Embracing Challenge

Heated Protective Housing Series PAS

PAS-100 to PAS-500

Instruction Manual
Version 1.00.01

Dear customer,

we have made up this operating manual in such a way that all necessary information about the product can be found and understood quickly and easily.
Should you still have any question, please do not hesitate to contact **M&C** directly or go through your appointed dealer. Respective contact addresses are to be found in the annexe to this operating manual.
Please also contact our homepage **www.mc-techgroup.com** for further information about our products. There, you can read or download the data sheets and operating manuals of all **M&C** products as well as further information in German, English and French.

Version: 1.00.01

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1 GENERAL INFORMATION

The product described in this operating manual has been examined before delivery and left our works in perfect condition related to safety regulations. In order to keep this condition and to guarantee a safe operation, it is important to heed the notes and prescriptions made in this operating manual. Furthermore, attention must be paid to appropriate transportation, correct storage, as well as professional installation and maintenance work.
All necessary information a skilled staff will need for appropriate use of this product are given in this operating manual.

2 DECLARATION OF CONFORMITY

CE - Certification

The product described in this operating manual complies with the following EU directives:

EMV-Instruction

The requirements of the EU directive 2014/30/EU “Electromagnetic compatibility“ are met.

Low Voltage Directive

The requirement of the EU directive 2014/35/EU “Low Voltage Directive“ are met.
The compliance with this EU directive has been examined according to DIN EN 61010.

Declaration of conformity

The EU Declaration of conformity can be downloaded from the **M&C** homepage or directly requested from **M&C**.

3 SAFETY INSTRUCTIONS

Please take care of the following basic safety procedures when mounting, starting up or operating this equipment:

Read this operating manual before starting up and use of the equipment. The information and warnings given in this operating manual must be heeded.

Any work on electrical equipment is only to be carried out by trained specialists as per the regulations currently in force.

Attention must be paid to the requirements of VDE 0100 (IEC 364) when setting high-power electrical units with nominal voltages of up to 1000 V, together with the associated standards and stipulations.

Check the details on the type plate to ensure that the equipment is connected to the correct mains voltage.

Protection against touching dangerously high electrical voltages:
Before opening the equipment, it must be switched off and hold no voltages. This also applies to any external control circuits that are connected.

The device is only to be used within the permitted range of temperatures and pressures.

Check that the location is weather-protected. It should not be subject to either direct rain or moisture.

The device must not be used in hazardous areas.

Installation, maintenance, monitoring and any repairs may only be done by authorized personnel with respect to the relevant stipulations.

4 WARRANTY

If the equipment fails, please contact **M&C** directly or else go through your **M&C** authorised dealer.
We offer a one year warranty as of the day of delivery as per our normal terms and conditions of sale, and assuming technically correct operation of the unit. Consumables are hereby excluded. The terms of the warranty cover repair at the factory at no cost or the replacement at no cost of the equipment free ex user location. Reshipments must be send in a sufficient and proper protective packaging.

5 USED TERMS AND SIGNAL INDICATIONS

DANGER!

This means that death, severe physical injuries and/or important material damages **will occur** in case the respective safety measures are not fulfilled.

WARNING!

This means that death, severe physical injuries and/or important material damages **may occur** in case the respective safety measures are not fulfilled.

CARE!

This means that minor physical injuries **may occur** in case the respective safety measures are not fulfilled.

CARE!

Without the warning triangle means that a material damage may occur in case the respective safety measures are not met.

ATTENTION!

This means that an unintentional situation or an unintentional status may occur in case the respective note is not respected.

NOTE!

These are important information about the product or parts of the operating manual which require user's attention.

SKILLED STAFF

These are persons with necessary qualification who are familiar with installation, use and maintenance of the product.

6 INTRODUCTION

A big problem of the extractive continuous gas analysis are the escort substances of the gas, such as water vapour as well as gas components that produce corrosive acids in connection with condensed water vapour.

In order to realise a maintenance-free resp. “hot” measurement, the condensation of water vapour and gas components within the gas conditioning must be prevented.

The solution for this problem are the heated **M&C** sample conditioning units **PAS**. If these systems are correctly adapted to the local process conditions, they guarantee a minimum maintenance requirement.

7 SERIAL NUMBER

The type plates with the serial numbers are to be found down on the right side behind the door.

NOTE!

In case of any question, please always indicate the serial number of the device.

8 VOLTAGE SUPPLY

The heated protective housings **PAS** are available in 115V or 230V execution. Detailed information are to be read on the type plate.

9 WARNINGS AND NOTES

NOTE!

The notes and warnings given in this Operating Manual must absolutely be heeded!

