MANURE SPREADER

“VIKING”

N272/3, N272/6

INSTRUCTIONS MANUAL PART I

TRANSLATION OF THE ORIGINAL OPERATING INSTRUCTIONS

REV. III

APRIL 2022

Instruction Manual No. N272/3_6-03-167/2013

EC DECLARATION OF CONFORMITY

The undersigned,	Jacek Kucharewicz, President of the Board,	
hereby declares, with full responsibility, that the complete machine:		
MANURE SPREADER		
1.1.	Brand (the trading name of the manufacturer)	Metal-Fach
1.2.	Type:	N272
1.2.1.	Variant:	-
1.2.2.	Version:	-
1.2.3.	Trade name(s) (if any):	VIKING N272/3, VIKING N272/6
1.3.	Category, subcategory, and vehicle speed indicator	S2a
1.4.	Company name and manufacturer's address:	Metal-Fach Sp. z o.o. ul. Kresowa 62 16-100 Sokółka, Poland
1.4.2.	Name and address of the manufacturer's authorised representative (if applicable)	N/A
1.5.1.	The location of the manufacturer's rating plate	Load body front wall
1.5.2.	The method used to fix the rating plate of the manufacturer:	Riveted, glued
1.6.1.	The location of the vehicle-identification number on the chassis	On the right chassis beam
2.	Machine-identification number:	

Complies with all the appropriate regulations of Directive 2006/42/EC and the Regulation of the Minister of the Economy dated 21 October 2008 on the principal requirements for machines (Journal of Laws of 2008, No. 199, item 1228, as amended)

The following harmonised standards were applied to assess the compliance.

PN-EN 690:2014-02, PN-EN ISO 12100:2012, PN-EN ISO 4254-1:2016-02, PN-EN ISO 13857:2020-03

and the following standards: PN-ISO 3600:2015, PN-ISO 11684:1998, and Regulation of the Minister of Infrastructure dated 31 December 2002, on technical conditions of vehicles and the range of their necessary equipment (Journal of Laws of 2003, No. 32, item 262, as amended).

Safety Testing Report No.: LBC/06/22

This EC Declaration of Conformity shall become null and void if the machine is modified or reconstructed without the Manufacturer's consent.

Sokółka
(Place)

30/11/2011
(date)

Jacek Kucharewicz
(Signature)

President of the Board
(position)

Machine data

Machine type:		Manure Spreader
Type designation:		N272/3, N272/6*
Serial Number[1]		_____
Machine manufacturer:		METAL-FACH Sp. z o.o. 16-100 Sokółka, Poland ul. Kresowa 62 Phone: +48 85 711 98 40 Fax: +48 85 711 90 65
Reseller:		_____
	Address:	_____
		_____
	Phone/Fax.:	_____
		_____
Delivery date:		_____
Owner or User:	Last Name:	_____
	Address:	_____
		_____
	Phone/Fax.:	_____

*Delete as applicable

[1]The data is located on the machine's rating plate located on the front part of the machine's main frame

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PART I

PART II

INTRODUCTION

The information included in the Instruction Manual is valid as of the date of its drawing up. The manufacturer reserves its right to make design changes to machines, and due to this, some values or illustrations might not correspond to the actual state of the machine supplied to the user. The manufacturer reserves its right to modify the constructional design without amending this Operating Manual. The Instruction Manual is part of the basic equipment of the machine. Before using the machine, its user shall read the contents of this Operating Manual and comply with its instructions. This will ensure the safe operation and reliable performance of the machine.

The machine has been built in compliance with the standards in force and current regulations of the law. This instruction manual describes the basic safety and operation principles of the Manure Spreader made by Metal-Fach, type N272/3 and N272/6.

The significant obligations of the Manufacturer are shown in the Guarantee Certificate, which includes the complete regulations currently in force regarding guarantee services.

If you do not understand the information in the Operating Manual, consult the original reseller of this machine or the Manufacturer directly.

The spare parts catalogue constitutes a separate list and is attached in the form of a CD, when the machine is purchased. It is also available on the Manufacturer's website: www.metalfach.com.pl.

The Warranty Card, including the terms and conditions of warranty, is attached to this Instruction Manual as a separate document.

Manufacturer's address:

Metal-Fach Sp. z o.o.

ul. Kresowa 62

16-100 Sokółka, Poland

Contact:

Phone: +48 85 711 98 40

Fax: +48 85 711 90 65

Safety symbols used in the Manual:

DANGER

A hazard warning symbol: indicates a severe hazard which, if not avoided, may result in death or serious injury. This symbol warns of extremely dangerous situations.

CAUTION

This symbol indicates very important information and instructions. Non-compliance can lead to serious damage to the machine, resulting from its incorrect operation.

WARNING

This symbol indicates potential hazards which, if not avoided, can result in death or serious injury. This symbol indicates a lower level of risk of injury than the DANGER symbol.

This symbol indicates useful information.

This symbol indicates maintenance activities that should be performed periodically.

1. General description

1.1 Introduction

THIS INSTRUCTION MANUAL IS PART OF THE BASIC ACCESSORIES OF THE Manure Spreader

The machine can only be operated by persons who have read this Instructions Manual, who are familiar with the design and functioning of the Manure Spreader, and with the operation of the tractor unit it works with.

To operate the machine safely, adhere to and follow all the instructions set forth in this Instruction Manual. Abiding by the guidelines provided in the Instruction Manual ensures safe operation for the User, and also prolongs the machine's service.

1.2 Identification of the N272/3 and N272/6 Manure Spreaders

The Manure Spreader should be identified using the nameplate, which is permanently attached to the loading box.

The data printed on the rating plate of the Manure Spreader is shown in Figure 1. Description of the nameplate markings is shown in Figure 2. The position of the rating plate and serial number is shown in figure 3.

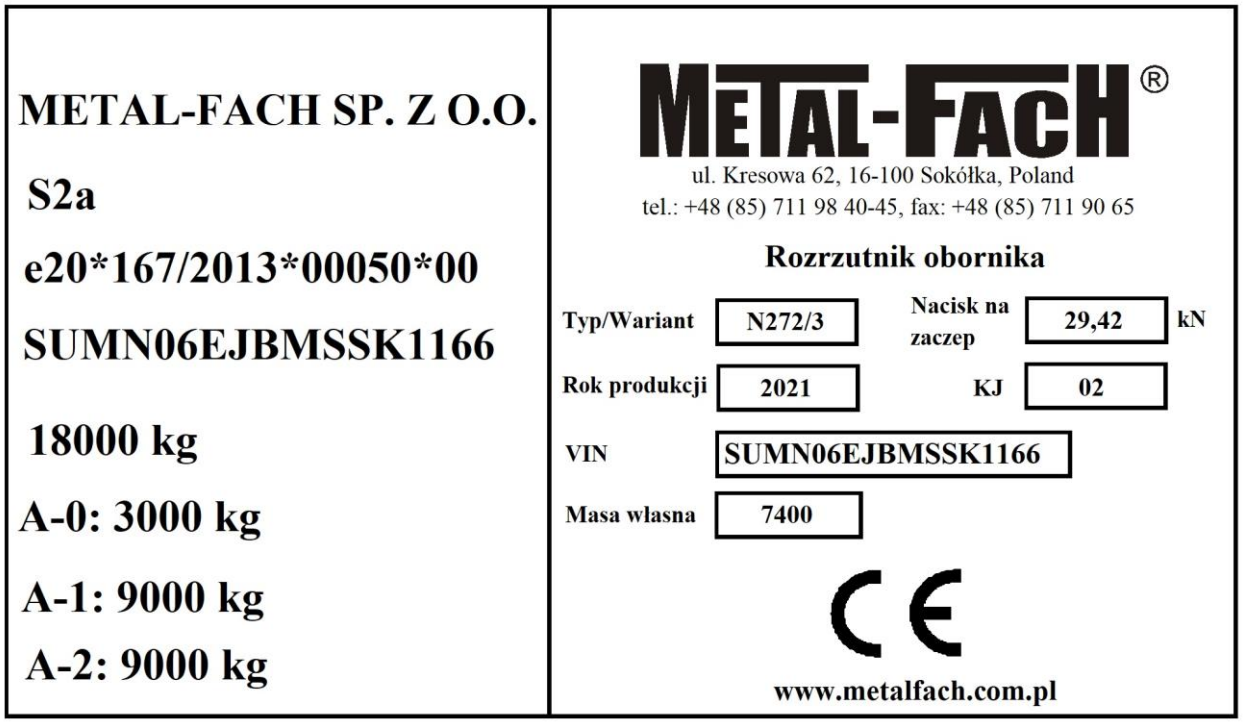


Figure 1. Rating plate

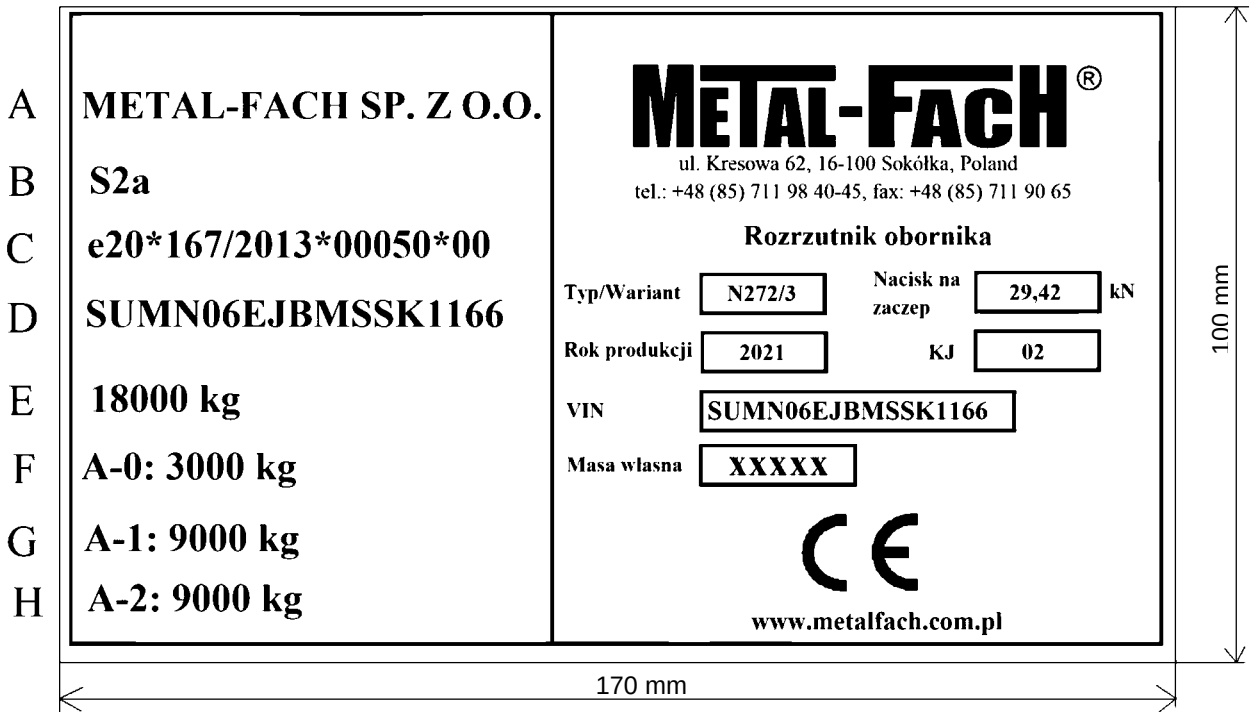


Figure 2. Key to the fields on the rating plate:
A – Manufacturer's name;
B – Category, Subcategory, and Vehicle-Speed Indicator;
C – EU-Type Approval Number;
D – VIN;
E – Permissible total design weight of the vehicle;
F – Permissible maximum hitch eye pressure;
G – Permissible maximum weight on the 1st axle;
H – Permissible maximum weight on the 2nd rear axle;

