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Find the *Thermo / HAAKE EZ Cool 80* at our website: ***Click HERE***

Instruction Manual

Circulator
HAAKE EZ COOL 80

version 1.2

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Konformitätserklärung /
Declaration of Conformity

075-2078

Produktbezeichnung / Product name	Identifikation / Identification
EZ Cool 80 Thermostat 230V/50-60Hz	426-1621

Hersteller / Manufacturer

Thermo Electron (Karlsruhe) GmbH
Dieselstraße 4
D – 76227 Karlsruhe
Germany

CE

Richtlinie / Norm
Directive / Standard

97/23/EG	**Druckgeräterichtlinie** **Pressure Equipment Directive**
2004/108/EG	**Richtlinie für elektromagnetische Verträglichkeit** **Electromagnetic Compatibility Directive**
EN 61326-1: 2006	Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV-Anforderungen, Teil 1 Allgemeine Anforderungen Electrical equipment for measurement, control and laboratory use EMC-requirements, Part 1 general requirements
2006/95/EG	**Niederspannungsrichtlinie** **Low voltage directive**
EN 61010-1: 2001	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel-, und Laborgeräte - allgemeine Anforderungen Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements
EN 61010-2-010: 2003	Besondere Anforderungen an Laborgeräte für das Erhitzen von Stoffen Particular requirements for laboratory equipment for the heating of materials

Wir erklären in unserer ausschließlichen Verantwortung, dass das Produkt, auf das sich diese Erklärung bezieht, mit den oben genannten Normen, normativen Dokumenten und den Bestimmungen der genannten Richtlinien übereinstimmt.
Die Prüfprotokolle werden bei Thermo Electron (Karlsruhe) 10 Jahre aufbewahrt.
We declare under our sole responsibility, that this product to which this declaration relates is in conformity with the a.m. standards or other normative documents and is following the provisions of the a.m. directives.
All test certificates will be kept by Thermo Electron (Karlsruhe) for 10 years.

	09.01.2008	Thermo Electron (Karlsruhe) GmbH Dieselstr. 4 * 76227 Karlsruhe Tel. + 49-721-4094-444, Fax + 49-721-4094-418
Unterschrift / Signature Geschäftsleitung/Business Management	Datum/Date	Hersteller/Manufacturer

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Konformitätserklärung /
Declaration of Conformity

075-2079

Produktbezeichnung / Product name	Identifikation / Identification
EZ Cool 80 Circulator 115V/60Hz	426-1623

Hersteller / Manufacturer

Thermo Electron (Karlsruhe) GmbH
Dieselstraße 4
D – 76227 Karlsruhe
Germany

CE

Richtlinie / Norm
Directive / Standard

97/23/EG	**Druckgeräterichtlinie** **Pressure Equipment Directive**
2004/108/EG	**Richtlinie für elektromagnetische Verträglichkeit** **Electromagnetic Compatibility Directive**
EN 61326-1: 2006	Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV-Anforderungen, Teil 1 Allgemeine Anforderungen Electrical equipment for measurement, control and laboratory use EMC-requirements, Part 1 general requirements
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1. Key to Symbols

1.1 Symbols used in this manual

! Warns the user of possible damage to the unit, draws attention to the risk of injury or contains safety notes and warnings.

Denotes an important remark.

1 Indicates the next operating step to be carried out and…

…what happens as a result thereof.

1.2 Symbols used on the unit



Caution: Read the instruction manual!



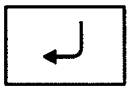
Adjustment possibility for setting the cut-off point for excess temperature protection



Menu selection



Value alteration (↑) higher / (↓) lower



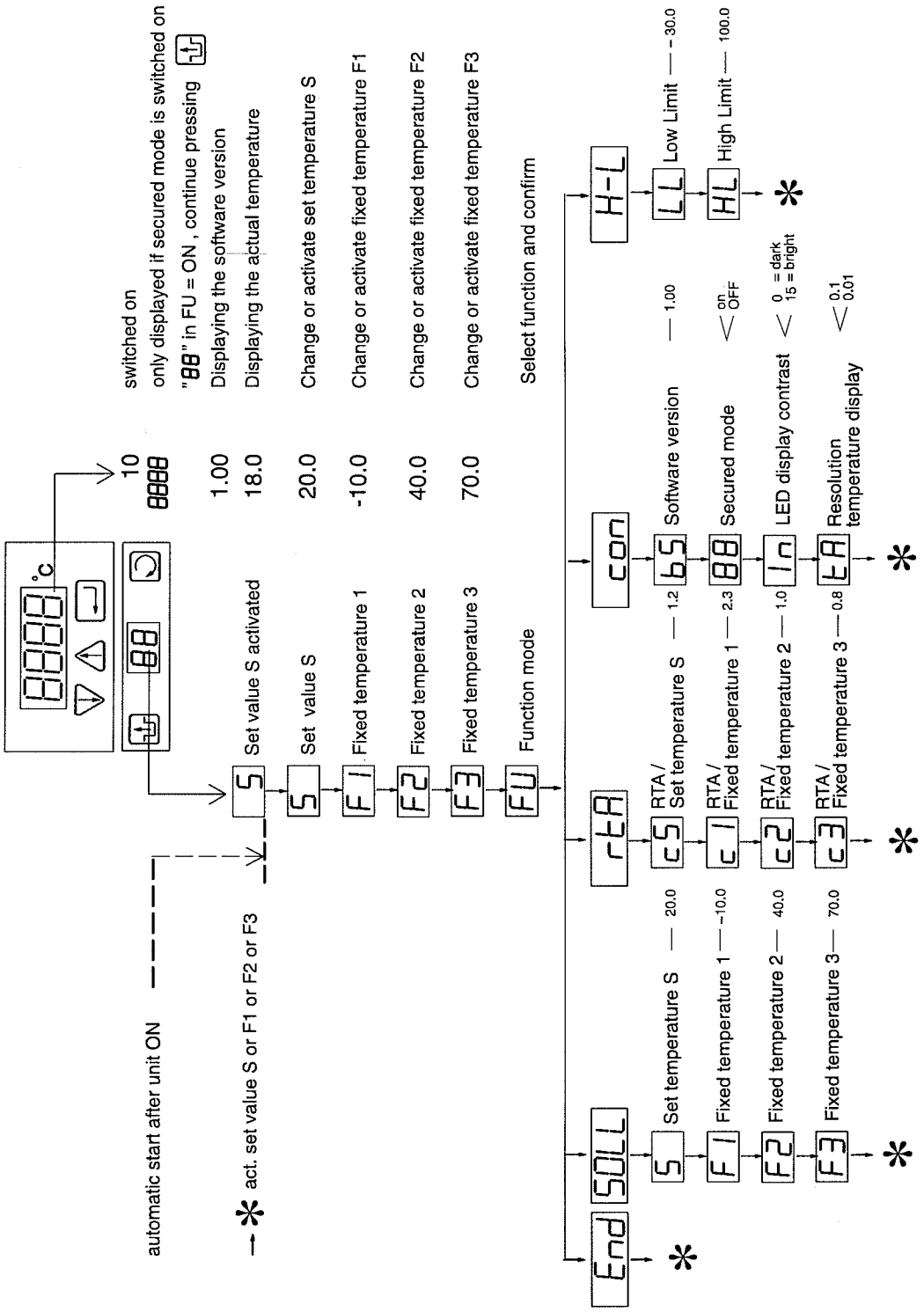
Enter key



Reset button (for usage after a fault or interruption)