10 TECHNICAL DATA

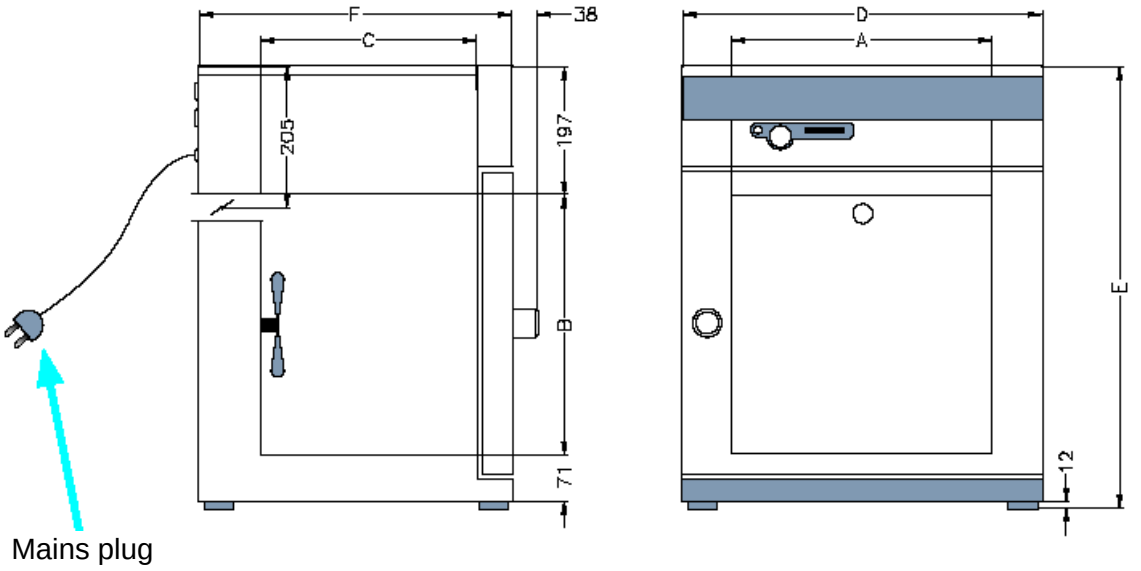


Figure 1 Dimensions

Heated protective housing					
Series PAS	**PAS-100**	**PAS-200**	**PAS-300**	**PAS-400**	**PAS-500**
Assembly interior:					
Width A mm	320	400	480	400	560
Height B mm	240	320	320	400	480
Depth C mm	175	250	250	330	400
External dimensions					
Width D mm	470	550	630	550	710
Height E mm	520 (720)*	600 (800)*	600 (800)*	680 (800)*	760 (960)*
Depth F mm	325	400	400	480	550
Weight empty kg	20	28	30	35	50
Ventilator	no	no	no	yes	yes
Power consumption	600W	1100W	1200W	1400W	2000W
Power supply	230V 50/60Hz other voltages on request				
Electrical connection	3m mains cable with an earthing-pin plug; a suitable terminal box is provided for built-in components				
Material of cabinet	Stainless steel 304				
Mounting	Wall-mounting with optional wall console				
Temperature control	Electronically, microprocessor controlled, incl. a solid-state relay				
Temperature display	Digital LED display				
Temperature limit	Temperature selection control and limiter in accordance with DIN 12880, protective classification 3.1				
Temperature selection	Lockable rotary button, range: +20 to +200°C *Standard				
Operating temperature	>5°C above ambient temperature up to +200°C				
Ambient temperature	Max. +40°C				
Case protection	IP20 EN 60529				
Options:					
	Observation window in door				
	External temperature control (2xPT100 internal)				
	Min.-temperature monitoring, potential free, contact rating 250VAC 16A				
	EEx-explosion-proof heating up to +120°C inner operating temperature				
	Steam heating				
	Wall bushings for sample pipes				
	Built-in components specific to the system				

Dimensions in () are corresponding to the total height incl. the wall console

11 APPLICATION

Heated **M&C** sample conditioning systems are used where increased and constant operating temperatures are necessary for the analysis of gases or liquids.
The large **M&C** product range of heatable components, in connection with the heated **PAS-...** protective housing, allows you to solve problems specific to your applications.

12 DESCRIPTION

The conditioning components are housed in the protective cabinet (wall mounting) made of stainless steel, which is heat insulated on all sides. The front door with its single-knob lock enables easy access to the accommodated components. An observation window made of triple safety glass is available as an option.
The heating of the cabinet is selectable within the range of +20 to +200 °C. An exact, electronic control unit keeps the temperature constant at ±1 °C. The temperature is displayed digitally. Two monitoring devices (temperature selection control and temperature limiter), which are fitted additionally, ensure safe operation. In order to distribute the temperature, a ventilator is fitted additionally into models of size **PAS-400** and above. Depending on individual requirements the following components can be installed:

- Filters
- Solenoid valves
- Valves, manually or pneumatically operated
- Ball valves, manually or pneumatically operated
- Flow meters with a needle valve and a mono stable flow control
- Pumps (pump head inside heated part, motor outside)
- Customised parts

Suitable bushings into the heated interior are provided for the heated sample lines.

