PRONAR SP. Z O.O.

17-210 NAREW, UL. MICKIEWICZA 101A, WOJ. PODLASKIE

TEL.: +48 085 681 63 29 +48 085 681 64 29

+48 085 681 63 81 +48 085 681 63 82

FAX: +48 085 681 63 83 +48 085 682 71 10

www.pronar.pl

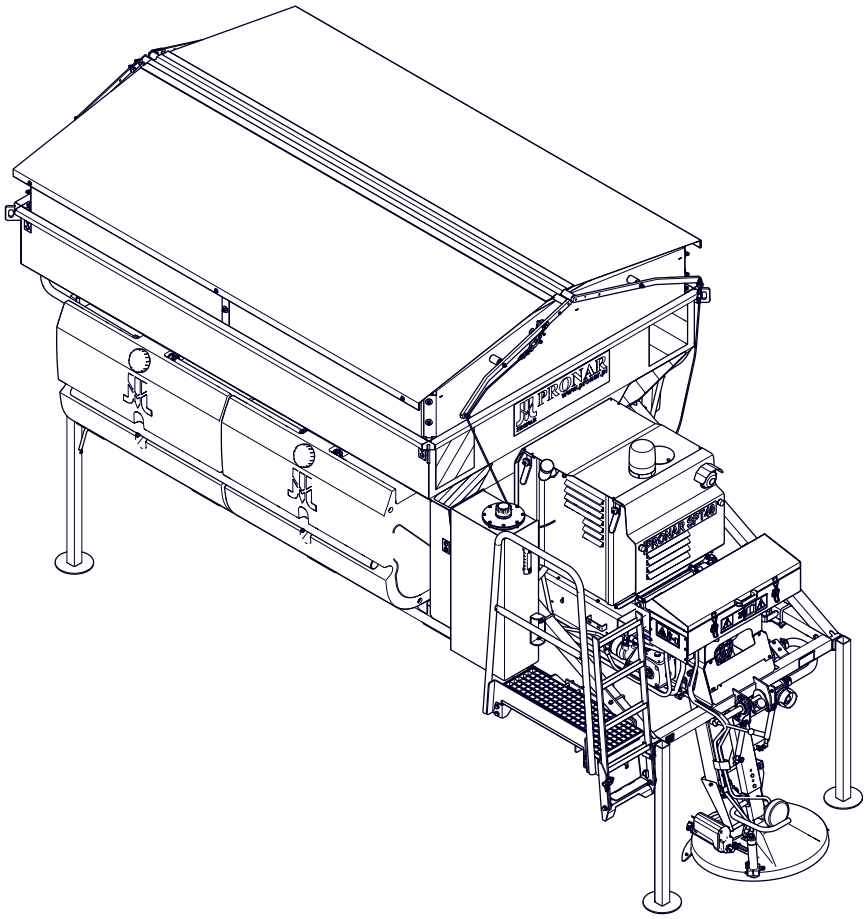
OPERATOR`S MANUAL

SPREADER

PRONAR SPT40

HATZ 2G40

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



EDITION 3A

11-2019

PUBLICATION NO 415.02.UM

EN

SPIS TREŚCI

PERIODIC INSPECTIONS MAINTENANCE

ENGINE MAINTENANCE

LUBRICATION SCHEDULE

PRONAR Sp. z o.o.
ul. Mickiewicza 101 A
17-210 Narew, Polska
tel./fax (+48 85) 681 63 29, 681 63 81, 681 63 82,
681 63 84, 681 64 29
fax (+48 85) 681 63 83
http://www.pronar.pl
e-mail: pronar@pronar.pl

EC DECLARATION OF CONFORMITY OF THE MACHINERY

PRONAR Sp. z o.o. declares with full responsibility, that the machine:

Description and identification of the machinery	
Generic denomination and function:	**Spreader**
Type:	**SPT40**
Model:	–
Serial number:	
Commercial name:	**Spreader PRONAR SPT40**

to which this declaration relates, fulfills all the relevant provisions of the Directive **2006/42/EC** of The European Parliament and of The Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (Official Journal of the EU, L 157/24 of 09.06.2006).

The person authorized to compile the technical file is the Head of Research and Development Department at PRONAR Sp. z o.o., 17-210 Narew, ul. Mickiewicza 101A, Poland.

This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user.

„PRONAR"
Spółka z o.o.
17-210 Narew, ul. Mickiewicza 101 A
tel. (085) 681 6329, 681 6429
fax (085) 681 6383

Z-CA DYREKTORA
d/s technicznych
członek zarządu
Roman Chmielaniuk

Narew, the 2015-09-29

Place and date

Full name of the empowered person position, signature

INTRODUCTION

INTRODUCTION

Information contained herein is current at date of publication. As a result of improvements, some numerical values, illustrations and completion (standard, additional and optional equipment) contained in this publication may not correspond to the factual specification of the machine supplied to the user.

The drawings in this publication are intended to explain the operating principle of the machine and may differ from the actual state. It cannot be the basis for any claims in this respect.

The manufacturer reserves the right to introduce design changes in machines produced that facilitate operation and improve the quality of their work, without making minor amendments to this Operator's Manual.

This Operator's Manual is an integral part of the machine's documentation. Before using the machine, the user must carefully read this Operator's Manual and observe all recommendations. This guarantees safe operation and ensures failure-free work of the machine. The machine is designed to meet obligatory standards, documents and legal regulations currently in force.

If the information contained in the Operator's Manual needs clarification then the user should refer for assistance to the sale point where the machine was purchased or to the Manufacturer.

It is recommended that the serial numbers of the machine and major subassemblies are inscribed in the spaces below after purchase of the machine.

Machine serial number

Engine serial number

This Operator's Manual contains important safety and operating instructions for the machine. The Operator's Manual should be kept near the machine so that it is accessible to authorized operators.

Keep this manual for future reference. If the Operator's Manual is lost or damaged, contact the seller or the manufacturer for a copy.

The Operator Manual is intended for the end user. For this reason, some required maintenance activities are listed in the inspection tables but the procedure is not described in this Operator Manual. To perform these activities, call the manufacturer's authorized service centre.

U.01.2.EN

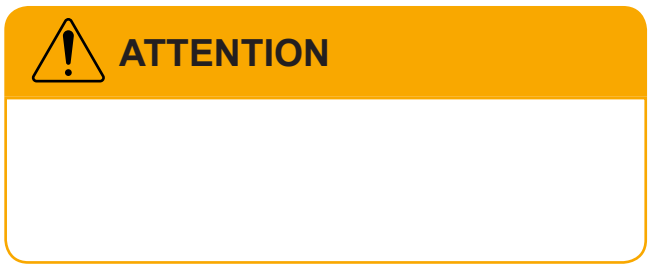
SYMBOLS APPEARING IN THIS OPERATOR'S MANUAL

DANGER

Information, descriptions of danger and precautions as well as recommendations and prohibitions associated with the safety of use are marked in the text with the sign **DANGER**. Failure to observe the instructions may endanger the machine operator's or other person's health or life.

ATTENTION

Particularly important information and instructions, the observance of which is essential, are distinguished in the text by the sign **ATTENTION.** Failure to observe the instructions may lead to damage to the machine as a result of improper operation, adjustment or use.



TIP

Additional tips included in the Operator's Manual describe useful advice for the machine operation and are marked with the sign **TIP.**

U.02.1.EN

DIRECTIONS USED IN THIS OPERATOR'S MANUAL

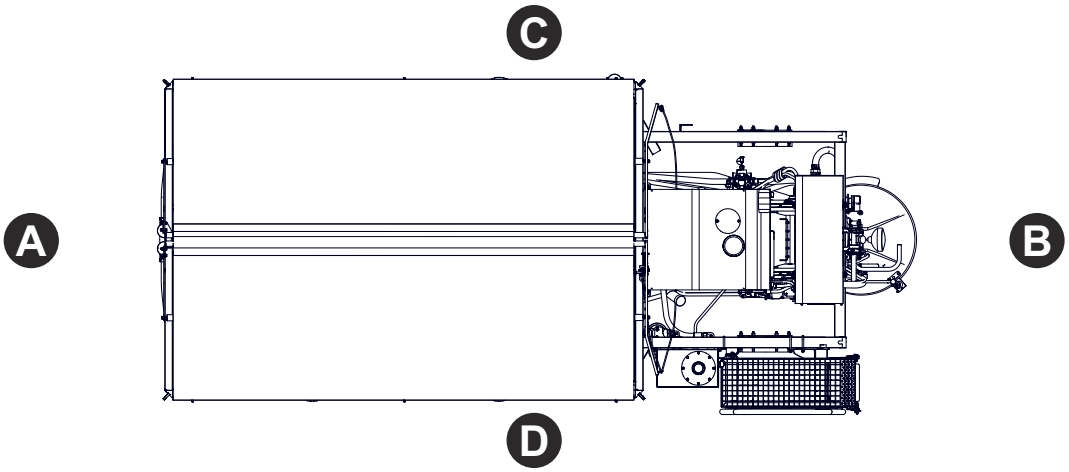


Figure 1 Directions used with reference to the machine

(A) - przód *(B) tył* *(C) strona prawa*

(D) strona lewa

Left side – side to the left hand of the operator facing in the direction of machine's forward travel.

Right side – side to the right hand of the operator facing in the direction of machine's forward travel.

Rotation to the right – clockwise rotation of a mechanism (the operator is facing the mechanism).

Rotation to the left – counter clockwise rotation of a mechanism (the operator is facing the mechanism).

U.03.2.EN

INSPECTION OF THE MACHINE AFTER DELIVERY

The Manufacturer guarantees that the machine is fully operational and has been checked according to quality control procedures and is ready for use. This does not release the user from an obligation to check the machine's condition after delivery and before first use. The machine is delivered to the User completely assembled. After delivering the machine, the User is obliged to check the completion of the machine in accordance with the order.

INSPECTION RECOMMENDATIONS

- Check completeness of the machine according to order.
- Check technical condition of protective shields and check if they open and close correctly.
- Check condition of paint coating; check the machine for traces of corrosion.
- Check the machine for damage resulting from wrong transport of the machine to its destination (crushing, piercing, bending or breaking of parts etc.).
- Check the following: hydraulic oil level in the tank, level of engine lubricating oil.
- Add fuel to the fuel tank.
- Check technical condition of conveyor belt.

Discovered defects should be notified directly to the seller in order to remove them. Incorrect level of operating fluids (except for fuel) may indicate that there is a leakage. Check the machine for tightness.

U.26.2.EN

ENVIRONMENTAL HAZARDS

DANGER

Used oil or gathered remains mixed with absorbent material should be stored in a precisely marked container. Do not use food packaging for this purpose.

A leak of hydraulic, lubricating or diesel oil constitutes a direct threat to the natural environment owing to limited biodegradability of oil.

While carrying out maintenance and repair work, which involves the risk of an oil leak, this work should take place on an oil resistant floor or surface. In the event of oil leaking into the environment, first of all contain the source of the leak, and then collect the leaked oil using available means. Remaining oil should be collected using sorbents, or by mixing the oil with sand, sawdust or other absorbent materials. The oil pollution, once gathered up, should be kept in a sealed, marked, hydrocarbon resistant container, and then passed on to the appropriate oil waste recycling centre. The container should be kept away from heat sources, flammable materials and food.

Oils, which have been used up or are unsuitable for further use owing to a loss of its properties should be stored in its original packaging in the conditions described above.

ATTENTION

Waste oil should only be taken to the appropriate facility dealing with the re-use of this type of waste. Do not pour oils into sewerage or water tanks.

U.32.1.EN

INSPECTIONS

When using the machine, regular inspections of its technical condition and the performance of maintenance procedures are essential, which keep the machine in good technical condition. In connection with this, the user is obliged to perform all the maintenance and adjustment procedures defined by the Manufacturer, according to the specified schedule.

Repairs during the guarantee period and all the inspections, except daily inspections and inspections conducted every 50 working hours, may only be performed by authorised service points.

Engine repairs and inspections of the engine, which are not described in the Operator's Manual, may only be performed by an authorised service point of the engine manufacturer.

In the event of unauthorised repairs, changes to factory settings and other actions, which are not regarded as possible for the shredder operator to perform, the warranty shall be invalidated.

Operation and inspections of the drive engine are described in section Engine maintenance.

The scope of the complete inspection of the sand spreader includes the following activities:

- periodic inspection of the machine performed according to the specified frequency and instructions included in section "*Periodic inspections, maintenance"*,
- inspection of the engine and its ancillaries according to the instructions specified in section "*Engine maintenance"*,
- lubrication according to section "*Lubrication schedule"*.

Inspection after running-in should be performed after 50 engine working hours but not later than after 100 engine working hours. Successive inspections should be performed by an authorized service point every 250 engine working hours, i.e. after 250, 500, 750 working hours, etc. Permissible delay in performing the inspection must not exceed the specified inspection frequency by more than 50 working hours. The scope of the inspections is detailed in the Operator's Manual.

U.41.1.EN

SECTION 1

BASIC INFORMATION

1.1 SHREDDER IDENTIFICATION

The sand spreader marking in the form of a data plate and serial number is placed on the rear of the machine on the frame, next to the fixing point of the left storage support - figure (1.1). When buying the machine check that the serial numbers on the machine agree with the number written in the *Warranty Book* and in the sales documents.

Meaning of data plate items is presented in the following table - figure (1.1):

A - machine name,

B - machine type / symbol,

C - serial number,

D - year of manufacture

E - machine tare weight [kg],

F - Quality Control stamp,

G - unfilled box or additional information.

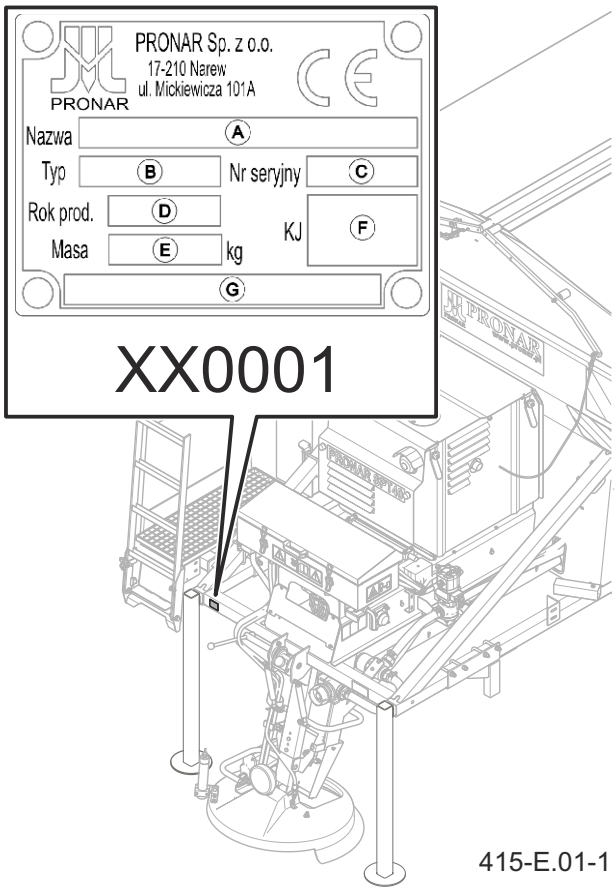


Figure 1.1 Location of the data plate

> ***TIP***
>
> Demand that the seller carefully and precisely fills out the Warranty Book and warranty repair coupons. A missing date of purchase or sale point stamp, may make the user ineligible for any warranty repair or refund.

E.2.4.415.01.1.EN

1.2 PROPER USE

PRONAR SPT40 spreader is used for surface spreading of coarse materials (sand, aggregate) and chemical agents (sodium chloride, calcium chloride, magnesium chloride, brine) for winter road maintenance. The use of the machine for other purposes should be regarded as improper. The spreader can be mounted on trucks that are equipped with a load platform and that meet the requirements set out in Table 1.1.

Using it as intended also involves all actions connected with the safe and proper operation and maintenance of the machine. Due to the above, the user is obliged to:

- carefully read the Operator's Manual of the machine and the Warranty Book and conform with the recommendations contained in these documents,
- understand the machine's operating principle and how to operate it safely and correctly,
- adhere to the established maintenance and adjustment plans,
- comply with general safety regulations while working,
- prevent accidents,
- comply with the road traffic regulations in force in a given country, in which the machine is used.

The machine may only be used by persons, who:

- are familiar with the contents of this publication and with the contents of the vehicle Operator's Manual,
- have been trained in machine operation and safe working conditions,
- have the required authorisation to drive the vehicle and are familiar with the road traffic regulations and transport regulations.

Machine is designed according to current safety requirements and engineering standards.

ATTENTION

It is forbidden to use the machine contrary to its intended use, in particular:
· for transporting people, animals,
· for transporting whatever materials
· spreading other materials than those specified in the Operator's Manual.
The use of spreading materials other than those recommended in this study may result in:
· irregularities in the spreading process, such as: clumping, hanging, spontaneous pouring of material,
· damage to machine assemblies,
and may void your warranty.

Table 1.1. Carrying vehicle requirements

	UNIT	REQUIREMENTS
Mounting method	–	on the carrying vehicle's load platform by means of LC 2000N securing tapes according to EN 12195-2 standard
Minimum load platform dimensions:[1] – length / width – height from the ground	 mm mm	 3 850 / 2 300 1350 ÷ 1 700
Carrying vehicle load capacity	t	10/11/12[2]
Voltage of electrical system of control electronics	V	24
Other requirements	–	connection with travel speed pulse input according to ISO 16844-2

[1] for the distance between the spreading disc and the ground equal to 400 mm
[2] depending on setting of the spreader's tank capacity

E.2.4.415.02.1.EN

1.3 EQUIPMENT

The spreader equipment includes:

- Operator's Manual,
- Warranty Book,
- parking supports.

Additional (optional) equipment:

- parking stands (for removing and installing the machine on the carrying vehicle's load platform without the use of lifting equipment),
- side bumpers (when the spreader is mounted on a carrying vehicle with strong side boards; side bumpers are used together with parking stands),
- automatic control (automatic change of parameters depending on selected working mode and temperature),
- control panel bracket (for mounting the control panel in the cab of UNIMOG vehicles),
- power supply wiring harness (wiring harness with a connector suitable for UNIMOG chassis),
- program for collecting data from the counters,
- optical spreading sensor.

E.2.4.415.03.1.EN

1.4 WARRANTY TERMS

PRONAR Sp. z o.o. Narew guarantees the reliable operation of the machine when it is used according to its intended purpose as described in the OPERATOR'S MANUAL. Defects discovered during the warranty period will be removed by the Warranty Service. The repair period is specified in the WARRANTY BOOK.

The warranty does not cover those parts and sub-assemblies of the machine which are subject to wear in normal usage conditions, regardless of the warranty period.

The warranty service only applies to such cases as: mechanical damage which is not the user's fault, factory defects of parts, etc.

In the event of damage arising from:

- mechanical damage which is the user's fault, road accidents,
- inappropriate use, adjustment or maintenance, use of the machine for purposes other than those for which it is intended,
- use of damaged or malfunctioning machine,
- repairs carried out by unauthorised persons, repairs carried out improperly,
- making unauthorised alterations to machine design,

the user will lose the right to warranty service.

Modification of the machine without the written consent of the Manufacturer is forbidden. In particular, do NOT weld, drill holes in, cut or heat the main structural elements, which have a direct impact on the machine operation safety.

For detailed Terms & Conditions of Warranty, please refer to the WARRANTY BOOK attached to each machine.

TIP

Demand that the seller carefully and precisely fills out the WARRANTY BOOK and warranty repair coupons. A missing date of purchase or sale point stamp may make the user ineligible for any warranty repair or refund.

E.2.4.415.04.1.EN

1.5 TRANSPORT

The machine is prepared for sale completely assembled and does not require packing. Packing is only required for the machine's operation and maintenance manual, control panel with a wiring harness and an engine ignition switch.

The machine is delivered to the user by transport vehicle, after being attached to the load platform. The machine should be firmly secured by means of certified fastening straps fitted with a tightening mechanism.

ATTENTION

The machine must not be transported on support legs of both types.

DANGER

When being transported on a motor vehicle the machine must be mounted on the vehicle's platform in accordance with the safety requirements and regulations. Use only certified and technically reliable securing measures.

Carefully read the manufacturer's instructions for the securing measures. Incorrect use of securing measures may cause an accident.

When loading and unloading the machine, comply with the general principles of workplace health and safety for reloading work. Persons operating reloading equipment must have the qualifications required to operate these machines.

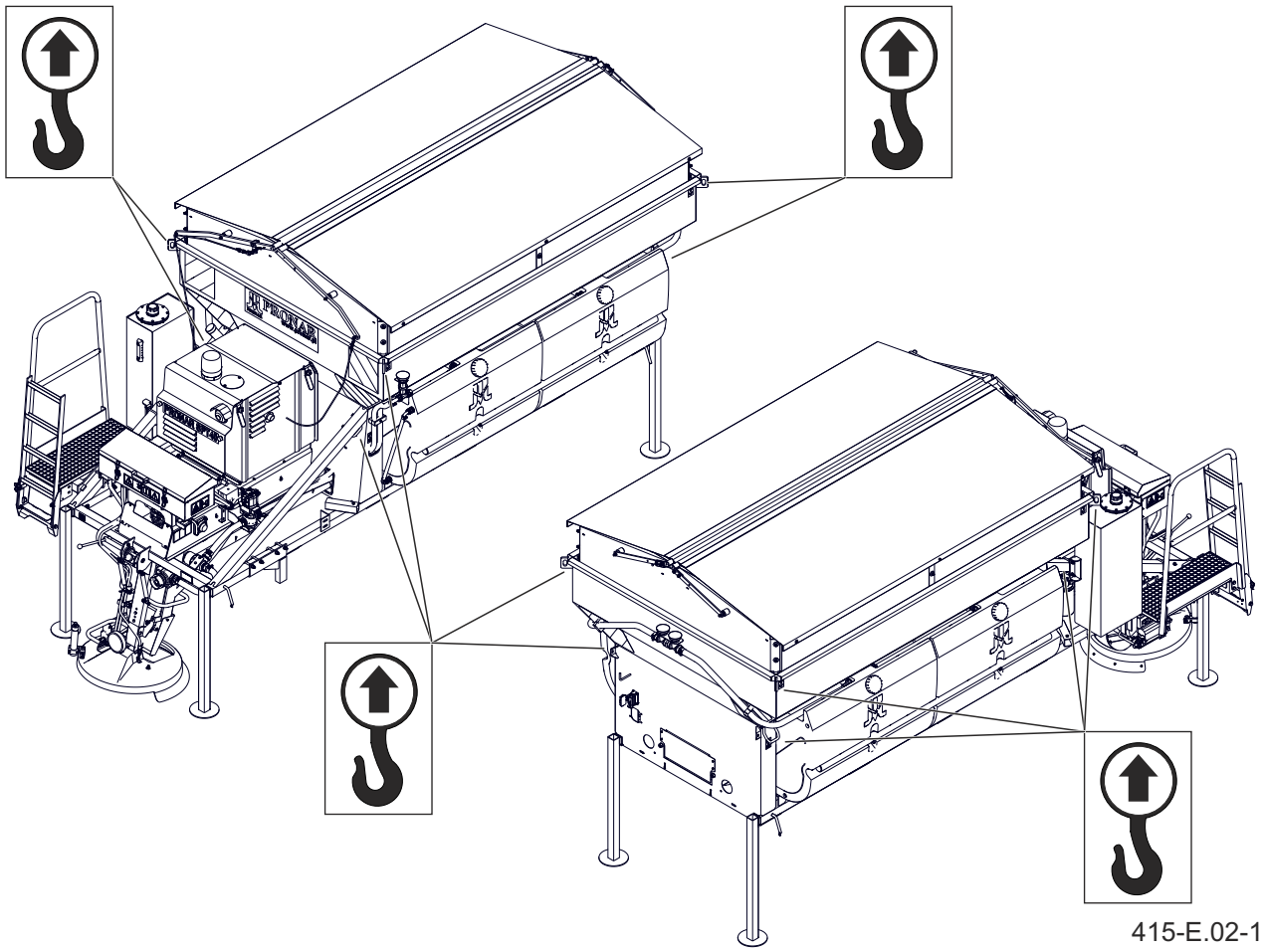


Figure 1.2 Transport lugs

The machine should be attached to lifting equipment in places specially designed for this purpose – figure (1.2), i.e. by the lugs on the sides of the tank (4 points) and grips on the frame (4 points). Suspension points are identified with information decals. When lifting the machine, take particular care due to the possibility of tipping over the machine and the risk of injuries from protruding parts. To keep lifted machine in the correct direction it is recommended to apply additional guy cables. During the loading work particular care should be taken not to damage paint coating.

DANGER

Driver of the vehicle should be particularly careful during travel. This is due to the vehicle's centre of gravity shifting upwards when loaded with the machine.

DANGER

It is forbidden to attach slings and any kind of load securing elements to other than indicated elements (e.g. hydraulic and electrical systems).
Nobody may stay in the maneuvering area when the sand spreader is being transferred to another means of transport.

ATTENTION

Depending on the machine setting, location of centre of gravity varies in the range of ± 100 mm

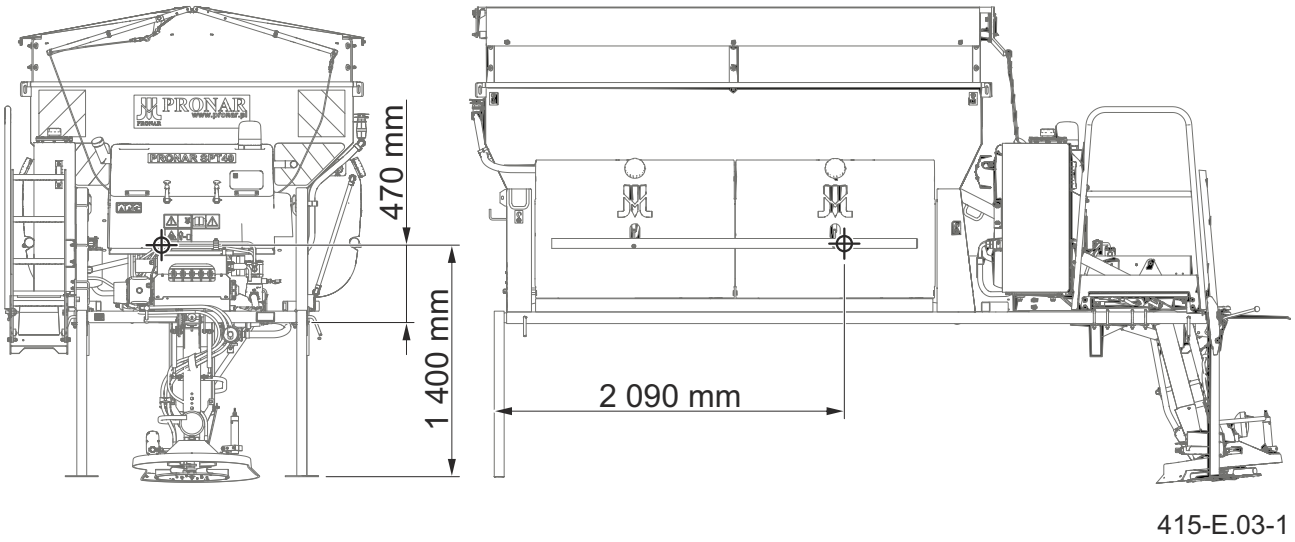


Figure 1.3 *Location of centre of gravity (empty tanks)*

E.2.4.415.05.1.EN

1.6 WITHDRAWAL FROM USE

In the event of decision by the user 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 dismantle the machine, remove oil completely from the hydraulic system, transmission and engine and dismantle the battery.

When spare parts are changed, worn out or damaged parts should be taken to a collection point for recyclable raw materials. Used oil and also rubber and plastic elements should be taken to the appropriate facilities dealing with the recycling of this type of waste.

ATTENTION

During dismantling personal protection equipment shall be used i.e. protective clothing, boots, gloves and protective goggles etc.

Avoid contact of skin with oil. Do not allow used oil to spill.

E.2.4.415.06.1.EN

SECTION 2

SAFETY ADVICE

2.1 BASIC SAFETY RULES

- Before use, the user must carefully read this Operator Manual and the Warranty Book. When operating the machine, follow all instructions in these documents.
- The user is obliged to be familiar with machine design, operation and safety features.
- The machine may only be used and operated by persons qualified to drive the carrier vehicle and trained in machine operation.
- If the information in this Operator Manual is difficult to understand, contact the seller who runs the authorised technical service on behalf of the Manufacturer, or contact the Manufacturer directly.
- Careless and incorrect use and operation of the machine and also failure to follow the instructions of this Operator Manual may pose risk to the health and life of bystanders and/or machine operator.
- Be aware of the residual risk. Use caution when operating this machine and follow all relevant safety instructions.
- The machine must never be used by unauthorised persons, including children, and people under the influence of alcohol, drugs or other intoxicants.
- Non-compliance with the safety rules of this Operator's Manual can be dangerous to the health and life of the operator and others.
- The machine must not be used for purposes other than those for which it is intended. Anyone who uses the machine for purposes other than those for which it is intended takes full responsibility for any consequences of this potentially incorrect use. Use of the machine for purposes other than those for which it is intended by the Manufacturer may invalidate the guarantee.
- The machine may only be used when all the protective features (i.e. safety guards, bolts, cotter pins, warning decals) are technically sound and correctly positioned. In the event of loss or damage to the protective features, they must be replaced with new ones.
- The machine is not intended to transport any load (including people and animals).
- Observe all applicable legal regulations regarding environmental protection.
- When selling the machine, give the complete documentation together with the machine to the buyer.
- The machine carrier must be equipped with a first aid kit and a fire extinguisher.
- If you notice fire or smoke, stop the machine immediately. Call the fire brigade, locate the source of fire or smoke as soon as possible and start extinguishing the fire using fire-fighting equipment suitable for the burning material. Exercise extra caution.

F.2.4.415.01.1.EN

2.2 SAFETY WHEN HITCHING THE MACHINE

- The carrier vehicle to which the machine will be coupled must be technically reliable and must meet all manufacturer's requirements.
- The machine should be secured to the carrier vehicle by means of suitable certified belts or chains.
- Be especially careful when hitching the machine to carrier vehicle.
- When hitching, there must be nobody between the machine and the carrier vehicle.
- After completed hitching of the machine, check the safeguards. Carefully read the carrier vehicle Operator Manual.
- Be especially careful when unhitching the machine from the carrier vehicle.
- Machine removed from the carrier vehicle must be placed on parking stands, on level, sufficiently hard surface in such a manner as to ensure that it is possible to connect it again.

F.2.4.415.02.1.EN

2.3 SAFETY RULES WHEN WORKING WITH HYDRAULIC SYSTEM

- The hydraulic system is under high pressure when operating.
- Regularly check the technical condition of the hydraulic lines and connections. There must be no oil leaks.
- In the event of the hydraulic system malfunction, discontinue using the machine until the malfunction is corrected.
- In the event of injuries being caused by pressurised hydraulic oil, contact a doctor immediately. Hydraulic oil may find its way under the skin and cause infections. In the event of contact of oil with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor. In the event of contact of oil with skin wash the area of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene).
- Use the hydraulic oil recommended by the Manufacturer. Never mix two types of oil.
- After changing the hydraulic oil, the used oil should be properly disposed of. Used oil or deteriorated oil should be stored in original containers or replacement containers resistant to hydrocarbons. Replacement containers must be clearly marked and appropriately stored.
- Do not store hydraulic oil in packaging designed for storing food or foodstuffs.
- Rubber hydraulic lines must be replaced every 4 years regardless of their technical condition.
- Repair and replacement of hydraulic system elements should be entrusted to the appropriately qualified persons.

F.2.4.415.03.1.EN

2.4 SAFETY DURING MAINTENANCE WORK

- Do NOT carry out maintenance or repair work (except for the adjustment of the conveyor belt) with the machine drive engaged. Before commencing work, turn off the engine, disconnect the battery and electrical leads.
- The conveyor belt is adjusted with the conveyor drive turned on. Be especially careful when making the adjustment.
- During the warranty period, any repairs may only be carried out by warranty service authorised by the Manufacturer. It is recommended that necessary repairs to machine should be undertaken by specialised workshops.
- In the event of any fault or damage, do not use the machine until the fault has been corrected.
- During work, use appropriate, close-fitting protective clothing, gloves and appropriate tools. When working on hydraulic systems it is recommended to use oil resistant gloves and protective goggles.
- Any modification of the machine releases the manufacturer from any responsibility for damage or detriment to health which may arise as a result.
- The sand spreader can only be stood on when it is absolutely motionless and the engine is switched off. Before climbing onto the sand spreader, immobilise the carrier vehicle with parking brake, secure against unauthorized access and remove key from ignition.
- Before undertaking any work on the machine, turn off the engine of the carrying vehicle and the machine, and wait until all rotating parts have come to a stop.
- Regularly check the technical condition of the safety devices and correct tightening of bolt connections.
- Regularly perform service inspections of machine as recommended by the Manufacturer.
- Before beginning repairs on hydraulic systems, reduce oil pressure.
- Servicing and repair work should be carried out in line with the general principles of workplace health and safety. In the event of injury, the wound must be immediately cleaned and disinfected. In the event of more serious injuries, seek a doctor's advice.
- Should it be necessary to change individual parts, use only original parts. Non-adherence to these requirements may put the user and other people's health and life at risk, and also damage the machine and invalidate the warranty.
- Regularly check technical condition and mounting of all guards and protective elements.
- Before welding or electrical work, the sand spreader should be disconnected from the electrical system. The paint coating should be cleaned. Burning paint fumes are poisonous for people and animals. Welding work should be carried out in a well lit and well ventilated space. Before beginning work, prepare a CO_2 or foam extinguisher.
- In the event of work requiring the machine to be raised, use properly certified hydraulic or mechanical lifts. After lifting the machine, stable and durable supports must also be used. Do NOT carry out work under a machine, which has only been raised with the jack or which stands on parking supports or parking stands.
- The machine must not be supported using fragile elements (bricks or concrete blocks).
- After completing work associated with lubrication, remove excess of lubricant.
- Used lubricants should be disposed of.
- In order to reduce the danger of fire the machine must be kept in a clean condition.

MACHINE CLEANING

The machine should be cleaned as needed.

Before using the pressure washer the user is obliged to acquaint himself with the operating principles and recommendations concerning safe use of this equipment.

DANGER

Carefully read the instructions for application of detergents and maintenance preparations.
While washing with detergents, wear appropriate protective clothing and goggles protecting against splashing.

- Before washing, remove manually and as accurately as possible any remaining spread material.
- Use only clean running water. Cleaning detergents with neutral pH may be used, which do not react aggressively with the mobile conveyor's structural elements.
- The use of pressure washers increases the effectiveness of washing, but be careful when working. During washing, the washer nozzle may not be placed closer than 50 cm from the cleaned surface.
- Water temperature should not exceed 55°C.
- Do NOT wash the internal combustion engine with a pressure washer.
- Do not aim the water jet directly at system components and equipment, i.e. valves, bearings, electric and hydraulic plugs, lights, electrical connectors, information and warning decals, nameplate, cable connectors, lubrication points, control panels, safety switches etc. High pressure water jet may penetrate the machine, resulting in mechanical damage or corrosion.
- Do not apply organic solvents, preparations of unknown origin or other substances, which may cause damage to lacquered, rubber or plastic surfaces. In the event of doubt it is recommended to make a test on an unseen surface area.
- Surfaces smeared with oil or grease should be cleaned by application of white spirit or other degreasing agents and then washed with clean water with added detergent. Follow the cleaning agent manufacturer instructions.
- Detergents should be kept in original containers, optionally in replacement containers, but very clearly marked. Preparations may not be stored in food and drink containers or in unmarked containers.
- Ensure flexible lines and seals are clean. The plastic from which these elements are made may be susceptible to organic substances and some detergents. As a result of long-term reaction of some substances, the ageing process may be accelerated and risk of damage increased. Rubber elements should be maintained with the aid of special preparations after previous thorough washing.
- Observe the environmental protection rules, wash the machine in places designed for this purpose.
- Washing and drying the machine must take place at temperature above 0°C.
- Electronic components and control panel may be cleaned only with a soft cloth.
- Each time after washing the machine perform maintenance and lubricate the machine.

F.2.4.415.04.1.EN

2.5 SAFETY DURING MACHINE OPERATION

- Before using the spreader always check its technical condition. In particular, check the technical condition of indicator lights, spreading mechanism, feeding mechanism and protective shields.
- The spreader drive can be started only when there are no bystanders or animals in the immediate vicinity of the machine working area. The machine operator is obliged to ensure proper visibility of the machine and the working area.
- During machine operation do not occupy a different position than that of the operator in the tractor cab. Do NOT leave the cab, when the machine is in operation.
- There must be no bystanders within the machine spreading zone.
- Do not approach the machine until the rotating parts come to a complete standstill.
- When working near pavements or on public roads there is a risk that thrown out particles of sand, salt, stones etc. may pose a threat to bystanders.
- Before loading sand spreader make certain that there are no stones, tools or other objects in the load box and on the spreading disc.
- Load should be uniformly distributed in the machine tank.
- Do NOT exceed permissible load weight of sand spreader because this may cause danger to road traffic and cause damage to the machine.
- Spreading agents must be prepared in accordance with the regulations concerning winter road maintenance in force in the country in which the sand spreader is used. Spreading agents other than those recommended by the Manufacturer must not be used.
- While working with the sand spreader, turn on the beacon light and the light near the spreading disc.
- Exercise extra caution while reversing.
- When spreading is completed, disengage the hydraulic drive of the feeding and spreading mechanisms and the combustion engine.
- When driving on public roads, observe all road traffic regulations in force in the country, in which the machine is used.
- Adjust speed to the prevailing road conditions and other limitations arising from road traffic regulations.
- Do not carry people or animals on the machine.
- Reckless driving and excessive speed may cause accidents.

