

Swimming pool dehumidifier

 $Operation \cdot \textit{Technology} \cdot \textit{Spare parts}$ 





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These operating instructions must be read carefully before commissioning/using the unit!

These instructions are an integral part of the unit and must always be stored in the immediate vicinity of the place of installation or on the unit.

Subject to changes; errors and typographical errors excepted!

#### **Dehumidification**

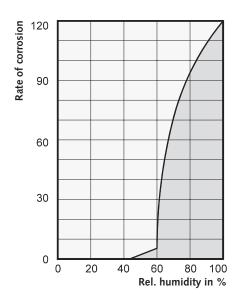
The interrelated processes occurring during dehumidification are based on physical laws. These are illustrated here in simplified form in order to explain the principle of dehumidification.

# The use of REMKO dehumidifiers

- No matter how well windows and doors are insulated, damp and moisture can penetrate even through thick concrete walls.
- The water volumes required for binding concrete, mortar, plaster, etc. are diffused out initially after 1-2 months under certain circumstances.
- Even moisture that has penetrated masonry following high water or flooding is released very slowly.
- This applies similarly to e.g. moisture contained in stored materials.

The moisture (water vapour) escaping from buildings or materials is absorbed by the ambient air. This increases their moisture content and ultimately results in corrosion, mould, rot, peeling of paint coatings and other unwanted moisture damage.

The diagram opposite shows an example of the rate of corrosion, e.g. for metal at different humidity levels.



It is noticeable that the rate of corrosion is insignificant below 50% relative humidity and can be disregarded below 40% relative humidity.

The rate of corrosion increases noticeably from 60% relative humidity. This humidity damage limit applies also to numerous other materials, e.g. powders, packaging, wood or electronic equipment.

Buildings can be dried out in different ways:

#### 1. Heating and air exchange:

The room air is heated to absorb moisture to subsequently be discharged to the atmosphere. The total input energy is lost with the discharged, moist air.

#### 2. Dehumidification:

The moist air in an enclosed room is continuously dehumidified according to the condensation principle.

In terms of energy consumption, dehumidification has one decisive advantage:

Energy expenditure is restricted solely to the existing room volume. The mechanical heat released through the dehumidification process is returned to the room.

With correct use, the dehumidifier consumes only about 25% of the energy required for the "heating and ventilation" principle.

#### **Relative humidity**

Ambient air is a gas mixture and always contains a certain amount of water in the form of water vapour. This water volume is expressed in g per kg dry air (absolute water content).

# 1m<sup>3</sup> air weighs about 1.2 kg at 20°C

Depending on the temperature, each kg of air is only able to absorb a certain amount of water vapour. When this absorptive capacity is reached, reference is made to "saturated" air; this has a relative humidity of 100%.

Relative humidity is therefore understood to be the ratio between the amount of water vapour currently contained in the air and the maximum water vapour volume at the same temperature.

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



Temp.	Water vapour content in g/m <sup>3</sup> at a humidity of								
°C	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					

#### **Drying materials**

Building materials or structures can absorb substantial amounts of water, e.g. bricks 90-190 l/m³, heavy concrete 140-190 l/m³, lime-sand bricks 180-270 l/m³. The drying out of moist materials, e.g. masonry, takes place as follows:

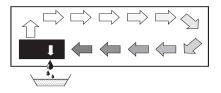
The contained moisture moves from the inside of the material to its surface



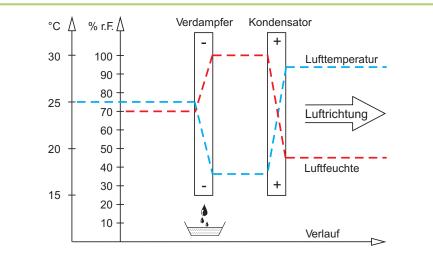
 Evaporation takes place on the surface = transition as water vapour to the ambient air

- The air enriched with water vapour continuously circulates through the REMKO dehumidifier. It is dehumidified and leaves the unit at a slightly higher temperature to absorb water vapour from anew
- In this way, the moisture contained in the material is gradually reduced The material dries!

The produced condensate is collected in the unit and discharged.



The air flow is cooled on its way through or via the evaporator to below the dew point. The water vapour condenses and is collected in a condensate trap and discharged.



# Condensation of water vapour

Since the maximum water vapour volume increases when the air is heated, however the contained water vapour volume remains the same, this results in a reduction of the relative humidity.

