HuMax 4K

| Service Manual

CE

Cat No. 15200/2

human

Diagnostics Worldwide

REVISION LIST OF THE MANUAL

Rev. /DATE.	REVISION DESCRIPTION
01/2010-11	First edition
02/2011-10	Introduction and Intended use correction, page 3; Figure 2, page 12; Figure 3, page 19; Figure 4, page 21
03/2018-07	New cover page

SYSTEM VERSION

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SERVICE UND SUPPORT

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1 SAFETY INSTRUCTIONS

1.1 Introduction

This manual must be available to the service technician. For accurate service, please read the following instructions carefully.
In order to avoid damage to the instrument or personal injury, carefully read the "GENERAL SAFETY WARNINGS", describing the appropriate operating procedures. Please contact your HUMAN authorised local Technical Service in the event of instrument failure or other difficulties with the instrument.

1.2 User Warranty

HUMAN warrants that instruments sold by one of its authorised representatives shall be free of any defect in material or workmanship, provided that this warranty shall apply only to defects which become apparent within one year from the date of delivery of the new instrument to the purchaser.
The HUMAN representative shall replace or repair any defective item within this warranty period at no charge, except for transportation expenses to the point of repair.
This warranty excludes the HUMAN representative from liability to replace any item considered as expendable in the course of normal usage, e.g.: lamps, valves, syringes, glassware, fuses, tubing etc.
The HUMAN representative shall be relieved of any liability under this warranty if the product is not used in accordance with the manufacturer's instructions, altered in any way not specified by HUMAN, not regularly maintained, used with equipment not approved by HUMAN or used for purposes for which it was not designed.

1.3 Intended Use of the Instrument

The instrument is intended for laboratory application by professional users. It must be operated in perfect technical conditions, by qualified personnel, in such working conditions and maintained as described in this manual, in the GENERAL SAFETY WARNINGS. This manual contains instructions for qualified professional operators.

1.4 General Safety Warnings

Use only chemical reagents and accessories specified and supplied by HUMAN and/or mentioned in this manual. Place the product so that it has proper ventilation.

The instrument should be installed on a flat, stationary working surface, that is free of vibrations.

Do not operate in area with excessive dust.

Operate at temperature and at a humidity level in accordance with the specifications listed in the User Manual.

Do not operate this instrument with covers and panels removed.

Use only the power cord specified for this product, with the grounding conductor of the power cord connected to earth ground.

Use only the fuse type and rating specified by the manufacturer for this instrument.

The use of fuses with improper ratings may pose electrical and fire hazards.

To avoid fire or shock hazard, observe all ratings and markings on the instrument.

Do not power the instrument in environments that are potentially explosive or at risk of fire.

Prior to cleaning and/or performing maintenance on the instrument, switch off the instrument and remove the power cord.

Only cleaning materials described in this manual may be used, as other materials may damage parts. It is recommended to always wear protective clothing and eye protection while using this instrument.

All warning symbols that appear in this manual must be carefully observed.

1.5 Disposal Management Concept

The applicable local regulations governing disposal must be observed. It is the user‘s responsibility to arrange for proper disposal of the individual components.

All parts which may contain potentially infectious materials must be disinfected by suitable, validated procedures (autoclaving, chemical treatment) prior to disposal. Applicable local regulations for disposal must be carefully observed. The instruments and electronic accessories (without batteries, power packs etc.) must be disposed of according to the applicable local regulations for the disposal of electronic components.

Batteries, power packs and similar power sources must be removed from electric/electronic parts and disposed of in accordance with applicable local regulations.

1.6 Biohazard Warning

Analytical instruments for in vitro diagnostic application involve the handling of human samples and controls which should be considered at least potentially infectious. Therefore every part and accessory of the respective instrument which may have come into contact with such samples must equally be considered as potentially infectious.

The „BIOHAZARD“ warning label must be affixed to the instrument prior to first use with biological material!

FIGURE 1
Biological Hazard Symbol

1.7 Instrument Disinfection

Before performing any servicing on the instrument it is very important to thoroughly disinfect all possibly contaminated parts. Before the instrument is removed from the laboratory for disposal or servicing, it must be decontaminated. Decontamination must be performed by authorised well-trained personnel, and in observance of all necessary safety precautions.

Notes:

2 INTRODUCTION

2.1 PURPOSE OF THE SERVICE MANUAL

This manual includes servicing and maintenance information of HuMax 4K. It is only to be used by technicians who were formerly trained by Human. 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 Human Servicing Team.

2.2 GENERAL PRESENTATION

The HuMax 4K bench top centrifuges are microprocessor controlled units. The microprocessor controlled PCB is located on the bottom sheet and display PCB ic located on the front panel.
The centrifuges are equipped with the locking system which prevents the lid from opening while the rotor is spinning.

