Service Manual

Thermo Scientific: **Medifuge**
Medispin

Fisher: **AccuSpin 8C**

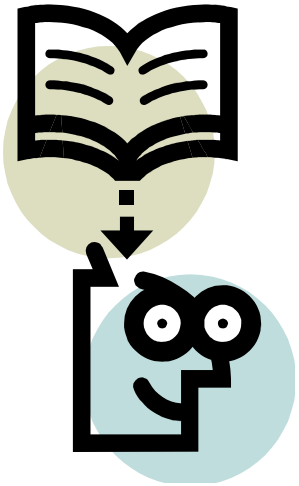
PN: 50163025-Version E

August 2021

thermoscientific

1. INTRODUCTION

Chapter: 1.0



1. INTRODUCTION

CAREFULLY READ THIS MANUAL BEFORE SERVICING THIS INSTRUMENT.

PURPOSE

This manual contains maintenance instructions intended for use by a qualified maintenance or service technician.

It is organized to provide information on the theory of operation to assist in troubleshooting for personnel of Thermo Fisher Scientific and authorized service organizations. Moreover, it outlines parts replacement and calibration procedures for putting the centrifuges back into service.

Should a specific maintenance problem arise which is not covered in this manual, please contact our after sales or product support department.

For any service item not addressed in this service manual please contact the service team. Make sure you have all necessary information on hand before contacting. This information includes serial number, software ID and revision, NV-RAM ID and revision, options and accessories installed and set parameters.

1.1 Table of Contents

1.2 Notes

Date	*Notes*

1.3 Technical Service Bulletins

Bulletin Number	Title	Issue Date
1604-CEN-OHA-0597	Medifuge front panel rework instructions	20/04/16

1.4 Technical Data Sheet

Thermo Scientific	Medifuge Medispin
Fisher Scientific	AccuSpin 8C

Environmental conditions	- Indoor use only - Max. height above sea level 3000m - Max. relative humidity 80% at 31°C - Linear decrease until 50% relative humidity at 40°C
Permissible ambient temperature	+2°C to +40°C
Timer range	1min – 99min, hold mode
Max. speed	4900 rpm
Min. speed	300 rpm
Max. kin. energy	680 J
Max. sound level at top speed	< 56 dB (A)
Height (lid open / lid closed)	510mm / 240mm
Width	325mm
Depth	450mm
Weight (without rotor)	15.5 kg
Heat output (BTU/h)	419.7

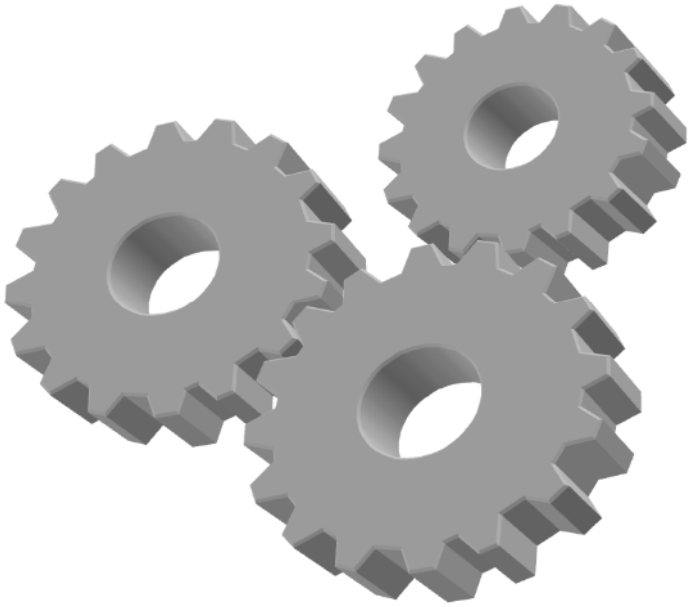
Volt Version (+/-10%)	**100V**	**120V**	**220-230V**
Power consumption (W)	100	130	130
Rated current (A)	1.7	1.8	1.1
Frequency (Hz)	50/60	60	50/60

Rotor Data

Max. cycles	60,000
Max. load	8 x 30 g
Max. imbalance	10 g
Max. speed	4900 rpm
Max. RCF fixed angle	3,114 xg
Max. radius fixed angle	116mm
Angle fixed angle	45°
Max. RCF swinging	3,490 xg
Max. radius swinging	130mm
Angle swinging	12-87°
Autoclavable	No

2. SERVICE

Chapter: 2.0



2. Service

2.1 Servicing Schedule (yearly procedure recommended)

Maintenance Routine without Dismantling the Centrifuge

- **Electrical Installation and Safety**
  - Switch OFF the centrifuge and disconnect the unit from power, check voltage supply and mains fusing (15/16 Amps, slow blow characteristic).
  - Check condition of plug and wall socket - (let) replace defective parts.
  - Check cord condition and fixing / connection - replace or refit it.
  - Check condition of instrument socket and replace it in case of bad contacts.

- **Location and Mechanical Installation**
  - Check the base (ground, table, lorry with lockable wheels etc.) for resonance-free and stable conditions.
  - Check for a well-ventilated place and enough space to walls or adjacent equipment, without exposition to direct sunlight.
  - Check the leveling of the centrifuge drive with use of a spirit level.

- **Lid Locking Mechanism and Safety Device**
  - Connect the centrifuge to power and switch ON.
  - Check for easy lid closing and opening - if in disorder, readjust hinge and/or torsion spring.
  - Check the gasket for correct sealing and replace it if damaged.
  - For checking of the safety circuit: start the centrifuge let it shortly run and stop it. The lid must not be unlocked by the microprocessor as long as the speed is more than 200 rpm – if safety circuit is out of function, replace main PCB.

- **Cleanliness of Centrifugal Chamber and Motor Casing**
  - Open the lid and remove the rotor by turning the rotor locking nut counterclockwise.
  - Clean the spin chamber with a dry and absorbent cloth (remove all dust and moisture), and check for corrosion. Take special care of the gap between the bowl and the motor, as penetrating fluids could lead to damage the motor and/or electronics and foreign objects may block the air flow *(see section for Cleaning)*.

- **Rotor and Accessories Condition and Sealing**
  - Check the condition of rotor and accessory parts (especially all supporting or stressed partitions): the rotor and/or accessory parts must not be used any longer, if there are visible traces of mechanical damage or rust.

- **Drive Shaft**
  - Check the condition of the drive motor shaft: the centrifuge must not be used any longer, if the drive shaft is damaged (bend, thread is worn out, etc.).

- **Temperature Control Circuit**
  - Check the air in and outlet for airflow. If the airflow is insufficient the temperature inside the centrifuge, electronics and rotor can rise to a too high temperature level.

- **Imbalance Behavior**
  - This centrifuge has NO imbalance detection.

Maintenance Routine after Dismantling the Centrifuge Housing

- **Motor Supporting Elements**
  - Check the anti-vibration mounts and replace them in case of increased rubber abrasion or abundance of imbalance but at least every 3 years.

- **Braking Circuit**
  - Check the function of the braking circuit (warming up of brake resistor, even and noiseless brake effect) and replace defective parts in case of malfunction.

- **Lid Spring**
  - The torsion spring of the lid must be greased on the front side.

- **Lead and Screwing Connections**
  - Check the terminal and plug connections of all leads and on all boards and electrical components, tighten all loosen screwing connections, refit or replace defective parts.
  - Check the screwing connections of all boards, mechanical and electrical components and re-tighten them if necessary (use screw locking lacquer for motor mounts and lid lock assembly).

- **Protection Earth Core and Grounding Connections**
  - Check the protection earth for continuity and all grounding plug connectors.
  - Check insulation resistance and leakage current.

2.2 Trouble Shooting

Malfunctions without error message

Error Indication	Error Cause	Possible Error Source	Corrective Procedure
Display remains dark	No mains voltage supply	Mains fuse or circuit breaker failed	Check supply voltage at XNa. If no voltage is present, check power switch, instrument socket and voltage supply. Replace defective parts
		Defective power cord or switch or instrument socket	
	No low voltage supply for display	Faulty connection from main PCB to display	Check presence of 3.3VDC across X1 pin 1 and 20. If the voltage is missing replace main board. Otherwise check display ribbon cable and display board.
		Faulty display or main PCB	
Display shows cryptically (wrong) characters	Display connection disturbed	faulty connection from main PCB to display	Check that the ribbon cable of the display is correctly inserted into the connectors. Check the power supply for good grounding. If no other error source can be identified, replace main PCB.
Display shows 888	CPU program reset caused by EMI	supply voltage drop (>10%)	(Let) improve the power supply. If the voltage drops often, use a voltage stabilizer.
		bad or missing grounding connection	Check all grounding connections
	CPU program reset caused by faulty controller		Replace main PCB
Buttons inoperative	keypad overlay has no contact	ribbon cable broken or no contact	 ***Do not test the buttons before the overlay is attached to the front panel. The keys may be damaged!*** Check correct seat of ribbon cable in display board. Replace a defective keypad overlay.
Drive makes noises, separation result insufficient	mechanical	worn anti vibration mounts	Check anti-vibration mounts and replace if worn or older than 3 years.
		Rotor inserts not seated correctly	Refer to instruction manual
		Load not balanced	Check weights of sample tubes and rotor inserts
		Bad motor bearings	Turn motor by hand. When you hear a scratching noise, replace complete motor.
	electrical	Missing phase	

		faulty electronic	Check winding and insulation resistance of the motor (see test points). If the motor and its leads are ok, replace main PCB.

