Production of «North Engineering Company»

TM SIKOM

PRF - 11/900

AUTOMATIC ELECTRICAL DOUGHNUT FRYER

ТУ 5151-017-48956771-2008

OPERATING MANUAL



Russia
Saint Petersburg

PRF-11/900 is intended for cooking mixture and traditional yeast doughnuts in an automatic mode.

The machine is a light, compacted, portable, easy to install device.

The machine is convenient to use in the sight of customers in places of selling: in shops, trading pavilions, fairs, parks etc.

Since the moment of dough loading, the machine carries out all technological operations automatically up to obtaining finished donuts.

The cutter of the PRF-11/900 donut machine can be equipped with a removable plunger pair for forming donut pieces of different shape and weight.

The machine has a built-in safety system (protection against overheat) switching on automatically when turning on the machine.

The machine can operate both on fry fat and refined vegetable oil.

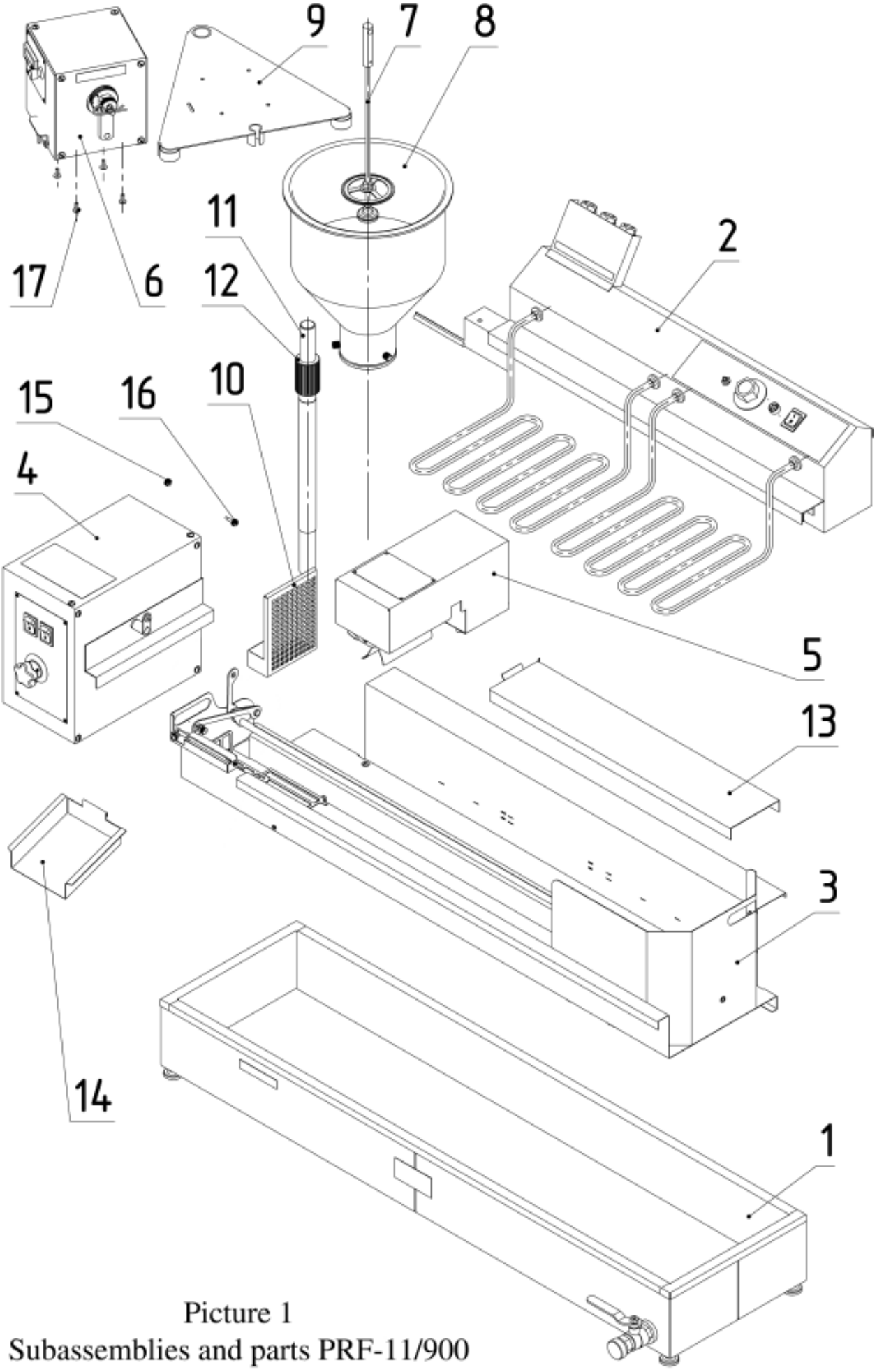
The possibility to adjust the output of the machine allows to use visual operation of the system (process of forming, frying, overturning, unloading) as the dominant of a trading point and to draw attention of the customers.

PRF-11/900 donut machine consists of the following parts (fig. 1):

1. Frying tank
2. Tubular heating elements (THE) unit
3. Tray with overturning and unloading mechanism
4. Control device (control unit)
5. Impeller drive
6. Cutter drive
7. Cutter piston
8. Cutter hopper
9. Platform
10. Filter
11. Post
12. Female screw
13. Deflector
14. Slide
15. Female screw
16. Male screw
17. Male screw M4x7,5; PZ-2.

All the details, except the frame of the cutter, are made of AISI 304 or 12X18H10T stainless steel.

The frame of the cutter is made of AD1M food aluminum alloy.



Picture 1
Subassemblies and parts PRF-11/900

Characteristics.

Electric supply ……...400/230 V / 50-60 Hz
Power rating, Wt ……5150
Capacity of the frying tank, l. ……16
Heating time, min. ……not more then 20
Capacity of the cutter hopper, l. ……7
Plunger pair (diameter), mm ……...30
Donut weight, gr. ……20-60

Maximum output
(for donuts up to 50 gr. weight)
traditional
(made of yeast dough), pieces per hour ……450
American donuts
(made of mixture), pieces per hour……...600
Maximum output
(for donuts of 60 gr. weight)
traditional
(made of yeast dough), pieces per hour ……..300
American donuts
(made of mixture), pieces per hour 450
Weight of the machine, kg. ……35
Weight Gross, kg. .....……38
Dimensions, mm
length ……1200
width ……550
height with the cutter 600

Class of an electro security in accordance with GOST R 51375-99; GOST R MEC 335-1-94 + amendment 1-1998 + amendment 2-2000; GOST R 51318.14.1-99; GOST R 51318.14.2-99.....1
Protection in accordance with GOST 14254-96.... IP20

Delivery set.

The delivery set includes:

1. Frying tank 1
2. THE unit 1
3. Tray with turning & unloading mechanism 1
4. Control device (control unit) 1
5. Impeller drive 1
6. Cutter drive 1
7. Cutter piston 1
8. Cutter hopper 1
9. Platform 1
10. Filter 1
11. Post with female screw 1
12. Deflector 1
13. Slide 1
14. Tongs 1
15. Pack box 1
16. Operating instructions 1
17. Socket 1
18. Removable plunger pair

Operating principle.

The operating principle of PRF-11/900 automatic donut machine is based on automatic forming of donuts from yeast dough or a special mixture (baking mixture) for American doughnuts, frying them in fry liquid in the frying tank divided into two streams, automatic turning and unloading of finished donuts.

Automatic forming of donuts is carried out by cutter with dough hopper (8) (pic.1), electro-mechanic drive (6) and piston (7), which extrudes a dough piece in the shape of a donut out of the hopper into the frying tank (1). Donut weight can be adjusted by the weight adjustment mechanism, which is located on the cutter drive.

A formed donut drops into the frying tank with heated fry fat or oil onto the deflector (13), rises up to the surface and moves with the flow of fry liquid down the streams of the frying tank.

