



RoboLabs

Incredible machines for fastfood & funfood

Popcorn machine VPM-MRS2FUS

User manual



Read this manual before use and keep for future reference!

PDF version of this document is available on www.robolabs.pro

Safety requirements



This is the safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER



- Not grounded equipment can cause electric shock. Power outlet **MUST HAVE PROPER GROUNDING** to avoid electric shock.
- Using excessive water during cleaning can cause short circuit and electric shock. **DO NOT USE** excessive water or water jet for cleaning. **DO NOT SPILL** water on electric panels or parts.
- **ALWAYS** unplug equipment before cleaning or servicing.
- No user serviceable parts inside. **DO NOT OPEN** electric panel unless you are qualified for this.

WARNING



- **DO NOT USE** other crops than corn with this machine.
- **DO NOT NOT LEAVE** running machine **UNATTENDED**.

WARNING



- During operation some surfaces might be hot. Direct contact can cause burn. **DO NOT TOUCH**.

WARNING



- **IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE PROPERTY DAMAGE, INJURY, OR DEATH.** Read and understand this manual before use.
- **ONLY INSTRUCTED PERSONNEL** is allowed to operate the equipment.

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1 General information

VPM-MRS2FUS is a hot-air popcorn making machine (hereinafter “the machine” or “the popper”, or “the equipment”). It can process both Butterfly and Mushroom popcorn kernels.

Commercial use only.

1.1 Technical specifications

Throughput	up to 12 kg/h
Rated voltage	208 VAC
Rated frequency	60 Hz
Rated current	25 A
Dimensions (LxWxH)	1070x580x1600 mm
Net weight	150 kg
Material	stainless steel

1.2 Manufacturer details

RoboLabs Ltd.
11 Industrialnaya Street, Tver, 170100 Russia
Technical support:
Email: support@robolabs.pro
Phone: +7 495 956 4000

1.3 Quality check

VPM-MRS2FUS	
_____	_____
model	serial no.
The equipment is made with accordance to mandatory requirements of the state standards, actual technical documentation, and approved for use.	
QC Engineer	
STAMP HERE	
_____	_____
signature	full name

DD.MM.YYYY	

1.4 Warranty obligations

The manufacturer guarantees trouble-free operation of the equipment during 12 months from the date of receiving the equipment by a dealer (in accordance with transport documentation); or, in case of purchase directly through Trapeza LLC or RoboLabs Ltd., from the date of purchase, given that terms of using, transportation, and storage are met.

The warranty repair is performed upon presentation of this manual and filled warranty card with the seller's seal and the date of sale. Technical specifications of the equipment can be changed by manufacturer at any time due to improvements and/or other reasons. Technical specifications stated in this document are intended to act as a reference point, which is necessary to evaluate suitability of the equipment for the customer's needs, and are not the subject of warranty policy.

The information stated in this document has been thoroughly checked and considered as accurate one; nevertheless, the manufacturer is not responsible for any typographical errors or misprints.

Due to constant improvement of the equipment, technical specifications are subject to change without prior notice!

1.5 Transportation and storage

The equipment may be transported by any kind of covered vehicle, in accordance with transportation rules for this kind of vehicle. Ambient temperature during the transportation and storage must be between minus 25°C and plus 55°C.

1.6 Ambient conditions

This equipment is designed to be operated at the ambient temperature from +5°C to +40°C (+41°F to +104°F) and relative humidity not more than 45% at 40°C (104°F) while using at altitudes not exceeding 1000 m over the sea level. The temperature decreasing is related to RH increasing, for example, 90% of RH at 20°C (68°F). This equipment **MUST NOT** be exposed to precipitations of any kind (rain, snow and so on).

2 Assembling and installation

2.1 Delivery set

- 1x Popcorn machine
- 1x Electric panel key
- 1x Cleaning brush
- 1x Spare halogen lamp
- 1x Documentation set


2.2 Assembling


1. Unpack the machine carefully.
2. Check the delivery set.
3. Remove protective film from all surfaces.
4. Wipe all surfaces with a clean soft cloth dampen with mild soap. Then remove soap residues with a clean cloth dampen with water. Let it dry.
5. Lock all four swivel casters.

NOTE 1: Each machine is tested at the factory with corn, some amount of corn kernels might be found inside the chamber.

NOTE 2: If equipment was stored below 0 °C, keep it at normal room temperature not less than 3 hours before the first start.

2.3 Power requirements


 **DANGER**



- Power outlet **MUST HAVE PROPER GROUNDING** to avoid electric shock.
- If supply or interconnection cords damaged, it must be replaced by manufacturer, service agent, or skilled person in order to avoid hazard.
- Connections must be done **BY SKILLED ELECTRICIAN ONLY**.

Equipotential bonding wire (up to 10 sq.mm) shall be connected

- to screw terminal on the base frame marked with IEC 60417-5021 sign:



Machine requires 3-wire (HOT-HOT-GROUND) 208 VAC 60 Hz power supply. Use NEMA 6-30 plug and receptacle.

2.4 Ventilation requirements

A ventilation hood measuring at least 800x800mm must be provided above the machine, with a minimum capacity of 300 cu.m/h.

