Next set speed to 4,800 rpm, time hold and temperature to +5°C. The temperature should be able to reach 5°C.

Test for pressure while under heat load.

CAUTION: ***Cover backside of power receptacle (P/N961827) with electrical tape when servicing the rear of the instrument to protect against shock hazard.***

To check the filling capacity with a refrigeration manifold gauge set:

Ambient temperature should be 22-27°C.

Put low side gauge on service value of refrigeration compressor.
Set for maximum cooling (0°C)
Set rotor for maximum speed, set time for hold.
Run rotor at maximum speed.
After 30 minutes the low side gauge should read :

With instrument off (unplugged), after 30 minutes the gauge should read 41 psig.

3.3.7 Temperature Sensor

Rotor Chamber

The temperature sensor is monitored for short-circuit or failure by the micro controller; ERROR 87, 90 is displayed if required.

In case of malfunction the sensor (which is poured into a metal jacket and fixed to the bottom plate of the centrifuge) must be exchanged. Malfunctions of the wiring and the connectors are also possible and must be repaired. After the circuit board is exchanged take care to correct the offset values in the EEPROM. To replace the Rotor Chamber Temperature Sensor, first remove the RTV from the bottom (outside) of chamber bowl. Then the sensor is pressed down from the inside of the chamber out through the bottom.

Heat Sinks

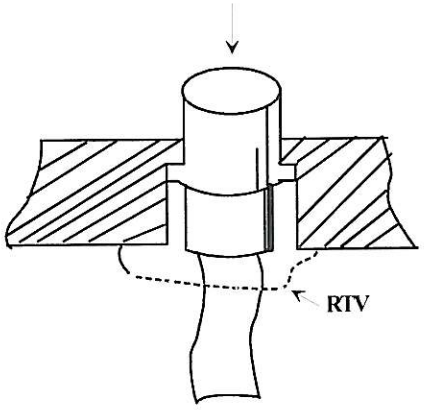
Temperature sensor B1 is located at the heat sink of the power board. This is set to overtemp at 70°C. (B1 is located on the left side of the heat sink)

The heat sink temperature is monitored, because overload and too high ambient temperature threaten the power transistors. The same sensor is used as for the rotor chamber. It is installed at the left side of the heat sink.

The sensor is connected to pin 17 of the 40-pin cable to the power board and then on to the analog input AN5 = pin 15 of IC12 (80535). Sensor response is signalized by the micro controller with ERROR 88.
For exchanging the sensor; first remove the power board, then exchange sensor and reinstall the power board.

Tempterature Sensor

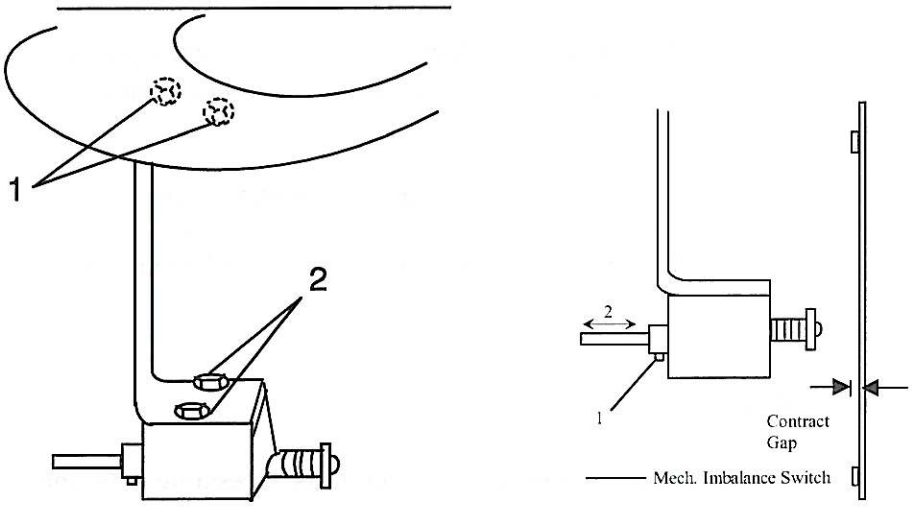
Remove sensor by pressing down
after removing RTV from bottom



3.4 Electronics

3.4.1 Imbalance

Allegra X-22R uses a mechanical imbalance switch. It is located at a support angle beneath the motor.
In case of imbalance the mechanical imbalance switch is pressed against the imbalance switch plate mounted on the tachometer board.



For removal proceed as follows:
Unplug connection cable to the power board (flat cable).
Unscrew 2 fixing screws of the support angle (1).
Unscrew 2 fixing screws of the imbalance switch at the support angle (2).
Replace imbalance switch.
For reinstallation proceed in reverse order.

After installation adjust the contact gap as follows.
Loosen slit screw at the contact (1).
Slide the contact at the rear of the imbalance switch in such a way that the contact gap is 1.0 ± 0.1mm (2).
Tighten slit screw.
After installation operate the centrifuge with an imbalance of 6 grams. It should not fail. Use decel value of three when testing the imbalance at 6 grams.
With a swinging bucket rotor the imbalance switch must fail at **15** grams imbalance. The imbalance LED will come on and the drive will brake fast. Otherwise repeat the adjustment. The centrifuge should operate with up to **6** grams of imbalance and not fail. With a fixed angle rotor it should pass at **10** grams and fail at **20** grams.

Note: 1 milliliter of water equals 1 gram.

3.4.3 Electronic Tests

For checking the rotational speed sensor and the rotor detection. The rotor can be rotated by hand (with open lid). The speed sensor LED must light-up six times per revolution. The rotor detection LED must light up according to the rotor code, where one coding magnet switches it off again. Spin the rotor by hand and confirm the LED lights up.

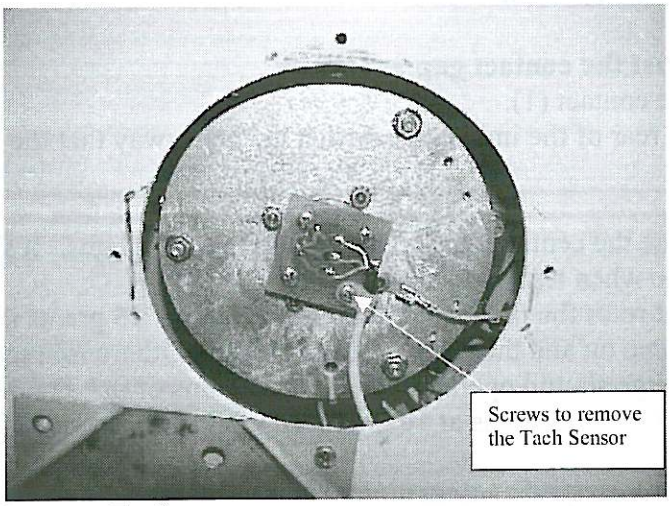
3.4.4 Speed Sensor

The speed sensor consists of a bistable Hall sensor which is placed on a small circuit board attache to the bottom of the motor. This unit can not be repaired but must be replaced as a whole.

A magnet segment with 6 pairs of poles rotates **1±0.5 mm** away from the sensor. A north pole in front of the Hall sensor switches the output to H = 5 V, whereas a south pole switches to L = O V. Therefore 6 H/L transfers must occur per rotor revolution. This is 3 highs and 3 lows.

For removal proceed as follows:

Tilt the centrifuge to the right side in such a way that the bottom is accessible from the outside.
Remove bottom plate.
Unplug cables.
Unscrew 4 phillips screws from the board .
Remove board and replace it if required.
Reinstallation proceeds in reverse order.