A circular flow of fry liquid is provided by the impeller (5) half-drowned into fry liquid and making necessary pressure, and the stream shield, which divides the frying tank into two communicating streams with forward and backward flow of fry liquid. The tray screens the flow from the obstacles (THE) and limits the mass of moving fry liquid, which ensures steadiness, evenness and necessary pressure of the flow all over the perimeter of the frying tank in the forward and backward streams.

At the end of the forward stream the turning skimmer carries a donut over into the backward stream with the help of the mechanism of turning and unloading. The skimmer also turns a donut onto the other side (the other side of a donut starts to fry). When skimmer lifts up with a donut, the flap also lifts by the spring and does not allow other donuts to float in under the skimmer returning to the original position. When the skimmer goes down it presses the flap to the bottom of the tray and clears the path for the next donut.

The skimmer of unloading at the end of the backward stream throws a donut out of the frying tank into the slide and from there – onto any dish. The edge of the skimmer does not allow a donut to float in the area of moving parts of the mechanism of turning and unloading. When the skimmer is lifted up, the flap does not allow the next donut to float in under the skimmer.

The time of a donut's being in each stream (time of frying) must be constant for donuts of the same weight in order to reach the same organoleptic properties of donuts regardless of the output settings of the machine. It is achieved by adjusting the correspondence of output settings to the quantity of donuts being fried simultaneously in both streams. Adjustment of output is enabled by step-by-step mode of the machine – synchronous work of the cutter drive and the donut feeding drive ensures forming a new donut simultaneously with throwing out finished one, turning over a donut from the forward stream into the backward one, and advancing donuts in both streams by the size of one donut.

The synchronization is executed by the control device (4), which gives commands to the cutter drive (6) and the mechanism of turning and unloading. Thus steady operation of the machine with any output settings is ensured.

The maximum output is achieved when there is maximum quantity of donuts in the frying tank simultaneously.

Preparation for work.

Carefully take the parts of the machine out of the package, check the delivery set. Remove a protective film from metal surfaces (at its presence).

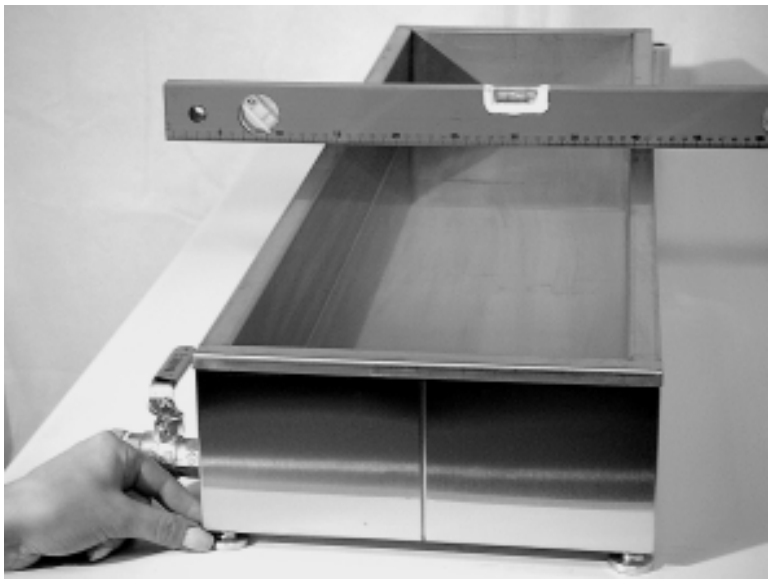


Wipe THE block, control device, impeller and cutter drive with a damp fabric, then wipe dry. It is forbidden to wash all the sets mentioned above under a jet of water or dip it to the water! Other parts of the device wash up in a soap solution and wipe dry.

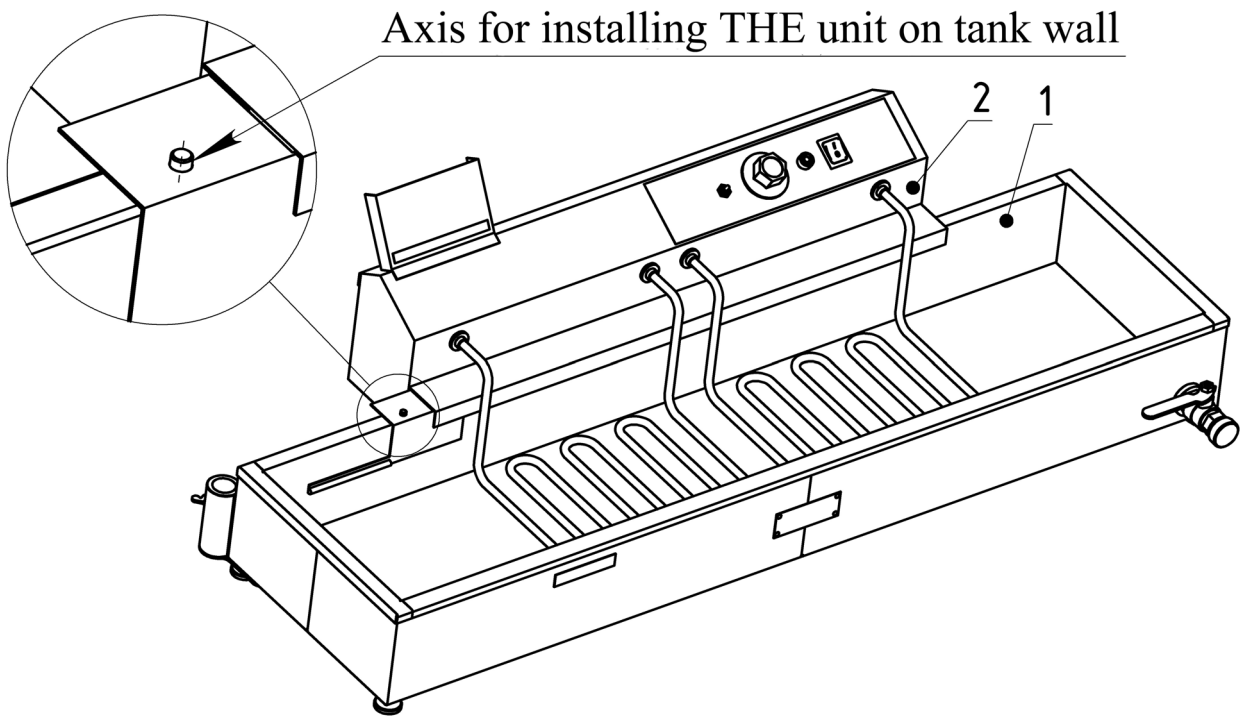
While assembling the machine, you must keep to the following sequence:

1. Setting the frying tank.

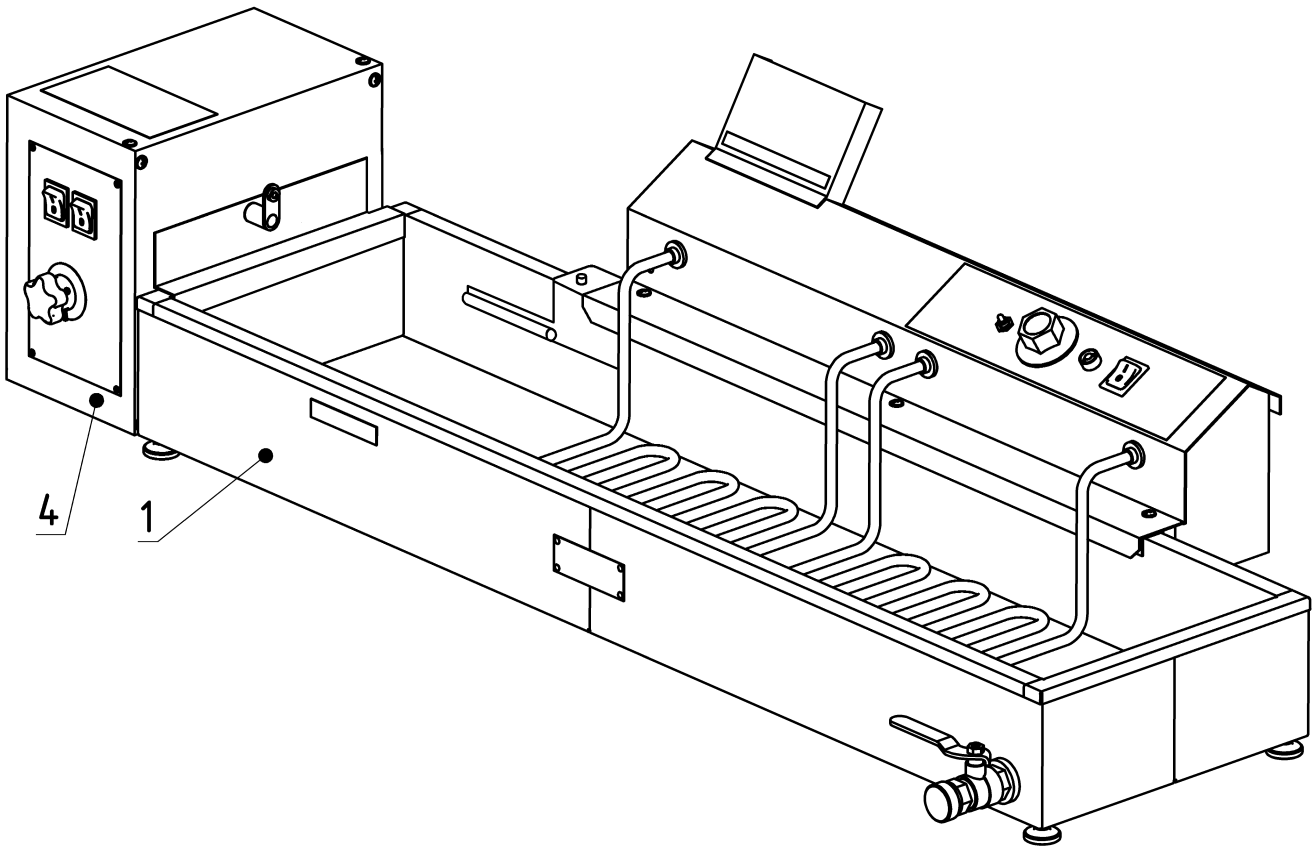
Set the frying tank (1) onto a prepared beforehand working place. With the help of level (not included in the delivery set) horizontalize the tank by rotating the legs .



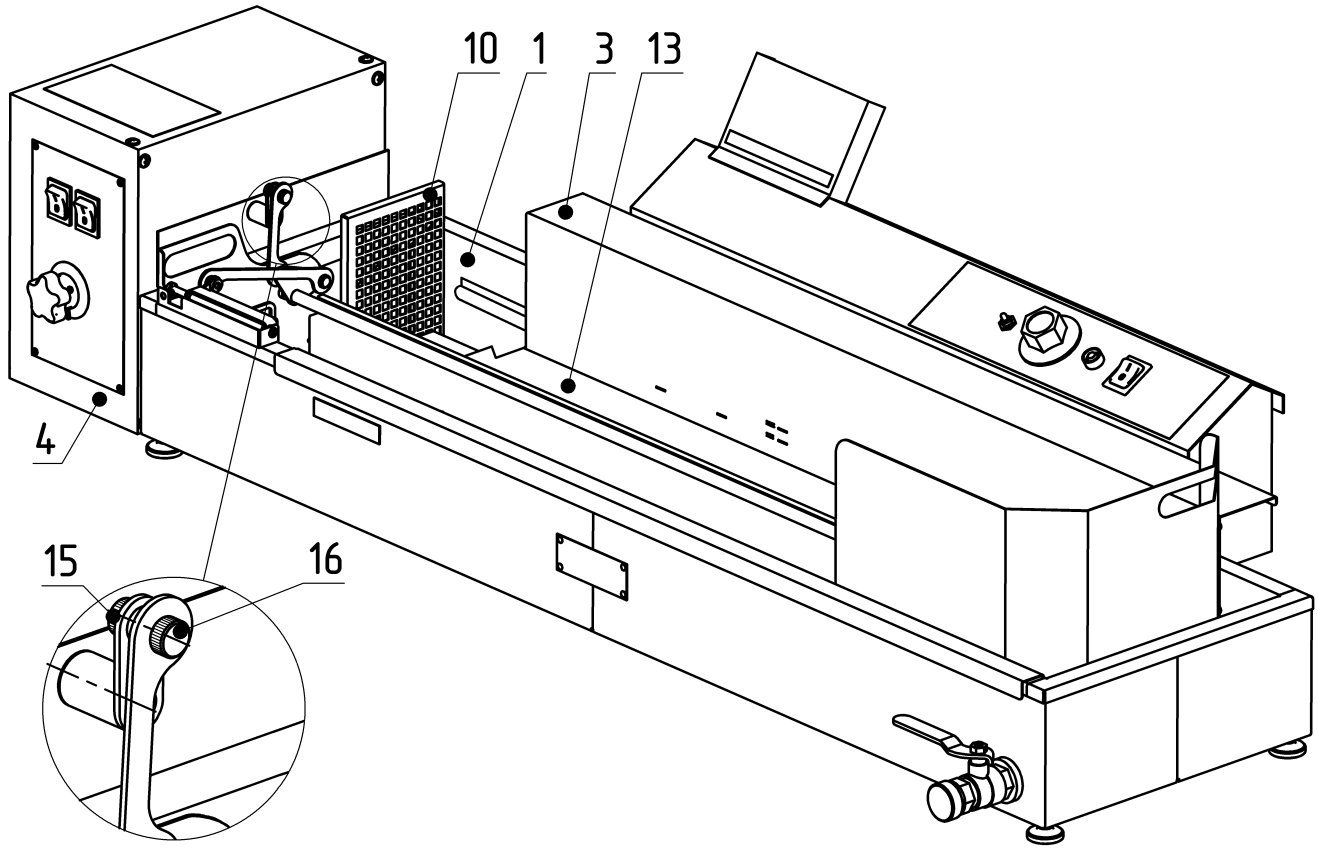
2. Put THE unit (2) onto the wall of the tank (1), so that you unite the corresponding hole (on the left) with the mounting axis (on the tank wall).



