

Thermo Haake

Service Manual Circulators C10, DC10, DC30/DL30, DC50

Part-No.: 799-1302
11.1998

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To the Reader of this Service Manual

This service manual has been written with greatest care.

The Thermo Haake Service Department strives to keep this manual up to date. In order to do this we need your help.

If you should have any suggestions, corrections or comments to make on the contents of the information based on your practical experience, please do not hesitate to pass these on to us.

Just copy this sheet, enter your notes in the space provided below and send it to us by fax using the following number (+49-721-4094-360).

We look forward to reading your suggestions and will try to incorporate them in future instruction print-outs.

Thank you for your help!

Comments on the contents:

In case of questions:

Name: _____ Tel. _____ Fax: _____

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General Section

1. General Section

1.1 Validity of the service manual

This service manual is valid for:

Unit:	Part-No:	Part-No:	Part-No:
	230V	115V	100V
C10	003-2702	003-3101	003-3393
DC10	003-2859	003-3242	003-3395
DC30	003-2617	003-3246	003-3536
DL30	003-2890	003-3252	003-3569
DC50 / RS232	003-2758	003-3249	003-3586
DC50 / RS485	003-3054	003-3258	
DC50 / RS232 – 80°C	003-3108		

General Section

1.2 Description of the target group

- !** This service manual is intended exclusively for service technicians.

Modifications or repairs of the unit may be carried out only by service partners trained or authorised by HAAKE.

General Section

1.3 General symbols

1.3.1 Symbols used on the unit



Caution: Read the instruction manual !
See symbol ! in this manual



Caution: These parts can become hot!

1.3.2 Symbols used in this manual



Draws attention to the risk of injury.



Warns of possible damage to the unit or contains safety notes.



Denotes an important remark.



Indicates the next operating step to be carried out and ...



... what happens as a result thereof.

General Section

1.4 General safety instructions and warnings

It is absolutely essential to observe also the device-specific safety instructions and hazard warnings in this operating manual.

- ! This unit fulfils the EC Directive 89/336/EEC (electromagnetic compatibility). Constructional changes or modifications are forbidden.**
- ! Only original parts and accessories should be used when repairs are carried out.**
- ! Repairs or alterations to the unit may only be carried out by authorized personnel or specialized service personnel according to the specifications detailed in the service manual.**
- ! The commissioning of this unit must only be carried out according to the procedure described in this instruction manual.**
- ! Adequate unit protection can only be guaranteed if the user operates the unit according to specifications in the operating instructions.**
- ! Do not start up this unit if there is any doubt regarding its safe operation due to e.g. visible damage.**
- ! Make sure that the unit is switched-off before connecting or disconnecting cables. This is necessary to prevent electrostatic charge build-up and possible destruction of electronic components.**

General Section

1.5 Your Contacts at HAAKE

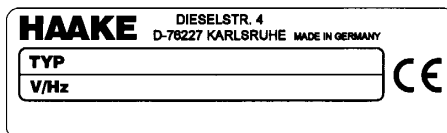
Company address

Gebrüder HAAKE GmbH,
Dieselstraße 4,
D-76227 Karlsruhe

Tel. (0721) 4094-0
Fax (0721) 4094-300
<http://www.haake.de>

Service/Repairs

Tel.: (0721) 4094-444
Fax: (0721) 4094-360
E-Mail: gebr.haake-repairs@t-online.de



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.

Instruction Manual

2. Instruction Manual

2.1 Instruction Manual C10

2.2 Instruction Manual DC10

2.3 Instruction Manual DC30/DL30

2.4 Instruction Manual DC50

Unit Description

3. Unit Description

Please consult the attached operating instructions for the description of the unit.

Testing and Measuring Devices

4. Testing and measuring devices

4.1 Required testing and measuring devices

1. Digital voltmeter 0,1mV resolution
2. Normal voltage and source of current 0,1mV resolution
3. Standard zero modem cable 9 male / 9 female or 9 male / 25 female
4. PC or Laptop with serial RS232 Interface (DC30/DC50)
5. Terminal program DOS or Windows.
e.g. Win Terminal or Hyperterminal (Win 95)
6. Slotted screw driver and screwdriver for recessed-head screws
7. Round socket key (HAAKE order no. 799-1304)

Technical Data

5. Technical Data

Technical Data see Instruction Manual.

Opening the Units

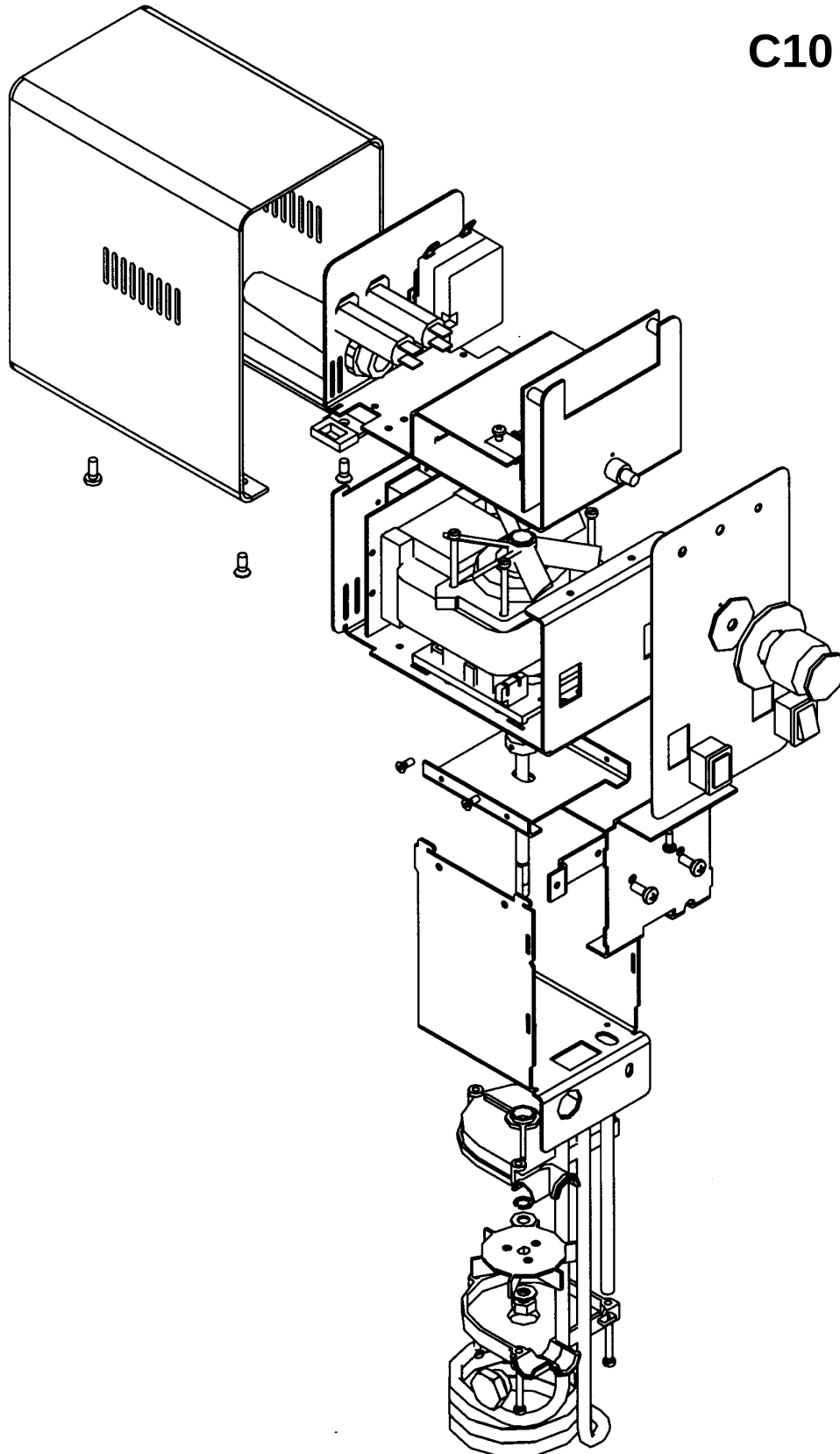
6. Opening the Units

6.1 C10: Replacing the printed circuit board

- 1** Release the bottom four fixing screws of the thermostat hood.
- 2** Pull the hood away to the rear.
- 3** Release the control knob on the front panel.
- 4** Release the clamping screw of the potentiometer.
- 5** Remove the two screws on the printed circuit board.
- 6** Release the cable connections.
- 7** Detach the triac from the heat sink.
- 8** Pull-out the printed circuit board to the rear.

Opening the Units

C10



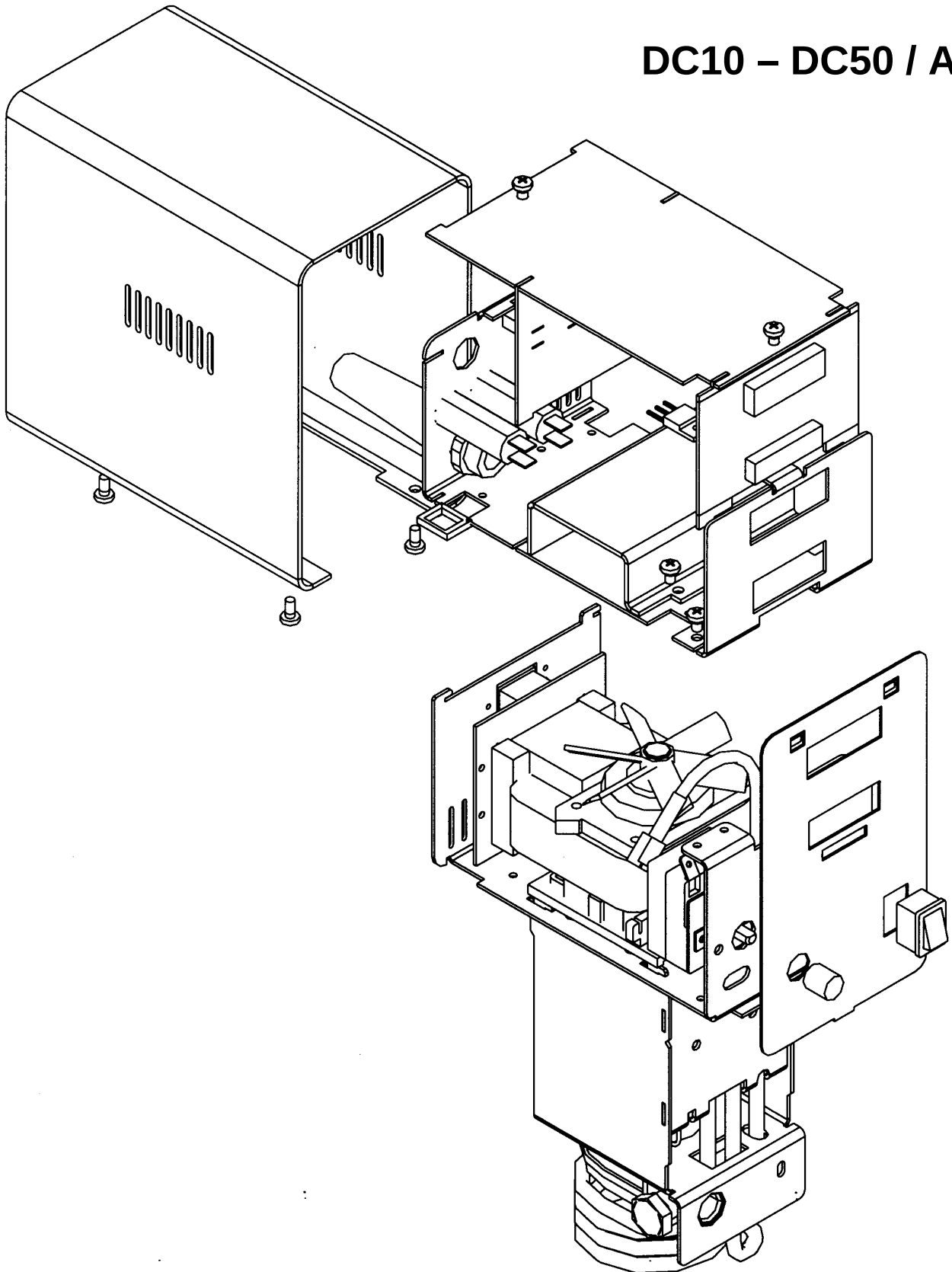
Opening the Units

6.2 DC10 – DC50: Replacing the printed circuit boards

- 1** Release the bottom four fixing screws of the thermostat hood.
- 2** Pull the hood away to the rear.
- 3** Release the fixing screws of the main printed circuit board.
- 4** If the interface is fitted, release its mounting screws too.
- 5** Remove the plugged-in printed circuit board.
- 6** For the power supply printed circuit board, pull-out the fuses to the rear and detach the triac from the heat sink.

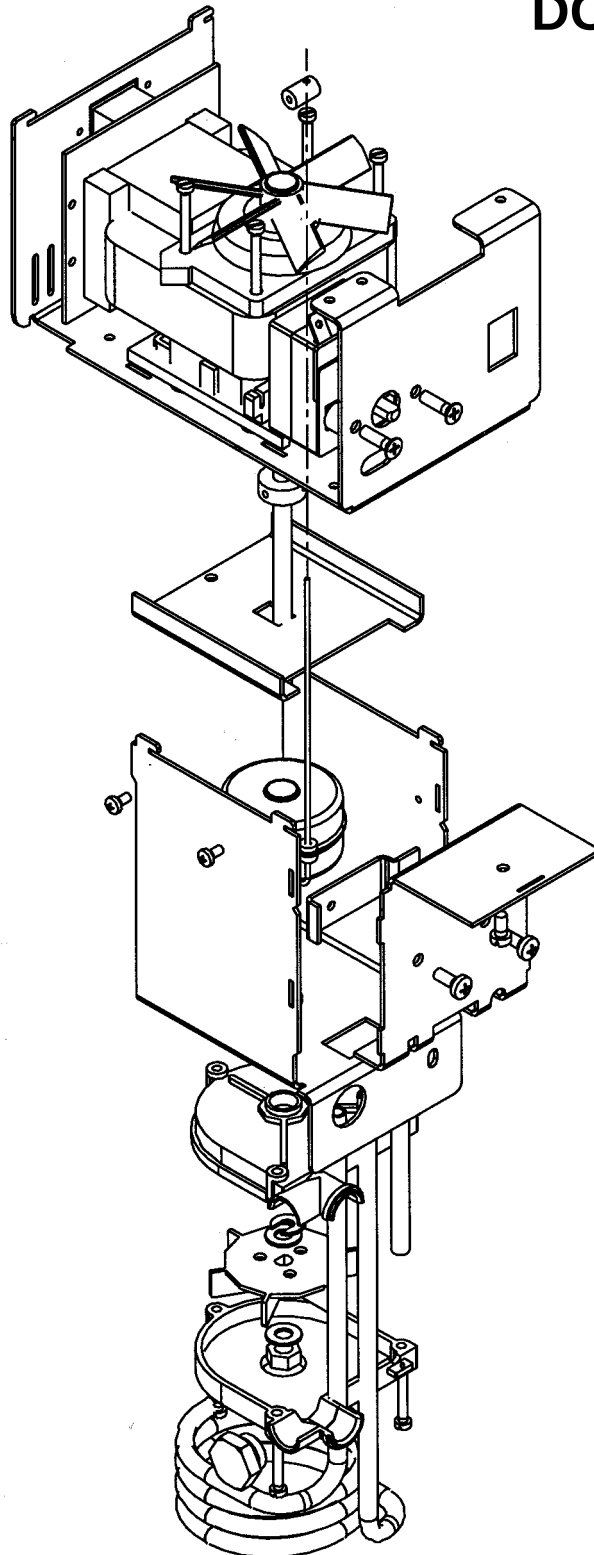
Opening the Units

DC10 – DC50 / A



Opening the Units

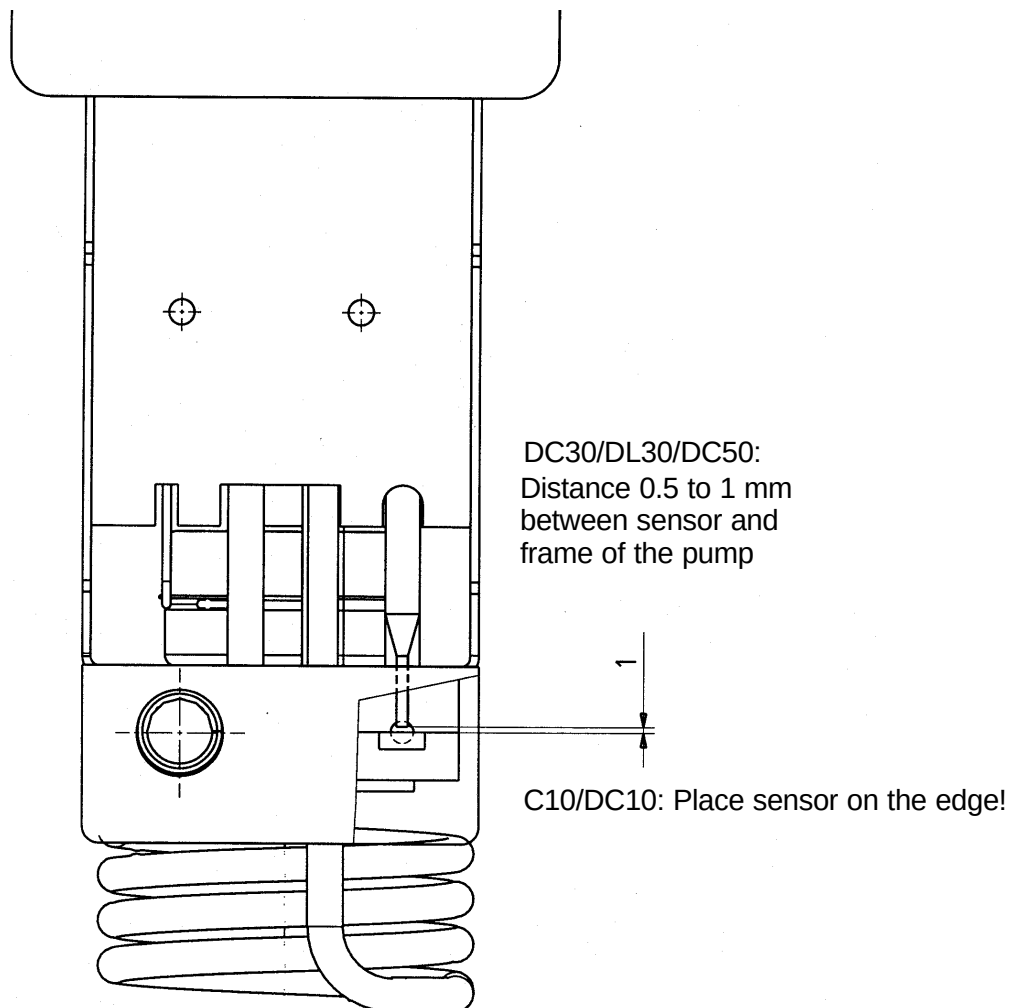
DC10 – DC50 / B



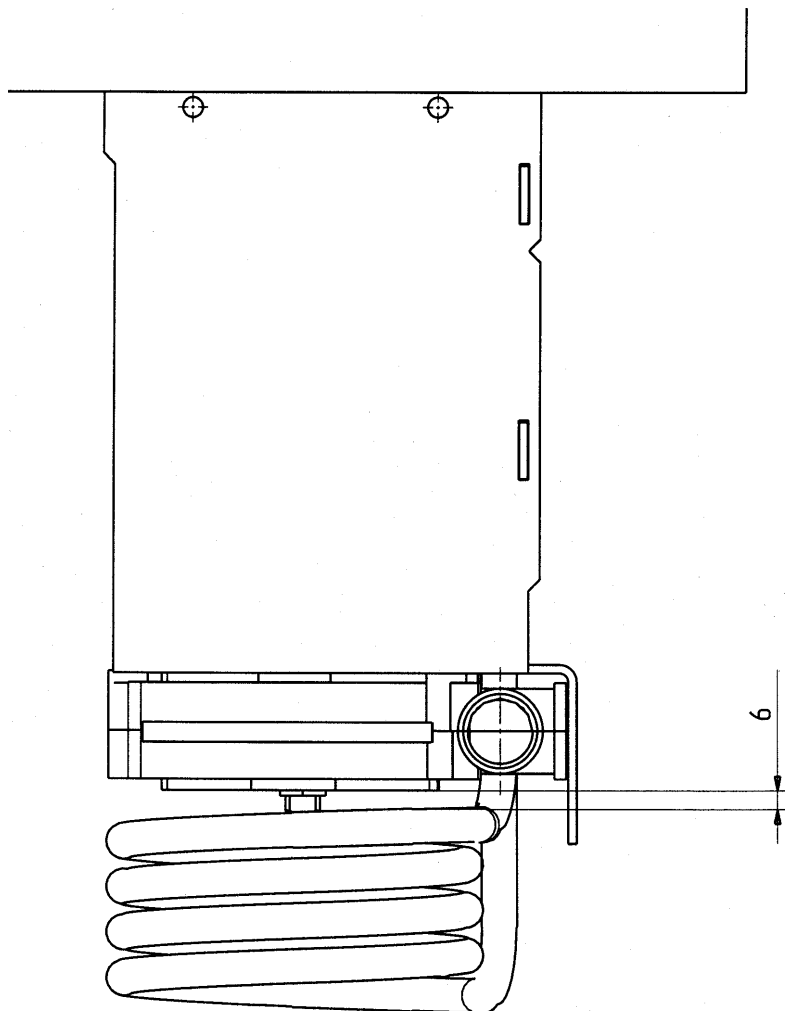
Opening the Units

6.3 Replacing the heater and the temperature sensor

- 1 Release the bottom four fixing screws of the thermostat hood.
- 2 Pull the hood away to the rear.
- 3 Loosen the fixing screws on front of the pump shaft.
- 4 Loosen the soldered joint from the temperature sensor.
- 5 Pull out the sensor upwards.
- 6 Remove the connector from the heater.
- 7 Remove the clamps from the overtemperature controller at the heater.
- 8 Pull out the heater downwards.



