

SPHG3200b DRY EXTRUDER

OPERATION MANUAL



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Important instruction:

1 This manual detailedly describes SPHG3200 series dry extruder of each system structure, function and use and maintenance method. Before installation and use of the machine , customer should read the manual,and have a full understanding of the ministries and its structure and function ,then have operation and maintenance of the machine. Due to the continuous improvement of product structure, after a certain time period, the manual of narrative content and the actual situation of the products will have small changes.Users should pay attention to it.

2 Please propose your advice to us for melioration when finding quality problem or others.Thanks !

1. Application Scope and Performance Features

1.1 Use and Application Scope:

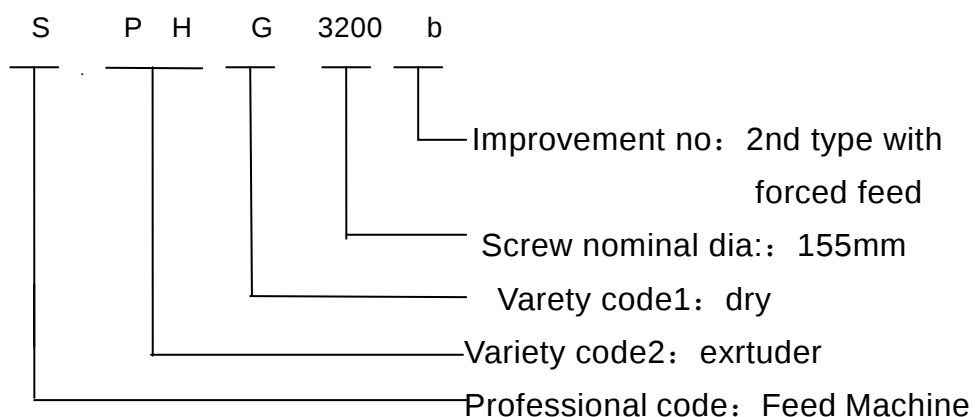
SPHG3200b model Dry Extruder is widely used for feed processing, and the extruding of soybean, maize and soybean meal. This machine also can be used for processing snack of food industry, processing of extruded food, preprocessing bean of oil industry and extruding rice bran and so on.

1.2 Performance features

This Dry Extruder technology (with conditioner) has two main advantages,- firstly: The raw material can be cooked before entering into extruder ,so that capacity can be increased ,further more it assures long life service of screw sleeve and screw barrel. Secondly: structure is compact and interchangeable.

2. Main specification and technical parameter:

2.1 Model significance:



2. 2 Main technical specifications

capacity(t/h)- soybean 1.5-2.5

Soybean meal 3-4

Maize: 1.0-1.8

screw barrel diameter (mm) 155

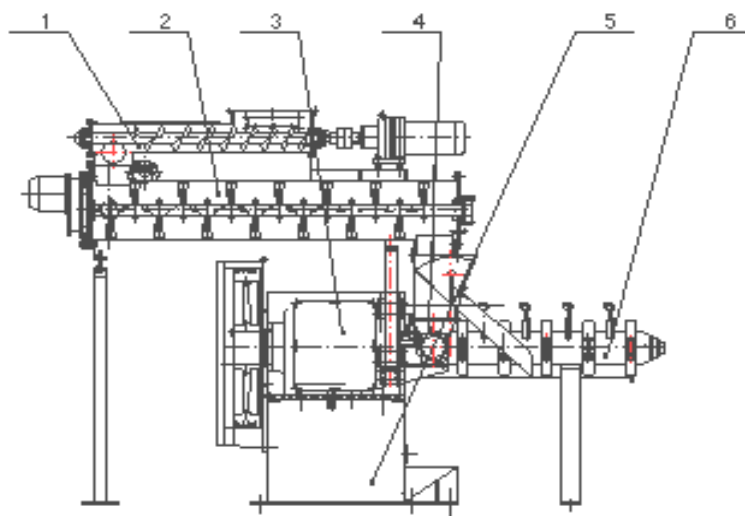
Main motor power (kw) 110/90

Feeding motor power(kw) 1.5

Conditioner motor power (kw) 2.2

Force-feeding motor power (kw) 1.5

Deflector motor power (kw) 2.2 (For extruding maize)



