



# Instructions for use

Vacuum cabinets - line Comfort

**VACUCELL** 22, 55, 111



Congratulations on obtaining a new temperature cabinet, Temperature sensitive, easy decomposable or oxidative materials, can be dried very tenderly in VACUCELL, vacuum drying ovens, where is the opportunity of extrusion of air by inert gas. Also complicated components with hardly accessible hollow spaces are drying quick and affectively in VACUCELL ovens.

The units meet technical and legislative requirements and they are designed according to respective EN standards. The units are made of high quality materials by using the latest technology. Each piece undergoes a careful output control.

Provided you will follow the instructions mentioned here the unit becomes your reliable and powerful partner.

Now these advantages will be available just for you. This unit will help to solve your everyday problems and it will become powerful assistant for you. This unit is very easy to use, nevertheless, we recommend you to read the Instructions for use carefully so that you could use all advantages of this unit and obtain complete knowledge for its optimal use.

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**APPENDICES:**

DECLARATION OF CONFORMITY



# 1 GENERALLY

## 1.1 SCOPE OF VALIDITY

These instructions apply to the device series VUK-B2V and VUK-B2V-M.

## 1.2 PURPOSE

VACUCELL (VU) is an electrically heated and evacuated chamber which may be used after evacuation to heat the objects located in it. Evacuated objects are placed on the shelves in the chamber. The device works at temperature up to 200 °C.

The temperature course is controlled by a modern microprocessor (Fuzzy-logic) with digital display and PT 100 temperature sensor. This system ensures high precision of temperature regulation and reliability of the tempering process. The unit has been designed, produced and tested according to the appropriate European standards. It complies with the legislative requirements of LVD and EMC directives – see the attached declaration of conformity. It is made of high-quality materials, using the latest technology. Each piece goes through a careful output control.

## 1.3 USE

VACUCELL is designed to perform:

- vacuum drying of easy oxidable matters with possible displacement of oxygen by inert gas
- accelerated drying of form-simple and complicated parts
- drying of samples up to constant weight at adjustable temperature and selectable time mode.

**The unit may be used primarily in the following branches:**

- biology
- cosmetics
- pharmaceuticals
- food industry
- chemistry
- electric technology
- plastics processing
- engineering.

The unit is designed to be used and handled by the persons familiar with dealing with the laboratory equipment and apparatuses.

# 2 IMPORTANT INSTRUCTIONS

## 2.1 UNPACKING, CHECKING AND HANDLING

After unpacking please check that the unit and the accessories are complete and undamaged. Possible damage must be immediately reported to the transporter. When handling - lifting the cabinet, etc - the cabinet must not be lifted using the hand rail or the door! Lift the cabinet using the four hooks that you push into the openings in the side of longitudinal legs of the cabinet.

Standard delivery consists of:

The temperature cabinet, two Al shelves, (ordering No. V459046 – volume 22, V459047 – volume 55, V459048 – volume 111)

silicon hose 8 x 18 for interconnection of chamber/ vacuum source (ordering No. 0662132).

Three chip cards formatted for program download (marked Programs – empty) and one special operations card (SO). Attention: If an SO card is used for a program download, its original function will be cancelled.

## 2.2 BEFORE PUTTING INTO OPERATION

- **Before beginning the work with the unit please read the Instructions for use carefully!**
- The unit is designed to work indoor within the ambient temperatures range of from 5 °C up to 40 °C, at maximum relative humidity of 80 %, up to the maximum altitude of 3 000 m.
- Install the unit by plugging the power cord to the mains. However, make sure at first that the mains parameters correspond to the values specified on the unit type label and to the data shown in Chapter 5.1 - Electric Connection!



Minimum distance of the unit from the rear and side walls is 100 mm.

- After the first switching-on of the unit the heating bodies and insulation start to be baked with a typical a smell; after a few operation cycles this smell disappears, nevertheless it is suitable, during the insulation baking at a temperature above 100 °C, to secure a sufficient air exchange (e.g. by ventilation or exhaustion).
- At temperatures above 100 °C the inner chamber surface becomes yellowish. This coloration is neither the material nor the device defect.

⚠ Place the material to be warmed-up on the shelves only, not on the bottom of the unit!

⚠ No inflammable, explosive or toxic materials can be inserted to the unit! The same concerns also materials material giving off such a stuff!

⚠ Do not put any corrosive materials into the devices.

⚠ The unit is not designed to warm-up liquids and it contains no liquids.

⚠ In case of any manipulation with the unit, other than its normal use, or if you do not use it for a longer period, disconnect it from electric mains by pulling the supply cord from the socket (position 2 – upper part panel)! When depressing the key **ON/OFF** the unit is set only in the stand-by mode, but it is not disconnected from electric mains !

⚠ Protection of the thermal cabinet, its surrounding and of the treated material against inadmissible temperature rise is secured by the protection thermostat t

⚠ Maximum permissible load: see chapter **5 - Specifications of the unit.**

⚠ Goods are only to be put on trays into ovens, never directly on the bottom of the oven!

⚠ Do not put any object on the outer surfaces of the ovens.

⚠ Aparatus may not be used in the atmosphere with a possible danger of flammable or explosive anesthetics.

⚠ No dangerous goods are permitted. Ovens may not be used for heating of liquids

⚠ Carrying capacity of the floor during installation of the device must correspond to the weight of the unit itself taking the weight of the maximum charge into consideration (see chapter **5 - Parameters of the unit**).

⚠ If the device is used in another that specified way, the protection provided by the device could be impaired.

## 2.3 USEFUL SPACE

Useful space is illustrated in Fig.1, where  $X(D) = 10\%$  of the interior chamber depth,  $X(W) = 10\%$  of the interior chamber width,  $X(H)_1$  is the distance of the lowest shelf from the bottom of interior chamber,  $X(H)_2$  is the distance of the top shelf from the top of the interior chamber. Within the space limited by said surfaces (according to the standard DIN 12 880 - illustrated by thick lines, thinner lines illustrate the interior walls of the chamber) temperature deviations stated in chapter Specifications of the unit are maintained. (It means, that over the last upper tray there are the limits from in chapter Specifications of the unit not obligatory.)

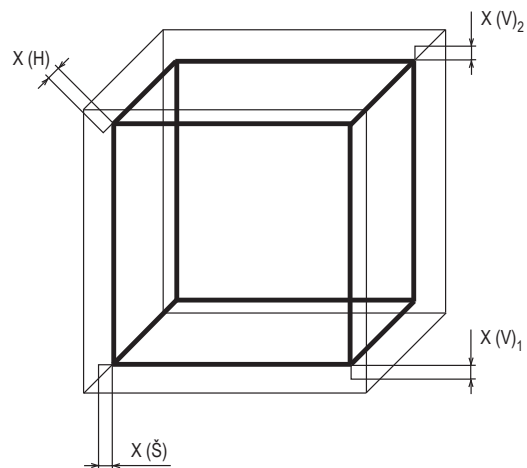


Fig. 1



## 2.4 WIRING AND OTHER CONDITIONS

<b>Basic data for connection:</b>	
Mains connection:	<b>1x230V/50(60)Hz</b> 1x115V/50(60)Hz
(standard types are marked with bold face)	
Mains voltage fluctuation	±10 %
<b>Protection against dangerous contact - class:</b>	I
<b>External circuits isolation:</b>	
– double isolation	
<b>Type of unit plug:</b>	
– as a standard CEE-7/VII, IEC-83/CH, 16 A/250 V (or another according to the type)	
<b>Socket protection:</b>	
– 10 A	
<b>Protection according to EN 60529:</b>	IP 20
<b>Overvoltage category according to (IEC 664 - EN 61010):</b>	
– II in case of pollution degree 2	
Fuses on the rear wall of the upper piece:	T 10 A
<b>Ambient conditions:</b>	
– ambient temperature: +5 °C to +40 °C	
– max.relative humidity: 80 % at 31 °C	
– maximal altitude: 3000 m	

## 3 DESCRIPTION OF THE UNIT

### 3.1 GENERAL VIEW

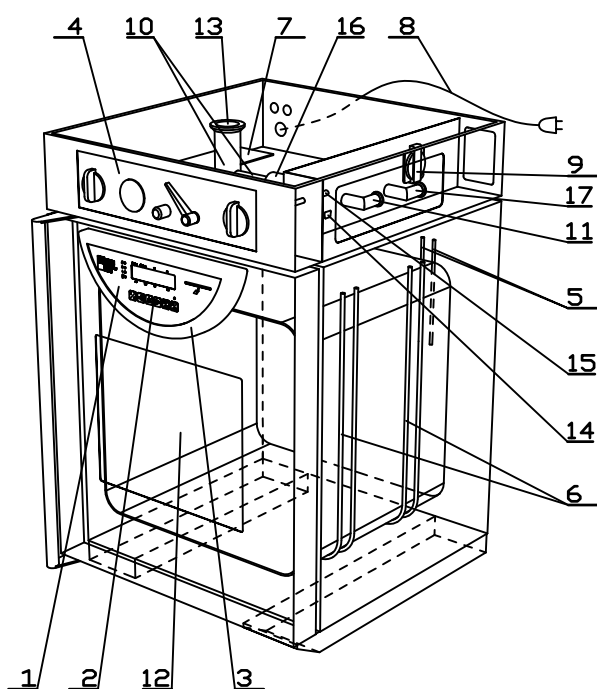


Fig. 2

- 1 - Panel of the regulator
- 2 - Control keys
- 3 - Plastic body of the regulator panel
- 4 - Panel of the upper part
- 5 - PT 100 temperature sensor and safety thermostat sensor
- 6 - heating bodies
- 7 - power part
- 8 - power supply cord
- 9 - built-in socket for the vacuum pump
- 10 - vacuum fittings
- 11 - inlet to connect the vacuum pump
- 12 - heat-resisting glass of the door
- 13 - measuring bushing
- 14 - RS-232C connector
- 15 - supply of inert gas to the needle valve
- 16 - ball valve
- 17 - supply of inert gas to the electromagnetic valve (see chap. 11)

### 3.2 CONTROL PANEL IN THE DOOR OF THE CABINET

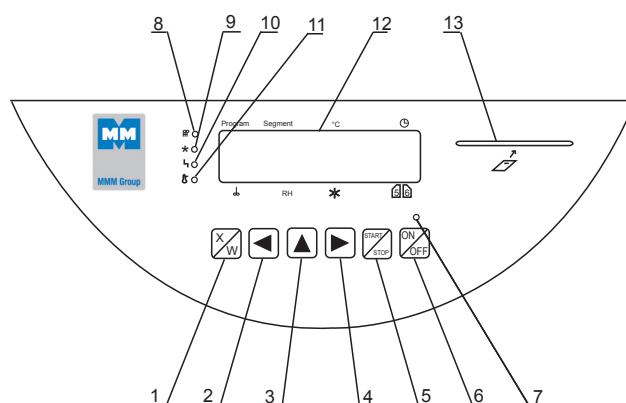


Fig. 3

- 1 - Activation key of the setting mode
- 2/4 - Left/right moving of the cursor
- 3 - Setting the parameters
- 5 - Key of the program start
- 6 - Switch (ON – the unit switched on, OFF – stand by mode)
- 7 - Indicator lamp of switching on – lights after switching on by the switch
- 8 - Indicator lamp of the heating – lights: temperature regulator state – heating activ
- 9 - for Vacucell not used
- 10 - Failure indicator lamp
- 11 - Indicator lamp of the safety thermostat – lights: the temperature is outside the set limits of the safety thermostat – heating is off / more detail in chapter 4.1.8 Setting the safety thermostat
- 12 - Display

13 - Opening for inserting the chip card

Position in display:

Program: program display

Segment: partial or complete graphical display of the program course

°C: temperature display

⌚ : process time

∅ not used

RH: not used

☀: not used

56: positions are used for specific purposes – see descriptions in the text.

