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# OPERATING AND MAINTENANCE INSTRUCTIONS FOR RODEWALD GERMINATION TABLE TYPE 5400 - 5700

Version E/54-57/06-95





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Concerning the basic unit, please refer to the **extra-bold** printed chapters.

All further chapters are belonging to options.

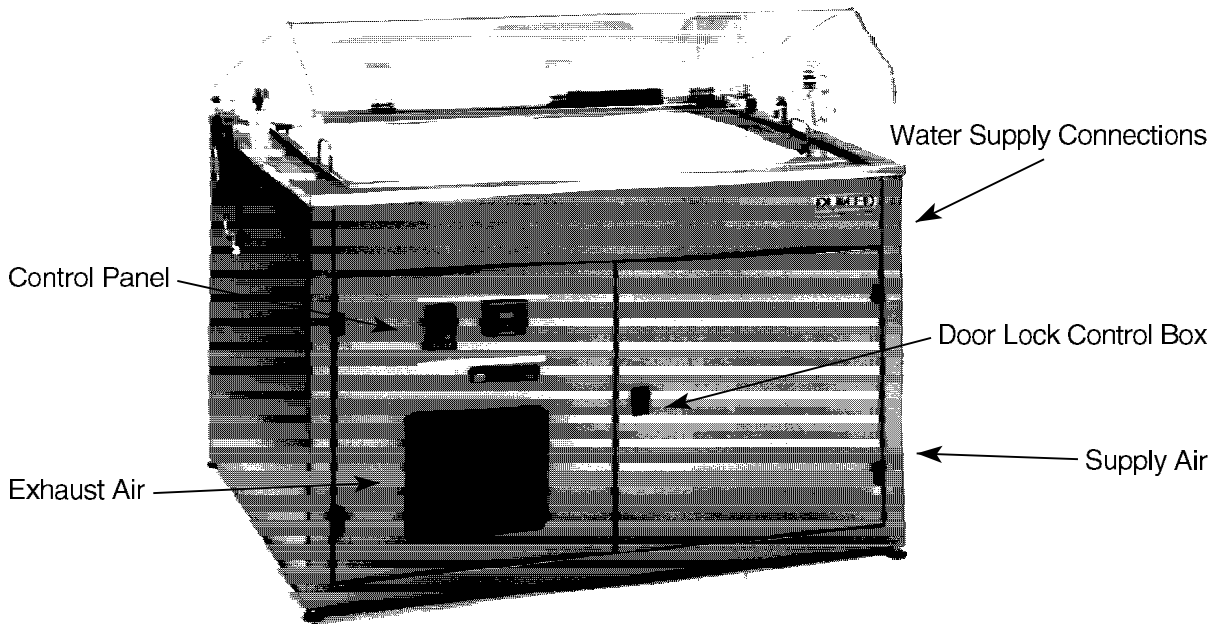
Deutsch Diese Bedienungsanleitung ist erhältlich in Deutsch.

Version E/54-57/06-95

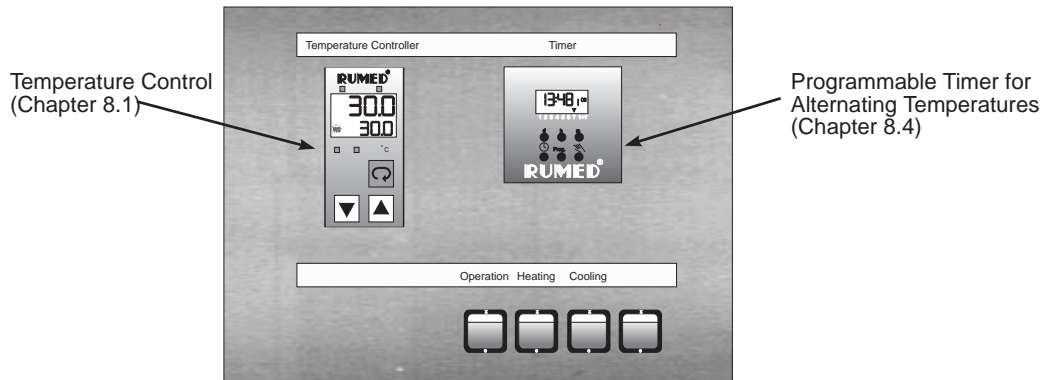
Français Ce mode d'emploi est disponible en Français.

Sur demande!

# 1 General View

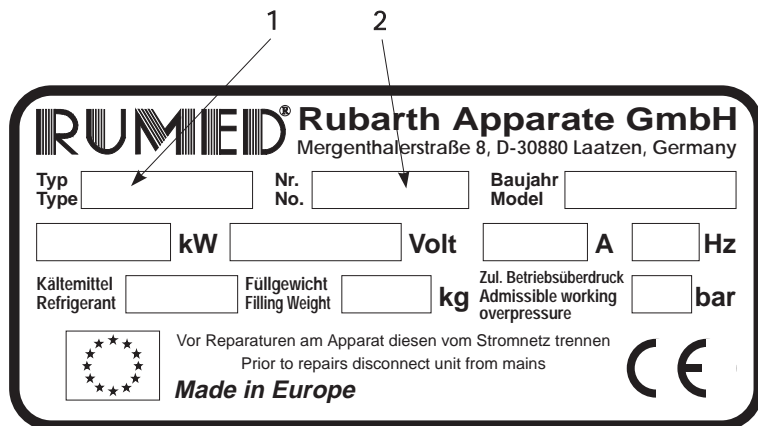


## Control Panel



## Nameplate

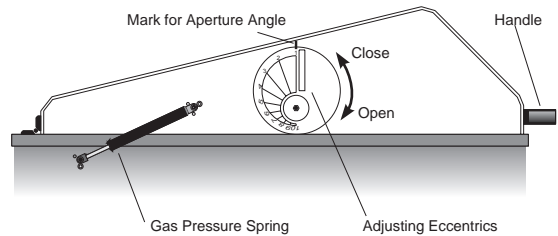
The nameplate is located at the right side above the water supply connections. In case of failures or for spare-part orders, please indicate the unit type (1) and the serial no. (2).



