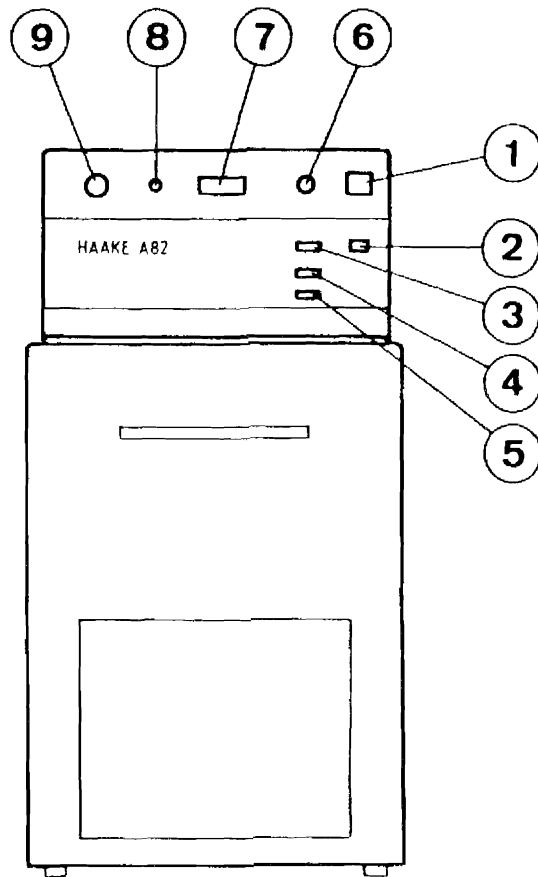


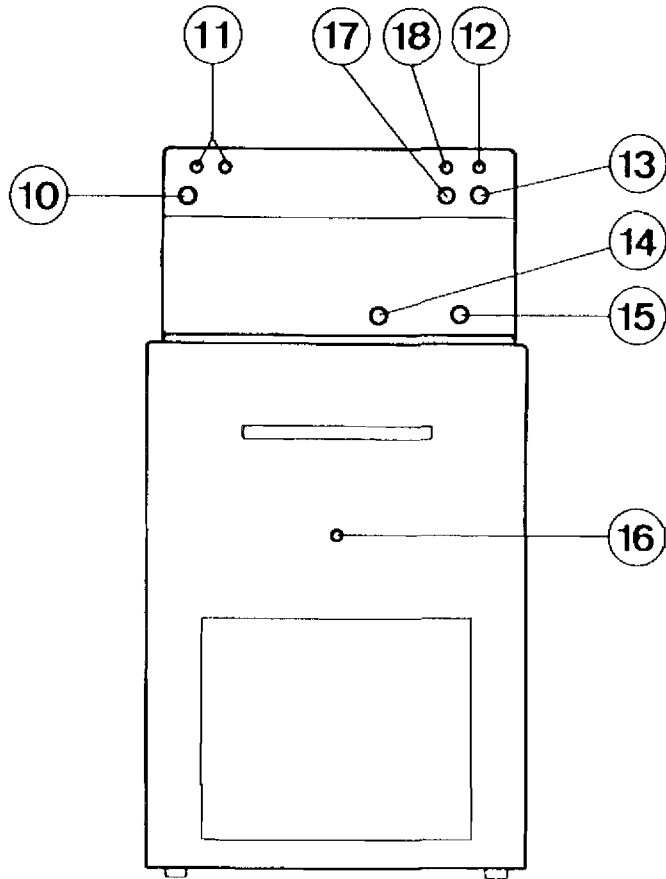
# HAAKE

DESCRIPTION OF CONTROLS



- |                            |  |
|----------------------------|--|
| (1) MAIN SWITCH            | - main switch with control lamp                                  |
| (2) COOLING                | - switch for the cooling compressor                              |
| (3) COOL-ON                | - power control lamp for the compressor (green)                  |
| (4) WARNING                | - warning control lamp (red)                                     |
| (5) HEAT-ON                | - heating control lamp (yellow)                                  |
| (6) TEMPERATURE SET        | - knob to preset the wanted temperature                          |
| (7) Display of temperature |  |
| (8) SET-IN                 | - pushbutton; depressed: see preset temperature displayed on (7) |
| READ-OUT                   | - released: see actual bath temperature displayed on (7)         |
| (9) TEMPERATURE LIMIT      | - excess temperature switch                                      |

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- 1) Mains cable
- 1) Fuses
- 2) Switch for external temperature preset
- 3) Extern socket for connecting cable to preset temperature externally
- 4) Return-hose fitting
- 5) External liquid circuit-hose fitting
- 6) Drain nozzle
- 7) Socket for external Pt 100 sensor
- 8) Switch for activating socket (17)

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## EQUIPMENT DESCRIPTION

The A 82 is a refrigerated bath and circulator with a built-in compressor cooling system which allows heating or cooling to constant temperatures in two modes of application:

- a) to control the temperature of laboratory vessels or samples placed into the bath vessel of the A 82,
- b) to control the temperature of instruments and apparatus which can be connected to the external, closed circuit of the circulator.

