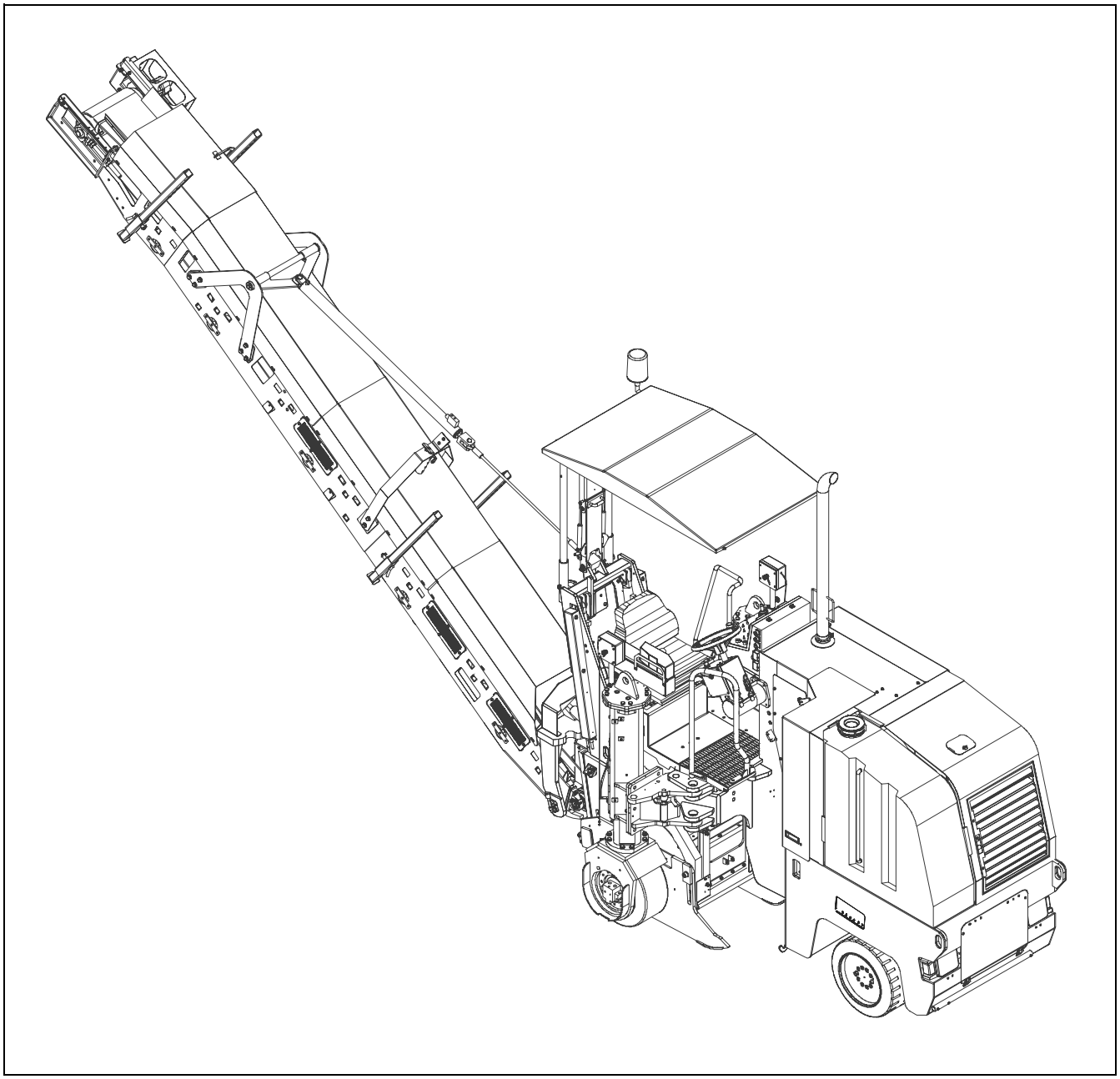
DYNAPAC



# Operating Instructions

GB

Valid for:

# Cold Planer PL 500/20S

**01-09.05**

900 98 10 46

# VALUE
# QUALITY
# THE ORIGINAL

DYNAPAC

# SPARE PARTS

*Your authorised Dynapac dealer:*

# Preface

If the machines are to be operated safely, the information provided in these Operating Instructions will be required. The information is shown in a brief and clear form. The Chapters are ordered by letter. Each Chapter starts with Page 1. The pages are identified using a Chapter letter and Page number.
Example: Page B 2 is the second page of Chapter B.

To avoid misunderstandings relating to enquiries, consultation sessions, orders, etc., always use the terms defined in these Operating Instructions.

These Operating Instructions document various options. During operation and when carrying out maintenance work, always ensure that the appropriate description for that option is employed.

The machine may only be operated by trained staff.

These Operating Instructions must be read and applied by every person engaged in the operation, upkeep (maintenance, repair, servicing) or transport of this device.

These Operating Instructions contain important specifications and information on how to safely, economically, professionally and correctly use the machine. Compliance helps to prevent dangerous incidents, downtime and repair costs, while also improving operational reliability, extending service life and safeguarding warranty cover.

Safety information and important explanations are identified by the following pictograms:


Stands for safety information which must be observed in order to prevent dangers affecting operators.

Stands for information which must be observed in order to prevent material damage.

Stands for information and explanations.

- ● Identifies standard equipment.
- ○ Identifies optional equipment.

These Operating Instructions must always be stored in a convenient location on the machine. They are valid in conjunction with the Dynapac safety manual, the information on intended usage and the supplementary operator's instructions required on the basis of existing national or regional specifications regarding technical regulations, accident prevention and environmental protection.

In the interest of further technical development, the manufacturer reserves the right to undertake modifications while retaining the key features of the machine type described and to do so without correcting these Operating Instructions.

V_PL500_20S_GB.fm 2-2 01-09.05

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# A Intended usage

☞ The Dynapac "Guideline for the intended and correct usage of cold planers" falls within the scope of supply of this machine. It forms part of these Operating Instructions and must be observed. National regulations apply without restriction.

The machine described in these Operating Instructions is a cold planer which can be used as follows in enclosed building sites on roads:

- for partial removal of asphalt, asphalt-cement and layers of concrete
- to remove distortions in the form of track grooves, lateral bulges, lateral warps,
- to recreate a proper surface,
- to perform roughing and demarcation work,
- for use in preparatory work in pipeline and cable-laying work.

For this, the underlying base layer must be robust enough to withstand movement of the cold planer.

The transportation of outsiders is expressly forbidden, as is using the cold planer as a traction mechanism, winch or lifting device.

The intended usage also includes compliance with the operating, transport, maintenance and repair conditions specified in the Operating Instructions.

The machine is not designed for any type of usage not described in the intended usage section. The manufacturer is not liable for such instances of use. The operator alone bears all risks for such usage. When in doubt, contact the manufacturer.

**Obligations of the operator:** An operator, as defined in these Operating Instructions, is any natural or judicial person who uses the cold planer himself or on whose behalf it is used. In special circumstances (e.g. leasing, rental), the operator is that person who is to observe the specified operating obligations in accordance with the contractual agreements made between the owner and user of the cold planer.
The operator must ensure that the cold planer is only ever used for its intended purpose and that risks of all kind to the health and safety at work of the operator or third parties are prevented. Compliance must also be maintained with the accident prevention regulations, all technical safety rules as well as the operating, maintenance and repair guidelines. The operator must ensure that all users have read and understood these Operating Instructions.

**Technical modifications, attachments and conversions:** The cold planer may only be operated with the extension parts, optional equipment and accessories, protection and safety devices authorised by the manufacturer as well as the setting values specified by the manufacturer. Autonomous changes to assemblies, their removal or replacement with other unauthorised parts and any attempt to take these out of service either completely or partially render null and void the manufacturer's liability for any resultant damage.
The attachment or installation of additional devices, which are used to intervene in the function of the cold planer or with which its functions are supplemented, is only permitted with the written approval of the manufacturer. If necessary, approval should be sought from the local authorities.
Consent from the authorities is however no substitute for approval from the manufacturer.

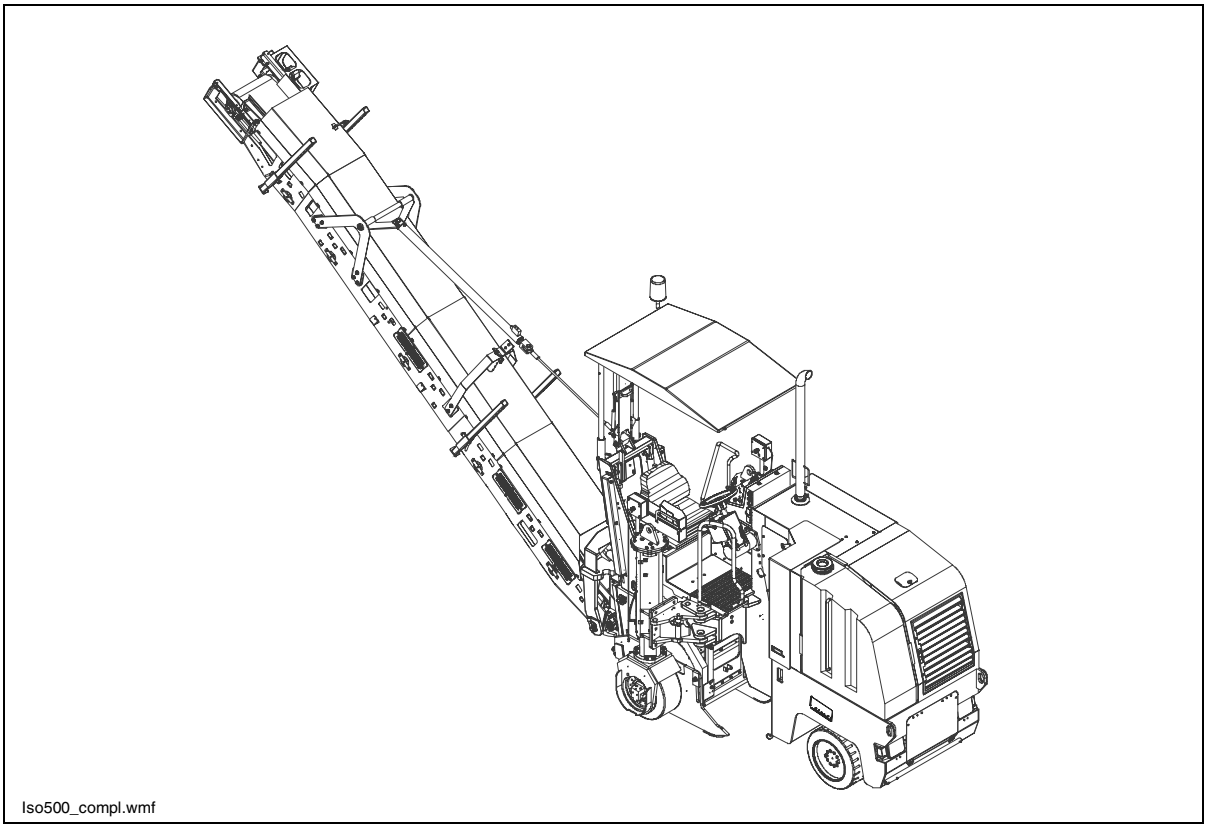
# B Vehicle description

## 1 Description of usage

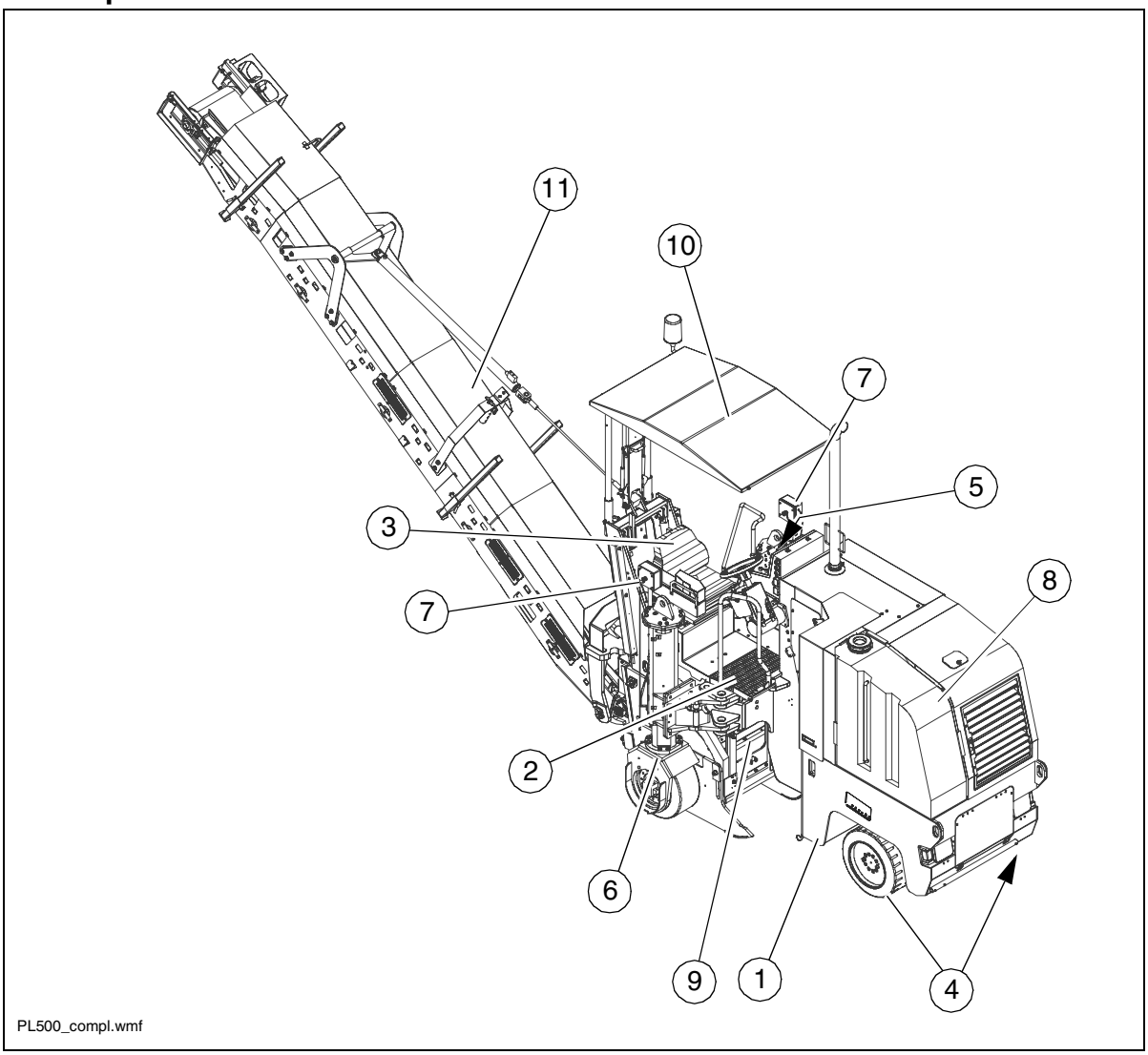
The DYNAPAC PL 500/20 S cold planer is a compact and very manoeuvrable cold planer with all-wheel drive and, depending on equipment standard, can be fitted with either three or four drive wheels.

This cold planer was designed for tasks such as the partial removal of asphalt and concrete and for preparatory work in pipeline and cable-laying operations.
The right-hand chassis leg can be folded in to allow for precision milling of edges.
The extremely small turning circle means that the planer can work around drain covers.

The PL 500/20 S meets European safety standards and complies with very high standards in terms of reliability, cost-effectiveness and environmental compatibility.



Iso500_compl.wmf




| Item | Designation |
|---|---|
| 1 | Frame |
| 2 | Operator’s control station |
| 3 | Driver’s seat |
| 4 | Drive wheel |
| 5 | Chassis leg |
| 6 | Swivel-mounted chassis leg |
| 7 | Milling depth display |
| 8 | Water tank |
| 9 | Water spraying system |
| 10 | Weather protecting sun roof (○) |
| 11 | Upper conveyor |

## 2.1 Vehicle

### Assembly

**Frame and assembly:** Robust, distortion-resistant steel welded design with useful brackets for supporting the assemblies, units, attachments and tanks. All parts can be easily accessed for maintenance and repair work.

**Operator's control station:** The operator's control station, conveniently located at the rear of the machine affording good all-round visibility, can be reached via a ladder and is equipped with a driver's seat on the right-hand side.
From the operator's control station on the right-hand side of the machine, the planer is easy and safe to operate, affording good visibility and corresponding ease of monitoring for the planing process.

**Controls at operator's control station:** A convenient operating and control element comprising all the requisite switching and display elements.
The securely arranged controls are obviously marked for all applications.

The steering system involves the use of a steering wheel while travel is controlled by means of a drive lever.

All requisite machine settings such as milling depth and angle adjustment can be performed comfortably from the operator's control station.

Access to all major switching and connection points, as well as to all maintenance locations, can be locked.

**Engine:** The machine is equipped with a powerful 4 cylinder Cummins diesel engine which effortlessly covers the performance requirements of this planer with its power rating of 82 Kw.
Compliance is maintained with emission values as defined in the U.S. EPA exhaust standard and the European COM2 exhaust standard. The engine covers are insulated from noise as standard, enabling noise emissions to personnel and the surrounding area to be reduced to a minimum.

**Milling section:** The mechanically high-strength V-belt-driven milling drum is located between the two rear chassis legs. The right-hand chassis leg can be swivelled in front of the milling drum.
The milling drum rotates in the opposite direction to the machine's direction of travel. The professional bit arrangement and equipping with the best cutting tools ensures rapid and clean milling as well as high bit life.
On the standard drum, with a milling width of 500 mm, the bit can be replaced via the rear milling drum flap, thereby keeping downtime to a minimum for replacement purposes.
The milling drum is bolted to the housing of the mechanical drive and can be replaced easily and quickly after removing the right-hand housing plate.

**Milling depth adjustment:** Milling depth adjustment is performed hydraulically, and separately for each rear wheel.
To the left and right sides of the operator's control station are two clearly legible milling depth indicators.

**Traction system, steering system, travel drive, brake:** Suspension of the two front wheel using a parallelogram-shaped rocker arm ensures an optimum contact surface at all times. The rear wheels on the chassis legs are designed for the milling adjustment.
The right-hand chassis leg can be swivelled in front of the milling drum.
The hydraulic all-wheel travel drive has continuously variable adjustment across two speed ranges. The hydraulic travel drives are connected to the wheel hubs by means of planetary gears. This ensures optimum feed and high gradeability.
A multi-disc brake on the rear wheels acts as brake.

**Water system:** The water system comprises a water spraying and cooling system. The water spraying and cooling system operates in the low pressure range. This system is used for cooling and jetting the bits.
The spray nozzles can be easily replaced.
The water tank has a high capacity and has good access for filling from the top.

**Loading unit**: the cold planer attachment is designed as a rear-loading unit and features a one-piece load transfer system.
Final loading of planing material occurs from the upper conveyor to the transport container or some other loading area outside the milling lane. The belt is wide and its transport speed can be varied. As part of this process, the operating speed of the upper conveyor can be varied across an infinite range from zero to maximum setting.
The belt can then be changed quickly and easily.
The height of the upper conveyor can be adjusted hydraulically over a wide range of heights and the conveyor can also be swivelled to quite a sharp angle on both sides.
The full-length cover substantially reduces the dust burden.
The upper conveyor can be dismantled / assembled very rapidly and can be erected on four integrated legs.
As an option, a short version of this loading belt can be supplied which can be used for applications such as the loading of planing material straight into the shovel on a wheel loader.

**Hydraulic system**: The drive unit, actuator functions and steering system are operated by independent hydraulic circuits ideally suited to the machine.

**Electrical system:** 24 volt system with two in-line cold-start high-performance batteries and a 3-phase alternator.
The power supply can be interrupted to ground/earth by the battery's main switch.

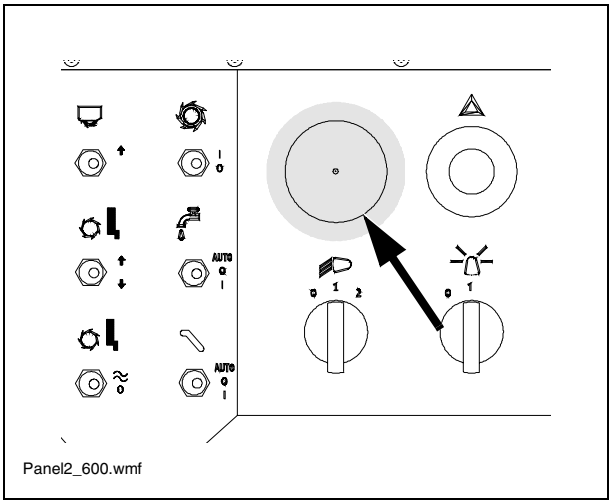
## 3 Safety devices

Safe operation is only possible if the operating and safety equipment works perfectly, and that guards are properly fitted.

☞ The function of these devices must be checked regularly (refer to Chapter D, Section "Checklists for the machine operator").

### Emergency-stop button

- On the control panel
  The engine, drives and steering system are shut down when the emergency-stop button is pressed. Any countermeasures which may be required (manoeuvring, deploying the chassis legs) are then no longer possible!

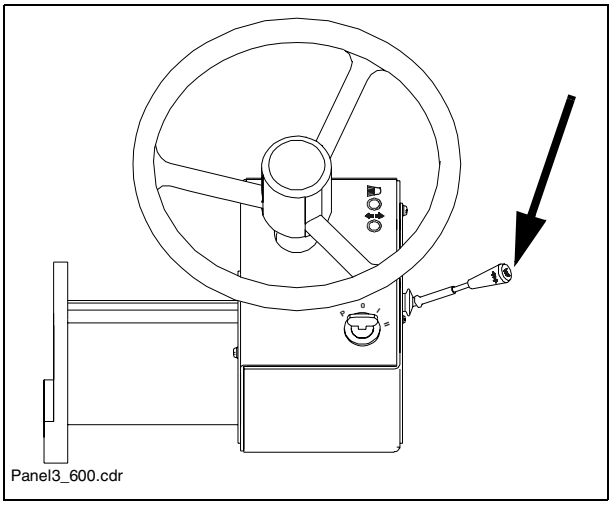



⚠ The EMERGENCY STOP button is not used for normal shut-down of the engine and should only be used in emergencies or for inspection purposes.

### Horn

- On the control panel

STOP Before starting up the machine, press the horn button to issue a warning signal.



## Headlights, flashers, rotary beacons

Lights for illuminating different operating areas and for indicating danger areas and/or dangerous situations are located at various machine positions.

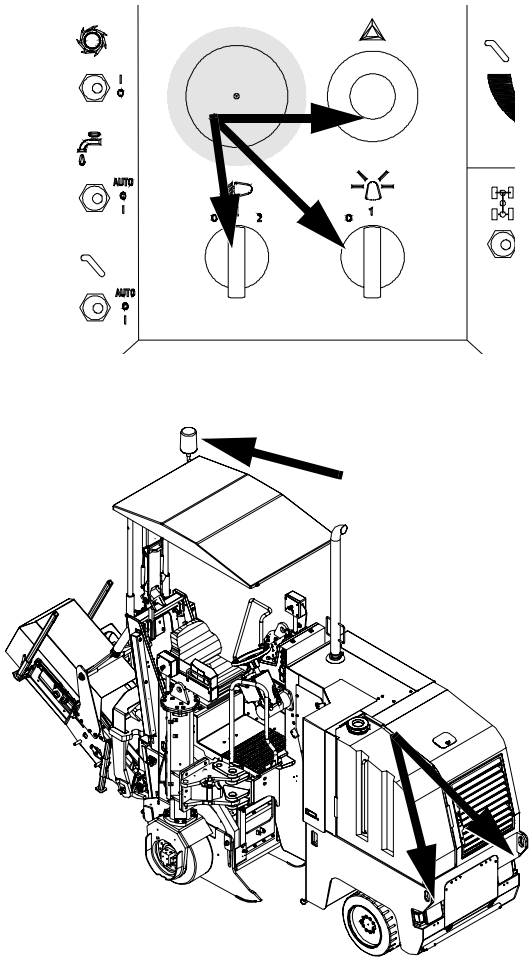
The machine has two contacts which can be fitted to the headlights or to the rotary beacons.

The headlights or rotary beacons are engaged using their respective switches on the control panel.

STOP The function of the headlights and warning lamps should be checked on a daily basis before starting work.

☞ The headlights are easy to remove and should therefore, as a safety precaution, be removed at the end of work and stored in a safe location.

⚠ Headlight contacts which are not used should be protected using rubber caps.

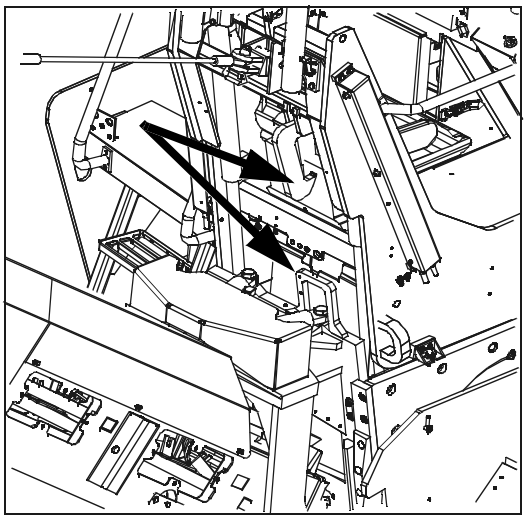



Panel2_600.wmf/Iso500_compl_short.wmf

## Retaining hook, moldboard

- Retaining tab on moldboard and retaining hook on machine frame engage with one another in raised position.

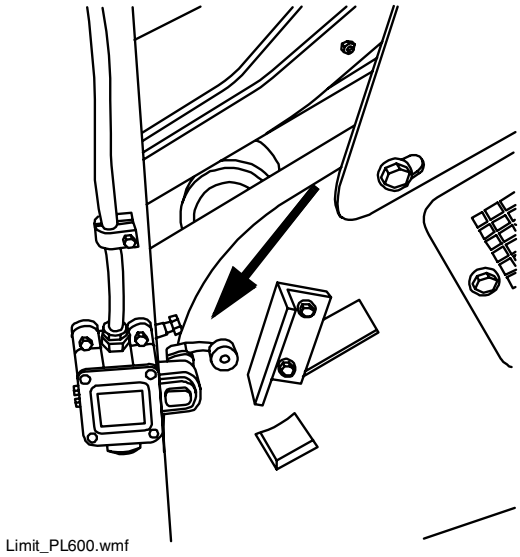
☞ Secures the moldboard to prevent it from being lowered accidentally.



Scraper_safety_pl600

**Limit switch on upper conveyor**

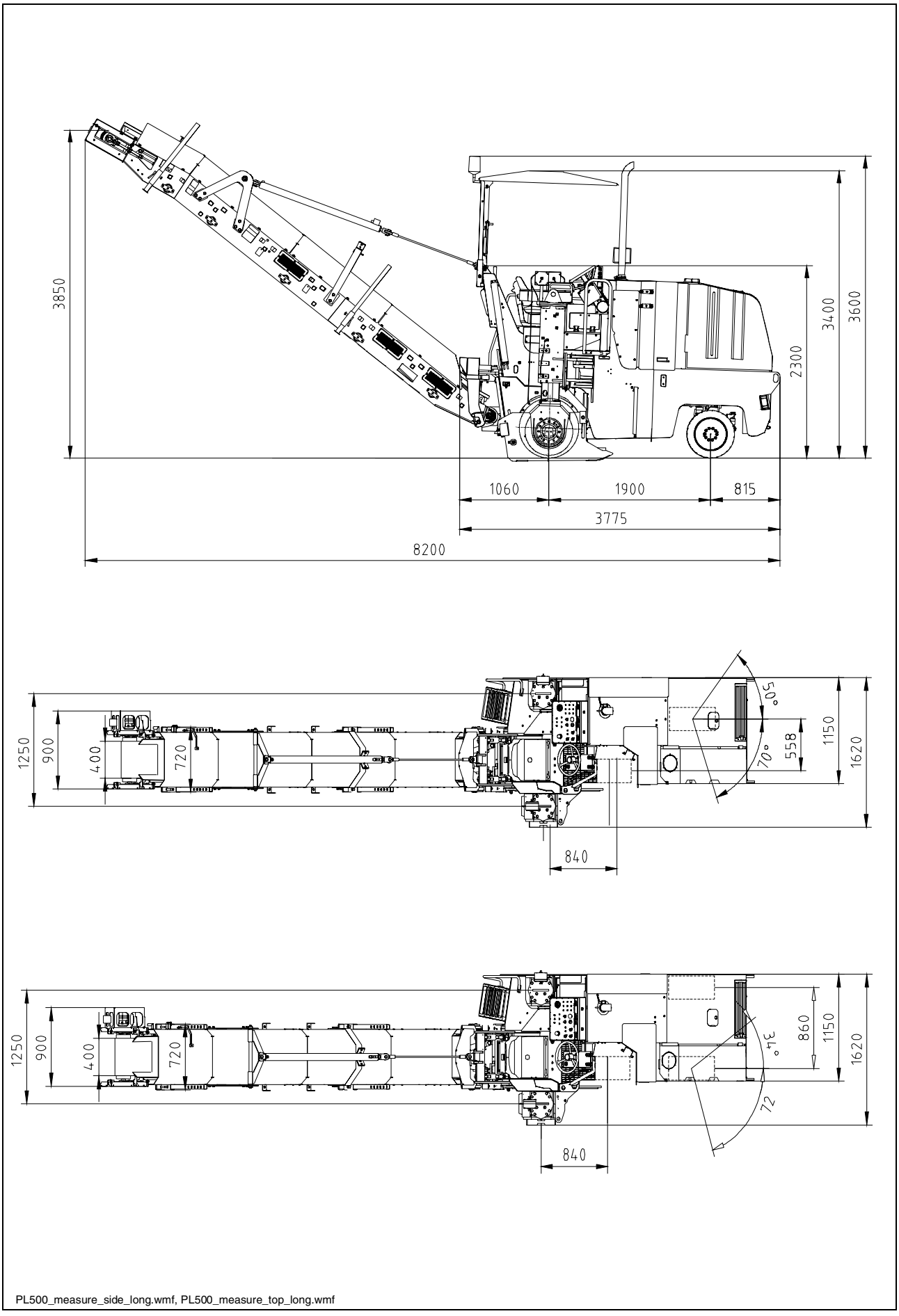
A limit switch on the frame of the upper conveyor prevents unfavourable load levels arising from excessive raising action.



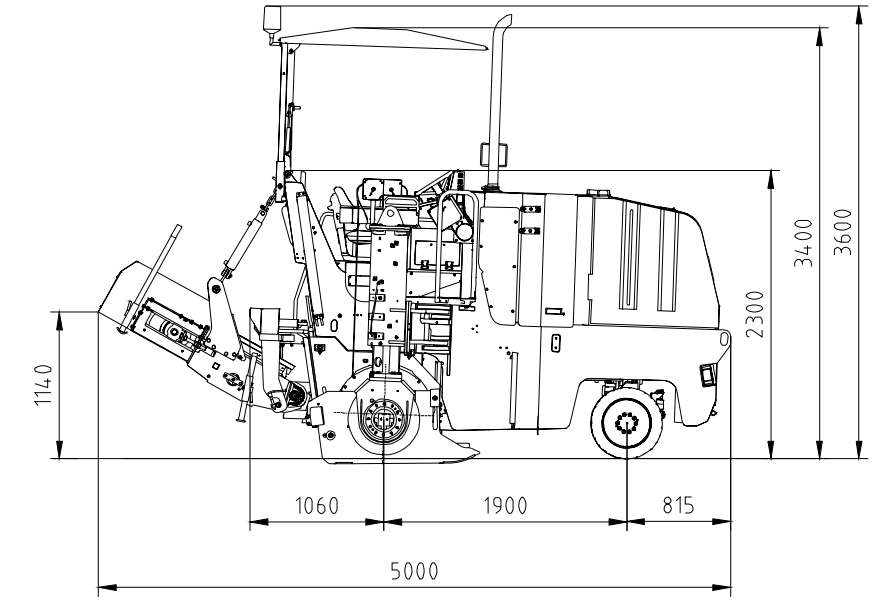
Limit_PL600.wmf

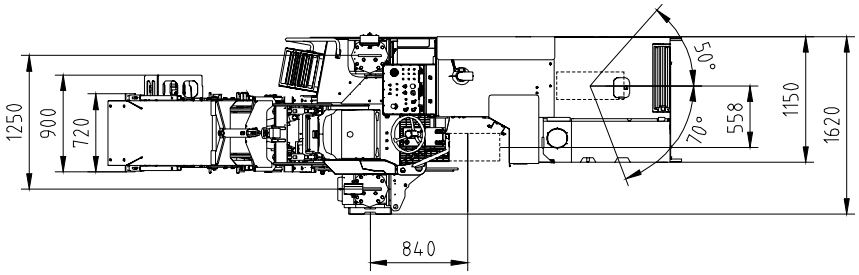
# 4 Technical data, standard version

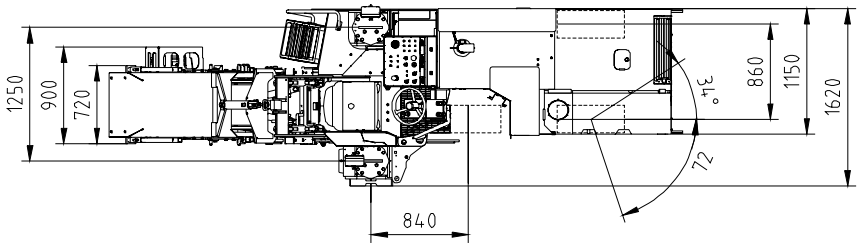
## 4.1 Dimensions




PL500_measure_side_long.wmf, PL500_measure_top_long.wmf




PL500_measure_side_short.wmf, PL500_measure_top_short.wmf

## 4.2 Weights

| | Upper conveyor long | Upper conveyor short | |
|---|---|---|---|
| Unladen weight | 8550 | 8050 | kg |
| Operating weight | 8850 | 8350 | kg |
| Ballast weight, total max. | 9100 | 8600 | kg |

## 4.3 Performance data

| | | |
|---|---|---|
| Transportation speed | 0 - 6 | km/h |
| Operating speed | 0 - 30 | m/min |
| Milling width | 500 | mm |
| Milling depth | 0 - 200 | mm |
| Spacing | 15 | mm |
| Cutting diameter | 700 | mm |
| Number of milling tools | 53 | items |

## 4.4 Engine

| | |
|---|---|
| Make/type | Cummins QSB 4.5-30-T-C110 |
| Version | 4-cylinder diesel engine (water-cooled) |
| Power (in accordance with DIN 6270) | 82 kw / 110 hp / 112 PS (at 2100 rpm) |
| Capacity | 4510 $cm^3$ |
| Fuel consumption, full load<br>Fuel consumption, 2/3 load | 23.6 l/h<br>15.8 l/h |
| Fuel tank filling volume | approx. 200 l |

## 4.5 Travel drive

| | |
|---|---|
| Input | Hydrostatic drive,<br>continuously variable across two speed ranges.<br>Input via the front wheels and rear wheels |
| Steering system | Hydraulic (power) steering system (Orbitrol) |

## 4.6 Hydraulic system

| | |
|---|---|
| Pressure creation | Hydraulic pumps (flange-mounted to the engine) |
| Pressure distribution | Separate hydraulic circuits for:<br>Travel drive, chassis legs and steering system |
| Hydraulic oil tank - filling volume | approx. 100 l |

## 4.7 Water system

| | | |
|---|---|---|
| Spray nozzles | 4 units | |
| Water tank - filling volume | approx. 400 | l |

## 4.8 Loading system

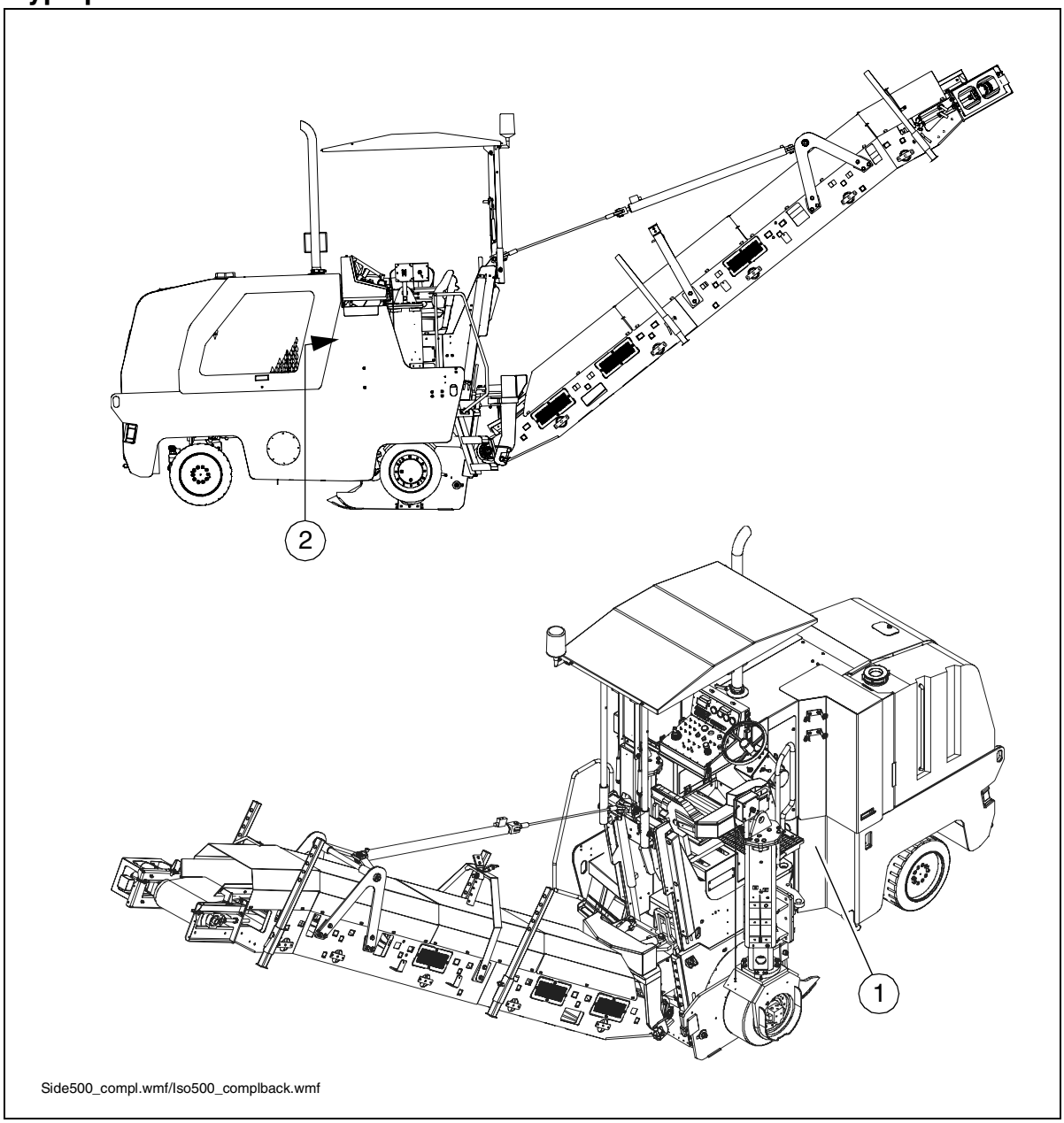
| | | |
|---|---|---|
| Belt width, upper conveyor | 400 | mm |
| Belt speed | approx. 4 | m/s |
| Loading capacity (theoretical) | approx. 80 | $m^3/h$ |

## 4.9 Electrical system

| | |
|---|---|
| On-board voltage | 24 V |
| Batteries | 2 x 12 V, 170 Ah |
| Generator | 24 V / 100 A |

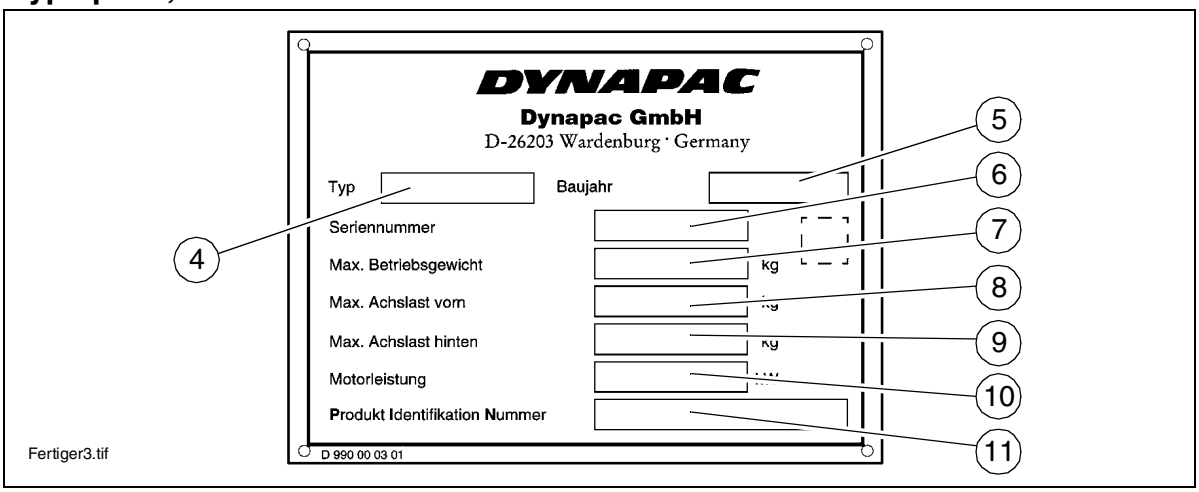
# 5 Identification points and type plates

## 5.1 Type plate and vehicle identification number




| Item | Designation | Position |
|---|---|---|
| 1 | Type plate | Vehicle frame, recess for swivel-mounted chassis leg. |
| 2 | Vehicle Identification Number (VIN) | Vehicle frame at rear, right-hand side of engine compartment flap. |

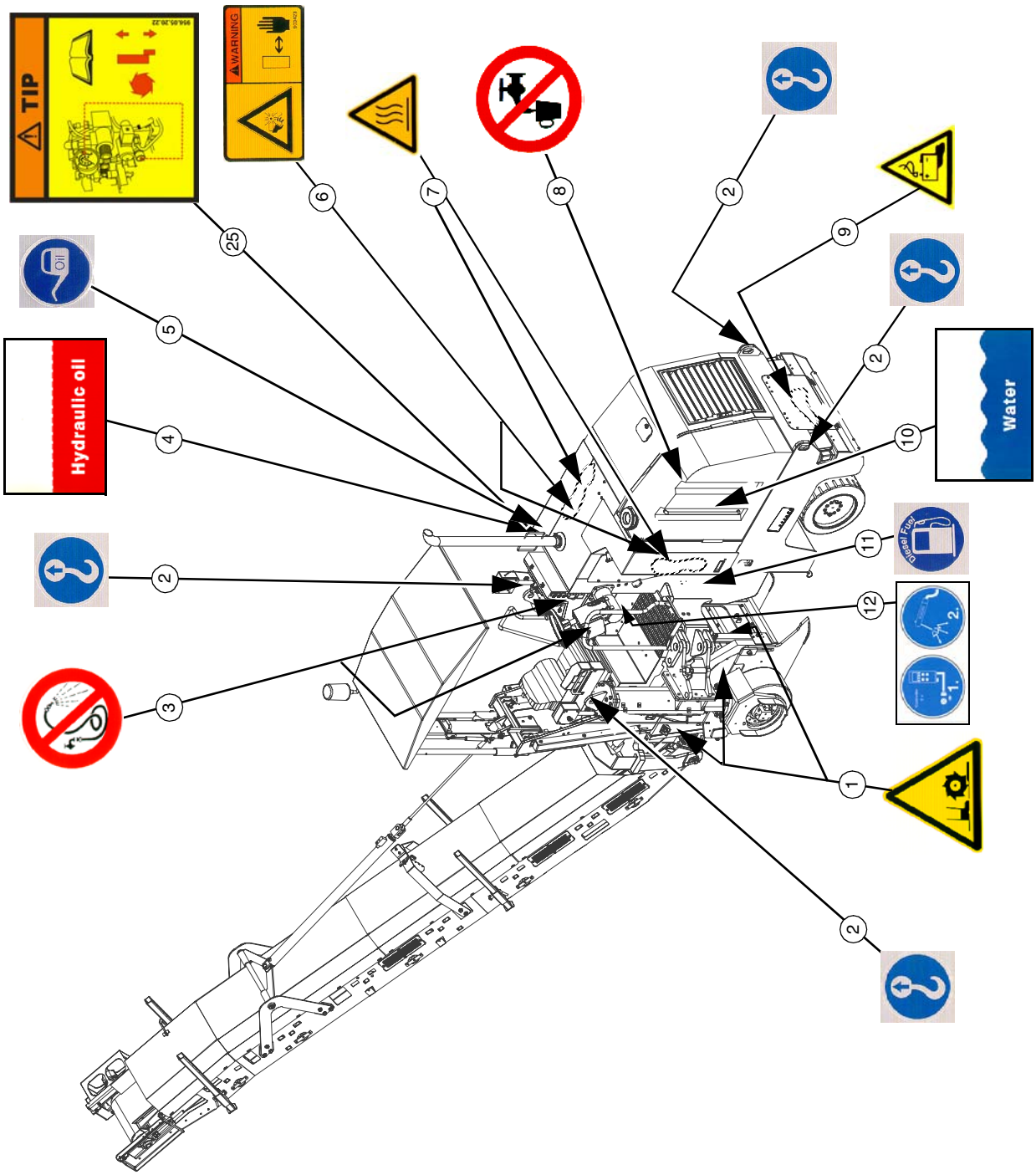
**Type plate, machine**

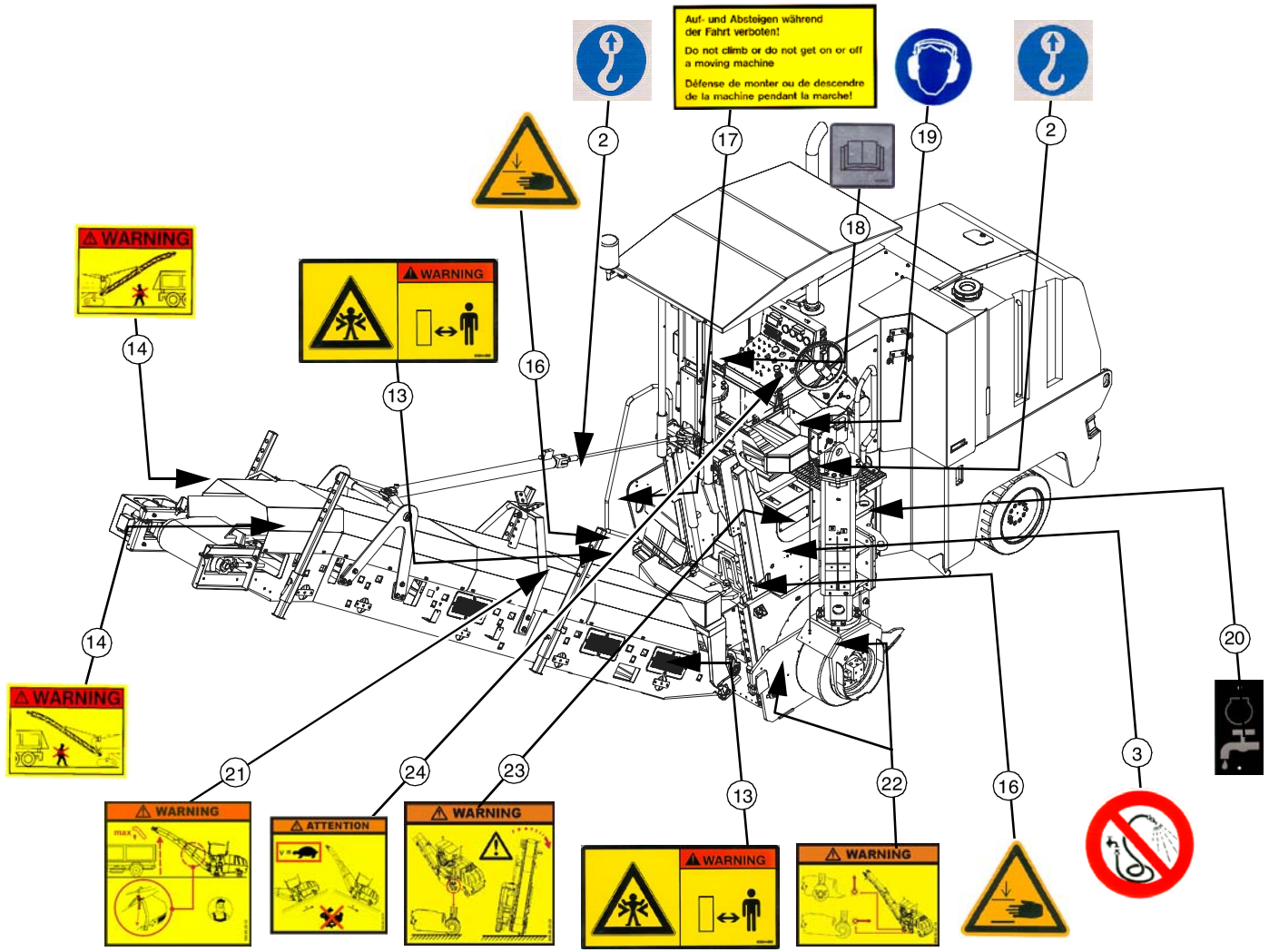



| Item | Designation |
|---|---|
| 4 | Planer type |
| 5 | Year of construction |
| 6 | Serial number of machine model |
| 7 | Maximum permissible operating weight incl. all extension parts in kg |
| 8 | Maximum permitted axle load at front in kg (CE) |
| 9 | Maximum permitted axle load at rear in kg (CE) |
| 10 | Nominal power in kW |
| 11 | Product identification number (PIN) |

☞ The vehicle identification no. stamped on to the machine must match the product identification number (11).

## 5.2 Identification points




Auf- und Absteigen während der Fahrt verboten!
Do not climb or do not get on or off a moving machine
Défense de monter ou de descendre de la machine pendant la marche!
WARNING
ATTENTION
2
13
14
16
17
18
19
20
21
22
23
24
3

| Item | Spare parts no. | Comments |
|---|---|---|
| 1 | 956.05.20.07 | |
| 2 | 990.00.02.05 | |
| 3 | 956.05.20.03 | |
| 4 | 956.05.30.03 | |
| 5 | 990.00.02.17 | |
| 6 | 956.04.53.00 | |
| 7 | 956.05.20.08 | Left and right on radiator |
| 8 | 956.05.20.02 | |
| 9 | 956.05.20.09 | Beside the batteries |
| 10 | 956.05.30.02 | |
| 11 | 990.00.02.15 | On filler neck for diesel fuel |
| 12 | 956.05.30.39 | |
| 13 | 956.04.49.00 | |
| 14 | 956.05.20.10 | |
| 15 | 956.05.20.11 | |
| 16 | 956.05.20.05 | |
| 17 | 956.05.20.04 | |
| 18 | 956.04.31.00 | |
| 19 | 956.05.10.04 | |
| 20 | 990.00.02.21 | |
| 21 | 990.05.20.18 | On both sides of the conveyor covering |
| 22 | 956.05.20.19 | |
| 23 | 956.05.20.20 | |
| 24 | 956.05.20.21 | |
| 25 | 956.05.20.22 | |

# 6 European standards

## 6.1 Permanent sound-pressure level

⚠ Ear protectors must be worn when operating this machine. The acoustic emission value may fluctuate greatly on the driver's ear as a result of the different materials used and may exceed 85 dB(A). Hearing damage may occur if ear protection is not worn. The measurements of noise emissions of the cold planer have been taken in accordance with the draft of ENV 500-6, dated March 1997 and ISO 4872 under free-field conditions.

**Sound-pressure level at driver's seat (head height):** $L_{AF}$ = dB(A)

**Sound-pressure level on the machine** $L_{WA}$ = dB(A)

| **Measuring point** | 2 | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|
| **Sound-pressure level $L_{AFeq}$ (dB(A))** | | | | | | |

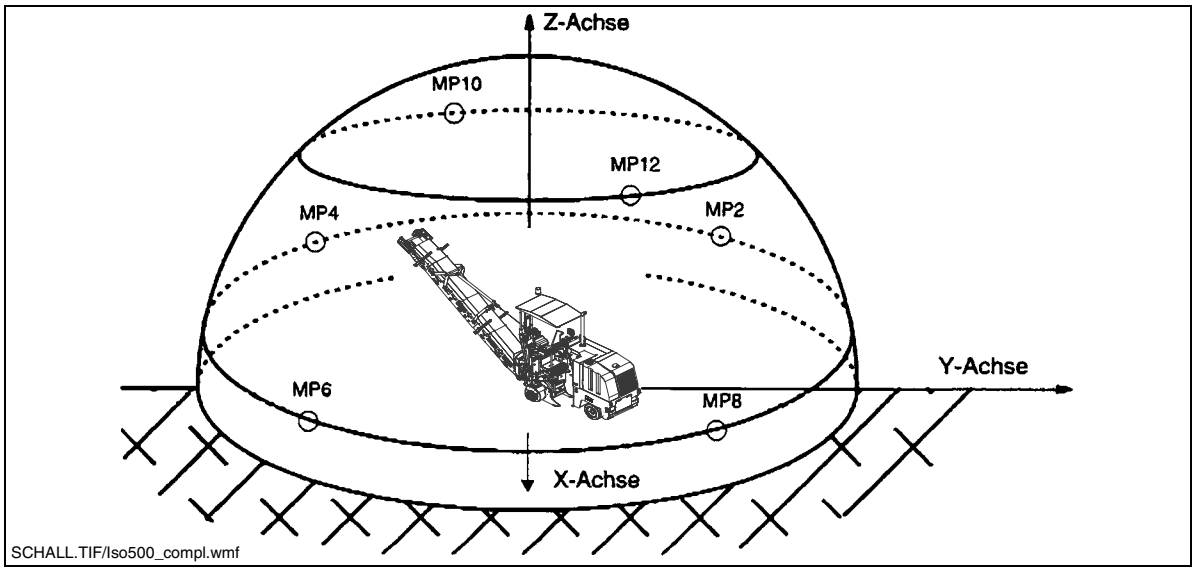
## 6.2 Operating conditions during the measurements

The diesel engine ran at nominal speed and the planer and conveyor units were operating.

## 6.3 Arrangement of measuring points

Semicircle-shaped measuring surface with a radius of 16 m. The machine was located in the centre. The measuring points have the following co-ordinates:

| | **Measuring points 2, 4, 6, 8** | | | **Measuring points 10, 12** | | |
|---|---|---|---|---|---|---|
| **Co-ordinates** | X | Y | Z | X | Y | Z |
| | ±11.2 | ±11.2 | 1.5 | - 4.32<br>+4.32 | +10.4<br>-10.4 | 11.36<br>11.36 |



## 6.4 Vibration acting on the entire body

When the machine is used for its intended purpose, the weighted effective values of acceleration at the driver's seat of $a_w = 0.5$ m/s$^2$ as defined in the draft of prEN 1032-1995 are not exceeded.

## 6.5 Vibration acting on the hand-arm

When the machines used for its intended purpose, the weighted effective values of acceleration at the driver's seat of $a_{hw} = 2.5$ m/s$^2$ as defined in the draft of prEN 1033-1995 are not exceeded.

## 6.6 Electromagnetic compatibility (EMC)

Compliance with the following limit values in accordance with the protection requirements of the EMC Guideline 89/336/EEC/08.95:

- Emitted radiation in accordance with DIN EN 50081-1/03.93:
  < 40 dB µV/m for frequencies of 30 MHz - 230 MHz at 3 m measuring distance
  < 47 db µV/m for frequencies of 20 MHz - 1 GHz at 3 m measuring distance

- Interference resistance against electrostatic discharging (ESD) in accordance with DIN EN 61000-4-2/03.96:
  The ± 4-KV contact and the ± 8-KV airborne discharge did not result in any influence on the cold planer which could be detected.
  Compliance is maintained with the modifications in accordance with assessment criterion "A", i.e. the cold planer continues to operate correctly during the test.

☞ Changes to the electrical or electronic components and their arrangement may only be conducted with the written approval of the manufacturer.

# C Transport

## 1 Safety regulations for transport

⚠ There is a risk of accident if the machine is prepared incorrectly and transportation is conducted incorrectly

Prepare the machine ensuring that all components are secured and cannot come loose. Dismantle all protruding and removable components and/or fit them so that they do not represent a hazard!

Lower the machine until the bit tips on the milling drum are approx. 1 cm above the ground, or if wooden supports are available, rest the tips gently on these.

The machine should be fastened onto the attachment points provided for this purpose and fixed to the transporter in accordance with the relevant regulations.
Ensure that the transport vehicle is authorised for transport of this type and that the maximum transport load is not exceeded.

Store all components which are not permanently connected to the machine in the boxes and storage areas provided.
Close all panels and check that they are securely fastened.


When loading via ramps, there is a risk that the machine will slip, tilt or overturn. Note wheelbase on 3-wheeled machines!


Drive carefully! Keep people away from the danger area!

**The following applies in addition to the above during transport on public roads:**

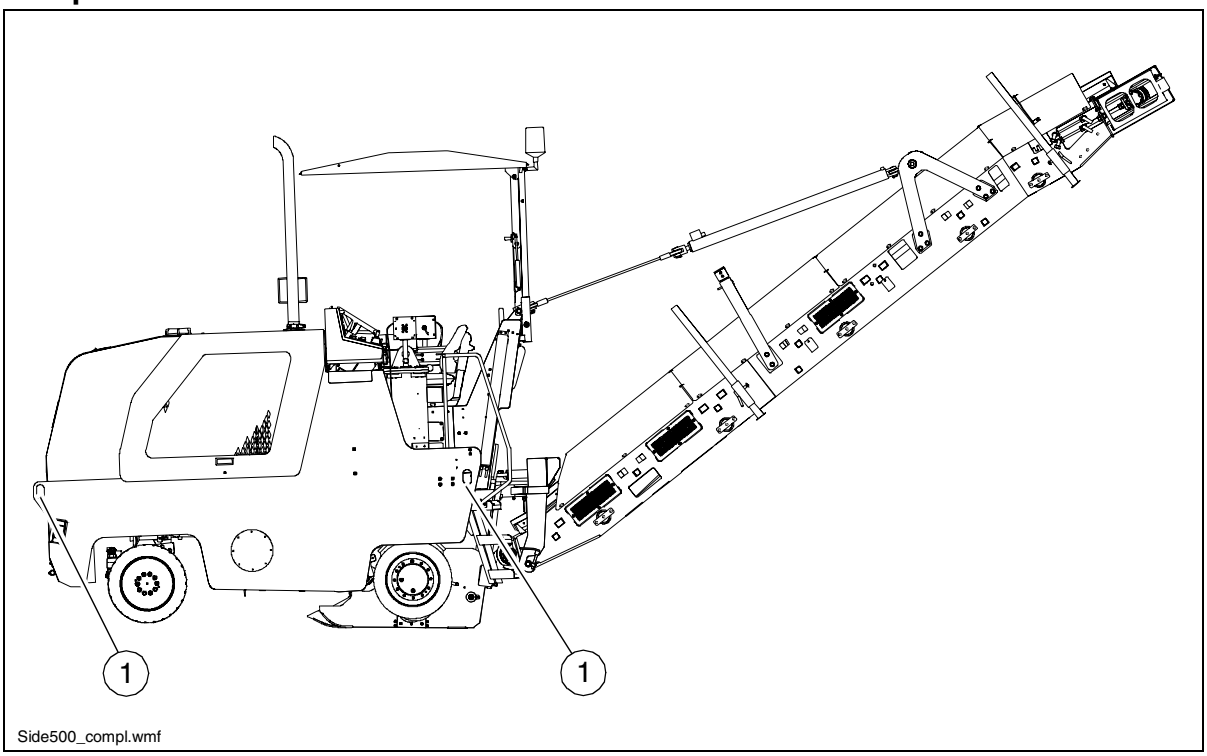
The machine operator must hold a valid driving license for this kind of vehicle.

