BUFFALO manure spreaders **MANUAL**

EUROMILK

ver. 3.1

MANURE SPREADERS

IMPORTANT !!!
READ BEFORE EVERY SINGLE USE OF EM BUFFALO SPREADER.

Service, operation, warranty.

The EM Buffalo manure spreader is designed for even spreading of all types of manure, peat, compost and lime. Using the manure spreader in a way other than described is unacceptable. Using it as intended also includes all activities related to operation and maintenance. The spreader is not intended for the transport of people or animals. Gama Group Szepietowscy Sp.j. guarantees the reliable operation of the machine when it is used in accordance with the technical and operational conditions described in the manual. The repair period is specified in the warranty card. The warranty does not cover parts and subassemblies of the machine that are subject to wear under normal operating conditions, regardless of the warranty period. The group of these elements includes the following parts and subassemblies:

drawbar eye;

PTO shafts;

tires;

brake shoes;

filters on air system connections;

seals;

hydraulic filters;

bulbs and LED lamps;

chains;

gears;

floor conveyor bars;

blades and knives of the spreading beater;

bearings;

The provision of warranty services applies only to such cases as: mechanical damage not attributable to the user, factory defects of parts and components, etc.

If the damage results from:

• mechanical damage caused by the user's fault, a road accident;
•machine overload;
•improper operation, adjustment and maintenance, use of the machine contrary to its intended purpose;
•performing repairs by unauthorized persons, improperly performed repairs;
•using the damaged machine;
•making any unauthorized changes to the machine structure.
the user loses the warranty.

The user is obliged to immediately report all noticed defects in the paint coatings or traces of corrosion and order removal of defects regardless of whether the damage is covered by the warranty or not. Modification of the manure spreader without the written consent of the Manufacturer is prohibited. In particular, welding, reaming, cutting and heating of the main machine components that directly affect safety during use are not permitted.

Using the manure spreader

- Before using the machine, the user should carefully read the contents of this manual and the instructions for the articulated telescopic shaft. Observe these recommendations during operation.
- Non-compliance with safety rules, careless and improper use as well as operation of the manure spreader contrary to the instructions puts the user and bystanders at risk.
- The machine may not be used by persons who are not authorized to drive agricultural tractors, including children, people under the influence of alcohol or drugs.
- Never mount the articulated telescopic shaft when using the manure spreader with the spreading beater removed.
- It is forbidden to use the machine contrary to its purpose. Everyone who uses the machine in a manner inconsistent with its intended use, thus takes full responsibility for all consequences arising from its use.

- Climbing the machine is only permitted when the manure spreader is absolutely motionless and the tractor engine is switched off.
- Any spreader modifications release Gama Group Szepietowscy Sp.j. from liability for damage or injury.
- During the warranty period, any repairs may only be carried out by a Warranty Service authorized by the manufacturer. After the warranty period, it is recommended that any repairs to the machine be carried out by specialized workshops.
- If it is necessary to change individual parts, use only original parts. Failure to comply with these requirements may endanger the health or life of bystanders or manure spreaders and may also damage the machine and constitute the basis for withdrawing the warranty.
- Connect and transport the manure spreader only with such a tractor that meets the manufacturer's requirements (minimum power requirement of the tractor, required tractor hitch, etc.).
- Before connecting the manure spreader, make sure that the oil in the tractor's external hydraulic system can be mixed with the hydraulic oil of the manure spreader.
- Take care when connecting the machine, nobody should be between the manure spreader and the tractor.
- Before using the manure spreader always check its technical condition. In particular, check the technical condition of the manure spreader and traveling systems of the manure spreader and tractor, technical condition of braking and light signaling systems and floor conveyor chain tension.
- The manure spreader may be started only when all the covers and other protective elements are functional and in place.
- The manure spreader disconnected from the tractor must be immobilized with the parking brake. If the machine stands on a slope it must be additionally secured against rolling by placing wedges under the wheels.
- Do not stay on the load box during loading.
- Loading work should be carried out by a person with qualifications and experience in this type of work.
- The manure spreader may be loaded only when the machine is placed on level, hard ground and connected to the tractor. Tractor and manure spreader must be placed straight ahead for driving.

- Remember about high vertical load of the drawbar eye and tractor hitch when loading the manure spreader, therefore the load must be arranged in such a way that it does not threaten the stability of the manure spreader and does not hinder driving the set.
- The manufacturer recommends that manure loading is carried out in layers over the entire length of the manure spreader, starting from the rear to the front. This ensures even loading of the machine during loading and reduces the risk of manure „hanging" during unloading. If a forklift loader is used for loading, it should be emptied by tilting at a height not exceeding the height of the crate more than 1 meter. Do not compact manure on the manure spreader. The loading height must not exceed the height of the beater clearance. The load should be evenly distributed on the load box to ensure optimal even distribution.
- Spreaders equipped with extensions for the transport of light materials, e.g. maize, should be dismantled when exporting manure. In the case of hydraulic extensions, they should be open during loading, and they may be closed during transport to protect the load against falling. Loading manure above the extensions may make it difficult to unload (manure suspension) and overload the suspension system and increase the load on the floor conveyor and gears, which in turn can lead to their damage.
- Due to the different densities of fertilization materials, the use of the total load box capacity may exceed the allowable load capacity of the manure spreader.
- The spreader can be used for spreading lime. When sowing lime, remember that this material is much heavier than manure. This involves the risk of overloading the machine and damage to, for example, the chassis. Another thing related to the large mass of fertilizer is a lot of pressure on the floor of the crate. Too much load on the manure spreader may cause the belt to stop. The manufacturer recommends that the amount of transported material is small, i.e. 1/3 to a maximum of 1/2 the capacity of the box (counting the box itself without extensions, in the case of large spreaders and the use of elevated slats in the floor conveyor, the amount of fertilizer must be less because the pressure on the floor is greater and strips take up more material generating a greater load on the gearbox which may lead to its damage). The slide (guillotine) should be set at a level slightly lower than the top of the loaded material to even out the dosing of the material passing to the adapter shafts. The less the gate slides open, the more accurate the dosing will be, but this will cause a build-up of material in the rear and increase the load on the floor conveyor.
- Tractor hydraulic performance should be set at 60 l / min, higher performance may change the settings in the protection of the hydraulic motor driving the floor conveyor, and as a consequence lead to damage to the hydraulic motor, transmission and floor conveyor, for which the manufacturer is not responsible. Higher capacity may also cause heating of the hydraulic system, which may damage sealants or cause malfunctioning of the system.

- In winter, make sure that the floor conveyor slats are not frozen to the floor.
- The manure spreader may be connected to the tractor only by means of a suitably selected articulated telescopic shaft, recommended by the Manufacturer.
- Before starting work, familiarize yourself with the propeller shaft operating instructions issued by the shaft manufacturer and follow the recommendations contained therein.
- PTO shaft must be equipped with covers. It is forbidden to use the shaft with damaged or missing safety elements.
- When using the manure spreader, do not use a PTO shaft speed higher than: for models RX1200HD-RX1800HD (beater type 00) 540 rpm, for models RX1870HD+ RX2470HD+ (beater type 70) 1000 rpm. It is prohibited to overload the shaft and manure spreader and to suddenly engage the clutch. Before starting PTO shaft make sure that the PTO rotation direction is correct.
- The beater and transmission system are protected by an overload and backstop clutch. For standard beaters, type 00, transmission up to 150km, and beaters type 70 use a transmission up to 250km. Operation of a tractor with a higher power than specified may cause the clutch on the shaft to engage. After engaging the clutch, immediately disengage the PTO drive on the tractor. Frequent activation of the clutch or too long a time of engaging can damage it, for which the manufacturer is not responsible. If the adapter rollers stop, roll the tape back, clean the rollers so that they can rotate.
- In the event of a sudden stop or blocking of the beater shafts e.g. by hitting something hard, the clutch may not work and the gearbox may be damaged, then the repair is not covered by the warranty.
- Before each use, check the beater shafts, the completeness of the screws, feet and knives. Incomplete, damaged or bent beater shafts lose their balance and get „run out". Working with such a shaft can lead to rapid wear of the bearings and gear damage.
- Disconnect the shaft drive whenever the machine does not need to be driven, or when the tractor and manure spreader are at an unfavorable angular position with respect to each other.
- The manufacturer recommends changing the oil in gearboxes: first after 50 hours, and then every 500 hours of operation or once a year. Type of oil TM 80W90. During the warranty period, the replacement must be made by the manufacturer's Gama Group service. Otherwise, the gear manufacturer (SISP) may not accept the warranty in the event of damage.
- The maximum speed with which you can move from the manure spreader is 25km/h, in case of exceeding this speed the manufacturer is not responsible for the machine and in particular for the proper operation of such elements as brakes, suspension, axles and wheels.

TABLE OF CONTENTS

INTRODUCTION

The information contained in the Operating Manual is up-to-date as at the date of preparation. Manufacturer reserves the right to introduce design changes in the machines, and therefore some sizes or illustrations may not correspond to the actual state of the machine delivered to the user. The manufacturer reserves the right to make design changes without making changes to this manual. The Operator's Manual constitutes the basic equipment of the machine. The user is obliged to read the content of this manual before starting the operation and to observe the recommendations contained therein. This will ensure safe operation and failure-free operation of the machine.

The machine has been constructed in accordance with the applicable standards and current legal regulations. The manual describes the basic safety and operation rules of the EUROMILK manure spreader, type RX850; RX1150; RX1250; RX1250HD, RX1450HD RX1650HD, RX1850HD RX1870HD+,RX2070HD+, RX2270HD+; RX2470HD+

The essential obligations of the manufacturer are presented in the warranty card, which contains the complete and binding regulations of warranty services.

If the information contained in the operating instructions turns out to be incomprehensible, please contact the point of sale where the machine was purchased or directly the manufacturer.

The warranty card along with the warranty conditions is attached to these Operating Instructions as a separate document.

Manufacturer address:
GAMA Group Szepietowscy Sp.j.
ul. Przemysłowa 5
18-200 Wysokie Mazowieckie
Poland
Telephone: + 48 517 118 781
serwis@euromilk.pl

Symbols used in the manual:

NIEBIEZPIECZEŃSTWO

Hazard warning symbol. Indicates a serious emergency which, if not avoided, could result in death or disability. The symbol warns about the most dangerous situations.

UWAGA

Symbol for attention to particularly important information and recommendations. Non-compliance with the recommendations described may result in damage to the machine due to improper use.

OSTRZEŻENIE

This symbol indicates a possible hazardous condition which, if not avoided, could result in death or personal injury. This symbol indicates a lower risk of injury than the symbol with the word „DANGER”.

Symbol indicating useful information.

Symbol indicating maintenance activities that should be performed periodically.

1. *GENERAL INFORMATION*

1.1 *INTRODUCTION*

The operator's manual is the basic equipment of the manure spreader.
The machine may only be operated by persons who are acquainted with the Operator's Manual, the structure and operation of the manure spreader, as well as the operation of the cooperating tractor.
In order to use the machine safely, you must read and follow all instructions described in this Operator's Manual. Compliance with the recommendations of the Operator's Manual guarantees safe work for the User and extends the service life of the machine.
Manure spreader identification
The manure spreader should be identified on the basis of the serial plate number permanently attached to the manure spreader frame located on the right side of the machine.

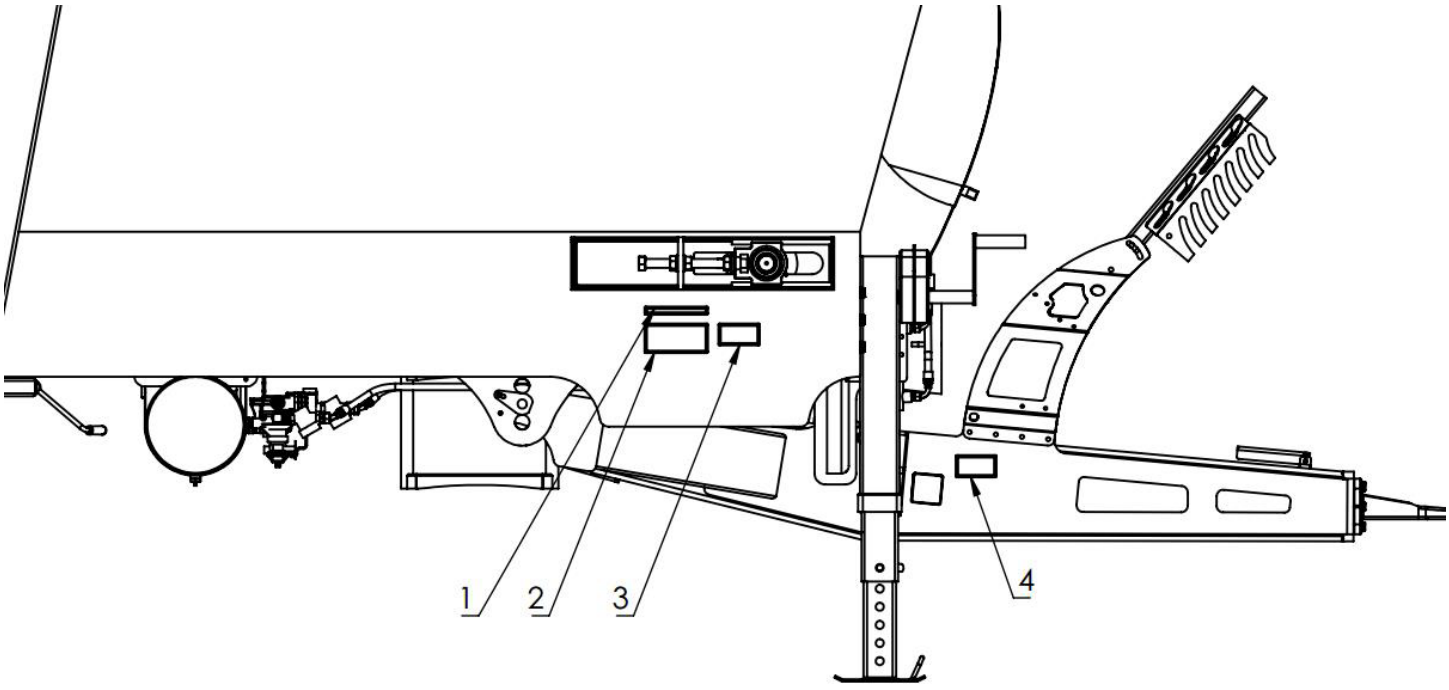


Fig. 1. Manure spreader identification

1- VIN number; 2- Homologation plate ; 3- CE serial plate number ;4- Drawbar homologation plate

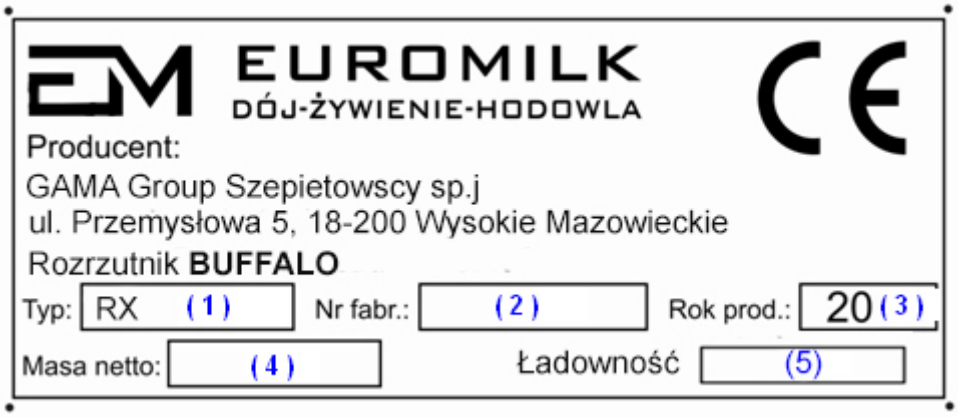


Fig.2. Serial plate number

1- Model; 2- Serial number; 3- Production year; 4- Weight ; 5- Tonnage

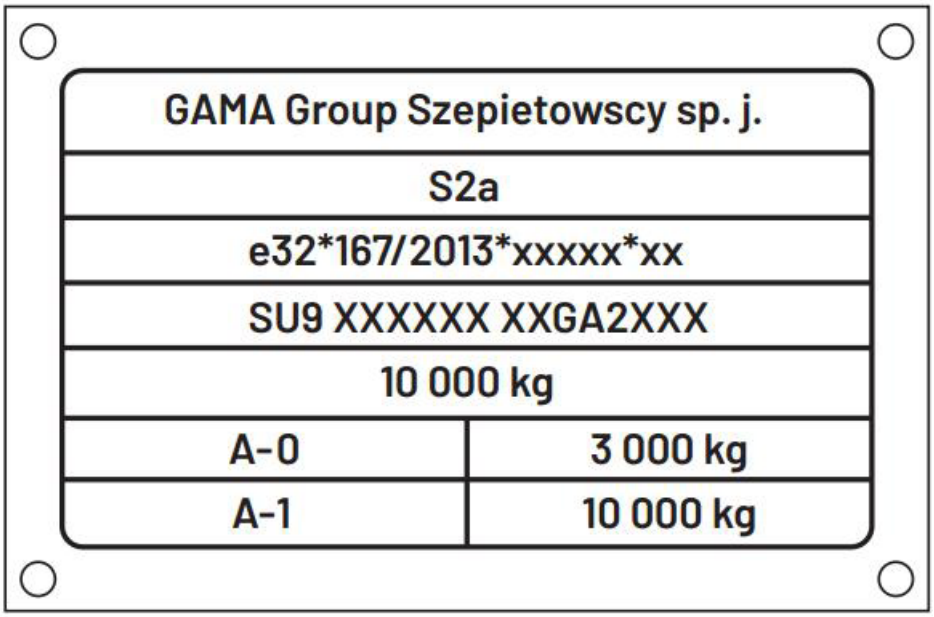


Fig 3. Homologation plate

Fig. 4. Drawbar homologation plate DS-I.

Fig. 5 Drawbar homologation plate DS-Y.

	WARNING! It is forbidden to enter the public roads with a manure spreader without a serial plate or with an illegible plate.
	When purchasing, check the conformity of the serial number on the machine's serial plate with the number entered in the User's Manual and the warranty card - it is important for the warranty to be recognized. When the user contacts the service, seller or manufacturer, the user is obliged to provide the information contained on the machine's rating plate.
	The User's Manual is the basic equipment of every manure spreader.
	When submitting complaints / service requests, please provide the designation of the machine type and serial number and, if necessary, a photo of the machine or the reported element.

1.2 ***USE***

The manure spreader is designed for even spreading of manure, lime, peat, compost, etc. materials and for transporting crops on farms and on public roads. It is not allowed to use the manure spreader in a way other than that described above. Using it as intended also involves all actions connected with the safe and proper operation and maintenance of the machine. Therefore, the user is obliged to:

- read the manure spreader OPERATOR'S MANUAL and the WARRANTY CARD and follow the recommendations contained in these documents,
- understanding the principle of operation of the machine and the safe and proper use of the manure spreader,
- compliance with agreed maintenance and adjustment plans,
- compliance with general safety regulations while working,
- accident prevention,

- comply with the road traffic regulations and transport regulations in force in the country where the manure spreader is used,
- read the agricultural tractor operator's manual and adhere to its recommendations,
- aggregating the vehicle only with an agricultural tractor that meets all the requirements set by the manufacturer of the manure spreader.

The manure spreader may only be used by persons who:

- are familiar with the content of the publications and documents attached to the machine as well as with the agricultural tractor operator's manual
- have been trained in the manure spreader operation and work safety,
- have the required driving license and are familiar with the road traffic regulations and transport regulations.

Description	Requirements	Measure unit
Braking installation 1-wire braking system 2-wire braking system System rated pressure	Socket according to DIN 74 294 The socket is compliant with PN-ISO-1728: 2007 6.5	bar
Hydraulic installation Hydraulic oil Nominal pressure	HL 46 160	bar
Electrical installation Electrical system voltage Connection socket	12 7-pole according to ISO 1724	V
Tractor hitch Minimum vertical load capacity of the hitch	2500	kg
Minimum power requirement RX850 RX1050 RX1250 RX1250HD RX1450HD RX1650HD RX1850HD RX1870HD+ RX2070HD+ RX2270HD+ RX2470HD+	 70 70 80 80 90 100 110 120 140 150 160	hp

1.3 ***STANDARD EQUIPMENT***

The basic equipment of each manure spreader includes:

- user manual;
- warranty card with warranty conditions;
- 2-line air brakes with braking force regulator;
- lighting installation;
- hydraulic system controlled by the manifold from the tractor;
- inspection ladder;
- wheel chocks;
- PTO shaft for connection with a tractor;

The manure spreader is ready for sale completely assembled and does not require any additional assembly. Delivery to the user takes place by road transport or independent transport after connecting to the tractor.

The manure spreader transported on the platform should be fastened with the use of belts or strapping chains equipped with a tensioning mechanism. The securing measures must have a valid safety certificate. Chocks or other elements without sharp edges should be placed under the manure spreader wheels to prevent it from rolling. Chocks must be attached to the vehicle's platform. During reloading work, special care should be taken not to damage the manure spreader fittings and the paint coating. Fastening belts or chains should be attached to the transport lugs. For this purpose, stringers or other durable structural elements of the frame can also be used.

Before loading onto the platform, connect it to the tractor's transport hitch and connect the brake system conduits. Access to the low-loader trailer should be made on unfolded ramps.

 UWAGA	When loading and unloading the manure spreader, comply with the general principles of workplace health and safety for reloading work. Persons operating reloading equipment must have the required authorization to use these devices.
 NIEBIEZPIECZEŃSTWO	Incorrect application of securing measures may cause an accident.

The spreader is adapted to traffic on public roads as a machine attached to the lower transport hitch of the agricultural tractor. Before joining traffic on public roads, make sure that the tractor has full steering. The front axle load of the tractor must be at least 20% of the tractor weight - this also applies to transport and work of the manure spreader with a load. If this condition is not met, the front axle must be additionally loaded.

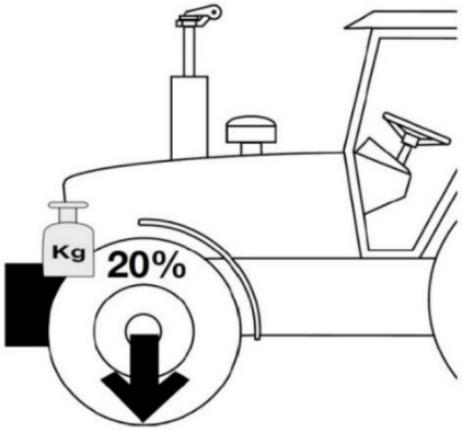


Fig.6. Minimum pressure on the front axle of the tractor.

Before transporting the manure spreader make sure that:

- the manure spreader is properly hitched to the tractor, and the hitching device is secured against unexpected disconnection;
- manure spreader and tractor brake system is working properly;
- manure spreader and tractor lighting are working properly;
- the guillotine is in the lowest, lower position;
- beater covers (deflectors - optional equipment), folded to the transport position;

hydraulic and air connection conduits are properly arranged; the support foot is fully raised;

- the parking brake is released;;

 UWAGA	Adjust the machine speed when transporting on public roads to the prevailing conditions and not exceed 30 km / h.

When transporting the manure spreader on public roads, observe the road traffic regulations. In the event of an emergency stop the tractor with the machine attached, the driver, stopping on a public road, should:

- stop the vehicle without jeopardizing road safety;
- position the vehicle as close as possible to the right edge of the road, parallel to the road axis;
- turn off the engine, remove the key from the ignition switch, engage the auxiliary brake, place chocks under the manure spreader wheel;
- outside built-up areas, a reflective warning triangle should be placed 30 to 50 m behind the vehicle and the hazard warning lights should be turned on;
- in built-up areas, turn on the hazard lights and place the warning triangle behind the vehicle, unless it is mounted in the holder at the rear of the machine;
- make sure that it is clearly visible to other road users;
- in the event of a failure, take appropriate measures to ensure safety at the point of failure.

1.4 ***DANGER TO ENVIRONMENT***

Leakage of hydraulic and gear oil may be a direct cause of threat to the natural environment. Maintenance and repairs where there is a risk of an oil leak should be performed in rooms with an oil resistant surface. In the event of an oil leak, contain the source of the leak, and then collect the leaked oil. Collect residual oil with absorbent material. Contamination collected in this way should be stored in tightly closed, oil-resistant and marked containers.

 NIEBIEZPIECZEŃSTWO	Store used hydraulic and gear oil or collected remains in tight, marked containers.
 UWAGA	Oil waste and used oil should be disposed of in accordance with applicable regulations.

1.5 ***DISPOSAL***

If the user decides to withdraw the machine from use, comply with the regulations in force in the given country concerning withdrawal from use and recycling of machines withdrawn from use. Before proceeding to disassembly, completely remove the oil from the hydraulic system and gearboxes and completely reduce the air pressure in the air brake systems.

 NIEBIEZPIECZEŃSTWO	During disassembly, use appropriate tools, equipment (overhead cranes, hoists, etc.), personal protective equipment, ie protective clothing, shoes, gloves, glasses, etc. Avoid skin contact with oil, and avoid oil leakage.

2. ***SAFETY OF USE***

2.1 Basic rules of use

2.1.1. ***OBLIGATION TO INFORM***

When handing over the manure spreader between users, the Operator's Manual must also be handed over, and the receiving manure spreader must undergo training, in accordance with the instructions contained therein.

