Instruction Manual
D8-L/D8-G/D8-GH

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Contents

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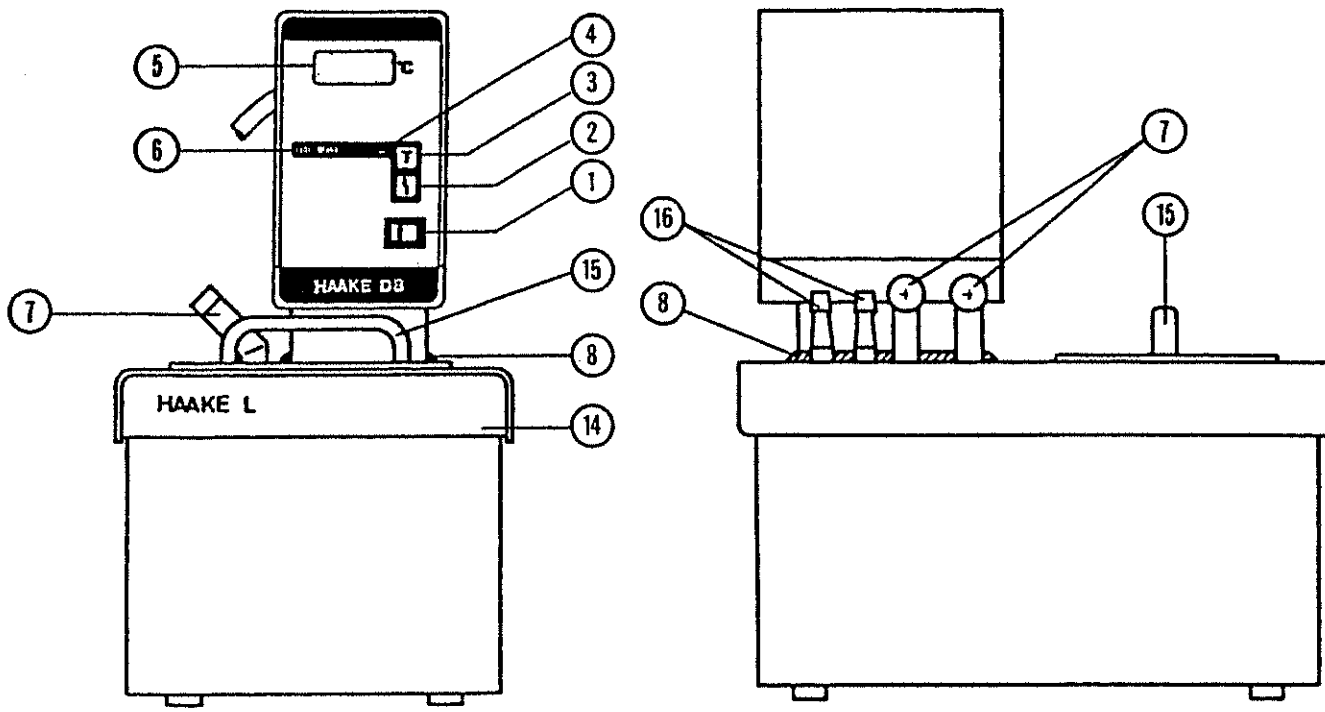
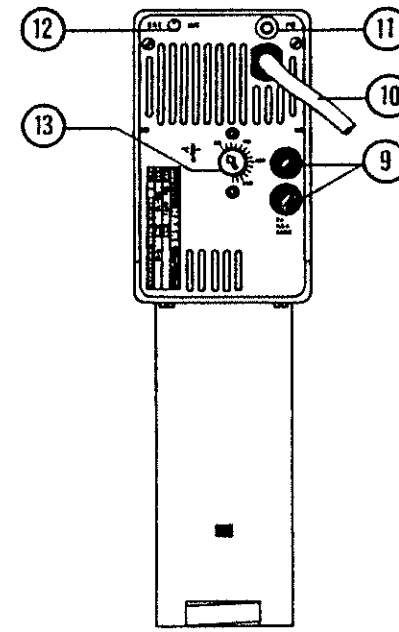
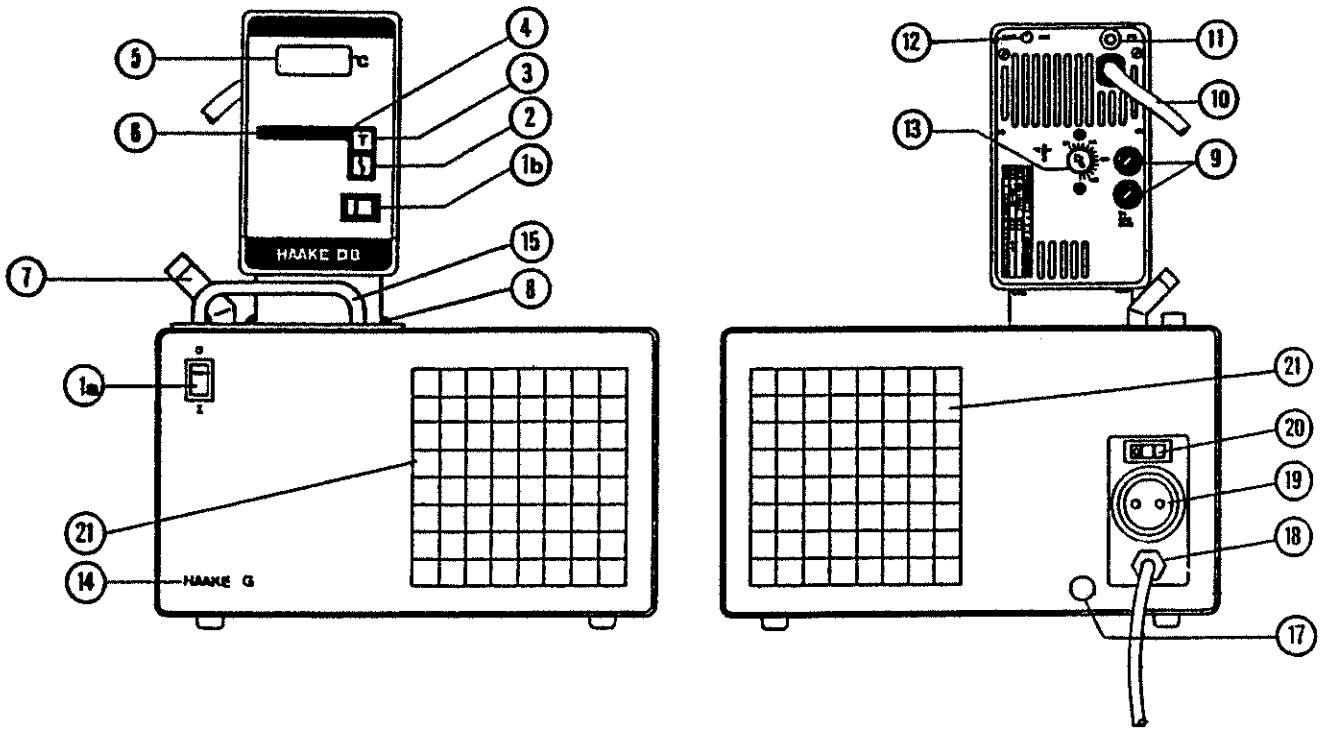
Panel Controls and Indicators D8 and D8-L





