

# Operating and installation instructions

## **REMKO RVS series** **Chiller**

RVS 50 DC, RVS 80 DC, RVS 130 DC, RVS 180 DC





## Content

<i>Safety notes</i>	4
<i>Environmental protection and recycling</i>	4
<i>Guarantee</i>	4
<i>Transportation and packaging</i>	5
<i>Unit description</i>	5
<i>Cooling cycle</i>	6
<i>Service limits</i>	7
<i>Operation</i>	8-18
<i>Installation instructions for qualified personnel</i>	19
<i>Installation</i>	20-25
<i>Care and maintenance</i>	26
<i>Shutdown</i>	26
<i>Electrical wiring</i>	27-28
<i>Electrical drawings</i>	29-32
<i>Leak testing</i>	33
<i>Before commissioning</i>	33-34
<i>Commissioning</i>	35
<i>Overhaul and repair</i>	36
<i>Troubleshooting and customer service</i>	37-40
<i>Resistance table</i>	40
<i>Dimensions</i>	41
<i>Technical data</i>	42



**Carefully read this original operating manual prior to commissioning/using the units!**



**This operating manual is a translation of the German original.**

**This manual is an integral part of the unit and must always be kept in the vicinity of the installation location or on the unit itself.**

*Subject to modifications. No liability accepted for errors or misprints!*

# REMKO series RVS

## Safety notes

Carefully read the operating manual before placing the unit in service for the first time. It contains useful tips  and notes as well as hazard warnings to prevent injury to persons or material damage . Failure to follow the directions in this manual can endanger persons, the environment and the equipment itself and will void any claims for liability.

- Keep this manual and the refrigerant data sheet near the unit.
- Only qualified personnel may set up and install the units and components.
- The set-up, connection, and operation of the unit and its components must take place in accordance with the operating conditions stipulated in this manual and comply with all applicable local regulations.
- Stationary units must be permanently installed for operation.
- Modification of the units and components supplied by REMKO is not permitted and can cause malfunctions.
- Units and components may not be operated in areas where there is an increased risk of damage. Observe the minimum clearances.
- The electrical power supply is to be adapted to the requirements of the units.
- The operational safety of the units and components is only assured if they are fully assembled and used as intended. Safety devices may not be modified or bypassed.
- Do not operate units or components if there are obvious defects or signs of damage.
- All housing parts and unit openings, e.g. air inlets and outlets, must be free from foreign objects, liquids, or gases.
- The units and components must be kept at an adequate distance from flammable, explosive, combustible, abrasive and dirty areas or atmospheres.
- Contact with some parts of the unit or components can result in burns or other injuries.
- Installation, repair and maintenance work may only be carried out by authorised specialists. Visual inspections and cleaning can be performed by the operator as long as the unit is disconnected from the power.
- Take appropriate precautions when performing installation, repair or maintenance work or cleaning the unit to make sure the unit does not pose a danger to persons.
- The units and components should not be exposed to any mechanical load or extreme levels of humidity.



## 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.



### Disposing of the units and their components

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

## Guarantee

In order to make warranty claims, it is essential that the ordering party or their representative complete and return the "certificate of warranty" and "commissioning report" to REMKO GmbH & Co. KG at the time when the equipment was purchased and commissioned. The warranty conditions are listed in the "General terms and 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.

## Transportation and packaging

The units are shipped in sturdy transport packaging. Immediately check the units on delivery and make a note of any damage or missing parts on the delivery note. Inform the forwarding agent and contractual partner.

Claims under guarantee made at a later date will not be accepted.

## Unit description

In cooling mode, the unit (an air-cooled chiller) takes heat out of the operating medium to be cooled, water or a mixture of water and glycol, within a closed medium cycle in the evaporator (plate heat exchanger) and passes it on to the closed cooling cycle. As a consequence of the heat exchange, the medium cools and the refrigerant in the cooling cycle vaporises under low pressure. The gaseous refrigerant enters an electric compressor (scroll construction) which increases the pressure and the temperature of the refrigerant. The gaseous refrigerant is led into a finned condenser, which, as a consequence of the heat exchange, condenses the refrigerant under high pressure to a liquid. The air emerging at the condenser heats the environment. The liquid refrigerant is fed by means of a variable injector valve back to the evaporator where the circuit begins again.

A return temperature dependent, seamless controller, which ensures the unit's operation and all of the safety functions, is used

to control the cooling capacity.

A potential-free contact provides for remote enabling.

The unit is designed for outdoor installation. Under certain circumstances, it can also be used in indoor areas.

The unit cooling cycle comprises an evaporator, compressor, electronic injection valve, condenser, condenser fan, pressure transducer, high and low pressure switches and a 4-way changeover valve for heating mode.

The medium cycle comprises a tube bundle heat exchanger, a circulation pump and a flow switch.

Vibration dampers, cabled remote controls and glycol concentrate are available as accessories.

## Intended use

Depending on the model and the unit, the units are only intended to be used as a chiller for the cooling of the operating medium water or a water-glycol mixture within a closed medium cycle.

Any different or additional use is a non-intended use.

The manufacturer/supplier assumes no liability for damages arising from non-intended 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.

## Proper handling

Insofar as intervention is required in the refrigerant circuit of the unit during maintenance or repair work, all work shall be carried out exclusively by persons and companies who have a certificate in accordance with the prerequisites of EC ordinance no. 517/2014 of the European Council.

## Applicability

Within the course of continuous further development of all products, REMKO GmbH & Co. KG reserve the right to carry out technical changes to the units as well as updates to the documentation.

The documentation on the unit (name plates, wiring diagrams, etc.) shall be considered as part of the overall documentation.

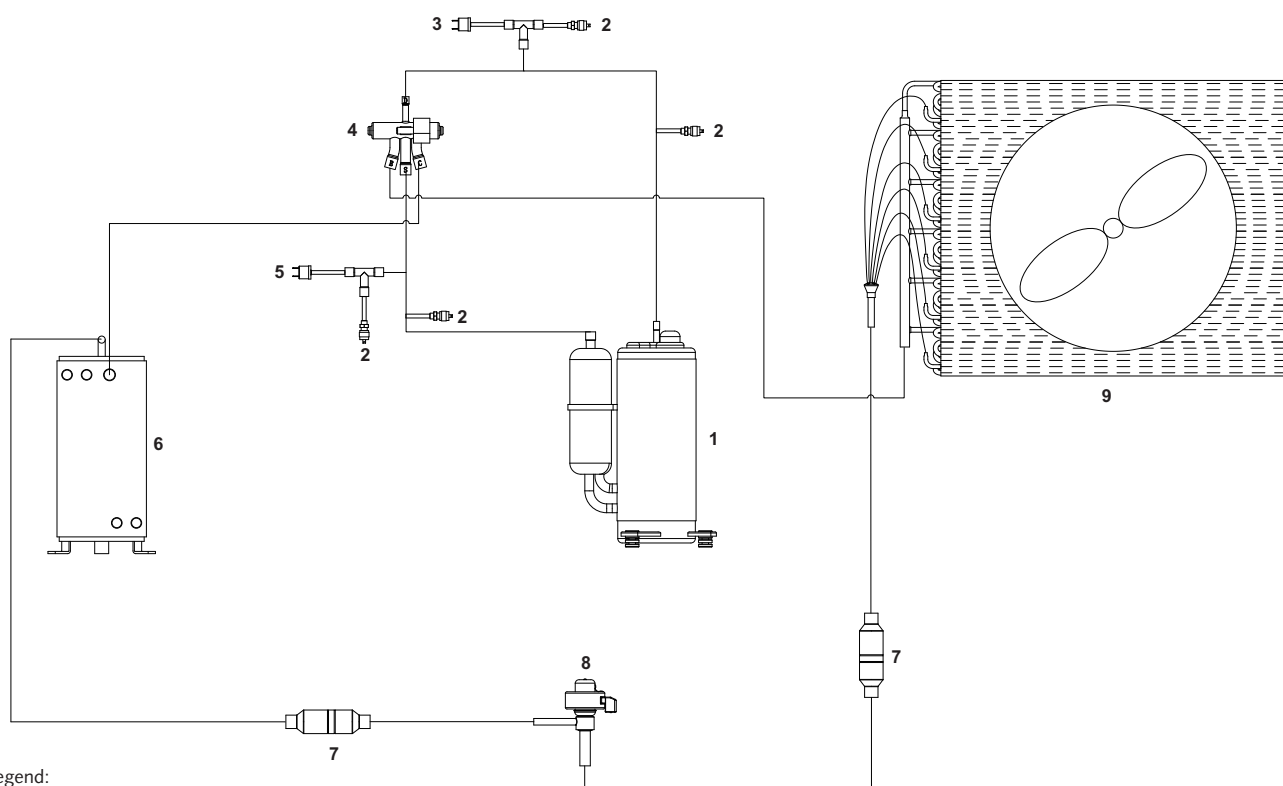
## Ecological design directive

The regulation (EU) 2016/2281 (LOT 21) approved by the European Commission is the enforcement action for the ecological design directive 2009/125/EC, whose principal objective is to reduce the primary energy demand in the European Union by 2030 and to reduce the emissions of hazardous substances associated with this.

The chillers from REMKO comply with the applicable energy requirements from the ecological design directive. The product datasheet required per the ordinance, to verify ERP conformity is attached as a separate document and is also available for download from [www.remko.de](http://www.remko.de).

# REMKO series RVS

## Cooling cycle



Legend:

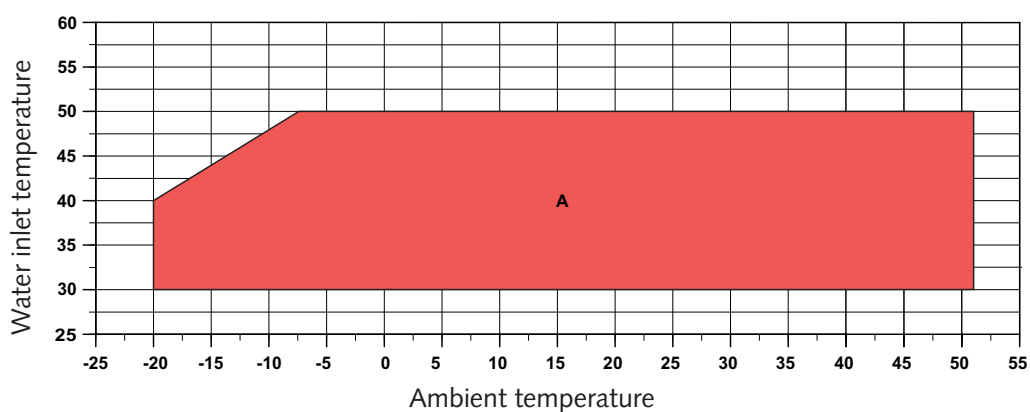
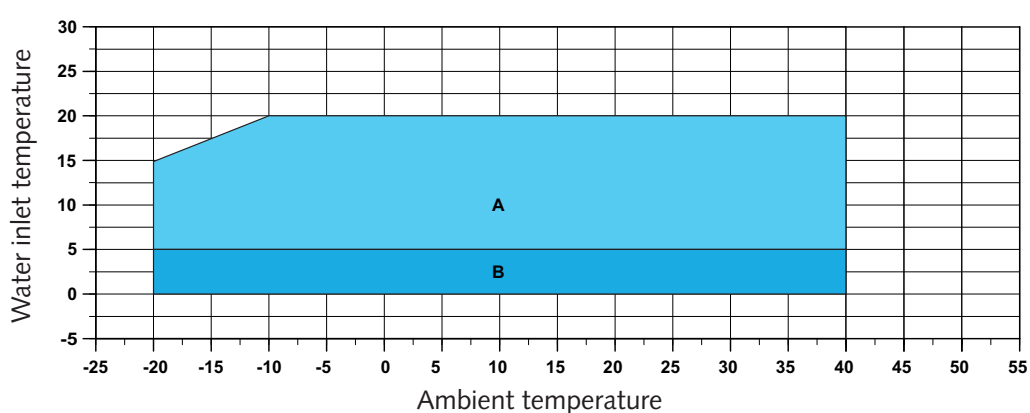
- |                          |                              |
|--------------------------|------------------------------|
| 1 Compressor             | 6 Tube bundle heat exchanger |
| 2 Schrader valve         | 7 Filter dryer               |
| 3 High-pressure switch   | 8 Electronic expansion valve |
| 4 4-way changeover valve | 9 Fin condenser              |
| 5 Low-pressure switch    |                              |

## Service limits

RVS DC units are chillers with heat pump function. The primary purpose of the units here is cooling operation, whilst the heating function represents an additional function by means of reverse circulation.

For trouble-free unit operation and compliance with the legal warranty conditions, it is essential that the unit is be used within its respective operational limits. These are shown in the following diagram. Further information on this can likewise be found in the *technical data*.

### Service limits



#### Legend

- A Standard version
- B Low-temperature version

# REMKO series RVS

## Operation



The controller of the chiller is to be operated with the touch pad, which is located right on the unit in a housing protected from splashed water. To open the housing, press the "PRESS" button on the right-hand side of the housing. After operating the controller, close the housing again in order to prevent water ingress. If there is no activity on the controller for longer than 60 seconds, the display switches to stand-by mode and no values are displayed. The display can be activated by touching any part of the display.

