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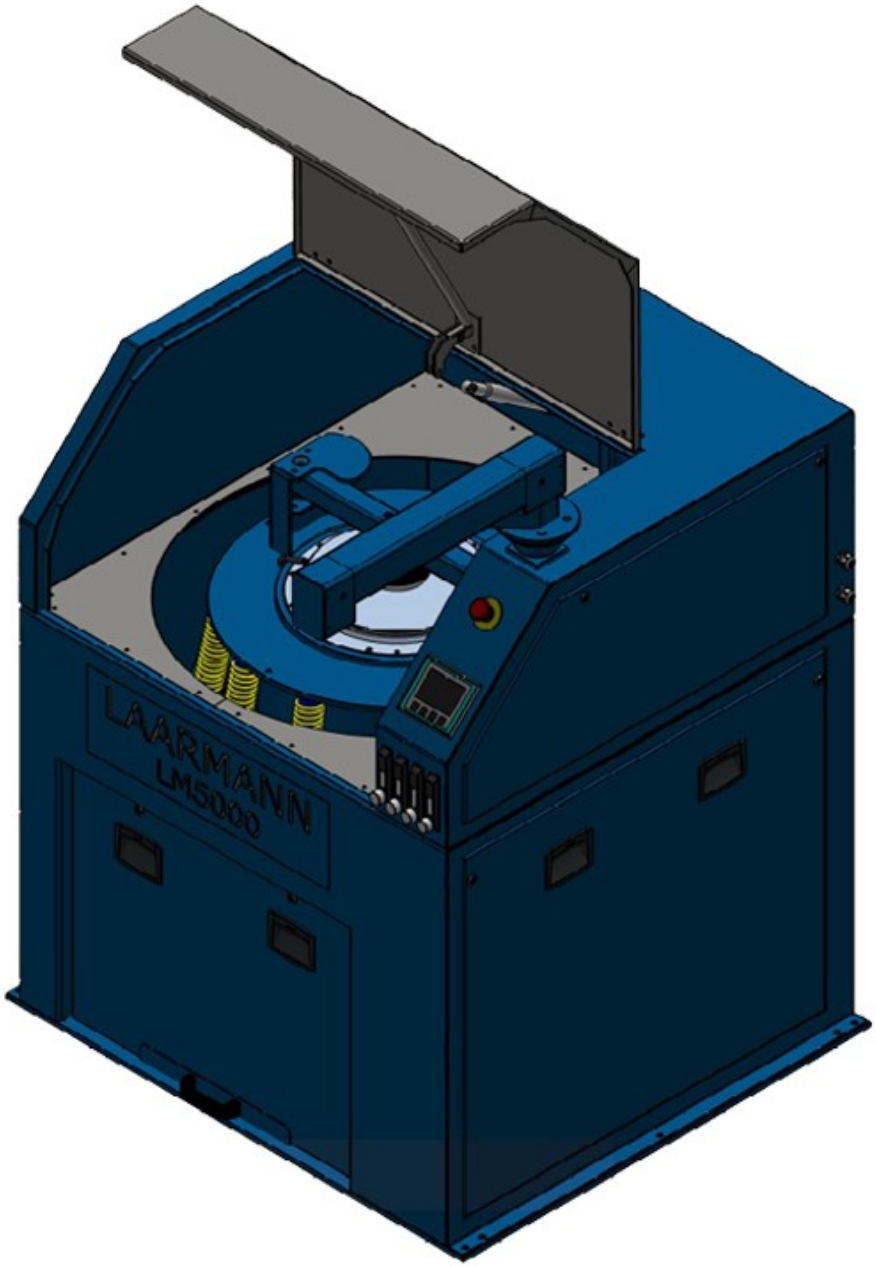
Innovators in Solids



LM5000 PULVERISER RING MILL

USER MANUAL

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LM5000 PULVERISER RING MILL MANUAL

Contents **Page**

1 Safety instructions

Before using the machine, make sure to read and understand this manual thoroughly. Keep the manual close to the machine, easily accessible to all the users.

Improper operation can cause injury to persons or damage to the equipment.

1.1 Safety symbols

Failure to comply with the sections of text marked in this way result in danger. Injuries are possible. Damage to the mill and accessories is possible, special care is required.

This symbol marks instructions for correct execution of certain jobs of work, e.g. that the work may only be carried out by an electrician.

This symbol indicates risks associated with hot surfaces.

1.2 Safety instuctions

Safety instructions

Claims for damages in any form whatsoever, for injury to persons or damage to the machine, caused through non-observance of the following safety instructions, are excluded.

Use according to the intended purpose

Do not make any alterations to the machine and use only approved spare parts and accessories. Otherwise the Declaration of Conformity will lose its validity and this will also lead to the loss of any guarantee claims.

Transport

Do not knock, shake or throw the LM5000 during transport. Otherwise the electronic and mechanical components may be damaged.

Packing material

Please keep the packing material for the duration of the guarantee period. In case of a complaint and return of the machine in unsuitable packing material, your guarantee claim will be lost.

Temperature variations

If the LM5000 is subjected to high temperature variations, protect it against condensed water. Otherwise the electronic components may be damaged.

Ambient temperature

If the temperature drops below +5°C or exceeds +40°C, electronic and mechanical components can be damaged. Performance can be changed to an unknown extent.

Atmospheric humidity

If the humidity exceeds 85%, electronic and mechanical components can be damaged. Performance can be changed to an unknown extent.

