

User Manual

**Bath-/ Immersion
Thermostat
E5**

with Timer

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Safety Instructions

The device has been produced after the valid rules of technology. It was tested extensively before leaving the production and has left the work in safety technical and function-technical faultless condition. To guarantee safe and faultless application, the user has to take the following notes and the existing regulations for accident prevention into account.

1. The device may be used for the applications confirmed by the manufacturer. Other applications should be checked back with the manufacturer.
2. The packing of the device was carried out with greatest care to make sure that damage by transport and storage is avoided. Upon receipt both packing and device have to be checked for damages. If such damages should be noticed, please advise the manufacturer.
3. Connection and the inauguration of the device have to be carried out by qualified staff. The operating instructions have to be studied carefully before putting the device into operation.
4. The operating instructions should be kept at a place accessibly for everyone.
5. The staff for the operation, maintenance and inspection of the device must show the corresponding qualification for this work. The operator is responsible for the instructions of his staff, he has to take care that everybody knows and understands the contents of the operating instructions.
6. Service and maintenance have to be carried out by qualified staff only. The device has to be separated from the mains voltage before opening. Having completed the work and before activating the device all safety precautions have to be checked. Any modifications of the device are forbidden. Spare parts have to be de-controlled by the manufacturer.

Any disregard of the safety regulations leads to the loss of warranty claim and claim for damages.

1. Application

Bath- and Immersion Thermostats type E5 with timer are well proved for applications in laboratories for research, industry, medicine and biotechnology. The thermostat guarantees gentle heatup and constant temperatures for measurements and chemical reactions. The E-series thermostats are supplied with a clamp for use in any container. The thermostats can be completed with a water bath made of polycarbonate or high-grade steel.

By an attachment named "connecting piece for external consumers" constant temperatures can be maintained also within small external vessels. It is possible to heat up liquids in closed external containers by operating with the circulation-pump. The necessary operational safety is achieved by high temperature and low-level cut-off.

The thermostats type E5 und E5s are supplied with an on-off temperature control, the type E20 comes with a self-adjusting control-system and a program for 2 sets of 10 temperature-time-segments each, an RS 232-interface and an external sensor connection. All thermostats can be combined with our cooler series.

Accessories available (please order separately):

Test-tube racks for containers of 10,11,14,18 and 32 mm in diameter (other diameter are available on request), external temperature sensor PT 100 (for E20 only), interface and software for PC-control (for E20 only), drain cock, bath-cover for 5l polycarbonate bath, cooling coil, connecting-part for external application, adjustable lifting bottom (for B12-B22 only).

2. Operational Safety

2.1 Conditions for safe operation

All water baths are constructed for permanent operation under laboratory conditions.

The Thermostats meet the safety-related requirements following :

DIN 12876	Electrical laboratory devices. The Thermostats correspond to the class 3 following DIN 12876 and are to be operated with noncombustible thermostat liquids only .
DIN EN 61010-1	Safety requirements for electrical equipment, control and laboratory use

- Environmental conditions between 10° C and +30° C do not affect function and safety of the device.
- The device is to be attached to an earthed socket only. Please pay attention to the details on the identification plate.
- Convince yourself that a sufficient volume of liquid is in the bath before you switch it on.
- Do not transport the water bath with heated liquid inside.
- Cool down the liquid before drain.
- Do not run the device in areas with potentially explosive atmosphere.
- Interruption of the protective ground can make the device dangerous.
- The tightness of the hose couplings at the connecting branches must always be ensured.
- On applying external consumers the liquid-level in interconnected vessels is to be taken into consideration.
- Maintenance and repair work of the device standing under voltage are forbidden.
- All encroachments have to be executed by specialist staff only considering appropriate regulations.
- Please use the fuses described by the manufacturer.
- Short circuit of the fuse holder is forbidden.

Attention: You should not run the device if strong damages are visible or load running noises are perceived. Do not use the plastic bath vessels together with alcoholic fluids.

2.2 *Thermostat liquids and hose materials*

Due to the relatively small temperature ranges of thermostats, the application of water (preferentially distilled or decalcified) has proved itself most favourably. If another liquid - for instance oil etc. - must be used, the liquid applied should be chosen with regard to viscosity and flash point, because these two values are important for the operation of the circulation pump. For connecting hoses of external vessels silicone hoses (not in connection with silicone oil) or perbunan hoses of the nominal width 8 can be used.

