RoboLabs

Incredible machines for fastfood & funfood

Popcorn machine
Grand Robopop 220 (VPM-RGM2EU)

400 V 50 Hz

User manual

Read this manual before use and keep for future reference!

PDF version of this manual 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 process other kernels than corn.
- DO NOT not leave running machine unattended.
- ALL swivel casters must be locked.

⚠WARNING

- Machine's surface might be HOT during the operation. Touching 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.

Contents

1 Overview

Grand Robopop 220 VPM-RGM2EU is a hot-air popcorn making machine (hereinafter “machine”). It can process both Butterfly and Mushroom popcorn kernels. The machine is intended for commercial use only.

1.1 Technical specifications

Throughput	up to 100 kg/h
Hopper volume	25 kg
Rated voltage	3N 400 VAC
Rated frequency	50 Hz
Rated power	24 kW
Dimensions (LxWxH)	1220x810x1930 mm
Weight	300 kg

1.2 Delivery set

1x Machine
1x Electric compartment key
1x Cleaning brush
1x Spare halogen lamp
1x User manual
1x Technical manual

1.3 Assembling and installation

1. Unpack the package carefully and check the delivery set.
2. Remove protective film from all surfaces.
3. Wipe all surfaces with a clean soft cloth dampen with dish soap. Remove soap residues. Wipe dry immediately.
4. Put the machine at even flat floor.
5. Lock all four swivel casters.
6. Connect to the power supply (see Power requirements section below).

1.4 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 5021 sign:

Use IEC 60309 3P+N+PE 63 A plug for connecting the machine. Short-circuit current rating for the machine is 6 kA at 400 VAC.

1.5 Ambient conditions

The 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).
A ventilation hood measuring at least 1200x1200mm must be provided above the machine, with a minimum capacity of 2500 cu.m/h. **NOTE: Ambient conditions have strong impact on the end product quality.**

1.6 Assembling

1. Unpack the machine carefully.
2. Check the delivery set.
3. Remove protective film from all surfaces.
4. Wipe outer surfaces with a clean soft cloth dampened with a mild soap. Wipe dry immediately.
5. Install on dedicated place. For space requirements see Appendix A.
6. Lock all four swivel casters.

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

2 Design and principle of operation

2.1 Principle of operation

The machine and its main parts are represented on Fig.1. Principle of operation is the following.

Turbine (5) creates airflow circulating through the chamber (3), then to heating elements area (6), and then back to the turbine. The direction of airflow is shown in red arrows.

Corn kernels are supplied from the corn bin with feeder (4) in the chamber.

Once popped, popcorn is being blown out of the chamber through the output port (1).

Operator uses control panel (2) to control the machine operation.