3. Main structural and working principle

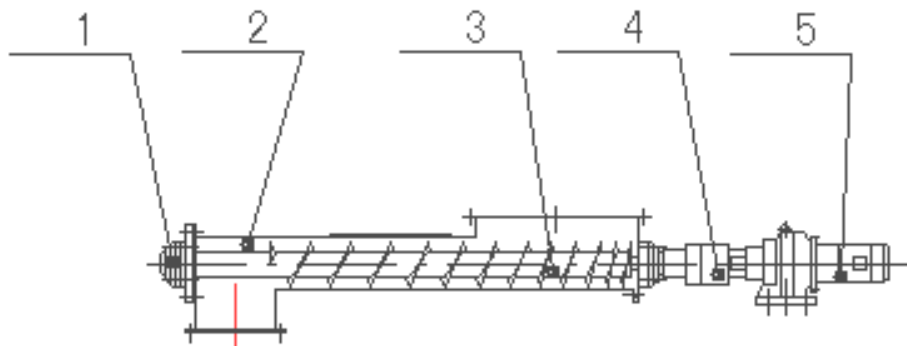
SPHG3200b Dry Extruder is a composition of feeder, conditioner, driving system, extruding system, force-feeding system and machine base. The structural sketch (diagram) is shown on picture 1 below:

Figure 1. Structural Illustration

1. Feeder 2. Conditioner 3. Driving System 4. Force-feeding System 5. Machine Base 6. Extruding System

SPHG3200b dry extruder operation process: The material goes into the feeding and conditioning device from the hopper. With the operation of the screw feeder, the material goes into the conditioner from the feeder. In the conditioner, water and steam can be added to cooking the material. The cooked material is fed into the extruding chamber through the forcing feeding device. The main motor is driven by the belt, which drives the extruder to run. With the rotation of the screw, the material moves to the discharge end continuously. With the roles of extruding, friction and shearing of the screw and barrel, the material in the extruding chamber produces high temperature and pressure. Thus the bad bacteria in the feed raw material is effectively killed. At the same time, the starch is α . The long peptide in the protein is disconnected and the urease in the soybean is destroyed, which greatly improves the digestibility of the feed by the animal. The material is extruded when discharged from the die with the release of high temperature and high pressure. If different size of soybean or corn is produced, dies of different holes can be changed. The change is fast and convenient.

It mainly consists of reducing motor, coupler, shell, and screw shaft. The feeding amount can be controlled by the frequency converter, which ensure that the material goes into the extruding chamber evenly and the extruder works under normal condition. Water and steam can be added in the conditioning process to cook the material. See figure 2 for the feeding device.



1. Bearing with base 2. Feeder shell 3. screw convey shaft 4. Coupling
5. STS

3.2 Conditioner

The conditioner is equivalent to a screw feeder, which consists reducing motor, conditioner shell, stirring shaft, steam inlet and son on (See Figure 3). When the machine runs, the material in the conditioner is fully stirred and mixed by the steam and becomes ripened and soft, and then goes to the extruding system through the hopper. It can produce extruded whole milk soybean, extruded porket feed, extruded maize and son on. For specific information please view Table 1. User can purchase relevant parts according to his specific need.

3.3 Driving system

It mainly consists big and small belt pulley, narrow V belt,

motor and driving box. The motor drives the main machine to work through the narrow V belt.

3.4 Machine base

This part is mainly welded by the square pipes and plates for tightly and reliably supporting the extruding system and the motor and guaranteeing smooth operation after starting the motor.

