

# Safety

## 1.1 Personal safety protection

- All the mechanical equipments manufactured by Jiangsu Muyang Holdings Co., Ltd are equipped with safety devices, which are consistent with modern technical level and universally effective safety rules prior to ex works, so that the customers can use the machines in accordance with the regulations.
- The enterprises are obligated to execute following regulations to guarantee operators' safety.
- The belt and chain guard hoods should be amounted and keep close at any moment. It is very dangerous when they are opened or disassembled. It may cause casualty accident. This is also applicable for the preventive device of the manipulator.
- The safety limit switch , interlock cylinder, revolutions monitor , as well as solenoid valve or lock electromagnet in the interlock device of access door should always be kept in good condition. Overlap or discard of the safety limit switches is not allowed.
- The cover plate, protecting hood or guard grating are usually installed and delivered together with the machine. They can only be disassembled with tools. And the machines with such kind of devices can never be put into work until the above-mentioned devices have been properly installed.
- The driving motors must be switched off completely to make the machine stop when carrying out inspection, commissioning, repair and maintenance. This can be done through a full-phase separating and lockable switch which is installed near the machine or on the operation desk, or the control panel on the site. It is not enough only to screw off the fuse wire!
- If the machine needs other energy like pneumatic, hydraulic, steam and hot water energy, it is necessary to cut off their energy supply or turn off the switch, and eliminate the pressure in the internal pipeline system of the machine.
- As for handling heated or cooled parts and components of the machine, especial care should still be taken for the danger of burning.
- If you have pressed the emergency stop switch to stop the machine and you want to reset the switch, so it is not permissible to only re-press this button to restart the machine.
- If some machines are equipped with a local shutdown system, especial care should be taken. Read the instruction manuals attached with the machine carefully. In such machines with a local shutdown system, temperature will rise because pressure or vacuum will occur after they have been used for a period.
- If the operators employed cannot read or write, the owner has the duty to explain to them clearly where dangers exist and warn them that special attention should be paid.
- The cleaning, lubricating and oiling of the machine or its parts and components may be carried out only when the machine is stopped. If you have to climb on or enter the machine to do such work, the mandatory provisions shall be made without exception: the power supply of motors must be cut off completely and the switch must be locked.
- Be careful, sampling from inside the machine can never be carried out unless there is not any danger. Usually, the samples can be taken from the pipe under the machine instead of inside machine.

- Clear off the deposited dust, dirties and materials frequently. Keeping the machine clean can enhance production safety and the cleaning level of workshop, and is also beneficial to prevent dust explosion.
- If oil (grease) leakage occurs, clean it immediately and seal well the place where leakage occurs. For oil or grease leaked on the floor will easily bring about hazards to the operators.
- In production operation, the machine must be equipped with safety devices, which may be neither removed and abandoned nor reduced in functions. Otherwise, we are not responsible for any accidents resulted here from, and reserve the right to ascertain where the responsibility lies.
- Please execute the special regulations on accidents prevention in the operation manual provided by us.
- Only the trained professionals are allowed to operate the machine and equipment manufactured by our Company.
- Environmental protection measure

If you decide not to use the machine any longer, the measure for environmental protection and reutilization shall be taken into consideration: drain the liquid inside the machine (such as motor oil, gearbox oil, brake oil and cooling water) into special containers and send them to the preparation workshop. Special waste (like battery, etc.) must be handled according to related regulations. The plastic parts shall be picked out for reutilization. The metal parts shall be sorted out so as to be ground or scraped.

## **1.2 Explosion protection**

### **- Common cleaning work**

- a. Keeping the working site with combustible dust clean is an important condition for safe production.
- b. Try not to pile bagged or bulk materials between machines.
- c. In order to reduce dust emission to surrounding areas, all conveying devices, cyclone separators , filtering bag should be kept in good condition. Especially, the unsealing of pipes or top covers should be avoided.
- d. In order to reduce dust explosion hazard, dust everywhere must be cleaned out frequently and effectively.
- e. Keep all motors free of deposited dust.