### 3.3 CONTROL PANEL IN THE UPPER PART

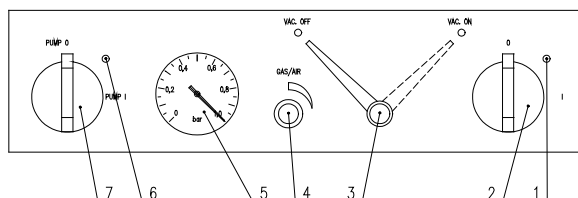


Fig. 4

- 1 - mains main switch indicator
- 2 - mains main switch
- 3 - ball valve connecting the chamber and the vacuum pump, in position VAC ON the valve is open
- 4 - needle valve to add inert gas or air
- 5 - vacuummeter
- 6 - indicator of the mains switch of built-in socket in the upper part
- 7 - mains switch of the built-in socket in the upper part - for the vacuum pump.

### 3.4 MAINS CONNECTION AND CONNECTORS

The mains connecting cord passes through the bush in the left part of the upper part to the power board, located in the upper part. In the right part of the upper part after removing the cover the connector RS232 C and the built-in socket for vacuum pump is accessible – see the picture below. There is an opening in the right rear part of the upper part, through which the hoses from the pump and with inert gas are connected to the VU.

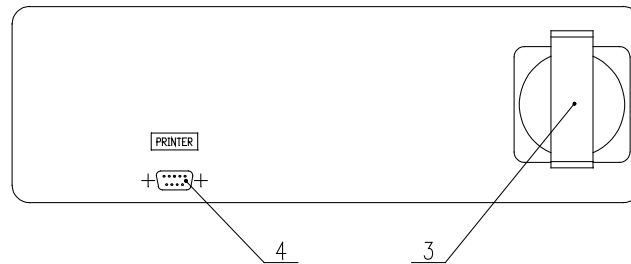


Fig.5

- 3 - mains socket ( for the vacuum pump)
- 4 - RS-232C connector to connect the printer

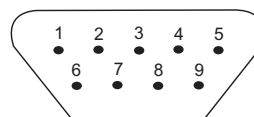


Fig. 6: nterface for protocol printer

#### 9 pin Canon connector on the case

Pin	Signal
2	RXD
3	TXD
5	GND
6	DTR

#### 25 pin Canon connector in the printer

Pin	Signal
2	TXD
3	RXD
7	GND
20	DTR

The appliances, which are connected with the connector RS-232C, must comply with valid regulations in terms of electric safety and electromagnetic compatibility.

#### Interface parameters:

- Baud: 9600
- Stopbit: 1
- Parity: none
- Databit: 8

## 4 FUNCTION AND OPERATION

Function of individual indicator lamps and control keys is described in section Description of the unit.

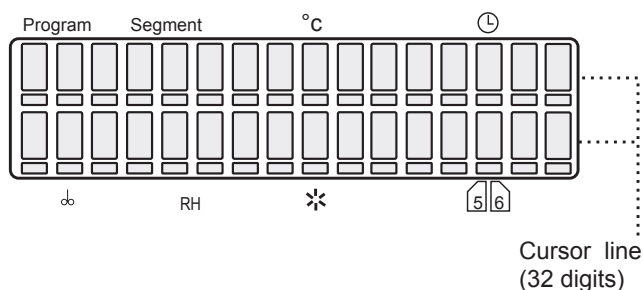
### Connecting to the mains

Compare the values of the nominal voltage and power input on the product plate with the appropriate voltage supply. If the parameters of the supply correspond to the device parameters, connect the plug to the mains socket.

### Switching on

Press **ON/OFF** (above which an indicator lights up), the display lights up and the unit is ready to work. Further procedures are described below.

The display shows all parameters at the same time. The cursor moves below all the 32 figures of the display in the so called cursor line and it is always placed below one of the 32 figures.



### Changing the parameters:

Move the cursor in the horizontal direction by means of ◀▶. Move the cursor in the horizontal direction by means of ▲ change the parameter which the cursor is placed below.

## 4.1 BASIC SETTING OF THE UNITS

The temperature cabinets with the Comfort regulator offer a wide scale of applications. A basis for a right starting the system is an optimum basic set-up. Following service mode with 7 various services serves for this set-up.

### 4.1.1 ACTIVATION OF THE SERVICE MODE

Press the keys ▲▶ simultaneously for 2 sec. On the display: Service 01. By means of ▲ select the services Service 01 – Service 08.

### 4.1.2 SERVICE 01 – RECORDING THE PROGRAMS P1 – P6

By means of this service you can record the programs P1 – P6 to the producer's chip card. Before the recording insert the right chip card to the opening in the panel. These cards can be ordered at the supplier of the unit.

### Make sure that the chip card is placed in the reading unit!

Press **START/STOP** to open the programme saving service. The display shows: „P1 ÷ 6 → MMM CCard“, Press **X/W** to do storing. The transmission is confirmed by the read out „Done“ on LCD. Press **START/STOP** again to enter another service. If the read out on the LCD is „Bad MMM CCard“, check the chip card and repeat the procedure. If there is a message „No MMM CCard“ on the display, check the chip card and repeat the procedure.

### 4.1.3 SERVICE 02 – RESTORE/RECORDING THE PROGRAMS FROM CHIP CARD TO THE UNIT

By means of this service you can record the programs P1 – P6, that have been stored to the chip card (see Service 01), back to the unit's memory. The programs already contained in the memory will be erased. Make sure that the chip card is placed in the reading unit.

Press **START/STOP** to open the programme saving service. The display shows: „P1 ÷ 6 → MMM CCard“, Press **X/W** to do storing. The transmission is confirmed by the read out „Done“ on LCD. Press **START/STOP** again to enter another service. If the read out on the LCD is „Bad MMM CCard“, check the chip card and repeat the procedure.

### CAUTION!

The original chip card delivered by the manufacturer should be used only. Cards whose type ends with the figure 1024 (AT24C1024) may only be used. Older cards ending with the figure 16 may not be used.

### 4.1.4 SERVICE 03 – SETTING THE REAL TIME AND DATE

By pressing **START/STOP** enter the service. You can set the appropriate time and date by means of ◀▶ and ▲.

Position	1	2	3	4	5	6	7	8	9	10	11
Scope	D	F	m	t	:	_	R	R	R	R	-

12	13	14	15	16
M	M	-	D	D

Cursor on the position 6: with the key ▲ selection of the date separator. The possible options are

dash (-), slash (/), dot (.), colon (:). The implicit value is dash. With the key ◀ back into the date setting mode.

Cursor on the position 7: with the key ▲ selection of the date format. The possible option for Czech language are YYYY-MM-DD, YYYY-DD-MM, MM-DD-YYYY, DD-MM-YYYY. The implicit value is YYYY-MM-DD (Czech), YYYY-MM-DD (English), JJJJ-MM-TT (German), AAAA-MM-JJ (French). With the key ▶ back into the date setting mode.

The service shall be terminated and closed by pressing the button **START/STOP**. The data format on the display: hour:min\_day.month.year. The selected format will be shown both on the LCD display and the printer.

#### 4.1.5 SERVICE 04 – SETTING THE PRINTING INTERVAL ON THE COMMUNICATION INTERFACE OF THE PRINTER

The thermal cabinets can be provided (as an option) with an external printer, which is connected to the interface by means of a cable – see chapter Protocol printing. Enter the service by pressing **START/STOP** and set the printing interval:

By means of ▲ select one of following options:  
 printer OFF  
 switched over to PC (application of SW WarmComm – data are sent to PC)  
 interval 10 s  
 interval 01 min  
 interval 01 h

By means of ◀ place the cursor in the position of 10/01 s, min or h. By pressing ▲ the printing interval can be changed in following range  
 10 to 50 s (step 10 s)  
 01 to 59 min (step 1 min)  
 01 to 12 h (step 1 h).

End and quit the service by pressing **START/STOP** again.

#### CAUTION!

Only one unit is active, either seconds or minutes or hours!

The service is extended by the possibility of setting the type of the connected printer. When the printer interval is displayed, the selection is available by the button ◀ (the cursor is in the left end position, i.e. in the place where the interval size can be set) or ▶ (the cursor is in

the right end position, i.e. in the place where the interval time unit can be set).

“Print = x “ is displayed; select x = 1 (the Citizen printer) or x = 2 (thermoprinter) by the button ▲. Citizen is the default setting.

Terminate and close the service again by pressing the button **START/STOP**.

#### 4.1.6 SERVICE 05 – SELECTING THE LANGUAGE

By pressing **START/STOP** enter the service. Select the language by means of ▲. End and quit the service by pressing **START/STOP** again.

#### 4.1.7 SERVICE 06 – SETTING THE SWITCHING TIMES OF INNER SOCKET (OPTIONAL DESIGN)

Using this service you can set the time of periodical switching on and off of the inner socket.

Open the service by pressing **START/STOP**. The bottom line of LCD states:

“on: XXPP off: YYQQ”,

where XXPP is the time for which the socket is switched on for one part of the period (00 – 99), YYQQ is the time when it is switched off (00 – 99).

PP is the abbreviation of time unit (minutes or hours) for switching on, QQ for switching off. The following applies: XXPP + YYQQ = whole period.

Use ◀ and ▶ to move the cursor, use ▲ to change the numbers of time units or units.

If XX = 00, then the socket never switches on, if XX ≠ 00 and YY = 00, then the socket is permanently switched on after the start up to termination.

#### 4.1.8 SERVICE 07 – SETTING THE SAFETY THERMOSTAT

Safety thermostat serves to protect the thermal cabinet, its surrounding and treated material against inadmissible exceeding the set temperature (e.g. it prevents damage or destroying of material samples in case of a damage to the temperature regulator or unintentional setting of higher temperature in the chamber of the unit than respective sample is able to bear).

Enter the service by pressing **START/STOP**. On the lower line of the display – in the position 12, 13, 14 (symbols **XXX** on display) – set the by you selected lower temperature limit (adjustable in the range from 0 °C to + 299 °C), minimal difference from the set regulated temperature is  $\pm 5$  °C),

in the position 16 (symbol **Y** on display) – set the type of the safety thermostat 2 – either 2 – complies with class 2 according to EN 610 10 - when surpassing set temperature in the chamber the display. In case of suppressing the set temperature in the chamber the display reports the error 04 “Safety Thermost.” the thermostat will switch the heating bodies off, the indicator safety thermostat lights up, the acoustic alarm starts up (the unit does not heat, even if the indicator heating lights). After the drop of the temperature in the chamber under the set safety thermostat limit the heating is still switched off, the indicator safety thermostat switches off, the report “Safety Thermost.” is still on the display and the acoustic alarm is still active. To start the operation again it is necessary to reset the safety thermostat – by pressing **START/STOP** cancel the error message and the acoustic alarm. The reset can also be carried out by pressing **X/W** in the mode Service 07.

Insert the chip card SO to the reading unit on the control panel and confirm the setting of the temperature thermostat type by pressing **X/W**. End and quit the service by pressing **START/STOP** again.

Check of the safety thermostat function:  
Set the limit temperature 85 °C according to the procedure described in Service 07 – Setting the safety thermostat – and confirm with the chip card SO. In P1 set the temperature 60 °C and start the program. After reaching the set temperature wait for approx. 10 min., stop the run of the program and select the Service 07; in Service 07 set the limit temperature to 50 °C and confirm the setting with the chip card SO. The unit is operating according to the description in chapter Service 07 - Setting the safety thermostat: the message “Safety Thermost.” is shown on the display etc.

