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NF 800 – NF 800R

MULTI-PURPOSE BENCHTOP CENTRIFUGES

n-prime

SERVICE MANUAL

CE

Z14.K 25 123 Rev. No: 01 Rev. Date: 02/2018

CONTENTS

SECTION 1
INTRODUCTION

1.1 PURPOSE OF THE SERVICE MANUAL

This manual includes servicing and maintenance information for NF 800 and NF 800R. It is only to be used by technicians who were formerly trained by Nuve. This manual includes operating principles, diagnosing and repairing methods and the spare part replacing information.

In the case that any problem which is not identified in this manual arises, please contact Nuve Service.

This manual is valid from 05.4396 serial number for NF 800 and 05.1593 serial number for NF 800R until the new manual publishes.

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1.2 GENERAL PURPOSE OF THE UNIT

The NF 800 and NF 800R multi-purpose bench top centrifuges are N-Prime controlled units. The microprocessor controlled PCB and display board are placed on the front panel. Both centrifuges are equipped with the locking system which prevents the lid on the opening while the rotor is spinning. The refrigeration system for NF 800R is located on the right side of the centrifugation bowl.

SECTION 2

OPERATING PRINCIPLES

2.1 GENERAL OVERVIEW

NF 800 and NF 800R centrifuges are split into three main components;

- Power Supply
- Control Unit
- Refrigeration Unit (for NF 800R)

2.2 EXPLANATIONS FOR THE FUNCTIONS

2.2.1 Power Supply

The power consumption values of the centrifuges are listed below.

	Glass Fuse	Power Consumption	Power Supply	
NF 800	4 A	500 W	230 V AC	
NF 800R	10 A	800 W	230 V AC	

Table 1

2.2.2 Main PCB

The microprocessor controlled PCB sends the speed information of the three-phase induction motor to the inverter. It compares the information provided by the optical sensor with the set spinning speed information, sends the required frequency information to the inverter and the inverter regulates the voltage frequency supplied to the motor to increase or decrease the speed.

The thermostat which is placed between the motor windings prevents the motor from over temperature by stopping it if excess heat occurs (the temperature exceeds 105°C). This safety feature protects the motor and the centrifuge against over temperature.

The imbalance detector placed on the motor disc under the motor senses unbearable imbalance and sends signal to the main PCB to stop the spinning of the rotor to protect the centrifuge.

The centrifuge does not operate if the lid remains open. The signal sent to the main PCB by the lid switch informs the user that the lid is open or close. The lid remains locked during the spinning of the rotor.

The temperature sensor in the NF 800R senses the temperature in the bowl and sends the information to the main PCB. The main PCB controls the refrigeration system to keep the temperature at set point.

2.2.3 Control Panel

The figure below shows the buttons and leds of the display. Please see user's manual for further information about the functions of the buttons and leds.

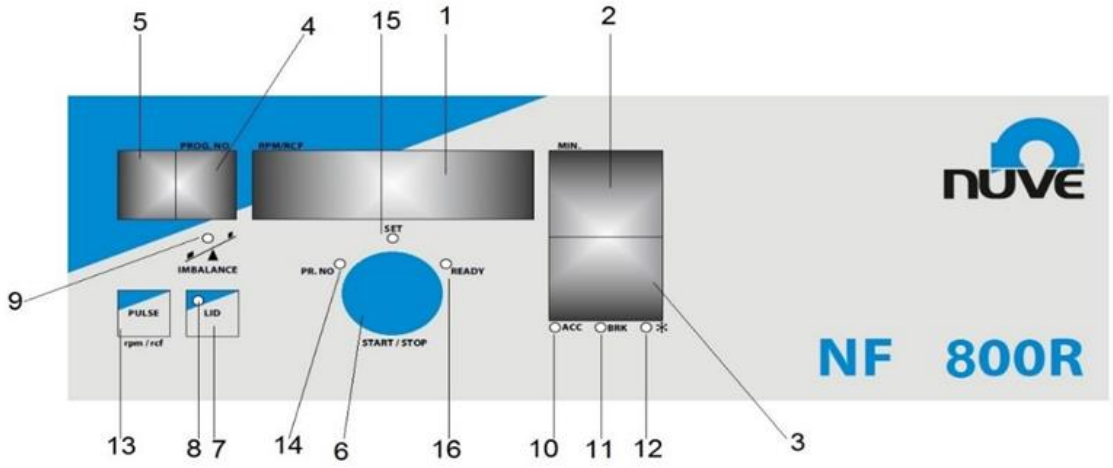


Figure 1

1. Speed Display
2. Time Display
3. ACC / BRK / ^{o}C* (acceleration / braking / temperature) Display
4. Program Number Display
5. Spinning Rotor Warning Leds
6. ENCODER Button
7. LID Button
8. LID Led / Lid Open Led
9. Imbalance Led
10. Acceleration Led
11. Braking Led
12. Cooling Led
13. PULSE Button
14. Program Number Led
15. Set Menu Led
16. READY Led

* Temperature Display exists only for NF 800R.

