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1 Safety

This operation manual must have been read carefully before use the machine. The operation manual should be put in the place where is easy to take and read so that it is easy to have a look as necessary. If the product has the problem, please must read the operation manual carefully again.

The safe operation will guarantee each operator and other people’s safety.

Each operator must know the security in the working area.

All of the equipment operator must learn the methods about operation and maintains of equipments. The operator must read the operation manual carefully and has known the safety precautions.

The crusher can not be started before all the safety and protective system has been applied.

Must check every thing carefully before machine run.

**Notice:** Do not neglect any unsafe factor, even a tiny negligence can cause the serious consequence.

A machine can not fail to work easily if it has good maintenance.

A machine failure may cause personal injury directly or during the maintaining process.

1.1 General safety

Because there exist all kinds of potential dangerous in the crushing operating, in order to ensure safety, must obey the following points strictly as
well as read carefully and obey the suggestions in this operation manual strictly.

1.1.1 Regularly train the related personnel for maintenance and safety;

1.1.2 Strictly comply with the basic safety operation regulations and related safety rules;
1.1.3 Hang warning plate in dangerous area;
1.1.4 Prepare the necessary protected device and tools properly;
1.1.5 The managerial staff must fulfill their responsibilities in order to ensure to constitute and comply with effective regulations and rules about safe operation.

1.2 Personnel safety

Only the person who have great skill and have passed the training can operate and maintain the machine.

1.2.1 Study all warnings, precautions and all warning plates and instruction around the crusher in this manual carefully;
1.2.2 It is not allowed to climb onto the equipments or touch the running parts when machine is running;
1.2.3 During the transportation and lifting process anybody is forbid strictly to climb on the equipments;
1.2.4 The attention can not be concentrated after drinking or other things so it is not allow operating this machine in that case;
1.2.5 Should wear safety glasses to protect eyes against flying chip, crumb or dusts;
1.2.6 Should wear clothing and cap properly to prevent that the hair and clothing winded into running machine;

1.2.7 Should wear glove to protect hands against injury. If it is necessary the aerophore should be worn.

1.3 Working area safety

1.3.1 Should keep working area clean. There should avoid block or other sundries on the walkway, platform and stairs, or under the conveyor.

1.3.2 Non-working staffs should not be allowed to enter into working area. If someone wants to enter into working area, must register.

1.3.3 All maintain tools and other parts should be put in appointed places to make easy use.

1.3.4 Anyone is not allowed strictly to stand under the lifting device.

1.3.5 Must check if all start alarms and alarming devices in the working area work properly every day when changing shift;

1.4 Equipment safety

1.4.1 It is prohibited to change, destroy or remove warning and safety signs;

1.4.2 Before shift changing, should check all equipment parts to ensure that all of the parts are in good condition for use. If there are the damaged parts, should repair or change them immediately;

1.4.3 Must strictly comply with the procedures provided in the instruction manual to start, stop machine;
1.4.4 During operation process, operators must always notice the changing of instruments and meters, running situation of equipments. If abnormal indications or abnormal noises are found, should stop machine immediately and check the problems. The machine can be restarted only after the problems have been solved;

1.4.5 The machine must be stopped firstly, then switch off power supply and lock up electric control bin when carry on repairing, maintenance, lubricating and adjustment work.

1.5 Electrics safety

1.5.1 Only qualified person who have passed the electrical training can operate the equipments for electrical units;

1.5.2 People who are around electrical equipment or undertaking electrical working should be on their guard. If the electrical equipment fails to work, should stop the machine immediately.

1.5.3 Before start should check if earth wire, motor wire, power wires are proper and firm.

1.6 Welding safety

1.6.2 Only person who have rich experience and be familiar with welding equipment and weld metal are allowed to carry on welding or incising;

1.6.2 Especially notice the spark or welding spatter, do not splash down on the belt, hose, oil tank, other parts or on the body of working staffs;

1.6.3 It must be noticed that there is nothing like pressure vessel or gasoline existing nearby during welding operation.

Notice: Should strictly carry on the operation according to the requirements in the instruction manual to prevent accidents in
advance.

