HAAKE DC10

Immersion Circulator

Limited Availability
Used and in Excellent Condition

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Instruction Manual

Circulator HAAKE C10 including all Baths

Analyze • Detect • Measure • Control™

Thermo
ELECTRON CORPORATION

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Konformitätserklärung /

Nr. 075-2026b

Declaration of Conformity

Produktbezeichnung / Product name	Identifikation / Identification
C10; 425-1001 und Kombinationen	003-5009
DC10; 426-1001 und Kombinationen	003-2859
DC30; 426-3001 und Kombinationen	003-2617
DC50; 426-5001 und Kombinationen	003-2758
DC50; 426-6001 und Kombinationen	003-3054
DL30; 427-3001 und Kombinationen	003-2890

Hersteller / Manufacturer

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

CE

Richtlinie / Norm
Directive / Standard

89/336/EWG	**Richtlinie für elektromagnetische Verträglichkeit** **Electromagnetic Compatibility Directive**
EN61326:1997 + A1:1998 + A2:2001	Elektrische Betriebsmittel für Messtechnik, Leittechnik und Laboreinsatz EMV-Anforderungen Electrical equipments for measurement, control and laboratory use EMC-requirements
73/23/EWG	**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 61010-2-010:1994 + A1:1996	Besondere Anforderungen an Labor- und Elektrowärmegeräte. Particular requirements for laboratory equipment for the heating of material

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.

	12.02.2004	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

Table of Contents

Table of Contents

Table of Contents

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!

Heating display light
on = the unit is heating; *off* = the unit is not heating

Temperature fine adjustment

Fault display light
on = the unit has a fault; *off* = the unit works properly

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

2. Quality Assurance

Dear customer,
Thermo Electron (Karlsruhe) implements a **Q**uality **M**anagement **S**ystem certified according to DIN/EN/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. This is why we initiate this monitoring process of important characteristics already during manufacturing and record the results 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 Electron (Karlsruhe) GmbH

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

Thermo Electron Corporation

International / Germany

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Dieselstrasse 4
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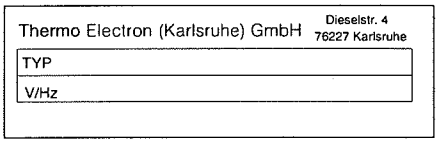


The following specifications should be given when product enquiries are made:

Unit name printed on the front of the unit and specified on the name plate.

4. Thermo Electron (Karlsruhe) 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 Electron (Karlsruhe) GmbH 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:	8 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

Constancy of temperature (Width of control range):	+/– 0,04 K
Stability of temperature (persistent):	+/– 0,02 K
Accuracy at +70°C:	+/– 0,1 K

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

We and our partners shall gladly be at your disposal for a calibration of your thermostat at your premises. Just contact us.

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 Electron (Karlsruhe) 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!**

! **Only use water or water with anti-freeze as bath liquid.**

! **The temperature controlling i.e. immersing of test tubes, Erlenmeyer flasks or similar objects directly within 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!

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 HAAKE C10 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...

- 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 display lights
- 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

Open-bath circulators:

For temperature controlling samples within the circulator's own bath.

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.

6.3 Temperature ranges

Working temperature range:

The temperature range of the circulator without additional heating or cooling sources.

Operating temperature range:

The temperature range of the circulator which can be reached if additional heating or cooling sources are used.

Tap water can be used as a cooling source. In this case the minimum working temperature possible is approx. 3°C above that of the tap water temperature.

! **High operating temperatures mean the unit surfaces heat up. Protective measures must be taken!**

6.4 Unit combinations

A complete, ready-to-use circulator always consists of a temperature control module, a bath vessel (HAAKE B3, K15, K20, W13, etc.) and a connecting element which attaches the temperature control module to or on the bath.

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

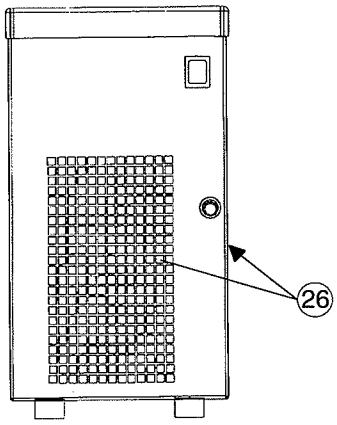
- indoors, max. 2000 meters above sea level,
- ambient temperature 5 ... 40° C,
- relative humidity max. 80%/31°C (→ 50%/40°C)
- excess voltage category II, contamination level 2

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.**

7.5 Information concerning the CE sign

The measuring and control instruments from Thermo Electron (Karlsruhe) carry the CE sign which confirms that they are compatible with the EU guideline 89/336/EEC (electromagnetic compatibility). The tests are carried out according to module H (official sheet L380 of the European Community) as our quality assurance system is certified according to DIN / ISO 9001.

It was tested according to the strict EMV test requirements of the EN61326-1/A1 (EMV requirements for electrical equipment for measuring technology, conduction technology and laboratory usage). This means it was tested for interference resistance and interference emission according to public low-voltage mains (household and commercial usage).
The following basic standards were applied in detail:

Interference resistance:

EN61000–4–2	electrostatic discharge
EN61000–4–3	electromagnetic fields
EN61000–4–4	fast transients
EN61000–4–5	surge voltages
EN61000–4–6	wire–guided HF–signals
EN61000–4–8	magnetic field of mains frequency
EN61000–4–11	voltage drop/short–time interruption

Interference emission:

CISPR16/class B	wire–guided interference emission
CISPR16/class B	radiated interference emission

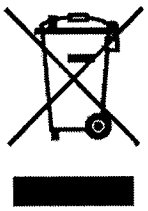
EN 61000–3–2	voltage variations and flickering
EN 61000–3–3	over-compensation voltage flows

The application in industrial and commercial (public mains) environments is thus possible.
A declaration of conformity is supplied with the ordered unit on request.

Our strict standards regarding operating quality and the 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 units which carry the CE sign such as monitors or analytical instruments can be affected if their manufacturers accept an interference (e.g. the flimmering of a monitor) as the minimum operating quality under electromagnetic compatibility conditions. For this reason we recommend you to observe a minimum distance of approx. 1 m from such units.

7.6 WEEE Compliance

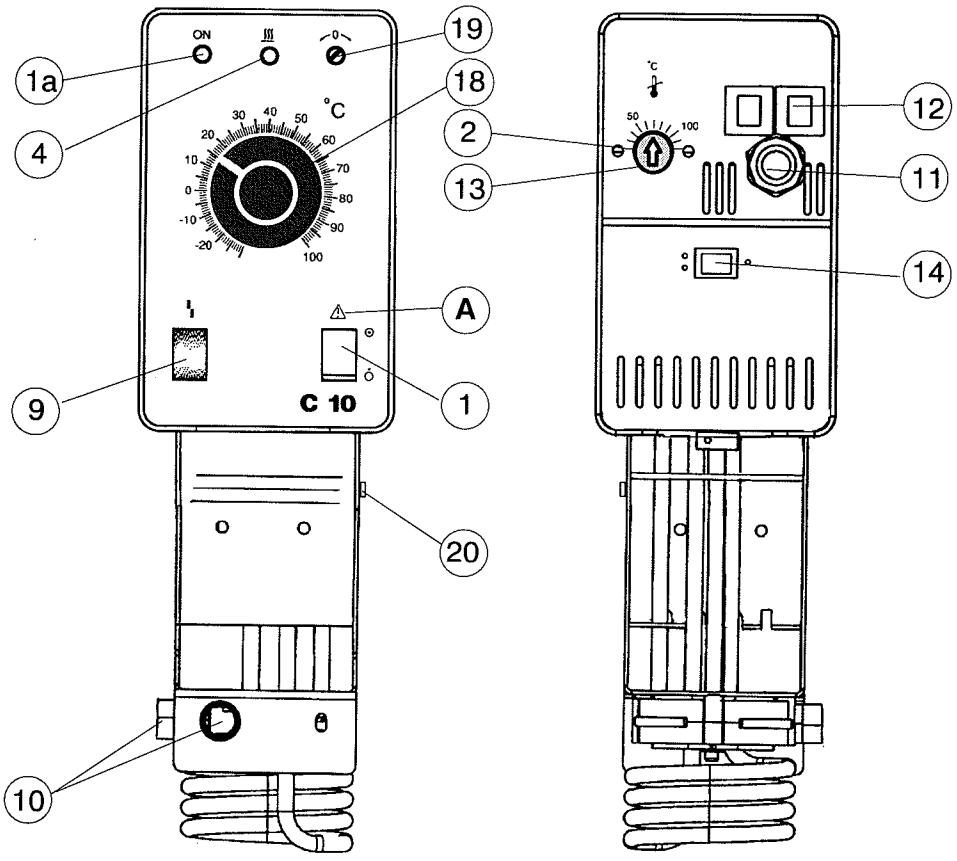
This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:



Thermo Electron 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 Electron's compliance with these Directives, the recyclers in your country, and information on Thermo Electron products which may assist the detection of substances subject to the RoHS Directive are available at www.thermo.com/WEEERoHS