3 OPERATING PRINCIPLES

3.1 GENERAL OVERVIEW

The HuMax 4K centrifuges are split into two main components,

- Power supply
- Control unit

3.2 EXPLANATIONS OF THE FUNCTIONS

3.2.1 POWER SUPPLY

The fuse and power consumption values of the centrifuge are listed below,

	Glass Fuse	Power Consumption	Power Inlet
HuMax 4K	2.5 A	150 W	230 Vac, 50 Hz

3.2.2 DISPLAY AND MAIN PCB, MOTOR DRIVER PCB

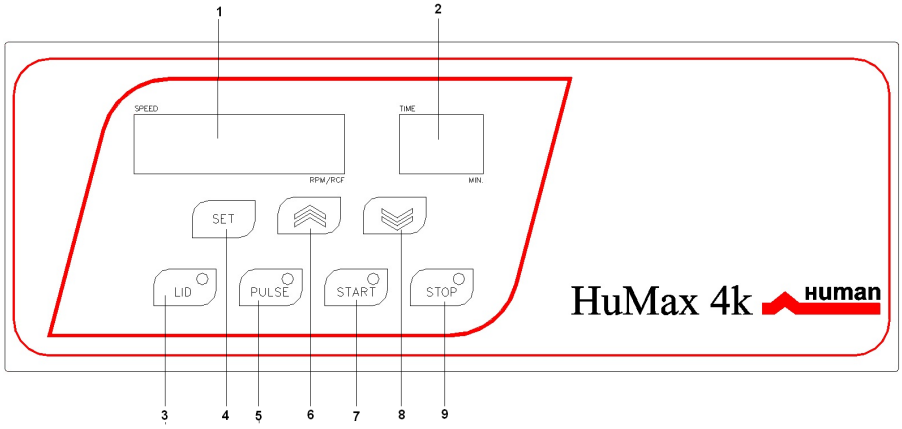
The main function of the microprocessor controlled main PCB is to control the speed of the motor. It regulates the frequency of the motor and the motor driver PCB increases or decreases the speed according to that frequency.

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

3.2.3 CONTROL PANEL

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

FIGURE 2



1 Speed display
2 Time display
3 Lid button and led
4 Set button
5 Pulse button
6 Value increase key
7 Start button and led
8 Value decrease key
9 Stop button and led

4 SERVICING

4.1 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 display & main PCB and motor driver PCB must not be replaced even the failure is caused by one of the components on the PCBs. 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 control element, please make sure that the failure is not caused by loose wire and terminal connections.

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

4.2 GENERAL FAILURES

TABLE 1

FAILURE	PROBABLE CAUSES	SOLUTIONS
1. The on/off switch is on but the led is not on and the display is blank.	Power inlet failure.	Check the mains supply. Check for weak connection in the socket and in the other terminal connections.
	Glass fuse has blown.	Replace the glass fuse(s) on the main PCB and check all parts of the centrifuge for short circuit.
	On/off switch is defective.	Replace the on/off switch.
2. The on/off switch and its led are on but the display is blank or some segments of the displays are not on.	The main PCB/display PCB connection cable is not fitted well or it is loose.	Disconnect the cable and re-connect it carefully.
	The cable is defective.	Replace the cable.
	The display board is defective.	Replace the display board.
	The main PCB is defective.	Replace main PCB.
3. The on/off switch is off but its led is on.	The cables of the switch is connected in reverse.	Check the connections and correct them.
4. The fuses blow frequently.	Short-circuit exits.	Check the electrical terminals, their cables and the components for a possible short circuit.
	The main PCB is defective.	Replace the main PCB.

FAILURE	PROBABLE CAUSES	SOLUTIONS
5. The lid cannot be opened.	Locking system failure	Check the whole system if necessary replace the lock.
	The locking bobbin is defective.	Check it and replace if necessary.
6. The centrifuge does not spin the rotor after the START has been pushed.	The „Lid“ led does not lighten.	Check the locking switch, replace it if it is defective.
	The locking bolt does not press on the locking switch tightly.	Check the locking system. If the bolt does not press on the switch tightly, adjust the switch.
7. “Err 3” appears on the display during the operation.	The communication between the display & main PCB and the motor driver PCB fails.	Check the connection cable between main PCB and display PCB if it is loose or broken.
		Replace the connection cable.
8. “Err 4” appears on the display during the operation.	Motor overheat failure.	Wait for the motor to cool down and start the centrifuge again.
		If the problem continues, replace the motor.
9. “Err 6” appears on the display during the operation.	Motor driver PCB is defective.	Replace the motor driver PCB.
10. “Lid open” occurs on thedisplay during the opeartion.	The lid is opened during centrifugation.	Close the lid and re-start the centrifuge.
		If the problem continues, check that the locking pin presses on the lock switch tightly while the lid remains closed.
		Check the lid switch and replace it if it is defective.
11. “Eoff” occurs on the display.	It occurs in case of a power failure during the run.	It disappears if you wait for 2 minutes or open and close the lidagain.