Error	Description
E-01	**System clock unstable** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-02	**Software status invalid** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-05	**Hardware reset by watchdog timer** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-10	**NV-RAM communication error** Deceleration method: free coasting Remedy: Cycle power off/on. If the error persists, check that the NV-RAM is correctly inserted into the socket. If correct, replace the NV-RAM.
E-11	**NV-RAM and main controller do not match** Deceleration method: free coasting Remedy: Install a correct NV-RAM.
E-12	**NV_RAM check sum error constant values** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the NV-RAM if the error persists.
E-22	**Speed signal disturbed** Deceleration method: free coasting Remedy: Make sure the signal is not disturbed by surrounding equipment such as microwave ovens, radios, etc. Check that all wires are connected correctly and have a good conductivity. Clean the speed detection board (light barrier). The speed detection board or the main board may be faulty if the error persists. NOTE: An automatic self-test is performed after next power on. If the error is persistent, E-45 (Safety test failed) may be triggered.
E-24	**Lid could not be opened** Deceleration method: braking Remedy: After 3 unlocking attempts the lid is still closed. If you could hear the clicking of the solenoid, the lid is mechanically blocked. If you could not hear the clicking, the solenoid is either not supplied with power or it is faulty. Check the resistance of the solenoid. If the solenoid is ok, replace the main board. NOTE: After pressing the OPEN button 3 times, a timer de-activates the OPEN function for 5-10 seconds to prevent the solenoid from overheating.
E-26	**Lid lock status unclear (Software)** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-27	**Lid lock status unclear (Hardware)** Deceleration method: free coasting Remedy: Check the lid lock micro switches. Replace the lid lock if faulty.
E-29	**Motor does not turn** Deceleration method: free coasting Remedy: Verify visually through the view port, whether the rotor is spinning or not. If the rotor is spinning, the speed signal is missing. Refer to E-22. If the rotor is not spinning, make sure the rotor / motor turns freely when rotated by hand. Check the winding and insulation resistance of the motor. If the motor is ok, replace the main board. NOTE: An automatic self test is performed after next power on. If the error is persistent, E-45 (Safety test failed) may be triggered.

Error	Description
E-31	**Motor over temperature** Deceleration method: free coasting **CAUTION**: Motor may be hot! Remedy: Wait 30 minutes to allow the motor to cool down. The over temperature cut out resets automatically once the motor is cool. Make sure there is sufficient space around the centrifuge and ventilation slots are free of dust and foreign objects. Check the motor winding and insulation resistance and replace it if faulty. If the error persists, bad motor bearings may be the cause.
E-36	**Over current or over voltage detected** Deceleration method: free coasting Remedy: Check the line voltage. Check the motor winding and insulation resistance and replace it if faulty. Replace the main board if the error persists.
E-39	**Overspeed** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-40	**Acceleration too low** Deceleration method: braking Remedy: Check that the rotor is properly balanced. Check the line voltage. Check the motor winding and insulation resistance and replace it if faulty. Make sure the rotor / motor turns freely when rotated by hand. Check that the motor is supplied with all 3 phases.
E-45	**Safety test failed** Deceleration method: free coasting Remedy: After any error involving the speed signal or a power outage, the centrifuge makes an automatic self test after next power on. Refer to error E-22 and E-29.
E-46	**"Lid" - Lid opened during spin** Deceleration method: free coasting Remedy: The lid was opened during the run. Close the lid immediately! If this alarm comes up even though the lid is closed, check the lid lock micro switches and wires.
E-48	**Set value status unit error** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-49	**Undefined error occurred** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the NV-RAM if the error persists.
E-50	**Temperature status unit error** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-51	**NV-RAM status unit error** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-52	**Lid status unit error** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-53	**Software primary and secondary mask reading error** Deceleration method: braking Remedy: Cycle power off/on. Replace the main board if the error persists.
E-54	**Software primary and secondary mask writing error** Deceleration method: braking Remedy: Cycle power off/on. Replace the main board if the error persists.
E-62	**Set value error** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board and/or NV-RAM if the error persists.
E-75	**RAM test error** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.

Error	Description
E-77	**Error during system check** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-81	**Redundant max speed value error** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-84	**Lid safety circuit check failed** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-100	**Set value error** Deceleration method: free coasting Remedy: Cycle power off/on. Replace the main board if the error persists.
E-109	**NV-RAM command could not be executed within time limit** Deceleration method: braking Remedy: Cycle power off/on. Replace the main board and/or NV-RAM if the error persists.

Self-test errors

The following table lists errors that may occur only during factory testing. Contact Product Support if you face one of those.

Error	Description
E-87	**Self-test data already existing** Deceleration method: free coasting
E-90	**Lid opened above 200 rpm** Deceleration method: braking
E-91	**Self-test acceleration error** Deceleration method: free coasting
E-92	**Self-test hold speed error** Deceleration method: free coasting
E-93	**Self-test deceleration error** Deceleration method: free coasting
E-94	**Component check error** Deceleration method: free coasting

2.3 Test Points

Make sure to take all necessary precautions to avoid electrical shocks. Only trained professionals should make measurements in powered systems!

Test Point	Expected Value	Conditions
Mains input **XNa**	230V / 120V	**CAUTION! Mains potential!** Unplug connector from XNa and measure across the two connector poles. Mains voltage should be present when the power cable is connected and the mains switch is in the ON position.
Motor **XM**	18.4 Ω	Disconnect the 3 motor phases from XM and measure the resistance across any two. The resistance across all motor phases must be equal. Any phase to ground should measure infinite.
Over temperature cut-out motor **X1M**	short	**CAUTION! Motor may be hot!** Disconnect the over temperature cut out from XM and measure the resistance across the two wires. The resistance should be low if the motor is cold and open if the motor is hot.
Lid latch Solenoid **XC**	140 Ω	Disconnect the solenoid from XC and measure the resistance across the two wires.
Lid latch micro switches **XA**	open	Disconnect the micro switches from XA and measure the resistance across pin 1+2. The switch is open, when the centrifuge lid is open. Measure the resistance across pin 3+4. The switch should only be open while the solenoid is engaged.
	closed	Disconnect the micro switches from XA and measure the resistance across pin 1+2. The switch is closed, when the centrifuge lid is closed. Measure the resistance across pin 3+4. The switch is closed when the centrifuge lid is closed and in stand-by.

Imbalance Behavior

This centrifuge is *NOT* equipped with automatic imbalance detection. Anyway to rotor will fail to reach speed in case of heavy imbalance resulting in E-40 (Acceleration too low).

2.4 Cleaning of Instrument Parts

The electrical and electronic components must not be cleaned with moist detergents. For cleaning the centrifuge housing or its accessories see Instruction Manual (Maintenance and Care).

- **Electronic components**
  Clean dusty components carefully with a dry and soft brush and remove loose dust with a vacuum cleaner.

- **Vent holes**
  Remove dirt from the unit by using a brush and a vacuum cleaner.

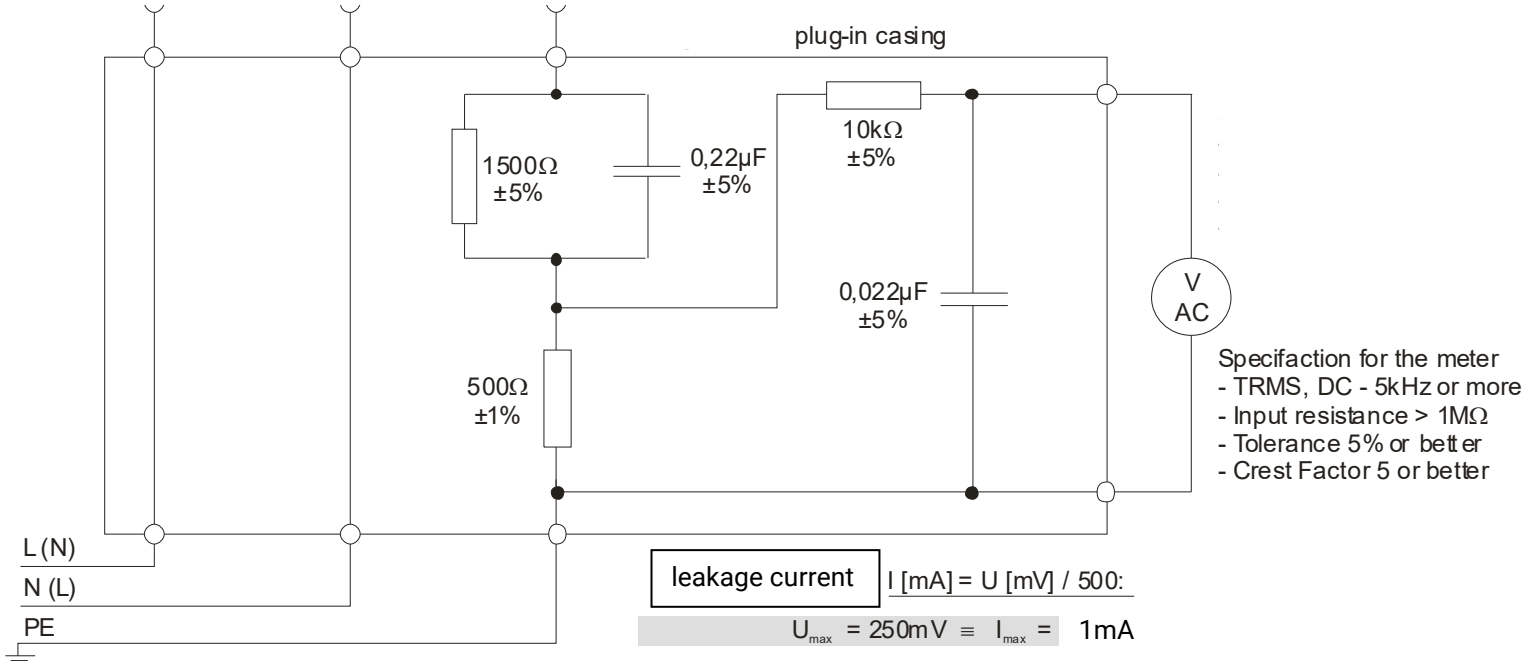
2.5 Electrical Safety Check

A final electrical safety check must be performed after each maintenance and / or repair!