In contrast, when the air is cooled, the capacity to absorb the maximum water vapour volume reduces, the water vapour volume contained in the air remains the same and the relative humidity increases.

If the temperature falls further, the capacity to absorb the maximum water vapour volume is reduced until it is equal to the contained water vapour volume.

This temperature is called dewpoint temperature. When the air is cooled below the dew-point temperature, the contained water vapour volume is larger than the maximum possible water vapour

Water vapour is discharged. This condenses to water. The air is relieved of moisture.

Examples of condensing are misted windows in winter or misting of a cold drinks bottle.





The higher the relative humidity, the higher the dew-point temperature, which is easier to fall below.

#### **Heat of condensation**

The energy transferred from the condenser to the air is composed of:

- 1. Heat energy previously removed in the evaporator.
- 2. Electrical motive energy.
- 3. Heat of condensation released during liquefaction of the water vapour.

For the change from a liquid to a gaseous state, energy is necessary This energy is called 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, energy is released during the liquefaction of gas, which is called heat of condensation.

The amount of heat of evaporation and condensation is the same.

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

This shows that a relatively large amount of energy is released through the condensation of water vapour.

If the moisture to be condensed is not introduced through evaporation in the room itself, but from outside, e.g. via ventilation, the heat of condensation released in the process contributes towards room heating.

In drying processes, the heat energy is recirculated, which is consumed during evaporation and released during condensation.

During dehumidification of the supplied air, the amount of heat energy produced is greater than that expressed in a rise of temperature.

The time necessary for drying normally does not depend only on the unit capacity, but is rather determined by the rate at which the material or parts of the building release their moisture.

### **Safety notices**

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

However, the units may constitute a hazard if used by untrained personnel, improperly or not for the intended purpose.

# The following information must be observed:

- The units must not be installed or operated in locations subject to explosion hazards
- The units must not be installed and operated in atmospheres containing oil, sulphur or salt

- The units must not be exposed to direct water jets
- The air inlet and outlet must always be kept free
- The air intake grilles must always be kept free of dirt and loose objects
- The units must not be covered during operation
- Never insert foreign objects into the units
- All electrical cables outside the units must be protected against damage (e.g. by animals, etc.)

- The units must only be installed or mounted in the intended position (horizontal)
- Free and frost protected condensate drain must always be ensured
- The unit connections must always be established in compliance with the applicable installation regulations

#### **ATTENTION**

All work on the refrigeration system and electrical equipment must be referred to an authorised specialist!



#### **Description of the unit**

The units are designed for universal and problem-free dehumidification.

They can be installed at numerous locations due to their compact size.

The units operate according to the condensation principle and feature a hermetically sealed refrigeration system, low noise and maintenance circulating fan and connecting cable with plug.

The fully automatic electronic control with hot gas defrosting, integrated hygrostat and connections for local condensate drain ensure trouble-free, continuous operation.

The units are reliable and easy to use and comply with the fundamental health and safety requirements of the pertinent EU regulations.

The units are used wherever it ist important to have dry rooms and consequential damage (e.g. through mould formation) is to be avoided.

# The units are also used for the dehumidification of:

- Private swimming pools
- Wellness areas
- Whirlpool areas
- Sports studios
- Store rooms/archives
- Museums

#### **Operation**

The units can be switched on and off with the operating switch and the integrated hygrostat. In dehumidification mode, the green "dehumidification" pilot light at the top of the front panel lights up.

The recirculation fan sucks in the humid room air via suction openes integrated at the bottom of the front panel.

This is transported via a filter, evaporator and condenser. Heat is extracted from the room air on the cold *evaporator* and cooled to below the dew point. The water vapour contained in the room air deposits as condensate or frost on the evaporator tubes.

The cooled and dehumidified air is reheated on the *condenser* (heat exchanger) and blown back into the room via the side outlet grilles with a slight rise of temperature of about 5°C above room temperature.

The conditioned drier air continuously mixes with the room air.

Due to the constant circulation of the room air through the unit, the relative humidity in the room is gradually reduced to the required humidity (% relative humidity).

The hygrostat is set at the factory to 50% relative humidity.

Depending on the room air temperature and relative humidity the condensed water drips constantly or only during the defrost phase into the condensate trap and subsequently via the integrated drain connection into the condensate drain to be provided locally.

#### Safety circuit:

If the temperature at the condenser should exceed 55°C (e.g. due to fan failure or clogged suction filter), the unit stops automatically to avoid being overloaded.