13 AUFBAU

The devices **PAS100 - 300** have natural ventilation.
In series **PAS400 – 500** air circulation is provided by a fan on the back wall of the chamber.
The incoming air (1) is warmed in a preheat chamber (2) in both convection and fan-circulation ovens. The preheated air enters the chamber (4) through ventilation slots (3) in the chamber side wall. The fan (5) on the chamber back wall produces a large air throughput and a more intensive horizontal forced circulation compared with natural convection. The air valve (6) on the back of the oven controls the rate of air intake and discharge (air change) (7).

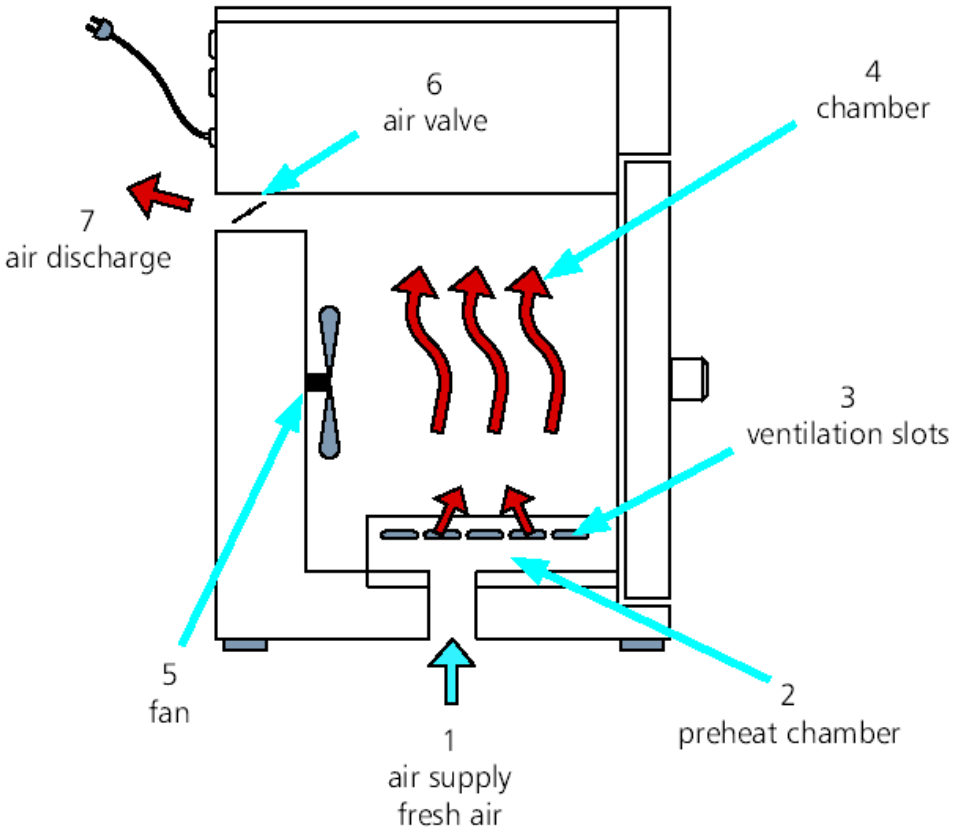


Figure 2 Design of the protective housing

13.1 BASIC EQUIPMENT OF THE HEATED PROTECTIVE HOUSINGS

- Electronic PID controller with permanent power matching, auto-diagnostic system for rapid fault finding (see chapter 15 “Error messages“)
- Manually adjustable air valve for re-circulation or fresh air operation
- Programmable electronic switch-off timer up to 99 h 59 min
- Recessing push/turn control for simple operation of oven
- Visual alarm indication
- Monitor relay to switch off heating in case of fault
- Mechanical temperature limiter (TB Class 1)
- High-grade PT100 temperature sensor Class A in 4-wire circuit
- Wall bracket

13.2 MATERIAL QUALITY

The external casing and working chamber is out of stainless steel 1.4301 which features high strength, optimum hygienic properties and corrosion resistance against many (not all) chemicals (warning against e.g. chlorine compounds). The oven load has to be checked carefully for its chemical compatibility with the above materials.

13.3 ELECTRICAL EQUIPMENT

- Operating voltage see label 50/60 Hz
- Current rating see label
- Protection Class 1, i.e. operating isolation with ground connection to EN 61 010
- Protection IP20 to EN 60 529
- Interference suppression to EN55011 Class B
- Oven protected by a fuse 250V/15A fast blow
- Controller protected by an 80 mA fuse (200 mA on 115 V)
- When connecting the device to the electrical supply you have to observe any local
- regulations which apply (e.g. in Germany DIN VDE 0100 with FI protection circuit)

NOTE! **Any work involving opening up the housing must only be carried out by skilled staff!**

13.4 SUPPLY FAILURE

After a failure of the supply, operation is continued with the same parameter settings.

