Seed Treater

METRA STM-120
USER MANUAL

Dear Customer,

To ensure reliable and long-term operation of the treater and high-quality seed treatment, please thoroughly review and follow all requirements in this operation manual.

Since we are constantly improving the treater during manufacturing, there may be slight differences between this manual and the unit you received.

Before using the machine, you must carefully observe all safety requirements.

The company is not liable for any losses resulting from improper operation or technical maintenance of the machine.

To prevent pump damage, it is strictly forbidden to operate the treater without fluid in the tank. Before starting, make sure to add at least 25 liters (6.6 gal) of water to the tank.

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1. GENERAL INFORMATION

1.1 This operation manual is intended to familiarize users with the structure and operational guidelines of the STM-120 screw seed treater (hereafter, "treater"). It includes a brief description, mode of operation, technical specifications, and other relevant information about the treater.

1.2 The treater is designed for the chemical protection of plants by treating agricultural seeds with water solutions or suspensions of authorized preparations.

1.3. The water used to prepare the working fluid (disinfectant + water) must be clean, free of mechanical impurities, and have a neutral pH.

1.4. Seeds to be treated must be free of impurities and dust and must meet the size, uniformity, germination, and sowing standards required by the regulations in effect in the consumer country.

1.5. Seed treatment should be conducted at above-freezing air temperatures.

2. SAFETY REQUIREMENTS

2.1 Before operating the treater, carefully read these safety rules and operation instructions.

2.2 Modifying or disconnecting the protective device (UZO) is not permitted.

2.3 Observe all occupational safety rules.

2.4 Equipment operation is allowed only after completing all assembly work.

2.5 To maintain the product warranty and ensure long-term, reliable, and safe operation, making any changes to the machine's construction is strictly forbidden.

2.6 When working with pesticides, ensure the use of personal protective equipment, including coveralls, safety shoes, a respirator, protective goggles, and rubber gloves.

2.7 Repair and maintenance of electrical equipment, on-site switches, and adjustments should only be performed by specially trained electrotechnical staff.

2.8 Inspection, maintenance, and repair of the treater should only be carried out after disconnecting it from the electrical network.

2.9 Only undamaged tools should be used for maintenance and repair of the treater.

2.10 After completing treater operation, disconnect it from the network.

2.11 Figure 2.1 indicates the locations of hazardous areas during treater operation.

2.12 Safety information is also displayed on the machine through special signs, as listed in Table 2.1.

> **ATTENTION!** *This section contains essential safety rules that must be followed during the operation of the treater.*

The manufacturer is not liable for any damage to life, health, or property, loss of income, or production downtime resulting from accidents caused by failure to follow the instructions and regulations in this manual.

Figure 2.1

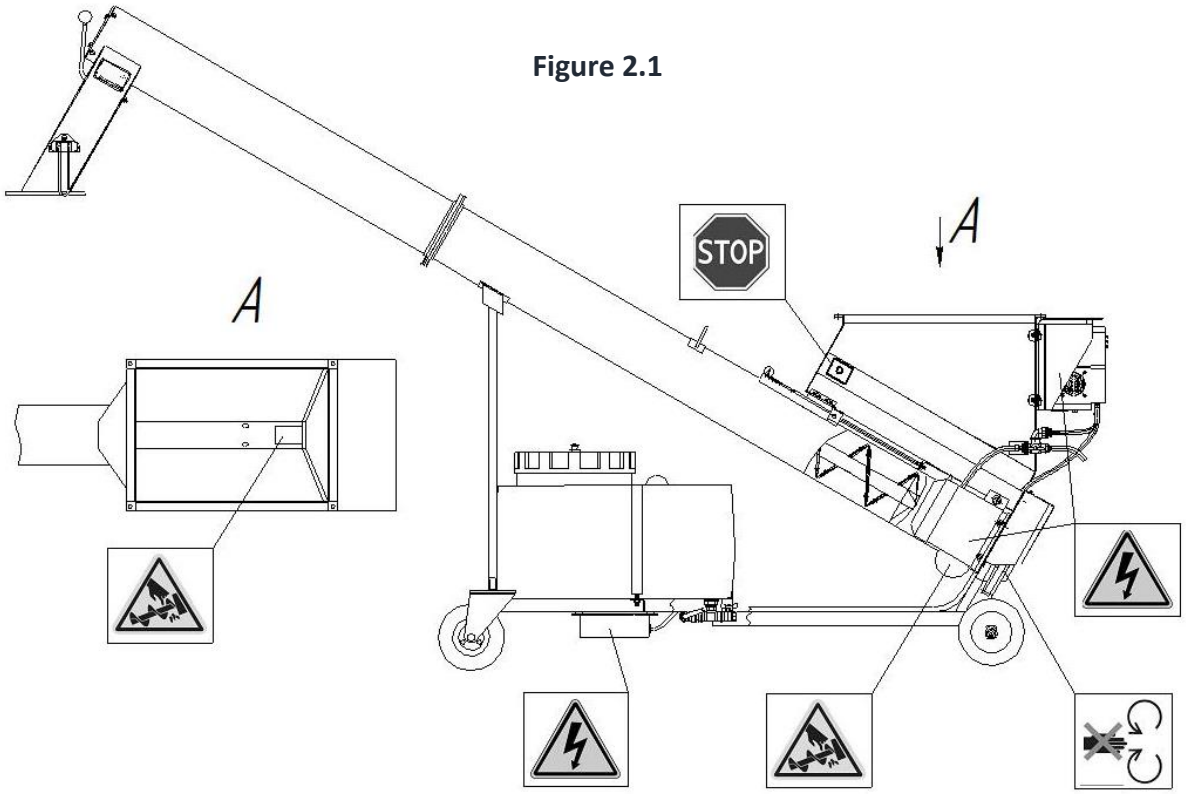
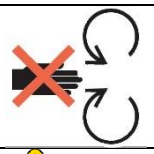
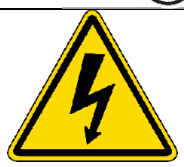
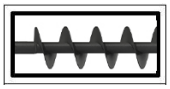
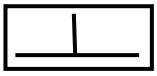


Table 2.1

	Sign Indicating Screw Rotation and Risk of Injury
	Sign Indicating Pulley Rotation in the Transmission System and Risk of Injury
	**High Voltage Warning Sign**: Can cause electric shock, burns, or death. Only qualified personnel may perform work.
	**Labor Protection Sign**: Indicates the need for personal protective equipment during treatment.
	**Toxic Chemical Warning Sign**: Indicates the presence of toxic substances, which can cause poisoning.
	Emergency Stop Sign for Treater
	Starter On Button
	Starter Off Button
	Sign Indicating Screw On/Off Location
	Information sign for the location of the liquid mixer on/off switch in the tank
	Information Sign for Network Power Connection Point

