

Manual instruction

Berry harvester “AREK 3”



KARMASZ s.c.

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1. Introduction

Manual instruction is attached to each machine for description of construction, handling and regulation of harvester “AREK 3”. The purpose is also to warn about possible risks. There is also information how to prepare machine to transportation on public roads. In each chapter you can find information about exploitation, technical handling and storing. If some of descriptions are not clear, please contact producer for more detail explanation, every time inform about serial number of harvester, year of manufacturing and year of issuing the manual. Important information and potential hazards are marked with symbols with description.



If you see this symbol, be careful of hazard

Read carefully information related and inform other users about the hazard

“AREK 3” harvester is equipped with nameplate on side part of machine body (see photo 1). You can find the basic data about machine: producer name, machine symbol, machine number, year of manufacturing, quality sign, weight. Warranty conditions and user’s rights are described in warranty card, attached to machine.

“AREK 3” harvester is designed for mechanical harvesting of black, red currant, gooseberry, aronia, etc. It is an attach type half row harvester, it means that each row has to be passed two times. Collected fruits are free of leaves and other inclusions, and are stalked.

Using harvester has many advantages, for example speed up of harvesting, reducing work load, using optimal time for harvesting. Optimal area for harvesting by “AREK 3” is about 10 ha. Using on one plantation different kind of shrubs with different date of fructification can increase period and area of harvesting.

FOR WORKING WITH HARVESTER “AREK 3” IT IS NECESSARY TO USE TRACTOR CLASS 6 kN.

Machine should be used, operated and repaired only by personnel who knows construction of the machine.



SELF-MADE STRUCTURAL CHANGES IN HARVESTER WITHOUT PERMISSION OF THE MANUFACTURER CAUSES LOSS OF RESPONSIBILITY FOR POSSIBLE DAMAGE AND LOSS OF WARRANTY.

2. Purpose

“AREK 3” harvester is designed for mechanical harvesting of black, red currant, gooseberry, aronia, etc.

Usage of harvester for other purposes means violation of harvester’s purpose. Following requirements about handling of harvester, operating, repairs according producer’s recommendations is a condition for usage of harvester according to its purpose.

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FOR WORKING WITH HARVESTER “AREK 3” IT IS NECESSARY TO USE TRACTOR CLASS 6 kN.

Machine should be used, operated and repaired only by personnel who knows construction of the machine.



Self-made structural changes in harvester without permission of the manufacturer causes loss of responsibility for possible damage and loss of warranty.

3. Safety instructions

Machine should be operated by tractor driver after reading instruction manual. During exploitation, following safety rules have to be followed:


- it is not allowed to operate the machine without reading instruction



manual  as well operation by disabled and children is not allowed

- Before using machine, check its technical condition, especially wear and fixture of rotating parts.



- during connection of machine to tractor, be careful , no people are allowed to stay between harvester and tractor during moving towards harvester.
- secure of bolts and pins in chassis of harvester, have to be done only by typical secure pins.



- all handling actions have to be done when the machine is lowered and tractor motor is switched off.



- Before any activity first switch off WOM drive and tractor motor and wait until all rotating parts stop.
- Harvesting can be started after achieving 540 rpm, it is not allowed to exceed WOM 600 rpm



Keep safety signs on harvester clean. The meaning and position of signs are shown in table (paragraph 8).



It is not allowed to work with harvester:

- during reverse driving
- on plantation with more than 5° slope
- to carry other people during transport
- on maximum shakers rotations without load (without stems inside shaking fingers working area)
- to operate by disabled or children
- machine should be stored clean in places which eliminate risk of hurting people and animals.



ATTENTION ! Harvester can be used on public roads only after installing suitable lighting and signs according actual traffic regulation.



If above principles are not followed, it can lead do hazard to operator and other people, it can also lead to machine damage. For damages resulting from failure in following safety rules, user takes responsibility.