#### 4.1.9 SERVICE 41 – TEMPERATURE TOLERANCE

The type of errors is selected on the last sign. 2 and 3 (see Chapter 4.8) in case of temperature deviation from the set corridor. There are the following possibilities: “H” (the errors are “critical” – the programme is stopped) or “S” (the errors

are “soft” – the programme continues running). The default value (after RAM initialization) is “H” (critical error).

#### 4.1.10 SERVICE 58 – DOOR BLOCKING

This service is available only in devices equipped with the door blocking function.

Open the service by pressing **START/STOP**. Select one of the following possibilities by means of **▲** button:

1. “Inactive” – the door is unblocked permanently;
2. “Manual” – the door can be blocked/unblocked by means of buttons **◀** and **▶**
3. “Automatic” – the door is blocked automatically after lapse of certain set time. The period of time can be set within the range from 2 to 9 seconds. Unblock the door by means of the buttons **◀** and **▶**. You can select “C” on the last position of the display. In such case, the door can be unblocked only after the SO card is inserted.

	S	e	r	v	i	c	e	5	8					
A	u	t	o	m	.	a	f	t	e	r	2	s	C	

#### 4.1.11 SERVICE 09 – QUIT THE SERVICE MODE

Cancel the service mode by pressing **START/STOP**. Then you can modify and start the programs.

### 4.2 PROGRAM P1

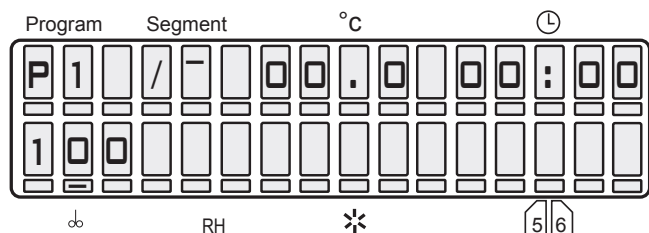
Constant temperature is required. The cabinet operates at the set temperature until the unit is switched off.

#### 4.2.1 SETTING THE PROGRAM P1

By means of **◀▶** place the cursor to the position Program and switch over to P1 by means of **▲**. Set the temperature at the position °C – you can set in steps of 1 °C.

**P 1 =** 

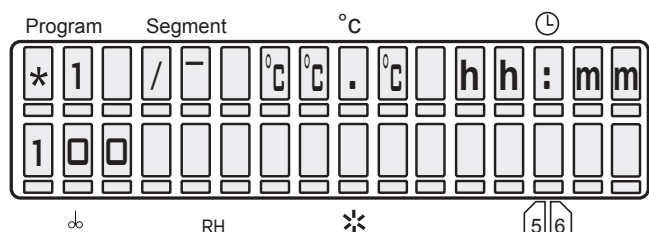
Display representation (in Vacucell only the upper line is engaged)



#### 4.2.2 START OF THE PROGRAM P1

Press the key **START/STOP**, an acoustic signal sounds and the symbol aircrew in the first position of the display starts to rotate clockwise.

See following display representation (in Vacucell only the upper line is engaged)



The first symbol (rotating aircrew) = the program is running,

The seventh to tenth symbol = actual temperature in °C,

The twelfth to sixteenth symbol = showing the time that passed since the start in h:min.

As soon as the set values are achieved, the time of operation at the set temperature is displayed.

#### 4.2.3 INFORMATION OF THE SET PARAMETERS DURING THE RUN OF THE UNIT

Press **X/W** and all information of the set parameters are displayed at the same time. If there is a reason in changing the parameters, all parameters in all programs including the active one can be set.

#### 4.2.4 STOP OF THE PROGRAM P1

Press the key **START/STOP** again.

### 4.3 PROGRAM P2

At first the set temperature is achieved, then the set time starts to be counted down and after the end of the process the heating is switched off.

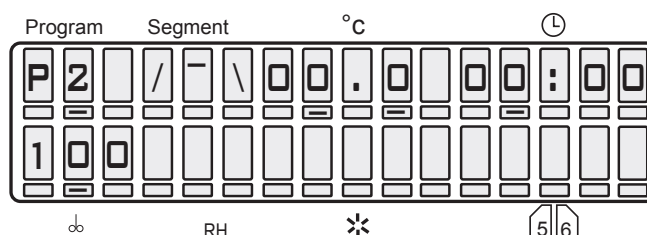
P 2 =

The cabinet operates at the set temperature until the set time has passed (max. 99 h 59 min).

#### 4.3.1 SETTING THE PROGRAM P2

By means of ◀▶ place the cursor to the position Program and switch over to P2. Set the temperature in the position °C. Move the cursor in the position ⊕ and set the required time of the process between 00h:00min and 99 h 59 min.

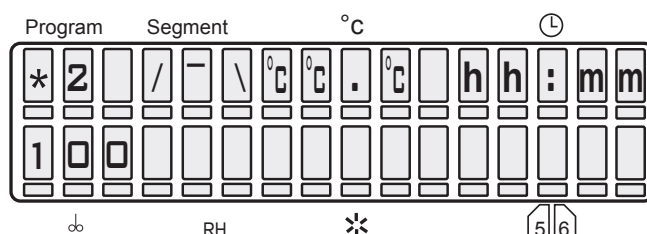
Display representation (in Vacucell only the upper line is engaged)



#### 4.3.2 START OF THE PROGRAM P2

Press the key **START/STOP**, an acoustic signal sounds and the symbol aircrew in the first position of the display starts to rotate clockwise.

See following display representation (in Vacucell only the upper line is engaged):



°C°C°C = actual temperature

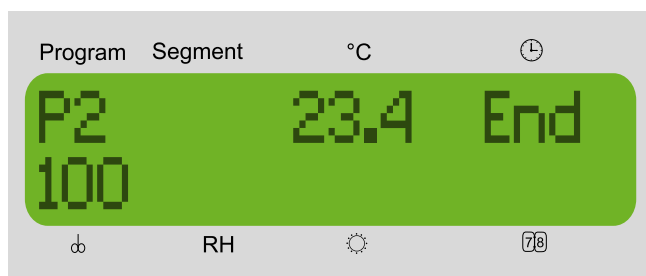
hh:mm = time from the start to reaching the set temperature, as soon as the set value is reached, the time remaining till the end of the program is displayed.

### 4.3.3 INFORMATION OF THE SET PARAMETERS DURING THE RUN OF THE UNIT

See 4.2.3.

### 4.3.4 INDICATION OF THE PROGRAMME END

After the programme ends, the display shows the number of the programme, temperature in tenths of °C and the text "End".




The programme end indication (and the temperature in the chamber) disappears after any button pressing on the panel; the temperature cannot be then displayed in any way (only by means of a new programme starting).

### 4.3.5 STOP P2

Press **START/STOP**.

## 4.4 PROGRAM P3

Delayed start after a given time.  
(The function enables to start the unit for instance on weekend. In this way the material can be prepared for your first working day.)

P 3 = 

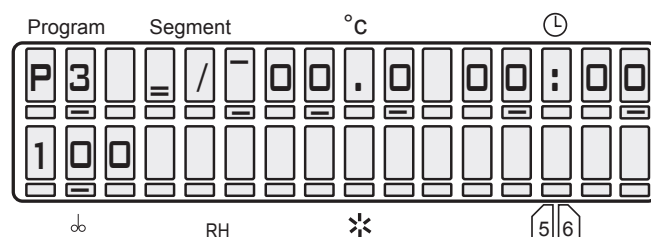
The unit starts running after passing the set time of the delayed start (max. 99 h 59 min) and operates at the set temperature. Time of operation at the set temperature can be limited or unlimited.

### 4.4.1 SETTING THE PROGRAM P3

By means of ◀▶ set the cursor to the position Program and switch over to the program P3.  
By means of ◀▶ place the cursor to the graph and make sure that the segment 1 of the graph

is activated (eventually change with ▲).  
Set the the time of delay between 00 h:00min and 99 h 59 min in the fields ⊕.  
By means of ◀▶ get to the graph and with ▲ switch over to the second segment of the graph \_/\_. Set the temperature in the fields °C.  
Place the cursor to the position ⊕ and set the time of the process between 00 h:00min and 99 h 59 or unlimited ∞∞∞:∞∞∞ (set the infinity in the following way: set 99 h, put the cursor to the nine in units and depress ▲).

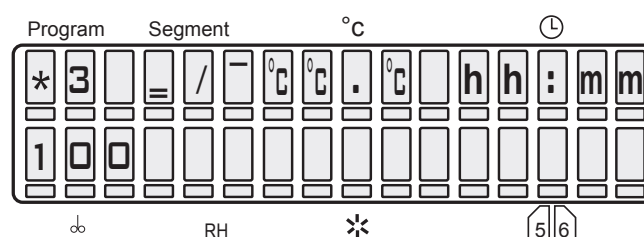
Display representation (in Vacucell only the upper line is engaged)



### 4.4.2 START OF THE PROGRAM P3

Press the key **START/STOP**, an acoustic signal sounds and the symbol airscrew in the first position of the display starts to rotate clockwise. See following display representation (in Vacucell only the upper line is engaged):

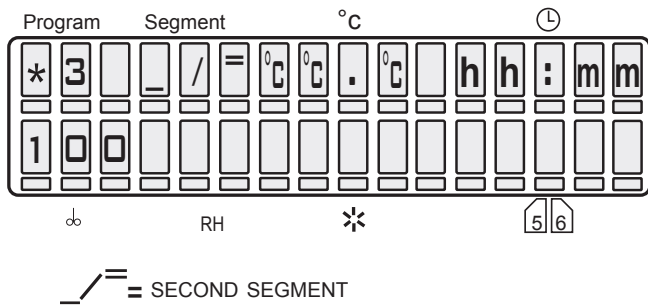
#### 4.4.2.1 P3 AND THE FIRST SEGMENT IN THE GRAPH ARE ACTIVE



 = FIRST SEGMENT

°C°C°C = actual temperature  
hh:mm = programmed time of delay, time countdown towards zero.

#### 4.4.2.2 P3 AND THE SECOND SEGMENT IN THE GRAPH ARE ACTIVE, THE FIRST SEGMENT HAS PASSED



°C°C°C = actual temperature.  
 hh:mm = time from the start to reaching the set temperature.

After reaching the set temperature the passed time is displayed in case of the unlimited time. If the time of the process is limited the time remaining till the end of the process is displayed.

#### 4.4.3 INFORMATION OF THE SET PARAMETERS DURING THE RUN OF THE UNIT

See 4.2.3.

#### 4.4.4 INDICATION OF THE PROGRAMME END

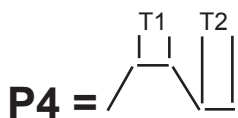
See 4.3.4.

#### 4.4.5 STOP OF THE PROGRAM P3

Press the key **START/STOP**.

### 4.5 PROGRAM P4

With two temperature levels T1 and T2, with a controlled rate of the temperature change (ramps) and with an option of cycles.



The program operates at 2 temperature levels T1 and T2, the time of operation at T1 is limited, the time of T2 can be limited or unlimited.

#### 4.5.1 SETTING THE PROGRAM P4

Index: T0 = initial temperature in the chamber  
 T1 = temperature level T1  
 T2 = temperature level T2

The eleventh figure of the display = (between the values of temperature and delay time), in which following information can be displayed:  
 r = value of the oblique ramp, can be set in positions 12 – 16 and corresponds to the rate of the temperature change in °C/min, max. value +3.20 °C/min, if T0 < T1, or T1 < T2. If r = 00.0, no ramp is active!  
 (Owing to a limited heating power the maximal rate of the change need not be maintained)  
 t = time accessible in position ☉ (00h:00 min -99 h 59 min), on case of T2 the time need not be limited  
 c = cycles displayed in position ☉, positions of the display 12 – 13 (accessible only in case of T2, if the delay time is not limited).  
 The possible number of cycles is 02 to 99 (eventually ∞- which is the next position after 99). (cycles are possible on condition that after the end of the interval at T2 the temperature drops below T0).

