Instruction manual & parts catalogue

ROTARY MOWER

Z-178

Z-178/1

Z-178/2

Z-178/3

INSTRUCTION MANUAL
PARTS CATALOGUE
WARRANTY CARD

REAR ROTARY MOWER

Z-178 (1,65 m)
Z-178/1 (1,35 m)
Z-178/2 (1,85 m)
Z-178/3 (2,10 m)

Machine model: ……
Manufacturer's number: ……
Year of manufacture: ……

FMR LISICKI Janusz Lisicki

www.fmrlisicki.pl email: biuro@lisickirawa.pl

Edition 1/2020

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1. PREFACE

This instruction manual is delivered with each machine in order for user to get familiarized with design, operation and adjustment of the mower. Also it is intended to provide warnings on existing or potential risks and the manual contains information regarding preparation for transportation on public roads. By strictly following recommendations given in the instruction manual, you can ensure long-lasting and reliable operation and reduce operating costs of the machine.

Each section describes relevant matters in detail. If the manual contains any information which is unclear for the user, it is possible to obtain comprehensive clarification by noticing the manufacturer (contact data is provided on the back cover) – it is necessary to provide: detailed address of the machine purchaser, symbol, manufacturer's number, year of manufacture, year and number of issue of the instruction manual.

In the instruction manual, to underline importance of information and potential risks, the following warning symbols with descriptions are used:

If you see this symbol, beware a risk and carefully read corresponding information and notice other operators.

The mower is provided with data plate located in the front part of the central frame. It contains basic data for machine identification: name of manufacturer, machine model, manufacturer's number, year of manufacture (when purchasing the machine this data should be provided on the first page of the instruction manual).

Warranty procedure rules and resulting rights, are given in Warranty Card, being an integral part of the instruction manual.

Instruction manual is basic equipment of the machine. It is advisable that machine supplier, both new and used, keeps confirmation of receipt of the manual and the machine, signed by the purchaser.

2. INTENDED USE

Rotary mower Z-178 is intended for mowing green forage (grass, alfalfa, etc.), harvested for direct feeding or for further processing, e.g. silage, to be used as dried fodder or hay.

Mower Z-178 and Z-178/2 should operate with tractors of towed weight of at least 9 kN, e.g.: Ursus C-360, MF 255, Ursus 4512; and Z-178/1 with tractors of at least 6 kN, e.g. Ursus C-330, MF 235. Mower Z-178/3 should operate with tractors of towed weight of at least 14 kN.

The mower can be used on meadows and stone-free fields, on flat or slightly undulating fields with gradient of up to 12°.

Any use of the machine other than the above shall be considered as misuse. To make sure that the machine is used as intended, strictly follow requirements for use, operation and repair of the machine as recommended by the manufacturer.

The machine should be used, operated and repaired only by personnel who are familiarized with its detailed specifications and occupational health and safety rules and procedures.

Always follow provisions concerning accident prevention as well as any basic occupational health and safety provisions and road traffic rules.

Unauthorized modifications to the machine without permission of the manufacturer will render warranty null and void.

3. SAFETY NOTES AND WARNINGS


Use the machine while keeping basic occupational safety rules and the following precautions:

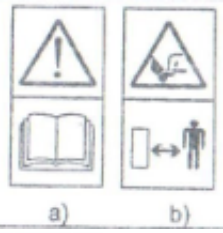
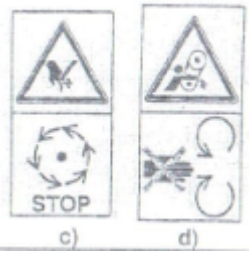
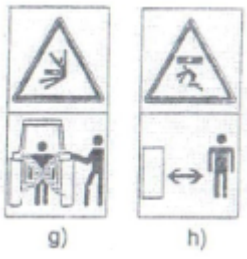
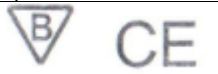
- **do not allow to use the machine by personnel who are not familiar with the instruction manual and minors, and children in particular,**
- mower can be operated only by personnel over 18 years old, who hold adequate qualifications to drive tractors,
- operation of mower by personnel under the influence of alcohol or other abusive substances, is forbidden,
- before the machine is used, check its technical condition, and in particular wear condition and reliability of cutting unit working parts connections,
- after the first hour of use of the mower, check tightness of all bolts and nuts,
- worn or damaged working parts (knives, holders, working drums) must be replaced,
- any missing or damaged cutting knives must be replaced in a set as recommended by the manufacturer in order to avoid dangerous unbalance,
- each time knives are replaced, it is required to check whether their mounting condition is as recommended by the manufacturer,
- the machine can operate only with recommended tractors – equipped with required weights of front axle (see Preparing tractor for operation with mower),
- **when attaching the machine to tractor take special care, and make sure there are no person between the machine and tractor when tractor engine is running,**
- **it is forbidden to operate the mower without guarding and safety curtain, and with damaged guarding or curtain lifted,**
- it is forbidden to operate without U-joint shaft cover and also with damaged cover,
- U-joint shaft must be fitted with cover fitted with chains preventing rotation,
- it is forbidden to control hydraulic lift lever from outside the tractor,
- **before performing any operations on the mower, first turn off PTO drive and tractor engine, remove ignition key and wait until drums with knives cease rotation,**
- for operations requiring the mower to be lifted on 3-point linkage it is necessary to additionally secure it against falling by means of a support or a chain,
- it is forbidden to lift the mower when the drive is on and drums are rotating,
- **it is FORBIDDEN to operate the mower when any unauthorised person is within 50 m,**
- on fields and meadows to be mown, foreign objects may be present,
- in the event of driving onto an obstacle, turn off the mower drive immediately and check whether the machine is not damaged,
- **before the drive is turned off or during the mower operation make sure whether in the danger zone there are no personnel or animals,**
- **it is forbidden to mow on edges of streets, roads, public squares (parks, schools, etc.) or on stony fields in order to eliminate potential risk of throwing hard objects,**
- start the mower only in its working position,
- start mowing only once the tractor PTO shaft has reached 540 rpm; do not exceed 600 rpm on the shaft; do not operate the mower while driving the tractor backwards,
- for transport, move the mower in transport position and remove knives from working drums,
- **move the mower from transport to working position and the other way round only on a level surface with discs positioned just above the ground,**
- it is forbidden to transport any personnel or loads on the machine or the tractor during transportation and operation,
- **for driving on public roads make sure to follow relevant road traffic regulations and fit the mower with required warning light devices and warning triangle for slow-moving vehicles.**

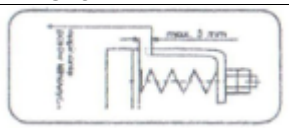
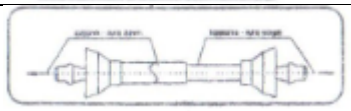

Failure to follow the above rules may pose danger to the operator and unauthorised personnel and also may cause mower damages. User of the mower is held responsible for any resulting damages.

4. Safety labels and notices

Table 1 specifies safety labels and notices provided on the mower and defines their meaning. Safety labels and notices should be protected against loss and becoming illegible. Missing or illegible safety labels should be replaced. It is required that new assemblies used for repair are marked with all safety labels as required by the manufacturer. Safety labels can be purchased from the manufacturer by giving safety label ref. no. (see Table 1) and version of the instruction manual.

Table 1. Safety labels for mower.

No.	Label	Meaning	Location
1.		a) Read instruction manual b) Keep a safe distance from the mower knives zone until the mower engine is running and PTO shaft is connected	Central beam (frame) (stickers)
2.		c) Before approaching any service or repair works, turn off the engine and remove ignition key d) Thrown or flying objects – keep a safe distance from the machine	
3.		e) Do not touch any machine elements until all its assemblies are stopped f) Do not open and remove the guarding until the engine is running.	On belt gear guard
4.		g) Do not stay nearby lift links when controlling the lift h) Keep a safe distance from the machine.	On linkage frame
5.	**WARNING** IT IS FORBIDDEN TO OPERATE THE MOWER WHEN ANY UNAUTHORISED PERSON IS WITHIN 50 M		Belt gear guard (sticker)
6.	1. Follow occupational health and safety rules listed in instruction manual. 2. It is forbidden to stay within 50 m from the mower when in operation. 3. It is forbidden to drive on public roads without proper marking in accordance with relevant regulations (Dz. U. No. 44 of 15.05.1999 r. it. 432)		Central beam (frame) (sticker)
7.		Safety “B” mark	Linkage frame (sticker)
8.		Machine type	Belt gear guard (sticker)

9.	WORK TRANSPORT	Latch switching direction: WORK-TRANSPORT	Link latch (sticker)
10.		V-belt assembly tightening indicator	Tightener angle bar (sticker)
11.		U-joint shaft location	Linkage frame (sticker)
12.	NO MACHINE LIFTING WITH REVS ON	Linkage frame (sticker)	Linkage frame (sticker)
13.		Direction and nominal rotational speed of power input connection	Power input connection cover (sticker)

5. GENERAL INFORMATION

5.1. Sales information

When purchasing make sure to check technical condition and equipment of the mower. Request the Seller to carefully complete the Warranty Card and claim vouchers. Lack of, e.g. date of purchase or dealer's stamp will render any possible claims addressed by user unrecognised.

The manufacturer delivers mower Z-178 i Z-178/1 in complete condition but with cutting unit cover removed.

Cutting unit cover should be installed by user (purchaser) on their own (see Assembling mower).

5.2. Equipment and spare parts

Mower Z-178 comes with the following basic equipment:

- instruction manual with parts catalogue and warranty card 1 pce
- special wrench (welded) 1 pce
- knives (in package) 12 pcs

On purchaser's special request and on extra charge it is possible to order the following by contacting seller (manufacturer):

- ***U-joint shaft,***
- ***rectangular warning light plates,***
- ***warning triangle for slow-moving vehicles.***

5.3. Design and working principle

Rotary mower Z-178 is composed of the following main assemblies (Fig. 1):

- linkage frame
- central beam (frame),
- main frame,
- cutting unit,
- drive train,
- drive train and cutting unit covers,
- safety device.

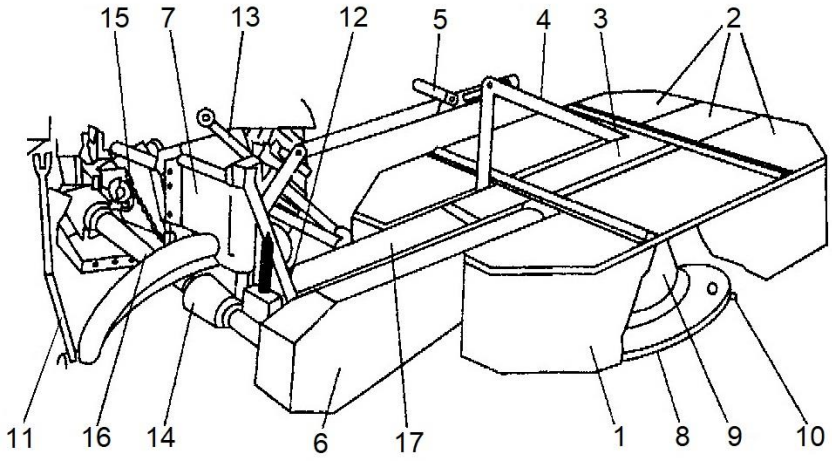


Fig. 1. Rotary mower Z-178: 1 - safety curtain, 2 - curtain frame, 3 - main frame, 4 - tension member, 5 - latch, 6 - guard, 7 - linkage frame, 8 - sliding disc, 9 - working drum, 10 - knife, 11 - tractor lower link, 12 - safety device, 13 - transport beam, 14 - roof guard, 15 - safety chain, 16 - U-joint shaft, 17 - central frame.

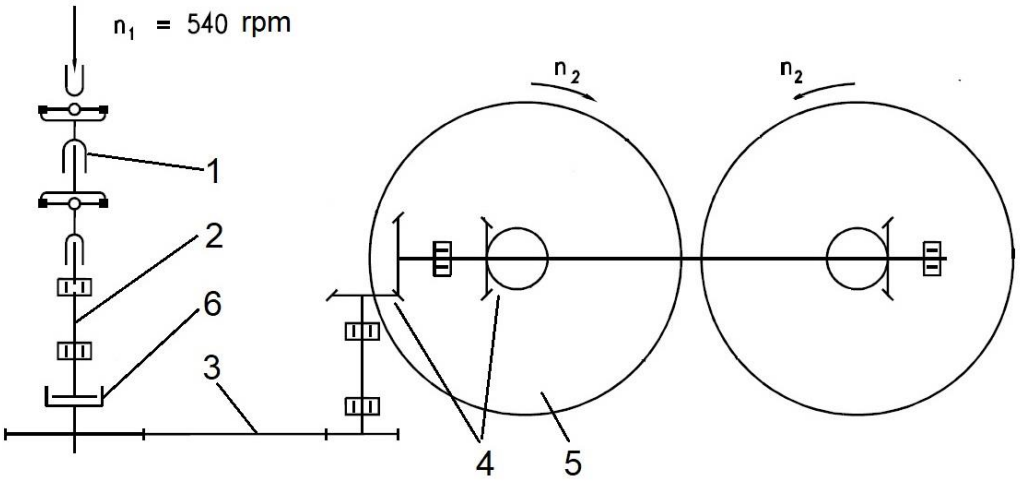
Linkage frame (7) is used to connect mower and tractor. Linkage frame, through centre frame (17), is jointed to main frame (3).

Cutting unit comprises two working drums (9), with loose knives (10) in lower part of drums. In working position drums are supported on sliding discs (8) which allow for following any ground unevenness.

The mower can be moved from transport to working position and the other way round by means of jointed connection between linkage frame and central frame. Cutting unit safety curtain (1) protects the machine operator and unauthorised personnel against hard objects which may be thrown at high speed by working drums (9).

Spring safety device (12) prevents mower damages after driving the cutting unit on an obstacle.

Working drums (5) (Fig. 2.) are powered from tractor PTO shaft through U-joint shaft (1), driving head shaft (2), belt-and-pulley drive (3) and ring-and-pinion gears (4). Drums with knives rotate in opposite directions, cutting plants and forming forage as swath. Overrunning clutch (6) integrated with pulley allows free rotation of drums after the engine is turned off, and thus protects drive elements against damage.



n_2 = 2050 rpm (Z-178)
n_2 = 2350 rpm (Z-178/1)
n_2 = 1900 rpm (Z-178/2)
n_2 = 1600 rpm (Z-178/3)

Fig. 2. Mower drive diagram: 1 - U-joint shaft, 2 - driving head shaft, 3 - belt-and-pulley drive, 4 – bevel-gear, 5 - working drum, 6 - overrunning clutch (not included in 178/3).

6. OPERATING SERVICE

6.1. Preparing tractor for operation with mower

Before approaching attachment of rotary mower to recommended tractors, the latter should be prepared accordingly:

- check technical condition and carry out daily maintenance in accordance with tractor instruction manual,
- in tractor remove or turn lower (agricultural) hitch beam aside,
- in tractor remove yoke plate from the beam or the whole lower hitch beam and turn upwards and secure upper (transport) hitch.

NOTE!!! *Removal of the above elements protects against possible U-joint shaft damage when lowering the linkage in lower (terminal) position.*

- install tractor PTO shaft cover,
- recommended tractors should be equipped with a set of front axle weights.

WARNING!!! *Use of tractor other than recommended (e.g. with lower towed weight), or without required front axle weights for operation with the mower, may cause loss of control of tractor front wheels.*

6.2. Attaching mower to tractor

The mower should be attached to tractor with use of 3-point linkage frame. The mower should be in transport position. Attachment points on mower linkage frame are presented in Fig. 3.