Opening the Units



C10/DC10/DC30/DL30/DC50:
Distance 6 mm between upper
spiral of the heater and the ribs
of the pump housing

Opening the Units

6.4 Replacing the motor

-  Release the bottom four fixing screws of the thermostat hood.
-  Pull the hood away to the rear.
-  Detach the cables from the mains switch, heater and sensor.
-  Release the mounting screws of the electrical bracket.
-  Detach the electrical bracket.
-  Pull-off the clamps of the overtemperature controller on the heater.
-  Remove the heater (see under "replacing the heater").
-  Release the three screws of the pump casing.
-  Pull-off the pump casing.
-  Remove the screw of the pump impeller wheel.
-  Pull-off the pump impeller wheel in the axial direction.



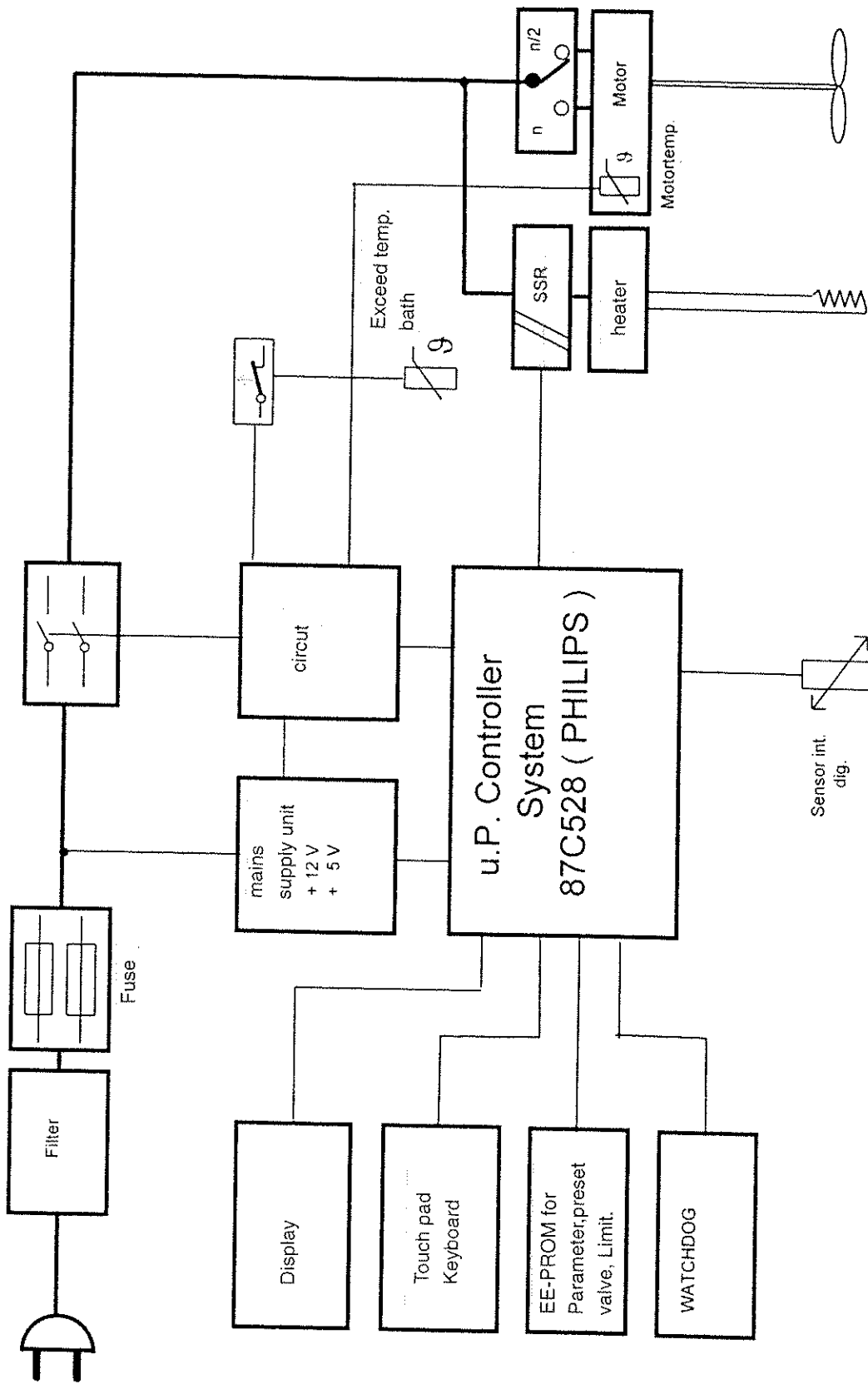
Take care to avoid damage when pulling-off the pump impeller wheel (Order No. 003-1603).

-  Pull-off the securing ring from the motor shaft.
-  Release the clamp screw of the strip-off ring on the motor shaft.
-  Release the four mounting screws of the motor.
-  Pull-out the motor.

Construction of the Unit / Components

7. Construction of the Unit / Components

7.1 System diagram

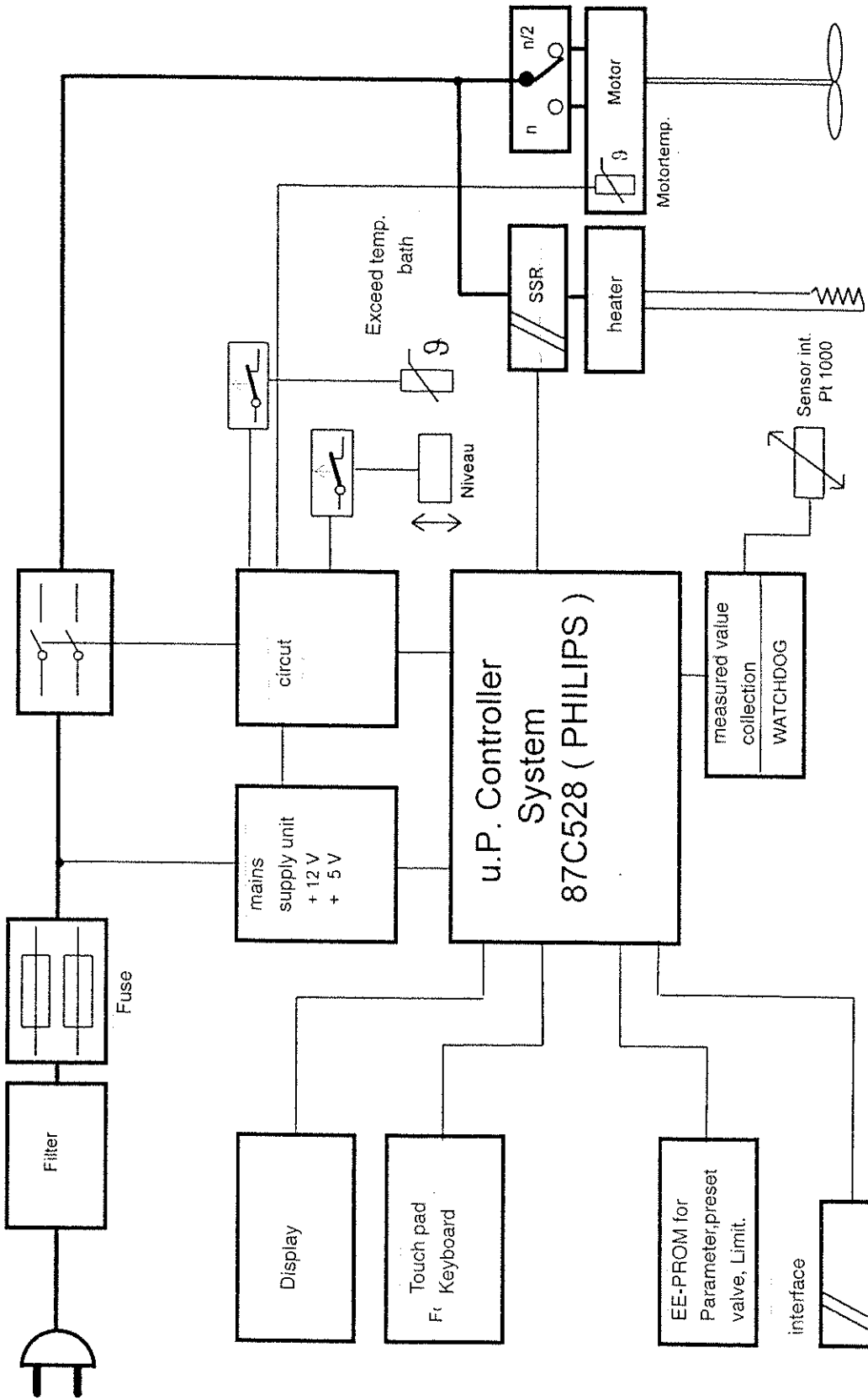


Änderungen	
a	
b	
c	

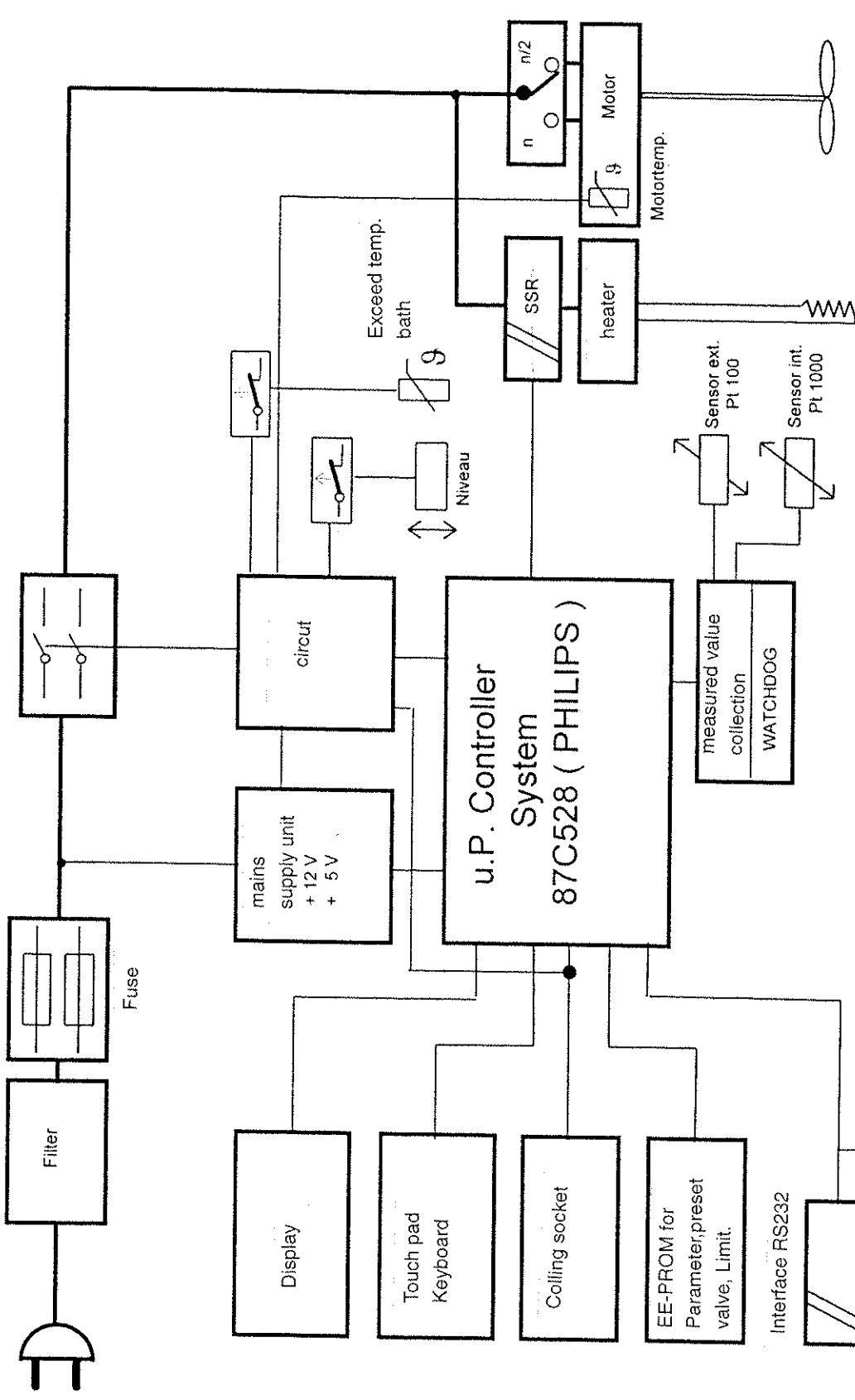
Blatt 1 von 1	d	e
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Benennung	gez.	Goetz
	gepr.	

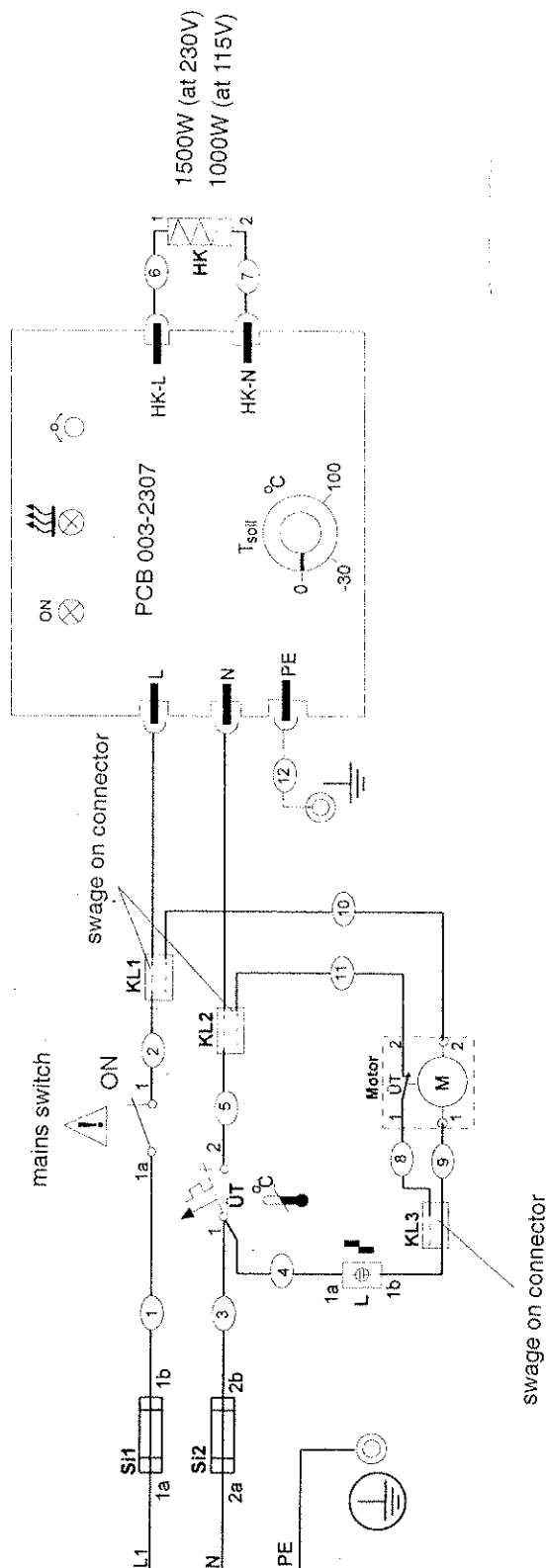
block wiring diagram DC10		
Gedr. H A K E GmbH Karlsruhe	Nr.	SERVICE 6/98



Änderungen		Blatt 1 von 1	Benennung	block wiring diagram DC30/DL30	
a					
b		d	gez. Goetz	Geb. H A A K E GmbH Karlsruhe	Nr. SERVICE 6/98
c		e	gepr.		

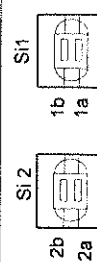


Änderungen		Blatt 1 von 1	Benennung	block wiring diagram DC50	
a					
b		d	gez. Goetz	Gebr. H A K E GmbH Karlsruhe	Nr. SERVICE 6/98
c		e	gepr.		



Fuses

(View from the back)



Cable set 003-2704 (230V)
Cable set 003-3104 (115V)

Fuse Si2 is replace by adapter 087-3047 at 100V/115V

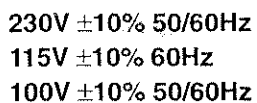
Änderungen		Blatt von	1/1	Benennung	Wiring diagram C10	
a	13098	27.01.98	Prohaska		gez. 28.11.97	Gebr. H A A K E GmbH
b	13171	18.03.98	Prohaska		gepr. <i>Prohaska</i>	Nr. 003-2827
c						Karlsruhe

Construction of the Unit / Components

7.2 Printed Circuit Board

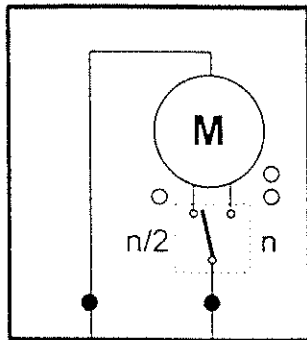
7.2.1 PCB-Description

7.2.2 PCB-Schematic



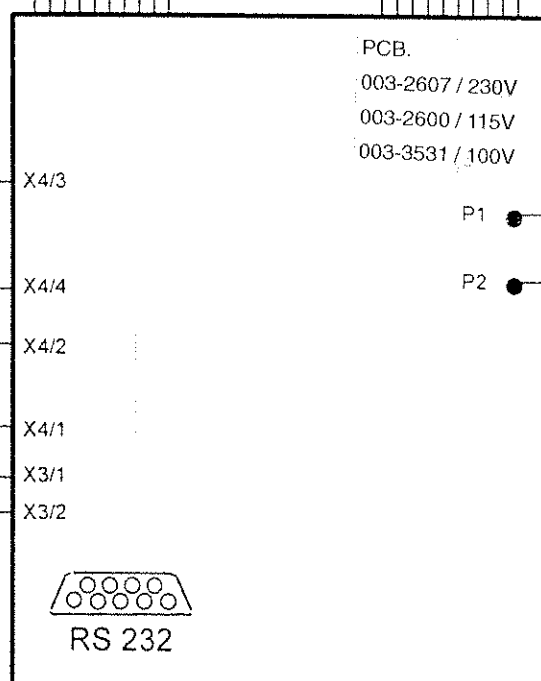
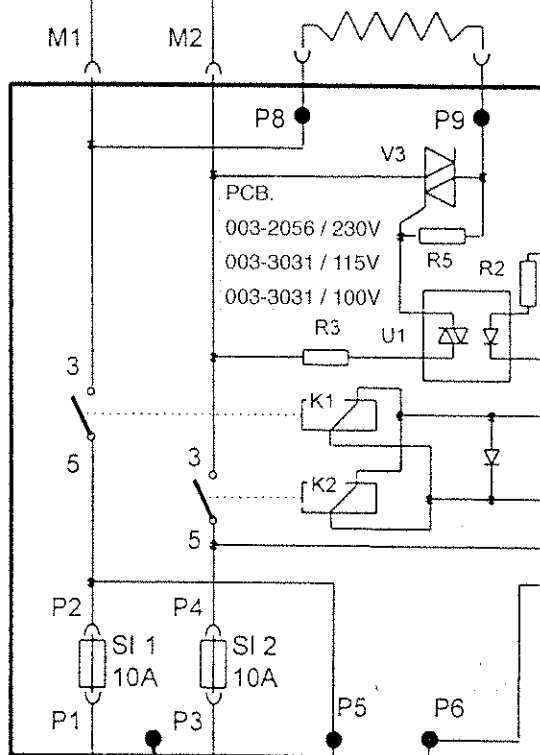
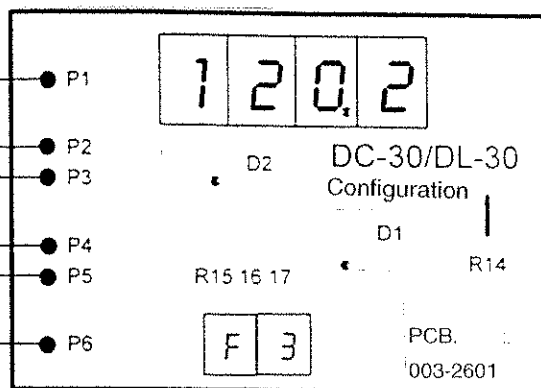
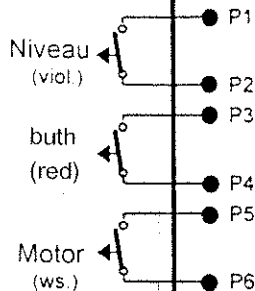
Änderungen		Blatt 1 von 1		Benennung Wiring diagram DC10		
a						
b		d		gez. 7.1.98 Goetz	Gebr. H A A K E GmbH	Nr.
c		e		gepr. <i>Goetz</i>	Karlsruhe	

Motor compl,	DC30	DL30
230 V	003-1586	003-2073
115V	003-1683	003-2076
100V	003-2314	003-3568



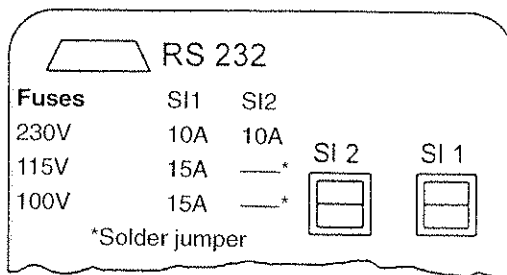
ALARM

Heater
2000W/230V
1200W/115V
1200W/100V



Pt 1000
Sensor int.
DC-30 = 003-1957
DL-30 = 003-2406

230V $\pm 10\%$ 50/60Hz
115V $\pm 10\%$ 60Hz
100V $\pm 10\%$ 50/60Hz



Änderungen

a 13213 vom 6.4.98

b

c

Blatt 1
von 1

Wiring diagram DC30/DL30

gez. 7.1.98 Goetz

gepr.