4. Plantation preparation

Proper preparation of plantation is essential for an effective harvesting of berry. Plantation ready for harvesting should fulfill following conditions:

- plantation should be as large as possible, because maneuver of the harvester is much easier and less time runs idle. The size of plantation for one "AREK 3" should be in the range of 10 - 15 hectares, and the length of the rows should be at least 150 m for red currant, aronia and gooseberry, 200m for black currant.
- In case of very long rows there should be breaks in the rows in order to allow the unloading of harvester platform.
- Plantation should be cleaned from stones and other hard objects that could damage the mechanisms of harvester or complicate the harvesting. On the plantation there shouldn't be large furrows, pits or other depressions. If the ground is wet harvester operation may not be possible, since the wheels will sink and stuck in the ground.
- At the end of rows of the plantation, there should be enough space to make turn back of harvester, space should be 8-10 meters.
- Plantation slope should not exceed 5 °. Larger slope makes it difficult or even impossible to operate with harvester.
- Shrubs should grow from a flat surface. It is unacceptable to have rise in a row in place of scrub above 100mm (priming). Larger priming will stop harvesting.
- Spacing between rows should be 4.5 - 5 m, density of shrubs planting in rows should be 0.4 - 0.7 m. The width of the base of the shrub should be 0,35 m. The center of the shrub should be loose and free from thick grass, young trees, etc.
- Best results from "AREK 3" harvester can be obtained on plantations, where stems gets fruits above 40 cm. "AREK 3" harvester can collect fruits from lower stems as well. In this case the efficiency of harvester will be lower. At correct maintained plantation, harvester efficiency is very high, in the range of 95 – 98 %, at the same time stems damage is minimal. Such efficiency can be obtained with two shakers and with correct regulation of harvester units.

Most sufficient shrubs for mechanical harvesting are shrubs with straight and stiff stems, where berries mature equally and do not drop when matured. Well known types of berries for mechanical harvesting are:

Black currant

- Ojebyn
- Ben Lomond
- Titania
- Roodknop

Red currant

- Rondon
- Holenderska czerwona
- Jankher van Tets
- Erstling aus Vierlander

Gooseberry

- White Triumph
- Rzeszowski Plenny
- Lady Dalamere
- Hinnomaki Red

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5. Technical data

5.1. Sale information

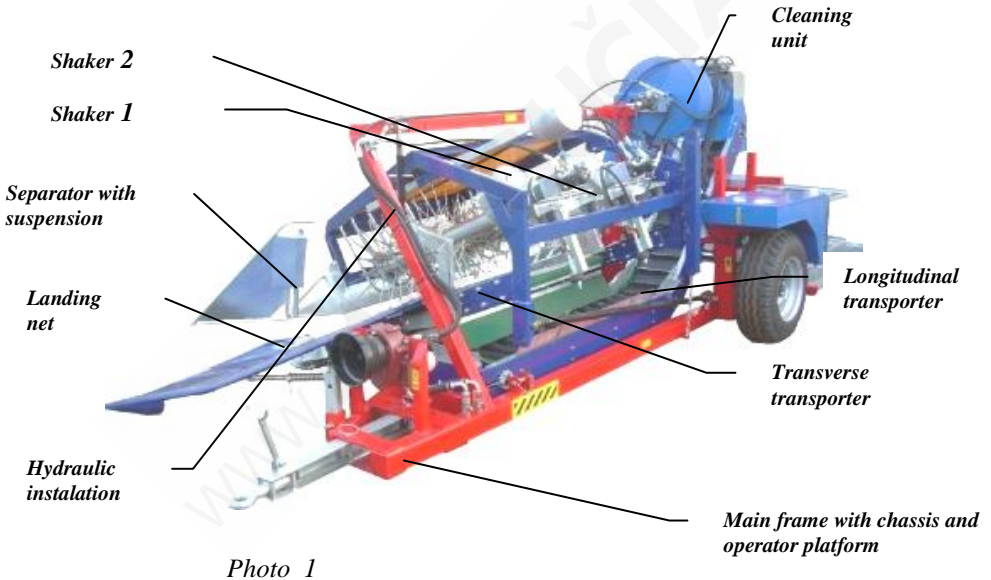
During purchasing, please check the technical condition and equipment of harvester. Ask the seller to fill up warranty card. No date or company stamp may result in rejecting warranty claim.