2 Main technical data (refer to the table below)

<table>
<thead>
<tr>
<th>Code</th>
<th>Model</th>
<th>Performance</th>
<th>Power (kW)</th>
<th>Outline dimension (m)</th>
<th>Weight (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Feed opening (mm)</td>
<td>Max. feed size (mm)</td>
<td>Discharge opening (Close side) (mm)</td>
<td>Capacity (t/h)</td>
</tr>
<tr>
<td>1</td>
<td>PEF500X750</td>
<td>760×500</td>
<td>425</td>
<td>50~120</td>
<td>40~86</td>
</tr>
<tr>
<td>2</td>
<td>PEF600X900</td>
<td>920×600</td>
<td>510</td>
<td>65~130</td>
<td>125~200</td>
</tr>
<tr>
<td>3</td>
<td>PEF750X1060</td>
<td>1060×750</td>
<td>640</td>
<td>65~200</td>
<td>160~350</td>
</tr>
<tr>
<td>4</td>
<td>PEF900X1200</td>
<td>1220×910</td>
<td>770</td>
<td>75~220</td>
<td>230~460</td>
</tr>
</tbody>
</table>

Remark: 1. The discharge opening is the adjustment range when the distance between the stationary jaw and swing jaw is maximum.

2. The specified capacity of this machine is calculated value according to the material with medium degree of hardness and bulk density 1.6 t/m³, and the distance between the stationary jaw and swing jaw is maximum. The capacity of the crusher will be affected by many factors such as the material nature, shape, granularity composition, feeding way, working condition and so on, so the capacity in the table will be change according to the different situation on the working site.

3 Application

DH KS series crusher is one kind of jaw crushers (compound pendulum) combined advanced technology and optimal-designed by our company. It is applicable to processing all kinds of ore and rock with compression strength
below 300MPa and a optimal equipment for primary and secondary crushing. It is widely used in the industries such as in the mining, metallurgy, building material, highway construction, railway construction and the chemical industry to process the materials.

4 Working principle

Shown as Figure1, the machine is mainly constituted by machine frame, movable jaw, eccentric shaft, jaw plate and adjusting bed etc. When machine is working, the eccentric shaft is driven by the motor through the grooved pulley, which makes the movable jaw moving according the fixed trace. So the material entering into the crushing chamber will be crushed between two jaw plates. The crushed material is discharged through the discharge opening by its self-weight.

5 Structure features

5.1 Frame

The machine frame is weld by steel plate and eliminated the stress by annealing. The stationary jaw plate is fastened on the front wall of the frame. The side liners (left and right) are installed in the crushing chamber inside the frame to prevent the wear of the frame inside wall. There are four \( \phi 33 \) holes on the front steel plate of frame. Knock the stationary jaw plate by using a stick to make it easy when dismantle stationary jaw plate. There are \( \phi 40 \) holes on the side steel plate of frame. Knock the side liner by using a stick to make it easy when dismantle the side liner.

The stationary jaw plate and side liner(left and right) are all the high manganese steel casting structure (wear parts) and should be changed regularly according to the property of crushed materials. When change the stationary jaw plate firstly should loose the bolts for side liner, after remove the side liner then knock the stationary jaw plate by using stick. The stationary jaw plate should be removed when the stationary jaw plate is disconnected from frame. The assembly sequence of stationary jaw plate is opposite to the disassembly sequence. The stationary jaw plate should be installed firstly then the side liner. When install the side liner, the two sides should fixed with stationary jaw plate and wedge welded on frame tightly. It should be noticed that it must be tightened by bolts of side liners when side
liners have been installed.

5.2 Swing Jaw Assembly

Shown in the Figure 2 the swing jaw is the steel casting structure and in front of which the swing jaw plate is installed. The top is suspended on the machine frame via eccentric shaft and roller bearing. The bottom is supported on the toggle plate and it is sliding contact with toggle plate. The fly wheel and grooved pulley is installed on the two end of eccentric shaft. The deflector plate is installed on the top of the swing jaw in order to prevent the wear of top of swing jaw and distortion of bearing hole that are caused by feeding, which will affect the working life of swing jaw and disassembly of bearing and other parts.
The swing jaw plate and wedge are installed in front of the swing jaw. They are high manganese steel casting structure (wear parts) and should be replaced periodically according to the property of the crushed material. When changing the swing plate, firstly remove the wedge. There are two holes (φ40) on the swing jaw to make it easy to remove the wedge. After removing the wedge, then remove the swing jaw plate. The assembly sequence of swing jaw plate is opposite to the disassembly sequence. The swing jaw plate should be installed firstly, then the wedge. The steel plate can be welded on the wedge in order to fasten the swing jaw plate.

The bearing of swing jaw assembly and frame are roller bearings. Shown as Figure 2, all of the bearing sealing apply oil seal. The 3# lithium grease or other equivalent lubricates should be added into bearing (notice: the different brand and different model of lubricate grease can not be used and mixed together). The quantity of lubricate grease to add into bearing should be 2/3 of bearing cubage. Fill oil every week, clean and change lubricate grease every six months. The bearing should be cleaned by using coal oil and refill oil to the 2/3 of bearing cubage.