### **- Frequency inspection and maintenance**

- a. Regularly check the working conditions of all V-belt and flat belt to avoid temperature rise caused by belt slipping. Check at least once a week.
- b. Check the safety devices such as speed monitor or the like regularly, at least once a week.
- c. Check and clean the magnetic separator, stoner and sifter at least once a day.
- d. In order to avoid heat generation, it is necessary to regularly check the functions of all main shafts and bearings, at least once a week, and to regularly fill up lubricating oil.

### **-Electric apparatus**

Regularly check the electric apparatus and articles, and special attention should be paid to the following points:

- a. It is forbidden to use any flashlights and other lamps without shielding or explosion-proof glass.

- b. It is forbidden to use any lengthened cable or electric furnace.
- c. It is necessary to immediately repair or replace the electric apparatus and equipment if any failure occurs.
- d. The cables without conduits are not allowed to be installed on the floor.
- e. Cut off the power supply of the machine after work.
- f. An electrician should be assigned to check the insulation of all the lines of electric network according to relevant regulations on heavy current, at least once a year.

#### **.Smoking and welding**

- a. Smoking is forbidden, which is applicable to all workers and staff of the enterprise as well as guests, customers, foreigners and drivers visiting the factory.
- b. If the tools such as welding machine or soldering lamp (flame soldering lamp) etc. are required for repair or installation, do as best as possible to arrange the work in a special workshop or on a special site.
- c. If it is necessary to carry out welding or the like directly in production area or storehouse once in a while, written applications must be submitted to a related supervisor in advance for written approval. The above mentioned operations can be carried out only when special safety measures have been taken, such as laying pieces of water soaked canvas or canvas special for covering on the surrounding area and preparing fire extinguishers. After completion of the operation, the welding site and the surrounding area are to be monitored at least for 10h. The gas cutting sparks are very dangerous, for people can't see where they will fly on earth. They can cross through the narrow clearance of walls and drop downstairs or to the next rooms, or even fly off 10 m away in distance. If the sparks drop in dusts, fire accidents may occur at any time.
- d. Welding is prohibited on a running conveyor. If the welding work is necessary, shut down the machine first, and then make a thorough cleaning and isolate both sides of the welding site tightly with materials like mineral wool to avoid connecting with other conveying devices, silos or tanks. If the work is to be done on the chutes or conveying pipes, it is necessary to disassemble them or divert their lower ends and seal them to avoid welding sparks entering the conveying pipes or silos.

#### **-Effect of static electricity**

In order to ensure the safety of electric circuits and avoid explosion resulted from spark discharge, the paint coat at the electric connections must be removed.

### **1.3 Description about safety control devices**

The control device supplied by MUYANG is a part of the Safety Plan for preventing accident. The control device must be checked by the expert of MUYANG before starting up and the approval (operation) certificate should be signed by him.

If the control system on the equipment of MUYANG is supplied by the third party, it must be made based on the specifications of MUYANG and checked by the expert of MUYANG before starting up and then the approval (operation) certificate should be signed by him.

### **1.3.1 Power supply connection**

- The related regulations of local safety authorities department should be obeyed. For example, a breaker for circuit protection should be installed on power wire according to local regulation.
- Check whether the operating voltage and frequency are in line with the data displayed on the machine nameplate and control cabinet.
- All power wires of control system should be connected as per schematic diagram, so as to realize actual switch of the phase line when using a single-phase source.

## **1.4 Safety program**

- This extruder shall be operated by trained and designated workers.
- All rotary parts should be provided with guard shield to prevent touching at will. The protective device can only be dismantled by spanner.
- A safety switch should be mounted on the driving motor for switching off each phase, and it can be locked. This switch can be mounted nearby the extruder or on control console or control panel of this equipment. This safety switch can be used for shutting down this equipment for maintaining.
- When maintenance, the protective gloves (maximum temperature up to 120°C), safety shoes with steel sheet, and safety helmet should be wore.

