

■ Operating and installation instructions

REMKO PWL series

Ceiling-mounted ventilation unit

PWL 101-H, PWL 102-H, PWL 103-H, PWL 201-H, PWL 202-H, PWL 203-H
PWL 301-H, PWL 302-H, PWL 303-H, PWL 101-HK, PWL 102-HK, PWL 103-HK
PWL 201-HK, PWL 202-HK, PWL 203-HK, PWL 301-HK, PWL 302-HK, PWL 303-HK



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

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!

Planning notes

In order to achieve an optimum comfortable temperature in a room, the planning of the room heating or room cooling must follow some fundamental rules.

Heating mode

The following data is required to plan the room heating:

- Room heating requirements Q_H (kW)
- Basic measurements of the room (length, width, height)
- Desired air exchange
- Required room temperature
- Required heating medium temperatures for supply and return flow

The air outlet temperature of the units should not *fall below* 34° C or *exceed* 42° C.

If the outlet temperature is below 34 , there is the risk of unpleasant cool drafts in the work area.

If the outlet temperature is *higher* than 42° C, an increased temperature in the ceiling area occurs.

The casting distance of the warm air flow is reduced and the air in the work area cannot be sufficiently penetrated by the warm air flow and mixed.

Undesired "*cold air zones*" form in the work area and excessive warm air pockets form in the ceiling area. The result is unnecessary heat losses.

Cooling mode

The following data is required to plan the room cooling:

- Room cooling load Q_H (kW)
- Basic measurements of the room (length, width, height)
- Required room temperature and possibly relative humidity
- Required cooling medium temperatures for supply and return flow

In order to prevent unpleasant draughts in the work area, the air outlet temperature in cooling mode should be no more than 6 - 8 K below the ambient temperature.

If the temperature difference is excessive (> 8 K), unpleasant "*cold air zones*" may form.

The circulated total air quantity of the units per hour should be 4 to 5 times the room volume so that the system can react dynamically and effectively.

If the air circulation is undercut, the desired room climate control is very slow-acting and delayed.

In order to prevent the units dripping, the fan should be set to the lowest speed and the air discharge direction should be selected to be parallel to the ceiling (horizontal). The medium temperature may also have to be adjusted accordingly in order to reduce condensate dripping.

Safety notes

The units were subjected to extensive material, functional and quality inspections prior to delivery.

However, dangers can emanate from the units if they are used improperly or not as intended by untrained personnel.

Always observe the following safety instructions:

- The respective building code regulations must be observed as a basic rule
- The operator is responsible for the proper unit installation, the correct electrical installation and the safe operation of the units
- The units must be set up, installed and operated in such a way that no one is endangered or stressed by radiated heat
- The units may only be fastened to structures or ceilings made of construction materials of sufficient load bearing capacity
- The fastening must take place with bearing anchors, which are to be fastened to the unit
- Assembly, connection of the heating medium, connection of the electrical system and the maintenance may only be carried out by trained, qualified persons
- The units may not be installed or operated in potentially flammable or explosive environments, or in extremely dusty / aggressive air

Unit description

- The units must be installed away from traffic zones and installed by crane, for example
- The units may only be operated in completely assembled condition
- Safety components (e.g. protection grids) must not be removed or rendered inoperative
- The units may only be used as intended within the specified output limits and with the approved conveying media
- The intake protection grid must always be free of dirt and loose objects; the unit outtake may not be covered or closed
- Never insert foreign objects into the unit
- The units may not be exposed to direct jets of water
- Do not operate the units in wet areas with high humidity (e.g. automatic car washes, etc.)
- All electrical cables for the units must be protected against damage (e.g. by animals etc.)

The units are stationary, indirectly fuelled recirculation cooling/heating units with Cu/Al finned heat exchangers for connection to a pumped cold / hot water network up to max. 90 °C.

The units have an exclusive and low design, have universal applications, and are easy to install and service.



The units are used wherever high and low-ceilinged rooms have to be heated or cooled and wherever great value is placed on exclusivity.

Examples of large rooms include:

- Exhibition halls
- Salesrooms
- Malls
- Business premises
- Warehouses
- Production halls
- Design offices
- Large entrance areas

The units must be installed on the ceiling or roof structure in a horizontal position.

The units are equipped with an aerodynamically designed, 2-speed, high-performance axial fan with a 400V/50 Hz external motor.

The inner, load-bearing unit structure is made of galvanised steel sheet.

The tube heat exchangers are made of copper tubes with aluminium fins on top. A condensate pump is installed ready for connection to remove the condensate that occurs in cooling mode.

For optimised air guidance, individually adjustable fins are installed in the top of the housing and fins that can be adjusted completely are installed in the bottom.

The air discharge direction (horizontal or vertical) can be adjusted individually to the on-site requirements by changing the fan's direction of rotation.

The plastic housing can be removed from the bearing housing parts by removing the locking bar. The integrated securing straps prevent the hood falling down.

The plastic housing on the units consists of materials that extinguish themselves in the event of fire (corresponding to fire class V-0).

The units conform to the fundamental health and safety requirements of the appropriate EU regulations, and are simple to operate.

NOTE

Fault-free function of the units is only guaranteed if the inlet temperature at the unit inlet and the pump performance are appropriate for the selected unit classification.

TIP

Help by reducing energy usage in stand-by operation! If the unit, the system or the components are not being used, we recommend disconnecting the power supply. Our recommendation does not apply to safety relevant components.

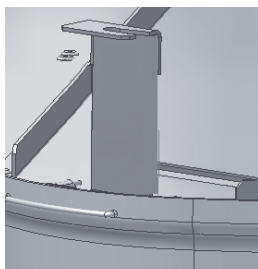
Unit installation

For safe unit installation, observe the following instructions:

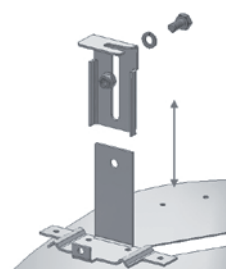
- The units are to be arranged so that people working and standing near them are not in the direct air flow
- The units may only be installed on ceilings or roof structures with sufficient load-bearing capacity
- The units must be installed so that they are level and free of stress
- The heat exchangers must be connected in such a way that no vibrations can be transferred from the unit to the piping system or vice versa
- Suitable screw connections, shut-off valves, bleed valves, etc. must be installed by the customer
- The maximum installation heights of the units must be observed for ceiling installation in both low and high-ceilinged rooms.
- Before connecting the units to an existing hot water heating system, the boiler and pump output must be checked for sufficient capacity
- A suitable repair switch (accessory) must be installed for maintenance and repair work
- The distance between the fan blade and unit housing must be checked for an even gap size

Make sure that no one is under the suspended load during installation! Use the template supplied in the packaging to mark the fastening points. Ensure that there is sufficient space between the unit and ceiling for the media connections. Install the unit so that it is insulated against vibration.

Fixed bracket (standard)



Adjustable bracket (optional)



The adjustable brackets (optional) can be aligned individually for adjustment.

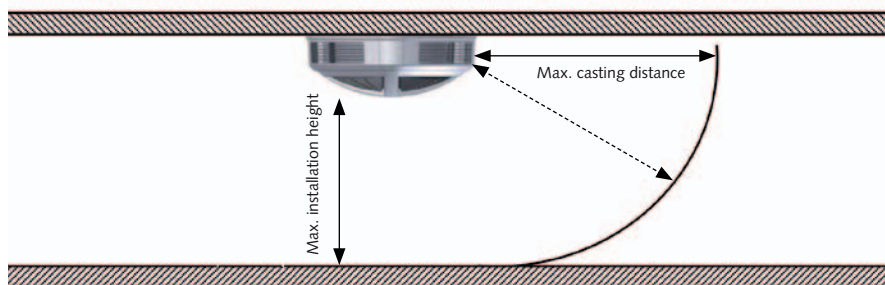
Maximum installation heights and application limitations

The maximum installation heights depend on the maximum casting distance and direction.

