

OPERATIONS MANUAL
VORTEX POPCORN™ MACHINE
ROBOPOP® MARK 3 AND ROBOPOP® MARK 3 DF

2014

1. DESCRIPTION AND OPERATION OF POPCORN MACHINE

1.1. POPCORN MACHINE DESIGNATION

Vortex Popcorn™ machine Robopop® is a fully automatic popcorn machine which pops kernels on the basis of the revolutionary technology. The corn evenly distributes over the parabolic bottom of the machine internal chamber, constant corn rotation around the chamber axis and simultaneous agitation takes place in the chamber, which in its turn provide their maximum fast and uniform heating. Owing to the artificially created vortex air stream inside the chamber, popcorn is immediately withdrawn from the hot zone. That cordially improves popcorn taste and quality.

1.2. TECHNICAL SPECIFICATIONS

Specifications	Mark 3	Mark 3 DF
Output	34 kg per hour	
Corn hopper volume	25 L	2 x 15L
Salt hopper volume	2 L	
Starting current	16 A	
The maximum load on all phases	42 A	
Nominal voltage	3 phases 380-415 V	(3 phases 208-240 V*)
Nominal power	10 kW	
Frequency	50 Hz (60 Hz*)	
Power consumption	5 kW/h	
Overall dimensions		
length	1300 mm	
width	830 mm	
height	2050 mm	
Weight	292 kg	295kg

* - For North American market Vortex Popcorn™ machine Robopop® is provided with the next technical parameters: 208-240 V and 60 Hz.

The machine should be operated at ambient air temperatures from +5°C to +40°C and relative humidity not exceeding 50% at 40°C. The above sea level should not exceed 1000 m (EN60204-1).

The popcorn machine protection class IP22 (EN60204-1). The popcorn machine is to be used indoors with forced ventilation provided.

The machine should be connected to the mains by qualified electrical staff only. A three-phase five-core circuit with an earth wire should be used for connection.

1.3. DELIVERY SET

The popcorn machine delivery set includes:

Vortex Popcorn™ machine Robopop® Mark 3 or Robopop® Mark 3DF	1 piece
Cart for popcorn	1 piece
Plastic bags for popcorn	50 pcs
Network Cable 5m with plug 3P + N + E, 32A	1 piece
Cable outlet 3P + N + E, 32A	1 piece
Spare parts set (see appendix B)	
Passport and operating manual	1 piece
User guide to set up the popcorn machine	1 piece

1.4. ARRANGEMENT AND PRINCIPLE OF OPERATION



Prior to shipment to the customer all popcorn machines are tested, so a small amount of corn and oil may remain in the machine.

Popcorn machine consists of the following main elements:

- 1 – popcorn machine with an internal chamber where corn is actually popped;
- 2 – 25 l corn dispenser with a screw conveyor;
- 3 – control unit;
- 4 – Stand the machine is installed on. The stand for popcorn machine is equipped with a heat chamber for the coconut oil heating;
- 5 – sifter – a welded perforated stainless steel drum for sifting unopened and damaged corn; in this sifter the popcorn is also salted and oiled;
- 6 – collector – a stainless casing for popcorn temporary receiving when a cart with popcorn is replaced;
- 7 – separator, which uses directed airflow to separate unopened corn from husk;
- 8 – waste hopper;
- 9 – unopened corn hopper. Undamaged unopened corn can be reused;
- 10 – screw salt dispenser;
- 11 – droplet-type nozzle for oil feeding;
- 12 – cart for popcorn with a replaceable plastic bag (not shown in the drawing);
- 13 – oil supply pump;
- 14 – oil container (not included in the delivery set);
- 15 – observation port;

16 – hatch for the internal chamber cleaning.

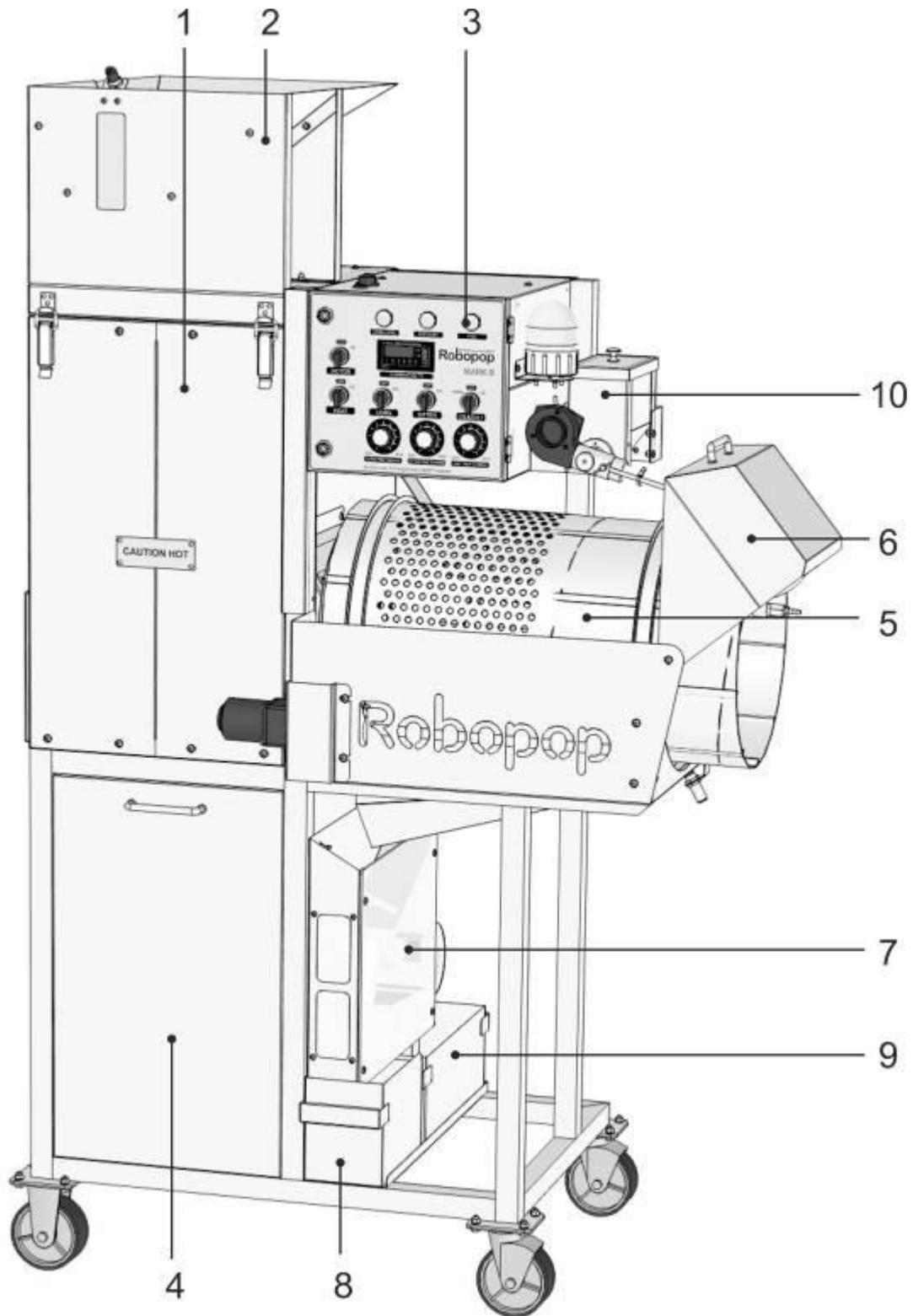


Fig. 1. Popcorn machine general view (front view)

Corn from dispenser 2 is fed to preheated up to 210-230 degrees chamber 2. The chamber performs continuous heating and closed circulation of hot air. The corn in the chamber is heated and bursts (pops). As soon as the popcorn pops, the airflow immediately removes it from the chamber into sifter 5. Together with popcorn, unopened corn and husk also move to the sifter, where they are immediately sifted out.

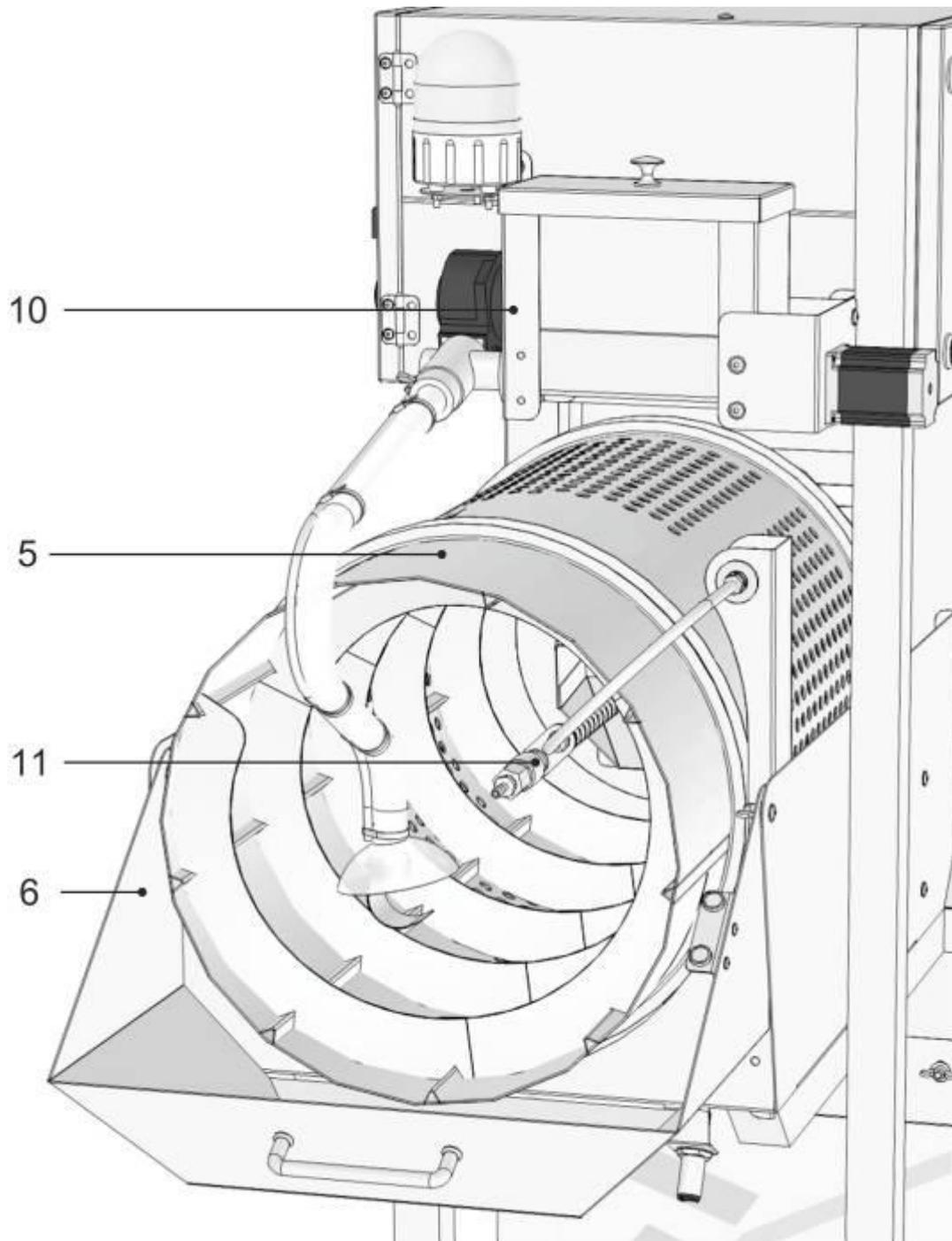


Fig. 2. Popcorn machine general view (right-side view)

Moving along the sifter, the popcorn is mixed, oiled and salted. Oil is fed into the popcorn from the droplet-type nozzle 10. Oil is fed by pump 13 from container 14 in the lower part of stand 4. Salt is fed from hopper 10 and sprayed over the popcorn by the fan.

Separator 7 locates underneath the sifter, which separates good unopened corn from husk and damaged corn. Husks go to hopper 8, while good unopened corns go to hopper 9. In order to reduce the percentage of unopened corns, those can be filled in dispenser 2 and reused.

