

DH 30 VPR+ / DH 60 VPR+

EN

OPERATING MANUAL
DEHUMIDIFIER / CLIMATE
MANAGER

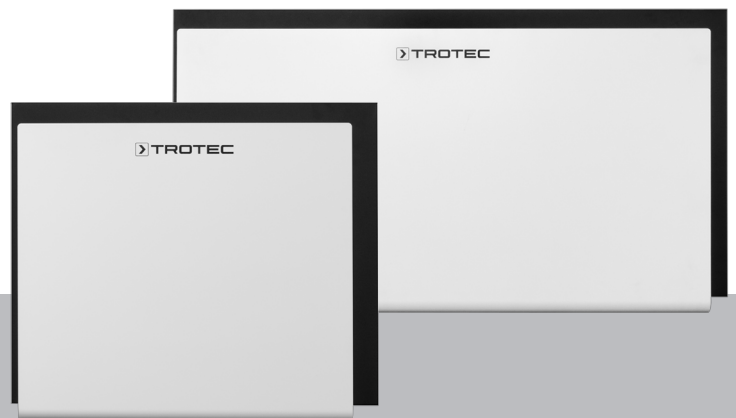


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Symbols



Warning of electrical voltage

This symbol indicates dangers to the life and health of persons due to electrical voltage.



Warning

This signal word indicates a hazard with an average risk level which, if not avoided, can result in serious injury or death.



Caution

This signal word indicates a hazard with a low risk level which, if not avoided, can result in minor or moderate injury.

Notice

This signal word indicates important information (e.g. material damage), but does not indicate hazards.



Info

Information marked with this symbol helps you to carry out your tasks quickly and safely.



Follow the manual

Information marked with this symbol indicates that the operating manual must be observed.

You can download the current version of the operating manual and the EU declaration of conformity via the following link:



DH 30 VPR+



<http://hub.trotec.com/?id=39535>

DH 60 VPR+



<http://hub.trotec.com/?id=39536>

Safety

Read this manual carefully before starting or using the device. Always store the manual in the immediate vicinity of the device or its site of use!



Warning

Read all safety warnings and all instructions.

Failure to follow the warnings and instructions may result in electric shock, fire and / or serious injury.

Save all warnings and instructions for future reference.

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.

Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

- Do not use the device in potentially explosive rooms.
- Do not use the device in aggressive atmosphere.
- Let the device dry out after a wet clean. Do not operate it when wet.
- Do not use the device with wet or damp hands.
- Do not expose the device to directly squirting water.
- Never insert any objects or limbs into the device.
- Do not sit on the device.
- This appliance is not a toy! Keep away from children and animals. Do not leave the device unattended during operation.
- Do not cover or transport the device during operation.
- Check accessories and connection parts for possible damage prior to every use of the device. Do not use any defective devices or device parts.
- Ensure that all electric cables outside of the device are protected from damage (e.g. caused by animals). Never use the device if electric cables or the power connection are damaged!
- The electrical connection must correspond to the specifications in chapter Technical data.
- Insert the mains plug into a properly secured mains socket.
- Observe the technical data when selecting extensions to the power cable. Completely unroll the extension cable. Avoid electrical overload.
- Before carrying out maintenance, care or repair work on the device, remove the mains plug from the mains socket. Hold onto the mains plug while doing so.

- Switch the device off and disconnect the power cable from the mains socket when the device is not in use.
- Do not under any circumstances use the device if you detect damages on the mains plug or power cable. If the supply cord is damaged, it must be replaced by the manufacturer, his service agent or similarly qualified persons in order to avoid a hazard. Defective power cables pose a serious health risk.
- Observe the storage and operating conditions (see chapter Technical data).
- Ensure that the air inlet and outlet are not obstructed.
- Ensure that the side of the device where the air inlet is found is kept free of dirt and loose objects.
- Only transport the device in an upright position with an emptied condensation tank or drain hose.
- Discharge the collected condensate before transport and storage. Do not drink it. Health hazard!

Intended use

Only use the device as a stationary dehumidifier for drying and dehumidifying room air as well as for odour elimination (ionization) whilst adhering to the technical data and safety instructions.

Intended use comprises:

- protecting valuables and movables in museums, galleries, libraries or garages against moisture,
- odour neutralization in garages, archives, wine cellars, cellar vaults, storage facilities or rooms that are neither inhabited nor used by persons,
- drying and dehumidifying:
 - production plants, underground rooms
 - store rooms, archives, laboratories
- keeping dry of:
 - instruments, devices, files
 - electrical control centres
 - moisture-sensitive goods, loads, etc.

Improper use

Do not place the device on wet or flooded ground.

Do not use the device outdoors.

Do not place any objects, e.g. wet clothing, on the device for drying.

Any unauthorised modifications, such as alterations or structural changes to the device, are forbidden.

Personnel qualifications

People who use this device must:

- be aware of the dangers that occur when working with electric devices in damp areas.
- have read and understood the operating manual, especially the Safety chapter.

Maintenance tasks which require the housing to be opened must only be carried out by specialist companies for cooling and air-conditioning or by Trotec.

Residual risks



Warning of electrical voltage

Work on the electrical components must only be carried out by an authorised specialist company!



Warning of electrical voltage

Before any work on the device, remove the mains plug from the mains socket!
Hold onto the mains plug while pulling the power cable out of the mains socket.



Warning

Dangers can occur at the device when it is used by untrained people in an unprofessional or improper way!
Observe the personnel qualifications!



Warning

A falling device can cause injuries! **Always transport and assemble the device with the help of other persons.** Never stand below the device when it is suspended. Ensure adequate stability of the device's wall fixing.



Warning

Risk of suffocation!
Do not leave the packaging lying around. Children may use it as a dangerous toy.



Warning

Ozone formation!

In case of improper use the device generates a minor concentration of ozone when operating at stage 5.
In general, ozone may cause or intensify fire, it may be fatal if inhaled and irritating to eyes, respiratory system and skin!
Endeavour to prevent the formation of ozone. Hence, never leave the device running at stage 5 in continuous operation!

Notice

Do not operate the device without an inserted air filter!
Without air filter the inside of the device will be heavily contaminated, this could reduce both the dehumidification performance and odour elimination and result in damage to the device.

Behaviour in the event of an emergency

1. In an emergency, disconnect the device from the mains feed-in:
Pull the mains plug.
2. Do not reconnect a defective device to the mains.

Information about the device

Value Protection Range technology (VPR+)

If properly dimensioned and operated, the dehumidifiers of the VPR+ series keep the humidity level steady around the clock and, if needed, neutralize a great number of offensive smells.

The humidity is automatically regulated to the set level that reliably prevents corrosion, condensation and mould formation.

A relative humidity between 45 and 50 % provides better protection than any other measure against corrosion and rust. Rust mainly occurs at inaccessible, hardly visible spots.

In addition to the dehumidification and odour elimination, the process air is further freed from dust and / or soot depending on the used filter model.

The integrated pump ensures the discharge of the accumulating condensate even over differences in height.

The fan comes with two stages to adjust the device performance to the contaminations and conditions in the room.

Description of the device

The dehumidifiers of the VPR+ series use the principle of condensation to automatically dehumidify rooms.

The fan sucks damp room air through the air inlet (3), the evaporator and the condenser located behind it. The air is cooled at the cold evaporator until it is below the dew point. Water vapour contained in the room air precipitates on the evaporator fins as either condensation or rime. The dehumidified, cooled air is rewarmed at the condenser and blown out at a temperature of approx. 5 °C above room temperature.

The drier air thus conditioned mixes with the air in the room via the air outlet (1). The humidity in the room where the device is positioned is reduced as air constantly circulates through the device. Depending on the air temperature and the relative humidity, the condensed water either drops into the condensation tray continuously or only during the defrost phases.

To set the desired humidity level, a hygostat with control dial (8) is provided in the device's interior. This control dial can be easily accessed once the filter flap (3) has been removed.

The device can reduce the relative humidity of a room to approx. 30 %.

At a room temperature of 15 °C, the devices emit 1.6 to 3 times of their power consumption to the room air in form of heat (see chapter Technical data, COP). Because of the heat dissipation, which develops during operation, the room temperature can therefore rise by approx. 1 to 3 °C.

A high humidity level in the air (starting at 70 % RH) provides the perfect breeding ground for mould. However, the room air must not be too dry either (< 40 % RH). Materials such as leather or rubber become porous, and wood becomes brittle and fissured.

For the storage of vehicles we recommend a relative humidity between 45 and 50 %. For other material-specific humidity values please refer to the respective manufacturer's instructions for the stored goods.