Heating mode

The maximum installation heights and casting distances (at 0.2 m/s) apply for an air outlet temperature of 20K above the room temperature and the ideal conditions of the primary air flow.

PWL	Installation height and casting distance in m with "vertical" discharge	Installation height and casting distance in m with "horizontal" discharge
101-3	3.8 / casting distance 2.3	2.5 / casting distance 3.4
201-3	5.5 / casting distance 4.0	3.8 / casting distance 7.9
301-3	7.0 / casting distance 5.5	5.7 / casting distance 7.0



Cooling mode

The maximum casting distances apply for an air outlet temperature of 8K below the room temperature and ideal conditions of the primary air flow.

PWL	Max. casting distance in m
101-3	4.0 ¹⁾
201-3	10.0 ¹⁾
301-3	9.1 ¹⁾

¹⁾ Horizontal and vertical discharge direction

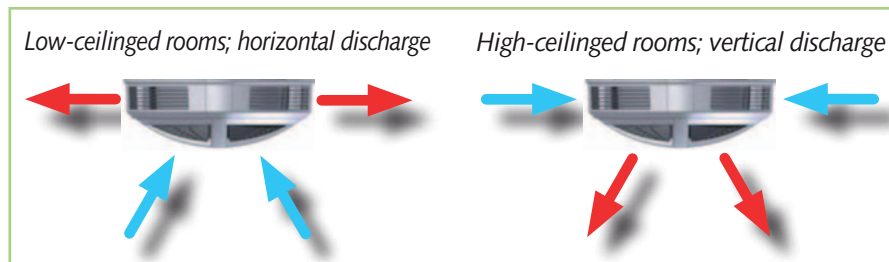
Installation examples

The units are designed for use in both high and low-ceilinged rooms.

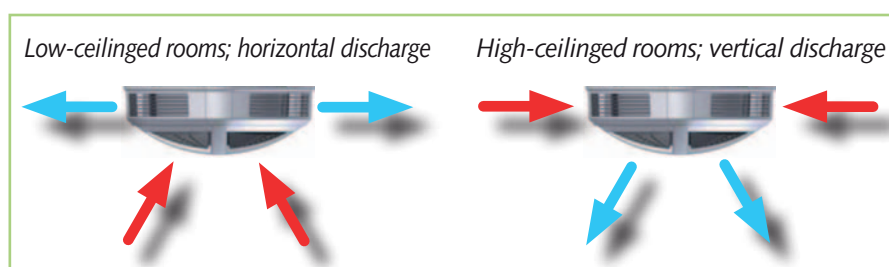
The fan's direction of rotation can be changed (pole switching) in order to adjust the air direction individually to the structural or personal requirements.

Therefore, if the units are used in low-ceilinged rooms, the air flow can be controlled horizontally in the room by the individually adjustable air discharge fins that are in the top part of the housing. This prevents people being exposed to direct airflow.

Heating mode

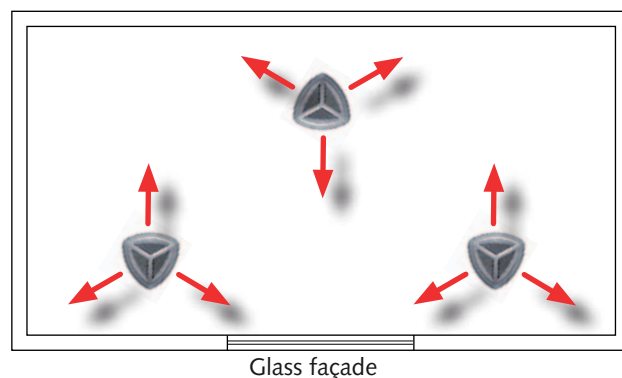
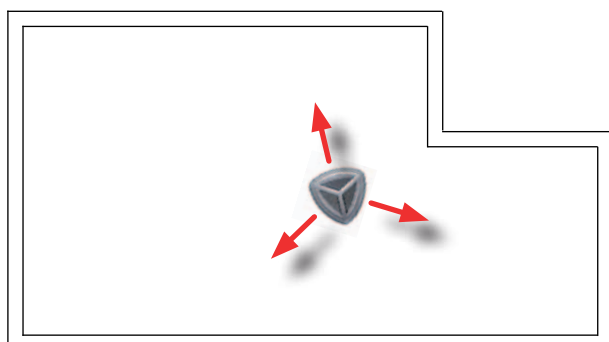
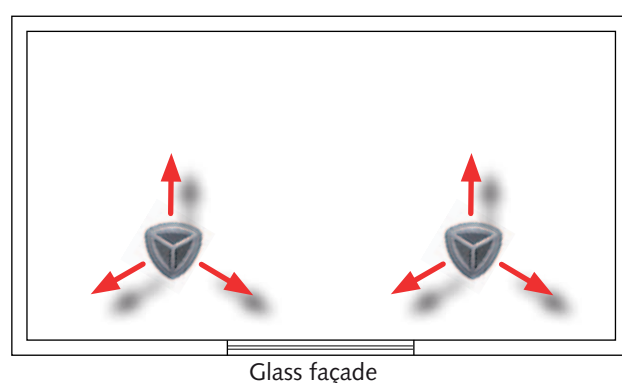
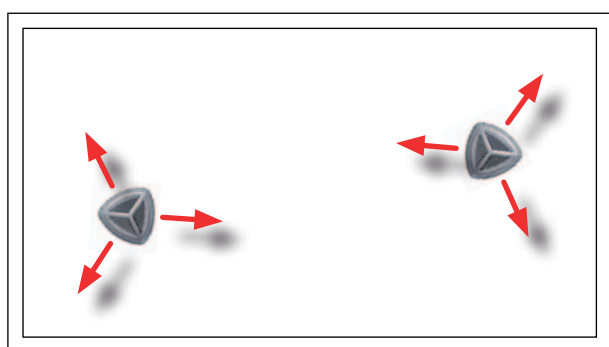


Cooling mode



Combined options for heating and cooling mode

Due to the triangular shape of the units, there are numerous installation arrangements so that even corners can be supplied in an optimised manner.



Electrical wiring

The electrical unit connections may only be established by authorised specialists in accordance with the applicable regulations, observing the regulations from the local energy supplier, as well as the unit-specific VDE installation regulations.

⚠ CAUTION

A failure to observe the applicable regulations, the operating manual and the unit-specific circuit diagrams can cause malfunctions with subsequent damage.

Guarantee claims are voided!

Connecting the units

The units are equipped with 2-speed, 400 V, three-phase axial fans.

The corresponding switchgears (accessories) are used to switch the speeds.

The direction of rotation change is performed by a pole switching device or a special switchgear (accessory).

Motor protection is ensured by integrated thermal contacts in conjunction with a suitable switchgear (accessory).

The three-phase motors are connected to the corresponding switchgears in accordance with the corresponding electrical drawings.

⚠ CAUTION

When the fan stops, the hydraulic feed must also be interrupted at the same time.

Connecting several units

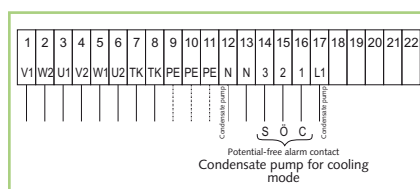
If required, several units (also of different sizes) can be operated in parallel via a switchgear (accessory).

The total output of the connected units must not exceed the maximum switching output of the corresponding switchgear.

The thermal contacts on all motors must be switched in sequence for thermal motor protection. Observe the special electrical drawings.

Only one external controller (thermostat, day/night regulation, etc.) can be connected to each switchgear!

Connection terminals in the unit



The corresponding power fuse in the supply line to the switchgear must be provided by the customer in accordance with the applicable regulations.