2.1.2.***GENERAL SAFETY REGULATIONS***

Before each start-up, check the manure spreader for safe operation, i.e .:
- in addition to the instructions contained in these Operating Instructions, the generally applicable safety and accident prevention regulations must be observed;
- attached signs, warning and information notices provide important instructions for safe operation - observing them is for your safety;
- the manure spreader should be started only when all required devices are connected and secured against unintentional disconnection or opening (e.g. drawbar hitch, couplings, PTO shaft);

- before starting work, familiarize yourself with all devices and controls as well as their functions. It is too late for this during work;

- the manure spreader must not be used by people under the influence of alcohol or other drugs, not trained and not properly authorized to drive motor vehicles, including by children.

2.1.3. ***SAFETY OF USE***

- Before using the machine, the user should carefully read this manual. During operation, follow all recommendations contained therein.
- If the information contained in the manual is difficult to understand, contact the seller or the manufacturer directly.
- Careless, improper use and operation of the manure spreader, and non-compliance with the recommendations given in this operator's manual is dangerous to health and life.
- Non-adherence to the rules of safe use may endanger the health and life of the operator and others.
- Be aware of the existence of a residual risk of hazards, therefore the application of the principles of safe use should be the basic principle of using the manure spreader.
- All information regarding work safety should also be passed on to all other users of the manure spreader.
- Any modifications to the design and operation of the manure spreader relieve Gama Group Szepietowscy S.j. from liability for damage or health detriment.
- To transmit power to the PTO, use only recommended articulated telescopic shafts with appropriate parameters.
- It is forbidden to use PTO shafts without shields for transmission.
- Before driving, check that the parking brake is released and the brake force regulator is set in the correct position, suitable for the loading condition (applies to air systems with manual brake force regulator).
- Before starting up, check the immediate surroundings (children, bystanders), pay special attention when visibility is restricted.
- After spreading is finished, lower the guillotine completely, disengage the PTO shaft, and disengage the chain floor conveyor. Never leave the manure spreader with open guillotine, PTO shaft engaged, chain floor conveyor drive engaged and open deflectors unattended.

unauthorized persons.

- Engaging and disengaging the PTO and hydraulically controlled components should always be controlled from the driver's seat.

The manure spreader must be attached according to the regulations and only the recommended devices must be attached and the drawbar eye must be secured with the tractor's transport hitch.

- Be especially careful when hitching and disconnecting the manure spreader to and from the tractor.
- During assembly and disassembly, always place the support and safety devices in a position that ensures safe operation.
- Observe the permissible axle loads, total weight and transport dimensions.
- Check for transport equipment: connection of brakes and lights, marking plate and other protective devices.
- Before driving, check the operation of lighting and brakes, and prepare the manure spreader in accordance with the recommendations provided in the section „Driving on public roads".
- The manure spreader must be loaded in such a way that, while driving on public roads, the material does not contaminate the roads.
- After finishing work, before driving on public roads, remove from the external parts of the machine those remnants of spreading material that may fall off and contaminate the roads while driving.
- Take into account changes in the vehicle's behavior, steering and braking ability due to the attached manure spreader and the load on it.
- When driving with a manure spreader, the load distribution and / or inertia forces must be taken into account, especially when the load is asymmetrically distributed.
- Do not stay within the range of the spread material.

Manure spreading may only be carried out if:

- the manure spreader is attached to the tractor,
- the pressure on the front axle of the tractor is at least 20% of the weight of the tractor itself,
- no one is in the spreading zone,
- the tractor is positioned on the spreader axis,
- a safe distance from power lines is kept,

- If it is necessary to perform the final spreading stage on a slope, the tractor with the manure spreader should be in the direction of travel downhill. When spreading on slopes, the gradient of the ground should not exceed 10°.
- Take care to avoid crushing fingers and hands when opening covers.
- Pay attention to the warnings against the places of crushing, drawing in and catching when starting the manure spreader. While attaching and detaching the manure spreader to the tractor, there is a risk of crushing and injury.

- Nobody must be between the tractor and the manure spreader, unless the vehicle is secured against rolling with the parking brake and / or by placing a wedge under the wheel.
- Secure the manure spreader and the tractor against rolling away when parked.
- The manure spreader must not be transported with the guillotine raised and the beater deflectors open.
- When lifting the slider of the loading box, keep a safe distance from electric lines.
- During repair and maintenance works that require entering the inside of the loading box, the tractor must be absolutely immobilized and secured before the engine can be started and controls are operated by bystanders
- The driving speed must always be adapted to the prevailing conditions. Avoid sharp turns when driving up or down slopes.
- Maintain a sufficient safety distance in the turning area.
- When driving backwards, ensure yourself sufficient visibility (possible help of a second person).
- When driving around curves, take into account the inertia and length of the manure spreader.
- When turning and backing up, observe a minimum turning radius of approx. 6 m.
- Only rectify faults on attachments with the engine switched off and the ignition key removed.
- In the event of failure of the hydraulic or pneumatic system, the manure spreader must be disconnected from use until the failure is remedied.
- It is forbidden to perform service or repair works under a loaded loading box
- Before beginning repair works in hydraulic or air systems, reduce oil or air pressure.
- In the event of injury from the powerful jet of hydraulic oil, see a doctor immediately. Hydraulic oil can enter the skin or eyes and cause infections.
- Use the hydraulic oil recommended by the manufacturer. Never mix two types of oil.
- Use gear oil recommended by the manufacturer. Never mix two types of oil.
- Before leaving the tractor, turn off the engine and remove the key from the ignition. Engage the handbrake and secure the manure spreader with the wedge.
- Do not exceed the permissible maximum axle loads of the manure spreader.
- Exceeding the permissible technical load capacity of the manure spreader may damage the machine, loss of stability while driving, scattering of the load, and also threaten the safety of road traffic. The braking system has been adjusted to the permissible total weight of the manure spreader, exceeding which will drastically reduce the effectiveness of the service brake.
- It is forbidden to exceed the permissible speed.
- The maximum allowable pressure in the hydraulic system is 160bar.
- Maximum allowable pressure in the double conduit pneumatic system 0.80 MPa, minimum 0.65 MPa.

- The activities preparing the manure spreader for work (connecting hydraulic hoses, pneumatic hoses, PTO shaft, etc.) should be performed with the tractor engine off and the ignition key removed.
- The manufacturer supplies the manure spreader completely assembled.
- Hydraulic (rubber) conduits should be replaced every 4 years.
- The manure spreader should be kept clean.

2.1.4. *OPERATING THE MACHINE*

- During work, make sure that there are no people or animals in the vicinity of the spreading zone.
- Staying in the spreading area is forbidden due to the risk of stones, pieces of wood or other solid elements in the material being spread.
- Before starting work, check the condition of the beater knives and their fastening elements.
- Before loading, check the tension of the floor conveyor chains. Regularly check the tension of the conveyor chains.
- When working on roads, drainage ditches, plot boundaries and water reservoirs, pay attention not to exceed the marked spreading zone.

2.1.5. *AIR AND HYDRAULIC INSTALLATION*

- When connecting the air conduits to the tractor's air system, make sure that the valves on the tractor and manure spreader are not under pressure.
- Check air connection regularly and replace damage and aging parts. The replacement of cables must meet the technical requirements of the manufacturer. Replace flexible hoses every 4 years, unless damaged previously.
- Leaks in the air braking system are inadmissible.
- The hydraulic system is under high pressure during operation.
- Use the hydraulic oil recommended by the manufacturer. Never mix two types of oil.
- Regularly check the technical condition of the connections and hydraulic lines.
- When connecting the hydraulic conduits to the tractor, make sure that the tractor hydraulic system and the manure spreader are not under vacuum. If necessary, reduce the residual pressure of the installation.
- In the event of injury from the powerful jet of hydraulic oil, see a doctor immediately. Hydraulic oil can penetrate the skin and cause infections.
- Repairs to the pneumatic or hydraulic system may only be carried out by an authorized representative of the manure spreader manufacturer.

- In the event of a fault in the air or hydraulic system, the machine must be decommissioned until the fault is remedied.

	The air braking system is under high pressure. Before starting work with the system, turn off the tractor engine, secure the manure spreader with the parking brake and supporting wedges, and then depressurize it.
	Rubber hydraulic conduits should be replaced every 4 years regardless of their technical condition, unless a defect was diagnosed earlier.

2.1.6. ***PTO SHAFT***

- The manure spreader may only be connected to the tractor through a properly selected PTO shaft recommended by the Manufacturer.
- Before starting work, the user should read the Drive Shaft Operator's Manual and adhere to the recommendations contained therein.
- The articulated telescopic shaft may only be connected and disconnected at:
• the manure spreader with the tractor hitch,
• tractor engine turned off,
• key removed from the ignition switch,
• the parking brake is on,
• disengaged PTO.
- Before starting the tractor with the manure spreader hitched, make sure that the PTO drive in the tractor is disengaged.
- The articulated telescopic shaft must be equipped with shields.
- It is forbidden to use the shaft without guards or with damaged elements.

- Install the PTO shaft in accordance with the guidelines of the Operator's Manual issued by the shaft manufacturer.
- Secure the shaft guards against turning with chains. Attach the shaft chains to fixed structural elements of the manure spreader and the tractor.
- The PTO shaft has markings on the shield, specifying which end of the shaft should be mounted on the machine side, and on the tractor side. Safety clutches should always be mounted on the machine side.
- After installing the shaft, make sure that it is correctly and safely connected to the tractor and manure spreader.
- Before starting the manure spreader, make sure that the shaft guards are operational and correctly positioned. Damaged or inoperative components must be replaced with new ones.
- During work and operation, it is forbidden to wear loose clothing that can be caught by rotating parts of the shaft. Contact with the rotating PTO shaft can cause serious injury or death.
- When working in conditions of limited visibility, use tractor working lights to ensure adequate visibility of the working roller and its surroundings.
- The PTO shaft should be transported and stored in a horizontal position with the chains fastened in order to avoid damaging the covers and other elements.
- Do NOT overload the PTO shaft and the drive system of the spreader adapter. It is not allowed to start the tractor PTO suddenly. Before starting PTO, check that the direction of rotation is correct.
- During work, use the PTO rotational speed of 540 rpm. or 1000rpm. depending on the transmission. Operating at other speeds may damage the machine or its components.
- Disengage the PTO drive each time when there is no need to drive the machine or when the tractor and the manure spreader are in an unfavorable angular position.
- Do not exceed the maximum permitted operating length of the PTO shaft.
- When disconnecting the roller from the tractor, place it in a specially designed holder.
- It is forbidden to use chains to suspend or support the shaft while parked or transporting the manure spreader.

2.2 RESIDUAL RISK

2.2.1. *RESIDUAL RISK DESCRIPTION*

Gama Group Szepietowscy Sp.j. in Wysokie Mazowieckie makes every effort to eliminate the risk of an accident. However, there is a residual risk that could lead to an accident.

Residual risk results from incorrect behavior of the manure spreader, e.g. as a result of inattention, ignorance or improper behavior of the manure spreader.

- Using the manure spreader for purposes other than those described in the Operator's Manual.
- The manure spreader should be operated by minors and not authorized to drive the tractor and by persons not acquainted with the Operator's Manual.
- Manure spreader operation by people under the influence of alcohol or other intoxicants.
- Being on the machine during work or transport.
- Being between the tractor and the manure spreader with the tractor engine running.
- There are bystanders, especially children, near the working manure spreader.
- Presence of people or animals in areas not visible from the operator's position.
- Cleaning, maintenance and inspection of the manure spreader mechanisms connected by PTO shaft with the tractor engine running.
- Checking the technical condition during manure spreader operation.
- Exceeding the permitted speed and load capacity.
- Using a defective articulated PTO shaft.
- Exceeding the permitted speed and load capacity.
- Introducing changes to the machine without the consent of the Manufacturer.
- Do not make sudden maneuvers with loaded manure spreader.
- When the manure spreader is loaded, do not make any maneuvers with a very small turning radius (it may damage the tires as well as the suspension).

In presenting the residual risk, the spreader is treated as a machine that has been designed and built according to the state of the art in the year of its manufacture.

2.2.2. RESIDUAL RISK ASSESMENT

The residual risk may be kept to a minimum by following the recommendations below:

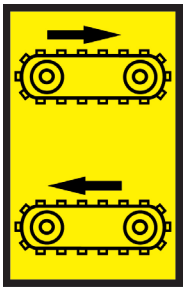
- Compliance with the safety rules described in the User's Manual.
- Handling the machine carefully.
- Operation of the machine without rush.
- Maintaining a safe distance from forbidden and dangerous places.
- It is forbidden to put your hands in dangerous and forbidden places.
- It is forbidden to stay on the machine when it is working. Performing repair maintenance work by trained persons.
- Use of appropriate protective clothing.
- Securing the machine against access by unauthorized persons, especially children.
- Ensuring that no one is in the blind spot (especially during the back-up and aggregation maneuver).

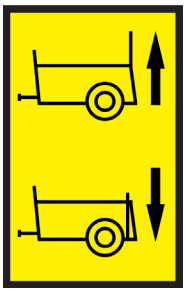
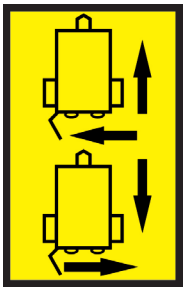
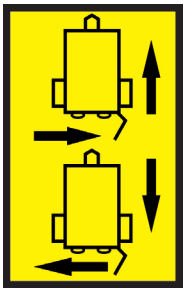
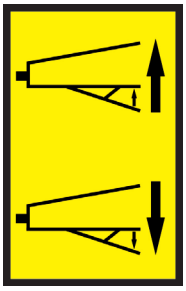
2.3 WARNING AND INFORMATION STICKERS

The manure spreader is labeled with information and warning decals. The user is obliged to take care of the legibility of notices, warning and information symbols placed on the manure spreader throughout its lifetime. If the information or warning decal has been damaged or removed, it must be ordered from the manufacturer or at the place where the machine was purchased. New components that have been fitted during repair should be re-tagged if necessary. When cleaning, do not direct a strong stream of water to the labels and do not use solvents.

	Familiarize yourself with the content of the Operating and Operating Manual
	Manufacturer's name and address
	Before commencing maintenance and repair activities, turn off the engine and remove the key from the ignition switch.
	Permissible speed of movement with the machine.
	Rotating parts, Keep a safe distance from rotating parts.

	Danger of crushing or drawing in. Do not put your hands into working elements.
	Danger of cutting. Do not put your hands under the guards when the machine is running.
	Danger of slipping and falling. Be careful when climbing the ladder.
	Danger of crushing. Staying in the area of movement of the tractor-manure spreader connections with the engine running.
	Use protective clothing
	Use protective covers.

	The jacking point
	Attachment point for slings, belts and transport chains
	Lubrication point, oil
	Lubrication point - solid lubricant
	Oil level check points.
	Manure spreader floor chain conveyor - working direction front - rear

	Permissible PTO shaft speed is 540 rpm.
	Permissible PTO speed 1000 rpm.
	Vertical shutter (guillotine) - opening,
	Rear transport door regulating the ejection width (left)/deflectors - opening, closing
	Rear transport door regulating the ejection width (right)/deflectors - opening, closing
	Support foot - working, parking position

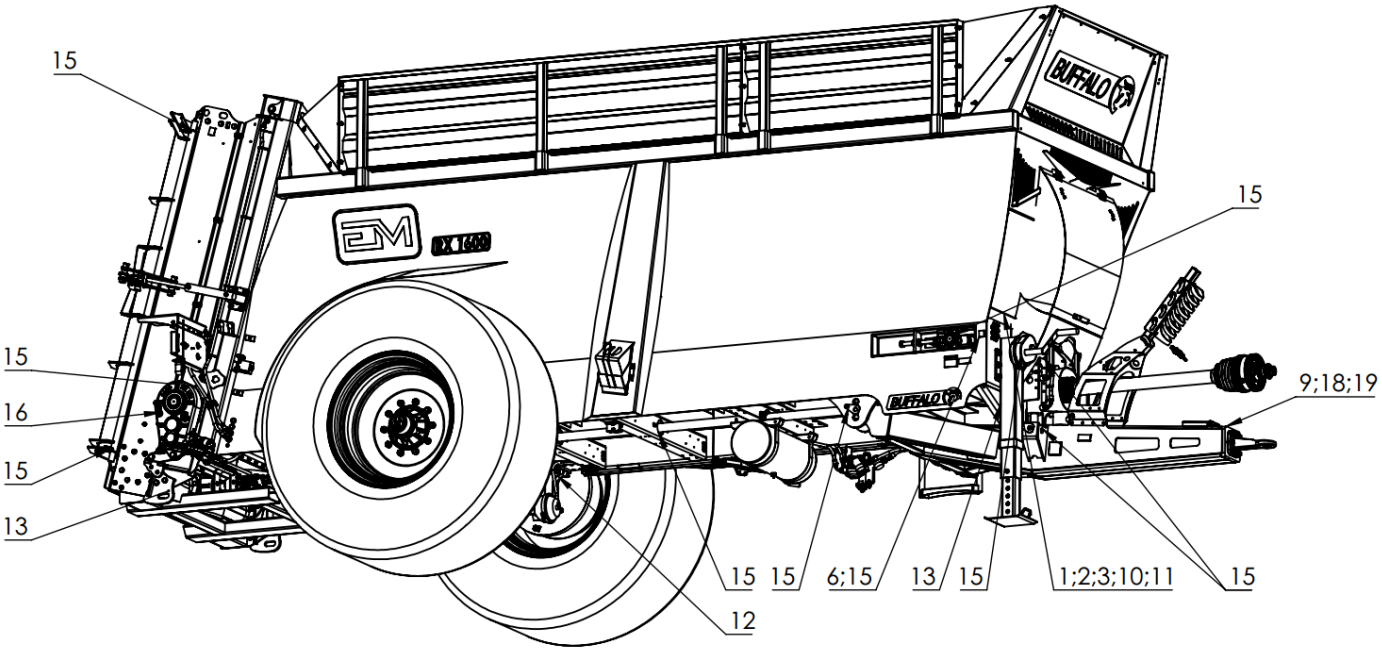


Fig.7. Locations of stickers

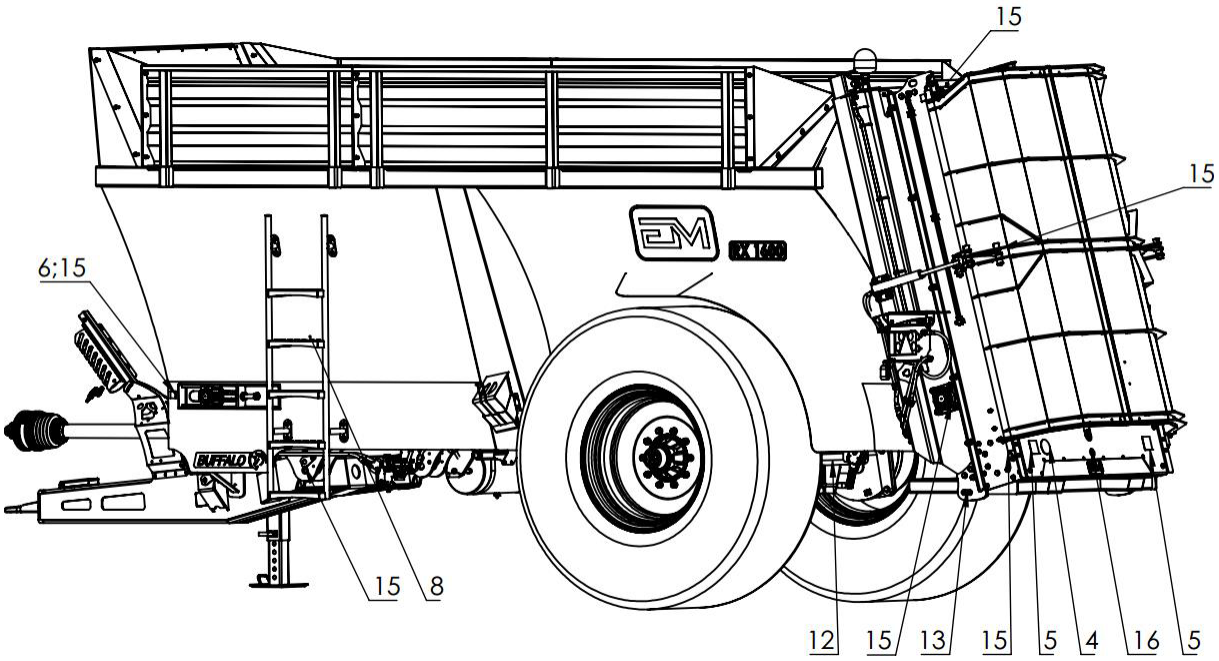


Fig.8. Locations of stickers

3. CONSTRUCTION AND OPERATION

3.1 BASIC TECHNICAL DATA

L.p.	basic data								
1.	Vehicle type			volumetric capacity					
2.	Chassis			Stif/sprun g					
3.	Type			RX850; RX1050; RX1250; RX1250HD; RX1450HD; RX1650HD					
4.	Construction type			Monobloque					
Size									
5.			J.M.	RX850	RX1050	RX1250	RX1250 HD	RX1450 HD	RX1650 HD
6.	length		m	6,67	6,67	7,37	7,15	7,75	8,35
7.	width		m	2,9	2,9	2,9	2,9	2,9	2,95
8.	Height	23,1-26	m	2,85	2,85	2,85	3,05	3,05	-
9.		620/75R26	m	2,86	2,86	2,86	3,06	3,06	-
10.		650/75R32	m	2,95	2,95	2,95	3,15	3,15	3,15
11.		650/65R38	m	2,96	2,96	2,96	3,16	3,16	3,16
12.		710/70R38	m	3,04	3,04	3,04	3,24	3,24	3,24
13.		650/65R30,5	m	2,88	2,88	2,88	3,08	3,08	3,08
14.		750/60R30,5	m	2,91	2,91	2,91	3,11	3,11	3,11
15.	distance beween wheels		m	2,3	2,3	2,3	2,3	2,3	2,3
Loading height									
16.	without extesions	23,1-26	m	2,25	2,25	2,25	2,45	2,45	-
17.		620/75R26	m	2,26	2,26	2,26	2,46	2,46	-
18.		650/75R32	m	2,35	2,35	2,35	2,55	2,55	2,55
19.		650/65R38	m	2,36	2,36	2,36	2,56	2,56	2,56
20.		710/70R38	m	2,44	2,44	2,44	2,64	2,64	2,64
21.		650/65R30,5	m	2,28	2,28	2,28	2,48	2,48	2,48
22.		750/60R30,5	m	2,31	2,31	2,31	2,51	2,51	2,51
23.	with extensions	23,1-26	m	-	-	-	3,05	3,05	-
24.		620/75R26	m	-	-	-	3,06	3,06	-
25.		650/75R32	m	-	-	-	3,15	3,15	3,15
26.		650/65R38	m	-	-	-	3,16	3,16	3,16
27.		710/70R38	m	-	-	-	3,24	3,24	3,24
28.		650/65R30,5	m	-	-	-	3,08	3,08	3,08
29.		750/60R30,5	m	-	-	-	3,11	3,11	3,11
Loading box inside measures									
30.	Length		m	4	4,7	5,2	5,7	4,7	5,3
31.	Width		m	1,5/2	1,5/2	1,5/2	1,5/2	1,5/2	1,5/2
32.	Height		m	1,3	1,3	1,3	1,3	1,3	1,3
33.	Height with extensions		m	1,9	1,9	1,9	1,9	1,9	1,9
Paranetres									
34.	Nominal load capacity		kg	8 000	10 000	12 000	12 000	14 000	16 000
35.	Weight (with standard equipmen		kg	4500	4500	4900	5400	5700	6100
36.	Permissible technological total weight		kg	11,8	11,8	13 600	14 200	15 800	17 400
37.	Permissible technological axle load capacity (* for 40 km / h)		kg	17 000	17 000	17 000	17000	17 000	17 000
38.	Permissible administrative axle load		kg	10 000	10 000	10 000	10 000	10 000	10 000
39.	Maximum load on the drawbar eye		kg	3 000	3 000	3 000	3 000	3 000	3 000
40.	Capacity		m^3	10,4	10,4	12,4	12,5	14,4	16,2
41.	Capacy with top extensis and back extensions		m^3	-	-	-	23	25	27,5
42.	PT speed		obr./ min	1000	1000	1000	1000	1000	1000
43.	Minimum power demand		KM	80	90	100	110	100	110
44.	Chn floor conveyor reductor		Nm	5 000	5 000	5 000	5000	5 000	5 000

