



DanVex DEH-1600i DanVex DEH-1900i

Dehumidifiers

» Operation manual





Operation instructions

Please read these instructions carefully before installing / operating this unit!
Our warranty becomes null and void in case of the unit improper operation, installation or maintenance or in case of the supplied unit modification without prior consent from our part.
Design is subject to changes!



Air dehumidification

The processes that take place during dehumidification are based on physical laws. We will try to illustrate them here in a simplified form to give you a general idea of dehumidification principles.

Attention!!! These units cannot be used for air cooling!!!

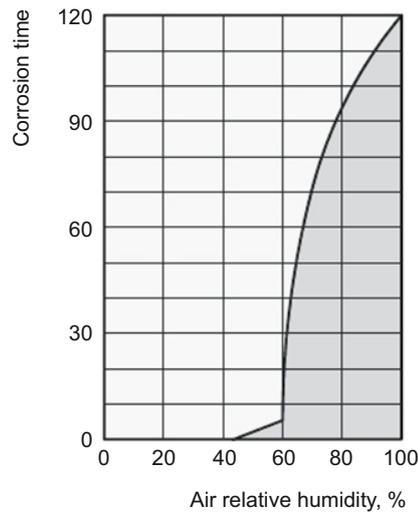


Use of DanVex dehumidifier

- Despite of windows and doors insulation quality, damp and moisture can penetrate even through thick concrete walls.
- It can take 1-2 months for the water used for construction (concrete works, whitewashing, plasterworks etc.) to dry out.
- The moisture that has penetrated masonry following high water or flooding is released very slowly.
- Damping of materials during storage in moist unheated premises.

The moisture escaping from building elements or materials by evaporation is absorbed by the ambient air. Thus, this increases the air humidity and ultimately results in corrosion, mould, rot, peeling of paint coatings and other unwanted damages.

The below diagram shows an example of metal corrosion rate at different air humidity levels.



As you can see on the graph the rate of corrosion is insignificant at the relative humidity (RH) below 50%, and it can be disregarded at RH below 40%. But at the relative humidity above 60% the rate of corrosion increases considerably.

This moisture damage example applies also to many other materials, such as powders, packaging, wood, electric equipment or electronic devices.

There are two different ways of achieving required humidity in a building being dried out:

1. By heating with further air exchange:

The ambient air is heated to absorb the moisture and then it is discharged to the atmosphere. However the total energy output is lost during the moist air discharging to outside.

2. By the air dehumidification:

The moist air in an enclosed room is continuously dehumidified by the condensation principle or by other dehumidification method.

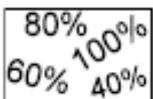
In terms of energy consumption the air dehumidification has one essential advantage:

the energy expenditure requirements are limited by the air volume in the existing room only.

The heat generated during the air dehumidification process (heat of condensation) slightly increases the air temperature in the room.

When properly used the dehumidifier consumes about 25% of the energy that would be needed for the „heating and ventilation“.

The relative and absolute air humidity



1 m³ of dry air weighs about 1,2 kg at 20° C.

The ambient air is a gas mixture that always contains a certain amount of water in the form of water vapor. The maximum water vapor content in the air (moisture content of the saturated air) depends on its temperature and pressure.

The *absolute humidity* is understood to be the water content in the dry air unit volume and is expressed in grams (g) of the water per a kilogram (kg) of the dry air.

The *relative humidity* is understood to be the ratio between the water percent currently contained in the dry air and the maximum possible water content at certain temperature and pressure and is expressed in percents (%).

When the air absorbs the maximum possible water volume the air becomes "saturated" and the relative humidity becomes 100%.



The ability of air to absorb water vapor increases with temperature increasing. This ; that the maximum (absolute) water content increases with temperature increasing.

Temp. °C	Water vapor content in g/m ³ in the air at the humidity of			
	40%	60%	80%	100%
-5	1,3	1,9	2,6	3,3
+10	3,8	5,6	7,5	9,4
+15	5,1	7,7	10,2	12,8
+20	6,9	10,4	13,8	17,3
+25	9,2	13,8	18,4	23,0
+30	12,9	18,2	24,3	30,3

Water vapor condensation

The maximum water vapor volume that can be absorbed increases when the air is **heated**, but the water vapor content remains however the same and this results in relative humidity reduction.

In contrast, when the air is **cooled**, the maximum water vapor volume that can be absorbed continuously reduces, the water vapor volume contained in the air remains however the same and the relative humidity increases.