Gebr. H A A K E GmbH
Karlsruhe

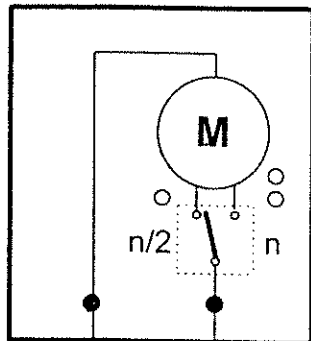
Nr.

Motor compl

230 V 003-1586

115V 003-1683

100V 003-2314



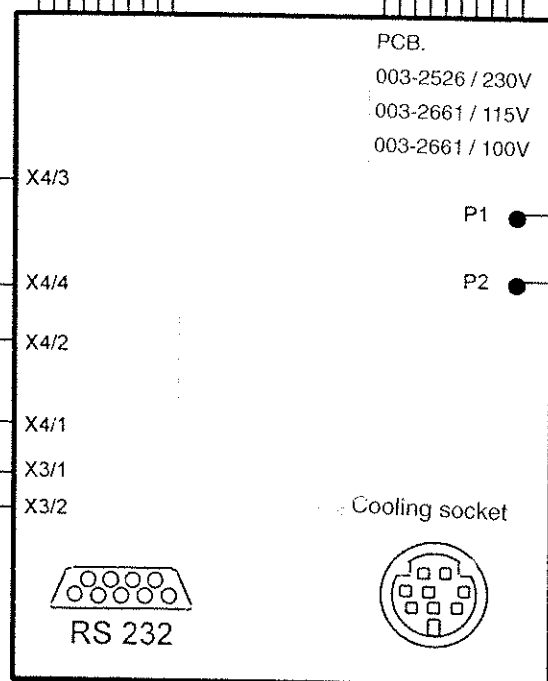
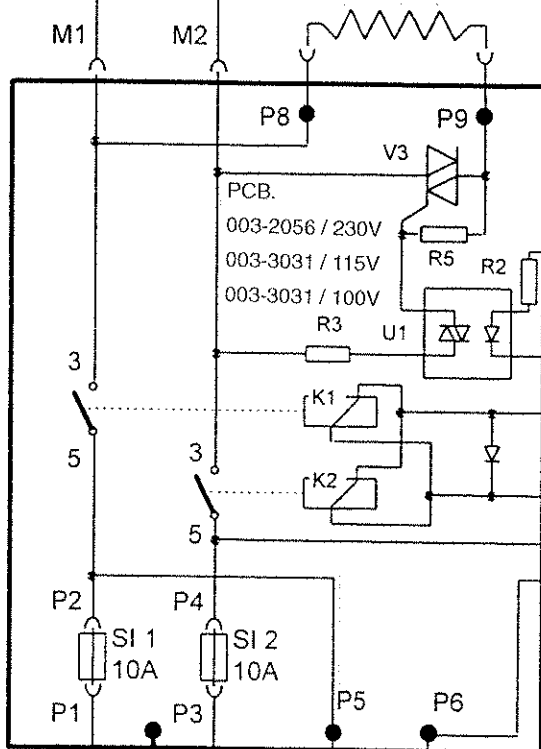
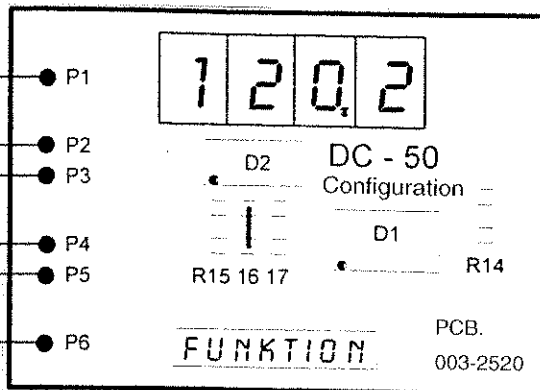
ALARM

Heater
2000W/230V
1200W/115V
1200W/100V

Niveau
(viol.)

buth
(red)

Motor
(ws.)



Pt 1000
Sensor ext.

Pt 1000
Sensor int.
003-1957

230V $\pm 10\%$ 50/60Hz
115V $\pm 10\%$ 60Hz
100V $\pm 10\%$ 50/60Hz

Fuses

230V

115V

100V

SI1

10A

15A

15A

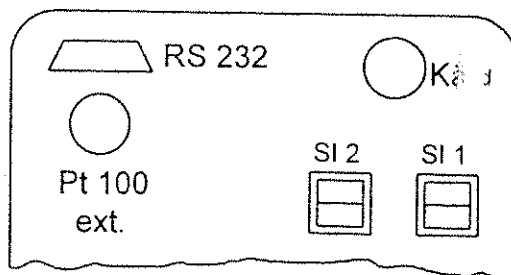
SI2

10A

—*

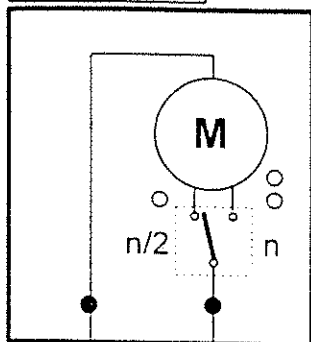
—*

*Solder jumper



Änderungen		Blatt 1 von 1	Benennung		
a			Wiring diagram DC50 (RS 232)		
b		d	gez. 7.1.98 Goetz	Gebr. H A A K E GmbH	Nr.
c		e	gepr.	Karlsruhe	

Motor kompl./ 230V
003 - 1586



ALARM

Niveau
(viol.)

buth
(red)

Motor
(ws.)

- 60.2

D2 DC - 50 (-80°C)
Configuration

R15 16 17

R14

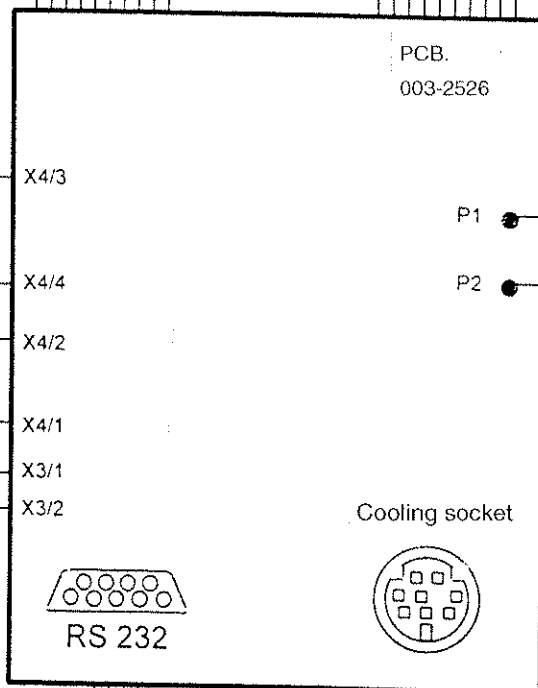
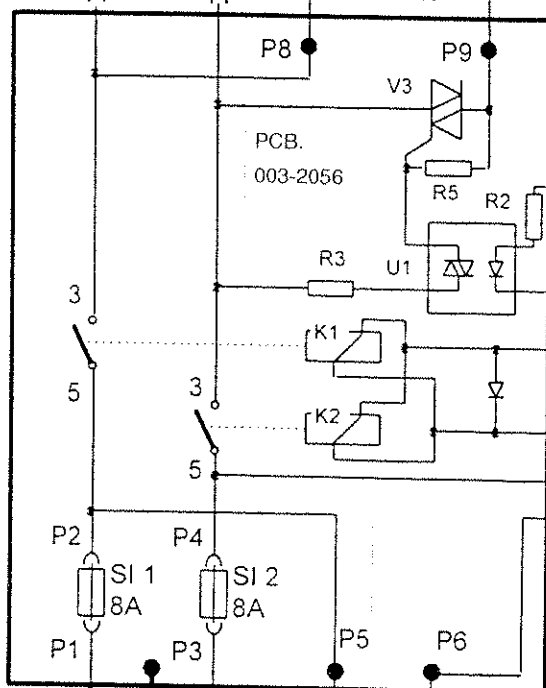
FUNKTION

PCB.

003-3118

Heater

1500 W



P1

P2

Cooling socket

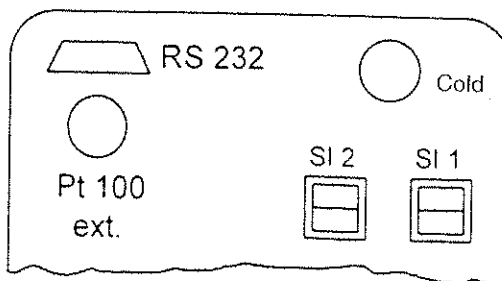
RS 232

Pt 1000
Sensor ext.

Pt 1000
Sensor int.
003-3111

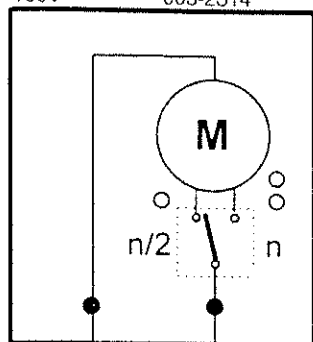
Mains on

230 V +/- 10%
50/60 Hz

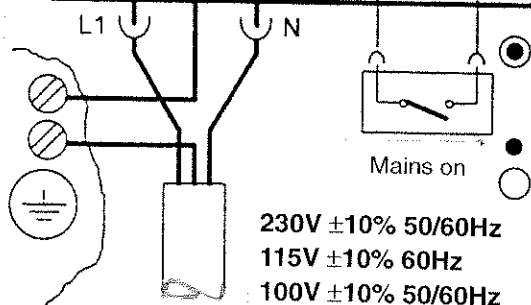
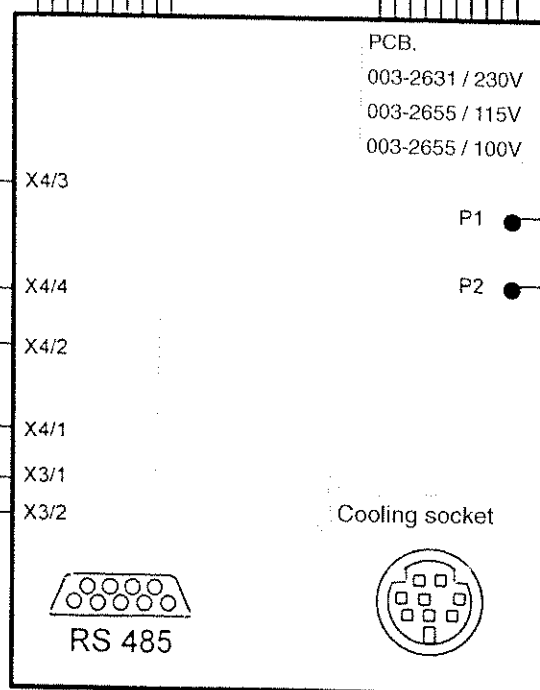
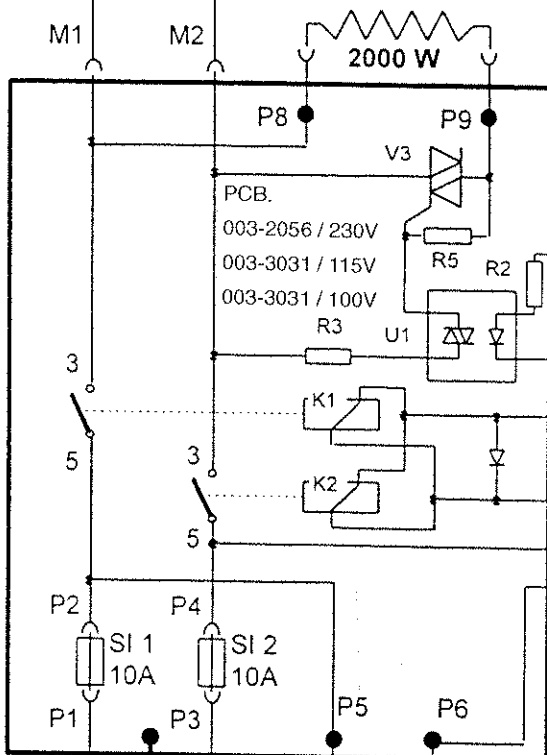
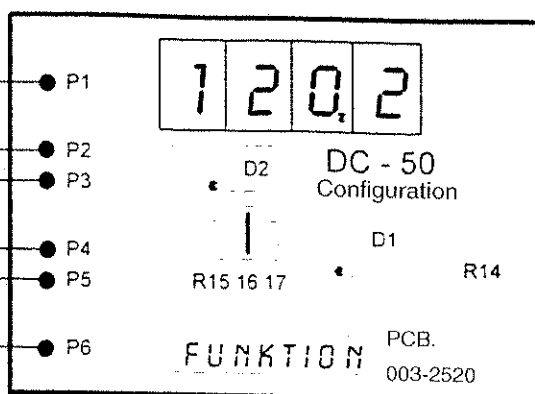
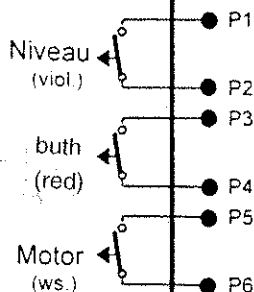


Anderungen	Blatt 1 von 1	Benennung (230V)	Wiring diagram DC50 (-80°C) (RS 232)	
a		gez. 7.1.98 Goetz	Gebr. H A A K E GmbH	Nr.
b	d	gepr.	Karlsruhe	
c	e			

230 V	003-1586
115V	003-1683
100V	003-2314



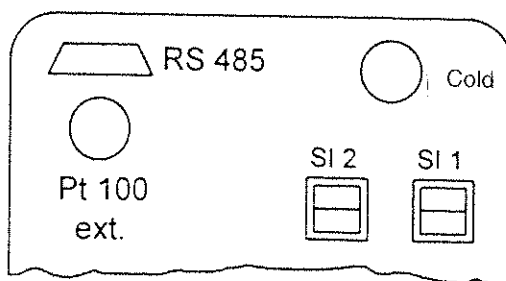
Heater
2000W/230V
1200W/115V
1200W/100V

Pt 1000
Sensor ext.

Pt 1000
Sensor int.
003-1957

Fuses	SI1	SI2
230V	10A	10A
115V	15A	—*
100V	15A	—*

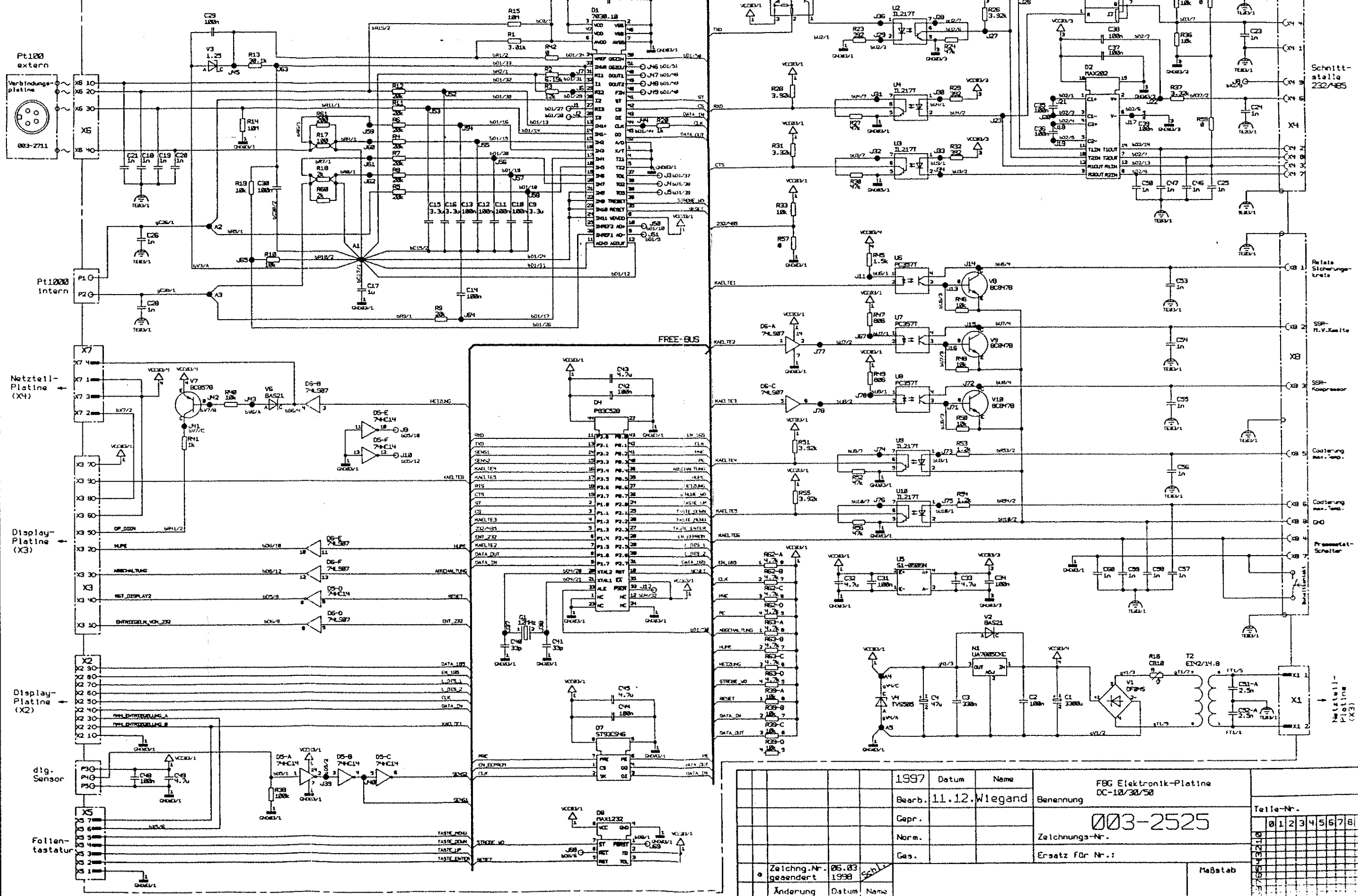
*Solder jumper



Änderungen	Blatt 1	Benennung		
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b	d	gez. 7.1.98 Goetz	Gebr. H A A K E GmbH Karlsruhe	Nr.
c	e	gepr.		

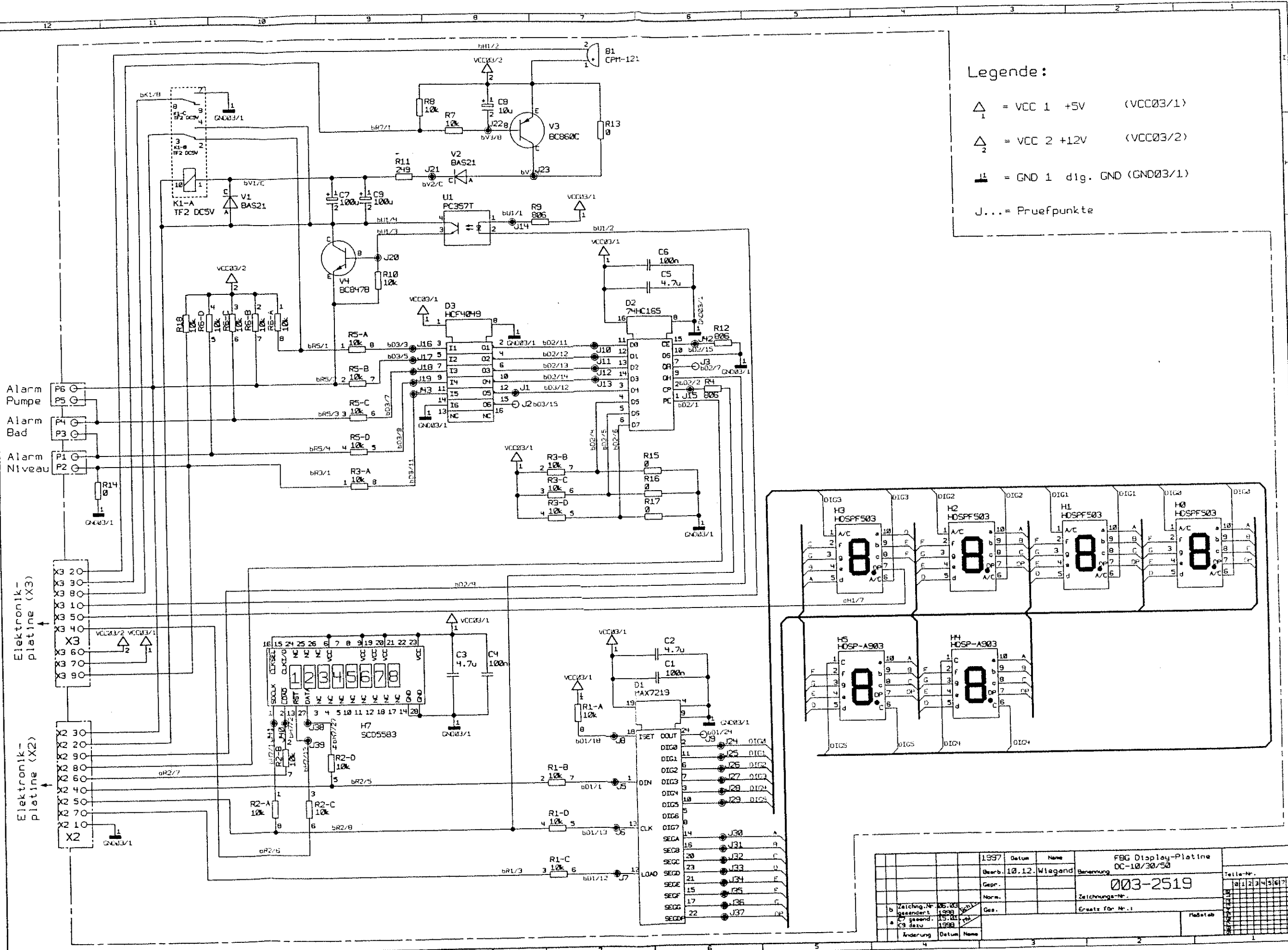
Legende:

- Δ = VCC 1 + 5V (VCC03/1)
- Δ = VCC 3 + 5V gt(VCC03/3)
- Δ = VCC 4 + 12V (VCC03/4)
- $\square$ = GND 1 dig.GND (GND03/1)
- $\square$ = GND 3 GND gt (GND03/3)
- $\square$ = PE (TE03/1)
- A ... = Sternpunkte
- J ... = Prüfpunkte
- ** = siehe Stückliste



1997	Datum	Name	FBG Elektronik-Platine
Bearb.	11.12.1998	Wiegand	Benennung
Gepr.			003-2525
Norm.			Zeichnungs-Nr.
Gas.			Ersatz für Nr.:
Zeichn.-Nr.	05.83		
geändert	1998		
Änderung	Datum	Name	Maßstab

Die Schaltung ist eine Kopie einer Schaltung, die in der Fachzeitschrift "Elektrotechnik" vom 10.12.1997 veröffentlicht wurde. Die Schaltung ist eine Kopie einer Schaltung, die in der Fachzeitschrift "Elektrotechnik" vom 10.12.1997 veröffentlicht wurde.