2.2.4 Refrigeration System (for NF 800R)

The refrigerator fluid is circulated in the closed system to cool down the temperature of the bowl. The components of the system are below,

- Compressor
- Condenser cooling fan
- Condenser
- Dryer
- Capillary pipe
- Evaporator

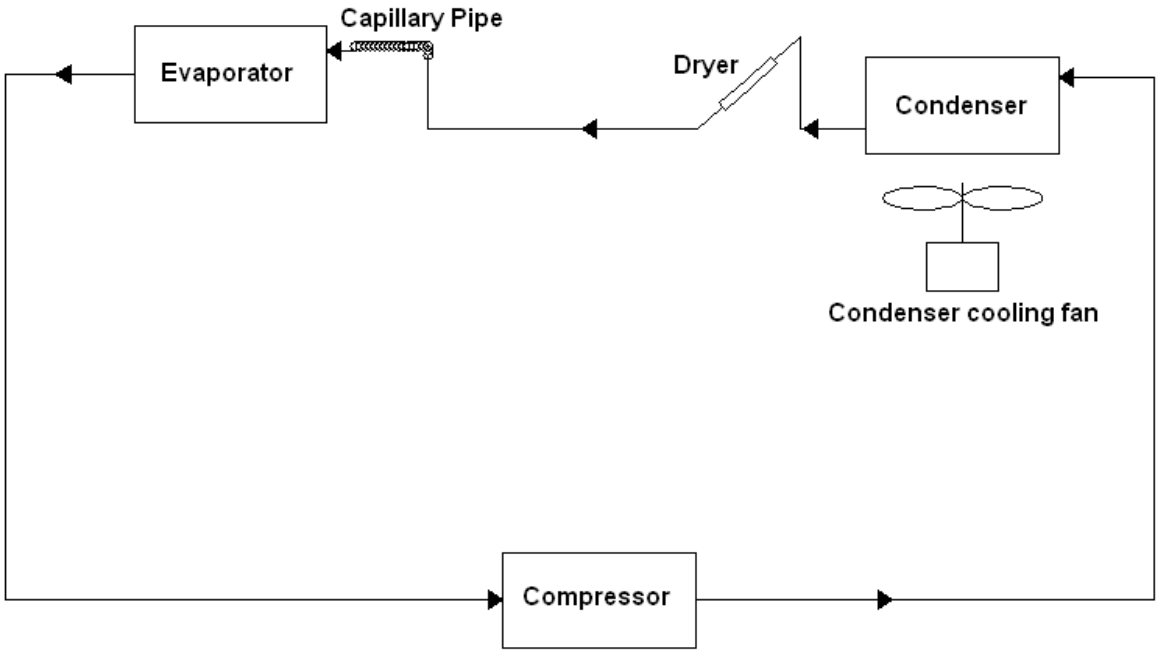


Figure 2

SECTION 3

SERVICING

ATTENTION : Before servicing, please take all necessary precautions both for your own and for environment's safety. Please pay attention to the warnings on the centrifuge!!

3.1 GENERAL VIEW

The failures can be diagnosed easily with the following tables.

Most of the arising problems can be confirmed by a multimeter.

The components on the main PCB must not be replaced even the failure is caused by one of the components on the main PCB. In this case, please send the failed PCB to factory service along with a note on which the failure explanations are written.

Before replacing the PCB or any other control element, please make sure that the failure is not caused by loose wire and terminal connections.

3.2 GENERAL FAILURES

1. The on/off switch is on but the led is not on and the display is blank.

1. • Check the main supply. Check connections in the socket and in the other terminal connections.
2. • Replace the glass fuse and check all parts of centrifuge for short circuit.
3. • Replace the on/off switch.

2) The on/off switch on and its led is on but the display is blank or some segments do not turn on.

1. • Disconnect the cable between main PCB and display and re-connect it carefully.
2. • Replace the cable between main PCB and display.
3. • If display board is defective, replace it with new one.
4. • If main PCB is defective, replace it with new one.

3) The on/off switch is off but its led is on.

1. • The cables of the switch is connected in reverse. Check the connections and adjust them.

4) The lid can not be opened.

1. • Check the whole locking mechanism system. Replace it if it is defective.
2. • Check the locking bobbin. Replace it if it is defective.

5) The fuses blow frequently

1. • Check the electrical terminals and their cables for a possible short circuit.
2. • Main PCB is defective, replace it with new one.
3. • For NF 800R, Check the refrigeration unit (the compressor and condenser cooling fan) for a possible short-circuit. Replace the relevant component if short-circuit exist

6) The centrifuge does not spin the rotor after starting any program.

1. • Check the locking switch if the "Lid" led does not turn off. Replace it if it is defective.
2. • Check the locking system. If the pin does not press on the switch tightly, adjust the pin.
3. • Display board is defective, replace it with new one.

7) The condenser cooling fan does not work.

1. • Check if wires contact connection terminals well.
2. • Check the motor windings with multimeter. Replace motor if it is defective.
3. • Rotate the fan shaft by your hand. If it is too tight to rotate, replace the fan motor.
4. • Replace the Solid State Relay.
5. • Replace the Display.

8) Compressor does not work (for NF 800R).

1. • Check the terminals and tighten them.
2. • Replace the thermic fuse.
3. • Check the outlet with a multimeter. If 12V DC does not exist, replace the main PCB
4. • Replace the Solid State Relay.
5. • Replace the Compressor.