If the machine is used in the open air or at high temperature, should shorten the lubricating period and replacing period.

**5.3 Toggle plate**

One end of the toggle plate is supported on the lower part of swing jaw and another end on the adjustment seat, which form the slide contact. The toggle plate will be flexed or broken when the unbreakable material enters the crushing chamber or the crusher load increase suddenly, which will protect other parts against damage.

**5.4 Adjustment unit**
The adjustment rod and shims can be used to adjust the discharge opening according to user’s needs to control the discharge size. Notice: must loose the spring when adjust the rod, remove the adjustment rod after add shims, tight the spring.

5. 5  Tension rod unit

The tension rod unit is composed of rod, spring, nut and other parts, which will be used for ensuring the entire running of crusher and balance the inertial force when swing jaw and toggle plate are working. The precompression of spring should not be over big as long as it can eliminate the knock sound come from between the toggle plate and swing jaw, toggle plate and adjustment seat.

6  Installation and operation

6. 1  The machine have passed the 4-hour-test without load before leave the factory. The machines and parts should be check by user after they receive. User should solve the problems may cause during transportation process.

6. 2  Installation

6. 2. 1  The installation should refer to the foundation drawing. The frame installation is required to be straight and foundation bolts should be fastened repeatedly.

6. 2. 2  Specially it should be paid more attention to the parallel between
the central lines of V pulley and of motor pulley when install.

6.3 **Test run**

6.3.1 Before start the crusher, ensure no body stand in the area where they may be injured. Check around the crusher and ensure there is no body on, beside and under the crusher. Before start, must warn each person nearby on their guards.

6.3.2 To ensure the crusher start without load. Check if there is any metal sundries and other parts in the crusher, should clean out if there exist.

6.3.3 Check the fastness of each fixed part and lubricating condition of each part, check if the tightness of conveyors are proper, check if the electrical equipment are normal.

6.3.4 The crusher must be started without load. It is not allowed to start with load strictly. The running without load should not less than 2 hours. Should observe the running condition when test run. It any abnormal situation is found, should stop machine immediately. It can be restarted only after check the problem and solve it.

6.3.5 The increasing temperature of bearing should not exceed 45°C when the crusher is working. If exceed, should stop crusher immediately and solve the problem.

6.4 **Feeding of crusher**

6.4.1 Normally the crushed material can be fed into crusher by using the feeder in front of crusher, also can be fed into crusher by using the material guiding trough.

6.4.2 The feeder, hopper and material guiding trough should be designed, manufactured and installed in order to prevent the stone material rolled out from the crushing charmer, hopper and material guiding trough,
which cause the personnel injury.

6.4.3 The feeding height should not be higher than 1 meter. The feed system and its installation should not affect the maintenance of crusher.

6.4.4 If crushed material contain a lot of fine material (less than the discharge opening), a vibrating screen or feeder with grizzly screen should be furnished, which make the fine material pass through the screen without passing through the crusher. Thus it will increase the throughput capacity as well as reduce the wear of jaw plate.

6.5 Running with load

6.5.1 It is not allowed strictly to climb the crusher and touch any running parts when crusher is running.

6.5.2 The material should be fed into crusher evenly. When start the test run with load, should feed small amount of material, gradually half load and full load. If feeding material is oversized or excessive, or feed the unbreakable material (metal block) frequently, that should speed up the wearing and damaging of the equipments. So should control over-sized material and unbreakable material fall into the crushing chamber. It is very important for normal working of crusher to keep even feeding.

6.5.3 The crusher should NOT be started with load strictly. So the start sequence of crusher should be: discharge conveyor→crusher→feed conveyor; the stop sequence is opposite to the start sequence. Firstly should stop feeding, then switch off the power supply of main machine after the materials in the crushing chamber have been discharged completely. The stop sequence should be: feed conveyor→crusher→discharge conveyor.

6.5.4 Avoid the unbreakable material enter into the crusher. Otherwise it
may cause overload and damage the crusher. Forbid the explosive material enter into the crusher.

6.5.5 If the sundries enter and stay in the crusher, should stop the feeder and crusher, empty the crushing chamber and take out the sundry goods. It may be achieved by adjusting the discharge opening to make the sundries discharged if necessary.