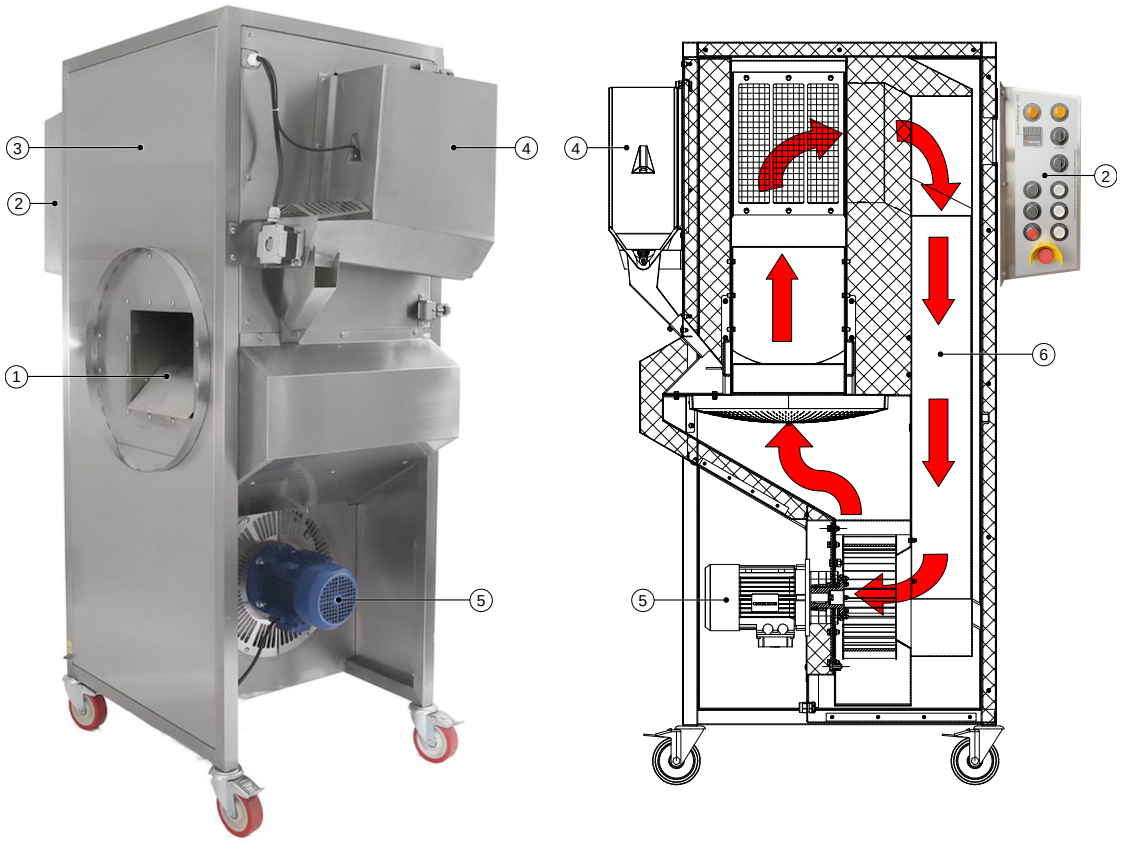

Figure 1: Main components

2.2 Working chamber

Opened chamber is shown on Fig.2.

Perforated bowl (1) has special shaped holes, that allow to create the air vortex as air flow comes in from the turbine.

Corn kernels is fed into the chamber from the corn supply tube outlet (4).

Chamber temperature sensor (2) constantly measures temperature in the chamber.

Optical sensor (3) 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.

Baffle (5) divides the chamber to separate the area where corn kernels are being heated up, and the output area.

Mesh screen (6) protects internal air ducts from being clogged with popcorn dust and scrap.

Back light (7) illuminates the chamber, so the operator can visually control the process through the observation port in the chamber door.

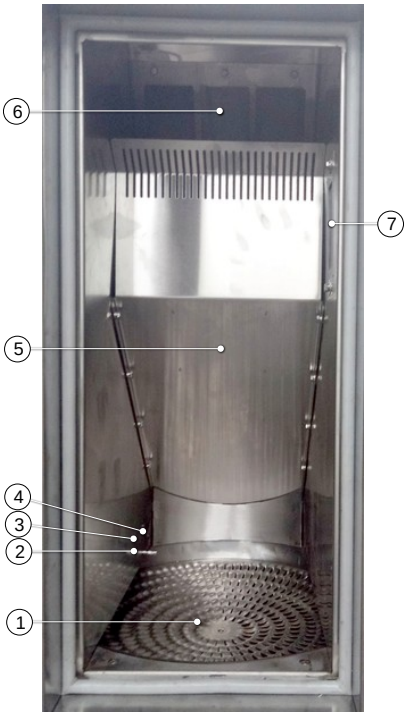

Figure 2: Chamber

2.3 Control panel

⚠WARNING

- Using Emergency stop switch during normal operation might lead to chamber clogging with popcorn, smoke formation, or machine failure. USE EMERGENCY STOP SWITCH ONLY in case of emergency!

There are following items on control panel, see Fig.3:

1 – Turn off button; 2 – Pause button; 3 – Start button; 4 – Temperature regulator; 5 – Clogging indicator; 6 – Low corn indicator; 7 – Feeding switch; 8 – Turbine switch; 9 – Heating indicator; 10 – Popping indicator; 11 – Cooling indicator; 12 – Emergency stop button.

Temperature regulator

Temperature regulator is used to control temperature in the chamber.

Light indicators

CLOGGING – chamber is clogged
LOW CORN – corn is low or no corn.
HEATING – machine is in heating mode.
POPPING (glows) – machine is in operation mode.
POPPING (blinks) – machine is in pause mode.
COOLING – machine is in cooling mode.

Switches

FEEDING – weight of a single load.
TURBINE SPD – turbine speed increment.

Push buttons

START – turns machine on.
PAUSE – turns on pause mode and resume popping mode.
TURN OFF – turns machine in cooling mode.
EMERGENCY STOP – immediately shuts the machine off.