3. TECHNICAL CHARACTERISTICS

3.1 Technical specifications for the treater are provided in Table 3.1.

Table 3.1: Treater Specifications

Parameter	**Value**	**Value**
Type	Mobile	
Production Capacity (with wheat seeds)	40 to 120 bu/h	1 to 3 t/h
Dry Mass (constructional), max	386 lb	175 kg
Operating Fluid Tank Volume, max	26 gal	100 dm^3
Operating Fluid Supply Rate by Dispenser	0.02 – 0.9 gpm	0.1 - 3.3 dm^3/min
Power Supply (AC)	380 ± 19 V	
Power Rating	1.7 HP	1.3 kW
Seed Hopper Loading Height, max	39 in	1000 mm
Seed Hopper Volume, min	15 gal	60 dm^3
Seed Unloading Height, min	55 in	1400 mm
Overall Dimensions (L × W × H), max	138.6 × 40 × 78 in	3320 × 1010 × 1980 mm
Workmanship between failures	16 000 000 bu/h	400 000 kg
Service life, not less than	5 years	

4. TREATER STRUCTURE AND PERFORMANCE

4.1 Treater Structure

The treater (see Figures 4.1 and 4.2) is a mobile, four-wheeled unit that consists of the following components:

- **Tank (1)**: Includes a hydraulic mixer (2) and a valve for fluid discharge from the tank.
- **Seed Hopper (4)**
- **Control Console (5)**
- **Seed Dosimeter (19)**: Features a draft (8) and a scale (9).
- **Distributor (7)**: Equipped with a deflecting gate (6) and unloading necks (12).
- **Screw (10)**: Includes a maintenance hatch (11).
- **Electrical Motor (13)**
- **Three-Way Valve (14)**
- **Hoses (15, 16)**: Used for fluid discharge and supply to the screw.
- **Power Cable with Fixed Seats (17, 18)**
- **Transmission Gear (20)**
- **Screws (7, 10)**: Fitted with special elastic covers (21) for efficient operation.

4.2 Technological Operations of the Treater

The treater performs the following operations:

- **Preparation of the Operating Fluid**
- **Application of the Operating Fluid onto the Surface of Seeds**
- **Unloading of Treated Seeds into Sacks (Big Bags)**

4.3 Treater Performance

4.3.1 The treater operates on a 380 V electrical network.

4.3.2 The operating fluid is prepared in the tank, where the preparations are mixed with water by the hydraulic mixer.

4.3.3 The dosage of the operating fluid is managed by a peristaltic pump-dispenser (hereafter referred to as the fluid dispenser).

4.3.4 The treatment process proceeds as follows: seeds are loaded into the hopper (4) manually or using mechanized means. The supply of seeds to the screw is regulated by the seed dosimeter (8), which features a gate that blocks the opening at the bottom of the hopper.

4.3.5 When the electrical motor (13) is activated, the drive of screws (7) and (10), the pump (3) (refer to Figures 4.1 and 4.2), and the fluid dosimeter (11) (see Figure 5.2) begin operation. The hydraulic mixer (2) mixes the operating fluid in the tank (1), and through the three-way valve (14) and hose (16), it is supplied to the screw (10) by the fluid dosimeter.

At the same time, the appropriate quantity of seeds is delivered to the screw via the seed dosimeter.

Even distribution of the operating fluid on the surface of the seeds and transfer of the processed seeds to the unloading neck (12) of screw (7) is facilitated within the screws. Seeds from screw (7) are directed into one of the two sacks (big bags) using the lever of the deflecting gate (6), which are secured by spring clamps at the unloading necks.