6.5.6 If crusher is stopped with load, then:

   a) Check the crushing chamber. The crushing chamber can only be checked from bottom of crusher not top in order to avoid the unbreakable materials from feed opening that cause serious personnel injury.

   b) Check the electric and mechanical problem. The crusher is clogged by sundry goods if there is no electric and mechanical problem, which is serious.

   c) If there is the iron block enter into the crusher, there will store energy in the crusher. So long as move the jaw plate to the place where it is maximum discharge opening, the stored energy will reduce greatly, then start crusher. If the crusher can not be started, repeat above steps. When all the jaw plates at the plate where it is maximum discharge opening, do not restart crusher and must take the iron block out of the crusher manually then.

6.6 Lubricate

6.6.1 Should check the lubricate holes of frame and swing jaw periodically to ensure having sufficient lubricate oil.

6.6.2 If the auto lubricating is not applied, the lubricating of bearing should be achieved by oil gun. Before oiling should clean up the oil nipple. The crusher should be stopped when add oil.
6.6.3 The qualified lubricate grease should be 3# lithium grease.

6.6.4 The interval to add oil should be 80 hours under the normal work condition. The frequency to add oil should be doubled under the bad work condition (40 hour/once).

6.6.5 The lubricating oil not only can lubricate but also can seal the labyrinth to avoid the bearing dirtied by dust and other impurities. As a result of insufficient lubricating it may cause bearing damaged and other problems. So it is very important to oil the bearing regularly.

6.7 Discharge opening adjustment

6.7.1 The discharge opening refers to the minimum distance between the stationary jaw plate and the bottom part of swing jaw, which is easy to be measured when crusher stop. Because the swing jaw always at the lowest point, the measured value is measured probably when the discharge opening is ±2mm.

6.7.2 The discharge opening should be measured from the minimum wear area all the time. The discharge opening can not be adjusted to the range less than minimum discharge opening. From the smallest attrition area determination dump mouth, may not adjust throughout the dump mouth is smaller than the smallest dump mouth scope.

6.7.3 There are two ways to adjust the discharge opening: the mechanical adjustment applies for DHKS3020 and DHKS3624 crusher; and the hydraulic adjustment applies for DHKS4230 and DHKS4836 crusher. The discharge opening can be adjusted by changing the shim quantity according to the product size that user needs and wearing condition of jaw plate in the operation. The adjust consequence are as follows:

a) loose the spring in the tension rod;
b) support the swing jaw by using adjustment rod (or hydraulic jack);
c) add shims with proper thickness according to the discharge opening;
d) loose the adjustment rod (or hydraulic jack)
e) Spring

**Notice**:
1. When add shims, the thickness of added shims should be the same completely in order to avoid swing jaw deflected. Add shims with proper thickness according to the discharge opening;
2. Should release the adjustment rod (or hydraulic jack) after adjustment and can not make it be at the stressful condition, otherwise it may cause the adjustment rod (or hydraulic jack) damaged.

6.8 The stationary jaw plate and swing jaw plate are symmetrical, so after the stationary jaw plate and swing jaw plate are worn, they can be used reversely to save the crushing cost of crusher.

6.9 Trouble shoot table
<table>
<thead>
<tr>
<th>Troubles</th>
<th>Causes</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The crusher shakes and makes knock-on noise.</td>
<td>The jaw plate or liner plate in the crushing chamber are loose.</td>
<td>Fasten or change the jaw plates or liner plates.</td>
</tr>
<tr>
<td>There is the knock sound at toggle seat.</td>
<td>The spring tension force of spring is inadequate or spring is disabled, the toggle seat is worn.</td>
<td>Adjusting the tension force of spring, change the spring, change the toggle seat.</td>
</tr>
<tr>
<td>The product size is increasing.</td>
<td>Serious wearing at the lower part of tooted plate.</td>
<td>Over turn the toothed-plate or adjust the discharge opening.</td>
</tr>
<tr>
<td>Fiercely splitting sound, the swing jaw stop moving, the flywheel continue running, the spring is loose.</td>
<td>The toggle plate is damaged.</td>
<td>Loose the nut, remove the spring, lift the swing jaw forward and change the toggle plate.</td>
</tr>
<tr>
<td>The fly wheel run inversely, crushing is stopped, the toggle plate is come off from sliding block.</td>
<td>The spring is damaged, the nut of tension bolt is out.</td>
<td>Change the damaged parts, assemble the toggle plate.</td>
</tr>
<tr>
<td>The bearing is heating.</td>
<td>The bearing holder is inclined, the roller spirally rotates, or the viscosity of lubricating oil is too high, the oil supply is too much or too little.</td>
<td>Re-assemble the bearing or change the bearing, adjust the viscosity of lubricating oil, adjust the oil quantity.</td>
</tr>
</tbody>
</table>

7 Wear parts

<table>
<thead>
<tr>
<th>Specification</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary jaw plate</td>
<td>ZGMn13Cr2</td>
</tr>
</tbody>
</table>
Swing jaw plate  ZGMn13Cr2  
Toggle plate  Q235-A  
Toggle seat  45  
Side liner  ZGMn13Cr2  
Bolt(swing jaw)  45  
Bolt(side liner)  Q235-A  
Rod  Q235-A  
Spring  60Si2Mn

8 Outline drawing and foundation drawing

The detailed documents about the outline drawing and foundation drawing of the machines will be given together with the machines.