The headlights must be set in accordance with the relevant regulations.

When driving on public roads, it may be necessary for someone to accompany the machine operator to give directions - especially at crossroads and road junctions.

Note the load bearing capacity of vaults and bridges as well as the permissible transport height and width.

## 2 Fix points




There are two fix points (1) on each side of the machine frame, at the front and back. The machine should be fastened to these points during transport on the transport vehicle.
The machine must be secured on the vehicle with appropriately sized lifting tackle (chain pulleys) and protected against tipping, slipping and dropping.

⚠ Note cable routing!
If necessary, fit a crosshead or a spacer to prevent damage to the water tank.

## 3 Transport on trailers

When transporting the machine on trailers, the load dimensions and weights should be taken into account when selecting and using appropriate tractor vehicles and transporters in accordance with the road traffic and registration authorities.

Approach ramps and tracks of the trailer should be coated with a slip-free material. There must be sufficient possible attachment points on the trailer.

Approach ramps and trailers must be upright during loading to prevent the machine from sliding or tilting sideways.

Always keep approach and transport areas free of contaminations, such as clay, grease or oil.

The machine must always reverse up onto the trailer (low loader). Only drive and manoeuvre in the operating gear.
If necessary, use winches to secure the machine when driving on.

The machine should be cleaned before being loaded.

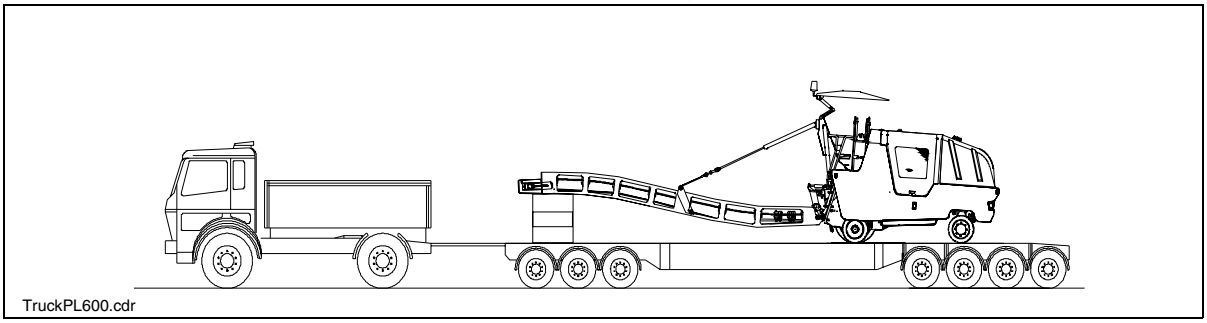
The machine should be parked and secured as follows:

☞ Position the machine on the transporter ensuring that the transport height, width and loaded distribution corresponds to the relevant regulations.

Activities and preventive measures:

- Lower the machine smoothly until the bit tips on the milling drum are approx. 0.5 - 1.0 cm above the ground, or if wooden supports are available, rest the tips gently on these.
- Weather protecting sun roof, working lights, warning lamps and operating devices should be folded inwards or removed. The side roof must be retracted.
- The front loading belt is placed on its support and the engine is switched off.
- Do not leave any insecure components on the machine or the load surface.
- Secure machine firmly on transport unit.

Depending on the nature of trailer, the upper conveyor can be supported on its own legs for transport, or can be placed on one of the supports provided on the trailer.
The upper conveyor must also be secured using suitable means.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## 4 Normal on-road travel

The machine can be registered for use on public roads by fitting a few optional items of extra equipment. However, these are only intended for use within enclosed construction sites.

If the loading or discharge section of the machine is outside the enclosed construction site, or if the machine needs to be driven from one section of a site to another, a second person must accompany the machine for that journey. All safety measures (cordoning off) required for this should be implemented.

If a machine needs to be parked in an area of heavy traffic, it must be cordoned off in accordance with specifications and the machine must also be chocked to prevent it from rolling away or tipping over.

If machine components protrude into another lane of traffic during milling or manoeuvring, this should be briefly cordoned off until the hazard has passed.

If necessary, the machine should always be used on the nearside, away from oncoming traffic.

For relocation or during journeys required over a long distance (distances > 1 km), the machine should be transported on its transporter for technical and safety reasons.

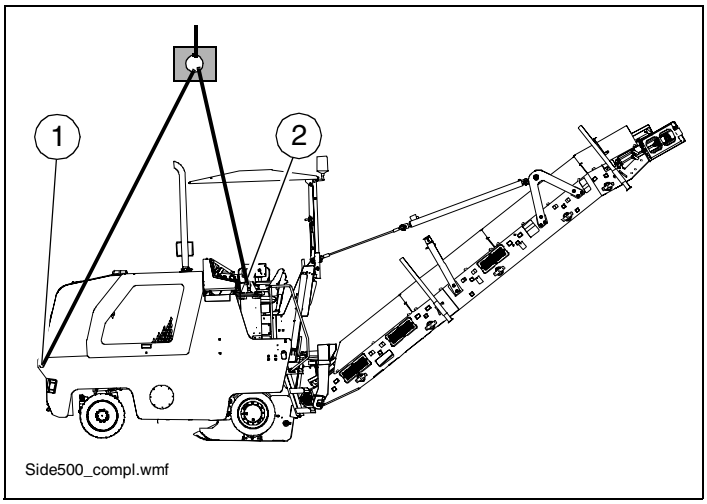
## 5 Loading by crane

In the event of breakdown, should it no longer be possible for the machine to be towed or if it cannot be loaded in any other way, there is also the possibility of raising it by crane.

⚠ Use lifting tackle with sufficient load bearing capacity.
(For weights and dimensions, refer to Chapter B). Ensure that the steel cables, shackles and crosshead are large enough.

☞ Four attachment points (1,2) are provided on the machine frame for loading the vehicle using lifting gear.

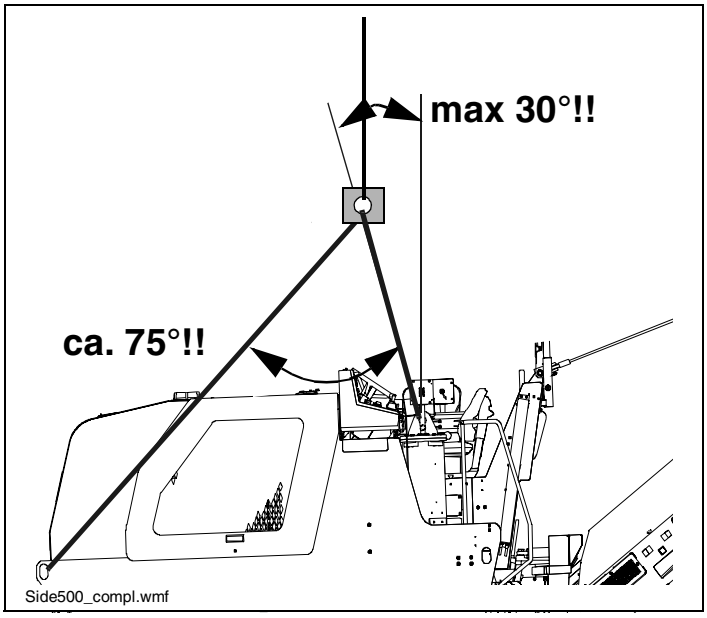
- Secure vehicle wherever it is parked up.
- Store loose parts and accessories, e.g. lamp fittings, in a safe place.
- Attach lifting gear to the four attachment points (1, 2).




⚠ During transport, ensure that the machine is always horizontal!
Ensure that there is nobody in the danger area.

⚠ Note cable routing!
If necessary, fit a crosshead or a spacer to prevent damage to the water tank.

⚠ The chains or steel cables to the front and rear lift eyes must be arranged at a relative angle of approx. 75°! The rear cable must be at no more than a 30°angle away from the perpendicular! Danger of accidents if this is not done!



## 6 Towing procedure

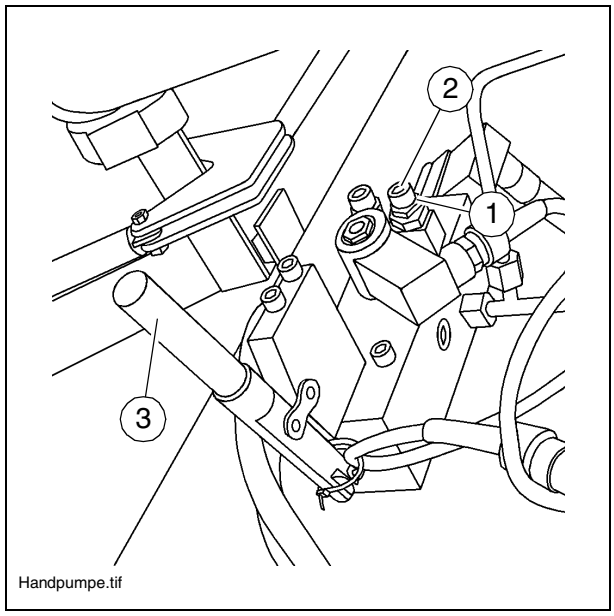
Comply with all specifications and introduce all requisite safety measures required for the towing of construction equipment.

The tractor vehicle must be such that it can still hold the machine when travelling downhill.
Only use authorised towbars!

Do not disengage travel drive and release brake until the machine has been properly secured to prevent accidental rolling away, or is already properly connected to the towing vehicle.

The engine compartment of the machine includes a hand pump which must be activated in order to tow away the machine.

- First of all, unfasten the lock nut (1) on the hand pump and tighten the threading dowel (2) as far as possible into the pump.
  Re-tighten the lock nut for safety.
- Now use the lever to activate the hand pump (3) until enough pressure has been developed and the brakes have released.



Handpumpe.tif

The brakes will release themselves at a pressure of approx. 30 bar.

The machine can now be carefully and slowly towed out of the construction site area.

Always tow the shortest possible distance to transport equipment or to the nearest safe parking area.

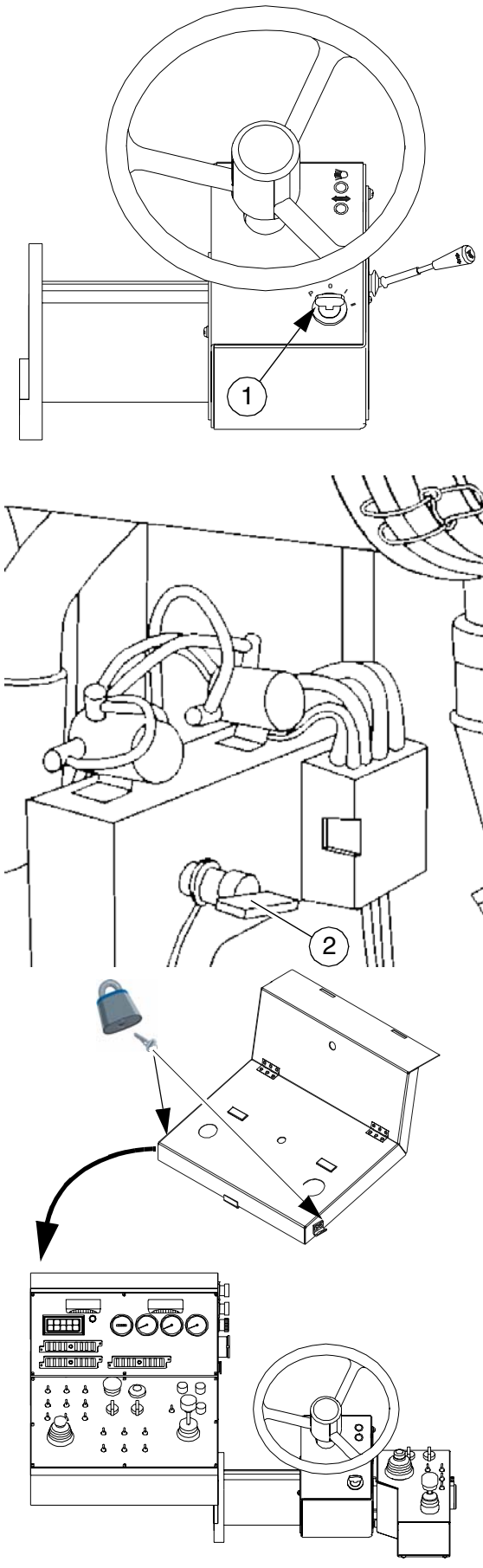
After towing, unfasten the threading dowel (2) a few turns, then secure again using the lock nut (1).
The brakes are now active again and the machine is protected against rolling away.

## 7 Secure before parking up

When parking on publicly accessible areas, the machine should be secured to ensure that unauthorised persons and children cannot cause any damage to it. The machine should be parked on level ground.

- Lower the machine evenly until the milling drum is almost in contact with the ground. Access to the milling drum should be cordoned off.

- Remove ignition key (1) and master switch (2) and take them with you – do not leave them „hidden“ in the machine.
- Fit cover (3) onto operating panel and lock.
- Store loose parts and accessories, e.g. lamp fittings, in a safe place.
- Lock all flaps, covers and storage bins.

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# D Operation

## 1 Safety regulations

Injury or death can result whenever the engine, travel drive, milling drum, conveyor or lifting units are engaged.
When operating the machine, therefore maintain strict compliance with the sections of these operating instructions and the safety specifications dealing with personal conduct.
Before starting the machine, ensure that no-one is working on or underneath the machine, or standing in the danger area!

- Do not start up the engine and do not use any of the controls if there is a notice specifically prohibiting their use!
  Unless otherwise specified, only operate the controls when the engine is running!

- Check thoroughly before starting the machine. Ensure that the machine status and position as well as the position of all safeguards, operating and adjustment fixtures permit the machine to be started safely.

- Sound the horn as a warning before starting the machine.

Do not stand in the danger area of the vehicle unless absolutely necessary. Danger of death!

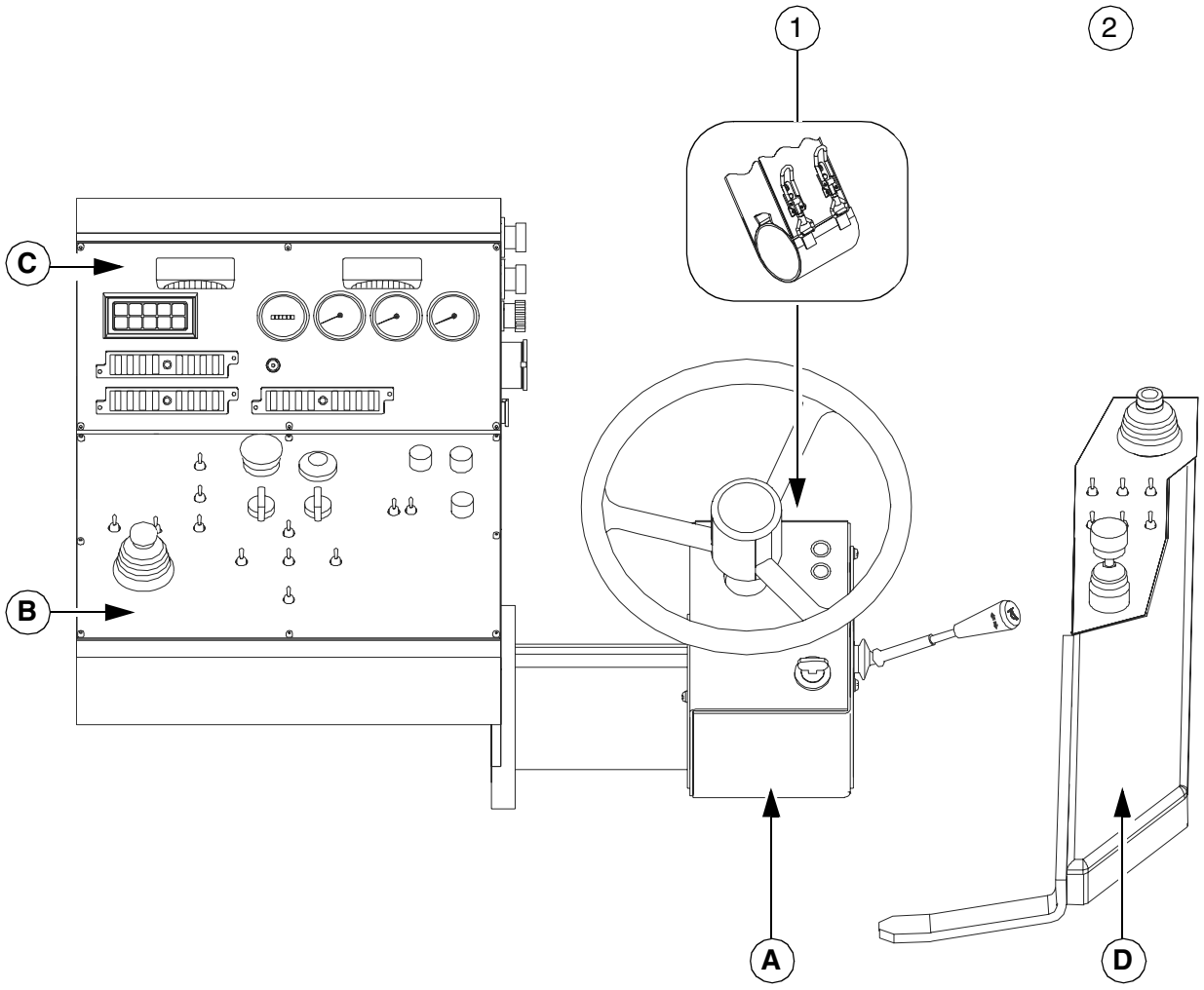
- While the equipment is operating, maintain a continuous check to ensure that no-one is in danger!
- Ensure that all guards and covers are present and that they are properly secured!
- Remedy any damage detected without delay! Operation is prohibited in the event of defects!
- Do not allow unauthorised people to travel on the machine.
- Clear all obstacles off the road surface and out of the working area!
- Always endeavour to select a position for the driver which places him/her on the nearside, i.e. away from road traffic!
- Maintain an adequate safety distance from overhangs, other equipment and other danger areas!
- On uneven ground, drive carefully to prevent slipping, tilting or overturning.

- Always ensure that the ground is able to support the weight of this machine!

Always keep the vehicle under careful control. Never attempt to load it beyond its capacity limits!

# 2 Controls

## 2.1 Control panel

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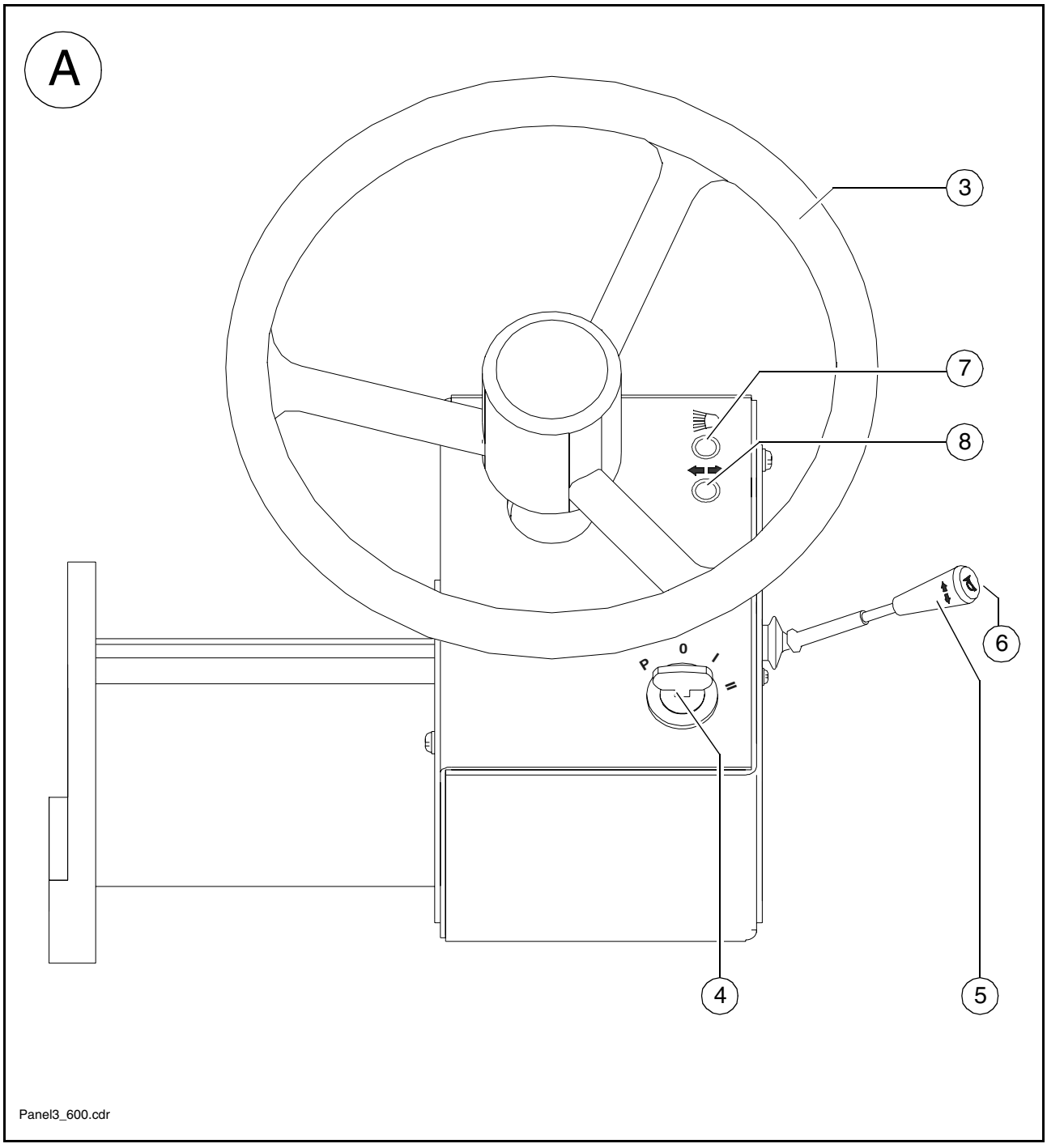
| Item | Designation | Short description |
|---|---|---|
| 1 | Safeguard steering unit | The entire steering unit can be set up to suit the needs of the driver.<br>Open both safeguards and turn steering unit to left or right using steering wheel, then swivel upwards or downwards.<br>Close safeguard again once desired position has been reached. |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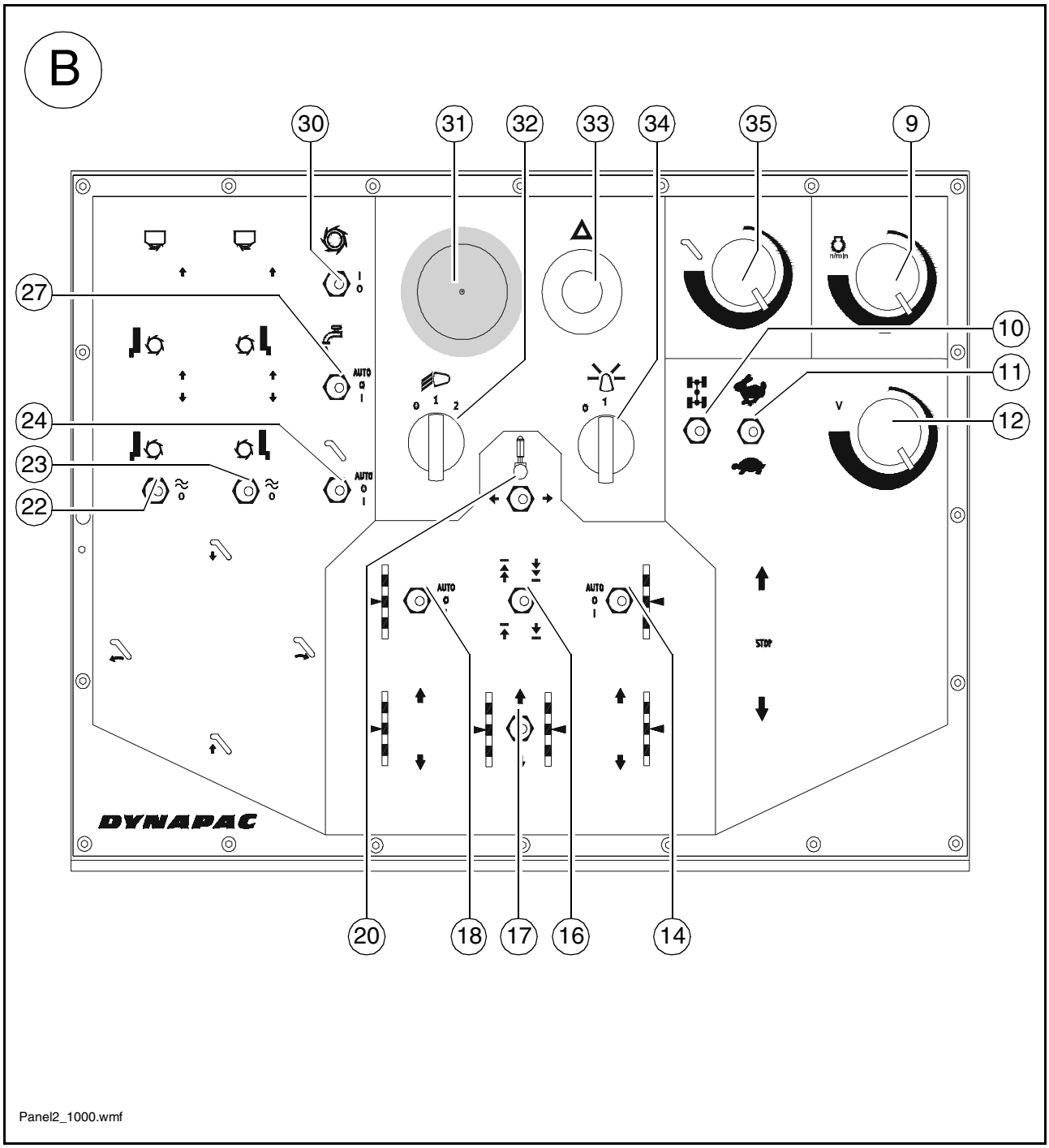
| Item | Designation | Short description |
|---|---|---|
| 3 | Steering wheel | Steering action is transmitted hydraulically to the front wheel or wheels.<br>To allow for safe handling, the steering wheel is equipped with a bracket handle. |
| 4 | Ignition lock | Key positions:<br>- P : Active lighting + hazard flasher can be engaged<br>- 0 : Ignition OFF<br>- 1 : Ignition ON<br>- 2 : Starter function<br>☞ It is only possible to start the engine if the drive lever is in centre position, the milling drum is not engaged and the switches for raising and lowering the machine are in neutral position.<br>⚠ The engine cannot be started until indicator lamps 38, 39, 40, 41, 42 go out.<br>☞ Key can only be removed from ignition lock in positions P and 0. |
| 5 | Multi-function switch | Integrated flasher switch and switch for high-beam and low-beam lighting, and horn button (6).<br>- Use turn signals (flashers) to change direction of travel on roads.<br>- High-beam headlights are switched on by pulling the lever fully upwards. To switch back to low-beam headlights, press the lever back down into centre position. |
| 6 | Horn | If danger threatens and as an acoustic warning signal, activate before setting off. |
| 7 | High beam indicator (blue) | Lights up whenever high-beam is switched on (on ignition lock).<br>STOP Avoid dazzling oncoming traffic! |
| 8 | Direction of travel indicator telltale | Flashes whenever direction of travel indicator is activated. |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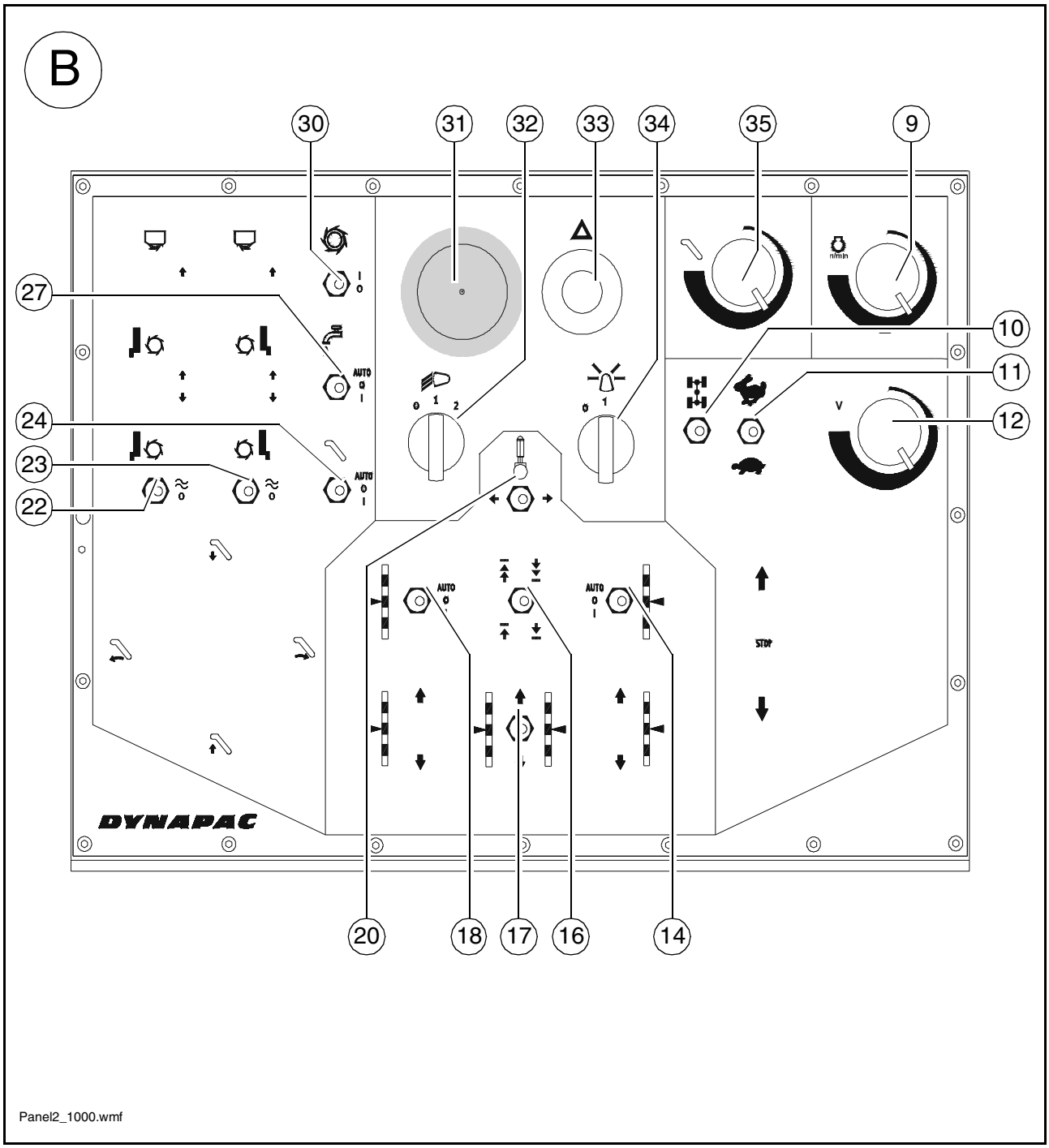
| Item | Designation | Short description |
|---|---|---|
| 9 | Engine speed adjuster | Infinitely variable adjustment of engine speed (provided that drive lever is fully deployed).<br>Min. setting: Idle speed<br>max. setting: Nominal speed<br>☞ Automatic engine speed control keeps the presset engine speed at the same level, even when operating under load. |
| 10 | Electric differential lock / ASC ON/OFF | To activate and deactivate the differential lock in conjunction with the anti-slip control (ASC).<br>Apply when the machine encounters traction problems.<br>- Top shift position: Differential lock ON / ASC ON<br>- Middle shift position: Differential lock OFF / ASC ON<br>- Bottom shift position: Differential lock OFF / ASC OFF<br>☞ When in transport gear, the ASC is automatically deactivated. The differential lock works in transport and working gear.<br>☞ During reverse travel, the differential lock is automatically deactivated. The ASC works during forwards and reverse travel.<br>☞ Note "ASC / differential lock" indicator lamp |
| 11 | Travel drive fast / slow | Two switch positions can be selected:<br>- Hare: Transportation speed<br>- Tortoise: Operating speed<br>☞ When changing from working speed to transportation speed, the milling drum transmission is automatically disengaged.<br>⚠ This operating mode can only be changed over once the machine is stationary and the drive lever is in centre position! |
| 12 | Preselection controller Travel drive | This is used to set the target engine speed which should be reached when the drive lever is fully deployed. |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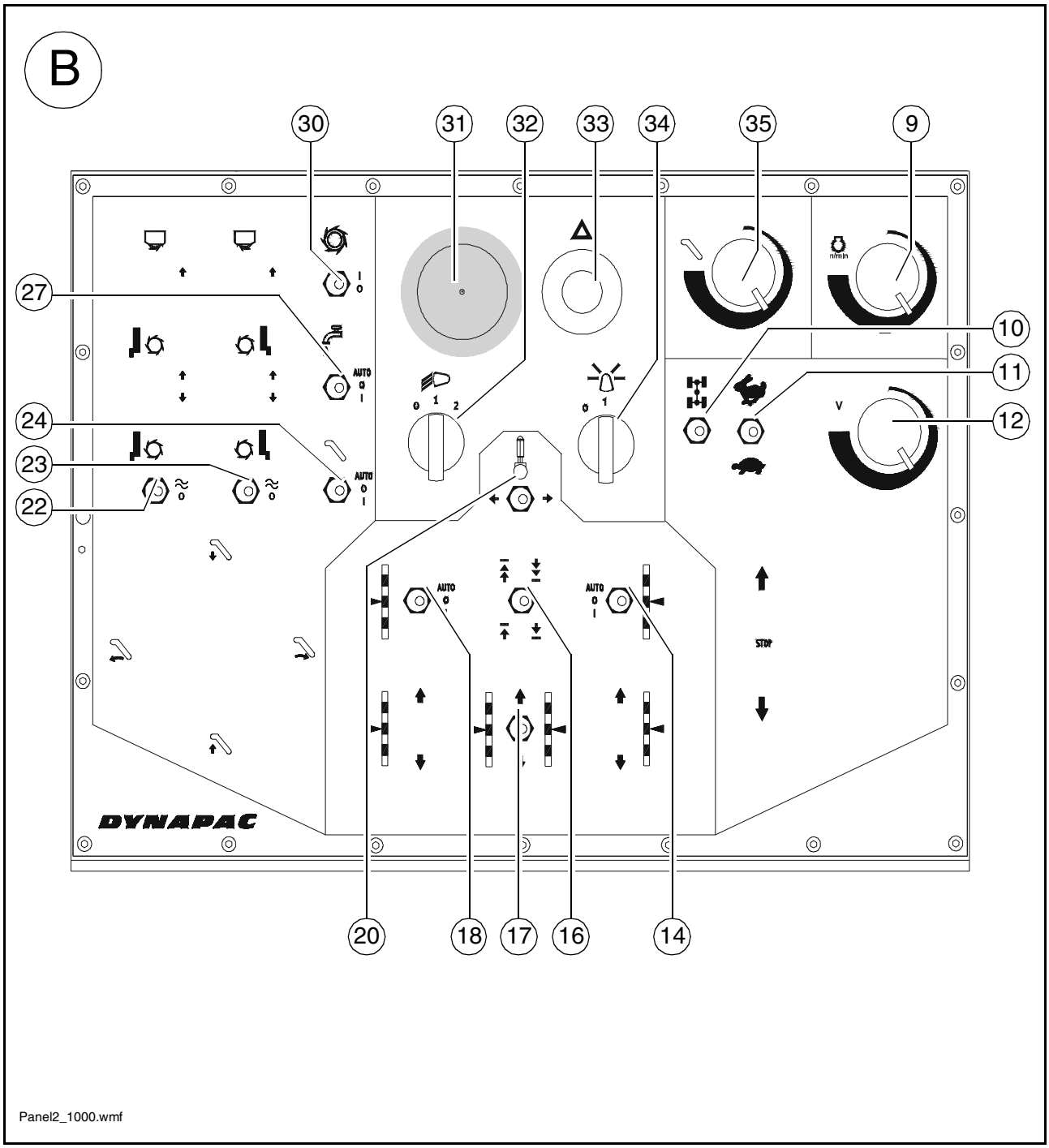
| Item | Designation | Short description |
|---|---|---|
| 13 | not used | |
| 14 | Right-hand levelling function | Three switch positions can be selected:<br>- 0 : Levelling OFF<br>- AUTO : Levelling engages automatically when the control lever for the travel drive is fully extended (milling mode)<br>- 1 : Levelling ON<br>Levelling active, responds regardless of the control lever.<br>☞ Adjustments using the connected levelling devices can only be undertaken in switch positions AUTO and 1. |
| 15 | not used | |
| 16 | Raising and lowering speed | Two switch positions can be selected:<br>- Top shift position: Fast raising and lowering speeds (e.g. for inching operation)<br>- Bottom shift position: Normal raising and lowering speed (e.g. for initial surface scraping and milling) |
| 17 | Machine raising/ lowering, left + right-hand sides | To evenly raise or lower the machine (e.g. for "initial surface scraping" or raising the machine at the end of the milling lane), the two chassis legs are moved together. |
| 18 | Left-hand levelling function | Three switch positions can be selected:<br>- 0 : Levelling OFF<br>- AUTO : Levelling engages automatically when the control lever for the travel drive is fully extended (milling mode)<br>- 1 : Levelling unit ON<br>levelling unit active, responds independently of control lever.<br>☞ Adjustments using the connected levelling devices can only be undertaken in switch positions AUTO and 1. |
| 19 | not used | |
| 20 | Hydraulically swivelling chassis leg in / out(○) | To swivel the right-hand chassis leg in and out, e.g. for precision milling of edges.<br>☞ Before the chassis leg is swivelled in or out, it needs to be retracted completely and the driver's seat needs to be slid inwards as far as possible.<br>Travel is only approved when the chassis leg is swivelled all the way in or out. |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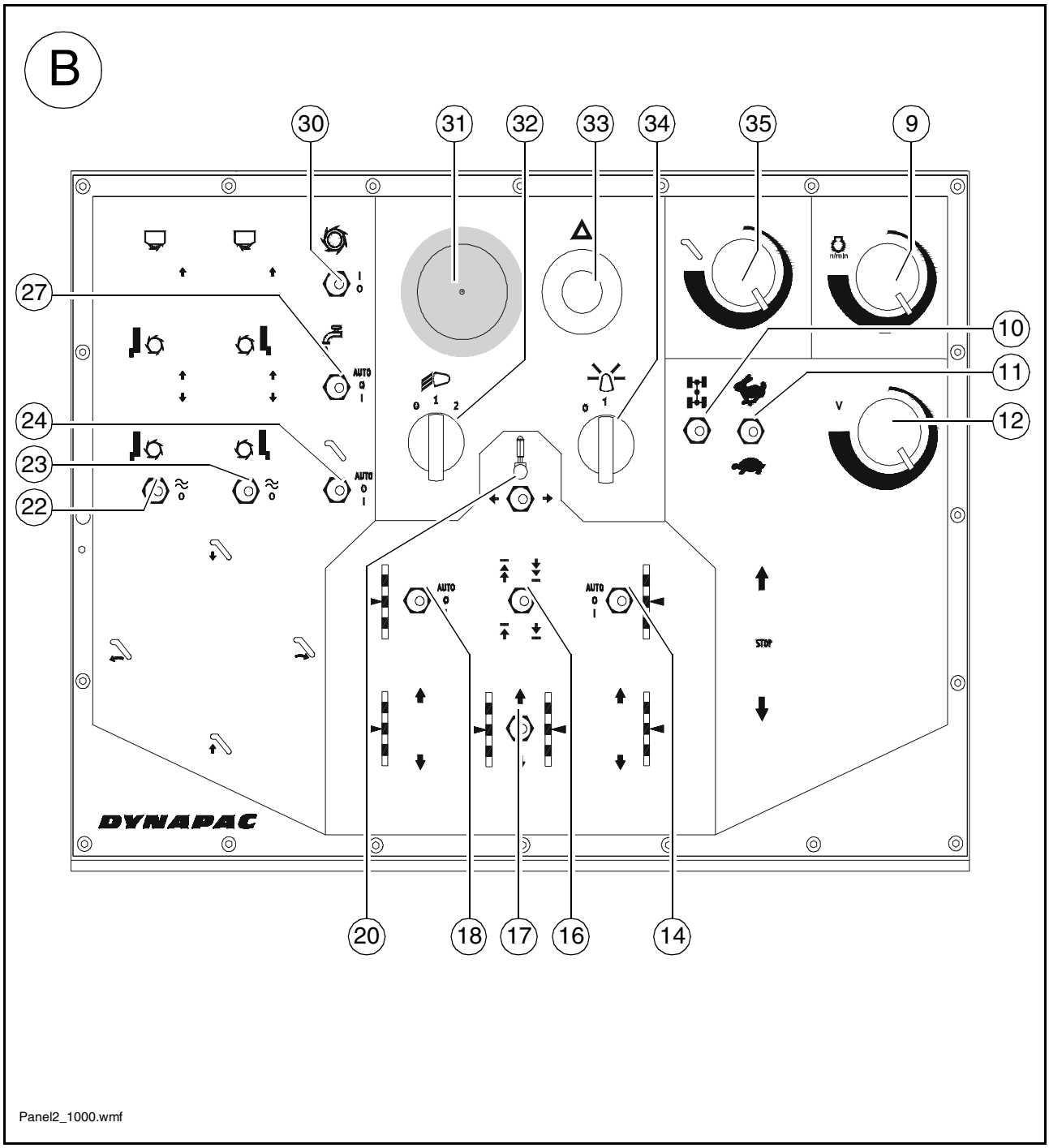
| Item | Designation | Short description |
|---|---|---|
| 21 | not used | |
| 22 | Selector switch<br>Sliding shoe | Two switch positions can be selected :<br>- 0 : Sliding shoe blocked - remains in desired position.<br>- ~ : Sliding shoe in floating position<br>☞ During milling operations, the sliding shoe should always be in float position. Under certain working conditions, it is however possible for the sliding shoe to dig into the substrate. This can be avoided through use of the blocking or relief function. |
| 23 | Selector switch<br>Scraper<br>(moldboard) (○) | Two switch positions can be selected :<br>- 0 : Moldboard blocked - remains in desired position.<br>- ~ : Moldboard in floating position<br>☞ During milling operations, the scraper should always be in float position. Under certain working conditions, it is however possible for the scraper to dig into the substrate. This can be avoided through use of the blocking or relief function. |
| 24 | Mode<br>Upper conveyor | Three switch positions can be selected :<br>- 0 : upper conveyor transport function OFF<br>- AUTO : transport function is linked to the control lever. The upper conveyor only starts when the milling procedure begins.<br>The upper conveyor stops or overruns when the milling procedure is interrupted or ended.<br>- 1 : transport function of upper conveyor in forwards direction ON<br>☞ The upper conveyor only runs in conjunction with the activated milling drum. |
| 25 | not used | |
| 26 | not used | |
| 27 | Water pump<br>ON / OFF / AUTO | Three switch positions can be selected:<br>- 0 : Water pump OFF<br>- AUTO : Water sprinkling is linked to the control lever. The water pump does not start to pump water until the planing operation starts (deploy the drive lever).<br>1 : Continuous sprinkling<br>STOP This water is definitely not drinking quality! |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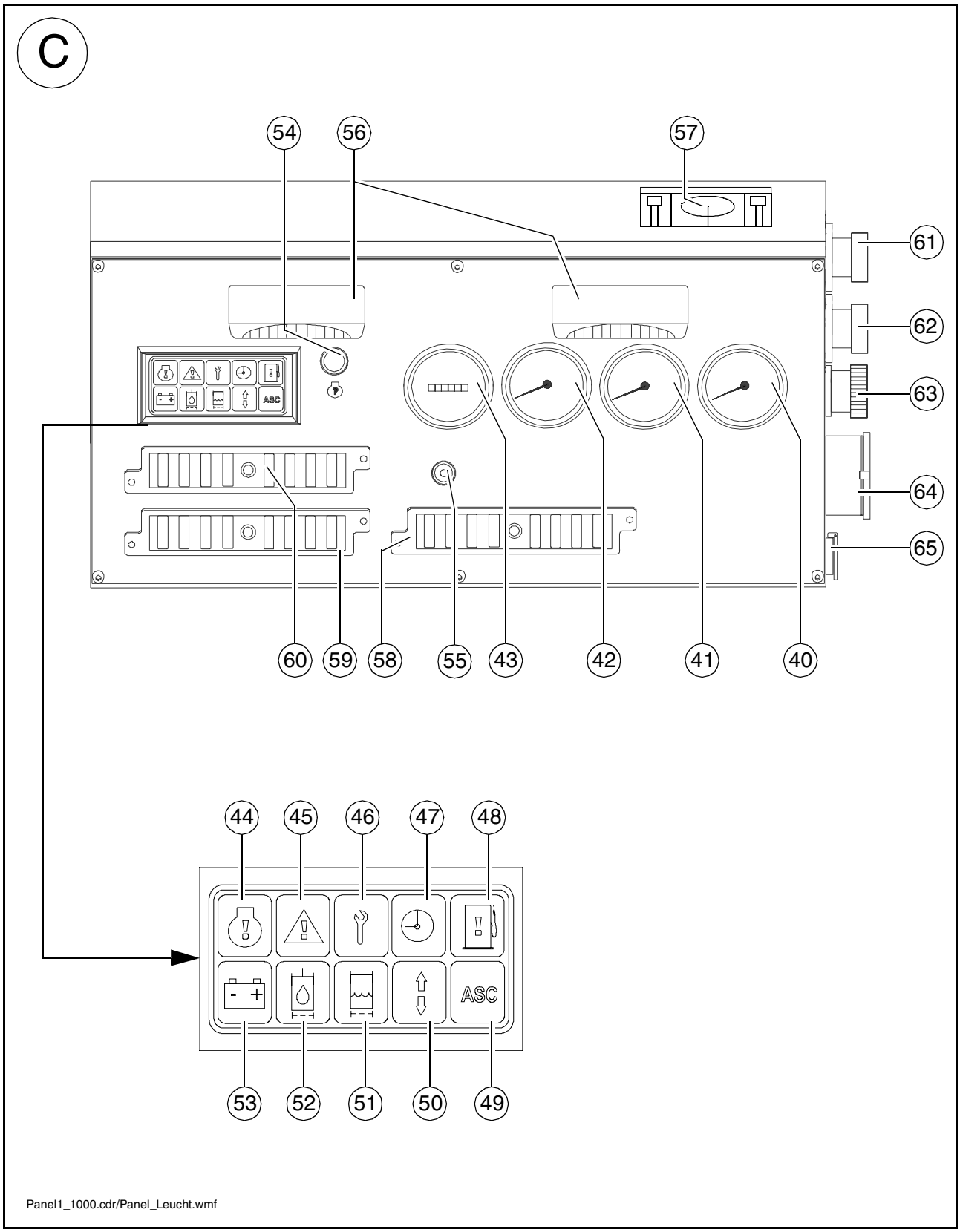
| Item | Designation | Short description |
|---|---|---|
| 28 | not used | |
| 29 | not used | |
| 30 | Milling drum drive ON / OFF | This switches the milling drum drive on or off.<br>- Top shift position: Milling drum drive engaged,<br>- Bottom shift position: Milling drum drive engaged.<br>⚠ Before the milling drum drive is engaged, check to ensure that the machine is not lowered to such a point that the milling drum makes contact with the substrate.<br>☞ The milling drum drive can only be activated when in working gear and when the drive lever is in its centre position.<br>☞ The engine cannot be started if the milling drum drive is engaged! |
| 31 | EMERGENCY STOP button | Press in emergencies (people in danger, risk of collision, etc.)<br>- The engine, drive units and steering are disengaged whenever the EMERGENCY STOP button is pressed.<br>To restart the engine, all EMERGENCY STOP buttons must be raised. |
| 32 | Light switch | Three switch positions can be selected :<br>- 0 : Light OFF<br>- 1 : Travel lighting ON (headlights, operating panel lighting)<br>- 2 : Work lighting ON (working lights, headlights, operating panel lighting) |
| 33 | Hazard flasher | Switch on for safety on roads |
| 34 | Warning lights | Two switch positions can be selected:<br>- 0 : Hazard lights OFF<br>- 1 : Hazard lights (rotary beacon) ON<br>☞ Switch on for safety on roads |
| 35 | Speed governor on upper conveyor | Used to adjust the discharge rate for cut material to prevailing conditions (quantity of material involved, delivery speed).<br>This adjustment can also be made while the milling operation is running.<br>STOP Ensure that no cut material accidentally gets "slung" from the upper conveyor! |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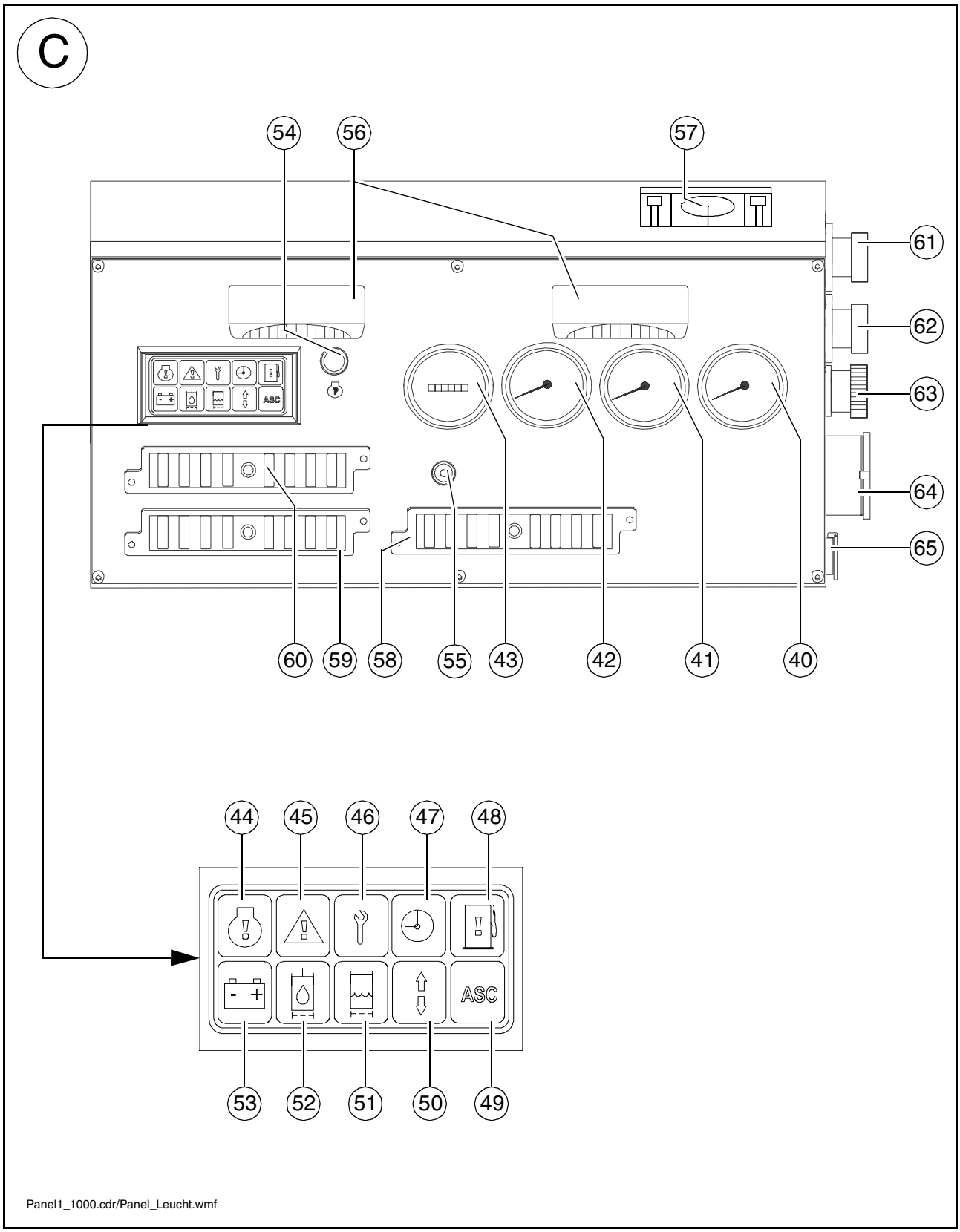
| Item | Designation | Short description |
|---|---|---|
| 40 | Fuel gauge | Always keep an eye on the fuel gauge.<br>⚠ Never run the diesel tank dry! Otherwise, the entire fuel system would need bleeding. |
| 41 | Coolant temperature | The coolant temperature should be between 60°C and 100°C.<br>Continuous operation at excessively low or high coolant temperature can damage the engine.<br>☞ Check coolant temperature gauge frequently.<br>⚠ Switch off engine if temperature does not match the specified values.<br>Check coolant level. |
| 42 | rpm meter (tachometer) | Displays engine speed in revolutions per minute (rpm).<br>☞ Engine speed can be adjusted using the engine speed adjuster. |
| 43 | Operating hours meter | The operating hours are only counted while the engine is running.<br>Comply with specified maintenance intervals. (refer to Chapter F) |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| Item | Designation | Short description |
|---|---|---|
| 44 | Error message with engine stop (red) | Lights up whenever a serious fault occurs in the engine. The engine is switched off automatically as a safety precaution.<br>☞ Lights up for a few seconds to check that the ignition is engaged.<br>⚠ Do not start the engine until this indicator lamp has gone out. |
| 45 | Error message (yellow) | Indicates that there is a fault with the engine. The machine can continue to be operated temporarily. However, to prevent further damage, the fault should be rectified as soon as possible.<br>☞ Lights up for a few seconds to check that the ignition is engaged.<br>⚠ Do not start the engine until this indicator lamp has gone out. |
| 46 | Maintenance (yellow) | Indicates that coolant (water) level in engine is too low.<br>⚠ To prevent damage to the engine, top up the coolant (water) level immediately to its correct level.<br>☞ Lights up for a few seconds to check that the ignition is engaged.<br>⚠ Do not start the engine until this indicator lamp has gone out. |
| 47 | Preheat indicator (yellow) | Lights up when ignition is switched on once combustion air to the engine has been preheated to the correct temperature.<br>⚠ Do not start engine until this indicator lamp has gone out to minimise wear and to ensure better starting characteristics.<br>⚠ Do not start the engine until this indicator lamp has gone out. |

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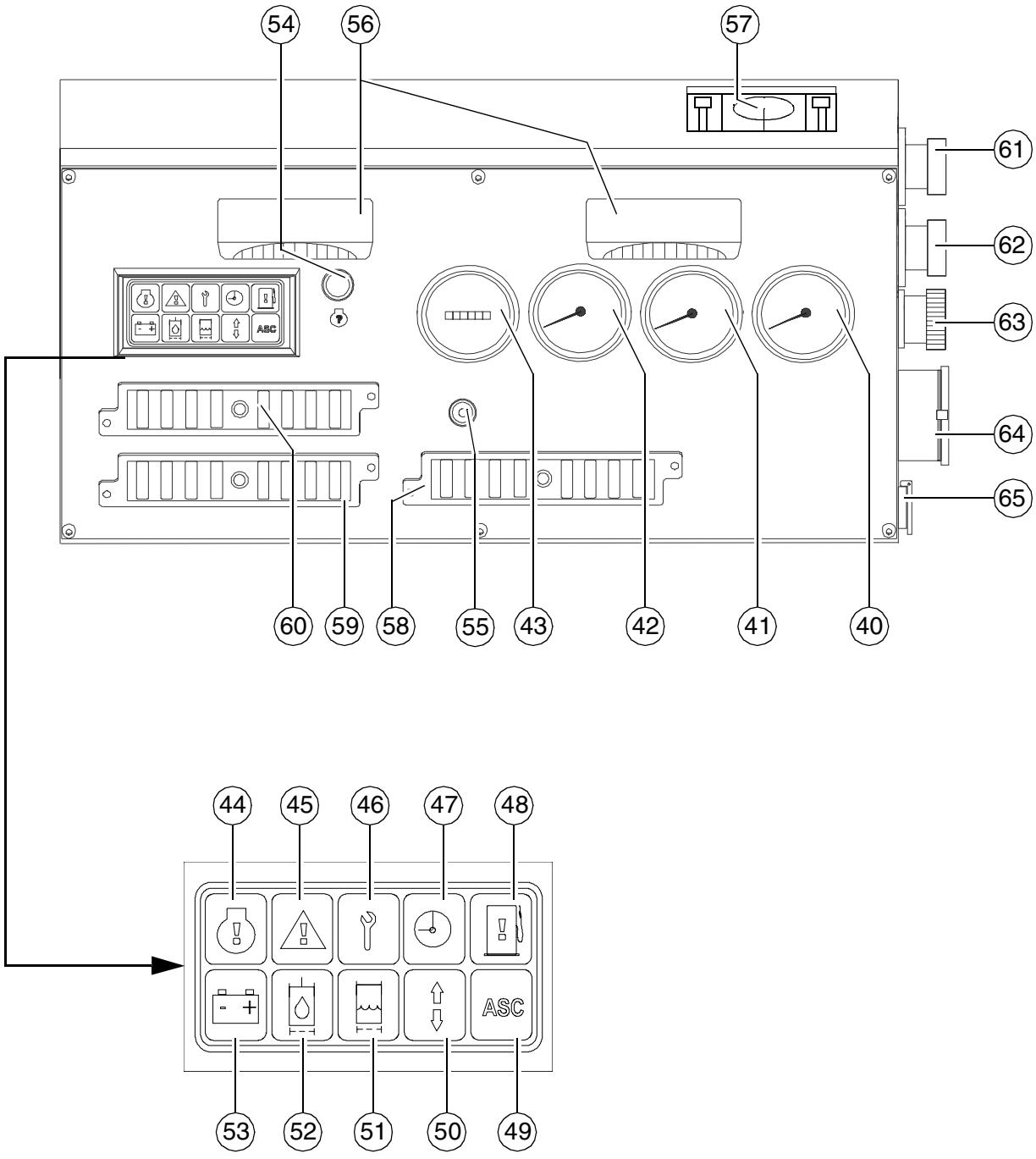