## **1.5 Personal safety protection device**

### **1.5.1 Safety switch of the conditioner**

Six doors of the conditioner are equipped with safety locks. When the six doors are closed, namely six plugs are inserted into the safety locks, a single of all doors are closed will be sent out to the control circuit, and only by then the conditioner can be started up.

When any door is opened, door plug is drawn out from the safety lock, and a single of door is opened will be given to the control circuit to prevent the conditioner form startup, so as to serve as the safety protection function.

## **1.6 Safety device of the machine**

### **1.6.1 By-pass door for emergency discharging**

A by-pass door 3 is provided at feeding inlet of extruding barrel. The opening and closing of the by-pass door is realized by the fore and aft motion of the cylinder 2 which is controlled by solenoid valve 1. When feed mash enter into ring die in a fast speed, the accumulated feed is too much ,and the load on motor increased and once the load on motors exceeds the rated value, the control central will give a single to solenoid valve, the by -pass door is opened to discharge feed mash. After the motor load returns to normal range, the by-pass door will be closed automatically and the machine will continue to run normally.

## **1.7 Application**

To ensure the efficient operation and safe use of the machine, the extruder should be installed at a region that, altitude is less than 1000m, temperature range is within 5°C~40°C, and air relative humidity range is within 90%.

MY215 Extruder is mainly used for the cooking and pellet-forming of all kinds of aquatic feeds.

## 1.8 Abrasion and corrosion of wear parts

- Quite a number of mechanical energy of each extruder is transformed into heat energy through friction according to the working principle.
- Pairs of the wearing parts (such as screw rod and bushing) are correlated with each other through the intermediate materials (i.e. raw mixer) between them, and the mutual stress result in abrasion.
- That is to say, except the reason of machine structure and material, the processed material also has a great influence on abrasion.
- The abrasion caused by material with high ash content or high fiber content is larger than that caused by mixing material with high oil content.
- If the additives of strong corrosion (such as acid) are used, from which the abrasion /corrosion will be several times higher.
- The scrapped machine and its parts should be dealt with according to the local laws.

## 1.9 Description of safety marks

1.9.1 The safety mark for “Be careful of electric shock!”: Never open the terminal box when the motor is not power-off.



1.9.2 Carry out maintenance and repairing in accordance of the instruction manual.



1.9.3 The safety mark for “ Be careful of mechanical injury!”: Never open the operating door while the machine is running and has not been stopped completely.



1.9.4 The safety mark for “Be careful to prevent from scalding”: Don’t touch the machine while it is in operation.



1.9.5 Don’t remove the guard shield while the machine is running.



1.9.6 Please put on your gloves as you carry out maintenance and repairing.



## 1.10 Noise

- ◆ The noise of the machine(sound power level ) $\leq$ 110 dB;
- ◆ In order to reduce the noise resulted from vibration, the foundation where the equipment is installed should be rigid enough and a shock absorber shall be available.

## Performance characteristics and indexes

### 2.1 Performance characteristics

The extrusion provides for production of many products with great superiority in comparison with other technologies. Because it almost integrates functions of different equipments in a single process when extruding, the procedures of mixing, extruding, cutting, cooking, forming and drying process in a certain degree can be carried out at the same time.

#### 2.1.1 Multi functions of the machine

An unique combined-type screw structure is adopted, and it can produce a wide varieties products only need to change some simple screw configurations or change the processing parameters.

### 2.1.2 Uniqueness of the product

Other technologies are difficult in producing some feed products or cannot produce products with certain shapes, however extrusion process can produce them easily.

### 2.1.3 High-quality of the product

This extruding operation is extremely effective in high-temperature and short-period processing. It provides improved nutrition with reducing the influences of anti-nutritional factors in products as well as sterilizing.