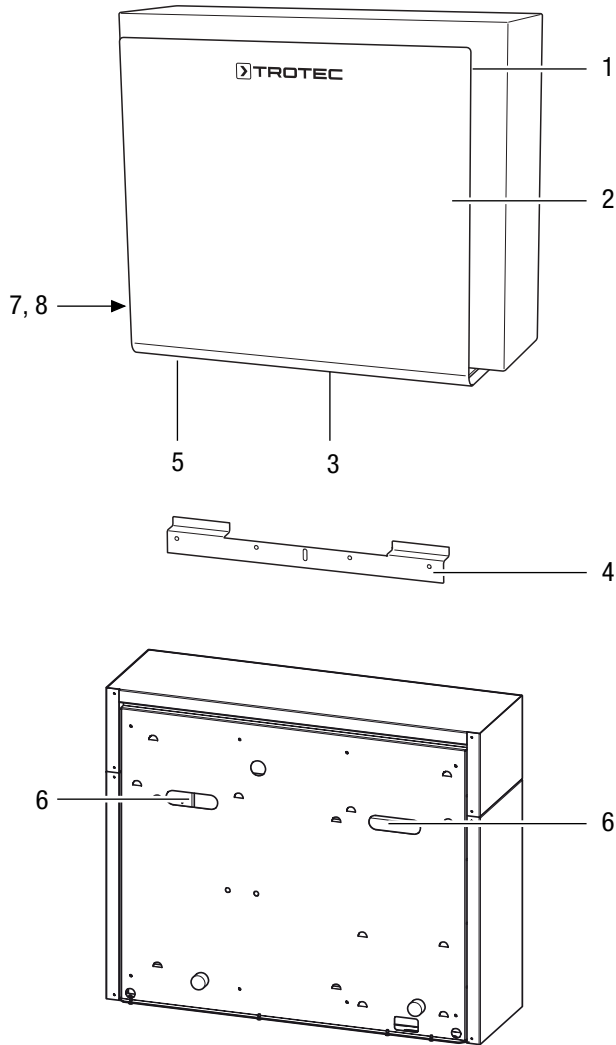
Additionally, the device comes equipped with an ionizer which eliminates odours and bacteria from the room air, if required.

Depending on the model an integrated filter absorbs dust and / or soot in the room air.

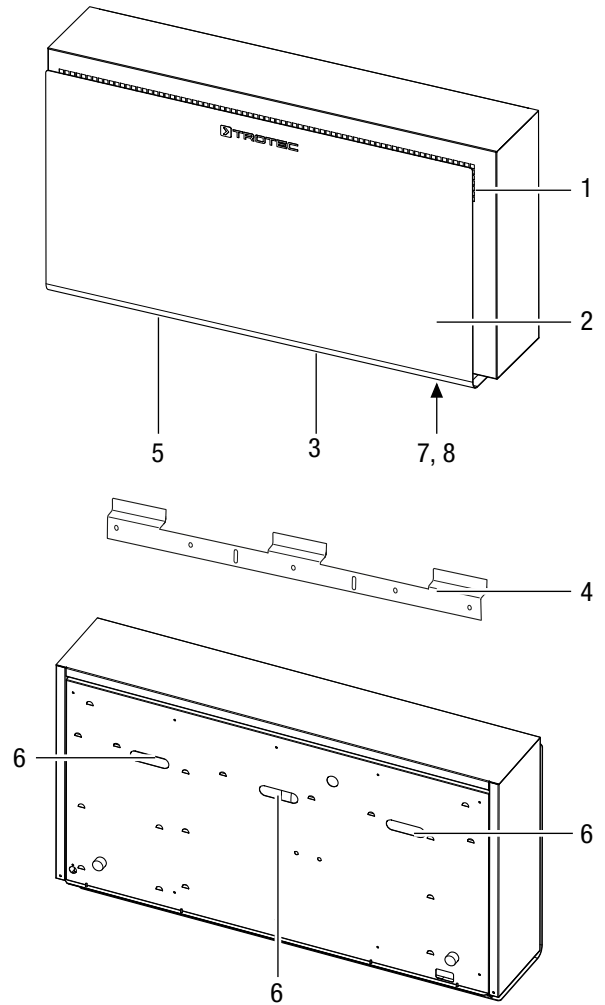
The incorporated pump helps to discharge condensate; in doing so, it is possible to overcome a difference in altitude of up to 10 m. That way, it is possible to discharge condensate across several storeys.

Device depiction

DH 30 VPR+



DH 60 VPR+



No.	Designation
1	Air outlet (behind faceplate)
2	Housing
3	Air inlet with filter flap
4	Wall holder
5	Hose connector for condensation drain hose
6	Suspension
7	Ionizer control panel (tamper-proof installation inside the device)
8	Control dial hygrostat (tamper-proof installation inside the device)

Scope of delivery

- Dehumidifier
- Wall holder
- Air filter (combination filter)
- Air filter (standard)
- Condensation drain hose, \varnothing 5 mm (inside), l = 10 m
- Power cable with CEE 7/7 Schuko plug
- Operating manual

Available accessories

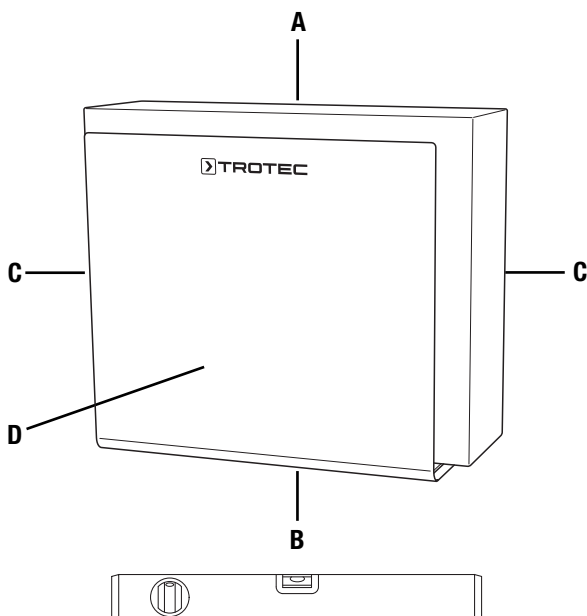
- Combination filter DH 30 VPR+ (5 pieces): art. no. 7.710.000.926
- Standard air filter DH 30 VPR+: art. no. 7.710.000.925
- Combination filter DH 60 VPR+ (5 pieces): art. no. 7.710.000.929
- Standard air filter DH 60 VPR+: art. no. 7.710.000.930

Transport, assembly and preparation for start-up

Always utilize the help of another person to transport and assemble the DH 30 VPR+. Always utilize the help of two other persons to transport and assemble the DH 60 VPR+. Do not try to assemble the device without the help of another person. To lift the device, use a forklift or an elevating truck as appropriate.

Observe the following instructions:

- When assembling the device, keep a sufficient distance to heat sources.
- When assembling the device, especially in wet areas, secure the device locally with an RCD (Residual Current protective Device) which complies with the relevant regulations.
- Make sure that extension cables are completely unrolled.
- Insert the mains plug into a properly secured mains socket.
- When assembling the device, observe the minimum distance from adjacent walls or other objects as described in the Technical Data chapter.



Assembly

Assemble the device as follows:

Select screw and dowel sizes suitable for the weight of the device (see technical data) and the structure of the wall.

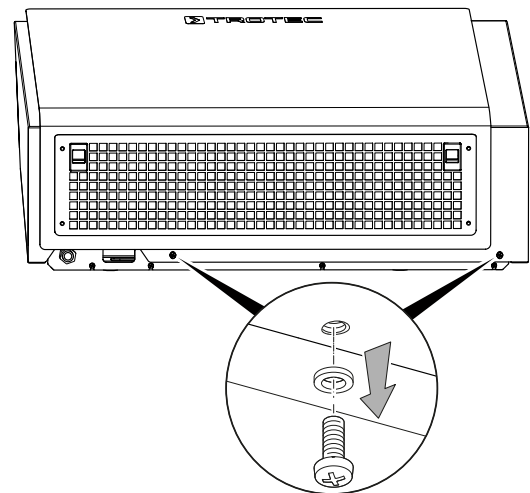


Warning

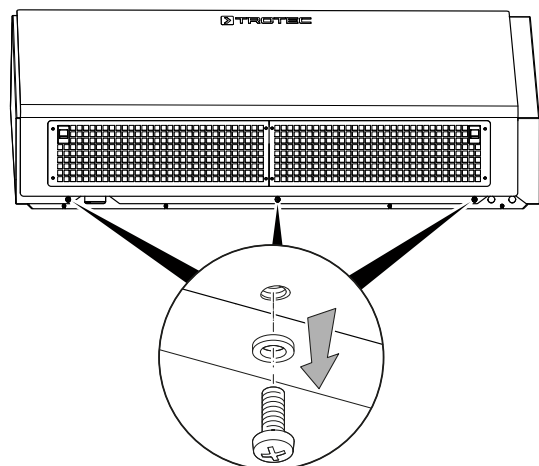
A falling device can cause injuries! **Always transport and assemble the device with the help of other persons.** Never stand below the device when it is suspended. Ensure adequate stability of the device's wall fixing.

1. The table or floor on which you should now unpack the device must be clean.
2. Open the screw connection at the housing.

DH 30 VPR+



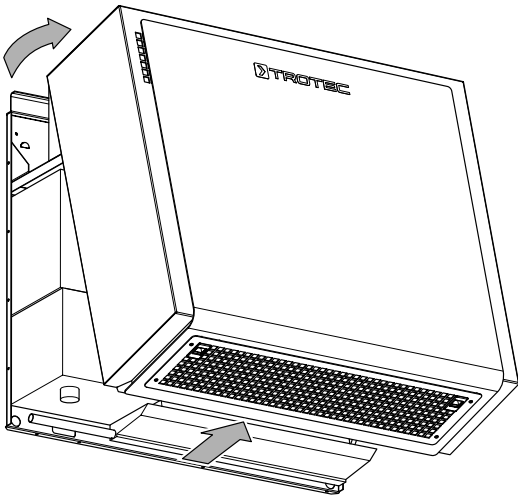
DH 60 VPR+



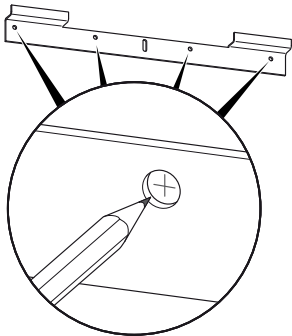
Info

The principle of hanging up the DH 60 VPR+ is the same as for the DH 30 VPR+. But the DH 60 VPR+ comes with a longer suspension rail. The following steps will be illustrated by using the DH 30 VPR+ as example.

