

ROTARY HAY RAKES WITH FLEXIBLE CONNECTING FRAME

RAS 400/4

RAS 600/6



INSTALLATION / HANDLING / MAINTENANCE

LIST OF SPARE PARTS

05.2018.

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SERBIA

WARNING TO YOU, USER

By purchasing this tool you have made a wise choice. It is the result of many years of thinking, research and improvements. And you will, like thousands of other users, understand that now you possess the best that could be created by technique, knowledge and field testing. You have purchased a reliable tool, but only if you use it correctly, you can expect a good performance and long life.

This Instructions Manual provides all the necessary information you need to achieve the best possible efficiency from your tool. The efficiency greatly depends on how carefully you read and understand this Manual and apply this knowledge. This is a simple tool, but one can frequently overlook the obvious deficiencies reflected in the poor performance frequently resulting from the fact that you neglected the natural wear of parts or that the tool has not been set up well. Therefore, do not think that you know how to use and maintain the tool before reading this Manual that you should constantly have at hand.

Our service representatives or sales service centers with their trained staff can offer you all original parts for rotary hay rakes for servicing. These parts are manufactured and carefully examined in the same factory where the rotary hay rakes are manufactured to ensure high quality and precise fitting for each replacement.

ROTARY HAY RAKES ARE MANUFACTURED BY: FPM AGROMEHANIKA D.O.O. BOLJEVAC

Rotary hay rakes meet the criteria stipulated by the Regulation on Machine Safety (Official Gazette, No. 58/2016) particularly in terms of stability and protection of parts and assemblies that, by their function and form, might threaten the safety of the operator.

IMPROVEMENT: FPM Agromehanika d.o.o is constantly striving to enhance and improve its products and therefore reserves the right to make changes or improvements as necessary, without any obligation to change/amend previously manufactured or sold equipment.

The information in this Manual is correct as of the date of publishing.

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FPM AGROMEHANIKA D.O.O BOLJEVAC

THE CERTIFICATE OF OCCUPATIONAL SAFETY, DECLARATION OF CONFORMITY 98/37/EC WITH SAFETY REQUIREMENTS DEFINED BY EUROPEAN DIRECTIVE ARE INTEGRAL PART OF THE INSTRUCTIONS FOR HANDLING AND MAINTENANCE.



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WARNING TO YOU, USER

It is very important that the PTO which is connected to your rotary hay rake is of appropriate dimensions. Therefore it is necessary to provide the PTO of the following characteristics:

- joint 35 JUS M.L1.601 at the both ends of the PTO
- one-way coupling

The PTO is the product of the company "WALTERSCHEID" and can be procured under the number:

EUROPEAN MARKET: W 200E SD15 1310 K33B 1 $\frac{3}{8}$ " (6) – 1 $\frac{3}{8}$ " (6)

RUSSIAN MARKET: W 200E SD15 1310 K33B 8X32X38 - 1 $\frac{3}{8}$ " (6)



IMPORTANT: In case of failure to comply with the above mentioned warning, the factory is not responsible for the damage or breakage on the tractor, the PTO or rotary hay rake.

READ CAREFULLY!

In this Manual and on the tools you will find decals with warnings: “CAUTION”; “ATTENTION” and “DANGER”. Warnings are intended to draw your attention to the personal caution and caution of those who work with you because they need to read them, too.

PERSONAL SAFETY

- CAUTION:** The word “CAUTION” is used where it is necessary to be cautious to protect the operator and others from an accident.
- ATTENTION:** The word “ATTENTION” indicates the possibility of serious injury to the operator and to staff that might occur suddenly. This is a word frequently used to alert the operator and other persons in order to avoid surprises when using rotary hay rake.
- DANGER:** The word “DANGER” indicates what must not be done, because it implies risk.

THE ADDITIONAL WARNINGS SUCH AS “WARNING” AND “IMPORTANT” REFER TO SPECIAL INSTRUCTIONS RELATED TO THE SAFETY OF TRACTOR ROTARY HAY RAKE.

SAFETY OF TRACTOR ROTARY HAY RAKES

- WARNING:** THIS WARNING DRAWS ATTENTION TO OPERATOR OF POTENTIAL DAMAGES OF THE ROTARY RAKES IF HE FAILS TO COMPLY WITH ANY INSTRUCTIONS.
- IMPORTANT:** THE READER IS INFORMED ABOUT SOMETHING HE SHOULD KNOW TO PREVENT MINOR FAILURES ON ROTARY RAKES, IN CASE HE MISSES IT.

WARNING!

FAILURE TO OBSERVE THE ABOVE STATED WARNINGS “CAUTION”, “ATTENTION” AND “DANGER” MAY CAUSE SERIOUS BODY INJURIES.

LIMITED WARRANTY

The factory provides warranty in compliance with the Law on Standardization, Regulation on Machine Safety (Official Gazette No. 58/2016) for each original part of the rotary hay rake delivered to the customer by the sales network of FPM Agromehanika d.o.o. Boljevac by which it guarantees that, at the time of delivery, each part was new, without defects in material and workmanship and that for the rotary hay rakes it provides two-year warranty from the date of delivery to the end user, provided that the rotary hay rakes are used and serviced according to the recommendations for handling and maintenance provided in this MANUAL.