9) The temperature does not decrease to the set value.

1. • Clean the condenser serpentines to remove dust.
2. • Condenser cooling fan does not work. See no. 7.
3. • Check Solid State Relay if it is defective.
4. • Check the main PCB outlet to the Solid State Relay with a multimeter.If "12 V DC" is not seen on multimeter,replace the main PCB.
5. • Compressor does not work. See no. 8.
6. • There is a leakage in refrigeration system. See section 3.4

NOTE: *The lid should be closed for cooling system to be started.*

3.3 ERROR CODES AND FAILURE SOLUTIONS

1) Err 1

1. • Unload the rotor and re-load paying attention to the balance.
2. • Make imbalance adjustment. See 3.5.
3. • Replace imbalance sensor
4. • Replace Display.

2) Err 2

1. • Wait on stand-by for approximately 30 minutes.
2. • If there is a loose connection on motor windings, check the display board connection.
3. • Check the motor cooling fan and replace it if necessary
4. • Replace the motor.

3) Err 3

1. • Check the optical sensor-mainboard connection.
2. • Check if running leds flash. Replace optical sensor if leds don't flash.

4) Err 4

1. • The lid has been opened during the centrifugation

5) Err 5

1. • Check the temperature sensor / main PCB connection and adjust if it is necessary. Replace temperature sensor if it is defective.
2. • Replace display board.

6) Err 6

1. • Inverter is defective. After motor stops, switch off the centrifuge and wait for 1 minute. Then switch on back.
2. • Replace the inverter.

7) Err 7

1. • Appears in case of "lock on" switch input failure on lid locking board
2. • Replace the lid switch.

8) Err 8

1. • Appears in case of "lock off" switch input failure on lid locking board
2. • Replace the lid switch.

9) Con.

1. • Check cable connections between main PCB and display if it is loose or defective.
2. • Replace the main PCB
3. • Replace the display

3.4 REFRIGERATION SYSTEM FAILURES

Attention: The possible failures of the refrigerated systems should be fixed by the trained and experienced service technicians.

3.4.1. Checking the System for Leakage

1. Discharge the refrigeration gas circulating in the system (see 3.4.2)
2. Connect the gas manifold's maximum pressure manometer pipe to the compressor service line.
3. Charge nitrogen gas to the system.
4. Check the welding points and the valves of compressor service lines with a leakage detector or soap foam.
5. Discharge the gas after finding leakage point. Fix it.
6. Re-charge nitrogen to the system to re-check the system.
7. If no leakage exits, discharge the nitrogen.

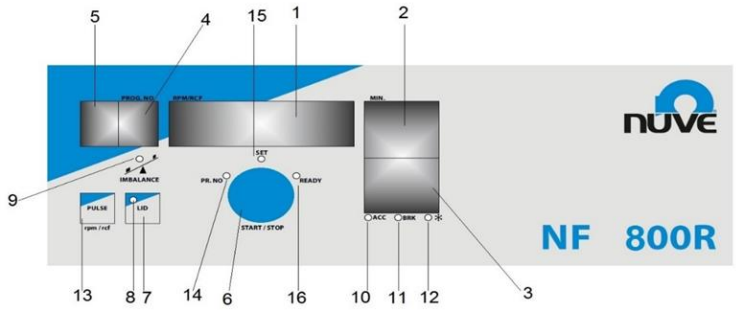
3.4.2. Vacuuming the System

1. Connect the gas manifold's maximum pressure hose to the vacuum pump, the minimum pressure hose to the compressor service line and the gas charge hose to the gas cylinder.
2. Open the minimum and maximum pressure valves.
3. Operate the vacuum pump and vacuum the system for at least 60 minutes.
4. Stop the vacuum pump after closing the maximum pressure valve.

3.4.3. Charging Gas to the System

1. Set the centrifuge to 0°C.
2. Open the valve on the gas cylinder to charge gas to the system and operate the centrifuge.
3. Charge refrigerant gas R134a and close the valve.
4. Observe the refrigeration performance and add a little more gas if necessary.

3.5 IMBALANCE ADJUSTMENT



If main PCB is replaced, below processes shall be performed;

- Press and hold LID(7) button for 1 minute.
- “A” parameter will appear on the display but continue to hold lid button.
- When you see “n” letter, press “ENCODER(6)” button.
- Then you will see “PASS” on the display.
- Enter password “2111” and confirm with “ENCODER” button.
- Make device choosing. (800-800R-1200-1200R)

(Above steps shall be performed only in case of board replacing. If board is not replaced, continue with the below steps.)

- Open lid. Then press and hold LID(7) button.
- Press “ENCODER(6)” button when “A” parameter appears.
- Press “ENCODER(6)” button when “B” parameter appears.
- Press “ENCODER(6)” button when “C” parameter appears. It will calculate a balance value. Press “ENCODER”(6) button to confirm after balance is calculated.
- Close the lid and operate centrifuge for 2 minutes.
- When “END” appears, press “ENCODER”(6) button and confirm. Centrifuge will be on first phase.
- Open lid by pressing “LID”(7) button. Press and hold “LID”(7) button for 1 minute and go to “C” parameter .
- Enter the balance value which is mentioned below. Confirm with “ENCODER”(6) button. Go back by pressing “LID”(7) button.
- Open the lid, put 7 gr load to one bucket, close the lid and start.
- Remove the 7 gr load when centrifuge has ERROR 1. Put 4 gr load to one bucket.
- Increase “C” parameter if centrifuge has balance error.
- On each parameter changing, make sure that centrifuge has balance error for 7gr but does not have balance error for 4 gr.

