



# RoboLabs

Incredible machines for fastfood & funfood

## Popcorn machine VPM-RGM2

### User manual



**Read this manual before use and keep for future reference!**

PDF version of this manual is available on [www.robolabs.pro](http://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-RGM2 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 100 kg/h
Rated voltage	400 VAC
Rated frequency	50 Hz
Rated current	42 A
Dimensions (LxWxH)	1220x810x1930 mm
Net weight	300 kg
Airborne acoustic noise	less than 70 dBA
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-RGM2	
_____	_____
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 cord 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 5-wire 3 phase 400 VAC 50 Hz power supply. Use the 63 A 400 V 50 Hz 3+N+PE connector in accordance with IEC 60309 standard. Short-circuit current rating for the machine is 6 kA.

### 2.4 Ventilation requirements

A ventilation hood measuring at least 1200x1200mm must be provided above the machine, with a minimum capacity of 2500 cu.m/h.

### 3 Design and principle of operation

#### 3.1 Main components

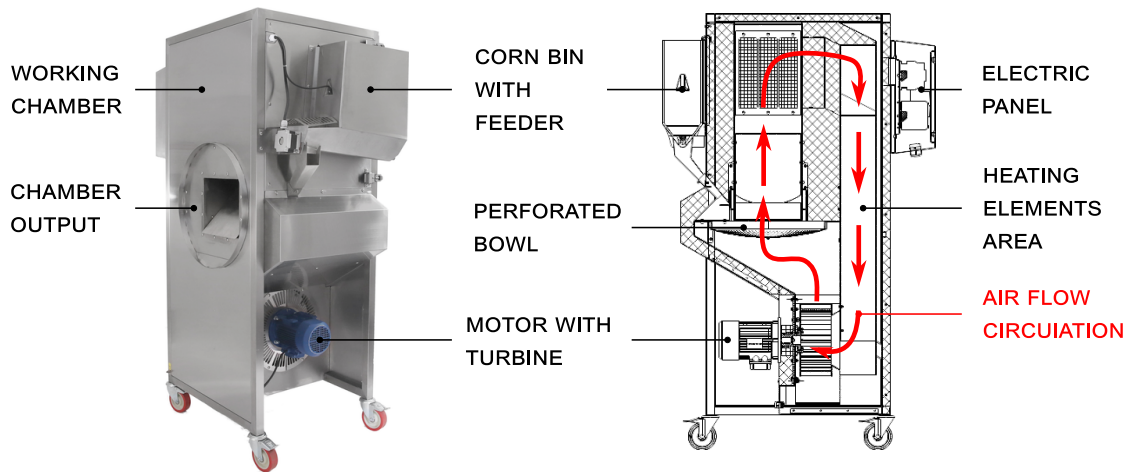


Figure 1: Main components

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 area**, 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 an auger inside the bin. The motor drives the auger, which pushes corn in the chamber. **Fixed guard** covers the rotating auger to avoid direct contact.

**Corn bin optical sensor** trips whenever the bin becomes empty. Once the sensor is tripped, the machine notifies an operator that the bin must be refilled.

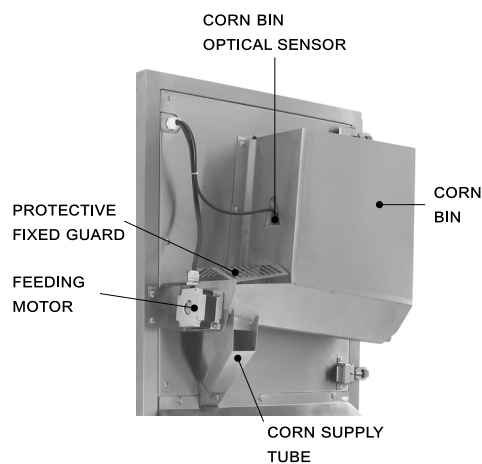


Figure 2: Corn bin with feeder

From the corn bin, corn kernels goes to **working chamber**, through the **corn supply tube**, see Fig. 3.

**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. Kernels eventually pop, and then being evacuated from the chamber by the means of air flow, through the **chamber output**.

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

**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. **Optical sensor** controls corn movement inside the chamber. Machine will not start next batch until a batch of corn is completely processed, thus avoiding chamber clogging with corn kernels and popcorn.