5 REPLACEMENT OF SPARE PARTS

5.1 Access to the Control Units

- Remove 8 screws that connects the bottom sheet to the body and hold the body up. Disconnect the hindering connections.

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

5.2 Replacing Motor Driver PCB

- Disconnect all terminals on the motor driver PCB (6) which are connected to the clamps.
- Disconnect the driver PCB ending of the driver PCB (6) / display and main PCB (2) connection cable.
- Remove the screws of the motor driver PCB (6).
- Place the new PCB and fix it with screws.
- Make the connections according to the electrical circuit diagram.
- Connect the driver PCB / display and main PCB connection cable.

5.3 Replacing Display and main PCB

- Disconnect the display and main PCB ending of the motor driver PCB (6) / display and main PCB (2) connection cable.
- Remove the four screws of the display and main PCB and take the PCB out.
- Place the new PCB on the front panel. Fix it with the screws.
- Check that the keys and the leds meet their places on the plastic panel
- Connect the motor driver PCB/ display and main PCB connection cable.

5.4 Replacing Plastic Panel

- Remove the plastic panel (11) from the front panel.
- Clean the panel surface with alcohol.
- Paste the new panel, make sure that the displays meet their places.

5.5 Replacing Locking Bobbin

- Disconnect the locking bobbin (4) and lid switch terminals from the main PCB (2).
- Remove the screws at the locking side of the body from the front side.
- Take the locking mechanism (3) out.
- Disconnect the locking bobbin terminal from the bridge rectifier (5) by cutting.
- Connect the bridge rectifier to the terminals of the locking bobbin by paying attention to the terminal directions of the rectifier.
- Place the locking mechanism and screw it.
- Make the locking bobbin-main PCB and lid switch-main PCB connections.

5.6 Replacing Locking Mechanism

- Disconnect the locking bobbin (4) and lid switch terminals from the main PCB (2).
- Remove the screws at the locking side of the body from the front side.
- Take the locking mechanism (3) out.
- Carry the locking bobbin, the bridge rectifier (5) and the switch to the new mechanism.
- Place the whole locking mechanism and screw it.
- Make the locking bobbin-main PCB and lid switch-main PCB connections.

5.7 Replacing Lid Switch

- Disconnect the locking bobbin (4) and lid swicth terminals from the main PCB (2).
- Remove the screws at the locking side of the body from the front side.
- Take the locking mechanism (3) out.
- Remove 2 screws that connect the lid switch.
- Screw the lid switch to its place.
- Place the whole locking mechanism and screw it.
- Make the locking bobbin-main PCB and lid switch-main PCB connections.

5.8 Replacing Motor

- Remove 8 screws that connects the bottom sheet to the body and hold the body up. Disconnect the hindering connections.
- Disconnect the thermal switch from the main PCB (2).
- Disconnect the motor terminals from the motor driver PCB (6).
- Take the complete motor (9) by removing 3 motor connection nuts.
- Assemble the new motor and make the necessary connections.