3. **Unpack and Check**

After unpacking the device and the accessories the scope of delivery has to be checked with the delivery note enclosed. In case of damages in transit please inform the carrier responsible to place a damage protocol if necessary.

4. **Technical Data**

Operating temperature range:	5° C ahead RT up to 100°C
... with external cooling:	-30 to 100°C
Temperature stability:	± 0,05 K
Temperature setting:	digital
Temperature display:	digital
Temperature controller:	- microprocessor PID - controlled - adjustable low and high set temperature limiter - adjustable key (push-button) locking - limit alarm, optical and /or acoustical - alarm circuit can be stopped - alarm signal can not be stopped if there is a error of the sensor - temperature setting Celsius or Fahrenheit
Timer:	0 to 99,9 min
Heating output:	1000 W
Pump:	pressure
Pump low rate:	5 litres/min
Pump pressure:	1,2 m
Safety class:	class 3 (DIN 12876)
Power supply:	230 V; 50 Hz
Dimensions (W x D x H) :	120 x 130 x 330 mm
Weight:	3,0 kg

The thermostat can be used with the following baths:

Bath container, plastics (only for water)	Bath volume	usable up to	Dimensions in mm W x D x H	Bath-opening
Polycarbonate bath P5	5 l	to + 100°C	200 x 270 x 170	160 x 140
Polycarbonate bath P6	6 l	to + 100°C	152 x 364 x 170	120 x 210
Polycarbonate bath P8	8 l	to + 100°C	152 x 467 x 170	120 x 310
Polycarbonate bath P13	13 l	to + 100°C	152 x 567 x 170	120 x 410
Polycarbonate bath P20	20 l	to + 100°C	276 x 440 x 210	240 x 285

Bath container High-grade-steel	Bath volume	usable up to	Dimensions in mm W x D x H	Bath-opening
B2	2 l	to + 100°C	220 x 200 x 190	only for extern.
B6	6 l	to + 100°C	310 x 275 x 195	230 x 75
B12	12 l	to + 100°C	310 x 470 x 195	230 x 270
B 16	16 l	to + 100 °C	310 x 470 x 245	230 x 270
B22	22 l	to + 100°C	310 x 470 x 300	230 x 270

5. Description

5.1 Immersion Thermostat Type E5

The Immersion Thermostat type E5 can be used for upheating liquids in any bath vessels of a maximum volume of about 20 litres. The device can be attached to containers with a clamp.

Type E5 is equipped with an electronic PID-controller with a digital display for the temperature. In addition it has an independent safety controller (of class 3 / DIN 12876) which avoids excessive upheating temperatures and prevents dry-running below minimum liquid volume.

In the case of malfunction or defect the safety device will effect a complete switch-off.

The integrated timer allows monitoring of the heating-time. After course of time a signal is given by the device. The thermostat will hold the current temperature on steady-state now.

All parts of the device which get in touch with the bath liquid are made of high-grade steel.

A cooling coil - delivered on request - can be used with all thermostats of "E"-series.

Applications below normal indoor temperature are possible by applying the cooling coil to the water supply or a circulation cooler.