- **Resistance check of protective conductor**
  The measuring value of the resistance between the mains plug's grounding pin and the grounding conductors of the motor, electronic chassis and the housing must not exceed 200mΩ.

- **Insulation resistance Check**
  Check also the insulation resistance between the poles of the mains plug and the grounding conductor; the resistance value must be more than 2MΩ.

- **Leakage current measured to IVD medical device regulation**
  The leakage current must not exceed 1mAmp in single fault condition (interrupted protection earth wire).



3. FUNCTIONAL DESCRIPTION

Chapter: 3.0

3. Functional Description

3.1 Block Functions

The Medifuge / Medispin / AccuSpin 8C is a non-refrigerated microprocessor-controlled laboratory tabletop centrifuge with induction drive motor and automatic speed detection.

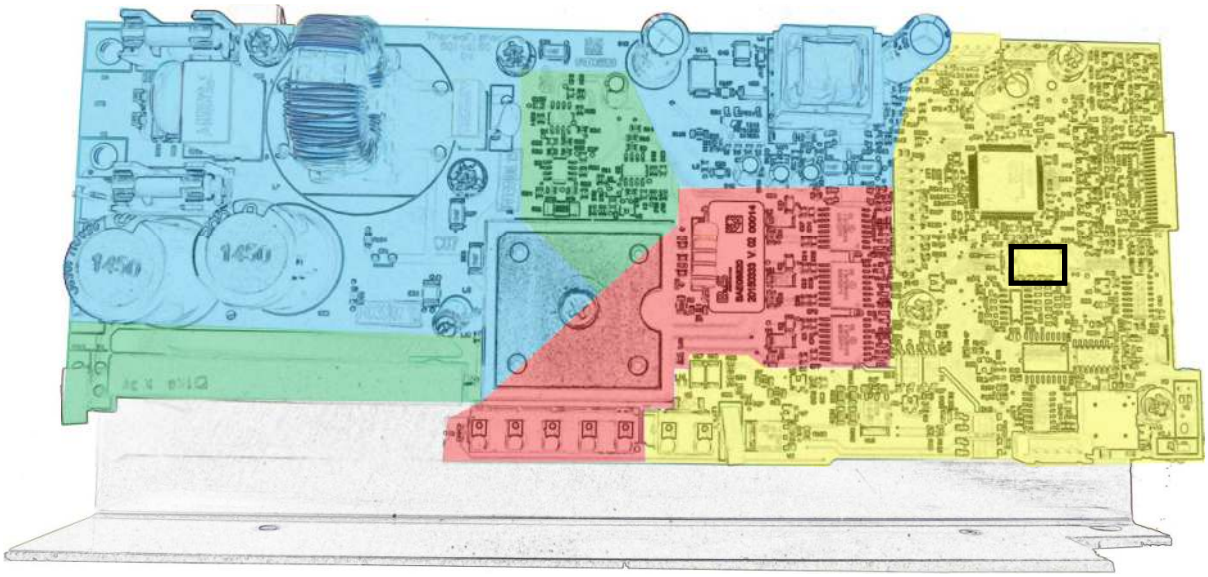
The unit is equipped with the following boards and components:

- Instrument socket and mains switch combined element.
- Grounding choke.
- Main PCB with microprocessor part and power electronics.
- 7-segment display.
- Keypad overlay.
- 3 phase induction motor with integrated thermal over temperature cut out (140°).
- Lid lock with electronic opening and emergency release.

3.2 Functions of Main PCB

The main PCB is mounted on a metal sheet in front of the unit behind the front panel.
The components on main PCB are arranged in following blocks:

- **Power supply**
- **Controller**
- **NV RAM**
- **Power circuit**
- **Protection circuit**



Power Pack

The power pack consists of a bridge rectifier and a switched mode power supply chip.

5V (VC): By switched-mode power supply chip TOP243G. For processors and its electronic components on main PCB, keypad and display. The reference potential is GND.

15V (+15VPrim): By switched-mode power supply chip TOP243G. For protection circuit. The reference potential is GND.

230V (U+): Realized with a bridge rectifier. A voltage doubler is realized via BR1 in 120V units.
For motor driving circuit. The reference potential is U-.

Microcontroller (Central Processing Unit) Part

The controller block includes the central processor unit (CPU) LPC1764 programmed with software to control the centrifuge and a data storage (NV-RAM). Current versions and revisions of software and data can be seen when holding the STOP button while switching ON the centrifuge
Software is loaded into the LPC1764 via a serial interface on the main board X1 and cannot be upgraded in the field. The NV-RAM data can be updated by replacing the entire NV-RAM with one of the latest revision.
NV-RAM data includes rotor parameters, such as max speed and g-force, acceleration and deceleration profiles.

Power Circuit

The 3-phased motor is provided with chopped direct voltage blocks These blocks are variable in frequency and pulse-width modulation, 120° de-phased and generated by the 3-phase bridge inverter M1. The 3 phases are controlled during acceleration, running at set speed and deceleration (e.g. for small speed: low frequency and small pulse-width length will be affected).

Protection Circuit

Electrical power is fed back into the intermediate circuit during motor deceleration (motor acts as generator). This braking power is transformed into heat by the connected resistor so that the power circuit voltage does not rise to an excessive level. The brake resistor is switched by a brake chopper build in M1.
Furthermore, this circuit monitors the voltage and current in the power circuit and the temperature of the motor and the brake resistor.

Display

The 7-segment displays are supplied with VCC managed by multiplex processing.

Speed detection

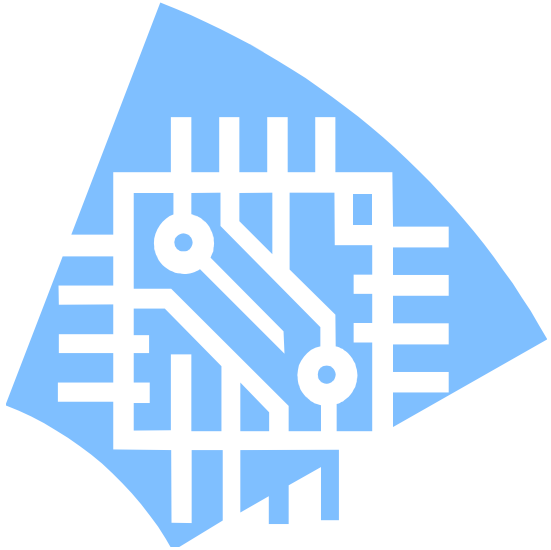
The speed detection board is mounted underneath the motor. The motor speed is optically detected by an infra-red-light barrier. A hole in the motor axle will allow two light beams per revolution. A following pulse shaping stage forms square-topped pulses which are passed to the controller via X2.