F.2.4.415.05.1.EN

2.6 SAFETY DURING BATTERY MAINTENANCE

- Do NOT use an open flame and do NOT produce sparks near the battery. Danger of explosion.
- Smoking near the battery is forbidden.
- Keep a proper sequence when disconnecting the battery terminals. First disconnect terminal (-) and then disconnect terminal (+). The battery leads should be connected in reverse order.
- Before electric welding, disconnect the machine from the power source. To do this, disconnect both battery leads and wiring harness from the carrier vehicle (power supply of electronic system).
- Do NOT short the battery leads. Risk of fire or explosion.
- The battery contains caustic sulfuric acid. Contact of the acid with skin can cause very severe chemical burns. In case of contamination with electrolyte, immediately take off contaminated clothes and rinse skin or eyes contaminated with acid using plenty of running water. If swallowed, do not induce vomiting. Drink plenty of cold water. Consult a doctor immediately.
- When handling the battery, use rubber gloves and protective goggles.
- The battery should be charged in rooms with efficiently operating ventilation.

F.2.4.415.06.1.EN

2.7 RESIDUAL RISK

Pronar Sp. z o. o. in Narew has made every effort to eliminate the risk of accidents. There is, however, a certain residual risk, which could lead to an accident, and this is connected mainly with the actions described below:

- using the machine for purposes other than those for which it is intended,
- being between the carrier vehicle and the machine while the machine is being attached,
- being on the machine while the engine is running,
- operating the machine with removed or faulty safety guards,
- failure to maintain a safe distance from the danger zone or being within the zones while the machine is operating,
- machine operation by unauthorized persons or persons under the influence of intoxicants
- cleaning, maintenance and technical checks when carrier vehicle is connected and engine is running.

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

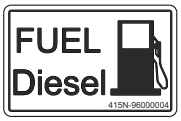
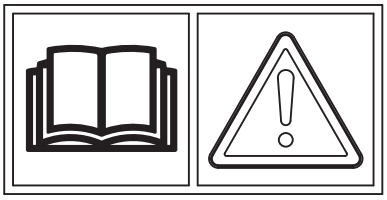
- operate the machine in prudent and unhurried manner,
- reasonably apply all the remarks and recommendations stated in the Operator Manual,
- carry out repairs and maintenance work in line with operating safety rules,
- repair and maintenance work should be carried out by persons trained to do so,
- use close fitting protective clothing,
- ensure unauthorised persons have no access to the machine, especially children,
- maintain a safe distance from prohibited or dangerous places
- do not climb on the machine when it is operating

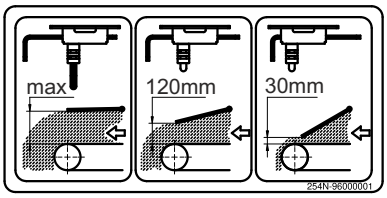
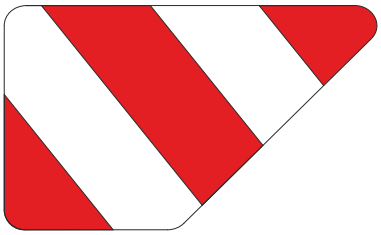
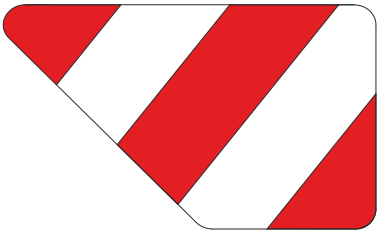
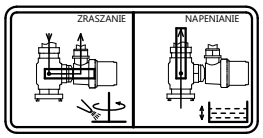
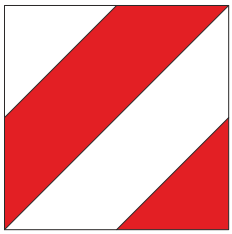
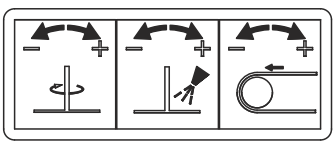
F.2.4.415.07.1.EN

2.8 INFORMATION AND WARNING DECALS

The machine is labelled with the information and warning decals mentioned in table 2.1. Throughout the machine use, you must ensure that any warning messages and information decals located on the machine are clear and legible. If any are destroyed or damaged, they must be replaced with new. New assemblies, changed during repair, must be labelled once again with the appropriate safety signs. During machine cleaning do not use solvents, which may damage the coating of information decals and do not subject them to strong water jets.

Table 2.1. Information and warning decals

Item	Decal	Meaning
1	PRONAR SPT40	Machine model **415N-96000001**
2		Warning decal Hot surface **415N-96000003**
3		Fuel filler label **415N-96000004**
4		Danger caused by materials thrown out by the machine. Keep a safe distance from the operating machine. **12N-15000008**
5		Before use Carefully read the Operator Manual. **35N-27000007**
6		Attachment points for lifting equipment during loading and for transport belts or chains **35N-27000009**
7		Oil filler label **130N-36000006**

Item	Decal	Meaning
8		Information decal Control of the feeding mechanism barrier **254N-96000001**
9		Outline marking. **254N-96000002**
10		Outline marking. **254N-96000003**
11		Information decal Control of the brine valve **254N-96000004**
12		Do not enter the tank; do not stand on the feeding mechanism if the machine drive is engaged **254N-96000006**
13		Information decal **187N-00000033**
14		Outline marking. **R1F TYP 1 DIN 11030**
15		Information decal Manual control of hydraulic block **415N-96000002**

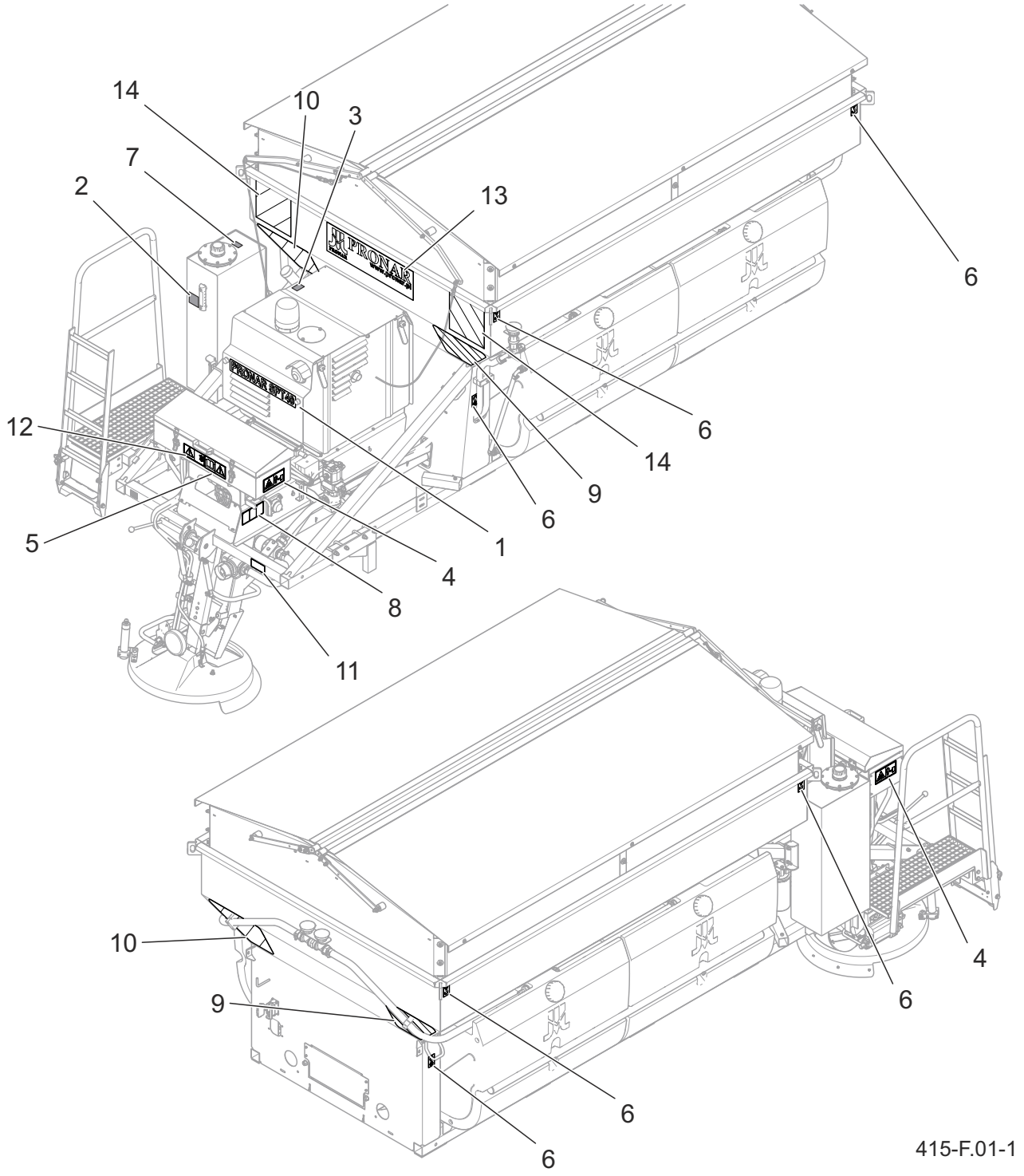


Figure 2.1 Locations of information and warning decals
Meaning of symbols (TABELA 2.1)

F.2.4.415.08.1.EN

SECTION 3

DESIGN AND OPERATION

3.1 TECHNICAL SPECIFICATION

Table 3.1. Basic technical specification of the spreader

	UNIT	PRONAR SPT40
Mounting method	–	on the carrying vehicle's load platform by means of LC 2000N securing tapes according to EN 12195-2 standard
Spreading width:		
chemical agents	m	2 – 12
coarse materials	m	2 – 6
Spreading density:		
chemical agents	g/m2	5 – 40
coarse materials	g/m2	50 – 200
Tank capacity	m3	4,5* / 5,25* / 6*
Capacity of brine tanks	dm3	1 800
Number of spreading discs	pc.	1
Number of spreading disc blades	pc.	6
Machine drive	–	own hydraulic system supplied by a hydraulic pump driven by an additional combustion engine
Control	–	with the aid of the control panel, from the operator cab
Electric power supply	V	24V
Pressure in the hydraulic system	MPa	16
Working speed	km/h	10 – 70
Machine weight (without load)	kg	1 800
Height of the machine from the carrying vehicle's load platform	mm	1 660* / 1 790* / 1 920*

** - depending on setting of tank extension walls*

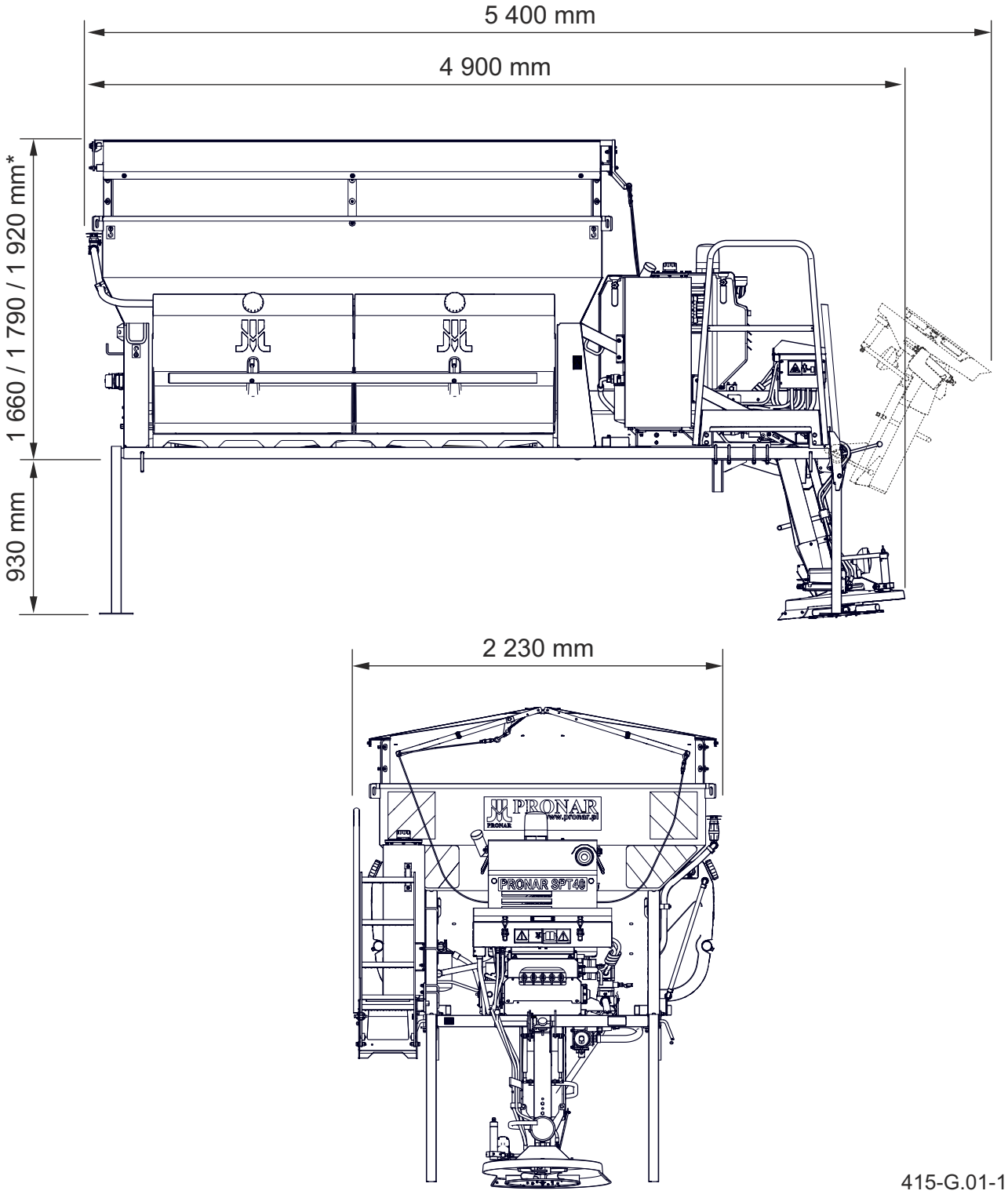


Figure 3.1 External dimensions of SPT40 spreader
** - depending on setting of tank extension walls*

G.2.4.415.01.1.EN

3.2 GENERAL DESIGN

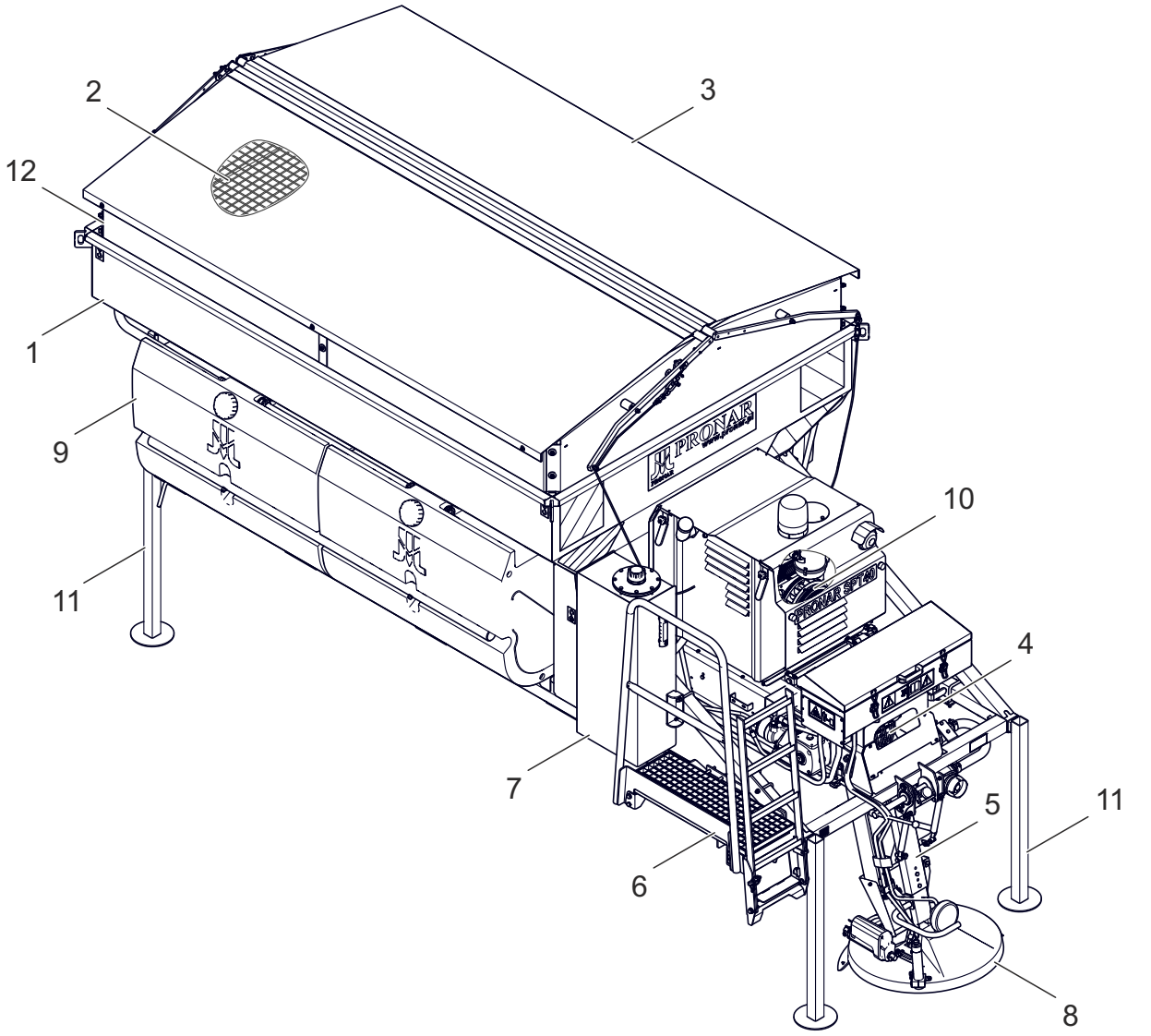


Figure 3.2 General design

(1) frame *(2) screen* *(3) tarpaulin cover*
(4) belt conveyor *(5) hopper system;* *(6) platform with a ladder*
(7) hydraulic system *(8) spreading system* *(9) tanks of brine spray system*
(10) combustion engine *(11) parking supports* *(12) adjustable wall extensions*

Sand spreader consists of a frame (1), whose integral part is a tank equipped with a screen (2) and a support frame with tarpaulin cover (3). Belt conveyor (4) located at the bottom of the tank carries the material to the hopper system (5), which feeds the material to disc blades of the spreading mechanism (8). Additionally, the brine spray system (9) makes it possible to feed the brine to the spreading mechanism. The spreader is equipped with its own hydraulic system (7) supplied by the hydraulic pump driven by the additional combustion engine (10). Working parameters are monitored and controlled from the carrying vehicle's cab by means of a control panel.

G.2.4.415.02.1.EN

3.3 HYDRAULIC SYSTEM

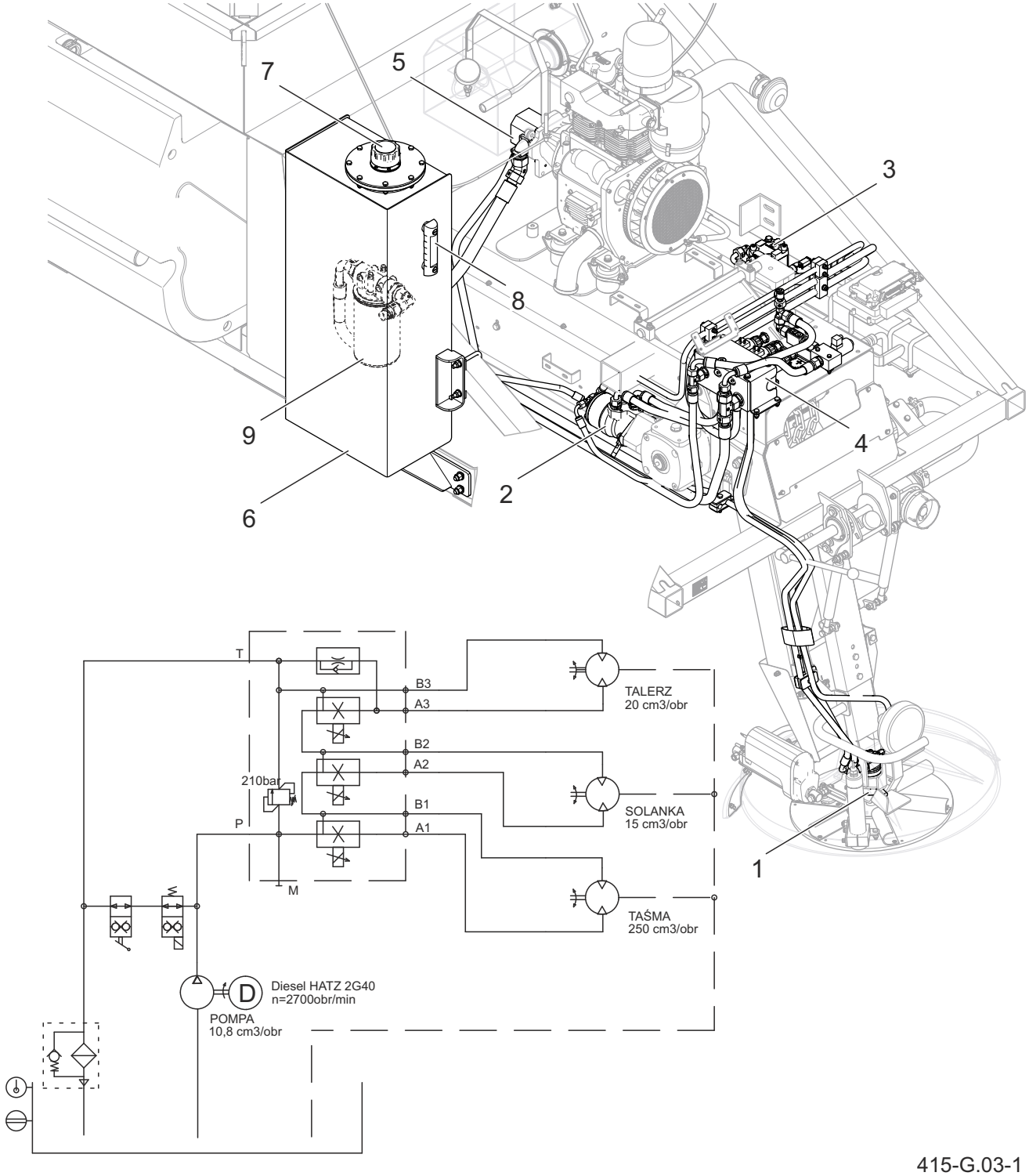


Figure 3.3 Design and diagram of hydraulic system

(1) hydraulic motor of spreading disc *(2) hydraulic motor of conveyor* *(3) hydraulic motor of brine pump*
(4) hydraulic block *(5) hydraulic pump* *(6) oil tank*
(7) oil filler plug *(8) oil level indicator* *(9) oil filter*

G.2.4.415.03.1.EN

3.4 BRINE SPRAY SYSTEM

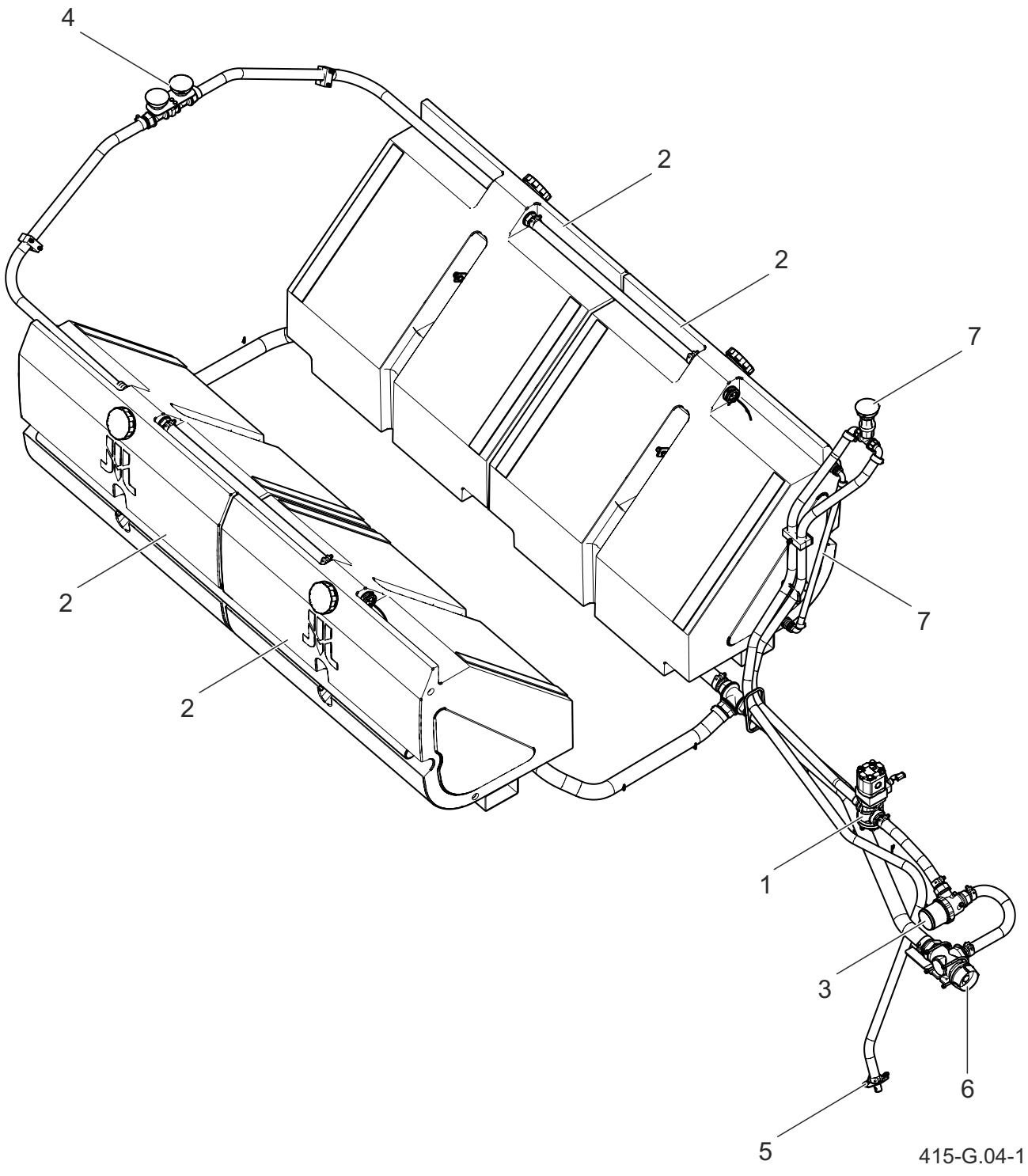


Figure 3.4 Design of brine spray system

(1) pump *(2) tank* *(3) filter* *(4) air vent*
(5) connector pipe *(6) filling valve* *(7) brine level indicator*

G.2.4.415.04.1.EN

3.5 HOPPER SYSTEM AND SPREADING SYSTEM

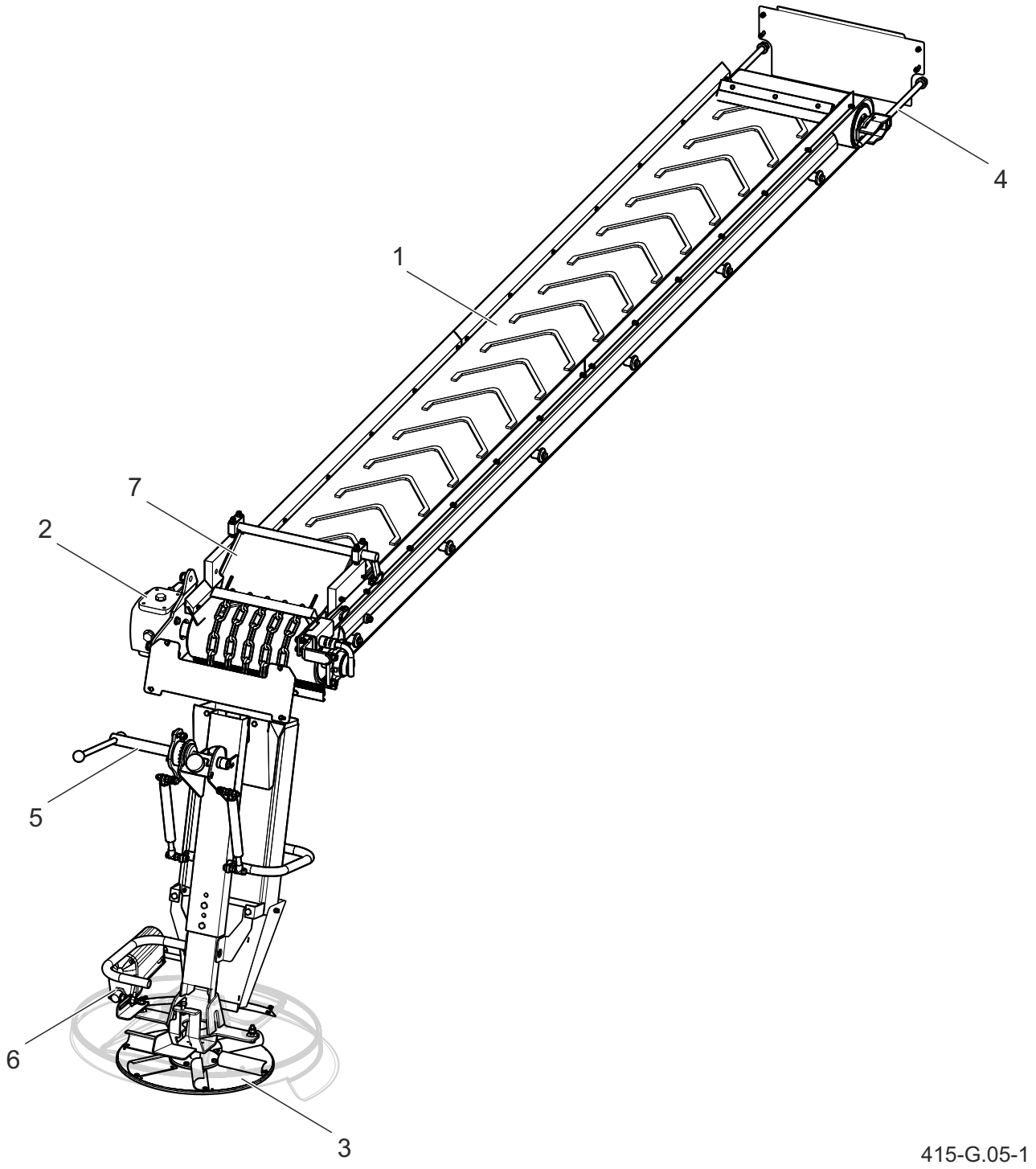


Figure 3.5 Design of hopper system and spreading system
(1) belt conveyor *(2) transmission* *(3) spreading disc*
(4) conveyor tensioner *(5) rising interlock lever* *(6) spreading direction adjusting cylinder*
(7) barrier

G.2.4.415.05.1.EN

3.6 ELECTRICAL SYSTEM

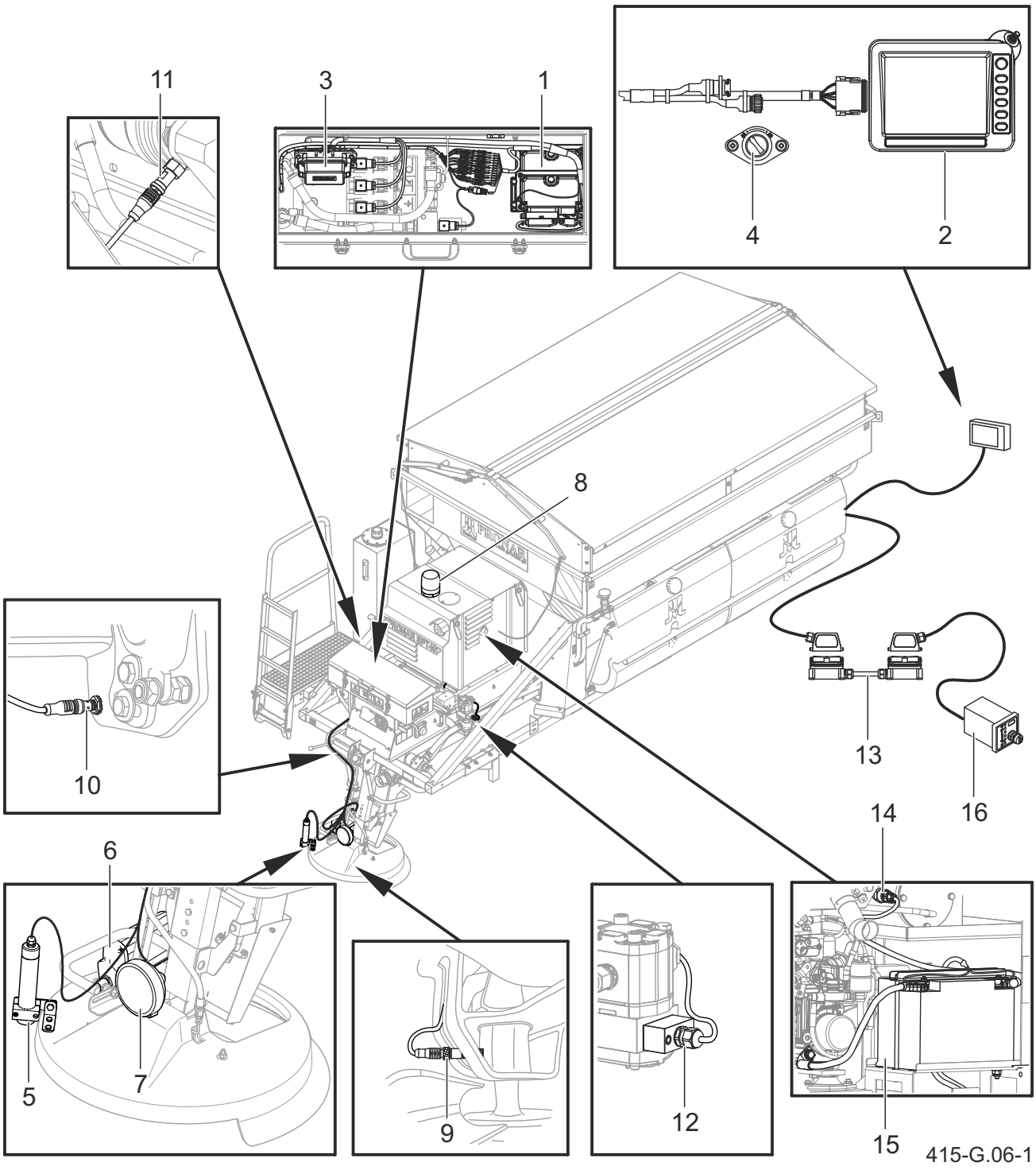


Figure 3.6 Electrical system components

(1) controller *(2) control panel* *(3) fuses* *(4) main switch*
(5) spreading sensor *(6) spreading direction adjusting cylinder* *(7) red rear lamp* *(8) beacon light*
(9) disk speed sensor *(10) spreading mechanism rising sensor* *(11) belt speed sensor*
(12) brine pump speed sensor *(13) complete wiring harness* *(14) fuel reserve sensor*
(15) battery *(16) ignition switch*

G.2.4.415.06.1.EN

CONTROL PANEL

SECTION 4

4.1 CONTROL PANEL

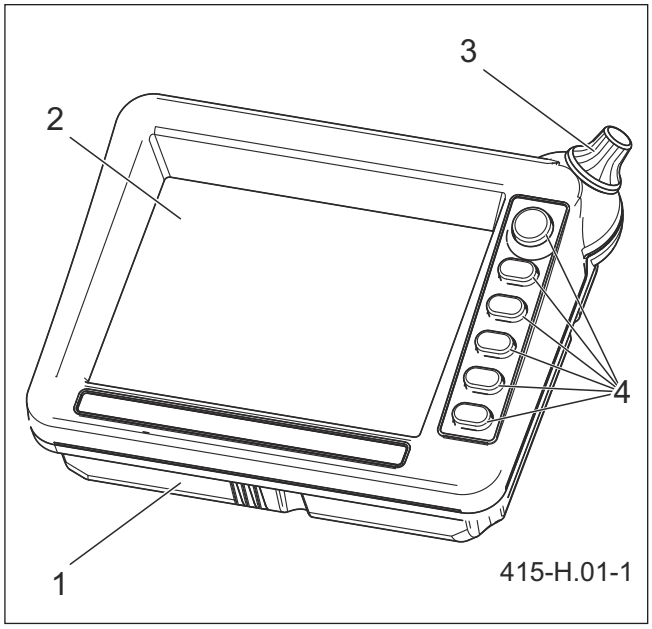


Figure 4.1 General design of control panel
(1) enclosure *(2) LCD display*
(3) parameter change knob *(4) function push-buttons*

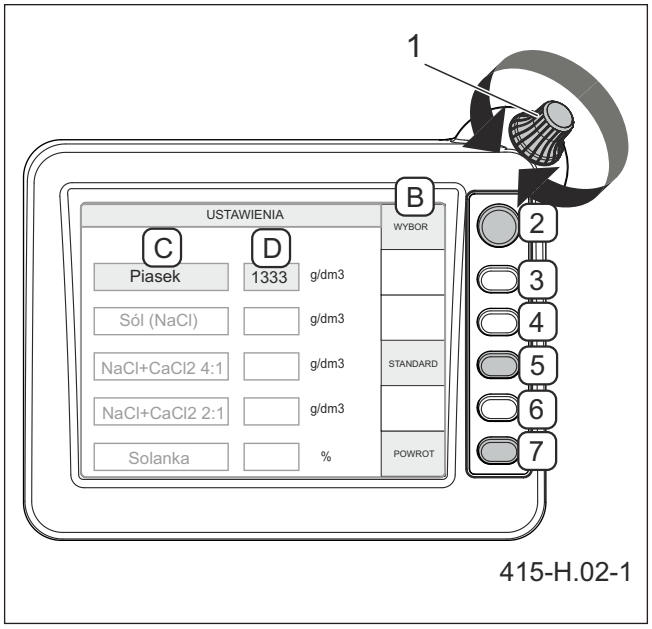


Figure 4.2 Example of control panel operation
(1) parameter change knob *(2 - 7) function push-buttons*
(B) pushbutton function *(C) parameter name field*
(D) parameter value field

Control panel – figure (4.1), consists of enclosure (1), colour LCD display (2), parameter change knob (3) and six function push-buttons (4).

