

# Operation Manual

**ZP-5 7 9B rotary tablet press (Enhanced)**



( As technology continues to update, we retain the right to change technology design. )

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## 1. Products introduction

The utility model relates to a single pressure automatic rotation, continuous tableting machine, which is characterized in that the raw material is pressed into various tablets. It is mainly used in the production of pharmaceutical tablets, while suitable for chemical, food, electronics and other industrial sectors. The periphery of the shell is completely closed, the material is made of stainless steel, the stainless steel material is used in the inner surface, and the surface of the turntable is specially treated to keep the surface gloss and prevent cross contamination, which is in accordance with the requirements of GMP.

Characteristic:

- 1.1. With transparent glass doors and windows, can clearly observe the state of the tablet, and can all open, easy to clean and maintain internal.
- 1.2. All controllers and operating parts are well distributed.
- 1.3. The frequency conversion speed regulating device is adopted for the electric speed regulation, the operation is convenient, the rotation is stable, and the safety is accurate.
- 1.4. All drives are arranged inside the machine to keep the machine clean.
- 1.5. Equipped with overload protection device, when the pressure overload, can automatically stop.
- 1.6. This machine is equipped with electromagnetic brake motor and other safety protection devices.

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## 2. Technical parameter

Model	ZP-5B	ZP-7B	ZP-9B
Dies (sets)	5	7	9
Max. Pressure (Kn)	60	60	60
Max. Dia. of tablet (mm)	20	20	20
Max. Filling Depth (mm)	15	15	15
Max.Thickness of largest tablet (mm)	6	6	6
Turret speed (r/min)	30	30	30
Production capacity (pcs/h)	9000	12600	16200
Motor Power (Kw)	2.2	2.2	2.2
Overall size (mm)	480*630*1100	480*630*1100	480*630*1100
Net weight (Kg)	220	220	220

## 3. Working Principle and Main Structures

3.1. Turret structure: The turret is the main operation component of the machine, consisting of the lower/upper bearing assemblies, shaft, turret, etc. XXX pairs of press dies are uniformly distributed on the circumference of the turret. The moment is transmitted through the flat pin between the turret and the shaft. The shaft is supported on the bearing, driven by the worm pair, connected with spline to drive the shaft and rotate the turret for operation.

3.2. Track mechanism: There are the cylindrical cam and the plane cam consisting of the upper track and the lower track, which are the path for the movement of the upper and the lower press lever. The upper track is composed of the upper press upward track,

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upper press downward track, upper press upper parallel track, upper press lower parallel track, pressing down track, etc., all securely fixed on the track disc. The lower track is composed of the lower press upward track, lower press downward track and the feeding track,

installed on the lower track seat.

3.3. Feeding adjustment device: It is located inside the machine to adjust the tablet weight.

The moon-shaped feeding track which can be seen on the machine plane adjusts the feeding amount with its rise or fall at the action of the screw. The amount decreases when turning the round disc in clockwise direction and increases in counterclockwise direction.

3.4. Tablet thickness (pressure) adjustment device: The tablet thickness (pressure) is

adjusted by means of adjusting the lower pressing wheel upward/downward. The lower pressing wheel is installed inside the machine, buckled on the eccentric shaft and its outside end connected on the handwheel. When the outside handwheel is adjusted, the eccentric shaft drives the pressing wheel to rise or fall, and adjust the tablet thickness (pressure) and further control the tablet thickness and hardness. The upper pressing wheel upward/downward adjustment can also be used as adjustment device, but generally not used.

3.5. Feeding device: It is composed of the feeding bucket, adjustment bolt, the feeder, etc.

The feeder is a moon-shaped grille feeder, installed on the turret. The spacing between the feeder and the turret operating surface and the height of the bucket shall be adjusted based on the grain flow rate.

3.6. Transmission device: It is composed of the motor, synchronous belt and worm reducer,

commissioning handwheel, etc. The motor is installed on the motor seat of the base plate. When it is started, the power is transmitted via a pair of belts to the reducer worm

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pair, and the motor rotation speed is adjusted through the AC frequency conversion stepless speed adjustment. When opening the two sides or the back door, these components can be directly observed and contacted.

3.7. Shell: The machine shell is a full-closed type, and conforms to GMP standard. The upper part is enclosed with 4 glass windows, to facilitate cleaning and maintenance. The lower part is closed with the stainless steel door, usually locked, and opened only for repair and installation of the press. An operation console is installed in front of the machine. The tablet pressing chamber and the driving part of the machine is separated with the stainless steel enclosure to ensure the tablet pressing chamber is clean and the driving components free from powder contamination or corrosion.