## 2 General

RUMED Rodewald-germination tables are offering optimum conditions for seed germination tests. The units consist of a tub which is hanged up in a water bath for temperature-conditioning and moistening. The Rodewald procedure is particularly suitable for vegetable or forest seeds due to the adjustable low humidity and the inferior tendency to fungal growth. The seed will be deposited on circular filter papers on the sand. The insertion sand tub is equipped with a water channel with adjustable level regulation giving moisture to the seed via wicks in the sand and the capillary effect of the sterilized crystal silica sand.

The Rodewald germination table is equipped with an acrylic glass cover producing optimum climatic conditions and lowering the evaporation rate. The glass cover can be steplessly opened for ventilation by means of two eccentrics. A surrounding groove avoids dripping of the condensate water into the sand or on the seed.



The degree of germination can be defined by counting the germs and comparison with the number of seeds. Rodewald germination tables can be delivered with and without automatic day/night temperature alternation and in two unit sizes each. The standard germination tables with day/night temperature alternation are equipped with an electronic temperature programme controller as well as with CFC-free refrigerating units.

## 3 Transportation and Storage

The standard domestic shipment of the unit will be effected unpacked in a van. The unit should be transported carefully in standing position. In case a short-time tilting of the unit should be unavoidable, for reasons of f. ex. passing doors, it might be possible that oil of the cooling machine will enter into the evaporator. This oil must flow back to the cooling machine. For this reason take care that after transportations the unit should not be started before expiration of 4 hours. The unit is recommended to be stored in dry rooms at temperatures between +10°C and +30°C. The shipment within European countries is mostly effected in stable cartons on a palette. Seaworthy and air-freight cases are generally conserved for 12 months and the units are welded in an aluminium wrapping. Condensation due to passing of different climatic zones is avoided by drying agent bags which are to be removed prior to initial starting of the machine.

Accessories, as Operating Instructions, paper substrate, 3 or 5 textile wicks, water drain hose, as well as the water connecting hose are located in the sand tub.

Sterilized silica sand is not included! It can be ordered separately (see chapter 10).



## 4 Installation

Model	Cooling	Exterior Dimensions [mm]			Weight [kg]	
		Height	Width	Depth	Shipping Weight	Operating Weight
5400	not included	1040	1160	930	110	230
5500	included	1040	1160	930	130	250
5600	not included	1040	1650	930	145	325
5700	included	1040	1650	930	170	350

Do not cover the ventilation slots; even a partial covering of the slots may lead to a heat accumulation. Uncovered ventilation slots are very important for a faultless operation of the cooling machine!

The ventilation grids being located in front of the air inlet and exhaust openings are mounted for optical reasons and are protecting the units being located behind from mechanical damage. Do not insert any filter mats, since this will cause insufficient ventilation of the units which might result in damage!

Installation of the unit in level position is indispensable! The floor of the installation place must be even and horizontal. Slight unevennesses can be balanced by the adjustable feet of the unit.

Before opening the control box for maintenance purposes by means of the delivered key for the switch cabinet, make sure that the mains plug is disconnected!

Remove the white blocking device of the key (transport safety device) prior to initial opening. The key cannot be withdrawn while the door is opened.



## 5 Power Supply

Current (A.C.) and voltage at the installation place must coincide with the indications on the nameplate of the unit. The nameplate is located at the right side above the water supply connections.

Connection is to be made to a duly earthed socket (a separately secured socket is recommended).

A two-pole residual current operated device with a response time of 10 milliseconds is mounted for the personnel's safety.

All the units are equipped with combined universal plugs according to the German or French standard. British, Swiss or other Standards upon request.

## 6 Connection of Water Supply

### Fresh Water

Connect the germination basin tightly to a  $\frac{3}{4}$ " tap water cock by means of the furnished water hose. Strictly observe the regulations for gas and water installation DVGW!

When using the germination basin, the tap cock must be opened, since evaporation losses will be automatically balanced through the opto-electronic level measuring by means of a solenoid valve.

The fresh water supply is effected by an U-shaped pipe at the right side of the germination table. Do not extend the pipe with a hose or similar material, since - in case of failure - water might be sucked from the germination basin and led to the public drinking water supply. An adjustable throttle in the water intake retards the water flow and keeps it almost depressurized. This is particularly important during the automatic filling for the balancing of the evaporation losses.

The different water pressure conditions of each installation place might require corresponding adjustment of the throttle.