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1.3 Menu Tree


automatic start after unit ON
act. set value S or F1 or F2 or F3
Set value S activated
Set value S
Fixed temperature 1
Fixed temperature 2
Fixed temperature 3
Function mode
Select function and confirm
switched on
only displayed if secured mode is switched on
"88" in FU = ON , continue pressing
Displaying the software version
Displaying the actual temperature
1.00
18.0
20.0
-10.0
40.0
70.0
10
8888
End
SOLL
rtA
con
H-L
Set temperature S — 20.0
Fixed temperature 1 — -10.0
Fixed temperature 2 — 40.0
Fixed temperature 3 — 70.0
RTA / Set temperature S — 1.2
RTA / Fixed temperature 1 — 2.3
RTA / Fixed temperature 2 — 1.0
RTA / Fixed temperature 3 — 0.8
Software version — 1.00
Secured mode
LED display contrast
Resolution temperature display
Low Limit — -30.0
High Limit — 100.0
on OFF
0 = dark 15 = bright
0.1 0.01

2. Quality Assurance

Dear customer,
Thermo Fisher Scientific implements a **Q**uality **M**anagement **S**ystem certified according to ISO 9001:2000.
This guarantees the presence of organizational structures which are necessary to ensure that our products are developed, manufactured and managed according to our customers expectations. Internal and external audits are carried out on a regular basis to ensure that our **QMS** is fully functional. We also check our products during the manufacturing process to certify that they are produced according to the specifications as well as to monitor correct functioning and to confirm that they are safe. The results are recorded for future reference.

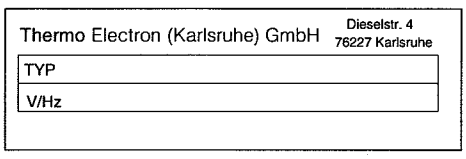
The "Final Test" label on the product is a sign that this unit has fulfilled all requirements at the time of final manufacturing.

Please inform us if, despite our precautionary measures, you should find any product defects. You can thus help us to avoid such faults in future.

3. Your Contacts at Thermo Fisher Scientific

Please get in contact with us or the authorized agent who supplied you with the unit if you have any further questions.

Thermo Fisher Scientific
Dieselstraße 4
D-76227 Karlsruhe, Germany
Tel. +49(0)721 4094–444
Fax +49(0)721 4094–300
Hotline +49(0)18 05 04 22 53
support.ct.de@thermofisher.com
www.thermo.com/tc



The following specifications should be given when product enquiries are made:

- **Unit name** printed on the front of the unit and specified on the name plate.
- **Version** of the operating software
- **Serial number** of the unit

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4. Thermo Fisher Scientific Test Certificate

This is to certify that the tempering device which you have acquired and to which these instructions for operation refer has been tested and equilibrated by Thermo Fisher Scientific in compliance with the regulations of a certified Quality Assurance System according to DIN ISO 9001.

Testing for constancy of temperature has been carried out in keeping with DIN standard DIN 12876 for laboratory equipment. (follow–up standard to DIN standard 58966).

The measuring equipment used in the testing process is regularly calibrated and can be traced back to the national norms of the Physikalisch Technische Bundesanstalt (PTB) Deutschlands[1] or to other national norms. In those cases where there are no norms and standards on a national level, the testing process is in keeping with currently valid technical rules and regulations, norms and standards.

All required measuring data are listed on this page of the Test Certificate.

Measuring conditions

Ambient temperature:	+ 20°C
Power supply / –frequency:	230V ± 5V / 50 Hz
respectively	115V ± 5V / 60Hz

System parameters

Volume:	3.5 litre
Liquid:	Water
Rated temperature:	+70°C

Measuring process

Checking constancy of temperature in bath according to DIN 12876, part 2 (follow–up standard to DIN 58966, part 2, paragraph 4.3)

Measuring agent

Type of sensor used for measuring:	Quartz
Inexactitude of measurement according to DIN IEC 751:	± 0.1 K

Test results

Temperature stability (Width of control range):	± 0.02 K
Temperature stability (persistent):	± 0.01 K
Accuracy at +70°C:	± 0.1 K

The individual test certificate for your thermostat will be provided upon request.

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5. Safety Notes

These notes are intended to draw your attention to risks which only **YOU** can recognize and avoid or overcome. They are intended to enhance your own safety consciousness. We have set the highest quality standards for ourselves and this unit during development and production. Every unit meets relevant safety regulations. **The correct unit usage and proper handling is however solely your responsibility.**

The intended workplace should correspond to a laboratory or pilot plant environment. The user should have an education level which is at least equivalent to a trained laboratory worker or specialized chemist. The following list should be seen as an example.

- **The device may not be operated if there are any doubts regarding a safe operation due to the outer appearance (e.g. damages).**
- **A safe operation of the instrument cannot be guaranteed if the user does not comply with this instruction manual.**
- **Ensure that this manual is always at hand for every unit operator.**
- **Only use this unit solely for the intended application.**
- **Repairs, alterations or modifications must only be carried out by specialist personnel. Consider the manufacturer's instruction manuals.**
  Considerable damage can be caused by improper repairs. The Thermo Fisher Scientific service department is at your disposal for repair work.
- **Do not operate the unit with wet or oily hands.**
- **Do not expose the unit to spray water or immerse it in water.**
- **Do not clean the unit with solvents (fire risk!), a wet cloth soaked in household detergent is normally sufficient.**
- **This device is not designed according to the standard EN 60601-1: 1990 (DIN VDE 0750-1 and IEC 601-1) and should not be operated in rooms used for medical purposes and/or in the vicinity of patients.**
- **Do not move the unit from the position where it was set up during operation or when it is still hot. There is a high risk of burns!**
- **Use only recommended bath liquids and read the MSDS of the suppliers.**

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! **The temperature controlling of external vessels or similar objects with the circulator constitutes normal circulator practise.**
We do not know which substances are contained within these vessels. Many substances are dangerous:

- inflammable, easily ignited or explosive
- hazardous to health
- environmentally unsafe

You alone are responsible for the handling of these substances! Our advice:

- If in doubt, consult a safety specialist.
- Read the product manufacturer's or supplier's EC Safety Data Sheet according to directive 91/155/EEC.
- Read relevant regulations concerning dangerous materials.
- Observe relevant guidelines for laboratories in your country.

The following measures were taken for the protection of the operator:

- Protection Class I according to VDE 0106 T1
  i.e. protection against electric shocks by grounding all parts which carry the risk of electric contact.

☞ The device must only be connected to mains receptacles with a protective ground.

- Protection IP 20 according to EN 60529
  i. e. regarding the protection against accidently touching live parts and damage by foreign matter, it has been ensured that foreign bodies with a thickness or diameter of more than 12 mm cannot penetrate.

☞ No special precautions were taken against the penetration of water and dust. The device should therefore not be used in a dusty atmosphere or in the neighborhood of spray water.

☞ Do not insert wires or tools in any of the openings.

! **Complete separation from the mains is required when:**

- **all dangers caused by this device are to be avoided,**
- **cleaning is carried out,**
- **repairs or maintenance by specialist personnel is about to be carried out**

Complete separation means:

Pull out the mains plug!

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6. Unit Description



This device contains safety elements according to category NFL making it suitable for unattended continuous operation with non-combustible substances as bath liquid (water or water with antifreeze).

