

CE

**Vötsch**  
Industrietechnik

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Temperature Test Chamber VT 4002  
VT 4004  
VT 7004

Hermetically sealed

# Operating Instructions

GB

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1. Introduction

1.1 General information

**This manual shall be read carefully prior to operation to avoid malfunctioning and related damage.**

The manual contains information and instructions regarding installation and operation of the VT 4002 - VT 7004 series of temperature test chambers.

A detailed description of the controller is to be found in the enclosed controller operating instructions.

Observe the three comments **DANGER**, **WARNING** and **NOTE**:



**DANGER**

is used, if non-compliance with the instructions may endanger living beings or the environment.



**WARNING**

is used, if non-compliance with the instructions may cause damage to the system.



**NOTE**

is used to indicate any form of assistance.

Please observe further safety symbols on the system, e.g.



**DANGER**

Warning about dangerous electrical voltage

**1.2 Warranty**

Report any damage immediately to the carrier and Vötsch Industrietechnik.

No warranty can be given in case of improper use contrary to the instructions in this manual.

This system has been designed, manufactured and inspected before delivery with all due care in accordance with the EC guidelines as per the enclosed declaration of conformity.

It is imperative for the safety of the system that the necessary maintenance and repair work should be performed by our service organisation (for the address see chapter 6.6) or by authorized service outlets. Only use original spares.

Needless to say that the user himself can service and clean the system in accordance with the maintenance schedule (chapter 6.4).

**1.3 Normal use and application**

The temperature test chamber has been designed and constructed for temperature tests. It permits testing methods to determine the effects of temperature on the material properties and reliability of a test specimen.

**Improper, inadmissible use****DANGER**

- Inflammable and explosive gases, fluids, dusts, inflammable, explosive, toxic, corrosive test specimens or other test specimens representing a danger when exposed to the temperature range of the system must not be placed in the test space or in the vicinity of the system. This also applies to substances which may create an explosive atmosphere with air.
- The test chamber is not intended to accommodate living beings as this is extremely dangerous to life and limb.
- The test chamber must not be used for heating or storing food.

## 1.4 Safety standards and instructions

**DANGER/WARNING**



- Thorough knowledge of the operating instructions for test chamber and controller is a prerequisite for operating the test chamber. These operating instructions are to be kept near the test chamber.
- For translations into other languages the statements and specifications of the German operating instructions are binding.
- Pull the mains plug prior to performing maintenance work!
- A pressure and seal test has been carried out on the refrigeration circuit.
- Ensure that refrigerating agents used comply with the specifications on the rating plate. Important notes for the user regarding installation and operation of refrigerating plants in VBG 20 (section IV, para. 18 and 19 and section V, paragraph 30) shall be observed when operating the system.
- Operation and maintenance of the system may only be performed by trained personnel. The user has to compile an operating manual on the basis of these operating instructions taking the relevant local and plant-internal conditions and the language for the operating personnel into consideration.
- With regard to installation and operation of the system the appropriate laws, specifications and guidelines of the country in question must be observed in addition to this manual.
- The test space is only protected against excess temperature when the system is switched on. For this reason, test specimens giving off heat must never be placed in the test space when the system is switched off. Fire hazard !
- Whenever CO<sub>2</sub>\* is used, make sure the room is well ventilated. Exhaust air must be led to open air. Danger of suffocation ! The applicable MAC values and CO<sub>2</sub> safety regulations must be observed.

When using the entry ports:

- Safety standards applicable to electrical systems, e.g. VDE 0100 part 410 and VDE 0113 part 1 as well as the appropriate accident prevention regulations must be observed.
- Only use lines which are resistant to temperature and humidity.
- The entry and notch ports must be sealed with suitable material.

Certain basic rules must be observed even for reliable safety devices. Improper use may represent a danger to life and limb of the operator or third parties or result in destruction of the test specimen or the system.

- Do not remove protective covers (e.g. grid of test space fan or condenser fan).
- Do not render safety devices ineffectual. Do not bridge or manipulate them.
- The electrical section is to be opened by appropriately trained specialists only. Set the mains switch to "0", pull the mains plug and ensure that the system cannot be switched on before opening.

These points are not to be considered as mere tips, but as a warning against rash action. Such manipulations are particularly dangerous as others know nothing about them and have confidence in the safety of the system.

### 1.5 Safety devices

Safety devices switch the system off permanently under the following circumstances:

- Excess temperature in the test space
- Excess temperature at the adjustable operating temperature limiter\*
- Excess pressure in the refrigeration circuit

Please note that these safety devices are only activated when the system is in operation.

### 1.6 Documentation for purchased equipment

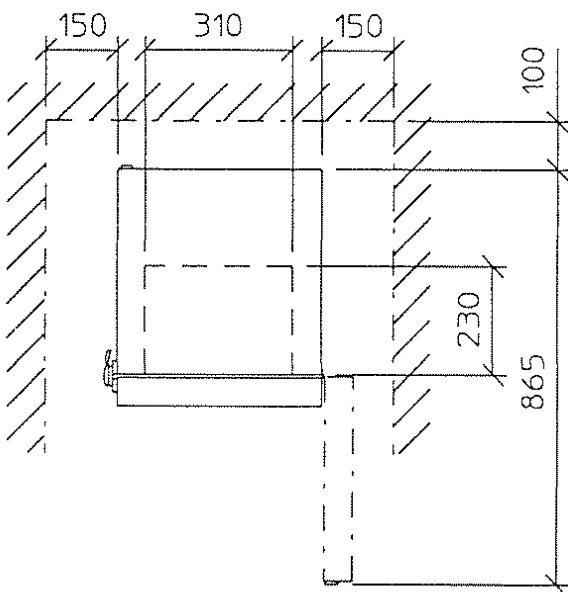
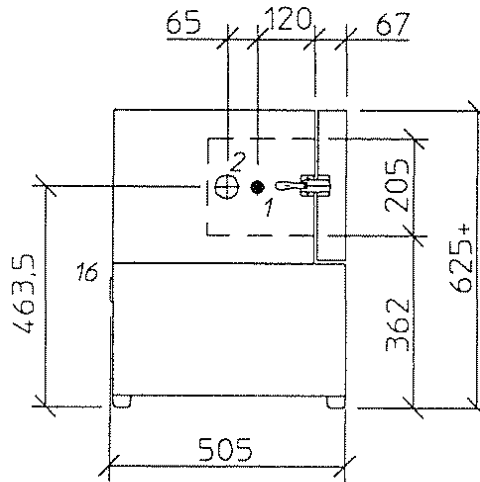
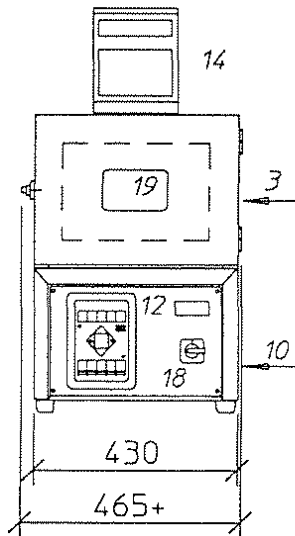
Please observe the documentation concerning the following equipment:

- Printer LX 300\*
- Printer HP Deskjet 660 C\*
- Interface converter IEEE\*
- Software TSI / TSI-MT\*
- E4-Terminal
- C-Terminal\*

2. Installation and preparation for initial operation

2.1 Layout

Layout VT 4002

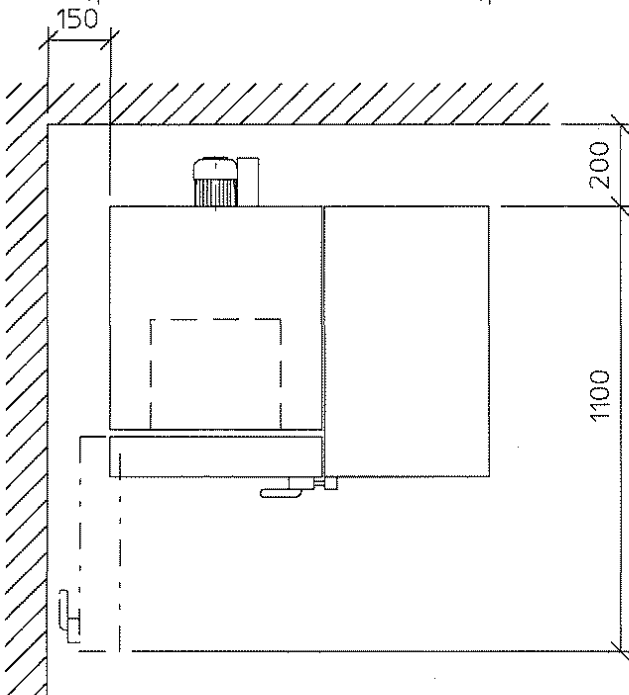
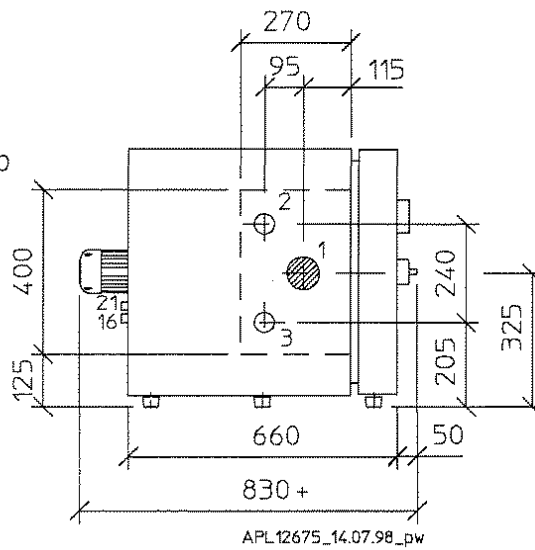
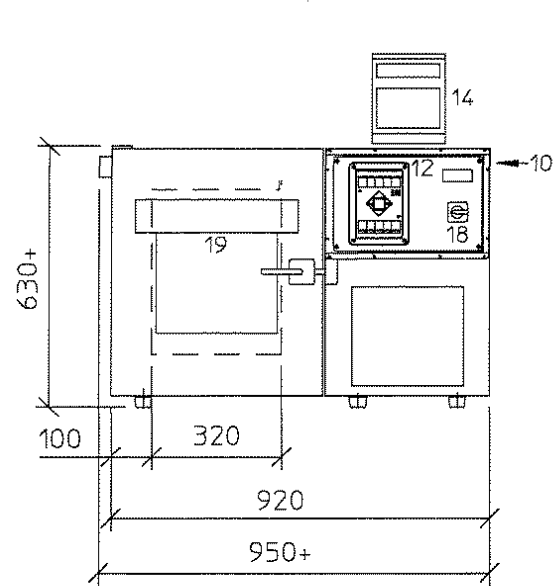


- Entry port  
NW 25 mm installed in basic equipment
- Entry port  
NW 50 mm\* additional installation position
- 1-3 Number of installation positions
- 4-9 not assigned
- 10 Connector panel
- 11 not assigned
- 12 E4-Terminal
- 13 not assigned
- 14 C-Terminal\*
- 15 not assigned
- 16 Power supply, length of cable approx. 5 m
- 17 not assigned
- 18 Main switch and adjustable operating temperature limiter\*
- 19 Door with window

+ For narrow entry openings components (e.g. hinges) may be screwed off to minimize width.