3 Design and principle of operation

3.1 Main components

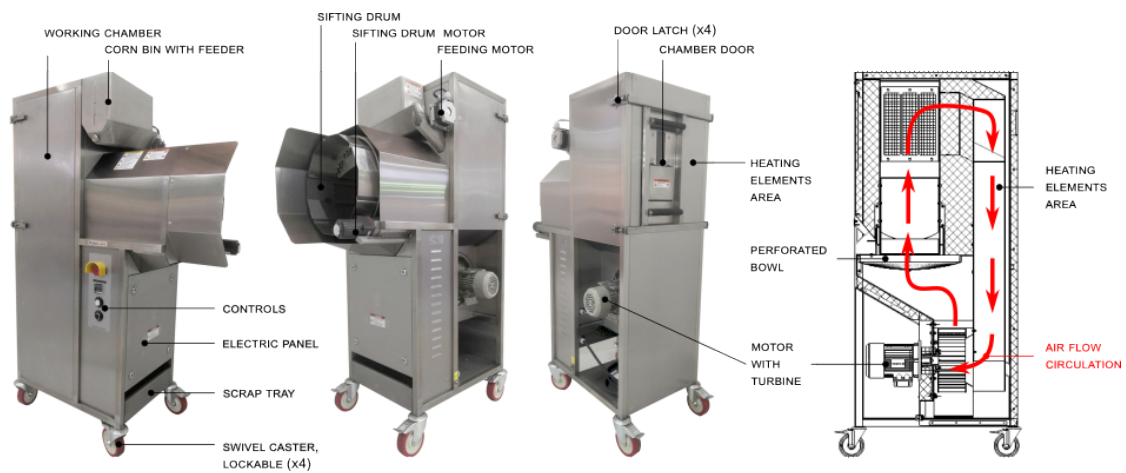


Figure 1: Main components

Main components of machine is represented on Fig. 1.

Motor with turbine causes air circulation inside the machine. Air goes from the turbine to the **working chamber**, then to the **heating elements**, where it is heated, and finally goes back to the turbine.

Popcorn kernels is loaded in the **corn bin with feeder**, see Fig. 2. The feeder consists of **feeding motor** and **feeding auger** inside the **corn bin**. The motor drives the auger, which pushes corn in the chamber through **corn supply tube**. Three **wing screws** allow quick detaching corn bin for cleaning purposes. From the corn bin, corn kernels goes through the **corn supply tube** to **working chamber**, see Fig. 2.

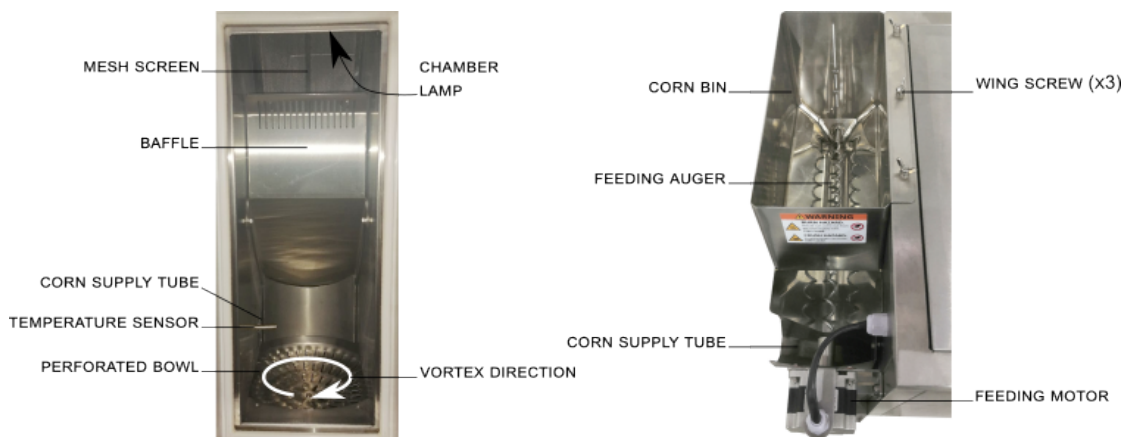


Figure 2: Chamber and corn bin

Perforated bowl has many holes of special shape, which cause air vortex inside the chamber as airflow goes through the bowl. Due to air vortex, corn kernels are constantly moving inside the chamber around center of the bowl.

Baffle divides the chamber for the area where corn kernels are being heated up, and the output area.

Mesh screen protects internal cavities (including heating elements area) from popcorn dust and scrap accumulation.

Temperature sensor constantly measures temperature of the air in the chamber.

Chamber lamp illuminates the chamber, so an operator can visually control the process through the observation port in the chamber door.

Once popped, popcorn being evacuated from the chamber to the sifting drum, see Fig. 1. Sifting drum is a perforated drum that allow to screen un-popped kernels, broken popcorn, husk and other scrap. Screened scrap falls to the **scrap tray**. Due to sifting drum rotation, popcorn eventually goes out from the machine in a receiving container ¹.

3.2 Controls

The machine is controlled from the control panel, that is represented on Fig. 3.

Thermostat allow to control temperature in the chamber.

START/PAUSE push button turns the machine on, and also used to initiate pause mode. Equipped with light indicator, which convey different information during machine operation.

COOLING push button turns the machine in cooling mode.

Emergency stop switch shuts the machine down immediately at any moment. It is also used to exit from testing mode of the machine.



Figure 3: Control panel

¹Receiving container is not included in the delivery set; popcorn cart (bag holder) can be ordered separately. Also it is possible to use any suitable container.

3.3 Modes of operation

Whenever the machine is turned on, it is in one of the following stages of operation.

Heating mode

Once operator turns the machine on, the turbine starts spinning and heating elements start to heat up air in the chamber. Upon reaching the set value temperature the machine automatically starts popping process.

Popping mode

Machine processes corn kernels cycle by cycle. Each popping cycle consists of three parts:

1. **Purge** – turbine is accelerated in order to blow out everything left in the chamber: un-popped kernels, dust and other scrap. Duration of purge part is always 10 seconds.
2. **Feeding** – corn kernels pushed into the chamber. Duration of feeding part is always 20 seconds.
3. **Popping** – corn kernels are heated up in the chamber, eventually evacuated as they pop. Duration of popping part might be 75, 90, or 110 seconds.