8. Functional and Operating Elements

8.1 Temperature control module HAAKE C10

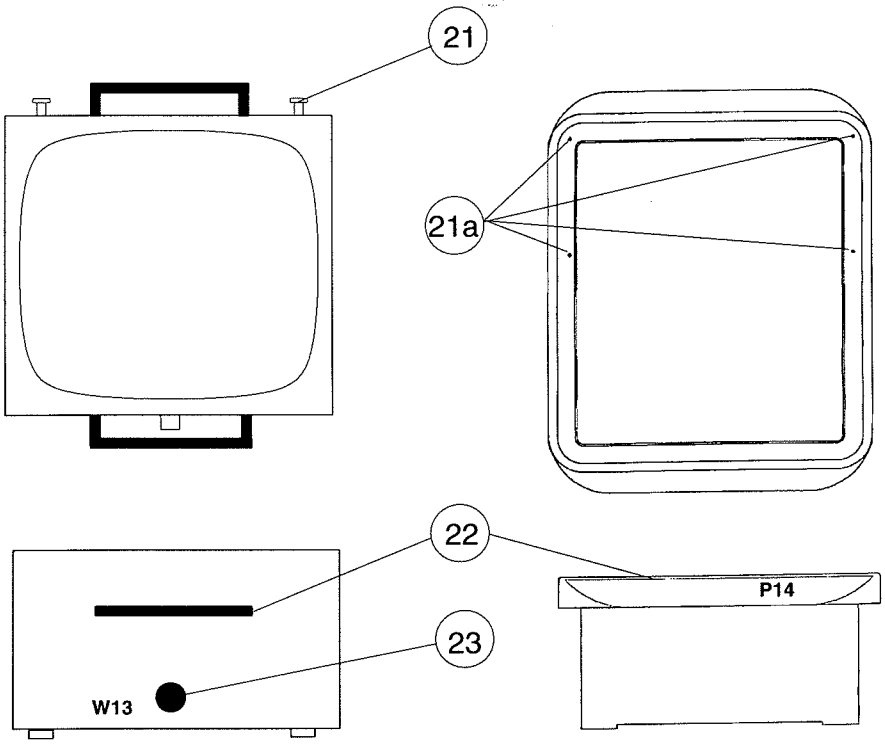


A Symbol: Read the instruction manual!

1 Mains switch
1a Mains display LED
2 Reset button (outer ring of setting button)
4 Heating control display
9 Fault display
10 Pump outlet (depending on requirements, one of the opening must be closed).
11 Mains cable
12 Fuses (if this fuse is triggered, see chap. 13.4)
13 Excess temperature setting dial
14 Speed reduction switch for TRS system
18 Temperature setting dial
19 Temperature fine-adjustment
20 Mounting screw for thermometer clamp

8.2 Bath vessel "HAAKE W" and integral bath "HAAKE P" (example model)

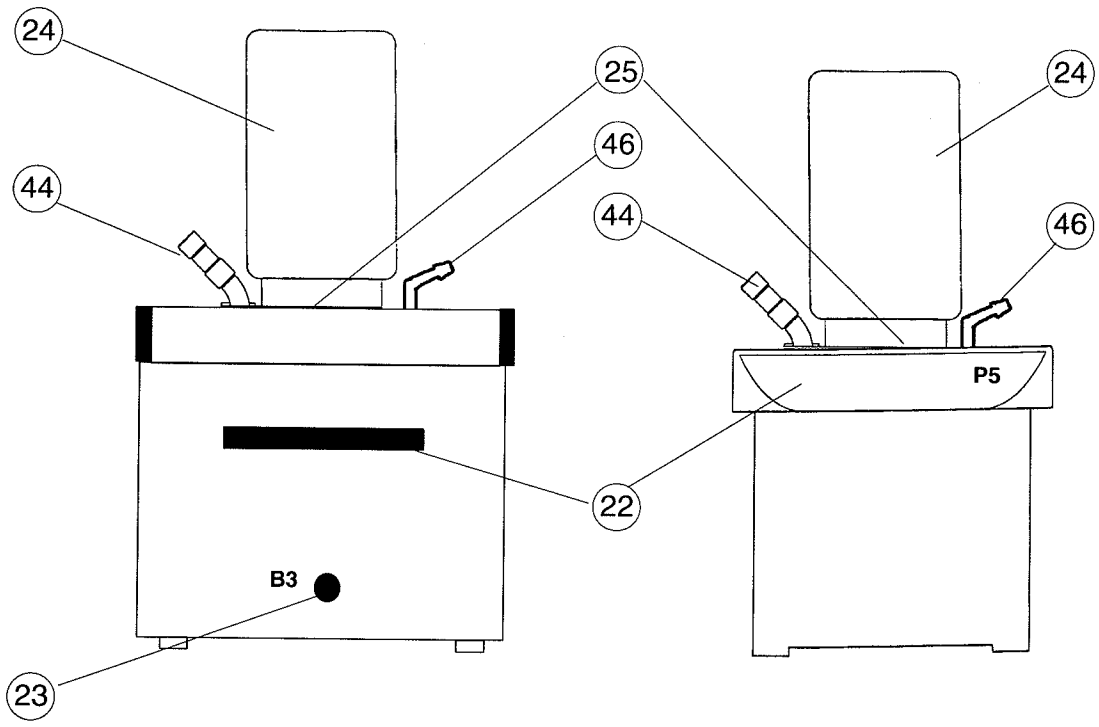
! The working temperature must be limited to +100°C.



21 Mounting screws for angled holder or bath bridge
21a Tapped holes for attaching the bath bridge
22 Handle
23 Drainage nozzle

8.3 Bath vessel "HAAKE B3" and integral bath "HAAKE P5"

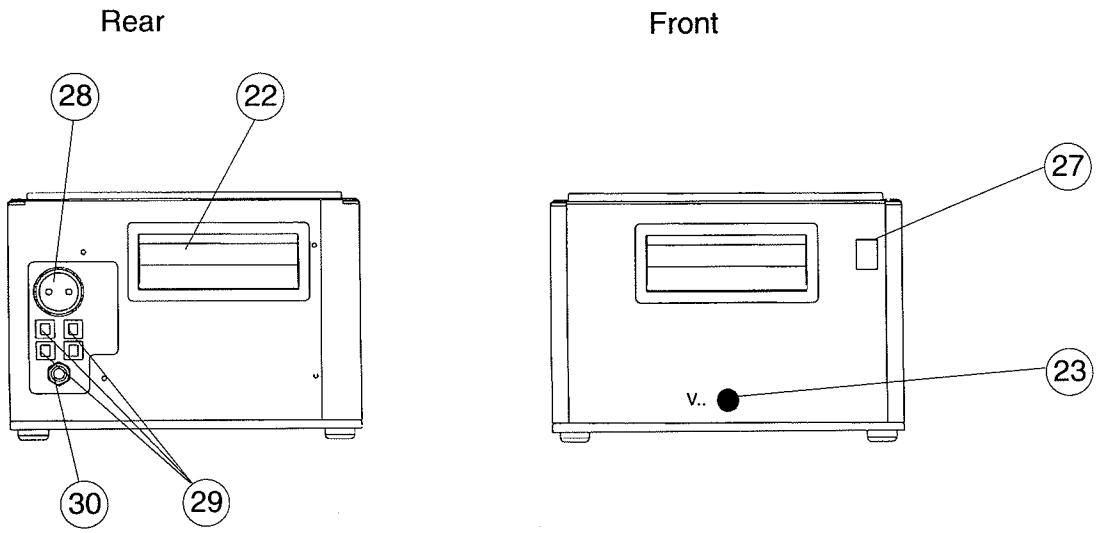
! The working temperature must be limited to +100°C.



22 Handle
23 Drainage nozzle
24 Temperature control module with intermediate plate
25 Bath opening (with plastic bath covering as a standard feature)
44 Pump connections
(front = to external object)
(rear = return from external object)
46 Connections for tap water cooling
(The flow direction can be chosen arbitrarily.)