If the air temperature falling continues the capacity to absorb the water vapor volume is continuously reduced until the air becomes saturated which is equal to the maximum water vapor content in the air. This temperature is called the dew-point temperature.

When the air is cooled below the dew-point temperature, the water vapor content becomes higher than the maximum possible water vapor content.

Excess water vapor displacement starts. The vapor condenses to water and thus is removed from the air.

A misted window glass in winter or a misted bottle with a cold drink are common examples of condensing.



The higher the relative air humidity the higher is the dew-point temperature, and thus it is easier to fall below the dew-point temperature.

Drying materials

Building materials/structures can absorb considerable amounts of water, e.g. bricks can absorb 90-190 l/m³, heavy concrete can absorb 140-190 l/m³, sand-lime bricks can absorb 180-270 l/m³.

Wet materials such as masonry are dried as follows:

- The moisture contained in the material moves from within the material to the wall surface.
- Evaporation takes place on the surface, i.e. water vapor is absorbed by the ambient air.
- The air enriched with water vapor continuously circulates through the air dehumidifier. It is dehumidified and leaves the unit being slightly heated to absorb the moisture again.
- In this way, the moisture content in the material is continuously reduced and the material dries.

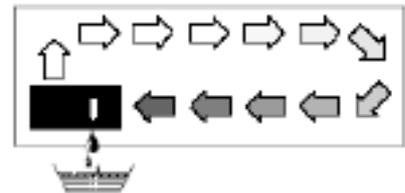
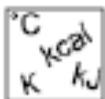
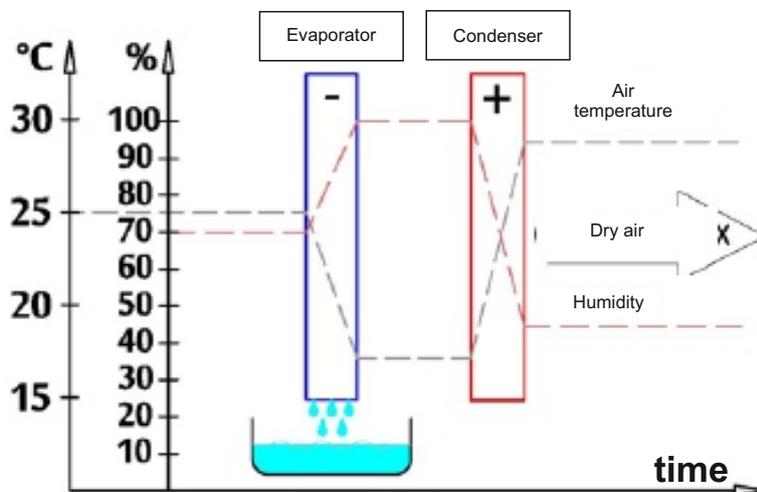


Diagram of the air condition during its circulation through the dehumidifier

The air flow is cooled on the way through the "evaporator-condenser" system till its temperature is below the dew point. Water vapor condenses, it is collected in a condensate trap inside the unit. The collected moisture is discharged in the form of water.



Heat of condensation

The energy transferred from the condenser to the air consists of:

- The heat earlier transferred from the evaporator.
- Useful electrical power
- The heat of condensation released through the condensation of water vapor.

When liquid turns into a gaseous state, the energy should flow in reverse i.e. from liquid to gas. This energy is called the **heat of evaporation**. It does not cause any rise of temperature, it is only necessary for the change from a liquid to a gaseous state. Vice versa, the energy is released when gas turns into liquid, such energy is called heat of condensation.

The heat generated at condensation and evaporation and is identical.

For water this is 2250kJ/kg (4.18kJ = 1kcal)

This shows that a relatively large amount of energy is released in the process of water vapor condensation.

If the moisture to be condensed is not generated at evaporation in the room but is introduced from outside, e.g. via ventilation, the heat of condensation released in the process will be used for the room heating.

If it is required to dry materials or rooms the heat energy circulates, i.e. it is consumed during evaporation and is released during condensation. A large amount of heat energy is generated at the supplied air dehumidification process, which results in a rise of temperature.

The time necessary for drying of building structures does not depend on the dehumidifying unit capacity, but is determined by the rate at which the material or the building elements release the moisture they contain.

Safety Instructions

Prior to delivery the units are subject to comprehensive testing of their materials, functional capabilities and quality.