Button symbol	Designation	Description
	Mode key	Operating modes can be changed, temperature settings changed and parameters set by pressing the mode key
	On/off key	The system can be switched on and off with the On/Off key. In addition, it is also possible to cancel the current operation and return to the previous operating stage
	Up arrow key	Values can be adjusted and pages scrolled through with the up arrow key
	Down arrow key	Values can be adjusted and pages scrolled through with the down arrow key
	Clock key	The clock key is used to set up and execute timer functions




Button symbol	Designation	Description
	Cooling mode	Is displayed when the system is in cooling mode
	Heating mode	Is displayed when the system is in heating mode
	Defrosting operation	Appears during the defrosting procedure (only in heating mode)
	Compressor	Appears when the compressor is running
	Circulation pump	Appears when the circulation pump is running
	Fan	Appears when the fan is running
	Timer	Is displayed with the activation of a timer
	Water outlet	Appears when the digital display shows the water outlet temperature
	Water inlet	Appears when the digital display shows the water inlet temperature
	Malfunction	Is displayed if there is a fault present
	Temperature (°C)	Appears when the digital display shows the a temperature in °C
	Temperature (°F)	Appears when the digital display shows the a temperature in °F
	Setting	Is displayed if the value is set
	Seconds	Appears when the digital display shows seconds
	Minutes	Appears when the digital display shows minutes
	Hours	Appears when the digital display shows hours
	Pressure	Appears when the digital display shows a pressure
	Medium flow rate	Appears when the digital display shows a medium flow rate

# REMKO series RVS

## Switching the unit on






The unit is switched on by pressing the  key for 1 second.

A further 1 second press of the  key in the start screen will switch the unit back off again. After one minute without being used, the display darkens.

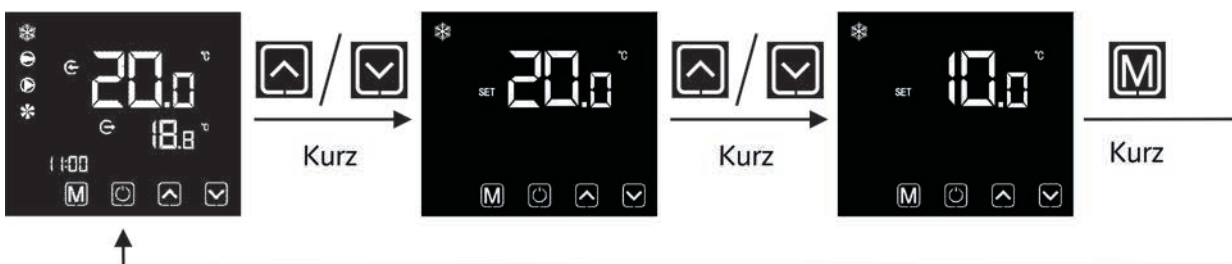
## Setting the operating mode







Before setting the operating mode, this must be implemented by installing/removing a wire jumper on the corresponding terminals (see chapter *Electrical connection*).

To set the operating mode, press the  key on the start screen for 1 second. The mode can thus be set to either cooling  or heating .

## Setting the setpoint (return temperature)



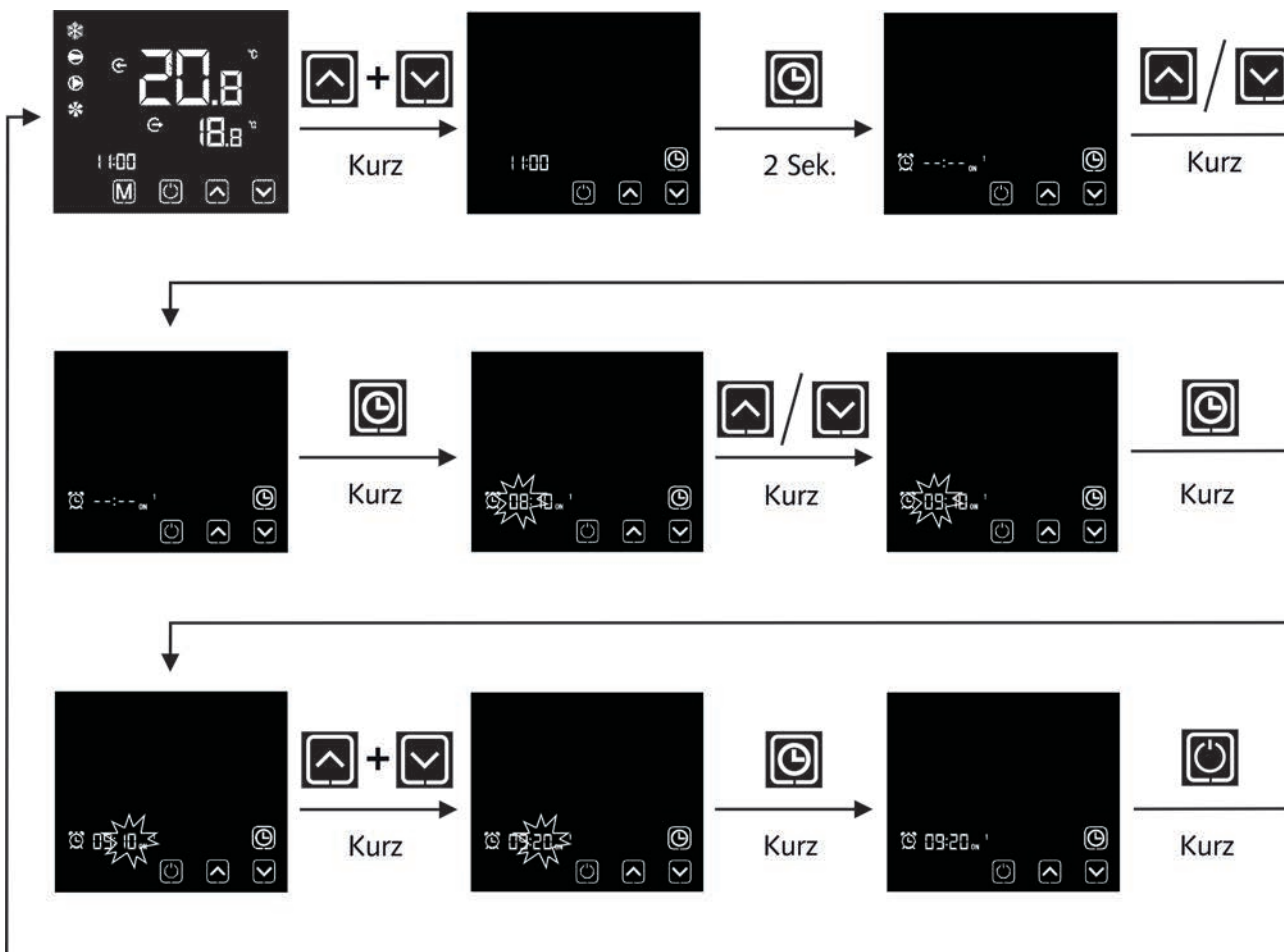
To set the setpoint for the return temperature, briefly press the  or  key in the start screen. The display flashes. Now the setpoint can be changed in steps of 0.5 with the same keys. Once the desired temperature is set, confirm the input with the  key. The value set will be saved and you are returned to the start screen. If there is no activity for 20 seconds during the set-up process, the system automatically returns to the start screen without changing any of the settings.

In order to cancel the adjustment process, press the  key to return to the start screen without changing any of the values.



# REMKO series RVS

## Saving timer programs



To save a timer program, briefly press the and keys simultaneously.

The key appears on the right-hand side of the screen.

Press this for 2 seconds.

Now you can select a switch-on or switch-off point with the and keys.

ON 1 = Switch-on point for the first timer program

OFF 1 = Switch-off point for the first timer program

ON 2 = Switch-on point for the second timer program

OFF 2 = Switch-off point for the second timer program

Use the key to confirm your selection. The display for the hours starts to flash.

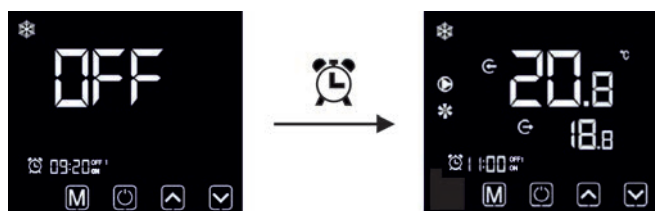
The hours can now be adjusted with the and keys.

Confirm the hours with the key and the minute display starts to flash. The minutes can now be adjusted with the and keys.

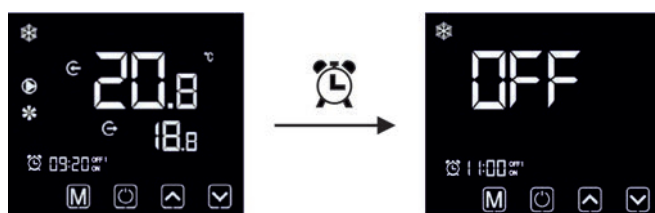
Confirm again by briefly pressing the key and the settings are saved.

To exit the timer menu, press the key briefly

In order to cancel the adjustment process press the key to return to the start screen without changing any of the values.



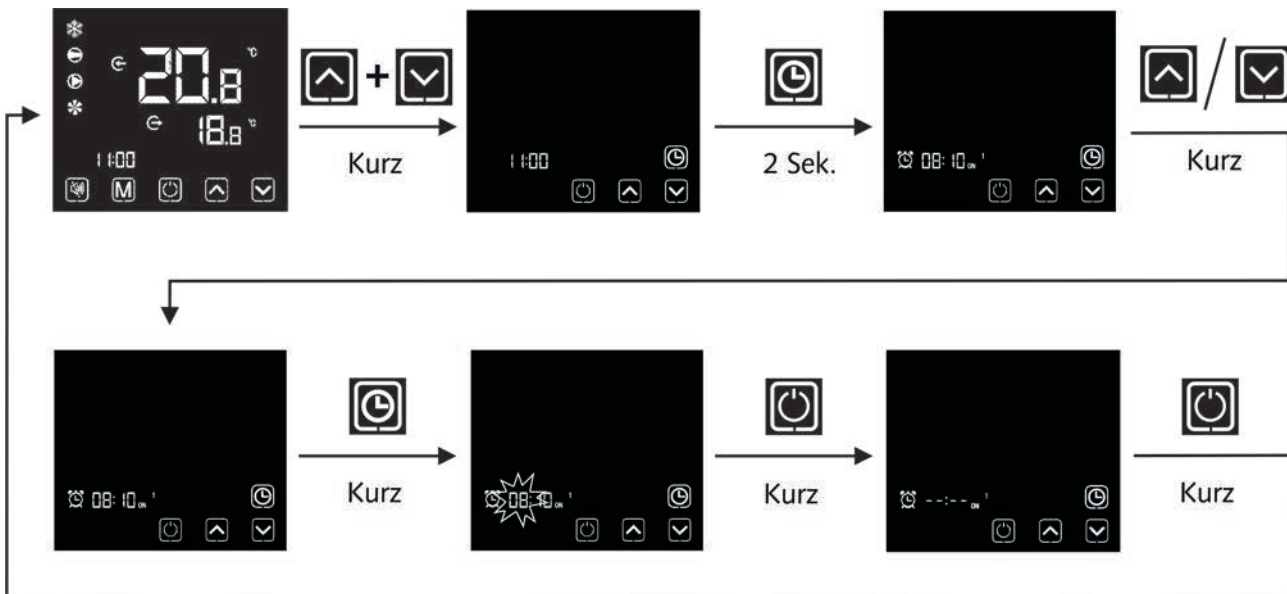
If the system is deactivated and the time set for a switch-on point (ON1, ON2) is reached, the system activates autonomously. It then carries out the operation with the settings before deactivating again.



If the system is activated and the time set for a switch-off point (OFF1, OFF2) is reached, the system de-activates autonomously.

# REMKO series RVS

## Deleting timer programs



To delete a timer program, briefly press the and keys simultaneously.

The key appears on the right-hand side of the screen. Press this for 2 seconds.

Now you can select a switch-on or switch-off point that you wish to delete with the and keys.

ON 1 = Switch-on point for the first timer program

OFF 1 = Switch-off point for the first timer program

ON 2 = Switch-on point for the second timer program

OFF 2 = Switch-off point for the second timer program

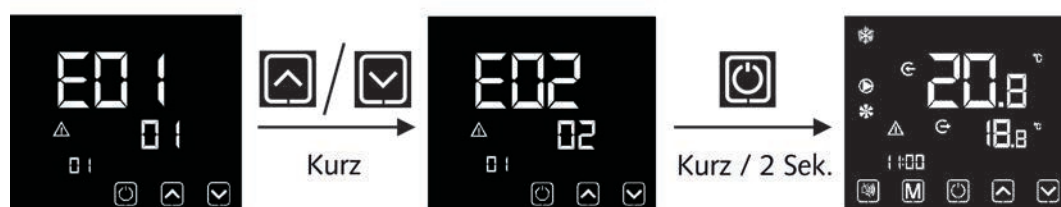
Use the key to confirm your selection. The display for the hours starts to flash.

The switch-on or switch-off point can now be deleted with a brief press of the key.



If the switch-on or switch-off point has been successfully deleted, the display shows - - : - - .

To return to the start screen, press the key briefly.

## Malfunction indication



If a fault arises on the unit, the controller reports this automatically. The screen shifts to the fault display and displays a fault code. The meanings of the various codes are listed in the *Faults and fault causes* chapter.

If multiple faults arise at the same time it is possible to switch between the fault displays with the  and  keys.


You can return to the start screen by briefly pressing the  key.

If there is no activity for 10 seconds, the display automatically returns to the fault display.

If the fault is rectified, the controller will detect this and the fault display will disappear automatically.

