

HuMax 5K

| User Manual



CE

Cat No. 15310/01

Human

Diagnostics Worldwide

REVISION LIST OF THE MANUAL

Rev. /DATE.	REVISION DESCRIPTION
01/2007-01	First edition
02/2008-11	Addition to chapter 7.2 "breakage and corrosion"
03/2010-05	Chapters: 1, 3, and 6.4 changed.
04/2011-09	Correction Dimensions
05/2011-10	Intended Use correction on page 6, Accelaration and Braking rate corrected on page 15
06/2011-12	Page 17 Rotor Type added
07/2017-10	New Design and new operation unit

SYSTEM VERSION

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SERVICE UND SUPPORT



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1 SAFETY INSTRUCTIONS

1.1 Introduction

This manual is considered part of the instrument and must be available to the operator and the maintenance personnel. For accurate installation, use and maintenance, 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 must be used for its intended purpose. 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 this 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.

2 DESCRIPTION

The HuMax 5K bench-top centrifuge is designed for daily routine centrifugation requirements. The performance and capacity of the HuMax 5K ideal for the separation of blood samples, urine particle sediment and carrying out of other routine applications in small and medium-sized laboratories.

HuMax 5K is a ventilated model that ensures minimal sample temperature elevation by means of a continuous air flow system, which employs air channels in the lid.

By means of the programmable microprocessor control system speed (RPM or RCF), time, acceleration/braking rate and temperature could be programmed and the 'pulse' function provides the operator to run the programs of short duration. The HuMax 5K ensures safe operation by means of a lid-locking system, which does not allow the centrifuge to operate or the rotor to spin if the lid is not closed.

The lid-locking system allows the lid to be opened when the program ends by pressing a single key. There are audible and visible indicators to inform the operator when the lid is open, when the program ends or when an error conditions has occurred. In the case of a power failure, the lid may be opened manually using the manual lid-opening tool (included).

The HuMax 5K bench-top centrifuge is manufactured in accordance with the following standards,
EN 61010- 1, EN 50081- 1, EN 61010- 2- 020

3 INSTALLATION

3.1 Contents of Package

HuMax 5K

- 1 user manual
- 1 power cable
- 1 manual lid-opening tool
- 1 puller tool
- 1 24 socket wrench (Nut & Lever)
- 1 Bucket Lubrication grease

3.2 Mains Supply

The HuMax 5K centrifuge is available in two variants with different electrical requirements.

Cat.no. 15300/1 requires 230 Vac, 50/60Hz or

Cat. no. 15300/2 requires 110 Vac, 60Hz

! Please note that the centrifuge should only be connected to a grounded outlet.

3.3 Environmental Conditions

The instrument is designed to operate safely under the following conditions:

- Indoor use only
- Temperature range: 5°C - 40°C
- Maximum relative humidity of 80% for temperatures up to 22°C
- Maximum performance is obtained between 15°C / 25°C.

3.4 Positioning

Place the centrifuge on a bench-top able to support its weight and vibrations in a clean, non-corrosive environment. Leave a 30 cm space on each side of the centrifuge.

3.5 Inspection

Before installation, the rotor should be inspected for corrosion and cleanliness. Chemical corrosion combined with stress will eventually lead to the failure of the rotor with potentially severe damage to the centrifuge. Dirt and particles inside the inserts can cause the breakage of tubes and lead to a major imbalance. The central hole of the rotor and the motor shaft must also be kept clean and dry at all times.

3.6 Loading

Each tube insert must be the same weight as the one diametrically opposite for balancing to avoid imbalance problems that could cause major damage!

FIGURE 2



! Rotor imbalance may cause major damage to the rotor and centrifuge. Never attempt to introduce liquids into the tube inserts.

If the number of tubes to be centrifuged is less than the capacity of the rotor, the tubes must be placed in opposite inserts. If an odd number of tubes is being centrifuged, a water-filled tube of the same weight must be used for balance.