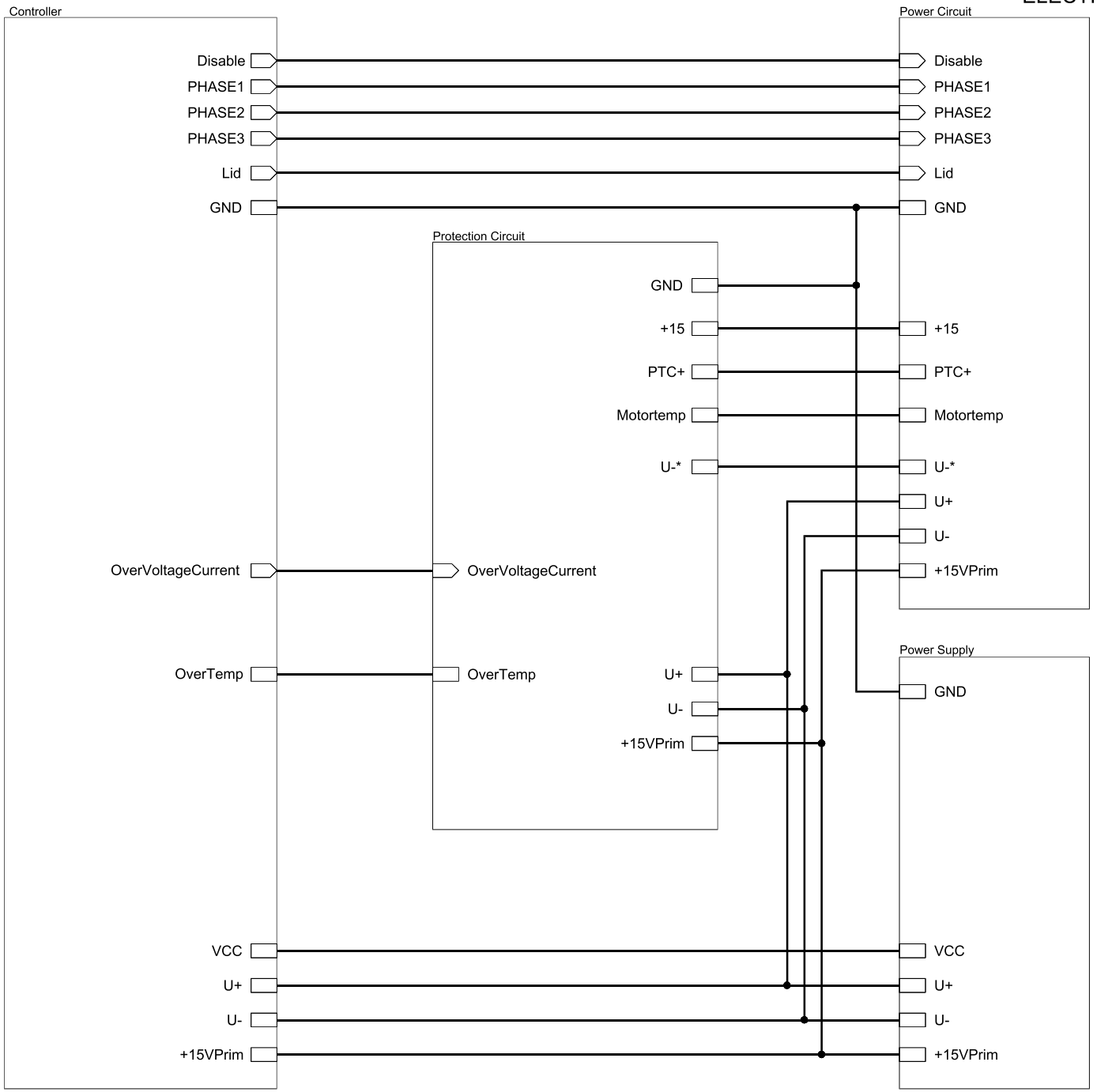
Lid lock system

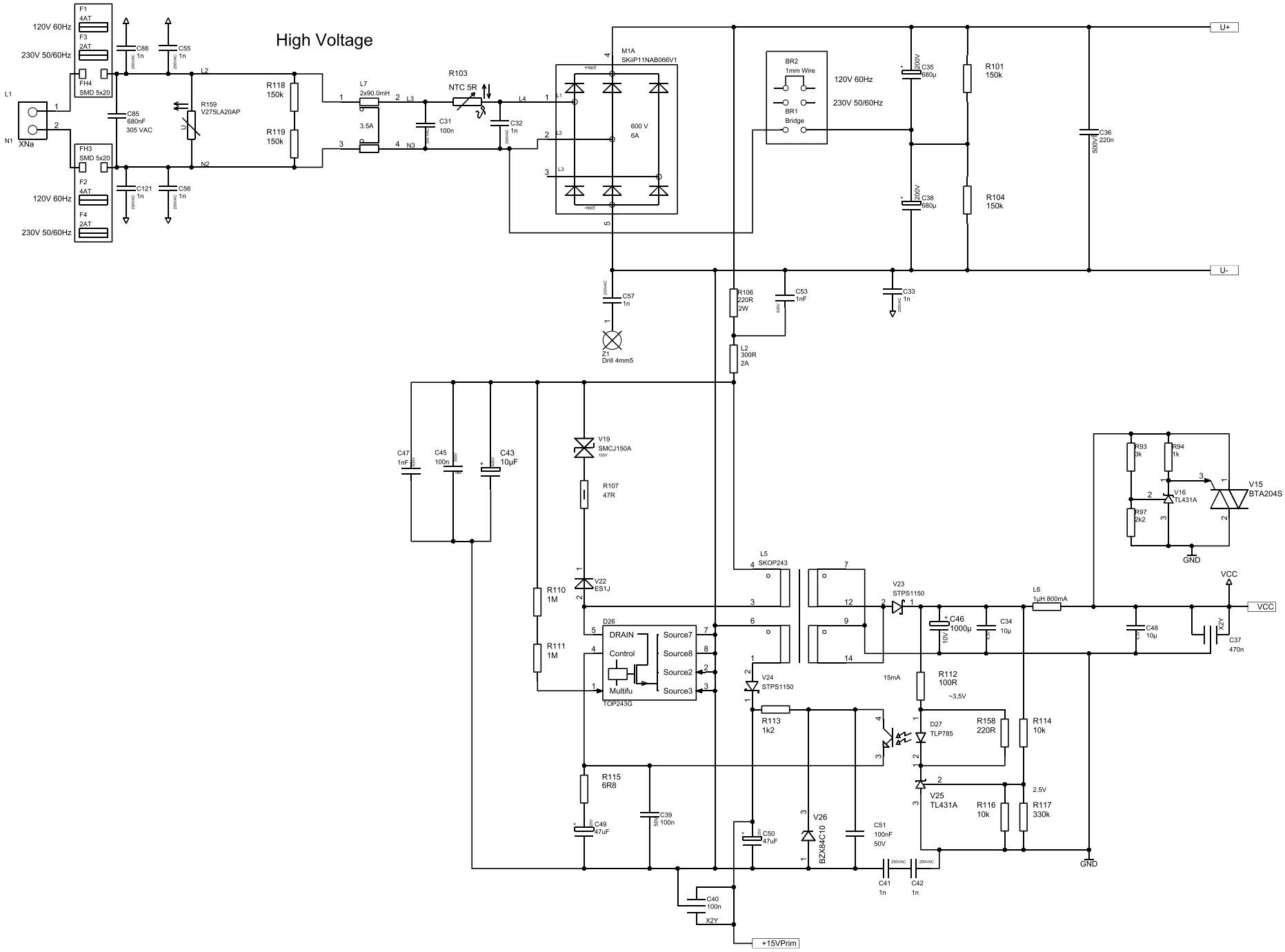
The centrifuge lid is held down by a moveable stud. When the Lid open button is pressed a solenoid is energized and moves the stud to unlock the lid. Two micro switches monitor the position of the lid and the solenoid plunger.

4. DIAGRAMS

Chapter: 4.0




Controller
Disable
PHASE1
PHASE2
PHASE3
Lid
GND
OverVoltageCurrent
OverTemp
VCC
U+
U-
+15VPrim
Protection Circuit
GND
+15
PTC+
Motortemp
U-*
OverVoltageCurrent
OverTemp
U+
U-
+15VPrim
Power Circuit
Disable
PHASE1
PHASE2
PHASE3
Lid
GND
+15
PTC+
Motortemp
U-*
U+
U-
+15VPrim
Power Supply
GND
VCC
U+
U-
+15VPrim


