been tested several times to ensure that it works properly. However, in the event that malfunctions should occur, the unit should be checked against the following list. Please inform your dealer if the unit is still not working correctly after all of the functional checks have been performed.

Malfunction	Possible causes	Remedial measures
The heat pump does not start or switches itself off	Power failure, under-voltage	Check the voltage and, if necessary, wait for it to come back on
	Defective mains fuse/main switch turned off	Exchange mains fuse, master switch on
	Damaged power supply	Repair by specialist firm
	Power company off-period Disable signal is shown in the display!	Wait until the power-company off-period is over and the heat pump starts up as required
	Operational temperature limits too low or too high	Observe temperature ranges
	Nominal temperature exceeded, incorrect operating mode	The set-point temperature has to be higher than the heat generator temperature, check mode
	Wiring fault on the heat pump	Disconnect the heat pump, then establish the correct terminal sequence using the connection plan. Re-establish voltage to the heat pump. Also make sure that the protective earth is connected correctly
Heating cycle pump does not switch off	Incorrect pump switching action	Have pump switching of ‘heating circuit’ checked out at specialist level
Heating cycle pumps fail to switch on	Incorrect operating mode set	Check mode
	Control board fuse in heat pump switching cabinet faulty	Exchange the fuse on the left side of the control board
	Incorrect heating program set	Check heating program. In the cold heating period, we recommend the ‘heating’ operating mode
	Temperature overlapping, e.g. outside temperature greater than room temperature	Check temperature ranges. Sample test!

15 General view of unit and spare parts

15.1 General view of heat pump WSP 80/110/140/180



REMKO WSP series

Heat pump spare parts list WSP 80/110/140/180

No.	Designation	WSP 80/110/140/180
1	Cover	On request by providing the serial number
2	Front door	
3	Side section, left	
4	Side section, right	
5	Back wall	
6	Adapter plate, top	
7	Recessed grip	
8	Feet (height-adjustable)	
9	WSP compressor	
10	Compressor hood	
11	Plate heat exchanger heating system	
12	Insulation shell, plate heat exchanger on heating system	
13	Plate heat exchanger heat source	
14	Grundfoss heating circulation pump	
15	Electronic expansion valve	
16	Coil for expansion valve	
17	Refrigerant dryer	
18	Grundfoss heat source circulation pump	
19	Heating system flow sensor	
20	Ball valve for filling/drainage	
21	Heat source flow sensor	
22	High pressure switch	
23	Compressor relay	
24	Phase monitoring relay	
25	Heating element 9 kW	
26	Smart-Serv incl. Bottle	
27	Automatic bleeding valve	
28	Safety valve, 3 bar	
29	Retaining bracket booster heating 9 kW	
30	Switch box	
31	Lid of switch box	
32	Heat pump control board	
33	SMT I/O module	

No.	Designation	WSP 80/110/140/180
34	Terminal strips	On request, please specify the serial number
35	Smart Control Touch operating panel	
36	Pressure sensor suction side/low pressure	
37	Pressure sensor pressure-side/high pressure	
38	Heat gas probe	
39	Probe suction-side	
40	Carel heating return/inlet heat pump probe	
41	SMT PT1000 heating inlet SMT probe	
42	Carel heating inlet/outlet heat pump probe	
43	Carel inlet brine probe	
44	Brine insulation shell, plate heat exchanger	
	Spare parts not illustrated	
	SMT PT1000 brine return flow probe	On request, please specify the serial number
	SD card (current software without Smart Web, Smart Count)	
	Connection cable for pressure sensors	
	Code resistance 200/240/300/360 Ohm	
	Red indicator light for REMKO Smart Serv	
	Carel additional circuit board	

To assure the correct delivery of spare parts, please always provide the unit type with its corresponding serial number (see name plate).

Components of fittings set (without illustration)

Designation	WSP 80/110/140/180
Fittings set, complete	On request, please specify the serial number
Immersion probe	
Dirt trap	
Ball valve 1“, red	
Ball valve 1“, blue	
Safety assembly	
External probe	

To assure the correct delivery of spare parts, please always provide the unit type with its corresponding serial number (see name plate).

16 General terms

Defrosting

At outdoor temperatures below 5 °C it is possible that ice may form on the evaporators of air/water heat pumps. The removal of this ice is referred to as defrosting and is undertaken by supplying heat, either regularly or as requirements dictate. Air/water heat pumps with circuit-reversal are distinguished by their demand-actuated, quick and energy-efficient defrosting system.

Bivalent operation

The heat pump provides the entire heating energy down to a predetermined outside temperature (e.g. -3 °C). If the temperature drops below this value, the heat pump switches off and the second heat generator takes over the heating, e.g. a heating boiler.

Seal inspection

System operators are obliged to ensure the prevention of refrigerant leakage in accordance with the directive on substances that deplete the ozone layer (EU Regulation 2037/2000) and the Regulation on Certain Fluorinated Greenhouse Gases (EU Regulation 842/2006). In addition, a minimum of one annual maintenance and inspection must be carried out, as well as a leak test for refrigerating plants with a refrigerant filling weight over 3 kg.