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| Item | Designation | Short description |
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| 48 | Warning lamp "water in fuel" (yellow) | Lights up if there is excessive water in the fuel system separator.<br>⚠ To prevent damage to the engine, drain off separated water immediately, in accordance with the Maintenance Instructions.<br>☞ Lights up for a few seconds to check that the ignition is engaged.<br>⚠ Do not start the engine until this indicator lamp has gone out. |
| 49 | Anti-slip control (ASC) | Indicator lamp for ASC<br>- Continuous light indicates that the anti-slip control is active.<br>- If there is a fault in the anti-slip control unit, a flash code is issued.<br>☞ Refer to Malfunctions section |
| 50 | Steering aid / error check Travel drive (yellow) | Always lights up when the steering system is in straight ahead position as well as during steering movements with the differential lock activated.<br>- If a fault occurs in the travel drive control system, a flash code is issued.<br>☞ Refer to Malfunctions section |
| 51 | not used | |
| 52 | Hydraulic filter-Indicator (yellow) | Lights up if ever hydraulic filter needs replacing.<br>☞ Replace filter cartridge acc. to Maintenance Instructions! |
| 53 | Battery charge check (red) | Must go out after starting at raised speed.<br>- If this light fails to go out, switch off the engine. |
| 54 | Fault / trouble-shooting query | If a fault discovered on the engine is indicated by one of the warning lamps, a code is displayed which correlates with a defined defect.<br>Press the button until this 3-digit code is indicated by the warning lamp.<br>☞ Refer to "Malfunctions" section for details of error code query procedure! |

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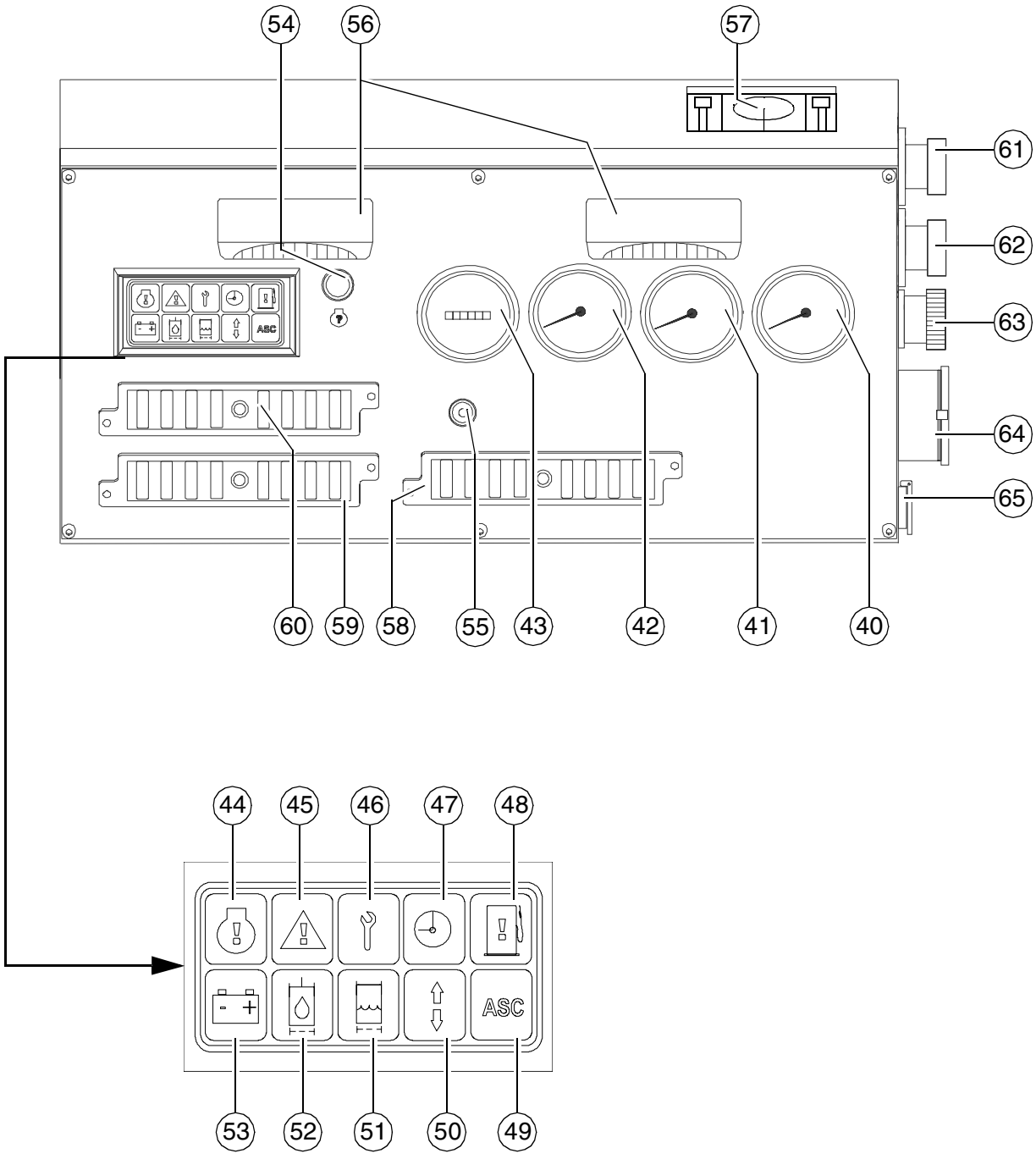
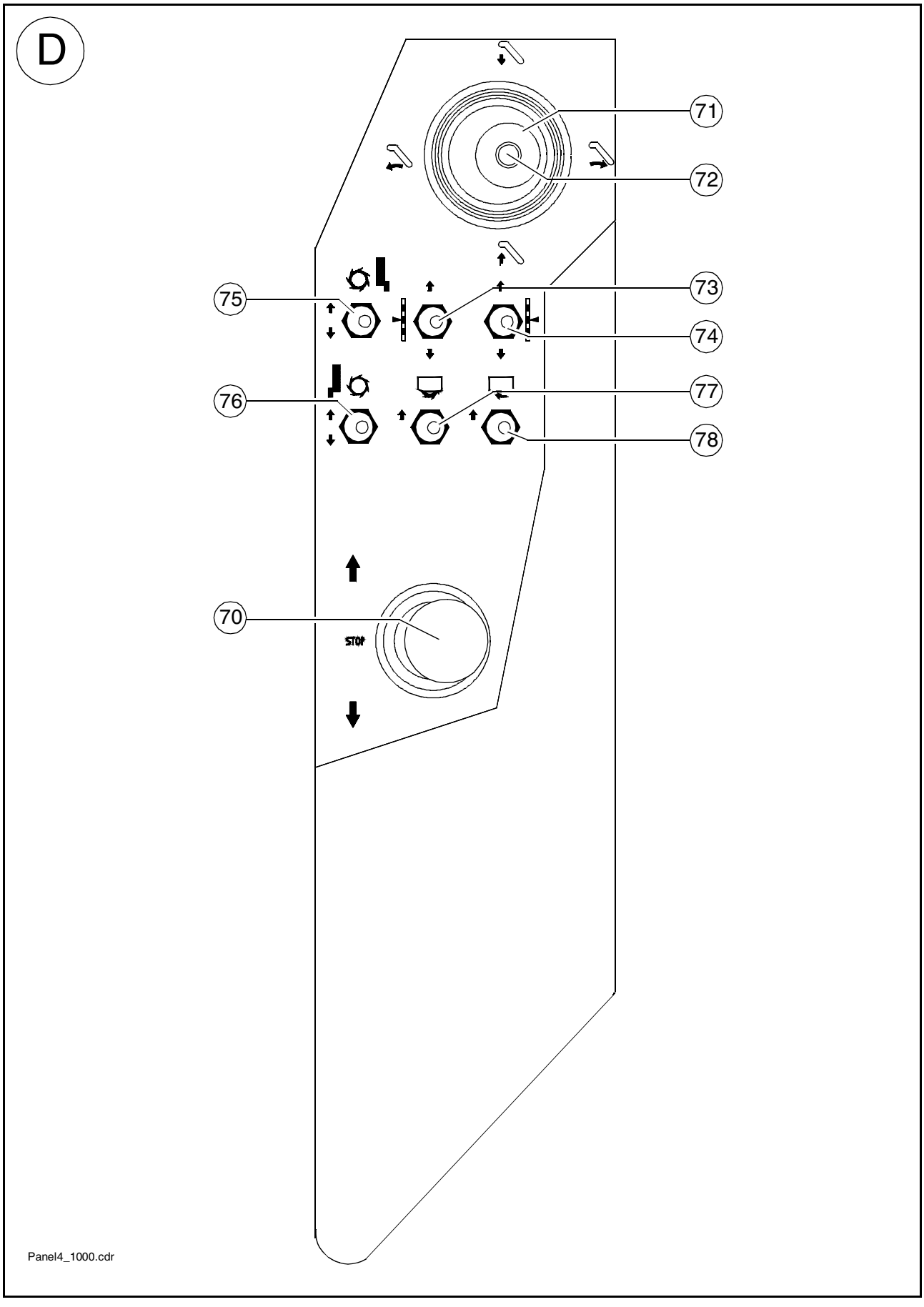



Panel1_1000.cdr/Panel_Leucht.wmf

| Item | Designation | Short description |
|---|---|---|
| 55 | Start inhibit | Indicates that one of the following operating modes prohibits the machine from being started:<br>- milling drum engaged<br>- drive lever not in centre position<br>- raising/lowering scraper is actuated<br>- raising/lowering sliding shoe is actuated<br>- raising side boards is actuated<br>- control lever on upper conveyor is actuated |
| 56 | Lighting | To light operating panel when parking lights are switched on. |
| 57 | Water scales / inclination indicator | - If the air bubble is located inside the marked area in the centre of the tube, the machine is standing on level ground.<br>- If the air bubble leaves the marked area, one side of the machine is higher than the other. |
| 58 | Fuse box I | ☞ Refer to Chapter F for details of assignment to fuse strips. |
| 59 | Fuse box II | ☞ Refer to Chapter F for details of assignment to fuse strips. |
| 60 | Fuse box III | ☞ Refer to Chapter F for details of assignment to fuse strips. |
| 61 | Socket on levelling unit, left | Socket for connecting up manual set controller for levelling unit on left side of machine. |
| 62 | Socket on levelling unit, right | Socket for connecting up manual set controller for levelling unit on right side of machine. |
| 63 | Interface on diagnosis unit | This is where the engine manufacturer's diagnosis unit is connected. Error messages can be called up on, and deleted from, the diagnosis unit. |
| 64 | Interface for ASC diagnosis + travel drive | At these interfaces, action can be taken when faults occur in the anti-slip control system and in the drive control system |
| 65 | Socket | 24 volt socket for external consumers, e.g. additional working lights or diagnosis equipment. |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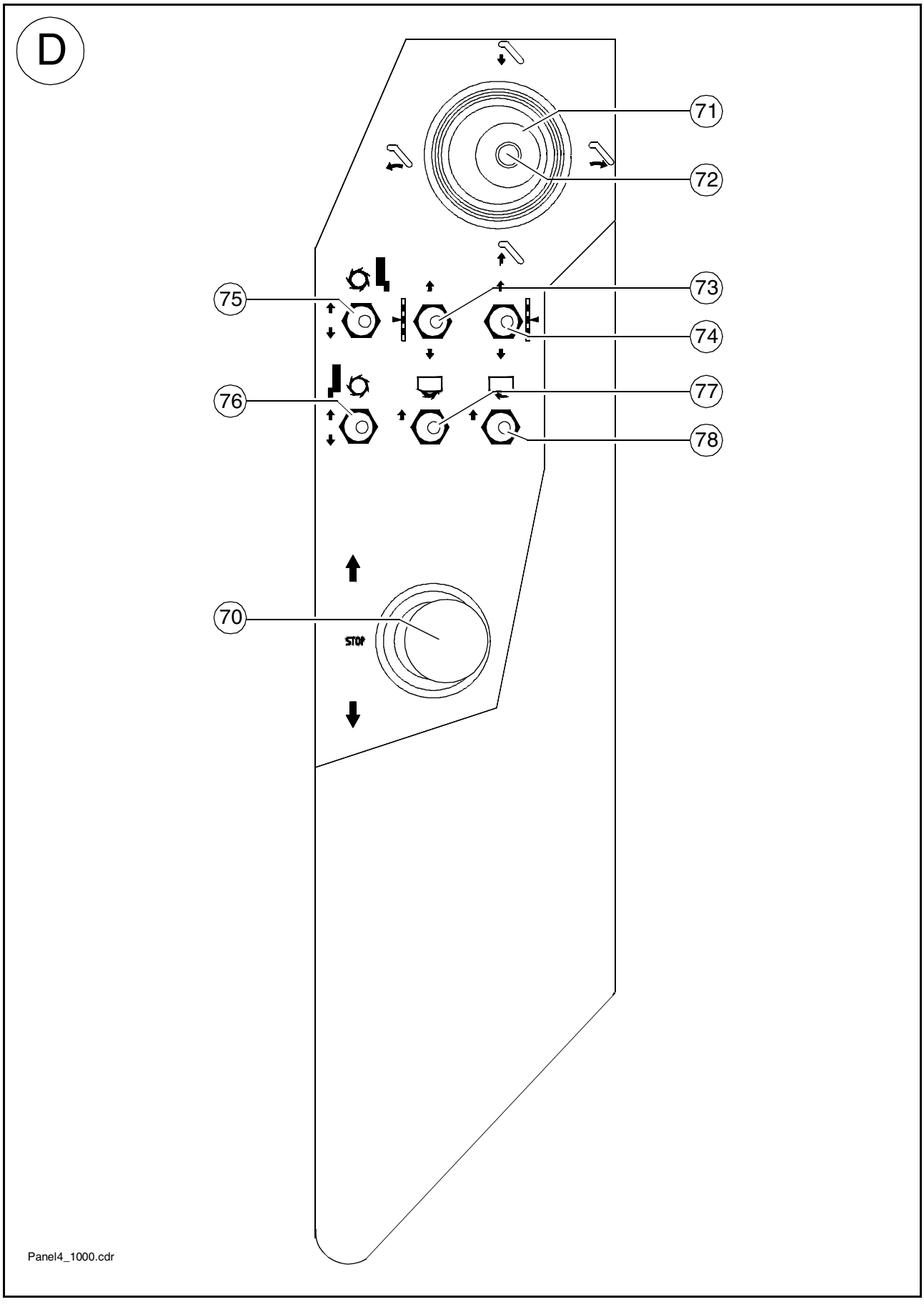
| Item | Designation | Short description |
|---|---|---|
| 70 | Drive lever (advance) | Engagement of travel drive and infinitely variable adjustment of driving speed - forwards and reverse.<br>Centre position: Engine can be started; engine running at idle speed; no travel drive; machine braked<br>Maximum speed can be set using the preselector controller.<br>☞ The engine is unable to start unless the drive lever is in its centre position! |
| 71 | Control lever Upper conveyor | Dual-axis control lever for moving the lower conveyor:<br>- Swivel direction, left: swivels the upper conveyor to the left<br>- Swivel direction, right: swivels the upper conveyor to the right<br>- Swivel direction forwards: lowers the upper conveyor<br>- Swivel direction backwards: raises the upper conveyor<br>☞ The upper conveyor is moved continuously while the control lever is swivelled in the appropriate direction.<br><br>STOP Ensure that no-one is standing in the danger area beside the upper conveyor. |
| 72 | Horn | If danger threatens and as an acoustic warning signal, activate before setting off. |
| 73 | Machine raising/ lowering, left-hand side | The hydraulic cylinder of the left-hand chassis leg is retracted and/or extended by pressing the switch.<br>- Operated upwards: Raising vehicle<br>- Operated downwards: Lowering the vehicle<br>☞ In order to raise or lower the machine evenly, the switch can be operated simultaneously with switch (15).<br><br>☞ The engine cannot be started if this function is engaged! |

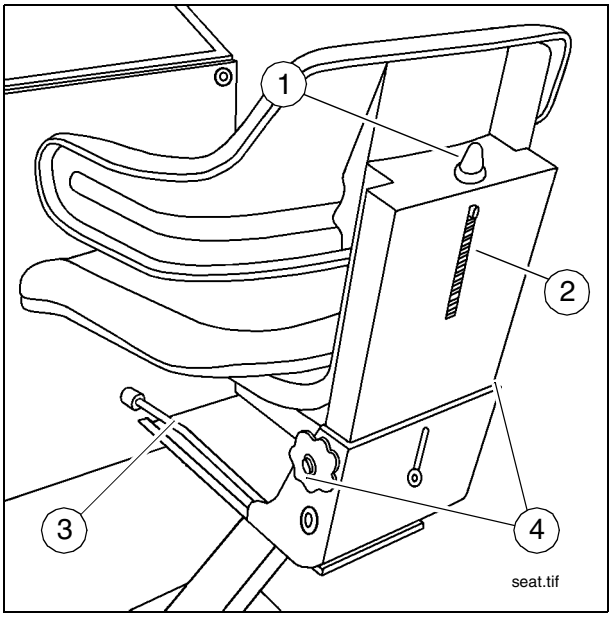

D
71
72
73
74
75
76
77
78
70
STOP
Panel4_1000.cdr

| Item | Designation | Short description |
|---|---|---|
| 74 | Machine raising/ lowering, right-hand side | The hydraulic cylinder of the right-hand chassis leg is retracted and/or extended by pressing the switch.<br>- Operated upwards: Raise vehicle<br>- Operated downwards: Lower the vehicle<br>☞ In order to raise or lower the machine evenly, the switch can be operated simultaneously with switch (19).<br><br>☞ The engine cannot be started if this function is engaged! |
| 75 | Raising / lowering scraper (moldboard) (○) | The moldboard is raised or lowered to the upper or lower limit position whenever the switch is being pressed in the relevant direction.<br>STOP Danger resulting from raised loads. Do not enter the danger area. |
| 76 | Raising / lowering the sliding shoe | The sliding shoe is raised or lowered to the upper or lower limit position whenever the switch is being pressed in the relevant direction.<br>STOP Danger resulting from raised loads. Do not enter the danger area. |
| 77 | Raising left side board | While the button is being pressed, the left side board is raised continuously until it reaches its upper limit position.<br>If the switch is released, the side board automatically lowers into its lower<br>limit position.<br>STOP Danger resulting from raised loads. Do not enter the danger area. |
| 78 | Raising the right side board | While the button is being pressed, the right side board is raised continuously until it reaches its upper limit position.<br>If the switch is released, the side boad automatically lowers into its lower<br>limit position.<br>STOP Danger resulting from raised loads. Do not enter the danger area. |

# 3 Other controls

## 3.1 Controls at operator's control station

### Driver's seat




A driver's seat on the operator's control station should be adjusted to suit the needs of the driver/operator before starting work.

- To adjust the seat for the weight of the driver, turn handle (1) on top of backrest support until the approximate weight of the driver is displayed on the scale (2).
- To set the correct distance from the operating panel, pull lever (3) forwards, then slide seat forwards or backwards and allow to engage in the desired position.
- For height adjuster of the backrest, unfasten both handles (4) on the backrest, slide the backrest upwards or downwards then tighten the handles again to secure backrest in this position.

STOP Always ensure that the driver's seat is properly secured.

**Weather protecting sun roof**

The weather protecting sun roof can be folded down to a lower setting for transport purposes.

- Remove folding cotter pins (1) and retaining pins (2) from left and right guide tubes.
- Move the roof into its lower position by pulling the bracket (3) on the articulated roof joint.
- Using folding cotter pins and retaining pins, secure roof in its lower position on the relevant bores in the two guide tubes.

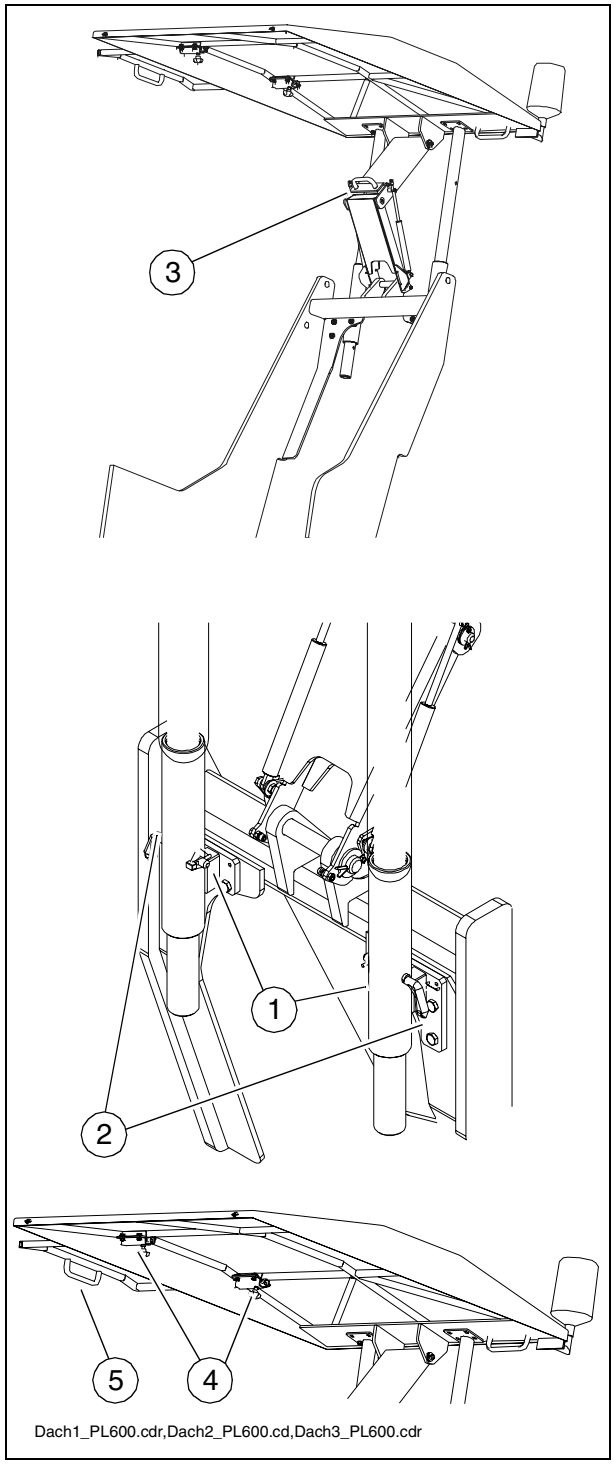
STOP Danger of crushing! Avoid placing fingers near the articulated joints during the roof folding operation.

☞ To raise the roof, reverse the order of this procedure.

**Side roof**

A side roof can be pulled out from the right-hand side of the weather protecting sun roof to protect the driver/operator from rain and strong sunlight.

- Open both brackets on roof tarpaulin.
- Unscrew fastening bolts (4).
- Pull out side roof frame together with roof tarpaulin by pulling bracket (5).
- Tighten down fastening bolts (4) to secure the roof.
- Secure the tarpaulin with brackets on the roof frame.



Dach1_PL600.cdr,Dach2_PL600.cd,Dach3_PL600.cdr

☞ To fold the roof away, reverse the order of this procedure.

⚠ When vehicle is in motion, side roof must not be extended!

**Weather-protecting sun roof, hydraulic (O)**

☞ The roof can be raised and lowered without the engine having to be started.

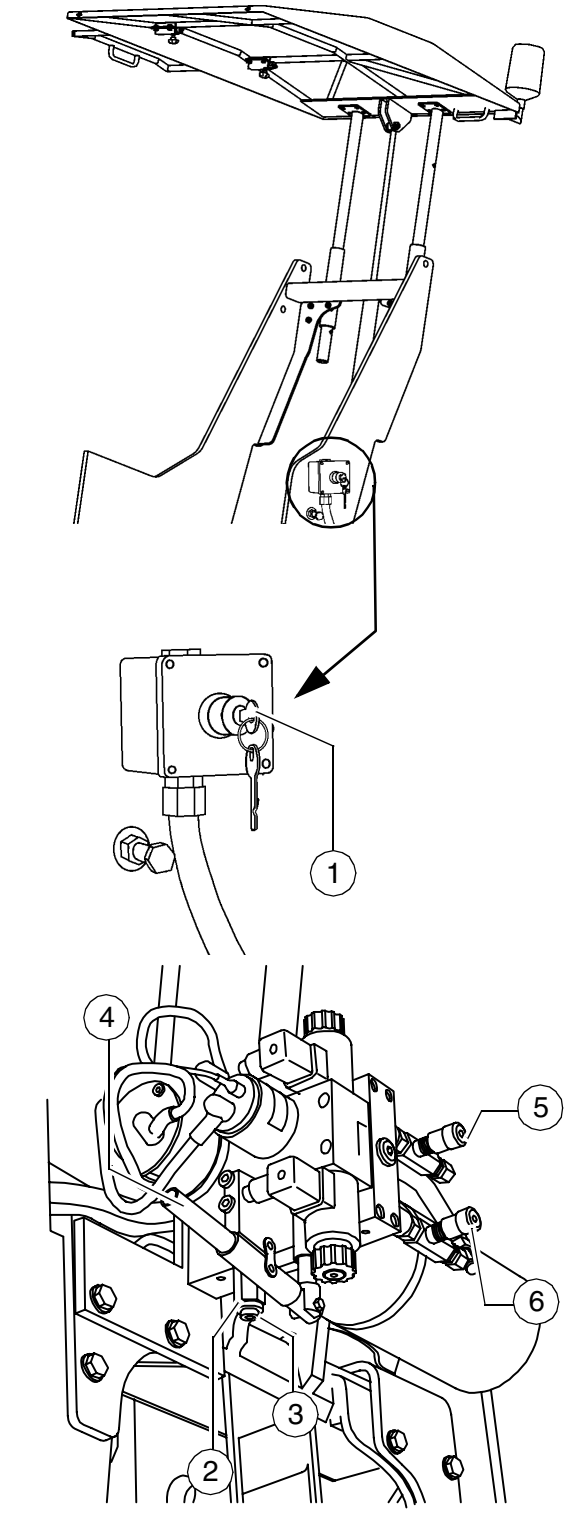
- To lower the roof, turn key-operated switch (1) to the left until the roof has lowered to its minimum level.
- To raise the roof again, turn key-operated switch (1) to the right until the roof has risen to its maximum level.

☞ If the roof has to be raised when the battery is flat, there is a hand pump on the hydraulic unit.

- First of all, unfasten the lock nut (2) on the hand pump and tighten the threading dowel (3) as far as possible into the pump.
- Re-tighten the lock nut for safety.
- Press the pump lever (4) until the roof has risen to the position required.

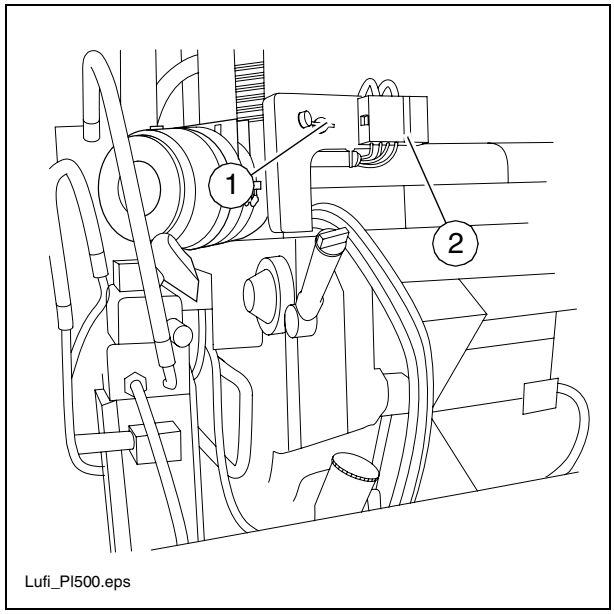
Two choke valves (5), (6) are fitted to set the raising and lowering speeds.

☞ Once the roof has been raised, unscrew the threading dowel (3) again by a few turns and lock with the lock nut (2).



Dach1_PL1000.tif/Keyswitch.tif/Dach_hydr1000.wmf

**Battery's main switch**




The battery's main switch (1) is located under the left-hand flap on the engine compartment. It disconnects the electrical circuit from its earth/ground.
The main fuses (2) are located beside the master switch.

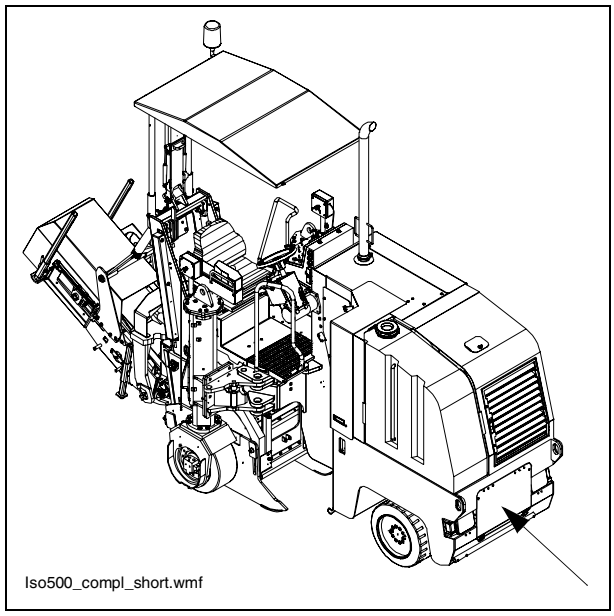
- To deactivate the master switch, turn to the left and remove.

☞ Do not lose the removed master switch because otherwise you will not be able to start the machine.

☞ For the specifications governing all fuses, refer to Chapter "Maintenance".

☞ Always switch off the master switch after finishing work! (otherwise battery might discharge as a result of creep currents)

**Batteries**




Both batteries on the 24 volt system are located behind a hinged panel at the front of the machine.

☞ For the specifications, refer to Chapter B "Technical data".
For maintenance, refer to Chapter "Maintenance".

⚠ Auxiliary starting - only in accordance with Instructions
(see Section "Starting Machine, auxiliary starting (starting aid).

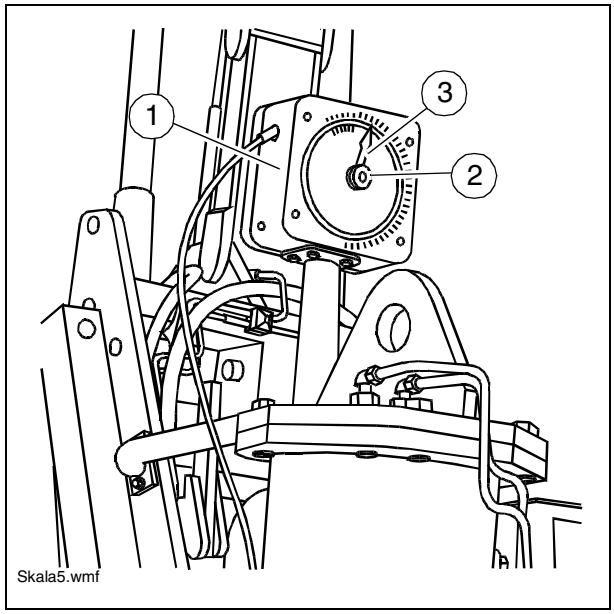
**Milling depth display**

There is an adjustable milling depth display (1) to the left and right of the chassis legs.

The right-hand chassis leg has a display unit on both sides for these positions:

- Chassis leg deployed
- Chassis leg retracted

- To set the indicator to a desired value, the retainer (2) needs to be unfastened and the indicator (3) should be turned. Then tighten the retainer back down again.

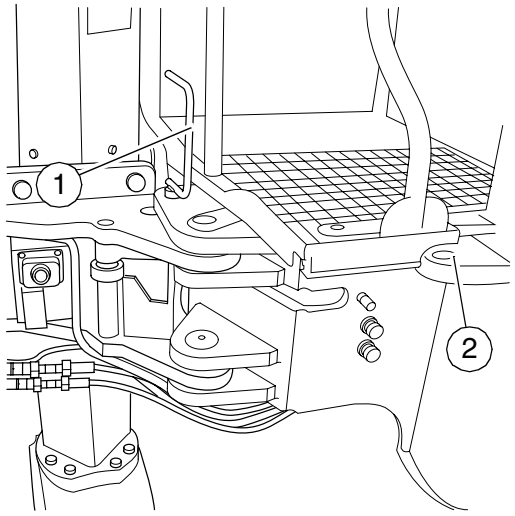



☞ The stroke for each of the chassis leg is then displayed on the scale in cm.

**Swivel-mounted chassis leg, hydraulic**

For certain operating requirements, e.g. to ensure accurate edge grading, the right-hand chassis leg can be folded in hydraulically until it lies flush against the outer edge of the vehicle.

- Evenly and carefully lower the machine onto its milling drum and raise the left-hand chassis leg until it lifts off the ground.
- Remove the pin (1) and swivel in the chassis leg.
- With the chassis leg in retracted position, secure by placing pin in bore (2).



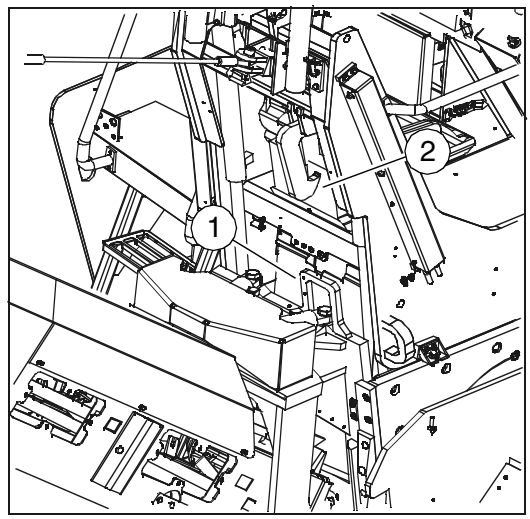
Schwenk1_Pl500.eps

☞ Before the chassis leg is swivelled in or out, it needs to be retracted completely and the driver's seat needs to be slid inwards as far as possible.

**Retaining hook, moldboard**

For safety reasons, during maintenance work on the milling drum or on the milling drum housing, the moldboard is secured in its upper position by means of a retaining hook.

- Extend the moldboard until the retaining tab on the flap (1) locates in the retaining hook (2).

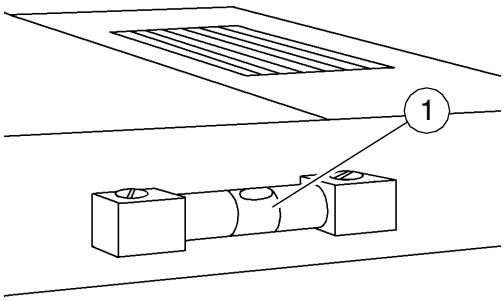


Scraper_safety_pl600

☞ To lower the moldboard, first raise the flap slightly until the retaining hook can be swivelled outwards.

STOP When working on the machine with raised moldboard (e.g. when replacing bit), always secure the flap using the retaining hook!

**Water scales / inclination indicator**




Wasserwaage.tif

A fluid inclination indicator for lateral inclination of the machine is located on top of the machine, immediately above the control panel.

- If the air bubble is located inside the marked area (1) in the centre of the tube, the machine is standing on level ground.
- If the air bubble leaves the marked area, one side of the machine is higher than the other.

☞ If an inclined angle is not desirable, the relevant chassis leg can be extended to compensate for this, restoring the machine to a level position.

**Throttle valve, levelling unit**

The retraction speed of the hydraulic cylinders on both chassis legs can be adjusted by their respective throttle valves.

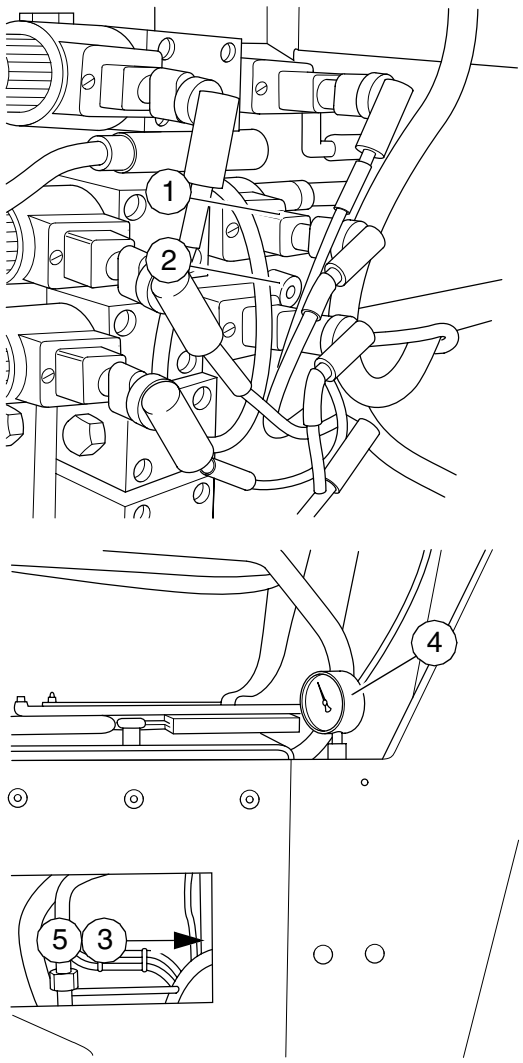
The two throttle valves are located underneath the seat console.

- Upper throttle valve (1): left-hand chassis leg
- Lower throttle valve (2): right-hand chassis leg

Adjust deployment speed:

- Rotate adjusting knob clockwise = slower retraction speed.
- Rotate counter-clockwise = faster retraction speed.

☞ With optional levelling equipment, the setting values need to be adapted after adjustment!



Drosse1_PL500.eps/Drossel2_PL500.eps

**Load relief of moldboard**

For certain defined working situations, the load relief on the moldboard can be adjusted.

The handwheel (3) for pressure setting is located on the valve block underneath the seat console.

The current pressure setting can be read off from the pressure gauge (4).

Adjust load relief setting:

- Unfasten lock nut using plastic wheel (5).
- Use handwheel (3) to set the desired pressure:
  - Turn adjusting knob clockwise = less pressure
  - Turn adjusting knob counter-clockwise = higher pressure
- After setting pressure, continue tightening the lock nut using the plastic wheel (5).

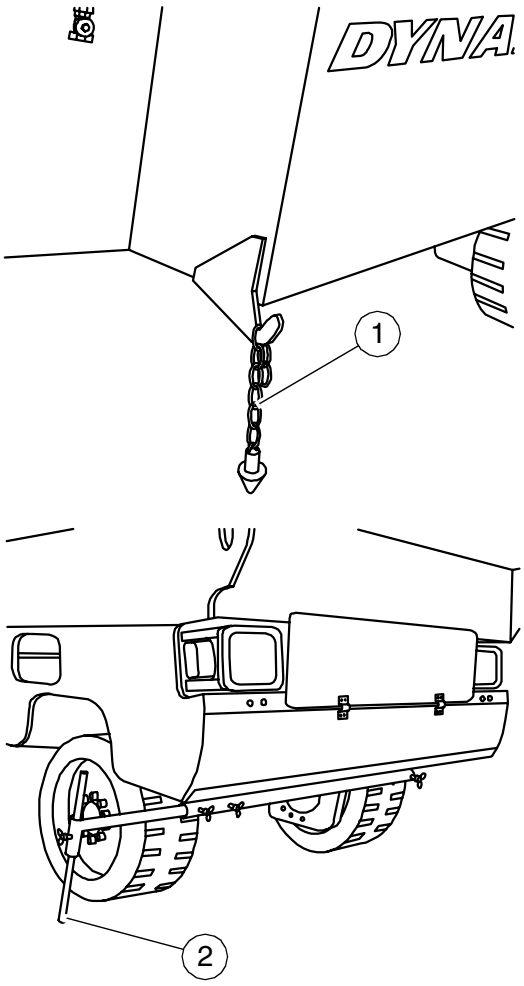
☞ The adjustment range is 0...210 bar

**Direction of travel indicator**

To enable the planer to operate in a straight line, direction marks should be in place, or be added (edge of road surface, kerb, line of chalk, etc.).

Two different direction indicators are located on the machine frame.

- Pointer (1) runs accurately over the outside edge of the milling drum.
- The depth of the indicator can be adjusted using the length of the chain (1).
- Pointer (2) can be adjusted to any marking.
- The depth and the excerpt length of the pointer are adjustable and were fixed by thumbscrews.



Zeiger_PL600.wmf/Zeiger2_PL600,wmf

**Working lights / rotary beacons**

At several points around the vehicle frame, plug-in contacts (1) are located for warning lamps and working lights.

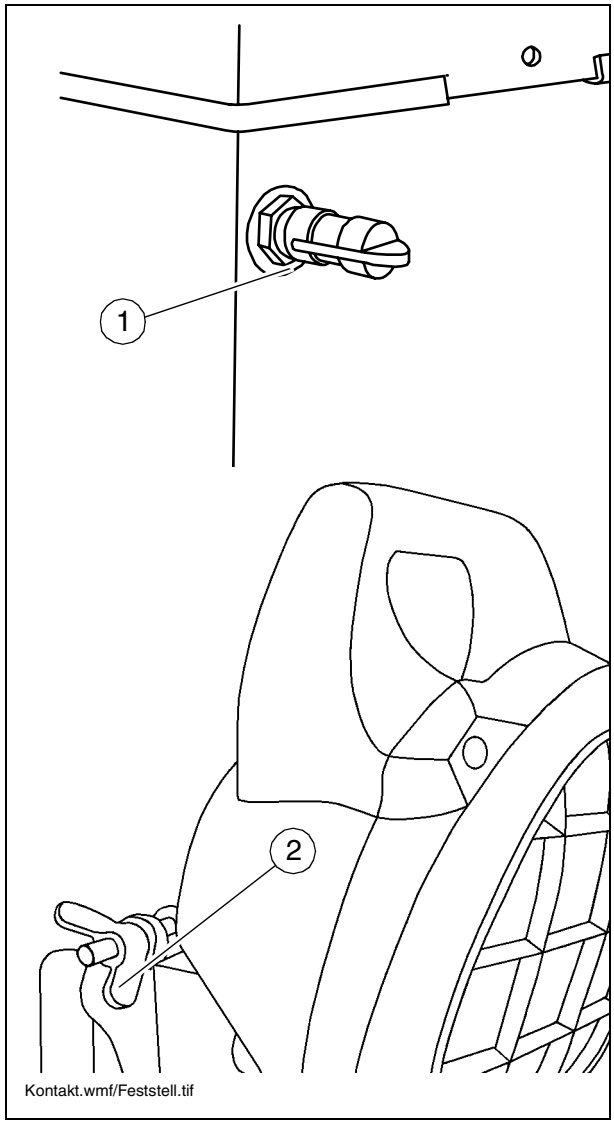
- Fit headlights in desired position and secure using wing nut (2).

⚠ The function of the headlights and warning lamps should be checked on a daily basis before starting work.

☞ The headlights are easy to remove so should be taken off at the end of work and stored in a safe place.

STOP Avoid dazzling oncoming traffic.

⚠ Headlight contacts which are not used should be protected using rubber caps.



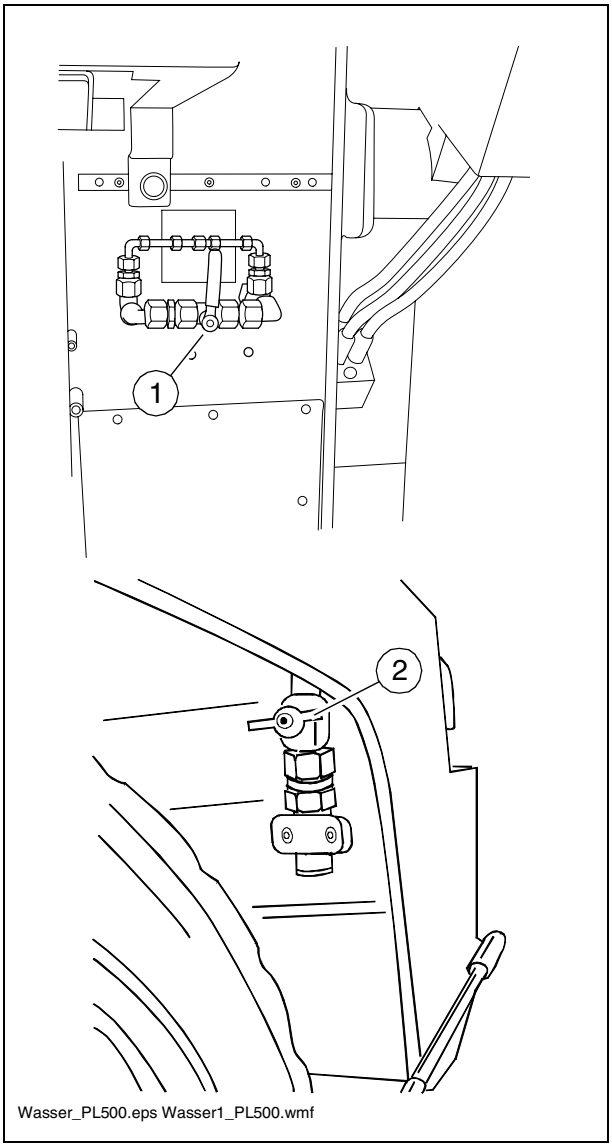
Kontakt.wmf/Feststell.tif

**Non-return valves for water spraying / drain valve on water tank**

- To cut off water supply to the spray nozzles on the milling drum spraying system, move valve lever (1) on the control panel into locking position.
- If it is necessary to drain the water tank, move valve lever (2) into through-flow direction. Water drain and valve are located beside the right-hand front wheel.


This water is definitely not drinking quality!

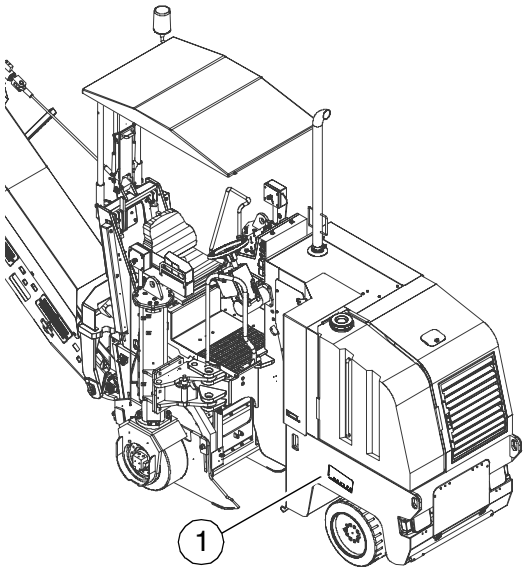
If there is a risk of sub-zero temperatures, completely drain the water tank using the drain valve, leave the valve open, unfasten the connecting lines and allow them to drain. Allow water pump to idle by loosening screw connections, take off water filter housing and filter insert and remove screw cap from water fill apertures.




Wasser_PL500.eps Wasser1_PL500.wmf

### Steps up to water tank

There is a recessed step (1) in the frame on the right side of the machine to enable staff to reach certain parts of the machine (e.g. to top up the water tank or to work on the engine).

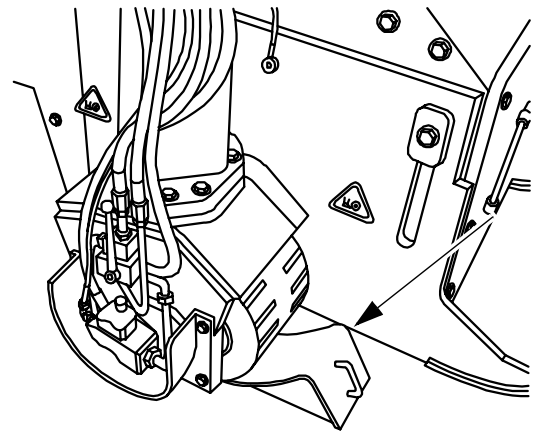



Iso500_compl.wmf

### Chocks

The machine's accessories pack includes a chock.

If the machine is parked on uneven ground, a chock should be placed under the rear wheels to prevent it from rolling away accidentally.

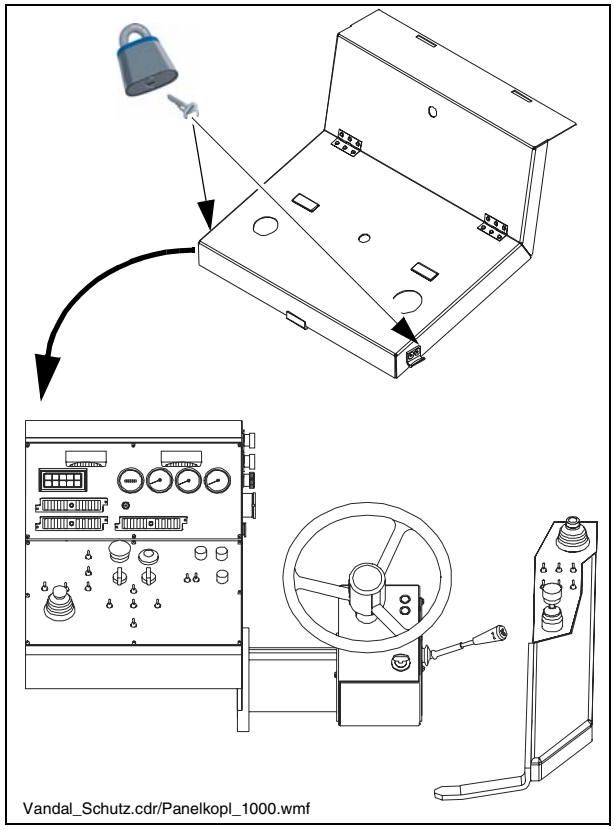


Keil_PL600.wmf

## Vandalism protection

On the inside of the maintenance flap on the machine's control panel is a cover secured with a screw to provide protection against vandalism to the operating panel.
When work finishes, this cover should be fitted over the operating panel and secured (retaining clamps and locks on left and right sides)

To remove the cover, these two retaining screws first need to be removed.



# 4 Levelling unit

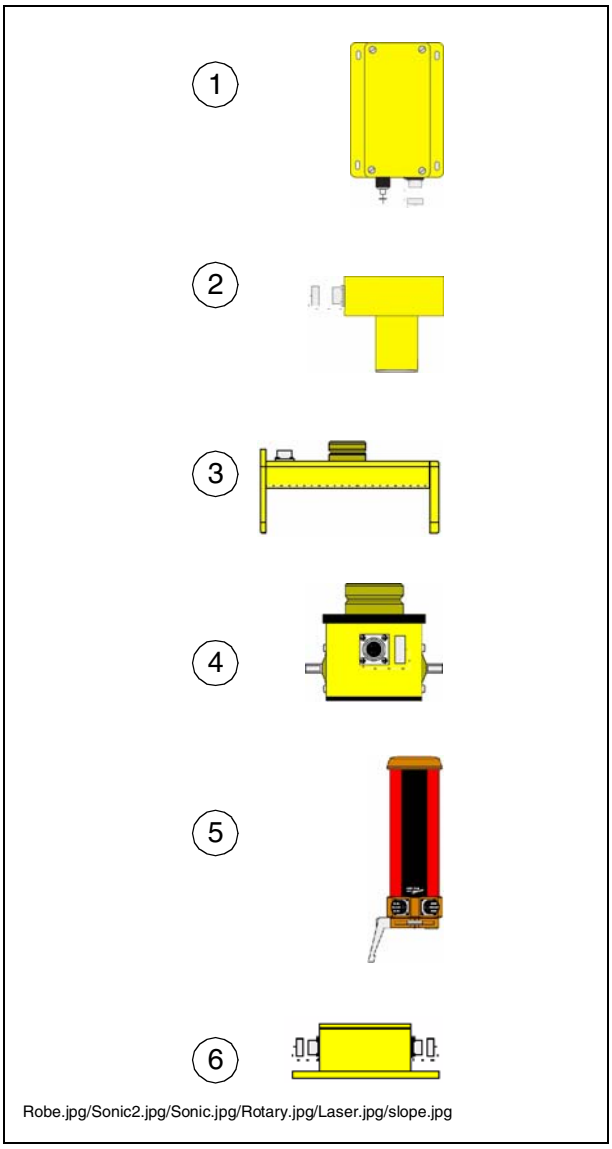
## 4.1 MOBA-matic type

The MOBA-matic is a control and feedback control system for construction machinery and has been especially designed for use in milling operations.

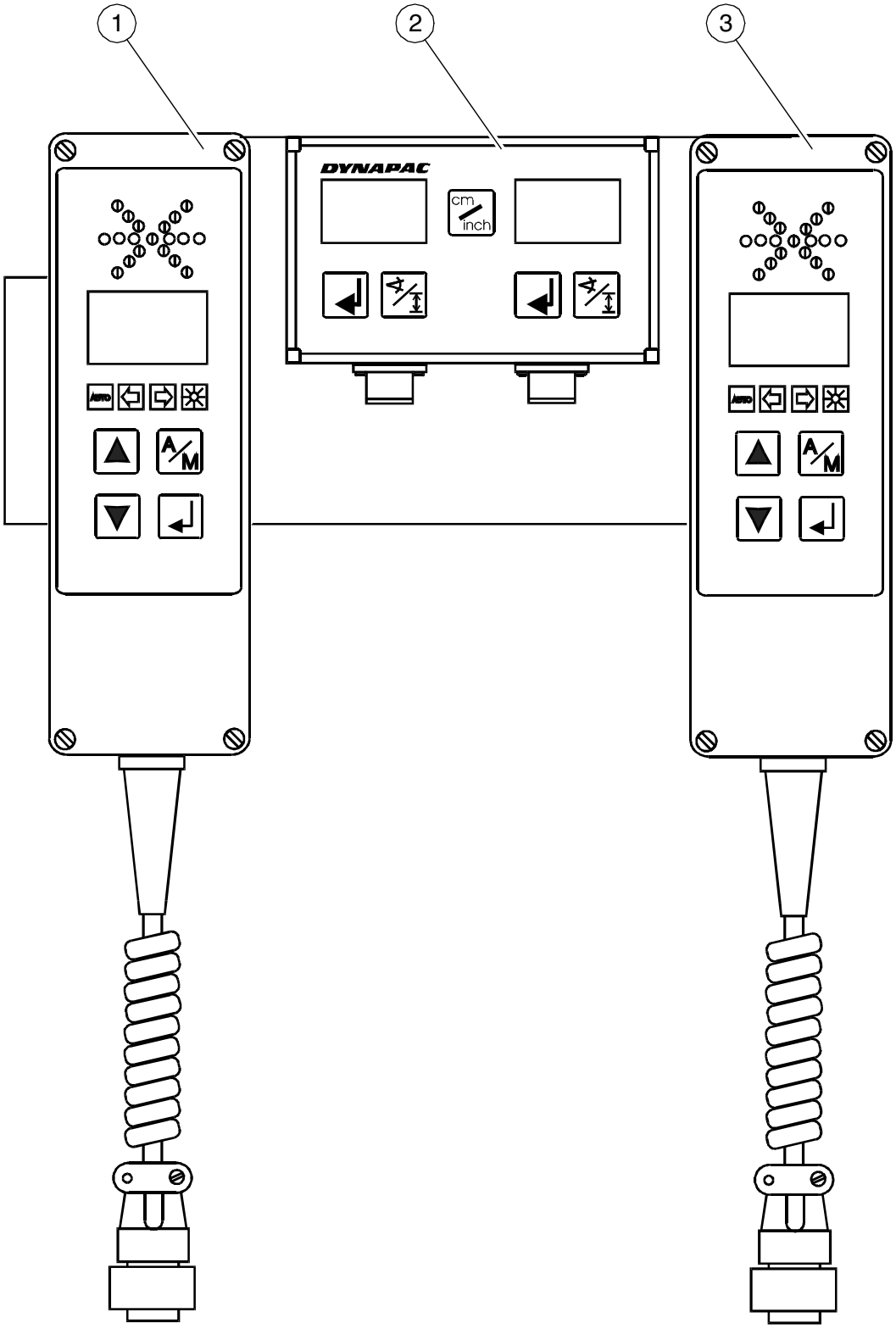
As optional equipment with this levelling unit is the Moba-matic with a very varied range of sensor combinations.

- (1):Cable tension sensor (distance sensor)
- (2):Digi-Sonic sensor (distance sensor)
- (3):Sonic Ski (distance sensor)
- (4):Digi-Rotary sensor (distance sensor)
- (5):Laser receiver (distance sensor)
- (6):Digi-Slope sensor (slope sensor)

If the optional levelling unit is fitted to this machine, two digital controllers and two cable tension sensors are fitted which act on the side boards. A digital actual value indicator can also be fitted.
In all cases, the use of a lateral slope sensor (Digi-Slope) and other types of sensor are possible.
The digital controller automatically detects the sensor connected during setting and briefly indicates this through the sensor detection.