Pause mode

Whenever the operator initiates pause, the machine processes current batch of corn, and then stop feeding next batches of corn. The temperature in the chamber is maintained at the set value. Popping process can be resumed at any time.

Cooling mode

The machine needs to be cooled down before turning the turbine off. Whenever the operator initiates cooling mode, heating elements are de-energized; but the turbine keeps running, cooling down the machine. Once temperature drops low enough, the turbine stops and machine turns off automatically.

Testing mode

In testing mode operator can test feeder and sifter. Also duration of popping part of the popping cycle is adjusted from this mode.

4 Intended use

DANGER



- **DO NOT USE** if power cord, or plug, or wall outlet are damaged, and also if chamber lamp is blown out.

WARNING



- **DO NOT USE** emergency stop switch for routine stop. Doing so might lead to machine failure and smoke formation.
- **MAKE SURE ALL FOUR SWIVEL CASTERS IS LOCKED.** Unlocked swivel casters might lead to accidental move of the machine.
- **DO NOT NOT LEAVE** running machine **UNATTENDED.**
- **DO NOT OPERATE** with blown chamber lamp.
- Rotating sifter can catch. **DO NOT OPERATE** with loose clothing, long exposed hair, or jewelry.

WARNING



- Outer surfaces of chamber, corn supply tube, and corn bin might be very hot during operation. **DO NOT TOUCH** the hot surfaces.
- Hot air comes out from the corn supply tube (see Fig. 2) during machine operation. **STAY CLEAR.**

WARNING



- Rotating corn auger can crush. **STAY CLEAR.**



4.1 Popping temperature

Thermostat panel represented on Fig. 4.

Process value (PV) display reads current temperature in the chamber.

Set value (SV) display reads the goal temperature.

Control keys used to adjust the set value.

To increase or decrease the set value, press  or , respectively.

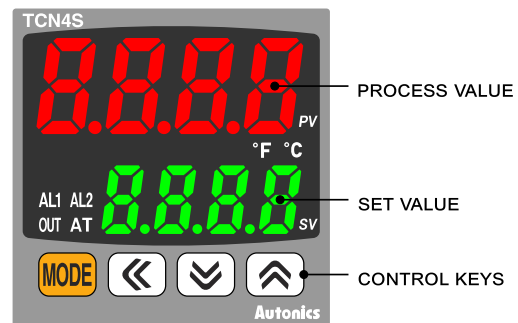


Figure 4: Thermostat panel

4.2 Popping time and testing mode

Popping time is the duration of popping stage. By default it is set to 110 seconds.

In case if you see that mostly all kernels are popped and evacuated from the chamber, but there is certain time left to the next feeding cycle, you can reduce popping time.

To adjust the popping time, you need to enter testing mode:

1. Turn the machine off.
2. Press and hold COOLING push button, and then press START/PAUSE push button once.
3. Once START/PAUSE indicator begins to blink, release COOLING push button.
START/PAUSE indicator blinking frequency represents the set value. To change the value, press START/PAUSE push button. Three options are available:

Blinking frequency	Popping time	Approx. machine capacity
SLOW	110 seconds	75%
MODERATE	90 seconds	87%
FAST	75 seconds	100%
4. To save the new value and exit, turn off the machine with Emergency stop switch.
5. To test sifter operation, press and hold COOLING push button for more than 3 seconds. Sifter starts to rotate.
6. To test feeder operation, press COOLING push button once, feeder executes single feeding cycle. If tested with corn, remove corn from the chamber before starting machine in normal operation mode.

NOTE: Every time you enter the testing mode, popping time parameter is reset to default.

4.3 Operating order

1. Make sure the chamber is free of corn kernels and popcorn.
2. Make sure the scrap tray is free of scrap.
3. Fill the corn bin with corn kernels.
4. Press START/PAUSE push button on the control panel.
5. Once warmed up, the machine begins to make popcorn.
6. To pause production process, press START/PAUSE push button once.
7. To resume production process, press START/PAUSE push button once.
8. To stop operation and turn off, press COOLING push button once.

4.4 Chamber cleaning during operation

If you see that there is a lot of un-popped kernels and/or other scrap accumulated in the chamber, then press and hold COOLING push button for more than 3 seconds. After this a single 10 seconds purge cycle is executed. Repeat as necessary. To resume popping, press START/PAUSE push button once.

4.5 Chamber clogging

DANGER



- **NEVER USE WATER** in case of smoke formation.

WARNING



- **DO NOT OPEN** in case of smoke formation.
- **DO NOT USE** fire extinguishers. Machine is made of stainless steel, as long as chamber is closed, popcorn won't get fire.

The chamber may be clogged due to the following reasons:

- Low quality corn. Un-popped kernels are accumulating in the chamber and cannot be evacuated, which causes weakened airflow, and eventually chamber clogging and smoke formation.
- Power supply issues (voltage drop, power cut-off) or actuating Emergency stop switch that causes turbine stop, which leads to steep temperature rise inside the chamber, and eventually chamber clogging and smoke formation.

IN CASE OF CHAMBER CLOGGED OR SMOKE FORMATION, DO THE FOLLOWING:

1. **UNPLUG** the machine.
2. **WAIT** until machine **COOLS DOWN**.
3. Open the chamber and thoroughly clean inside.
4. If corn supply tube is clogged with corn kernels and popped popcorn, use the cleaning brush from the delivery set to remove popcorn stuck in the tube and to clean the tube.