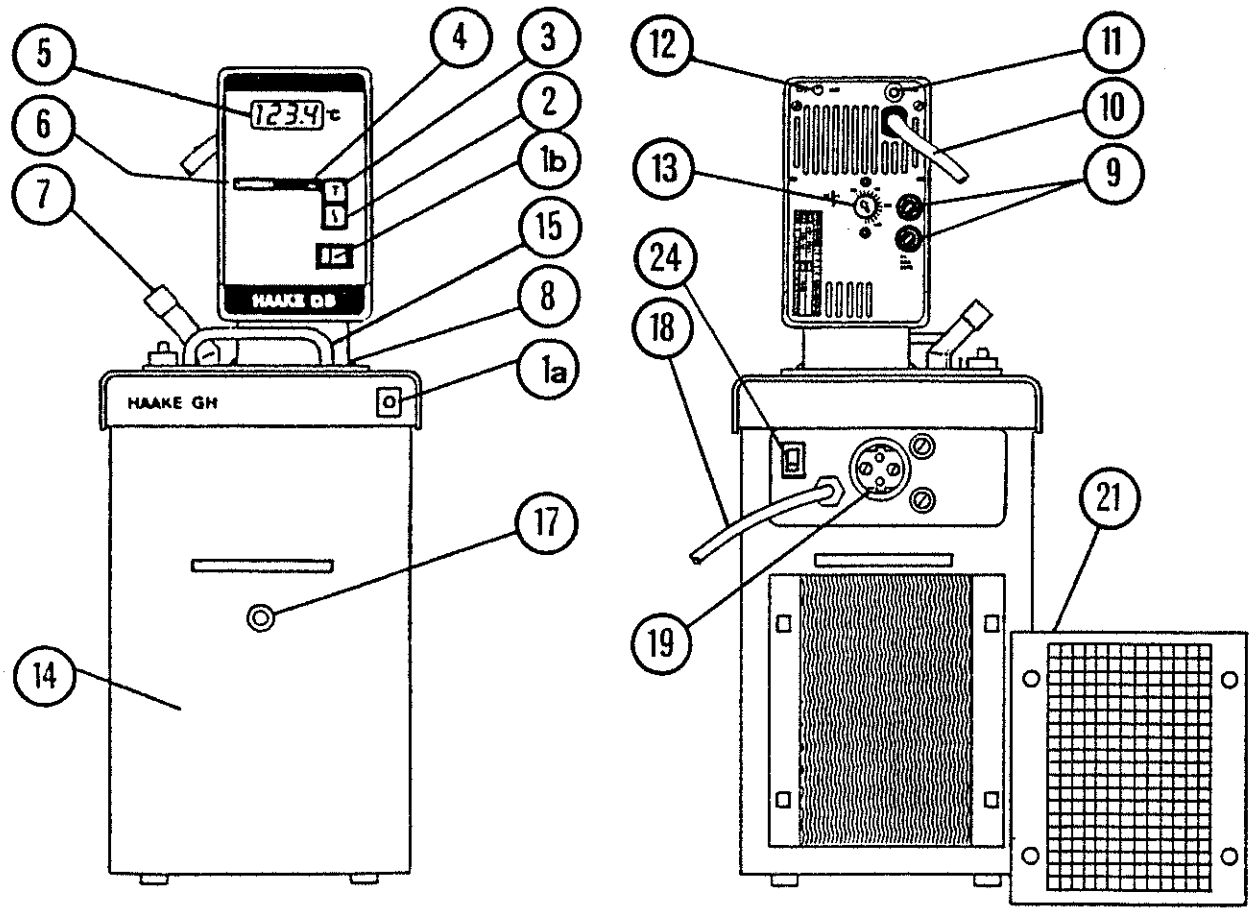
(1) Mains Power Switch
(2) Reset Key/Malfunction Indicator
(3) Switch - Preset Temperature Display
(4) Heater Control Light
(5) LED Preset/Actual Temperature Display
(6) Serrated Wheel - Temperature Presetting
(7) Tubing Connection (rear = Pressure)
(front = Return Flow)
(8) Gasket
(9) Fuses
(10) Power Cable
(11) Programmer Socket
(12) Toggle Switch - External Temperature Presetting
(13) Overtemperature Setting
(14) Bath Vessel "L"
(15) Bath Lid
(16) Tubing Connection - Cooling Water Circuit

Panel Controls and Indicators - D8-G



(1a) Power Switch, Bath Vessel "G"
(1b) Power Switch, Temperature Control Module D8
(2) Reset Key/Malfunction Indicator
(3) Switch - Preset Temperature Display
(4) Heater Control Light
(5) LED Preset/Actual Temperature Display
(6) Serrated Wheel - Temperature Presetting
(7) Tubing Connection (rear = Pressure)
(front = Return Flow)
(8) Gasket
(9) Fuses
(10) D8 Power Cable for connection to (19)
(11) Programmer Socket
(12) Toggle Switch - External Temperature Presetting
(13) Overtemperature Setting
(14) Bath Vessel "G"
(15) Bath Lid
(17) Drain Nozzle
(18) Power Cable for Bath Vessel "G"
(19) Power Socket for Temperature Control Module D8
(20) Switch for Refrigerating Compressor
(21) Cooling Grid

Panel Controls and Indicators - D8-GH



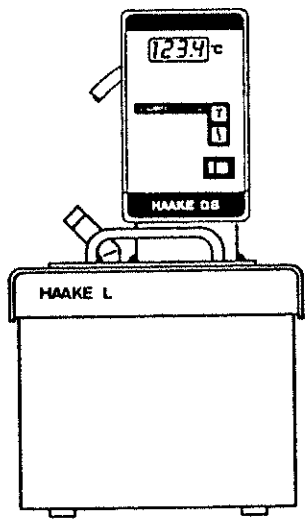
(1a) Power Switch, Bath Vessel "GH"
(1b) Power Switch, Temperature Control Module D8
(2) Reset Key/Malfunction Indicator
(3) Switch - Preset Temperature Display
(4) Heater Control Light
(5) LED Preset/Actual Temperature Display
(6) Serrated Wheel - Temperature Presetting
(7) Tubing Connection (rear = Pressure)
(front = Return Flow)
(8) Gasket
(9) Fuses
(10) D8 Power Cable for connection to (19)
(11) Programmer Socket
(12) Toggle Switch - External Temperature Presetting
(13) Overtemperature Setting
(14) Bath Vessel "GH"
(15) Bath Lid
(17) Drain Nozzle
(18) Power Cable for Refrigerated Bath "GH"
(19) Power Socket for Temperature Control Module D8
(21) Rear Cooling Grid (remove for simple cleaning of the liquefier)
(24) Switch for speed changing of the fan motor