Stand 4 is a welded structure fitted with wheels for free moving of the machine.

Popcorn moves from the sifter to the moving cart with a plastic bag. Two carts use is

recommended, that accelerates the popcorn bag replacement to a new one. Collector 6 is used for temporary, up to 30 seconds, popcorn flow holding. This time is sufficient for the bag changing without the machine stopping.

Observation port 15 is used for visual control over the popping process. Hatch 16 in the lower part of the machine is used for cleaning the internal chamber from corn dust and husks.

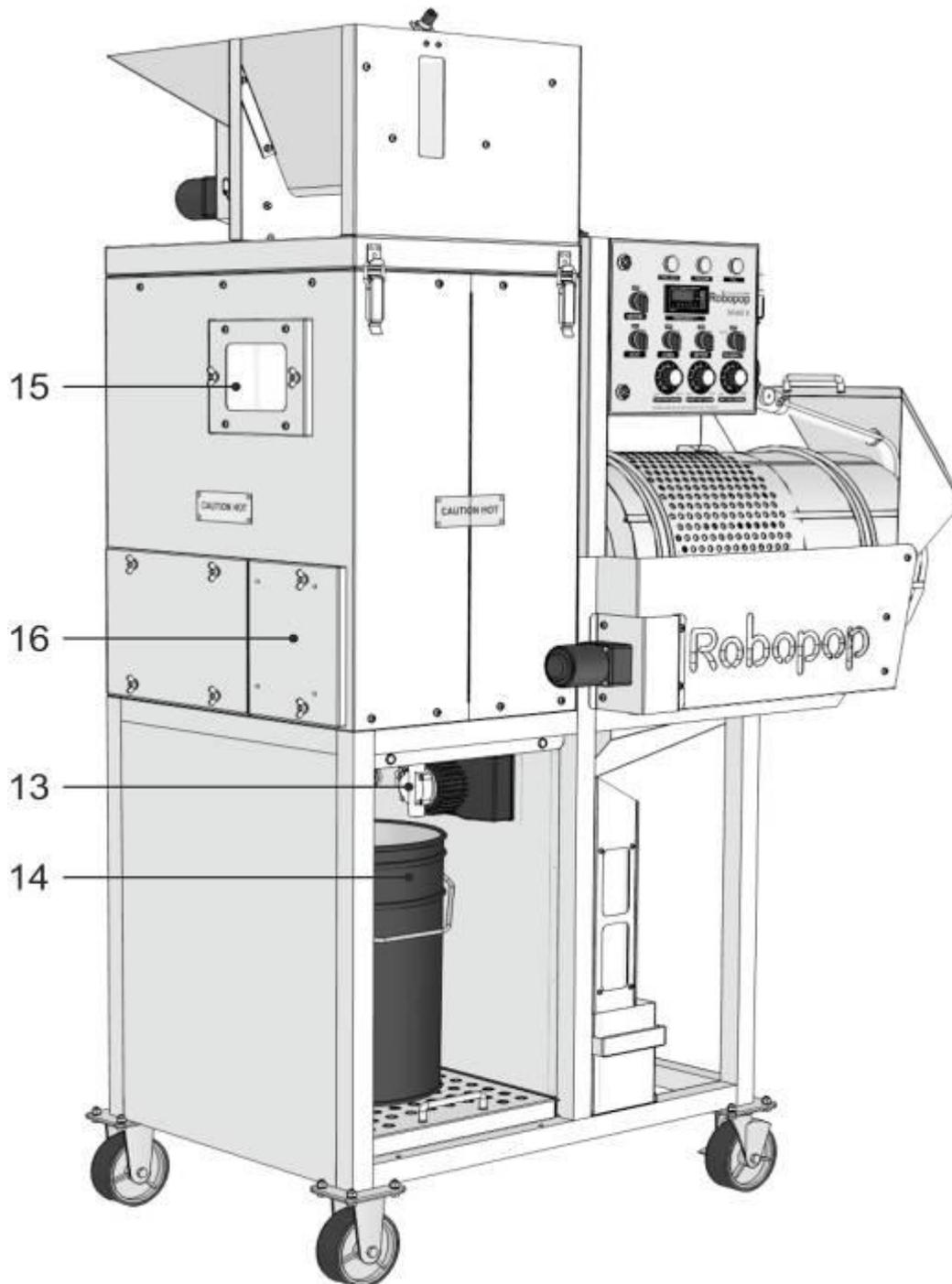


Fig. 3. Popcorn machine general view (left-side view)

2. INTENDED USE

2.1. SAFETY REQUIREMENTS

Never turn the machine off using <<POWER>> toggle when it is running. This may result in fire and breakdown of the machine!

The machine should be turned off by pressing <<TURN OFF>> button. The machine will switch to the cooling mode, which takes about 10-15 minutes. Only after the turbine was cooled and stopped, <<POWER>> button may be turned off.

You should daily open hatch 16 in the lower part of the machine and clean chaff and debris from the chamber. It is convenient to do this with a vacuum cleaner. Failing to do this on a regular basis may result in fire!



WARNING! Many machine components become hot during operation and may cause burn injury!

2.2. PLACEMENT REQUIREMENTS

In a view of the equipment specialties we recommend to provide the machine with purge ventilation. 1000 m³/hour is recommended level of purge ventilation for Vortex Popcorn™ machine Robopop® Mark 3 and Mark 3 DF.

STRICTLY PROHIBITED!

- TOUCHING THE MOVING PARTS OF THE RUNNING MACHINE!
- WASHING THE ELECTRICAL PARTS AND CONTROL UNIT WITH WATER! ONLY WIPING WITH A WET CLOTH IS ALLOWED!
- DISASSEMBLING THE MACHINE OR REMOVING SEPARATE COMPONENTS WITHOUT ISOLATING MACHINE FROM THE MAINS!
- MODIFYING THE MACHINE DESIGN!
- USING THE MACHINE FOR POPPING ANY GRAIN OTHER THAN CORN!

ATTENTION!

CAREFULLY READ THE OPERATING MANUAL BEFORE THE MACHINE USING!

ONLY TRAINED PERSONNEL MAY BE ADMITTED TO USING THE POPCORN MACHINE!

DO NOT OPERATE THE MACHINE IF THERE IS SOME POPCORN INSIDE THE CHAMBER! IT SHOULD BE REMOVED FIRST.

PROTECTORS AND SYSTEM LOCKUPS

“Emergency stop” button on the control panel completely shuts off the machine at any time.



WARNING! Use the button “Emergency stop” only in emergency cases threatening life



WARNING! In case of emergent electricity shut off during the operation, the chamber can be clogged up with popcorn. In order to resume the operation it will be necessary to take the lid off the chamber and clean it from popcorn and kernels.

In the electrical network before the solid state relays that control the heating elements (each approx. 11A at 230V), is set to 25A contactor (KM2 in the diagram), which is connected to the emergency thermostat sensor which is installed in the camera. In the case of the solid-state relay failure or the automation systems failure and uncontrolled heaters heating the emergency thermostat will be triggered, it will disable the heating elements, preventing their further overheating.

An automatic switch 32 A (chart Q1) located at the power cable entry will shut the machine off in the case of short circuit.

If the chamber is overfilled with corn, there is an optic sensor inside the chamber which will interrupt the corn supply. It will prevent the chamber overfilling and clogging.



CAUTION! The bowl can be overfilled in case of wrongly chosen operating parameters: low temperature, etc., belt drive breakage, motor collapse, one of the heaters failure.

The sifter drum is not rigidly connected with draw roller. Thus, if a slight effort is applied to it, it will turn and stay in place.

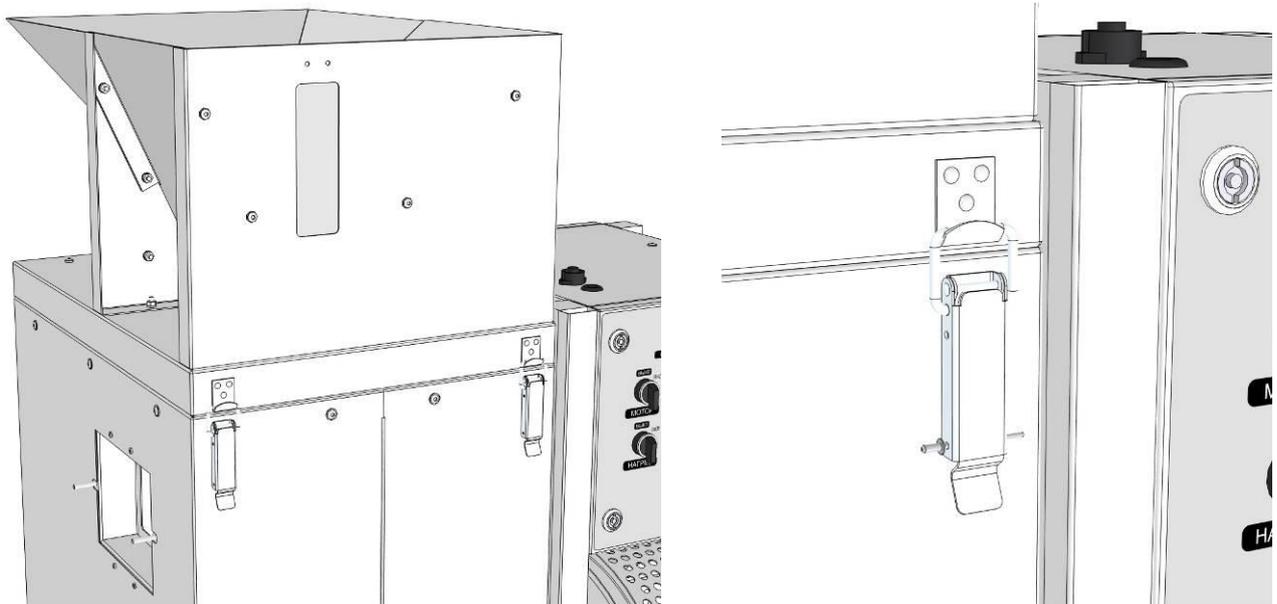
The machine has the photo sensor which will shut off the corn input if the popcorn cart is overfilled. The machine also has the photo sensor in the corn dispenser, which will shut off the salt and oil input of if there is no corn.

There is a block system in the machine which will not let to turn off the power if its temperature is more than 180°C. The temperature in the chamber should be lower than the indicated one. “Emergency stop” button will cut off power, and it should be used only in cases of emergency.