### Waste Water

Lead the waste water connection which is also used as safety overflow depressurized to a water outlet pipe with a minimum size of  $\frac{3}{4}$ ". The customer's waste water connection must be equipped with a stink trap. Check the proper functioning of the safety overflow after installation. For this purpose, the relay in the control box which is marked with K1 is to be actuated manually. Observe, that only skilled personnel should perform the check. Upon the start of the overflowing, the water level should not raise (draining of water, see chapter 9.1). If the water level is raising due to high line pressure, readjust the throttle in the water intake being located in the control box at the right top side directly behind the solenoid valve. Prior to adjustment, unscrew the cover with a fork wrench (size 17 mm). After that, adjust the throttle with a screw driver until the water intake is reduced to an amount which can be discharged by the safety overflow (Turning clockwise reduces the water intake, turning anticlockwise increases the water intake). The throttle is factory-adjusted to: 1  $\frac{1}{2}$  rotations opened (close totally in clockwise direction and then open 1  $\frac{1}{2}$  rotations anticlockwise). When the throttle had been adjusted, replace the cover and screw it down.

### Water Circuit

The water flows through the germination basin from the left to the right side and reaches the circulation pump through the floor drain and a filter. Having passed the heating element with integrated overtemperature protection and the cooler, the additionally temperature-conditioned water reenters the basin through nozzles at the left side.

The temperature sensor is located between the filter and the circulation pump.

The safety overflow (stand pipe) is installed in the basin at the right front side. It should never be closed and periodically checked by the customer (see waste water).

## 7 Commissioning

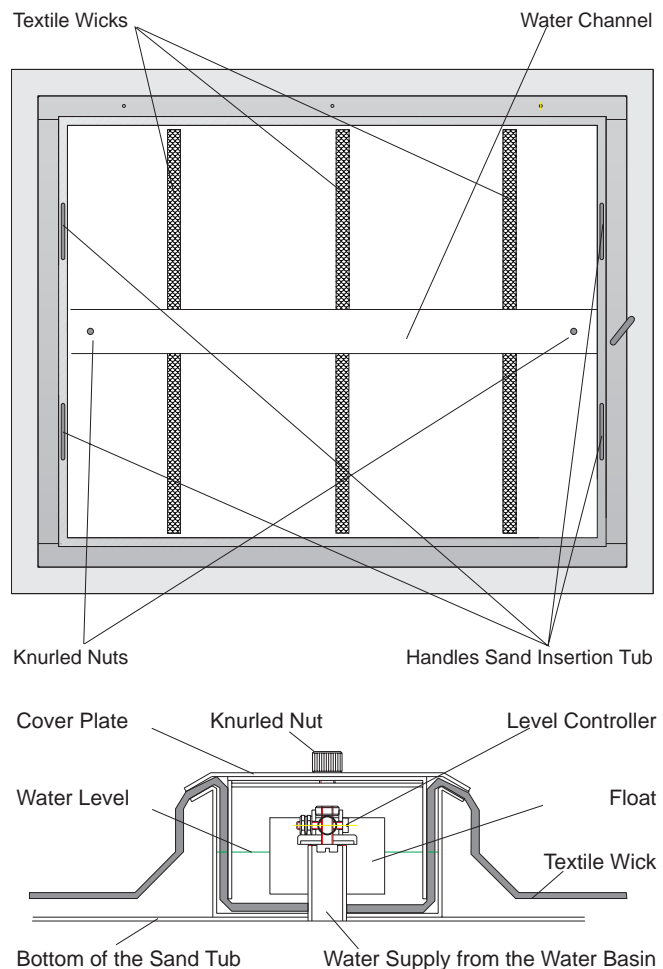
Prior to commissioning make sure, that the electrical, water and waste water connections are installed according to the instructions in chapter 5 and 6. The decisive regulations [for example VDE (=Association of German Electrotechnical Engineers) and EVU (=Electricity Supply Company) for the electrical connections, as well as DVGW (= German Association Gas/Water) for the water connection are to be observed!

Open the acrylic glass cover and remove the accessories, as well as the sand insertion tub before initial start-up of the unit. Clean the water basin and the sand insertion tub with a moist cloth prior to initial filling. Remove the protective cap of the level measuring probe in the left lateral wall of the water basin, since otherwise the level measuring probe will not switch-off the water intake (the protective cap is only a transport safety device).

***Do not deposit any metallic objects on or into the unit for reasons of extraneous rust formation which might affect the stainless steel surface of the unit!***

The delivery scope of the unit does not comprise the sand! However, 3 or 5 textile wicks (according to model) will be furnished as basic equipment. (Especially suitable are also straps for blinds with a width of 22 mm). The textile wicks are deposited in the sand insertion tub (see figure). Spare wicks can be delivered in rolls of 4,5 m length (see chapter 10) and can be cut to the exact size (approx. 82 cm). It is recommendable to weld up the ends of the wicks by means of a lighter to avoid fraying out.

For insertion of the textile wicks, open the water channel in the sand insertion tub. Loosen the two knurled nuts at the left and right side and remove the cover plate. Then insert the wicks observing that the middle wick is to be led below the float, thus avoiding any obstruction (see detailed drawing). Both the longitudinal sides of the channel cover are equipped with a sheet metal panel pushing the wicks to the bottom of the water channel, and thus ensuring sufficient moistening of the wicks and providing the necessary free space





for the float. The number of wicks depends on the desired degree of humidity (more wicks → more humidity) and on the structure of the used wicks. Experimental values for the furnished wicks are: 3 wicks for the models 5400 and 5500, and 5 wicks for the models 5600 and 5700. Distribute the wicks as evenly as possible over the length of the sand tub. The distance between the wicks should be twice as large as the distance of the wicks to the edge of the sand tub (see drawing). An uneven positioning (even in the later higher position in the layer of sand) may result in a very uneven humidification. When the wicks have been inserted, replace the cover of the water channel and tighten the knurled nuts.