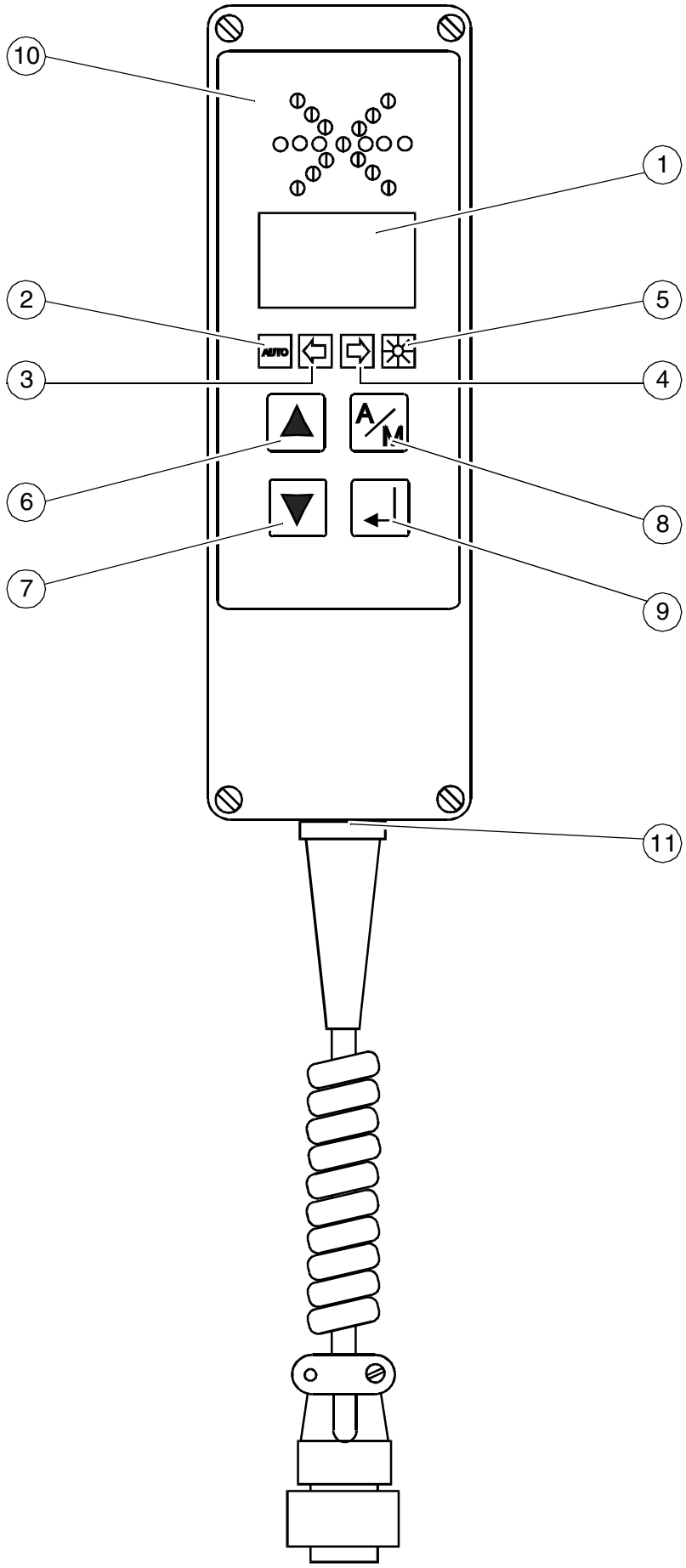


Robe.jpg/Sonic2.jpg/Sonic.jpg/Rotary.jpg/Laser.jpg/slope.jpg



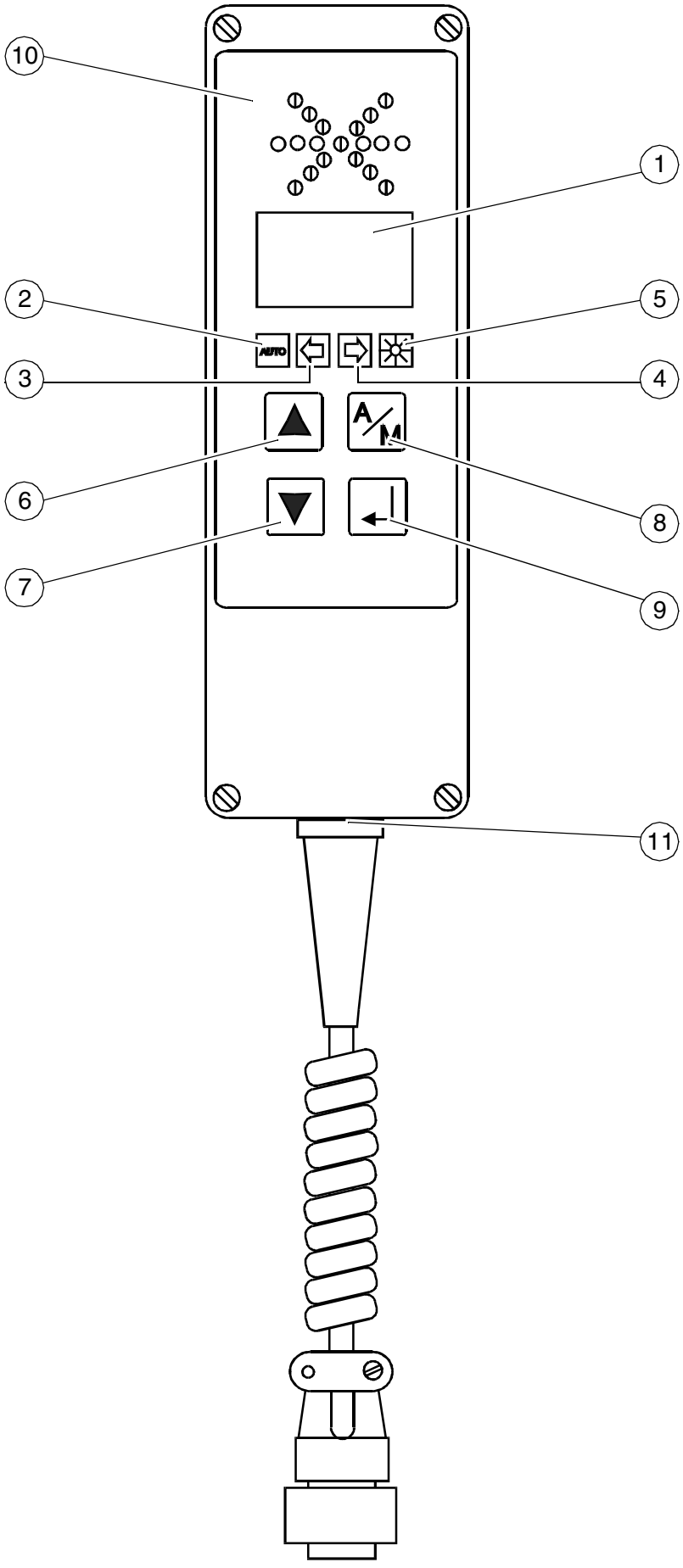

Nivellcompl.cdr

| Item | Designation | Short description |
|---|---|---|
| 1 | MOBA-matic, left side | Open-loop and closed loop control system for the levelling unit on the left side of the machine. |
| 2 | MOBA actual value indicator (○) | Actual value indicator for height sensing and lateral slope on left + right sides of machine. |
| 3 | MOBA-matic, right side | Open-loop and closed loop control system for the levelling unit on the right side of the machine. |




Moba1can.jpg

| Item | Designation | Short description |
|---|---|---|
| 1 | Liquid crystal display | Display can be easily read, even when the light is poor, thanks to the integrated lighting. |
| 2 | Function lamp "AUTO" | Three operating modes are available:<br>- Lamp off: Stand by position - direct adjustment of milling depth and lateral slope possible in manual mode. The display indicates the nominal value selected.<br>- Lamp on: Machine operating in automatic mode (automatic mode has been activated on the main operating panel). The display indicates the nominal value selected.<br>- Lamp flashes: Machine operating in semi-automatic mode (stand by position or pre-settings for milling depth/ lateral slope possible). The display indicates the actual value of the milling depth adopted.<br>☞ If active intervention is made via the operating panel, the machine jumps into semi-automatic mode! |
| 3 | No function | |
| 4 | No function | |

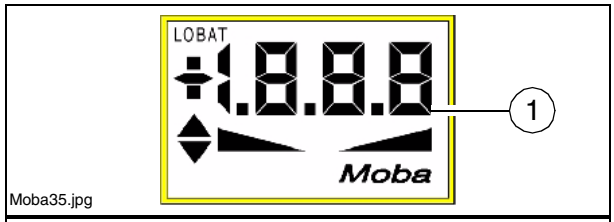



Moba1can.jpg

| Item | Designation | Short description |
|---|---|---|
| 5 | No function | |
| 6 | UP button | To increase the nominal value. The machine responds in automatic or manual mode (change to actual value).<br>Machine does not respond in semi-automatic mode (only for pre-selections, i.e. nominal value specifications.) |
| 7 | DOWN button | To decrease the nominal value. The machine responds in automatic or manual mode (change to actual value).<br>Machine does not respond in semi-automatic mode (only for pre-selections, i.e. nominal value specifications.) |
| 8 | Automatic/ semi-automatic / manual button | To switch between automatic, semi-automatic and manual mode |
| 9 | Input button | When this button is pressed, calibration to zero is conducted and/or the nominal value is set to match the actual value |
| 10 | LED display | Enlarged and detailed depiction of functions of the arrow symbols on the LC display.<br>The LED is particularly useful when the operator is at a great distance from the controller and if the sun is strong. |
| 11 | Connection cable | To connect with the sockets on the operating panel and/or actual value indicator (O). |

☞ The following pages describe connection of the MOBA-matic equipment to existing or missing actual value indicator with the vehicle circuit voltage in considerable detail!

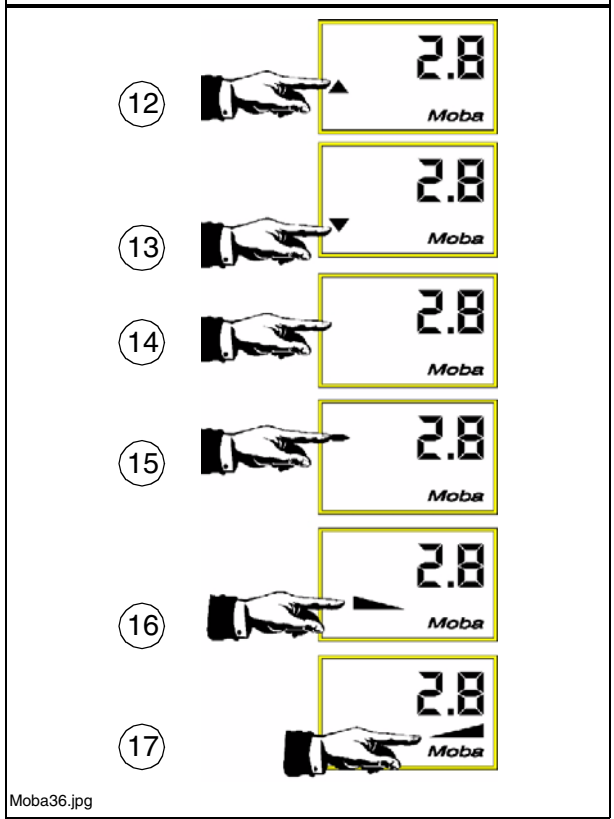
## 6.1 Liquid crystal display (1)



Moba35.jpg

The display symbols have the following meanings:

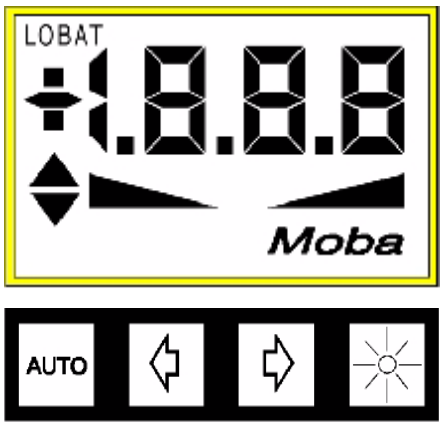
| Symbol | Meaning |
|---|---|
| ARROWS RAISE (12) / LOWER (13) | Controlled controller output |
| Value without prefix (14) | Positive display value |
| Value with negative prefix (15) | Negative display value |
| Bar dropping to the right (16) | Slope to the right |
| Bar dropping to the left (17) | Slope to the left |



Moba36.jpg

### Activation message

A display test is conducted once the digital controller has been activated. During this test, all segments of the LC display and all function lamps are activated for approx. 2 seconds. Should symbols not appear on the display, please contact After-Sales Service.

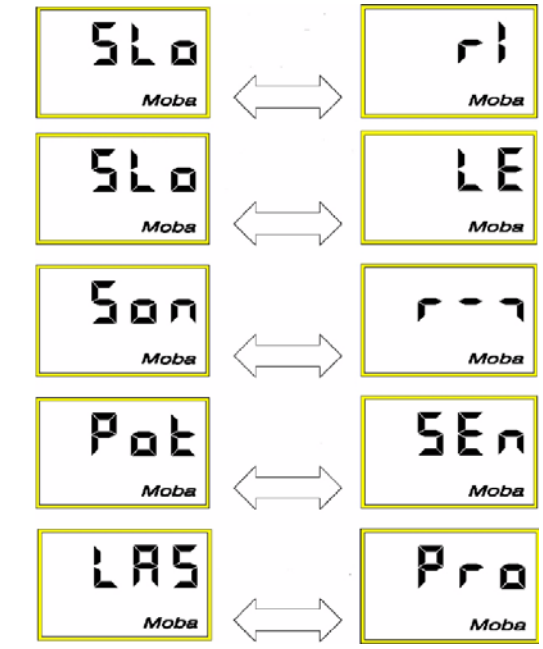


Moba35.jpg/Moba37.jpg

## Sensor message

After the activation message, the digital controller briefly twice indicates the sensor connected using an alternating display image. While this image is displayed, the two direction lamps also flash. The control then automatically changes into operating mode.

⚠ If the sensor has been changed, the controller continues to issue the alternating sensor message until this message is acknowledged (by pressing any button). The operator should be reminded that the sensor has been replaced and that settings for the sensor should therefore be checked.



Moba38.jpg

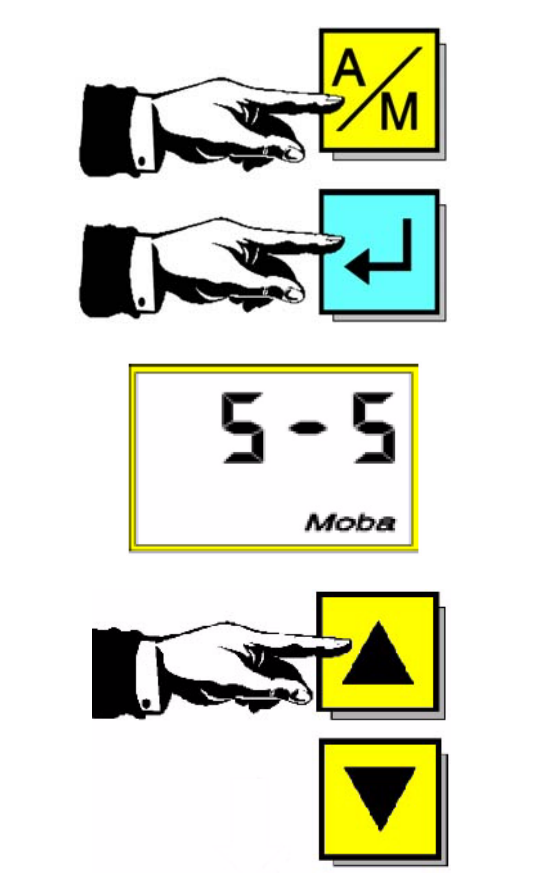
## Changeover between height sensor and lateral slope

- Press the A/M button and the input key several times at the same time until the indicator switches between the abbreviation for sensor selection "S-S" and identification of the active sensor.

☞ SLo : Lateral slope sensor
rop : Height sensor

- Select the sensor required using the UP/DOWN buttons.
- Confirm and return to operating mode by again pressing the A/M button.

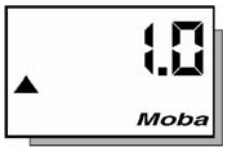
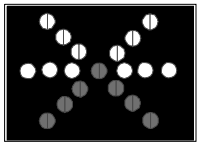
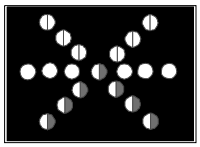
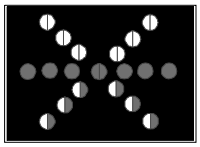
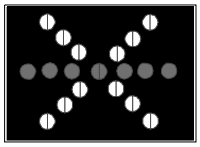
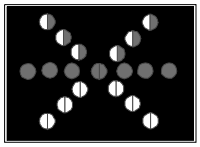
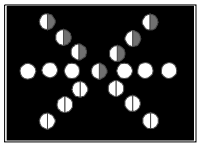
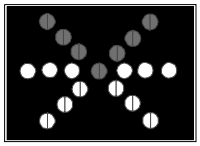
☞ If no buttons are pressed, the controller automatically switches back into operating mode after 5 sec.



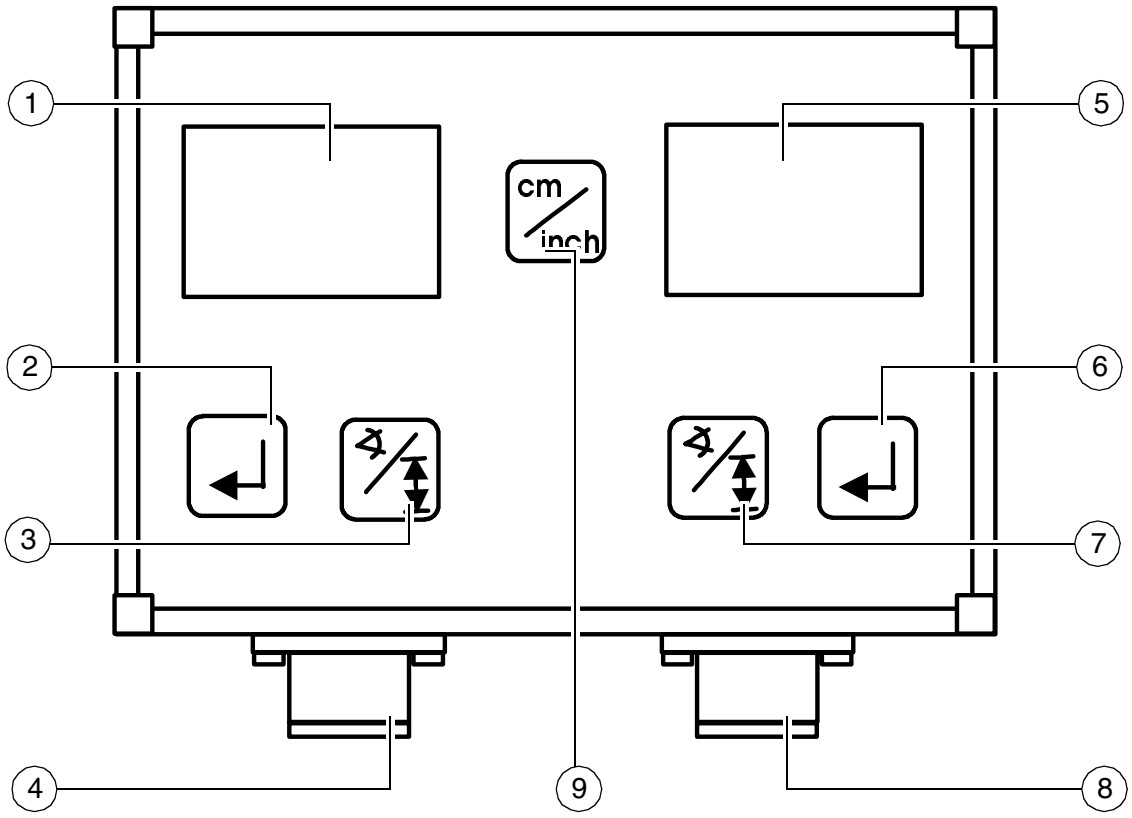
Moba_AM.Enter.bmp/Moba39.jpg/MobaSS.jpg

## LED display

The LED‘s are only used to provide the operator with a better display of the status of each of the activated valve outputs. Its display is simply an enlarged and detailed depiction of the function of the arrow symbols on the LC display.
The LED display is particularly useful when the operator is at a great distance from the controller and if the sun is strong.

| LC display | LED display | Status | Function |
|---|---|---|---|
| Arrow lit contin.   | Arrow lit continuously  | Large control variance | RAISE control output constantly lit |
| Arrow flashing   | Arrow flashing  | Average control variance | RAISE control output runs through cycle with large pulse width |
| Arrow flashing   | Bar lit/arrow flashing  | Small control variance | RAISE control output runs through cycle with small pulse width |
| No active arrows   | Bar lit  | No control variance | Control outputs not activated |
| Arrow flashing   | Bar lit/arrow flashing  | Small control variance | LOWER control output Lower runs through cycle with small pulse width |
| Arrow flashing   | Arrow flashing  | Average control variance | LOWER control output runs through cycle with large pulse width |
| Arrow lit contin.   | Arrow lit continuously  | Large control variance | LOWER control output constantly lit |

## 6.2 **Actual value indicator** (O)



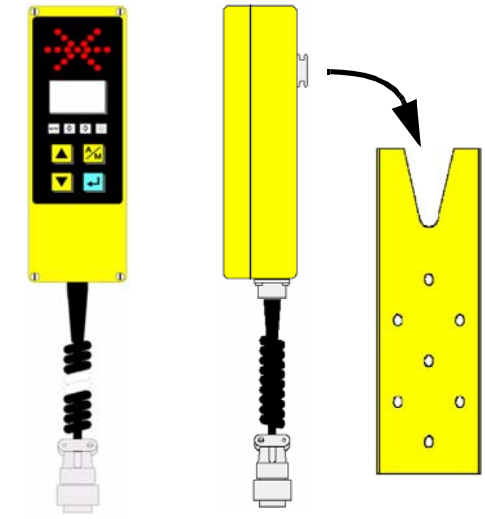

Moba2.cdr

☞ The optional actual value indicator provides a means of comparing the nominal value, as displayed by the MOBA-matic, and the prevailing actual value.

| Item | Designation | Short description |
|---|---|---|
| 1 | Liquid crystal display, left side | Actual value display for left-hand side of machine. Display is easy to read, even in poor light, thanks to integrated lighting. |
| 2 | No function | |
| 3 | Lateral slope / height display changeover left side | When this key is pressed, the display changes from the actual height value on this side of the machine to the machine's lateral slope value or vice versa.<br>☞ The lateral slope can only be displayed in one of the two indicators! |
| 4 | Receptacle | For connecting with the associated connection cable on one of the operating panel's receptacles and/or for connecting with the MOBA-matic. |
| 5 | Liquid crystal display, right side | Actual value display for right-hand side of machine. Display is easy to read, even in poor light, thanks to integrated lighting. |
| 6 | No function | |
| 7 | Lateral slope / height display changeover right side | refer to item (3) |
| 8 | Receptacle | refer to item (4) |
| 9 | cm/inch changeover | By pressing and holding down this button, the two displays toggle between metric (cm) and imperial (inch) readings. |

**Connection:**

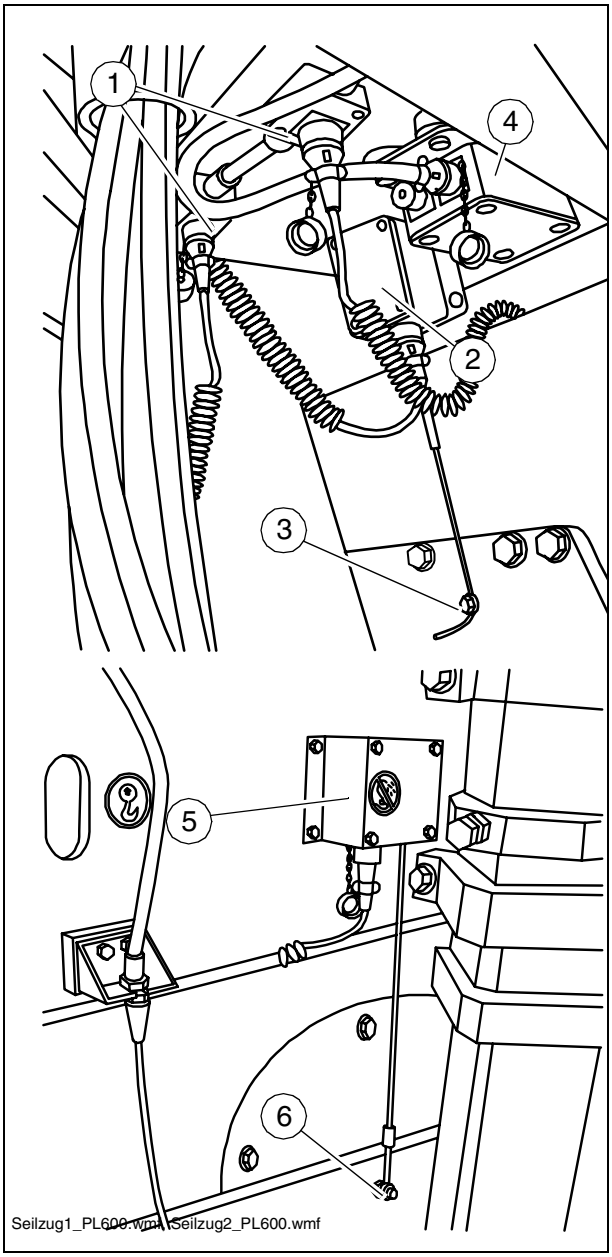
The two digital controllers and the actual value indicator, with a retaining knob on its reverse side, are slid into their brackets from above and are clearly visible from the right side of the control panel on the machine frame.



Moba1can.cdr/Halt.jpg/Halt2.jpg

If disconnected, plug connections should then be re-established.

- The two connection boxes (1) are located directly beside the controller on the underside of the machine frame, to the left side of the milling drum housing. A connection between controller and sensors is created via these two sockets.
- The cable tension sensor for the side board on the left side of the machine (2) is also arranged at this location on the underside of the machine frame.
  - If required, the tension cable on the sensor should be attached to the fastening point (3) on the side board.
- In addition, the lateral slope sensor (4) is located at this point. For connection purposes, the rear socket is provided on the left side of the housing.
- The cable tension sensor for the side board of the right-hand side of the machine (5) can be found directly on the machine frame above the board.
  - If required, the tension cable on the sensor should be attached to the fastening point (6) on the side board.




Seilzug1_PL600.wmf Seilzug2_PL600.wmf

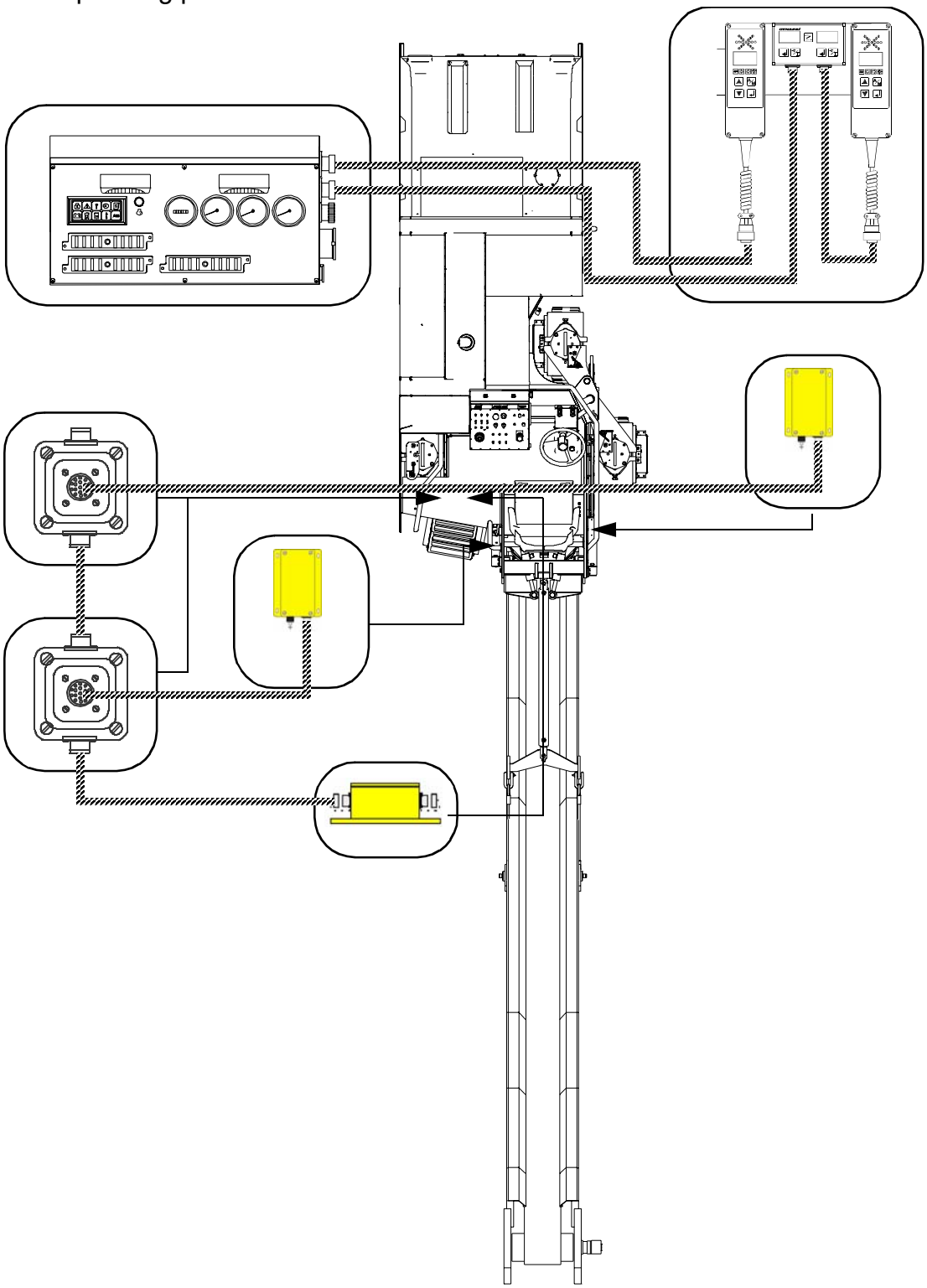
Proceed as follows during the connection process:

- Unscrew protective cap from connector
- Fit connector in position determined by plastic ridge on socket, and groove in side of connector.
- Tighten cap ring firmly down to secure the connector.

**Connection of MOBA-matic, actual value indicator and sensors**

As optional equipment with other sensors, these devices can also be connected to the machine locations illustrated here.

☞ The sockets for the two distance sensors and the lateral slope controller are located underneath the machine frame between the access steps and the milling drum housing.
The sockets for the MOBA-matic and the actual value indicator are located on the operating panel.




Do not undertake connections when the machine is operating or the machine elements are being driven!

Always check that the connector / connection cable is not damaged! Keep threads on plugged connections and cable connections free of dirt and grease to prevent bad contacts. Only appropriate cleaning agents should be used for cleaning purposes.

The control system for protecting against theft and damage can be taken off and should be removed from the machine at the end of work every day and kept in a safe place.

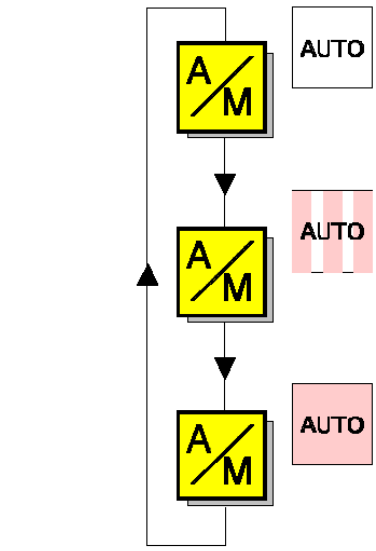
## Button usage and possible button combinations on the digital controller during milling

### AM button

This button is used to change between the operating modes:

- manual - "AUTO" function lamp off.
- semi-automatic - "AUTO" function lamp flashing.

automatic mode - "AUTO" function lamp on.



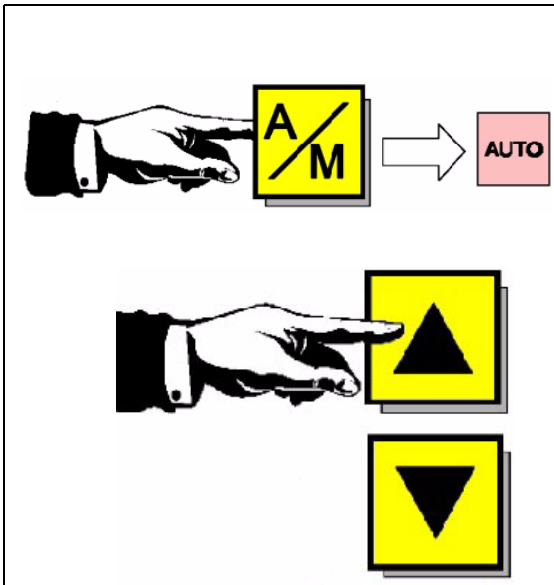
Moba_AM.bmp

### UP/DOWN buttons

These buttons are used to change the nominal value in automatic and semi-automatic mode. When in automatic mode, the machine responds to a touch of the button and either changes its milling depth or lateral slop depending on the sensor connected up. The newly set nominal value does not need to be confirmed using the SET button in these operating modes.

When in semi-automatic mode, the nominal value is specified, i.e. the machine does not yet respond, only doing so in automatic mode.

In semi-automatic or automatic mode, the nominal value is changed as follows

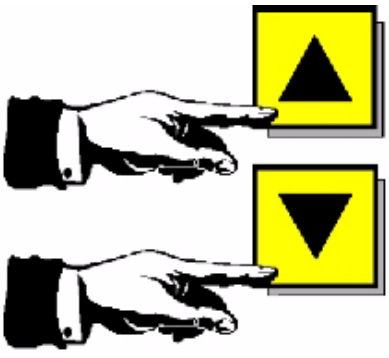


Moba23.jpg/Moba39.jpg

- Height sensors: continuously in 1/10 steps in accordance with selected setting in centimetres, inches or feet.
- Lateral slope sensors: in 1/10%, 5/100% or 2/100% depending on lateral slope resolution selected

**UP/DOWN keys (simultaneous pressing)**

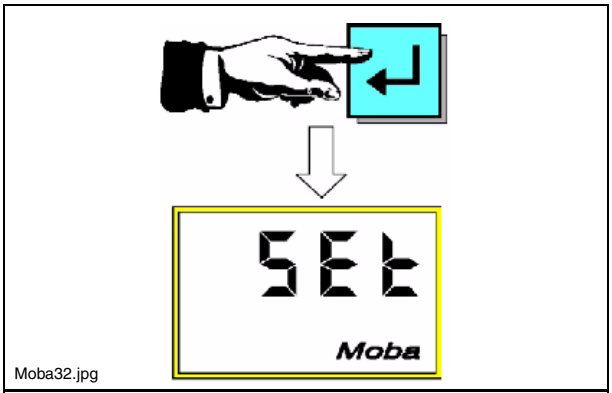
During the milling process with the height sensors in automatic mode. The nominal value is immediately set to 0 (useful when milling recesses)



Moba31.jpg

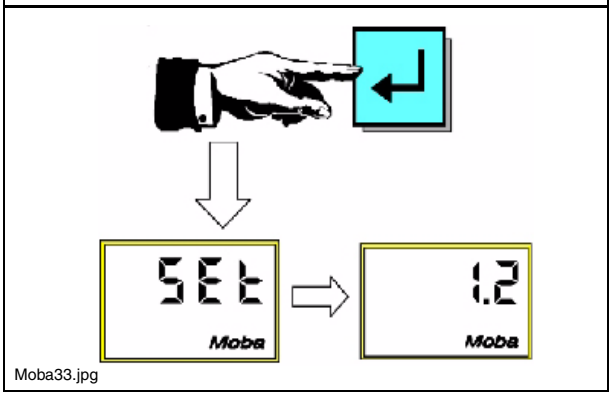
## SET button

- When using the Digi-Slope sensor, the SET button must always be used to confirm an actual slope value set in manual mode or preselected or existing in semi-automatic mode. This must be done before changing over into automatic mode so that this value is adopted as the nominal value.



Moba32.jpg

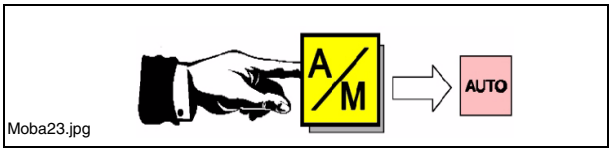
- When the height sensors are being used, if the actual value or a preselected value is to adopted as a nominal value after switching over to automatic mode, the SET button must only be pressed briefly otherwise the system performs a variance check (comparing the setting to its default value).



Moba33.jpg

## 6.3 Basic settings

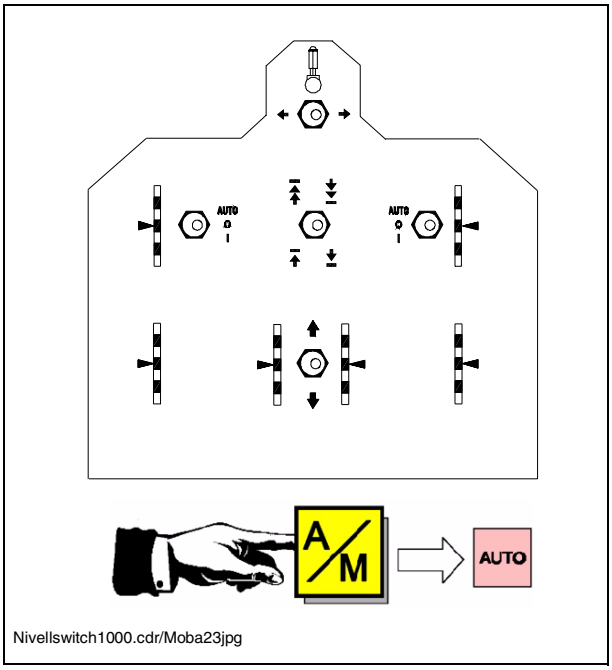
Always conduct all basic settings in manual mode!
(Function lamp off)



Moba23.jpg

☞ The levelling equipment **cannot** activate automatic mode via the digital controller.

Automatic mode for milling operations can only be set from the operating panel of the operator's control station.
During the milling process, changes to all operating modes (automatic, semi-automatic, manual) can only be conducted on the controller via the A/M button once automatic mode has been activated.



Nivellswitch1000.cdr/Moba23jpg

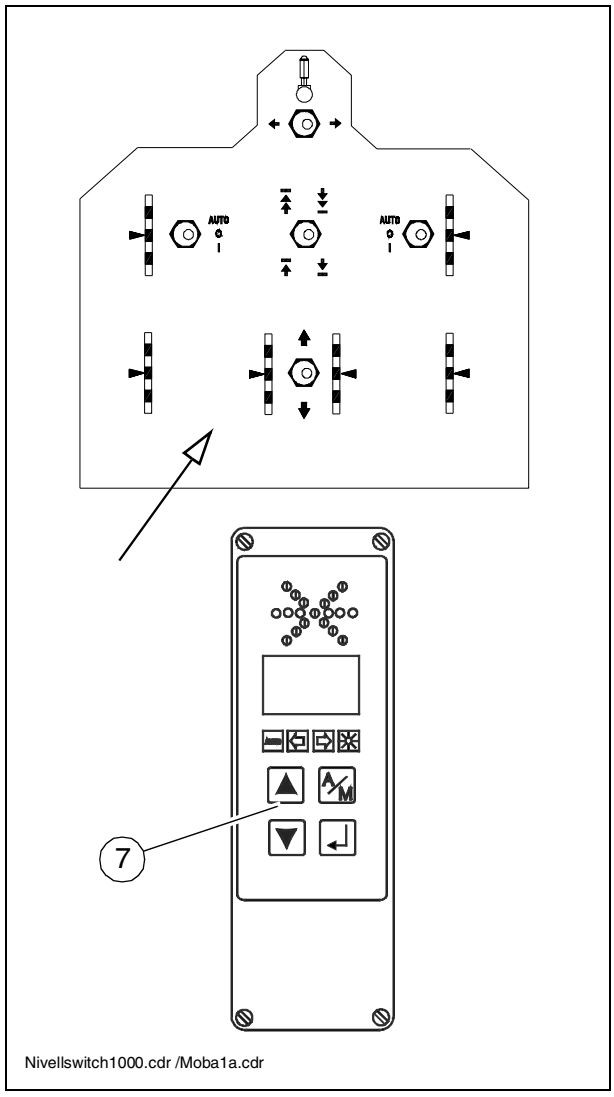
## 6.4 Calibration to zero

### Initial situation for calibration to zero

- Sensors and controllers are fitted, all connection cables are connected.
- The machine is standing on a smooth, level surface without lateral slope, uniformly lowered so that the milling drum is just slightly above the ground.
- The side boards are lowered
- The milling drum is activated, the diesel engine runs at idle speed.
- The moldboard is raised slightly and provides a clear line of sight to the rotating milling drum and the ground.

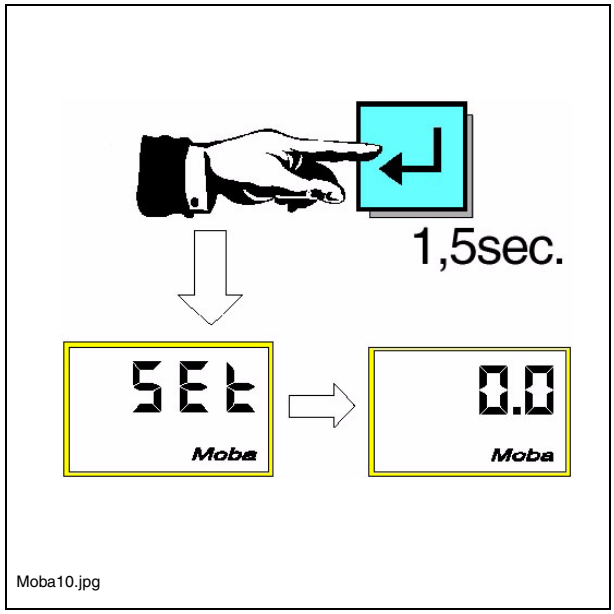
### Other tasks

- Lower back of machine using the appropriate function key on the control panel without allowing the rotating milling drum to make contact with the ground.
- Move digital controller to "Manual" (AUTO function lamp (4) is off)
  - Move levelling function for both machine sides to the "ON" position.
- Use the buttons (7) to slowly and smoothly lower the left and right of the machine until the entire width of the rotating milling drum and the bit tips scratch against the base.
- Both side boards locate flush with the ground.



**Calibration to zero for cable tension and Digi-Sonic sensors when sensing the ground via the side boards.**

- Hold down the input keys of the left and right controllers (approx. 1.5 sec) until "SET" and then the value 0.0 appear on the display.
- The actual and nominal values are now set to zero.
- If the Digi-Sonic sensor is used as the height sensor, this must have been previously moved into its bracket so that it is approx. 500 mm above its reflection surface on the side board.



Moba10.jpg

## 6.5 Actual value calibration

### Digi-Slope sensor (lateral slope sensor)

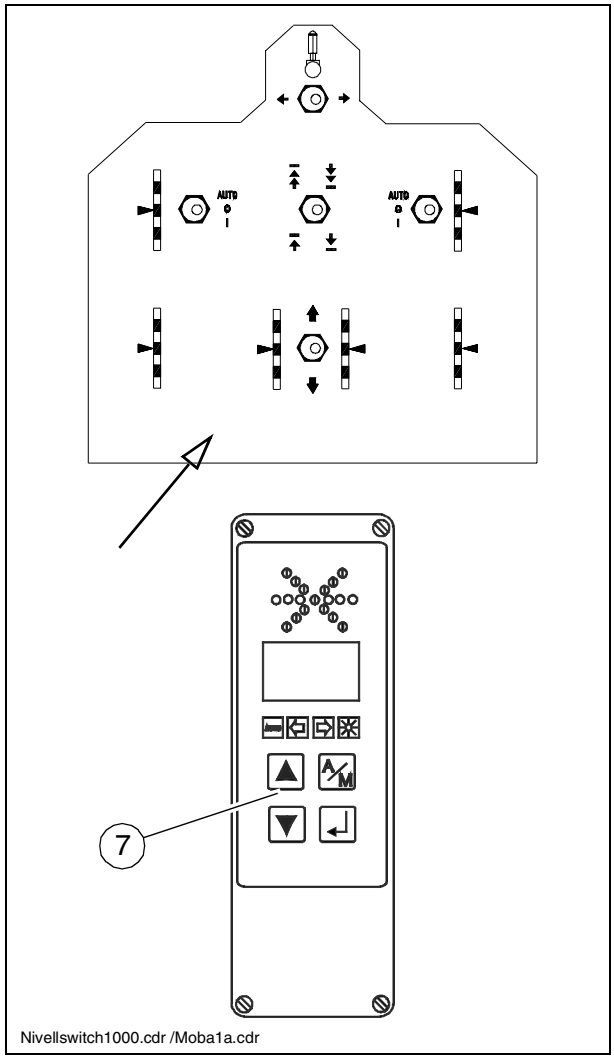
During this process, the actual value display of both digital controllers is compared with the actual slope angle of the machine / milling drum

### Initial situation for actual value calibration

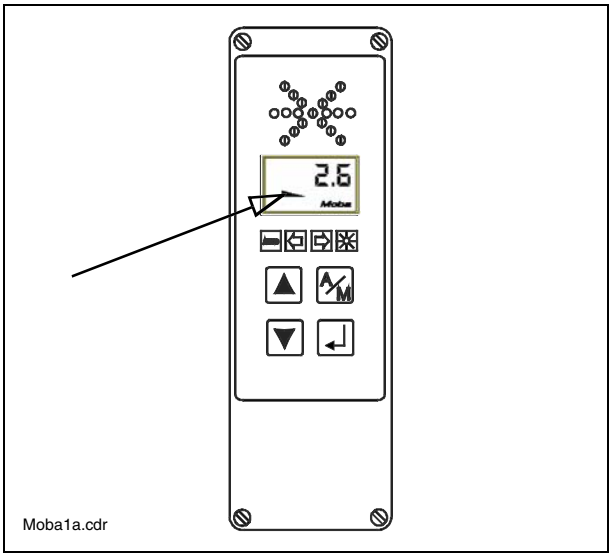
- Sensors and controllers are fitted, all connection cables are connected.
- The machine is standing on a smooth, level surface without lateral slope, uniformly lowered so that the milling drum is just slightly above the ground.
- Use a digital spirit level to define the lateral slope of the ground.
- The side boards are lowered.
- The milling drum is activated, the diesel engine runs at idle speed.
- The moldboard is raised slightly and provides a clear line of sight to the rotating milling drum and the ground.

### Other tasks

- Lower back of machine using the appropriate function key on the control panel without allowing the rotating milling drum to make contact with the ground.
  - Move levelling function for both machine sides to the "ON" position.
- Use the buttons (7) to slowly and smoothly lower the left and right of the machine until the entire width of the rotating milling drum and the bit tips scratch against the base.
- Both side boards locate flush with the ground.



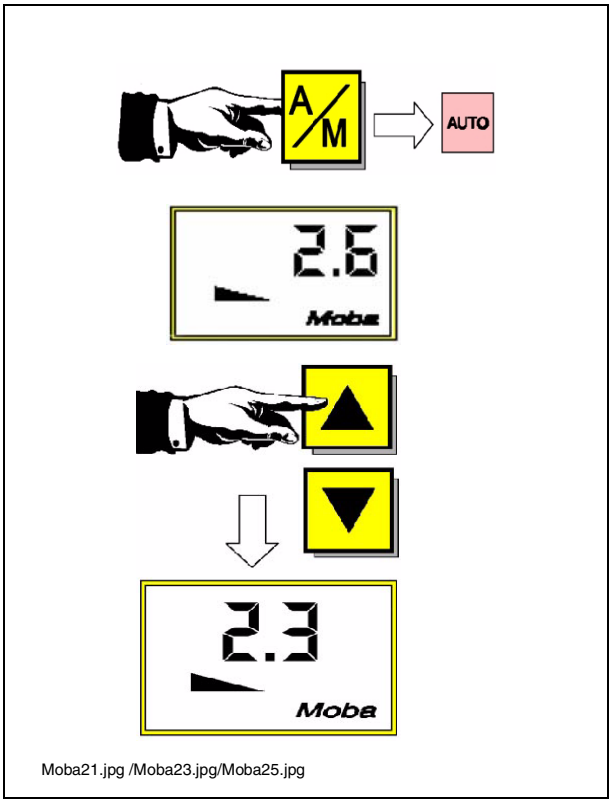
- Changing the controller over to lateral slope is indicated in the display window by a lateral slope symbol and the actual value of the planer / milling drum's lateral slope is shown as a %.




☞ If the value displayed for lateral slop differs from the value previously measured on the ground, the calibration must be undertaken as follows:

Example:
The controller value displayed is corrected to the value measured using the spirit level as follows:

- The A/M button is used to change over to manual mode, the "Auto" function lamp is off.
  The display shows the actual value.
- Press and hold down the input key. "SET" appears on the display, then the display changes again to the actual value.
- The input key remains depressed and the actual value is corrected to the value required (example 2.3) using the UP/ DOWN buttons.




☞ Only then release the input key! The value is saved automatically.

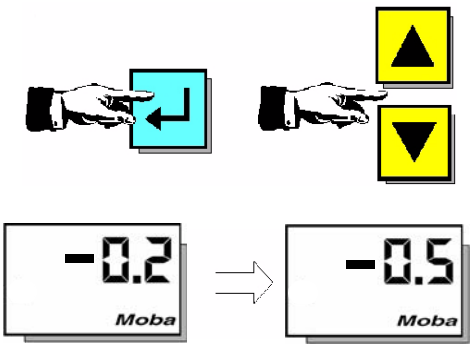
The actual value calibration should be conducted on both controls one after another. Should the installation position of the Digi-Slope sensor have changed or should a controller have been replaced, a new actual value calibration must be conducted in both instances.
The actual value can be corrected at any time, i.e. even in automatic mode during milling.

☞ The actual value of the lateral slope is determined with the aid of a highly accurate spirit level. It is measured right next to the milling drum box on the underside of the machine frame as a %.

## Height sensors (to correct the actual value to the value displayed)

- In automatic mode, press and hold down the input key. "SET" appears on the display, then the display changes again to the actual value.
- The input key remains depressed and the actual value is corrected to the value measured in the milling lane (example -1.2) using the UP/ DOWN buttons.
- Only then release the input key! The value is saved automatically.

☞ The actual value can only be corrected in automatic mode.




Moba26.jpg /Moba27.jpg

# 7 Operation

## 7.1 Preparing for operation

### Devices and aids

To prevent delays and to ensure a problem-free flow of work, before starting work, operators should check whether all the devices and aids required for smooth operations are available.

A sufficient quantity of lubrication agents and fuel substances, tools, spare bits and other spare parts required as well as items of clothing for personal safety (protective clothing, reflective jackets, gloves, ear protection) should be available.

### Before starting work

- Read safety instructions.
- Check personal protective equipment.
- The parts and equipment removed for safe keeping should be fitted again in accordance with the appropriate instructions.
- Walk around the machine to check for damage and leaks to ensure that the machine can be safely started.
- Conduct checks in accordance with "Checklist for machine operator".

**Checklist for machine operator**

Once the maintenance and checking work listed in the maintenance manual has been conducted at the specified intervals, the inspections and control work listed in the following list should also be noted and conducted.
This work is used to assess the machine status and to assure perfect operations as well as personal safety.
If permitted by the operations in question, the checks should be conducted before, during and after use.
Any defects found should be rectified immediately in compliance with the safety regulations.

| Check! | How? |
|---|---|
| Emergency-stop button<br>- on main control panel | Check with engine running:<br>Engine must shut down immediately after actuation.<br>The button engages and must be pulled out so that the engine can be started again. |
| Horn<br>- On the operating panel | Briefly press horn knob.<br>Horn signal must sound. |
| Lighting<br>- Operating headlight<br>- Rotary beacons<br>- Hazard flasher | Lights must function,<br>keep headlight glass clean. |
| Steering system | Check with engine running:<br>Straight-ahead travel for machine, steering responds synchronously to steering wheel motion. |
| Travel drive | Check with engine running:<br>Machine accelerates, hesitates and brakes smoothly both in the drive and working gear. |
| Traction system - chassis leg | Check with engine running:<br>Smooth extension and retraction. |
| Safety switch | Fastening, check condition and function. |
| Water system | Check:<br>- Function of spray nozzles. |
| Starter | Engine cannot be started unless:<br>- drive lever is not in centre position<br>- milling drum is engaged<br>- actuator switch for chassis legs is not in O position. |

| Check! | How? |
|---|---|
| Other equipment:<br>- Engine panels<br>- Lateral flaps | Check that panels and flaps are secure. |

☞ In addition to the checklist, a visual check should be carried out of all components and function settings.
Note the condition, fastening and wear of individual elements, completeness and wear of milling tools as well as checking for specified settings, seal integrity and lubrication!

## 7.2 Starting the machine

The following should be done before the diesel engine can be started and the machine can be operated:

- Daily machine maintenance.

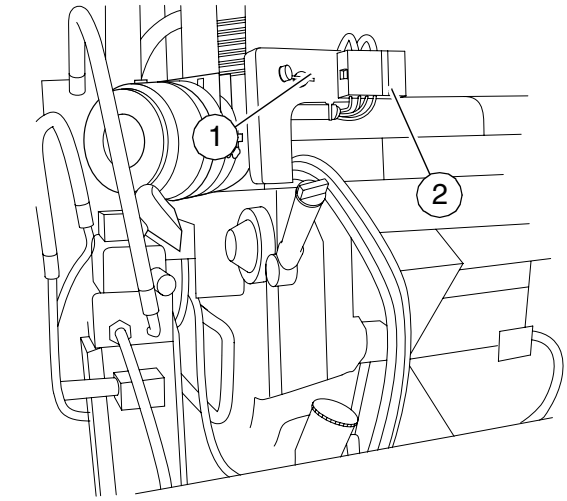
⚠ Check the operating hours counter to determine whether further maintenance work should be conducted.

- Check the safety and protection equipment.

If necessary:

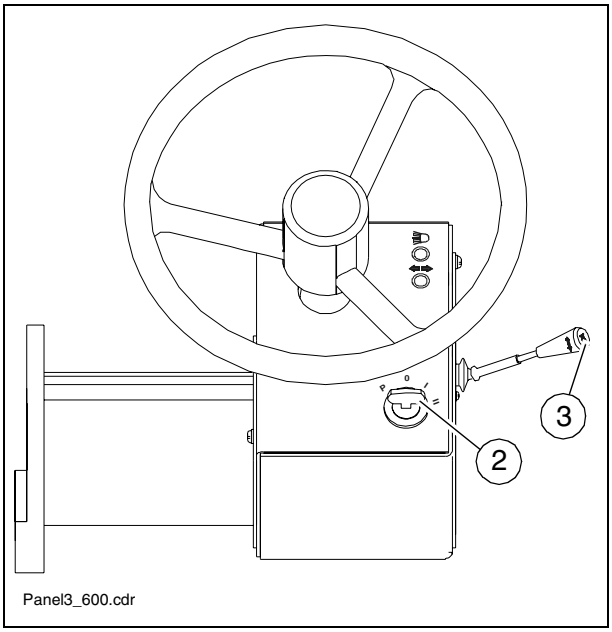
- Remove vandalism protection.
- Set up the control panel.

- Switch on battery's main switch (1).



Lufi_Pl500.eps

- Insert ignition key (2) in ignition lock in setting "P". When starting, ensure that the light is not switched on in order to save the battery.
- Switch on ignition (Pos. 1).
- Turn ignition key in Pos. 2 to start the diesel engine.




STOP Before starting, sound the horn by briefly pressing the horn button (3).

☞ It is not possible to start the vehicle unless the drive lever is in its 0 position or if the emergency-stop button is pressed, and the milling drum drive or height adjuster must also be engaged.

⚠ If the engine does not start straightaway, continue starting for a maximum of 20 seconds without a break, then wait 1 minute.

☞ If the battery has gone flat, perform an auxiliary start.

- Once the diesel engine fires, let go of the ignition key.
- The ignition key automatically jumps back into Pos. 1.
- Check operating values using the indicator lamps and display instruments, performing corrections if necessary.
- Allow the machine to warm up if necessary.

**Auxiliary starting (electrical starting aid)**

☞ If the batteries are flat and the starter is not turning, the engine can be started using an external source of power.

The following are suitable as sources of power:

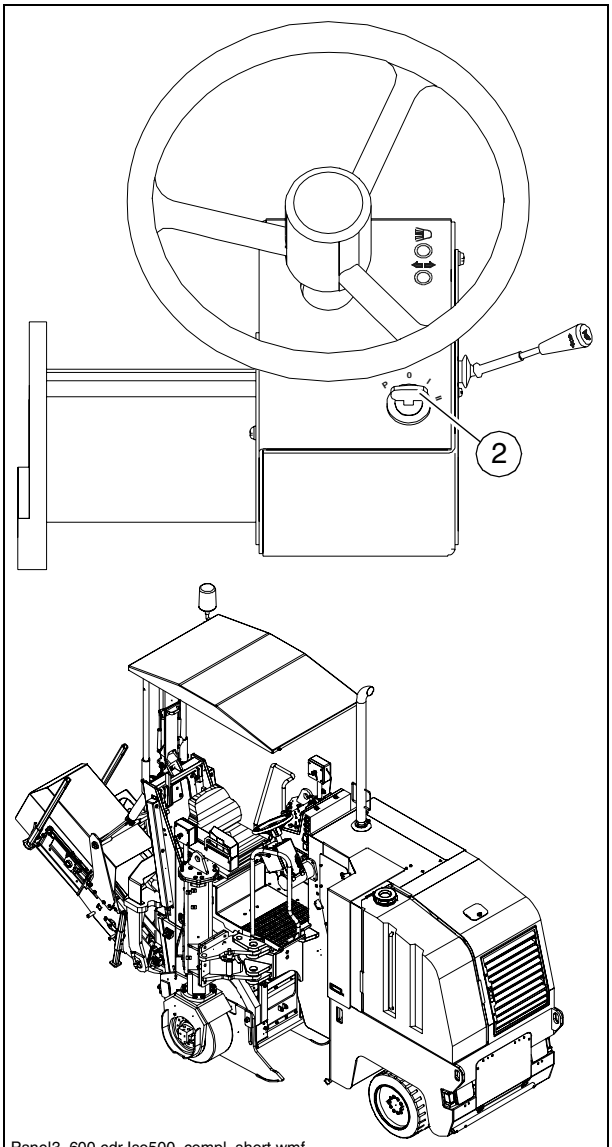
- another vehicle with a 24 V system;
- additional 24 V battery;
- starting aid, 20V/100A.

⚠ Normal charge devices and rapid charge devices are not suitable as starting aids.

To externally start the engine:

- Connect power source to batteries located behind flap at front of machine using suitable cables.

⚠ Check correct polarity! Always connect the negative cable last and remove it first!




- Insert ignition key (2) in ignition lock in setting "P".
- Switch on ignition (Pos. 1).
- Turn ignition key in Pos. 2 to start the diesel engine.
- Once the diesel engine fires, let go of the ignition key.
- The ignition key automatically jumps back into Pos. 1.

If the engine fails to start despite this starting aid: track down the cause, then proceed in accordance with the engine's Operating Instructions if necessary.

Once the engine is running:

- disconnect external source of power.

☞ When using starting aid spray, ensure fuel injection system is properly ventilated, as defined in the engine's Operating Instructions.

