

Technical Information

CP2



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FOR SUPPLY OF TECHNOLOGICAL EQUIPMENT FOR
OIL SEED PRESSING BY THE METHOD OF

TWO-LEVEL COLD PRESSING

With the capacity from 6 to 530 t of seeds per day



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1. Introduction

Farmet Corporation is engaged in development, design, production and sale of complex technological equipment for pressing and processing of vegetable oils and production of feed. It produces a wide range of screw presses, extruders, cookers and other machinery and equipment for pressing the oil seeds, covering a wide range of functions. Company Farmet has developed a range of technologies for oilseed pressing. This allows choosing an optimal solution according to the specific conditions and customer's requirements.

The usage of produced presses, extruders and other machinery and equipment, their modification and various ways of sequencing offers many possibilities for solving particular requirements for pressing, from small capacities for processing of special crops up to large pressing plants with the capacity of 1000 tons per day. The general overview and the main advantages are mentioned in the material "**Production of Vegetable Oils**".

The approach to the complex technology (plant) including differencing into individual operational sets is described the material "Plant for Production of Vegetable Oils", hereinafter only "**Plant Design**". In the enclosure we pass on the "**General Trading conditions**". We recommend reading these materials in detail before reading this technical information.

This technical information represents whole solution of operation set PS2 Pressing Plant for pressing of vegetable oils by the method of:

Two-level cold pressing

According to the required capacity this technology can be realized by using standard models of Farmet presses:

Types of used presses	Range of capacity (ton of seed /h.)	Range of capacity (ton of seed /day)	Range of capacity (ton of seed /year)
FL 200+FL 200	0.25 – 1.5	6.0 – 36	1980 – 11880
FL 200+FS 1010	1 – 7	24 - 168	7920 – 55 440
FS 1010+FS 1010	1.8 – 12.6	43.2 - 300	14256 – 99000
FS4015+xFS 1010	5.5 – 22	132 - 528	43 560 – 174 240

2. Range of Solution

This technical information describes the technical solution of the operational set PS2 Pressing Plant and its range and possibilities of optional supplementary solutions – "Options". **Battery Limits of the delivery** and the recapitulation of the offer are defined in the Enclosure No. 2. Detailed specification is a part of the price offer, which will be processed based upon your information given in the Enclosure No.7 – Specification.

The offered technological device of the pressing plant contains a set of machines and equipment, which altogether provide effective pressing of vegetable oils from oilseeds. The technology can be designed for pressing the whole range of oilseeds, mostly **rapeseed and sunflower**. Cold pressing is generally not used for **soybean processing** due to its low oil content and the necessity to carry out thermal treatment in order to utilize its feed potential (removal of anti-nutritional substances).

Due to different properties of each kind of oilseeds, especially due to different oil content in them, it is necessary to optimize the technology for a particular kind of oilseed or a group of oilseeds. The replacement of some components of presses (screws, inserts, weep holes) is necessary when pressing other type of oilseed.

For achieving optimal processing, it is necessary to use specific pre-treatment of the particular kind of oilseed. For example for processing sunflower, it is suitable to add dehulling and partial removing of hulls prior to pressing.

The Subject of the offer is a complex supply of machines and equipment necessary for pressing of oil from oilseeds at the output parameters according to the Enclosure No.1 – Parameters.

The offered technological equipment includes:

- Machines and equipment in compliance with the text of this offer (equipment described as “OPTION” is not included in the basic offered price. Price of “OPTIONS” is stated separately or it will be specified after checking local conditions);
- Project documentation for processing the documentation for building permission;
- Project for implementing the technology
- Documentation of the actual state (in case that during assembly there are significant project changes)
- Technological electrical installation
- Computer control system and visualization of the process
- Accompanying documentation – the manual for using the technology and the particular machines or equipment; technological schemes and wiring diagrams, documentation of pressure tanks;
- EU Declaration of Conformity for all equipment used according to the EU rules for delivery in EU and EU directive declaration for the whole delivered technology when the investor ensures the participation with his general project engineer.
- Auxiliary steel constructions (brackets, holders and fasteners of conveyors, troughs and pipelines, hoppers and similar small constructions)

The Subject of the offered technological equipment does not include:

- The construction project – we expect co-operation with the investor’s general project engineer
- Technological floors, service platforms and bridges inside the building (if specified in the project documentation)
- Construction of manipulation and access paths, preparation of hoisting equipment in the places where heavyweight equipment is to be installed (an overhead crane is required for installation of giant presses FS4015);
- Any construction works
- Transportation to the realization site
- Assembly
- Supply of the electric energy to the switchboards of the technology.
- Compensation of the reactive power (to be solved centrally for the whole plant);
- Source of steam - a boiler room producing the required amount of steam according to the parameter table
- Certification and eventual revisions and approvals outside the EU.
- General fire, electrical, hygienic and other approvals and revisions performed in accordance with the overall construction
- Chief assembly; putting into operation and operators training is not included in the basic price. It is priced separately.

- Operational fluids for the supplied machinery and equipment (thermic and gear oils, etc.); This offer contains only machines and devices explicitly mentioned in this Technical information.

3. Description of the Process and Technology

3.1. Principle of the Offered Technology

Screw presses and the process of so-called “separating screw pressing” is commonly used for obtaining oil from oilseeds. Screw presses are multi-stage machines; the material is pressed gradually in the individual stages, accordingly to changing screw flight. Pressure developed within the press causes oil to continuously flow out through weep holes in the strainer of the press. The change of the screw shape in individual stages (pressing geometry) and setting the width of the weep holes allow optimizing the process for different kinds of oilseeds.