The compressor restarts automatically after 45 minutes.

### Ÿ

#### NOTE

in normal operation, the compressor always starts with a delay of about 45 seconds.



#### Installation

For optimal and reliable unit operation, the following information must be observed in any event:

- The unit must be mounted or installed in a suitable location appropriate to the structural conditions
- The supplied wall bracket with suitable fixing material (not included) must be fixed securely to the wall
- The unit must be mounted or installed horizontally to ensure unhindered condensate drainage
- The unit must be mounted or installed so that the air is able to be sucked in and blown out unhindered
- For optimal unit operation, the minimum distances from the unit to the ceiling and to the floor must be observed
- The unit should not be installed in the immediate vicinity of radiators or other heat sources
- The room to be dehumidified must be closed from the ambient atmosphere
- Open windows, doors, etc. as well as frequent entering and leaving the room must be avoided as far as possible.
- For optimal room air circulation by the dehumidifier, the inlet and outlet grilles must always be kept free of dirt and other obstacles

#### **Electrical connection**

The units are operated with 230V AC/50Hz



- Electrical connection takes place using a supplied mains cable with safety plug
- The unit must only be connected to a socket-outlet appropriate to the place of installation and unit rating

#### **ATTENTION**

The unit connections must always be established in compliance with the applicable installation regulations.

#### Condensate drain

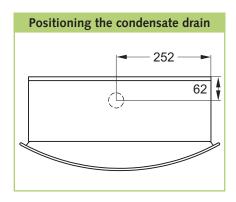
The condensate drain is located at the bottom of the unit. The condensate drain must be connected to the supplied drain connection (not fitted).

A solid or flexible ½" drain connection can be connected.

- The drain hose must always be installed with a minimum gradient of 2% to enable the water to drain unhindered from the drip tray
- For an outlet through the wall, specific preparations are necessary for correct condensate drainage prior to installation of the unit, e.g. the drilling of holes
- The position of the outlet connection is shown in the diagram below

#### **ATTENTION**

Careful and professional installation or mounting must be ensured.



#### **ATTENTION**

For securing the compressor during transport, a cable tie is attached at the back of the

This must be removed prior to installation of the unit.

#### **♥** NOTE

A separate condensate container with integrated overflow protection is available as an accessory.



# Additional condensate container

Where it is not possible or difficult to provide a natural condensate drain, the unit can be provided with an additional condensate container.

The container is available as an accessory.

The condensate container is mounted directly below the unit, see diagram below.

When the unit is used with condensate container, the dehumidifier switches off automatically when the container is full.

An LED on the front panel shows a steady "red" light when the container is full and needs to be emptied.

The condensate container consists of the following parts:

- Condensate container housing with electromagnetic switch for the water stop and cable connection to the printed board
- Condensate collecting container
- 4 fixing screws



# Mounting the condensate container

- Mount the unit on the supplied wall bracket
- After removing 2 screws at the top of the unit, lift up the front panel and remove it from the unit horizontally
- Screw the condensate container housing below the unit with 4 fixing screws
- Route the unit connecting cable through the diaphragm sleeve at the bottom of the condensate container housing

#### Access to control:

The electronic control is located in a housing in the centre of the unit. Access to the control takes place by removing the 4 screws on the sides of the housing.

- Route the cable of the electromagnetic switch through the diaphragm sleeve at the bottom of the unit and connection to terminal 13 and 14 on the control board
- Refit the cover of the control and front panel of the unit
- Place the condensate container in the condensate container housing.
   Position the condensate container so that the float points towards the electromagnetic switch

#### **Commissioning**

Prior to each commissioning or depending on the local conditions, the air inlet and outlet grilles must be checked for clogging.

After switching on with the operating switch, the unit operates via an integrated hygrostat set to 50% relative humidity (standard value for indoor and outdoor swimming pools).

The unit does not start at room air conditions below 50% relative humidity.

If the relative humidity is above 50%, the unit automatically starts the dehumidification process.

To change the hygrostat setting if necessary, the front panel must be removed.

The hygrostat is located below the electronic control.

Turning the control knob clockwise reduces the humidity, turning it anticlockwise increases the humidity.

An external hygrostat (accessory) can be fitted if required. For connection options, see "Electrical connection diagram".

In order to prevent compressor damage, the units are provided with reclosing protection, which prevents immediate reconnection of the compressor after disconnection.