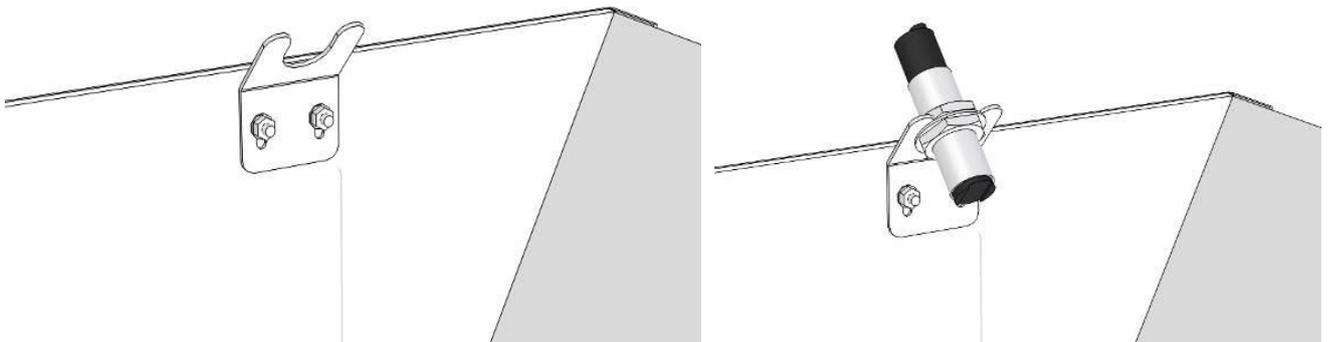
The base on which the machine is mounted has two wheels with a mechanical brake which excludes the possibility of spontaneous movement

2.3. PREPARING FOR OPERATION

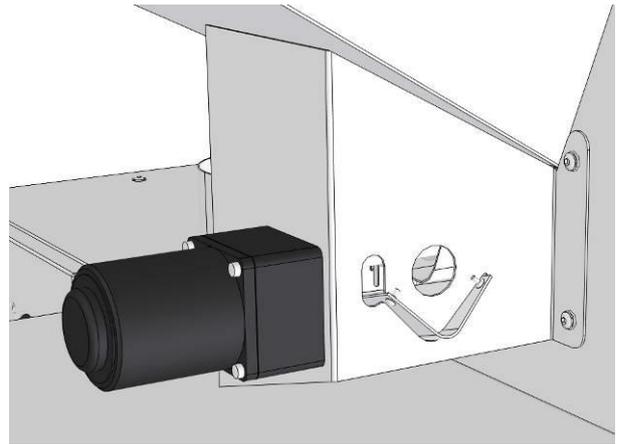
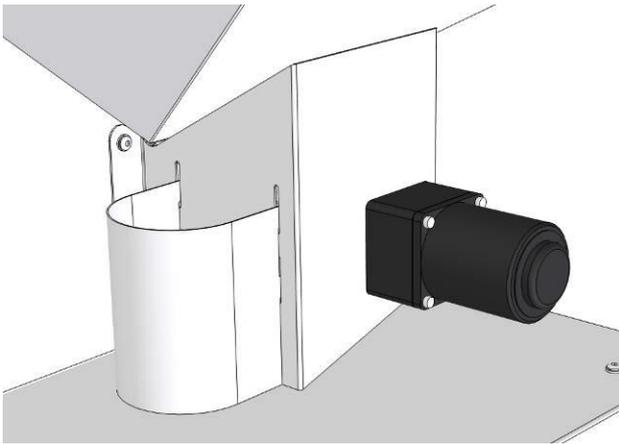
1. Carefully unpack the machine, check the completeness of delivery and remove the protective film from the metal parts.
2. Install the cover with the corn dispenser onto the machine. The dispenser peephole should be turned to the operator. Fasten the latches and fix them with pins.



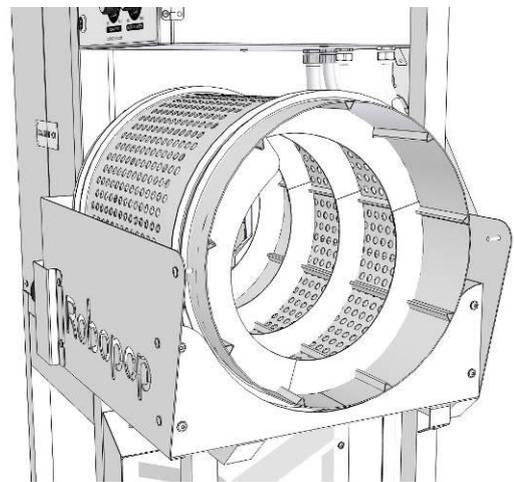
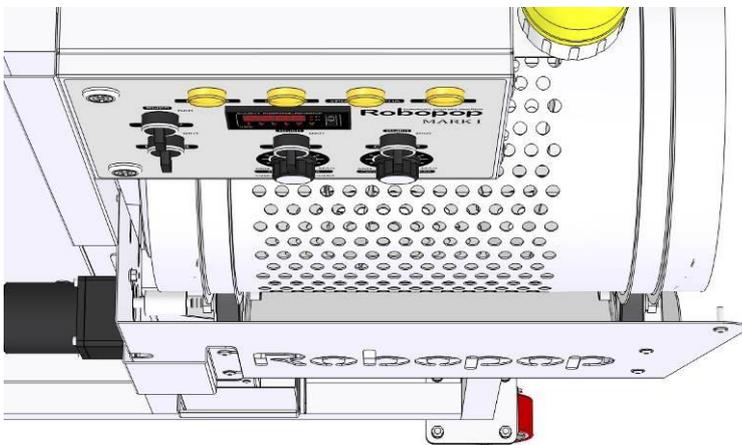
3. Install the bracket under the corn photo sensor at the front side of the dispenser. Install the photo sensor.



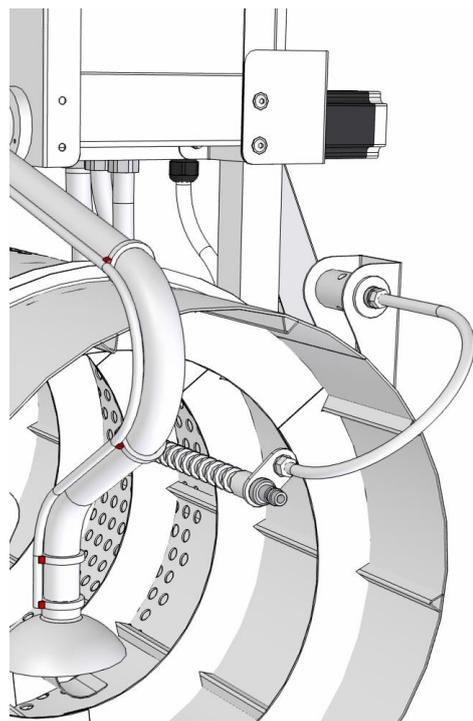
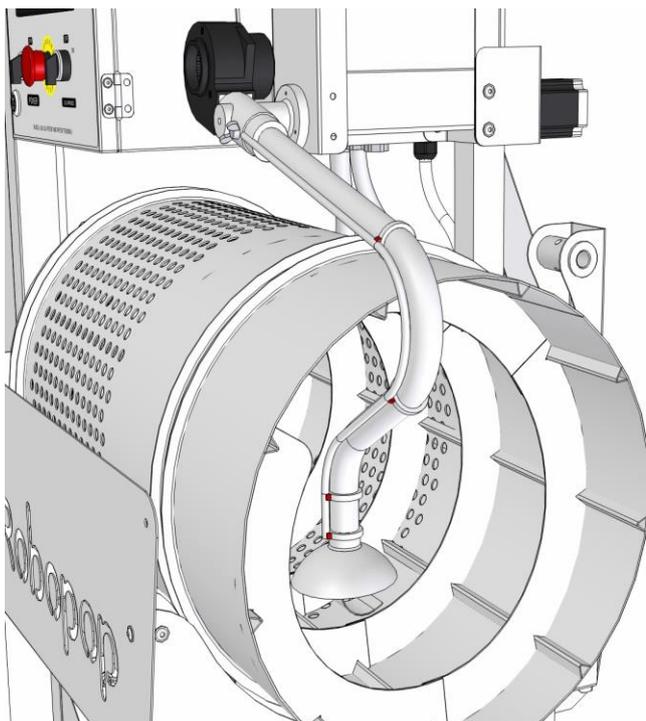
4. Connect the connector of the dispenser gear motor to the control unit.
5. Install the protective shroud and the guide groove.



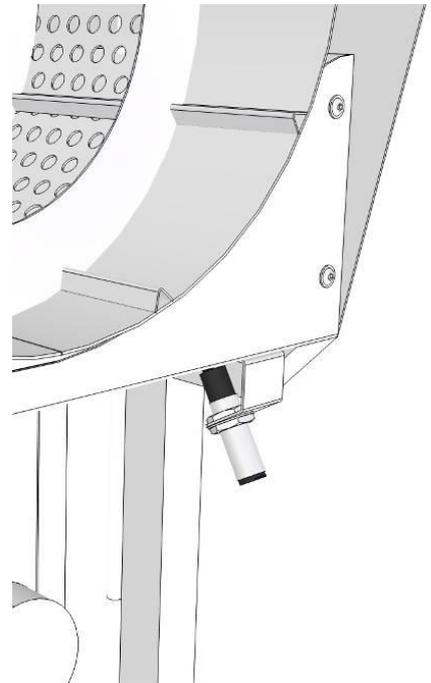
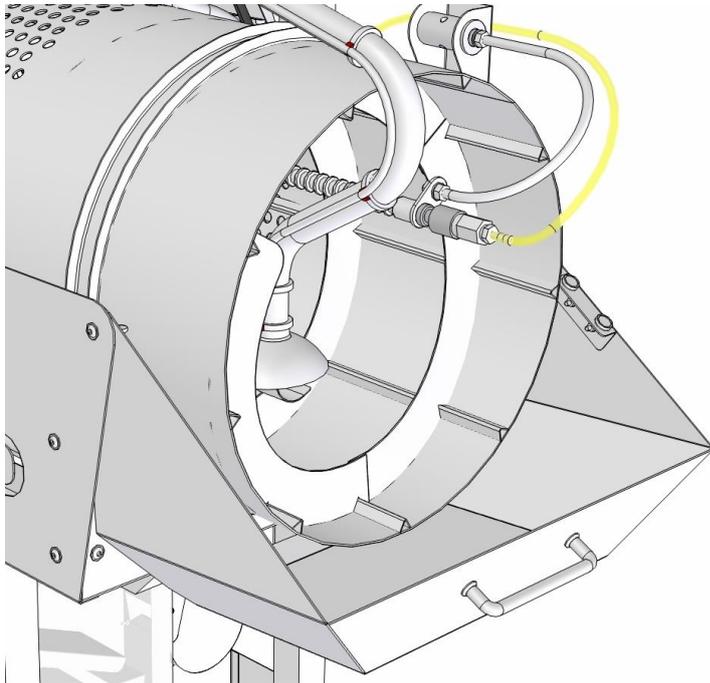
6. Install the sifter. The drive rollers should get into the slots of the sifter guides. Turn the sifter by the hand. It should rotate freely without touching the machine metal parts.



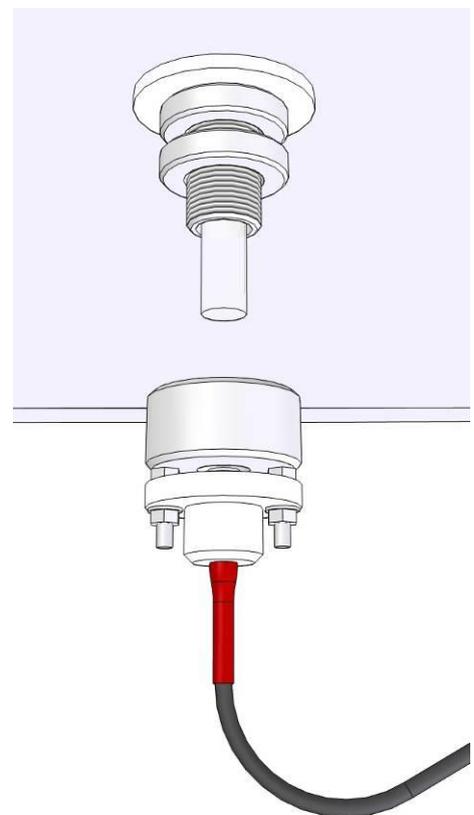
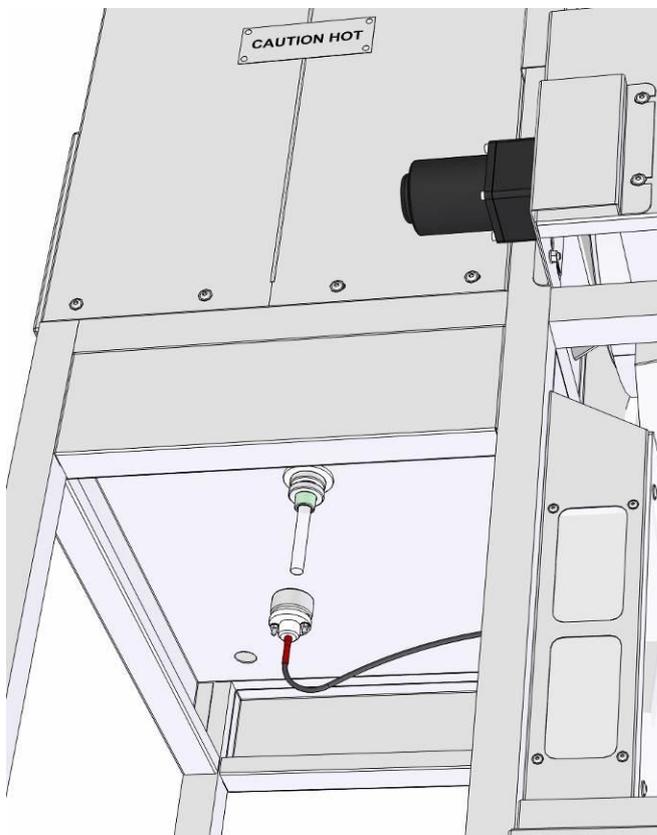
7. Install the salt dispenser pipe.