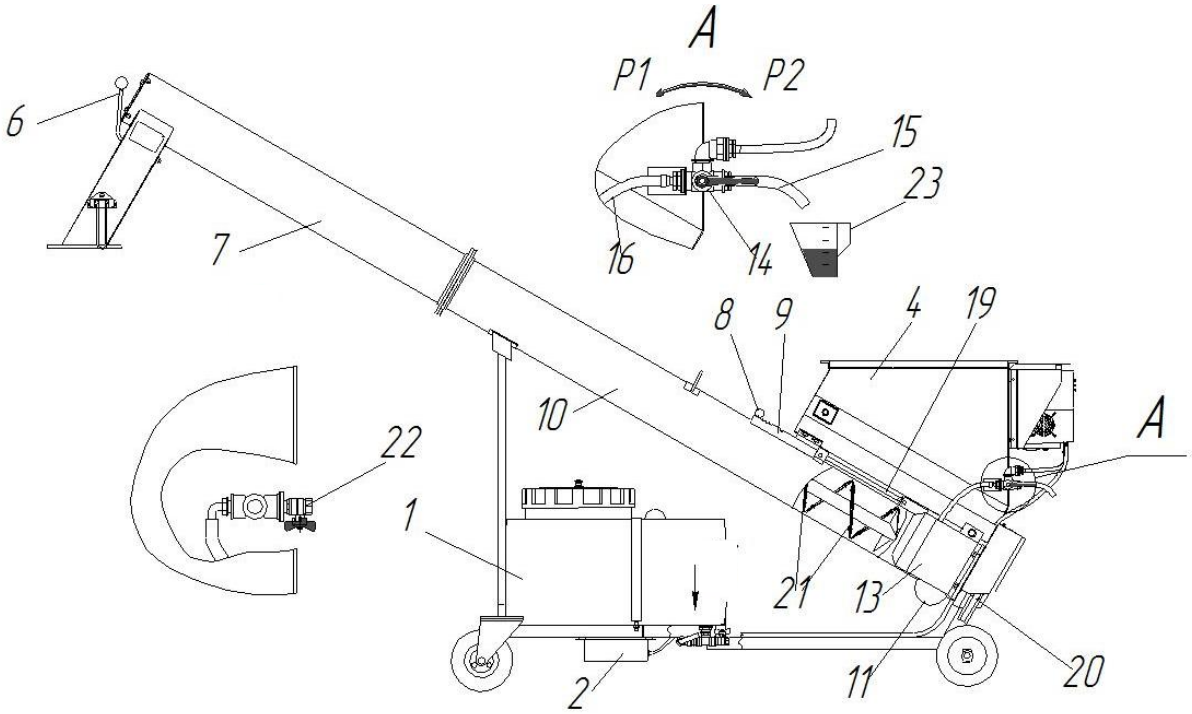


Figure 4.1

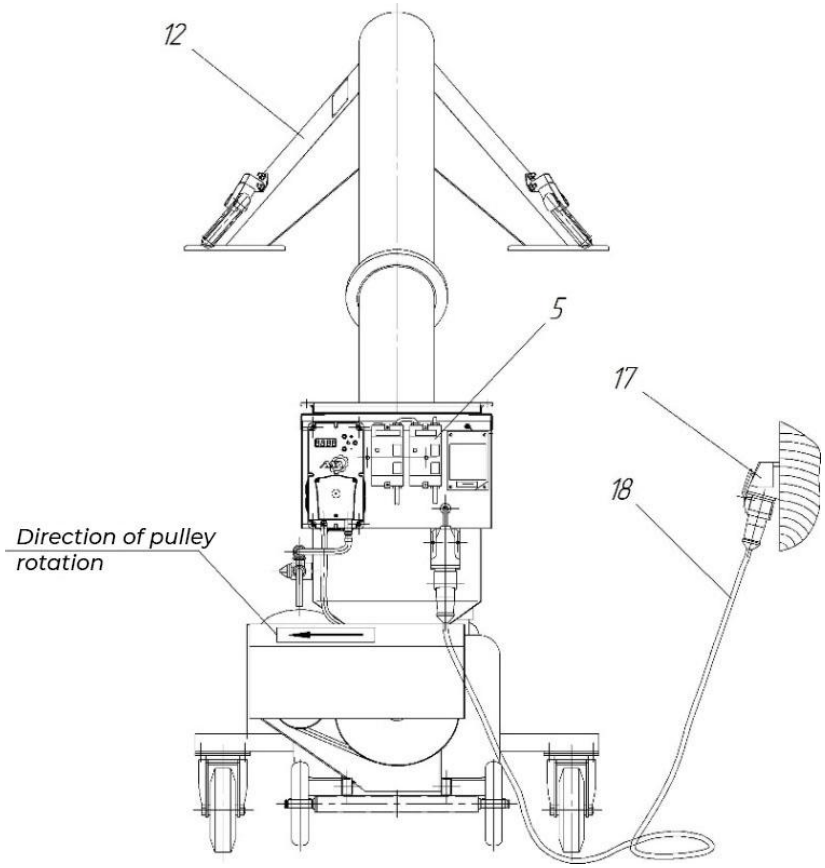


Figure 4.2

1. Tank
2. Magnetic mixer
3. -
4. Seed Hopper
5. Control Console
6. Lever of the Deflecting Gate
7. Screw with Seed Distributor
8. Lever of the Seed Dosimeter
9. Scale of the Seed Dosimeter
10. Drive Screw
11. Maintenance Hatch
12. Unloading Necks
13. Electrical Motor
14. Three-Way Valve (P1 – "Operation," P2 – "Trial")
15. Draining Hose
16. Hose for Fluid Supply to the Screw
17. Fixed Seat HS-16 A
18. Power Cable
19. Seed Dosimeter
20. Belt Gear
21. Elastic Cover
22. Valve for Fluid Discharge from the Tank
23. Measuring Container

The pump unit (see Figure 4.3) consists of a vortex pump (RK-60) with an electrical drive and hydraulic communication. The three-way valve (2) regulates the fluid supply to the tank for the mixer (Figure 4.3 A) or the fluid discharge from the tank (Figure 4.3 B).

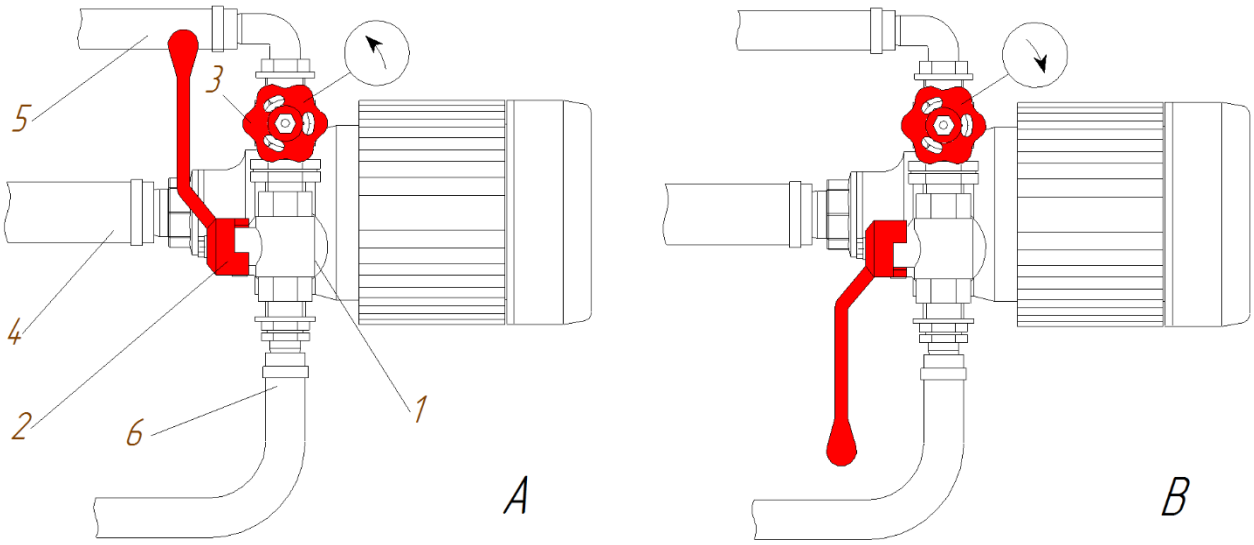


Figure 4.3

1. Pump
2. Three-Way Valve
3. Valve
4. Hose for Fluid Supply from the Tank to the Pump
5. Hose for Fluid Supply to the Mixer
6. Hose for Fluid Discharge from the Tank

5. PREPARATION FOR OPERATION

5.1 Check the completeness of the treater according to Annex A of this manual.

5.2 Inspect the bracing of the main assembly units, details, and hose connections. Ensure the required tension of the drive mechanism.

5.3 Visually inspect for any damage to electrical cables and confirm that there are no foreign objects in the hopper or tank.

5.4 If necessary, install the screw with the seed distributor (7, see Figure 4.1) according to Figure 5.1. Secure it to the flanges (1), ensuring that the spiral bolts of the screws are centered with the conical connection (3). The claws of the plug (2) and the half-coupling (4) must engage properly.