The value of cycle number is a global value that does not relate to individual segments, it relates to the complete programmed sequence. It can be displayed while displaying any segment on the display, however it does not concern only the displayed segment, but the whole sequence! The minimal number of cycles is really 2. If the customer wishes only one cycle, it is a start of program without cycles. The program can be started by depressing "Start"; no matter which segment is shown on the display, the program always runs from the segment 0 or 1, if the time of the zero segment is zero. For successful inserting of the cycling process into a started process it is essential that at the moment of the start "cXX" is shown on the display, where XX is the number of intended runs of the whole sequence. E.g. number two means, that the sequence is carried out and then repeated completely, i.e. it runs twice around. If "cXX" is not shown on the display at the moment of the start (by depressing "Start") and there are data on time or on the ramp of the actually displayed segment shown at this place, the whole sequence runs once and is not repeated, i.e. there are no cycles.



## 4.5.2 SETTING THE SEGMENT FOR T1

### 4.5.2.1 SETTING THE TEMPERATURE T1

Set the cursor to the position Program and switch over to the program P4. By means of ◀▶ place the cursor to the graph and make sure that T1

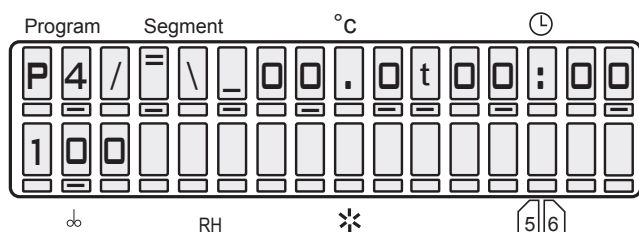
( $\sqrt{\quad}$ ) is activated. If not, change it with ▲. Get to the position °C – setting the temperature – and set the temperature.

### 4.5.2.2 SETTING THE DELAY TIME FOR THE TEMPERATURE T1

Place the cursor below the eleventh figure of the display and initiate the information of the parameters by pressing ▲. Either „r“ or „t“ is shown on the display (see the notes above). Select „t“. Get to the position ⊕ and set the delay time between 00h:00min and 99h 59min.

### 4.5.2.3 DISPLAY OF THE TEMPERATURE T1 AND THE DELAY TIME

(in VACUCELL only the upper line is engaged)



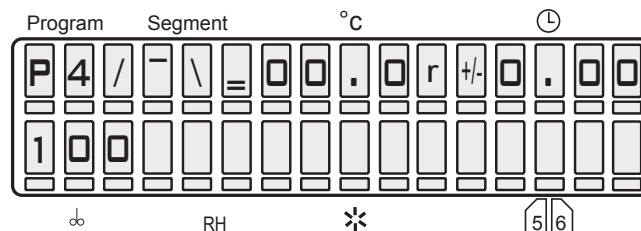
### 4.5.2.4 SETTING THE RAMP AT T1

Place the cursor below the eleventh figure of the display and select “r” by means of ▲. Get to the position ⊕ and set the required ramp (maximal value +3.20 °C/min for T0 < T1). If the ramp is not required, set “r” to 00.0.

In that case the temperature change will be performed at the maximal rate. The symbol ± is shown automatically according to the relation of T0 and T1 (ramp with the negative value of the change rate can be set if the the rate of the spontaneous cooling down is higher).

### 4.5.2.5 DISPLAY OF THE TEMPERATURE T1 AND THE RAMP

(in VACUCELL only the upper line is engaged)



## 4.5.3 SETTING THE SEGMENT FOR T2

### 4.5.3.1 SETTING THE TEMPERATURE T2

Set the cursor to the position Program, make

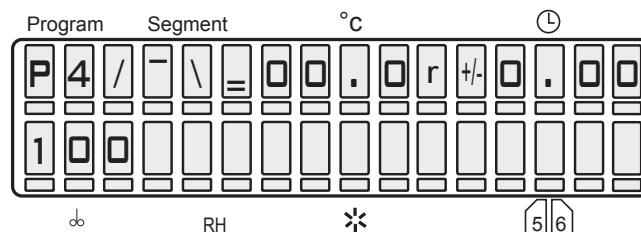
sure that T2 ( $\sqrt{\quad}$ ) is activated. If not, activate it with ▲. Switch over to the position °C – setting the temperature – and set the temperature – see 4.2.1.

### 4.5.3.2 SETTING THE DELAY TIME FOR THE TEMPERATURE T2

Place the cursor below the eleventh figure of the display and initiate the information of the parameters by pressing ▲. Either „t“ or „r“ or „c“ is shown on the display. Select „t“. Get to the position ⊕ and set the delay time between 00h:00min and 99h 59min unlimited ∞∞:∞∞ (set the infinity in the following way: set 99 h, put the cursor to the nine in units and depress ▲).

### 4.5.3.3 DISPLAY OF THE TEMPERATURE T2 AND THE DELAY TIME

(in VACUCELL only the upper line is engaged)



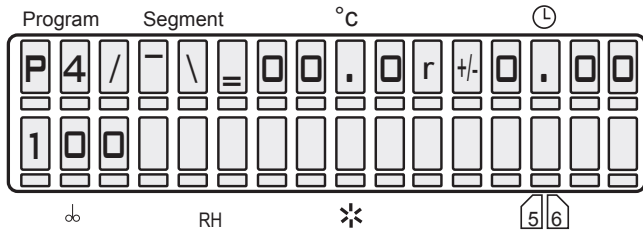
### 4.5.3.4 SETTING THE RAMP AT T2

Place the cursor below the eleventh figure of the display and select “r” by means of ▲.

Get to the position  $\odot$  and set the required ramp (maximal value +3.20 °C/min for T1 < T2). If the ramp is not required, set "r" to 00.0. In that case the temperature change will be performed at the maximal rate. The symbol  $\pm$  is shown automatically according to the relation of T1 and T2 (see 4.5.2.4).

#### 4.5.3.5 DISPLAY OF THE TEMPERATURE T2 AND THE RAMP

(in VACUCELL only the upper line is engaged)

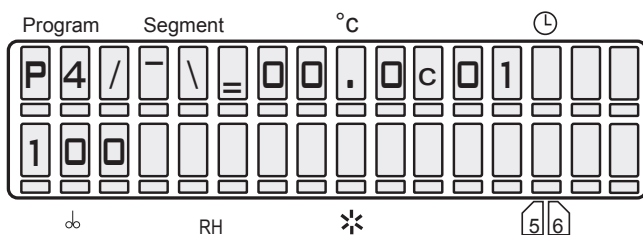


#### 4.5.3.6 SETTING THE CYCLES FOR THE PROGRAM P4

Place the cursor below the eleventh position of the display and select "c" by means of  $\blacktriangle$ . Get to the position  $\odot$  and set the number of cycles between 02 and 99 cycles (eventually  $\infty$ ). The number of cycles gives, how many times the cycle will run, for instance the value 03 means that at the end of the first cycle the whole process will be repeated twice. If there is no „c“ on the display at the moment of the program start, no cycles will be carried out and after the end of the exposure at T2 the temperature must drop below the level T1.

#### 4.5.3.7 DISPLAY OF THE CYCLES FOR THE PROGRAM P4

(in VACUCELL only the upper line is engaged)

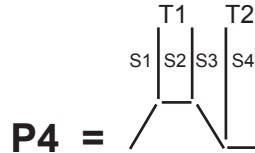


#### 4.5.4 START OF THE PROGRAM P4

##### CAUTION!

If the cycles are required, there must be „c“ on the display at the moment of the start!

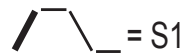
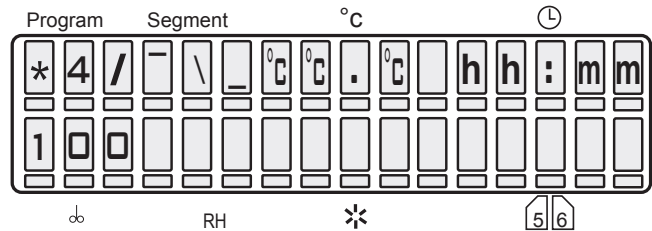
Press the key **START/STOP**, an acoustic signal sounds and the symbol airscrew in the first position of the display starts to rotate clockwise. See following display:



The graph shows the actual state of the program.

#### 4.5.4.1 S1 IS ACTIVE, TEMPERATURE IS HEADING TOWARDS T1

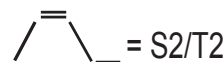
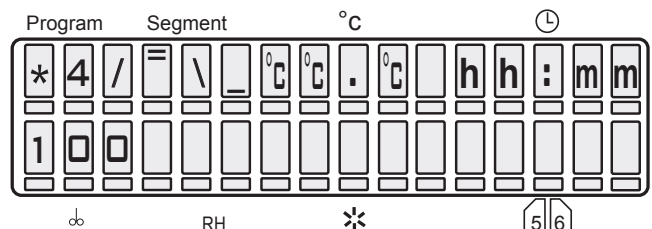
(in VACUCELL only the upper line is engaged)



°C°C°C = actual temperature  
hh:mm = time from the start to reaching T1.

#### 4.5.4.2 S2 IS ACTIVE, TEMPERATURE T1 REACHED, DELAY TIME AT T1 IS RUNNING

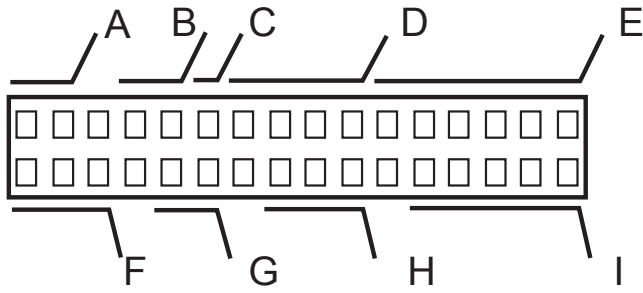
(in VACUCELL only the upper line is engaged)



°C°C°C = actual temperature  
hh:mm = countdown of the delay time at T1 from the set value to zero.

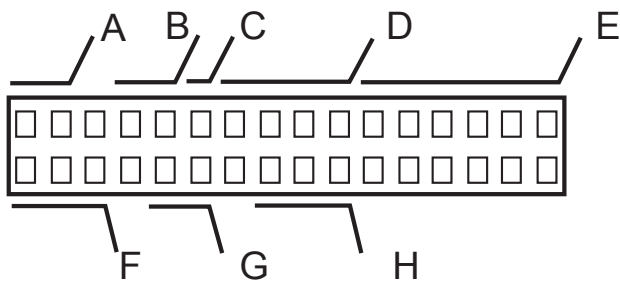


**Display – program selection state**



A: P5	name of the program
B: XX	number of the segment being set
C: X	type of the segment being set x time of the zero segment is set to zero, the segment will be jumped over > is not the last, limited length – see E >  the last, limited length – see E ∞ the last, unlimited length
D: XX . X	required temperature of the segment being set (lend temperature)
E: TXX : XX	required length of the segment being set, or
R±X : XX	required length of the segment being set, time is deciding, or
r ± X . XX	ramp = required rate of the segment being set, time is deciding, or
cXX	number of cycles of the whole program
F: XXX	empty (required pressure)*
G: XX	empty (required hysteresis)*
H: XXX	empty
I: XX . XX	actual month and day (cannot be set)

**Display – program run**



A: * 5	rotating symbol and program number
B: X	number of the actual segment
C: X	type of the segment being set: > is not the last, limited length – see E >  the last, limited length – see E ∞ the last, unlimited length
D: XX . X	actual chamber temperature
E: XX : XX	actual time of the segment – hours, minutes all segments – counting down from the set value to zero, in case of an unlimited length of the last segment counting up from zero in case of time longer than 99 h 59 min >>:>> is displayed
F: XXX	empty (actual pressure)*

G: XX	empty
H: XXX	empty

( ) \* - different pressures can only be set with the vacuum control system – see 11.6.