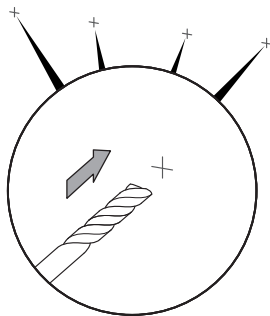
3. Remove the housing.



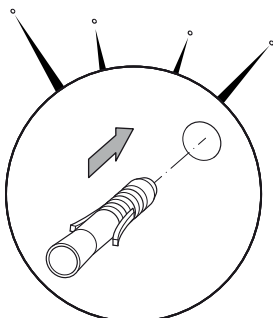
4. Mark the position for the bore holes.



5. Drill the holes into the wall.

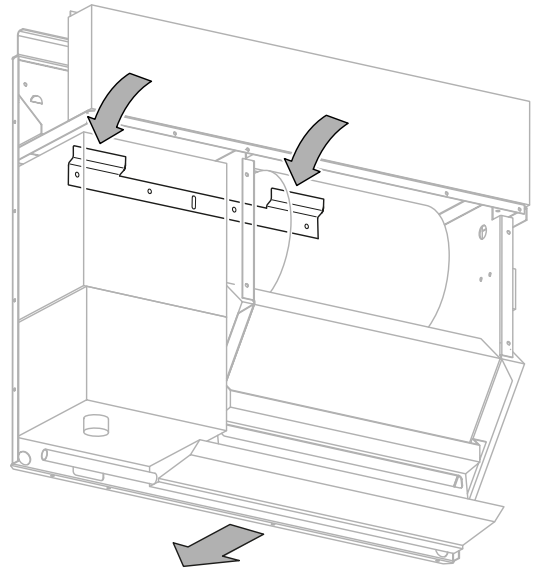


6. Insert suitable dowels into the bore holes.

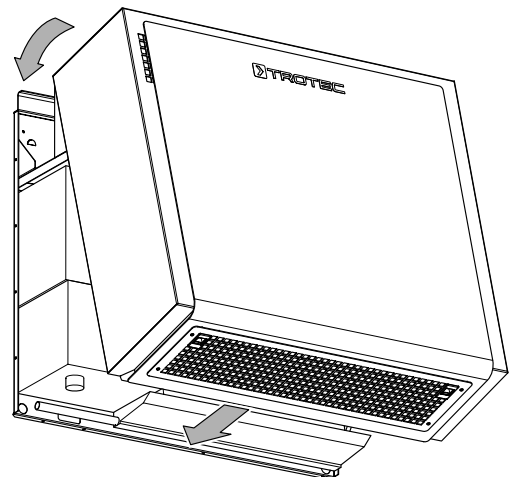


7. Fasten the wall holder in place.

8. Suspend the device from the wall holder by means of the mounting brackets. Utilize the help of one or two other persons as well as suitable lifting gear to do so.



9. Put the housing back on the device.



10. Fasten the housing to the device.

Storage

Drain any possibly remaining condensate.

When the device is not being used, observe the following storage conditions:

- in an upright and stable position.
- dry and protected from frost and heat.
- protected from dust and direct sunlight.
- with a cover to protect it from invasive dust, if necessary.

Important information regarding the dehumidification performance and drying rate

The dehumidification performance depends on:

- the layout of the room
- the individual usage behaviour
- the room temperature
- the relative humidity

The higher the room temperature and relative humidity, the greater the dehumidification performance or drying speed at which a wet vehicle dries.

For use in living rooms, a relative humidity of approx. 50 % is sufficient. In store rooms and archives, the humidity should generally not exceed a level of approx. 50 %.

Dehumidification of garages



For the storage of vehicles we recommend a relative humidity between 45 and 50 %. For other material-specific humidity values please refer to the respective manufacturer's instructions for the stored goods.

How the room temperature influences the dehumidification performance?

In the winter at decreasing mean temperatures of below 15 °C the dehumidifier's capacity and thus the room volumes to be covered are disproportionately reduced.

This circumstance results from the physical correlations between the room air's moisture absorption capacity at low temperatures and the performance curve of condenser dryers that may appear complex to the layman. In order to render these complex correlations comprehensible for the typical user we endeavour to briefly describe the recommended course of action on the subject of capacity and performance limits of the DH-VPR+ devices at low temperatures:

Correlation between the temperature in the garage and duration of the drying process

Mean temperature in a garage during the winter	Approximate drying duration of wet vehicles* using a DH-VPR+ climate manager	The drying period can be reduced through additional ventilation**
starting at 19 °C	less than 1 day	 drying accelerated by approx. 50 – 70 %
16 – 19 °C	approx. 1 day	
12 – 15 °C	1 – 2 days	
8 – 11 °C	3 – 5 days	 drying accelerated by approx. 30 – 50 %
4 – 7 °C	more than 5 days	
	* The time for drying moisture accumulated in the car body, at the underbody and inside the engine compartment as well as in ribbings and hollows could even be significantly extended if there is no air circulation!	** Additional ventilation has a favourable impact on the drying duration for residual moisture accumulated in the car body, at the underbody and inside the engine compartment as well as in ribbings and hollows.

Rule of thumb:

The higher the room temperature, the sooner will the dehumidifier DH-VPR+ have "dried" the room air and therefore all the vehicles in the garage. In contrast, the lower the room temperatures, the longer will it take to completely dry wet vehicles. To be sure, even at low temperatures the DH-VPR+ can quickly dry the air in the garage to the desired level, the car and floor however remain moist.

On principle, it takes a disagreeably long time to dry wet vehicles at temperatures below 15 °C (up to several days), this is particularly problematic considering the instant corrosion. It is not due to the dehumidifier DH-VPR+ that the vehicle will not dry, but rather the physical circumstances of humidity combined with the evaporation behaviour (drying rate) of water.

A consequence of low temperatures is that on surfaces water evaporates very slowly even at an ideal room climate of 50 % RH. In simplified terms, this is due to the fact that at low temperatures – insofar as relative humidity (% RH) is concerned – the gradient of vapour pressure between the dry room air and the water surface is very large, in terms of the absolute humidity (g/m³), however, it is very small.

As a result, the water at wet vehicles situated in cold garages evaporates very slowly even though the DH-VPR+ devices are running at full capacity.



Here a worst-case scenario:

A modern car wet with rain is parked in a garage along with a classic vehicle. The room temperature is 4 °C. Attributable to evaporation of water at the still warm, wet vehicle, the relative humidity in the garage quickly rises to 95 %.

95 % of relative humidity at 4 °C mean that in absolute terms only about **6 g of water** are bound in a cubic metre of air, for that is the physical limit that can be absorbed.

For comparison:

At a room temperature of 21 °C and 95 % RH, **17 g of water** are retained by a cubic metre of air. In other words, for every 100 m³ of room air in the garage the air contains over 1 litre more of pure water (than at 4 °C) in the form of water vapour. This quickly adds up to several litres of water in the garage! And it results in the DH-VPR+ withdrawing next to none of the water from the room air at these low temperatures, because it is unable to extract any. Hardly any water is bound in the room air, rendering dehumidification a physical impossibility.

The higher the room temperature, the more moisture can be absorbed by the room air				
Temperature in the garage:	4 °C		21 °C	
Relative humidity:	50 %	95 %	50 %	95 %
Moisture retained by the room air: (absolute humidity)	3 g/m ³	6 g/m ³	9 g/m ³	17 g/m ³
	Vapour pressure difference: 3 g/m ³		Vapour pressure difference: 8 g/m ³	
				
Consequence for drying wet vehicles:	⊖ Low drying speed (minor vapour pressure difference)		⊕ High drying speed (great vapour pressure difference)	

With 95 % the relative humidity given in our example is rather high. The vehicle's corrosion and the mould formation at the walls started immediately. It does not take a great amount of absolute humidity in the air to get the processes of corrosion and mould growth going. It is enough if water is bound as vapour, even though expressed in absolute terms (g/m³) the values are not very impressive.

And there is another aspect:

Due to the minor absolute vapour pressure differences, the drops of water on the wet car do not evaporate. It stays wet despite the DH-VPR+ operation. And the situation is the same: Low temperatures --> minor differences in the air's moisture content with regard to the absolute humidity level (g/m³) in spite of large differences regarding the relative humidity.

Even at low temperatures, the DH-VPR+ keeps the room climate at the desired level. If new water enters the scene at these low room temperatures by way of a wet vehicle and the temperature remains low, the wet vehicle will dry very slowly, hence causing the humidity inside and at the car to rise to a corrosion-prone level. Dry keeping is not a problem. Quick drying, however, is a physical impossibility.