Harvester is delivered with following basic attachments:

- manual instruction
- reinforced boom

5.2. Construction and operation

Construction of berry harvester “AREK 3”



Harvester is constructed of following main units – see photo 1:

- main frame with chassis and operator platform
- separator with suspension
- shaker 1
- shaker 2
- longitudinal transporter
- transverse transporter
- landing net
- cleaning unit
- hydraulic instalation

5.3. General data

General data:

Harvester type	Connecting, half shearer
Towing speed	12 km/h
Transportation length	5010 mm
Working length	5840 mm
Width	2375 mm
Height	2310 mm
Clearance	200 mm
Weigth	1385 kg
Hook load	350 kg

Exploitation data :

Power source	Farm tractor class 6kN
Working speed	0,6 – 1,8 km/h
Working efficiency	0,1 – 0,2 ha/h
Harvesting efficiency	> 95%
Berry inclusions	< 1 %
Operating personel	Tractor driver + one harvester operator
Raising and lowering working mechanisms	hydraulic
Max. allowed load of rear platform	500 kg.

Trolleys:

Tracks of wheels	1280 mm
Dimension of tires	10 x 15
Tires air pressure	250 kPa

Transverse transporter:

Belt speed	0 – 0,25 m/s
------------	--------------

Longitudinal transporter:

Belt speed	0 – 0,35 m/s
Lubrication points	4 points
Type of lubricator	LT - 43

Cleaning unit:

Fan rotations speed	0 – 1200 rpm
Lubrication points	-
Type of lubricator	-

Shaker:

Number of shakers	2 pieces
Breaker	Belt type
Gear box lubrication	oil HIPOL 15
Oil volume	0,2 l
Number of shaking elements	5 elements per shaker
Shakers rotations speed range	0 – 1500 rpm
Lubrication points	1 point per shaker
Type of lubricator	LT - 43

Hydraulic instalation:

Pump	Caponi 32c28x198hg13
Shaker 1 drive unit	Hydraulic motor MP 25 HYDRAULIC
Shaker 2 drive unit	Hydraulic motor MP 25 HYDRAULIC
Fan drive unit	Hydraulic motor MP 25 HYDRAULIC
Transverse transporter drive unit	Hydraulic motor MP 100 HYDRAULIC

Longitudinal transporter drive unit	Hydraulic motor MP 80 HYDRAULIC
Type of hydraulic oil	HYDROL L-HL 68
Volume of oil	100 L
Max. oil temperature	80 ⁰ C
Oil filter	SOFIMA CA152 E CD 1
Flow divider	-
Overflow valve	VMP 1/2
Overflow valve	VMP 3/4

5.4. Working principle, berry harvesting



Raw of shrubs are divided into two halves by nose of separator: one half is separated from shaking elements, second half is put inside harvesting unit, where shaking elements hit stems of shrubs, which causes vibrations and berries are separated from shrubs (photo 4). Berries together with inclusions fall down on transverse transporter (photo 3) and then are transported to longitudinal transporter. Longitudinal transporter transports berries to cleaning unit, where all inclusions are blown off during pouring to container.

Clean berry stored in container is picked up by operator and stored on harvester's platform.

The harvester have to be controlled in a way, that the rail on a bottom side of transverse transporter is pushing against base of shrub. Pushing force is regulated by weight attached to harvester's frame.

Landing net in front of separator should be lowered during harvesting and the spring under should be regulated in a way that landing net is slightly touching the ground (photo 2).

Shakers' rotations should be regulated in a way that all berry is separated from shrubs. There is no standard regulation, it have to be made individually to the plantation. Regulation depends on type of plantation, age of shrubs, variety, maturity, working speed, etc. Regulation is done by hydraulic valves located on frame between shakers' heads (photo 5).

Tightening the valve increases speed of shaking heads, loosening the valve reduces shaking amplitude and slows down shakers. Shakers have to be regulated in a way to minimally damage stems of shrubs. During work, shaking heads have to be regulated by breaking bands.

Tension of band is regulated by nut on the bottom of breaker below rubber shock absorber (photo 5). During work, shaking head together with column should rotate with speed not lower than speed of harvester.

In young plantations, harvester is hydraulically lowered to lowest position to the ground and the gap between transporter and rail is regulated in a way that stems are freely moved and pushed to transporter. In bigger plantations, harvester is lifted up and the gap is regulated to fit size of shrubs. Too small gap can cause stem damages or harvesting cannot be possible.