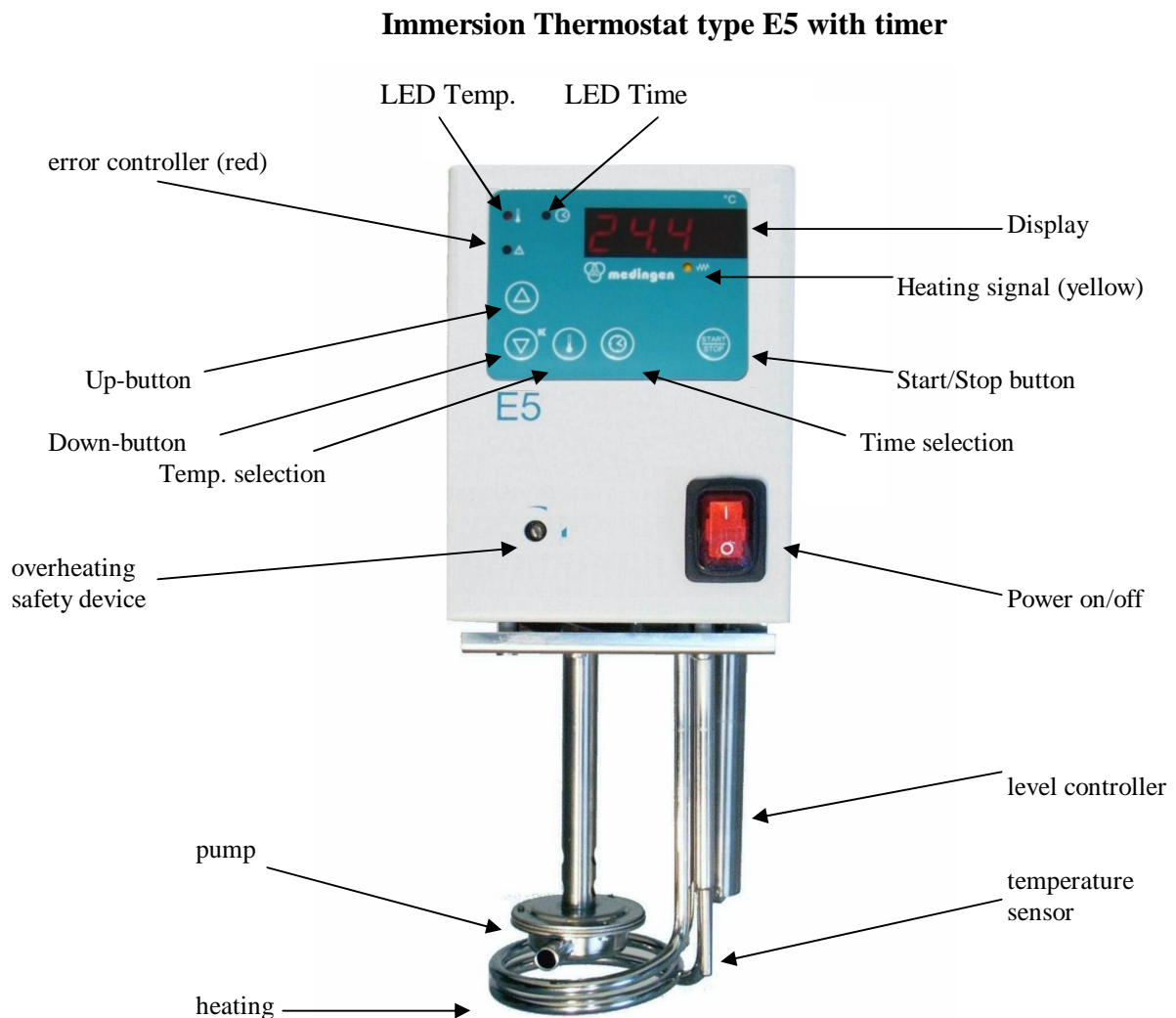
Notice: If a cooling coil is connected no other external application can be run.

5.2 Bath Thermostat Typ E5

A complete unit of bath thermostat - ready to operate - consists of the following units:

- a thermostat of the "E"-series
- a bath
- a bath bridge where a cooling coil and a connecting piece can be fastened for temperature regulation of external vessels.

The opening of the bath is large enough for using test tube racks (see accessories) for a variety of different test applications or for other objects. (with the exception of „B 2“).



6. Setting into operation

The following preparations are necessary for setting the thermostat into operation. Please proceed as follows:

- Bring the device into a firm position. Execute the mounting work required.
- Fill the bath with liquid up to a level of about 25 mm below the bath rim.
- If you want to bring a closed external vessel to a given temperature, you have to mount the connecting piece and to close all hose connections.
- Connect the device to the power supply.
- For all devices classified safety class 3 (DIN 12876) the safety appliance for excessive temperature has to be adjusted to a higher value than the max. temperature required.

Mounting of the cooling-coil and the connection piece

The endpieces of the parts mentioned above have to be plugged from below through the provided holes of the bridge. Please screw the cylinder bold from above through the provided drills in in the web of the cooling coil resp. connection piece. With a hose of diameter 8 you have to connect the the pump at the ‚Pumpenkappe‘ with the connection piece.

7. Operation

7.1. Operation with fixed control parameters (first operation level)

The operation with fixed parameters, named first control-level, allows the operation with different temperature and time values.

Parameter	Function description	Range of Adjustment	Works Adjustment
S1	Temperature set points (the current set point selected is indicated and/or adjusted)	0,0°C ... 100°C	10,0° C
T1	Timer set points (the current set point selected is indicated and/or adjusted)	0:00 ... 99:99 min.	5:00 min.

Adjustment options



Key: UP

Pressing this key you can increase the parameter or parameter value or scroll the parameter list.



Key: DOWN

Pressing this key you can decrease the parameter or parameter value or scroll the parameter list. In case of alarm the buzzer function can be switched off with this key.