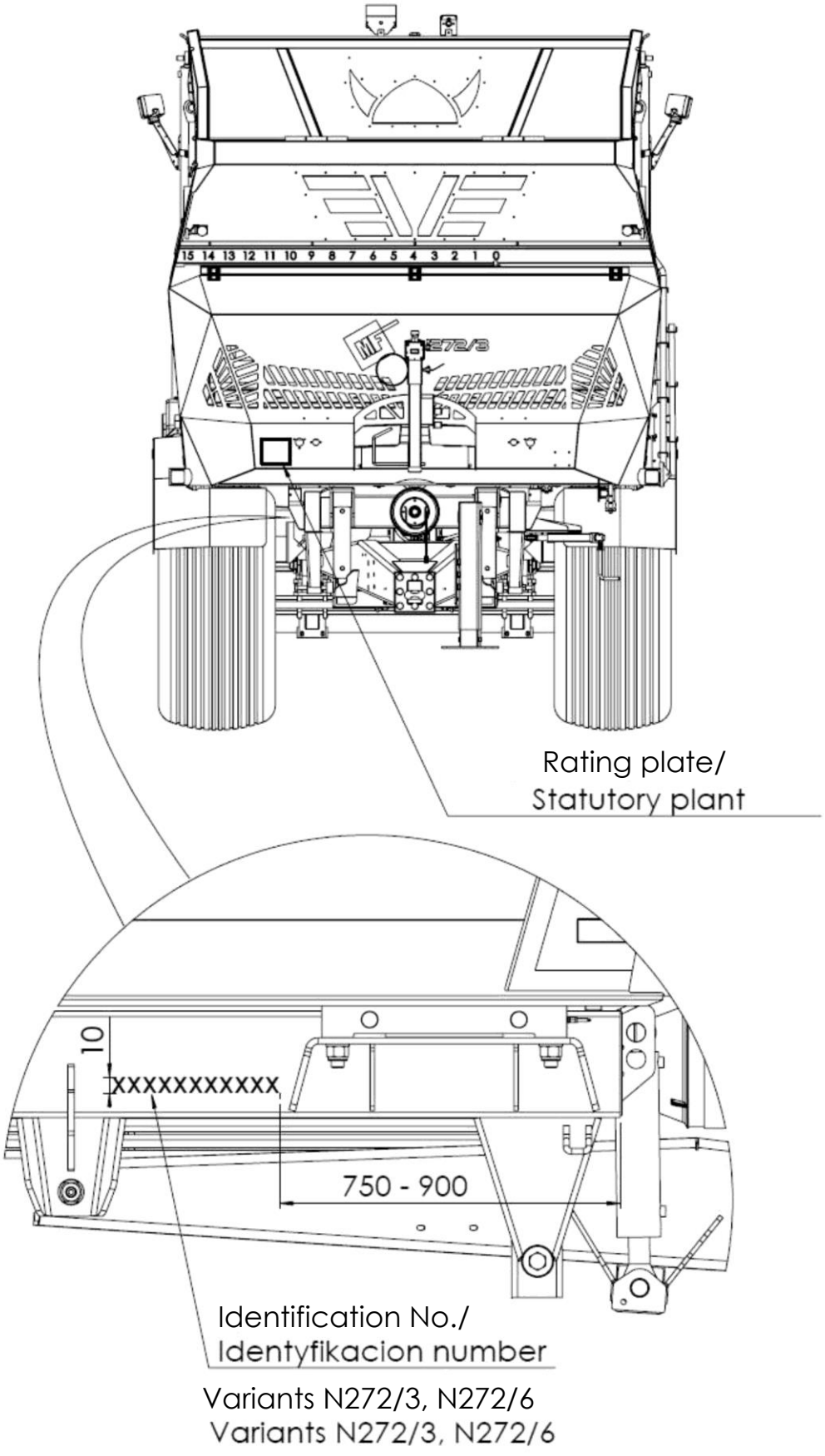


Figure 3. The position of the rating plate and serial number

CAUTION

CAUTION!
Entering public roads without a rating plate or with an illegible rating plate is prohibited.

Upon the purchase, check the compliance of the factory number located on the machine rating plate with the number written in the Instruction Manual and Guarantee Certificate - it is crucial for recognizing the guarantee. When contacting technical service, the seller, or the Manufacturer, the User is obliged to provide the information included on the machine's rating plate.

The Instruction Manual is provided as the basic equipment of each Manure Spreader.

In the case of selling the Spreader to another user it is obligatory to provide the Instruction Manual. It is recommended that the supplier of the Spreader keep a record of every confirmation of receipt signed by the purchaser, when the Instruction Manual is submitted with the machine to the new User.

Please read the Instruction Manual carefully!

If you follow its recommendations, it will be possible to avoid hazards, operate the machine efficiently and productively, and maintain the warranty for the duration granted by the Manufacturer.

CAUTION

CAUTION!
It is prohibited for persons who have not read this instruction manual to use the Spreader.

1.3 Intended use of the Manure Spreader

Manure spreader is designed for the even spreading of manure, peat, compost, etc. and for transport of agricultural products on farms and on public roads. It is not permitted to use the spreader in any other way than the one described above.

The operator must use the machine in accordance with its intended use by carrying out activities involving the correct and safe operation and maintenance of the spreader, which will include:

- reading and understanding the spreader's principles of operation
- Operate the machine safely and correctly.

- Always maintain or have the machine maintained on schedule.
- Comply with the general safety regulations.
- Comply with the traffic laws.

DANGER

DANGER!
The Spreader must not be used contrary to its intended purpose, in particular to:

- carry people and animals
- operate it with exceeded payloads
- spread and transport toxic and flammable materials
- distribute liquids, sand or fibrous substances
- carry goods, machinery and equipment not secured, which, while driving, may shift its position or affect the stability of the spreader
- carry out transport of building materials, individual objects or any materials that are not included in its intended use

Unauthorised structural changes to the spreader voids the manufacturer's liability for consequential damage.

Table 1. Requirements for agricultural tractors

Description	Requirements	UoM
Braking system 2-line braking system Pressure rating of the system	 Sockets acc. to PN-ISO-1728:2007 min. 650	 kPa
Hydraulic system Hydraulic oil Nominal pressure Oil purity	 HL 46 16 20/18/15 acc. to ISO 4406-1996	 MPa
Electrical system Electrical system voltage Connection socket	 12 7-pole acc. to ISO 1724	 V
Tractor hitch Minimum vertical load-bearing capacity of the hitch	N272/3 – 3000 N272/6 – 3000	kg
Minimum power demand of the tractor	N272/3 – 135 N272/6 – 140-150	HP
Minimum turning radius	6	m

1.4 Basic equipment

The basic accessories of each Spreader include:

- Operating instructions;
- Warranty Certificate with warranty terms and conditions;
- A bracket for fixing a slow-vehicle marking plate
- two-line pneumatic brakes with adjustable braking force (dual-line pneumatic brakes with ALB);
- automatic parking brake (parking-release valve);
- Lights.

1.5 Transport

The Spreader is sold fully assembled and does not require any further assembly. It is delivered to the User by means of motor transport or independently, when coupled with a tractor.

CAUTION

CAUTION!
General health and safety regulations must be observed when loading and unloading the spreader. Those operating the loading and unloading equipment must have the required authorisation to use it.

CAUTION

CAUTION!
It is forbidden to attach slings of lifting devices to the upper mounting brackets of the body and the beater unit to lift, load or unload a complete spreader.

Fasten the spreader to be transported on a platform by means of tie down straps or chains providing a tensioning mechanism. Such fasteners must have a valid safety certificate. Place chocks or other parts without sharp edges under the wheels of the spreader to prevent the machine from rolling. Attach the chocks to the platform of the means of transport. Special attention must be paid during loading and unloading so as not to damage the equipment of the spreader and its paint coating. Attach the fastening straps or chains to lifting points/shipping brackets welded to the body frame. The longitudinal members or other robust structural elements of the frame can also be used for that purpose.

Before loading the spreader on the platform, couple it to the tractor's hitch and connect the brake system lines. Drive the trailer onto the low-bed trailer using ramps.

DANGER

DANGER!
Improper use of fasteners can cause an accident.

CAUTION

CAUTION!
Pay particular attention to the angle of inclination of the ramps on the low loader. It may not exceed 10°. The excessive inclination of the ramps can lead to damage to both the spreader and the transport trailer.

The Spreader may be driven on public roads, as a machine attached to the **lower hitch** of a farm tractor.

Before merging with the traffic on public roads, make sure that the tractor is fully manoeuvrable. The front-axle load of the tractor must be at least 20% of the tractor's weight, which also applies when transporting and operating a loaded Spreader. If this condition is not fulfilled the front axle of the tractor must be loaded additionally.

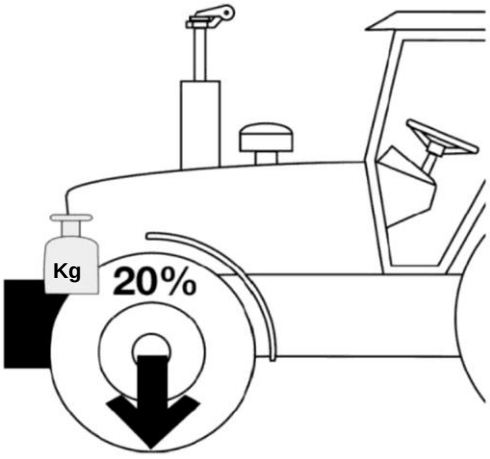


Figure 4. Minimum front-axle load of the tractor

CAUTION

CAUTION!
During the transport of the machine on public roads adapt the speed to the traffic conditions and do not exceed the speed of 40 km/h.

Prior to spreader transport make sure that

- the spreader is properly coupled to the tractor and the hitch device is secured against accidental disconnection
- both the spreader and the tractor brake systems function correctly
- the lighting systems of both the Spreader and the tractor are working correctly;

- the body gate is in its lowest position
- the hydraulic and pneumatic hoses are arranged in such a way that they are protected from damage during travel
- the support foot is raised to its uppermost position;
- the parking brake is released;
- the triangle, which indicates slow-moving vehicles, is mounted in a bracket on the rear cover of the adapter.

During transport of the spreader on public roads adhere to the road traffic regulations. During an emergency, pulling over the tractor with the attached machine the driver must:

- stop the vehicle without endangering other road traffic;
- Park the vehicle as close to the edge of the road as possible, parallel to the road centre line
- Stop the tractor engine, take out the key from the key switch, engage the auxiliary brake and place the chocks under a spreader wheel
- Outside a built-up area, place a warning triangle between 30 and 50 metres behind the vehicle and switch on hazard lights
- when in a built-up area, switch on the hazard-warning lights and place a warning triangle behind the vehicle, unless it is installed on a bracket on the rear of the machine; make sure that it is clearly visible to other road Users;
- in the event of a breakdown, take the appropriate steps to secure the area where the breakdown has occurred.

1.6 Environmental hazards

Leaking hydraulic and gear oils can pose a direct threat to the natural environment. Carry out all maintenance and repairs in areas with an oil-resistant surface if there is a risk of oil leakage. If oil does leak, close the source of the leakage and collect the spilled oil. Use absorbent materials to collect oil residue. Store all collected pollutants in tightly closed, oil-resistant and marked containers.

DANGER

DANGER!
Store used hydraulic and gear oil or any collected residue mixed with absorbent materials in tightly sealed containers. Do not use food containers for this purpose.

CAUTION

CAUTION!
Send all waste oil for disposal in accordance with the applicable regulations.
It is forbidden to dispose of oil into the sewage system or water reservoirs.

1.7 Disposal

If the machine is to be withdrawn from use, the User must comply with the national regulations regarding withdrawing from use and recycling of end-of-life machines, applicable in a given country. Before dismantling, remove all oil from the hydraulic system and gearboxes. Reduce air pressure in the braking system to the minimum.

DANGER

DANGER!
When dismantling, use suitable tools, lifting equipment and personal protective equipment such as gloves, shoes, protective clothing, glasses, etc.
Avoid contact with skin. Prevent any oil leaks.
Send all waste oil for disposal in accordance with the applicable regulations.
When replacing worn, damaged or unrepairable parts and components send them to recyclable material sites.

2. Safety of use

2.1 Basic safety principles

2.1.1 Mandatory disclosure of information

CAUTION

CAUTION!
If the spreader is sold to further users, attach the Instruction Manual, and the purchaser of the spreader must undergo training as indicated in the Manual.