The circulator pump motor is protected against thermal overloading. Two pump speeds can be selected.

The safety element measures the surface temperature of the heating element. If this exceeds a certain temperature (due to e.g. a leakage in the liquid circuit or a liquid shortage), the safety element is triggered.

The EZ COOL 80 circulators offer the possibility of setting this cut-off temperature variably.

6.1 Safety features

The comprehensive safety system is designed on the principle of the concept of the "single fault" (EN 61010). This assumes that two separate faults do not occur simultaneously. This system therefore offers protection against *one* (single) fault. This one fault will effectively occur automatically if you...

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- do not read this manual,
- do not correctly set the excess temperature protection, i.e. your safety reserves have already been used up.

Such faults can include e.g.:

Fault in the temperature control unit:
⇒ Excess temperature ⇒ poss. fire danger

Leakage in the liquid circuit or
Evaporation of heat transfer liquid:
⇒ Low liquid level ⇒ poss. fire danger, destruction of polyacrylic bath vessel

Pump blocked or
Great portion of antifreeze in the bath liquid:
⇒ Motor overheating ⇒ poss. fire danger

Or also:
Excess temperature protection level not correctly set:
⇒ poss. fire danger

If a safety feature is triggered...

- Fault Indentification System (FIS) indicates the fault,
- the **safety-relevant components** of the heating unit (heating element and motor) are switched off immediately i.e. the safety circuit transfers the unit to a stable, safe condition,
- the heat transfer liquid in the heating unit gradually adjusts to ambient temperature, but...

! **For units with switched on compressor cooling, this cooling remains functional and thus cools the heat transfer liquid to the lowest reachable temperature.**

6.2 Applications

Heating and refrigerated circulators:

For temperature controlling closed temperature control circuits such reactors, heat exchangers or similar objects. Separate open vessels cannot be temperature controlled as these circulators are only equipped with a pressure pump.

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7. Unpacking / Setting Up

7.1 Transportation damage?

- Notify carrier (forwarding merchant, railroad) etc.
- Compile a damage report.

Before return delivery:

- Inform dealer or manufacturer
  (Small problems can often be dealt with on the spot).

7.2 Ambient conditions according to DIN EN 61010

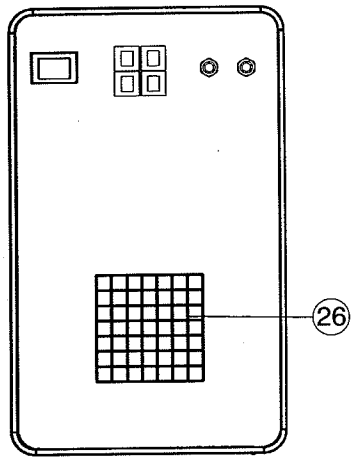
- indoors, max. 2000 meters above sea level,
- ambient temperature 5 ... 40°C,
- relative humidity max. 80%/31°C (→ 50%/40°C)
- excess voltage category II, contamination level 2

7.3 Resting time after transportation (only for refrigerated circulators)

As we can unfortunately not guarantee that our refrigerated circulators are always transported according to our recommendations (i.e. upright), lubrication oil can leak from the compressor into the cooling circuit.
If the refrigerated circulator is started up whilst still in this state, the compressor may be damaged to the lack of oil.

Therefore:

! Rest the unit for 24 hours after setting up.



7.4 Ventilation

☞ Keep all ventilation grids **26** free from obstruction to ensure unhindered air circulation.

! Blocked ventilation grids lead to increased unit heating which in turn reduces the cooling capacity and thus impairs correct functioning.

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7.5 Information concerning the CE sign

Thermo Scientific electrical equipment for measurement, control and laboratory use bears the CE marking.

The CE marking attests the compliance of the product with the EC-Directives which are necessary to apply and confirms that the apparatus meets all relevant essential requirements of the directive, the defined relevant protection requirements.

The conformity assessment procedures were performed following a defined methodology according to each applicable directive.

The council decision 93/465/EEC shall be authoritative concerning the modules of the various phases of the conformity assessment procedures and the rules for the affixing and use of the CE marking, which are intended to be used in the technical harmonization directives.

To confirm compliance with the EC-Directive 2004/108/EC Electromagnetic Compatibility (EMC) our product was tested according to the EMC requirements for emission and immunity for electrical equipment for measurement, control and laboratory use.

Compliance with the protection requirements areas (domestic establishments and establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes) and industrial areas is ensured.

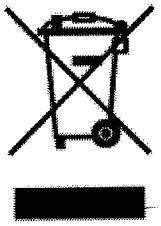
Our strict standards regarding operating quality and resulting considerable amount of time and money spent on development and testing reflect our commitment to guarantee the high level of quality of our products even under extreme electromagnetic conditions.

Practice however also shows that even electrical equipment which bears the CE marking such as monitors or analytical instruments can be affected if their manufactures accept an interference (e.g. the flickering of a monitor) as the minimum operating quality under electromagnetic compatibility phenomena. For this reason we recommend you to observe a minimum distance of approx. 1 m from such equipment.

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7.6 WEEE Compliance

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:

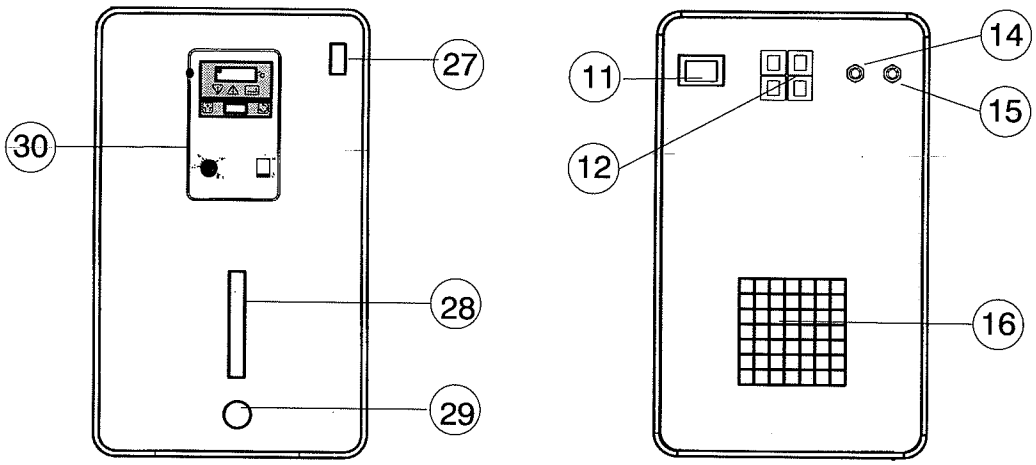


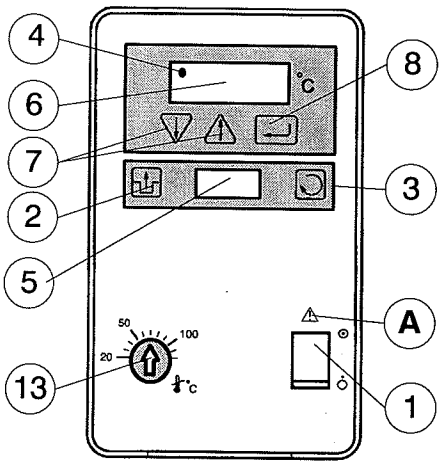
Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State, and this product should be disposed of or recycled through them. Further information on Thermo Fisher Scientific compliance with these Directives, the recyclers in your country, and information on Thermo Fisher Scientific products which may assist the detection of substances subject to the RoHS Directive are available at www.thermo.com/WEEERoHS

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8. Functional and Operating Elements

8.1 Temperature control module HAAKE EZ COOL 80



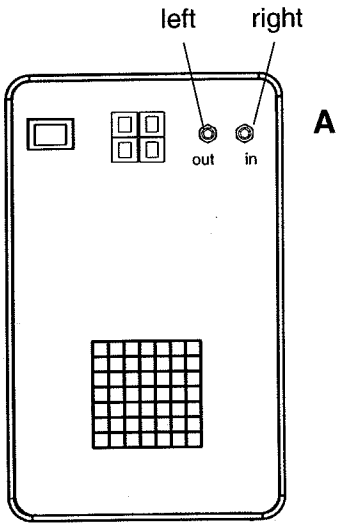


A Symbol: Read the instruction manual!