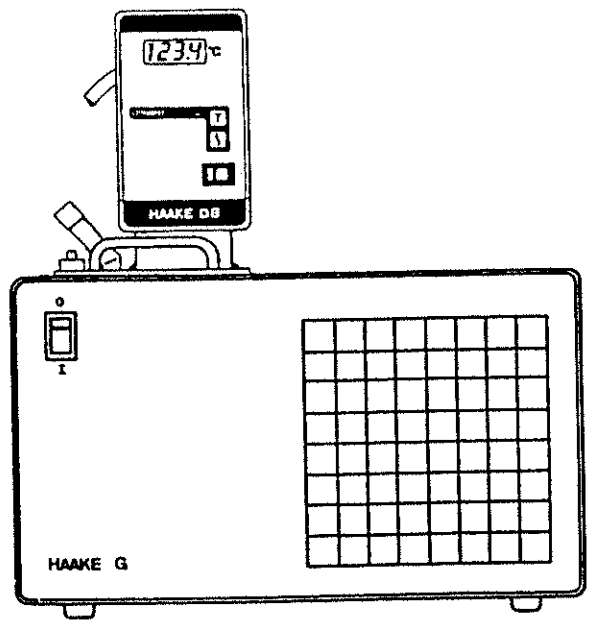
Inventory Checklist

a) **D8-L**

This Heating Bath/Circulator-comprise:

Temperature Control Module D8
Bath Vessel "L"
Tubing 8 + 12 mm Ø
Tube Couplings 8 + 12 mm Ø
Tube Clips 8 + 12 mm Ø
Silicone Rubber Bung
Square Gasket
Instruction Manual

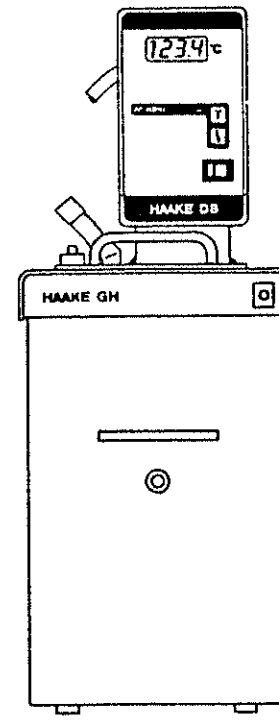




b) **D8-GH**

This Refrigerated Bath/Circulator comprises:

Temperature Control Module D8
Refrigerating Bath "GH"
Tubing 8 + 12 mm Ø
Tube Couplings 8 + 12 mm Ø
Tube Clips 8 + 12 mm Ø
Silicone Rubber Bung
Square Gasket
Instruction Manual



c) **D8-G**

This Refrigerated Bath/Circulator comprises:

Temperature Control Module D8
Refrigerating Bath "G"
Tubing 8 + 12 mm Ø
Tube Couplings 8 + 12 mm Ø
Tube Clips 8 + 12 mm Ø
Silicone Rubber Bung
Square Gasket
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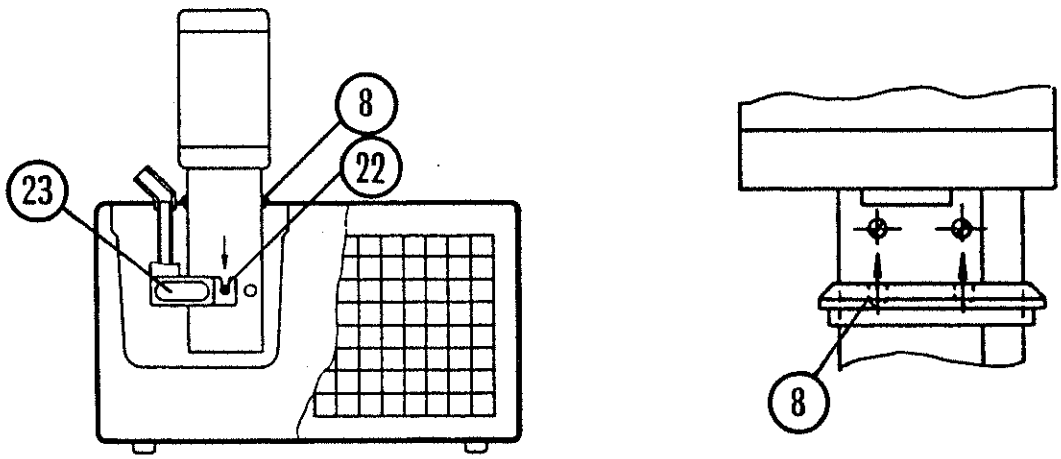
OPERATING INSTRUCTIONS:

Unpacking:

The packing is designed to reduce the danger of damage in transit. Should there be any damage to the circulator or other parts, please inform the delivery agency to facilitate any damage claim. Please contact the dealer from whom you bought the unit prior to returning it. Minor problems can often be cleared and corrected on site.

Assembly:

a) Attaching the D8 Temperature Control Module to bath vessels:



1. Slide the gasket (8) over the rectangular protective shield of the temperature control module so that the screw heads on the side of this protective shield become hidden in the notches provided in the gasket.

   NOTE: The notches in the gasket as well as the screws are not positioned symmetrically to the center line of the protective shield.

2. Turn screw (22) out a few turns and slide temperature control module D8 vertically into the bath vessel until the screw is seated in the notch (22) of the elbow connector to the tube fitting. The screw heads at the side of the rectangular shield are then covered by the gasket (8).

3. Verify that the gasket of the pump outlet becomes seated in a corresponding opening of the baffles plate (23) and then tighten screw (22) so make the connection between the two parts leak-proof.

b) Cable connection to the refrigerating baths "G" and "GH"

The power cable of the D8 is plugged into socket (19). The power cable of the refrigerating bath "G" or "GH" is connected to the mains.

Filling:

The filling level should neither be below 85 mm nor should it exceed the high mark of approx. 130 mm. All filling heights between 85 and 130 mm are allowed.

Recommended Bath Liquids:

+5 to +80°C: Distilled Water
−50 to +60°C: HAAKE Bath Liquid SYNTH 60
−10 to +150°C: HAAKE Bath Liquid SYNTH 210
−40 to +150°C: HAAKE Bath Liquid SIL 180
+20 to +150°C: HAAKE Bath Liquid MIN 200

All statements regarding the pump capacity and the temperature control accuracy are based on tests with water and a temperature of 70°C (DIN 58966). It should, therefore, be understood that the operating conditions and values thus found will differ when liquids with a higher viscosity are used.

The flashpoint of the liquids selected should be approx. 10°C above the operating temperature. The viscosity of the liquids should be preferably smaller than 5 mPa·s. For a short period of time or during the heating up phase the viscosity may be max. 30 mPa·s.