5 Maintenance and cleaning

DANGER



- **DO NOT USE EXCESSIVE WATER OR WATERJET** for cleaning.
- **DO NOT SPILL WATER** on the machine.
- **ALWAYS KEEP** power cord plug off the floor and water.

WARNING



- Inner and outer surfaces of the chamber, as well as corn supply tube are very hot. **ALWAYS WAIT** until machine **COOLS DOWN** before cleaning.

CAUTION



- **DO NOT USE** high alkaline cleaners.
- **DO NOT USE** sharp items or abrasives for cleaning.

The purpose of maintenance and cleaning is to keep machine in good condition during all the lifetime and to meet safety requirements.

5.1 Daily cleaning

1. Wipe outer surfaces of the machine with a soft and clean cloth dampened with mild soap.
2. Wipe outer surfaces of the machine with a soft and clean cloth dampened with clear water to remove soap residues and let it dry.
3. Remove un-popped kernels and debris from perforated bowl, see Fig. ??.
4. Remove dust from internal surfaces of the chamber with the means of soft dry clean cloth.
5. Empty the scrap tray.

5.2 Weekly cleaning

1. Perform daily cleaning procedures.
2. Clean the mesh screen (see Fig. ??) with a suitable brush or a vacuum cleaner.
3. Empty the corn bin.
4. Wipe internal surfaces of the bin with a soft clean cloth dampened with mild soap; then remove soap residues with a cloth dampened with water. Let it dry.
5. Use the cleaning brush to clean the corn supply tube from the side of corn feeder, and then from inside the chamber.

6. Take out the **sifter drum**, see Fig. 5. Sifter drum lays freely on four **wheels**. To take sifter drum out, lift it and then pull out from the machine.
7. Wash sifter drum thoroughly to remove dust and grease, especially from the rims that are in contact with the wheels.
8. Thoroughly clean all four wheels form dust and grease. Failed to do so might cause sifter stops and eventually chamber clogging.

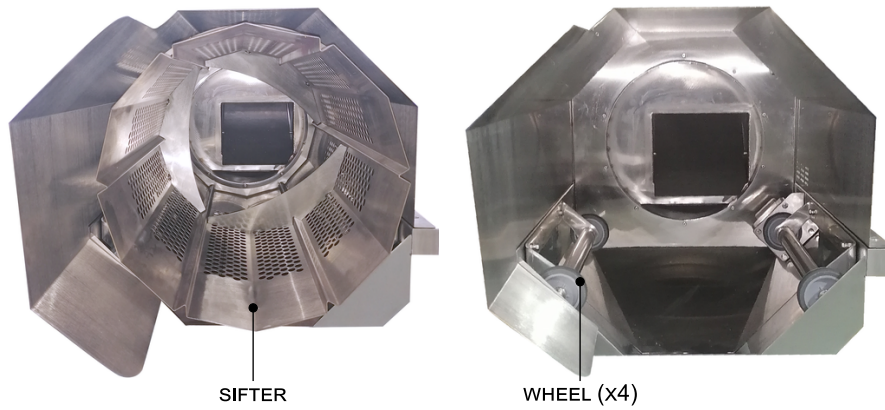


Figure 5: Sifter cleaning

5.3 Conservation

If machine is not used for long time, perform all cleaning procedures and pack it in original packaging.

6 Technical service

DANGER



- **THIS SECTION IS FOR SKILLED TECHNICIANS ONLY.**
- **DO NOT OPEN** electric panels unless you are qualified for this.
- High voltage inside electric panel. **DO NOT TOUCH** bare terminals and/or wires.
- **ALWAYS UNPLUG** the machine before servicing, unless you need it to be energized for performing setup procedures.

WARNING



- Internal parts of machine might be hot. **ALWAYS WAIT** until machine cools down before servicing.

WARNING



- **ALWAYS WEAR** eye protection while servicing this equipment to avoid possible injury.

6.1 Lamp replacing

1. Unplug the machine. Wait until cools down.
2. Open the chamber. Lamp is located either on the upper side of the chamber, or on its left side, see Fig. 6.
3. Remove two screws that holds **protective cover**; take it off. If it is stuck, carefully insert flat screwdriver under the metal frame of the cover and turn it gently to detach the cover.
4. The lamp is held by two spring loaded **lamp sockets**. Take the lamp firmly and press towards one of the socket, then release the opposite end of the lamp from the socket, and finally release the second end and take the lamp out.
5. **ALWAYS WEAR GLOVES WHILE REPLACING THE LAMP!** Skin grease will significantly reduce the lifetime of the lamp. Use a soft clean cloth or gloves to take and install the new lamp.
6. Insert the lamp in the sockets in the same way.
7. Close the protective cover and fix with screws.
8. Close the chamber.

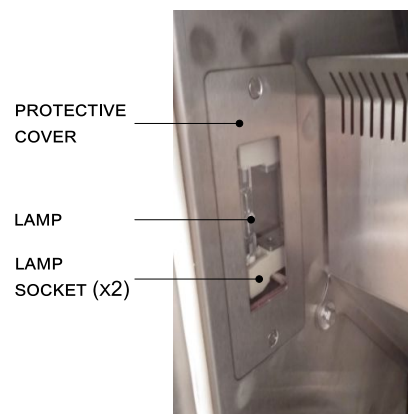


Figure 6: Backlight

6.2 Thermostat setup

There are three setting groups in TC4SP unit (Fig.7): 1st setting group, 2nd setting group, and SV setting group (the main indication mode). When power is applied, the unit gets into SV setting group (Run mode). To access the 2nd group of parameters press and hold the **MODE** key for 4 seconds; once display reads **PAR2**, release the **MODE** key.