2.1.2 General principles for work safety and use

Before each commissioning, the spreader must be checked for safe operation:

- Observe the generally applicable safety and accident-prevention regulations, and follow the information provided in this Instructions Manual;
- The attached symbols, warning and informatory inscriptions provide important guidelines for safe operation – observing them ensures your safety;
- Operate the Spreader only if all required devices are connected and protected against unintentional disconnection or opening (e.g. hitch and drawbar, couplings, PTO shaft)
- Before starting work, learn how to operate all devices and controls and their functions as it will be too late to do this during the operation;
- Persons under the influence of alcohol or other stimulants, and those who are not trained and do not hold proper driving licences are forbidden to operate the spreader

2.1.3 Operating safety

1) Before using the machine, the user must read and understand the content of this Instruction Manual. Observe all instructions in this Manual during operation.
2) If the information contained in this Manual is unclear, please contact the distributor running an authorised technical service on behalf of the Manufacturer or contact the Manufacturer directly.
3) Careless and improper use and operation of the Spreader, as well as failure to observe the recommendations contained in this Instructions Manual, are dangerous to health and life.
4) Failure to observe the safety rules poses a threat to the health and life of the operators, and third parties.
5) Please note that during the Spreader's operation some residual risks can occur, so exercising safety rules must be a priority.
6) All safety-related information must also be passed on to all other spreader users and operators.
7) Any structural and functional modifications of the Spreader release Metal-Fach Sp. z.o.o. from liability for damage to property or health impairment.
8) Use only the recommended PTO shafts with the correct parameters to transmit power from the shaft.
9) Do not use of PTO shafts without guards for power transmission.
10) Before starting to drive, check that the parking brake is released and that the brake force control is in the correct setting for the load status (it applies to a dual-line pneumatic system with manual brake force control).

11) Before operating the machine, inspect the direct vicinity (for any children and bystanders). Extreme attention is required if visibility is poor.
12) After finishing spreading, lower the slide gate of the hopper completely, switch off the PTO shaft drive, and switch off the floor conveyor drive. Never leave the Spreader unsupervised with the gate of the hopper open, if the PTO shaft drive or the floor conveyor drive are switched on, and/or the adapter shields removed.
13) It is only allowed to enter the hopper if the Spreader has come to a complete stop, the PTO shaft is disengaged, the tractor's engine is switched off, and the machine is protected against unauthorized access.
14) Always activate and deactivate the PTO shaft and hydraulically-controlled components from the driver's seat.
15) Couple the spreader as prescribed and only connect it to the recommended equipment and secure the drawbar eye with the tractor's transport hitch.
16) Special care must be exercised when coupling and uncoupling the Spreader to and from the tractor.
17) When installing and removing any supporting and safety devices and ladders, always place them in a position ensuring safe operation.
18) Follow the acceptable axle loads, total weight and transport dimensions.
19) Check the transport equipment by inspecting the connections and operation of the light and brake systems, the Slow Vehicle warning plate, and other protective devices and equipment.
20) Before driving, check the operation of the lights and brakes, and prepare the Spreader, in accordance with the recommendations provided in the “Driving on public roads” section.
21) Ensure that the spreader is loaded in such a way that the material does not contaminate surfaces when travelling on public roads.
22) After finishing work and before driving on a public road, remove any residue of the spread material from the external parts of the machine, to prevent it from falling off and contaminating roads.
23) Notice all changes in vehicle behaviour, steering and braking performance due to loaded spreader being coupled to it.
24) When driving with a coupled spreader, notice how the load and/or inertia forces are distributed, especially if the load distribution is asymmetrical.
25) Do not stand within range of the material being spread.
26) The spreading of manure can only be carried out, if:

- the Spreader is coupled with the tractor,
- the tractor and Spreader unit is standing on a firm surface,
- the front-axle load of the tractor is at least 20% of the weight of the tractor,
- there are no persons within the spreading area,
- the tractor is aligned with the centre line of the Spreader,
- keeping a safe distance from power lines,
- no strong gusts of wind occur, which can carry the spreading material away outside the permitted spreading area.

27) If it is necessary to carry out the final stage of spreading on a slope, align the tractor and the Spreader in the direction of the downslope. When spreading on slopes, make sure that the surface inclination does not exceed 10°.
28) Exercise care when opening the shields, so your fingers and hands are not crushed.

29) When starting the Spreader, observe the signs warning against places, where crushing, dragging, and catching hazards can occur. When coupling to and uncoupling the Spreader from the tractor, there is a risk of crushing and injuring limbs.
30) No one is allowed to be present between the tractor and the Spreader, unless the vehicle is protected against rolling by the parking brake and/or wheel chocks.
31) Secure the Spreader and the tractor against rolling, when stationary.
32) It is forbidden to transport the spreader with the hopper's slide gate raised and the adapter's covers removed.
33) Keep a safe distance from power lines when lifting the slide gate of the hopper.
34) When carrying out repair and maintenance work, which requires entering the hopper, the tractor must be stationary and protected against the risk of starting the engine and the use of the control elements by unauthorised personnel.
35) Always adjust your driving speed to the existing conditions. Avoid sudden up or downhill turns on sloping terrain.
36) Maintain a sufficient safe distance when turning back with the coupled trailer.
37) When reversing, ensure that you have sufficient visibility (if possible, have someone to assist you with guidance).
38) When cornering, take into account the inertia of the Spreader.
39) Observe a minimum turning radius of approx. 6 m when turning and reversing.
40) Remove any functional faults of the attached devices only when the engine is switched off and the ignition key removed.
41) In the event of a failure of the hydraulic or pneumatic systems, the Spreader must be taken out of service, until the failure has been remedied.
42) It is forbidden to carry out maintenance or repair work, when the hopper is loaded.
43) Before carrying out repair work on the hydraulic or pneumatic systems, the oil or air pressure must be reduced.
44) In the event of an injury sustained from a strong hydraulic oil jet, consult a physician immediately. Hydraulic oil can penetrate under the skin or into the eye, and cause infections.
45) Use the hydraulic oil recommended by the Manufacturer. Never mix two different types of oil.
46) Use the gear oil recommended by the Manufacturer. Never mix two different types of oil.
47) Before leaving the tractor, turn off the engine, remove the ignition key, apply the hand brake and secure the spreader with chocks.
48) Do not exceed the maximum permissible axle loads of the Spreader.
49) Exceeding the permissible technical load carrying capacity of the Spreader can damage the machine, and cause the loss of its stability while driving and spillage of the load, and also compromise the safety of other road traffic. The braking system has been adapted to the permissible total weight of the Spreader, which, if exceeded, will considerably reduce the performance of the main brake.
50) It is forbidden to exceed the permissible driving speed.
51) The maximum permitted pressure in the hydraulic power system is 16 MPa.
52) The maximum allowable pressure in a double-line pneumatic system is 0.80 MPa, and the minimum is 0.65 MPa.
53) Preparing the spreader for operation (connecting hydraulic hoses, pneumatic system, PTO shaft, etc.) must be made with the tractor engine switched off and the ignition key removed.

54) The Manufacturer delivers the Spreader fully assembled.
55) Change the hydraulic (rubber) lines every 4 years.
56) Noise – the equivalent A-weighted emission sound pressure level (LpA) should not exceed 75 dB. The peak C-weighted instantaneous sound pressure value (LCpeak) is 82±1 dB.
57) Keep the spreader clean.

WARNING

WARNING!
If operated during a storm, there is a risk of lightning striking the Spreader.

2.1.4 Working with the machine

- When working with the machine, make sure that no people or animals are present in the vicinity of the spreading area.
- It is forbidden to stand within the spreading area, since the spreading material can contain stones, fragments of wood, or other objects.
- Before commencing work, check the condition of the adapter blades and their fasteners.
- Before loading, check the tension of the chains of the floor conveyor. Regularly check the tension of the conveyor chains.
- When working close to roads, drainage ditches, plot boundaries, and water bodies, make sure that designated spreading zone is not exceeded.

2.1.5 Pneumatic and hydraulic systems

CAUTION

CAUTION!
The pneumatic braking system is under high pressure.
Before starting work on the system, switch off the tractor engine, secure the spreader with the parking brake and support chocks and depressurise it.

- When connecting pneumatic lines to the tractor's pneumatic system, ensure that the valves on the tractor and spreader side are not under pressure.
- Check the pneumatic connections on a routine basis and replace all damaged and worn parts. Replace the lines as required by the manufacturer's specifications. Replace flexible pneumatic lines every 5 years unless damage has been found earlier.
- Air leaks from the pneumatic braking system are not allowed.
- The hydraulic system is under high pressure during operations.
- Use the hydraulic oil recommended by the Manufacturer. Never mix two different types of oil.
- Regularly check the technical condition of the hydraulic connections and hoses.
- When connecting the hydraulic hoses to the tractor, make sure that the hydraulic systems of the tractor and the Spreader are not under pressure. If necessary, reduce the residual pressure of the system.
- In the event of an injury sustained from a strong hydraulic oil jet, consult a physician immediately. Hydraulic oil can penetrate under the skin and cause infections.
- Repair work on the pneumatic or hydraulic systems may only be carried out by an authorised representative of the spreader manufacturer.
- In the event of a failure of the hydraulic or pneumatic system, the spreader must be taken out of service until the failure has been removed.

Replace flexible pneumatic lines every 5 years unless damage has been found earlier.
Replace rubber hydraulic hoses every 4 years regardless of their technical condition, unless a fault has been found earlier.

CAUTION

CAUTION!
The required purity of hydraulic oil is 20/18/15, according to ISO 4406-1996.

2.1.6 Working with the PTO shaft

- The Spreader may only be connected to the tractor by means of an appropriately selected PTO shaft recommended by the Manufacturer.
- Before starting work, read the Instruction Manual of the drive shaft and follow its guidelines.
- Connect and disconnect the PTO shaft only when:
  - the Spreader is coupled with the tractor hitch,
  - the tractor's engine is switched off,
  - the key is removed from the ignition switch,
  - the parking brake is pulled up,
  - and the PTO shaft is switched off.
- Before starting the tractor with the spreader hitched, make sure that the PTO shaft drive in the tractor is switched off.
- The PTO shaft must be fitted with guards.
- It is forbidden to use the PTO shaft without its guards or with damaged components.
- Install the articulated telescopic shaft, in accordance with the guidelines provided in the Operating Instructions issued by the shaft's Manufacturer.
- Secure the guards of the PTO shaft against rotating, using chains. Fasten the chains of the shaft to the permanent structural components of the Spreader and the tractor.
- The PTO sheath is marked indicating which end of the shaft to mount on the machine side and which on the tractor side. The protective couplings must always be fitted on the machine side.
- After installing the PTO shaft, make sure that it is correctly and safely connected to the tractor and the Spreader.
- Each time you start the Spreader, make sure that the PTO guards are in good technical condition, and that they are correctly positioned. Change any damaged or faulty components for new ones.
- When working with and maintaining the machine, it is forbidden to wear loose clothing, which can be caught by the rotating parts of the PTO shaft. Contact with a rotating PTO shaft can result in a serious injury or death.
- When working in conditions of reduced visibility, use the tractor's service lights to ensure adequate sight of the working PTO shaft and its immediate vicinity.
- Transport and store the PTO shaft horizontally with its chains fastened together, to prevent damage to the guards and other components.
- It is forbidden to overload the PTO shaft and the drive system of the Spreader’s adapter. It is not allowed to start the PTO shaft of the tractor in a sharp manner. Before starting the PTO shaft, make sure that the direction of rotation is correct.
- **Use a PTO shaft speed of 1000 rpm during operation.** Operating at different speeds can damage the machine or its components.
- Switch off the PTO shaft drive, whenever there is no need to drive the machine, or when the tractor and Spreader are oriented at an unfavourable angle.
- Do not exceed the maximum and minimum permissible working length of the PTO shaft.
- When uncoupling the PTO shaft from the tractor, place it in a special holder designed for that purpose.

- It is forbidden to use chains for suspending or supporting the PTO shaft, when the Spreader is parked or transported.