Electrical connection

If the values for the mains power supply on the name plate are not observed, the electrical and mechanical components may be damaged.

Inserting grinding media

Ensure that the grinding media are inserted correctly in the machine. Otherwise they can be damaged, when starting the machine

Removing and opening hot grinding media

When removing and opening hot grinding media, always wear protective gloves. There is a danger of burning the hands

Materials

Observe the relevant regulations and directives for handling chemicals and hazardous materials. Milling of materials, which give a risk of fire or explosion,is prohibited.

Cleaning

Do not clean the LM5000 under running water. Danger to life through electric shock. Use only a soft cloth moistened with water. Cleaning agents and solvents should not be used, not for cleaning the milling tools either.

Electrical connection

If the values for the mains power supply on the name plate are not observed, the electrical and mechanical components may be damaged.

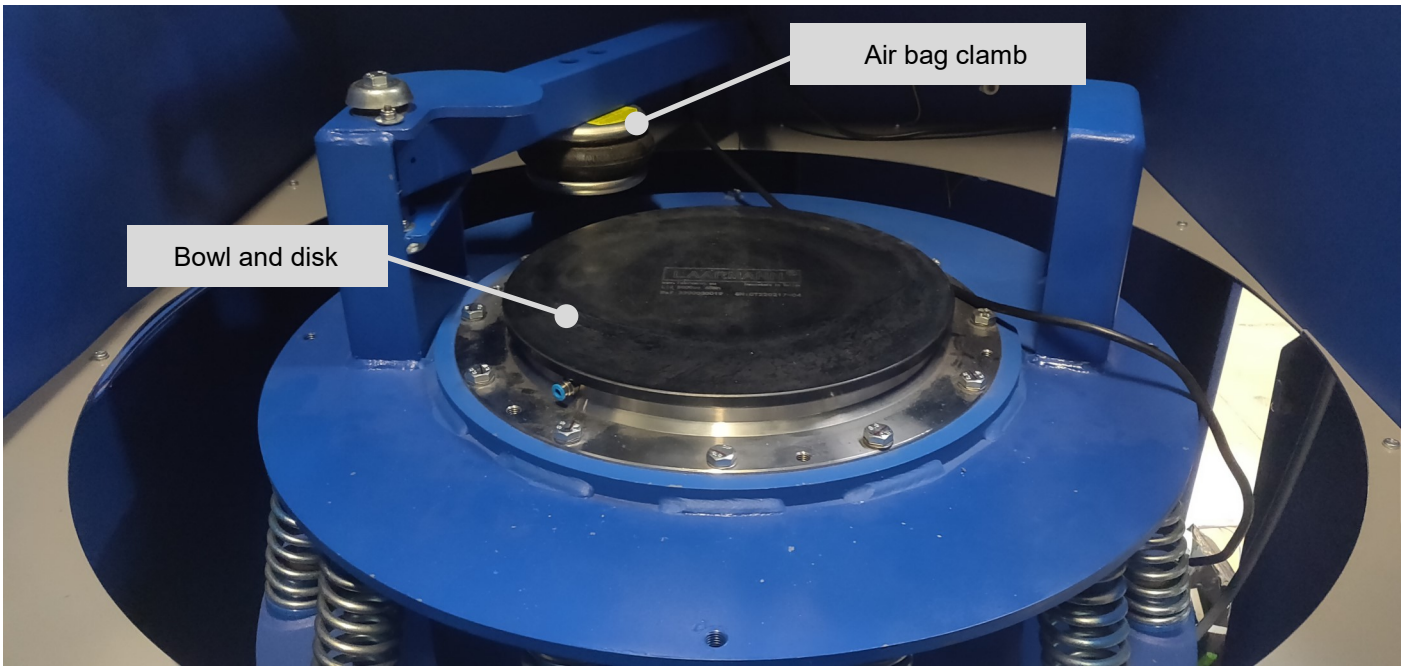
2 General Discription

The LM5000 is a laboratory machine, which is suitable for pulverizing and homogenizing hard and brittle materials in the dry and wet state.

It is used for fast pulverizing.

The closed milling pulverizing system guarantees complete recovery of the samples.

Final finenesses of down to 20-40 µm can be achieved, depending on the milling time and the specific properties of the sample material.



2.1 Improper Usage

The sample quantity should not be less than 25% of the bowl volume.

The disc may otherwise damage the bowl.

The bowl, puck and lid must always be made of identical material.

3 Technical features

3.1 Construction

The housing of LM5000 is made of steel plate with powder coated RAL5005 paint.

Protective equipment

The milling chamber of the LM5000 is safely closed by an electrical safety switch.

Starting of the machine is possible only when:

- power is connected;
- air pressure is sufficient;
- the emergency switch is not activated;
- all parameters are given to the digital program of the machine;
- There is a bowl inside of the machine when using the automatic program;
- Hood is locked;

3.2 Technical data

Ambient temperature	5°C – 40°C
Atmospheric humidity	85% RH
Dimensions W x D x H (inclusive base plate)	1400 x 730 x 1460 mm (1900mm with hood open)
Max volume of milling cups	3500cc
Noise emission (without milling bowl)	70 dB(A)
Power supply	2200W
Rated power	400V ± 10% – 50/60Hz
Timer	5 sec – 99 min, timer HOLD function, in 1 sec steps (below 10 min), or 10 sec steps (above 10 min)
Weight	490 kg

4 Installation

4.1. Unpacking

Before the installation, carefully examine the delivery for possible damage or missing parts. Open the crate and take the machine out of the box. Check that the machine has not been visibly damaged during the transport.