	General data							
1.	Vhile type			Capacity trailer				
2.	Chassis			Stiff/sprung				
3.	Type			RX1850HD;RX1870HD+;RX2070HD+; RX2270HD+; RX2470HD+				
4.	Type of construction			Monobloque				
	Measurements							
5.			J.M.	RX1850 HD	RX1870 HD+	RX2070 HD+	RX2270 HD+	RX2470 HD+
6.	Length		m	8,95	8,4	9	9,6	10,2
7.	width		m	2,9	2,9	2,95	2,9	3
8.	Height	650/75R32	m	3,15	3,15	-	-	-
9.		650/65R38	m	3,16	-	-	-	-
10.		710/70R38	m	3,24	3,24	-	-	-
11.		650/65R30,5	m	3,08	3,08	3,08	-	-
12.		750/60R30,5	m	3,11	3,11	3,11	-	-
13.		550/60R22,5 tandem	m					-
14.		650/55R26,5 tandem	m					
15.		710/50R26,5 tandem	m					
16.	Distance betwee wheels		m	2,3	2,3	2,3	2,35	2,35
	Loadng height							
17.	without extensions	650/75R32	m	2,55	2,75	-	-	-
18.		650/65R38	m	2,56	-	-	-	-
19.		710/70R38	m	2,64	2,84	-	-	-
20.		650/65R30,5	m	2,48	2,68	2,68	-	-
21.		750/60R30,5	m	2,51	2,71	2,71	-	-
22.		550/60R22,5 tandem	m	2,65	2,85	2,85	2,85	-
23.		650/55R26,5 tandem	m	2,7	2,9	2,9	2,9	2,9
24.		710/50R26,5 tandem	m	2,7	2,9	2,9	2,9	2,9
25.	with extensions	650/75R32	m	3,15	3,35	-	-	-
26.		650/65R38	m	3,16	-	-	-	-
27.		710/70R38	m	3,24	3,44	-	-	-
28.		650/65R30,5	m	3,08	3,28	3,28	-	-
29.		750/60R30,5	m	3,11	3,31	3,31	-	-
30.		550/60R22,5 tandem	m	3,25	3,25	3,25	3,25	-
31.		650/55R26,5 tandem	m	3,3	3,5	3,5	3,5	3,5
32.		710/50R26,5 tandem	m	3,3	3,5	3,5	3,5	3,5
	Inside measure of the loading box							
33.	Length		m	5,9	5,4	6	6,6	7,2
34.	width		m	1,5/2	1,5/2,1	1,5/2,1	1,5/2,1	1,5/2,1
35.	height		m	1,3	1,5	1,5	1,5	1,5
36.	Height with extensions		m	1,9	2,1	2,1	2,1	2,1
	Parameters							
37.	Tonnage		kg	18 000	18 000	20 000	22 000	24 000
38.	Weight (*stadandard equipment)		kg	6500	7000	7500	9000	9500
39.	Total permissible technological weight		kg	19 200	19 600	21 600	24 500	26 400
40.	Permissible technological axle load capacity (* for 40 km / h)		kg	21 700	21 700	21 700	32 000	32 000
41.	Permissible administrative axle load		kg	10 000	10 000	10 000	18 000	18 000
42.	Maximum load on the drawbar eye		kg	3 000	4 000	4 000	4 000	4 000
43.	Capacity		m^3	18,1	18	20,2	22,1	24,2
44.	Capacity with extensions and a rear extension		m^3	30	31	34	37	40
45.	PTO speed		obr./ min	1000	1000	1000	1000	1000
46.	Minimum power requirement		KM	120	120	140	150	160
47.	Floor conveyor reducer		Nm	6 100	10 000	10 000	10 000	10 000

Tires available:

- **23,1-26 16PR 159A8 Alliance**

width: 587mm;

overall height: 1560mm.

bar\km/h	static	10	**25**	30	40	50
1.9	8990	5870	**4810**	4180	3910	3560
2.1	9550	6230	**5100**	4440	4150	3780
2.3	10060	6560	**5380**	4680	4375	3980

- **620/75R26 (23,1R26)Alliance- Radialne 167A8/164B**

width: 625mm;

height: 1590mm

bar\km/h	static	10	**25**	30	40	50
2.0	9520	6210	**4600**	4430	4140	3800
2,4	10600	6920	**5120**	4930	4610	4230
2,8	11590	7560	**5590**	5390	5040	4630
3,2	12540	8180	**6050**	5830	5450	5000

- **650/75R32 172A8/172B Alliance**

width: 625mm;

overall height:: 1800mm.

bar\km/h	static	10	**25**	30	40	50
2.0	11020	7190	**5320**	5130	4790	4790
2.5	12540	8180	**6050**	5830	5450	5450
2.8	13410	8750	**6470**	6420	5830	5830
3	13960	9110	**6740**	6490	6070	6070
3.2	14490	9450	**6990**	6740	6300	6300

- **650/65R38 171D/174A8 Alliance**

width:: 645mm;

overall height: 1835mm.

bar\km/h	**25**	40	50	65
2	**5400**	4990	4790	4560
2.4	**6010**	5550	5320	5070
3	**6850**	6330	6070	5780
3.6	**7290**	6730	6460	6150

- **650/75R32 175A8/175B Alliance**

width: 625mm;

overall height: 1800mm.

bar\km/h	static	10	**25**	30	40	50
3.3	14840	9680	**7160**	6900	6450	6450
3.5	15360	10020	**7410**	7150	6680	6680
3.7	15870	10350	**7660**	7380	6900	6900

710/70R38 BKT Agrimax RT765 178D/181A8 on the rim10/281/335 ET-50

width: 716mm;
overall height: 1959mm

bar\km/h	10HT	10LT	30	40	50
1,4	5165	6740	**5165**	4825	4825
1,6	5675	7105	**5675**	5300	5300
2,0	6460	8090	**6460**	6025	6025
2,4	7195	9005	**7195**	6720	6720
2,8	7865	9850	**7865**	7350	7350
2,9	8025	10050	**8025**	7500	7500

- **650/65R30.5 176D Vredestein/BKT**

width 645mm;
overall height 1621mm.

bar\km/h	10	**25**	40	50	65
1.0	5800	**4900**	4280	3790	3170
1.2	6450	**5495**	4785	4245	3540
1.6	7755	**6690**	5795	5150	4275
2.0	9055	**7885**	6810	6055	5015
2.4	10360	**9080**	7820	6960	5750
2.8	10965	**9615**	8280	7370	6090
3.2	11570	**10150**	8740	7775	6425
3.6	12175	**10685**	9200	8180	6760
3.8	12480	**10950**	9430	8385	6930
4.0	12780	**11220**	9660	8590	7100

- **750/60R30,5 BKT FL 630 SUPER 181Don the rim 10/281/335 ET-50**

width 754mm;
overall height: 1675mm.

bar\km/h	10	**25**	40	50	65
1.2	6240	**5475**	4715	4195	3465
1.6	7575	**6650**	5725	5095	4210
2.0	8765	**7695**	6620	5895	4870
2.4	10100	**8865**	7630	6790	5610
2.8	11435	**10040**	8640	7690	6355
3.2	12330	**10820**	9315	8290	6850
3.6	13665	**11995**	10325	9190	7590
4.0	14850	**13035**	11220	9985	8250

550/60R22,5 16PR 167 A8/163 B BKT ***(for RX2070HD)***

width 550mm;
overall height: 1240mm.

bar\km/h	10	**20**	30	40	50
2.4	6970	**6275**	5580	4980	4480
2.6	7310	**6575**	5845	5220	4700
2.8	7630	**6865**	6105	5450	4875

650/55R26,5 169D BKT ***(for RX2470HD)***

width: 645mm;

overall height: 1389mm.

bar\km/h	10	**25**	40	50	65	70
1,2	4385	**3850**	3315	2950	2440	2220
1,6	5385	**4675**	4025	3585	2960	2695
2.0	6160	**5410**	4660	4145	3425	3120
2.4	7100	**6235**	5370	4775	3945	3595
2.8	8040	**7060**	6080	5410	4470	4070
3.2	8670	**7610**	6550	5830	4815	4385
3.6	9605	**8435**	7260	6460	5340	4860
4.0	10440	**9165**	7890	7020	5800	5280

The user is obliged to comply with the permissible speeds transport for the maximum load capacity of the spreader.

In case of using tires of a different brand, the parameters of the given type should be adhered to tires.

3.2 CONSTRUCTION AND PRINCIPLE OF OPERATION

The construction of the manure spreader is shown in the figure below. The main structural element is a monocoque load box with a rigid uniaxial chassis. The connection to the tractor is via a suspended drawbar, equipped with a drawbar eye. A support foot is bolted to the shell, which serves to support the machine when parked, when it is not connected to the tractor. On the left side of the load box there is an inspection ladder for observation of the load space and for entering during cleaning and maintenance. In the rear part of the load box there is a vertical shutter (guillotine) that separates the transported load from the beater and prevents the load from falling out during transport. The main working element is a beater with two vertical shafts/rollers. The transported mass moves towards the beater through a hydraulically driven floor chain conveyor. The beater can be equipped with deflectors that act as spread limiters and safe during transport. After dismantling the beater, vertical shutter and mounting the extensions and the volumetric beater, the spreader can be used to transport volumetric masses, e.g. corn.

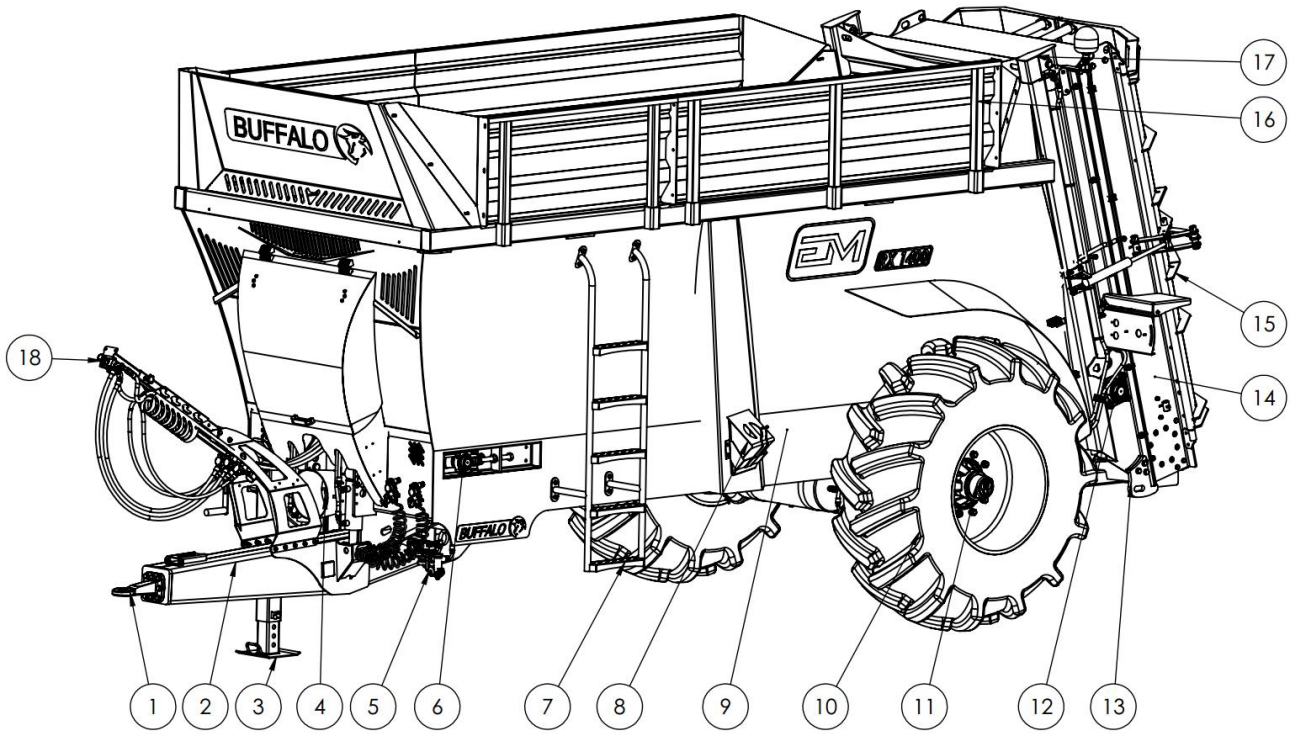


Fig.9.Construction

1-drawbar eye; 2- drawbar; 3-support foot; 4-PTO shaft; 5-brake force regulator; 6- roller with a unit for tensioning the floor conveyor chain; 7- inspection ladder; 8- supporting wedge; 9- loading box; 10- wheel; 11- axis; 12- drive shaft of the floor conveyor; 13- beater suspension holder; 14- beater; 15- deflectors; 16- extensions; 17- vertical gate (guillotine); 18- manual speed controller of the floor conveyor.

3.2.1 FEED MECHANISM

The feeding mechanism consists of a floor conveyor, a conveyor drive shaft and a roller with a unit that tightens the floor conveyor chain. The entire mechanism is powered by the tractor's hydraulic system.

The floor conveyor is made of a pair of chains connected by profile bars. The chains are driven by chain wheels mounted on the feeder shaft. The shaft is driven by a reduction gear and a hydraulic motor.

In the front part of the spreader there is a shaft with a tensioning system through which we tighten the feeder chains. Scrapers are installed at the conveyor chain wheels to prevent them from clogging.

The floor conveyor is protected against damage by an overload hydraulic valve located at the hydraulic motor. At the time of reloading, when the conveyor is overloaded or mechanically blocked, the conveyor will be stopped. Additionally, the system is protected by a directional valve against unintentional starting of the conveyor in the opposite direction to the discharge. In the event of the necessity to withdraw the floor conveyor, clasp the hydraulic couplings at the hydraulic motor.

3.2.2 BEATER DRIVE ASSEMBLY

The drive unit of the beater consists of the universal joint shaft for the tractor, the solid shaft that transmits the drive from the front part of the spreader to the rear part, and the universal joint shaft which transmits the drive to the beater, equipped with an overrunning clutch. As an option, the spreader can be equipped with a wide-angle roller, which also enables work on a headland.

Roller symbol	Roller type/ Use	Max. moment [Nm]	Overload clutch [Nm]
8G9N131CE007003	Standard to the tractor	3900	-
7G8R121CEWS7016A	Wide-angle to the tractor	3500	-
8G7N081FXA52003	to connect it to te beater	2900	2100
8G7N081FXA52002	to connect it to the beater	2900	2300
WPA8G7N161FXA5259C	To connect it to the beater	2900	2600

3.2.3. VERTICAL SPREADING BEATER

The vertical 2-rotor beater is used for grinding and spreading the mass fed through the floor conveyor. The beater is mounted on the rear part of the manure spreader. The adapter is driven by the tractor's drive unit and PTO.

The adapter consists of the left and right side profiles, the upper beam, which together with the gear form a frame for the rollers. In the lower part there is a gear with shafts mounted. The main working tools are knives that are bolted to the shafts with screws. Rotating rotors shred the feed material throwing it back and to the sides. The lower part of the rotors is ended with discs with blades, thanks to which the spreading width of the material is increased.

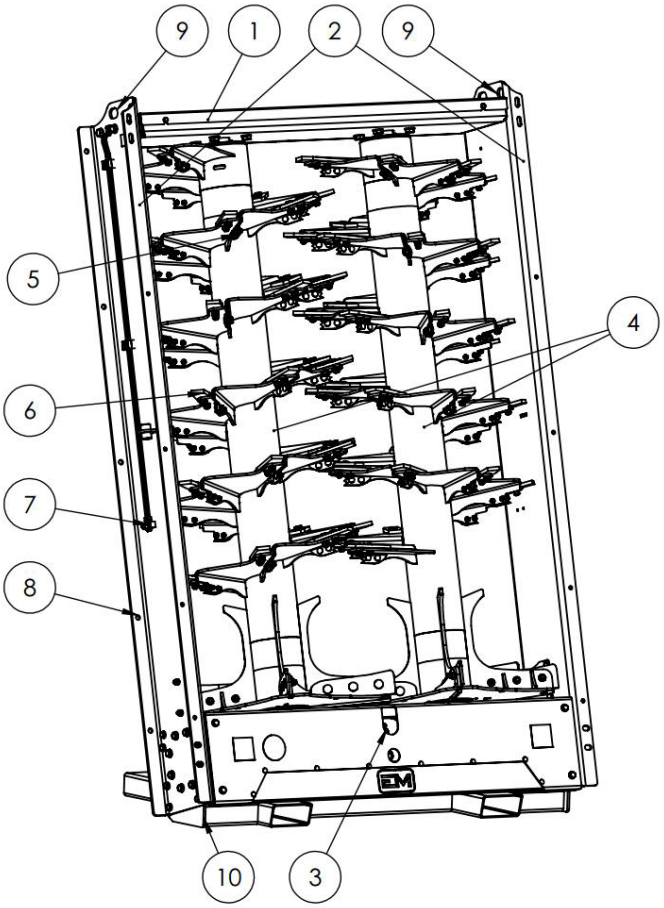


Fig.10. Vertical spreading beater

1- upper beam; 2- sides of the beater; 3- gearbox; 4- beater shafts/rollers; 5- beater shaft knives; 6- spreading paddles; 7- central lubrication of the bearings of the upper shafts of the beater; 8- mounting holes of the spreader beater; 9- points of attachment of slings; 10- grips to detach beater.

The beater is connected to the loading box with M16 bolts. In order to disassemble the beater:

-disconnect the PTO shaft from the beater gear;
-using a lifting device with a load capacity of min. 1200 kg, or a tractor with a loader equipped with pallet forks, secure the beater against possible falling;
-unscrew the bolts connecting the beater with the loading box;
-slowly lift the beater upwards and drive away with the beater;
-After dismantling the beater, place it on a solid surface and secure it against tipping over.

3.2.4 GUILLOTINE (REAR HYDRAULIC SLIDER)

The manure spreader can be equipped with a loading box hydraulic slider. It separates the transported material from the beater. It is placed in the side guides that seal and protect the material from getting outside the loading box. The vertical gate valve is reinforced, so that when overloaded with manure, which will press against the gate, it will not damage it. At the bottom of the bolt (as in the front of the loading box) there is a rubber sealing belt, profiled in relation to the conveyor chains. The guillotine is opened by moving it up by means of hydraulic cylinders controlled by the tractor's external hydraulics.

3.2.5. BRAKING SYSTEM

The manure spreader can be equipped with one of the three main brake systems:
- double conduit air installation;
- hydraulic brake system;
- air-hydraulic braking system.

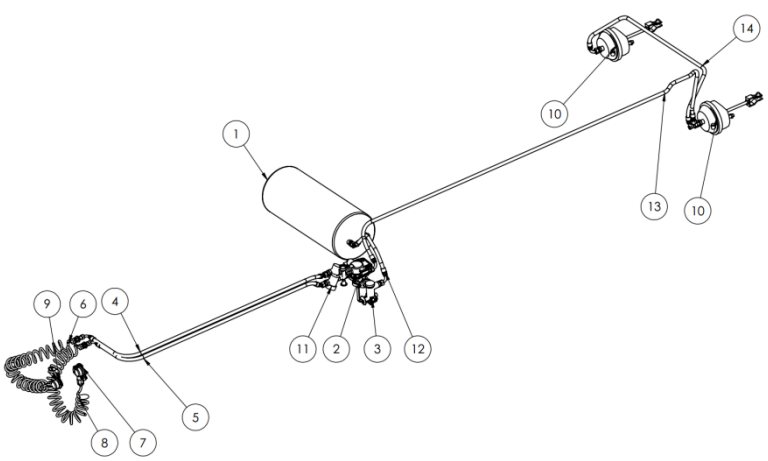


Fig.11. Air brakes double conduit

1-air tank; 2- control valve; 3- brake force regulator; 4- flexible control cable; 5- power cord; 6- yellow coiled wire (control); 7- red wire connector (power); 8- red spiral cable (power supply); 9- yellow wire connector (control); 10- pneumatic actuator; 11- air filter; 12- flexible conduit for the tank; 13- flexible conduit for the actuator; flexible cable connecting the actuators.

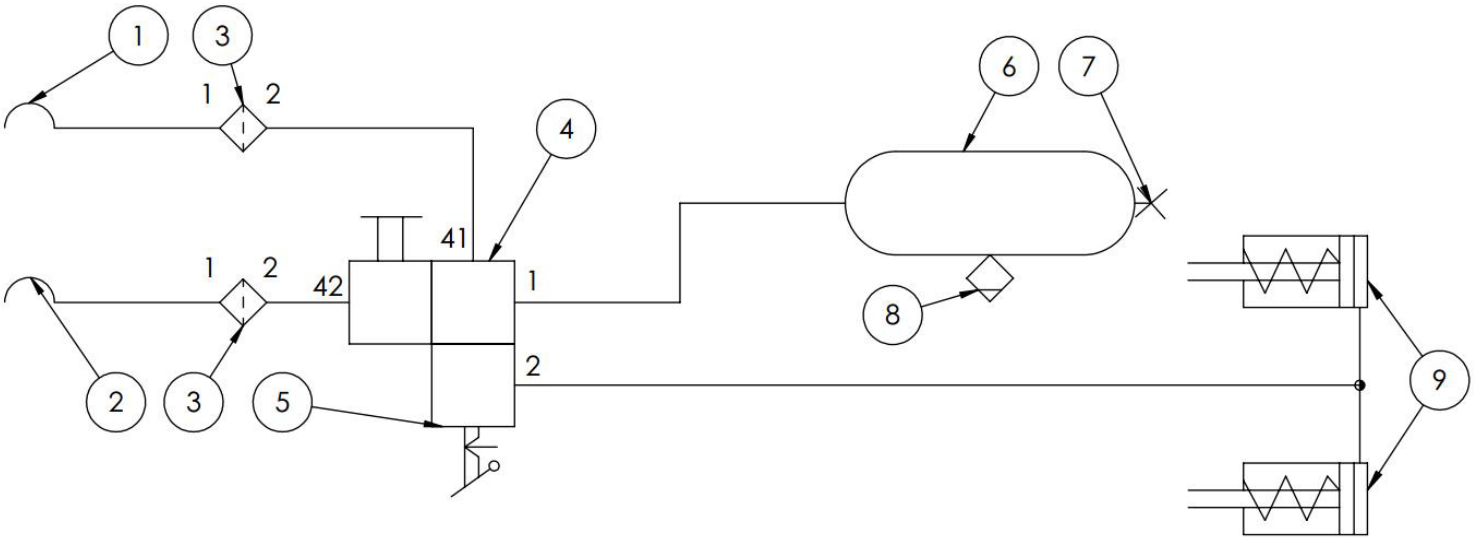
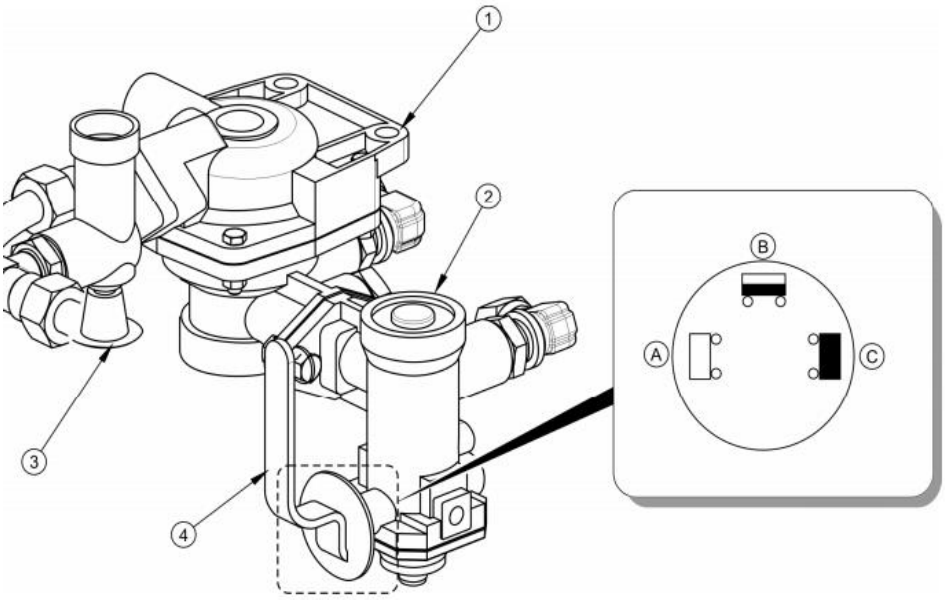


Fig.12. Diagram of a double conduit air system

no	Part name	Number
1.	Yellow hard connector M22x1.5	AW322110
2.	Red hard connector M22x1.5	AW322120
3.	Line filter	5 242 04 000 0
4.	Control valve	5 213 02 700 0
5.	3-stage braking force regulator	5 222 00 013 0
6.	40 l air tank	116 39 27
7.	M22 test connector	10KE01
8.	Drain valve M22	05KHS2
9.	M24 diaphragm actuator	SM-024

The main brake is activated from the driver's seat by pressing the tractor brake pedal. The air control valve used in the air system activates the spreader brakes simultaneously with the tractor brakes. In the event of an unexpected disconnection of the lines from the tractor, the control valve will automatically activate the machine's brakes.

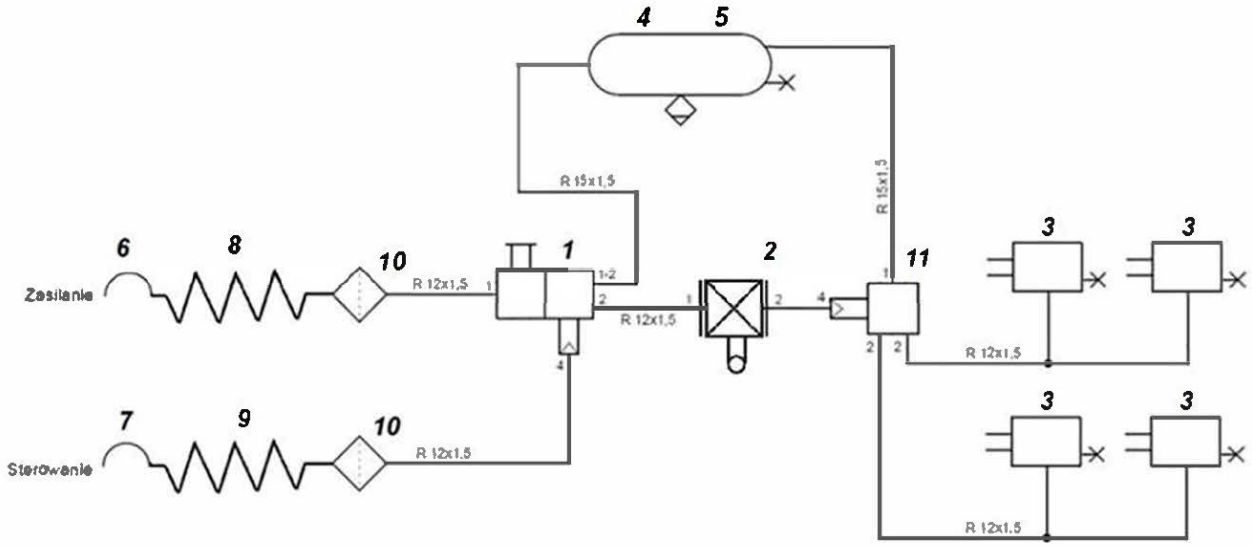
The brake force regulator, used in the air brake system, adjusts the braking force depending on the loading box filling. Switching to the appropriate operating mode is done manually by changing the position of the lever. This is done by the machine operator before driving. There are three working positions: (A) „no load", (B) „half load", (C) „full load".