Figure 3 Conditioner

1. Reducing Motor 2. Conditioning shaft 3. Steam adding port
4. Water-adding system 5. Paddle 6. Bearing with base

3.5 Extruding system

The extruding system is the main working part of the extruder and is also where the material changes its property. It mainly consists driving main shaft, multiple screws, resistance ring, cone shaft, barrel and die. The extruding screw is divided into several sections with the same diameter and different screw pitches so that different screw types can be formed flexibly according to the property of raw material and the production. Resistance rings of different diameters and dies of different hole diameters are supplied to adjust and control the temperature and the pressure in the extruding chambers of different sections during extruding processing. See picture 4 for the main extruding system.

3.6 Forcing feeder

The forcing feeder consists the screw, sprocket wheel and chains, etc. Powering from the gear reducer of the feeder-conditioner, the sprocket wheel and chain drive the forcing feeder screw to achieve the feeding purpose.

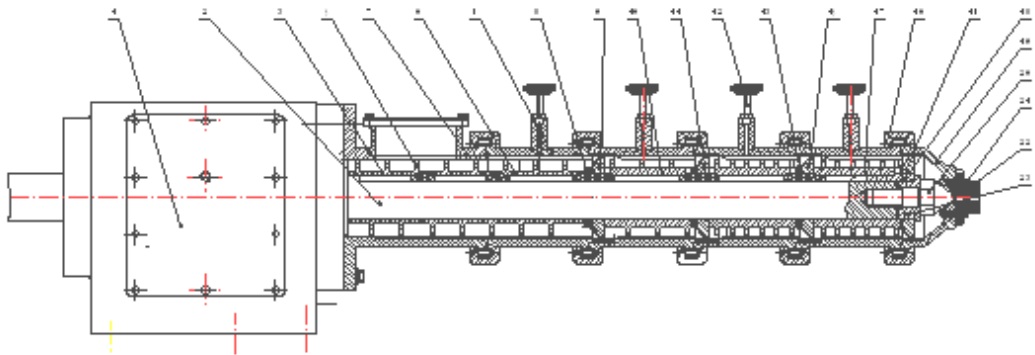
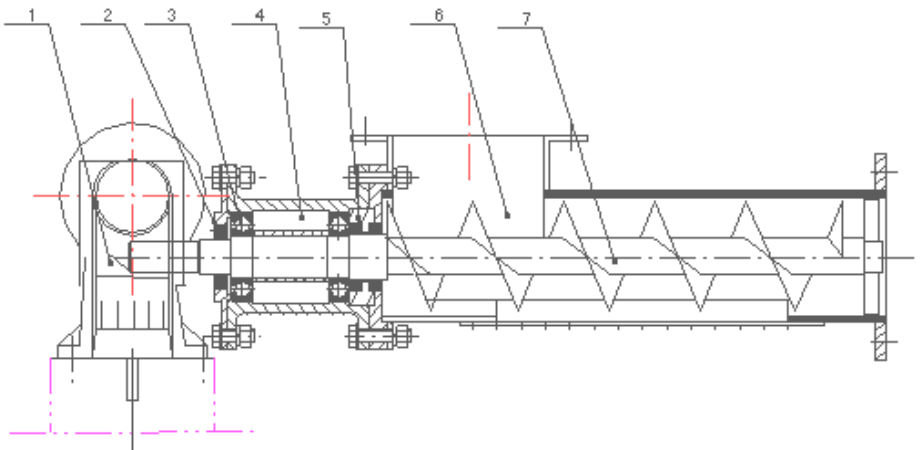


Figure 4 Extruding System

1. Driving main shaft 2. Driving box 3. Barrel I 4. driving key I
 5. Inlet clamp 6. Barrel IV 7. Clamp II 8. Adjusting washer 9.
 Resistance ring I 10.Barrel II 11. Resistance ring II 12.
 Thermometer 13. driving keyII 14. Resistance ring III
 15.Barrel III 16. Clamp 17. Resistance ring IV 18. Key 19.
 Outlet clamp 20. Cone shaft 21. Outlet die 22. Outlet die holes
 23sets