**Allowing engine to "warm up"**

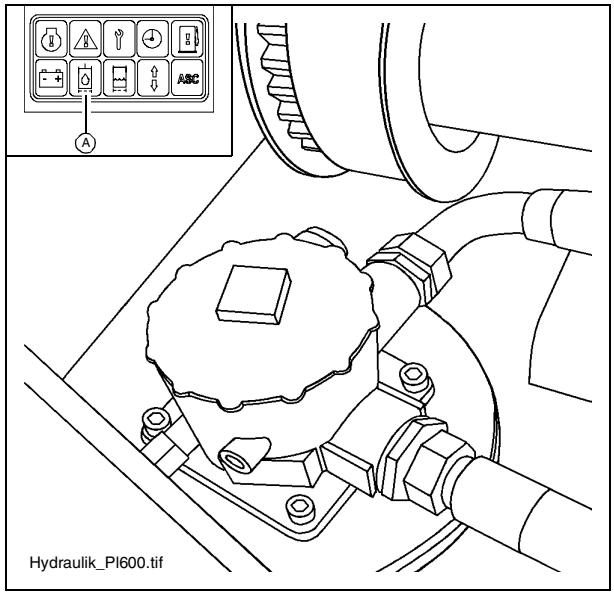
To keep excessive wear and increased load of individual assemblies to a minimum, the engine should always, but especially at low outside temperatures (<10°C), warm up for approx. 5 minutes at idle speed and without any load.
The milling drum should be engaged.

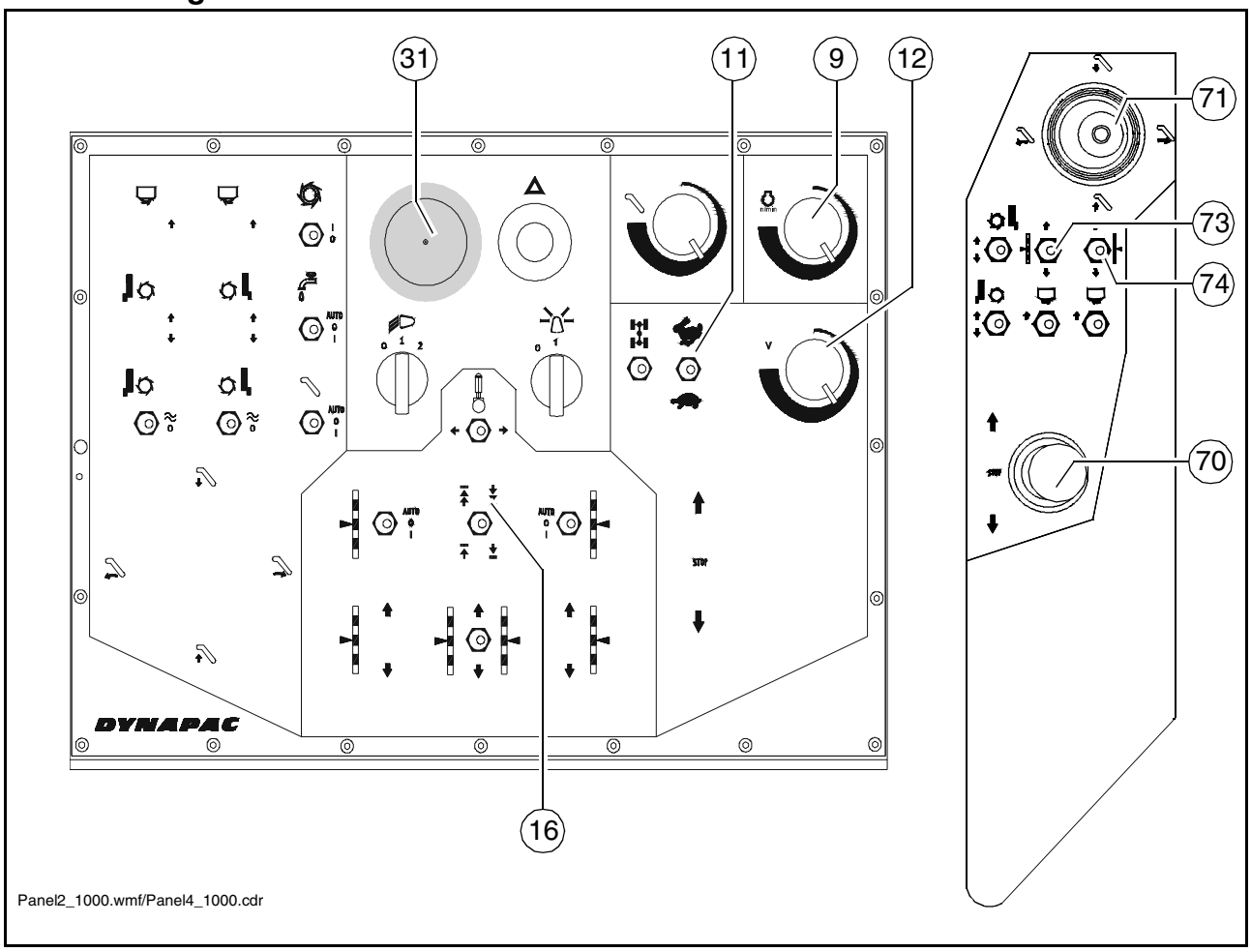
☞ The optimum operating values of a warm machine are:

- Coolant temperature of engine: 60°C
- Hydraulic oil temperature: 40°C

☞ Take due note of visual signal from the hydraulic system! If the indicator lamp lights up (A), the milling operation must be interrupted, or should not be engaged.
Check hydraulic oil filter for signs of dirt, and also check the oil level.

Before the milling procedure is started, all hydraulic function elements on the machine should be moved several times.






- Raise machine uniformly by pressing both switches (73) + (74) together until the desired ground clearance has been reached. Where applicable, press the switch for raising and lowering speed (16) to rapid adjustment beforehand.
- Ensure that machine is as horizontally positioned as possible (pay close attention to the inclination - or "slope" - indicator)

⚠ Never fully raise the machine for driving purposes!
Risk of tipping! Ensure adequate ground clearance!

- Move switch (11) into driving gear (hare symbol).
  If necessary, move the machine in working gear (tortoise symbol).
- Check that all other functions are switched to "0" and, if necessary, select this setting.

⚠ Always operate hazard lights when moving the machine (rotary beacons and hazard flashers)!

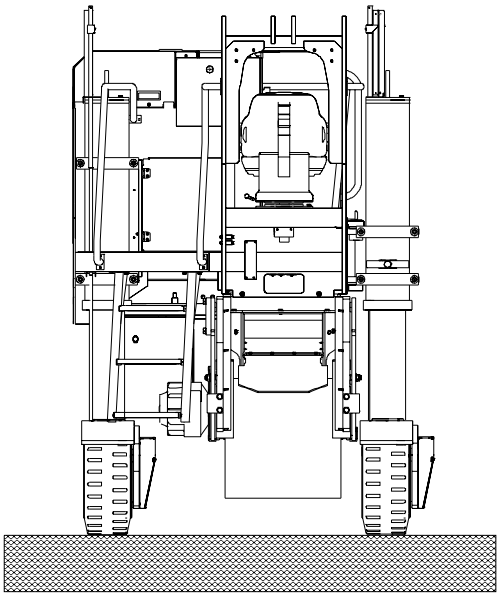
- Set controller for engine speed (9) to "MAX".
- Move preselector controller for travel drive (12) to full power setting.
- To drive the vehicle, carefully move the drive lever (70) forwards or backwards in the desired direction of travel.
- The driving speed is set in accordance with the distance the drive lever (70) moves from its centre position.
- Where necessary, guide the upper conveyor using the control lever (71).

STOP In emergency situations, press the emergency-stop button (31)!

- To stop the vehicle, move the drive lever (70) into its centre position.

**"Driving" position**

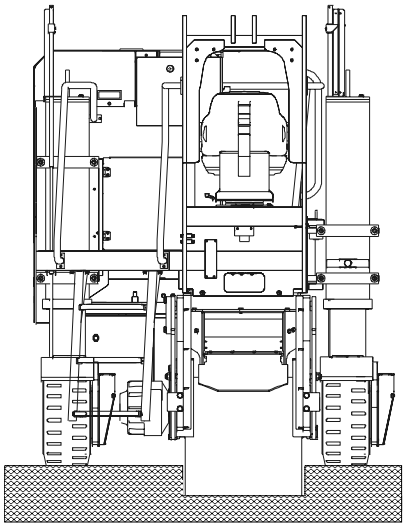
- Chassis legs lowered - milling drum raised



PL600_Back1.cdr

**"Milling" position**

- Chassis legs raised - planer lowered

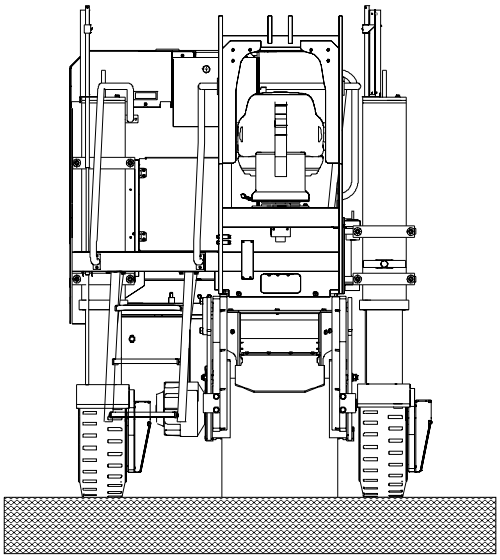


PL600_Back2.cdr

**Zero setting**

- Run milling drum at low rotational speed.
- Lower the planer until the bit tips scratch the road surface across the entire breadth of the milling drum.
- Set milling depth scales to zero.

☞ The zero setting has to be undertaken both when the chassis leg is swivelled out and in! Always undertake the zero setting on level ground which is not sloped in any way.



PL600_Back3.cdr

**Surface milling**

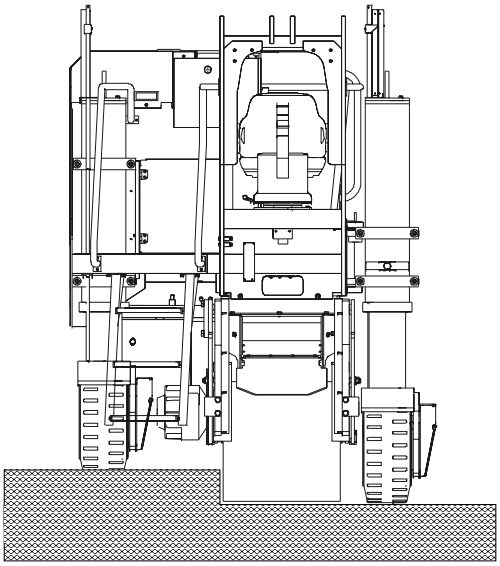
1. With deployed right-hand chassis leg:

The right-hand chassis leg engages in the milled and cleaned first lane.

Depth setting:

- right - zero
- left - desired milling depth

2. With folded right-hand chassis leg:
   (right-hand chassis leg runs in front of milling drum along the lane which has not yet been milled).



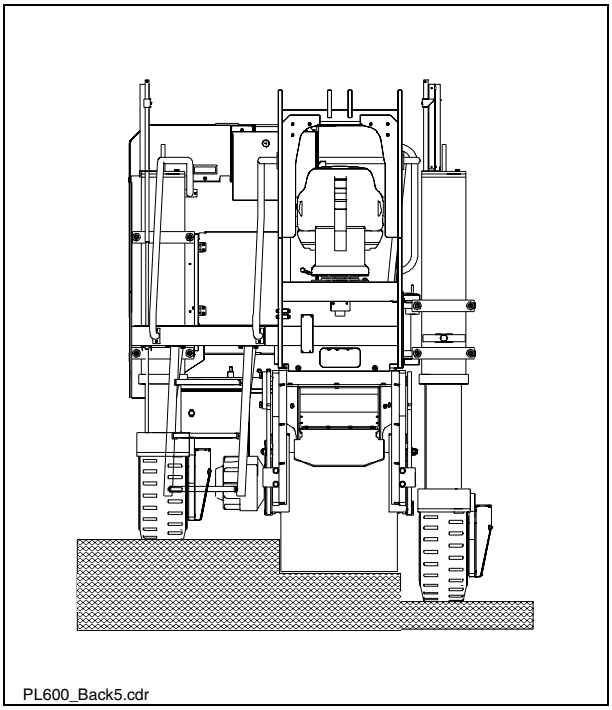
PL600_Back4.cdr

Necessary if space constraints prevent the right-hand chassis leg from being deployed or if the right-hand track does not have sufficient load-bearing capacity for the vehicle.

Depth setting:

- Same milling depth on left and right sides

**Planing on road surface wheel or on offsets**


PL600_Back5.cdr

⚠ Pay close attention to load-bearing capacity of right-hand track.

⚠ Raise planer sufficiently!
The milling drum must have more ground clearance than the height of the offset.

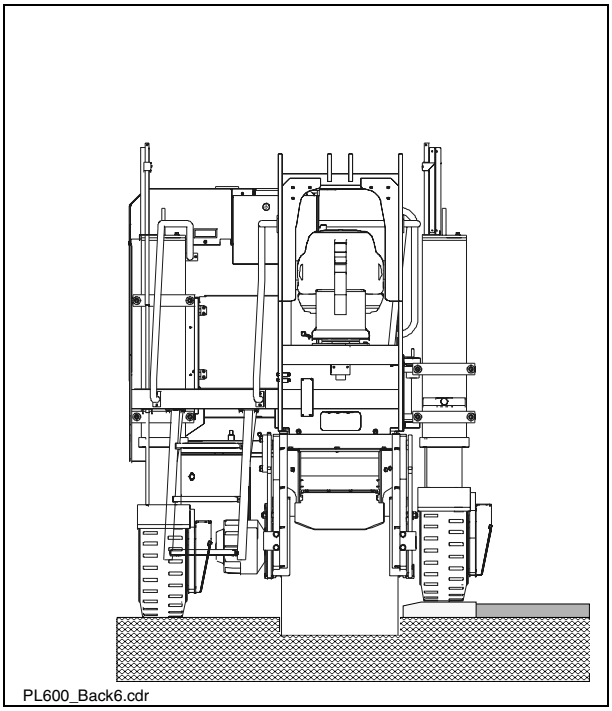
⚠ Always keep planer level when engaging it in the milling position!

⚠ For planing operations, lower the machine evenly down to the desired milling depth.

Depth setting:

- left - desired milling depth
- right - desired milling depth + height of offset or in such a way that the planer is always in a horizontal position.

**Milling at the curb**
**(with deployed chassis leg)**


PL600_Back6.cdr

Advantages:

- high planing precision
- exact planing surface
- direct planing against kerb possible

Disadvantages:

- Under certain circumstances, it may not be possible to achieve the required milling depth

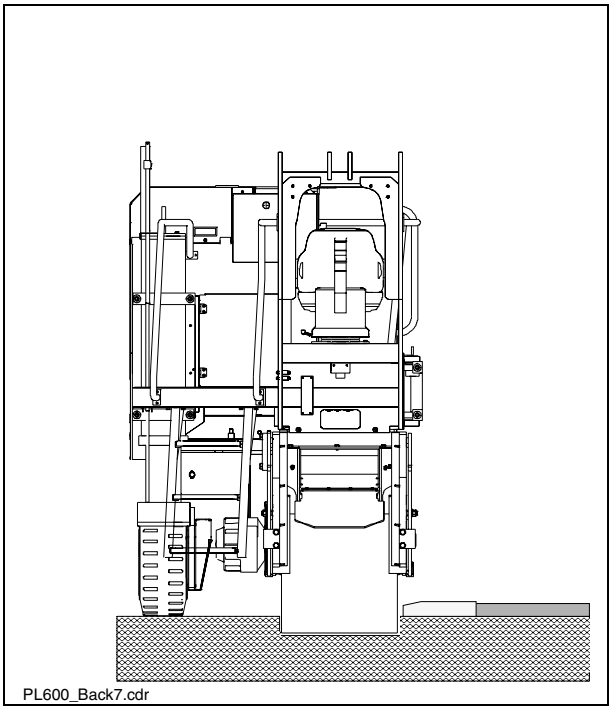
**Milling at the curb (with chassis leg swivelled in)**

Advantages:

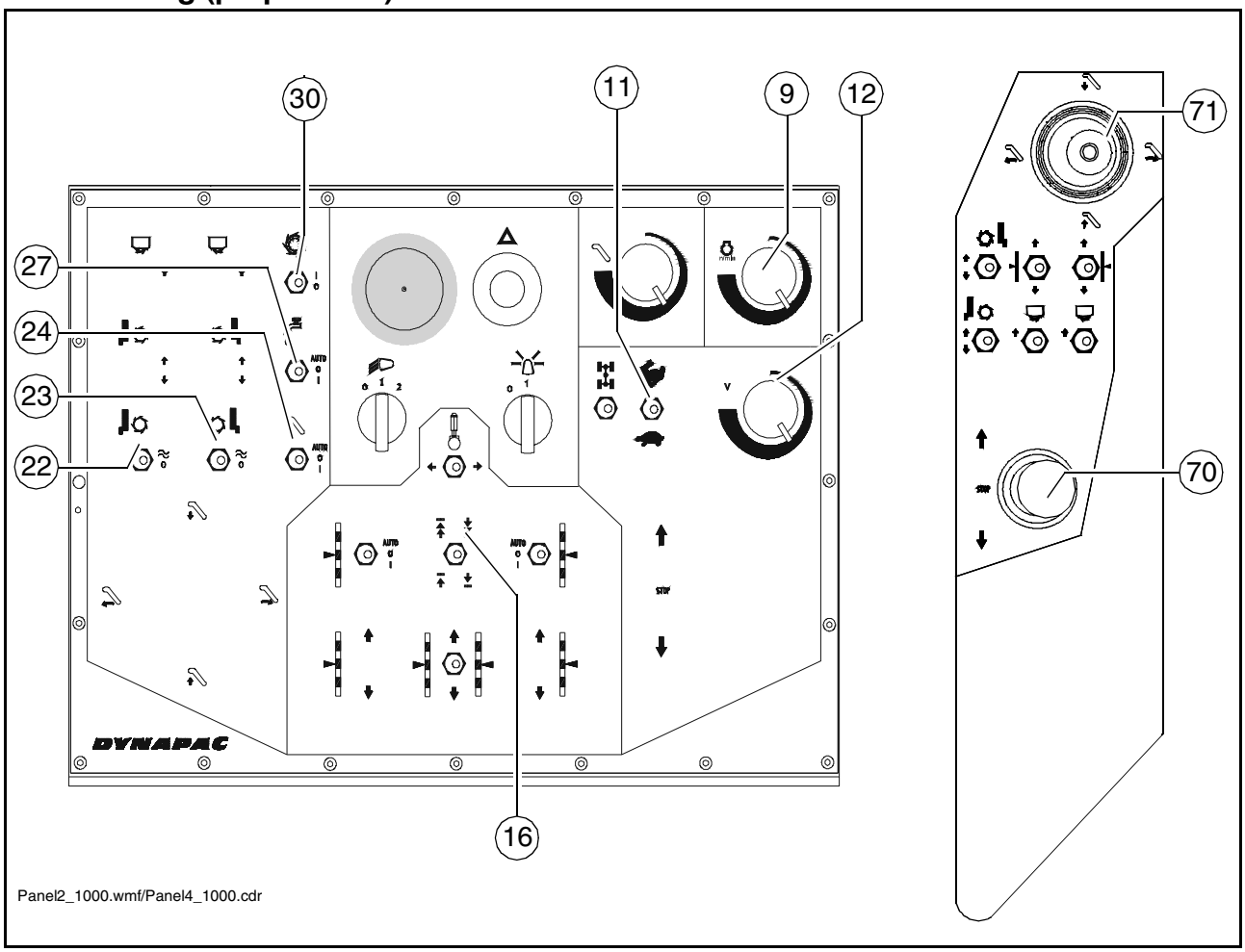
- Maximum milling depth is reached
- direct planing against kerb possible

Disadvantages:

- Less precise planing results
- Less exact planing surface



**Milling (preparation)**:



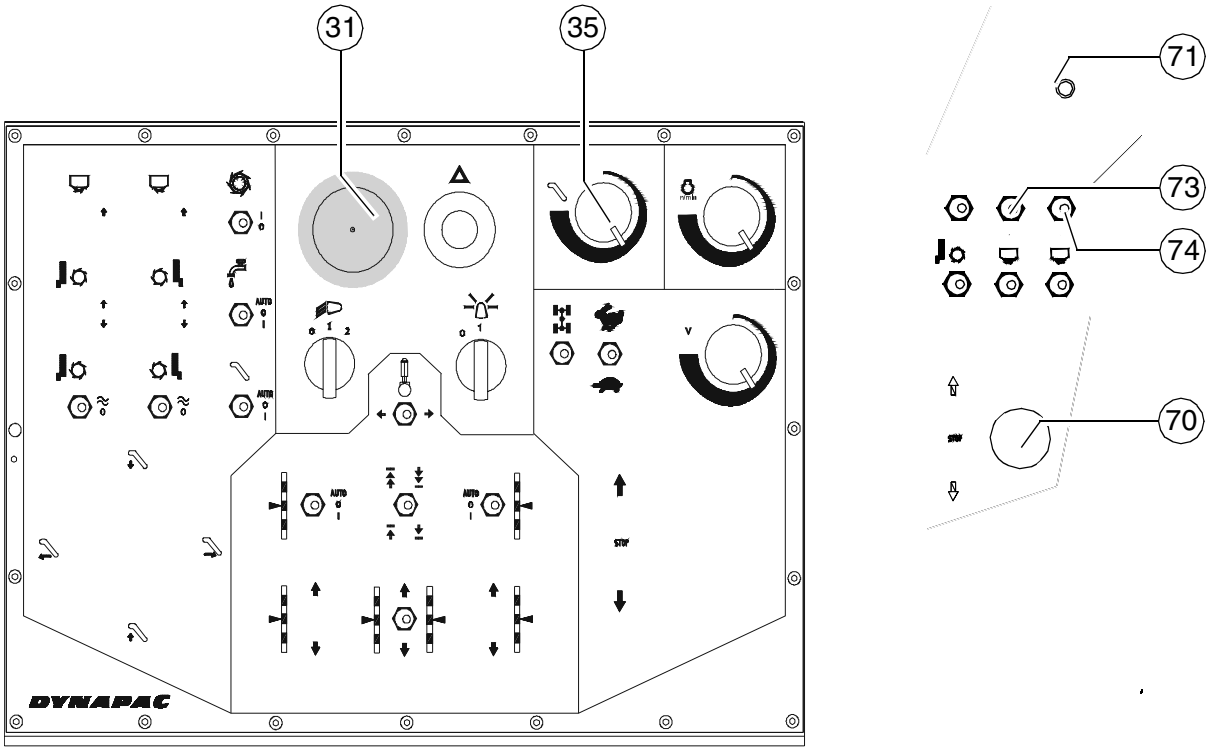

- Drive the machine to the planing location and lower manually as far as possible (milling drum does not make contact with ground at this stage).

Engage the following functions on the main operating panel:

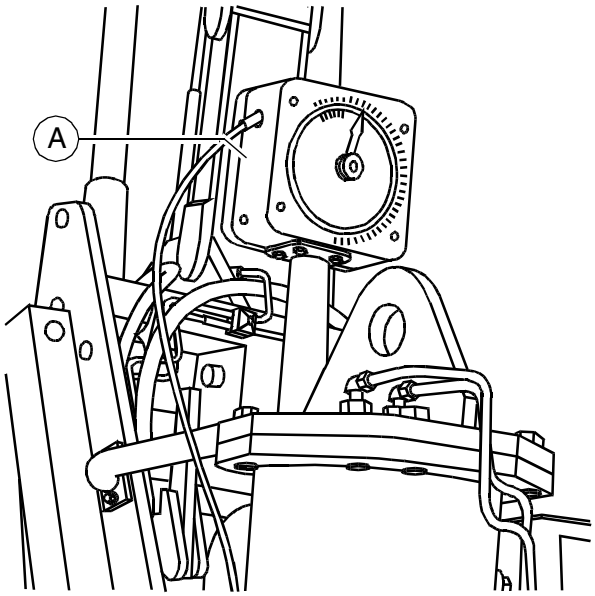
| Item | Switch | Position |
|---|---|---|
| 11 | Transport/working gear | Working gear (tortoise mode) |
| 12 | Preselector for travel drive | Approx. average power |
| 30 | Milling drum ON / OFF | Milling drum drive ON |
| 27 | Water pump ON / OFF | "Auto" pos. or „1“ |
| 9 | Increase the engine speed | "max" |
| 16 | Raising and lowering speed | Lower switch position (slow) |
| 22 | Selector switch for front board | Floating position |
| 23 (○) | Selector switch for moldboard | Floating position |
| 24 | Upper conveyor mode | "Auto" pos. or „1“ |

☞ The automatic function for water sprinkling and upper conveyor is engaged as soon as the drive lever moves out of its central position and is disengaged automatically as soon as the machine is stopped.

## Planing without automatic levelling device




Panel2_1000.wmf/Panel4_1000.cdr




Skala5.wmf

Once all preparatory work for planing has been completed, the planer is ready for operation and a truck is parked below the upper conveyor to receive cutting debris, the stationary machine is lowered to the required depth.

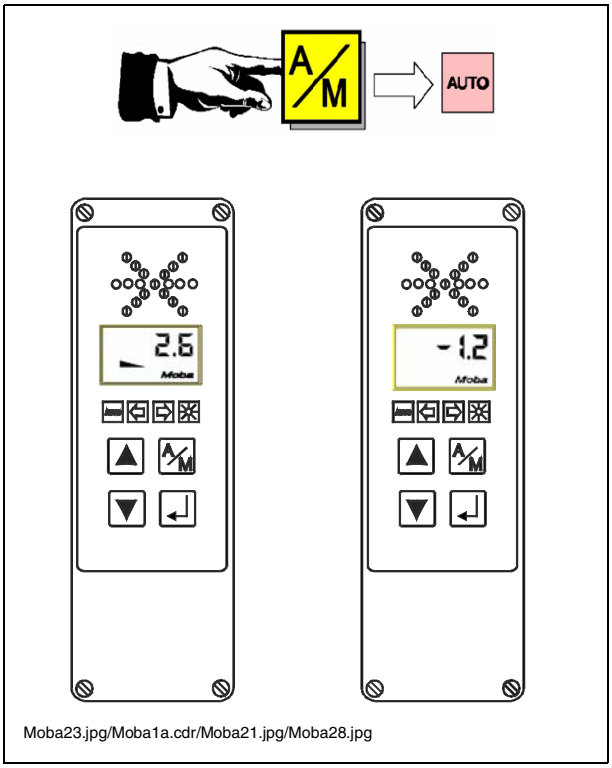
- Carefully lower the stationary machine by pressing the switches (74 + 73) until the milling drum makes gentle contact with the working surface.
- Set the milling depth indicators (A) on both sides of the machine to zero.
- Press the switches (74 + 73) again to lower the machine carefully down to the desired milling depth paying careful attention to the milling depth indicators.
- Set desired milling speed by adjusting the setting of the drive lever (70). The machine starts to move when the drive lever moves out of its central position.
- If necessary, adjust the speed of the upper conveyor using the preselector (35).
- If necessary, guide the upper conveyor using the control lever (71).

☞ The automatic function for water sprinkling and upper conveyor is engaged as soon as the drive lever moves out of its central position and is disengaged automatically as soon as the machine is stopped.

## 8.1 Operating the Moba-matic during milling

### Initial situation for operation

- Sensors and controllers are fitted, all connection cables are connected.
- The zero value and/or actual value calibration has been conducted, the machine is in its operating position, all other settings required for planing have been conducted on the machine
- The A/M button is switched to semi-automatic mode (AUTO function lamp flashing)
- The nominal milling depth values and/ or the nominal lateral slope value has been pre-selected.



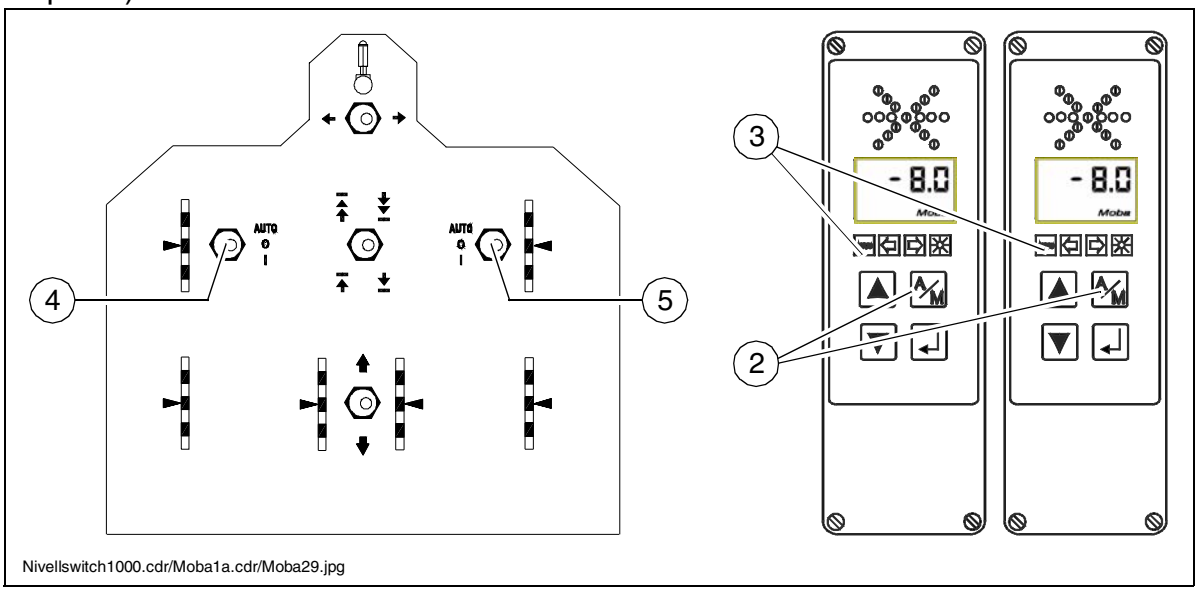
Moba23.jpg/Moba1a.cdr/Moba21.jpg/Moba28.jpg

## 8.2 Other tasks for adopting the initial position for milling:

### Milling with height sensors

Lower planer using switch (1) on operating panel to control the rear chassis legs evenly until baseplates on the side boards make contact with the ground at the back of the machine.

**When starting to mill with offset** (i.e. lower machine immediately to milling depth required):

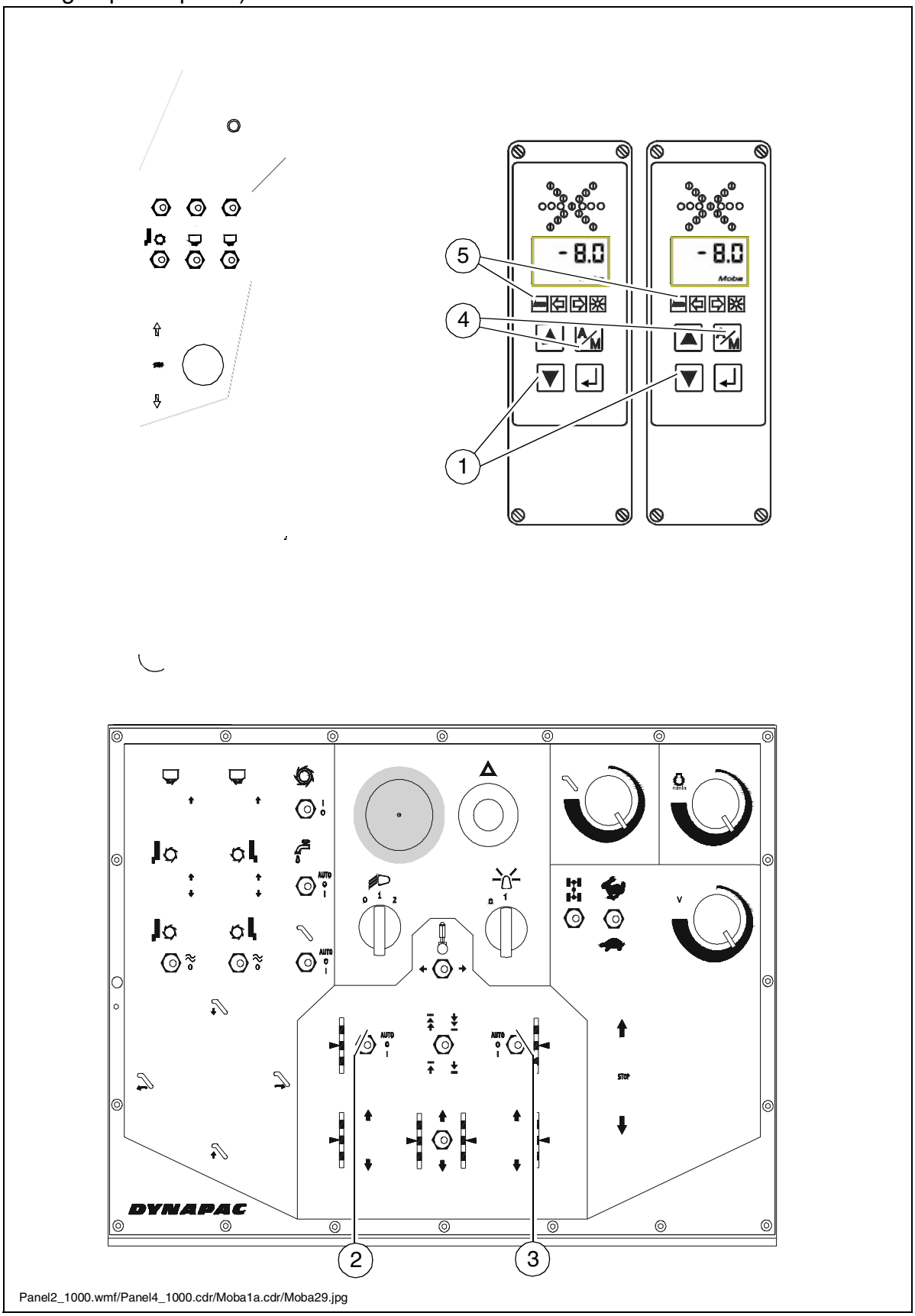


Nivellswitch1000.cdr/Moba1a.cdr/Moba29.jpg

- Enable the automatic function on the levelling equipment using pushbutton (2) (function lamp AUTO (3) lights up).
- Raise the engine speed and engage the milling drum drive.
- Use switches (4) and (5) of the main control panel to switch the levelling unit into "AUTO" and with the machine stationary, lower it to the milling depth preselected with the drive lever deflected slightly.
- Set desired milling speed by adjusting the setting of the drive lever.The machine starts to move when the drive lever moves out of its central position.
- If necessary, adjust the speed of the upper conveyor using the preselector.
- If necessary, guide the upper conveyor using the control lever.

☞ The automatic function for water sprinkling and upper conveyor is engaged as soon as the drive lever moves out of its central position and is disengaged automatically as soon as the machine is stopped.

**When starting to mill without offset** (i.e. lower machine gradually from zero to the milling depth required):

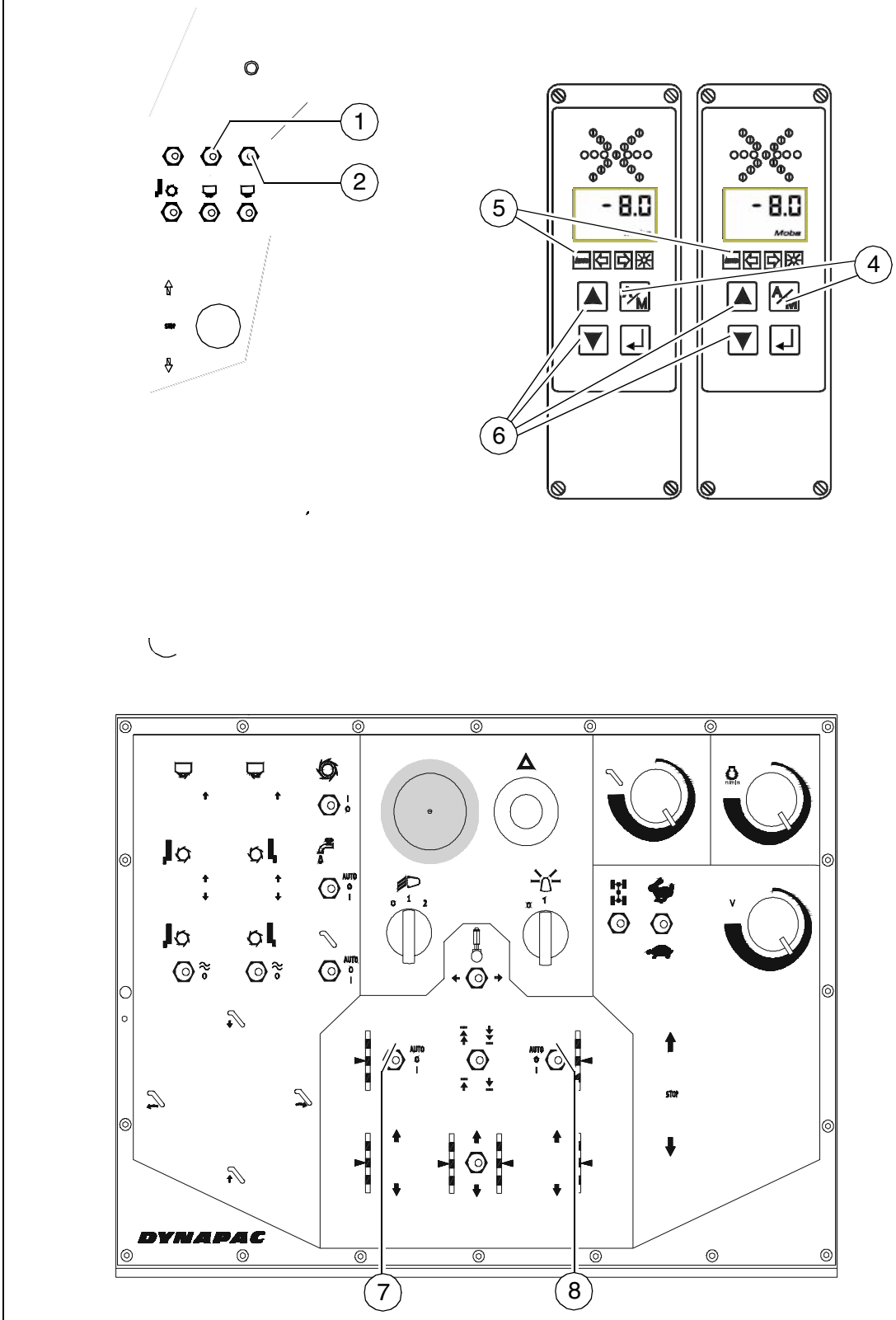



Panel2_1000.wmf/Panel4_1000.cdr/Moba1a.cdr/Moba29.jpg

- When in semi-automatic mode, set nominal value 0 on the two digital controllers using the DOWN buttons (1), activate the levelling unit using buttons (4) on the digital controllers (AUTO function lamp (5) lights up), use switches (2) and (3) on the main control panel to shift to "ON" at the same time and while stationary, lower the machine to height zero.
  At the start of feeding, use the DOWN buttons (1) to slowly set the nominal value and therefore continuously lower to the milling depth required.
- Set desired milling speed by adjusting the setting of the drive lever. The machine starts to move when the drive lever moves out of its central position.
- If necessary, adjust the speed of the upper conveyor using the preselector.
- If necessary, guide the upper conveyor using the control lever.

☞ The automatic function for water sprinkling and upper conveyor is engaged as soon as the drive lever moves out of its central position and is disengaged automatically as soon as the machine is stopped.

## Milling with height sensors together with the transverse slope sensor




Panel2_1000.wmf/Panel4_1000.cdr/Moba1a.cdr/Moba29.jpg

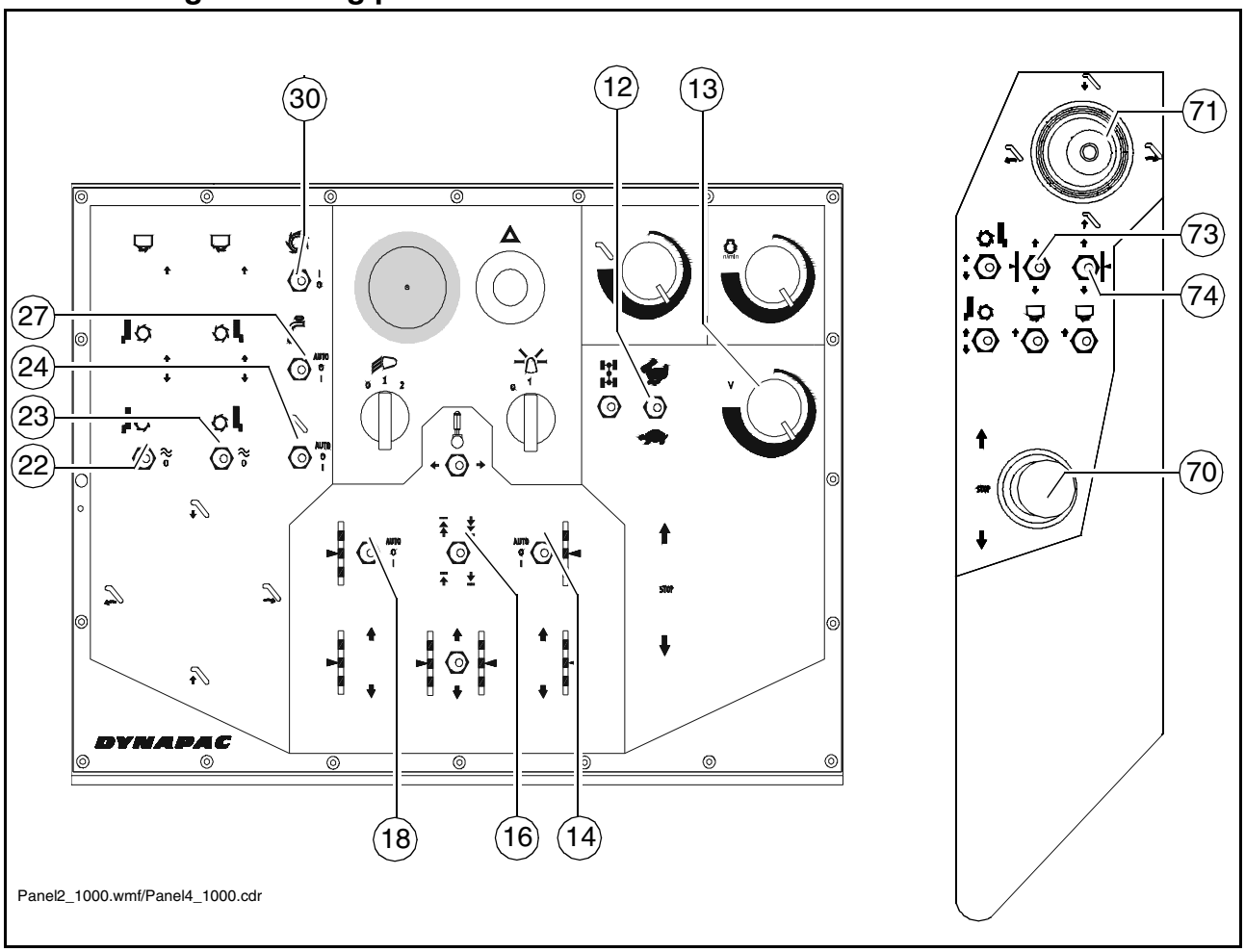
- Lower the machine to its zero cutting depth setting using switches (1), (2), (3).
- Move the A/M buttons (4) of both controllers to automatic mode (the AUTO function lamp (5) lights up).
- Set the desired nominal values for each of the digital controllers using the UP/ DOWN pushbuttons (6) (milling depth (here -8cm), lateral slope (here 2.6% tilting downwards and to right side).
- To increase speed, deflect the drive lever slightly.
- Using the manual adjustment facility, lower the machine using switches (1), (2), (3) on the operating panel uniformly down to roughly the desired cutting depth (note direction of "slope")!
- Use switches (7) and (8) on the main control panel, to shift the levelling unit to "automatic". The machine now lowers to the values set.
- Set desired milling speed by adjusting the setting of the drive lever. The machine starts to move when the drive lever moves out of its central position.
- If necessary, adjust the speed of the upper conveyor using the preselector.
- If necessary, guide the upper conveyor using the control lever.

☞ The automatic function for water sprinkling and upper conveyor is engaged as soon as the drive lever moves out of its central position and is disengaged automatically as soon as the machine is stopped.

☞ The lateral slope sensor is automatic provided that it is connected up!

☞ During milling, both controllers must not be switched to lateral slope!

**Ending the milling procedure**




Stop the machine and raise at the end of the milling lane:

- The drive lever (70) is located in centre position.
- If the automatic levelling device is used for planing, first shut down the levelling unit using switches (14) and (18).
- Move selector switch for the front board (22) and the moldboard (23) (○) to "0".
- Raise machine uniformly by pressing both switches (73) + (74) together until the desired ground clearance has been reached. Where applicable, press the switch for raising and lowering speed (16) to rapid adjustment beforehand.
- Allow milling drum drive (30), water pump (27) and upper conveyor (24) to run on briefly, then switch to "0".
- Move switch (11) to transportation speed (hare).
- Set preselector controller for driving speed (12) to around 50%.
- Start to move the machine by deflecting the drive lever out of its centre position and move out of the construction site area. If necessary, use the preselector controller (12) to slowly increase the driving speed.
- Where necessary, guide the upper conveyor using the control lever (21).

⚠ Comply with safety regulations when moving the machine outside the construction site!

**Parking the machine**

Before parking the machine, take a reading from the operating hours counter and check if any maintenance work is required at that point.

When parking the machine on publicly accessible land, secure it to ensure that unauthorised persons and children cannot do any damage to the machine.
The machine should be parked on level ground. Lower the machine evenly until the milling drum is almost in contact with the ground.

- Remove ignition key and master switch and take them with you – do not leave them "hidden" in the machine
- Fit cover to operating panel and lock.
- Stow loose parts and accessories such as plug-in lights or rotary beacons.
- Lock down all flaps and covers.

**Parking the machine for long periods of time**

When storing the machine for the season, it should be parked so that it is protected from strong sunlight, wind, dampness and frost.

If the machine cannot be parked in enclosed buildings, it should be parked in a covered area or the entire machine should be covered with an appropriate canopy.

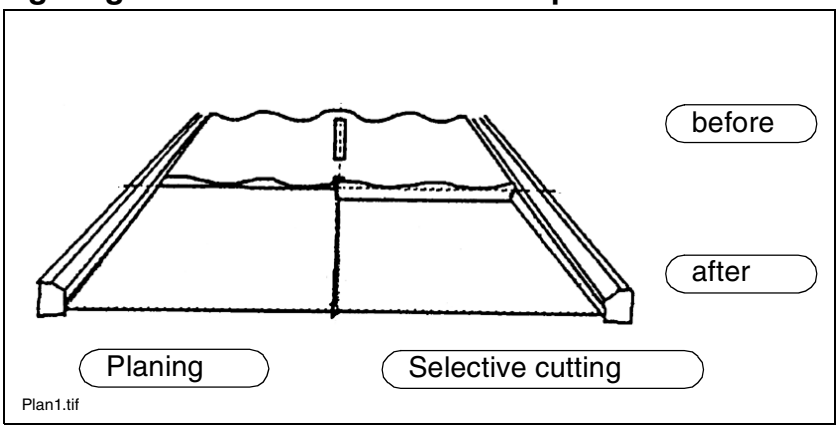
In addition, protect the operating panels by fitting the supplied locking cover and securing its lock.

⚠ Storage temperature must not exceed +70°C or be less than -12°C!
If the machine is stored at temperatures below 0°C, it should be checked for sufficient protection from frost. The water should be fully drained from the water system (tank, filter housing, pumps, hose connections and nozzles).
Observe the relevant information in the Maintenance Instructions!.

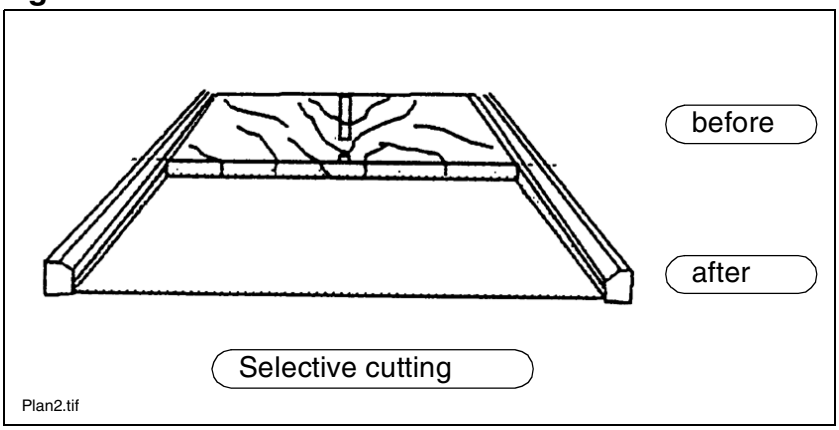
The batteries should be removed during the storage period or connected to appropriate battery trickle chargers to maintain their charge level.

## 9 Scope for using the small planers

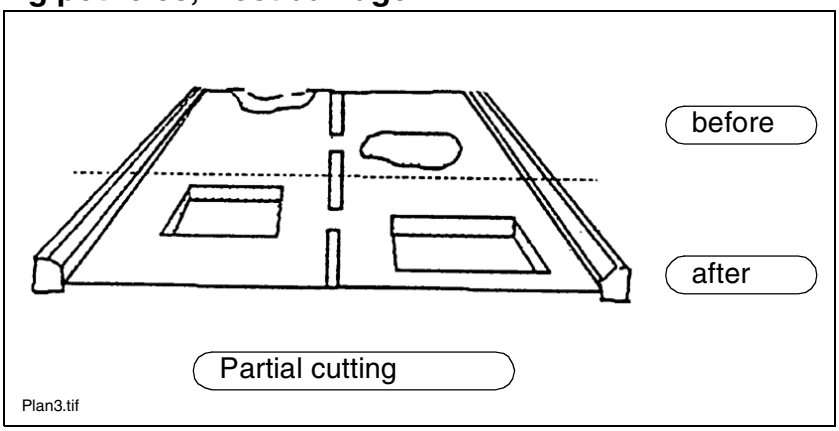
### Remedying longitudinal and transverse bumps in the road surface



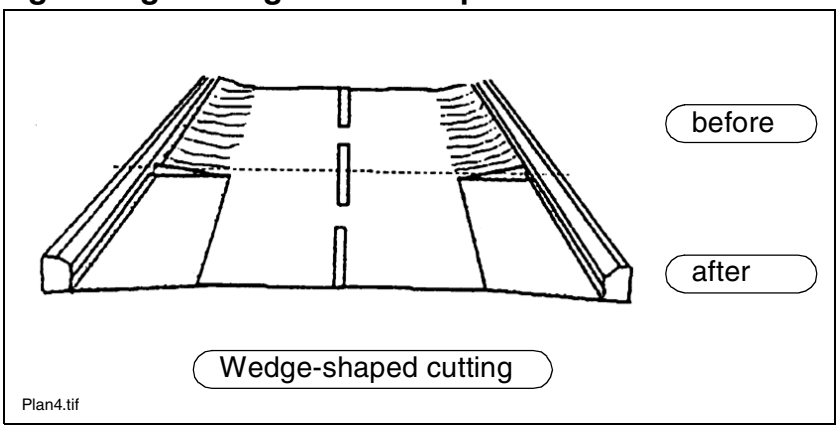

### Remedying cracks



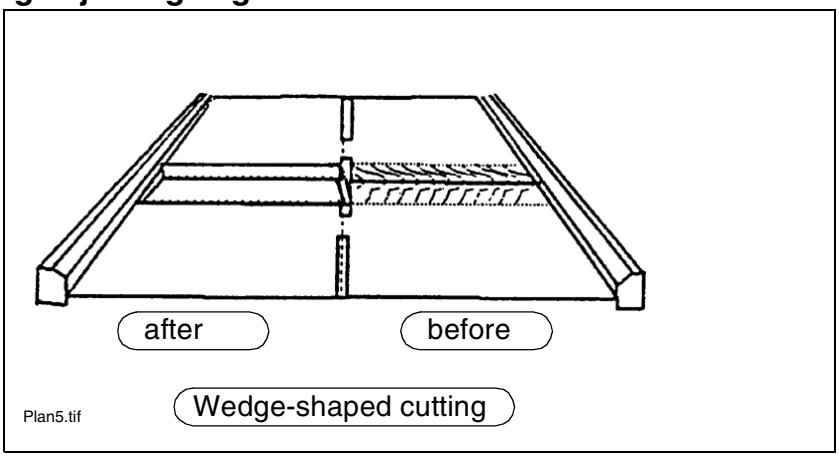

### Remedying potholes, frost damage



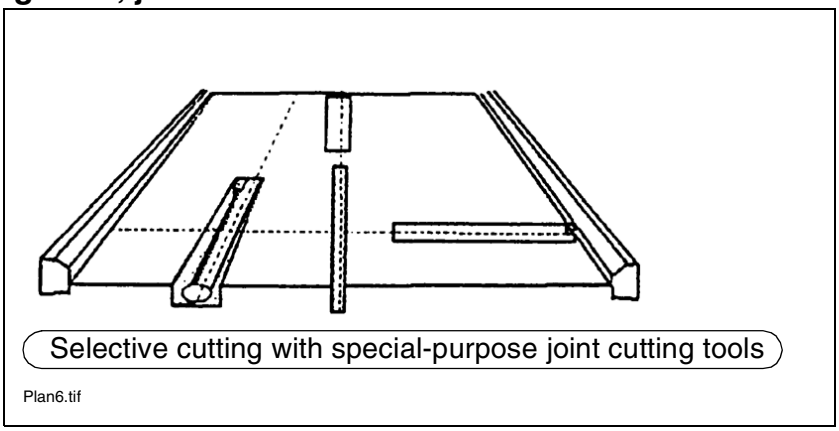
## Remedying damage to edges and bumps



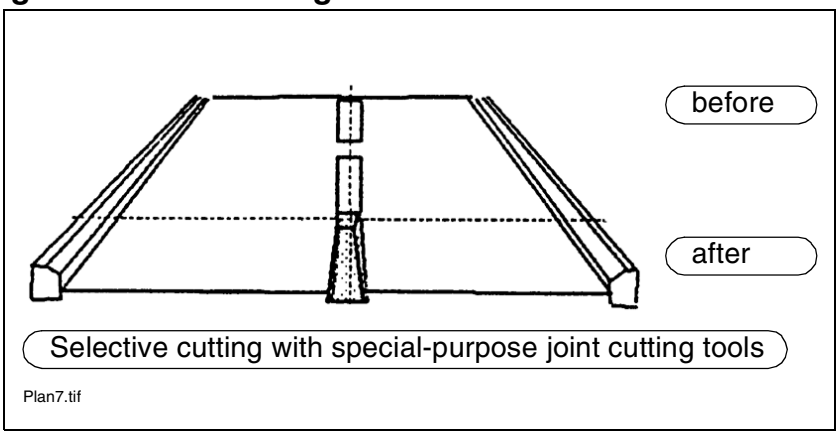

## Producing adjoining edges



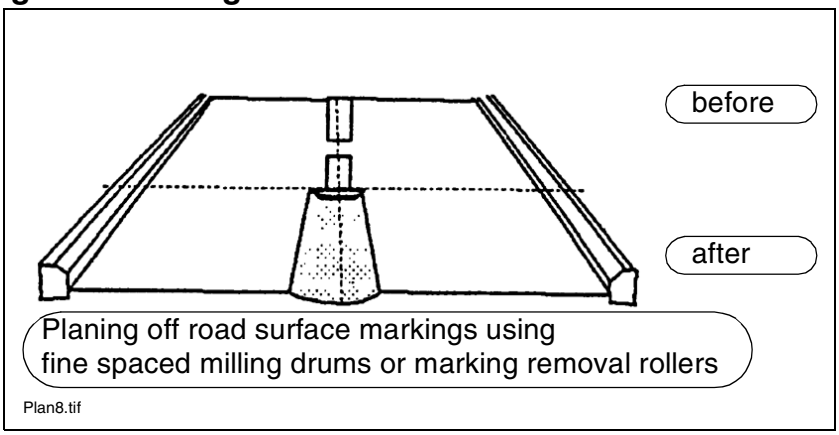

## Producing slots, joints and cable trenches



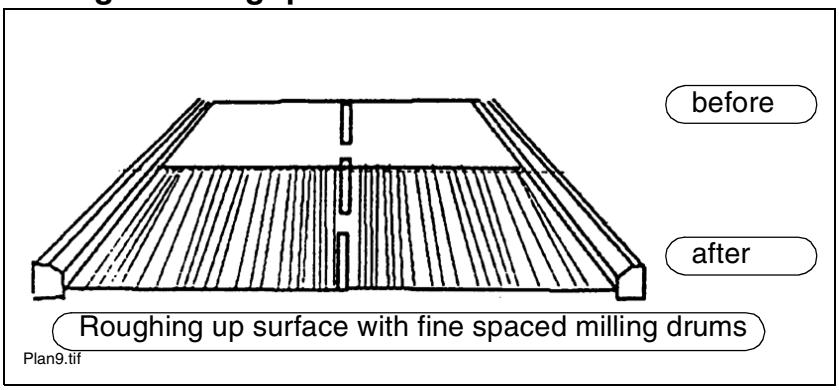
## Removing embedded markings




## Removing road markings



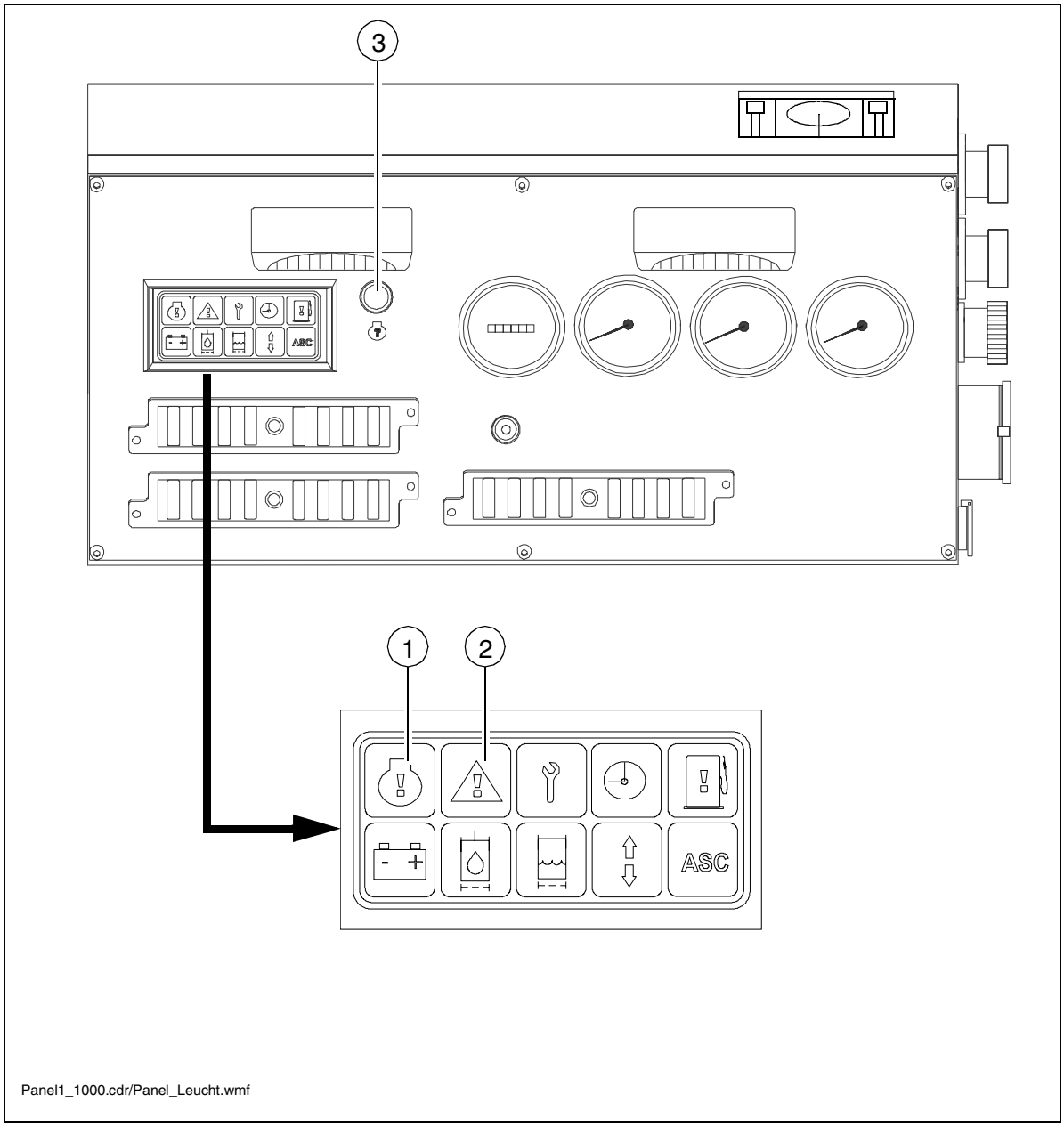

## Re-establishing surface grip



# 10 Malfunctions

## 10.1 Error code query for engine

If a defect on the engine is detected by one of the warning lamps (1) or (2), a code to which a defined malfunction has been assigned can be displayed on screen by pressing the query key (3).
This flash code is issued in each case by a second warning lamp. If a malfunction affects warning lamp (1), the flash code is then issued by warning lamp (2) and vice versa.