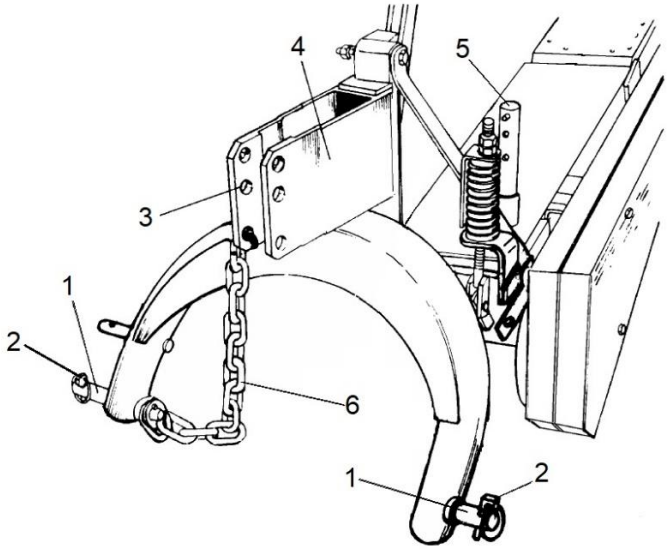


Fig. 3. Mower linkage frame: 1 - linkage frame lower pivot, 2 - linchpin, 3 - openings in linkage frame yoke, 4 - linkage frame yoke, 5 - support, 6 - chain.

WARNING!!! *Be careful when attaching the machine to tractor.*
It is forbidden:

- *to allow any person to stay between the machine and tractor when it approaches (driving backward) the machine,*
- *to attach the machine with working tractor engine,*
- *to use elements other than recommended by the manufacturer to secure connections.*

To attach the mower to tractor:

- install ball-and-socket joints of tractor lower links (first left and then right one) on linkage frame pivot (1) (Fig. 3) and secure them using linchpins (2);

- insert joint end of upper link in-between yoke plates (4) (using upper or middle openings (3), and then connect with pin and secure with linchpin (2);
- raise support (5) and secure with split pin;
- tighten chains limiting lateral deflections of tractor linkage,
- install chain (6) in upper transport hitch or its bracket (see section. 6.6. Mower adjustment rules).

6.3. Installing U-joint shaft

For rotary mower drive, use U-joint shaft with “semi-concealed” cover, holding safety “B” mark and characterised by technical parameters matching data in specification (refer to Table 2).

For use of the shaft with “semi-concealed” cover, additional covers from tractor PTO shaft and machine power input connection side are required. Machine power input connection cover is installed by manufacturer of the mower.

Use of U-joint shaft with parameters other than recommended by manufacturer of the machine may cause its overloading and emergency damage or split of its both parts during machine lifting and pose risk to service technicians and personnel around.

When installing U-joint shaft please remember that outer tube of shaft cover is positioned from the tractor side (Fig. 4).

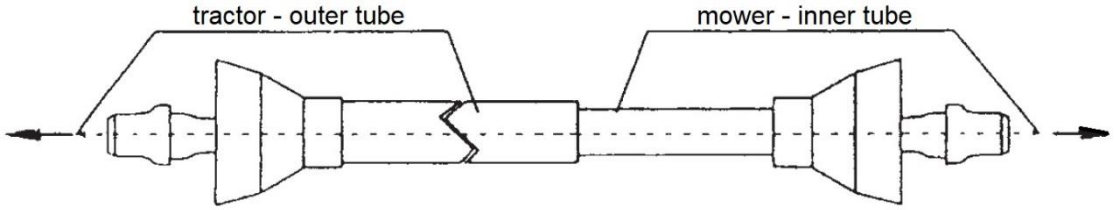


Fig. 4. U-joint shaft

It is forbidden to install (mount or remove) U-joint shaft with tractor engine running.

To install the shaft:

- **lower the mower on the ground and turn off tractor engine and remove ignition key,**
- slide shaft ends (yokes) over machine power input connection and tractor PTO shaft and secure against slipping out using latches,
- check if latches effectively protect shaft ends against slipping out during operation,
- mount shaft cover chains; one to tractor PTO shaft cover, and the other to mower power input connection cover.

It is forbidden to use U-joint shaft without cover or with damaged cover and without additional covers from tractor PTO shaft and machine power input connection side.

6.4. Setting mower in transport position and transportation

For transport passages to and back from work site, set mower attached to tractor in transport position.

Be careful when moving the mower from transport to working position and the other way round. Follow recommendations given in 6.4 and 6.5 (setting in transport and working position, respectively). It is forbidden to move the mower:

- *in areas with uneven surface and visible ground inclination,*
- *if lifted up high (as for transport) and when the mower linkage frame is not levelled properly,*
- *in the presence of unauthorised personnel within mower rotation reach.*

Failure to follow the above recommendations may cause risk related to a sudden self-acting turn of the mower in relation to its linkage frame. Such turn may occur after unlocking of safety elements (transport beam or safety device).

In order to move the mower to transport position do the following (Fig. 5):

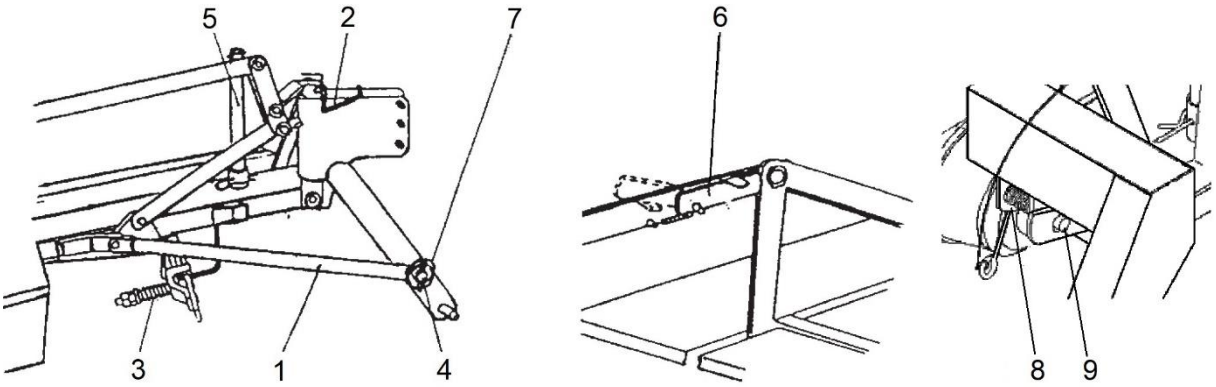


Fig. 5. Mower in transport position: 1 - transport beam, 2 - yoke hook, 3 - safety device, 4 - upper frame pin, 5 - support, 6 - latch - transport position, 7 - linchpin, 8 - latching mechanism, 9 - safety pin.

- ***position the set (tractor with mower) only on a level surface and lower the mower so discs touch the ground;***
- ***turn off tractor PTO drive (if not turned off previously) and engine, remove ignition key and wait until mower working assemblies cease rotation;***
- remove U-joint shaft,
- remove cutting knives from discs (refer to Mower servicing);
- ***level (crosswise to lengthwise tractor axle) the mower linkage frame – by adjusting right hanger (lower pivots of linkage frame should be positioned at the same height above the ground); lower the mower so sliding discs are low – just above the ground;***
- detach safety device (3) from upper pivot (4) of linkage frame (Fig. 5);
- ***grab the mower by cutting unit cover from the outer side (Fig. 8) and turn (to the right) to transport position, and then while holding down (so it will not turn by itself) install transport beam (1) on pivot (4) and secure with linchpin (7) (Fig. 5) (Mover version Z-178/3 is not equipped with transport beam (1). Latching mechanism (8) will lock the mower in the transport position.);***
- ***make sure the pin (9) of latching mechanism (8) snaps into the hole of central frame.***
- put latch (6) in transport position (Fig. 5) (Not included in Z-178/3 and in all versions of mover equipped with hydraulic lifting system);
- lift the mower on tractor 3-point linkage in upper position (clearance between sliding disc and the ground should be about 0.4 m).

Moreover, in order to adapt the mower for transport on public roads and ensure safety:

- check safety elements,
- use tractor with front weights,
- mount warning light plates and warning triangle for slow-moving vehicles and check lights for operation,
- pay particular attention to the space around the set (tractor with mower) when manoeuvring,

- follow safe driving speed rules – however no more than 15 km/h (attaching mower on tractor 3-point linkage may affect its handling).

If traffic regulations require, the mower should be equipped with appropriate signal boards and transport lighting during transport. (Fig. 6):

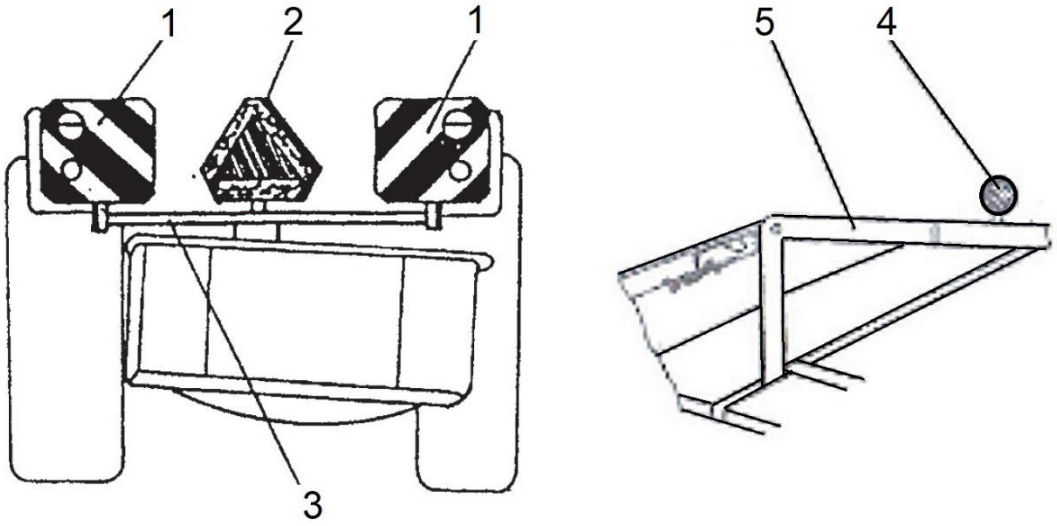


Fig. 6. Mower marking and lighting: 1 - warning light plates, 2 - warning triangle for slow-moving vehicles, 3 - special beam with holders, 4 - side reflector lights, 5 - link.

Seller of the mower, on extra charge, on purchaser's request, delivers portable warning light device in accordance with road traffic regulations.

6.5. Setting mower in working position

Before approaching operation, move the mower from transport to working position. Thus, do the following (Fig. 7, 8, 9, 10):

- ***position the set (tractor with attached mower) only on a level surface and lower the mower so sliding discs are low above the ground,***
- ***check crosswise levelling of the mower (lower linkage frame pivots should be at the same height above the ground),***
- ***detach transport beam (1) from upper pivot (4) of linkage frame and put on yoke (2) hook, while with left firmly hand hold down the mower main frame (Fig. 8), and then while still holding the frame (so it will not turn by itself) move and grab the cover from the outer side (Fig. 9) and turn (to the left) to working position,***
- ***for Z-178/3 mower (without transport beam (1)) pull the rope (10) of latching mechanism (safety pin (9) will come out of the hole in central frame) and turn the mower to working position (Fig. 10).***
- install safety device (3) on upper pivot (4) of linkage frame and secure it with linchpin,
- put latch (6) in upper position (Fig. 7),
- install knives; on working drums, install a set of knives (for Z-178, Z-178/1 and Z-178/2 - 3 pieces each drum, for Z-178/3 – 6 pieces each drum) of the same weight, as otherwise the drum will become unbalanced which may cause mower damage,
- install U-joint shaft (see Installing U-joint shaft).

***CAUTION!!!** U-joint shaft can be connected to tractor only with mower in operation, and for transport (to field and back), and also during any servicing; disconnect the shaft from tractor PTO and put it on holder mounted at linkage frame.*

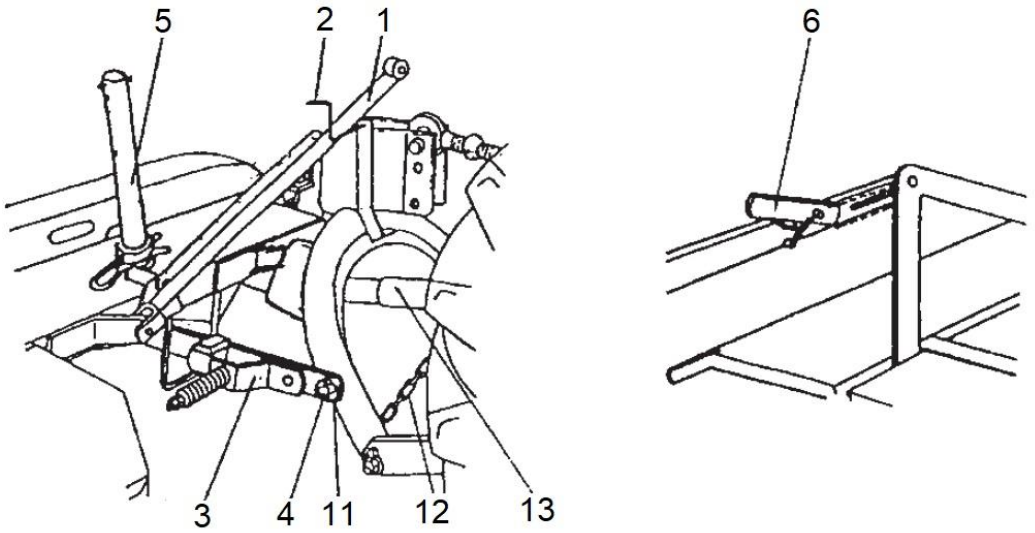


Fig. 7. Mower in working position: 1 - transport beam, 2 - yoke hook, 3 - safety device, 4 - upper pivot of linkage frame, 5 - support, 6 - latch, 7 - yoke hook, 8 - chain,11 - linchpin, 12 - chain, 13 - U-joint shaft.

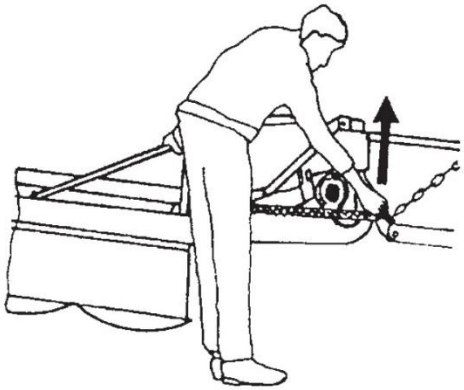


Fig. 8. Supporting mower when removing transport beam.

Fig. 9. Turning mower when moving from transport to working position and other way round.

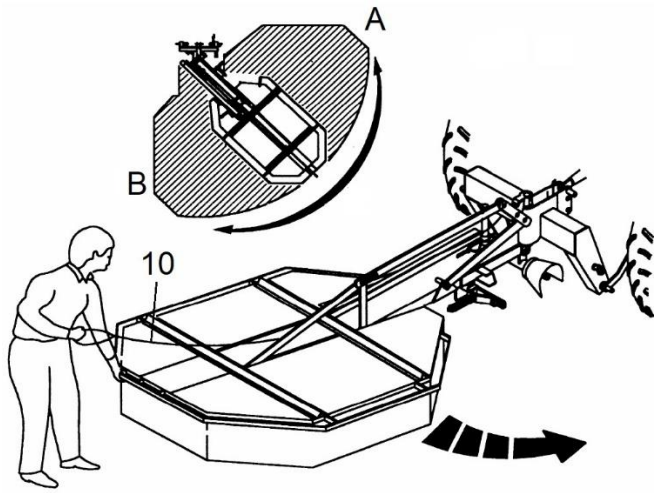


Fig. 10. Turning Z-178/3 mower: A - working position, B - transport position; 10 - latching mechanism's rope.