The offered technology of the two-level cold pressing is based on usage of the first level presses (pre-presses) and the second level presses (final presses). Such arrangement optimizes the process of the mechanical transformation of the material, minimizes its thermal load and improves the oil yield.

The technology is suitable for pressing of oilseeds with high oil content; on the contrary, one-level cold pressing is more suitable for oilseeds with the oil content lower than 25-30%.

The technology does not require a source of steam.

The technology is upmost gentle to the processed material, the obtained oil is rated as “cold pressed” (high-quality oil with low content of phospholipids).

3.2. Description of the Technology

(See the technological scheme PS2 in the Enclosure no.3.)

The operational set PS2 described in this offer is delivered as a complex, fully functional technology, including all machines, the necessary conveyors, pumps, wiring and control system. The delivery starts with the **intermediate bin 2.00**, which provides supply of seed for several hours of operation of the pressing plant. There, where is the danger that the temperature of the pressed seeds can fall below 15°C (in winter time), we recommend adding the **OPTION Temperature stabilization of seeds 2.00.2, 2.00.3**. The seed is continually transported from the **intermediate bin 2.00** through the **magnetic separator of metal parts 2.20.2** into the press of the first level – the **pre-presses 2.35**. This transport way of the seed can be supplemented with **the OPTION Seed cleaning 2.05**, where it is possible to choose the **Entry aspiration 2.05.1**, the **Vibratory screen 2.05.2**. and possibly also the **Destoner 2.05.3**.

Further, it is possible to add the **OPTION Continuous seed weighing 2.10**.

For processing of sunflower (possibly also for soya) we recommend the **OPTION Dehulling and separation of hulls 2.15** and possibly also the **OPTION Granulation of Hulls 2.16** – see standalone Technical information.

Pressing cakes from **pre-presses 2.35** are transported by a screw conveyor into the **presses of the second level 2.45**. The number of these parallel lined pairs pre-press – final-press determines the total capacity of the pressing plant according to the data in the Enclosure No.1 – Parameters. Seeds are pressed in the screw press step by step and the oil flow through weep holes. The outgoing oil contains mechanical particles (solids) and therefore it has to be further processed by separation and filtration. The separation process is a part of PS2, while filtration is described in the standalone Technical Information PS3 (AFF).

Variants of the solids separation:

In case of the CP2 technology with presses FL200 (see TI COMPACT), the presses are placed above common retaining tank, which serves as a central separator at the same time. Solid particles fall to the bottom and the sediment is carried out from the bottom by a slow-running chain conveyor and transported back to pressing. For small capacities, it is then possible to use filtration on leaf filters with manual regeneration. This is the preferred solution, which is described in details in the TI COMPACT. However it is also possible to use automatic filtration (see TI AFF), nevertheless for small capacities of the FL200 presses the automatic filtration is more investment-demanding.

Large presses FS1010 and FS4015 have integrated retaining tanks. Oil with the solids is carried out from the press tank with a screw conveyor into the central separator. The central separator has to be placed in a floor under the presses; oil is raked out from the presses and gravity-fed into the central separator. Here, sedimentation takes place and a slow-motion chain conveyor takes solids out of the bottom, separated it from oil and forwards the solids to repeated pressing.

At the FS1010 presses, separation of solids can be solved by means of separator integrated within the press, which retains the roughest particles. The press tank is equipped by a stirrer to prevent sedimentation of the solids. The sieve separator separates the roughest solid particles from oil. Oil is then pumped by an integrated pump into PS3 Filtration. In such a case, the central separator does not need to be used.

Processing of the pressing cakes: Pressing cakes from the final presses are transported by **gathering screw conveyor 2.65** into PS4 “Transport ways of pressing cakes”. Pressing cakes coming out of the press can reach the temperature up to 80°C. The gathering **conveyor is equipped with perforation for free evaporation of steam (passive aspiration)**. We recommend order the **OPTION “Forced aspiration of presses”** for better comfort in the pressing plant.

Pressing cakes at the output of the final press have a shape of leaves, with thickness ranging from 1mm for medium presses FL200 up to 5mm for giant presses. These leaves are then broken by the integrated breaker. The resulting shape is given mainly by the features of the particular oilseed and it also depends on its moisture level, temperature, etc.

If granulation of the pressing cakes is required, it is possible to use the **OPTION 2.75. Granulation of the pressing cakes**, which utilizes an independent granulator. This should be lined right after the press, as it takes advantage of the increased temperature at the output of the press and good mouldability of the pressing cakes. It is also advantageous to add the **OPTION Moisturizing of pressing cakes** before the granulation, so that together with obtaining the required shape also the moisture level can be adjusted to the optimal level. Added water is introduced into the whole volume of the pressing cakes within the granulator, which is the best for optimal shelf life. This OPTION does not include separation and re-granulation of fines.

For presses FS1010 and FL200, it is possible to use the **OPTION Integrated granulator 2.45.9**. Granulation is carried out by means of additional terminal part of the press with additional granulation screw segment and reinforced pressing cakes chute with granulation plate. Such granulation integrated right into the press is of low energetic demand, as it uses increased temperature of the pressing cakes at the output of the press and their good mouldability. It is however necessary to take into consideration, that fine leaves or irregular shapes may appear where the pressing cakes pass between the granulation plate and the main shaft (up to 10% of the pressing cakes volume). When processing material of very low moisture level (below 5%), the mouldability of the material significantly decreases and therefore the integrated granulator cannot be used. Such situation occurs mainly at technologies, where the material is deliberately dried out, such as the technologies WP1/WP2. Its application with the EP2 technology is possible with certain care and regular checking of moisture level of the pressing cakes, frequent inspection of the granulator and following of the overall load of the press.