3.7 Rotor Installation

Unscrew the nut on the shaft with a 24 mm socket wrench. Make sure the shaft and the rotor are clean. Carefully place the rotor onto the drive shaft, positioning the pins of the shaft into the key slots underneath of the rotor. Make sure the shaft nut holding the rotor is tight.

3.8 Manual Lid Opening

In the case of a power failure or malfunction, the instrument can be opened manually to access the samples. To open the lid manually:

! Before opening the lid manually, the rotor must be completely stopped. (Observe the rotor while opening the lid carefully by hand; if the rotor is still rotating, close the lid and wait approximately 10 minutes before repeating the operation.)

- Power off the instrument
- Insert the manual lid-opening tool into the hole on the left-hand side of the instrument.
- Push the tool inward, holding it horizontal until the lid lock releases and the lid can be opened.

4 SPECIFICATIONS

Technical Specifications	HuMax 5K	
Maximum Speed	4.100 rpm	
Maximum RCF	2.819xg	
Maximum Capacity	Swing-out: 4 x 100 ml Angle: 16 x 15 ml	
Control System	Programmable Microprocessor Control System	
Acceleration	5 acceleration rates, 0: slowest, 4: fastest	
Braking	5 braking rates, 0: slowest, 4: fastest	
Speed Set Range	1.000 – 4.100 rpm	
Speed Set Step	10 rpm	
Timer Set Range	1 - 99 minutes + hold position	
Timer Set Step	1 minutes	
Motor	Maintenance Free Brushless Induction Motor	
Power Supply	230Vac 50/60 Hz for cat.no. 15200/2 or 110Vac 60 Hz for cat.no. 15200/1	
Max Power	450 W	
Dimensions (WxDxH):	Instrument without any components	38 x 46.5 x 34 cm
	Space required for routine use:	48 x 50 x 74 cm
	Packing Dimensions:	52 x 44 x 44 cm
Weight:	Gross: 28.8 kg, Net: 25.5 kg	

TABLE 1

5 ACCESSORIES

5.1 Swing Out Rotor

TABLE 2

Cat. No.	Description	Capacity	Max Tube Dimension (mm)	Max. Radius (mm)	Max. Speed rpm	Max. RCF xg	Rotor Type
15301	Swing-out rotor	4 x 100 ml		150	4.100	2.819	SC415
15305	Set of 4 inserts	1 x 100 ml	46.5 x 108	143	4.100	2.687	SC400
15306	Set of 4 inserts	1 x 50 ml conical	30 x 120	147	4.100	2.763	SC450
15307	Set of 4 inserts	4 x 15 ml	17 x 108.5	139	4.100	2.612	S1615
15308	Set of 4 inserts	2x15 ml conical	17 x 121	150	4.100	2.819	SX415
15309	Set of 4 inserts	4 x 7 ml	13 x 110	139	4.100	2.612	S1615
15310	Set of 4 inserts	4 x 5 ml	13 x 85	114	4.100	2.142	S1657
15303	MTP rotor	2x1 MTP		107	4.100	2.011	nPLAt

5.2 Angle Rotor

TABLE 3

Cat. No.	Description	Capacity	Max Tube Dia. (mm)	Max. Radius (mm)	Max. Speed rpm	Max. RCF xg	Rotor Type
15302P	Angle Rotor	16 x 15 ml	17	114	4.100	2.142	A1615
15301P	Angle Rotor	30 x 15 ml	17	114	4100	2450	A3015

5.3 Adapter

TABLE 4

Cat. No	Tube Type	Max. Tube Dimension (mm)
17155	1.5 / 2 ml microtubes	11 x 70
17156	7 ml vacuum / non-vacuum tubes	13 x 115
17157	5 ml vacuum / non-vacuum tubes	13 x 90

6 SAFETY INTERLOCK SYSTEM

The HuMax 5K centrifuge is equipped with an interlock system that prevents the centrifuge lid from opening when the rotor is spinning.

The centrifuge will not operate until the lid is closed completely. The lid remains closed until the rotor stops spinning. The run can not be started before the lid is correctly closed. If the lid is open the lid-open indicator will light.