***When filling the tub with dry sand, take care for sufficient dust protection. If necessary, wear a breathing mask!***

Then the sand insertion tub must be filled with sterilized silica sand until approx. 20 mm below the upper edge. When filling, observe that the position of the wicks will not be changed. They should lay on a sand layer of approx. 10 mm height and should be covered by a sand layer of approx. 50 - 60 mm height. Smoothen the surface of the sand layer.

The tub is equipped with two handles at each side for easy transportation by 2 persons. Transport of the tub should be only effected using the handles to avoid contusion of the fingers. It is very important, that no sand gets into the water basin, where it can clog the lines or the pump. The sand tub must be filled before filling water into the germination basin, since an empty sand tub would float on the surface due to the lifting force of the water and thus might damage the acrylic glass cover.

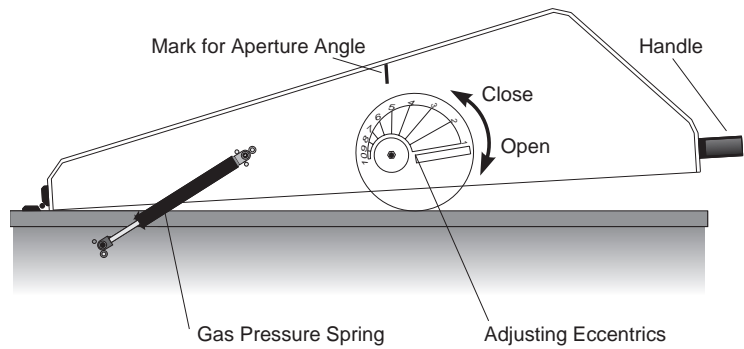
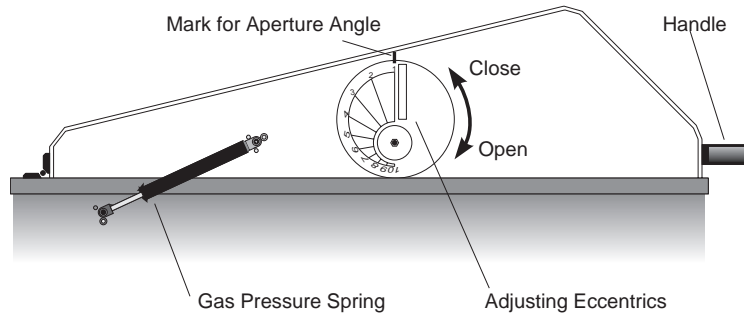
***Never insert the filled sand tub into the filled water basin, since the water would flow over, as the capacity of the safety overflow would be exceeded by the abrupt water displacement and penetrating water might damage the electrical system!***

The germination table is switched on by the white rocker switch, and with opened water intake the basin will be automatically filled. When the working water level is reached, the solenoid valve of the level measuring system switches-off the water intake, and the circulation pump starts running. During the filling cycles, the circulation pump, the cooling (model 5500 and 5700) and the heating are out of operation. The red rocker switch "Heating" and the blue rocker switch "Cooling" must be switched-on. The heating capacity is controlled continuously and contactlessly by a solid state relay. Upon request of cooling capacity, the refrigerating unit starts running, and the solenoid valve cooling will be opened. If there will be momentarily no demand for cooling capacity, the solenoid valve cooling will be closed, and the bypass valve in the cooling circuit will be opened. If there is no request for cooling for more than 3 minutes, the refrigerating unit will be switched-off.

As soon as the sand is evenly moistened, the germination table can be charged. The seed will be deposited on paper substrates and placed on the humid and temperature-conditioned sand. The acrylic glass cover can be opened for ventilation using the eccentrics with graduation at both sides. There is a mark on the hood above the eccentrics for incremental measuring of the aperture angle for experimental values. The cover should always be opened as wide, that formation of condensation drops at the lower side of the cover will be avoided. If, for all that, condensation drops are occurring, open the cover slowly, so that the condensate does not drop off, but is drained off along the lower side of the inclined cover.

The cover should be only moved by means of the handles and should not be jammed, i. e. when putting down the cover, the adjusting values of the eccentrics must be the same.

Actions by force as well as heat loads, f. ex. caused by projectors, might damage the cover.



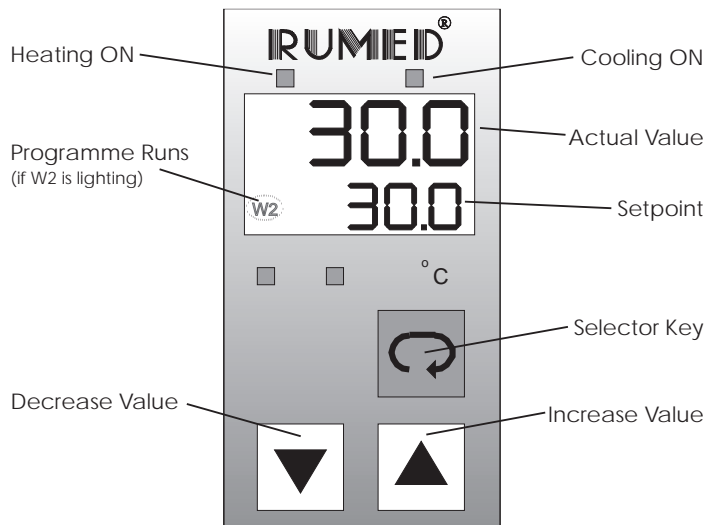
## 8 Temperature Control

### 8.1 Temperature Controller



#### Functioning

The digital temperature controller can be used as constant value controller or with model 5100 and model 5300 as programme controller. Temperature sensor is a Pt 100 resistance thermometer, class A.