Depending on a display menu page selected – figure (4.2), currently assigned functions (B) are displayed next to function push-buttons (2),(3),(4),(5),(6),(7). On each display menu page, different functions are displayed for a given push-button. Empty function field next to push-buttons (3),(4),(6) means that the push-buttons are not active at the moment. Knob (1) is used for moving to another field (C) and for changing values of parameters in field (D).

H.2.4.415.01.1.EN

4.2 CONTROL PANEL MENU

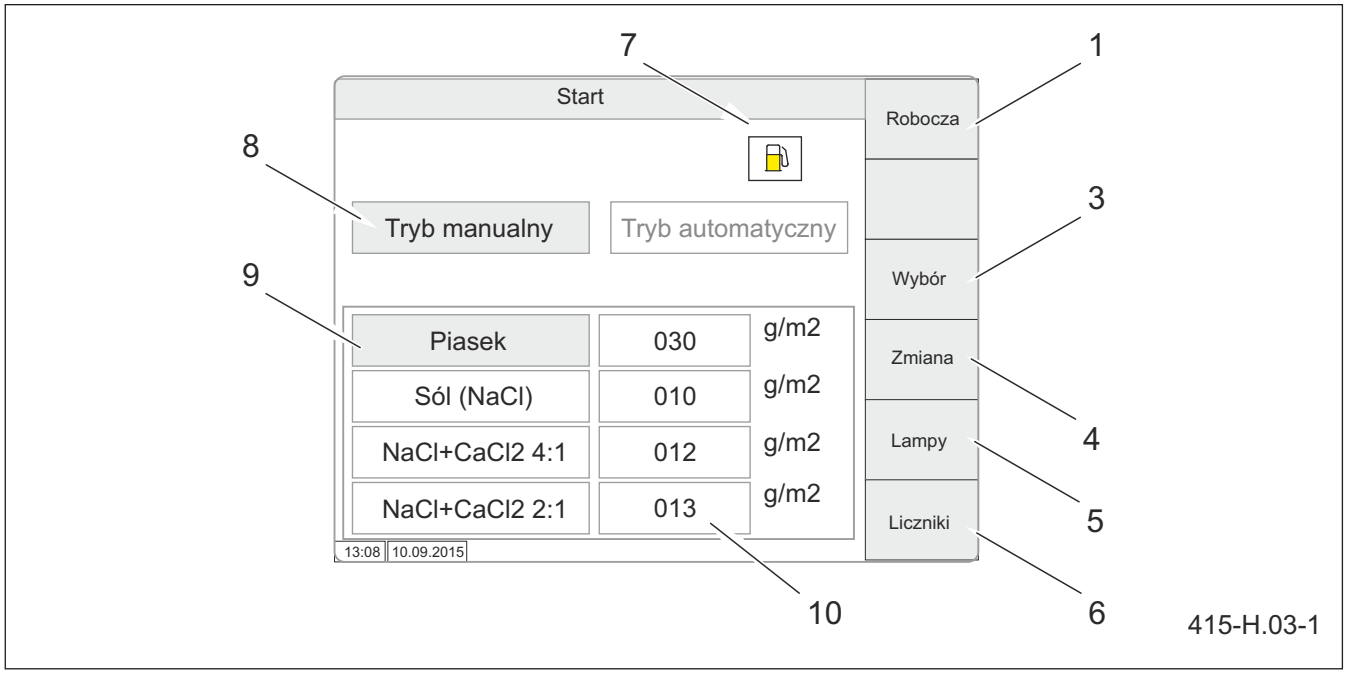


Figure 4.3 Home page of control panel display
Description of home page functions is included in TABLE 4.1

Table 4.1. Description of functions on control panel home page

Identification Figure 4.3	Function name	Description
1	„Working”	Moving to working page
3	„Selection”	Selecting a field for editing: * - automatic mode / manual mode - selecting a spreading material
4	„Change”	Editing a selected field
5	„Lights”	Turning on warning lights
6	„Counters”	Moving to counter page
7	-	Information and warning indicators
8	„Manual mode” „Automatic mode”	Manual or automatic working mode is active (option)
9	„Sand”	Currently selected spreading material
10	„030 g/m2”	Preliminary setting of spreading density for a currently selected material

** - Active selection is marked with a red frame.*

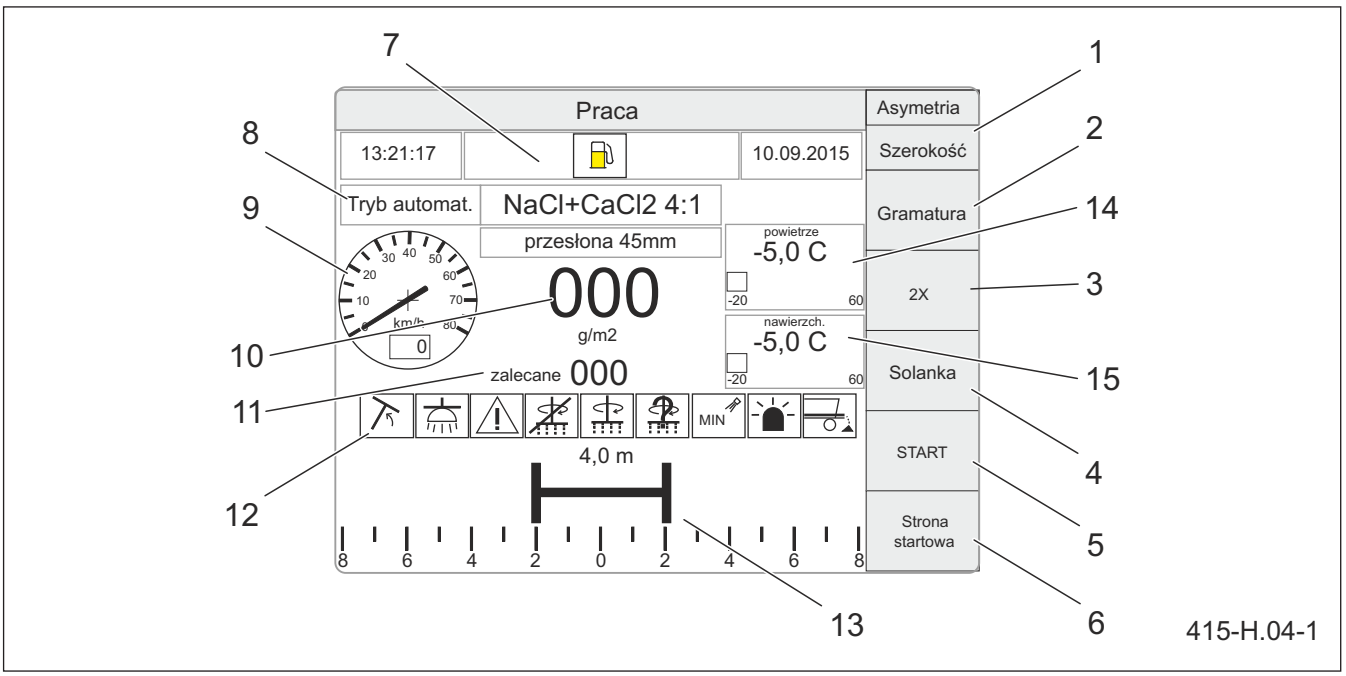


Figure 4.4 Working page of control panel display
Description of working page functions is included in TABLE 4.2

Table 4.2. Description of functions on control panel working page

Identification Figure 4.4	Function name	Description
1	„Asymmetry” „Width”	Editing of asymmetry and spreading width
2	„Spreading density”	Editing of spreading density
3	„2X”	Double dose
4	„Brine”	Activation of brine spraying
5	„Start”	Activation of spreading
6	„Home page”	Moving to home page
7	-	Window of messages and indicator lights
8	„AUTO MODE” „NaCl+CaCl2 4:1” „Barrier opening - 45mm”	Currently selected working conditions
9	„0 km/h”	Current working speed or speed simulation (available in service mode)
10	„000 g/m2”	Defined density
11	„recommended 000”	Recommended density in automatic mode
12	-	Information and warning indicators
13	„4 m”	Spreading pattern (width and asymmetry)
14	„air -5,0 C”	Air temperature (option)
15	„road surface -5,0C”	Road surface temperature (option)

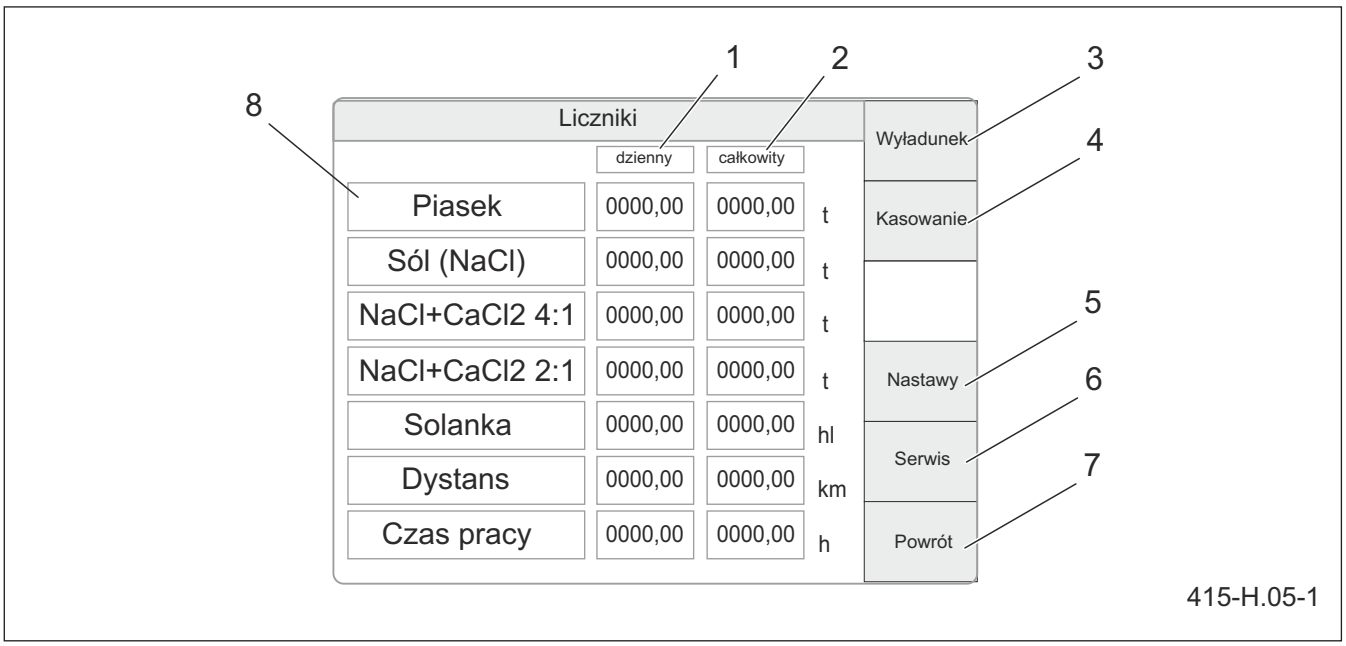


Figure 4.5 Counter page of control panel display
Description of counter page functions is included in TABLE 4.3

Table 4.3. Description of functions on control panel counter page

Identification Figure 4.5	Function name	Description
1	„daily”	Daily counter of given materialresettable
2	„total”	Total counter of given material- nonresettable
3	„Unloading”	Start of unloading
4	„Resetting” *	Resetting (zeroing) of daily counter
5	„Settings”	Moving to page with settings (a password must be given in order to enter the page)
6	„Service”	Moving to service page (a password must be given in order to enter the page)
7	„Back”	Back to previous page
8	„Sand”	Type of material

** - Press the push-button for 3 seconds*

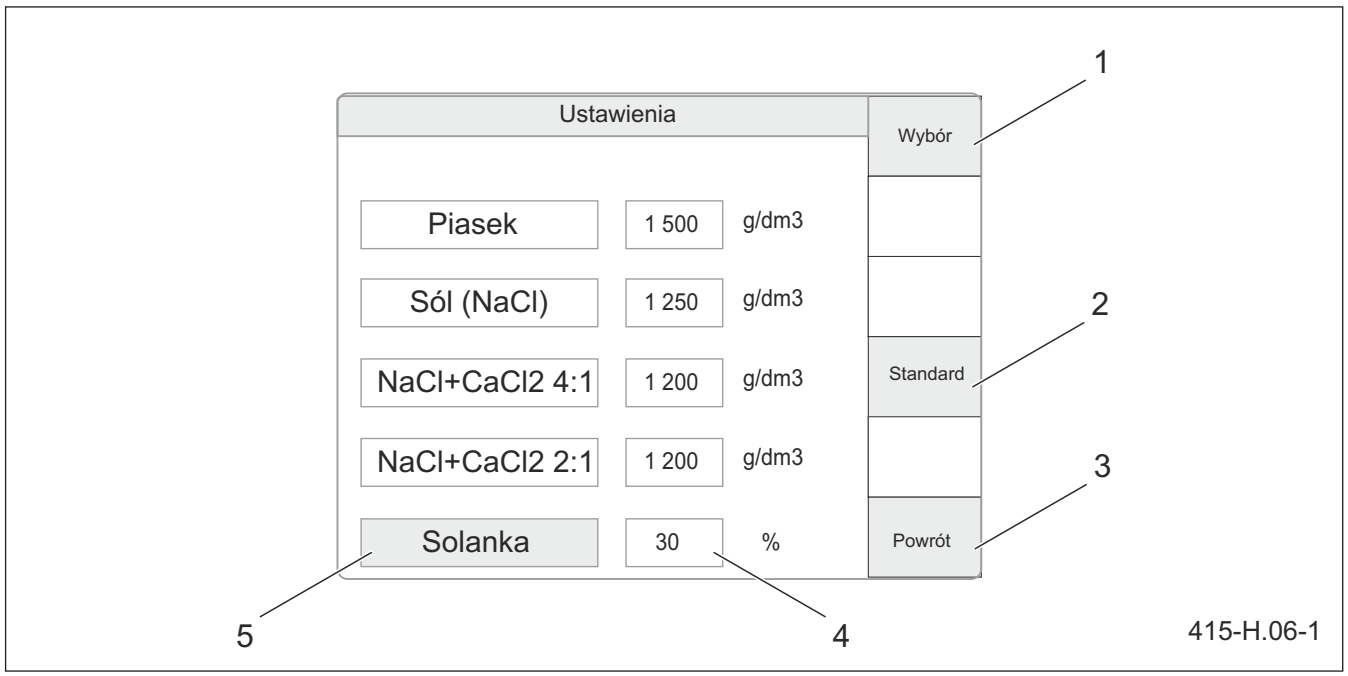


Figure 4.6 Material setting page of control panel display
Description of setting page functions is included in TABLE 4.4

Table 4.4. Description of material setting page functions

Identification Figure 4.6	Function name	Description
1	„Selection”	Selecting a type of spreading material
2	„Standard”	Selecting standard values
3	„Back”	Back to previous page
4	1500 g/dm3” „30%”	Setting of specific gravity of material and percentage content of brine
5	„Brine”	Marked type of material to change

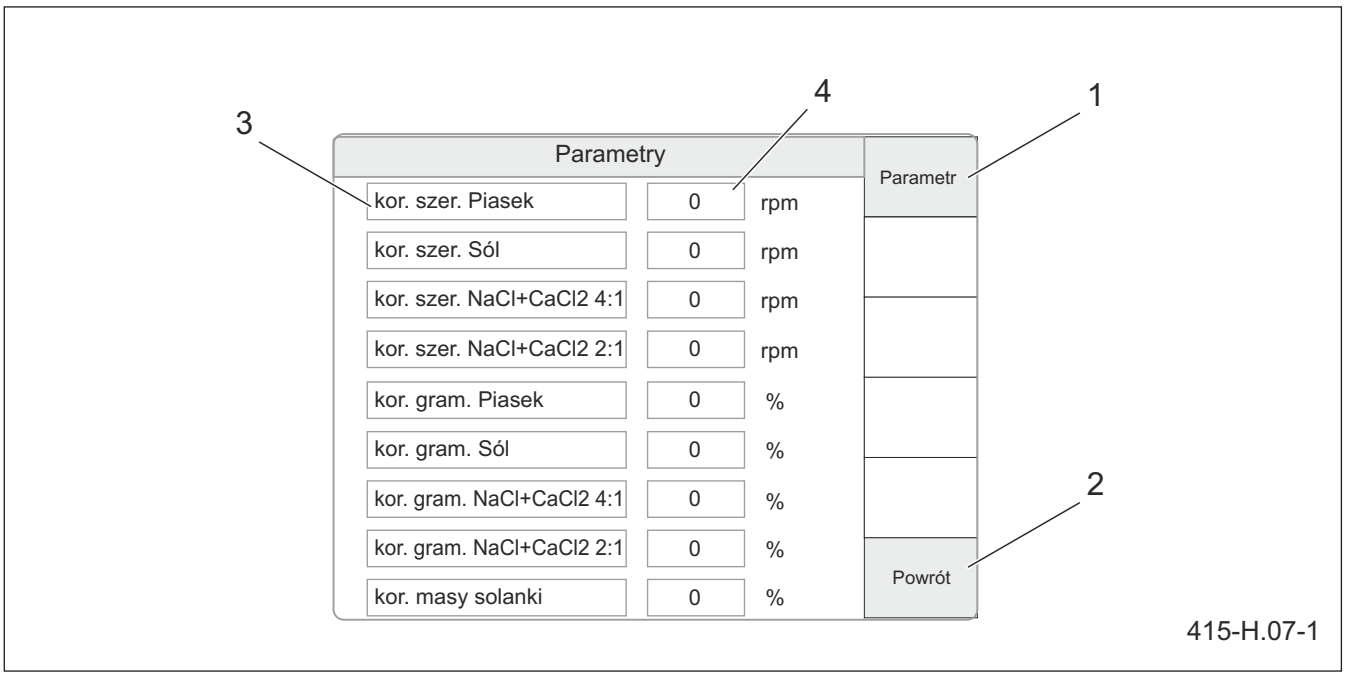


Figure 4.7 Parameter correction page
Description of parameter page functions is included in TABLE 4.5

Table 4.5. Description of parameter correction page functions

Identification Figure 4.7	Function name	Description
1	„Parameter”	Selecting a parameter
2	„Back”	Back to previous page
3	„width correction Sand”	Selecting a type of correction and type of material
4	„0 rpm” lub „0%”	Parameter correction value rpm - correction of rotations per minute % - percentage correction

TIP

A password must be given in order to enter the parameter correction page „Parameters”.

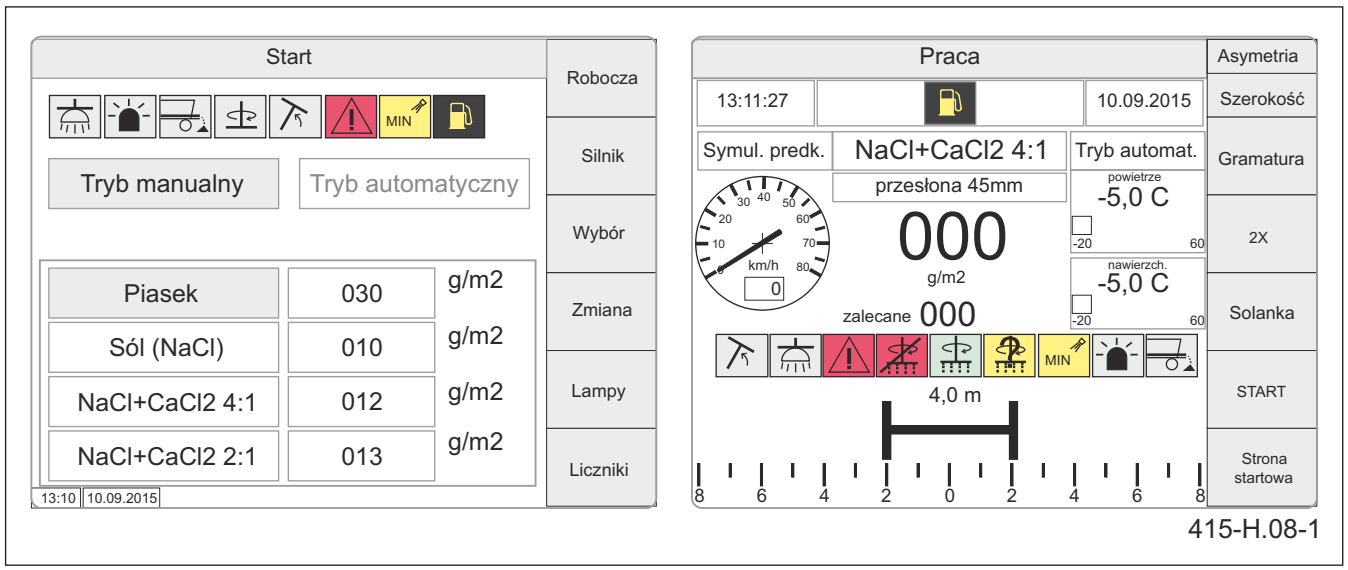
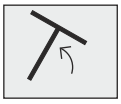
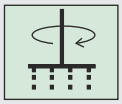
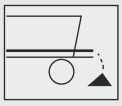


Figure 4.8 Arrangement of information-warning indicators

Table 4.6. Description of information-warning indicators on the control panel

Symbol	Description
	Low fuel level (yellow colour)
	Disc is raised (grey colour)
	Disc lamp is ON (grey colour)
	Error (red colour)
	No spreading (red colour)

Symbol	Description
	Spreading is active (green colour)
	Problem with spreading (yellow colour)
	Minimum brine level (yellow colour)
	Beacon light is ON (grey colour)
	Unloading is ON (grey colour)

H.2.4.415.02.1.EN

CORRECT USE

SECTION 5

5.1 GET READY FOR OPERATION BEFORE FIRST USE

The manufacturer guarantees that the machine is fully operational and has been checked according to quality control procedures and is ready for use. This does not release the user from an obligation to check the machine's condition after delivery and before first use. The machine is delivered to the user completely assembled. Prior to connecting to carrier vehicle, machine operator must verify the sand spreader's technical condition, prepare it for first use and configure as needed. In order to do this:

- the user must carefully read this Operator Manual and observe all recommendations, understand the design and the principle of machine operation,
- check technical condition of protective shields and confirm that they open and close correctly,
- Visually inspect the machine components for mechanical damage resulting from, for example, incorrect shipping.
- make sure the brine tanks are secure before filling,
- check the condition of protective paint coat,
- check the following: hydraulic oil level in the tank, level of engine lubricating oil,
- add fuel to the fuel tank,
- check all the lubrication points, lubricate the machine as needed according to recommendations provided in section 5,
- check all nut and bolt connections,
- check if spreading discs and blades are correctly installed,
- check tension of conveyor belt.

DANGER

Before using the machine, the user must carefully read this Operator Manual
Careless and incorrect use and operation of the machine, and failure to follow instructions in this Operator Manual is dangerous to your life and health.
The machine must never be used by persons who are not authorised to drive carrier vehicle, including children, and people under the influence of alcohol or other substances.
Non-compliance with the safety rules of this Operator's Manual can be dangerous to the health and life of the operator and others.
Before starting the machine, ensure that there are no bystanders in the danger zone.

ATTENTION

Failure to follow instructions in this Operator Manual or starting the machine incorrectly may cause damage to the machine.
Before using the machine always check its technical condition.
There must not be any doubt about technical condition.
Do NOT use an inoperative machine.

If all the above checks have been performed and there is no doubt as to the machine's good technical condition, it can be connected to carrier vehicle, started and all its individual systems checked. In order to do this:

- connect the machine to carrier vehicle (see *MACHINE SETUP*),
- start the engine (see *START THE ENGINE*),
- check correctness of electrical system operation,
- check the tightness and operation of the hydraulic system and the brine spray system,
- check operation of hopper system and spreading system,
- check the conveyor belt for correct operation.

In the event of a disruption in the operation of the machine immediately discontinue its use, find and remove the fault. If a fault cannot be rectified or the repair could void the warranty, please contact the Manufacturer for additional clarifications.

I.2.4.415.01.1.EN

5.2 INSPECTIONS DURING DAILY OPERATION

- Conduct daily inspection according to the guidelines presented in sections *INSPECTIONS*
- *PERIODIC, MAINTENANCE, ENGINE MAINTENANCE* and *LUBRICATION PLAN*. If necessary, make the necessary repairs immediately.
- Check technical condition of protective shields and wear parts. Check if shields are complete and correctly closed.
- Check the technical condition of belt conveyor and spreading disc, if complete and correctly mounted.

ATTENTION

Do NOT start the machine if its daily inspection was not carried out.

- After completed work, check and possibly remove material accumulated near the tightening roller and on the internal surface of the conveyor belt.

I.2.4.415.02.1.EN

5.3 MACHINE INSTALLATION

INSTALLING THE MACHINE ON THE CARRYING VEHICLE'S LOAD PLATFORM

DANGER

When hitching, there must be nobody under and between the machine and the carrying vehicle.
Exercise caution when hitching the machine to carrying vehicle.

ATTENTION

Before hitching the sand spreader to carrying vehicle, read the carrying vehicle operator's manual.

ATTENTION

Before installing the machine on the carrying vehicle, remove snow, ice and other contaminants from the load platform.

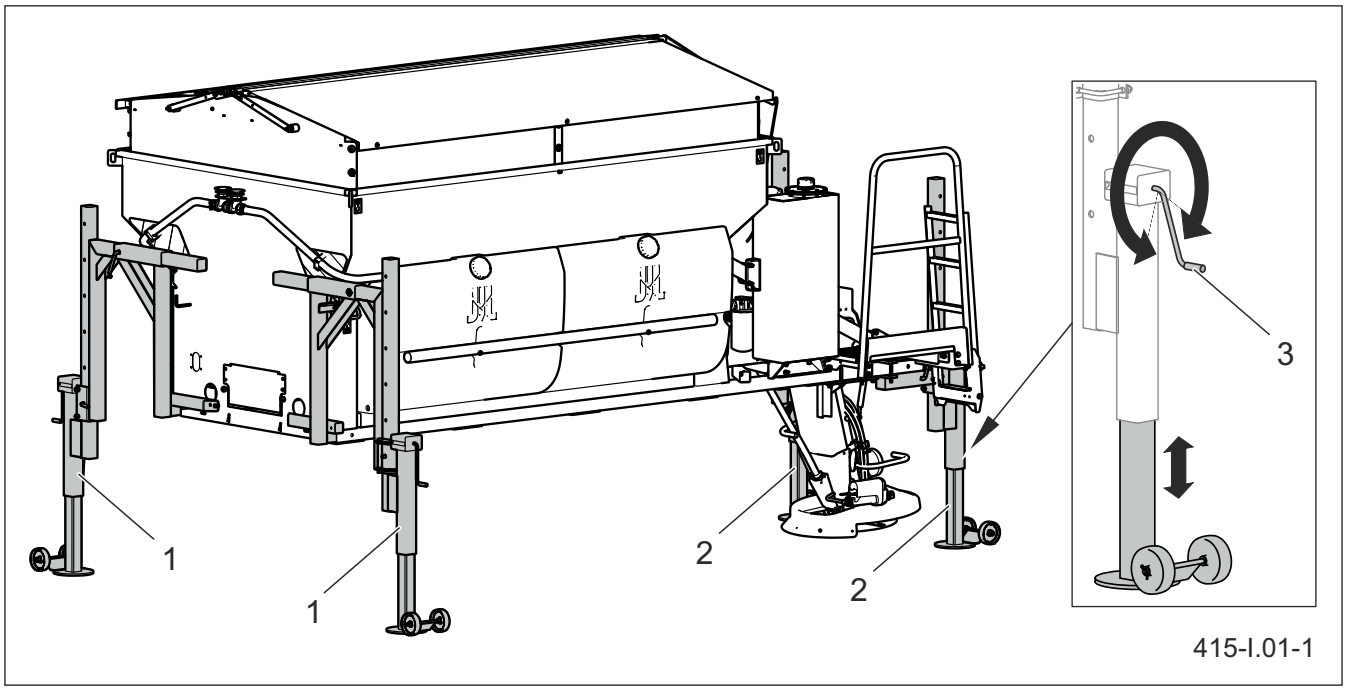


Figure 5.1 Parking stands
(1) front parking stand (2) rear parking stand (3) height adjustment mechanism

The sand spreader can be installed on the carrying vehicle that meets the requirements contained in table *1.1 REQUIREMENTS FOR CARRYING VEHICLE.*

If the sand spreader is equipped with adjustable parking stands (figure5.1) adjust the stands properly depending on the height of the carrying vehicle's load platform. Adjustments can be made using crank mechanism (3).

Position setting is facilitated by adjustable guides (1) and (2) with wheels (figure 5.2) and limiters attached to the bottom of frame beam in the rear section of the machine. Set the front (1) and rear (2) guides in such a manner as to ensure that dimension (A) is slightly smaller than the internal width of the carrying vehicle's load platform (figure 5.2).

TIP

Guides (figure 5.2) are used in carrying vehicles which have sufficiently strong side walls of the load platform.
The use of guides depends on the method of fixing the machine on the load platform *(see SECURING THE MACHINE TO THE CARRYING VEHICLE'S LOAD PLATFORM)*.

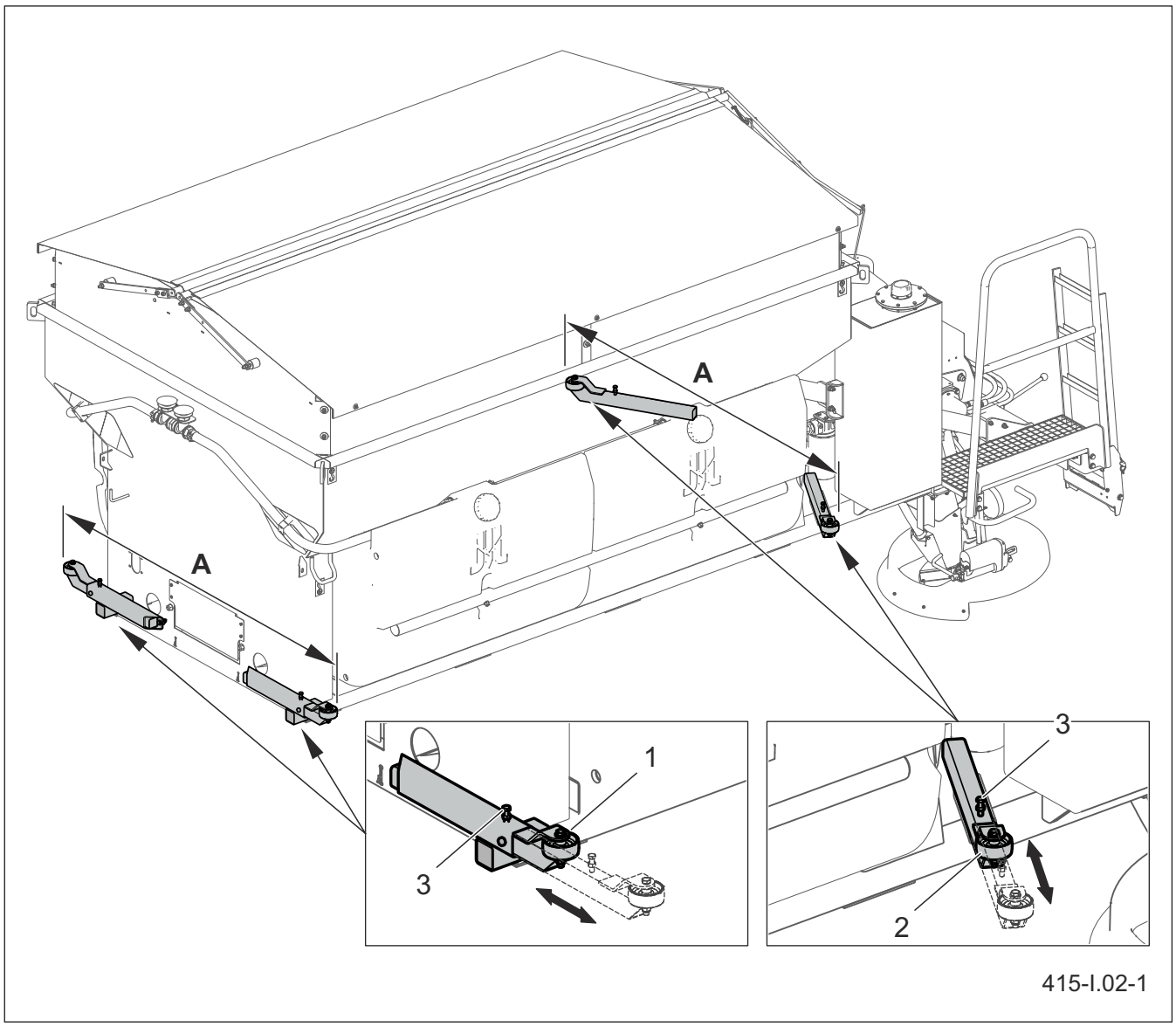


Figure 5.2 Guides
(1) front guide *(2) rear guide* *(3) set screw*

Reverse the carrying vehicle and position the load platform so as to ensure that the sand spreader is positioned symmetrically with regard to the right side and the left side of the load platform. Make sure that the limiters on the bottom of the sand spreader frame are supported on the rear edge of the load platform.
Dismantle the parking stands when the load platform is positioned properly with regard to the sand spreader. In order to do this:

- Lower the machine onto the carrying vehicle's load platform by rising successively the parking stands by means of height adjustment mechanism (3) (figure 5.1).
- When the machine is fully supported on the load platform, remove linchpins (2) and pins (1) that secure stands in guides (figure 5.3).
- Dismantle front stands (3) and rear stands (4) and keep them for further use.

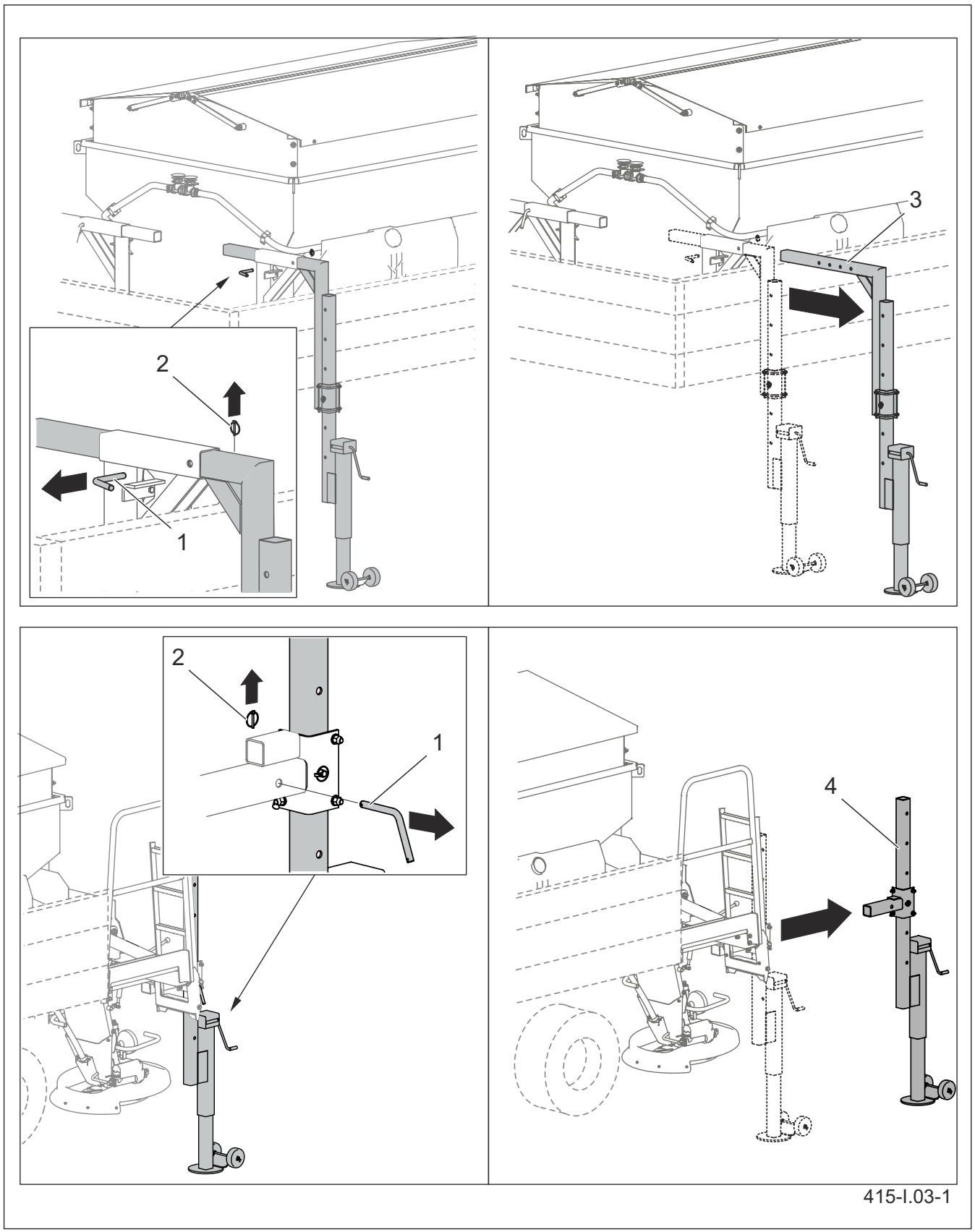


Figure 5.3 Dismantling the parking stands
(1) pin *(2) linchpin* *(3) front parking stand* *(4) rear parking stand*

SECURING THE MACHINE TO THE CARRYING VEHICLE'S LOAD PLATFORM

The machine positioned on the carrying vehicle should be secured to load platform by means of fastening straps certified according to EN 12195-2 standard and fitted with a tightening mechanism. The sand spreader is fitted with eight attachment points for fastening straps (figure 5.4). In order to correctly secure the sand spreader, the carrying vehicle's load platform must be fitted with attachment points for fastening straps. Otherwise, install such points in a proper manner.