Conclusion:

Using DH-VPR+ devices classic cars can be stored and showcased during the winter to a temperature of 0 °C. Yet the capacity is disproportionately reduced (see table **Correlation between the temperature in the garage and duration of the drying process**).

However, if both the storage and a quick drying of wet vehicles are required – also during the winter – you will additionally have to ensure heating in order to increase the drying rate for wet vehicles so as to effectively prevent corrosion and mould growth.

So, if the classic car garage is used all through the year and / or there are often wet cars inside, we recommend room temperatures of at least 15 °C. If water only sporadically enters the garage, there is no need for permanent heating. It will be sufficient to heat the garage to a level between 15 °C and 20 °C during the drying phase lasting several days. On these grounds, we recommend a general on-demand heating option to achieve a reasonable temperature for drying the garage quickly. Depending on the temperature, a heating phase of 3 to 7 days should normally suffice to ensure a fail-safe drying process.

This period can be considerably reduced by the use of fans. Especially for a quick drying in the car body, at the underbody as well as in ribbings and hollows we always recommend the use of fans for wet classic cars (see table **Correlation between the temperature in the garage and duration of the drying process**).

The more frequently and extensively the cars are used, the higher should be the average temperature in the garage so as to attain a quick and fail-safe drying process and thus to prevent corrosion and mould.

Operation

- Once the device has been switched on, the drying function works fully automatically.
- The ionization function may be started manually as needed, see chapter Ionization.
- To make sure that the built-in sensor can determine the humidity correctly and that the room air is permanently filtered, the fan continues to operate until the device is switched off.
- Avoid open doors and windows.



Info

The possible dehumidification performance of the DH-VPR+ climate managers is directly tied to the room temperature.

The higher the room temperature, the more moisture can be withdrawn from the room air.

The lower the room temperature, the less moisture can be withdrawn from the room air.

For more information please read the chapter

Important information regarding the dehumidification performance and drying rate. The physical correlations are illustrated elaborately by way of example scenarios and the recommended course of action.

Operating elements

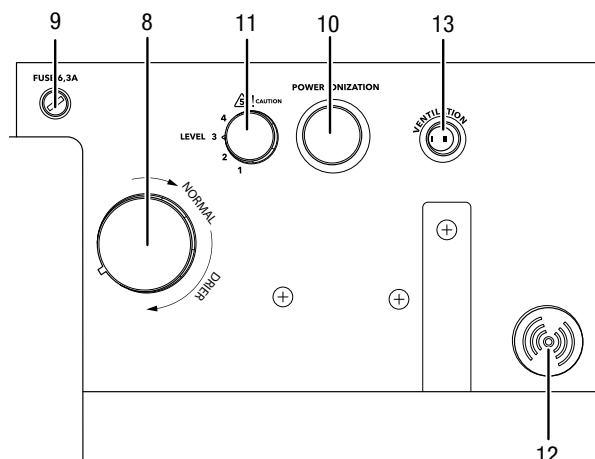


Info

You can access the operating elements by opening the filter flap at the device, see chapter Maintenance.

The control panel of the DH 30 VPR+ is located on the left-hand side, in case of the DH 60 VPR+ it can be found on the right.

The depiction of the operating elements features the device DH 60 VPR+ by way of example. In case of the DH 30 VPR+, the individual operating elements can be located elsewhere but with identical labelling.

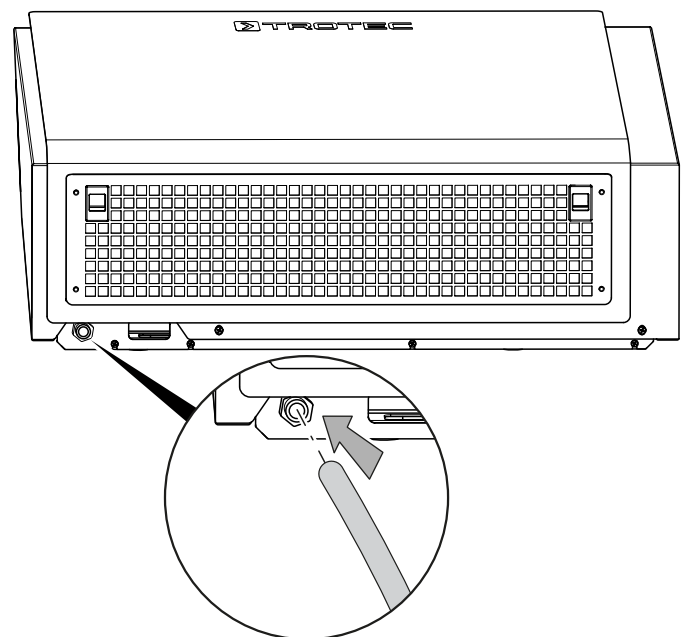


No.	Designation
8	Control dial hygostat
9	Fusing 6.3 A / T (time delay)
10	Power Ionization button
11	Ionizer control dial
12	Warning light
13	Fan stage switch

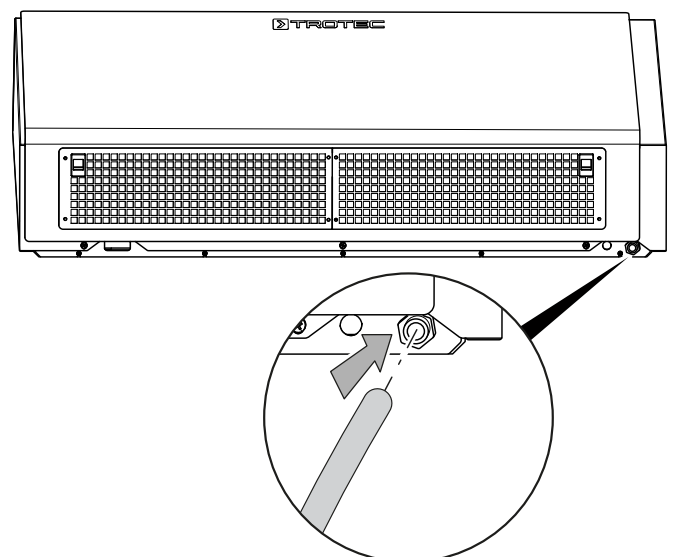
Installing the condensation drain hose

1. Connect one end of the condensation drain hose to the bulkhead coupling.

DH 30 VPR+



DH 60 VPR+



2. Place the other end of the condensation drain hose in a sufficiently dimensioned container (at least 50 litres for the DH 30 VPR+, 90 for the DH 60 VPR+) or lead the hose end to a drain.
3. Avoid kinking.

Notes regarding the condensation drain hose:

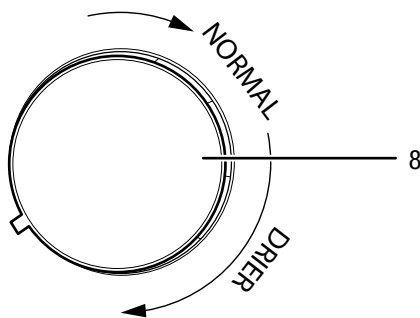
- The maximum pump height amounts to 10 m for the DH 30 VPR+ and to 15 m for the DH 60 VPR+.
- The condensation drain hose should be no longer than 25 m.
- The end of the condensation drain hose must always be free and may not protrude into the water.
- While laying the condensation drain hose, make sure that – even at low temperatures – the water inside the hose cannot freeze.

Switching the device on

1. Ensure that the condensation drain hose has been laid and connected properly. Do not create tripping hazards.
2. Ensure that the condensation drain hose is not bent or jammed and that there are no objects on the condensation drain hose.
3. Ensure that the condensation can run off properly.
4. Insert the mains plug into a properly secured mains socket.

Regulating the room humidity level

1. Set the desired humidity level via the control dial (8) of the hygostat.
2. Turn the control dial to the middle of the word *NORMAL*. After 2 days a humidity level between 50 and 55 % should be reached.
3. Then check the humidity level by means of a thermohygrometer. If the air is too dry (insufficient humidity level), turn the hygostat control approx. 1 cm to the left, if the air is too humid (excessive humidity), turn it approx. 1 cm to the right (towards the word *DRIER*).
4. Every time you have changed the hygostat setting wait for 2 days, then repeat the procedure until the desired humidity level is reached.



- ⇒ Upon reaching the desired humidity value, the compressor switches off automatically.
- ⇒ The fan keeps running to ensure a permanent air circulation for filtering the air, neutralizing possible odours and monitoring the humidity level.
- ⇒ If the set humidity level is exceeded, the compressor will automatically be activated to dehumidify the room air once again.

Automatic defrost

If the room temperature is lower than 15 °C, the heat exchanger will freeze during dehumidification. The device will then carry out an automatic defrost. The duration of the defrost process can vary depending on the room temperature. The lower the temperatures, the longer the defrost period.