In case that the pressing cakes are the final product, it is necessary to ensure their cooling and storage. **Should hot pressing cakes be stored in higher layers, there is a danger of their autoignition!** Therefore, we recommend the **OPTION Cooler of the pressing cakes 2.85**, which secures cooling down to temperature not more than 20°C above the ambient temperature. Optionally, it is possible to add the **OPTION Moisturizing of pressing cakes 2.70** before the cooler.

Other consequent operational equipment is described in individual Technical information (see TI / AFF, Dehulling and Separation of Hulls, Granulation of Hulls, Storage of Press Cakes, Storage of Oil, Degumming).

3.3. Control and Process Visualization

Farmet Corporation has invented a system of intelligent control and visualization

FIC Farmet Intelligent Control

This system is described in detail in the Enclosure No. 5.

3.4. Auxiliary Equipment

Further processing of oil before storing

Further processing of oil is described in Technical Information Automatic Filtration of Vegetable Oils.

Aspiration of water vapour

During the pressing process, seed gets heated (by friction in the press) and water contained in the seed partially evaporates. Evaporation takes place in the press and at the output of the pressing cakes. Water steam is released into the space of the pressing plant and it is taken away by the air-conditioning system, which is a part of the building and not a part of the offered technological equipment. The specific solution must be considered in the project study of the building and of the technology. It is possible to make a system of local press and press output exhaustion on demand – see the **OPTION Forced ventilation of presses**.

Dust aspiration

All equipment and transport ways are designed and sealed so that the emission of dust is decreased. Still, emission of dust can appear in the conveyors, in spills, hoppers, etc.

4. OPTIONS

It is possible to add these **OPTIONS (recapitulation)**:

2.00.2 Thermal stabilization of seeds – electric including the source

In order to keep the quality of pressing capacity it is necessary that the temperature of the seed entering into the press is not lower than 15°C. This Option ensures heating of the input seed of approx. 20°C (in winter period from -5°C to +15°C) using the electrical boiler, which is a part of this Option. This OPTION can be also used for warming for higher temperatures, such as from +10°C to about +25°C, but due to lower thermal gradient temperature increase by 20°C is no more reached. For small capacities with the FL 200 presses are used directly electric heated conveyors with thermal oil filling.

2.00.3 Thermal stabilization of seeds – steam without the source of steam (for FS1010 a FS4015 presses)

This OPTION is equal to 2.00.2, but using a steam-heated conditioner instead. The source of steam is not a part of this Option.

2.05 Oilseed cleaning

This option serves mostly for protection of technology and increasing durability of pressing mechanism, allows to process even slightly non-standard material. We require clean oilseed with parameters

according to the agreement for setting the plant to work and for guarantee tests. The Option can be chosen in the following scope:

2.05.1. Initial Aspiration

This stage of cleaning is suitable especially for sunflower seed, where a big amount of dust in the seed is already present. Dust is aspirated before the entrance to the cleaning screens. It prevents sticking in the following steps of cleaning.

2.05.2. Vibration screen cleaner with aspiration

Screen grader separates larger impurities (stones, straws etc.) and lighter impurities (dust, sand etc.). Impurities of size similar to seed can't be separated by this stage of cleaning which is especially important for crops with bigger oilseeds (sunflower, soybean). Light impurities are separated by aspiration at the output of cleaner.

2.05.3 Destoner

Destoner secures separation of heavier impurities, mostly stones. It works on a principle of different densities of material and thus it can also separate particles of similar size to seeds, that is especially appropriate for crops with bigger oilseeds (sunflower, soybean).

2.10 Continuous oilseed weighing at the input into PS2

Continuous tensometric scales provide information about the processed amount, it means about the immediate output of the technology

Precision of the weighting is 1-1,5%.

2.15 Dehulling and separation of hulls (for sunflower)

It removes a part of hulls prior to the pressing. It decreases the content of fibre in pressing cakes and they become more valuable feed. Dehulling of sunflower has a positive influence on oil yield as well as on oil quality (it lowers the content of pigment and wax). Detailed description of technology Dehulling and separation of hulls is given in the respective Technical Information.

2.15 Granulation of hulls

It follows-up the OPTION Dehulling and separation of hulls.

This technology serves for processing of sunflower hulls into the form of granules (pellets), which are more suitable for handling, storing and subsequent utilization of hulls. Granulation considerably decreases volume of hulls and thus decreases requirements for storage capacity as well.

This technology is closely described in the standalone Technical Information (TI GS).

2.45.9 Integrated granulator

This OPTION consists of an additional device mounted directly at the terminal part of the press, using the drive of the main press shaft. It includes different terminal part of the press, a granulation screw segment and granulation plate with openings, through whose the material is being pushed and consequently cut by a cutting knives. This way the pressing cakes will be formed into the shaft of pellets of 10mm diameter. Content of non-granulated particles (fine dust, irregular particles) is possible up to 10% of the overall volume.

This OPTION is available only for presses FL200 and FS1010. It can be used for materials of moisture above 6%; i.e. it is not recommended for hot-pressing technologies, where the independent granulator is the choice (see the OPTION 2.75.).

In the standard version, no special conveyor for hardening of the pellets is considered; the pellets are taken away by standard screw conveyors.

2.35.6/2.45.6 Integrated separator of solid particles (only for presses FS1010)

In case of presses FS1010, separation of solid particles can be solved by using integrated separator, which collects the roughest particles. The press tank is equipped with stirrer to prevent sedimentation of light solid particles. The sieve separator from oil separates rough solid particles and then the oil is pumped by an integrated pump into PS3 Filtration.