6.6. Mower adjustment rules

After the mower is moved to working position, lower it so sliding discs on working drums touch the ground. Sliding discs should be parallel to the ground, whereas linkage frame should be positioned at such height from the ground so distance “X” (Fig. 11) is about 0.3 m, and mandrel (K) is in the middle position of oblong opening in the link (6). Adjustments are carried out using upper connector (3) and right hanger (2) on tractor linkage (Fig. 12).

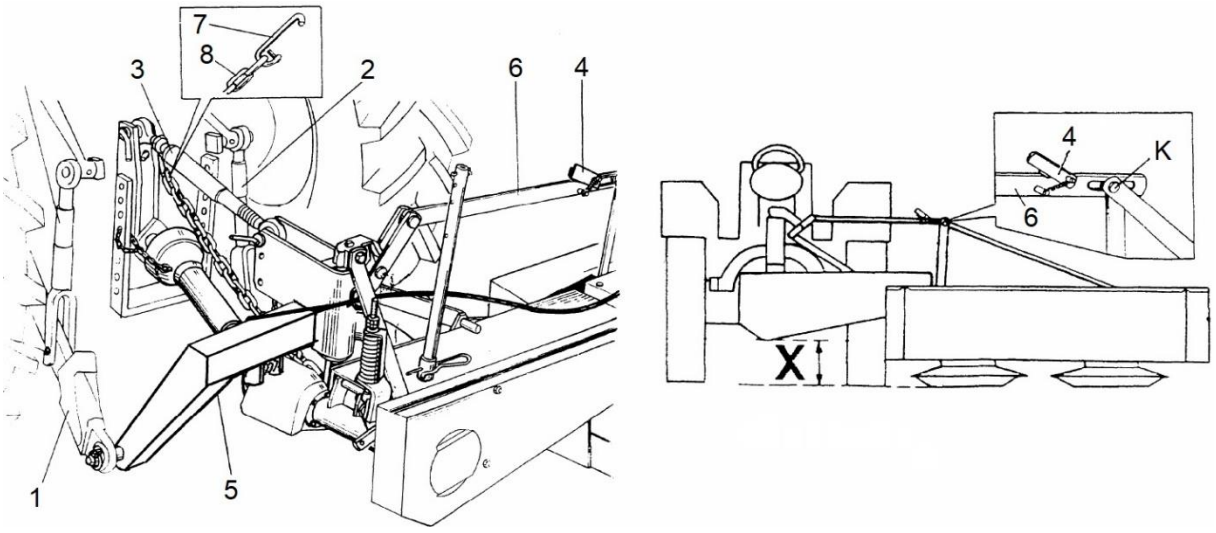


Fig. 11. Mower in correct position for operation: 1 - tractor lower link, 2 - hanger, 3 - upper connector, 4 - latch, 5 - linkage frame, 6 - tension member, 7 - chain hook, 8 - chain.

At the same time in order to ensure correct operation, linkage frame should maintain this position (determined as described above) throughout the operation. Thus use chain (8) (Fig. 11) which prevents mower linkage frame from falling. The chain is mounted to transport hitch or its bracket.

The mower can be adjusted to mowing height 32 mm (low), and 40 or 44 mm (medium). The mower is factory-set to mowing height 32 mm.

Mowing height is adjusted (Fig. 12) using spacer ring (D) which is mounted on working drum between hub (2) and resistance disc (1).

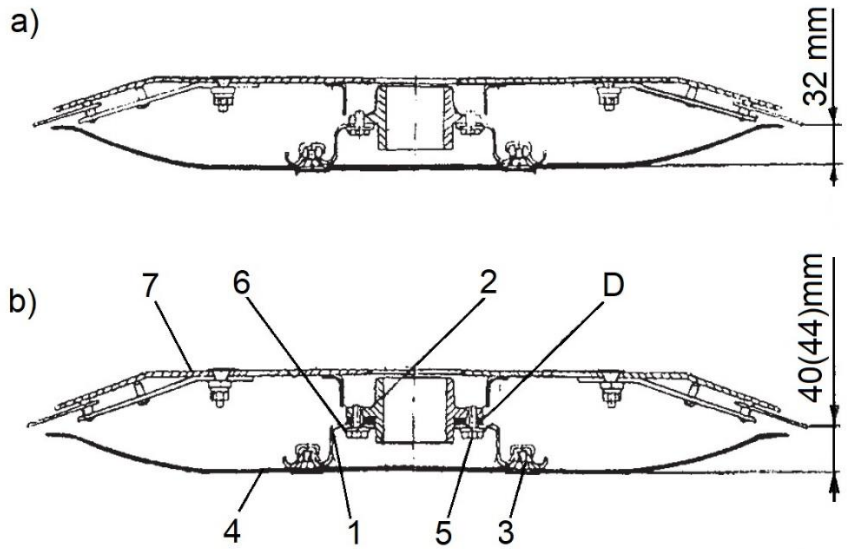


Fig. 12. Using various mowing heights: a) - low 32 mm (without spacer ring D, b) - medium 40 mm with mounted spacer ring D of 8 mm in thickness or (44 mm) with mounted spacer ring D of 12 mm in thickness; 1 - resistance disc, 2 - hub, 3 - special bolt M12 x 25, 4 - sliding disc, 5 - bolt M10 x 30, 6 - tab washer, 7 - resistance disc.

In order to change mowing height from 40 mm to 44 mm, replace ring (D) of 8 mm in thickness with ring of 12 mm in thickness, and for mowing height 32 mm remove the ring (D).

Thus:

- set the mower as for transport and lift as high as possible,
- immobilize the tractor using hand brake and turn off the engine,
- protect the mower from falling with chain and additionally with support under one of discs,
- unscrew special bolts M12 x 25 and remove sliding disc,
- unscrew bolts mounting resistance disc (M10 x 30) and remove it,
- adjust mowing height and re-assemble in reverse order,
- carry out adjustment on the other disc by changing support position.

6.7. Mower operation – mowing

On fields and meadows being mowed, there should be no foreign, hard objects, and larger stones should be removed and smaller should be rolled in the spring.

The mower should be operated with working drums safety curtain lowered. Engage mower drive slowly and only after drums have reached their full capacity (540 rpm of PTO shaft), the set can enter the field to be mowed. Adjust driving speed to terrain configuration and type of mowed material. For idle passages, first turn off the mower drive and then lift it.

Do not operate the mower on uneven and stony fields – due to possible damage of knives, holders and other elements of the mower and due to a risk related to throwing hard objects (stones, damaged knives, etc.).

***WARNING!!!** After tractor PTO drive is turned off, working drums with knives will rotate for some time. Before approaching any works on the mower (including removal of potential clogging) first always turn off tractor drive and engine, remove ignition key and wait until working drums with knives cease rotation.*

***WARNING!!!** It is forbidden:*
to operate the mower when any unauthorised person is within 50 m.

After the mower drives onto an obstacle, spring safety device (Fig. 13) enables deflection of mower cutting unit backwards. Then it is required to stop the tractor and turn off the drive. Safety device engages back in its previous position if the tractor is slightly moved backwards. Length of tensioned spring of the safety device (**Y** dimension Fig. 13) should be about 170 ÷ 150 mm. Arbitrary tensioning of the spring may cause locking of the safety device, and therefore mower damage after driving onto an obstacle.

***CAUTION!!!** Due to possible damage of the mower, do not allow:*
- *exceeding tractor PTO shaft rotational speed above 600 rpm,*
- *lifting the mower with revs off and drums rotating,*
- *mowing when tractor is driven backwards (as then the safety device is disabled).*

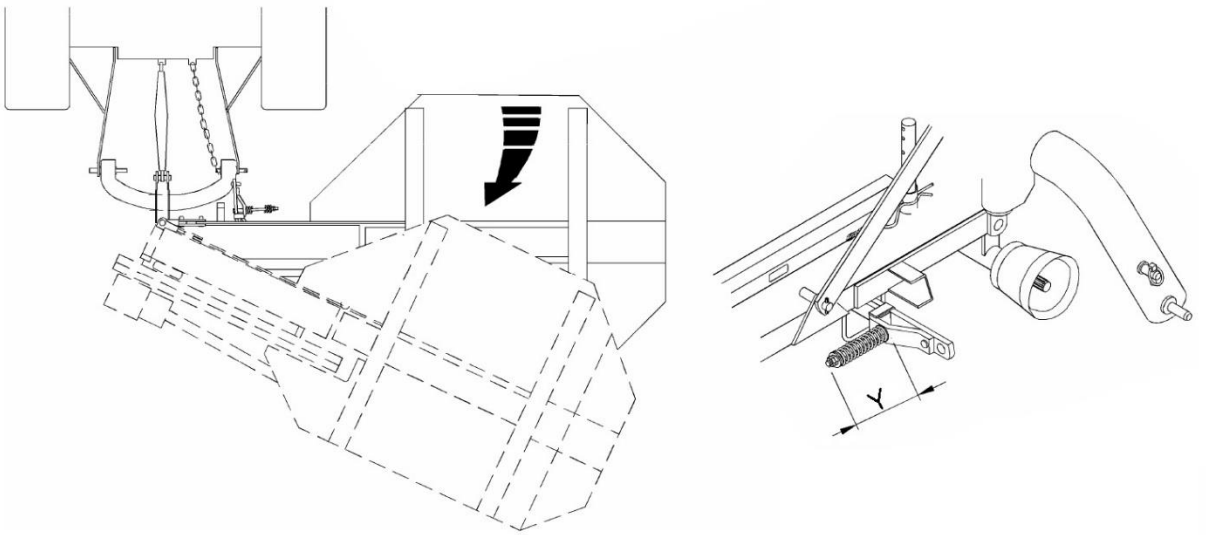


Fig. 13. Operation of safety device preventing machine damage.

6.8. Rest position

In rest position, the mower is completely disconnected from the tractor linkage. This happens during downtimes or mower storage in after-season period. The mower is moved to rest position from transport position.

Thus, do the following:

- with mower lifted on 3-point linkage lower the support and secure it with split pin,
- lower the mower by supporting it on sliding discs and support,
- detach joint end of tractor upper connector from linkage frame yoke;
- remove ball-and-socket joints of tractor lower links from linkage frame pivots.

6.9. Residual risk description

Despite the fact that manufacturer, assumes responsibility for design and marking of rotary mowers Z-178, Z-178/1, Z-178/2 and Z-178/3 in order to eliminate risks during operation, and also during servicing and maintenance, some risk elements are unavoidable, though. Residual risk results from erroneous or inappropriate behaviour of rotary mower operator. Major source of risk follows these forbidden operations:

- operation without guarding or with damaged or opened guarding,
- mower operation in the presence of unauthorised personnel within 50 m,
- mowing on edges of streets, roads, public squares (parks, schools, estates, etc.) or on stony terrain,
- operation of mower by personnel who are under the influence of alcohol or other abusive substances,
- lifting the mower attached to tractor with drive on and drums rotating,
- transportation of the mower with knives installed,
- approaching rotating machine parts,
- transport of personnel on the mower,
- stay between the mower and tractor with engine running,
- removal of safety guards with engine running,
- transportation of the mower with PTO drive connected,
- use of U-joint shaft without cover or with damaged cover,
- tampering with U-joint shaft during operation,
- exceeding rotational speed by PTO shaft above 600 rpm
- inspection of technical condition when the mower is running,

When describing residual risk, rotary mowers Z-178, Z-178/1, Z-178/2 and Z-178/3 are considered machines which until their production start, have been designed and developed in accordance with the state of the art.

6.10. Residual risk assessment

When following recommendations such as:
- carefully read instruction manual,
- do not operate without guarding or with guards damaged or opened,
- do not allow any person to stay on the mower when in operation and during passages,
- do not operate the mower when any person is within 50 m,
- do not stay between tractor and the mower when the engine is running,
- do not lift the machine when running,
- adjust mower operation only with tractor drive and engine off,
- make sure maintenance and repair works are carried out only by properly trained personnel,
- make sure the mower is operated by personnel who hold adequate qualifications to drive tractors and have read the instruction manual,
- protect the mower from being accessed by children,

residual risk can be eliminated when using rotary mowers Z-178, Z-178/1, Z-178/2 and Z-178/3 without posing any risk to people and environment.

CAUTION!
Residual risk may occur if specified recommendations and instructions are not followed.

7. MOWER SERVICING

7.1. Knife replacement (Fig. 14)

When installing and removing knives from working disc, use safety gloves and special wrench (1) which is basic equipment of the mower.

Knives are installed (removed) (Fig. 14) as follows:

- using gloves grab knife (3) (cutting edge of knife should face downwards),
- insert wrench (1) into gap between working disc (5) and sliding disc (6) so round tongue of the wrench is positioned above knife holder (2),
- pulling the wrench upwards, turn knife holder (4) downwards until its mandrel pulls out from opening in the disc,
- install the knife by putting its opening on holder mandrel and release the wrench.

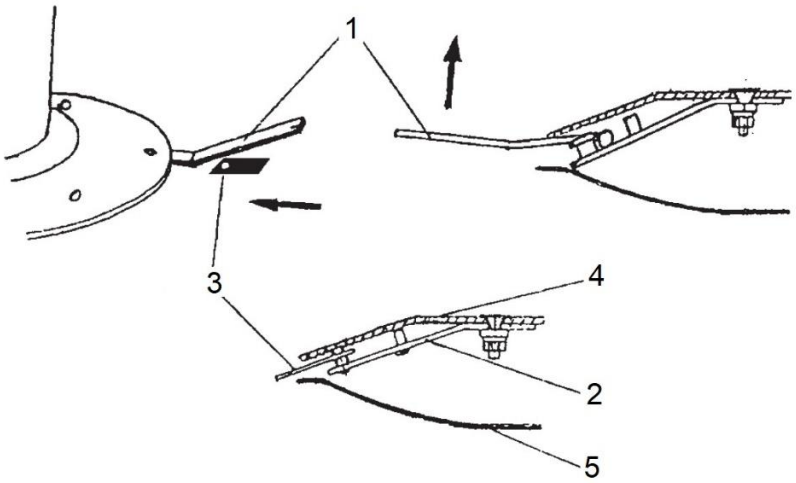


Fig. 14. Installation of knives: 1 - special wrench, 2 - knife holder, 3 - knife, 4 - working disc, 5 - sliding disc.

IMPORTANT!!! *After knife is installed, check if upper plane of holder mandrel is flush with upper edge of opening in the disc, and mandrel is centred in relation to the opening. Failure to keep this condition means incorrect installation or leaving damaged knife installed or wear condition of the mandrel or deformation of (spring) plate of the holder – which may cause dangerous loss (throwing) of knife during operation.*

***NOTE!!!** Damage or wear of at least one knife makes it necessary to replace the whole set of knives as only then working drum will be balanced. **Use approved knives only.** Knifes worn on one side (with only one blunt edge) can be installed again on adjacent disc (with opposite rotation direction) provided they are not damaged and have the same weight.*

Worn or damaged (broken, deformed) holders and knives must be replaced. Recovery of knives and holders using any methods, is forbidden. Limit wear of holder mandrel head (reduction in diameter in knife mounting point) up to 25% is acceptable. Holder with loose mandrel mounting in the plate, should be replaced.

When replacing holders (knives), pay attention to their position in relation to each other (alternating) on each disc. Correct installation of holders (knives) is presented in Fig. 15.