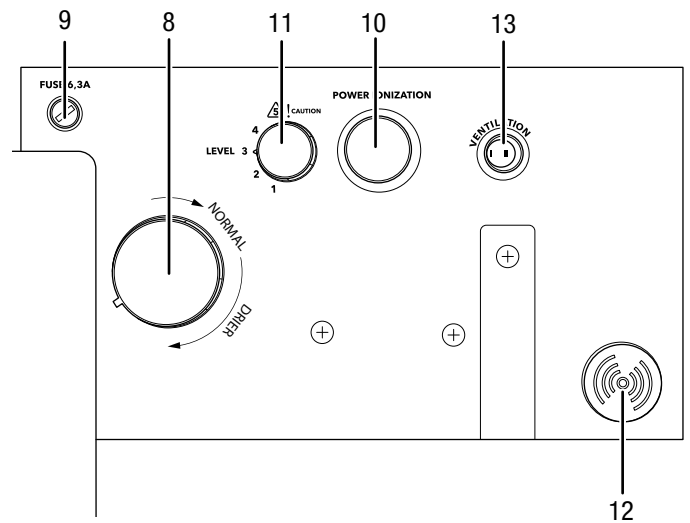
Ionization

Ex factory, the dehumidifier DH-VPR+ comes equipped with a special, high-quality NTP air purification unit. In its plasma zone, airborne odours, pollutants and microorganisms, as are found primarily in the recommended fields of application for the VPR+ series, can be neutralized efficiently through oxidative conversion.

When contaminated air flows through the ionizer unit, it is neutralized by means of electrical excitation to form singlet oxygen with broken down hydrogen and oxygen molecules, which are harmless for humans and nature.

The ionizers employed in the VPR+ series are able to continuously neutralize most types of these application-specific odorous substances in the room air. As a consequence the odour nuisance is reduced slowly, but steadily.

Ionization control



The ionization function can be switched on via button 10. When the ionization function is activated, the button (10) is illuminated.

The device comes with a controller for 5 intensity levels (11). With the settings 1 to 4 the production of singlet oxygen can be adjusted from the minimum to the maximum value for the standard permanent treatment.

Beyond that, an additional 5th level is available for short-time intensive treatments.

When using this fifth setting, a small amount of ozone is generated inside the device, however, if used as intended, this concentration is neither a health hazard nor is it damaging to the material.

Recommended procedure for standard treatment (settings 1 - 4)

The perception of odours is subjective. Besides, fluctuating climate parameters such as the humidity level and room temperature influence not only the diffusion of odour particles in the room, but also the reaction potential for the oxidative conversion of airborne odours and pollutants.

For this reason it is not possible to specify a linear reference value e.g. depending on the room size. Instead we recommend an individual, active levelling geared to the local circumstances and your personal requirements:

1. Before the first application, air the room out thoroughly.
2. To begin with, set the ionizer to level 3 and the fan to stage 1 and let the device run with these settings for up to 7 days.
3. During or at least at the end of the treatment there should be either a perceivable reduction of the odour intensity and / or a slight ozone odour.
If so, you can now turn the ionizer down by 1 level and, if required, repeat this step according to your odour perception until you have reached level 1.
4. If after a period of 7 days you cannot observe a reduction of the odour intensity or an ozone smell, increase the operating level one by one up to max. level 4 and treat the room again for up to 7 days. Before using level 5 (intensive treatment), first read the *Procedure for intensive treatment*.

Note:

- Any time you reduce or increase the setting by one level, wait for at least 7 days before making another change.

After every interval and before any level adjustment air the room out exhaustively!

For the standard treatment the fan should be set to stage 1.

Procedure for intensive treatment

In case of considerable odour nuisance – e.g. from *long-lasting sources* such as drains, fuel odours or the smell of mould or intensive *one-time sources* like tobacco, animal smells or musty odours in the car etc. – and if the previously performed standard treatment was not successful, it is appropriate to carry out a short-time intensive treatment at level 5 to effectively eliminate the cause.

1. Make sure that all surfaces in the room to be treated are freely accessible for the circulatory air of the DH-VPR+ (open windows, boot and bonnet of vehicles, open wardrobe doors, shut the curtains to provide the best possible effective surface). If possible, remove car mats and carpets in the passenger compartment and boot and spread them out on the floor of the garage. The better the air circulation at the surfaces to be treated, the better the chances for a successful odour elimination. To achieve optimum results, the room temperature during the intensive treatment should be in a range of 20 to 25 °C. This generally serves to ensure a diffusion of the odorous substances. During the intensive treatment the room temperature must not exceed 28 °C!
2. Set the ionizer to level 5 and the fan to stage 2 and let the device run with these settings for 24 hours.
3. After this treatment period set the intensity switch from 5 back to a lower level and see to a thorough 15-minute ventilation (rush airing) of the room. The ozone smell is usually evaporated after 2 to 3 intermittent ventilation processes.
4. If after the 24-hour treatment the reduction in odour intensity is not satisfactory, repeat step 2 up to five times as the circumstances require.
5. After a successful odour reduction repeat step 3 and continue with the standard treatment (levels 1 - 4).
6. Also set the fan to at least stage 1.

Small amounts of ozone are generated within the device during the intensive treatment. In the room air the ionizer does not produce ozone concentrations exceeding the generally applicable limit values. For reasons of safety and due to individual sensitivities however, there must be no person or animal present in the room to be treated. Entering the room as well as brief visits to switch the device on and off are as harmless as the short-term exposure to the ozone smell that is sometimes subjectively perceived as intense.

Note:

- If an ozone odour becomes noticeable in the room (not just at the outlet opening) during the standard treatment, gradually turn the intensity down until the smell is no longer perceivable (Remember to air the room every time you lower the intensity level).

Ozone smell

If used as intended and for appropriate room sizes in inhabited rooms such as basements, garages, halls or libraries our ionizer does not produce harmful concentrations exceeding the max. allowable concentration at the workplace (MAC limit value) even if set to the highest level (5).

And yet, even this low concentrated ozone odour is often perceived as very disagreeable. The factor between the odour threshold perception of $40 \mu\text{g}/\text{m}^3$ and the valid exposure limit values at the workplace based on the MAC value (maximum allowable concentration) of $0.2 \text{ mg (200 } \mu\text{g)}/\text{m}^3$ of room air amounts to 5.

With ozone concentrations of as little as $40 \mu\text{g}/\text{m}^3$ or slightly above many a person perceives this ozone smell as offensive and very disagreeable. Up to the MAC limit value variations in the ozone concentration can hardly be discerned by way of smell, which means that even with completely uncritical concentrations the reek of ozone is distinctive.

However it also indicates that at the same time strong odorophores are being effectively neutralized, e.g. tobacco, animal or mould odours diffusing from leather, textiles, carpets, wood or other porous materials.

Room temperatures and odours

Also important for a successful application beside the correct dosing is the temperature at which the treatment takes place. Heat increases the rate at which odorous substances diffuse from materials. Once the odour is in the air, it is bound by oxygen.

If during the wintertime the room temperature is too low (below $12 \text{ }^\circ\text{C}$), the odour might come back all of a sudden in the summer. Additional heating in the cold season helps to improve the release of not yet diffused odour particles. Hence, the correct temperature for an effective treatment is to be attained by trial and error.

It is easily conceivable, that you only need to use the ionizer after the winter season, when the fuel evaporation of vehicles with carburettor increases, odours from textile coverings begin to diffuse or else only after extreme precipitation periods, when the basement begins to smell musty owing to the increasing moisture penetration in the brickwork.

Individual odour perception

The odour perception and rating differs from one individual to another.

Because of this individual perception, a general across-the-board recommendation for dosage and usage is not feasible, therefore every user can only achieve his *odour balance* by actively and patiently levelling out the intensity levels.

Whether it concerns the smell of mould in a vault cellar, fuel odours in the garage or the musty smell in a historical library – every person feels differently about it. Mostly, it is not the smell per se that is regarded as bothersome, but the intensity.

Subtle smells, generally associated with the respective collector's item, are often desirable and even perceived as quaint – an automobile enthusiast for instance might just love a *whiff of gas* in the garage whereas his wife will probably take to her heels once a certain intensity is reached. For an oenophile an old wine cellar may well smell a little *musty and old*, but never foul. There are many other examples we could add to the list.

To ensure an adequate efficiency of the device as well as your individual satisfaction, active tuning of the intensity level over several weeks bringing it closer to your *personal odour balance* cannot be avoided.

An odour neutraliser is no odour improver

Nevertheless, you should always bear in mind that this device is an odour neutraliser, not an odour improver as may be commonly used for the active scent marketing in department stores. Pure neutralization through the electrical oxidation or chemical bonding of odours does not imply a subsequent fragrance or *pleasant smell* in the air.

From experience: in some cases it is also possible that after the successful *neutralization of primary odours* other smells, which have previously gone unnoticed, become apparent and are then in turn individually perceived as objectionable.

Odour is and will remain an extremely distinct issue greatly influenced by the personal sense of smell and the perceptual sensitivity.

With a device of the VPR+ series you have chosen a professional tool to improve the storage conditions for your valuables.

We are not in a position to improve the existing state of materials and objects, but, if applied correctly, our products can contribute to their permanent preservation by protecting your valuables from corrosion, dust, mould and bacterial decomposition.

Ozone treatment for similar applications

A (highly concentrated) ozone treatment is carried out for example in the professional car valeting. Especially in case of pre-owned cars, unpleasant odours inside the passenger compartment (e.g. former smoker's vehicle) can be eliminated in this manner.

The oxidising effect of ozone turns odorous substances into odourless substances. Germs and odour-causing bacteria are killed in this process – even at otherwise inaccessible locations such as under seats or in ventilation openings. As a result of this treatment the vehicle is disinfected and usually odour-free.