8. Install the oil nozzle and connect it to the oil tube and then to the socket which is located under the main motor.
9. Install the collector. Fix it with butterfly-nuts.



10. Install the cart overflow sensor on the bracket under the sifter.

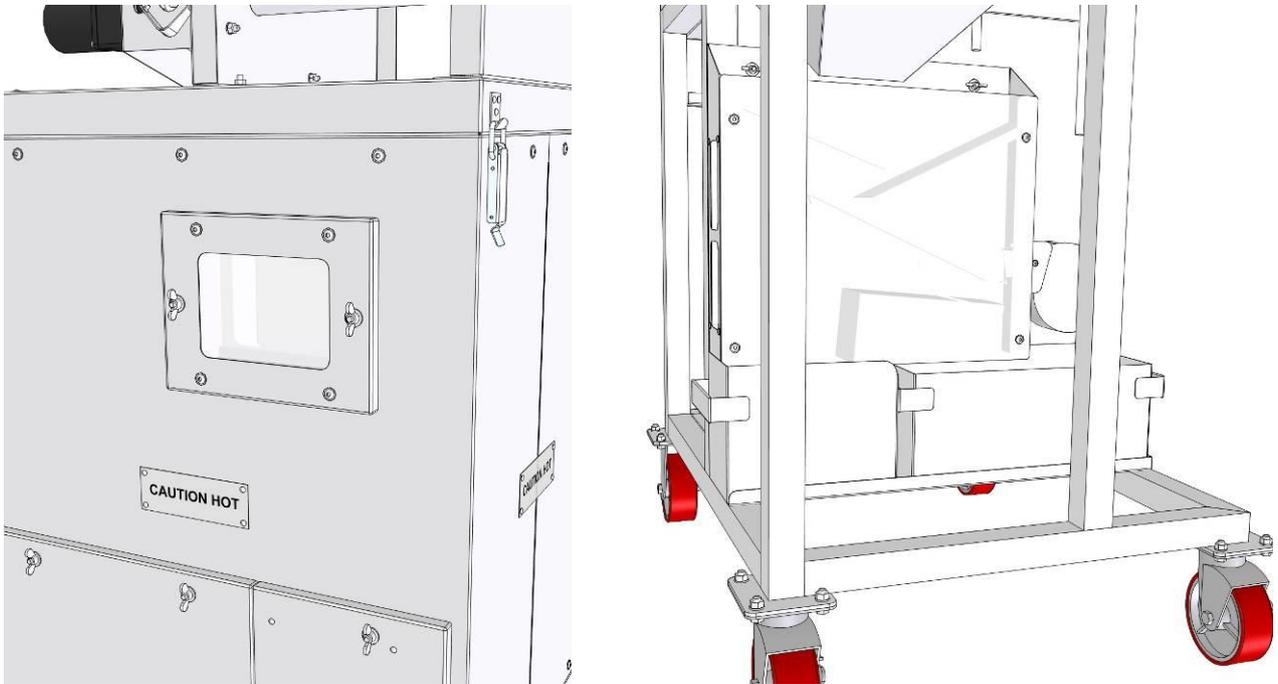


11. Carefully unpack the light conductor (quartz rod) and the chamber overload sensor. Insert the light conductor into the hole at the bottom of the machine chamber. Screw

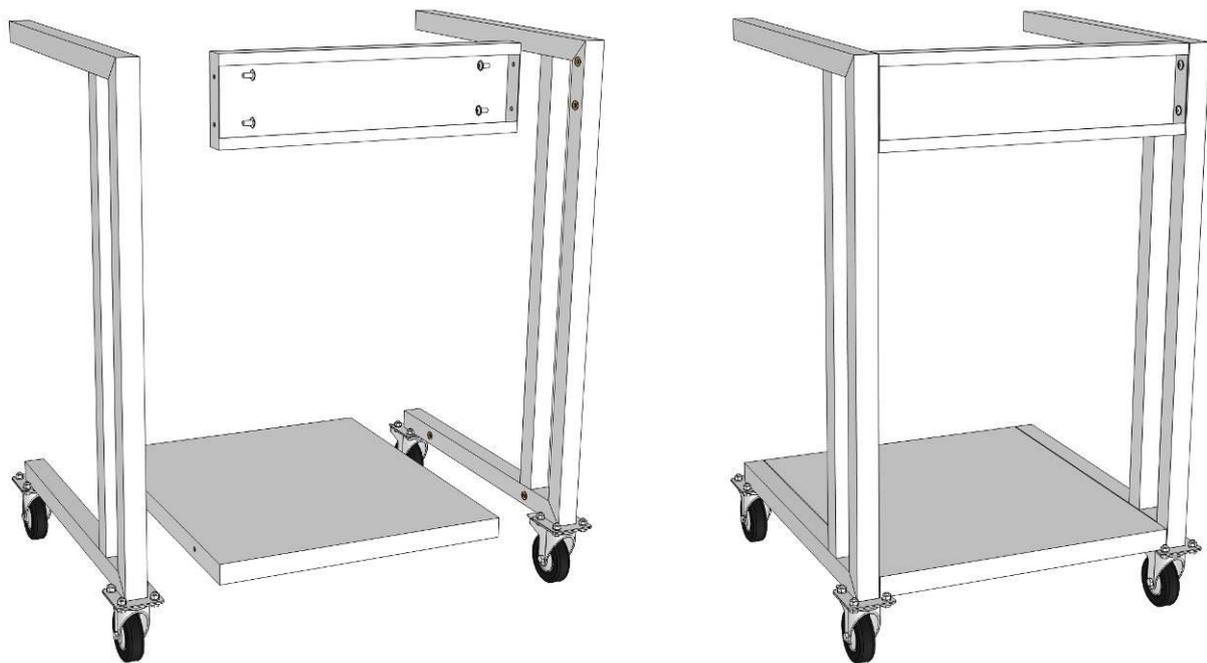
on the locknut, and then the chamber overload sensor. The light conductor should protrude by 5mm inside the machine bowl. For controlling the sensor protrusion height, insert your hand into the chamber through the observation port. Connect the overload sensor to the power socket.

12. Carefully unpack the door. Install and fix it by butterfly-nuts.

13. Install the trays for corn and husks under the separator.



14. Assemble the cart for popcorn.

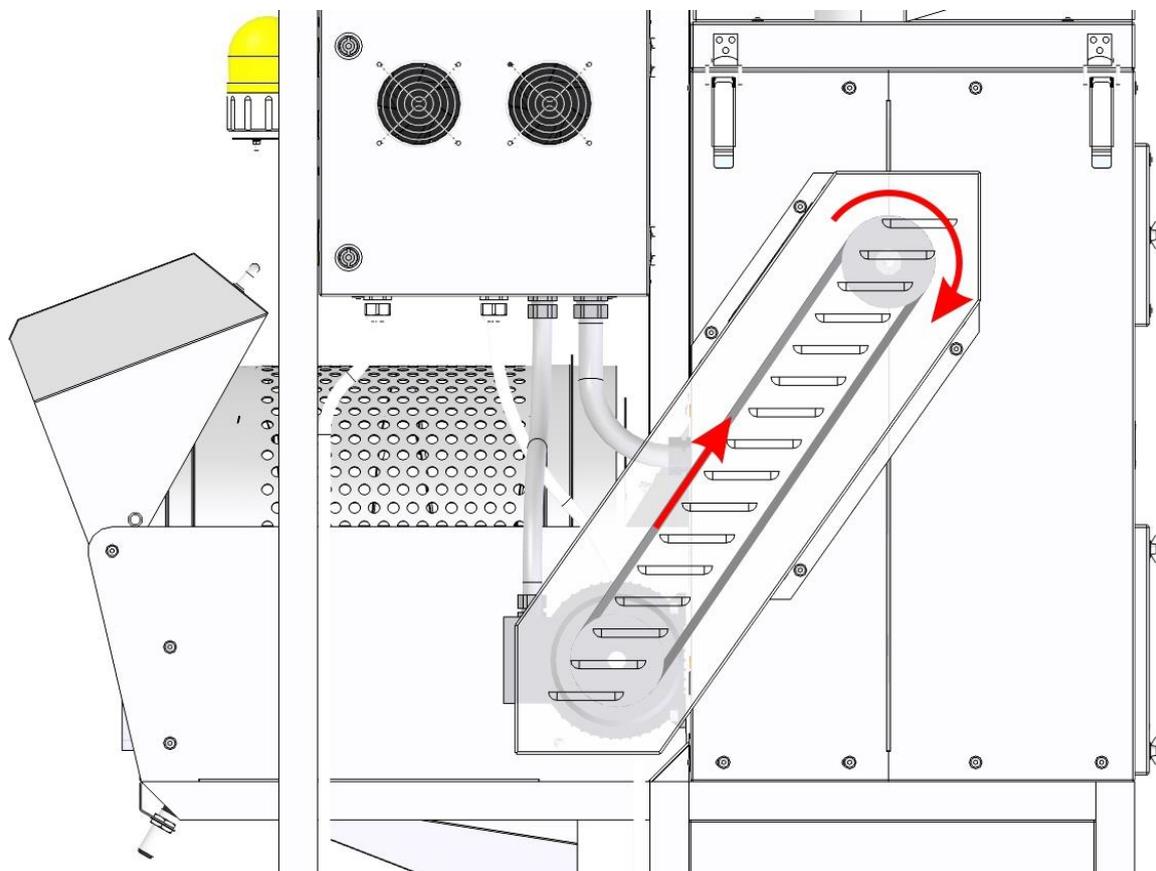


2.4. CONNECTING TO MAINS

The machine should be connected to the mains by qualified electrical staff only. A three-phase five-core circuit with an earth wire should be used for connection.

2.5. MACHINE FIRST START

1. Turn on the machine by «POWER» toggle.
2. Wait LCD display loadings. Press on the screen <<BUTTERFLY>> button then press <<START>>.
3. The electric motor will be launched. Check the electric motor shaft rotation direction. The shaft should rotate clockwise. If not, change the two phases in the wall plug. For this purpose you will need to switch off the machine, having pressed on the display <<TURN OFF>> button.



4. If the electric motor shaft rotates in the necessary direction wait while the chamber is warming up. It will take 10-15 minutes. A specific smell may occur during the first start. This is normal.
5. The sifter will automatically start rotation when the temperature in the chamber reach 180 °C. The sifter should rotate freely, without touching the metal parts of the machine. The separator turbine will be also launched.
6. Test the separator by dropping several grains in it. The grains should go to the grain tray without stopping on the angle plates.
7. After the set temperature reaching, the corn supply will start automatically. Fill 3-4 kg

of grain into the dispenser. The first popcorn will fly out of the chamber in about 2 minutes.

8. Lift the collector and fix it in the upper position. Roll up the cart with a popcorn bag.
9. The oil and salt supply will be started automatically in 2 minutes.



ATTENTION! THE FIRST CORN LOAD IS USED FOR THE CHAMBER CLEANING AND THIS CORN IS NOT SUITABLE FOR CONSUMPTION.

2.6. PROCEDURE

Prior to operation, fill corn into hopper 2. When cooking salted popcorn with oil, you should also fill salt in hopper 10 and place an oil container (the oil should be in liquid homogeneous condition) into the stand. Dip the oil-intake pipe into the oil container. Prepare carts with bags for popcorn.

1. Do not turn the machine off the mains, even for the night. The machine should only be turned off the mains for its transportation or in case of a several days operation break.