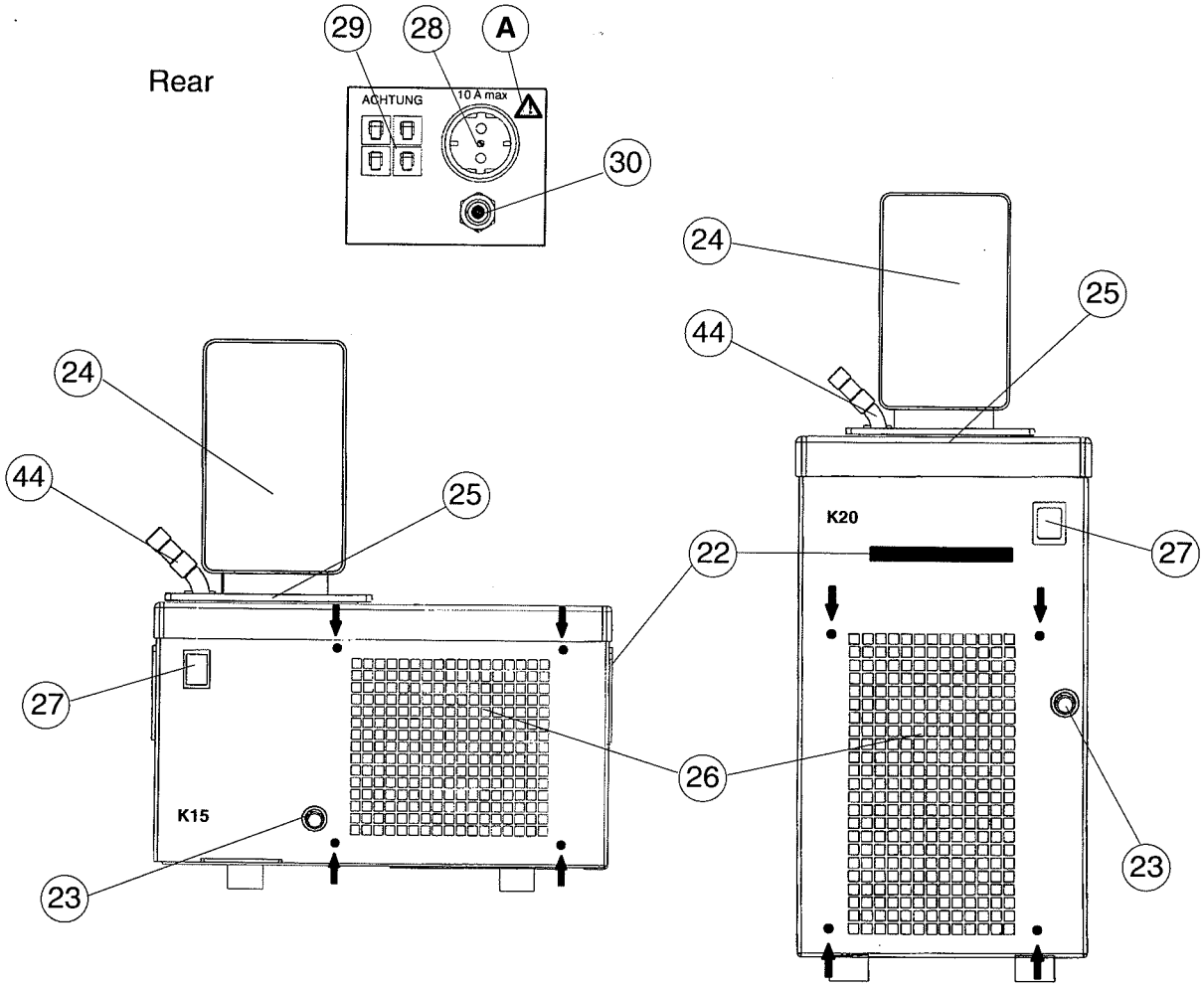
! Depending on the equipment variant, the content of delivery does not always include **44** and **46** but these items can be retro-fitted.

8.4 Bath vessel HAAKE V15 / V26



22 Handle
23 Drainage nozzle
27 Cooling unit mains switch
28 Mains socket for temperature control unit
29 Fuses (if this fuse is triggered, see chap.13.4)
30 Mains cable

8.5 Bath vessel HAAKE K15 / K10 / K20



A	Symbol: Read the instruction manual!
22	Handle
23	Drainage nozzle
24	Temperature control module with intermediate plate
25	Bath opening (with plastic bath covering as a standard feature)
26	Ventilation grid (removeable, four mounting points: ⬇)
27	Cooling unit mains switch
28	Mains socket for temperature control unit
29	Fuses (if this fuse is triggered, see chap.13.4)
30	Mains cable
44	Pump connections (front = to external object) (rear = return from external object)

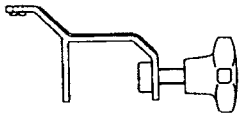
9. Assembly

The complete program is based on individual modular components which have all been separately tested to the highest standards. In order to guarantee a high degree of availability, the components are kept on stock as separate units by us, our dealers and representatives, and grouped together just prior to shipment to our customers according to their order. These units are packed individually in order to ensure safety during transport. Therefore there are a few simple assembly steps left to be carried out by the customer.

You require:

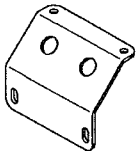
1 screwdriver – size no. 2 (for Phillips screws)

As an **immersion circulator** with bracket mounting



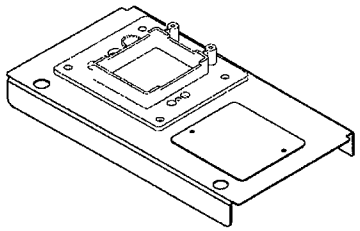
see **page 21**

As an **open-bath circulator** with angled mounting and bath vessel with **stainless steel HAAKE W13 – HAAKE W46**



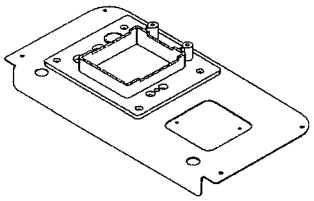
see **page 22**

As an **open-bath circulator with bath bridge H62** and bath vessel with **stainless steel HAAKE W13 – HAAKE W46** or **polyacrylic bath HAAKE W12P / W18P**



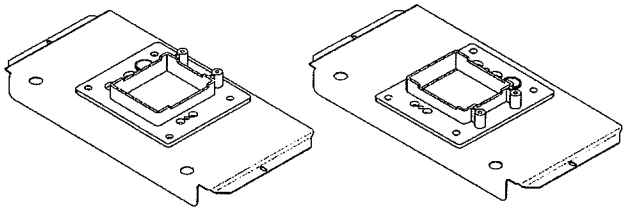
see **page 23**

As an **open-bath circulator with bath bridge H64** and **integral bats HAAKE P14 / P21**



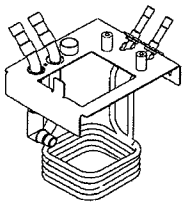
see **page 24**

As an **open-bath circulator with bath bridge H66 or H67** and **bath vessel HAAKE V15 / V26**



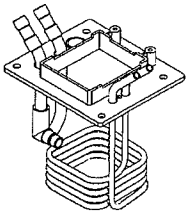
see **page 25**

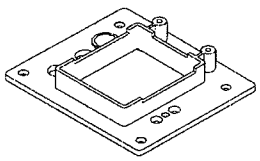
As a combined **open-bath and heating circulator with bath bridge H63** and **polyacrylic bath HAAKE W5P**



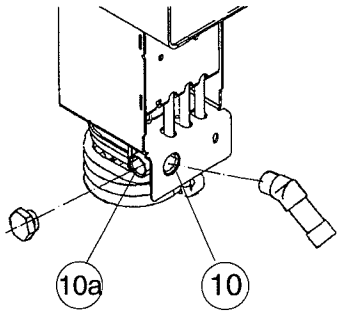
see **page 29**

As a combined **open-bath and heating circulator with bath bridge** and **Integral bath HAAKE P5/U**





see **page 29/30**



9.1 Immersion circulators with bracket mounting

1 Screw angled nozzle onto pump outlet **10** and hexagon plug screw onto pump outlet **10a** on the side.

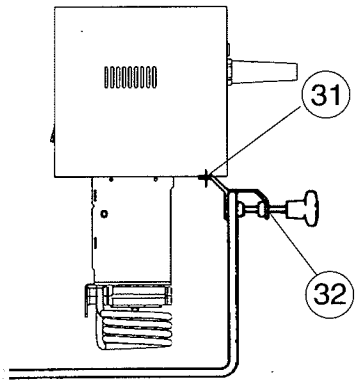
Attach bracket mounting for bath vessel **32**:

2 Stand the temperature control module upside-down,

! **Dry unit first if necessary, in order to avoid exposing the electronics to water penetration.**

3 Unscrew pair of screws **31** and remove spacers

4 Attach bracket mounting using these screws.

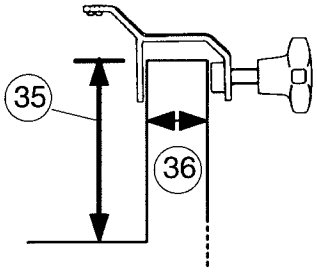


All containers which fulfill the following conditions can be used as the bath vessel:

- perpendicular walls,
- corrosion-resistant,
- minimum bath depth 150 mm (**35**),
- wall thickness max. 26 mm (**36**).

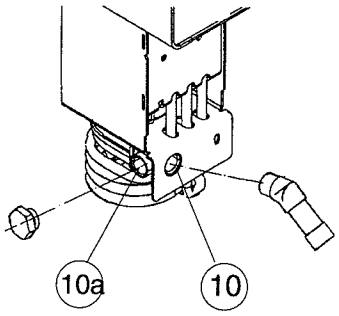
! **Polyacrylic and other plastic vessels are instable at higher temperatures, therefore:**

- **Only use under supervision!**
- **Set the excess temperature protection accordingly**
  (***below*** 65°C for polyacrylic baths)!
- The usage of a bath bridge is highly recommended in order to avoid a one-point load on the bath vessel!