### 2.1.4 Effective utilization of energy

Extrusion can ripen material in a great degree in the cooking process, sufficiently use steam and reduce power consumption, and thus process cost can be saved.

### 2.1.5 Convenient and precise control system

Adopting the automatic control system can accurately control the flow and flow ratio of all materials, and also the different processing parameters can be recorded for the convenience of future production or providing the basis for adjusting processing parameters.

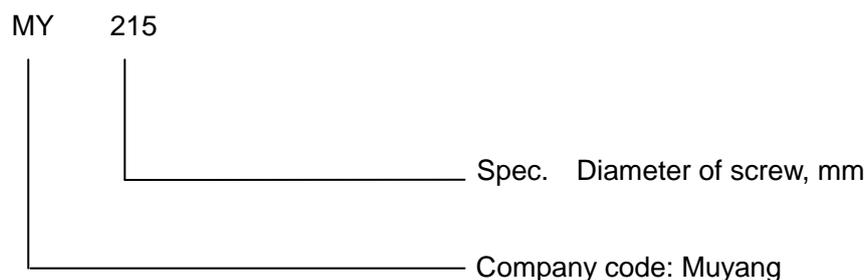
### 2.1.6 Minimum industrial wastewater

This extruding can effectively avoid industrial wastewater; this is an outstanding advantage for feed manufacturers bearing the increasing pressure for reducing influences of production activities on surrounding environment.

## 2.2 Main technical parameters and performance indexes

### 2.2.1 Model description

The model composition of extruder is as follows:



## Structure

### 3.1 Overall structure

The extruder is composed of an anti-bridge feeding bin, a feeder, a conditioner, the extruding principal machine, a cutter, a pipeline system and an electric control system.]

## Technology requirements

When processing floating and sinking aquafeed with an extruder, the homogeneity and granularity of feed mash should be guaranteed. For aquafeed produced by different die hole, the requirements to the granularity of feed mash are different. The minimum requirement of raw material is shown in following table:

Die aperture for production $\Phi$ (mm)	Max. particle size of mash feed (mm)
1.0	0.3
1.5	0.5
2.0	0.65
2.5	0.8
3.0	1.0
4.0	1.2
5.0	1.5
$\geq 5.0$	1.5

Ground particle size will directly affect the quality of extruded products. The ground fineness of raw material for aquatic feed is generally controlled to pass 20 mesh (0.85mm) screen. The ground fineness is generally controlled to allow 95% pass through a 60 mesh (0.25mm) screen when the die hole diameter is less than or equal to the 1.5mm diameter.

To ensure the extrusion operation is carried out smoothly, when the basic requirement of the material particle is met, there is one more point needing to be emphasized specially. The fiber raw materials and impurities such as stones and welded pieces in process flow and equipment if not cleaning timely will lead to machine stoppage, especially when producing small pellets.

## Attention points of maintenance and repair

- 1) The equipment should be cleaned for both inside and outside after each shift of production. Clean the extruding chamber and screw with water after each stoppage timely, so as to avoid difficult cleaning after the materials cooling down and agglomerating;
- 2) Clean up each matching surface of discharging assembly and cutter after each stoppage, and spread them evenly with vegetable oil before getting off work.
- 3) Clean up the spared discharging die in time, and spread or steep vegetable oil on it.
- 4) The big belt pulley of extruder main shaft should be usually cleaned for preventing dust accumulation; otherwise, unbalance of the belt pulley will cause extruder vibration;