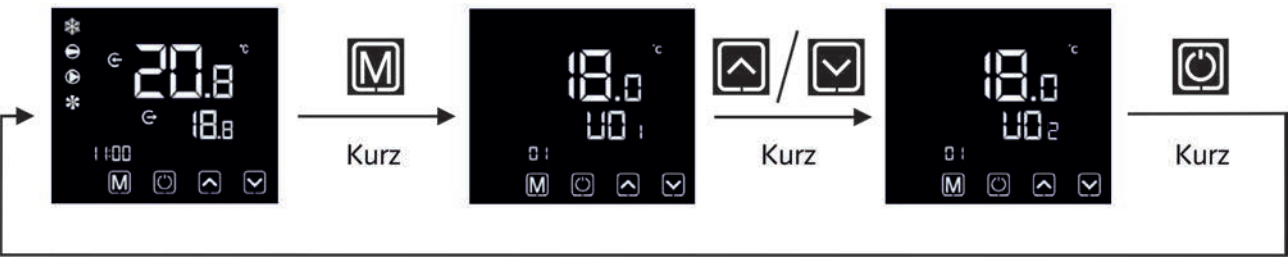
If a major fault arises 3 times within a 30 minute period, the fault message must be manually reset after the cause of the fault has been successfully removed.

A listing and definition of the major faults can be found in the *Faults and fault causes* chapter.

Once the cause of the fault has been removed the fault message must be manually reset by pressing the  key for 2 seconds.

# REMKO series RVS

## Calling up operating parameters



To display the operating parameters, briefly press the key on the start screen. Now the sensor values and other operating conditions can be called up here. The and keys can be used to navigate between the different operating parameters. The meaning of the individual parameters can be found in the list below.

ID	Designation
U01	Water inlet temperature
U02	Water outlet temperature
U03	Suction gas temperature
U04	Heat gas temperature
U05	Ambient temperature
U06	Finned heat exchanger temp.
U07	Low pressure
U08	High pressure
U09	Throttle setting

ID	Designation
U10	Current compressor frequency
U11	Required compressor frequency
U12	Suction gas overheating
U13	Heat gas overheating
U14	Current fan speed
U15	Not used
U16	Not used
U17	Driver status

## Defrosting operation



In heating mode, condensate forms on the finned heat exchanger and this can freeze under certain conditions and thus have an insulating effect. Because this can significantly impair the operation of the unit, the system can switch to defrosting mode if required. The symbol for defrosting is shown on the system display during the defrosting process. Once the defrosting process has ended, the symbol disappears and the system carries on with normal operation.



## Anti-freeze protection

The anti-freeze protection is based primarily on 3 parameters:

ID	Designation	Factory setting
C01	Anti-freeze protection temperature	4 °C
C02	Anti-freeze protection low pressure	0 bar
C03	Anti-freeze protection temperature difference	2 °C

Cooling mode:

If the water outlet temperature (U02) is less than or equal to the anti-freeze protection temperature (C01) or if the suction pressure (U07) is less than the anti-freeze protection low pressure (C02) for 10 seconds, the system switches to anti-freeze protection.

Heating mode:

If the water outlet temperature (U02) is less than the water inlet temperature (U01) -2°C or less than the anti-freeze protection temperature (C01), the system switches to anti-freeze protection.

In both cases, the system only carries on with normal operation once the water outlet temperature rises by the anti-freeze protection temperature difference or the suction pressure is higher than the anti-freeze protection low pressure parameter.

The anti-freeze protection temperature is set to 4°C at the factory.

If glycol is used, it is possible to change the parameters to operate at lower temperatures, depending on the glycol concentration. The table below can be helpful for this.

**Adjustment is only possible after password input. For this purpose, please contact REMKO.**

Glycol content	Anti-freeze protection +/-2°C	Correction factors when using a mixture of glycol* and water			
		Cooling capacity	Power consumption	Medium flow rate	Pressure loss
Vol. %	°C	K <sub>L</sub>	K <sub>PE</sub>	K <sub>V</sub>	K <sub>D</sub>
0	0	1	1	1	1
20	-9	0.960	0.995	1.040	1.19
35	-21	0.950	0.990	1.090	1.35
40	-26	0.925	0.985	1.105	1.51

\* We recommend using an ethylene glycol mixture. Observe the safety and product data sheets for the type of glycol used.

### CAUTION

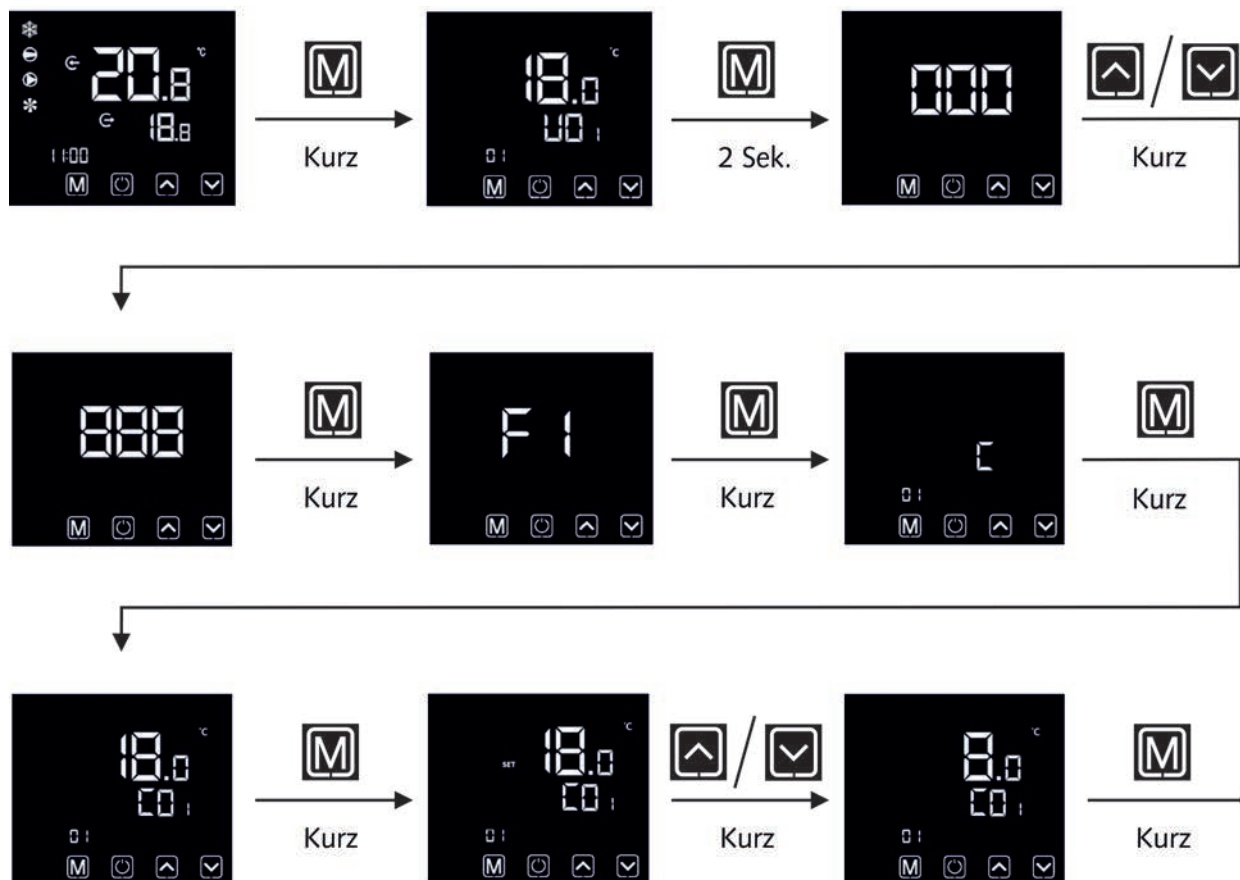
Use the required type and mix ratio appropriate for the application area to ensure the freezing point.

### CAUTION

The product and safety data sheets of the glycol type used must be observed during use and disposal.

# REMKO series RVS

## Setting the anti-freeze protection parameters



Press the **M** key on the start screen briefly to access the operating parameters level.

Then press the **M** key in the operating parameters level for 2 seconds to access the next level down. A password will be required for this. Now enter the password with the **↑** and **↓** keys and confirm with the **M** key.

Press the **M** key again on the next and next again windows.

Select the C01 parameter with the **↑** and **↓** keys and confirm the selection with the **M** key.

The value can now be adapted to the glycol concentration with the help of the **↑** and **↓** keys.

A short press of the **M** key saves the setting.

## Installation Instructions for qualified personnel

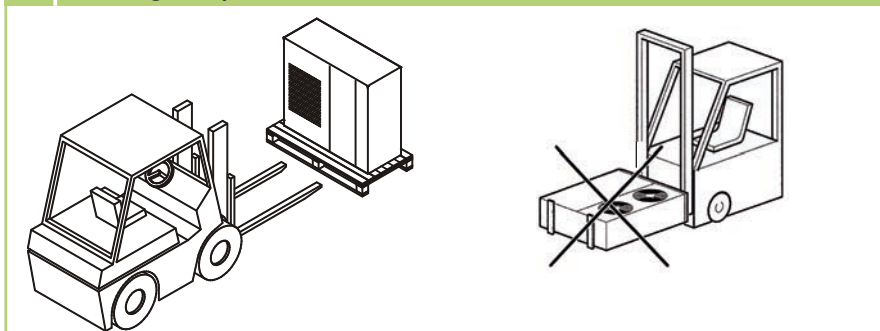
### Important notes prior to installation

- Observe the manuals for the indoor units and chillers when installing the entire system.
- The indoor units and chillers work independently. A connecting line between the two is not necessary.
- Select an installation location which allows air to flow freely through the inlet and outlet. See section "Minimum clearances".
- Do not install the unit in the immediate vicinity of devices which generate intensive thermal radiation. Installation in the vicinity of thermal radiation reduces the unit output.
- Lift the unit only at intended lifting points. Never apply loads to the medium piping.
- The medium connection lines, valves and connections must be insulated impervious to vapour diffusion.
- Seal off open lines to prevent dirt getting in.
- Make all electrical connections in accordance with applicable DIN and VDE standards.
- Always ensure the electrical cables are properly connected to the terminals. Otherwise there is a risk of fire.
- Comply with all regulations governing structural and building requirements and conditions with regard to the installation site.
- In the selection of the installation site, pay attention to the site itself and to any possible acoustic reflection from surrounding units.
- To avoid the transmission of vibrations to the installation site, the units must be installed on vibration absorbing material or on vibration decoupled foundations. In doing so, make sure that the lines are also vibration decoupled.
- If the installation site must fulfil special sound emission requirements, these must be realised on-site when appropriate adjustments can be made. In these cases, please consult an appropriate acoustics expert.
- The units are tested in the factory and require only electrical and hydraulic installation by a suitable specialist.
- The unit must be kept upright when transporting to a higher elevation:
- Check the contents of the packaging for completeness and check the unit for visible transport damage. Report any damage immediately to your contractual partner and the shipping company.
- If necessary, also insulate the condensate drainage line (only units with HP-function). In dual systems with cooling and heating modes, the requirements of the current Energy-Savings-Ordinance (EnEV) are to be complied with.

### Transport

- Transport the unit in its original packaging as close as possible to the installation location. You avoid transport damage by doing so.
- The units may only be moved as installed (upright) using appropriate transport gear (**Figure 1**). Secure against tipping!

#### 1 Standing transport



# REMKO series RVS

## Installation materials

The unit is fastened on vibration dampers (accessories) to the floor by means of bolts. The carrying capacity of the bracket and the wall must be taken into account when fastening to the wall.

## Definition of the Danger Area

Access to the unit is only permitted for authorised and trained persons. If unauthorised persons can approach the danger areas, these areas must be identified with corresponding signs, barriers, etc.

- The external danger area surrounds the unit up to a distance of 2 m, measured in all directions from the unit housing.
- The external danger area on-site can differ as a result of the setup. The specialist company performing the installation work bears the responsibility for this.
- The internal danger area is located inside the machine and can only be reached with the use of an appropriate tool. Access is prohibited for unauthorised persons!

## Installation



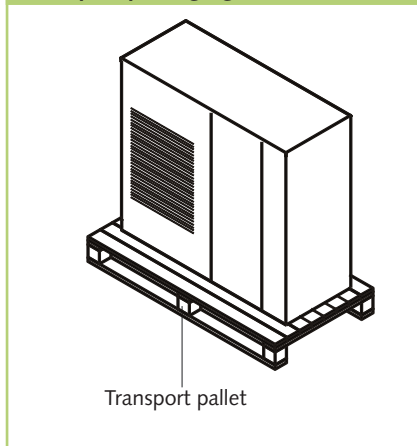
### NOTE

*Installation should only be performed by authorised specialists.*

## Disassembly of the transport pallets

The units are supplied with transport pallets for the purpose of transportation. Remove these before installation.

### Transport packaging



## Unit installation

1. Install the vibration dampers (accessories) under the unit (accessories).
2. Attach the unit to the building where structurally permitted. Refer to the *Selecting the installation location* chapter for this.
3. When installing the unit, ensure that the minimum clearances described hereafter are complied with. Any infringement of these stipulated clearances can result in a functional impairment of the unit operation.

4. Ensure that structure-borne sound is not transferred to parts of the building.
5. Connect the medium piping.
6. Connect the unit electrically.



### NOTE

*The electrical connection of the unit is to be established by suitable specialist personnel and in compliance with all electrical safety regulations. Compliance with VDE regulations is essential.*



### NOTE

*The dimensioning of the supply line and the selection of the customer-side unit safeguard(s) is the responsibility of the specialist company carrying out the work. The unit manufacturer provides no information regarding the dimensioning of pipework or the selection of fuses/breakers as these are subject to local conditions. All of the data required for the selection can be found in the technical data for the unit.*



### NOTE

*The selection of the RCD breaker is the responsibility of the specialist company carrying out the work. Based on the provisions per VDE 0160, E VDE 0100 Part 530 as well as the guidelines of VdS 3501 and the safety regulations from BGI 608, the use of an AC/DC-sensitive, type-B RCD is recommended for ensuring standards-compliant personnel and fire protection.*

## Selecting the installation location

The unit is designed for horizontal installation on a base in outdoor areas. The installation site must be level, flat and firm. The unit should also be secured to prevent it from tipping over.