2.2 Residual risks

2.2.1 Description of residual risks

It is inevitable that some risks will occur during the Spreader's operation, although METAL-FACH in Sokółka assumes responsibility for the machine's design and structure, in order to eliminate hazards.

Residual risk can result from incorrect behaviour by the Spreader's operator, e.g. carelessness, ignorance, or improper actions. The following prohibited actions cause the highest level of risk.

1) The operating of the Spreader by minors or persons without authorisation to drive a tractor, as well as by persons who have failed to read the Instruction Manual.
2) The operating of the Spreader by persons, who are sick or under the influence of alcohol or other intoxicating substances.
3) Using the Spreader for purposes other than those described in the Instruction Manual.
4) Standing between the tractor and the Spreader, while the tractor's engine is running.
5) Oil leakage and sudden movement of components caused by rupturing of hydraulic hoses.
6) Standing on the machine while operating or transporting.
7) Bystanders, children in particular, standing close to the running spreader.
8) Presence of persons or animals in areas not visible from the operator's position.
9) Cleaning, maintaining and inspecting the spreader assemblies connected to the PTO shaft while the tractor engine is running.
10) Checking its technical condition, when the Spreader is in operation.
11) Operating defective power take-off shafts.
12) Exceeding the permitted speed and load carrying capacity.
13) Making modifications to the machine without the Manufacturer's consent.

When specifying the residual risks, we assume that the spreader is a machine that was designed and manufactured in the state-of-the-art in the year of its manufacture.

2.2.2 Residual risk assessment

Residual risk can be reduced to the minimum by applying the following recommendations:

1) Adhering to the safety rules described in the Instruction Manual.
2) Using common sense, when operating the machine.
3) Do not hurry, when operating the machine.
4) Maintain a safe distance from the restricted and dangerous places.
5) Do not reach into dangerous and/or restricted areas with your hands;
6) Do not stand on the machine, while it is in operation.
7) Have repair and maintenance work performed by trained personnel.
8) Wear the appropriate protective clothing.
9) Make sure no unauthorised persons have access to the machine, especially children.
10) Make sure there is no person present in the blind spot (especially when reversing and coupling).

CAUTION

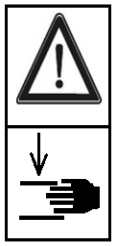
CAUTION!
Failure to comply with the instructions and guidance provided herein may result in residual risks!

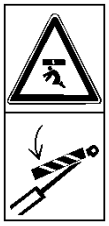
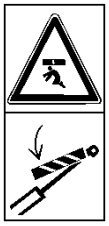
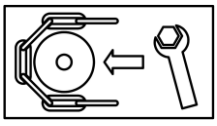
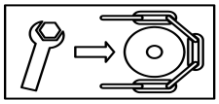
2.3 Warning and information stickers

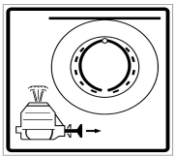
The Manure Spreader is marked with information and warning stickers. The User is obliged to ensure that the inscriptions, warning signs, and informative pictograms provided on the Spreader remain legible for the duration of its working life. If any information or warning sticker has been damaged or removed, have it ordered from the Manufacturer or the point of sale the machine was purchased from. Re-attach stickers to any new components that have been fitted during repair work. When cleaning, do not point a strong jet of water at the labels and do not use solvents.

Table 2. Information and warning stickers

No.	Safety symbol (sign)	Meaning of the symbol (sign) or content of the inscription	Location on the Spreader
1.		Caution! Before you start operating the machine, read the Instruction Manual.	Load body front wall

2.		Caution! Turn off the engine, remove the key, and disconnect the telescopic shaft before servicing or repairing.	Load body front wall
3.		Caution! Risk of electric shock. Keep a safe distance from power lines.	Load body front wall
4.		Caution! Torso crushing hazard. Stay clear of the area where the articulated coupling joints rotate, if the engine is running.	Load body front wall
5.		Caution! Danger of being dragged in by the drivetrain. Do not reach into the area of rotating parts.	At the drawbar and at the rear on the right-hand side of the spreader body.
6.		Caution! Thrown or flying materials. Hazard to the whole body. Keep a safe distance from the machine.	On the adapter frame
7.		Caution! Hand crushing hazard. Keep a safe distance from moving parts.	On the adapter frame
8.		Caution! Danger of hand or upper torso being dragged in by the rotors of the adapter. Do not reach into the area of rotating parts.	On the rear panel of the hopper. Near the adapter.

9.		Caution! Risk of falling. Do not travel on platforms or ladders.	On the right-hand panel of the hopper. Next to the ladder
10.		Caution! Danger of crushing toes or a foot. Keep a safe distance from the support foot and the drawbar.	At the support foot
11.		Secure the lifting cylinder before entering the danger zone.	On both sides of the horizontal adapter flap
12.		Do stand under the rising cover	On both sides of the horizontal adapter flap
13.		Do not stand under the cover being lowered	On both sides of the horizontal adapter flap
14.		Attachment points of the transport tie down straps	Lifting points
15.		Lubricating points	The front and rear sections of the floor conveyor
16.		Tensioning the floor conveyor chain	On the left panel of the hopper
17.		Tensioning the floor conveyor chain	On the right-hand panel of the hopper

18.		Speed limit of 40 km/h	At the rear, on the lightboard
19.		Pneumatic brake release mechanism	Load body front wall
20.		PTO rotational speed	On the front sheath
21.		Jacking point	On the driving axles
22.		Adjust the length of the shaft	On the hitch
23.		Do not put your hand into moving parts of the conveyor, be careful	On the right and left panels of the load body front and rear

	Warning inscriptions	**Meaning of the symbol (sign) or content of the inscription**	**Location on the Spreader**
24.		Turn off the PTO drive and close the adapter covers when the machine is stationary!	Load body front wall
25.		Check chain tension regularly	On the right and left panels of the hopper
26.		Do not enter the hopper when the drive is enabled	On the right-hand panel of the hopper. Next to the ladder
27.		Tighten the wheel nuts after a few kilometres and then periodically	Above the road wheels
28.		Adapter weight …… kg	On the adapter frame

29.		Load capacity: 14 t – N272/3, 18 t – N272/6	Load body front wall
30.		Switch off the PTO shaft drive when cornering.	Load body front wall
31.		Use a hitch for single-axle trailers to couple the trailer.	Load body front wall

CAUTION

CAUTION!
The user of the spreader must maintain legibility of all warning inscriptions and signs attached on the trailer over the whole period of operation. If they are damaged or destroyed, replace them with new ones.

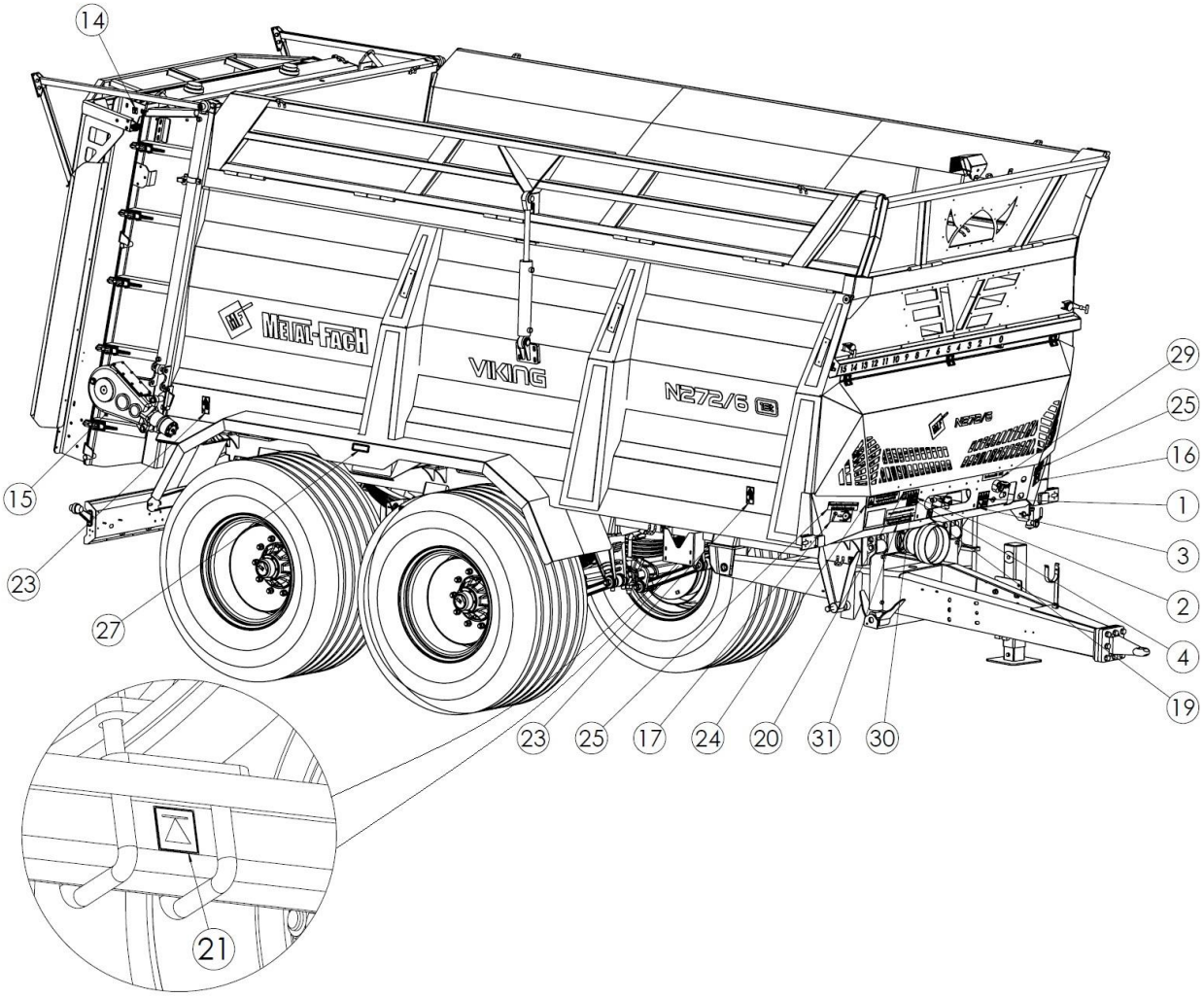


Figure 5. Layout of warning and information decals on the vertical adapter (front)

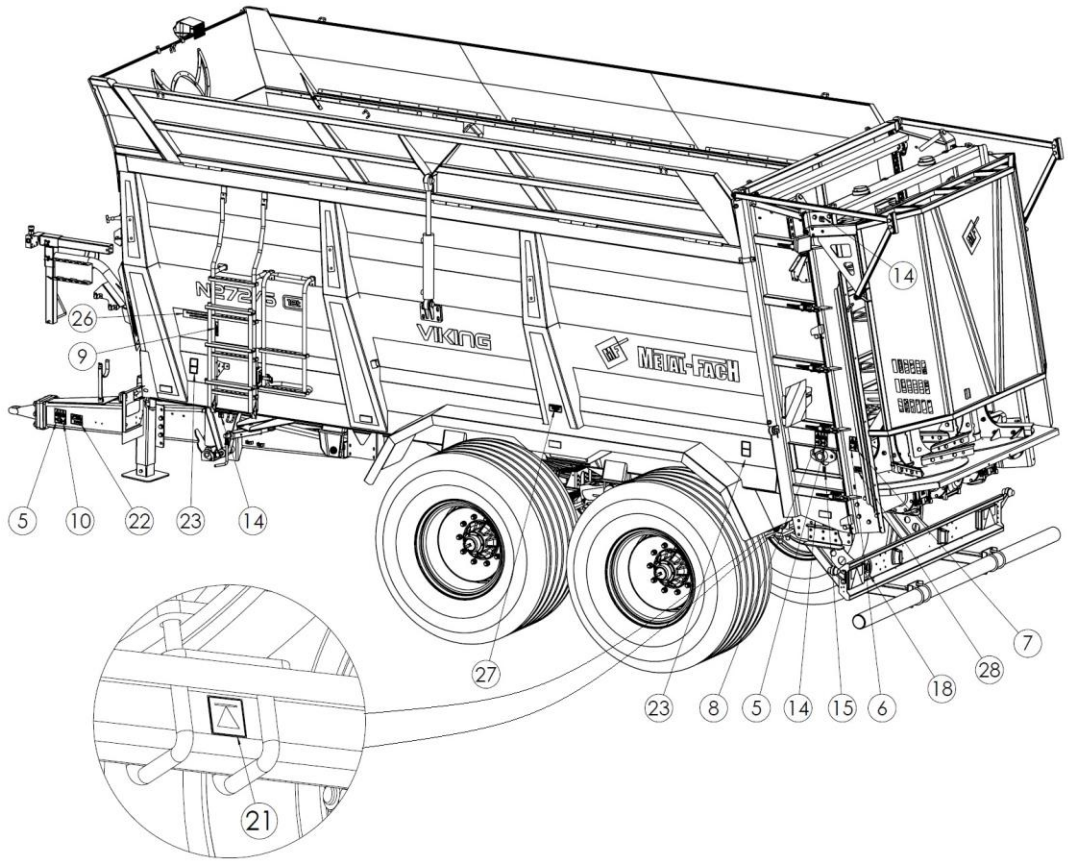


Figure 6. Layout of warning and information decals on the vertical adapter (rear)