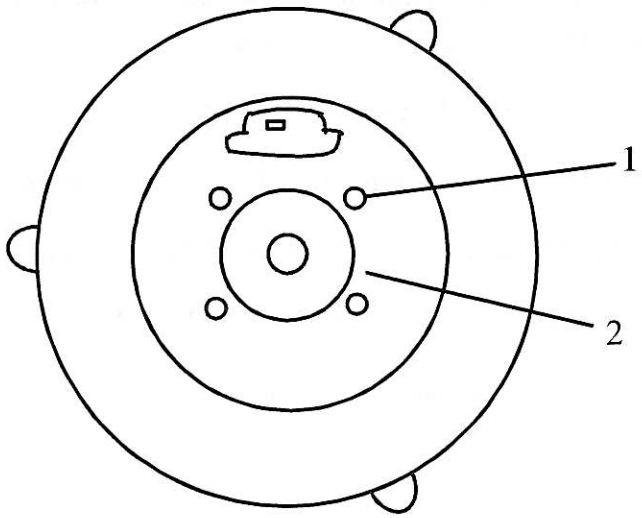
Speed Sensor - Exchange

3.4.5 Rotor Indentification

The same Hall sensor as described previously is used. It is mounted on the motor cover - inside the rotor chamber. A 4-pin cable leads alongside the motor down to the speed sensor board.
Small bar magnets of changing polarity are located in the rotor at a distance of 0.8...2mm in front of the Hall sensor. Between 2 and 12 magnets are located on a circle divided in 30° sectors. The number is always even. Angular position and number of magnets form the rotor code.

For removal proceed as follows:

Unscrew the 4 fixing screws of the rotor cover (1).
Lift cover with mounted sensor carefully approx. 10 cm .4 inch (2).
Unscrew 2 fixing screws beneath the cover.
Unplug the connection plug on the speed sensor board.
Exchange sensor.
For reinstallation proceed in reverse order.



Rotor Code Sensor - Exchange

3.4.6 Top and Lid of the Centrifuge

This section describes all components of the centrifuge accessible from the top.

Micro Controller Board

Dismantling and Installation: The micro controller board is located behind the front cover. The board is removed and installed together with the touch panel.

Caution! **Prior to start of work always disconnect the main plug and prevent accidental reconnecting by placing a warning sign "DO NOT CONNECT TO POWER".**

NOTE: ***The micro controller board contains static-sensitive CMOS components (i.e. damage may be caused by touching with your fingers). "Use anti static mat, grounding straps and other anti static devices."***

3.4.7 Sealing Ring of Armored Chamber - Replacement

A rubber sealing ring is located at the top edge of the armored chamber. Replacement is required if the installed sealing is damaged or gets brittle.

Press defective sealing inward towards the central chamber axis.

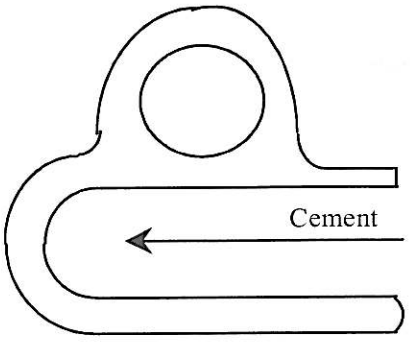
Pull off the sealing ring from the chamber edge towards the center and remove it.

Apply silicone (RTV **P/N 342778**) cement to the groove of the new sealing.

Starting with the seam, place the new sealing onto the chamber edge.

Smooth the remaining bulge outward using a rubber mallet.

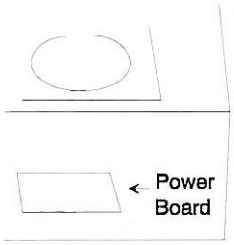
Wipe off the excess cement.

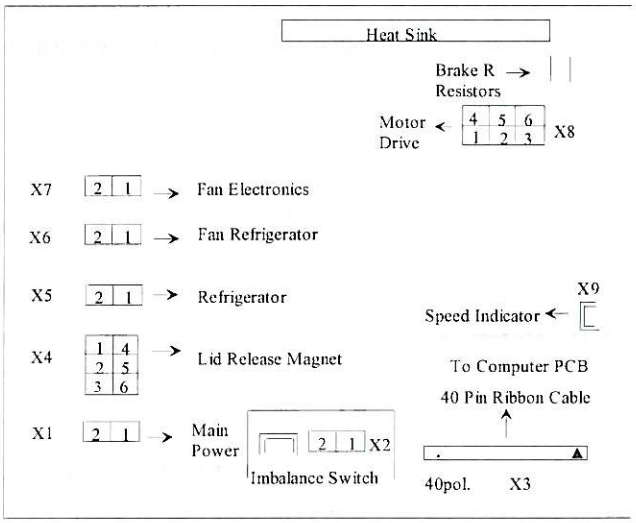


3.4.8 Power Board

Position, Dismantling and Installation

The power board is located at the front, bottom inside the centrifuge. Mark and then disconnect all cables leading to the power board.
Take out the power board attached to the heatsink. Do not detach the power board from the heatsink, the IGBT might be destroyed.
For reinstallation proceed in reverse order.





3.4.9 Maintenance Requirements

PMC Procedures

To properly maintain Beckman centrifuges regular maintenance should be performed on a periodic basis.

Contamination

Insure that the instrument is safe to work on. No pathogenic, radioactive, or biohazardous material can be present. Ask the operator to clean the instrument and rotors prior to doing a preventative maintenance.

Safe Positioning

Check and insure the centrifuge is located properly and firmly. Insure the proper clearances from the walls and sides as specified in the installation instructions. Insure that the table the centrifuge is placed on is steady, and that the proper air flow paths are clear. Check the refrigeration system if applicable. Insure airflow is clear and fans are operational. Condensing fins should be free of dust in order to function properly.

Centrifuge Identification

The indentification label with serial number and etc. must be legible. The rotation direction arrow must be present.

Rotors and Accessories

The required indentification labels must be present and legible on all rotors and accessories. Visually inspect rotors for signs of corrosion. Rotors that are not properly maintained and show cracks, damage or corrosion may no longer be used.
If the customer or yourself is unsure of a rotor's condition, the rotor can be scheduled for a FRIP inspection or returned to the SPINCO Rotor Center. The Rotor Center can inspect and repair if possible. Make sure that only good rotors are permitted for use.

Test Operation

Perform a test run and check the instruments operation. Note any problems. Disconnect the instrument power by unplugging the main power cord. Post a sign on the centrifuge :

"DO NOT CONNECT TO MAIN POWER OR ATTEMPT TO OPERATE THIS INSTRUMENT, IT IS BEING SERVICED".

Inspect the Instrument

Inspect and correct all instrument problems such as loose hardware chaffing wires, burnt wires, pitted relay contacts, cracked hinges, etc. Insure all vibration devices, motor mounts and etc. are in working order. Correct any problems found in the test run also.

Safety Barrier

Inspect the chambers, safety barriers and other body and enclose parts for damage, loose bolts etc. Correct all descrepencies found.

Protective Door

Insure the centrifuge door and associated safety latches are functional and not damaged.

Calibration

Power on the instrument, perform instrument calibration. Check imbalance detector operation and calibration.

Final Checks and Test Run

Reassemble instrument and make a final test run. Check all operational settings.

Safe Braking

Insure the effectiveness of the braking system for the centrifuge both at full and slow decels.