**Example of P5 setting:**

Requirement:

Operation for 5 working days under temperature of 40 °C, 2 weekend days under temperature of 50 °C. This mode of operation is to be repeated cyclically with maximum possible final repetitions.

**Examples of P5 programme setting**

P	5		0	0	x	-	-	.	-		0	0	:	0	0
---	---	--	---	---	---	---	---	---	---	--	---	---	---	---	---

P	5		0	1	>	4	0	.	0	T	0	0	:	0	0
---	---	--	---	---	---	---	---	---	---	---	---	---	---	---	---

P	5		0	2	>	4	0	.	0	T	9	9	:	0	0
---	---	--	---	---	---	---	---	---	---	---	---	---	---	---	---

P	5		0	4	>	5	0	.	0	T	0	0	:	0	0
---	---	--	---	---	---	---	---	---	---	---	---	---	---	---	---

P	5		0	5	>	5	0	.	0	T	4	8	:	0	0
										c	9	9			

**CAUTION!**

In time and temperature setting in programme 5, it is recommended to observe the following principles:

If you need to change the temperature in an already set chain of segments, pay attention to whether the nature (rising or decreasing) and/or the subsequent or preceding ramps (marked “R” or “t”) are in accord with the expected change. If not, cancel the ramp and set it again only after the temperature setting.

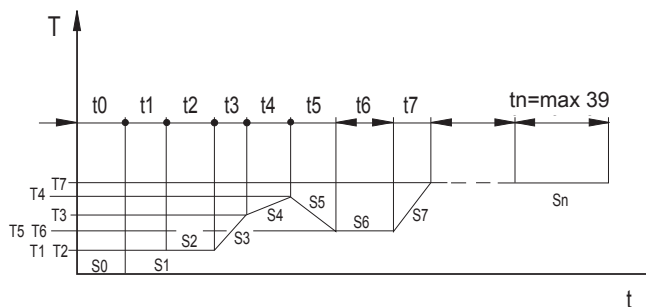
The segment temperature shall be set at first and only then the ramp. If the ramp (“R” or “t”) is decisive for the segment, then we should switch to time (“T” or “r”) at first if we want to change the temperature.

When setting a chain of segments, we should proceed from the lower segment to the higher one.

**4.6.1.1 INDICATION OF THE PROGRAMME END**

See 4.3.4.

## 4.6.2 DESCRIPTION OF THE PROGRAM P6 AND ITS CONTROL



P6 programme works with segments the duration of which is determined by real time and calendar date.

1. P6 programme consists of 40 segments and follows strictly the real time, i.e. follows the set programme independently of the time of start, power supply failures, restarts after an error, etc.
2. The segment 0 (so-called “delayed start”) is compulsory and time and year is set in it; it can even be set to the past and means the “programme beginning”. The segments 1 to 39 have equal properties; each of them is determined by the final temperature, time or speed (ramp), ventilator rotation speed, relative humidity (RH) and, according to the device model, by the exposure lighting of the chamber as well.
3. If cycling is switched on, the segment end times are shifted after the end of each cycle (forward one duration of the programme). The control of parameters during the device run (after **X/W** pressing), therefore, shows updated parameters.
4. The whole P6 programme (all segments at once) can be shifted by means of Service 64 by any time interval both to the future and past and there is no need to rewrite all segments before a new start of the programme.

### 4.6.2.1 SEGMENT 0 („PROGRAMME BEGINNING”)

The segment is compulsory, i.e. it cannot be switched off. This condition is necessary for defining the beginning, and thus the overall duration of a programme, which is necessary for cycling.

When setting the delayed start, year is set in the bottom line. The programme start thus can be set even to the past. Year is always displayed at the

same place (7th position on the bottom line); the sequence month-day (DD-MM or MM-DD) is set in Service 3.

P	6		0	0	>	2	2	.	5		0	9	:	0	0
1	0	0				2	0	0	9		1	8	-	0	2

or

P	6		0	0	>	2	2	.	5		0	9	:	0	0
1	0	0				2	0	0	9		0	2	-	1	8

In other segments, in the bottom line. Years will be calculated at the programme start, e.g.

P	6		0	1	>	2	2	.	5		0	9	:	0	0
1	0	0		O	F	F		O	N		1	8	-	0	2

or

P	6		0	1	>	2	2	.	5		0	9	:	0	0
1	0	0		O	F	F		O	N		0	2	-	1	8

Each of the segments S 1 to S 39 can be set as the last one, i.e. after the end temperature  $T_i$  is reached and, at the same time, time  $t_i$  lapses, either the programme ends or the subsequent cycle follows.

Each of the segments 1 to 39 can be set as the last and indefinite one, i.e. the programme must be terminated at this segment by the **START/ STOP** button.

If there is an active selection of cycles on the display in the moment of the programme start, (see the Figure Display – programme selection – E: cXX), then – during the programme run – the device will shift to the beginning again after termination of the last segment and the whole programme is repeated. The overall number of the whole cycle courses equals to the numerical value after the letter “c”. Segment 0 is included in the cycle as well.

The cycles number value is related to the whole programmed sequence. It can be displayed in the presence of any segment but it does not relate to the displayed sequence only, but to the whole sequence!

The minimum number of cycles is 2; if the customer wishes only one cycle, then there is a programme start without cycles. The programme can be started by the “Start” button. It will always be started from segment 0 and/or 1 (if the zero segment time is zero) regardless of the segment displayed. However, it is of key importance for successful inclusion of cycling in the activated process that the display must show “c XX” at the moment of the programmed sequence start,

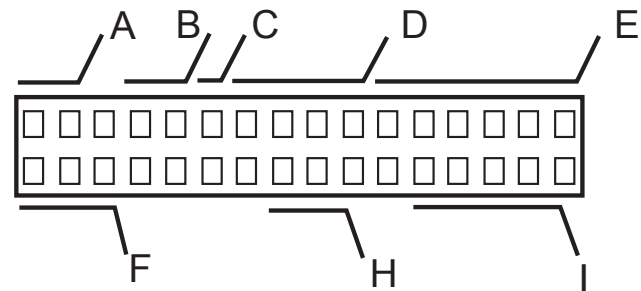
where XX is the number of intended courses of the whole sequence. For example, the number 2 means that the sequence will be carried out and then repeated once more. If there is not “c XX” displayed at the moment of switching on by means of the Start button, but time or ramp of the actually displayed segment are displayed, the whole sequence will run only once.

The time is not determined as a segment duration but it is determined by the hour, minute, day, and month of its end, i.e. by the real time. If the set time and date of the segment is lesser than the time and date of the previous segment, the segment will end no sooner than in the subsequent year. The actual time and date (including the year) must be set to the system (regulator) in the service mode. Rising to the set relative humidity starts after the set temperature is reached.

**Ranges of the parameters:**

time	t0 to t39	each segment up to 1 year
ramp	r1 to r39	0 to 3.2 °C/ min for heating -1.0 to 0 °C/ min for cooling
temperature	T1 to T39	range according to the device parameters
number of cycles	C	2 to 99 (eventually ∞- which is the next position after 99

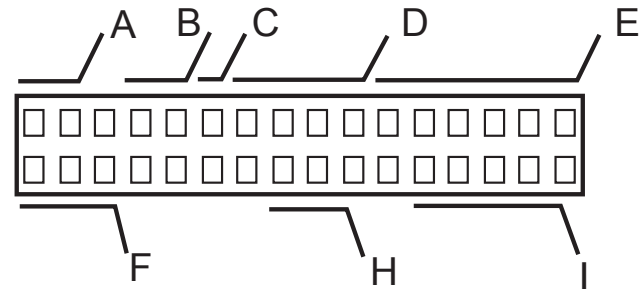
**Display – program selection state**



A: P6	name of the program
B: XX	number of the segment being set
C: X	type of the segment being set: > is not the last, limited length – see E >   the last, limited length – see E ∞ the last, unlimited length
D: XX . X	required temperature of the segment being set (lend temperature)
E: TXX : XX	hour and minute of the end of the segment being set , ramp is deciding, or
R ± X . XX	ramp = required rate of the segment being set, time is deciding, or
t XX .XX	required length of the segment being set, time is deciding, or
r ± X .XX	ramp = required rate of the segment being set, ramp is deciding, or
cXX	number of cycles of the whole program

F: XXX	not engaged
G: XX	not engaged
H: XXX	not engaged
I: XX . XX	month and day of the end of the segment being set

**Display – program run**



A: *6	rotating symbol and program number
B: XX	number of the actual segment
C: X	type of the segment being set: > is not the last >   the last, limited length, see E ∞ the last, unlimited length
D: XX . X	actual chamber temperature
E: XX : XX	actual time of the segment – hours,minutes all segments – counting down from the calculated maximal value to zero, in case of an unlimited length of the last segment counting up from zero in case of time longer than 99 h 59 min >>:> is displayed
F: XXXX	not engaged (required pressure)*
G: XX	not engaged
H: XXX	not engaged
I: XX . XX	not engaged

( ) \* - different pressures can only be set with the vacuum control system – see 11.6.

**Caution!**

When setting the time and temperature in programme 6, the following principles should be observed:

If there is a need to change the temperature in an already set chain of segments, pay attention to whether the nature (rising or decreasing) and/or the subsequent or preceding ramps (marked “R” or “t”) are in accord with the expected change. If not, cancel the ramp and set it again only after the temperature setting.

The segment temperature shall be set at first and only then the ramp. If the ramp (“R” or “t”) is decisive for the segment, then we should switch to time (“T” or “r”) at first if we want to change the temperature.

When setting a chain of segments, we should proceed from the lower segment to the higher one.

### 4.6.2.2 PROGRAMME START

After the programme starting (by the **START/STOP** button or order from WC3), years of other segment will be calculated and the test of the last segment time will be then performed.

Three situations may occur:

1. The actual time is lower than the zero segment time – waiting phase is started; the whole programme will run.
2. The actual time is higher than the zero segment time but lower than the last segment time – all segments that should be terminated at the given time will be skipped and that segment which corresponds to the actual one will be started. Duration of such segment will be adapted (shortened) so as to terminate at the set time ; LCD displays the time remaining to the segment end.
3. The actual time is higher than the zero segment time – warning audible signal (Operator Error) sounds and the programme does not start.

### 4.6.2.3 POWER SUPPLY FAILURE

After a power supply failure, the following situations may occur:

1. Programme without cycles; the actual time is lower than the last segment time. Those segments that should already be terminated will be skipped, duration of the actual segment will be adapted (shortened).
2. Programme without cycles; the actual time is higher than the last segment time. The programme will be terminated (all segments will be skipped because the programme “ended” during the power supply failure); LCD displays “End of P6”.
3. Programme with cycles; the actual time is lower than the last segment time. See point 1 above. The programme will continue with a shortened “actual” segment; subsequent cycle runs normally.
4. Programme with cycles; the actual time is higher than the last segment time. The programme definition is shifted by the appropriate number of P6 programme durations so that the programme could continue. The operation then is like in point 3 above.

### 4.6.2.4 AUTOMATIC SHIFTING OF P6 PROGRAMME BEGINNING IN CYCLING

After each cycle is terminated, the programme definition is recalculated (all segments are shifted forward by one programme duration).

When checking the parameters during the programme run by **X/W** pressing, the actual P6 setting is displayed. After the last cycle or programme without cycling ends, the parameters will not be shifted, i.e. the last parameters according to which the programme was running are always displayed after the programme end or interruption (with or without cycles).