To access the 1st group of parameters, press and hold the **MODE** key for 2 seconds; once display reads **PAR1**, release the **MODE** key.

Press the **MODE** key to go through the parameters. Press the **←** key to see current value of the parameter. Press the **↑** **↓** keys to change the value. Press the **MODE** key to move to the next parameter.

The unit gets back to SV setting group when no key touched for 30 seconds. To change the set value, use **↑** **↓** keys while in initial screen (SV group).

The settings must be changed in the same order as they appear in the list. Note that after changing **In-t** (temperature sensor type) or **UnIt** (temperature unit) values, parameters **H-Su**, **L-Su**, **AL1**, **AL2**, **AHYS** must be set again. The regulator has more parameters than listed below; if you see a parameter not from the list, skip it and move to the next one.

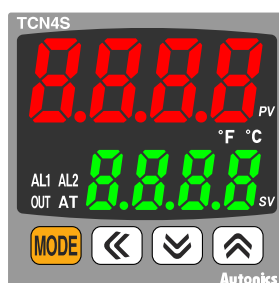


Figure 7: TCN4S panel

Group	Param	Value	Meaning
PAr2	LoC	oFF	Unlock all settings for changing
PAr2	In-t	YCA	Temperature sensor type
PAr2	L-Su	0190	SV low-limit value
PAr2	H-Su	0240	SV high-limit value
PAr2	C-nd	PId	Control type
PAr2	oUt	SSr	Control output
PAr2	AL-1	An1A	AL1 alarm operation mode
PAr2	AHYS	0005	Alarm output hysteresis
PAr1	AL1	-010	AL1 alarm temperature
PAr1	P	005.0	Proportional band, °C
PAr1	I	0010	Integral time
PAr1	d	0000	Derivative time
PAr2	LoC	LoC2	Settings group 1,2 locked
-	SV	0210	Default temperature

6.3 Thermal cut-out

Thermal cut-out (AT) controls the contactor (KM2) that feeds the heating elements (EK1,EK2). Sensing element (bulb) of the cut-out is located in the heating elements area and connected to the cut-out with **Capillary tube**, see Fig. 8. If the temperature in the area exceeds 350° C, then the thermal cut-out (AT) trips and opens the contactor (KM2), avoid further heating.

If thermal cut-out tripped, then it is a must to find out the reason caused this and eliminate it. After this the thermal cut-out needs to be released to continue normal operation. To release the cut-out, press the **Releasing pin**, see Fig. 8:

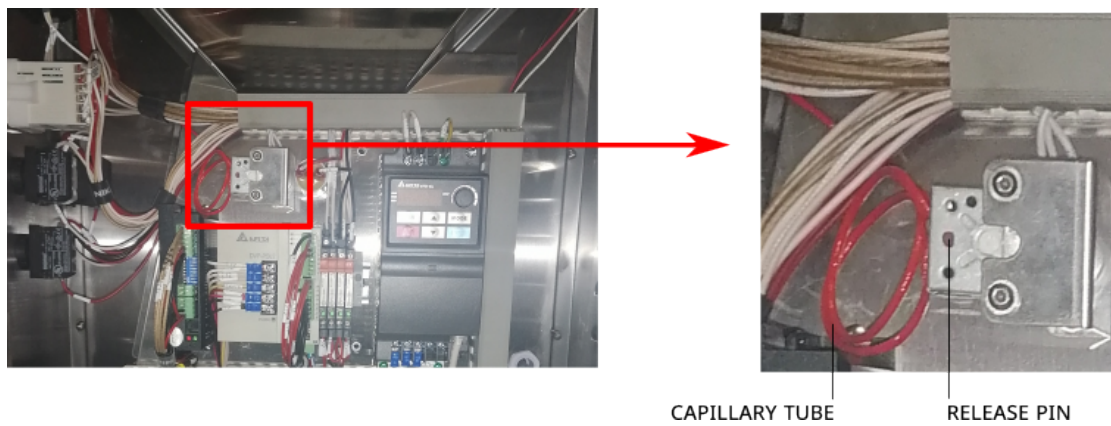


Figure 8: Thermal cut-out

6.4 VFD setup

DANGER



- Capacitors in the output circuit of the VFD maintain high voltage at output terminals U, V, W for up to 10 minutes after power cut off. **WAIT AT LEAST 10 MINUTES** before replacing connections.

NOTE 1: VFD setup must be performed only when the drive is stopped.

NOTE 2: After setting parameter 02.00 to 9, VFD displays **End**, and gets back to the main indication mode. After this, continue setup process from parameter 00.03.



Figure 9: VFD control panel

Parameters changing procedure

1. Locate the VFD control panel, see Fig 9.
2. To change or view parameter value, press **ENTER**, the display shows **00.00**.
3. Press **▲** or **▼** to choose the first two digits of the parameter (for example, 02).
4. Press **ENTER** again, display shows **02.00**.
5. Press **▲** or **▼** to choose the second two digits of the parameter, for example, **02.11**.
6. Press **ENTER** again to see the current value of the parameter. Change value, if needed, with **▲** or **▼**.
7. Press **ENTER** to confirm and save the new value, the display shows **End**.
8. Press **MODE** to return back to the previous level of selection or to the main mode.

Parameter	Value	Description
00.02	10	Settings initialization
01.00	60.00	Maximum output frequency
01.09	15.0	Accel time 1
01.10	15.0	Decel time 1
01.16	4	Auto acceleration/deceleration
02.00	3	Source of first master frequency command
02.01	4	Source of first operation command
02.04	0	Motor direction control
02.07	1	Up/Down Mode
02.10	1	Combination of the 1st and 2nd master freq. command
02.11	40.00	Keypad frequency command
09.00	1	Communication address
09.01	2	Transmission speed
09.04	3	Communication protocol

6.5 Stepper driver

DANGER



- High voltage inside electric panel. **ALWAYS UNPLUG** the machine before servicing the driver.