High Voltage
120V 60Hz
230V 50/60Hz
F1 4AT
F3 2AT
F2 4AT
F4 2AT
FH4 SMD 5x20
FH3 SMD 5x20
C88 1n
C55 1n
C85 680nF 305 VAC
C121 1n
C56 1n
L1
N1
XNa
L2
N2
R159 V275LA20AP
R118 150k
R119 150k
L7 2x90.0mH
3.5A
R103 NTC 5R
C31 100n
C32 1n
M1A SKiiP11NAB066V1
600 V 6A
BR2 1mm Wire
BR1 Bridge
120V 60Hz
230V 50/60Hz
C35 680µ
C38 680µ
R101 150k
R104 150k
C36 220n
U+
U-
C57 1n
Z1 Drill 4mm5
R106 220R 2W
C53 1nF
C33 1n
L2 300R 2A
C47 1nF
C45 100n
C43 10µF
V19 SMCJ150A
R107 47R
R110 1M
R111 1M
V22 ES1J
D26
DRAIN
Control
Multifu
TOP243G
Source7
Source8
Source2
Source3
L5 SKOP243
V23 STPS1150
V24 STPS1150
L6 1µH 800mA
C46 1000µ
C34 10µ
C48 10µ
C37 470n
VCC
GND
R93 3k
R94 1k
V16 TL431A
R97 2k2
V15 BTA204S
15mA
R112 100R
~3,5V
R113 1k2
D27 TLP785
R158 220R
R114 10k
R115 6R8
C49 47uF
C39 100n
C50 47uF
V26 BZX84C10
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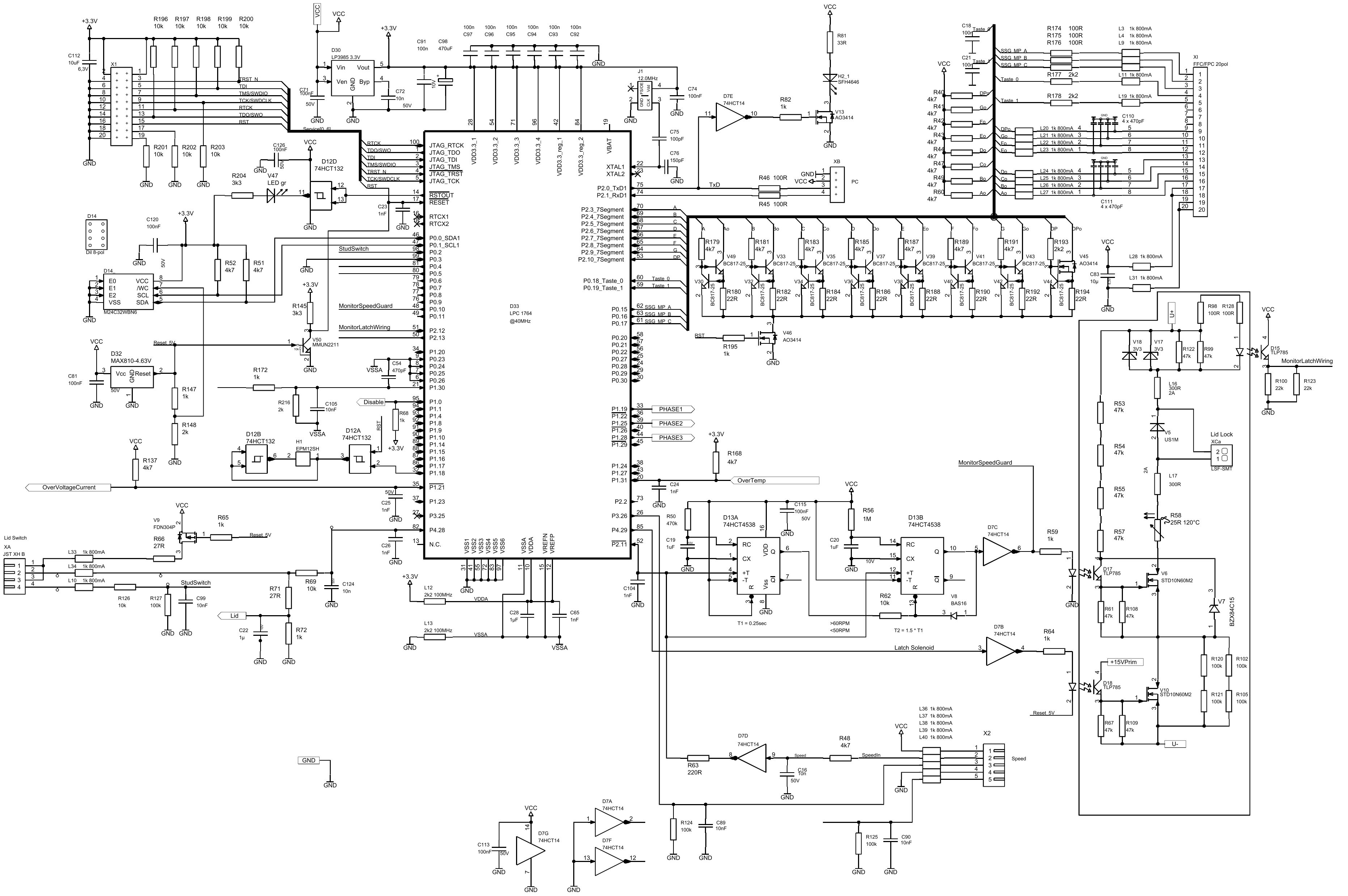
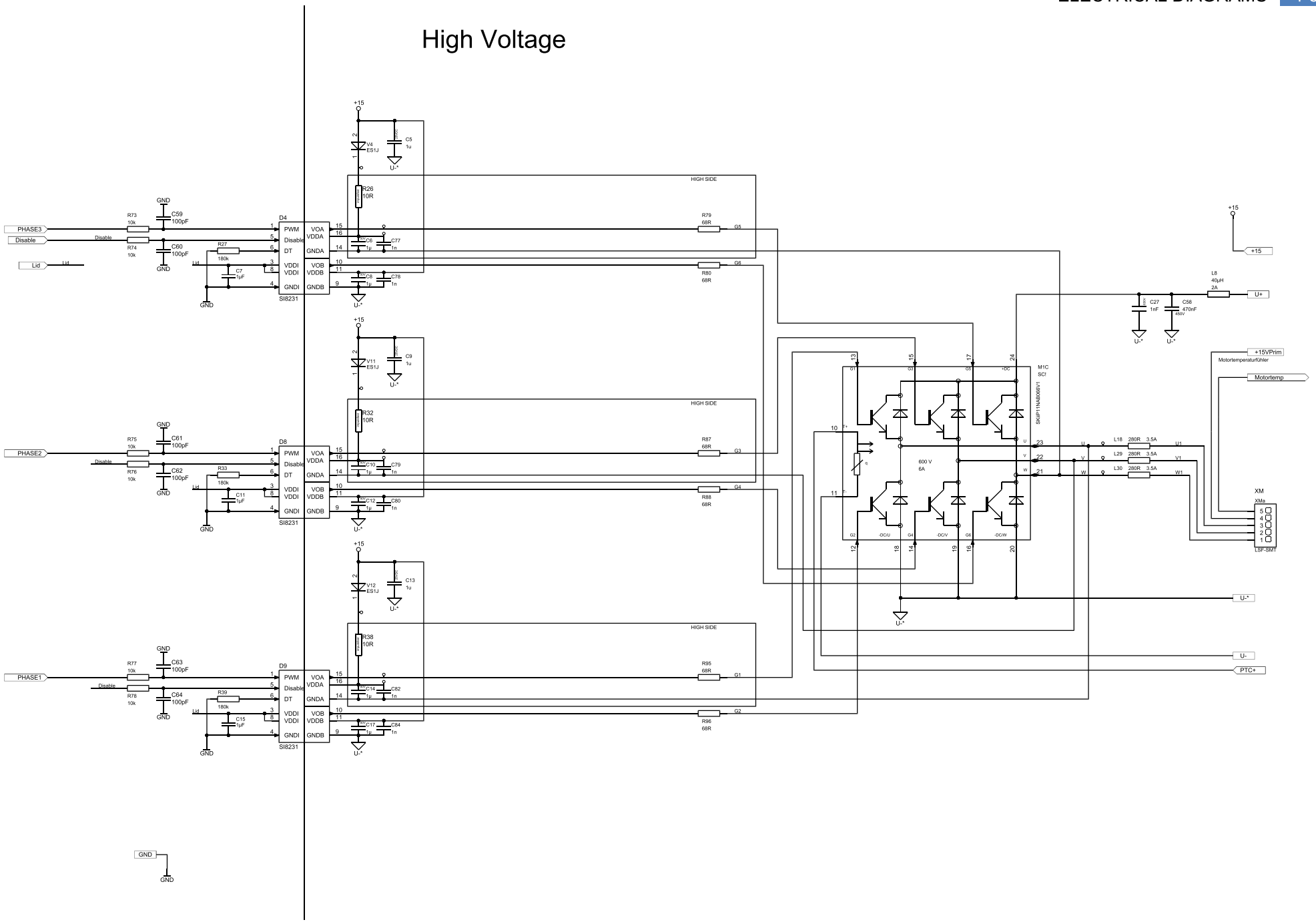
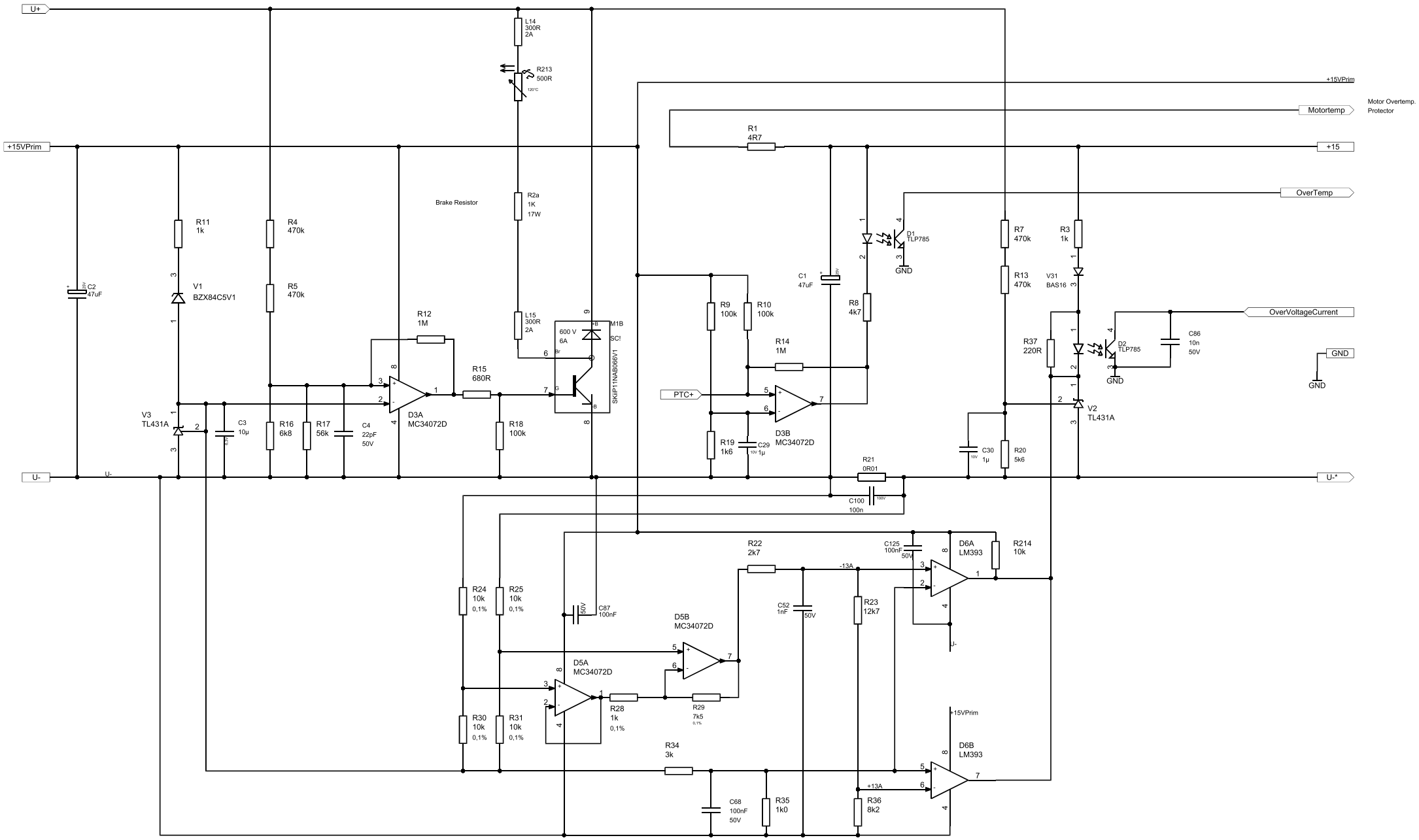
2.5V
R117 330k
C41 1n
C42 1n
C40 100n
+15VPrim



D33
LPC 1764
@40MHz
D30
LP3985 3.3V
D14
M24C32WBN6
D32
MAX810-4.63V
D12D
74HCT132
D12B
74HCT132
D12A
74HCT132
D13A
74HCT4538
D13B
74HCT4538
D7E
74HCT14
D7C
74HCT14
D7B
74HCT14
D7D
74HCT14
D7A
74HCT14
D7F
74HCT14
D7G
74HCT14
J1
12.0MHz
XI
FFC/FPC 20pol
XB
PC
X2
Speed
Lid Switch
XA
JST XH B
Lid Lock
XCa
LSF-SMT
StudSwitch
MonitorSpeedGuard
MonitorLatchWiring
OverVoltageCurrent
OverTemp
Disable
Lid
PHASE1
PHASE2
PHASE3
Latch Solenoid
Reset_5V
+15VPrim
U+
U-
TxD
SpeedIn
T1 = 0.25sec
T2 = 1.5 * T1
>80RPM
<50RPM
H2_1
SFH4646
V13
AO3414
V45
AO3414
V46
AO3414
V50
MMUN2211
V9
FDN304P
D15
TLP785
D17
TLP785
D18
TLP785
V6
STD10N60M2
V10
STD10N60M2
V5
US1M
V7
BZX84C15
V8
BAS16
R58
25R 120°C
V47
LED gr
H1
EPM12SH