Recommended Tubing:

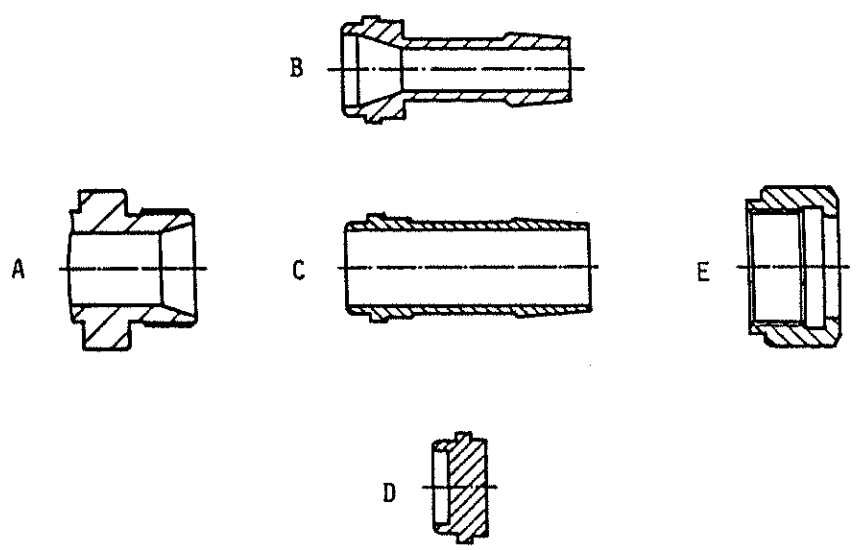
PVC tubing for temperatures of +10 to 60°C
Perbunan tubing for temperatures of −30 bis 100°C
Viton tubing for temperatures of +10 bis 150°C
Metal tubing to cover the entire range

Connection of Tubing:

a) Temperature control directly in the bath vessel: The nozzles (7) are connected with a short piece of tubing with 12 mm Ø in short circuit. The tube should be protected against kinks e.g. with a kink protection spring.

b) Connect to external closed loop systems e.g. instruments with a closed temperature control jacket or a heat exchanger coil: Attach the required hose fittings to the nozzles (7) according to the description below. Lead a tube from the rear nozzle (7) to the external instrument and a second hose (back flow) to the front nozzle (7).

All tubing connections should be safeguarded with clips.



A Hose fitting (circulator) with M 16 x 1 thread
B Hose fitting 8 mm
C Hose fitting 12 mm
D Plug piece
E Coupling nut (M 16 x 1)

Parts B, C and D are attached to fitting A by means of part E.

Metal hoses with coupling nuts can be connected directly to fitting A.

No gaskets are required.

Mains Power Connection:

For safety reasons, connect the unit to a grounded mains outlet only. Compare the local voltage and frequency conditions with the specifications of the name plate prior to the actual connection. Deviations of ± 10% are allowed.

Starting:

a) D8-L

Start the unit by actuating switch (1) of the temperature control module D8. The pump motor runs, bath liquid is circulated, and if the preset temperature is higher than the liquid temperature of the bath, the heater control light (4) will be on, indicating that the heater is operating.

b) D8-G, D8-GH

1. Actuate switch (1a) of the refrigerating bath. The cooling fan of the refrigerating compressor is on. Socket (19) will be under power.

2. Start the temperature control module D8 by actuating switch (1). The main power control light (3) will now be on, bath liquid is circulated and if the preset temperature is higher than the liquid temperature of the bath, the heater control light (4) will be on, indicating that the heater is operating.

3. If cooling action is not required, the cooling compressor of the refrigerating bath "G" should be switched off separately with switch (20). The cooling fan for the compressor must continue to run as otherwise there would be a build-up of undue high pressure in the cooling circuit.

4. For standard applications, first the automatic speed control of the fan motor is switched on (switch 24). The speed of the fan is adjusted automatically according to the requirements of heat removal capacity or ambient temperature.

Malfunction Indication

If the unit indicates a malfunction immediately after being started: (Temperature display (5) and malfunction indicator (2) are flashing) this may have three reasons:

- The overtemperature limit set with (13) is already reached or exceeded by the bath temperature.
- The low liquid level protection is activated by the bath level being too low.
- The viscosity of the bath liquid is too high or a foreign object is blocking the pump blade which will then activate the thermal protection of the pump motor.

The causes for such malfunctions can be remedied as follows:

- Regulate the overtemperature protection to a higher level. In doing so, consider the flashpoint of the bath liquid you are using.
- Correct the liquid level within the limits stated under "**Filling**"
- Select a more suitable bath liquid. Remove whatever foreign object is blocking the pump blade.

Press the reset key upon correcting the malfunction(s). Please also refer to the "**Safety Features of the D8**".

Temperature Presetting/Actual Temperature Display

1. Press key "T" (3). The display (5) then shows the preset temperature.
2. Turn setting wheel (6), until the desired preset temperature is displayed in the window (5).
3. Release key "T".
4. The display (5) then indicates the actual bath temperature.

A temperature above 150°C cannot displayed and set!

External Temperature Presetting

Instead of the preset temperature as described before, presetting elements or the HAAKE Programmers PG20/PG40 can be used to set operating temperatures.

At the rear of the D8 a 3.5 mm jack plug socket (11) is provided it may be used to connect suitable presetting elements. The required voltage is: 10 mV/°C; 0.00 V ≙ 0.00 °C. This feature allows automatic time-linear temperature programms (°C/t). Switch (12) marked "EXT/INT" must be flipped to "EXT" in order to make this jack plug socket usable. This switch position will be indicated by a flashing decimal point of the temperature display (5).

If this toggle switch (12) is erroneously flipped to "EXT" without a suitable external presetting element being connected, this will be regarded and treated as a 0°C information by the instrument.

Cooling:

a) **D8-L**

Connection to tap water cooling:

Connect tube fittings of cooling coil (16). The flow rate direction is equal. A minimum bath temperature of 2°C to 3° above the cooling water temperature can be achieved by tap water cooling.

Connection to flow-through coolers:

Temperatures down to below 0°C may be achieved and controlled with the D8-L if a flow-through cooler (e.g. HAAKE DK12) is integrated into the return flow of the external liquid circuit of this unit.

b) **D8-G, D8-GH**

Both, the D8-G and the D8-GH are provided with a built-in cooling compressor. The cooling coil is arranged on the outside of the integral bath. This design frees the bath from the cooling coil which in other refrigerated bath circulators is normally arranged inside the bath which reduces the available volume and tends to be quickly covered with dirt or other layers thus hampering the cooling capacity.

Bath temperatures of -25°C and approx.-15°C can only be achieved by constant cooling action against short heating pulses.

The cooling unit can also be used for pulling the bath liquid quickly down from high to low temperatures.

Unnecessary and permanent cooling against heating at bath temperatures above approx. 40°C should be avoided with the D8-G: The pressure within the coolant circuit would increase unduly which in turn would mean a strain for the compressor. The cooling compressor is protected against excess heat and excess current by a KLIXON which in case of a fault or overload switches the unit off until the heat and the current have dropped below specified limits. Cooling will then start again automatically. If the fault as outlined above not be found and eliminated, the cooling system will run in an **ON/OFF** cycle with a frequency of 5 to 10 minutes, this will lead to great fluctuation of the bath temperature and eventually to a total breakdown of the cooling compressor.

At ambient temperatures of above 30°C or during high thermal loads, the cooling fan of the refrigerated bath "GH" will run faster for a short period of time which will be noticed as a higher operating noise. This design feature is to prevent excess pressures in the cooling circuit of the unit. If the fan motor is running in the low speed mode, the bath's outer surface temperature could increase. Especially when operating at a bath temperature of approx. 20°C, the speed is changed automatically from low to high. This results in temperature peaks in the bath liquid. In this case the speed controller should be switched off (switch 24).