Please keep the packing material for the duration of the guarantee period. In case of a complaint and return of the machine in unsuitable packing material, your guarantee claim will be lost.

Check that the mains cord is compatible with the local standard.

If any kind of damage occurred during transport, immediately make a complaint to the carrier. Any incorrect delivery or missing parts should be reported to the Supplier of authorized dealer.

4.2 Selecting the right place

When selecting the right place for the machine, please consider the following:

- Put the device on smooth, horizontal and stable place.
- Leave enough space beyond the device for normal air circulation, min. 200 mm at the back of the machine.
- Leave enough space around the device, that you will easy control and maintain it.
- Don’t use the device in surroundings, where there are fast temperature and humidity changes. Also avoid places exposed to direct sunlight and places nearby heating devices.
- Avoid places, where the possibility of shocks and vibrations exists.

Note: The machine should not be placed so, that it is difficult to pull out the cord plug from mains power

4.3 Connectiong the power cord

The correct voltage and frequency for the LM5000 are given on the name plate. Ensure that these values correspond to the available power supply system.

To avoid interference from noise, surges and spikes, a dedicated line is preferred. If no such line is available, avoid lines to which powerful electric motors, refrigerators and similar devices are connected.

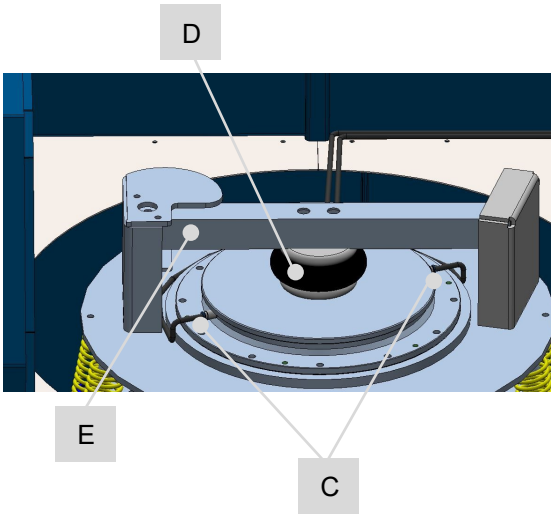
4.4 Environmental conditions

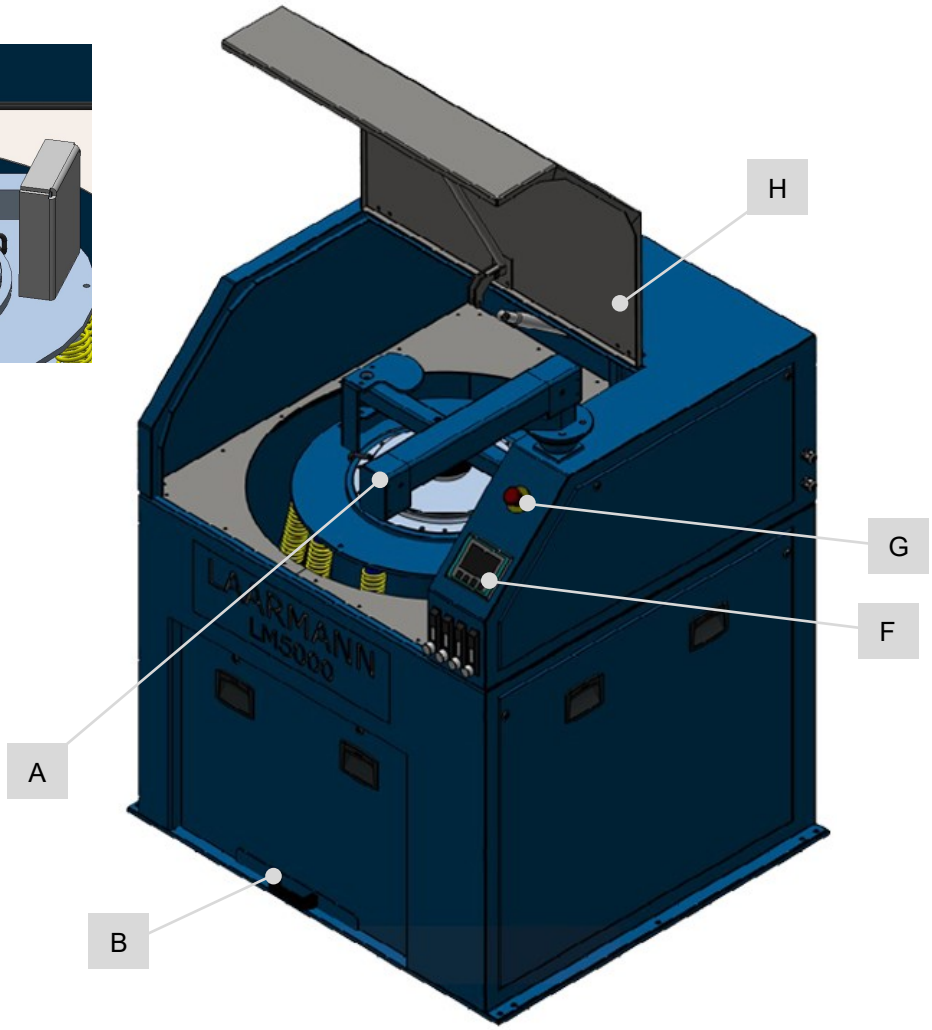
The machine has been built for operating in laboratory environment. Therefore the environmental conditions should be the following:

- Temperature from +5°C to +40°C
- Humidity up to 85% RH, non-condensing

5 Instructions for use

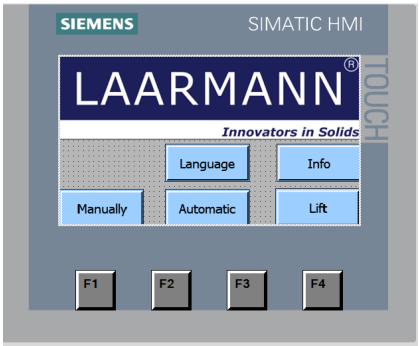
5.1 Overall view





Element	Description	Function
A	Lift	Used to place the heavy bowl and disc into the LM5000
B	Dust drawer	Collects any excessive dust
C	Air/Argon tube	Injects Air and Argon into the bowl
D	Air bag clamp	Holds the bowl into the designed postion by applying pressure.
E	Clamping block	Support component for clamping the bowl
F	Dust drawer	Collects any excessive dust
F	Control panel	Set grinding parameters and control the operation of the instrument
G	Emergency stop button	Will stop the machine in case of emergeny
H	Hood	Protective hood, Most be closed while running

5.2 Instructions for use

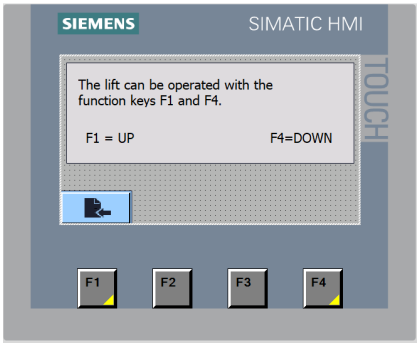


This is the starting screen upon startup.

Here you can select "**Manual Control**" for manual input. Hand control is usually chosen for short operations or testing parameters.

Select "**Automatic Control**" for custom automatic programs for specific applications with the given parameters
You can also have the controls in your own language, please contact LAARMANN for the options. Once bought your nations flag will appear next to the British flag and you can press it to switch languages. For contact information press **Info**

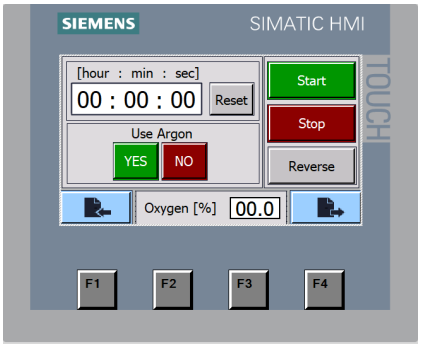
Press **lift** to operate the Lift



When in the Lift menu the Lift can be operated with the F1 and F4 keys used for transporting the disc

F1: move the lift up

F4: move the lift down



Manual control

For starting quick and experimentation the manual control menu is often used. On the left side there is an overview of the current time. When the start button is pressed the timer will start counting.

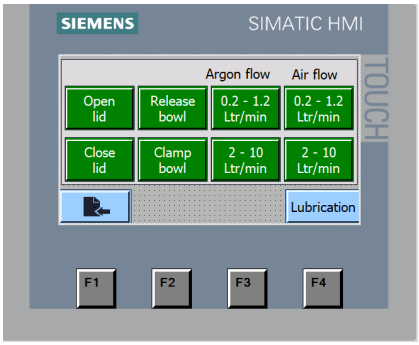
Before starting the machine, you need to clamp the bowl. Press the "**Clamp bowl**" button and the button will change colour (green). You can press **Reverse** while the machine is in motion to change the direction.

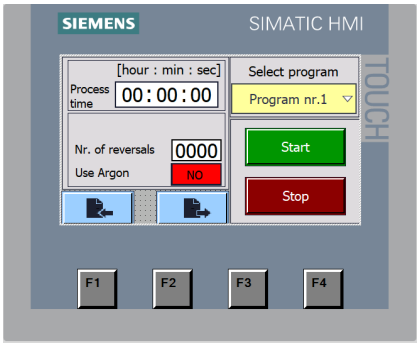
Press "**Start mill**" to start the machine. When you stop the machine by pressing "**Stop mill**" you must press "**Release Bowl**" to be able to remove the Bowl from the machine. **M** / **S** count the passed time, these number can't be adjusted If you press exit, you will go back to the start screen. The hand control is mostly used for system checks and short milling. For operational use please use the automatic program.

Press reset to reset the timer.

Reverse can be pressed to change the rotation direction of the pulversier ring mill

Go the next **chapter 5.3** for information about Argon

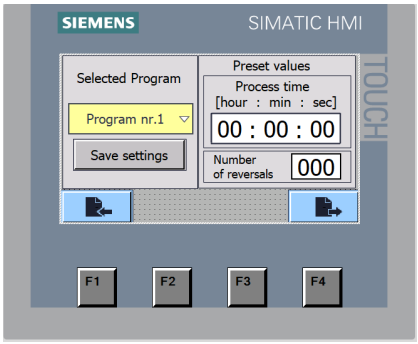




Automatic Control

Automatic control offers more customization of parameters to get the results that your sample requires

From the first menu a program can be selected with the dropdown menu. Press **Start** to begin the current selected program. An overview of the parameters can be seen when pressing the next page button.