DANGER

DO NOT use the machine if it is not properly secured to the carrying vehicle's load platform.
Secure the machine according to the rules for securing loads on vehicles moving on public roads.

Permissible load of fastening straps and method of their attachment depend on a selected method of securing the machine to the carrying vehicle's load platform.

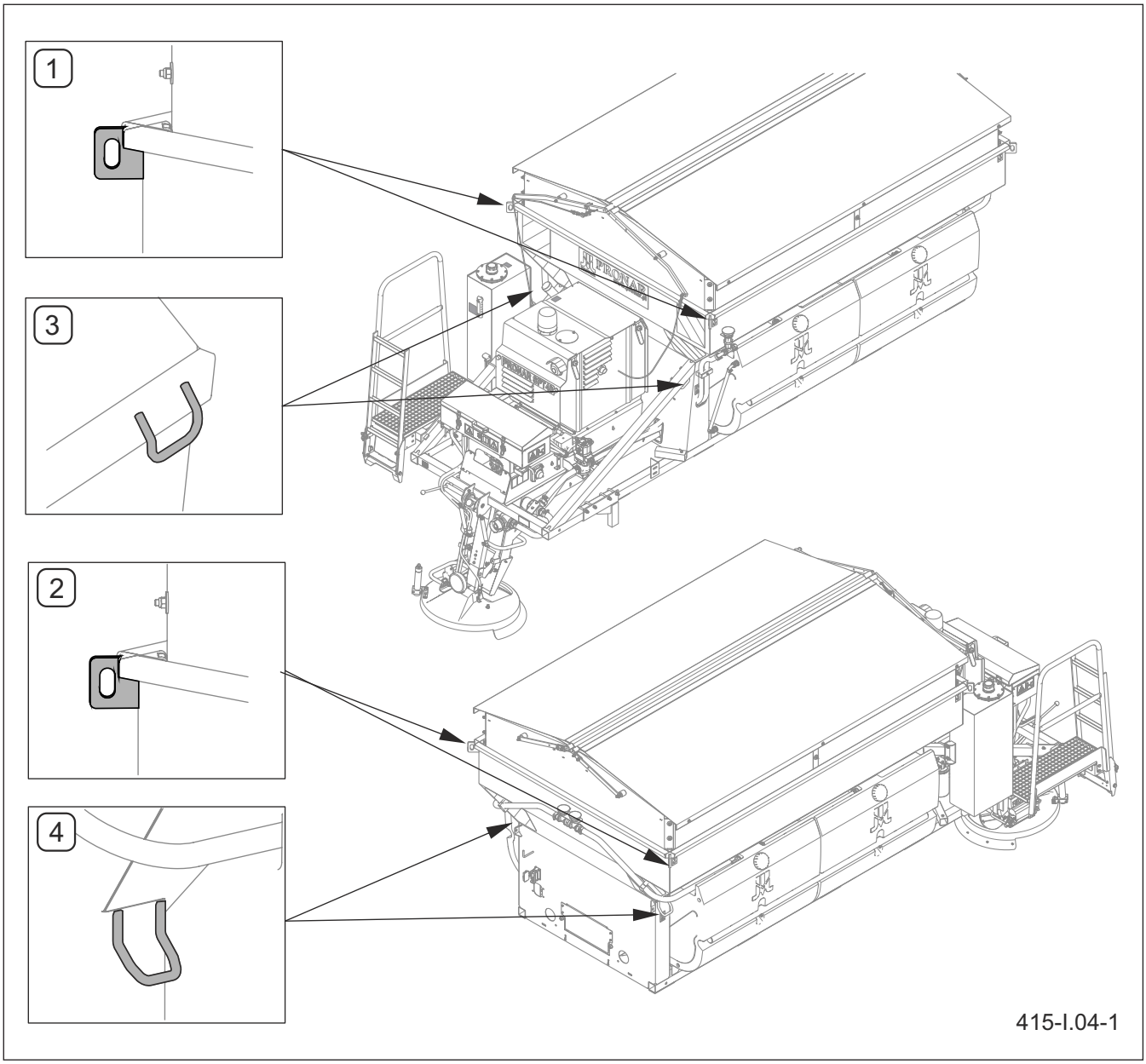


Figure 5.4 Attachment points for fastening straps
(1) rear, upper attachment points
(2) front, upper attachment points
(3) rear, lower attachment points
(4) front, lower attachment points

ATTENTION

Install fastening straps in such a manner as to protect them against damage caused by sharp edges of the machine or carrying vehicle.

ATTENTION

Fastening strap may be used only if it is not damaged and has a legible label with a proper certificate according to EN-12195-2.

Securing method 1 (figure 5.5) is used in case of carrying vehicles with weak or without side walls of load platform. To secure the machine, use four LC 2 000 daN fastening straps according to EN 12195-2 standard and attach them to special catches on the load platform or to the load platform side.

Securing method 2 (figure 5.6) is used in case of carrying vehicles with strengthened side walls of load platform. To secure the machine, use four LC 2 000 daN fastening straps according to EN 12195-2 standard and attach them to the load platform side.

Securing method 3 (figure 5.7) is used in case of carrying vehicles with strengthened side walls of load platform. To secure the machine, use 4 LC 2 000 daN fastening straps according to EN 12195-2 standard.

Securing method 4 (figure 5.8) is used in case of carrying vehicles with weak or without side walls of load platform. To secure the machine, use four LC 2 000 daN fastening straps according to EN 12195-2 standard and attach them to special catches on the load platform.

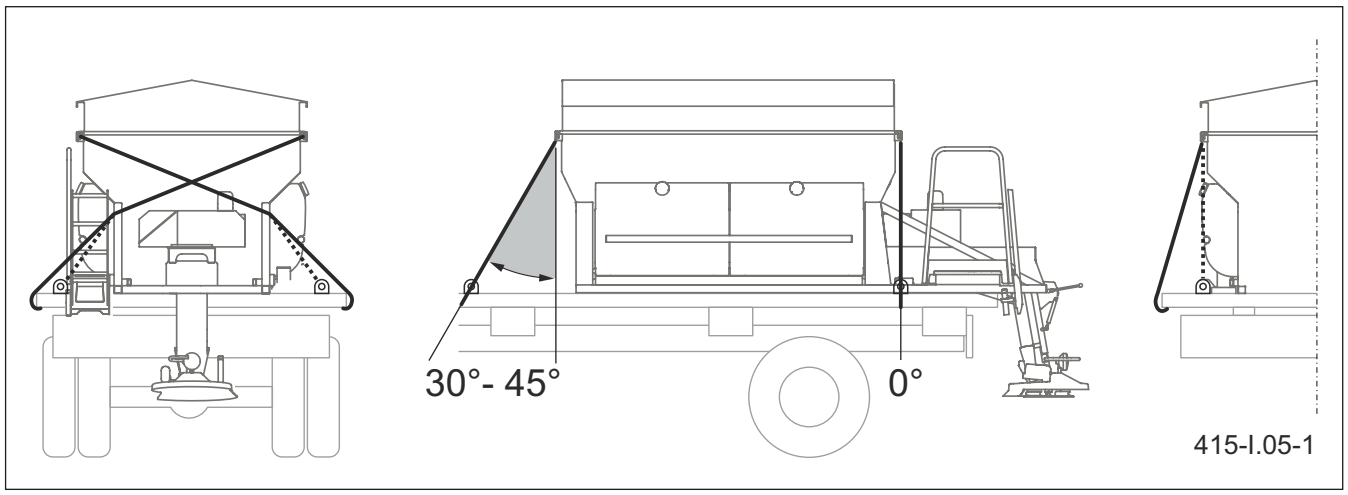


Figure 5.5 Securing method 1

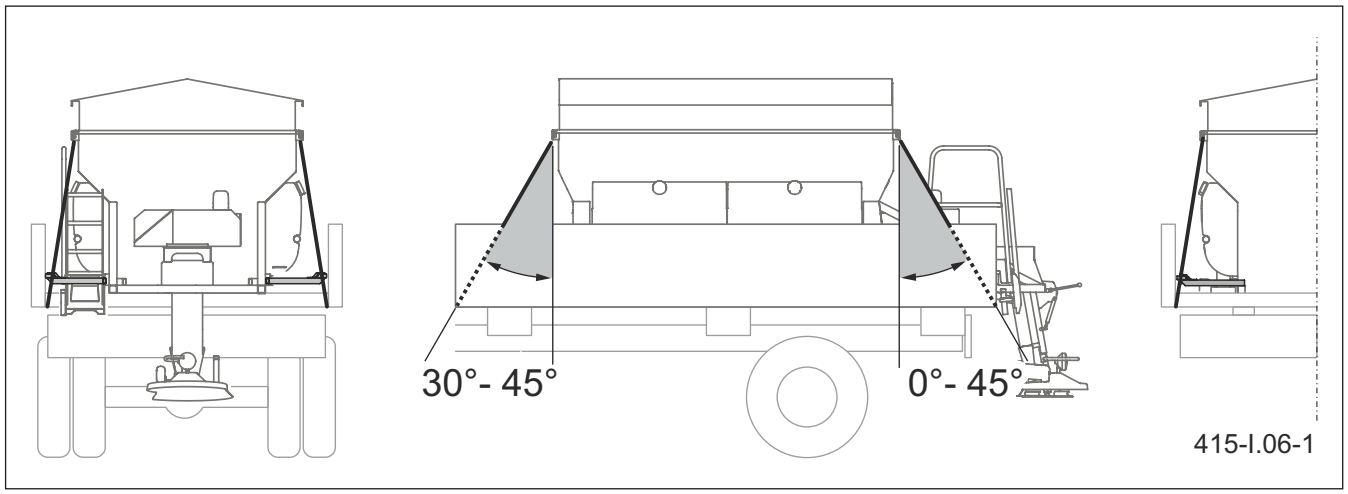


Figure 5.6 Securing method 2

Securing method 5 (figure 5.9) is used in case of carrying vehicles without side walls of load platform. To secure the machine, use four LC 2 000 daN fastening straps according to EN 12195-2 standard and attach them to special catches on the load platform or to the load platform side.

DANGER

If the carrying vehicle's load platform has „tipper" function, switch this function off or lock to prevent accidental use.

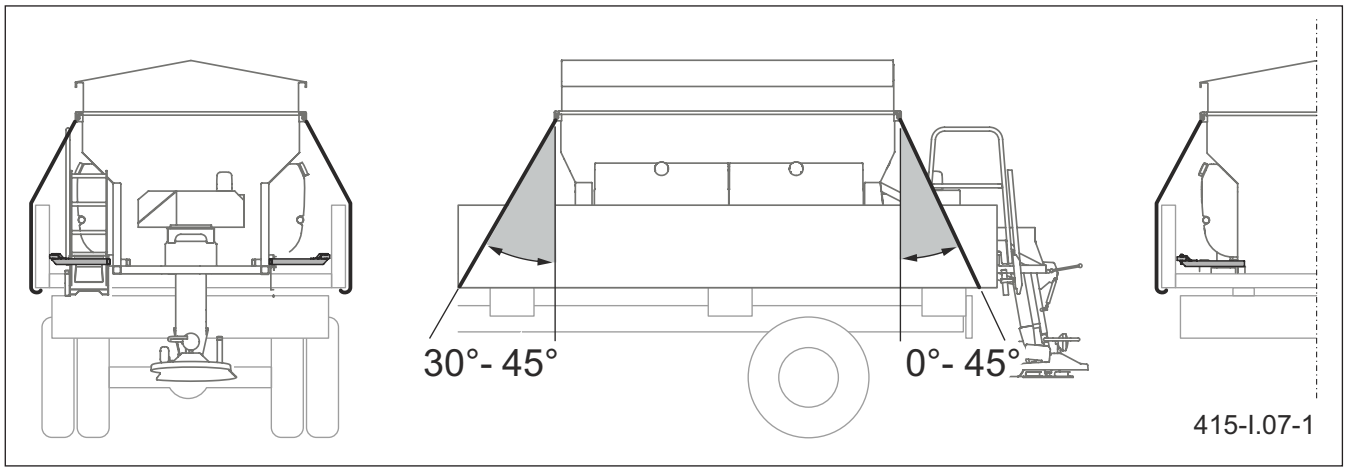


Figure 5.7 Securing method 3

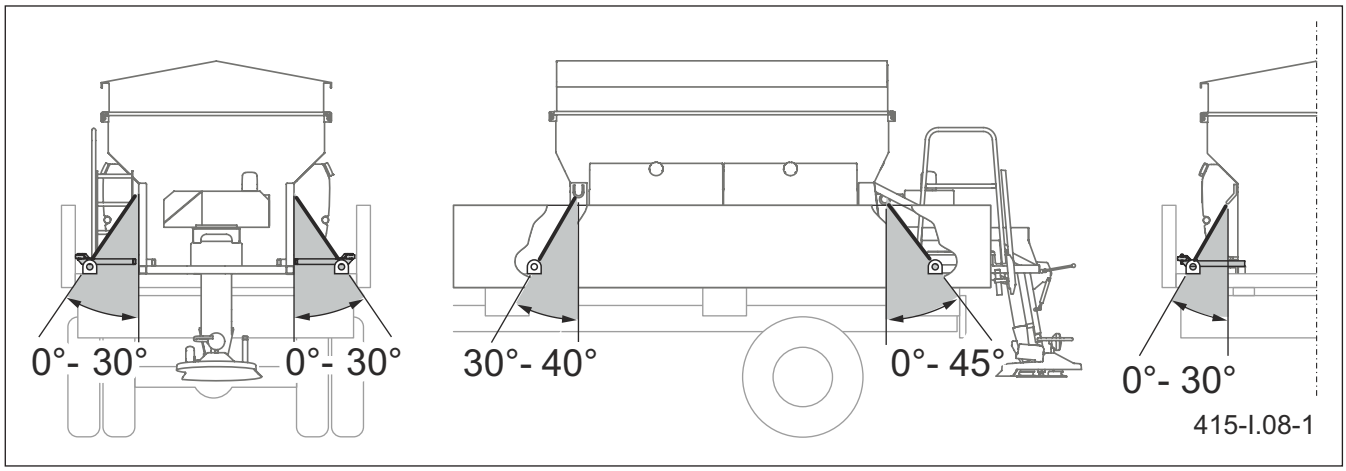


Figure 5.8 Securing method 4

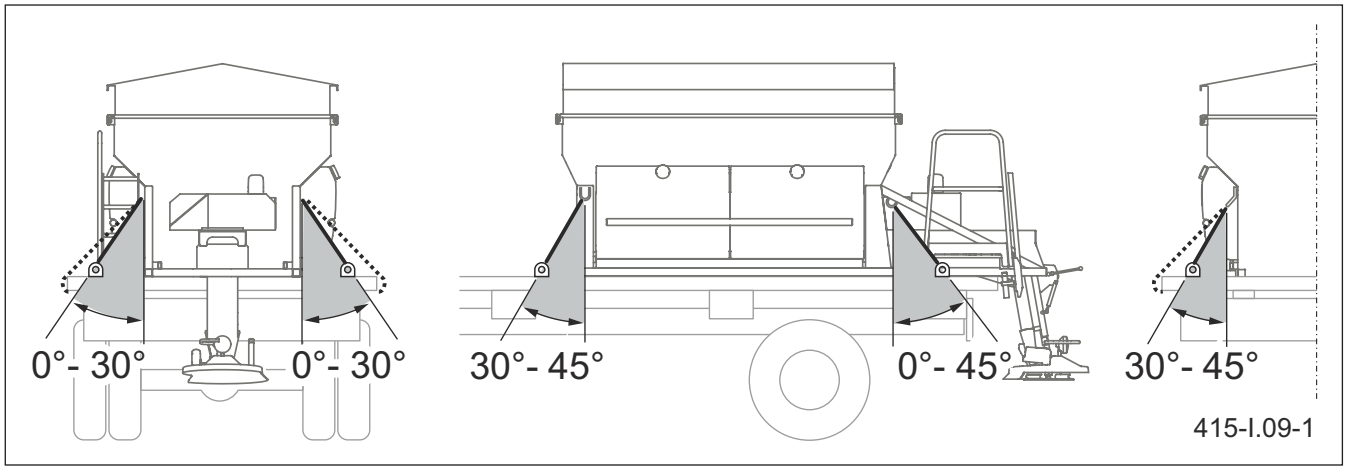


Figure 5.9 Securing method 5

CONNECTING THE CONTROL ELECTRICAL SYSTEM

To ensure correct operation of the sand spreader's control system, the carrying vehicle should be equipped with a connection with travel speed pulse input according to ISO 16844-2.

When connecting the sand spreader to carrying vehicle electrical system (figure 5.10):

- Connect the leads of the power supply wiring harness (1) equipped with a 3-pin socket (2) to the carrying vehicle's battery (24V). Connect the red lead to the positive end of the vehicle's battery (+) and the black lead to the negative battery end (–).
- The vehicle travelling speed signal should be fed to the contact (4) in the 3-pin socket (2).
- Podpiąć wtyczkę (3) do gniazda (2) wiązki zasilającej (1). Contact (9) the plug must be connected to the vehicle travelling speed signal contact (4).
- Connect the control panel's main switch (8) to the connector in the wiring harness of the display (5).
- Connect the control panel (7) to the wiring harness connector (5).
- Connect the wiring harness of the display (5) terminated with the 10-pin connector to the 10-pin socket (6) of the sand spreader's wiring harness.
- Place the control panel in the operator cab in an easily accessible place.

DANGER

Prior to connecting individual system conduits, the user must carefully read the carrying vehicle operator's manual and observe all Manufacturer's recommendations.

ATTENTION

During operation, the connecting cables should be routed so that they do not get entangled in moving machine and carrying vehicle parts.

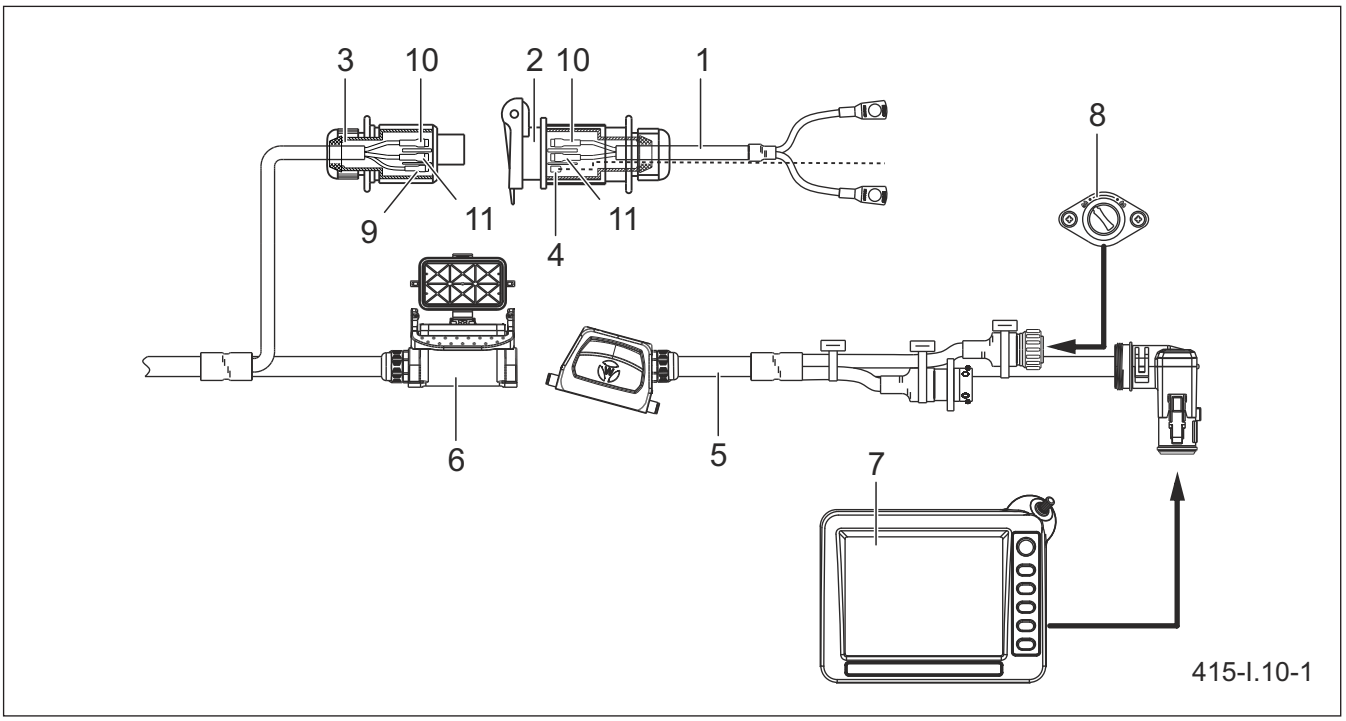


Figure 5.10 Connecting the electrical system

(1) supply wiring harness (2) 3-pin socket (3) 3-pin plug (4) vehicle travelling speed signal
(5) control panel wiring harness (6) 10-pin socket (7) control panel (8) main switch of control panel
(9) contact of 3-pin plug (10) power supply plus (+) (11) ground (-)

I.2.4.415.03.1.EN

5.4 GET READY FOR OPERATION

SET UP THE SPREADING MECHANISM

Before starting work, set the spreading mechanism in a proper manner. Adjustments are made after installing the machine on the carrier vehicle.

Lower the spreading mechanism (Figure 5.11) to working position:

- loosen clamp bolt (2),

DANGER

The spreading mechanism may be lowered, raised and set in any manner only when the machine installed on the carrier vehicle's load box is switched off.

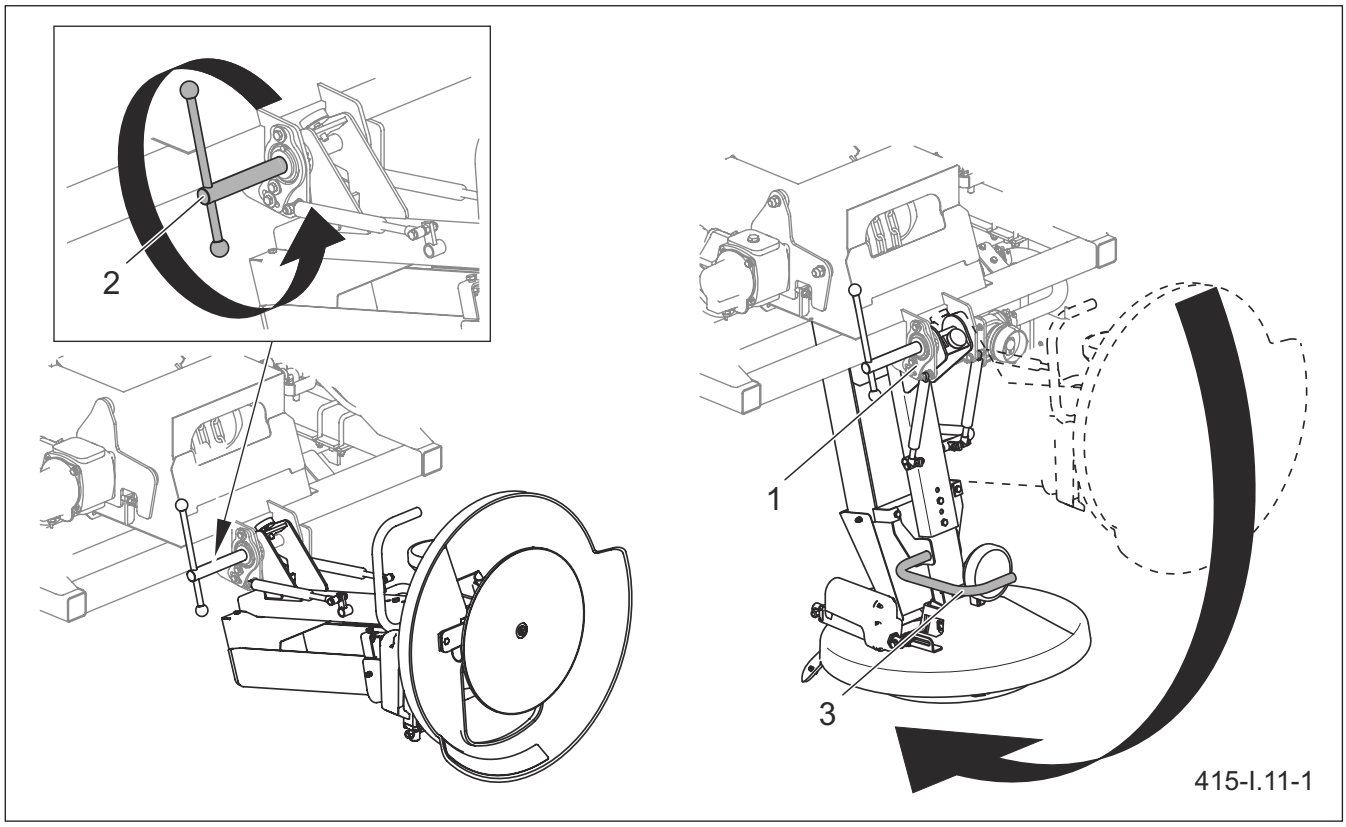


Figure 5.11 Lowering the spreading mechanism
(1) spreading mechanism (2) compression bolt (3) bracket

- lower the mechanism while holding grip (3),
- tighten clamp bolt (2).

During operation, the spreading disc should be levelled. To check that the spreading disc is level, measure the distances between the disc and the ground in two extreme points (A) to confirm that the distances are the same (Figure 5.12). Otherwise, make adjustment as follows:

- check that clamp bolt (2) is tightened,
- loosen three bolts (1),
- shift the spreading mechanism forward or backward in order to set the spreading disc in such a manner that distances (A) are the same,
- tighten bolts (1).

After levelling the spreading disc, check its height above the road surface. After lowering of the spreading mechanism, correctly set spreading disc should be located at the height of 400 ±15mm above road surface (Figure 5.13).

To set the distance between the spreading disc and road surface (Figure 5.13):

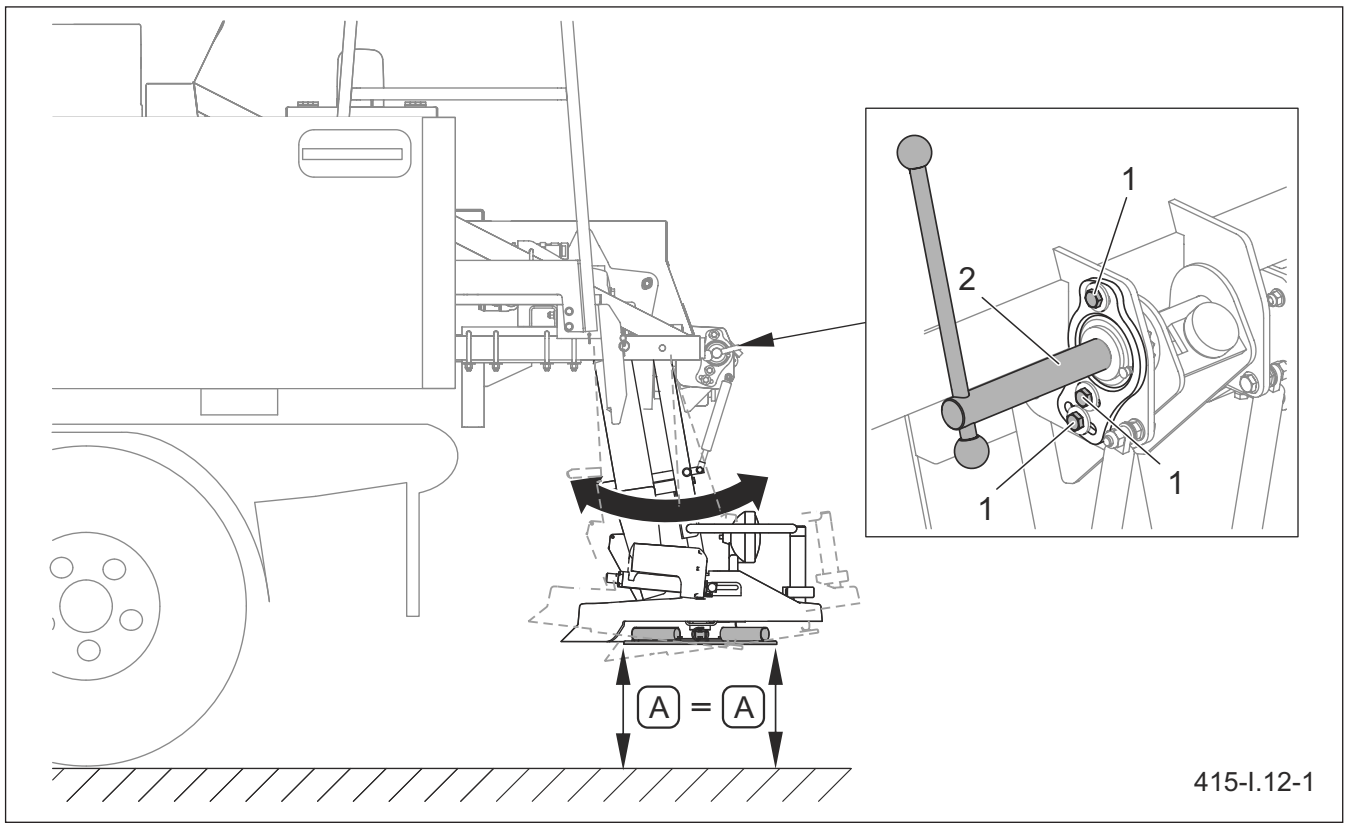


Figure 5.12 Levelling the spreading disc
(1) bolt *(2) compression bolt*

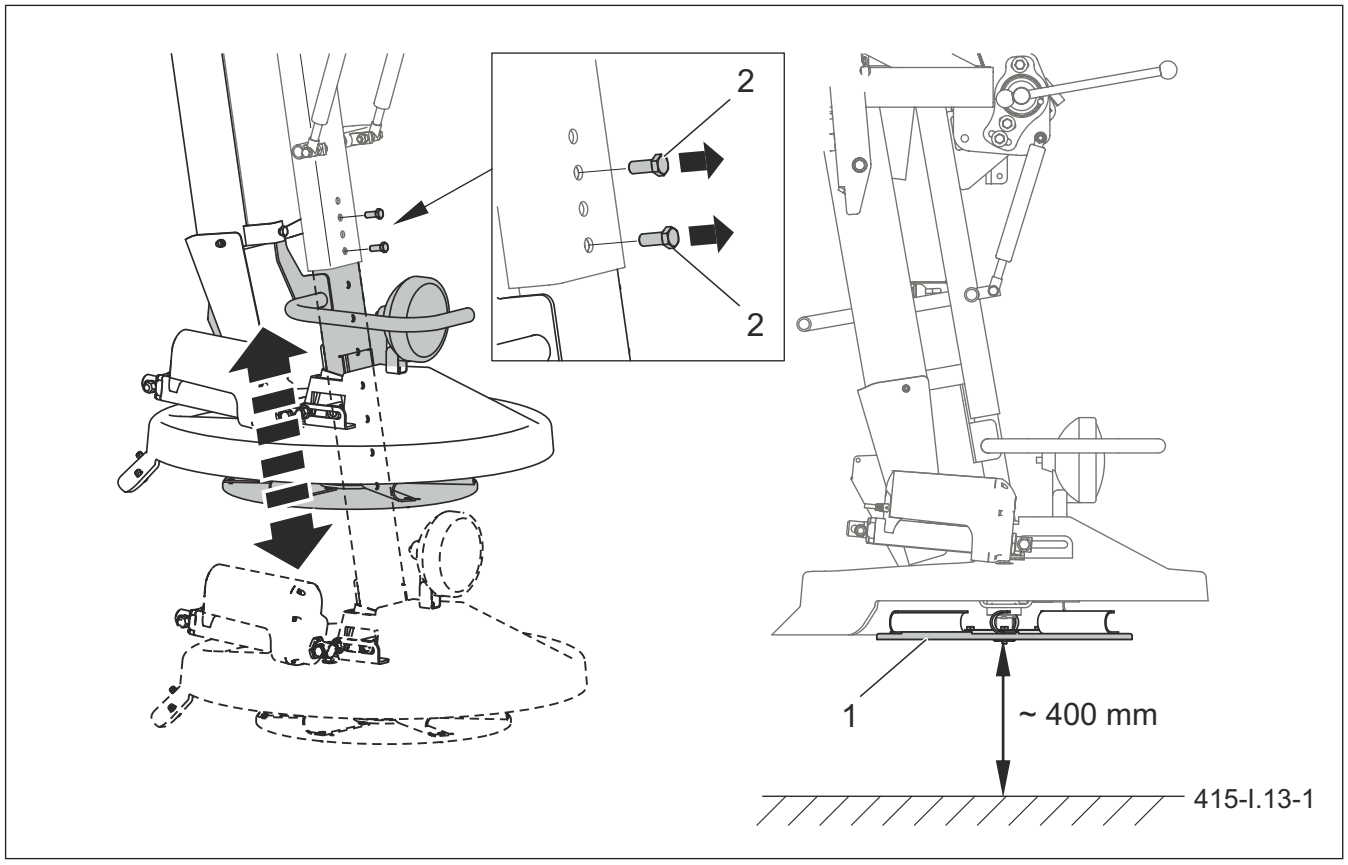


Figure 5.13 Setting the distance between the spreading disc and road surface
(1) spreading disk *(2) bolt*

- unscrew two bolts (2) while holding the spreading mechanism,
- set the spreading mechanism so as to ensure that the distance between spreading disc (1) and road surface is approximately 400 ±15 mm,
- screw bolts (2) into proper holes of the guide.

The distance between the spreading disc and road surface is recommended to be checked again after loading the tank and filling the tank with brine. Please note that the spreading width depends on the height of spreading disc above the road surface.

SETTING THE BELT CONVEYOR BARRIER

To change the position of barrier (1), turn and pull pin (2), move slide (3) to selected position (A), (B) and lock pin (2) in proper slide opening. To set position (C), pull out slide (3) completely and leave locking pin (2) in pulled out position. Position (C) is used only when unloading material from the tank of parked sand spreader (see *UNLOAD*)

Depending on spreading material, belt conveyor barrier (Figure 5.14) should be set in one of the three positions:

- Position (A) – salt spreading (conveyor barrier opening: 45 mm).
- Position (B) – sand spreading (conveyor barrier opening: 120 mm).
- Position (C) – tank emptying (conveyor barrier maximally opened).

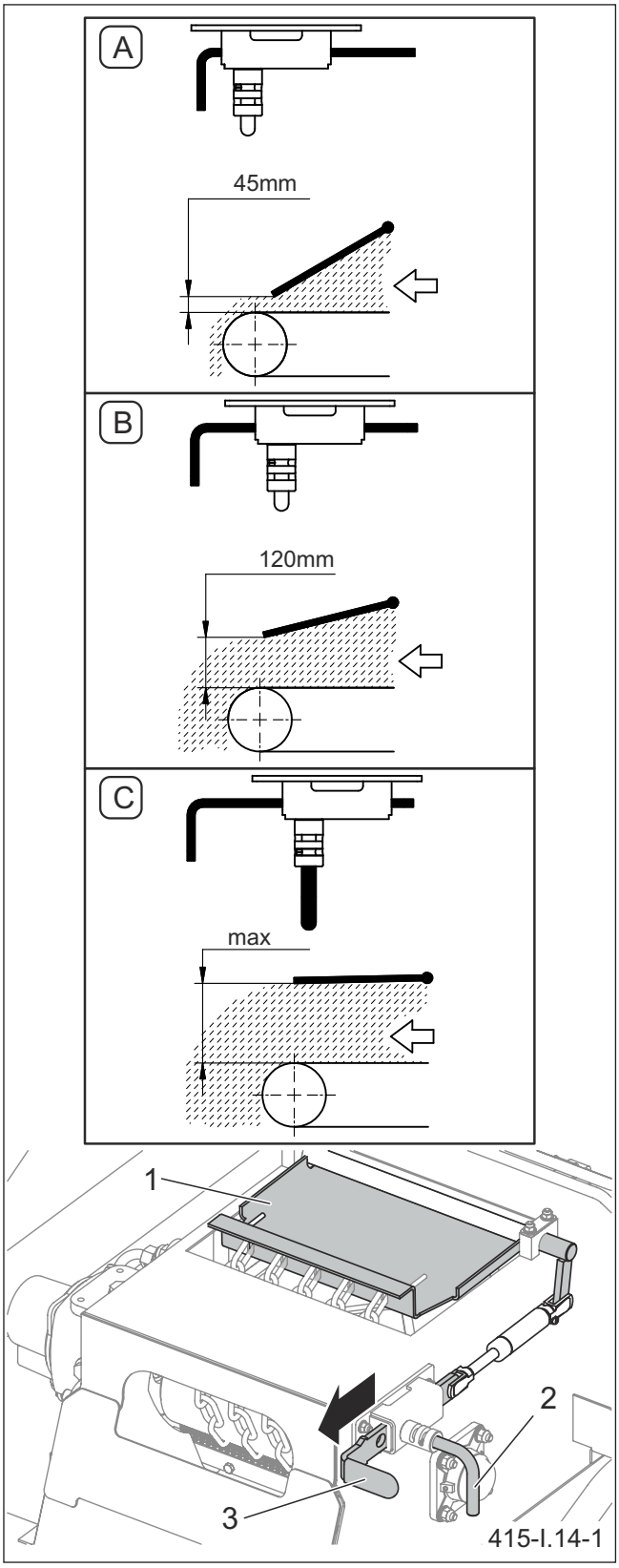


Figure 5.14 Position the conveyor shutter
(A) salt spreading (B) sand spreading (C) empty the tank
(1) screen
(2) locking pin
(3) slider

I.2.4.415.04.1.EN

5.5 LOADING THE MACHINE

LOADING THE TANK

The platform fitted with ladder (1) facilitates raising and lowering of tarpaulin cover (figure 5.15).

To lower the ladder (figure 5.15):

- hold the ladder (1) and remove securing cotter pin (3),
- lower the ladder (1).

Release pawl (3) by pulling a cord and raise tarpaulin cover by means of frame lever. Tarpaulin cover rising sequence (I) - (II) is shown in figure (5.16).