14 RECEPTION AND STORAGE

- Carefully remove the heated protective housing and eventual accessories out of the packing immediately on arrival and inspect the contents of supply against the packing list;
- Check the items for any damage in transit and, if required, inform the shipping insurance company immediately of the damage found;

NOTE! **The heated protective housing must be stored in a weather-protected frost-free area!**

15 PREPARATION FOR MOUNTING

- Before installing the heated protective housing, an easy access for maintenance and space for adequate ventilation must be considered.
- **Check whether the mains voltage corresponds to the indication on the type plate.**
- Check whether the materials in touch with the sample are resistant.

15.1 INSTALLATION FACILITIES (ACCESSORIES)

The heated protective housing can be placed on the floor or on a bench (working surface). It is important that the oven is set up accurately horizontally; the door may have to be adjusted (see chapter 13 „Maintenance“).

WARNING! **Do not place the device on a readily inflammable support surface!**

The spacing from the back of the heated protective housing to the wall should be at least 15 cm. The spacing to the ceiling must not be less than 20 cm and that at the side to the wall not less than 8 cm. Generally it is essential to have adequate air ventilation around the housing.

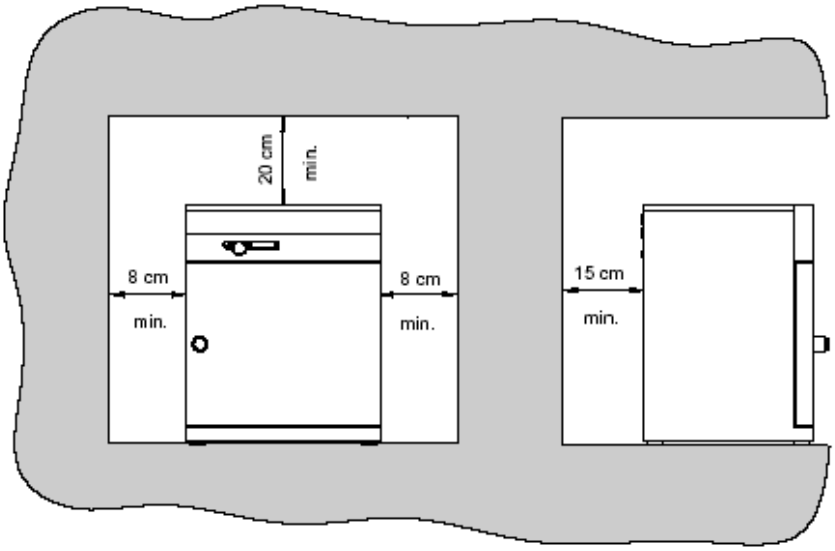


Figure 3 Minimum dimensions for mounting resp. installation

15.2 WALL BRACKET

The models **PAS-200** to **PAS-500** can be wall-mounted using the wall bracket. The wall bracket is factory-fitted with a fire-resistant plate. The suitable mounting material is attached to the range of delivery.

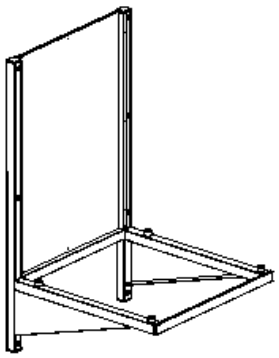


Figure 4 Wall bracket

16 OPERATING

16.1 OPERATING THE DOOR

The door is opened by pulling on the door handle.
The door is closed by the door handle being pushed in.