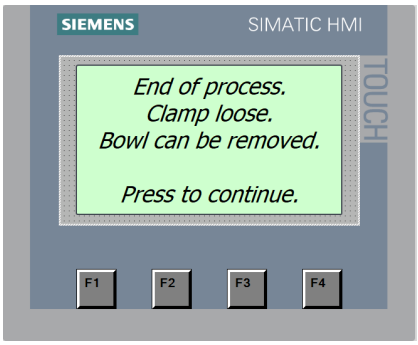


In the **Settings** submenu the time, number reversals (meaning the the ring mill will switch to the other direction) and the Process time can be adjusted. Press save settings to save the current selected program. You can adjust all the programs from this menu

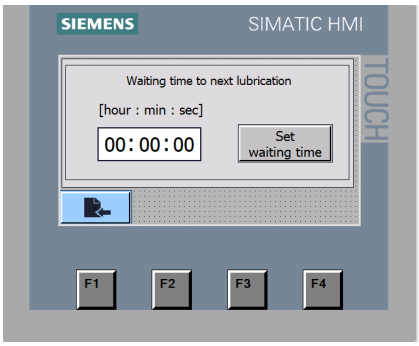
Press to back icon to return to the overview page

Press “start” to run the current selected program and press “stop” to stop the current program

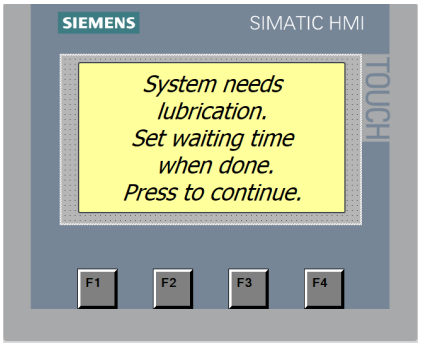
Go the next **chapter 5.3** for information about the Argon settings



When the automatic program is complete the bowl can now be safely removed if this message is shown



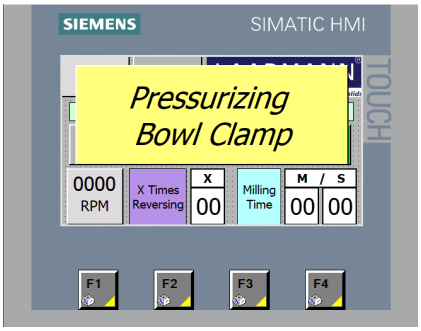
In the lubrication menu there is a time counter when the next lubrication needs to be done. the time is 72hours in total. The timer will go down when the machine is running. Press Set waiting time to set the timer back to 0



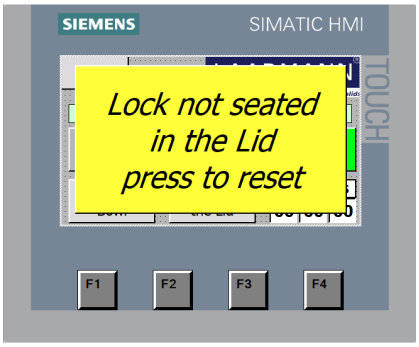
After 72 hours of running the machine this notification will come up. Navigate to manually and

then to lubricate and run the process

5.2 Errors and notifications



When this message appears the LM5000 is using the air pressure to clamp. the bowl no further action is needed

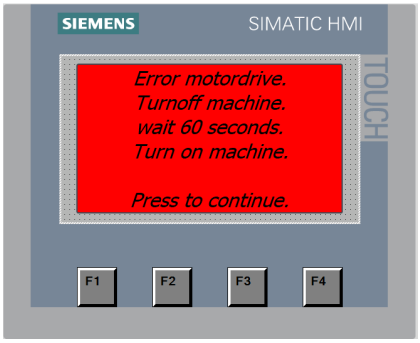


In case of this message, please close the hood an press “lock the Lid”.

If this message comes up when the lid is closed and you have pressed “lock the Lid” carefully check if you can open the hood or not. After verifying press to reset and check again.

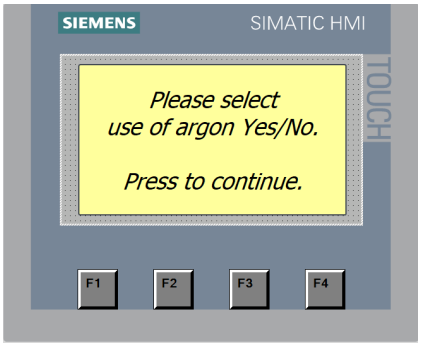
In case of this message, please check all the emergency stops and verify that the installation doors are correctly closed.

To release the emergency stop you need to turn it and it will come up. After verifying that all stops are checked press the message to continue.

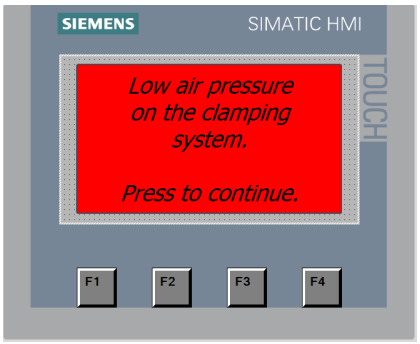


In case of this message please contact authorised personnel to check the motor of the machine. After visual inspection and ensured that no parts are either broken or damaged, contact an electrical engineer to verify the connections.

When everything is checked, run the machine in hand control without grinding media inside. If the machine works properly you can resume using it as normal. Should it still not work, please contact LAARMANN.