Safety Features of the D8

The D8 is provided with three (3) Safety Features:

- Overtemperature protection
- Low liquid level protection
- Thermo-protection of the motor

According to DIN 12 879 it is categorized into the Safety Class "2" and may be used unsupervised in continuous operation.

Whenever one of the protection features is activated all lines of the temperature control module D8 are switched off permanently. Prior to starting again the reset key (2) has to be activated first. The refrigerated baths "G" and "GH" are **not** switched off by such action.

Important Note! Only when the reason for a malfunction has been found and remedied can the unit be restarted.

a) Overtemperature Protection:

The overtemperature protection safeguards the circulator against uncontrolled heating beyond the preset temperature value. This condition might be caused by faulty control of the electronics.

The overtemperature setting element (13) is used for setting the overtemperature limit. It is quite important to complete this setting carefully with due consideration of the flashpoint of the bath liquid used.

Two points have to be considered:

- Protection against ignition of the bath liquid. The switching treshold must be reasonably far (10°C) from the flashpoint of bath liquid.

- Protection of the object to be temperature controlled. For instance, this might be a biological sample. Here, the switching treshold has to be placed as close as possible to the desired temperature value.

The overtemperature setting element (13) is adjusted by means of a slotted screw which is encircled by a rough scale of temperature values (20° - 160°C). These temperature values are only a reference for the switching treshold selected. This treshold may, however, be set quite exactly if the following procedure is observed:

Setting the Overtemperature Protection:

Example: Flashpoint = 60°C; switching treshold to be selected = 50°C

1. Adjust the overtemperature setting element to a value clearly higher than 50°C.
2. Adjust preset temperature to 50°C.
3. Wait until the display (5) indicates an actual temperature of 50°C.
4. Turn slotted screw (13) slowly to the left until the unit is switched off.
5. Unit is switched off when (2) flashes and the temperature display (5) is not indicating a firm value but flashes also.
6. Press reset key (2) when the actual temperature has dropped somewhat.

The unit may now be safely used for temperatures up to 50°C.

If the unit is to switch off at an approximate temperature value, the slotted screw (13) may be turned somewhat in the other direction (right) and may then be reset with key (2).

b) Low Liquid Level Protection:

It protects the unit in case the liquid level drops below a fixed safety level. This warrants that the heater coil is always covered by liquid so that it cannot overheat which would lead to its destruction. At the same time it is prevented that inflammable bath liquids are ignited.

If the liquid level drops below the minimum filling level, the red malfunction indicator (2) will light and the low liquid level protection will switch the unit off permanently. When the bath level has been replenished, the unit may be restarted by pressing the reset key (2).

c) Thermo-Protection of the Motor:

HAAKE pump motors are provided with an overload protection which in case of excess motor heat will switch off the pump and the heater of the unit. This state will also be indicated by the red malfunction light (2). Possible causes for excess motor heat: Pump blade blocked by a foreign object. Viscosity of the bath liquid higher than approx. 30 mPa·s.

Special Instructions for the Operation of the D8-G and D8-GH

For continuous, long-term operation of the cooling system it is essential that air passes unobstructed through the front and rear ventilation grids, i.e. the units must not be placed too near to a wall nor should objects be allowed to cover these grids. There is an easy check for testing the air flow: A sheet of light weight paper should "stick" to the front ventilation grid when the cooling system is operating.

One the cooling compressor has been switched off, it should not be restarted immediately (automatic overload protection) because the compressor would then have to start up against high internal pressure. After about 5 minutes, when the pressure in the cooling gas circuit has levelled off, the compressor can be restarted.

The heat exchanger (liquefier) which is part of the cooling system must be kept clean. Its fins have to be cleaned regularly with a few burst of an air-gun. A heat exchanger badly covered with a thick layer of dust and lint will cause an increase of the internal cooling gas pressure. This in turn, hampers the cooling capacity. In extreme cases, this can lead to irregular **ON/OFF** cycles due to the activated KLIXON overload element.

Normally it is sufficient to use the air-gun without removing the grids. However, when the layer on the heat exchanger has become very thick, it might be advisable to remove the grids for better and more effective cleaning. The D8-GH offers the possibility to remove the rear panel very quickly. Thus, the liquefier can be cleaned with a stiff bristled brush.

Technical Specifications: (nach DIN 58 966)

		D8-L	D8-G	D8-GH
Operating Temperature Range	°C	30 to 150	-15 to 150	-25 to 150
Extended Temperature Range *)	°C	-50 to 150	- -	- -
Temperature Setting Mode		digital		
Temperature Control Accuracy	°C	± 0,02		
Temperature Control Mode		WATTOMATIC(R)		
Control Sensor		Pt 100		
Heater Capacity (220V/115V)	W	1500/1000		
Cooling Coil		Standard	- -	- -
Cooling Capacity at 20°C	W	- -	200	340
Pressure Pump: Pressure, max.	mbar	150		
Flow Rate, max.	l/min.	12		
Overtemperature Protection	°C	variable, 20 to 160		
Low Liquid Protection		fixed		
Safety Class		2		
External Temperature Presetting	V/°C	0.01 (0.0 V = 0.0°C)		
Bath Depth	mm	150		
Bath Opening	mm	125 x 100	125 x 100	170 x 150
Filling Volume	l	3	3	4.5
Overall Dimensions: WxLxH	mm	190x285x380	375x360x390	220x405x430
Weight	kg	7	22	25
Submerged parts:		Stainless Steel 18/8 / Plastic		
Total Wattage (220V/115V)	W	1550/1050	1710/1210	1810/1310
Power Requirements:	V/Hz	220 V ± 10% /50-60	220 V ± 10% /50	220 V ± 10% /50-60
		or 115 V/60 Hz		
RFI Suppression (VDE 0875)		N		
Allowable ambient temperature	°C	10 - 40		

