Operating and installation instructions

REMKO RBW PV series

Hot-water heat pumps
Air/water system for hot-water preparation

RBW 301 PV, RBW 301 PV-S

Instructions for Technicians

0179-2021-08 Edition 3, 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 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.

1.2 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.

1.3 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.

1.4 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.

1.5 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.

1.6 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.

1.7 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.
- Local regulations and laws such as Water Ecology Act 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 a heightened 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 must not be altered or bypassed.

1.8 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.

1.9 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.

1.10 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.

1.11 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!

1.12 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

Series		RBW 301 PV	RBW 301 PV-S
Function		Domestic hot-water heating	
System		Air/water heat pump	
Drinking water tank enamelled, gross volume	l	Series 300	
Drinking water tank enamelled, net volume	l	287	280
Auxiliary heater/rated output	kW	Series/1.5	
Usable limits, heating	°C	-7 to +40	
Min./max. Water temperature	°C	38/60	
Heating capacity for A7/W50	kW	1.8	
COP per ErP [1)]	COP	3.72	
Energy efficiency ratio		A+	
Power supply	V/~/Hz	230/1/50	
Electrical rated power consumption	kW	0.46	
Max. rated power consumption	kW	2.06	
Rated current consumption	A	8.92	
Max. current consumption	A	9.0	
Daily electricity consumption Q_{elec}	kWh	6,049	
Refrigerant/basic capacity	--/kg	134A[2)]/1.25	
CO_2 equivalent	t	1.79	
Fuse protect. provided by the customer (per outd. unit)	A slow-acting	16	
Sound power level/sound pressure 1m hemispherical	dB(A)	57,9/40,9	
Max. airflow volume	m^3/h	350	
Min. medium flow rate	m^3/h	175	
Max. operating pressure	bar	7	
Air duct connection	mm	145	
Hydraulic connection, water-side	Inches	IG 3/4"	
Condensate-drain socket	Inches	IG 1/2"	
Max. permissible air-side pressure loss	Pa	50	
Pipe length supply/exhaust duct max.	m	6	
Dimensions (height/diameter/tilt height)	mm	1840/640/1920	
Enclosure class	--	IP X1	
Weight	kg	136	142

[1)] COP = coefficient of performance (heating capacity figure)

[2)] Contains greenhouse gas according to Kyoto protocol, GWP 1430

Integrated heat exchanger

Series		RBW 301 PV	RBW 301 PV-S
Solar heat exchanger	m^2	---	1.5
Heat exchanger connection	Inches (mm)	---	G 3/4" (19.05)

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

2.2 Product data

Average condition

Series		RBW 301 PV	RBW 301 PV-S
Energy efficiency ratio		A+	
Load profile		XL	
Hot water preparation energy efficiency (mean temperature period A20/W55)	%	154	
Hot water preparation energy efficiency (A14/W35)	%	145	
Current consumption stand-by	kW	0,037	
Yearly energy consumption Q_{HE} (average) [1)]	kWh	1087	
Factory temperature setting	°C	50	
Inside sound power level	dB(A)	57,9	

Product data for water heaters with heat pump according to delegated regulation (EU) 812/2013

Name of supplier:		REMKO GmbH & Co. KG	
Supplier model identifier:		**RBW 301 PV**	**RBW 301 PV-S**
Energy efficiency ratio (average climatic conditions)		A+	
Load profile		XL	
Hot water preparation energy efficiency (average climatic conditions A7/W55)	%	130.6	
Yearly energy consumption (average climatic conditions) [1)]	kWh	1282	
Sound power level L_{WA}, inside/outside	dB(A)	57	
Factory delivery temperature setting	°C	50	
Hot water preparation energy efficiency ratio (colder A2/W55 / warmer A14/W55 climatic conditions)	%	119/145	
Yearly energy consumption (colder A2/W55/warmer A14/W55 climatic conditions)	kWh	1405/1158	
Heat losses	W	44	
Volume of mixed water at 40 °C	L	347	
Storage volume RBW/PV/RBW PV-S	L	287/280	

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

When assembling, installing or maintaining the water heater, pay particular attention to the following:

The electrical installation is to be carried out exclusively by trained or certified personnel. The refrigeration maintenance and service is to be carried out only by qualified persons. For maintenance and opening of the heat pump, the mains supply line is to be disconnected from the power supply.

2.3 Unit dimensions and designations of the pipe connections

RBW 301 PV

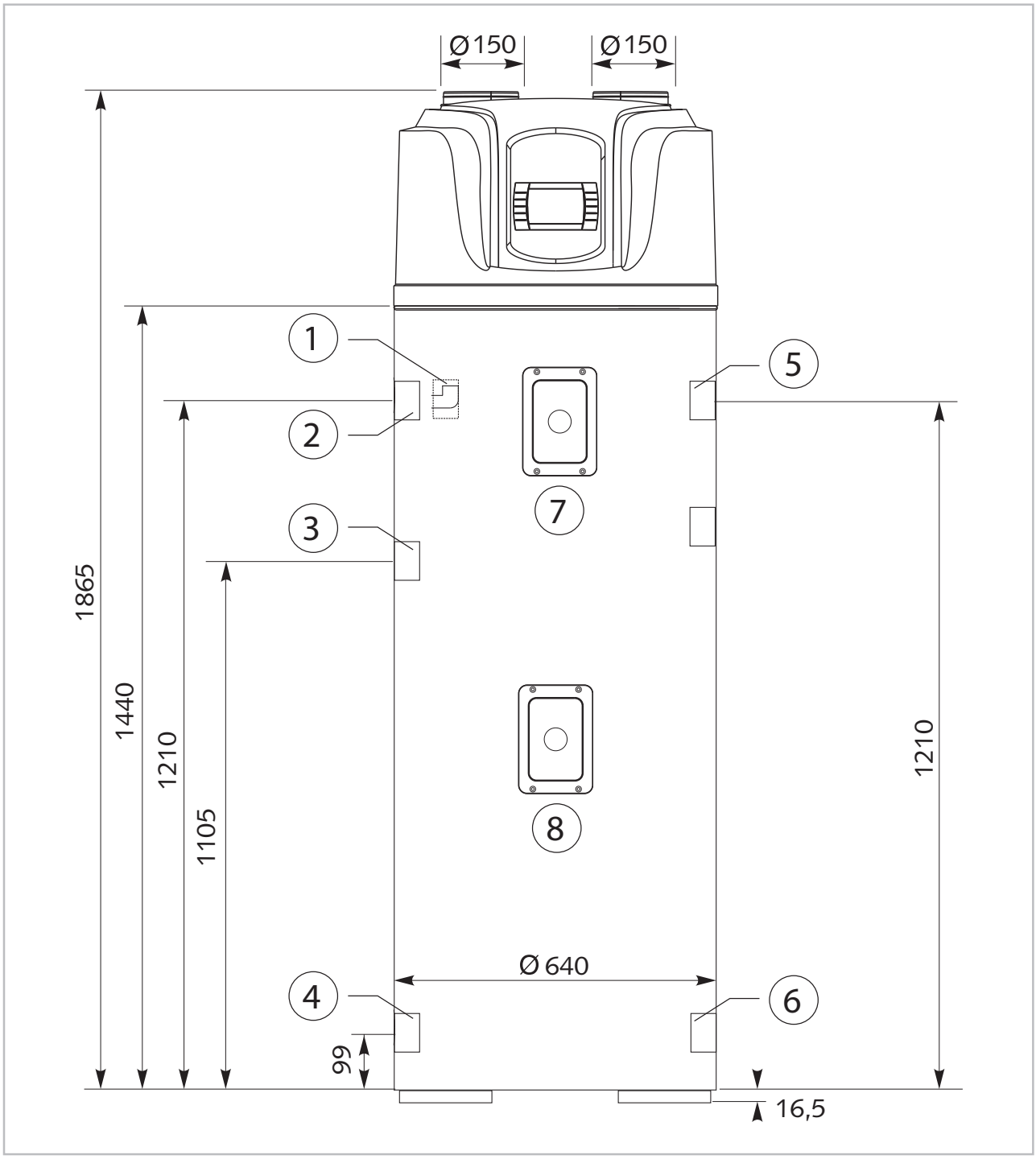


Fig. 1: Dimensions and designations of the pipe connections (data in mm)

1: Condensate drain Rp 1/2
2: Hot water outlet G 3/4"
3: False anode
4: Cold water inlet G 3/4"
5: Safety valve connection
6: Drainage G 3/4"
7: Overheating protection
8: Heating coil

We reserve the right to make changes within the framework of technical advancement!

RBW 301 PV-S

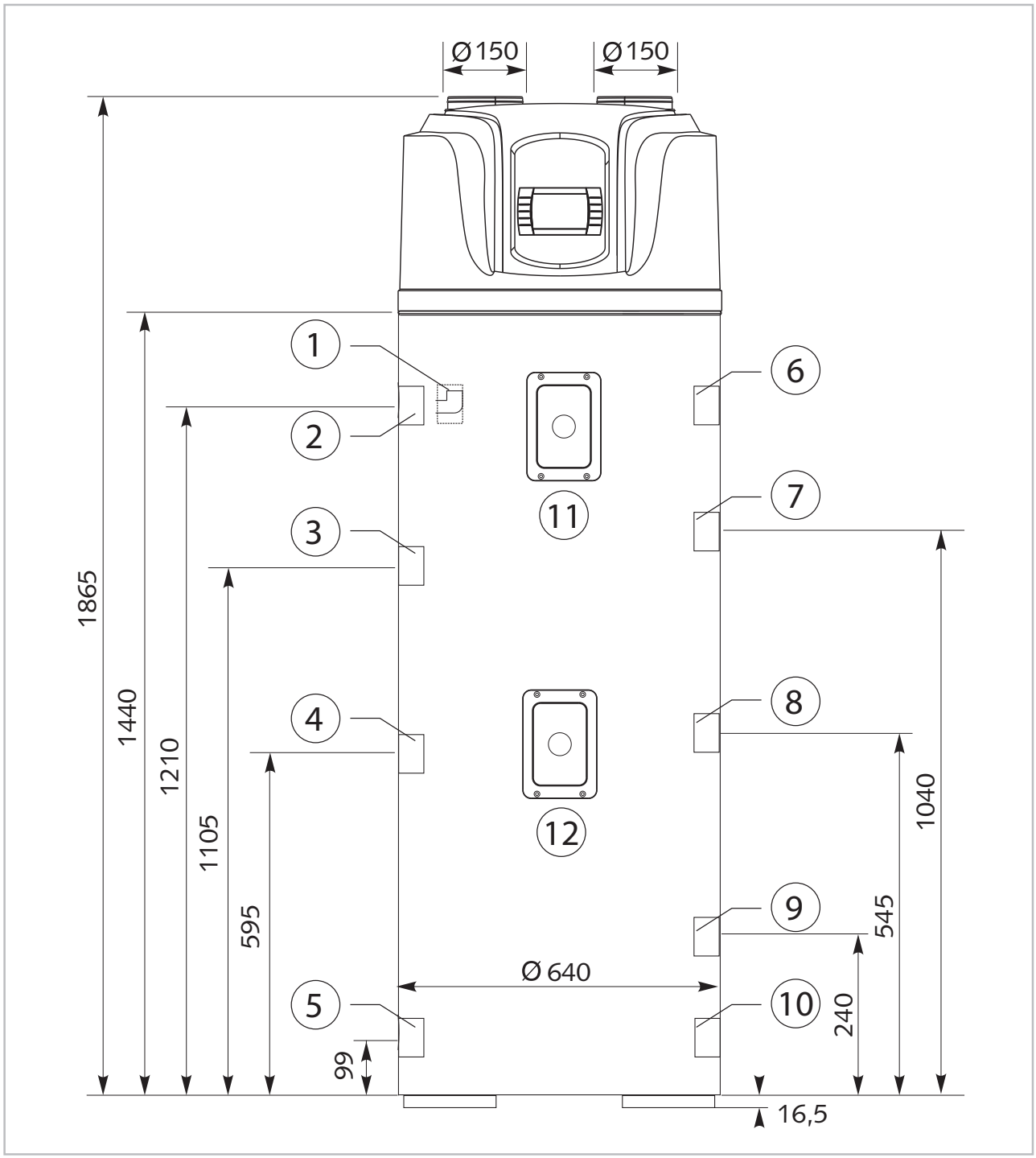


Fig. 2: Dimensions and designations of the pipe connections (data in mm)

1: Condensate drain Rp 1/2
2: Hot water outlet G 3/4"
3: False anode
4: Circulation G 3/4"
5: Cold water inlet G 3/4"
6: Safety valve connection
7: Heating-inlet heat exchanger G 3/4"
8: Immersion sleeve for temperature probe
9: Heating-return flow heat exchanger G 3/4"
10: Drainage G 3/4"
11: Overheating protection
12: Heating coil

We reserve the right to make changes within the framework of technical advancement!

Air connections

Fig. 3: Air connections

! NOTICE!

Ensure that the cold air that is expelled is not taken in directly again!

3 Design and function

3.1 Domestic hot water heat pump, general

Arguments in favour of the domestic hot water heat pump from REMKO

- Hot water heat pump with advanced technology guarantees optimum and extremely quiet operation.
- The powerful radial fan enables air guidance in pipe lengths of up to 6 m supply air/6 m exhaust air with Ø 150 mm.
- The side angled air connections enable the heat pump to be installed even if the ceiling height is low (< 2 m).
- The thermostatic expansion valve and the safety devices ensure optimum circuit functionality.
- The heart of the hot water heat pump: The strong and durable condenser with oil cooler and waste heat utilisation through suction gas cooling.
- Large-area finned evaporator.
- The air connections enable a simple supply/exhaust air installation at the assembly site.
- Environmentally friendly and non-flammable safety refrigerant R134A.
- Enamelled quality hot water tank. Quality assurance guarantees a long service life, sacrificial false anode for increased safety.
- Tube coil condenser ensures efficient heat transfer and optimum safety.
- Internal smooth tube heat exchanger for the connection of solar collectors or boilers.
- Electric heater, factory installed.
- Negligible maintenance costs.

Function of the hot water heat pump

The hot water heat pump utilises ambient air for hot water preparation. The air is drawn in from above with the aid of a fan, supplied to the evaporator and subsequently blown out again at the top. The evaporator is so-called, because it evaporates the refrigerant in the heat pump circuit. During evaporation, heat is taken from the ambient air drawn in, because this is warmer than the refrigerant in the evaporator. This means that heat can be obtained from the air and transferred to the refrigerant even at relatively low temperatures. The refrigerant is compressed by the condenser, and brought to a higher temperature level. This heat is transferred to the drinking water via the tube coil condenser. The cooled refrigerant, which is once again liquid in state, is expanded in the expansion valve, transported to the evaporator and is therefore able to absorb heat once again.

! NOTICE!

The storage tank must be completely filled and bled for initial commissioning.

! NOTICE!

The heat-up phase may take some time, depending on the filling water temperature and air intake temperature.

The refrigerant circuit

The hot water heat pump operates according to the Carnot process. The refrigerant circuit is filled with refrigerant R134a in the factory, is highly efficient and guarantees optimum safety and efficiency in operation.

3.2 Product description

The Remko RBW 301 PV is a domestic hot water heat pump with integrated enamelled hot water storage tank. The storage tank has a volumetric capacity of 300 l. The RBW 301 PV is easy to install due to the practical pipe connections and plug-in electric wiring, e.g. in the basement, plant room or utility room.

The Remko RBW 301 PV-S is a domestic hot water heat pump with an additionally integrated heat exchanger with 1.5m^2, for the connection of a solar plant or another heat generator.

During pure heat pump operation, the max. drinking water temperature is 60 °C. This means that a high level of drinking water hygiene can be guaranteed. With an increased demand for hot water or high temperatures, it is possible to actuate the 1.5 kW electric heating element.

REMKO GmbH & Co. KG herewith confirms that the supplied product corresponds to the UBA (German Environment Agency) positive list.

3.3 Corrosion protection (only RBW 301 PV-S)

Oxygen always plays a role if metal materials in a heating system corrode. The pH value and the salt content also play a major role. A licensed 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 builder/ planner and
- depending on the materials installed: filling the heating system with demineralised soft water 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		
Total rated 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	saline
Electrical conductivity at 25 °C	µS/cm	< 100	100-1,500
Oxygen content	mg/l	< 0.1	< 0.02
pH value at 25 °C		8,2-10,0 *)	

*) For aluminium and aluminium alloys, the pH range is restricted: 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. There is a reason for this, because unprofessional use of chemicals leads:

- frequently to the failure of elastomer materials
- to blocking and sedimentation due to the sludge that forms
- to defective anti-friction seals on pumps
- to the formation of biofilms that cause microbially influenced corrosion and/or that can substantially impair thermal 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!

The hot water tank is produced from enamelled steel. This is designed for standard quality drinking water. If drinking water with above-average aggressive qualities is used (chloride content ≥ 150 mg/l) then it is not possible to provide a guarantee unless special protective measures are implemented!

Check and replace the magnesium anode

Checks

Allow the hot water tank to cool before performing any maintenance work.

Perform maintenance yearly (in accordance with DIN EN 8065, Annex A, Table A1, row 42).

Check the magnesium anode yearly.

NOTICE!

Check the false anode regularly and have this replaced by your fitter if necessary. This is a prerequisite for the guarantee!

It is replaced differently depending on the tank type or anode design.

When installing replacement anodes, they may have to be shortened to the corresponding tank height.

NOTICE!

It is essential to replace the magnesium-false anode if this exhibits a diameter of just 6-10 mm!

Replacement

Replace as follows:

1. Switch the REMKO RBW hot water heat pump off.
2. Drain the storage tank to the relevant height.
3. Unscrew the magnesium anode.
4. Seal the new magnesium anode in and install it.
5. Fill the storage tank and check that the magnesium anode is leak-tight.
6. Switch the REMKO RBW hot water heat pump on.