Figure 5 Forcing Feeder



1. Reducing motor 2. Oil seal 3. Bearing 4. Bearing
 base5. Oil seal 6. Shell 7. Screw shaft

Soybean			Soybean Meal				Maize			
Fig No.	Spare Parts	Qty	Fig No.	Spare Parts	Qty	Remark	Fig No.	Spare Parts	Qty	Remark
.3-5	Screw1	2	.3-5	Screw1	2	Same	.3-5	Screw1	2	Same
.3-5A	Screw4	1	.3-5A	Screw4	1	Same	.3-5A	Screw4	1	Same
.3-9	Screw 2	1	.3-9	Screw2	3	Same	.3-9	Screw2	3	Same
.3-11	Screw 3	2	-							
.3-13	Resistance Ring	4	.3-13a	Resistance Ring	3	Change	.3-13b	Resistance Ring	4	Change
.3-16	Key	1	.3-34	Key	1	Change	.3-16	Key	1	Same
.3-17	Discharge Barrel	1	.3-31	Connect Barrel	1	More	.3-41	Discharge Barrel	1	Change
.3-18	Barrel	1	.3-35	Barrel	1	Change	.3-18	Barrel	1	Same
.3-19	Cone Shaft	1	.3-36	Cone Shaft	1	Change	.3-39	Cone Shaft	1	Change
.3-26	Barrel	1	.3-8a	Thin Spacer	2	More	.3-43	Transition Barrel	1	More
.3-20	Die	1	.3-32	Cone Cover	1	More	.3-42	Die	1	More
.3-21	Die Hole	10 12 per pcs	.3-33	Cutter Set	1	More	.3-44	Die	10、 8、 6 / 8	More
.3.5	Cutter Cover	1	.3.5	Cutter Cover	1	Same	.3.5	Cutter Cover	1	Same
.3.5-2	Connecting Plate	1	.3.5-2	Connecting Plate	1	Same				
							.3.6	Cutting Set	1	More

Chart1 Specification of Screw And Resistance Ring For Different Material

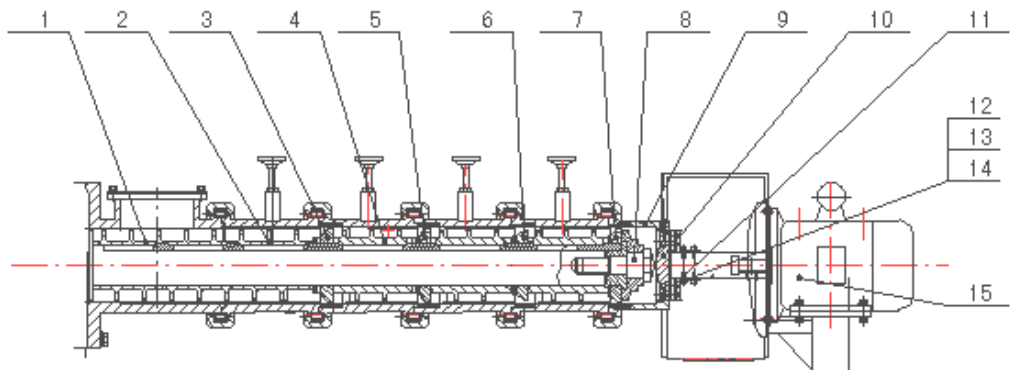


Figure 7 The Barrel Assembly for Extruding Maize

1. Barrel I 2. Barrel IV 3. Resistance ring I 4. Barrel II 5. Resistance ring II 6. Resistance ring III 7. Resistance ring IV 8. Cone shaft 9. Outlet clamp 10. Outlet die 11. Outlet die holes 12. Deflector pole 13. Deflector base 14. Deflector 15. Deflector structure