However hazards can arise if the unit is operated by untrained persons unfamiliar with its operation principles or in case the unit is not used for the intended purpose.

The following safety instructions must be observed:

- It is prohibited to install or operate the units in the locations subject to explosion hazard.
- It is prohibited to install or operate the units in the locations with oil, sulphur, chlorine or salt containing atmospheres.
- The units must be installed upright.
- It is prohibited to use a direct jet of water for the unit washing.
- It is prohibited to cover the air inlet and outlet holes.
- The intake side of the unit must be free of dirt and loose objects.
- It is prohibited to insert objects in the unit.
- It is prohibited to cover or transport the unit during operation.
- All electric cables outside the unit must be protected against damage (e.g. from animals etc.).
- It is necessary to insure that all cables meet the requirements for capacity, length and purpose.
- The unit must only be transported in vertical condition. The condensate containers must be drained prior to each transportation of the unit.
- It is prohibited to use the unit for purposes other than intended or not specified in this operations instructions.

In case the requirements are not observed our company disclaims any liability and out warranty becomes null and void.



Only authorized personnel is permitted to perform works on cooling and critical system!

Unit description

The unit is designed for automated, versatile and trouble-free air dehumidification.

The unit operates on condensation principle. It is equipped with a closed loop cooling system, low noise and low maintenance fan and with a power cable with a plug.

The unit's control panel is equipped with a LCD display used for the system functional checks. A fully automated unit control system, a trouble-free regulated humidistat, an integrated overflow system as well as flexible hose connection for direct condensation discharge assure fail safe and long-term operation of the unit.

The unit complies with the fundamental safety and health requirements of the existing EU regulations.

The unit is easy and safe to operate.

Unit location

The unit is operated in the buildings where dry air is necessary to prevent significant financial losses (for example, due to mould formation).

The unit is mainly used for drying and dehumidification of:

◇ Industrial buildings of various applications, storage rooms and cellar rooms.

It is also used for dry air maintenance in:

◇ Storage areas, archives, laboratories.

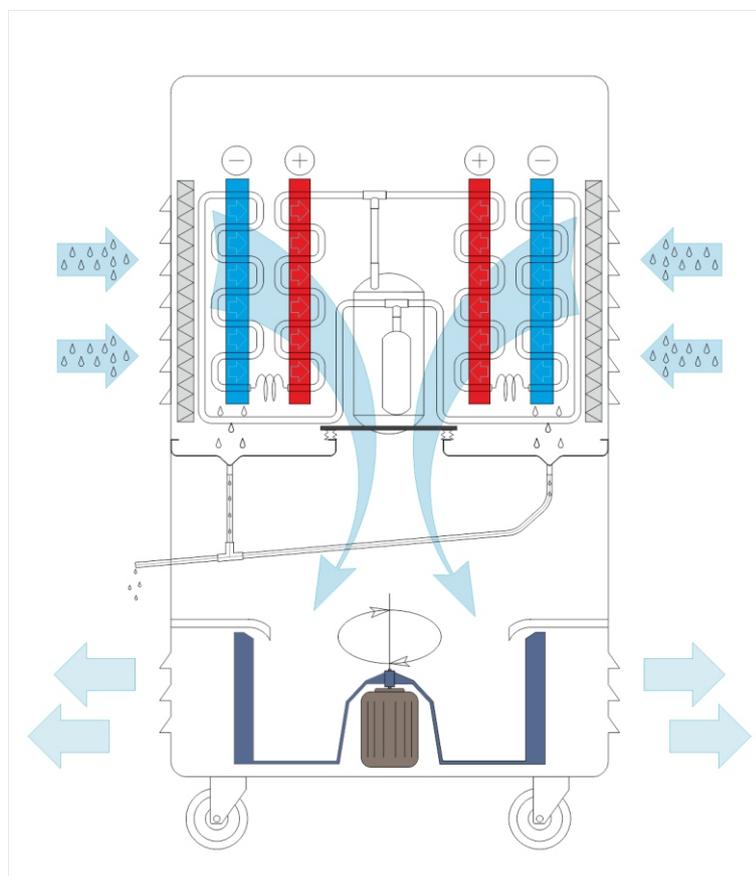
◇ Laundries, changing rooms etc.

Functions

The unit operates on condensation principle.

The fan intakes moist surrounding air into the units rear side through the air filter, evaporator and condenser located behind the evaporator.