Imbalance Adjustment Formula:

A= Calibration Value

B= Tolerance Value by parameter entering

** If imbalance value is more than A+((AxB)/5), centrifuge has imbalance error.

SECTION 4

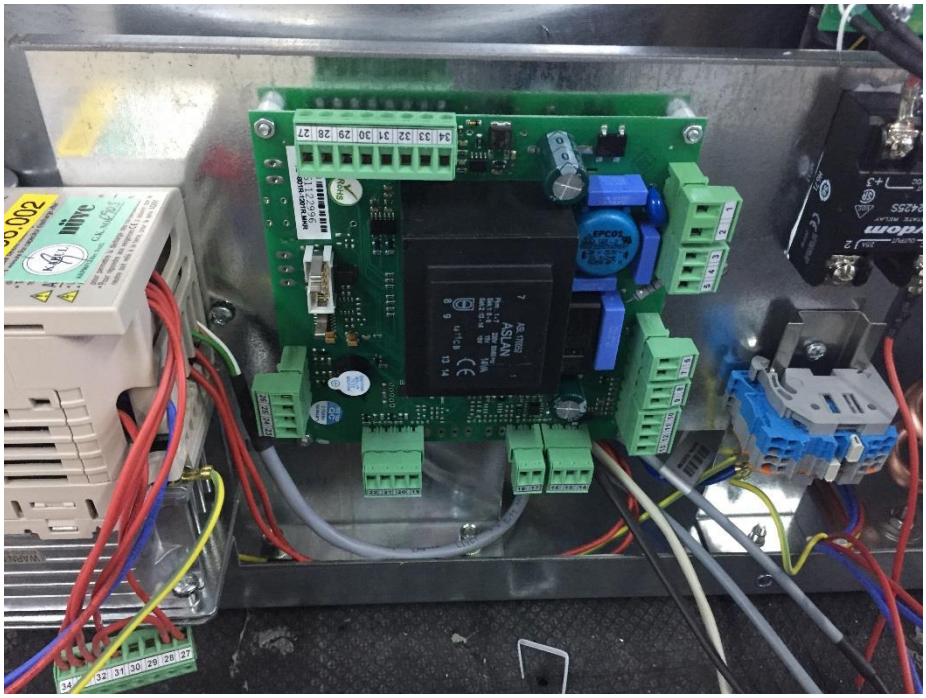
REPLACEMENT OF SPARE PARTS

Attention: Disconnect the centrifuge from the mains before replacing any part!!

4.1. Access to the Control Units

- Remove the front panel screws and take the panel out.
- Remove the screws of the rear cover sheet and take the sheet out.

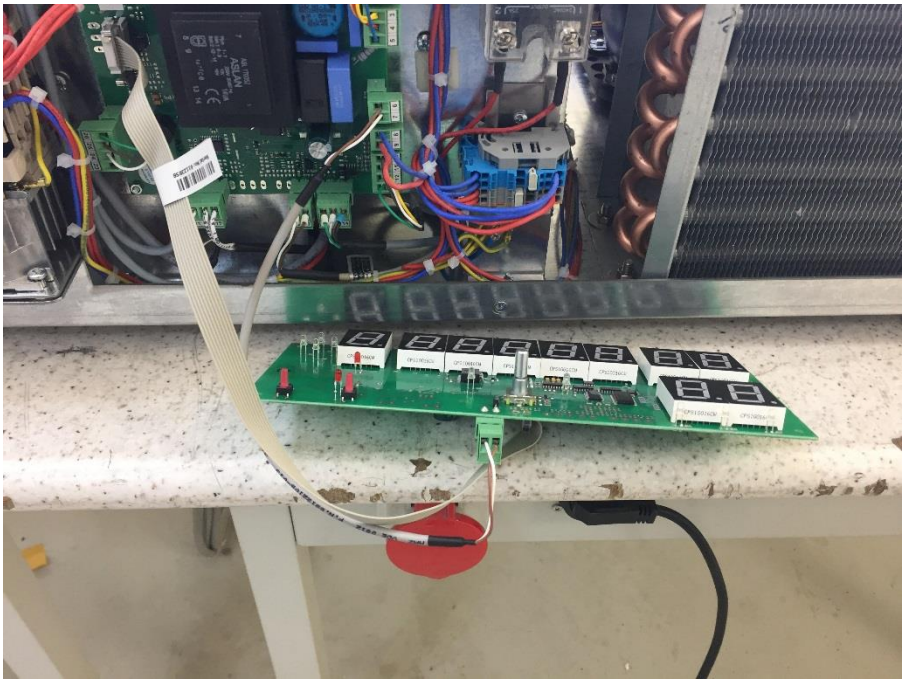
4.2 Replacing the Main PCB



Picture 1

- Disconnect all terminals on the main PCB which are connected to the clamps.
- Disconnect the main PCB ending of the main PCB / display PCB connection cable.
- Remove four screws of the main PCB.
- Place the new PCB and screw it.
- Make the connections according to the electrical circuit diagram.
- Connect the main PCB/ display PCB connection cable.