! If a power failure occurs, manual access to the sample in the centrifuge is possible using the special tool included with the centrifuge. Please take a look at the chapter **Manual Lid Opening (3.8)** for further information.

7 INSTRUCTIONS FOR USE

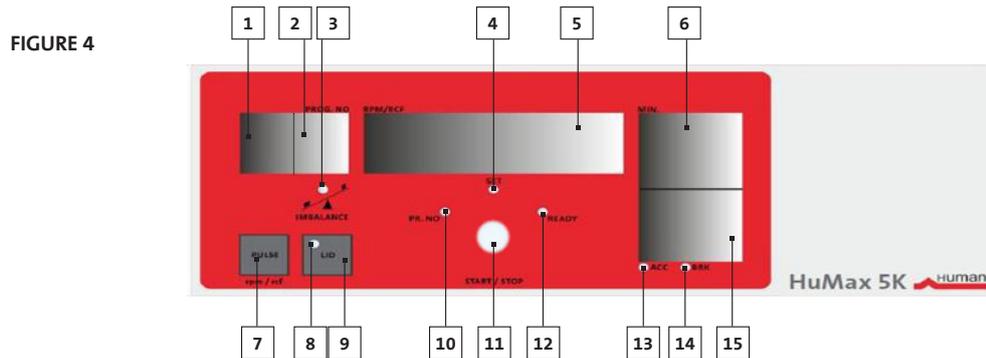
7.1 Front View Of The Instrument



FIGURE 3

- | | |
|--|---------------|
| 1. Air Channels | 7. Lid |
| 2. Hinge | 8. Lid bolt |
| 3. Chamber | 9. Gas spring |
| 4. Gasket | 10. Rotor |
| 5. Hole for the manual lid
opening tool | |
| 6. Display and control panel | |

7.2 Controls And Indicators



1 - Running Indicator Leds	The 4 leds light up consecutively during the run to indicate the spinning of the rotor.
2 - Program No Display	Display of the program number from 0 to 9.
3 - Imbalance Indicator Led	It is activated if imbalance occurs. Brake is applied immediately.
4 - Set menu Led	It Indicates that the user is on the set value menu.
5 - Status Display	Display of speed (500 - 4100 rpm) or display of RCF (0 - 2819 xg) during programming and error code.
6 - Time Display	Display of the run time from 1 min. to 99 min. and hold position (H).
7 - PULSE Button	Pulse mode on by pushing the button during READY situation. It is pushed to see the RPM or RCF value on the speed display during the run, to pass among the displays and to store the programmed values.
8 - LID Indicator Led:	It turns on if the lid remains open or is not properly closed.
9 - LID Key	Opens the lid if the liud indicator lights up.
10 - Program Number Led	It indicates that the user is on the program menu.
11 - ENCODER Button	This has two functions, turn the button clockwise and opposite clockwise, reach program menu, set value and "READY" situation. By turning the ENCODER button increase or decrease values during programming stage. When the Led is "READY", push the ENCODER button to start the device. Stop the run by pushing the ENCODER button.
12 - READY Led	It indicates that the device is ready to run.
13 - Acceleration Indicator Led	It turns on while acceleration rate is being programmed and while the rotor is accelerating.
14 - Breaking Indicator Led	This indicator turns on while the breaking rate is being programmed and while the rotor is braking.
15 - Acceleration/ Brake	Displays the acceleration and brake rates from 0 to 5.

7.3 Preparing The Run

- Switch on the centrifuge
- Open the lid
- Load the rotor, making sure it is properly balanced.
- Close the lid
- Create a new program or select the required program memory.

The centrifuge is ready to run.