Layout VT 4004 / VT 7004



- Entry port  
NW 80 mm installed in basic equipment
- Entry port  
NW 50 mm\* additional installation position
- 1-3 Number of installation positions
- 2-9 not assigned
- 10 Connector panel
- 11 not assigned
- 12 E4-Terminal
- 13 not assigned
- 14 C-Terminal\*
- 15 not assigned
- 16 Power supply, length of cable approx. 5 m
- 17 not assigned
- 18 Main switch and adjustable operating temperature limiter\*
- 19 Door with window\*

+ For narrow entry openings components (e.g. hinges) may be screwed off to minimize width.

## 2.2 Supply connections

The electrical connection, including a 5-m connecting cable, is located at the rear of the chamber.

## 2.3 Installation

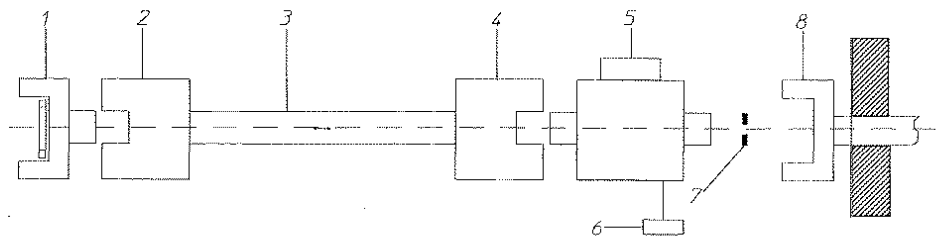
The system is to be installed as follows:

- Unpack the system and check that the delivery conforms with the order.
- Remove the accessories from the test space or box.
- Place the system on a level surface.
- Ensure that mains voltage and frequency correspond to the specifications on the rating plate (beneath the main switch). Ensure that the mains fuse rating is adequate.

### Special voltage\*

If the on-site mains voltage/frequency differ from our standard values as specified in chap. 3.4 "Technical data", the system must be connected by an expert in accordance with the "Special voltage" manual enclosed.

- Connect the system to the power supply.
- C-Terminal\*  
Place the C-Terminal\* next to or on top of the test chamber  
Insert the connecting cable at "Control Panel" on the connector panel.
- CO<sub>2</sub> shock cooling\*

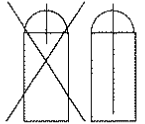


CO<sub>2</sub> connection

- 1 Bottle connection with seal and filter
- 2 Screw fitting
- 3 CO<sub>2</sub> hose
- 4 Screw fitting
- 5 CO<sub>2</sub> solenoid valve
- 6 Electrical connection
- 7 Nozzle
- 8 Test space connection


**WARNING**

Only use bottles with offtake pipes to remove liquid. Do not subject CO<sub>2</sub> bottles to temperatures exceeding + 31°C (contents vaporize otherwise). Max. permissible operating overpressure is 73 bars.



Connect the CO<sub>2</sub> bottle and the CO<sub>2</sub> shock cooling system in the following manner:

- Screw the bottle connection with seal (1) onto the CO<sub>2</sub> bottle, ensuring that the direction of flow is correct.
- Connect the CO<sub>2</sub> hose (2) with the bottle connection.
- Insert the CO<sub>2</sub> sealing cap with the pressure compensation membrane into the entry port.

**WARNING**


When operating in CO<sub>2</sub> mode without sealing cap, min. 1/3 of the entry port surface must remain free for pressure compensation .

- Activate CO<sub>2</sub> shock cooling via switching channel on the terminal.

**DANGER**


Ensure adequate room ventilation !  
The applicable MAC values and CO<sub>2</sub> safety regulations must be observed.

If MAC values are exceeded CO<sub>2</sub> vapour must be vented to outdoor atmosphere  
- Danger of suffocation !

Should CO<sub>2</sub> cooling not start up, check and clean the nozzle or replace the nozzle if necessary; check the bottle connection filter and clean if necessary; check electrical connection of the CO<sub>2</sub> solenoid valve; make sure switching channel is activated.

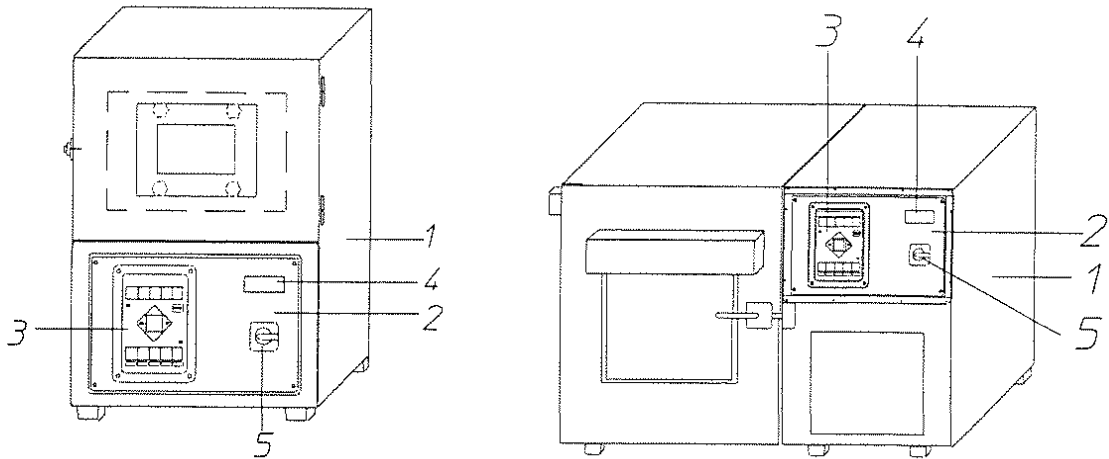
## 2.4 Preparation for initial operation

Prepare the system for initial operation as follows:

- Ensure that the chamber has been correctly installed in accordance with chapter 2.3.
- Seal all entry ports with the plugs supplied.
- In case of heat-emitting test specimens ensure they are disconnected when the chamber is switched off.
- Turn the main switch to "I".

### 3. Description

#### 3.1 Design



VT 4002

VT 4004 / VT 7004

- 1 Mechanical section
- 2 Electrical section
- 3 E4-Terminal
- 4 Adjustable operating temperature limiter\*
- 5 Main switch

#### Mechanical section

The mechanical section (1) contains the refrigeration assemblies. Cooling is effected directly. It is accessible from the right and from the rear by removing the covers. The pressure within the refrigeration circuit is monitored by the pressure limiter F2 and pressure control device F3 (see chapter 3.2).

#### Electrical section

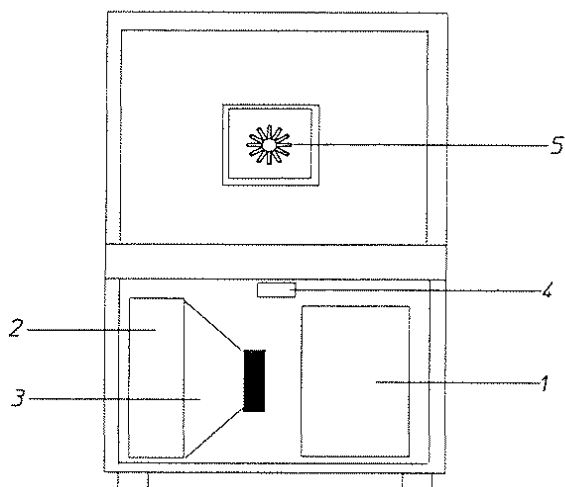
The electrical section (2) contains all control modules and electrical components. It is accessible from the front: undo the fastening screws of the front plate and tilt the control panel.

#### Control

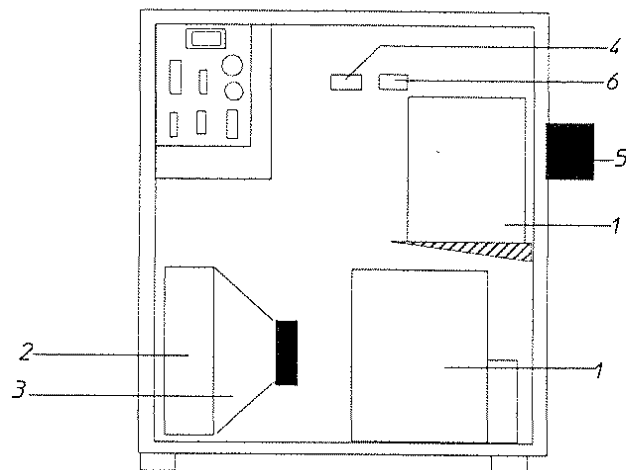
The control unit facilitates precise thermal conditioning, constant temperature regulation and stable control response.

<b>Air guidance</b>	<p>The high air flow rate ensures even distribution of air in the test space. This guarantees rapid transfer of the respective air conditions to the test specimen.</p> <p>The air is drawn in at the centre of the rear panel and enters the test space over the rear panel edges.</p> <p>The assemblies required for thermal conditioning are located behind the rear panel of the test space. They consist of:</p> <ul style="list-style-type: none"><li>- heat exchanger made of copper piping with aluminium fins</li><li>- electric heating</li></ul>
<b>Test space</b>	<p>The test space is made of high-grade steel, material no. 1.4301.</p>
<b>Measuring sensors</b>	<p>The temperature measuring sensors are located behind the rear panel of the test space.</p>
<b>Entry ports</b>	<p>Entry ports* are provided on the right and/or left side through which measuring lines may be run into the test space. Observe the safety instructions in chapter 1.4.</p>

### 3.2 Mechanical structure



VT 4002



VT 4004 / VT 7004

- 1 Compressor (two compressors, series 7 ..)
- 2 Condenser
- 3 Condenser fan
- 4 Pressure limiter F2
- 5 Fan motor for test space air circulation
- 6 Pressure control device F3 for VT 7004

### 3.3 Control unit

#### 3.3.1 Control unit in general

The electrical system houses the microprocessor-based control and monitoring system. The following data can be set on the Terminal and will be displayed:

- digital input of temperature in °C
- digital display of set and actual temperature value
- manual and automatic operation  
Program memory for max. 99 test programs with 99 program lines each, total max. 2000 program lines
- software temperature limiter for minimum and maximum test space temperature

Details on function and operation of the control unit are to be found in the enclosed controller operating instructions.