EXCEPTIONS:

1. Parts made of wood are not covered by warranty.
2. Parts not manufactured by FPM Agromehanika d.o.o. Boljevac (tires, plastics, belts, PTO, PTO guard, etc.). These items are not covered by this warranty but by the warranty of the corresponding producers.
3. Parts that are normally worn during exploitation such as spring rakes, hydraulic tubes, etc.
4. The warranty expires in case of misuse, improper or careless use or damage in an accident. The warranty becomes invalid in case of use of non-original parts and the factory is not responsible for damages caused in transport.

THE FACTORY IS NOT LIABLE FOR THE LOSS OF PROFITS DUE TO FAILURE OF THE ROTARY HAY RAKE, OR INJURY OF ANY THIRD PARTY, OR FOR ANY ADDITIONAL COSTS OF WORK ON REMOVAL AND REPLACEMENT OF PARTS.

Customer is responsible for and bears the costs of the following:

1. Regular maintenance, such as lubrication, the oil fill, minor adjustments, etc.
2. Transport of the hay rake to the place where the service is provided during the warranty period and back.
3. Travel time of the authorized servicer to the owner of the rotary rake and back, or delivery and return of the rotary rake from the service workshop after repair.

This warranty does not apply to the rotary rake that was changed or modified without our explicit permission or was repaired by someone else, outside of authorized service.

The warranty refers to strict compliance to the warning:

- All instructions in this Manual must be observed and all the parts should be regularly checked and replaced, if necessary. No warranty is provided for products that are not new.

Persons who only work in our factory are not official representatives of the factory and have no right to take any obligation on its behalf.

No warranty covers equipment for the products broader than the provided one, therefore the factory is not responsible for injuries resulting from such use.



Most accidents occurs during operation, maintenance and transport as a result of failure to comply with basic safety requirements. For this reason, you are the most important person for operation and maintenance of your tool, whether you work alone, with family members or other persons, be sure to read and observe the basic procedures for working with the rotary hay rake that should also be heard by all others. In addition, the hay rake is provided with the warning decals that should draw attention to the obligation to observe safety.

- ⚠ The instructions for operation, maintenance and safety at work must be unconditionally observed in order to secure a safe and secure work with rotary hay rake.
- ⚠ Before starting work, the operator must be absolutely familiar with the operation of all parts of the rotary hay rakes, during work it may be too late. First of all, learn to turn off the tool quickly and safely, in case of danger.
- ⚠ Instructions for use and maintenance must be kept for the estimated operating time of the rotary hay rake.
- ⚠ The metal plate must always be legible, visible and clean.
- ⚠ When connecting or disconnecting the rotary hay rake to and from the tractor, always move the supporting wheel to the adequate position (safety).
- ⚠ When disconnecting or connecting the hay rake to and from the tractor, be particularly careful, since the area around the lifting levers is a dangerous zone.
- ⚠ Before use, check the ballast of the front tractor wheels. Fix the weights at the adequate place.
- ⚠ Observe the permitted axle load and total weight. Due to the weight, there is different balance on the wheel axes.
- ⚠ Due to safety requirements while driving, use a tractor with a cabin. Keep all the glasses closed while working to reduce the noise level.
- ⚠ Before you start the rotary hay rake, even for a very short distance, always turn and secure it in its transport position. Observe the permitted dimensions when transporting.
- ⚠ Before you start driving on public roads, be sure to secure the hay rake for safe driving and obey the rules of conduct in public transport.
- ⚠ When required by special circumstances, use the light signals to indicate the danger if it is not forbidden by traffic regulations.
- ⚠ Never transport other persons on either the tool or tractor during work or transport.
- ⚠ Do not transport the hay rake if it is loose and not-secured for safe driving.
- ⚠ During transport, never drive engaged rotary hay rakes.
- ⚠ Never engage tractor PTO while hay rake is in transport position.
- ⚠ Never leave the driver's position while tractor is operating.
- ⚠ Each time before using the hay rake, make sure that all the parts (nuts, screws, etc.) are adequately tightened, particularly tighten the rake supporters and the rakes themselves.
- ⚠ If the rakes, rake supporters and/or their parts that are used to tighten them (bolts, screws, etc.) are worn or damaged, replace them immediately with the original parts manufactured by FPM AGROMEHANIKA D.O.O. BOLJEVAC.

- ⚠ For safety of transport on public roads, check that all prescribed protections and reflectors are properly fixed and placed on the frame; if they are damaged or broken, immediately replace them with original parts manufactured by FPM AGROMECHANIKA D.O.O. BOLJEVAC.
- ⚠ Before starting the adjustment, lubrication or cleaning of the rotary hay rakes, lower the rakes to the ground, turn off the engine of the tractor, remove the ignition key, turn off the PTO and pull the parking brake of the tractor.
- ⚠ Wait for the rotary parts to stop moving before you approach the rakes.
- ⚠ While working, keep away from all parts of the rakes.
- ⚠ Never wear loose clothing that might be caught by the rotary parts of the hakes. Clothing should fit to the body. Wear protective clothing, goggles, gloves and shoes, particularly when working on rocky soil.
- ⚠ Pay particular attention to connecting the PTO protection with the chains that have been installed for that purpose. If the protection is damaged, replace it immediately by the new one.
- ⚠ The operator must be absolutely certain that no person or animal is located in the area of working with the rakes, before he starts the tool and starts working. One should always think about the consequences of irresponsible work, because they are irreparable.
- ⚠ Remove foreign objects from the field before you start working.