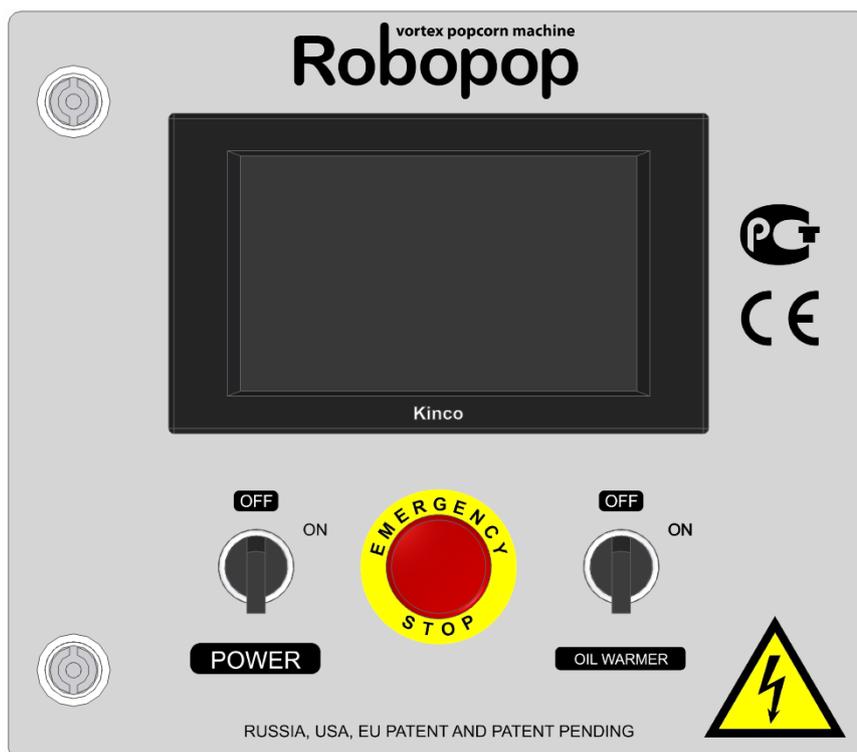


Рис. 4 The machine control panel

2. Some sorts of oil melt at about 24C (76 F), so at normal room temperature it will be solid, so if you use that type of oil <<OIL WARMER>> toggle should be constantly in <<on>> position. The stand has the heat elements which warm up that stand and prevent oil from congelation. If the machine operates with oil which has room temperature melting point the oil-duct and droplet-type nozzle should be put in the “warm” stand overnight as well. Otherwise the oil will congeal and the machine will be inoperable.

3. Prior the machine launching, be sure that <<POWER>> toggle is <<on>>, the corn and salt hoppers are filled, and the oil container is placed in the niche with the oil-intake pipe

dipped in it. The sifter (drum) <<collector>> should be lifted, and the cart with the popcorn bag is prepared.



FOR BUTTERFLY POPCORN, THE MAXIMUM CORN FEEDING SHOULD NOT EXCEED 5-SPEED.
FOR POPCORN MUSHROOM THE MAX FEED RATE CAN BE SET

To preserve the good popcorn quality, different temperature requires for each feed rate. Below there are recommended temperature settings, the figures may differ (+/-5 *C) in a few of big variety of corn.



200*C and below – 3 feed rate and lower
205-215*C - 4-5 feed rate
220-235*C – 6-7 feed rate

The corn has a small amount of moisture which it transfers to heat elements, after that the reduction of temperature takes place. The time of the set temperature reaching mainly depends on the feed rate and takes from 5 to 15 minutes (voltage and corn quality also affect that figure)

So the popcorn quality may be estimated only after the delay time expiration.

4. Having performed the operations on the paragraph 3, you should select on the main screen (fig. 5) the required popcorn type and press <<START>> (fig. 6). The rest will be done automatically; the machine will warm up and the first popcorn fly out from the chamber in 12-15 minutes.

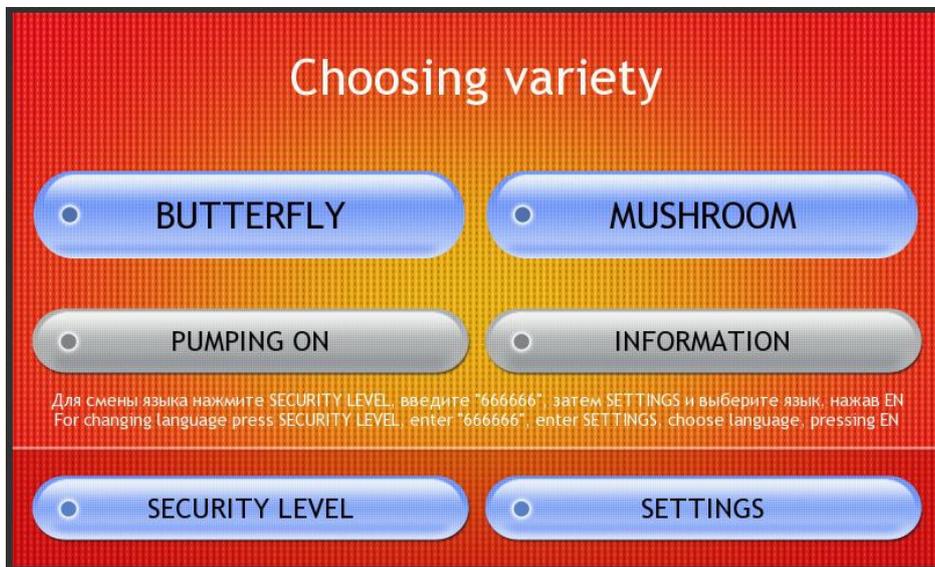


Fig. 5. Main screen

5. If the machine starts beeping and the green lamp on the control unit blinks, you should read from the screen which action is required. The machine will inform you whether the corn is coming to the end or the popcorn hopper is full.

6. If the popcorn hopper is full, you should without the machine stopping rotate down the collector by this the popcorn will be gathering in the collector instead of the hopper.

Within 20-30 seconds when the popcorn will be collected in the collector, you should take the bag with the popcorn out of the cart and put an empty bag in it.

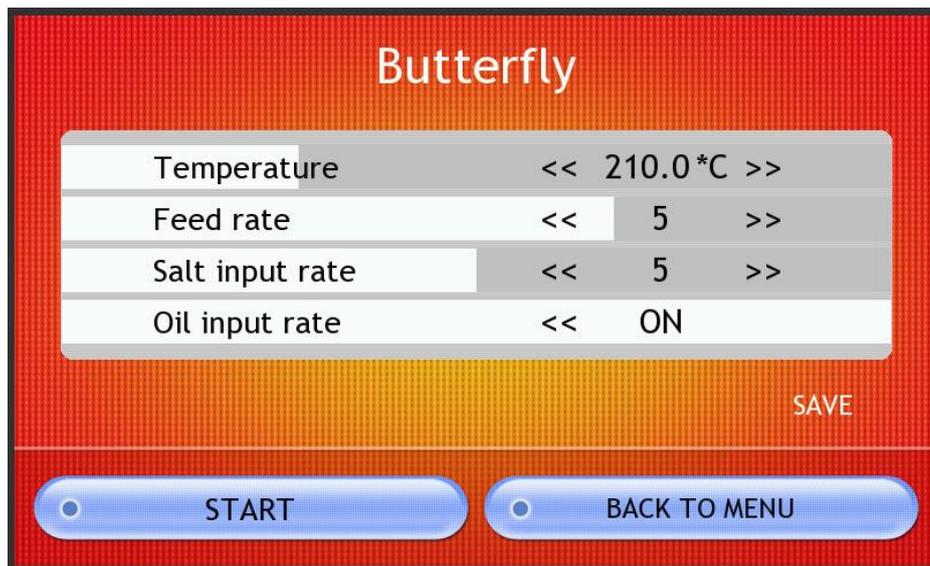


Fig. 6. Recipe screen

When the cart with an empty bag is replaced, you should lift the collector and the popcorn will run to the bag again.

7. The machine only controls the corn level in the upper hopper and the popcorn level in the receiving hopper (the cart). The operator should control the salt and oil level.

Salt may be added to the hopper without stopping the machine. The oil container may also be replaced <<on the run>>, quickly taking the oil-intake pipe out of an emptied container and immediately dipping it into a full one. The salt hopper capacity is enough for 2 hours of the machine operation; the oil consumption is at 6-8 liters per hour, depending on the mode.

8. If you need to briefly (for up to 30 minutes) stop the machine, press button <<PAUSE>> (fig. 7). The machine will stop popcorn production, but it will maintain the temperature and air circulation inside the machine.

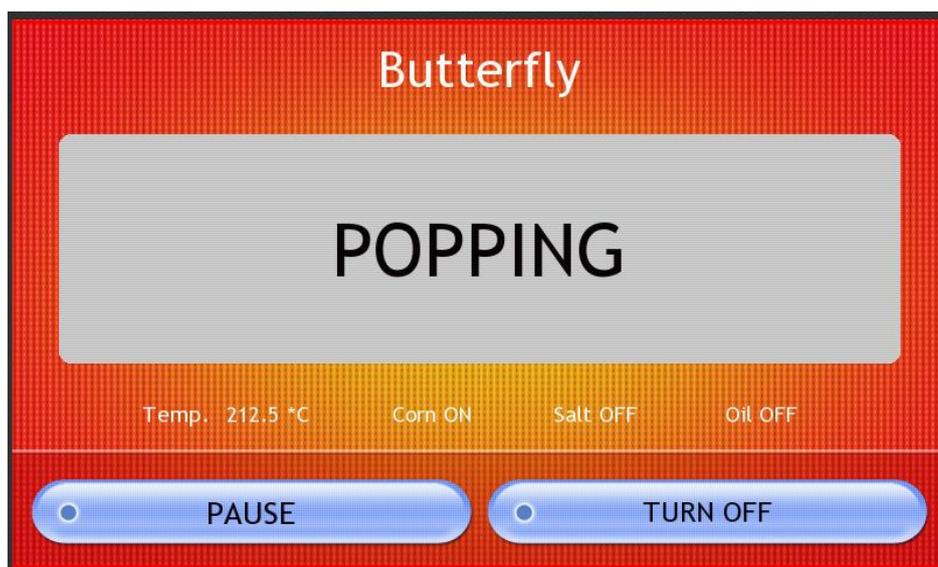


Fig. 7. Cooking mode

9. During the machine operation, the left (nearest small) part of the lower hopper-separator accumulates waste (husks, burnt corn etc.). Those should be removed as the hopper is filled.

Separation corn quality from the waste strongly depends on the corn brand. There are recommendations to different corn brands.

For Preferred Mushroom Jumbo corn, in most cases separation is useless since the quality of waste is very low and composes 4-6% (the most part of them are burnt, cracked and half-opened corn). To reuse such corn is prohibited. It may lead to the chamber blockage and the machine breakdown.

For the most butterfly corn brands, if the separator is set correctly, it is possible to reduce the waste percentage to less than 1%. Before the corn reuse it is necessary to make a visual assessment of the waste composition and in case of open grains fallen there to remove them. It shall take 15-30 seconds. There is no need in the corn sorting.

The rules should be observed while the corn separation:

- The corn may be separated only once. In the case of corn second separation and subsequent popping the main corn part will burn and crack. This grain is better to throw away.

Do not mix the waste of different corn brands as popcorn quality will be reduced in that case. The butterfly corn can be reused only with the butterfly corn, the same about the mushroom corn.

That corn should be reused, for 2 hours.

10. If the machine operates with oil and salt additions, the sifter (drum) should be daily removed and washed with warm water. The machine should be cleaned from oil leaks and dirt as well.

We recommend using liquid vegetable oils, which will not solidify at room temperature. Canola, sunflower, corn oils, their blends, especially RoboOil (the blend of coconut and canola) are the best choices for RoboPop machines. These oils are always available at the popcorn market.

If you use such oils you will not have to partially take the machine apart every night and put in back in place every morning in your worries about solidified oil in the tubes, oil dispenser and the pump condition and whether your personnel remembers to put the tubes away in the right place for the night.

11. If the main motor is running and the turbine inside the body does not rotate or rotates with insufficient speed (this can be heard), which indicates about the belt break or slack tension, then you should immediately stop the machine by pressing <<TURN OFF>> screen button.

12. If the machine internal chamber caught fire during the operation (this is possible if the machine is not cleaned or incorrectly turned off), the machine should be unplugged by pulling the mains cord out of the socket and only after that fire-fighting measures should be undertaken.