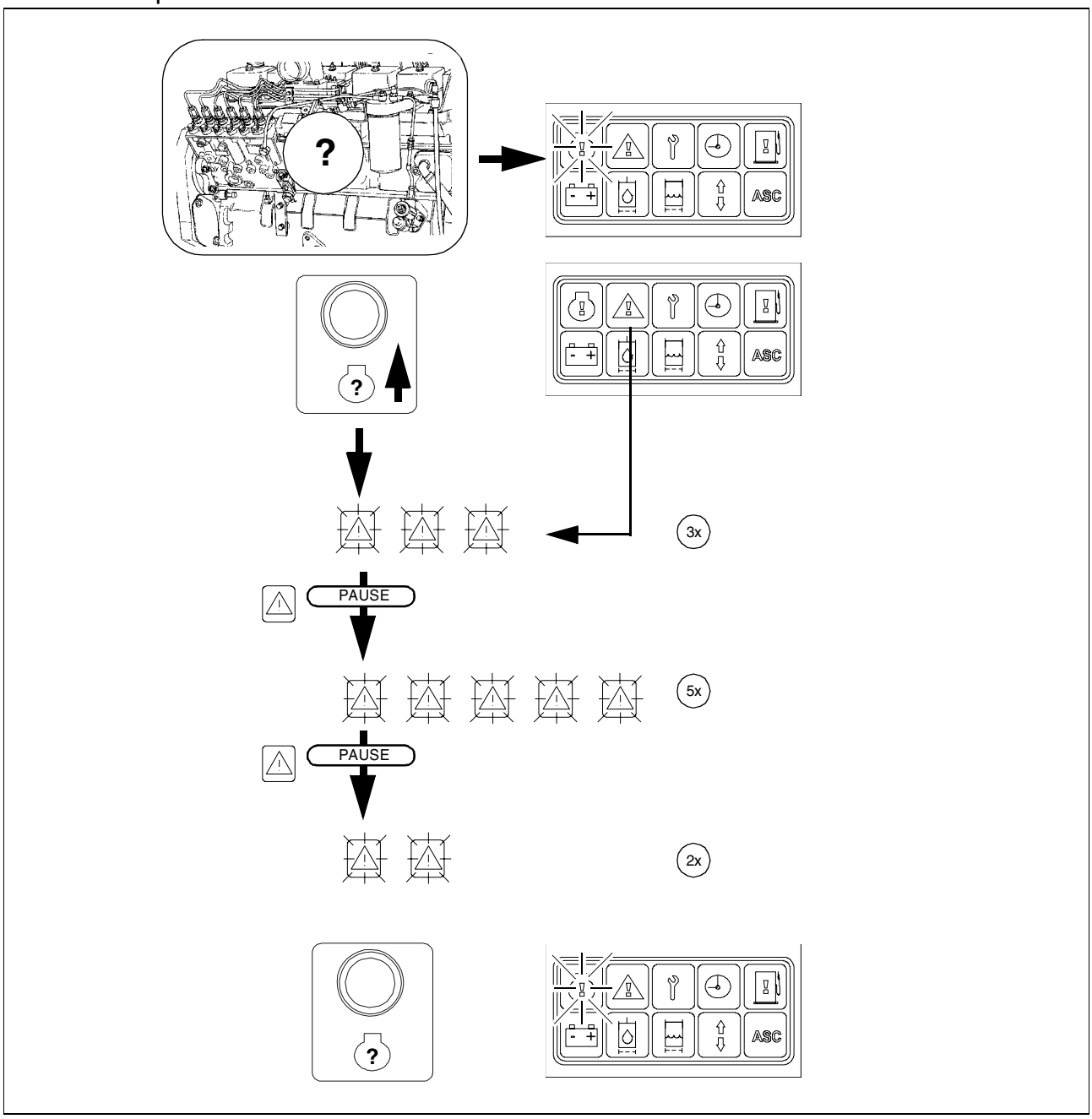



Panel1_1000.cdr/Panel_Leucht.wmf

### Output of the numerical code

- Press button (3) until this 3-digit code is indicated by the warning lamp. While the malfunction query key is being pressed, the warning lamp which initially indicated the presence of that malfunction goes out.

Example:




Flash sequence: 3-pause-5-pause-2.
Error code: 352

☞ If the output switch continues to be held in its upper position, the code is reissued.

Once the malfunction query switch returns to its 0 position, the warning lamp which first indicated the presence of the error lights back up again. This continues until the malfunction or defect has been remedied.

☞ In cases where several defects occur simultaneously, the various different flash codes are displayed when the output switch is pressed.

⚠ Advise our After-Sales Service staff of the malfunction number being displayed for your road planer and we will be only too pleased to discuss what action you should then take.

## Error codes

| Error code and warning lamp | PID(P) SID(S) FMI | SPN (S) FMI | Cause | Effect |
|---|---|---|---|---|
| 111* YELLOW | S254 12 | 629 12 | ECM internal hardware error. | Possible no effect or engine may run rough or not start. |
| 115* YELLOW | P190 2 | 190 2 | No engine speed or position signal detected at pin 17 of the engine harness. | Engine power derate. Possible white smoke. |
| 122 YELLOW | P102 3 | 102 3 | High voltage detected at the boost pressure sensor signal pin 45 of the engine harness. | Engine will derate to no-boost fueling. |
| 123 YELLOW | P102 4 | 102 4 | Low voltage detected at boost pressure sensor signal pin 45 of the engine harness. | Engine will derate to no-boost fueling. |
| 131 YELLOW | P091 3 | 091 3 | High voltage detected at throttle position signal pin 30 of the OEM harness. | Engine idles when idle validation switch indicates idle and ramps up to a default set speed when the idle validation switch indicates off-idle. |
| 132 YELLOW | P091 4 | 091 4 | Low voltage detected at throttle position signal pin 30 of the OEM harness. | Engine idles when idle validation switch indicates idle and ramps up to a default set speed when the idle validation switch indicates off-idle. |
| 133 YELLOW | P029 3 | 029 3 | High voltage detected at remote throttle position signal pin 9 of the OEM harness. | Engine will not respond to remote throttle input. |
| 134 YELLOW | P029 4 | 029 4 | Low voltage detected at remote throttle position signal pin 9 of the OEM harness. | Engine will not respond to remote throttle input. |
| 135 YELLOW | P100 3 | 100 3 | High voltage detected at oil pressure signal pin 33 of the engine harness. | Default value used for oil pressure. No engine protection for oil pressure. |
| 141 YELLOW | P100 4 | 100 4 | Low voltage detected at oil pressure signal pin 33 of the engine harness. | Default value used for oil pressure. No engine protection for oil pressure. |
| 143 YELLOW | P100 1 | 100 1 | Oil pressure signal indicates oil pressure below the low minimum engine protection limit. | Power derate and possible engine shutdown if engine protection shutdown feature enabled. |
| 144 YELLOW | P110 3 | 110 3 | High voltage detected at coolant temperature signal pin 23 of the engine harness. | Default value used for coolant temperature. No engine protection for coolant temperature. |
| 145 YELLOW | P110 4 | 110 4 | Low voltage detected at coolant temperature signal pin 23 of the engine harness. | Default value used for coolant temperature. No engine protection for coolant temperature. |

| Error code and warning lamp | PID(P) SID(S) FMI | SPN (S) FMI | Cause | Effect |
|---|---|---|---|---|
| 146 YELLOW | P110 0 | 110 0 | Coolant temperature signal indicates coolant temperature has exceeded the minimum engine protection limit. | Power derate and possible engine shutdown if engine protection shutdown feature is enabled. |
| 151 RED | P110 0 | 110 0 | Coolant temperature signal indicates coolant temperature has exceeded the maximum engine protection limit. | Speed derate and possible engine shutdown if engine protection shutdown feature is enabled. |
| 153 YELLOW | P105 3 | 105 3 | High voltage detected at intake manifold temperature signal pin 34 of the engine harness. | Default value used for intake manifold temperature.<br>No engine protection for intake manifold temperature. |
| 154 YELLOW | P105 4 | 105 4 | Low voltage detected at intake manifold temperature signal pin 34 of the engine harness. | Default value used for intake manifold temperature.<br>No engine protection for intake manifold temperature. |
| 155 RED | P105 0 | 105 0 | Intake manifold temperature signal indicates intake manifold temperature is above the maximum engine protection limit. | Speed derate and possible engine shutdown if engine protection shutdown feature is enabled. |
| 191 | P050 11 | 876 11 | A/C Clutch drive signal indicates a short to ground when commanded on. | Can not turn on A/C. |
| 234 RED | P190 0 | 190 0 | Engine speed signal indicates engine speed has exceeded the overspeed limit. | Fuel to injectors disabled until engine speed falls below the overspeed limit. |
| 235 MAINT. | P111 1 | 111 1 | Coolant level signal at pin 37 of the engine harness indicates coolant level is low. | Power derate and possible engine shutdown if engine shutdown feature is enabled. |
| 241 YELLOW | P084 2 | 084 2 | Vehicle speed signal on pins 8 and 18 of the OEM harness has been lost. | Engine speed limited to ”Max. Engine Speed without VSS”. Cruise control, gear-down protection and the road speed governor will not work. Trip information data that is based on mileage will be incorrect. |
| 242 YELLOW | P084 10 | 084 10 | Invalid or inappropriate vehicle speed signal indicated on pins 8 and 18 of the OEM harness indicating connection or possible tampering. | Engine speed limited to ”Max. Engine Speed without VSS”. Cruise control, gear-down protection and the road speed governor will not work. Trip information data that is based on mileage will be incorrect. |
| 243 NONE | P121 4 | 513 4 | Error detected in the exhaust brake relay enable control circuit at pin 42 of the engine harness. | Exhaust brake will not work. |

| Error code and warning lamp | PID(P) SID(S) FMI | SPN (S) FMI | Cause | Effect |
|---|---|---|---|---|
| 245 NONE | S033 4 | 647 4 | Error detected in the fan clutch relay enable circuit at pin 31 of the engine harness. | Electronic control module (ECM) can not control the engine cooling fan. Fan will remain on or off. |
| 261* YELLOW | P174 0 | 174 0 | VP44 Fuel Pump Control Module indicates the fuel temperature has exceeded the pump protection limit. | Power derate. |
| 264 YELLOW | P174 2 | 174 2 | High or low voltage detected at the fuel temperature sensor signal circuit inside VP44 pump controller. | Default value used for fuel temperature.<br>Possible low power. |
| 278* YELLOW | P073 11 | 1075 11 | Error detected in lift pump circuit at pin 11 of the engine harness. | Possible low power, engine may die, run rough or be difficult to start. |
| 283 YELLOW | P021 3 | 636 3 | High voltage detected at main engine speed/position sensor voltage supply pin 8 of the engine harness. | ECM will use the VP44 pump speed as a backup.<br>Possible white smoke and power loss. |
| 284 YELLOW | P021 4 | 636 4 | Low voltage detected at main engine speed/position sensor voltage supply pin 8 of the engine harness. | ECM will use the VP44 pump speed as a backup.<br>Possible white smoke and power loss. |
| 297 YELLOW | P223 3 | 1084 3 | High voltage detected at OEM pressure signal pin 48 of the OEM harness. | Default value used for OEM pressure.<br>Lose ability to control OEM pressure. |
| 298 YELLOW | P223 4 | 1084 4 | Low voltage detected at OEM pressure signal pin 48 of the OEM harness. | Default value used for OEM pressure.<br>Lose ability to control OEM pressure. |
| 319 MAINT. | P251 2 | 251 2 | Power to the real time clock has been interrupted and ist setting is no longer valid. | Time stamp in ECM powerdown data will be incorrect. |
| 349 YELLOW | P191 0 | 191 0 | Auxiliary device speed signal on pins 8 and 18 of the OEM harness is out of range of the ECM thresholds. | Lose ability to control speed of the Auxiliary device. |
| 352 YELLOW | S232 4 | 620 4 | Low voltage detected at engine position sensor +5 VDC supply pin 10 of the engine harness. | Default value used for sensors connected to this +5 VDC supply. Engine will power derate to no-boost fueling and loss of engine protection for oil pressure, intake manifold pressure, and ambient air pressure. |
| 361 RED | S251 3 | 251 3 | High current detected at the VP44 fuel pump control valve. | Fueling to the injectors disabled and engine is shut down. |

| Error code and warning lamp | PID(P) SID(S) FMI | SPN (S) FMI | Cause | Effect |
|---|---|---|---|---|
| 362 YELLOW | S251 4 | 251 4 | Low or no voltage detected at the VP44 fuel pump control valve. | Engine will lose power and may shut down. |
| 363 YELLOW | S251 7 | 251 7 | No fuel control valve movement detected by the VP44 fuel pump controller. | Engine power loss. |
| 364* YELLOW | S233 9 | 1077 9 | No communications or invalid data transfer rate detected on data link between ECM and VP44 fuel pump controller at pin 4 and 13 of the engine harness. | Engine will run at a backup mode set speed when throttle is off-idle. |
| 365 YELLOW | S233 4 | 1077 4 | Low voltage detected at VP44 fuel pump controller supply voltage circuit. | Engine may lose power and may shut down. |
| 366 YELLOW | S233 2 | 1077 2 | VP44 fuel pump controller battery voltage measurement is outside the range between 6 and 24 VDC. | Engine will lose power and may shut down. |
| 367 RED | P190 11 | 1078 11 | VP44 fuel pump speed/position sensor signal lost. | Fueling to injectors disabled and engine will shut down. |
| 368 YELLOW | S254 8 | 1078 8 | The VP44 fuel pump controller can not achieve the timing value being commanded by the engine ECM. | Significant engine power loss. |
| 369 YELLOW | P190 2 | 1078 2 | VP44 fuel pump controller does not detect engine position pulse at pin 7 of the engine harness. | Significant engine power loss. Possible white smoke. |
| 372* YELLOW | S233 11 | 1077 11 | VP44 fuel pump controller detects continuous voltage at idle select pin 16 of the engine harness ... OR ... fuel pump controller detects an open circuit or short circuit to ground at idle select pin 16 of the engine harness. | If communication is lost between the ECM and VP44 fuel pump controller, engine will only operate at a speed slightly higher than idle, regardless of throttle position. |
| 373 RED | S233 3 | 1077 3 | High voltage detected at VP44 fuel shut off signal pin 6 of the engine harness. | Fueling to injectors is disabled and engine will shut down. |
| 374* YELLOW | S233 12 | 1077 12 | VP44 fuel pump controller has detected an internal error. | Response will vary from some power loss to the engine shutting down. |
| 375 YELLOW | S254 2 | 629 2 | Engine ECM is commanding a fueling or timing value that the VP44 pump can not achieve. | Possible no effect or engine may exhibit some power loss. |

| Error code and warning lamp | PID(P) SID(S) FMI | SPN (S) FMI | Cause | Effect |
|---|---|---|---|---|
| 376* RED | S233 13 | 1077 13 | No calibration in the VP44 fuel pump controller. | Fueling to injectors disabled and engine will shut down. |
| 377 YELLOW | S233 7 | 1077 7 | VP44 fuel pump controller is not powering down when key switch power is removed from the ECM. | Equipment batteries may be drained low during long shutdown periods. |
| 381* YELLOW | S237 11 | 626 11 | Error detected in cold start aid relay 1 enable circuit at pin 41 of the OEM harness. | Intake air heater can not be fully energised by the ECM. Possible white smoke and/or hard starting. |
| 382* YELLOW | S237 11 | 626 11 | Error detected in cold start aid relay 2 enable circuit at pin 31 of the OEM harness. | Intake air heater can not be fully energised by the ECM. Possible white smoke and/or hard starting. |
| 385 YELLOW | S232 3 | 620 3 | High voltage detected at OEM harness sensor +5 VDC supply pin 10 of the engine harness. | Sensors connected to this +5 VDC supply (i.e., remote throttle position sensor) will not function. |
| 386 YELLOW | S232 3 | 620 3 | High voltage detected at the engine position sensor +5 VDC supply pin 10 of the engine harness. | Default value used for sensors connected to this +5 VDC supply. Engine will derate to no-boost fueling and loss of engine protection for oil pressure, intake manifold temperature, and coolant temperature. |
| 387 YELLOW | P091 3 | 91 3 | High voltage detected at the throttle position sensor +5 VDC supply pin 29 of the OEM harness. | Engine idles when idle validation switch indicates idle and ramps up to a default set speed when idle validation switch indicates off-idle. |
| 391 YELLOW | S017 11 | 632 11 | Error detected in VP44 power supply relay enable circuit at pin 43 of the engine harness. | Possible no effect on performance or engine may not run. |
| 415 RED | P100 1 | 100 1 | Oil pressure signal indicates oil pressure below the very low engine protection limit. | Speed derate and possible engine shutdown if engine protection shutdown feature enabled. |
| 418 WIF | P097 0 | 097 0 | Water-in-fuel signal indicates the water in the fuel filter needs to be drained. | Excessive water in the fuel can lead to severe fuel system damage. |
| 422 YELLOW | P111 2 | 111 2 | Voltage detected simultaneously on both the coolant level high and low signal pins 27 and 37 of the engine harness ... OR ... no voltage detected on either pin. (Fault is active for Switch type coolant level sensors only). | No engine protection for coolant level. |

| Error code and warning lamp | PID(P) SID(S) FMI | SPN (S) FMI | Cause | Effect |
|---|---|---|---|---|
| 429 YELLOW | P097 4 | 097 4 | Low voltage detected at water-in-fuel signal pin 40 of the OEM harness. | No water-in-fuel protection. |
| 431 YELLOW | P091 2 | 091 2 | Idle validation signals on pins 25 and 26 of the OEM harness indicate voltage detected simultaneously on both pins (Open Circuit). | No effect on performance, but loss of idle validation. |
| 432 YELLOW | P091 13 | 091 13 | Idle validation signal at pin 26 of the OEM harness indicates the throttle is at the idle position when the throttle position signal at pin 30 of the OEM harness indicates the throttle is not at the idle position ... OR ... idle validation signal at pin 26 of the OEM harness indicates the throttle is not at the idle position when the throttle position signal at pin 30 of the OEM harness indicates the throttle is at the idle position. | Engine will only idle. |
| 433 YELLOW | P102 2 | 102 2 | Boost pressure signal indicates boost pressure is high when other engine parameters (i.e., speed and load) indicate boost pressure should be low. | Possible overfueling during acceleration. Increase in black smoke. |
| 434* YELLOW | S251 2 | 627 2 | Supply voltage to the ECM fell below 6.0 VDC for a fraction of a second ... OR ... the ECM was not allowed to power down correctly (retain battery voltage for 30 seconds after key OFF). | Possible no noticeable performance effects OR engine dying OR hard starting.<br>Fault information, trip information, and maintenance monitor data may be inaccurate. |
| 441 YELLOW | P168 1 | 168 1 | Voltage detected at ECM power supply pins 38, 39, and 40 of the engine harness indicates ECM supply voltage fell below 6 VDC. | Engine will die or run rough. |
| 442 YELLOW | P168 0 | 168 0 | Voltage detected at ECM power supply pins 38, 39, and 40 of the engine harness indicates the ECM supply voltage is above the maximum system voltage level. | None on performance. |
| 443 YELLOW | S232 1 | 620 1 | Low voltage detected at throttle position sensor +5 VDC supply pin 29 of the OEM harness. | Engine idles when idle validation switch indicates idle and ramps up to a default set speed when idle validation switch indicates off-idle. |

| Error code and warning lamp | PID(P) SID(S) FMI | SPN (S) FMI | Cause | Effect |
|---|---|---|---|---|
| 444 YELLOW | S232 1 | 620 1 | Low voltage detected at OEM harness sensor +5 VDC supply pin 10 of the OEM harness. | Sensors connected to this +5 VDC supply (i.e., remote throttle position sensor) will not function. |
| 488 YELLOW | P105 0 | 105 0 | Intake manifold air temperature signal indicates intake manifold air temperature is above the minimum engine protection threshold. | Power derate and possible engine shutdown if engine protection shut-down feature is enabled. |
| 489 YELLOW | P191 1 | 191 1 | Auxiliary device speed signal on pins 8 and 18 of the OEM harness is out of range of the ECM threshold. | Lose ability to control the speed of the auxiliary device. |
| 515 YELLOW | P091 3 | 091 3 | High voltage detected at the coolant level +5 VDC sensor supply voltage pin 49 of the engine harness. | No engine protection for coolant level. |
| 516 YELLOW | P091 4 | 091 4 | Low voltage detected at the coolant level +5 VDC sensor supply voltage pin 49 of the engine harness. | No engine protection for coolant level. |
| 517 YELLOW | S251 12 | 1076 12 | A mechanically stuck fuel control valve has been detected by the VP44 fuel pump controller. | Engine may shut down. |
| 524 YELLOW | P113 2 | 113 2 | Error detected on the High Speed Governor Droop selection switch input pin 24 of the engine harness. | Operator can not select alternate HSG Droop. Normal droop is used. |
| 527* YELLOW | P154 3 | 702 3 | Error detected in the Dual Output Driver ”A” circuit pin 5 of the OEM harness. | The device controlled by the Dual Output Driver ”A” signal will not function properly. |
| 528 YELLOW | P093 2 | 093 2 | Error detected on the Torque Curve Selection switch input pin 39 of the OEM harness. | Operator can not select alternate torque curves. Normal torque curve is used. |
| 529* YELLOW | S051 3 | 703 3 | Error detected in the Dual Output Driver ”B” circuit pin 21 of the engine harness. | The device controlled by the Dual Output Driver ”B” signal will not function properly. |
| 551 YELLOW | P091 4 | 091 4 | Idle validation signals on pins 25 and 26 of the OEM harness indicate no voltage on either pin. | Engine will only idle. |
| 599 RED | S025 14 | 640 14 | The dual output feature in the customer specialised calibration has initiated an engine shutdown based on operating conditions, engine sensor values, or OEM inputs to the ECM. | Engine will shut down. |

| Error code and warning lamp | PID(P) SID(S) FMI | SPN (S) FMI | Cause | Effect |
|---|---|---|---|---|
| 611* | S151 0 | 1020 0 | ECM detected the engine has initiated a protection shutdown or has been keyed-off while above a specified load limit. | No effect. |
| 768 YELLOW | S009 11 | 923 11 | Error detected in the Output Device Driver (Transmission Shift Modulation Signal) signal pin 21 on the OEM harness. | Can not control the Transmission. |

## 10.2 Error messages for anti-slip control

| GPI message error | GPI message potential type of errors | AMP Pin | System reaction ASC | Comment | ASC error lamp DOUT0 | SUSMIC Flash code | DIA1 Error |
|---|---|---|---|---|---|---|---|
| | | 1 | disabled | short circuit (+) | | | |
| | | 1 | enabled | no PC/DIA1 function<br>short circuit (+): fuse | | | |
| | | 2 | enabled | open circuit (-)<br>short circuit (+)<br>short circuit (-) | | | |
| Neutral Switch | | 3 | disabled | Diagnostic at system start<br>short circuit (-) | Yes | • • — — | Number 10 |
| | | 4 | enabled | open circuit (-)<br>short circuit (+)<br>short circuit (-) | | | |
| Valve front L | ValTooLow<br>ValTooHigh | 6 | disabled | short circuit (+): Min vol. flow [1]<br>short circuit (-): Max vol. flow<br>open circuit: Max vol. flow | Yes | • — • • | Number 02 |
| ValveFront R | ValTooLow<br>ValTooHigh | 7 | disabled | short circuit (+): Min vol. flow [2]<br>short circuit (-): Max vol. flow<br>open circuit: Max vol. flow | Yes | — — • • | Number 03 |
| ValveFront L | ValTooLow<br>ValTooHigh | 8 | disabled | short circuit (+)<br>short circuit (-):Max vol. flow<br>open circuit: Max vol. flow | Yes | • — • • | Number 02 |
| ValveFront R | ValTooLow<br>ValTooHigh | 9 | disabled | short circuit (+)<br>short circuit (-): Max vol. flow<br>open circuit: Max vol. flow | Yes | — — • • | Number 03 |
| Sens Power | | 14 | disabled | PPU and Poti Error | Yes | • — • — | impossible |
| | | 15 | disabled | short circuit (+) | | | |
| PPUFront Left | OutOfRange | 16 | disabled | Indirect diagnostic | Yes | • — — • | Number 06 |
| PPUFront Right | OutOfRange | 17 | disabled | Indirect diagnostic | Yes | — — — • | Number 07 |
| PPURear Left | OutOfRange | 18 | disabled | Indirect diagnostic | Yes | • • • — | Number 08 |
| PPURear Right | OutOfRange | 19 | disabled | Indirect diagnostic | Yes | — • • — | Number 09 |
| | | 20 | enabled | no PC/DIA1 function | | | |
| | | 21 | enabled | no PC/DIA1 function | | | |
| ValveRear L | ValTooLow<br>ValTooHigh | 23 | disabled | short circuit (+)<br>short circuit (-): Max vol. flow<br>open circuit: Max vol. flow | Yes | • • — • | Number 04 |
| ValveRear R | ValTooLow<br>ValTooHigh | 25 | disabled | short circuit (+)<br>short circuit (-): Max vol. flow<br>open circuit: Max vol. flow | Yes | — • — • | Number 05 |
| ValveRear L | ValTooLow<br>ValTooHigh | 26 | disabled | short circuit (+): Min vol. flow [1]<br>short circuit (-): Max vol. flow<br>open circuit: Max vol. flow | Yes | • • — • | Number 04 |
| ValveRear R | ValTooLow<br>ValTooHigh | 27 | disabled | short circuit (+): Min vol. flow [1]<br>short circuit (-): Max vol. flow<br>open circuit: Max vol. flow | Yes | — • — • | Number 05 |
| | | 28 | disabled | short circuit (-) | | | |
| | | 28 | disabled | short circuit (-) | | | |
| | | 29 | disabled | short circuit (+) | | | |
| Front Steering FNR Sensor | ValTooLow<br>ValTooHigh | 31 | disabled | | Yes | • — — — | Number 13 |
| Rear Steering Tilt Sensor | ValTooLow<br>ValTooHigh | 32 | disabled | | Yes | — • — — | Number 14 |
| CAN Bus | OutOfRange | 37 | disabled if CAN used | | No | — — — — | Number 20 |
| CAN Miss | OutOfRange | 38 | disabled if CAN used | | No | — — — — | Number 21 |
| | | 40 | enabled | short circuit (+): Message on<br>short circuit (-): Message off<br>open circuit: Message off | On<br>Off<br>Off | | |
| Configuration error | | | Disabled | Software configuration error | Yes | — • • • | |

⚠ Advise our After-Sales Service staff of the malfunction number being displayed for your road planer and we will be only too pleased to discuss what action you should then take.

## 10.3 Error message from travel drive

Version errors (not to be displayed on the error screen of the WinGPI service program):

| No° | Error | Caused by | Error LED Blink code | System Reactions / Troubleshooting |
|---|---|---|---|---|
| 1 | Wrong Kernel | Operating system version does not match with application SW | — • • • | Disable propel function/ Upgrade kernel SW version |
| 2 | Wrong Hardware | Application SW downloaded on wrong hardware type (S1X-??) | — — • • | Disable propel function/ Replace microcontroller by S1X-49 |

System errors (numbers according to WinGPI error screen):

| No° | Error | Caused by | Error LED Blink code | System Reactions / Troubleshooting |
|---|---|---|---|---|
| 1 | Sensor Pwr | Sensor supply voltage out of range, open or short circuit | X | check wiring, change hardware |
| 5 | EDC Drive Pump (+) | open or short circuit in wiring to EDC forward direction | — • — • | Disable propel function/ check wiring to EDC |
| 6 | EDC Drive Pump (-) | open or short circuit in wiring to EDC reverse direction | • — — • | Disable propel function/ check wiring to EDC |

User errors:

| No° | Error | Caused by | Error LED Blink code | System Reactions / Troubleshooting |
|---|---|---|---|---|
| 1 | Limit Pot | open or short circuit in wiring, faulty pot | • — • • | check wiring and pot |
| 2 | Eng RPM Pot | open or short circuit in wiring, faulty pot | • • — • | check wiring and pot |
| 4 | Drive Pot | open or short circuit in wiring, faulty pot | — — — • | Disable propel function/ check wiring and pot |
| 8 | Drum Safety Switch | Open cover of milling drum case | • • • — | Disable milling operation |
| 10 | Default Par | checksum error of default parameters | — • • — | set default parameter |
| 11 | Limit Pot Par | checksum error of pot. parameters | • — • — | repeat setup of pot |
| 12 | Eng Pot Par | checksum error of pot. parameters | — — • — | repeat setup of pot |
| 13 | Drv Pot Par | checksum error of pot. parameters | • • — — | repeat setup of pot |
| 16 | Deadband Par | checksum error of deadband parameters | — • — — | repeat deadband setup |
| 20 | CAN bus error | open or short circuit in wiring, faulty CAN node in network | • — — — | check wiring and all CAN nodes |
| 21 | Release | software has prototype status | — — — — | download only released software on series products |

⚠ Advise our After-Sales Service staff of the malfunction number being displayed for your road planer and we will be only too pleased to discuss what action you should then take.

## 10.4 MOBA-Matic error messages

| Fault indication | Fault diagnosis | Controller output | Action |
|---|---|---|---|
| **no SEn** | Controller does not recognise a sensor. | Outputs inhibited in automatic mode. | ● Connect sensor.<br>● Check cable connections, change if necessary.<br>● Change sensor. |
| **Son out**<br>**SLo out**<br>**Pot out**<br>**LAS out** | Measured value of the corresponding sensor outside the allowable range. | Outputs inhibited in automatic mode. | ● Check sensor setting or check its direction.<br>● Change sensor. |
| **Son dEF**<br>**SLo dEF** | Controller detects a defective sensor. | Outputs inhibited in automatic mode. | ● Check cable connections, change if necessary.<br>● Change sensor. |
| **Err 2** | Data loss of the battery backed up memory. | Outputs inhibited in automatic mode. | ● Acknowledge an alarm with any button.<br>● Set working position again (zero and setpoint). |
| **Err 3**<br>**Err 4**<br>**Err 5** | Data loss of the battery independently stored parameter. | Outputs inhibited in automatic mode. | ● Acknowledge the alarm indication by pressung any button. The machine parameters will be set to their basic values. If necessary set up again.<br>● Set working position again (zero point and setpoint). |

# E Set-up and modification

## 1 Special safety instructions

Injury or death can result whenever the engine, travel drive, release unit, conveyor or lifting units are engaged.
When operating the machine, therefore maintain strict compliance with the sections of these operating instructions and the safety specifications dealing with personal conduct. Before starting the machine, ensure that no-one is working on or underneath the machine, or standing in the danger area!

- Protect machine to prevent it from being started accidentally:
  Move drive lever into centre position and turn preselector controller to zero, remove ignition key and battery's main switch.
- Secure raised machine components (e.g side board or moldboard) mechanically to prevent them from lowering accidentally.
- Always use genuine spare parts for replacement, or ensure that genuine parts are used by others for this same work.

When connecting up or unfastening hydraulic hoses and when working on the hydraulic system, hot hydraulic oil can spray out under high pressure.
Switch off engine and depressurise the hydraulic system! Protect eyes!

Before starting the machine up again, ensure that all guards are properly reinstalled.

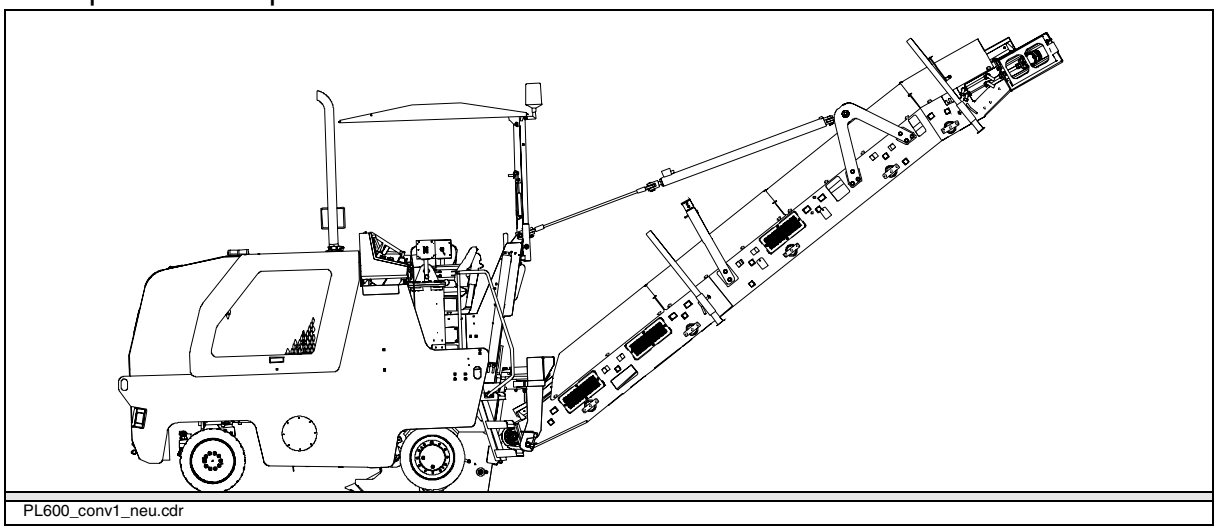
## 2 Planing without upper conveyor / Preparation for transport

### 2.1 Dismantling the upper conveyor

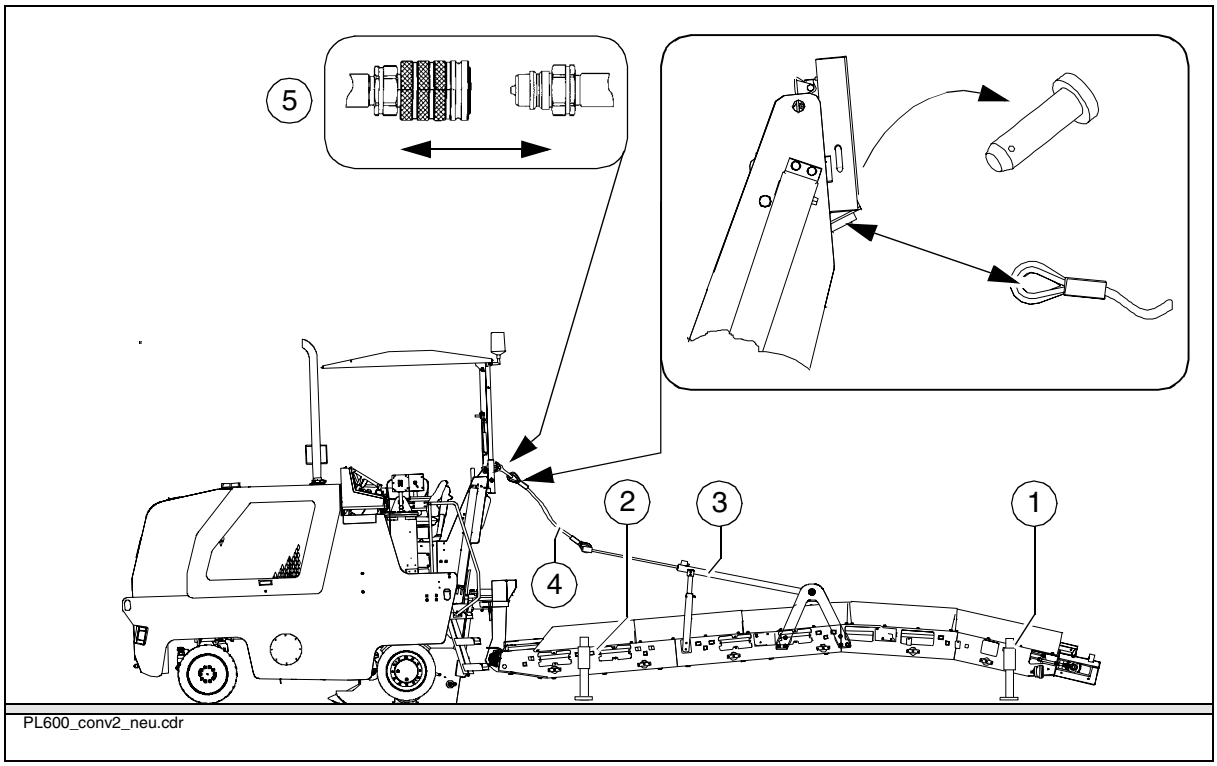
To reduce the transport length of the machine and to carry out planing operations without the upper conveyor, this should be removed from the machine. This operation involves following a few simple steps.

Upper conveyor and milling drum must be disengaged before commencing this disassembly work!

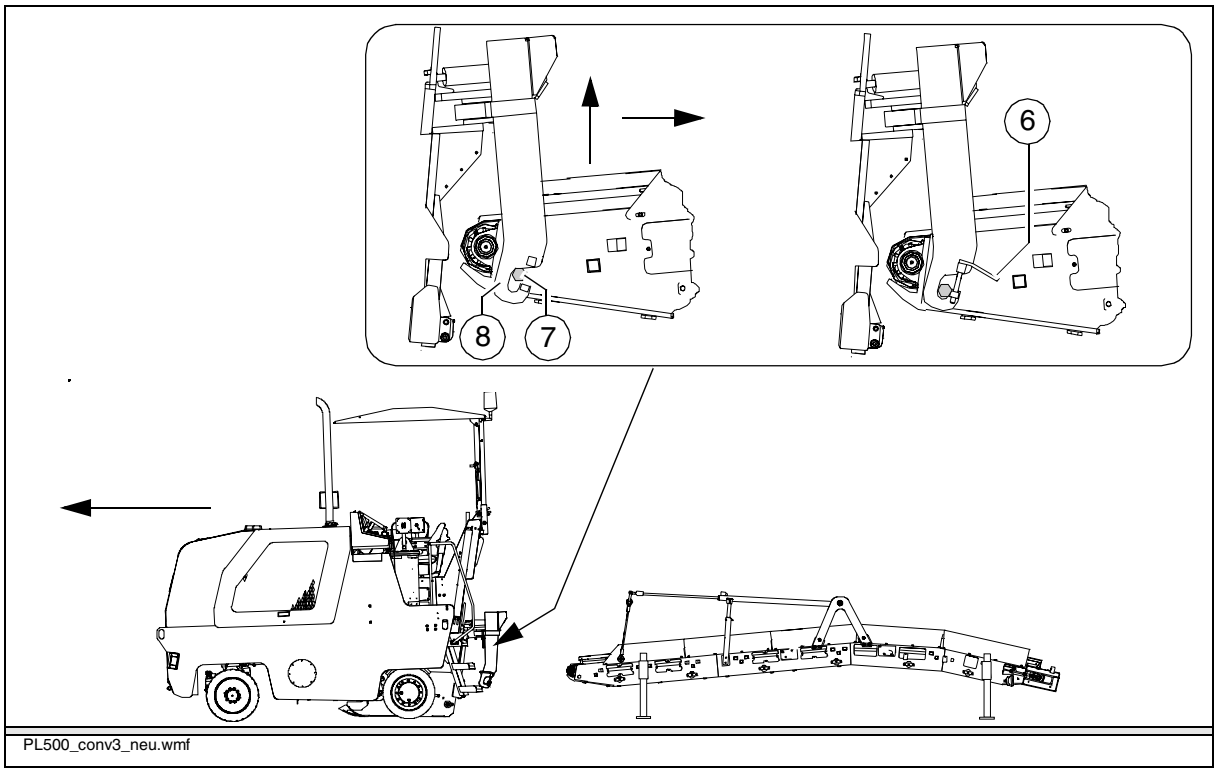
Operations required:




- Position upper conveyor over the desired parking location, which should ideally be on level ground.




- Lower upper conveyor until the front and rear parking legs (1) + (2) can be extended to the desired length:
  - Remove parking legs and secure to required length with dowels and cotter pins.
- Continue lowering machine until at least the two rear parking legs (1) are supported on the ground.
- Set up cylinder bracket (3) so that it is located directly underneath the cylinder.
- Using the chassis legs, lower the machine until the hydraulic cylinder is located in its bracket and tension on the retaining cable (4) has been relieved.
- Unfasten the retaining cable (4) from the machine frame.
- Disconnect four quick-action couplers from the hydraulic circuit (5) and fit protective caps, then disconnect the electrical plugged connection.




- Remove the locking pins (6) from both sides.
- Lower the moldboard slightly until the retaining pins (7) are located above the retaining brackets (8).
- Drive machine off its upper conveyor.

# F Maintenance

## 1 Safety regulations for maintenance

Always comply with Health & Safety and Fire Prevention regulations when carrying out maintenance work. Always wear appropriate protective clothing and equipment.

If not otherwise stated, always switch of the engine before carrying out maintenance work.

Carry out all maintenance work on flat, firm ground.

When working in confined spaces, ensure that exhaust gases are vented to atmosphere. Provide adequate ventilation.

Before starting maintenance work, secure the machine to prevent accidental starting, rolling or lowering. To do this, take the following precautions:

- Move drive lever into neutral centre position then set machine feed to "Zero" using the preselector.
- Remove ignition key and main battery isolator.
- Attach "DO NOT START" panel to control panel in clearly visible location.
- When working below the machine, always secure the frame to prevent it from lowering accidentally and always wear a safety hat.
- If necessary, fit chocks under wheels to prevent machine from starting to roll away.

If safety and guards need to be removed for maintenance work, always ensure that they are reinstalled before the machine goes back into service.

Never use highly flammable substances for cleaning work.
Keep ladders and (access) steps free of grease and in non-slip condition at all times.
When using a high pressure cleaner or a steam jetter to spray down the machine, never subject electrical components, electronic assemblies, insulation materials and fans to a direct jet of water or steam and cover them up whenever and wherever possible.

Avoid electric welding work on the machine because this can lead to damage to electronic and hydraulic assemblies!
In exceptional circumstances, if electric welding work is required on the machine, always take due note of the following before starting work:

- ignition must be switched off
- interrupt the electrical circuit
- fit earth/ground terminal of welding unit as close as possible to welding location.

Whenever you work on the electrical system, always disconnect the earth/ground cable from the battery.
Only use fuses with the specified ratings.

## 2 Liability is rendered null and void if non-genuine spares or wearing parts or incorrect fuel substances are used.

For maintenance and repair work, only use wearing parts and spare parts approved by the manufacturer and fit them properly.
In cases of doubt, consult the manufacturer.
Only use substances recommended in these Operating Instructions as lubrication agents and fuel substances.
Failure to comply with these regulations excludes all manufacturer's liability for any resultant damage.

## 3 Maintenance intervals

The manufacturer is incorporating an ever increasing number of zero-maintenance assemblies in the design of this machinery. The number of lubricating points described in the next section may therefore differ from the actual number of lubricating points present on the machine.

The maintenance intervals and the scope of maintenance work on the engine are not itemised in full detail in the ensuing section. These should be listed in accordance with the specifications of the engine manufacturer in accordance with the attached Operating and Maintenance Instructions.

| Maintenance location | Activity | Operating hours | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 50 | 100 | 250 | 500 | 1000 / annual | 2000 / every 2 years | when required |
| **(3.1) Engine (power unit)** | | | | | | | | | |
| Fuel tank | Check fill level | ■ | | | | | | | |
| | Top up fuel | | | | | | | | ■ |
| | Clean tank and system | | | | | | | ■ | |
| Engine | Check oil level | ■ | | | | | | | |
| | Top up oil | | | | | | | | ■ |
| | Change oil | | | | ■ | | | | |
| | Change oil filter | | | | ■ | | | | |
| | Change fuel filter | | | | | ■ | | | |
| | Fuel filter (drain water separator) | ■ | | | | | | | |
| | Bleed fuel system | | | | | | | | ■ |
| | Check air cleaner | | | | ■ | | | | |
| | Empty dust collection tank | | ■ | | | | | | |
| | Clean / replace air filter insert | | | | | | | | ■ |
| | Check cooling ribs | ■ | | | | | | | |
| | Clean cooling ribs | | | | | | | | ■ |
| | Check fan for signs of damage | ■ | | | | | | | |
| | Check coolant level | ■ | | | | | | | |
| | Top up coolant level | | | | | | | | ■ |
| | Change coolant | | | | | | ■ | | ■ |
| | Check drive belts | ■ | | | | | | | |
| | Tension drive belts | | | | | | ■ | | |
| | Check valve clearance | | | | ▼ | | ■ | | |
| | Check valve clearance | | | | | | | | ■ |

| | |
|---|---|
| **Maintenance** | ■ |
| **Maintenance during the running-in period** | ▼ |

| Maintenance location | Activity | Operating hours | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 50 | 100 | 250 | 500 | 1000 / annual | 2000 / every 2 years | when required |
| **(3.2) Hydraulics** | | | | | | | | | |
| Hydraulic oil tank | Check oil level | ■ | | | | | | | |
| | Top up oil | | | | | | | | ■ |
| | Change oil | | | | | | ■ | | |
| Suction /return hydraulic filter | Change filter cartridge | | | | | | ■ | | ■ |
| Hydraulic hoses | Perform a visual inspection | | | | | ■ | | | |
| | Replace hoses | | | | | | | | ■ |
| **(3.3) Drive wheels** | | | | | | | | | |
| Planetary gear -drive wheels | Check oil level | | ■ | | | | | | |
| | Top up oil | | | | | | | | ■ |
| | Change oil | | | | ▼ | | ■ | | |
| | Check visible unattached nuts and screws and tighten if necessary | | | | ▼ | | ■ | | |

| | |
|---|---|
| **Maintenance** | ■ |
| **Maintenance during the running-in period** | ▼ |

| Maintenance location | Activity | Operating hours | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 50 | 100 | 250 | 500 | 1000 / annual | 2000 / every 2 years | when required |
| **(3.4) Milling section** | | | | | | | | | |
| Milling drum | Dismantle milling drum | | | | | | | | ■ |
| Bits, wearing sleeves bit blocks | Check condition | ■ | | | | | | | |
| | Replace bits, wearing sleeves, bit blocks | | | | | | | | ■ |
| Side board | Replace sliding shoes | | | | | | | | ■ |
| | Replace support plates | | | | | | | | ■ |
| Belt drive | Check belt | ■ | | | | | | | |
| | Replace belt | | | | | | | | ■ |
| Clutch | Check friction lining | | | | | | ■ | | |
| | Replace belt | | | | | | | | ■ |
| Angular gear | Check oil level | | ■ | | | | | | |
| | Top up oil | | | | | | | | ■ |
| | Change oil | | ▼ | | | ■ | | | |
| Milling drum gearbox | Check oil level | | ■ | | | | | | |
| | Top up oil | | | | | | | | ■ |
| | Change oil | | | ▼ | | | ■ | | |
| | Check bolt connections and, if necessary, glue down/retighten | | | | ■ | | | | |
| Scrapers / moldboard | Check scrapers | | ■ | | | | | | |
| | Replace scrapers | | | | | | | | ■ |

| | |
|---|---|
| **Maintenance** | ■ |
| **Maintenance during the running-in period** | ▼ |

| Maintenance location | Activity | Operating hours | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 50 | 100 | 250 | 500 | 1000 / annual | 2000 / every 2 years | when required |
| **(3.5) Loading unit** | | | | | | | | | |
| Conveyor belt | Check tension / deflection | ■ | | | | | | | |
| | Adjust tension / deflection | | | | | | | | ■ |
| | Check for signs of damage | ■ | | | | | | | |
| | Replace conveyor belt | | | | | | | | ■ |
| Loading belt rollers | Check condition | ■ | | | | | | | |
| | Replace rollers | | | | | | | | ■ |
| Steel securing rope | Check condition | ■ | | | | | | | |
| | Replace securing rope | | | | | | | | ■ |
| Hopper rubber on transfer points and rubber seals | Check for signs of damage | | ■ | | | | | | |
| | Replace hopper rubber / rubber seals | | | | | | | | ■ |

| | |
|---|---|
| **Maintenance** | ■ |
| **Maintenance during the running-in period** | ▼ |

| Maintenance location | Activity | Operating hours | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 50 | 100 | 250 | 500 | 1000 / annual | 2000 / every 2 years | when required |
| **(3.6) Water system** | | | | | | | | | |
| Water tank | Check fill level | ■ | | | | | | | |
| | Top up top up water level | | | | | | | | ■ |
| | Change water | | | | | | ■ | | |
| | Clean tank | | | | | ■ | | | |
| | Dismantle tank | | | | | | | | ■ |
| Water filter | Check water filter | ■ | | | | | | | |
| | Replace filter | | | | | | | | ■ |
| | Drain off water | | | | | | | | ■ |
| Spray nozzles | Check function | | | | | | | | ■ |
| | Drain off water | | | | | | | | ■ |
| **(3.7) Electrical power supply** | | | | | | | | | |
| Batteries | Check fill level of battery acid | | | ■ | | | | | |
| | Top up with distilled water | | | | | | | | ■ |
| | Apply grease to battery terminals | | | | ■ | | | | |
| **(3.8) Miscellaneous** | | | | | | | | | |
| Emergency-stop button | Check function | ■ | | | | | | | ■ |
| | Replace pushbuttons | | | | | | | | ■ |
| Limit switches on upper conveyor | Check function | ■ | | | | | | | |
| Chassis leg guide | Apply grease to guide surface | | | | | | | | ■ |
| | Adjust clearance on sliding plates | ▼ | | | | | | ■ | ■ |

| | |
|---|---|
| **Maintenance** | ■ |
| **Maintenance during the running-in period** | ▼ |

| Maintenance location | Activity | Operating hours | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 50 | 100 | 250 | 500 | 1000 / annual | 2000 / every 2 years | when required |
| **(4.0) Lubricating points** | | | | | | | | | |
| Chassis leg, right side | Grease the joint (grease nipple) | | ■ | | | | | | |
| Steering system | Grease the steering unit (grease nipple) | | ■ | | | | | | |
| Belt tensioner | Grease the clutch bearing (grease nipple) | | ■ | | | | | | |
| Clutch bearing | Lubricate clutch bearing (grease nipple) | | | | | ■ | | | |
| Upper conveyor suspension | Grease the fulcrum (grease nipple) | | ■ | | | | | | |
| Upper conveyor | Lubricate clamping mount for drive drum (grease nipple) | | ■ | | | | | | |
| Hydraulic cylinder | Grease the bearing points (grease nipple) | | ■ | | | | | | |
| **(5.0) Inspections** | | | | | | | | | |
| General visual inspection | | ■ | | | | | | | |
| Inspection by a skilled specialist | | | | | | | ■ | | |

| | |
|---|---|
| **Maintenance** | ■ |
| **Maintenance during the running-in period** | ▼ |

## 3.1 Power unit - engine

### Fuel tank

The fuel tank should be filled before every job to ensure that it does not run dry: if this did happen, time-consuming and costly bleeding of the fuel system would be required.

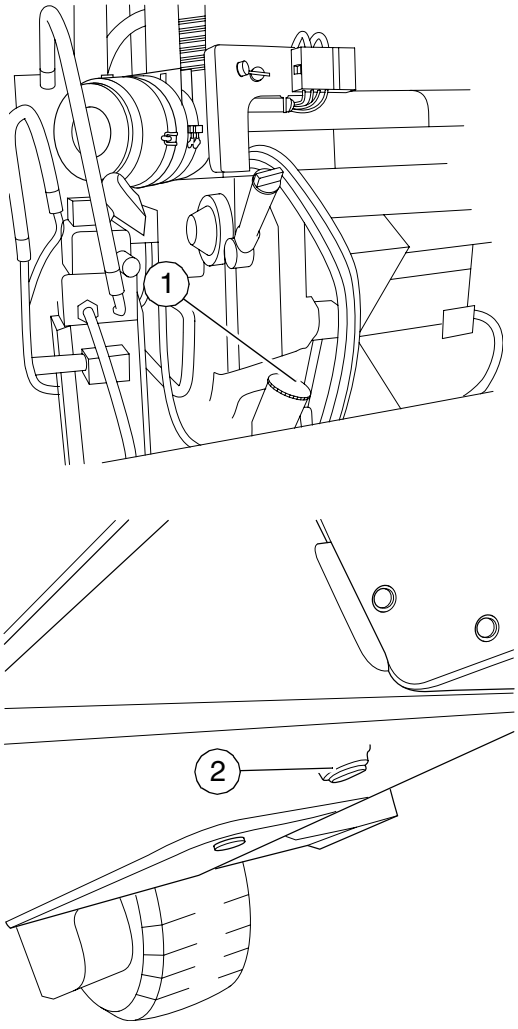
☞ Check fuel level at regular intervals using the display on the operating panel.

The tank neck (1) is located under the left-hand flap on the engine compartment.
This flap is opened using a square-section wrench.

STOP When filling the tank, ensure that no fuel escapes into the ground. Switch off engine and do not smoke. Do not fill tank in confined spaces. Health hazard! Keep fire extinguishers close at hand.

☞ If there is any need for cleaning work which requires the fuel tank to be emptied, drain off all remaining fuel from the tank.

The drain screw for this diesel fuel is located on the left-hand side, underneath the machine.



Tank_Pl500.eps/Tank2_Pl500.eps

- To drain the fuel, first place a suitable receptacle under the drainage point, then remove the screw plug (2).
  After draining the fuel, fit a new seal to the screw plug and tighten back into place.

STOP Wear protective clothing when draining off diesel fuel.
Health hazard caused by contact with the skin.
Smoking and naked flame prohibited!

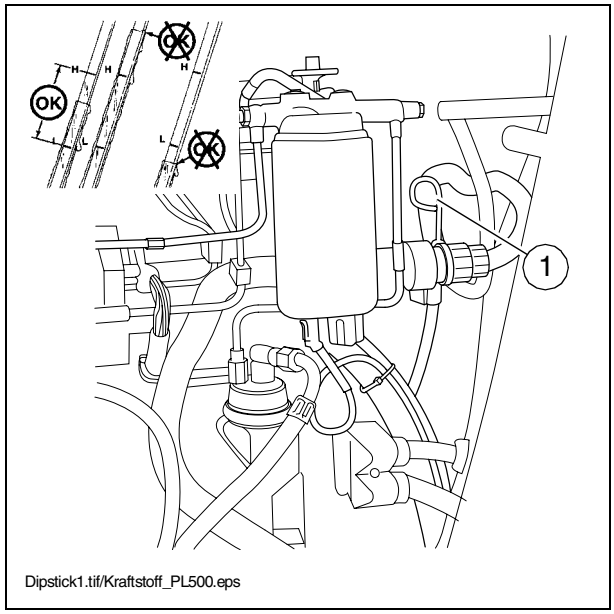
⚠ Never fill machine with dirty or contaminated fuel! Impurities in the fuel can cause serious damage and may cause the engine to fail!

**Diesel engine**

⚠ The engine oil level should always be checked before starting work using the dipstick (1).
Always check the oil with the machine stationary.

The dipstick is located behind the left-hand flap on the engine compartment. This flap is opened using a square-section wrench.

⚠ Excessive oil in the engine damages the gaskets; not enough oil leads to overheating and destruction of the engine.

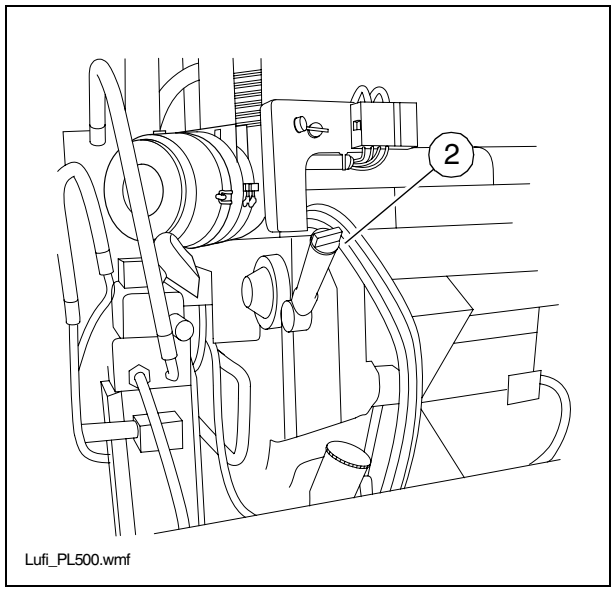


Dipstick1.tif/Kraftstoff_PL500.eps

The filler aperture (2) for engine oil is located under the left-hand flap on the engine compartment.

Carry out an oil change every 250 operating hours.

☞ Follow advice in the engine's operating instructions!