Legende:

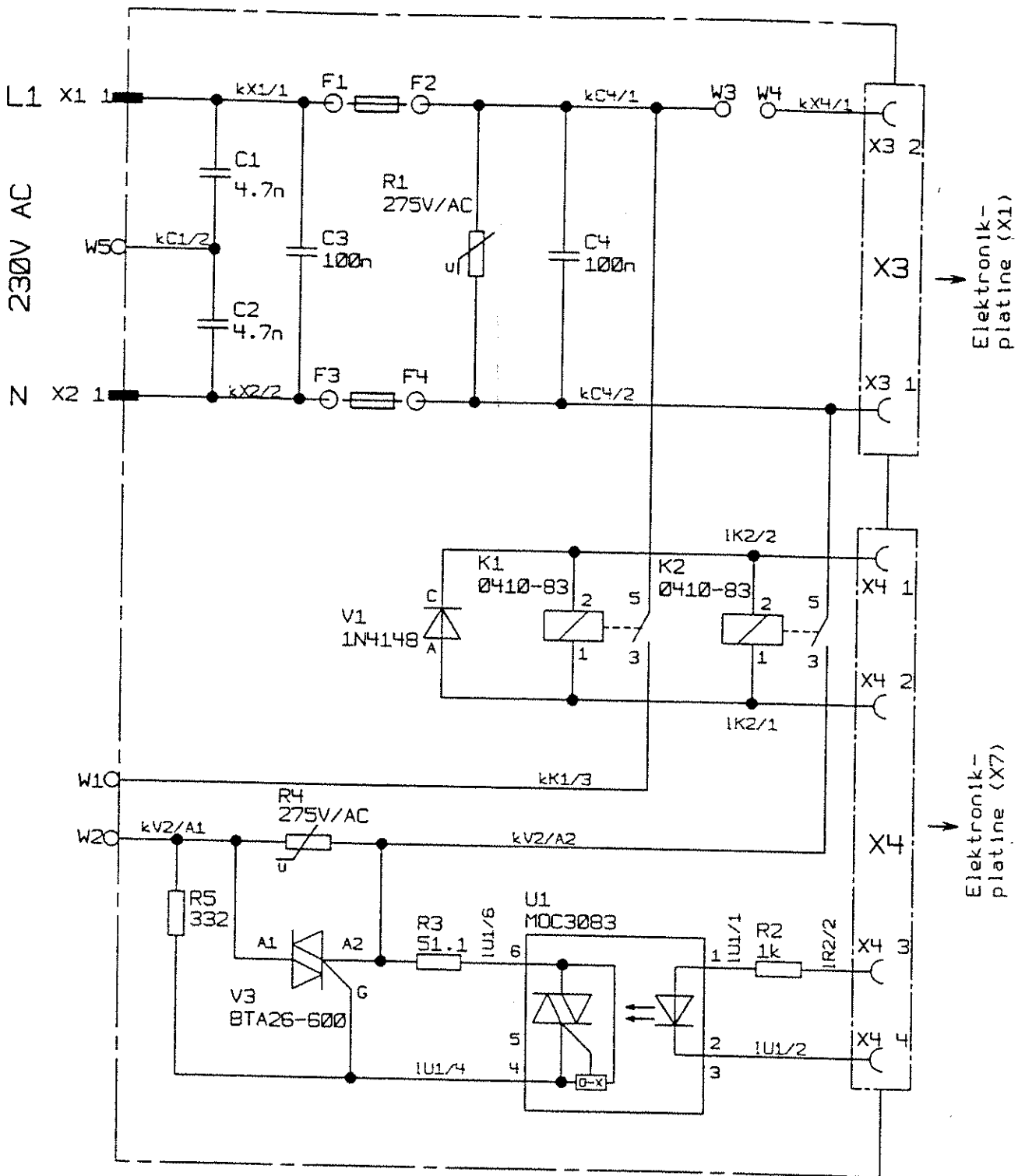
Δ_1 = VCC 1 +5V (VCC03/1)

Δ_2 = VCC 2 +12V (VCC03/2)

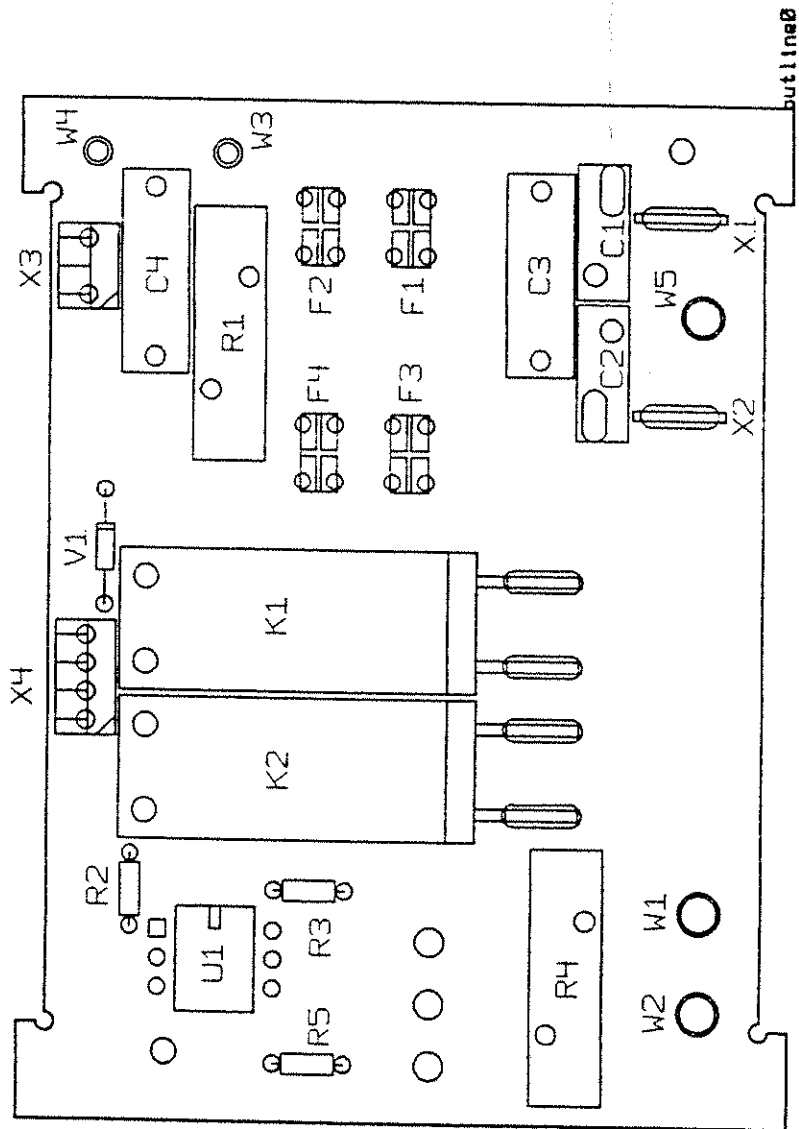
$\square$ = GND 1 d1g. GND (GND03/1)

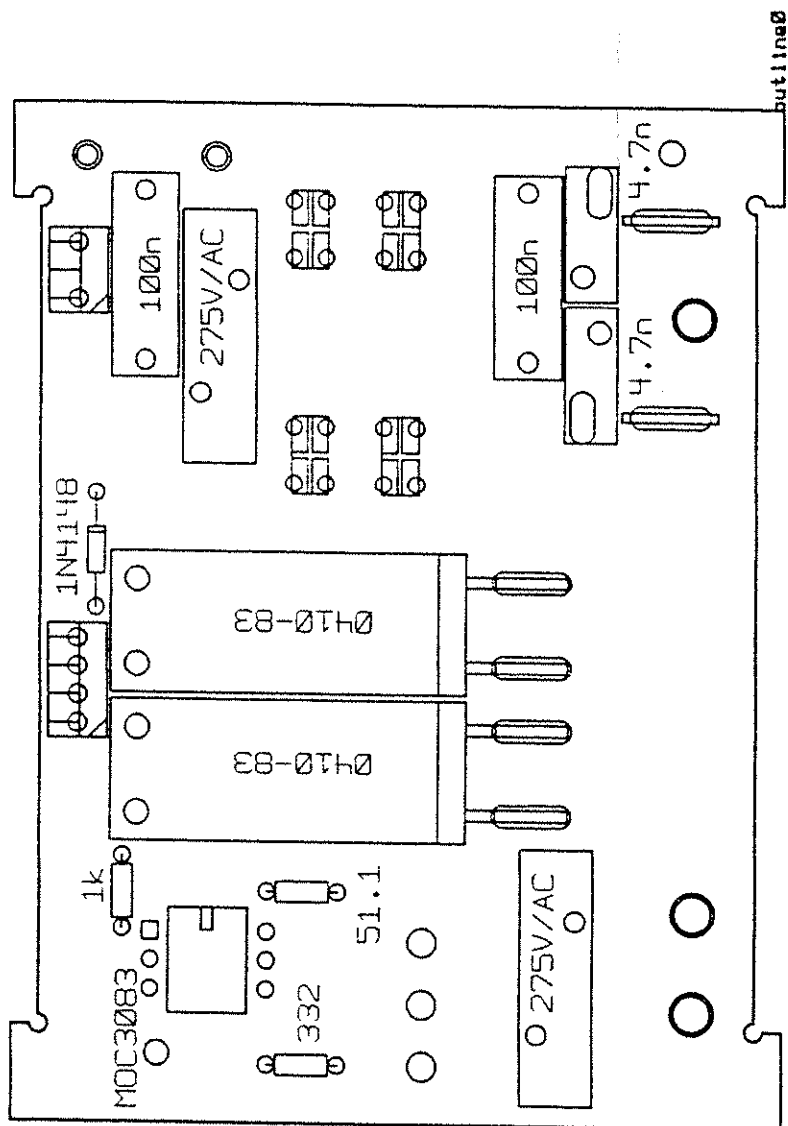
J... = Prüfpunkte

1997		Datum	Name	FBG Display-Platine	
Bearb.		10.12.	Wiegand	OC-10/30/50	
Gepr.				Benennung	
Norm.				Zeichnungs-Nr.	
Gez.				003-2519	
Änderung		Datum	Name	Ersatz für Nr. 1	
b Zeichnung-Nr.		003-2519		Tabelle	
c gezeichnet		15.11.1997			
d gezeichnet		15.11.1997			
e Änderung					



				1997	Datum	Name	FBG Netzteil																		
				Bearb.	10.12.	Wiegand	Benennung	DC-10/30/50																	
				Gepr.			003-2055		Teile-Nr.																
				Norm.					<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr></table>										0	1	2	3	4	5	6
0	1	2	3	4	5	6	7	8																	
				Ges.			Zeichnungs-Nr.																		
	a	LPA Netzteil entfernt	05.03.1998	Sch.				Ersatz für Nr.:																	
		Änderung	Datum	Name				Maßstab																	
4				3				2		1															

[illegible]

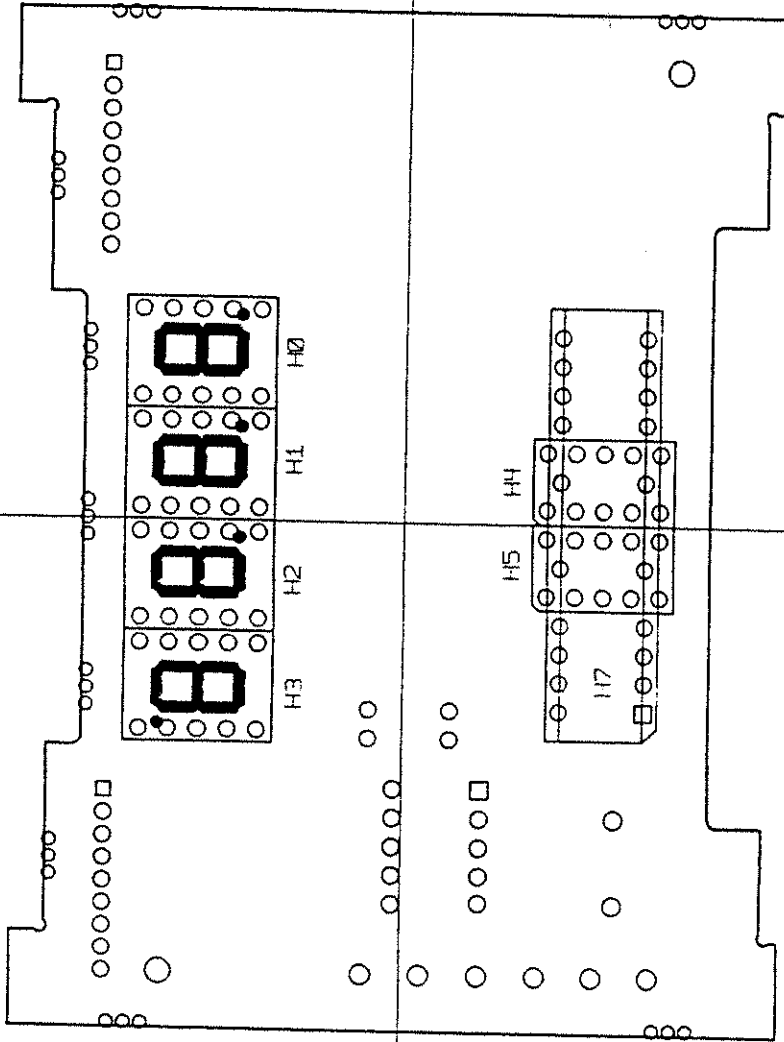
[illegible]

B

A

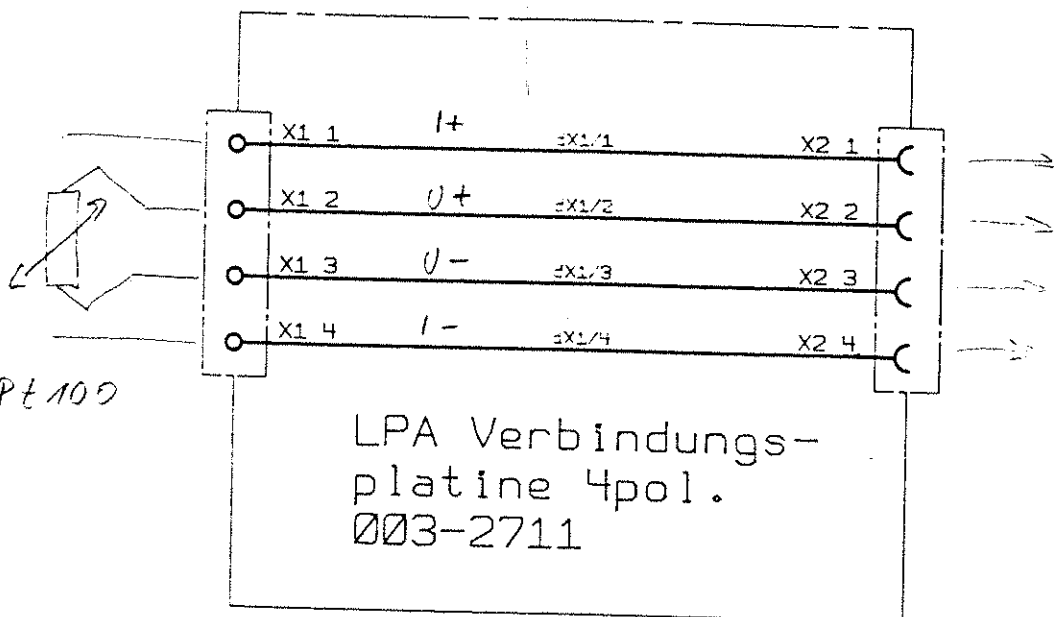
2

1



1998		Datum		Name		FBC Display-Platine DC-10/30/50			
Bearb.		06.05.		Ruhl		Benennung			
Gepr.						Zeichnungs-Nr.		003-2519	
Norm.						Ersatz für Nr.:			
Ges.						Meßstab		1:1	
Proj.		19.01.1998		yo		Telle-Nr.		0123456789	
Änderung		Datum		Name					
a 70/056									

Pt 100



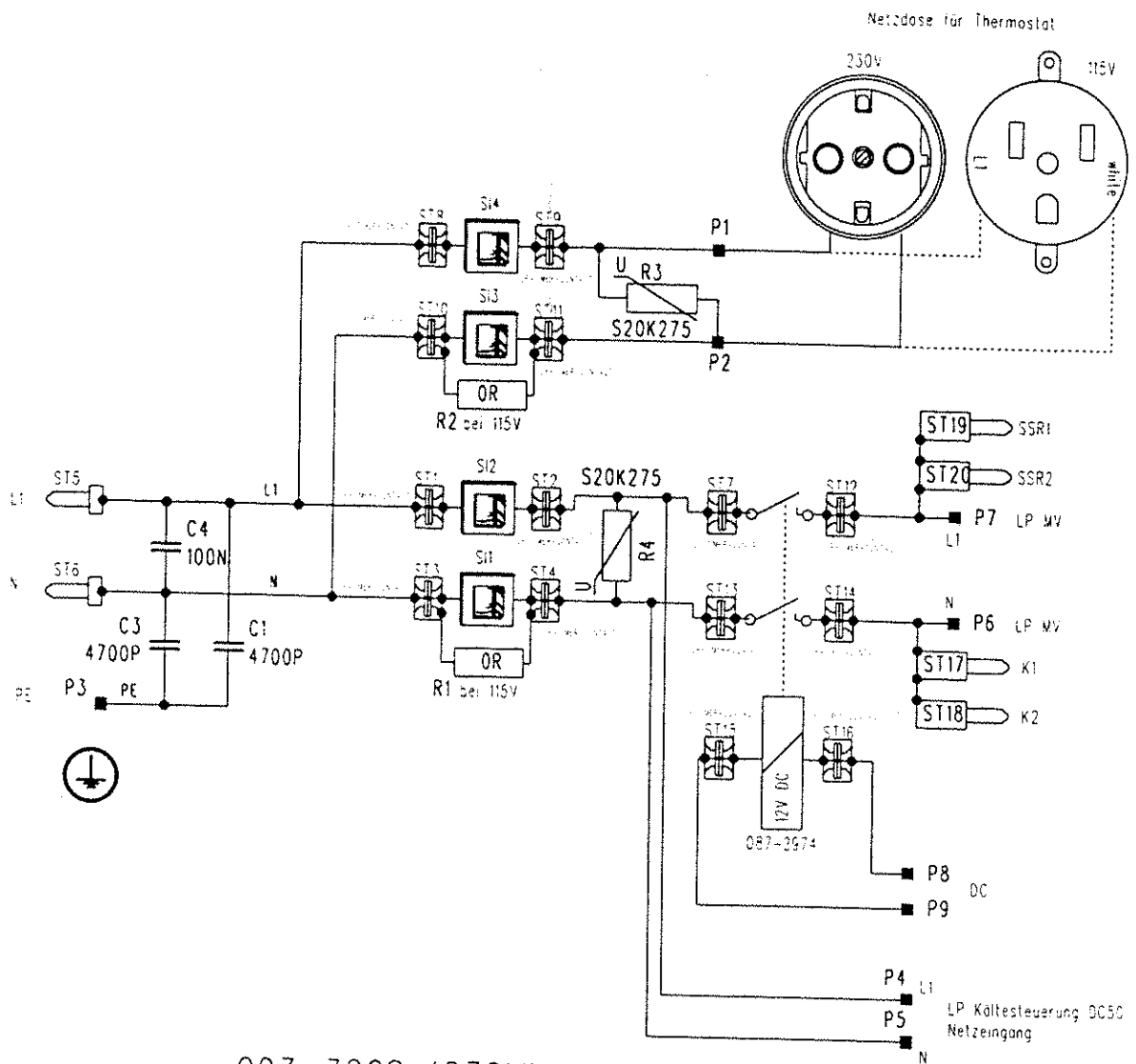
Zinn L. K. 10. 11. 1911

			1997	Datum	Name	F8G Verbindungsplatine 4 polig	
			Bearb.	30.09	Wiegand	Benennung OC-50	
			Gepr.			003-2711	Telle-Nr.
			Norm.				0123456789
		06.11.MW	Ges.			Zeichnungs-Nr.	Mittelmaßstab
		09.10.MW				Ersatz für Nr.:	
	Änderung	Datum	Name	JUMO MESS- UND REGELTECHNIK M.K. JUCHHEIM GmbH & Co. FULDA			Maßstab