Before loading, check that there are no foreign objects (tools, stones etc.) in the tank. The tank should be loaded from above through the screen that prevents lumps of material from entering the tank. When loading the tank, it is recommended to use a front loader or belt conveyor. Efforts should be made to evenly distribute the load in the tank in order to ensure proper stability of the sand spreader. Avoid throwing material into the tank from a great height. After loading, cover the tank with tarpaulin cover (figure 5.16) and make sure that the pawl (3) is locked.

DANGER

Loading may be performed only if the sand spreader is switched off and mounted on the carrying vehicle's load platform. Be especially careful when loading the machine.

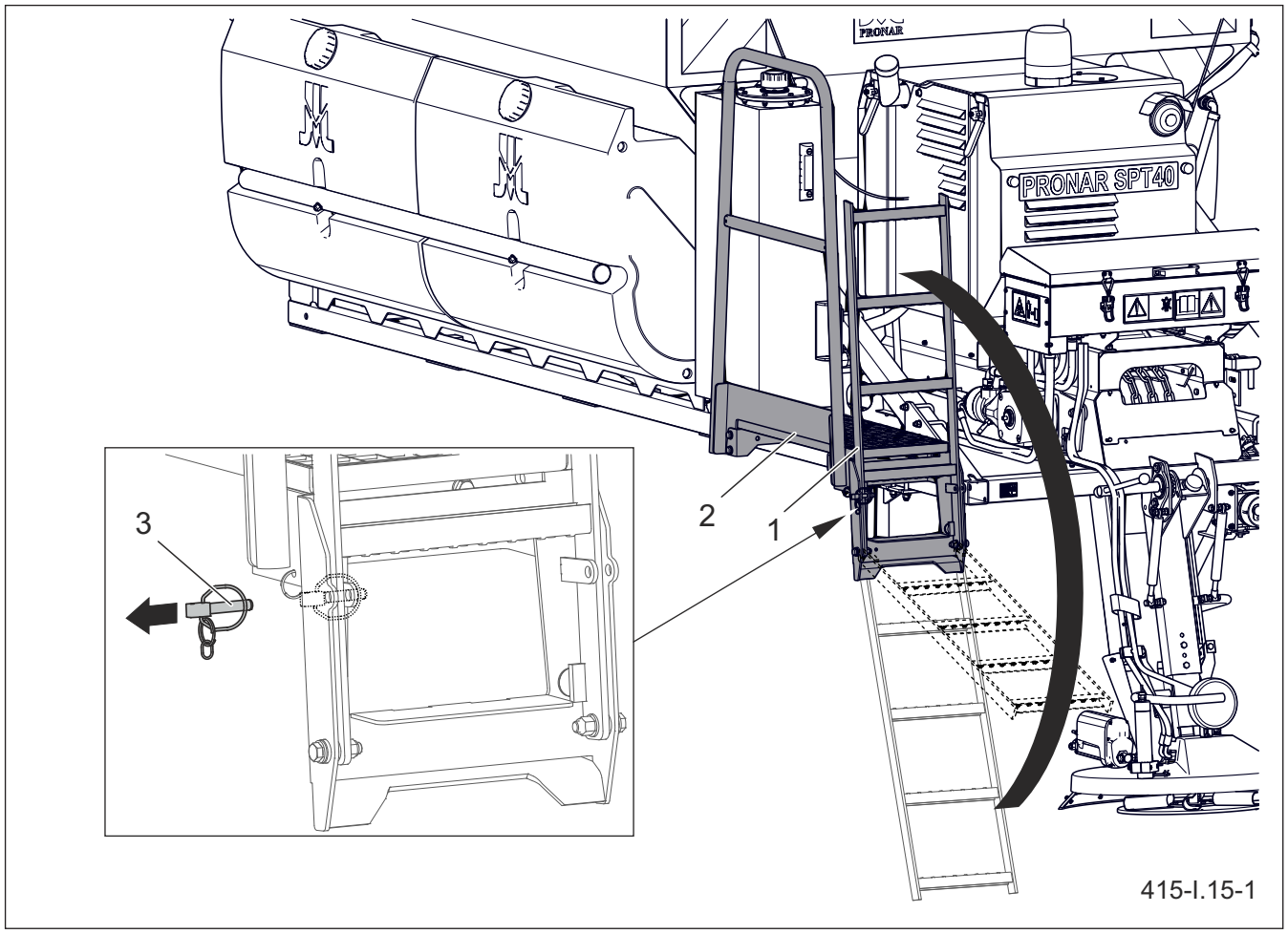


Figure 5.15 Ladder and platform
(1) ladder *(2) platform* *(3) securing cotter pin*

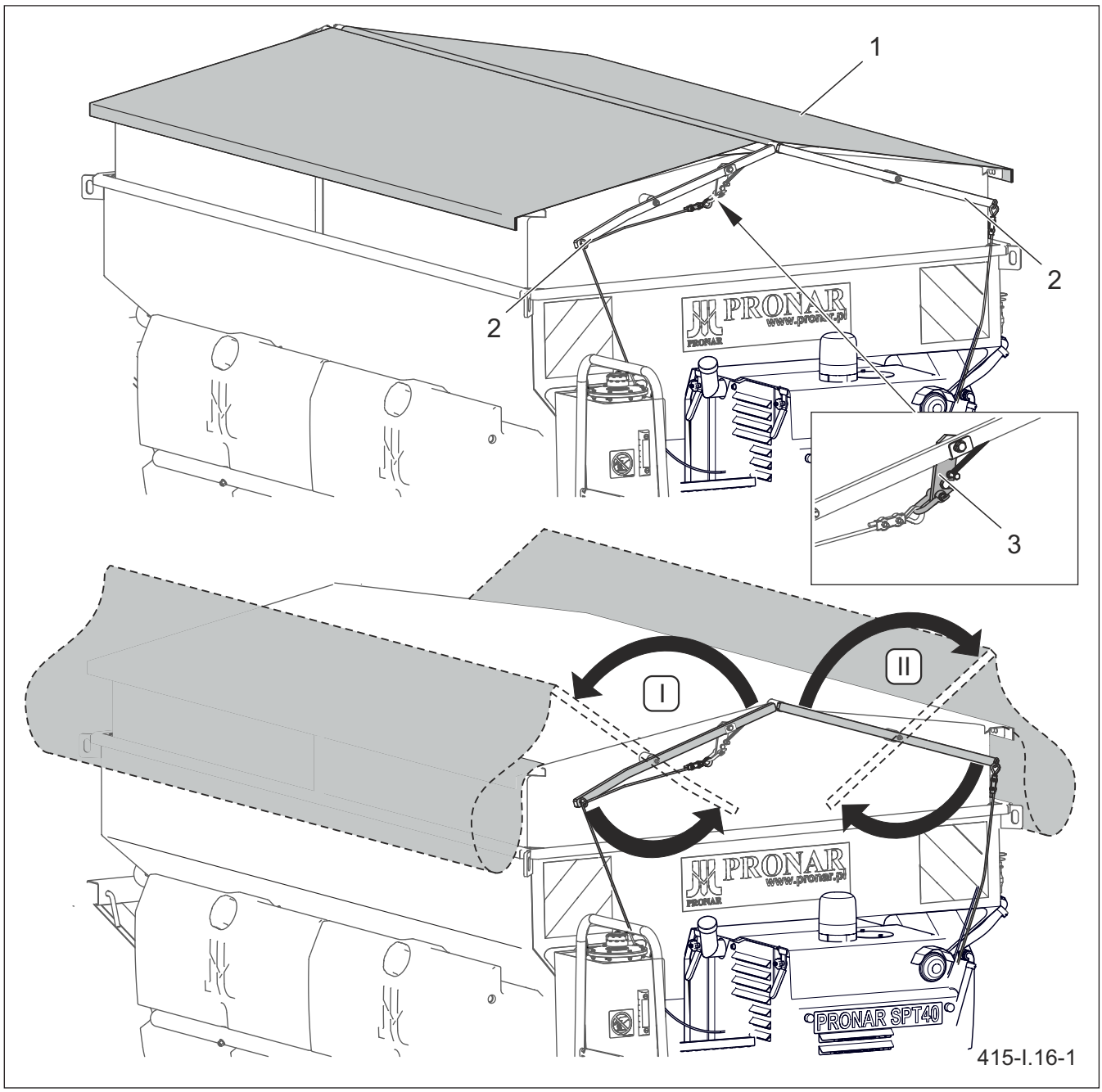


Figure 5.16 Raising the tank's tarpaulin cover
(1) tarpaulin cover *(2) frame lever* *(3) pawl*

ATTENTION

Spreading agents must be prepared in accordance with the regulations concerning winter road maintenance in force in the country in which the sand spreader is used.
Spreading agents other than those recommended by the Manufacturer must not be used.

FILLING THE TANK WITH BRINE

DANGER

Filling the tanks with brine should be performed only if the sand spreader is switched off and mounted on the carrying vehicle's load platform. Be especially careful when filling the tanks.

The tanks can be filled with brine (figure 5.17) through tank openings secured with plugs (1) or through connection (2) secured with a plug (3).

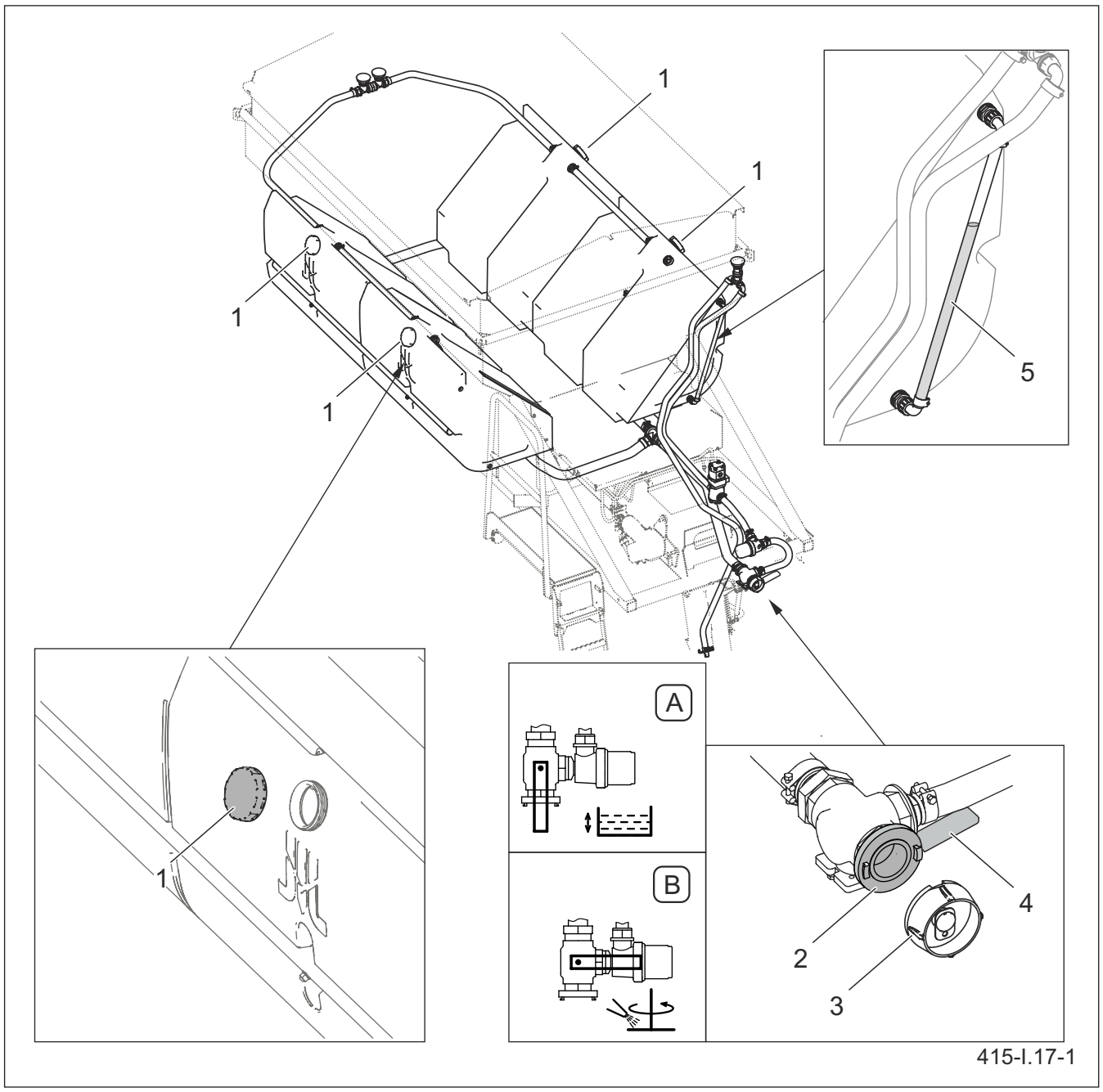


Figure 5.17 Filling the tank with brine

(1) tank plug *(2) STORZ 52C connection* *(3) valve plug* *(4) valve lever*
(5) brine level indicator *(A) valve in position „filling/emptying”* *(B) valve in position „brine spraying”*

In order to fill the tanks with brine (figure 5.17) through connection (2):

- set valve lever (4) in position (B),
- unscrew plug (3) and connect filling hose to connection (2),
- set valve lever (4) in position (A) and start filling,
- brine level is checked on brine level indicator (5) located on the tank,
- when filling is completed, set lever (4) to position (B),
- disconnect filling hose and tighten plug (3).

TIP

Each time before filling the tanks with brine, check and, if necessary, tighten the bolts fixing the tanks to the frame.

To fill the tanks directly through filler opening, unscrew plug (1) and insert filling hose to filler opening. It is enough to fill one tank only, because all tanks are connected. When filling is completed, tighten the tank plug.

TIP

If filling with brine is performed too quickly, the tank to which brine is poured directly may be filled faster than the other tanks. In such a case, stop filing and wait until level of liquid in all tanks is the same.

I.2.4.415.05.1.EN

5.6 MACHINE OPERATION

PRELIMINARY INFORMATION

DANGER

Do NOT use an inoperative machine.

ATTENTION

Do NOT start the machine without making certain that it is in perfect technical condition.

Proper starting of the sand spreader includes a range of preparatory activities such as:

- daily inspection,
- Machine setup
- preparing for work and loading,
- start the engine,
- starting proper working.

If no contraindications for starting the sand spreader are found, commence starting the machine.

START THE ENGINE AND START SPREADING

ATTENTION

Before starting the engine make certain that all shields are closed.

ATTENTION

During the first 50 working hours, a new engine must not exceed 70% of its maximum rated power.

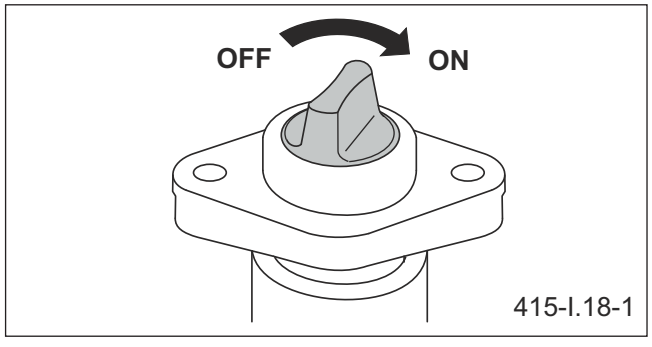


Figure 5.18 Main switch of control panel
(ON) turned on *(OFF) turned off*

- Turn control panel on.

  Turn main switch (Figure 5.18) clockwise to (ON) position - switched on (the switch is installed on the control panel power lead).

- Start the engine

  See ENGINE MAINTENANCE / START THE ENGINE.

- On the “Start” home page of the control panel (Figure 5.19), use button (1) “Select” to check the box (A) for selecting the operating mode, Select “Manual mode” by means of button (2) “Change”.
- Move to field (B) by means of button (1) „Selection” and select the type of material to be spread. By means of „Change” button, select the

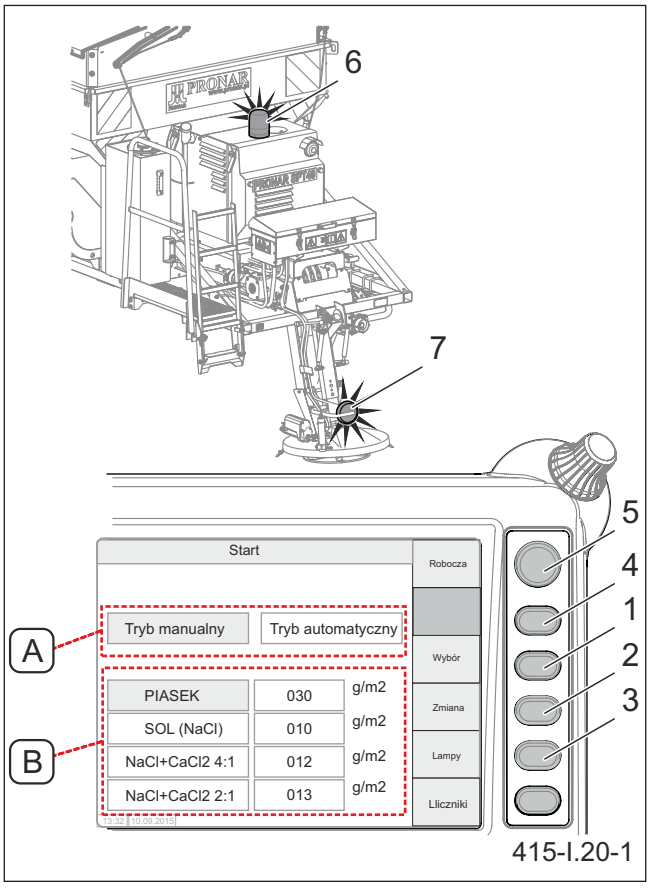


Figure 5.19 Activate individual functions on control panel home page
(A) operating mode check box *(B) material selection box*
(1-5) function buttons *(6) beacon light*
(7) rear lamp

type of material to be spread that is currently in the tank.

- Press the button (3), turn on warning lamp (6) at the rear of the machine and lamp (7) near the spreading disc.

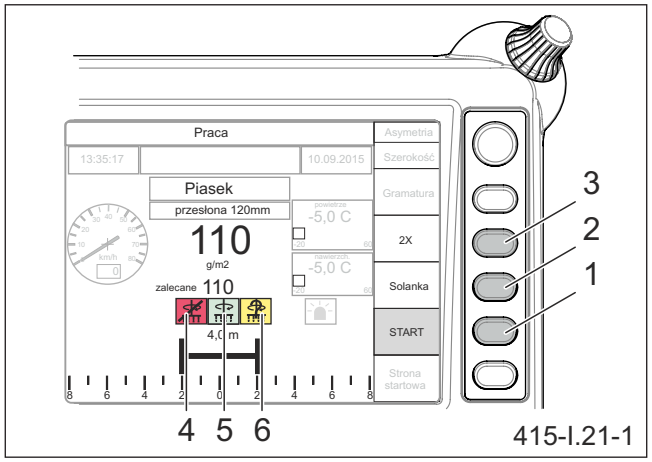


Figure 5.20 Start spreading
(1) spreading on button (2) brine sprinkling button (3) double dose button (4-6) spreading status lights

- On control panel “Operation” page (Figure 5.20), press button (1) to activate spreading; the “Start” function will be highlighted.

Activation of spreading disc drive and belt conveyor is indicated by light (4) Brine spraying is switched on and off by means of button (2) “Brine” (not active for sand). Push button (3), marked “2X” to temporarily double the spreading material dose.

Spreading can be started before moving off or during travel. Adjust ground speed to road conditions and spreading material:

- ground speed during sand spreading: 10 – 40 km/h,
- ground speed during salt spreading: 10 – 70 km/h.

CHANGE SPREADING WIDTH AND ASYMMETRY

Spreading width is changed from the operator cab, on control panel working page (“OPERATION”). To change spreading width (Figure 5.21):

- highlight “Width” function by means of button (1),
- turn knob (2) to set a required width (3) from 2 m ÷ 12 m.

ATTENTION

The optical sensor detects 3 conditions: spreading - green indicator light, no spreading - red indicator light, clogged sensor - yellow indicator light and green indicator light are ON simultaneously.

DANGER

There must be no bystanders within the sand spreader working zone.

To change asymmetry of spreading, highlight “Asymmetry” field on working page “Operation” by means of button (1). Turn knob (2) to move current spreading width to the right or to the left (Figure 5.22).

For example, in the figure 5.22, for spreading width of 6 m, spreading asymmetry is shifted to the right.

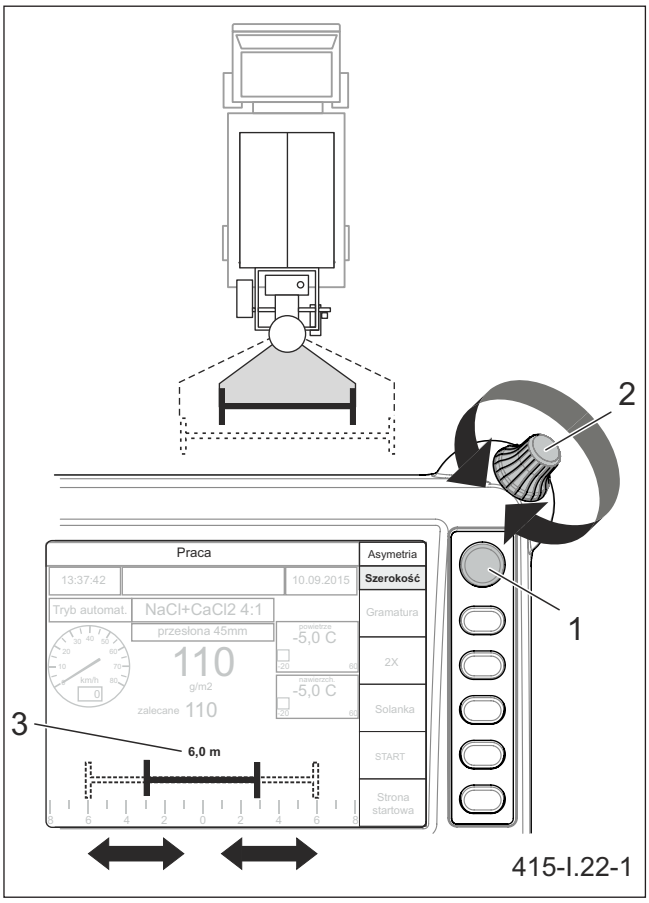


Figure 5.21 Adjustment of spreading width
(1) “Asymmetry-Width” selection button (2) parameter adjustment knob (3) current spreading width

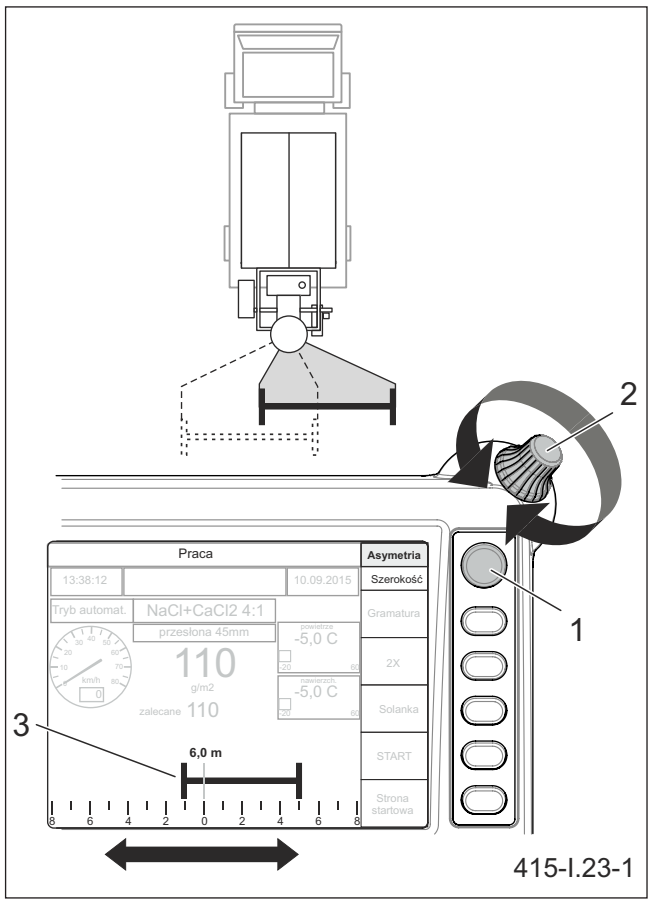


Figure 5.22 Changing asymmetry of spreading
(1) "Asymmetry-Width" selection button (2) parameter adjustment knob (3) graphical image the spreading pattern asymmetry

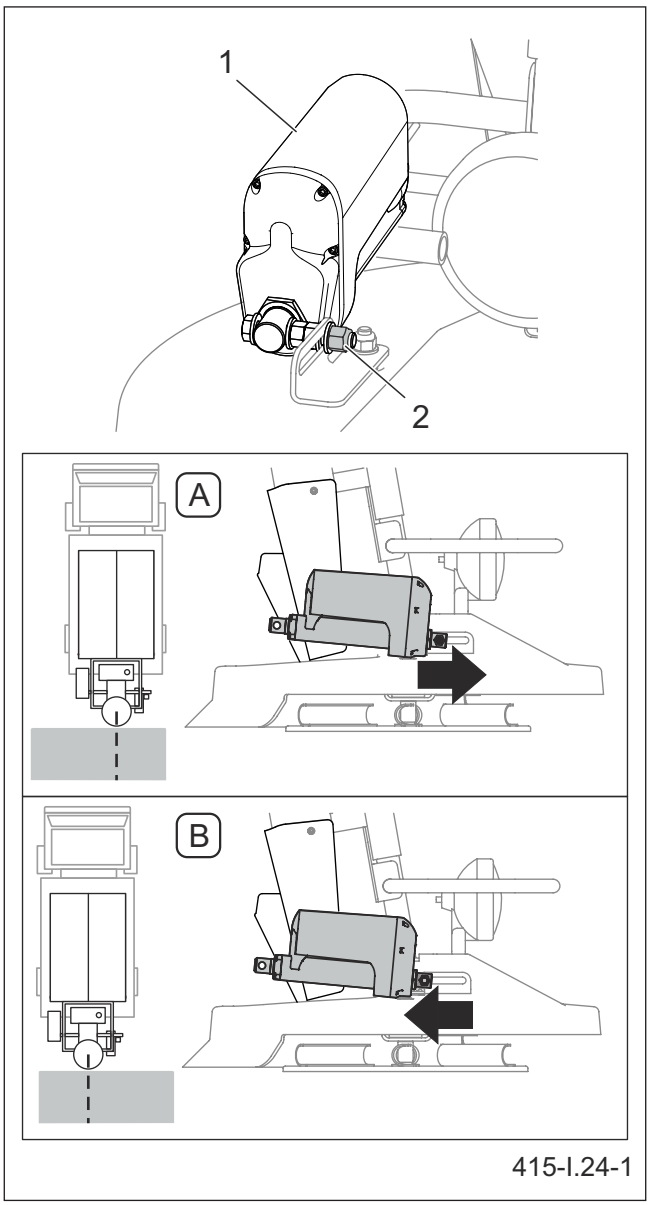


Figure 5.23 Adjustment of spreading mechanism
(1) spreading direction adjustment cylinder (2) nut (A), spreading too far to the left
(B) spread shifted too far to the right

ADJUSTMENT OF SPREADING MECHANISM

If there are differences in spreading symmetry during spreading mechanism operation, with regard to values set on the control panel, it may be necessary to adjust the setting of the electric cylinder.

In order to adjust the spreading mechanism, set symmetric 4 meter-wide spreading zone on the control panel. Activate spreading and drive a short distance at a constant speed. Stop the vehicle and check effect of spreading. If spreading to the right side and to the left side is not the same, adjust spreading direction (Figure 5.23) adjusting cylinder (1) () as follows:

- Loosen nut (2).
- Move cylinder (1) forward if spreading zone is excessively shifted to the left (A).
- Move cylinder (1) backward if spreading zone is excessively shifted to the right (B).
- Tighten nut (2), conduct test spreading, if necessary, repeat the adjustment.

OPERATION IN AUTOMATIC MODE (OPTION)

Optionally, the sand spreader can operate in automatic working mode. In automatic working mode, the electronic system selects a proper dose of material on the basis of road surface temperature measurement and selected, defined working mode. Three working modes are defined in the automatic working mode according to the guidelines for winter road maintenance issued by the General Directorate of Domestic Roads and Motorways:

- T1 – prevent formation of black ice, glazed frost,

hoarfrost,

- T2 – prevent snow freezing to road surface,
- T3 – eliminate black ice, hoarfrost, thin layers of compacted or icy snow, remains of fresh snow.

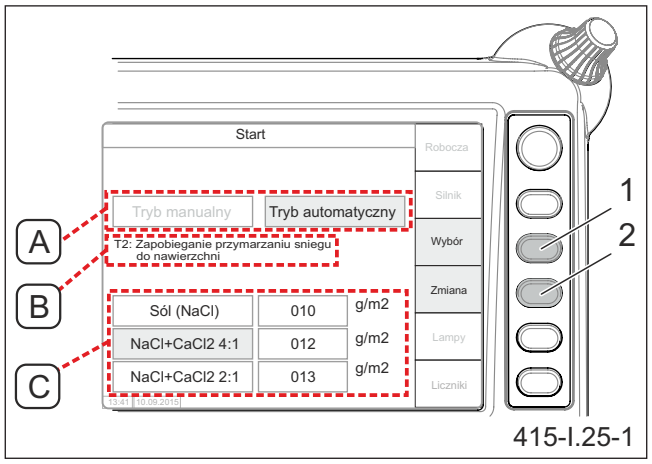


Figure 5.24 Select automatic mode
(1) button to select field A , B or C for editing (2) button for changing the marked area (A) the auto / manual operating mode check box (B) automatic mode T1, T2, T3 check box (C) spreading material check box

To select automatic mode (option):

- on the “Start” home page of the control panel (Figure 5.24), use button (1) to check the box (A) for selecting the operating mode,
- select “Automatic mode” by means of button (2) “Change”,
- select one of the three defined modes T1,T2,T3 by means of button (1) “Selection”,
- by means of button (1), mark field (C) and then, by means of button (2) „Change”, select (C) type of material to be spread that is currently in the tank (automatic mode cannot be selected for „Sand”).

On control panel “Operation” page (Figure 5.25) the operator can correct the dose for a defined automatic mode after selecting “Spreading density” function by pushing button (1). Correction is made by means of knob (5). Recommended density (3) for a defined mode T1, T2 or T3 is displayed below spreading density set by the operator (2).

STOP SPREADING AND THE ENGINE

- On control panel “Operation” page push button (Fig 5.26) to turn off spreading.

  Indicator light (3) will go out when the spreading disc drive and the belt conveyor are stopped.
- Next push button (2) to go to “Start” home page and turn off the lights.
- Turn off the engine.

  See ENGINE MAINTENANCE / STOP THE ENGINE.
- Turn off the control panel power.

  Turn the main switch to the (OFF) position - off .

Tabela 5.1. Examples of specific weights of spreading materials

Solid material		
Material name	**Specific weight [kg/l]**	**Weight per m² [kg]**
Medium sand	1.60	1,600
Coarse sand	1.60	1,600
Fine salt (NaCl)	1.20	1,200
Coarse salt (NaCl)	1.32	1,320
Liquid		
Material name	**Specific weight [kg/l]**	**Weight per 1000L [kg]**
Calcium solution ($CaCl_2$)	1.16	1,160
Saline solution (NaCl)	1.20	1,200

TIP

Doses of material for particular temperature ranges and working modes are defined in table included in the guidelines for winter road maintenance issued by the General Directorate of Domestic Roads and Motorways (Attachment to Ordinance No. 18 of General Director of Domestic Roads and Motorways of 30 June 2006).

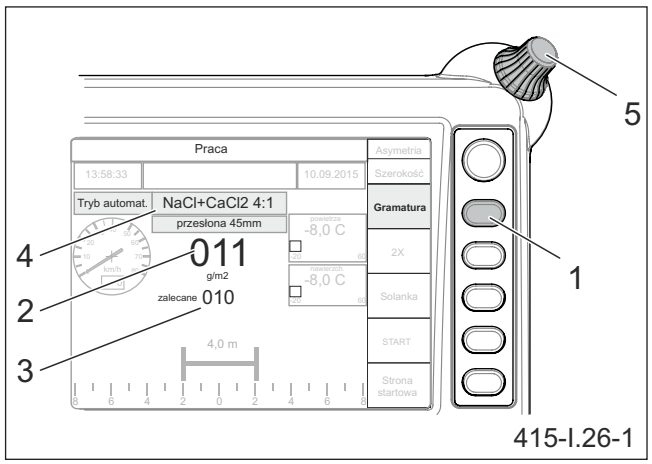


Figure 5.25 Automatic mode adjustment (option)
(1) adjust dose button (2) operator preset value (3) recommended value and operating mode (4) pre-selected material (5) settings adjust knob

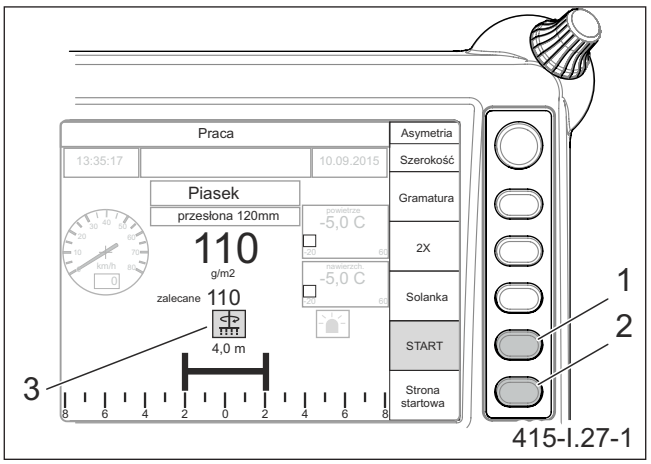


Figure 5.26 Stopping of spreading
(1) spreading on / off button (2) home page button; (3) sprinkling on indicator light

TIP

When road surface temperature change is detected in automatic working mode, the electronic system will change preset spreading density while maintaining the value added or subtracted previously by the operator.
If spreading density is not corrected by the operator in automatic mode, the preset value and recommended value will be equal.

ATTENTION

Do not turn the engine off when working at full load. Before turning the engine off, let it run at low speed for a short time.

I.2.4.415.06.1.EN

5.7 DRIVING ON PUBLIC ROADS

When driving on public roads, respect the road traffic regulations, exercise caution and prudence. Make sure that the machine is correctly attached to the carrying vehicle. During operation, ensure that there is suitable visibility, turn on the orange beacon light at the rear of the machine. Special attention should be paid to the bystanders likely to be near the working machine.

Avoid ruts, depressions, ditches or driving on roadside slopes. Driving across such obstacles could cause the carrying vehicle and the machine to suddenly tilt. Driving near ditches or canals is dangerous as there is a risk of the wheels sliding down the slope or the slope collapsing. Speed must be sufficiently reduced before making a turn or driving on an uneven road or a slope. For the period of sand spreader operation, protect the lifting system of the carrying vehicle's load platform (if any) against automatic or accidental activation.

DANGER

During spreading, adjust travelling speed to the prevailing road conditions and do not exceed the following values:
- travelling speed during sand spreading: 10 – 40 km/h,
- travelling speed during salt spreading: 10 – 70 km/h.

I.2.4.415.07.1.EN

5.8 UNLOADING

EMPTYING THE TANK

DANGER

Before leaving the cab turn off the engine, engage the parking brake and secure the vehicle's cab against access of third persons.
Exercise caution while unloading.

Before dismounting the sand spreader from the carrying vehicle's load platform, before adjusting works, repairs and in case of spreading material change, the machine's tank should be completely emptied. In order to do this:

- raise the spreading unit and lock it in the upper position (figure 5.27),
- set the belt conveyor barrier to maximally open position (figure 5.28),
- start the engine,
- on control panel „Counters" page, select „Unloading" function,

To raise the spreading mechanism for unloading (figure 5.27) do the following:

- loosen clamp bolt (2),
- raise spreading mechanism (1) while holding grip (3), this will be signalled by „Raised disc" indicator light on the control panel,
- tighten clamp bolt (2).

To set the barrier (1) for unloading, (figure 5.28) turn and pull the pin (2) and raise the barrier by pulling the slide (3). The barrier is set to maximally open position only when material is being unloaded from the tank.
When the tank is empty, switch off „Unloading" function on the control panel and turn off the engine. Lower the spreading system to working position and set belt conveyor barrier to proper position.