The connections in the terminal box must be connected to the corresponding switchgear (accessory).

⚠ CAUTION

The electrical unit connection may only be established by trained specialists.

Hydraulic connection

Connection to the on-site hydraulic system

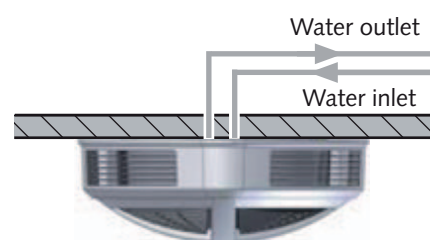
Before connection to the on-site hydraulic system, ensure that the respective unit-specific output requirements can always be provided.

■ The water-side unit connection is to be established by the customer with appropriate screw connections for the pipes and shut-off valves in the supply and return flow.
We recommend using compensators and automatic bleeders!

■ The connection-side is on top and the supply and return flow can be connected as required

■ The thread sizes of the pipe connections are R 1" inside thread

■ The finned heat exchangers must be bled carefully after installation is complete.
Air pockets in the heat exchanger cause a reduction in the heating or cooling capacity!



💡 NOTE

In order to prevent damage from the connecting pipes turning, an appropriate tool must be used to hold them while connecting the screw connections for the heating medium connection.

Commissioning

Drainage when at risk of freezing

Complete static drainage of the finned heat exchangers is not possible in the condition as installed.

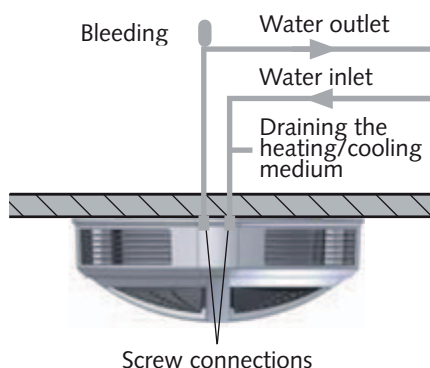
If necessary, drainage is only possible with the assistance of compressed air.

Important information regarding anti-freeze protection!

In order to prevent frost damage, a frost protection device must be used at temperatures below 0 °C.

In systems that are decommissioned in rooms at risk of freezing, the heat exchanger may never contain "only" water.

The heating medium (water) must then be supplemented with a suitable antifreeze with a sufficient mixture ratio for the environment. In the process, the hydraulic output loss must be taken into account.



CAUTION

No guarantee claims can be accepted for frost damage on the finned heat exchangers!

Before initial commissioning

CAUTION

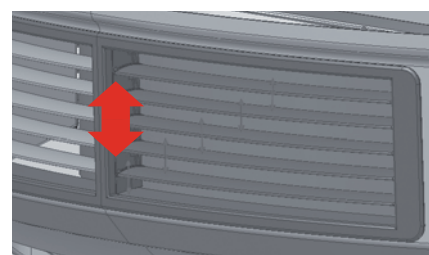
Commissioning can only take place once it has been assured that the proper assembly and electrical installation correspond to the applicable provisions of the EC Directives.

- Check to ensure that mechanical installation was performed correctly
- Check that connection to the on-site heating system has been established correctly
- Check whether hot surfaces are protected against unintentional contact
- Checked whether the electrical wiring of the units has been established in accordance with the applicable directives and standards, and observing the enclosed circuit diagrams
- The fan chamber, the intake and discharge areas must be checked for foreign objects
- The fan's ease of movement must be checked
- Disconnect the power supply to the switchgear (accessory) and switch on the unit using the switchgear's control switch
- Check the fan's direction of rotation.
The direction of rotation is changed by reversing 2 phases or with an external switchgear (accessory)

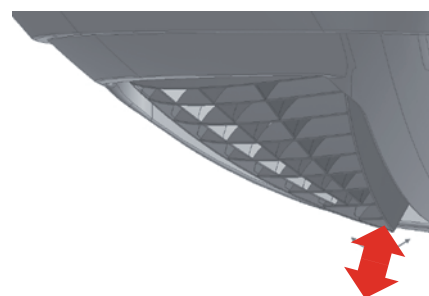
- Note that if using a speed controller (accessory), the regulating device output must be attuned to the total output of the connected motors
- Check whether all air discharge and intake openings are opened accordingly

Air guidance

The fins in the upper side housing part (horizontal discharge or intake) can be adjusted individually in 5 ° increments.



The 3 fin segments in the lower housing part (vertical discharge or intake) can each be adjusted as a unit with a louvre.



Care and maintenance

During initial commissioning

All regulating, control and safety equipment must be checked for function and correct settings during the initial commissioning.

- The current consumption of the fan must be measured.
The rated current may not exceed the value specified on the name plate in the respective switching speeds
- Check the motor protection function of the fan
- Check the entire system for tension-free installation and potential vibrations
- Check the heating/cooling medium supply lines for proper connection, tightness and insulation

Shutdown

Switch the operating switch for the relevant switchgear to the "Off" or "0" position.

In the event of longer breaks in operation

- Disconnect the electrical connection at all poles
- Shut off the hydraulic connection
- If there is a danger of frost, the complete system should be emptied if the heating medium (water) has not been mixed with suitable anti-freeze protection agent
(also see page 9)

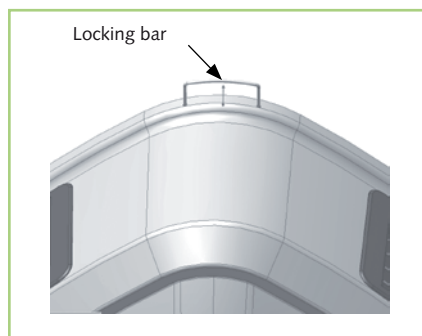
The units are basically maintenance-free. Perform a visual inspection on the units and finned heat exchanger surface every six months and before the heating period begins.

If the units are subjected to excessive dust, perform the inspections at more regular intervals.

To do this, remove the 3 locking bars from the corners of the bearing unit part to release the unit's hood.

Use straps to hold the hood below the bearing part for inspection. Undo the strap adjuster on the straps to remove the hood from the unit completely if required.

When removing, note that the suction hose and the probe for the condensate pump must also be removed from the bearing part.



Important precautions prior to maintenance

- The units should be fully disconnected (all poles) from the electrical power supply and secured to prevent unauthorised reactivation



CAUTION

It is not sufficient to switch off the unit only via the operating switch!

- Ensure that no more condensate is formed, as the condensate pump is also disconnected from the power supply in this case and is therefore not functioning
- Wait until the fan stops
- Shut off the water circuit and safeguard it to prevent it being opened inadvertently
- Allow the finned heat exchanger to cool

Cleaning the units

- Only dry clean the unit surfaces or clean with a moistened cloth and some soap solution if necessary
- Never use high pressure cleaners or steam cleaners on the installed unit
- Never use abrasive or solvent-based cleaners
- Only suitable cleaners may be used even for heavy contamination
- Clean all intake openings and discharge fins
- Clean the fan blades. If required, first remove the motor or the protection grid
- Clean the heat exchanger fins by blowing, with suction or using a smooth brush

Repair

- If the finned heat exchanger surface is coated with greasy or sooty particles, the exchanger element can be removed and cleaned using a steam cleaner at a low pressure and with suitable cleaning agents

- Clean severe soiling on the fan and the aluminium fins with soap solution

- Clean dirt deposits off the condensate tray in the unit housing regularly

In order to be able to drain the condensate tray completely, the condensate hose's intake opening must be affixed to the lowest point on the hood.

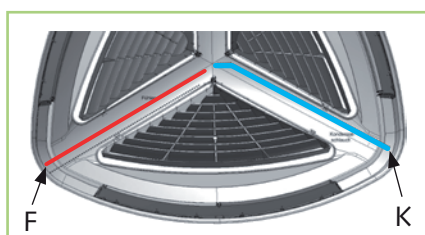
The condensate probe must be installed slightly above the intake opening.