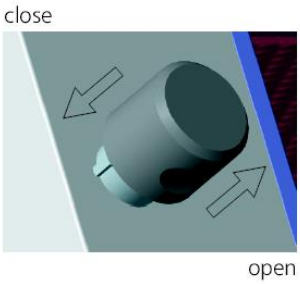


Figure 5 Operating the door

16.2 CONTROLS AND INDICATIONS

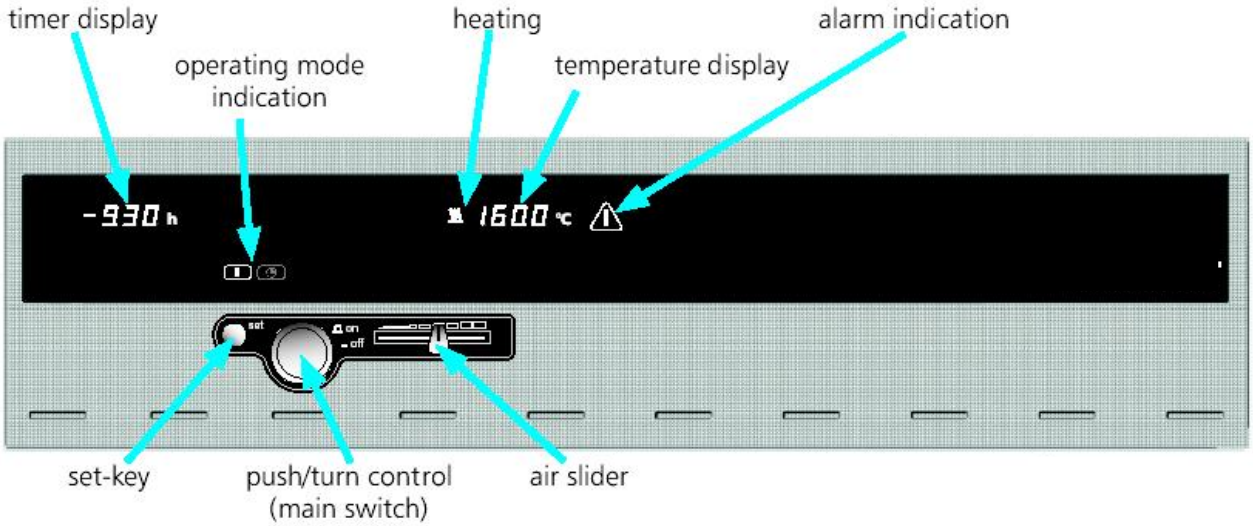
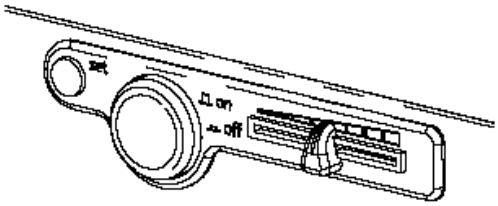


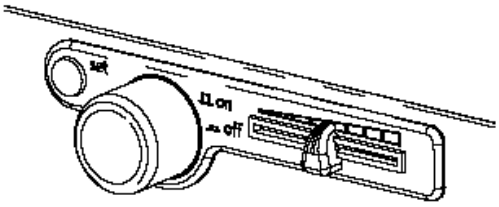
Figure 6 Controls and indications

16.3 SWITCHING ON

The heating is switched on by pressing the push/turn control.



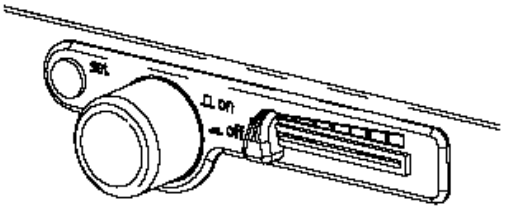
Heating switched off. The push/turn control is using the pushed in and protected against damage



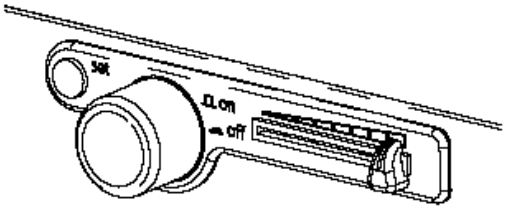
Heating switched on and can be operated push/turn control and the SET key.

16.4 SETTING AIR CHANGES

Moving the air slider opens and closes the air valve to control the supply and discharge of air.



Air valve closed

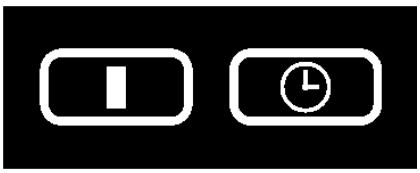


Air valve open

16.5 SETTING THE TEMPERATURE

Hold down the SET key and set the temperature set point with the push/turn control. After the SET key has been released the display briefly flashes the temperature set point. The display then changes to the actual current temperature and the controller starts to control to the selected temperature set point.

16.6 SELECTING THE OPERATING MODE



Normal Operation **Timer Operation**

After holding down the SET key (approx. 3 sec), the current operating mode flashes on the display. A different operating mode can be selected with the push/turn control while the SET key is being held down. After the SET key has been released the controller operates in the new operating mode.

16.7 NORMAL OPERATION

In this operating mode the heated protective housing operates continuously and heats and controls to the set temperature. On the **PAS-400 – 500** the fan is running continuously.
Setting the temperature:
Hold down the SET key and set the required temperature set point with the push/turn control.
After the SET key has been released the display flashes briefly the temperature set point.
The display then changes to the actual current temperature and the controller starts to control to the selected temperature set point.

16.8 TIMER OPERATION

In this operating mode the heated protective housing operates on the timer; it heats/controls to the set temperature and maintains this temperature until the set time has elapsed. The clock symbol is flashing during timer operation, then the heating is switched off; on **PAS-400 – 500** the fan runs on for 30 minutes. The timer display shows END.