☞ ***Further on page 34*** *"Filling".*

An explanation on how to mount an optional ***cooling coil*** *can be found* ***on page 27.***
Afterwards further ***on page 31.***



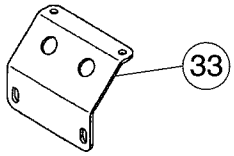
9.2 Open-bath circulators with angled mountings

1 Screw angled nozzle onto pump outlet **10** and hexagon plug screw onto pump outlet **10a** on the side.

Attach angled mounting for bath vessel **33**:

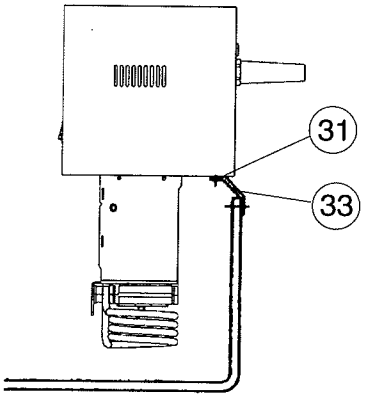
2 Stand the temperature control module upside-down,

! **Dry unit first if necessary, in order to avoid exposing the electronics to water penetration.**



3 Unscrew pair of screws **31** and remove spacers,

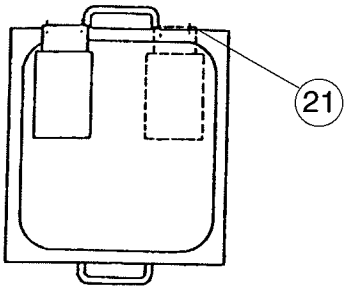
4 Attach bracket mounting using these screws.

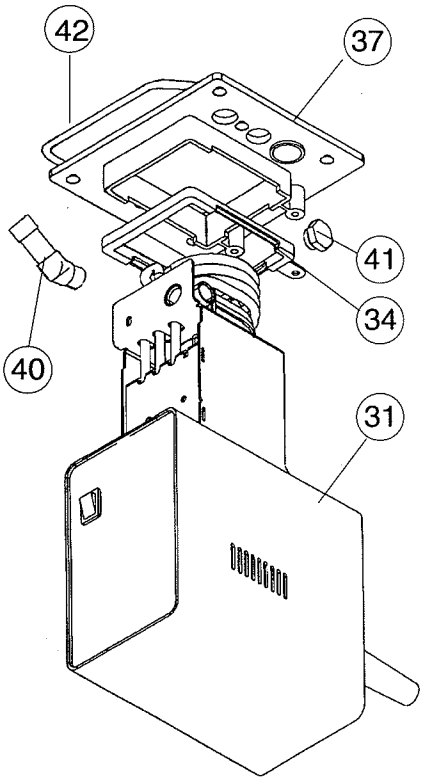


5 Attach the temperature control module to the rear side of the bath using the thumbwheel screws **21.**

☞ ***Further on page 34*** *"Filling".*

An explanation on how to mount an optional ***cooling coil*** *can be found* ***on page 27.*** *Afterwards further* ***on page 31.***





9.3 Open-bath circulators with bath bridge and stainless steel or polyacrylic baths

Preparation:

1 Stand the temperature control module upside-down,

! **Dry unit first if necessary, in order to avoid exposing the electronics to water penetration.**

2 Unscrew and remove pair of screws **31** and hexagon plug screw **41** (pump outlet on the side),

Mounting the plate:

3 Place the seal **34** onto plate **37** and slide the plate over the shaft.

4 Insert the screws **31** through the plate **37** and screw tight.

5 Screw angled nozzle **40** onto pump outlet and hexagon plug screw **41** onto pump outlet on the side.

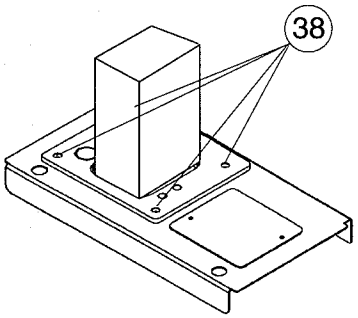
Mounting the bridge onto the bath vessel:

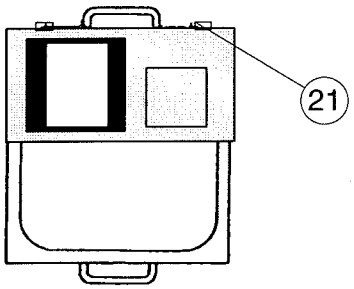
6 Place the seal **42** under the plate **37**.

7 Locate the plate with the attached temperature control module on top of the bath vessel and secure using the four sunken screws **38**.

8 Attach the bridge to the bath vessel with the thumbwheel screws **21** (bridge overlaps; only tighten screws lightly).

9 Fit the supplied conical bung in the thermometer hole in the bridge.

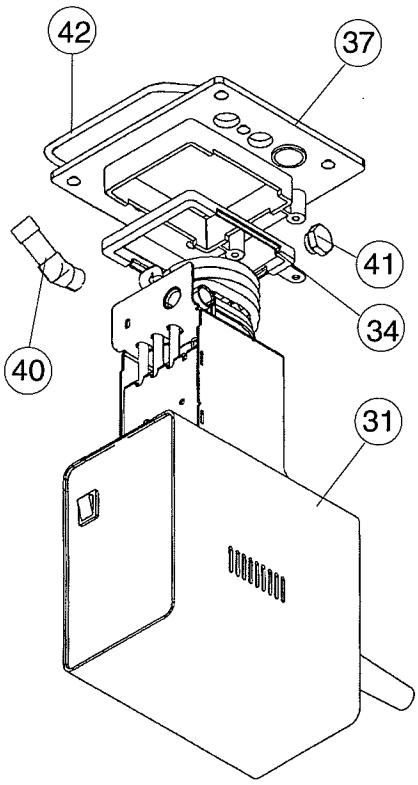


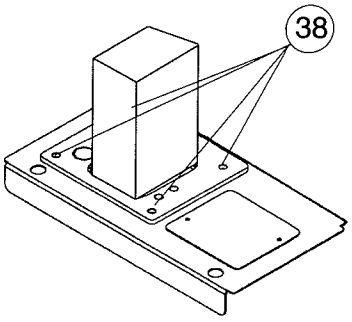


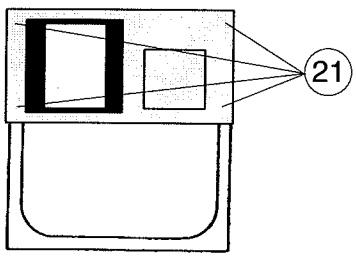
☞ ***Further on page 34** "Filling".*

*An explanation on how to mount an optional **cooling coil** can be found **on page 27.** Afterwards further **on page 31.***

*An explanation on how to mount an optional **lifting platform** can be found **on page 28.***







9.4 Open-bath cirulators with bath bridge H64 and bath vessel HAAKE P14 and HAAKE P21

Preparation:

1 Stand the temperature control module upside-down,

! **Dry unit first if necessary, in order to avoid exposing the electronics to water penetration.**

2 Unscrew and remove pair of screws **31** and hexagon plug screw **41** (pump outlet on the side),

Mounting the plate:

3 Place the seal **34** onto plate **37** and slide the plate over the shaft.

4 Insert the screws **31** through the plate **37** and screw tight.

5 Screw angled nozzle **40** onto pump outlet and hexagon plug screw **41** onto pump outlet on the side.

Mounting the bridge onto the bath vessel:

6 Place the seal **42** under the plate **37**.

7 Locate the plate with the attached temperature control module on top of the bath vessel and secure using the four sunken screws **38**.

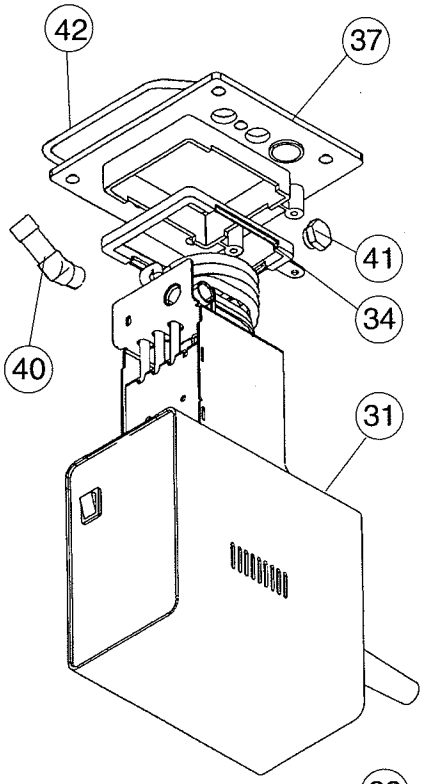
8 Attach the bridge to the bath vessel with the four sunken screws **21.**

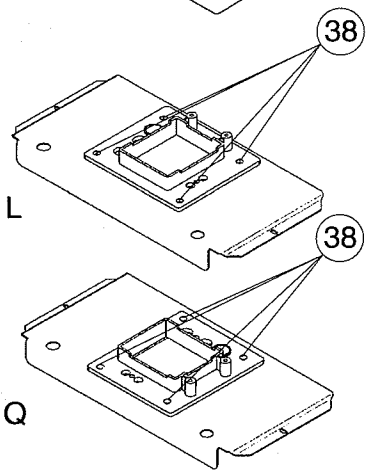
9 Fit the supplied conical bung in the thermometer hole in the bridge.