Photo 2.



Photo 3



Photo 4.

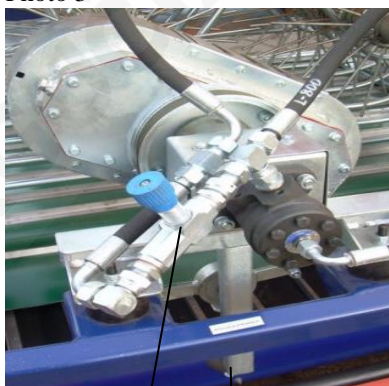


Photo 5.

Regulation valve for shaker

Regulation screw for shaker breaker



ATTENTION! Wrong regulation of weight for balancing transverse transporter can cause abrasion of rail and damage of drive chains.

6. Operating instruction

6.1. Preparation of harvester to work

Before connecting of harvester to recommended tractor, it is necessary to:

- check technical condition and perform daily maintenance according instruction manual of the tractor
- check technical condition of harvester and completeness of parts
- mount delivered with harvester boom
- mount delivered with harvester drive shaft



ATTENTION! Be careful during connecting of harvester to tractor.

It is not allowed to:

- stay between harvester and tractor during moving (retreating) tractor to



harvester

- connect harvester to tractor with running motor
- use other than standard cover elements for secure of connections.

6.2. Handling of frame with chassis

Frame with chassis is the main support element of harvester for all other working units. On longitudinal pipe there is handle to which frame of separator is mounted by bolt for transport of harvester outside plantation. To prepare the harvester to work, you have to remove bolt and lower the separator (photo 6). Operator platform behind the harvester during transport is lifted up and secured by chain. Side cover of platform during transport is mounted in handles at the back of lifted platform. To prepare harvester to work, it is necessary to remove side cover, lower the platform and mount cover at the side.



*Blocking
bolt*

Photo 6



Adjusting of backlash in wheels' bearings – regulation of backlash in wheels' bearings is made in following way: unscrew cover of hubs, remove safety pin for lace cup, screw maximally the nut and then unscrew by about 30 °. After that, secure the nut with safety pin, which secures against unscrewing and mount cover for hubs.

6.3. Handling of separator

Separator is mounted on ties, which are mounted to harvester's frame with bolts. Position of separator is regulated by chain driven by hydraulic cylinder. Side deviation of separator nose is possible to be regulated. It should be regulated in a way that bigger part of shrub is separated during work. It is possible to regulate gap width over rail, which is necessary during work in plantation with different height of shrubs. Pressure of rail is regulated by sliding weight. It is necessary to control everyday correct tightening of screws.

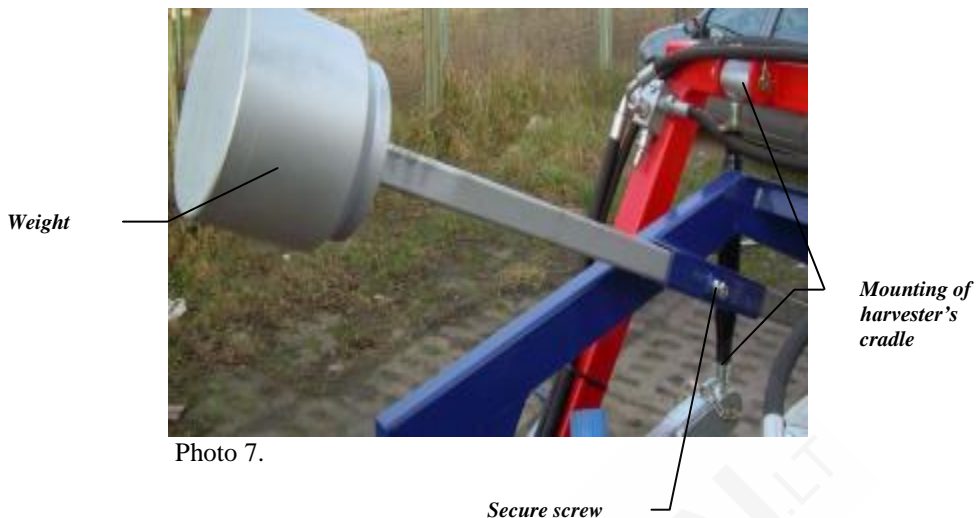


Photo 7.