The ozone treatment is also a worldwide standard method for odour neutralization and disinfection in the hotel industry, used in smoking rooms or for other substantial odour nuisances. In the sector of fire, water and sewage damage restoration ozonization has been the most commonly used standard method for many years.

Employed for these applications are however pure ozone generators with concentrations of 5 g/m³ and more, which cannot be compared with the NTP generator built into the VPR+ series.

Should you have similar requirements or be unable to get the odour sources under control despite the application of the VPR+ ionizer, please contact our specialist consultants. We'd be happy to advise you and we offer ozone generators of every performance class for the professional odour neutralization. If necessary, we will refer you to proven experts in your region.

Neutralization of fuels

Generally, the fuel odour in garages can be neutralized sufficiently. Within 2 weeks the objective of a sufficient neutralization rate is usually achieved.

With extreme evaporation rates however (many sources of evaporation, sports carburettor, leaky tank lines or gaskets and high room temperatures) in some cases the neutralization performance of the (or an) ionizer is not sufficient to produce the desired success. An ozone concentration well beyond the max. allowable concentration at the workplace (MAC limit value) would have to be emitted in the room.

Leaving aside the fact that fuel vapours of this concentration are hazardous to health, low-dose ionizers can solve this special problem only in part.

In order to successfully eliminate such extreme fuel odours, mechanical and chemical bonding of the vapours has to be effected in addition to the electrical neutralization.

For this purpose we offer mechanical air cleaners that have activated carbon filters specifically designed for extreme fuel odours. Combined with the ionizer we achieve a satisfactory solution in 99 % of cases with extreme fuel odours. Often another separate ionizer can also be helpful in such cases. Please contact our consultants as needed.

Air filter

As standard, devices of the VPR+ series are delivered with 2 air filters:

- 1 x air filter dust (standard)
- 1 x air filter dust/soot (combination filter)

The technical data given for the *air volume freely blowing* refers to the air volume at the device outlet without filter. Every air filter applied reduces the amount of circulated air depending on the type of filter and its filtration efficiency.

All filters are adapted for the devices of the VPR+ series and work together perfectly.

Owing to the more efficient 2-stage filter ladder, the dust/soot combination filter reduces the amount of exhaust air to a greater extent than the standard air filter. The circulating air performance depends on the contamination level of the combination filter: with a new air filter it is reduced by 15 %, if the filter is heavily contaminated with soot the circulating air performance will be reduced by up to 99 %. Soot contains oily products from incomplete combustion and clogs the filter surface excessively – especially when combined with the dust from the room air. On these grounds and in case of a high dust and soot pollution it is especially important to regularly check the air filter for dirt and to replace it if necessary.

The two stages of the fan permit an individual adjustment of the circulating air performance to the respective room size and odour nuisance. The selected filtration method must be observed, since the attainable air flow rate varies depending on the used filter type (standard or combination filter). The table below contains the model-specific air flow rates for the fan stages 1 and 2 including all filter combinations:

DH 30 VPR+:

Fan stage	Freely blowing	Standard filter	Combination filter
Stage 1	502 m ³ /h	455 m ³ /h	420 m ³ /h
Stage 2	745 m ³ /h	685 m ³ /h	635 m ³ /h

DH 60 VPR+:

Fan stage	Freely blowing	Standard filter	Combination filter
Stage 1	745 m ³ /h	675 m ³ /h	590 m ³ /h
Stage 2	1,065 m ³ /h	985 m ³ /h	900 m ³ /h

In garages with modern vehicles, where corrosion is of minor importance, in museums, libraries or wine cellars, thus all rooms in which the emission of soot can normally be ruled out and where the prevention of mould and bacteria is paramount, it is advisable to use the standard air filter. The standard air filter has less impact on the reduction of circulated air volume than the combination filter. Consequently a higher air circulation is achieved when using the standard air filter. Albeit, for the filter change the same rules apply as for the combination filter.

A dirty air filter significantly reduces the dehumidification performance, the equipment's lifetime and the efficiency of odour neutralization.

Shutdown



Warning of electrical voltage

Do not touch the mains plug with wet or damp hands.

1. Hold onto the mains plug while pulling the power cable out of the mains socket.
2. If necessary, remove the condensation drain hose and any residual fluid from it.
3. Clean the device according to the Maintenance chapter.
4. Store the device according to the Storage chapter.

Errors and faults

The device has been checked for proper functioning several times during production. If malfunctions occur nonetheless, check the device according to the following list.

The device does not start:

- Check the power connection (230 V/1 ~/50 Hz).
- Check the power cable for damages.
- Check the on-site fusing.
- Have the electrics checked by a specialist company for cooling and air-conditioning or by Trotec.

The device is running, but there is no formation of condensate:

- Check whether the condensation drain hose is positioned correctly.
- Check the room temperature. Observe the device's permissible operating range according to the technical data (see chapter **Important information regarding the dehumidification performance and drying rate**).
- Ensure that the relative humidity complies with the technical data (see chapter **Important information regarding the dehumidification performance and drying rate**).
- Check the preselected humidity level at the hygrosat's control dial (8). The humidity in the room must be above the selected range. Reduce the desired humidity level by turning the control dial (8) to the right (towards the word *DRIER*).
- Check the condensate pump for proper functioning or unusual vibrations and sounds. Remove external dirt (see chapter Maintenance).
- Check the air filter for dirt. If necessary, clean or replace the air filter (see chapter Maintenance).

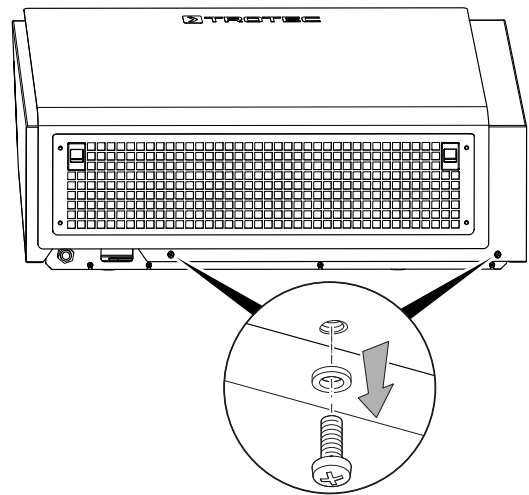
The device is loud or vibrates:

- Check whether the device is mounted horizontally.
- Check whether the air filter has been inserted correctly.

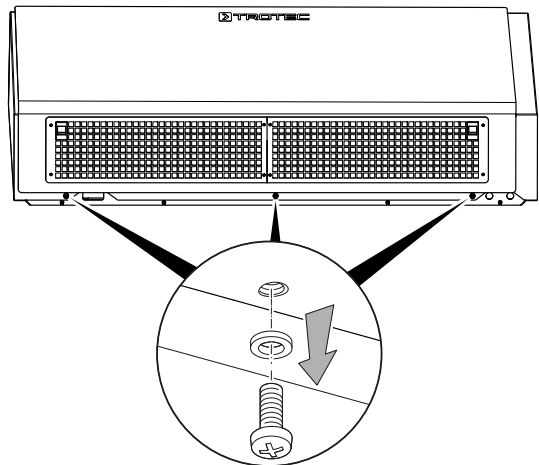
An alarm signal is emitted:

- The pump attempts to pump off a larger quantity of water. The device will be switched off completely. As soon as the water is gone, the device will restart and the alarm dies.
- If the emitted alarm signal is a continuous tone, the condensate pump inside the device needs to be checked. To do so, please proceed as follows:
 1. Hold onto the mains plug while pulling the power cable out of the mains socket.
 2. Open the screw connection at the housing.

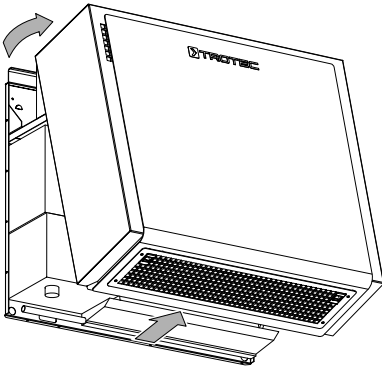
DH 30 VPR+



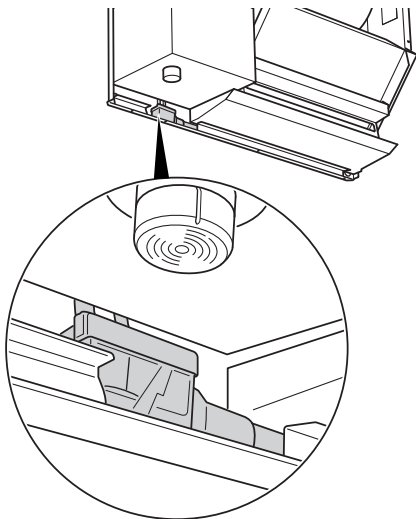
DH 60 VPR+



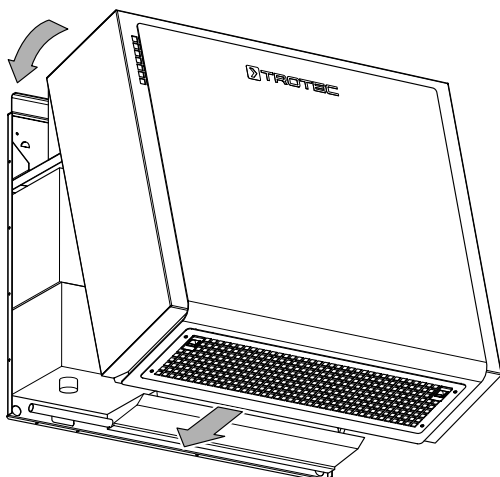
3. Remove the housing.