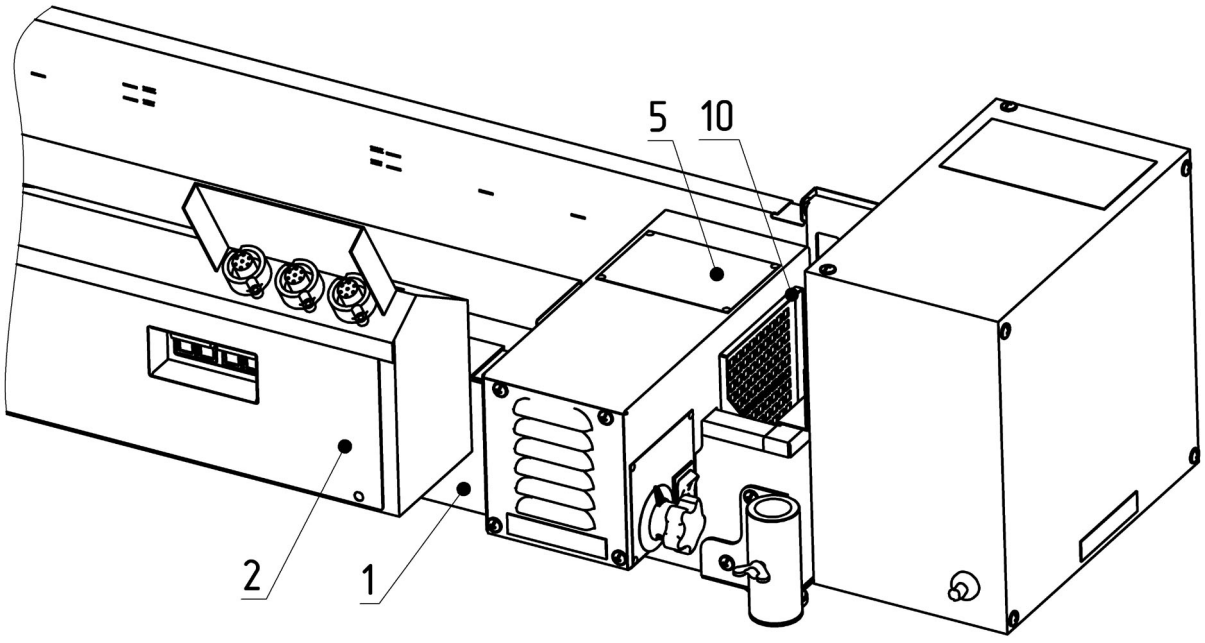
3. Set the control device (4) on the left wall of tank (1). Be sure that the case of control device (4) is set tightly on the wall.



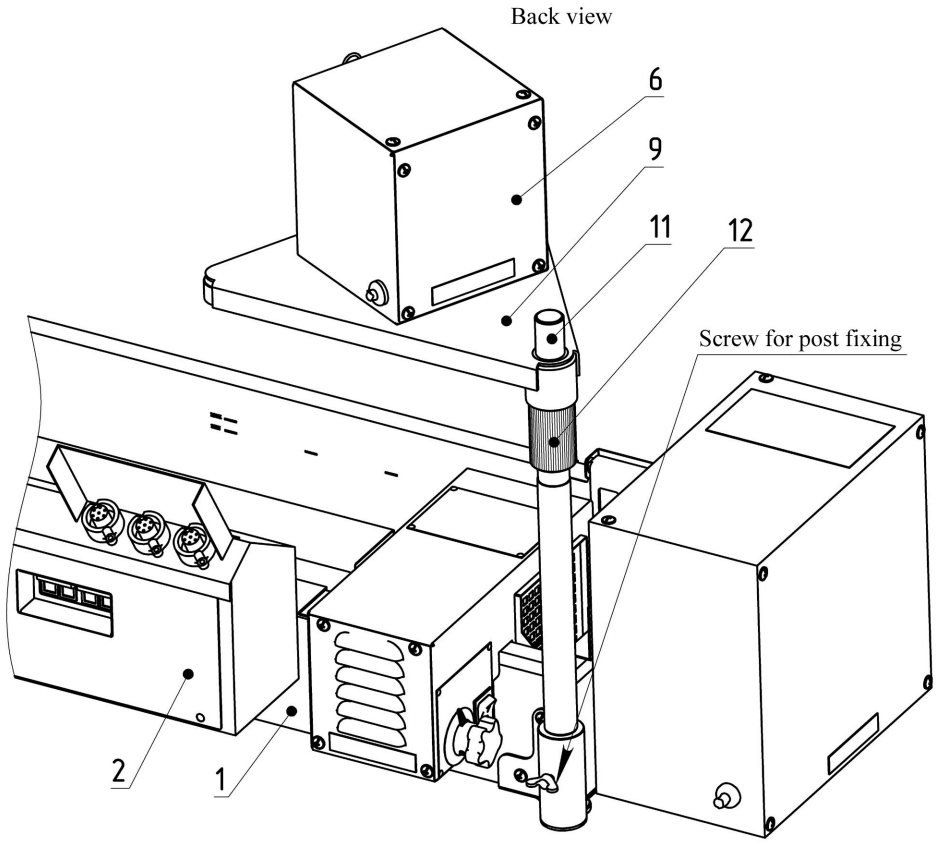
4. Insert the tray with the turning & unloading mechanism (3) on the front wall of the tank (1). Be sure that the tray (3) is tightly set on the tank wall (1). Unite the lever of turning & unloading mechanism (3) with the crank lever of the control device (4) using male screw (16) & female screw (15). Screw them up to the stop. Put filter (10) to the frying tank (1) to the side of set control device (4). Set deflector (13) as shown on the picture below.



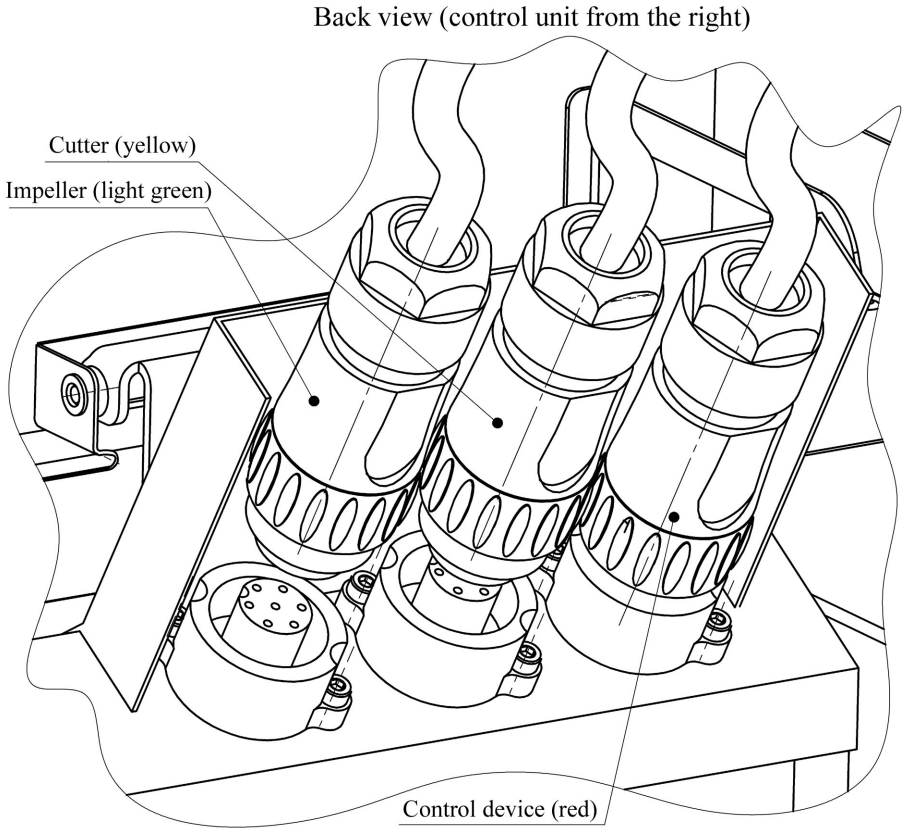
5. Set the impeller drive (5) on the back wall of frying tank (1) between filter (10) & THE block (2).