## **4. Installation, Adjustment and Operation**

### 4.1. Installation and Adjustment of Press Die

#### 4.1.1. Preparation before press installation: dismantle the material bucket and the feeder.

Open the right door, rotate the handwheel to clean the turret operating surface, press hole and the press to be installed. Rotate the pressure adjusting handwheel to adjust the pressure to the minimum level. Dismantle the lower press loading/unloading track.

4.1.2. Installing the middle die: Unscrew the middle press fixing screw about 1mm out of the outer circle of the turret, take care not to contact with the powder suction nozzle and other parts, to the extend the middle press when installing shall not contact the top of the screw. As the middle die is very tight, place it stably, insert the smashing rod into the press hole and hammer it in gently. When the middle die is in the die hole, its plane shall not be higher than the turret plane, and finally, tighten with the screw.

4.1.3. Installing the upper press: Dismantle the inlaid tongue, insert the upper press lever into the hole, rotate the press lever with the thumb and the index finger, to check the flexibility of the upward/downward movement of the head in the middle die, there shall

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be no clogging. Then turn the handwheel to the press lever to contact the parallel track. After completing the installation of the upper press lever, install the inlaid tongue.

4.1.4. Installing the lower press: install as per the method for the upper press, and install the lower press on the loading/unloading track.

4.1.5. Commissioning: after installing all the dies, turn the handwheel to make the turret rotate 2 circles, observe the operation of the upper/lower press levers in the middle die hole and on the tracks. There shall be no clogging or collision. Pay attention to the upmost point (i.e. tablet release point), it shall be 0.1 – 0.3mm higher than the turret operation surface. Close all the doors, start the motor to run without load for 2 minutes, and the machine can be put into use after the normal operation.

4.2. Installation and adjustment of feeder: install the feeder on the carriage, fix with the knurled screw, then adjust the adjusting screw to make the spacing between the feeder bottom and the turret operation surface as 0.05 – 0.1mm, and tighten the knurled screw. Adjust the height of the powder scrapping plate to make the bottom plane aligned with the turret operation surface, then tighten with screw.

4.3. Adjustment of feeding amount: It is controlled by the adjustment handwheel installed at the right side in front of the machine, with the indication symbols at the side of the handwheel. The feeding amount decreases when the handwheel rotates in the clockwise direction; and the amount increases when the handwheel rotates in the counterclockwise direction. There shall be enough grains in the feeder when making the adjustment, and the adjust the pressure to ensure the sufficient hardness of the tablets to facilitate the weighing.

4.4. Adjustment of tablet thickness (pressure): It is controlled by the adjustment handwheel installed at the left side in front of the machine, with the indication symbols at the side of the handwheel. The tablet thickness decreases (the pressure increases) when the

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handwheel rotates in the counterclockwise direction; and the tablet thickness increases (the pressure decreases) when the handwheel rotates in the clockwise direction. When the feeding amount is adjusted, the thickness and the hardness of the tablet shall be checked and the appropriate fine adjustment shall be made until it is complied.

4.5. Powder supply adjustment: Upon adjustment of the feeding amount, adjust the grain flow. First unscrew the bolt at the side of the bucket carriage, then adjust the adjusting bolt on the bucket carriage to adjust the distance from the bucket mouth to the turret operation surface, to the extend the storage amount of grains at the feeding mouth will not overflow. Tighten with screws after the adjustment.

4.6. Speed selection: The method for speed adjustment is very simple. The rotation speed shall increase when turning the adjusting button in the clockwise direction, and the speed shall decrease when in the counterclockwise direction. The key point is the selection of the speed, which is directly related to the service life of the machine, the tablet weight and quality. As there are the differences in the nature, viscosity, water content and the grain diameter distribution of the grains, the tablet diameter and the pressures, no uniform requirements are made for the speed selection, which can only be determined as per the actual situation and the experience of the technical personnel. However, in general, when pressing the materials with higher content of mineral and plant fibers, in large tablet diameter or poor adhesiveness, it is better to adopt the low speed for pressing the tablet and the maximum speed cannot exceed 25 turns/minutes. In contrast, when pressing the materials with good adhesiveness and flow rate, in small tablet diameter and easily molded, the high speed can be adopted. And the optimal tablet pressing speed can be realized through trials and adjustments. It is recommended that the rotation speed for the continuous pressing shall not exceed 80% of the maximum rated rotation speed.