By choosing this Option, the pumpability of oil is facilitated already in the collection tank of the press

FS1010, which allows the installation of the press on the floor without the need to construct a technological floor for presses, which in turn reduces the costs for construction solutions. In such case, central separator is not used, and therefore the Option is a choice between central and integral separator and does not cause the increase in price.

2.50 Set of special tools and devices

It is used for maintenance and adjustment of the presses of the corresponding type. Tools included here have to be permanently available for carrying out warranty service and adjustments (once set is sufficient for the whole factory and given press line).

This OPTION should always be chosen and supplied for new installations!

2.52 Stainless steel design – press tank, pipeline

We recommend this Option in case of increased demands on obtained oil, which should be used for food industry. The Option includes stainless press tank and pipeline from the food-grade materials.

2.54 Forced aspiration of presses

Press and the output of the press and conveyors of pressing cakes will be locally aspirated by force. A ventilator and air-conditioning pipeline to the places of evaporation is part of this Option. The connection to the general air-conditioning of the building or its outflow outside the building is not part of this Option. This has to be considered within the project.

2.70 Moisturizing of pressing cakes – spraying

This OPTION enables optimization of moistening of press cakes to the required value. This OPTION consists of an adjustable dosing pump and a set of injecting nozzles. Measurement of moisture is not a part of this Option. Moisture has to be measured continuously by a “manual” measuring (this device is not a part of the Option) and based on measured moisture the dosed amount is to be adjusted by changing revolutions of the dosing pump using a frequency changer.

Water dosing is possible in a scope from 0 to 8% of a mass share of water and press cakes. Amount of water, which can be dosed, is limited to a maximum absorbing ability of the pressing cakes. If too much water remains on the surface of the pressing cakes, it can initiate a development of moulds.

Volume is determined by management of volume dosing pump using system FIC in correlation to required per-cent additive and actual amount of processed material.

2.71 Dosing of additives in the injected water

This Option allows dosing of additional agents into the water which is being sprayed onto the pressing cakes. It is e.g. addition of soaking agent for better moistening of press cakes or anti-microbial agents for disinfection and prolongation of press cakes’ storability. Water solutions are dosed automatically into moistening nozzles. Volume is determined by management of volume dosing pump, using system FIC in correlation to required per-cent additive and actual amount of processed material.

This option can be installed several times for dosing of various additives (e.g. soaking agent, antibacterial agents)

2.75. Granulation of pressing cakes

This OPTION consists of a granulator, a conveyor of pressing cakes into the granulator and a conveyor for hardening of the pellets before the cooler. Output of the granulator is fitted with aspiration. The granulator is to be placed before the cooler, right after the presses, where increased temperature of the material facilitates its granulation. The granulator is intended only for granulation of still warm pressing cakes right after pressing. It is recommended to cool the pellets down after granulation.

2.85 Cooling of pressing cakes

This Option contains transport of pressing cakes from the conveyor under presses into the cooler. (The estimated location of the cooler is max. 10m); and the delivery of the counter-flow cooler and air conditioning system.

This OPTION ensures cooling to temperature no more than 20°C above the ambient temperature. The OPTION is designated for use in mild climate.

2.94 Set of wear parts

Set includes wear parts for first period of operation (approximately for the first year of operation of the pressing shop). The period of wearing out and their change is dependent on the processed seed and on the operation of equipment.

In particular, it includes last screw and insert, input insert of presses, set of inserts and working screws for extruders, V-belts and of presses and extruders.

Detailed list will be specified for each specific offer.

2.95 Frequency changers for main drives of the presses

Presses FS1010 are equipped with frequency changers implicitly. More detailed description is cited in TI FIC – see the particular file.

OPTION is intended for technologies with “CLEVER” level of automation.

2.96 Basic equipment of laboratory

This OPTION includes laboratory devices and tools necessary for the successful setting into production and optimization for required parameters.

It includes:

1. NIR analyser, which serves for a quick assessment of moisture and oiliness of seeds and for an assessment of moisture and oiliness of press cake as well. Furthermore, it allows specifying a content of fibre and crude protein in a press cake.
2. Laboratory grinder.
3. Manual weight for calibration of transporters.
4. Manual touchless thermometer.
5. A set of small tools and equipment.

Options - all mentioned Options are delivered including the wiring necessary for their function and its connections to the system of operation, adjustment and visualization (this is not valid for standard design with presses FL200).

Option prices specified in the price offer are only valid when ordering together with the PS2 technological order. Costs for additional supplies are usually much higher and have to be calculated according to the particular situation.

Please allow specific attention to the choice of Options and general specifications at the beginning of your investment plan. Please fill in and send us the specification according the Enclosure No.7.

5. Equipment Parameters

The table in Enclosure no. 1 - Parameters states basic parameters of the output, quality, space and energy requirements. These are indicative data for the standard verified solutions, and some of these data can be adjusted according to specific requirements of a particular investment intention. To achieve the performance and quality parameters it is necessary both - a start-up procedure of the technology (several weeks) and a stable operation.

The decisive parameters are the capacity of technology (the quantity of oilseeds processed per unit of time) and amount of pressed oil. There are many inconsistencies and mistakes in the definition and understanding of these parameters, especially in the practical setting. That is why these parameters are clarified in the material “**Production of Vegetable Oils**”.

5.1. Parameters of the Input Oilseeds

It is necessary to pay close attention to the quality of oilseeds to ensure effective pressing. There are the decisive parameters listed below that affect the pressing process.