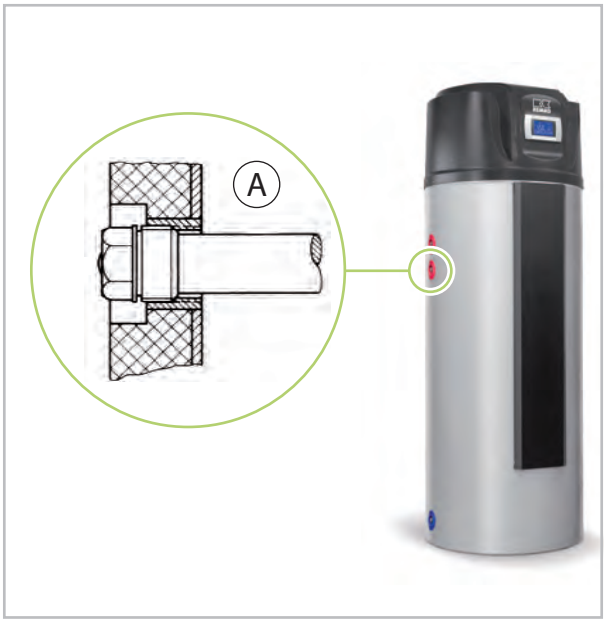


Fig. 4: Replacing the magnesium anode

Filling with completely deionised water

! 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. 5: Form for logging filling with completely deionised water

4 Assembly

4.1 System layout

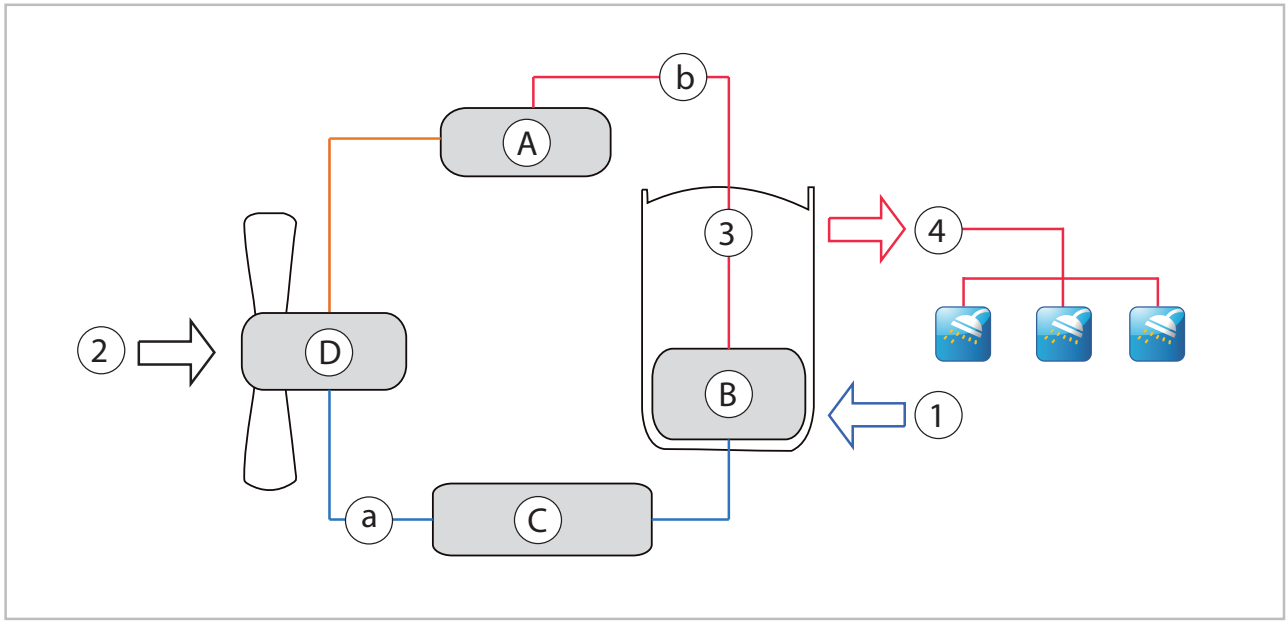


Fig. 6: System layout

1: Cold water inlet
2: Ambient air
3: Storage tank
4: Hot water
A: Compressor
B: Condenser
C: Thermal expansion valve
D: Evaporator
a: Low refrigerant temperature
b: High refrigerant temperature

4.2 General installation notes

DANGER!

Danger of death!

Only authorised specialist personnel are permitted to remove the front panel and the upper cover plate once the power plug has been unplugged, because contact with live parts poses a danger of death!

NOTICE!

Never tilt the unit more than 15 degrees for an extended period of time. The unit can be tipped by a max. 60° for short-term transport only. Proceed with caution when lifting and lowering the unit. Horizontal storage or transportation is not permissible!

- 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.
- Make sure that pipes carrying water do not pass through living or sleeping areas.

4.3 Set-up

⚠ WARNING!

The set-up of the heat pump may only be carried out by trained specialists.

- The heat pump must be set up indoors.
- A condensate drain must be available.
- The heat pump must be set up vertically.
- Suitable installation sites are dry, clean, frost-free rooms with a level floor, which have a height of no less than 2 m.
- The heat pump must be installed with all of its surface on a firm, level base.
- The base must have sufficient load-bearing capacity for the weight of the heat pump.
- 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.
- In order to keep output losses to a minimum, the heat pump should be set up as close as possible to the hot water consumer.
- If the supply and exhaust air from neighbouring rooms is to be used, ensure that no positive or negative pressure can build up in the rooms.
- The air connections must be positioned to prevent an air short circuit.

Use of a circulation system

It is not advisable to use a circulation system because the loss per running metre of piping can be approx. 25- 30 Watts. However, if such a system is installed, a timer and a thermostat should be installed with it.

! NOTICE!

To avoid damage to the system, the installation location must be dry, capable of carrying the load and frost-free.

! NOTICE!

Keep the hot water heat pump and lines free of frost

Fig. 7: Floor set-up

Minimum distances

Fig. 8: Minimum distances in mm

Suction air

The suction air must not be loaded with aggressive substances (ammonia, sulphur, halogen, chlorine, etc.)! This can cause the destruction of machine parts!

Air connections

The air take-off point should be selected with consideration to a high average air temperature and the requisite air volume of 350 m^3/h. Air inlets and outlets are arranged at an angle at the rear. In order to keep the air resistance to a minimum, the air intake and exhaust duct should be configured as straight as possible, with a minimum smooth tube cross-section of Ø 150 mm. The entire tube length for the intake and exhaust air should not be more than 12 m, whereby the installation of no more than 3 right-angled elbows is permitted. The entire tube length must be reduced by 1 m with every additional elbow. In order to prevent the discharge of condensate water, the air lines must be laid horizontally or with a slight downward gradient towards the suction/blow-out openings, or the installation of an evaporation pouch is required.

Fig. 9: Air connections

! NOTICE!

Ensure that the cold air that is expelled is not taken in directly again!

Air duct lines

- Suction and blow-out lines from smooth tube, Ø 150 mm.
- The max. overall length of the pipe (suction and exhaust air) is 12 m with a max. of 3 x 90° elbows
- The entire tube length must be reduced by 1 m for every additional elbow!
- The pipes incl. accessories must be provided by the customer (ventilation pipe made of plastic, aluminium or galvanised sheet steel, etc.).
- The pressure loss must not exceed a max. 50 Pa.

! NOTICE!

When operating the domestic hot water heat pump in recirculation mode, the room volume must be at least 30 m^3 (see next diagram, illustrations A-C).

The suction and blow-out connections are at an angle on the rear of the unit. The suction and exhaust ducts can be guided directly out of the unit on the side or upwards at first (e.g. under the ceiling as shown in the example below).

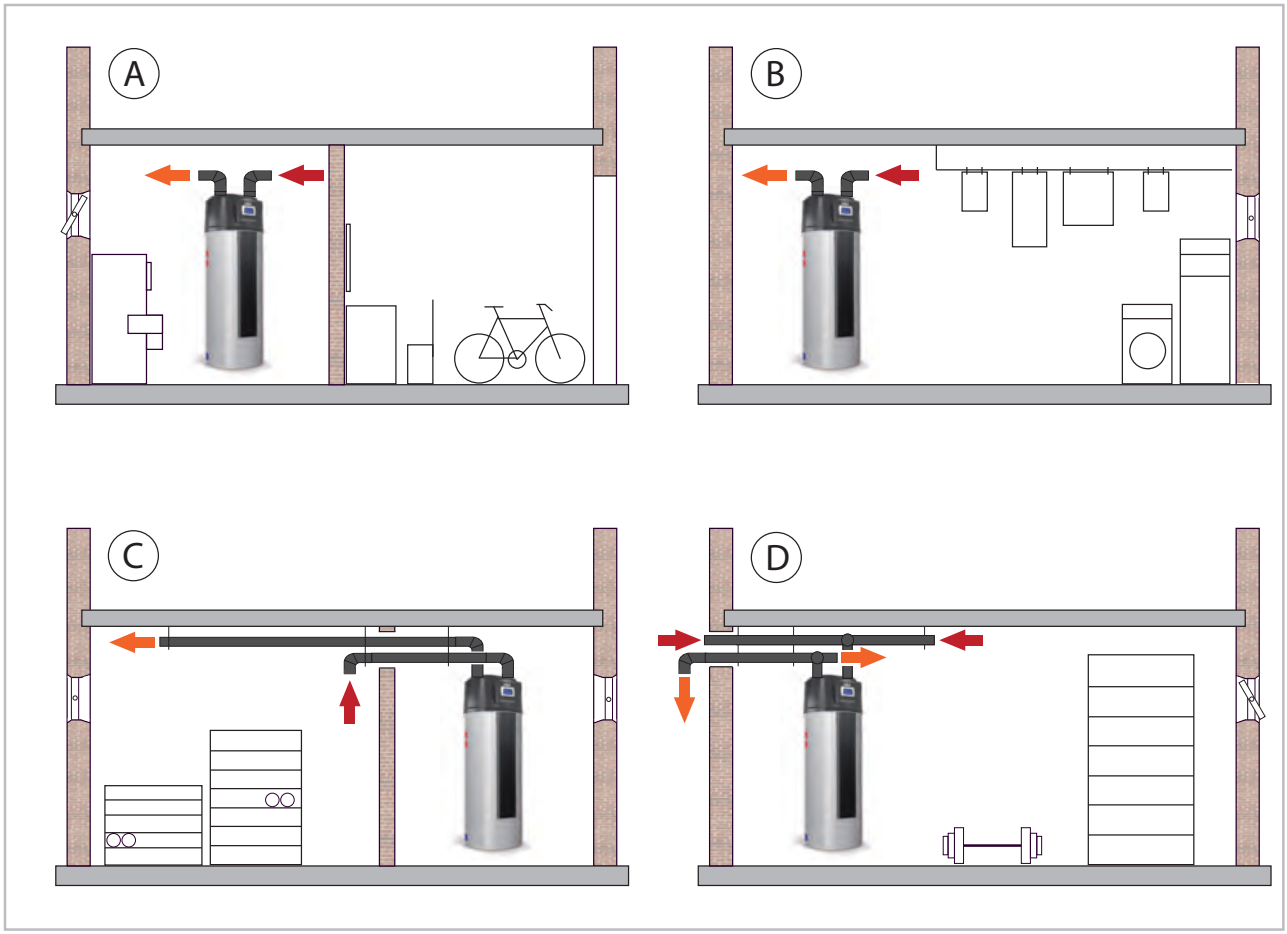


Fig. 10: Possible installations

A: Heating room/hobby room (recirculation mode)
B: Laundry room (recirculation mode)
C: Storage/storeroom (recirculation mode)
D: Gym room

5 Installation

General notes

The hot water heat pump is a factory-tested unit. Once the water connections have been professionally established, the storage tank has been filled and the electrical connection (230 V/ 50 Hz) has been established, it is possible to switch the unit on.

⚠ WARNING!

The hot water heat pump must be connected and put into operation exclusively by a certified and authorised specialist!

⚠ WARNING!

It is necessary to fill the unit with water before the electrical wiring is connected!

Sanitary connection and assembly

! NOTICE!

If using copper and galvanised steel tubes always observe the sequence in the flow direction: Copper after galvanised steel!

Avoidance of heat losses

In order to minimise heat losses plan the water lines as short as possible and include thermal insulation. Have the lines installed by a professional.

Sanitary installation

The direct connection with a stainless steel tank must never be produced from copper or galvanised. If a stainless steel tank is connected with a galvanised cold water line (with the requisite fittings or threaded connections) then a fine filter must be fitted upstream of the stainless steel tank in order to protect against rust particles, etc. Brass, red brass, plastic and stainless steel are all suitable connection materials. If a stainless steel storage tank is connected with a galvanised or copper line then it is necessary to fit a red brass or brass fitting between these parts.

It is possible to dispense with the use of a false anode if the chloride content in the drinking water is < 150 mg/l.

Always install a pressure reducer in the cold water line.

Pressure reducer

Always install a pressure reducer in the cold water supply line!

Safety valve

The safety valve prevents positive pressure from building and serves to drain off the excess water, which occurs due to expansion of the storage tank contents when heated.

- Only install a type-approved membrane safety valve. This must be adjusted such that it safely prevents the maximum permissible positive operating pressure of the heat pump storage tank - of **6 bar** - from being exceeded by more than 1 bar. The connection diameter of the safety valve must be at least 1/2“. No shut-off valve may be installed between the safety valve and storage tank.
- The drain line downstream of the drainage funnel for the safety valve must exhibit twice the cross-section of the safety valve connection, it must not lead outdoors and must not be blocked. Drainage should take place exclusively via the cold water connection or drainage cock.

During the heating process, the expansion water must visibly drip out of the safety valve drain (heat-up time 4-7h!).

- The hot water distribution system should be configured without circulation.
- The hot water lines must be thermally insulated according to the local (municipal) regulations.

Charging with a second heat generator (solar, combustible burner for solid fuel)

- The supply and return lines must be thermally insulated by design, and must be connected such that no return or single tube gravity circulation can arise with electric heating and the circulation pump switched off.
- The expansion of the heating water must be guaranteed at all times (also with electric heating).
- Fit a bleeder at the top point in the hot water line.

The hot water heat pump is fitted with a 1.3 m^2 heating battery as standard. This enables connection with an existing heating system. The option therefore exists of also heating the hot water with the existing boiler. For this purpose, the heating battery supply and return flow are connected with the heating system.

! NOTICE!

When connecting the hot water heat pump with a boiler:

When operating the circulation pump, the powerful boiler circulation can result in the transport of heat from the hot water heat pump into the boiler. In order to prevent this, fit a check valve after the circulation pump of the heat generator!

Condensate water drain

The cooling of the air in the evaporator results in condensate water forming. The condensate drain on the hot water heat pump must be transported away from the heat pump with plastic pipes and an uninterrupted flow of the condensate must be guaranteed. Depending on the humidity, up to approx. 0.25 l/h of condensate may arise.

The condensate drain must not be permanently connected with a duct connection, and must be designed and executed so that it is discharged freely.

Domestic hot water-side connection (pressure-tight)

Hot water heaters are pressure-tight storage tanks with which pressure-tight connections can be established. If the line pressure is higher than the permissible operating pressure, a pressure reducing valve provided by the customer must be installed in the cold water supply. Only pressure-tight fittings may be used. The component-tested safety equipment must be installed in the cold water line (see the following diagram). A type-examination tested safety group in accordance with DIN 1988 must be installed in the water connection of the cold water line (cold water supply) for closed hot water heaters. The water connection may only take place through a tested diaphragm safety valve or a diaphragm safety valve/connection fitting combination (not a piston valve) for pressure-tight storage tanks! A safety valve combination is comprised of a shut-off, testing, return flow, drainage and safety valve with expansion water drain and is installed between the cold water supply and cold water feed of the storage tank in the sequence shown in the following diagram:

6 Hydraulic connection

Hydraulic connection drawings

All components and safety devices must be provided by the customer.