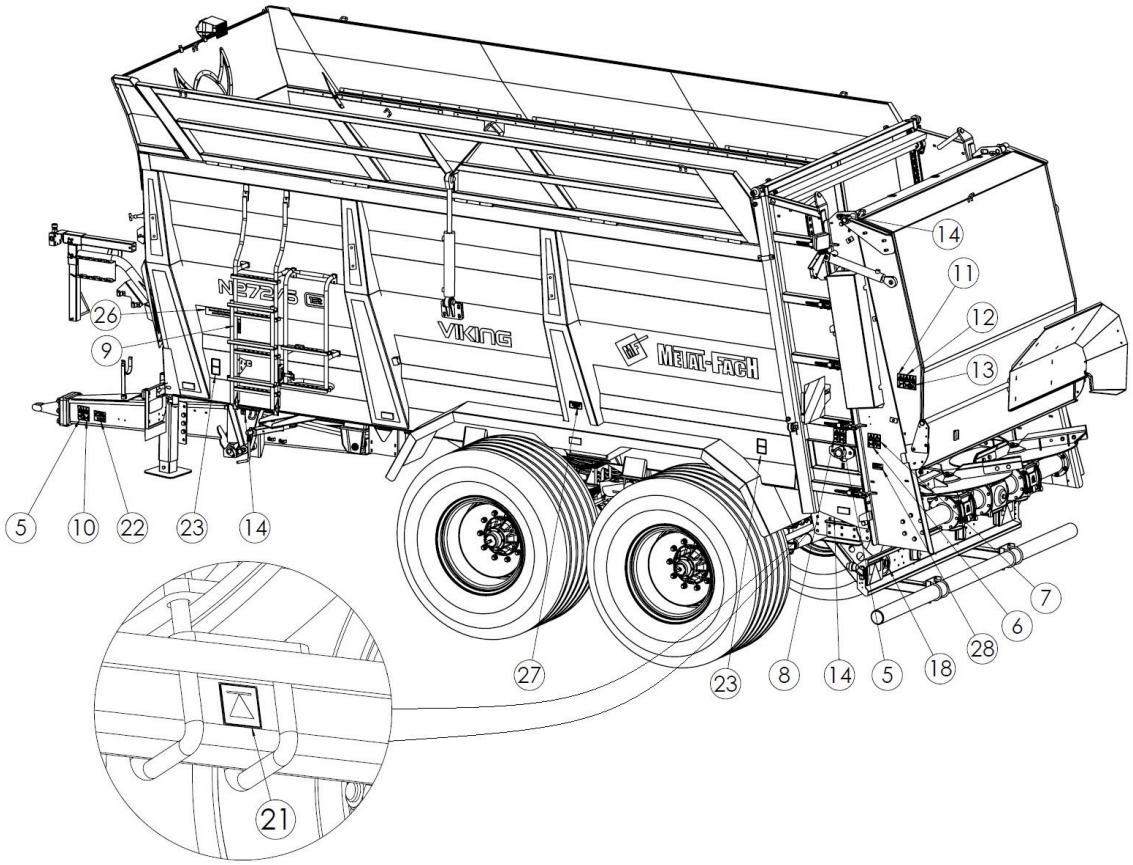


Figure 7. Layout of warning and information decals on the horizontal adapter

3. The Design and Principles of Operation

3.1 Basic Technical Data

Table 3. Basic technical data

No.	General data				
1.	Vehicle type		Manure Spreader		
2.	Suspension		Tandem on 4 parabolic leaf springs		
3.	Trade name		N272/3 (14 t); N272/6 (18 t) **VIKING**		
4.	Body type		Shell type hopper		
5.	Rating plate location		Front beam of the body		
Overall dimensions					
			UoM	**N272/3 (14 t)**	**N272/6 (18 t)**
6.	Length	2-auger vertical adapter	mm		
		2-auger horizontal disc adapter			
7.	Width	550-60/22.5” wheels	mm		
		600-55/22.5” wheels			
		650/55R26.5” wheels			
		710/55R22.5” wheels			
		710/50 R26.5 wheels			
8.	Height	550-60/22.5” wheels	mm		
		600-55/22.5” wheels			
		Wheels 650/55R26.5”, 710/50R26.5			
		710/55R22.5” wheels			
9.	Wheel track		mm		
Loading height					
10.	Loading height	550-60/22.5” wheels	mm		
		600-55/22.5” wheels			
		Wheels 650/55R26.5”, 710/50R26.5			
		710/55R22.5” wheels			
11.	Loading height with extensions	550-60/22.5” wheels	mm		
		600-55/22.5” wheels			
		Wheels 650/55R26.5”, 710/50R26.5			
		710/55R22.5” wheels			
12.	Ground clearance of the hopper floor	550-60/22.5” wheels	mm		
		600-55/22.5” wheels			
		Wheels 650/55R26.5”, 710/50R26.5			
		710/55R22.5” wheels			
Internal dimensions of the spreader body					
13.	Length		mm		

14.	Width			mm	
15.	Height			mm	
16.	Height with hydraulic extensions (sheet metal)			mm	
Performance parameters					
				UoM	**N272/3 (14 t)** / **N272/6 (18 t)**
17.	Permissible total weight			kg	
18.	Poor visibility in traffic*			kg	
19.	Permissible axle load			kg	
20.	Kerb weight			kg	
21.	Maximum pressure on the drawbar eye (max.)			kg	
22.	PTO rotational speed			RPM	1000
23.	Tractor power demand (min.)			HP	min. 135 / min. 140 - 150
24.	Cargo space			m³	13.4
25.	Cargo space with extensions			m³	18.4
26.	Effective spreading width			m	
27.	Maximum spreading width			m	
28.	Permissible transport speed			km/h	
29.	Working speed			km/h	
Miscellaneous					
30.	Pressure in the hydraulic system (max)			MPa	
31.	Maximum pressure in the 2-line pneumatic braking system			MPa	0.80
32.	Electrical system voltage			V	
33.	Types of hitch	Type of shock absorption		-	Hydraulic
		Coupling with the tractor	Lower hitch		YES
			Upper hitch		NO
34.	Drawbar eyes (types)	Standard		mm	Drawbar eye ∅50
		Optional			Rotational drawbar eye ∅50
		Optional			Drawbar eye ∅40
		Optional			K80 ball drawbar eye
35.	Driving axles	Standard		mm	Permanent □90 / Permanent □130
		Optional			NONE / Trailing, steering □130
36.	Brakes	Standard		-	Pneumatic with ALB

			UoM	N272/3 (14 t)	N272/6 (18 t)
37.	Parking brake		-	Pneumatic – manually controlled by the parking and release valve, braking the 1st front axle	
38.	Tyre size	Standard	-	550/60-22.5”	
		Optional		600/55-22.5”	
		Optional		-	650/55R26,5”
		Optional		710/45R22,5”	-
		Optional		-	600/55 R26.5
		Optional		-	710/50 R26.5
39.	Tyre air pressure*		bar	2.8 – 4.0	
40.	Minimum load index and speed rating of tyres		-	160 A8	
41.	Adapter type	Standard	-	2-auger, vertical, 2000 x 1880, fixed with an eccentric fastener	
		Optional		2-auger, horizontal, disc, 2000 x 1830, fixed with an eccentric fastener	
42.	Adapter weight	Vertical 2-auger	kg		
		2-auger horizontal disc			
43.	Oil in the hydraulic system (HL-46)		L	10.5	
44.	Oil in the gearbox of the floor conveyor (gearbox oil 80W90)		L	4.3	
45.	Oil in the gearbox of the spreading adapter (gearbox oil 80W90)		L	13.5	
46.	Chain of the floor conveyor	Chain link	mm	∅14 (14 x 50)	
		Number of rows	pcs.		
47.	Tensioning the chain of the floor conveyor	Tensioning screws in the front beam	pcs.		
48.	The chain wheel scrapers on the floor conveyor	Front	-	YES	
		Rear		YES	
49.	Safeguards (overload couplings)	Adapter	-	PTO front – shear pin	PTO rear – friction clutch
		The floor-conveyor gear		The cross-directional hydraulic valve	
50.	The slide gate-lifting indicator	Standard	-	YES	
51.	The thickness of the hopper panel (steel grade)		mm	3 (S355)	
			UoM	**N272/3 (14 t)**	**N272/6 (18 t)**

52.	Floor thickness of the spreader body (steel grade)			mm	3 (STRENX 700)	
53.	The wheel chocks included in the delivery			-	YES	
54.	Wheel mudguards	Standard		-	YES	
55.	Deflectors	Vertical adapter	Standard	-	Fixed permanently (no adjustment)	
		Horizontal adapter	Optional		Deflector guarding the right-hand bottom disc	
56.	Adapter tailgate (cover)		Vertical adapter		Lifted, with a slide gate	
			Horizontal adapter		Lifted hydraulically	
57.	External ladder			-	Fixed with bolts on the left-hand side of the body	
The hydraulic system						
58.	Hydraulic extensions	Standard	0.5 m	-	Hydraulically controlled	
59.	Load body slide gate			-	Hydraulically controlled	
60.	Parking jack			-	Hydraulic control	
61.	The drive of the floor conveyor			-	Hydraulically controlled	
62.	Bottom hitch			-	Hydraulically controlled	
63.	No distributor	Without hydraulic extensions		-	4 pairs of hoses (4 sections)	
		With hydraulic extensions			5 pairs of hoses (5 sections)	
64.	Distributor 6-section	Optional (VIKING 18t – if the spreader features a steering axle, then the distributor comes as standard)		-	1 pair of hoses	Steering axis - 2 pairs of hoses
						Permanent axles – 1 pair of hoses
65.	Horizontal adapter (optional)	Without hydraulic extensions			5 pairs of hoses	
66.		With hydraulic extensions		-	6 pairs of hoses	
67.	Horizontal adapter with a section distributor 6-section	Optional (VIKING 18t – if the spreader features a steering axle, then the distributor comes as standard)		-	1 pair of hoses	Steering axis - 2 pairs of hoses
						Permanent axles – 1 pair of hoses
68.	Hydraulic brake, hydraulic-pneumatic brake	Optional		-	Additionally 1 hydraulic line	

* depending on the equipment

Table 4. Basic technical data of the tyres

Tyre assembly No	Axle No.	Tyre size, including load index and speed rating symbol	Rolling radius [mm]	Rated load per tyre [kg]	Maximum permitted axle load [kg] (*)	Maximum permissible vehicle weight [kg] (*)	Maximum permissible vertical load at the coupling point [kg] (*) (**)	Wheel track [mm]		Trade name
								Min.	Max.	
D	1.2	550/60 22.5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/3, N272/6
E	1.2	550/60 R22,5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/3, N272/6
S	1.2	560/60 R22,5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/3, N272/6
T	1.2	580/65 R22,5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/3, N272/6
U	1.2	600/50 R22,5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/3, N272/6
F	1.2	600/55-22.5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/3, N272/6
G	1.2	600/55 R22,5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/3, N272/6
W	1.2	620/50 R22,5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/3, N272/6
H	1.2	710/45 R22.5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/3, N272/6
I	1.2	600/55-26.5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/6
J	1.2	600/55 R26,5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/6
K	1.2	650/55 R26,5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/6
L	1.2	710/50 R26,5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/6
X	1.2	680/55 R26,5 160 A8		Min 4500 kg	9000 kg	18000 kg	3000 kg			N272/6

(*) In accordance with tyre specifications.