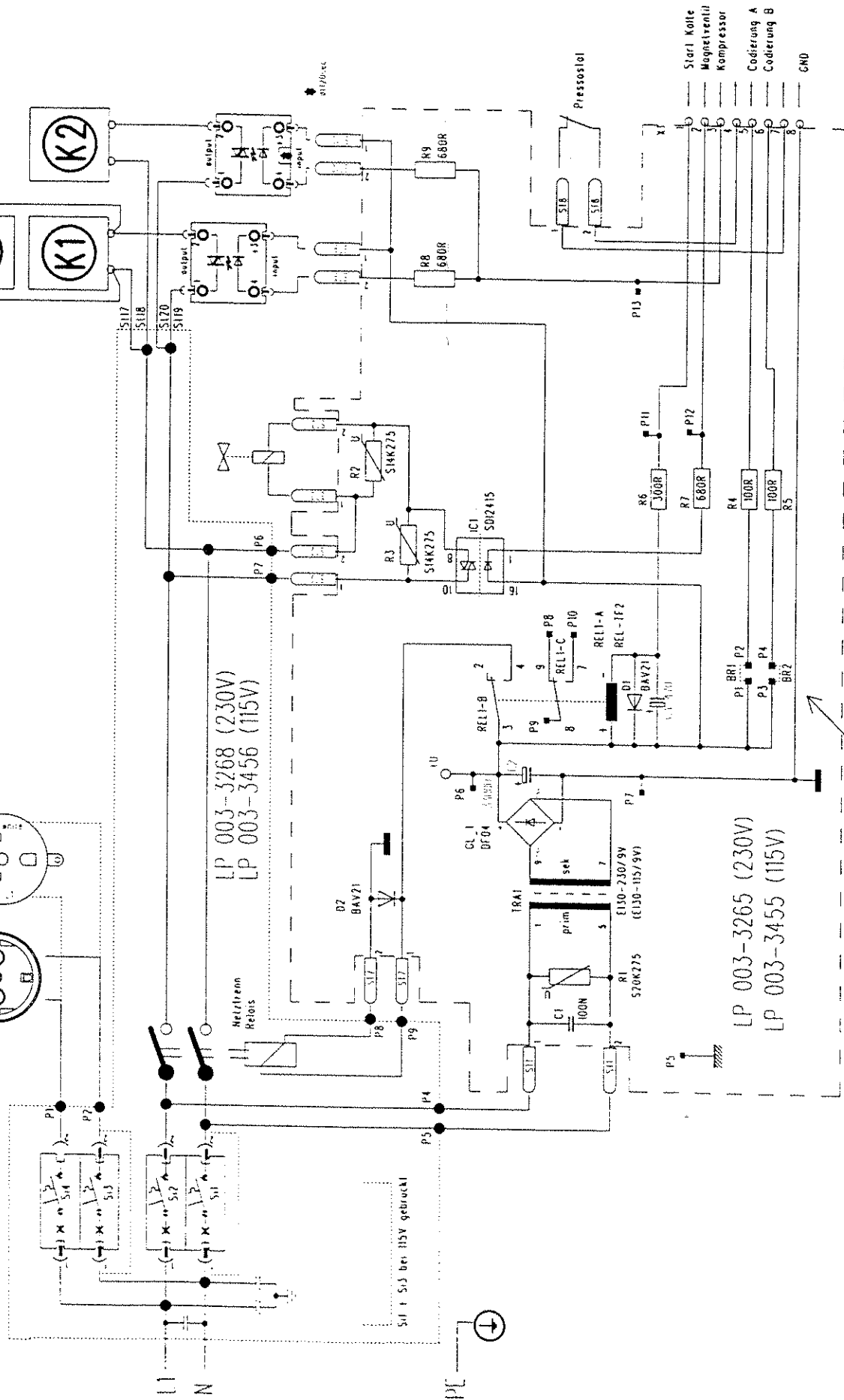
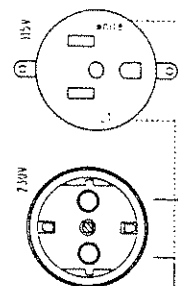
Construction of the Unit / Components

7.3 PCB Refrigeration control DC50

.....



Änderungen		Blatt von	1/1	Benennung	
a				Netzplatte Kältesteuerung DC50	
b		d		gez. 08.01.98	Gebr. HAAKE GmbH
c		e		gepr.	Nr. 003-3267

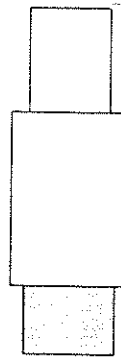


Codierung für Kollegiate

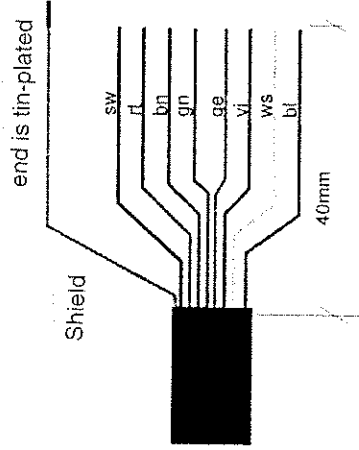
Codierliste 003-3463

Änderungen	Blatt	Benennung	Kältesteuerung DC50
1	400	1/1	
2			
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99			
100			

Gebra. HAAKE GmbH Nr. 003-3264



- Pin
- 8 — black
 - 7 — red
 - 6 — brown
 - 5 — green
 - 4 — yellow
 - 3 — violet
 - 2 — white
 - 1 — blue



Cable specification

CTMD8P-OV1SAU-AWG24-950 Fa. YAMAICHI

Page 1: MDIN08P plug encapsulated to cable

Page 2: open end

cable covering reduced 40mm

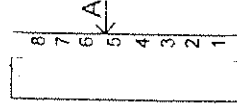
and secured by heat-shrinkable sleeve

cable : UL2464, 8C, 24AWG with AL-foil & Cu-braid

pure length of cable: 950mm

Connect flexible cords to Socket board
(method of termination)

Sight A



polarization ribs,

1x Socket board 8 pole
Fa. AMP

Modell MTA-100 No.643814-8

1x Strain relief cover

Fa. AMP

Modell MTA-100 No.643075-8

Supplement of the cable

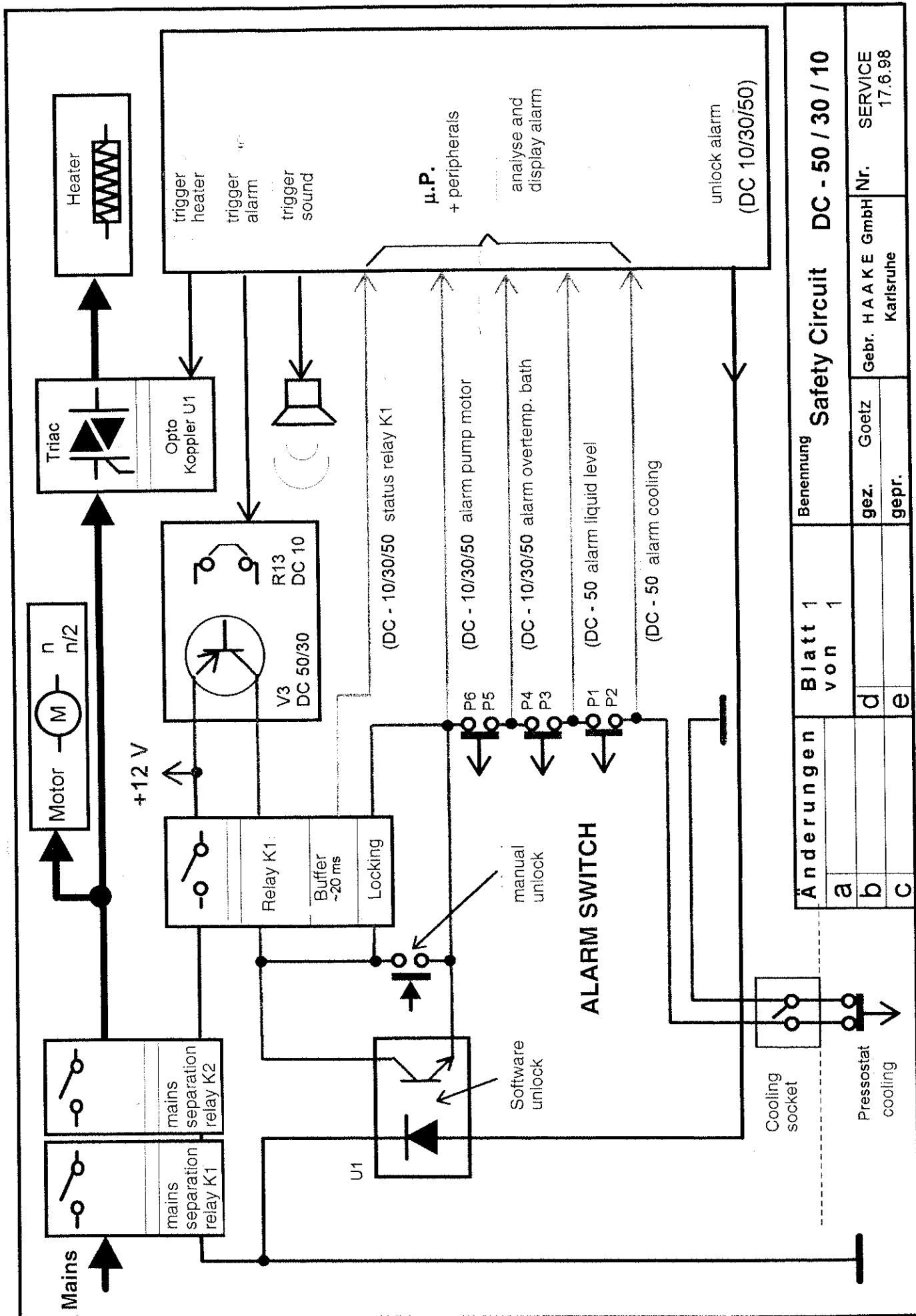
CTMD8P-OV1SAU-AWG24-950 Fa. YAMAICHI

Änderungen		Blatt	Benennung	Control cable DC50 – cooling units complete	
a	13228 20.04.98 Prohaska	1/1		gez. 22.04.98 Prohaska	
b	13238 22.04.98 Prohaska			gepr.	
c					
				Gebr. H A A K E GmbH Karlsruhe	Nr. 003-3342

Trouble Shooting and Remedies

8. Trouble Shooting and Remedies

8.1 Safety circuit



Änderungen		Blatt 1 von 1	Benennung		Safety Circuit		DC - 50 / 30 / 10	
a			gez.	Goetz	Gebr. H A K E GmbH	Nr.	SERVICE	17.6.98
b			gepr.		Karlsruhe			
c								

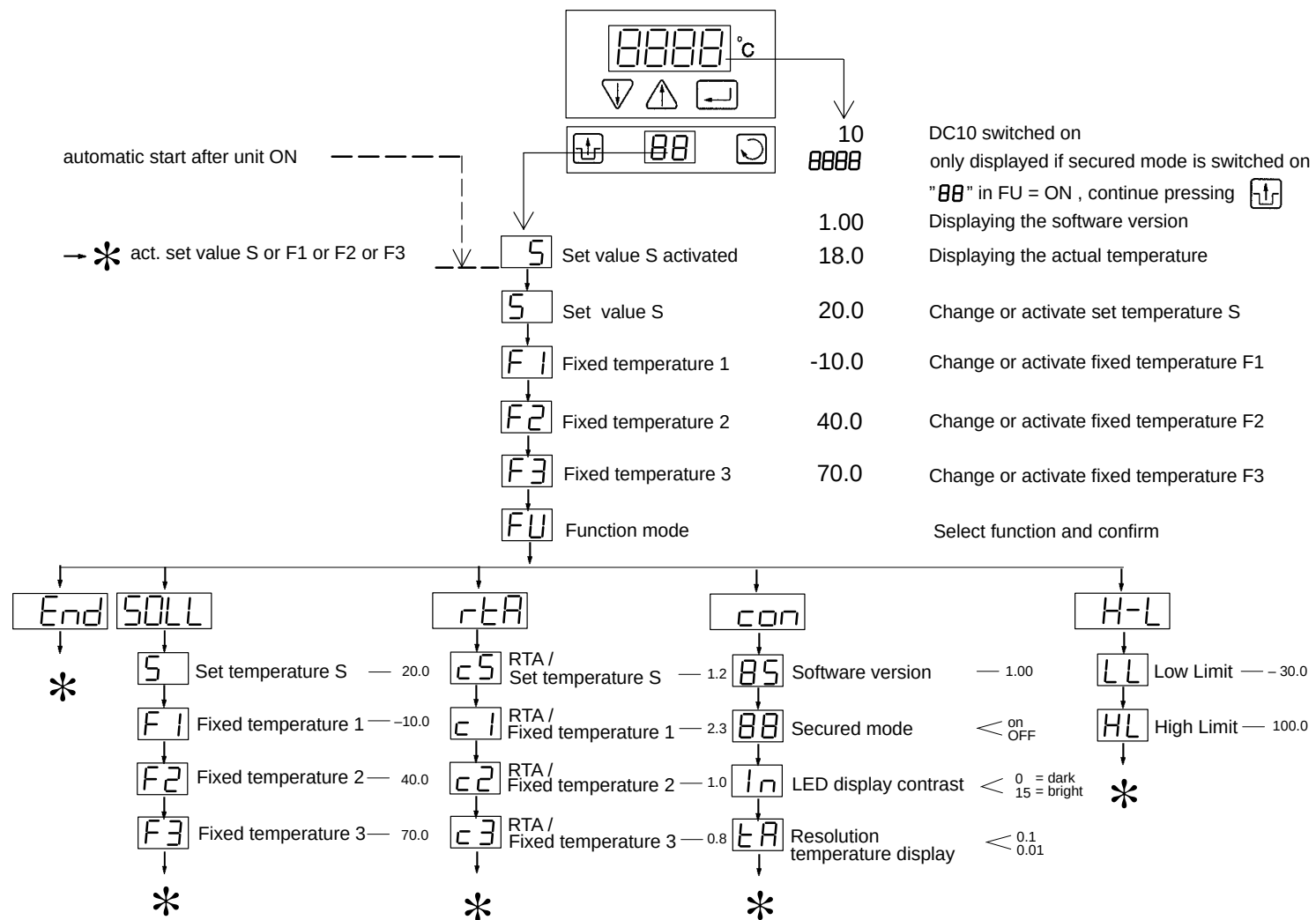
Trouble Shooting and Remedies

8.2 Menu Tree DC10

8.3 Menu Tree DC30/DL30

8.4 Menu Tree DC50

Menu Tree DC10



Telefax

HAAKE

Dieselstr. 4 76227 Karlsruhe
Germany

☎(0721) 4094-0

Telex 7826 739 hak d

Fax (0721) 4094 300

To/An:

Fax Nr.

From/von:

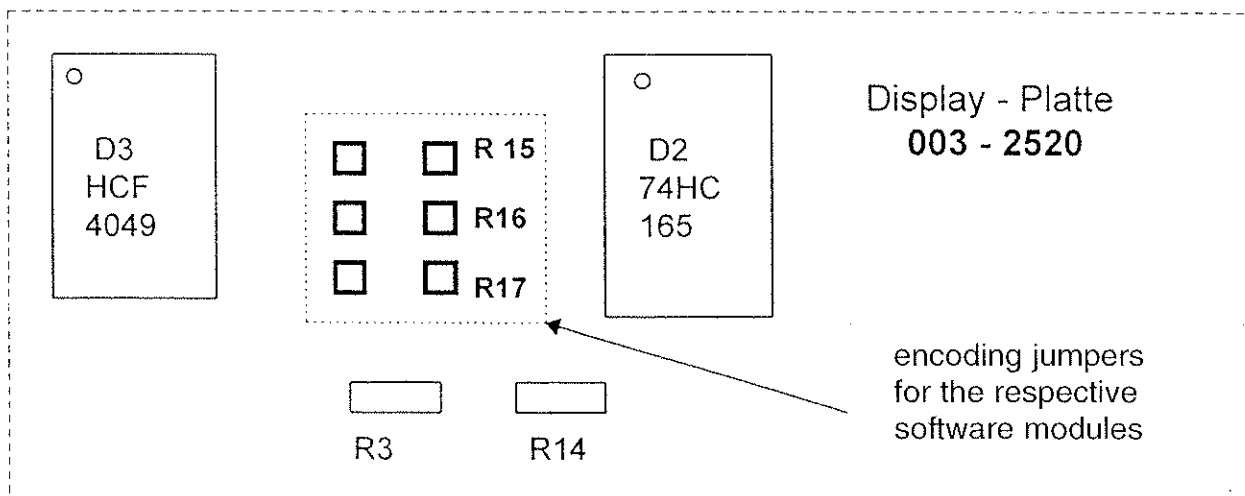
Date/Dat.:

No. of pages/Seitenzahl:

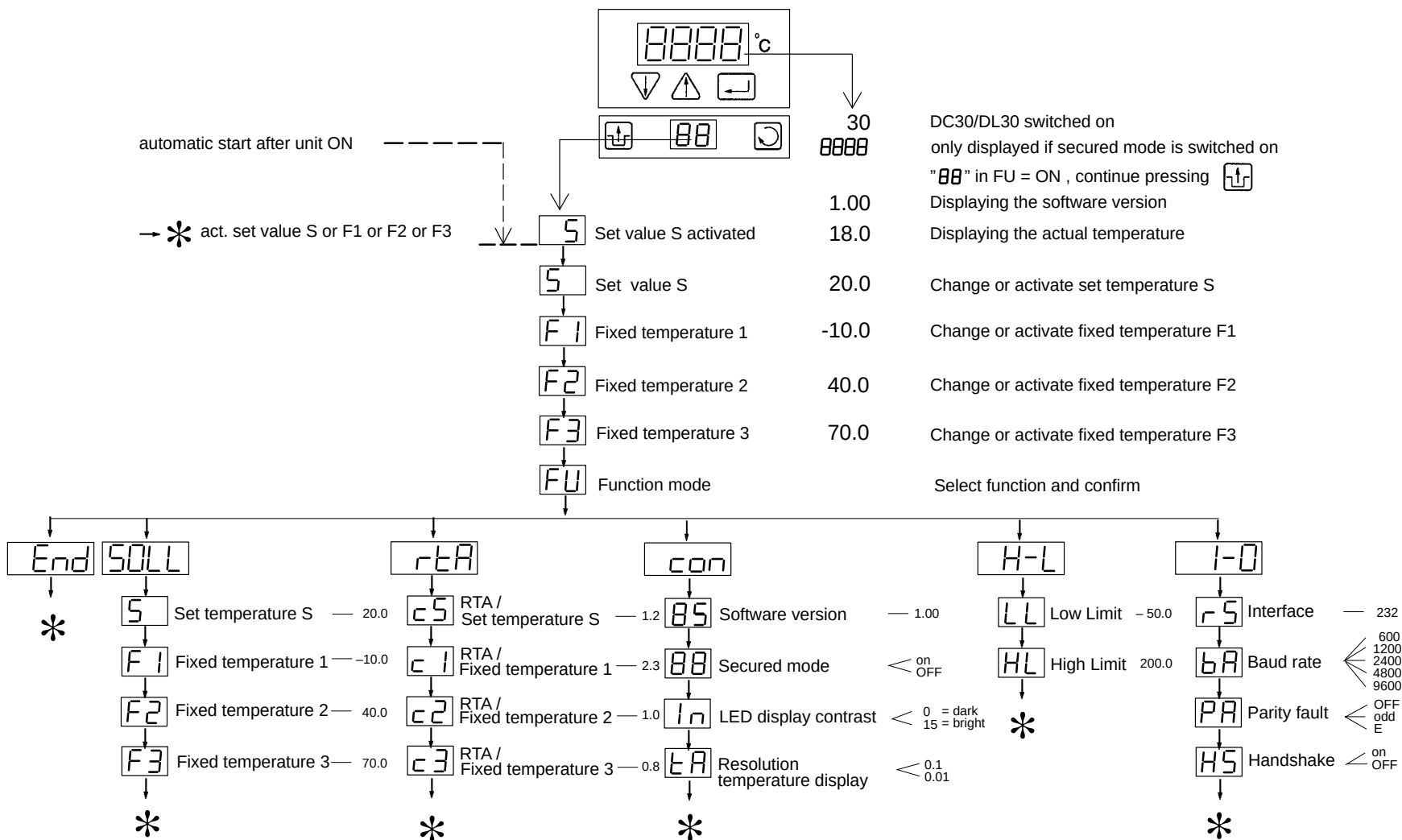
In the "new" DC generation the individual software modules (DC – 10 / 30 / 50) are activated with hardware jumpers.

The resistors R15, R16, R17 are used as hardware switches on the display printed circuit board, Order No. 003 2520, circuit diagram scm-job: 003-2519.