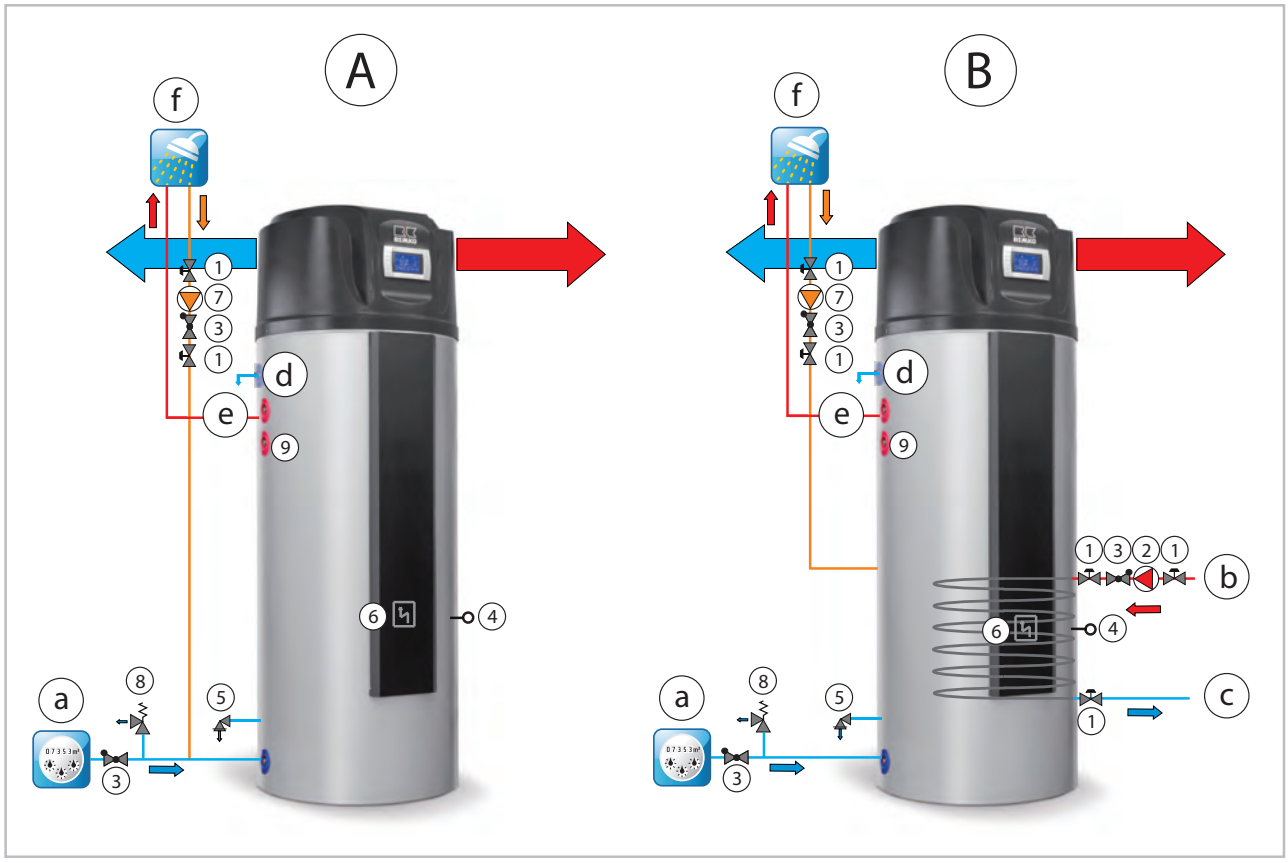


Fig. 11: Hydraulic connection drawings

A:	Series RBW 301 PV
B:	Series RBW 301 PV-S
a:	Cold water inlet
b:	Inlet 2nd heat generator
c:	Return flow 2nd heat generator
d:	Condensate drain
e:	Hot water outlet
f:	Hot water
1:	Shut-off valve
2:	Storage tank recharging (by oil, gas or solar)
3:	Flap valve
4:	Immersion sleeve (for oil, gas or solar)
5:	Storage tank emptying
6:	Electric heating coil
7:	Circulation pump
8:	Safety valve, 6 bar
9:	Magnesium anode
Not shown:	Safety temperature limiter (STL) beneath the cover

Hydraulic circuit diagram 1 for REMKO RBW heat pump

Functions: Heating and hot water

**This hydraulic circuit diagram serves merely to assist in planning activities;
the customer-provided hydraulic system on site must be planned and laid out by the installer!**

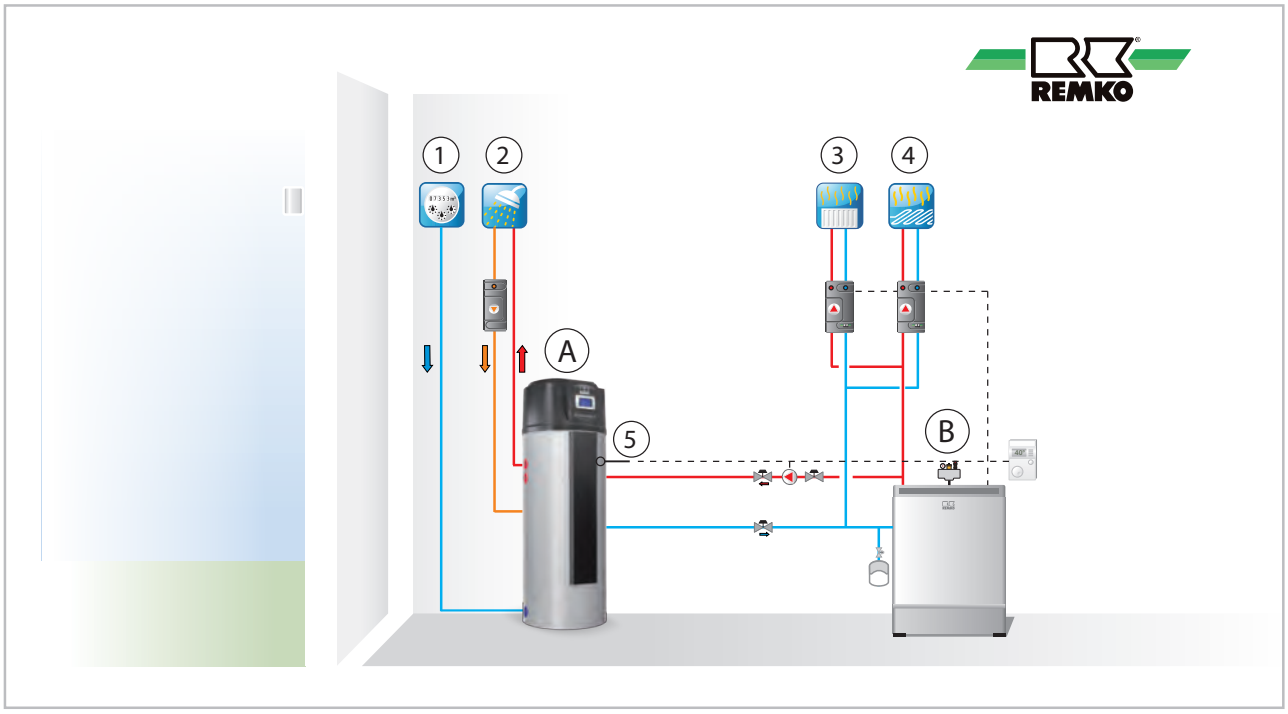


Fig. 12: Example 1 - RBW hydraulic circuit diagram

A: RBW heat pump
B: Oil/gas boiler
1: Cold water
2: Hot water
3: Heating circuit 1 mixed
4: Heating circuit 2 mixed
5: Boiler probe (hot water probe)

Hydraulic circuit diagram 2 for REMKO RBW heat pump

Functions: Heating and hot water

**This hydraulic circuit diagram serves merely to assist in planning activities;
the customer-provided hydraulic system on site must be planned and laid out by the installer!**

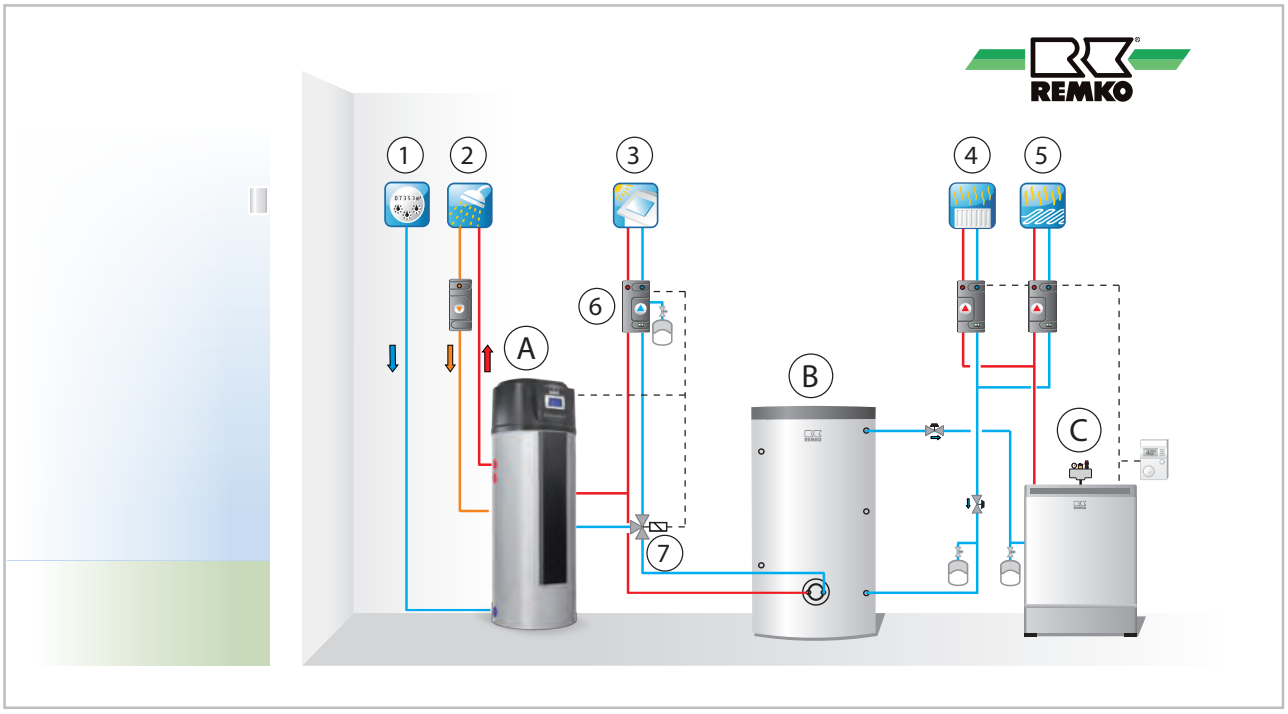


Fig. 13: Example 2 - RBW hydraulic circuit diagram

A: RBW heat pump
B: Storage tank
C: Oil/gas boiler
1: Cold water
2: Hot water
3: Solar
4: Heating circuit 1 mixed
5: Heating circuit 2 mixed
6: Solar pump
7: Solar changeover valve

7 Electrical wiring

7.1 General notes

DANGER!

All electrical installation work must be done by an electrician.

The wiring provided by the customer must comply with the local regulations. The power supply to the unit must comply precisely with the voltage and frequency stipulated in the technical data. Get in contact with the local energy supplier if incorrect mains voltages require correction. Operation of a unit with incorrect mains voltage constitutes misuse, which is not covered by the guarantee.

DANGER!

Attention

In order to avoid electric shocks and damage to the unit, ensure that the electrical installation has been carried out professionally prior to establishing the electrical wiring (power plug with 2 m cable to the socket provided by the customer).

7.2 Connection of the power PCB

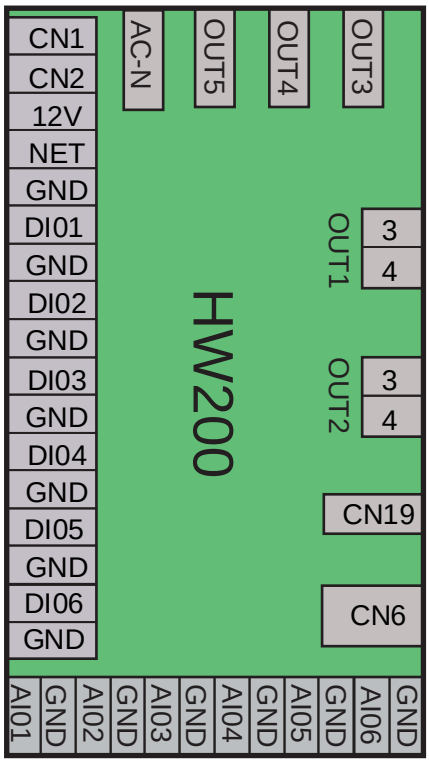
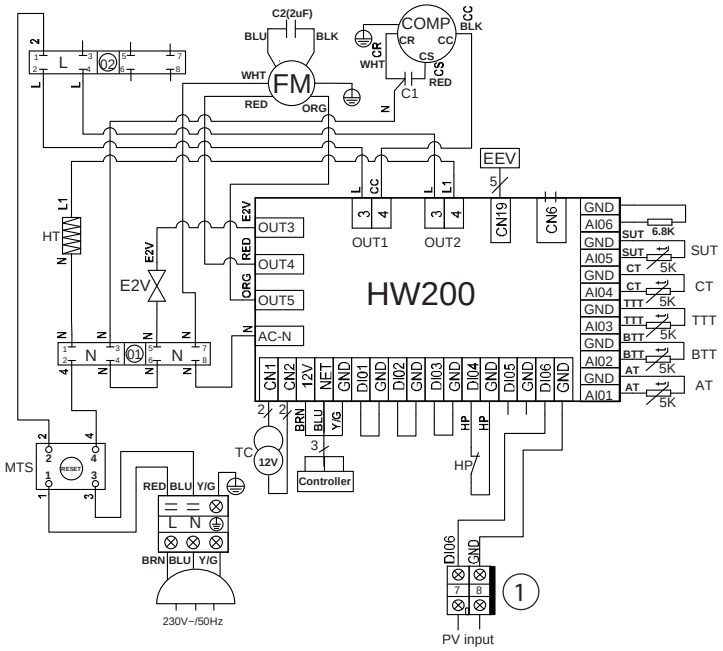


Fig. 14: Connection of the power PCB

AC-N:	Neutral conductor
AI01:	Air suction temperature
AI02:	Temperature storage below
AI03:	Temperature storage above
AI04:	Temperature evaporator (refrigerant)
AI05:	Temperature suction pipe (refrigerant)
AI06:	Probe collector
CN1:	Transformer 1 - 230V
CN2:	12V
CN6:	/006
CN19:	Not connected
DI01:	Jumper
DI02:	Jumper
DI03:	Jumper
DI04:	High pressure
DI05:	Not connected
DI06:	Contact photovoltaic (potential-free)
12 V/NET/ GND:	Power supply control panel
OUT2(3):	Electrical heating coil 230 V
OUT2(4):	Power supply electrical heating coil 230 V
OUT1(3):	Compressor
OUT1(4):	Compressor power supply 230 V
OUT3:	4-way valve
OUT4:	High speed fan
OUT5:	Pump solar

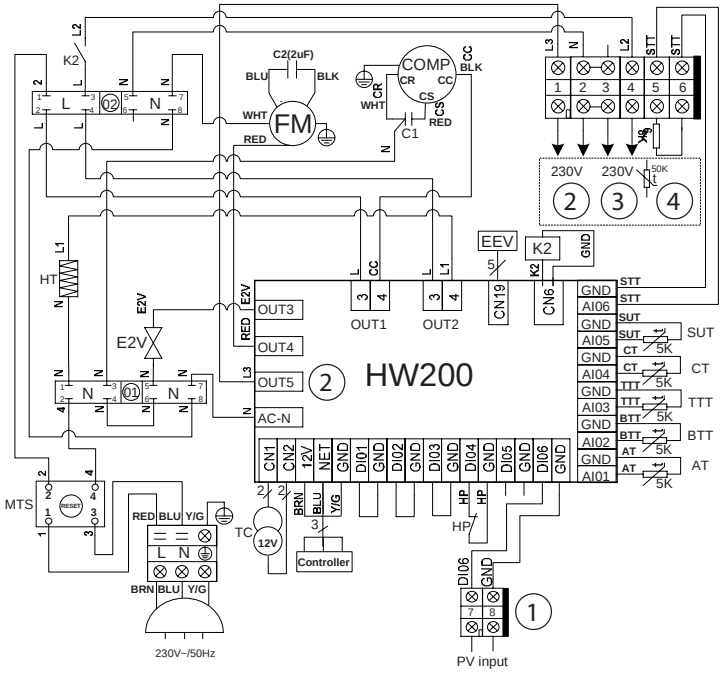
7.3 Circuit diagrams

RBW 301PV



1: Contact photovoltaic (potential-free)
Contact PV Input open = PV-operation OFF
Contact PV Input closed = PV-operation ON

RBW 301PV-S



1: Contact photovoltaic (potential-free)
Contact PV Input open = PV-operation OFF
Contact PV Input closed = PV-operation ON
2: Solar pump
3: Changeover valve
4: Probe collector

8 Commissioning

Before you switch on the domestic hot water heat pump, ensure that

1. the storage tank is filled with water.
2. the electrical wiring exhibits 230V/50Hz.
3. all connections have been correctly established.

CAUTION!

Ensure that a safety valve (6 bar) is correctly connected to the cold water inlet at all times!

9 Control logic

Compressor

1) Minimum switch-off time t=2 minutes

Following the request by the controller, the stand-still time is a further 2 min.

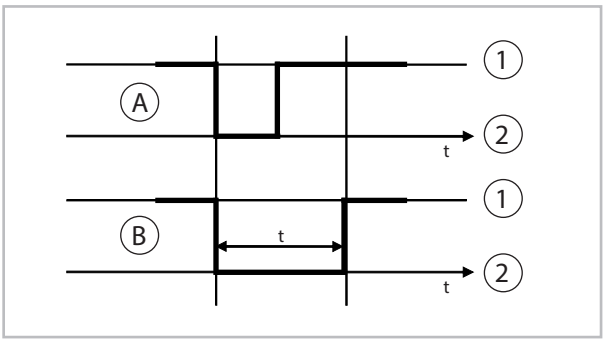


Fig. 15: Control logic switch-off time

A: Signal
B: Compressor
1: On
2: Off

2) Minimum switch-on time t=2 minutes

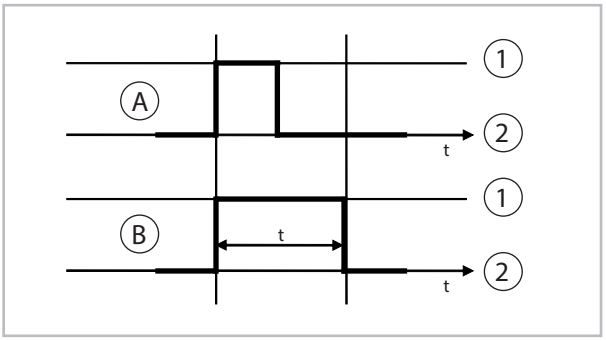


Fig. 16: Control logic switch-on time

A: Signal
B: Compressor
1: On
2: Off

3) Normal heating

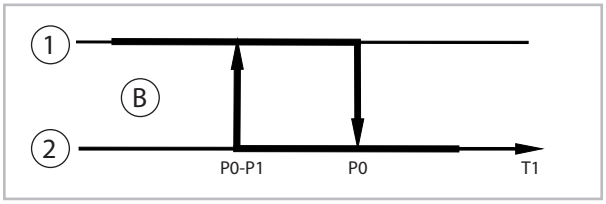


Fig. 17: Control logic normal heating

B: Compressor
1: On
2: Off

Defrosting

1) Defrosting start

a) Run-time compressor min. parameter d03.

b) Min. temperature at the evaporator under d01.

2) Defrosting end

a) Evaporator temperature > d02 or max. defrosting period d04 exceeded.

3) Evaporator fan off, 4-way changeover valve off.