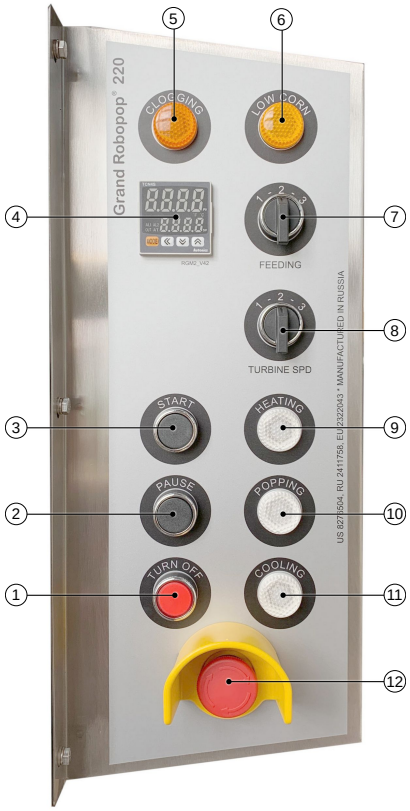

Figure 3: Control panel

2.4 Corn bin with feeder

⚠WARNING

- Burn hazard! Hot air may comes out from the machine through the corn supply tube (pos.1 Fig.4). DO NOT touch or reach into the corn supply tube. KEEP OFF this area.

Corn bin with feeder is shown on Fig.4.

Corn kernels is loaded in the corn bin (5). Inside there is a feeding auger, that is driven by the motor (2). When the motor (2) operates, corn kernels are being pushed to the corn supply tube (1) that directs corn kernels into the working chamber.

Protective fixed guard (3) prevents direct access to the exposed part of feeding auger.

Photoelectric sensor (4) trips whenever the bin becomes empty. Once the sensor is tripped, the machine notifies the operator that the bin must be refilled.

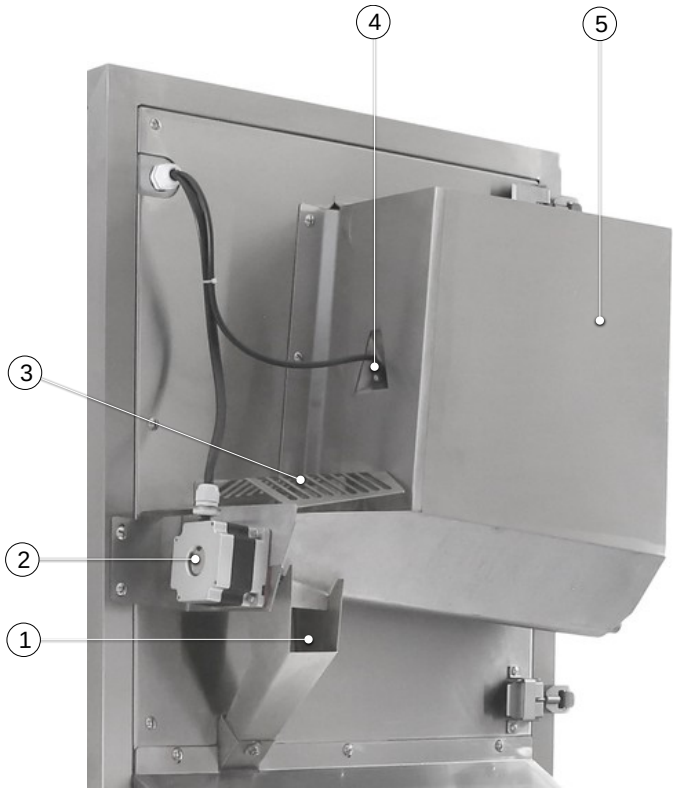

Figure 4: Corn bin with feeder

2.5 Modes of operation

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

Heating mode

Once the machine is turned on, it automatically starts to heat up air in the chamber. Upon reaching certain temperature the machine automatically switches to popping mode.

Popping mode

This is the main mode of operation. Machine processes corn kernels batch by batch, in cyclic mode. Each cycle consists of three stages:

1. **Feeding** – hopper auger rotates, pushing corn kernels into the chamber.
2. **Popping** – corn kernels are being heated up in the chamber, eventually being blown out from the chamber once popped.
3. **Purging** – turbine is accelerated in order to blow out everything left in the chamber: unpopped kernels, dust and other scrap.

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 the machine turns off automatically.