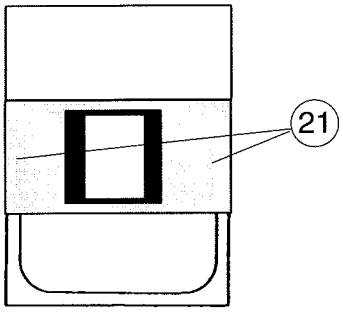
☞ ***Further on page 34*** *"Filling".*

An explanation on how to mount an optional ***cooling coil*** *can be found* ***on page 27.*** *Afterwards further* ***on page 31.***

An explanation on how to mount an optional ***lifting platform*** *can be found* ***on page 28.***







9.5 Open-bath cirulators with bath bridge and bath vessel HAAKE V15 and HAAKE V26

Preparation:

1 Stand the temperature control module upside-down,

! **Dry unit first if necessary, in order to avoid exposing the electronics to water penetration.**

2 Unscrew and remove pair of screws **31** and hexagon plug screw **41** (pump outlet on the side),

Mounting the plate:

3 Place the seal **34** onto plate **37** and slide the plate over the shaft.

4 Insert the screws **31** through the plate **37** and screw tight.

5 Screw angled nozzle **40** onto pump outlet and hexagon plug screw **41** onto pump outlet on the side.

Mounting the bridge onto the bath vessel:

6 Place the seal **42** under the plate **37**.

7 Locate the plate with the attached temperature control module on the bath bridge L (standard version) or Q (special version) and secure using the four sunken screws **38**.

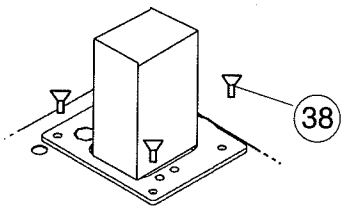
8 Attach the bridge to the bath vessel with the thumbwheel screws **21**.

9 Fit the supplied conical bung in the thermometer hole in the bridge.

☞ ***Further on page 34*** *"Filling".*

An explanation on how to mount an optional ***cooling coil*** *can be found* ***on page 27.*** *Afterwards further* ***on page 31.***

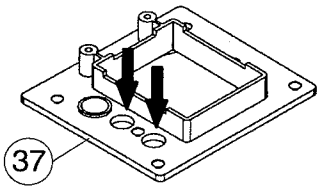
An explanation on how to mount an optional ***lifting platform*** *can be found* ***on page 28.***



9.6 Subsequently fitting a circulation set

1 Remove the temperature control module with plate from the bath bridge (unscrew the four sunken screws **38**).

2 Stand the temperature control module upside-down,



! Dry unit first if necessary, in order to avoid exposing the electronics to water penetration.

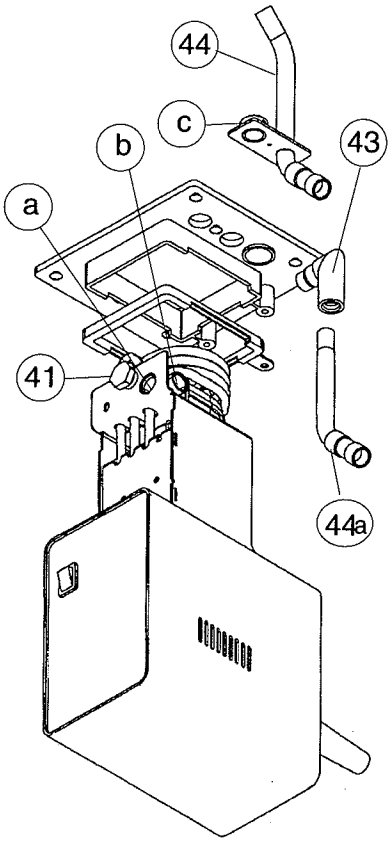
3 Unscrew angled nozzle **40** from pump outlet and hexagon plug screw **41** from pump outlet on the side,

4 Remove the covering plate from the marked openings (↓↓).

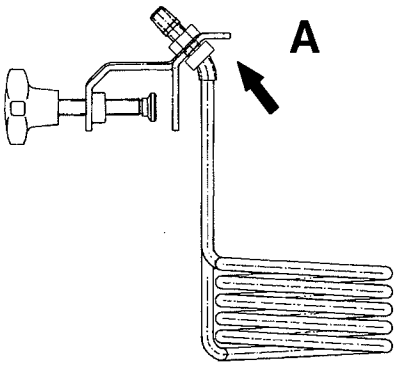
5 Insert hexagon plug screw **41** into **a** and nozzle **43** into pump outlet **b** on the side.

6 From below insert circulation set **44** into the plate (↓↓) and fix with sunken screw.

7 Insert tube **44a** through plate and circulation set into nozzle **43** and fix it with setscrew **c** (the required allen key is supplied).



Mount the temperature control module with plate to the bath bridge.

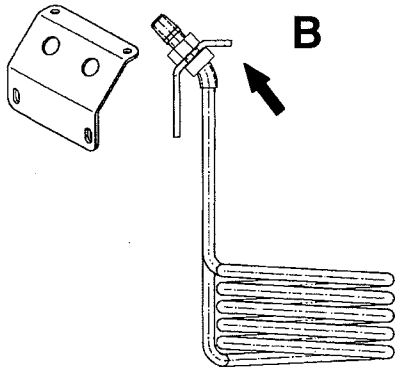


9.7 Subsequently fitting a cooling coil

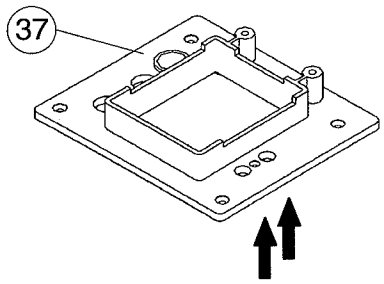
Open-bath circulators with bracket mounting **A** or angled mounting **B**

1. Remove the hexagon nuts from the cooling coil.
2. Insert cooling coil from below through the bracket or angled mounting as illustrated.

   The cooling coil now surrounds the shaft of the temperature control module.



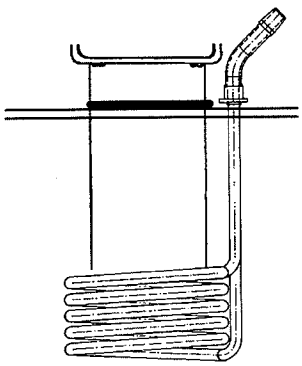
3. Adjust the cooling coil (it should be equally spaced away from the shaft on all sides) and screw tight using hexagon nuts.
4. Attach the cooling coil with the bracket or angled mounting to the unit according to the instructions on pages 21 and 22.



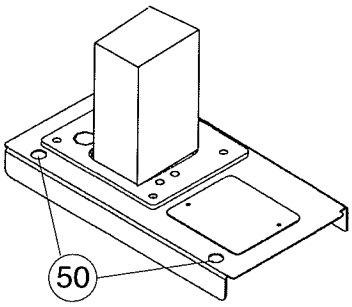
Open-bath circulators with a plate on a bath bridge:

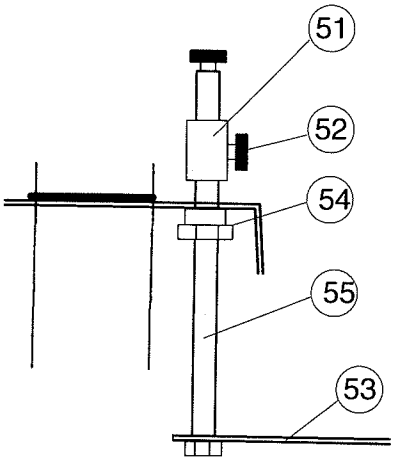
1. Remove the covering plate from the marked openings (↓↓).
2. Insert cooling coil from below into the plate **37** as illustrated.

   The cooling coil now surrounds the shaft of the temperature control module.



3. Adjust the cooling coil (it should be equally spaced away from the shaft on all sides) and screw tight using using the screw which previously held the covering plate



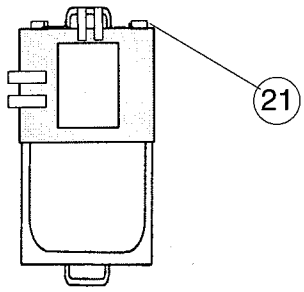


9.8 Fitting a lifting platform to the bridge

For fitting a lifting platform it is not necessary to remove the bath bridge with the fixed temperature control module.