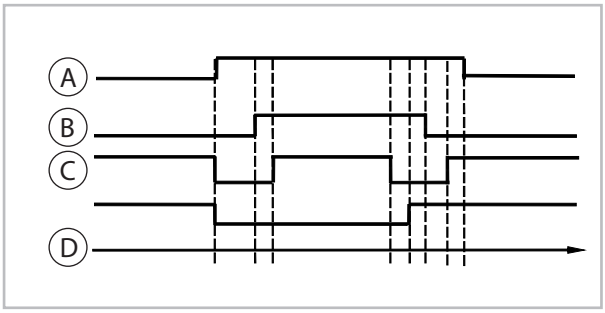


Fig. 18: Control logic defrosting

A: Defrosting signal
B: Changeover valve
C: Compressor
D: Fan motor

10 Operation

Functions of the operating unit

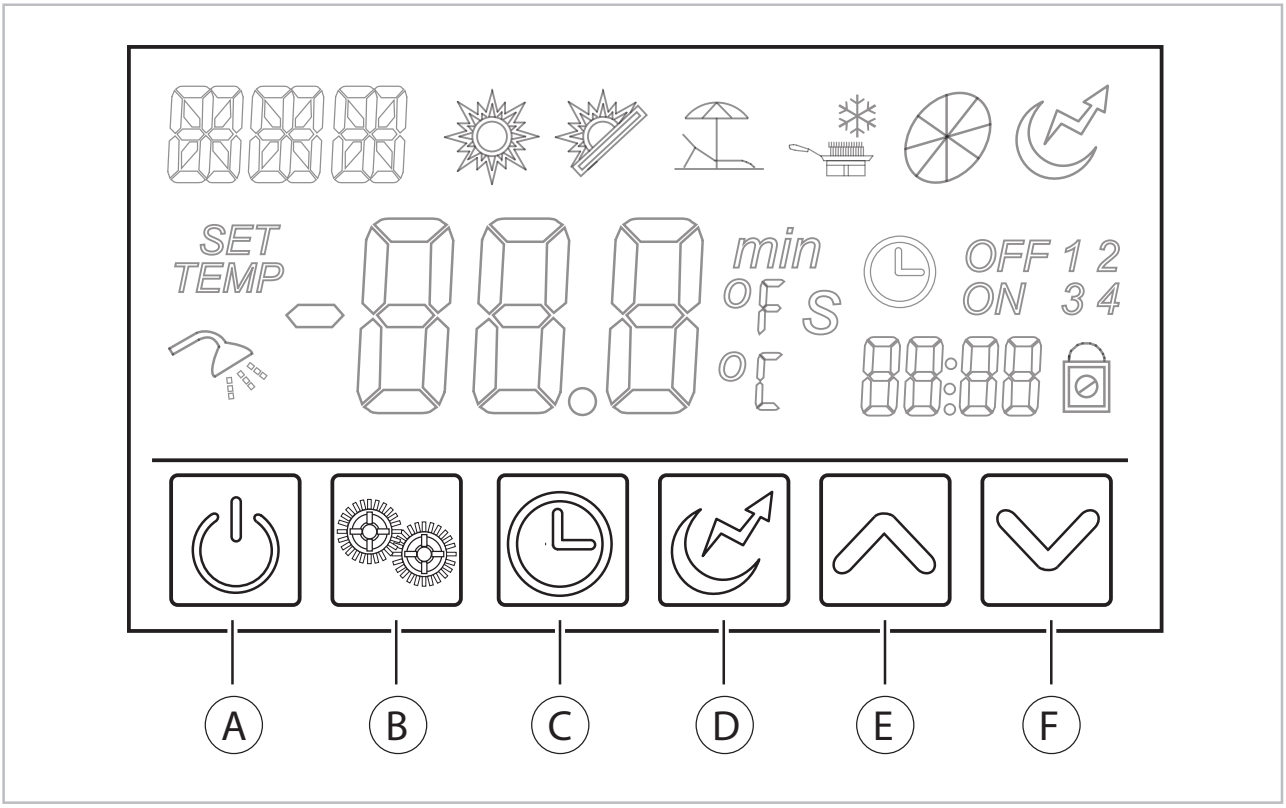


Fig. 19: Operating unit keys

Key functions

Ⓐ - **"ON/OFF" key**

This key switches the domestic hot water heat pump on or off

(Press and hold the key for approx. 2 seconds).

Ⓑ - **"Mode" key**

The modes and parameters are selected using this key. If you wish to reset the parameters to the factory setting, press this key for longer than 10 seconds.

Ⓒ - **"Clock" key**

Press this key to set the time and date.

Ⓓ - **"Electric heating element" key**

Press this key to switch on the electric heating coil. Activate the ventilation function by holding down this key for 2 seconds.

Ⓔ - **"Up" arrow key**

Press this key to increase the setpoints.

Ⓕ - **"Down" arrow key**

Press this key to decrease the setpoints.

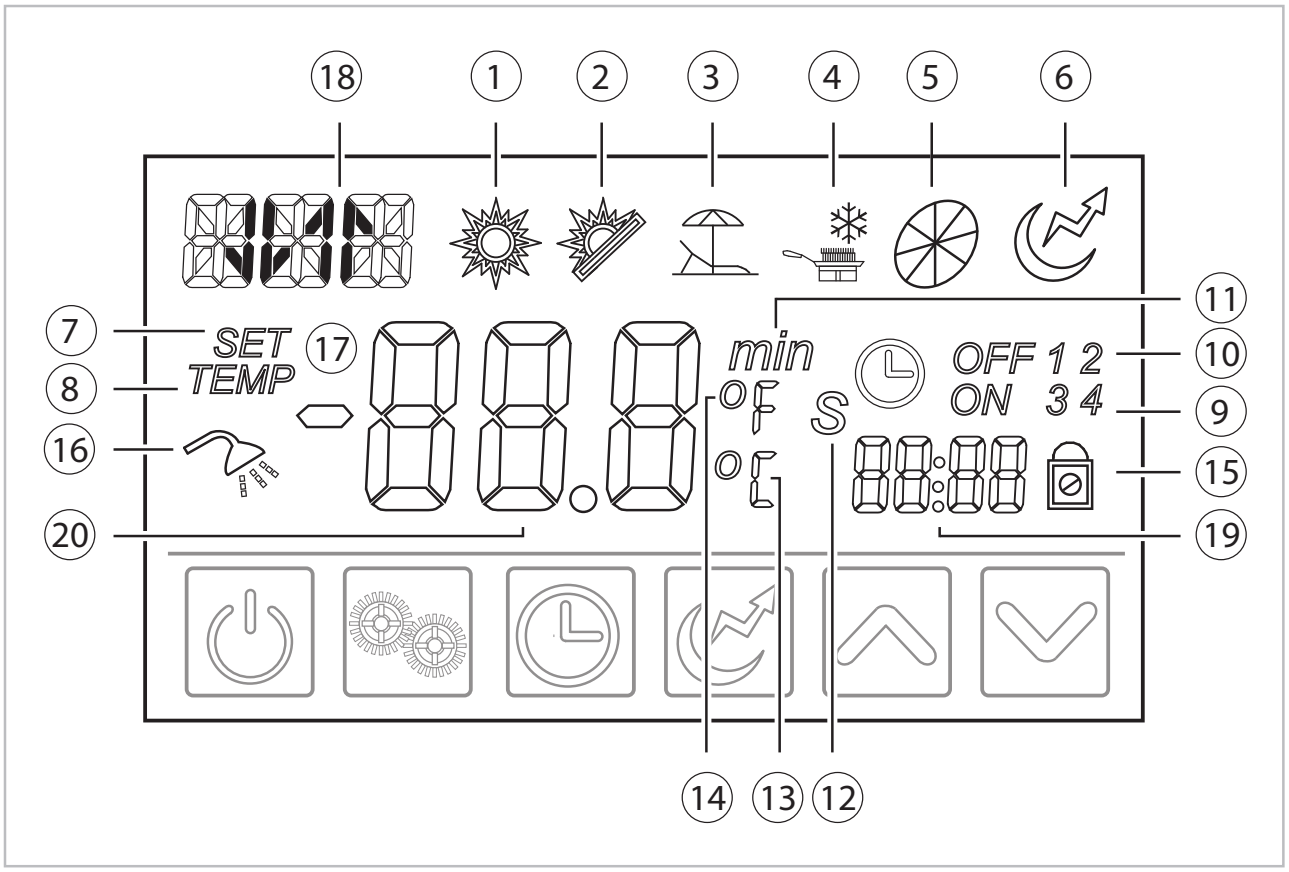


Fig. 20: Symbols of the operating unit

Symbol functions

① - Heating mode compressor and heating coil

② - Economic heating mode, only compressor

①+② - Automatic mode

③ - Holiday mode

④ - Invalid

⑤ - Recirculation mode

⑥ - Electric heating element

⑦ - Parameter selection

⑧ - Current temperature measured

⑨ - Timer "On"

⑩ - Timer "Off"

⑪ - Minute

⑫ - Second

⑬ - ° Celsius

⑭ - ° Fahrenheit

⑮ - Keyboard locked

⑯ - The unit is in standby once the temperature has been reached

⑰ - Water temperature storage tank, top

⑱ - Water temperature storage tank, bottom

⑲ - Time and date

⑳ - 1) Actual temperature

2) Parameter values when setting interface

Operation

Commissioning preparation

1. After switching on the power supply the controller uploads the parameters for approx. 15 seconds.
2. Ensure that the storage tank is filled with water.
3. In order to switch on the unit, touch the "On/Off" switch for at least 0.5 seconds. The water temperature measured then appears on the display.

Unit operation

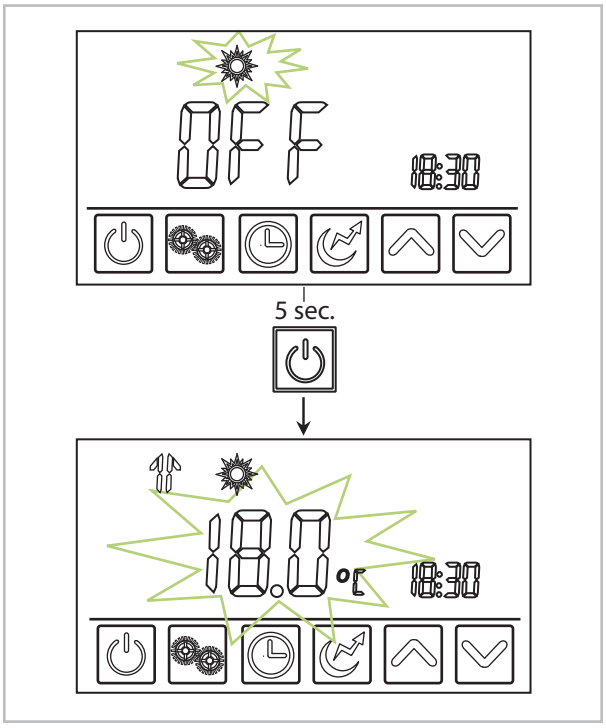


Fig. 21: "On/Off" key

Setting mode

4 operating modes are available: Hybrid mode, Economic mode, Automatic mode and Holiday mode.

1: Hybrid mode

The water is heated in combination with the heat pump and electric heating coil.

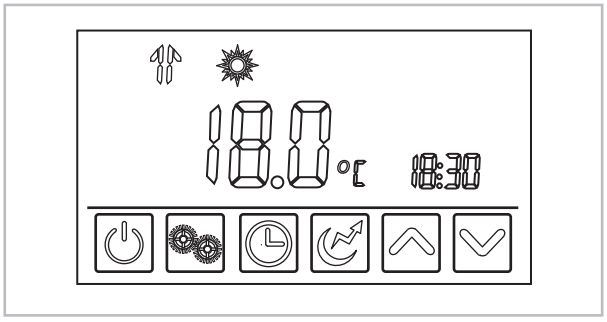


Fig. 22: Hybrid mode

2: Economic heating mode

The water is heated exclusively in heat pump mode. The electric heating coil can be additionally activated manually.

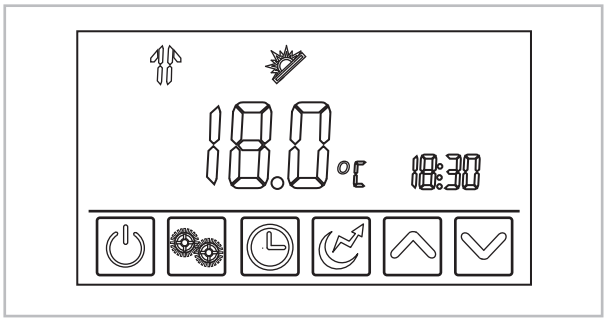


Fig. 23: Economic heating mode

3: Automatic mode

The controller switches the heat pump and where applicable the heating coil on, depending on the ambient air (suction air).

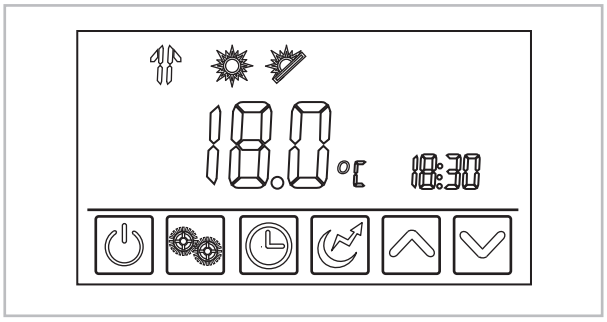


Fig. 24: Automatic mode

4: Holiday mode

It is possible to select this mode in order to go on holiday for a certain period of time. The heat pump is off during this period. It is possible to program a date of departure and a date of arrival.

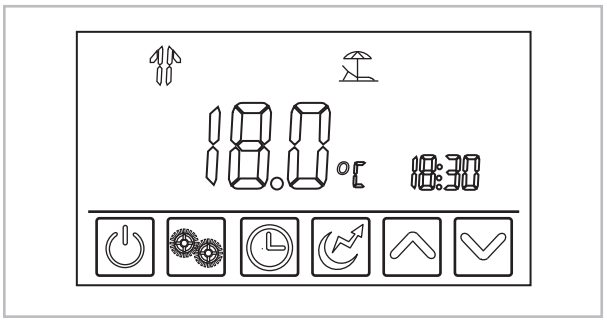


Fig. 25: Holiday mode

Before leaving the system, switch the heat pump to holiday mode. In order to have hot water available upon your return, program the switch-on point 1 day in advance of your arrival.

For parameter settings, see *'Setting the holiday program' on page 41*

Operation

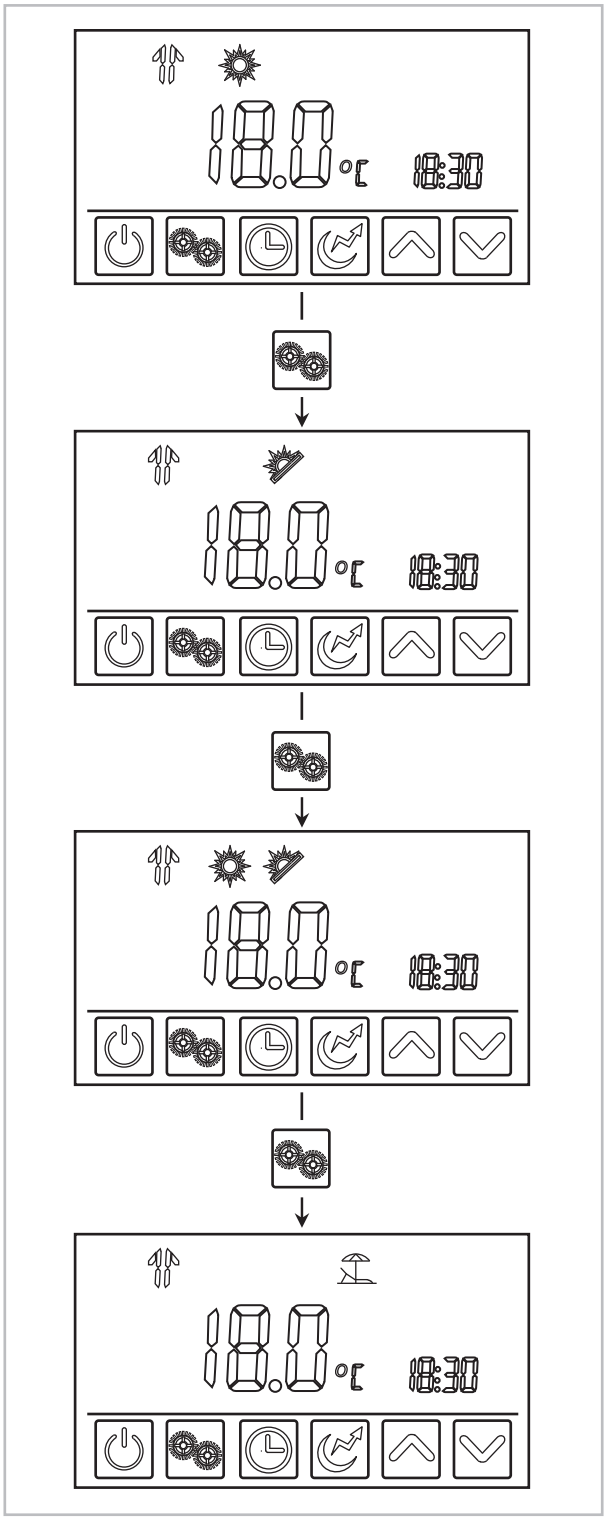


Fig. 26: Operation

Setting the setpoint (domestic hot water temperature)

In the main menu (default screen) tap on the "Up" (E) or "Down" (F) arrow keys.

Once the setpoint temperature has been reached, press the "Mode" key (B) in order to save the setpoint temperature, or press the "On/Off" key (A) in order to cancel the setpoint setting.