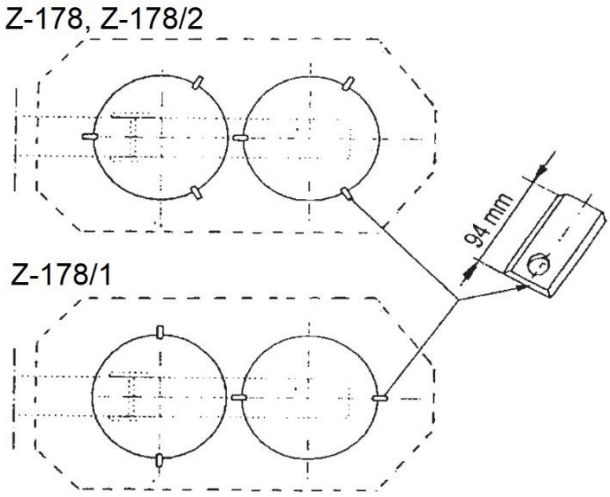


Fig. 15. Correct alternating installation of holders (knives) on working discs

7.2. Tightening V-belts

The mower is equipped with spring V-belt tensioner which is fitted with spring tensioning indicator (3) (Fig. 16). Belts are properly tensioned if gap between indicator (3) and tensioner bracket surface (4) (dimension S) is 0.5 - 3 mm. In case of damage or elongation of at least one belt (in order to keep equal length) always replace the whole set of belts (all pcs with the same dimension marking and trademark).

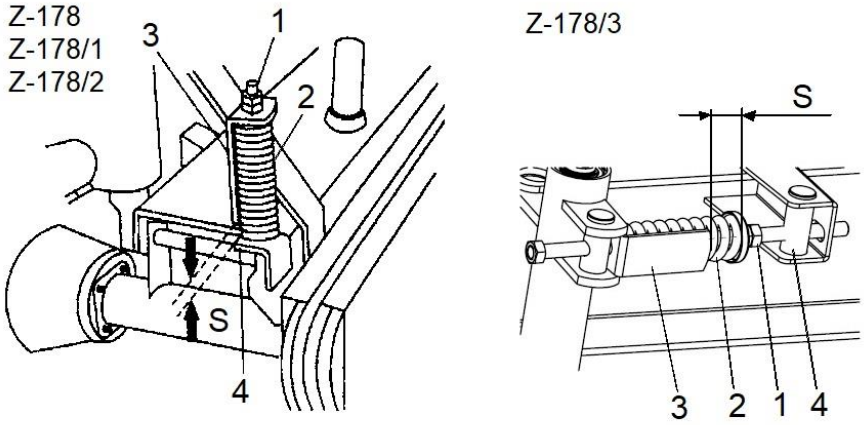


Fig. 16. V-belt tightener: 1 - adjustment nuts, 2 - tightener spring, 3 - tightener indicator bar, 4 - tightener bracket, S (dimension) = 0.5-3 mm.

7.3. Daily maintenance

Daily after the work is complete, clean the mower from plant residues and dirt and check its technical condition:

- inspect external visible parts and assemblies and their connections,
- tighten all loose screw connections and replace worn or damaged parts with original spare parts,
- pay special attention to the condition of cutting unit, replace worn or damaged knives and holders in sets,
- check tightening of V-belts,
- lubricate in accordance with lubrication instructions for the mower and U-joint shaft.

7.4. After-season maintenance

After the agricultural season:

- clean the mower thoroughly of any soiling and wash,
- carry out detailed technical inspection of individual parts and assemblies,
- replace any worn or damaged parts,
- loosen V-belts,
- carry out the mower maintenance,
  - touch up any areas with damaged painting;
  - clean working surfaces of parts with wearable coating (linkage frame pivots, working and sliding discs) and coat them with enamel or anti-corrosion agent (temporary protection), e.g. “Akorin N” or “Korplast C”,
- replace oil in gear box (main frame) and lubricate in accordance with lubrication instructions.

7.5. Lubricating instructions

To keep long-lasting and defect-free operation of the mower make sure to lubricate it in regular intervals and using the right method.

Gear box

- every 10-15 working hours check grease level through vent hole (using clean dipstick). Correct grease level should be 50-60 mm from the bottom of gear box. In case if grease level is reduced, first remove the cause of leakage and then fill up. Grease volume in gear box: Z-178 - 8÷10 dm^3; Z-178/1 - 6÷8 dm^3; Z-178/2 - 10÷12 dm3; Z-178/3 - 12÷14 dm^3,
- make sure to replace grease after each agricultural season.

REMEMBER!!! *For gear box use “EPX00” grease. Do not mix various grease grades and use grease of viscosity lower than recommended. When replacing oil pay attention to clean contact surface between cover and welded wrench and to apply fresh silicone sealant 350°C.*

Central beam joints – lubricate every season, using “STP” grease

NOTE!!! *Use and lubricate U-joint shaft strictly as recommended in the instruction manual delivered by manufacturer of the shaft.*

8. STORAGE

Store the mower in dry, hardened and roofed area, with limited access of personnel and animals.

Storage in open air is acceptable. In such case the mower is exposed to weather conditions. Therefore, periodic inspection and possible refilling, maintenance and lubrication is required (see: After-season maintenance).

Check stability of the mower after it is placed in the storage area. Placing the mower on a soft and (or) uneven ground may affect its stability (possibility of overturning) when stored.

9. ASSEMBLING MOWER

The manufacturer delivers mower Z-178 in complete condition, with cutting unit cover removed.

User (purchaser) of the mower is responsible for installation of cutting unit cover.

WARNING!!! *Operation without installed cutting unit cover or with damaged cover or safety curtain lifted, is forbidden.*

Mount safety curtain with its two frames (left and right) to the mower as follows (Fig. 17):

- unscrew bolt (1) fixing tension member (2) to main frame (8), and then raise tension member,
- using three bolts (4) fix safety curtain right frame (5) to cover (6) and if necessary, beam with lighting holders (14) (optional equipment),
- slide left frame (3) on frame connectors (5) and fix frame (3) using two bolts (4) to cover (6),
- insert tension member (2) through opening and install safety curtain (7) on both frames (right and left). Fix safety curtain to frames using cord (11). Insert the cord through the opening, encircle frame tube and pull out through the same opening, as illustrated in Fig. 17,
- screw the end of tension member (2) back to main frame using bolt (1),
- fix side guard (9) to central beam (12) using two bolts (10).

Mount sheet-metal guard with safety curtains to the mower as shown in Fig. K7 and K8 (refer to Parts catalogue).

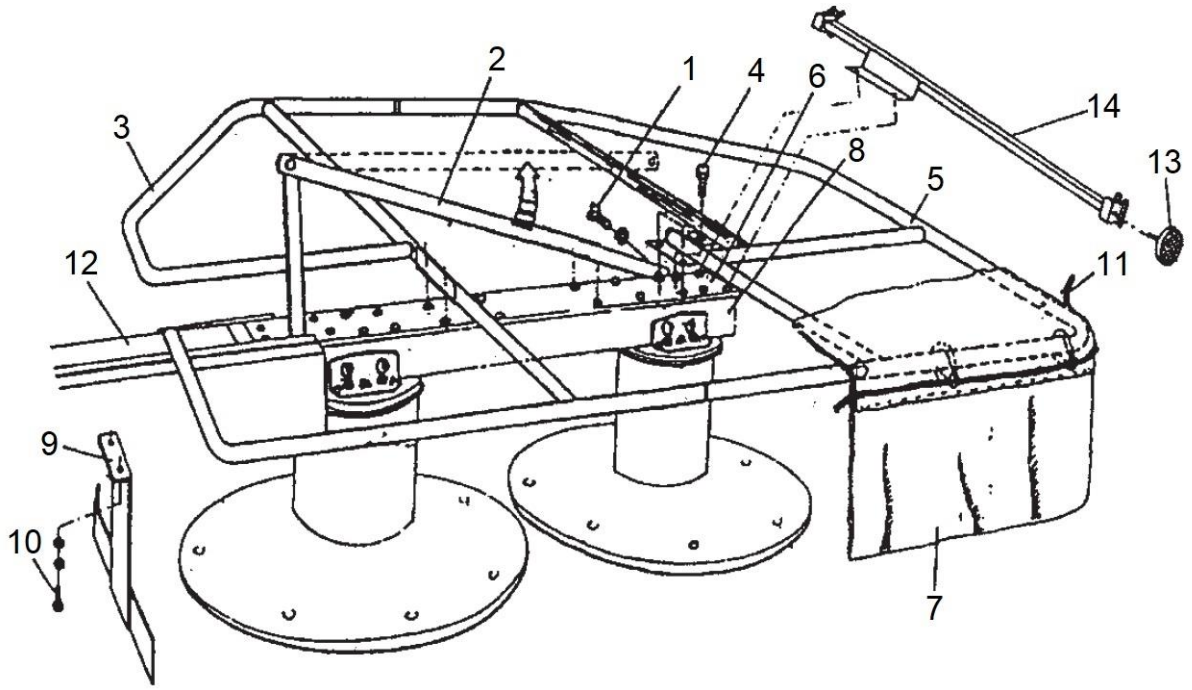


Fig. 17. Installing safety curtain: 1 - bolt M10x30, 2 - tension member, 3 - left safety curtain frame, 4 - bolt M10x25, 5 - right safety curtain frame, 6 - cover, 7 - safety curtain, 8 - main frame, 9 - side guard, 10 - bolt M8x25, 11 - cord, 12 - central beam (frame), 13 - reflector, 14 - beam with lighting holders.

10. INFORMATION ON DEFECTS AND MALFUNCTIONS

DEFECTS	CAUSE	SOLUTION
Mower does not cut grass.	Worn knives. Loose V-belts.	Replace knives. Tighten V-belts.
Mower gets hot and starts operating loudly.	No oil in gear box.	Refill oil.
Mower vibrates excessively.	No holder or knife.	Install holder or knife.
Mower operates despite power input connection is off.	Worn overrunning clutch.	Replace large pulley.
Excessive inter-tooth clearance.	Worn gear wheels.	Adjust using spacers.
Mower loses knives.	Worn knife holders.	Replace holders.

11. SPECIFICATION

Operational data for mower Z-178, Z-178/1, Z-178/2 and Z-178/3 is given in Table 2.

Table 2. Operational data

No.	Technical parameters	Unit of measure	Mower data			
1.	Model according to KTM	-	Z-178	Z-178/1	Z-178/2	Z-178/3
2.	Mower type		Rear rotary			
3.	Working width	m	1.65	1.35	1.85	2.10
4.	Power demand	kW	up to 22	up to 18	up to 35	up to 56
5.	Number of working drums	pcs	2			
6.	Working disc dimension	m	0.78	0.63	0.90	1.01
7.	Number of knives	pcs	6	4	6	12
8.	Mowing height	mm	32/40/44 (1)			
9.	Drum rotating speed	rpm	2050	2350	1900	1600
10.	Rotational speed, PTO	rpm	540			
11.	Mower dimensions (working/transport position):					
	• length	m	1.69/3.28	1.58/2.86	2.00/3.40	2.00/2.35
	• width	m	3.32/1.91	2.85/1.58	3.60/2.00	4.10/1.80
	• height	m	1.22/1.56	1.26/1.55	1.25/1.60	1.25/2.40
12.	Working speed	km/h	up to 12			
13.	Working capacity	ha/h	up to 1.4	up to 1.0	up to 1.8	up to 2.4
14.	Number of operators	-	1			
15.	Transport speed	km/h	up to 15			
16.	Transport clearance	m	0.25 - 0.40			
17.	Energy source:					
	• tractor class		0.9 9	0.6 6	0.9 9	
	• towed weight	kN	9	6	9	14
18.	U-joint shaft:		1 (6-spline shaft ends)			**With one-way clutch!!!**
	• type: (acc. to tractor PTO)	-	540 rpm)			
	• symbol		7103056CE007007 (acc. to Bondioli & Pavesi)			7143-066-CE-007-096
	• capacity (series)		100			
	• nominal torque	Nm	390			540
	• nominal transferred power	kW	22			
	• nominal length of shaft (retracted) (2)	mm	560			
	• shaft marking	“	use shaft marked with safety “B” mark			
19.	Machine weight	kg	365	310	470	690

1) manufacturer assembles mower for mowing height of about 32 mm
2) measured between axes of cross-pieces

12. DISASSEMBLY, WITHDRAWAL FROM USE AND ENVIRONMENTAL PROTECTION

During disassembly (repair) keep general precautions for workshop works.

Protect hands (body) from getting wounded and affected by grease and oil. Use safety gloves and tools in good technical condition.

Do not leave worn or used parts after repair (withdrawal from use) on field or farmyard. They should be stored in a separate place (with limited access of personnel or animals) and regularly delivered to scrap yards.

When refilling (replacing) grease, do not allow its spilling. Used grease should be stored in leak-tight tanks (e.g. empty fresh grease tanks) and periodically delivered to petrol stations where tanks are collected.

Left machine parts or elements, spilled grease, may cause an accident or natural environment pollution and infringe regulations in force.

13. NOTES

14. SPARE PARTS CATALOGUE

Parts ordering procedure

In each order sent to the manufacturer or points of sale, make sure to give the following data:

- full address of purchaser,
- full shipping address (destination of ordered parts),
- manufacturer's number and year of manufacture of mower,
- exact name of part,
- reference number of part (given in catalogue charts),
- number of pieces of ordered part,

For each order, payment terms of the delivery should be arranged with the manufacturer or point of sale of mowers.

The following is possible:

- direct receipt of parts,
- cash-on-delivery by courier company (small parts),
- delivery through a shipping company (large parts or assemblies).

The manufacturer reserves the right to make design changes of parts given in each assembly drawing in parts catalogue. It may be impossible to update such changes in instruction manual and parts catalogue on regular basis.

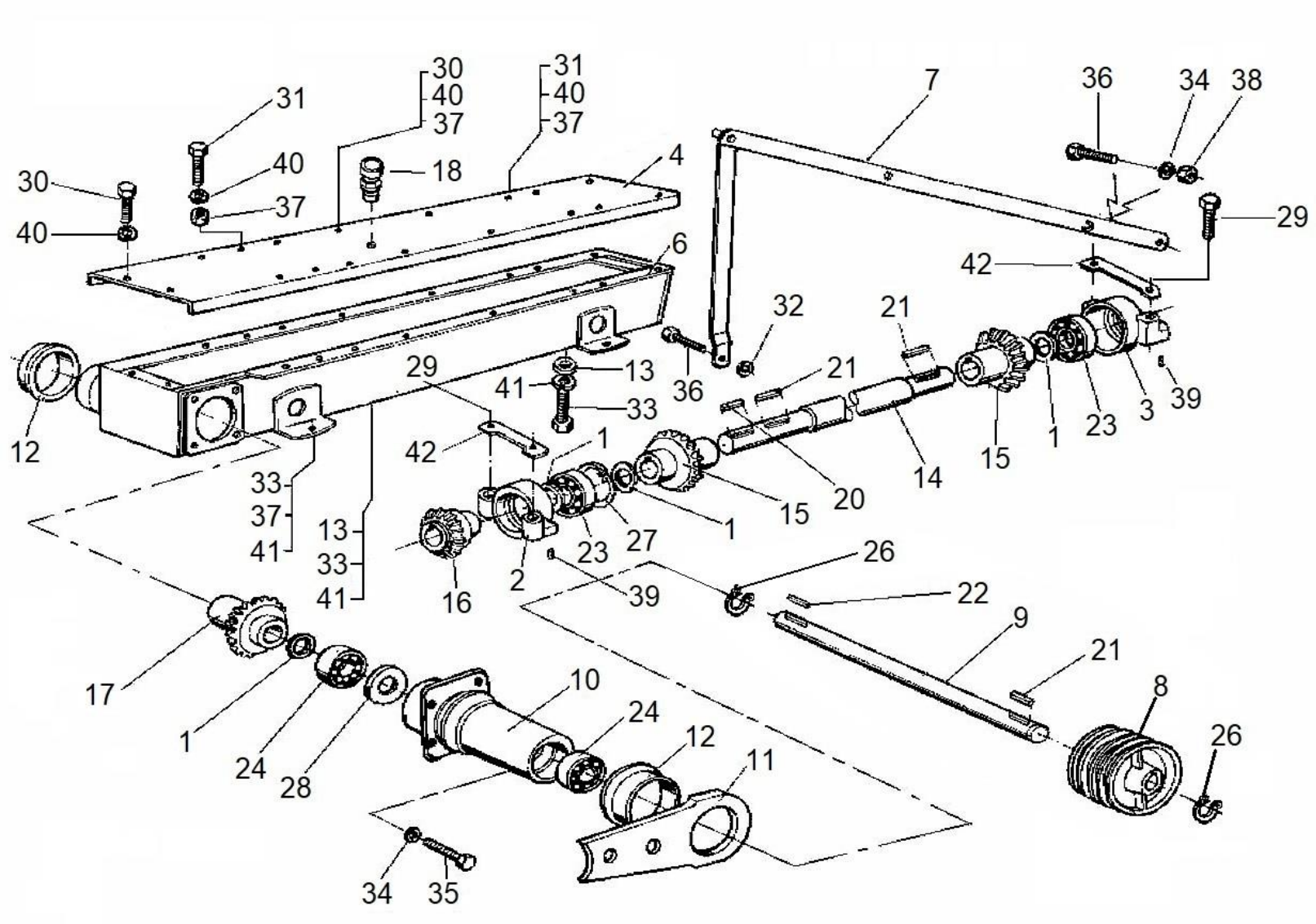


Figure K1. Main frame body and cutting unit drive.