4.3 Replacing Control and Display PCB



Picture 2

- Disconnect the display PCB ending of the main PCB/display PCB connection cable.
- Remove four screws of the display PCB and take the PCB out.
- Place the new display PCB on the front panel. Fix it with the screws.
- Check that the buttons and the leds meet their places on the plastic panel.
- Connect the main PCB/ display PCB connection cable.

4.4 Replacing Temperature Sensor (for NF 800R)

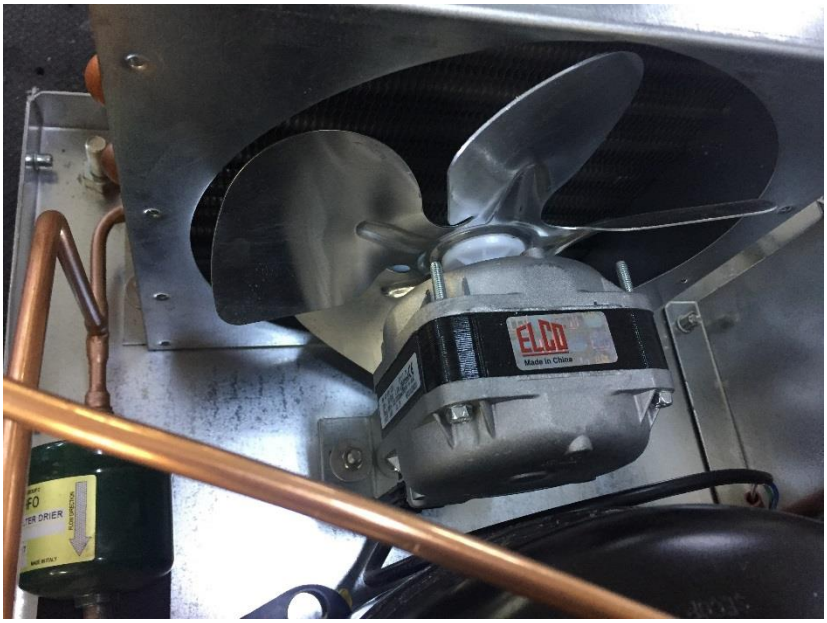
- Remove the temperature sensor endings from the main PCB.
- Remove the temperature sensor connection nut from the bowl bottom.
- Pull the sensor through the bowl and take it out.
- Place the new sensor by passing it through the bowl, tighten its nut to fix it. Make the necessary connections according to the electrical circuit diagram.

4.5 Replacing Plastic Panel

Picture 3

- Remove the plastic panel from the front panel.
- Clean the panel surface with alcohol.
- Paste the new panel, make sure that the display meets its places.

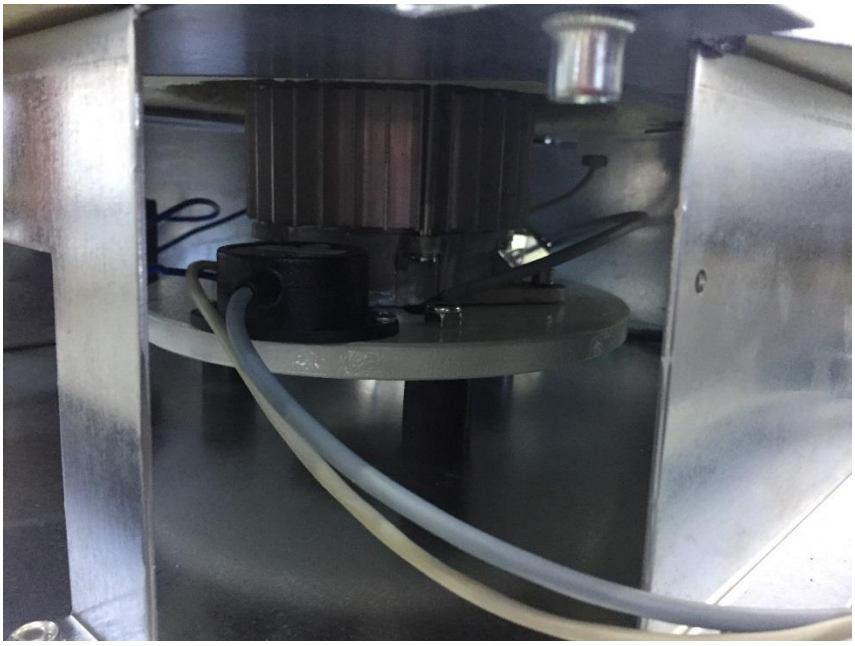
4.6 Replacing Condenser Cooling Fan (for NF 800R)



Picture 4

- Disconnect the fan motor cables.
- Remove three screws of the fan motor – condenser connection and take the fan motor out.
- Take the fan motor fitting base and fix the new motor on to it.
- Mount the base on which the new fan motor is fixed and make the cable connections.