1 Mains switch
2 Reset button
3 Menu selection key
4 Heating control display
5 Menu position display
6 Set or actual temperature display
7 Value alteration (↓) higher (↑) lower
8 Enter key
11 Mains connection
12 Fuses (if this fuse is triggered, see chap. 12.4)
13 Excess temperature setting dial
14 outlet to application
15 inlet from application
16 fan
27 Switch for cooling on/off
28 Filling level
29 Draining port
30 Display and user interface

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9. Connecting Hoses



Pump nozzle **A**:

left: outlet to external object (pressure side)
right: return flow from external object

Hoses are normally used to connect the pump with an external vessel.

General recommendations concerning the max. allowable length of hoses cannot be given. It all depends largely on the size, form and material of the external vessel to be temperature controlled. It should be understood that the length of a hose and its diameter combined with the circulating capacity have a large effect on the temperature control effectiveness. Whenever possible, the decision should be made in favor of the wider hose diameter and the vessel to be temperature controlled should be placed as close as possible to the circulator.

! High operating temperatures will lead to high temperatures on the hose surface, this is even more so at the metal nozzles. In this case: DO NOT TOUCH!

! The required hose material is dependent on the heat transfer liquid used.

! Hoses must not be folded or bent!
A wide radius should be used if turns have to be made!

! Hoses may become brittle after prolonged use or they may get very soft. They should, therefore, be checked regularly and exchanged if necessary!

! Secure all hose connections using hose clamps!

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9.1 Plastic hoses

It must be ensured that the hoses selected are fully suitable for the particular application, i.e. that they will not split, crack or become disengaged from their nozzles.

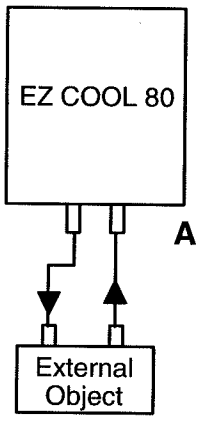
Perbunan hoses have proved to be satisfactory for your circulator.

These hoses are available as running meter goods with internal diameters of 8 or 12 mm.

Order no.: 082-0172 for 8 mm i.D. hose
082-0173 for 12 mm i.D. hose

Hoses made of other materials are also available from Thermo Scientific.

Hoses with 12 mm internal diameter can be pushed directly onto the nozzle **A**.



9.2 Connection of external closed systems

E.g. instruments with a pressure-tight temperature jacket or coil or a heat exchanger.

Hose connection:
From the pressure port (at the left) to the external object and then back to the return port (at the right).

If it cannot be avoided that the external object is situated higher than the circulator, the heat transfer will only not flow back on the condition that the system is completely tight and leak-free. To be on the safe side it may be considered necessary to fit stop cocks to the inlet and outlet hoses.

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10. Filling with Bath Liquid

10.1 Recommended bath liquids

5 to 80°C *Distilled Water*

- Normal tap water leads to calcareous deposits necessitating frequent unit decalcification.

! **Calcium tends to deposit itself on the heating element. The heating capacity is reduced and service life shortened!**

- Water, of course, can be employed up to 95°C, however above 80°C water vaporization reaches a level which necessitates the liquid to be constantly replenished.

☞ Add an appropriate amount of Chloramine T (Order no. 128-0020) to avoid algae growth in the water.

–10 to 80°C *Water with Antifreeze*

In applications below 5°C the water has to be mixed with an antifreeze. In doing so, the amount of antifreeze added should cover a temperature range 5°C lower (but max. –30°C) than the operating temperature of the particular application. This will prevent the water from gelling (freezing) in the area of the evaporating coil the surface area of which is much colder than the working temperature. An excess of antifreeze deteriorates the temperature accuracy due to its high viscosity.

! Important ! **Thermo Fisher Scientific takes no responsibility for damages caused by the selection of an unsuitable bath liquid.**

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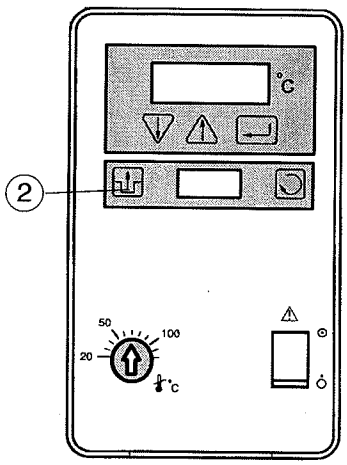
10.2 Filling with heat transfer liquid

When working with water or water with antifreeze:
Fill the internal tank with about 3.6 liter of heat transfer fluid. Use the filling port at the top left corner of the unit. Adjust carefully to the max level and check the level regularly. If level is below minimum you need to refill. Below the min. level the cooling capacity is decreased significantly.

External systems included within the circulating circuit have to be filled with the same heat transfer liquid in order to avoid too much liquid being drawn from the internal bath.

☞ The bath level should be checked when the preset temperature has been reached!

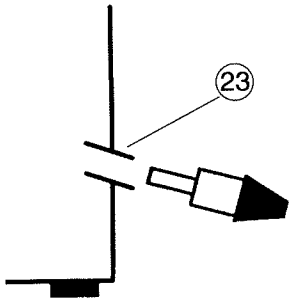
Quite often closed external systems cannot be prefilled as suggested. In this case the internal bath of the unit has to be filled to the max. level. After starting the unit, the pump will feed the necessary liquid to the external system. Should the demand be higher than the volume difference between high and low, the low liquid level sensor will be activated and the pump switched off.



In this case:

1. Replenish the liquid,
2. Reset the unit:
   Depress the key **2** (at the front).
   ⇒ The unit starts up again
3. Repeat this action if necessary.

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11. Draining

The temp. control unit is drained at the nozzle **23**.

1 Place a suitable vessel underneath nozzle.

☞ Bear in mind that the liquid will run out in a slight arc.

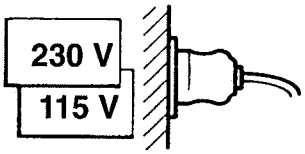
2 Turn plug slowly until it becomes disengaged from the thread. A pin will prevent the liquid from running out right away.

3 Pull out plug (pin) in one quick motion. The liquid will start to run out.

4 Possible residues can be drained by tilting the circulator slightly.

! Hot heat transfer liquid should not be drained! When certain conditions make draining necessary, please act safety conscious: Wear protective clothing and protective gloves!