Biological Ripeness and Drying Care - these parameters are very difficult to evaluate in practice and no single methodology has been set. It is necessary to avoid following:

- Burnt oilseeds (odour, dark colour, hard)
- Atypical light-colour indicating unripeness
- Mouldy and in other ways afflicted oilseeds
- Damaged oilseeds – according to most standards the limit for **damaged seeds is max 2%** (the oxidation of oil in oilseed starts in the damaged oilseeds and this causes deterioration of the oil quality)

Impurities - For storing and trading with oilseeds, there are limits of dirt content given by local regulations and standards. Most often, 2% of impurities are considered to be the threshold, which is also the maximal content of impurities at the entry into the technology. However, even these 2% may cause problems with service life of wear parts, damages and decrease of oil yield. Therefore, we always strongly recommend the **OPTION Oilseed cleaning**.

The OPTION Oilseed cleaning as a part of this technology is not intended to replace quality after-harvest cleaning of the oilseed, but serves as an auxiliary cleaning for protection of the technology; it also helps to increase the service life and to reach the best parameters of pressing.

The OPTION Oilseed cleaning makes possible to process even a slightly non-standard material in case of emergency. If the OPTION Destoner is not chosen, it is necessary to guarantee that the entering seed will not contain hard particles (stones, pieces of concrete, sand ...).

Moisture - of the input seeds is very important for the cold pressing technology and it has an influence on the parameters of pressing. The moisture recommended for storing (see the following Table A) is set down for the majority of oilseed. We recommend even lower the upper moisture limit for the high-quality pressing, e. g. only up to 7 % moisture for rape. Higher moisture causes higher plasticity of pressed material inside the press, poor oil flow and increased formation of solids in the oil. On the contrary, too low moisture (less than 5 %) causes press overheating and also worsening of pressing parameters, including worsened power consumption.

Table A below specifies medium value of range of moisture for efficient pressing.

Temperature of the input oilseed also influences parameters of pressing. The material is heated by friction in the press. If the temperature of the input material is too low (less than 15°C), the pressed material also stays too cold in the process of pressing. This causes too high viscosity of oil and the oil flows out poorly. It is necessary to keep the temperature of the input seeds ideally between 15 – 25°C. Where the climatic conditions, the way of storing and transport of seeds into the pressing plant do not procure these temperatures, we recommend ordering the Option “**Thermal seeds stabilization**”.

Oiliness - (oil content in the seed) is the key parameter for determining the yield of oil (how much oil will be pressed). There are values for standard seeds of particular kinds mentioned in the following Table A. The technology is optimized for these values for the specified kind. If the real oiliness is lower but in the range of effective pressability according to the Table A, the technology will press the oil. The parameter “maximal residual fat in pressing cakes” will be kept, however the yield will be lower.

If the oiliness is higher than stated medium, the yield will rise, but the parameter “maximal residual fat in pressing cakes” (see the Table B) can slightly worsen (big amount of oil does not manage to flow away from the press) This quality worsening should not be higher than 0,2 % of the increase of the residual fat in pressing cakes per every 1% of higher content of fat in the oilseed above the medium limit stated in the following Table A.

Table A – Input parameters

Oilseeds	Max. moisture for storing	Medium moisture recommended	Range of moisture for efficient pressing	Oiliness medium at medium moisture	Oiliness Range of effective pressability
Rapeseed	8 %	6.5 %	5,5 – 7 %	42 %	38 - 44 %
Sunflower	8 %	6.5 %	5,5 -7 %	43 %	40 - 48 %
Soya	12 %	10 %	9 – 12%	19 %	17 - 22 %

Oilseeds with oiliness out of the range of effective pressing mentioned in this table can be pressed, too, however, the throughput may decrease, the parameters may worsen and problems with solid particles and with the stability of the process may arise.

5.2. Output Parameters After Pressing

Capacity of technology is rated as a throughput of oilseed at the entry to the technology. In case that the OPTION Dehulling and separation of hulls is used, it is understood as the throughput before the dehulling.

For sunflower, capacity of a technology is rated for using the OPTION Dehulling and separation of hulls.

For dehulled sunflower seed, the capacity must be derated by 10-15%.

If the OPTION Returning of filtration cake (a part of PS3) is used), capacity of the technology will be slightly decreased (depending on the quantity of filtration cakes to be returned for re-processing, practically no more than by 8%).

According to our experience the quality of pressing is best described by the parameter “**Residual fat in pressing cakes**” (percentage ratio of oil in pressing cakes). We are used to state it converted on the moisture of pressing cakes 10 %. Commonly achieved values are stated in the table B by keeping the input quality of the seed as it is described above.

Table B – Output parameters

Oilseeds	Residual fat in pressing cakes in moisture 10 %	Residua fat in dry mass %	Yield %	Remainder of oil in pressing cakes in % (oiliness - yield)
Rapeseed	10 - 12	11.1 – 13.3	35,56 - 34,08	6.44 – 7.92
Sunflower	10 - 12	11.1 – 13.3	36,69 - 35,23	6.31 – 7.77
Soya	Not suitable for cold pressing			

If requested, we will be pleased to send you the information explaining the terms stated above.

Evaluations have often been mistaken by confusing parameters “**Residual fat in pressing cakes**” (as a percentage of oil from the weight of the pressing cakes) and the parameter “**Remainder of oil in pressing cakes**” (calculated as oiliness minus the yield, which is in fact the volume of oil in pressing cakes but related not to the weight of pressing cakes but to the weight of the incoming oilseed!)

For clarity, see Enclosure No. 6 - Material balance, where all these parameters are stated.

6. Requirements for Installation and Operation of the Technology

The customer has to ensure below specified terms and conditions for installation and operation of the technology. Presented parameters are indicative and it is necessary to concretize them during designing the project study or project preparation of the technology implementation.