Accessories, Updates and Options

Inspect all accessories for damage. Insure all accessories are operational and safe. Insure the centrifuge has all safety updates, current version of firmware and is in general maintained to the current revision. Safety interlocks and devices must not be bypassed or deleted.
After the PMC is complete explain the service performed to the customer. Make recommendations as to proper rotor and instrument maintenance. Review all commitments and thank the customer before you leave.

3.5 Service Mode Zent 3 Version Electronics

3.5.1 Service Mode

To activate the service mode:

Press Cursor Up key
Press Enter three times, holding down the key the third time until the Service Mode appears in the time display = 'Ser'

The program and speed fields display the following parameters:

program	speed	description
0	ver	software version and centrifuge type
1	sen	sensor status
2	imbal	imbalance calibration
3	error	error table
4	eep--	erase EEPROM or Door Lockout Timer
5	imbw	static imbalance
6	imbf	dynamic imbalance
7	led888	LED test
8	zeit	accumulated run time
9	zykl	cycle mode
10	temp	temperature offset

Select the program using the ↑ and ↓ keys.
To exit any service program press STOP.

0 Software Version and Centrifuge Type

Press ENTER to activate.
The time and speed fields display the following parameters:

time = Software Version
speed = Centrifuge Type

1 Sensor Status

Press ENTER to activate.
The program, time and speed fields display the following parameters:

ACC/DEC =
digit 1, i.e. left = 1 inverter bus charged, 0 inverter bus discharged

digit 2, = 1 inverter enabled, 0 inverter not enabled

TIME =
digit 1, i.e. left =1 door closed, 0 door not closed
digit 2 = n/a
digit 3 = 1 chamber overtemperature (O/T), 0 no chamber O/T

SPEED =
digit 1, i.e. left = 1 no inverter O/T, 0 inverter O/T
digit 2 = 1 imbalance, 0 no imbalance
digit 3 = 1/0 rotor ID sensor output
digit 4 = 1/0 tach sensor output
digit 5 = 1 rotor turning, 0 rotor stopped at least 2 seconds

2 Dynamic Imbalance N/A

3 Error Table

Press ENTER to activate.
The 14 most recent errors are stored in the error table. Pressing the ↑ and ↓ keys scrolls through the list of errors. Pressing RPM deletes the error from the list. The time and speed fields display the following parameters:

time = sequence number
speed = error number

4 Erase EEPROM or Door Lockout Timer

Press ENTER to activate.
The speed field displays 'ERASE'. Two options are available by pressing the following keys:

ENTER = deletes the error table; exits Service Mode
not effected: elapsed run time, cycle counter, temperature offset, imbalance thresholds

RPM = deletes error table, run time, temperature offset, imbalance thresholds
not effected: elapsed run time, cycle counter; exits Service Mode
The accumulated run time and cycle counter values can be deleted in programs 8 and 9, respectively. The temperature offset and imbalance thresholds revert to their default values.

5 Static Imbalance N/A
6 Imbalance Cutoff N/A

7 LED test
Press ENTER to activate.
Every discrete LED and seven segment LED digit is turned ON.

8 Accumulated Run Time
Press ENTER to activate.
The speed and time fields display the following parameters:

speed = time =
hhh & hh-mm
A maximum of 99999 hours and 59 minutes can be displayed, about 11 years.
Pressing RPM clears the stored elapsed time in the EEPROM.
Pressing STOP or ENTER exits the program.

9 Cycle Mode

Press ENTER to activate.
The centrifuge can be programmed to cycle automatically. The time and speed fields display the following parameters:

time = wait time (minutes)
speed = cycle counter

The following keys are used to program the cycle mode parameters:

↑ and ↓ = wait time (1minute increments)
RPM = clear the cycle counter
START = begin cycling and start the centrifuge
FSTOP = end cycling and stop the centrifuge
STOP or ENTER = exit the program

10 Temperature Offset Mode

Press ENTER to activate.
A temperature offset can be programmed to be added or subtracted from the temperature display to match the temperature measured with a dunk test.
The speed, time, and temp fields display the following parameters:

speed = temperature including offset
time = temperature offset
temp = temperature without offset
↑ and ↓ = offset (+/- 0.1C increments)
STOP or ENTER = exit the program

3.5.2 Error listing for Zent 3

No.	Type	Description	Service Procedure
	System CPU:		
1	fail	CPU test after power up failure	change EPROM, change Control Board
2	stack	stack overflow	same as error #1
3	CPU RAM	CPU RAM failure	same as error #1
4	RAM	external RAM failure	same as error #1
5	EPROM	checksum invalid	same as error #1
6	comm	communication fault	same as error #1
7	comm	Control to Display communication error	√ connection, change Control and/or Display Board
8	watchdog	frequent tripping	√ +5volt power supply on Control Board, change EPROM, change Control Board
9	status	disallowed SW traps	change EPROM, change Control Board
10			
	Motor CPU:		
11	fail	CPU test after power up failure	change EPROM, change Control Board
12	stack	stack overflow	same as error #11
13	CPU RAM	CPU RAM failure	same as error #11
14	RAM	external RAM failure	same as error #11
15	EPROM	checksum invalid	same as error #11
16	comm	communication fault	same as error #11
17	reset	Motor CPU reset	same as error #11
18	watchdog	frequent tripping	√ +5volt power supply on Control Board, change EPROM, change Control Board
19	status	disallowed SW traps	change EPROM, change Control Board
	Tach, System CPU:		
20	unstable	interrupt faulty	√ tach sensor to Control Board connection, √ tach sensor cable grounding, √ tach sensor/magnet ring gap, change tach sensor
21	overspeed	RPM exceeds limit	same as error #20

No.	Type	Description	Service Procedure
22	unstable	noisy or jittery	same as error #20
23	compare	inconsistent reading between motor and system CPUs	same as error #20
24	control	final speed not reached	√ AC input voltage, √ how easily the rotor turns, change Power Board, change drive
25	drive	inverter problem	√ AC input voltage, change Power Board
26	monoflop	no indication of rotor turning even though tach O.K.	change EPROM, change Control Board
27	PWM check	PWM signal or feedback signal absent	same as error #26
28	no tach	start without tach	same as error #20 lid lockout requires power to be left on for 12-13 minutes, or can be cleared in the service mode
29	no tach	lose tach during run	same as error #28
30	compare	inconsistent overspeed limit between motor and system CPUs	same as error #26
	Tach, Motor CPU:		
31	overspeed	RPM exceeds limit	same as error #20
32	unstable	noisy or jittery	same as error #20
33	compare	inconsistent tach reading between motor and system CPUs	same as error #20
34	control	final speed not reached	same as error #24
5	drive	inverter problem	same as error #25
36	monoflop	no indication of rotor turning even though tach O.K.	change EPROM, change Control Board
37	PWM check	PWM signal or feedback signal absent	same as error #26
38	no rotor	start without rotor	same as error #20
39	no tach	no tach indication	same as error #20
40	overspeed	hardware overspeed test failure	√ overspeed jumper settings, change Control Board
41	overspeed	hardware overspeed detection, at max rotor speed	same as error #40