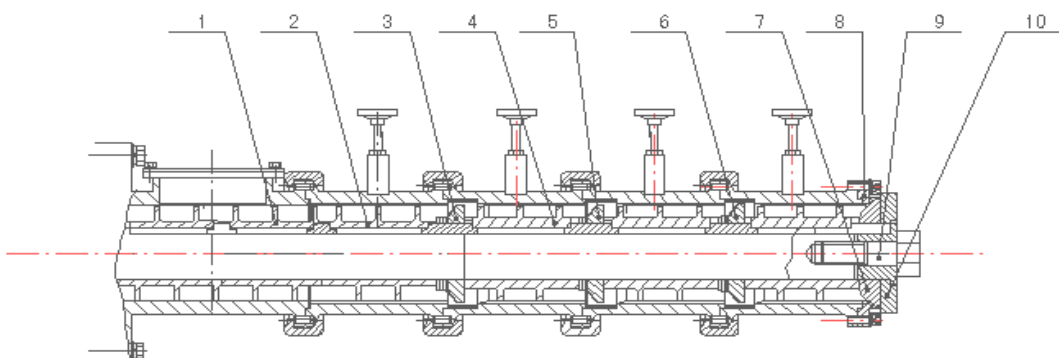


Figure 8 The Barrel Assembly for Extruding Soybean Meal

1. Barrel I 2. Barrel IV 3. Resistance ring I 4. Barrel II 5. Resistance ring II 6. Resistance ring III 7. Outside Cone Cover 8. Outlet clamp 9. Cone Shaft 10. Deflector base

4. Electrical controlling system

Electrical controlling system controls the equipment motor.

Main machine 110/90kW 3 Phase, AC

Feeder motor 1.5kW 3 Phase, AC Frequency Convertible

Conditioner motor 1.5/2.4kw

5. Equipment Installation

5.1 Foundation requirement

The SPHG3200b dry extruder itself is very heavy. It runs smoothly with little vibration. There is not any special requirement on the foundation and no foot bolt is needed for fixing except that the floor should be level.

5.2 Installation Environment

Extruder is working under high temperature. The circumstance should be well ventilated. It is better that an air absorption device be mounted at the outlet of the extruder.

5.3 Hoisting

The cable for hoisting should go through the special hoisting hole. Do not put the cable on the screw barrel to avoid from damaging the main working part of the equipment.

5.4 Installation requirement

5.4.1 The floor foundation contacting the equipment base should be level.

5.4.2 The feeding hopper cover of the feeding system should be soft connected with the feeding pipe to prevent the transmission of vibration. The hopper cover should be fixed with movable inspection door for convenient checking of the feeding condition.

5.4.3 Iron removing device should be mounted before this machine. The material and soybean should be cleaned without any hard or metal material before being fed into the extrusion chamber to prevent from damaging the parts or accessories inside the extrusion chamber.

5.5 Adjustment of the Axial position of the pulley

To keep smooth driving of belt, The end of the pulley and the extrusion chamber shaft should be kept in the same plane. The above can be realized by pressing and turn the cone barrel in the middle of the small pulley and adjusting the axial position of the pulley.

5.6 Tensioning of narrow V belt

Screw the bolts under the motor base to adjust the tension of the narrow V belt. The motor base should be kept level after adjustment to prevent the narrow V belt from being slanting and increasing the wearing of the belt.

6. Operation

6.1 Attentions should be taken before and after turning on the machine.

6.1.1 Check all the parts especially the coupling bolts of the extrusion chamber and the bolts connecting the extrusion chamber and the machine support. There should be not any loose.

6.1.2 Disassemble the extrusion barrel at the end. Turn with the wrench locking the cone shaft (nose) so that the main shaft turns counterclockwise. At this time there should be not any knocking noise inside the extrusion chamber.

6.1.3 After minutes of running free of load, turn on the feeder motor and check the frequency conversion performance of the feeder. It should running normally.

6.1.4 After stopping the machine, you should wear gloves against high temperature to takeout the discharge extrusion barrel at the end. Turn on the main motor to fully discharge the material inside the extrusion chamber and put in small quantity of soybean to clean and lubricate the extrusion chamber.