### 4.6.2.5 AUTOMATIC SHIFTING OF P6 PROGRAMME BEGINNING - USER SERVICE 64

Durations of all segments remain unchanged.

	S	e	r	v	i	c	e	6	4				
S	h	i	f	t	i	n	g	p	r	o	g	P	6

After the programme is started (**START/STOP** – see), time and whole date of the zero segment are displayed.

	S	e	r	v	i	c	e	6	4						
0	9	:	0	0		2	0	0	9	-	0	2	-	1	8

or

	S	e	r	v	i	c	e	6	4						
0	9	:	0	0		2	0	0	9	-	1	8	-	0	2

or

	S	e	r	v	i	c	e	6	4						
0	9	:	0	0		0	2	-	1	8	-	2	0	0	9

or

	S	e	r	v	i	c	e	6	4						
0	9	:	0	0		1	8	-	0	2	-	2	0	0	9

Any parameter can be changed (a year can be changed by one year forward or backward as compared to the actual year) and by **X/W** pressing, the programme will be shifted by the difference between the new and original segment time (“Done” is displayed).

	S	e	r	v	i	c	e	6	4				*
D	o	n	e										

The programme can be shifted both forward and backward. Time (hh:mm) is always displayed at the beginning of the line; date is displayed in a format chosen in the user service 3 (i.e. 4 possibilities of the sequence year-month-day). This differs from the segment 0 setting where the year is always at the first place.

### 4.6.2.6 EXAMPLE OF P6 PROGRAMME SETTING

Week cycle:

Requirement: Operation at 40 °C for 5 working days a week; operation at 50 °C for 2 weekend days; this cycle shall be repeated 99 times.

Lower line: Different pressures may only be set with the vacuum control system – see 11.6. –

Requirement: Operation at 500 mbar pressure and hysteresis of 10 for 5 working days a week; operation at 800 mbar pressure and hysteresis of 60 for 2 weekend days.

Start on Monday 30.10. 2009 at 08:00AM

P	6		0	0	>	-	-	.	-		0	8	:	0	0
1	0	0				2	0	0	9		1	0	:	3	0

Monday morning 08:15 AM

P	6		0	1	>	2	0	.	0	T	0	8	:	1	5
1	0	0		5	0			O	N		1	0	.	3	0

Saturday morning 08:00 AM

P	6		0	2	>	2	0	.	0	T	0	8	:	0	0
1	0	0		5	0			O	N		1	1	.	0	4

Saturday morning 08:15 AM

P	6		0	3	>	0	4	.	0	T	0	8	:	1	5	
1	0	0		6	0			O	F	F		1	1	.	0	4

Monday morning 08:00 AM

P	6		0	4	>	0	4	.	0	T	0	8	:	0	0	
1	0	0		6	0			O	F	F		1	1	.	0	6

Note: The 15-minute delay between 8:00 AM and 8:15 AM was chosen on condition that it is sufficiently long enough for the transfer from one temperature to another. If it is not the case, an experimentally ascertained delay must be set.

### 4.6.2.7 SUMMER/WINTER TIME

The regulator does not take account of the time changes. When the time is changed to the summer/winter time, the user must change the time manually in Service 3, or the time can be set in a remote way. The programme of the recording Warmcomm 3-F SW synchronizes the regulator time with the time of a PC, if connected, with an installed recording SW (the set regulator time

equals the PC time). Any time change during the programme run, however, does not influence its course because the durations of the segments are calculated only at the programme start (and in the examples above, the day and night phase will be changed at 6:00 PM and 10:00 AM).

To match the times fully, the programme must be restarted either by stopping and immediate starting, or by power supply failure simulation (by the power supply switch).

### Service 64 – P6 programme start shifting

The whole P6 programme (all segments at once) can be shifted by any time interval both to the future and past. The setting is described in the P6 programme description.

### 4.6.2.8 INDICATION OF THE PROGRAMME END

See 4.3.4.

## 4.7 ERROR MESSAGES

Error messages are placed on the display and have the following meaning:

Error 00	PT 1 (regulatory sensor) Call the service.
Error 01	PT 2 (flexible sensor a) Call the service.
Error 02	Temperature is below the preset lower limit. See service 41 in the Instructions for Use.
Error 03	Temperature above the preset upper limit. See service 41 in the Instructions for use.
Error 04	Protective thermostat is activated; heating is disconnected. See service 07 in the Instructions for Use.
Error 05	Protective thermostat setting. See service 07 in the Instructions for Use. This error may be caused by starting a programme whose preset temperature is out of the preset protective thermostat range, or by a HW breakdown.
Error 10	Controlling programme. Call the service.
Error 11	Communication. Call the service.
Error 12	PT 3 (flexible sensor b) Call the service.
Error 19	PT 4 (flexible sensor c) Call the service.
Error 20 *)	Door cannot be blocked. See service 58 and chapter 10.12 in the Instructions for Use.



Error 21 *)	Door cannot be unblocked See service 58 and chapter 10.12 in the Instructions for Use.
Error 27	PT 5 (flexible sensor d) Call the service.
Error 28	Great temperature difference between the regulatory sensor and protective thermostat. Call the service.

\*)..... This is a soft error

\*\*)... Error type may be set by the user.

## 4.8 PROTOCOL PRINTING

DPT 6333 printer is recommended for the record printing on the printer. Other printers may also be used, e.g. CITIZEN, model iDP 3110-24 RF-A. Printing to a PC application (Printer Archiv) is allowed as well.

### 4.8.1 INSTALLATION AND SETTING OF THE PRINTER

DPT-6333-V24 does not require any microswitch setting by the user.

Setting the DIP microswitches of the printer CITIZEN iDP 3110:  
all four pins are in the lower position OFF.

Setting the DIP microswitches of the printer CITIZEN CBM 910:  
OFF / ON / OFF / ON / OFF / ON / ON / OFF  
(from the left to the right).

CBM 910II: OFF / ON / OFF / OFF / OFF / OFF / ON / OFF.

After the setting is changed, the printer must be switched off and on either by the switch or by disconnection from the power supply.  
(A different type of the printer must be adjusted with the help of the printer's manual and the data on the interface RS232 shown on the case.)

1. Connect the printer to the device by means of a cable with serial connector (RS-232C). Connect one end of the cable to the printer socket (see Fig. 4) and the other one to the connector in the rear part of the printer. Connect the printer to the electric power mains by means of an adapter. Some types require the switch on the right side of the printer to be switched on. The indicators POWER and SEL light up. The printer is in the on-line mode. Paper is fed by pressing the LF button (in the on-line mode only, i.e. after the SEL button

pressing – the SEL indicator turns off. To renew the on-line mode, the SEL button must be pressed – the SEL indicator lights up). The printer can print in the on-line mode only!

2. Follow the chapter User Support Functions to set the type of data from the COM output connector (user mode U3) and the required print interval (user mode U1).

By the printer interval setting you can determine the time intervals of actual chamber temperature printing. The interval is shown in the record heading.

The printer interval can be set on the display in the range from  
tmin = 1 min to tmax = 255 min  
(i.e. 4 hours 15 min) in 1-minute increments.

## 4.9 CREATION OF VACUUM IN THE CHAMBER

Push the hose from the vacuum pump onto the end of the vacuum piping of the unit (Fig. 2, position 11) which is accessible through the side cut-out in the upper part. Connect the mains cord of the vacuum pump into the socket in the shaft of the upper part and switch the pump on. Set the ball valve on the front panel of the upper part into the position VAC ON. Value of vacuum begins to rise on the vacuumeter in the front panel after several tens of seconds (the needle valve and the door must be closed properly).

## 4.10 SEALING EXCHANGE AND DOOR SETTING

Take the whole sealing off, begin in the middle bottom part.

Fix the new sealing on the edge of the chamber, begin in the middle bottom part. Slam the sealing between the chamber and the outer cover.

To check up the tightness place a sheet of paper between the door and the chamber when closing the door. Pull it out slowly, you should feel a stronger resistance.

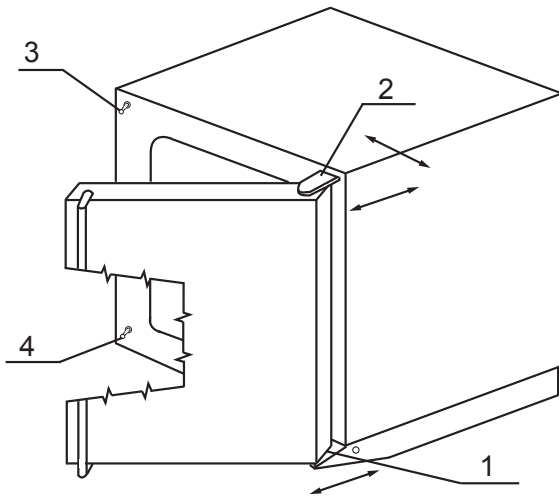
The door is adjustable at four points (see Fig.12):

**Pins of the lock 3, 4** – on the left front part of the jacket – at the top and at the bottom: these pins can be loosened by means of the lock nut and they can be adjusted forwards/backwards by means of the thread.

**Door hinge, lower 1:** by loosening the screw M8 at the front on the right side of the foot it is possible to adjust the door forwards/backwards in the horizontal direction.

**Door hinge, upper 2:** after removing the cover of the extension part the screws M8 in the front right corner become accessible. After loosening these screws the position of the door can be adjusted.

Adjust the door so that when closed the rubber sealing of the chamber would fit to the sheet of the floating door along the whole perimeter. To check it up place a sheet of paper between the sealing and the metal sheet of the floating door before it is closed, it is possible to take the paper out against a small resistance.



## 4.11 ADDITIONAL FUNCTIONS

### 4.11.1 KEYBOARD BLOCKING

This function is active only if activated in the service setting of the unit type; it is not functional otherwise.

- The function serves to prevent any unintentional or unauthorized handling of the unit.
- After blocking (concurrent pressing of **X/W**, **◀** and **▶** for the period of 2 seconds at least), the keyboard will not react to any key button press.
- The keyboard can be unblocked by the same combination of the key buttons.

## 5 SPECIFICATIONS OF THE UNIT

VACUCELL (VU)					
Technical data <i>Interior of stainless steel material</i> DIN 1.4571(AISI316Ti)	volume	cca ltrs	22	55	111
	width	cca mm	340	400	540
	depths	cca mm	260	320	410
	height	cca mm	300	430	480
Shelves	Shelves wiring Standard equipment	number max. Pieces suppl	5 2	8 2	9 2
Shelves distance	height	mm	40	40	40
Usefull dim.of shelf	width × depths	mm	280x236	340x296	480x380
Max.permissible load of the shelves	one shelf totally per unit	kg kg	20 35	25 45	25 65
External dimensions (including door and handle)	width	cca mm	560	620	760
	depths	cca mm	490	550	640
	height	cca mm	700	830	880
Package dimensions (three layers carton)	width	cca mm	740	830	830
	depths	cca mm	615	635	730
	height (incl.pallette)	cca mm	915	1010	1070
Weight	nett	cca kg	65	98	130
	brutt	cca kg	76	110,5	144,5
Electric parameters – mains 50/60 Hz	max. input	kW	0,8	1,2	1,8
	input in stand by mode	W	5	5	5
	current	A	3,5	5,2	7,8
	nominal voltage	W	230	230	230
	For the nominal voltage***)	A	7	10,5	15,7
	current	V	115	115	115
For the nominal voltage***)					
Temperature data Working temp (regulation start)	from 5 °C over ambient temp to °C		200	200	200
Temp. deviations acc.to DIN 12 880 Teil 2 from working temp -Al shelves pressure 5-10 mbar**	at 100 °C accuracy in space	to (±) °C	2	2	3
	at 200 °C accuracy in time	to (±) °C	<5 0,4	<6 0,4	<7 0,4
Temp. deviations acc.to DIN 12 880 Teil 2 from working temp-ss shelves pressure 5-10 mbar**	at 100 °C accuracy in space	to (±) °C	10	10	11
	at 200 °C accuracy in time	to (±) °C	8 0,5	23 1,0	* 1,0
Time of rise onto 98 % voltage 230 V – (Al shelves pressure 5-10 mbar)	onto temp 100 °C	min	60	65	110
	onto temp 200 °C	min	80	85	130
Time of rise onto 98 % voltage 230 V - (steel shelves, press 5-10 mbar)	onto temp 100 °C	min	130	140	170
	onto temp 200 °C	min	170	180	220
Heat radiation	at 100 °C	W	150	260	370
	at 200 °C	W	130	520	750
Vacuum connection	vacuum connection measuring	DN mm	16	16	16
	feedthrough	DN mm	40	40	40
	needle valve for inert gas or air	Ø mm	8	8	8
	chamber untightness	mbar.l.s <sup>-1</sup>	≤ 5.10 <sup>-3</sup>	≤ 5.10 <sup>-3</sup>	≤ 5.10 <sup>-3</sup>

**Note:**

All technical data are related to 22 °C of ambient temperature and ± 10 % voltage swing. The volume 22 cools ca. 20 °C under the ambient temperature (it uses the Peltier effect.)