6.1. Premises for Installation

It is necessary to provide insulated building with minimum dimension stated in the table in Enclosure no.1. – Parameters. Spaces for installation of the technology must correspond to the requirements of the project documentation; the floor must be even, firm and of sufficient bearing capacity, made of non-porous and non-dusty material.

In accordance with the project documentation, there might be necessary to prepare corresponding adjustments (trenches in the floor, passages through walls, etc.), possibly also technological floors and constructional adjustments for facilitation of installation, maintenance and servicing of the technology (access paths, passages). When the giant presses FS4015 are to be used, the overhead crane over the presses is necessary for installation and maintenance.

Minimal temperature of 0°C must be secured during operation of the technology.

Besides of the pressing shop itself, it is usually necessary to create much large area for storing the oilseeds, pressing cakes and oil. Logistics – i.e. the way of supplying seeds, dispatching pressing cakes and oil plays also an important role. This must be solved during designing the project study. For more details, please, see the material “Plant design”.

6.2. Energy

Electric power – technological device uses voltage system 3+PEN/3 + N + PE, AC 50Hz, 3 x 400/230 V. The installed electric input for each capacity is presented in the table in the Enclosure No.1 – Parameters, where the presupposed confluence is indicated.

Steam – it serves for heating in the cooker and/or the conditioner in case that the **OPTION Thermal stabilization of oilseed (steam)** is chosen. Estimated consumption of the steam is stated in the table in Enclosure No. 1 - Parameters. The input pressure of the steam is 0.3MPa for the Option “Thermal seeds stabilization”.

6.3. Operation Media

Water – the technology EP2 does not require water input. For the needs of sanitation, the customer should bring water supply into the spaces of the pressing shop (water line with a tap for hose connection). For connection of OPTIONS (Moisturizing of pressing cakes, Dosing of water into extruder, topping up the cooling circuit, etc.), it is necessary to ensure water supply.

The operation set PS2 Pressing Plant does not require any other operation media.

6.4. Specific Consumption per 1 ton of Processed Oilseed

Type	Jednotka	Consumption per 1 ton of seed in PS2 *	Pro technologii:
Electrical energy (without Options)	kWh/1ton	53	FL200+FS1010 (at throughput of 2t/hr)
		58	2xFL200+FS1010 (at throughput of 2t/hr)
		65	FS1010+FS1010 (at throughput of 2t/hr)
		62	FS4015+xFS1010 (at throughput of 6,8t/hr)
Electrical energy (without Options)	kWh/1ton	26	

* informative data for processing of rapeseed of initial temperature of 20°C, moisture level 6,5%

6.5. Laboratory

In order to operate the technology, it is necessary to find out the parameters regularly and to check the setting in accordance with the results.

For successful commissioning and securing quality of technological settings, we offer the basic tools and equipment along with delivery of technology; see the **OPTION Basic equipment of laboratory**.

Alternatively it is possible to use one's own or contractual laboratories. In order to operate and set up the technology it is essential to ensure at least the following laboratory tests:

Pressing:

- Measuring of moisture level and oiliness in the entering oilseed, pressing cakes (possibly also in hulls);
The most suitable are analytical instruments with short time of processing the results within about 30 minutes, with a possibility of verification by means of classical methods of extraction and drying within approx. 24 hrs.

For the OPTION Dehulling:

- Fibre content in the pressing cakes – with evaluation within approx. 24 hrs.
- Fat content in the hulls – with evaluation within approx. 24 hrs.

Other laboratory tests can be required at requests of customers or national control authorities. These requirements can exceed the scope of aforementioned tests and it is necessary to proceed in accordance with applicable laws, regulations and standards or according to signed contracts.

7. Operation and Maintenance of PS2

The technology PS2 is designed for continuous operation with automatic operation and permanent control by the operator. The technology requires trial run and running-in (see the General Trade Conditions). The pressing technology (as well extrusion) is based on creating pressure by mechanical friction in the inner part of the press (screws, lamellas, chambers), therefore wear and tear arises. It is necessary to allow for carrying out regular cleaning and we recommend shut down and clean complete technology at least once each 6 months.

We use the highest quality materials and procedures for production of screws still, it is necessary to replace the worn screws and inserts of presses and extruders (as well impeller wheels of hullers if used). Working life of screws depends on the processed raw material and its purity significantly (Beware of abrasive dust and sand – we recommend Option Cleaning).

We advise to study all obtained Farnet documents, completing the above mentioned information, especially all enclosures, the document “Plant Design“ and “Production of Vegetable Oils“.

Thank you for your interest in our products.

Team of specialists, Farnet Corporation

Enclosures:

1. Parameters of technological equipment
2. Definition of battery limits
3. Technological layout PS2
4. Dispositional layout
5. Control and Visualization FIC (electronic separate file)
6. Material balance (electronic separate file)
7. Specification for processing the price offer (electronic separate file)
8. General trading conditions (electronic separate file)

Enclosure no. 1: Parameters CP2-x (FL200+FS1010)