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

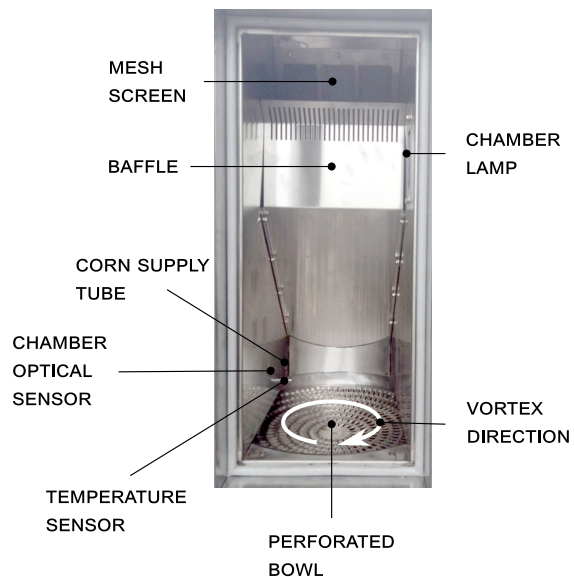


Figure 3: Working chamber

### 3.2 Controls

Control panel represented on Fig. 4.

**HMI panel** is used to control the machine, change the parameters of operation, and so on.

**START push button** turns the machine on.

**Emergency stop switch** shuts down the machine immediately at any moment.



Figure 4: Control panel



### 3.3 Stages of operation

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

#### Standby mode

Once the machine is turned on, the HMI panel boots up, and the machine is waiting for operator action. At this moment operator can:

1. Check and adjust parameters of the machine, and also reset to default.
2. Test corn feeder, turbine.
3. Start popcorn production process.

#### Heating stage

Once operator initiates the production process, the machine starts to heat up air in the chamber. Upon reaching the set value temperature the machine automatically starts popping process.

#### Popping stage

Machine processes corn kernels cycle by cycle. Each 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.
2. **Feeding** – corn kernels pushed into the chamber.
3. **Popping** – corn kernels are heated up in the chamber, eventually evacuated as they pop.

#### Pause stage

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 stage

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 the machine can be turned off.

## 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. Use only in case of emergency.
- **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.

### 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.**

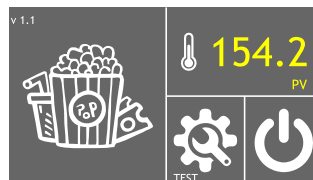
### WARNING




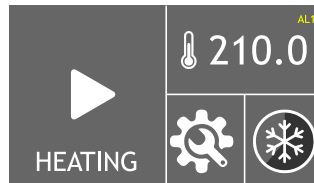
- **MAKE SURE FIXED GUARD IS SECURED** on its place (see Fig. 2). Touching rotating auger might cause hand or finger injury.

### 4.1 Operating order

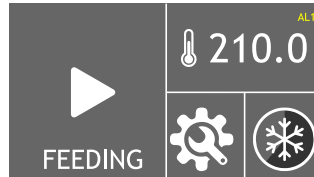
1. Make sure the chamber is clean. If not, clean the chamber.
2. Make sure the receiving device (e.g. sifter VPM-RGSM3EU) is running.
3. Fill the corn bin with corn kernels.
4. Press START push button on the control panel. Wait until HMI display shows the start screen. The yellow reading with PV means process value temperature. The white reading of the temperature represents the set value:



5. Press  to start heating up. The display reads HEATING:

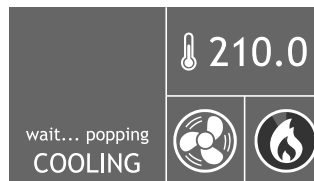



6. Once warmed up, the machine begins to execute production cycle. Each stage of the cycle is represented as 'FEEDING', 'POPPING' and 'PURGE':




7. To suspend the operation, press . To resume, press .

8. To finish the operation, press and hold  until 'COOLING' message appears:



9. To resume popping, press and hold .

10. Wait until the initial screen appears. Press and hold  to shut down the machine.

## 4.2 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 HMI interface

The HMI interface consists a range of screens (see Fig. 5), that provide ability of controlling and monitoring of machine operation, changing parameters of operation and settings of the machine, and also testing of the machine.