The association is as follows:

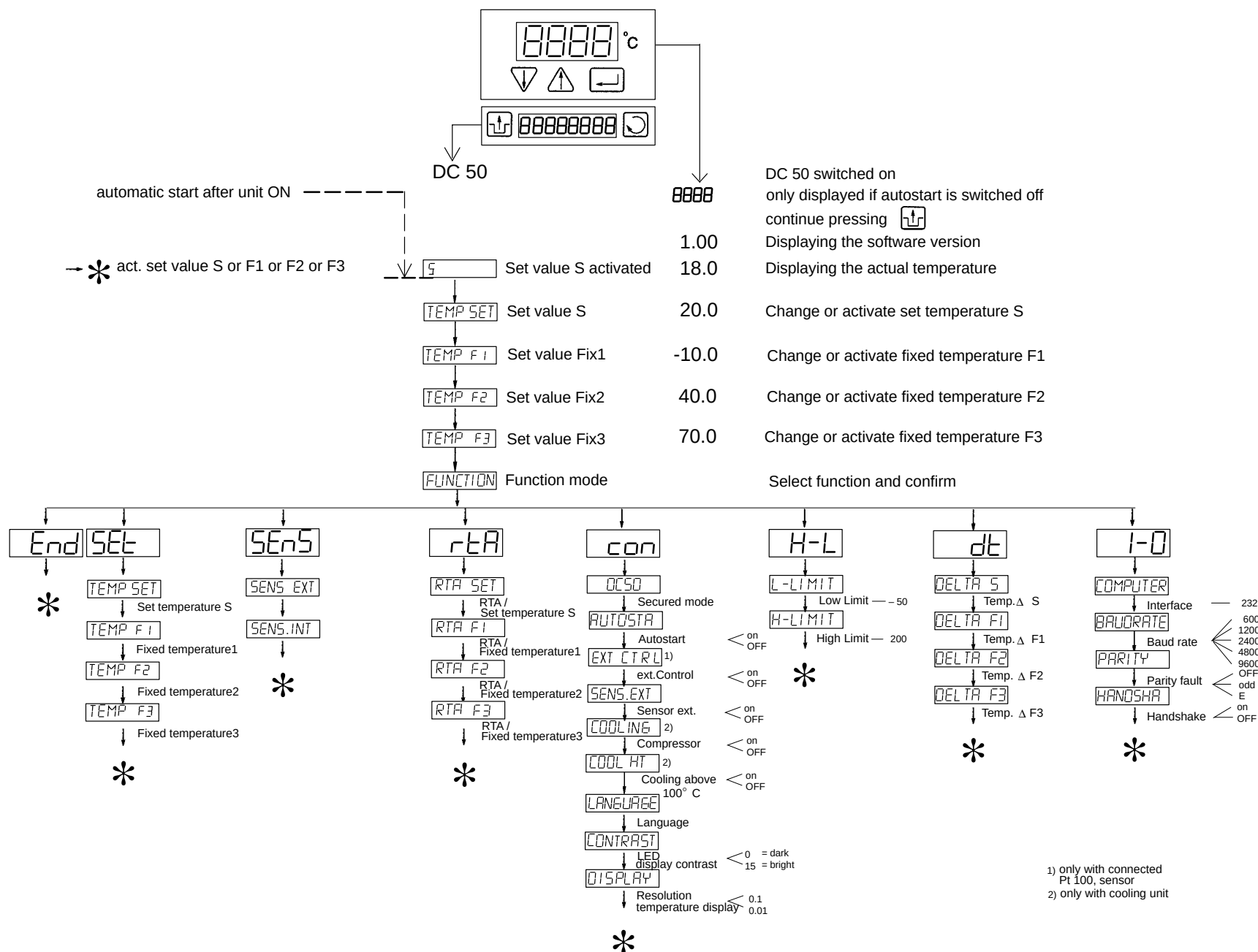


Menu Tree DC30/DL30

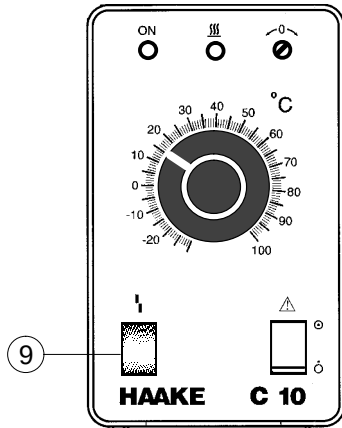


DC30/DL30 switched on
only displayed if secured mode is switched on
"88" in FU = ON, continue pressing 
Displaying the software version
Displaying the actual temperature

Menu Tree DC50



Trouble Shooting and Remedies



8.5 Fault Displays C10

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:

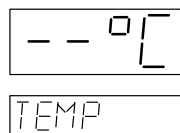
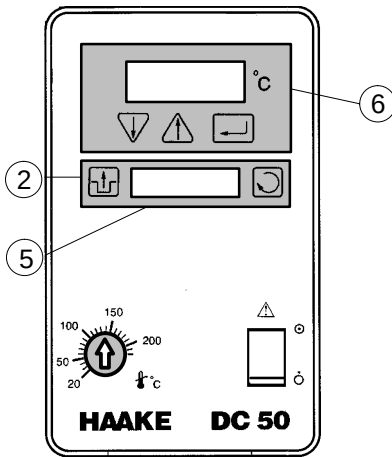
- there is not enough liquid in the bath
 - ⇒ check for leaks, top up if necessary,
 - ⇒ fluid has evaporated, top up if necessary.
- Excess temperature has been set too closely to the desired set temperature
 - ⇒ increase value slightly according to specifications made in Instruction Manual chapter 14.1.1.
- the control function is defective
- temperature controller (mechanical) defective
 - ⇒ replace the temperature controller
- capillary tube is broken

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 minutes later after the temperature has dropped again.**
- ⇒ check the pump for leaks
- temperature protection of the motor defective
- overheating of the motor winding
 - ⇒ replace the motor

Trouble Shooting and Remedies



8.6 Fault Displays DC10/DC30/DL30/DC50

DC10/DC30/DL30

An acoustic signal is sounded and "XXXX" is shown on display **6**. "P.L." is shown on display **5**.

DC50

An acoustic signal is sounded and "XXXX" is shown on display **6** and display **5** (see below).

The heating element and pump are completely switched off.

The following faults are possible:

--°C	=	Excess temperature
---P.L.	=	Low liquid level
--P.U.	=	Pump or motor overloading
--F.I.	=	Sensor breakage or short circuit internal
--F.E.	=	Sensor breakage or short circuit external
---R.F.	=	Refrigeration unit fault
---C.O.	=	External fault RS232C or RS485
---E.	=	Undefined fault
---	=	

Excess temperature

The low liquid level protection can be triggered if:

- Excess temperature has been set too closely to the desired working temperature
⇒ increase value slightly according to specifications made in Instruction Manual chapter 14.1.1.
- the control function is defective
- capillary tube is broken
- temperature controller (mechanical) defective
⇒ replace the temperature controller
- printed circuit board is defective
⇒ replace printed circuit board

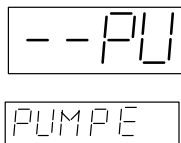
Trouble Shooting and Remedies



Low liquid level

The low liquid level 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.
- mikro-switch is defective
- ⇒ replace mikro-switch
- floater tight
- printed circuit board is defective
- ⇒ replace printed circuit board



Pump or motor overloading

The motor or pump is blocked:

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

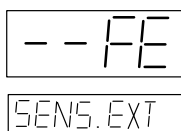
8.7 Sensor breakage or short circuit internal

The sensor must be exchanged by qualified service personnel.



8.8 Sensor breakage or short circuit external

The sensor must be exchanged by qualified service personnel.



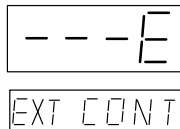
Trouble Shooting and Remedies



Refrigeration unit fault

The "pressostat" safety feature is triggered. The display shows "co" (alarm cooling). If this happens, please press the reset button **2**. Usually the unit will then start correctly without going into fault status again. However, if fault status appears several times in succession, the unit is defective.

- ⇒ check pressure
- ⇒ test cooling capacity



External fault RS232C or RS485

(depending on the unit type)

The circulator has been switched to fault status via the interface.

- ⇒ check the external system.
- ⇒ check / remove printed circuit board

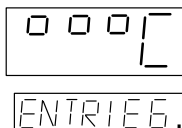


Undefined fault

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

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

- ⇒ check / remove printed circuit board



Fault eliminated

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

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

Testing

9. Testing

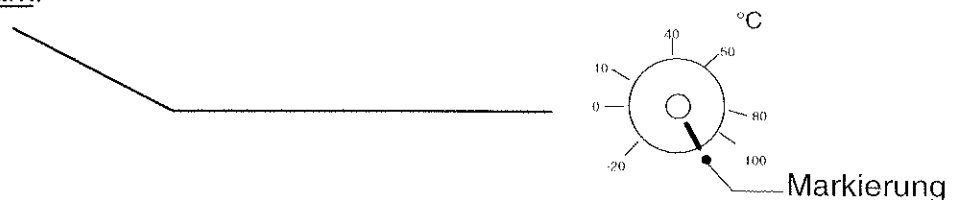
9.1 Alignment and function testes

Test Instruction

(01) Reg.No.	(02) Datum	(03) Name	(04) Bereich	HAAKE
003-2688	12.02.98	Prohaska	Therm	
(05) für		(07) Sachnummer		(06) Seite
Controller Plate C10 (230V)		003-2307		1/2
Controller Platte C10 (115V)		003-2684		

Alignment and function tests PCB 003-2307 and PCB 003-2684

- 1.0 Mains connection (230V/115V) to St4(L1) and St5(N)
Bulb 100 Watt to St2(HK-N) and St3(HK-L)
- 1.1 Switch on mains voltage : Green LED D3 (mains control)
yellow LED D1 (heating control) [$T_{\text{preset}} > T_{\text{act}}$] and bulb must be lit.
- 1.2 Replace temperature sensor LM335AZ by voltage transmitter
Connection points TEST plug Pin 1(+) Pin 2(-)
- 1.3 Turn T preset poti (P3) to " upper " limit stop.
Place upon the scale knob with break and screw down at scale mark.



The preset temperature presetting must be changeable between -30°C and 105°C . The direction of rotation for increasing values is

$T_{\text{preset}} = 100^{\circ}\text{C}$: Voltage presetting $U=3.732\text{V}$
Set switch point of the controller with poti (P1) $\emptyset$ at the front side.
At LED D1(yellow) the switch point is visible.

- 1.4 $T_{\text{preset}} = 0^{\circ}\text{C}$: Voltage presetting $U=2.732\text{V}$
Set preset value to $T=0^{\circ}\text{C}$. Set the switch point with poti P2 (T_{min}) on the printed circuit board.
At LED D1(yellow) the switch point is visible.

- 1.5 Test " 70°C " : Set the preset value to 70°C and search the switch point with the voltage transmitter. $U=3.43 \pm 0.01\text{V} (\pm 1^{\circ}\text{C})$
At LED D1(yellow) the switch point is visible.

- 1.6 Test " -10°C " : Set the preset value to -10°C and search the switch point with the voltage transmitter. $U=2.63 \pm 0.01\text{V} (\pm 1^{\circ}\text{C})$
At LED D1(yellow) the switch point is visible.

Test Instruction

(01) Reg.No.	(02) Datum	(03) Name	(04) Bereich	HAAKE
003-2688	12.02.98	Prohaska	Therm	
(05) für		(07) Sachnummer		(06) Seite
Controller Plate C10 (230V)		003-2307		2/2
Controller Platte C10 (115V)		003-2684		

- 1.7 "Breakage of sensor": $T_{\text{preset}} = \max (+105^{\circ}\text{C})$
Voltage presetting $U=3.43\text{V}$ ($+70^{\circ}\text{C}$)
Bulb is lit !
Remove voltage transmitter.
Bulb is switched off.!
- 1.8 "Short circuit of sensor" : $T_{\text{preset}} = -30^{\circ}\text{C}$
Voltage presetting $U=2.4\text{V}$ (-33°C)
Bulb is lit !
Reduce voltage slowly until bulb goes out!
Value of voltage must be $U=2.32 \pm 0.05\text{V}$.
This corresponds to a temperature of $-40 \pm 5^{\circ}\text{C}$
- 1.9 After the function test and the alignment the potentiometer P2 has to be lacquered.

Test Instruction

Test Instruction-No.	Datum	Name	Bereich	HAAKE
003-3241	02.02.98	Goetz	Entw.	
for componentry DC-10 / DC-30 / DL - 30 / DC - 50		HAAKE-Nr.		Seite / von 1/6

2. Function Tests

All tests have to be carried out at end mounted units which means the cover has to be screwed down.

- 2.1 The circulator (DC- 10, DC - 30, DL - 30, DC - 50) is operated with max. filling volume („clean „, decalcified water)

see circulator Norm DIN 58966 part 2 chapt.4.3.1.

- 2.2 Set excess temperature protection to about 80 °C !

Put the unit into operation. (see operating instructions 003 - 3245)

- 2.3 Check all menu functions as well as the function of the operating keys. (see 003-3245)

Preset value **S** : Set **+20,0 °C** and store.

Fixtemp.1 **F1** : Set **- 10,0 °C** and store.

Fixtemp.2 **F2** : Set **+ 40,0 °C** and store.

Fixtemp.3 **F3** : Set **+ 70,0 °C** and store.

DC - 30 / 50 (232) : Check function of the interface RS 232 C in addition transmit and receive !

DC - 50 (485) :Check function of the interface RS 485 in addition transmit and receive !

At the supply the following parameters are preset and stored:

Menu level DC - 10 :

con	h-l	ra	soll		
88 = OFF	LL = 0 °C	cS = 0,00	S = 20,0°C		
In = 10	HL = 120°C	c1 = 0,00	F1= -10,0°C		
tA = 0,1		c2 = 0,00	F2 = 40,0°C		
AF = OFF		c3 = 0,00	F3 = 70,0°C		

geprüft (gez.)

genehmigt(gez.)

Test Instruction

Test Instruction-No.	Datum	Name	Bereich	HAAKE
003-3241	02.02.98	Goetz	Entw.	
for componentry DC-10 / DC-30 / DL - 30 / DC - 50		HAAKE-Nr.		Seite / von 2/6

Menu level DC - 30, DL - 30 :

con	h-l	r ^l a	soll	i-o	
88 = OFF	LL = 0 °C	cS = 0,00	S = 20,0°C	bA = 4800	
In = 10	HL = 120°C	c1 = 0,00	F1= -10,0°C	PA = OFF	
tA = 0,1		c2 = 0,00	F2 = 40,0°C	HS = ON	
		c3 = 0,00	F3 = 70,0°C		

Menu level DC - 50 (RS 232 C):

con	h-l	r ^l a	soll	i-o	d ^l c
on	0,0	0,00	20,0	232	2,0
autosta	l limit	rta s	soll s	computer	delta s
off	150,0	0,00	-10,00	4800	3,0
ext reg	h limit	rta f1	soll f1	baudrate	delta f1
off		0,00	40,00	off	2,0
sens ext		rta f2	soll f2	parität	delta f2
d		0,00	70,00	on	4,0
sprache		rta f3	soll f3	handsha	delta f3
10					
kontrast					
0,1					
display					
on					
kaelte					
off					
kaelteht					

geprüft (gez.)

genehmigt(gez.)

Test Instruction

Test Instruction-No.	Datum	Name	Bereich	HAAKE
003-3241	02.02.98	Goetz	Entw.	
for componentry DC-10 / DC-30 / DL - 30 / DC - 50		HAAKE-Nr.		Seite / von 3/6

Menu level DC - 50 (RS485):

con	h-l	r-a	soll	i-o	d-l
on	0,0	0,00	20,0	485	2,0
autostt	l limit	rta s	soll s	computer	delta s
off	150,0	0,00	-10,00	4800	3,0
ext reg	h limit	rta f1	soll f1	baudrate	delta f1
off		0,00	40,00	off	2,0
sens ext		rta f2	soll f2	parität	delta f2
d		0,00	70,00	01	4,0
sprache		rta f3	soll f3	nr rs485	delta f3
10					
kontrast					
0,1					
display					
on					
kaelte					
off					
kaelteht					

2.4 Switch mains switch off , then

switch mains switch on and press the keys ↓ and ↵ at the same time. (h factor accessible)

All values stored under 2.3 must still be available.

geprüft (gez.)

genehmigt(gez.)

Test Instruction

Test Instruction-No.	Datum	Name	Bereich	HAAKE
003-3241	02.02.98	Goetz	Entw.	
for componentry DC-10 / DC-30 / DL - 30 / DC - 50		HAAKE-Nr.		Seite / von 4/6

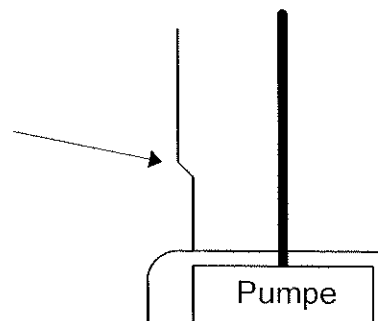
2.5 Float (DC - 30, DL - 30, DC - 50)

Reduce liquid level slowly.

Below the drawn notch

the unit must switch off.

(Alarm display see 003-3245)



2.6 Excess temperature switch (Pump motor. Monitoring)

Unravel connection conductor of exceed temperature switch motor
(to Pin 5 or. Pin 6 on Display PCB.)

(Alarm display see 003-3245)

2.7 Exceed temperature switch (Bath temp. Monitoring)

Change the setting (red knob) : the scale value of the switch point must lie near the
"actual" value of the temperature shown on the display.

(Alarm display see 003-3245)

permissible deviation : $\leq | 10 \text{ }^{\circ}\text{C} |$

2.8 Permanent test

Preset temperature : 70 °C ; exceed temperature protection : 80 °C

Permanent operation of at least **1 hour**

geprüft (gez.)

genehmigt(gez.)

Test Instruction	Test Instruction-No.	Datum	Name	Bereich	HAAKE
	003-3241	02.02.98	Goetz	Entw.	
for componentry DC-10 / DC-30 / DL - 30 / DC - 50			HAAKE-Nr.		Seite / von 5/6

3. Safety Test

according to the instruction EN 61010 part 1

3.1 Ground conductor impedance of units with plug connection

EN 61010 part 1 chapt.6.5.1.2.

Measurement of the impedance by test unit between grounding contact of the mains connection conductor and several shock hazarded metal parts.

(see additional form page for safety test)

max. allowable impedance value : 0,1 Ω

Note : Observe the influence of the test clamps which means cut out if possible.

3.2 Insulation consistency

Voltage test according to. EN 61010 part 1 chapt. 6.8.4.

Voltage check at the end mounted unit by connecting a test voltage between the touchable conductive parts and the short circuited plug pins (outer conductor) of the mains connection cable.

Test voltage : 1350 V / AC 50 / 60 Hz (according to EN 61010 part 1 diagram D4

Operation voltage 300 V eff)

Note : The test voltage is set to the prescribed value step by step in 2 seconds and it must be kept for another 2 seconds.

3.3 Leakage current (according to EN 61010 at the component test the measurement of the leakage current is not prescribed. Nevertheless the test is done because of safety reasons.

Measurement with test unit at warm unit under normal operation conditions (which means full heating capacity).

allowable leakage current : max. 1.00 mA

3.4 Fix type plate (correct data , clearly readable)

4. Alignment

geprüft (gez.)

genehmigt(gez.)

Test Instruction	Test Instruction-No.	Datum	Name	Bereich	HAAKE
	003-3241	02.02.98	Goetz	Entw.	
for componentry DC-10 / DC-30 / DL - 30 / DC - 50			HAAKE-Nr.		Seite / von 6/6

- 4.1 preceding warming up phase : as chapt. 2.8 / about 30 min.
- 4.2 By a calibrated comparison thermometer („ Testing devices „) the operation temperature in the center of the bath is measured.

Measurement according to DIN 5866 part 2 chapt. 4.2. and 4.3. at warm unit.

Calculate the difference between display circulator and display comparison thermometer.

h factor = display circulator - display comparison thermometer

Put in h factor . (in steps of 0.01 °C / range +/- 5 °C)

e.g. DC - 10, DC - 30, DC - 50

Display	Display	h factor
Circulator	Comparison thermometer	through $\uparrow\downarrow\rightarrow$ key
70.0 °C	70.15 °C	- 0.15 °C
70.0 °C	69.87 °C	+ 0.13 °C

After the input of h let the unit adjust to maximum of power to test it.

Preset result : Display comparison thermometer = Display circulator (= 70.0 °C)

4.3 Constancy of temperature

Measurement and record according to DIN 58966 part 2 chapt. 4.2. and 4.3.

but without typ. cooling water current.

allowable control band width : DC - 10 : + / - 0.02 °C

DC - 30 / DL - 30 / DC - 50 : + / - 0.01 °C

Long-time drift : max. 10 x allowable control band width

5. End control

Clean unit.

Sight control as chapt. 1.1

After the end of the test the units should still function!

geprüft (gez.)

genehmigt (gez.)

Geräte -
Typ :

Codier - Widerstände
(Lötbrücken oder 0 R Widerstände)

	R 15	R 16	R 17
DC - 30	offen ☐ ☐	offen ☐ ☐	offen ☐ ☐
DL - 30	Brücke ☐ ☒	offen ☐ ☐	offen ☐ ☐
DC - 50	offen ☐ ☐	Brücke ☐ ☒	offen ☐ ☐
DC - 10	Brücke ☐ ☒	Brücke ☐ ☒	offen ☐ ☐
LKB	Brücke ☐ ☒	Brücke ☐ ☒	Brücke ☐ ☒
DC - 50 Kälte	offen ☐ ☐	Brücke ☐ ☒	Brücke ☐ ☒

m.f.G.

H.Goetz

Testing

9.2 Software

Please consult the attached operating instructions for the software of the unit.

