TOKUL AGRO PRODUCTS IND. AND TRADE LTD. CO.
info@tokultarim.com | www.tokultarim.com
Ph: +90-537-522-5471

Operations Manual

To assist in efficient and safe operation of Tokul Cold Oil Press

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1. Equipment Specifications

Upon arrival of your equipment, it is recommended that you write your specific equipment information in this manual and keep it with your equipment at all times.

This manual contains relevant safety, performance and troubleshooting information that will enhance the value of this equipment when it is operated and maintained in accordance with this guide. Additionally, maintaining this manual with the equipment will ensure that relevant information is in the hands of the operator at all times, ensure efficient operation and increase the resale value of the machine.

Name and address of purchaser:_____

_____

_____

Model Number of your equipment_____

Serial Number of your equipment_____

Date purchased from Tokul_____

List any options obtained with this equipment_____

Seeds this unit was originally intended to press_____

Type of pressing head and size_____

2. Technical Specifications

Tokul has chosen high quality manufacturers for this series of expellers. All expellers are of stainless steel and/or chrome nickel materials which undergo a rigorous heating and hardening process that operates between 1030-1050 C, depending on the specific material chosen. Following this hardening process, the hardened pieces are again heated to 150 C. The BODYCOTE system is applied to locally procured materials and all machine working parts are treated with nickel phosphate in order to increase corrosion resistance and durability

There are four basic models available in this series, which are designed to meet the customer needs by efficiently scaling up the operation by increasing the number of heads working together in a single unit. These units can be combined as desired to increase plant throughput.

The four basic models available are:

The Single Head Screw Press

Single Head Screw Press Technical Specifications

Height: 1.25m

Length: 0.9m

Width: 0.5m

Weight : 150 KG (330lbs)

Capacity: Up to 5 Kg/ hour(depending on nozzle used, seed density and moisture)

Motor: 2.2kW and available in a variety of voltages (please specify)

Typical oil removal: 85-95% (depending on nozzle, moisture and seed condition)

Materials used: 1.4121 SS, 1.4125 SS, 1.2379 SS and 51420 CHROME NICKEL

We source our materials from a German-Turkish joint venture which is known worldwide for top quality products. See www.birlesikmetal.com.tr

The Three Head Screw Press

Three Head Screw Press Technical Specifications

Height: 2.3m

Length: 1.5m

Depth: 1m

Weight : 700 KG (1400lbs)

Capacity: Up to 15 KG/hour(depending on nozzle used, seed density and moisture)

Motor: 2.2kW standard with 5.5kw upgrade option, independent motor option available in a variety of voltages (please specify)

Typical oil removal: 85-95% (depending on nozzle, moisture and seed condition)

Materials used: 1.4121 SS, 1.4125 SS, 1.2379 SS and 51420 CHROME NICKEL

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The Five Head Screw Press


Five Head Screw Press Technical Specifications

Height: 2.3m

Length: 2.5m

Depth: 1m

Weight: 750 KG (1550lbs)

Capacity: Up to 25 Kg/day(depending on nozzle used, seed density and moisture)

Motor: 5.5kW standard with 2.2kW and 7.5kW options, independent motor option available in a variety of voltages (please specify)

Typical oil removal: 85-95% (depending on nozzle, moisture and seed condition)

Materials used: 1.4121 SS, 1.4125 SS, 1.2379 SS and 51420 CHROME NICKEL

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The Twenty Head Screw Press


Twenty Head Screw Press Technical Specifications

Height: 2.3m

Length: 6m

Width: 1m

Weight : 3300 KG (3mton)

Capacity: 2400 Kg/day(depending on nozzle used, seed density and moisture)

Motor: 5.5kW standard with 2.2kW and 7.5kW options, independent motor option available in a variety of voltages (please specify)

Typical oil removal: 85-95% (depending on nozzle, moisture and seed condition)

Materials used: 1.4121 SS, 1.4125 SS, 1.2379 SS and 51420 CHROME NICKEL

We source our materials from a German-Turkish joint venture which is known worldwide for top quality products. See www.birlesikmetal.com.tr

We perform a heating and hardening process that subjects components to 1030-1050C temperatures (depending on material) and reheated after cooling to 150 C. Final processing includes coating with nickel phosphate to increase durability.