Item no. in Fig.	Part name	Part number or standard	Quantity				Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/3** 2,10 m	
	Inner drive shaft, set (poz. 8, 9, 10, 11, 12, 21, 22, 24, 26, 28)	5-041-010-248	1	-	-	-	
		5-041-010-248/2	-	1	-	-	
		5-041-010-076	-	-	1	-	
		5-041-010-248/3	-	-	-	1	
1	Shim Ø25 x Ø35 x 0,1	5-178-010-098	as needed				
	Shim Ø25 x Ø35 x 0,3	5-178-010-105					
	Shim Ø25 x Ø35 x 0,5	5-178-010-118					
	Shim Ø25 x Ø35 x 1,0	5-178-010-120					
2	Left bearing housing	5-178-010-187	1	-	1	-	
		5-178-010-187/2	-	1	-	1	
3	Right bearing housing	5-178-010-190	1	-	1	-	
		5-178-010-190/2	-	1	-	1	
4	Welded cover	5-178-010-658	1	-	-	-	
		5-178-010-658/2	-	1	-	-	
		5-178-010-048	-	-	1	-	
		5-178-010-658/3				1	
6	Welded main frame	5-178-010-645	1	-	-	-	
		5-178-010-645/2	-	1	-	-	
		5-178-010-063	-	-	1	-	
		5-178-010-645/3				1	
7	Shackle, set	5-178-010-235	1	-	-	-	
		5-178-010-235/2	-	1	-	-	
		5-178-010-124	-	-	1	-	
		5-178-010-235/3				1	
8	Pulley, small	5-178-010-250	1	-	-	-	
		5-178-010-250/2	-	1	-	-	
		5-178-010-089	-	-	1	-	
		5-178-010-250/3				1	
9	Drive shaft	5-178-010-263	1	-	-	-	
		5-178-010-263/2	-	1	-	-	
		5-178-010-263/1	-	-	1	-	
		5-178-010-263/3				1	

Table 1. Main frame body and cutting unit drive.

Item no. in Fig.	Part name	Part number or standard	Quantity				Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/3** 2,10 m	
10	Hub	5-178-010-276	1	-	1	-	
		5-178-010-276/2	-	1	-	1	
11	Back plate	5-178-010-289	1	-	1	-	
		5-178-010-091	-	1	-	1	
12	Support sleeve	5-178-010-291	2	2	2	2	
13	Sealing sleeve	5-178-010-337	8	4	8	4	
14	Inner drive shaft	5-178-010-352	1	-	-	-	
		5-178-010-352/2	-	1	-	-	
		5-178-010-213	-	-	1	-	
		5-178-010-352/3	-	-	-	1	
15	Gear wheel, big	5-178-010-673	2	-	2	-	
		5-178-010-673/2	-	2	-	-	
		5-178-010-673/3	-	-	-	2	
16	Gear wheel, small	5-178-010-660	1	-	1	-	
		5-178-010-660/2	-	1	-	-	
		5-178-010-660/3	-	-	-	1	
17	Drive gear	5-178-010-673/K	1	-	-	-	
		5-178-010-673/2	-	1	-	-	
		5-178-010-673/1	-	-	1	-	
		5-178-010-673/3	-	-	-	1	
18	Plug	5-178-010-441	1	1	1	1	
20	Parallel key A8x7x36	5-178-010-597	1	1	1	1	
21	Parallel key A8x7x50	5-178-010-604	3	3	3	2	
	Parallel key A8x7x70	5-178-010-604/3	-	-	-	1	
22	Parallel key A8x7x36	5-178-010-597	1	-	-	-	
	Parallel key A8x7x50	5-178-010-604	-	1	1	1	
23	Ball bearing 6305	PN-85/M-86100	2	-	2	-	
	Ball bearing 6206	PN-85/M-86100	-	3	-	3	
24	Ball bearing 6305-2Z-C3	PN-85/M-86100	2	-	2	-	
	Ball bearing 6206-2Z-C3	PN-85/M-86100	-	3	-	3	
26	Spring retaining ring Z25	PN-81/M-85111	2	-	2	-	
	Spring retaining ring Z30	PN-81/M-85111	-	2	-	2	

Table 1. continued.

Item no. in Fig.	Part name	Part number or standard	Quantity				Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/3** 2,10 m	
27	Spring retaining ring W62	PN-81/M-85111	1	2	1	2	
28	Sealing ring A25x52x10	PN-72/M-86964	1	-	1	-	
	Sealing ring A30x52x10	PN-72/M-86964	-	1	-	1	
29	Bolt M10x60-8.8-B	PN-85/M-82101	4	8	4	8	
30	Bolt M10x20-8.8-B-Fe/Zn8c	PN-85/M-82105	14	16	10	18	
31	Bolt M10x25-8.8-B-Fe/Zn8c	PN-85/M-82105	8	8	8	8	
32	Spring washer 12,2Fe/Zn9	PN-77/M-82008	1	-	1	-	
	Spring washer 14,2Fe/Zn9	PN-77/M-82008	-	1	-	1	
33	Bolt M10x35-8.8-B-Fe/Zn8c	PN-85/M-82105	12	12	12	12	
34	Spring washer 12,2Fe/Zn9	PN-77/M-82008	5	5	5	5	
36	Bolt M12x30-8.8-B-Fe/Zn8c	PN-85/M-82105	1	-	1	-	
	Bolt M14x30-8.8-B-Fe/Zn8c	PN-85/M-82105	-	1	-	1	
37	Nut M10-8-B-Fe/Zn8c	PN-86/M-82144	26	28	22	30	
38	Nut M12-8-B-Fe/Zn8c	PN-86/M-82144	1	1	1	1	
39	Retaining pin Ø6x16	PN 85021	4	4	4	4	
40	Washer 10,4-Fe/Zn9	PN-77/M-82008	22	24	18	26	
41	Spring washer 10,2Fe/Zn9	PN-78/M-82005	12	12	12	12	
42	Two-hole bent washer	5-178-010-632	2	4	2	4	

Table 1. continued.

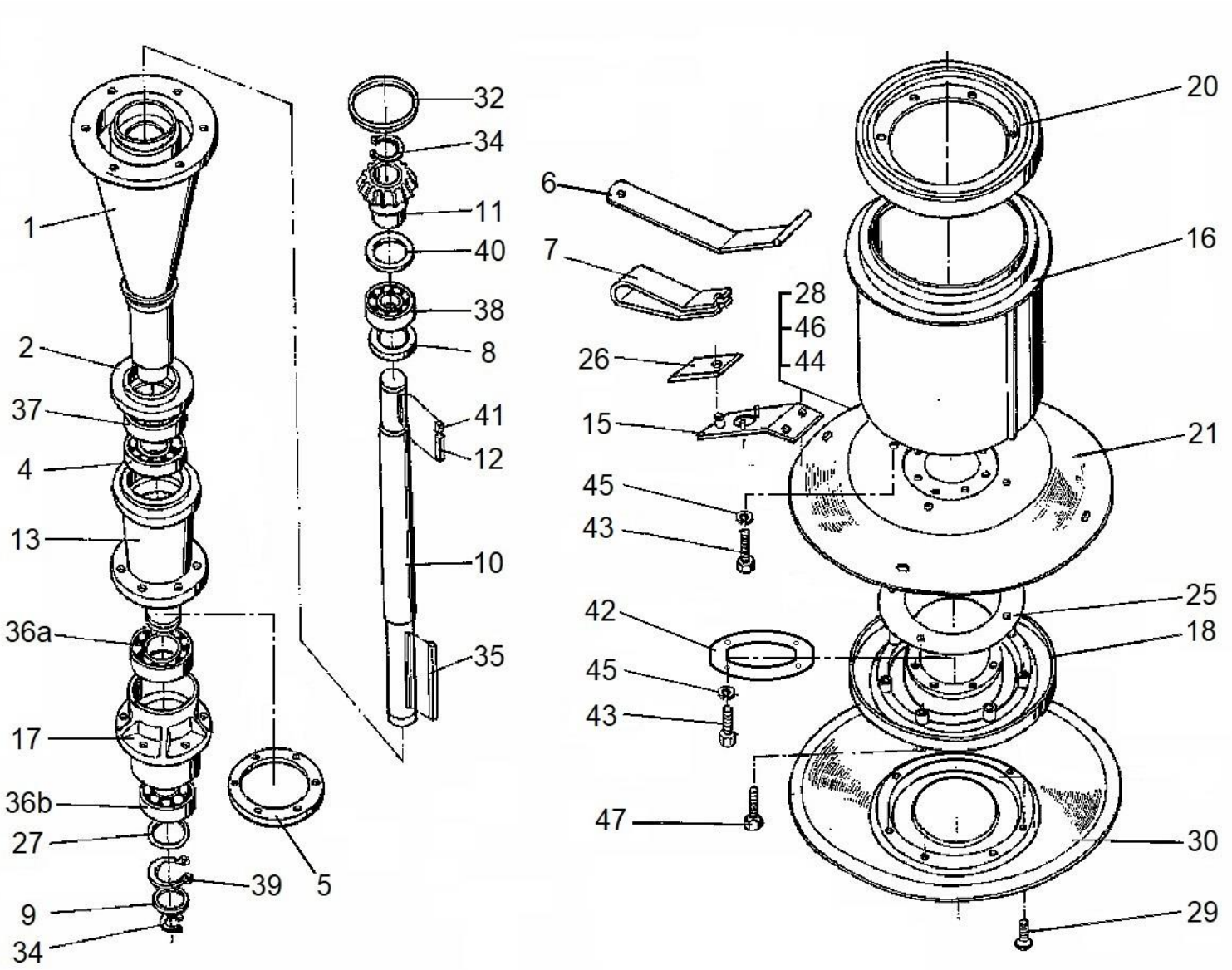


Figure K2. Cutting unit and bearings.

Item no. in Fig.	Part name	Part number or standard	Quantity				Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/3** 2,10 m	
	Drum bearings (item. 1, 2, 4, 8, 9, 10, 11, 12, 13, 34, 35, 36a, 36b, 37, 38, 40, 41)	5-178-010-788	2	2	2	2	
1	Drum hub	5-178-010-747	2	2	2	1	
2	Spacer guard	5-178-010-031	2	2	2	2	
4	Ball bearing 6209ZZ or 2RS	PN-85/M-86100	2	2	2	2	
5	Spacer ring	5-178-000-046	2	2	2	2	Use for 40 or 44 mm mowing
6	Welded wrench	5-178-000-059	1	1	1	1	
7	Mounting pliers	5-178-000-061	1	1	1	1	Optional equipment
8	Shim Ø50 x Ø62 x 0,1	5-178-010-057	as needed				
	Shim Ø50 x Ø62 x 0,3	5-178-010-060					
	Shim Ø50 x Ø62 x 0,5	5-178-010-072					
	Shim Ø50 x Ø62 x 1,0	5-178-010-085					
9	Shim Ø25 x Ø35 x 0,1	5-178-010-098	as needed				
	Shim Ø25 x Ø35 x 0,3	5-178-010-105					
	Shim Ø25 x Ø35 x 0,5	5-178-010-118					
	Shim Ø25 x Ø35 x 1,0	5-178-010-120					
10	Drive shaft	5-178-010-617	2	2	2	2	
11	Gear wheel, small	5-178-020-666	2	-	2	-	
		5-178-020-666/2	-	2	-	-	
		5-178-020-666/3	-	-	-	2	
12	Parallel key	5-178-010-156	2	2	2	2	
13	Working wheel hub	5-178-010-790	2	2	2	-	
		5-178-010-790/3	-	-	-	2	
15	Knife holder complete	5-178-010-309	6	6	-	12	
		5-178-010-109	-	-	4	-	
16	Drum cover complete	5-178-010-721	2	2	2	2	
17	Sliding disc hub	5-178-010-775	2	2	-	2	
		5-178-010-775/1	-	-	2	-	
18	Resistance disc complete	5-178-010-340	2	-	2	-	
		5-178-010-340/2	-	2	-	-	
		5-178-010-340/3	-	-	-	2	
20	Drum cover	5-178-010-365	2	2	2	20	

Table 2. Cutting unit and bearings.

Item no. in Fig.	Part name	Part number or standard	Quantity				Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/3** 2,10 m	
21	Working disc	5-178-010-378	2	-	-	-	
		5-178-010-378/2	-	2	-	-	
		5-178-010-193	-	-	2	-	
		5-178-010-378/3	-	-	-	2	
25	Cover	5-176-010-439	2	2	2		
26	Knife	5-178-010-454	12	12	8	24	
27	Shim Ø45 x Ø55 x 0,1	5-178-010-467	as needed				
	Shim Ø45 x Ø55 x 0,3	5-178-010-470					
	Shim Ø45 x Ø55 x 0,5	5-178-010-482					
	Shim Ø45 x Ø55 x 1,0	5-178-010-495					
28	Lock bolt M12x25 10.9	5-178-010-502	12	12	-	24	
29	Countersunk head bolt M12x25	5-178-010-515	12	12	12	12	
30	Sliding disc complete	5-178-010-528	2	-	-	-	
		5-178-010-528/2	-	2	-	-	
		5-178-010-200	-	-	2	-	
		5-178-010-528/3	-	-	-	2	
32	Sealing ring round Ø70 x Ø4	5-178-010-543	2	2	2	2	
34	Spring retaining ring Z25	PN-81/M-85111	4	4	4	4	
35	Parallel key A8x7x80	5-178-010-584	2	2	2	2	
36a	Ball bearing 6210-Z-C3	PN-85/M-86100	2	2	2	2	
36b	Ball bearing 6209-Z-C3	PN-85/M-86100	2	2	2	2	
37	Ball bearing 6210-2Z-C3	PN-85/M-86100	2	2	2	2	
38	Ball bearing 6305-ZZ lub 2RS	PN-85/M-86100	2	2	2	2	
39	Spring retaining ring Z45	PN-81/M-85111	2	2	2	2	
40	Sealing ring B40x62x10	PN-72/M-86965	2	2	2	2	
41	Felt seal 5x8x12	PN-77/M-86012	2	2	2	2	
42	Pressure ring	5-178-010-812	2	2	2	-	
		5-178-010-812/3	-	-	-	2	
43	Bolt M10x30-8.8-B-Fe/Zn8c	PN-85/M-82105	16	16	-	20	
	Bolt M10x35-8.8-B-Fe/Zn8c	PN-85/M-82105	-	-	16	-	
44	Nut M12-8-B-Fe/Zn8c	PN-86/M-82144	12	12	-	24	
45	Spring washer 10,2Fe/Zn9	PN-77/M-82008	28	28	28	32	
46	Spring washer 12,2Fe/Zn9	PN-77/M-82008	12	12	-	12	
47	Bolt M10x20-8.8-B-Zn	PN-85/M-82105	12	12	12	12	
	Bolt M10x30-8.8-B-Zn	PN-85/M-82105	12	12	12	12	Use together with dist. ring pos. 5