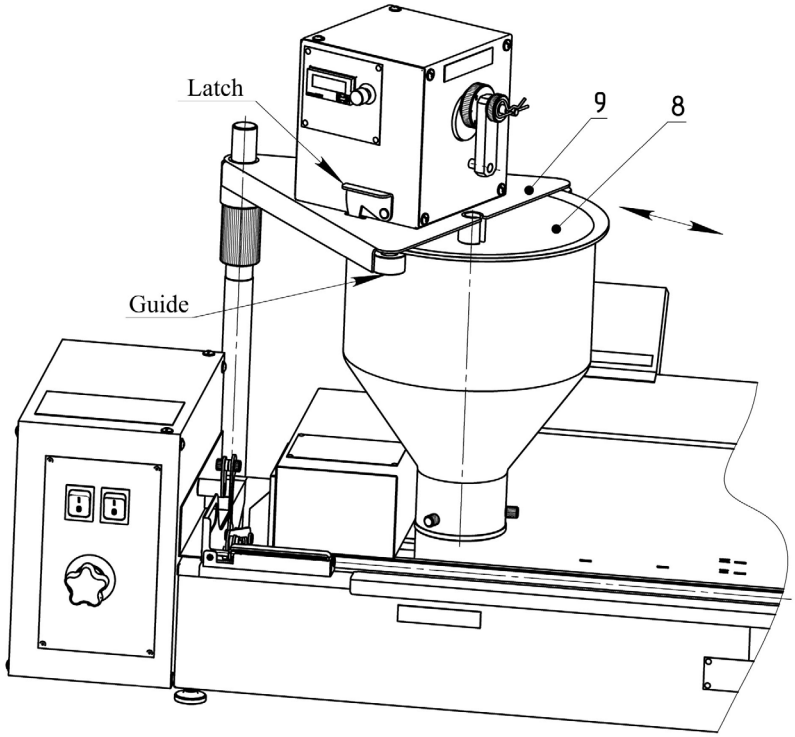
6. Insert post (11) with female screw (12) into the bearing of frying tank (1) & tight with the screw. Put from above the platform with cutter drive to the post (11) up to the stop to the female screw (12).



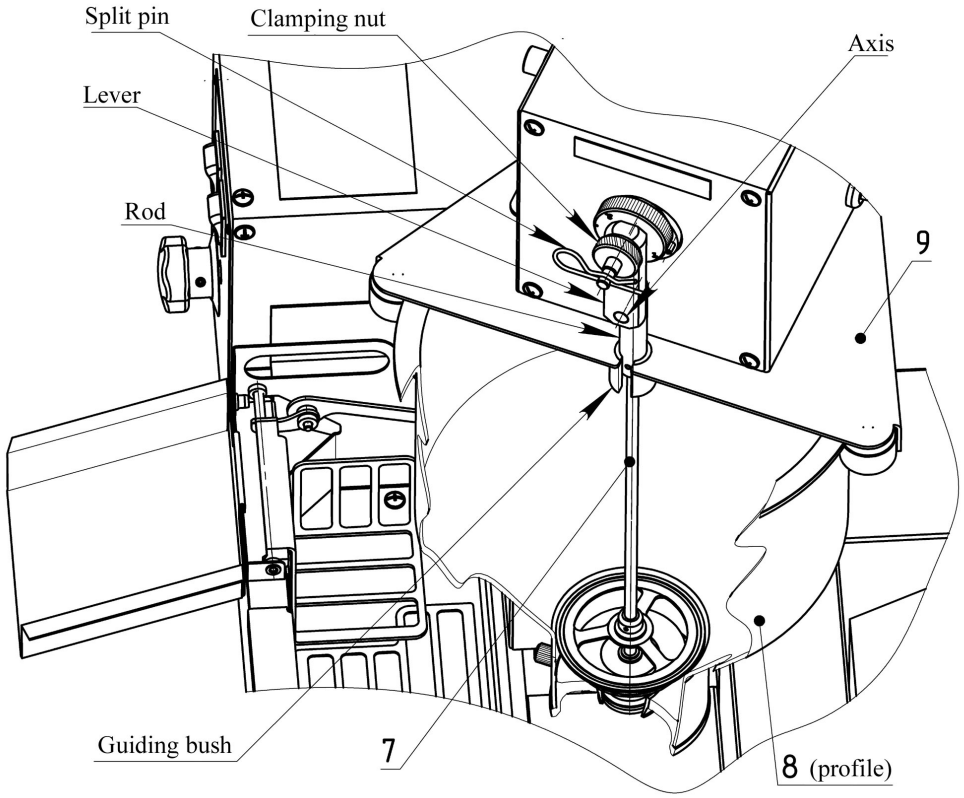
7. Cutoff points of control device (4), impeller drive (5) & cutter drive (6) connects to the corresponding cutoff points (see the colors as on the picture) in THE block (2).



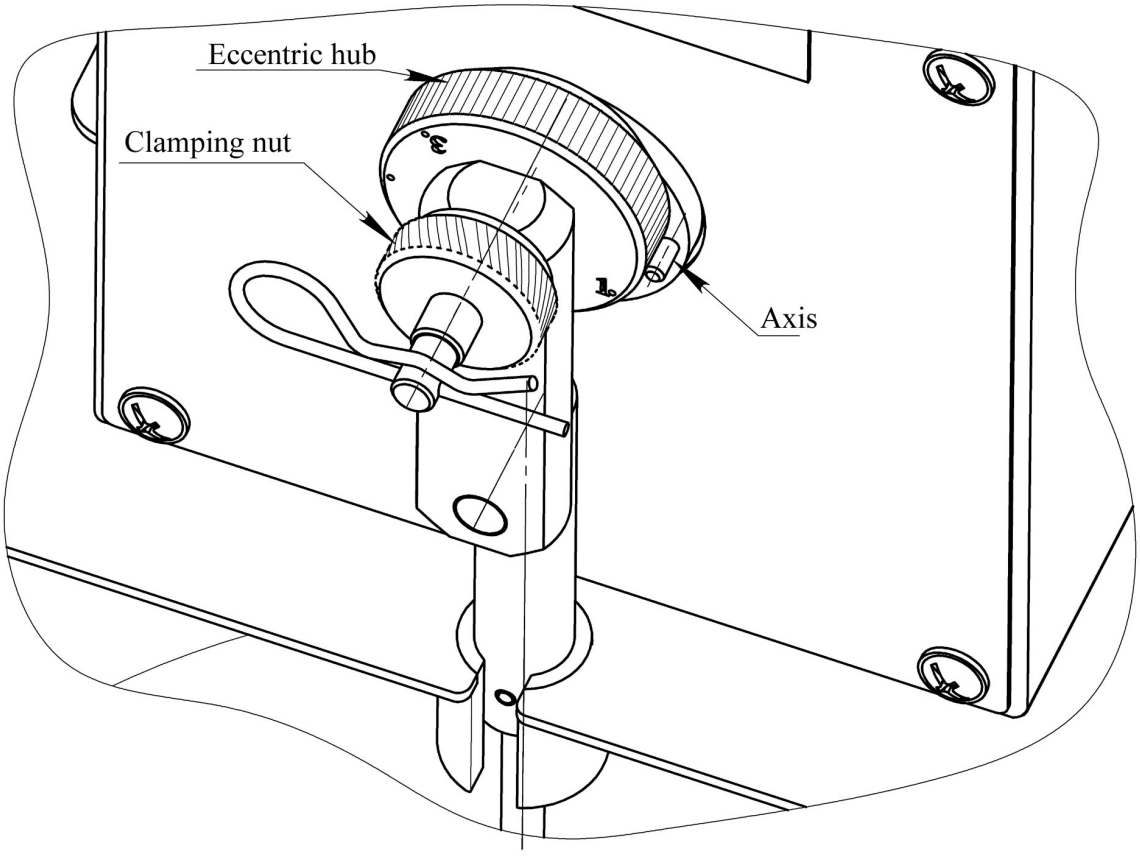
8. Put the latch (on the case of cutter drive (6)) up to the stop (clockwise). Slide cutter hopper (8) into the platform (9) up to stop (arrows show the direction of installation & taking away). Then put the latch down (anticlockwise) & lock in the cutter hopper (8). Rotating the platform (9) move the hopper in the middle of stream (3) to the right of impeller.



9. Put the cutter piston (7) to the cutter hopper. Unscrew the female screw up to stop to the split pin. Move the lever of cutter drive (6) from its case & turn it aside. Bring the rod of the cutter piston (less diameter) in the groove of the guiding bush of the platform (9). Put the lever axis to the rod tip hole.