Further technical details can be drawn from the PHILIPS Operating Instructions No. 9499 040 21601.



### 8.2 Setpoint Control

The temperature controller keeps the test room temperature constant on an adjusted value. Actual value and setpoint are displayed simultaneously on two different digital displays being located upon another. The upper digits indicate the actual value, the lower digits the setpoint. The setpoint value can be decreased or increased by pressing the keys  and .

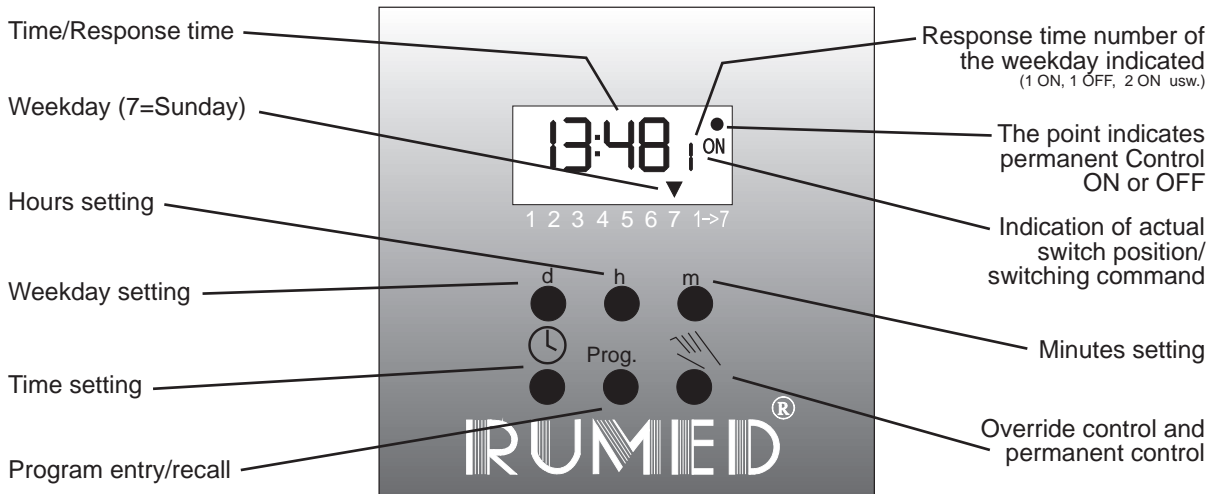
### 8.3 Programme Control

The option dual setpoint daily programme is achieved by configuration of the temperature controller as programme controller. This option offers the possibility of a change between two temperatures with programmable values for the temperature variation speed (ramps). The programme can be started at any desired moment by the switching command (1 ON) of the timer. The switching command (1 OFF) terminates the programme. The moment for the switching command OFF results from the running time of the programme. During the programme cycle "W2" is displayed.

The timer can be operated in the switching modes "Auto", "Permanent ON" and "Permanent OFF". For programme control, the timer must be switched to position "Auto". For a commutation to setpoint control, the timer must be switched to "Permanent OFF". The controller will then be operated as setpoint controller and all the programmed parameters will be kept in the controller as well as in the timer.

As soon as the timer is commutated again to "Auto", the programme control is reactivated (See chapter 8.4 "Programme Timer for Alternating Temperature" -> "Change of Switching Status").

### 8.4 Programmable Timer for Alternating Temperatures









#### General

The digital timer can be operated in the operating modes "daily programme" and "weekly programme". It is recommended to programme the daily reiterating day-/night temperature change in the operating mode "daily programme". (The small triangle in the display must aim to 1->7; if not, the "weekly programme" of the timer is activated. Change of the operating mode is effected by a reset of the timer.

Reset of the Timer and Selection of the Mode "Daily Programme"		
Please observe the following four steps <b>exactly</b> for starting the timer in the daily programme mode.		
		Press the four keys simultaneously to reset the timer (can be read at the display)
- none -		Let the keys loose, and the display test will be finished
		Press and hold the key with the clock sign and set the actual hour by means of the key h. <i>(our example: 13)</i>
		Press and hold the key with the clock sign and set the actual minutes by means of the key m. <i>(our example: 48)</i>
After having entered the actual time, let the key with the clock sign loose and the timer will run.		






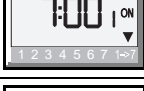

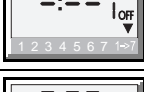


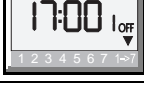



Change-over from Summer- to Winter Time	
	press keys simultaneously, and time is put on by an hour (summer time)
	press keys simultaneously, and time is put back by an hour (winter time)

Change of the Switching Status		
		Clock indicates the actual time (f. ex. 13.48 h) Switching status is "Automatic OFF"
 + 		Press and hold key m and press key Hand once. The switching status will change-over to "PERMANENT ON" (display indicates a point above ON)
		Press and hold key m and press key Hand once. The switching status will change-over to "PERMANENT OFF" (display indicates a point above OFF)
		Press and hold key m and press key Hand once. The switching status will again change-over to "AUTOMATIC" (point disappears)




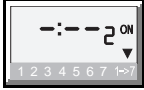


### Daily Programme



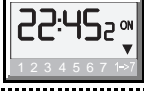
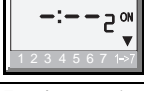


When the mode "daily programme" is activated, maximum 6 ON- and 6 OFF-commands can be programmed. However, for one programme cycle only 1 ON- and 1 OFF-command is required. The command ON starts the programme, the command OFF terminates the programme. At the same time, a programme reset is effected in the temperature controller, which is the only possibility for a further programme start. Correspondingly, the time delay between an OFF-command and the next ON-command must be at least 1 minute, otherwise the programme reset cannot be effected and the programme controller will not change to the next programme cycle (i. e. in the operating mode "daily programme" it is possible to run a four-hour programme cycle six times per day maximum).