Main used equipment	Unit	CP2-1	CP2-2	CP2-3	CP2-4	CP2-5	CP2-6	CP2-7
Presses FS 1010 –pre-press Rapeseed / sunflower	Piece	1 / 2	2 / 4	3 / 6	4 / 8	5 / 10	6 / 10	7 / 14
Presses FS 1010 – final press	Piece	1	2	3	4	5	6	7
Requirements for installation PS2	Unit	CP2-1	CP2-2	CP2-3	CP2-4	CP2-5	CP2-6	CP2-7
- height of the ceiling min. (without Options)	m	6,5	6,5	6,5	6,5	6,5	6,5	6,5
- area (without Options)	m ²	55	75	95	115	135	175	195
- electrical installed input (usage 0.8) (without Options) Rapeseed / sunflower	kW	95 / 118	175 / 217	253 / 317	329 / 416	409 / 519	505 / 622	588 / 725
- operating personnel / shift **	Workers**	1	1	1	2	2	2	2
Operating personnel per shift PS2+3+4+5	Workers**	2	2	2	3	3	3	3
- number of trucks of the basic delivery	Piece	2	3	5	7	9	11	13
Chief assembly: week / worker	weeks/workers	3/2	3/2	3/3	4/3	4/3	5/3	5/3
Delivery date FCA	Months	4	5	6	6	7	7	8
Parametres of the technology	Unit	CP2-1(FL200+FS1010)	CP2-2(FL200+FS1010)	CP2-3(FL200+FS1010)	CP2-4(FL200+FS1010)	CP2-5(FL200+FS1010)	CP2-6(FL200+FS1010)	CP2-7(FL200+FS1010)
Rapeseed 42% / 6,5% *	t/hour - t/day	1 – 24	2 – 48	3 – 72	4 – 96	5 – 120	6 – 144	7 – 168
- capacity in the seed	t/year	7 920	15 840	23 760	31 680	39 600	47 520	55 440
-production of oil (yield 34,08%)	t/hour - t/day t/year	0,34 – 8,2 2 700	0,68 – 16,4 5 400	1,02 – 24,5 8 100	1,36 – 32,7 10 800	1,7 – 40,9 13 500	2,05 – 49,1 16 200	2,39 – 57,3 18 900
-production of pressing cakes (residual fat 12% / moisture 10%)	t/hour - t/day t/year	0,66 – 15,8 5 220	1,32 – 31,6 10 440	1,98 – 47,5 15 660	2,64 – 63,3 20 880	3,3 – 79,1 26 100	3,95 – 94,9 31 320	4,61 – 110,7 36 540
Parametres of the technology	Unit	CP2-1(2FL200+FS1010)	CP2-2(2FL200+FS1010)	CP2-3(2FL200+FS1010)	CP2-4(2FL200+FS1010)	CP2-5(2FL200+FS1010)	CP2-6(2FL200+FS1010)	CP2-7(2FL200+FS1010)
Sunflower (incoming material) 43% / 6,5% * with use of the OPTION Dehulling and separation of hulls	t/hour - t/day	1,3 – 31,2	2,6 – 62,4	3,9 – 93,6	5,2 – 124,8	6,5 – 156	7,8 – 187,2	9,1 – 218,4
- capacity in the seed	t/year	10 296	20 592	30 888	41 184	51 480	61 776	72 072
- production of oil (yield 35,23%)	t/hour - t/day t/year	0,48 – 11,4 3765	0,95 – 22,8 7529	1,43 – 34,2 11294	1,90 – 45,6 15058	2,38 – 57 18823	2,85 – 68,4 22588	3,33 – 79,9 26352
production of pressing cakes (residual fat 12% / moisture 10%)	t/hour - t/day t/year	0,58 – 13,8 4603	1,16 – 27,9 9206	1,74 – 41,8 13809	2,32 – 55,8 18411	2,91 – 69 23014	3,49 – 83 27617	4,07 – 97,6 32220
Sunflower unhulled 43% / 6,5% *	t/hour - t/day	1,15 – 27,6	2,30 – 55,2	3,45 – 82,8	4,60 – 110,4	5,75 – 138	6,90 – 165,6	8,05 – 193
- capacity in the seed	t/year	9108	18216	27324	36432	45540	54648	63756
Production of oil (yield 35,23%)	t/hour - t/day t/year	0,41 – 9,72 3208	0,81 – 19,4 6418	1,22 – 29,2 9626	1,62 – 38,9 12835	2,03 – 48 16044	2,43 – 58 19253	2,84 – 68 22462
Production of press cakes (residual fat 12%, moisture 10%)	t/hour - t/day t/year	0,74 – 17,8 5896	1,49 – 35,7 11794	2,23 – 53,6 17691	2,98 – 71,5 23587	3,72 – 89 29484	4,47 – 107 35381	5,21 – 125 41278

All given data is indicative. Output parametres depend on the type and quality of the material and other conditions. The produces has the right to make changes without previous warning.

Capacity data DO NOT include potential losses during Seed cleaning

Capacity data are assessed without consideration of the OPTION Returning of filtration cake (see this OPTION in the file PS3 Filtration)

* The figure shows the oiliness / moisture of treated seed. The annual capacity is calculated for 330 days of operation.

** The number of workers is indicative and depends on local conditions. The employee performs supervision and occasional intervention and in most cases serves other parts of the technology PS1 – Seed storage, PS3 Filtration, PS4 Transport Ways of Pressing Cakes and the Storage of pressing cakes. For security reasons; we recommend the presence of at least two employees per shift. It is therefore appropriate to build a common control room for all technologies.