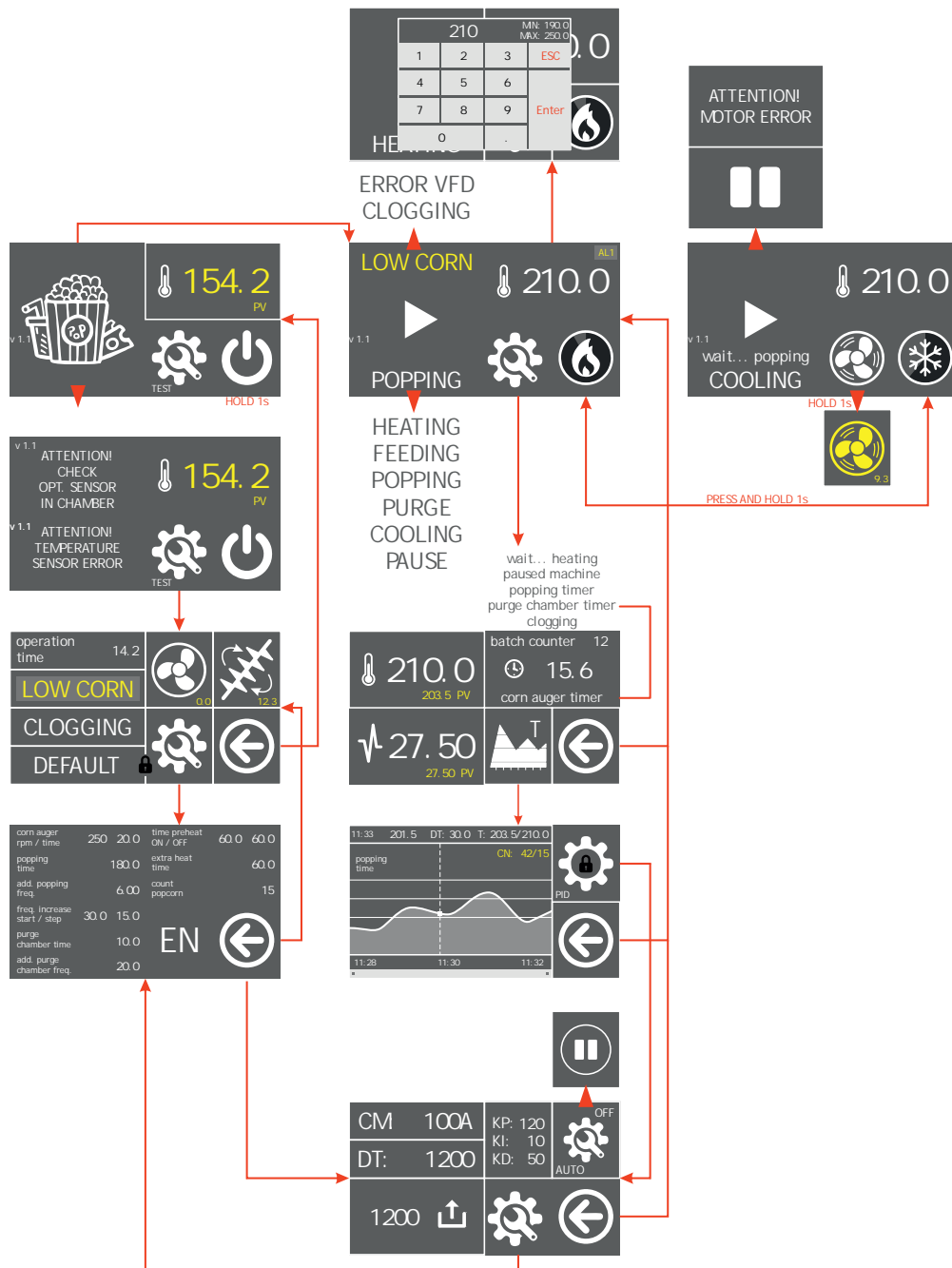


Figure 5: HMI screens flowchart

## 5.1 Initial screen

The initial screen (Fig. 6) appears first after machine turned on.

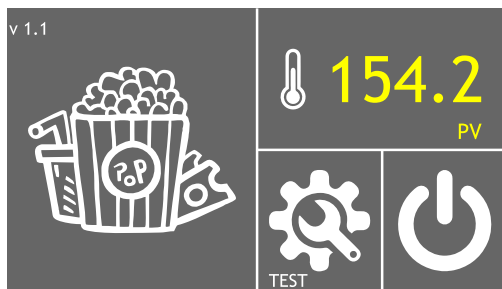


Figure 6: Initial screen

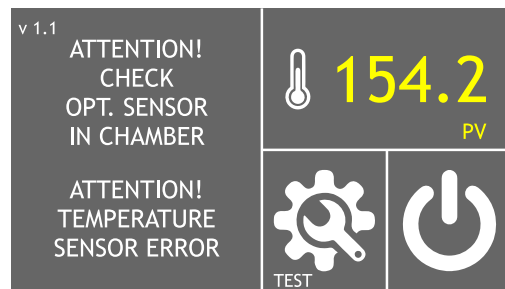






Figure 7: Error messages

v1.1 – version of software.