1. Remove the closure pieces **50**.
2. Unscrew nuts **54** from sleeves **51**,
3. Insert sleeves **51** from above into the bath bridge and fix with nut **54** from below using a wrench,
4. Locate lifting platform **53** in the bath vessel.
5. From above insert handles **55** through the sleeves. Screw the handles to the nuts of the lifting platform.

The height adjustment of the lifting platform is carried out via the thumbwheel screws **52**.



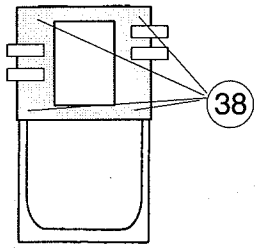
9.9 Open-bath and heating circulators with bath bridge and polyacrylic HAAKE bath W5P

! The highest working temperature must be limited to +60°C.

Mounting the bridge onto the bath vessel:

6 Attach the bridge to the bath vessel with the thumb-wheel screws **21** (bridge overlaps; only tighten screws lightly).

7 Fit the supplied conical bungs in the thermometer holes in the bridge.



9.10 Open-bath and heating circulators with bath bridge and integral bath HAAKE P5/U

! The highest working temperature must be limited to +120°C.

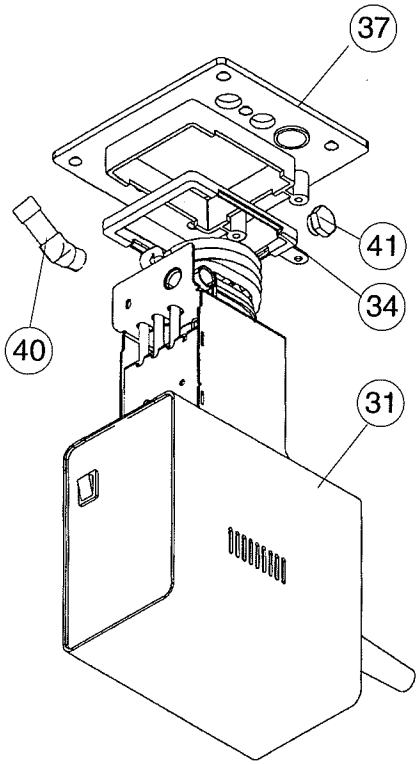
Mounting the bridge onto the bath vessel:

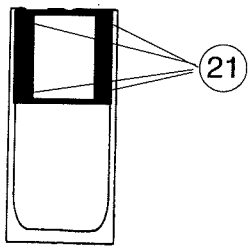
1 Locate the plate with the attached temperature control module on top of the bath vessel and secure it using the four sunken screws **38**.

2 Fit the supplied conical bung in the thermometer hole in the bridge.

☞ ***Further on page 34*** *"Filling".*

Further on page 31 *"Connecting Hoses".*





9.11 Open-bath circulators with bath bridge and integral bath HAAKE P5

! The highest working temperature must be limited to +120°C.

Preparation:

1 Stand the temperature control module upside-down,

! Dry unit first if necessary, in order to avoid exposing the electronics to water penetration.

2 Unscrew and remove pair of screws **31** and hexagon plug screw **41** (pump outlet on the side),

Mounting the plate:

3 Place the seal **34** onto plate **37** and slide the plate over the shaft.

4 Insert the screws **31** through the plate **37** and screw tight.

5 Screw angled nozzle **40** onto pump outlet and hexagon plug screw **41** onto pump outlet on the side.

Mounting the bridge onto the bath vessel:

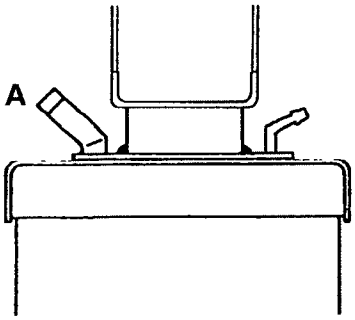
6 Locate the plate **37** with the attached temperature control module on top of the bath vessel, .and secure using the four sunken screws **21**.

7 Fit the supplied conical bung in the thermometer hole in the bridge.

☞ ***Further on page 34*** *"Filling".*

An explanation on how to mount an optional ***cooling coil*** *can be found* ***on page 27.*** *Afterwards further* ***on page 31.***

An explanation on how to mount an optional ***lifting platform*** *can be found* ***on page 28.***



10. Connecting Hoses

Pump nozzle **A**:

front: outlet to external object (pressure side)
rear: return flow from external object

Hoses are normally used to connect the pump with an external vessel. If objects are to be temperature controlled in the internal bath only, connect the pump nozzles **A** with a short hose with a min. length of 50 cm in order to achieve a better temperature constancy.

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!**

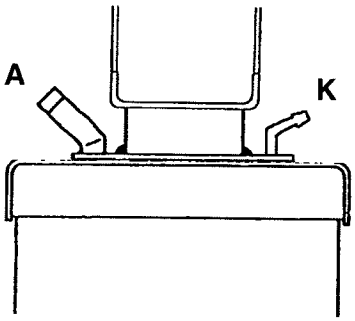
! **The required hose material is dependent on the heat transfer liquid used.**

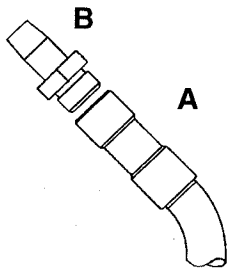
! **Hoses must not be folded or bent!**
A wide radius should be used if turns have to be made!

! **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!**

Connecting Hoses





10.1 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 Haake.

Hoses with 12 mm internal diameter can be pushed directly onto the nozzle **A**. For 8 mm hoses the content of delivery includes 2 hose adapters **B** with R 1/4 screw thread which must be screwed into nozzle **A**.

10.2 Tap water cooling

Only for units without own refrigeration unit!

10.2.1 Connection to cooling (tap) water

Using the cooling coil a lowest operating temperature approx. 3°C above the given cooling water temperature can be achieved.

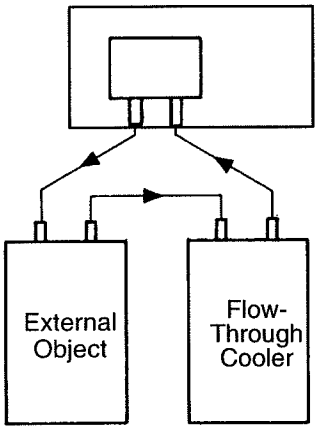
1 Use hoses with 8 mm internal ∅ and connect to the cooling coil **K.** The direction of the flow can be freely selected. It must be taken care that at the outlet side, the water can run out unhindered.

Pressure fluctuations of the public water net may hamper the temperature constancy. For proper results the water pressure should be stable or measures should be taken to keep it stable.
The min. pressure should not be below 1 bar.

2 The amount of flow should be set to a min. value. At first the full flow should be used so that the unit can reach its operating temperature. Then, the amount of flow should be reduced using the water cock or a hose clamp. The actual temperature will rise above the set temperature if the water flow is insufficient. If so increase the water flow.

10.3 External Cooling Devices

Heating / Open-bath circulator



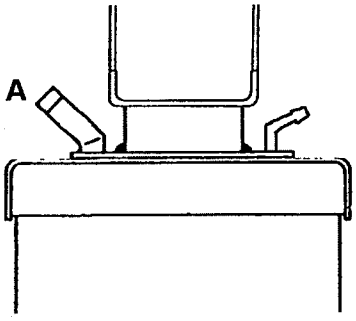
With immersion and flow-through coolers from Thermo Electron (Karlsruhe), the heat transfer liquid can be cooled down considerably below 0°C and the circulator can be rendered independent of tap water.

A flow-through cooler should be used for the circulator and bath HAAKE B3. The flow-through cooler is hooked up into the return flow line of the external vessel and from there to the circulator (see Fig.).

Immersion coolers have proven themselves especially suitable for open-bath circulators with angled brackets or the bath bridge H62.
The fitting opening is already provided in the bath bridge H62.

The assembly and application are described in the instruction manual of the cooler in detail.

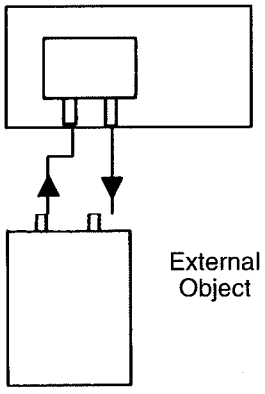
10.4 Pressure pump



10.4.1 Temperature controlling an object in the internal bath

Connect pressure and return nozzle **A** with a short hose.

Heating / Open-bath circulator



10.4.2 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 front) to the external object and then back to the return port (at the rear).

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.

11. Filling with Bath Liquid

11.1 Recommended bath liquids

5 to 95°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!**

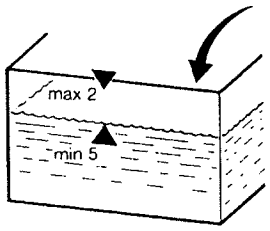
- Water, of course, can be employed up to 95°C, however above 80°C water vaporization reaches a level which necessitates the liquid to be constantly replenished.