(**) Load transmitted onto the reference centre of the coupling under static conditions, regardless of the coupling device; if the maximum permissible vertical load at the coupling point depending on the coupling is indicated in this table, extend the table on the right hand side and indicate in the column heading the identification of the coupling device; for vehicles of category R or S this column refers to rear coupling devices, if any.

The User must observe the permissible transport speeds commensurate with the maximum load carrying capacity of the Spreader.

If another brand of tyre is used, observe its parameters.

DANGER

DANGER!
Failure to adhere to the permissible speed, tyre and axle loads can result in a serious accident.

3.2 The Design and Principles of Operation

The components of the spreader are shown in Figure 8. The main structural parts include a lower frame (4) with tandem spring-mounted suspension (5) on which the spreader body (7) is supported. A hydraulically sprung hitch (2) equipped with a fixed drawbar eye (1) is used for connection with the tractor's lower hitch. It is also possible to mount the eye for a rotary and ball drawbar. A hydraulic parking jack (3) is attached to the drawbar to support the spreader when it is not connected to the tractor and to adjust the height of the drawbar during coupling. A fixed ladder (17) is installed on the left-hand side of the body wall to inspect the load compartment and enter the inside of the body during cleaning or maintenance works. There is a hydraulically controlled gate (11) at the rear of the load body, to separate the loaded material from the adapters and prevent it from falling out during transport. The main operation component is the beater unit (10) with two vertical augers. The loaded material is moved towards the beater unit by the chain feeder (13) fitted on the floor of the spreader body. The adapter has a cover (10) that acts as a safety device during transport. The cover lifts up automatically when the slide is extended. Optionally, side extensions (20) can be mounted, which can be opened with hydraulic cylinders. This feature allows you to reduce the loading height when filling the load body.

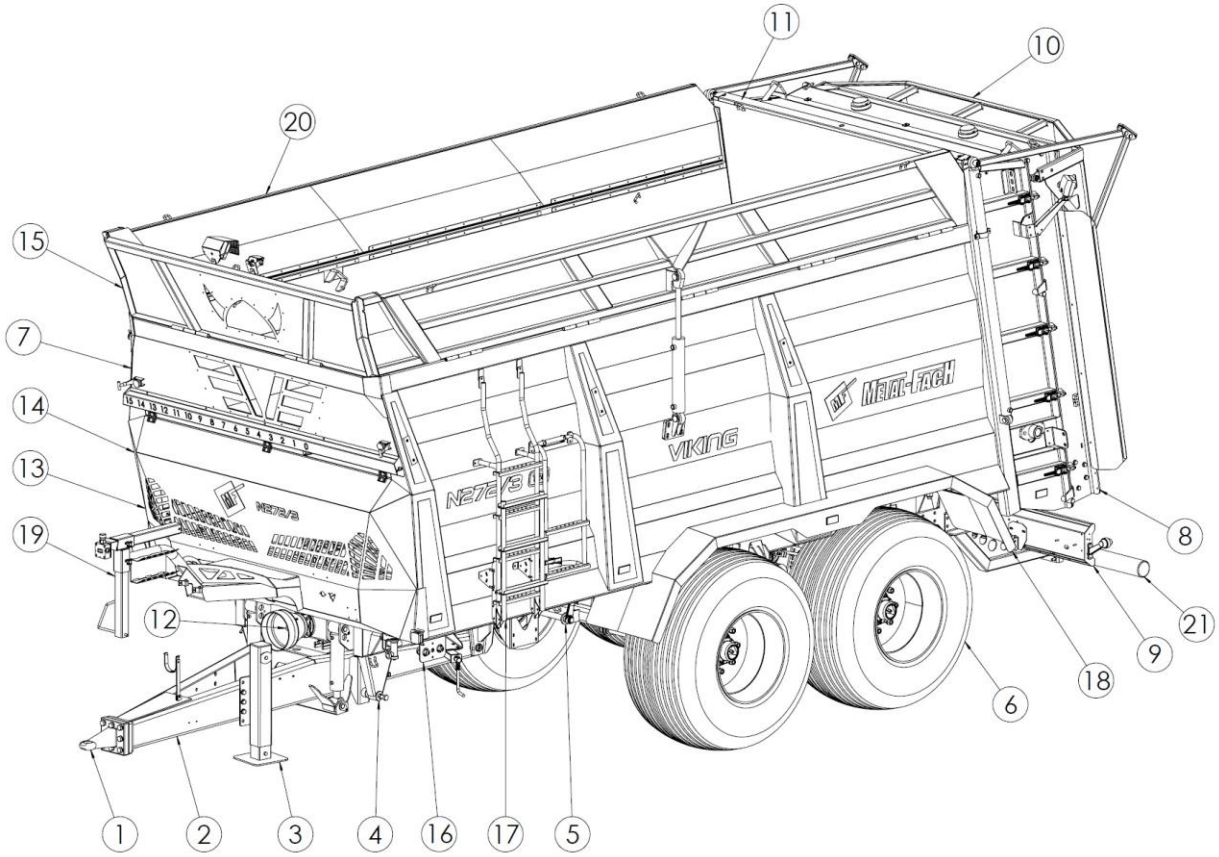


Figure 8. General design of the Manure Spreader:
1 – drawbar eye, 2 – hitch, 3 – support leg, 4 – bottom frame, 5 – suspension, 6 – ground wheel, 7 – body, 8 – adapter unit, 9 – lighting beam, 10 – beater shield, 11– body gate, 12– drive unit, 13 – chain feeder, 14 – front guard, 15 – front extension, 6 – parking and release brake, 17 – ladder, 18 – mudguards, 19 – cable bracket, 20 – side extension, 21 – overrun bar

3.2.1 The feeding mechanism

The feeding unit consists of a floor conveyor, a feeder roller set and a tensioning system. The entire unit is driven by the tractor's hydraulic system.

The floor conveyor consists of two pairs of chains connected by scraping bars. The chains are driven by sprocket wheels mounted on the feeder roller. The feeder roller is driven by the reduction gear and the hydraulic motor. In the front part of the spreader there is a tensioning system for the chains of the feeder. There are scrapers installed by the sprocket wheels of the conveyor, which prevent the sprockets from clogging.

The floor conveyor is protected against damage by an overload hydraulic valve located in the hydraulic motor. If overloaded or blocked mechanically, the conveyor is paused immediately.

3.2.2 The slide gate-lifting indicator

The slide gate lift indicator is mounted on the front of the spreader so that the tractor operator can check its position at all times. The scale from 1 to 15 corresponds to the position of the gate valve from 0 to 1.5 m.

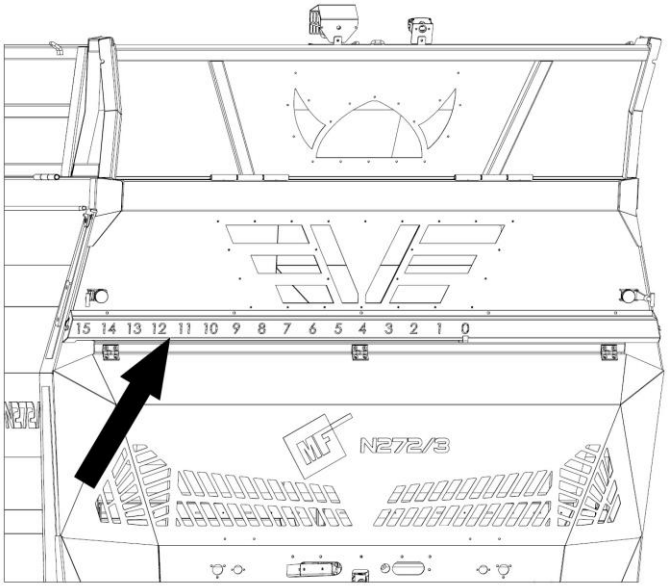


Figure 9. The slide gate-lifting indicator

3.2.3 The drive unit of the adapter

The drive unit of the adapter consists of a PTO shaft coupled with the tractor, rotating at the nominal torque of 900 Nm with a shear-pin coupling, a split quill shaft which transmits power from the front part to the rear part of the Spreader, and a PTO shaft which transmits power to the adapter.

Table 5. Articulated telescopic shafts

The symbol for the tractor connection shaft		Nominal torque	Nominal length	Transmitted power	Overload coupling
		Nm	mm	kW	Nm
680005/802.K68-1/5NW L=1460/2490					
*680060/S802.K68-1/5NW L=1530/2220					
The symbol for the adapter connection shaft	Adapter type	Nominal torque	Nominal length	Transmitted power	Overload coupling
680440/804.C6803A/5NW	P2				
680450/804.C6803A/5NW	T2				

Description of codes: P2 – vertical 2-rotor adapter, T2 – 2-auger horizontal disc beater unit

* - the wide angle shaft used as an option

3.2.4 2-auger vertical spreader adapter

The 2-auger vertical spreader adapter is used for shredding and scattering the material supplied by the floor conveyor. The adapter is mounted on the rear of the spreader. The adapter is supplied by the drive unit and the PTO of the tractor.

The beater unit consists of a left beam (1), a right beam (2) and an upper beam (3) to form the beater unit frame. In its lower part there is a gearbox (4), on which the vertical augers (5) and (6) are mounted. The primary working tools are the replaceable blades (7) screwed on to the rotor segments. When rotating, the rotors shred the material feed and eject it to the back and the sides. The end of the lower part of the augers is fitted with discs with blades, which increase the material spreading width.

The adapter is connected to the hopper using eccentric clamps. To disassemble the beater unit

- disconnect the PTO shaft from the beater unit gearbox
- remove the adapter covers,
- remove the adapter lower covers,
- release the eccentric clasps securing the adapter,
- use a lifting device with the minimum lifting capacity of 1200 kg to remove the adapter,
- after removing the adapter, place it on a solid surface and secure against tipping over.