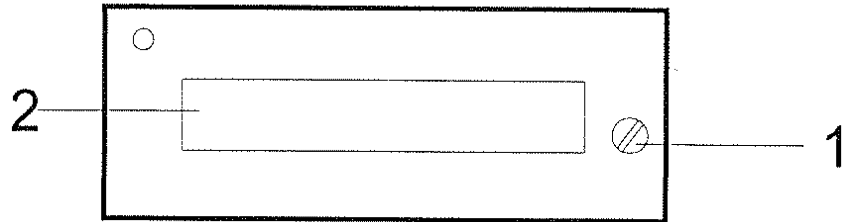
**WARNING**

The following information concerning heat-emitting test specimens must be observed

The system switches off automatically in case of faults thus disabling the cooling system. Test specimens which give off heat would heat up the test space to inadmissible levels. It is therefore necessary to ensure that heat dissipation from the test specimen is interrupted when the system is switched off. This may be triggered for example by the appropriately converted potential-free contact.

### 3.3.2 Adjustable operating temperature limiter\*

The operating temperature limiter\* (see illustration below) is used for test specimen protection. The maximum temperature is set with a screwdriver at the potentiometer (1) and represented in the display (2). The temperature set must be approx. 5 - 10 K higher than the maximum temperature setpoint of the system.

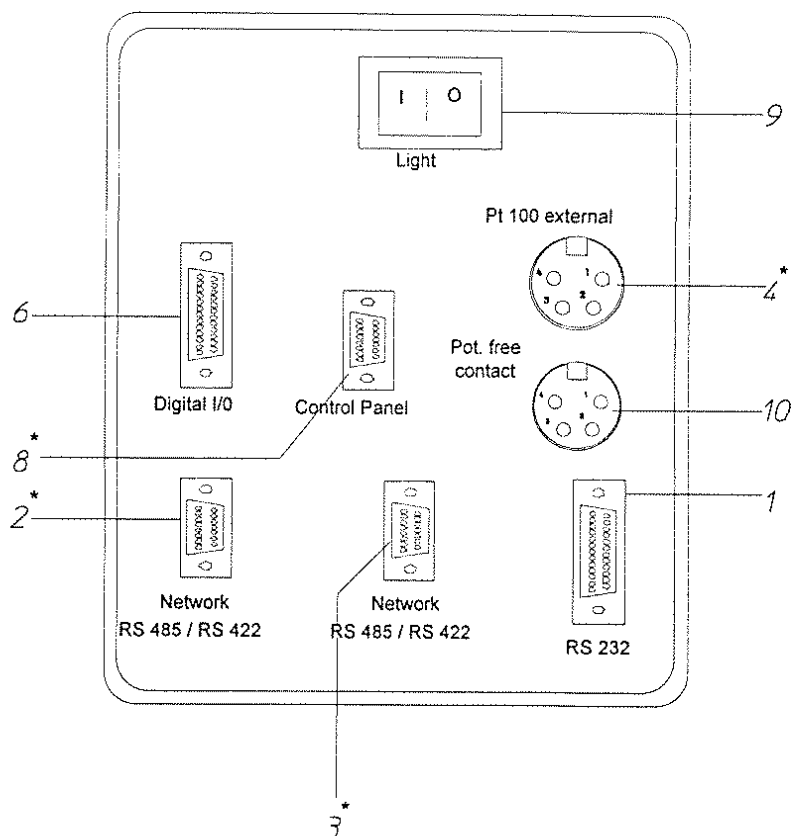


Adjustable operating temperature limiter\*

The temperature sensor can be moved freely throughout the test space and can therefore be attached to the most sensitive spot of the test specimen.



### 3.3.3 Connector panel



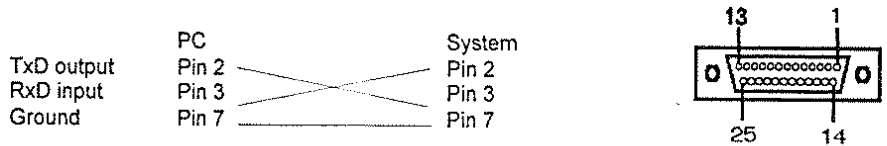
Connector panel

- 1,2\*,3\* Interfaces RS 232 and RS 485\* / RS 422\*
- 4\* Mobile temperature sensors\*
- 6 Digital I/O
- 8\* Control panel
- 9 Light switch
- 10 Potential-free contact

The position of these connections may differ depending on the optional accessories ordered.

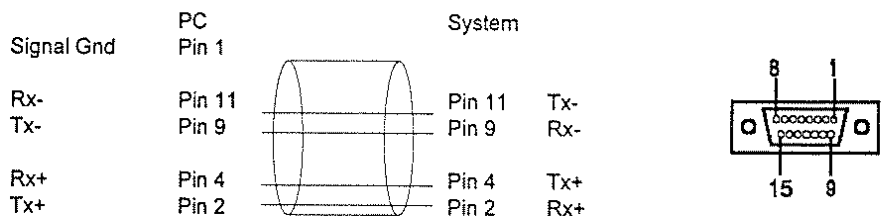
### 3.3.3.1 RS 232 interface

The RS 232 interface is used for external control via a computer. Depending on the type of computer it may be necessary to attach bridges at the PC end. In case of 9-pole interface connection at PC end, the original adapter (ordering code 881228) is to be used. The 25-pole sub D socket (1) is assigned as follows:



### 3.3.3.2 RS 485/RS 422 interface

The network RS 485/RS 422\* interfaces are used to network several chambers. The 15-pole sub D sockets (2 and 3) are assigned as follows:

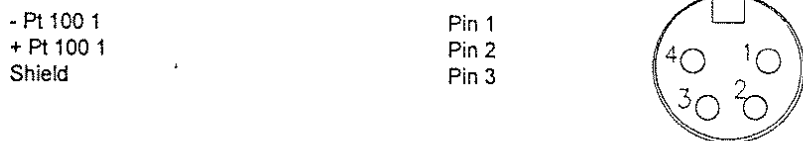


The pin assignment to PC is only applicable in connection with interface Converter RS 232/RS 485, Ordering code 883632.

### 3.3.3.3 Mobile temperature measuring sensor

The plug connection (4) is provided for the mobile temperature measuring sensor\*. Put the temperature measuring sensor through the entry port and fix it (electrically insulated) on the desired spot in the test space. Insert the connection of the temperature measuring sensor at "Pt 100 external" on the connector panel and seal the entry port.

The connection is used for external acquisition of temperature values. The 4-pole socket (4) is assigned as follows:



### 3.3.3.5 Digital customer I/O

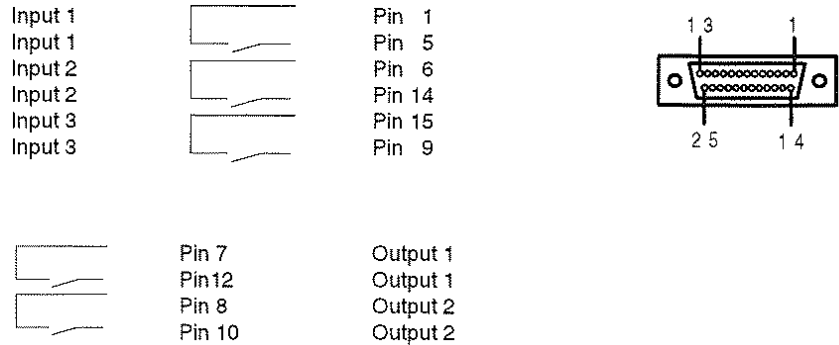
The Digital I/O connection comprises the digital inputs and outputs, which can be freely programmed within a program or as an additional function in manual mode (max. output load 24 V, 0.5 A). All inputs are designed for 24 V. They are separated by optocouplers.



**WARNING**

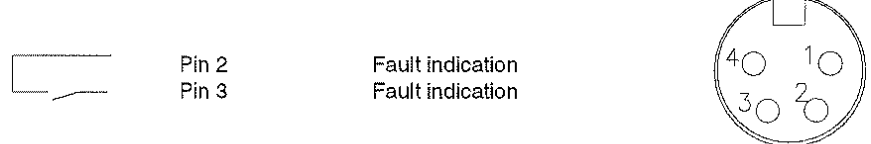
Do not apply external voltage to inputs

The 25-pole sub D socket (6) is assigned as follows:



### 3.3.3.6 Fault indication

The connection for the potential-free contact is taken to socket (10) (max. load 24 V, 0.5 A).



In case of malfunction pin 2 and pin 3 are open.  
If the potential-free contact is used, make sure it is compatible with the on-site measuring system.

### 3.3.3.7 Control Panel

The Control Panel\* (8) is used to connect the C-Terminal to the system.

### 3.3.3.8 Test space illumination

The test space illumination for type VT 4002 is located on the rear wall, in the case of VT 4004 and VT 7004 on the outside of the door. It is operated via the switch "Light" (9) on the connector panel or via the lighting panel on the door.

**3.4 Technical data**

The following technical data is applicable to all VT models:

**General installation requirements**

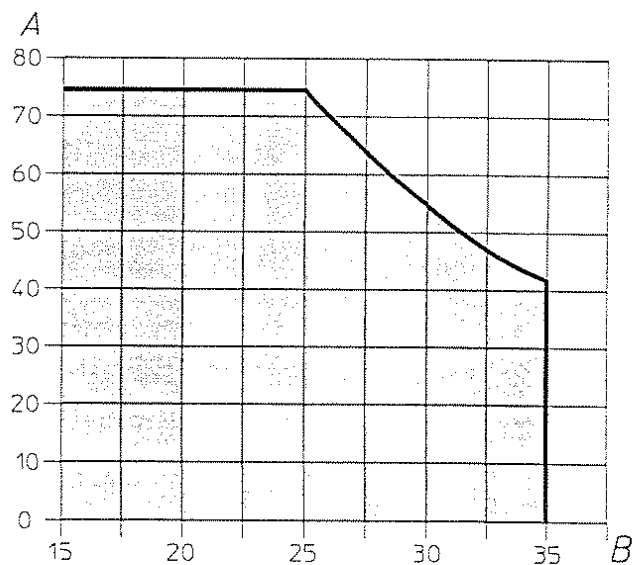
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Dry, well-ventilated locations with

Ambient temperature +15°C to +35°C

Maximum relative humidity 75 %

Do not expose the system to direct sunlight and avoid installing in the vicinity of heat sources.