For external installation, please observe the following instructions to protect the unit from the influence of the weather.

It is also possible to install the unit in the interior of the building. However, in this case the circulation of the required air flow volume (see technical data) must be assured. Any change to the air flow volume can result in faults or damage to the unit.

### Rain

The unit should be at least 10 cm off the ground when mounted on the roof or ground.

### Snow

The unit should be wall-mounted in areas of heavy snowfall.

Installation should be at least 20 cm above the expected level of snow to prevent snow from entering the outdoor unit (Figure 2).

### Sun

The finned condenser gives off heat in cooling mode.

Exposure to sunlight further increases the temperature of the fins and reduces the heat released by the finned heat exchanger.

### Sun

The finned condenser gives off heat in cooling mode.

Exposure to sunlight further increases the temperature of the fins and reduces the heat released by the finned heat exchanger.

The unit should, whenever possible, be installed on the north side of the building.

If necessary, take measures to provide sufficient shade (responsibility of customer). This could be a small roof.

However, the discharging warm air flow must not be affected by the measures.

### Wind

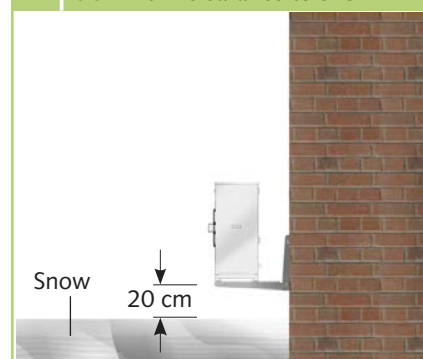
If the unit is being installed in windy areas, ensure that the warm outlet air is discharged in the prevailing wind direction. If this is not possible, it may be necessary to install a windbreak on-site (Figure 3).

Ensure that the windbreak does not adversely affect the air intake to the unit.

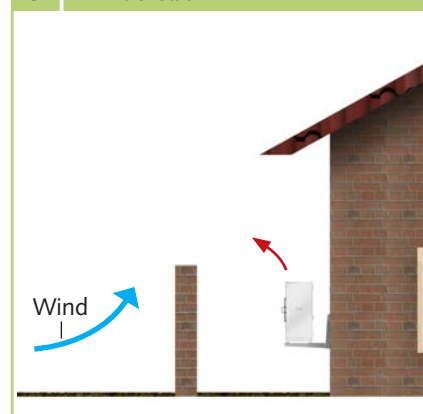
### NOTE

Cooling capacity changes as a consequence of ambient conditions influenced by rain, sun, wind, and snow, for example.

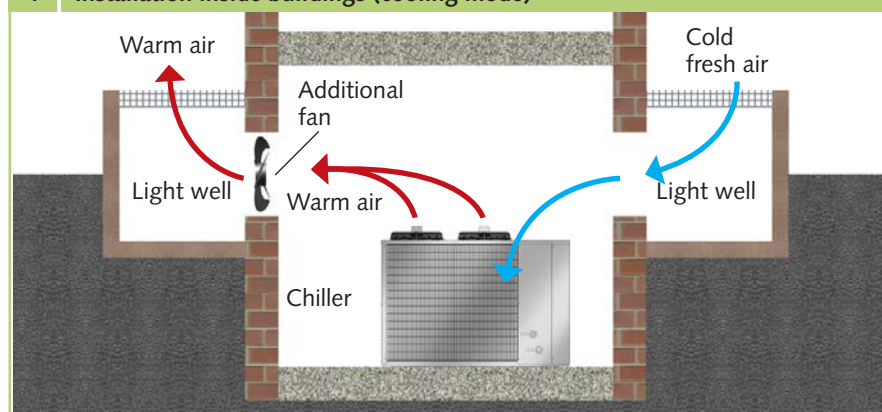
#### 2 Minimum clearance to snow



#### 3 Windbreak



#### 4 Installation inside buildings (cooling mode)





# REMKO series RVS

## Connection of the medium piping

- The connection of the lines on-site takes place on the front side of the unit (operating side).
- For the purpose of servicing, connections must be equipped with shut-off valves and flow volumes adjusted using valves for hydronic balancing.
- Additional automatic bleed valves are to be provided in the supply and return at the installation's highest point.
- The medium piping may not exert any structural load on the unit.
- The line connections may not generate any thermal or mechanical stresses on the unit (cool lines or hold in place with a second tool if required).
- If the unit is at first to be operated with only a part of the entire system, the medium flow for the missing system components is to be simulated using valves for hydronic balancing.
- The pipe sizing is to be designed such that the stipulated minimum flow volume is achieved.

Observe minimum flow volume of the chiller.

The lines are to be insulated against vapour diffusion and, if necessary, the current German energy-saving ordinance (EnEV) must be observed. UV resistance must be realised outdoors

## Minimum/maximum flow volume

The cold water generator's circulation pump generates a constant medium flow. The result is a loss of pressure in the system and in the cold water generator. The differential pressure or flow switch in the chiller measures the pressure loss over the evaporator or the flow of the medium and switches the unit off if the flow rate drops below the minimum medium volume.

The medium flow rate limit may likewise not be exceeded (maximum flow volume). A 3-way valve with bypass and a hydraulic compensator to establish a primary and secondary circuit or a volume dependent bypass are necessary to ensure a constant flow volume.

## Pressure and temperature displays

The pressure and temperature displays to be installed on-site at the intake and outlet serve to set the medium flow rate.

The display should be able to be shut off.

Temperature sensors are located in the chiller's medium inlet and outlet. Sensor values can be queried via the controller.

## Valves for hydronic balancing

The calculated individual pressure losses in the pipeline network layout for each individual unit are adjusted to the entire system with valves for hydronic balancing to be provided on-site. The nominal flow rates for the medium adjust to the necessary values as a consequence of the pressure loss.



### NOTE

*To adjust the circulation pump, we recommend that a main hydronic balancing valve is provided in the vicinity of the unit.*

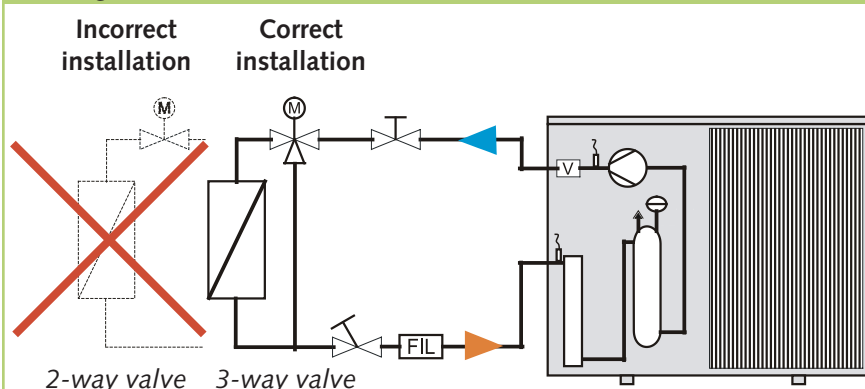
## Fill and drain connection

A connection should be provided in an area safe from frost for the draining of pipe lines (especially if water is used as a medium). Applicable local disposal ordinances must be observed if glycol is used.

## Medium piping

Medium piping can be made of copper, steel or plastic. To minimise pressure losses, only streamlined fittings should be used. When designing the layout, the large flow volumes in cold water systems, high pressure losses in connection with water-glycol mixtures and the cold water generator's minimum flow volume must be taken into account.

### Ensuring the minimum flow volume

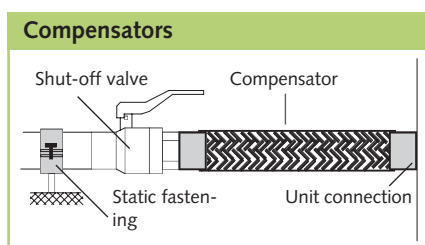


## Diaphragm expansion vessel (MAG)

To avoid pressure fluctuations during standstill because of temperature changes, diaphragm expansion vessels filled with nitrogen (moisture neutral) must be integrated in the system.

## Compensators

Compensators are used to connect lines to the unit to prevent vibration in the chiller from transmitting to other system components.



## Safety valve

Safety valves limit excess operating pressure due to excess warming or overfilling of the operating medium. The valve outlet requires unobstructed draining into a drain line. Applicable local disposal ordinances must be observed if glycol is used.

The standard scope of delivery for the unit includes a safety valve; an additional valve may be necessary at a suitable point.

## Air bleeding valves

The unit has manual air bleeding valves. The unit can be bled here after the system has been filled. Automatic bleeding valves must also be installed at the highest point in the collector line.

### CAUTION

*Glycol-tolerant air bleeding valves are necessary when using media that contain glycol.*

## Shut-off valves

As a rule, in cold water systems, shut-off valves with full admission should be used. For the purpose of servicing, medium inlet and medium outlet must be equipped with shut-off valves (if necessary safety valves).

## Dirt trap

A rinsable dirt trap must be installed upstream from the unit intake. The mesh size should not be less than 10 mesh/cm<sup>2</sup>. Shut-off valves should be installed upstream and downstream from the dirt trap.

### CAUTION

*Improperly installed or missing dirt traps can cause fouling of the plate heat exchanger.*

## External medium storage tank

If, for example, the required capacity of the cold water consumer is significantly less than the cooling capacity generated by the chiller, an increase in the medium content is recommended. As an example, the medium piping can be oversized or an additional storage tank installed to increase compressor operating time. A storage tank should, as a rule, be provided if the minimum medium volume is not reached.

## Anti-freeze protection (accessories)

As a medium for a cold water system, a water-glycol mixture is used as a rule. Depending on the use to which the glycol type and quantity is put, the viscosity changes, the loss in pressure increases and the unit's cooling or heating capacity reduces. All system components must be approved for use with glycol. As a rule, the addition to the water of ethylene glycol, in a proportion of 34 %, with inhibitors for corrosion protection is recommended.

### CAUTION

*During use and disposal, product and safety data sheets for the glycol type being used as well as applicable local ordinances (e.g. Water Resources Act) must be observed.*

### CAUTION

*Use the required type and mix ratio appropriate for the application area to ensure the freezing point.*

# REMKO series RVS

## Condensate drainage connection and secure discharge

### Condensate drainage connection

If the temperature falls below the dew point, condensation will form on the finned condenser during **heating mode**.

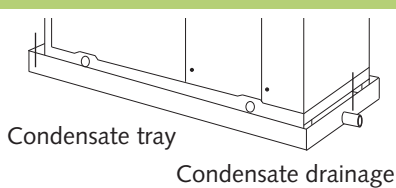
A condensate tray should be installed on the underside of the unit to drain any condensate.

- The condensate drainage line should have an incline of min. 2%. This is the responsibility of the customer. If necessary, fit vapour-diffusion-proof insulation.
- When operating the unit at outdoor temperatures below 4 °C, care must be taken that the condensate drainage line is anti-freeze protected. The lower part of the housing and condensate tray is also to be kept frost free in order to ensure permanent draining of the condensate. If necessary, fit a pipe heater.
- Following installation, check that the condensate drain is unobstructed and ensure that the line is permanently leak tight.

### Safe drainage in the event of leakages

Local regulations or environmental laws, for example the German Water Resource Act (WHG), can require suitable precautions to protect against uncontrolled drainage in case of leakage to provide for safe disposal of escaping air conditioning fluid or hazardous media.

#### Condensate drain



#### NOTE

*Cumulative ice formation in the lower part of the finned heated exchanger can develop under certain weather conditions. To prevent this ice formation, we recommend keeping the heat exchanger frost free on both sides using a heating band for example.*

## Minimum clearances

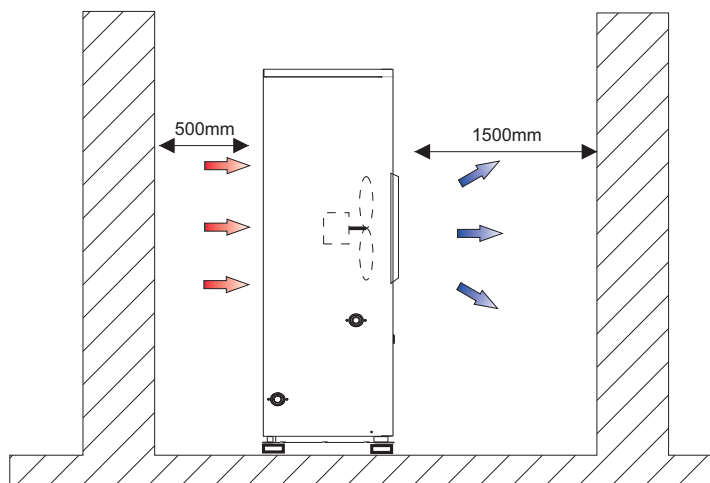
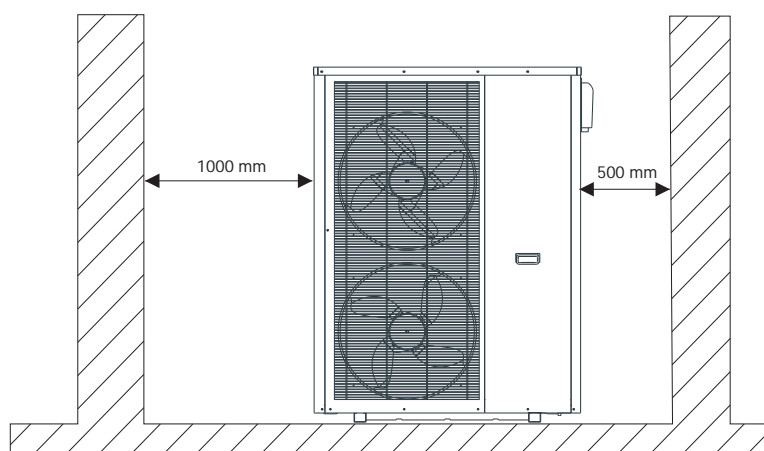
Fig. 5 shows the minimum clearances for trouble-free operation of the units. The protective zones serve to provide unhindered air intake and outlet, as well as providing sufficient room for performing maintenance and repairs and preventing the unit from being damaged.