\* not measured

\*\* The heat in vacuum is transferred to the goods on the shelves by conduction in the shelves, therefore the mentioned temperature deviations are valid for temperatures on the surface of the shelves, there must be a perfect heat-conducting contact between the temperature sensors and the shelf surface. Goods placed on the shelves must also be in a perfect contact with the shelves, the goods temperature depends especially on their physical properties and on the contact with the shelf.

\*\*\*) The mains voltage is shown on the unit type label.

## 6 CLEANING AND DECONTAMINATION

Cleaning is to be performed only after cooling the unit down and after disconnection of the mains cord from the mains. Internal walls of the chamber and the surface of the unit is to be cleaned with water and detergent or suitable chemical means, it is necessary to use rags that are not rough and do not release fibres. Abrasive cleaning means are not recommended, they could cause scratching of the metal sheets. In case of contamination of the cabinet either outside or inside by dangerous material is the user responsible to carry out necessary cleaning or decontamination of all contaminated surfaces with a suitable and approved disinfecting agent. Before using of any method of cleaning or decontamination we recommend to verify at the producer the compatibility of the procedure.

## 7 MAINTENANCE

The unit requires no special maintenance. In case of troubles, please, contact the service.

### 7.1 INSPECTION OF ELECTRIC COMPONENTS

The cases of thermal technique are destined for a basic/normal environment, the manufacturer recommends the inspection period of 1 year, if not determined by local regulations otherwise.

#### **Inspection operations:**

Inspection of the electrical installation, particularly of the electric power supply, of connecting terminals and a protective terminal. Check the integrity of the conductor insulation (for example, due to wearing through, burning etc.) and the firm connection in the terminals. The resistance of the protective connection is  $< 0.1$  Ohm, the resistance of the supply is not included.

If the case is placed in a different environment, the inspection must be performed in accordance with the local standards.

The service inspection is the matter of agreement between the client and the service organization.

## 8 WARRANTY CONDITIONS AND SERVICE GUARANTEED LIFETIME

MMM guarantees faultless delivery and function within the frame of contract rules and warranty time. Fixed sale and delivery conditions of MMM are valid.

MMM assumes no responsibility for the faults or other losses originated due to normal wear, chemical or physical influences, natural disasters, extreme loading, incorrect operation or improper or inadequate use, especially when not observing the appended Instructions for use, in case of incorrect installation, in case of damages originated due to the effect of foreign bodies, as well as in case of faulty or improper maintenance or repair. In the case of sending back to the producer (to repair or exchange at claim), use the original package. In the other case you accept the responsibility for eventual damage during transport and the producer will exact from you a compensation of necessary coherent repairs.

For a correct connection to the mains observe the technical data and Instructions for use.

#### **Important notice:**

MMM is responsible for safety and technical properties of the unit only in case, when the repairs and modifications of the unit are performed by itself or by the organization specifically authorized by the producer, and when the parts will be during the repair substituted by the spare parts admitted by the producer and spare parts satisfying the quality standard of MMM.

MMM recommends the user of the unit to ask the one who carried out the repair for the certificate on the kind and extent of work, if need be with the data concerning the change of nominal data or work extent, date of performance, name of the company and signature.

## 9 TRANSPORT AND STORAGE

The unit is being prepared for transport by an authorized person. The unit shall be transported in its original package. If you send the device back (to repair or exchange at claim), use the original package. Otherwise you take responsibility for possible damaging during the transport and producer will claim the costs for appropriate repairs of you. The device shall be stored in the range of temperatures from 0 °C to 40 °C.

## 10 METHOD OF LIQUIDATION OF THE PACKING AND OF THE DISCARDED UNIT

**Palette:** Disposal at an incineration plant

**Cardboard:** Recyclable waste

**Unit which was put out of operation:**

The unit should be liquidated by a company authorized to dispose the waste. Such company shall provide for liquidation in accordance with the environmental regulations. The unit does not contain any components dangerous to the living environment.

**For the European Union Member Countries:**

If the user stops to use the labelled product, and



the product will become useless for him 

A product which the user stops to use and which becomes useless for the user and which is labelled with shall be shut down by the user and the user shall inform:

- The manufacturer (in the Czech Republic);
- The seller (in other EU countries).


then the product must not be disposed in municipal waste and is subjected to the regime in compliance with the national rules on liquidation of electrical and electronic equipment, corresponding to WEEE (Waste Electric and Electronic Equipment) Directive in version force ( in the Czech Republic it is (Waste Law No. 185/2001 Code of Law) in version in force).

Please, ask for detailed information about correct

liquidation of electrical and electronic equipment by your seller or supplier.

**For countries outside of European Union:**



 The symbol given above is valid only in European Union countries. Please, ask for detailed information about correct liquidation of electrical and electronic equipment by authorities in your country or by your seller of electrical equipment.

## 11 OPTIONS

### 11.1 INDEPENDENT SENSOR PT100

It is an additional sensor that can freely move inside the chamber. By means of it, you can measure temperature inside the chamber or in the material. The sensor conductors are joined to a vacuum-sealed connector placed in an access port of 40 mm diameter.

This sensor is measured and calibrated in the same way as the regulatory sensor and its value is offset as well. It is displayed on the screen (according to the user mode setting) in regular intervals alternating the regulatory sensor temperature displaying; it can be differentiated from the regulatory sensor temperature by an apostrophe accompanying the highest figure. Exposure can also be started (according to the user mode setting) only after this sensor temperature is reached (with tolerance of – 0.25 °C); however, the original condition, i.e. regulatory sensor temperature reaching with tolerance of – 0.05 °C must be satisfied at the same time.

During measurement, good heat-conducting contact between the sensor and the measured material must be ensured, especially under vacuum!

### 11.2 SUPPORTIVE SW FOR PC

#### 11.2.1 RECORDING SW - WARMCOMM - FOR PC UNDER WINDOWS

The program WarmComm is designed to record the temperature course in the ovens/incubators. Data obtained during the regulation are displayed in a diagram (with time on the horizontal axis and measured data on the vertical axis).

The program enables to follow the regulation on-line, to store the regulation course to a file on a disc and to view the already stored files, to send e-mails in case of not receiving data from the cabinet and to send reports of excessive values being reached within the specified time interval. The instructions for the programme use are supplied with the installation programme. Hardware requirements: Common PC with an operational software Windows 2000, XP and higher. One free port RS 232 (COM) is required for each connected device. The maximum length of the connecting cable is 15 m.

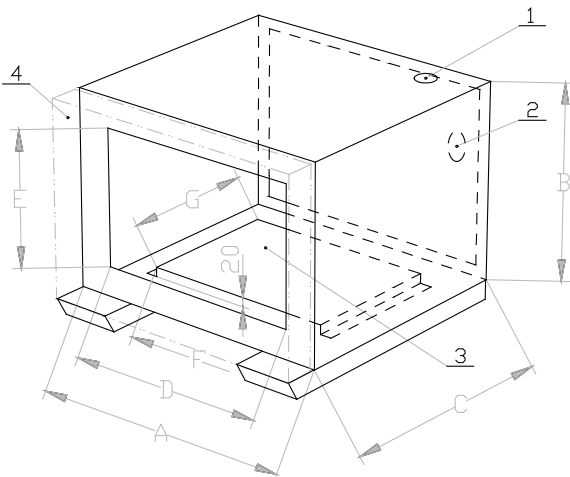
### 11.2.2 RECORDING PRINTING SW - PRINTER ARCHIVE - FOR PC UNDER WINDOWS

The Printer Archive programme serves for text recording from the device print outlet. It serves as a direct substitution of a physical printer. The data are recorded to a file on a PC disc and the programme offers more possibilities of the recorded data handling including archiving or printing on a table PC printer.

Hardware requirements: Common PC with an operational software Windows 95 and higher. One free port RS 232 (COM) is required for each connected device. The maximum length of the connecting cable is 15 m. For more detailed information about HW, ask the seller.

### 11.3 BOX „VACUSTATION“

Serves for placing the vacuum pump MZ2C, event. MD4C (or another pump with corresponding dimensions and power) in the space of the box, the vacuum cabinet Vacucell is placed on top of it. Both elements are screwed together. Details see below.



	VU 22	VU 55	VU 111
A	560	620	760
B	600	600	600
C	360	420	510
D	450	510	650
E	490	490	490
F	310	400	400
G	334	394	394

Size [mm]

- 1 – through hole for the hose connecting the chamber with the vacuum pump
- 2 – through hole for the vacuum pump mains cord
- 3 – metal sheet for fixing the vacuum pump (e.g. MZ2C or MD4C)
- 4 – door of the box Vacustation (with window) – contour with dot and dash line.

### 11.4 CHEMICALLY RESISTANT VACUUM PUMP

For instance membrane vacuum pumps MZ2C (suction power cca 1.7 m<sup>3</sup>/h, achievable vacuum cca 9 mbar) and MD4C (suction power cca 3 m<sup>3</sup>/h, achievable vacuum cca 2 mbar) are recommended.

### 11.5 SEPARATOR AND EMISSION CONDENSER

The separator of the gas/steam exhausted from the chamber is placed between the chamber and the pump, emission condenser with water cooler is placed on the pump outlet and reduces the amount of emissions of the exhausted gas/steam in the ambient atmosphere. Both parts are made of glass and attached to the pump.

### 11.6 SYSTEM OF VACUUM CONTROL

- a) Combination VACUCELL + electromagnetic vacuum valve + external controller  
Consists of a controller e.g. CVC II and an electromagnetic suction valve, it enables to create a stabile vacuum value in the chamber and to display the measured value on the CVC II display.

CVC II is placed separately outside the box VACUCELL, the suction valve is installed in the upper piece of Vacucell or on the vacuum pump.

- b) VACUCELL + electromagnetic vacuum valve + built-in control system the system measures and regulates in the range from 10 to 1100 mbar, temperature drift = 0,03 mbar/1 °C

With VACUCELL the pressure transducer calibration and the device configuration has to be performed in the mode of the service engineer. The complete setting and watching of parameters is on the lower display line. The keys are used in the usual way.

### Still stand

During the still stand the lower display line is in the following form: „XXXXmBarYYY standT“. XXXX is the pressure (vacuum) value, at which the regulation is performed, in millibar-units (4 orders – range 0000 to 1999).