During the machine work, separator 7 separates husks from unopened corns. Hopper 8 accumulates waste (husks, burnt corn etc.), during the process the waste in the hopper should be periodically thrown out. Hopper 9 accumulates unopened corn. That corn should be reused, for 2 hours.

The oil pump has manual oil feed level regulation, the oil pump locates on stand 4.

2.7. MACHINE PROGRAMMING

For more information about popcorn machines Robopop Mark 3 and Robopop Mark 3

DF programming, see the user guide popcorn machine settings

2.8. OIL SUPPLY ADJUSTMENT

Oil flow regulator locates directly at the oil pump (item 3, Fig. 8). The small potentiometer (see Fig. 8) which allows to regulate the oil flow from 0% to 100% locates on the oil pump body.

100% regulator value corresponds to the real oil supply 5-5.5 kg per hour.

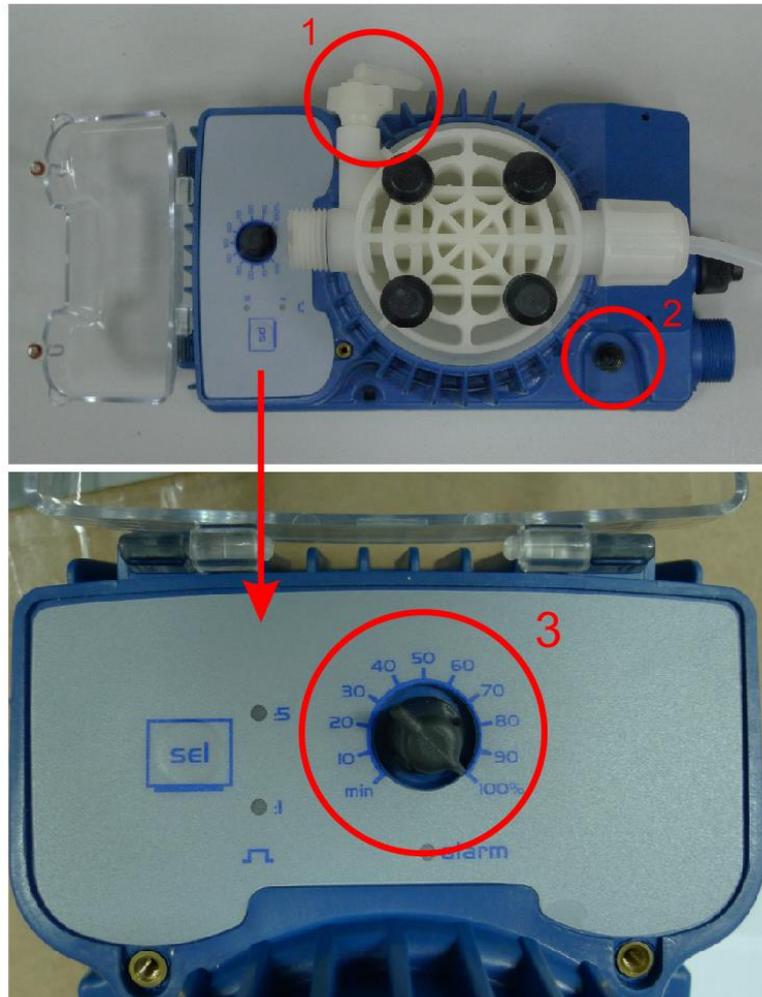


Fig. 8. Oil supply adjustment

The switch item 2 also located on the pump housing. To ensure that the pump work properly and get “ON”, “OFF” signal from the main controller, that switch should be in “ON” position.

There is a special valve on the pump housing for oil pumping item 1. For more information concerning oil pumping see section 3.7.

2.9. QUARTZ LIGHT CONDUCTOR AND OPTICAL SENSOR INSTALLIATION

Vortex Popcorn™ machine Robopop has an automatic system of corn shutdown in the case of the chamber overflow. That system enables to prevent the chamber blocking from

corn and popcorn and as consequence smoking of the chamber.

The overfill protection system consists of several elements:

1 – an backlight camera – the source of light

2 – an optical sensor – the light detector;

3 – the quartz rod (light conductor) – send the flow of light from the chamber to the sensor;

4 – the twilight switch (locates in the control unit) – get the signal from the optical sensor.

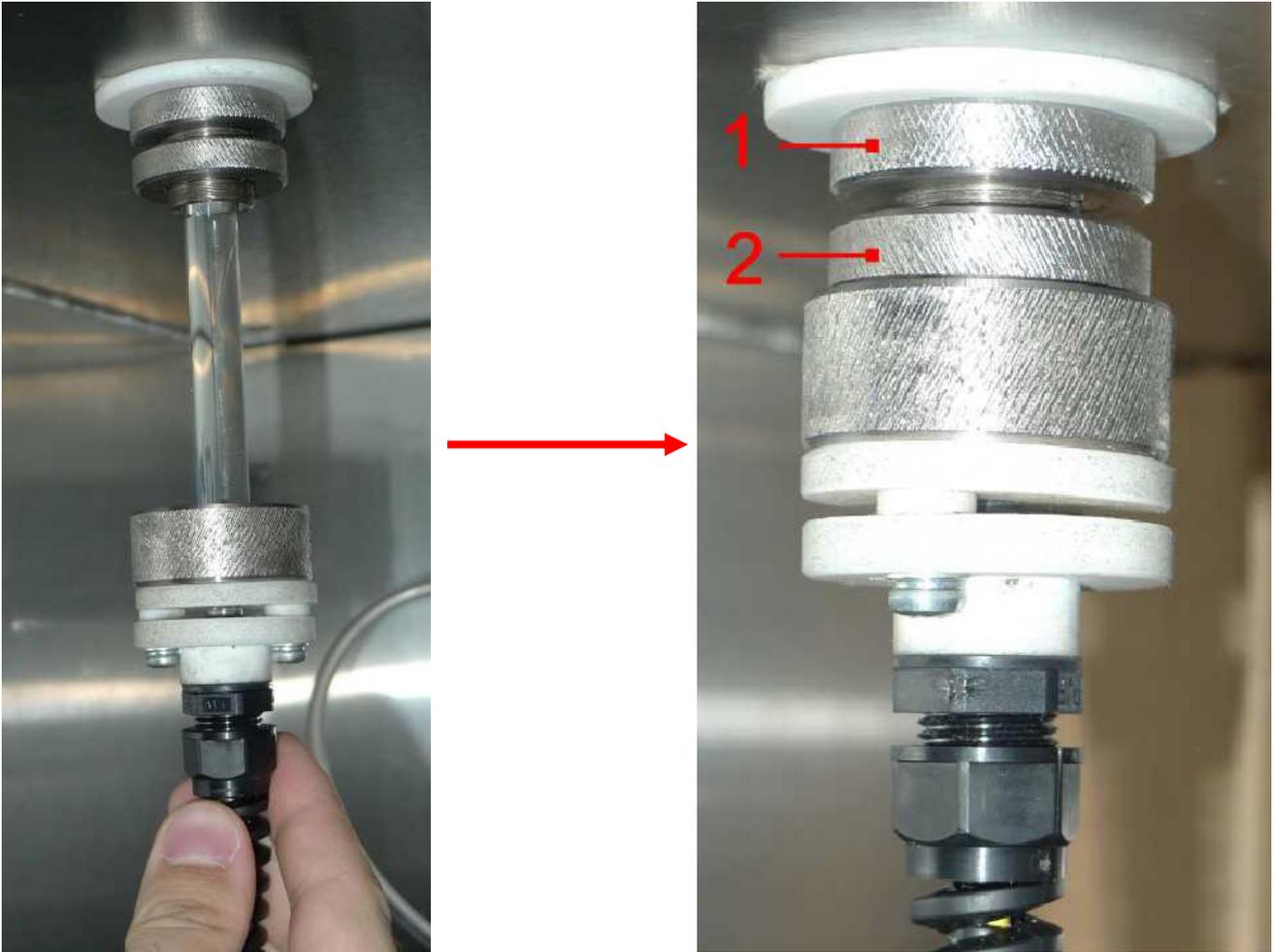


Fig. 9 Quartz rod(light conductor) and optical sensor installation



Attention! Quartz rod and the optical sensor wrong installation may lead to the chamber corn clogging and subsequent smoke formation.

In order to install the quartz light conductor is necessary:

1 – insert the rod in the sensor body. The sensor body has a silicone seal, so the rod should be installed with a small effort.

The rod upper end is spherical, and it should be installed in the chamber. The lower end of the rod - is flat, so it should be installed in the sensor housing.

2 - Firmly tighten up nut 1 and screw nut 2 on the tube before the road sensor

installation.



Attention! The distance between the nuts 1 and 2 should not be less than 5 mm.

3 - Carefully install the sensor with the rod in the steel tube and tighten the sensor to the nut. Additionally tighten the nut, in order to prevent spontaneous unscrewing the sensor from vibration.

4 - Connect the sensor to the connector on the body of the chamber. The connector is located on the top of the far right corner of the chamber.

5 – Check the rod protrusion in the chamber, it should not be more than 5 mm. This can be done through the observation port, took it off beforehand, and grope protruding rod in the chamber center.

2.10. optical sensor sensitivity setting

In order the chamber overload automatic protection system works correctly, the optical sensor sensitivity should be properly set. :

1 - Open the control unit and find the twilight switch SOU-1 (see fig. 10).

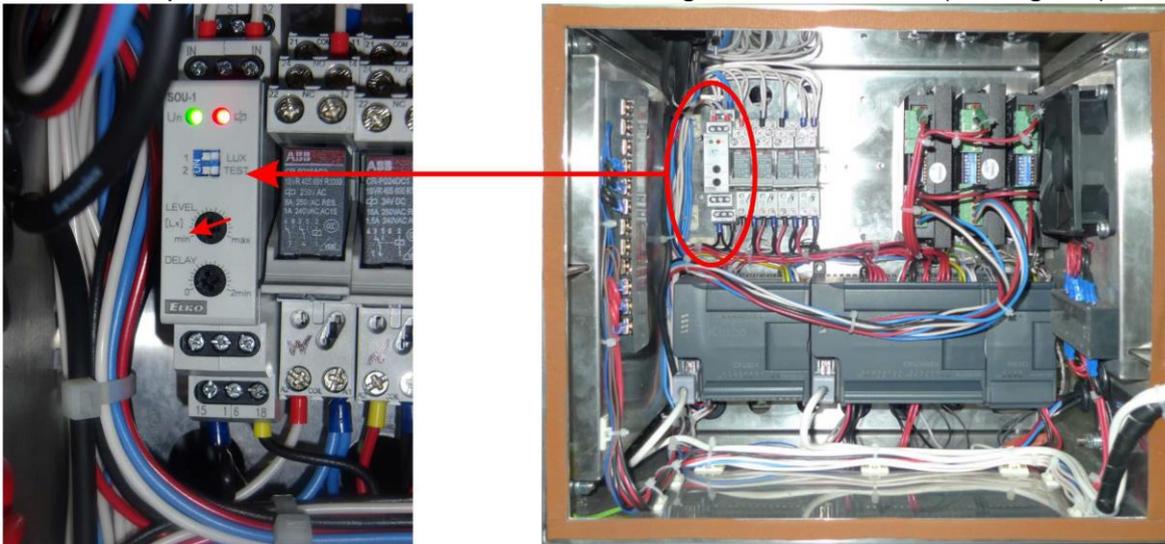


Fig. 10. Twilight switch SOU-1

2 - enter the unit test mode. For more information about the Test mode, refer to the service section 3.1.

At the switched off engine - MOTOR OFF, the sensor will also be inactive - Sensor Overload OFF (see Fig. 10).



3 - carefully using a screwdriver set the LEVEL of the potentiometer to the left (all the way counter-clockwise - very carefully so as not to break).

4 - turn on the motor - MOTOR ON, the sensor will also be inactive - Sensor Overload OFF. This is because we have reduced sensitivity.

5 - carefully and very slowly with a screwdriver, turn the potentiometer LEVEL clockwise to 1-2mm as long as the sensor turns on, in that case Sensor Overload Indicator will light up (see Fig. 10).



6 – Repeat turning on and off process several times. Every time the sensor should trigger each time while you turn the motor on and go off when you turn the motor off.