#### NOTE

*Failure to comply with the minimum clearances is considered a breach of intended use. The manufacturer assumes no liability for damage or malfunctions arising from this.*

### 5 Minimum clearances

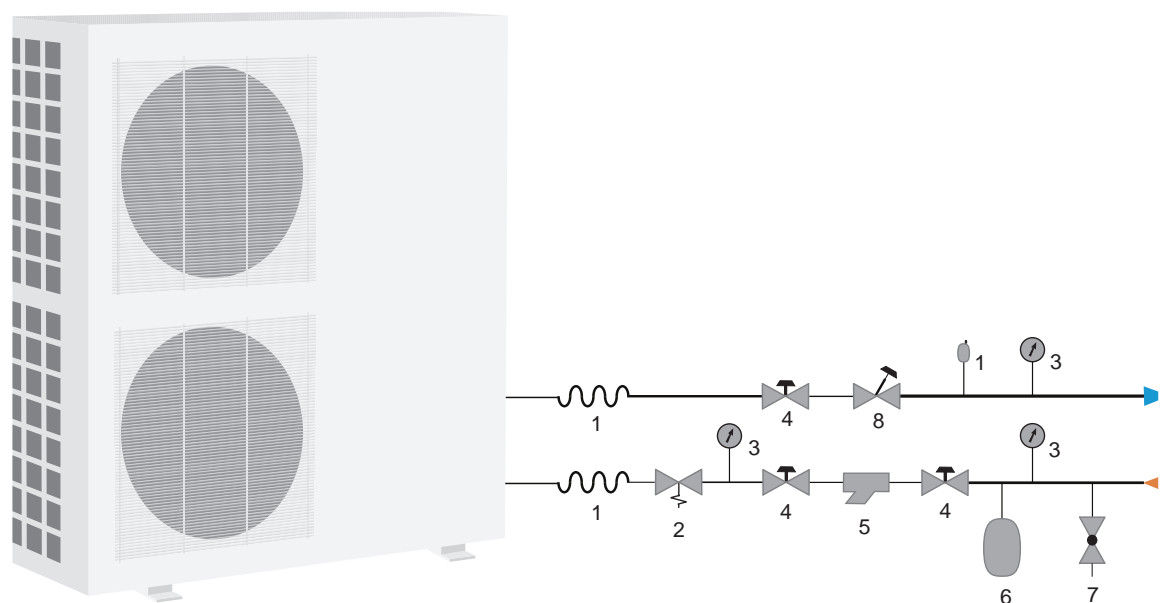
#### RVS 50 - 180 DC





## Necessary system components

### System components



#### Legend:

- |                           |                              |                                |
|---------------------------|------------------------------|--------------------------------|
| 1 Expansion pipe coupling | 4 Shut-off valve             | 7 Fill and drain device        |
| 2 Safety valve            | 5 Dirt trap                  | 8 Valve for hydronic balancing |
| 3 Manometer               | 6 Diaphragm expansion vessel |                                |

### NOTE

The system layout shown above shows the recommended pipework components to be established on-site. The detailed planning, layout and design of all components as well as the complete hydraulic system is the responsibility of the specialist company carrying out the work.

## Medium storage tank

The units have integrated high-efficiency components, which adapt the cooling capacity of the unit to the respective load situation in accordance with the internal controller logic. This prevents cycled operation of the compressor, which can be caused through too little water in the complete system.

As a result, the use of a medium storage tank is not absolutely essential with RVS DC type units. However, the use of an external medium storage tank serves to increase the total water volume and thus contributes to an increase in the quality of regulation. For this reason, a system layout with an external medium storage tank is advisable as a matter of principle.

# REMKO series RVS

## Care and maintenance

Regular care and observation of some basic points will ensure trouble-free operation and a long service life.

### CAUTION

*Prior to performing any work, ensure that the equipment is isolated from the power supply and secured to prevent accidental switch-on!*

### Care

- Ensure the unit is protected against dirt, mould and other deposits.
- Clean the unit using a damp cloth.  
Do not use a jet of water.
- Do not use any caustic, abrasive or solvent-based cleaning products.
- Clean the fins on the unit prior to long shutdown periods.

### Maintenance/leak testing

- We recommend that you take out a maintenance contract with an annual service from an appropriate specialist firm.
- The legally stipulated maintenance intervals are defined in EC ordinance no. 517/2014 of the European Council.

### CAUTION

*Wearing appropriate protective clothing is necessary when working on the units.*

### NOTE

*Statutory regulations require a leak test for the cooling cycle dependent on the GWP value. Inspection and documentation of the work performed is to be carried out by specialist technicians.*

Type of task	Commis- sioning	Monthly	Half-yearly	Yearly
Checks / Maintenance/Inspection				
General	•			
Clean dirt traps	•			•
Check medium filling	•		•	
Check circulation pump	•		•	
Dirt/damage condenser	•	•		
Check quality of the glycol	•	•		
Measure voltage and current	•			•
Check direction of rotation	•			•
Check compressor	•			•
Check fan	•			•
Check the refrigerant volume	•		•	
Check condensate drainage	•		•	
Check insulation	•			•
Sealing test for cooling cycle	•			• <sup>1)</sup>

1) see note

## Shutdown

### Temporary shutdown

1. Shut down the cold water consumers connected to the system.
2. Switch the unit off via the internal controller in the chiller (or using the remote control).
3. Check the percentage concentration of glycol.
4. Check the unit for visible signs of damage and clean it as described in the "Care and maintenance" chapter.
5. As much as possible, cover the unit with a plastic foil to protect it against the weather.

### CAUTION

*If only water and not a mixture of water and glycol is used, in regions subject to freezing, water must be drained from components when these are at standstill. The drained water volume must be replaced when components are put back into operation!*

### Permanent shutdown

Ensure that units and components are disposed of in accordance with local regulations, e.g. through authorised disposal and recycling specialists or at collection points.

REMKO GmbH & Co. KG or your contractual partner will be pleased to provide a list of certified firms in your area.

## Electrical wiring

### CAUTION

*All electrical installation work is to be performed by specialist companies. Disconnect the power supply when connecting the electrical terminals.*

- The power supply is made at the chiller; a control cable to the interior unit is not necessary.
- An all-pole isolating switch, which trips in the event of a failure of any of the individual phase conductors, must be installed in the supply line upstream of the unit.
- Electric connections must be carried out as fixed connections in accordance with the applicable regulations.
- Check all terminal points for stability.
- The supply line must be adequately insulated on-site and the voltage drop may not exceed permissible values.
- Make sure that the electrical system is adequate for the operation of the unit and can supply the operating current necessary for other already operated units.
- Determine before installation, when connecting to existing system components, whether the unit's supply line is adequately dimensioned for the unit's rated power consumption.
- The connection of the units must always be carried out with adequately dimensioned, low-resistance earth conductors, and, if necessary, carried out several times (especially with plastic pipes).
- When installing the units on flat roofs, lightning protection measures may be necessary.

- All electrical connections such as network supply, cable remote control etc. must be carried out in the unit's switch cabinet.
- The lines to be installed are to be fed into the switch cabinet through the cable glands provided.
- An electrician must determine the sizing and selection of the fuses and the cross section of the lines to be installed. Note that starting current may be up to 10 times nominal current.

Carry out the following electrical connections:

- Connection of the power supply.
- Possible enabling contact for the set mode or stand-by.
- Possible operating mode contact for cooling or heating mode.
- Possible connection of cabled remote control (accessory).
- Possible connection of the GLT to the unit controller via Modbus.

### NOTE

*The selection of the RCD breaker is the responsibility of the specialist company carrying out the work. Based on the provisions per VDE 0160, E VDE 0100 Part 530 as well as the guidelines of VdS 3501 and the safety regulations from BGI 608, the use of an AC/DC-sensitive, type-B RCD is recommended for ensuring standards-compliant personnel and fire protection.*

## Power supply

The units require a fixed AC or three-phase current connection. The power supply line must be connected in accordance with the wiring diagram.

### CAUTION

*Check all plug and terminal connections to verify that they are tight and make a permanent contact. Tighten as required.*

Proceed as follows to connect:

1. Open the control panel and switch cabinet cover by removing the screws and lifting off the cover.
2. Feed the voltage-free cable through the glands into the switch cabinet and clamp the cable to the strain relief.
3. Then connect the cable in accordance with the connection diagram.
4. Ensure a correct rotating field.
5. Mount all removed parts.

### NOTE

*We recommend the use of safety fuses.*

# REMKO series RVS

## External enabling contact Operation/Standby

In addition to being operated with the controller or the cabled remote control, the unit can be switched on (normal operation) and switched off (Stand-By) via an external potential-free contact (normally-closed).

The contact is equipped with a wire jumper in the factory. The unit is enabled in this condition.

If the contact is opened, the unit is disabled and *OFF* is shown in the display.

## General alarm signal ALARM 230V

The connection of a general alarm signal, for example, for signalling or for further processing to a building control system is possible as standard equipment. 230V is output here.

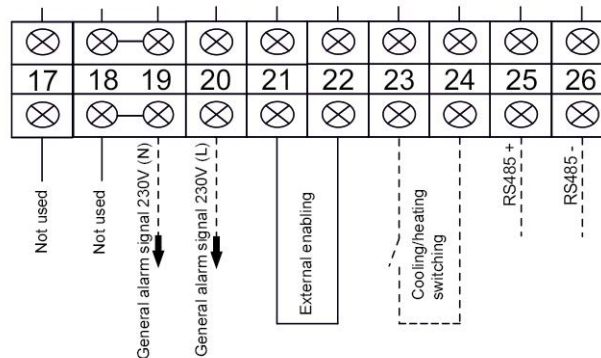
There is no voltage present at this contact during normal unit operation. As soon as a fault is diagnosed on the unit, 230V is present on the respective terminals of the alarm contact.

## Modbus interface RS485

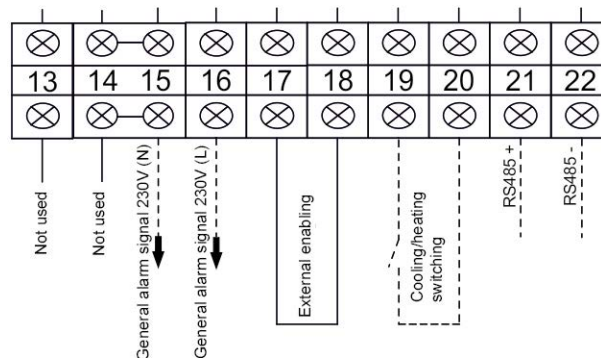
The unit has a Modbus interface RS485 as standard. This enables the querying or stipulation of setpoints, system temperatures, operating modes etc. A detailed list of all necessary information can be obtained on request.

### Terminal blocks

#### RVS 80 DC



#### RVS 50, 130, 180 DC



## Changeover cooling/heating mode

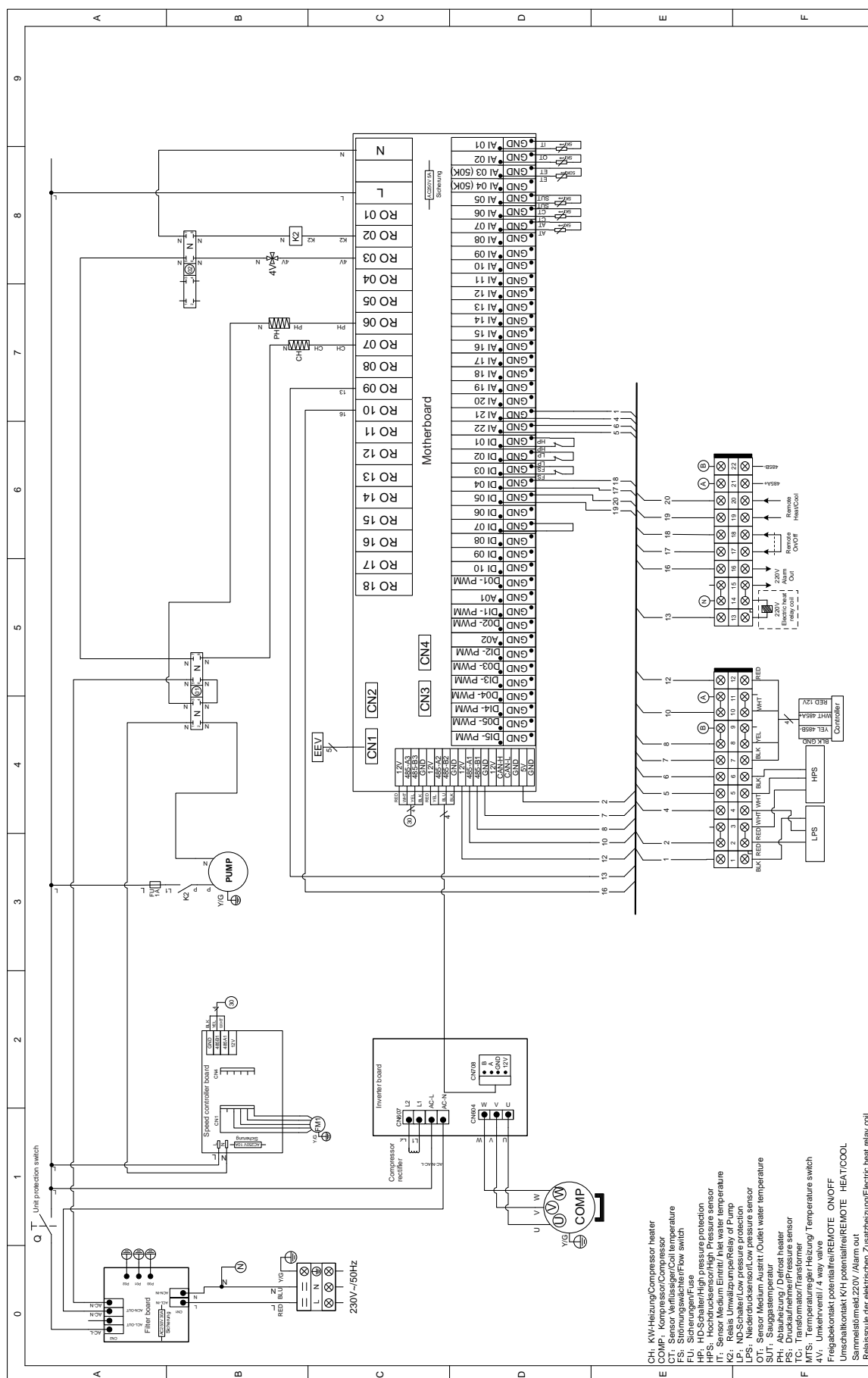
This changeover contact enables the unit to be switched to cooling mode or heating mode from a remote location.