6.2 Operation sequence

6.2.1 Soybean extrusion

Takeout the end extrusion barrel, turn on the machine. Feed in a little soybean and preheat the fourth screw barrel to 50°C. Press tightly the outlet die and back screw it for 3-4 turns. Stop the machine and fix on the extrusion chamber together with the outlet die. Increase gradually the feeding value after the material coming out from the outlet die until the main machine works between 85-90% of the rated electricity current. Different capacity and size of full fat soybean powder can be obtained by different die hole. Fit on cone resistance ring when processing the soybean to control the temperature of the fourth extrusion chamber between 120-140°C. The moisture content of the soybean material should be controlled within 12%-14%, and it's more economical and reasonable to use pulverized soybean powder (normally use 3-4mm screen).

6.2.2 Operation of extruding the soybean meal

Remove the discharge sleeve,install the screw, Resistance ring ,adjustable washer cutter and discharging cover as for Fig.8. Boot up the main engine,forced feeder,conditioner and feeder motor,etc.Firstly,feed a little amount of material while switching up the contioner steam valve in order to conditioning the material's temperature and water content,ensuring that the temperature is 80-95°C and the

water content is 18-20%. After discharge, increase the feed amount gradually as well as the steam adding amount until the main engine could be working when the rated current is between 85%-90%.

7. Repair and Maintenance

7.1 After each shift, clean the equipment inside and outside. Particularly, there could be no material left in the extruding chamber to ensure no caked mass to be cleaned after the machine is cooled.

7.2 Lubricate the main bearing in the extrusion chamber, chain drive of the feeder and the frequency controlled motor with oil. The other bearings should be greased.

Lubrication oil: N46 or N68 machinery oil

Grease: Calcium grease ZG-3

7.3 Do not exceed the indicated oil level line on the housing or bearing seat when injecting lubricant oil to the transmission case. Release the oil and replace it by new one after smooth running for 72 hours. Oil level should be inspected to ensure that the minimum allowed oil level and add the lubrication oil timely before each shift starts producing.

7.4 No heavy knock when removing the feed outlet die and screw with special screw removal tool

7.5 Keep the extruder and the surroundings clean.

7.6 The machines should be maintained thoroughly every year.

7.7 Warranty period: 1 year warranty from the date of sale of this product (except vulnerability parts) Free warranty for manufacturing quality problems while providing accessories and other paid services are provided not due to quality problems.

8.Trouble shooting

Trouble	Cause	Solution
1.No material out when adding soybean	1. Too small gap between the inside cone of the outlet die and the outside cone of the cone shaft 2. Too much material is put in within short time	1. Press the outlet die and the cone shaft and back screw for 3-4 turns 2. Reduce the feeding speed.
2.Too big extruded soybean	Too big gap between the inside cone of the outlet die and the outside cone of the cone shaft	Adjust as above or Change a small hole die
3.Temperature in the extruding chamber is not enough	1. Too small diameter of the resistance ring or it is worn 2. Not adding steam or the steam quality is low.	1. Replace a new resistance ring 2. Open the steam valve or check the steam pipeline
4.Less capacity	Resistance ring worn	Replace
5.No output after normal operation	1. Too much material is put in within short time 2. Outlet die is	Stop the machine and remove it

	blocked by metal or hard material	
6. The diameter of the pellet is too big.	The outlet die hole is worn.	Change it
7. The diameter of the pellet is too small.	The outlet die hole is too small	Change it
8. The pellet is too long or too short.	The speed of the deflector is not well adjusted.	Readjust it
9.Back spray of the material at the inlet	Too fast feeding in material or not smooth feeding or blockage happened	Control the feeding speed or stop the machine and remove it.

9.Principles of safe operation

Much attention should be paid to the safety issues during test running and operation of the SPHG3200b dry extruder.

9.1 During smooth running ,do not stand in front of feed outlet of the extruder.

9.2 If blockage happened and it is needed to disassemble the outlet die and the clamp, there should be no man in front of the outlet of the extruder to avoid to be injured by the parts thrown out, such as the outlet die and the clamp in the barrel because of big pressure.

9.3 During the disassembling of the equipment, please wear heat-resistant glove to protect you from being burnt.

9.4 During repairing you must cut off the power supplier to avoid the accident caused by false operation. When you start the machine, protect yourself from being hurt by the throwing out of the barrel, resistance ring, washer and other parts.