Energy supply company switching

Certain energy supply companies offer special tariffs for the operation of heat pumps. These special tariffs are usually associated with off-periods, and legislation stipulates that a max. of 3 off-times per day, each of max. 2 hours in duration, can be taken.

When switching off the power supply companies only on the barrier is in contact only requirement of a heat source (heat pump) is blocked. Be switched off at monoenergetic operation, the power supply of the electric heating element with.

Expansion valve

Heat pump component for lowering the condensing pressure on the vapour tension. In addition, the expansion valve regulates the quantity of injected refrigerant in relation to the evaporator load.

Limit temperature/bivalence point

Outside temperature at which the 2nd heat generator is turned on for bivalent operation.

Heating capacity

Flow of heat emitted from the condenser to the environment. The heating capacity is the sum of the electrical power consumed by the condenser and the heat flux obtained from the environment.

Annual performance number

The annual performance number relates to the ratio of heat content delivered by the heat pump system to the supplied electrical energy in one year. It may not be compared to the performance number. The annual performance number expresses the reciprocal of the annual power input factor.

Annual power input factor

The annual power input factor indicates the power input (e.g. electrical energy) required in order to achieve a certain benefit (e.g. heating energy). The annual power input factor includes the energy required for auxiliary drives. Calculation of the annual power input factor is based on VDI Directive 4650.

Refrigeration circuit, hermetically sealed (according to EN ISO 14903:2017)

System, in which all parts carrying refrigerants are connected by welding, brazing or a comparable permanent leak-tight connection, which may contain valves with caps and working connections with caps which permit proper repair or disposal and which, under a pressure of at least one quarter of the maximum permissible pressure, has a tested degree of tightness control of less than 3 g per year.

Refrigerating capacity

Heat flux extracted from the environment by the evaporator (air, water or soil).

Refrigerant

The working medium used in a refrigerant plant, e.g. heat pump, is referred to as the refrigerant. The refrigerant is a liquid which is used for thermal transfer in a refrigeration plant and which is able to absorb heat by changing its state at low temperatures and low pressures. A further change of state at higher temperatures and higher pressure serves to dissipate this heat.

Compressor (condenser)

Unit designed for the mechanical conveyance and compression of gasses. Compression serves to significantly increase the pressure and temperature of the medium.

Coefficient of performance

The current ratio of thermal output produced by the heat pump to the consumed electrical power is referred to as the coefficient of performance, as measured under standardised boundary conditions according to EN 255 / EN 14511. A coefficient of performance of 4 means that a usable thermal output amounting to 4-times the electrical power consumption is available.

Monoerergetic operation

The heat pump covers a large proportion of the required thermal output. On a few days per year an electrical heating coil supplements the heat pump under extremely low outdoor temperatures. Dimensioning of the heat pump for air/water heat pumps is generally based on a limit temperature (also known as balance point) of approx. -5 °C.

Monovalent operation

In this mode, the heat pump is the sole heating appliance in the building all year round. Normally brine/water or water/water heat pumps are oerated monovalently.

Buffer tank

The installation of a hot water buffer tank is generally recommended in order to extend the running time of the heat pump under low heat requirements. A buffer tank is required for air/water heat pumps in order to bridge off-periods.

Heat source

Medium from which the heat pump derives heat, in other words, soil, air and water.

Noise

Noise is transmitted in media such as air or water. Essentially there are two types of noise, airborne sound and structure-borne sound. Airborne sound is transmitted entirely via the air. Structure-borne sound is transmitted in solid materials or liquids and is only partially radiated as airborne sound. The audible range of sound lies between 20 and 20,000 Hz.

Sound pressure level

The sound pressure level is a comparable characteristic quantity for the radiated acoustic output of a machine, for example, a heat pump. The noise emission level at certain distances and acoustic environments can be measured. The standard is based on a sound pressure level given as a nominal noise level.

Evaporator

Heat exchanger on a refrigerant plant which uses the evaporation of a working medium in order to extract heat from its environment at low temperatures (e.g. the outdoor air).

Condenser

Heat exchanger on a refrigerant plant which liquefies a working medium in order to transmit heat to its environment (e.g. the heating system).

Regulations and guidelines

The erection, installation and commissioning of heat pumps has to be undertaken by qualified specialist engineers. In doing so, various standards and directives are to be observed.

Heat requirement assessment

A precise dimensioning of the system must be carried out for heat pump systems in order to maximise efficiency. Calculation of the heat requirement is undertaken according to national standards. However, approximate requirements can be determined based on the W/m² tables multiplied by living space to be heated. The result of this is the overall heat requirement, which includes the transmission heat requirement and the infiltration heat loss.

Heat carrier

Liquid or gas medium (e.g. water, brine or air) with which heat is transported.

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