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12. Connecting Up

12.1 Connecting to the mains

Only attach this unit to mains sockets with a grounded earth. Compare the local mains voltage with the specifications written on the name plate. Voltage deviations of +/- 10% are permissible. The socket must be rated as suitable for the total power consumption of the unit.

12.2 Checking the liquid circuit

Before switching on, check again to make sure that the pressure and suction ports are connected with each other – or alternatively if an external object is to be temperature controlled, that the hoses are connected correctly and secured (see chapter 9.2).

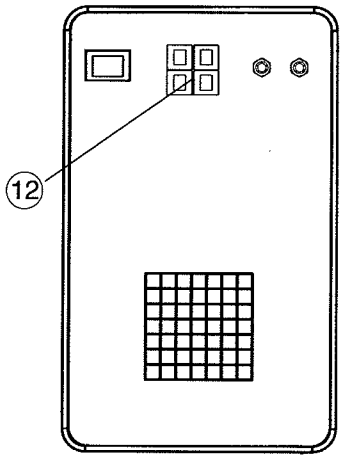
12.3 Changing the mains plug (e.g. for Great Britain)

! This should only be carried out by qualified specialist personnel!

The mains cable wires have the following colors:

Brown	=	**Live**
Blue	=	**Neutral**
Green/Yellow	=	**Earth**

12.4 Fuses on the unit



All units are equipped with automatic thermally-triggered fuses.

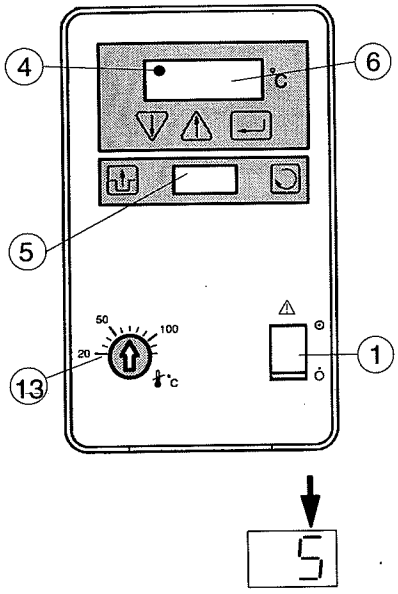
If the fuse **12** has triggered...

- the fuse does not have to be exchanged – resetting suffices;
- a white marking is visible;
- a certain cooling down time should be allowed (approx. 5 min) before the (dip) switch can be pressed again.

! Do not use tools; do not use force. Both destroy the fuse.

! If the fuse should be triggered again after resetting, the unit probably has a defect. In this case the unit should be sent in for servicing.

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13. Operating

13.1 Switching on

1 Set the excess temperature protection clearly above the desired operating temperature using the dial **13**.

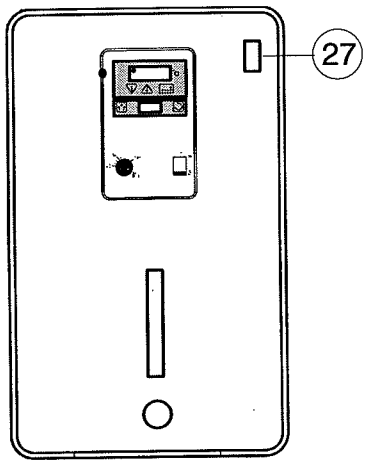
2 Switch the circulator on at the mains switch **1**.

This causes:

⇒ Display **6** briefly shows the device identification and thereafter the version number of the operating system software, e.g. "0.11", and after that the **actual temperature** at the location of the control sensor is displayed.

⇒ The display **5** shows which one of the four adjustable set values is currently activated (set temperature **"S"** or one of the fixed temperatures " **F1"**, " **F2"** ," **F2"** (see chapter 13.4).

⇒ The pump motor runs – the bath liquid is circulated.



The cooling device is switched on via it's own switch for cooling **27** at the front. The compressor starts with a slight jerk. Only activate cooling device if cooling is actually required.

13.2 Heating control lamp

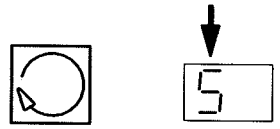
The display **4** lights up when the heating is switched on (set temperature is higher than the actual temperature).

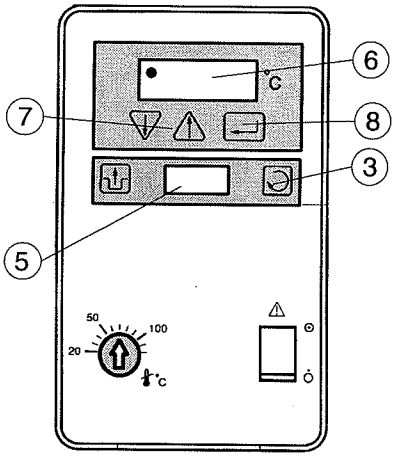
⇒ display **4** lights up constantly during the heating up phase,

⇒ display **4** flashes on and off during the control phase.

The display **4** does not light up if the heating is not activated (set temperature is lower than the actual temperature).

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13.3 Adjusting the variable set temperature

1 Press the menu button **3**:

⇒ A left-justified "**S**" appears in the small display **5** (for **s**et temperature adjustment).

2 Increase (↑) or decrease (↓) the value shown in the display **6** with the buttons **7** . The first degree of temperature change is thereby passed slowly and thereafter the rate of temperature change in the display is five times faster.

3 Press the enter button **8**.

⇒ The selected value is stored as new set temperature and activated.

☞ **The new value is not saved until the Enter button has been pressed. The circulator continues to use the old set value.**

The display **6** automatically switches back to actual temperature display after a short time.

13.4 Adjusting the fixed temperatures F1 to F3 (facultative)

This device permits permanent storage of three fixed temperatures which can be activated when required.



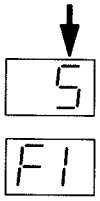
1 Press the menu button **3** :

⇒ The small display **5** shows **F1** (for fixed temperature **1**), **F2** or **F3** .

2 Press the buttons **7** to increase (↑) or decrease (↓) the value shown in the display **6** .

3 Press the enter button **8** .

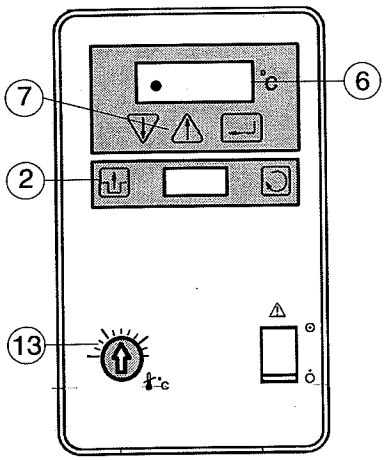
⇒ The selected value is stored as fixed temperature F1, F2 or F3 and activated as currently valid set value.



The display **6** automatically switches back to actual temperature display after a short time. At the same time the small display **5** shows whether the temperature set point S, F1, F2 or F3 is currently active.

To activate another set value, press the menu button **3** until the designator of the desired set point (e.g. "**S**") is shown in the display **5**. Then press the button **8** to confirm without changing the value.

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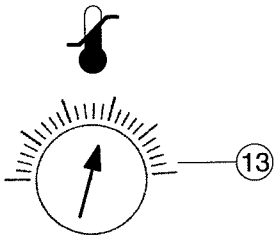
14. Excess Temperature Protection

If one of the safety devices is triggered:

- The fault cause is shown in the display **6** (see also chapter 16.).
- all voltage conducting unit components (the heating element and pump motor) are switched off immediately i.e. the safety circuit transfers the unit to a stable, safe condition.