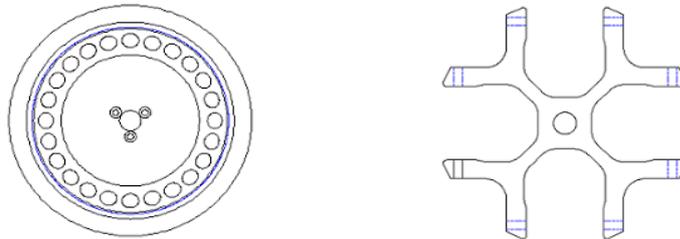
7.4 Making A New Programm

TABLE 5

Determine the rotor type, the speed and time, the acceleration and braking rates.

Programm Setting	 By turning the Encoder button select SET menu	 Push the Encoder button		The Display flashes. By turning the Encoder button increase or decrease the value	 
Rotor Type Setting		The Display flashes. By turning the Encoder button increase or decrease rotor type	 	Push the Encoder button and save the value	
PRM/RCF		The Display flashes. By turning the Encoder button select RCF or RPM	 	Push the Encoder button and save the value	
Speed Setting		The Display flashes. By turning the Encoder button increase or decrease run speed	 	Push the Encoder button and save the value	
Time Setting		The Display flashes. By turning the Encoder button set operating time value	 	Push the Encoder button and save the value	
Acceleration Setting		Acceleration led turns on and the display flashes. By turning the Encoder button set acceleration level	 	Push the Encoder button and save the value	
Brake Setting		Brake led turns on and the display flashes. By turning the Encoder button set brake level	 	Push the Encoder button and save the value	

FIGURE 5



! The correct rotor type should be selected in order to see the correct RCF values during the run.

- Load the rotor with samples by paying attention to the dynamic and static balances.
- Close the lid, see that the lid open warning led (8) turns off.
- See that the READY led (12) turns on and push ENCODER button (11).
- The rotor starts accelerating according to the set value and the acceleration led turns on. The set speed or RCF value is displayed during the set time duration. (RPM or RCF screen will appear in every 3 seconds). For the operations whose speeds are higher than 2.000 rpm, the rotor accelerates according to the set acceleration value up to 2.000 rpm and then continues accelerating with the highest acceleration value, 5 to reach the set speed. As the speed reaches the set value, “-“ sign appears on the acc/brk display (15).
- The elapsed time is counted down as the centrifugation starts.
- When the time display shows “00”, the program ends, the breaking led turns on and the set break rate is shown at acc/brk display (15). The rotor brakes with the highest break rate, 5 until it slows down to 2.000 rpm and continues braking according to the set braking value.
- The elapsed time until the rotor stops is counted and is shown at the time display. This is the time that passes until the rotor stops.
- When the speed display shows “0”, the “end” expression appears. The user is warned by an intermittently sounding alarm.
- Push the LID button (9) to open the lid.
- You may leave the centrifuge at stand-by position.
- Load the rotor with samples by paying attention to the dynamic and static balances.

7.4.1 PULSE MODE

- Load the rotor with samples by paying attention to the dynamic and static balances.
- Close the lid, see that the lid open warning led (8) turns off.
- See that the READY led (12) turns on and push ENCODER button (11).

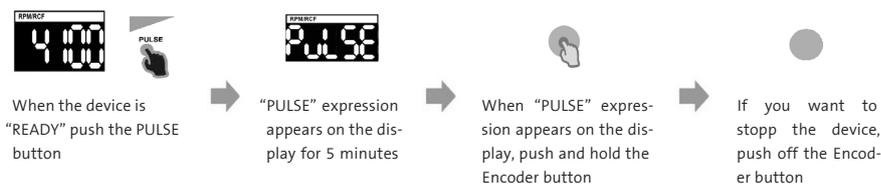


FIGURE 6

- You can reach the desired speed by pressing and holding the ENCODER button (11) within the RPM speed limits you have set.
- In the PULSE mode, the rotor operates according to the set acceleration and braking values you set.
- While operating in Pulse mode, press the ENCODER button (11) and start counting from the moment the rotor starts to accelerate. When you take your hand off the ENCODER button, it will stop counting by braking.