9 Technical data and elementary diagram of the electric control part

Normally if there is no indication in the contract, the electric control bin will be furnished by user. The standard electric control bin can be chosen. As a rule, the XJZ1 series electric control bin will be chosen for Y series motors, the XQP4 series starter for JR, YR series motor. The detailed performance and circuit diagram refer to the following table and figure.

9.1 **Technical data of the electric control part:** (Y Series motor)

<table>
<thead>
<tr>
<th>Model</th>
<th>Motor</th>
<th>Rated</th>
<th>Power of</th>
<th>Current</th>
<th>Reference</th>
<th>DJI—E setting</th>
</tr>
</thead>
</table>

17
<table>
<thead>
<tr>
<th></th>
<th>power (kW)</th>
<th>current (A)</th>
<th>auto transformer (KW)</th>
<th>ratio of current transformer</th>
<th>current value of thermorelay (A)</th>
<th>value of Current-time converter (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XJZL—14</td>
<td>14</td>
<td>28</td>
<td>14</td>
<td>50/5</td>
<td>32</td>
<td>4.2</td>
</tr>
<tr>
<td>XJZL—20</td>
<td>20</td>
<td>38</td>
<td>20</td>
<td>50/5</td>
<td>42</td>
<td>5.6</td>
</tr>
<tr>
<td>XJZL—22</td>
<td>22</td>
<td>42</td>
<td>22</td>
<td>75/5</td>
<td>44</td>
<td>4.2</td>
</tr>
<tr>
<td>XJZL—28</td>
<td>28</td>
<td>56</td>
<td>28</td>
<td>75/5</td>
<td>63</td>
<td>5.2</td>
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<tr>
<td>XJZL—30</td>
<td>30</td>
<td>57</td>
<td>30</td>
<td>75/5</td>
<td>63</td>
<td>5.2</td>
</tr>
<tr>
<td>XJZL—40</td>
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<td>80</td>
<td>40</td>
<td>100/5</td>
<td>85</td>
<td>5.6</td>
</tr>
<tr>
<td>XJZL—55</td>
<td>55</td>
<td>103</td>
<td>55</td>
<td>200/5</td>
<td>120</td>
<td>3.8</td>
</tr>
<tr>
<td>XJZL—75</td>
<td>75</td>
<td>140</td>
<td>75</td>
<td>200/5</td>
<td>160</td>
<td>5.2</td>
</tr>
<tr>
<td>XJZL—100</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td>300/5</td>
<td>3.5</td>
<td>4.9</td>
</tr>
<tr>
<td>XJZL—115</td>
<td>115</td>
<td>230</td>
<td>115</td>
<td>300/5</td>
<td>4</td>
<td>5.6</td>
</tr>
<tr>
<td>XJZL—135</td>
<td>135</td>
<td>270</td>
<td>135</td>
<td>600/5</td>
<td>3.5</td>
<td>3.1</td>
</tr>
<tr>
<td>XJZL—155</td>
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<td>294</td>
<td>155</td>
<td>600/5</td>
<td>4.1</td>
<td>3.8</td>
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<tr>
<td>XJZL—190</td>
<td>190</td>
<td>370</td>
<td>190</td>
<td>600/5</td>
<td>4.8</td>
<td>4.5</td>
</tr>
<tr>
<td>XJZL—225</td>
<td>225</td>
<td>410</td>
<td>225</td>
<td>800/5</td>
<td>3.8</td>
<td>3.8</td>
</tr>
<tr>
<td>XJZL—260</td>
<td>260</td>
<td>475</td>
<td>260</td>
<td>800/5</td>
<td>4.4</td>
<td>4.5</td>
</tr>
<tr>
<td>XJZL—300</td>
<td>300</td>
<td>535</td>
<td>300</td>
<td>800/5</td>
<td>4.8</td>
<td>5.2</td>
</tr>
</tbody>
</table>

9.2 Elementary diagram of the electric control part
XJZ1-14-75

Remark: when use the manual, it has two functions: manual start running and auto start running.

XJZ 1-80 –300