Heat is extracted at the cold evaporator. The air is cooled to below the dew point. The water vapor contained in the room air deposits as condensate or frost on the evaporator fins.



Dried and cooled air is heated in the condenser (radiator) again. Then it is discharged to outside, the air temperature is about 5 degrees higher than the room temperature.

The dried air is mixed with surrounding air again. The relative humidity gradually drops to the required RH value due to continuous outside air circulation through the unit.

Depending on the room temperature and relative humidity the condensed water can drip continuously or only during certain defrosting stages into a condensate tray with further discharge to outside through integrated drain channels.

For uncontrolled continuous operation of the unit it is required to drain the condensate using an external water hose.

Installation

For optimum, economical and safe unit operation the following instructions must be followed:

- ◇ The unit must be installed securely upright to ensure unhindered condensate discharge into the condensate tray.
- ◇ If possible the unit must be installed in the centre of the room long wall so that optimal air circulation is ensured.
- ◇ It must be ensured that the air is able to be sucked in freely at the front of the unit and to be discharged through the side parts of the air throttle.
- ◇ It is prohibited to locate the unit in close proximity to radiators and other heat sources.
- ◇ The room to be dried or dehumidified must be closed to prevent the air entering from neighbor rooms and from outside.
- ◇ Windows and doors must be closed to prevent free air exchange between the room and ambient atmosphere.
- ◇ If the unit is used in dust-laden environments it is necessary to take appropriate maintenance measures specially adapted to the particular operation conditions.
See the chapter «Maintenance and service».

Important information on electrical connections

- ◇ Electric wiring of the unit should be done in accordance with DIN VDE 0100, Part 704 for electric current supply sources equipped with automatic circuit-breakers.
- ◇ If the unit is installed in humid premises such as laundries or cellars it should be equipped with proper automatic circuit-breakers at the buyer's expense.

Commissioning

Prior to commissioning works or to comply with local requirements it is necessary to check air intake openings and outlet openings to be sure that they are free from foreign matters. Intake filters condition should be checked as well.

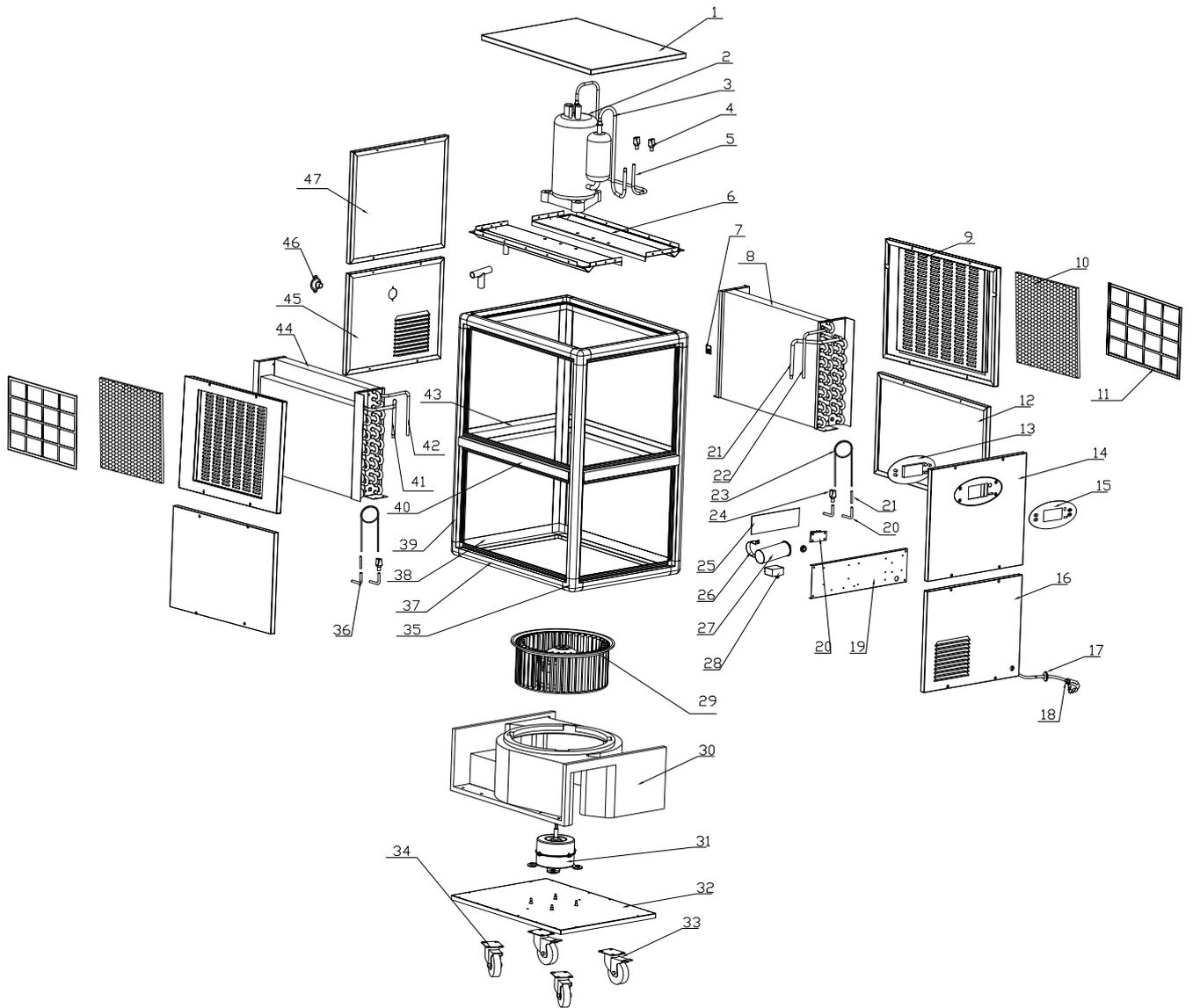
The following instructions are to be observed:

- ◇ Extension cables should be of proper cross-section.
- ◇ It is allowed to use extension cables if they are fully disentangled or stretched!
- ◇ It is not allowed to pull the unit by the power cord.
- ◇ Upon actuation the unit operates in fully-automatic mode.
- ◇ The unit is equipped with a protection device that prevents the compressor from switching on at restart immediately after the unit switching off, thus preventing the compressor damage.

The compressor switches on after 3 minutes only.

We do not ensure the efficient operation of the unit if the room temperature is below 10 °C and if the relative humidity is below 40 %.

Explode drawing:



Control panel and LCD-display

Dehumidifier control elements are located on the dehumidifier body on the left side upper panel.

LCD-display

HUMIDITY UP
button

HUMIDITY DOWN
button



Timer button

ON/OFF button

Commissioning

Prior to commissioning works or to comply with local requirements it is necessary to check air grills openings to be sure that they are free from foreign matters. Intake filters condition should be checked as well.

If the filter is heavily polluted it is necessary to wash it under water and dry without squeezing.

The following instructions are to be observed:

- Extension cables should be of proper cross-section.
- It is allowed to use extension cables if they are fully disentangled or stretched!
- It is not allowed to pull the unit by the power cord.

Upon actuation the unit operates in fully-automatic mode. The unit is equipped with a protection device that prevents the compressor from switching on at restart immediately after switching off, thus preventing the compressor damage. *The compressor switches on after 3 minutes only.*

We do not ensure the efficient operation of the unit if the room temperature is below 10 °C and if the relative humidity is below 40 %.

Start up and operation

- 1) **Unit switching On/Off:** to switch on the dehumidifier it is required to connect to device to the power source, an audible signal will be heard. Press ON/OFF button once to switch on, press ON/OFF button twice to switch off.
- 2) **Humidity value adjustment:** the unit can operate in fully automatic mode. On the control panel display the current humidity level detected in the room is shown by default. To set the required values use HUMIDITY UP/HUMIDITY DOWN buttons. To increase the value use HUMIDITY UP button, to reduce the value use HUMIDITY DOWN button. When the humidity value is 3% higher than the set value the unit will automatically switch on. If continuous dehumidifier operation is required «CO» should be set on the indicator.



Important:

- The dehumidifier will not start if the set humidity is higher than the current humidity.
- The dehumidifier is characterized by a delayed compressor start. The compressor switches on 3 minutes after the dehumidifier switches on and the fan starts to operate (for pressure equalization in the pressure circuit).
- In case the unit is used at low-temperature conditions the dehumidifier can be switched off for defrosting, the defrosting indicator lights up on the control panel. In this mode the compressor is switched off, only the fan continues operation.
- The display shows the humidity values in the range from 30% to 90%.
- If it is not planned to use the dehumidifier for a long period of time it should be disconnected from the power supply.