No.	Type	Description	Service Procedure
42	imbalance	hardware imbalance test failure	√ imbalance sensor and Control Board connection, √ imbalance sensor position, change imbalance sensor
43	imbalance offset	DC offset not in range	same as error #42
44	n/a		
50	status	floating point operation error, overflow	change EPROM, change Control Board
51	status	floating point operation error, overflow	same as error #50
52	status	floating point operation error, underflow	same as error #50
53	n/a		
	EEPROM:		
69	type	not compatible	EEPROM loose, same as error #20
70	type	version not compatible with SW version	same as error #69
71	hardware	not responding	same as error #69
72	verify	not responding	same as error #69
73	checksum	program data not valid	same as error #69
74	checksum	free area not valid	same as error #69
75	checksum	imbalance not valid	same as error #69
76	checksum	offset not valid	same as error #69
77	checksum	program variables not valid	same as error #69
	Door:		
78	close failure	not closed after door relay active	n/a, motorized latch only
79	hook difference	time difference between hooks too large	n/a, motorized latch only
80	transistor	transistor failure	change Power Board
81	monoflop	rotor turning with door open	turning rotor by hand with the door open, √ door contacts, √ tach sensor
82	test	door lock test signal failure	√ door latch to Power Board connection, change Power Board, change Control Board
83	open failure	door won't open	same as error #82

No.	Type	Description	Service Procedure
84	O/T	chamber O/T	√ refrigeration system including Power Board, relay, √ O/T sensor to Control Board connection, change O/T sensor
85	O/T	Rotor exceeds 50C	√ refrigeration system including Power Board, relay
86			
87	temperature	temperature signal out of range	√ temperature sensor to Control Board connection, change temperature sensor, change Control Board
88	O/T	Power Board heatsink exceeds 70C	√ airflow, √ O/T sensor and cable
89			
90	temperature	temperature sensor failure	same as error #87
91	n/a		
94	imbalance	static imbalance sensor failure	same as error #42
95	imbalance	dynamic imbalance sensor failure	change EPROM, change Control Board
96	n/a		
98	rotor ID	invalid rotor ID	√ rotor ID sensor to rotor gap, rotor missing magnets, √ rotor ID sensor and cable
99	rotor ID	invalid rotor ID	wrong rotor ID keyed in by user, same as error #98

SECTION 4

SCHEMATICS

4.1. Circuit Description

4.1.1 Power Board

The power board comprises relay operation control, power supply for the micro controller board, intermediate circuit, the star-delta switch proper, brake chopper, over voltage monitoring, transistor temperature monitoring, and possibly the imbalance switch.

4.4.2 Electronic Speed Regulations for Centrifuge Drives

All laboratory centrifuges require drive systems with variable rotational speed. Universal motors were used for this purpose, where the commutation takes place by carbon brushes and collectors. By means of a speed control, a specific rotational speed could be adjusted and regulated within an adjustment range. Sometimes regulating transformers were used as speed adjustment circuits.

Universal motors have system-inherent disadvantages. For example, brushes and communators wear out quickly causing frequent maintenance and shortening the life. The brush dust causes contamination, interfering with laboratory work. Undesired carbon dust deposits in the centrifuge may occur.

An alternative to the universal motor is the three-phase asynchronous motor, characterized by its simple structure. In the industrial drive technology for fixed speeds it is by far the motor type most widely used. If driven with AC current they provide high torque and are less noisy. With brushes no longer in use, the only life cycle-significant elements are the bearings. This is of secondary importance. The asynchronous motor can be regarded as maintenance free.

In order to operate an asynchronous motor at varying speeds it must be driven with three-phase current of variable current or variable frequency. For this purpose a three-phase converter is required, driven by a DC voltage source (the intermediate circuit).

The power transistors are digital switches, because they can only be switched on or off. The speed sensor is also digital. Thus the entire speed regulation system can be designed digitally if a microprocessor is used. As compared to analog systems the advantage is greater stability and simple integration. Adjustment is not required. Remaining functions the microprocessor cannot handle due to its limited operation speed, are integrated into its own gate array. The result is a system with economic component use and high flexibility.

Intermediate Circuit (Bus Current)

The intermediate circuit drives the converter. It consists of a main rectifier and one or more storage capacitors.

The generated DC voltage is the basis for generating the three-phase current for driving the motor. In order to attenuate the switch-on current peaks of the electronic capacitors, the main voltage is connected first via resistors. After approximately 0.5 sec. the resistors are short-circuited via K4.

Main Input

For the main input function see the machine-specific circuit diagram "Main Input".
The main voltage is supplied to the power board via plugs x3/1 and x3/2.
It connects lid release magnet via relay K1,2 and lid switch to voltage. If the lid switches are closed, the following components are connected to the input.

The opto-coupler U2 (tells the micro controller that the lid is closed)

The relay K3 (can switch on the compressor)

The relays K2 (can switch on the fans)

The relays K4 (can switch on the intermediate circuit)

Relay Control

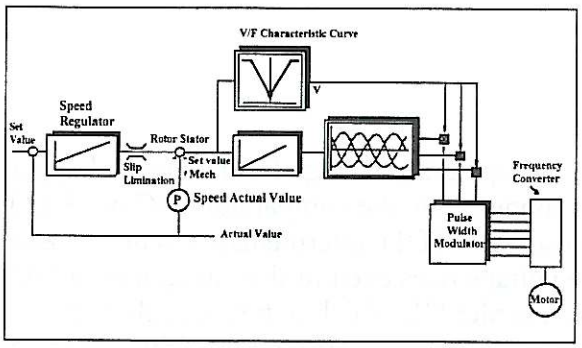
The relays are switched by the micro controller output ports via the relay driver D7.
Relay K4 is time-delayed by Rx and Cx with respect to PWM signed presence.

The thermistor temperature sensor measures the heat sink temperature.

The opto-coupler Ux LED is connected to the voltage after the lid is closed. Ux thus signals to the micro controller that the lid is closed.

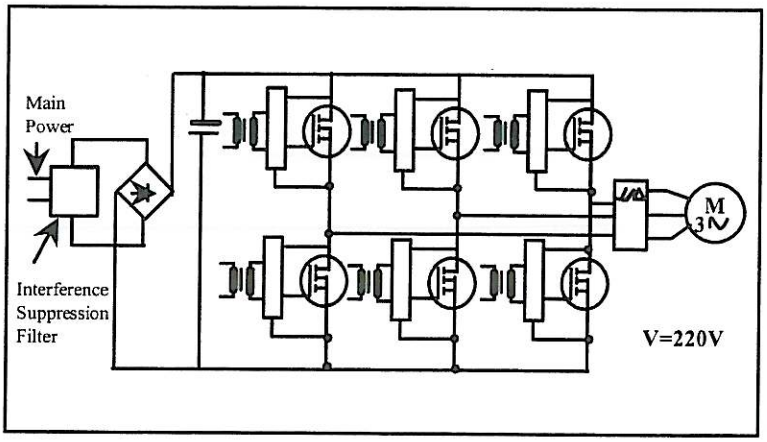
The exact sine valuation of the motor voltage generated in the converter allows an even rotation of the motor at or above only approx. 30 RPM. Density gradient centrifugations can thus be performed very well with these centrifuges.

Acceleration and braking follows selectable curves. They contain a time function together with the max. slip speed for the motor. The slip is dominant; i.e.. if the preset acceleration time is shorter than physically possible, acceleration does not follow the time but the max. slip speed. This is always the case for curve 9. Here the desired times are so short that they can never be achieved. Acceleration/braking in this case follows max. slip speed and is thus achieved in the shortest possible time.



Frequency Converter

The converter consists of a power transistor module with corresponding drivers and the current monitoring. Two transistors with their drivers are wired as a semi-bridge. Only one transistor per semi-bridge is conductive at any one time. If uncomfortable voltage peaks accidentally cause 2 transistors of one semi-bridge to become conductive at the same time, they are usually destroyed. Often the CMOS circuits in the driver stages are damaged as well, causing another failure in the future. As such damage is undetectable, do not exchange transistors but the entire board.