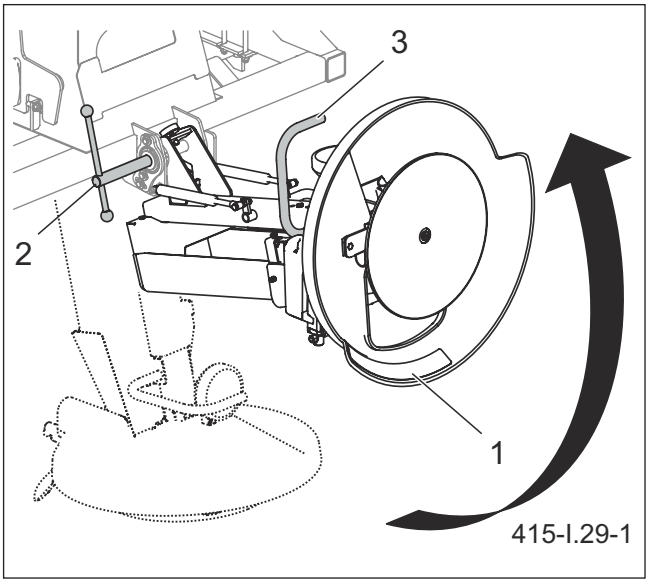


Figure 5.27 Raising the spreading mechanism
(1) spreading mechanism (2) clamp bolt
(3) grip

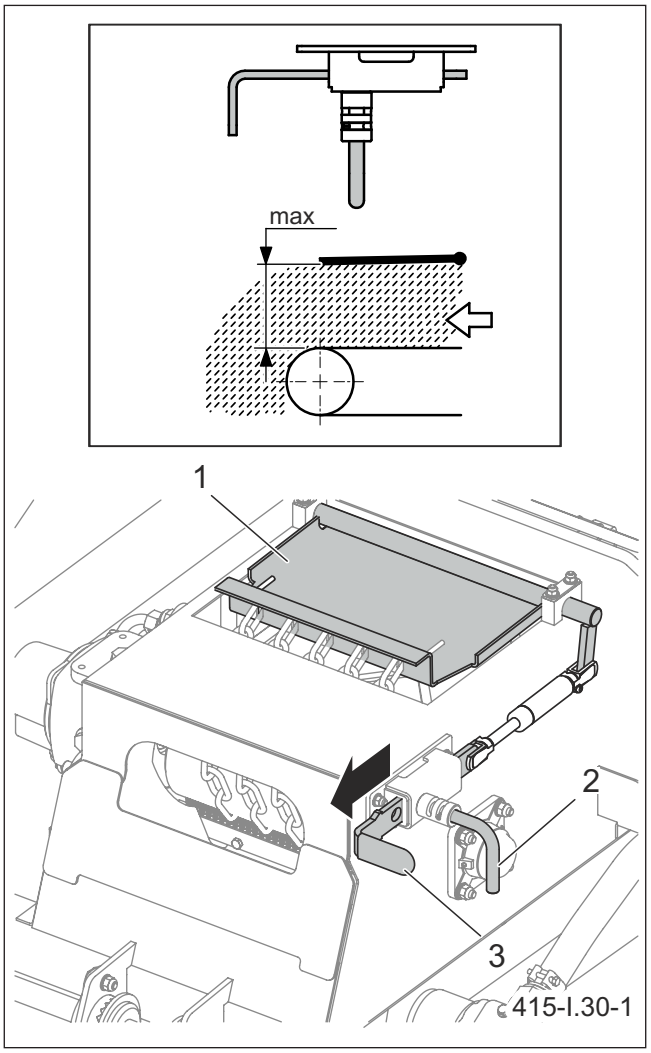


Figure 5.28 Setting the belt conveyor barrier for unloading
(1) barrier (2) locking pin
(3) slide

EMPTYING BRINE TANKS

Before dismounting the sand spreader from the carrying vehicle's load platform and before repairs of spray system, empty the brine tanks.

To empty the brine tanks proceed as follows: (figure 5.29):

- prepare a container for brine,
- set valve lever (1) in position (B),
- unscrew plug (2) and connect proper drain hose to connection (3),
- set valve lever (1) to position (A) and start emptying the tanks,
- brine level is checked on brine level indicator (4) located on the tank,
- after emptying the tanks, set lever (1) to position (B),
- disconnect drain hose from connection (3) and tighten drain plug (2).

ATTENTION

Before unscrewing plug (2), make sure that valve lever (1) is in position (B) (figure 5.29).

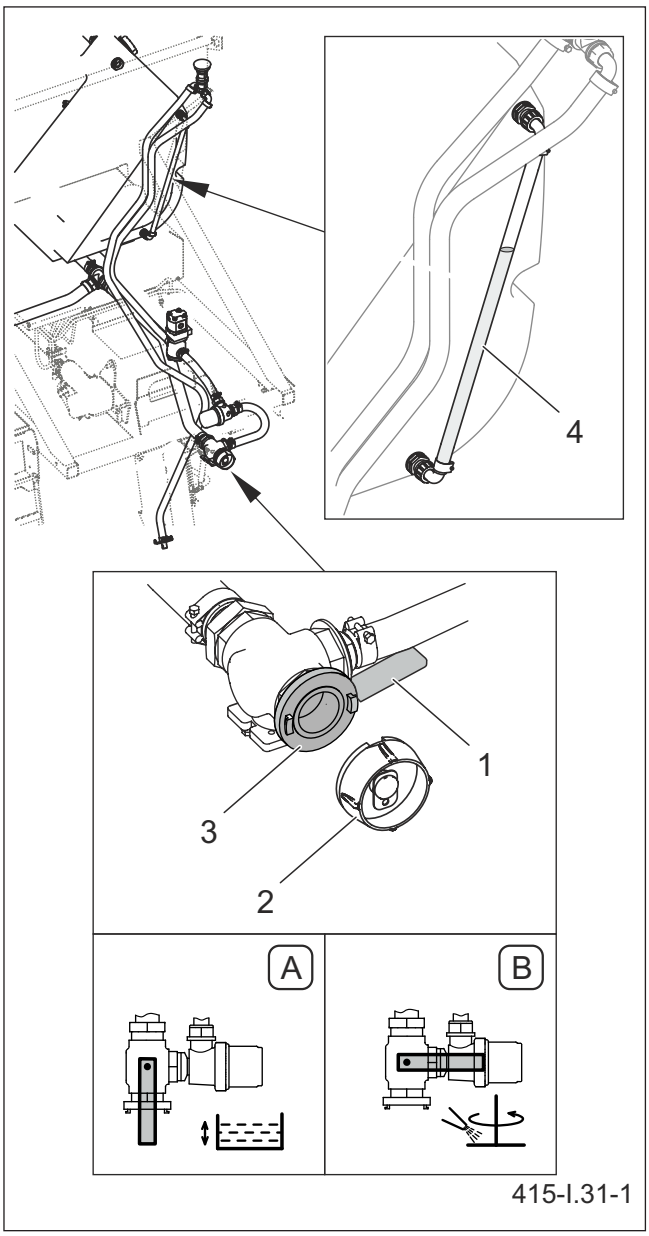


Figure 5.29 Emptying brine tanks
(1) valve lever (2) valve plug
(3) STORZ 52C valve connection (4) brine level indicator
(A) valve in „filling/emptying" position
(B) valve in „brine spraying" position

I.2.4.415.08.1.EN

5.9 DISMOUNTING THE MACHINE FROM THE CARRYING VEHICLE'S LOAD PLATFORM

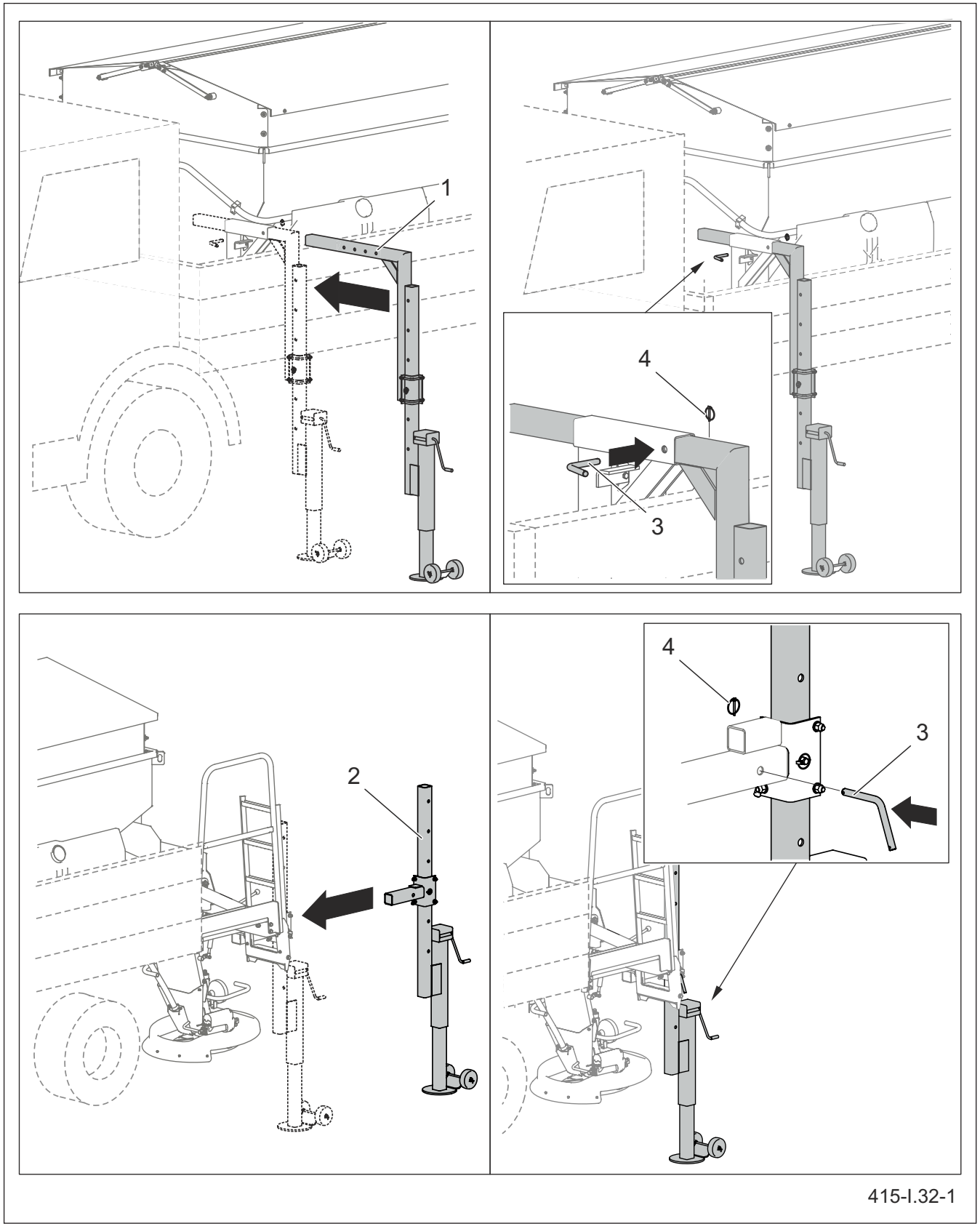


Figure 5.30 Installing the parking stands
(1) front parking stand *(2) rear parking stand* *(3) pin* *(4) linchpin*

DANGER

Before dismounting the machine from the carrying vehicle's load platform, turn off the vehicle's engine, engage the parking brake and secure the vehicle's cab against access of third persons.
Exercise due caution when dismounting the machine.

ATTENTION

Before dismounting the machine from the carrying vehicle's load platform , the spreading material tank and the brine tanks should be completely emptied.

Machine dismounted from the carrying vehicle must be placed on parking stands, on level, sufficiently hard surface in such a manner as to ensure that it is possible to connect it again.

To dismount the machine from the carrying vehicle's load platform proceed as follows:

- Place the carrying vehicle's load platform in the area where the machine is to be stored.
- Disconnect control panel and electric leads.
- Remove straps fastening the machine to the carrying vehicle's load platform.
- Install front (1) and rear (2) parking stands (figure 5.30) and lock them using linchpins (3) and cotter pins (4).
- Raise the parking stands uniformly by means of height adjustment mechanism.
- When the sand spreader is completely raised above the carrying vehicle's load platform, drive the carrying vehicle away from the machine.

I.2.4.415.09.1.EN

SECTION 6

PERIODIC INSPECTIONS MAINTENANCE

6.1 PERIODIC MAINTENANCE SCHEDULE

Table 6.1. Expected periodic inspections of the machine

Inspection	Description	Inspection conducted by
A	Inspection conducted daily before the first start or every 10 hours of continuous operation in shift mode.	User.
B	Inspection performed every 50 hours of engine operation. Before commencing work, perform also all the activities included in the scope of daily inspection.	User.
C	Inspection performed every 250 hours of engine operation. Before starting work, also perform all inspection steps every 50 hours of operation.	Warranty Service.
D	Inspection performed every 500 hours of engine operation.	Warranty Service.
E	Inspection performed every 1000 hours of engine operation. Before starting work, also perform all inspection steps every 50 and 350 hours of operation.	Warranty Service.
F	Inspection performed every 3000 hours of engine operation. Before commencing work, perform also all the activities included in the scope of inspections conducted every 50, 250, 500 and 1000 working hours.	Warranty Service.
G	Inspection conducted every 4 years of the machine use.	Warranty Service.
H	Inspection should be conducted as needed.	User.
I	Inspection carried out right after the end of the season	User.

During the warranty period, C, D, E, F and G inspections are performed by a manufacturer service point. After the warranty period, we recommended that these inspections should be performed by specialised workshops.

The A, B, H and I inspections are performed by the machine operator according to the schedule.

Having performed the machine inspections described below, also carry out the scheduled engine inspection - see table *"Engine maintenance schedule"*.

DANGER

Make sure the machine is secured against unauthorized start-up.

Table 6.2. Machine inspection schedule

Description of activities	A	B	C	D	E	F	G	H	I
Check fuel level and refuelling [6.5]	●								
Check hydraulic oil level and add hydraulic oil [6.6]	●								
Inspect rollers and conveyor belt [6.7]	●								
Checking tension and adjusting the conveyor belt [6.8]								●(3)	
Inspect and replace of conveyor belt brushes [6.10]								●(3)	
Replacement of conveyor belt brushes								●	
Inspect spreading disc [6.11]	●								
Inspect the hydraulic system [6.12]	●								
Check technical condition of electrical system [6.13]	●								
Inspection of tightening torque of nut and bolt connections [6.15]		●							
Draining water from fuel tank [6.16]			●						
Check the battery [6.17]		●(1)	●(2)						
Battery charging [6.18]								●	
Replace the battery [6.19]								●	
Clean brine filter [6.20]								●(3)	
Change hydraulic oil				●(2)					
Replacement of hydraulic oil filter				●(2)					
Checking oil level in conveyor drive transmission			●(2)						
Changing oil in the conveyor drive transmission				●(2)					
Replace hydraulic lines [6.23]							●		
Post-season inspection [6.24]									●
Lubrication – according to a separate schedule									

(1) - first time

(2) - or every 12 months depending on which occurs first

(3) - at least once a month

J.2.4.415.01.1.EN

6.2 CHECK FUEL LEVEL AND REFUELLING

- Switch on power supply of the control panel by means of the main switch.
- If the yellow "*Low fuel level*" indicator (4) (FIGURE 6.1) lights up on the control panel display, add fuel to the fuel tank.

In order to fill the fuel tank it is necessary to:

DANGER

Be especially careful when refuelling.
Be careful of static electricity.
Fuel is a flammable material. Never refuel the machine when smoking or near open flames or sparks.

- clean the surface around the filler plug (2) to prevent dirt from getting into the tank (1) and contaminating fuel,
- Unscrew the filler cap (2) and add fuel.

  It is advisable to use a funnel to prevent fuel from spilling out.
- in case of fuel spill, wipe the spilt fuel carefully and tighten the filler plug.

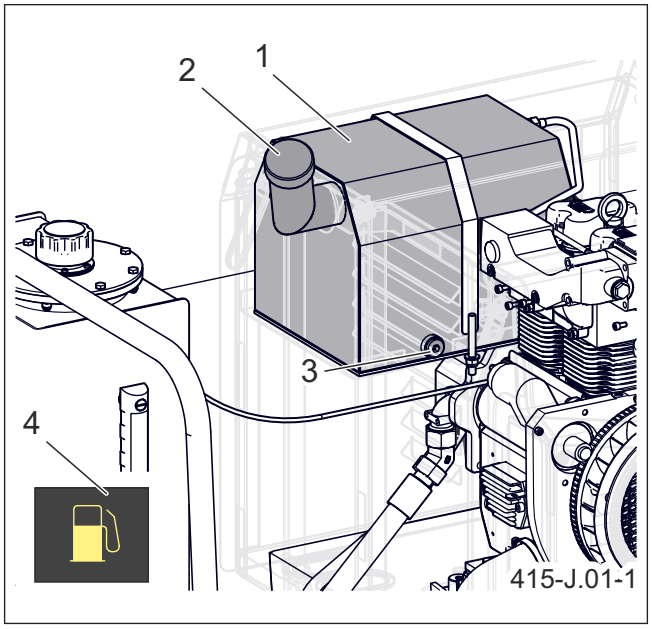


Figure 6.1 Check fuel level
(1) fuel tank *(2) oil filler plug*
(3) fuel drain plug (yellow) *(4) "Low fuel level" indicator*

IMPORTANT

Lost or damaged plug should always be replaced with an original replacement plug
Never remove the plug or refuel when the engine is running.
Use diesel fuel that meets the requirements of the engine specification.
Do not use contaminated Diesel oil or Diesel oil mixed with water, because it may cause a serious damage to the engine.
Do not fill the fuel tank completely. Allow space for fuel expansion.

J.2.4.415.02.1.EN

6.3 CHECK HYDRAULIC OIL LEVEL AND ADD HYDRAULIC OIL

- Check hydraulic oil level on the oil level indicator (2)

  Proper oil level is indicated by the black mark.
- If oil level is too low, unscrew filler plug (3) and add oil.
- Tighten the cap.

IMPORTANT

Check oil level and add oil when the engine is in a horizontal position.
Oil level should be halfway up the indicator scale on the tank casing.

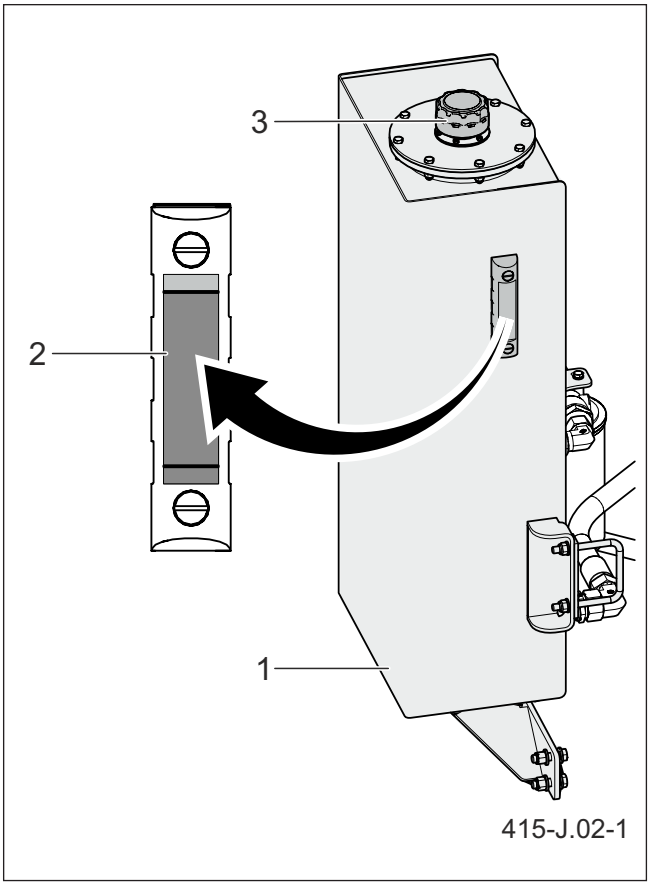


Figure 6.2 Check hydraulic oil level
(1) oil tank *(2) indicator*
(3) filler plug

J.2.4.415.03.1.EN

6.4 INSPECT ROLLERS AND CONVEYOR BELT

Exercise due care and keep a safe distance from working machine while checking guidance of conveyor belts. The inspection involves checking whether the moving conveyor belt tends to shift laterally. If it does, first make certain that the rollers (the drive and tensioning roller) are clean. You can check if the rollers are dirty and possibly clean them only when the conveyor drive switched off and the machine engine is off. After cleaning, check again whether the belt guidance is correct. If the belt still tends to shift outwards, adjust the rollers.

IMPORTANT

Remember to regularly check that the conveyor belt is clean. Contamination of rollers is the most common cause of belt and bearing failures.
Check the conveyor belt guidance every day. Adjust the conveyor belt, if it is not positioned centrally on the tensioning and drive roller.

J.2.4.415.04.1.EN

6.5 CHECKING TENSION AND ADJUSTING THE CONVEYOR BELT

The conveyor belt tends to stretch during normal machine operation. This is a normal phenomenon. Regularly check conveyor for correct operation.

If the conveyor belt slips on the drive roller, adjust the belt tension. If the belt does not move centrally on the rollers, adjust the conveyor rollers.

ADJUST CONVEYOR BELT TENSION

Conveyor belt may only be tightened when the conveyor drive is off. Conveyor belt is tightened by means of bolts (1) and (2) located on the front wall of the tank (Figure 6.3). Turn both bolts (1) and (2) clockwise. To avoid shifting the belt sideways to the edge of the roller, turn both bolts by the same number of rotations.

ADJUST THE TENSION ROLLER

IMPORTANT

Excessive belt tension may damage the bearings and the rollers.

Before starting the conveyor belt adjustment (Fig. 6.3), unscrew bolts (4) and (5) and remove cover (3).

- Start the sand spreader's engine.
- Activate "Unloading" function in "Counters" menu on the control panel.

  A detailed description can be found in the UNLOAD section.
- Conveyor belt is adjusted during conveyor operation by means of tensioning bolts (1) and (2) located on the front wall of the tank.

  Depending on shifting of conveyor belt, choose the rotation direction of tensioning bolts (1) and (2).
- During the adjustment, make one turn of each bolt and wait for some time to see the effect of the adjustment. Continue adjustment until the conveyor belt is positioned centrally on the conveyor roller.

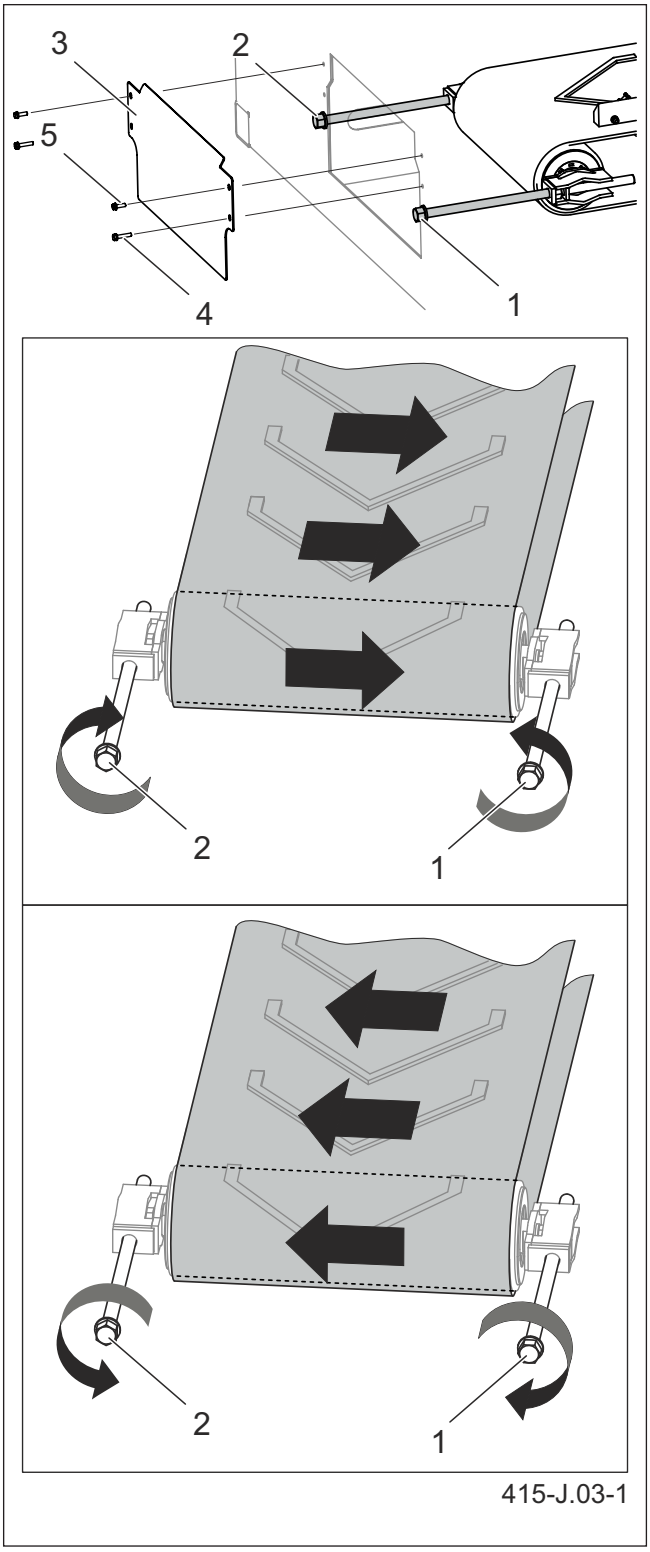


Figure 6.3 Adjust the tension roller
(1)(2) adjustment bolts *(3) cover*
(4) M6x30 bolt *(5) M6x20 bolt*

DANGER

Adjust the belt when the machine is parked and the conveyor drive turned off Be especially careful when making the adjustment.

ADJUST THE DRIVE ROLLER

If the conveyor belt is shifted sideways to the edge of the conveyor drive roller, adjust the roller as needed. The adjustment is made only on one side of the conveyor (Figure 6.4) using bolt (2) by changing the position of the roller drive transmission bracket.

- Start the sand spreader's engine.
- Activate "Unloading" function in "Counters" menu on the control panel.

  A detailed description can be found in the UNLOAD section.
- Loosen nuts (1) and position the belt in the middle of the roller by means of adjusting screw (2).

  During the adjustment, make one turn of bolt (2) and wait for some time to see the effect of the adjustment. Continue adjustment until the conveyor belt is positioned centrally on the conveyor roller.
- When adjusted, turn off the conveyor drive, stop the engine and tighten the nuts (1).

TIP

In new sand spreaders and when replacing the conveyor belt, adjust the conveyor belt tension using the torque of 15Nm. During normal operation of the machine, adjust the conveyor belt tension using the torque of 7 Nm.

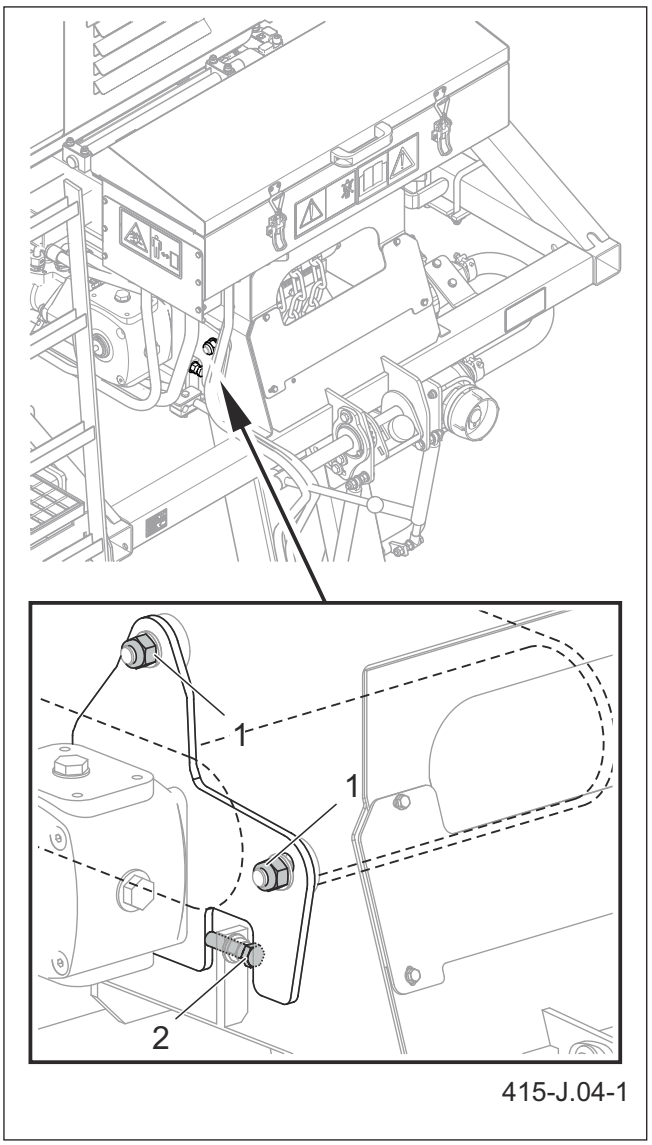


Figure 6.4 Adjustment of drive roller
(1) locking nut *(2) adjusting bolt*

J.2.4.415.05.1.EN

6.6 INSPECT AND REPLACE OF CONVEYOR BELT BRUSHES

DANGER

Before inspection or replacement of conveyor brushes, turn off the carrier vehicle's engine and the sand spreader's engine and secure the vehicle's cab against access of unauthorised persons.

Belt conveyor is equipped with two brushes located under the belt, near the chute. Brushes are used for collecting remains of spreading material from conveyor belt. Degree of wear of brushes should be checked periodically. Brushes should be pressed against the whole width of the lower side of the conveyor belt. In the event of confirmation of wear of the brushes, they must be replaced.

TIP

Regularly check the condition of brushes under the conveyor belt. In the event of confirmation of excessive wear of the brushes, they must be replaced.
The brushes should be inspected at least once a month during the working season.

REPLACEMENT OF CONVEYOR BELT BRUSHES

- Unscrew bolts (3) and remove clamping strip (2).
- Remove worn or damaged brush (1) and replace it with a new one.
- Set the brush in parallel to the belt.
- Assemble the complete unit performing the above activities in reverse sequence.
- Replace the second brush in the same way.

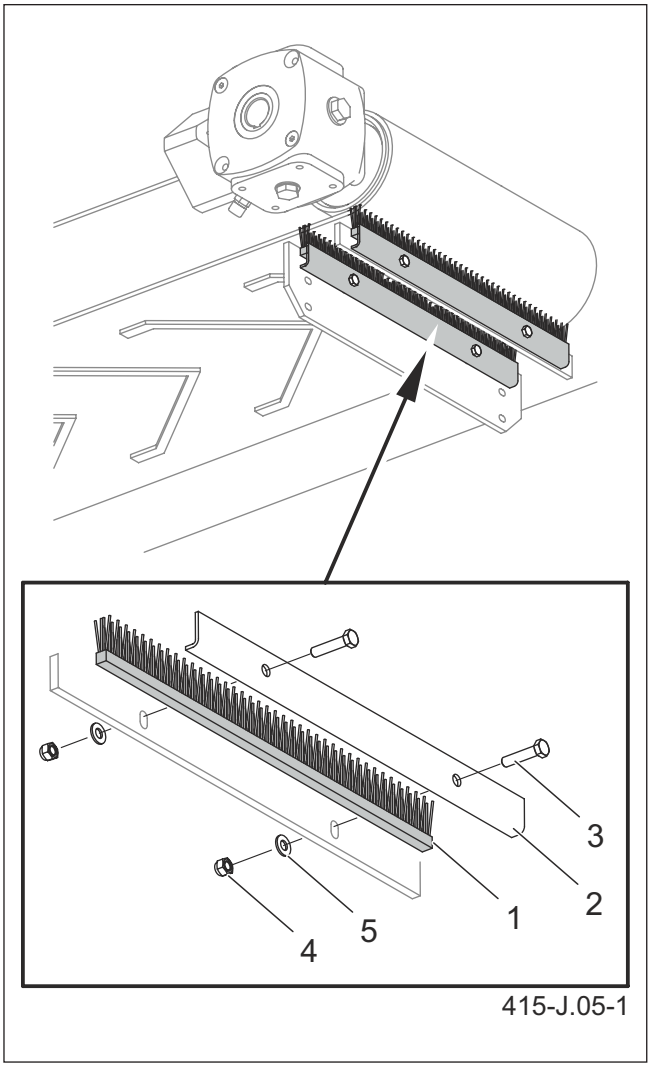


Figure 6.5 Replacement of conveyor belt brushes
(1) brush *(2) clamping strip*
(3) bolt *(4) nut*
(5) washer

TIP

Belt conveyor is equipped with two replaceable brushes with the length of L= 410 mm, part number STL4999-255662, located under the drive roller.

J.2.4.415.06.1.EN

6.7 INSPECT SPREADING DISC

DANGER

Spreading disc blades may be checked and replaced only if the machine is switched off and secured.

Technical condition of spreading mechanism disc blades should be checked periodically paying attention to mechanical damage, excessive wear and completeness of securing elements.

REPLACE SPREADING DISC BLADES

- Unscrew nuts (3).
- Remove bolts (2) and washers (4).
- Replace blades (1) with new ones, check condition of bolts and nuts, if necessary replace,
- Install in reverse order.

Table 6.3. The list of working components of spreading disc

Item	Name / Part No.	Number of items
1	Blade / 402-005-000801	6
2	Bolt / 324-500-001312	12
3	Nut / 324-200-000411	12
4	Washer / 324-300-000274	12

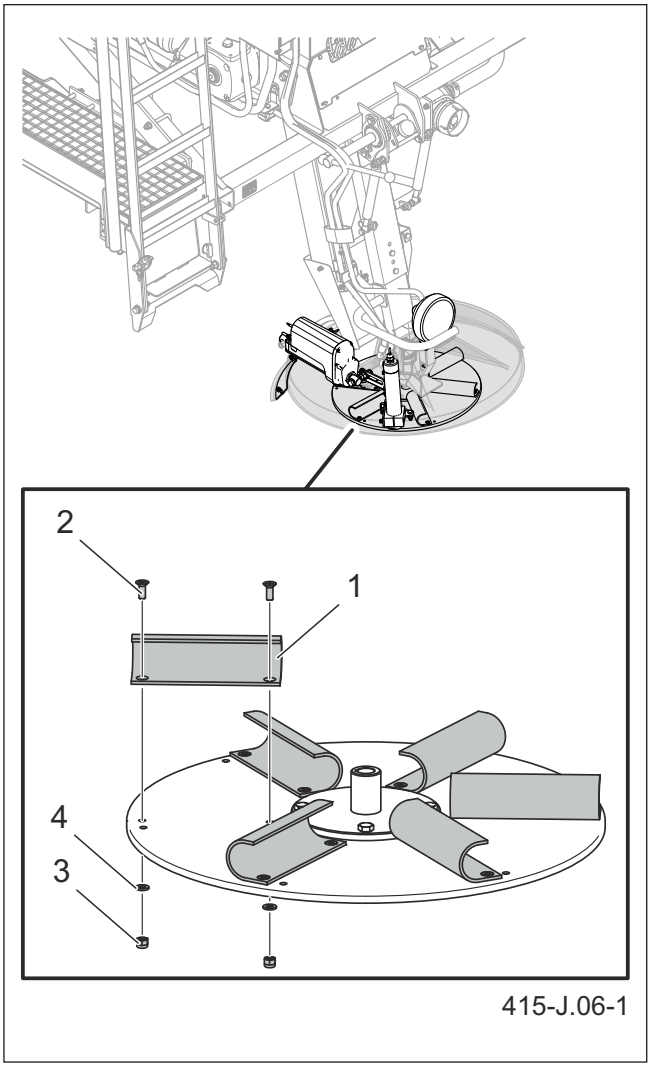


Figure 6.6 Replace spreading mechanism disc blades
(1) blade *(2) bolt*
(3) nut *(4) washer*

J.2.4.415.07.1.EN

6.8 INSPECT THE HYDRAULIC SYSTEM

IMPORTANT

Before starting work, visually inspect the hydraulic system components.

Hydraulic system maintenance duties:

- visual inspection of tightness of hydraulic pumps, motors and connections,
- check the technical condition of lines;
- visual inspection of hydraulic connections.

In the event of contact of oil with skin wash the place

DANGER

Do not repair hydraulic system on your own. All hydraulic system repairs must be performed only by suitably qualified personnel.

DANGER

During work on hydraulic system, use the appropriate personal protection equipment i.e. protective clothing, footwear, gloves and eye protection. Avoid contact of skin with oil.

DANGER

Oil fires should be quenched with carbon dioxide (CO_2), foam or extinguisher steam. Do NOT use water for fire extinguishing!

of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene). Contaminated clothing should be changed to prevent access of oil to skin. In the event of contact of oil with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor.

Spilt oil should be immediately collected and placed in a marked tight container. Used oil should be taken to the appropriate facility dealing with recycling or regeneration of oils.

The hydraulic system must be tight. Replace any leaking or damaged seals of pumps and hydraulic cylinders. If leaks appear at connections then try to tighten

IMPORTANT

Do NOT use the machine if the hydraulic system is unreliable.
The hydraulic system is under high pressure when operating.
Regularly check the technical condition of the hydraulic lines and connections.
The hydraulic system is filled with L-HL-32 hydraulic oil.

the connections. Tightening torques for hydraulic lines are given in the table "*Tightening torques for hydraulic hose terminations.*" If the leak at connections is not removed, replace conduit, connector and seals (depending on place of leakage). Hydraulic oil leaks may occur also in rubber lines, as a result of their delamination or abrasion. A conduit must be replaced with a new one.

Table 6.4. Hydraulic line terminal tightening torque

Line size	Torque
DN	[Nm]
6	30÷50
8	30÷50
10	50÷70
13	50÷70
16	70÷100
20	70÷100
25	100÷150
32	150÷200

TIP

Bleeding of the hydraulic system is not required during normal operation of the conveyor.

TIP

The condition of hydraulic system should be inspected regularly while using the machine.

J.2.4.415.08.1.EN

6.9 CHECK TECHNICAL CONDITION OF ELECTRICAL SYSTEM

DANGER

Do not repair electric system on your own. All electric system repairs must be performed only by suitably qualified personnel.

IMPORTANT

Before beginning work on electrical system, disconnect the machine from power source (disconnect power wire from the carrier vehicle and the wires connecting battery with engine).

The service of the electrical system involves periodic inspection of the operation of the control system as well as the lighting system.

In case of bulb burnout in beacon light or fog light, replace the bulbs. The list of bulbs is presented in the table "*List of lighting components*."

In the event of a fault in the electrical system, check the fuses. Fuses and relays are located in hydraulic unit enclosure under a cover. Remove a blown fuse from the holder and replace it with a new one. The list of fuses is presented in the figure and the table "*Fuses*."