☞ **The fault cause must be identified and remedied.**

After the fault has been eliminated the unit can be started again by pressing the Reset key **2**.



14.1 Excess temperature protection dial

It offers protection against dangers caused by an uncontrolled heating up of the heat transfer liquid above the desired set temperature.

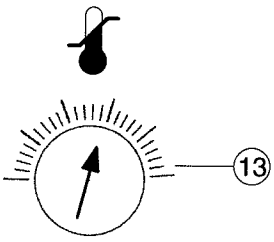
The cut-off temperature is adjusted with the excess temperature setting dial **13**.

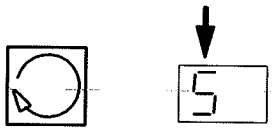
☞ **Proper protection can only be guaranteed if the cut-off point has been correctly set.**

There are two main aims for correct setting:

- **Safety (primary importance):**
  Protection against ignition of the heat transfer liquid. The cut-off point must be set at least 25°C **below** the fire point of the bath liquid used. However, this unit is for use with water **only**.
- **Protection of the object to be temperature controlled (secondary importance):**
  Additional protection, e.g. of a biological sample. The cut-off point should be set as close as possible to the desired temperature value.

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14.1.1 Setting the excess temperature

The cut-off point is set with the excess temperature dial **13** with a rough scale of temperature values arranged around it. This scale, of course, can only serve as an approximate setting means for this cut-off point. However, the cut-off point can be determined to act exactly if the following procedure is adhered to:

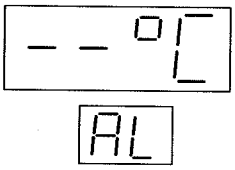
If for instance a bath liquid has a fire point of 60°C the unit should cut off after reaching 35°C at the latest:

1. First set the desired set value "5" using keys **7** (↑) or (↓) to exactly 35°C.
2. After the circulator has reached this temperature, turn the excess temperature dial **13** backwards very slowly (to the left) until the unit cuts off (fault message on display **6**).
3. Reset the unit via the Reset key **2** after the heat transfer liquid has cooled down somewhat.
4. Then set the set temperature to the actual temperature (< 35°C).

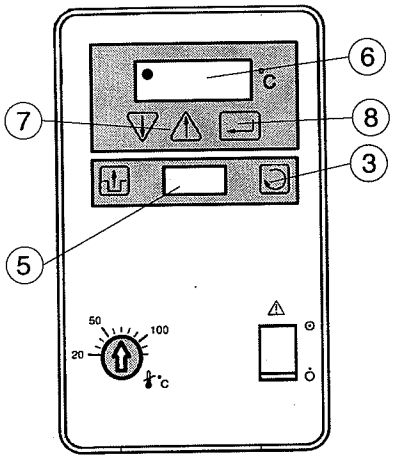
   ⇒ The unit can now be used for temperatures below 35°C. As soon as 35°C is reached, it is securely switched off.

14.1.2 Testing the cut-off point

Set the set temperature to a higher value than 35°C, set the unit to heat up and watch the digital display or thermometer. The value indicated when the alarm goes off is the real cut-off temperature. The reaching of the cut-off point is indicated at the display by the following message:

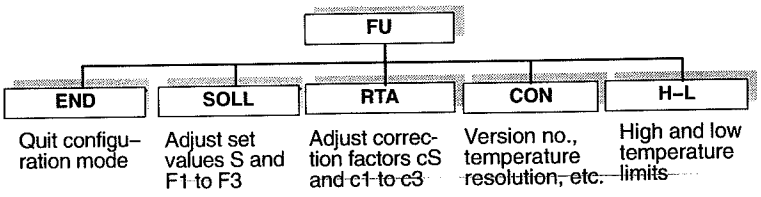


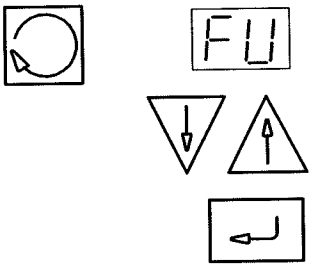
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15. Configuration

The device is completely ready for operation after defining the desired set temperature and adjusting the overtemperature protection. It is furthermore possible to adjust or call-up several functions in the function mode **"FU"**.





1 Switch to function mode by pressing the menu button **3** several times (until display **5** shows **FU**).

2 Switch to the desired function SOLL, RTA, CON or H–L with the arrow buttons **7**. Press the enter button **8** to confirm the selection made.

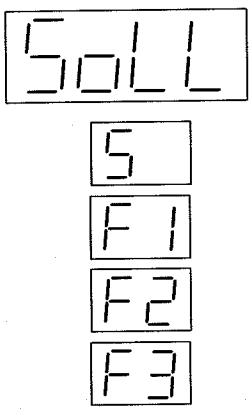
3 Move around through the submenus with the menu button **3** (see chapter "Menu Tree").

4 A further press of the menu button **3** quits function mode and returns to display of the actual temperature.

Display **6** always returns automatically to actual temperature display after a short time.

END is provided to skip function mode without making any settings.

15.1 Set value S and fixed temperatures F1 to F3



The adjustment has already been made in chap. 13.3 and 13.4. In the function mode it is also possible to adjust and change these set values *without activating them.*

1 Press the arrow buttons **7** in the menu FU to change to the SOLL function. Press the enter button **8** to confirm this selection.

2 Press the menu button **3** to move through the submenus S, F1 to F3 (the procedure for making adjustments is the same as in chapter 13.3).

A correcting factor **c** should be associated with each value: S ⇔ cS, F1 ⇔ c1 ... (see chapter 15.2).

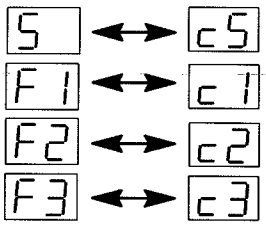
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15.2 Adjusting the correction factors (RTA system)

Display **6** shows the actual temperature at the control sensor.

This temperature does not correspond directly to the temperature in the circulator's bath and even less to the temperature in the external connected system.

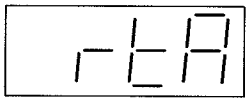
The temperature difference is determined by measuring the actual current temperature using a suitable measuring device (calibrated or gauged thermometer).



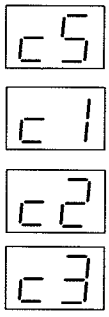
This is how the correction factor **c** (RTA system) is entered into the circulator. It remains stored in the circulator and is automatically assigned to the corresponding set temperature.

The same as for the set values in chap. 13.4, four correction factors can be stored: **cS** , **c1** , **c2** and **c3** , whereby, for example, **c1** is the correction value associated with **F1**.

The resolution of the correction factor according to the RTA system is 0.01 °C and the possible range of variation is ±9.9 °C.



Entry (see also the example on the next page):



1. Switch to the RTA function with the arrow buttons **7** in the menu FU. Press the enter button **8** to confirm this selection.
2. Press the menu button **3**:

⇒ The small display **5** shows **cS** (correction factor for working with the set temperature **S**).

3. Set the determined temperature difference on the display **6** with the buttons **7**.
4. Press the enter button **8**.