⚠ IMPORTANT: Do not work by the roads, footpaths, public areas (parks, schools, etc.) and on the rocky soil, in order to avoid the risk of accidents due to bouncing of objects to other objects and persons.

- ⚠ Never work with the machine when reversing.
- ⚠ It is absolutely forbidden to have the rotary hay rakes operated by an incompetent person, a person without a driver's license or a person without adequate psycho-physical characteristics.
- ⚠ Only reliable people are allowed to handle the hay rakes. Children under the age of 16 are strictly forbidden to handle the hay rakes.
- ⚠ Work only under good light and visibility.
- ⚠ At the end of the season working with the rotary hay rakes, it is necessary that the authorized servicer inspect your tool, bring it into proper condition, particularly the spring rakes, and to accurately tighten all the parts (screws, nuts, etc.).



THESE WARNINGS MUST NEVER BE NEGLECTED



CONNECTING THE RAKES TO TRACTOR

- ⚠ Before each connecting and disconnecting of the rakes to and from the tractor, lock hydraulic controls to prevent any unintentional lifting or lowering.
 - ⚠ When connecting, pay attention to the category of the tractor and the connecting levers of the rakes - they must fit or be adjusted.
 - ⚠ Zone around the connection points is very dangerous. There is a risk of injury when connecting the connecting levers.
 - ⚠ When using external commands for hydraulics do not stand between the tractor and the rotary hay rakes.
 - ⚠ Observe and block the lateral movement of the connecting levers during transport of the rotary hay rakes.
- When driving on public roads with the rotary hay rakes in transport position, the tractor hydraulics commands must be blocked against unintentional lowering.
- ⚠ Do not use the rotary hay rakes for work on uneven/bumpy terrain or too steep slopes< do not use narrow track tractors for rotary hay rakes transport.



THESE WARNINGS MUST NEVER BE NEGLECTED



SAFETY



USE OF PTO

- ⚠ It is allowed to use only the PTOs that are delivered with the rotary hay rakes or recommended by the manufacturer of the rotary hay rakes.
- ⚠ PTO lining must be installed and be in proper condition.
- ⚠ Take care of proper overlapping of tubes in transport and operating position.
- ⚠ Connecting and disconnecting of the PTO can be performed only with the turned off output shaft of the tractor, turned off engine and ignition keys pulled out.
- ⚠ Always make sure that the PTO shaft is mounted correctly, fit the one-way coupling towards the tractor output shaft and check that the PTO shaft is securely fastened and fitted into the grooves.
- ⚠ Secure the PTO linings with anti-rotation chains, be sure to read the instructions provided with the PTO.
- ⚠ When not using the hay rake, hook the PTO to the frame.
- ⚠ If you are not sure of how PTO works, if it is unprotected, or the protection has been used or broken, replace it with the new one having the “CE” mark.
- ⚠ Before turning on the output shaft of the tractor check if the selected speed and direction of rotation is customized to the permissible speed and direction of rotation of the hay rakes.
- ⚠ Before turning on the output shaft of the tractor, be sure that there are no persons or animals in the danger zone of the rotary hay rakes.
- ⚠ Do not turn on the output shaft while the tractor engine is turned off.

- ⚠ If the PTO is damaged, fix the damage immediately; it is best to contact the nearest service center before you use it again. Any unprofessional intervention leads to imbalance of the shaft, which may result in deterioration in performance or damage to the rotary hay rake or the output shaft of the tractor.



THESE WARNINGS MUST NEVER BE NEGLECTED



SAFETY



PNEUMATICS

- ⚠ Before any intervention on the wheels, check whether the tool is lowered to the ground, whether it is stable and secured against accidental starting (put wedges-supporters under the wheels).
- ⚠ Assembly, disassembly and repair of pneumatics may only be carried out by a competent person who has the appropriate tools and accessories.
- ⚠ Regularly check the pneumatics pressure, and follow the recommendations provided by the pneumatics manufacturer.



THESE WARNINGS MUST NEVER BE NEGLECTED



SAFETY



MAINTENANCE

- ⚠ Before performing any maintenance or repair work, switch off the tractor output shaft, switch off the engine and remove the ignition key.
- ⚠ Before performing any maintenance work on the hay rake, lower the tool to the ground and secure it against unintentional starting.
- ⚠ For work and replacement of tool parts, be sure to wear protective gloves and use only standard, prescribed tools and accessories.
- ⚠ When changing the oil, lubricating or replacing the filter, it is necessary to dispose of the replaced components by observing and respecting the Law on Environmental Protection.
- ⚠ Turn off the power source before performing any work on the electrical installations.