When the Argon option in inplemented and on or off is not selected this message will appear press the screen and select an option to continue

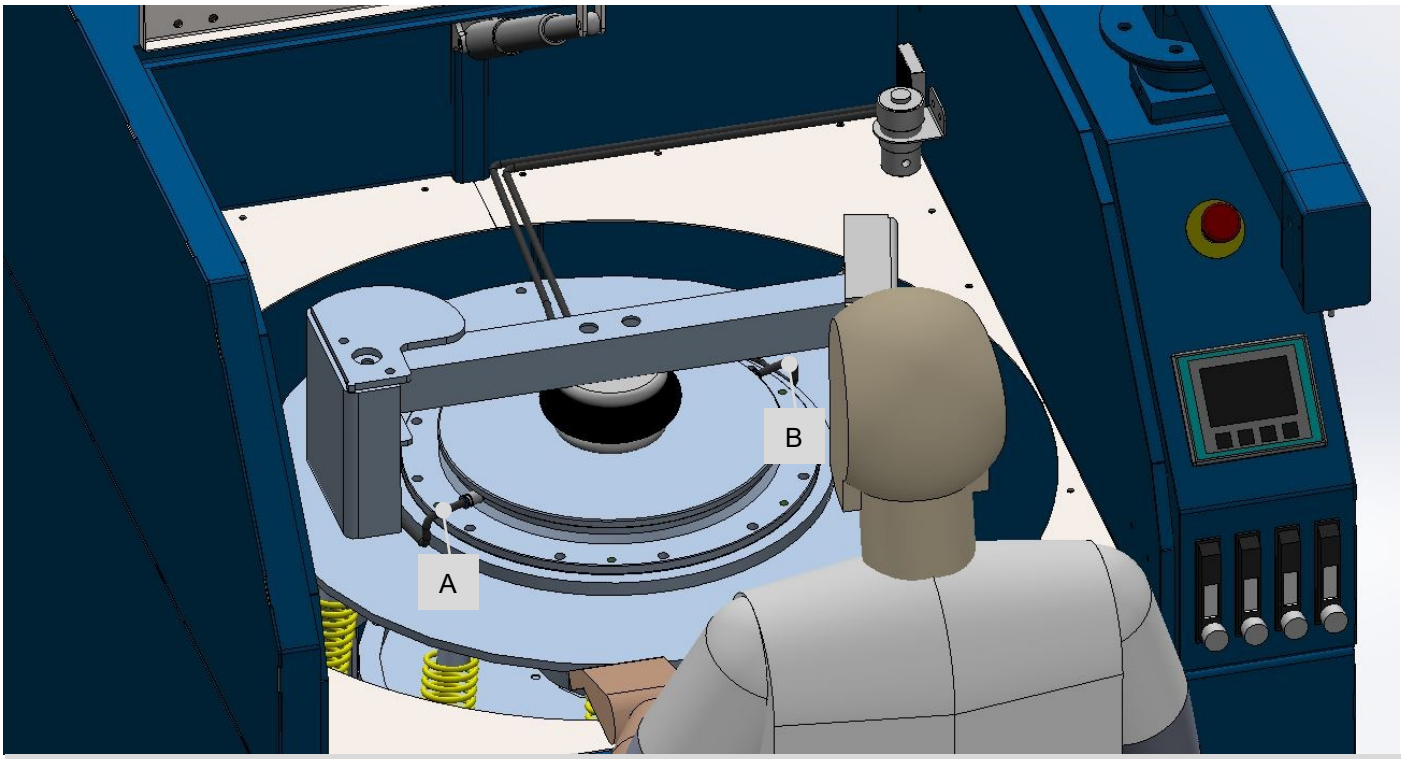


In case of this message, please check the pressure coming from the supply.

The pressure should be around 7 bar to ensure smooth operation. Also check if there is no air escaping within the system.

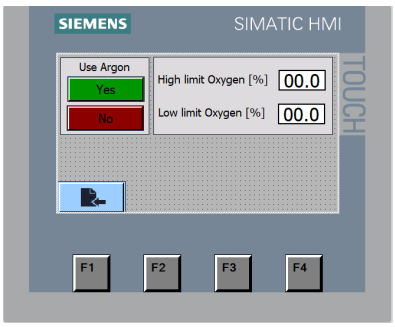
Open the side panel with the delivered keys to verify that the machine receives enough pressure.

5.4 Argon



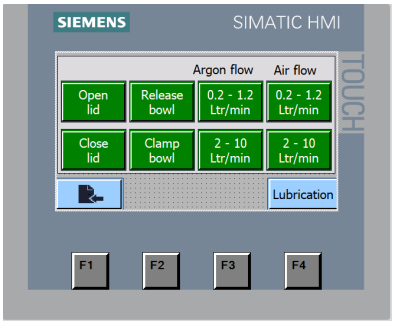
A and **B** = enterance of Argon and Air points

For some application with specific materials we can implement an option to apply Argon for safety and be enable the sampling flameable materials. Argon is an inert gas, meaning it does not readily react with other substances. It is used in machines to create an inert atmosphere, which is essential for certain processes. For example, in heat treatment processes like annealing, where controlled heating and cooling of materials are required, argon is used to prevent oxidation and maintain a stable environment.