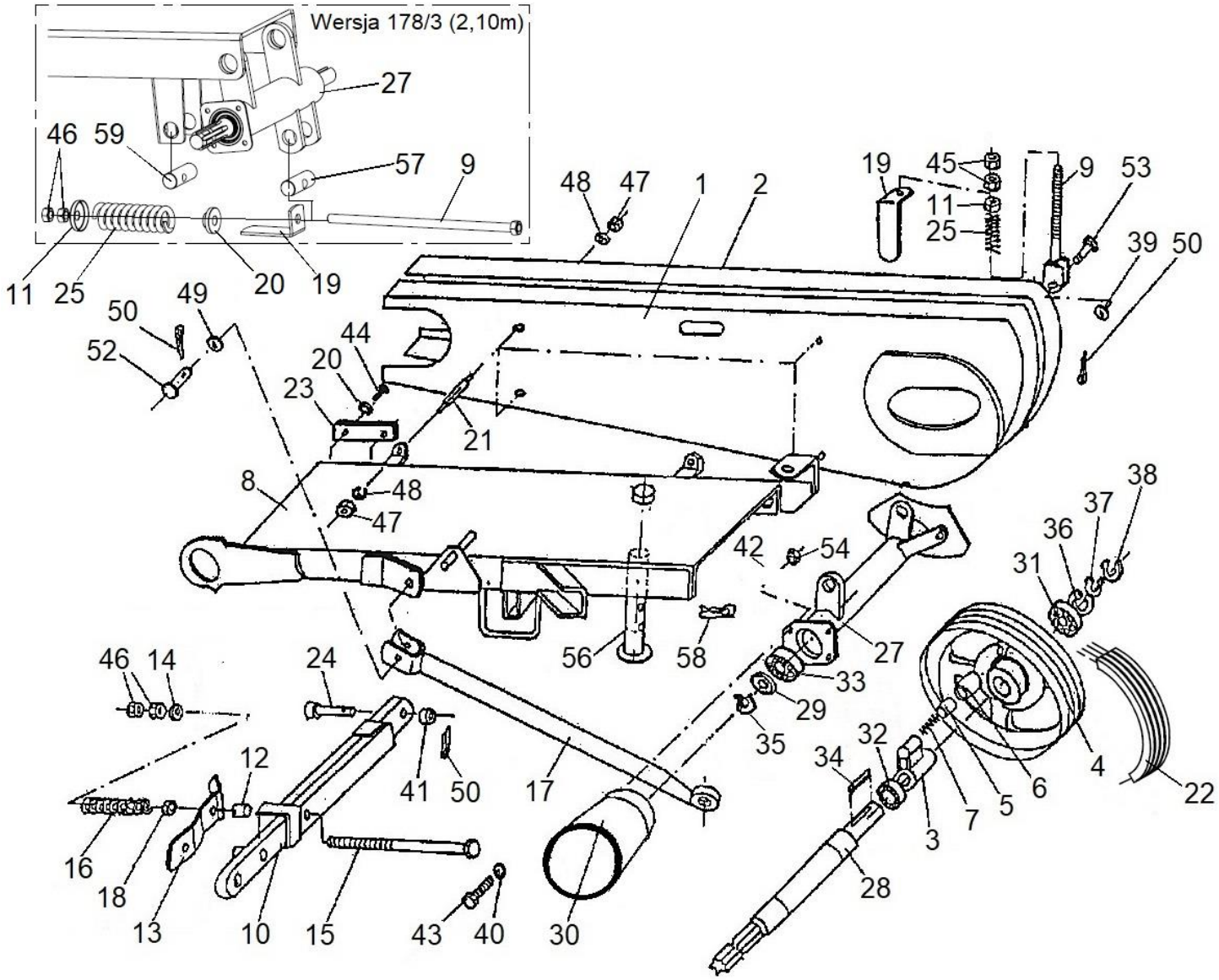


Fig. K3. Drive train and central beam

Item no. in Fig.	Part name	Part number or standard	Quantity						Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/1 (60)** 1,35 m	**Z-178/1 (80)** 1,35 m	**Z-178/3** 2,10 m	
	Wheel with coupling (poz. 3, 4, 5, 6, 7, 31, 36, 37)	5-178-020-160	1	-	-	-	-	-	
		5-178-020-160/2	-	1	-	-	-	-	
		5-178-020-189	-	-	1	1	1	-	
		5-178-020-160/3	-	-	-	-	-	1	
	Safety device, set (poz. 10, 11, 12, 13, 14, 15, 46)	5-178-020-287	1	-	1	1	1	-	
		5-178-020-287/2	-	1	-	-	-	-	
		5-178-020-287/3	-	-	-	-	-	1	
	Driving head (poz. 27, 28, 29, 30, 32, 33, 35, 40, 42, 43, 54)	5-178-020-720	1	-	-	-	-	-	
		5-178-020-720/2	-	1	-	-	-	-	
		5-178-020-720/1	-	-	1	1	1	-	
		5-178-020-720/3	-	-	-	-	-	1	
1	Rear cover, guard set	5-178-020-144	1	-	-	-	-	-	
		5-178-020-144/2	-	1	-	-	-	-	
		5-178-020-280	-	-	1	-	-	-	
		5-178-020-280/60	-	-	-	1	-	-	
		5-178-020-280/80	-	-	-	-	1	-	
		5-178-020-144/3	-	-	-	-	-	1	
2	Front cover, guard set	5-178-020-157	1	-	-	-	-	-	
		5-178-020-157/2	-	1	-	-	-	-	
		5-178-020-293	-	-	1	-	-	-	
		5-178-020-293/60	-	-	-	1	-	-	
		5-178-020-293/80	-	-	-	-	1	-	
		5-178-020-157/3	-	-	-	-	-	1	
3	Key carrier	5-178-020-172	1	-	1	1	1	-	
		5-178-020-172/2	-	1	-	-	-	-	
4	Pulley	5-178-020-185	1	-	-	-	-	-	
		5-178-020-185/2	-	1	-	-	-	-	
		5-178-020-191	-	-	1	1	1	-	
		5-178-020-185/3	-	-	-	-	-	1	
5	Key carrier pin	5-178-020-198	1	1	1	1	1	-	
6	Sleeve	5-178-020-205	1	1	1	1	1	-	
7	Coupling spring	5-178-020-218	1	1	1	1	1	-	

Table 3. Drive train and central beam

Item no. in Fig.	Part name	Part number or standard	Quantity						Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/1 (60)** 1,35 m	**Z-178/1 (80)** 1,35 m	**Z-178/3** 2,10 m	
8	Central beam, set	5-178-020-233	1	-	-	-	-	-	
		5-178-020-233/2	-	1	-	-	-	-	
		5-178-020-237	-	-	1	-	-	-	
		5-178-020-237/60	-	-	-	1	-	-	
		5-178-020-237/80	-	-	-	-	1	-	
		5-178-020-233/3	-	-	-	-	-	1	
9	Tightener bar	5-178-020-246	1	1	1	1	1	-	
		5-178-020-246/3	-	-	-	-	-	1	
10	Welded lock	5-178-020-290	1	-	1	1	1	-	
		5-178-020-290/2	-	1	-	-	-	1	
11	Spring seat	5-178-020-307	1	1	1	1	1	1	
12	Spacer tube	5-178-020-310	1	-	1	1	1	-	
13	Latch	5-178-020-322	1	-	1	1	1	-	
		5-178-020-322/2	-	1	-	-	-	1	
14	Spring seat of safety device	5-178-020-355	1	1	1	1	1	-	
		5-178-020-355/3	-	-	-	-	-	1	
15	Bolt M14x260	5-178-020-348	1	-	1	1	1	-	
16	Safety device spring	5-178-020-350	1	1	1	1	1	-	
		5-178-020-500	-	-	-	-	-	1	
17	Transport beam, set	5-178-020-363	1	1	1	-	-	-	
		5-178-020-363/60	-	-	-	1	-	-	
		5-178-020-363/80	-	-	-	-	1	-	
18	Spring seat of safety device	5-178-020-355/3	-	-	-	-	-	1	
19	Angle piece	5-178-020-409	1	1	1	1	1	-	
		5-178-020-409/3	-	-	-	-	-	1	
20	Spring seat of safety device	5-178-020-307/3	-	-	-	-	-	1	
21	Stud bolt	5-178-020-017	4	-	-	-	-	-	
		5-178-020-017/2	-	4	-	-	-	-	
		5-178-020-020	-	-	4	4	4	-	
		5-178-020-017/3	-	-	-	-	-	4	

Table 3. continued.

Item no. in Fig.	Part name	Part number or standard	Quantity						Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/1 (60)** 1,35 m	**Z-178/1 (80)** 1,35 m	**Z-178/3** 2,10 m	
22	V-belt SPA 2932	5-178-020-452	4	-	-	-	-	-	
	V-belt SPA 3150	5-178-020-452/2	-	4	-	-	-	-	
	V-belt SPA 2832	5-178-020-185	-	-	3	-	-	-	
	V-belt SPA 2120	5-178-020-185/60	-	-	-	3	-	-	
	V-belt SPA 2482	5-178-020-185/80	-	-	-	-	3	-	
	V-belt SPA 3650	5-178-020-452/3	-	-	-	-	-	4	
23	Cover plate	5-178-020-465	1	1	1	1	1	1	
24	Pin Ø18x60	5-178-020-478	1	1	1	1	1	1	
25	Tightener spring	5-178-020-500	1	-	1	1	1	-	
		5-178-020-500/2	-	1	-	-	-	1	
27	Driving head tube, set	5-178-020-684	1	-	1	1	1	-	
		5-178-020-684/2	-	1	-	-	-	-	
		5-178-020-684/3	-	-	-	-	-	1	
28	Head shaft	5-178-020-602	1	-	1	1	1	-	
		5-178-020-602/2	-	1	-	-	-	-	
		5-178-020-602/3	-	-	-	-	-	1	
29	Sealing ring	5-178-020-615	1	1	1	1	1	1	
30	Plastic guard	21903	1	1	1	1	1	1	
31	Ball bearing 6009-2RS	PN-85/M-86100	1	2	1	1	1	-	
	Ball bearing 6207-2RS	PN-85/M-86100	-	-	-	-	-	2	
32	Ball bearing 6206-2RS	PN-85/M-86100	1	2	1	1	1	-	
33	Ball bearing 6007-2RS	PN-85/M-86100	1	2	1	1	1	-	
	Ball bearing 6207-2RS	PN-85/M-86100	-	-	-	-	-	1	
34	Parallel key A8x7x56	PN-70/M-85005	1	1	1	1	1	-	
	Parallel key A10x9x65	PN-70/M-85005	-	-	-	-	-	1	
35	Spring retaining ring Z35	PN-81/M-85111	1	1	1	1	1	1	
36	Spring retaining ring W75	PN-81/M-85111	1	1	1	1	1	-	
37	Spring retaining ring Z45	PN-81/M-85111	1	1	1	1	1	-	
38	Spring retaining ring Z30	PN-81/M-85111	1	1	1	1	1	-	
	Spring retaining ring Z35	PN-81/M-85111	-	-	-	-	-	1	
39	Washer 17	PN-78/M-82006	1	1	1	1	1	-	

Table 3. continued.

Item no. in Fig.	Part name	Part number or standard	Quantity						Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/1 (60)** 1,35 m	**Z-178/1 (80)** 1,35 m	**Z-178/3** 2,10 m	
40	Widened washer M8	PN-M-82030	4	4	4	4	4	4	
41	Washer 18	PN-78/M-82005	2	2	2	2	2	1	
42	Spring washer 8,2-Fe/Zn9	PN-77/M-82008	4	4	4	4	4	4	
43	Bolt M8x20-5.6-B-Fe/Zn8C	PN-85/M-82105	4	4	4	4	4	4	
44	Bolt M12x30-8.8-B-Fe/Zn8C	PN-85/M-82105	2	2	2	2	2	2	
45	Nut M16-8-B-Fe/Zn8C	PN-86/M-82144	2	2	2	2	2	-	
46	Nut M14-8-B-Fe/Zn8C	PN-86/M-82144	2	-	2	2	2	-	
	Nut M16-8-B-Fe/Zn8C	PN-86/M-82144	-	2	-	-	-	2	
47	Nut M10-8-B-Fe/Zn8C	PN-86/M-82144	8	8	8	8	8	8	
48	Spring washer 10,2-Fe/Zn9	PN-77/M-82008	4	4	4	4	4	4	
49	Spring washer 12,2-Fe/Zn9	PN-77/M-82008	2	2	2	2	2	2	
50	Split pin S-Zn Ø5x28	PN-76/M-82001	3	3	3	3	3	1	
52	Pin Ø18x45	5-178-020-821	1	1	1	1	1	-	
53	Pin Ø16x40	5-178-020-822	1	1	1	1	1	-	
54	Nut M8-6-B-Fe/Zn8C	PN-86/M-82144	4	4	4	4	4	4	
55	U-joint shaft	7103056CE007007	1	1	1	1	1	-	Optional equipment
		7143-066-CE-007-096	-	-	-	-	-	1	Optional equipment
56	Support	5-178-020-760	1	-	1	1	1	-	
		5-178-020-760/2	-	1	-	-	-	1	
57	Pin Ø30	5-178-020-823	-	-	-	-	-	1	
58	Split cotter	5-178-020-289	1	1	1	1	1	1	
59	Pin Ø30 with inner thread	5-178-020-824	-	-	-	-	-	1	

Table 3. continued.

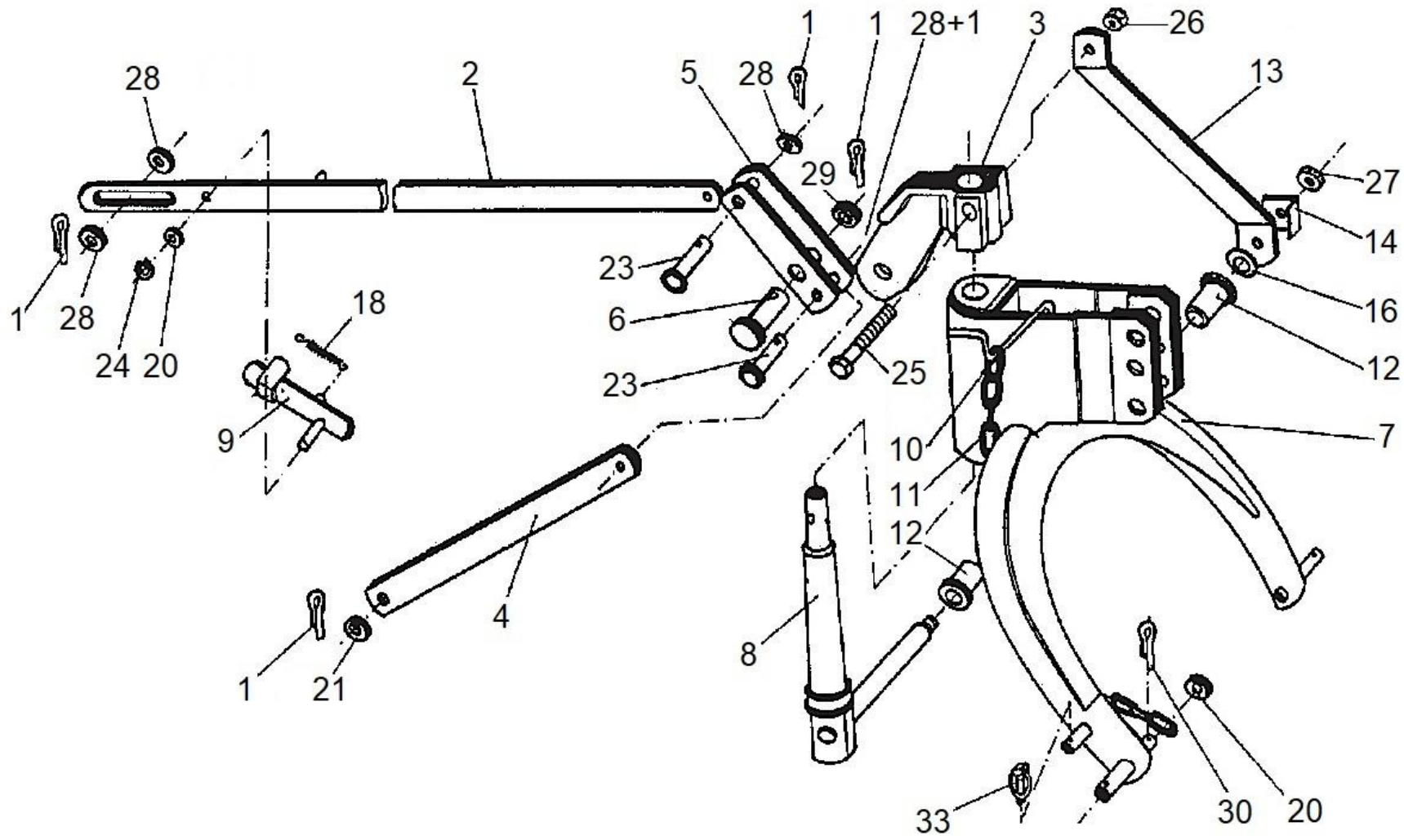


Figure K4. Linkage.