A = Relative humidity % r.h.  
 B = Ambient temperature °C

**Environmental requirements**

**Temperature test chamber** **VT 4002 - VT 7004**

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Test space	high-grade steel material 1.4301
Load on floor	max. 200 kg/m <sup>2</sup>
Concentrated load	max. 15 kg

Protection class of the chamber IP 20

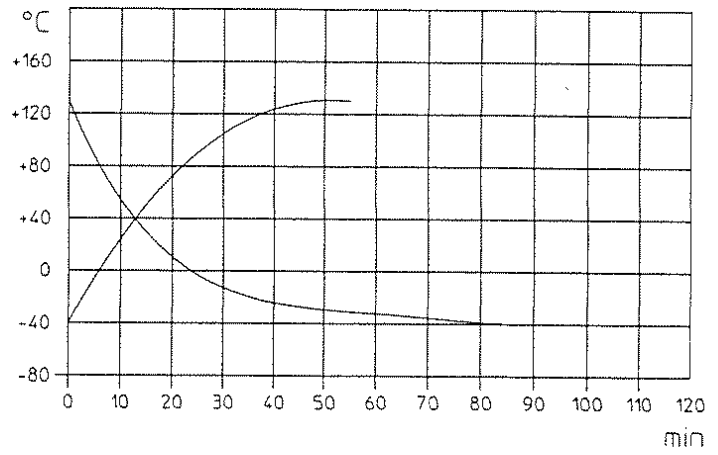
EMC Test Class A  
 in accordance with DIN 50 011 (1991):  
 (electromagnetic compatibility of conducted and emitted interference)

Temperature test chamber	VT 4002	VT 4004	VT 7004
<b>Characteristics for temperature tests</b>			
Temperature range	-40 °C to +130 °C	-40 °C to +180 °C	-70 °C to +180 °C
Temporal temperature fluctuations under stabilized conditions	± 1.0 K	± 1.0 K	± 1.0 K
Spatial temperature fluctuations under stabilized conditions	± 2.0 K	± 2.0 K	± 2.0 K
Wall distance of the measuring points	50 mm		
Heating rate acc. to DIN 50011 part 12 (measured in the test space centre)	5 K/min (see curve p. 20)	5 K/min (see curve p. 21)	5 K/min (see curve p. 22)
Cooling rate acc. to DIN 50011 part 12 (measured in the test space centre)	3.5 K/min (see curve p. 20)	5 K/min (see curve p. 21)	3.5 K/min (see curve p. 22)
Heat compensation maximum	350 W (see curve p. 20)	500 W (see curve p. 21)	450 W (see curve p. 22)
<b>Installation and operational data</b>			
Test space dimensions	see layout in chapter 2		
Housing dimensions	see layout in chapter 2		
Weight	approx. 60 kg	approx. 130 kg	approx. 150 kg
Test space illumination*	230 V, 15 W	230 V, 8 W	230 V, 8 W
Observation window width x height	135 mm x 86 mm		
Rated voltage	230 V, +6/-10 %, 1/N, 50Hz		
Rated power	0.7 kW	1.5 kW	2.0 kW
Rated current	4.0 A	7.5 A	10.0 A
On-site fuse protection	16 A slow		

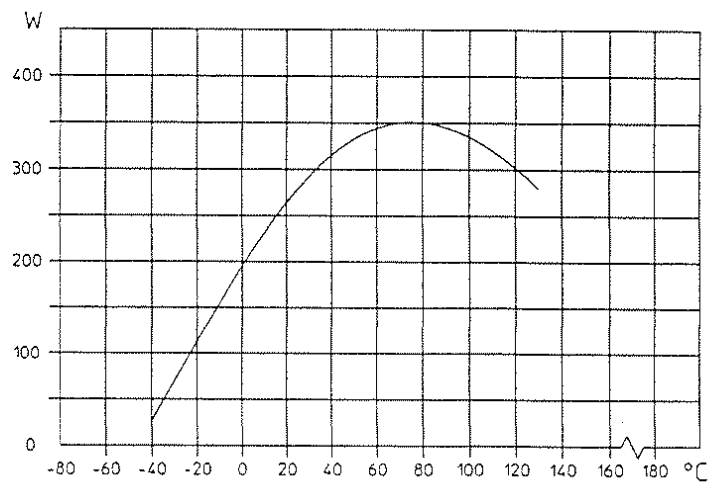
Temperature test chamber	VT 4002	VT 4004	VT 7004
<b>Noise measurement - acc. to DIN 45635 part 1 accuracy class 2</b>			
Sound pressure level measured from the front at a distance of 2 m	< 55 dB (A)	< 58 dB (A)	< 59 dB (A)

All figures represent average values of standard systems at an ambient temperature of +25 °C and rated voltage of 230 V / 50 Hz, without test specimen, without radiation and without optional accessories.

VT 4002

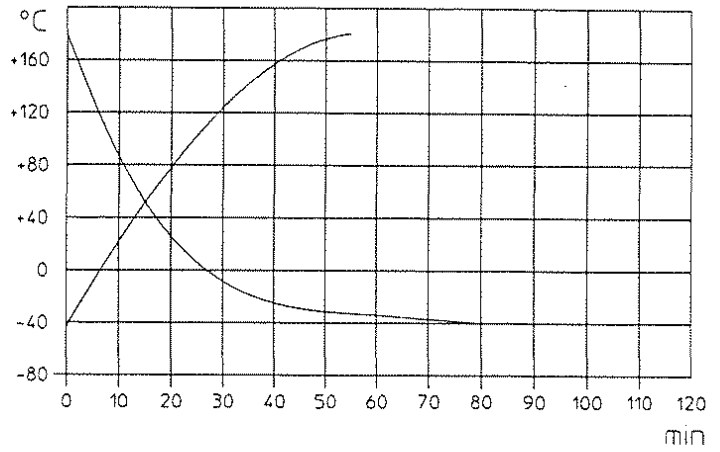


Temperature change rate without test specimen

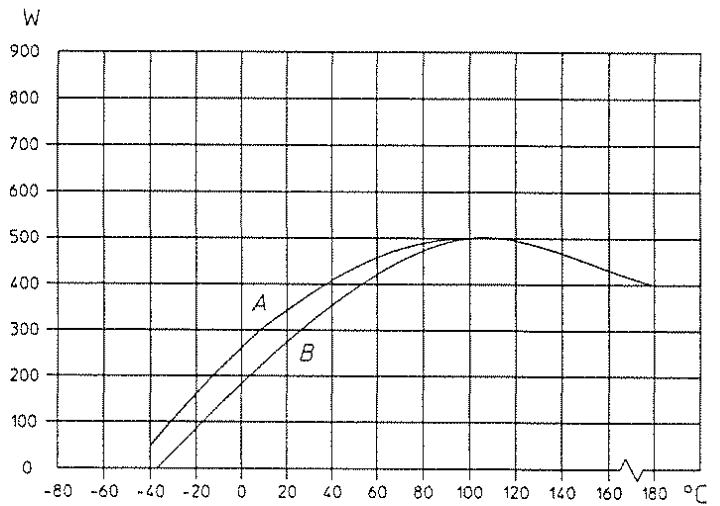


Heat compensation

VT 4004



Temperature change rate without test specimen

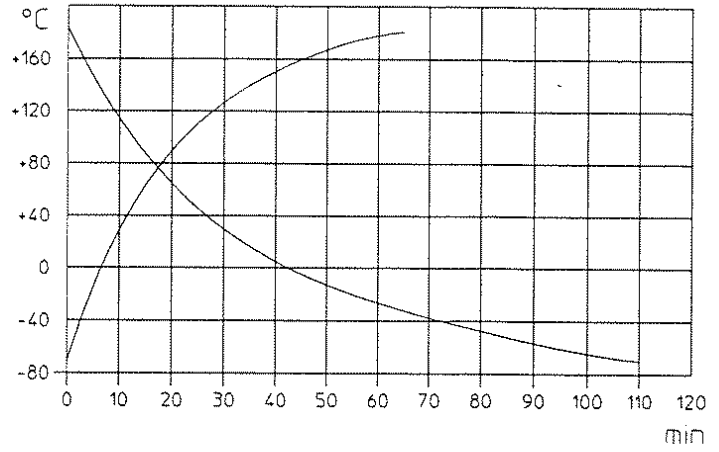


Heat compensation

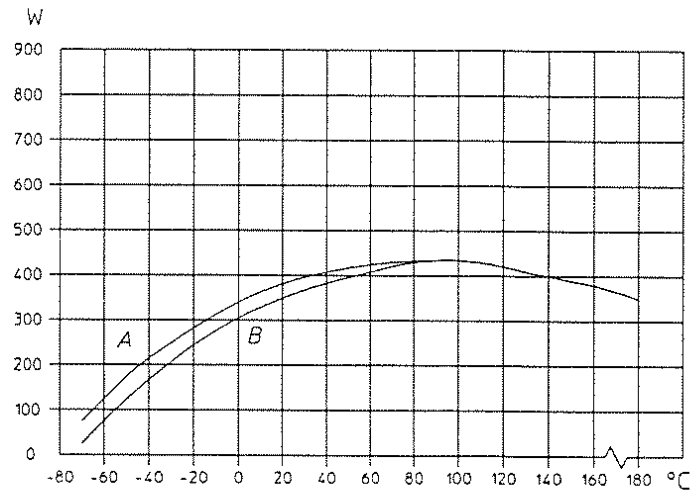
- A = System without window
- B = System with window



VT 7004



Temperature change rate without test specimen



Heat compensation

- A = System without window
- B = System with window

### 3.5 Optional accessories

The system may be equipped with optional accessories.  
The installation to be carried out by:

F = Factory  
S = Service  
U = User

NOTE
------



Remember that the system may only be equipped with original accessories from Vötsch Industrietechnik