3 Intended use

3.1 Operating order

1. Ensure the chamber is clean.
2. Ensure the receiving device (e.g. VPM-RGSM3EU sifting drum) is running.
3. Fill corn bin with corn kernels at least for 3/4 of its volume.
4. Press START to turn the machine on. Machine begins to heat up.
5. Once machine reaches set temperature, it starts to make popcorn automatically.
6. If you want to suspend the operation, press PAUSE once. To resume the operation, press PAUSE one more time.
7. To end the operation and turn the machine off, press COOLING. Heating is turned off, but turbine continues its operation in order to cool down the machine enough to turn off safely.
8. Once machine cooled down enough it turns off automatically.

3.2 Chamber clogged with popcorn

⚠CAUTION

- **DO NOT PANIC** if chamber is clogged.
- **DO NOT OPEN** chamber.
- **DO NOT USE** fire extinguisher. The machine is made of stainless steel, as long as chamber is closed, popcorn won't get fire.

The optical sensor (pos.3 Fig.2) protects the machine from clogging. The new portion of corn won't be pushed in the chamber until the previous batch is processed and left the chamber. Thus the possibility of clogged chamber is minimal. However, the chamber may be clogged due to various reasons, for example:

- Power supply issues (voltage drop, power cut-off, etc.).
- Actuating Emergency stop switch.

If chamber is clogged, do the following:

1. Disconnect machine from the mains.
2. Wait until machine cools down (may take few hours).
3. Open the chamber and clean inside.
4. If corn supply tube is clogged with corn kernels and popped popcorn, use a cleaning brush from the delivery set.

4 Settings

4.1 Popping temperature

Temperature regulator has Process value (PV) display (1), Set value (SV) display (2), and adjusting keys (3), see Fig.5:

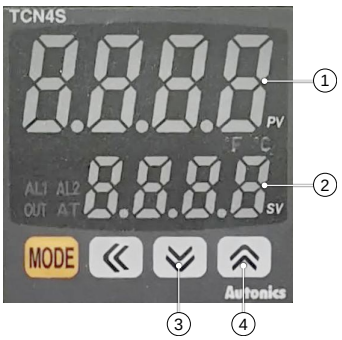

Figure 5: Temperature regulator panel

Popping temperature affects shape and size of popcorn. Too high temperature leads to smaller popcorn and possible chamber clogging. Too low temperature leads to reduced productivity, improperly popped kernels, and clogged chamber. Choose the exact value that provides the best result for particular corn. Normally, Butterfly corn requires 200-215°C (392-419°F); Mushroom 210-225°C (410-437°F). Too high temperature causes shrink volume of popcorn. Too low temperature causes reduced output.

Process value display (1) reads the current temperature in the chamber, Set value display (2) reads the value defined by user. Press ⏬ to decrease the set value. Press ⏫ to increase the set value.

NOTE: During normal operation PV may fluctuate, this is normal.

4.2 Feeding time

Feeding time is the duration auger operates pushing corn kernels to chamber. FEEDING switch allows to set 35 seconds (1), 40 seconds (2), and 45 seconds (3). Longer time of auger operation means more corn processed per cycle.

Machine uses chamber optical sensor (pos.3 Fig.2) to control the process. It won't start the new batch of corn until the previous batch has not processed yet. For this reason, Feeding time does not directly affect the overall production of the machine.

Choose the feeding time depending on performance of a certain corn. For example, if corn has too much moisture, bigger load of corn per batch might cause deeper temperature drop, unstable operation of the machine, and eventually, poor quality end product. For more stable operation while using low quality corn, it is recommended to keep Feeding time at minimum.

4.3 Turbine speed

Turbine speed for Mushroom should be higher than for Butterfly. Unlike Mushroom, which has proper spherical shape, Butterfly has irregular shape with “winglets”; hence less intense airflow is required to blow out Butterfly popcorn; and more intensive airflow is required for Mushroom.

Alike the popping temperature, excessive values of turbine speed may cause a bunch of issues. Too slow turbine will cause popcorn accumulation in the chamber, smoldering, smoke formation, and finally, chamber clogging. Too fast turbine increases scrap rate, because many kernels are blown out of the chamber before they pop. Airflow intensity can be reduced because of clogged metallic mesh inside the chamber. See **Maintenance and cleaning** section.

The Vortex patented technology is based on air convection inside the machine. Airflow is created by the turbine (blower) that is being controlled by the machine’s algorithm. During popping stage the algorithm gradually increases the turbine speed, starting from the basic speed (F) set on the inverter (VFD). How much the speed will be increased over the whole popping cycle is directly depended on TURBINE SPD position. Positions 1, 2, 3 corresponds to increments of 6 Hz, 8 Hz, and 10 Hz, respectively.