1- control valve; 2- brake force regulator; 3- brake release button when parked; 4-regulator setting lever (A- „without load"; B- „load fields"; C- „full load")

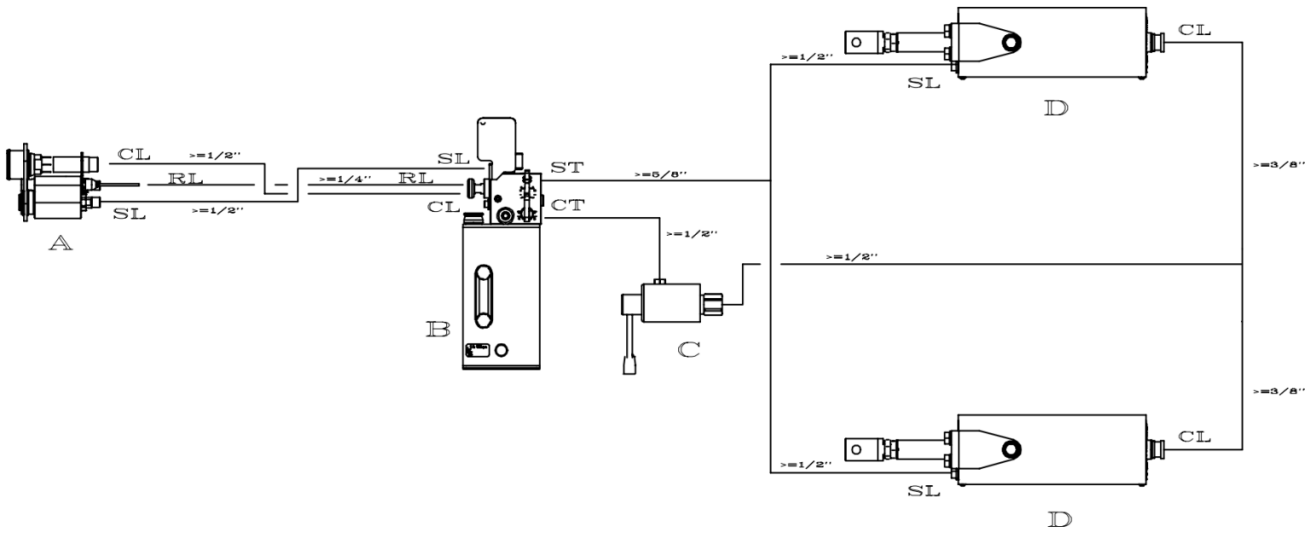
Fig.13. Control valve and brake force regulator

Diagram of the pneumatic braking system of a Buffalo manure spreader with tandem suspension



L.p.	Nazwa	Numer	Ilość
1.	Main valve with disinhibition	5 213 02 700 0	1
2.	Automatic braking force regulator (ALB)	5 223 21 500 0	1
3.	24 "diaphragm actuator + fork	T24	4
4.	Reservoir area 60L fi 276 mm	902 407	1
5.	Tank clamp fi 276 mm	209 843 2	2
6.	Red hard connector M22x1. 5 - power supply 1		1
7.	Yellow hard connector M22x1. 5 - control		1
8.	Coiled PU M22x1. 5 red cable	AW522110	1
9.	Coiled PU M22x1. 5 yellow cable	AW522120	1
10.	Line filter M22x1. 5	5 242 04 000 0	2
11.	Relay valve with damping	5 232 61 010 0	1

Diagram of the dual-circuit hydraulic system of the single axle spreader



Pos.	Description	Code	Qty
A	DLC Coupling Joint	205873/D	1
B	Automatic braking valve for spring brakes	206613	1
C	Manual load sensing valve	206120	1
D	Combined spring brake D.35	306636/35B	2

The valve manages the service and emergency braking functions in two-line hydraulic braking system. In the event of disconnecting the manure spreader from the tractor, the automatic brake valve activates the emergency braking function. This function is achieved by using the energy previously stored in the compressed spring of the actuators, which they become active when the oil of the spring brake section is discharged into the tank.

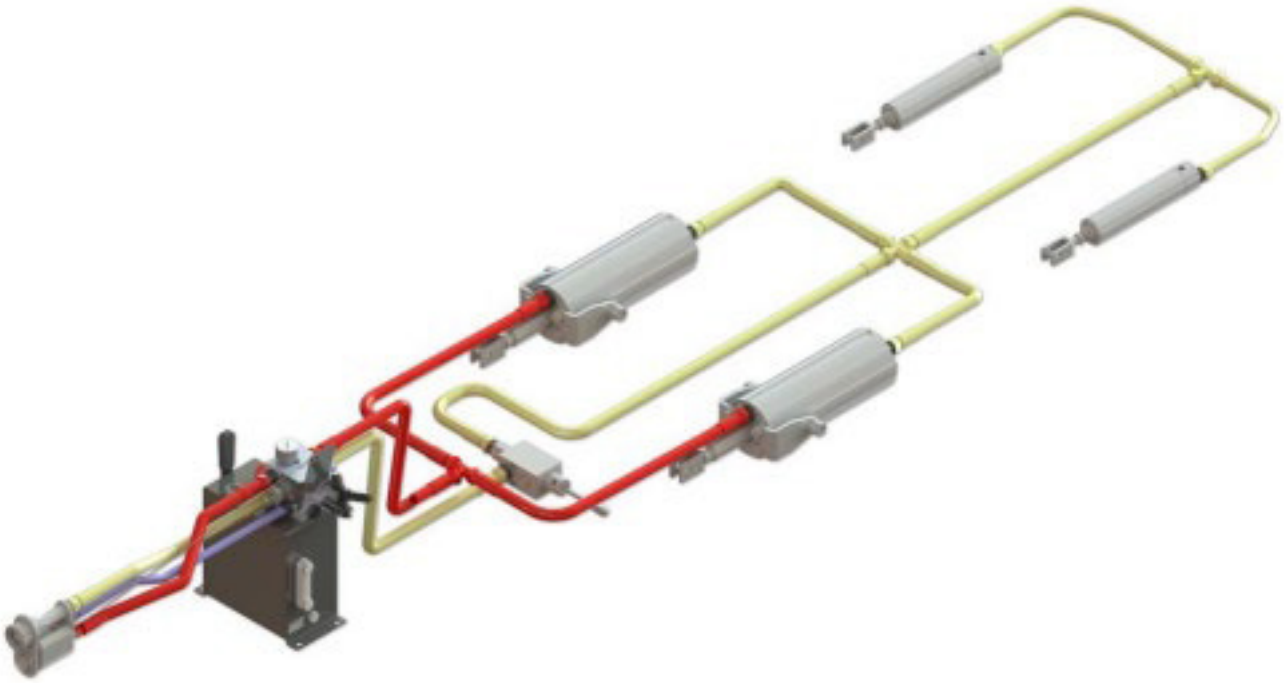


Fig.15. Dual-circuit hydraulic braking system

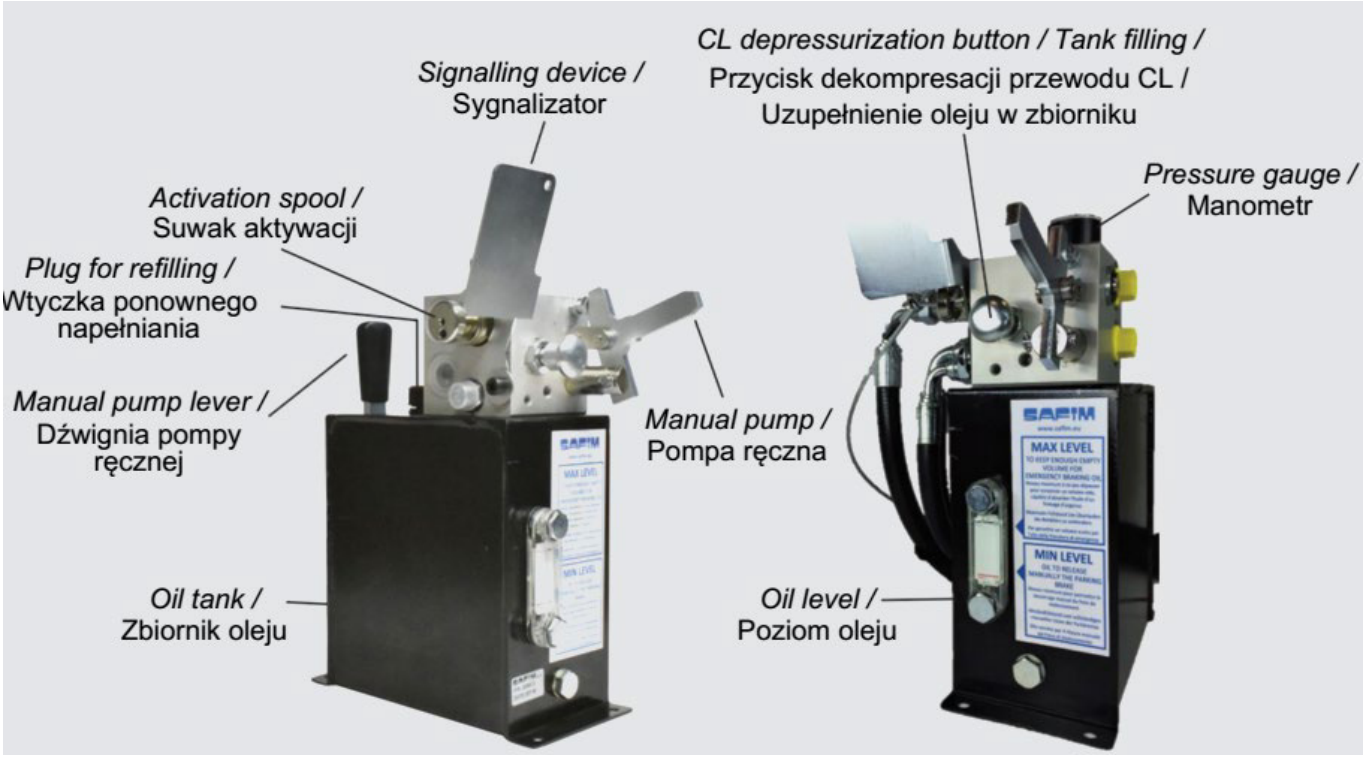
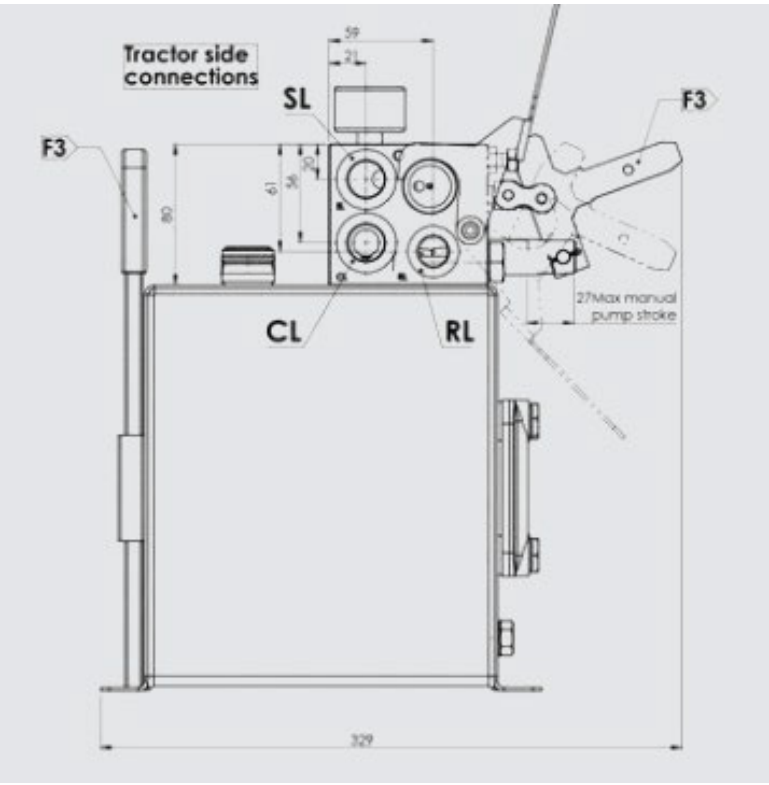
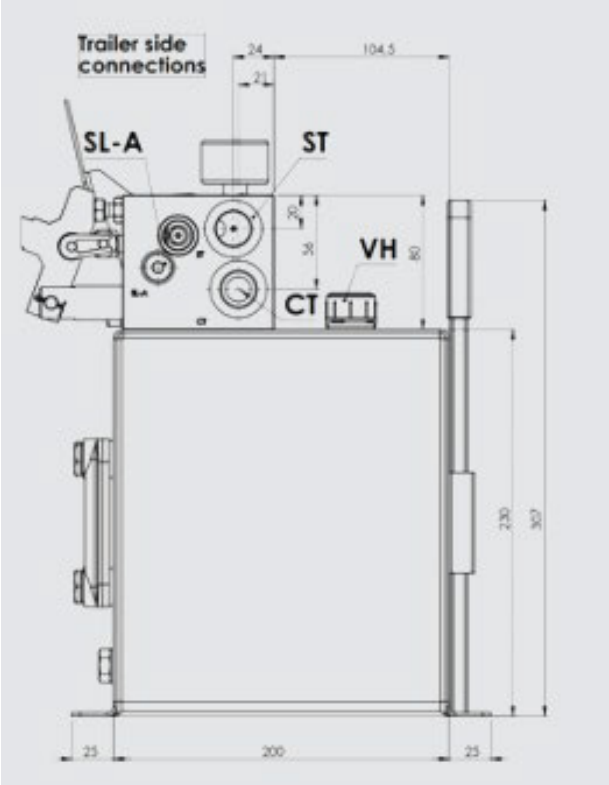


Fig.16. A valve controlling the pump and the tank





CL - Control cable (from the coupling connector)

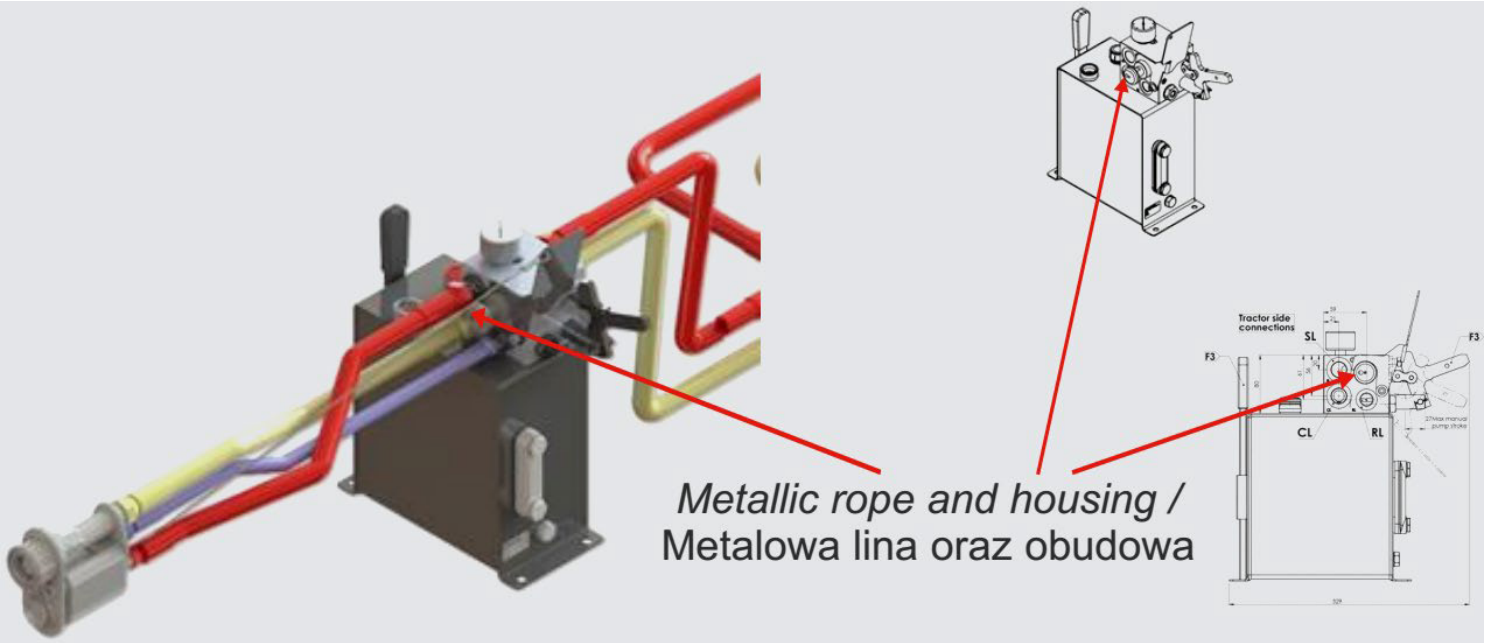
SL - Auxiliary Cable (From Coupling Connector)

RL - Return line (from the coupling connector)

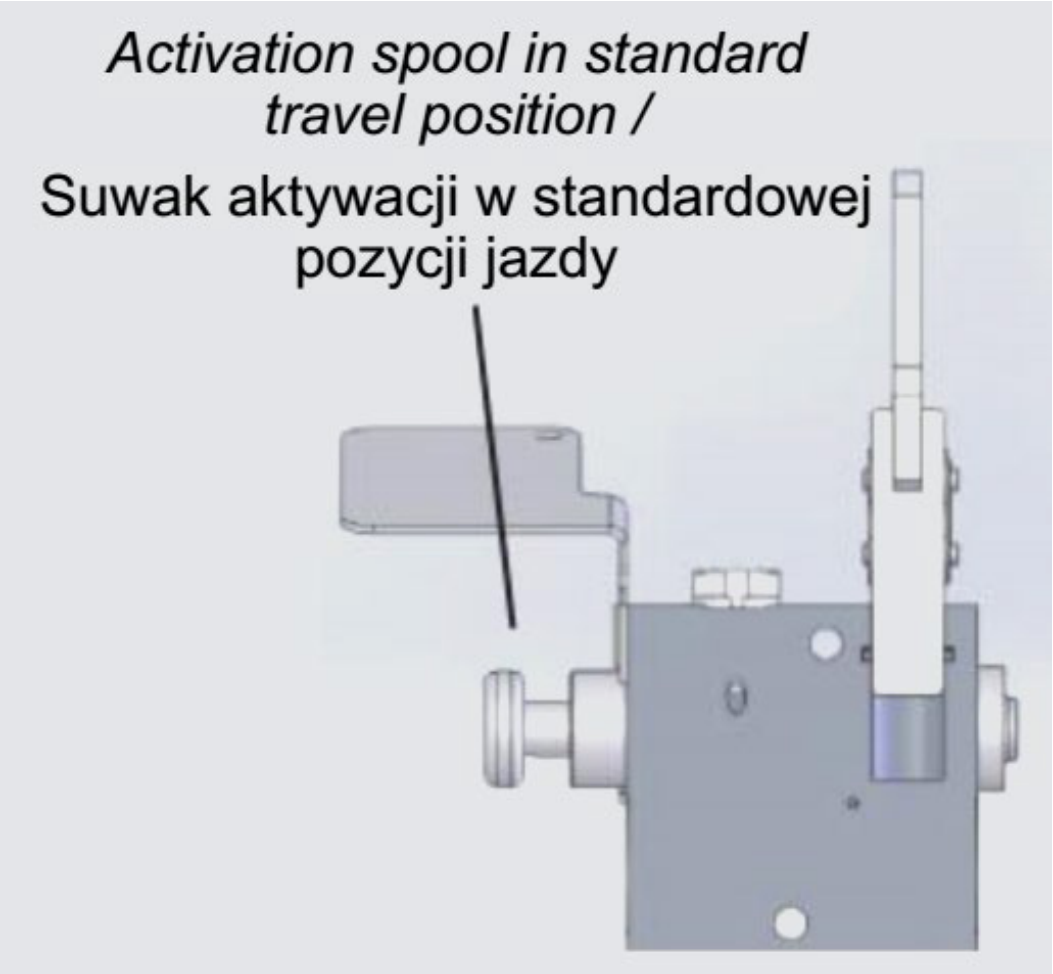
CT - Output port (brake actuators or load sensing valve, if present installed)

ST - Outlet port (spring brake section of connected SAHR actuators - SL port)

SL-A - Return line from automatic load sensing valve, if equipped installed



Connect the metal cable (pre-mounted on the coupling joint) to it dedicated housing on the valve. Please make sure the cable length is 20-30 cm shorter than length of the hydraulic hoses.



Driving mode

- Two-line connection: connection to the tractor
- Tractor engine: on
- Parking brake: released

The activation slider automatically returns to the drive mode position when line pressure additional (SL) increases to its normal value. The normal valve function mode is activated each time the operator connects the two-wire coupler, he will start the tractor engine and slow down
parking brake. In this situation, all emergency functions are activated. The device provides all standard trailer braking functions when the driver brakes. In case of
the trailer is disconnected from the tractor, the automatic brake valve activates the automatic function
emergency braking.

Safe mode

When the trailer is disconnected from the tractor, an automatic brake valve connects the section spring brake of SAHR actuators with reservoir. Oil to keep the springs taut

is discharged into the reservoir, the action of the spring activates the emergency brake function.

Function

the automatic emergency brake is activated even in the event of a pressure drop in

line (SL) while the DLC is still connected to the tractor. Activation slider

remains in its normal function position when the automatic brake function is active.

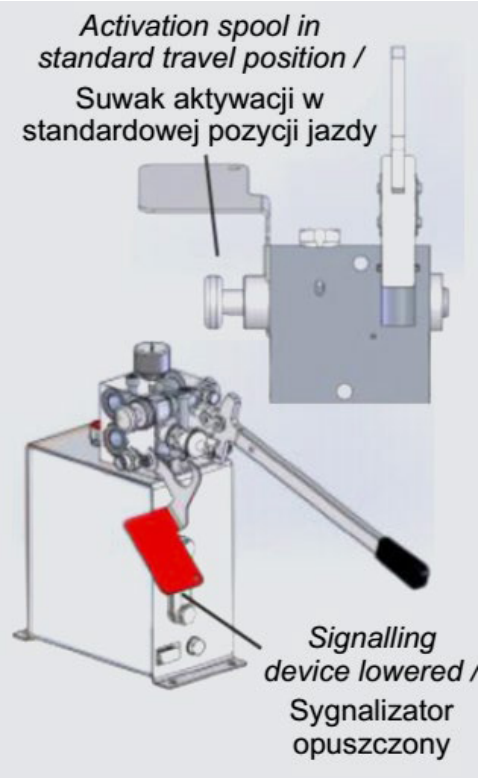
Parking mode

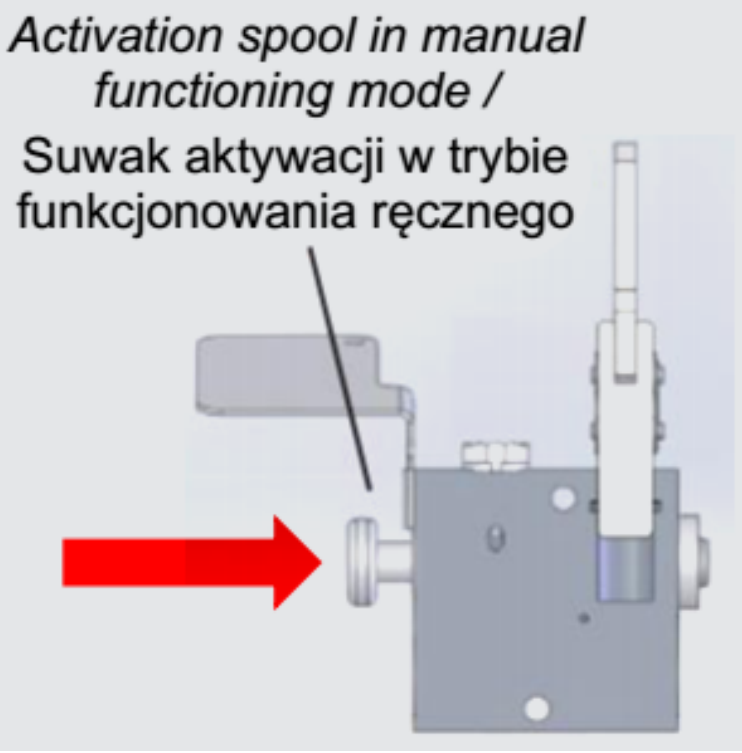
In the trailer braking system with a spring brake, an automatic function application

Emergency braking coincides with the parking brake application because the brakes

spring loads generate both functions. Therefore, disconnecting the DLC connector provides correct parking of the vehicle. If the operator disconnects the two-conduit coupling from the tractor, he recommends

connecting it to the artificial connection of the valve housing to avoid contamination.emergency braking.





Removal of the automatic brake function

In order to remove the automatic brake function it is necessary (in the case of towing the trailer by non-twin-line tractor or other type of vehicle):

• Press the activation slider as shown in the picture until it reaches the end of its extension. The beacon will move

down, generating the activation of the manual operation.