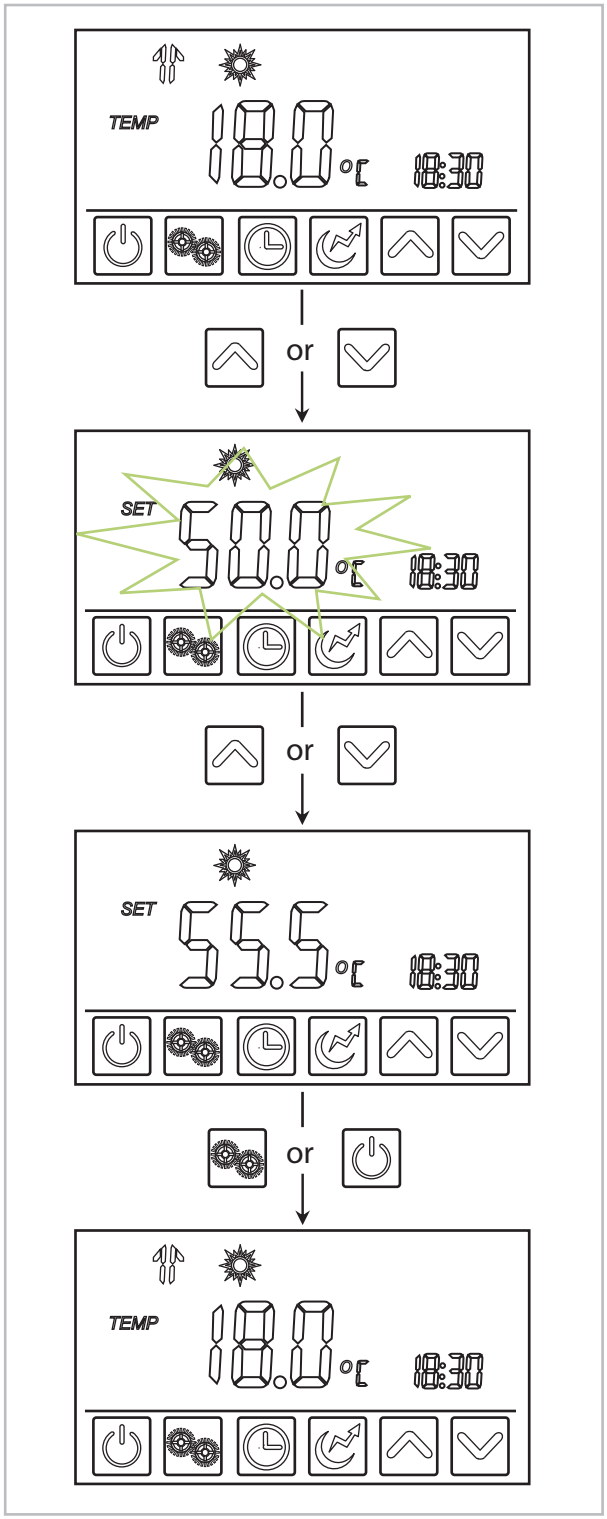


Fig. 27: Setting the setpoint

NOTES

1. If the "On/Off" key is pressed after the values have been changed then the values are not saved.
2. If no key is pressed for 5 seconds after changing the values, the controller jumps to the main view and the settings are saved.
3. The storage tank probe below is responsible for the desired hot water temperature (indicator top left in the display). The RBW heat pump switches the heat pump on and off according to this probe value. When commissioning for the first time, approx. 10 hours of operation may be required before the hot water setpoint temperature is reached.

Key lock

In order to lock the keys, press the "On/Off" key for approx. 5 seconds. The "lock" symbol appears on the display. No settings can be implemented in this state. To unlock, press the "On/Off" key for approx. 5 seconds

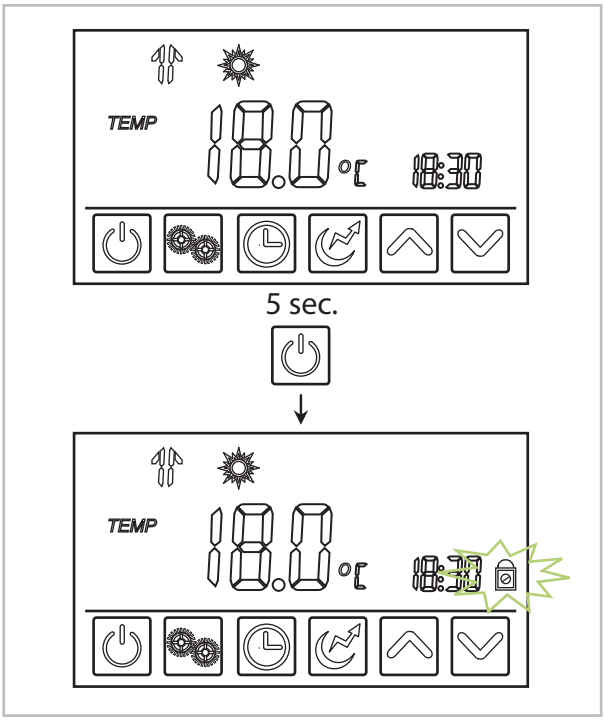


Fig. 28: Key lock

NOTE

If the unit exhibits an alarm, the key lock is released automatically

Electric heating element (heating coil)

Irrespective of which operating mode has been set, the heating coil can be activated. In order to do so, confirm the "Electric heating element" key (D). The symbol appears on the display to indicate that the heating coil is active. Upon reaching the target temperature, the heating coil switches off automatically.

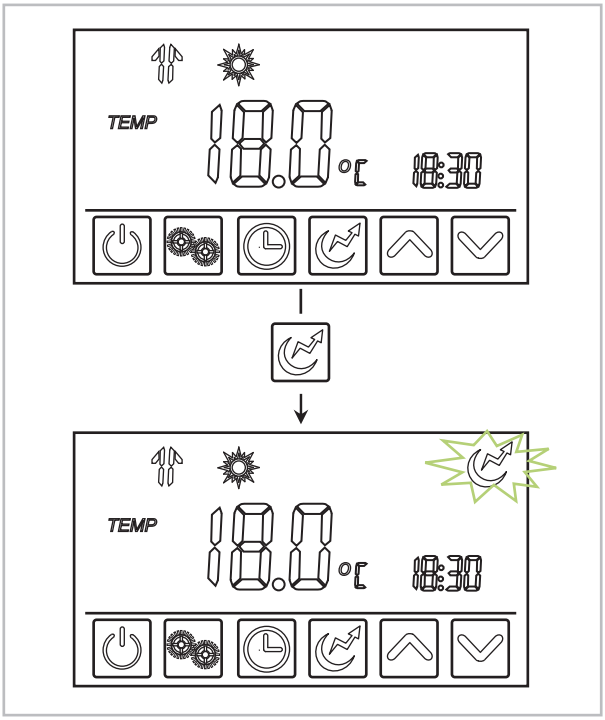


Fig. 29: Electrical heating element - HP is on

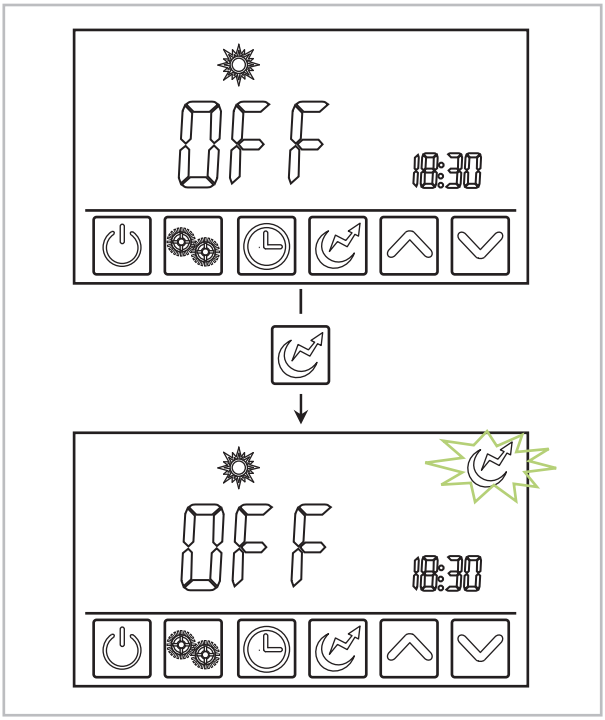


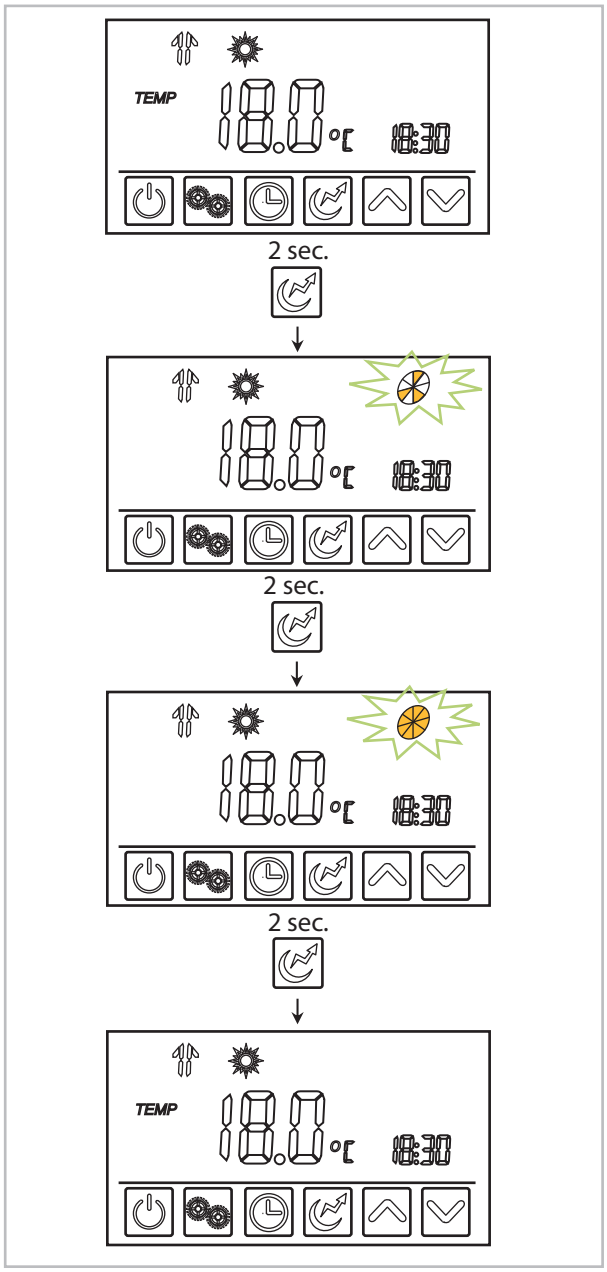
Fig. 30: Electrical heating element - HP is off

NOTES

1. The auxiliary heater must also be separately enabled automatically as required in parameter level "r" via parameters "r04, r05, r06" (see *on page 49*, no. 41 to 54). The auxiliary heater is inactive unless the values are adjusted.
2. The auxiliary heater is always enabled according to the stored parameters "r04" to "r10", irrespective of the intake temperature!

Recirculation mode

In recirculation mode, the RBW 301 PV unit has two fan stages available and the RBW 301 PV-S unit only has one (the middle) fan stage available. The recirculation operation can be used in order to ventilate the connected room, without the heat pump (compressor) being in operation. To do so, press the "Electric heating element" key (D) for approx. 2 seconds. The fan symbol appears on the display. It is possible to select 2 fan stages (only for the RBW 301 PV unit). In order to implement a setting, press the "Electric heating element" key (D) for 2 sec.



Setting the time

In order to set the time, press the clock symbol. When the time flashes, set the time using the arrow keys. In order to save, press the "Mode" key (B). Then set the date.

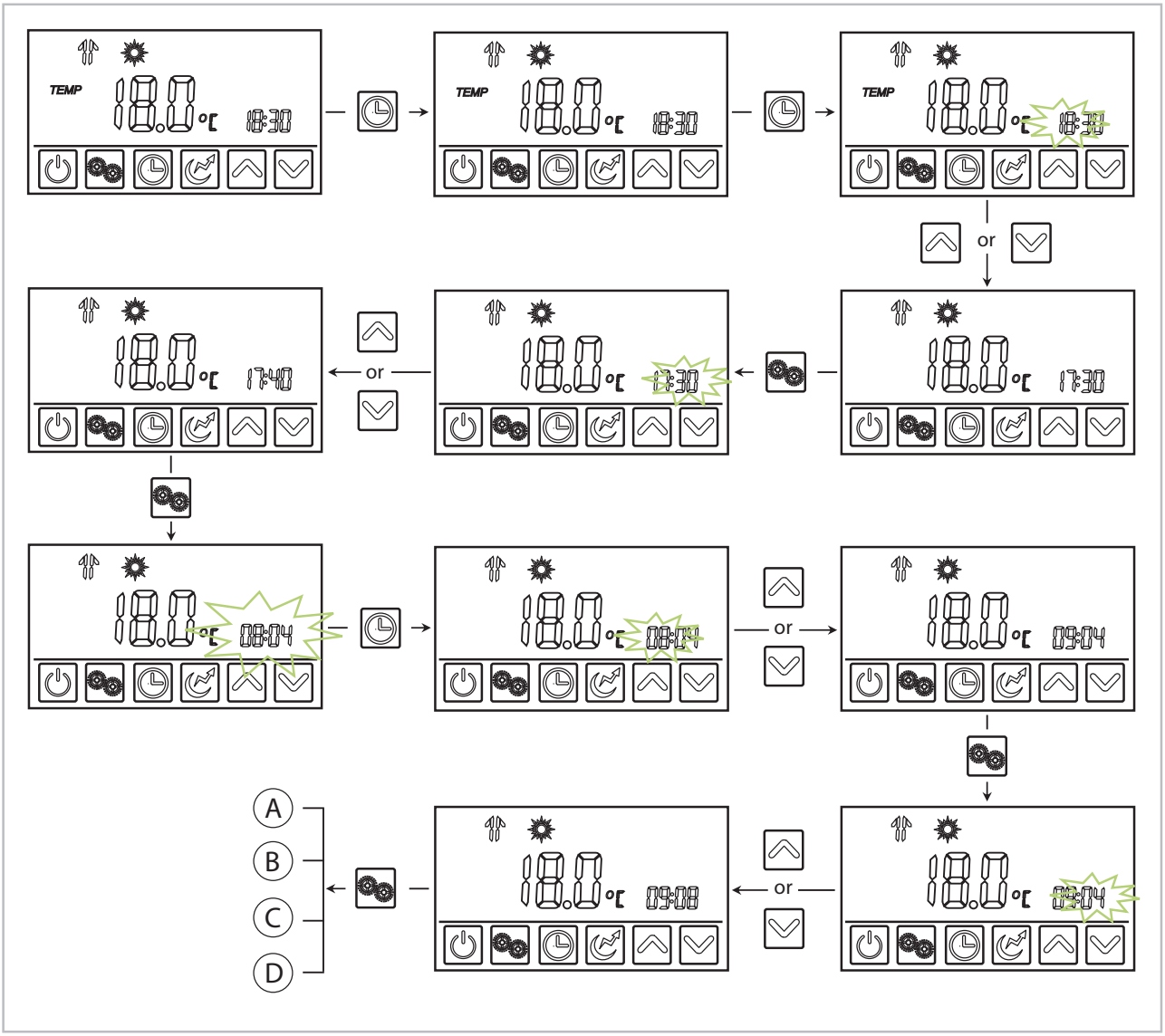


Fig. 31: Setting the time

A: To set the year value proceed precisely as described above.
B: If the "On/Off" key (A) is pressed during programming, the values are not saved and the main menu is displayed once more.
C: If no settings are implemented for 5 seconds, the values are saved and the main menu is displayed.
D: In order to check the date press on the "CLOCK" key (C).

Time program

To set the daily program, proceed as follows:

Possibility 1

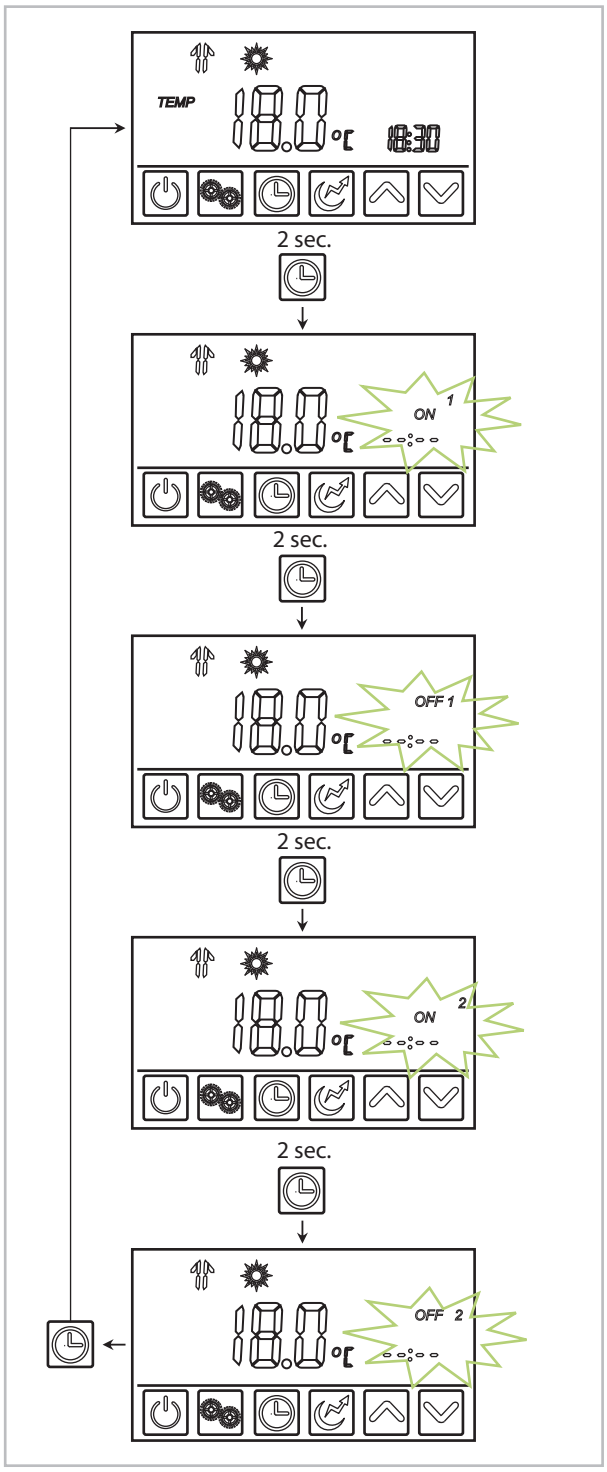


Fig. 32: Time program - setting possibility 1

Possibility 2

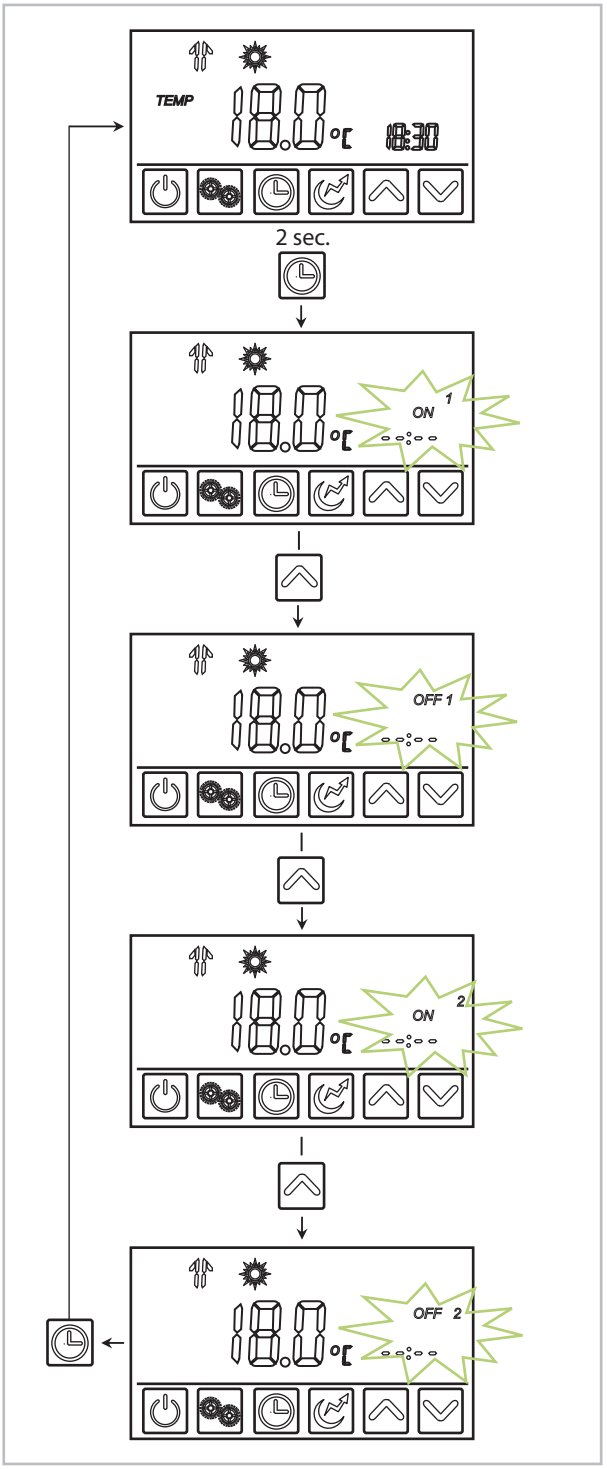


Fig. 33: Time program - setting possibility 2

Example of a daily program setting - switch on at 16:30 hrs

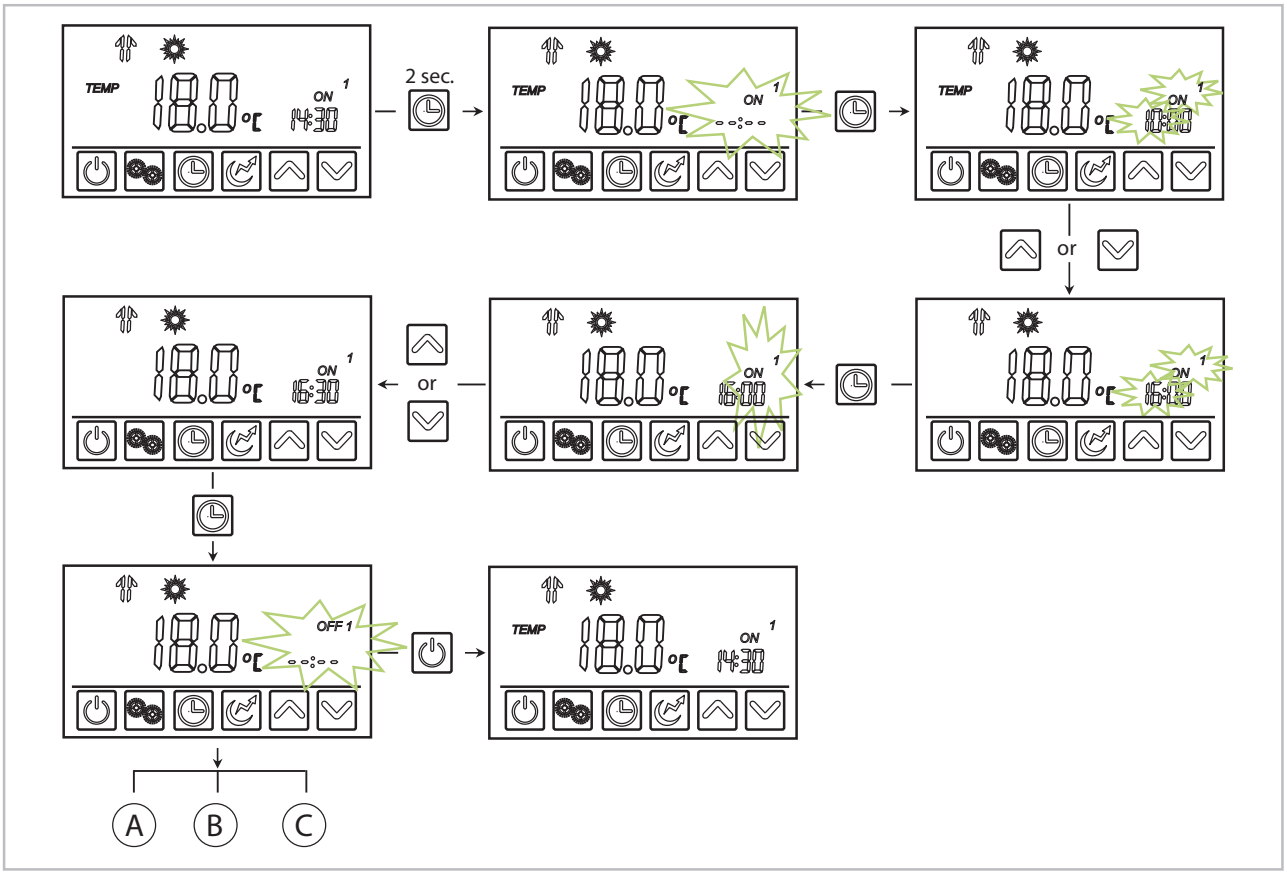


Fig. 34: Time program - example

A: Press the "CLOCK" key (C) in order to access time program 1, settings are implemented as described.

B: If no settings are implemented for 5 seconds, the values are saved and the main menu is displayed.

C: If the "Hours/minutes" display flashes and the "On/Off" key (A) is pressed, you will access the main menu directly without saving the values.

Deactivating the set time program

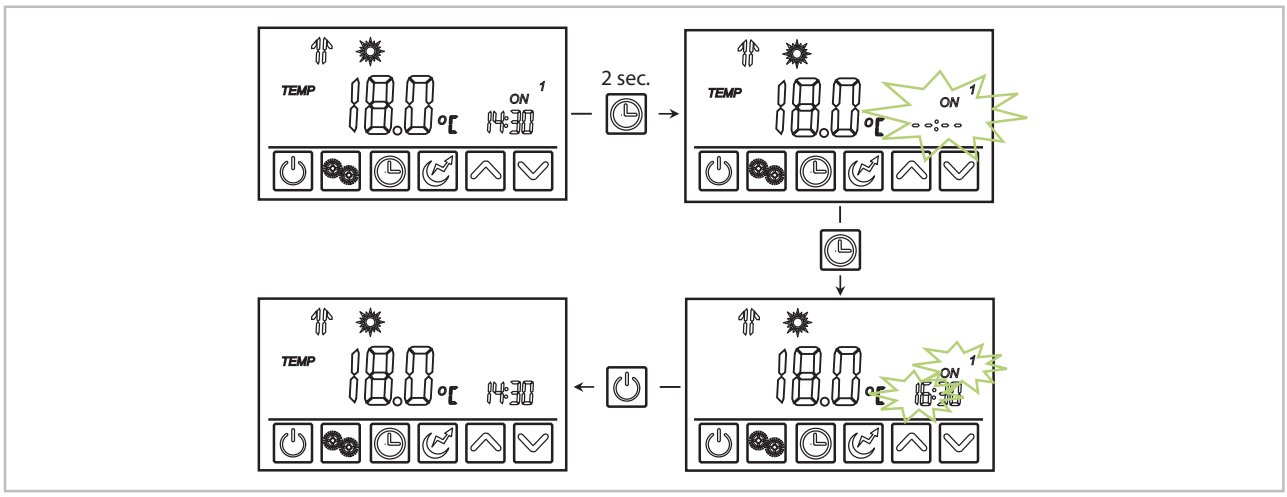


Fig. 35: Deactivating the time program

NOTE:

Order to deactivate the time program, the “clock” icon must be used to restart the “Settings” level. After the time program is activated, the “ON” indicator on the LCD flashes and the "⏻" key is used to deactivate it.

Setting the holiday program

Press the "Mode" key (B) until the "Holiday mode" symbol (3) appears.

Example: Start the program on the 27th September.

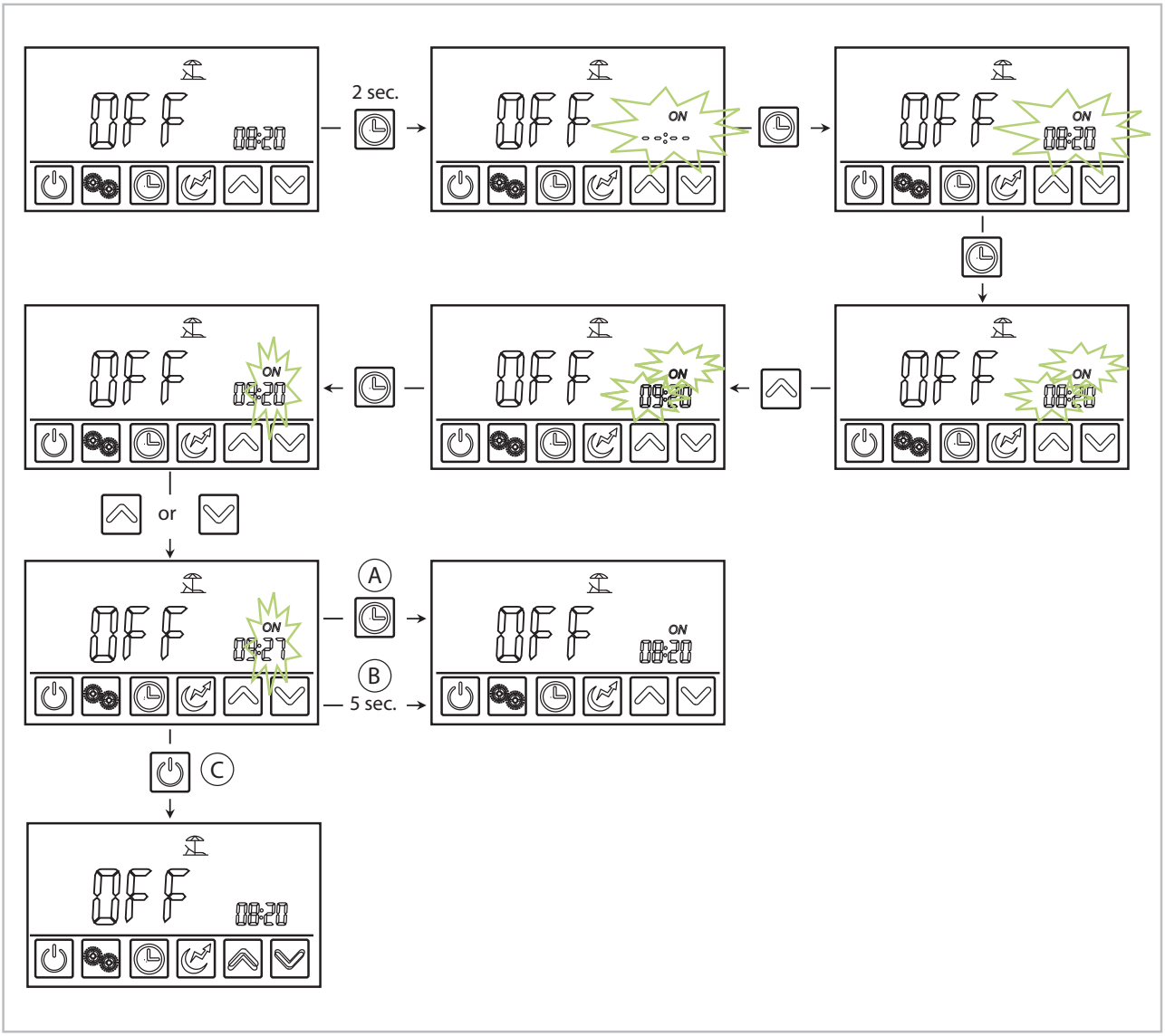


Fig. 36: Holiday mode

A: Press the "Clock" key (C) in order to save your entry.
B: Wait 5 seconds and your settings will be implemented.
C: Press the "On/Off" key (1) in order to return directly to the main display.

NOTES

1. Switch the unit off before going on holiday and set the date upon which the heat pump should start up again. It is not necessary to switch it on. The unit will switch itself on automatically on the set date.
2. When the unit switches on, the symbols continue to be displayed in the main display, e.g. "OFF". The display information is deleted at 0:00 hrs.
3. The heat pump is started at 0:00 hrs.

Parameter configuration

Main menu

Main display: In order to access the parameter level, proceed as follows:

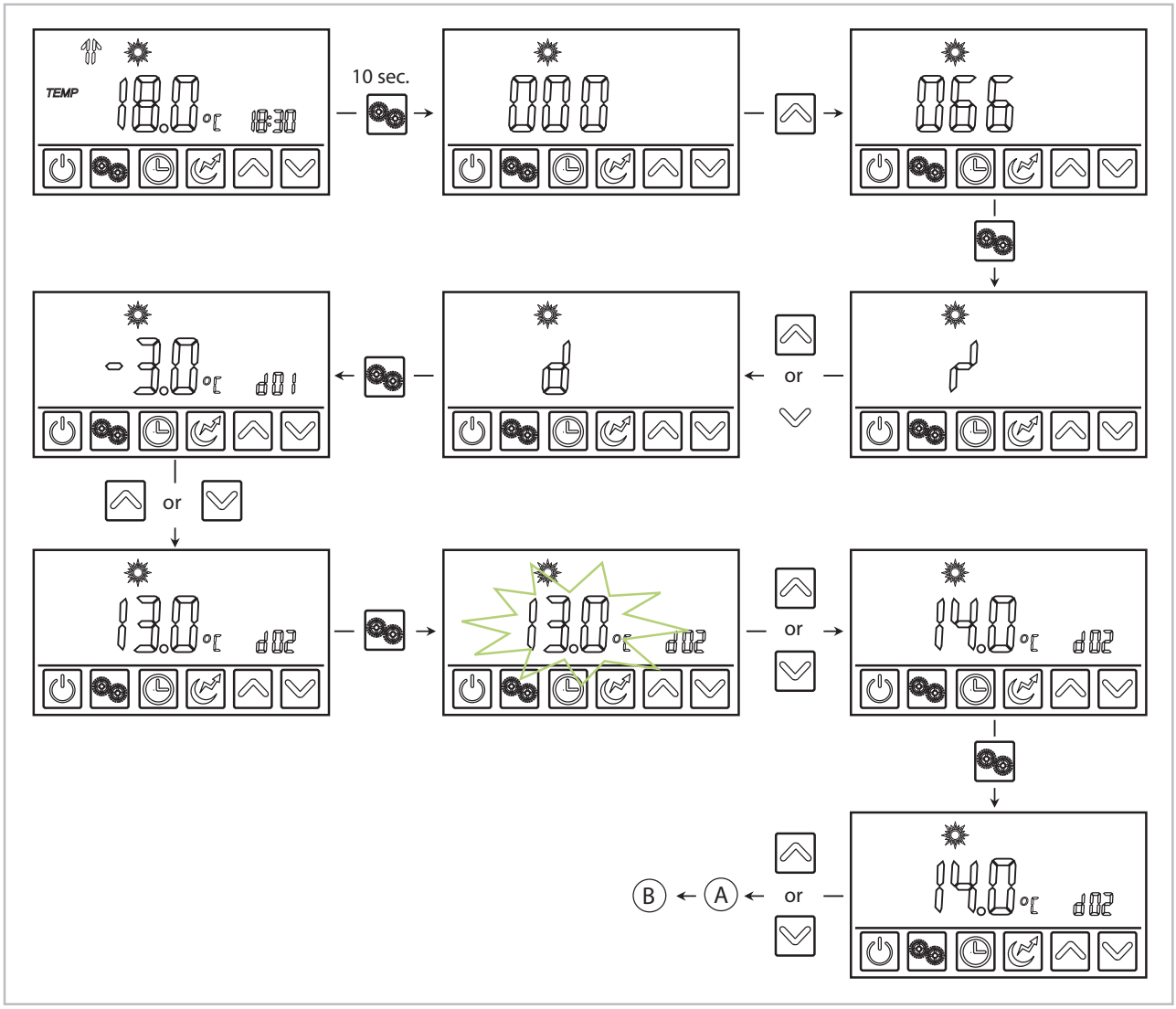


Fig. 37: Configuration of the parameters - expert level

A: The steps for changing other parameter values are the same as with the parameter "d02".
B: Confirm the "Mode" key (B) in order to save your setting and press the "On/Off" key to return to the main menu.

NOTES

1. If, after changing the values, the "On/Off" key is pressed whilst the parameter flashes, the values will not be saved and it will jump to the top parameter.