The A 82 operates at bath temperatures below 30°C with controlled heating against constant cooling.

This circulator features an electronic temperature control which automatically matches the heating energy to the bath proportionally to the heating requirement at any time. This gives simple operation combined with very good temperature control stability of the bath, even when the heating requirements vary during long periods of operation.

The circulator may only be used under supervision - see also "safety devices".

## OPERATING INSTRUCTIONS

### Unpacking

The packing was designed to reduce danger of damage in transit. Should there be any damage to the circulator or other parts, please notify the delivery agency to facilitate any claim of damage.

Please contact the dealer from whom you bought the unit before returning a damaged unit. Often minor problems can be rectified on site.

### Start-up

Connect the unit to an earthed mains socket only. Before connecting to the mains compare the mains voltage with the voltage data on the name tag of the unit. Deviations up to ±10% are permissible.

### Recommended bath liquids

Distilled water, mineral oils, silicone oils.

The flash point of the selected oils must be above 160°C! Viscosity of the oils: preferably approx. 5 mPa·s, max. 30 mPa·s at the lowest operating temperature.



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se that the cause of the above indicated fault is neither found nor eliminated  
e cooling system will show an ON/OFF-cycle with a frequency of 5 - 10 minutes.  
is will lead to big fluctuations of the bath temperature and may cause longterm  
breakdown of the cooling compressor.

## ease note:

is essential for a continuous longterm operation of the cooling system that  
e air can pass unobstructed through the front and rear side fan grids, i.e. the  
32 must neither be placed too near to a wall nor should objects almost cover  
ese grids. Easy test to check a sufficient flow rate of cooling air: light  
ber should stick on the front grid when the cooling system operates.

## ety devices for excess temperature protection

built-in excess temperature safety element of the A 82 provides protection  
inst dangers caused by uncontrolled heating of inflammable bath liquids above  
preset temperature. In case of a disturbance the safety element switches off  
A 82 completely: heating, pumping, cooling. The red warning control lamp (4)  
hts up. When the bath temperature drops below the cut-off temperature the  
culator is automatically restarted.

(9) the cut-off temperature of the excess temperature protection can be varied  
ween 20 to 160°C. This allows to adapt the cut-off temperature to the flash  
nts of the thermal liquids selected for the A 82.

eral rule: The cut-off temperature set at (9) must be at least 10°C below  
flash point of the liquid chosen.

ting of the cut-off temperature:

rn (9) clockwise to its stop.

ot the cut-off temperature required at (6) and check it on the display (7) -  
epress (8).

bart the circulator and keep it supervised until the bath temperature has  
ttled at the cut-off temperature level.

ow turn (9) counter-clockwise until the hydraulic thermostat switch cuts off  
ie A 82 and the warning control lamp (4) lights.

arning (9) just a bit backwards again will mean that the excess temperature  
rotection provided will always cut off the A 82 whenever the bath temperature  
rpasses this excess temperature limit.

A 82 is protected against the hazards caused by uncontrolled heating beyond  
preset excess temperature limit. It also contains a fixed low liquid level  
iter and may be employed in unsupervised operation.

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## Socket (13) "Extern":

This is a dual purpose socket:

1. Remote control of the preset temperature. With the switch (12) on "ON" a remote control module may be connected to socket (13) for presetting any temperature within the operating temperature range of the A 82 or it may be used for connecting a suitable temperature programmer.

The external control mode is indicated on the display (7) by a black marker (arrow or triangle) in the upper left hand corner.

PLEASE NOTE: If switch (12) is on "ON" without a remote control of some sort connected at the same time, the heater element will be switched off. This, in turn, means that the temperature in the bath will drop to the lowest temperature possible with the A 82.

It should, therefore, be taken care that switch (12) is not in its "ON" position erroneously. For normal operation it should be "OFF".

2. Socket (13) provides a permanent signal for the connection of a temperature recorder or a remote temperature display. This signal is independent from the position of switch (12).

Socket (13) "Extern":



Pin 3 = "In"

Pin 4 = "Out"

Pin 5 = Output: 0.00 V = 0°C; 10 mV/°C

Connecting plug: Type T 3400-2 (Order-No.: 087-0644)

## Socket (17) "External Temperature Control"

This socket is used for the connection of a Pt 100 sensor which will then control the temperature in an external vessel or apparatus.