The standard 20 head press includes an integrated feed bunk, digital speed and heat control and stand to enable ease of operation, optimization and repeatability. Our systems are expandable to ensure customers achieve projected scale up results. Options including feed, oil and pellet augers can be included as required.

3. Safety Information

While your expeller is designed to run continuously without supervision when properly set up, there are a number of safety concerns that must be considered before this equipment is operated.

Personnel that are responsible for the operation of the oil expeller should ideally be trained by Tokul personnel but, at minimum, be thoroughly familiar with the contents of this manual.

Failure to observe safety and equipment warnings may result in personnel injury, equipment damage, excessive wear and tear and down time.

Oilseed expellers should only be used for their designed purpose of expelling plant oils from oil bearing seeds. Any use of this equipment for purposes other than this designed use is at the owners risk.

Any plant safety rules must be followed at all times. These rules may require things such as hearing protection, safety glasses, hard toe shoes, no loose clothing or jewelry, etc. Local plant safety rules should be applied in addition to those safety issues that are specific to this machine and discussed here.

While Tokul makes every attempt to provide a complete solution, this equipment may not be supplied with an end use plug that fits the power supply source at your facility. It is important that a proper power plug or hard wired connection with a disconnect switch is made to the unit. These connections should only be made by a licensed electrician or qualified plant personnel. Standards governing proper electrical connections must be in accordance with any local requirements.

Any repairs that need to be made on the equipment should be attended to immediately before continuing operation. For multiple head units, the head in need of changes can easily be taken offline by shutting off the feed from the bunker. Any head taken offline in this manner must be clearly labeled and locked out to preclude any damage. Feed funnel is often removed as an indicator of the head being offline

Operating personnel must be familiar with the equipment and any changes in the operational status of the equipment must be immediately noted so the conditions can be diagnosed and monitored so that corrective actions can be taken.

An operating expeller operates under extremely high pressure that can exceed 15 Meter Ton of force. These high pressures also generate heat in the pressing head, even if the heating elements are not in use. After extended runs, it can be expected that the entire press head should be considered a burn hazard and caution must be exercised to avoid getting burned by hot parts. Frictional heat can be controlled by seed pretreatment, moisture and oil content as well as rate of feed and nozzle size.

Prior to any repairs on the equipment, the unit must be disconnected from the power source by unplugging or switching the source disconnect off. Any covers or safety shields must be installed before the unit is placed back in service.

Modifications to the machine that are not authorized by Tokul are at the owners risk.

Seeds can only be fed by gravity. Inserting hands or other items in order to force seeds into the press is dangerous and can result in injury and damage to the equipment. The feed hopper must be in place before use. Caution must demonstrated if remove the feeding funnel from an operating machine.

Proper operation of the machine requires all around access by operating personnel. Plant supervisors must ensure at least 4’ clearance is provided around the machine on all sides. Combustible materials should be kept outside this area as well.

Ring heaters can get extremely hot and must be handled with care. The heater ring power should never be turned on if they are not mounted on a press head. Heaters not in use should be unplugged at the base of the controller and removed if they are not in use so they do not get fouled. Heaters that are badly fouled with oil will smoke and they should be kept clean with cloth or stiff brush.

Water should never used for cleaning wear parts of a machine while on the machine.

The expeller must be firmly bolted to any supporting structure before use.

4. General Information

The oilseed expeller puts oil bearing seeds under extreme pressures to separate oil from the meal cake.

Seed > oil expeller + heat > oil and meal pellets

The Tokul expeller is designed to expel oil from a wide variety of materials efficiently and consistently under the creation of the proper conditions. An awareness of the primary components of these conditions will be discussed briefly here.

Seed size: Particle size reduction in the pretreatment section is a primary influencer in oil recovery. Materials that are too fine often clog (bridge) in the hopper and result in many fines passing through the filter with the oil. In this case, fibrous materials may be needed to generate proper pressures and effect oil separation. Seeds that are too large will not feed properly as well as exhibit poor oil removal.

In general, soybean size seeds and larger should be cracked or split to enhance oil removal (not ground). Seeds smaller than soybeans do not need to be reduced in size.