⇒ This confirms the value as new correction factor **cS**.

Proceed analogously as described for cS to adjust the correction factors c1 to c3 for the set values F1 to F3.

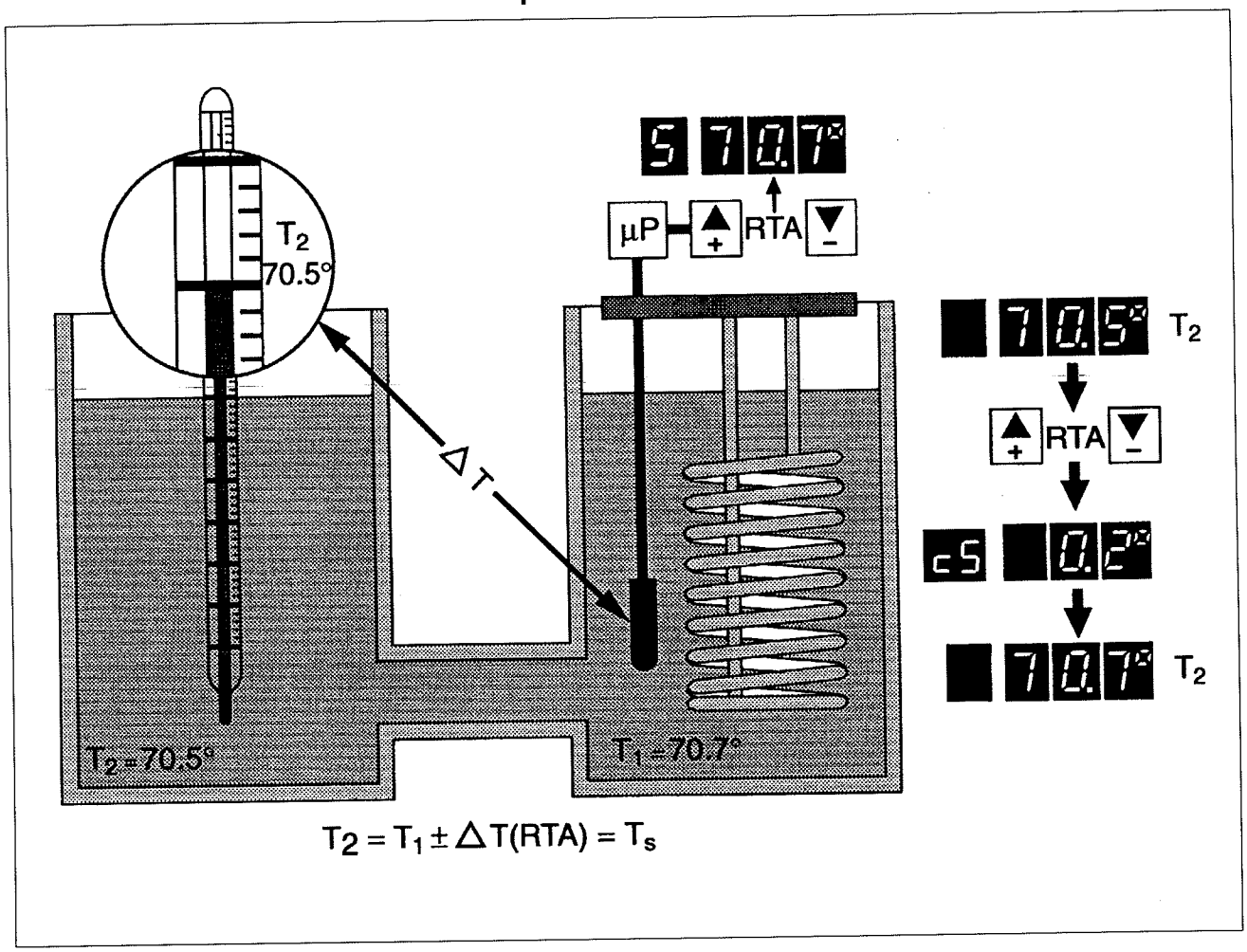
☞ **The new value is not saved until the Enter button has been pressed. The circulator continues to use the old value.**
***Warning:* The correction factor "c" may have to be determined again if the set temperature is altered!**

The display **6** automatically switches back to actual temperature display after a short time.

After the Enter button **8** has been depressed, the correction value (like the set value) remains stored even in case of a power failure.

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Example:



Set value programmed at the circulator T_{set} = 70.7°C

Actual temperature in bath / system T_{act} = 70.5°C

⇒ Deviation, calculated according to $\Delta T = T_{set} - T_{act}$

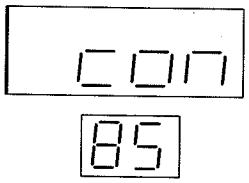
ΔT = 0.2°C

⇒ Entry of the corrected value ΔT as correction factor "c 5 "

c 5 = +0.2°C

The temperature control is thus internally altered so that the desired 70.7°C is also attained in the external system. The temperature displayed at the circulator and that of the external system now correspond with each other.

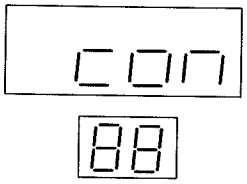
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15.3 Displaying the version of the operating software

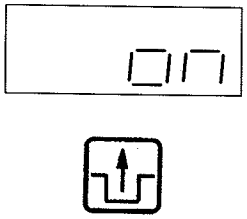
It is often necessary to know the version number of the software for service and other manufacturer inquiries.

1. Change to **con** in the menu FU and press button **8** to confirm. Press button **3** to switch to **BS**. The version number appears in the upper display **6**.



15.4 Secured mode

1. Change to **con** in the menu FU and press button **8** to confirm. Press button **3** to switch to **88**.
2. Switch security mode ON or OFF with the arrow buttons **7** and press button **8** to confirm.

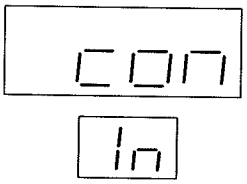


Secured mode: ON
The temperature control module switches to the secured mode in case of a power failure or if it is switched on via the mains switch. Display **6** flashes over all segments 8888. Switching on again is only possible after the reset button **2** has been pressed. This is due to safety reasons.
The unit reacts in the same way if is switched on via a mains switch in the laboratory.



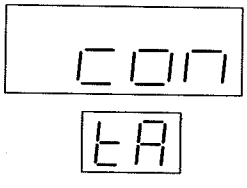
Secured mode: OFF
After a power failure or if it is switched on via the mains switch the temperature control module will switch on and start heating corresponding to the stored values and the last temperature used.

! Please consider any possible resulting risks!



15.5 Adjusting the LED display contrast

1. Change to **con** in the menu FU and press button **8** to confirm. Switch to **In** with button 3.
2. Press the arrow buttons **7** to change the display contrast (0 to 15) and then press button **8** to confirm the setting.



15.6 Resolution of the temperature display

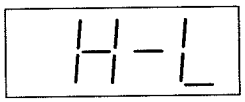
1. Change to **con** in the menu FU and press button **8** to confirm. Switch to **tA** with button **3**.
2. Choose the resolution (0.1 or 0.01 °C) with the buttons **7** and then press the button **8** to confirm (0.01°C resolution is available only in the display range from −9.5 to +99.5 °C).

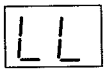
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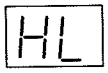
15.7 Adjusting temperature limit values

The setting range of the operating temperature of the circulator can be limited if the application requires this.