CAUTION



- Changing driver settings or disconnecting its terminal blocks while driver is energized might damage the driver. **ALWAYS UNPLUG** the machine before servicing the driver.

Stepper driver (DD) drives the motor (M2) that actuates corn auger. The driver is set up with eight dip switches (SW#1...SW#8). Factory settings are the following:

SW#1	ON
SW#2	ON
SW#3	OFF
SW#4	OFF
SW#5	OFF
SW#6	ON
SW#7	ON
SW#8	OFF

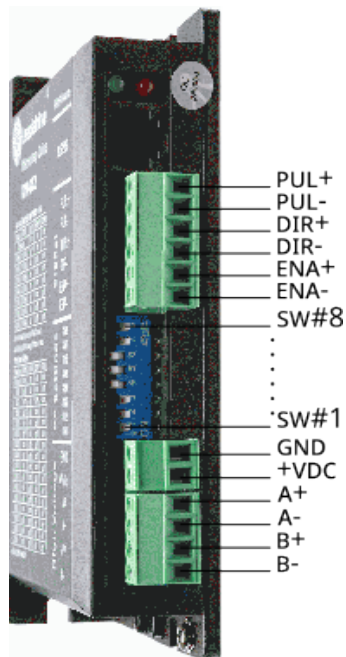
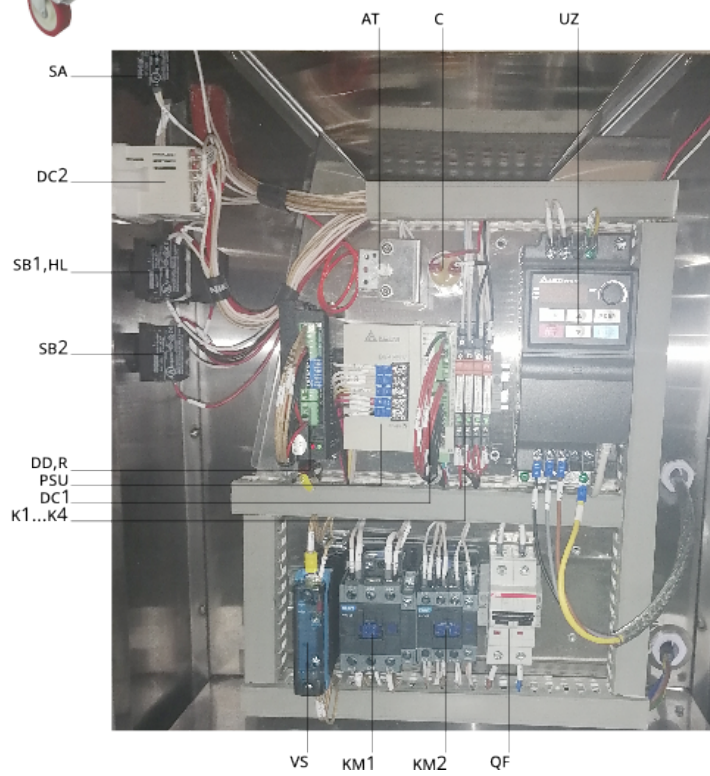
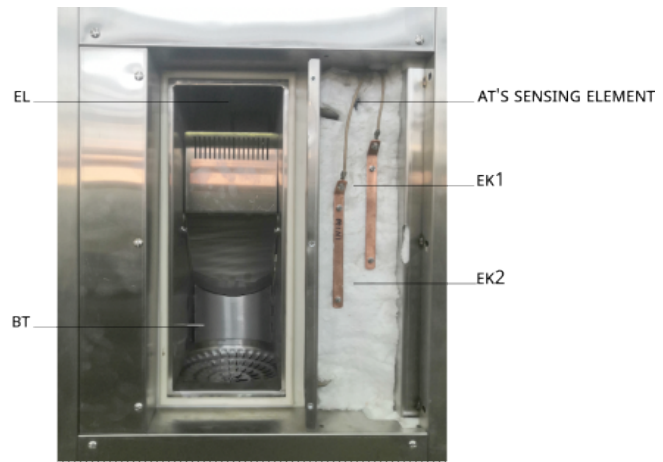
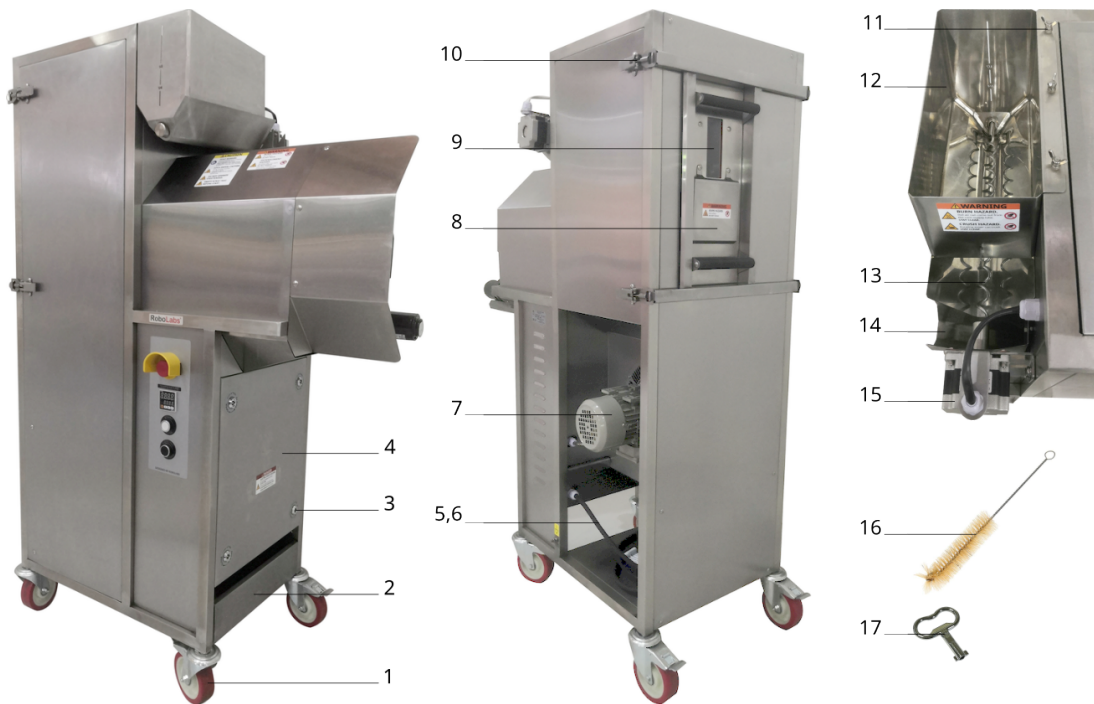