The following table shows the programming of the response times for our dual setpoint programme example.

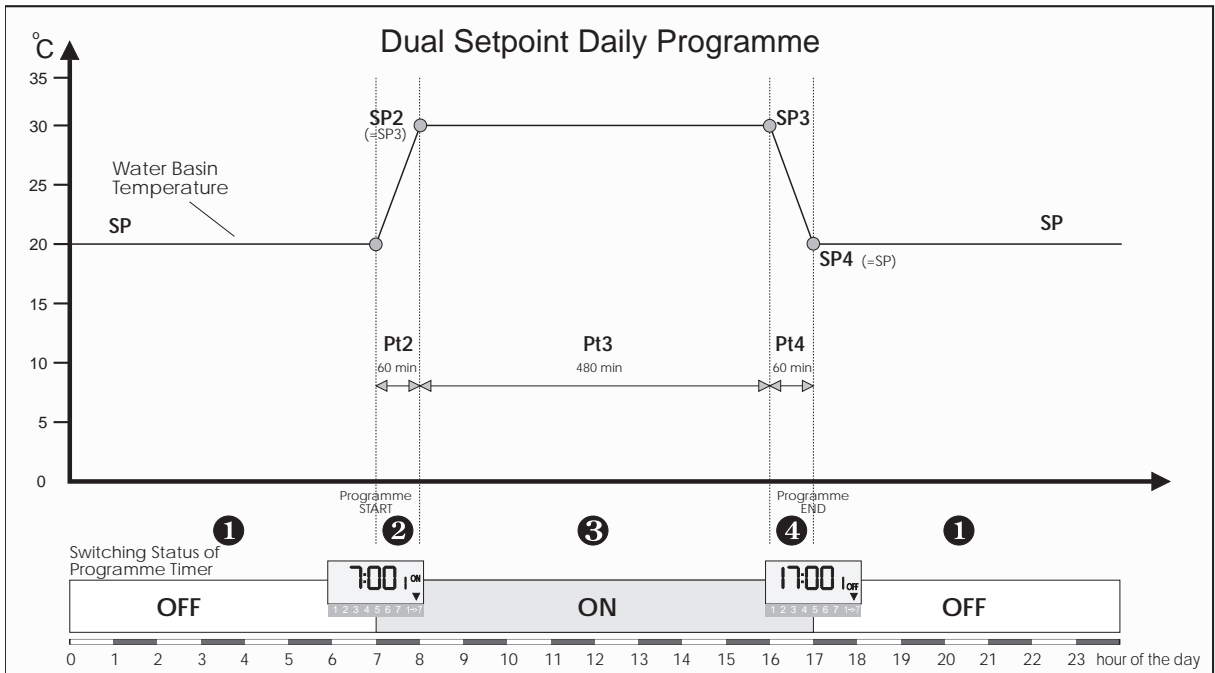
Programming On- and Off-Commands (Operating Mode "Daily Programme")		
		Clock indicates the actual time (f. ex. 13.48 h)
		Press once, to call the programming mode (Here: f. ex. not yet programmed)
 or 		Enter time for the command 1 ON by means of the keys <b>h</b> and <b>m</b> (Here: f. ex. 7.00 h)
		Press once, to call the command 1-OFF (Here: f. ex. not yet programmed)
 or 		Enter time for the command 1 OFF by means of the keys <b>h</b> and <b>m</b> (Here: f. ex. 17.00 h)
	There are no further switching commands required for our example programme! If requested, all other switching commands can be called successively on pressing the key <b>Prog.</b> (2 OFF, 3 ON, 3 OFF, 4 ON, 4 OFF, 5 ON, 5 OFF, 6 ON, 6 OFF ← after 6 OFF, 1 ON 1 OFF etc. will be repeated)	
		Press once, to terminate the programming mode and to return to the normal display (if there will be no entry within 30 sec., the display will automatically return to actual time).

A correct execution of the programme is based on the condition, that only the required ON-/OFF-commands have been programmed. When you are not sure, if you have programmed unintentionally switching commands which are not required and which may disturb the programme flow, you can visually check the commands by calling them on the display.

Display of the Programmed ON-/OFF-Commands		
		Clock indicates the actual time (f. ex. 13.48 h)
<b>Prog.</b> ●		Press once, to call the programming mode. The command 1 ON will be displayed ( <b>Example programmed to 7.00 h</b> )
<b>Prog.</b> ●		Press once, to call the command 1-OFF ( <b>Example programmed to 17.00 h</b> )
<b>Prog.</b> ●		Press once, to call the command 2-ON ( <b>Here: f. ex. not yet programmed</b> )
<b>Prog.</b> ●	If requested, all other switching commands can be called successively on pressing the key <b>Prog.</b>  (2 OFF, 3 ON, 3 OFF, 4 ON, 4 OFF, 5 ON, 5 OFF, 6 ON, 6 OFF ←after 6 OFF, 1 ON 1 OFF etc. will be repeated)	
 ●		Press once, to leave the display mode and to return to the normal display (If there will be no entry within 30 sec., the display will automatically return to actual time).