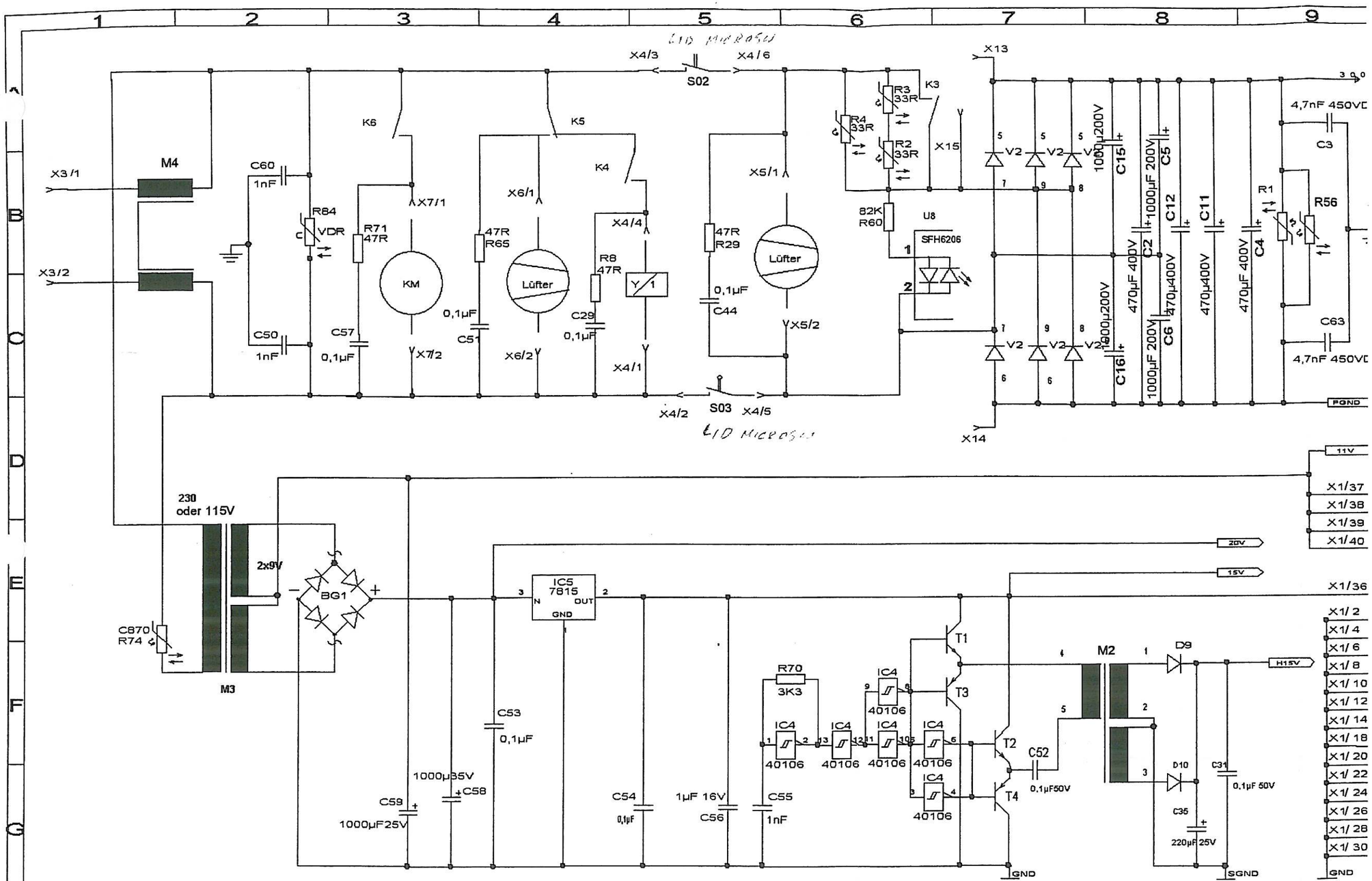
NOTE: Consider in general that trying to repair within the converter (transistors and drivers) should be avoided, because extensive experience and quite expensive measuring equipment is required.

Brake Chopper

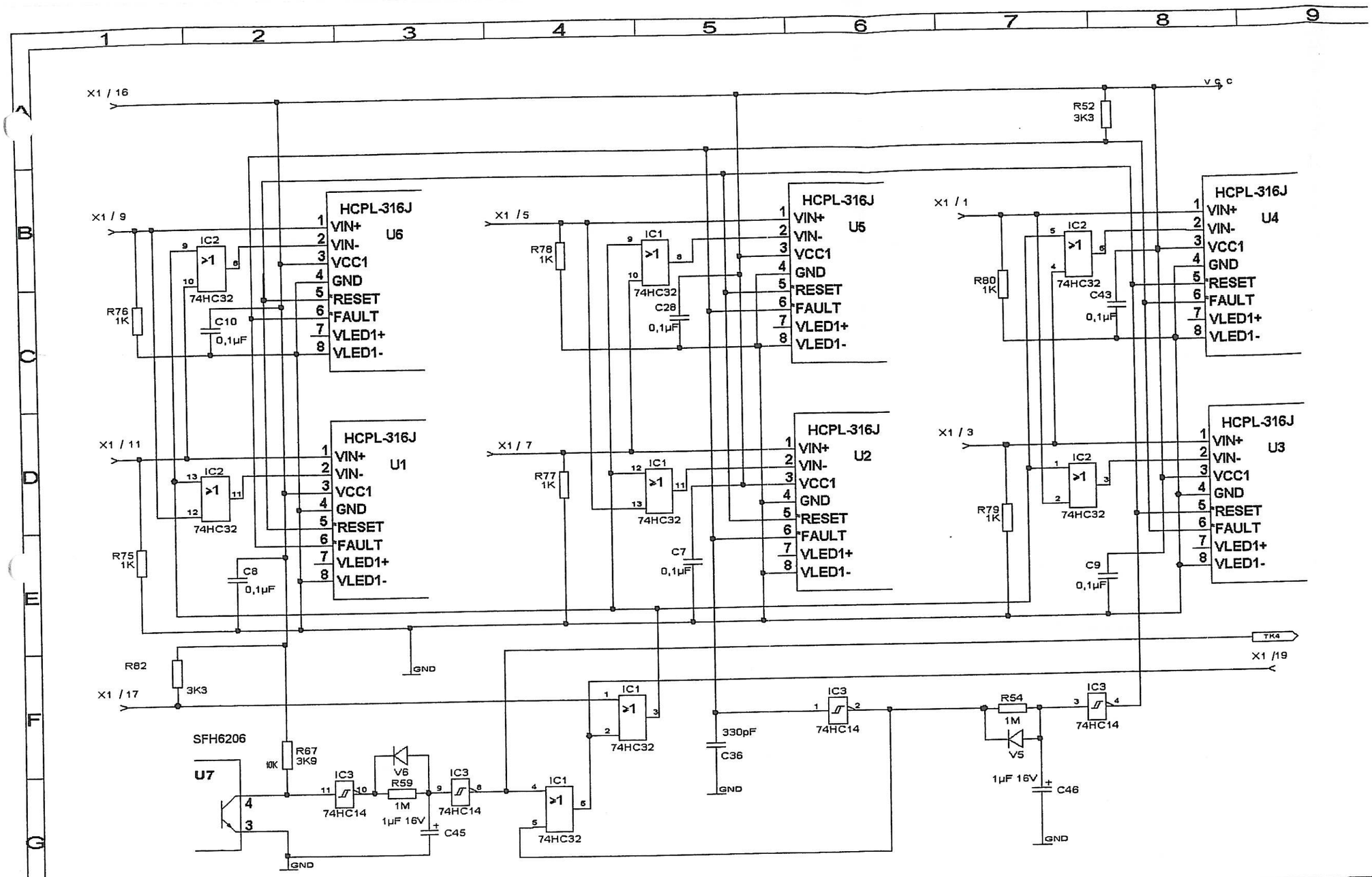
The voltage regulator TL431 N3 generates the operating voltage for the brake chopper via R37 and R38. The reference voltage is connected to the comparator N2C pin 8 and 9 and switches on transistor V38 and thus resistor R87 if the intermediate circuit voltage exceeds approx. 360 V. If the intermediate voltage rises even further, at approx. 390V the second comparator switches on the opto-coupler U1, which in turn signals over voltage to the micro controller. Error message 25 or 35 appears and the drive slows down freely.