Ordering Code.	Installation	
88 52 19.	F-S	50 mm entry port for VT 4002
88 12 13	F-S	50 mm entry port for VT 4004, VT 7004
88 12 14	F-S	80 mm entry port for VT 4004, VT 7004
88 63 55	F-S	Dehumidification for the heating phase
88 49 74	F-S	CO <sub>2</sub> shock cooling for VT 4004 /VT 7004
88 28 56	F-S	LX 300 single-colour printer (black)
88 52 63	F-S	LX 300 multi-colour printer
88 52 64	U	Colour extension kit for LX 300
88 52 61	F-S	Printer HP Deskjet 660 C
88 28 60	F-S	Printer software
88 50 56	F-S	Temperature measurement on the test specimen
88 12 35	S-U	Connecting cable for Interface RS 232
88 12 27	S-U	Interface converter IEEE 488 to RS 232
88 36 32	S-U	Interface converter RS 232 <--> RS 485
88 47 23	F-S	Interface RS 485/422 for networking (plus network card)
88 12 28	U	Adapter cable, 25-pole to 9-pole
88 19 01	S-U	Software TSI
88 54 01	S-U	Software TSI-MT
88 27 21	U	C-Terminal
88 51 90	F-S	Connection for C-Terminal

88 26 22	F-S	Adjustable operating temperature limiter
88 51 78	S	Door with window, VT 4004 / VT 7004
88 68 62	F-S	Door hinges on the left, for VT 4002
88 66 34	U	Additional door with hinges on the right, for VT 4002
88 49 76	U	Laboratory bench, mobile, for VT 4004 / VT 7004
88 53 88	F-S	Special voltage 220 V, 1/N, 60 Hz for VT 4002 / VT 4004
88 53 94	F-S	Special voltage 220 V, 1/N, 60 Hz for VT 7004
88 53 95	F-S	Special voltage 240 V, 1/N, 50 Hz
88 53 89	F-S	Special voltage 254 V, 1/N, 60 Hz for VT 4002 / VT 4004
88 53 96	F-S	Special voltage 254 V, 1/N, 60 Hz for VT 7004
88 64 40	S	Spare parts package VT 4002
88 63 57	S	Spare parts package VT 4004
88 63 58	S	Spare parts package VT 7004

Further information on optional accessories is available on request.

## 4. Operation

### 4.1 General information

The temperature test chamber can be operated in manual (fixed value operation) or automatic mode.

Extensive temperature test sequences can be programmed with the EDIT program.

The temperature test chamber can be controlled by a computer and the TSI software via the RS 232 interface or in ASCII mode.

The test specimen is protected against excessive temperatures by the adjustable operating temperature limiter\*.

The upper and lower temperature limits can be set with the software temperature limiter at the Terminal (see enclosed controller operating instructions).

Permissible temperature limits and mechanical loads in the test space must be observed (see chapter "Technical Data").

Refer to chapter 5 in case of faults during operation.

## 4.2 Putting into operation

- Ensure that the test space is suitable for the intended test specimen with regard to weight, corrosive effect, heat etc.
- Ensure that installation has been carried out in accordance with chapter 2.3.
- Ensure that maintenance work as specified in chapter 6 has been carried out. Maintenance work becoming necessary during the intended test period should be performed beforehand for reasons of safety.
- Put the test specimen in the test space.



**DANGER**

The test space and inside of the door may still be hot or extremely cold. Do not touch!

- Ensure that entry ports are sealed with plugs.
- Set the main switch to "I".
- Put optional accessories into operation.
- Select switching channel on E4-Terminal (refer to controller operating instructions E4-Terminal for number of switching channel), or via additional functions on the C-Terminal\* (see controller operating instructions C-Terminal)



**NOTE**

Please note that optional accessory "Dehumidification for the heating phase" is only operative at temperatures  $\leq 100$  °C. The heating rate is thereby reduced.

- Observe safety instructions.
- Set the desired maximum temperature at the adjustable operating temperature limiter.\*
- Put external systems into operation.
- After the automatic initialization of the program the start menu "OFF" appears.

The control unit is now ready for operation.  
The following modes are available:

- Manual fixed value mode
- Automatic mode
- EDIT-program

Refer to the enclosed controller operating instructions for detailed description of the operating modes.

### 4.3 Operating modes

#### 4.3.1 Manual mode

Temperature values run in manual mode.  
 It is possible to change values or process test programs with EDIT during operation.

#### 4.3.2 Automatic mode

Test programs created with EDIT run in automatic mode. It is possible to process other test programs with EDIT during operation.

In automatic mode it is possible to run fixed standard programs with test standards for this series of systems.

Programm location	Test standard:
No. 101	IEC 68-2-14
No. 102	MIL STD 331 A (for VT 7004 only)
No. 103	DIN 40 046 part 4

### 4.4 EDIT- Program

Test programs are created and managed with EDIT.  
 The structure is described in the enclosed controller operating instructions.

A maximum of 99 test programs each consisting of 99 program lines and a maximum of 10 loops may be stored.

### 4.5 Putting out of operation



<b>DANGER</b>
---------------

Please note that the test space and the inside of the door may still be hot or extremely cold. Do not touch !

- Bring the system down to room temperature.
- Put external systems out of operation.
- Put auxiliary equipment out of operation.
- Ensure that the start menu OFF is displayed.
- Set main switch to "0". For shorter stops (e.g. when loading or unloading the test space) the start menu "OFF" is sufficient.
- Remove the test specimen from the test space.

**5. Fault diagnosis and rectification**

Faults which occur during operation are signalled by the red ERROR indicator lamp. The system is switched off permanently.

Proceed as follows in case of faults:

- Rectify the fault.  
The following table lists the faults, their causes and rectification. Contact the service organisation of Vötsch Industrietechnik if a fault occurs frequently.
- Acknowledge error message.
- Continue operation of the system.

Index	Fault message	Cause	Rectification
2	Software test specimen protection temperature	Actual temperature value above or below the test chamber configuration	Check values entered and adjust setpoint to temperature range (see technical data)
0	Operating temperature limiter*	Limit for protection of the test specimen exceeded	Check limit adjustment or programmed setpoint setting
1	Temperature limiter test space	Temperature fuse has tripped or is broken	Switch off system and contact our service organisation.
3	Excess pressure compressor pre-cooling	Excess pressure in the refrigeration circuit	Switch off chamber, clean condenser, (with a brush or a vacuum cleaner) Push reset button at pressure limiter F2 (chapter 3.2) . Put system into operation again.
4	Excess pressure compressor low cooling	Excess pressure in the low-cooling circuit	See index 3. Contact our service organisation if the fault cannot be rectified,

Contact our service organisation if a fault cannot be rectified with the aforementioned measures. Refer to chapter 6.6 for the address.

## 6. Maintenance

### 6.1 General information

Regular care and maintenance are decisive factors to ensure trouble-free operation over many years.

Some basic maintenance work is incorporated in the maintenance schedule and may be performed on-site by trained personnel. This does not replace the expert maintenance offered by our service organisation (see chapter 6.6).

### 6.2 Disposal of waste resulting from servicing

Vötsch Industrietechnik has the technical facilities required for expert disposal of refrigerants, oils and mechanical components resulting from servicing.

If desired, our service organisation will take back the materials and parts to be disposed of, at customer's expense.

#### 6.2.1 Disposal of system

The following safety instructions must be observed when disposing of the system:

**DANGER**



- Destroy the door lock
- The refrigerant used (see rating plate) contains no ozone reducing CFC. Although its ozone depletion potential (ODP) rate equals 0.00, this refrigerant must not be released into the atmosphere but requires expert disposal.
- Compressor oil must be consigned to a waste oil disposal plant.
- The thermal insulation consists of asbestos-free mineral fibre which should be disposed of as ordinary refuse.

With regard to the specified materials and the disposal of the remaining components the national and local waste disposal regulations valid at the time of disposal must be observed.



### 6.3 Consumables

The following consumables are used during maintenance work:

Ordering code	Description
60 45 02 02	Incandescent bulb 230 V, 15 W, E14
60 48 23 26	Fluorescent tube 230 V, 8 W

Consumables may be ordered from our service department. Please refer to chapter 6.6 for the address.

### 6.4 Maintenance schedule

Interval	Assembly	Maintenance work
After every test	Test space	Clean test space in accordance with 6.5.1
	Test space door	Clean seals in accordance with 6.5.2
	Condenser	Check for deposits of dust and clean in accordance with 6.5.3
As necessary	Test space illumination	Replace incandescent bulb or fluorescent tube in accordance with 6.5.4

## 6.5 Maintenance work

**DANGER**



Switch off the system - turn main switch to "0" - and pull the mains plug prior to performing maintenance work !

### 6.5.1 Cleaning the test space

The inner walls and the bottom of the test space should be cleaned with clear water and subsequently dried after every test in order to prevent corrosion.

**NOTE**



Unwashed, mounted PCBs and some plastics set chlorides free. In conjunction with high humidity levels and the nickel chromium steel used, chlorine leads to stress corrosion cracking.

**WARNING**



Regular cleaning of the test space prevents such damage.

If corrosive deposits have formed, they must be removed immediately. Polish up with stainless steel cleaning wool to avoid scratches on the surface.

**WARNING**



Do not use sharp tools.

- 6.5.2 Cleaning the test space door** The seal on the test space door should be cleaned with clear water and subsequently dried after every test in order to prevent sticking and freezing up. Also check by means of a paper strip if the door is properly sealed. If this is not the case, contact our service organisation.

**6.5.3 Cleaning the condenser**

Check the air-cooled condenser of the refrigeration unit regularly for deposits of dust.  
Clean the condenser every three months with a vacuum cleaner or handbrush.  
Clean even more frequently in dusty environments to prevent excess pressure in the refrigeration system.

**6.5.4 Replacing the incandescent bulb and fluorescent tube**

**VT 4002:**

The light is located on the rear wall of the test space

- Unscrew the rear wall
- Unscrew the defective bulb
- Insert a new bulb
- Refit the rear wall

**VT 4004 / VT 7004:**

The light is located on the outside of the door

- Unscrew the shield
- Turn and remove the fluorescent tube
- Insert a new fluorescent tube
- Refit the shield

## 6.6 Maintenance by the service organisation

Comprehensive maintenance and the annual inspection of safety devices are necessary to ensure trouble-free operation over many years. Our service organisation assumes responsibility for performing these tasks. This is laid down in a maintenance contract.