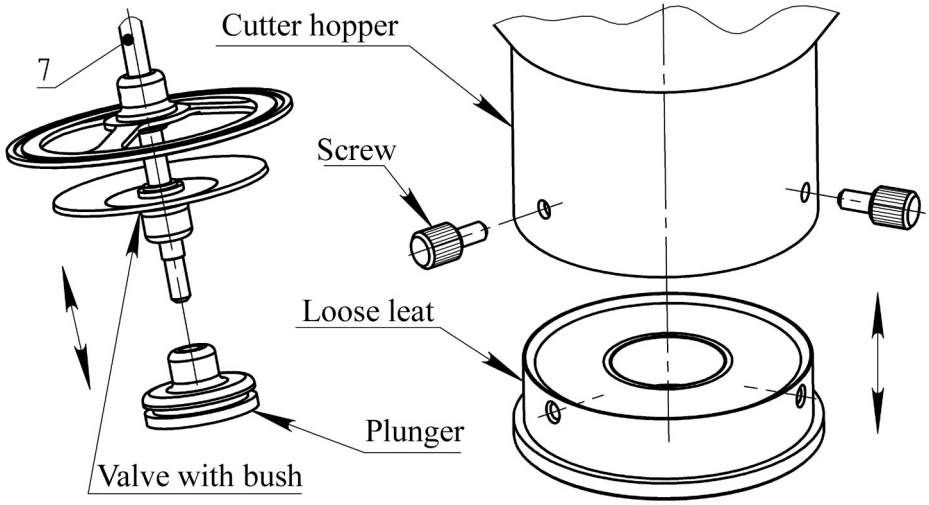


10. Insert eccentric hub by rotation in position from «1» to «3» (recommended «2»). The corresponding figure should be placed near the axis. Twirl a clamping nut up to stop.

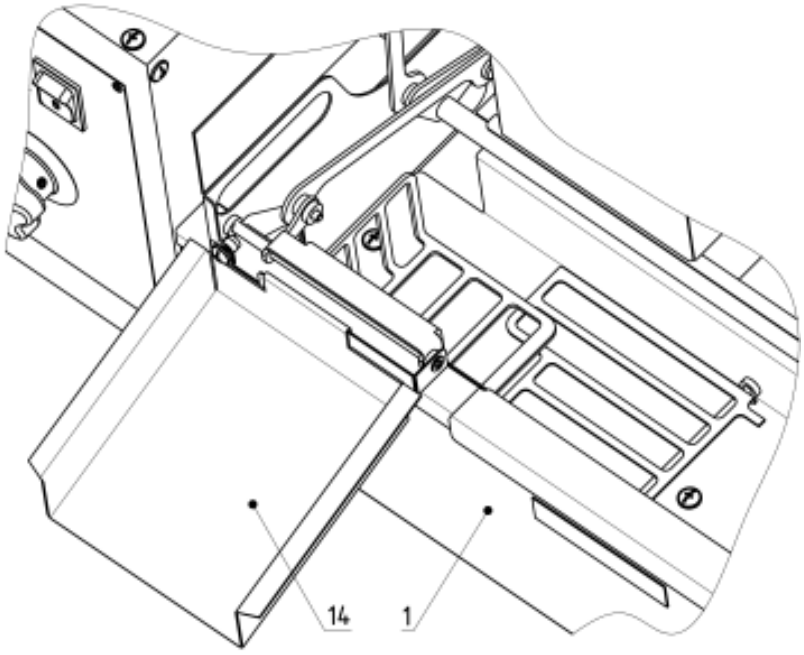


11. If you need larger or smaller donut diameter replace a plunger pair using another from the set. For this purpose:

- unscrew from the cutter piston's rod (7) existing plunger & set the plunger of needed diameter (be sure that the position of valve & bush is corresponding with the picture);
- turn off 3 screws from the cutting hopper & take off the available loose leaf;
- in cutting hopper install the loose leaf which diameter corresponds to the diameter of needing plunger, fix it by screwing.



12. Install slide (14) aboard the frying tank (1) under the skimmer of unloading.



Connecting the machine to power supply.

Connecting the machine to power supply should be carried out only by qualified electrotechnical personnel. Three-wire network with ground wire should be used. Supply cable should have cut area of each wire not less than 2,5 mm^2.

Connect the supply cable to the socket (in the delivery kit) strictly according to the marking on it.

Filling fry liquid.

Special fry fat or refined vegetable oil can be applied as fry liquid.

Be sure that sink tap is turned off & has a screwed gag on it.



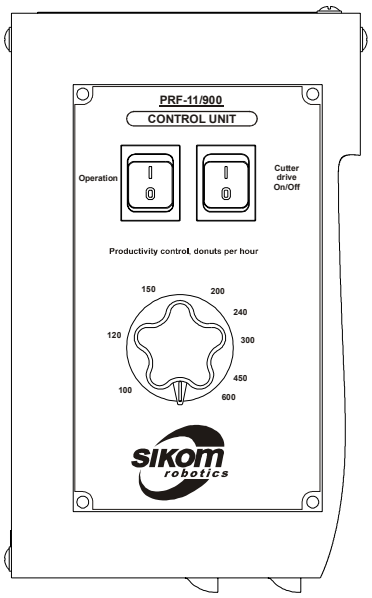


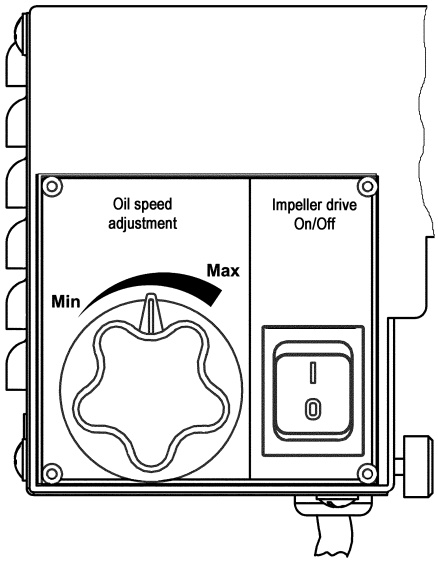
Fill fry liquid in the fryer tank up to the level marked "MIN" on the wall of the tray (3). When heated up, fry liquid widens and its level rises approximately up to the middle of the shaft of the mechanism of turning and unloading - the maximal admissible level ("MAX" mark on the wall of the tray).

Plugging.

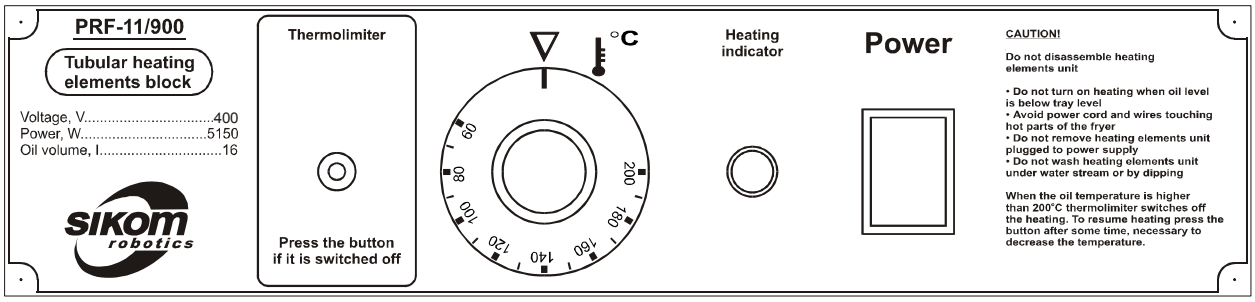
After loading the cutter and flooding fry liquid, make sure that:

- all the plugs on the THE unit (2) are fixed reliably;
- the switch of the cutter on the control device (4) is set in the "0" position;
- the output control is set in the "0" position;
- the button of impeller drive is set in the "0" position;





- the "Power" button on the THE unit (2) is set in the "0" position.