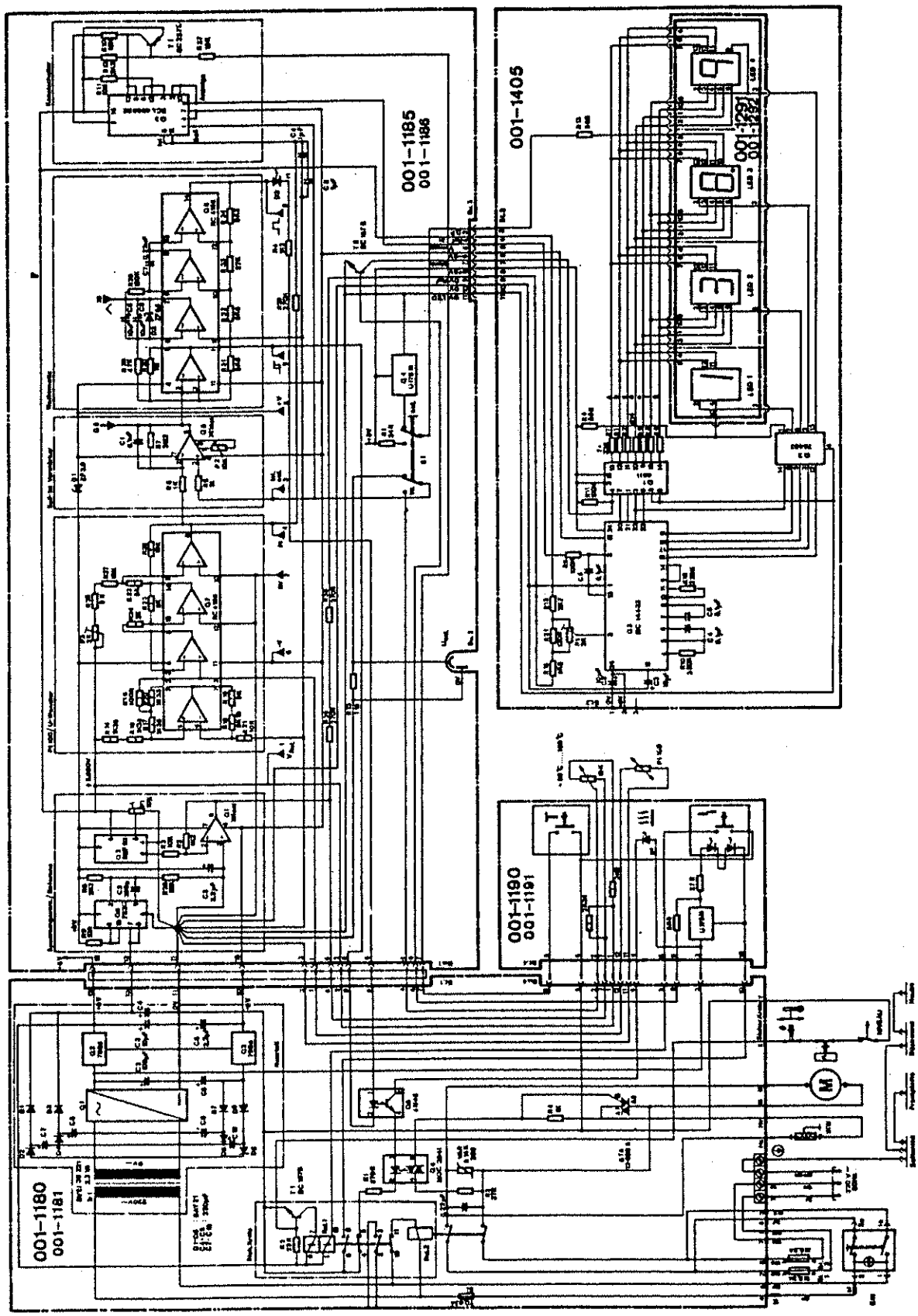
*) with additional cooling (Optional)

Special Accessories

Order No.:	Description:
806-1152	Checking thermometer, division: 0.1°, -1 to +51°C
806-1153	Checking thermometer, division: 0.1°C, +49 to +101°C
806-1154	Checking thermometer, division: 0.1°C, +99 to +151°C
082-0173	Tubing, Perbunan, 12 mm Ø I.D. (by the meter)
082-0172	Tubing, Perbunan, 8 mm Ø I.D. (by the meter)
082-0304	Tubing, PVC, 12 mm Ø I.D. (by the meter)
082-0745	Tubing, PVC, 8 mm Ø I.D. (by the meter)
082-0662	Tubing, Viton, 12 mm Ø I.D. (per 10 cm)
082-0661	Tubing, Viton, 8 mm Ø I.D. (per 10 cm)
333-0147	Spiral spring (as kink protection for 12 mm Ø tubes)
333-0133	Test tube rack for 18 tubes 16 mm Ø (D8-L/D8-G only)
333-0137	Drain nozzle with thread R ¼" (D8-G/D8-GH only)
832-0260	Coupling for attaching 8 mm I.D. tubes to drain nozzle (D8-G/D8-GH only)

Various bath liquids; Programmers and Flow-through Coolers (refer to special brochure).
Stainless steel tubing on request.

Circuit Diagram D8



Spare parts for temperature control module D8

Mandatory information when ordering:

Fig.-No.; Position-No.; Description; Instrument Type + Factory No. Line voltage/Frequency

(e.g. Fig. 13, Pos. 1; Mains switch, D8; No. 868371, 220/50Hz)