The compressor initially switches on again after a delay of about 45 seconds!

#### Status display LED

The LED on the front panel lights up:

**green** = unit dehumidifies

= the water container (accessory) is full and must be emptied

#### **Defrosting**

At room temperatures below 20°C, the evaporator will start to frost after a short time.

When the evaporator sensor registers a temperature on the evaporator surface that is lower than 5°C, the unit will continue to operate for about a further 44 minutes in dehumidification mode. After lapse of this time, the fan stops and the evaporator surface is defrosted by the injection of hot gas.

When the evaporator sensor registers a temperature above 5°C, the compressor is switched on again and the dehumidification mode is restarted.

### **Decommissioning**

- Switch the operating switch to the "0" position (off)
- In case of extended periods of non use, the units must be disconnected from the supply
- If provided, the condensate container must be emptied and rinsed with clear water. Attention should be paid to subsequent dripping

condensate!

#### Care and maintenance



#### **Ö** NOTE

Regular care and maintenance is a basic precondition for a long useful life and troublefree operation of the unit.

All moving parts are provided with low-maintenance permanent lubrication. The refrigeration system is a hermetically sealed system and must only be repaired by authorised specialised companies.

- Observe regular care and maintenance intervals
- Depending on the particular operating conditions, the units should be tested by an expert for reliable operation as necessary, but at least once a
- Keep the unit free of dust and other deposits
- If the unit should be fouled, it must be cleaned carefully and thoroughly with suitable agents
- If the evaporator tubes should be heavily fouled, these can be cleaned carefully with soapy water
- Do not use a direct jet of water, e.g. high pressure cleaner, etc.
- Do not use caustic cleaning agents or those containing solvents
- Only use suitable cleaning agents to remove heavy fouling

#### Cleaning the suction filter

The suction filter should be checked at regular intervals and cleaned if necessary. The filter is fixed in a holder behind the intake grilles.

#### **ATTENTION**

Regularly check the inlet and outlet grilles as well as filters for clogging.

- A lightly clogged filter can be cleaned by carefully blowing out or using suction
- A heavily clogged filter can be washed in a luke warm (maximum 40°C) soapy solution. Subsequently rinse thoroughly with clear water and allow to dry
- It must be ensured that the filter is completely dry and undamaged prior to refitting
- The units must only be operated with the filter fitted



#### **NOTE**

Heavily clogged filters must be replaced with new ones. Only original spare parts must be used.

#### Cleaning the condensate water collecting tray

To ensure that the produced condensate water is able to drain freely, the condensate collecting tray and the outlet must be cleaned at regular intervals.



### **Troubleshooting**

The units were manufactured using the latest production methods and tested repeatedly for perfect function. If faults should still occur, the unit must initially be checked against the following list.

#### The unit does not start

- Check setting of operating switch
- Check system connection and local system fuse -230V/1~/50 Hz-
- Check the mains plug and cable for damage
- Check the condensate container, if provided for filling level and correct seating
- Check the integrated hygrostat. Set the hygrostat to a lower relative humidity (turn setting knob fully clockwise) If the unit does not start, the integrated hygrostat must be checked for faults.

#### Unit switches off automatically – restarts after 45 minutes and switches off again after a short time.

- Does the fan operate when the unit switches on again after 45 minutes?
- Is the condenser surface possibly fouled?
- Is the suction filter clogged?
- Is the ambient temperature possibly above 30°C?
- Are the intake and outlet grilles free?

# The unit operates, but no condensate forms

- Check room temperature

  The operating range of the unit is between 3°C and 30°C
- Check the air humidity, min. 40% relative humidity is necessary
- Check the suction filter for clogging and clean or replace if necessary
- Check the evaporator and condenser for fouling and clean if necessary
- Check the evaporator for ice/ frost formation. If this is the case, the automatic defrost function and temperature sensor must be checked

# The red pilot light (fault) lights up also when the condensate container is empty

Check whether the float of the water container moves freely or is possibly damaged

# The condensate container is full – however the unit does not switch off automatically

- Check that the condensate container is placed correctly in the housing and the float is correctly positioned pointing towards the electromagnetic switch
- Check whether the float of the water container moves freely or is possibly damaged