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## 5. Electrical Operation

5.1. Operation panel of console.

5.2. Operation procedures:

Open the switch cabinet door and switch on the power supply, and the indication lamp on the operation panel is on; press RUN button, slowly turn the frequency conversion button, and the speed shall slowly increase. When emergency stop is required, press STOP button, and the machine shall stop immediately. Upon completion of tablet pressing, open the switch door to switch off the power.

## 6. Troubleshooting

6.1. Jitter of upper/lower pressing wheel: wear of pressing wheel due to lack of lubrication.

In case of slight wear, repair and add lubricant; for serious wear, replace immediately.

6.2. Wear of upper track:

6.2.1. Dry wear from lack of lubricant, causing slight damage of the track surface, repair timely and, replace it for serious cases;

6.2.2. For the lubrication between the track with poor enamel and the press lever, the grease can be used for lubrication, 30" gear grease or the air compressor grease can be used, to apply once with the brush before starting the machine;

6.2.3. Too much dust to cause the press lifted and wear of the upper track. Change the grain production process to ensure the powder content of grain (above 100 mesh) not more than 10%;

6.3. Indicator of tablet weight difference

6.3.1. Wear or incorrect installation of feeder. If worn, replace the feeder; if incorrect installation, make adjustment timely;

6.3.2. Problem of press die: check the total length of the lower/upper press lever,

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if exceeding the range of tolerance, stop using it.

## **7. Lubrication**

- 7.1. For the lubrication of the general components, there is a nozzle on the surface of the device for filling the lubrication oil or grease according to the type of the oil cup, once at each time of starting. And lubricants can be added during operation according to the temperature rise and the actual operation.
- 7.2. The mechanical oil can be added in the worm cabinet, generally N46 in summer and N32 in winter, and the oil volume shall be added to the extend the worm gear is immersed under one tooth face, and the oil level can be checked through the level glass. Change the oil after use for about half a year.
- 7.3. For the lubrication of the upper track disc, apply the mechanical oil with the brush prior to each time of use.
- 7.4. Adopt N32 mechanical oil for lubrication of the press lever and the track, and do not use too much, to avoid ingress of waste oil into the grains to cause contamination.

## **8. Maintenance**

- 8.1. Regularly inspect the components, 1 –2 times per month, including the worm, worm gear, bearing, pressing wheel, camshaft, upper/lower tracks, checking the flexibility of the moving parts and the wear. Make repair timely when discovering any defect;
- 8.2. After operation or upon shutdown, remove the unused powder and brush off the residual powder at all parts of the machine. In case of a long time shutdown, dismantle the press dies and clean the machine fully, apply the antirust oil on the smooth surface of the components and cover with cloth shield;
- 8.3. Maintenance of the press dies shall be conducted in the special box. Immerse it fully in the oil, and keep it clean and avoid rust and bruise. Better to use one special box for

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each type, so as to avoid mixing and know clearly the damage or loss;

- 8.4. Clean the operation area regularly, in particular, there shall be no dust or flying ash in manufacture of medical or food tablets;
- 8.5. Make regularly maintenance and inspection of the electrical components to keep the normal and sound operation condition. Regularly clean the accumulated dust on the cooling fan with compressed air;
- 8.6. Keep the good working environment (temperature and humidity) of the electrical components to prolong the service life;
- 8.7. Maintenance of the electrical components shall be conducted by professional technical personnel, especially the frequency converter, which shall be sent to the professional manufacturer for repair;
- 8.8. Before making the insulation test for the electrical components, it is required to dismantle all the main circuit control line of the frequency converter, to avoid damage to the converter from the insulation test. For the individual insulation test to the frequency converter, please refer to the operation instruction for frequency converter.

## 9. List of Rolling Bearing and Installation Position

Description	Model	Quantity	Installation position
Single row centripetal ball bearing	108	1 pcs	Shaft
Single row conical roller bearing	7105	1 pcs	Shaft
Single row thrust ball bearing	8210	1 pcs	Turret
Single row thrust ball bearing	8308	1 pcs	Turret
Single row thrust ball bearing	8104	1 pcs	Worm shaft
Single row thrust ball bearing	8106	1 pcs	Worm shaft