Power Supply

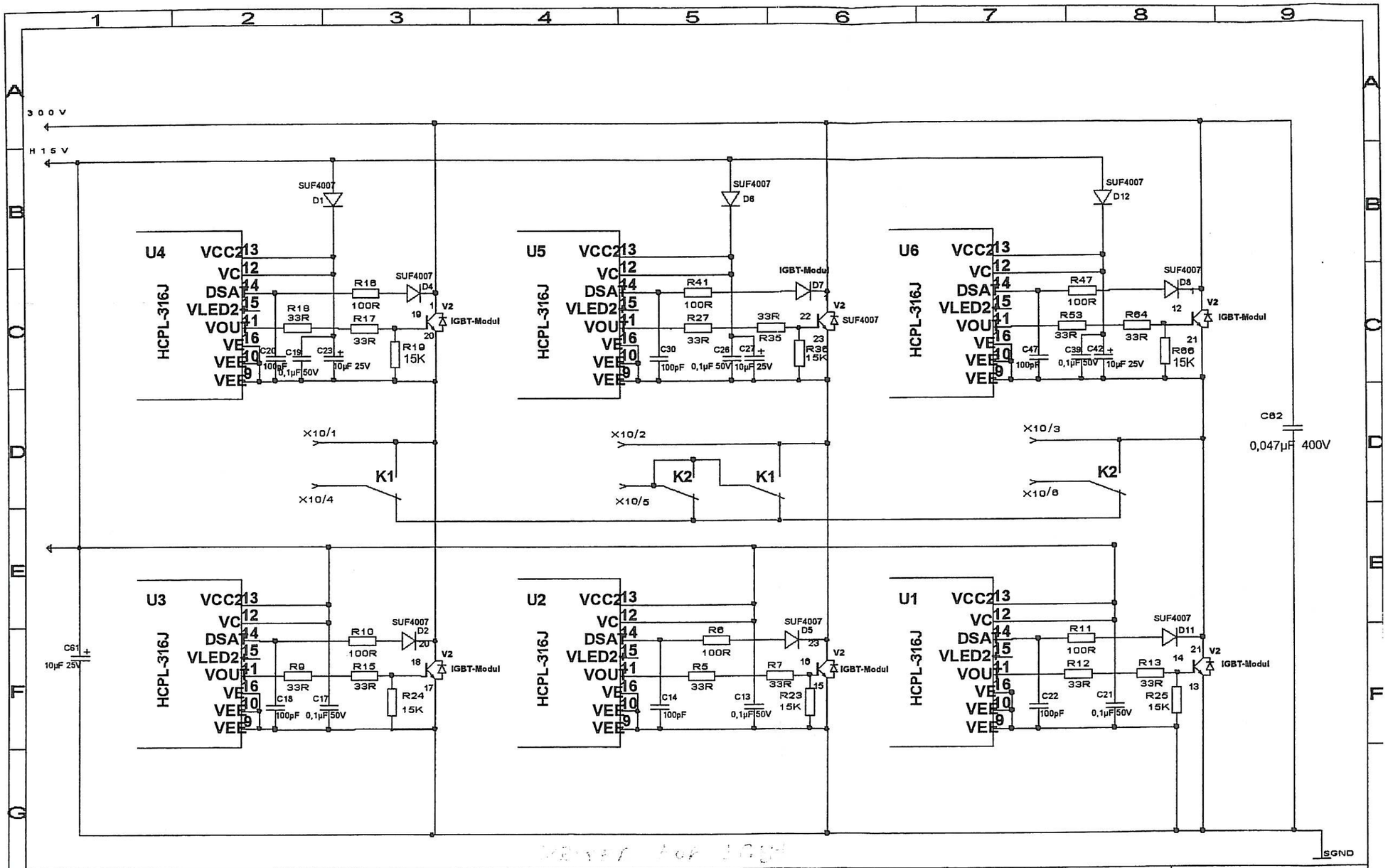
Capacitor C1 and diode V39 form a voltage doubler with approx. 25 V at its output, stabilized by N4 to 15 Volt. The unstabilized 25 VDC voltage supplies the switching relays.



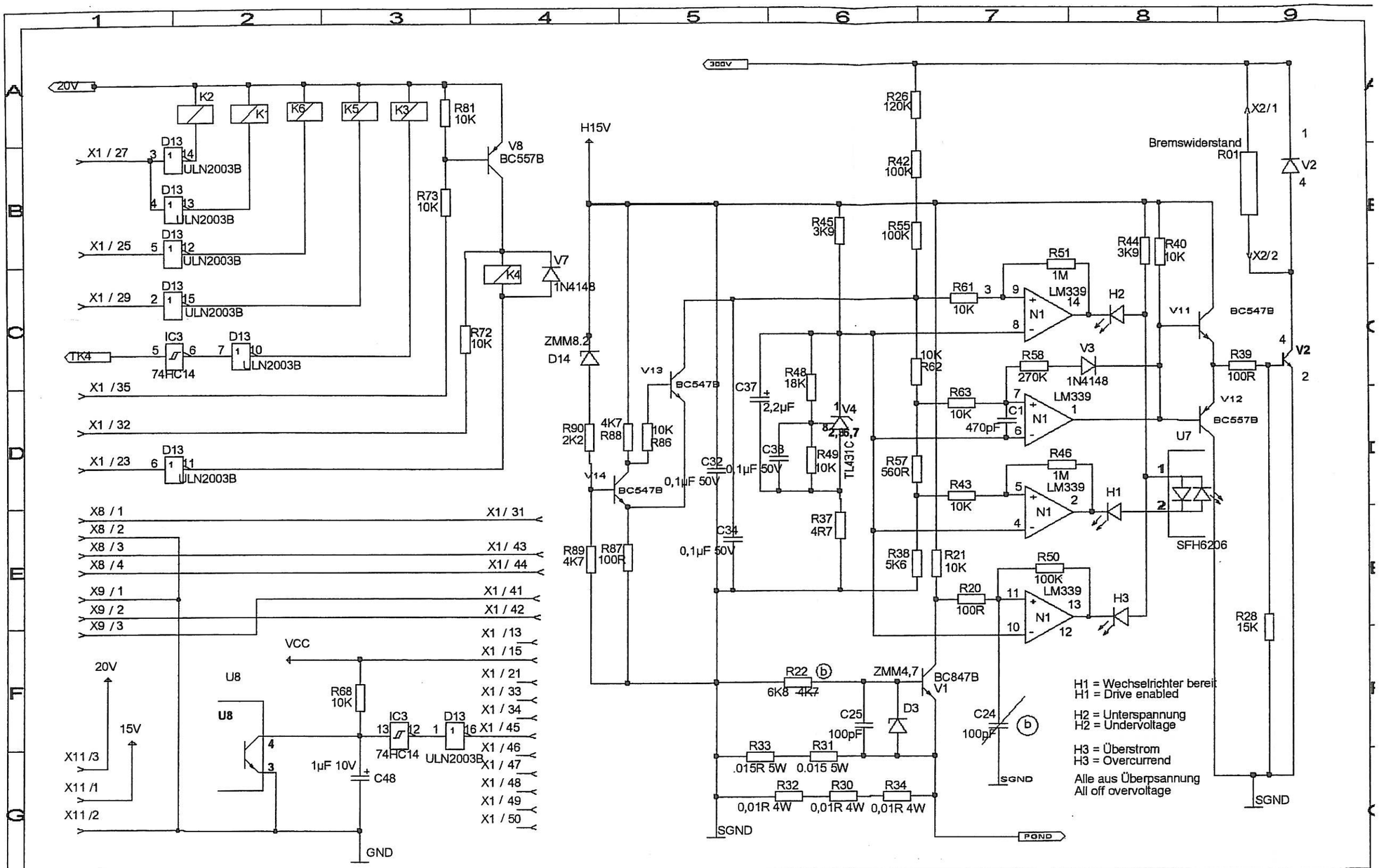
			Datum	08.07.2002	70792 230V 8A C2, C4 R1, R2, R3, R56 70793 120V 4A (C15 u. C16) oder (C5 u. C6), C3, C63, R1, R2, R3 70794 230V 4A C2, R1, R4,	SIGMA Laborzentrifugen GmbH 37520 Osterode Harz	Bezeichnung Schaltbild für Leistungsplatte Zent 3
			Bearb.	Gärtner			Zeichnungsnummer 25293
a	0208	02.05.2002	gepr.				Platte 25291/21
	Mitteilung	Datum	Norm			Auftrags Nr.:	Blätter 4 Blatt:



			Datum	08.07.2002	SIGMA Laborzentrifugen GmbH 37520 Osterode Harz	Bezeichnung **Schaltbild für Leistungsplatte Zent 3**	Zeichnungsnummer **25293**
			Bearb.	Gärtner			
a	0208	02.05.2002	gepr.				
	Mitteilung	Datum	Norm		Auftrags Nr.TEXT	Platte 25291/21	Blätter: 4 Blatt:



			Datum	08.07.2002	SIGMA Laborzentrifugen GmbH	Bezeichnung Schaltbild für	Zeichnungsnummer
			Bearb.	Gärtner	37520 Osterode Harz	Leistungsplatte Zent 3	25293
a	0208	02.05.2002	gepr.		Auftrags Nr.:	Platte 25291/21	Blätter: 4 Blatt: 3
	Mitteilung	Datum	Norm				



			Datum	08.07.2002	Alternativ: R31 und R33 oder R30, R32, R34	SIGMA Laborzentrifugen GmbH 37520 Osterode Harz	Bezeichnung: Schaltbild für Leistungsplatte Zent 3
b	C24 gestr., R22 geänder	07.08.2002	Bearb.	Gärtner			Zeichnungsnummer: 25293
a	0208	02.05.2002	gepr.				
	Mitteilung	Datum	Norm			Auftrags Nr.:	Platte 25291/21