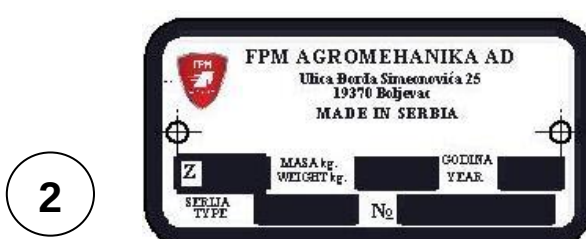
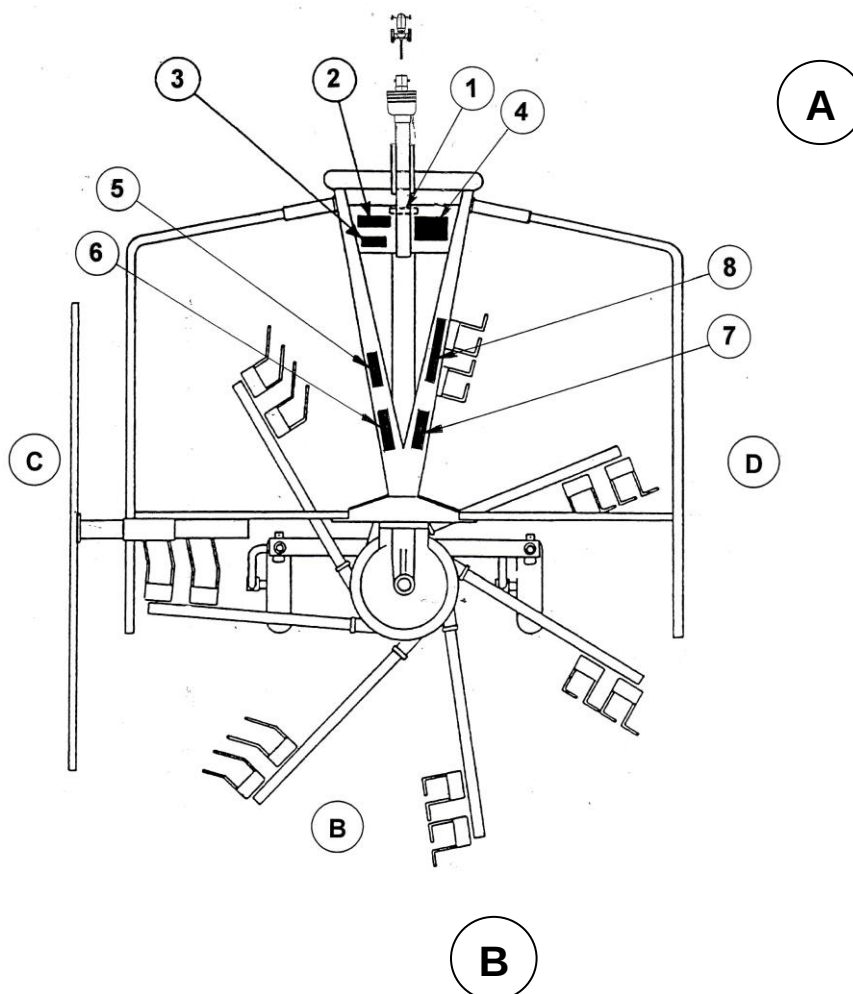


THESE WARNINGS MUST NEVER BE NEGLECTED

WARNING DECALS

FPM Boljevac

The following warning decals are placed on your rotary hay rakes to ensure your safety and the safety of people who work with you. By holding this Manual in your hand, walk around the machine and check these warning decals and instructions in the Manual. The decals must be clearly visible and legible, otherwise replace them with the new ones.