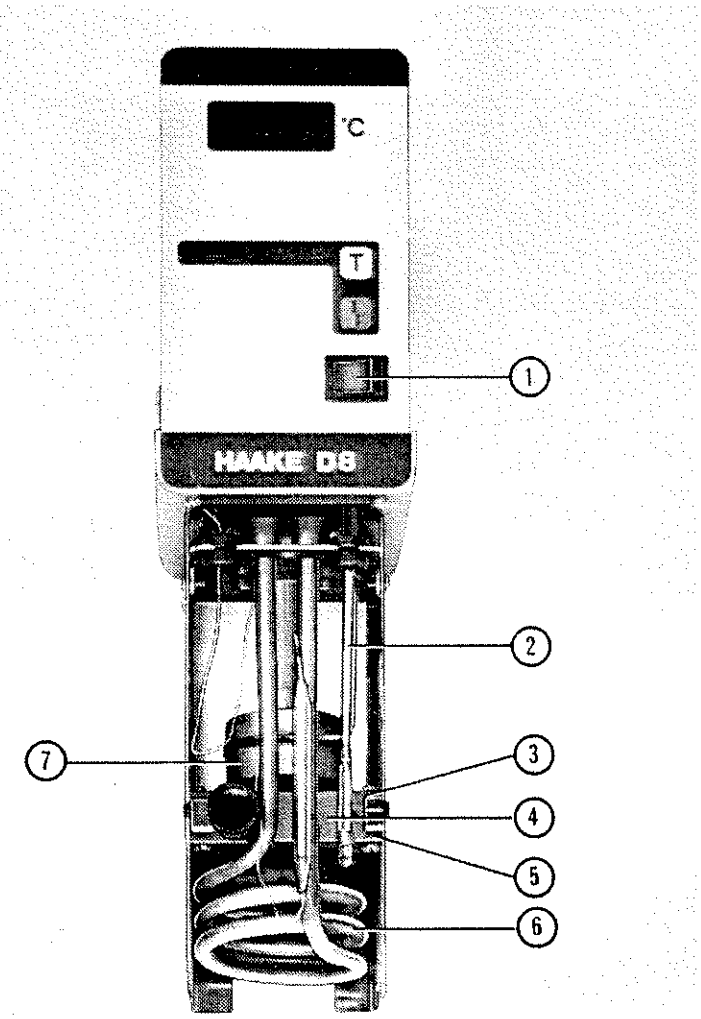


Fig. 13

1 Mains switch
2 Pt 100 Sensor
3 Pump housing - upper
4 Pump blade (hidden)
5 Pump housing - lower
6 Heater coil
7 Float

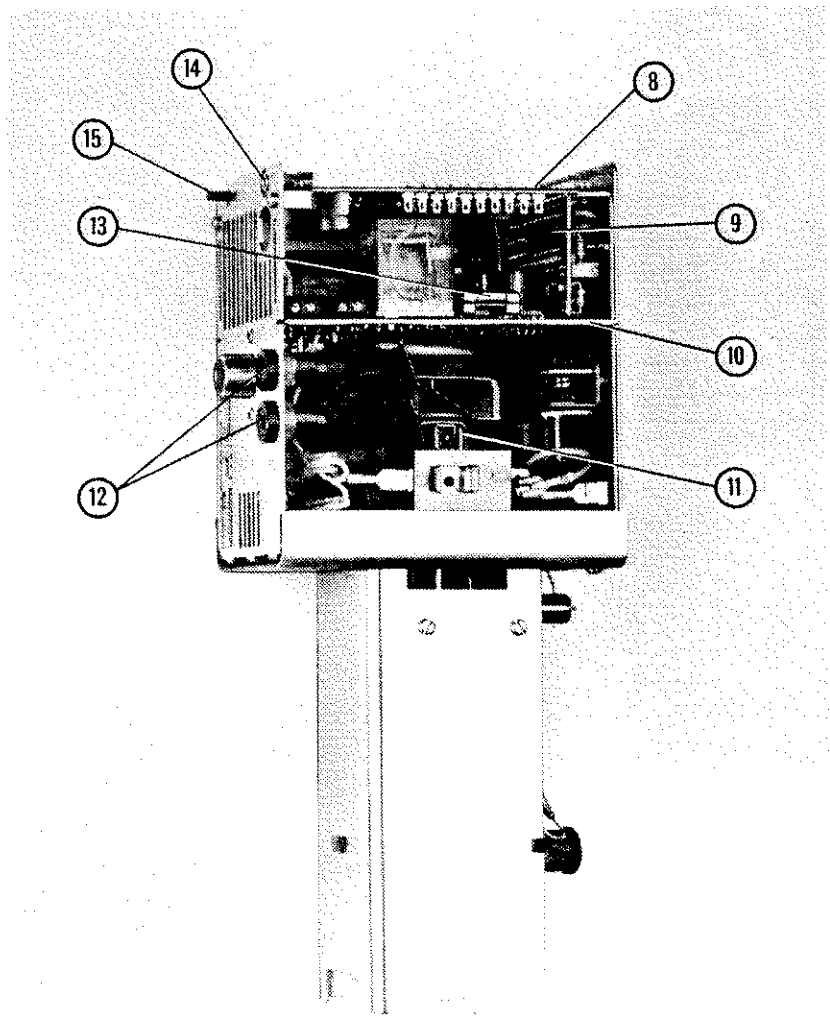
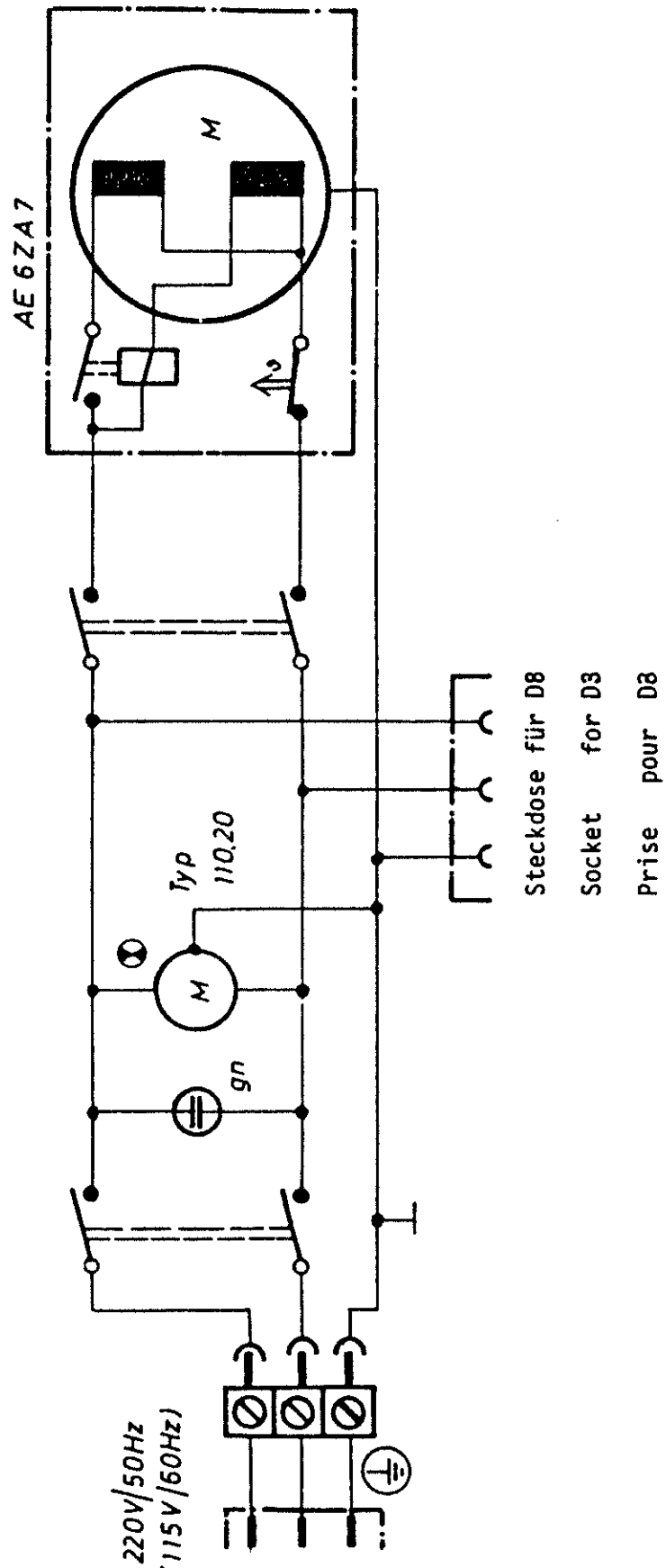