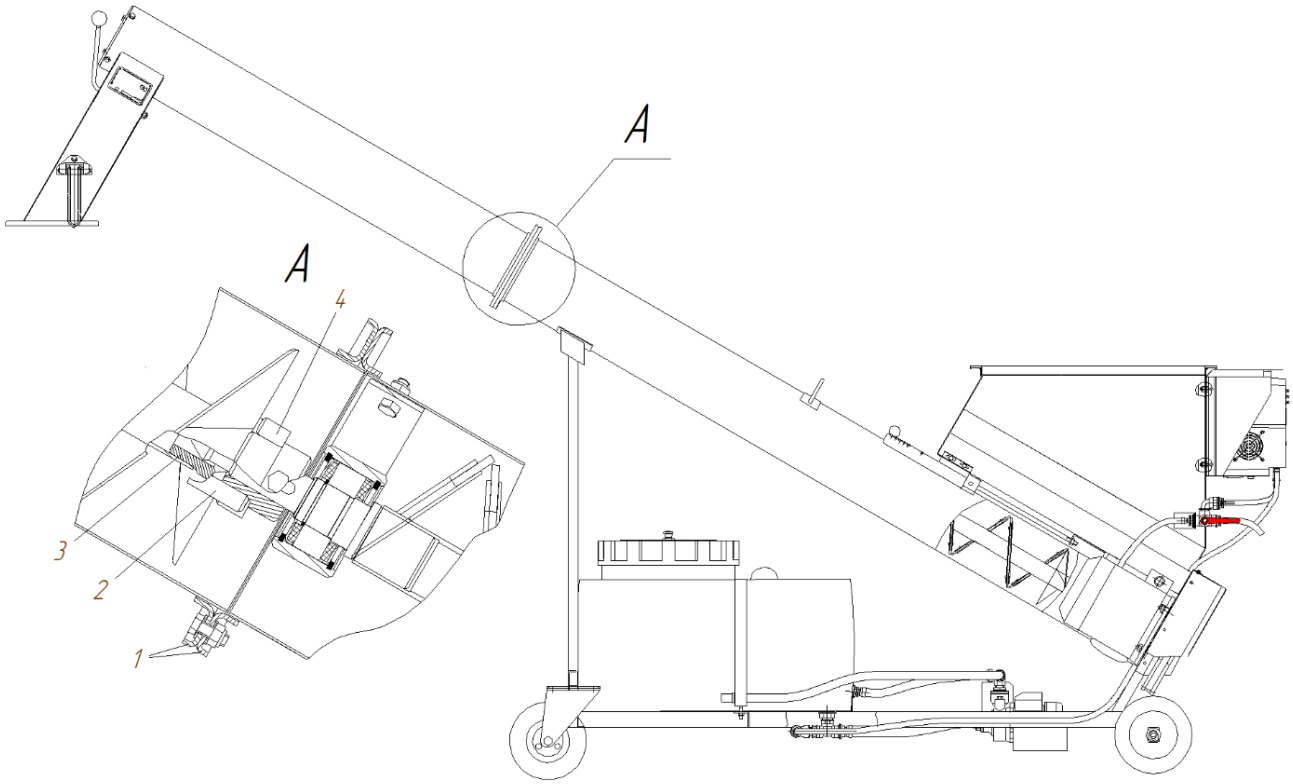


Figure 5.1

5.5 Connect the power cable (18, see Figure 4.2) and the fixed seat (HS-16 A) (17) to the machine and the power supply source as follows:

- Install the fixed seat at the operation site and connect it to the 380 V network through safety stops or an automatic switch rated for a maximum current of 16 A.
- Connect the end of the cable with the portable socket to the fixed fork (17, see Figure 5.2) mounted on the machine.
- Connect the other end of the cable, equipped with a portable plug, to the fixed seat.

5.6 The location of the controls for the electrical drive of the treater is illustrated in Figure 5.2.

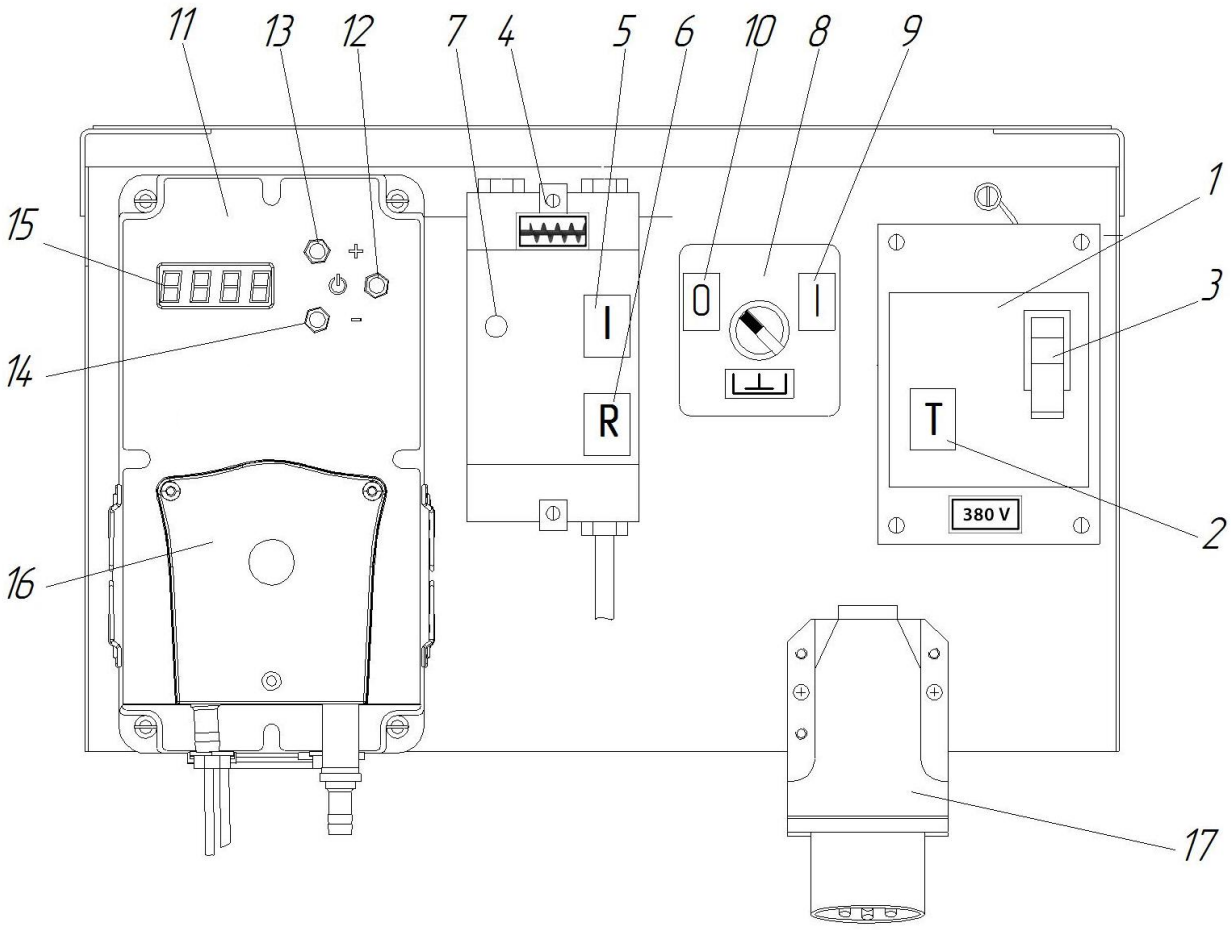


Figure 5.2

1. Safety Cutout Device (PZV)
2. Button for Serviceability Check of the Device
3. Lever of the Device
4. Starter for the Electrical Motor of the Screw
5. 'Start' Button for the Screw
6. 'Stop' Button for the Screw
7. Turn-On Control Indicator
8. Mixer rotary button
9. Mixer 'Start' position
10. Mixer 'Stop' position
11. Fluid Dispenser
12. 'On/Off' Button
13. '+' Button
14. '-' Button
15. Display
16. Dosage Chamber
17. Fixed Fork for Connection to the Power Supply