4.7 Replacing Imbalance Detector



Picture 5

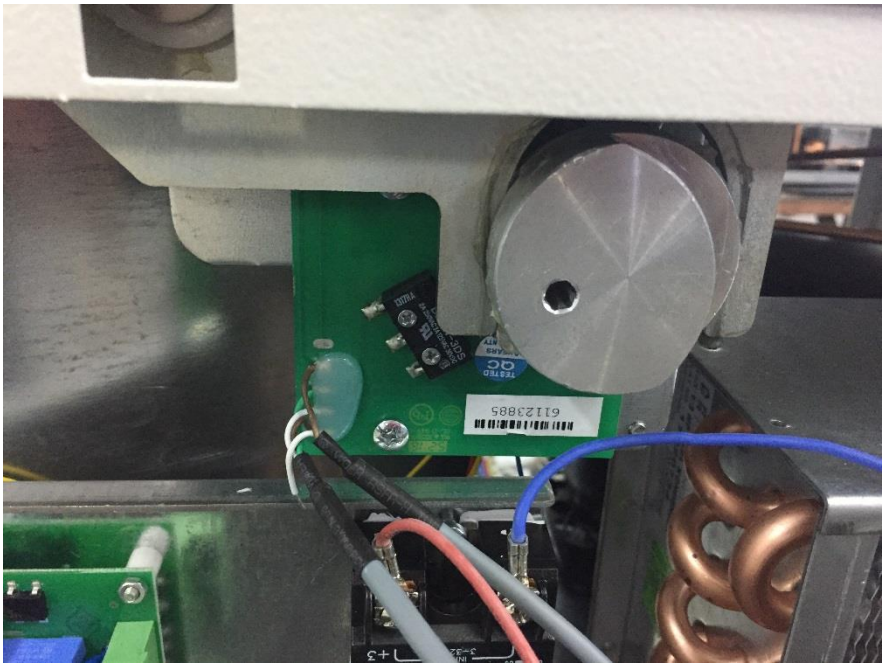
- Disconnect the imbalance detector - main PCB connection.
- Remove the imbalance detector which is fitted on the motor disc.
- Fit the new detector.
- Make the main PCB connections of the new detector.

4.8 Replacing Gas Spring

Picture 6

- Remove the back cover.
- Separate the gas spring from the body by means of the bolt.
- Take off the pin on gas spring-lid connection by helping of a shaft
- Make the lid connection of the new gas spring first.
- Then adjust the lid opening angle, check the opening and make the body connection.

4.9 Replacing Unlocking Motor



Picture 7

- Remove the front panel.
- Disconnect the locking bobbing – main PCB connection.
- Disconnect the lock switch – main PCB connection.
- Remove the allen screws on the locking pin.
- Remove the mount screws of unlocking motor and take motor off from switch board.
- Place new unlocking motor.
- Adjust lock switch carefully.

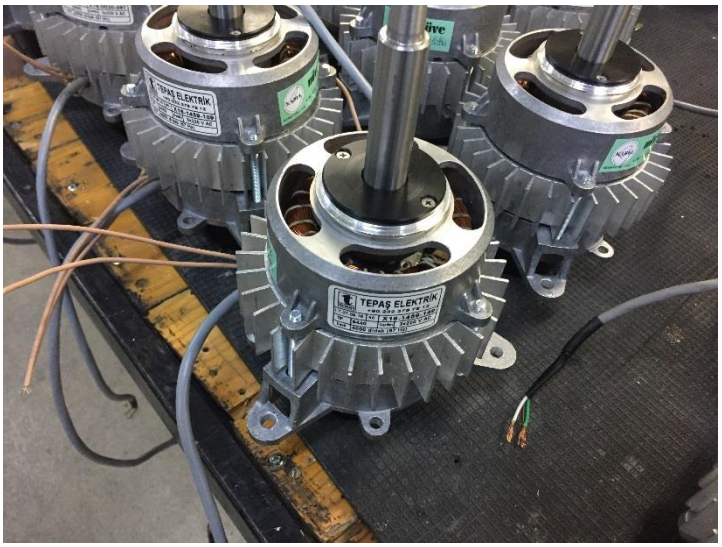
4.10 Replacing Lid Locking Switch

- Remove the front panel.
- Disconnect the locking bobbing – main PCB connection.
- Disconnect the locking switch – main PCB connection.
- Remove the allen screws on the locking pin.
- Remove the mount screws of unlocking motor and take motor off from switch board.
- Place new unlocking motor.
- Adjust locking switch carefully.

4.11 Replacing Optical Sensor

- Remove the rubber sheat inside the chamber.
- Unscrew 3 bolts of motor.
- Disconnect inverter connections of motor, mainboard connections of optical sensor.
- Take off the motor.
- Place motor and new optical sensor, make connections.

4.12 Replacing Motor



Picture 8

- Remove the rubber sheat inside the chamber.
- Unscrew 3 bolts of motor.
- Disconnect invertor connections of motor, mainboard connections of optical sensor.
- Take off the motor.
- Place new motor and optical sensor, make connections.