- 5) Bearings box of the extruder are lubricated by circulating lubrication oil with the name and code: ISO-VG68 bearing oil (room temperature  $\geq 0^{\circ}\text{C}$ ); ISO-VG32 bearing oil ( $-8^{\circ}\text{C} \leq \text{room temperature} \leq 0^{\circ}\text{C}$ );
- a) Lubricate the feeding conditioner and the bearings of its driving device and other bearings with lubricating grease.
- i. Designation and code of lubricating grease: 221 lubricating grease(SY1525-82) or 2# common lithium base grease .
- 6) New oil for the reducing gear box must be replaced regularly; the first oil replacing should be carried out after one-month operation of the principal machine, and replace once a year since. The used oil must be emptied before replacing new oil every time, empty the residue in the chamber with compressed air and fill in new oil (calculated a per 10hr operation per day), and both over high or low oil level will affect normal operation of the reducing gear box.
- 7) For other bearings, lubricate grease each 48 working hours.
- 8) Lubricate the chain driving mechanism and coupling of the conditioner regularly.
- 9) The oil in the reduction box of conditioner should be controlled to upon the standard oil surface, and 1/2 old oil should be replaced with new oil after working for 200h and should be replaced completely after working for 384h. The reducing gear box is lubricated with industrial closed gear oil (GB 5903-1995) L-CKC Grade I, viscosity grade 220 (according to GB/T 3141-1994).
- a) Disassembling the screw sections, and it is not allowed to knock them out heavily.
- 10) Clean the pneumatic valve on the upper part of anti-bridge feeding bin every week, so as to avoid time delay for feeding caused by blockage in this part. Clean the residual material on the cylinder wall of the feeder each week. Clean the residual material in soft joint between feeder outlet and conditioner inlet each week. Clean the water adding and steam nozzle of conditioner each week to keep liquid application smoothly. Dismount the by-pass and clean it once a week, and clean the residual material at the feeding inlet of extruding barrel at the same time.
- a) Note: When cleaning all the equipment, the power must be cut off, and the air switch should be broke and the power supply should be cut off
- 11) Keep the extruder and its surroundings clean.

## Malfunction and troubleshooting

### Malfunction and troubleshooting

Trouble	Causes	Solutions
The temperature of extruding chamber cannot meet the rated temperature	Steam pipeline of Jacket is blocked. The inlet of steam pipeline in extruding chamber is blocked;	Clean the steam pipeline of jacket. Clean the inlet of steam pipeline in extruding chamber.
Temperature of extruding chamber fails in meeting the requirement	Steam pressure is not enough; Steam pipeline is blocked;	Check steam pressure, adjust it normally to 3 bar; Clean the steam pipelines;
.Material surface is coarse with different length after extruding.	Poor conditioning. Part of the die plate holes are blocked; Ground particle size larger than	Conditioning the material; Stop production and clean the die plate; Improve grinding effect and achieve fine particles;

	required; Bad quality die plate;	Adopt the die plate from the regulated manufacturer;
Throughput decreases	Shear block is worn off b) screw head is seriously worn	Replace shear block; Replace screw head;
Material cannot be discharged suddenly after normal operation	Excessive short-time feeding or cut-off feeding; Blocked die holes;	Stop production, check and correct it;
Wave type intermittent discharge	Low filling degree of expanding chamber	Improve the output
Insufficient expansion	Insufficient gelatinization	Improve the output; Improve the conditioning temperature; Improve the jacket heating temperature; Improve the rotary speed of main motor;
Excessive expansion degree	Excessive temperature Too fast rotating speed of main motor Opening area of the die plate does not match the output.	Decrease the temperature. Reduce the rotating speed. Change the opening area of die plate or adjust the output.
Over long or short expansion grains	Over-high or low cutting speed	Adjust the cutting transmission speed;
Poor product forming	Improper raw material formula; Over-high or low processing temperature; Unstable feeding; Too much or too little moisture contained in product; Incorrect cutting speed; Blade is worn out; Too large ground particles;	Change formula of raw materials; Recombine the components in machine barrel; Adjust to even feeding; Reduce or increase water or steam addition volume; Adjust the rotating speed appropriately; Replace blade; Smash the raw material more fine to reach the defined granularity.

## Transport and storage

### Transport

The extruder is suitable for land or water transportation. Attention should be paid to the package and storage marks on the packing box when unloading or loading during transport. To prevent over-turning or heavily pressing the extruder when transport, and the front end of the extruder should be equipped with support when packing.