Switching on and off the motor should be done with a delay of at least one minute. Also keep in mind that the optical sensor is triggered with 1-3 seconds delay.

3. MAINTENANCE

3.1. GENERAL INSTRUCTIONS

The maintenance purposes are to keep the popcorn machine operable during the entire service life and the fire safety rules observance.

The maintenance should be done as necessary.

The recommended maintenance schedule with types of actions is presented below

No.	Actions	Period
1.	Washing the sifter, salt dispenser pipe and oil nozzle	Once a day
2.	Cleaning the external surface of the machine from dust and dirt	Once a day
3.	Cleaning the internal chamber from husks and corn dust	Once a week
4.	Cleaning the internal chamber net from husks and corn dust	Once in 3 months
5.	Chamber lamp replacement	Once in 3 months
6.	Drive belt replacement	Once in 6 months

3.2. SAFETY MEASURES

Prior to maintenance, disconnect the machine from the electrical mains.

Do not wash electrical parts and control unit with water. You may wipe them with a soft cloth moistened in a soap solution.

If combustion occurs when the machine is running (it is possible if the machine is not cleaned or turned off correctly), you should disconnect the machine by pulling the power cord from the socket, and only after that fire-fighting actions should be taken.

3.3. MAINTENANCE PROCEDURE

In the end of the working day or before a long break the internal chamber cleaning from husks and corn dust should be done, and, in case of using salt and oil, remove and wash the sifter and the oil nozzle.

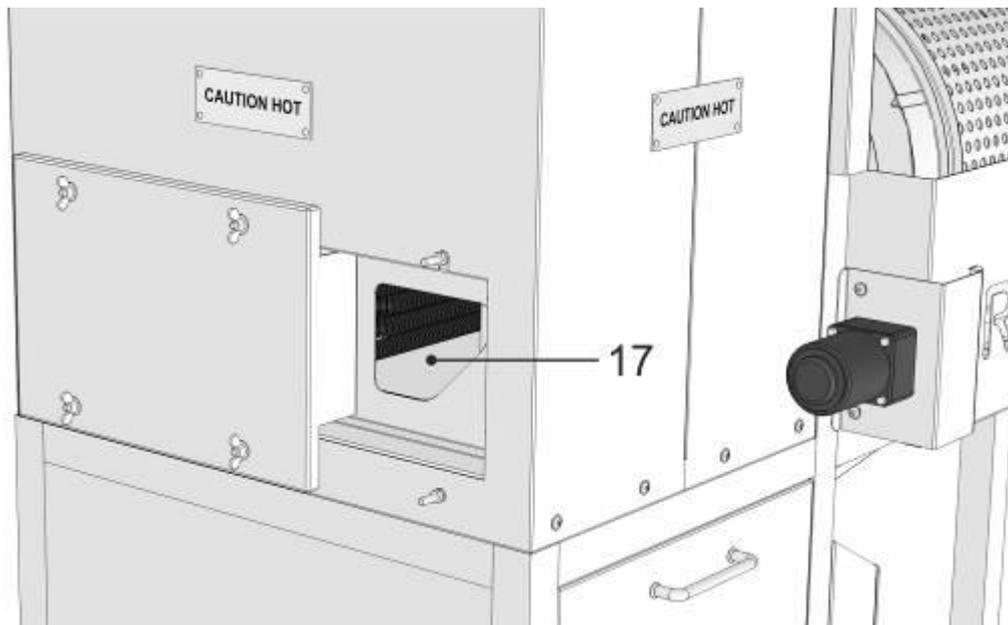
In order to clean the chamber, unscrew the wing nuts and open the hatch 16 in the lower part of the chamber. Remove husks and debris through special hole 17. It's convenient to do with a vacuum cleaner.

After the chamber was cleaned, the hatch should be fixed again with the help of wing nuts.

Washing the internal chamber with water jet is prohibited.

If the machine operates with oil and salt additions, the sifter (drum) should be daily removed and washed by warm water. Also remove oil runs and dirt from other parts of the machine.

To remove sifter 5, collector 6 should be lowered, than the droplet type nozzle and the salt feeding pipe should be removed also.



For the salt feeding pipe disassembling, the wing screw next to the fan should be unscrewed and the salt feeding pipe carefully pulled out.

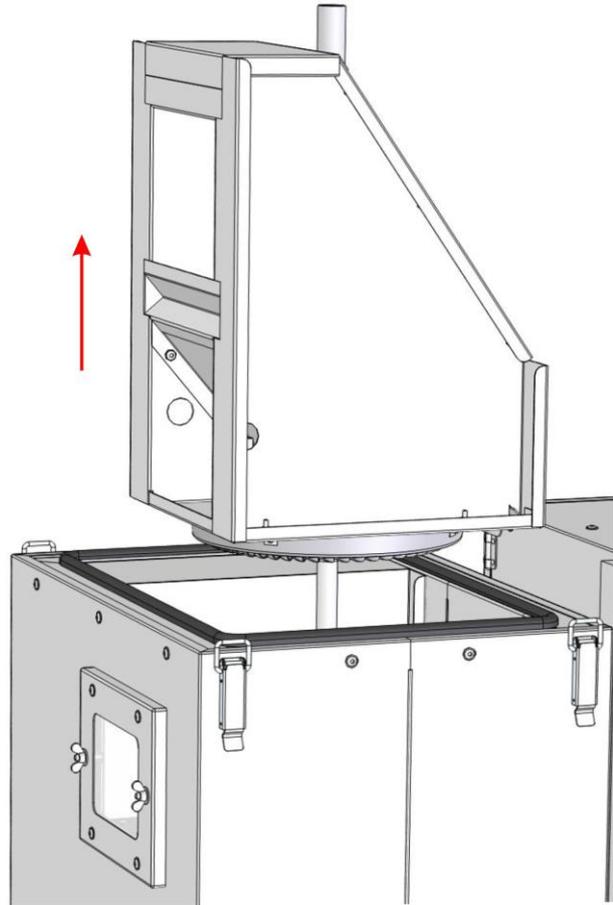
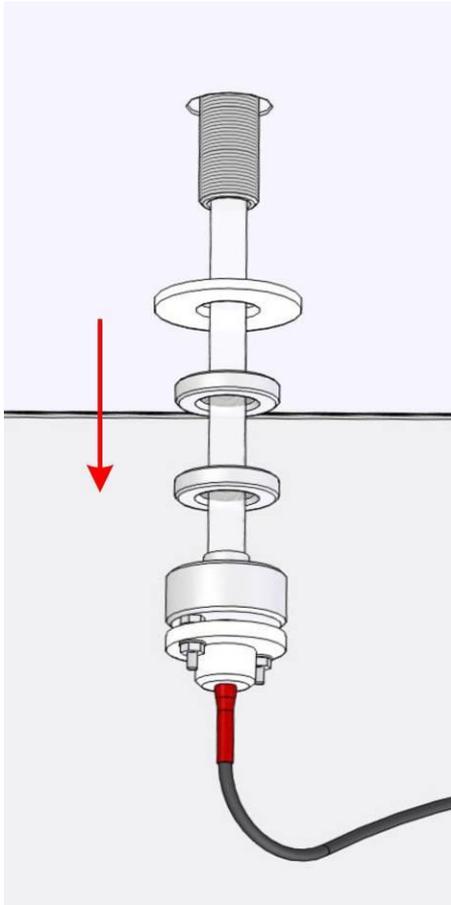
For the oil tube disassembling, at first the oil pipe should be disconnected. Then unscrew the wing screw located on the bracket and pull out the droplet type nozzle together with a U-shaped stick. Then carefully lift the sifter up and pull it out.

The sifter may be washed in a washing bath or a dishwasher. The sifter should be dried up before reinstalling.

The machine assembling should be performed in the reverse order. First, install the sifter, the guides should be installed exactly on the rollers. To center the sifter make several turns manually. Install the salt feeding pipe and the droplet type nozzle.

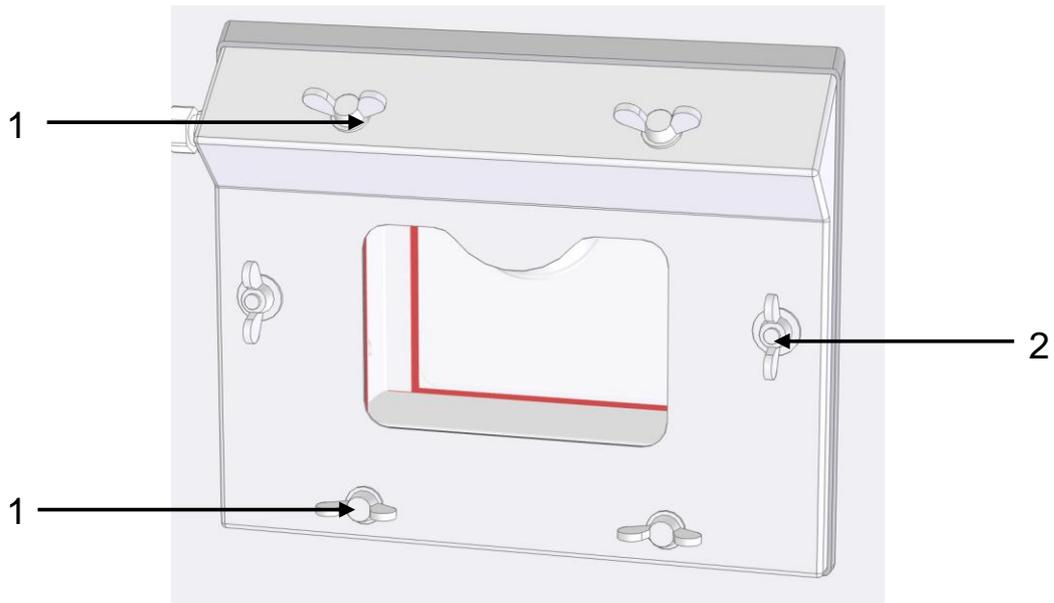
3.4. POPCORN MACHINE CHAMBER DISASSEMBLY PROCEDURE

1. Disengage the machine and disconnect it from the mains.
2. Disconnect the corn dispenser motor from the control unit.
3. Dismount the grain (corn) sensor.
4. Unfasten the latches that hold the machine cover and carefully remove the cover together with the dispenser.
5. Disconnect the chamber overload optical sensor.
6. Unscrew the chamber overload sensor and carefully remove the light conductor.
7. Unscrew the nuts that fix the light conductor tube.
8. Lightly swaying the internal chamber from side to side pull it out by the protruding parts of the machine.