9.5 During smooth operation, do not touch the clamp and rotating parts to avoid of being hurt.

10. Transportation

The machine should be fixed on the bottom of the case when it is transported in the wooden cases. Or it should be fixed on the truck when it is transported by the truck.

11. vulnerable part

11.1 Vulnerable standard parts

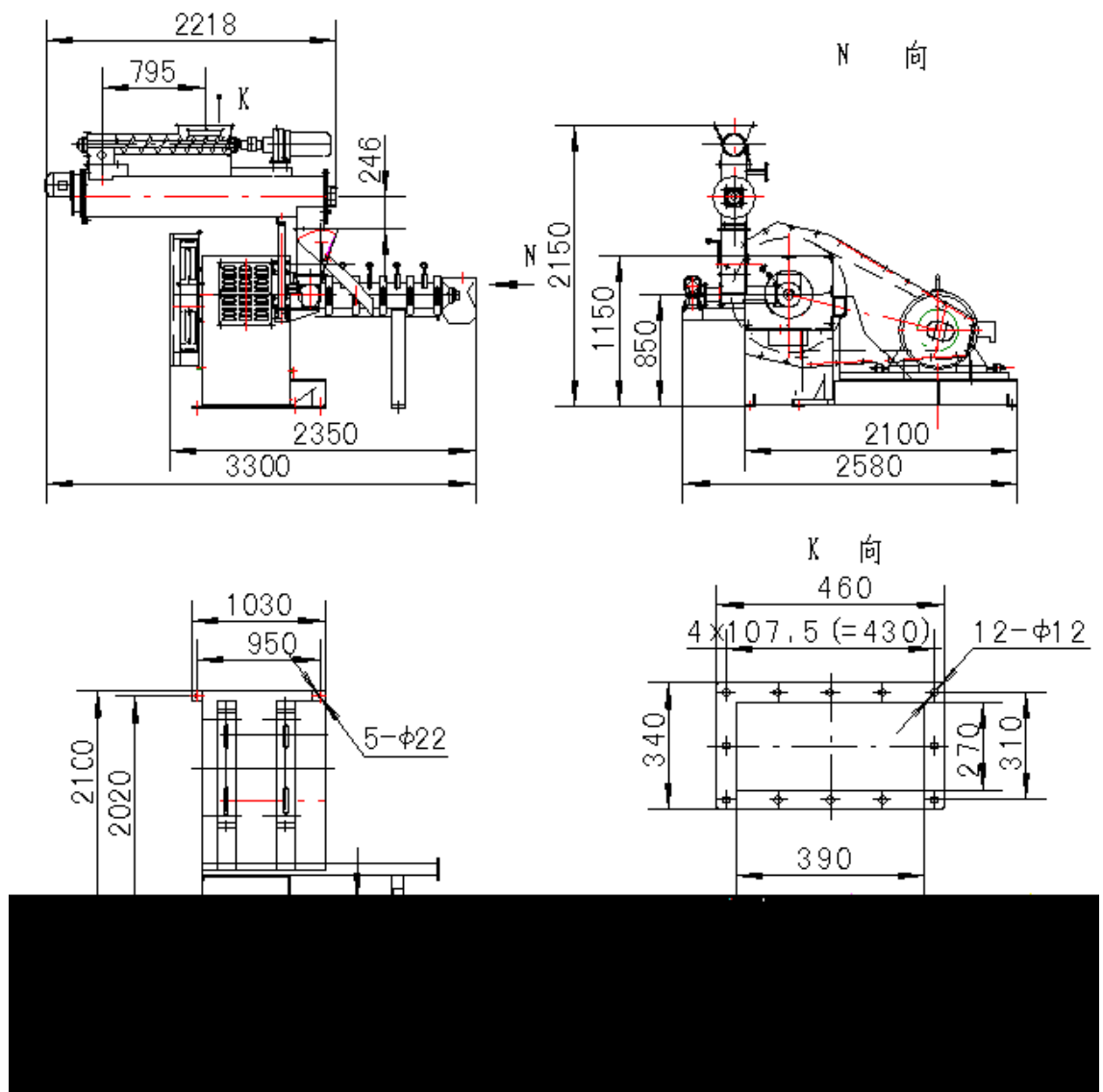
No.	Description	Qty	Mounting Parts
1	Bearing with Housing	2	Feeder
2	Bearing with Housing	1	Conditioner
3	Narrow V Belt	1	Transmission System
4	Bearing	1	Transmission System
5	Bearing	1	Transmission System
6	Bearing	1	Transmission System
7	Thermometer	4	Extruding System
8	Bearing	2	Forcing Feeder
9	Oil seal	2	Forcing Feeder
10	Oil seal	1	Forcing Feeder