High Voltage




U+
+15VPrim
U-
L14
300R
2A
R213
500R
120°C
Brake Resistor
R2a
1K
17W
L15
300R
2A
C2
47uF
V1
BZX84C5V1
R11
1k
R4
470k
R5
470k
R12
1M
R15
680R
R16
6k8
R17
56k
C4
22pF
50V
C3
10µ
V3
TL431A
R18
100k
D3A
MC34072D
600 V
6A
M1B
SC!
SKiiP11NAB066V1
R1
4R7
R9
100k
R10
100k
R14
1M
R19
1k6
C29
1µ
D3B
MC34072D
PTC+
C1
47uF
R8
4k7
D1
TLP785
GND
R21
0R01
C100
100n
R7
470k
R13
470k
R3
1k
V31
BAS16
R37
220R
D2
TLP785
C86
10n
50V
V2
TL431A
C30
1µ
R20
5k6
+15VPrim
Motortemp
Motor Overtemp.
Protector
+15
OverTemp
OverVoltageCurrent
GND
U-*
R22
2k7
C125
100nF
50V
D6A
LM393
R214
10k
-13A
R24
10k
0,1%
R25
10k
0,1%
C87
100nF
50V
D5B
MC34072D
C52
1nF
50V
R23
12k7
D5A
MC34072D
R28
1k
0,1%
R29
7k5
0,1%
R30
10k
0,1%
R31
10k
0,1%
R34
3k
C68
100nF
50V
R35
1k0
+13A
R36
8k2
D6B
LM393

5. DISASSEMBLY

Chapter: 5.0

5. Disassembly

5.1 Recommended Tools for Disassembly

Part Nr.:	Description	Quantity	Screw	Key / Nut	Position	Force
20510285	Lens Head Screw 5x12	5	Allen	3mm	Housing	
20510368	Lens Head Screw 5x8	2	Allen	3mm	Lower Front Panel	
20510352	Ratchet Screw 5x10	3	Hex	8mm	Main PCB	
20420070	Nut M6	3	Hex	10mm	Motor	10Nm
20430216	Hex Screw 6x12	3	Hex	10mm	Motor	10Nm
20460122	Lense Head Screw 30x008	5	Torx	T10	Display / TA Plate	
20460098	Crosshead Screw 30x006	4	Philips	1	Speed Detection Board	
50148698	Thermoplast Screw 5x14	4	Torx	TX25	Lid *(shell-inner metal plate)*	
20510285	Lense Head Screw 5x12	2	Allen	3mm	Lid Latch	

5.2 Disassembly of Mechanical Parts

Housing

The Housing consists of two parts:

- The lower **front panel**.
- The **main housing**.

It is not necessary to remove the lower front panel before removing the main housing.

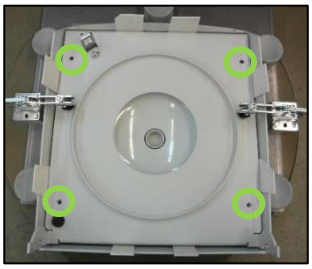
- Switch off the unit and pull out the mains plug.
- Place the unit on a table with enough space so it is possible to tilt the housing to the left.
- Open the lid and remove the rotor *(Loosen the rotor locking nut counterclockwise)*.
- Remove the 5 screws (M5x12, Allen) around the housing.
- Lift the housing up, tilt it to the left and put it on its side.

- Unplug the connector of the lid latch on the main PCB, remove the cable tie from the wiring, unscrew the PE connection of the latch system, disconnect the ribbon cable from the main PCB and change the housing.
- Reassemble the housing analogously in reverse order.

Lid

If you only want to replace the outer cover shell, proceed as follows:

- Open the lid. Pull out the mains plug.
- Remove the **4 screws** (5x14, TX25) attaching the shell to the inner metal plate.



If you want to replace the inner metal plate or the complete lid, proceed as follows:

- Place the housing upside down on a table so the lid hangs free.
- Remove the **stopper screw.**

- Loosen the **nut on the right** (from the outside) which holds the lid axis.
- Push down the lid spring with one hand while pushing the lid axis out to the left with the other hand using a small Philips screwdriver.

Leave the screwdriver inserted to prevent the lid from falling down.

- Once you can reach the axis on the left side, keep pushing down the lid spring with your right hand and pull out the axis to the left.

Use the screwdriver also for guiding the axis during reassembly.

Lid Spring

- *See section "Lid" above.*

5.3 Replacement of Electrical Components

NVRAM on the Main PCB

Before replacing the NV-RAM check the version and revision number of the old NV-RAM.

- Press and hold the *STOP button* while switching on the unit to display the version and revision.
- Remove the housing *(see section 5.2).*

Discharge your body before handling CMOS components.

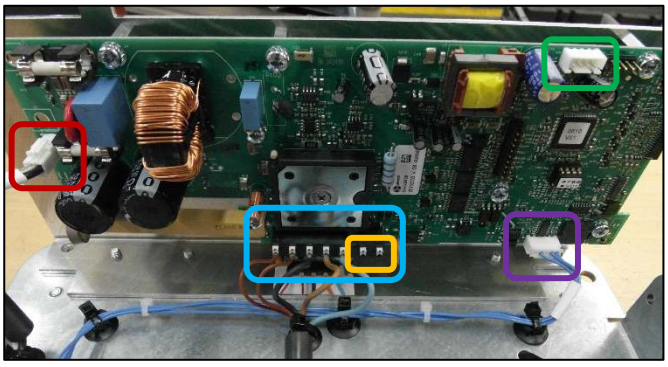
- Use a chip removal tool or a small screwdriver to pull the **NVRAM** out of its socket.
- Reinsert the new NVRAM correctly.
- Reassemble the device analogously in reverse order and check the displayed NVRAM's version number.

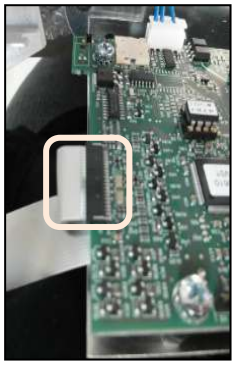
Main PCB

- Remove the housing *(see section 5.2).*

Discharge your body before handling CMOS components.

- Unplug all connectors as:
  Mains supply XN
  Lid solenoid XC
  Lid micro switches XA
  Motor XM
  Speed det. board X2
  Display XI





When installing a new main PCB, make sure that the voltage selection bridge BR1 is set correctly for your line in voltage.

- Loosen the **3 screws** (5x10, Hex) and remove the main PCB.

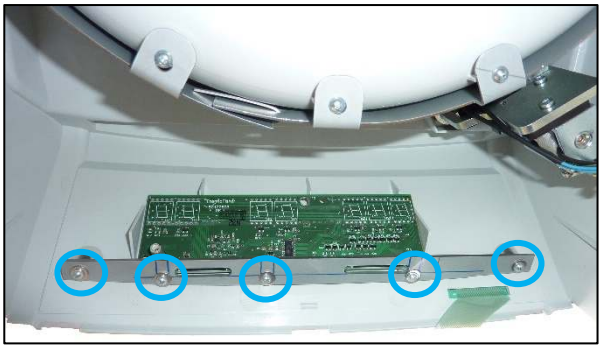
Lid lock

- Open the lid. Pull out the mains plug.
- Remove the housing.
- Disconnect the micro switches and the solenoid from main PCB (XA & XC) and the grounding wire from the base plate.
- Remove the **2 screws** (5x12, Allen) attaching the lid latch to the housing.
- Remove the lid latch.

When reinstalling the lid lock, align it in a way that the lid hook moves in and out smoothly.

Display

- Remove the housing.
- Disconnect the two ribbon cables.
- Remove the **5 screws** (30x8, Torx) attaching the display to the housing.

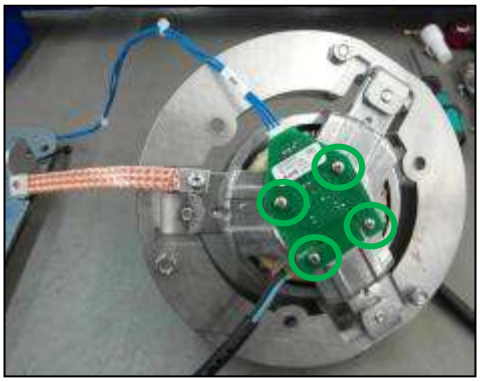


Keypad Overlay

- Remove the housing.
- Disconnect the keypad overlay from the display.
- Use a screwdriver, knife or similar to remove a corner of the overlay from the front panel. Pull the overlay off.
- Clean the surface of the front panel from all adhesive residues.

Speed detection board

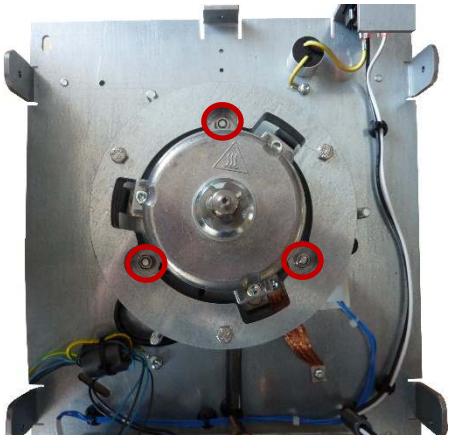
- Remove the motor.
- Remove the **4 screws** (30x6, Philips) attaching the speed detection board to the bottom of the motor.