–30 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 Electron (Karlsruhe) takes no responsibility for damages caused by the selection of an unsuitable bath liquid.**



11.2 Filling with heat transfer liquid

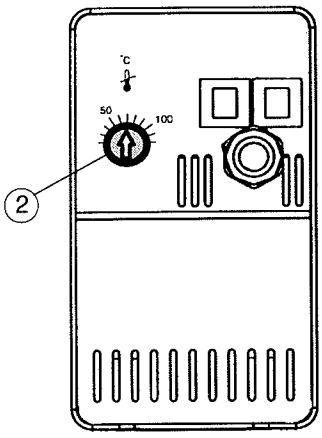
Filling level of the interior bath:
max. up to 2.0 cm below the cover plate,
min. up to 5.0 cm below the cover plate.

When working with water or water with antifreeze:
the filling level should be 2 cm below the deck plate.

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.

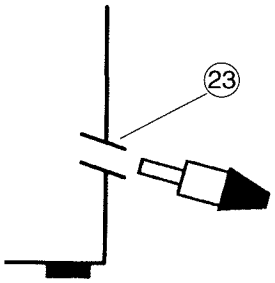
☞ The bath level should be checked when the preset temperature has been reached!

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:
   Press in the outer ring **2** (at the rear).
   ⇒ The unit starts up again
3. Repeat this action if necessary.



12. Draining

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

1 Place a suitable vessel underneath nozzle.

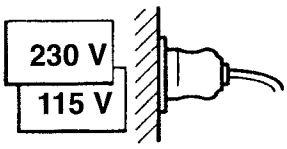
☞ Bear in mind that the liquid will run out in a slight arc.

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.

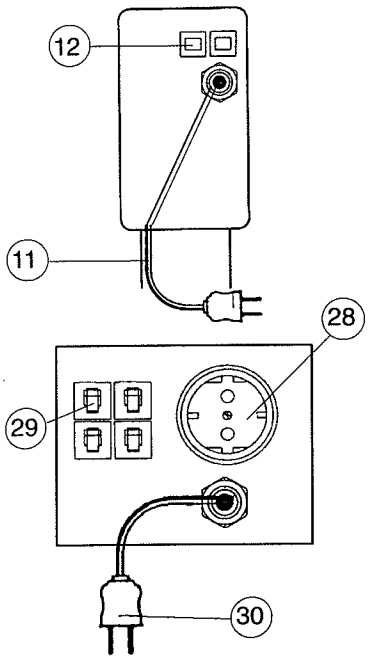
! Hot heat transfer liquid should not be drained! When certain conditions make draining necessary, please act safety conscious: Wear protective clothing and protective gloves!



13. Connecting Up

13.1 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.

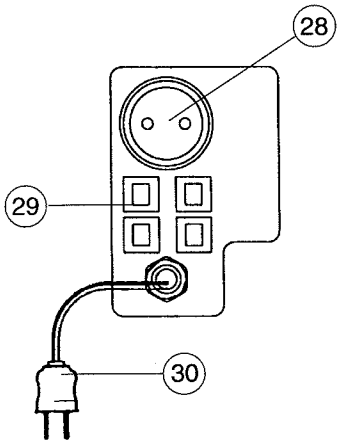


13.1.1 Only for refrigerated baths HAAKE K15, K10, K20, V15 and V26

1 Insert the mains plug **11** of the temperature control module into the socket **28** at the rear of the refrigerated bath.

2 Connect the refrigerated bath's mains plug **30** to a grounded mains socket.

! Socket 28 is live as soon as this connection has been made whether the refrigerated bath has been switched on at the mains switch or not!



13.2 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 10.4).

13.3 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**

13.4 Fuses on the unit

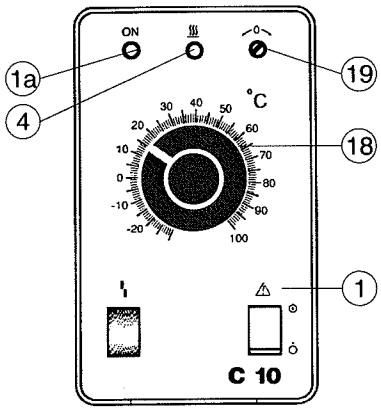
All units are equipped with automatic thermally-triggered fuses.

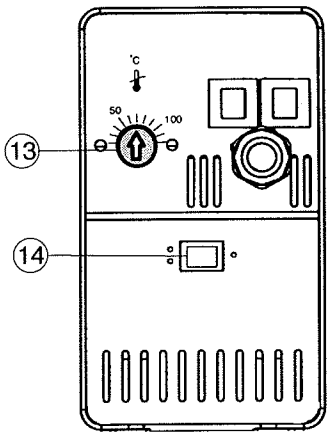
If the fuse **(12/29)** has triggered...

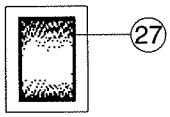
- the fuse does not have to be exchanged – resetting suffices;
- a white marking is visible;
- a certain cooling down time should be allowed (approx. 5 min) before the (dip) switch can be pressed again.

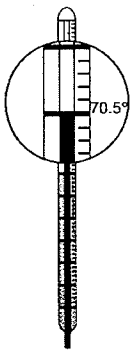
! Do not use tools; do not use force. Both destroy the fuse.

! 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.









14. Operating

14.1 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:

⇒ Mains display light **1a** shows green.

⇒ Pump motor starts up – the heat transfer liquid starts to circulate.

⇒ The rotation speed of the pump motor can be changed with the switch **14**.

°° full speed / ° reduced speed

A separate cooling device (if available) is switched on via it's own mains switch **27**. The compressor starts with a slight jerk. Only activate cooling device if cooling is actually required.

14.2 Setting the desired temperature

1 The set temperature is adjusted using the dial **18**. (in divisions of 1°C).

Temperature fine-adjustment is carried out using the potentiometer **19** (a small screwdriver is required for this). Fine-adjustment can be controlled via a checking thermometer. Please note that the circulator requires some time to react to alterations.

14.3 Heating control lamp

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

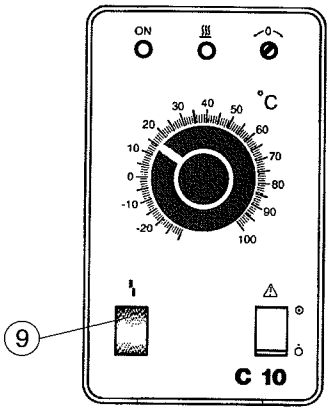
⇒ display **4** lights up constantly during the heating up phase,

⇒ 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 current temperature).

14.4 Displaying the actual temperature

The thermometer supplied as a standard feature is graduated in segments of 0.5°C. Thermometers with smaller gradations are available on special request.
Please note: This thermometer is neither calibrated nor gauged.



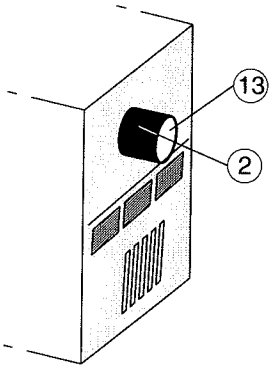
15. Excess Temperature Protection

If one of the safety devices is triggered:

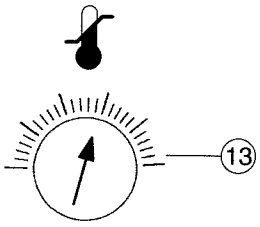
- The fault display light **9** lights up
- all voltage conducting unit components (the heating element and pump motor) are switched off immediately i.e. the safety circuit transfers the unit to a stable, safe condition.

☞ **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** (outer ring of the setting dial **13** at the rear).



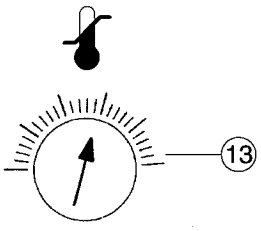
15.1 Excess temperature protection dial



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.**



15.1.1 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:

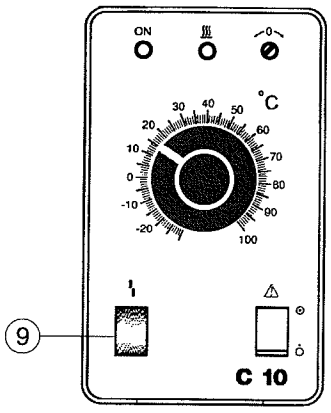
If for instance the unit should cut off after reaching 35°C at the latest:

1. Set the set temperature to 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 (malfunction light **16** is on).
3. Then set the set temperature to the actual temperature (< 35°C).
4. Reset the unit via the reset key **2** after the heat transfer liquid has cooled down somewhat.

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

15.1.2 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 thermometer. The value indicated when the alarm goes off is the real cut-off temperature.



16. Fault Displays

16.1 Excess temperature or low liquid level

Fault display light **9** is illuminated; heating element and pump are completely switched off.