2. After saving the settings via the "Mode" key it is possible to return to the main menu by pressing the "On/Off" key.

3. After 20 seconds the set values will be saved and the display will show the main screen.

Reset to factory condition

Main menu

Main display: To start the reset function, proceed as follows:

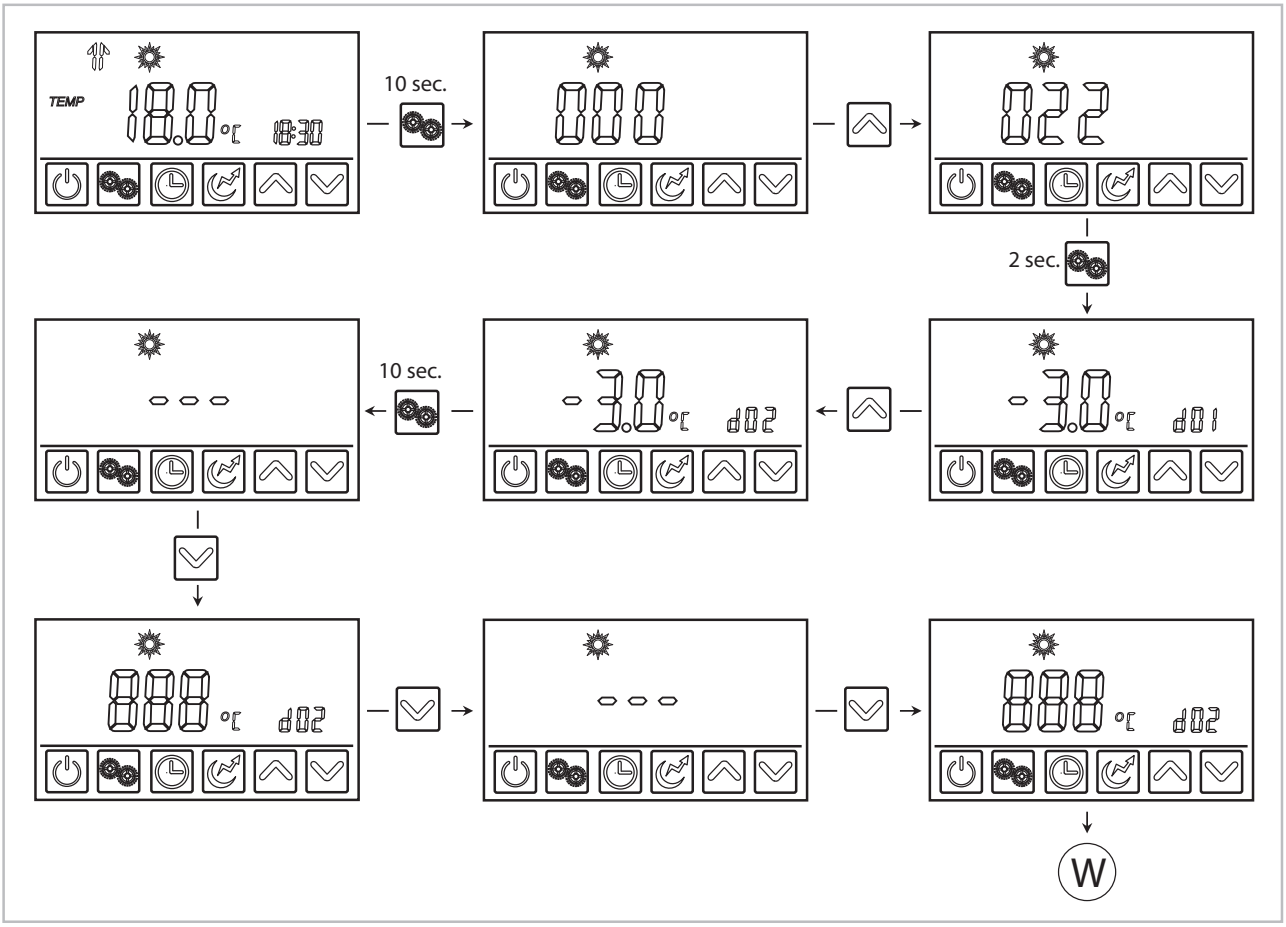


Fig. 38: Reset to factory condition

W: Then wait until the start screen appears

After the number combination "888" appears, the controller is reset with the exception of the stored time program to factory settings. After the reset, the controller is restarted in the previously set operating mode.

Activating the legionella function

Main display: In order to access the parameter level, proceed as follows:

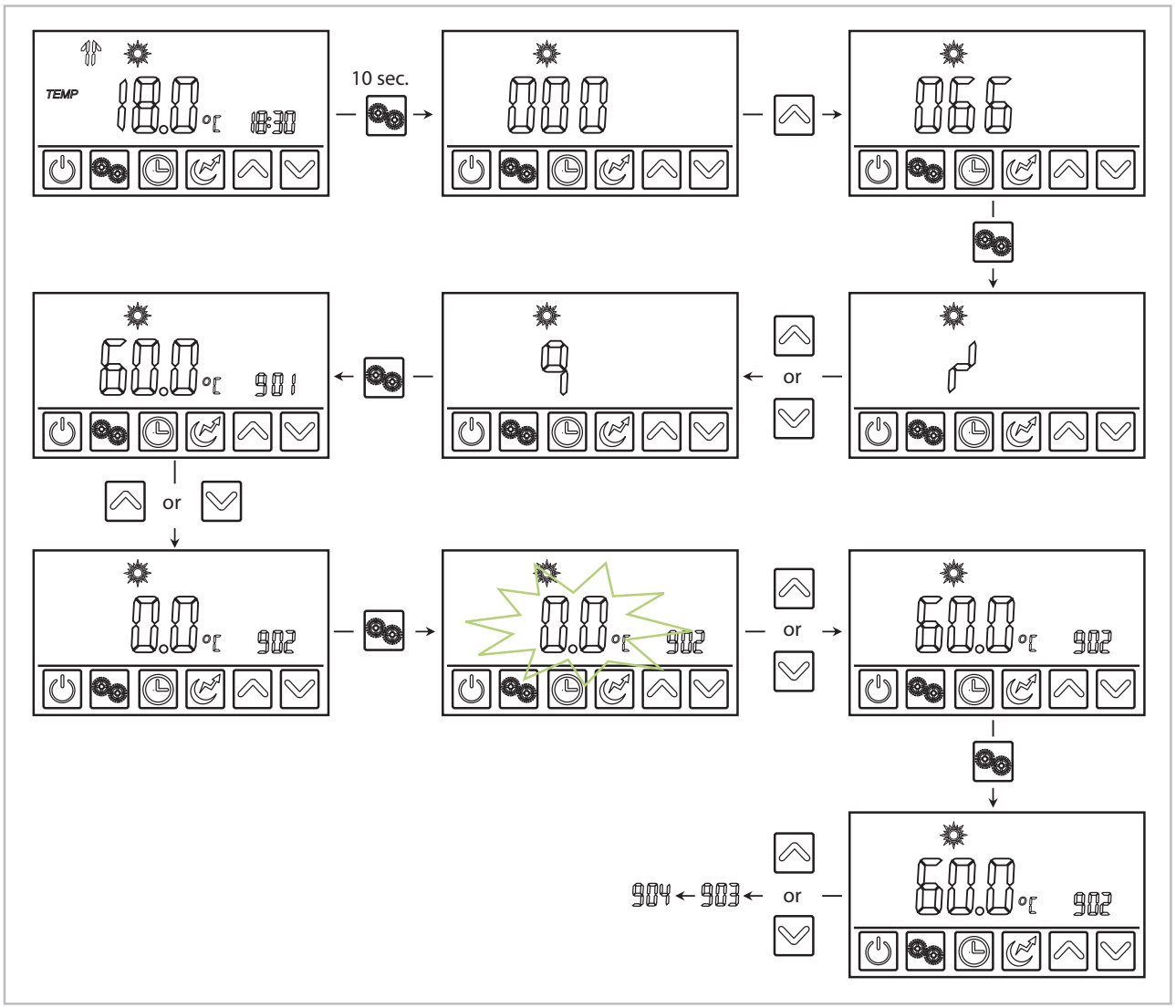


Fig. 39: Activating the legionella function

g03: The steps for changing other parameter values are the same as with the parameter "g02".
g04: Confirm the "Mode" key (B) in order to save your setting and press the "On/Off" key to return to the main menu.

NOTES

1. If, after changing the values, the "On/Off" key is pressed whilst the parameter flashes, the values will not be saved and it will jump to the top parameter.

2. After saving the settings via the "Mode" key it is possible to return to the main menu by pressing the "On/Off" key.

3. After 20 seconds the set values will be saved and the display will show the main screen.

4. To activate the legionella function, parameters "g01 to g04" must be adjusted (see *'Parameter' on page 48*, no. 14 to 17).

Activating the solar function

If the REMKO RBW domestic hot water heat pump is operated in conjunction with a thermal solar plant, please note the following:

- To operate the heat pump in conjunction with max.7.5 m² solar collector surface, once the hydraulic connection is established, it is also necessary to connect the collector probe supplied as standard. To do so, use the appropriate measuring point on your collector surface and connect the probe to the connection (Fig. 40), terminal 4. The solar collector pump is installed on terminal 2.
- Then remove the resistor, with which this connection is already equipped. This resistor should remain with the unit, to ensure emergency operation in the event of a potential malfunction. If the REMKO RBW domestic hot water heat pump is operated without the probe or resistor, an error is shown on the display.

Once installation of the thermal solar plant is complete and the collector probe has been connected, the system is ready for operation. To optimise the installed system, it is also necessary to adjust the following parameters on your system.

Description	Code	Parameter	Value	Range
Used storage tank probe solar	n	n01	0	0-bottom/1-top
Min. run-time solar pump		n02	15 min	1-30 min
Start temperature difference solar		n03	5°C	0~20 K
Night reduction		n04	0/no	0-no/1-yes
Start time night reduction		n05	00 h	00~23 h
End time night reduction		n06	6 h	00~23 h
Start temperature night reduction		n07	70°C	40~90°C
End temperature night reduction		n08	10°C	1~40°C
Max. storage tank temperature for the solar changeover valve		n09	70°C	50~90°C
Max. storage tank temperature solar pump stop		n10	70°C	50~90°C
Solar pump operation storage tank temperature-independent		n11	0/no	0-no/1-yes
Start collector temperature solar pump	r	r01	55°C	10~60°C

To adjust the parameters, perform the steps already described for configuring and activating the legionella function in the relevant parameter menus.

Solar changeover valve

In order to increase solar yield, you have the option to use a changeover valve to charge an additional storage tank (see example Fig. 12)

Description	Code	Parameter	Value	Range
Max. storage tank temperature for the solar changeover valve	n	n10	70°C	50~90°C

To adjust the parameters for activating the changeover valve, perform the steps already described for activating the solar function in the relevant parameter menus.

RBW 301 PV / RBW 301 PV-S

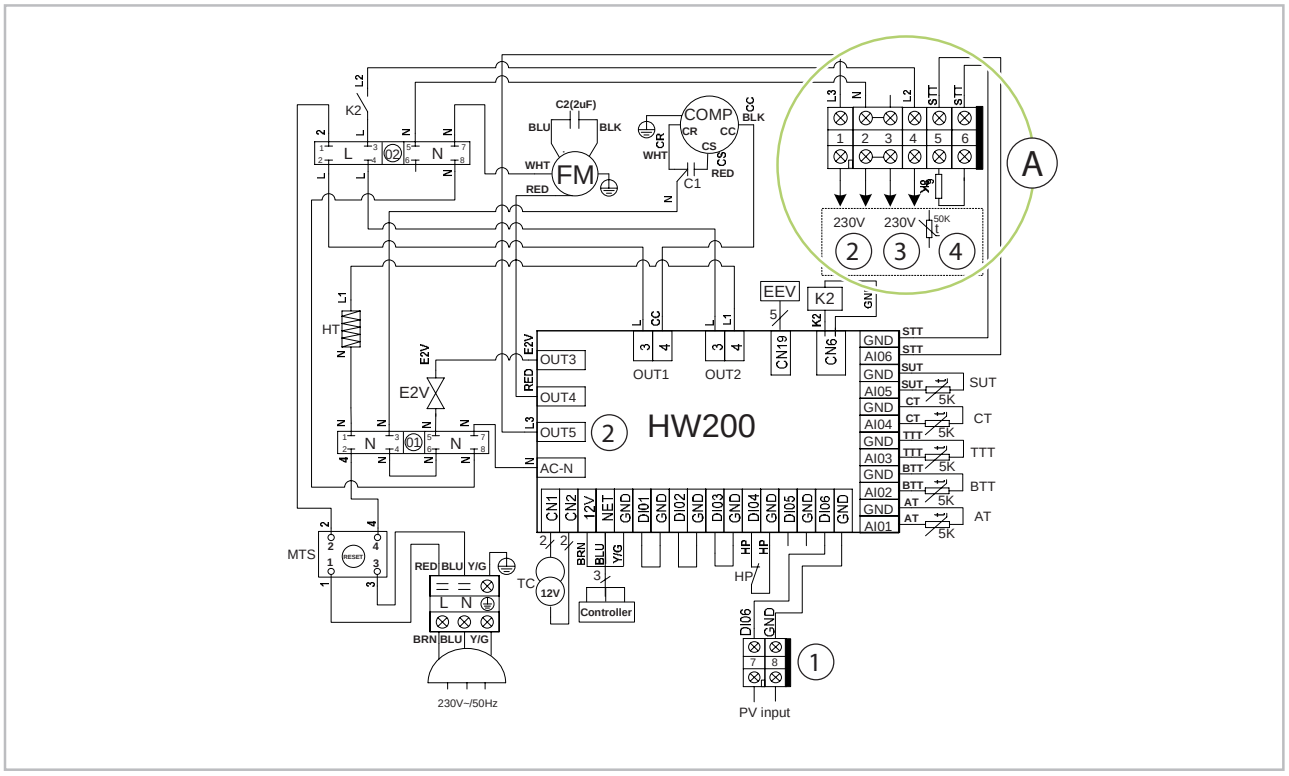


Fig. 40: Electrical drawings for domestic hot water heat pump with solar connection

1: PV contact (potential-free)
Input PV contact open = PV operation OFF
Input PV contact closed = PV operation ON
2: Solar pump
3: Solar changeover valve
4: Collector sensor
A: Solar terminal block upon request, for retrofitting. Not supplied as standard!

Activating the PV function

To operate the REMKO RBW domestic hot water heat pump in conjunction with a photovoltaic system, you have the option to use the potential-free contact (Fig. 40), terminal 1.

To optimise the installed system, the following parameters must also be adjusted on your system.

Description	Code	Para-meter	Value	Range
PV function	r	r02	0/1	1
Setpoint with PV yield		r14	45°C	10-60°C
Parallel operation heat pump/heating coil		r04	0/no	0-no/1-yes
Switch-on temperature elec. Heating coil		r05	55°C	30~90°C
Switch-on delay elec. Heating coil		r06	200 min	0~450 min

When the potential-free PV contact is closed, the RBW heat pump is activated with the corresponding PV yield. Activation of the PV function takes place directly without delay if the potential-free contact PV input (1) is closed. Enabling also takes place if the heat pump is to be locked by a time program. The auxiliary heater is only active in the individual operating modes if it has been manually enabled via the corresponding parameters (r04 to r06). With active charging of the RBW heat pump via a generated PV yield, this remains active until the set temperature at the probe below has been reached (parameter "r14" must be adjusted). The set temperature (parameter "r14") is only established through enabling via the PV contact. Without this enabling, the target temperature set for the domestic hot water (see *Chapter 10 'Operation' on page 29*) is always established.

If the system is in PV mode, the sun icon on the display flashes.

Parameter

Parameter list (expert level)

No.	Description	Code	Para-meter	Value	Range
1	Factory setting	/	/01	0	
2	Factory setting		/02	0	
3	Factory setting	C	C01	0	
4	Factory setting		C02	5°C	
5	Factory setting		C03	0.8 °C	
6	Factory setting		C04	15 °C	
7	Start defrost temperature (evaporator)	d	d01	-3°C	-30~0 °C
8	End defrost temperature (evaporator)		d02	13°C	2~30 °C
9	Time between defrosts		d03	45 min	30~90 min
10	Max. defrosting period		d04	8 min	1~20 min
11	Min. defrosting period Eco defrosting (recirculation defrosting)		d05	3 min	1~10 min
12	Defrosting mode 0 = recirculation, 2 = heat gas		d06	0	0~2
13	Ambient temp. at start of heat gas defrosting		d07	4°C	-10~20 °C
14	Setpoint for legionella function	g	g01	60°C	30~70 °C
15	Duration of legionella function		g02	0 min	0~90 min
16	Time start of legionella function		g03	0 h	0~23 h
17	Time interval (days) of legionella function		g04	7 days	7~99 days
18	Electronic expansion valve mode	E	E01	1	Factory setting
19	Overheating temperature		E02	5°C	Factory setting
20	Expansion valve initial position		E03	240	Factory setting
21	Expansion valve minimum position		E04	100	Factory setting
22	Expansion valve defrosting mode position		E05	480	Factory setting
23	Automatic restart after power failure	H	H01	1	0-no/1-yes
24	No function		H02	0	0-no/1-yes
25	Heat source (air)		H03	0	Factory setting
26	Warm-up time after commissioning		H04	1 min	Factory setting
27	Cooling function		H05	0	Factory setting
28	Cooling function duration		H06	6.0 h	Factory setting
29	Temperature unit		H07	0	0-°C/1-F
30	Factory setting		H99	0	0-no/1-yes