• Pump the oil from the spring brake reservoir using the hand pump. Function

the auto / parking brake will be disabled.

NOTE: the brakes will be released when the pressure in the SL towards the spring section of the actuators

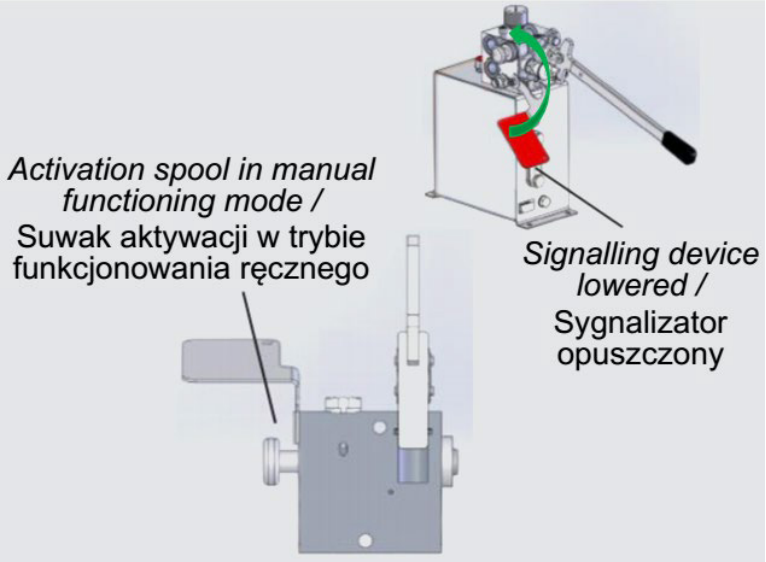
SAHR will be over 15 bar. Check the pressure gauge while inflating to make sure that

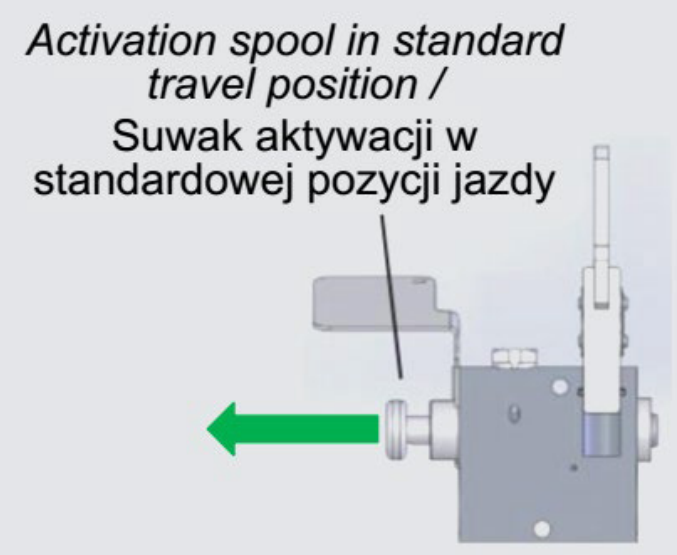
whether it shows the appropriate pressure not exceeding 35 bar.

NOTE: every time the activation slider is in „manual operation mode" it is not

automatic activation of the parking brake is ensured. Where the vehicle must

to park again, check that the activation slider is in the «normal driving position».





Reconnection to the tractor

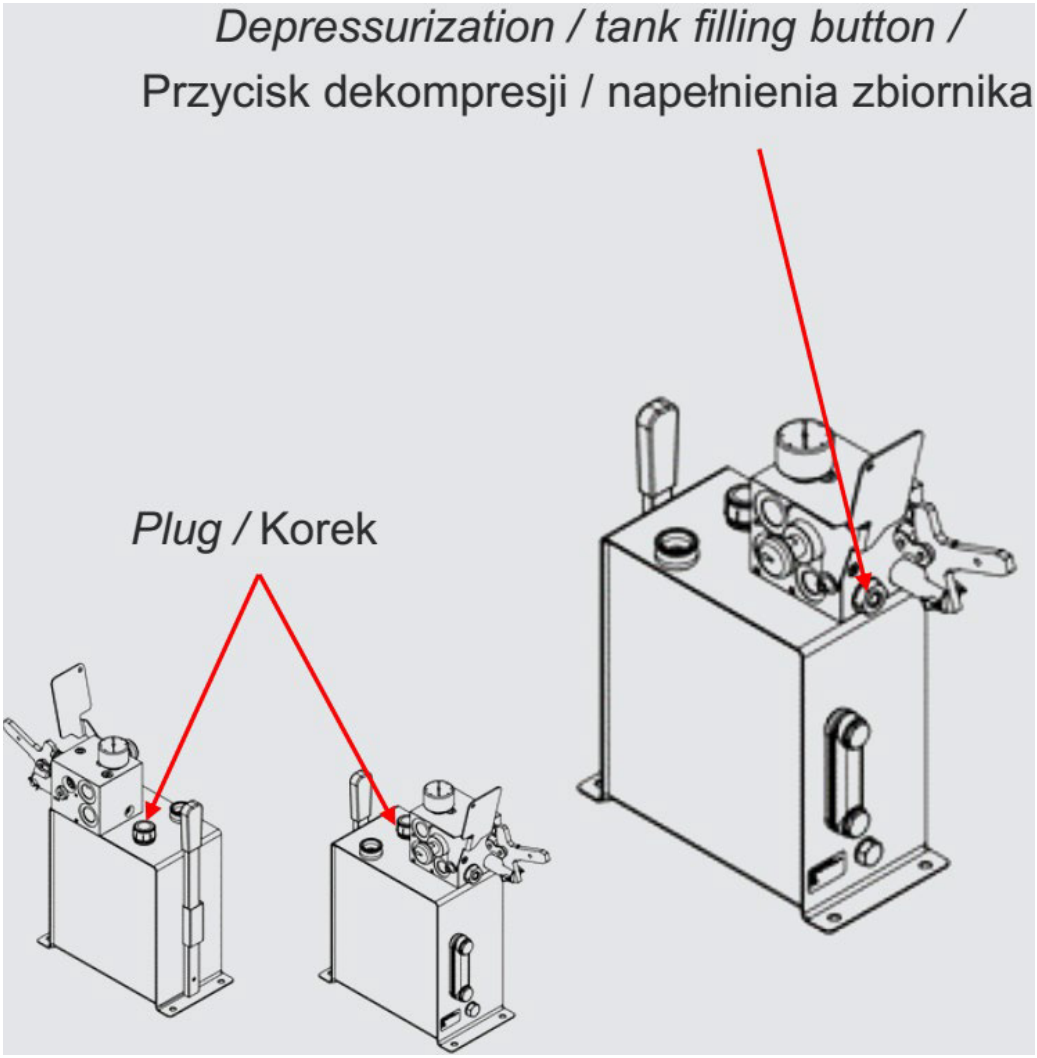
The activation slider automatically returns to its normal function position each time

when the pressure in the secondary line (SL) rises to a normal value. Normal mode

valve function is activated each time the operator connects the two wire connector, it turns on tractor engine and releases the parking brake. In this situation, all emergency functions are there switched on. Put the light switch back to its driving position before starting the engine

tractor and before releasing the tractor parking brake. If the activation slider is already in

driving position, the beacon cannot be reset.

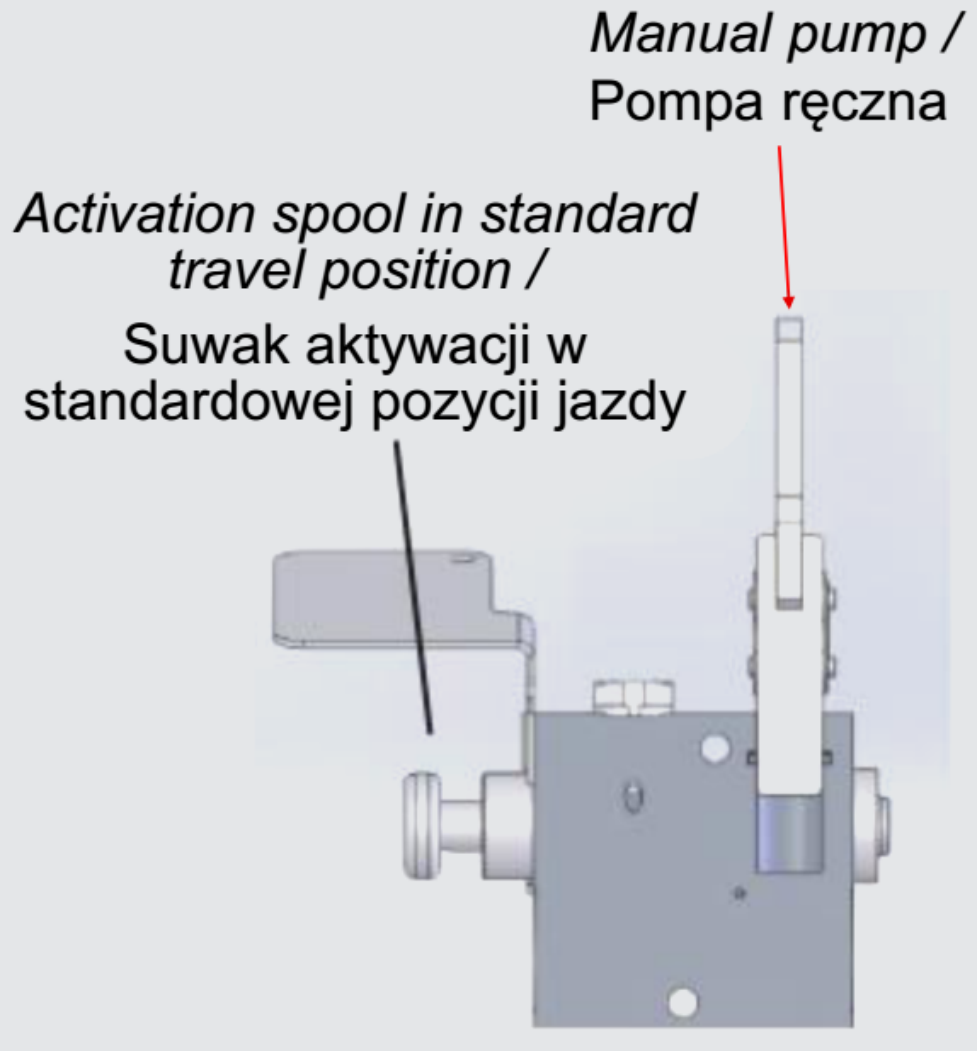


Tank - Filling and Maintenance - 1

Two alternative procedures allow the reservoir to be filled with oil after it is installed in the device:

• Unscrew the oil plug from above and fill the tank with the correct amount of oil * 48

• Press the «decompression / refill» button on the front side of the valve and keeping it in the same position, slightly depress the tractor brake pedal (this procedure requires two operators, one on the tractor and one on the valve). Oil from the tractor via the control line (CL) to the tank. When the oil is right level, release the «decompression / fill the tank» button.



Tank - Filling and Maintenance - 2

Regularly check the oil level in the reservoir: the level must always be between
with the «max» and «min» positions on the level indicator. If the oil level is below the minimum level, please
follow one of the procedures described previously to fill the tank. If the oil level
is above the maximum, use the hand pump when the trailer is hitched to the tractor
(The activation slider is at the «normal function position»). The oil will flow from the reservoir into the reservoir
tractor via an additional cable (SL).

Decompression button

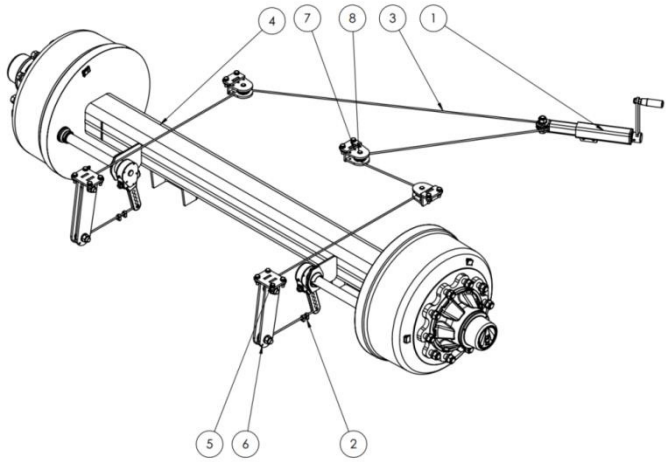
If reconnection of the tractor's two-line coupling is difficult due to pressure remaining inside the pipes, it is possible to discharge the pressure by pressing the button decompress for a few seconds. This can happen while the vehicle remains parked in the sun for some period of time. The excess oil will be drained into the reservoir and the connection of the DLC connector

will be possible again. You can press the decompression button with tools such as screwdriver, wrench or lever for hand pump supplied with the mounting kit

valve.

3.2.6. PARKING BRAKE

The parking brake is used to immobilize the manure spreader when parked. The layout of the system is shown below.



1- brake tensioning mechanism; 2-cable clamp; 3- strand; 4- wheel axle; 5-rear roller holder; 6- roll of rope; 7- Front roller holder; 8- roller pin

Fig.14. Parking brake construction

3.2.7 ELECTRICAL INSTALLATION

The manure spreader's electrical system is adapted to be powered by a 12V DC source from the tractor's electrical system. Connecting the manure spreader's electrical system with the tractor's system should be made with the connection lead provided with the machine.

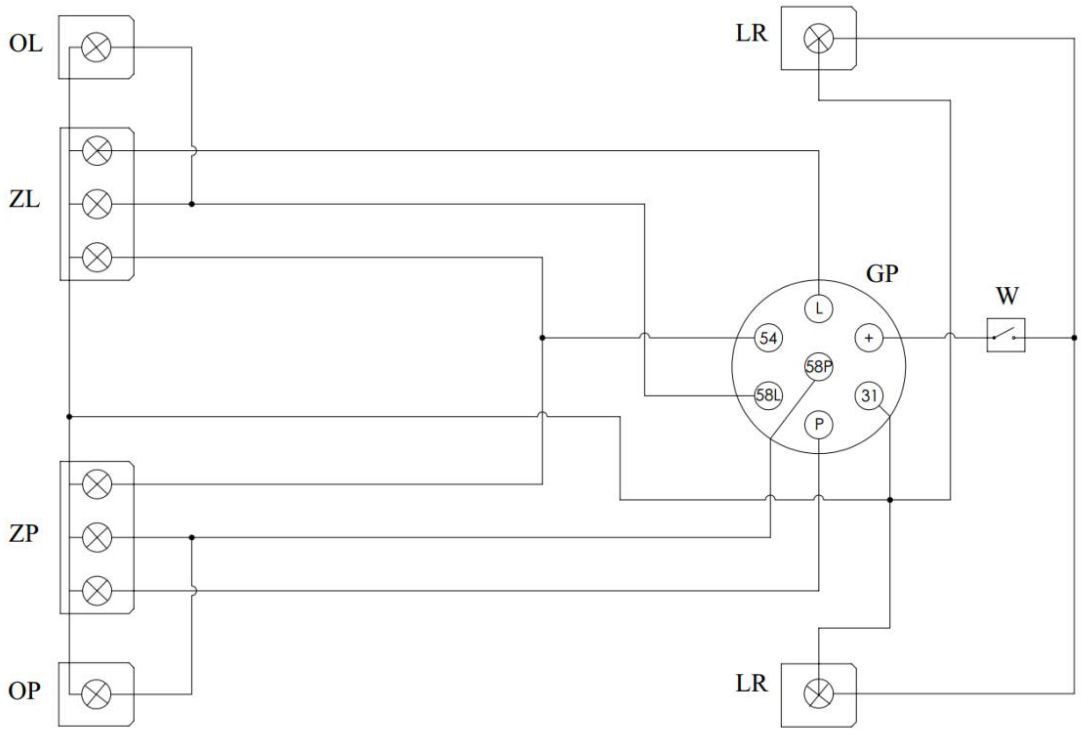


Fig.15. Electrical installation drawing

Symbol	Name
ZP	Right multifunction lamp
ZL	Left multifunction lamp
GP	Connection socket
OP	Right clearance light
OL	Left clearance light
LR	Work lamp
W	Work lamp switch

L	Left turn signal	Yellow
+	Work lamp	Blue
31	Mass	White
P	Right turn signal	Green
58P	Right positional	Brown
54	Stop	Red
58L	Left positional	Black

4. RULES OF USE

The construction of the manure spreader is shown in the figure below. The main structural element is a monocoque load box with a rigid uniaxial chassis. The connection to the tractor is via a suspended drawbar, equipped with a drawbar eye. A support foot is bolted to the shell, which serves to support the machine when parked, when it is not connected to the tractor. On the left side of the load box there is an inspection ladder for observation of the load space and for entering during cleaning and maintenance. In the rear part of the load box there is a vertical shutter (guillotine) that separates the transported load from the beater and prevents the load from falling out during transport. The main working element is a beater with two vertical shafts/rollers. The transported mass moves towards the beater through a hydraulically driven floor chain conveyor. The beater can be equipped with deflectors that act as spread limiters and safe during transport. After dismantling the beater, vertical shutter and mounting the extensions and the volumetric beater, the spreader can be used to transport volumetric masses, e.g. corn.

4.1. PREPARING MACHINE FOR WORK

4.1.1 CONTROL AFTER THE DELIVERY

The manure spreader is delivered to the user completely assembled and does not require any additional assembly activities. However, this does not release the user from the obligation to inspect the machine prior to purchase and commissioning.

Before connecting to the tractor, the machine operator must check the technical condition of the manure spreader and prepare it for the first start-up. To do this, check:

- completeness of the machine;
- condition of the paint coating and mechanical damage to individual components;
- technical condition of safety guards and correct installation;
- technical condition of hydraulic and air lines;
- technical condition of PTO shafts and their covers;
- hydraulic system and gears for signs of any leaks.

4.1.2 PREPARATION OF THE MANURE SPREADER FOR THE FIRST START

Before first start-up, check:

- lubrication points and lubricate elements if necessary;
- correct tightening of screw connections (road wheels, drawbar, adapter elements);
- oil level in the gears: adapter, floor feeder;
- tension of the floor feed chain;
- make sure that after connecting, the PTO shaft transmitting drive from the tractor is of the appropriate length in every possible setting of the tractor in relation to the machine;
-check compliance of the tractor PTO rotational speed with the required manure spreader drive rotations.

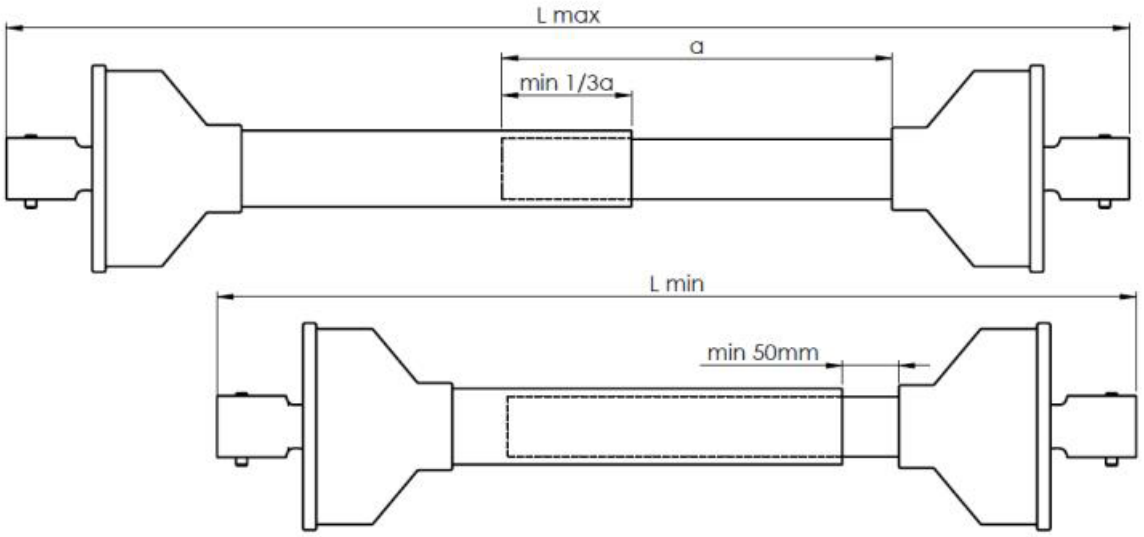


Fig.16. The length of the PTO shaft when connected to the tractor

4.1.3 CHANGING THE HEIGHT OF THE DRAWBAR

The height of the drawbar is changed by means of bolts securing the drawbar with the frame in its rear part or through pins of a rigid link or drawbar shock absorber cylinder in its middle part. The correct height of the drawbar is when the machine is positioned horizontally after coupling the manure spreader with the tractor or the front of the manure spreader is slightly higher than the rear.

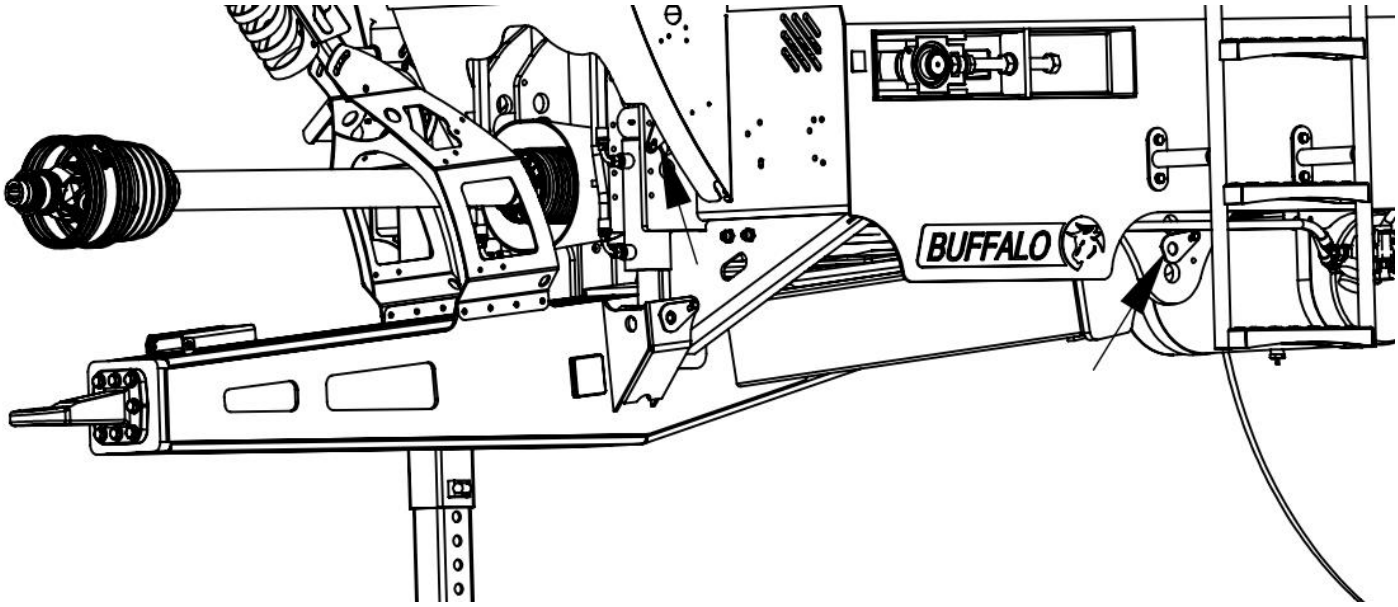


Fig.17. Changing the height of the drawbar

4.1.4 FIRST START-UP

After completing the preparatory activities and the manure spreader is ready for operation, hitch it to the tractor. After starting the tractor, check the operation of individual systems while parked, without load. Perform the first start-up in the sequence shown below:

1. Connect the manure spreader to the tractor on a suitable drawbar.
2. Raise the support foot.
3. Connect the PTO shaft.
4. Connect conduits of the braking, electric and hydraulic systems.
5. Check the operation of the lighting system.
6. Release the manure manure spreader's parking brake.
7. When moving off, check the operation of the braking system.
8. Check the operation of the hydraulic system (guilloine, deflectors - open and close with the appropriate lever).
9. Check the operation of the floor conveyor:

- use the appropriate manifold lever to start the floor conveyor;
- set a value from 0 to 10 on the controller, with a value of 0, the floor conveyor should stand in place, along with increasing the setting on the controller, the floor conveyor should start and accelerate;
- through holes in the front wall of the manure spreader observe the movement of chain with slats, checking if the direction is correct.

10. Check the operation of the spreading beater - start the PTO shaft at low revolutions, leaving it at revolutions for a few minutes, check:
- rotation of the adapter shafts, no vibrations, jamming, scrubbing etc.
- there are no disturbing knocks, noises, etc. in the drive system and adapter.
11. Disengage the PTO drive, tractor and unhitch the manure spreader.

If all the preparatory activities were successful, the manure spreader may be approved for use. In the event that during the first start-up, a malfunction of individual systems or defects are found, it should be reported to the point of sale, the Manufacturer's service center in order to clarify the problem or repair.

4.2 HITCHING UP AND UNHITCHIG THE MANURE SPREADER

The machine may only be aggregated with an efficient agricultural tractor with all necessary connections (air, hydraulic, electric brakes) and a tractor hitch meeting the requirements of the spreader manufacturer.

 UWAGA	Before connecting the machine, check the technical condition of the hitching system of the tractor and the manure spreader as well as connection elements of the braking, hydraulic and electric systems.
 NIEBIEZPIECZEŃSTWO	During hitching, there must be no other people between the manure spreader and the tractor. When attaching the machine to the machine, the tractor operator should exercise particular caution and make sure that bystanders are not in the danger zone during hitching. Check that nobody or nothing is in the load box. Be especially careful when joining. When connecting the hydraulic lines to the tractor, make sure that the tractor and manure spreader hydraulic systems are not under pressure.