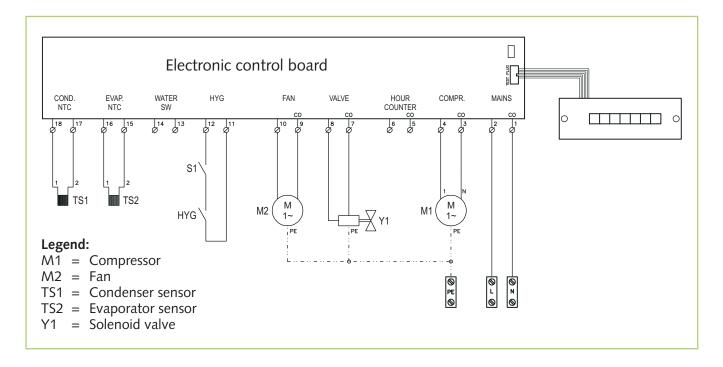
#### **♥** NOTE

If the unit does not function perfectly despite checking, an authorised specialist must be contacted.

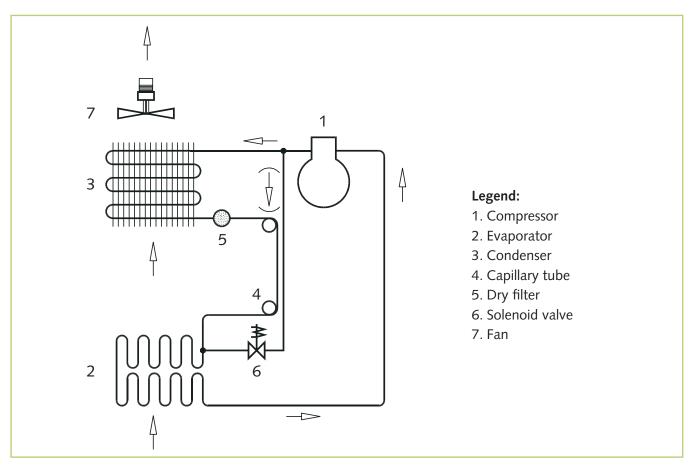
#### **ATTENTION**

All work on the refrigeration system and electrical equipment must be referred to an authorised specialist!

### **Electrical wiring diagram**



### **Refrigeration circuit**



We reserve the right to make changes to dimensions and the design in the interest of technical advances.



### **Condensate container (accessories)**

# Additional condensate container

Where it is not possible or difficult to provide a natural condensate drain, the unit can be provided with an additional condensate container.

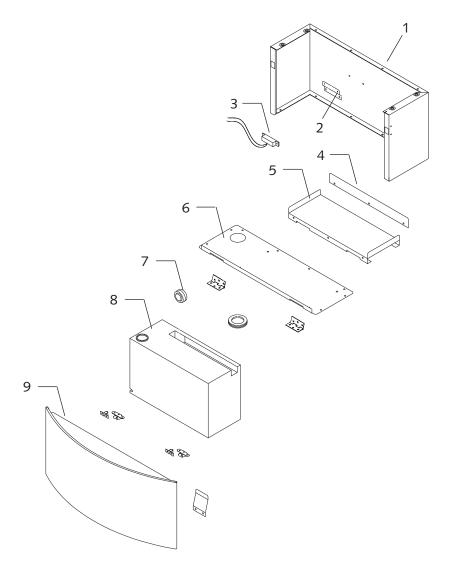
The condensate container is mounted directly below the unit.

When the unit is used with condensate container, the dehumidifier automatically switches off when the container is full.

An LED on the front panel shows a steady "red" light when the container is full and needs to be emptied.