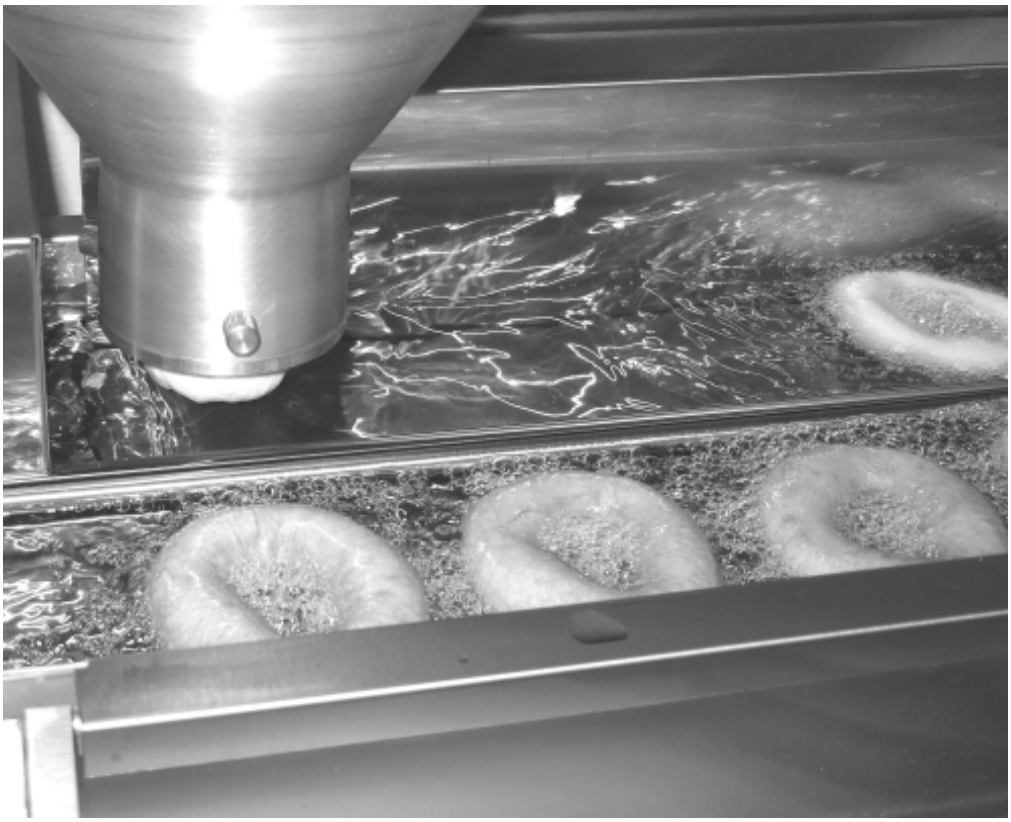


1. Plug the machine to the power supply.
2. Switch the "Power" button on the THE unit (2) to the "I" position.
3. Switch the button on the impeller drive (5) to the "I" position.
4. Set the temperature relay sensor of the THE unit on 190 °C. The time of heating oil up to this temperature is not more than 20 min. As soon as this temperature is achieved, the heating indication lamp turns off. During the operation different temperature can be set depending on the output, donut dimensions and the composition of dough. (min. output - 185...190C, max. output - 195...200C).
5. After oil has heated up to the required temperature regulate the distance from the bottom of cutter hopper (8) to the frying liquid surface (15...20 mm). For this purpose move up or down the platform (9) with the cutter drive (6) along the post (11) by rotating of female screw (12). Oil the inner surface of hopper, piston & attrition surfaces. Be sure that the cutter piston is in its up position & fill hopper with dough.

6. For making pilot lot of donuts place the eccentric hub (mechanism of donut's weight adjustment) to the recommended position «2» (see page 11). Press buttons «OPERATION ON» & «CUTTER DRIVE OFF» on the control unit (7). By output lever (placed on control device) set a value 300 donuts per hours.

After the first loading of the cutter with dough the first 3-4 donuts may have less weight because the lower volume of the cutter is not filled in with dough completely. .

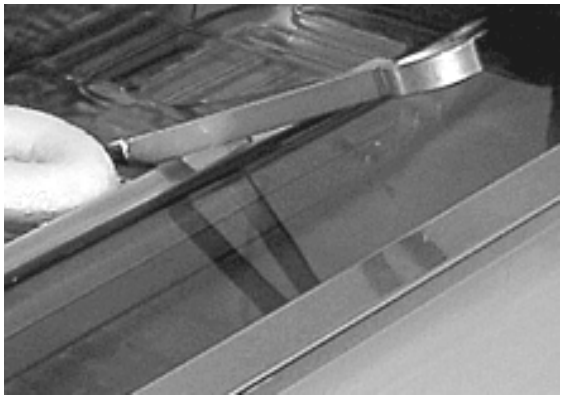
After donuts start to have stable dimensions, if necessary, adjust the weight of a donut by the mechanism of weight adjustment, and the operating temperature by the temperature control. Ajust the speed of the oil flow, if necessary, by the handle on impeller drive (5).



7. After adjustment set the required output and turn on the cutter drive. The quantity of donuts being in the forward and backward streams of the frying tank simultaneously is different with different output settings, which results from necessary time for frying every side of a donut. However the quantity of donuts in the backward stream must always be equal to the quantity of donuts in the forward stream. An approximate dependence of the quantity of donuts in every stream on the output with the temperature of 190°C for a donut of medium weight is shown in chart 1.

In order to ensure the required number of donuts in the streams:

- set the required output;
- switch the operation & cutter drive buttons on;
- hold back donuts before the skimmer of turning until the required quantity is accumulated;



- release donuts before the skimmer of turning and hold back them before the skimmer of unloading;
- mechanism of turning starts to turn donuts over from the forward stream to the backward stream one by one;





- release donuts before the skimmer of unloading when the quantity of donuts in every stream becomes equal.



The mechanism of turning and unloading starts to turn donuts over from the forward stream to the backward one and throw them out of the backward stream into the slide one by one.

Now the only task is to be in time putting trays under the slide for gathering finished donuts.

CHART 1

Output, donut per hour	60	100	150	200	240	300	340	400	450	510	600
Donut's quantity in each stream	1	2	3	3÷4	4÷5	5÷6	6÷7	7÷8	8÷9	9÷10	≥10
Donut's interval, sec.	60	36	24	18	15	12	10,5	9	8	7	6

The necessary quantity of donuts in the tank for the same mode may change considerably depending on:

- the quality of dough;
- the weight of a donut;
- the fry liquid used;
- the operating temperature.

The above must be taken into account when you load dough of new kneading. Change (adjust) the above parameters, if necessary.

The operating machine must be under supervision. For stable operation of the machine the following parameters should be controlled:

– level of dough in the cutter (should not be low, otherwise the pistol will suck in the air);
– level of fry liquid in the tank (should not be lower than the marks on the walls of the tray; fry liquid should be added periodically);
– added dough (must have the same thickness and composition like previously used, otherwise it is necessary to change one or few parameters:

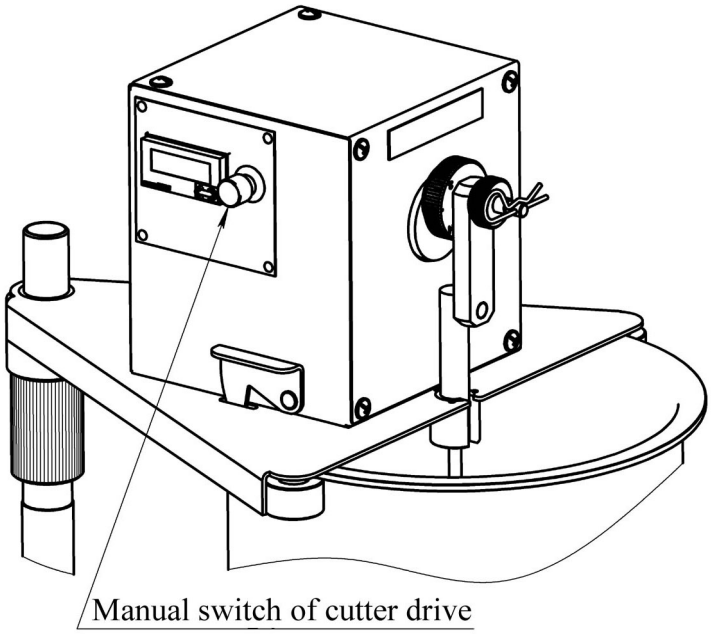
– weight of donuts;
– temperature;
– quantity of donuts in the tank;
– filling the filter with particles of dough; the filter should be extracted and cleaned periodically.
– dish (tray) for finished donuts should be emptied timely to allow new donuts to be unloaded.