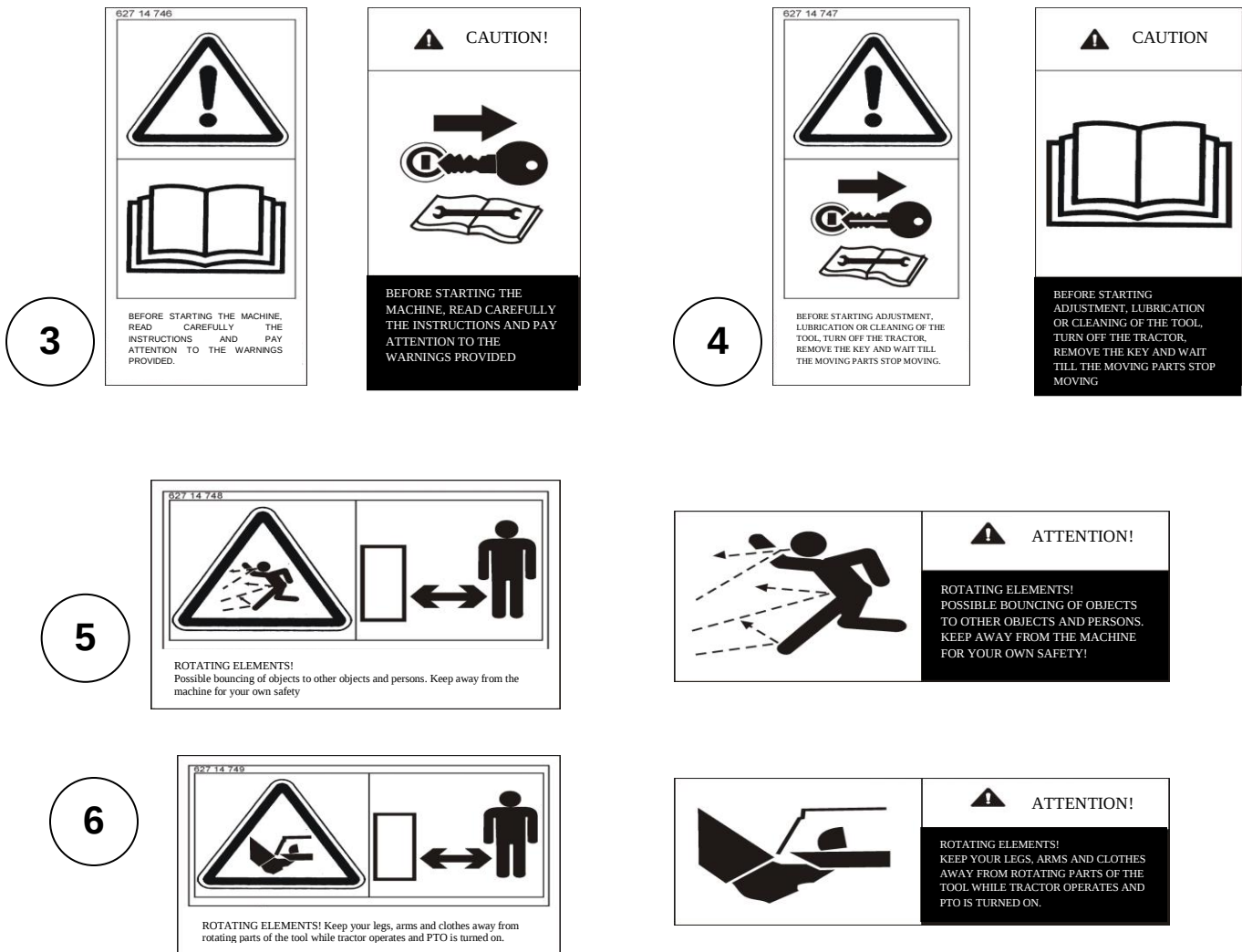


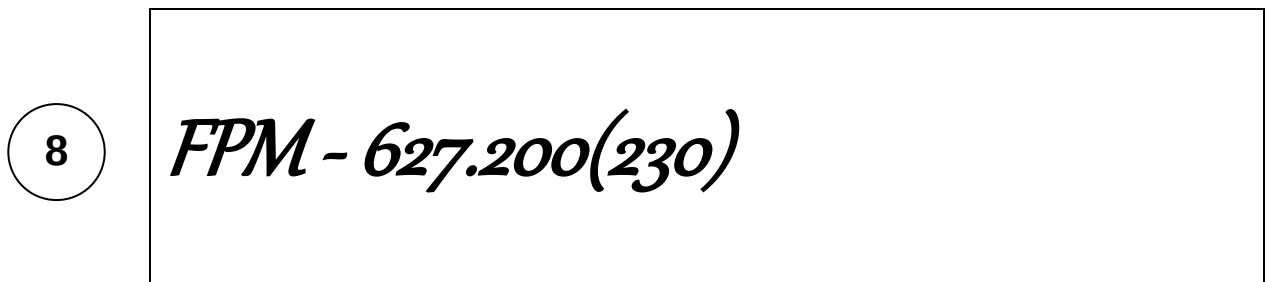
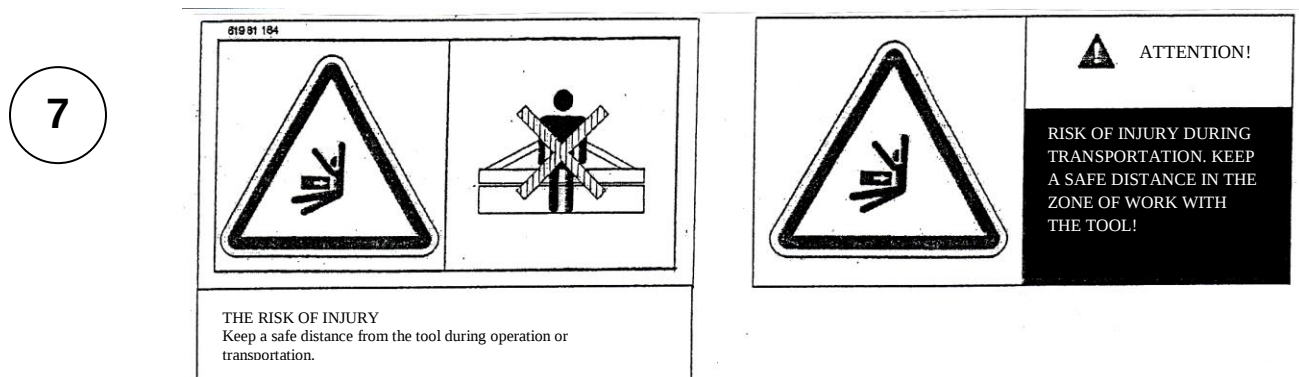
WARNING DECALS

FPM Boljevac

Identification of the rotary hay rakes is performed by the statutory plate (no. 2) containing the following marks:

- The field marked by letter "Z" contains the number of certificate (document) on safety at work
- The field "MASA/WEIGHT" contains the weight of the product;
- The field "GODINA/YEAR" contains the year of production (the last two numbers);
- The field "SERIJA/TYPE" contains batch code and product commercial code;
- The field "№" contains the serial number of the rear spreader consisting of nine numbers with the following meaning:
 - 1st number - year of production
 - 2nd and 3rd number - manufacturer's code
 - the remaining 6 numbers - serial number of product from the day of commencement of production





SPECIFICATION OF TECHNICAL CHARACTERISTICS

Characteristic:	Product	
	RAS 400/4	RAS 600/6
Working width (m)	4	6
No. of rotors/ collecting elements	24/24	36/36
Wire diameter (mm)	9	9
Tractor category	I	I/II
Tractor minimum power output, kW, (hp)	13/18	44/60
Maximum operating speed (km/h)	12	12
Maximum work rate (ha/h)	4.5	6,8
Wheels	4/15x6.00-6	4/16x6.50-8
Weight(kg)	390	570

In this manual “left” and “right” is defined in terms of the driving direction.