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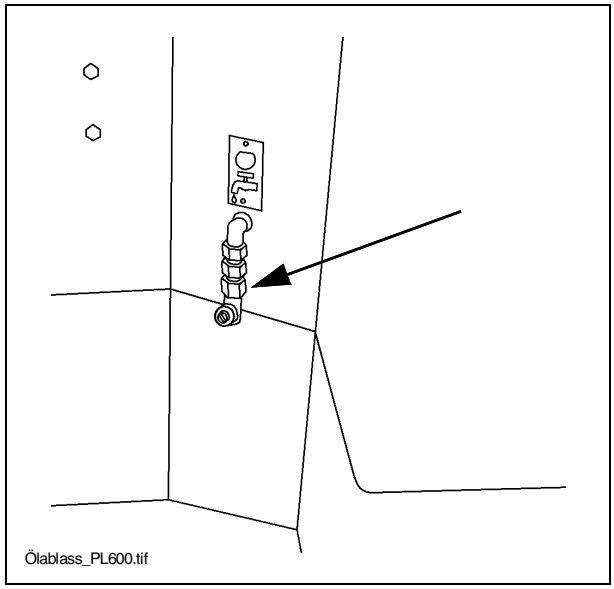
## Oil changes




An oil drain cock is located on the right-hand side of the machine on the frame.

Risk of scalding from hot oil!

Collect used oil in a suitable container and send for disposal.

Before changing the oil, run the engine up to operating temperature.

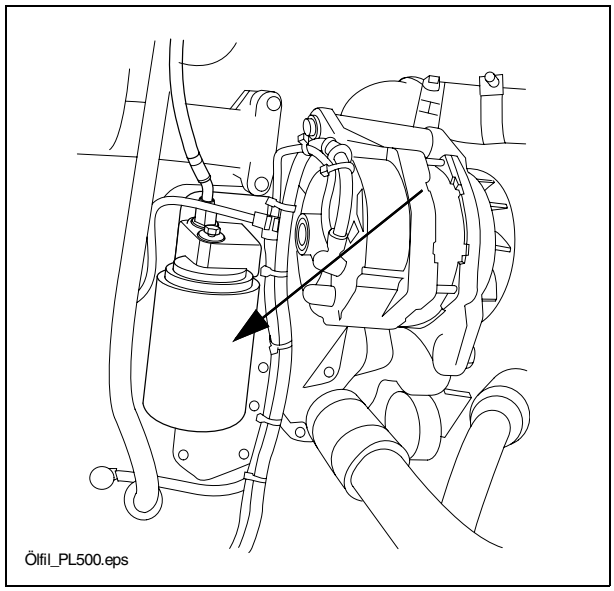
- Twist and turn screw cap to remove.
- Fit the hose provided in the accessories kit. Hold the end of the hose down in the waste oil container.
- Use a wrench to open the stop cock and drain the oil off completely.
- Close the stop cock again.

Fill new oil through the filler neck (behind the left-hand flap on the engine compartment).
Check fill level using dipstick (behind the left-hand flap of the engine compartment).

Before checking the oil level with the dipstick, wait for a moment to allow the filled oil to reach the oil pan.

Follow advice in the engine's operating instructions!

## Oil filter




Change the oil filter at the same time as each oil change, at intervals of 250 operating hours.

The oil filter is located on the engine block behind the right-hand flap of the engine compartment. This flap is opened using a square-section wrench.

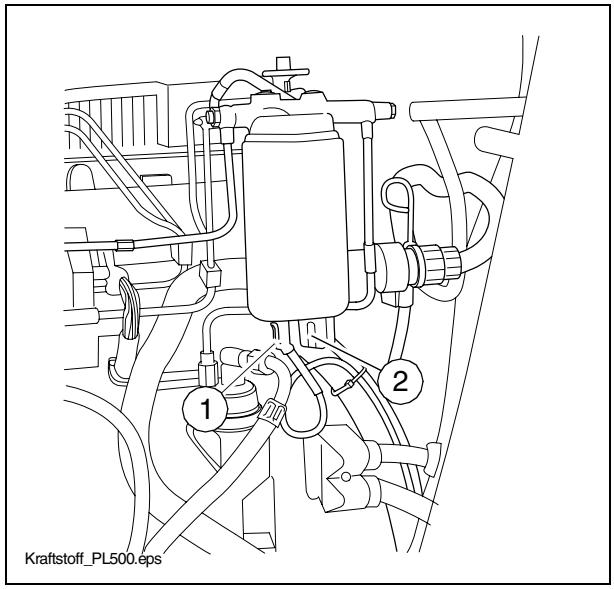
Unfasten filter and clean the supporting surface. Apply light coating of oil to the gasket on the new filter and fill filter with oil before installing it. Tighten down by hand.

Send used filter for proper disposal.

After replacing the oil filter, ensure seal integrity and oil pressure are correct.

Follow advice in the engine's operating instructions!

**Fuel filter**




⚠ Replace the fuel filter every 500 operating hours.

The fuel filter is located behind the left-hand flap on the engine compartment.This flap is opened using a square-section wrench.

Unfasten the electrical plugged connection (1) on the water sensor, unfasten the filter using a filter key and clean the supporting surfaces.
Fit new gasket, then fill new filter with fuel, tighten by hand then reconnect the electrical plugged connection to the water sensor.

STOP Send used filter for proper disposal.

⚠ Ensure seal integrity is good after changing the filter.

☞ Follow advice in the engine's operating instructions!

**Draining water from the fuel filter**

⚠ Drain water from the filter on a daily basis, as required.

Hold a suitable receptacle under the drain valve (2).

In order to drain off the water which has collected in the fuel filter, unscrew the water drain valve (2) until all the water has drained out.

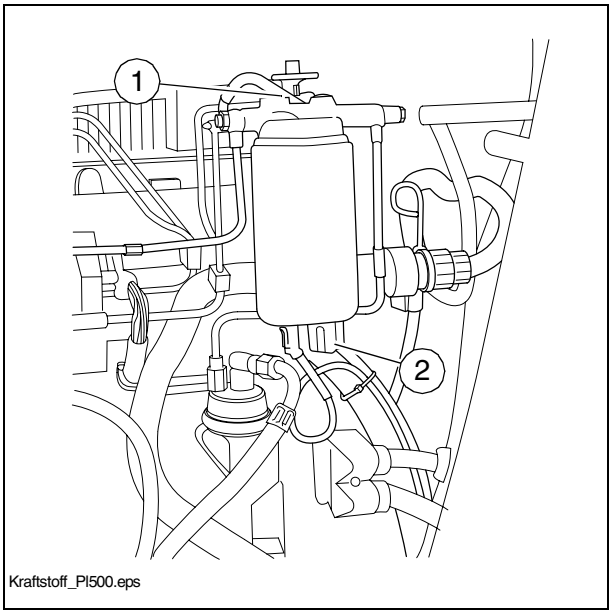
STOP Send the drained mixture of water and diesel fuel away for proper disposal.

STOP Avoid skin contact with fuel! Ensure that no fuel escapes into the ground!

☞ Follow advice in the engine's operating instructions!

**Bleed fuel system**

If it proves necessary to bleed the fuel system, e.g. after changing the filter, use the bleed screw and hand pump provided.



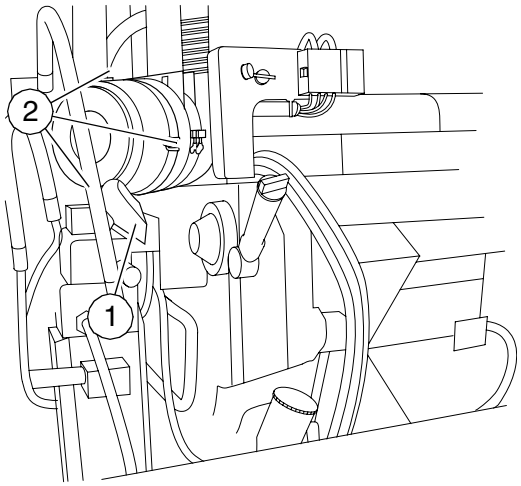

☞ The bleed screw (1) and hand pump (2) are located near the fuel filter.

- Unfasten bleed screw (1) slightly.
- Operate lever (2) on the mechanical hand pump several times until fuel starts to emerge from the open bleed screw bore.
- Tighten the bleed screw (1) back down to specified torque.

☞ Follow advice in the engine's operating instructions!

STOP Avoid skin contact with fuel! Ensure that no fuel escapes into the ground!

## Air cleaner



Lufi_Pl500.eps

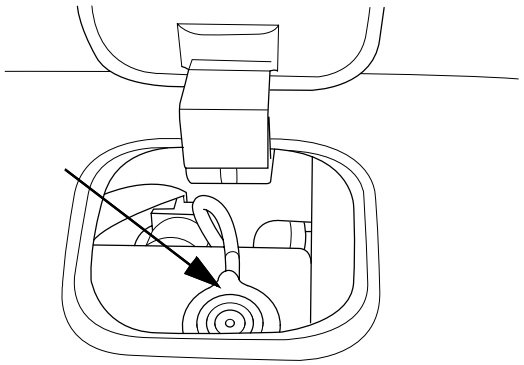
The air cleaner is located behind the right-hand flap of the engine compartment. This flap is opened using a square-section wrench.

⚠ Drain the dust collector (1) every 50 hours.

To gain access to the filter cartridge, the connections (2) on the housing and the sealing cover must be removed from the filter housing.
Replace filter cartridge after removal or clean the old one using compressed air.

☞ Follow advice in the engine's operating instructions!

## Radiator


Wasse2r_PL500.eps

⚠ Check the coolant level daily before starting work.
Replace the coolant at least once a year.

The expansion tank with the filler aperture is located under a flap on the upper side of the water tank.

STOP When hot, this unit is pressurised. When opening the unit, there is a risk of scalding!

In addition, on a daily basis, check the cooling ribs for dirt and, where applicable, clean using suitable agents.

STOP Collect used coolant in a suitable container and send for disposal.

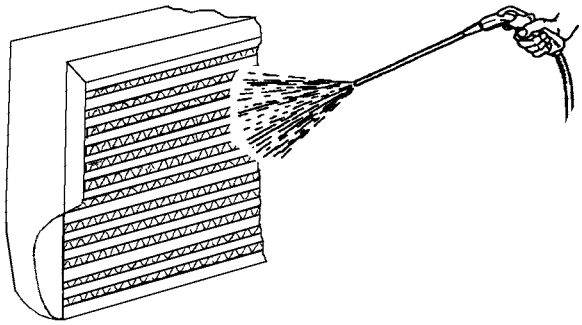
☞ Follow advice in the engine's operating instructions!

**Radiator**

⚠ Check the cooling ribs on the radiator for dirt and leaks on a daily basis.

The radiator is located in the front section of the engine compartment.

☞ With severe contamination, it is advisable to spray the radiator with dirt solvent, then to spray it down with a water jet.

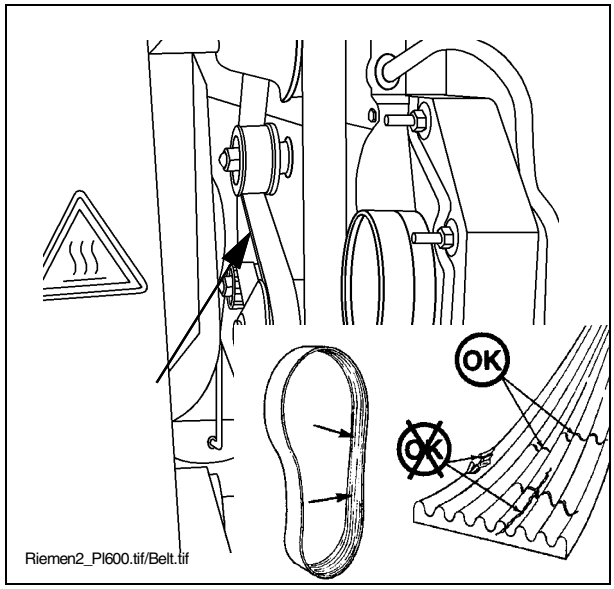


Kühl.bmp

### Drive belt

⚠ Check the drive belt daily for visual signs of damage.

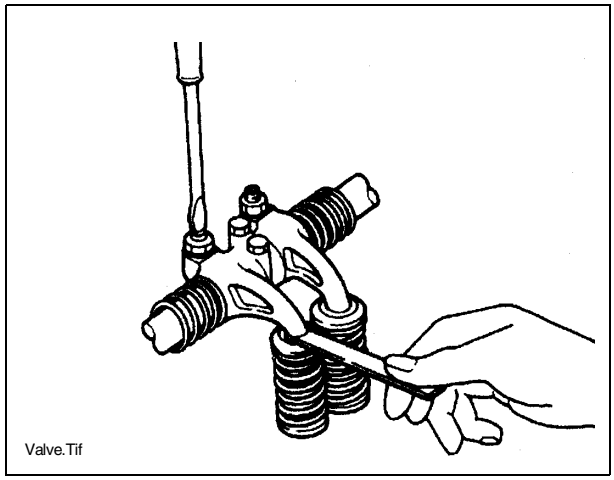
☞ For maintenance of the drive belt: refer to Engine Operating Instructions.




### Valve clearance

⚠ During the running-in period, engine valve clearance should be checked every 250 operating hours, thereafter every operating hours, and corrected if necessary.

☞ For details of how to check and correct valve clearance: refer to Engine Operating Instructions.



## 3.2 Hydraulics

### Hydraulic oil tank

⚠ Check the oil level daily on the indicator (1) located on the left-hand side of the machine.
Change the hydraulic oil every 1000 operating hours, and at least once a year.

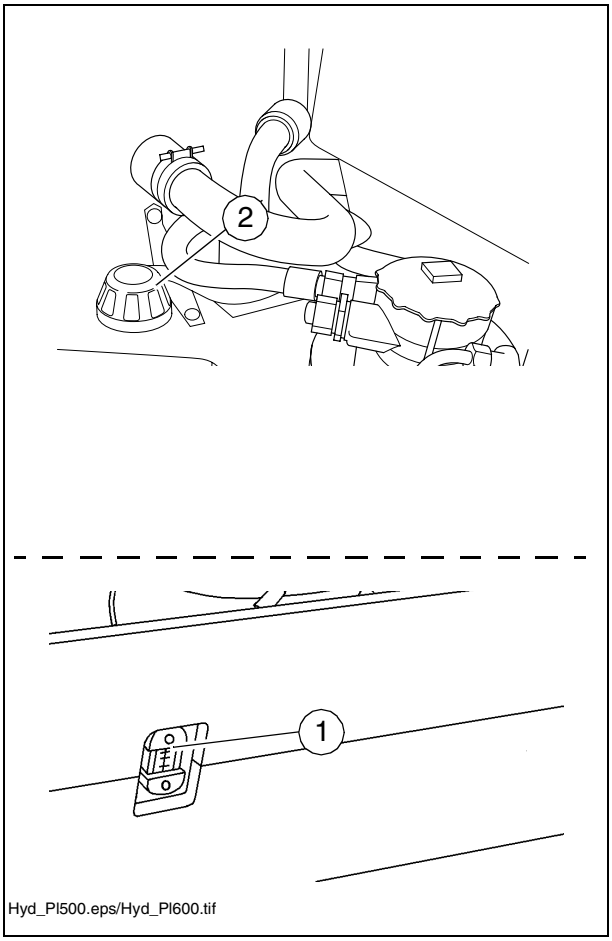
The filler neck for the hydraulic oil is located behind the rear flap of the engine compartment.

To top up the hydraulic oil, open the screw cap (2) and fill new oil through a funnel.

⚠ Ensure that no impurities are able to enter the tank.

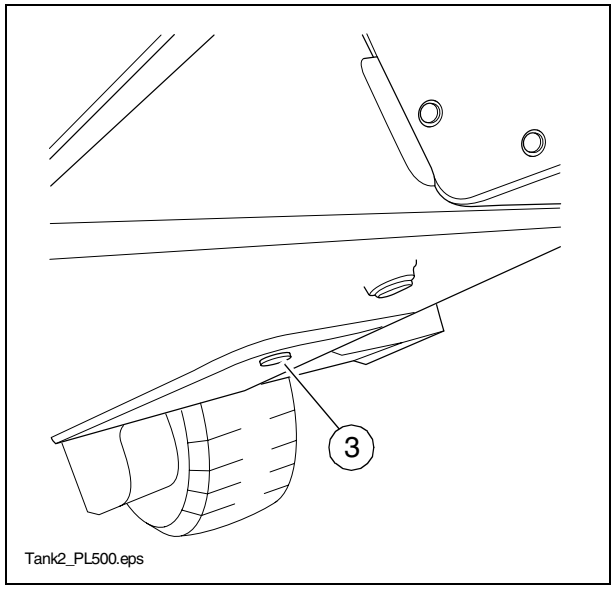
STOP Avoid skin contact with hydraulic oil.

⚠ Always use recommended grades of hydraulic oil.



Hyd_Pl500.eps/Hyd_Pl600.tif

### Changing the hydraulic oil




The oil drain screw (3) for hydraulic oil is located under the machine in the right-hand direction of travel.

To drain the hydraulic oil, first place a suitable receptacle under the drainage point, then remove the screw plug.
After draining the fuel, fit a new seal to the screw plug and tighten back into place.

Top up new oil through the filler aperture in the hydraulic oil tank (behind the right-hand maintenance flap of the engine compartment). Check fill level against indicator.

Collect used oil in a suitable container and send for disposal.

Protective clothing when draining hot oil. Health hazard caused by contact with the skin.

## Suction-return hydraulic filter

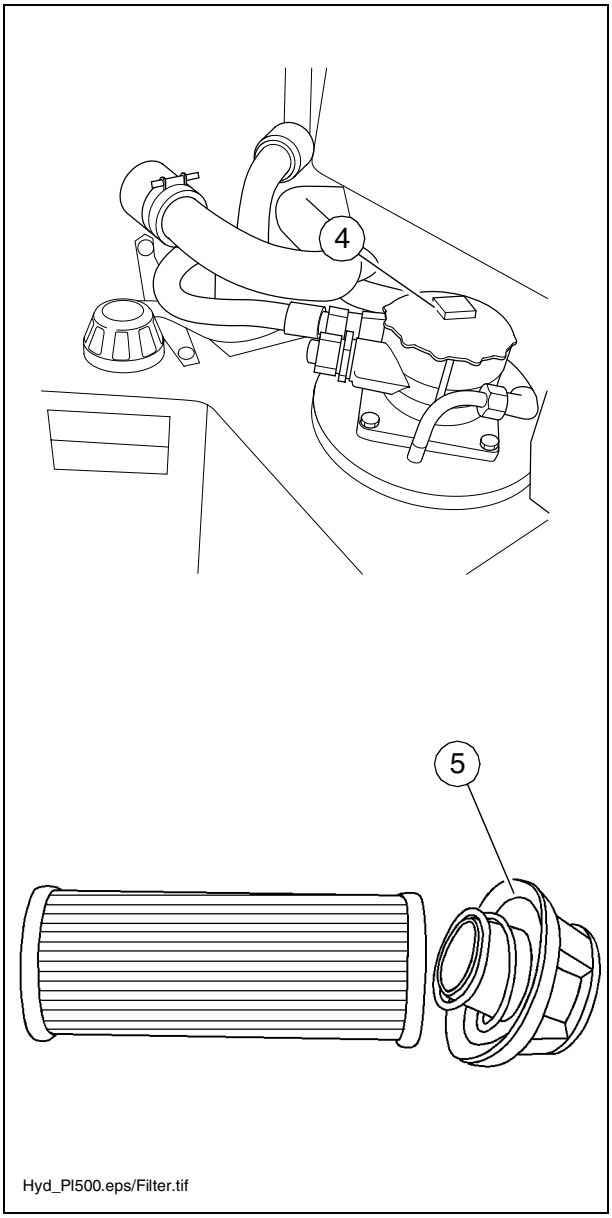
The return line to the hydraulic filter is located on the hydraulic oil tank behind the right-hand maintenance flap on the engine compartment. This maintenance flap is opened using a square-section wrench.

- Unfasten the filter housing cover (4) by removing the square-section bolts.
- Remove the complete filter cartridge from the housing.
- Remove handle (5) from the used filter cartridge.
- Fit handle to the new filter cartridge and install in the filter housing.
- Reinstall the filter housing cover (4) properly.


Wear protective clothing when draining hot oil. Health hazard caused by contact with the skin.

Never clean and reuse the filter! Always fit a new filter.


Send used filter for proper disposal.



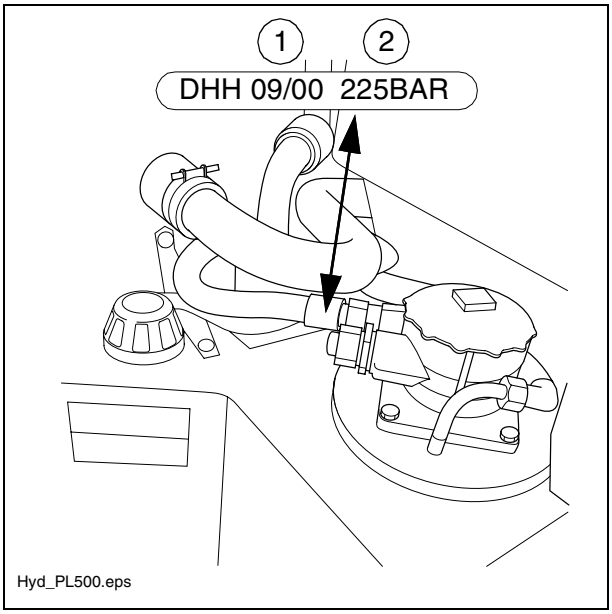

## Hydraulic hoses

Check the condition of the hydraulic hoses every 500 operating hours carefully. Replace damaged hoses immediately.


Ageing hoses become porous and may burst or split! Risk of accident!

A stamped number on their screw connection provides information about the date of manufacture (1) and also quotes the maximum pressure limit (2) for this hose.

Never install superimposed hoses and always pay attention to the permitted pressure limits.



## 3.3 Drive wheels, chassis legs

### Planetary gears

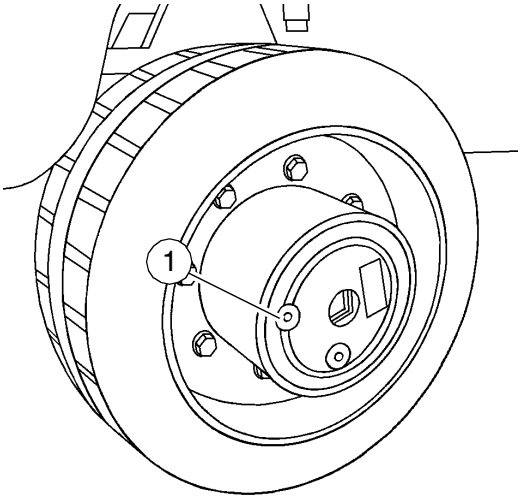
#### Oil level check

⚠ Check oil level every 50 operating hours.

When checking the oil level and while filling with oil, the screw plug used for oil level checks (1) must be in its 9 o'clock position.

The oil level should reach the lower edge of the bore for the screw plug.
Top up oil through the opened filler screw until a small amount of oil emerges from the screw plug bore.

⚠ When filling with oil, ensure high standards of cleanliness are observed.

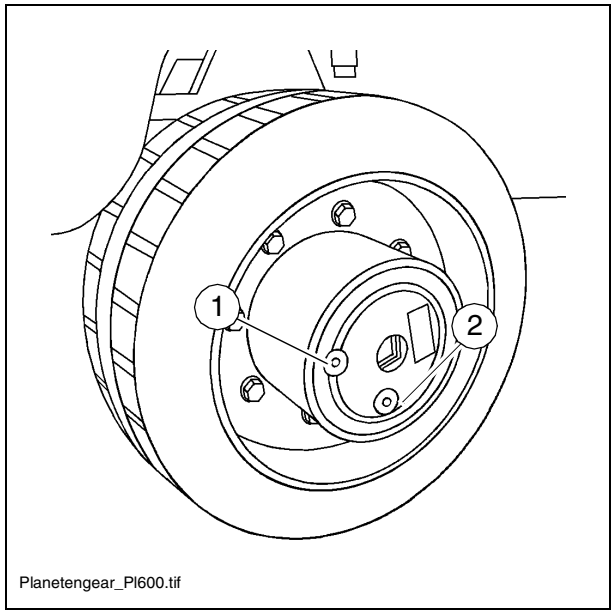


Planet gear_PL600.tif

## Changing oil in planetary gear unit

First oil change after 250 hours of running-in period, thereafter every 1000 hours, but at least once a year.

To drain the oil, turn the drain screw (2) into its 6 o'clock position, ensuring that the filler screw (1) is in its 9 o'clock position.



Planetengear_Pl600.tif

Always perform oil changes with the oil at operating temperature, immediately after the gearbox comes to a standstill. This ensures that suspended particles of solid matter do not have time to settle and form sediment.

Wear protective clothing when draining hot oil. Health hazard caused by contact with the skin.

- Unscrew the oil drain screw (2), collect draining oil.
- To bleed the system, unscrew and remove the filler screw (1).
- Once the oil has drained off completely, fasten the drain screw (2) back into place.
- Top up oil through the opened filler screw until a small amount of oil emerges from the screw plug bore.
- Properly screw in the filler screw (1) again.

Collect used oil in a suitable container and send for disposal.

When filling with oil, ensure high standards of cleanliness are observed.

## 3.4 Milling section

### Milling drum

The milling drum is bolted to the angle gearbox on the milling drum drive. It is not mounted in bearings on its right-hand side.

### Dismantling milling drum

The milling drum is easy to dismantle for repair work, or for replacement of the tool, e.g. when changing the roller width.

- Swivel right-hand chassis leg into its front position.
- Raise machine and secure to prevent it from lowering accidentally.
  Ensure that the milling drum does not make contact with the ground.

STOP Secure heavy components to prevent them from dropping accidentally. Use appropriate restraining and lifting tackle!

- Remove side board (1) (A):
  - Lower side board until it makes contact with the ground.
  - Unscrew stop plate (2).
  - Disconnect the cable tension sensor (3) if fitted.
- Remove the cables (4) used for raising and lowering the side board.

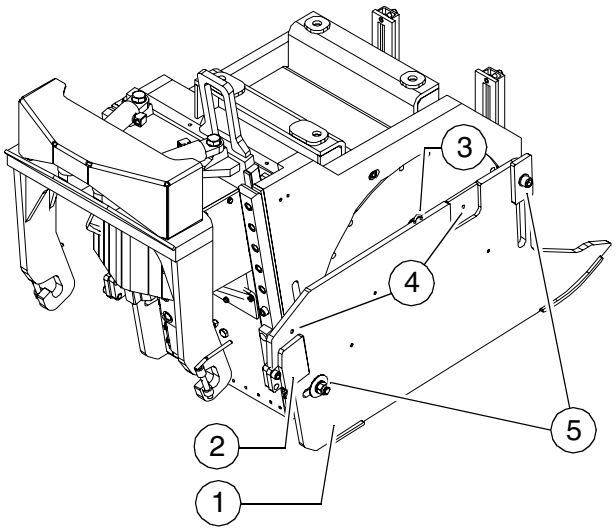
☞ Eye bolts can be employed instead of cables for restraining and raising the side board after removal.

  - Remove guide bolts (5).
- Loosen cover (6) of milling drum box (B):
  - Take off all fastening bolts (7).
- Loosen cover from input (C), (D):
  - Insert special tool 503.02.02.64 (8) in both of the cover's holes (9)
  - Loosen cover and milling drum from milling drum housing by turning clockwise.
- Remove roller from input shaft (E):
- Use a retaining or lifting device (lift truck, fork lift etc.) fit for the purpose to pull the milling drum off the drive and out of the milling drum housing.

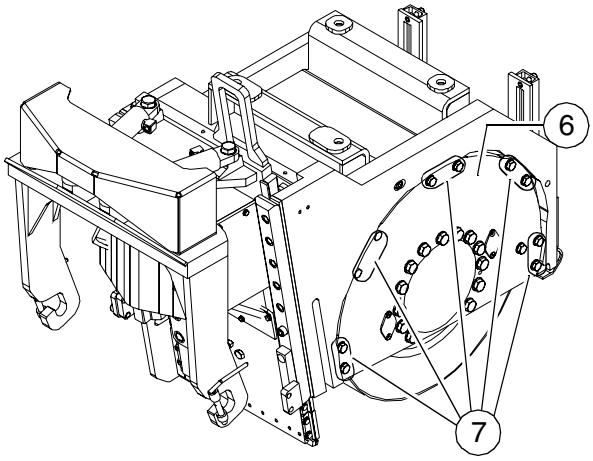
☞ Reassemble in reverse order. Ensure that fastening bolts are installed in the correct order, are tightened to the correct torque and are kept clean!

⚠ During disassembly and assembly, ensure that the milling drum is not tilted but guided in as straight a line as possible!

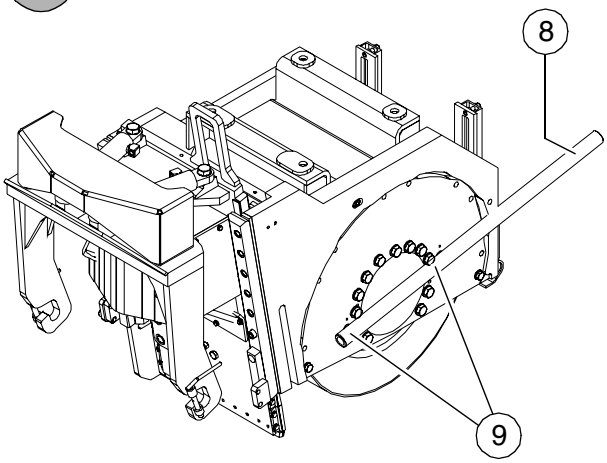
A




B




C

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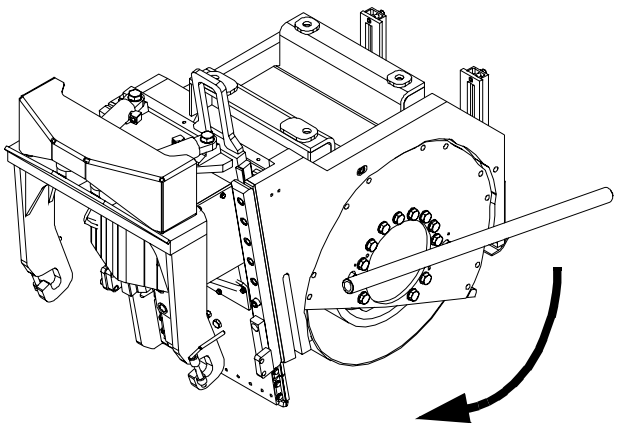
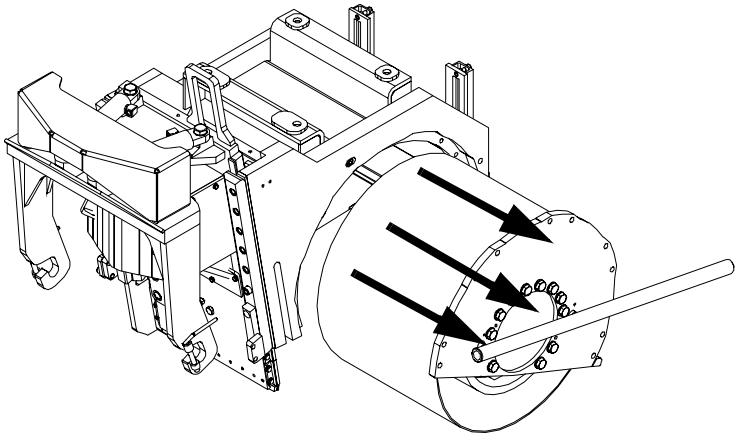


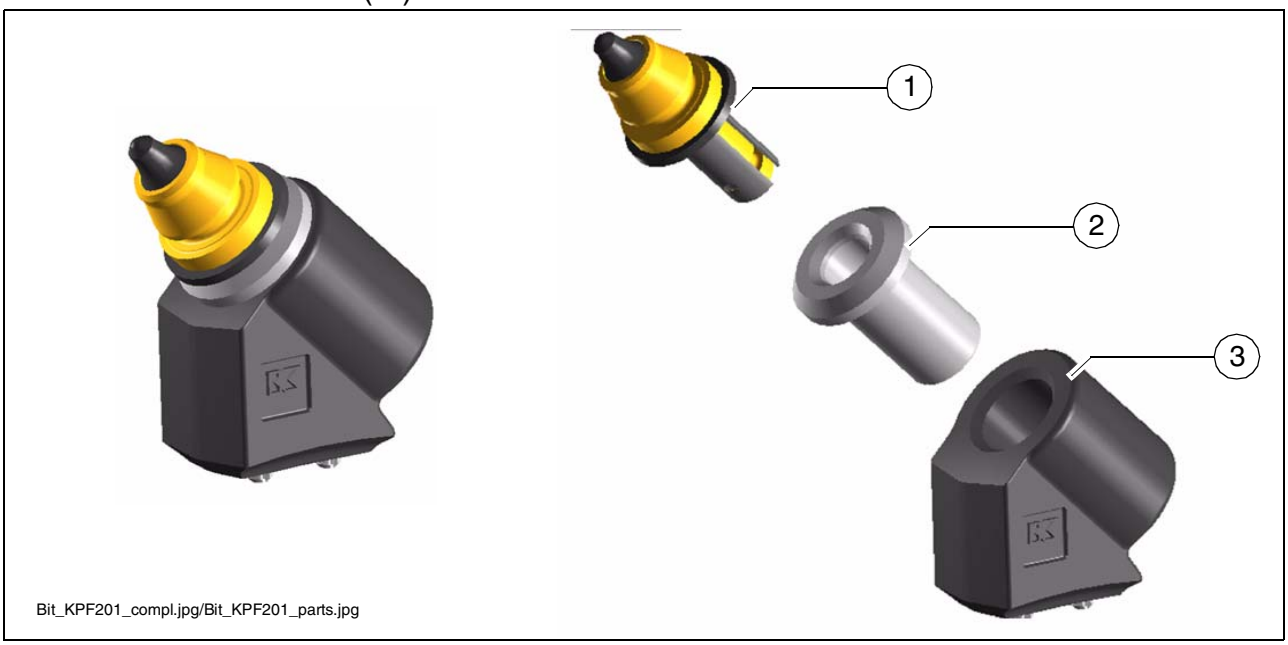
E



Box1_Pl500.wmf.....Box5_PL500.wmf

## Bits, wearing sleeves, bit blocks

SYSTEM KPF201 (○)



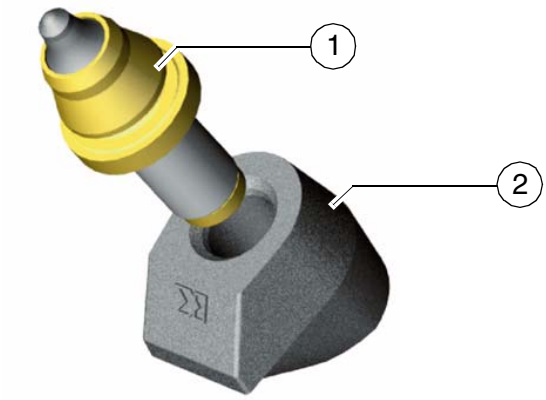

Bit_KPF201_compl.jpg/Bit_KPF201_parts.jpg

The three-part KPF 201 quick-change system comprises:

- Bit (1)
- Wearing sleeve (2)
- Block (3).

☞ The wearing sleeve (2) is there to ensure that a worn planing tool does not cause wear to the block.

SYSTEM C10 (○)



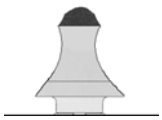

Bit_C10_parts.jpg

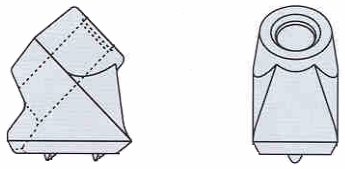
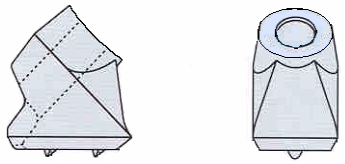
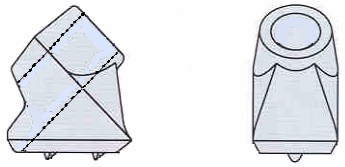
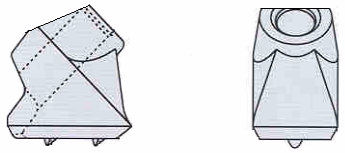
The two-part C10 quick-change system comprises:

- Bit (1)
- Block (2).

⚠ The condition of the bits and if necessary that of the wearing sleeve and bit blocks needs to be checked several times a day.
Immediately replace worn or damaged bits, wearing sleeves and blocks.

☞ The machine capacity can only be fully utilised if planing / cutting tools are in perfect condition.

| **Wearing features on round-shafted bits** | |
|---|---|
|  | New bits |
|  | Worn bits - replace as soon as possible |
|  | Eroded bits - replace as soon as possible |
|  | Bits with one-sided wear - replace immediately |
|  | Worn bits - replace immediately |
|  | Broken off bits - replace immediately |
|  | Broken off bits - replace immediately |

| Wearing features of bit blocks | |
|---|---|
|  | New bit block |
|  | Serious wear to locating faces of the planing bit or wearing sleeve - replace without delay |
|  | Serious wear to locating bore on the planing bit or wearing sleeve - replace without delay |
|  | Severe wear to flank - replace immediately |

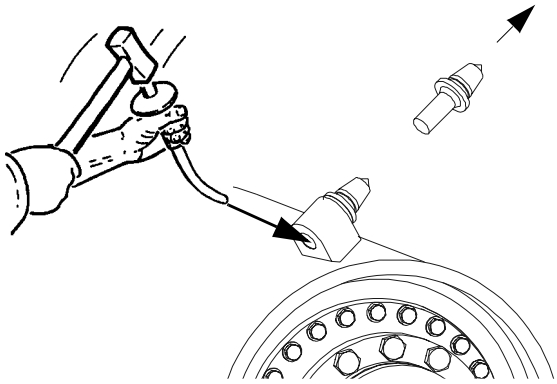
The following safety precautions need to be taken, and the following action needs to be taken when inspecting and replacing the bits and, where necessary, to the wearing sleeves:

- Ensure that the engine cannot be started.

When using the pneumatic extractor, ensure compliance with the relevant safety regulations!

### Dismantling the bits

- Fit hammer punch into bore on reverse side of bit block then drive out worn and damaged bits by striking with a hammer.



Meißeldemon.cdr/Meisselh1.tif

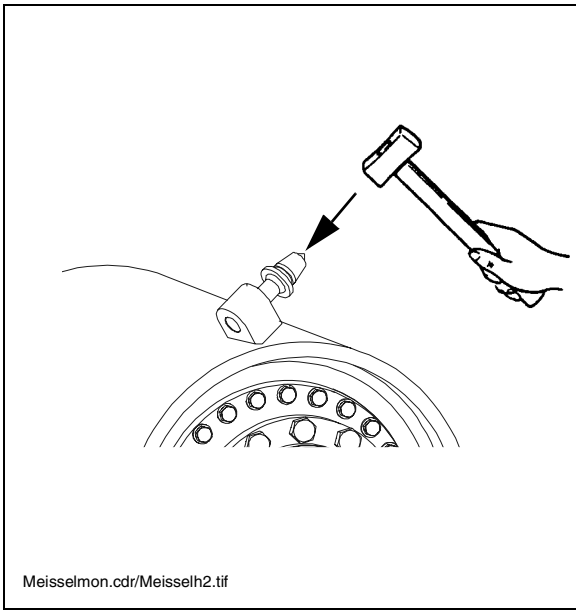
### Installing the bits

- Knock new bits into the bit blocks with a hammer with copper, brass or rigid plastic head.

⚠ Do not use a steel-headed hammer to drive bits into their holders because this could destroy their bit tips. Risk of injury from flying metal splinters.

⚠ After assembly, ensure that the bits are able to rotate. Jammed bits suffer from one-sided wear so wear out too rapidly.

⚠ When installing new bits and wearing sleeves, always ensure that all bores and locating surfaces are free of dirt!



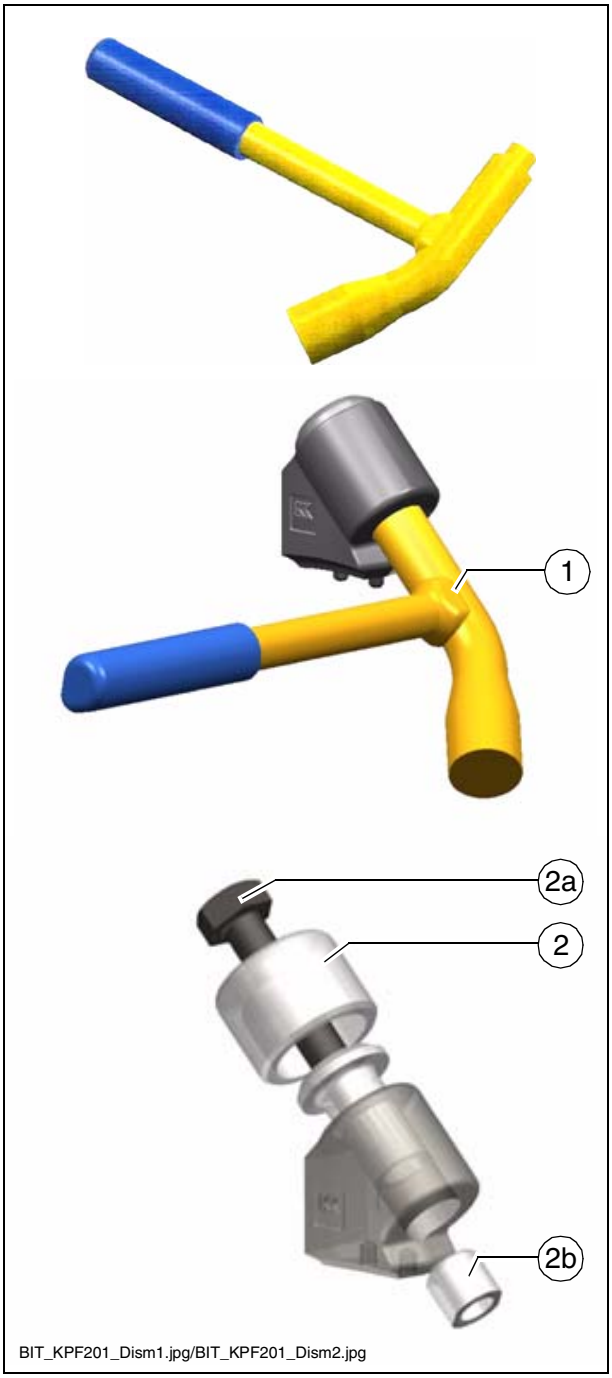
Meisselmon.cdr/Meisselh2.tif

## Dismantling the wearing sleeves

System KPF201

Two different tools are available for dismantling the wearing sleeves:

- Fit the sleeve driver (1) to the bore on the back of the bit block, then drive out worn and damaged wearing sleeves by striking with a hammer.
- Fit the drawing tool (2) to the bit block, guide the pin (2a) through the bore in the sleeve and tighten down the drawing nut (2b).
  The sleeve is drawn out by tightening down the pin in the drawing nut.



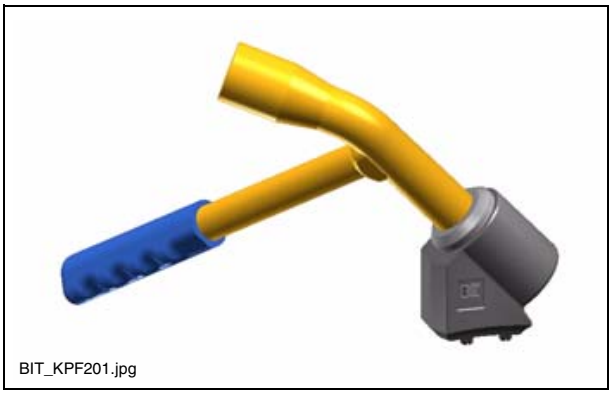
BIT_KPF201_Dism1.jpg/BIT_KPF201_Dism2.jpg

## Fitting the wearing sleeves

System KPF201

- Drive new wearing sleeves into the bit blocks by striking from the front with the sleeve driver.

⚠ Only use the sleeve driver or the drawing tool to dismantle or fit the wearing sleeves!

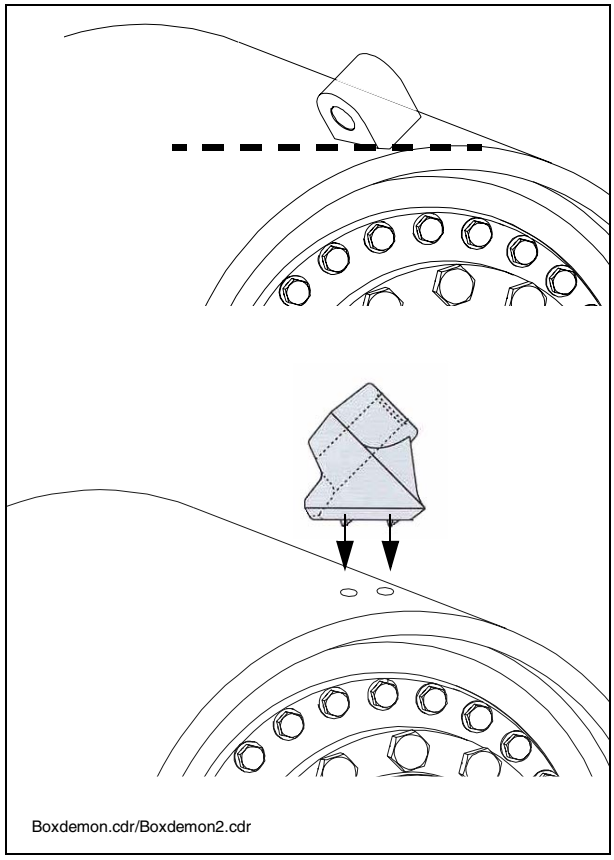

BIT_KPF201.jpg

⚠ When installing new bits and wearing sleeves, always ensure that all bores and locating surfaces are free of dirt!

**Replace bit block**

The bit blocks arranged on the roller need to be so firmly and reliably welded to the milling drum that they only very occasionally break off, and then only under extreme conditions (e.g. old steel rails lying concealed in the cutting surface).
Position knobs on the bracket and position bores on the roller determine the correct position for the bit holder and make it easier to replace the unit: worn bit blocks are then relatively easy to replace:

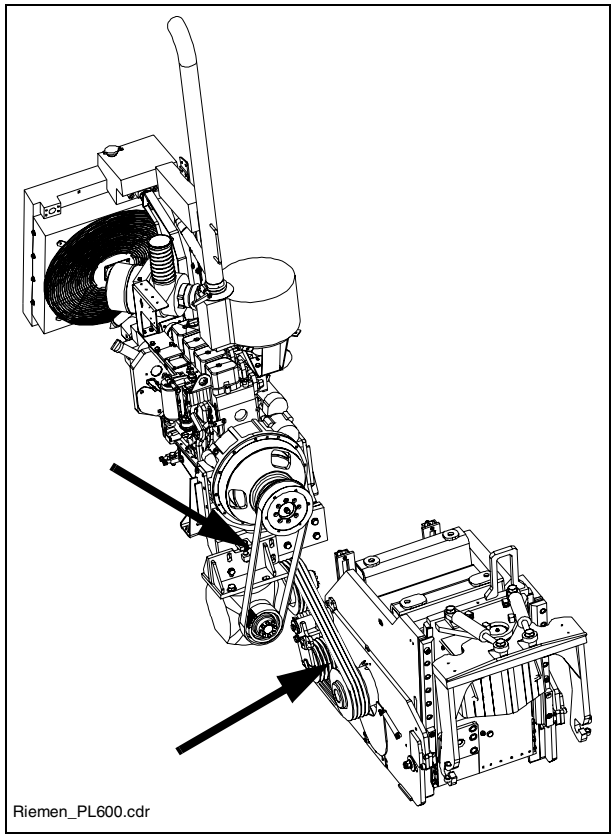
- Remove the worn bit block from the milling drum and ensure that the locating face is smooth and even.
- Position the new bit blocks (with inserted bit) on the roller (locating nipple on block must engage in the locating bores on the roller).
- Attach new bit block to the shaft then weld firmly into place.





Take all necessary safety precautions during cutting and welding work!

**Belt drive**


Riemen_PL600.cdr

⚠ Check the condition of belts on the cutting drive on a daily basis.
Replace damaged and worn belts without delay.
Clean material debris out of all grooves in the v-belts!
Always replace these belts in pairs.

The belt drive comprises 6 individual belts. It is located on the left-hand side of the milling section and can be accessed via the maintenance flap on the control panel.

STOP Ensure that the engine cannot be started accidentally!

If the belt tensioner is loose, it is easy to remove the belts from their pulleys.

⚠ In addition, check the condition of the pulleys. If flank wear on the pulleys is excessive, they must be replaced immediately.

## Clutch

Check wear on clutch friction linings every 1000 operating hours.
Replace worn friction linings immediately.
The clutch is located behind the left-hand maintenance flap on the control panel.

Ensure that the engine cannot be started accidentally!

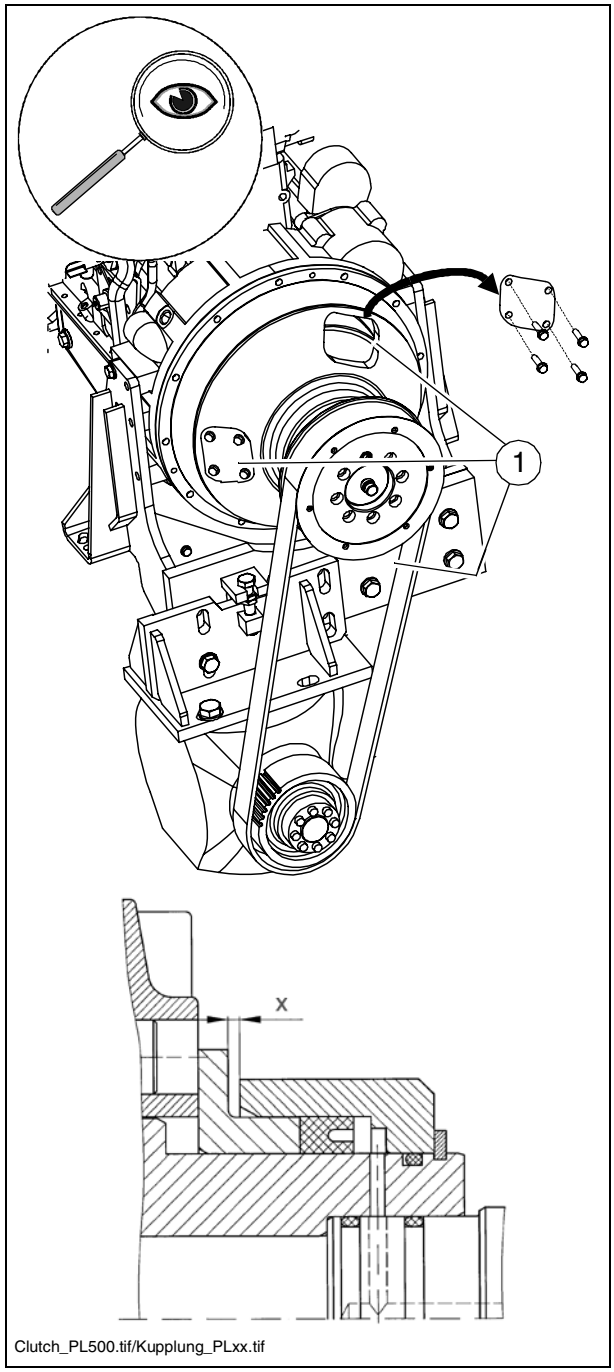
For inspection purposes, an inspection cover (1) needs to be removed from the clutch housing.

- Remove the four screw plugs (2) from an accessible inspection cover (1).
- Remove the inspection cover.
- Pressurise the axial oil feed line on the coupling from an external source until the piston is pressed against the disc pack.

Shift pressure is approx. 35 bar!

The gap (X) between piston and cylinder when the clutch is engaged and in new condition is 2 mm, with a wear limit of 6 mm.

If it protrudes to a measurable extent, (dimension X>10mm), contact the Dynapac After-Sales Service team!

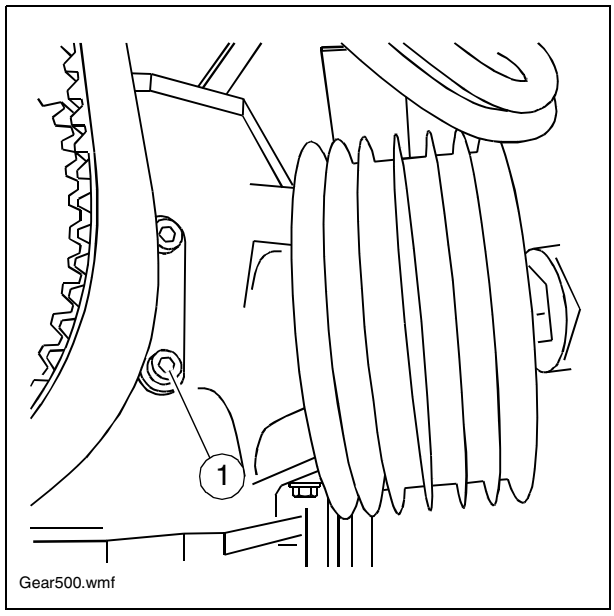


Clutch_PL500.tif/Kupplung_PLxx.tif

- After this inspection, the inspection cover needs to be fastened back down properly.

## Angular gear

### Oil level check




⚠ Check oil level every 50 operating hours.

When checking the oil level or topping the oil up, the machine must be standing on level ground.

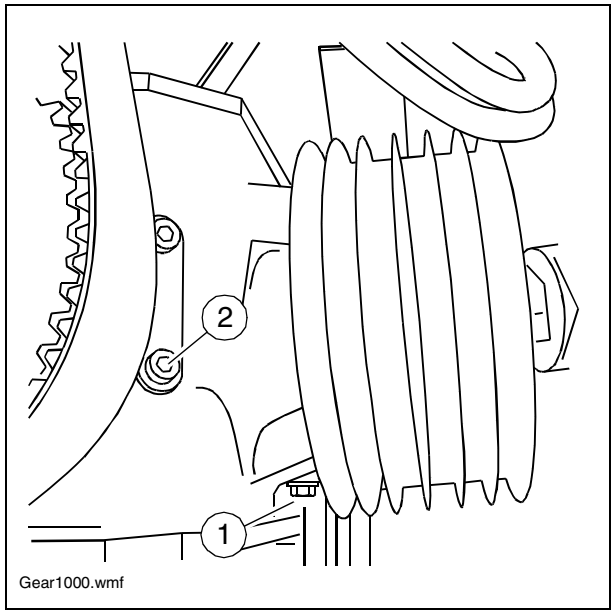
- Unscrew and remove the filler and inspection screw (1).

The oil level should reach the lower edge of the bore for the screw plug.

- Top up oil through the open bore until a little oil starts to emerge.
- Reinstall filler and inspection screw properly.

⚠ When filling with oil, ensure high standards of cleanliness are observed.

## Oil changes




First oil change after 50 hours of running-in period, thereafter every 500 hours, but at least once a year.

Always perform oil changes with the oil at operating temperature, immediately after the gearbox comes to a standstill. This ensures that suspended particles of solid matter do not have time to settle and form sediment.

Wear protective clothing when draining hot oil. Health hazard caused by contact with the skin.

- Park machine on level ground.
- Unscrew and remove the inspection screw (2).
- Unscrew the oil drain screw (1), collect draining oil.
- Once the oil has drained off completely, fasten the drain screw (1) back into place.
- Top up oil through the opened inspection screw until a small amount of oil emerges from the screw plug bore.
- Properly screw in the filler screw (2) again.

Collect used oil in a suitable container and send for disposal.

When filling with oil, ensure high standards of cleanliness are observed.

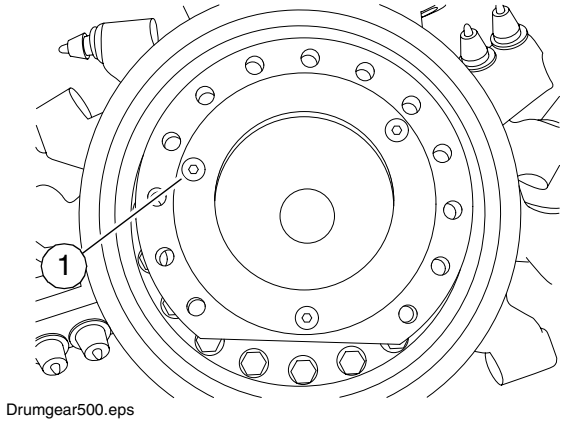
## Milling drum gearbox

### Oil level check

When checking the oil level or topping the oil up, the machine must be standing on level ground.

- Unscrew and remove the filler and inspection screw (1).

The oil level should reach the lower edge of the bore for the screw plug.



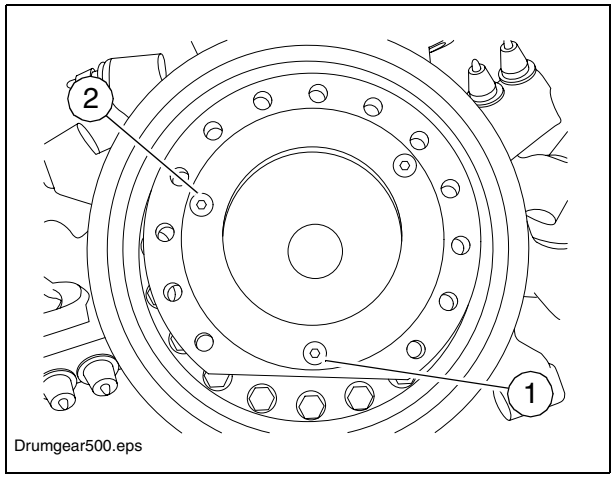
Drumgear500.eps

- Top up oil through the open bore until a little oil starts to emerge.
- Reinstall filler and inspection screw properly.

⚠ When filling with oil, ensure high standards of cleanliness are observed.

## Oil changes

⚠ Always perform oil changes with the oil at operating temperature, immediately after the gearbox comes to a standstill. This ensures that suspended particles of solid matter do not have time to settle and form sediment.



Drumgear500.eps

STOP Wear protective clothing when draining hot oil. Health hazard caused by contact with the skin.

- Park machine on level ground.
- Unscrew and remove the inspection screw (2).
- Unscrew the oil drain screw (1), collect draining oil.
- Once the oil has drained off completely, fasten the drain screw (1) back into place.
- Top up oil through the opened inspection screw until a small amount of oil emerges from the screw plug bore.
- Properly screw in the filler screw (2) again.

STOP Collect used oil in a suitable container and send for disposal.

⚠ When filling with oil, ensure high standards of cleanliness are observed.

## Side boards

## Sliding shoes

The side boards which slide over the ground (1) should be checked every 50 hours to ensure that they are still properly attached.