HITCHING UP THE MANURE SPREADER

In order to connect the manure spreader with a tractor, perform the following steps:

- Make sure that the manure spreader is immobilized with the parking brake and securing chocks are placed under the wheel.
- Position the agricultural tractor directly in front of the drawbar eye.
- Position the drawbar eye at such a height that it is possible to connect the machines.
- If the manure spreader is equipped with a hydraulic supporting foot, connect the hydraulic conduits of the supporting foot to the tractor sockets and set the manure spreader drawbar to the appropriate height.
- Reverse tractor, connect the manure spreader to the tractor's hitch. Check the coupling pin safety device which protects the machine against accidental disconnection.
- Raise the support foot to its maximum position.
- Activate the tractor parking brake, turn off the tractor engine, remove the key from the ignition switch and secure the tractor against access by unauthorized persons.
- Connect air system conduits (applies to double conduit systems).

• Connect the air conduit marked yellow with the yellow socket in the tractor.
• Connect the air conduit marked red with the red socket in the tractor.
• Connect the air system conduit (applies to single conduit systems).
• Connect the air conduit marked black with the black socket in the tractor.

- Connect hydraulic conduits of the floor conveyor installation.
- Connect the hydraulic conduits of the guillotine valve installation.
- Connect hydraulic conduits of the control system of beater covers (deflectors).
- Connect the main power cable for the electric lighting system.
- Connect the PTO shaft to the tractor. Make sure that the ends of the hitch on the PTO shaft fit well and that the hitch is properly attached.
- Release manual parking brake of the manure spreader by turning the crank of the parking brake mechanism.

UNHITCHING THE MANURE SPREADER

In order to disconnect the manure spreader, do the following:

- Place tractor and manure spreader in one line.
- Set the support foot in such a way that the drawbar eye was set in a position enabling safe disconnection of the tractor.
- Reduce pressure in individual tractor hydraulic systems.
- Activate the tractor parking brake, turn off the tractor engine, remove the key from the ignition switch and secure the tractor against access by unauthorized persons.
- Immobilize the manure spreader with parking brake and place chocks under the wheel.
- Disconnect the hydraulic conduits of the installation of the hydraulic foot, the floor conveyor displacement, vertical shutter, adapter covers, protect them with covers and hang the plugs in the holder.
- Disconnect electric system wires.
- Disconnect brake system conduits.
- Disassemble PTO shaft and secure it.
- Disconnect the manure spreader hitch from the tractor hitch and drive the tractor away.

 NIEBIEZPIECZEŃSTWO	Be especially careful when disconnecting the manure spreader from the tractor. Disconnecting the manure spreader from the tractor and parking of the loaded manure spreader supported by a support foot is prohibited. It is forbidden to disassemble the support foot and support the machine on „makeshift" stands.

4.3. LOADING THE MANURE SPREADER

Before loading, place the coupled tractor and the manure spreader on a firm, even surface. Machines should be parked for driving straight ahead with the parking brake immobilized.
Before starting loading, it is obligatory to check that there are no people, objects inside the loading box, that the floor conveyor is not damaged and that the guillotine is fully lowered.
It is recommended to use appropriate loaders, loaders or conveyors for loading. Manure loading should start from the rear part of the load box and should be carried out in layers. When loading, emptying the material from the bucket, forks should be smooth from the lowest possible height. It is forbidden to compact the manure on purpose. The loading height must not exceed the clearance height of the beater mechanism. You should aim for an even distribution of the load over the box for optimal spreading.

Due to the various density of fertilizing materials, using the total capacity of the load box may exceed the permissible load capacity of the spreader. It is therefore necessary to observe the technical and administrative gross vehicle weight. Approximate specific gravity of selected materials is presented in the table below.

TYPE OF MATERIAL	DENSITY [kg/m3]
Fermented manure	700-800
Old manure	800-950
Fresh manure	700-750
Compost	950-1100
Agricultural lime	1500-2500

Regardless of the type of transported material, the user is obliged to secure it in such a way that it cannot move freely and contaminate the road. If this condition cannot be met, the transport of such materials is prohibited**.**

 UWAGA	Before driving, check that the loading box guillotine is closed and the tailgate is lowered. It is forbidden to exceed the permissible load capacity of the manure spreader, as it may endanger road safety and may damage the machine. Uneven loading results in uneven manure spreading across the field. The loading height must not exceed the clearance height of the adapter mechanism.

4.3.1 LIME LOADING AND UNLOADING

The spreader can be used for sowing lime. When sowing lime, remember that it is much heavier than manure. This involves the risk of overloading the machine and damaging, for example, the running gear. Another thing with a lot of fertilizer is the pressure on the floor of the box. Too much load on the spreader may cause the belt to stop. It is recommended that the amount of transported material be small, i.e. 1/3 to a maximum of 1/2 of the box capacity (including the box itself without extensions, in the case of large spreaders and the use of raised slats in the floor conveyor, the amount of fertilizer must be smaller because the pressure on the floor is greater and the slats take up more material, generating a greater load on the drive transmission system, which may damage them). The gate valve (guillotine) should be set at a level slightly lower than the top of the loaded material to even out the dosing of the material passing to the beater shafts. The less the slide gate is opened, the more precise the dosing will be, but it will cause the material to build up at the rear and increase the load on the floor conveyor.

Lime should be spread immediately after loading, because after a long time it can settle permanently on the spreader floor, which can block the chains and the slats. The spreader loaded with lime must not come into contact with any moisture, it is forbidden to turn on the drive of the floor conveyor during any rainfall (in case of water entering the spreader loaded with lime, it should be unloaded manually). Due to its compaction properties, lime can accumulate in the chain links and chain wheels, therefore the condition of all the floor conveyor elements should be checked regularly (preferably after each pass). After each spreading lime, the chains, feeder slats and sprockets should be thoroughly cleaned (in this case a pressure washer with pure water or preparations intended for this purpose is recommended), washing and drying must take place at a temperature above zero.
Manure spreaders are not typical machines designed to spread lime and related materials. When spreading lime with spreaders, we will not achieve optimal spreading parameters compared to spreading lime with specialized machines designed for this purpose.

 UWAGA	It is essential to follow the instructions for spreading lime. Failure to follow the rules for spreading lime with the spreader may result in damage to the machine.

4.4. ADJUSTMENT OF FERTILIZATION DOSE AND MANURE SPREADING

4.4.1 ADJUSTMENT OF THE FERTILIZATION DOSE

The amount of material spread over a given area of a field depends on the following factors:
- effective spreading width depending on the type of spread material;
- speed of the floor conveyor;
- driving speed;
- loading height of the loading box;

MANUAL REGULATOR OF CHAIN FLOOR CONVEYOR SPEED

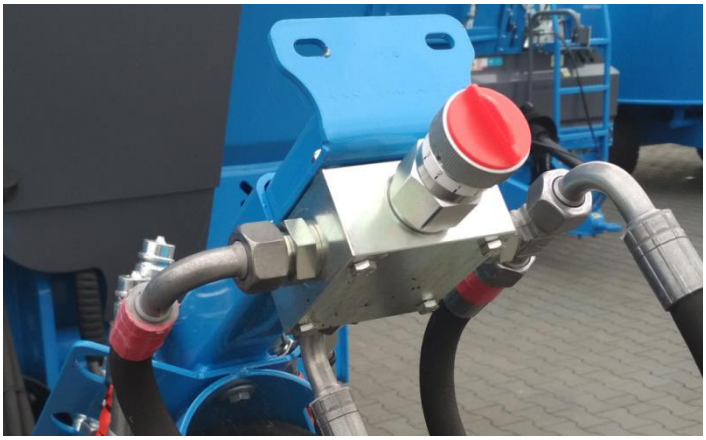


Fig.18. Manual regulator of chain floor speed

The floor conveyor speed should be selected experimentally and set using the knob on the flow regulator, which is located on the adjustable handle above the drawbar (standard equipment).

Adjusting the speed of the floor conveyor:

- reducing the speed of the conveyor - by turning the regulator knob clockwise towards „0".
- increasing the speed of the conveyor - by turning the regulator knob anti-clockwise to the value „10".

ELECTRONIC CONTROL OF CHAIN FLOOR CONVEYOR SPEED

Fig.19. Electronic control of chain floor conveyor speed ARPWM V1.1.

Preparing the controller for work

To enter the settings menu, disconnect the controller from the power source, press the „ON / OFF" button and holding it in the pressed position, turn the controller to the power source. Wait about 2-3 seconds until the display shows „P1", at this moment you can release the „ON / OFF" button.

Parameters editable in the controller:

- P1, resolution of the proportional valve opening value change (1, 2, 5 or 10 divisions)
- P2, minimum regulation current expressed as a percentage (range 2% - 88%, resolution 1%)
- P3, the maximum control current expressed as a percentage (range 12% - 98%, resolution 1%)
- P4, the starting ramp (soft start) expressed in seconds (range 0 - 9.9 sec. Resolution 0.1 sec.)
- P5, stop ramp (soft stop) expressed in seconds (range 0 - 9.9 sec. Resolution 0.1 sec.)
- P6, PWM frequency expressed in hertz (range 60 - 250 Hz, resolution 10 Hz)
- PE, saving settings and switching to operating mode.

Change of parameters.

- In the settings menu, the „ON / OFF" button is used to approve parameters for editing and to exit the edition. The „+" button is used to select the parameter to be edited and to increase the value of the edited parameter. The „-" button is used to select the parameter to be edited and to decrease the value of the edited parameter.
- Example. After entering the settings menu, the display shows „P1", by pressing the „+" button we go to the P4 parameter (display indication „P4"), confirm with the „ON / OFF" button, the display shows the start ramp time value (for example „5.0"

5 seconds). Use the „+" and „-" buttons to set the desired value, after setting the desired parameter value, approve it with the „ON / OFF" button, the display shows „P4" again. Use the „+" button to go to the „PE" indication, and then use the „ON / OFF" button to confirm the previously made change. The controller goes into the working state.

We change other parameters in the same way. We can edit several parameters at the same time. The memory is saved only after confirming the „PE" parameter with the „ON / OFF" button. To exit the settings menu without saving the changes made, you should disconnect the controller from the power source before confirming the changes made („PE" parameter confirmed with the „ON / OFF" button). The operating parameters are stored in the EEPROM memory of the device and are not deleted after disconnecting the device from the power source.

Factory set value:

- P1 5 divisions
- P2 40%
- P3 90%
- P4 1.0 sec.
- P5 1.0 sec.
- P6 100 Hz

DETERMINING THE CONTROL CHARACTERISTICS

On the basis of the catalog card of the proportional valve, we set the minimum and maximum value read from the current-flow characteristic curve and we enter the recommended percentage of the PWM signal.

In a practical way

- In the settings menu, we set the minimum current value to 2%, the maximum value to 98%
- In the operating mode, use the „-" button to set the value ‚1', turn on the „ON / OFF" valve and slowly increase the value by pressing the „+" button until the device (machine) reacts.
- Use the „+" and „-" buttons to set the value to the device (machine) reaction limit, read and save the value indicated on the display.
- Use the „+" and „-" buttons to set the value corresponding to the maximum required value of the device (machine) operation, read and save the value indicated on the display.
- We convert the saved values according to the formula:

(x * 0.96) +2 where x is the value previously read from the display. We enter the converted values into the device as the minimum and maximum value, respectively.

- PWM frequency is entered from the valve's catalog card (standard is 100-170 Hz)

We introduce time ramps at our discretion in order to achieve the proper operation of the device (machine) during start-up and stop.

USING THE CONTROLLER

After connecting the controller to the power supply, it is immediately ready for operation. The „ON / OFF" button is used to switch the proportional valve on, the valve activation is confirmed by the LED diode. The „+" and „-" buttons are used to change the proportional valve opening value, the valve opening value can be changed both with the proportional valve on and off. The display shows the valve opening percentage („50" means 50%). The display indication is a percentage between the minimum and maximum values of the current that is currently set in the settings menu. When the valve is switched on, its operation begins along the starting ramp (soft start), switching off takes place along the stop ramp (soft stop). If the ramp time is set to „0", the valve works without a time ramp.

The time value of the ramp relates to the full control range between the set minimum and maximum value. For example, if we set the value of the start ramp to 5 seconds and the display during operation shows „50", the ramp time (up-slope) will be 2.5 seconds.

NOTES! 3-digit values are indicated by a lit dot on the right side of the display. The period should be treated as an extra zero. Example „70" means 70, „16." is 160

The minimum difference between the maximum and minimum current values (in the setup menu) is 10%. The device does not allow you to set a smaller difference.

The maximum load of the device 6A, operating voltage 10-18V

When the device is plugged into a power source, the display and LED test are performed.

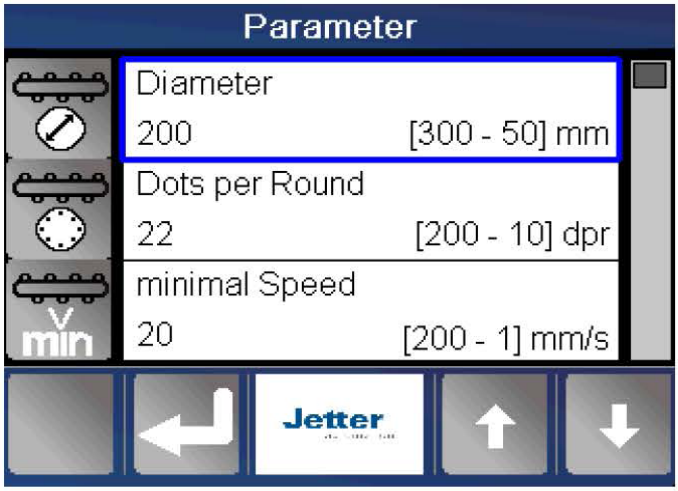
Correct display „8.8.” and the LED is on, it takes about a second. Any other indication may indicate damage to the diode display or the entire device.

Pressing and holding the „+” or „-” button increases the speed of change of the value indicated on the display.

4.4.2 PREMIUM CONTROL PANEL

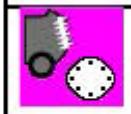
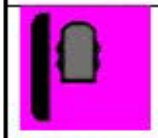
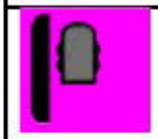
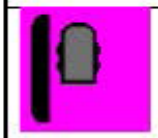
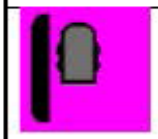
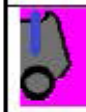
1. SERVICE SETTINGS

1.1.1. Parameters



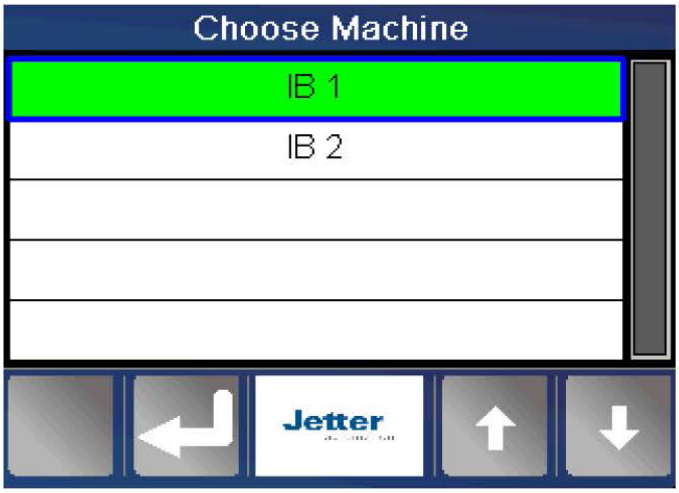
The parameters necessary for the correct operation of the manure spreader are set on the settings screen. The following list contains these parameters.
Parameters are symbolized by icons, next to which there is a text description and a value. The values are stored in non-volatile memory. On the left there is the value and on the right there is the unit and allowed range of the parameter value. Pressing the arrows moves the selection, but if the parameter is selected, the arrows are used to change the value of the selected parameter.

Symbol	Description	Meaning
	Diameter	The diameter of chain floor conveyor wheel
	Pulses per rotation conveyor	Number of pulses per rotation of the conveyor drive wheel
	Minimum speed	Minimum speed of chain floor conveyor
	Maximum speed	Maximum speed of chain floor conveyor
	Maximum tension	Setting the maximum analog output controlling the conveyor speed

	Minimum tension	Setting min. analog output controlling the conveyor speed
	Timed Speed up	Set the duration of temporary acceleration
	Pause time	The countdown pause time after which the spreader counter is increased by one.
	Pulses per shaft rotation	Number of pulses per shaft rotation
	Pulses per wheel rotation	Number of pulses per trailer wheel rotation
	Minimum speed	Lower speed range of the conveyor regulator
	Maximum speed	Upper range of conveyor regulator working speed
	Speed replacement Value	Speed substitute value
	Deflector – operation posiiton	Deflector position setpoint for work preparation procedure
	Deflector – transport posiiton	Deflector position setpoint for transport preparation procedure
	Operation posiiton - Timeout	The time after which the transition to the next step occurs when setting the deflector in the preparation for work procedure. Applies to both deflectors.
	Transport position - Timeout	The time after which the transition to the next step occurs when setting the deflector in the preparation for transport procedure. Applies to both deflectors.
	Guillotine – operation position	Guillotine position setpoint for work preparation procedure.

	Guilotine – transport posiiton	Guillotine position setpoint for transport preparation procedure.
	Operation posiiton - Timeout	The time after which the transition to the next step takes place when setting up the guillotine in the work preparation procedure.
	Transport posiiton - Timeout	The time after which the transition to the next step takes place when setting up the guillotine in the preparation procedure for transport.
V	Time Speed Measurement	Time to determine the average speed value.

1.1.2. Machine choice

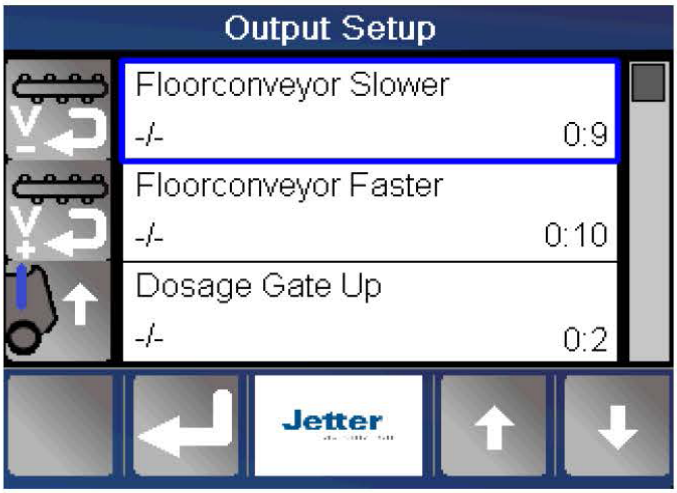


The machine type is selected on this screen. If no type is selected, none of the fields is highlighted in green. The machine is selected with a potentiometer or buttons. Green indicates the selected configuration. Choosing a new configuration will delete the old one. The user sets the cursor on the desired machine and confirms the selection by pressing the Enter button. If the field is already highlighted in green, it means that it has been previously selected. Then pressing Enter does not cause any action. If the user selects another field, all settings are cleared except for the configuration icons.

1.1.3. Variant choice

The desired variant is selected on this screen. These variants are related to the type of machine. Variant X, always on the list, means the basic variant, with no initial settings. A green tick indicates the currently selected variant. The user selects the variant with the arrows and accepts with the Enter button. If the option already chosen is selected, no action will be taken on acceptance and any changes made to date will be preserved.

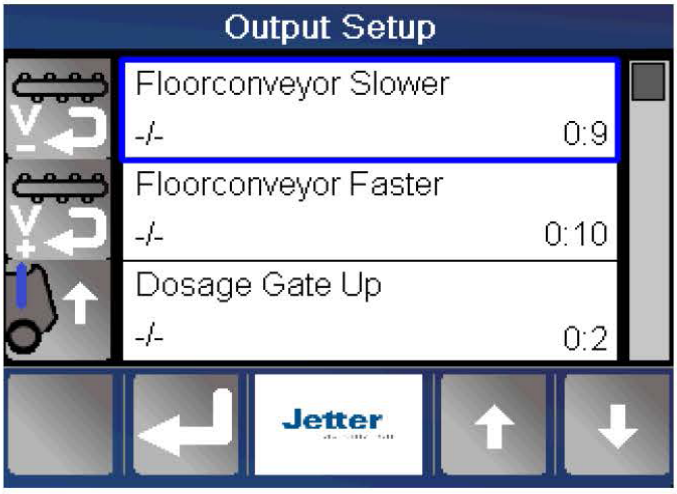
1.1.4. Output setup



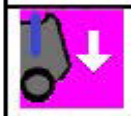
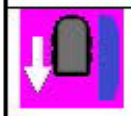
1.1.3. Variant choice

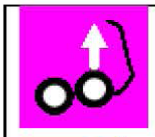
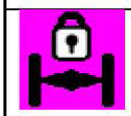
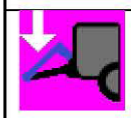
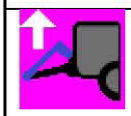
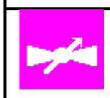
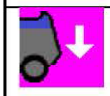
The desired variant is selected on this screen. These variants are related to the type of machine. Variant X, always on the list, means the basic variant, with no initial settings. A green tick indicates the currently selected variant. The user selects the variant with the arrows and accepts with the Enter button. If the option already chosen is selected, no action will be taken on acceptance and any changes made to date will be preserved.

1.1.4. Output setup

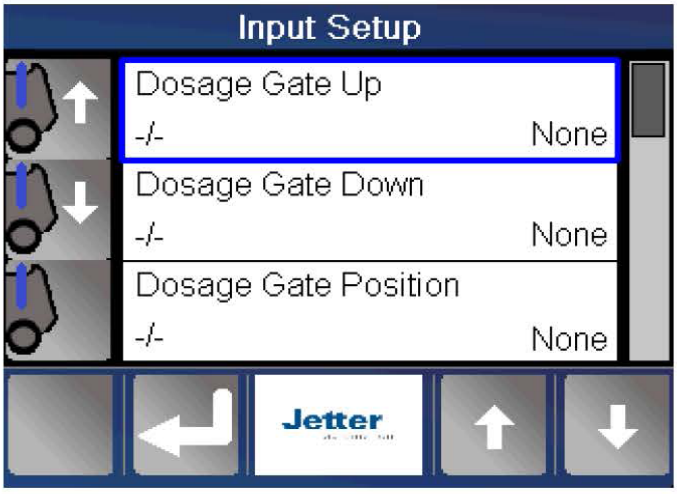


Machine functions can be assigned to specific outputs on this screen. Use the buttons to position the cursor to select the function icon. After selecting the icon, you can use the arrows to select the output for a given function and assign it to it with the Set button. Up to four outputs can be assigned here. After selecting the "Clear" option, you can also disconnect all assigned outputs from the given function by pressing the set button.

Symbol	Descritpion
	Chain floor conveyor - slower
	Chain floor conveyor - faster
	Guillotine up
	Guillotine down
	Small rear cover - up
	Small rear cover - down
	Workiiiiing lights
	Opening the left deflector
	Closing the left deflector
	Opening the right deflector
	Closing the right deflector
	Axle lowering

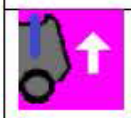
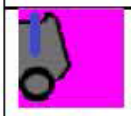
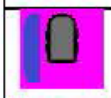
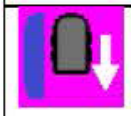
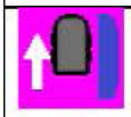
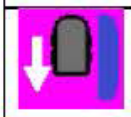
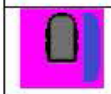
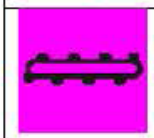
	Axle lifting up
	Unlocking the steering axle
	Steering axle blocking
	Drawbar - down
	Drawbar - up
	Bypass valve
	Proportional valve
	Extensions - up
	Extensions - down

1.1.5. Input setup

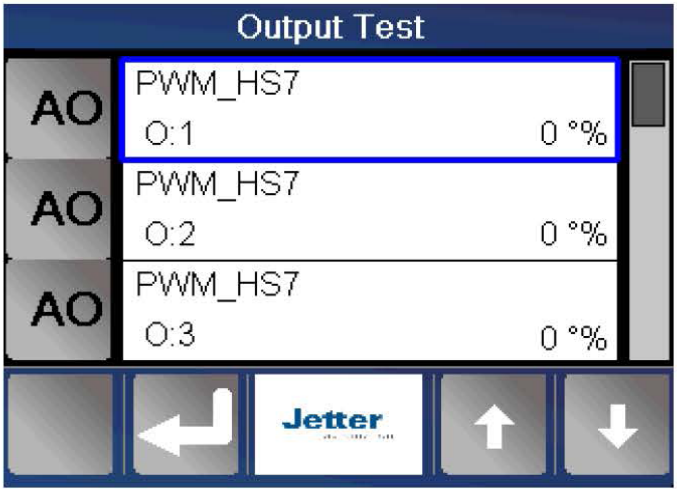


Input configuration is similar to output configuration. Choose the number and type of each input. Four types of inputs are supported: Digital (NO), Digital (NC), Analog, Frequency.

The selection is confirmed with the Set button.