Pin 1 = Reference potential "Zero"

Pin 3 = U-actual 0°C = 0.00 V; 10 mV/°C

In using an external control sensor it should also be understood that the distance of this sensor from the heater element will hamper the temperature constancy of the unit. In other words: Long distance - poor constancy. Switch (18) is used to activate socket (17). EXTERN = Temperature control by external sensor. INTERN = Temperature control by internal (built-in) sensor.

## Cleaning the heat exchanger

The heat exchanger, an integral part of the cooling system, must be kept clean. Its fins must be cleaned regularly e.g. with a few bursts of an air-gun. If the heat exchanger is covered with dust and lint, the cooling capacity will be considerably reduced and in extreme cases this could even lead to a malfunction condition.

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## Filling the bath container with bath liquid

Distance to coverplate: min. 3 cm, max. 7 cm.

### Attention:

A descending of the liquid level below the minimal permissible level limit (7 cm under the coverplate) e.g. by evaporation or loss of liquid into an external liquid circuit must be prevented. Failure to check this can result in a damage to the heater element or, in the case of inflammable bath liquids such as oil, combustion can occur.

If the A 82 is used to provide temperature control of external instruments or apparatus their heating/cooling chambers must be prefilled with the same bath liquid. Failure to fill such external equipment may result in too much bath liquid flowing out of the bath resulting in a dangerously low liquid level in the bath. After a short operating period: check the liquid level!

If a very wide operating temperature range has to be covered, changes in filling level as a result of thermal expansion of the bath medium must be taken into account: please base your calculation on the fact that liquid volumes increase by appr. 10% per 100°C temperature increase.

The outled nozzle (16) serves to empty the bath.

## Recommended hoses for an external liquid circulation

PVC hoses for temperatures between 10 and 60°C.  
Perbunan hoses for temperatures between -30 and 150°C.  
Silicone hoses for temperatures between -40 and 100°C.

Hose connections must be secured with hose clamps.

## Temperature adjustment

The temperature required is set by turning knob (6). Depressing pushbutton (8) will display on (7) the value of the preset temperature. The temperature in the bath is continuously displayed on (7). Once in a while it is a good procedure to countercheck the display by means of a calibrated thermometer placed into the bath (in the middle of the bath opening and halfway down into the bath liquid).

Slight deviations which may become apparent between preset temperature and the temperature in the bath must be regarded as the tolerance effect due to i.e. Pt 100 temperature control sensor or the multitude of electrical components used for the electronic temperature control.

To eliminate such a deviation the preset value is corrected at (6). The A 82 allows to set temperatures in the range of -40 to 150°C.

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## Switching-on the circulator

### 1) Main switch (1)

Switching from 0 to I: control lamp lights, the pump circulates the bath liquid and, if a temperature above the bath temperature is selected, the heater element heats. This is indicated by the yellow control lamp (5) which lights up. In the heating-up phase lamp (5) lights constantly, in the regulating phase lamp (5) blinks.

### 2) When cooling is required: Switch (2) from 0 to I. This switch allows to start and stop the cooling compressor.

The A 82 is switched off by selecting 0 at the main switch (1).

## Temperature control of objects

a) In the bath: the hose fittings (14) and (15) must be shortcircuited with a hose. Secure hose against kinks, e.g. with a spiral spring (see optional accessories).

b) Connecting of external closed loop systems e.g. instruments with a closed heating jacket or a heating coil: connect a hose of 12 mm I/D to the front hose fitting (15) - external instrument or heating coil - lead second hose to hose fitting (14).

Use whenever possible those hoses with the biggest inner diameter possible for external closed-loop liquid circuit. Hose connections to hoses 8 mm I/D (stand accessory) are screwed into the hose fittings (14) and (15).

## Cooling

The A 82 has a built-in compressor cooling system and a cooling coil placed on the inside of the built-in bath vessel. This cooling coil must be kept free from ice, which could result from water freezing in thermal liquids such as water with antifreeze or in alcohols which absorbed water.

Bath temperatures between -40 and appr. 40°C can only be achieved with constant cooling against controlled counterheating. However the cooling system can also be used to cool hot bath liquids down after the temperature preset had been lowered.

One should avoid unnecessary cooling against heating at temperatures above 50°C. The internal pressure in the cooling gas circuit will then greatly increase and with it the load on the compressor. The cooling system is protected against excess temperature at the compressor capsule and against excess amperage for the motor windings of the compressor. In case of such a fault the compressor winding protection switches off the compressor until current and temperature have decreased below their specified limits. Then the compressor is automatically restarted.