 154.2 PV – current temperature in the chamber.

 – press to start popping process.

 – press to enter the testing screen.

 – press and hold 1 sec to turn the machine off.

If chamber temperature sensor or chamber optical sensor needs to be checked, the machine will show the error messages, see Fig. 7.

## 5.2 Testing screen

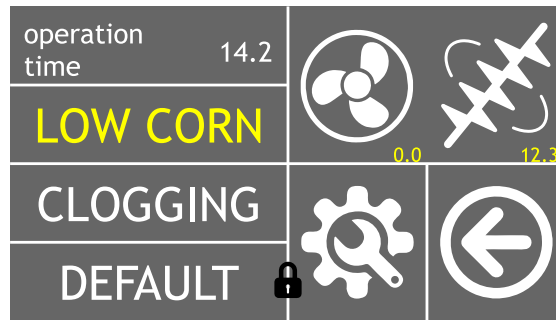



Figure 8: Testing screen


**Operation time 14.2** – Total operation time in hours.


**LOW CORN** – Corn bin sensor indicator. Yellow when tripped.


**CLOGGING** – Chamber optical sensor indicator. Yellow when tripped.


**DEFAULT** – Reset all settings to default (password required, see below).

 – Turbine ON/OFF button. Press once to start. Press again to stop. Reading in the right low corner adjacent to the sign is the turbine speed in Hz.

 – Auger start button. Press once to start a cycle of feeding. Reading in the right low corner adjacent to the sign is the auger cycle timer.

 – Press to proceed to the settings screen.

 – Press to enter password (2325) required to reset the settings.

 – press to return to the previous screen.

## 5.3 Settings screen


corn auger rpm / time	250 20.0	time preheat ON / OFF	60.0 60.0
popping time	180.0	extra heat time	60.0
add. popping freq.	6.00	count popcorn	15
freq. increase start / step	30.0 15.0	EN	
purge chamber time	10.0		
add. purge chamber freq.	20.0		

Figure 9: Settings screen

**Corn auger rpm/time** – Speed of corn auger and duration of feeding cycle, in seconds.

**Popping time** – duration of popping stage, in seconds.

**add.popping freq.** – increment for turbine speed during popping stage, in Hz.

**freq.increase start/step** – the turbine speed is changed from the basic speed set, see Fig. 13, to the basic speed plus **add.popping freq.** The speed is being changed gradually, in four steps. The first value (30 seconds) defines the moment when the turbine begins to accelerate (counting from the moment the feeder stopped). The second value (15 seconds) defines duration of each step.

**purge chamber time** – duration of purge stage, in seconds.


**add. purge chamber freq.** – increment for turbine speed during purge stage in Hz.

**time preheat ON/OFF** – Defines the heaters operation during heating up stage. For example 60/60 means that heaters are on for 60 seconds, then are off for 60 seconds.

**extra heat time** – forced heating time. In the beginning of each cycle heaters are operated at full rate, without PID-regulation, this helps to avoid significant temperature drop during the cycle.

**count popcorn** – count threshold for optical sensor in the chamber.

**EN** – press to change the language of the interface (RU/EN).

 – press to return to the previous screen.



## 5.4 Operation process screens

**LOW CORN** – error message (if error condition presents). the following options are possible:

- LOW CORN – Photoelectric sensor in the corn hopper is tripped. Refill the hopper.
- VFD ERROR – Turbine drive (VFD) has an error.
- CLOGGING – Chamber optical sensor is tripped.



– indicates that machine is in popping mode. Press to put machine in pause mode.



– indicates that machine is in pause mode. Press to put machine in popping mode.

**POPPING** – current status of operation, the following options are possible:

- HEATING – the machine is being heated up.
- FEEDING – corn feeding auger operates, loading batch of corn kernels in the chamber.
- POPPING – corn inside the chamber is being processed.
- PURGE – the machine increases the speed of turbine in order to remove un-popped kernels, dust and husk from the chamber, before loading next batch of corn.
- COOLING – the machine is being cooling down.
- PAUSE – the machine does not process corn, but maintains the working temperature in the chamber.