Table 6.5. List of lighting components

Lamp type	Bulb type	Quantity [item]
Beacon light beacon 2RL-007 550-021	H1, 70W 24V	1
Fog lamp M56 red 56/03/01	BA15S P21W 24V	1

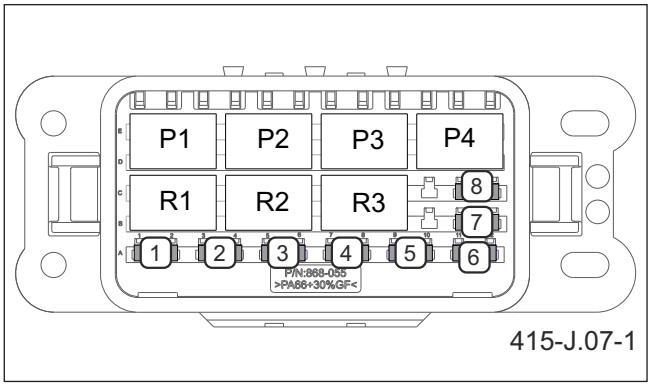


Figure 6.7 Fuses

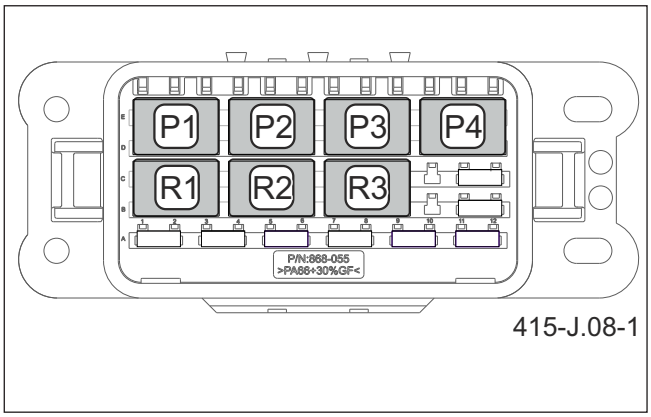


Figure 6.8 Relays
(P1, P2) Electric spreading direction adjustment cylinder relay
(P3) tail lamp relay
(P4) beacon light relay
(R1) engine start relay - option
(R2) engine stop relay - option
(R3) Relief valve power relay

TIP

Relays (P1), (P2) - Micro 280 10 / 15A 24V
Relays (P3), (P4), (R1), (R2), (R3) - Micro 280 15A 24V

Table 6.6. Fuses

Marking (figure 6.7)	**Protected circuit**	**Fuse**
1	Power supply of control panel	MINIVAL 5A
2	Power supply of extension module and sensors (RCE12-4/22)	MINIVAL 3A
3	Power supply of main controller (RC2-2/21)	MINIVAL 3A
4	Power supply of extension module and relays (RCE12-4/22)	MINIVAL 20A
5	Power supply of main controller (RC2-2/21)	MINIVAL 3A
6	Power supply of sensors (RC2-2/21)	MINIVAL 3A
7	Power supply of sensors (RCE12-4/22)	MINIVAL 2A
8	Power supply of engine start/stop relays (option)	MINIVAL 15A

J.2.4.415.09.1.EN

6.10 INSPECTION OF TIGHTENING TORQUE OF NUT AND BOLT CONNECTIONS

Table 6.7. Tightening torque for nut and bolt connections

Thread	8.8	10.9	A2-70
	M [Nm]		
M6	10	15	7
M8	25	36	17
M10	49	72	33
M12	85	125	57
M14	135	200	91
M16	210	310	140
M20	425	610	273
M24	730	1,050	472
M27	1,150	1,650	682
M30	1,450	2,100	930

During maintenance or repair work, apply appropriate torque when tightening bolt and nut connections, unless other tightening torque values are given. Recommended tightening torques of the most frequently used bolt and nut connections are given in the table. Given values apply to non-lubricated steel bolts.

If you need to replace the fasteners (bolts, nuts), the lowest allowable strength class is 8.8. Do NOT use nut and bolt connections of a lower strength class.

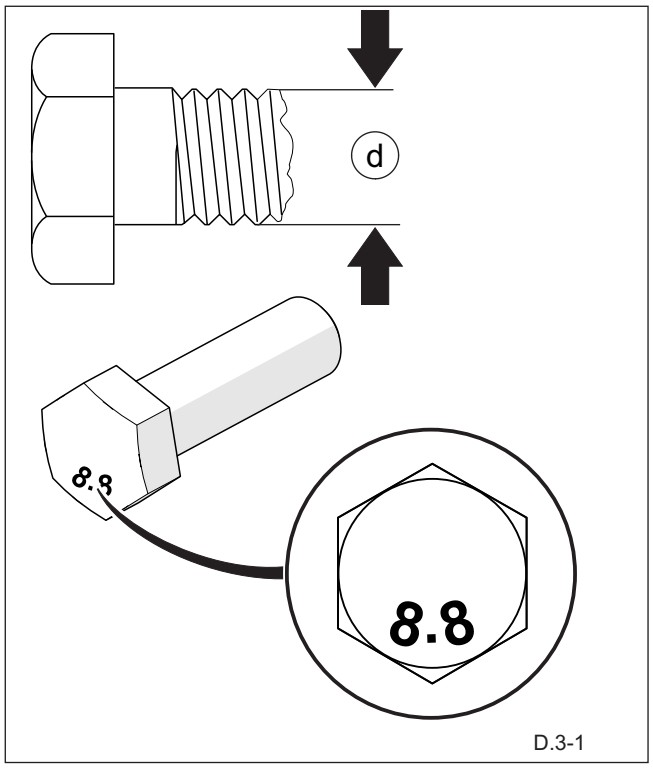


Figure 6.9 Bolt with metric thread
(8.8) resistance class *(d) thread diameter*

J.2.4.415.10.1.EN

6.11 DRAINING WATER FROM FUEL TANK

Contaminated fuel may cause damage to or malfunctioning of the the engine. Fuel tank should be periodically cleaned by draining 1 - 2 litres of fuel.

- Place a container with capacity of at least 2 litres under the fuel drain plug (2).
- Unscrew the fuel drain plug and drain about 1 litre of fuel.
- If fuel is still contaminated, drain another litre of fuel.
- Tighten drain plug.

DANGER

Do NOT approach the tank with an open flame.
Wipe away spilt fuel until dry because it may cause fire.

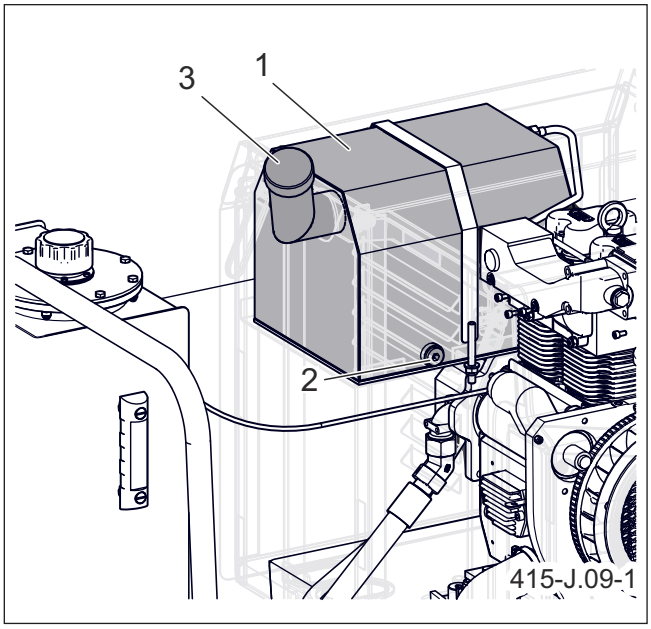


Figure 6.10 Fuel tank
(1) tank *(2) drain plug*
(3) filler plug

J.2.4.415.11.1.EN

6.12 CHECK THE BATTERY

CHECK ELECTROLYTE LEVEL IN THE BATTERY

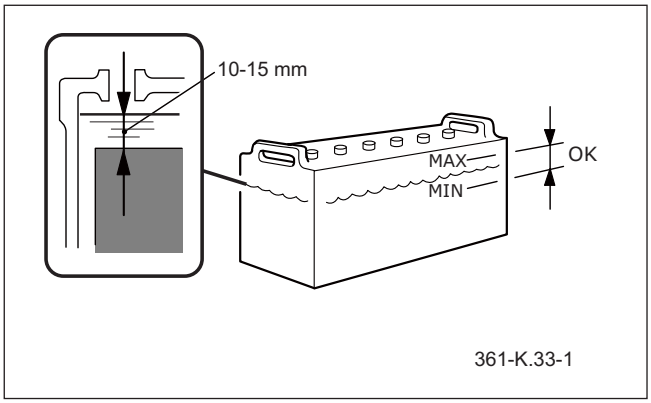


Figure 6.11 Check electrolyte level

Electrolyte evaporates during battery use. Electrolyte level should be between the marks of the upper and lower level or, if there are no marks, electrolyte level should be 10 – 15 mm above the upper part of the battery electrodes. If loss of electrolyte is large, add only distilled water to the battery cells.

The battery in which an excessive loss of electrolyte has occurred may be permanently damaged.

DANGER

Electrolyte contained in the battery is a strongly caustic acid. Wear safety goggles and proper working clothes during battery maintenance.

Before measuring density, carefully read the Operator Manual of the densimeter.

Do not lay tools or other metal items on top of the battery.

CHECK BATTERY CHARGE LEVEL

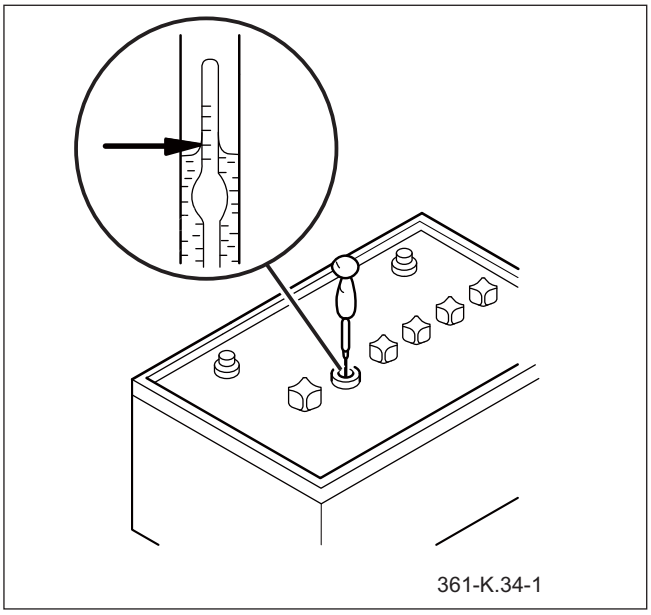


Figure 6.12 Check density of electrolyte

Battery charge level should be checked using available testers or by measuring density of electrolyte.

Electrolyte density should be measured using a densimeter by sampling electrolyte from each battery cell. Density of electrolyte in a properly charged battery should be 1.28 g/cm³ (not more than 1.29 g/cm³). If density of electrolyte is lower than 1.26 g/cm³, charge the battery. Take the measurement at temperature of 25°C.

If the battery connections are sulphated, disconnect the battery leads and clean the sulphated areas with fine sandpaper. Before reconnecting the leads to the battery, grease them with industrial grade petroleum jelly or electrical contact grease.

J.2.4.415.12.1.EN

6.13 BATTERY CHARGING

If the battery is maintenance-free and you cannot check the electrolyte density, check the battery no-load voltage. If voltage drops below 12.5 V, you must charge the battery. The battery should be charged using current with value not higher than 10% of the battery's rated capacity (e.g. 4.5A at capacity of 45Ah). The charging time should be at least 10 hours.

- Disconnect wire (-) from the battery.
- Disconnect wire (+) from the battery.
- Dismantle the battery.
- Place the battery in a well-ventilated place.
- Remove plugs and check level and density of electrolyte.
- If necessary supplement electrolyte with distilled water.
- Check condition of terminals and any obstruction of ventilation openings in caps and clean if necessary.
- Connect wire (+) of the rectifier and then connect wire (-). Set charging current and connect the rectifier to the mains.
- Charge the battery until electrolyte reaches constant density 1.28 g/cm³ or the voltage on the clamps of battery at no load is at least 12.5 V.
- After tightening, protect terminals with industrial grade petroleum jelly.

During operation of the machine note that battery life is affected by many factors. Important factors include:

- technical condition of the alternator,
- tension on vee-belt driving alternator,
- operating temperature.

In the even the mobile conveyor will not be operated for an extended period of time, we recommend to remove the battery and store it in a warm and ventilated room and to periodically check if it is properly charged. Before installing the battery, check the voltage.

DANGER

Do not approach the battery with an open flame during battery charging (or just after charging). Danger of explosion.
Electrolyte contained in the battery is a strongly caustic acid. Wear safety goggles and proper working clothes during battery maintenance.
In case of contact with acid:
- rinse skin with plenty of water,
- rinse eyes with water for about 15-30 minutes and consult a doctor immediately.

Stop battery charging when temperature of electrolyte exceeds 55°C.
Never reverse the positive (+) and negative (-) battery terminals.

IMPORTANT

Ensure proper ventilation when charging battery in a closed building.

J.2.4.415.13.1.EN

6.14 REPLACE THE BATTERY

- Turn the engine off and turn the main switch to OFF position.
- Disconnect wire (-) from the battery.
- Disconnect wire (+) from the battery.
- Dismantle the battery.
- Install a new battery.
- Connect the (+) wire to the battery.
- Connect the (–) wire to the battery.
- Set the main switch to ON position.

IMPORTANT

Avoid short circuits and any contact of live cables with ground. Do not disconnect the battery when the engine is running. The resulting voltage peaks can destroy electronic components.

J.2.4.415.14.1.EN

6.15 CLEAN BRINE FILTER

TIP

Each time before filling the tanks with brine, check and, if necessary, tighten the bolts fixing the tanks to the frame.
It is recommended to maintain such a level of brine as to ensure that the pump is filled with the solution at all times. This prevents corrosion of internal pump components and facilitates suction of fluid in the beginning of spraying.
Brine filter cartridge should be cleaned at least once a month during the working season.
Filter of brine spray system is equipped with a reusable mesh cartridge with part number of C00100036. In the event of damage to the cartridge, replace it with a new one.

Maintenance of brine spray system involves periodical cleaning of filter, checking operation and tightness of the system.

BRINE FILTER CLEANING

- Set valve in position (A) - "filling/emptying".
- Unscrew filter housing (4).
- Remove filter cartridge (3) and wash it in water.
- Install the cartridge and tighten filter housing (4).
- Set valve in position (B) - "brine spraying".

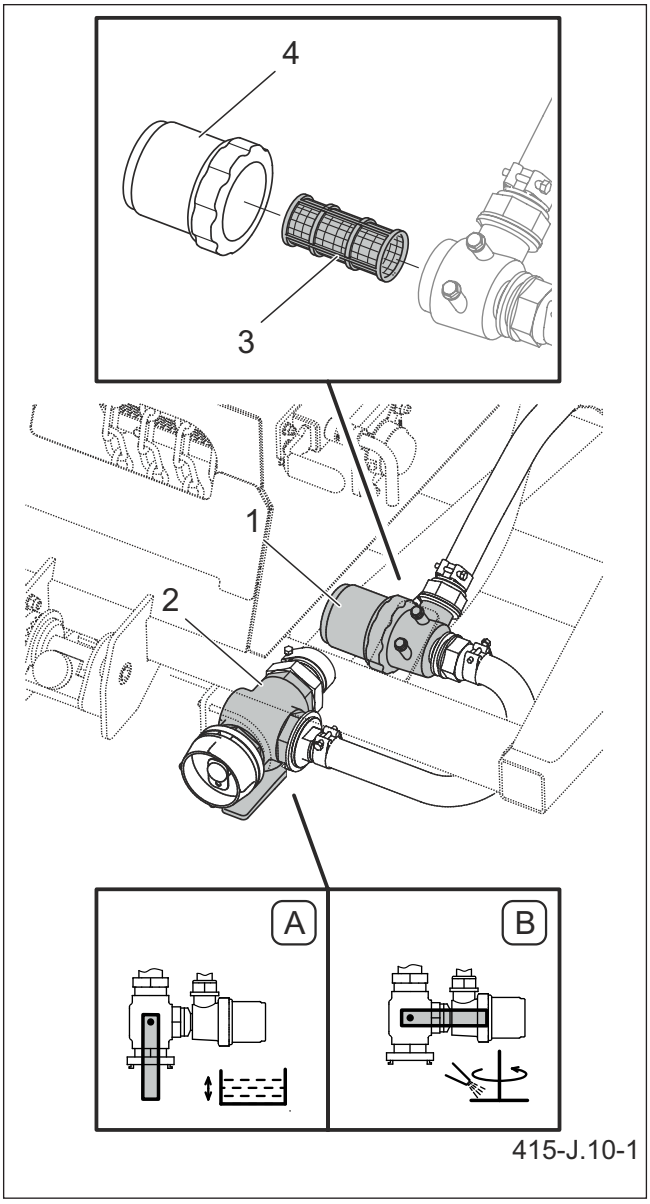


Figure 6.13 Clean brine filter
(1) brine filter cartridge (2) valve (3) filter mesh (4) filter housing
(A) valve in the “filling / drain” position
(B) valve in “brine spray” position

J.2.4.415.15.1.EN

6.16 CHANGE THE HYDRAULIC OIL AND OIL FILTER

Only the authorised service may change the hydraulic oil and filter cartridges during the warranty period.

- Unscrew the filler plug (1) and the oil drain plug (3).
- Drain oil to previously prepared container (about 100 litres).
- Unscrew contaminated filter cartridge (2).
- Clean the surface where the filter cartridge and filter body join.
- Apply a little oil to the gasket of the new filter.
- Tighten the new filter cartridge.
- Remove the strainer (from under the filler plug) and blow it with compressed air.
- Check the filler plug seal (1), confirm that vent openings in the plug are not blocked. Tighten the plug.
- Pour new oil into the tank until oil reaches the required level marked on the indicator located on hydraulic system tank.
- Used hydraulic oil should be disposed of according to local regulations.

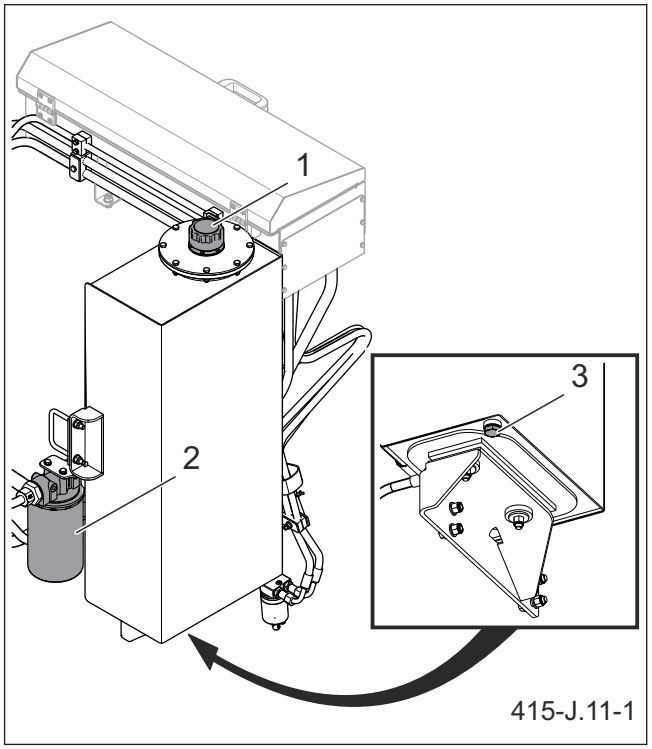


Figure 6.14 Change oil and oil filter
(1) filler plug with filter cartridge
(2) replaceable filter
(3) oil drain plug

TIP

Installed in the hydraulic system is a replaceable filter cartridge, part number CCA301FD1.
Replace oil filter cartridge every 500 engine working hours or once a year.

J.2.4.415.16.1.EN

6.17 CHECKING OIL LEVEL AND CHANGE OIL IN CONVEYOR DRIVE TRANSMISSION

DANGER

When checking oil level and changing oil, use the suitable personal protection equipment i.e. protective clothing, footwear, gloves eye protection. Avoid contact of skin with oil.

Maintenance of belt conveyor drive transmission involves periodical checking of oil level and changing oil.

CHECK OIL LEVEL

- set the machine horizontally,
- unscrew inspection plug (3),
- oil level should reach the lower edge of the inspection plug opening (3),
- if necessary, add oil through filler opening (1) to the required level.

OIL CHANGE

- Unscrew filler plug (1),
- Unscrew drain plug (2) and drain oil to a previously prepared container.
- Tighten drain plug (2) and pour new oil through filler plug opening (1).
- Check that air vent in filler plug (1) is not blocked, if necessary clean the air vent.
- Tighten filler plug (1).

Used oil should be taken to the appropriate facility dealing with recycling or regeneration of oils.

If a leak is noticed, carefully inspect seals and check oil level. Operating the transmission with insufficient amount of oil or without oil may cause permanent damage.

During the warranty period the transmission may only be repaired by the authorised service.

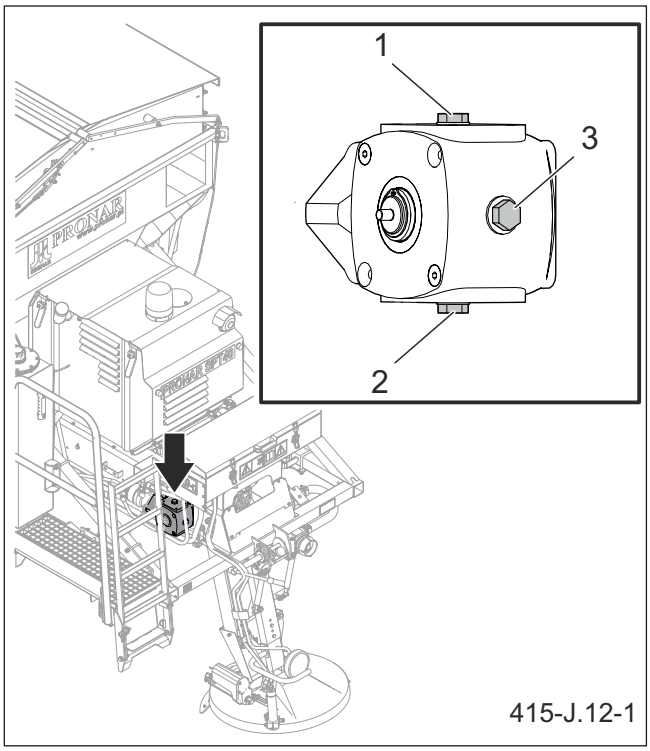


Figure 6.15 Inspect and replace oil in the gearbox
(1) oil filler plug (2) drain plug
(3) inspection plug

TIP

It is recommended to check oil in the belt conveyor drive transmission before commencing the working season but no less frequently than every 250 engine hours. Change oil every 500 hours of operation or once a year, depending on which occurs first and when the transmission is repaired.

To lubricate the belt conveyor drive transmission use 0.6 L grade SAE 90 EP transmission oil.

J.2.4.415.17.1.EN

6.18 REPLACE HYDRAULIC LINES

Rubber hydraulic lines must be replaced every 4 years regardless of their technical condition. The replacement should be entrusted to specialist repair workshops. Information concerning hydraulic lines can be found in the spare parts list.

IMPORTANT

Flexible hydraulic lines must be replaced every 4 years due to their working characteristics and material (ageing, high pressure, variable loads).

J.2.4.415.18.1.EN

6.19 POST-SEASON INSPECTION

In the winter season spreader operation is usually short, but intensive, followed by a long storage period. The post-season inspection, carried out immediately after the completion of winter road maintenance, will allow you to keep the machine in its best technical condition before the next season.

This inspection covers the following:

- machine cleaning
- machine maintenance,
- Secure the machine.

PROCEDURE

- Thoroughly clean and wash the machine.

  See CLEAN THE MACHINE, CLEAN THE ENGINE, CLEANING THE BRINE FILTER.

- Inspect the machine, inspect technical condition of individual components. Repair or replace any used or damaged components.
- Paint defects must be cleaned of rust and dirt, thoroughly degreased, and then preserved by applying anti-corrosive agents to the work surfaces.
- Lubricate and maintain the machine each time after washing.

  Lubricate the machine according to the schedule and apply a thin layer of grease or other preservative to all metal surfaces that are not painted (especially working elements). Do not use old oils and greases for maintenance.

- Machine should be kept in closed or roofed building.

  See STORAGE.

TIP

Proper machine maintenance and storage improve durability.

J.2.4.415.19.1.EN

6.20 MACHINE CLEANING

DANGER

Carefully read the instructions for application of detergents and maintenance preparations. While washing with detergents, wear appropriate protective clothing and goggles protecting against splashing.
Disconnect the battery before cleaning.

- The machine should be cleaned as needed. Before using the pressure washer the user is obliged to acquaint himself with the operating principles and recommendations concerning safe use of this equipment.
- Before washing carefully clean the machine, pay special attention to accumulation of spreading material on the inner side of the conveyor belt near the tensioning roller.
- Use only clean running water. Cleaning detergents with neutral pH may be used, which do not react aggressively with the mobile conveyor's structural elements.
- The use of pressure washers increases the effectiveness of washing, but be careful when working. During washing, the washer nozzle may not be placed closer than 50 cm from the cleaned surface.
- Water temperature should not exceed 55°C.
- Do NOT wash the internal combustion engine with a pressure washer.
- Do not direct water jets directly at system elements and equipment i.e. control valves, bearings, hydraulic cylinders, electric and hydraulic plugs, lights, electrical connections, information and warning decals, identification plate, conduit connections, lubrication points, control panels, safety switches, etc. High pressure water jets may get inside the machine and cause mechanical damage or corrosion.
- For cleaning and maintenance of plastic coated surfaces, use clean water or special preparations designed for this purpose.
- Do not apply organic solvents, preparations of unknown origin or other substances, which may cause damage to lacquered, rubber or plastic surfaces. In the event of doubt it is recommended to make a test on an unseen surface area.
- Surfaces smeared with oil or grease should be cleaned by application of white spirit or other degreasing agents and then washed with clean water with added detergent. Follow the cleaning agent manufacturer instructions.
- Detergents should be kept in original containers, optionally in replacement containers, but very clearly marked. Preparations may not be stored in food and drink containers or in unmarked containers.
- Ensure flexible lines and seals are clean. The plastic from which these elements are made may be susceptible to organic substances and some detergents. As a result of long-term reaction of some substances, the ageing process may be accelerated and risk of damage increased. Rubber elements should be maintained with the aid of special preparations after previous thorough washing.
- Rubber components should be washed with warm soapy water or 10% glycerol alcohol mixture. You can also use liquid ammonia (do not use diesel oil, gasoline, turpentine or similar solvents).
- Clean the chains with a brush and kerosene, preserve with graphitized grease diluted with kerosene or gasoline, applying the mixture with a brush to the chain links.
- Observe the rules of environmental protection and wash the machine in a place designed for this purpose.
- Washing and drying the machine must take place at temperature above 0°C.
- Electronic components and control panel may be cleaned only with a soft cloth.
- Lubricate and maintain the machine each time after washing.

J.2.4.415.19.1.EN

6.21 STORAGE

- After finishing work, clean the machine thoroughly.
- After cleaning, inspect the whole machine, inspect technical condition of individual elements. Repair or replace any used or damaged components.
- In the event of damage to the paint coat, clean rust and dust from damaged area, degrease and then paint with undercoat and after it is dry, paint with topcoat, retaining uniform colour and thickness of the protective coating. Until the time of touch-up painting, the damaged place may be covered with a thin layer of grease or anticorrosion preparation.
- The sand spreader's tank should be emptied and covered with tarpaulin cover.
- If the machine will not be used for a long time, protect it from adverse weather conditions, especially those which initiate corrosion of steel, have aggressive impact on anticorrosion coating and accelerate ageing of conveyor belt.
- In the event of a prolonged storage, it is essential to lubricate all components regardless of the date of the last lubrication.

IMPORTANT

Remains of material containing salt cause quick corrosion of metal parts.
If the machine is not be used for a long time, start the sand spreader's engine once a month for 20 minutes and switch the engine speed from low to high ten times.

- It is recommended that the machine be stored in a closed or roofed room (cool and dry), where it is not exposed to sunlight and away from heating devices.
- Loosen the conveyor belt on the tensioner.
- The machine must be secured for storage so that operating components and hydraulic lines (especially flexible lines) do not remain under pressure.
- When the machine is in storage for an extended period, disconnect the control panel and ignition switch from the machine, remove the battery and periodically check its charge level. If you need to charge the battery. Do not allow the battery to fully discharge.

J.2.4.415.20.1.EN

6.22 TROUBLESHOOTING

Table 6.8. Troubleshooting

Fault (Alarm)	Possible cause	Solution
Control panel is not working	Main switch of control panel is off	Turn on the main switch (power supply)
	Electric wire is disconnected from control panel	Connect the power supply to control panel
	Burnt out fuse	Replace
	No contact in electrical connections	Clean or replace a connection
Belt conveyor does not move or does not move smoothly	Oil level in carrier vehicle hydraulic system is too low	Check and add oil if necessary
	Too slack belt is slipping on drive roller	Adjust according to the Operator Manual
	Hydraulic system is damaged	Repair *
	Damaged transmission of conveyor belt drive	Repair *
Hydraulic system malfunction	Oil level in carrier vehicle hydraulic system is too low	Check and add oil if necessary
	Leakage in hydraulic system	Check and correct the fault
Spreading disk malfunction	See "Hydraulic system malfunction"	See "Hydraulic system malfunction"
	Damaged hydraulic motor of spreading disc drive	Repair *
Brine spray system does not work	Brine level in tanks is too low	Check brine level on the brine level indicator, supplement brine.
	Brine valve is set in “fill/drain” position	Set the valve in “brine spray” position
	Oil level in the system is too low	Check oil level in the carrier vehicle's system, add oil if necessary.
	Leakage in hydraulic system	Check and correct the fault
	Clogged brine filter	Check and clean if necessary
	Brine pump drive damaged	Repair *
	Leakage in hydraulic system	Check and correct the fault
Lights do not work	Burned-out bulb	Replace
	Damaged relay	Replace
Low hydraulic oil level.	Loss of oil	Check hydraulic system for tightness, check condition of hydraulic lines and connections
High temperature of hydraulic oil	Faulty temperature sensor	Replace
	Faulty pump	Check and repair the pump *

Fault (Alarm)	Possible cause	Solution
Incorrect spreading of material	Incorrect machine settings	Set the belt conveyor barrier in a manner suitable for a given type of spreading material, conduct a test and correct settings.
	Electrical spreading direction adjusting cylinder is incorrectly set	Check and adjust according to Operator Manual
	Damaged relay in fuse box	Replace
	Damaged spreading disc blades	Replace
** during the warranty period inspections and repairs are carried out be authorised service*		

TIP

Refer to the ENGINE MAINTENANCE / TROUBLESHOOTING chapter for a list of engine faults and remedies (see “Engine Faults and Troubleshooting” table).

J.2.4.415.21.1.EN

6.23 CONSUMABLES

Table 6.9. List of consumables

Place of application - name	Quantity	Number / type / standard
Hydraulic system - hydraulic oil (1)	65 L (2)	L-HL-32
Reduction gear - gear oil	0,6 L	SAE 90 EP
Hydraulic system - oil filter (filter cartridge)	1 pc	AMF301EFD1BB606 (CCA301FD1)
Brine sprinkler system - filter (filter mesh insert)	1	8074008 (C00100036)
Fuel tank - Diesel oil	26 L	PN-EN 590+A1:2010
Grease	-	ŁT-43-PN/C-96134

(1) - oil level should be halfway up the indicator scale on the tank casing.
(2) - oil tank capacity

J.2.4.415.22.1.EN

ENGINE MAINTENANCE

SECTION 7

7.1 GENERAL INFORMATION

Chapter ENGINE MAINTENANCE contains only the technical description of the engine and instructions for starting, operating and maintaining the engine. When operating the engine, observe standards and legal regulations currently in force as well as all internal regulations.

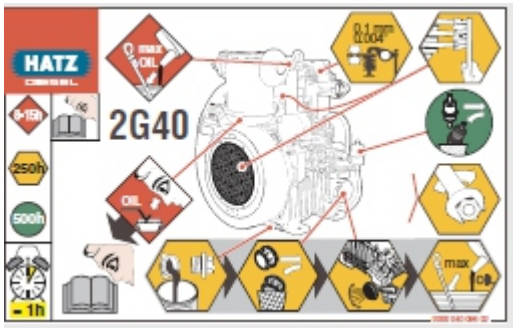
To ensure correct use of the engine, the prescribed inspection and maintenance intervals must be adhered to. Failure to follow the above-mentioned rules will cause damage to the engine.

K2.2.4.415.01.1.EN

7.2 SAFETY RULES DURING ENGINE MAINTENANCE

- Before starting the engine, it is absolutely necessary to carefully read the Operator Manuals of the machine and the engine. This will prevent accidents, enable proper operation and maintenance and thus ensure maximum service life of the engine.
- Before starting the engine, make sure that all required protection devices are installed.
- The engine may be operated, maintained and repaired only by authorized (qualified) people.
- Do not start the engine in closed rooms or in rooms without ventilation system. Exhaust gas is toxic and it may cause loss of consciousness or even death.
- Do not approach the rotating parts of the engine.
- Keep a safe distance from hot elements of the engine. Risk of burn injuries. Keep flammable and explosive materials away from the engine.
- Lost or damaged fuel filler plug should always be replaced with original replacement plug.
- Do NOT remove the fuel filler plug when the engine is running or near an open flame.
- Fuel fumes are very toxic. The fuel producer's instructions must be complied with.
- Only refuel when the engine is switched off.
- Do not fill the fuel tank completely. Allow space for fuel expansion.
- Immediately wipe away spilt fuel and oil. The engine and engine compartment should be kept clean and tidy.
- Do NOT approach the engine with an open flame. There is a risk that fuel fumes or oil will catch fire.
- All maintenance and repair work should be performed only when the engine is stopped, cool and disconnected from power supply. Disconnect the electrical leads from the battery. Ensure unauthorised people have no access to the ignition key.
- While performing maintenance and repair work, use proper, close-fitting protective clothing, gloves, protective shoes, protective goggles and appropriate tools. Do not wear chains or other loose objects that can be easily caught by the engine components.
- Start the engine using only the starting system installed in the machine. The use of electrical bypasses is forbidden.
- The engine is marked with information-warning decals. Follow the instructions on the decals.
- Ensure that the information and warning decals are legible throughout the entire period of the engine use. Clean the decals with clean water or water with a small amount of detergent. If any are destroyed or damaged, they must be replaced with new.
- The applicable regulations for the protection and disposal of used oils, coolants, filters and cleaning agents must be complied with.
- Visually inspect the fuel hoses before starting the engine. Fuel released under high pressure may cause bodily injuries and burns as well as it may cause a fire. Perform technical inspections regularly.
- When performing maintenance work, be particularly aware of condensate from the exhaust system, which may contain sulfuric acid. Sulfuric acid burns are dangerous to health and life. The use of fuels with a sulphur content exceeding 15ppm increases the amount of sulfuric acid. In the event of contact of acid with skin, rinse the place of contact using plenty of clean running water. Immediately take off damp clothing. Consult a doctor.
- Running the engine at no load or at a very low load for a long period may negatively affect its performance. Make sure that the engine load is at least 15%. With such a low degree of the engine power utilization, the engine load should be increased shortly before it is turned off.

Table 7.1. Information and warning decals on the engine

Item	Decal	Meaning
1		Maintenance instructions
2		Only refuel with diesel fuel acc. to the specifications *(see section CONSUMABLES)* Do not use biodiesel
3		The engine may run only on very low sulphur or sulphur-free fuel

K2.2.4.415.02.1.EN

7.3 TECHNICAL DATA AND DESIGN OF ENGINE

ENGINE PARAMETERS

Table 7.2. Basic engine specification

Type		2G40 / 2G40H
Type of engine	-	four-stroke Diesel engine air cooled
Combustion system	-	direct injection
Number of cylinders	-	2
Bore / stroke	mm	92 / 75
Engine displacement	cm^3	997
Oil pressure	Minimum	1.0 bar przy 900 rpm (min^{-1})
Engine oil capacity	L	3,0 (1)
The difference between MAX and MIN marks	L	0,8
Battery power	max. Ah	12V / 88Ah – 24V / 88Ah
Toxicity standard	-	EU Stage V EPA Tier IV

(1) - These values should be treated as approximate. The MAX mark on the oil level indicator is always decisive

ENGINE NAMEPLATE

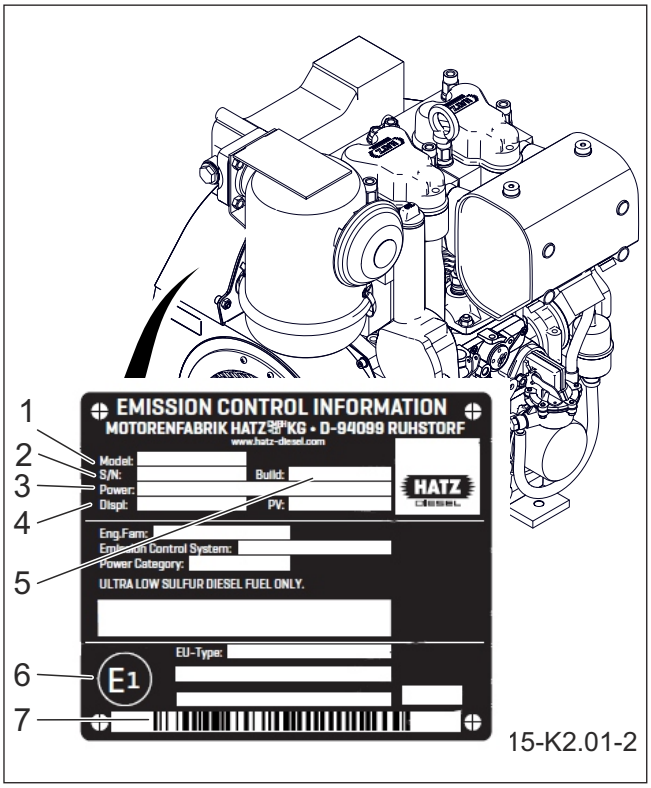


Figure 7.1 Location of the nameplate
(1) engine model (2) engine serial number (3) engine power (4) engine displacement (litres) (5) year of manufacture (6) EU country of origin (Germany) (7) barcode (engine serial number)

PHYSICAL CONDITIONS OF THE ENGINE OPERATION

The engine will normally adapt to operation under the standard reference conditions as defined in ISO 3046-1.

Table 7.3. Physical conditions of the engine operation

Parameter	Unit	Value
Intake air temperature	°C K	+25 298
Relative humidity	%	30
Air pressure (about 100 meters above sea level)	kPa	100

TIP

If the machine is operated at high altitudes and in high temperatures, adjustment of the engine settings may be necessary if climatic conditions were not taken into account when purchasing the machine. In this case, contact the nearest Manufacturer's service point.