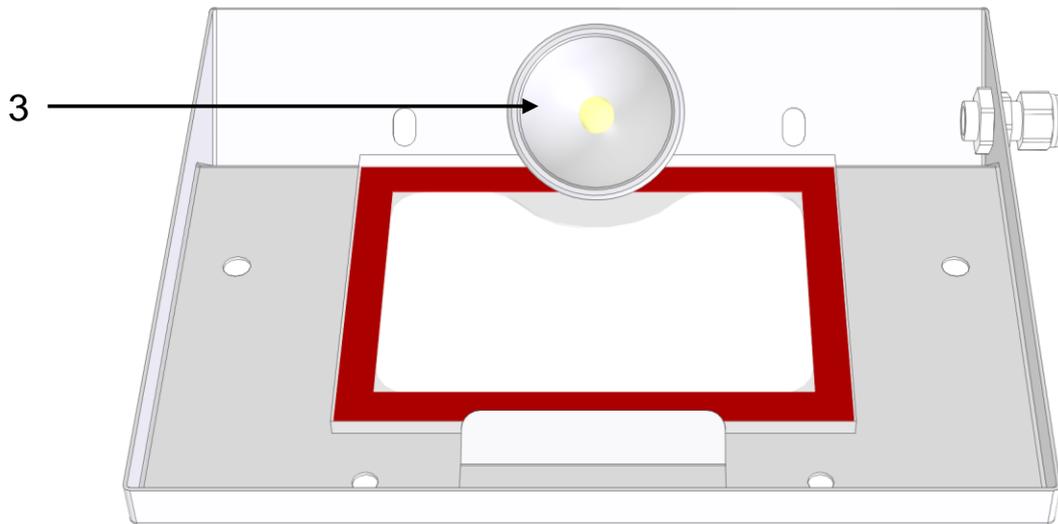
3.5. CHAMBER LAMP REPLACING

1. Turn the machine off and disconnect it from the mains.
2. Unplug the connector from the control unit.



3. Unscrew the butterfly screws that fix the front door panel (item 1).

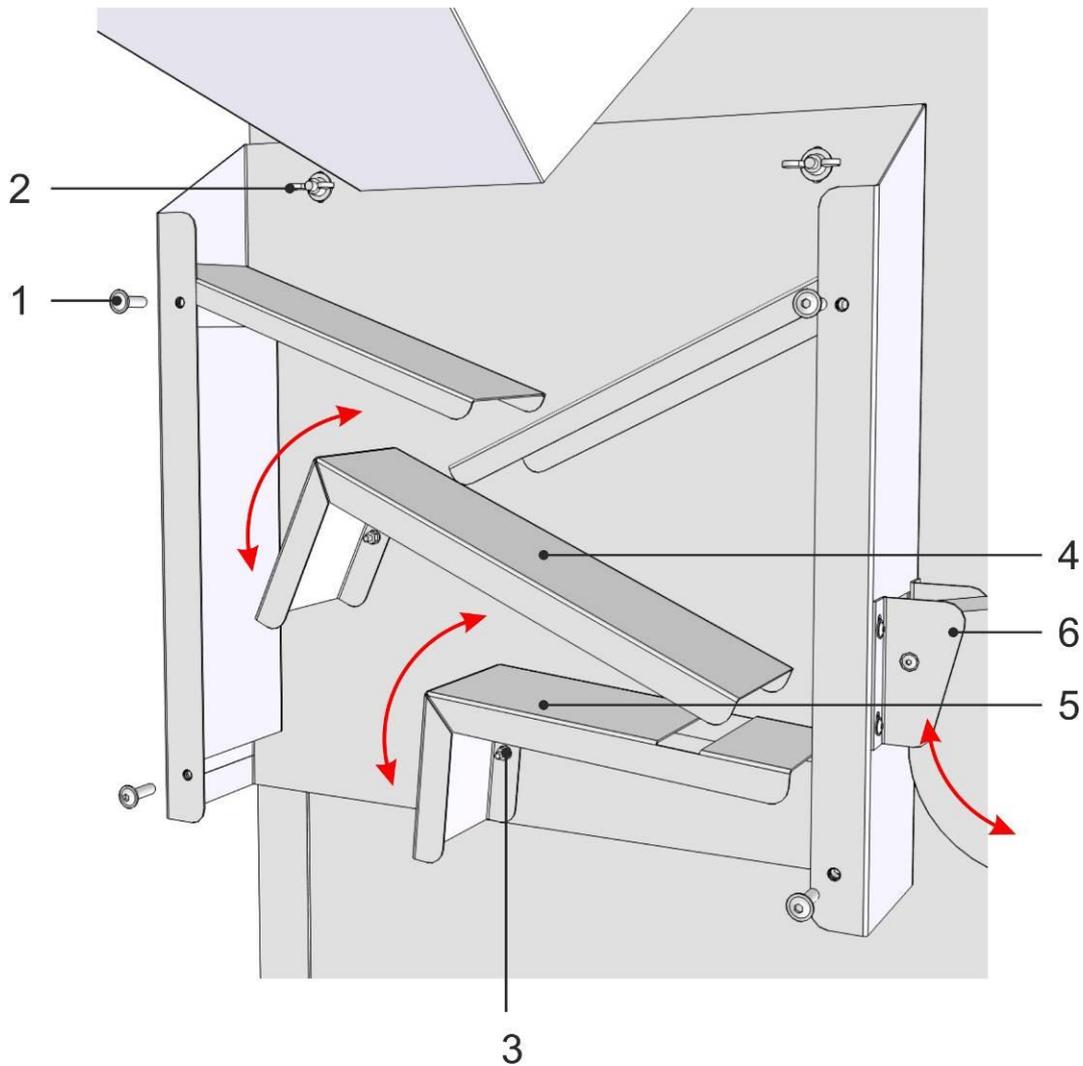
4. Unscrew the butterfly screws that fix the door (item 2).
5. Carefully remove front door panel with glass and light bulb. Be careful not to break the front glass!
6. Unscrew the fused bulb (item 3), and replace to a new one.
7. Assemble should be performed in the reverse order.



3.6. SEPARATOR SETTING

If the corn separation quality is insufficient, you should calibrate the angle plates of the separator (pos. 4 and 5) and the fan position (pos. 6).

1. Remove the transparent wall by unscrewing the 4 screws (pos. 1) at angles.
2. Unscrew the wing nuts (pos. 2) that fix the separator and carefully remove it.
3. Slightly loosen the screws (pos. 3) that fix the angle plates at the rear of the separator.
4. Replace the separator and the transparent wall.
5. Launch the machine and manually adjust the position of the angle plates. The criterion is the following: unopened corns should freely roll down into the corn tray without being caught by the angle plates, while the husks and broken popcorn should be blown into the waste hopper.
6. After you have found the optimal position of the plates, you should again dismantle and remove the separator and tighten the screws that fix the angle plates.



3.7. OIL PUMPING

If the oil does not flow from the nozzle while the pump is smoothly running, it means that the pump has caught air.

In order to resume the oil supply, you should remove air from the pump membrane. Unscrew the special valve (2-3 turns) which is located on the pump body (fig 8, item 1). Connect the silicone tube to the pump (included in the set). Dip the oil-intake pipe into the oil tank. Make several long draws with the mouth through the silicone tube until the oil fills the pump membrane.

The motion of the oil can be visually observed: the oil will move along the oil tube higher and higher.

3.8. TROUBLESHOOTING

Problem	Possible reason	Remedy
Corn rotates slowly in the bowl; open popcorn does not fly out of the machine	Electric motor rotates in the opposite direction	Shift the two phases in the wall plug
When corn feed is on, the chamber overload sensor responds, while the bowl is empty	Chamber illumination lamp is burnt off	Change the lamp
	Optical chamber overload sensor is not connected	Connect the sensor
	Light conductor is damaged	Change the light conductor
	Optical sensor failed	Change the sensor
Chamber overload sensor responds while the bowl is more than half empty	Optical chamber overload sensor is set incorrectly	Adjust the light conductor protrusion height in the chamber. The light conductor should protrude by 5mm inside the machine bowl. Adjust the sensor sensitivity
Corn sensor activates, while the corn dispenser has enough corn.	Optical corn sensor in the dispenser is set incorrectly	Adjust the corn sensor sensitivity
popcorn sensor responds, while the cart is half full	Optical popcorn sensor is set incorrectly	Adjust the ready popcorn sensor sensitivity
Corn pops not as "mushroom", but as "butterfly"	Low temperature in the chamber	Increase the chamber temperature. "Butterfly" pops at 210-215°C, "mushroom" at 210-235°C.
The chamber is overfilled while the corn feed rate is set lower than the medium	Low temperature in the chamber. One or more heat elements failed	Replace the failed heat element
	Low turbine rotation speed due to V-belt slippage	Check the V-belt tension; replace the V-belt if necessary
	Internal chamber is jammed	Clean the internal chamber
Abnormal sound during turbine rotation	Foreign object inside the internal chamber	Clean the internal chamber
	V-belt low tension	Check the V-belt tension; replace the V-belt if necessary

	Bearing unit of the turbine is worn out	Replace the turbine bearing unit
Corn and husks get stuck in the separator	Oil in the separator	Wash and dry the separator
	Angle plates of the separator positioned incorrectly	Set the separator (see the manual)
During separation, some husks get into the corn hopper / good corn gets into the husks hopper	The incorrect position of the separator angle plates	Set the separator (see the manual)
Oil thickens on the drum walls forming uniform deposit	Low temperature in the room where the machine is being run	Additionally heat the drum, e.g. by a heat gun
Oil flows from the nozzle unevenly	Nozzle jammed	Wash the nozzle with warm water and dry
Oil does not move along the oil tube, while the pump runs and there is enough oil in the container	Air in the oil tube	Purge the pump in manual mode (see the manual)

3.9. PRESERVATION

If the equipment is not used for a long time, perform all maintenance works.

4. TRANSPORTATION AND STORAGE

Vortex Popcorn™ machine Robopop® may be transported by any roofed transport in accordance with the transportation rules for this kind of transport.

The popcorn machine transportation conditions are as per group (J2), and the storage conditions are as per group (C) GOST 15150-69.

The transportation conditions as to the mechanical effect are as per group (C) GOST 23216-78.

5. ACCEPTANCE CERTIFICATE

Robopop[®] popcorn machine corresponds to the requirements of the Technical Conditions TU 5151-016-74387948-2010 and is qualified as suitable for operation.

Acceptance Certificate

Robopop[®] Mark 3 / Mark 3DF popcorn
machine
(Article description)

No. _____
(serial number)

Manufactured and accepted in accordance with the mandatory requirements of the state standards, current technical documentation and qualified as suitable for operation

Quality Control Department Engineer

Personal signature

Printed name

Year, month, date

6. WARRANTY OBLIGATIONS

The warranty period for the popcorn machine is 12 months from the date of receipt of the equipment by the dealer (according to the transport documentation) or in case of purchasing directly through Business Russia LLC structures – from the date of shipping the equipment from Business Russia LLC, subject to observance of the operation, transportation and storage conditions.



ATTENTION! The warranty does not cover the chamber lamp and the V-belt.

The warranty repair is performed upon presentation of this manual and filled in warranty ticket with the seller's seal and sale date.

The manufacturer reserves the right to change the design of the popcorn machine without notice to the customer.

7. MANUFACTURER'S DETAILS

Address: Russia, 170000, Tver, Industrial street, 11.

“NPO Tvertorgmash” LLC

Phone: +7 (4822) 77-81-73

www.npo-ttm.ru

APPENDIX A. SPECIFICATION OF THE WIRING DIAGRAM FOR VORTEX POPCORN™ MACHINE ROBOPOP® MARK 3 AND MARK 3 DF

Signs	Name	Description
AP	Pump	230AC
AT1	Thermostat 90°C	230AC, 16A
AT2	Thermostat 300°C	230AC, 16A
BL1	Photoresistor (overload sensor)	
BL2, BL3, BL4	Photosensor BR-400	24DC
BL5	Inductive Sensors	24DC
BT	The temperature sensor (RTD)	Pt100
C1	Capacitor	1,5 µF
DC1	PLC K306EX-24AT	230AC
DC2	PLC K304-AT14	230AC
DC3	PLC K331-04RD	24DC
DD1, DD2, DD3, DD4	Driver M542	
EK1, EK2, EK3	Heat element	230AC, 2500W
EK4	Heater	230AC, 800W
EL	Lamp halogen	12DC, 20W
EMI	EMI Filters DL-25EA3	440AC, 25A
HL	Lamp signal WARM	230AC
HLA	Lamp with buzzer alarm	24DC, 8A
HMI	HMI LCD MT4424T	24DC
K1, K2, K3, K4	Electromagnetic relay CR-P024D	24DC, 8A
KM1	Contactora	400AC, 9A
KM2	Contactora	400AC, 25A
KS	Twilight switch SOU-1	230AC, 16A
M1	Asynchronous motor AIR71V2	380AC, 3000rpm
M2, M3, M5	Step motor FL86STH with reduction gear 1:5	
M4	Step motor FL57STH	
MF1	Fan (separator)	230AC
MF2	Fan (salt spray)	230AC
MF3, MF4	Fan (rear building)	24DC
Q1	circuit breaker	32A
R1, R2, R3	Resistor	2 kΩ, 2W
S1	POWER switch	4A
S2	Emergency stop	4A
S3	WARM switch	4A
TV12	The power supply	12DC, 5A
TV24	The power supply	24DC, 10A
VS1, VS2, VS3	Relays Solid State HD-2544.ZD3	3...32DC, 25A

APPENDIX B. SPARE PARTS SET FOR VORTEX POPCORN™ MACHINE ROBOPOP MARK 3 AND MARK 3DF

1	V-belt 3A1275	1 piece
2	Halogen Lamp 12VDC 25W GU5.3	1 piece
3	Power Supply for Halogen Lamp	1 piece