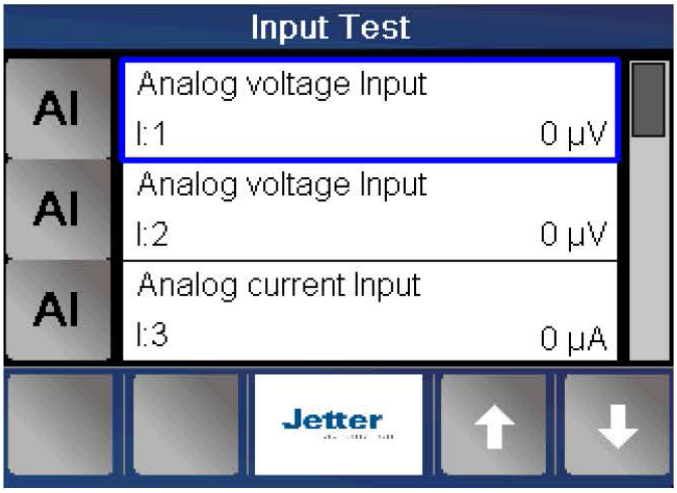
Symbol	Descritpion
	Guillotine is up
	Guillotine is down
	Guillotine posliton
	Left deflector posliton
	Left deflector - open
	Left deflector - closed
	Right deflector - open
	Right deflector - closed
	Right deflector position
	Chain floor conveyor speed
	Trailer speed
	Shafts speed

1.1.6. Output test



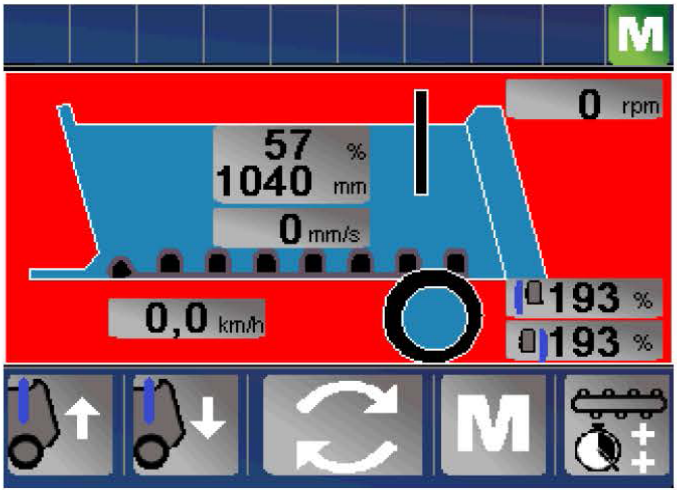
The OutputTest screen is used for test output control. Use the arrows to select the output. The icon indicates the type of output (digital or analog). For a selected output, its arrows can be used to force its status. For analog outputs, the value can be set in milli-range, from 0 to 1000. True or False can be forced for digital outputs. If no output is selected with the cursor, none of the outputs is forced.

1.1.7. Input test



The Input Test screen is used to check the inputs. The icon indicates the type of output (digital or analog). Input description and current status are shown on the right. The statuses are constantly updated.

1.1.8. Assigning functions to operating buttons (softkeys)



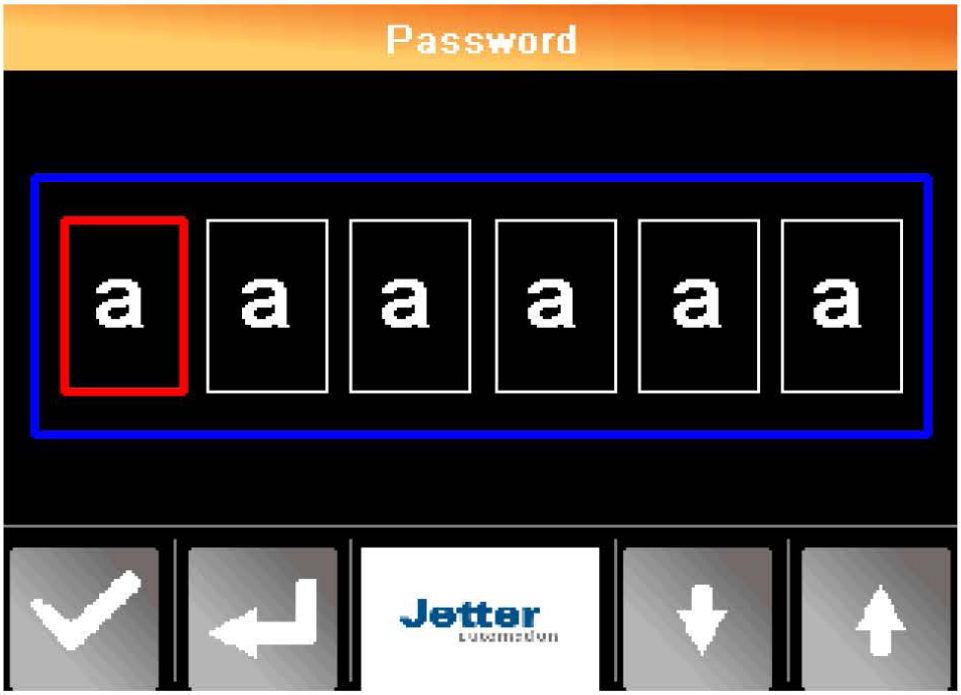
Each softkey button can be assigned a selected function.

Press the selected softkey button. Subsequent presses will sequentially switch all available functions. The selected function is automatically assigned, you do not have to confirm or save the changes. By long pressing the function is disconnected (the soft key will not have any function assigned).

Symbol	Description	Meaning
		Switching work screens with softkey buttons by turning the potentiometer.

The work screen in this application is the only screen that displays current activities, status and feedback. The appearance of the work screen depends on the specific implementation and features used.

1.1.9 Passwords



Password screen

Pressing the potentiometer activates the password field (green tick).

A blue check mark in the entry field shows the cursor position. If it is activated (green tick), you can turn the potentiometer or by pressing the arrows to select the letter. The check mark can be confirmed by pressing Enter or the potentiometer. The color of the selection turns blue. Now, by turning the potentiometer you can move to the next password character.

Pressing the password accept button (the so-called ‚check mark') passes the entire password for verification. If it is correct, the current user is granted the appropriate level of access. If the password is correct, it automatically goes to the next screen. If an incorrect password has been entered, all password characters on the display are set back to 'a'. If the user has already been logged in, the login screen is not displayed.

The following passwords have been set by default for each access level:

0	Driver	
1	Contractor	bbaaaa
2	OEM-Dealer	Zzaaaa
3	OEM	compar

Symbol	Description	Meaning
	Passoword acceptance	Accept the entire password and validate
	Enter	Password sign selection

4.4.3 MANURE SPREADING

Before spreading the manure, check the condition of the hydraulic connections and safety guards again. Limiting the spreading and precise fertilization of the field at the borders is achieved by the appropriate setting of the left or right deflectors.

THE START OF SPREADING

- Place the tractor and manure spreader combination straight in the place where fertilization will begin.
- Open the beater deflectors with the appropriate manifold lever in the tractor. In order to limit the spreading, open the right or left deflector of the beater to the required position
- Check that the tractor PTO is set to the correct speed range.
- At low engine speed, switch on the PTO of the tractor in order to avoid damage to the PTO shaft or other drive components. Increase the engine speed until the beater rotors are rotating correctly and keep them within this range.
- Raise the guillotine to the maximum position.
- Using the appropriate manifold lever, start the floor conveyor drive, making sure that the correct direction and speed of movement are obtained.
- Engage tractor gear and start work when manure is fed to the adapter shafts in sufficient quantity.

THE END OF SPREADING

- In the final stage of spreading, in order to obtain the same dose of spread material, reduce the driving speed or increase the speed of the floor conveyor by means of a knob on the flow regulator.
- After the loading box is completely empty, turn off the floor conveyor drive.
- Reduce engine speed and disable PTO drive.
- Lower the guillotine to the very end.
- Close the adapter covers completely.
- Clean the manure spreader after each spreading when driving on public roads to avoid contamination.

 NIEBIEZPIECZEŃSTWO	Manure spreader operation with removed protective covers or damaged PTO shaft, poses a direct threat to health and life people operating the device. It is forbidden to stay within the working area of the machine. Keep a safe distance near power lines. Do not spread manure near grazing animals.
 NIEBIEZPIECZEŃSTWO	It is forbidden to use a PTO rotation speed other than recommended. Using a different PTO speed will cause the crushing rollers to have insufficient revolutions and the drive will be exposed to damage.
 UWAGA	It is forbidden to use a different manure spreader starting sequence. The feed mechanism can only be operated when the shutter is raised. The load may only be moved forward in exceptional circumstances, e.g. when the chopping drums are blocked or when the tractor's rear wheels lose traction. When shifting the load forward, the load is not allowed to come into contact with the front wall due to possible damage to the load box or the drive train. During turns and during transport journeys, the PTO drive must be disengaged.

4.4.4 LOCKING THE SPREADING BEATER

When spreading manure, the spreading beater can jam, the rotors of the beater may become stuck, and the overload clutch on the drive shaft may engage. In such a case, immediately turn off the PTO drive and stop the floor conveyor.

In order to unlock the beater shafts:

- Disengage PTO drive.
- Retract the floor conveyor so far that the weight does not press against the beater shafts and allows them to rotate freely. It is unacceptable to reverse the floor conveyor when the load is in contact with the front wall of the loading box. If it is impossible to reverse the floor conveyor, turn off the tractor engine, brake the tractor and the manure spreader with the parking brake, remove the ignition key and secure the tractor against unauthorized access. Then remove the blocking elements manually using the appropriate tools.

Procedure for reversing the floor conveyor:

- When steering with manual and electronic regulator, shift the hydraulic lines at the conveyor drive hydraulic motor and switch the manifold lever on the tractor in the direction of unloading.
- With the Premium Electronic Controls, there is no need to reattach the cables, just press the reverse floor button.
- Start the tractor engine and turn on the PTO in order to clean the rotors of the beater of residual material.

5. TECHNICAL MAINTENANCE

During the use of the manure spreader, constant inspection of its technical condition and performance of maintenance procedures are necessary to keep the vehicle in good technical condition. Therefore, the user is obliged to perform all maintenance and adjustment activities specified by the Manufacturer. Repairs during the warranty period may only be performed by the manufacturer's service. The procedures and scope of activities that the user can perform on their own are described in detail below. In the event of unauthorized repairs, changes to factory settings or activities that have not been considered possible by the manure spreader operator, the user loses the guarantee.

5.1. CHECKING AND ADJUSTING THE TENSION OF THE FLOOR CONVEYOR CHAINS.

The tension of the chains of the floor conveyor during operation must be checked daily, especially at the beginning of its operation. Conveyor chains are tensioned with the adjustment screws (5) located in the front part of the side walls of the loading box. In order to increase the tension of the chains, loosen the nut (6), while holding the screw (5) with the nut (7) with a wrench, move the bearing unit forward. Carry out the tensioning operation on the left and right side of the manure spreader, paying attention to the same chain tension.

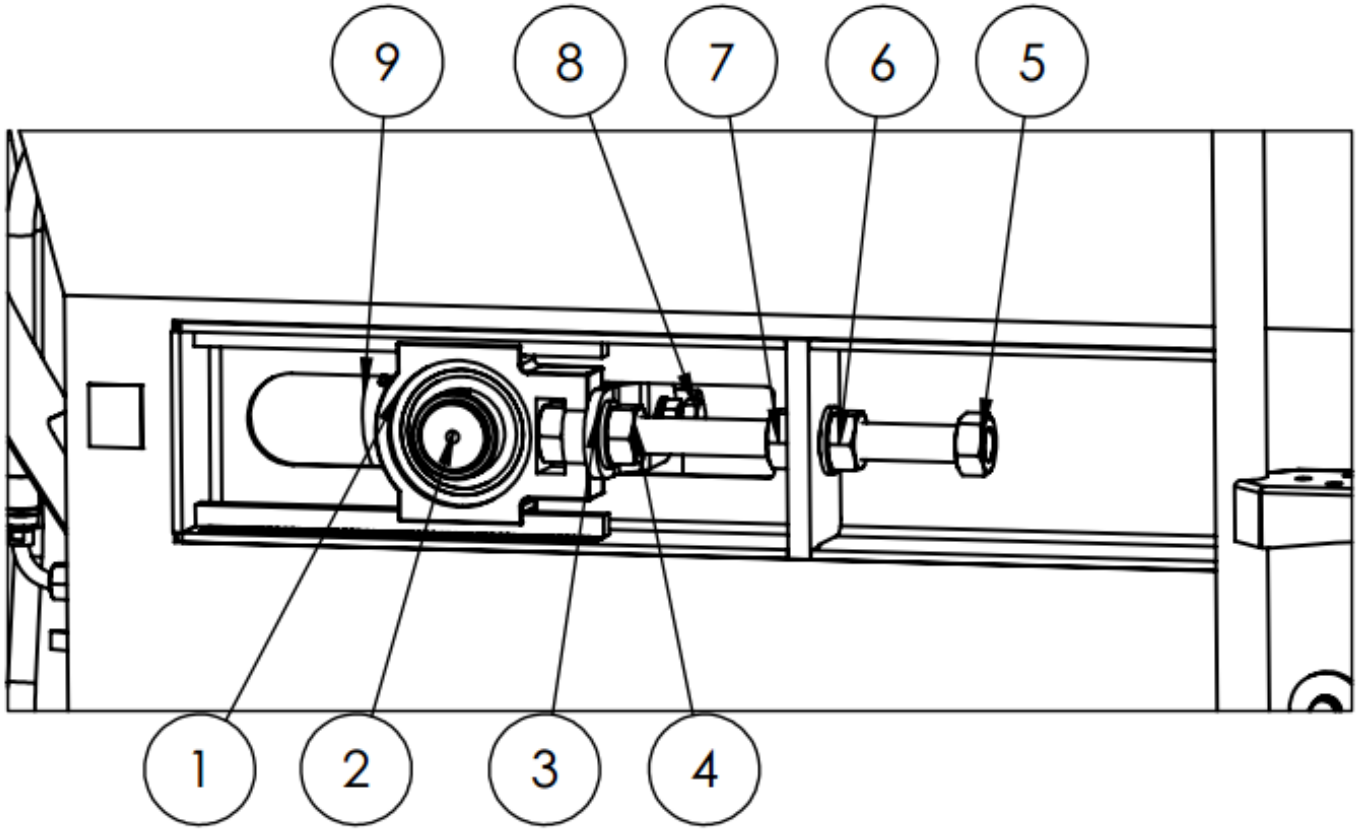


Fig.28. Floor conveyor chain tensioning unit.

1- bearing; 2- floor conveyor tension roller; 3-plate of the tension wheel cleaner; 4- a nut; 5- tension screw - 6,7- screw; 8- wheel cleaner screw; 9- chain tension wheel.

Correctly tensioned chain should be able to be raised 40-80 mm upwards, if a force of 50 kg is applied to it in the middle of the loading box.

If the range of chain tensioning adjustment is fully used, we can shorten the conveyor chain by removing 2 chain links at the point of their connection. Chain tension may be caused by improper chain tension adjustment and blockage of the floor conveyor sprockets. Clogging of the sprockets is caused by damaged or worn scrapers of the sprockets, therefore their technical condition should be checked regularly and, if necessary, replaced.

5.2. HYDRAULIC INSTALATION

The hydraulic system of the manure spreader should be tight. It is forbidden to operate the manure spreader with a leaking hydraulic system. Checking the tightness consists in actuating the individual circuits of the hydraulic system several times. In the event of an oil leak, the connection must be sealed or the leaky conduit replaced.

In the new spreader, the hydraulic system is filled with HL-46 oil. The oil in the tractor hydraulic system should be of the same type as the oil in the spreader hydraulic system. Mixing oils of the same type is allowed, provided that the oil manufacturer approves it. The hydraulic system of the spreader is not equipped with a filter as standard, therefore the cleanliness of the oil in the system depends on the condition of the oil and filters in the tractor's hydraulic system. Correct and failure-free operation of the hydraulic system depends on the degree of cleanliness of the hydraulic oil. The plugs of the quick couplers of the manure spreader hydraulic conduits and the tractor hydraulic sockets should be kept clean. Each time the conduits are disconnected from the tractor, wipe the quick coupler plugs dry with a clean cloth and protect them with covers.

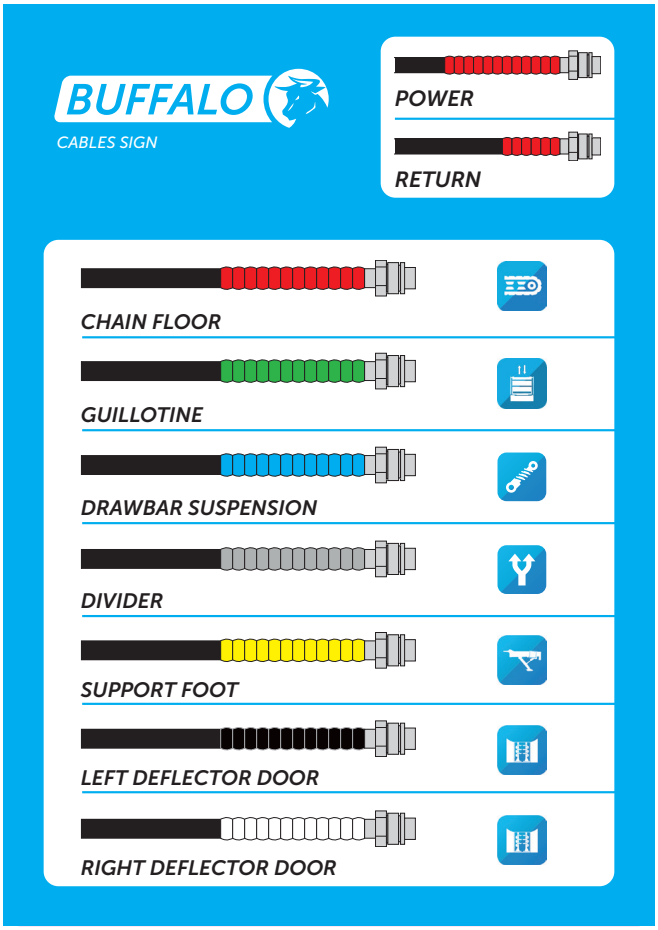


Fig.29. Information board labeling the hydraulic cables

	Replace rubber hydraulic conduits every 4 years regardless of their technical condition, unless damage was previously found. Regularly change the filters and oil in the tractor's hydraulic system, it will ensure reliable and durable operation of the spreader's hydraulic system.
 UWAGA	Regularly check the tightness of the hydraulic system and technical condition of the conduits, and remove leaks on a regular basis. The hydraulic system is under high pressure during operation. Use the hydraulic oil recommended by the manufacturer, never mix two types of oil. Contaminated oil can cause failure of hydraulic system components

5.3. GEARBOXES

The manure spreader gear is serviced by checking the level, refilling and changing the gear oil. Oil change should be performed at operating temperature, right after finishing work, when oil is still warm. It is recommended that the oil be changed: the first after 50 hours, and then every 500 hours of operation or once a year.

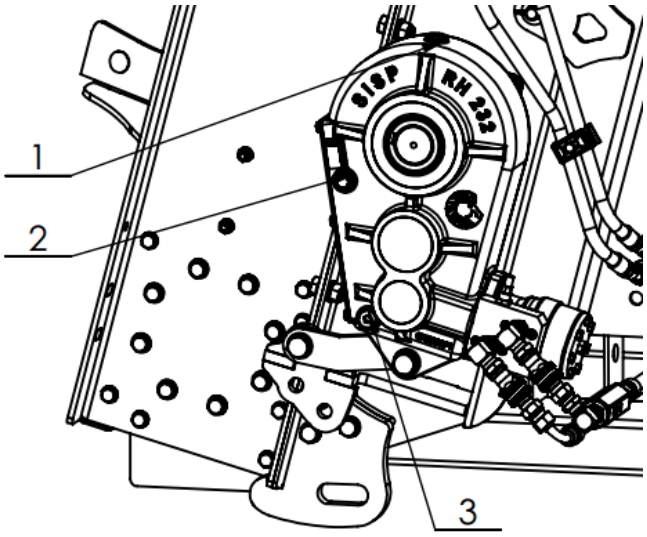


Fig.30. Chain floor conveyor gearbox

1-oil filler plug, 2- oil level sight glass, 3-oil drain plug.

In order to drain the oil from the floor conveyor gear, unscrew the oil filler plug and then the drain plug. Fill the gear units with new oil through the oil filler neck until the oil appears in the sight glass. The correct oil level is when the oil is visible in the middle of the sight glass.

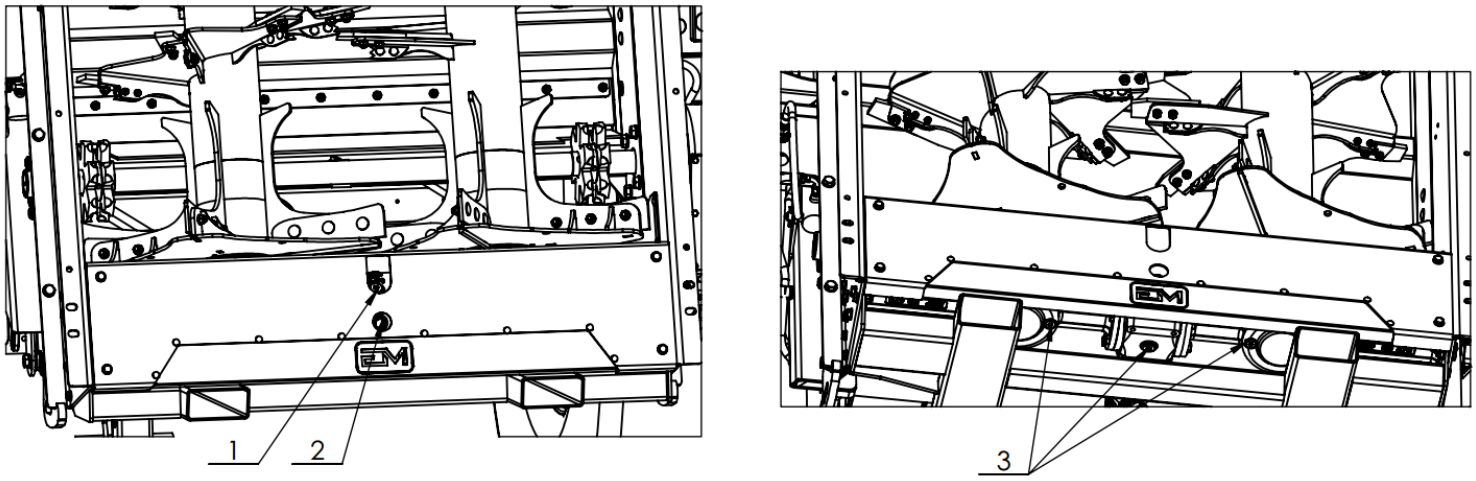


Fig.31 Beater gearbox

1-oil filler plug, 2- oil level sight glass, 3-oil drain plug.

In order to drain the oil from the beater gear, unscrew the oil filler plug and then the drain plugs. Fill the gear units with new oil through the oil filler neck until the oil appears in the sight glass. The correct oil level is when the oil is visible in the middle of the sight glass. In the beater gearbox, the gearboxes are connected with each other, therefore the inspection and oil filling takes place through one sight glass and the filler for the entire gearbox.

NAME	OIL TYPE	QUNATITY [l]
Beater gear RD670	80W90	6,2
Adapter gear SRDR970	80W90	11
Gearbox of the floor conveyor RH232	80W90	2,5
Gearbox of the floor conveyor RH330	80W90	3,8
Gearbox of the floor conveyor RH372	80W90	6
Gearbox of the floor conveyor RH340	80W90	3
Gearbox of the floor conveyor RH440	80W90	5

	Oil level in the beater gear and the floor conveyor gear should be checked through the inspection glass before each start of the machine.
	Change the oil in the adapter gear and the floor conveyor gear after the first 50 hours of operation, and then every 500 hours of operation or once a year.

5.4. GREASING

Proper lubrication is one of the most important factors determining the service life and proper operation of individual components and mechanisms of a spreader. The spreader lubrication points are shown below. General purpose grease ŁT-42, ŁT-43. When lubricating articulated telescopic shafts, follow the operator's manual attached to the shafts.