Pretreatment: Seeds that are within shells or hulls should be dehulled before pressing. While some portion of the shells may pass with the seed, the bulk of the outer portion of the kernel should be removed for best oil recovery. Hulls contain no oil and will absorb released oil from the kernel and result in higher wear and tear on working parts.

Temperature: Temperature is a primary driver in forcing oil removal from seeds. While higher temperatures generally result in higher oil

recoveries, this may not be desirable for other reasons. The expelling process is very strongly affected by temperature and optimal temperatures will be quickly noted by attentive operators.

Moisture: Seed moisture is another primary factor for expelling efficiency. Both moisture and oil both act as lubricants in the expelling chamber. Low moisture seed (<8% or less) creates higher pressures and therefore higher oil recovery, but also generates more frictional heat. Using low oil seeds (<20%) and low moisture levels (<6%) can create very high pressure conditions that can damage your machine. Conversely, seeds with high moisture (>12%) will result in lower oil recovery rates and also pass moisture into the oil that can result in shortened shelf life of the oil through oxidation and biodegradation because of the presence of water. Higher moisture seeds will run cooler than dry ones. Optimal seed moistures will be 8-12%. The purchase of a seed moisture meter would be a good investment and important to ensuring efficiency and consistency.

Speed: Your oil expeller is equipped with a Variable Speed Drive motor controller. Generally, motor speeds are maintained from 20-40 for best results.

Combination factors: The factors listed above can combine in various ways to create a myriad of conditions that will influence your operation. It is recommended that these conditions are carefully noted for your seeds to help you determine the optimal conditions for your materials.
Your oil expeller will produce oil from your seeds optimally when they are consistently fed materials that meet the best practices that are generally described above. The consistent nature of the seeds also helps to make this a stable process.

Operator knowledge and familiarity is a very important feature of an efficient pressing operation and operators should make every attempt to document all conditions so that combination factors can be assessed.

The oil expeller itself Is made up of a number of key components

Motor: The motor is electrically powered and should be properly connected by a qualified electrician.

Gearbox: The gearbox may be a single unit, or power up to 3-5 heads per motor. The gearbox is sealed, but oil levels should be checked.

Feed Body: This portion of the head mounts to the gearbox and has a hole for mounting the feed hopper. This section sees the feed section of the pressing screw bring seed into the pressing chamber.

Feed Hopper: The feed funnel fits snugly into the feed body to allow seeds to be fed. Hands and foreign objects should never be used to cram seed into an operating expeller.

The following components are considered the 'working parts' of the press and are subject to wear and tear.

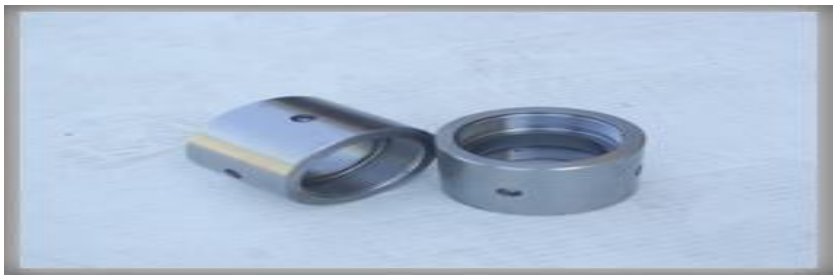
Filter Section:

The filter section has the job of enabling the oil to come thru the holes as pressure is exerted on the seed. These sections come with a single row or multiple rows of perforations depending on the material being crushed. Consult your Tokul representative to ensure you have the best filter for your application. In time, it loses its ability to separate the oils from the solids by the holes getting larger and expanded because of the friction that is generated inside the press head. Some fine solids will always pass with the oil, called foots, and these can be settled and filtered from the oil as needed. Proper pretreatment and optimal pressing conditions can minimize the amount of solids that go with the oil.

Pressing Screw:

The pressing screw conveys the seed to the end of the machine head (the star) where the pressure is generated. This pressure causes the oil to exit the feed materials through the filter section. Over time the feed screw gets worn out depending on how much it used and what type of seeds are being pressed. Seeds not properly cleaned, dehulled and/or excessively dry will cause excessive wear on these components.