5.4 Replacement of Drive Components

Drive Motor

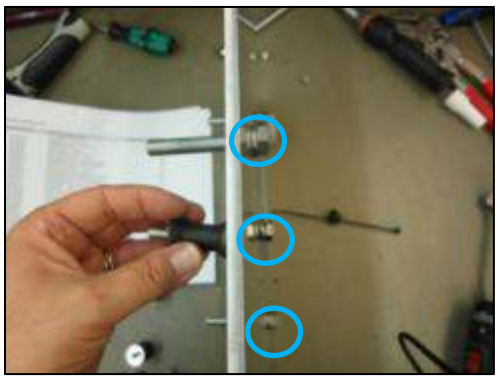
- Remove the housing.
- Unplug the motor ***(XM)***.
- Unplug the speed detection board.
- Unscrew the PE *(ground cable)*.
- Remove all cable ties.
- Loosen the **3 nuts** (M6) incl. the screws of the AV-mounts and their lock washers.
- Remove the motor.
- Remove the speed detection board from below and install it on the new motor.
- Reassemble the motor analogously in reverse order and **fasten the 3 nuts with 10Nm** and lock them with screw locking lacquer.



Anti-vibration mounts

Always replace all 3 anti-vibration mounts and their sandpaper discs together. We recommend changing them once a year but at least every three years.

- Remove the housing.
- Remove the motor.
- Unscrew the **3 nuts** from underneath.
- Remove the AV mounts.
- Install the new AV mounts together with new sandpaper discs, replace the lock washers, tighten the nuts evenly (use a torque key: **10 Nm**) and secure them with screw locking lacquer.
- Reassemble the device in reverse order.



6. SPARE PARTS LIST

Chapter: 6.0

6. Medifuge Spare Parts

Thermo Scientific:	Medifuge
	Medispin
Fisher:	AccuSpin 8C

ThermoFisher SCIENTIFIC
The world leader in serving science

Overview

- Front View
- Spare Parts List Front View
- Housing Inside
- Spare Parts Housing Inside
- Electronics
- Spare Parts List Electronics
- Service Kits

Spare part numbers and spare parts are subject to change in case of technical upgrades or supplier change. New specifications and part numbers are announced through technical service bulletins.

Front View

50149856
Outer Lid Shell

20050543
Window

50146222
Gasket

50146001
Housing

50147717
Lower Front Panel

70902056
Lid complete

20058120
Foot

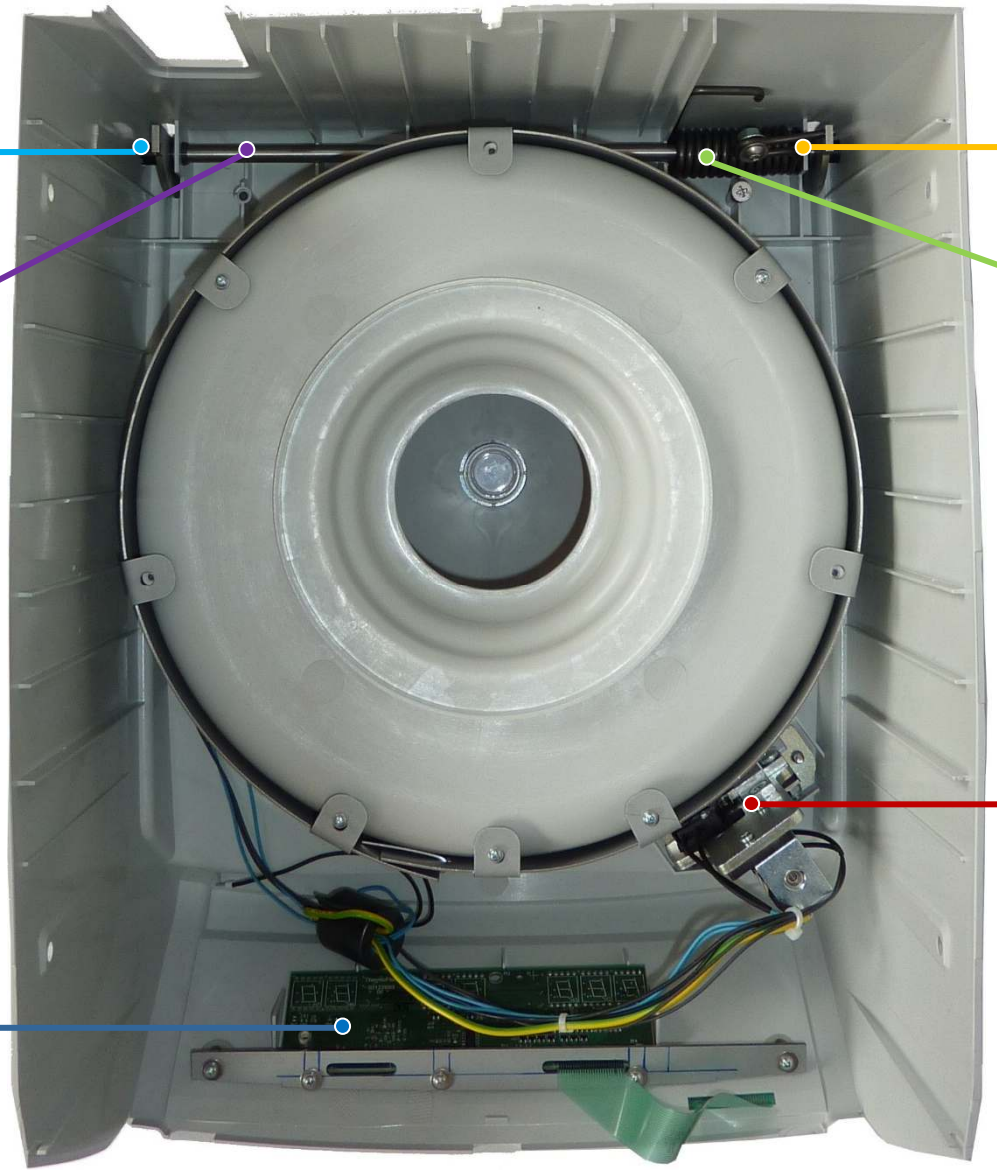
Keypad Overlay

Version	Part number
Medifuge	20059402
Medispin	20059404
AccuSpin 8C	20059403

Spare Parts Front View

Part Nr.:	Description:	Medifuge	Medispin	AccuSpin 8C
50149856	Outer Lid Shell	X	X	X
70902056	Lid Complete	X	X	X
20050543	Window	X	X	X
50146222	Gasket	X	X	X
50146001	Housing	X	X	X
20059402	Overlay Medifuge	X		
20059404	Overlay Medispin		X	
20059403	Overlay AccuSpin 8C			X
50147717	Lower Front Panel	X	X	X
20058120	Foot	X	X	X

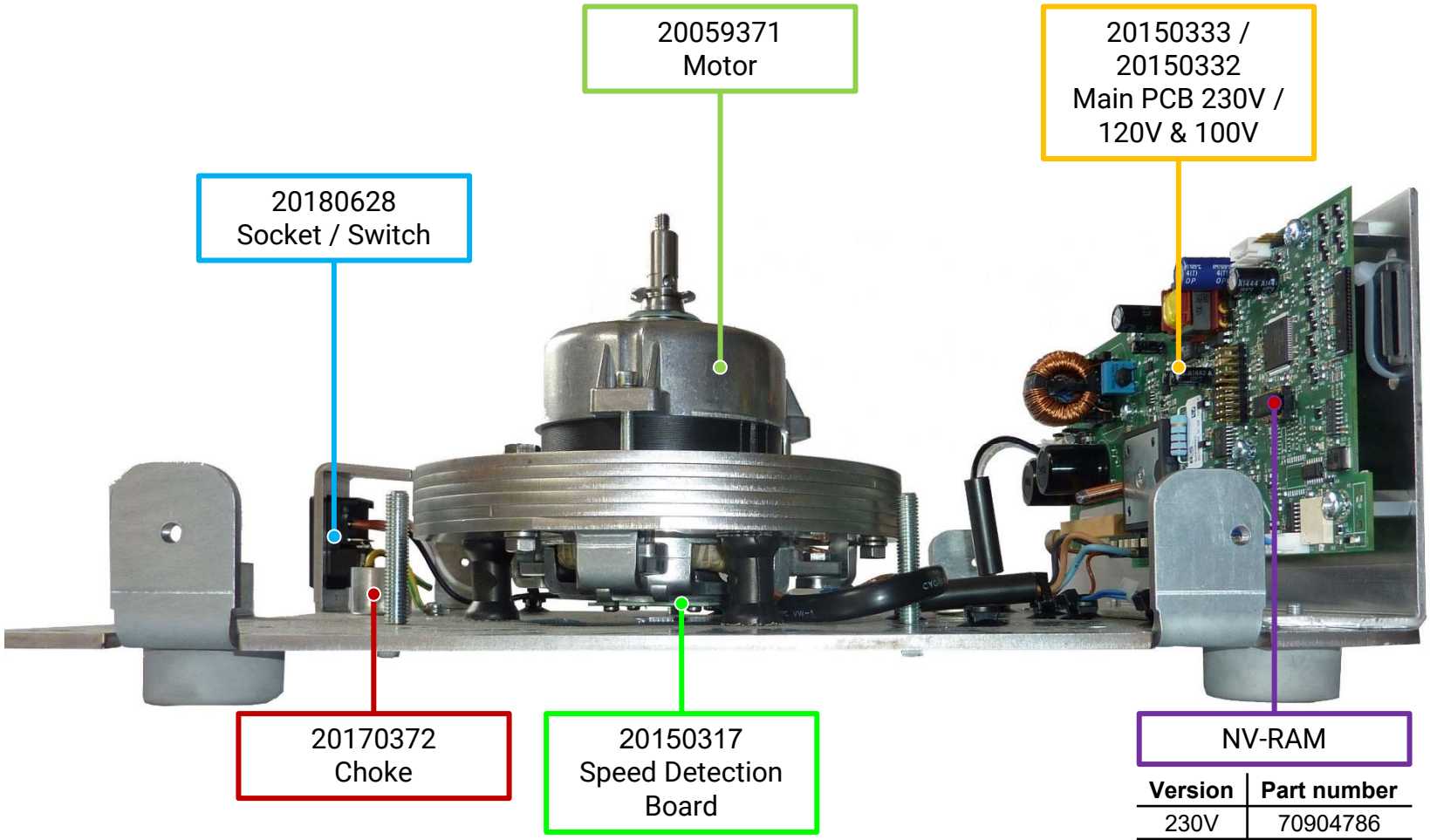
Housing Inside



Spare Parts Housing Inside

Part Nr.:	Description:	Medifuge	Medispin	AccuSpin 8C
20150336	Display	X	X	X
20901162	Lid Latch	X	X	X
50148656	Bushing	X	X	X
50148240	Spring	X	X	X
50147732	Axis	X	X	X
50148242	Nut	X	X	X