4. Check whether the float in the container floats. If required, fill a little water into the condensation tray. If the float is stuck and does not float, it could help to lightly tap the side of the container.
5. Check whether water has accumulated in the condensate collection container or the condensation tray.



6. If so, clean the drain hoses.
7. Put the housing back on the device.



8. Fasten the housing to the device.
9. Plug the power cable back into the mains socket.

If the alarm signal continues despite these measures, please contact Trotec.

The device gets very warm, is loud or loses power:

- Check the air filter for dirt. Remove external dirt.
- Check the inside of the device for dirt. If necessary, clean the interior of the device using compressed air.

Your device still does not operate correctly after these checks?

Have the device repaired by authorised expert staff or by Trotec.

Maintenance

Maintenance intervals

Maintenance and care interval	before every start-up	as needed	at least every 2 weeks	at least every 4 weeks	at least every 6 months	at least annually
Check air inlets and outlets for dirt and foreign objects and clean if necessary	X			X		
Clean the exterior		X				X
Visually check the inside of the device for dirt		X				X
Check for damage	X					X
Check the attachment screws		X				X
Test run						X
Replace air filter					X	
Replace air filter (in case of a high dust and/or soot pollution)		every 2 months at the latest				
Empty the condensate pump, condensation tray and/or condenser dryer		X				

Maintenance and care log

Device type:

Device number:

Maintenance and care interval	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Check air inlets and outlets for dirt and foreign objects and clean if necessary																
Clean the exterior																
Visually check the inside of the device for dirt																
Check for damage																
Check the attachment screws																
Check the condensate pump and tank, and clean if necessary																
Test run																
Comments																

1. Date: Signature:	2. Date: Signature:	3. Date: Signature:	4. Date: Signature:
5. Date: Signature:	6. Date: Signature:	7. Date: Signature:	8. Date: Signature:
9. Date: Signature:	10. Date: Signature:	11. Date: Signature:	12. Date: Signature:
13. Date: Signature:	14. Date: Signature:	15. Date: Signature:	16. Date: Signature:

Activities required before starting maintenance

- Do not touch the mains plug with wet or damp hands.
- Before any work, remove the mains plug!



Warning of electrical voltage

Maintenance tasks at the electrical equipment or the air-conditioning technology must only be carried out by specialist companies for cooling and air-conditioning or by Trotec.

Cleaning the housing

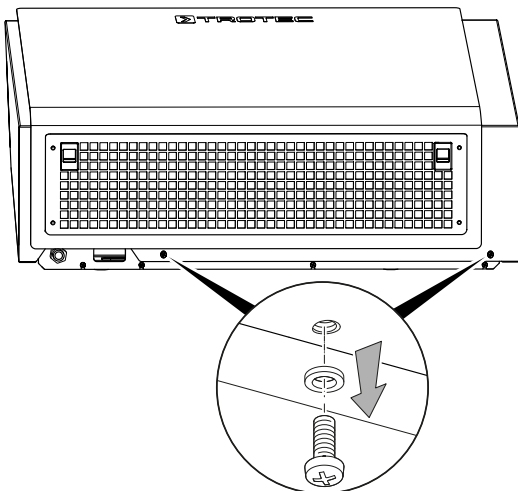
Clean the device with a soft, damp and lint-free cloth. Ensure that no moisture enters the housing. Protect electrical components from moisture. Do not use any aggressive cleaning agents such as cleaning sprays, solvents, alcohol-based or abrasive cleaners to dampen the cloth.

Cleaning the inside of the device

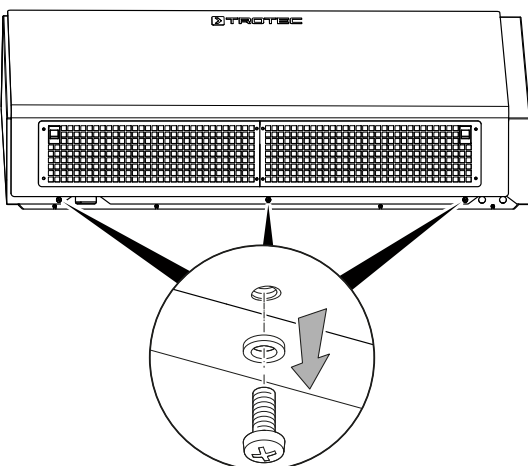
Perform this activity once a year.

1. Open the screw connection at the housing.

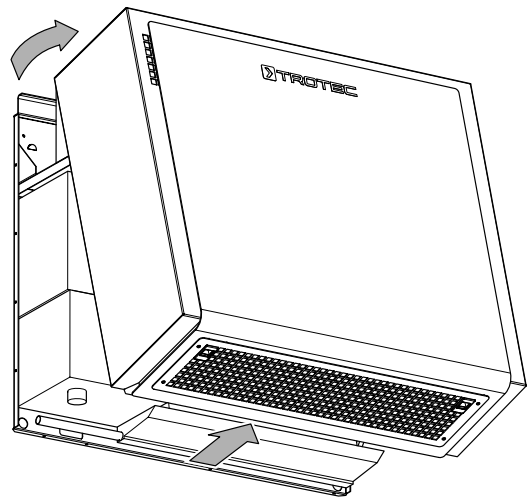
DH 30 VPR+



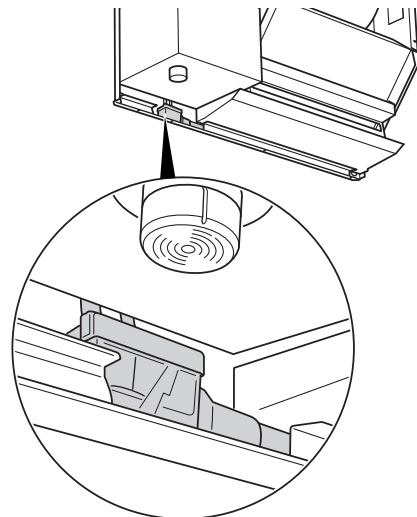
DH 60 VPR+



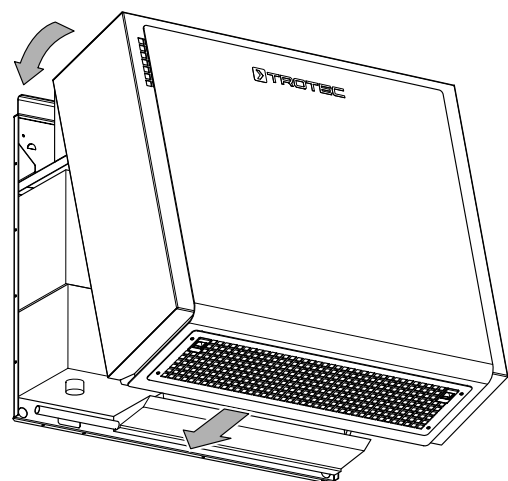
2. Remove the housing.



3. Clean the hose lines at the pump and remove any dirt.



4. Put the housing back on the device.



5. Fasten the housing to the device.
6. Plug the power cable back into the mains socket.

Refrigerant circuit

- The entire refrigerant circuit is a maintenance-free, hermetically sealed system and may only be maintained or repaired by specialist companies for cooling and air-conditioning or by Trotec.

Replacing the air filter

Perform this activity every 6 months. In case of a high dust and/ or soot pollution the air filter has to be replaced after 2 months at the latest.

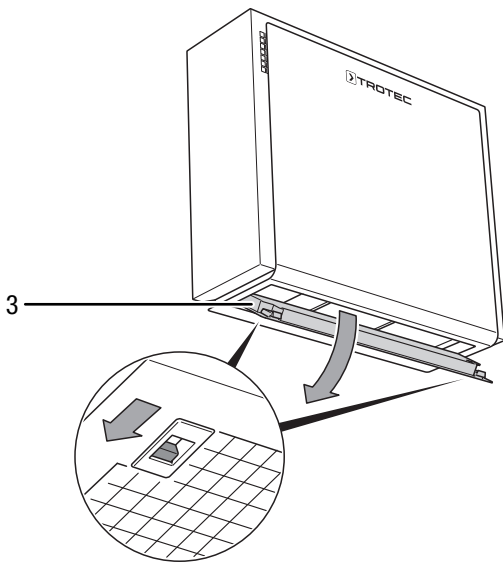
Notice

Ensure that the air filter is not worn or damaged. The corners and edges of the air filter must not be deformed or rounded. Before reinserting the air filter, make sure that it is undamaged and dry!

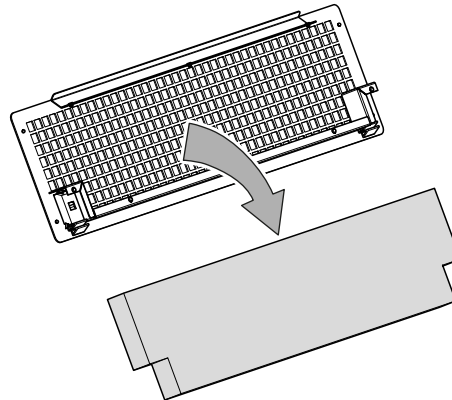
Notice

A dirty air filter obstructs the air current. This can lead to damages at the refrigerant circuit and ionizer. During operation with a dirty air filter there will be neither dehumidification nor ionization.