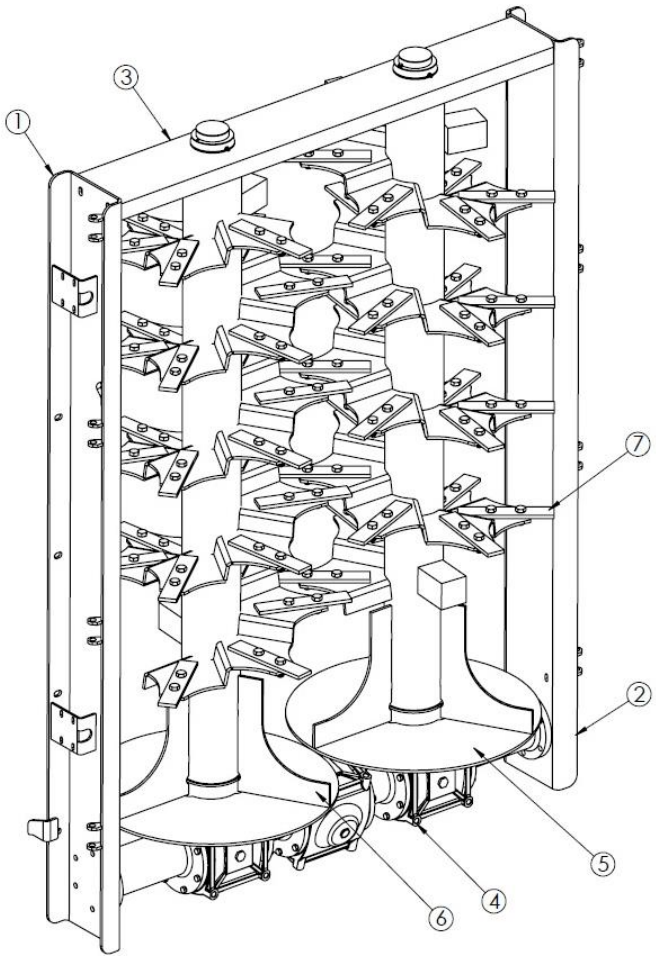


Figure 10. 2-rotor verticaladapter

3.2.5 2-auger horizontal disc adapter

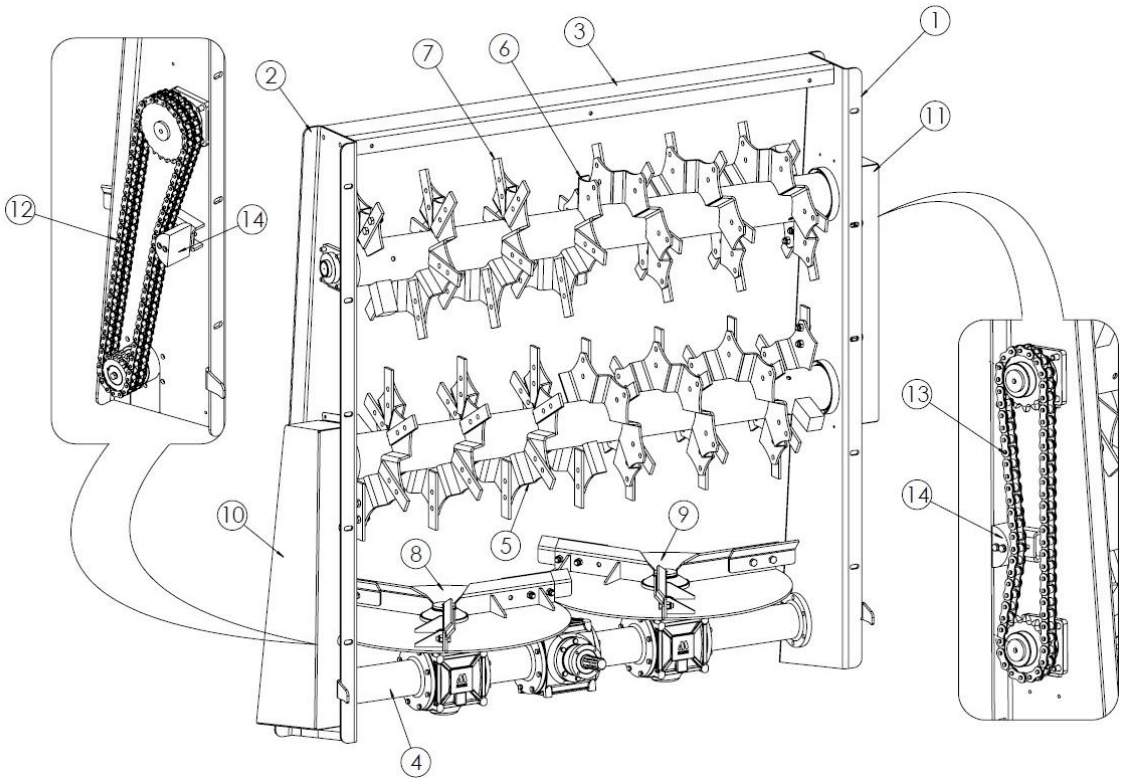


Figure 11. 2-auger horizontal disc adapter

The 2-auger horizontal disc adapter (Fig. 11) consists of a left beam (1), a right beam (2) and an upper beam (3) to form the beater unit frame. In its lower part there is a gearbox (4), on which the spreading discs (5) and (6) are mounted. The main working tools consist of the replaceable blades (7) screwed on to the horizontal rotors (8) and (9). By rotating, the rotors grind the fed material, which is supplied by the adapter guard to the spreading discs. The rotating discs eject the shredded material backwards and sideways. Power is transmitted from the gear (4) to the horizontal rotors (5) and (6), via the chain transmissions installed under the guards (10) and (11). From the gear, power is transmitted to the rotor of the lower 16B2 chain (12). The top auger is powered from the bottom auger by the 20B1 chain (13). The chain tension is controlled by tensioners (14).

3.2.6 Adapter cover

The cover of the 2-auger vertical adapter is fastened to the hopper by means of hinges and connected to the slide gate with towing eyes. As soon as the slide gate is lifted, the adapter cover rises automatically and returns to the “shut” position after the slide gate has been lowered.

The cover of the 2-auger disc horizontal adapter is attached to the body in its top section by means of hinges and is opened upwards by hydraulic cylinders. They are controlled directly from the tractor cab via the lever of the external valve block. Close the beater unit shield for transport and operation and open it only for technical inspections of the auger components, cleaning and maintenance. The beater unit shield is used as a wall hit during operation by the shredded material. The shredded material then falls on the beater unit discs, which eject it evenly backwards and sideways. Working with the cover raised is allowed, but please note

that this affects the even spread of the material and you will have to keep closely to the previous track while doing the successive pass, which increases the number of passes.

3.2.7 Load body slide gate

The N272/3 and N272/6 spreaders are fitted with a body gate as standard. It separates the material to be transported from the beater unit. It is supported in the side guides, which seal and protect the material against penetrating outside the hopper. The bottom section of the slide gate is reinforced, which protects the gate against damage resulting from excess manure pressing on it. At the bottom of the gate (as at the front of the body) a rubber sealing belt is fixed, matching the shape of the conveyor chains.

The gate is opened by hydraulic cylinders, controlled by the tractor's external hydraulic system, to move it upwards.

3.2.8 Main brake system

The spreader is equipped with a 2-circuit pneumatic brake with ALB (with automatic brake force control) – Figure 12. The brake is activated from the driver's seat by pressing the brake pedal of the tractor. The pneumatic control valve (1) enables the spreader's brakes to operate simultaneously with the tractor's brakes. In the event of an accidental disconnection of the hoses (8) and (9) the control valve will automatically activate the brakes of the machine. The ALB system features a valve (2) which automatically and continuously adjusts the braking force on the spreader wheels according to the load level of the body.

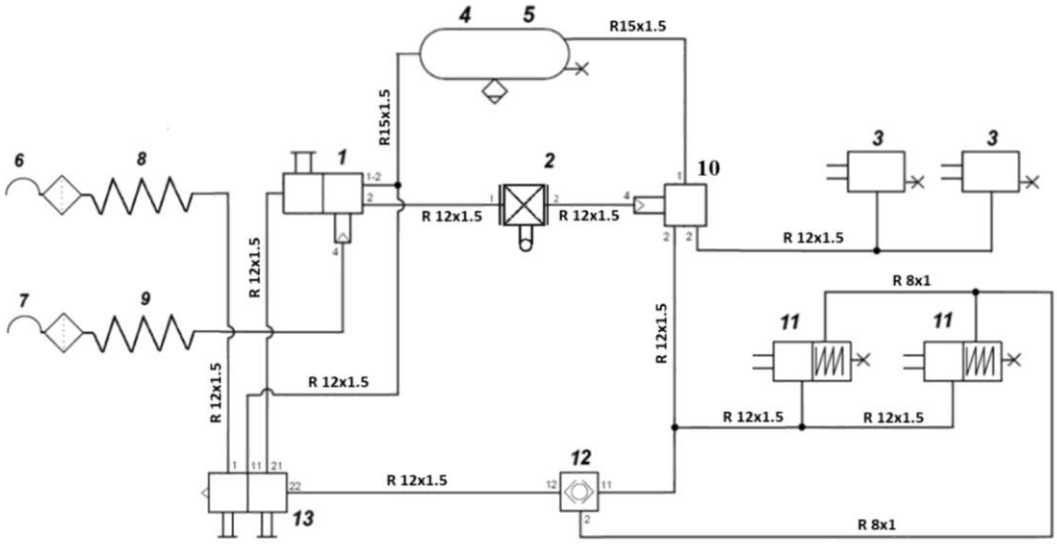


Figure 12. 2-line pneumatic braking system with ALB
1 – Main valve, 2 – Automatic brake force regulator ALB, 3 – Diaphragm actuator 24", 4 – Air tank, 5 – Tank bracket, 6 – Red connector with filter – supply, 7 – Yellow connector with filter – control, 8 – Red coiled hose, 9 – Yellow coiled hose, 10 – Relay valve with damping, 11 – Diaphragm spring actuator 24'/30", 12 – 3/2 way valve, 13 – Park and release valve

3.2.9 Parking brake

The parking brake is used to stop the Spreader, while it is parked. The parking brake control valve is shown in Figure 13.

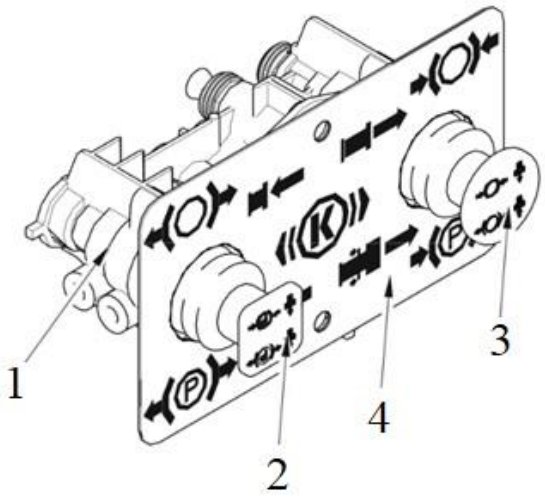


Figure 13. Parking brake – release valve
1 – valve, 2 – red button, 3 – black button, 4 – rating plate

The parking brake is pneumatically operated with the parking and release valve, located on the left-hand side of the spreader and acts on the wheels of the first axle. This valve is used on spreaders with diaphragm spring actuators and is equipped with an emergency brake function. Emergency braking is activated if the supply line pressure drops. Two buttons located on the valve allow you to set the spreader to the appropriate mode of operation.

The red button (2) controls the operation of the parking valve. When the button is pulled out, the parking brake (spring-loaded) is applied. The black button (3) controls the shuttle valve. It is used to release/apply the brake when the spreader is disconnected from the tractor. This button cannot be pressed when the pneumatic lines are connected. In the depressed position, the spring (parking) brake is released.

Table 6. System operating modes

No.	Black button (release valve)	Red button (parking valve)	The spreader is connected to the tractor with pneumatic hoses	Operation conditions	Parking brake
1.	extended	retracted	yes	driving	released
2.	extended	extended	yes	parking	started
3.	retracted	retracted	no	manoeuvring	released
4.	retracted	extended	no	parking (spreader uncoupled)	started

3.2.10 Hydraulic steering lock system

The spreader can be equipped with a passive steering rear axle. The axle design makes it easier to change the direction of the vehicle when taking sharp turns, it avoids ruts in the ground and gives better stability when cornering.

The hydraulic steering lock system is used to lock the rear axle when driving on public roads at higher speeds and when reversing. Otherwise, the spreader will tend to turn uncontrollably to the left or right.

The following figure (Figure 14) shows the 2-circuit hydraulic system for the steering axis lock.