The changeover of operating mode must be implemented both through the connection/disconnection of the external changeover contact and through the setting in the controller display.

If the contact is open and the unit is switched to cooling mode (snowflake) via the setting in the controller display, the unit operates in cooling mode.

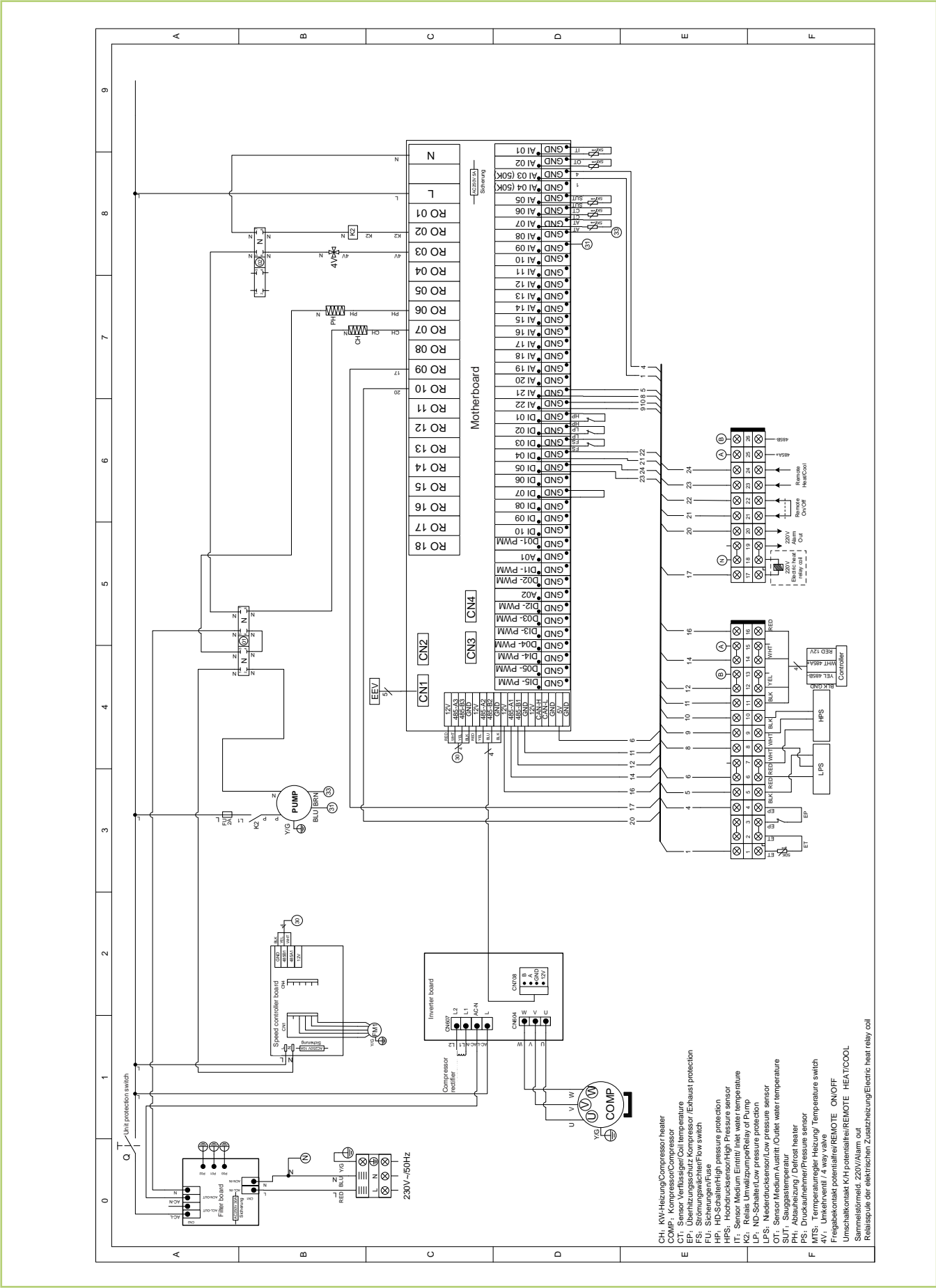
If the contact is closed and the unit is switched to heating mode (sun) via the setting in the controller display, the unit operates in heating mode.

## Electrical drawings RVS 50 DC

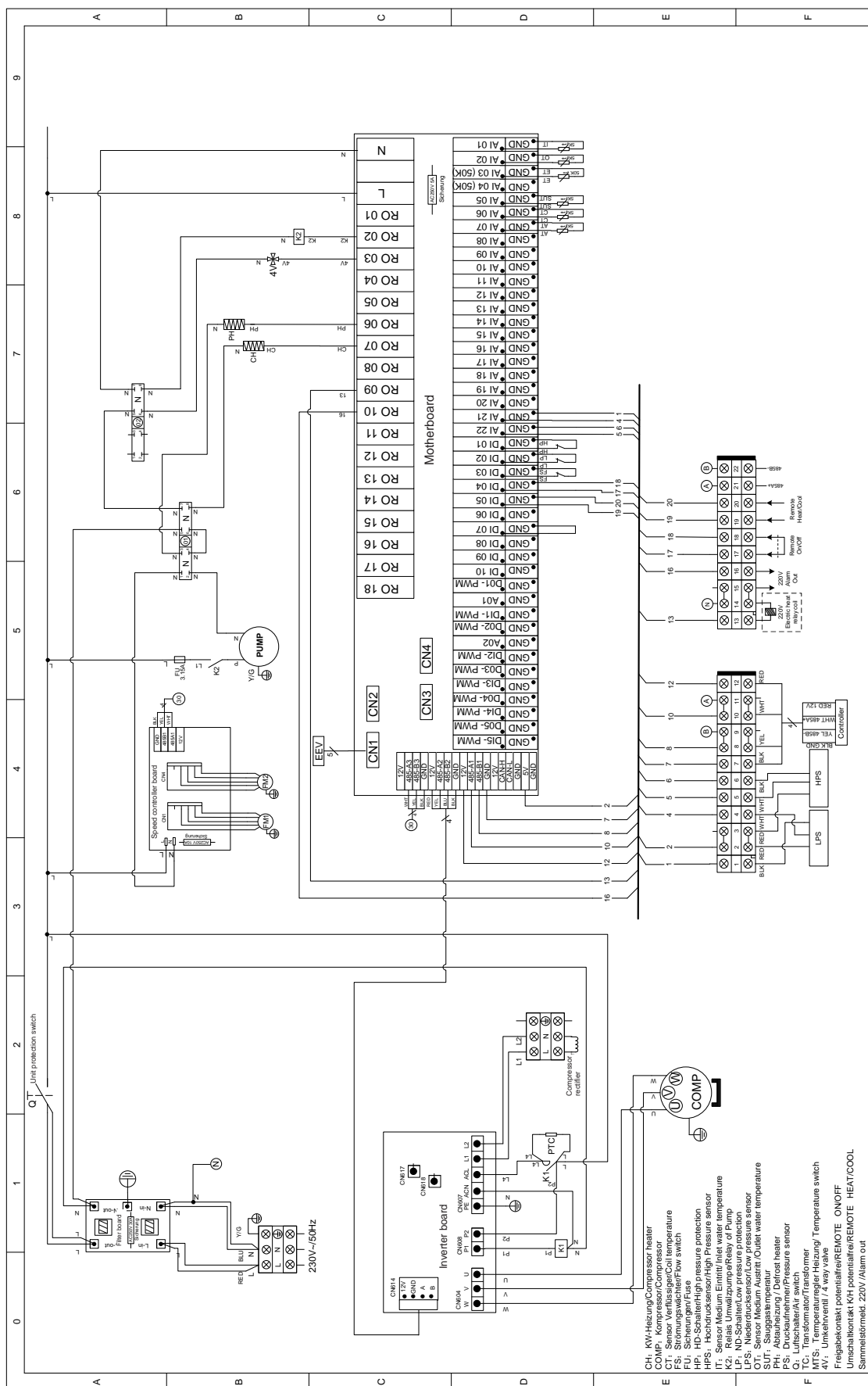


# REMKO series RVS

## Electrical drawings RVS 80 DC



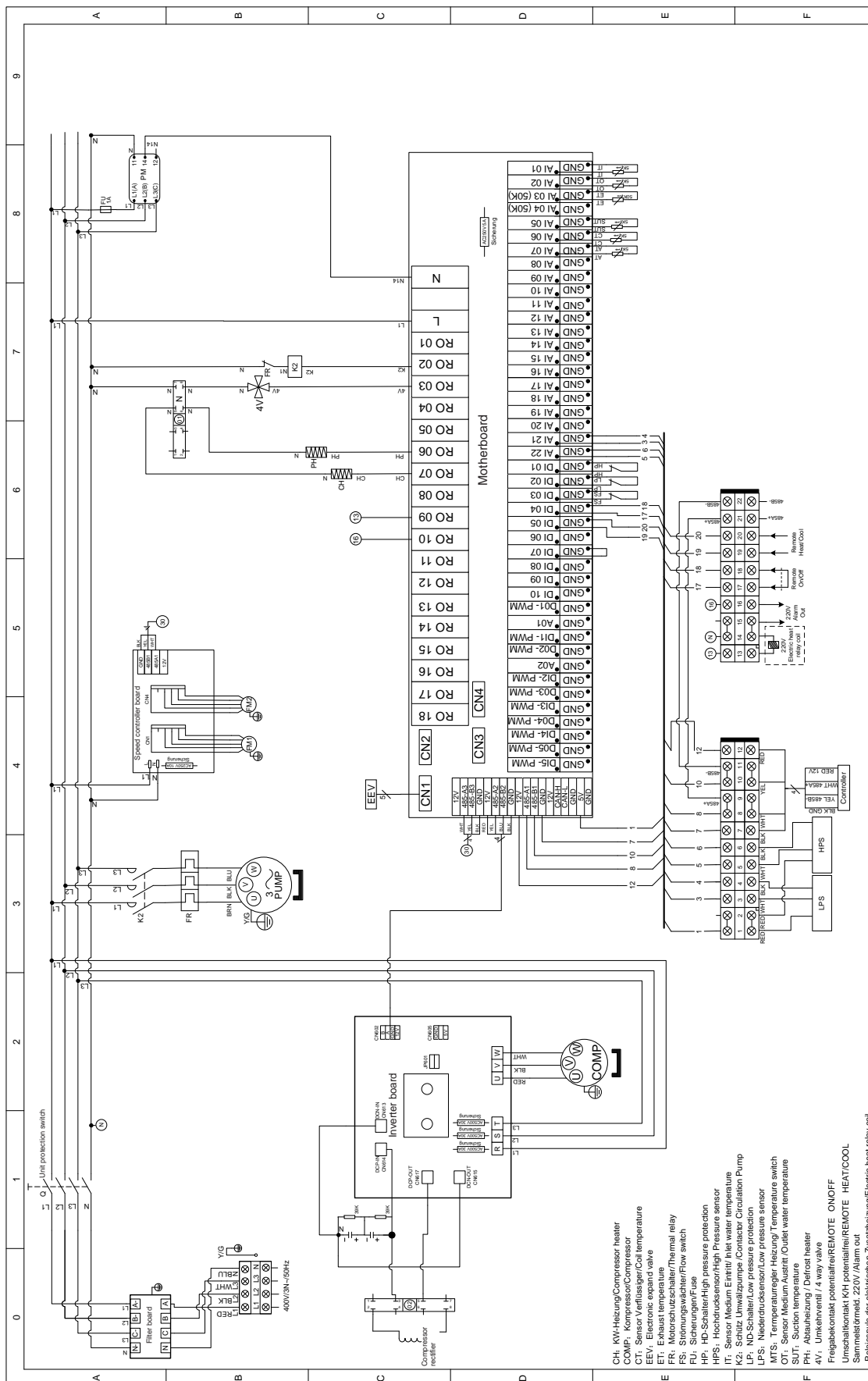
# Electrical drawings RVS 130 DC





# REMKO series RVS

## Electrical drawings RVS 180 DC





## Leak testing

The leak test is carried out after the connection has been made.