5.7 The electrical circuit of the electrical drive of the treater is illustrated in Figure 5.3.

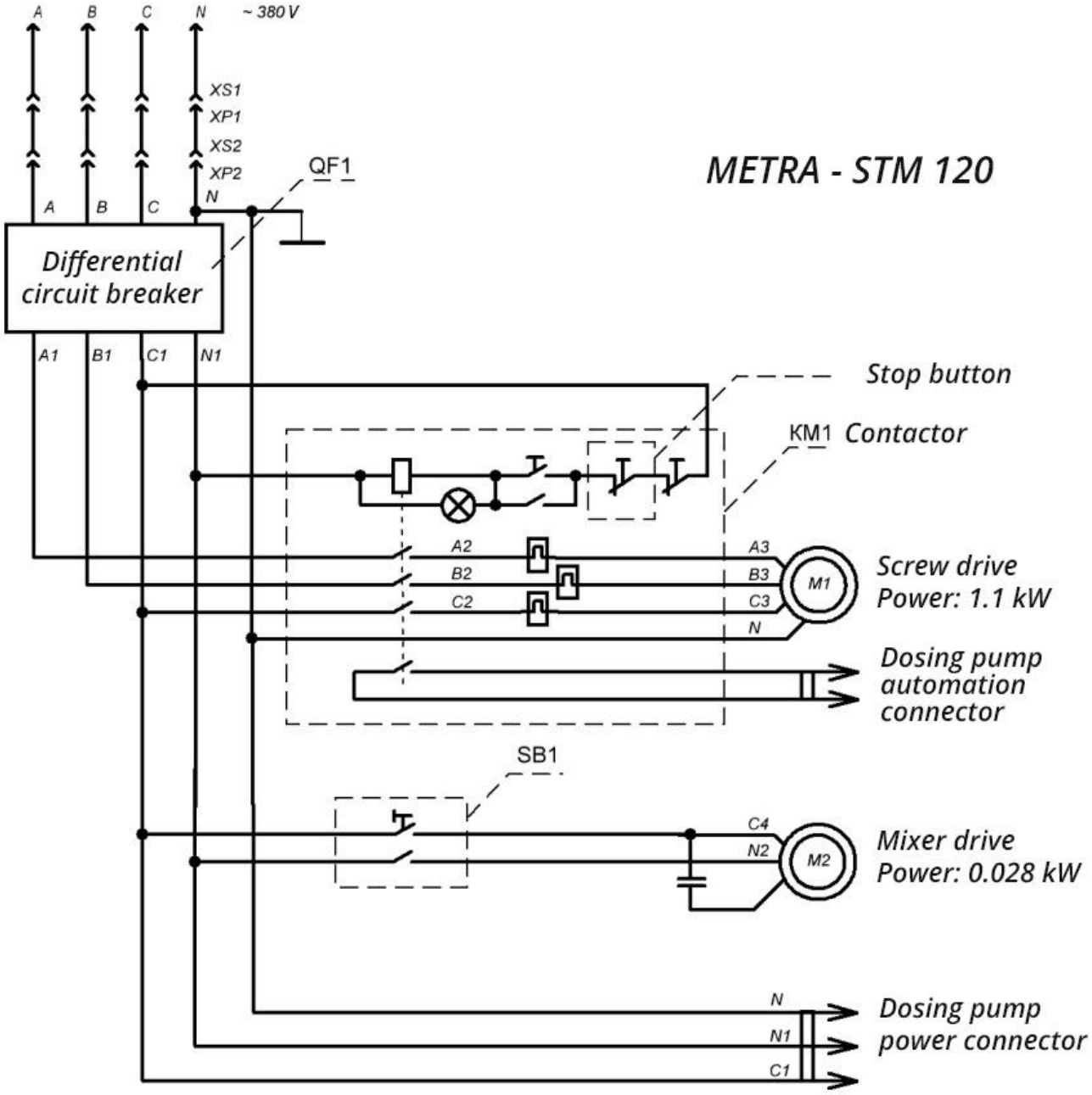


Figure 5.3

Indication	Name	Quantity
KM1	Starter PML 1210, ~ 380V, 50 Hz (I_t.e. = 1.5...2.6 A, TU 16.644.001-83)	2
	Adapter for the Starter PKL 1102	1
M1	Electrical Motor 4A80A6UZ, M300 (Flange) N = 1.1 kW (1.48 hp); n = 1000 rpm; I_n = 2.24 A (GOST 19523-74)	1
M2	Electrical Motor of the Pump Drive RK-60 (N = 0.37 kW (0.5 hp); n = 3000 rpm; I_n = 2.5 A)	1
	Plugs for Connection of the Fluid Dosimeter:	
	- Network PC-113	1

	- Control Mic 326	1
QF1	Safety Cutout Device (PZV) EF1-4, 25 A, I_AM = 0.03 A	1
XS1	Fixed Seat HS-16A	1
XP1	Portable Fork VP-16A	1
XS2	Portable Socket RP-16A, 380V, IR44	1
XP2	Fixed Fork VS-16A-6h/400 V, IR54	1
SB1	Red Button (‘Knob’) BS542	1

6. BREAK-IN AND ADJUSTMENT

6.1. Before starting operation, the break-in and adjustment of the treater must be carried out in the specified order:

> ***ATTENTION!*** *The fluid dispenser automatically starts operation simultaneously with the drive of the screws. To avoid fluid leakage, turn off the fluid dispenser.*
>
> ***ATTENTION!*** *For a short-term shutdown of the treater, turn off the drive of the screws and the pump by pressing the corresponding buttons.*
>
> ***ATTENTION!*** *For a long-term shutdown of the treater, turn off the safety cutout device and disconnect the treater from the power supply.*
>
> ***ATTENTION!*** *In the event of an emergency, turn off the treater using the emergency stop button.*

6.1.1. Pour at least 25 liters (6.6 gal) of water into the tank.

6.1.2. Turn on the power supply at the safety cutout device (PZV). To check its functionality, press the button marked ‘T’. The safety cutout device should turn off.

6.1.3. Turn on the safety cutout device again.

6.1.4. Turn on the drive of the screws. The direction of rotation of the motor shaft must correspond to the direction of the arrow indicated on the protective cover of the screw drive pulleys. (If there is an incompatibility, switch the positions of the two phase conductors in the power supply circuit of the treater. This procedure must be performed by qualified personnel.)