Probe lower edge = intake opening upper edge.

Laying must be performed as shown in the following illustration.

F = Probe line

K = Condensate hose (inner ø 6)



NOTE

Repair and maintenance work may only be carried out by authorised and qualified technicians.

Replacing the fan

1. Remove the unit housing. (see Care and maintenance)
2. Disconnect the fan's electrical connection.
3. Remove the protection grid along with the fan from the bearing housing.
4. Install the new fan carefully in reverse order.
5. Check that the fan blade moves freely and that there is space between it and the fan housing.
6. Re-establish the motor's electrical connection properly.



CAUTION

Prior to maintenance or repair work, the unit must be disconnected from the mains power supply and safeguarded to prevent a restart.

Replacing the finned heat exchanger

1. Remove the unit hood completely. (see Care and maintenance)
2. Disconnect the fan's electrical connection.
3. Disconnect the hydraulic unit connection.
4. Remove the bottom bearing plate (6 screws)
5. Remove the bearing plate along with the finned heat exchanger in a downwards direction.
6. Install the replacement heat exchanger and all other components carefully in reverse order.



CAUTION

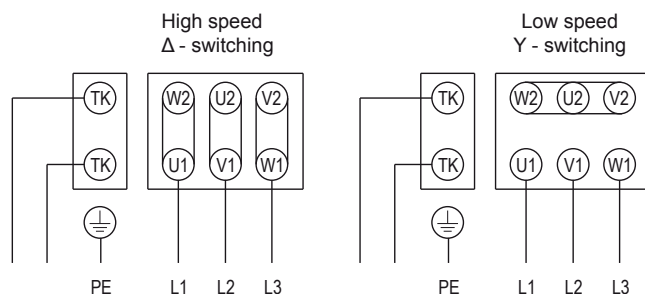
An electrical safety check must be carried out in accordance with VDE 0701 after any work on the units.

Recommended maintenance intervals in normal unit operation

Check the condensate tray and clean if necessary	½ yearly
Check the condensate drain and clean if necessary	½ yearly
Perform a functional inspection on the condensate pump and the alarm sensor	½ yearly
Check the air grate and clean if necessary	Yearly
Check the electrical wiring and grounding	Yearly
Clean the finned heat exchanger	Yearly
Check the fan for ease of movement and functions	Yearly

400 V / 2-speed fan motor

Connection diagram



Standard unit design: Δ /Y switching and thermal contacts.

CAUTION

The electrical unit connection must be established by authorised specialists in accordance with DIN EN 60335-1 and VDE 0116.

NOTE

All connection terminals of the electrical wiring are to be checked for firm seating and tightened as necessary.

Condensate pump

The compact condensate pump must pump out the condensate that is produced in cooling mode. The pump is a self-priming rotation diaphragm pump.

The condensate is pumped out via a flexible PVC condensate hose with an inner diameter of 6 mm.

Safety notes:

- Ensure that the power supply has been disconnected before connecting, removing or replacing the condensate pump
- Do not use the condensate pump to pump flammable and explosive fluids such as petrol, heating oil, solvents, etc.
- The condensate pump may only be used to pump fluids to which the pump material is resistant

- Do not use the condensate pump in an explosive atmosphere
- The electrical wiring must be established in accordance with the wiring diagram. Ensure that the power supply is earthed in accordance with the legal regulations
- Ensure that the condensate pump is not installed higher than 7 m (maximum suction height) above the drip tray outlet or not lower than 20 m (maximum delivery height) below the condensate drain's peak



NOTE

Before finally commissioning the system, test the condensate pump's functions based on the delivery height. Fill water into the device housing's condensate tray and check that the pump is functioning. Ensure that the pump switches off after pumping.

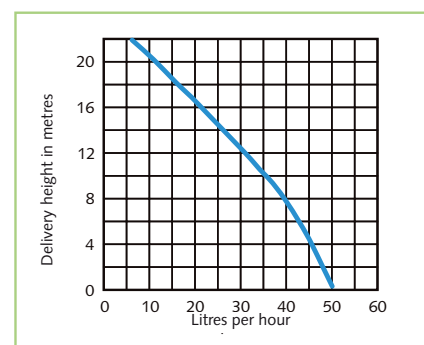
Pump controller

Power supply: 230 V/50 Hz
Brown cable: L
Blue cable: N
Green/yellow cable: PE
The pump's power supply must be fused with a 1 A fine wire fuse.

Potential-free alarm contact:

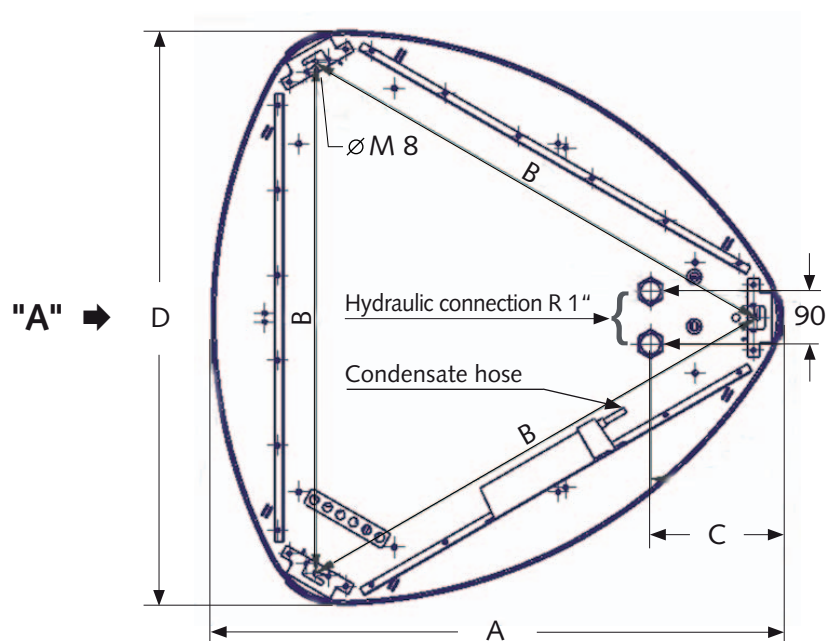
Black: combined cable
Yellow: Contact closed during operation and open in the event of an alarm
Red: Contact open during operation and closed in the event of an alarm

Performance diagram

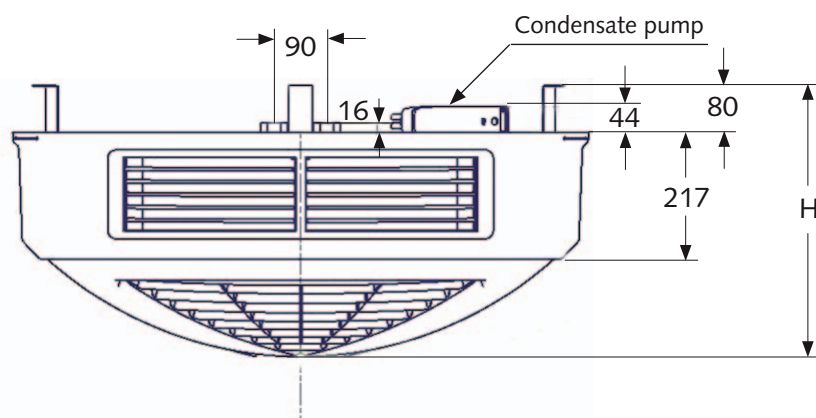


Max. delivery rate: 50 l/h
Max. delivery height: 20 m
Max. suction height: 7 m
Connection inner Ø: 6 mm
Temperature protection at: 130 °C

Unit dimensions



NOTE
The supply and return lines can be connected in any way



View "A"

Dimensions	PWL 101-103 HK	PWL 201-203 HK	PWL 301-303 HK
A	985 mm	1084 mm	1178 mm
B	632 mm	963 mm	1043 mm
C	229 mm	229 mm	229 mm
D	989 mm	1073 mm	1160 mm
H	465 mm	485 mm	504 mm

The distance between the unit and ceiling must be at least 80 mm!