SECTION 5

DRAWINGS AND ELECTRICAL CIRCUIT DIAGRAMS

5.1 NF 800 ELECTRICAL CIRCUIT DIAGRAM

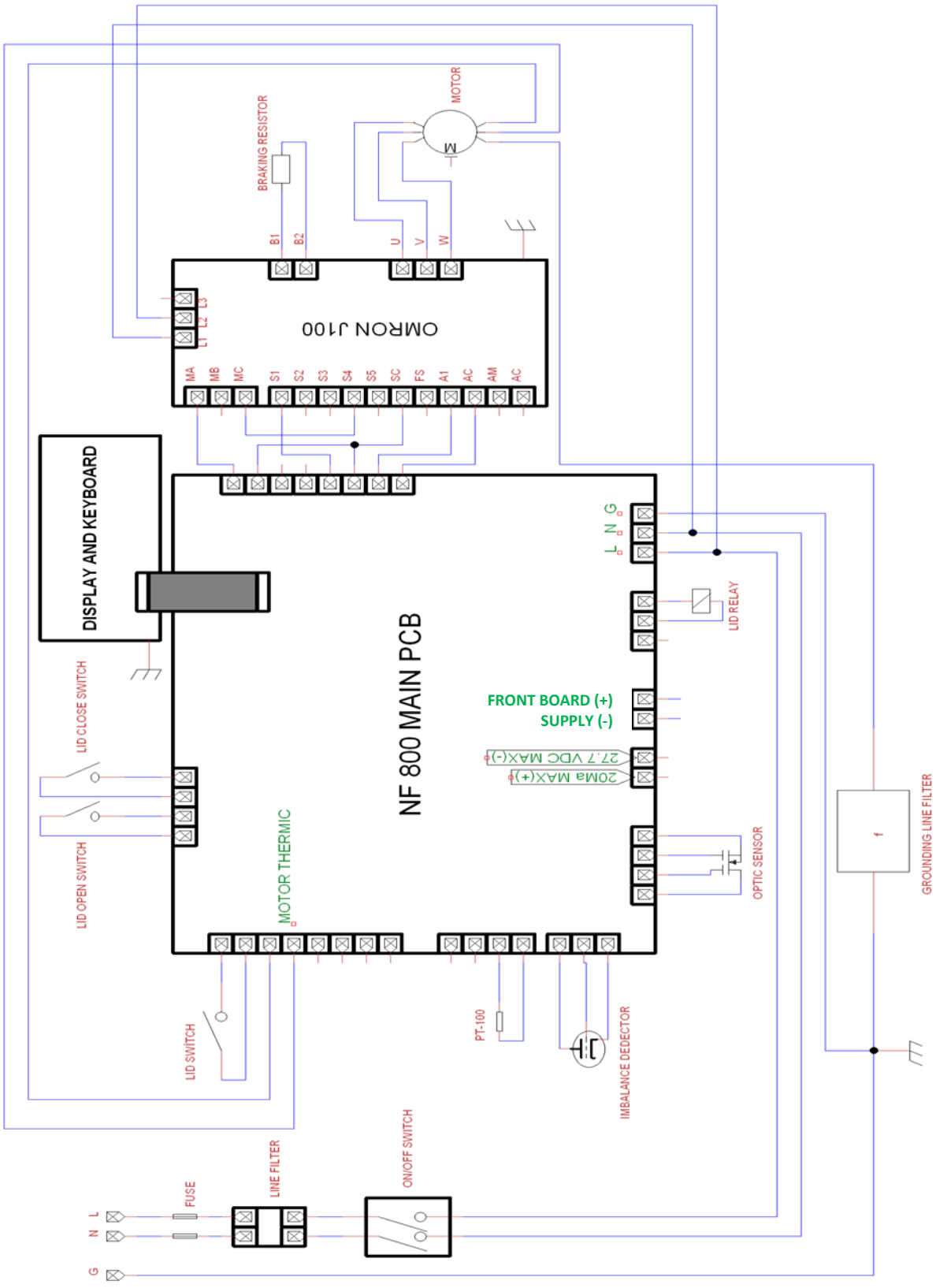


Diagram 3

5.2 NF 800R ELECTRICAL CIRCUIT DIAGRAM

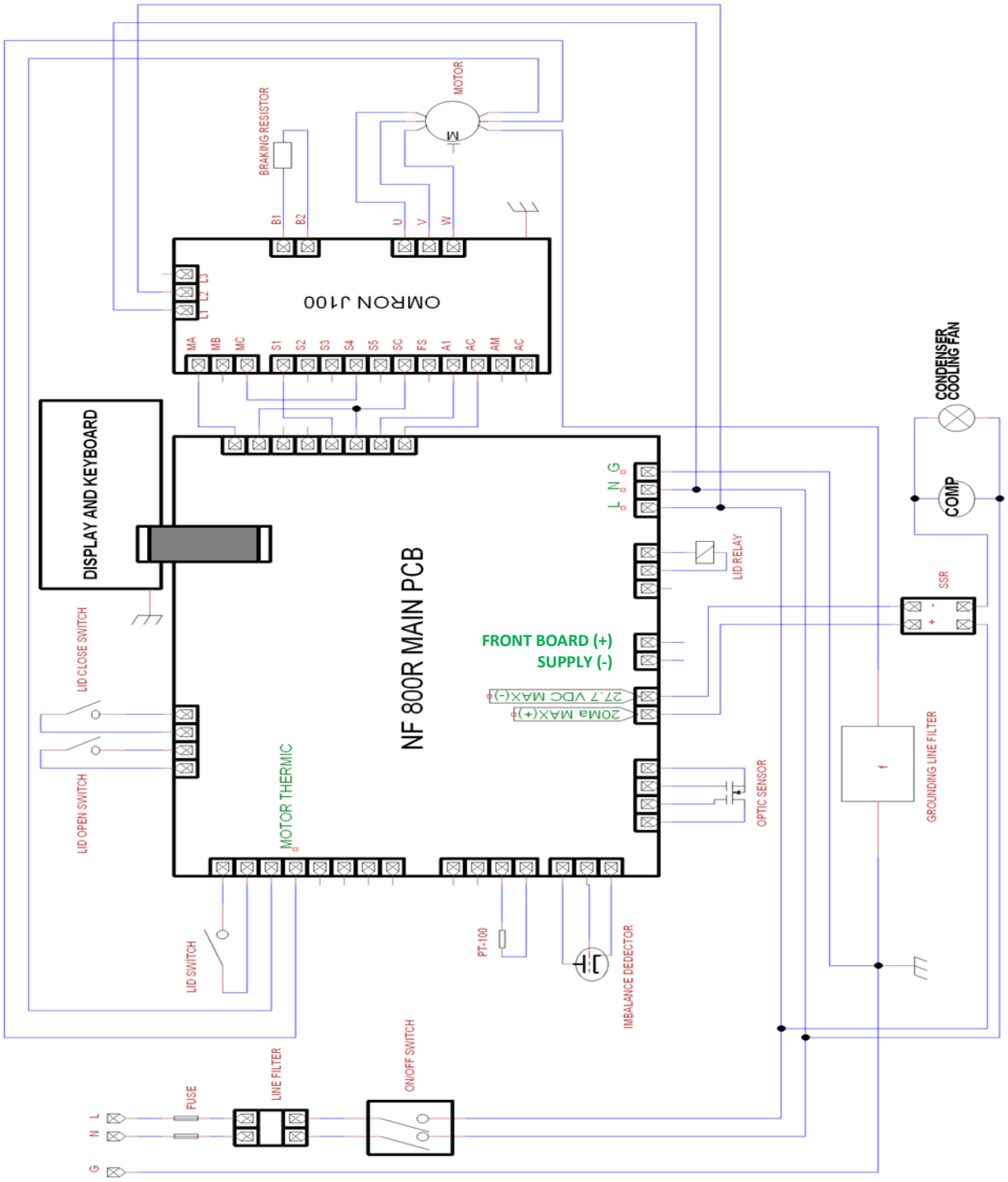


Diagram 4

SECTION 6

SPARE PART LIST

6.1 SPARE PART LIST

PRODUCT CODE	PRODUCT NAME
Z12.A 03 052	ON/OFF SWITCH GREEN / GENERAL
Z17.A 03 068	LID SWITCH
Z19.A 07 022	FITTING PADS
Z11.A 08 193	PULLER - SCREWED
Z15.A 11 020	GAS SPRING
Z11.C 03 224	LID GASKET
Z15.D 11 002	IMBALANCE DETECTOR
Z12.E 03 021	COMPRESSOR - FR 7,5G R134a
Z15.E 05 124	SWITCH BOARD
Z15.E 05 130	MAIN PCB - NF 800
Z12.F 04 012	FAN - FLOW
Z15.F 06 020	FILTER - EMC F-CLCLB90 - 12A / Nüve8
Z15.G 05 071	DISPLAY - N Prime NF 800
Z15.G 05 072	DISPLAY - N Prime NF 800R
Z15.I 01 042	TEMPERATURE SENSOR - PT100
Z12.I 06 001	INVERTER