Item no. in Fig.	Part name	Part number or standard	Quantity						Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/1 (60)** 1,35 m	**Z-178/1 (80)** 1,35 m	**Z-178/3** 2,10 m	
	Bar linkage (poz. 2, 3, 4, 5, 6, 23, 28, 29, 30, 31)	5-178-020-068	1	-	-	-	-	-	
		5-178-020-068/2	-	1	-	-	-	-	
		5,178-020-240	-	-	1	-	-	-	
		5,178-020-240/60	-	-	-	1	-	-	
		5,178-020-240/80	-	-	-	-	1	-	
		5-178-020-068/3	-	-	-	-	-	1	
	Chain with hook (poz. 10, 11)	5-178-020-259	1	1	1	1	1	1	
1	Split pin S-Zn Ø6x40	PN-76/M-82001	5	5	5	5	5	4	
2	Front link, set	5-178-020-070	1	-	-	-	-	-	
		5-178-020-070/2	-	1	-	-	-	-	
		5-178-020-252	-	-	1	-	-	-	
		5-178-020-252/60	-	-	-	1	-	-	
		5-178-020-252/80	-	-	-	-	1	-	
3	Head	5-178-020-083	1	-	1	1	1	-	
		5-178-020-083/2	-	1	-	-	-	-	
		5-178-020-083/3	-	-	-	-	-	1	
4	Rear shackle	5-178-020-096	1	1	1	-	-	-	
		5-178-020-096/1(60)	-	-	-	1	-	-	
		5-178-020-096/1(80)	-	-	-	-	1	-	
5	Front link connector	5-178-020-103	2	2	-	-	-	-	
		5-178-020-103/1	-	-	2	2	2	-	
6	Pin Ø25h9x55	5-178-020-825	1	1	-	-	-	1	
	Pin Ø25h9x50	5-178-020-825/1	-	-	1	1	1	-	
7	Linkage frame, set	5-178-020-656	1	-	1	1	1	-	Round frame
		5-178-020-656/2	-	1	-	-	-	-	Rectangular frame
		5-178-020-656/3	-	-	-	-	-	1	Rectangular frame
8	Pivots	5-178-020-131	1	-	1	1	1	-	
		5-178-020-131/2	-	1	-	-	-	-	
		5-178-020-131/3	-	-	-	-	-	1	
9	Latch, set	5-178-020-220	1	1	1	1	1	-	
10	Hook	5-178-020-261	1	1	1				

Table 4. Linkage

Item no. in Fig.	Part name	Part number or standard	Quantity						Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/1 (60)** 1,35 m	**Z-178/1 (80)** 1,35 m	**Z-178/3** 2,10 m	
11	Chain, set	5-178-020-274	1	1	1	1	1	1	
12	Joint sleeve	5-178-020-389	2	2	2	2	2	-	
		5-178-020-389/2	-	-	-	-	-	2	
13	Shackle	5-178-020-391	1	-	1	1	1	-	
		5-178-020-391/2	-	1	-	-	-	-	
		5-178-020-391/3	-	-	-	-	-	1	
14	Tab washer	5-178-020-424	1	1	1	1	1	1	
16	Washer	5-178-020-480	as needed						
18	Latch spring	5-178-020-526	1	1	1	1	1	-	
20	Washer 17	PN-78/M-82005	2	2	2	2	2	-	
23	Pin Ø22h9x55	5-178-020-826	2	2	-	-	-	1	
	Pin Ø22h9x50	5-178-020-826/1	-	-	2	2	2	-	
24	Spring retaining ring Z16	PN-81/M-85111	1	1	1	1	1	-	
25	Bolt M12x85-8.8-B-Fe/Zn8C	PN-85/M-82101	1	-	1	1	1	-	
	Bolt M14x1,5x100	5-178-020-827	-	1	-	-	-	1	
26	Self-locking nut M12-8-B-Fe/Zn8c	PN-86/M-82175	1	-	1	1	1	-	
	Self-locking nut M14x1,5-8-B-Fe/Zn8c	PN-86/M-82175	-	1	-	-	-	1	
27	Nut M20x1,5-0,6B	PN-85/M-82153	1	1	1	1	1	-	
	Self-locking nut M20x1,5-8-B-Fe/Zn8c	PN-86/M-82175	-	-	-	-	-	1	
28	Washer 22,5	PN-63/M-82004	4	4	4	4	4	2	
29	Washer 25,5	PN-63/M-82004	1	1	1	1	1	1	
30	Split pin S-Zn Ø5x30	PN-76/M-82001	1	1	1	1	1	-	
33	Spring pricker A11x50	5-178-031-045	1	1	1	1	1	1	

Table 4. continued.

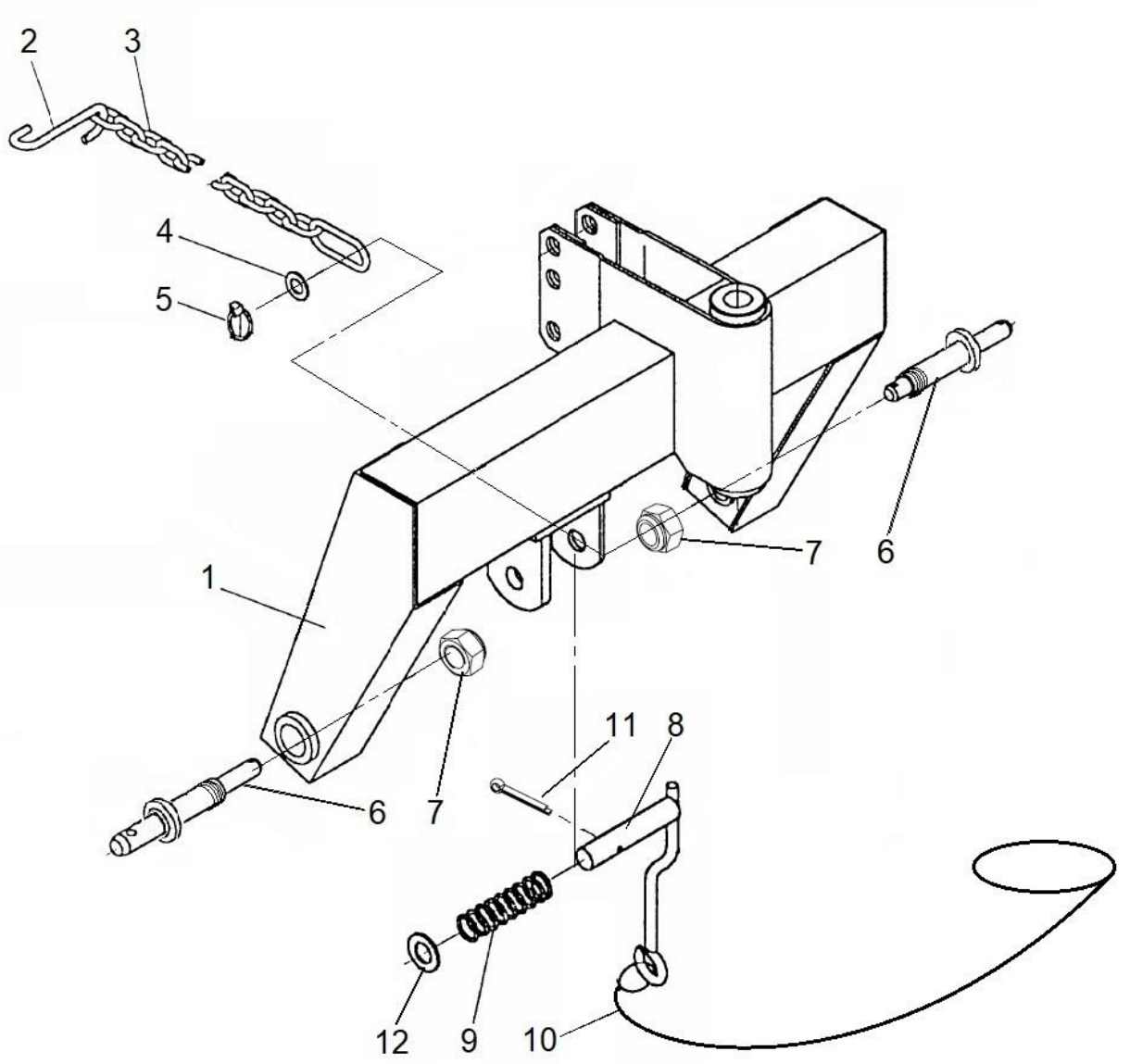


Figure K5. Linkage with replaceable pins.

Item no. in Fig.	Part name	Part number or standard	Quantity					Remarks
			Z-178 1,65 m	**Z-178 (Pr)** 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/3** 2,10 m	
1	Linkage frame, set	5-178-020-656/1	1	-	-	1	-	Round frame
		5-178-020-656/4	-	1	-	-	-	Rectangular frame
		5-178-020-656/2	-	-	1	-	-	Rectangular frame
		5-178-020-656/3	-	-	-	-	1	Rectangular frame
2	Hook	5-178-020-261	1	1	1	1	1	
3	Chain, set	5-178-020-274	1	1	1	1	1	
4	Washer 22,5	PN-63/M-82004	1	1	1	1	1	
5	Spring pricker A11x50	5-178-031-045	1	1	1	1	1	
6	Replaceable pin	5-178-020-831	2	2	-	2	-	
		5-178-020-831/2	-	-	2	-	2	
7	Self-locking nut M24x1,5	5-178-020-539	2	2	2	2	2	
8	Shoulder bolt, set	5-178-020-833	-	-	-	-	1	
9	Compression spring	5-178-020-834	-	-	-	-	1	
10	Pin cord	5-178-020-835	-	-	-	-	1	
11	Split pin S-Zn Ø6x40	PN-76/M-82001	-	-	-	-	1	
12	Washer 25,5	PN-63/M-82004	-	-	-	-	1	

Table 5. Linkage with replaceable pins.

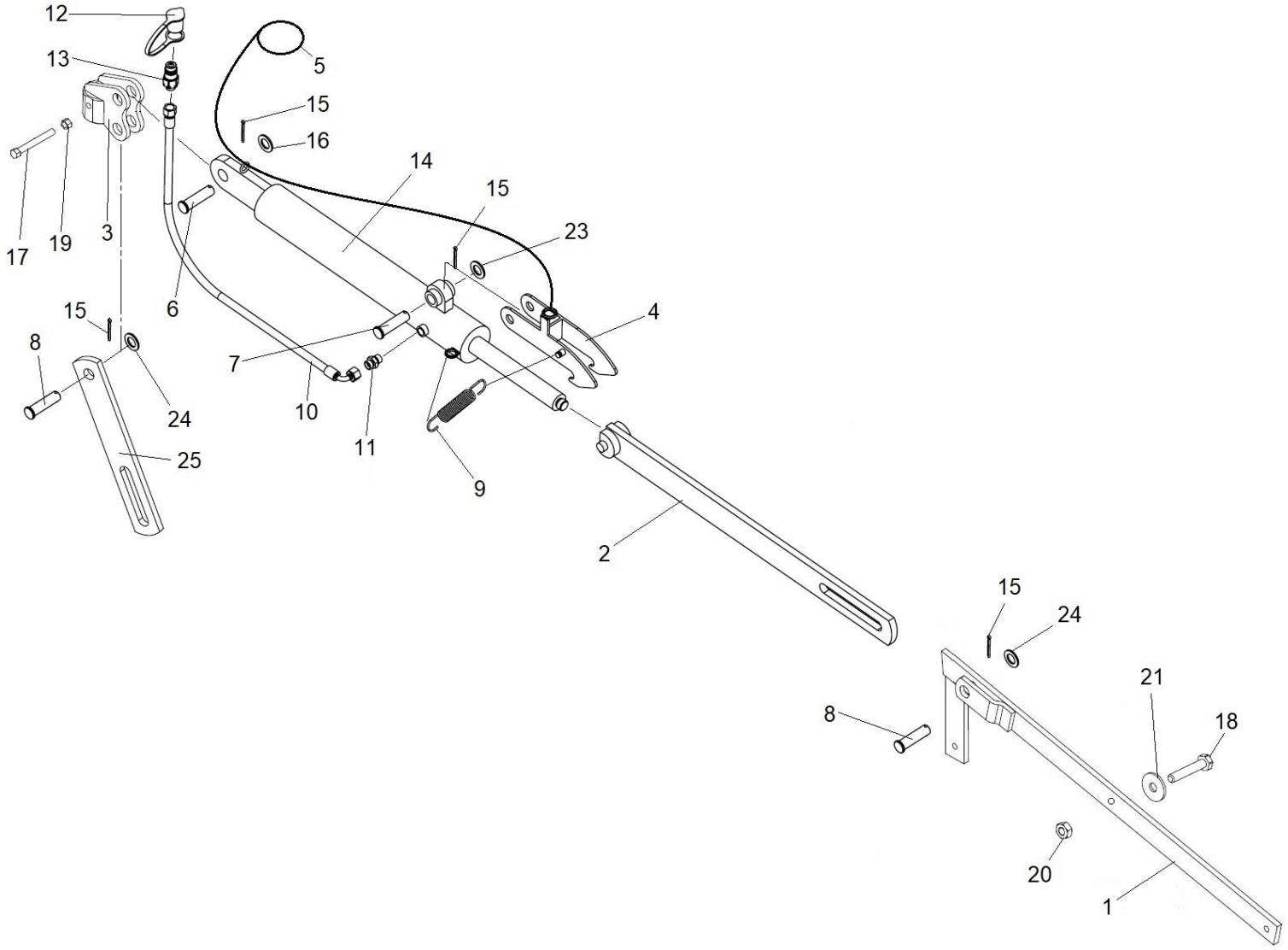


Figure K6. Hydraulic lifting system.