PWL 101-103 - Heating • Performance tables • Technical data

Type		PWL 101-H				PWL 102-H				PWL 103-H			
Version		2-speed				2-speed				2-speed			
Speed	rpm	920		750		920		750		920		750	
Electrical connection	V	400/3~N											
Frequency	Hz	50											
Power consumption	kW	0.1/0.07											
Nominal current	A	0.26/0.13											
Air volume	m³/h	2030		1685		1960		1610		1885		1530	
Sound pressure level ¹⁾	dB (A)	56		47		56		47		56		47	
Sound power level	dB	64		55		64		55		64		55	
Max. installation height	m	2.8				2.7				2.5			
Max. casting distance ²⁾	m	3.4				3.2				3.0			
Hydraulic connection	Inches	R 1"				R 1"				R 1"			
Water volume	l	1.0				1.6				2.5			
Weight	kg	31				35				38			
PWW heating medium	t _{L1} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C
45/38 °C	0	8.2	12	7.4	13	13.4	20	12.0	22	17.5	27	15.0	29
	5	7.2	15	6.4	16	11.8	23	10.5	24	15.3	29	13.2	30
	10	6.2	19	5.5	20	10.1	25	9.1	27	13.2	30	11.3	32
	15	5.1	22	4.6	23	8.4	28	7.6	29	11.0	32	9.5	33
	20	4.1	26	3.7	26	6.7	30	6.1	31	8.8	34	7.6	35
50/40 °C	0	8.8	13	7.9	14	14.4	22	13.0	24	18.8	29	16.2	31
	5	7.8	16	7.0	17	12.8	24	15.5	26	16.7	31	14.4	33
	10	6.8	20	6.1	21	11.1	27	10.0	28	14.5	33	12.5	34
	15	5.7	23	5.1	24	9.4	29	8.5	30	12.3	34	10.6	35
	20	4.7	27	4.2	27	7.7	32	7.0	33	10.1	36	8.7	37
55/45 °C	0	9.9	14	8.8	15	16.1	24	14.5	26	21.1	33	18.1	35
	5	8.9	18	7.9	19	14.5	27	13.0	29	18.9	34	16.3	36
	10	7.8	21	7.0	22	12.8	29	11.5	31	16.7	36	14.4	38
	15	6.8	25	6.1	26	11.1	32	10.0	33	14.6	38	12.5	39
	20	5.8	28	5.2	29	9.5	34	8.5	36	12.4	39	10.7	40
60/45 °C	0	10.2	15	9.1	16	16.7	25	15.0	27	21.9	34	18.8	36
	5	9.2	18	8.2	19	15.1	28	13.5	30	19.7	36	17.0	38
	10	8.1	22	7.3	23	13.4	30	12.0	32	17.5	37	15.1	39
	15	7.1	25	6.4	26	11.7	33	10.5	34	15.3	39	13.2	40
	20	6.1	29	5.4	29	10.0	35	9.0	36	13.1	40	11.3	42
70/50 °C	0	11.6	17	10.4	18	19.1	29	17.1	31	24.9	39	21.5	41
	5	10.6	20	9.5	22	17.4	31	15.6	34	22.8	40	19.6	43
	10	9.5	24	8.5	25	15.7	34	14.1	36	20.5	42	17.8	44
	15	8.5	27	7.6	28	14.0	36	12.6	38	18.3	44	15.9	45
	20	7.4	31	6.7	32	12.3	38	11.1	40	16.1	45	14.0	47

t_{L1} = air inlet temperature / t_{L2} = air outlet temperature

²⁾ at Δt 20 K (Air inlet to air outlet temperature difference)

Operating method with limitation of the casting distance

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

PWL 101-103 - Cooling • Performance tables • Technical data

Type		PWL 101-HK						PWL 102-HK						PWL 103-HK					
Version		2-speed						2-speed						2-speed					
Speed	rpm	920		750				920		750				920		750			
Electrical connection		400/3~N																	
Frequency	Hz	50																	
Power consumption	kW	0.1/0.07																	
Nominal current	A	0.26/0.13																	
Air volume	m³/h	2030		1685				1960		1610				1885		1530			
Sound pressure level ¹⁾	dB (A)	56		47				56		47				56		47			
Sound power level	dB	64		55				64		55				64		55			
Hydraulic connection	Inches	R 1"						R 1"						R 1"					
Water volume	l	1.0						1.6						2.5					
Max. condensate accumulation	l/h	2.8		2.6				4.3		4.1				6.3		5.7			
Weight	kg	31						35						38					
Motor vehicle refrigerant	t _{L1}	Q _g	Q _s	t _{L2}	Q _g	Q _s	t _{L2}	Q _g	Q _s	t _{L2}	Q _g	Q _s	t _{L2}	Q _g	Q _s	t _{L2}	Q _g	Q _s	t _{L2}
	°C	kW	kW	°C	kW	kW	°C	kW	kW	°C	kW	kW	°C	kW	kW	°C	kW	kW	°C
5/10 °C	23	3.5	3.4	19	3.1	3.5	19	5.8	3.5	16	5.1	3.5	16	8.4	3.5	14	7.2	13	13
	25	3.9		20	3.5		20	6.5		17	5.8		17	9.4		15	8.0	14	14
	26	3.7		21	3.3		21	6.0		18	5.3		17	8.7		15	7.4	14	14
	27	4.1		22	3.7		21	6.7		18	6.0		18	9.7		15	8.3	15	15
	32	5.4		25	4.9		25	8.9		21	7.9		20	12.5		17	10.8	16	16
7/12 °C	23	2.7		20	2.4		19	4.5		17	4.0		17	6.7		15	5.8	15	15
	25	3.2		21	2.9		21	5.2		18	4.7		18	7.7		16	6.6	15	15
	26	3.0		22	2.7		21	4.8		19	4.3		18	7.1		16	6.1	16	16
	27	3.4		22	3.0		22	5.6		19	4.9		19	8.1		17	7.0	16	16
	32	4.7		26	4.2		25	7.7		22	6.8		21	10.8		18	9.4	18	18
9/14 °C	23	2.0		20	1.8		20	3.3		18	2.9		18	5.1		16	4.4	16	16
	25	2.4		22	2.2		21	4.0		19	3.6		19	6.1		17	5.2	17	17
	26	2.7		22	2.4		22	4.4		20	3.9		19	6.2		17	5.3	17	17
	27	2.7		23	2.4		23	4.4		20	3.9		20	6.4		18	5.6	17	17
	32	3.9		26	3.5		26	6.4		23	5.7		22	9.2		20	8.0	19	19
11/16 °C	23	1.6		21	1.4		21	2.6		19	2.3		19	3.9		17	3.4	17	17
	25	1.9		22	1.7		22	3.1		20	2.7		20	4.4		18	3.9	18	18
	26	2.2		23	1.9		23	3.5		21	3.1		20	4.7		18	4.1	18	18
	27	2.4		23	2.2		23	3.9		21	3.5		21	5.5		19	4.8	18	18
	32	3.3		27	2.9		27	5.2		24	4.7		23	7.6		21	6.6	20	20
13/18 °C	23	1.2		21	1.0		21	1.9		20	1.7		20	2.7		19	2.3	18	18
	25	1.6		23	1.4		23	2.6		21	2.3		21	3.5		19	3.0	19	19
	26	1.8		23	1.6		23	2.9		22	2.5		21	3.9		20	3.4	19	19
	27	2.0		24	1.8		24	3.2		22	2.8		22	4.3		20	3.7	20	20
	32	3.1		27	2.7		27	5.0		24	4.4		24	7.2		22	5.8	21	21