Service and Maintenance

Long-life and trouble-free performance is based upon regular maintenance and watch service.

Complete equipment inspection should be carried out annually, it is also required to perform complete cleaning of the equipment after any long idle periods. Frequent maintenance is not required since all moving parts of the equipment are provided with permanent lubrication. The cooling system is of a closed and low-maintenance type. The cooling system maintenance should be performed by an authorized service center only.

Please, make sure the power plug is disconnected from the mains socket prior to any maintenance jobs!

- Do not allow dust or other matters to build up on the machine.
- It is allowed to clean the unit with dry or slightly wet clothes. *It is forbidden to clean the unit using a direct water jet.*
- Do not use any abrasive detergents or solvent-containing cleansers; use proper cleansers and detergents only even if the unit is heavily polluted.
- It is required to check the air filter condition regularly. *Clean and replace it as appropriate.*



Only authorized personnel is permitted to perform works on cooling and electrical system.

Troubleshooting

The equipment was repeatedly tested by its manufacturer to ensure its normal operation. Nevertheless, should a trouble happen, please follow the below guidelines:

Unit fails to start:



- Check the humidifier connection to the power supply source 230V / 50 Hz .
- Check the power plug condition.
- Check the humidistat settings. *Relative humidity in the room should be higher than the set-up humidity level.*

The unit starts with no condensation:

- Check the indoor temperature (the lower the temperature is the low the unit efficiency). *The unit operational temperature range is from 5 °C to 32 °C.*
- Check the humidity level. *The minimum relative humidity level is 40 %.*
- Make sure air intake filter on the air grill is clean. *Clean and replace as appropriate.*
- Check heat-exchanger fins for contamination. *To carry out the inspection the equipment panels should be opened; these procedures can be performed in an authorized service center only.*



Please, make sure the power plug is disconnected from the mains socket prior any maintenance jobs!

The unit operates with noise, vibrates or sweats:

- Make sure the equipment is installed on even surface and in upright position.
- Make sure the internal condensate tray and adapter are clean.
To carry out the inspection the equipment panels should be opened; these procedures can be performed in an authorized service center only.

Should the equipment not operate properly upon all the mentioned tests are done, please call the authorized service center for assistance.