- The time can always be set to OFF, the heating is then switched off and the timer display shows END.
- Time is counted down, it is always possible to see how long the heated protective housing will remain switched on.

Setting the temperature:
Turn the push/turn control clockwise until the temperature display is flashing.
Hold down the SET key and set the required temperature set point with the push/turn control.
After the SET key has been released the oven flashes briefly the temperature set point. The display then changes to the actual temperature and the controller starts to control to the selected temperature set point.

Setting the timer:
Turn the push/turn control anticlockwise until the timer display is flashing.
Hold down the SET key and set the required operating time with the push/turn control.

16.9 TEMPERATURE MONITOR AND PROTECTION DEVICES

16.9.1 TEMPERATURE LIMITER (TB)

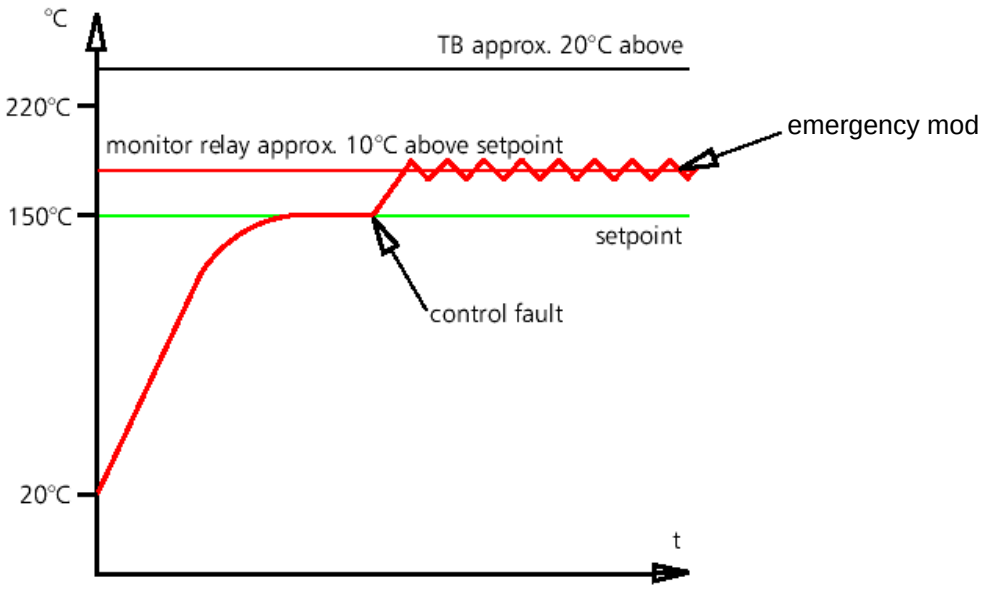
All devices are equipped with a mechanical temperature limiter (TB) Protection Class 1 to DIN 12 880.
If the electronic monitor system should fail during operation and the fixed factory-set maximum temperature is exceeded by approx. 20°C the temperature limiter switches off the heating permanently as a final protective measure. The alarm symbol lights up as warning. ⚠

Fault rectification after the TB cut-out has been activated:
1. Switch off the heating and allow it to cool down
2. Rectify the fault (e.g. replace temperature probe) and where appropriate contact customer service
3. The oven is again ready for operation only after it has cooled down and after the fault has been rectified.

16.9.2 MONITOR RELAY

In addition to mechanical temperature protection the heated protective housing is provided with an electronic monitor relay.
If a fault occurs during operation or if the selected set point temperature is exceeded by 10°C the monitor relay switches over the heating to this temperature in emergency mode. The alarm symbol is flashing as warning. ⚠

Fault rectification after the monitor relay may been activated:
Check the controller for error messages (see chapter 15 „Error messages“) and where appropriate contact customer service.



Example:
With a set point temperature of 150°C, if a fault occurs in the power unit (faulty triac) the oven continues to operate in emergency operation at approx. 160°C.

Figure 7 Function of the monitor relay

17 STARTING

During operation and maintenance works, the following prescriptions have to be observed:

- the Operating Manual
- the standard EN 60519-1 „Safety in Electrical Heating Facilities“ Part 1: General Requirements
- the standard EN 60519-2 „Safety in Electrical Heating Facilities“ Part 2: Special Instructions for Facilities with Resistance Heating
- the standard VDE 0100 or similar regional prescriptions
- eventually applicable standards and prescriptions (i.e. Employer’s liability insurance association in Germany).

When the heated protective housing is started up for the first time, it should be supervised continuously until steady conditions have been reached. Severe vibrations during transport may cause movement of the temperature probe in its holder inside the chamber. Note therefore that before the first start-up the temperature probe should be checked for its correct position and, if necessary, carefully aligned in its mounting (see figure 8).