Z15.K 01 082	POWER CABLE - 3x1mm
Z15.K 01 262	FLAT CABLE - N Prime
Z15.K 17 046	PACKING BOX - STANDARD
Z15.K 17 069	PACKING BOX WITHOUT BOTTOM
Z15.K 27 106	PLASTIC BUSHING – LOCK BOLT
Z15.L 02 021	DUST ISOLATION RUBBER
Z12.M 06 075	MOTOR - FAN / ELCO
Z19.M 06 077	MOTOR - CONICAL MİL ASYNCHRONOUS
Z15.M 06 113	MOTOR - UNLOCKING RSM/ 6 SDG T31,25 1 230V
Z19.M 06 116	ASYNCHRONOUS MOTOR
Z11.M 51 357	FAN MOTOR COMPLETE
Z19.O 04 011	OPTICAL SENSOR
Z14.P 06 025	PIN - Ø 6 x 15/SLOTTED
Z15.P 15 303	PANEL - N Prime / NF 800
Z15.P 15 304	PANEL - N Prime / NF 800R
Z15.P 19 008	PALLET
Z12.R 07 028	SOLID STATE RELAY - SSR 25A / GENERAL
Z14.S 02 025	FUSE - 10 A / FAST
Z14.S 02 026	FUSE - 4 A / FAST
Z11.S 03 122	NUT - ROTOR MOUNTING/M 10x1
Z12.S 13 019	POWER CABLE SOCKET – FUSED / GENERAL
Z15.T 03 020	RUBBER BUFFER - Ø 25x35 B Type

TABLE 2