A - Front part

B - Rear part

C - Left side

D - Right side

(marks are shown on page 9, Figure with decals).

Metric thread is used during installation.

Tighten all screws during installation.

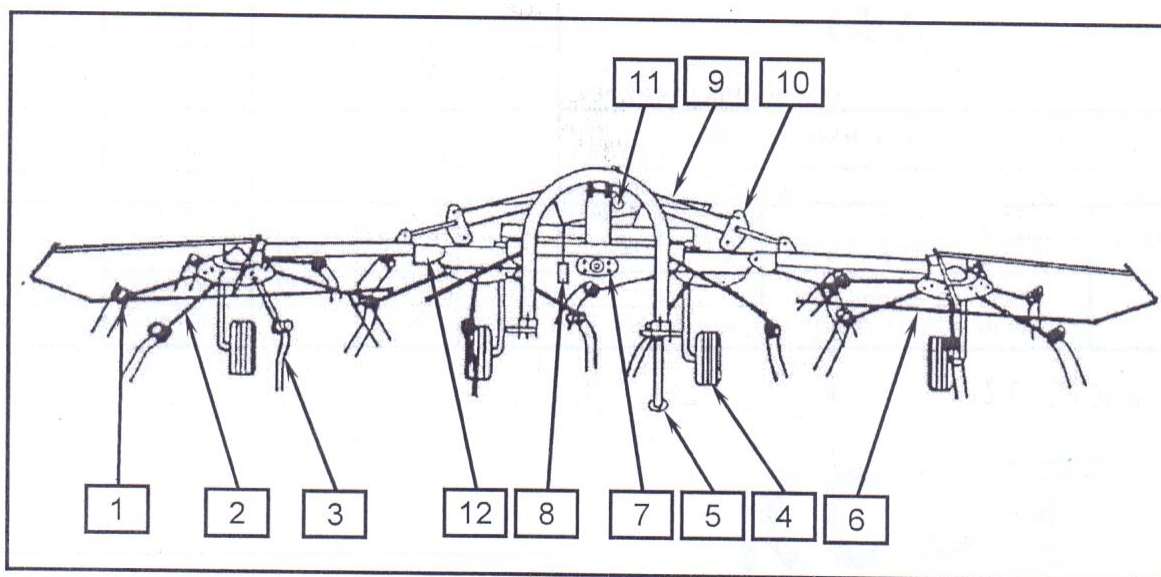
Letters are used for each figure to indicate where to install items.

Carefully read the text to properly install rotors.

DESCRIPTION

Rotary hay rakes are primarily intended for spreading and turning of hay. Simple and robust construction along with application of other instructions guarantees long-lasting and safe operation of the tool. The tool operates on the principle of rotation of the spring rakes which are fixed on the rotation heads. The two forward-tilting rotating heads rotate towards each other, which allows the spring fingers to gently grab the hay in front, and gently place it behind the spreader. Gentle, loose and completely even spreading and turning the hay significantly speeds up drying. Such a procedure with hay reduces the losses that occur due to crushing, reduces the dependence on bad weather, and valuable nutrients remain in the hay. The spreader is constructed in such a way that each rotating head adapts to the surface separately via support wheel. That is why the spreader, in addition to the large working width, grips the hay gently and cleanly. The spreader works well and smoothly on steep surfaces, as well. Spreading elements are made of high-quality steel and fixed so that they allow full elasticity of the spring. You can attach the spreader to any tractor with three-point linkage. It is PTO driven tool. Placing the spreader in the transport and operating position is simple and fast. The spreader is suitable for small and medium areas. Working with it is simple and safe.