! This is not a safety element but merely an aid to help avoid user faults when operating the unit. The excess temperature protection must be set separately.







1 Change to the function H–L with the arrow buttons **7** in the menu FU. Then press the enter button **8** to confirm the selection.

2 Press the menu button **3** :

⇨ The small display **5** shows **LL** (Low Limit temperature value).

3 Set the desired limit value with the arrow buttons **7** (the lowest possible temperature is –30°C).

4 Press the enter button **8** .

⇨ The chosen value is stored as low limit value **LL** .

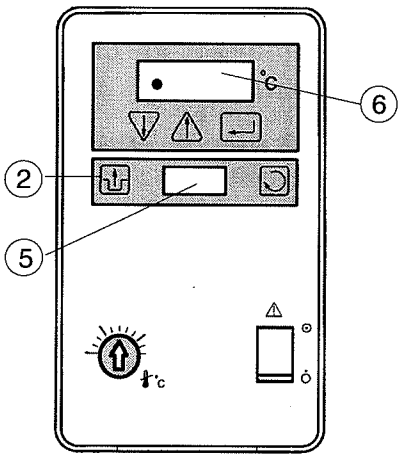
To set the high limit value HL, proceed analogously as described for LL.
HL (High Limit): The highest possible temperature is 100° C.

☞ **The new value is not saved until the Enter key has been pressed. The circulator continues to use the old value.**



5 Press the menu button **3** again to quit function mode and return to display of the actual temperature.
Or just wait until the displays **5** and **6** automatically return to actual temperature display mode after a short delay.

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16. Fault Displays

Display **6** shows the fault message " XXXX ".
"AL" is shown on display **5**.
The heating element and pump are completely switched off.

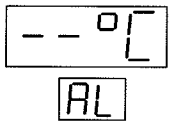
The following faults are possible:

- - OL = Excess temperature

- - PU = Pump or motor overloading

- - - S = Sensor breakage or short circuit

- - - F = Undefined fault



16.1 Excess temperature

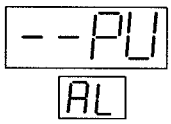
The low liquid level protection can be triggered if:

- Excess temperature has been set too closely to the desired working temperature

  ⇒ increase value slightly according to specifications made in chapter 14.1.1.

- the control function is defective

  ⇒ Return unit for servicing.

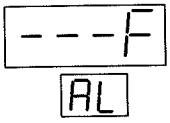


16.2 Pump or motor overloading

The motor or pump is blocked:

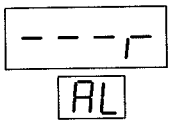
⇒ It can take 10 min or longer, until the motor temperature has sunk far enough so that the unit can be switched on again by pressing the reset key **2**. If the circulator switches off again after a short time, return the unit for servicing!

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16.3 Sensor breakage or short circuit

The sensor must be exchanged by qualified service personnel. Please return unit for repairs.

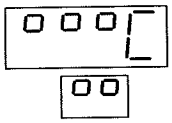


16.4 Undefined fault

This can be caused by fault which only occurs for a short period of time, i.e. with a fluctuating bath level when the filling level is very close to minimum.

Before returning the unit, top up with heat transfer liquid. This fault can often be remedied in this way!

In all other cases this unit must be checked by qualified service personnel.





16.5 Fault eliminated?

After the fault has been eliminated, the cause of the fault is shown on the display **6** (e.g. 000 C). The preceding three zeros mean that the fault has been eliminated

The reset key **2** must be pressed in order to start up the unit again.

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17. Testing the Safety Features

The safety feature for excess temperature protection must be checked at regular intervals. The level of regularity of checking depends on the unit's designated application and the heat transfer liquid used (inflammable or non-inflammable). Practical experience has shown that between 6 to 12 times a year is sufficient.

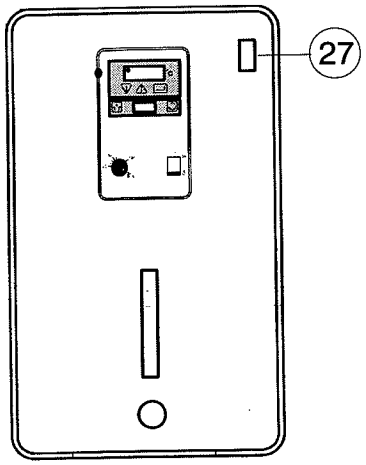
17.1 Excess temperature protection

Set a cut-off temperature (see chapter 14.1) that is lower than the desired set temperature. Switch on the circulator and check if the circulator really does switch itself off at the set cut-off temperature
If not follow the specifications detailed in chapter 14.1.1.

It may be deemed necessary to have the unit checked over by qualified service personnel.

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18. Cooling



The refrigerated bath is used mainly for enabling lower than ambient or tap water temperatures in circulators or for cooling a heated bath down to a low temperature level very quickly.

The working temperature range is shown in the technical specifications.

1 In this case switch the refrigerated bath off at the mains switch **27**.

Switching the cooling compressor on for quick cooling down purposes (even at working temperatures of 80°C) is however permissible.

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19. Maintenance

The stainless steel surfaces of the bath vessel and of the housing may after some time show spots and become tarnished. Normal stainless steel cleaners as they are used in the kitchen can be used. The bath vessel and built-in components should occasionally (at least every time the bath liquid is changed) be cleaned using a household cleaner. Vinegar-based cleaners have proved to be suitable used according to the manufacturers recommendations.

☞ **Do not use scouring powder!**

☞ **Use only distelled water as temperature fluid to avoid calsium spots. Also to make up water / glycol mixtures.**

The inside of the bath vessel must be kept clean in order to ensure a long service life. Substances containing acidic or alkaline substances and metal shavings should be removed quickly as they could harm the surfaces causing corrosion. If corrosion (e.g. small rust marks) should occur in spite of this, cleaning with stainless steel caustic agents has proved to be suitable. These substances should be applied according to the manufacturers recommendations.

19.1 Cleaning the fins of the liquefier

In order to maintain the cooling capacity of the unit, cleaning has to be done two to four times per year, depending on the grade of soiling.

! **Switch off the unit and pull out the mains plug.**

19.2 Discarding the unit:

One day the life span of your cooling unit will end.
Therefore:

! **This unit contains ozone-friendly coolant R134a. The unit may however only be discarded by authorized personnel.**

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20. Technical specifications

20.1 Technical specifications of the temperature control module HAAKE EZ COOL 80 according to DIN 58966

Operating temperature *)	°C	–10..80
Temperature accuracy	± K	0.1
Heater capacity 230V / 115V	W	1500 / 1100
Pump pressure max.	mbar	250
Max. flow rate during circulation using 12 mm ø hoses	l/min	12
Voltage	V	230 ±10% or 115 ±10%
Frequency 230V / 115V	Hz	50..60 / 60
Total wattage consumption 230V / 115V	VA	2050 / 1250
Safety elements according to category		NFL
Excess temp. protection		variable
Motor overload protection		yes
FIS-system		yes
Temperature setting		digital
Setting limitation		yes
Temperature display		LED green
RTA-system		yes
Control type		PID
Control sensor		digital IC

* The working temperature range is dependant on the cooling selected.

The product is compliant with EN 61000–3–11 requirements and underlies special connection conditions. The maximal electric impedance must not exceed (0.083+ j 0.052) Ohm.

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