In Germany:

Vötsch Industrietechnik GmbH  
Service Centre  
D-35447 Reiskirchen-Lindenstruth  
Tel.: 06408 / 84-0  
Fax.: 06408 / 6 45 47

or

Vötsch Industrietechnik GmbH  
Frommern  
Beethovenstrasse 34  
D-72336 Balingen

**P.O. Box address:**  
P.O. Box 10 04 53, D-72304 Balingen  
Tel.: 07433/303-0  
Fax: 07433/303-220  
Tx.: 763629 hvb

abroad:

Our representative

**NOTE**



The following data is always required to expedite administration and fault rectification:

Type of system, order and ID no.\*\*  
System accessories  
Program version  
Fault messages in the fault menu

\*\*This data is to be found on the rating plate underneath the main switch.

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## ASCII - kommunikationport description

commissionsno. : T2-4  
Chamber name : T 201 -40Grd.C  
date ..... : 06/04/02  
controller .. : TC

## Chamber communicationsport default settings:

- protokol ..... : ASCII
- baudrate ..... : 9600
- chamberaddress .... : 00
- art of com.port .. : RS 232
- language ..... : deutsch

How you can change the default com.port settings, please read the controller serive manual.

(E-Terminal cap.: 3.5 and C-Terminal cap: 3.2)

The chamber is fixed as a slave. She never be answered without a question.

chamber data format : - 8 databits  
                          - 1 startbit  
                          - 1 stopbit  
                          - no parity

data format start sign : one \$ sign

data format chamberaddress : 2-signed integer

data format end sign : one <CR> sign

data format nom./akt.value : 4 for-,point,1 after comma sign

data format dig.in/output : allways 8-bit block  
(not used bits filled with zero; 0=OFF 1=ON)

data format error number : 2-signed integer (look E-Terminal)

data format error text : 31 charakter (look C-Terminalt)

data format program no : 4-signed integer



read Chamber T 201 -40Grd.C (T2-4)

Caution! If the digital output AL-ERROR is high, you can get the error with the F-command and quit it with the Q-command.

command from PC: (value only exambles !!)

```
start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : I
end sign ..... : <CR>
```

chamber answer : (value only exambles !!)

```
0. analog nominal value Temper : 0010.0 (examble 10.0)
0. analog actual value Temper : 0011.2 (examble 11.2)
1. analog naminal value Pt100 1 : 0000.0 (not used)
1. analog actual value Pt100 1 : 0011.2 (examble 11.2)
2. analog naminal value Pt100 2 : 0000.0 (not used)
2. analog actual value Pt100 2 : 0011.2 (examble 11.2)
3. analog naminal value Pt100 3 : 0000.0 (not used)
3. analog actual value Pt100 3 : 0011.2 (examble 11.2)
4. analog naminal value Pt100 4 : 0000.0 (not used)
4. analog actual value Pt100 4 : 0011.2 (examble 11.2)

0. digital output on : 0 not used
1. digital output start : 1 switched ON
2. digital input AL-ERROR : 0 switched off
3. digital output Temper : 1 switched ON
4. digital output add.dehum : 0 switched OFF
5. digital output CO2 cool. : 1 switched ON
6. digital output compr.air : 0 switched OFF
7. digital output free out1 : 1 switched ON
8. digital output free out2 : 0 switched OFF
9. digital input free in 1 : 1 switched ON
10. digital input free in 2 : 0 switched OFF
11. digital input free in 3 : 1 switched ON
12. digital input free in 4 : 0 switched OFF
13. digital output AdjTempHi : 1 switched ON
14. digital output AdjTempUn : 0 switched OFF
15. digital output AdjTempSp : 1 switched ON
end sign ..... : <CR>
```

Examble : (| remarks linefeed)

PC -> Chamber :\$00I<CR>

Chamber -> PC :0010.0 0011.2 0000.0 0011.2 0000.0 0011.2 0000.|
|0 0011.2 0000.0 0011.2 0101010101010101<CR>|

write Chamber T 201 -40Grd.C (T2-4)

Attention!! If you set a nominal value you must be switch on the digital output with the same name !  
Not used channels fill up (see dataformat)

command from PC: (value only examples !!)

```

start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : E
  0. analog nominal value Temper : 0010.0 (example 10.0)
  1. analog nominal value not used : 0000.0 (fill up with 0)
  2. analog nominal value not used : 0000.0 (fill up with 0)
  3. analog nominal value not used : 0000.0 (fill up with 0)
  4. analog nominal value not used : 0000.0 (fill up with 0)

  0. digital output not used : 0
  1. digital output start : 1 switched ON
  2. digital output not used : 0
  3. digital output Temper : 1 switched ON
  4. digital output add.dehum : 0 switched OFF
  5. digital output CO2 cool. : 1 switched ON
  6. digital output compr.air : 0 switched OFF
  7. digital output free out1 : 1 switched ON
  8. digital output free out2 : 0 switched OFF
  9. digital input not used : 0 (not write enable)
 10. digital input not used : 0 (not write enable)
 11. digital input not used : 0 (not write enable)
 12. digital input not used : 0 (not write enable)
 13. digital output AdjTempHi : 1 switched ON
 14. digital output AdjTempUn : 0 switched OFF
 15. digital output AdjTempSp : 1 switched ON
end sign ..... : <CR>

```

```

Chamber answer :
O.K. sign : 0
end sign .... : <CR>

```

```

Example : (| remarks linefeed)
PC -> Chamber :$00E 0010.0 0000.0 0000.0 0000.0 0000.0 101010100000|
|101<CR>|
chamber -> PC :0 <CR>

```

write gradient T 201 -40Grd.C (T2-4)

command from PC: (value only examples !!)

```
start sign ..... : $
chamberadress (always 2 integer) : 00 (here chamber 1)
command ..... : U
  0. gradient up-speed   Temper : 0001.0 (examble 1.0)
  0. gradient down-speed Temper : 0002.0 (examble 2.0)
  1. analog nominal value not used : 0000.0 (fill up with 0)
  1. analog nominal value not used : 0000.0 (fill up with 0)
  2. analog nominal value not used : 0000.0 (fill up with 0)
  2. analog nominal value not used : 0000.0 (fill up with 0)
  3. analog nominal value not used : 0000.0 (fill up with 0)
  3. analog nominal value not used : 0000.0 (fill up with 0)
  4. analog nominal value not used : 0000.0 (fill up with 0)
  4. analog nominal value not used : 0000.0 (fill up with 0)
end sign ..... : <CR>
```

```
Chamber answer :
O.K. sign      : 0
end sign ..... : <CR>
```

Examble : (| remarks linefeed)

```
PC -> Chamber :$00U 0001.0 0002.0 0000.0 0000.00000.0 0000.00000.0 |
|0000.00000.0 0000.0<CR>|
chamber -> PC :0 <CR>
```

read error T 201 -40Grd.C (T2-4)

```
command from PC: (value only examples !!)
start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : F
end sign ..... : <CR>
```

```
chamber answer : (value only examples !!)
errornumber : 01 (ex: error no 1)
errortext : software test spec.protection..
end sign ... : <CR>
```

```
example :
PC -> Chamber :$00F<CR>
Chamber -> PC:01 software test spec.protection.. <CR>
```

quit error

Attensione! It will always be quitt the first error !

```
command from PC: (value only examples !!)
start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : Q
end sign ..... : <CR>
```

```
chamber answer : (value only examples !!)
counter of aktual errors ..... : 00
end sign ..... : <CR>
```

```
Example :
PC -> Chamber :$00Q<CR>
Chamber -> PC:00<CR>
```

automaticprogramm start/stop T 201 -40Grd.C (T2-4)

xxxx is equal to the number of the automatic programm  
you will be startet

Is xxxx equal the 0000, you will be stopped the  
aktual automatic programm !

command from PC: (value only exambles !!)

start sign ..... : \$

chamberaddress (always 2 integer) : 00 (here chamber 1)

command ..... : P

programm number ..... : xxxx

end sign ..... : <CR>

chamber answer :

O.K. sign ..... : 0

end sign ..... : <CR>

examble : prog.nr 7 start

PC -> Chamber :\$00P0007<CR>

Chamber -> PC:0<CR>

Chamber: T 201 -40Grd.C (T2-4)

errornumber/errorortext	quitt-enable
00 ..... test spezimen protection	. no
01 ..... temperaturlimiter test space	. no
02 ..... software test spec.prot. temp	. no
03 ..... high pressure (pre-)compressor	. no

Analog Channel		input-range	min	max
0	Temper	.. [°C]	..... -045.0	0132.0
1	Pt100 1	.. [°C]	..... 0000.0	0000.0
2	Pt100 2	.. [°C]	..... 0000.0	0000.0
3	Pt100 3	.. [°C]	..... 0000.0	0000.0
4	Pt100 4	.. [°C]	..... 0000.0	0000.0

Digital Channel	Type
0	on not changable
1	start write Output
2	AllError read Input
3	Temper controller active
4	add.dehum write Output
5	CO2 cool. write Output
6	compr.air write Output
7	free out1 write Output
8	free out2 write Output
9	free in 1 read Input
10	free in 2 read Input
11	free in 3 read Input
12	free in 4 read Input
13	AdjTempHi write Output
14	AdjTempUn write Output
15	AdjTempSp write Output

## chamberconfiguration

commisionsno. : T2-4  
 Chamber name : T 201 -40Grd.C  
 date ..... : 06/04/02  
 controller .. : TC

Analog Input				input-range		protection-range	
no	name	unit	short	min	max	min	max
0	Temper	[°C]	t	-45.000	132.000	-50.000	135.000
1	Pt100 1	[°C]	1Pt	-300.000	300.000	-50.000	135.000
2	Pt100 2	[°C]	2Pt	-300.000	300.000	-50.000	135.000
3	Pt100 3	[°C]	3Pt	-300.000	300.000	-50.000	135.000
4	Pt100 4	[°C]	4PT	-300.000	300.000	-50.000	135.000

## Analog Output

no	name	type	min==0	max==10V or 20mA
0	Temper	actual	-100.000	200.000
1	Pt100 1	actual	-100.000	200.000
2	Pt100 2	actual	-100.000	200.000
3	Pt100 3	actual	-100.000	200.000
4	Pt100 4	actual	-100.000	200.000

## Digital Channel

no	name	type
0	Temper	controller active
1	add.dehum	write Output
2	CO2 cool.	write Output
3	compr.air	write Output
4	free out1	write Output
5	free out2	write Output
6	free in 1	read Input
7	free in 2	read Input
8	free in 3	read Input
9	free in 4	read Input
10	AdjTempHi	write Output
11	AdjTempUn	write Output
12	AdjTempSp	write Output

## error

errornumber/errorrtxt	quitt-enable
00 test spezimen protection	no
01 temperaturlimiter test space	no
02 software test spec.prot. temp	no
03 high pressure (pre-)compressor	no

## switchcyclecounter

no	name	unit	short	set	reset
0	h.counter	h	B.h	no	no

## ASCII - kommunikationport description

commissionsno. : T4-4  
Chamber name : T 401 -40Grd.C  
date ..... : 06/04/02  
controller .. : TC

## Chamber communicationsport default settings:

- protokol ..... : ASCII
- baudrate ..... : 9600
- chamberadress .... : 00
- art of com.port .. : RS 232
- language ..... : deutsch

How you can change the default com.port settings, please read the controller serive manual.