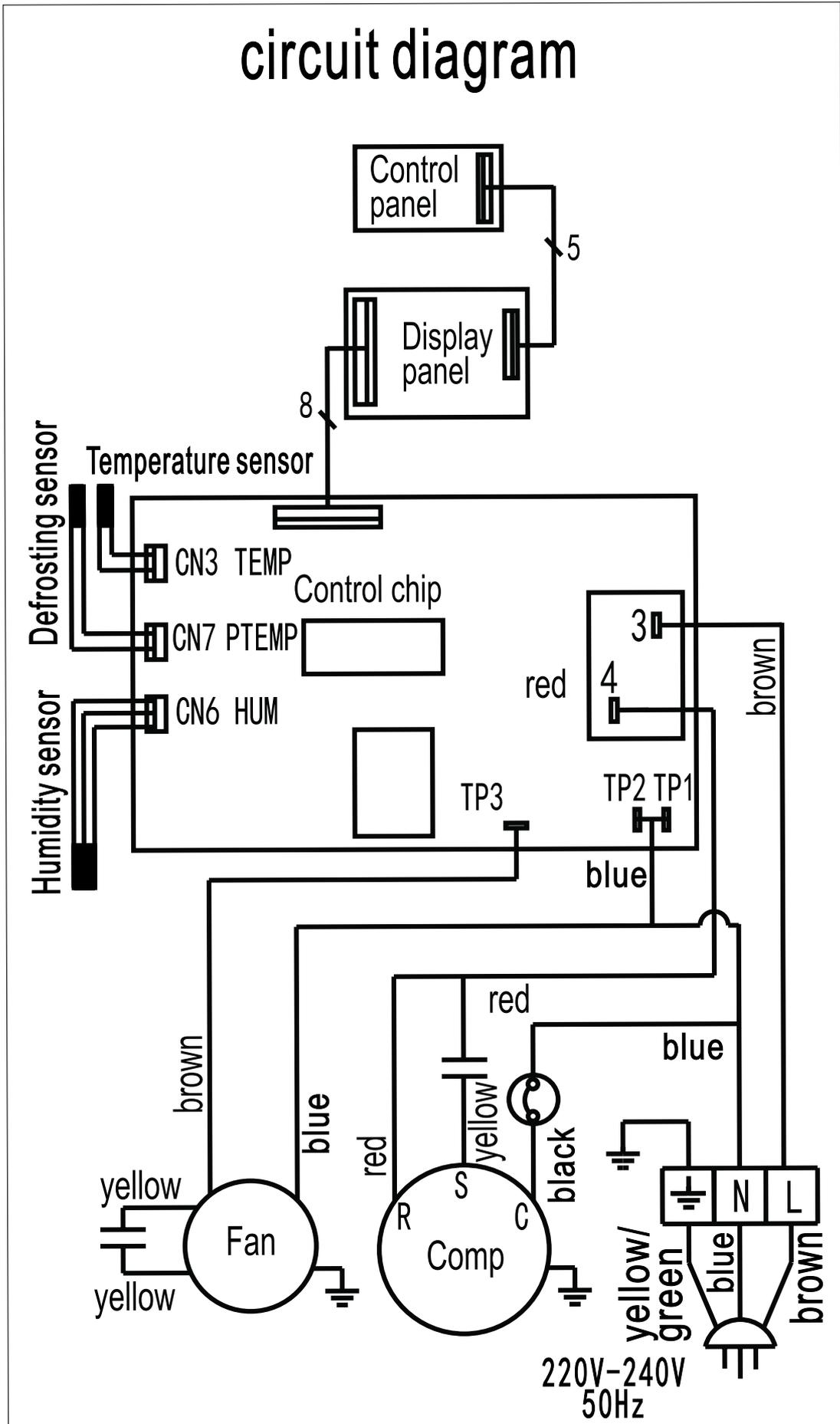


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Specifications

Model		DEH-1600i	DEH-1900i
Operational temperature range	°C	5-32	5-32
Operational humidity range	% RH	40-95	40-95
Dehumidification (at 30 °C / 80% RH)	l/day	158	187
Air capacity	m3/hour	1400	1600
Internal condensate tank capacity	liters	x	x
Cooling agent	-	R407c	R407c
Power	V	~230	~230
Frequency	Hz	50	50
Rated consumption	kW	1,75	2,16
Sound pressure	dB (A)	64	64
Depth	mm	490	490
Width	mm	600	600
Height	mm	910	910
Gross weight	kg	60	65

Attachment. Electrical diagram



Warranty obligations

DanVex warrants that all the equipment parts will answer the technical requirements for 24 months from the date of delivery (warranty period).

The warranty does not cover wearable parts such as filters. The warranty covers the defects in workmanship and materials.

During the warranty period DanVex repairs and replaces the part having a defect of material or a manufacturing error.

DanVex completely fulfills its warranty obligations when it supplies the Customer a repaired or a spare part.

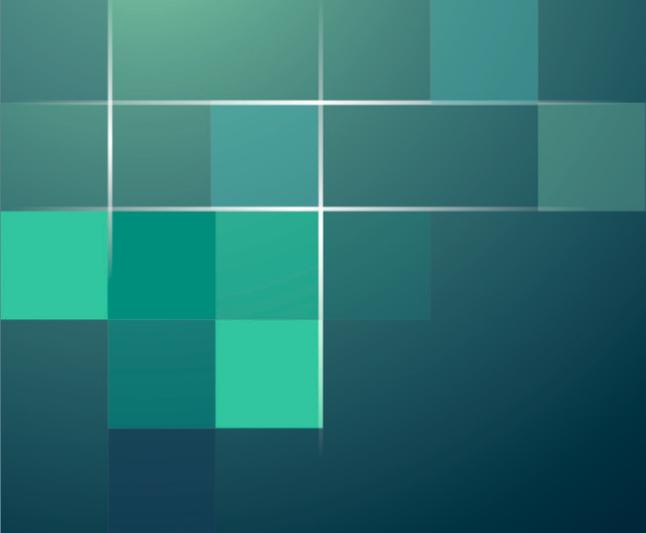
Parts repair or replacement does not result in the warranty period extension.

The parts and components replaced under the warranty belong to DanVex.

DanVex or its distributor upon DanVex request has a right to inspect the defective parts and to check the correctness of the warranty claim.

Warranty repair execution conditions:

The damage occurred during the equipment normal operation. All recommendations and instructions of the manufacturer concerning the equipment installation, operation and maintenance were observed. Only original parts and materials were used for the equipment maintenance and repair.



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