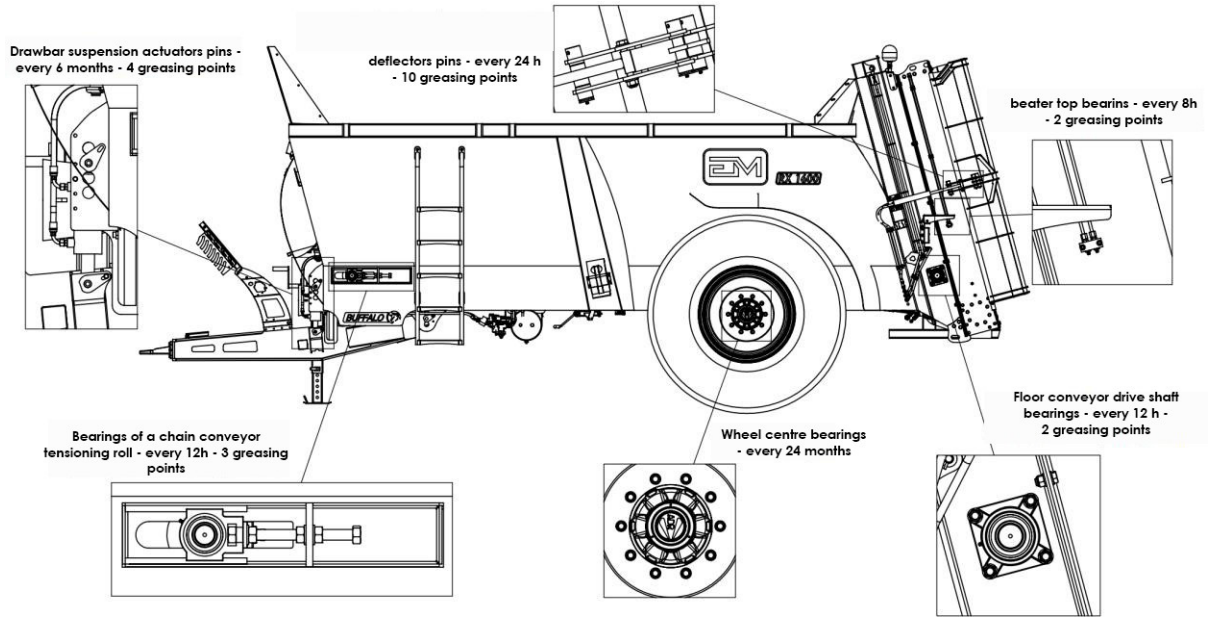


Fig.32 Greasing points

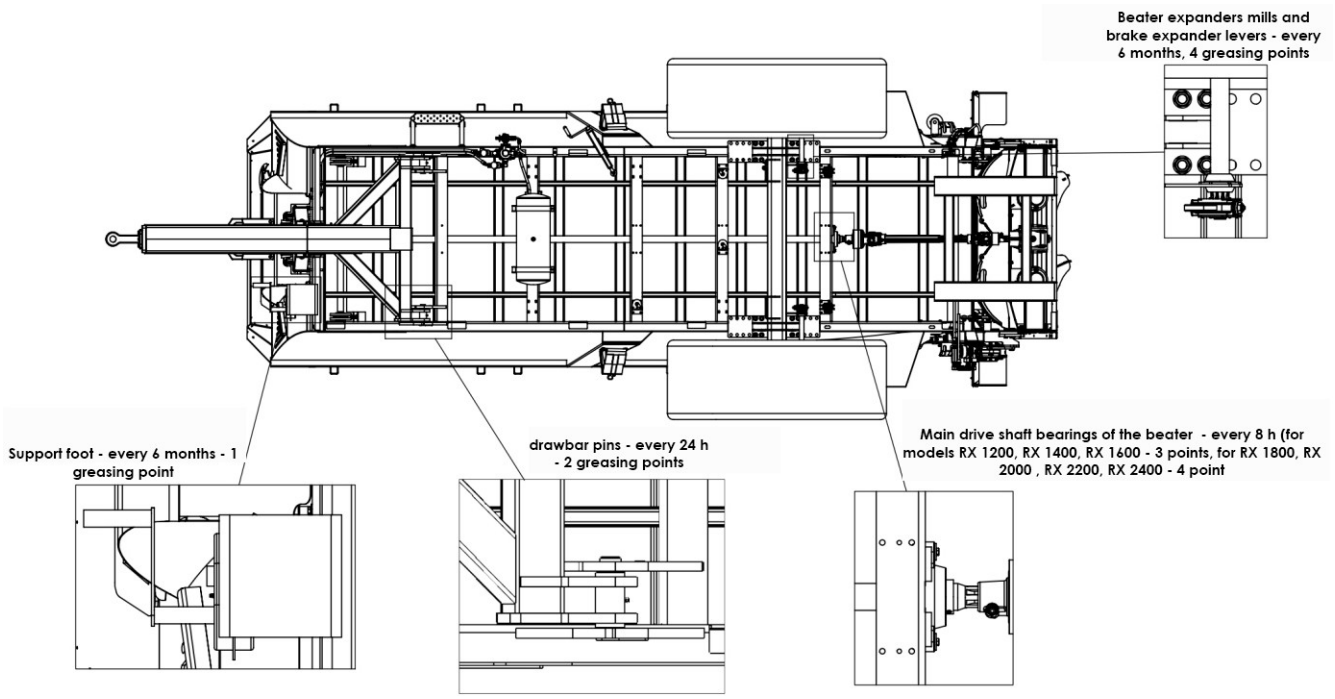


Fig.33 Greasing points

Lubrication of the wheel hub bearings is carried out by dismantling the hub, removing the used grease and applying new one. Each time the grease is changed, check the condition of the bearings and, if necessary, replace them with new ones. After mounting the hub, adjust the bearing play.

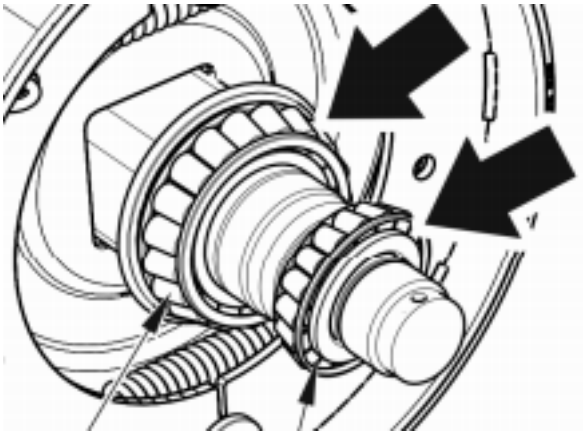


Fig.34 Axle bearings greasing points

5.5. AIR BRAKES SYSTEM

The repair, replacement and regeneration of air braking system components should be entrusted to specialized workshops having appropriate qualifications and tools for this type of work.

The maintenance of the air system by the user is limited to:

- System tightness inspection and visual inspection.
- Cleaning air filters.
- Drain the air tank and clean the drain valve.
- Exchange of flexible connection cables.
- Cleaning and maintenance of air conduit connections.

5.5.1. TIGHTNESS TEST AND VISUAL INSPECTION OF AIR BRAKING SYSTEM

Leak check and visual inspection of the installation:

- Hitch manure spreader to tractor.
- Immobilize tractor and manure spreader with parking brake, chocks under the manure spreader wheel.
- Connect the brake system conduits in order to supplement the manure spreader brake system with air.
- Turn off tractor engine.
- Check tightness of air system elements with released tractor brake pedal
- Check the tightness of air system components with depressed tractor brake pedal (the help of a second person is required).

In the event of a leak, the air will leak to the outside where the damage is caused by a characteristic hissing sound. Smaller leaks can be detected by coating the controlled elements with a foaming preparation (dishwashing liquid, soap). Damaged parts, replace with new ones or send for repair. Remove leaks in connections by tightening the connection or replacing the connection or seal with new ones.

Perform the visual inspection of the air braking system simultaneously with the leak test. Pay particular attention to the condition of the air conduits, the way they are fastened, the cleanliness of the elements and their completeness. Cables must not be chafed, permanently deformed, partially cut and bent. Contamination of the system components with oil and grease is not allowed. Depending on the working conditions, but at least once every 6 months, clean the air filter inserts.

5.5.2. CLEANING THE AIR FILTERS

Depending on the working conditions of the manure spreader, but not less than once every three months, remove and clean air filter inserts, which are located in the air system valve. The inserts are reusable and cannot be changed unless they are mechanically damaged.

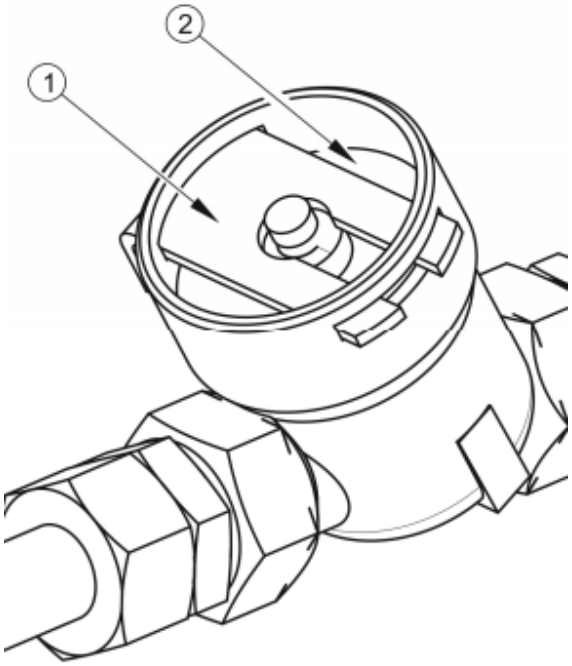


Fig.35 Air filter

1- securing plate; 2-filter cover

Procedure for cleaning the filter:

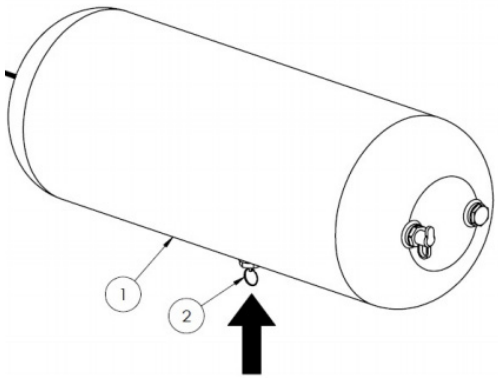
- Reduce pressure in supply lines.
- Pull out the securing clip, holding the cover against being pushed out by the spring in the housing.
- Wash and blow out the element and filter body with compressed air.
- Reassemble in reverse order.

5.5.3. DRAINING THE AIR TANK

Draining the air reservoir:

- Pull out the drain valve pin to remove the water (compressed air will cause the water to escape).
- Release the drain valve pin (the valve should close automatically and cut off air flow).

In the event that the drain valve is leaking, it must be dismantled and cleaned, or replaced if necessary.



1- air tank; 2- drain valve

Fig.36 Air tank with drain valve

5.5.4. REPLACEMENT OF FLEXIBLE CONNECTION CABLES

Flexible connection cables are replaced every 4 years, unless they are damaged earlier (permanently deformed, worn or cut).

In order to replace the wires:

- Reduce the pressure in the installation completely.
- Unscrew the air connections from the hoses.
- Unscrew the flexible hoses from the brake valve.
- Install new conduits.
- Check the tightness of their connections.

5.5.5. CLEANING AND MAINTENANCE OF AIR CONDUIT CONNECTIONS

In the event of damage to the connection elements of flexible conduits, they must be replaced with new, operational ones. Contact of the seals of the connections with oils, greases, petrol, etc. may damage them or accelerate the aging process. If the manure spreader is disconnected from the tractor, connections should always be protected with covers and placed in appropriate holders. After the end of the season, it is recommended to preserve the seals of the connections with a suitable preparation, e.g. silicone spray for rubber elements.

Before connecting the machine, check the technical condition of the pneumatic connections of the manure spreader and the tractor. Keeping the connections clean extends their service life and ensures correct operation of the entire braking system.

5.6. SUPPORT FOR WHEEL AXLE AND BRAKES

Work related to the repair, replacement or regeneration of axle components and mechanical brakes should be entrusted to specialized workshops having the appropriate technology and qualifications to perform this type of work.

5.6.1 AXIS SUPPORT

It is recommended to regularly check the play of the wheel axle bearings. Such an inspection should be performed in the newly purchased machine, after driving the first 100 km. Then, during operation, after driving about 1500-2000 km, it should be checked again and, if necessary, adjusted. To check the clearance:

- Hitch manure spreader to tractor, immobilize tractor with parking brake.
- Place tractor and manure spreader on hard and level ground to travel straight ahead
- Place blocking chocks under the wheel opposite to the lifted wheel. Make sure that the manure spreader does not roll during the inspection.
- Raise the wheel on the opposite side of the stacked chocks. The jack should be placed in the place marked on the axle.
- Turning the wheel slowly in both directions check that the movement is smooth and that the wheel turns without excessive resistance and jamming.
- Turn the wheel so that it rotates very quickly, check that the bearing does not make any unusual sounds.
- Try to feel the play when moving the wheel. You can use a lever placed under the wheel with the other end resting on the ground.
- Repeat the steps for each wheel separately, remembering that the jack must be on the opposite side of the chocks.

If you feel the loose adjust the bearings. Unnatural noises coming from the bearing may be a sign of excessive wear, contamination or damage. In this case, the bearing, together with the sealing rings, should be replaced with new ones, or cleaned and re-lubricated. Check the technical condition of the hub cover, if necessary replace it with a new one. Inspection of bearing looseness may only be performed, when the manure spreader is hitched to the tractor, and the load box is empty.

- Remove the hub cover.
- Remove the cotter pin securing the castellated nut.
- Tighten the castle nut in order to remove the play - the wheel should turn with a slight resistance.
- Unscrew the nut (not less than 1/3 of a turn) to cover the nearest nut groove with the hole in the wheel axle pin. The wheel should turn without excessive resistance.
- Secure the castellated nut with a cotter pin and install the hub cap.

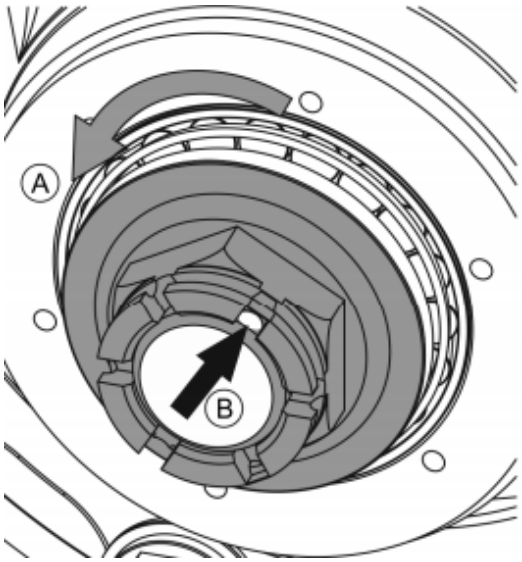


Fig.37 Wheel axle play adjustment nut.valve

After correct adjustment of bearing play, the wheel should rotate smoothly, without jams and perceptible resistance (not caused by rubbing of the brake shoes against the drum). Slight friction of the jaws against the drum, especially in a new trailer or after their replacement with new ones, is normal. The correctness of the bearing clearance adjustment must be finally checked after driving a few kilometers, by checking the degree of heating of the hubs. Apart from improper adjustment of bearing clearance, the cause of significant resistance to wheel rotation and heating of hubs may be contamination in the lubricant or damage to the bearings. The above symptoms require disassembly of the wheel hub and removal of the malfunction.

5.6.2 TIRES, ASSEMBLY, DISASSEMBLY OF THE WHEEL

Tire pressure should be checked each time the spare wheel is changed and not less frequently than once a month. In the event of intensive use, it is recommended to check the air pressure more frequently. The manure spreader must be unloaded at this time. The check should be performed before driving, when the tires are not warm, or after the machine has been parked for a long time.

When checking the pressure, you should also pay attention to the technical condition of the rims and tires. You should take a close look at the side surfaces of the tires, check the condition of the tread. In the event of mechanical damage, consult the nearest tire service center and make sure that the defect in the tire qualifies it for replacement. Rims should be inspected for deformation, cracks in material, cracks in welds, corrosion, especially in the area of welds and contact with the tire.

REMOVING THE WHEELS

- Immobilize the manure spreader with parking brake.
- Place blocking chocks under the wheel opposite to the wheel being dismounted.
- Make sure that the manure spreader is properly secured and will not roll when removing the wheel.
- Loosen the wheel nuts in a diagonal sequence.
- Place a jack and raise the manure spreader to such a height that the wheel does not touch the ground.
- Unscrew nuts and dismantle wheel.

WHEEL ASSEMBLY

- Clean wheel axle pins and nuts from dirt.
- Check condition of pins and nuts, replace if necessary.
- Place wheel on hub, tighten nuts in such a way that rim adheres exactly to hub. Tighten the nuts gradually diagonally with a torque wrench to obtain the appropriate tightening torque (for nuts M22x1. 5-460Nm).

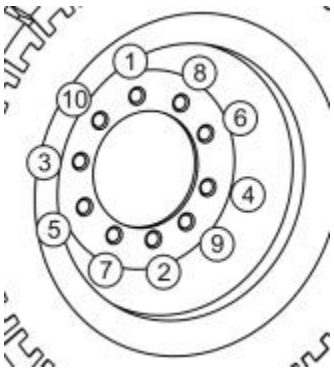


Fig.38 The order of unscrewing, tightening the road wheel nuts.

Check the tightness of the road wheel nuts each time the wheel is mounted. Then after the first travel with a load, and subsequent travels during use at least every 50 operating hours or every 100 kilometers.

5.6.3 USING BRAKES

After purchasing the manure spreader, the user is required to carry out a general inspection of the axle brake system, and then periodically. Repair, replacement and regeneration of brake components should be entrusted to specialized workshops having appropriate qualifications and tools for this type of work.

The obligations of the user related to the control of the axle brake include:

- checking the operation of the brakes,
- brake lining wear control,
- working brake adjustment,
- checking the operation of the parking brake,
- replacement of the parking brake cable and adjustment of its tension.

Brake function check:

- connect the manure spreader to the tractor, place chocks under the tractor wheel,
- check how the air cylinder and its fork are mounted on the brake lever arm,
- check the completeness of axle brake elements (pins, cotter pins, nuts, etc.),
- actuate and release the main brake, and then the parking brake (the brake should activate smoothly and retract without any resistance or jams),
- check the stroke of the actuator piston rod,
- check pneumatic cylinders for tightness,
- carry out a test ride, without a load, actuating the main brake several times and checking the operation of the main brake.

Significant wear of the linings causes an increase in the stroke of the brake cylinder piston rod, deterioration of braking efficiency and lengthening of the reaction time. Brake lining wear is checked through inspection windows in the brake drum cover. The brake shoes must be replaced when the thickness of the brake linings is less than the minimum specified by the manufacturer.

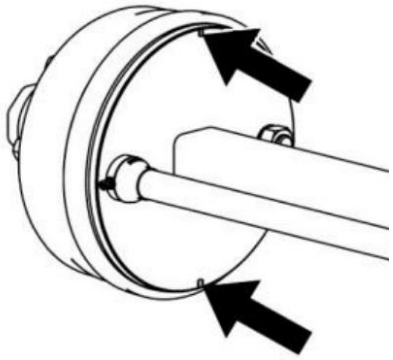


Fig.39 Brake lining wear check points

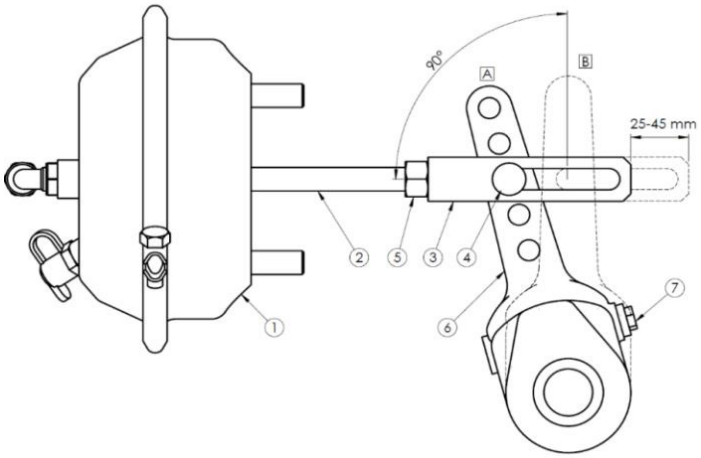


Fig.40 Adjusting the stroke length of the brake actuator.

Adjustment of the cylinder piston rod stroke and the angle of the expander lever setting is performed by appropriate setting of the cylinder forks (3) and adjustment of the stroke with the adjustment screw (7). Adjustment should be made for each of the mechanisms: actuator - expander lever, maintaining the same settings.

5.7. MAINTENANCE OF ELECTRICAL INSTALLATION AND WARNING ELEMENTS

Work related to the repair, replacement or regeneration of electrical system components should be entrusted to specialized workshops that are appropriately qualified for this type of work. The responsibilities of the user are only:

- technical inspection of the electrical installation and reflectors,
- replacement of light bulbs.

Scope of maintenance activities:

- checking the condition of the electrical system connection cable and the socket in the manure spreader,
- checking the completeness, technical condition and correct operation of lighting,
- checking the completeness and technical condition of all reflectors,
- checking the correct installation of the marking plate for slow-moving vehicles in the holder,
- before driving onto a public road, make sure that the tractor is equipped with a reflective warning triangle,
- before going on public roads, make sure that lighting lamps and reflectors are not contaminated.

Lamp	Type of lamp	Number of bulbs/ lamp	Number of lamps
Right rear lamp assembly	W21P	R10W/1pcs P21W/2pcs	1
Left rear lamp assembly	W21L	R10W/1pcs P21W/2pcs	1
Right rear lamp assembly	W70DP	LED	1
Left rear lamp assembly	W70DP	LED	1
License plate lamp	W52	LED	2
Right marker lamp	DOB67 P	LED	1
Left clearance lamp	DOB67 L	LED	1

5.8. CLEANING, MAINTENANCE AND STORAGE

Work related to the repair, replacement or regeneration of electrical system components should be entrusted to specialized workshops that are appropriately qualified for this type of work. The responsibilities of the user are only:

- technical inspection of the electrical installation and reflectors,
- replacement of light bulbs.

Scope of maintenance activities:

- checking the condition of the electrical system connection cable and the socket in the manure spreader,
- checking the completeness, technical condition and correct operation of lighting,
- checking the completeness and technical condition of all reflectors,
- checking the correct installation of the marking plate for slow-moving vehicles in the holder,
- before driving onto a public road, make sure that the tractor is equipped with a reflective warning triangle,
- before going on public roads, make sure that lighting lamps and reflectors are not contaminated.

5.8.1 CLEANING

Every day after finishing work, it is necessary to thoroughly clean the manure spreader from manure residues. The use of a pressure washer obliges the user to familiarize himself with the principle of operation and recommendations regarding the safe operation of this device.

Manure spreader cleaning guidelines:

- Immobilize the manure spreader and tractor with the parking brake, place chocks under the manure spreader wheel.
- Turn off tractor engine and remove key from ignition.
- Secure the tractor against access by other people.
- Clean the manure spreader with a strong stream of water and leave it to dry (perform these activities at temperatures above 0 ° C
• Do not bring the stream of water closer than 40 cm to the surface being cleaned. Washing the surface with a strong jet of water at a short distance may damage painted surfaces.
• The water temperature should not exceed 50oC
• Do not direct the water jet directly at: electrical system components, hydraulic and pneumatic system components (cylinders, valves, connectors), warning and information decals, data plate, lubrication points, etc.
• If it is necessary to use cleaning agents, perform an initial surface test in a hardly visible place.
- Parts with grease, degrease with gasoline or with a degreasing agent, and then wash with clean water.
- Do not use organic solvents or substances of unknown origin.
- When cleaning plastic or rubber surfaces, use cleaning agents designed for this purpose.
- Observe the principles of environmental protection, wash the manure spreader in a place intended for this purpose,

5.8.2 PRESERVATION

After thoroughly washing and drying the manure spreader, preserve it properly, fill in any paint losses and lubricate. . After lubricating the lubrication points, activate all manure spreader mechanisms to distribute the grease. Check the technical condition of bearings, guards, chains, electrical system, brake system and signaling.
Places of worn paintwork, naturally abrasive as a result of friction of the moving material or cooperation of elements rubbing against each other, protect with a small amount of oil or anti-corrosion preparations.
Check tire pressure of road wheels. Tires should be preserved at least once a year using available means for this purpose.

5.8.3 STORAGE

It is recommended that the manure spreader be stored in a closed or roofed room. During long-term storage outdoors, it is necessary to protect it against the influence of weather conditions, especially factors causing corrosion of steel and accelerating tire aging. In the event of a longer stoppage, it is necessary to lubricate all elements regardless of the period of the last lubrication. Rims and tires should be carefully washed and dried. During longer storage, it is recommended to move the machine once a month so that the place of contact of the tire with the ground is in a different place. The tires will not deform and will retain the correct geometry. You should also check the pressure in the tires from time to time, if necessary, pump the wheels to the correct value. Store the articulated telescopic shaft for connecting to the tractor in a horizontal position.

Each time after disconnecting the manure spreader from the tractor, secure it against unauthorized use by placing a lock on the coupling.

Fig.41 Protection against unauthorized use.

5.9. SCREW TIGHTENING TORQUES

See the table on the next page.

Screw		Screw tightening torques [Nm]					
Diameter	lead of thread	Bolt strength class					Nut, wheel bolts
		4,8	5,8	8,8	10,9	12,9	
3	0,5	0,9	1,1	1,8	2,6	3,0	
4	0,7	1,6	2,0	3,1	4,5	5,3	
5	0,8	3,2	4,0	6,1	8,9	10,4	
6	1,0	5,5	6,8	10,4	15,3	17,9	
7	1,0	9,3	11,5	17,2	25	30	
8	1,25	13,6	16,8	25	37	44	
8	1,0	14,5	18	27	40	47	
10	1,5	26,6	33	50	73	86	45
10	1,25	28	35	53	78	91	
12	1,75	46	56	86	127	148	
12	1,5						80
12	1,25	50	62	95	139	163	
14	2,0	73	90	137	201	235	
14	1,5	79	96	150	220	257	140
16	2,0	113	141	214	314	369	
16	1,5	121	150	229	336	393	220
18	2,5	157	194	306	435	509	
18	1,5	178	220	345	491	575	300
20	2,5	222	275	432	615	719	
20	1,5	248	307	482	687	804	400
22	2,5	305	375	502	843	987	
22	2,0						450
22	1,5	337	416	654	932	1090	500
24	3,0	383	474	744	1080	1240	
24	2,0	420	519	814	1160	1360	
24	1,5						550
27	3,0	568	703	1000	1570	1840	
27	2,0	615	760	1200	1700	1990	
30	3,5	772	995	1500	2130	2500	
30	2,0	850	1060	1670	2370	2380	