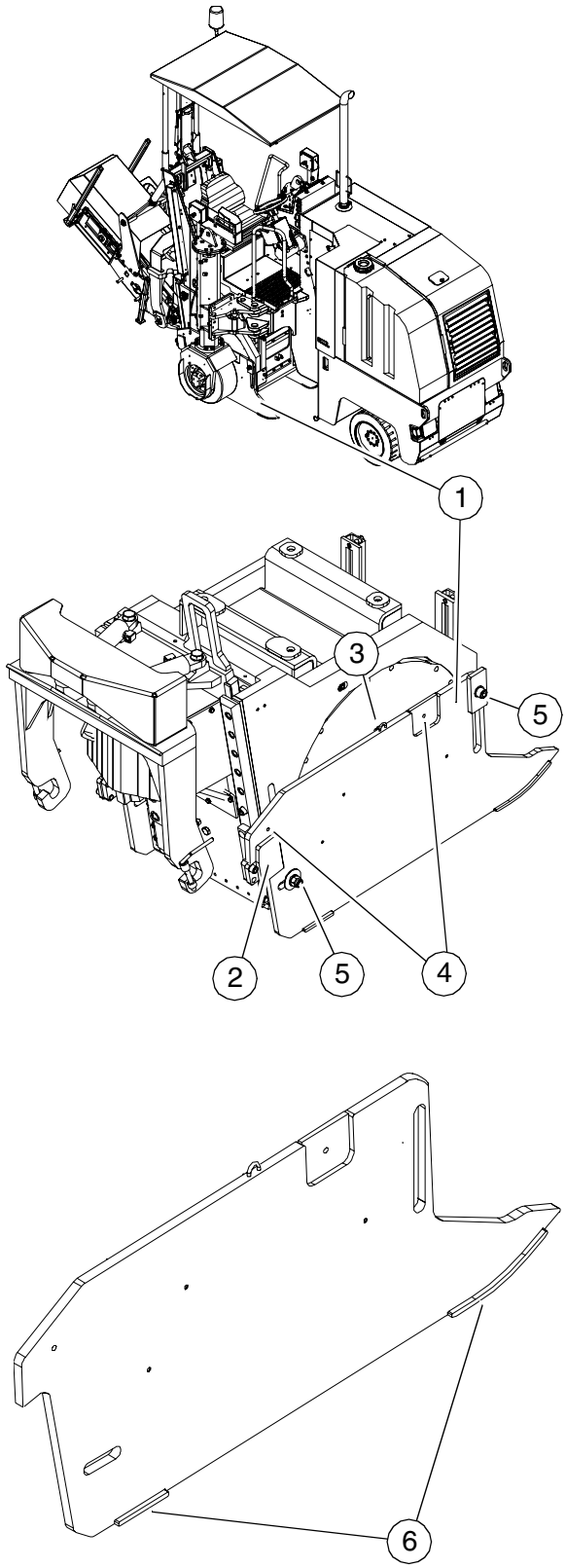
There is one side board on either side of the milling drum housing.
The sliding shoes on the side boards are in continuous sliding contact with the asphalt during planing operations, as a result of which they are subject to increased levels of wear. Once the material on these shoes becomes too thin, the shoes have to be replaced.
Check the sliding shoes on both side boards at regular intervals and replace if required.

- Remove side board (1) A:
  - Lower side board until it makes contact with the ground.
  - Unscrew stop plate (2).
  - Disconnect the cable tension sensor (3) if fitted.
  - Remove the cables (4) used for raising and lowering the side board.

☞ Eye bolts can be employed instead of cables for restraining and raising the side board after removal.

  - Remove guide bolts (5).
- Cut the welded sliding shoes (6) off the side board.
- Weld new sliding shoes firmly to the side board.

STOP Take all necessary safety precautions during cutting and welding work!

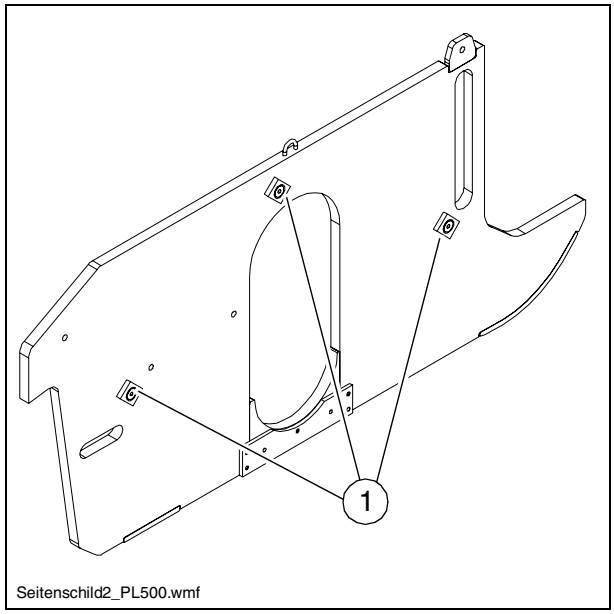


Iso500_compl_short.wmf,Box1_PL500.wmf,Seitenschild1_PL500.wmf

## Support plates

There are several support plates on the internal surface of the side boards which ensure that the side boards can be raised or lowered in a sliding fashion.
If the material on the support plates becomes too thin, these must be replaced.
Check the support plates on both side boards at regular intervals and replace if required.

- Remove side board:
  - see previous page!
- Remove support plates by unfastening the fastening bolts.
- Tighten down new support plates to specified torque.



Seitenschild2_PL500.wmf

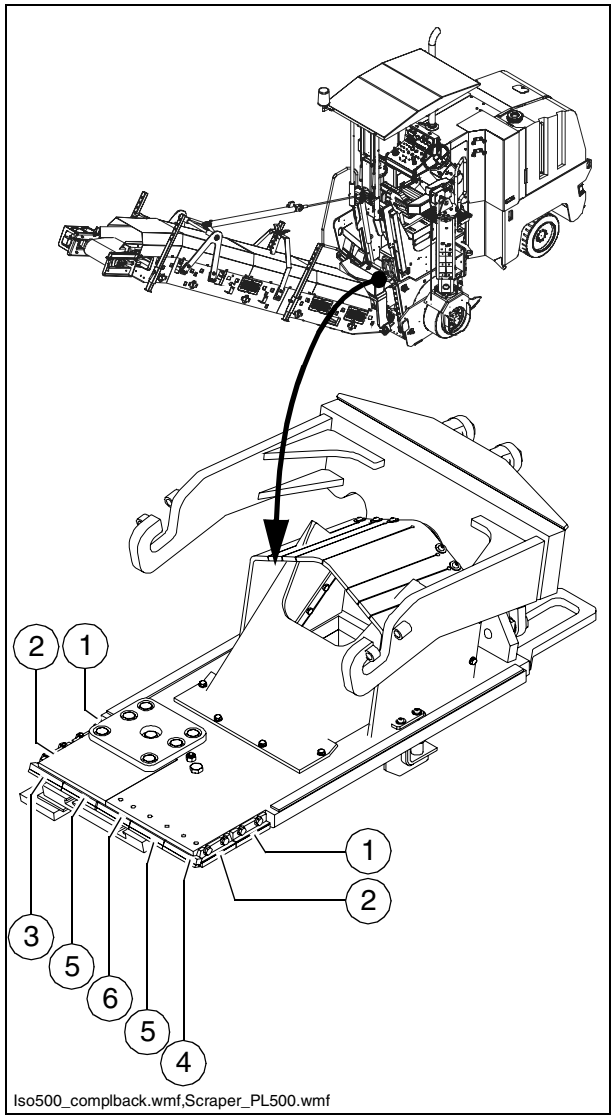
☞ If necessary, also replace the fastening bolts.

## Moldboard / Scraper

⚠ Inspect the scrapers on the moldboard every 50 operating hours and replace if necessary.
If surplus material is left in the milling lane, also check these components.

The scrapers ensure that almost no cut material remains in the milling lane, thereby ensuring that waste material is collected up properly.
These components, installed down the full length of the moldboard, are fitted with hardened metal tips which gradually wear down over time.

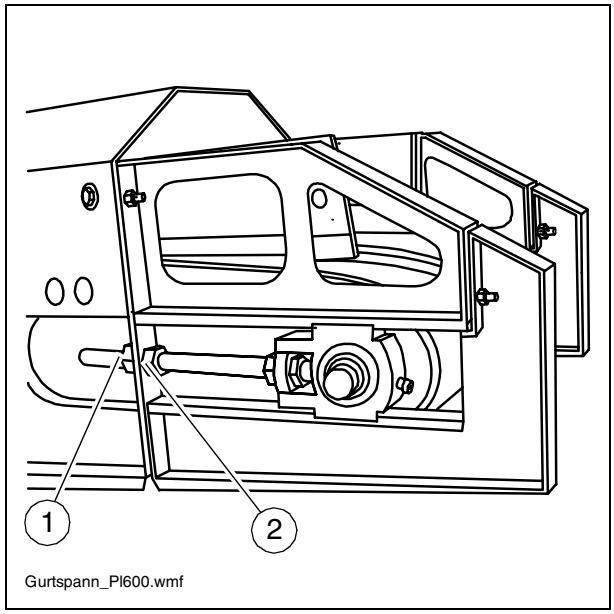
- Raise the machine, completely retract the moldboard and fully raise the side boards.
- Ensure that the engine cannot be started.
- Remove worn scrapers by unfastening the two hex bolts.
- Clean the locating surface, install new components properly and, if necessary, adjust to the required height using the longitudinal slots.




☞ Note that several scraper blades (1-6) of different sizes must be used!

## 3.5 Loading unit

### Belt tension



Gurtspann_Pl600.wmf

⚠ Check belt tension on the upper conveyor on a daily basis. If there is too much slack in the belt, adjust the tension.

☞ During the first weeks of operation, the belt may stretch excessively (residual and elastic elongation).
It is therefore necessary to adjust the belt tension repeatedly during this period.

Increasing the tension:

- Unfasten lock nuts (1) on both sides of the clamping fixtures.
- Adjust tension on both sides evenly on the adjusting nuts (2) using an open-end wrench.
- Tighten lock nuts (1) back down after the adjustment procedure.

☞ If the belt on the reversing drum is running to one side, tighten the right-hand spindle or loosen the left-hand spindle if the drum is rotating clockwise, or vice versa for anti-clockwise rotation.

⚠ Avoid excessive angle setting on the reversing drum because this can cause the belt fabric to stretch excessively.

☞ If the reversing roller is unable to apply sufficient tension control, the load-bearing rollers need to be realigned. To do this, unfasten the displacement plate for the load-bearing station and twist the station round slightly.
If the belt is to be adjusted to the right, the left-hand load-bearing roller needs to be pushed forwards, or its right-hand side needs to be pushed forwards if the belt needs to be adjusted towards the left side.

The following factors can cause the belt to run at an oblique angle:

- Encrusted material on drums and rollers.
- Off-centre material buildup
- Differing levels of belt stretch, e.g. one-sided over-tightening
- One-sided wear of the drum friction lining
- Chafing of belt against machine frame.
- Improper version of endless belt connection.

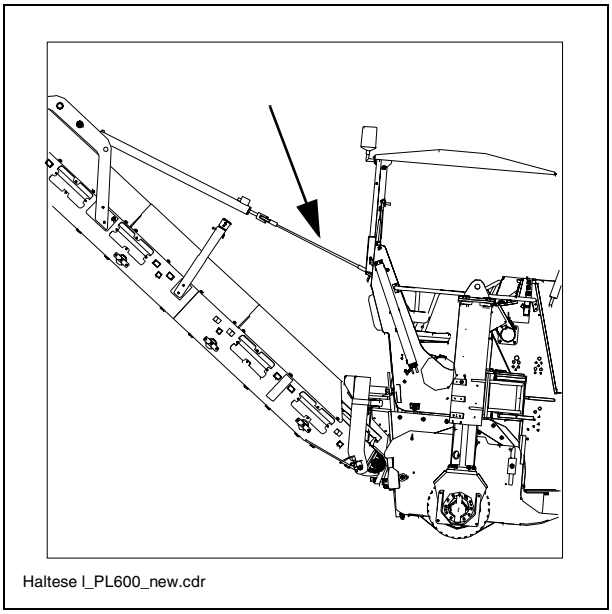
⚠ In addition, perform visual check of belt and loading belt rollers for signs of damage or wear.

⚠ Remove encrusted material from the drums on a regular basis.

⚠ Inspect bolt connections on a regular basis.


During all work on the upper conveyor, ensure that the conveyor drive cannot be started!

**Steel cables**



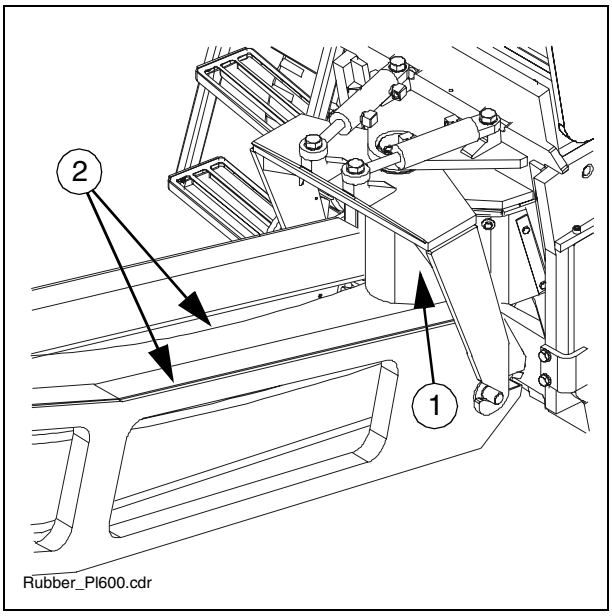

⚠ Check the condition of the steel retaining cable on the upper conveyor on a daily basis.
Always replace damaged steel cables immediately.

STOP Tearing steel cables constitute a serious threat to man and machine.

Relieve tension on any damaged steel cables on the upper conveyor and replace!

STOP During all work on the upper conveyor, ensure that the conveyor drive cannot be started!

**Rubber funnel gasket at transfer point and rubber seals / guides**




Various rubber components are located on the upper conveyor which should provide problem-free material removal.
These rubber components should be visually inspected on a weekly basis for signs of damage.

- Collecting funnel (1)
- Side guide on upper conveyor (2)

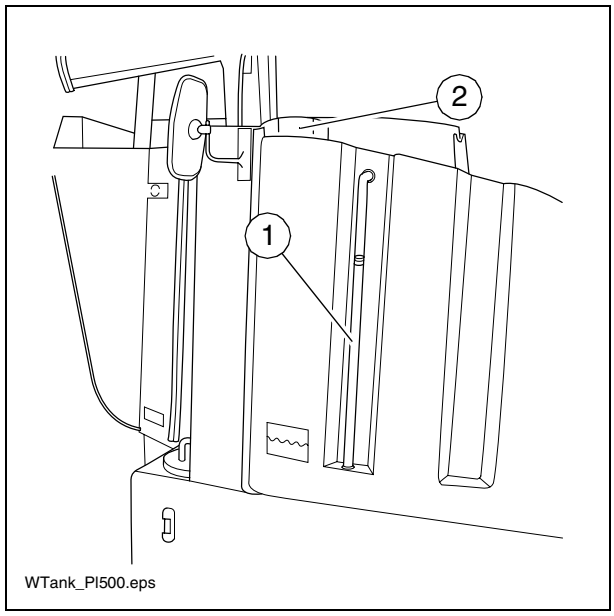
All rubber components are fitted using bolt connections and are easy to remove if required.

- Dismantle fastening bolts then remove damaged components.
- Fit new component properly then tighten down the fastening bolts.

## 3.6 Water system

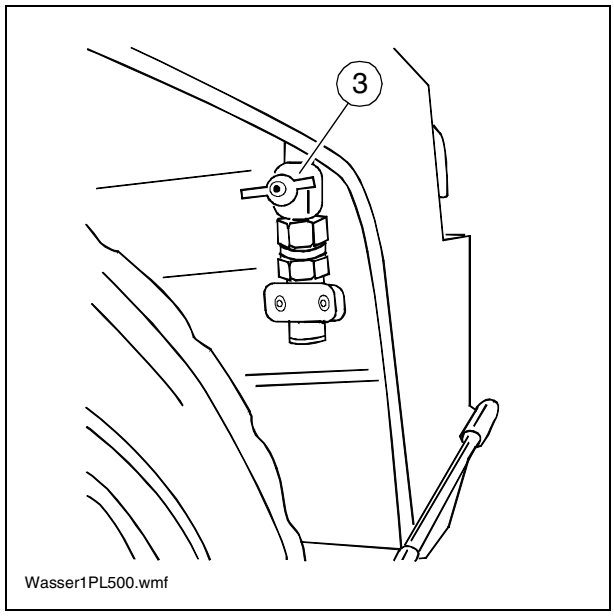
### Water tank

Check the water tank level before starting work by inspecting the filler gauge (1) on the right-hand side of the water tank. If necessary, top up the tank.




- Unscrew filler aperture (2), fill with water to top edge then close aperture properly.

⚠ If necessary, and at least every 500 operating hours, the inside of the tank needs to be cleaned. Clean the water tank as thoroughly as possible once it is empty.
Spray out the tank as thoroughly as possible with a water jet lance which can be inserted into the tank through the filler aperture.
If the machine is not operating continuously, this water should be changed once a year.




- Completely drain off tank by opening the drain valve (3). Leave valve in its open position. Water drain and valve are located beside the right-hand front wheel.
- The dissolved sediment runs through the open drain valve.
- After completion of cleaning work, close the drain valve and the sealing cover on the water tank.

STOP This water is definitely not drinking quality!

⚠ If there is a risk of sub-zero temperatures, completely drain the water tank using the drain valve, leave the valve open, unfasten the connecting lines and allow them to drain. Remove sealing cap from water filler apertures.

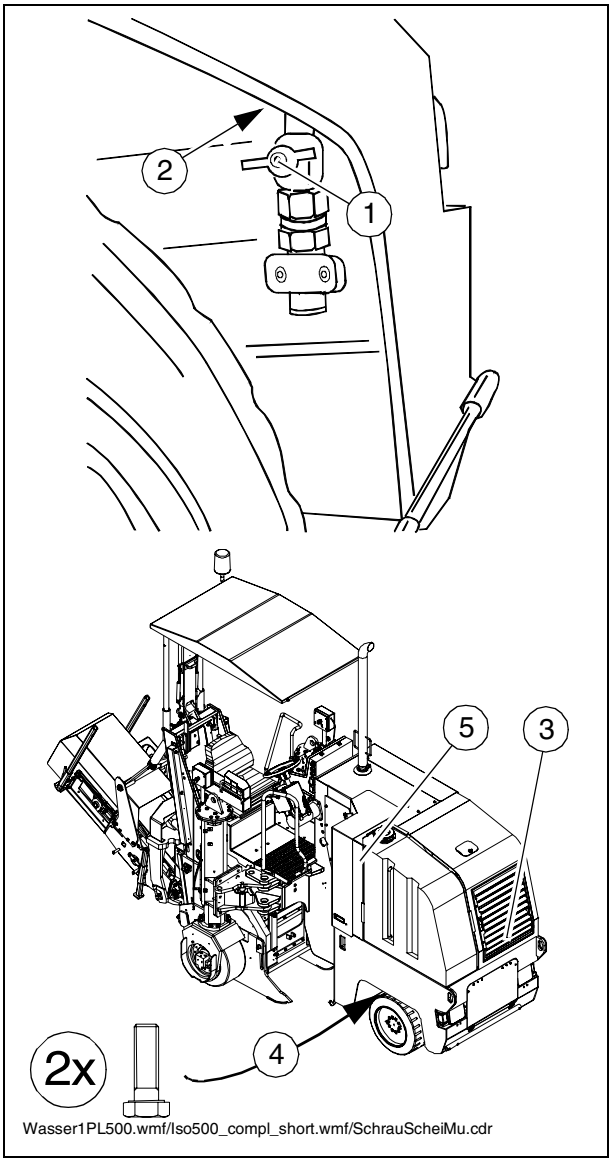
**Remove water tank**

If it is necessary to remove the water tank, proceed as follows:

- Park machine in suitable location, open the drain valve (1) and completely empty the water tank.
- Remove hose connection from tank (2) by untightening the hose clamp.
- Unscrew the hose line behind the radiator grille (3).
- Also remove the two tank screws (4) located at the back on the underside of the machine frame.
- If necessary, dismantle the trim panel (5).

The water tank can now be lifted up and out of the machine frame.

☞ The water tank is installed in reverse order!



Wasser1PL500.wmf/Iso500_compl_short.wmf/SchrauScheiMu.cdr

**Water filter**

⚠ Replace the filter cartridge daily after work, and whenever the contamination indicator shows that this is necessary!

☞ The machine's accessories include another water filter to daily replacement is not a time-consuming operation.

The water filter is located behind the front flapt.

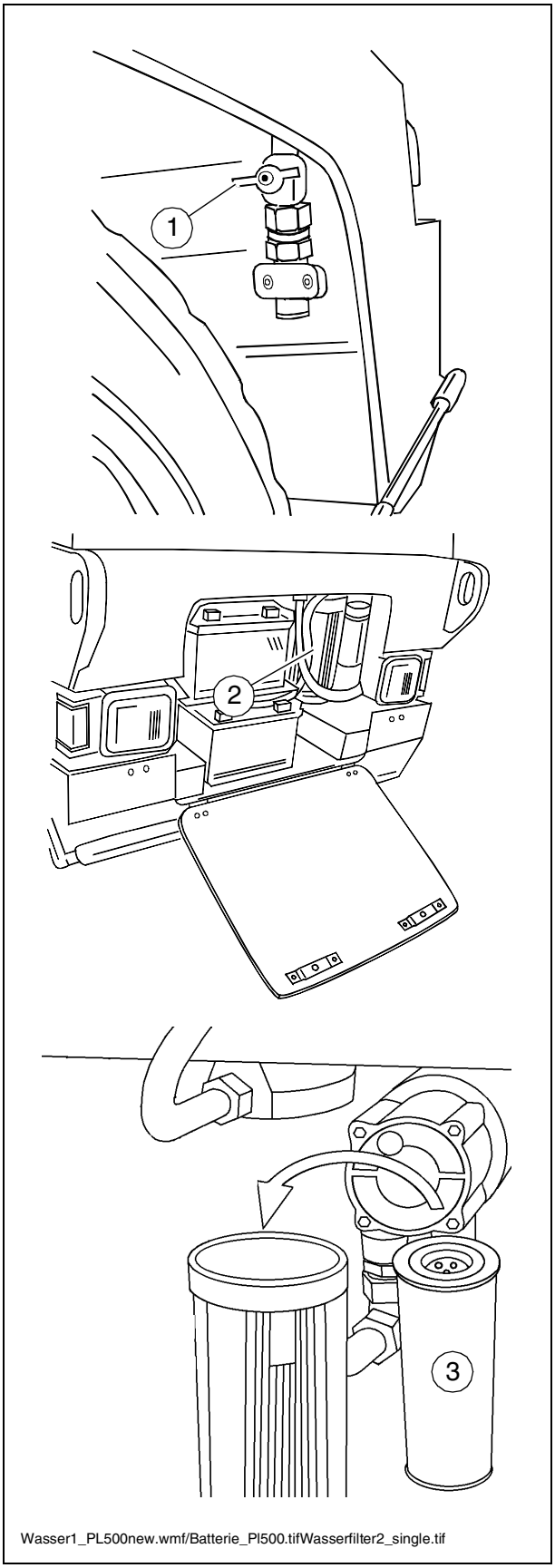
☞ The filter can be changed even if the water tank has not been drained.

- Close stop cock (1) (lever in vertical position).
- Unfasten filter housing (2) using the wrench in the on-board toolkit and unscrew by hand.
- Remove filter cartridge (3), also rinse out housing and install a new / cleaned filter.
- Clean the locating faces of upper and lower housing sections and check the gasket.
- Screw down filter housing by hand and tighten gently using the wrench.

⚠ Ensure seal integrity is good after changing the filter.

- Mesh size of main filter: 75 microns

☞ The removed filter cartridge can be cleaned and, if necessary, can be flushed using a high pressure cleaner. After the next time the machine is used, the cleaned filter kit is then available to replace the other filter.




Wasser1_PL500new.wmf/Batterie_Pl500.tifWasserfilter2_single.tif

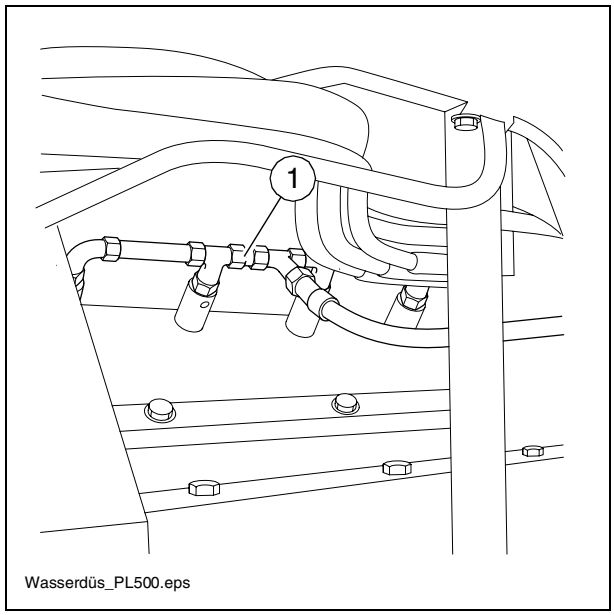
If there is a risk of frost, the filter housing must be emptied completely to protect it from damage.

- Close the stop cock (1).
- Shake out filter housing (2) and any water contained in it.
- Reinstall drained filter housing.

**Spray nozzles**

The spray nozzles are located at the front end of the milling drum box.
For inspection and cleaning purposes, these nozzles can be pulled out of their retaining brackets.

- Pull nozzles (1) out of bracket.
- Clean nozzles with a wire brush. If necessary, dismantle nozzle for cleaning purposes or replace.
- Reinstall nozzles properly and insert in guide.



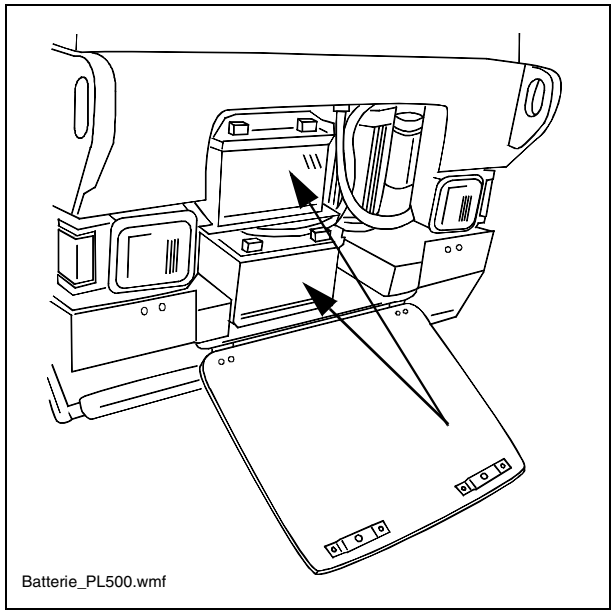
Wasserdüs_PL500.eps

⚠ If there is a risk of frost, the feed hoses need to be pulled out of the their bracket together with the nozzles and completely drained to protect them from damage.

- Pull hoses and nozzles out of their brackets, drain them completely and hang them up to dry.
- Before restarting the unit, reinstall these hoses properly.

## 3.7 Power supply

### Batteries


Batterie_PL500.wmf

⚠ Check the charge level of the batteries every 250 operating hours and at least every 3 months.

The two batteries are located behind the flap at the front of the machine.

The batteries are factory-filled with the correct quantity of acid. The fluid level should come up to the top mark. If required, top up the battery, but only use distilled water to do so!

The battery terminal clips must be free of corrosion (oxide) and protected with a special grade of terminal grease.

STOP The gas in the battery is explosive. Avoid naked lights and sparks.

⚠ When removing the batteries, always first remove the negative terminal, ensuring that the battery terminals cannot be short circuited.

STOP The battery contains corrosive and toxic sulphuric acid. Wear protective goggles and avoid all contact with the skin!

## 3.8 Other

### Emergency-stop button

For your personal safety, the safety of other persons and of the machine, you should check the function of the emergency-stop button on a daily basis.

⚠ Defective emergency-stop buttons must be replaced immediately.

The emergency-stop button is located on the control panel.

⚠ The engine, drives and steering system are shut down when the emergency-stop button is pressed. Any action which may then be required, e.g. steering, is no longer possible at this time! Risk of accident!

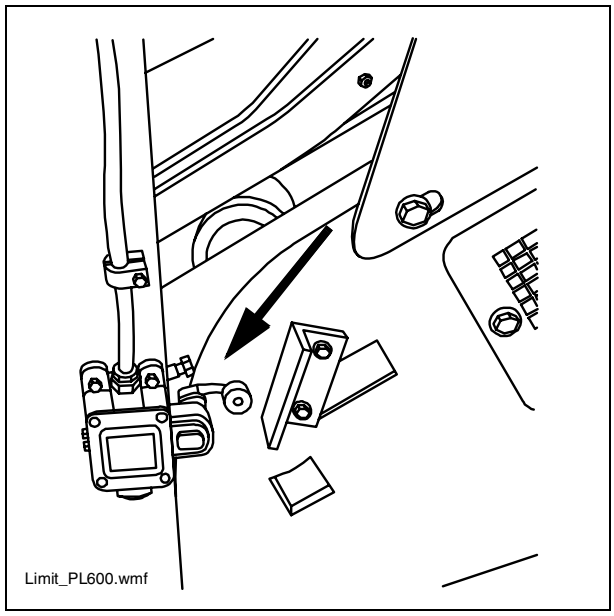
### Limit switch on upper conveyor

The safety cutout for height restriction must be checked for correct operation on a daily basis.

- The height adjuster must be disabled automatically as soon as the limit switch is tripped.

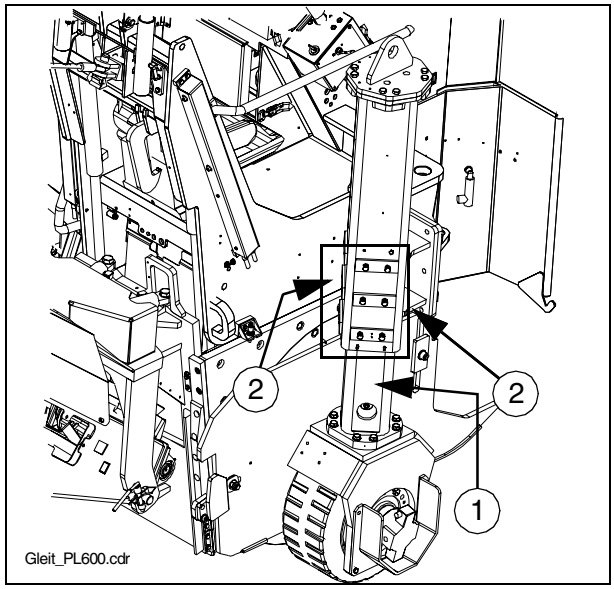
☞ The limit switch is located on the left-hand side of the frame on the upper conveyor beside the suspension

☞ The limit switch is completely redundant on versions with a short upper conveyor!



**Chassis leg guide**

There are several sliding plates in the guides on both chassis legs through which the chassis legs can be guided when extending or retracting.




☞ The sliding surfaces on all sides of the square tube should always be properly greased.

- In extended position, apply grease to the sliding surfaces of the square tube with a brush.

**Adjust clearance**

☞ Clearance on the chassis leg guides is adjusted on either side by three individual sliding plates.

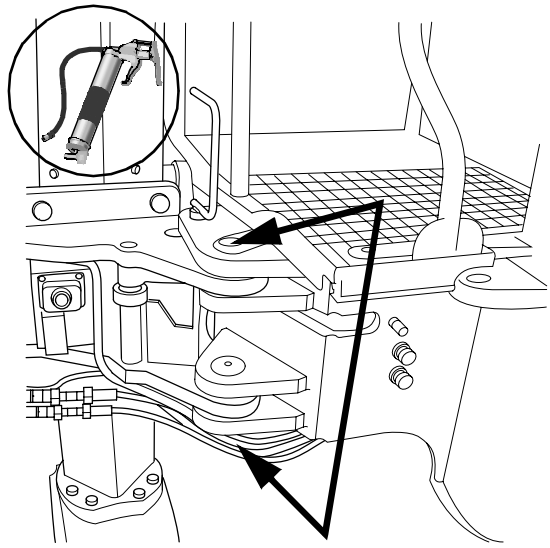
- Tighten all sliding plate screws until the sliding plates lie flush against the square-section tube.
- To set the correct clearance, unfasten all screws a further 1/4 turn.

## 4 Lubricating points

### Chassis leg, right side

There is a grease nipple on the swivel joint on the chassis leg.

Fill 5 strokes of grease using the grease press.

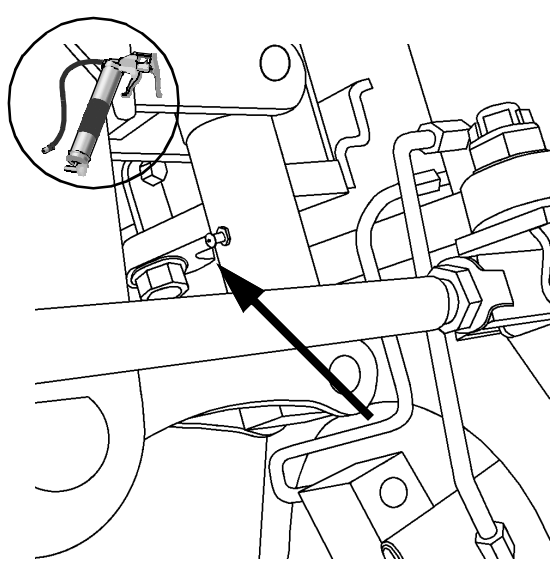


Schwenk1_PL500.eps

### Steering system

There are two grease nipples beside the steering system underneath the machine.

Fill 5 strokes of grease using the grease press.

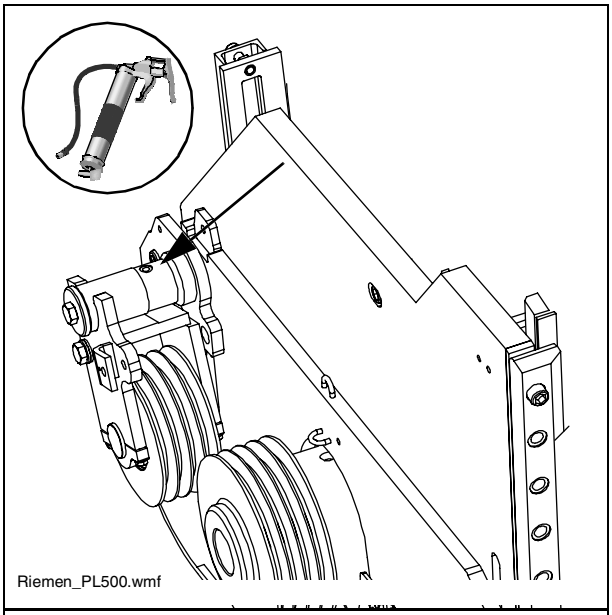


Lenkschm_PL600.tif

**Belt tensioner**

There is one grease nipple on the bearing point of the belt tensioner on the milling drum drive.

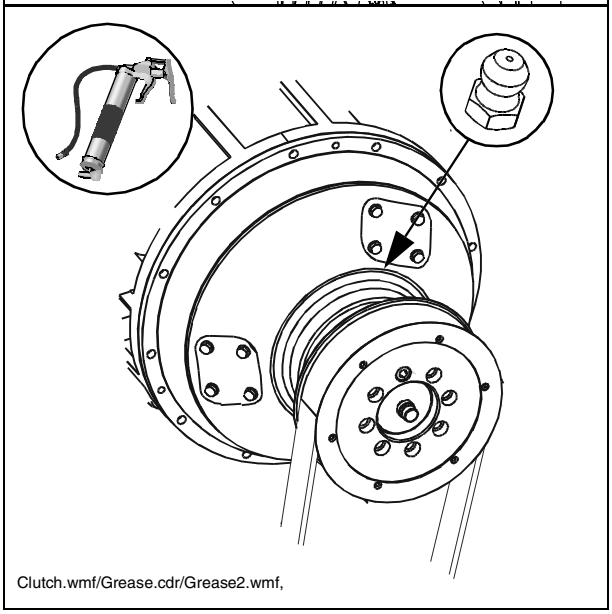
Fill 3 strokes of grease using the grease press.


Riemen_PL500.wmf

**Clutch bearing**

The grease nipple for the clutch bearing is located behind the belt disc.

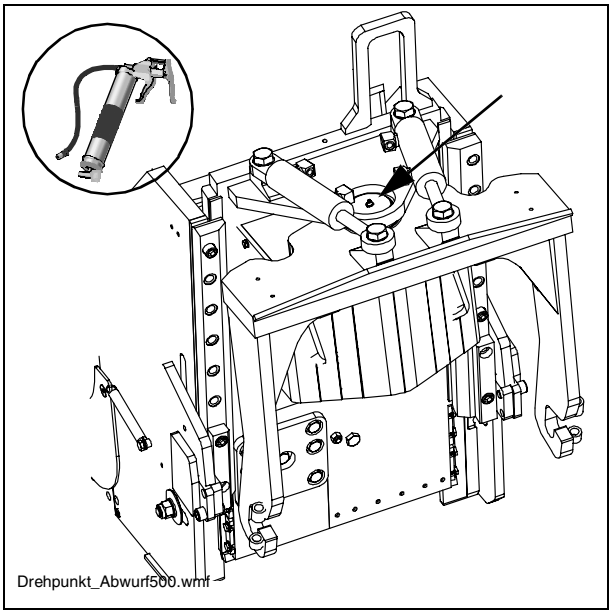
Add 5 loads of grease with a grease gun.


Clutch.wmf/Grease.cdr/Grease2.wmf,

**Fulcrum on upper conveyor mounting**

There is a grease nipple on the bearing point of the upper conveyor mounting.

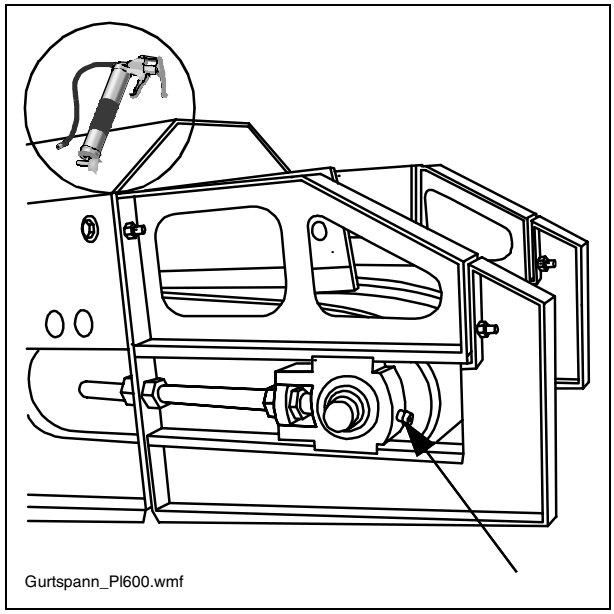
Fill 3 strokes of grease using the grease press.


Drehpunkt_Abwurf500.wmf

**Clamp mounting on the drive drum**

There is a grease nipple on clamp mounting to the right-hand side of the upper conveyor.

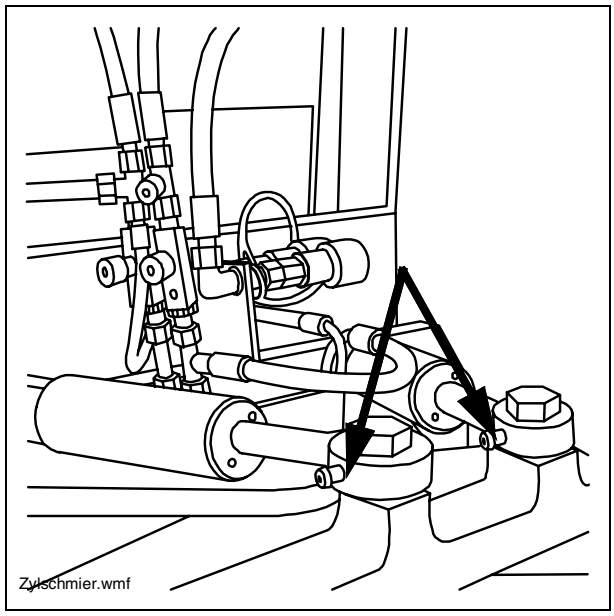
Fill 3 strokes of grease using the grease press.




**Hydraulic cylinder**

There are grease nipples on each bearing point on most hydraulic cylinders.

Fill 3 strokes of grease using the grease press.



## 5 Inspections

### General visual inspection

A walk around the machine and the following inspections form part of the daily routine:

- Any damage to components or controls?
- Any signs of leakage on engine, hydraulic system or gearbox, etc.?
- All fastening points OK?

⚠ Remedy defects immediately to prevent damage, danger of accidents and environmental contamination!

### Inspection by a specialist

☞ The road planer must be inspected by a skilled specialist

- when required (this depends on operating conditions and applications),
- but at least once a year to ensure that it is in safe operational condition.

## 6 Lubrication agents and fuel substances

Only use the specified greases or corresponding quality grades from well-known manufacturers.

Only use containers which are clean on inside and outside for filling oil or fuel.

☞ Comply with specified filling volumes!

⚠ Operating at the wrong oil or lubricant levels will accelerate the process of wear, culminating in machine breakdown.

| Grease | BP multi-grade grease L2 | ESSO multi-grade grease | FINA Marson L2 | Mobilux 2 Mobiplex 47 | Aral Aralub MPU | SHELL EP 2 | Retinax A |
|---|---|---|---|---|---|---|---|
| Engine oil | Refer to Engine Operating Instructions.<br>Shell Rimula 10 W 40 is the factory-filled grade. | | | | | | |
| Hydraulic oil | Refer to Section 7.1<br>Shell Tellus Oil 46 is the factory-filled grade. | | | | | | |
| Gear oil 220 (planetary gear, milling drum gear) | | | | | | | |
| | Castrol Optigear is the factory-filled grade of gear oil (planetary gear on drive wheels, milling drum gear) | | | | | | |
| Gear oil 90 (angular gear) | | | | | | | |
| | Shell Spirax MB90 is the factory-filled grade of oil (angular gear) | | | | | | |
| Dist. water | | | | | | | |
| Diesel fuel | | | | | | | |
| Cooling fluid | Cooling fluid (anti-freeze with corrosion inhibitor)<br>Shell long-life 40 fluid is factory-filled (engine) | | | | | | |

## 6.1 Hydraulic oil

Preferred hydraulic oils:

a) Synthetic hydraulic oil based on esthers, HEES

| Manufacturer | ISO viscosity class VG 46 |
|---|---|
| Shell | Natural HF-E46 |
| Panolin | HLP SYNTH 46 |
| Esso | HE 46 |

b) Mineral oil pressurised fluids

| Manufacturer | ISO viscosity class VG 46 |
|---|---|
| Shell | Tellus Oil 46 |

⚠ When changing from mineral oil pressurised fluids to bio-degradable pressure fluids, please contact our factory advisory service!

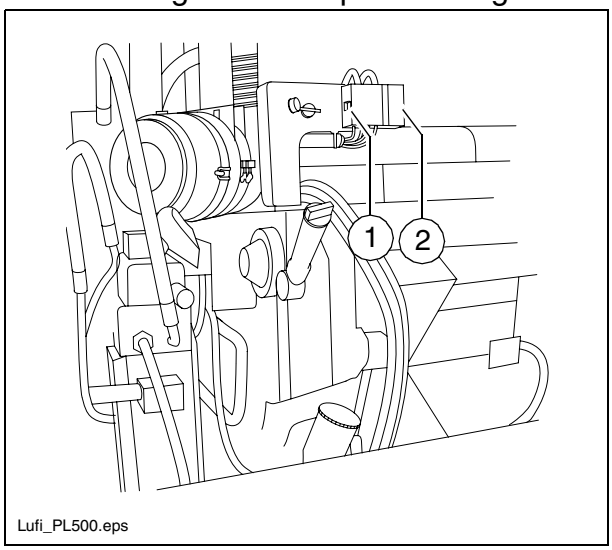
☞ Only use containers which are clean on inside and outside for filling oil or fuel.

## 6.2 Filling volumes

| | Volume |
|---|---|
| Fuel tank | approx.200 litres (up to max. fill level) |
| Engine oil | approx. 14 litres |
| Hydraulic oil tank | approx. 100 litres (up to max. fill level) |
| Water tank | approx. 400 litres (up to max. fill level) |
| Planetary gear on drive wheels | approx. 0.5 litres on each (up to max. fill level) |
| Angular gear | approx. 4.0 litres (up to max. fill level) |
| Milling drum drive gearbox | approx. 4.0 litres (up to max. fill level) |
| Coolant of milling drum | approx. 17.0 litres |
| Engine coolant | approx. 6.0 litres (up to max. fill level) |
| Batteries | up to max. fill level indicator |

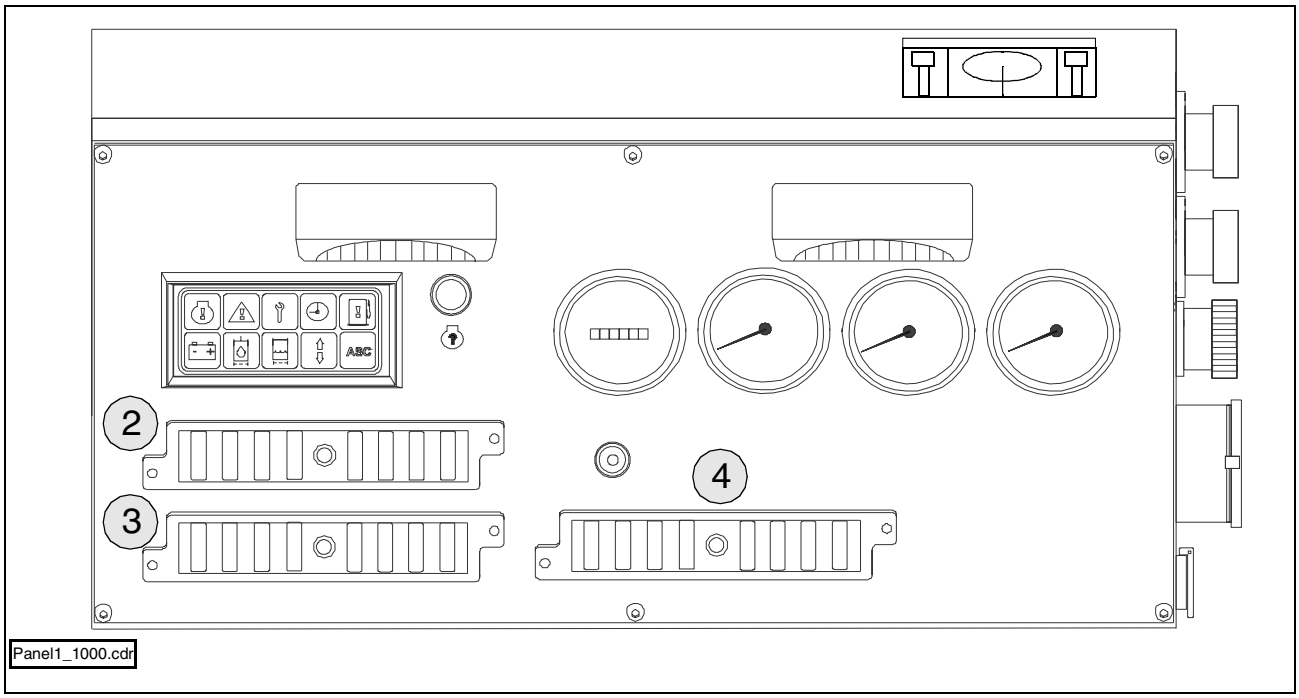
## 7 Electrical fuses

### 7.1 Main fuses (1) (behind the right-hand flap of the engine compartment)

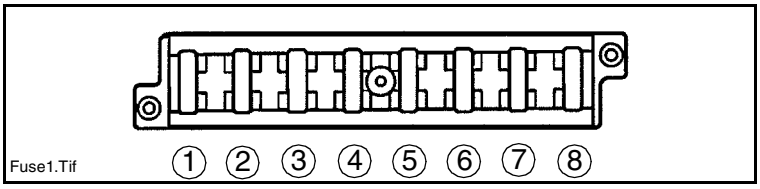



| | | |
|---|---|---|
| 1 | - F1.1 Main fuse<br>- F1.2 Main alternator fuse<br>- F1.3 Ignition<br>- F1.4 Heating system | 100 a<br>100 a<br>30 a<br>100 a |
| 2<br>(O) | - F1.5 Hydr. weather-protecting sun roof<br>- F1.6 Hydr. weather-protecting sun roof | 60 a<br>30 a |

## 7.2 Fuses on the operating panel

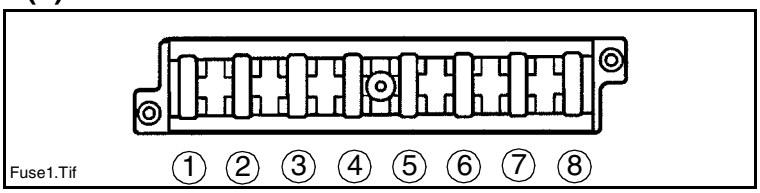



**Fuse holder (2)**



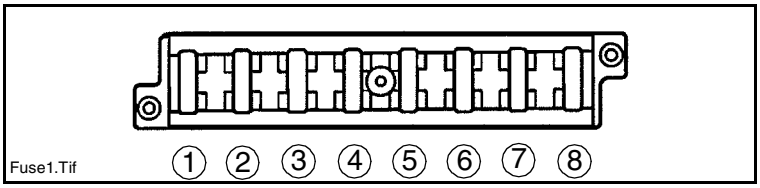

| No. | F2.1 - F2.8 | A |
|---|---|---|
| 1. | Alternator | 10 |
| 2. | Fittings | 10 |
| 3. | Susmic travel drive | 10 |
| 4. | ASC | 10 |
| 5. | Levelling unit | 10 |
| 6. | Front/rear scraper, side board, cutting drive | 10 |
| 7. | Conveyor belt | 10 |
| 8. | Rotary beacons | 10 |

**Fuse holder (3)**



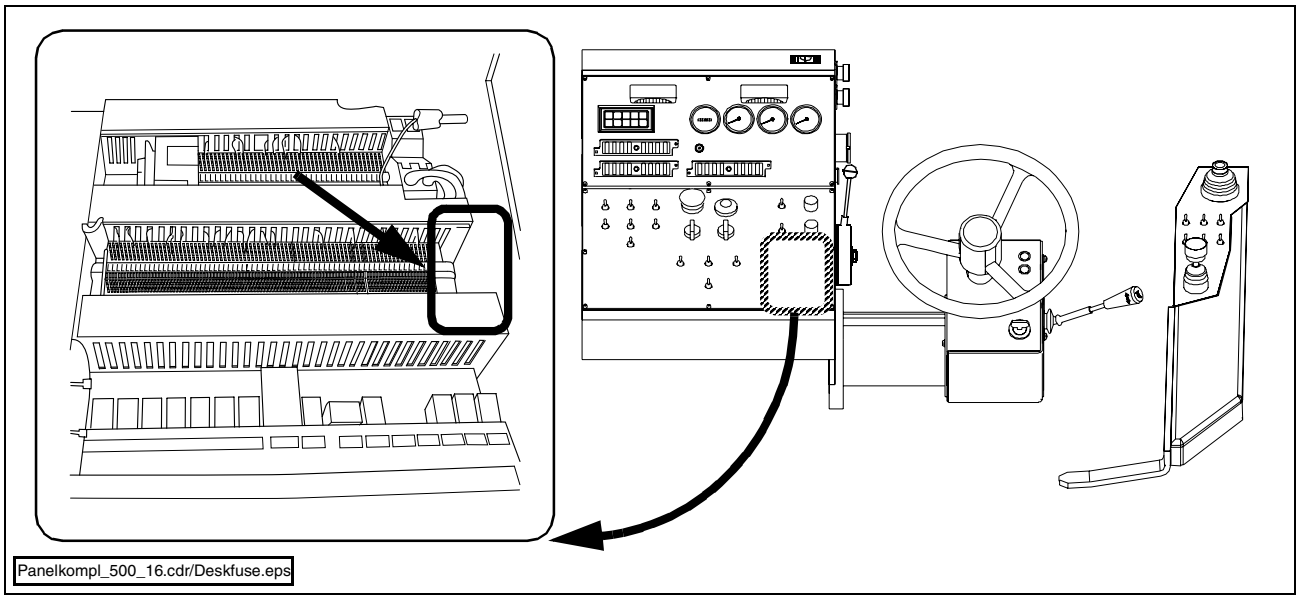

| No. | F3.1 - F3.8 | A |
|---|---|---|
| 1. | Brake light | 10 |
| 2. | Flashers | 10 |
| 3. | Hazard flashers | 10 |
| 4. | Left-hand low-beam headlights | 10 |
| 5. | Right-hand low-beam headlights | 10 |
| 6. | Left-hand high-beam headlights | 10 |
| 7. | Right-hand high-beam headlights | 10 |
| 8. | Left-hand parking lights | 5 |

**Fuse holder (4)**




| No. | F4.1 - F4.8 | A |
|---|---|---|
| 1. | Right-hand parking lights | 5 |
| 2. | Working lights | 15 |
| 3. | Horn | 5 |
| 4. | Engine | 7,5 |
| 5. | Engine | 7,5 |
| 6. | Engine | 7,5 |
| 7. | Engine | 10 |
| 8. | Engine | 10 |

## 7.3 Fuses in the operating panel




| No. | F5.1 - F5.2 | A |
|---|---|---|
| 1. | Advance fuse protection, power supply | 40 |
| 2. | Lights | 20 |

## 8 Tightening torques

☞ Maximum tightening torques for shaft screws with metric ISO standard threads

| |  | |  | |  | |
|---|---|---|---|---|---|---|
| | Preload force (N) | Tightening torque (Nm) | Preload force (N) | Tightening torque (Nm) | Preload force (N) | Tightening torque (Nm) |
| M3 | 2250 | 1.3 | 3150 | 1.9 | 3800 | 2.3 |
| M4 | 3900 | 2.9 | 5450 | 4.1 | 6550 | 4.9 |
| M5 | 6350 | 6.0 | 8950 | 8.5 | 10700 | 10 |
| M6 | 9000 | 10 | 12600 | 14 | 15100 | 17 |
| M8 | 16500 | 25 | 23200 | 35 | 27900 | 41 |
| M10 | 26200 | 49 | 36900 | 69 | 44300 | 83 |
| M12 | 38300 | 86 | 54000 | 120 | 64500 | 145 |
| M14 | 52500 | 135 | 74000 | 190 | 88500 | 230 |
| M16 | 73000 | 210 | 102000 | 295 | 123000 | 355 |
| M18 | 88000 | 290 | 124000 | 405 | 148000 | 485 |
| M20 | 114000 | 410 | 160000 | 580 | 192000 | 690 |
| M22 | 141000 | 550 | 199000 | 780 | 239000 | 930 |
| M24 | 164000 | 710 | 230000 | 1000 | 276000 | 1200 |
| M27 | 215000 | 1050 | 302000 | 1500 | 363000 | 1800 |
| M30 | 262000 | 1450 | 368000 | 2000 | 442000 | 2400 |

☞ Screw tightening torques on engine: refer to Engine Operating Instructions.

# 9 Maintenance log

To keep a proper record of all maintenance, service and repair work, please use the pre-printed forms on the following pages.

**Notes on how to fill in the maintenance logs properly:**

e.g.:

9.1 Assembly, engine, engine systems

| Date | MH | Occasion | Comments about scope of work | Result, name, signature |
|---|---|---|---|---|
| 2001-06-10 | 980 | 1000 hour service | Replacing fuel, oil and water filters, changing the oil, replacing the air filter, general visual inspection, total of 3 working hours | V-belts must be replaced - order. |
| | | | | |
| | | | | |
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e.g.:

9.6 Assembly, water system

| Date | MH | Occasion | Comments about scope of work | Result, name, signature |
|---|---|---|---|---|
| 2001-01-02 | 550 | High-pressure pump failure | Lack of maintenance - filter contaminated, water pump worn, needs to be replaced, filter replaced, total of 2 working hours | New pump installed |
| | | | | |
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| Date | MH | Occasion | Comments about scope of work | Result, name, signature |
|---|---|---|---|---|
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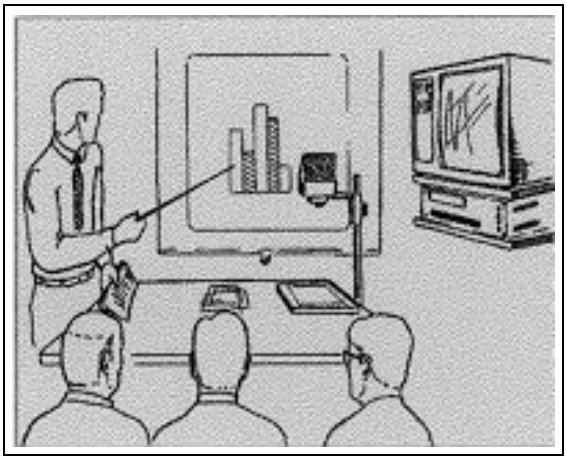
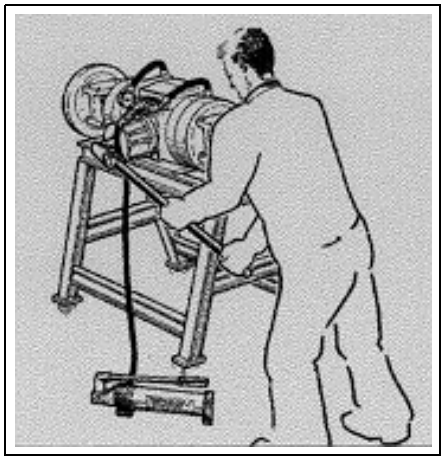
# DYNAPAC AFTERSALES

## TRAINING

As your Dynapac dealer we can offer you various training programmes, such as; driving, service and application training. Give us a call - it will give you even more out of your Dynapac equipment!





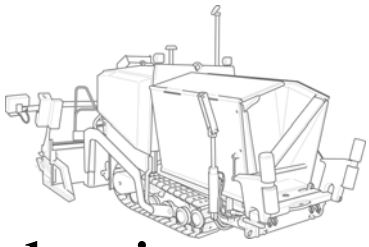
## SERVICE

Always use your Dynapac workshop for service and maintenance. We can give you the best service to the right price. The workshop also has all the required tools and special equipments to carry out all types of repair if you are in need of that.

## INFORMATION

The easiest way to solve a minor problem out in the field, is to contact your Dynapac dealer for trouble-shooting and advise. Make us a visit to inform yourself about the whole range of Dynapac equipment and „Know how“.

DYNAPAC



Don´t hesitate to contact
your local dealer for:
service
spare parts
documentation
accessories
and
information
about the complete
Dynapac
paving and planing
range