Manson:



This piece holds the star part of the machine where pressing occurs at the end of the pressing screw. The manson acts as the bridge between the star and filter section and it does not need to changed as much as other main working parts. The manson is where the heating ring is mounted.

Star Section:

This part creates resistance to the seeds that are conveyed by pressing screw. This restriction through the start causes pressures up to 15 mton and forces the seeds to release it's oil through the filter section. It is also recommended to be changed as the same time as other screw mill and filter as it gets larger in time which results in reduced pressure generation and reduced oil recovery.

Nozzles:

Depending on the seed type, different size nozzles from 6mmto 15 mm are used. The nozzle screws into the star section and the smallest possible nozzle is selected (that allows continuous flow) to get the optimize oil recovery. (See start up procedures). Nozzles also need to be changed over time as they get larger and lose their efficiency in creating resistance. The nozzles also determine the size of the pellet created by the press.

Five nozzles can be used with each head of the press and are numbered 1-5. These nozzles are numbered according to the following chart:

Number	size(mm)
1	6
2	8
3	10
4	12
5	15

There are also three variations of the basic pressing head. The standard head is described above. The 55 mm head is shown below on a 5 head machine. In the 55mm head, the manson and star are a single unit. The 55 mm head has slightly higher throughput using the same pressing screw as the standard head and offers easier access with multiple head units.

There is also a 70mm version of this design that looks the same but uses a slightly larger screw than the 55mm version. These variations should be listed in section one ion this manual so that when spares are needed, the proper sizes and types can be specified.

5. Equipment Preparation and Start Up

Proper preparation for pressing will make the work day run smoother and more safely. Prior to using the oil expeller please ensure:

1- Operating Personnel are be thoroughly familiar with the contents of this manual before operating the machine

2- The equipment must be clean and in full operating condition

3- The work area must allow clear access around the machine without clutter and excess materials

4- Be sure the electric cable is safely connected and open the power for the speed control device and heaters.

5- Install the #5 nozzle and be sure that no materials are left in the pressing chamber from previous activity

6- Place a small amount if seed in the hopper so feed screw stays covered by seeds at all times.

7- Start heating the head of the machine up to 90 C. This temperature may be set by pressing the SET button on the heater control panel and using the arrows to adjust the digital temperature.

8- Once you see that the pressing head is heated enough to the set point,(the red indicator light on the heater control panel goes off after about 15-20 minutes), start the machine by using the GREEN RUN button on the panel and set the speed as 25 F.

9- Start feeding the machine head one by one and decrease the nozzles as minimum as possible depending on the type of seeds.

10 - Once you see the head work properly and both oil and meal pellets emerge on a steady basis, open gates of the seed container and the seeds will flow to keep the feed funnel full as the seed cake and oil comes from each head.

11 - Lower the heat of the head to that desired for your operation (in some seeds such as grape and pomegranate after you see oil and seed cake coming out, you can turn off the heater and remove the heating ring all together) Cold pressing can be done by removing the heater from the manson.

12 - At the end of the pressing day, shut the machine down by turning if the heaters and motors and turning off the main power switch on the control panel. Heads should be cleaned while hot for the next day of production so the parts do not get stuck when the meal hardens upon cooling. At minimum, mansons should be removed while hot and the two parts can be cleared of any compressed materials before the next pressing. Exercise caution with hot parts.

13 – Multiple head units should started one head at a time starting with the one closest to the motor.

14 - It is advised that you perform pressing for the first time with the help of that trained personnel and an electrician. Tokul technical support should be contacted if questions arise.

6. Continuous Operation of the Press

1 – The Tokul machine is designed to operate continuously and without supervision once conditions have stabilized with seed, oil and meal flows as described above.

2 – It is important that the machine is in good working order and showing consistent operation before leaving unattended.

3 – An operating machine should be checked on a regular interval that ensures safe and efficient operation. This interval is determined by the operator in consideration of feed and take away systems.

4 – The feed bunker space (except with single screw which has only hopper) will provide at least 24 hour storage of seed and should be monitored to ensure adequate feed.

5 – Operating screws that lose feed should be cleared and restarted if they have cooled or been without feed for 5-10 minutes or more. Hot meal near the cone will cool and harden and plug the machine which can damage motor and gearbox.