Figure A

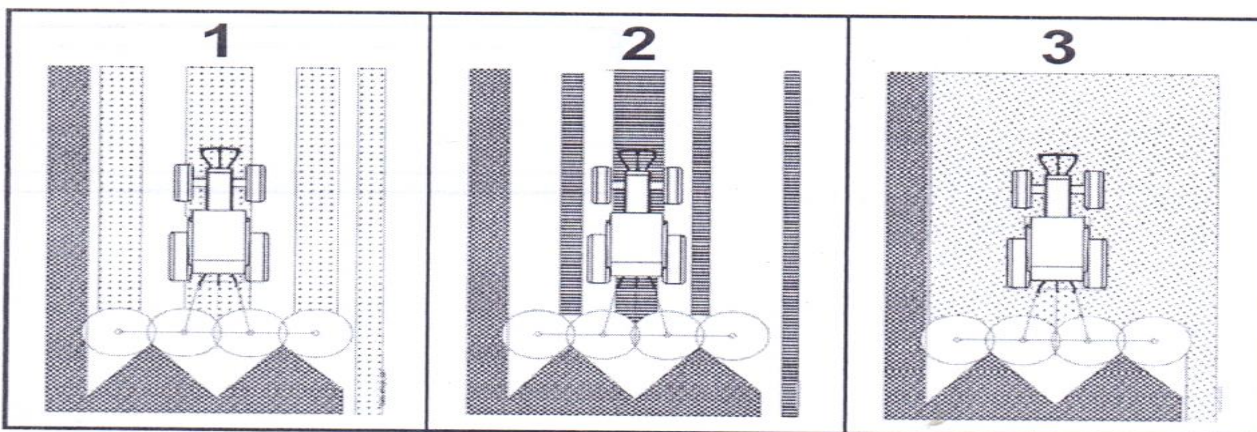


1.	Side rotor
2.	Spring fingers bracket
3.	Spring fingers
4.	Support wheel
5.	Support foot
6.	Protection
7.	PTO protection
8.	Hydraulic tube
9.	Hydraulic cylinder
10.	Arrester catch
11.	Pulling rope
12.	Rotor joint

DISPLAY OF WORKS WITH THE HAY RAKES

1. Spreading green grass
2. Spreading
3. Turning

Figure B



HAY RAKE OPERATION MANUAL

When coupling the spreader to the tractor for the first time, check the PTO length according to the instructions supplied with the PTO. Use only the PTO with a safety coupling. When coupling the spreader to the tractor, you must raise and fix the spreader support feet.

Setting the spreader to working position: first release the inner wheels (to rotate freely), lower the spreader to the ground, hydraulically release the blockers on the hydraulic rollers, lower the side rotors to the ground (slowly), if the spreader has no hydraulics, place it in the working position when release the inner wheels and lower them to the ground, pull out the safety pins and lower the outer rotating heads and place the safety pins in the cross connections.

Adjust the depth of rotation so that the front spring fingers reach the hay. Adjust the spreader with the upper tractor lever. Check the operation of the spreader regularly and make sure that the spring fingers do not penetrate deep into the hay as they can damage the grass root. Adjust the working speed and RPM of the tractor output shaft to the amount of grass mass and the degree of hay witherness. A fresher and higher amount of mass requires a higher PTO RPM (540 min-1). The best spreading is achieved by adjusting the speed and RPM. If the hay is drier, turn it with a lower PTO RPM. If the safety coupling starts to slip, stop operation and identify what caused the coupling to slip. If you encounter an obstacle while driving, be sure to

remove or bypass it. If the cause of the slip is a large amount of grass, continue to work with the corresponding lower RPM. You can work with the spreader only by driving forward.

Placing the spreader in the transport position: use the rope to lift the cylinder locks, hydraulically lift the side rotors, which lock themselves in the vertical position; if the spreader does not have hydraulics, place it in the transport position by first pulling out the external rotor locks and raising the bars above the blocks. Lift and secure the side rotors with locks.

The springs serve to make it easier to lift the side rotors. You can tighten them, but not too much since the side rotors will bounce in operation. When manually moving the spreader in the transport position, lock the inner wheels, as shown in Figure C. When the spreader is in position A, the wedge lever must be in position A. When the spreader is in transport position B, the wedge lever must be in position B.

If the tractor operates with combined drive of hydraulics and tractor output shaft, the PTO shaft must be switched off before lifting the spreader to the transport position. The spreader drive in the transport position must be switched off. Before uncoupling the spreader from the tractor, you must lower the support feet and secure them.

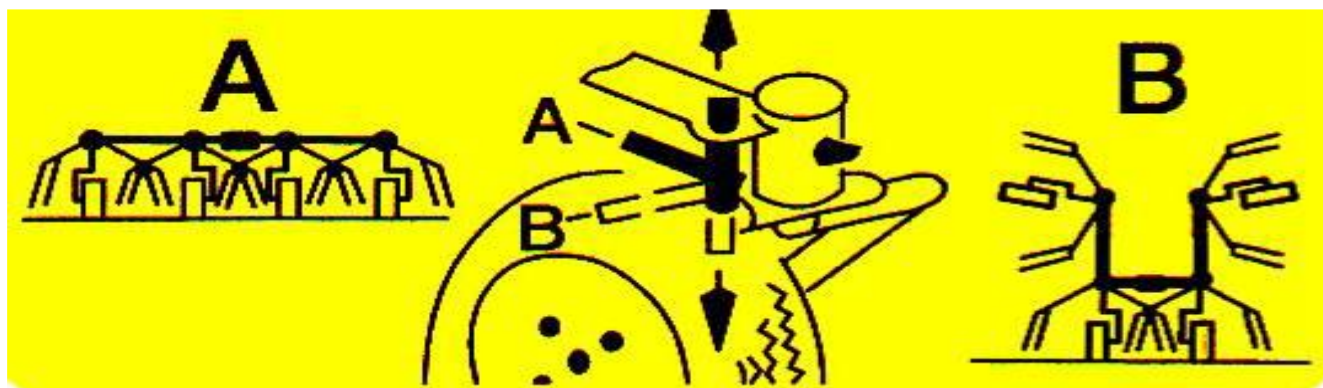


Figure C

MAINTENANCE

The spreader does not require special maintenance, but if you want to extend its lifespan, follow these steps:

1. The drive mechanism is made of bevel gear. The middle gearbox is filled with EP-O semi-liquid grease to the shut-off valve.
2. Lubricate the gears, which move the rotating heads, with LIS 2 grease every 10 to 15 working hours. Also lubricate the sliding surfaces of the articulated joints, through which the drive is transmitted to the side rotating heads.
3. Lubricate the PTO shaft according to the enclosed instructions.
4. Check the tire pressure regularly, the pressure must be 2 bar.
5. From time to time, check the screws that fasten the spring fingers and spring fingers brackets to ensure that they are securely tightened.
6. The spring fingers are properly attached to the bracket so that they are bent at a precisely defined angle (Figure D).
7. Inspect the spreader during the winter and prepare it for the next working season.
8. All bends of the spreader must always be oiled. All other bearings are closed and permanently lubricated.
9. The number of lubrication points and intervals are presented in the diagram (Figure E).