Modifying or Cancelling the Programmed ON-/OFF-Commands		
		Clock indicates the actual time (f. ex. 13.48 h)
<b>Prog.</b> ●		Press the key PROG several times until the switching command to be modified is displayed (Example: press 3 times to call 2 ON)
<b>h</b> ●	 ----- 	Modify the desired time by means of the keys h and m (Here: f. ex. modification to 22.45 h)
<b>m</b> ●		or delete the command 2-ON by pressing the keys h and m simultaneously
<b>Prog.</b> ●	Further switching commands to be modified or deleted are called by means of the key PROG and can be modified or deleted according to the above mentioned procedure.	
 ●		Press once, to terminate the programming mode and to return to the normal display (If there will be no entry within 30 sec., the display will automatically return to actual time).

### 8.5 Example for a Dual Setpoint Daily Programme



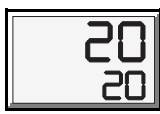


























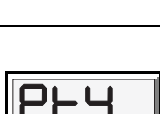


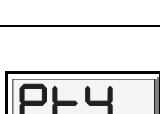

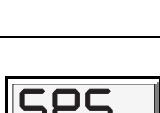

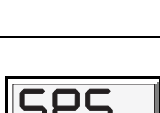






Segment	①	②	③	④	①
Function	Night Temperature	Heating	Day Temperature	Cooling	Night Temperature
SP (°C)	20 20	SP2 30	SP3 30	SP4 20	20 20
Pt (min)		Pt2 60	Pt3 480	Pt4 60	
Switching Command Timer	7:00 ON		17:00 OFF		
Switching Status	OFF	ON		OFF	

The moment for the command 1 Off is calculated: **time end + time start + Pt2 + Pt3 + Pt4**,

i. e. **our example:** 7.00 h + 60 min + 480 min + 60 min = 7.00 h + 10 h (3 h p.m.) = 17.00 h (5 h p.m.)

**ATTENTION:** If the time for the instruction OFF had not been chosen correctly, the programme might be aborted!

Entry of Programme Data		
 or 		Adjustment of value SP <i>(acc. to our example: 20 °C)</i>
		Push key until SP2 is displayed
 or 		Adjustment of value SP2 <i>(acc. to our example 30 °C)</i>
		Push once, Pt2 will be displayed
 or 		Adjustment of value Pt2 <i>(acc. to our example 60 min)</i>
		Push once, SP3 will be displayed
 or 		Adjustment of value SP3 <i>(acc. to our example 30 °C)</i>
		Push once, Pt3 will be displayed
 or 		Adjustment of value Pt3 <i>(acc. to our example 480 min)</i>
		Push once, SP4 will be displayed
 or 		Adjustment of value SP4 <i>(acc. to our example 20 °C)</i>
		Push once, Pt4 will be displayed
 or 		Adjustment of value Pt4 <i>(acc. to our example 60 min)</i>
		Push once, SP5 will be displayed
		Adjustment of value SP5 <i>(is not required for our example - so press key until ---- will be displayed)</i>
		Push once, Pt5 will be displayed
		Adjustment of value Pt5 <i>(is not required for our example - so press key until ---- will be displayed)</i>
After approx. 30 sec. waiting time, the controller switches automatically to the display setpoint/actual value! (If this occurs unintentionally during data entry, repeat the procedure from the beginning).		



## 9 Service and Maintenance

### 9.1 Cleaning the Germination Basin

- Close the water intake and switch-off the germination table by means of the white rocker switch.
- **Unplug mains plug!**
- Open the door of the control box using the key for the switch cabinet.
- Drain the water by turning the waste water cock (being located in the upper right corner of the control box) by a quarter turn upwards to the right.
- Open the cover and take off the sand tub. Wait until the water basin is completely emptied.
- Wipe off the water basin (tenacious lime deposits can be removed by means of commercially available acid of vinegar).
- Empty sand tub and loosen knurled nuts of the cover for the water channel.
- Remove cover and empty residual water.
- Withdraw the wicks and clean them, if necessary replace them; clean and dascalify all parts.
- Clean the coarse filter being located in front of the pump in the water intake (follow the course of the thicker hose of the two hoses starting from the pump). Open the sealing cap by means of a suitable adjustable key, withdraw insert, clean and replace insert, replace and tighten sealing cap.
- Clean circulation pump, if necessary (see chapter 9.2 Maintenance of the Circulation Pump).
- Assembly and filling, see chapter 7 "Commissioning", page 8.
- Close the waste water cock and close the door with the key.
- Insert the refilled sand tub.
- Reconnect unit to mains.
- Open the water intake and switch-on the germination table by means of the white rocker switch.