The excess temperature protection can be triggered if:

- there is not enough liquid in the bath

  ⇒ check for leaks, top up if necessary,

  ⇒ fluid has evaporated, top up if necessary.

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

  ⇒ increase value slightly according to specifications made in chapter 15.1.1.

- the control function is defective

  ⇒ Return unit for servicing.

16.2 Motor or pump overloading

The motor or pump is blocked:

⇒ **The motor switches itself off. The motor switches itself back on again automatically a few minuted later after the temperature has dropped again.**

⇒ Check the pump for leaks.
Return the unit for servicing if necessary!

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 15.1) 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 15.1.1.

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

18. Cooling

Only for unit combinations with refrigerated bath

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 100°C) is however permissible.

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.

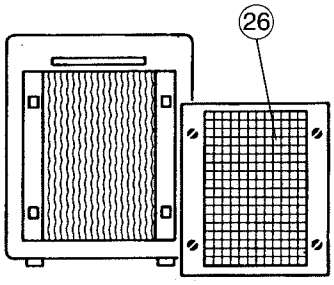
☞ **Do not use scouring powder!**

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.

☞ **For cleaning the integral baths HAAKE P5, P14 and P21 you must not use any substances which contain solvents!**

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.**

Only for HAAKE V15 and HAAKE V26 bath:

1 Clean the fins with compressed air.
For extreme soiling remove the cooling compressor casing (only specialist personnel).

Only for HAAKE K15 and HAAKE K20:

1 Loosen ventilation grid **26**: Rotate the mounting screws 90° in any direction and remove grid.

2 Clean fins with brush or similar tool.

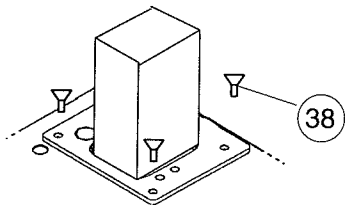
3 Replace grid and push screws back in (do not rotate screws).

19.2 Discarding the unit:

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

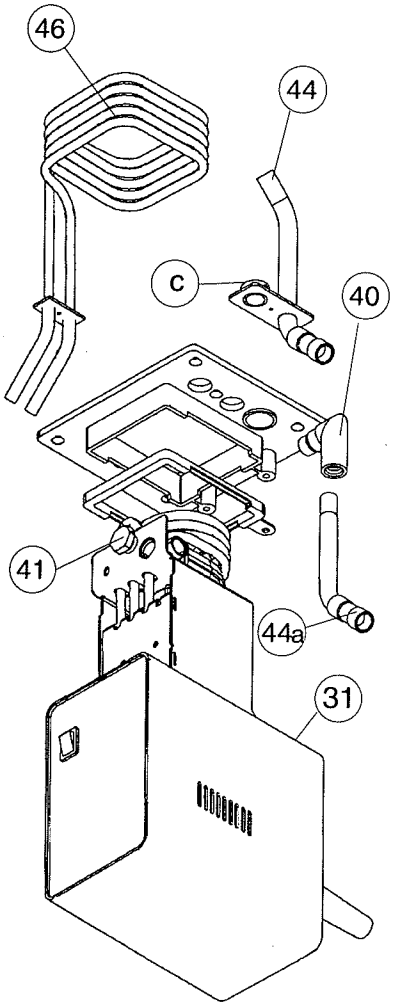
! **This unit contains ozone-friendly coolant R134a. The unit may however only be discarded by authorized personnel.**

20. Disassembly for Servicing



1 Remove the temperature control module from the bath bridge/cooling bath (unscrew the four sunken screws **38**).

2 Stand the temperature control module upside-down,



! Dry unit first if necessary, in order to avoid exposing the electronics to water penetration.

Circulation set

3 Loosen the setscrew **c** of the circulation set **44**,

4 Remove the tube **44a**,

5 Loosen the screw of the circulation set **44** and remove the set upwards.

6 Unscrew and remove hexagon plug screw **41** and nozzle **40**.

7 Unscrew and remove pair of screws **31**,

8 Take off plate with seal and cooling coil upwards.

Cooling coil

9 Unscrew and remove the screw of the cooling coil **46**.

10 Take off the cooling coil upwards.

21. Technical specifications

21.1 Technical specifications of the temperature control module HAAKE C10 according to DIN 12876

Operating temperature *)	°C	–30..100
Temperature accuracy	+/– K	0.04
Heater capacity 230V / 115V	W	1500 / 1000
Pump pressure max.	mbar	300
Circulation capacity (open)	l/min	17
Max. flow rate during circulation using 12 mm ø hoses	l/min	12.5
Immersion depth from..to	mm	85..140
Voltage	V	230 ±10% or 115 ±10%
Frequency 230V / 115V	Hz	50..60 / 60
Total wattage consumption 230V / 115V	VA	1550 / 1050
Safety elements according to category		NFL
Excess temp. protection		variable
Motor overload protection		yes
Alarm signalling		optical
Temperature setting		analog
Temperature display		thermometer
Control type		ON / OFF
Control sensor		analog IC

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

21.2 Fuse values

Mains voltage	Fuse(s) at the rear panel
230 V	2x8 A
115 V	1x10A
100 V	1x10 A

Subject to alterations

Printed in Germany (FRG)

Part no. 003-3043
1.1.060.2–08.2005

21.3 Technical specifications of the HAAKE refrigerated baths

		K10	K15	K20	V15	V26
Voltage	V	230 ± 10 % 115 ± 10 %	230 ± 10 % or 115 ± 10 % or 100 ± 10 %			
Frequency	Hz	50 (230 V) 60 (230 V) 60 (115 V)	50 (230 V) 60 (230 V) 60 (115 V) 50–60 (100 V)		50 (230 V) 60 (230 V) 60 (115 V) 50–60 (100 V)	
Total wattage consumption	VA	2300 (230 V) 1600 (115 V)	2600 (230 V) 1600 (115 V) 1600 (110 V)		2550 (230 V) 1500 (115 V) 1500 (110 V)	
Additional connections		Mains socket for temperature control module N_{max} = 2100 VA(230 V) N_{max} = 1300 VA(115 V) N_{max} = 1300 VA(100 V)				

21.4 Fuse values

Unit type	Mains voltage	Fuse(s) at the rear panel
K10	230 V	2x10 A/2x5 A
	115 V	1x12 A/1x6 A
K15	230 V	2x10 A/2x5 A
	115 V	1x12 A/1x6 A
	100 V	1x12 A/1x6 A
K20	230 V	2x10 A/2x5 A
	115 V	1x12 A/1x6 A
	100 V	1x12 A/1x6 A
V15	230 V	2x10 A/2x5 A
	115 V	1x12 A/1x6 A
	100 V	1x12 A/1x6 A
V26	230 V	2x10 A/2x5 A
	115 V	1x12 A/1x6 A
	100 V	1x12 A/1x6 A

21.5 Dimensions, material and the permissible temperature ranges of the HAAKE baths

Bath	Material	Tempera-ture (°C)	Bath opening (mm) w. holder	w. bridge	Bath depth (mm)	Volume (l) from..to	Dimensions (WxDxH) [1] (mm)
W5P	P	0..60	–	120 x 240	150	4..6	170 x 400 x 340
W12P	P	0..60	–	300 x 165	150	9..12	310 x 335 x 340
W18P	P	0..60	–	300 x 340	150	15..19	310 x 510 x 340
W13	S	..200	300 x 325	300 x 175	150	7..12	335 x 360 x 350
W15	S	..200	300 x 325	300 x 175	200	10..15	335 x 360 x 400
W19	S	..200	300 x 500	300 x 350	150	12..19	335 x 535 x 350
W26	S	..200	300 x 500	300 x 350	200	20..26	335 x 535 x 400
W45	S	..200	–	300 x 500	300	37..42	360 x 540 x 510
W46	S	..200	–	300 x 700	200	26..44	360 x 910 x 410
P5	I	0..100	–	130 x 175	160	5	160 x 330 x 360
P14	I	0..100	–	300 x 190	160	14	330 x 380 x 360
P21	I	0..100	–	300 x 380	160	21	330 x 570 x 360
B3	S	..200	–	130 x 100	150	3	200 x 300 x 375
B5	S	..250	–	140 x 150	150	4.5	210 x 360 x 380
B7	S	..300	–	130 x 100	200	7	230 x 360 x 440
B12	S	..300	–	220 x 140	200	12	320 x 380 x 440
V15	S	–5..150	300 x 325	300 x 175	200	10..15	340 x 540 x 400
V26	S	–10..150	300 x 500	300 x 350	200	20..16	360 x 750 x 400
K10	S	–10..150	–	130 x 100	150	3	195 x 355 x 570
K15	S	–28..150	–	130 x 100	150	4.5	385 x 465 x 415
K20	S	–28..150	–	130 x 100	150	4.5	230 x 460 x 590

P = Polyacryl, S = Stainless steel

I = Integral bath vessel made of PPO (modified)

[1] Approx. height including temperature control module

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