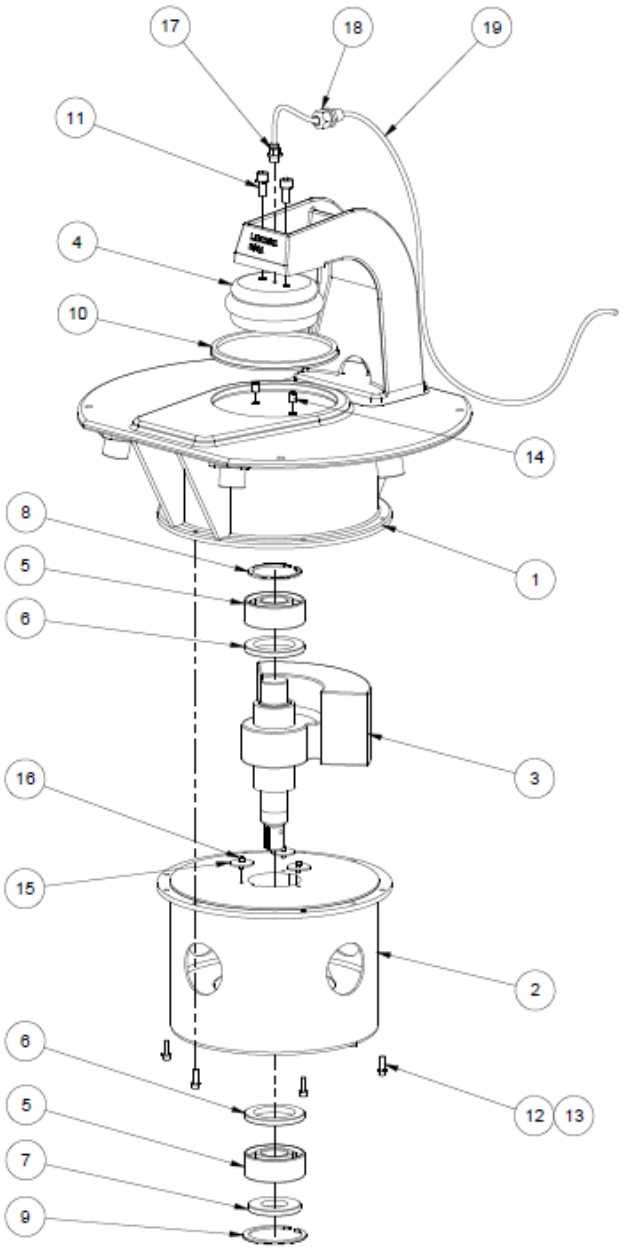
Percentages of oxygen can be entered here enter the value the is required for the material that is being processed the machine won't start running until the oxygen percentages are achieved.

While running Argon will be applied to keep the oxygen levels accurate

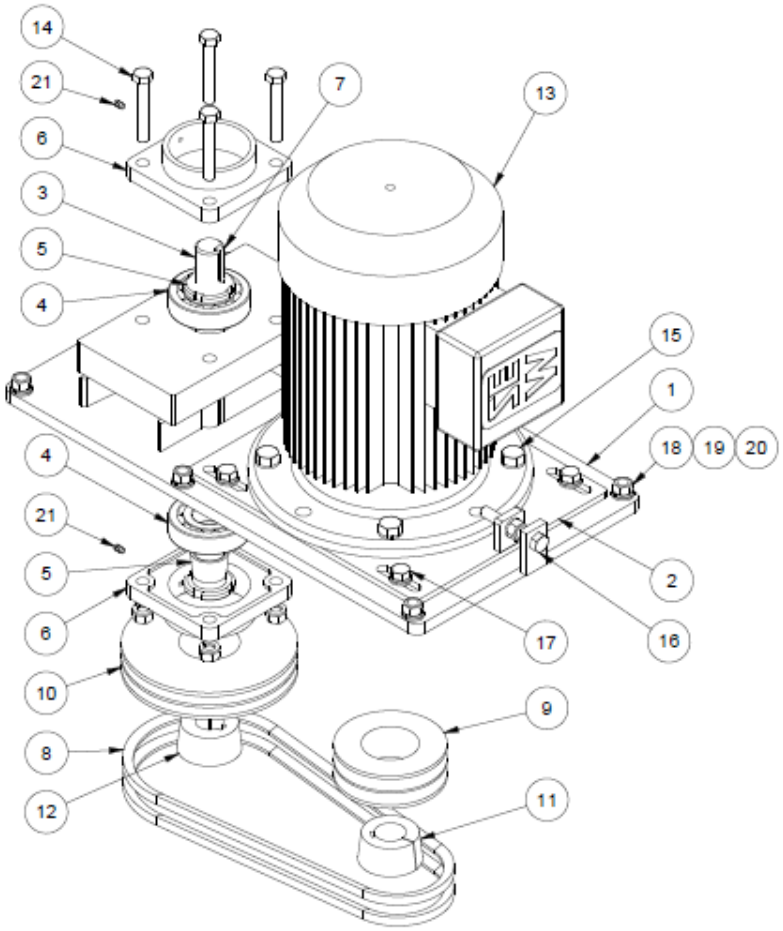


In the manual program you can apply the air flow and argon flow manually for testing