! You may display the RPM or RCF value on the speed display during the run by pushing the function button. The centrifuge waits at the stand-by position with the program values of the last program. Please open the lid after every operation, otherwise the centrifuge cannot be run again.

7.5 END OF OPERATION

At the end when the motor has stopped "End" is shown on the speed display and the audible alarm beeps. If the "Hold" position is selected, the program will stop, when the "ENCODER" button is pressed.

! In the case of any persistent error, please contact your local HUMAN representative.

7.6 Error Codes

If the centrifuge fails to operate, check that,

- The on/off switch is on,
- The fuses are sound,
- The plug is not defective,
- The centrifuge is well connected to the supply,
- The electricity installation is not defective,
- Power is supplied.

In case of below written failures, related error codes are shown.

In case of below written failures, related error codes shown on the speed display, motor starts braking.

Err 03: The communication between the display & the control PCB and the motor driver PCB fails.

Err 04: Motor overheat failure. Please wait for the motor to cool down and start the centrifuge again.

Err 05: This failure occurs when the temperature sensor endings are broken or the temperature sensor is defective.

Err 06: Motor driver PCB is defective.

blncEr: It is the imbalance error. This means the load is not distributed properly. Please balance the load statically and dynamically and check if the weights of the buckets are the same.

Lid Open: This failure occurs when lid is opened during the centrifugation. Please close the lid properly and start the centrifuge again.

Eoff: It occurs in case of a power failure during the run. It disappears if you wait for 2 minutes or open and close the lid again.

8 HAZARDS, PRECAUTIONS AND LIMITATIONS OF USE

8.1 Cautions

The following precautions must be observed:

- Never try to bypass the safety lid lock while the rotor is spinning.
- Do not try to open the lid until the display returns to stand-by mode.
- Only use a correctly grounded mains supply.

Special attention to the following is necessary:

- Installation of the unit: Proper ventilation, levelling of the centrifuge, rigidity and stability of the bench.
- Rotor installation: Check that the rotor nut is tightened firmly.
- The accessories and the rotor chamber must be kept clean.
- Load balancing.
- Samples: The cleaning of the accessories is particularly important when using corrosive products in the samples (saline, acids, bases).

8.2 Contamination Hazards

Our centrifuges are used in medical research where hazardous substances, including radioactive chemicals, are frequently found.

Always use the appropriate decontamination procedures when the rotor is exposed to these chemicals.

Examples of commonly used techniques are outlined below. This information is given as a guide only. It is the responsibility of the owner to use the most suitable procedure.

The rotor should always be completely disassembled before being subjected to heat and after external chemical cleaning.

8.3 Disinfection

Alcohol (70% ethanol or isopropanol) applied for 10 minutes is ideal for destroying bacteria and viruses.

Alternatively, rotors can be autoclaved for 20 minutes at 120°C to destroy micro-organisms.

Any part which has been subjected to temperatures above 130°C must be discarded.

Note that the black colour on the surface of the rotor will gradually fade if the rotor is regularly autoclaved or bleached. This does not indicate a degradation of the anodisation.

! Do not open the instrument!
• There are no user-servicable parts inside. In the case of a malfunction, please contact your local HUMAN representative.

8.4 Electrical

High voltage is present behind the panels of the centrifuge.

8.5 Improper Use

- Use only rotors and accessories designed for use in the centrifuge.
- Do not attempt to override the lid interlock assembly.
- Load and lock the rotor only in the recommended way. As the centrifuge starts to spin, an improperly loaded rotor can cause sufficient force to damage the drive shaft and the rotor chamber.