Electronics



Version	Part number
230V	70904786
120V	70904787
100V	70904788

Spare Parts Electronics

Part Nr.:	Description:	Medifuge	Medispin	AccuSpin 8C
50104102	Ribbon Cable Display	X	X	X
20180628	Socket / Switch	X	X	X
20170372	Choke	X	X	X
20059371	Motor	X	X	X
20150333	Main PCB 230V	X		X
20150332	Main PCB 120V / 100V	X	X	X
50148506	Transformer 100V		X	
70904786	NV-RAM 230V	X		
70904787	NV-RAM 120V	X		X
70904788	NV-RAM 100V		X	
20150317	Speed Detection Board	X	X	X

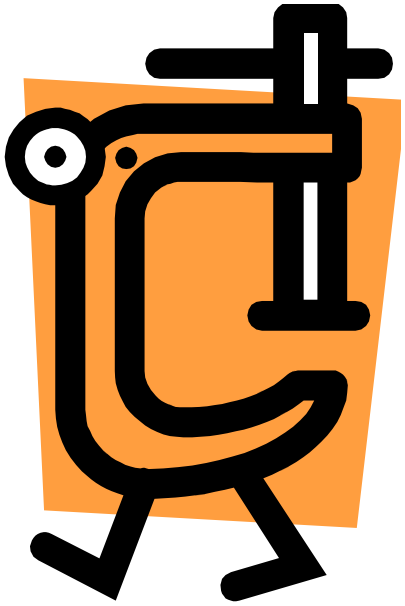
Service Kits

Service Kit includes:
- 3x AV-mount
- 6x Sand paper disc
- 3x Nut M6
- 6x Washer
- 3x Screw

Part Nr.:	Description:	Medifuge	Medispin	AccuSpin 8C
50149855	Service Kit AV-Mounts	X	X	X

7. CALIBRATION

Chapter: 7.0



7. Calibration Certification Procedure

7.1 General

Successfully completing the Preventive Maintenance Checklist and Calibration Certification Procedure as outlined will ensure that the instrument is properly maintained and calibrated to Thermo Scientific specifications.

7.2 Equipment Required

- Digital Multimeter
- Stopwatch
- Photo Tachometer
- Safety Tester
- Service Manual

Check calibration due date on all test equipment before starting certification.

7.3 Documentation Required

- Preventive Maintenance Procedure and Checklist *(Service Manual)*
- Calibration Certification Procedure and Form
- Certification Label
- Certificate of calibration for each piece of test equipment used to perform the certification
- Training Certificate

7.4 Preventive Maintenance Check

- Perform Preventive Maintenance checks as outlined in the Service Manual to ensure the instrument is in good working order without performing any calibrations.
- Complete the Preventive Maintenance Checklist. (calibration data will be filled in after Certification)

7.5 Calibration Certification

Speed

Install a rotor and attach a piece of reflecting tape (or black tape on reflecting rotors) near the center of the rotor. Close the centrifuge lid.
Set the speed to 1000 rpm and start the centrifuge. When the display shows 1000 rpm wait for 10 seconds. Use an optical (laser) tachometer and measure the speed of the rotor through the window in the centrifuge lid. Record the measured speed and the displayed speed in the speed section of the certification form.
Set the speed to rotor maximum. When the display shows the set speed wait for 10 seconds and measure the speed through the window. Record the measured speed and the displayed speed in the speed section of the certification form.
Determine whether the speeds recorded meet the specifications on the form. If the specifications are met, this test is finished. If the specifications are not met, replace the main PCB, as adjustments are not possible and repeat the test.

sample pic.

There is no possibility the measure the speed signal of the centrifuge itself!

Time

Install a rotor and close the lid. Set the time to 10 minutes. Start the centrifuge and the stopwatch at the same time. Stop the stopwatch when the time section of the display shows 0. Record the measured time in the time section of the certification form. Determine if the time value recorded meets the specifications in the form. If the specifications are met, this test is finished. If the specifications are not met, replace the main PCB, as adjustments are not possible and repeat the test.

Safety Test

Perform an electrical safety test according to the instruction manual of the tester.
The test should consist of:

- Grounding resistance check
- Insulation resistance check
- Accessible current check

Record the measured values in the safety test section of the calibration form.
Determine whether the values recorded meet the specifications on the form. If the specifications are met, this test is finished. If the specifications are not met, check for missing grounding connections and / or faulty parts.

Documentation

After filling in the certification information complete the following documentation:

- Log test equipment data on calibration certification form.
- Review P.M. checklist and calibration certification form to ensure that all data and required information has been recorded properly (including your signature and date).
- Fill out a certification label and place it on the right side of the centrifuge where visible or at a location selected by the customer.
- Ask the customer to sign the calibration certification form and place a copy in the customer's Certification Record Book for that centrifuge.
- Place copies of the P.M. checklist and Field Service Report in the same Record Book.
- Provide copies of your training certificate and test equipment calibration certificates if requested by the customer.

Thermo SCIENTIFIC	**Calibration certification**	**Medifuge Medispin accuSpin 8C**

Account name:	**Account address:**
Instrument model:	**serial Number:**
Report number:	**Date:**

SPEED						
Standard test			Rotor inserts used:			
Set speed (rpm)	Tolerance (whichever is greater)	Displayed Speed (rpm)	Measured speed (rpm)	Meets spec. (y/n)	Notes	Passed (initials)
1000	+/- 10 rpm, 1%					
Rotor max	+/- 10 rpm, 1%					
Custom test			Rotor used:			
	+/- 10 rpm, 1%					
	+/- 10 rpm, 1%					

TIME					
Standard test		Rotor inserts used:			
Timer Set (min.)	Tolerance (sec.)	Measured time (m/s)	Meets spec. (y/n)	Notes	Passed (initials)
10	+/- 10				
Custom test		Rotor Used:			
	+/- 10				
	+/- 10				

SAFETY TEST			
	Limit	Actual	Passed (initials)
Grounding resistance	< 200 mΩ		
Insulation resistance	> 2 MΩ		
Accessible current	1mA		

TEST EQUIPMENT			
Type	Model	Serial number	Date of next calibration
Stopwatch			
Optical tachometer			
Safety tester			

Certified by:_____ Reviewed by:_____ Expiration date _____
Signature Date Customer Signature Date

Use ONLY blue permanent ink when filling out. Leave NO blank spaces.

8. PREVENTIVE MAINTENANCE

Chapter: 8.0

Thermo SCIENTIFIC	Preventive maintenance checklist	Medifuge Medispin accuSpin 8C

Account name:	**Account address:**
Instrument model:	**Serial number:**
Report number:	**Date:**

Maintenance without dismantling the centrifuge

Acceptance criteria	Pass	Fail
Electrical installation		
Supply voltage and main power fusing meets specifications (data plate)		
Instrument plug and wall socket in good condition		
Power cord insulation not damaged		
Instrument socket not damaged		
Comments:		
Location and mechanical installation		
Base resonance-free and stable		
Safety clearance around instrument of 30 cm		
Centrifuge level		
Comments:		
Lid lock mechanism and safety circuit		
Centrifuge lid opens and closes easily and smoothly		
Rubber gasket not damaged		
Centrifuge lid is properly supported by spring		
Centrifuge lid does not open while rotor is spinning		
Comments:		
Cleanliness of chamber		
No particles inside spin chamber		
Comments:		
Rotor and inserts		
No cracks		
No deep scratches		
No parts aborted		
Not more than 60,000 cycles		
Comments:		
Drive motor shaft		
No scratches		
Not bent		
Thread in good condition		
Spring disc and drive pin in place		
Comments:		

Report Number:	Date:

Maintenance after dismantling the centrifuge casing

Acceptance criteria	Pass	Fail
Motor support elements		
Anti-vibration mounts not older than 3 years		
Anti-vibration mounts in good condition		
Comments:		
Braking circuit		
Brake resistor cold in stand by		
Brake resistor hot during deceleration		
Brake effect smooth and noiseless		
Comments:		
Lead and screwing connections		
All connections on mains inlet socket and power switch tight		
All connections on main board tight		
All other connections tight		
Comments:		
Protection earth core and grounding connections		
Grounding resistance < 200 mΩ		
Insulation resistance > 2 MΩ		
Accessible current < 500 µA		
Comments:		

Comments:

Instrument passed: YES ☐ NO ☐

Certified by:_____ Reviewed by:_____ Expiration date _____
Signature Date Customer Signature Date

Use ONLY blue permanent ink when filling out. Leave NO blank spaces. August 2015

ThermoFisher SCIENTIFIC	REVISION CONTROL 50163025	Page: 1 von 1 Date: 25.08.2021
Editor: Lisa Mühlhaus Approval: Michael Wedemeyer	SERVICE MANUAL MEDIFUGE	Internal note: 50163025_E_SM_MEDI-FUGE_V25112020.PDF

Historie / History

Rev.	ECR No.	Description	Date	Editor
A		Pre-release	September 2015	M.Wedemeyer
B		Initial release	September 2015	M.Wedemeyer
C		Addition of Fisher AccuSpin 8C	March 2016	M.Wedemeyer
D		Addition of Thermo Scientific Medispin	May 2016	M.Wedemeyer
E		Design Modification	August 2021	L.Mühlhaus T. Reich