6.4. Handling of shakers.

Shakers are driven by hydraulic cylinders. Fingers of shakers shake the stems, which cause that the berries drop on band of transverse transporter. Rotation speed of motors have to be adjusted according to size of plantation. Each column is equipped with 5 pieces of shaking elements (“suns”). In case of harvesting in higher plantations (above 1,5 meter) there should be additional “suns” mounted on each column.

It can happen that during harvesting shaking, elements will lose or break fingers of “suns”. It is a natural phenomenon and it does not affect precision of harvester.

In shakers heads there are rotating masses, which are driven by gears in oil. Oil have to be changed after 100 working hours.



Photo 9.

*Shaker's column
with "suns"*



Please use oil HIPOL 15, volume no more than 0,2 l per one shaker. Bigger volume of oil may result in damage of sealing on head shafts. After start of harvester, there may be small amounts of grease or oil on heads covers, which are remains after head assembly process made by producer. If the oil appears after few hours of harvesting, it can mean that there is leakage from the head. It should be reported to the producer.



Attention!!! Too high tension of bands of breakers makes harvesting more difficult or even impossible and causes shrubs damage.

6.5. Handling of transverse transporter

Transverse transporter moves below vibrating stems. (photo 10).

Shaking berries drop on transverse transporter and are transported to longitudinal transporter. Transporter's band should have correct tension.

Band tension is realized by moving of upper shaft mounted on transporter's walls (photo 12). After regulation the band should not be shifted to any side or shouldn't wave at the end of transporter during movement. Before regulation of band tension, screws fixing slides should be loosen.

In order to dismount band, remove bolt and then pins, which are connecting bands. Pins should be inserted into inside part of chain. Chain is moved on impregnated slides. Don't allow excessive wear of slides, as the screws mounting bars may quickly damage chain. Chain should be lubricated every 20 working hours, with half liquid mix of gear oil and graphite grease. Every day, after work, bands should be washed from fruits remaining (clean water without chemicals).

On the bottom side of transverse transporter there is a rail protecting band (photo 11). It is a wear part, which is wearing on ground during harvesting. Its regeneration is a change in the plating metal workshop.



Photo 10



Photo 11

Rail



Photo 12

6.6. Handling of longitudinal transporter (photo 13,14)

Longitudinal transporter transport fruits from transverse transporter to cleaning unit and further to containers. Band of longitudinal transporter is very similar to band of transverse transporter. Procedure for tensioning, disassembly and conservation. There are holes in side walls for chain lubrication.

There are four sprockets at transporter bend, which bends the band. Sprockets are mounted on bushings. For longitudinal transporter important is condition of rubber covers protecting running sprockets from fruit contamination.



Photo 13



Photo 14

6.7. Handling of cleaning unit

Cleaning unit is located at the end of diagonal part of longitudinal transporter. (photo 15). Its main elements are: fan and sucking pipe. Fan, by sucking the air from hopper, located in longitudinal transporter, takes away leaves and other inclusions outside. Running fan should be protected against thick sticks, foil, etc., which can cause fan damage. Fan regulation is made by hydraulic valve (photo 17). Regulation should be done in a way that only leaves and other inclusions are taken away, but not the fruits.

Too slow rotations will result in leaves in container, it means that fan rotations have to be increased to remove only leaves and inclusions. Too high rotations will result in mashed fruits on wheel next to fan's exhaust canal. Harvesting on wet plantation is not recommended. Wet leaves can stuck air canal, which can stop harvesting.



Photo 15

6.8. Handling of hydraulic instalation.

Hydraulic instalation drives all working units of the harvester. Source of pressure is hydraulic pump (photo 16) driven by WOM gear box (photo 20). Oil is directed to an overflow valve set to value 16 – 16,5 MPa.,



Photo 16

Transporters' circuit: consist of two slow rotation hydraulic motors serial connected, which are driving longitudinal and transverse transporter. Transporters' circuit is bypassed by shut off valve, which is used for start and stop of transporting bands. This valve is accessible from harvester operator's platform.