Functional test

Switch-off/switch-on

- Brief display of the version number
- The actual temperature is displayed.

Testing

9.3 Interface RS232/RS485

Please consult the attached operating instructions for the interface of the unit.

Spare parts list

10. Spare parts list

C10
230V/115V/100V

DC10
230V/115V/100V

DC30
230V/115V/100V

DL30
230V/115V/100V

DC50
230V/115V/100V

DC50 –80°C
230V

DC50
 003-2670(230V RS485)
 003-2669(230V)/003-2667(115V)/003-3538(100V)
 DC30 - DL30
 003-2607(230V)/003-2600(115V)/003-3564(100V)
 DC10
 003-2671(230V)/003-2630(115V)/003-3574(100V)

087-2946(8A)/087-2770(10A)/
 087-2848(12A)/087-2794(15A)

003-2015

082-2409(230V)/082-2420(115V)

087-1659

799-1300

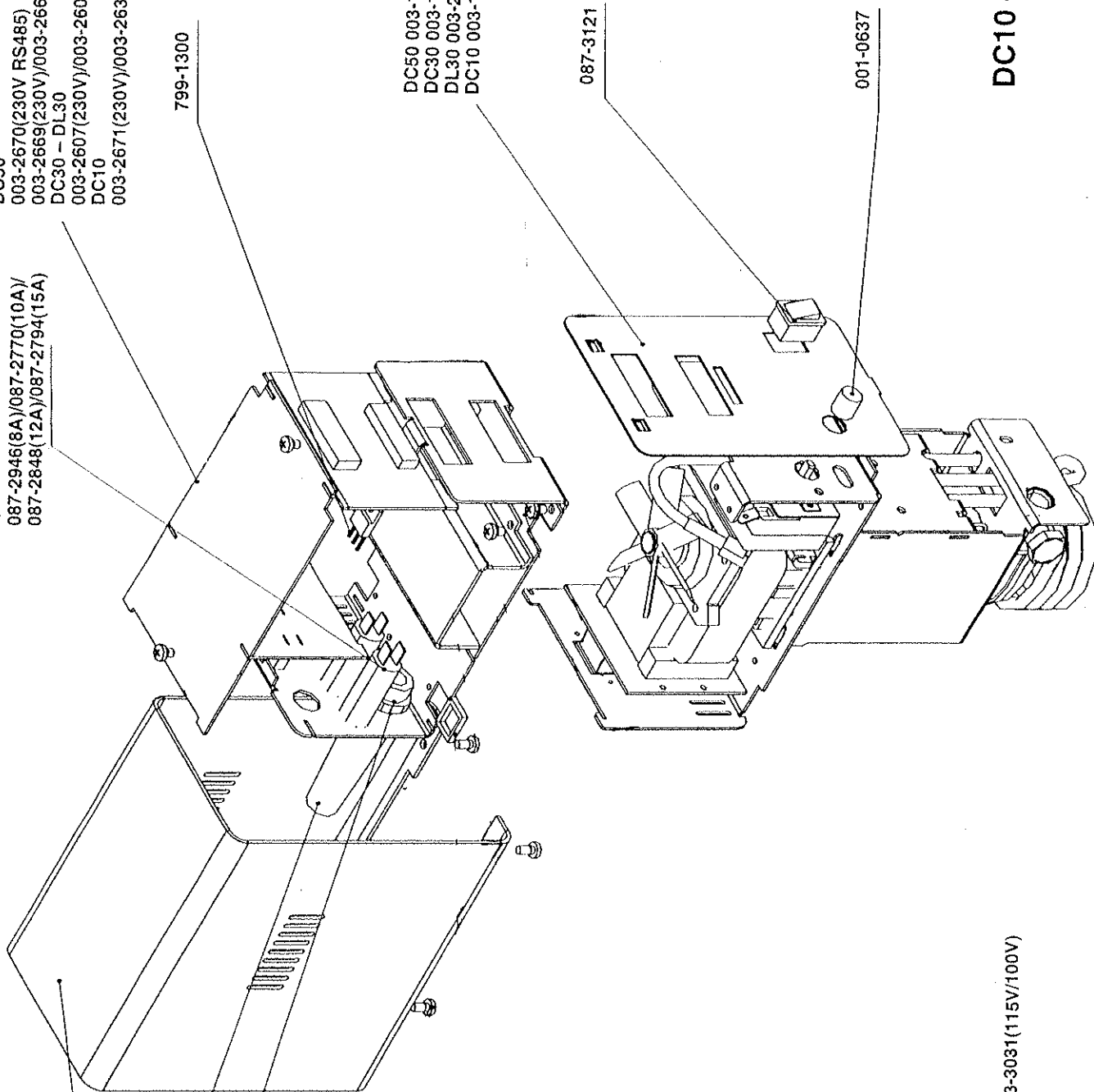
DC50 003-1993
 DC30 003-1992
 DL30 003-2452
 DC10 003-1991

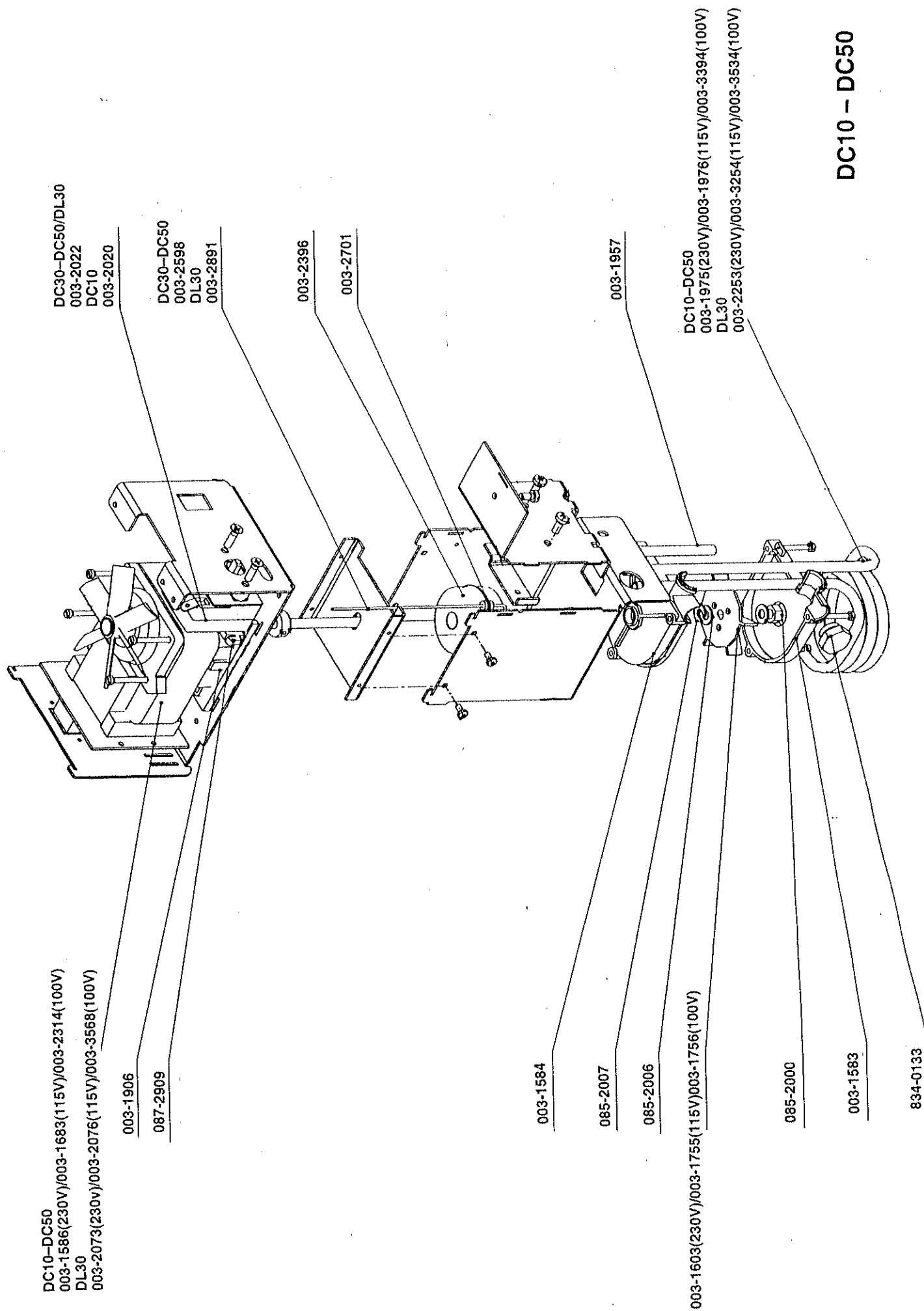
087-3121

001-0637

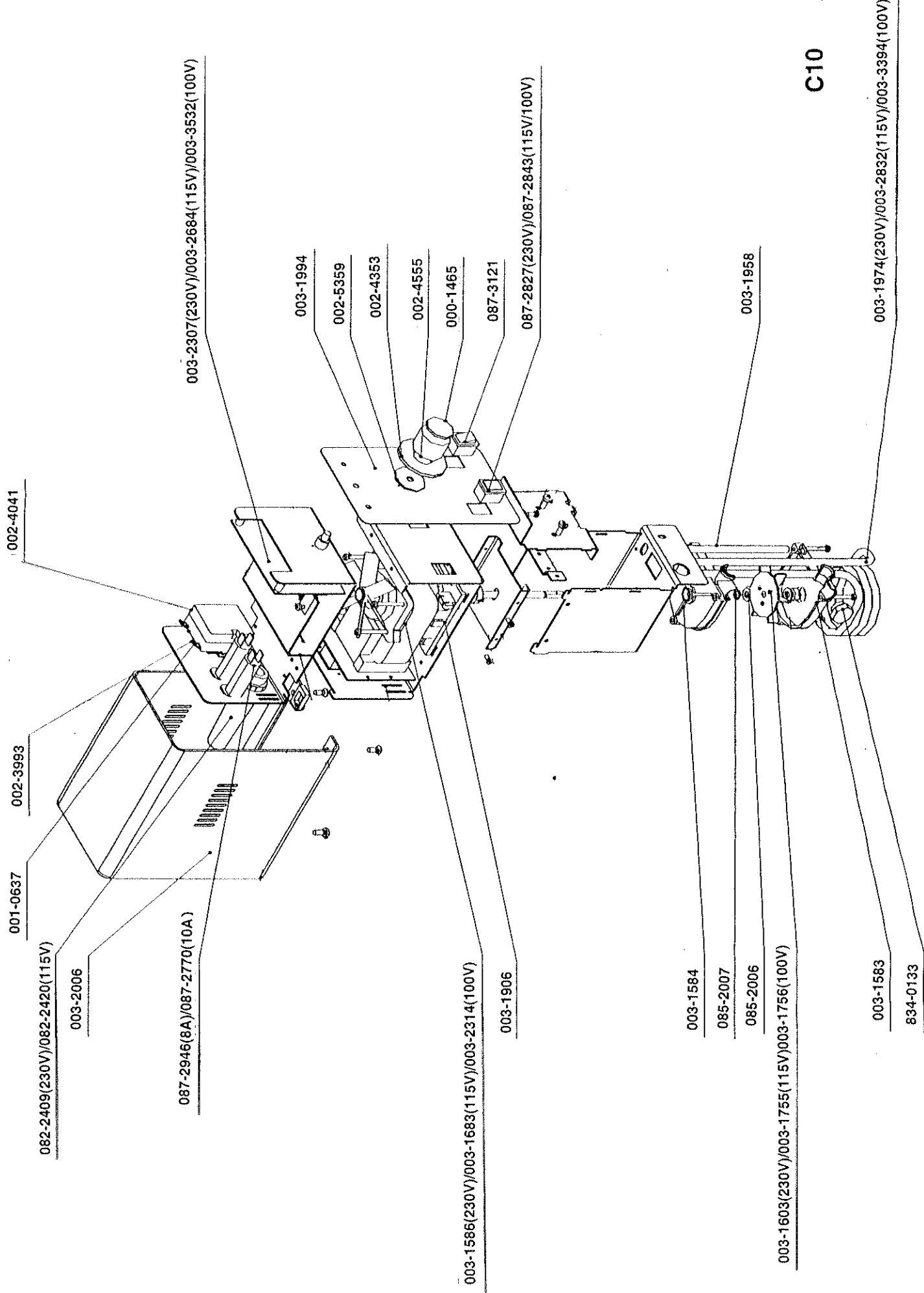
DC10-DC50
 003-2056(230V)/003-3031(115V/100V)

DC10 - DC50





DC10 - DC50



Sach-Nr./Item-No. : 759-0340

Thermostat C10 230V

Circulator C10 230V

Sach-Nr. Bezeichnung
Item-No.

Description

003-1586	MOTOR 230V/50Hz	MOTOR 230V/50Hz
003-1906	MOTORFÜß	MOTOR SUPPORT
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.
085-2007	SICHERUNGSSCHEIBE	WASHER
085-2006	STÜTZSCHEIBE	DISC
003-1603	PUMPENRAD	PUMP WHEEL
085-2000	SECHSKANTMUTTER	NUT
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.
003-1974	HEIZKÖRPER 1500W/230V	HEATER 1500W/230V
003-1958	TEMPERATURFÜHLER	TEMP. SENSOR
003-2307	LEITERPLATTE	PCB CONTROLLER
087-2946	THERM. ÜBERSTROMAUSLÖSER 8A	CIRCUIT BREAKER 8A
082-2409	NETZKABEL MIT STECKER 230V	MAINS CABLE 230V
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP
002-4041	ÜBERTEMPERATURSCHUTZ +20-120	OVER TEMPERATURE PROTECTION
001-0637	EINSTELLKNOPF	KNOB
002-3993	SCHALTHULSE	BUSHING
003-1994	FRONTPLATTE C10	FRONT FILM C10
003-4972	FRONTPLATTE AB 04/99 FÜR C10	FRONT PLATE SINCE 04/99 FOR C10
087-3121	WIPPSCHALTER	SWITCH
087-2827	SIGNALLEUCHTE	SIGNAL LAMP
002-5359	BREMSSCHEIBE	DISC
002-4353	PFEILSCHEIBE	DISC W.ARROW
002-4555	KURZKNOPF	KNOB
000-1465	DECKEL	COVER F. KNOB
003-2006	HAUBE C10	COVER C10
003-2015	HAUBE AB 04/99 FÜR C10	COVER SINCE 4/99 FOR C10
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B

Sach-Nr./Item-No. : 759-0342
 Thermostat C10 115V/60Hz

Circulator C10 115V/60Hz

Sach-Nr. Bezeichnung
 Item-No.

Description

003-1483	MOTOR 115V/60Hz	MOTOR 115V/60Hz
003-1906	MOTORFUß	MOTOR SUPPORT
003-1584	GEHÄUSE-OBERTEIL	PUMP HOUSING U.
085-2007	SICHERUNGSSCHEIBE	WASHER
085-2006	STÜTZSCHEIBE	DISC
003-1755	PUMPENRAD	IMPELLER WHEEL
085-2000	SECHSKANTMUTTER	NUT
003-1583	GEHÄUSE-UNTERTEIL	PUMP HOUSING D.
003-2832	HEIZKÖRPER	HEATING ELEMENT
003-1958	TEMPERATURFÜHLER	TEMP. SENSOR
003-2684	LEITERPLATTE	PCB
087-2770	THERM. ÜBERSTROMAUSLÖSER 10A	CIRCUIT BREAKER 10A
082-2420	NETZKABEL MIT PVC-STECKER	POWER CABLE WITH PLUG
087-1659	KABELVERSCHRAUBUNG	CABLE CLAMP
002-4041	Übertemperaturschutz +20-120	Over temperature protection
001-0637	EINSTELLKNOPF	KNOB
002-3993	SCHALTHÜLSE	BUSHING
003-1994	FRONTPLATTE C10	FRONT FILM C10
087-3121	WIPPSCHALTER	SWITCH
087-2843	SIGNALLEUCHTE	
002-5359	BREMSSCHEIBE	DISC
002-4353	PFEILSCHEIBE	DISC W.ARROW
002-4555	KURZKNOPF	KNOB
000-1465	DECKEL	COVER F. KNOB
003-2006	HAUBE C10	COVER C10
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B

Sach-Nr./Item-No. : 759-0344

Thermostat C10 100V/50-60Hz

Circulator C10 100V/50-60Hz

Sach-Nr. Bezeichnung
Item-No.

Description

003-2314	MOTOR	MOTOR
003-1906	MOTORFUß	MOTOR SUPPORT
003-1584	GEHÄUSE-OBERTEIL	PUMP HOUSING U.
085-2007	SICHERUNGSSCHEIBE	WASHER
085-2006	STÜTZSCHEIBE	DISC
003-1756	PUMPENRAD	IMPELLER WHEEL
085-2000	SECHSKANTMUTTER	NUT
003-1583	GEHÄUSE-UNTERTEIL	PUMP HOUSING D.
003-3394	HEIZKÖRPER	HEATING ELEMENT
003-1958	TEMPERATURFÜHLER	TEMP. SENSOR
003-3532	LEITERPLATTE	PCB
087-2848	ÜBERSTROMAUSLÖSER 12A	CIRCUIT BREAKER 12A
082-2420	NETZKABEL MIT PVC-STECKER	POWER CABLE WITH PLUG
087-1659	KABELVERSCHRAUBUNG	CABLE CLAMP
002-4041	Übertemperaturschutz +20-120	Over temperature protection
001-0637	EINSTELLKNOPF	KNOB
002-3993	SCHALTHÜLSE	BUSHING
003-1994	FRONTPLATTE C10	FRONT FILM C10
087-3121	WIPPSCHALTER	SWITCH
087-2843	SIGNALLEUCHTE	
002-5359	BREMSSCHEIBE	DISC
002-4353	PFEILSCHEIBE	DISC W. ARROW
002-4555	KURZKNOPF	KNOB
000-1465	DECKEL	COVER F. KNOB
003-2006	HAUBE C10	COVER C10
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B

Sach-Nr./Item-No. : 759-0354

Thermostat DC10 100V/50-60Hz Circulator DC10 100V/50-60Hz

Sach-Nr. Item-No.	Bezeichnung	Description	F P
003-2314	MOTOR 100V/50-60Hz	MOTOR 100V/50-60Hz	
003-1906	MOTORFÜß	MOTOR SUPPORT	
003-2020	TEMPERATURREGLER DC10	TEMPERATURE CONTROLLER	
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.	
085-2007	SICHERUNGSSCHEIBE	WASHER	
085-2006	STÜTZSCHEIBE	DISC	
003-1756	PUMPENRAD	IMPELLER WHEEL	
085-2000	SECHSKANTMUTTER	NUT	
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.	
003-3394	HEIZKÖRPER	HEATING ELEMENT	
003-1959	TEMPERATURFÜHLER DIGITAL	TEMP. SENSOR, DIGITAL	
087-3121	WIPPSCHALTER	SWITCH	
001-0637	EINSTELLKNOPF	KNOB	
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING	
002-5055	ABDECKKAPPE	COVER	
087-2794	THERM. ÜBERSTROMAUSLÖSER 15A	CIRCUIT BREAKER 15A	
082-2420	NETZKABEL 115V	MAINS CABLE 115V	
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP	
003-1991	FRONTFOLIE DC10	FRONT FILM DC10	
003-2015	HAUBE	COVER	
003-2815	ABDECKBLECH	COVER PLATE	
001-9383	ABDECKKAPPE	CAP	
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW	
003-3031	LEITERPLATTE DC10-DC50	PCB DC10-DC50	
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB	
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B	

Sach-Nr./Item-No. : 759-0352

Thermostat DC10 115V/60Hz

Circulator DC10 115V/60Hz

Sach-Nr. Item-No.	Bezeichnung	Description	P P
003-1683	MOTOR 115V/60Hz	MOTOR 115V/60Hz	
003-1906	MOTORFÜß	MOTOR SUPPORT	
003-2020	TEMPERATURREGLER DC10	TEMPERATURE CONTROLLER	
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.	
085-2007	SICHERUNGSSCHEIBE	WASHER	
085-2006	STÜTZSCHEIBE	DISC	
003-1755	PUMPENRAD	IMPELLER WHEEL	
085-2000	SECHSKANTMUTTER	NUT	
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.	
003-1976	HEIZKÖRPER	HEATING ELEMENT	
003-1959	TEMPERATURFÖHLER DIGITAL	TEMP. SENSOR, DIGITAL	
087-3121	WIPPSCHALTER	SWITCH	
001-0637	EINSTELLKNOPF	KNOB	
003-2806	KANTENSCHUTZ	EDGE PROTECTOR	
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING	
002-5055	ABDECKKAPPE	COVER	
087-2794	THERM. ÜBERSTROMAUSLÖSER 15A	CIRCUIT BREAKER 15A	
082-2420	NETZKABEL 115V	MAINS CABLE 115V	
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP	
003-1991	FRONTFOLIE DC10	FRONT FILM DC10	
003-2015	HAUBE	COVER	
003-2815	ABDECKBLECH	COVER PLATE	
001-9383	ABDECKKAPPE	CAP	
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW	
003-2630	LEITERPLATTE DC10 115V	PCB DC10 115V	
003-3031	LEITERPLATTE DC10-DC50	PCB DC10-DC50	
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB	
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B	