GENERAL DESIGN OF THE ENGINE

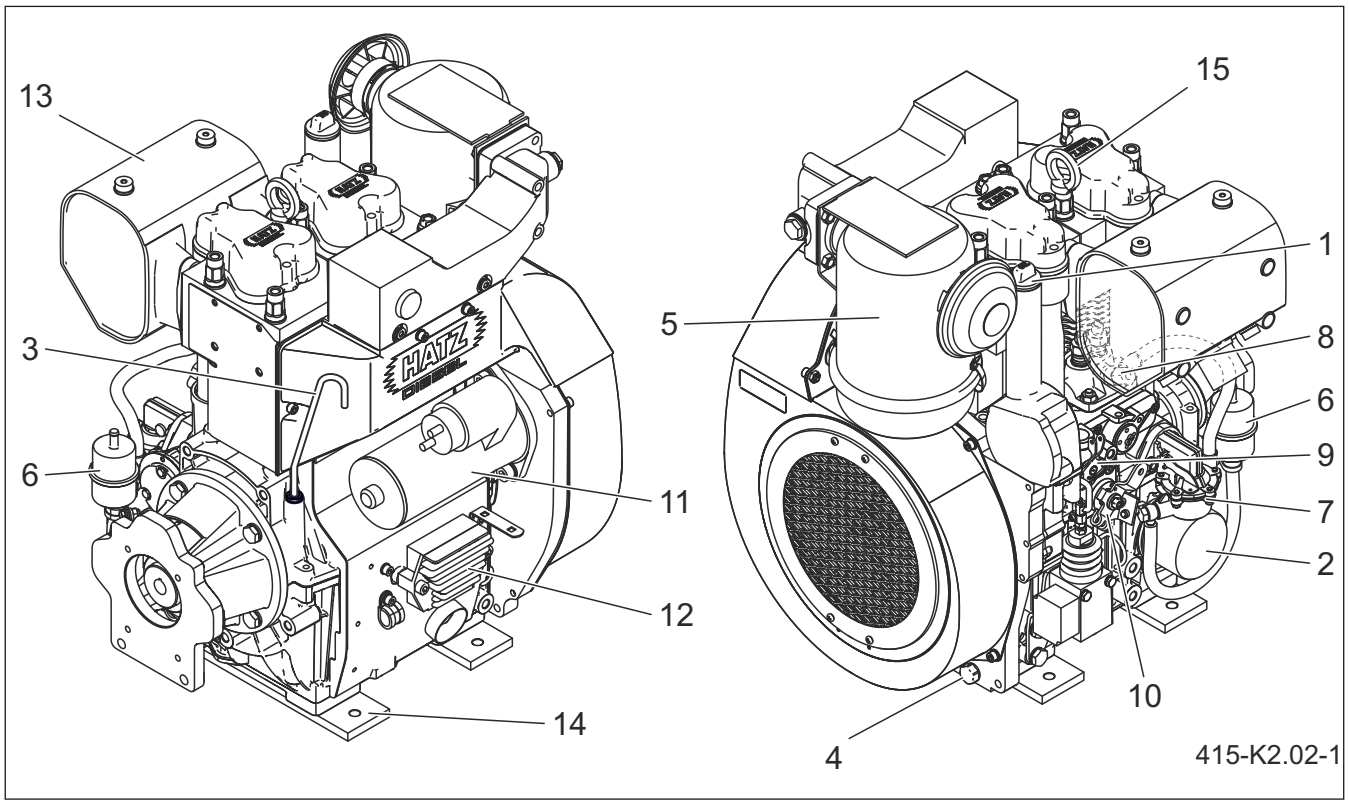


Figure 7.2 General design of the engine

(1) oil filler neck *(2) oil filter* *(3) oil dipstick* *(4) oil drain plug*
(5) wet air filter *(6) fuel filter* *(7) fuel pump* *(8) fuel injection pump*
(9) stop lever *(10) gear change lever* *(11) starter* *(12) voltage regulator*
(13) muffler *(14) engine mounting* *(15) eyebolt*

K2.2.4.415.03.1.EN

7.4 STARTING THE ENGINE

Before the first start-up of the engine, carry out checks in accordance with the guidelines contained in section *PREPARING FOR WORK BEFORE THE FIRST START-UP.*

DANGER

Before starting the machine, make sure that there are no by-standers in the danger zone.

ATTENTION

Before each start-up, the operator must check that the machine is in a safe condition.
Use engine and diesel oils meeting the requirements specified in the *CONSUMABLES* section.

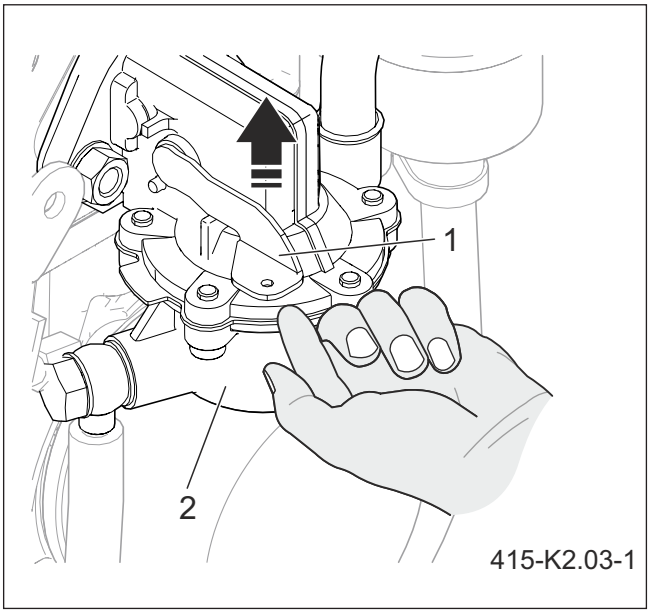


Figure 7.3 Pumping fuel using a hand lever
(1) hand lever *(2) fuel pump*

PREPARING THE ENGINE FOR START-UP

- Check the engine oil level and add oil if necessary.

  The engine must be positioned horizontally when checking the oil level.
- Check the oil level and add oil, if necessary, in the wet air filter (option).

  Fill the oil tank with engine oil up to the level mark. Install the oil tank and ensure that the seal is correctly positioned and the clamps are properly mounted. In the version with an attached separating cyclone, pay attention to the correct position of the dust outlet.
- Check the fuel level in the tank and add fuel if necessary.

  When filling the fuel tank for the first time, when the fuel system is empty or after replacing the fuel filter, pump fuel using the hand lever (1) of the fuel pump (2) (figure 7.3) until you can hear that fuel returns to the fuel tank via the injection pipe.
- At temperatures below 0°C, use winter fuel or add kerosene early enough (see CONSUMABLES).

STARTING THE ENGINE

- Set the engine speed control lever (1) to 1/2 START or START position, as required (*figure* 7.4).
- Make sure that the stop lever (2) is in the START resting position.
- Remove the protective cap (1) from the ignition switch (figure 6.5).
- Insert the ignition key (2) into the ignition switch and turn to the „I" position.
- Wait until the engine preheating indicator (3) goes out, then turn the key to position „II".

  Do not hold the key in position „II" for more than 30 seconds.

DANGER

Do not start the engine in closed rooms or in rooms without ventilation system.

ATTENTION

Under no circumstances should you use any specific aerosols to assist in starting the engine!

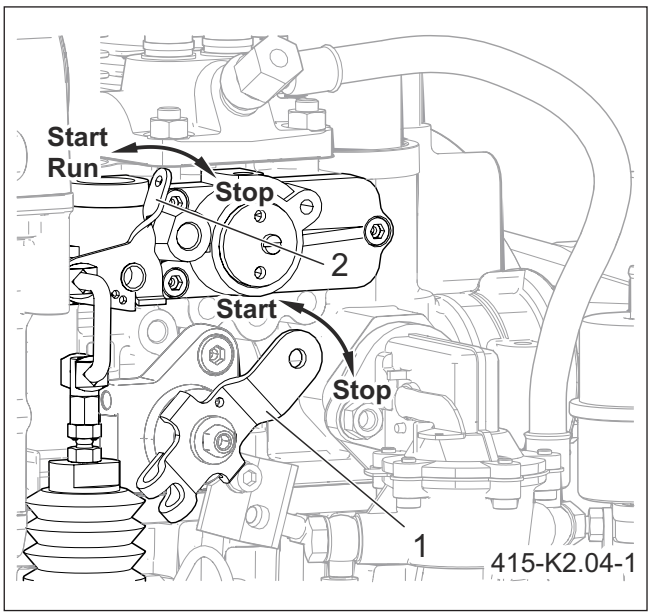


Figure 7.4 Engine speed setting lever
(1) engine speed control lever (2) stop lever

- Release the ignition key after starting the engine.

  The key returns to position „I" and remains in this position during the engine operation. The battery charging indicator light (7) and the oil pressure indicator (6) go out. The working indicator (8) lights up and shows that there is no engine fault. The next start-up can be performed after the ignition is reset (the key in „0" position).

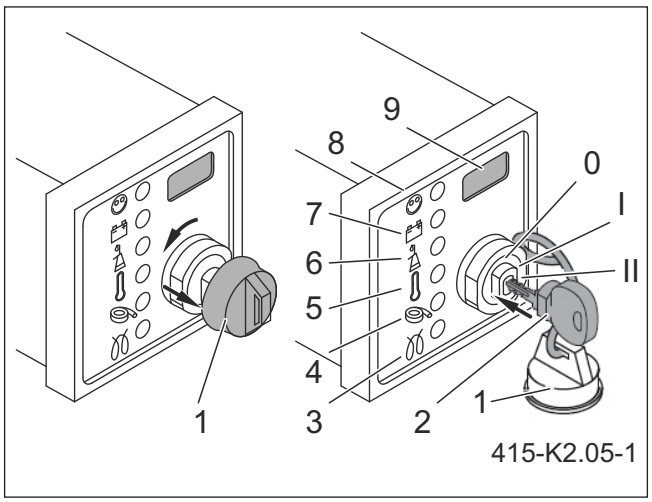


Figure 7.5 Starter
(1) protective cap (2) ignition key
(3-8) information and warning indicators
(9) working hours counter - option

TIP

If the engine does not start, turn the ignition key back to position „0" and remove the cause of the problem.
In the event of a fault, stop the engine immediately. Identify and remove the fault (see *TROUBLESHOOTING*).

TIP

If the engine is equipped with a starter protection module, return the key to position „0" for at least 8 seconds after a failed engine start. Otherwise, the starter will remain locked and the engine will not start.

Table 7.4. Description of information and warning indicators on the starter

Marking Figure 7.5	Symbol	Description
3	Engine preheating	Lights up in temperatures below 0°C. Start the engine when the indicator light goes out.
4	Air filter maintenance	Lights up when the air filter is dirty. Clean or replace the filter element immediately.
5	Engine overheating	The engine temperature is unacceptably high. Danger of damage to the engine. Stop the engine immediately!
6	Low oil pressure	Engine oil pressure too low Danger of damage to the engine. Stop the engine immediately and check the oil level. If the oil level is correct, contact the service centre.
7	No battery charging	Malfunction in the alternator or the alternator charging circuit. The battery is no longer being charged. Rectify the fault immediately.
8	Working indicator	Lights up during the engine operation when there is no engine fault.

K2.2.4.415.04.1.EN

7.5 ENGINE SHUTDOWN

ATTENTION

During breaks or after finishing the engine operation, secure the key against unauthorized access.
Protect the ignition switch against dirt and moisture. After removing the ignition key, seal the ignition switch with the protective cap.

Depending on the equipment, the engine can be turned off using:

- Engine speed control lever (mechanically).
- Stop lever (mechanically).
- Ignition key (electrically).

ENGINE SHUTDOWN (MECHANICAL)

- Move the engine speed control lever (1) back to the „STOP” position.

  The engine will shut off.

TIP

Engines with the lower idle speed locked cannot be turned off using the speed control lever. Such engines are turned off using the stop lever or the ignition key, depending on the engine equipment.

- In engines with blocked lower idle speed, after moving the engine speed control lever (1) back, move the stop lever (2) towards the STOP position and hold it there until the engine shuts off.
- With the engine off, release the stop lever (2) and ensure that it returns to its START position.

  The battery charging indicator and the oil pressure indicator will light up.
- Turn the ignition key (5) to position “0” and remove the key from the ignition.

  All indicator lights should go out.

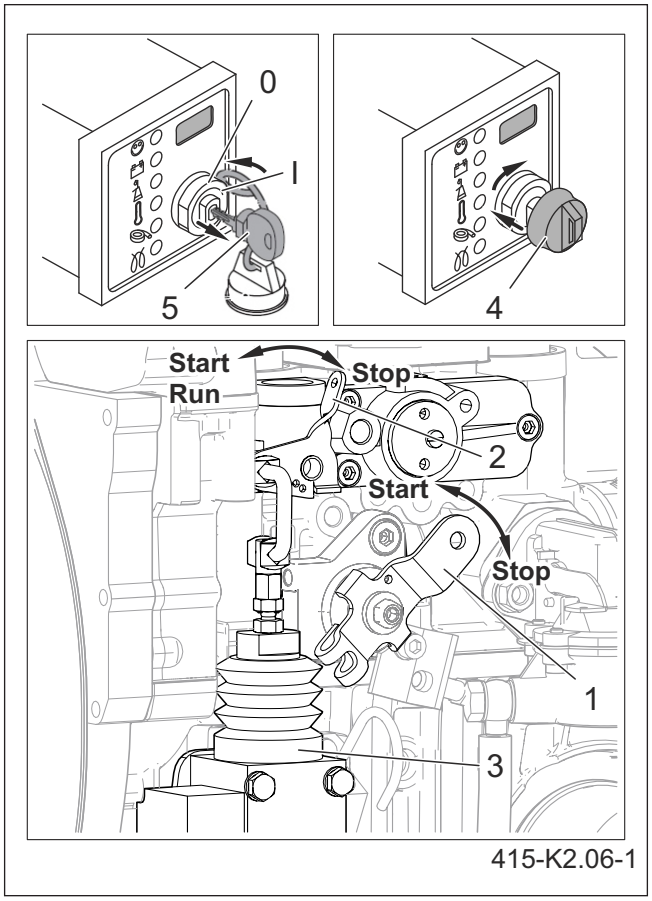


Figure 7.6 Engine shutdown
(1) engine speed control lever (2) stop lever
(3) stop magnet (4) protective cap
(5) ignition key

ENGINE SHUTDOWN (ELECTRICAL)

- Turn the ignition key (5) to position “0”.

  The stop lever (2) is moved to the STOP position by the stop magnet (3). The engine shuts off. All indicator lights go out.
- Remove key from ignition.
- Seal the ignition switch with the protective cap (4).

TIP

When the machine is turned off, always turn the ignition key to position „0” , otherwise the battery may be completely discharged.

K2.2.4.415.05.1.EN

7.6 TECHNICAL INSPECTIONS

Table 7.5. Engine maintenance schedule

	After the first 25 hours of operation	every 8 - 15 hours or daily before the first start-up	every 250 hours	every 500 hours	If needed	Inspection conducted by
Walk-around inspection		•				U
Engine cleaning					•	U
Checking the level of engine lubricating oil		•				U
Checking the combustion air intake area		•				U
Checking the cooling air area		•				U
Checking the bottom of the wet air filter for oil level and degree of contamination, change contaminated oil if necessary		•				U
Wet air filter maintenance			•			S
Oil change	•(1)		•			S
Replacement of oil filter	•(1)		•			S
Checking and adjusting the engine valve clearance	•		•			S
Cleaning the cooling air area			•			S
Inspection of tightening torque of nut and bolt connections	•		•			S
Replacement of fuel filter				•(2)	•	S

(1) - or after 12 months at the latest, irrespective of the total number of engine operating hours

(2) - the frequency of the fuel filter servicing depends on the fuel cleanliness; it may be necessary to reduce the frequency to 250 engine operating hours

***S** - Warranty Service; **U** - User*

During the warranty period, the inspections marked with the letter „S" are performed by a Warranty Service. After the warranty period, we recommended that these inspections should be performed by specialised workshops.

The inspections marked with the letter "U" are performed by the machine operator according to the schedule. Maintenance work beyond the scope described in the Operator Manual may only be performed by authorized (qualified) people.

K2.2.4.415.06.1.EN

7.7 WALK-AROUND INSPECTION

Walk-around inspection is a detailed inspection of the engine compartment. Carry out the inspection each time before starting the machine. During walk-around inspection, pay special attention to leaks of fuel and oil. If a leak is detected, determine the place and cause of the leak. Wipe up any spilled liquid and repair or replace damaged parts before starting the engine.

- Check completeness of plugs, stoppers, etc.
- Confirm that protective shields are technically sound and correctly positioned.
- Check wiring harnesses for damage (abrasion of insulation, broken leads, loosening, contact with hot components, etc.).
- Pay attention to loosen bolt and nut connections and tighten them, if necessary.
- Check elastic conduits for mechanical damage and leaks. Damaged or worn conduits should be replaced. Check band clips and tighten them, if necessary.

DANGER

Damaged fuel system conduits may cause a leak of fuel under pressure, which may cause a fire.

ATTENTION

Do NOT use the machine with damaged conduits. Damaged and leaking conduits may cause a serious defect.

- Make sure that the engine compartment is clean, and remove dirt, if necessary.
- If DO NOT START (or similar) label is attached, contact the person who has attached the warning label. The engine may be out of order.

K2.2.4.415.07.1.EN

7.8 ENGINE CLEANING

Before engine cleaning, switch off the engine and set the main electric switch to OFF position. The plate with the inscription DO NOT START should be suspended in a well visible place for the period of cleaning (e.g. near the main electric switch or the ignition).

Always keep the engine clean. Do not clean the engine using aggressive chemicals. Blowing with compressed air is usually sufficient. In case of doubts, contact the engine manufacturer experts. When cleaning, avoid dampening the electrical system components (cables, starter, sensors, etc.) If this is unavoidable, disconnect the battery first and dry all components thoroughly with compressed air before reconnecting.

Visually inspect the engine for leaks.

DANGER

Cleaning, maintenance and repair work should only be carried out with the engine turned off.

Engine contaminated with grease, fuel or oil creates fire hazard. Accumulated deposits or spilt flammable liquids should be regularly removed.

Do not clean the engine and its accessories with a pressure washer. Pressure can cause a lot of damage, and water can get to undesirable places. Observe the rules contained in chapter “Cleaning the machine”.

K2.2.4.415.08.1.EN

7.9 CHECKING THE LEVEL OF ENGINE LUBRICATING OIL

- Turn off the engine and wait a few minutes for the engine oil to flow down to the crankcase.

  The engine must be cool and level.
- Clean debris from the engine in the area of the oil dipstick (1).
- Take out oil dipstick and wipe it until dry.
- Insert oil dipstick and take it out again to check the engine oil level.

  Add engine oil up to the top mark on the oil dipstick.
- If engine oil level is too low, unscrew filler plug (2) and add proper amount of oil.
- After fresh oil is added, wait until oil flows into the oil pan and check oil level again.
- Tighten the filler plug (2) and insert the oil dipstick (1).

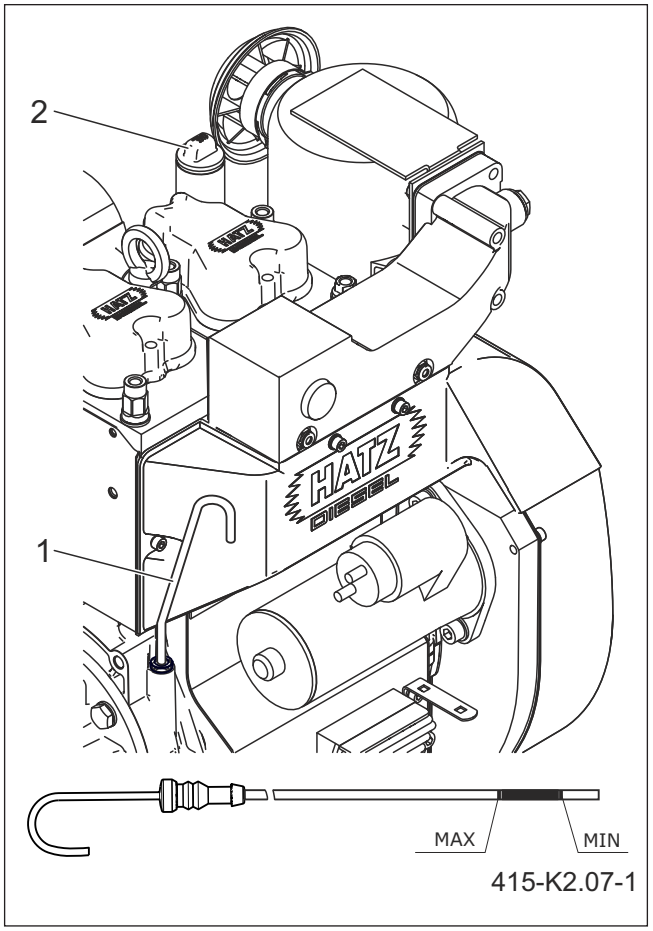


Figure 7.7 Checking engine oil level
(1) oil dipstick *(2) oil filler cap*

ATTENTION

Operating the engine with the oil level below the MIN level or above the MAX level can cause damage to the engine.
The engine must be cool and positioned horizontally when checking the oil level.
Excessive oil level may be caused by leaky fuel system, leaky cooling system or other defect.

K2.2.4.415.09.1.EN

7.10 CHECKING THE COMBUSTION AIR INTAKE AREA

WET AIR FILTER

- Check the air intake opening (1) - depending on the version - for heavy contamination, clean if necessary.
- In the version with a separating cyclone, check that the dust outlet (2) is not obstructed, clean if necessary.

TIP

Heavy contamination indicates that the air filter maintenance intervals should be shortened accordingly due to heavy dusting.

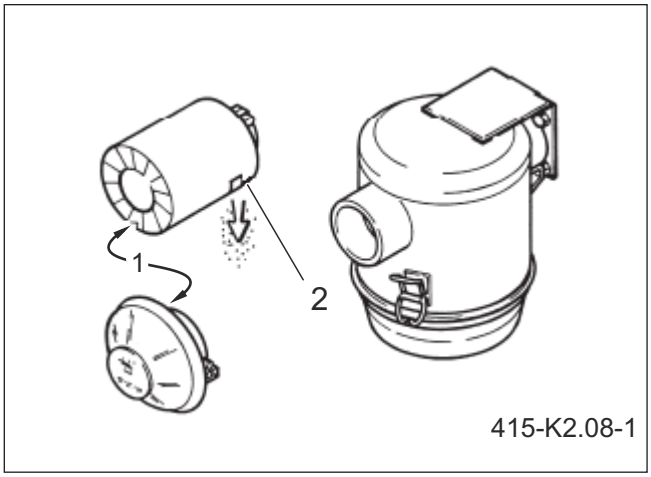


Figure 7.8 Checking the combustion air area
(1) air inlet *(2) air outlet*

K2.2.4.415.10.1.EN

7.11 CHECKING THE COOLING AIR AREA

ATTENTION

The engine temperature indicator light (option) lights up when the engine temperature is unacceptably high. Turn off the engine immediately and remove the cause of the problem.

- Check the cooling air inlet and outlet area for heavy contamination with leaves, dust etc., clean if necessary.

TIP

Heavy contamination indicates that the air filter maintenance intervals should be shortened accordingly due to heavy dusting.

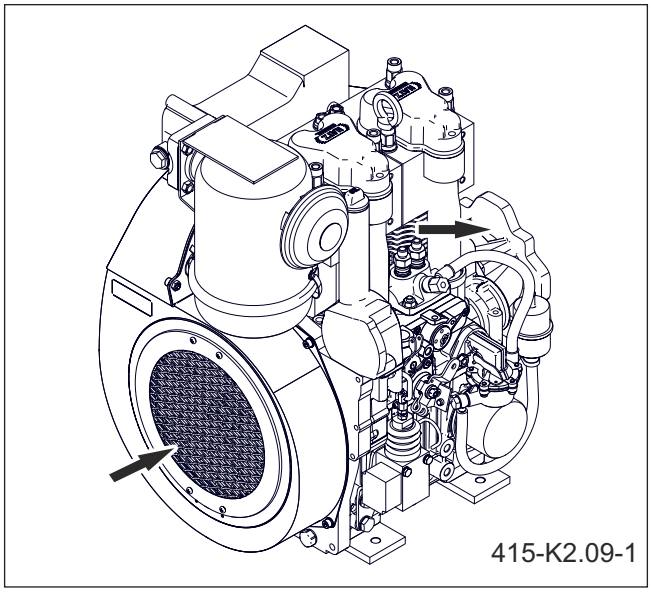


Figure 7.9 Checking the combustion air area

K2.2.4.415.11.1.EN

7.12 CHECKING THE BOTTOM OF THE WET AIR FILTER

- Release the clamps (1) and remove the oil tank (2).
- Check cleanliness of the filter and clean it if necessary.

  When the deposited dirt has reached about half the oil filler level or the oil becomes sticky, clean the air filter.
- Check the oil level and, if necessary, add engine oil to the level mark (4) as required.
- Install the oil tank and ensure that the seal (3) is correctly positioned and the clamps (1) are properly mounted.

DANGER

The applicable regulations for the protection and disposal of used oils, filters and cleaning agents must be complied with. Do not allow the oil to get into ground water, water reservoirs or sewage system.

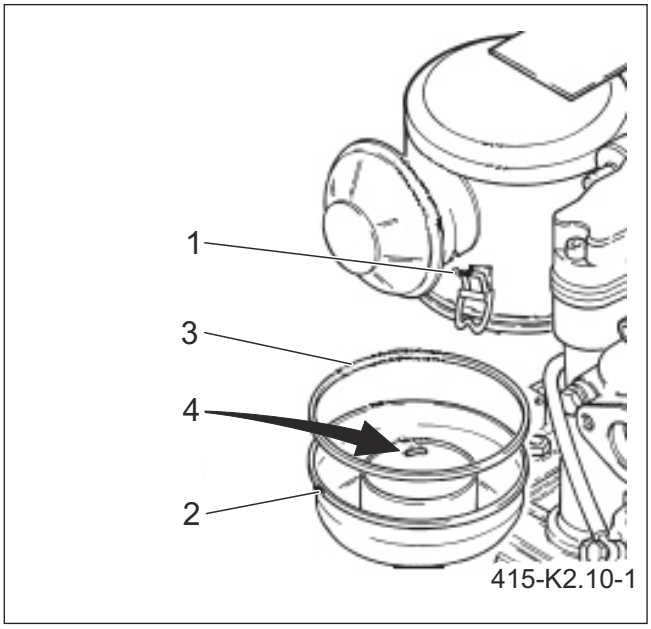


Figure 7.10 Checking the bottom of the wet air filter
(1) clamp *(2) oil tank*
(3) seal *(4) oil level mark*

K2.2.4.415.12.1.EN

7.13 TROUBLESHOOTING

Table 7.6. Engine faults and how to remove them

Fault (Alarm)	Possible cause	Solution
Engine does not start or starts poorly, but the starter rotates the engine crankshaft.	The engine speed control lever is in the STOP or idle position.	Place the lever in the START position.
	The stop lever is in the STOP position.	Place the lever in the START position.
	No fuel in the injection pump.	Add fuel. Check the entire fuel system thoroughly. If no defects are found, check: - conduit leading to the engine - fuel filter - operation of the fuel supply pump
	Compression too low: - Incorrectly set valves. - Worn valves. - Worn cylinder and / or piston ring.	Check valve clearance, adjust if necessary. * Repair *
	Faulty injectors.	Repair *
Engine does not start in cold weather	Temperature lower than the minimum operating temperature of the engine.	Start the engine preheating system (additional equipment).
	Faulty engine preheating system (additional equipment).	Repair *
	Fuel loses its consistency due to insufficient frost resistance.	Check that the fuel that flows out of the detached fuel conduit is clean and not cloudy. If the fuel has changed its consistency, warm up the engine or drain the entire fuel system. Pour in frost-resistant fuel mixture
	Engine starting speed too low: - Oil too thick. - Insufficiently charged battery.	Change engine oil. Pour in oil of the correct viscosity grade * Check the battery, if necessary, contact the service centre.
	The machine is not declutched.	If possible, disengage the clutch to disconnect the engine from the machine *

Fault (Alarm)	Possible cause	Solution
Defective starter or engine does not rev up.	Disturbances in the electrical system: - Battery cables and / or other cable connections incorrectly connected. - Loose and / or rusty cable connections. - Defective and / or not charged battery. - Defective starter. - Defective relays or monitoring devices, etc.	Check the electrical system and its components or contact the service centre
The engine starts, but immediately cuts out when the starter is disengaged.	The engine speed control lever is not sufficiently moved to the START position.	Place the lever in the START position.
	The machine is not declutched.	If possible, disengage the clutch to disconnect the engine from the machine *
	Clogged fuel filter.	Replace the filter *
	Fuel circulation interrupted.	Check the entire fuel system thoroughly.
The engine shuts off by itself.	Fuel circulation interrupted: - No fuel in the fuel tank. - Clogged fuel filter. - Defective fuel supply pump.	Refuel. Replace the filter * Check the entire fuel system*
	Mechanical damage.	Contact the service centre
The engine loses power and revs.	Defective fuel system. - No fuel in the fuel tank. - Clogged fuel filter. - Insufficient fuel tank venting.	Refuel. Replace the filter * Provide sufficient fuel tank venting.
	Leaky conduit connections.	Check conduit connections for tightness.
	The engine speed control lever moves by itself.	Lock the engine speed control lever.
The engine loses power and revs, black smoke comes out of the exhaust pipe.	Contaminated air filter.	Clean the air filter or replace it with a new one if necessary. *
	Incorrectly adjusted valves.	Adjust the valves *
	Faulty injectors.	Contact the service centre

Fault (Alarm)	Possible cause	Solution
The engine is overheating. The engine temperature indicator light (option) lights up	Too much lubricating oil in the engine.	Drain the engine oil to the upper mark (MAX) on the oil dipstick
	Insufficient cooling: - Contaminated the entire cooling air area. - Air supply plates not properly closed.	Clean the cooling air area. Check that air supply plates or supply channels are intact and properly sealed.
** during the warranty period, inspections and repairs are carried out be authorised service*		

K2.2.4.415.13.1.EN

7.14 CONSUMABLES

Table 7.7. List of consumables

Place of application - name	Quantity	Number / type / standard
Air filter, set	1 szt.	HATZ 011 222 10
Engine oil filter	1 szt.	HATZ 503 028 00
Fuel filter	1 szt.	HATZ 504 788 00 (> -6°C), 400 894 01 (< -6°C)
Engine oil (including sump capacity)	3 L	SAE 5W30
Fuel tank - Diesel oil	26 L	PN-EN 590+A1:2010

ENGINE OIL

All branded oils that meet at least one of the following specifications are allowed:

- ACEA - B3 / E4 or better.
- API - CF / CH-4 or better.

ATTENTION

Wrong engine oil significantly shortens the engine's service life. Use only engine oil that meets the above specifications.

Select the recommended oil viscosity depending on the ambient temperature for starting the cold engine.

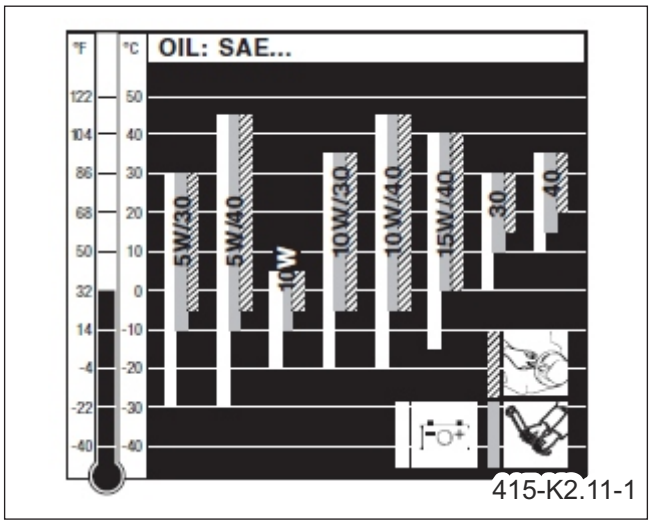


Figure 7.11 Oil viscosity grade depending on temperature

FUEL

All types of Diesel fuel that meet the minimum requirements of the following specifications can be used:

- Europe: EN 590.
- UK: BS 2869 A1 / A2.
- USA: ASTM D 975-09a 1-D S15 or 2-D S15.

At temperatures below 0°C, use winter fuel or add kerosene early enough.

ATTENTION

The use of out of specification fuel may cause damage to the engine.

ATTENTION

When Diesel fuel is stored for long periods, deposits may form in the fuel tank or canister due to the fuel aging. These deposits cause malfunctions of the engine due to clogging of the fuel filters and damage to the fuel injection system.

Table 7.8. Winter fuel

Lowest ambient temperature in °C at start-up	Percentage of kerosene for	
	summer fuel	winter fuel
0 do –10	20 %	–
–10 do –15	30 %	–
–15 do –20	50 %	20 %
–20 do –30	–	50 %

K2.2.4.415.14.1.EN

SECTION 8

LUBRICATION SCHEDULE

8.1 LUBRICATION

Lubrication of the machine should be performed according to the specified schedule or each time after washing the machine, regardless of the date of previous lubrication. Lubrication points should be kept clean because excessive amount of lubricant stimulates accumulation of contaminants. Lubrication should be performed using generally available tools such as manually or foot operated pneumatic grease guns, etc. filled with a recommended grease.

Before commencing lubrication, remove old grease and other contaminations. Check grease nipples and set of stoppers. If necessary, supplement missing elements. After finishing work, remove and wipe off excess oil or grease.

ATTENTION

Empty grease or oil containers should be disposed of according to the recommendations of the lubricant Manufacturer.

DANGER

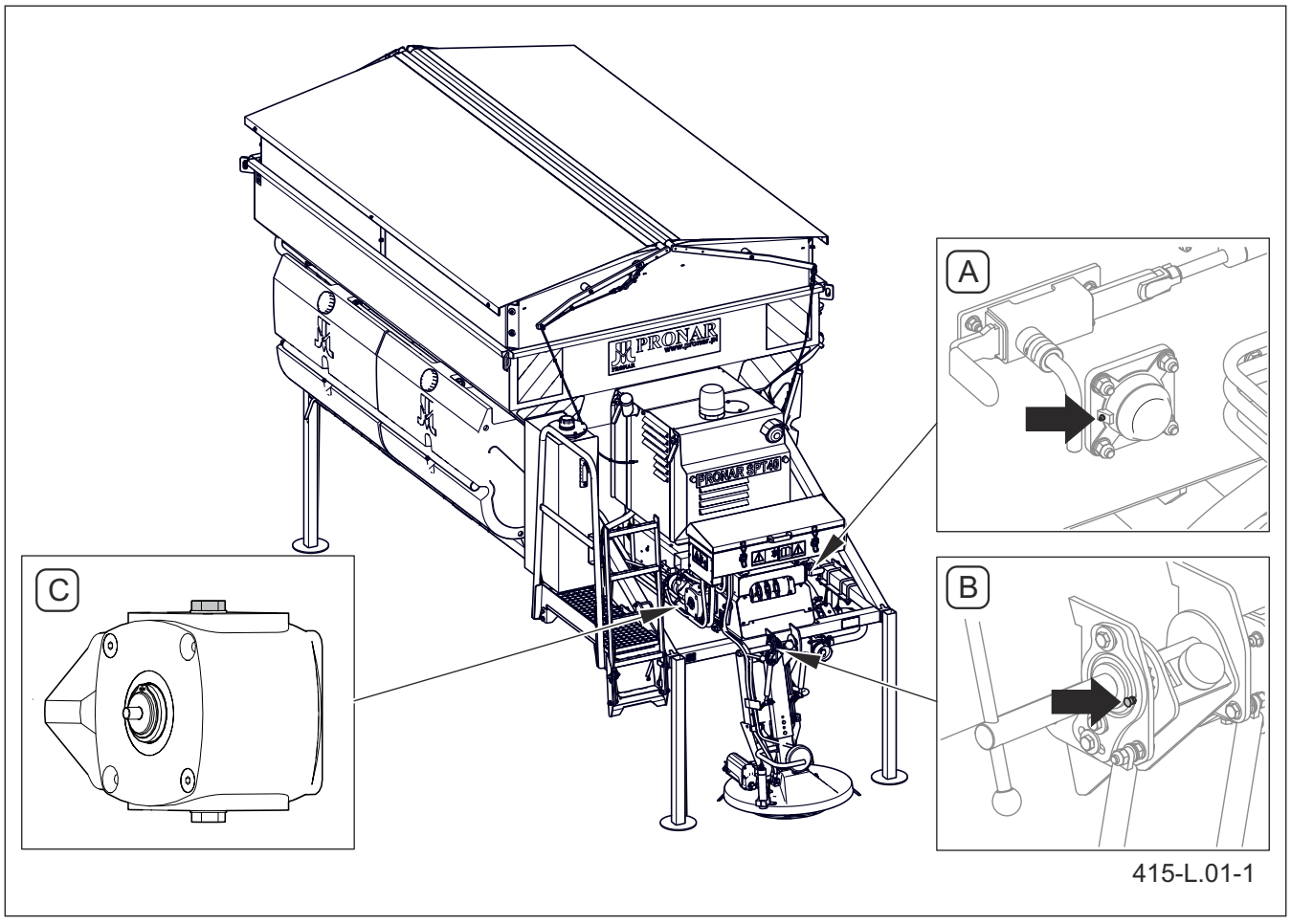
Before starting work, protect the machine against accidental starting by unauthorized persons.

L.2.4.415.01.1.EN

8.2 LUBRICATION SCHEDULE

Table 8.1. Lubrication schedule

Item	Lubrication point	Number of lubrication points	Type of grease	Frequency
A	Bearing of belt conveyor drive shaft	1	grease	20H
B	Pivot point of hopper system	1	grease	1M
C	Conveyor drive transmission	1	oil	1R
H - hour | D - day | M - month | R - year | BU - always before use				



Rysunek 8.1 Lubrication points

L.2.4.415.02.1.EN