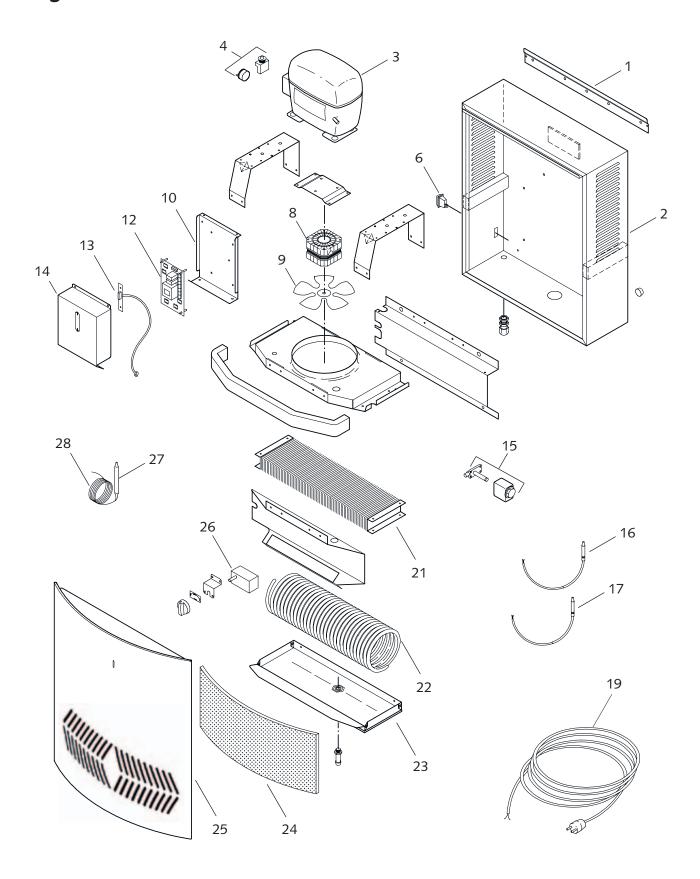
The condensate container has a capacity of 6 litres. Automatic switch off takes place at a container level of 5 litres.



### Spare parts list

No.	Designation	EDP No.
1	Housing	1109131
2	Holder for electromagnetic switch	1109132
3	Electromagnetic switch	1109133
4	Stop rail	1109134
5	Holder for condensate container	1109135
6	Housing bottom, complete	1109136
7	Float	1109139
8	Condensate container, complete	1109140
9	Front panel	1109142

### Diagram of unit SLE 20





### **Spare parts list**

No.	Designation	EDP No.
1	Wall bracket	1109100
2	Housing, complete	1109101
3	Compressor, complete	1109102
4	Starting relay, complete	1109103
6	Operating switch	1109113
8	Fan motor	1109105
9	Fan blade	1109106
12	Control board	1109107
13	Diode board	1109108
14	Electronics cover	1109109
15	Solenoid valve, complete	1109110
16	Condenser NTC sensor	1109111
17	Evaporator NTC thermistor (metal)	1109112
19	Mains cable with plug	1109124
21	Condenser	1109114
22	Evaporator	1109121
23	Condensate tray, complete	1109122
24	Suction filter	1109127
25	Front panel	1109126
26	Hygrostat, complete	1109115
27	Dry filter	1109119
28	Capillary tube	1109120

#### Intended use

The units are designed and equipped for dehumidification purposes.

The manufacturer is not liable for any damage attributed to failure to observe the manufacturer's instructions or applicable statutory requirements or unauthorised changes to the unit.

#### **Ö** NOTE

Use for any other purpose than that described in these operating instructions is not permitted.

Non-observance will invalidate all liability and warranty claims.

#### **ATTENTION**

Copyright
Reproduction of this document
in whole or part in any form
or use for purposes other
than that intended is strictly
forbidden without the prior
written permission of
REMKO GmbH & Co. KG.

# Customer service and warranty

A precondition for any warranty claims is that the dealer or his customer has completed and returned the enclosed "Warranty document" to REMKO GmbH & CO. KG at the time of sale and commissioning.

The units were repeatedly tested for perfect functioning at the factory. If problems should occur which cannot be remedied by troubleshooting by the operator, your specialised dealer or contract partner should be contacted.



#### Disposal of packaging

Think of the environment when disposing of the packaging material.

Our units are carefully packed for transport and delivered in sturdy cardboard packaging on a wooden pallet, if necessary.

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

By reusing packaging material, you make a valuable contribution towards waste reduction and the conservation of raw materials.

Only dispose of packaging material at the facilities provided.

#### NOTE

Adjustments and maintenance must be referred to authorised specialists.



# Important information on recycling

The units are operated with environmentally-friendly and ozone neutral refrigerant R134A. The refrigerant and oil mixture contained in the unit must be disposed of properly in accordance with the statutory and locally applicable regulations.

#### Disposal of old unit

Our production is subject to constant quality controls.

Only high-quality materials are used, the majority of which are recyclable.

Make your contribution towards environmental protection by disposing of your old unit in an environmentally-friendly manner.

Only dispose of your old unit at an authorised recycling facility or collection point.







# EC Declaration of Conformity



We herewith declare that the following dehumidifier complies with the pertinent requirements of the respective EC directive in terms of its design and construction in the marketed version.

#### Important information:

This declaration will be invalidated if the unit is used, installed or maintained improperly, or if modifications are made to the supplied unit without our prior permission.