9 CLEANING AND PREVENTIVE MAINTENANCE

9.1 Periodic Maintenance

- Disconnect the power cable and after the maintenance check the presence of the mains grounding line.
- Rotors should be washed after every use, especially if a spillage has occurred, in warm water containing a few drops of liquid soap. (A mild washing liquid is ideal as a cleaner).
- Rotors and other accessories must be clean if any spillage or chemicals occur.
- You may use a nylon brush to clean the buckets and tube inserts of the rotor.
- **Do not use metal brushes.**
- Dry the rotor with a piece of soft absorber cloth. Please make sure that the buckets and inserts are well dried, you may use hair dryer.
- The buckets of the swing-out rotors should be greased frequently with the oil provided with the centrifuge. Please remove the light oil from the pins and put a small amount of fresh oil every time you grease. This will ensure free swinging of the buckets. Most of the imbalance problems are mostly raised by the users who do not clean and oil the pins.
- Please do not leave the rotor on a metal surface, particularly stainless steel as electrochemical reactions set off easily with the aluminum or magnesium in the rotor.
- Make sure that no deposit remains at the bottom of the bucket because the pressure of a flask or tube from above during centrifugation will certainly increase the chance of corrosion.

! All cleaning should be performed with the centrifuge disconnected from the power outlet.

9.2 Sterilization

- Apply alcohol, for example %70 ethanol or isopropanol, for 10 minutes against bacteria and viruses.
- The rotors and buckets may be autoclaved at 121°C and under 215 kPa pressure for 20 minutes but please do not forget to remove all accessories.
- Do not use formaldehyde for the sterilization process.
- Phenol is a corrosive substance and should never be used.
- Glutaraldehyde is a toxic substance and increases the rate of fatty acid in the body.

10 ELECTRICAL CIRCUIT DIAGRAM

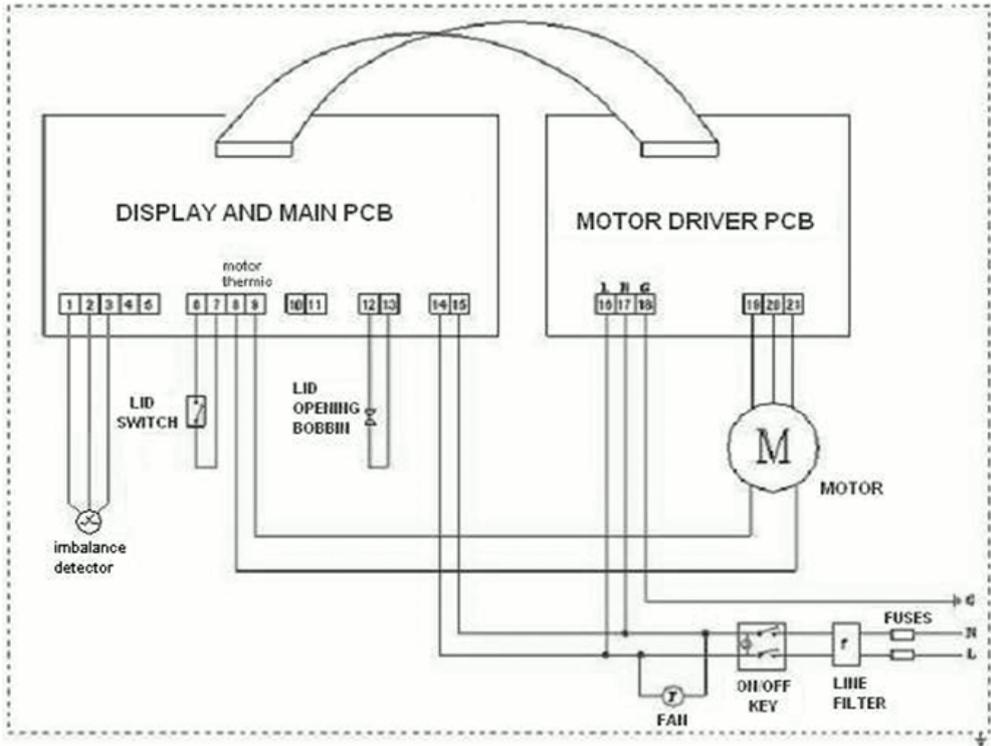


FIGURE 7

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The logo graphic consists of a horizontal bar with a red-to-white gradient. On the right side, the bar is broken into three segments that rise and then fall, creating a stylized 'H' shape.

Human