6.1.5. Turn on the liquid mixer in the tank.

6.1.6. Perform the break-in of the treater at idle speed for 5 to 7 minutes.

6.1.7. Ensure there are no unusual noises or water leaks.

6.1.8. Turn off the drive of the screws and the mixer.

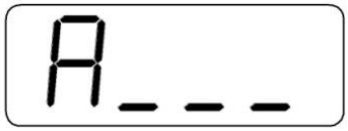
6.2. Perform rough calibration of the fluid dispenser

Set the three-way cock to the position for discharging fluid from the dispenser (see figure 4.1, 'Trial' P2) and bring up the measuring container. Ensure that the hose for fluid supply to the dispenser is fully filled with fluid. If the hose is not filled, perform manual pumping of the dispenser. For this purpose, use the functions for forward and reverse pumping:

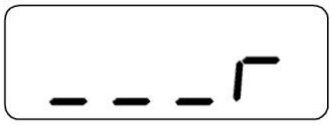
- Turn off the fluid dispenser by pressing the button "⏻". The following will be displayed:

- To access the menu for the forward and reverse function, simultaneously press the buttons '+' and '-'. The following message will appear on the display:

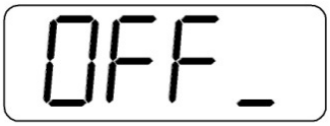
- When pressing and holding the button '+', the pump will start pumping fluid, and while the button is held, the following will be displayed:



- When pressing and holding the button '-', the pump will start pumping fluid in the reverse direction, and while the button is held, the following will be displayed:



- Turn off the fluid dispenser again by pressing the button "⏻". The following will be displayed:

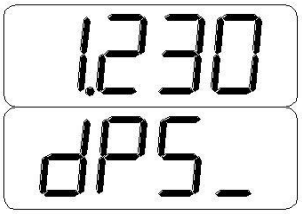


- While holding the button '-', press the button "⏻". The following will be displayed:

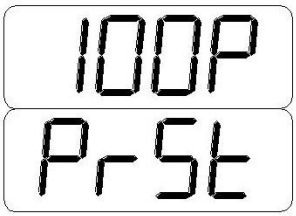
- Press the button '+'. The following will be displayed:

- Finally, press the button "⏻".

After the dosimeter completes 100 rotations, it will stop automatically and measure the amount of pumped fluid (for example, 1.230 liters or gallons). A four-digit number along with the inscription 'dPS_' will be displayed. Use the buttons '+' or '-' to input the volume of fluid, in liters or gallons, obtained after pumping during 100 rotations. Press the button "⏻" to confirm.



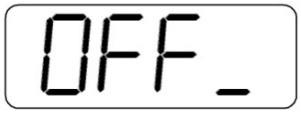
- A three-digit number with the index 'P' and the inscription 'PrSt' will appear on the display. Use the '+' button to set the value to 100P.
- Press the button '+' to confirm the value displayed.



  - ***Note: This point must be set to the value of 100P.***

- Press the button "⏻", and the following will be displayed:

- Press the button "⏻", and the following will be displayed:



- Press the button "⏻", and a four-digit number indicating the established supply of the dosimeter will be shown on the display.
  For example:

7 RECOMMENDATIONS FOR SETUP AND REGULATION

7.1 Preparation of the Operating Fluid

7.1.1 The composition of the operating fluid must adhere to the recommendations provided by the manufacturers of the preparations.
7.1.2 The preparation of the operating fluid should be performed in the following sequence:

- Close the valve of the hydraulic mixer.
- Turn on the mixer.
- After mixing, the operating solution is ready for use.
- To maintain the concentration of the working fluid, leave the mixer turned on.

7.1.3 During seed treatment, the recommended discharge of the operating fluid is **10 liters (2.64 gallons) per 1 metric ton (1.1 short tons) of seeds**. A decrease in discharge may lead to a deterioration in treatment quality.

7.2 Selection of Operating Productivity

7.2.1 After preparing the operating fluid, use **Table 7.1** to select the desired operating productivity of the treater.

Table 7.1 Scale division of the seed dosimeter

	Estimated productivity of the treater		
	Wheat	Barley	Oat
1	0.8 metric ton/h 29.4 bushels/hour	0.6 metric ton/h 27.6 bushels/hour	0.4 metric ton/h 20.6 bushels/hour
2	1.2 metric ton/h 44.1 bushels/hour	1.0 metric ton/h 46.0 bushels/hour	0.6 metric ton/h 30.9 bushels/hour
3	2 metric ton/h 73.5 bushels/hour	1.3 metric ton/h 59.8 bushels/hour	0.9 metric ton/h 46.3 bushels/hour
4	2.5 metric ton/h 91.9 bushels/hour	1.6 metric ton/h 73.6 bushels/hour	1 metric ton/h 51.6 bushels/hour
5	3 metric ton/h 110.3 bushels/hour	2 metric ton/h 92.0 bushels/hour	1.3 metric ton/h 67.1 bushels/hour

7.2 Selection and Checking the Productivity of the Treater Depending on the Seeds

> **ATTENTION!** *Table 7.1 provides estimated values of productivity for the treater at different scale divisions of the seed dosimeter. These values may vary based on seed variety, humidity, and contamination levels.*

7.2.2 Actual Productivity Determination

To determine the actual productivity of the treater, perform the following operations, ensuring to take at least three samples and weigh them:

- **Fix the Draft:** Set the draft of the seed dosimeter on the bracket of the scale to the position '0'.
- **Load Seeds:** Fill the hopper with seeds.
- **Prepare Weighing Containers:** Get containers ready for collecting and weighing seeds.
- **Turn Off the Fluid Dispenser:** Ensure the fluid dispenser is off (the display should show 'OFF').
- **Turn On the Drive of the Screws:** Activate the drive of the screws.
- **Set the Draft and Measure:** Adjust the draft of the seed dosimeter to the appropriate scale division. Measure the filling time of the containers starting from when the filling stabilizes.
- **Weigh the Seeds:** Weigh the collected seeds from each sample.
- **Calculate Actual Productivity:** Use the following formula to calculate the actual productivity:

$$Pf = 3.6 * \frac{m1+m2+m3}{\mathrm{t1+t2+t3}}, \text{ t/h}$$

Where:

- Pf = actual arithmetic mean productivity of the treater at the chosen division of the seed dosimeter (in t/h) **Pf: in short tons per hour = (Pf in metric tons) × 1.10231**
- $m1, m2, m3$ = weights of seed samples (in kg) **m1, m2, m3: in pounds (lbs) = (m1, m2, m3 in kg) × 2.20462**
- $\mathrm{t1}, \mathrm{t2}, \mathrm{t3}$ = times of sample collection (in s)

Determine Sample Duration: The duration of sample-taking should be based on how quickly the containers fill.

End of Sample Taking: After sampling, set the lever of the seed dosimeter back to position '0' and turn off the drive of the screws.