Name of manufacturer : REMKO GmbH & Co. KG

Klima- und Wärmetechnik

Im Seelenkamp 12 D - 32791 Lage

Unit (machine) type : Permanently installed dehumidifier

Series : **REMKO SLE 20** 

Series/Serial number : 730.....

Applicable directives : MA - RL 89/392/EEC Machinery Directive [98/37/EC]

NS - RL 73/23/EEC Low Voltage Directive

EMC – RL 89/336/EEC EMC Directive

Reference standards : EN 292 - 1; EN 292 - 2; EN 294; EN 349;

EN 60204 - 1; EN 810; DIN 45635 - 1;

EN 60335 - 1; EN 60335 - 2 - 40;

EN 50081-1-EMC; EN 50082-1-EMC; EN 55014-1; EN 55014-2; EN 55104;

EN 61000 - 3 - 2; EN 61000 - 3 - 3;

Position as at 30 March 2007

REMKO GmbH & Co. KG

Signature (Technical Manager)

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### **Maintenance report**



Unit type:	Unit type: Serial number:																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Unit cleaned – outside	_																				
Unit cleaned – inside –																					
Condenser cleaned																					
Evaporator cleaned																					
Fan function checked																					
Unit checked for dama	ge																				
Protective devices chec	ked																				
All fixing screws checke	ed																				
Electrical safety checked	d																				
Test run																					
1. Date:	2. Date:			3.	Date	e:				4.	Date	e:				5.	Date	e:			
Signature	Signatur							 e													
6. Date: Signature	7. Date: Signatur																				
11. Date: Signature	12. Date: Signatur		13. Date:		15. Date:																
16. Date: Signature	17. Date: Signatur						Date: Signature														

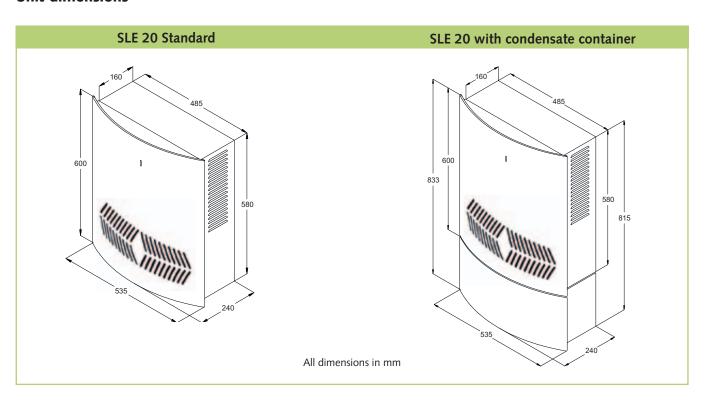


### **Technical data**

Series		SLE 20
Daily dehumidification capacity at 30°C and 80% relative humidity	Litre/day	10.5
Daily dehumidification capacity at 30°C and 60% relative humidity	Litre/day	7.5
Operating temperature range	°C	3-30
Humidity operating range	% relative humidity	40-100
Air capacity	m3/h	220
Refrigerant		R134a
Refrigerant quantity	g	190
Power supply	V/Hz	230/1~/50
Max. nominal current consumption	Α	2.1
Max. power input	kW	0.39
Sound pressure level L <sub>pA</sub> 1m <sup>1)</sup>	dB (A)	46
Depth	mm	240
Width	mm	535
Height	mm	600
Weight	kg	28
EDP No.		615200

<sup>1)</sup> Noise measurement DIN 45635 - 13 - Category 3

#### **Unit dimensions**



## **REMKO EUROPE-WIDE**

### .... and somewhere near you!

### Take advantage of our experience and consulting services



#### Consulting

Through intensive training, we ensure that the expert knowledge of our consultants is always up-to-date. This has given us the reputation of being more than just a good, reliable supplier: REMKO, a partner who helps solve problems.

#### Sales

REMKO not only has an extensive sales network in Germany and abroad, but also unusually highly qualified sales experts.

REMKO field representatives are more than just salesmen: they must also be customer consultants in air conditioning and heating technology.

#### **Customer service**

Our units operate precisely and reliably. If a fault should occur, REMKO Customer Service is there to help you. Our extensive network of experienced specialised retailers guarantees our customers a fast and reliable service at all times.

#### REMKO GmbH & Co. KG Klima- und Wärmetechnik

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