1. Flush the system twice with clean tap water.
2. Clean the sieve insert of the dirt trap provided by customer.
3. Fill the system with water again and bleed the unit at the manual bleed valves.
4. Adjust the test pressure to at least 250 kPa (2.5 bar).
5. Check the connections for leaking water after a period of at least 24 hours . If leaks are visible, the connection has not been properly made. Tighten the connection or establish a new connection.
6. After a successful leak test, remove the excess pressure from the medium piping if a water-glycol mixture is used or adjust the non-circulating pressure to the required system pressure.

## Before commissioning

### Filling the system

The system is filled at the customer-provided filling and draining connections.

### Anti-freeze protection for the medium

If a water-glycol mixture is used, it is to be pre-mixed before being put in the system. The desired concentration is then to be checked.

### Unit preliminary pressure for the medium

The preliminary pressure of the medium (without operation of the circulation pump) varies within the system. From the highest point, the pressure increases by approx. 10 kPa (0.1bar) per metre difference in altitude (geodetic altitude). The value measured at the highest point is identified as the non-circulating pressure.

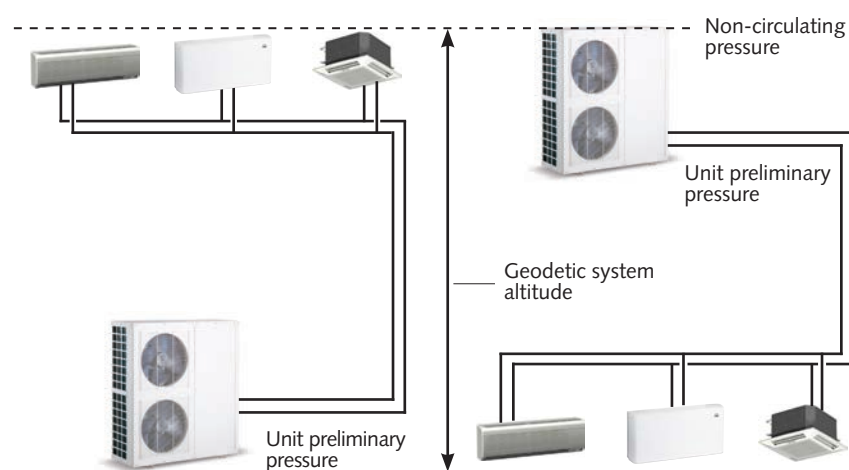
The position of the unit in the system is decisive in the calculation of the unit's preliminary pressure (pressure of the manometer on the unit installed by the customer). The pressure must be set to at least 70 kPa (0.7 bar).

- If the unit is positioned **at the lowest** point in the system, the unit preliminary pressure (=non-circulating pressure+geodetic system altitude) must be set to **at least 70 kPa (0.7 bar) + 10 kPa (0.1bar) x geodetic system altitude**.
- If the unit is positioned at the highest point in the system, the unit preliminary pressure (=non-circulating pressure) to at least **70 kPa (0.7 bar)**. Please note that the system pressure at the lowest point is increased by the geodetic system altitude!

### Bleeding the system

- Air may still be in the pipe lines after the leak test. The operation of the circulation pump transports this to the next highest point or to the cold water consumer. Here it is necessary to vent again (**Figure 7**).
- Also vent the pump if necessary.
- The non-circulating pressure must then be adjusted to the required system pressure.

#### 6 Unit preliminary pressure



#### 7 Manual bleeding



Manual bleeding

# REMKO series RVS

## Diaphragm expansion vessel

- The preliminary pressure for the diaphragm expansion vessel must be adjusted individually to the system layout, the volume of the medium and the installation site.
- If necessary, change the installation site. For this, the manufacturer's authorisation is required.
- For cooling and heating systems, the volume and the preliminary pressure for the diaphragm expansion vessel must be adjusted to both operating modes; integrate an additional diaphragm expansion vessel in the system if necessary.

## Valves for hydronic balancing

- The calculated excess pressure in the pipe network layout at the individual cold water outlets must be adjusted at the valves for hydronic balancing.

## Safety valve

- The safety valves and their correct function must be checked.
- The drain line for the valves is to be checked for function and leak tightness.
- If necessary, change the installation site. For this, the manufacturer's authorisation is required.

## Additional checks

### General checks

- Checking that minimum clearances are correct.
- Checking the transfer of cooling and heating capacity via the cold or hot water consumer (indoor unit).

### Electrical checks

- Checking electrical connections for correct phase sequencing.
- Functional check of the cooling mode/heating mode enable (option).
- Functional check of the enable mode/Stand-By (option).

### Checking the medium cycle

- Checking the circulation pump for freedom of movement.
- Checking whether all valves are open.
- Checking the medium circuit.
- Setting the circulation pump's nominal flow rate.

### Checking the cooling circuit

- Checking the cooling circuit for adequate oil/refrigerant.
- Checking the cooling circuit for leak tightness.



### NOTE

*The units are equipped with a phase sequence relay which prevents the operation of the controller if the direction of rotation of the electric power supply is wrong. The rotary field must be replaced if the controller is not activated during commissioning of the unit.*



### NOTE

*During manual bleeding, any glycol mixtures which escape must be disposed of separately.*

## Commissioning



### NOTE

*Commissioning should only be performed by specially trained personnel and documented after the certificate has been issued.*

- Observe the manuals for the unit and all other components when commissioning the entire system.

### Functional test for Cooling mode:

1. Switch the power supply on.
2. Open all shut-off valves if necessary.
3. Switch the unit and the corresponding circulation pump on to the highest level. The outlet temperature must be between +4 and +18°C.
4. Switch the unit on and select the cooling operating mode. If the return temperature is warmer than the setting, the compressor display will flash and the compressor will begin to work after approx. 3 to 5 minutes.
5. Please note that the inlet temperature at the nominal flow rate of the medium lies approx. 5 K below the return temperature.
  - If the supply temperature falls below the factory setting of 4°C, a fault triggers. If this is the case, a higher return temperature must be selected. If the spread is too great or too small, the medium flow rate must be checked.

- The circulation pump starts and the controller checks the medium flow rate via the differential pressure/flow switch.  
If the volume is insufficient, a fault shut-off will be carried out and the cooling cycle will not be enabled.

6. Measure and record all the required values in the commissioning report and check the safety functions.
7. Check the unit control system using the functions described in the "Operation" chapter.

### Functional test for Heating mode

1. Switch the power supply on.
2. Open all shut-off valves if necessary.
3. The voltage supply is made at the chiller; a control cable to the interior unit is not necessary.  
The outlet temperature must be between +35 and +45°C.
4. Switch the unit on and select the heating operating mode. If the return temperature is colder than the setting, the compressor display will flash and the compressor will begin to work after approx. 3 minutes.
5. Please note that the supply temperature at the nominal flow volume of the medium lies approx. 5 K above the return temperature.

- The circulation pump starts and the controller checks the medium flow rate via the differential pressure/flow switch.  
If the volume is insufficient, a fault shut-off will be carried out and the cooling cycle will not be enabled.

6. Measure and record all the required values in the commissioning report and check the safety functions.
7. Check the unit control system using the functions described in the "Operation" chapter.

### Final tasks

- Reassemble all disassembled parts.
- Familiarise the operator with the system.

## Overhaul and repair



### NOTE

*Overhaul and repairs should only be performed and documented by specially trained personnel.*

### Cooling circuit

Repairs on the cooling cycle are to be documented in the operating manual. The following measures must be observed:

- Environmentally correct collection and disposal of refrigerant and defective components
- Repairs carried out properly and permanently with original spare parts and connecting materials appropriate to the task
- Long-lasting leak-testing with the maximum occurring pressure
- Long-lasting and properly implemented evacuation and drying of the refrigerant circuit
- Proper filling with pure refrigerant and corresponding quantity per operating instructions/name plate
- Functional check of safety components



### CAUTION

*Wear protective clothing when handling refrigerant.*



### CAUTION

*Only refrigerant in a liquid state may be used to fill the cooling cycle.*

### Medium cycle

Repairs on the medium cycle are to be carried out and documented in accordance with the current regulations and/or regional guidelines. The following measures must be observed:

- Environmentally correct collection and disposal of operating medium and defective components
- Repairs carried out properly and permanently with original spare parts and connecting materials appropriate to the task
- Long-lasting leak-testing with the maximum occurring pressure
- Functional check of safety components
- Proper filling with pure operating medium



### NOTE

*The escape of refrigerant contributes to climatic change. In the event of escape, refrigerant with a low greenhouse potential has a lesser impact on global warming than those with a high greenhouse potential. This unit contains refrigerant with a greenhouse potential of 2088. That means the escape of 1 kg of this refrigerant has an effect on global warming that is 2088 times greater than 1 kg CO<sub>2</sub> based on 100 years. Do not conduct any work on the cooling cycle or dismantle the unit - always enlist the help of qualified experts.*

### Electrical components

Repairs on electrical components and parts are to be carried out and documented in accordance with the current regulations and/or regional guidelines. The following measures must be observed:

- Environmentally correct disposal of defective components
- Repairs carried out properly and permanently with original spare parts
- Inspection of the unit or system in accordance with the currently applicable regulations and guidelines, e.g. protection against direct contact, damage to components, defective components, changes to factory-delivered components, etc.
- Testing of the unit or system in accordance with the currently applicable regulations and guidelines, e.g. devices for protection against electric shock/overvoltage/incorrect rotating field, overcurrent protection devices, display and fault devices, interlocks, etc.
- Measurement and assessment of the unit or system in accordance with the currently applicable regulations and guidelines, e.g. insulation resistance, loop impedance, residual current protective devices, low-resistance connection of the earth conductor, earthing resistance, incorporation into the lightning protection system, etc.



### CAUTION

*All overhaul/repairs to be carried out in electrically de-energised condition.*

## 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. If malfunctions should occur, please check the unit as detailed in the list below. Please inform your dealer if the unit is still not working correctly after all the function checks have been performed.

### Operational malfunctions

Malfunction	Possible cause	Checks	Remedial measures	Major
P01	Medium inlet probe defective	<ul style="list-style-type: none"> <li>- Check:</li> <li>- Probe resistance</li> <li>- Connections of the probe cable</li> </ul>	<ul style="list-style-type: none"> <li>- Replace defective probe</li> <li>- Renew connections</li> </ul>	
P02	Medium outlet sensor defective	<ul style="list-style-type: none"> <li>- Check:</li> <li>- Probe resistance</li> <li>- Connections of the probe cable</li> </ul>	<ul style="list-style-type: none"> <li>- Replace defective probe</li> <li>- Renew connections</li> </ul>	
P04	Probe defective, ambient temperature probe	<ul style="list-style-type: none"> <li>- Check:</li> <li>- Probe resistance</li> <li>- Connections of the probe cable</li> </ul>	<ul style="list-style-type: none"> <li>- Replace defective probe</li> <li>- Renew connections</li> </ul>	
P07	Probe defective, suction gas temperature probe	<ul style="list-style-type: none"> <li>- Check:</li> <li>- Probe resistance</li> <li>- Connections of the probe cable</li> </ul>	<ul style="list-style-type: none"> <li>- Replace defective probe</li> <li>- Renew connections</li> </ul>	
P08	Probe defective, heat gas temperature probe	<ul style="list-style-type: none"> <li>- Check:</li> <li>- Probe resistance</li> <li>- Connections of the probe cable</li> </ul>	<ul style="list-style-type: none"> <li>- Replace defective probe</li> <li>- Renew connections</li> </ul>	
PP1	"Low-pressure probe fault"	<ul style="list-style-type: none"> <li>- Check:</li> <li>- Probe resistance</li> <li>- Connections of the probe cable</li> </ul>	<ul style="list-style-type: none"> <li>- Replace defective probe</li> <li>- Renew connections</li> </ul>	
PP2	"High-pressure probe fault"	<ul style="list-style-type: none"> <li>- Check:</li> <li>- Probe resistance</li> <li>- Connections of the probe cable</li> </ul>	<ul style="list-style-type: none"> <li>- Replace defective probe</li> <li>- Renew connections</li> </ul>	
E01	High-pressure switch, high-pressure alarm	<p>In cooling mode: Finned heat exchanger blocked, dirty or exposed to excessive sunlight? Condenser fan or high-pressure switch defective?</p> <p>In heating mode: Medium flow rate too low, Medium temperature on the plate heat exchanger too high, High-pressure switch defective.</p>	<p>In cooling mode: Clear finned heat exchanger, clean, shade, have condenser fan checked by specialist personnel, check high-pressure switch.</p> <p>In heating mode: Check medium flow rate and medium temperature, check high-pressure switch</p>	X
E02	Low-pressure probe low-pressure alarm	<p>In cooling mode: Insufficient refrigerant, Medium flow rate too low, low-pressure switch defective.</p> <p>In heating mode: Insufficient refrigerant, Finned heat exchanger blocked or dirty? Evaporator fan or low-pressure switch defective?</p>	<p>In cooling mode: Insufficient Refrigerant, check medium flow rate and low-pressure switch.</p> <p>In heating mode: Clear and clean finned heat exchanger, have evaporator fan checked by specialist personnel, check low-pressure switch.</p>	X