7.3 Setup of the Fluid Dispenser

7.3.1 Calculate Required Supply

To set up the fluid dispenser, calculate the required supply using the following formula:

$$Q1 = \frac{Pf * Qp}{60}, \text{ l/min (gal/min).}$$

Where:

- $Q1$ = required supply of the operating fluid dispenser (in l/min (gal/min)). **Q1: in gallons per minute (gpm) = (Q1 in liters per minute) × 0.264172**
- Qp = discharge norm of the operating fluid per 1 ton of seeds (in l/t). **Qp: in gallons per ton (g/t) = (Qp in liters per ton) × 0.264172**
- Pf = actual productivity of the treater (in t/h). **Pf: in short tons per hour (tons/h) = (Pf in metric tons per hour) × 1.10231**

7.3.2 **Turn On the Fluid Dispenser** Activate the fluid dispenser by pressing the designated button ⏻ . The current established supply will appear on the display. Use the '+' or '-' buttons to set the calculated value of supply $Q1$ (for example, $Q1$ =1.230 l/min (gal/min)).

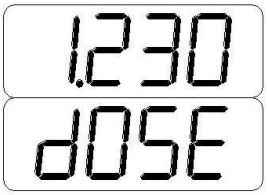
7.4. Precise calibration of the fluid dispenser:

- Set the three-way cock in the position for discharge of fluid from the dispenser and bring up a measuring container. Make sure the hose for fluid supply to the dispenser is fully filled with fluid, if no, repeat the operation described in p.6.2.
- Turn off the fluid dispenser by pressing « ⏻ » the following will be shown on the display:

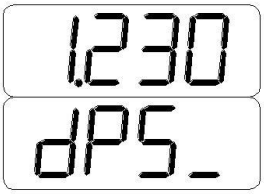
- Retaining the button «-», press the button « ⏻ » the following will be shown on the display:

- Press the button '-', the following will be shown on the display:

- A four-digit number and the inscription ‘dOSE’ will be shown on the display:
  By pressing the buttons ‘+’ and ‘-’, set the calculated value of supply Q1.



- Press « ⏻ ». After the dosimeter completes one hundred rotations, it will stop automatically, measure the amount of pumped fluid.
  In case of significant (> 20%) change of productivity of the treater, it is recommended to repeat points from 7.2. to 7.4.



- A four-digit number and the inscription ‘dPS_’ will be shown on the display. With the buttons ‘+’ and ‘-’, introduce the volume measured by the measuring container in liters or gallons.
- Press « ⏻ », the following will be shown on the display:

- Press « ⏻ », the following will be shown on the display:

- Press « ⏻ », a four-digit number that indicates the established supply of the dosimeter in l/min (gal/min). will be shown on the display

THE TREATER IS READY FOR OPERATION.

8 SEED TREATMENT

8.1. Seed treatment is performed in the following sequence:

Load the hopper with seeds (the gate of the seed dosimeter must be closed).
Fix sacks ‘big bags’ at the unloading necks.

- Set the handle of the three-way cock (figure 4.1) to the position ‘Operation’ P1.
- With the lever (3), turn on the safety cutout device (PZV) (figure 5.1).
- Turn on the auger drive with the button (5) and the mixer with the rotary button (9).
- Open the gate of the seed dosimeter while fixing the draft of the seed dosimeter (8) (figure 4.1) on the bracket of the scale (9) according to the chosen productivity.

- Seeds will start coming to the screws, mixing with the operating fluid and unloading alternately through the unloading necks into sacks ‘big bags’.

8.2. During the treatment process:

- Refill the hopper with seeds as needed, replace filled sacks (‘big bags’) with empty ones, and regulate the seed flow using the deflecting gate (6).
- If the screws stop due to seed overloading, disconnect the treater from the electrical power source, open the hatch (11) (see Figure 4.1), and clear seeds from the screws.

When there are 5–10 liters (**1.3 to 2.6 gallons**) of fluid remaining in the tank, reduce the mixing intensity using the valve (3) (see Figure 2.3) to prevent fluid foaming.

> **ATTENTION!** *Avoid overfilling the unloading containers with seeds, as this may cause the screws to stop, leading to motor overload and potential damage.*

8.3. In case of process stoppage or end of operation:

- Close the seed dosimeter’s deflecting gate and turn off the treater.
- If resuming operation after a pause, reload the hopper with seeds, secure the sacks to the unloading necks, turn on the treater, and open the seed dosimeter gate.

8.4. Cleaning the Treater After Seed Treatment

Upon completion of seed treatment or when switching to the treatment of seeds from other crops, the treater must be thoroughly cleaned of seeds and operating fluid.

- **Clean the Screw:** Open the hatch of the screw and remove any seed residues.
- **Empty the Tank:** To remove the operating fluid from the tank, set the three-way valve to the position indicated in Figure 4.3b and turn on the pump until the tank is completely emptied.
- **Clear the Dispenser Hose:** Use the averse and reverse function to clear the dispenser hose of fluid (refer to Section 6.3).
- **Drain Residual Fluid:** Drain any remaining fluid using the valve located at the lower part of the tank.
- **Wash the Hydraulic System:** Clean the hydraulic system with fresh water and dispose of the wastewater in a designated area.

9 TECHNICAL MAINTENANCE

9.1. Importance of Maintenance

Timely and quality maintenance of the treater is essential for identifying and addressing issues that could lead to premature activation and breakdown throughout its service life.

9.2. Maintenance Schedule

The types and frequency of technical maintenance are detailed in Table 9.1.

Table 9.1

Types of technical maintenance	Periodicity or term of setting for TM, h
1 Every-shift technical maintenance (ETM)	6 - 12
2 First technical maintenance (TM-1)	60
3 Technical maintenance in case of storage	once a season

9.3. List of works performed during technical maintenance, indicated in the corresponding tables:

ETM	Table 9.2
FM-1	Table 9.3
Preparation for long-term storage	Table 9.4
Withdrawal from long-term storage	Table 9.5

Table 9.2 - List of works performed during ETM

Content of works and methodology of their conduct	Technical requirements	Appliances, tools, devices and materials	Note
Drain the residues of fluid from the tank. Pour at least 10 liters **(2.6 gal)** of water into the tank, turn on the mixer and the working fluid dispenser for 3-5 minutes and flush the hydraulic communication. Drain water from the tank and hoses of the dosimeter. Turn off the pump and the dosimeter	Residues of operating fluid are not permitted	Tight containers with the inscription 'Toxic'	Draining is to be performed in a specially allocated place

Table 9.3 - List of works performed during TM -1

Content of works and methodology of their conduct	Technical requirements	Appliances, tools, devices and materials	Note
1. Clean the assembly units of the machine from the residues of seeds, dust, dirt and preparations 2. Remove the cover of the peristaltic pump and lubricate the hose pressed by the rollers with silicone oil 3. Check completeness, technical condition, security of the connections of nodes and details of the machine	The machine must be clean - Bolts and nuts are to be securely tightened	Rag, water, bucket Screwdriver Wrenches 12x13, 14x17	Cleaning is to be performed with a wet rag. Use of solvents of paint and varnish materials is not permitted
4. Check the tension of the wedge-and-passing gear by pulling the branch of the pass by means of the force meter	The value of pulling the branch of the pass with force of 25 N must not exceed 4 mm **(0.15 in)**	Force meter, ruler, wrenches 13x14, 14x17	
5. Check, and, if necessary, perform isolation of the damaged places of the wires of power supply	Presence of wires with damaged isolation is not permitted	Electrician's tape	