(E-Terminal cap.: 3.5 and C-Terminal cap: 3.2)

The chamber is fixed as a slave. She never be answered without a question.

chamber data format : - 8 databits  
                          - 1 startbit  
                          - 1 stopbit  
                          - no parity

data format start sign : one \$ sign

data format chamberadress : 2-signed integer

data format end sign : one <CR> sign

data format nom./akt.value : 4 for-,point,1 after comma sign

data format dig.in/output : allways 8-bit block  
(not used bits filled with zero; 0=OFF 1=ON)

data format error number : 2-signed integer (look E-Terminal)

data format error text : 31 charakter (look C-Terminalt)

data format program no : 4-signed integer



read Chamber T 401 -40Grd.C (T4-4)

Caution! If the digital output AL-ERROR is high, you can get the error with the F-command and quit it with the Q-command.

command from PC: (value only examples !!)

```
start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : I
end sign ..... : <CR>
```

chamber answer : (value only examples !!)

```
0. analog nominal value Temper : 0010.0 (examble 10.0)
0. analog actual value Temper : 0011.2 (examble 11.2)
1. analog naminal value Pt100 1 : 0000.0 (not used)
1. analog actual value Pt100 1 : 0011.2 (examble 11.2)
2. analog naminal value Pt100 2 : 0000.0 (not used)
2. analog actual value Pt100 2 : 0011.2 (examble 11.2)
3. analog naminal value Pt100 3 : 0000.0 (not used)
3. analog actual value Pt100 3 : 0011.2 (examble 11.2)
4. analog naminal value Pt100 4 : 0000.0 (not used)
4. analog actual value Pt100 4 : 0011.2 (examble 11.2)

0. digital output on : 0 not used
1. digital output start : 1 switched ON
2. digital input AL-ERROR : 0 switched off
3. digital output Temper : 1 switched ON
4. digital output add.dehum : 0 switched OFF
5. digital output CO2 cool. : 1 switched ON
6. digital output free out1 : 0 switched OFF
7. digital output free out2 : 1 switched ON
8. digital input free in 1 : 0 switched OFF
9. digital input free in 2 : 1 switched ON
10. digital input free in 3 : 0 switched OFF
11. digital input free in 4 : 1 switched ON
12. digital output AdjTempHi : 0 switched OFF
13. digital output AdjTempUn : 1 switched ON
14. digital output AdjTempSp : 0 switched OFF
15. bit only for fill up : 0
end sign ..... : <CR>
```

Examble : (| remarks linefeed)

PC -> Chamber :\$00I<CR>

Chamber -> PC :0010.0 0011.2 0000.0 0011.2 0000.0 0011.2 0000.|
|0 0011.2 0000.0 0011.2 01010101010100<CR>|

write Chamber T 401 -40Grd.C (T4-4)

Attention!! If you set a nominal value you must be switch on the digital output with the same name !  
Not used channels fill up (see dataformat)

command from PC: (value only examples !!)

```

start sign ..... : $
chamberadress (always 2 integer) : 00 (here chamber 1)
command ..... : E
  0. analog nominal value Temper : 0010.0 (example 10.0)
  1. analog nominal value not used : 0000.0 (fill up with 0)
  2. analog nominal value not used : 0000.0 (fill up with 0)
  3. analog nominal value not used : 0000.0 (fill up with 0)
  4. analog nominal value not used : 0000.0 (fill up with 0)

  0. digital output not used : 0
  1. digital output start : 1 switched ON
  2. digital output not used : 0
  3. digital output Temper : 1 switched ON
  4. digital output add.dehum : 0 switched OFF
  5. digital output CO2 cool. : 1 switched ON
  6. digital output free out1 : 0 switched OFF
  7. digital output free out2 : 1 switched ON
  8. digital input not used : 0 (not write enable)
  9. digital input not used : 0 (not write enable)
 10. digital input not used : 0 (not write enable)
 11. digital input not used : 0 (not write enable)
 12. digital output AdjTempHi : 0 switched OFF
 13. digital output AdjTempUn : 1 switched ON
 14. digital output AdjTempSp : 0 switched OFF
 15. bit only for fill up : 0
end sign ..... : <CR>

```

```

Chamber answer :
O.K. sign : 0
end sign .... : <CR>

```

Example : (| remarks linefeed)

```

PC -> Chamber :$00E 0010.0 0000.0 0000.0 0000.0 0000.0 101010100000|
|100<CR>|
chamber -> PC :0 <CR>

```

write gradient T 401 -40Grd.C (T4-4)

command from PC: (value only examples !!)

```

start sign ..... : $
chamberadress (always 2 integer) : 00 (here chamber 1)
command ..... : U
  0. gradient up-speed    Temper : 0001.0 (examble 1.0)
  0. gradient down-speed  Temper : 0002.0 (examble 2.0)
  1. analog nominal value not used : 0000.0 (fill up with 0)
  1. analog nominal value not used : 0000.0 (fill up with 0)
  2. analog nominal value not used : 0000.0 (fill up with 0)
  2. analog nominal value not used : 0000.0 (fill up with 0)
  3. analog nominal value not used : 0000.0 (fill up with 0)
  3. analog nominal value not used : 0000.0 (fill up with 0)
  4. analog nominal value not used : 0000.0 (fill up with 0)
  4. analog nominal value not used : 0000.0 (fill up with 0)
end sign ..... : <CR>

```

```

Chamber answer :
O.K. sign      : 0
end sign ..... : <CR>

```

Examble : (| remarks linefeed)

```

PC -> Chamber :$00U 0001.0 0002.0 0000.0 0000.00000.0 0000.00000.0 |
|0000.00000.0 0000.0<CR>|
chamber -> PC :0 <CR>

```

read error T 401 -40Grd.C (T4-4)

```
command from PC: (value only examples !!)
start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : F
end sign ..... : <CR>
```

```
chamber answer : (value only examples !!)
errornumber : 01 (ex: error no 1)
errortext : software test spec.protection..
end sign ... : <CR>
```

```
example :
PC -> Chamber :$00F<CR>
Chamber -> PC:01 software test spec.protection.. <CR>
```

quit error

Attensione! It will always be quitt the first error !

```
command from PC: (value only examples !!)
start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : Q
end sign ..... : <CR>
```

```
chamber answer : (value only examples !!)
counter of aktual errors ..... : 00
end sign ..... : <CR>
```

```
Examble :
PC -> Chamber :$00Q<CR>
Chamber -> PC:00<CR>
```

automaticprogramm start/stop T 401 -40Grd.C (T4-4)

xxxx is equal to the number of the automatic programm  
you will be startet

Is xxxx equal the 0000, you will be stopped the  
aktual automatic programm !

command from PC: (value only exambles !!)

start sign ..... : \$

chamberadress (always 2 integer) : 00 (here chamber 1)

command ..... : P

programm number ..... : xxxx

end sign ..... : <CR>

chamber answer :

O.K. sign ..... : 0

end sign ..... : <CR>

examble : prog.nr 7 start

PC -> Chamber :\$00P0007<CR>

Chamber -> PC:0<CR>

Chamber: T 401 -40Grd.C (T4-4)

errornumber/errortext	quitt-enable
00 ..... test spezimen protection	. no
01 ..... temp.limit.test space / fan	. no
02 ..... software test spec.prot. temp	. no
03 ..... high pressure (pre-)compressor	. no

Analog Channel		input-range	min	max
0	Temper	.. [°C]	..... -045.0	0185.0
1	Pt100 1	.. [°C]	..... 0000.0	0000.0
2	Pt100 2	.. [°C]	..... 0000.0	0000.0
3	Pt100 3	.. [°C]	..... 0000.0	0000.0
4	Pt100 4	.. [°C]	..... 0000.0	0000.0

Digital Channel	Type
0	on not changable
1	start write Output
2	AllError read Input
3	Temper controller active
4	add.dehum write Output
5	CO2 cool. write Output
6	free out1 write Output
7	free out2 write Output
8	free in 1 read Input
9	free in 2 read Input
10	free in 3 read Input
11	free in 4 read Input
12	AdjTempHi write Output
13	AdjTempUn write Output
14	AdjTempSp write Output

## chamberconfiguration

commisionsno. : T4-4  
 Chamber name : T 401 -40Grd.C  
 date ..... : 06/04/02  
 controller .. : TC

Analog Input				input-range		protection-range	
no	name	unit	short	min	max	min	max
0	Temper	[°C]	t	-45.000	185.000	-50.000	190.000
1	Pt100 1	[°C]	1Pt	-300.000	300.000	-40.000	180.000
2	Pt100 2	[°C]	2Pt	-300.000	300.000	-40.000	180.000
3	Pt100 3	[°C]	3Pt	-300.000	300.000	-40.000	180.000
4	Pt100 4	[°C]	4PT	-300.000	300.000	-40.000	180.000

## Analog Output

no	name	type	min==0	max==10V or 20mA
0	Temper	actual	-100.000	200.000
1	Pt100 1	actual	-100.000	200.000
2	Pt100 2	actual	-100.000	200.000
3	Pt100 3	actual	-100.000	200.000
4	Pt100 4	actual	-100.000	200.000
5	Temper	nominal	-100.000	200.000

## Digital Channel

no	name	type
0	Temper	controller active
1	add.dehum	write Output
2	CO2 cool.	write Output
3	free out1	write Output
4	free out2	write Output
5	free in 1	read Input
6	free in 2	read Input
7	free in 3	read Input
8	free in 4	read Input
9	AdjTempHi	write Output
10	AdjTempUn	write Output
11	AdjTempSp	write Output

## error

errornumber/errorrtxt	quitt-enable
00 test spezimen protection	no
01 temp.limit.test space / fan	no
02 software test spec.prot. temp	no
03 high pressure (pre-)compressor	no

## switchcyclecounter

no	name	unit	short	set	reset
0	h.counter	h	B.h	no	no

## ASCII - kommunikationport description

commissionsno. : T4-7  
Chamber name : T 401 -70Grd.C  
date ..... : 06/04/02  
controller .. : TC

## Chamber communicationsport default settings:

- protokol ..... : ASCII
- baudrate ..... : 9600
- chamberadress .... : 00
- art of com.port .. : RS 232
- language ..... : deutsch

How you can change the default com.port settings, please read the controller serive manual.