Fig. 14

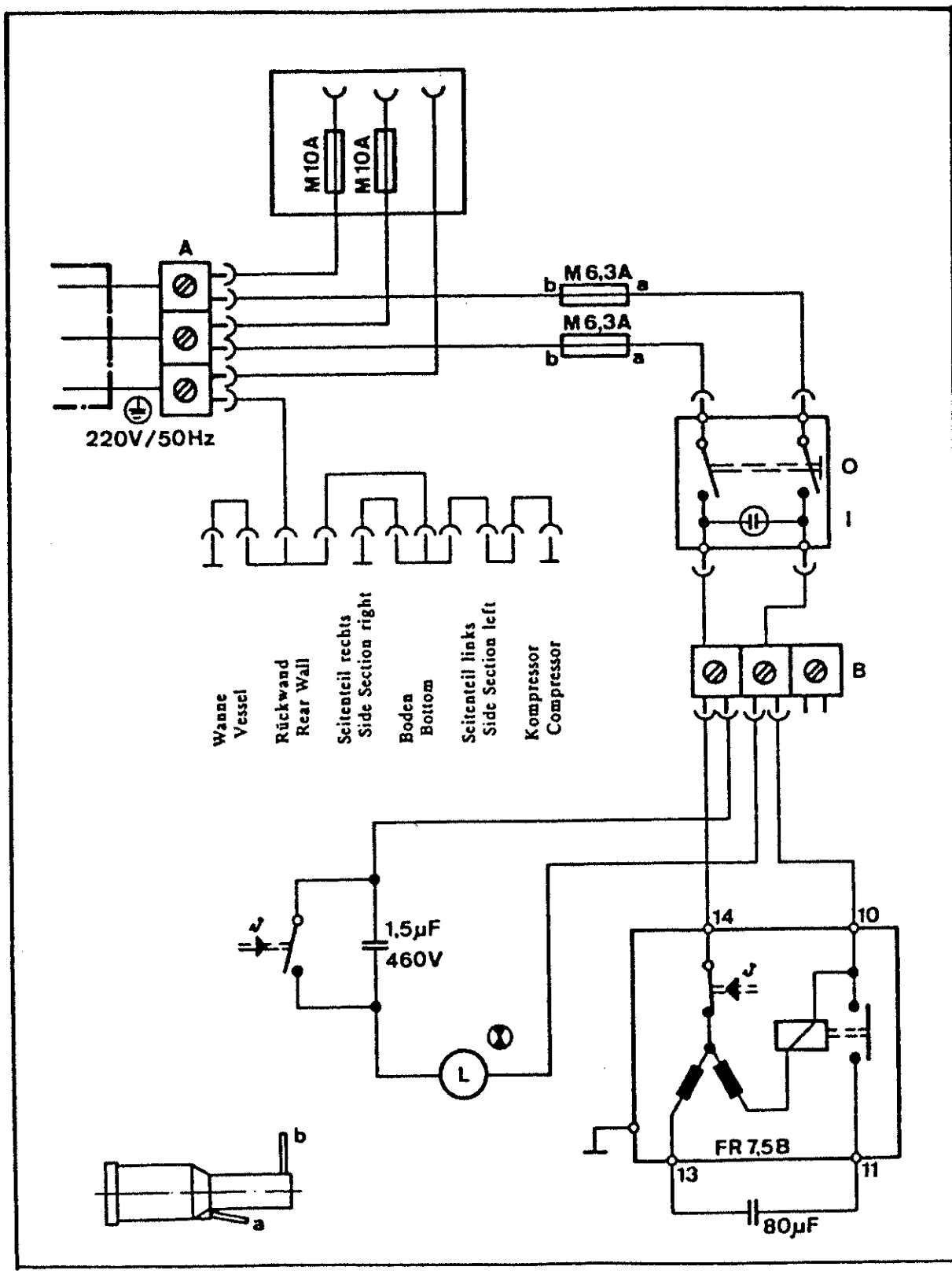
8 Circuit Board - Control
9 Circuit Board - LED-Display
10 Circuit Board - Power Section
11 Motor
12 Fuse
13 Fuse
14 Socket - external presetting
15 Toggle switch for external presetting

Circuit Diagram Refrigerated Bath "G" (220V/50 Hz, 115V/60 Hz)



Schaltbild: Kältebad G
Circuit diagram: Refrigerated bath G
Schéma électrique: Cryostat G
220 V ± 10%/50 Hz - 115 V ± 10%/60 Hz

Circuit Diagram Refrigerated Bath "GH" (220V/50 Hz)



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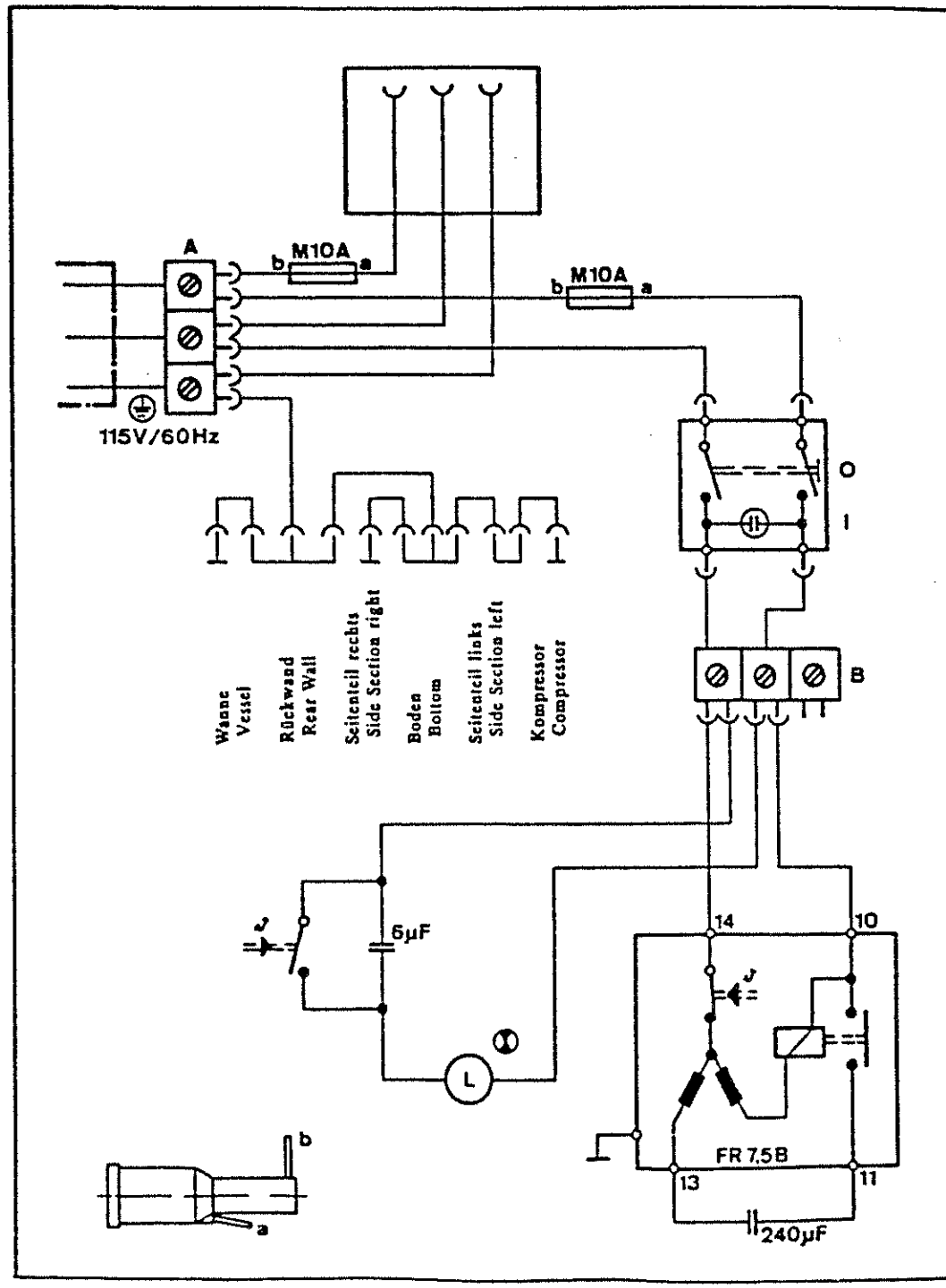
Circuit Diagram Refrigerated Bath "GH" (115V/60 Hz)



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