Figure 10: Stepper driver

A Electric components designations



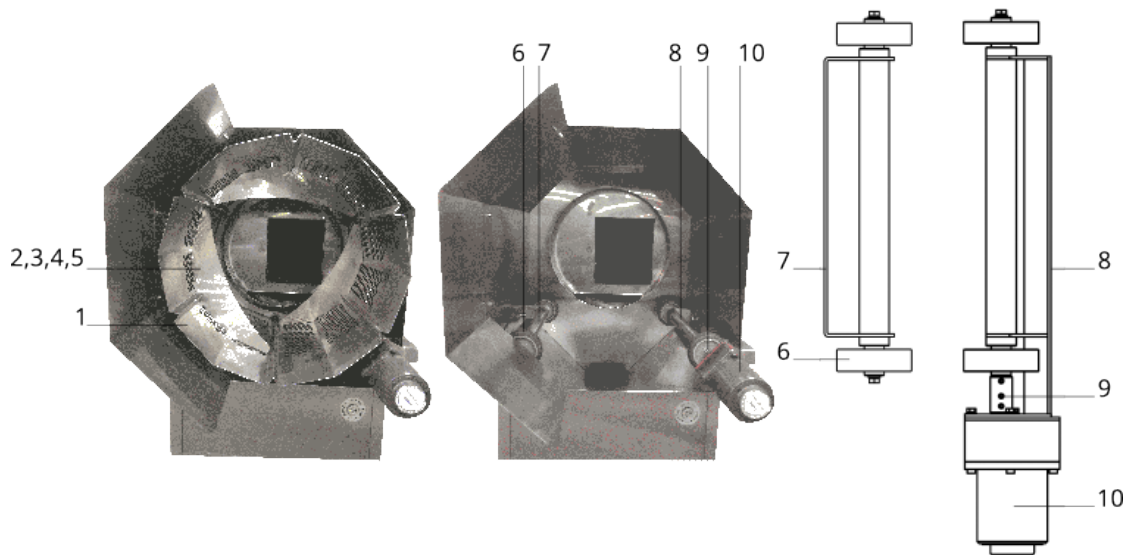
B Parts list



Pos.	Item	QTY	Part no.
1	Swivel caster w/brk 3300 PUR 125 F18	4	24731
2	Scrap tray ² TM 2668.03.00.000	1	21579
3	Lock KY05.1.2	4	25786
4	Cover TM 1684.09.00.000	1	15898
5	Supply cord w/o plug H07RN-F 3G4	3	33852
6	Cable plug FA-751P63050	1	25858
7	Turbine w/motor asm TM 2668.24.00.000-01	1	21581
8	Door asm ² TM 2668.02.00.000	1	21578
9	Door glass asm TM 1684.02.02.000	1	15895
10	Latch ³ TM 2677.09.00.000	4	21477
11	Wing screw M6 DIN 316 SS	3	25291
12	Corn bin asm TM 2668.15.00.000 ²	1	21574
13	Auger w/clutch asm TM 2677.03.01.000	1	15897
14	Loading chute TM 1684.17.00.000	1	10483
15	Step motor FL86STH65-2808A-03	1	24730
16	Cleaning brush	1	20728
17	Panel key AP010512	1	25632

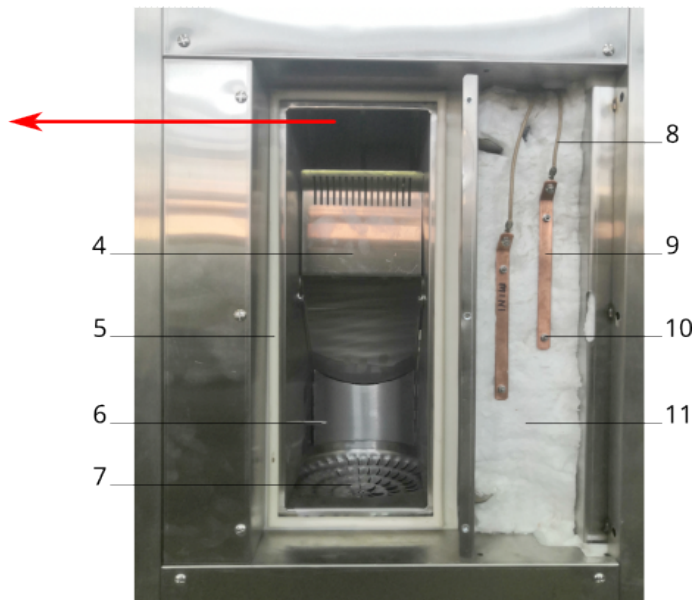
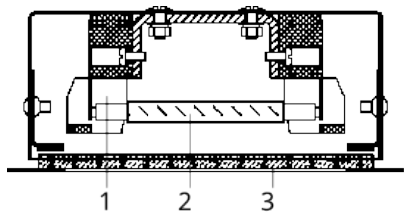
²Machines with s/n from 2668219040101.