– working temperature set value. Press to change, see Fig. 11. Type the new value and press ENTER to confirm.



– press to move to process monitoring screen.



– indicates that the machine is not in cooling mode at the moment. Press and hold for 1 sec to switch to cooling mode, see Fig. 12.

**wait... popping** – indicates that machine needs to finish current production cycle before actual cooling down.



– press and hold for 1 sec to initiate a cycle of purge. During the purge, the sign becomes yellow and in the right low corner adjacent to the sign, the purge timer will be shown.



– press and hold for 1 sec to stop cooling process.



Figure 10: Operation process screen



Figure 11: Temperature change

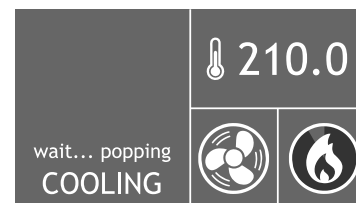


Figure 12: Switch to cooling

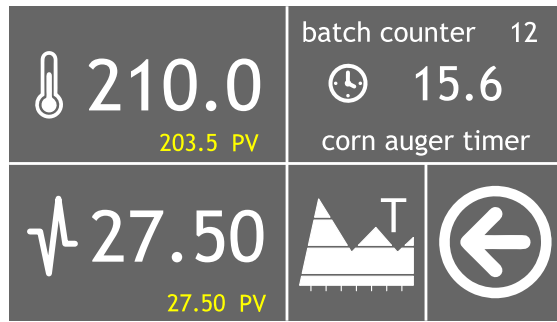


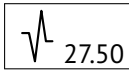
Figure 13: Process monitoring screen

## 5.5 Process monitoring screen



210.0 – working temperature set value. Press to change the value.

203.5 PV – current temperature in the chamber.



27.50 – set value for basic turbine speed. Press to change the value.

27.50 PV – current speed of the turbine.

batch counter 12 – batch counter (reset every time the machine is turned off).



15.6 – countdown timer for the stage of the operating cycle that takes place at the moment. Only shown when machine is in popping mode.

corn auger timer – the name of the stage that takes place at the moment (only when the machine is in popping mode), including:

- corn auger timer – duration of corn feeding auger operation, in sec.
- popping timer – duration of popping stage, in sec.
- purge chamber timer – duration of purge stage, in sec.

When machine is not in popping mode, the following messages appear here:

- wait... heating – indicates that the machine is in heating mode.
- paused machine – indicates that the machine is in pause mode.
- clogging – indicates that the chamber is clogged.



– press to move to the temperature graph screen.



– press to return to the previous screen.

## 5.6 Temperature graph screen

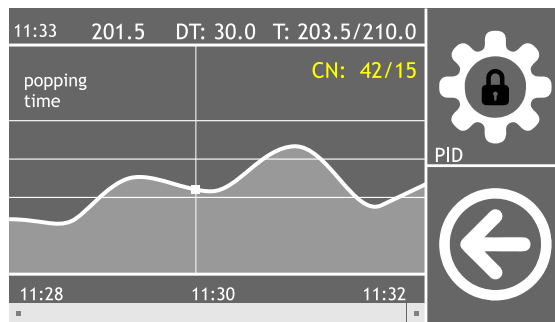


Figure 14: Temperature graph screen

**11:33** – Current time.

**201.5** – Temperature value at the point where the vertical dashed line intersects the temperature graph. Touch the line and drag left or right to move across the graph.

**DT:30.0** – Temperature delta parameter. Defines vertical scale for temperature. For example, DT:30.0 means that the display fits temperature within the range  $\pm 30^{\circ}\text{C}$  from the set value (middle line).

**T:203.5/210.0** – current temperature in the chamber (203.5), set value (210.0).

**CN: 42/15** – current value of popcorn counter (42), threshold value (15). See "count popcorn" in Settings screen section.



– press to move in the PID regulator screen (password required).



– press to return to the previous screen.

Scrolling bar in the low part of the screen allows to see the temperature graph changing in time. Time stamps are marked below the graph.

## 6 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.

### 6.1 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. 3.
4. Remove dust from internal surfaces of the chamber with the means of soft dry clean cloth. Avoid hard impact to the optical sensor, see Fig. 3.

### 6.2 Weekly cleaning

1. Perform daily cleaning procedures.
2. Clean the mesh screen (see Fig. 3) 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.

### 6.3 Conservation

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