6 Spart part overview



Item	Part no 220-240V	Part no 380-415V	Description	Qty
1	611040	611040	Enclosure	1
2	612000	612000	Transformer	1
3	604059	604059	Contactor	1
4	604252	604250	Overload relay	1
5	605813	605813	Timer	1
6	605911	605911	Hour run meter	1
7	605007	605007	Start switch body	1
8	605008	605008	Stop button (Muchroom head operator)	1
9	340064	340064	Solenoid valve 50/60Hz	1
10	616200	616200	Air pressure switch	1
11	340001	340001	Air clamp bleed control	1
12	340003	340003	Gauge	1
13	340002	340002	Filter regulator	1
14	605009	605009	Start switch actuator	1
15	605010	605010	Stop switch actuator	1
16	340024	340024	Air fitting elbow	1
17	340027	340027	Straight connector	2
18	340040	340040	Special Tee fitting	1
19	340048	340048	Tee Plug	1
20	340096	340096	Swivel elbow	2
21	605814	605814	Timer mounting bracket	4
22	609500	609500	Cable gland 16mm	2
23	609514	609514	Cable gland 25mm	2
24	609521	609521	Cable gland 12mm	2
25	652011	652011	Cable	1
26	652006	652006	Wiring harness	1
27	340039	340039	Air bleed plug	12
28	340035	340035	Bulkhead Connector – 6mm	12
29	340041	340041	Tee	1
30	340026	340026	Straight Connector	1
31	340012	340012	6mm Air hose	2
32	340182	340182	4mm Air hose	2
33	607004	607004	3 Phase plug & lead	1



item	Part no 50 Hz 220-415V	PART No*: 60 Hz 254-480V	PART No*: 60 Hz 220V	Description	Quanitity
1	115002	115002	115002	Drive plate	1
2	115013	115013	115013	Motor mounting plate	1
3	115049	115049	115049	Pulley shaft	1
4	221005	221005	221005	Bearing	2
5	221006	221006	221006	Adapter sleeve	2
6	221019	221019	221019	Bearing housing	2
7	115076	115076	115076	Key (set of 3)	1
8	225003	225011	225011	Vee belt	2
9	225004	225012	225012	Driving pulley	1
10	225006	225006	225006	Driven pulley	1
11	225005	225010	225010	Taperlock bush, driving pulley	1
12	225007	225007	225007	Taperlock bush, driven pulley	1
13	614007	614007	614211	Electric Motor	1
14	521003	521003	521003	Bearing housing bolt set	1
15	511002	511002	511002	Motor mount bolt set	1
16	521004	521004	521004	Adjustment bolt set	1
17	511023	511023	511023	Drive plate bolt set	1
18	512005	512005	512005	Nut	6
19	512615	512615	512615	Spring washer	6
20	512605	512605	512605	Flat washer	6
21	350543	350543	350543	Connector straight	2

7 Working Instructions

7.1 General

The LM5000 is a high performance product. It is used mainly in the processing minerals.

7.2 Starting the milling process

- Set the parameters as described before
- Open the lid of the machine and put in the sample on top of the puck in the bowl
- Close the machine lid and press start on the display.

The milling process can only be started, when the hood is closed, the power is connected and when the air pressure is high enough.

Do not open the hood during the milling process, also not by force.

Do not mill inflammable or explosive samples! For these kind of samples, please contact LAARMANN for special features.

Please note that the properties and therefore the dangerous nature of your sample, can change during the milling process.

7.3 Stopping the milling process

- Pressing stop on the display
- When the milling time elapses, the milling process is automatically ended. The display is reset to the last set value.

When removing and opening the bowl, always wear protective gloves. There is a danger of burning the hands.

8 Troubleshooting

Problem	Explanation / Solution
Machine is not starting	Check the mains power supply. Check the air pressure Call the emergency knob and release it. Check if you have the correct settings for running the program.
Display doesn't work.	Call authorized service.

Should the problem not resolve, please contact LAARMANN.

9 Maintenance

LM5000 needs to be greased first time after 20 hours.

Later intervals each 40 Hours.

LAARMANN advises to use LAARMANN GREASE. Similar can be graphite free, high temperature grease.

9.1 Wear

The milling tools can become worn out, depending on the frequency of the milling operation and the milled material. The milling bowl, lid and puck should be regularly checked for wear and replaced, if necessary.

9.2 Cleaning

Before cleaning the machine, unplug the mains cord from wall socket.

Use only a soft cloth moistened with water. Cleaning agents and solvents should not be used, not for cleaning the milling tools either.

Do not clean the LM5000 under running water. Danger to life through electric shock.

LAARMANN®

Innovators in Solids

CE

Pulveriser

Type LM5000

Product	Pulveriser
Model	LM5000
Power supply	400V/50Hz

This declaration of conformity confirms compliance of the above mentioned equipment to the relevant sections of the following European Directives:

2006/42/EG European machine guideline

2014/35/EU Low Voltage Guidelines

ISO 12100, ISO 294-2, ISO 13850 Safety guidelines

BGV A3 General electrical facitilies

2014/30/EU Electromagnetic Compatibility Directive (EMC)

NEN-EN-IEC 61000-6-2:2019 Immunity

EN 61010-1 Safety of Machinery – Electrical Equipment of Machines

WARNING:

This equipment is required to be operated strictly in accordance with the instructions given in the operating manual supplied with the product. All supply voltages and frequencies as stated on the rating plate must be used. External power cables and connectors must be supplied by LAARMANN. Any additional equipment used must be of a type approved by LAARMANN.

This conformity certificate will lose its validity in case of:

- Usage of unlicensed spares
- Usage of unlicensed accessories
- Any self made modifications of the machine

LAARMANN GROUP B.V. Roermond, June 2015

Steven Adang