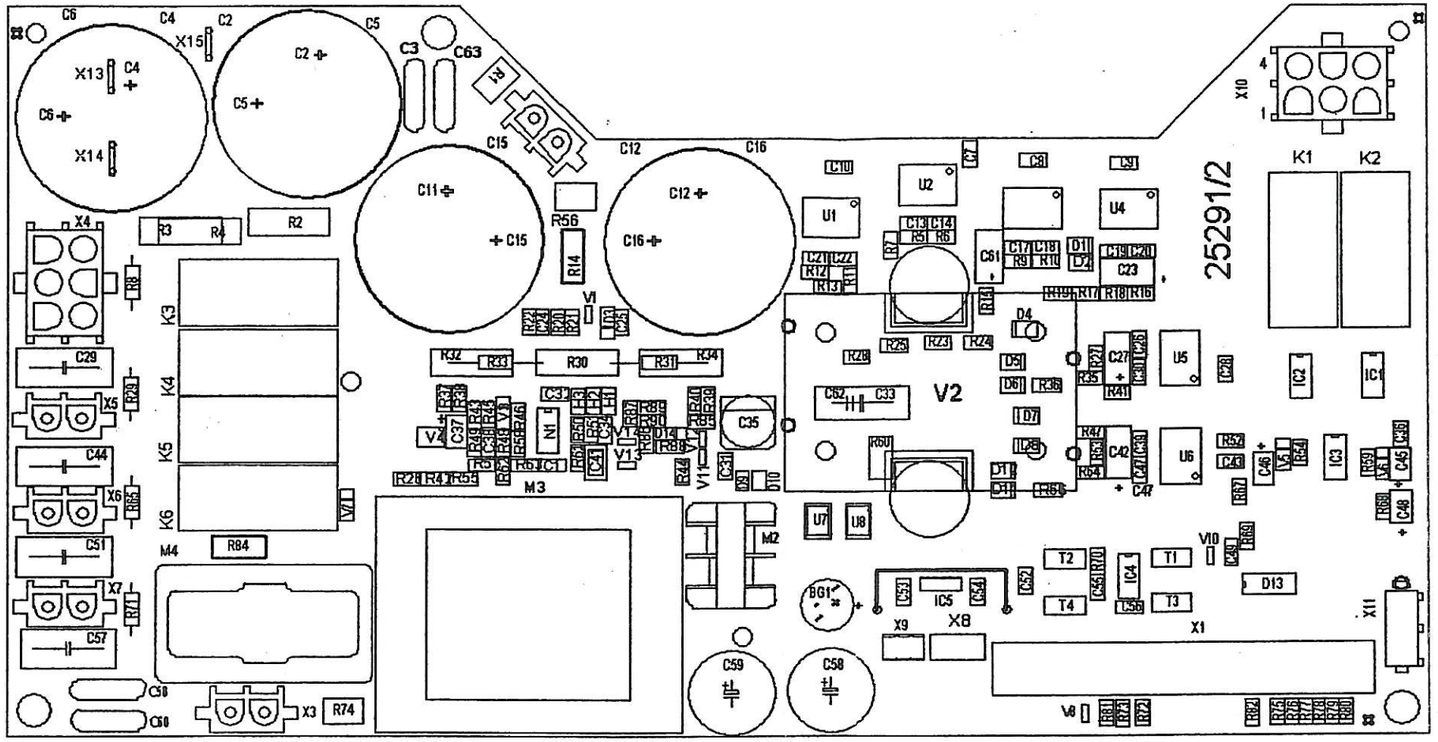
Blätter: 4 Blatt: 4

H1 = Wechselrichter bereit
H1 = Drive enabled

H2 =Unterspannung
H2 =Undervoltage

H3 = Überstrom
H3 = Overcurrend

Alle aus Überspannung
All off overvoltage



Version 25291/2

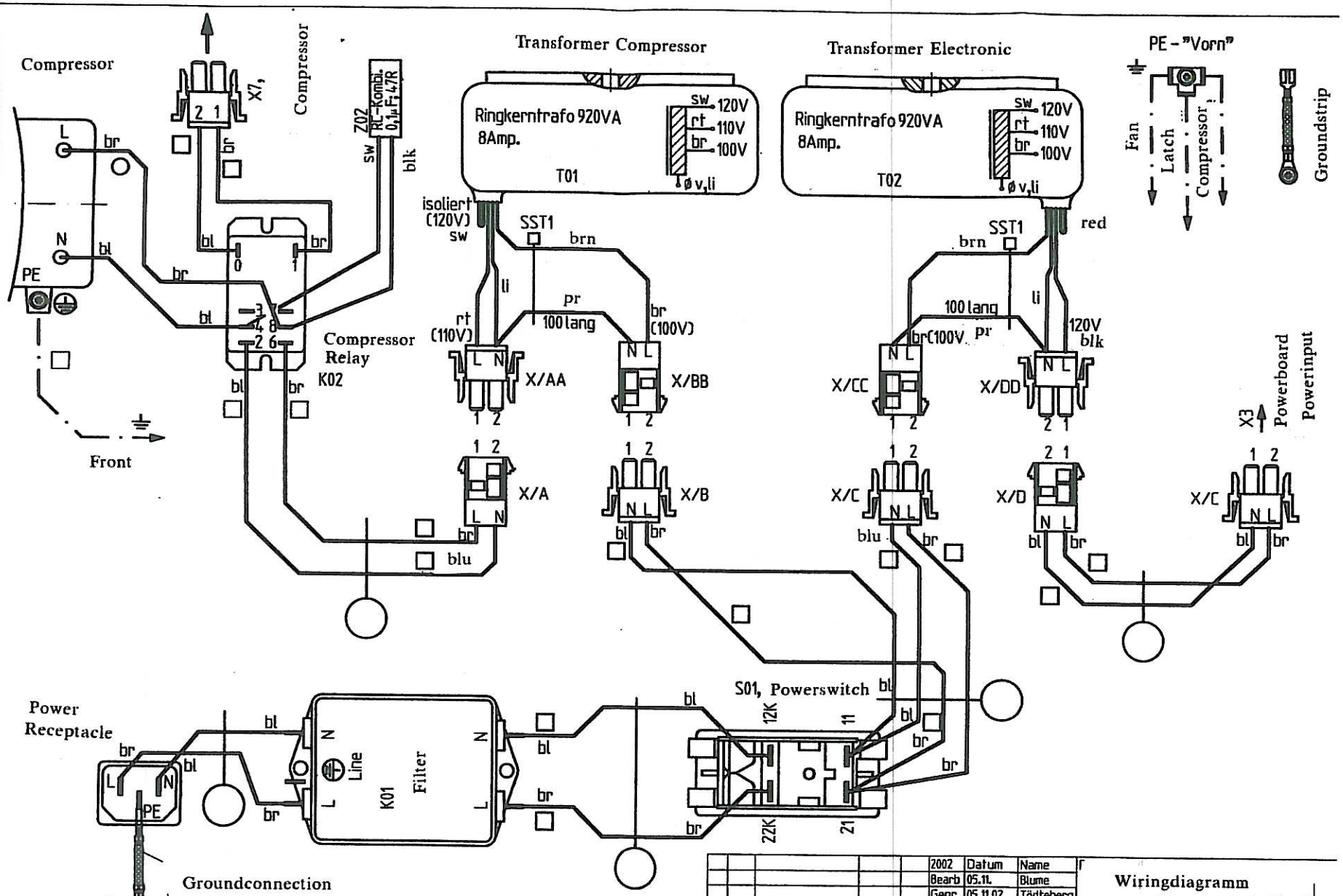
Alternativ: (R30, R32, R34) oder (R31 und R33)

Nicht bestückt werden: Not assembled:
C3, C33, C40, C41, C49, C63, C24
R14, R69, R85, V10
X13, X14, X15

Version:

70792 C2 und C4 je 470µF 400V; R2 und R3
70793 (C5 und C6) oder (C15 und C16) je 1000µF 200V Durchmesser max 30mm; R2 und R3
70794 C2 470µF 400V; R4
70695 (C5, C6, C15, C16) je 1000µF 200V Durchmesser max 30mm oder (C5 und C6) je 2200µF 200V; R2 und R3

			Datum	02.05.2002	SIGMA Laborzentrifugen GmbH	Bezeichnung Bestückungsplan	Zeichnungsnummer
b	C24 not assembled	07.08.2002	Bearb.	Gärtner	37520 Osterode Harz	für Leistungsplatte Zent 3	25292
a	0208	02.05.2002	gepr.				
	Mitteilung	Datum	Norm		Auftrags Nr.:	Leistungsplatte 25291/21	Blatter 1 Bla



Schutzvermerk nach DIN 34 beachten

					2002	Datum	Name	Wiringdiagramm	
					Bearb	05.11.	Blume	Allegra X - 22 R, 100 V	
					Gepr.	05.11.02	Tödteberg		
					Norm				
					sigma			Japan - Version 100 V; 50/60 Hz	Zeichnungs-Nr. 70853 / Blatt 1 von 1
Ind	ÄM	Änderung	Datum	Name	37520 Osterode / Harz			Stoff-Nr.:	Stückliste Nr.: 70853

SECTION 5

PARTS

5.1.1 Electrical

365738	Board Assembly, Zent3 Power, 120V/ 5A
368950	Board Assembly, Zent3 Power, 230V/ 5A
392235	Display/Control Assembly Allegra X-22
392218	EPROM, Allegra X-22
392209	Display/Control Assembly Allegra X-22R
392205	50 pin Ribbon cable
392216	EPROM, Allegra X-22R
365753	Tach Generator Board
365754	Cable, Tach
365752	Rotor ID Plate Assembly
365787	Imbalance Sensor Assembly
392211	Latch Assembly
365757	Temperature Sensor (includes cable)
365758	Cable, Heat sink O/T Assembly
365705	Cable, Ribbon, 50 Pin
392239	Fan, 120V
365980	Fan, 230V
	Power switch with integrated Fuse:
392236	120V X-22, 230V X-22R
392237	230V X-22
392238	120V X-22R
365757	Temperature Sensor (O/T) on Heat-sink (B1)
361349	Tach Generator Board
392198	Imbalance Detector Assembly
392223	Motor Assembly
392226	Power Receptacle
368870	Filter Kit, 100V/120V
365825	Filter Kit 230V
392219	Ground Filter

5.1.2 Mechanical

P/N	Description
392201	Lid rubber Seal
361328	Motor Shaft Cone, 9/16 in. ID
364206	Boot, Rubber Seal, Motor Cover
961803	Vibration Damper, Motor Suspension
361329	Cover, Disc (plastic for motor)
361330	Cap for Motor Cover
392224	Button front panel
392196	Chamber Spacer
368230	Hinge, Lid
392213	Gas Damper
365838	Foot, Rubber,

5.1.3 Refrigeration

P/N	Description
893332	Compressor, 50/60 Hz
392220	Compressor, 60Hz
365973	Relay, Power 230V
392193	Condenser
367815	Snubber, E1

5.1.5 Tools and Supplies

P/N	Description
883371	Tri-Flow Lubricant
964429	4 Weight Set (2,6,9,10g)
961660	Anti-Seize (961660)
964432	Metric Hex Key Set
267356	Drive Tester
306812	SPINKOTE Lubricant
335148	Silicone Vacuum Grease
339555	Solution 555
964371	Teflon Grease
361367	Rotor Tie-Down Bolt Assembly
361371	Spanner Wrench, T Handle, 10mm
347998	Arrow Label
339379	Rotor Cleaning Brush
339558	Rotor Cleaning Kit

SECTION 6

ACCESSORIES & MISCELLANEOUS

NO MATERIAL AVAILABLE AT THIS TIME

SECTION 7

APPLICATIONS

NO MATERIAL AVAILABLE AT THIS TIME

SECTION 8

SERVICE MEMOS

ISSUED DURING TRAINING CLASS