Please note that this troubleshooting table continues on the next pages

# REMKO series RVS

Malfunction	Possible cause	Checks	Remedial measures	Major
E03	Medium flow disturbance	Check: - Air in the medium piping - Open shut-off devices - Medium pressure - Circulation pump capacity - Medium flow rate - Flow monitor	- Bleed medium cycle - Open shut-off valves - Increase medium pressure - Have circulation pump, medium flow rate and flow monitor checked by a specialist company.	X
E07	Frost protection triggered	Is the supply temperature greater than or less than 4°C?	Raise return flow temperature, increase medium flow rate, adjust anti-freeze temperature to the operating medium.	X
P81	Heat gas overtemperature	Check: - Heat gas temperature (U04) - Heat gas temperature probe, probe resistance - Refrigerant quantity	- Replace heat gas temperature probe - Fill refrigerant to operational levels after rectifying the cause of the problem	X
E44	Heating system dropped below bottom operating limit	Outside temperature below -20°C?		
E21	Low voltage fuse triggered	Check: - Voltage on R/S/T on the inverter board (min 300V)	Establish stable power supply on the supply line - Replace inverter board	
E22/23	Overflow protection	Check: - Current consumption of the complete system	- Restart system	
E24	DC bus overvoltage protection triggered	Check: - Voltage at R/S/T on the inverter board (max 500V) - Voltage between DCP-IN and DCN-IN on the inverter board (max 800V)	Establish stable power supply on the supply line - Replace inverter board	
E25	Inverter board low voltage protection device triggered	Check: - Voltage at R/S/T on the inverter board (min 210V) - Voltage between DCP-IN and DCN-IN on the inverter board (min 300V)	Establish stable power supply on the supply line - Replace inverter board	
E27	IPM overcurrent protection	Check: Compressor current draw, Pressure difference, high/low pressure	- Reduce pressure difference by raising the low pressure or lowering the high pressure	
E28	IPM overheating protection	Check: - Function of the fan - Air throughput	- Ensure that there is adequate distance at the fan inlet and outlet - Clean the finned heat exchanger	
E30 / E31	Overheating of the control electronics	Check: - Function of the fan - Air throughput	- Ensure that there is adequate distance at the fan inlet and outlet - Clean the finned heat exchanger	



Malfunction	Possible cause	Checks	Remedial measures	Major
E32	IPM current probe	Check: Compressor current draw, Pressure difference, high/low pressure	- Reduce pressure difference by raising the low pressure or lowering the high pressure - Replace inverter board	
E33 / E34	Compressor overcurrent protection	Check: Compressor current draw, Pressure difference, high/low pressure	- Reduce pressure difference by raising the low pressure or lowering the high pressure	
E35	Faulty input voltage	Check: - Voltage between U&V, U&W and V&W (380V (+/-10%))	Establish stable power supply on the supply line - Replace inverter board	
E36	Compressor start-up fault	Check: - U/V/W connections on compressor - U/V/W connections on the inverter board - Voltage between U&V, U&W and V&W (380V (+/-10%)) - Compressor motor windings - Operating pressures in the refrigerant circuit	- Renew connections - Replace compressor - Replace inverter board	
E37	DSP communications fault		- Replace inverter board	
E38	PFC communications fault		- Replace inverter board	
E39	Supply voltage check	Check: - Voltage on the supply line	Establish stable power supply on the supply line - Replace inverter board	
E40	EEPROM error	Check: Correct seating of the EEPROM	- Correct the seating of the EEPROM - Replace inverter board	
E41	Faulty compressor start-up voltage	Check: - Voltage between U&V, U&W and V&W (380V (+/-10%))	Establish stable power supply on the supply line - Replace inverter board	
E45	PFC communications fault		- Replace inverter board	
E46	Fan motor 1 defective	Check: - Fan motor operation - Fan motor current draw	- Replace the fan motor.	
E47	Fan motor 1 defective	Check: - Fan motor operation - Fan motor current draw	- Replace the fan motor.	
EE8	Communication fault between motherboard and inverter board	Check: - Connections between motherboard and inverter board	- Renew connections - Replace inverter board - Replace motherboard	
E08	Communication fault between motherboard and display	Check: - Communications between motherboard and display	- Renew connections - Replace display - Replace motherboard	

# REMKO series RVS

Malfunction	Possible cause	Checks	Remedial measures	Major
F032	Fan motor 1 defective	Check: - Fan motor operation - Fan motor current draw	- Replace the fan motor.	X
E081	Communication fault between motherboard and fan speed controller	Check: - Connections between motherboard and fan speed controller	- Replace fan speed controller - Replace motherboard	

## Resistance table

The resistance values for the probes: AT (ambient), CT (register), SUT (suction gas), OT (medium outlet), IT (medium inlet) are shown in the following table.

The ET (compressor outlet) probe is an NTC 50.

Temperature [°C]	Resistance (kΩ)
-30	63.73
-29	60.32
-28	57.12
-27	57.12
-26	51.27
-25	48.60
-24	46.09
-23	43.72
-22	41.49
-21	39.38
-20	37.40
-19	35.53
-18	33.76
-17	32.09
-16	30.52
-15	29.03
-14	27.62
-13	26.29
-12	25.03
-11	23.84
-10	22.72
-9	21.65
-8	20.64
-7	19.68
-6	18.77

Temperature [°C]	Resistance (kΩ)
-5	17.91
-4	17.10
-3	16.32
-2	15.59
-1	14.89
0	14.23
1	13.60
2	13.01
3	12.44
4	11.90
5	11.39
6	10.90
7	10.44
8	10.00
9	9.58
10	9.18
11	8.80
12	8.44
13	8.09
14	7.76
15	7.45
16	7.15
17	6.87
18	6.59
19	6.33

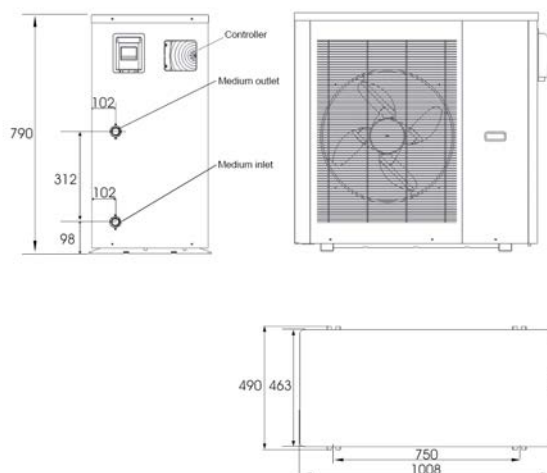
Temperature [°C]	Resistance (kΩ)
20	6.09
21	5.85
22	5.62
23	5.40
24	5.20
25	5.00
26	4.81
27	4.63
28	4.46
29	4.29
30	4.13
31	3.98
32	3.83
33	3.70
34	3.56
35	3.43
36	3.31
37	3.19
38	3.08
39	2.97
40	2.97
41	2.77
42	2.67
43	2.58
44	2.49



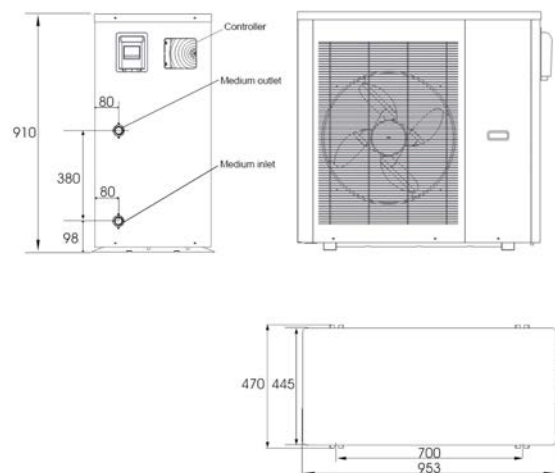
## Dimensions

### Unit dimensions

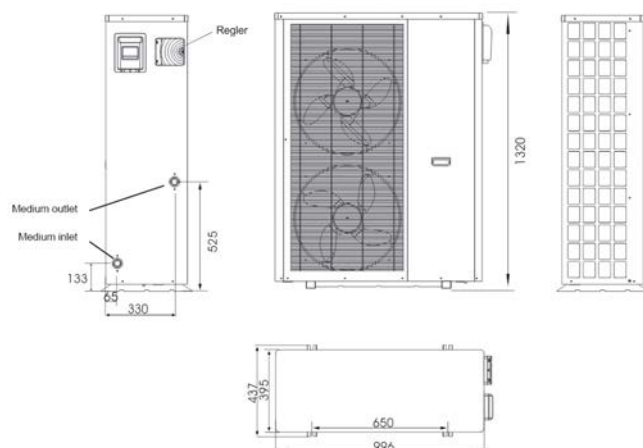
#### RVS 50 DC



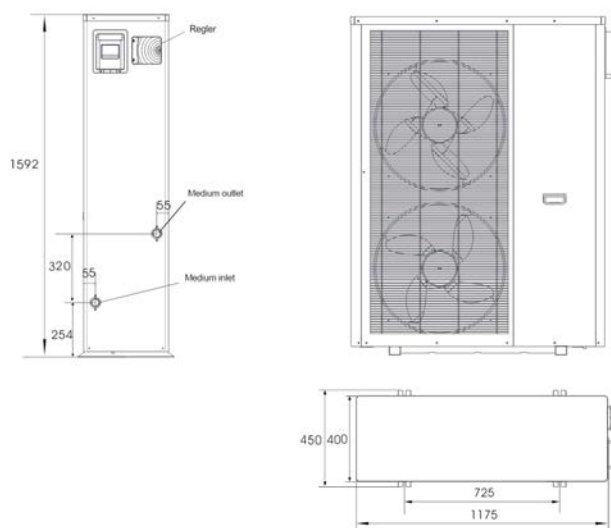
#### RVS 80 DC



#### RVS 130 DC



#### RVS 180 DC



# REMKO series RVS

## Technical data

Series		RVS 50 DC	RVS 80 DC	RVS 130 DC	RVS 180 DC
Operating mode		Compact air-cooled chiller for external installation with seamless power regulation for cooling and heating			
Nominal cooling output	kW	4.7 <sup>1)</sup> (1.6 - 5.6)	7.6 <sup>1)</sup> (2.0 - 10.0)	13.5 <sup>1)</sup> (5.0 - 14.5)	16.9 <sup>1)</sup> (7.0 - 20.0)
SEER		4,57	5,51	5,01	4,15
Annual room cooling efficiency $\eta_{s,c}$	%	180	218	197,4	163
Setting range return temp. Cooling	°C	+10 to +20 / +3 to +20 <sup>4)</sup>			
Setting range return temp. Heating	°C	+30 to +50			
Operating range, cooling	°C	-15 to +45			
Operating range, heating	°C	-20 to +52			
Cooling circuits, number		1			
Refrigerant		R410A <sup>7)</sup>			
GWP value		2088			
Refrigerant filling quantity <sup>6)</sup>	kg	2.5	2.4	3.2	4.4
CO <sub>2</sub> equivalent		5.22	5.01	6.68	9.19
Compressor, number/type		1/Rotary piston			
Air flow rate, max.	m <sup>3</sup> /h	3,900	3,900	7,800	8,600
Nominal airflow volume	m <sup>3</sup> /h	3,650	3,650	7,300	8,100
Number of fans		1		2	
Power consumption, fan	kW	0.11	0.11	0.22	0.25
Current consumption, fan	A	0.5	0.5	1.0	1.1
Sound pressure level <sup>3)</sup>	dB(A)	37.3	37.3	41.7	46.2
Sound power level	dB(A)	68.5	68.5	73.1	77.6
Power supply	V/Hz	230/1~/50			400/3~N / 50
Enclosure class	IP	X4			
Electr. power consumption, max. <sup>4)</sup>	kW	2.1	3.4	5.6	9.0
Elec. current consumption, max. <sup>4)</sup>	A	9.2	18.0	27.0	14.0
Electr. rated power consumption Cooling <sup>1)</sup>	kW	1.3	2.3	4.5	5.5
Electr. rated current consumption Cooling <sup>1)</sup>	A	5.6	10.4	20.7	9.5
Electr. starting current, max.	A	Not applicable as the unit starts with min. frequency			
Operating medium		Water; max. 35% ethylene glycol, max. 35% propylene glycol			
Operating pressure, medium, max.	kPa	600			
Nominal flow rate, medium Cooling	m <sup>3</sup> /h	1.0	1.6	2.8	4.2
Minimum flow volume, medium	m <sup>3</sup> /h	0.62	1.00	1.75	2.63
Maximum flow volume, medium	m <sup>3</sup> /h	1.68	2.70	4.70	7.00
Pressure loss, indoor	kPa	10.0	24.0	105.0	71.0
Nominal pump pressure, max.	kPa	60.8	122.6	206.0	220.7
Equipment pressure, available	kPa	50.8	98.6	101.0	149.7
Power consumption, pump	kW	0.05	0.18	0.50	0.65
Current consumption, pump	A	0.4	0.7	2.8	1.7
Medium connection, inlet	Inches	1	1	1 1/4	1 1/4
Medium connection, outlet	Inches	1	1	1 1/4	1 1/4
Dimensions - Height	mm	790	910	1320	1592
Width	mm	1008	953	996	1175
Depth	mm	463	445	395	400
Weight	kg	95	110	148	219
Standard colour		similar to RAL 9018			

1) Air inlet temperature TK 35°C, medium inlet 12°C, medium outlet 7°C, 0% glycol concentration

3) Distance 10 m free field

4) With low temperature accessories

6) The refrigerant filling quantity is subject to continuous optimisation. Therefore, the exact filling quantity can be found on the name plate



# REMKO QUALITY WITH SYSTEMS

Air-Conditioning | Heating | New Energies

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