*Regulation valve
for fans*



*Regulation valve
for bands*

Photo 17

Shakers and fan circuit: consist of 3 fast rotations hydraulic motors connected in series, for shaker 1, shaker 2 and fan. Motors for shakers are bypassed by regulation valves, located on frame between shakers, valves adjust rotations of shakers. Fan's motor is regulated by valve in operator's panel.



*Valves for
shakers
regulation*

Photo 18

Oil tank: oil tank is located at the back side of harvester, above wheel (photo 19). Also the frame of harvester (longitudinal and transverse pipe) is filled up with oil. Because of big surface of frame, it is used as oil cooler.

Total volume of hydraulic circuit is about 100 l. Circuit is filled up with hydraulic oil HL 68. Tank is equipped with oil level indicator and thermometer, located on outside wall.

Oil level is correct when it reaches till 2/3 height of oil level indicator, if the level drops to 1/3, oil should be added.

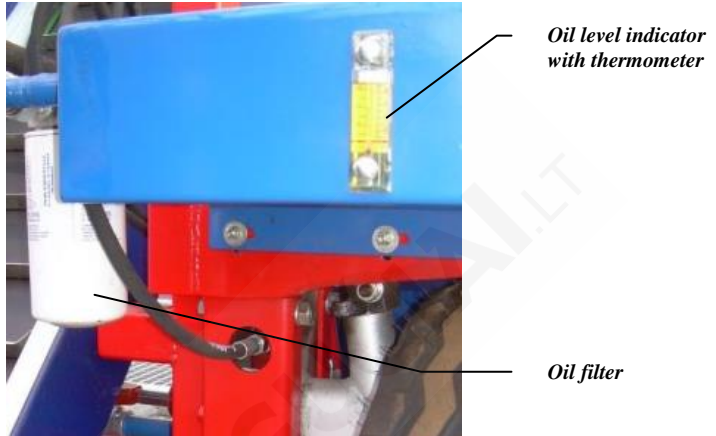


Photo 19



ATTENTION: it is not allowed to use another type of oil, as well use different types of oils in the tank.

Because of short working time in one season, it is recommended to change oil every two years.

During work, correct oil temperature is 60 – 70°C.

In case the temperature rises to more than 80°C work should be stopped until oil cools down. If reason of oil temperature rise is damage in hydraulic installation, damage has to be removed.



ATTENTION! During oil change prevent environmental pollution. Waste oil pour into sealed containers and give back to the company for the recycling of used oils and lubricants.

Pump gear box: Gear box is filled with gear box oil HIPOL 15 , which level has to be checked every day, before starting of work.

Oil should be changed every three years and in case of need, missing oil should be added. Oil can be changed in following way: remove filler, control and drain plug and remove oil to sealed container. Close drain plug and pour new oil thru filler hole. Pour the oil until it appears in hole of control plug and then close filler plug. Bigger amount of oil is not recommended as it may damage sealing of gear box.



Photo 20

Hydraulic hoses and connectors: oil flow in hydraulic installation is made thru rigid pipes (metal pipes) and elastic hoses (rubber hoses). Elastic hoses should lie down freely, without any tension in any working condition of the harvester. In case of hose damage, it should be changed to a new one of the same type.

In case of leakages on connector, leaking connector should be tightened or if necessary, sealing elements should be changed. It should be done by personnel who knows principle of construction of hydraulic systems. Small leakages in hydraulic system come usually from the specific work of harvester and it should be removed by user.

7. Off season maintenance



After harvesting season it is necessary to:

- clean and wash the harvester
- check technical condition of all parts and units
- change used elements to new ones
- degrease damaged paint layer, paint places where layer was damaged
- dismount belts of transporters, clean them, preserve chain with graphite lubricant mixed with oil. Mount the belts and keep it slightly tensioned.



It is not allowed to keep remaining of fruits on transporters or chains after harvesting season.

8. Notes

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9. Warranty card

KARMASZ s.c.
96-124 Maków Słomków ul. Główna 35
WARRANTY CARD
Berry harvester "AREK 3"

Year of manufacturing

Serial number

Date of sale

User:
Name and surname or company name

.....
Address

.....
Telephone number

Warranty conditions:

1. The guarantor of the obligations contained in the Warranty Card is manufacturer.
2. The warranty period is 12 months from the date of sale by the manufacturer.
3. The powers of the guarantee are carried out upon presentation of a valid Warranty Card.