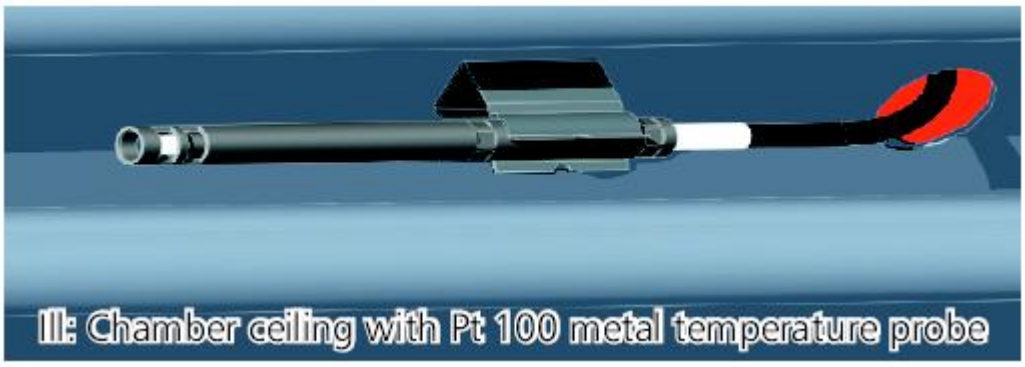


Figure 8 Arrangement of the temperature sensor

There must be no possibility of the formation of inflammable gas/air mixtures either within the oven chamber or in the immediate surroundings of the equipment.
Large amounts of dust or corrosive fumes inside the oven chamber or in the surroundings of the equipment may produce deposits within the oven and lead to short-circuits or damage the electronics. It is therefore important that adequate precautions are taken against excessive dust or corrosive fumes.

18 MAINTENANCE

Important for a long life of the heated protective housing and in case of warranty claims.

NOTE! **Any work involving opening up the oven must only be carried out by skilled staff!**

The heated protective housings require little maintenance. It is however recommended to lubricate all moving parts of the doors (hinges and closure) once a year (or 4 times a year with continuous operation) using a thin Silicone grease, and to check that the hinge screws are tight. A well-closing door is essential on an heated protective housing. On the housings, tight closure of the door is ensured by a seal on the oven and another one on the door. In continuous operation the flexible sealing material may take a permanent set. Readjustment may then be necessary in order to ensure proper closing of the door.

The top part (1) of the door hinge can, after releasing the 2 screws (2) at the top or bottom of the door, be moved slightly in the direction of the arrow.
The door can be adjusted after releasing the socket screw (3) and rotating the eccentric (4) by means of a screwdriver. NOTE ! Screw (3) is locked with locking varnish. It can be released by a sharp tug using a hexagon socket key. Apply more locking varnish to screw (3) and tighten it.
The closing panel (6) can also be adjusted in the direction of the arrow after releasing the screw (5). It is important that the panel is then screwed down firmly.

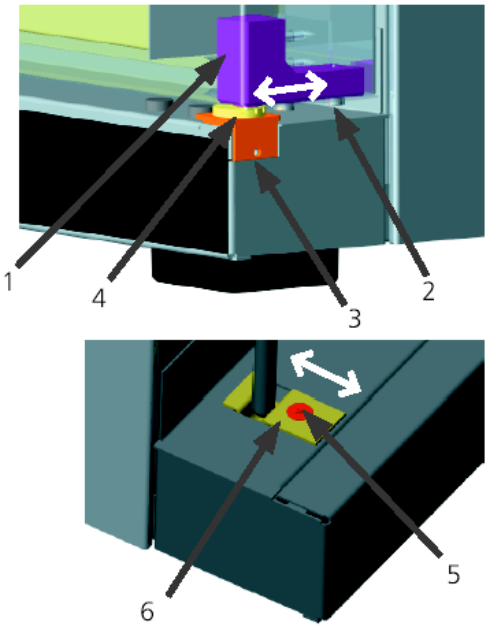


Figure 9 Layout of the door hinge

18.1 CLEANING

Regular cleaning of the easy-to-clean inside of the chamber prevents deposits which over time can detract from the appearance and the functionality of the stainless steel chamber .
The metal surfaces of the oven can be cleaned with commercially available cleaning agents for stainless steel. It is important to ensure that no rust-forming object comes into contact with the chamber or the stainless steel casing. Rust deposits cause infection of the stainless steel.
If any contamination causes rust stains on the surfaces of the chamber, such spots must be cleaned off immediately and the area polished. The control panel, the plastic input modules and other plastic components of the heated protective housing must not be cleaned using scouring cleaning agents or those contained solvents.

19 CLOSING DOWN

Before closing down, i.e. switching off the heating, the heated gas conditioning system and if necessary the interior of the heated protective housing should be purged with inert gas or air in order to avoid a condensation and an eventual acidification.