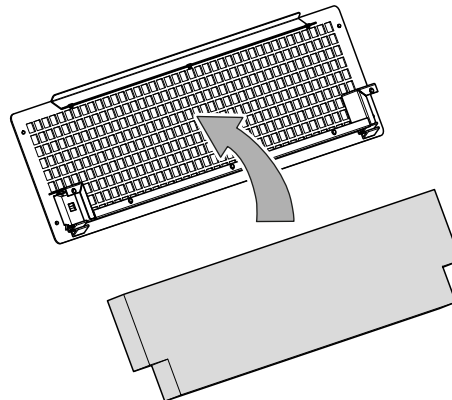
1. Open the filter flap (3).



2. Remove the air filter.



3. Install the new air filter. In doing so, make sure that the white side of the combination filter faces outwards. The air filter's frame must line up precisely with the corners and edges of the cut-out to prevent unfiltered air flows!



4. Dispose of the used filter according to the national regulations.
5. Refit the filter flap (3).

Technical annex

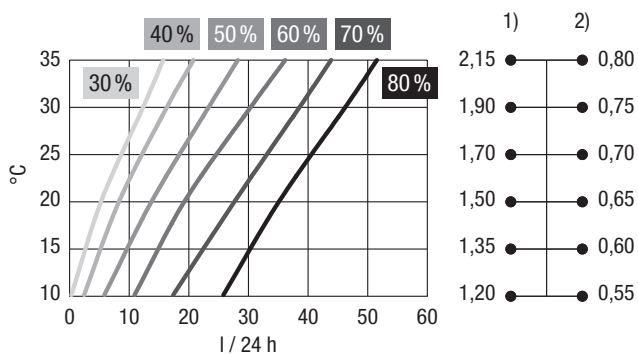
Technical data

Parameter	Value	
Model	DH 30 VPR+	DH 60 VPR+
Dehumidification performance	see dehumidification diagrams	
Mains connection	1/N/PE~ 230 V / 50 Hz	
Power cable	CEE 7/7 / l = 3.5 m	
Power input dehumidification	0.75 kW	1.2 kW
Power input ventilation	88 W	85 W
Nominal/peak current	4.4 A / 15.8 A	7.5 A / 30 A
Heat emission at 15 °C	1.35 kW	2.3 kW
Coefficient of performance (COP *)	2.5	2.9
Refrigerant	R-407C	R-407C
Amount of refrigerant	0.5 kg	0.8 kg
GWP (Global Warming Potential)	1774	1774
Air flow rate (freely blowing, stage 2)	745 m ³ /h	1,065 m ³ /h
Sound pressure level (3 m distance)	52 dB(A)	54 dB(A)
Operating range temperature	0 to 40 °C	0 to 40 °C
Setting range relative humidity	30 % to 60 % RH	
Max. permissible relative humidity	90 % RH	
Max. pump height of the condensate pump	10 m	15 m
Condensation drain hose	ø 5 mm (inside), l = 10 m	
Weight	57 kg	90 kg
Dimensions (width x depth x height) incl. wall holder	787 x 280 x 690 (mm)	1,255 x 280 x 690 (mm)
Standard faceplate	steel, white powder-coated	
Minimum distance to walls or other objects:	A: top: 12.5 cm B: bottom: 12.5 cm C: side: 12.5 cm D: front: 12.5 cm	12.5 cm 12.5 cm 12.5 cm 12.5 cm

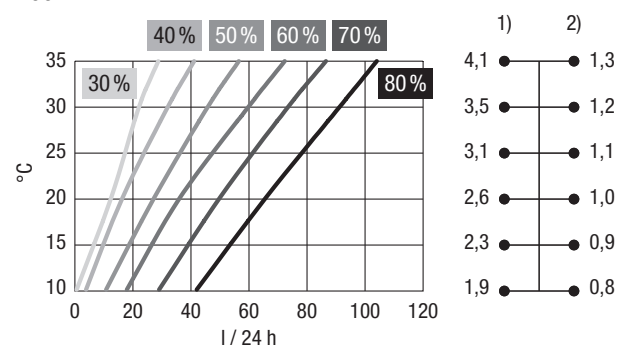
* The COP is the ratio of the generated cooling capacity or heat output to the electrical power input.

Dehumidification chart

DH 30 VPR+

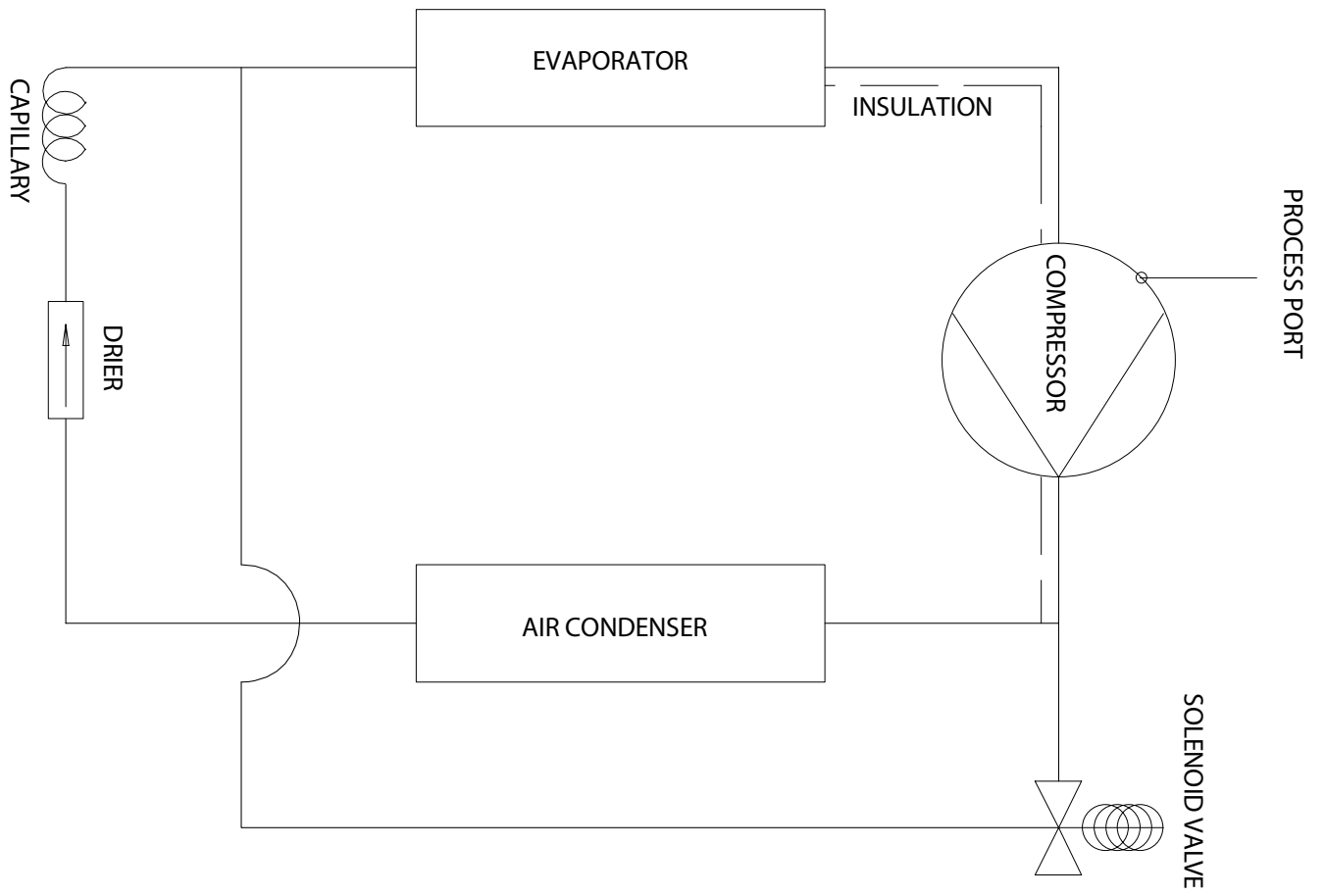


DH 60 VPR+



No.	Designation
1)	Heat emission in kW at 60 % RH
2)	Power input in kW at 60 % RH

Refrigerant circuit diagram



Disposal



■ The icon with the crossed-out waste bin on waste electrical or electronic equipment stipulates that this equipment must not be disposed of with the household waste at the end of its life. You will find collection points for free return of waste electrical and electronic equipment in your vicinity. The addresses can be obtained from your municipality or local administration. For further return options provided by us please refer to our website www.trotec24.com.

The separate collection of waste electrical and electronic equipment aims to enable the re-use, recycling and other forms of recovery of waste equipment as well as to prevent negative effects for the environment and human health caused by the disposal of hazardous substances potentially contained in the equipment.

You are responsible for deleting any personal data stored on the waste equipment to be disposed of.

The device is operated with fluorinated greenhouse gas which can be dangerous for the environment and contribute to global warming when emitted to the atmosphere.

Further information is provided on the nameplate.

Dispose of the refrigerant appropriately and according to the national regulations.

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