Sach-Nr./Item-No. : 759-0350

Thermostat DC10 230V

Circulator DC10 230V

Sach-Nr. Item-No.	Bezeichnung	Description	P- P-
003-1586	MOTOR 230V/50Hz	MOTOR 230V/50Hz	
003-1906	MOTORFÜß	MOTOR SUPPORT	
003-2020	TEMPERATURREGLER DC10	TEMPERATURE CONTROLLER	
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.	
085-2007	SICHERUNGSSCHEIBE	WASHER	
085-2006	STÜTZSCHEIBE	DISC	
003-1603	PUMPENRAD	PUMP WHEEL	
085-2000	SECHSKANTMUTTER	NUT	
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.	
003-1975	HEIZKÖRPER 2000W/230V	HEATER 2000W/230V	
003-1959	TEMPERATURFÜHLER DIGITAL	TEMP. SENSOR, DIGITAL	
087-3121	WIPPSCHALTER	SWITCH	
001-0637	EINSTELLKNOPF	KNOB	
003-2806	KANTENSCHUTZ	EDGE PROTECTOR	
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING	
002-5055	ABDECKKAPPE	COVER	
087-2770	THERM. ÜBERSTROMAUSLÖSER 10A	CIRCUIT BREAKER 10A	
082-2409	NETZKABEL MIT STECKER 230V	MAINS CABLE 230V	
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP	
003-1991	FRONTFOLIE DC10	FRONT FILM DC10	
003-2015	HAUBE	COVER	
003-2815	ABDECKBLECH	COVER PLATE	
001-9383	ABDECKKAPPE	CAP	
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW	
003-2671	LEITERPLATTE DC10	PCB CONTROLLER DC10	
003-2056	LEITERPLATTE	PCB CONTROLLER	
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB	
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B	

Sach-Nr./Item-No. : 759-0364

Thermostat DC30 100V/50-60Hz

Circulator DC30 100V/50-60Hz

Sach-Nr. Item-No.	Bezeichnung	Description	Ph Ph
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003-2314	MOTOR 100V/50-60Hz	MOTOR 100V/50-60Hz	
003-1906	MOTORFÜß	MOTOR SUPPORT	
087-2909	MICROSCHALTER	MICRO SWITCH	
003-2396	SCHWIMMER	FLOAT	
003-2701	BUCHSE	BUSHING	
003-2598	SCHWIMMERSTANGE	STOCK	
003-2022	TEMPERATURREGLER	TEMPERATURE CONTROLLER	
085-0254	GEWINDESTIFT M 3X6 DIN 553 MS	THREADED PIN M3X6 DIN553 BR.	
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.	
085-2007	SICHERUNGSSCHEIBE	WASHER	
085-2006	STÜTZSCHEIBE	DISC	
003-1756	PUMPENRAD	IMPELLER WHEEL	
085-2000	SECHSKANTMUTTER	NUT	
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.	
003-3394	HEIZKÖRPER	HEATING ELEMENT	
003-1957	TEMPERATURFÜHLER Pt1000	TEMP. SENSOR Pt1000	
087-3121	WIPPSCHALTER	SWITCH	
001-0637	EINSTELLKNOPF	KNOB	
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING	
002-5055	ABDECKKAPPE	COVER	
087-2794	THERM. ÜBERSTROMAUSLÖSER 15A	CIRCUIT BREAKER 15A	
082-2420	NETZKABEL 115V	MAINS CABLE 115V	
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP	
003-1992	FRONTFOLIE DC30	FRONT FILM DC30	
003-2015	HAUBE	COVER	
001-9383	ABDECKKAPPE	CAP	
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW	
003-3564	LEITERPLATTE DC30/DL30	PCB DC30/DL30	
003-3031	LEITERPLATTE DC10-DC50	PCB DC10-DC50	
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB	
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B	

Sach-Nr./Item-No. : 759-0362

Thermostat DC30 115V/60Hz

Circulator DC30 115V/60Hz

Sach-Nr. Item-No.	Bezeichnung	Description	P1 P1
003-1683	MOTOR 115V/60Hz	MOTOR 115V/60Hz	
003-1906	MOTORFUß	MOTOR SUPPORT	
087-2909	MICROSCHALTER	MICRO SWITCH	
003-2396	SCHWIMMER	FLOAT	
003-2701	BUCHSE	BUSHING	
003-2598	SCHWIMMERSTANGE	STOCK	
003-2022	TEMPERATURREGLER	TEMPERATURE CONTROLLER	
085-0254	GEWINDESTIFT M 3X6 DIN 553 MS	THREADED PIN M3X6 DIN553 BRS.	
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.	
085-2007	SICHERUNGSSCHEIBE	WASHER	
085-2006	STÜTZSCHEIBE	DISC	
003-1755	PUMPENRAD	IMPELLER WHEEL	
085-2000	SECHSKANTMUTTER	NUT	
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.	
003-1976	HEIZKÖRPER	HEATING ELEMENT	
003-1957	TEMPERATURFÖHLER Pt1000	TEMP. SENSOR Pt1000	
087-3121	WIPPSCHALTER	SWITCH	
001-0637	EINSTELLKNOFF	KNOB	
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING	
002-5055	ABDECKKAPPE	COVER	
087-2794	THERM. ÜBERSTROMAUSLÖSER 15A	CIRCUIT BREAKER 15A	
082-2420	NETZKABEL 115V	MAINS CABLE 115V	
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP	
003-1992	FRONTFOLIE DC30	FRONT FILM DC30	
003-2015	HAUBE	COVER	
001-9383	ABDECKKAPPE	CAP	
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW	
003-2600	LEITERPLATTE DC30/DL30 115V	PCB DC/DL30 115V	
003-3031	LEITERPLATTE DC10-DC50	PCB DC10-DC50	
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB	
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B	

Sach-Nr./Item-No. : 759-0360

Thermostat DC30 230V

Circulator DC30 230V

Sach-Nr. Item-No.	Bezeichnung	Description	P P
003-1586	MOTOR 230V/50Hz	MOTOR 230V/50Hz	
003-1906	MOTORFÜß	MOTOR SUPPORT	
087-2909	MICROSCHALTER	MICRO SWITCH	
003-2396	SCHWIMMER	FLOAT	
003-2701	BUCHSE	BUSHING	
003-2598	SCHWIMMERSTANGE	STOCK	
003-2022	TEMPERATURREGLER	TEMPERATURE CONTROLLER	
085-0254	GEWINDESTIFT M 3X6 DIN 553 MS	THREADED PIN M3X6 DIN553 BRS.	
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.	
085-2007	SICHERUNGSSCHEIBE	WASHER	
085-2006	STÜTZSCHEIBE	DISC	
003-1603	PUMPENRAD	PUMP WHEEL	
085-2000	SECHSKANTMUTTER	NUT	
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.	
003-1975	HEIZKÖRPER 2000W/230V	HEATER 2000W/230V	
003-1957	TEMPERATURFÜHLER Pt1000	TEMP. SENSOR Pt1000	
087-3121	WIPPSCHALTER	SWITCH	
001-0637	EINSTELLKNOPF	KNOB	
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING	
002-5055	ABDECKKAPPE	COVER	
087-2770	THERM. ÜBERSTROMAUSLÖSER 10A	CIRCUIT BREAKER 10A	
082-2409	NETZKABEL MIT STECKER 230V	MAINS CABLE 230V	
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP	
003-1992	FRONTFOLIE DC30	FRONT FILM DC30	
003-2015	HAUBE	COVER	
001-9383	ABDECKKAPPE	CAP	
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW	
003-2607	LEITERPLATTE DC30 230V	PCB CONTROLLER DC30 230V	
003-2056	LEITERPLATTE	PCB CONTROLLER	
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB	
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B	

Sach-Nr./Item-No. : 759-0374

Thermostat DL30 100V/50-60Hz Circulator DL30 100V/50-60Hz

Sach-Nr. Item-No.	Bezeichnung	Description	P P
003-3568	MOTOR 100V/50-60Hz	MOTOR 100V/50-60Hz	
003-1906	MOTORFUß	MOTOR SUPPORT	
087-2909	MICROSCHALTER	MICRO SWITCH	
003-2396	SCHWIMMER	FLOAT	
003-2701	BUCHSE	BUSHING	
003-2891	SCHWIMMERSTANGE	FLOAT-ROD	
003-2022	TEMPERATURREGLER	TEMPERATURE CONTROLLER	
003-2394	STELLRING	RING	
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.	
085-2007	SICHERUNGSSCHEIBE	WASHER	
085-2006	STUTZSCHEIBE	DISC	
003-1755	PUMPENRAD	IMPELLER WHEEL	
085-2000	SECHSKANTMUTTER	NUT	
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.	
003-3534	HEIZKÖRPER	HEATING ELEMENT	
003-2406	TEMPERATURFÜHLER Pt1000	TEMP. SENSOR Pt1000	
087-3121	WIPPSCHALTER	SWITCH	
001-0637	EINSTELLKNOPF	KNOB	
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING	
002-5055	ABDECKKAPPE	COVER	
087-2794	THERM. ÜBERSTROMAUSLOSER 15A	CIRCUIT BREAKER 15A	
082-2420	NETZKABEL 115V	MAINS CABLE 115V	
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP	
003-2452	FRONTFOLIE DL30	FRONT FILM DL30	
003-2015	HAUBE	COVER	
001-9383	ABDECKKAPPE	CAP	
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW	
003-3564	LEITERPLATTE DC30/DL30	PCB DC30/DL30	
003-3031	LEITERPLATTE DC10-DC50	PCB DC10-DC50	
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB	
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B	

Sach-Nr./Item-No. : 759-0372

Thermostat DL30 115V/60Hz

Circulator DL30 115V/60Hz

Sach-Nr. Item-No.	Bezeichnung	Description	P P
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003-2076	MOTOR 115V/60Hz	MOTOR 115V/60Hz	
003-1906	MOTORFUß	MOTOR SUPPORT	
087-2909	MICROSCHALTER	MICRO SWITCH	
003-2396	SCHWIMMER	FLOAT	
003-2701	BUCHSE	BUSHING	
003-2891	SCHWIMMERSTANGE	FLOAT-ROD	
003-2022	TEMPERATURREGLER	TEMPERATURE CONTROLLER	
003-2394	STELLRING	RING	
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.	
085-2007	SICHERUNGSSCHEIBE	WASHER	
085-2006	STÜTZSCHEIBE	DISC	
003-1755	PUMPENRAD	IMPELLER WHEEL	
085-2000	SECHSKANTMUTTER	NUT	
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.	
003-3254	HEIZKÖRPER DL30 115V/1200W	HEATING ELEMENTDL30 115V/1200W	
003-2406	TEMPERATURFÜHLER Pt1000	TEMP. SENSOR Pt1000	
087-3121	WIPPSCHALTER	SWITCH	
001-0637	EINSTELLKNOPF	KNOB	
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING	
002-5055	ABDECKKAPPE	COVER	
087-2794	THERM. ÜBERSTROMAUSLÖSER 15A	CIRCUIT BREAKER 15A	
082-2420	NETZKABEL 115V	MAINS CABLE 115V	
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP	
003-2452	FRONTFOLIE DL30	FRONT FILM DL30	
003-2015	HAUBE	COVER	
001-9383	ABDECKKAPPE	CAP	
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW	
003-2600	LEITERPLATTE DC30/DL30 115V	PCB DC/DL30 115V	
003-3031	LEITERPLATTE DC10-DC50	PCB DC10-DC50	
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB	
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B	

Sach-Nr./Item-No. : 759-0370

Thermostat DL30 230V

Circulator DL30 230V

Sach-Nr. Bezeichnung
Item-No.

Description

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003-2073	SPALTPOLMOTOR 230V/50Hz	MOTOR 230V/50Hz
003-1906	MOTORFUß	MOTOR SUPPORT
087-2909	MICROSCHALTER	MICRO SWITCH
003-2396	SCHWIMMER	FLOAT
003-2701	BUCHSE	BUSHING
003-2891	SCHWIMMERSTANGE	FLOAT-ROD
003-2022	TEMPERATURREGLER	TEMPERATURE CONTROLLER
003-2394	STELLRING	RING
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.
085-2007	SICHERUNGSSCHEIBE	WASHER
085-2006	STÜTZSCHEIBE	DISC
003-1603	PUMPENRAD	PUMP WHEEL
085-2000	SECHSKANTMUTTER	NUT
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.
003-2253	HEIZKÖRPER 230V/2000W	HEATER 230V/2000W
003-2406	TEMPERATURFÜHLER Pt1000	TEMP. SENSOR Pt1000
087-3121	WIPPSCHALTER	SWITCH
001-0637	EINSTELLKNOBF	KNOB
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING
002-5055	ABDECKKAPPE	COVER
087-2770	THERM. ÜBERSTROMAUSLÖSER 10A	CIRCUIT BREAKER 10A
082-2409	NETZKABEL MIT STECKER 230V	MAINS CABLE 230V
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP
003-2452	FRONTFOLIE DL30	FRONT FILM DL30
003-2015	HAUBE	COVER
001-9383	ABDECKKAPPE	CAP
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW
003-2607	LEITERPLATTE DC30 230V	PCB CONTROLLER DC30 230V
003-2056	LEITERPLATTE	PCB CONTROLLER
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B

Sach-Nr./Item-No. : 759-0384

Thermostat DC50 100V/50-60Hz

Circulator DC50 100V/50-60Hz

Sach-Nr. Item-No.	Bezeichnung	Description	F F
003-2314	MOTOR 100V/50-60Hz	MOTOR 100V/50-60Hz	
003-1906	MOTORFÜß	MOTOR SUPPORT	
087-2909	MICROSCHALTER	MICRO SWITCH	
003-2396	SCHWIMMER	FLOAT	
003-2701	BUCHSE	BUSHING	
003-2598	SCHWIMMERSTANGE	STOCK	
003-2022	TEMPERATURREGLER	TEMPERATURE CONTROLLER	
003-2394	STELLRING	RING	
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.	
085-2007	SICHERUNGSSCHEIBE	WASHER	
085-2006	STÜTZSCHEIBE	DISC	
003-1756	PUMPENRAD	IMPELLER WHEEL	
085-2000	SECHSKANTMUTTER	NUT	
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.	
003-3394	HEIZKÖRPER	HEATING ELEMENT	
003-1957	TEMPERATURFÜHLER Pt1000	TEMP. SENSOR Pt1000	
087-3121	WIPPSCHALTER	SWITCH	
001-0637	EINSTELLKNOPF	KNOB	
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING	
087-2794	THERM. ÜBERSTROMAUSLÖSER 15A	CIRCUIT BREAKER 15A	
082-2420	NETZKABEL 115V	MAINS CABLE 115V	
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP	
003-1993	FRONTFOLIE DC50	FRONT FILM DC50	
003-2015	HAUBE	COVER	
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW	
003-3558	LEITERPLATTE DC50 100V	PCB DC50 100V	
003-3031	LEITERPLATTE DC10-DC50	PCB DC10-DC50	
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB	
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B	

Sach-Nr./Item-No. : 759-0382
 Thermostat DC50 115V/60Hz

Circulator DC50 115V/60Hz

Sach-Nr. Bezeichnung
 Item-No.

Description

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003-1683	MOTOR 115V/60Hz	MOTOR 115V/60Hz
003-1906	MOTORFUß	MOTOR SUPPORT
087-2909	MICROSCHALTER	MICRO SWITCH
003-2396	SCHWIMMER	FLOAT
003-2701	BUCHSE	BUSHING
003-2598	SCHWIMMERSTANGE	STOCK
003-2022	TEMPERATURREGLER	TEMPERATURE CONTROLLER
003-2394	STELLRING	RING
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.
085-2007	SICHERUNGSSCHEIBE	WASHER
085-2006	STÜTZSCHEIBE	DISC
003-1755	PUMPENRAD	IMPELLER WHEEL
085-2000	SECHSKANTMUTTER	NUT
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.
003-1976	HEIZKÖRPER	HEATING ELEMENT
003-1957	TEMPERATURFÜHLER Pt1000	TEMP. SENSOR Pt1000
087-3121	WIPPSCHALTER	SWITCH
001-0637	EINSTELLKNOPF	KNOB
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING
087-2794	THERM. ÜBERSTROMAUSLÖSER 15A	CIRCUIT BREAKER 15A
082-2420	NETZKABEL 115V	MAINS CABLE 115V
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP
003-1993	FRONTFOLIE DC50	FRONT FILM DC50
003-2015	HAUBE	COVER
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW
003-2667	LEITERPLATTE DC50 115V	PCB DC50 115V
003-3031	LEITERPLATTE DC10-DC50	PCB DC10-DC50
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B

Sach-Nr./Item-No. : 759-0380

Thermostat DC50 230V

Circulator DC50 230V

Sach-Nr. Bezeichnung
Item-No.

Description

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003-1586	MOTOR 230V/50Hz	MOTOR 230V/50Hz
003-1906	MOTORFUß	MOTOR SUPPORT
087-2909	MICROSCHALTER	MICRO SWITCH
003-2396	SCHWIMMER	FLOAT
003-2701	BUCHSE	BUSHING
003-2598	SCHWIMMERSTANGE	STOCK
003-2022	TEMPERATURREGLER	TEMPERATURE CONTROLLER
003-2394	STELLRING	RING
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.
085-2007	SICHERUNGSSCHEIBE	WASHER
085-2006	STÜTZSCHEIBE	DISC
003-1603	PUMPENRAD	PUMP WHEEL
085-2000	SECHSKANTMUTTER	NUT
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.
003-1975	HEIZKÖRPER 2000W/230V	HEATER 2000W/230V
003-1957	TEMPERATURFÜHLER Pt1000	TEMP. SENSOR Pt1000
087-3121	WIPPSCHALTER	SWITCH
001-0637	EINSTELLKNOFF	KNOB
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING
087-2770	THERM. ÜBERSTROMAUSLÖSER 10A	CIRCUIT BREAKER 10A
082-2409	NETZKABEL MIT STECKER 230V	MAINS CABLE 230V
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP
003-1993	FRONTFOLIE DC50	FRONT FILM DC50
003-2015	HAUBE	COVER
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW
003-2669	LEITERPLATTE DC50 230V	PCB DC50 230V
003-2056	LEITERPLATTE	PCB CONTROLLER
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B

Sach-Nr./Item-No. : 759-0386

Thermostat DC50 230V RS485

Circulator DC50 230V RS485

Sach-Nr. Bezeichnung

Description

Item-No.

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003-1586	MOTOR 230V/50Hz	MOTOR 230V/50Hz
003-1906	MOTORFÜß	MOTOR SUPPORT
087-2909	MICROSCHALTER	MICRO SWITCH
003-2396	SCHWIMMER	FLOAT
003-2701	BUCHSE	BUSHING
003-2598	SCHWIMMERSTANGE	STOCK
003-2022	TEMPERATURREGLER	TEMPERATURE CONTROLLER
003-2394	STELLRING	RING
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.
085-2007	SICHERUNGSSCHEIBE	WASHER
085-2006	STÜTZSCHEIBE	DISC
003-1603	PUMPENRAD	PUMP WHEEL
085-2000	SECHSKANTMUTTER	NUT
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.
003-1975	HEIZKÖRPER 2000W/230V	HEATER 2000W/230V
003-1957	TEMPERATURFÜHLER Pt1000	TEMP. SENSOR Pt1000
087-3121	WIPPSCHALTER	SWITCH
001-0637	EINSTELLKNOPF	KNOB
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING
087-2770	THERM. ÜBERSTROMAUSLÖSER 10A	CIRCUIT BREAKER 10A
082-2409	NETZKABEL MIT STECKER 230V	MAINS CABLE 230V
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP
003-1993	FRONTFOLIE DC50	FRONT FILM DC50
003-2015	HAUBE	COVER
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW
003-2670	LEITERPLATTE DC50	PCB DC50
003-2056	LEITERPLATTE	PCB CONTROLLER
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B

Sach-Nr./Item-No. : 759-0388

Thermostat DC50 230V/50Hz/K75 Circulator DC50 230V/50Hz/K75

Sach-Nr. Item-No.	Bezeichnung	Description	F F
003-1586	MOTOR 230V/50Hz	MOTOR 230V/50Hz	
003-1906	MOTORFÜß	MOTOR SUPPORT	
087-2909	MICROSCHALTER	MICRO SWITCH	
003-2396	SCHWIMMER	FLOAT	
003-2701	BUCHSE	BUSHING	
003-2598	SCHWIMMERSTANGE	STOCK	
003-2022	TEMPERATURREGLER	TEMPERATURE CONTROLLER	
003-2394	STELLRING	RING	
003-1584	GEHAUSE-OBERTEIL	PUMP HOUSING U.	
085-2007	SICHERUNGSSCHEIBE	WASHER	
085-2006	STÜTZSCHEIBE	DISC	
003-1603	PUMPENRAD	PUMP WHEEL	
085-2000	SECHSKANTMUTTER	NUT	
003-1583	GEHAUSE-UNTERTEIL	PUMP HOUSING D.	
003-1974	HEIZKÖRPER 1500W/230V	HEATER 1500W/230V	
003-3111	TEMPERATURFÜHLER PT1000	TEMP. SENSOR Pt1000	
087-3121	WIPPSCHALTER	SWITCH	
001-0637	EINSTELLKNOFF	KNOB	
087-2717	SCHRAUBENSICHERUNG	SCREW LOCKING	
087-2946	THERM. ÜBERSTROMAUSLÖSER 8A	CIRCUIT BREAKER 8A	
082-2409	NETZKABEL MIT STECKER 230V	MAINS CABLE 230V	
087-1659	KABELVERSCHRAUBUNG M. KNICKSCH	CABLE CLAMP	
003-1993	FRONTFOLIE DC50	FRONT FILM DC50	
003-2015	HAUBE	COVER	
834-0133	VERSCHLUSS-SCHRAUBE	CLOSING SCREW	
003-2669	LEITERPLATTE DC50 230V	PCB DC50 230V	
003-2056	LEITERPLATTE	PCB CONTROLLER	
832-0268	RUNDSCHNURRING 11X2,5 PERBUNAN	ROUND CORD RING 11X2,5 PERB	
799-1300	TRIAC BTA 26-600B	TRIAC BTA 26-600B	