11	Oil seal	2	Transmission System
12	Oil seal	2	Transmission System

11.2 Vulnerable Parts

No.	Code	Description	Qty	Mounting Parts
1	.5-3A	Barrel IV	1	Extruding System
2	3-9	Barrel II	1	Extruding System
3	3-11	Barrel III	2	Extruding System
4	3-13	Resistance Ring	4	Soybean Extruding System
5	3-13a	Resistance Ring	3	Soybean Meal Extruding System
6	3-13b	Resistance Ring	4	Maize Extruding System
7	3-32	Outside Cone Cover	1	Soybean Meal Extruding System
8	3-15/3-15a/b	Clamp II	4	Extruding System
9	3-17	Outlet clamp	1	Soybean Extruding System
10	3-31	Link clamp	1	Soybean Meal Extruding System
11	.3-41	Outlet clamp	1	Maize Extruding System
12	3-19	Cone shaft	1	Soybean Extruding System
13	3-36	Cone shaft	1	Soybean Meal Extruding

				System
14	3-39	Cone shaft	1	Maize Extruding System
15	3-21	Die hole 12 or 10mm	1	Soybean Extruding System
16	3-42	Outlet die	1	Maize Extruding System
17	3-44	Die hole 10 or 8mm	8	Maize Extruding System
18	3-33-1	Knife	10	Soybean Meal Extruding System
19	3.6-4	Deflector	4	Maize Extruding System



Main technical specifications:

1. Main motor power: 110/90kW, 2. conditioner motor power: 1.5kW/2.4kW
3. Feeder power: 1.5kW 4. Forced feeder power: 1.5kW 5. Cutter power moter: 2.2 kW

Fig.10 SPHG3200b dry extruder sample

I PAPERS

NO.	Name	Unit	Qty.	Remarks
1	Operation manual	ea	1	
2	Qualified certificate	ea	1	
3	Electromagnetic speed control controller operation manual	ea	1	
4	Reducer operation manual	ea	1	
5	Variable frequency speed control controller operation manual	ea	1	Special for extruding the corn

II Accessories

No.	Name	Spec.	Unit	Qty.	Remarks
1	Discharge die ring	$\phi 10$ (or $\phi 12$)	ea	1	extruding the soybean for standby application.
2	Adjustable cushion	$\delta=2, 3, 5$	ea	Each one per size	
3	Cutting blade		pc	8	Used for corn
4	Blade		pc	12	Used for soybean
5	Resistance ring	$\phi 165$	ea	1	extruding the soybean for standby

					application
6	Resistance ring	φ154	ea	1	extruding the corn for standby application
7	Wrench with single opening65	Specical use	ea	1	
8	Sprayer	BB1/8-SS5	ea	1	extruding the corn for standby application
9	Braided metal tube	JRL8TG30/W G20-300	ea	1	extruding the corn for standby application
10	Ball valve	G1/2"	ea	1	extruding the corn for standby application
11	Connection plate	.3.5-2	ea	1	Used to exchange the outlet cover of the extruding soybean.soybean meal and corn
12	Inner sleeve		ea	1	Used to discharge the screw.
13	Sleeve1		ea	1	Used to discharge the front bearing
14	Sleeve 2		ea	1	Used to discharging the pushing bearing



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