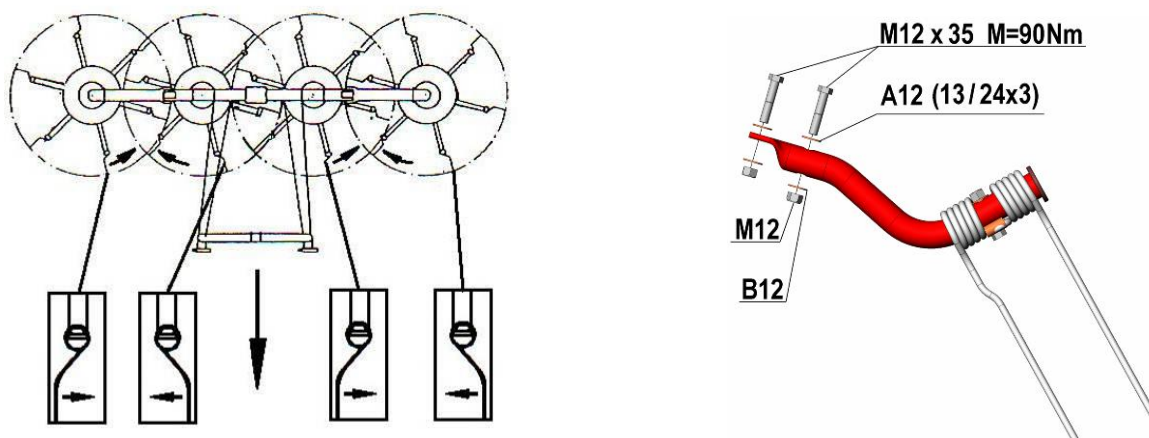


Figure D

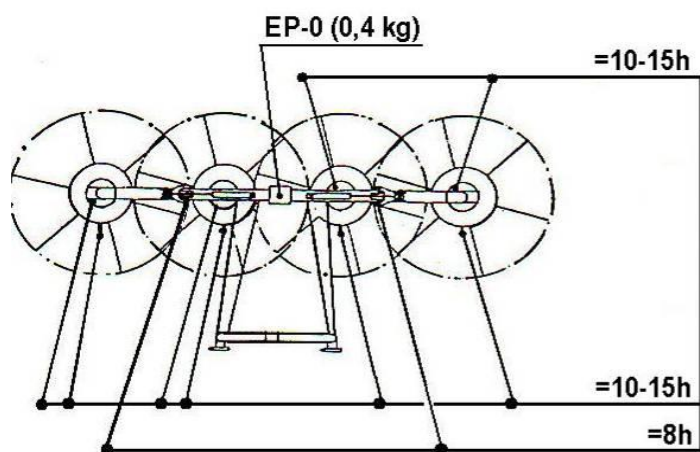


Figure E

PERIODIC INSPECTIONS

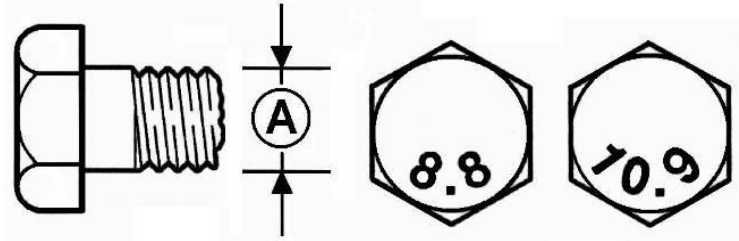
Thorough periodic inspection should be performed every year. Periodic inspections during the year are required primarily in terms of lubrication and maintenance.

Inspection includes the following:

- inspection of bevel gears;
- inspection of spring fingers;
- inspection of screw connections;
- inspection of the PTO protection of the spreader;
- lubrication according to maintenance and lubrication instructions

NOTE:

Tightening torque for M_A bolts and nuts (unless otherwise stated).



A = thread size

A Ø	8.8	10.9	12.9
	M _A (Nm)		
M 5	5,9	8,7	10
M 6	10	15	18
M 8	25	36	43
M 10	49	72	84
M 12	85	125	145
M 14	135	200	235
M 16	210	310	365
M 20	425	610	710
M 24	730	1050	1220
M 27	1100	1550	1800
M 30	1450	2100	2450

After the first start-up and after a few working hours, check the tightening of the bolts and nuts. Tighten them as needed.

Perform regular inspections (approximately every 50 hours).



**FOR YOUR OWN SAFETY AND TO GET ALL
THE BEST FROM YOUR HAY RAKE, USE
ONLY ORIGINAL PARTS MANUFACTURED
BY FPM AGROMEHANIKA d.o.o. BOLJEVAC**

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