¹⁾ LpA 1m, Noise level measurement DIN 45635 - 01 - KL 3

PWL 201-203 - Heating • Performance tables • Technical data

Type		PWL 201-H				PWL 202-H				PWL 203-H			
Version		2-speed				2-speed				2-speed			
Speed	rpm	920		750		920		750		920		750	
Electrical connection	V	400/3~N											
Frequency	Hz	50											
Power consumption	kW	0.28/0.18											
Nominal current	A	0.67/0.37											
Air volume	m³/h	3110		2580		2900		2400		2850		2350	
Sound pressure level ¹⁾	dB (A)	61		53		61		56		61		56	
Sound power level	dB	69		61		69		64		69		64	
Max. installation height	m	5.5				5.3				5.2			
Max. casting distance ²⁾	m	7.9				5.8				5.0			
Hydraulic connection	Inches	R 1"				R 1"				R 1"			
Water volume	l	1.0				1.8				2.9			
Weight	kg	32				35				38			
PWW heating medium	t _{L1} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C
45/38°C	0	10.6	10	9.5	11	18.2	18	16.1	20	23.5	24	20.5	26
	5	9.2	14	8.2	14	16.0	21	14.1	22	20.6	26	17.9	27
	10	7.8	17	7.0	18	13.7	24	12.1	25	17.7	28	15.4	29
	15	6.3	21	5.7	21	11.4	27	10.1	27	14.8	30	12.9	31
	20	4.9	25	4.4	25	9.2	29	8.1	30	11.9	32	10.3	33
50/40°C	0	11.2	11	10.0	11	19.6	20	17.3	21	25.3	26	22.1	28
	5	9.7	14	8.7	15	17.4	23	15.3	24	22.4	28	19.5	29
	10	8.3	18	7.4	18	15.1	25	13.3	26	19.5	30	17.0	31
	15	6.8	21	6.2	22	12.8	28	11.3	29	16.6	32	14.5	33
	20	5.4	25	4.9	26	10.5	31	9.3	31	13.6	34	11.9	35
55/45°C	0	12.7	12	11.4	13	21.9	22	19.3	24	28.3	29	24.7	31
	5	11.2	16	10.1	16	19.7	25	17.3	26	25.4	31	22.1	33
	10	9.8	19	8.8	20	17.4	28	15.3	29	22.5	33	19.6	35
	15	8.4	23	7.5	24	15.1	30	13.4	31	19.6	35	17.1	36
	20	6.9	27	6.2	27	12.9	33	11.4	34	16.6	37	14.5	38
60/45°C	0	12.6	12	11.4	13	22.7	23	20.1	25	29.4	30	25.6	32
	5	11.2	16	10.1	16	20.5	26	18.1	27	26.5	32	23.1	34
	10	9.8	19	8.8	20	18.2	28	16.1	30	23.5	34	20.6	36
	15	8.3	23	7.5	24	15.9	31	14.1	32	20.6	36	18.0	37
	20	6.9	27	6.2	27	13.6	34	12.0	35	17.6	38	15.4	39
70/50°C	0	14.2	13	12.7	15	25.9	26	22.9	28	33.5	35	29.3	37
	5	12.8	17	11.5	18	23.6	29	20.9	31	30.6	37	26.7	38
	10	11.3	21	10.2	22	21.3	32	18.9	33	27.6	39	24.1	40
	15	9.9	24	8.9	25	19.1	34	16.8	36	24.7	40	21.6	42
	20	8.5	28	7.6	29	16.8	37	14.8	38	21.7	42	19.0	44

t_{L1} = air inlet temperature / t_{L2} = air outlet temperature

²⁾ at Δt 20 K (Air inlet to air outlet temperature difference)

Operating method with limitation of the casting distance

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

PWL 201-203 - Cooling • Performance tables • Technical data

Type		PWL 201-HK				PWL 202-HK				PWL 203-HK			
Version		2-speed				2-speed				2-speed			
Speed	rpm	920		750		920		750		920		750	
Electrical connection	V	400/3~N											
Frequency	Hz	50											
Power consumption	kW	0.28/0.18											
Nominal current	A	0.67/0.37											
Air volume	m³/h	3110		2580		2900		2400		2850		2350	
Sound pressure level ¹⁾	dB (A)	61		53		61		56		61		56	
Sound power level	dB	69		61		69		64		69		64	
Hydraulic connection	Inches	R 1"				R 1"				R 1"			
Water volume	l	1.0				1.8				2.9			
Max. condensate accumulation	l/h	2.3		2.2		5.6		5.2		7.6		7.1	
Weight	kg	32				35				38			
Motor vehicle refrigerant	t _{L1/r.F.} °C/%	kW	t _{L2/r.F.} °C/%	kW	t _{L2/r.F.} °C/%	kW	t _{L2/r.F.} °C/%	kW	t _{L2/r.F.} °C/%	kW	t _{L2/r.F.} °C/%	kW	t _{L2/r.F.} °C/%
5/10 °C	23	3.3	20	3.0	20	8.2	17	7.3	16	11.0	15	9.7	14
	25	3.9	22	3.6	21	9.2	18	8.3	17	12.3	16	10.9	15
	26	3.8	22	3.4	22	8.5	18	7.6	18	11.4	16	10.1	15
	27	4.2	23	3.8	23	9.5	19	8.5	18	12.8	16	11.3	16
	32	5.9	27	5.3	26	12.4	21	11.1	21	16.8	18	14.8	18
7/12 °C	23	2.5	21	2.3	20	6.4	18	5.8	17	8.7	16	7.7	16
	25	3.0	22	2.8	22	7.4	19	6.7	18	10.0	17	8.9	16
	26	3.3	23	3.0	23	6.9	19	6.2	19	9.3	17	8.3	17
	27	3.6	24	3.2	23	7.8	20	7.0	19	10.6	18	9.4	17
	32	5.0	27	4.5	27	10.7	22	9.6	22	14.5	20	12.8	19
9/14 °C	23	2.0	21	1.8	21	4.7	18	4.3	18	6.5	17	5.7	17
	25	2.6	23	2.3	22	5.7	20	5.2	19	7.8	18	7.0	17
	26	2.9	23	2.6	23	6.4	20	5.7	19	8.2	18	7.2	18
	27	3.1	24	2.8	24	6.2	21	5.6	20	8.5	19	7.5	18
	32	4.4	28	4.0	27	9.0	23	8.1	23	12.3	21	10.9	20
11/16 °C	23	1.6	22	1.4	21	3.9	19	3.4	19	4.9	18	4.4	18
	25	2.1	23	1.9	23	4.5	20	3.9	20	5.7	19	5.1	19
	26	2.4	24	2.1	24	5.0	21	4.4	21	6.4	19	5.6	19
	27	2.6	24	2.4	24	5.7	21	5.1	21	7.3	20	6.4	19
	32	3.9	28	3.5	28	7.4	24	6.6	24	10.1	22	8.8	21
13/18 °C	23	1.2	20	1.1	19	2.8	20	2.5	20	3.6	19	3.1	19
	25	1.6	23	1.4	23	3.7	21	3.3	21	4.7	20	4.1	20
	26	1.9	24	1.7	24	4.1	22	3.7	21	5.3	20	4.6	20
	27	2.1	25	1.9	25	4.1	22	3.7	21	5.3	20	4.6	20
	32	3.5	29	3.1	28	7.1	25	6.3	24	9.1	23	8.0	22