Table 9.4 - List of works performed during preparation for long-term storage

Content of works and methodology of their conduct	Technical requirements	Appliances, tools, devices and materials	Note
1. Wash the surfaces of the machine contaminated with the operating fluid with a 5-10% solution of synthetic or technical detergents heated to 50-80 ºC (122- 176 °F), and then wash with tepid water, wipe the dirty places with a wet rag	Presence of dust, dirt, residues of preparations is not permitted	Rag, water, lime, chromium-sulphurous sodium	Use of solvents is not permitted
2. Pour out the residues of the operating fluid from the tank by opening the cock in the lower part of the tank. Turn on the pump for some time until complete pump-out of water from it. Pour out the residues of fluid from hoses and the dispenser of the operating fluid. For that purpose, turn on the fluid dispenser (12) (figure 5.2) and pour out the residues of the fluid through the hose (15) (figure 4.1) into the measuring container. Wash the hydraulic communication with water and drain it	Residues of operating fluid are not permitted	Wrenches 13x14, 17x19, pliers, rag, soap, talc TRPV (for supporting purposes)	Drain water in a specially allocated place
3. Open the cover of the peristaltic pump, remove the hose pressed by the rollers, disconnect it from the pressure and suction hoses, lubricate with silicone oil and send it to the storeroom	-	Screwdriver	
4. Remove the drive wedge pass. Wash it with tepid water, dry, sprinkle with talc and send it to the storeroom	The pass must be clean and dry	Wrenches 13x14, 17x19, pliers, rag, soap, talc TRPV (for supporting purposes)	
5. Clean the electrical motor and blow it with compressed air, if necessary, isolate the damaged places of the electrical wires, clean and lubricate with protective oil	Presence of damages is not permitted	Compressor, electrician's tape, solid oil (synthetic or grease), rag.	
6. Wash, dry and lubricate unpainted threaded surfaces	Put oil in thin layers.	Rag, washing fluid, gun oil, NT-203A or wax mixture ZVVD	
7. Clean the places of damaged paint, degrease and paint	The paint must correspond to the color of the machine	Coated abrasive, enamel, solvent, brush	
8. Send the machine for storage	-		

Table 9.5 - List of works performed in case of withdrawal from long-term storage

Content of works and methodology of their conduct	Technical requirements	Appliances, tools, devices and materials
1. Install the drive pass and adjust its tension.	Fulfill p.4 of table B.3	Wrench 17x19
2. Check, and, if necessary, tighten the loosened braces.	The components and details must be securely fixed	Wrenches 12x13, 14x17
3. Lubricate the hose of the peristaltic pump with silicone lubricant, set it between the rollers and the body. Set the cover of the pump to its place. Connect the suction and pressure hoses of the pump to the nozzles and fix them with collars.	-	Screwdriver
4. Clean the parts of the treater lubricated with conservation materials.	-	Rag
5. Prepare the treater for operation.	According to the requirements of section 5	-

10 POSSIBLE DEFECTS AND METHODS OF THEIR ELIMINATION

External manifestations of defects, methods of their elimination and necessary tools are indicated in table 10.1.

Table 10.1

Defect, external manifestation	Method of elimination. Necessary regulations and trials	Necessary tool and devices	Notes
1 The motor does not turn on	Check the presence of voltage in three phases. Repair or replace the switch	Voltamperemeter, screwdriver	
2 The motor hoots and does not rotate	The same	The same	
3 Absence of indication on the display of the fluid dispenser	Check the presence of the 'operating zero' in the chain of power supply of the treater	Voltamperemeter, screwdriver	
4 Untreated seeds fall out of the unloading neck, there is operating fluid in the tank: a) the line of fluid supply to the screw is clogged; b) the fluid dispenser rotates but does not supply fluid	Clean (wash) the nozzles and hoses of the hydraulic communication; check the places of connection of hoses with the collars, if necessary, replace the collars; wash the hoses of suction and pressurizing communication of the dosimeter	Set of wrenches, screwdriver	

11 RULES OF STORAGE

11.1. After the end of works, the treater must be prepared for storage.

11.2. Preparation is to be carried out observing the instructions on the conduct of technical maintenance described in Annex B.

11.3. Storage of the machine is carried out in closed facilities or under a lean-to.

11.4. Before putting to storage, inspection of the technical condition of the machine is to be performed.

12 TRANSPORTATION

12.1. The treater is shipped to the customer in one cargo item without package (the control console and the electrical motor are covered with film).

12.2. Loading and unloading of the treater is to be performed with a crane or automatic loader with lifting capacity of at least 1 t.

12.3. During transportation, the treater must be securely fast, moving along the platform or body of vehicles is not permitted.

13 DISPOSAL

13.1. The used equipment of the treater belongs to low-hazard wastes and can be stored openly at the industrial facility. These wastes without negative ecological consequences can be disposed according to the accepted conditions of this or that enterprise.

14 MANUFACTURER'S WARRANTIES

15.1. The manufacturing enterprise guarantees serviceability of the treater during 12 months from the date of putting the machine into operation.

15.2. Once the treater has arrived at the destination point, the consignee must check:

- Number of the treater on the table.
- Number of cargo items.
- Completeness of the treater.

15.3. In case of incompleteness of the treater, one needs to prepare an act signed by the representatives of the organization that receives the treater and the transport organization. By virtue of that act, the consignee can report a claim to the transport organization.

15.4. The manufacturing enterprise is not liable for damage or loss of details during transportation.

If the package is not damaged, and the actual quantity of details, assembly units and tools does not correspond to the Packaging list - one need to prepare a shortage report and submit it to the BTC of the enterprise. Upon consideration of the report, the manufacturing enterprise urgently delivers the lacking components.

15.5. The warranty can be annulled for any of the following reasons:

- Wrong operation of the treater (failure to observe the rules provided in this 'Operational manual').
- Violation of operating modes, exceeding allowed load, repair or disassembly by specialists who are not authorized to perform such works.
- Clogging of the flow circuits with impurities of the used substance.
- Use for preparation of the operating fluid of treaters (fungicides) which are not recommended for use on the territory of the country-consumer.
- Use of other substances, apart from treaters, for preparation of the operating fluid.
- Operation of the treater by unqualified staff, irresponsible attitude towards technical maintenance, unauthorized implementation of modifications that impacts operation of the treater, stability and safety of its operation.
- Use of assembly units, details and spare parts of other manufacturers.
- Modification of the treater as a result of which change of any of its functions has occurred.
- Loss, damage to the mark plate of the treater or making changes to it.
- Operation of the treater under unfavorable conditions, different from the recommended ones (overload, emergency situations etc.).
- The warranty does not cover the screws.
- The warranty does not cover filter elements, drive braces, elements of electrical equipment.

15.6. Any expenses for delivery, postal transmission, time compensations, material losses in business are not subject to reimbursement.