(E-Terminal cap.: 3.5 and C-Terminal cap: 3.2)

The chamber is fixed as a slave. She never be answered without a question.

chamber data format : - 8 databits  
                          - 1 startbit  
                          - 1 stopbit  
                          - no parity

data format start sign : one \$ sign

data format chamberadress : 2-signed integer

data format end sign : one <CR> sign

data format nom./akt.value : 4 for-,point,1 after comma sign

data format dig.in/output : allways 8-bit block  
(not used bits filled with zero; 0=OFF 1=ON)

data format error number : 2-signed integer (look E-Terminal)

data format error text : 31 charakter (look C-Terminalt)

data format program no : 4-signed integer



read Chamber T 401 -70Grd.C (T4-7)

Caution! If the digital output AL-ERROR is high, you can get the error with the F-command and quit it with the Q-command.

command from PC: (value only examples !!)

```
start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : I
end sign ..... : <CR>
```

chamber answer : (value only examples !!)

```
0. analog nominal value Temper : 0010.0 (example 10.0)
0. analog actual value Temper : 0011.2 (example 11.2)
1. analog nominal value Pt100 1 : 0000.0 (not used)
1. analog actual value Pt100 1 : 0011.2 (example 11.2)
2. analog nominal value Pt100 2 : 0000.0 (not used)
2. analog actual value Pt100 2 : 0011.2 (example 11.2)
3. analog nominal value Pt100 3 : 0000.0 (not used)
3. analog actual value Pt100 3 : 0011.2 (example 11.2)
4. analog nominal value Pt100 4 : 0000.0 (not used)
4. analog actual value Pt100 4 : 0011.2 (example 11.2)

0. digital output on : 0 not used
1. digital output start : 1 switched ON
2. digital input AL-ERROR : 0 switched off
3. digital output Temper : 1 switched ON
4. digital output add.dehum : 0 switched OFF
5. digital output CO2 cool. : 1 switched ON
6. digital output free out1 : 0 switched OFF
7. digital output free out2 : 1 switched ON
8. digital input free in 1 : 0 switched OFF
9. digital input free in 2 : 1 switched ON
10. digital input free in 3 : 0 switched OFF
11. digital output AdjTempHi : 1 switched ON
12. digital output AdjTempUn : 0 switched OFF
13. digital output AdjTempSp : 1 switched ON
14. bit only for fill up : 0
15. bit only for fill up : 0
end sign ..... : <CR>
```

Example : (| remarks linefeed)

PC -> Chamber :\$00I<CR>

Chamber -> PC :0010.0 0011.2 0000.0 0011.2 0000.0 0011.2 0000.|
|0 0011.2 0000.0 0011.2 0101010101010100<CR>|

write Chamber T 401 -70Grd.C (T4-7)

Attention!! If you set a nominal value you must be switch on the digital output with the same name !  
 Not used channels fill up (see dataformat)

command from PC: (value only examples !!)

```

start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : E
  0. analog nominal value Temper : 0010.0 (examble 10.0)
  1. analog nominal value not used : 0000.0 (fill up with 0)
  2. analog nominal value not used : 0000.0 (fill up with 0)
  3. analog nominal value not used : 0000.0 (fill up with 0)
  4. analog nominal value not used : 0000.0 (fill up with 0)

  0. digital output not used : 0
  1. digital output start : 1 switched ON
  2. digital output not used : 0
  3. digital output Temper : 1 switched ON
  4. digital output add.dehum : 0 switched OFF
  5. digital output CO2 cool. : 1 switched ON
  6. digital output free out1 : 0 switched OFF
  7. digital output free out2 : 1 switched ON
  8. digital input not used : 0 (not write enable)
  9. digital input not used : 0 (not write enable)
 10. digital input not used : 0 (not write enable)
 11. digital output AdjTempHi : 1 switched ON
 12. digital output AdjTempUn : 0 switched OFF
 13. digital output AdjTempSp : 1 switched ON
 14. bit only for fill up : 0
 15. bit only for fill up : 0
end sign ..... : <CR>
    
```

```

Chamber answer :
O.K. sign : 0
end sign .... : <CR>
    
```

```

Examble : (| remarks linefeed)
PC -> Chamber :$00E 0010.0 0000.0 0000.0 0000.0 0000.0 101010100010|
|100<CR>|
chamber -> PC :0 <CR>
    
```

write gradient T 401 -70Grd.C (T4-7)

command from PC: (value only examples !!)

```

start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : U
  0. gradient up-speed   Temper : 0001.0 (example 1.0)
  0. gradient down-speed Temper : 0002.0 (example 2.0)
  1. analog nominal value not used : 0000.0 (fill up with 0)
  1. analog nominal value not used : 0000.0 (fill up with 0)
  2. analog nominal value not used : 0000.0 (fill up with 0)
  2. analog nominal value not used : 0000.0 (fill up with 0)
  3. analog nominal value not used : 0000.0 (fill up with 0)
  3. analog nominal value not used : 0000.0 (fill up with 0)
  4. analog nominal value not used : 0000.0 (fill up with 0)
  4. analog nominal value not used : 0000.0 (fill up with 0)
end sign ..... : <CR>

```

```

Chamber answer :
O.K. sign      : 0
end sign ..... : <CR>

```

Example : (| remarks linefeed)

```

PC -> Chamber :$00U 0001.0 0002.0 0000.0 0000.00000.0 0000.00000.0 |
|0000.00000.0 0000.0<CR>|
chamber -> PC :0 <CR>

```

read error T 401 -70Grd.C (T4-7)

```
command from PC: (value only exambles !!)
start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : F
end sign ..... : <CR>
```

```
chamber answer : (value only exambles !!)
errornumber : 01 (ex: error no 1)
errortext : software test spec.protection..
end sign ... : <CR>
```

```
examble :
PC -> Chamber :$00F<CR>
Chamber -> PC:01 software test spec.protection.. <CR>
```

quit error

Attensione! It will always be quitt the first error !

```
command from PC: (value only exambles !!)
start sign ..... : $
chamberaddress (always 2 integer) : 00 (here chamber 1)
command ..... : Q
end sign ..... : <CR>
```

```
chamber answer : (value only exambles !!)
counter of aktual errors ..... : 00
end sign ..... : <CR>
```

```
Examble :
PC -> Chamber :$00Q<CR>
Chamber -> PC:00<CR>
```

automaticprogramm start/stop T 401 -70Grd.C (T4-7)

xxxx is equal to the number of the automatic programm  
you will be startet

Is xxxx equal the 0000, you will be stopped the  
aktual automatic programm !

command from PC: (value only exambles !!)

start sign ..... : \$

chamberadress (always 2 integer) : 00 (here chamber 1)

command ..... : P

programm number ..... : xxxx

end sign ..... : <CR>

chamber answer :

O.K. sign ..... : 0

end sign ..... : <CR>

examble : prog.nr 7 start

PC -> Chamber :\$00P0007<CR>

Chamber -> PC:0<CR>

Chamber: T 401 -70Grd.C (T4-7)

errornumber/errortext	quitt-enable
00 ..... test spezimen protection	. no
01 ..... temp.limit.test space / fan	. no
02 ..... software test spec.prot. temp	. no
03 ..... high pressure (pre-)compressor	. no
04 ..... high pressure (low-)compressor	. no

Analog Channel		input-range	min	max
0	Temper	.. [°C] .....	-075.0	0185.0
1	Pt100 1	.. [°C] .....	0000.0	0000.0
2	Pt100 2	.. [°C] .....	0000.0	0000.0
3	Pt100 3	.. [°C] .....	0000.0	0000.0
4	Pt100 4	.. [°C] .....	0000.0	0000.0

Digital Channel	Type
0	on not changable
1	start write Output
2	AllError read Input
3	Temper controller active
4	add.dehum write Output
5	CO2 cool. write Output
6	free out1 write Output
7	free out2 write Output
8	free in 1 read Input
9	free in 2 read Input
10	free in 3 read Input
11	AdjTempHi write Output
12	AdjTempUn write Output
13	AdjTempSp write Output

## chamberconfiguration

commisionsno. : T4-7  
 Chamber name : T 401 -70Grd.C  
 date ..... : 06/04/02  
 controller .. : TC

Analog Input				input-range		protection-range	
no	name	unit	short	min	max	min	max
0	Temper	[°C]	t	-75.000	185.000	-80.000	190.000
1	Pt100 1	[°C]	1Pt	-300.000	300.000	-70.000	180.000
2	Pt100 2	[°C]	2Pt	-300.000	300.000	-70.000	180.000
3	Pt100 3	[°C]	3Pt	-300.000	300.000	-70.000	180.000
4	Pt100 4	[°C]	4Pt	-300.000	300.000	-70.000	180.000

Analog Output				min==0	max==10V or 20mA
no	name	type			
0	Temper	actual		-100.000	200.000
1	Pt100 1	actual		-100.000	200.000
2	Pt100 2	actual		-100.000	200.000
3	Pt100 3	actual		-100.000	200.000
4	Pt100 4	actual		-100.000	200.000
5	Temper	nominal		-100.000	200.000

## Digital Channel

no	name	type
0	Temper	controller active
1	add.dehum	write Output
2	CO2 cool.	write Output
3	free out1	write Output
4	free out2	write Output
5	free in 1	read Input
6	free in 2	read Input
7	free in 3	read Input
8	AdjTempHi	write Output
9	AdjTempUn	write Output
10	AdjTempSp	write Output

## error

errornumber/errorrtxt	quitt-enable
00 test spezimen protection	no
01 temp.limit.test space / fan	no
02 software test spec.prot. temp	no
03 high pressure (pre-)compressor	no
04 high pressure (low-)compressor	no

## switchcyclecounter

no	name	unit	short	set	reset
0	h.counter	h	B.h	no	no