Watch the chamber through the observation port after feeding cycle is completed. If corn kernels do not move around the perforated bowl for more than 60 seconds, increase the basic speed F.

Too high basic speed (F) and/or too high value of speed increment (set by TURBINE SPD) might cause higher scrap rate. Too low values might lead to chamber clogging. Choose both values based on performance of particular corn so that to minimize the scrap rate, from one side, and to avoid chamber clogging, from the other side.

Basic speed (F) adjustment procedure

⚠DANGER

- **Electric shock hazard!** High voltage inside electric panel. DO NOT touch bare terminals and/or wires.
- Only skilled person is permitted to perform the following operation.

To change the basic speed (F) do the following:

1. Open the electric panel of the machine.
2. Locate the VFD unit with control panel, see Fig.6.
3. Ensure the display reading starts with F. If not, press MODE one or more times, until F reading appears on the display.
4. Press ▲ or ▼ keys to increase or decrease the basic speed.
5. Close the electric compartment.

Figure 6: VFD control panel

5 Popcorn quality

Popcorn is a product that requires ultimate attention towards many aspects. Understanding popcorn processing technology is essential to get high quality product.

5.1 Raw corn

It is impossible to get good stable result using low quality supplies, first of all, raw corn kernels. Choose reliable corn suppliers. Make sure that raw corn is stored and handled properly at your production site or warehouse. Ask your supplier for corn storage recommendations.

5.2 Moisture content

Popcorn is crunchy when its moisture content doesn't exceed 1-1,5%. Popcorn that just came out of the machine usually has higher moisture rate (4-5%), it is still losing moisture as cooling down. At this moment it may appear soggy and chewy. You must arrange the workflow in such a way that popcorn has enough time to cool down before the next stage of processing, coating, for example.

5.3 Production capacity

Due to the nature of popping process, the weight of raw corn processed is not the same as the weight of ready-to-eat product at the machine's output. The difference might be up to 20%. Low quality corn or improperly chosen parameters may increase the difference.

If corn used is too dry, or there is a lot of damaged kernels, then there will be a lot of unpopped kernels screened in sifter and found in the scrap tray.

If turbine speed is set too high, a lot of kernels will be blown out before they would have been popped.

Scrap amount might be up to 5-7% (by weight, compared to the weight of raw corn processed). If scrap rate exceeds this value, then the reason might be low quality corn or too high turbine speed.

6 Maintenance and cleaning

⚠DANGER

- **ALWAYS UNPLUG** equipment before cleaning or servicing.
- **DO NOT USE** excessive water or water jet for cleaning. **DO NOT SPILL** water on electric panels or electric parts.
- Keep power cord and plug off the floor and water.

⚠WARNING

- Burn hazard! **WAIT** until cooled down before cleaning.

⚠CAUTION

- **DO NOT USE** aggressive solutions, or 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. If machine is not used for long time, do all the cleaning procedures.

Recommended cleaning schedule:

Outer surface cleaning	every day
Chamber cleaning, including mesh screen	every day
Feeder cleaning	every month

6.1 Outer surface

1. Unplug the machine.
2. Clean outer surfaces of the machine with a clean soft cloth or sponge dampened with cleaning solution.
3. Wipe dry immediately.

6.2 Chamber

1. Open the chamber.
2. Remove unpopped kernels from the perforated bowl, (pos.1 Fig.2).
3. Remove dust from internal surfaces of the chamber with the means of soft dry clean cloth. Avoid hard impact to the optical sensor, (pos.3 Fig.2).
4. Clean the mesh screen (pos.6 Fig.2) with a suitable brush or a vacuum cleaner.
5. If the mesh screen is heavily clogged with dust and scrap, then do the following:
   (a) Remove the screws that hold the baffle (pos.5 Fig.2).
   (b) Take the baffle out from the chamber.
   (c) Clean the mesh screen.
   (d) Put baffle back on its place and secure the fasteners.

6.3 Corn bin with feeder

1. Empty the corn bin.
2. Wipe internal surfaces of the bin with a soft clean damp cloth.
3. Wipe dry immediately.

Use a soft dry clean cloth to clean the feeder inner surfaces. It is allowed to use a vacuum cleaner to remove dust from inside the feeder.

7 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 +55°C.

8 Quality control check

Grand Robopop 220, VPM-RGM2EU

Product name, 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

9 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!

10 Manufacturer details

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Technical support:
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Phone: +7 495 956 4000

A Dimensions

NOTE: VPM-RGSM3EU sifting drum is not included in the delivery set and shall be ordered separately.

All dimensions are in mm: