Manual
Temperature Control Box

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1 Heating of test cells

The electrolyte in the equipment should be heatable.

Electrical heating is recommaned, because otherwise you may contaminate your electrolyte with the heating medium (oil, water with surfactants).

Due to the electric conductivity of electrolytes you should only apply safety extra low voltages. A special protection is not needed under these circumstances.

One has to use self limmiting heating elements not to exceed the maximum temperature of the plastic we use in our test equipment

For the PP test cell the elements are limmited to 130°C

For the PTFE test cell the elements are limmited to 240°C .

2 PTC Heating elements

2.1 General remarks

PTC heating elements are self limiting. Below the maximum temperature they have a low impedance. Above that temperature the impedances increases and the current reduces.

2.2 Used elements

We use the following elements from the company DBK:

PP half cell

- Gaskatel, 24V. Resistance of one element ca. 2.2 Ohm

PTFE half cell

- DBK HP 06 2/22 12-24V. Resistance of one element 5 Ohm

2.3 Parallel oder serial connection

You may connet the heating elements in parallel or serial.

At the PP test cell the elemennts are allways connected in parallel.

At the PTFE test cell we recommand a serial connection up to temperatures of 110°C. If you are looking for higher temperatures you should change to a parallel connection.

3 Temperature-Measurement

The temperature sensor should have a protection cover out of PTFE. Other sensors with for example metallic protection covers should not be used because of the corrosion attack by the electrolyte.

We can recommand the following sensors:

- PT100 from Omega HSRTD 3-100-A-1m
- PT100 from TC Direkt: FEP Pt100

4 Temperatur-Control

Adjust the nominal temperature
Press the ▲▼ key to adjust the nominal temperature. With the ◄ key you can jump to the next decimal place
Auto-Tuning:
The PID control may adjust the optimal values on its own. Press in that case the AT key for 2 seconcs.
Set-Up.
Press the Set key for 2 seconds. You will enter the set up manual. Addtional informations are in the Sestos manual. The most important factors are:

CTrL: 1 On/Off; 2 Auto adjusment, 3 PID
oPH : Upper output limit

If the temperature overshoots that happens because of a to large power supply. You can adjust this power supply value with the parameter **oPH** (Output upper limit 0 bis 220). Reduce that value a run again the auto tuning by adjusting the CTrL value to „2“.

Tabelle 1: Typical PID Values for the PP half cell

		Temperature [°C]					
		30	40	50	60	70	80
M50	Integral („I“)	1500	300	71	40	25	166
P	Differential („P“)	920	1940	1	4844	9998	888
T	Hysteresis time („D“)	414	364	340	218	266	391
CTI	Control period	20	60	60	60	120	20
oPH	Output upper limit	10	40				

Tabelle 2: Typisal PID Values for the PTFE half cell (parallel connection)**

		Temperature [°C]					
		30	50	70	90	110	130 **
M50	Integral („I“)	750	214	181	150	133	185
P	Differential („P“)	882	626	624	734	950	788
T	Hysteresis time („D“)	618	1109	507	592	390	296
CTI	Control period	40	40	40	60	60	40
oPh	Output upper limit	10	30	40	100	100	80

The power controller is a solid state relay (A Sestos SSR 521). This reduces the current / voltage spikes which may interfere with the sensitive inputs of the potentiostat.

5 Power supply

Power supply 24V 240W integrated.

You should use banana plugs to connnect the cell with the temperature control bos. The polarity is not important. The open ends of the cable are inserted into the conntact terminals of the cell.

At these contact terminals you can change from parallel to serial connection

6 Setting-up Operation

6.1 Operating Conditions

Nominal voltage
• The maximum voltage should not exceed 24 V.

Nominal current

• The maximum current is 25Amprtr for the SSR relais.

6.2 Warnings

Hot surfaces

• The cell heaters and / or the applied cell current can heat up the half cell far beyond 80 deg. C. Do not place heat sensitive things on the half cell. Do not place inflammable things near the half cell. Pay attention to a correct lining of your measurement and heating cable. Select cable insulations with a reasonable temperature specification. Else there is a risk of an electrical shortcut and fire hazard.

Laboratory use

• The half cell is defined solely for use in a laboratory environment. The laboratory environment must be conform to the safety data sheets and specifications of your electrolyte.


Protective equipment

• The operator of the half cell must be dressed with adequate laboratory protective equipment according the safety data sheets and specifications of your electrolyte.
A pressure surge on the gas inlet or reach of boiling point may lead to electrolyte sputtering out of the half cell. Electrolyte vapour according vapour pressure curve is being emitted permanently by the half cell.