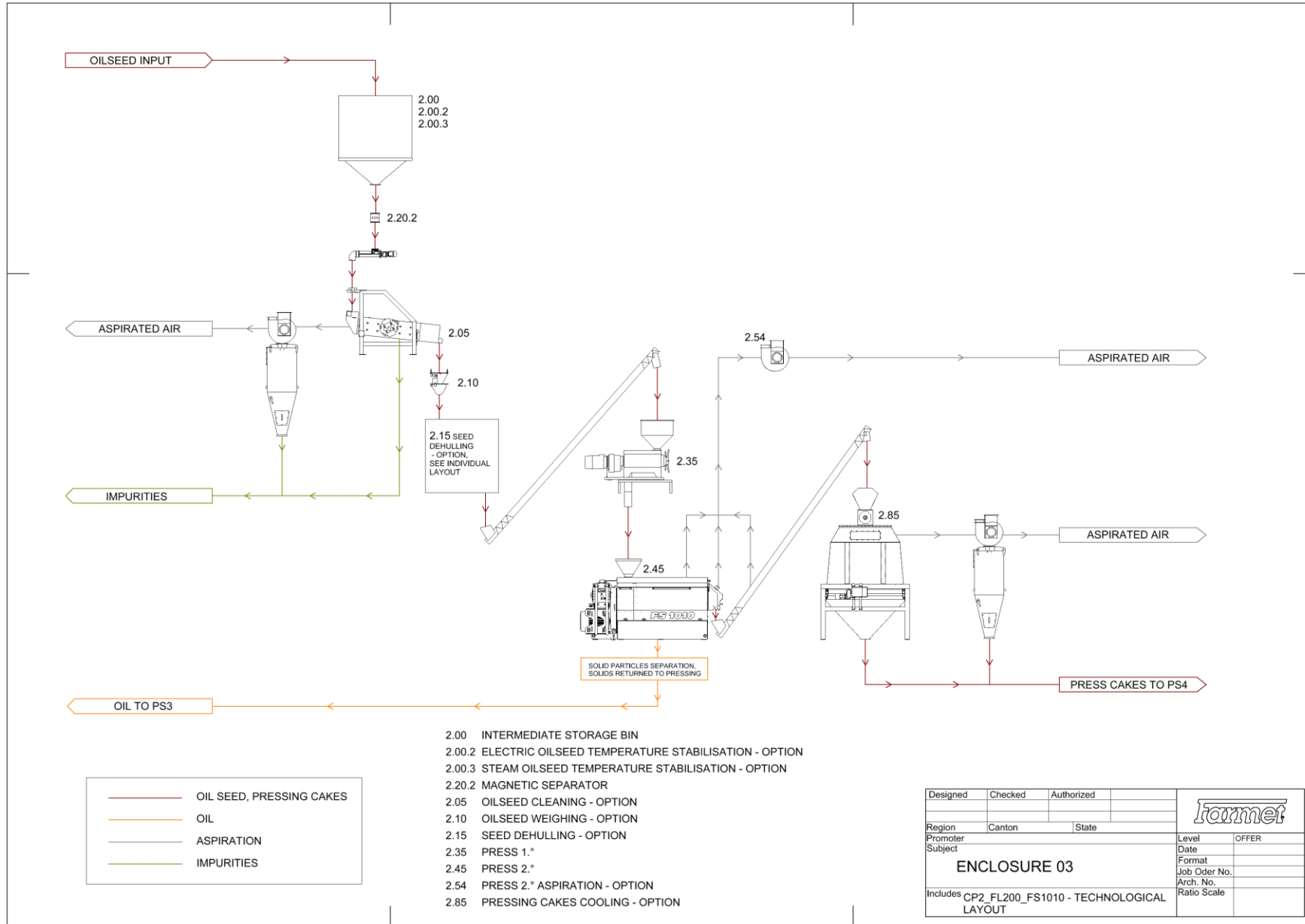
In case of sunflower with use of the OPTION of Dehulling and separation of hulls, production of oil/press cakes is calculated considering 65% separation of total hulls and 6% content of fat in hulls.

Enclosure no. 2: Battery Limits of the Delivery PS2

Dimensions, parameters and properties in the battery limit points and their exact placement will be specified in the project documentation.

	Boundaries of Farnet delivery of PS2 (without OPTIONS)
Entry limit of raw material	<p>Oilseeds from PS1 – Input intermediate bin of oilseeds. Customer provides filling of this bin. The intermediate bin must be continuously filled up.</p> <p>Filtration cake from PS3 – this transport way is not included (it is in PS3)</p>
Output limit of products	<p>Pressing cakes Output conveyor behind final presses up to the distance 3m from presses or 3m long conveyor under the cooler of pressing cakes if the Option “Cooling of pressing cakes” is chosen. Another transport way of pressing cakes is a part of PS4.</p> <p>Oil – Oil pump in the press tank and oil pipeline up to the max distance 10 m from the last press is part of the delivery. Connection to PS3 - Filtration is enough in common cases.</p>
Limits of energy connection	<p>Electric power – customer ensures main input to terminals in the switch box, set 3+PEN/3+PE+N, AC 50Hz, 400/230V, compensation of idle current.</p>
Limits of media connection	<p>Water – Technology PS2 does not require. Customer ensures an outlet in the technology installation area that is fitted with a tap – hose connection for the sanitation needs.</p> <p>For connection of the OPTIONS (Moisturizing of pressing cakes, Dosing of water in to extruders, topping up the cooling circuit), the customer has to bring the water line to the designated point according to project documentation.</p> <p>Hot Water – not required</p>
Limits of air-conditioning system	<p>Farnet provides only local aspiration from places of evaporation to ventilators. Ventilators are placed by presses and steam heaters; outlet from the building is not a part of the delivery.</p> <p>Air-conditioning of the building is not a part of this offer.</p>
Limits of solution of measurement and regulation system	<p>Farnet provides operation, measuring and regulation of the delivered PS2-technology. If other operation sets are delivered together with PS2, unified control and visualization is provided.</p>
Limits of solution of subsidiary constructions and technological stores	<p>All auxiliary steel constructions for the installation of the technology PS2 are part of delivery.</p> <p>The delivery does not include technological floors, if required by the technology (i.e. in layouts with the FS4015 presses, layouts utilizing the central separator or steam cookers).</p>

Enclosure No. 3: Technological Layout CP2- 1(FL200+FS1010)



Enclosure No. 4: Dispositional Layout, Illustrative Scheme CP2-3(FL200+FS1010)