t_{L1} = air inlet temperature / t_{L2} = air outlet temperature

¹⁾ LpA 1m, Noise level measurement DIN 45635 - 01 - KL 3

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

PWL 301-303 - Heating • Performance tables • Technical data

Type		PWL 301-H				PWL 302-H				PWL 303-H			
Version		2-speed				2-speed				2-speed			
Speed	rpm	920		750		920		750		920		750	
Electrical connection		400/3~N											
Frequency	Hz	50											
Power consumption	kW	0.36/0.22											
Nominal current	A	0.84/0.46											
Air volume	m³/h	4300		2650		4150		2400		3900		1710	
Sound pressure level ¹⁾	dB (A)	66		59		66		59		68		61	
Sound power level	dB	74		69		74		69		76		69	
Max. installation height	m	7.0				6.5				6.0			
Max. casting distance ²⁾	m	5.0				7.0				6.2			
Hydraulic connection	Inches	R 1"				R 1"				R 1"			
Water volume	l	1.1				2.0				3.3			
Weight	kg	43				46				48			
PWW heating medium	t _{L1} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C	kW	t _{L2} °C
45/38°C	0	13.8	9	10.3	11	22.3	16	15.9	19	30.5	23	17.2	29
	5	12.0	13	8.9	15	19.3	19	13.8	22	26.7	25	15.1	31
	10	10.1	17	7.6	18	16.4	22	11.7	24	23.0	27	13.0	32
	15	8.3	21	6.2	22	13.4	24	9.6	27	19.2	29	10.9	34
	20	6.4	24	4.8	25	10.4	27	7.5	29	15.4	32	8.8	35
50/40°C	0	14.5	10	10.9	12	23.5	17	16.8	21	32.9	25	18.6	32
	5	12.7	14	9.5	16	20.5	20	14.7	23	29.1	27	16.5	33
	10	10.9	17	8.1	19	17.6	22	12.6	25	25.3	29	14.4	35
	15	9.0	21	6.8	23	14.7	25	10.5	28	21.5	31	12.3	36
	20	7.2	25	5.4	26	11.7	28	8.4	30	17.7	33	10.2	38
55/45°C	0	16.5	11	12.3	14	26.7	19	19.0	23	36.7	28	20.7	35
	5	14.7	15	10.9	17	23.7	22	16.9	26	32.9	30	18.6	37
	10	12.8	19	9.6	21	20.7	25	14.8	28	29.2	32	16.5	38
	15	11.0	22	8.2	24	17.8	28	12.7	31	25.4	34	14.4	40
	20	9.1	26	6.8	28	14.8	30	10.6	33	21.6	36	12.3	41
60/45°C	0	16.5	11	12.3	14	26.8	19	19.1	23	38.1	29	21.7	37
	5	14.7	15	11.0	17	23.8	22	17.1	26	34.3	31	19.6	38
	10	12.8	19	9.6	21	20.8	25	14.9	28	30.6	33	17.5	40
	15	11.0	22	8.2	24	17.9	28	12.9	31	26.8	35	15.3	41
	20	9.1	26	6.9	28	15.3	31	11.2	33	22.9	37	13.2	43
70/50°C	0	18.6	13	13.9	15	30.2	21	21.6	26	43.5	33	24.8	42
	5	16.7	16	12.5	19	27.2	24	19.5	29	39.7	35	22.7	44
	10	14.9	20	11.2	22	24.2	27	17.4	31	35.9	37	20.5	45
	15	13.0	24	9.8	26	21.5	30	15.6	34	32.1	39	18.4	47
	20	11.2	28	8.4	29	18.5	33	13.4	37	28.2	41	16.3	48

t_{L1} = air inlet temperature / t_{L2} = air outlet temperature

²⁾ at Δt 20 K (Air inlet to air outlet temperature difference)

Operating method with limitation of the casting distance

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

PWL 301-303 - Cooling • Performance tables • Technical data

Type		PWL 301-HK				PWL 302-HK				PWL 303-HK			
Version		2-speed				2-speed				2-speed			
Speed	rpm	920		750		920		750		920		750	
Electrical connection		400/3~N											
Frequency	Hz	50											
Power consumption	kW	0.36/0.22											
Nominal current	A	0.84/0.46											
Air volume	m³/h	4300		2650		4150		2400		3900		1710	
Sound pressure level ¹⁾	dB (A)	66		59		66		59		68		61	
Sound power level	dB	74		69		74		69		76		69	
Hydraulic connection	Inches	R 1"				R 1"				R 1"			
Water volume	l	1.1				2.0				3.3			
Max. condensate accumulation	l/h	3.0		2.7		4.2		4.1		9.5		6.7	
Weight	kg	43				46				48			
Motor vehicle refrigerant	t _{L1/r.F.} °C/%	kW	t _{L2/r.F.} °C/%	kW	t _{L2/r.F.} °C/%	kW	t _{L2/r.F.} °C/%	kW	t _{L2/r.F.} °C/%	kW	t _{L2/r.F.} °C/%	kW	t _{L2/r.F.} °C/%
5/10 °C	23	4.5	20	3.5	20	7.4	18	5.6	17	14.3	15	8.4	13
	25	5.2	22	4.1	21	8.6	20	6.5	18	16.0	16	9.4	14
	26	5.0	23	3.8	22	8.1	20	6.0	19	14.8	17	8.6	14
	27	5.5	23	4.4	22	9.1	21	6.9	19	16.6	17	9.7	14
	32	7.7	27	6.0	26	12.6	24	9.5	22	21.7	19	12.6	16
7/12 °C	23	3.3	21	2.6	20	5.4	19	4.2	18	11.3	16	6.6	14
	25	4.0	22	3.2	22	6.6	20	5.1	19	13.1	17	7.7	15
	26	4.4	23	3.3	22	7.1	21	5.1	20	12.2	18	7.1	15
	27	4.7	24	3.5	23	7.7	21	5.5	20	13.8	18	8.1	16
	32	6.5	27	5.1	26	10.6	24	8.0	23	18.8	20	10.9	17
9/14 °C	23	2.7	21	2.1	21	4.4	20	3.2	19	8.4	17	5.0	16
	25	3.4	23	2.6	22	5.5	21	4.0	20	10.2	18	6.0	16
	26	3.8	23	2.9	23	6.3	21	4.5	20	10.7	18	6.1	16
	27	4.1	24	3.1	23	6.6	22	4.7	21	11.1	19	6.5	17
	32	5.8	28	4.3	27	9.4	25	6.6	23	16.0	21	9.3	18
11/16 °C	23	2.1	22	1.6	21	3.5	20	2.5	20	6.5	18	3.8	17
	25	2.7	23	2.1	23	4.5	22	3.2	21	7.5	19	4.4	18
	26	3.1	24	2.4	23	5.2	22	3.7	21	8.3	20	4.7	18
	27	3.5	25	2.6	24	5.7	23	4.1	22	9.6	20	5.4	18
	32	5.1	28	3.9	28	8.3	26	5.9	24	13.2	22	7.7	20
13/18 °C	23	1.5	22	1.1	22	2.6	21	1.8	20	4.7	19	2.7	18
	25	2.1	24	1.6	23	3.5	22	2.6	22	6.2	20	3.5	19
	26	2.5	24	1.9	24	4.1	23	3.0	22	6.9	21	3.9	19
	27	2.8	25	2.1	25	4.7	24	3.3	23	7.7	21	4.3	19
	32	4.6	29	3.4	28	7.5	26	5.3	25	11.9	23	6.7	21

t_{L1} = air inlet temperature / t_{L2} = air outlet temperature

¹⁾ LpA 1m, Noise level measurement DIN 45635 - 01 - KL 3

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

Intended use

The units are designed exclusively for heating and cooling purposes in industrial or commercial use on the basis of their structural design and equipment.

The units must only be operated by appropriately instructed personnel.

The manufacturer shall not be liable for damage resulting from non-observance of the manufacturer's specifications, the respective local legal requirements or from unauthorised alterations to the units.

Customer service and guarantee

As a prerequisite for any guarantee claims to be considered, it is essential that the ordering party or their representative complete and return the **"Certificate of guarantee"** to REMKO GmbH & Co. KG at the time when the units are purchased and commissioned.