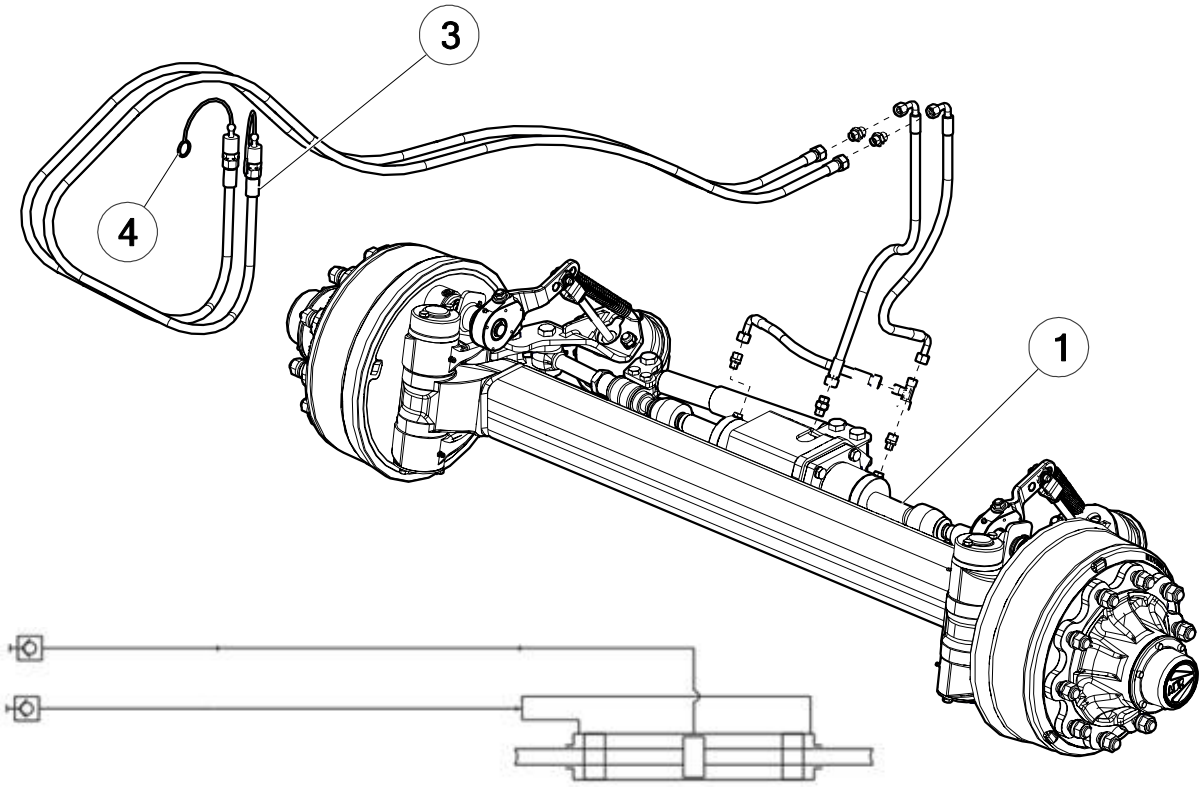


Figure 14. Rear axle hydraulic lock system diagram
1 – hydraulic cylinder, 2 – hydraulic line, 3 – hydraulic quick connector, 4 – hydraulic plug

The axle steering lock is controlled from the tractor cab via the external hydraulics distributor lever on the tractor. The hydraulic lines (2) for connecting to the tractor are equipped with quick plug couplings (3) and secured with plugs (4). The lock mechanism is released and locked by pushing the piston rod in or out of the hydraulic cylinder (1).

3.2.11 The electrical and lighting systems

The electrical system of the spreader can supply power from a 12 V DC power source from the tractor electrical system. Connect the electrical system of the Spreader to the electrical system of the tractor system by means of a connecting cable supplied with the machine. The wiring diagram is shown in Figure 15 and the arrangement of lights in Figure 16.

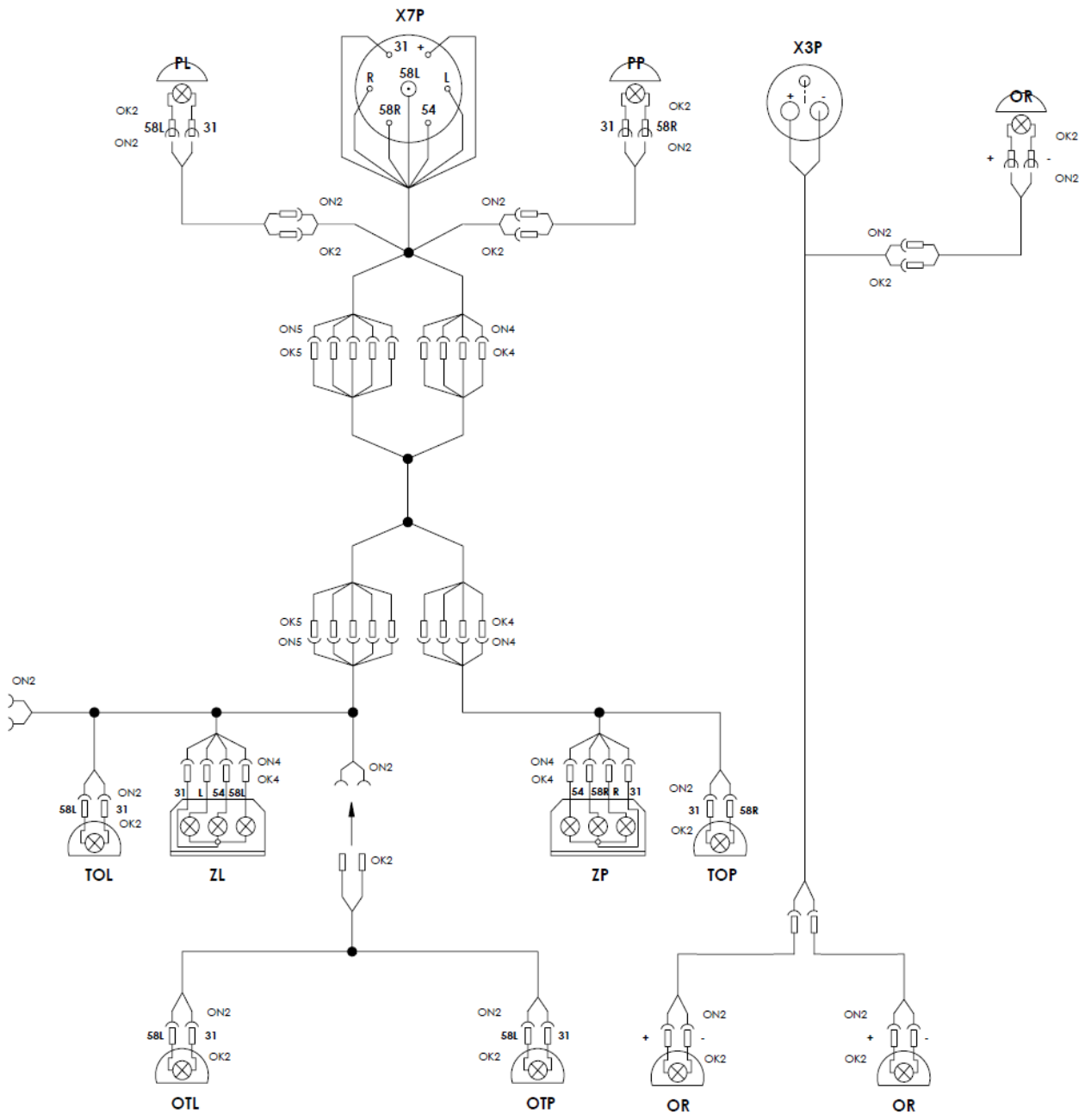


Figure 15. Wiring Diagram

Colour code for wires, electrical parts and connections are given in Tables 7, 8 and 9.

Table 7. Cable colour code

Designation	**Colour**
c	Black
b	White
k	Red
t	Green
z	Yellow

Table 8. List of codes for electrical parts

Symbol	**Name**
ZP	Rear-light cluster, right
ZL	Rear-light cluster, left
GP	Connection socket
OP	Marker lamp, right
OL	Marker lamp, left
PPP	Front running light, right
PPL	Front running light, left

Table 9. GT sockets connection marking

Designation	**Function**
1 - L	Traffic indicator lamp, left
3 - 31	Earth
4 - R	Traffic indicator lamp, right
5 – 58R	Running lights
6 - 54	Brake light

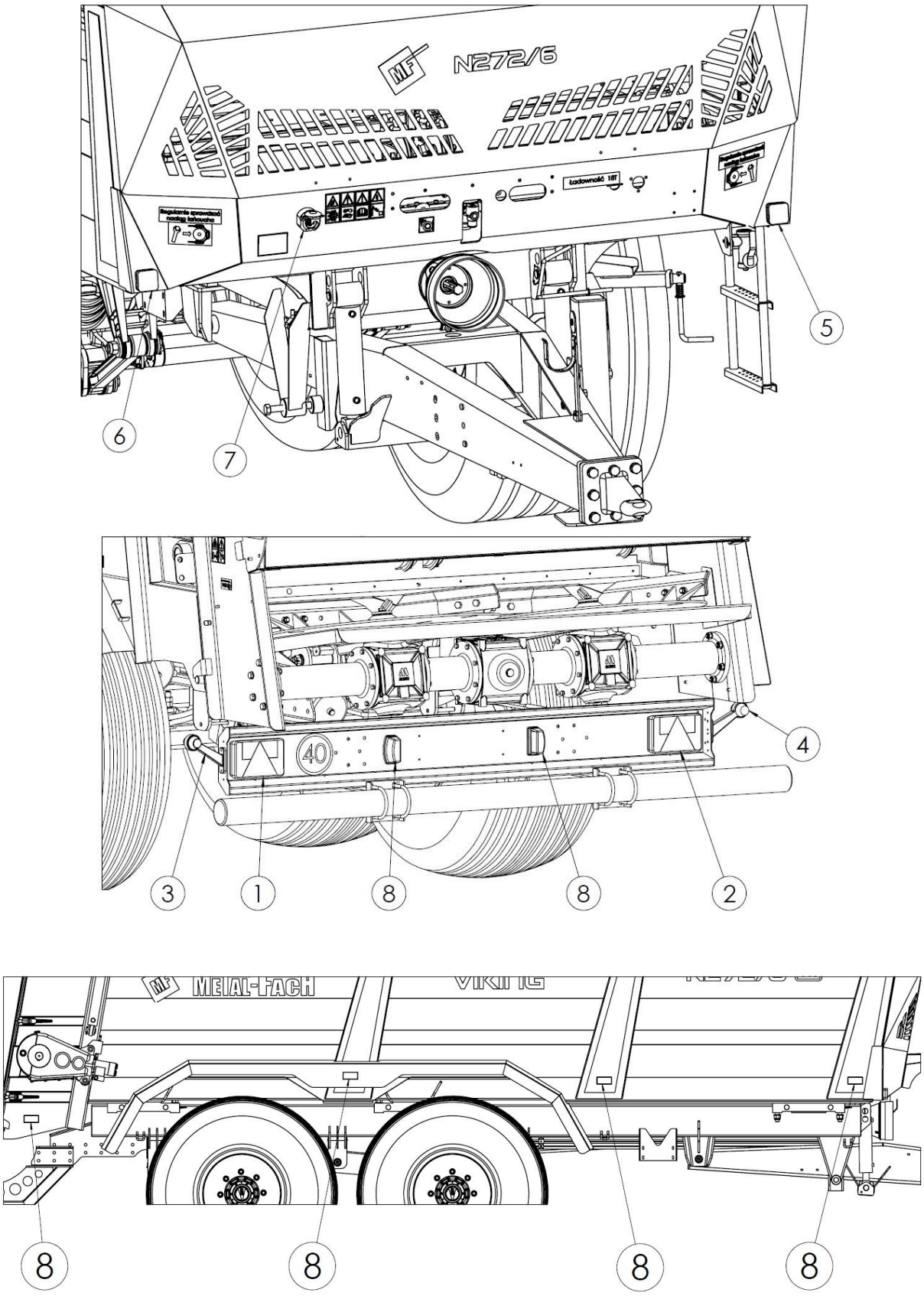


Figure 16. Arrangement of the electrical system components:
1 - rear left lamp cluster, 2 - rear right lamp cluster, 3 - left marker light, 4 - right marker light, 5 - front left running light, 6 - front right running light, 7 - connection socket

INDEX OF NAMES AND ABBREVIATIONS

dB (A) – scale A decibel, sound pressure unit;

kg – kilogram, weight unit;

km – kilometre, a commonly used multiple measure of the metre, the basic unit of length in the SI system;

kPa – kilopascal, pressure unit

HP – horse power, power unit;

m – metre, length unit;

mm – millimetre, an auxiliary length unit equal to 0.001 m;

kPa – Megapascal, a pressure unit;

N – Newton **–** a force unit in the SI system;

Nm - Newton-metre, a unit for the moment of force in the SI system;

Pictogram – an information plate;

t – tonne, a mass unit;

Rating plate – a manufacturer's plate unambiguously identifying the machine

V – Volt, a voltage unit;

UV - Ultraviolet radiation; It is an invisible electromagnetic radiation with a negative impact on human health; UV radiation has a negative effect on rubber parts;

Transport hitch – hitching components of a farm tractor (see the Instruction Manual of the tractor).

ALPHABETICAL INDEX

PART I

PART II

NOTES

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