Key: selection of temperature setpoint

With this key the temperature setpoint can be selected. If - previously - the timer display is or has been active, the controller switches to temperature display with first key pressing.



Key: selection of timer setpoint

With this key the time setpoint relevant for the timer is selected. If - previously - the temperature display is or has been active, the controller switches to timer display with first key pressing.



Key: START/STOP

With this key the selected heating time is started. The display indicates the remaining time. After course of time set the timer gives a signal for 5 seconds. The timer can be switched off with the DOWN key. The elapsing timer has no influence on regulation - the temperature will be hold. After any restart of the timer, it can be cancelled by pressing the key for at least 2 seconds. With 'parameter settings' the remaining time displayed can be suppressed. In this case the display switches to temperature display after 3 seconds and the LED of the timer flashes to indicate that it is activated.

7.2. Setting of the control parameters (second operation level - P-level)

For special applications, some parameters can be adjusted by the operator.

It is strongly recommended by the manufacturer, that these special adjustments should be done by specialist staff only to avoid malfunctions.

The one-finger-setup of the setpoint adjustment requires an exactly simultaneous pressing of the UP and DOWN key for at least 4 seconds to open a parameter list containing the control parameters. (If the setpoint adjustment failed a new attempt is possible after 5 seconds.) With the UP and DOWN keys the list of parameters can be scrolled in both directions. Pressing key 'Temp. selection' will give you the value of the respective parameter. Pressing also the UP or DOWN key at the same time the value can be adjusted. The return to the initial position takes place automatically if no key has been pressed for 60 seconds.

Parameter	Function description	Range of Adjustment	Presettings	Remark
P2				do not adjust !
P4	Control range limitation – lower setpointlimitation	-99.9...P5°C	0.0°C	
P5	Control range limitation – upper setpoint limitation	P4...999.9°C	100°C	
P7	Proportional band	1...100 K	4 K	
P8	Readjust time Tn (I-factor)	0...999 sec. (0 sec. = inactive)	900 sec.	do not adjust !
P9	Lead time Tv (D-factor)	0...999 sec. (0 sec. = inactive)	6 sec.	do not adjust !
P10			30 sec.	do not adjust !
P19	Key-lock	0: no key-lock 1: key-lock	0	

P20				do not adjust !
P21	Actual value correction sensor F1	-20...20.0 K	0,0 K	for calibration
P30	Lower alarm value	-99,9°C/K...P31	0,0 °C	
P31	Upper alarm value	P30...999 °C/K	+100 °C	
P32-P40				do not adjust

Parameter description:

P2: Do not adjust!

P4: Control range limitation – lower setpoint limitation

P5: Control range limitation – upper setpoint limitation

The adjustment range of the setpoint can be limited in both directions.

P7: Proportion range at PID regulation

With approximation of the actual value to the setpoint value the variable is reduced linearly from +-100% to 0%. The regulators are adjusted to work optimally with 70°C. If the application temperature deviates relevantly the controller can be adjusted as necessary.

Temperature below 70°C - increase parameter P7 / temperature over 70°C - decrease parameter P7.

P8: Readjust time Tn (Integral-portion)

The normal proportion-controller works with fix deviation of the actual value from the setpoint. The integral portion provides a complete compensation of this deviation. The reset-time is a measure for the period of time needed to adjust a remaining temperature deviation of the size of the proportional range. If a small reset time Tn is set, a fast post-adjustment will take place. At a too small reset time, however, the system may tend to vibrate.

P9: Lead time Tv (Differential-portion)

The differential portion mutes temperature changes. If a long lead time Tv is set, muting is strong. At too long lead time, however, the system may tend to vibrate. At setting 0 the values are ineffective. Therefore it is possible to realise a pure PI or PD regulation.

P10: Do not adjust!

P19: Key-lock

The key-lock allows blocking of the control keys. In locked condition parameter adjustments with keys are not possible. During the attempt to adjust the parameters despite key-lock the message "===" appears in the display.

P20: Do not adjust!

P21: Actual value correction

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the therewith adjusted value.

P30: Lower alarm value

P31: Upper alarm value

The exit alarm is a boundary alarm or a range alarm with one-sided or symmetrical hysteresis (see parameter P32 and A42). Both at the boundary alarm and the range alarm, limit values can be relative, i.e. going along with the setpoint, or absolute, i.e. independent of the setpoint. The operation mode is set with parameter A30.

If, in case of boundary alarm and only one switching point is required the not used second switching point should be adjusted to a value above or below the operating range of the controller.