Parameter list (expert level) - continued

No.	Description	Code	Para-meter	Value	Range
31	Used storage tank probe solar	n	n01	0	0-bottom/1-top
32	Min. run-time solar pump		n02	15 min	1-30 min
33	Start temperature difference solar		n03	5° C	0~20 °C
34	Night reduction		n04	0/no	0-no/1-yes
35	Start time night reduction		n05	00 h	00~23 h
36	End time night reduction		n06	6 h	00~23 h
37	Start temperature night reduction		n07	70 °C	40~90 °C
38	End temperature night reduction		n08	10 °C	1~40 °C
39	Max. storage tank temperature for the solar change-over valve		n09	68 °C	50~90 °C
40	Max. storage tank temperature solar pump stop		n10	70 °C	50~90 °C
41	Solar pump operation storage tank temperature-independent		n11	0/no	0-no/1-yes
42	Start collector temperature solar pump	r	r01	55 °C	10~60 °C
43	PV function		r02	0/1	1
44	Hysteresis setpoint HW water		r03	5 °C	1~20 °C
45	Parallel operation heat pump/heating coil		r04	0/no	0-no/1-yes
46	Switch-on temperature elec. Heating coil		r05	55 °C	30~90 °C
47	Switch-on delay elec. Heating coil		r06	200 min	0~450 min
48	Elec. heating coil replaces compressor [1)]		r07	0	0-no/1-yes
49	Lower heat pump usable limit		r08	-5 °C	-20~10 °C
50	Bivalence point elec. heating coil without delay		r09	10 °C	0~30 °C
51	Bivalence point elec. heating coil with time delay r06		r10	25 °C	10~40 °C
52	Circulation pump runtime		r11	60 s	0~255 s
53	Lower heat pump emergency stop usable limit		r12	-15 °C	-5~-30 °C
54	No function		r13	56 °C	50~56 °C
55	Setpoint with PV yield		r14	45 °C	10-60 °C
56	High temperature condenser stop temperature		r15	-30 °C	Factory setting
57	Minimum temperature for fan speed control		r16	-30 °C	Factory setting
58	Top tank probe active/inactive		r17	0	Factory setting
59	Return flow temperature increase (heating)		r18	0 °C	Factory setting
60	Factory setting		r19	-30 °C	Factory setting
61	Factory setting		r20	-30 °C	Factory setting

Parameter list (expert level) - continued

No.	Description	Code	Para-meter	Value	Range
62	Removes on/off switch status	S	S01	Status	CL/OP
63	OHP switch (over heat protection) condenser		S02	Status	CL/OP
64	No function		S03	Status	CL/OP
65	Error output high pressure alarm switch status		S04	Status	CL/OP
66	Switch status elec. Heating coil		S05	Status	CL/OP
67	No function		S06	Status	CL/OP
68	Ambient temperature	t	t01	Measured value	-9~99°C
69	Storage tank temperature, lower		t02	Measured value	-9~99°C
70	Storage tank temperature, upper		t03	Measured value	-9~99°C
71	Evaporator temperature		t04	Measured value	-9~99°C
72	Suction gas temperature		t05	Measured value	-9~99°C
73	Collector temperature		t06	Measured value	-9~99°C
74	Compressor status	O	O01	Status	on/off
75	Electric heating coil status		O02	Status	on/off
76	Solenoid valve for defrosting		O03	Status	on/off
77	Fan speed low		O04	Status	on/off
78	Fan speed high/ circulation pump/ solar pump		O05	Status	on/off
79	Operation circulation pump/solar pump		O06	Status	on/off
80	EEV position		O07	Status	0~500

[1)]After reaching the lower usable limit

Parameter list (operator level)

No.	Description	Para-meter	Value	Range
1	Start defrost temperature (evaporator)	d01	-3°C	-30°C~0°C
2	End defrost temperature (evaporator)	d02	13°C	2~30°C
3	Time between defrosts	d03	45 min	30~90 min
4	Max. defrosting period	d04	8 min	1~12 min
5	Duration of legionella function	g02	0 min	0~90 min
6	Time start of legionella function	g03	0 h	0~23 h
7	Time interval (days) of legionella function	g04	7D	7~99 days
8	Max. storage tank temperature solar pump stop	n10	70°C	50~90°C
9	Switch-on delay electr. heating coil	r06	200 min	0~450 min

Parameter description

Para-meter	Designation	Description
d01	Start defrost temperature (evaporator)	If the evaporator temperature is < d01 then the defrosting process starts
d02	End defrost temperature (evaporator)	If the evaporator temperature is > d02 then the defrosting process ends
d03	Time between defrosts	This is the min. run-time of the heat pump between 2 defrosting processes
d04	Max. defrosting period	Once the set time d04 lapses, defrosting ends
g02	Duration of legionella function	Time of the legionella function
g03	Time start of legionella function	The legionella function starts at this time
g04	Time interval (days) of legionella function	The legionella function is activated at this interval (number of days)
n10	Max. storage tank temperature solar pump stop	If the storage tank temperature is higher than n10, the solar pump r06 stops: Switch-on delay electrical heating coil. Upon exceeding the set run-time r06, the electrical heating coil is switched on

11 Care and maintenance

Regular care and maintenance guarantee trouble-free operation and a long service life of the heat pump.

- Check the electrical wiring
- Empty the storage tank for a heat pump shut-down. Risk of freezing!
- We recommend cleaning the storage tank regularly
- Check the function of sacrificial anode regularly
- We recommend setting the hot water temperature as low as possible, in order to ensure the most effective operation possible
- Check all parts for pressure resistance and leak-tightness. Check the refrigerant volume regularly
- To perform the statutory seal test where applicable, it is necessary to arrange an annual maintenance contract with an appropriate specialist firm.
- In the air intake of a basement laundry drying, filters should be provided and should be monitored monthly. Also note the maximum pressure loss.

12 Temporary shutdown

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

- The system is to be switched to "Stand-by" mode during temporary shutdowns.
- 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.
- Changing the operating mode is described in the "Operation" chapter.

! NOTICE!

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

13 Troubleshooting and customer service

13.1 Troubleshooting and customer service

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 list below. Please inform your dealer if the unit is still not working correctly after all of the functional checks have been performed.

Fault description	Cause	Remedy
System does not function	Power supply correct?	Switch electricity off/on and check voltage
	Cable connections correct?	Check connections and replace if necessary
	Fuse correct?	Check fuses and replace if necessary
High pressure fault	Excess refrigerant	Refill
	Condenser too hot	Reduce temperature in the storage tank
Low pressure alarm	Refrigerant level low	Check circuit for leaks
	2. Refrigerant filter/capillary blocked	Replace filter or capillary tube
	Suction air temperature too cold/not present	Check air supply/temperature
No hot water being supplied	Shut-off cocks for water supply closed	Open shut-off cocks
	Water pressure too low	Increase water pressure
Display remains dark	Safety temperature limiter has triggered	Reduce the temperature in the storage tank

Error codes and their meanings

Code	Error description	Cause	Remedial measures
P01	Probe, storage tank bottom, defective	Defective or short-circuited. Plug-in contact not correct	Check probe resistance. Replace probe
P02	Probe, storage tank top, defective		
P034	Probe, collector defective		
P04	Probe, ambient air defective		
P05	Probe, evaporator defective		
P07	Probe, suction pipe defective		
E01	High pressure fault	Refrigerant pressure is too high, pressure switch has triggered	Check pressure, water temperature too high
E02	Low pressure alarm	Refrigerant pressure is too low, pressure switch has triggered	Check pressure, refrigerant deficiency
E03	Overheating error	Water level too low	Check water level
E08	Communication fault	Communication error between operating unit and motherboard	Cable connection, check plug-in contacts

13.2 Resistances of the temperature sensors

NTC R-T Table (R25=5KΩ B25/50=3470K)

Temp. (°C)	Resistance (KOhm)	Temp. (°C)	Resistance (KOhm)
-30	63.7306	1	13.6017
-29	60.3223	2	13.0057
-28	57.1180	3	12.4393
-27	54.1043	4	11.9011
-26	51.2686	5	11.3894
-25	48.5994	6	10.9028
-24	46.0860	7	10.4399
-23	43.7182	8	9.9995
-22	41.4868	9	9.5802
-21	39.3832	10	9.1810
-20	37.3992	11	8.8008
-19	35.5274	12	8.4385
-18	33.7607	13	8.0934
-17	32.0927	14	7.7643
-16	30.5172	15	7.4506
-15	29.0286	16	7.1513
-14	27.6216	17	6.8658
-13	26.2913	18	6.5934
-12	25.0330	19	6.3333
-11	23.8424	20	6.0850
-10	22.7155	21	5.8479
-9	21.6486	22	5.6213
-8	20.6380	23	5.4048
-7	19.6806	24	5.1978
-6	18.7732	25	5.0000
-5	17.9129	26	4.8108
-4	17.0970	27	4.6298
-3	16.3230	28	4.4566
-2	15.5886	29	4.2909
-1	14.8913	30	4.1323
0	14.2293	31	3.9804
32	3.8349	67	1.1771
33	3.6955	68	1.1413
34	3.5620	69	1.1068
35	3.4340	70	1.0734
36	3.3113	71	1.0412
37	3.1937	72	1.0100
38	3.0809	73	0.9800
39	2.9727	74	0.9509
40	2.8688	75	0.9228
41	2.7692	76	0.8957
42	2.6735	77	0.8695
43	2.5816	78	0.8441
44	2.4934	79	0.8196
45	2.4087	80	0.7959
46	2.3273	81	0.7730
47	2.2491	82	0.7508
48	2.1739	83	0.7293
49	2.1016	84	0.7086
50	2.0321	85	0.6885
51	1.9656	86	0.6690
52	1.9015	87	0.6502
53	1.8399	88	0.6320
54	1.7804	89	0.6144
55	1.7232	90	0.5973
56	1.6680	91	0.5808
57	1.6149	92	0.5647
58	1.5636	93	0.5492
59	1.5142	94	0.5342
60	1.4666	95	0.5196
61	1.4206	96	0.5055
62	1.3763	97	0.4919
63	1.3336	98	0.4786
64	1.2923	99	0.4658
65	1.2526	100	0.4533
66	1.2142		

REMKO RBW PV series

NTC R-T Table (R25=50.000KΩ B25/50=3950K)

Temp. (°C)	Resistance (KOhm)	Temp. (°C)	Resistance (KOhm)
-40	2009.2	-6	232.60
-39	1869.0	-5	220.13
-38	1739.6	-4	208.40
-37	1620.2	-3	197.38
-36	1509.8	-2	187.02
-35	1407.8	-1	177.27
-34	1313.5	0	168.10
-33	1226.2	1	159.46
-32	1145.3	2	151.32
-31	1070.4	3	143.66
-30	1001.0	4	136.43
-29	936.58	5	129.62
-28	876.76	6	123.19
-27	821.21	7	117.12
-26	769.58	8	111.39
-25	721.58	9	105.98
-24	676.92	10	100.87
-23	635.35	11	96.040
-22	596.63	12	91.470
-21	560.55	13	87.148
-20	526.92	14	83.057
-19	495.54	15	79.185
-18	466.26	16	75.519
-17	438.91	17	72.045
-16	413.37	18	68.754
-15	367.69	19	65.634
-14	367.16	20	62.676
-13	346.26	21	59.870
-12	326.70	22	57.207
-11	308.38	23	54.679
-10	291.22	24	52.279
-9	275.13	25	50.000
-8	260.05	26	47.834
-7	245.89	27	45.775

Temp. (°C)	Resistance (KOhm)	Temp. (°C)	Resistance (KOhm)
28	43.818	63	11.182
29	41.956	64	10.799
30	40.185	65	10.431
31	38.500	66	10.078
32	36.896	67	9.7393
33	35.368	68	9.4134
34	33.913	69	9.1002
35	32.527	70	8.7991
36	31.206	71	8.5096
37	29.947	72	8.2313
38	28.746	73	7.9637
39	27.600	74	7.7061
40	26.507	75	7.4584
41	25.464	76	7.2199
42	24.468	77	6.9904
43	23.517	78	6.7694
44	22.608	79	6.5566
45	21.740	80	6.3515
46	20.911	81	6.1541
47	20.118	82	5.9639
48	19.359	83	5.7805
49	18.634	84	5.6037
50	17.940	85	5.4333
51	17.276	86	5.2690
52	16.641	87	5.1105
53	16.032	88	4.9576
54	15.450	89	4.8104
55	14.892	90	4.6678
56	14.357	91	4.5304
57	13.845	92	4.3978
58	13.353	93	4.2690
59	12.882	94	4.1462
60	12.430	95	4.0268
61	11.997	96	3.9114
62	11.581	97	3.8000

Temp. (°C)	Resistance (KOhm)	Temp. (°C)	Resistance (KOhm)
98	3.6923	110	2.6457
99	3.5887	111	2.5756
100	3.4876	112	2.5077
101	3.3903	113	2.4420
102	3.2978	114	2.3783
103	3.2052	115	2.3166
104	3.1172	116	2.2568
105	3.0320	117	2.1989
106	2.9497	118	2.1427
107	2.8699	119	2.0882
108	2.7927	120	2.0354
109	2.7180		

14 General view of unit and spare parts

14.1 Exploded view of the unit

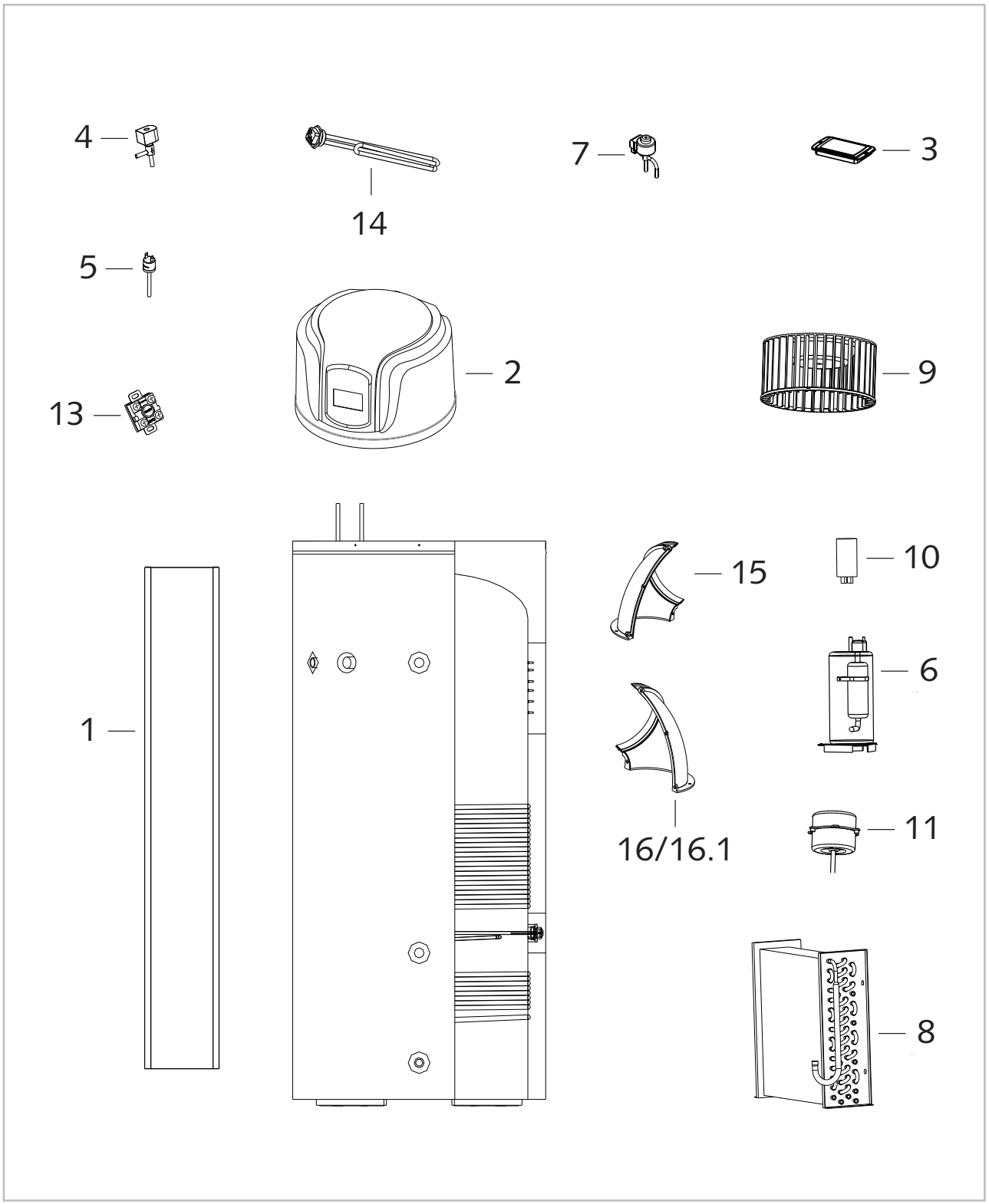


Fig. 41: Exploded view of the unit

We reserve the right to modify the dimensions and design as part of the ongoing technical development process

14.2 Spare parts list

No.	Designation	RBW 301 PV	RBW 301 PV-S
	From serial number:	1740N...	1741N...
1	Casing, front	1110769	1110769
2	Casing, top (cover)	1110775	1110775
3	Complete operating unit including circuit board	1110800	1110800
4	Solenoid valve	1110740	1110740
5	High pressure switch	1110771	1110771
6	Compressor	1110774	1110774
7	Electronic expansion valve	1110772	1110772
8	Heat exchanger (evaporator)	1110770	1110770
9	Fan blade	1110747	1110747
10	Compressor capacitor 15 nF	1110802	1110802
11	Fan motor	1110749	1110749
13	Safety temperature limiter (STB)	1110760	1110760
14	Electrical heating coil, 1.5 kW	1110766	1110766
15	Ventilation elbow half shell (left)	1124195	1124195
16	Ventilation elbow half shell (right)	1124196	1124196
16.1	Half shell ventilation grille	1124197	1124197

When ordering spare parts, please always state the EDP number, unit number and unit type (see name plate)!

Spare parts not illustrated

No.	Designation	RBW 301 PV	RBW 301 PV-S
	Operating unit panel	1110763	1110763
	Fan motor capacitor 2 nF	1110773	1110773
	Transformer	1110764	1110764
	Magnesium anode	1110801	1110801
	Probe, air suction T1	1110746	1110746
	Probe, water inlet T2	1110751	1110751
	Probe, water outlet T3	1110752	1110752
	Probe, heat exchanger T4	1110753	1110753
	Probe, suction pipe T5	1110745	1110745
	Collector sensor T6	---	1110755
	Air guidance unit outlet	1110791	1110791
	Suction gas probe	1110803	1110803
	Air guidance unit inlet	1110804	1110804
	Casing (front)	1110769	1110769
	Electronics module panel (casing)	1110765	1110765
	Display panel (frame)	1110757	1110757
	Solenoid valve	1110740	1110740

When ordering spare parts, please always state the EDP number, unit number and unit type (see name plate)!

15 Index

REMKO RBW PV series

REMKO QUALITY WITH SYSTEMS

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