³Machines with s/n from 2668219110146.



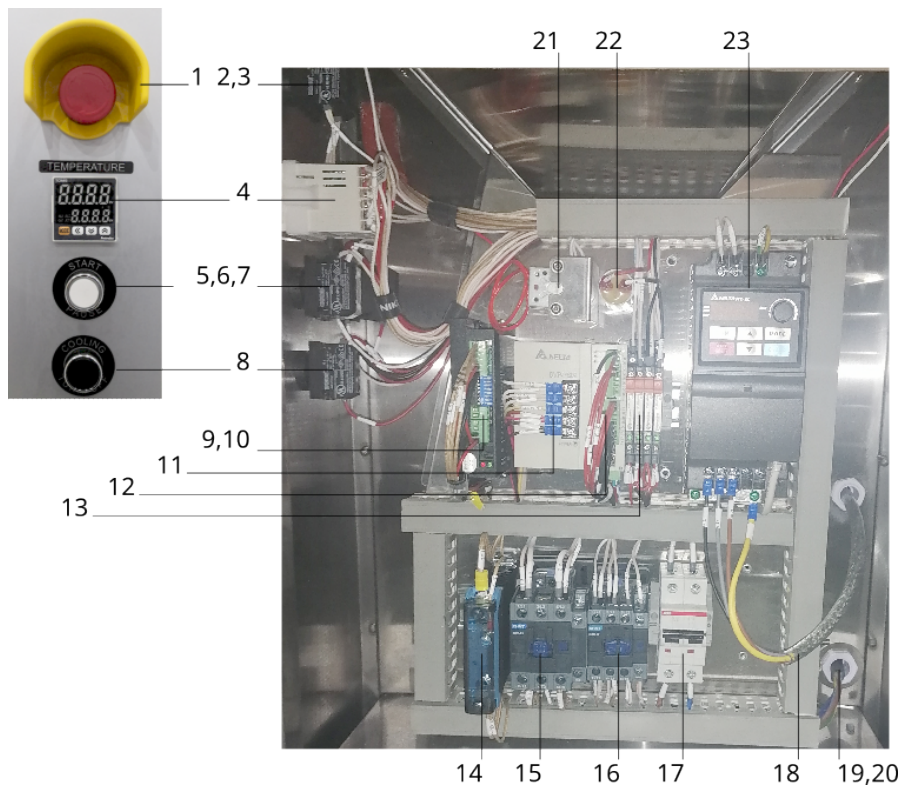
Pos.	Item	QTY	Part no.
1	Sifter ⁴ TM 2668.01.00.000	1	21575
2	Blade TM 2668.01.02.000	3	32999
3	Wing nut M6 DIN 315 SS	6	16048
4	Lock washer 6 DIN 127 SS	6	25293
5	Flat washer 6 DIN 125 SS	6	26059
6	Wheel w/steel hub	4	20595
7	Sifter idle roller asm TM 1684.14.00.000	1	15902
8	Sifter drive roller asm TM 1684.13.00.000	1	15901
9	Clutch TM 1684.13.00.000	1	15900
10	Motor w/gearbox YN70-15/70JB36G10	1	26212

⁴Machines with s/n from 2668219040101.



Pos.	Item	QTY	Part no.
1	Lamp socket ⁵ 206	2	25842
2	Lamp HALOLINE ECO R7S 48W 230V 64684	1	22615
3	Lamp protective glass TM 1684.22.01.000	1	10986
4	Baffle TM 1684.25.00.000	1	10970
5	Sealing frame TM 2668.32.04.000	1	25529
6	Temp sensor ДТПК 124-00.32/4	1	25105
7	Perforated bowl TM 1684.26.00.000	1	15894
8	Wiring kit	1	15991
9	Busbars set TM 1684.23.00.000	1	15893
10	Heating element 170-50-8.5/2.5	2	33286
11	Insulation mat AVANTEX 38mm roll	1	16222

⁵Machines with s/n from 1684184252



Pos.	Item	QTY	Part no.
1	Protective collar M22-XGPV	1	25473
2	Switch B200E	1	25138
3	Contact block B2	1	25493
4	Temp regulator TCN4S-24R	1	25111
5	Push button B100DB	1	25121
6	Contact block B1	2	22451
7	Contact block B5	1	22078
8	Push button B100DH	1	25156
9	Stepper driver DM556E	1	32142
10	Stepper driver wire R2K	1	26090
11	Power supply DVP-PS02	1	15355
12	PLC w/o software DVP14SS211T	1	22453
13	EM relay RM1.51.0.024.00	4	25979
14	SS relay SAL963460	1	10359
15	Contact NXC-25	1	31025
16	Contact NXC-09	1	30686
17	Circuit breaker S202-C32	1	25843
18	Shielded cable 9YSLCY-JB 4G1,5	1	17728
19	Thermal cut-out SP-141CS	1	10577
20	Capacitor MAB MKP 1/400/E1 UL	1	22081
21	Inverter VFD007EL21A	1	25425