P32 - P40: Do not adjust!

7.3 Third operation level (A-level)

Attention: The following control parameters are adjustable with support of the manufacturer only. Please get in touch if necessary!

Access to the third control level is granted when selecting the last P-parameter on the second control level. Continue pressing the UP key for approximately 10 seconds until “PA” appears. Continue pressing the UP key and additionally press the DOWN key for about 4 seconds and the first A-parameter of the third control level is indicated.

With the keys UP and DOWN you can scroll the list in both directions. Pressing key 3 will give you the value of the respective parameter. By pressing the UP or DOWN key at the same time the value can be adjusted. The return to the initial position takes place automatically, if no key has been pressed for 60 seconds, or by pressing the UP and DOWN key for approx. 4 seconds simultaneously.

Parameter	Function description	Range of Adjustment	Standard setting	Custom setting
A1 ... A6			0	do not adjust!
A8	Display mode	0: integrals 1: resolution 0.5 K	0	
A9	Remaining time display	0: Remaining time no display 1: Remaining time display	1	
A19 ... A30				do not adjust!
A31	Special function at boundary alarm	4: buzzer active/display flashes	4	
A32 ... A40				do not adjust!
A56	Alarm suppression after “mains on” / ”standby-on”	0...999 min.	30 min.	
A60 ... A70				do not adjust!
A80	Temperature scale	0: Fahrenheit (“AUS”) 1: Celsius (“AUS”)	1	
A81 ... A91				do not adjust!
Pro	Program version			

Parameter description:

Attention: The adjustment of the following parameters can change the equipment characteristics and is therefore to be set with utmost care.

A1 to A 6: Do not adjust!

A8: Display mode

The value can be indicated in integrals or with decimals. In general, all parameter indications are presented with decimals.

A9: Remaining time display

A19 ... A30 Do not adjust!

A31: Special function at boundary or alarm

With this parameter it can be selected, whether, in the case of an alarm, the indication to flash and/or the buzzer is to start. Sensor alarm is indicated independently by flashing display and the buzzer.

A32 ... A40 Do not adjust!

A56: Alarm suppression after "mains-On" and/or "Standby-On"

This parameter allows a switch-on delay of the alarm contact after switching on the mains voltage or standby. This delay corresponds with the time set here.

A60 ... A70 Do not adjust!

A80: Temperature scale

The display can be switched between Fahrenheit and Celsius. At conversion, the parameters and setpoints maintain their numerical value and adjustment range. (Example: A controller with the desired value of 0°C is switched to Fahrenheit. The new desired value is then interpreted as 0°F, which corresponds to a temperature of -32°C).

A81 ... A91 Do not adjust!

Pro:

Program version.

8. Maintenance and Repair

The thermostats are maintenance-free.

To ensure an always perfect operation, all parts getting in touch with the liquid should be purified at regular intervals. This is of special importance to heat-transferring parts as for instance heating units and sensors.

Indication	Fault cause	Error elimination
F1	Sensor error, short or open circuit at sensor F1	Check sensor
EP	Data loss at parameter memory	The controller must be repaired.
Flashing display	Boundary or range alarm (if activated, triggered by temperature monitoring at sensor F1)	-----
Buzzer	Temperature alarm (see A31)	The buzzer can be stopped with the DOWN key.

Error messages are stored and can be displayed even if the fault is eliminated. Pressing the DOWN key deletes the error message.

Do not hesitate to contact our customer service if you do have any questions.

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Declaration of Conformity

We : medingLab Temperiertechnik
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hereby declare under our sole responsibility that the products :

Thermostat E5

Thermostat E5 S

to which this declaration relates, are in conformity with the following Council directives of the EU member states :

Council directive on harmonization of the laws of the member states :

- relating to electrical equipment for use within certain limits 2006/95/EC
- relating to electromagnetic compatibility 2004/108/EC

and meet the essential requirements of the mentioned directives.

This equipment has been tested according to the following standards :

DIN 12876 :1	Electrical laboratory devices Safety class 1
EN 61010-1 /2002-08	Safety requirements for electrical equipment for measurement, control and laboratory use Part 1 General requirements
EN 61010-2-010/ A1	Safety requirements for electrical equipment for measurement, control and laboratory use Part 2-010 Particular requirements for laboratory equipments
EN 61326 -1:2006	Electromagnetic compatibility

The technical documentation required to demonstrate that the products meet the requirements of these directives has been compiled and can be made available for inspection by the relevant enforcement authorities.

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