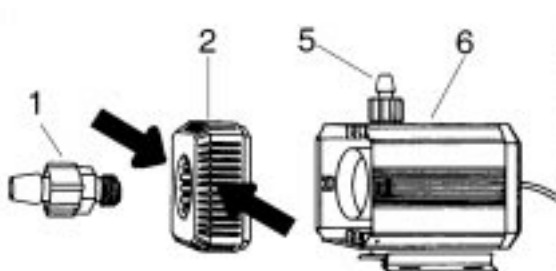


### 9.2 Maintenance of the Circulation Pump

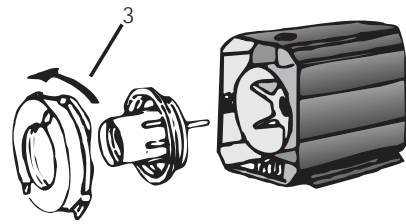


When the circulation pump is too badly soiled on the suction or pressure side, a loud noise will occur, and the pump should be thoroughly cleaned. Cleaning should be effected as follows:

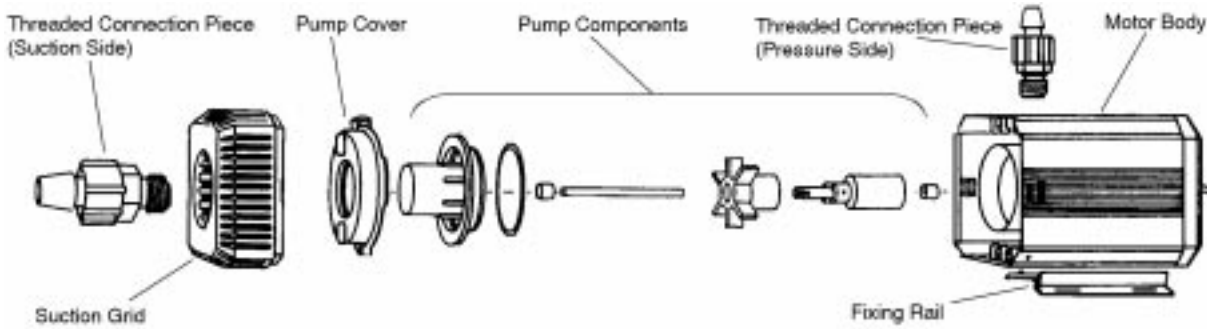
- Close water intake and switch-off the germination table by means of the white rocker switch - **Unplug mains plug!**
  - Open the door of the control box by means of the key for the switch cabinet.
  - Drain the water by turning the waste water cock by a quarter turn upwards to the right.
- Unplug mains plug of the pump.
  - Loosen the nuts of the hose clamp at the connection pieces (1) and (5) by turning them to the right (seen from the hose in direction of the pump) and withdraw the hoses from the connection pieces. **(Attention: Collect residual water which might eventually penetrate!)**



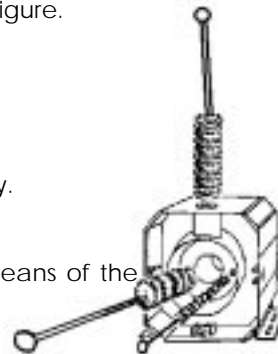
- Unscrew suction connection piece (1).
- Slightly press the two suction grids laterally together and strip them from the motor body (6).
- Unlock the cover of the pump (3) in direction of the arrow and withdraw the pump components according to the drawing.



**General Plan**



- Clean the pump thoroughly with a cleaning brush as shown in the figure.
- Clean the pump components with running water.
- Reassemble the pump components in vice-versa sequence.
- Reconnect mains plug of the pump.
- Close the waste water cock and lock the door by means of the key.
- Reconnect mains plug of the unit.
- Open the water intake and switch-on the germination table by means of the white rocker switch.



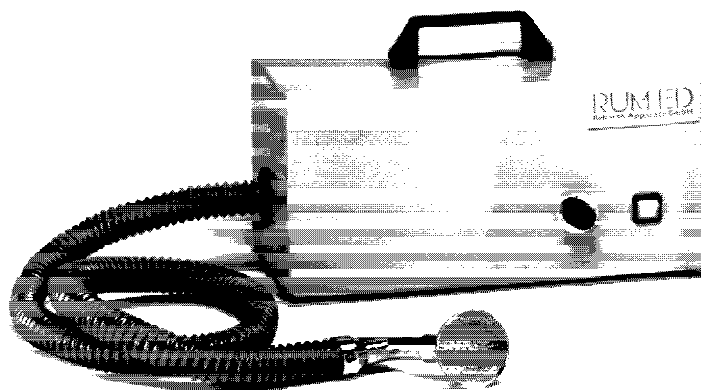
**10 Incidentals and Spare Parts**

Description	Package	Order-No.
Paper Substrate (70 mm Ø)	1000 Pieces	5095
Silica Sand	50 Kg Sack	Upon Request!
Door Key	1 Piece	
Circulation Pump	1 Piece	
Cleaning Brushes for Circulation Pump	1 Set	
Textile Wicks	Roll (4,5 m)	

## 11 Optional Accessories

### Vakuu Seed Counter

The vacuum counter is used for counting and depositing of seed on paper substrates and is particularly suitable for seeds being regularly shaped and relatively even, as for example grain, brassica and trifolium sorts. The counter consists of three main components: a vacuum system with connection hose, a number of counting heads corresponding to the



different seed sorts and a valve to dissolve the vacuum. The vacuum can be adjusted by a potentiometer. The counting heads with 100, 50 or 25 bores are smaller than the paper substrate, and are equipped with an edge to prevent the seed from falling off. The diameter of the holes should be adapted to the size of the seed and the suction capacity of the vacuum.



### Seed Sorting System

The seed sorting system serves for separation of the light and heavy grains of seed or hollow bodies generally. The seed is filled from the top into the acrylic glass cylinder of the seed sorting system. A blower with speed control blows through the cylinder from bottom to top, and the seed falls into one of the three collecting vessels attached to the cylinder. Thus, the light seed is collected in the upper vessels and the heavy seed in the lower collecting vessel.