Item no. in Fig.	Part name	Part number or standard	Quantity		Remarks
			Z-178/2 1,85 m	**Z-178/3** 2,10 m	
1	Welded shackle, set	5-178-020-841	1	-	
		5-178-020-841/3	-	1	
2	Shackle	5-178-020-842	1	-	
		5-178-020-842/3	-	1	
3	Welded head	5-178-020-083/3	1	1	
4	Flap, set	5-178-020-843	1	1	
5	Flap cord	5-178-020-844	1	1	
6	Pin Ø25h9x55	5-178-020-825	1	1	
7	Pin Ø14h9x60	5-178-020-828	1	1	
8	Pin Ø22h9x55	5-178-020-826	2	2	
9	Flap spring	5-178-020-526	1	1	
10	Hydraulic hose, set	5-178-020-850	1	1	
11	Straight connection M18x1,5 - G3/8"	PN-EN ISO 8434-1	1	1	
12	Hydraulic plug cover	5-178-020-851	1	1	
13	Hydraulic quickcoupling, plug EURO M18x1,5	ISO 7241-A	1	1	
14	Hydraulic cylinder, set	5-178-020-852	1	1	
15	Split pin S-Zn Ø6x40	PN-76/M-82001	4	4	
16	Washer 25,5	PN-63/M-82004	1	1	
17	Bolt M14x1,5x100	5-178-020-827	1	1	
18	Bolt M12x35-8.8-B-Fe/Zn8C	PN-85/M-82101	1	1	
19	Self-locking nut M14x1,5-8-B-Fe/Zn8c	PN-86/M-82175	1	1	
20	Nut M12-8-B-Fe/Zn8C	PN-86/M-82144	1	1	
21	2x widened washer M12	PN-M-82019	1	1	
23	Washer 14,5	PN-63/M-82004	1	1	
24	Washer 22,5	PN-63/M-82004	2	2	
25	Bottom shackle	5-178-020-845	1	1	

Table 6. Hydraulic lifting system.

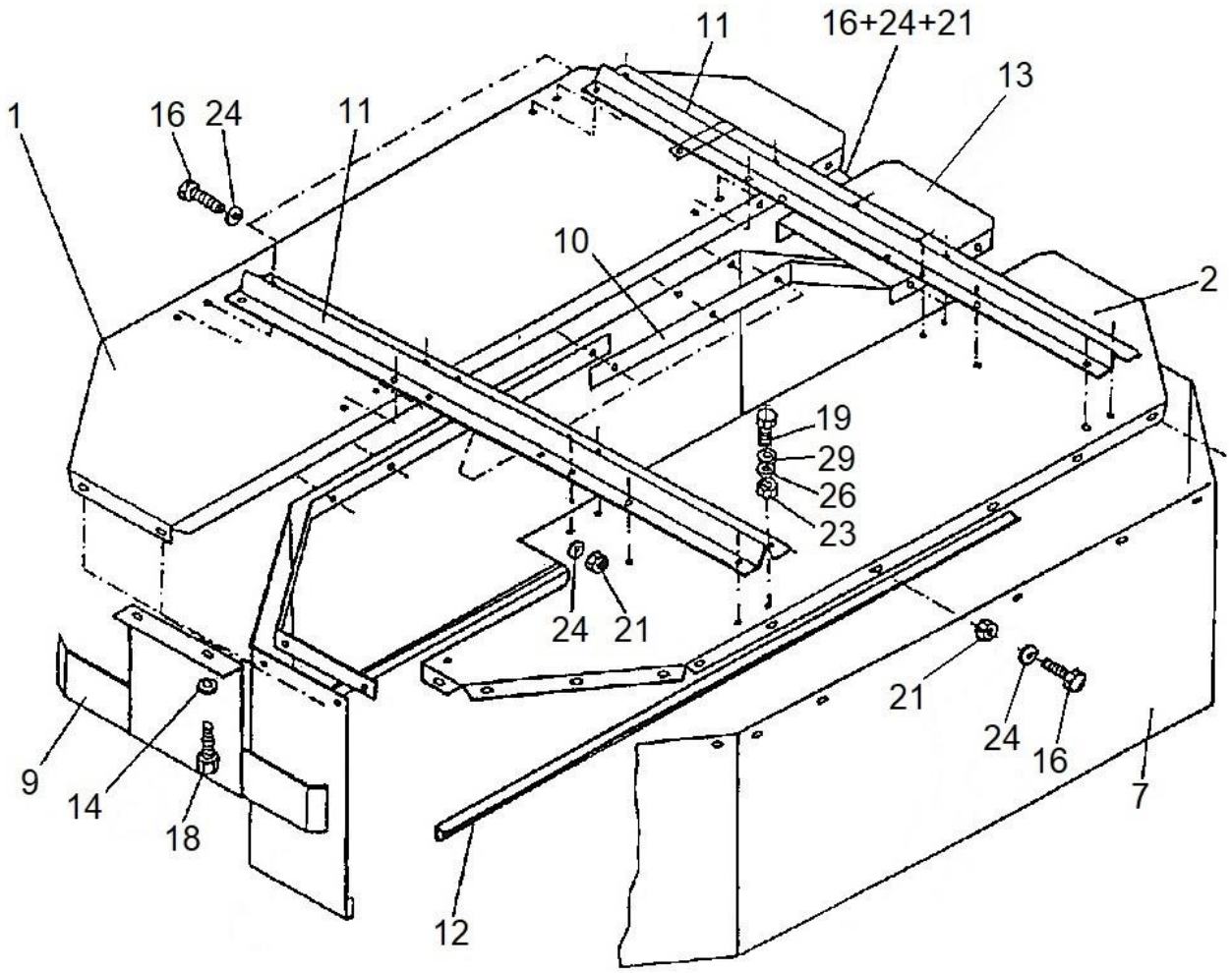


Figure K7. Metal cover set.

Item no. in Fig.	Part name	Part number or standard	Quantity				Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/3** 2,10 m	
	Metal cover, set	5-178-030-203	1	-	-	-	
		5-178-030-203/2	-	1	-	-	
		5-178-030-146	-	-	1	-	
		5-178-030-203/3	-	-	-	1	
1	Front cover	5-178-030-216	1	-	-	-	
		5-178-030-216/2	-	1	-	-	
		5-178-030-159	-	-	1	-	
		5-178-030-216/3	-	-	-	1	
2	Rear cover	5-178-030-229	1	-	-	-	
		5-178-030-229/2	-	1	-	-	
		5-178-030-161	-	-	1	-	
		5-178-030-229/3	-	-	-	1	
7	Curtain	5-178-030-196	1	-	-	-	
		5-178-030-196/2	-	1	-	-	
		5-178-030-133	-	-	1	-	
		5-178-030-196/3	-	-	-	1	
9	Side cover, set	5-178-030-101	1	1	1	1	
10	Curtain bar	5-178-030-272	2	-	-	-	
		5-178-030-272/2	-	2	-	-	
		5-178-030-272/1	-	-	2	-	
		5-178-030-272/3	-	-	-	2	
11	Supporting bar	5-178-030-244	2	-	2	-	
		5-178-030-244/2	-	2	-	2	
12	Corner bar	5-178-030-257	1	-	-	-	
		5-178-030-257/2	-	1	-	-	
		5-178-030-207	-	-	1	-	
		5-178-030-257/2/K	-	-	-	2	
		5-178-030-257/2/D	-	-	-	2	

Table 7. Metal cover set.

Item no. in Fig.	Part name	Part number or standard	Quantity				Remarks
			Z-178 1,65 m	**Z-178/2** 1,85 m	**Z-178/1** 1,35 m	**Z-178/3** 2,10 m	
13	Middle cover	5-178-030-231	1	-	-	-	
		5-178-030-231/2	-	1	-	-	
		5-178-030-174	-	-	1	-	
		5-178-030-231/3	-	-	-	1	
14	Widened washer	5-178-030-170	2	2	2	2	
16	Bolt M6x16-8.8-B-Fe/Zn8C	PN-85/M-82105	49	53	43	58	
19	Bolt M10x20-8.8-B-Fe/Zn8C	PN-85/M-82105	19	19	19	-	
	Bolt M10x25-8.8-B-Fe/Zn8C	PN-85/M-82105	-	-	-	32	
21	Nut M6-8-B-Fe/Zn8C	PN-86/M-82144	49	53	43	58	
23	Nut M10-8-B-Fe/Zn8C	PN-86/M-82144	19	19	19	32	
24	Washer 6,5 Fe/Zn9	PN-59/M-82030	49	53	43	58	
26	Washer 10,5 Fe/Zn9	PN-59/M-82030	19	19	19	32	
29	Spring washer 10,2 Fe/Zn9	PN-77/M-82008	19	19	19	32	

Table 4. continued.

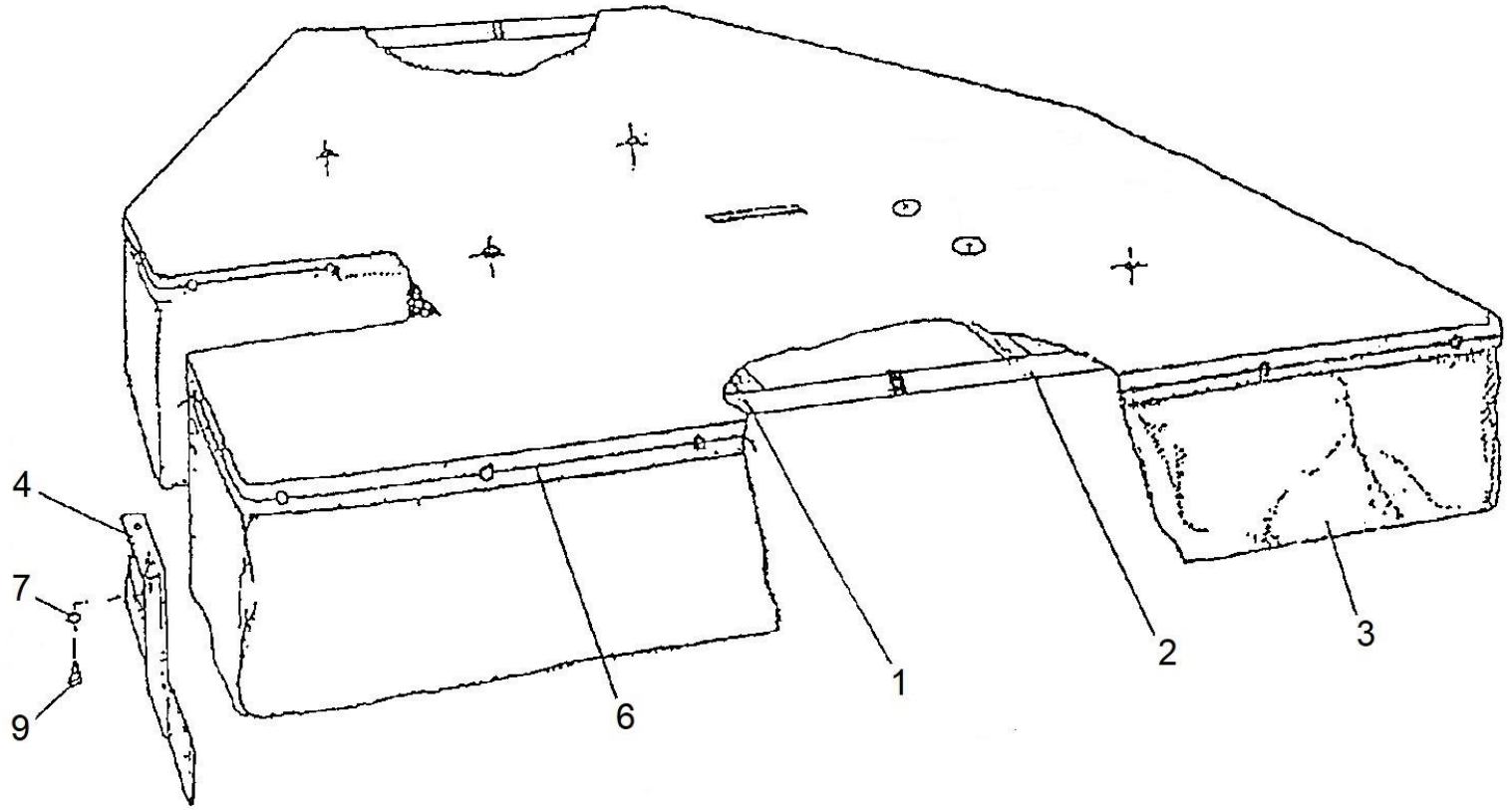


Figure K8. Elastic cover set.

Item no. in Fig.	Part name	Part number or standard	Quantity		Remarks
			Z-178 1,65 m	**Z-178/1** 1,35 m	
	Elastic cover, set (poz. 1-9)	5-178-040-014	1	-	
		5-178-040-014/1	-	1	
1	Left frame	5-178-040-030	1	-	
		5-178-040-030/1	-	1	
2	Right frame	5-178-040-042	1	-	
		5-178-040-042/2	-	1	
3	Curtain	5-178-040-055	1	-	
		5-178-040-055/1	-	1	
4	Side cover, set	5-178-040-027	1	1	
6	Nylon braided cord without core 7023-532-111-IR-221-5-8	BN-72/75976-05	1	1	
7	Widened washer	5-178-040-170	2	2	
9	Bolt M8x20-5.8-B-Fe/Zn8C	PN-85/M-82105	2	2	

Table 8. Elastic cover set.

WARRANTY CARD

Rear rotary mower:

Manufacturer's number

Warrantor's stamp

Date of manufacture

QC signature

Date of purchase

Seller's stamp

Seller's signature

The product quality has been checked and meets the required standards and regulations and is permitted for use.

Note: Warranty card without the required information or with corrected or illegible information – **is invalid**.

Warranty claim procedures

1. The Warrantor ensures good quality and efficient operation of the product covered by this warranty, within 12 months from the date of purchase.
2. Defects and damages of the product found within the warranty period shall be removed free-of-charge within 14 days at the Purchaser's site.
3. Any repairs under the warranty are carried out by the service provided by the dealer.
4. In the warranty period, the Purchaser is entitled to replace the product for a new, defect-free or obtain cash refund, if:
a) in the warranty period it is necessary to carry out 4 warranty repairs, and the product still shows defects which prevent it from being used as intended.
5. Any claims concerning product replacement or cash refund are received, considered and completed within 14 days by the point of sale.
6. The following damages repaired at the Purchaser's expense are not qualified as warranty repairs and are not included in repairs listed in item 4a:
a) caused by misuse of the product or use of the product not in accordance with the instruction manual,
b) caused by random events or other occurrence for which the Warrantor cannot be held responsible.
7. The Purchaser bears the costs of technical evaluation – if service worker finds that a claimed product is free of defects or damages.
8. The Warrantor is entitled to cancel Warranty Card for the product if the following is found:
a) tampering with the interior of the product, introducing changes in the product or causing deliberate damages,
b) vast damage caused by random events or other occurrence for which the Warrantor cannot be held responsible,
c) lack of required records or changes in Warranty Card,
d) misuse of the product or installation or use not in accordance with instruction manual.

EC DECLARATION OF CONFORMITY

We: **FMR LISICKI JANUSZ LISICKI**
2 Wałowska str., 96-200 Rawa Mazowiecka
NIP: 835-100-53-17 Regon. 750388791
Tel. 46 814 51 88,
Fax: 46 814 66 58
e-mail: biuro@lisickirawa.pl
sprzedaz@lisickirawa.pl
serwis@lisickirawa.pl

Rear rotary mower
Z 178; Z 178/1; Z 178/2; Z 178/3,
Manufacturer's number:……..Year of manufacture:……

to which this declaration refers, complies with all provisions set out in: **Directive 2006/42/EC, implemented by Regulation of the Minister of Economy of 21.10.2008 on general requirements for machinery**
(Dz. U. No. 199 item 1228),

In order to complement relevant safety, health and environmental protection requirements, the following harmonised standards are included:
- PN-EN ISO 12100:2012
- PN-EN ISO 13857:2010
- PN-EN ISO 4254-1:2016-02
- PN-EN ISO 4254-12:2012
- PN-EN ISO 11684:1998
- PN-ISO 3600:1998

Person authorised to prepare technical documentation:
Janusz Lisicki - owner, Pukinin 76, 96-200 Rawa Mazowiecka

This declaration shall cease to be valid if rotary mower is modified or reconstructed without our consent.

When handing rotary mower to other party, it should be handed in operational condition together with the instruction manual and declaration of conformity.

Pukinin 20-01-2020

Owner

Janusz Lisicki