6 – Oil and meal coming from the machine needs to be taken away from the machine properly so that unsafe conditions do not develop in the operation area. This needs to be properly checked at an interval appropriate for that system.

7 – Equipment operating unsupervised should be secured to the extent required to preclude unauthorized changes to expeller settings

8 – Manson should be removed after use on standard head machines to eliminate difficulties removing heads once meal has cooled. Pressing screws that get stuck in this manner must be cleared before continuing to preclude damage to motor and gearbox.

Oil and Feed Augers make collection easy

7. General Guidance and Best Practice Tips

1 – When operation is completed, mansons and stars should be removed while still hot for easy removal.

2 – Keep parts clean and maintain a clear working environment

3 - Good seed in gets good seed out.

4 – Do not compromise safety at any time.

5 – Monitor conditions and use the informational displays the machine offers.

6 – Seeds should be between 6-12% moisture for optimal results. Low oil seeds at low moisture can create high pressure conditions that can damage your equipment.

7 – Metal and foreign objects must be prevented from entering an operating machine with seed cleaning and/or magnets.

8 – Seeds should be properly pre-treated to ensure best results in the press.

9 – Meal firmness and oil flow are indicators of optimal conditions. Meal cake should be very hard to crush between fingers.

10 - Amperage draw from multiple head units pressing low oil content seeds should be monitored to ensure plugging does not occur and excessive force is applied with multiple head applications that can damage motor and gearbox.

8. Maintenance

After you finish the pressing run for the day, turn off the machine from the control panel as well as the heaters followed by the main power switch for the unit.

First the nozzle and then the manson is removed so that the end parts can be cleared and cleaned before the next pressing. The filter may be removed for cleaning, but at minimum the screw should be rotated to clear any compressed particles from the pressing screw which will clog the nozzle on the next pressing run. Compressed air is also effective to clean the machine and parts after a pressing run. Do not use water on the machine.

A food grade grease should be placed in the cup on top of each head and should be checked monthly. Electrical and working parts should be inspected periodically.

Gear box oil should be checked annually and more oil added as required to keep the gearbox oil (80-90 weight)

level about half full.

9. Spare Parts

Tokul maintains stocks of spare parts for your press. These parts are described above and should be clearly described complete with the following information:

Press type
Number of heads
Type of head
Seeds being crushed
Estimated time in service
Number of pieces needed
Description of part needed
Mailing address

This information can be sent to Tokul: **TOKUL AGRO PRODUCTS IND. AND TRADE LTD. CO.**
Tel: + 90 232 857 02 52 Fax: + 90 232 857 02 49 info@wtokultarim.com www.tokultarim.com

10. Troubleshooting Guide

Symptom	Impact	Action
Nozzle is plugged, no meal comes out	Can overload motor and cause manson to be hard to remove	1. Immediately shut down press and remove manson for cleaning. Stop feed and remove funnel on multi- head machine. 2. If still hot, motor may be run in reverse for a few seconds to relieve pressure on manson/star 3. Flush pressing chamber until fresh seed is seen and restart according to manual with number 5 nozzle.
Meal is exiting machine but no oil comes out	Lowers extraction efficiency	1. Increase heat setting on temperature controller 2. Reduce nozzle size, one step at a time 3. Vary speed of seed feed rate slowly 4. Examine seed pretreatment steps
Oil is coming out but no meal is exiting	Leads to plugging	1. Immediately follow steps for plugging 2. Seeds may have high oil and lack fiber. Fiber can be added to increase pressure generation 3. Seeds are too moist 4. Nozzle is too small for conditions
After becoming stabilized, meal stops exiting machine	Leads to plugging if not properly handled	1. If head is still hot, feed can be resumed if it was stopped 2. Ensure feed funnel is full, head must be cleared and restarted 3. Seed conditions changed

Symptom	Impact	Action
Cake is not firm (cake crumbles or forms only very short pellets)	Indicator of low pressing chamber pressure	1. Reduce nozzle size 2. Ensure feed funnel is kept completely full 3. Ensure seeds are not too large to enter pressing screw at feed section 4. Oil may need to be heated to increase oil removal and generate higher pressure