6 DRAWINGS AND DIAGRAMS

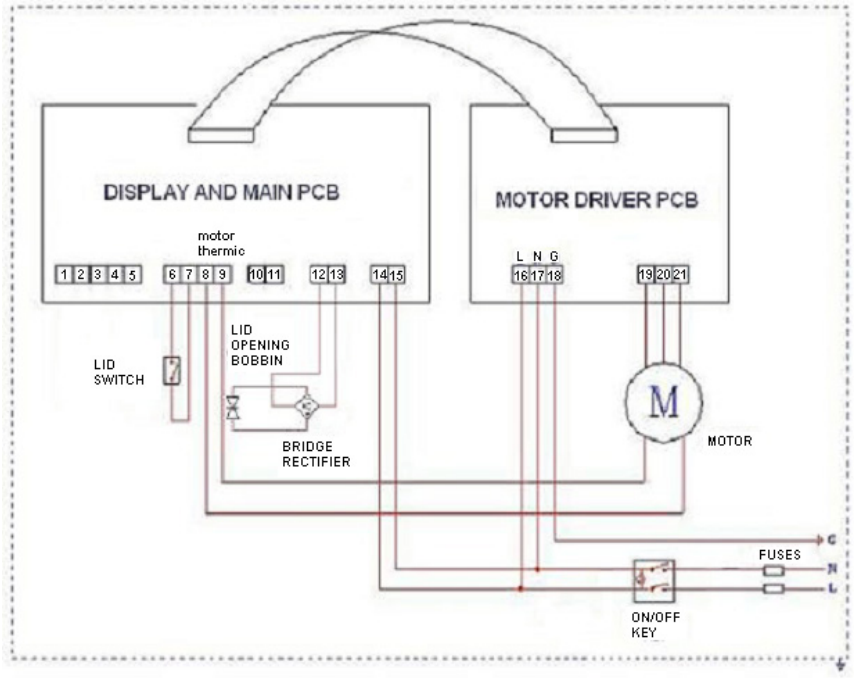


FIGURE 3

Electrical circuit diagram

7 SPARE PARTS

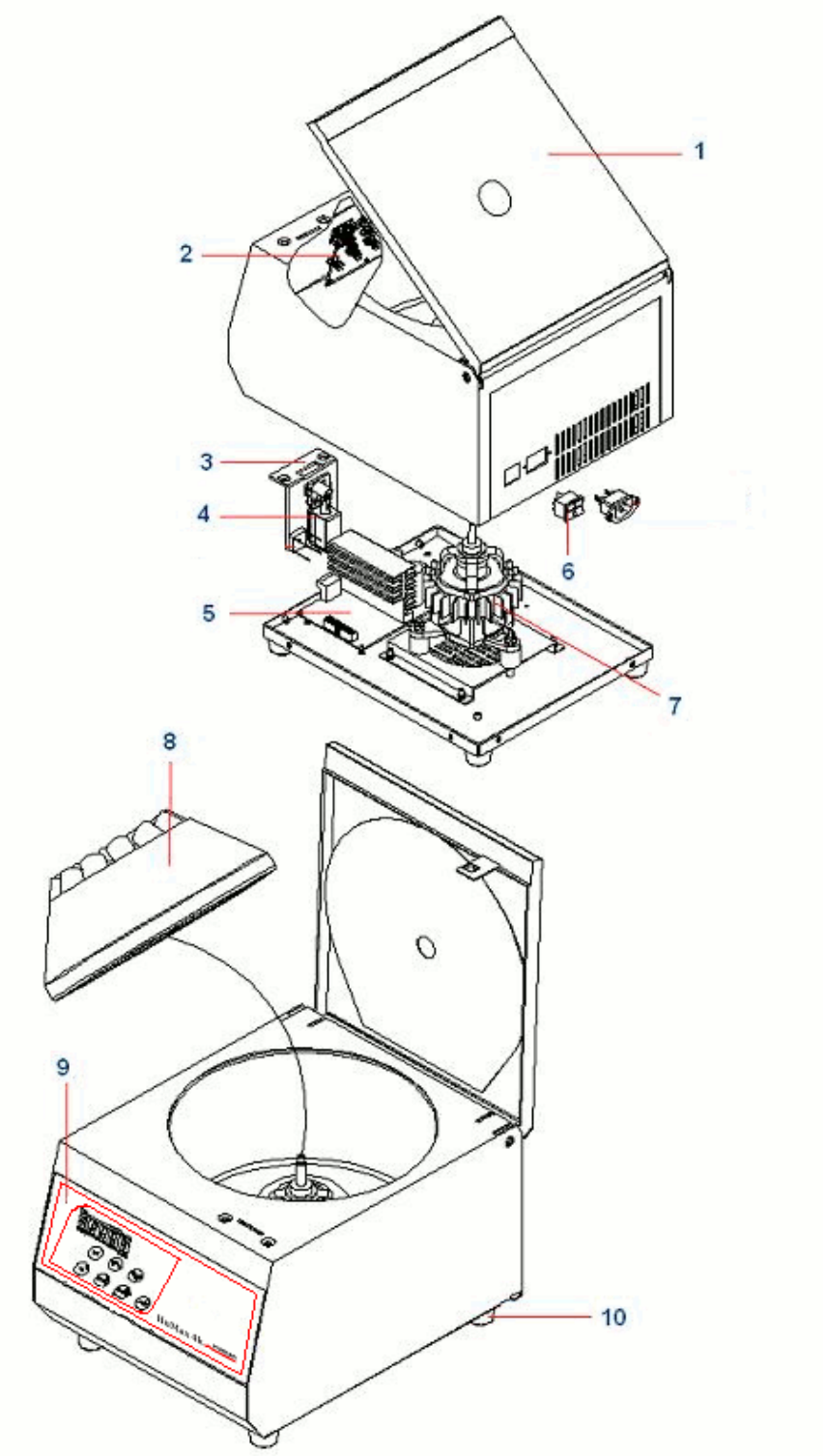


FIGURE 4

1 Lid window
2 Main PCB
3 Lid locking system
4 Lid locking solenoid
5 Motor driver PCB
6 On / Off switch
7 Motor
8 Rotor
9 Panal
10 Shock absorber

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