YYY is the value of the pressure hysteresis for the regulation in millibar-units (3 orders – range 000 to 250).

stand T is the text-information, whether the heating is permitted or prohibited at the specific moment, see function B and C in Sr 55.

In each segment of P4, P5 and P6, different pressure and hysteresis can be set:

„XXXXmBarYYY“

### Condition during the program run

During the program run the lower display line is in the following form: „XXXX.XmBar standT“.

XXXX.X is the value of the measured pressure in millibar-tenths

(stand T is the text-information, whether the heating is permitted or prohibited at the specific moment, see function B and C in Sr 55 in the Service instructions).

The pressure value is printed with the protocol printer.

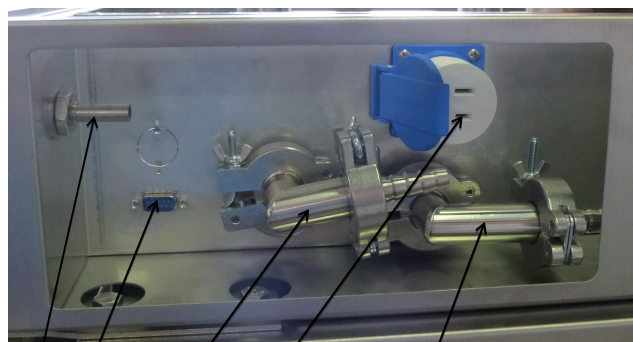
Pressure and temperature can also be sensed by means of the SW WarmComm.

## 11.7 AIR-INLET SOLENOID VALVE

It serves for more precise vacuum regulation or for inert gas filling of a chamber. The function is identical with chapter 11.6.

## 11.8 INLET AIR FILTER

It is mounted using the ½“ hose to the inlet of the air inlet solenoid valve, pos.17.



15/ 14/ 11/ 9/ 17  
 Technical parameters of the filter

Type:	VACU-GUARD In-Line Disk Filter —60 mm
Rated retention in air:	99.99 % particle retention for particles ≥ 0.1 mm
Connectors:	3/8 –1/2“ (10 –12 mm) SB inlet and outlet
Maximum operating pressure:	1 bar (15 psi)
Flow rates (SLPM):	2 psi (0.14 bar)* 27
*Differential pressure	4 psi (0.28 bar)* 57 6 psi (0.41 bar)* 83 10 psi (0.69 bar)* 139

## 11.9 DOOR SEALING FPM (FKM,VITON)

It is mounted for higher chemical resistance and durability under high temperatures.

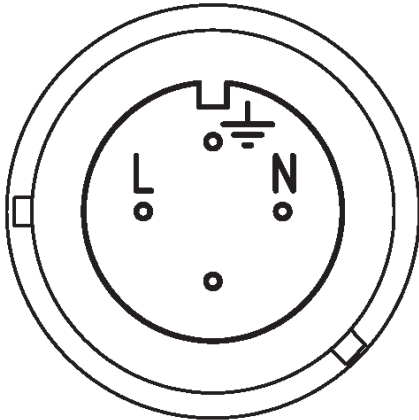
## 11.10 POTENTIAL-FREE CONTACT FOR ALARM REPORTS

Potential-free contact is taken to the connector on the rear panel of the supra structure, it can be connected to voltage up to 24 V/ 1A. It serves for remote alarm (in Anglo-Saxon countries marked as BMS relay Building Management System relay) – i.e. the information on the failure is transmitted by a long-distance line, interrupted by the built-in relay of a potential-free contact, into a room that is distant from the place the temperature cabinet is installed in. The relay switches on in all failure conditions reported on the display.

### 11.11 INNER SWITCHED SOCKET

The socket system consists of a vacuum electric bushing and two connectors. During the device installation, the cable is taken from the relevant device from the chamber through the hole in the bushing and it is connected to the inner connector of the socket (see figure). The connector is connected to the vacuum bushing (already connected with an external connector with feeding cable from the factory). The whole set is fixed in the upper flange of the bushing instead of a blind flange.

For details on switching control see chapter 4.1 – Basic Setting of Devices - Service 06.



### 11.12 VERSION WITH VACUUM WATCHER

**Function:**  
the vacuum watcher senses the pressure in the chamber and in case the pressure is higher than 125–7 mbar it disconnects the heating bodies. The messages “Heating disable” and “Heating enable” report about disconnecting and connecting the heating bodies.

**Rough check-up of the proper function:**  
In the state “Heating disable” the pressure indicated by the pointer manometer (on the unit’s panel) must be higher than ca. 150 mbar. In the state “Heating enable” the pressure indicated by the pointer manometer must be lower than ca. 150 mbar.

### 11.13 DOOR BLOCKING

In this design, an electrically controlled mechanism can be used which prevents an unintentional door opening. The mechanism stays in its position even after the unit is switched off. In this model, an electrically controlled mechanism is used to block unintentional door opening. The mechanism remains in its position even after the device is switched off. If the position sensor is not in accord after the blocking mechanism transfer, either the error 20 (“Locking impossible”) or 21 (“Unlocking impossible”) is announced.

SERVICE 58 enables you selecting between two methods of blocking:

1. **Manual:** The door is blocked/unblocked by pressing the buttons ◀ and ▶ for 2 seconds. If you try to block an open door, you are warned of a mistake by a longer beep.
2. **Automaticky** - after the door closing and pre-set period of time lapsing. You can unblock the door manually as described in point 1. The door will be blocked during the running program only. After the door is unblocked, you will have a pre-set period of time for the door opening. If you do not open it, the door will be blocked again after the pre-set period of time (2 to 9 seconds) elapses. The door blocking is indicated on the display by flashing sign “#”. Unlocking can be conditioned by SO card insertion (see Service 58).

#### **ATTENTION!**

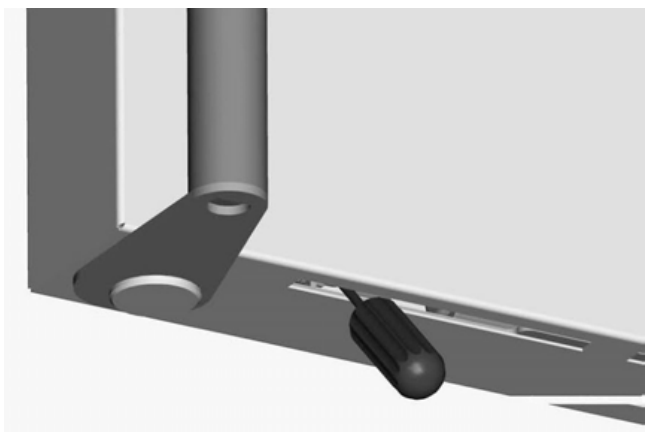
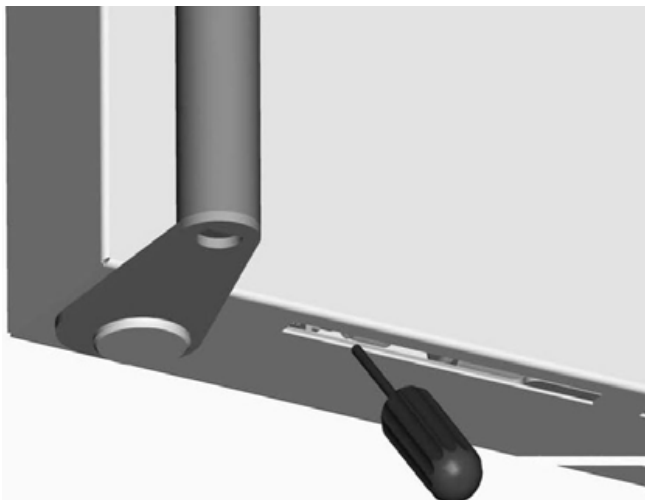
Blocked door may not be opened forcibly. The blocking system can be damaged mechanically. If there is a need of an emergency door opening (e.g. in case of power failure), follow the Emergency Door Opening.

#### **Emergency door opening**

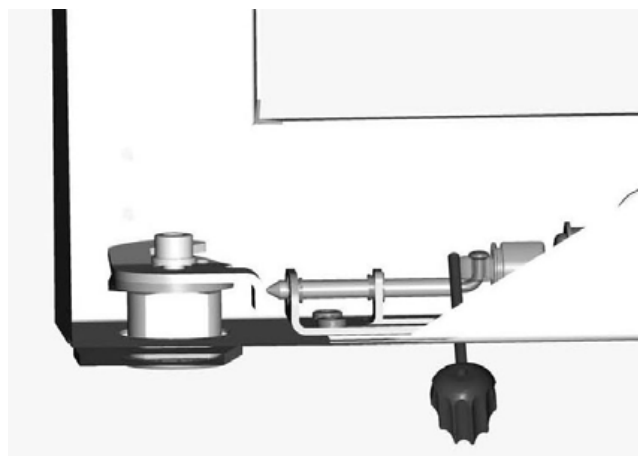
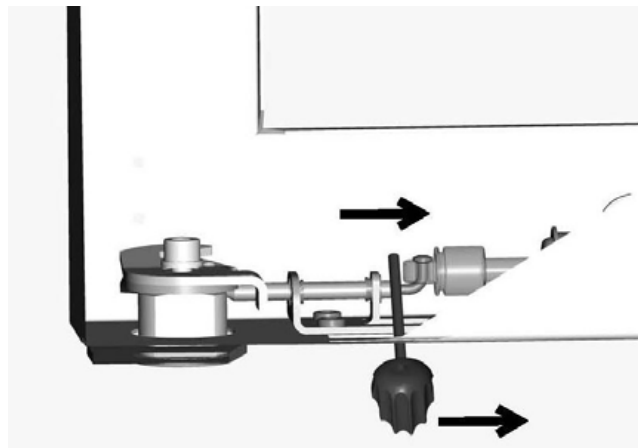
**(use it only in case of failure or power failure)**

1. To insert a thin object (screwdriver, rod etc.) through the air hole of the door (in the bottom door surface) under the angle of ca 45 ° in the distance of ca 90 mm from the door edge.





2. To push in the arrow direction and thus to push away the blocking rod (10 -15 mm is enough). In case of standard model – of the right door in the arrow direction, in case of the non-standard model – of the left door – it would be reversely (always in the direction from handle to the door hinges).



3. To open the door by means of the door handle. If it would be not possible to move away the blocking rod of the door – see above, then it would be necessary to unscrew the whole blocking mechanism underneath (4x M4 screws) and to push it away as a whole. After such intervention, the service work is necessary (backward blocking mechanism assembly).





# EC-DECLARATION OF CONFORMITY



<b>Date</b> 2012-06-09	<b>European Directive 2006/95/EC, 2004/108/EC</b>
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## Manufacturer

MMM Medcenter Einrichtungen GmbH, Semmelweisstrasse 6, D-82152 Planegg / München

declare on our own responsibility that product

<b>drying oven:</b>	electrically heated laboratory oven intended for material heating in the temperature range up to 200 °C with possible evacuation of the chamber or possible usage of inert gas in the chamber.
<b>trade name:</b>	<b>VACUCELL</b>
<b>type:</b>	VUS-B2V, VUK-B2V
<b>model:</b>	22, 55, 111

meets all the provisions of the Directives no. 2006/95/EC, 2004/108/EC, which apply to him.

This declaration is valid for all of the above products, that are marketed after the date of issue and is valid until changes in the facts contained therein.

## Standards applied:

EN 61010-1:2001	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
EN 61010-2-010:2003	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-010: Particular requirements for laboratory equipment for the heating of material
EN 61326-1:2006	Electrical equipment for measurement, control and laboratory use - EMC requirements Part 1: General requirements

Ing. Milan **Krajcar**  
executive  
jednatel



... excellence  
in medical and laboratory  
engineering

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