Guarantor provides good quality and efficient operation of the product when used as intended.

I declare that I have read the terms of the warranty.

Stamp of seller

User's signature

10. Declaration of Conformity

According PN-EN 45014:2000

Nr /20....r.

We:

Supplier

Address.....

DECLARE FULL RESPONSIBILITY for :

Product Berry harvester "AREK 3"

Serial number:.....

Complies with:

Documents	Title
PN-EN 292-1; -2:2000	Machines. Safety
PN-EN 1553:1553	Common safety requirements
PN-EN 294:1994	Machines safety
PN-ISO 3600;1998	Manual instruction. Content and form
PN-ISO 11584:1998	Safety signs and warning. General rules
PN-93/R-02001/01	Technical measures to ensure safety

Additional information:

- Regulation of the Minister of Economy, Labor and Social Policy of 10.04.2003 on essential requirements for machines and safety elements (Dz. U. Nr91 Item 858 of 23.05.2003 r)
- Regulation of the Minister of Infrastructure of 31.12.2002 (Dz.U.Nr 32, item 262) on the technical conditions of vehicles and obligatory equipment
- Regulation of the Minister of Transport and Maritime Economy of 10.07.1999 (Dz.U.Nr 91, item 1039), concerning the approval of vehicles
- Ordinance of the Minister of Agriculture and Food:
 - from 01.12.1998 item. 51 (Dz. U. No. 12)
 - from 06.27.1997 item. 479 (Dz.U.Nr76) on BiHP in agriculture.
- Regulation of Minister of Labor and Social Policy:
 - From 28/05/1996 poz.285,287,288 (Dz. U. No. 62)
 - From 26.09.1997 item. 844 (Dz. U. No. 129)
 - 29.11.2002 item. 1833 (Dz. U. No. 217).
- Regulation of the Minister of Economy of 30.10.2002 item. 1596 (Dz. U. No. 191) on minimum requirements for occupational health at the plant in the use of equipment by workers at work.

.....
(Place and date of issue)

.....
(Name, surname, position)

.....
(Signature)

11. Spare parts list

Shaker – spare parts available on the market

Nr.	Name of part	Size	Quantity	Norm
1	Ball bearing	6008	1	PN-69/M 86100
2	Ball bearing	6013	2	PN-69/M 86100
3	Ball bearing	6205-2RS	1	PN-69/M 86106
4				
5	Ball bearing	CX 22207	2	PN-69/M 86100
6	Ball bearing	1206	1	PN-69/M 86130
7	Snap ring	Z 35	2	PN-81/M 85111
8	Snap ring	Z 30	1	PN-81/M 85111
9	Snap ring	Z 40	1	PN-81/M 85111
10	Snap ring	Z 42	1	PN-81/M 85111
11	Snap ring	Z65	1	PN-81/M 85111
12	Snap ring	W 52	2	PN-81/M 85111
13	Snap ring	W 62	2	PN-81/M 85111
14	Snap ring	W 72	6	PN-81/M 85111
15	Snap ring	W 100	2	PN-81/M 85111
16	Sealing ring	A 40*52*7	1	PN-72/M 86964
17	Sealing ring	A 35*62*7	2	PN-72/M 86964
18	Sealing ring	A 45*72*8	4	PN-72/M 86964
19	Sealing ring	A 75*100*10	2	PN-72/M 86964

Shaker - spare parts available only from the producer

Nr.	Name of part		Quantity
1	Gears	set	1
2	Coupling insert $\varnothing 100$	one piece	1
3	Metal coupling disc metal	one piece	2
4	Breaker belt	one piece	1
5	Rubber shock absorber	one piece	1
6	Brass breaker sleeve	one piece	1
7	Breaker „Sun”	set	5
8	Column	one piece	1

Attention :

Warranty exclude:

- hydraulic hoses
- rubber elements, excluding conveyors belts
- shakers' fingers
- leakages of from hydraulic connections, resulting from harvester work specific
- breakers' belts

Notes :

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