The units were tested at the factory several times to verify their correct function. However, if malfunctions should arise that cannot be remedied by the operator with the assistance of the troubleshooting section, please contact your specialist dealer or contractual partner.



Environmental protection and recycling

Disposal of packaging

When disposing of packaging material, please consider our environment.

Our units are carefully packed and delivered in stable transport packaging and, if applicable, on a wooden pallet.

The packaging materials are environmentally-friendly and can be recycled.

By recycling packaging materials, you make a valuable contribution to the reduction of waste and conservation of raw materials.

Therefore, only dispose of packaging material at appropriate collection points.

Disposal of the old unit

The manufacturing process for the units is subject to continuous quality control.

Only high-grade materials are processed, the majority of which are recyclable.

You also contribute to environmental protection by ensuring that your old equipment is only disposed of in an environment friendly manner.

Therefore, only bring the old unit to an authorised recycling business or to an appropriate collection point.



NOTE

Operation that differs from that specified in this operating manual is prohibited. Failing to observe this renders any manufacturer liability or guarantee claims void.



NOTE

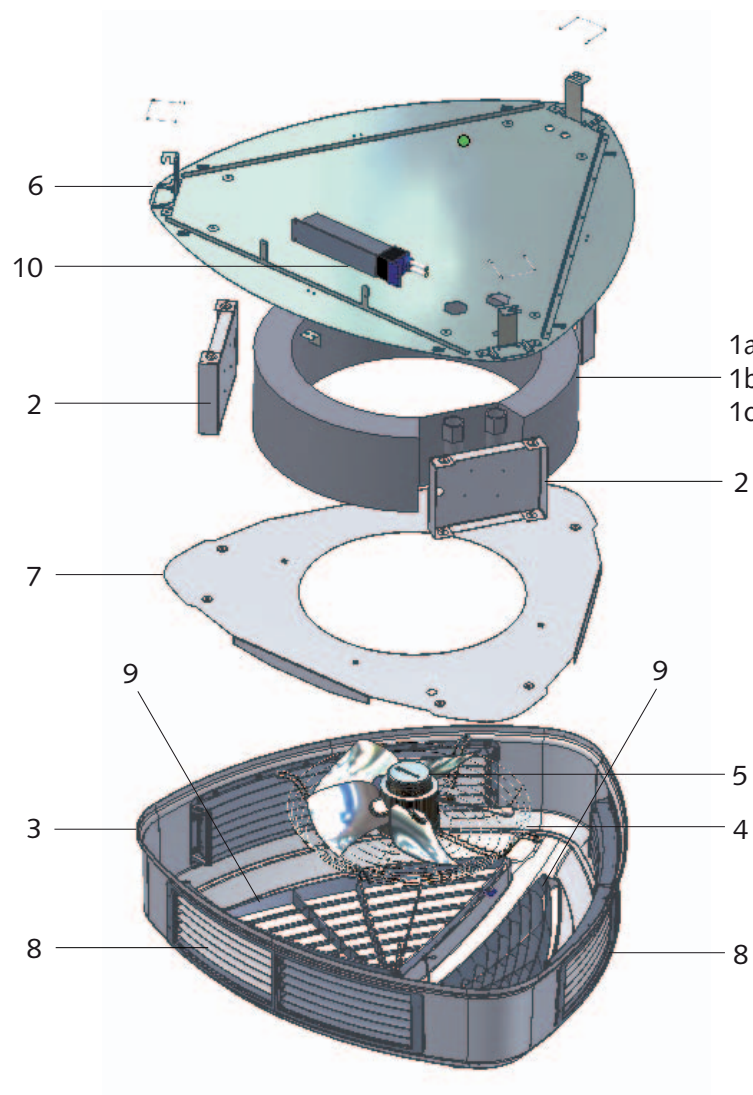
Adjustment and maintenance work may only be carried out by authorised specialist personnel.



CAUTION

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View of the unit



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

Spare parts list

No.	Designation	PWL 101-103 HK	PWL 201-203 HK	PWL 301-303 HK
		EDP	EDP	EDP
1a	Heat exchanger assy. 1	1110700	1110711	1110722
1b	Heat exchanger assy. 2	1110701	1110712	1110723
1c	Heat exchanger assy. 3	1110702	1110713	1110724
2	Electr. terminal box	1110703	1110714	1110725
3	Unit housing	1110704	1110715	1110726
4	Protective fan grate	1110705	1110716	1110727
5	400V / 2-speed fan	1110706	1110717	1110728
6	Support plate, top	1110707	1110718	1110729
7	Support plate, bottom	1110708	1110719	1110730
8	Air grate, side	1110709	1110720	1110731
9	Air segment, bottom	1110710	1110721	1110732
10	Condensate pump	1110735	1110735	1110735
Not illustrated	Condensate probe	1110736	1110736	1110736

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

Legend / usable limits

Finned heat exchanger

The CU/AL finned heat exchangers are comprised of copper tubes with fitted aluminium fins. The connection pipes made of steel tubing are guided out of the housing on the angled sides. The non-twist connections are equipped with a 1" inside thread.

The heat exchanger and the housing design determine the usable limits.

The maximum inlet temperature in heating mode must not exceed 90 °C.

The minimum inlet temperature in cooling mode must not fall short of 4 °C.

An operating pressure of 16 bar in the heating/cooling circuit must not be exceeded.

The temperature in the immediate vicinity of the units must not exceed 70 °C (built up heat).

Fan and motor

The fan is driven by an external motor that forms the fan hub at the same time.

On the external motor, the impeller and its drive motor are combined in one unit that is optimised for ventilation and in its design.

The axial fan is balanced statically and dynamically.

The rotor housing is made of cast aluminium.

- 3-phase drive 400 V/50 Hz
- Heat class: F
- Enclosure class: IP 54
- Motor protection: Thermal contact (TC)
- The winding circuit in the star (Y) is the low speed
- The winding circuit in the triangle (D) is the high speed

Application area for motors in insulation class "F"

- Heating medium inlet temperature up to max. 90 °C
- Ambient temperature (intake temperature) up to max. 40 °C

Motor protection

Thermal contacts are embedded into the motor windings.

These thermal contacts (temperature monitors) open as soon as the maximum winding temperature of 135 °C is exceeded (fault). In the event of unit group switching, all thermal contacts must be switched in sequence.

Therefore, as many motors as you wish can be safeguarded by a full motor protection device in theory.

However, the number of fan heaters is limited by the switching output of the switchgears.

Technical data

Series		PWL 101-103 HK	PWL 201-203 HK	PWL 301-303 HK
Electrical connection	V	400/3~N	400/3~N	400/3~N
Frequency	Hz	50	50	50
Power consumption	kW	0.10/0.07	0.28/0.18	0.36/0.22
Nominal current	A	0.26/0.13	0.67/0.37	0.84/0.46
Speed	rpm	920/750	920/750	920/750
Ventilation capacity for assembly 1	m ³ /h	2030/1685	3110/2580	4300/2650
Ventilation capacity for assembly 2	m ³ /h	1960/1610	2900/2400	4150/2400
Ventilation capacity for assembly 3	m ³ /h	1885/1530	2580/2350	3900/1710
Sound pressure level L _{pA} 1m ¹⁾	dB(A)	56/47	61/56	66/59
Hydraulic connection	Inches	R 1" IT	R 1" IT	R 1" IT
Water volume ²⁾	ltr.	1.0/1.6/2.5	1.0/1.8/2.9	1.1/2.0/3.3
Cooling/heating medium	°C	Pumped cold/hot water from 4 °C to max. 90 °C		
Max. operating pressure	bar	16	16	16
Weight	kg	31/35/38	32/35/38	43/46/48

¹⁾ Noise level measurement DIN 45635 - 01 - KL 3

²⁾ Water volume in the finned heat exchanger's tube bundle

REMKO QUALITY WITH SYSTEMS

Air-Conditioning | Heating | New Energies

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