20 ERROR MASSAGES

E-0 Error on self test
E-1 Power module triac faulty
E-2 Power module faulty
E-3 PT100 temperature probe faulty

21 OPTION LOW TEMPERATURE ALARM

The heated protective housing **PAS** can be controlled by a low temperature alarm contact.
The sensor is fixed to the ceiling of the inner oven. The controller of this thermostat is installed in the top of the oven under the top cover.
The range of temperature setting is from 100 – 180°C. The standard controller setting is at +150°C. The contact is closed during normal operation and opens when the temperature decreases <150°C. The contact rating is 230V AC, 16A.
To change controller setting, unscrew the 4 screws at the top of the rear side of the housing and take the cover of. Put the knob of the controller to the desired temperature on the scale. Close the cover.

22 ANNEXE

Wiring plan low temperature alarm drawing no.: 22842010

Further product documentation can be seen and downloaded from our home page:
www.mc-techgroup.com

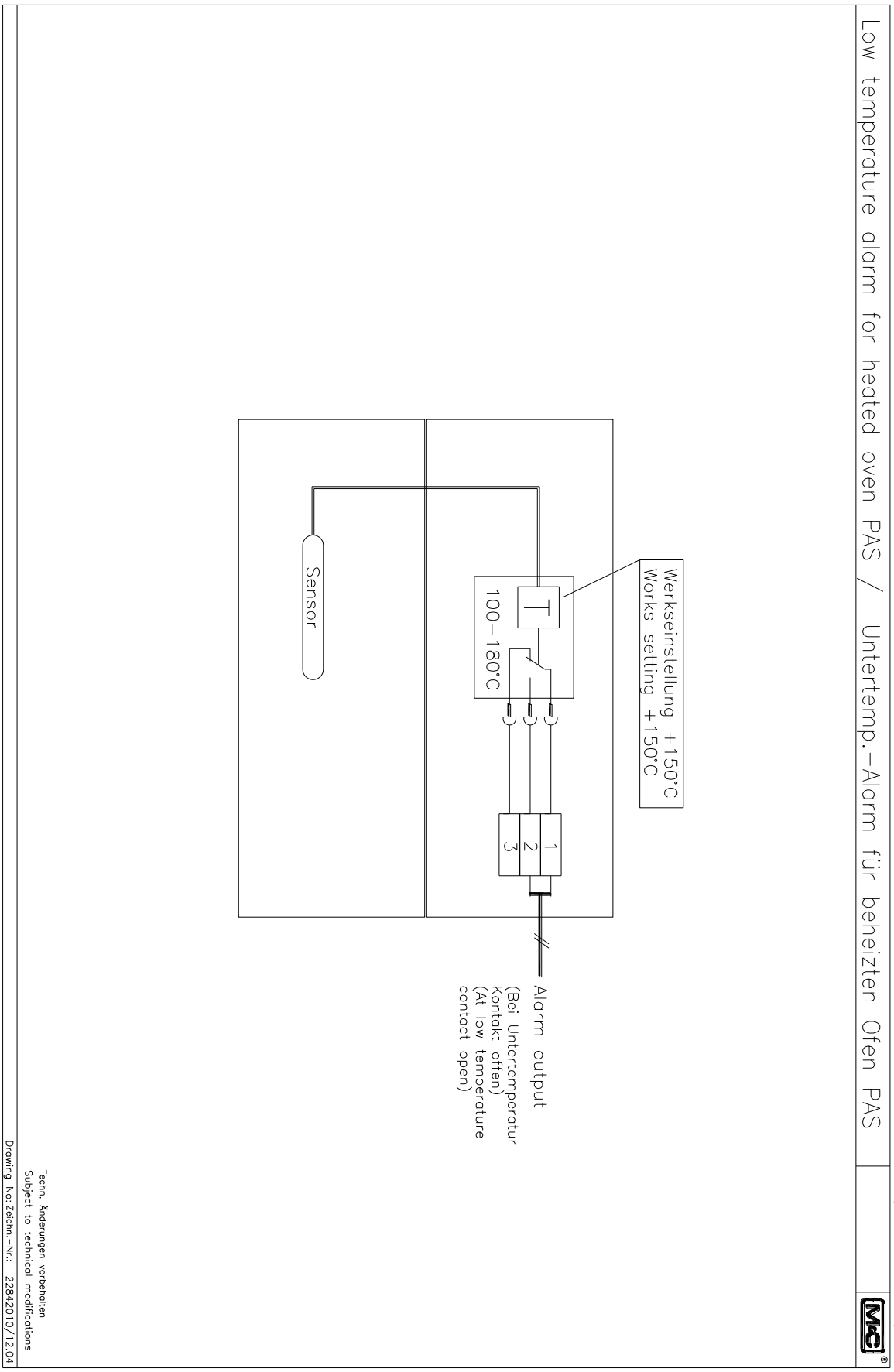


Figure 10 Wiring plan for low temperature alarm