Keep in mind that when the temperature exceeds 200°C thermolimiter turns off the heating automatically (heating indicator lamp goes off). To resume heating, after some time necessary to decrease the temperature of fry liquid press the button of thermolimiter.

Drastic change in electricity supply may course automatic switching off of the equipment. In that case switch THE switchers off then start it on again.



If the control device is not working, but THE unit is still operating, you may continue the work in manual mode. For this purpose you should push regularly the manual switch of cutter drive which is placed directly on cutter drive.



The cutter will work normaly in the manual mode, but donuts turning & unloading should be also made manualy.

For finishing your work switch the button “CUTTER DRIVE” off. Wait till all the donuts will be unloaded & switch the “OPERATION” button off. Set the button of impeller drive in “0” position. Move the lever of THE block temperature regulation up to stop anticlockwise, set “Power” button to “0” position & unplug machine from power supply.

Maintenance of the system.

Having finished work, set all the switches on THE unit, control unit, and impeller unit in the «off» position, then unplug the system from the power supply.

If working on the machine intnesively, it is recommended to lubricate periodically the cutter and the plunger pair with oil or fry fat (approximately after every fifth dough loading). To do it:

1. unplug machine from the power supply;
2. unscrew the strap nut of the mechanism of donut weight adjustment and release the rod of the cutter piston;
3. remove rod with piston from cutter hopper;
4. remove cutter hopper.

After washing dry the details and reassemble the system in the reverse order. Wipe the frame of the drive with a soft cloth wet in soap water and wipe dry.

It is recommended to wash the machine every day (at least once a weak).
To do it:

– set all switches in the position «off» and «0»;
– unplug the machine;
– pour out fry liquid;
– disassemble the machine keeping the sequence reverse to assembling.

DO NOT WASH THE DRIVE OF THE CUTTER UNDER RUNNING WATER OR BY DIPPING!

DO NOT WASH TUBULAR HEATING ELEMENTS UNIT, CONTROL UNIT, IMPELLER DRIVE AND CUTTER DRIVE UNDER RUNNING WATER OR BY DIPPING!

DO NOT OPEN THE CASES OF TUBULAR HEATING ELEMENTS BLOCK, THE CONTROL DEVICE, THE IMPELLER DRIVE AND THE CUTTER DRIVE!

Wash all components, dry them thoroughly and then reassemble the system.
Remember that durty components result in lower quality of finished donuts and poor appearance of the machine.

Safety requirements.

The machine should operate on a reliable table to avoid a fall or an accidental push.

There must not be any sources of open fire near the machine as heated oil is flammable.

The premises must be equipped with fire extinguisher, as heated oil cannot be put out with water.

Avoid dropping water into hot oil.

The tap must always have a plug against an accidental turn-on.

Change the oil timely, because old oil has lower ignition temperature.

STRONGLY FORBIDDEN!

- TO TOUCH MOVING PARTS OF THE OPERATING MACHINE;
- TO DISASSEMBLE THE MACHINE OR TO REMOVE SEPARATE PARTS WITHOUT UNPLUGGING;
- TO DISASSEMBLE THE TUBULAR HEATING ELEMENTS BLOCK, THE CONTROL DEVICE, THE FRAME OF THE CUTTER DRIVE, THE FRAME OF THE IMPELLER DRIVE;
- TO WASH THE ABOVE PARTS UNDER A STREAM OF WATER OR BY DIPPING;
- TO CHANGE THE DESIGH OF THE MACHINE.

Trouble-shooting.

To fry quality donuts without problems, certain experience is needed both in handling the machine and in preparing dough, therefore trained personnel should work with the donut machine.

The PRF-11/900 donut machine is designed for cooking donuts 20–60 gr weight and 70–90 mm diameter.

If the dough is too dense, there may appear an effect of cutter drive slowing down because of bad passability and drying of dense dough inside the plunger pair. In this case it is necessary to lubricate the cutter (see before) and to use more liquid dough henceforth.

We recommend using the plunger pair of 40 mm for cooking mixteredonuts. It is not included in delivery kit, but the donut system with the modernized cutter with the set of removable plunger pairs can be ordered.

Chart 2 will help you to achieve good results in cooking yeast donuts.

The problem charts displays that many problems arise because of dough, which determines the quality of finished donuts and smooth operation of the system, therefore for stable operation the optimal recipe of preparing dough should be determined experimentally .

If the donuts have improper shape or size, the most probable reason is the wrong water percentage in the dough. Make two trial kneadings having the first one with 10% more water, and the second one with 10% less water, than in the unsuccessful kneading. Second probable reason is the wrong proofing or punching, or poor yeast.

CHART 2

Solving / Problem	Not horizontalized fryer tank	Insufficient oil level in the fryer tank	Too little dough in the cutter	Cutter piston motion is not adjusted	Insufficient donut weight	Surplus donut weight	Old fry liquid	Too low frying temperature	Too high frying temperature	Insufficient frying time	Surplus frying time	Not enough sugar in dough	Too much moisture in dough (liquid dough)	Too little moisture in dough (thick dough)	Surplus dough preparing time	Insufficient dough preparing time	Bad quality flour	Recipe of dough is not fit for the system
Too small donuts				■										■	■			
Too large donuts													■			■		
Too heavy (dense) donuts				■									■	■		■		■
Too light donuts			■	■														
Irregular shaped donuts			■	■	■	■							■					■
Donuts are floating badly, failures during turning and unloading occur	■	■	■		■	■	■											
Insufficiently baked crust						■		■		■			■		■	■	■	
Too light donuts								■		■		■	■		■			
Too dark donuts					■		■		■		■					■	■	■
Tough donuts					■				■		■		■		■			

Having reached the optimal quality of dough, adjust the required size and weight of donuts so that they are in the range stated above.

The optimal frying time and temperature are also determined in experimentally depending on weight, desired color and softness of finished donuts. However, remember that too high frying temperature leads to forming of tough crust of donuts and too low temperature leads to oversaturation with fat or overfrying of donuts.

Acceptance certificate.

The PRF-11/900 donut machine conforms to the requirements of Technical Conditions TU-5151-004-48956771-99, GOST R 51375-99; GOST R MEK 335-1-94+ add. 2-2000; GOST R 51318.14.1-99 GOST R 51318.14.2-99 and has been recognized valid for operation.

Manufactured «_____» _____ 200__.

Signature of person responsible for acceptance_____

Stamp of Quality Control Section _____

Guarantee commitments.

1. The manufacturer enterprise guarantees failure-free operation of the machine within 6 months since the date of sale with observance of the conditions of operation, transportation and storage.
2. Guarantee repair is held upon the presentation of these instructions with the date of issue, the signature of the person responsible for acceptance, the stamp of Quality Control Section of the manufacture enterprise and the guarantee coupon of the seller enterprise with the date of sale, the signature of the seller and the stamp of the seller enterprise.
3. The manufacturer enterprise reserves the right to make modifications in the machine design without preliminary notice.

Manufacturer address.

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