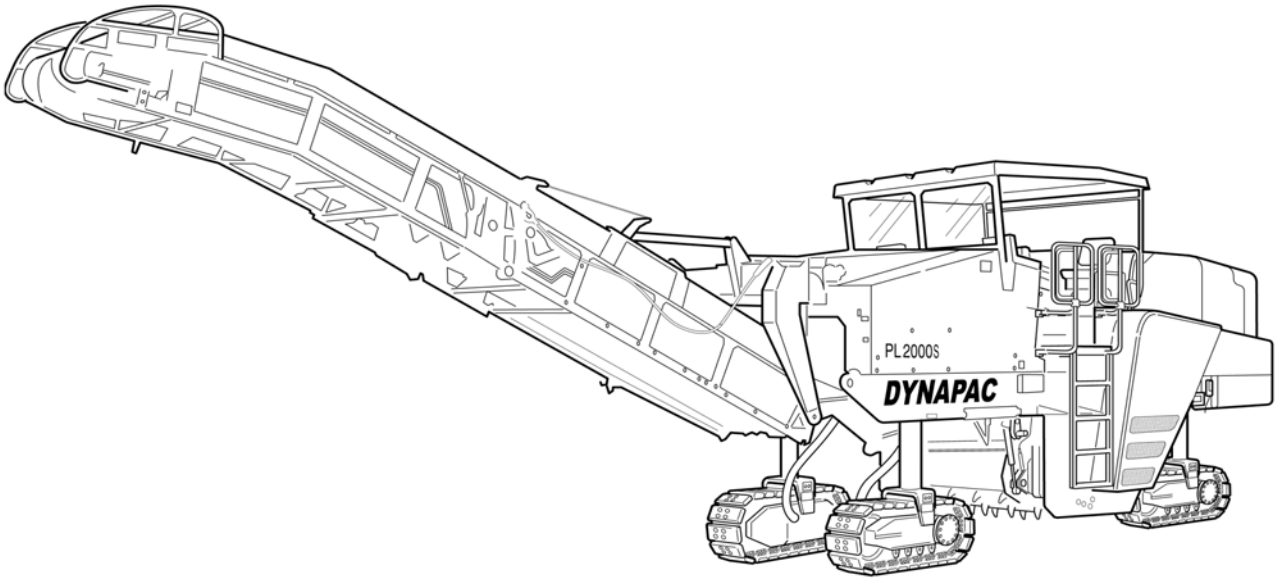
DYNAPAC



Operating instructions

GB

Valid for:

Cold planer
PL2000S
PL2100S

02-10.01

900 98 04 83

Foreword

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.

In order to prevent misunderstanding when making inquiries, during consultations, when placing orders etc. , please always use the terms specified in the Operating Instructions.

These Operating Instructions document various options. During operation and when undertaking maintenance work, ensure that the description appropriate for the option in question is used.

The machine may only be operated by trained staff.

These Operating Instructions should be read and applied by everyone who has been assigned tasks involving the operation, recondition (maintenance, repairs, inspection) or transport of the machine.

These Operating Instructions contain important specifications and information on how to safely, economically, professionally and correctly use the machine. Compliance with these instructions will help to prevent dangerous situations, reduce downtimes and repair costs, to increase reliability during usage and the service life and to ensure compliance with the warranty terms.

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.

The Operating Instructions must always be available at the machine's operating site. 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.

Dynapac GmbH
Wardenburg

Ammerländer Strasse 93
D-26203 Wardenburg / Germany
Tel.: +49 / (0)4407 / 972-0
Fax: +49 / (0)4407 / 972-228
www.dynapac.com

V00.001.GB 2-2 10.01

Table of contents

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:

- to partially or completely remove asphalt, asphalt based and cement layers
- to remove distortions in the form of track grooves, lateral bulges, lateral warps,
- to recreate a proper surface,
- to implement roughing up and stripping 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 used for its intended purpose and that all kinds of risk to the life, limb and health of users 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. The manufacturer is not liable for damage resulting from unauthorised changes to the assemblies, their removal or their replacement with other, non-intended components or taking them completely or partially out of operation.
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.

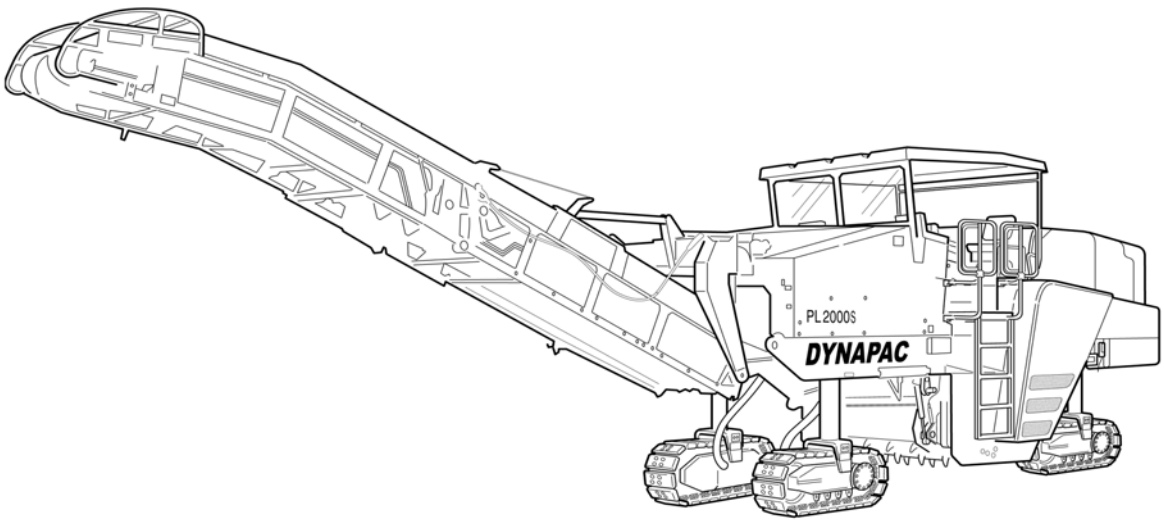
B Vehicle description

1 Description of usage

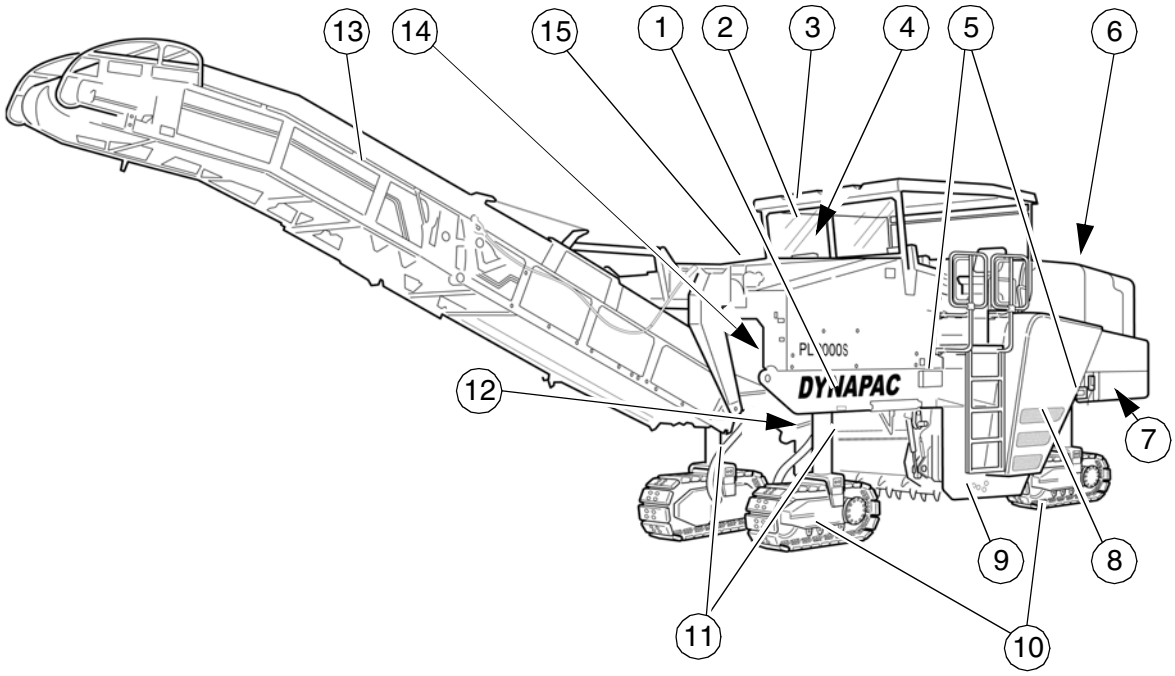
The DYNAPAC cold planercold planer PL 2000 S / PL 2100 S is a compact, efficient large planer detachment, hydraulically driven by four steerable crawler units. It has a front loading system which is used to remove asphalt and cement layers. The milling drums are driven mechanically by power-transmission belts.

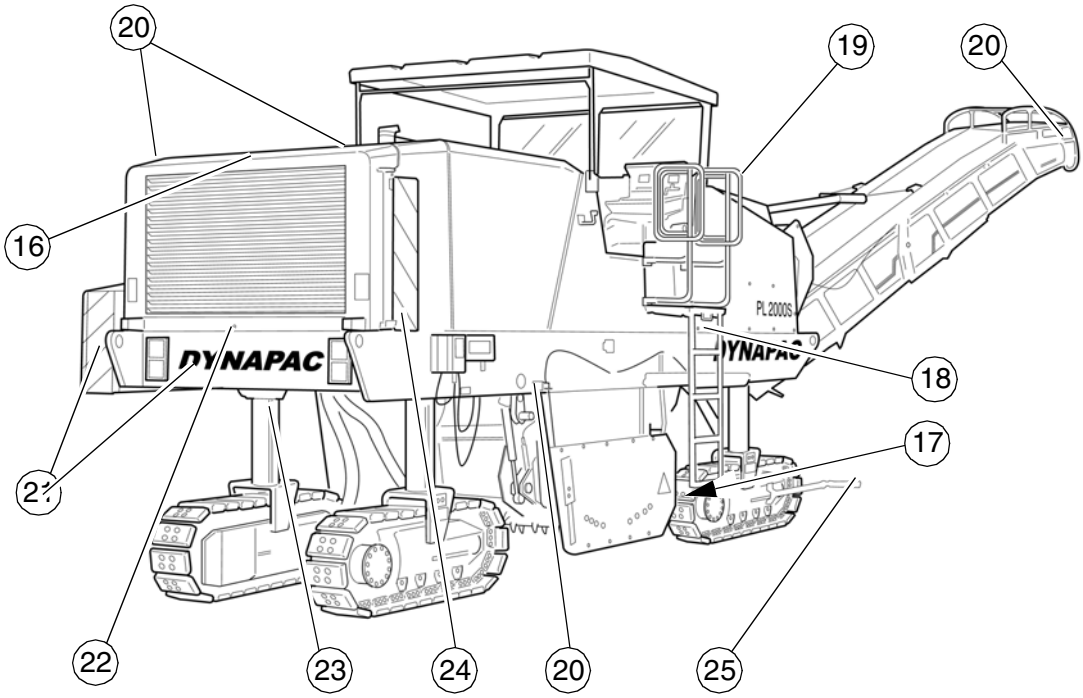
As a result of its high planing performance, we would recommend that this cold planer is used in particular when carrying out extensive redevelopment work on large and spacious roads, such as motorways, urban and country roads, car parks, airports etc.

The PL 2000 S / PL2100 S corresponds to the European safety standard and satisfies very stringent requirements in terms of its reliability, economic viability and environmental responsibility.



P5030058new.tif





P5030058.eps, P5030061.eps

Item	Designation
1	Frame
2	Operator’s control station
3	Weather protecting sun roof
4	Control panel
5	Lower control panels
6	Engine
7	Air pressure system
8	Belt drive (milling drum drive)
9	Cutting section
10	Traction systems
11	Strut towers
12	Lower conveyor
13	Upper conveyor
14	Water refilling system
15	Water tank
16	Video monitoring system
17	Water spraying system
18	Folding ladder
19	Guardrails (on both sides)
20	Plug-in contacts for additional headlight (on both sides)
21	Storage area
22	Swivel-mounted radiator grille
23	Connection for external water filling (filling under pressure)
24	Swivel-mounted warning sign
25	Plumbline fixture

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 continuous length of accessible operator's control station is located in the central part of the machine and can be reached via two ladders. Two ergonomic seats ensure that the planer can be conveniently operated from both sides and that the operator has a good overview of and can monitor the milling process.
The cold planer can be fitted with a weather protecting sun roof (can be folded in) and all-round panels as an option. During transportation, the roof can be mechanically or hydraulically folded forwards and fixed on the water tank.

Controls at operator's control station: An operating panel, the position and height of which can be easily adjusted, can be locked on the right and left and contains all operating and control elements required. If necessary, the machine operator can move this into any other position required, even beyond the edge of the machine. The securely arranged controls are obviously marked for all applications.

Steering and feed are simultaneously controlled using a drive lever, designed as a joystick. A second joystick controls the position of the upper conveyor and its speed (controlled in a gradual manner).

A LC display integrated in the operating panel rapidly and comprehensively informs the machinist of the present operating modes as well as any setting and maintenance work required on the machine. All machine settings, including the grading depth and slope control, can be simply programmed and modified by means of a perforated keypad with internationally comprehensible symbols.

Space has been left for the installation of a monitor for observing the planer track and the dead space. This equipment is optionally available and can be installed with four video cameras.

The main control panel, the lower control panels and access to all important switching and connection points can be sealed off.

Lower control panels: The operating panels housed here are located on neither side of the planer, in front of and behind the milling roller box. They contain duplicates of the main controls of the operator's control station with override functions so that the milling process can be monitored, corrected and interrupted from this point.

One digital controller for the grading depth and one for the slope position are attached next to the rear operating panels on the left and right sides.

Dynapac CAN-BUS data communication system: The tried and tested state-of-the-art electronic PLC (Programmable Logic Control) monitors all control functions of the cold planer. Signals processed by microprocessors are safely transferred by an efficient CAN-BUS system (Data Information System) and displayed as information on the LC display. Possible function deviations and errors are noted and can be corrected immediately.

Engine: The machine is fitted with an efficient 6-cylinder Cummins turbodiesel engine which with its 600 bhp easily covers the rating of the large planer. This engine has electronic engine management which also automatically adapts it to the extreme operating and environmental conditions and therefore keeps its torque stable. Compliance is maintained with emission values as defined in the U.S. EPA exhaust standard and the European COM2 exhaust standard. The engine cover is noise-insulated as standard so that operating staff and the surrounding area are subjected to minimum levels of noise.

Cutting section: The cutting section consists of the mechanical milling drum drive, the milling drum housing, the milling drum, the moldboard, the sliding shoe and the side boards.

All these elements are precisely tuned to one another and their designs adapted so that high performance milling is assured with low levels of cutting tool wear, as is very good retrieval, granulation and transport of the milled product, an exact milling pattern with cleaner milling edges is produced and the processed area is kept clean and free of milling product which has not been retrieved.

- The mechanical milling drum

is driven by the diesel engine via a hydraulic separating clutch, belt pulleys and a 14-belt powered-belt pack on a planetary gear directly connected with the drum body. This guarantees a low-loss transfer of power, intercepts load impact and has a long service life. The drive is fitted with an automatic belt tensioning fixture. The hydraulically selectable 3-pulley dry-plate clutch and the two-stage planetary gear are configured specially for the milling drum drives and finely tuned to the engine rating of the machine.

- The milling drum

rotates in the opposite direction to the machine forward drive. The professional cutting tool arrangement and equipping with the best cutting tools ensures rapid and clean cutting as well as high cutting tool downtimes.
A good, tried and tested, new type of changeable fixing system is used on the standard drum (line spacing 15 mm, milling width 2010 mm (PL 2000 S) / 2100 mm (PL 2100 S)). Thanks to the manner in which it is able to rapidly and simply replace upper fixing parts, it makes minimum change times possible and does not therefore cause long downtimes during replacement.

The milling drum housing

seals off the milling drums to the left and right through the side boards, the sliding shoe to the front, the moldboard to the rear, in all grading depths and therefore ensures optimum material pickup and a clean cutting surface.
The side plates are fitted with replaceable, zero-wear hard metal plates to increase their service life.

Traction system, steering system, brakes

- Traction system

Four large crawler units, suspended in floating manner on the strut towers, hydrostatically driven and fitted with sensor-monitored anti-slip control are equipped with slip-free plastic pads. They provide excellent traction when cornering and in all usage positions.
Driving and working gear can be selected. The speed limits required can be set beforehand using the button provided or can be changed during operations. The control lever of the travel drive then allows the speed to be gradually adjusted in this driving range from zero to the maximum for both forwards and reverse travel.
When overloaded, the machine feed is automatically reduced using limit load control.

- Steering system

The machine has fully-tracked steering and therefore has high manoeuvrability. When used in conjunction with a pre-selection button, the control lever allows the machine to be driven in four different steering variations and the speed to be changed at the same time:

- "only front-steered",
- "only rear-steered",
- "co-ordinated front and rear-steered"
- "driving in crab steering"

If necessary, both axes are brought into the straight ahead position at the touch of a button.

- **Brakes:** The machine is braked by the auto-inhibit of the hydrostatic drive and by the hydraulic spring accumulator brakes integrated in the gears of all four drive units. The machine is braked when the control lever is swivelled back from the maximum position to neutral. The accumulator spring brakes are activated both in the neutral position (during machine "Stop") and when the engine is shut down and they act as parking brakes.
  During a towing procedure, the spring accumulator brakes can be hydraulically disengaged by a manual pump.
- **Strut towers:** The strut towers are secured to the vehicle frame. The cold planer is lowered and raised in a controlled manner into the position required via these towers. The milling drum is therefore moved into the correct cutting position and compliance can be maintained with the grading depth and slope required during milling. The height of the strut towers is adjusted using an integrated hydraulic cylinder which is activated by proportional valves.
  The grading depth and slope are set by means of the two front columns. The height of each of the front strut towers can be adjusted individually. The two rear columns operate in tandem and therefore adapt themselves to the appropriate machine position. For service purposes, the rear strut towers can also be changed over to individual adjustment mode.
  The strut towers make a large lifting height possible so that the space required between the machine and ground is always provided during difficult manoeuvres such as loading.

Levelling equipment: The cold planer is fitted with electronic levelling equipment as standard. The levelling equipment consists of two digital controllers and LC display which can be connected with combination of a tilt sensor and various height or distance sensors.
The levelling equipment controls the cylinders of the front drive unit legs.
The grading depth and lateral slope required are pre-selected and compliance is automatically maintained with them during milling as the distance defined to a reference surface is continually compared and corrected.
The automatic operation can be briefly bridged and replaced by manual control.
The levelling equipment cannot respond when not intended during a period of downtime because a safety cutout is engaged when the machine is stopped.
In its standard version, the cold planer is fitted with two digital controllers and optionally either with two cable tension sensors acting on the side boards or two ultrasonic sensors for zero-contact sensing of the surface.
As an option, the machine can be fitted with an additional tilt sensor, either with ultrasonic sensors or laser receivers for zero-contact sensing or also with rotary sensors for contact sensing of tensioning cables and side panels.

Water system: The water system consists of the water spraying and cooling system and the water high pressure cleaner. It is operated by a hydraulically driven water pump which can be switched from medium to high pressure displacement.

- Water spraying and cooling system:

The water spraying and cooling system operates in a medium pressure range of approx. 20 - 25 bar. The system is used to cool and rinse-clean the milling cutting tool, milling drum, lower and upper conveyors.
The spray nozzles can be easily replaced.

- Water high pressure cleaner (optional):

For cleaning work, the system can be switched over to high-pressure operations, approx. 130 bar. The cold planer can optionally be fitted with a water lance and a tube reeling device for such purposes. An appropriate high-pressure connection is provided for these.

Water refilling system: The cold planer is fitted with two front and rear C-shaped pipe connections and a large filling aperture as standard for rapid water filling.
As an option, a hydraulically driven recirculating pump which significantly reduces the filling time can also be used.
The water tank is large and resistant to corrosion.

Loading unit: The cold planer is designed as a front loader and has a dual-section, wide-belt loading system. The lower conveyor located under the machine receives the material released and ejected by the milling drum and conveys it to the front upper conveyor.
Wide gravel funnels ensure a clean transfer. Via the upper conveyor, the milled product is finally loaded onto a means of transport or its support outside the cutting track.
Both conveyors are wide and have conveyance speeds which can be set in both forward and reversing mode. Their maximum values can be pre-selected depending on the material in question. Here, the speed of the upper conveyor can be gradually adjusted from zero to maximum when in operation. The speed of the lower conveyor automatically changes in proportion to the speed adjustment of the upper conveyor.
All belt changes can be simply and rapidly performed.
The lower conveyor is positioned on a sliding shoe to protect it from wear. This shoe also serves as a compression device and prevents lumps from breaking up on the cutting surface. Spraying the inside of the belt with water prevents it from sticking to the asphalt granulate
The upper conveyor with hydraulic height adjustment has a large loading height and can be swivelled by 45° on both sides. The level of dust contamination is noticeably reduced through the use of the complete cover available.
As an option, the upper conveyor can be folded in for simpler transport.

Hydraulic system: The various operating functions of the cold planer are conducted using several, independent hydraulic circuits with a clear pipework system, predominantly permanently installed piping and short sections of hose connection.
All hydraulic pumps are driven centrally by a pump drive in turn driven by the diesel engine.
The following ensure that the entire hydraulic system is kept perfectly clean:

- a large return suction filter, fitted in the hydraulic oil tank, for the drive circuits of the traction unit, loading belt, fan and water system as well as for the drives of the cylinder adjustment functions;
- two pressure filters, fitted in front of the milling drum housing, on the right under the machine and easily accessible from the outside. In the drive circuit for height adjustment and steering, these are switched between the load-sensing adjustment pump and the hydraulic control blocks.

Electrical system: 24 volt system, with two in-line cold start high-performance batteries 2V/170 Ah/600A, 3-phase alternator 24V/100A.
The power supply can be interrupted to ground/earth by the battery's main switch.

Air pressure system: Compressor driven directly by the engine with compressed air reservoir of 20l/6.3 bar. There is a commissioning point with a rapid release clutch for external consumers (e.g. pneumatic cutting tool driver or rotary screwdriver) in the rear section under the machine.

Optional equipment:

- Extended levelling equipment: a transverse slope sensor, a digital rotary arm sensor, the ultrasound Sonic-Ski and laser receivers are contained in this package. In addition to this, a Roadscanner System can be used in conjunction with a transverse slope sensor.
- Fine spaced milling drum: cutting width 2010 mm, with welded on lug boxes which can be positioned, line spacing 7.5 mm
- Cutting section for 2100 mm cutting width with normal or fine spaced milling drum,
- Upper conveyor with folding option: can be mechanically folded in downwards
- Weather protecting sun roof: can be mechanically or hydraulically lowered, with all-round weather protecting panel (can be folded in) and electrical windscreen wiper.
- Additional operating panel: for the machine to be operated from both sides of the operator's control station at the same time.
- Video control system: monitor and four video cameras for observing the cutting track area in front of the front drive unit, the sliding shoe area in front of the milling drum housing, the scraper flap area behind the milling drum housing and the area of the rear operating track during reverse travel. If necessary, the cameras can be swivelled and fitted differently so that the cold planer can also be steered by the machine operator by means of this video system if necessary.
- Emergency operating equipment: can be used if the main operating panel fails
- Dust suction system: extraction and filtering of dusts and harmful vapours in the following areas: cutting section, material transfer point between the lower and upper conveyor and discharge area on upper conveyor
- Water refilling pump by means of auto-suction recirculating pump driven by hydraulic motor, displacement quantity approx. 18m^3/h
- High pressure cleaner: water lance with approx. 13 m hosing, tube reeling device, operating pressure 130 bar, water consumption approx. 38 l/min
- Pneumatic cutting tool driver: cutting tool set in toolbox, working pressure 6.3 bar, air consumption approx. 460 l/min, number of impacts 3000 p/min.
- Pneumatic piledriver: socket wrench set and extension in toolbox, working pressure 6.3 bar, air consumption approx. 580 l/min, torque 640 Nm.
- Compressed air pistol: for precision cleaning of areas difficult to access, working pressure can be adjusted between 2 -10 bar.
- Pneumatic grease press: with flexible compressed air hose, working pressure max. 8 bar, compression 480 bar (60:1)
- Spiral compressed air line: 10m in length for connecting compressed air tools

☞ Other useful extensions and attachments are available on request.

3 Safety devices

The machine can only be safely operated if the control and safety devices are functioning perfectly and if the protective equipment is fitted correctly.

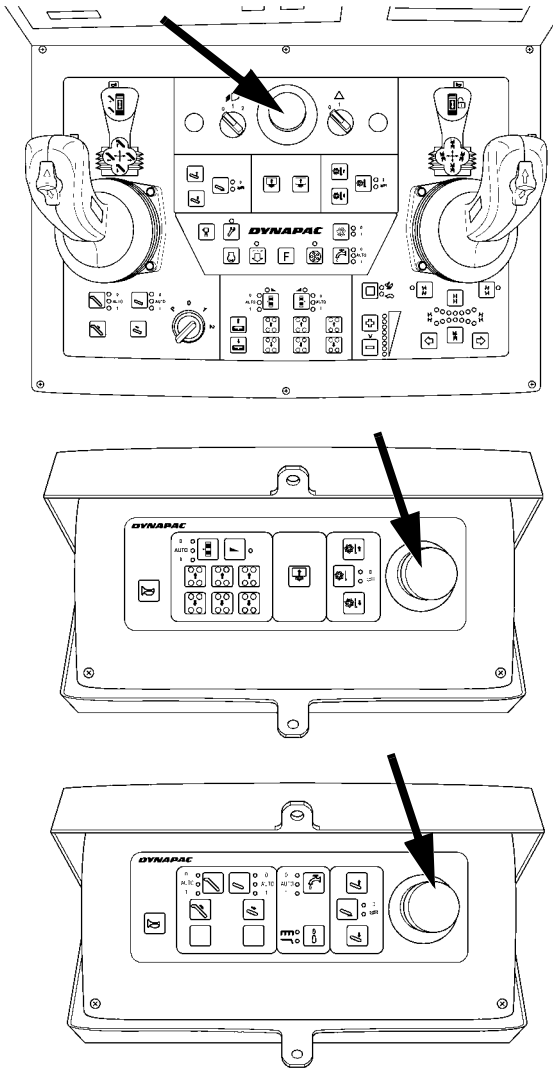
☞ The function of these devices must be checked regularly (refer to Chapter D, Section "Checklists for the machine operator").

Emergency-stop button

- on upper control panel
  (○ on both upper control panels)
- on all lower control panels

⚠ The engine, drives and steering system are shut down when the emergency-stop button is pressed. Any countermeasures required (diverting, lifting the upper conveyor etc.) are then no longer available! Risk of accident!

⚠ The emergency-stop button must not usually be used to shut down the engine and should only be pressed in an emergency or for test purposes.

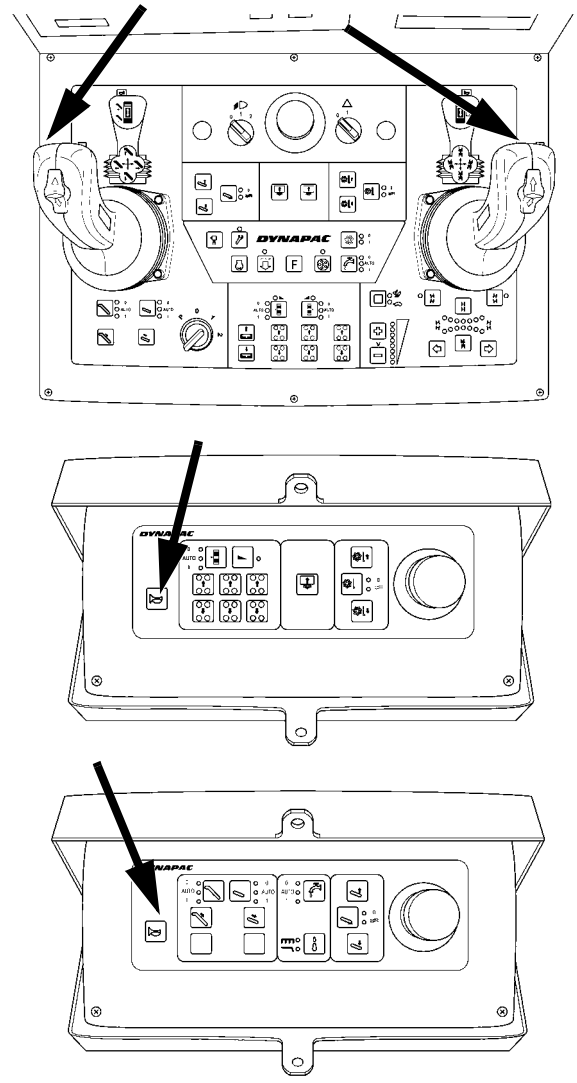


Pult2new_a.Tif/Pult3new.Tif/Pult4new.Tif

Horn

- on upper control panel on both control levers
  (○ on both upper control panels)
- on all lower control panels

⚠ Before starting to operate the machine and moving the conveyor units, the horn knob and/or the horn button should be pressed to issue a warning signal.



Pult2new_a.Tif/Pult3new.Tif/Pult4new.Tif

Headlights, indicators rotary beacons

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

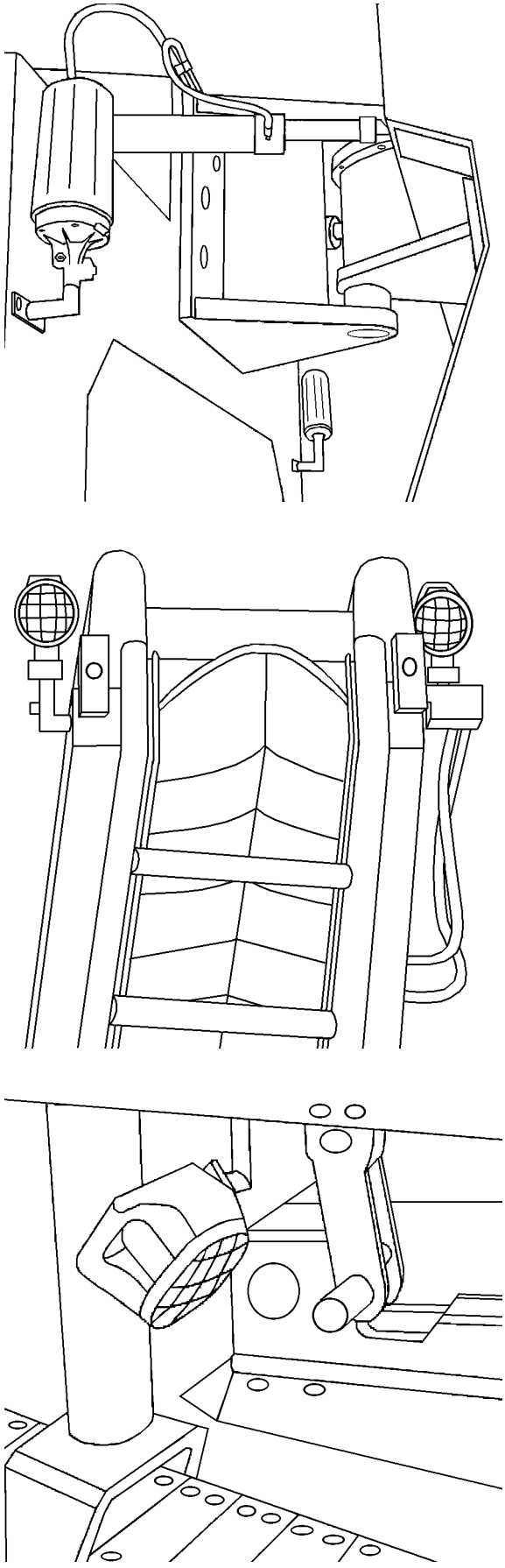
Several contacts, to which headlights can be connected, can be found around the machine.

The headlights, indicators and rotary beacons can be activated using the appropriate switches on the upper control panel.

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

☞ The headlights can be simply removed and should be taken off from the easily accessible points and safely stored once work is complete.

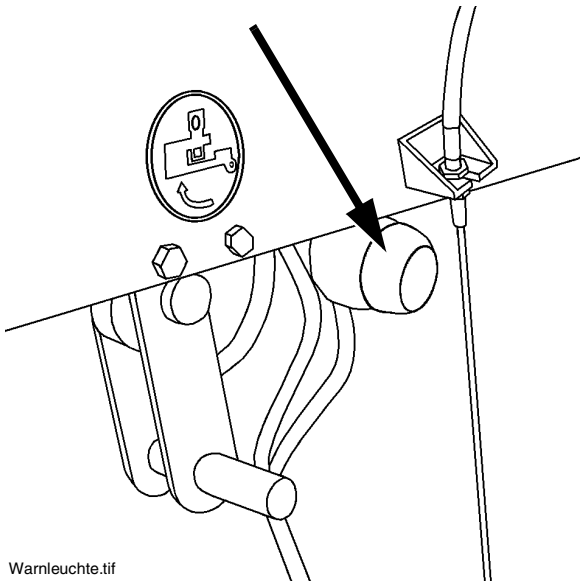
⚠ Headlight contacts which are not used should be protected using rubber caps.



419Gel.Tif/423Bel.Tif/422Bel.Tif

Hazard warning lights on side panels (O)

One hazard warning light can be found above the side panel on both the left and right-hand sides of the machine.
The hazard warning lights are operated as soon as the side panels are raised.

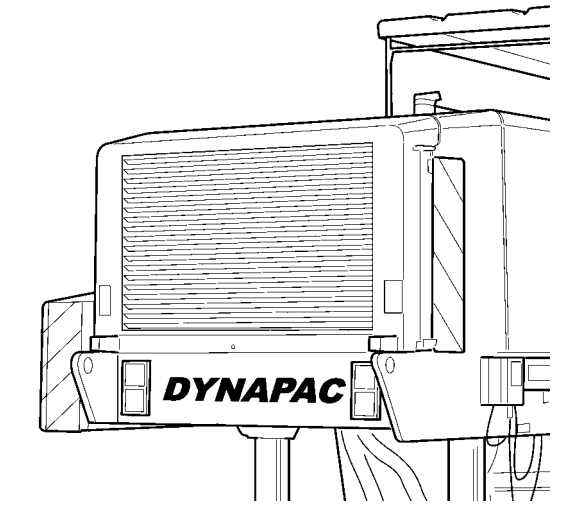


Warnleuchte.tif

Reverse lights and folding warning signs, reverse warning device,

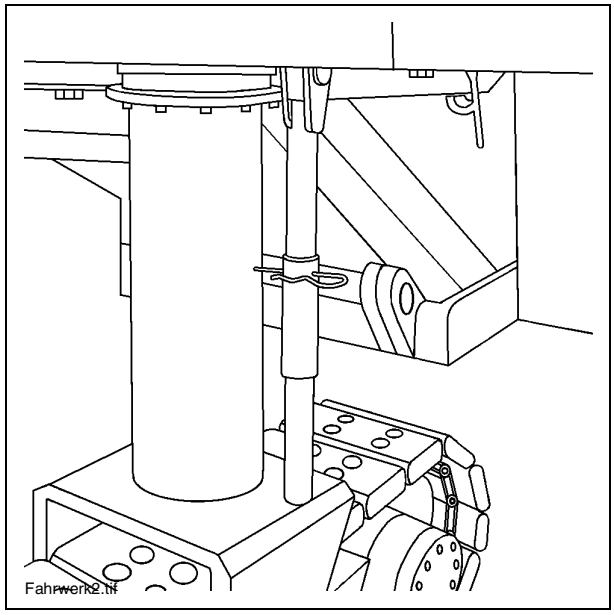
The reverse lights illuminate the danger area behind the machine.
A warning sign can be folded out on the right-hand side of the machine and is used e.g. to warn any traffic behind the machine. A reflective film is fitted to the other side of the back of the machine.

The machine is also fitted with an acoustic reverse warning device which sounds as soon as the machine starts to reverse.



209.Rückscheinwerfer2.tif

Traction unit supports



One separable traction unit support can be found on every traction unit as a safety measure.

The complete traction unit support is used for retaining purposes during maintenance and repair work.
In order to achieve a lower transport height, the upper section of the separable support is used on the trailer during transport.

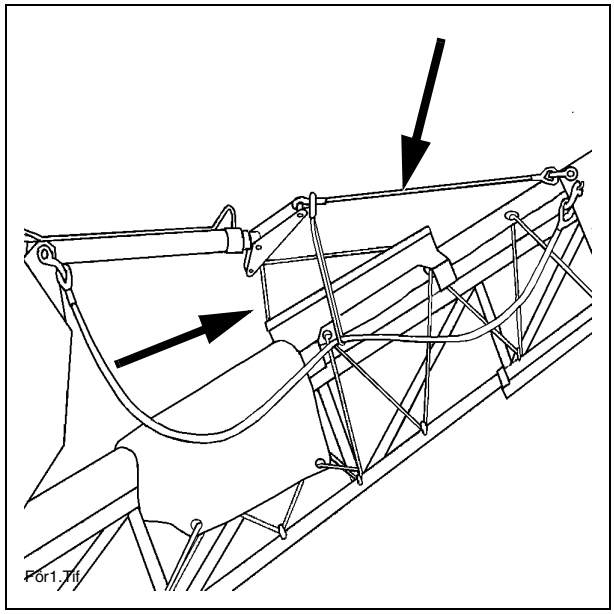
The full length of traction unit supports should be inserted during all maintenance and repair work under the vehicle as well as when parking for long periods of time.

If the machine is lowered unintentionally, wedge-shaped supports advance automatically into the recesses provided in the locating plates and therefore prevent the machine from being lowered further.

Steel retaining cables

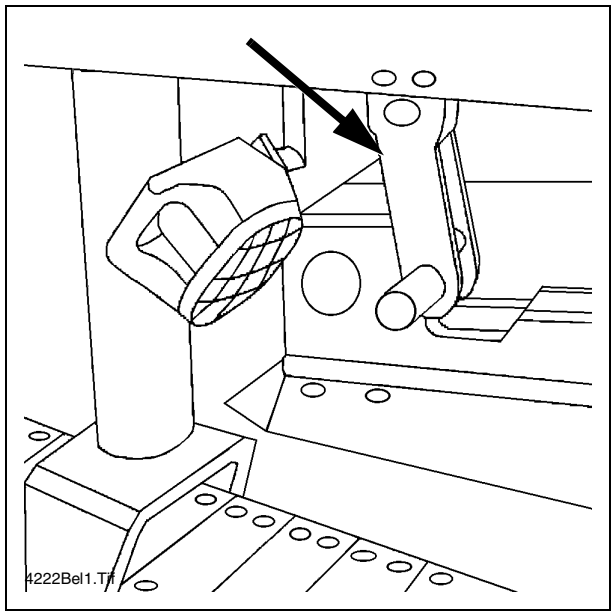
The steel cables hold the upper conveyor and should be regularly checked for damage.

If damage is found, the steel cables should be replaced immediately



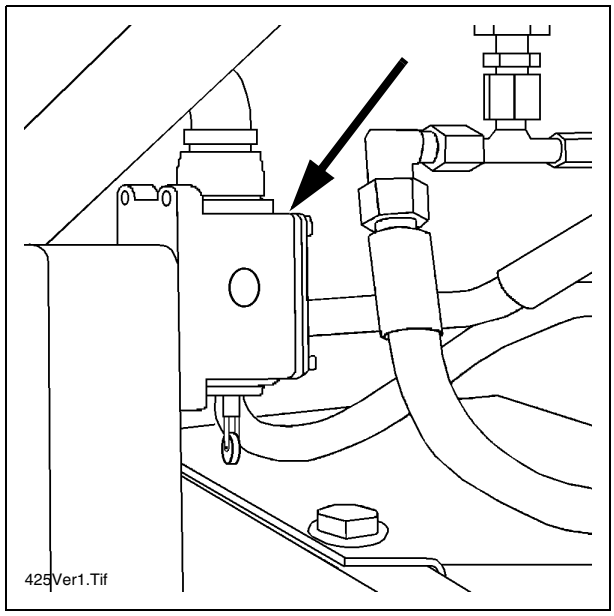
Retaining hook of scraper flap

When the scraper flap is open, the retaining hook must be inserted before work may begin.



Limit switch of scraper flap

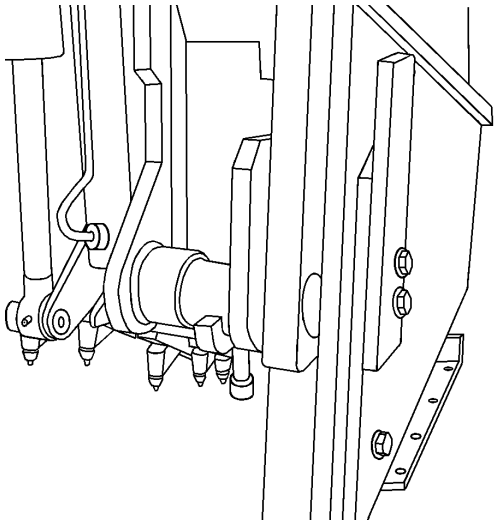
The switch is pressed when raising the scraper flap and ensures that the milling drum drive cannot be started.



Scraper flap safeguard

One safeguard for the scraper flap is located on either side of the rear of the drum box.

The safeguard must be released before the scraper flap can be opened.

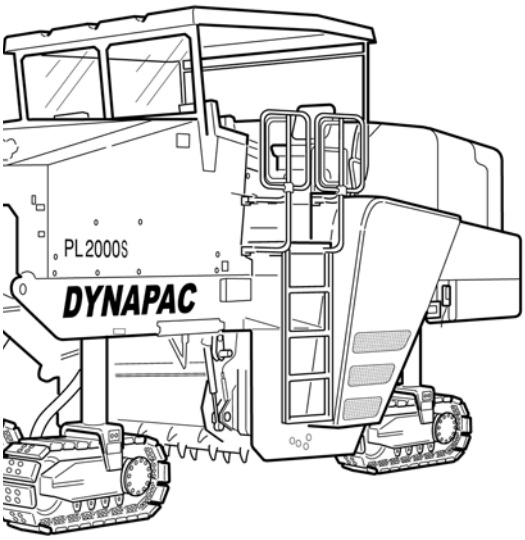


09walz~1.tif

Exit ladders, grab bars and guardrails

The ladders on both sides of the machines are fitted with slip-free covers.
Grab bars and guardrails are also provided.

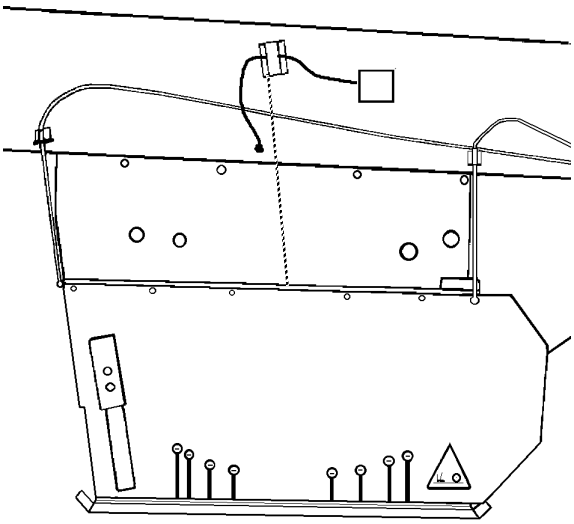
Climbing up and down the ladders during travel and travelling on the ladders themselves is prohibited!



P5030058new.tif

Side shield

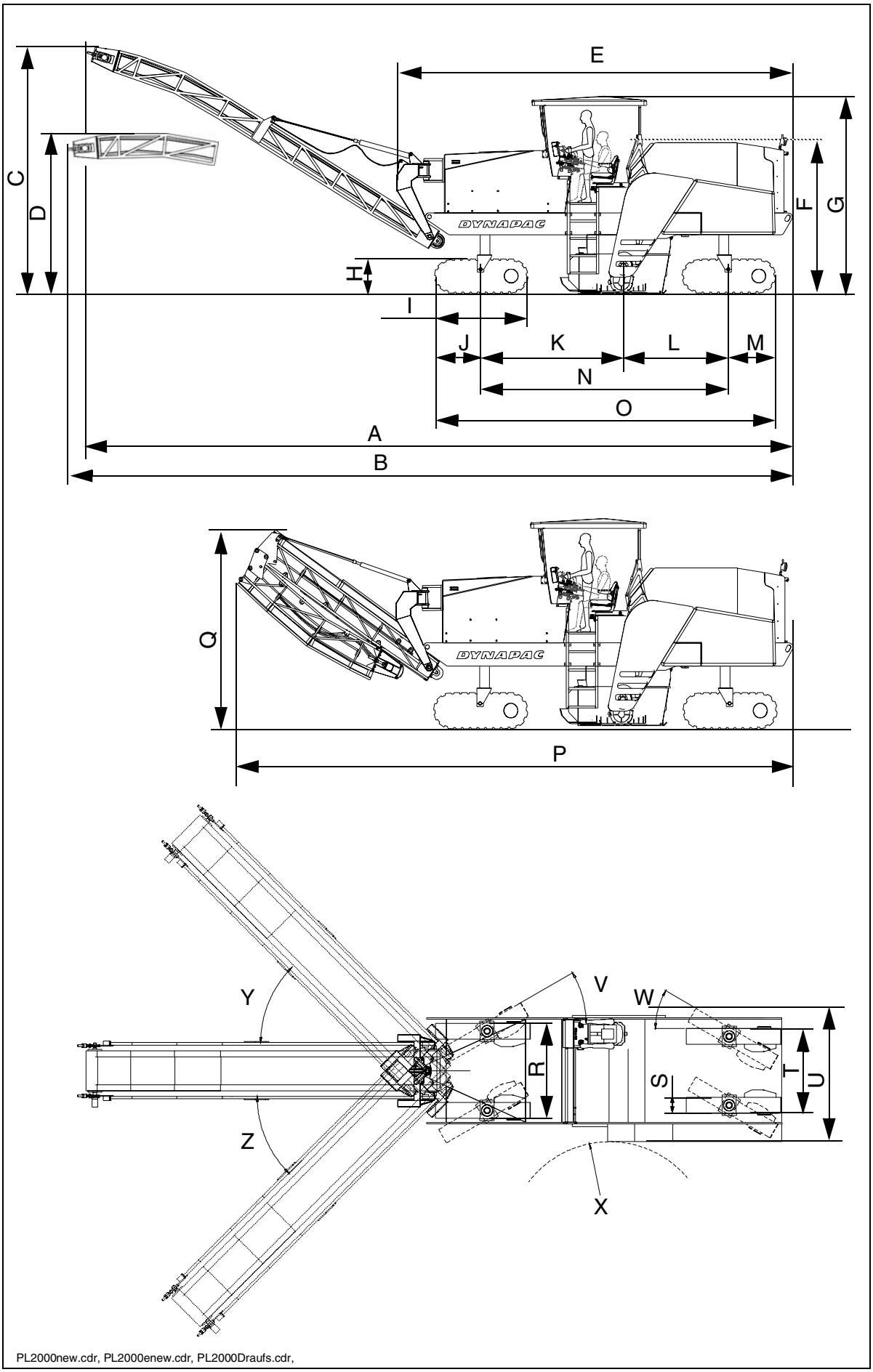
A side shield is fitted to both sides of the milling drum housing on the machine. These shields can be lifted by pressing the appropriate buttons on the controls.



Schild2.Tif

4 Technical data, standard version

4.1 Dimensions



PL2000new.cdr, PL2000enew.cdr, PL2000Draufs.cdr,

	Designation	PL 2000 S Standard	PL 2100 S Standard	
A	Machine length with max. paving height	14278	14278	mm
B	Machine length with upper conveyor at transport height	15018	15018	mm
C	Max. paving height	4907	4907	mm
D	Transport height of upper conveyor	beliebig	beliebig	mm
E	Machine length without upper conveyor	8023	8023	mm
F	Height without (with lowered) weather protecting sun roof	3100	3090	mm
G	Height with weather protecting sun roof	3964	3958	mm
H	Drive unit height	690	690	mm
I	Drive unit length	1890	1890	mm
J	Length of drive unit suspension to start of drive unit	934	934	mm
K	Distance between suspension of front drive unit - milling drum	2900	2900	mm
L	Distance between suspension of rear drive unit - milling drum	2100	2100	mm
M	Length of drive unit suspension to end of drive unit	955	955	mm
N	Distance between suspension of front drive unit - rear drive unit	5000	5000	mm
O	Total distance between the drive units (incl. drive units)	6890	6890	mm
P	Machine length with upper conveyor folded in	11479	11479	mm
Q	Transport height with upper conveyor folded in	1657-3865	1657-3865	mm
R	Track width, outer front drive units	1890	1890	mm
S	Chain width	310	310	m
T	Tract width, outer rear drive units	1680	1680	mm
U	Machine width	2682	2782	mm
V	Max. steering lock turn, front drive units	30	30	degr.
W	Max. steering lock turn, rear drive units	30	30	degr.
X	Turning radius	2025	2025	mm
Y	Max. swash angle, upper conveyor to the right	45	45	degr.
Z	Max. swash angle, upper conveyor to the left	45	45	degr.

4.2 Weights

	PL 2000 S	PL 2100 S	
Operating weight CE*	33.500	33.900	kg
Weight when empty	31.000	31.400	kg
Operating weight (with full tank)	36.500	36.900	kg
Upper conveyor	approx.1.500	approx.1.500	kg
Axle load, front	17.900	16.400	kg
Axle load, rear	16.100	15.800	kg

☞ *CE weight: water and fuel tank half filled, driver and tools on board.

4.3 Performance data

	PL 2000 S	PL 2100 S	
Transportation speed	0 - 5	0 - 5	km/h
Operating speed	0 - 40	0 - 40	m/min
Cutting width	2010	2010	mm
Grading depth	0-320	0-320	mm
Max. slope	10	10	degr.
Line spacing	15	15	mm
Cutting diameter	1100	1100	mm
Cutting speed	4.7 - 8.8	4.7 - 8.8	m/s
Number of milling tools	166	166	items

4.4 Loading system

Belt width, lower conveyor	850	mm
Belt width, upper conveyor	800	mm
Belt speed, lower conveyor	0-4	m/s
Belt speed, upper conveyor	0-5	m/s
Loading capacity (theoretical)	470	m^3/h

4.5 Engine

Make/type	Cummins QSX 15
Version	6-cylinder diesel engine (water-cooled)
Power (in accordance with DIN 6270)	448 kW / 609 PS / 600 hp (at 2100 rpm)
Capacity	15000 cm^3
Fuel consumption, full load Fuel consumption, 2/3 load	109 l/h 69 l/h
Fuel tank filling volume	approx. 1100 l

4.6 Travel drive

Input	Hydrostatic input, continuously variable
Drive units	4 individually driven crawlers, each with 26 plastic bottom plates
Steering system	Hydraulic fully-tracked steering
Steering variants	-only at front -only at rear -front and rear -crab steering

4.7 Hydraulic system

Pressure creation	Hydro pumps via transfer box (directly flange-mounted on engine)
Pressure distribution	Separate hydraulic circuits, e.g. for: loading and upper conveyor, cylinder functions clutch, belt tensioner fan, filling equipment, water system
Hydraulic oil tank - filling volume	approx. 300 l

4.8 Water system

Filling pump		1,7	m^3/h
High pressure cleaner		130	bar
Spray nozzles	Lower conveyor Milling drum box	1 item 1.0 mm 6items 1.0mm 2 items 2.5 mm (boundary area)	
Water tank - filling volume		approx. 3700	l
Water contents (min.)		3	h

4.9 Compressed air system

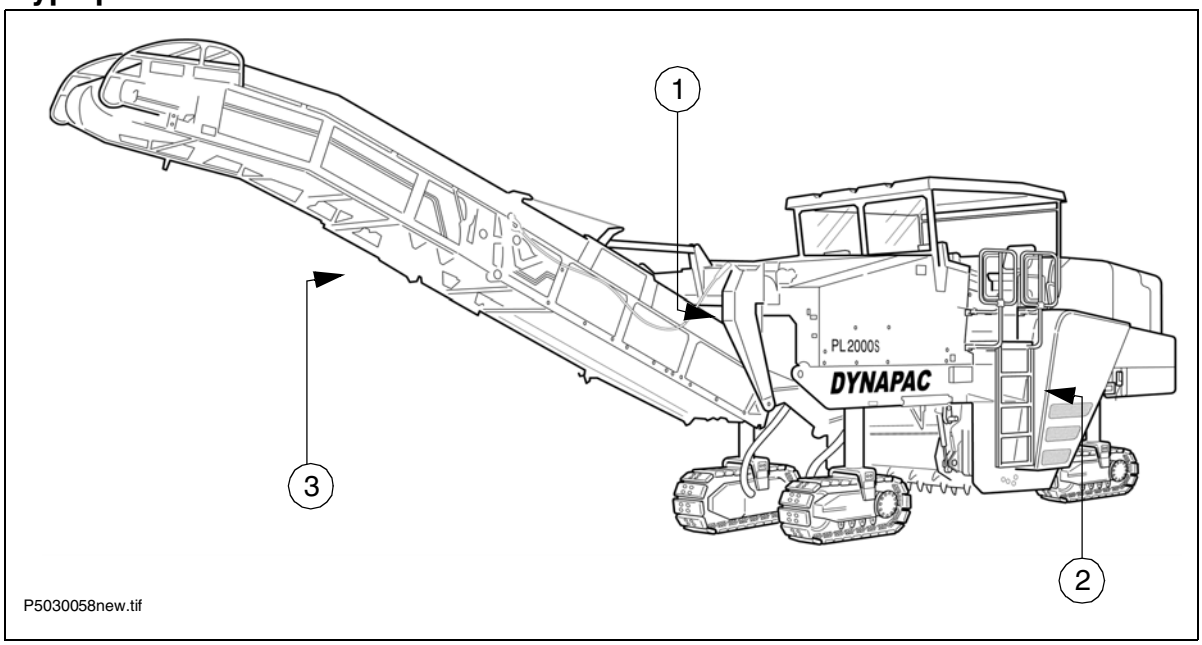
Performance	529	l/min
Compressed air reservoir	20	l
Permissible working pressure	6.5	bar

4.10 Electrical system

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

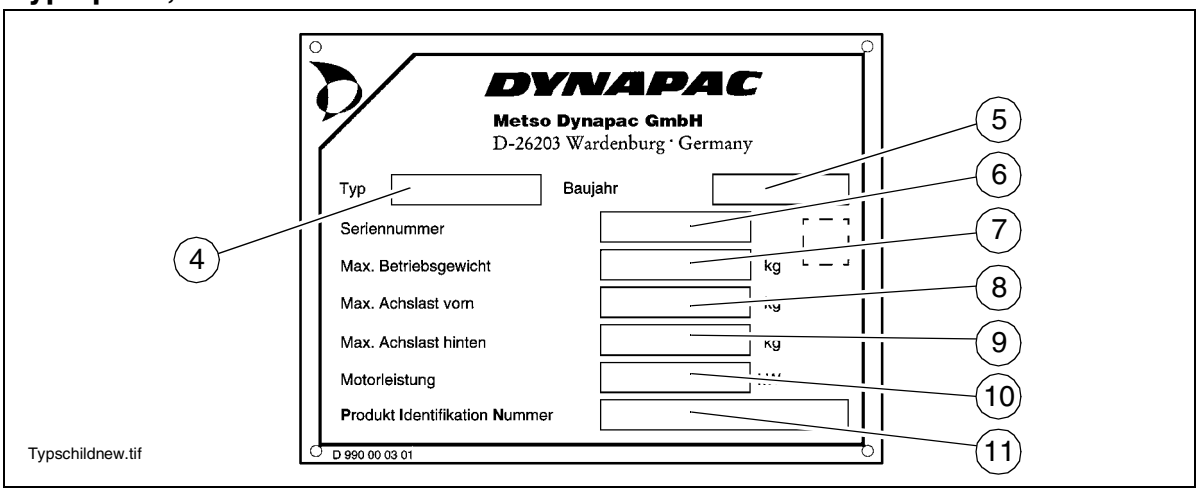
5 Identification points and type plates

5.1 Type plate and vehicle identification number



Item.	Designation	Position
1	Type plate	Front, right side of frame
2	Vehicle identification number	Between ladder and protective box of belt drive.
3	Type plate, upper conveyor	

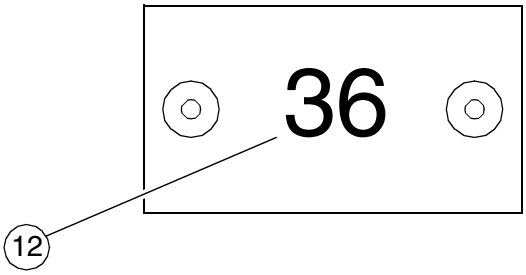
Type plate, machine



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 permissible axle load, at front, in kg
9	Maximum permissible axle load, at rear, in kg
10	Nominal power in kW
11	Product identification number (PIN)

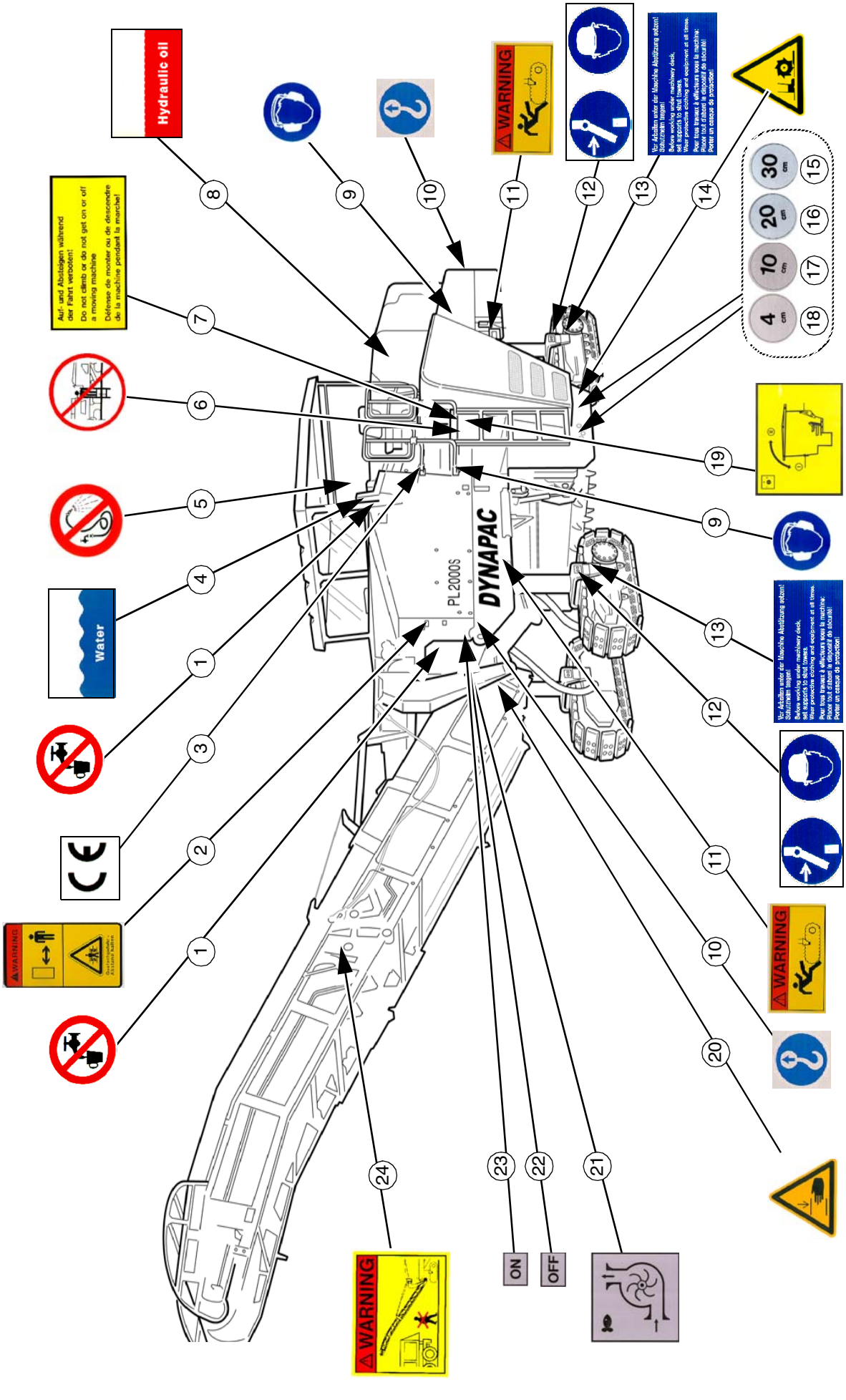
☞ The vehicle identification no. stamped on to the machine must match the product identification number (11).

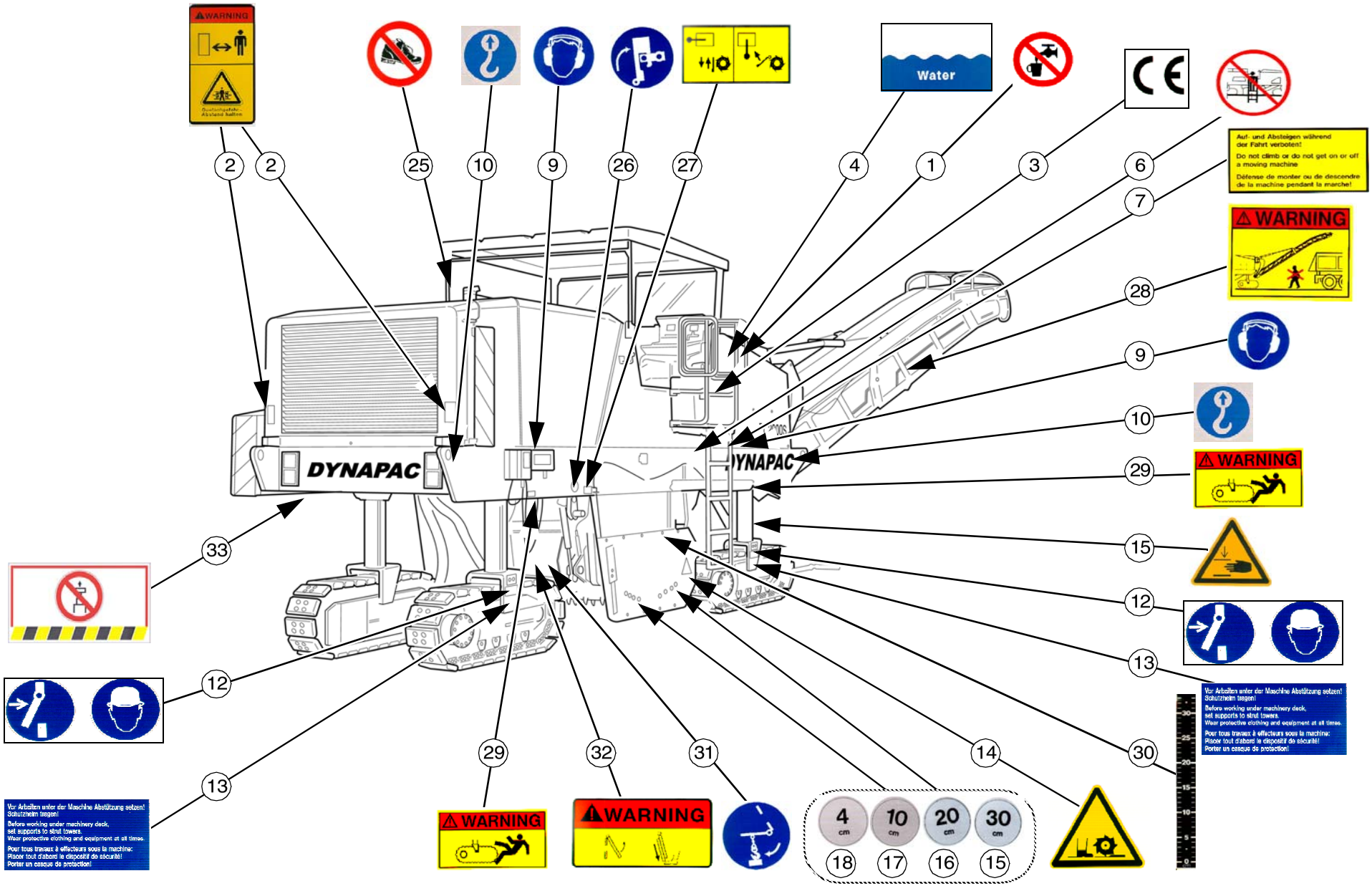
Serial number of discharge conveyor

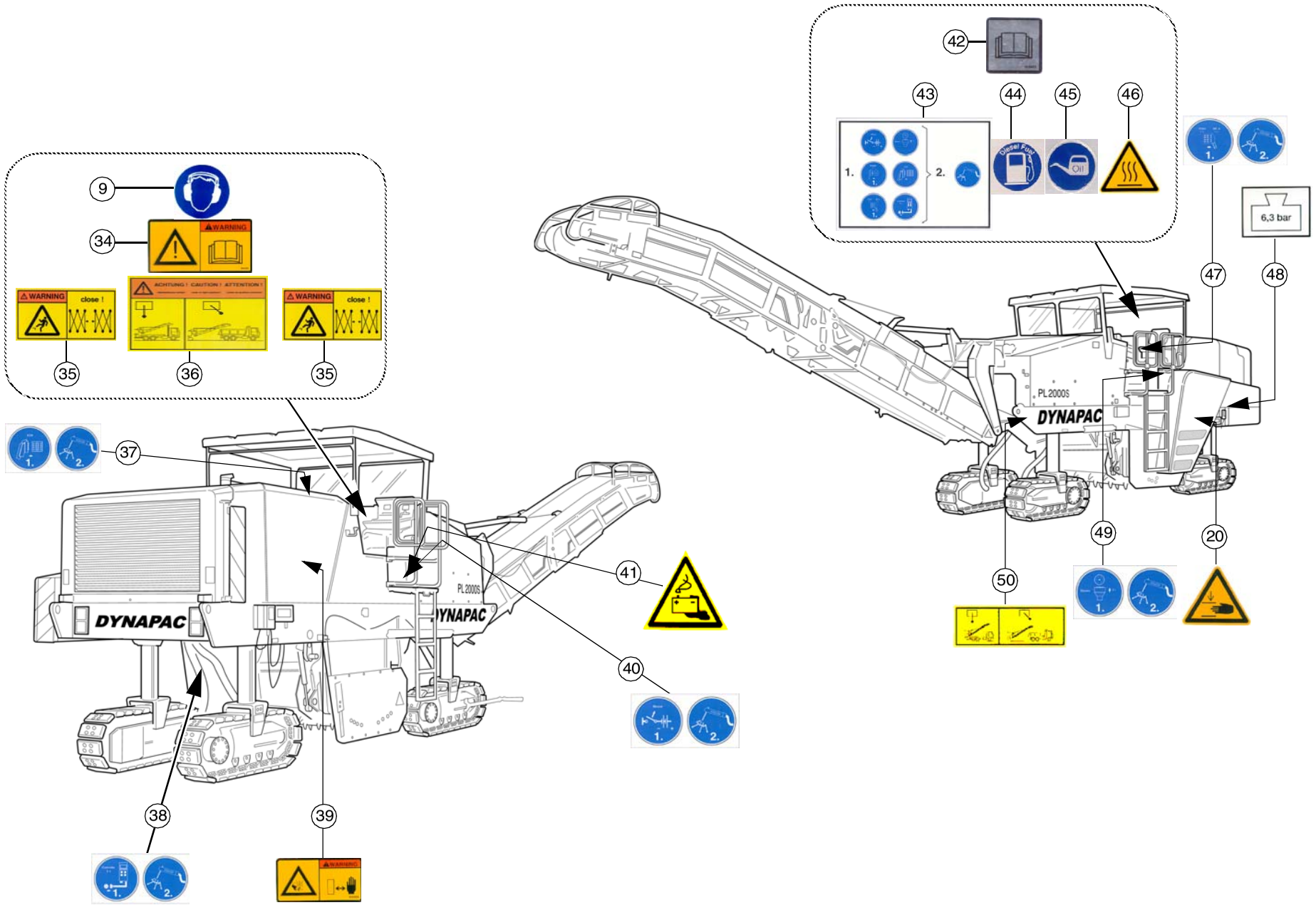


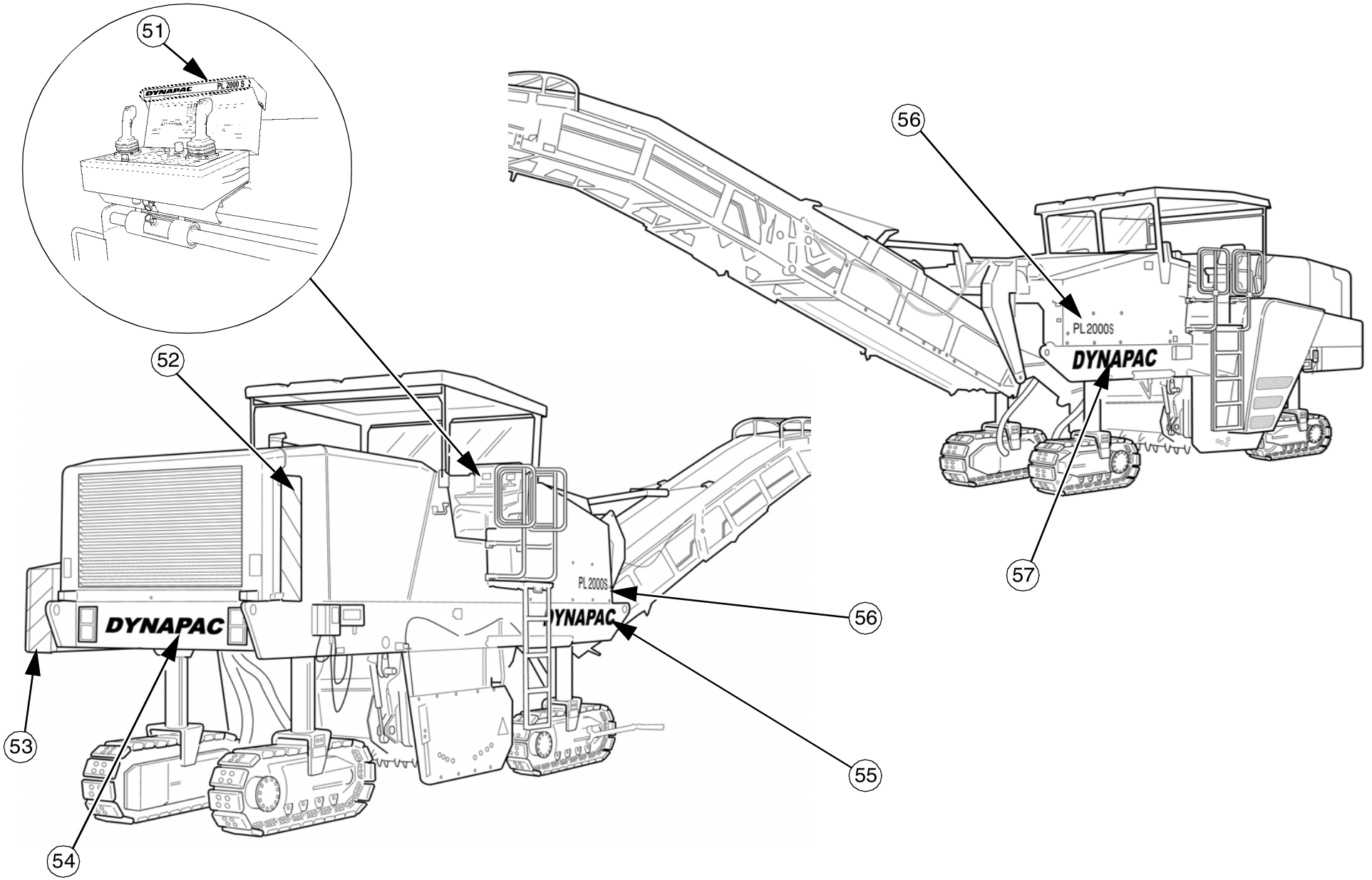
Item	Designation
12	Serial number of discharge conveyor

5.2 Identification points




WARNING
Water
DYNAPAC
DYNAPAC
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
⚠ WARNING
⚠ WARNING
⚠ WARNING
Vor Arbeiten unter der Maschine Abstützung setzen! Schutzhelm tragen!
Before working under machinery deck, set supports to strut towers. Wear protective clothing and equipment at all times.
Pour tous travaux à effectuers sous la machine: Placer tout d'abord le dispositif de sécurité! Porter un casque de protection!
4 cm
10 cm
20 cm
30 cm
18
17
16
15
2
2
25
10
9
26
27
4
1
3
6
7
28
9
10
29
15
12
13
30
14
31
32
29
12
13
33


9
34
WARNING
WARNING
close !
35
ACHTUNG ! CAUTION ! ATTENTION !
36
WARNING
close !
35
37
38
39
DYNAPAC
PL2000S
41
40
42
43
1.
2.
44
Diesel Fuel
45
Oil
46
47
6,3 bar
48
PL2000S
DYNAPAC
49
20
50


51
52
53
54
55
56
57
DYNAPAC
PL 2000S

Item.	Spare parts no.	Comments
1	956.05.20.02	
2	956.05.20.15	
3	956.05.30.08	
4	956.05.30.02	
5	956.05.20.03	
6	956.05.20.01	
7	956.05.20.04	
8	956.05.30.03	
9	956.05.10.04	
10	990.00.02.25	
11	956.05.20.13	
12	956.05.10.03	
13	956.05.10.05	
14	956.05.20.07	
15	956.05.30.07	
16	956.05.30.06	
17	956.05.30.05	
18	956.05.30.04	
19	956.05.30.44	
20	956.05.20.05	
21	956.05.30.41	
22	956.05.30.43	
23	956.05.30.42	
24	956.05.20.10	
25	990.00.01.11	
26	956.05.10.01	
27	956.05.30.14	
28	956.05.20.11	
29	956.05.20.14	
30	990.00.04.01	
31	956.05.10.02	
32	956.05.20.12	

33	956.05.30.40	
34	956.04.50.00	On front panel, inside of driver’s cab
35	956.05.30.09	
36	956.05.30.15	On front panel, inside of driver’s cab
37	956.05.30.37	Engine room, on right
38	956.05.30.39	Underneath of vehicle frame
39	956.04.53.00	2x on fan housing (left and right)
40	956.05.30.36	Beside the batteries
41	956.05.20.09	Under the right bottom plate, beside the batteries
42	956.04.31.00	
43	956.05.30.10	On the central maintenance flap
44	990.00.02.15	On the tank flap
45	990.00.02.17	On the right-hand maintenance flap
46	956.05.20.08	Behind the central maintenance flap
47	956.05.30.35	Operator’s control station, front left
48	956.05.30.01	On the compressed air tank
49	956.05.30.34	Behind the flap next to the ladder
50	956.05.40.01	On the changeover valve of the upper conveyor
51	956.05.30.27	
52	956.05.00.01	
53	956.05.00.02	
54	956.05.30.29	
55	956.05.30.28	"Dynapac" logo on right
56	956.05.30.26	Logo PL2000
56a		Logo PL2100
57	956.05.30.28	"Dynapac" logo on left

6 European standards

6.1 Permanent noise 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} = 90 dB(A)

Sound pressure level on the machine L_{WA} = 106,5 dB(A)

Measuring point	2	4	6	8	10	12
Sound pressure level L_{AFeq} (dB(A))	77,1	77,1	77,5	77,4	77,1	78,9

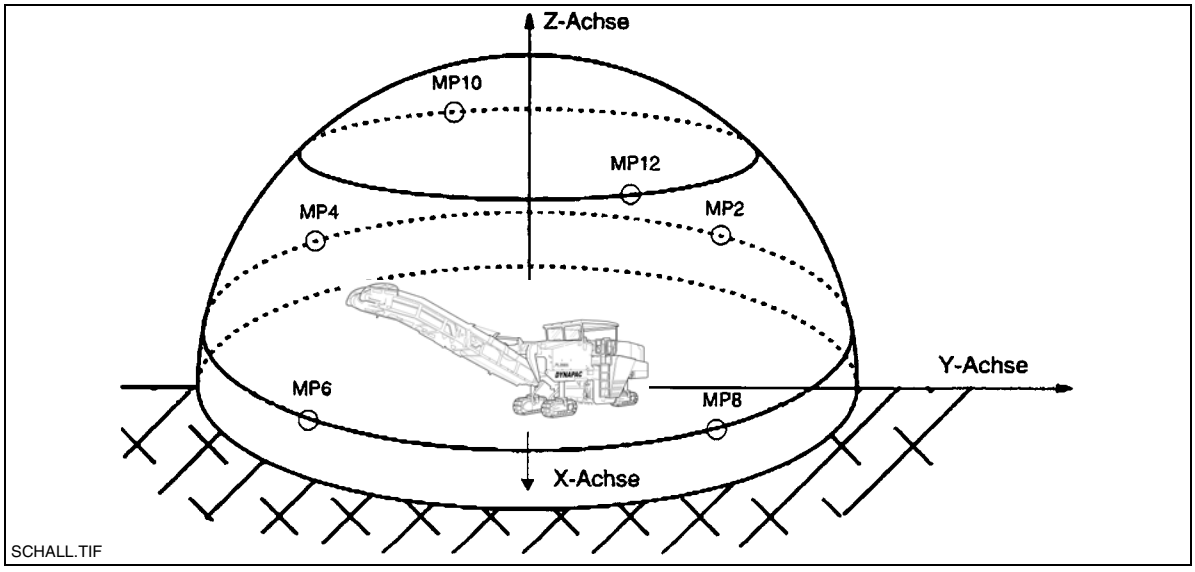
6.2 Operating conditions during the measurements

The diesel engine runs at nominal speed, the cutting equipment was in operation.

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 +4.32	+10.4 -10.4	11.36 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 measured at a distance of 3 m
  < 47 db µV/m for frequencies of 20 MHz - 1 GHz measured at a distance of 3 m

- Disturb 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!

The weather protecting sun roof should be deployed and appropriately fastened during transport.
Lower all of the machine down to the upper section of the separated traction unit supports. When in this position, the cutting tool tips of the milling drum are approx. 1 cm above the ground. If a wooden support is fitted, the milling drum can rest gently on this.
The upper conveyor should also be moved into its floating position if necessary.

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.
Use the cover to secure the main control panel, close the side operating units.

When loading via ramps, there is a risk that the machine will slip, tilt or overturn.

Drive carefully! Keep people away from the danger area!

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

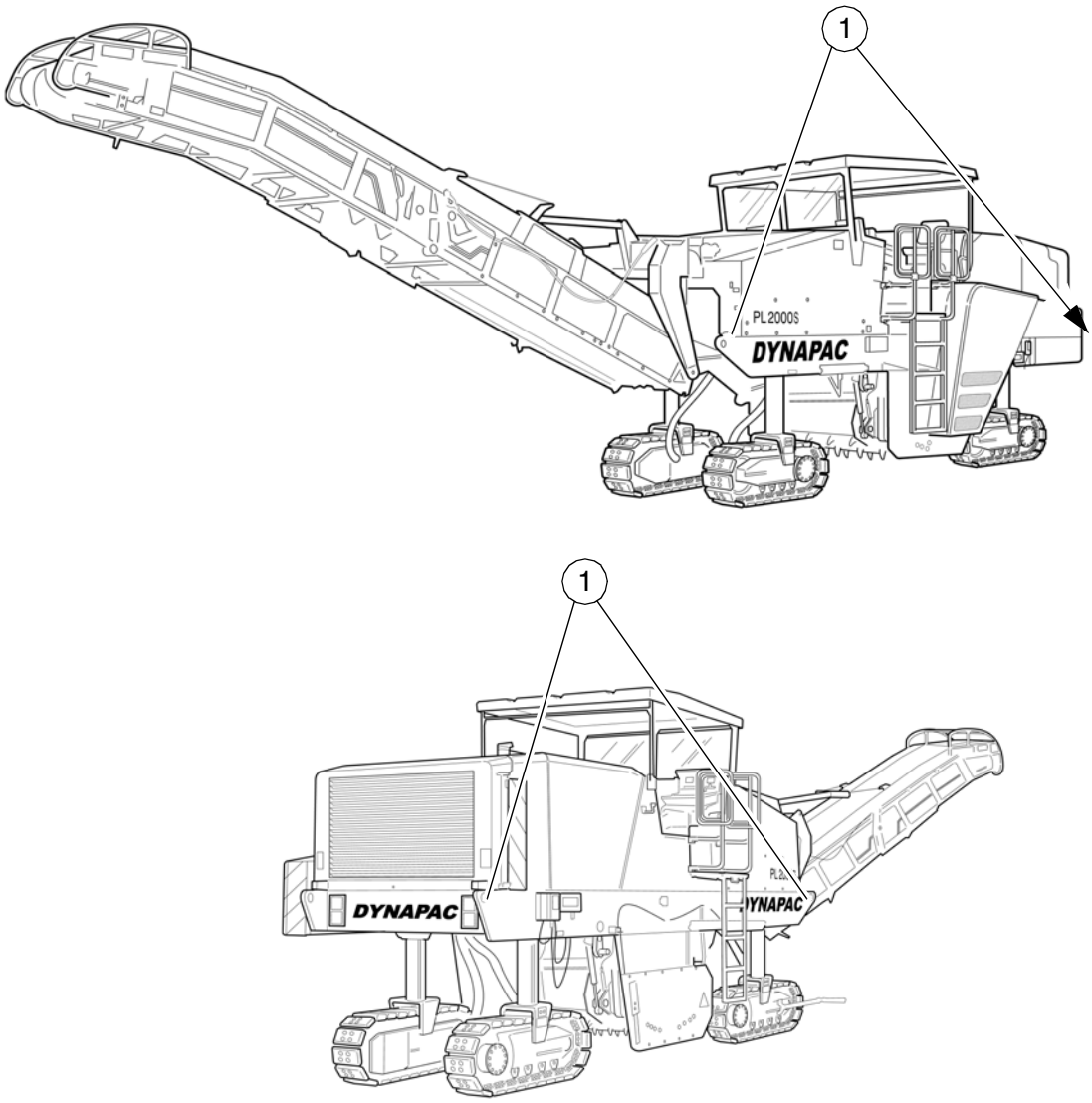
The machine driver must have a valid driving licence for this type of vehicle.

The operating panel must be on the side facing oncoming traffic and be secured in place.
The headlights must be set in accordance with the relevant regulations.

When driving on public roads, if necessary, another person must guide the machine driver – especially at crossroads and side-road junctions.

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

2 Fix points



P5030058new.tif/P5030061new.tif

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 is to be fixed to the transporter using sufficiently sized shackles (chains) and secured so that it cannot tilt, slide or fall off.

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.

Only drive onto the trailer and manoeuvre in working gear.
If necessary, use winches to secure the machine when driving on.

The machine should be cleaned before being loaded.

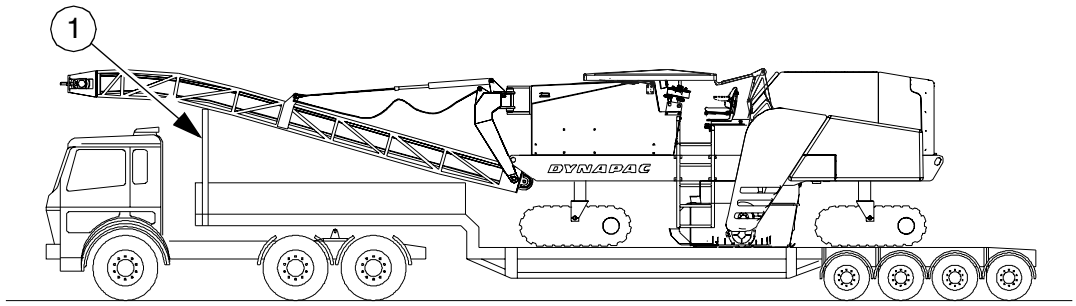
The machine should be parked and secured as follows:

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

Activities and preventive measures:

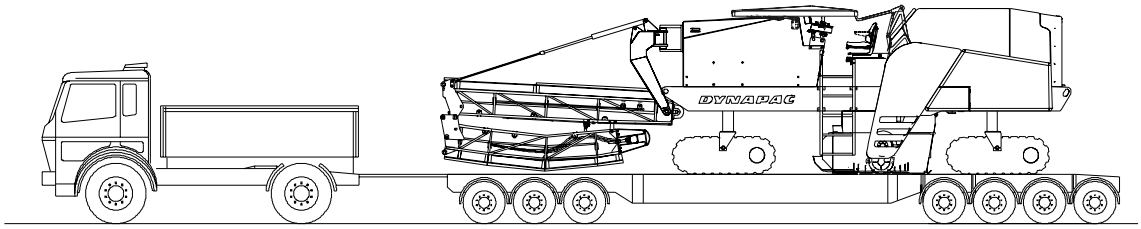
- In order to achieve a lower transport height, the machine is evenly lowered down to the upper section of the separated traction unit supports. When in this position, the cutting tool tips of the milling drum are just (approx. 1 cm) above the ground and can if necessary be gently rested on a wooden supporting if fitted.
- sliding shoe and scraper plate are raised slightly
- weather protecting sun roofs, ladders, operating equipment should be folded in or removed.
- the front loading belt is placed on its support and if fitted, the parking brake is engaged and the engine switched off.
- do not leave any insecure components on the machine or the load surface.

When transporting machines with a rigid upper conveyor, there must be a support (1) upon which the upper conveyor can be placed.



Truck1new.cdr

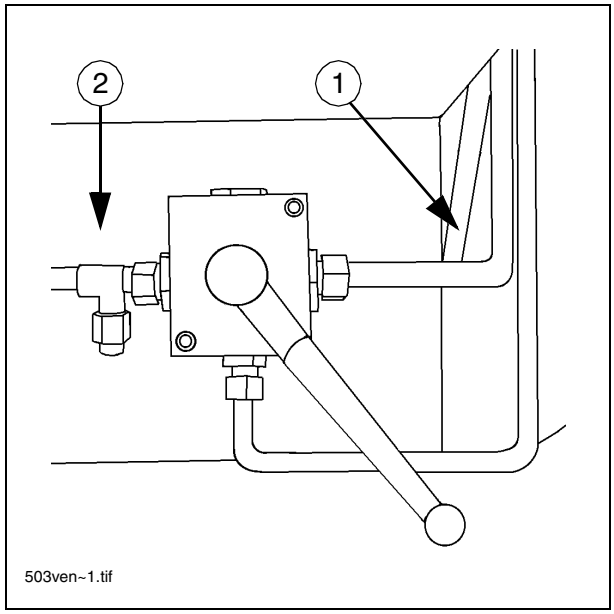
When transporting machines with a foldable upper conveyor, this is placed on the front locating surface of the transporter and if necessary secured separately.



Truck2new.cdr

- Securely fix the machine to the four fix points provided on the transporter.

⚠ If the support for the upper conveyor or the locating surface for the folded in upper conveyor is placed on the frame of the towing machine, the swivel hydraulics of the upper conveyor must be changed over to the floating position once parts have been placed on this frame.
In order to do this, the lever provided for this purpose must be moved out of its operating position (1) into the transport position (2)!



⚠ Risk of accident! If the locating surface is not on the towing machine, but on the trailer, the swivel hydraulics must always be shifted into the operating position!

☞ When transporting the machine on different forms of transport, such as by rail or ship, proceed as described in the appropriate valid transport and loading regulations.

4 Normal on-road travel

The machine is not intended for normal on-road travel and is not equipped for such circumstances. It should be used within enclosed building sites.

If the machine's loading or unloading area is outside an enclosed building site or if the machine has to propel itself from one section of the roadworks to another, the machine must be dual-manned for safety reasons. All safety measures (cordoning off) required for this should be implemented.

If a machine has to be parked on a public highway, it should be cordoned off in accordance with the relevant regulations and secured to prevent the machine from rolling away, tilting or swivelling.

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

The rotary beacons and hazard flasher are permanently activated during milling and transport, the warning signs on the machine are permanently folded down.

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 Articulation procedure of foldable upper conveyor (O)

5.1 Folding in the upper conveyor

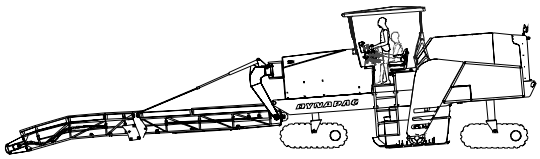
The transport length of the machine can be significantly reduced using the foldable upper conveyor (available as an option).

Various operations are required and conditions should be checked and/or set to enable the upper conveyor to be folded in.

- The machine is on level ground and in a secure horizontal position.
- The upper conveyor is in its operating position.
- The milling drum is not engaged.
- Loading and upper conveyors are not being operated.

Operations required:

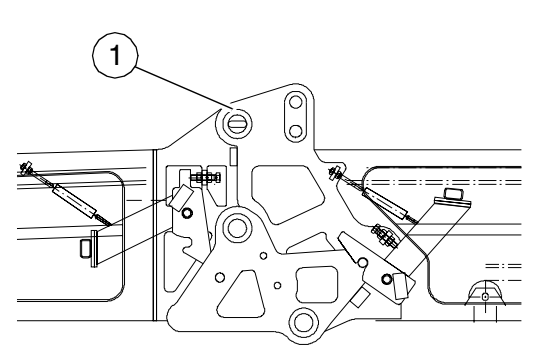
- Lower upper conveyor until the front section of the belt frame touches the ground.
  If necessary, the front of the machine will have to be lowered via the traction unit legs.



PL2000anew.cdr

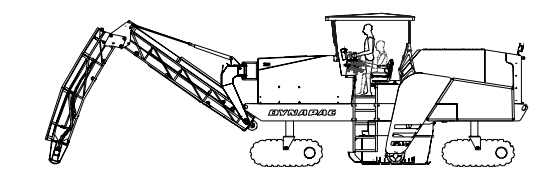
- Remove the interlock bolts (1) from both sides of the articulation range of the upper conveyor.

☞ Keep the bolts somewhere safe so that they are not lost.



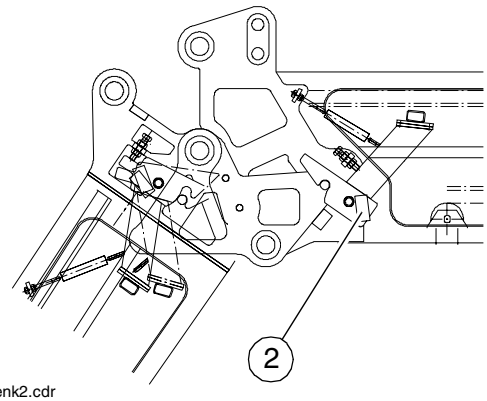
Gelenk1.cdr

- If necessary, slowly raise the upper conveyor by extending the traction unit legs and unfolding over the belt frame until the reversal interlock is reached.



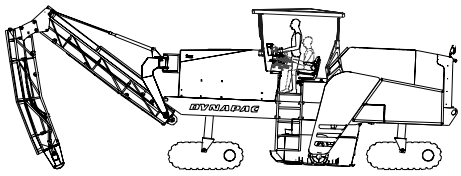
PL2000bnew.cdr

- Open the left-hand reversal interlock (2) on both sides in the articulation range of the upper conveyor.
  - Insert an appropriate aid into the support of the interlock hook and open interlock by turning lever to the right.

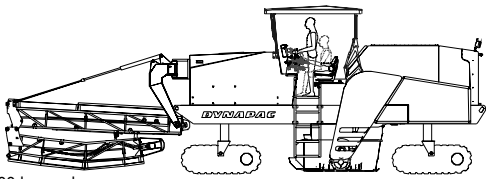


Gelenk2.cdr

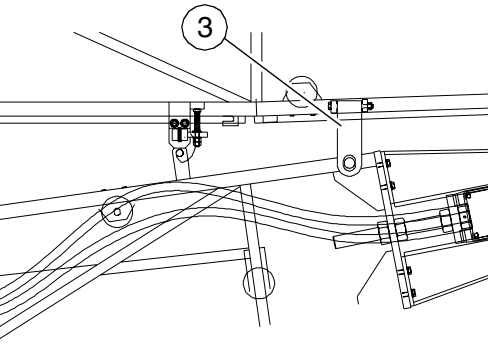
- Move the machine forwards slightly until the roll bar on the upper front section of the belt frame has sufficient contact with the ground.
  If necessary, the front of the machine will have to be raised via the attraction unit legs.


PL2000cnew.cdr

- Slowly raise the upper conveyor further until the front section of the belt frame lies on the rear section. The frame components are completely folded down.


PL2000dnew.cdr

- Insert retaining tab (3) on both sides of the belt frame.
  - Remove retaining cotter pin, guide tab over the journal of the lower frame section and secure with cotter pin.



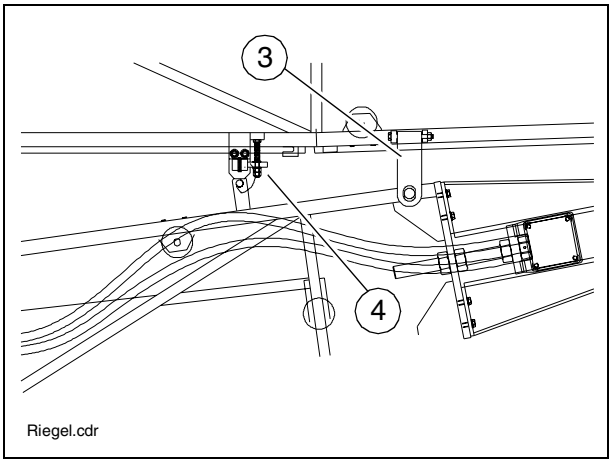
Riegel.cdr

5.2 Unfolding the upper conveyor

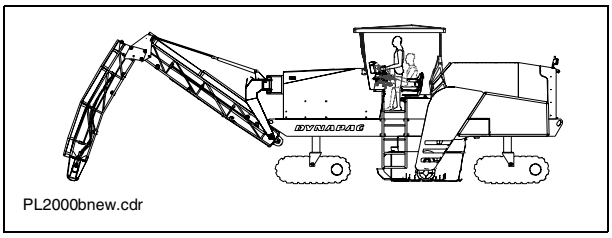
The procedure for unfolding the upper conveyor is exactly the same as the procedure for folding it in, but in reverse order.

Before the upper conveyor can be unfolded, the transport safeguards on both sides of the machine must be opened.

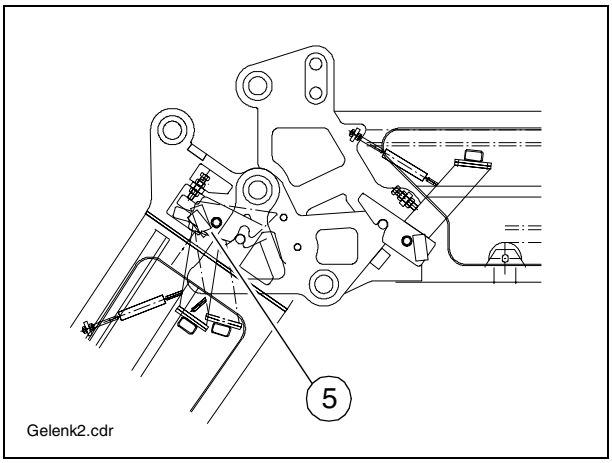
- Open retaining tab (3) on both sides of the belt frame:
  - Remove retaining cotter pin, guide tab over the journal of the upper frame section and secure using the cotter pin.
- Open engaged interlock (4):
  - Insert appropriate aid in to the support of the interlock hook and open interlock by turning lever to the left.



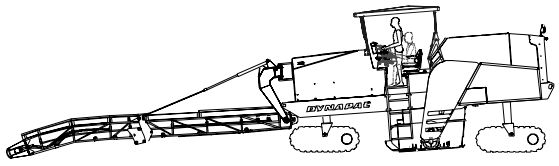
- The upper conveyor can be unfolded up to the point at which the reversal interlock is reached.



- Open the right-hand side reversal interlock (5) on both sides in the articulation range of the upper conveyor.
  - Insert suitable aid in to the support of the interlock hook and open interlock by turning lever to the left.

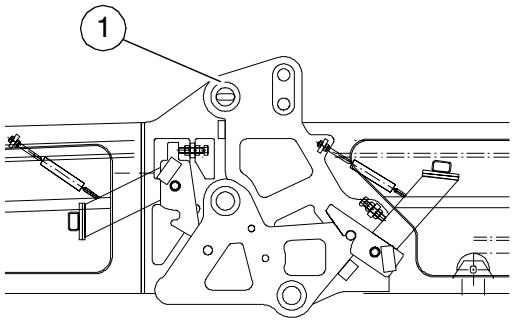


- Lower upper conveyor until the joint is fully unfolded again.
  If necessary, the front of the machine will have to be lowered via the traction unit legs.



PL2000anew.cdr

- Re-insert the interlock bolts correctly into both sides.



Gelenk1.cdr

6 **Hydraulically foldable upper conveyor** (O)

Folding in upper conveyor

The machine's transport length can be significantly reduced in a few simple steps by using the hydraulically foldable upper conveyor (available as an option).

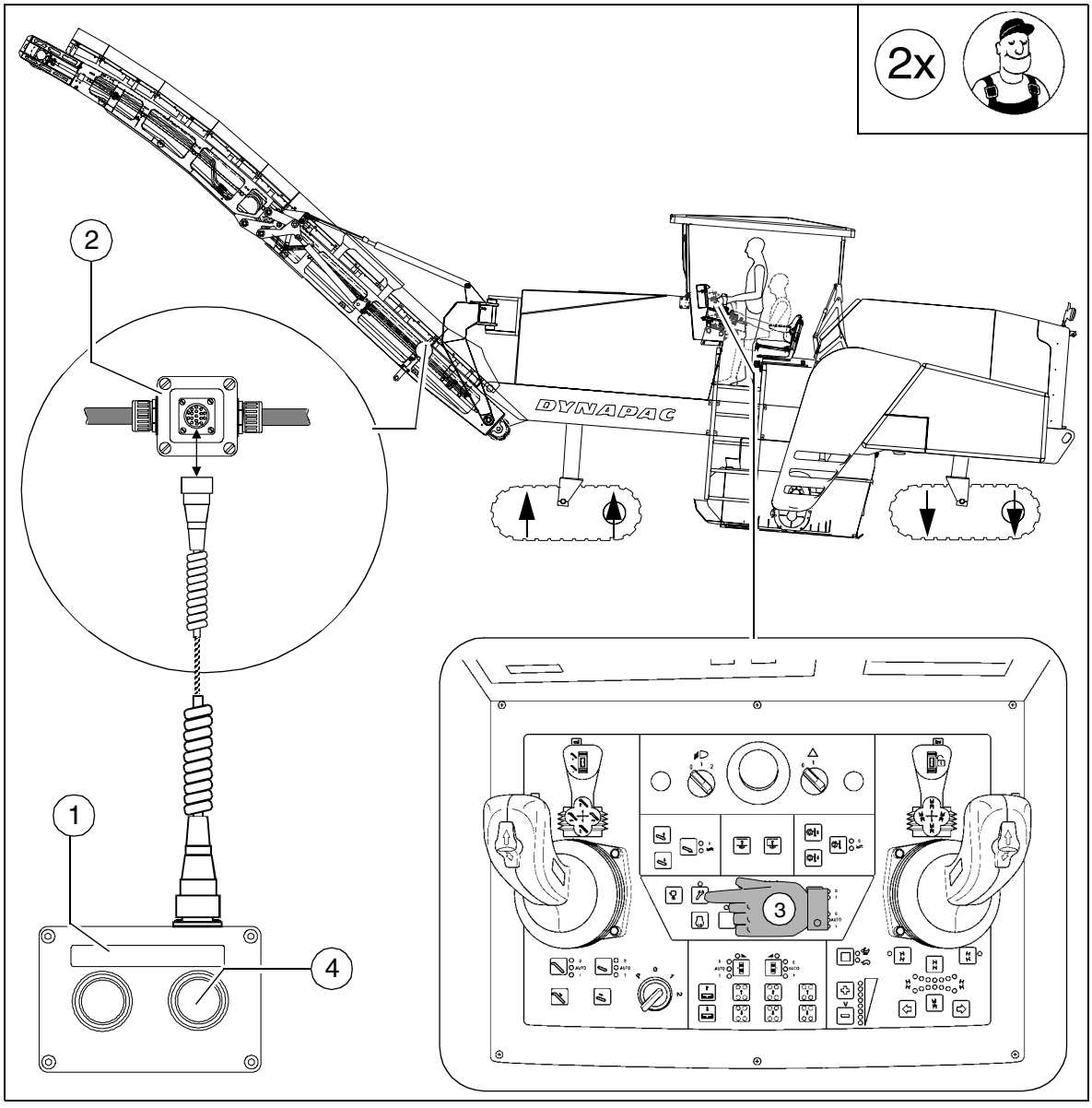
To fold the upper conveyor, various preconditions must be checked and/or satisfied.

Machine has been moved out of its milling track and is therefore on as level a base as possible.

Upper conveyor is in its working position.

Milling drum is not activated.

- Loading and upper conveyors are not being operated.

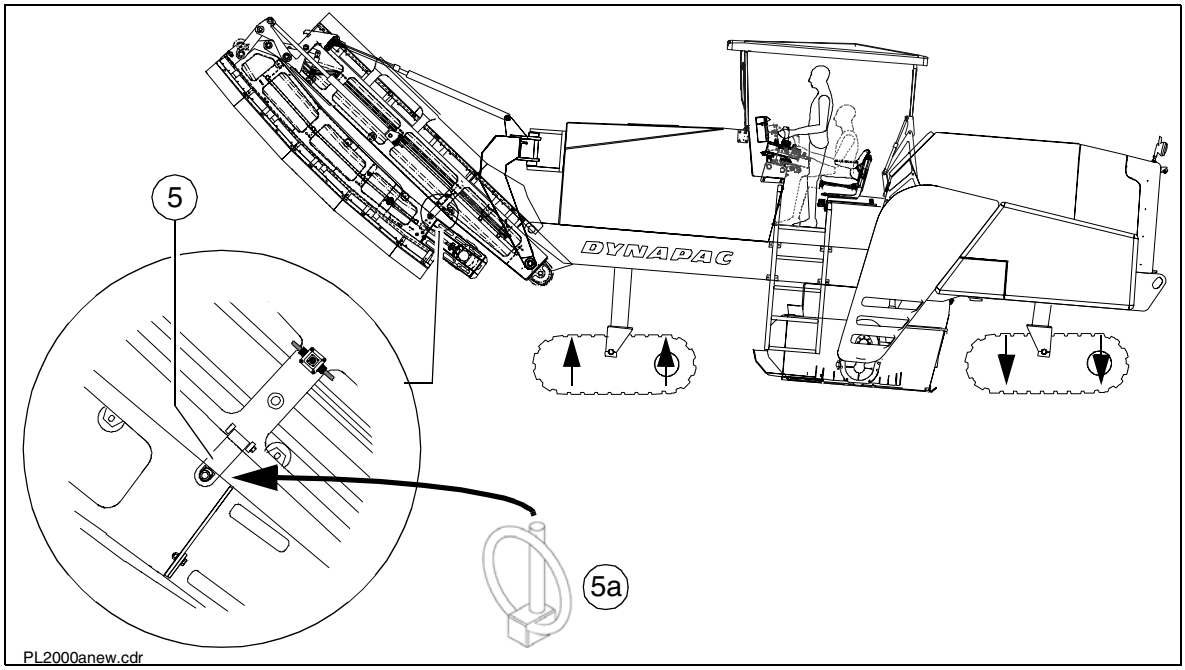


Steps required for folding process:

- Raise loading conveyor into its highest position.
- Firstly raise machine as far forward as possible over traction unit legs then lower as far as possible to the rear.
- Connect control box (1) (in accessories) to socket (2) on left-hand side of upper conveyor.
- Activate service button (3) on operating panel (LED confirmation).
- Press control box pushbutton (4).

When pushbutton is pressed, a warning sound can be heard and the upper conveyor begins to fold. The pushbutton must be held down during the entire folding process.

Ensure that there is no one in the machine's danger area!



- Once upper conveyor is folded in completely, upper section must be secured in this position using the retaining tabs (5) and associated articulated cotter pins (5a) located on both sides of lower section of upper conveyor.
- Remove control box (1) from socket (2) and use appropriate cover to close box.

6.1 Folding out upper conveyor

To fold out, proceed as for the folding in process but in reverse.

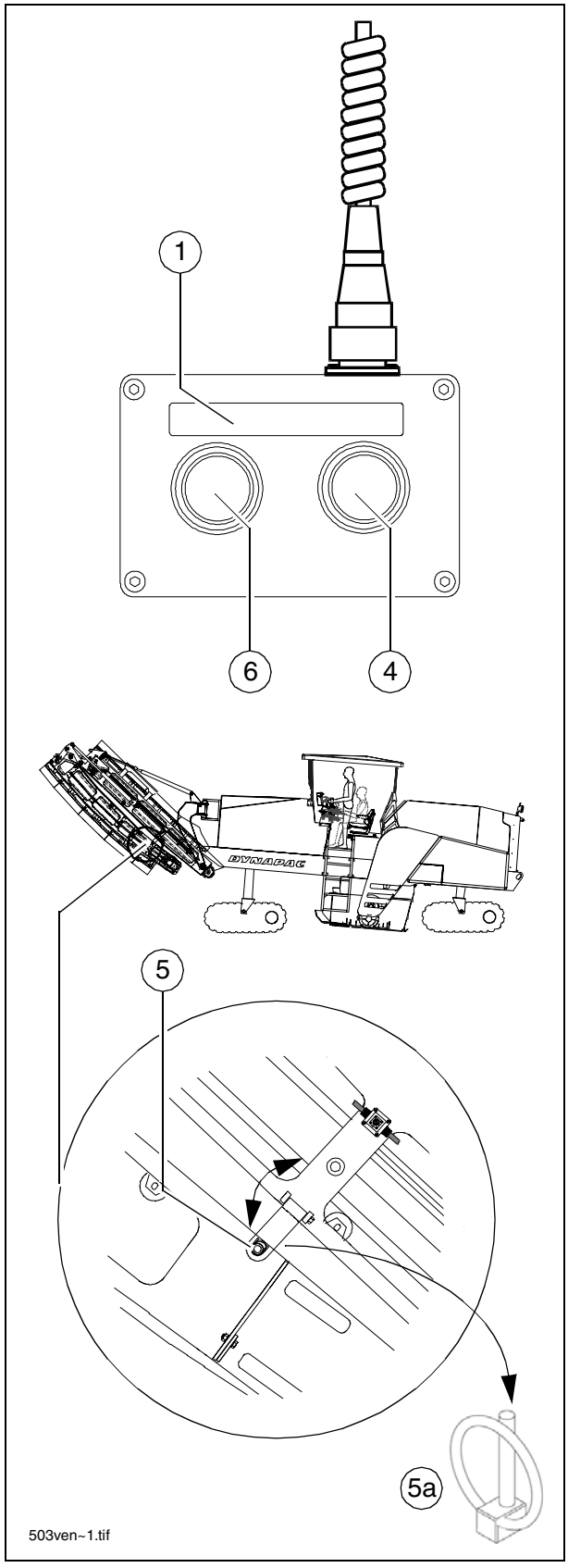
The following should be noted:

- Again press pushbutton (4) on control box (1) to fold upper conveyor in until stop is reached.
- Remove retaining cotter pin (5a) from both sides of upper conveyor and fold retaining tab (5) up over bolts and again secure using cotter pin.
- Fold upper conveyor out completely by pressing pushbutton (6).

☞ When pushbutton is pressed, a warning sound can be heard and the upper conveyor begins to fold. The pushbutton must be held down during the entire folding process.

STOP Ensure that there is no one in the machine's danger area!

☞ The folding process is complete once the belt is correctly retensioned (visual inspection).

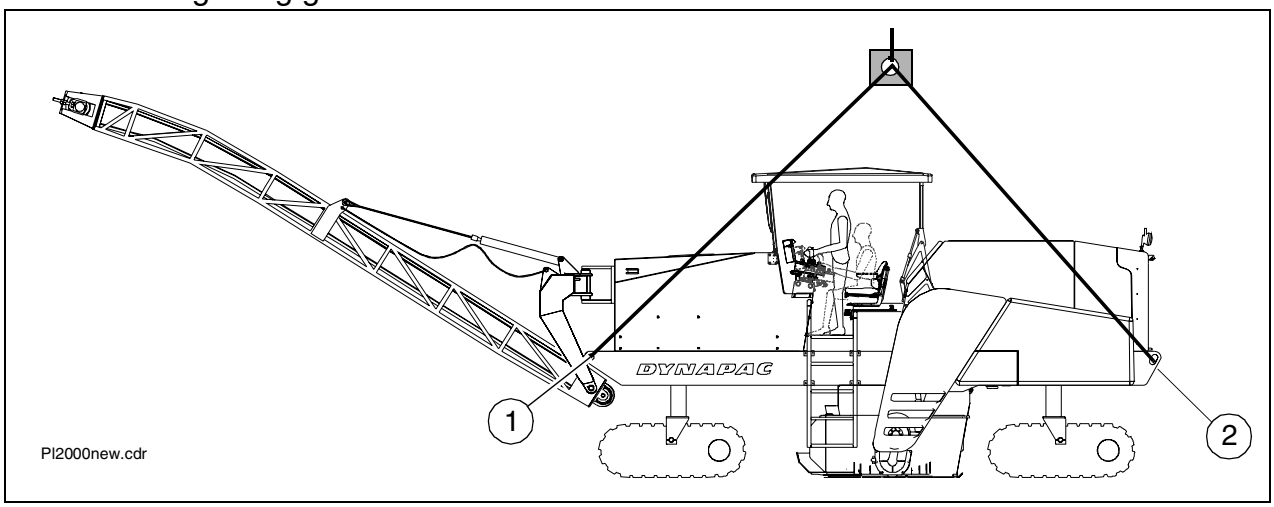


7 Loading by crane

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.

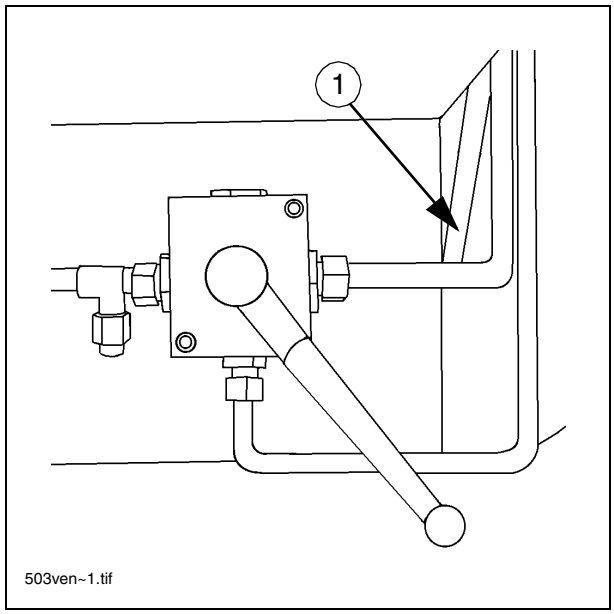
☞ Four attachment points (1,2) are provided on the machine frame for loading the vehicle using lifting gear.



- Secure vehicle wherever it is parked up.
- Move upper conveyor into operating position.
- Weather protecting sun roof may be deployed.
- Safely store loose components and accessories, such as removable spotlights or levelling equipment parts.
- 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.

⚠ Risk of accident! When loading by crane, the swivel hydraulics of the upper conveyor must always be moved into their operating position (1) because otherwise the machine may e.g. swivel outwards accidentally if on a slight incline.



8 Towing procedure

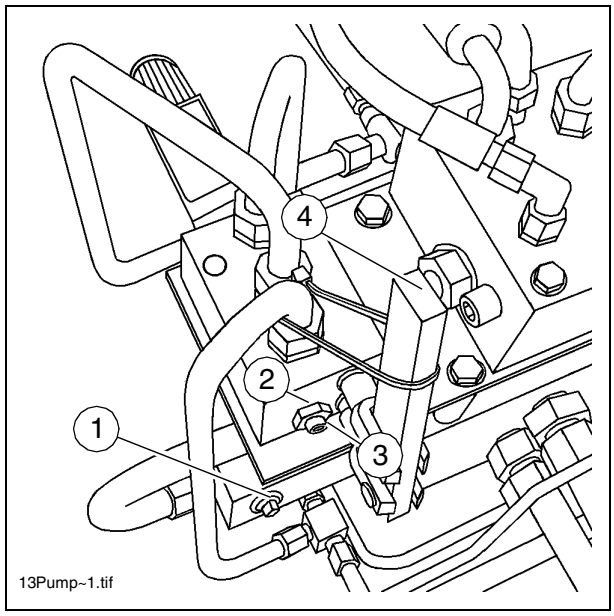
Observe all regulations and undertake all necessary cautionary measures which apply to the towing of heavy construction machinery.

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

Only disengage travel drive and only release traction unit brakes once the machine is sufficiently secured to prevent it from accidentally rolling away or once it has already been correctly connected to the towing vehicle.

A valve and manual pump are located under the right bottom plate of the operator's control station. These must be actuated if the machine is to be towed.

- In order to disengage the hydraulic circuit for towing, the valve (1) under the manual pump must first be changed over.
- Then the lock nut (2) on the manual pump must be released and the threading dowel (3) screwed as far as possible into the pump.
  Re-tighten the lock nut for safety.
- Now the lever of the manual pump (4) must be pressed until sufficient pressure has built up and the traction unit brakes have released themselves.



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.

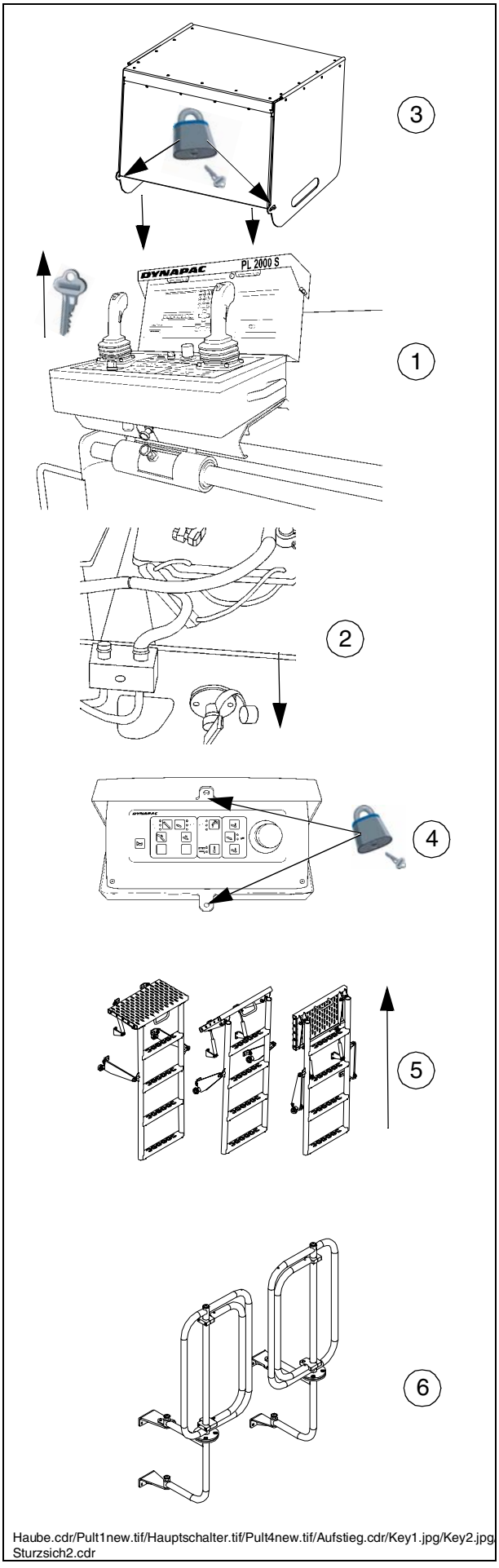
Once towing is complete, change back the valve (1), unscrew the threading dowel (3) again (several turns) and use the lock nut (2) to secure.
The traction unit brakes are now active again and the machine is secured to prevent it from rolling away.

9 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, the upper conveyor lowered and, if possible, swivelled into a safe area.

- Lower scraper, sliding shoe and side boards.

- 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.
- Close protective hoods of side operating units (4) and lock.
- Fold up the ladder (5) on the right-hand side of the machine.
- Close guardrail (6).
- Safely store loose components and accessories such as removable spotlights or levelling equipment parts.
- Deploy folding roof, remove key.
- Lock all bottom lids, hoods and storage rooms.
- Fold out full length of traction unit supports so that the vehicle cannot be lowered should attempts be made to do so.



Haube.cdr/Pult1new.tif/Hauptschalter.tif/Pult4new.tif/Aufstieg.cdr/Key1.jpg/Key2.jpg
Sturzsich2.cdr

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 up, ensure that no-one is working in or under the vehicle, and that no-one is in the immediate 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.

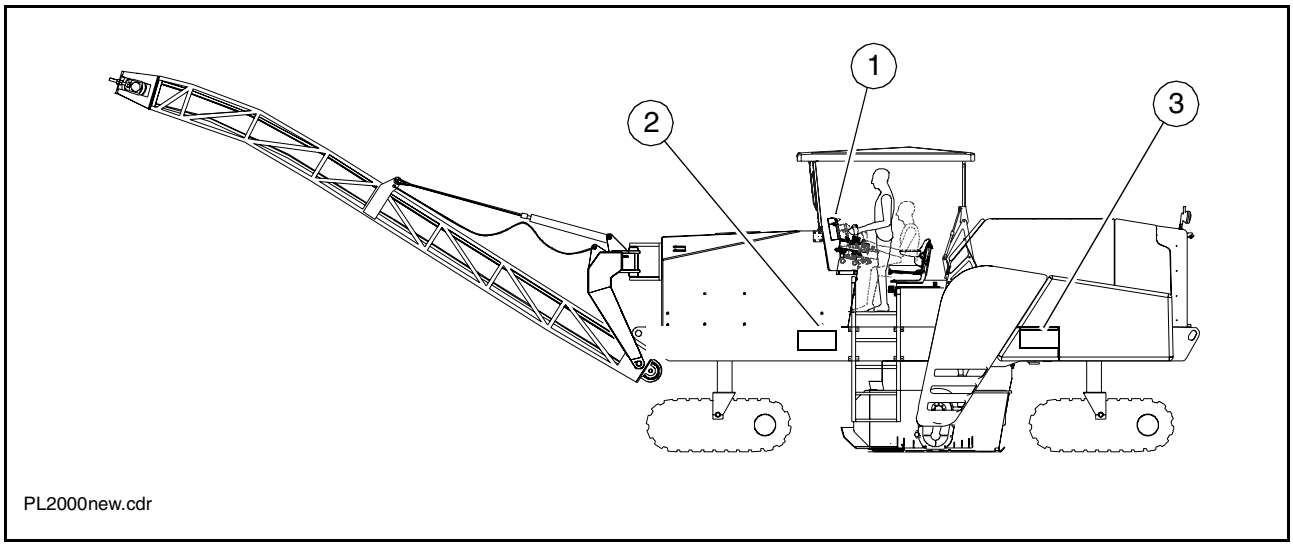
- Sound the horn as a warning before starting the machine.

When the drive unit is operating, never step under the vehicle. 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 in place and have been secured properly!
- 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! Lock the control panel and driver's seat in position.
- 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 keep the vehicle under careful control. Never attempt to load it beyond its capacity limits!

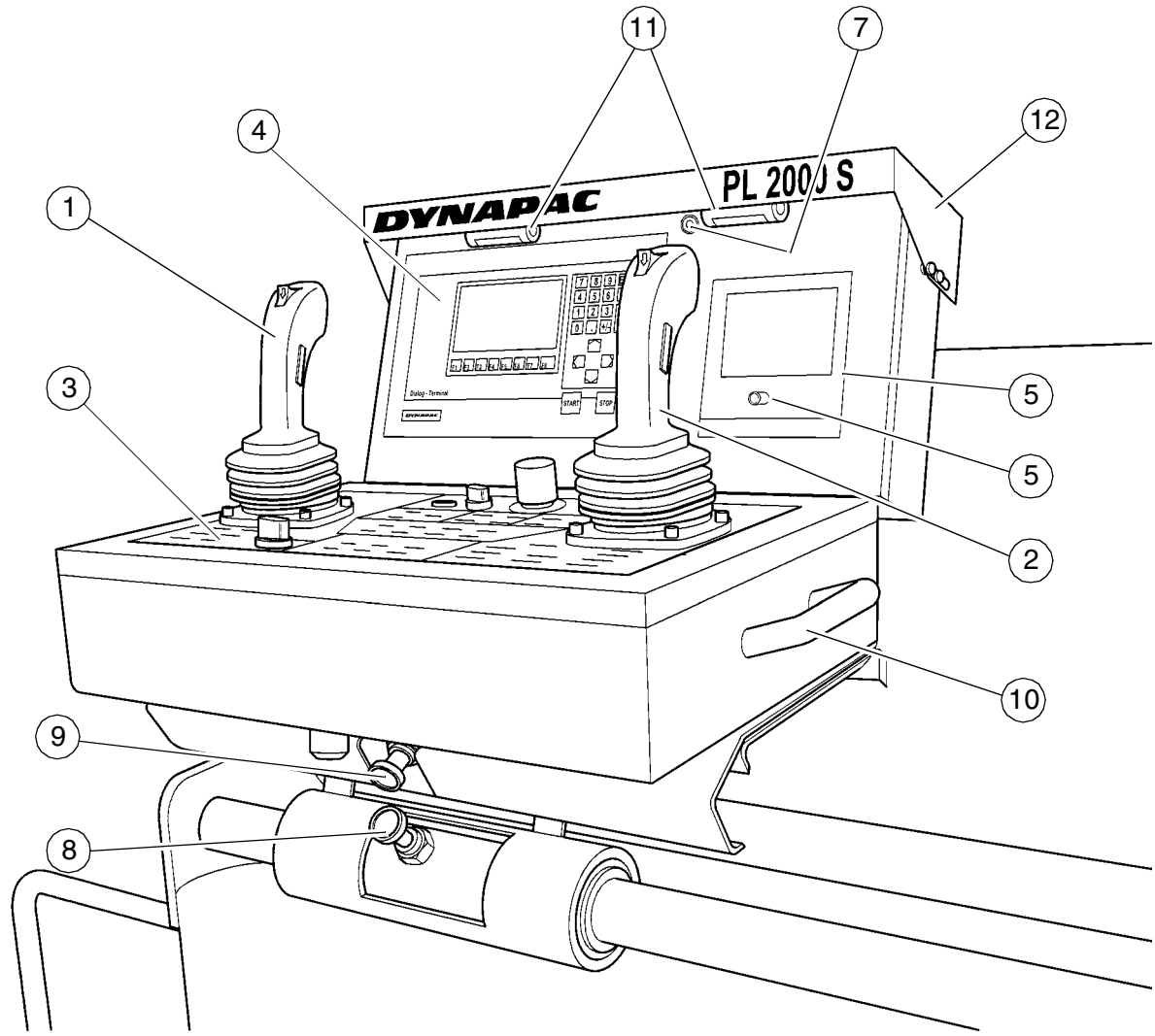
2 Controls



Pos.	Designation	Short description
1	Controls operator's control station	Arranged on the operator's control station, easy to move to either side, even beyond the outer edges of the vehicle, suitable for locking on left and right sides. Height is adjustable for ease of operation whether standing or sitting. Contains all controls and operating elements required for directing the cold planercold planer.
2	Lower front control panel	Control panel arranged before the planer box, identical on both sides of the machine. Contains duplicate controls to those in the operator's control station with an override function required to operate the functional elements on the front of the cold planer.
3	Lower back control panel	Control panel arranged behind the planer box, identical on both sides of the machine. Contains duplicate controls to those in the operator's control station with an override function required to operate the functional elements on the rear of the cold planer with a removable digital controller used for setting the grade and slope of the planer.

3 Controls

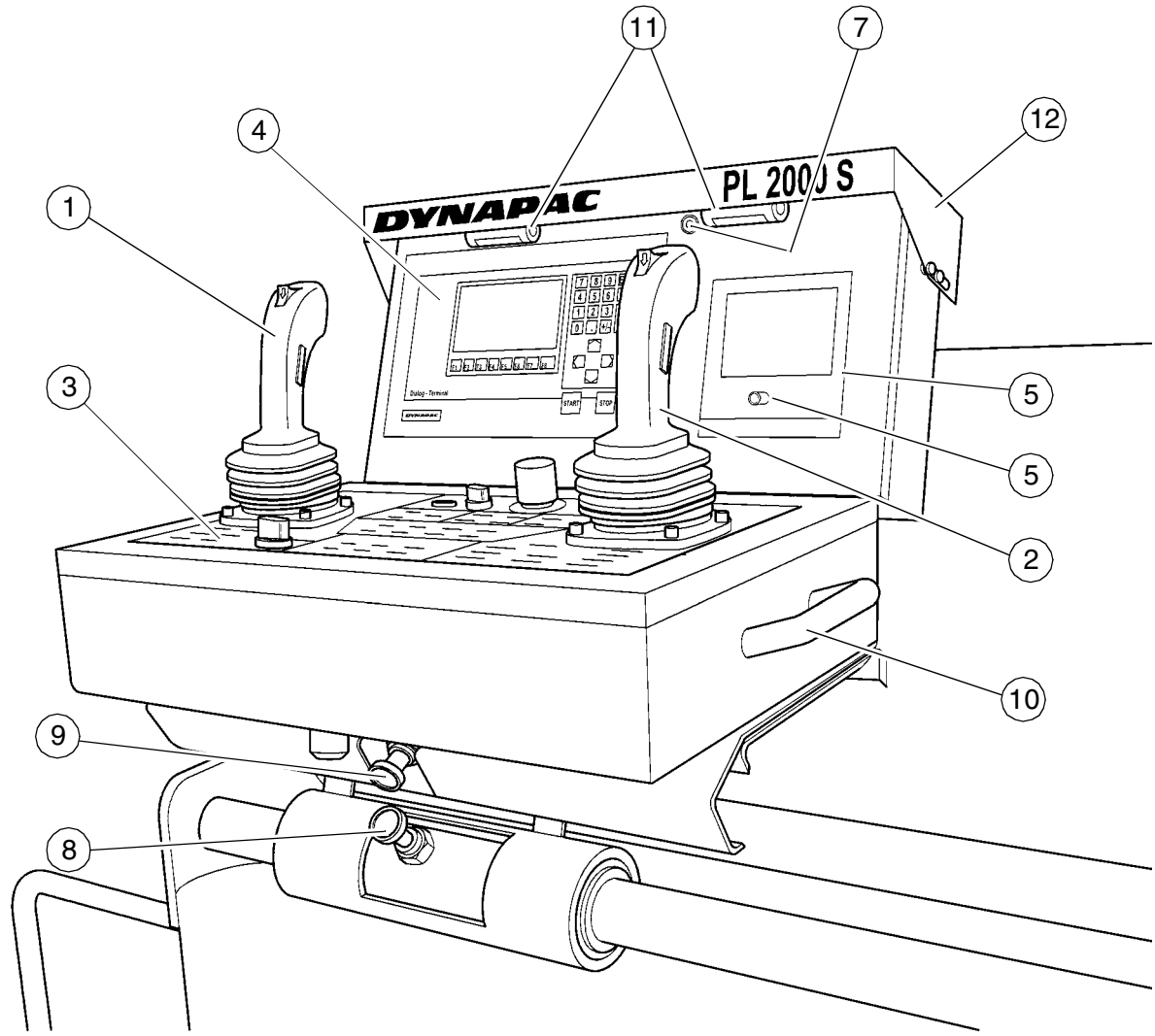
3.1 Control panel



Pult1neu.Tif

If the machine is fitted with a second, optional control panel, the order of the two control levers and their associated functions are the other way round on the additional control panel.
In such instances, many of the functions can only ever be implemented with a time delay. In this case, only commands from the control panel which first activates the control unit are carried out.
If overlaps occur, functions such as travel drive, steering, forwards travel and upper conveyor control are deactivated for safety reason. (Error message on display).

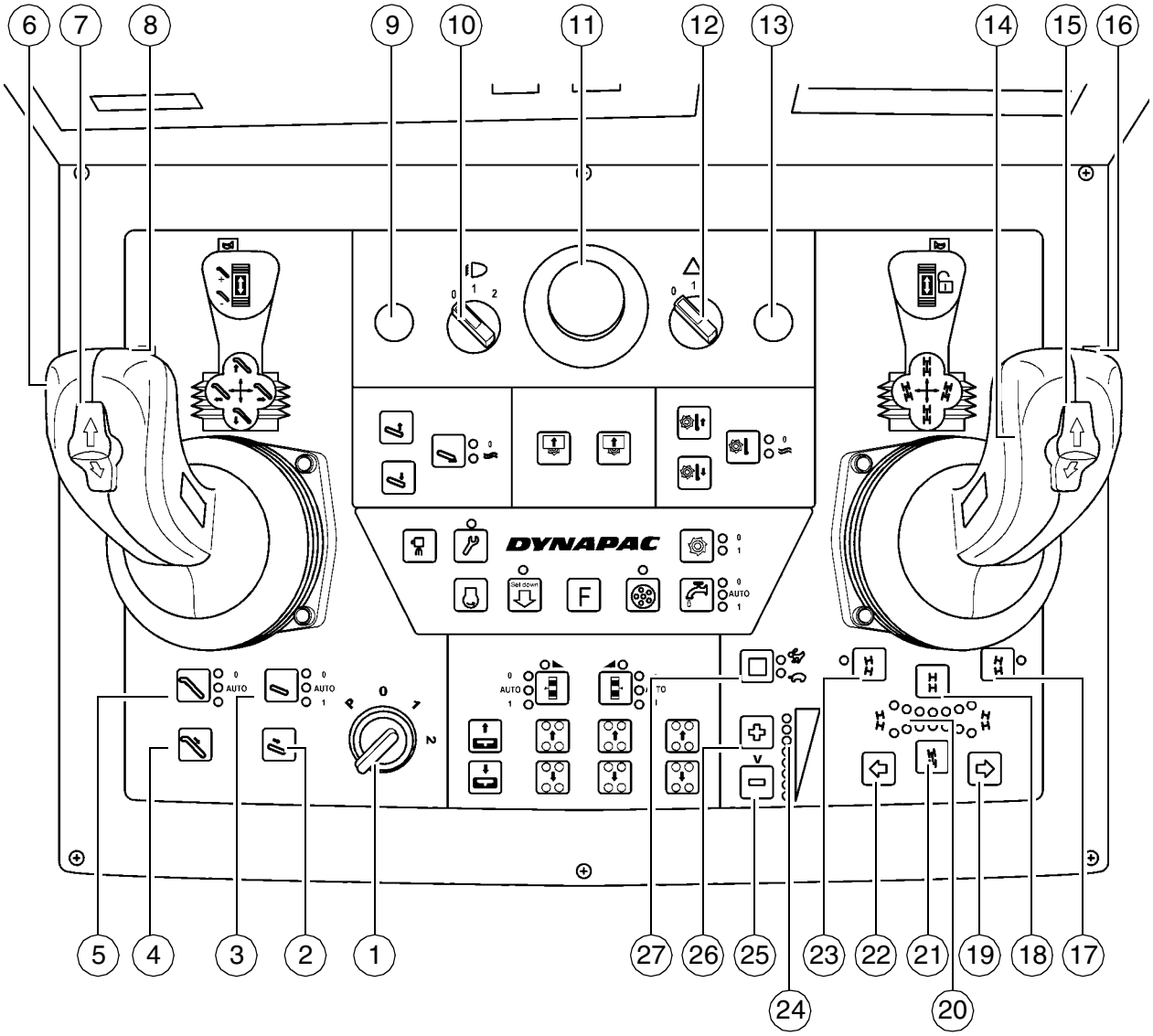
Pos.	Designation	Short description
1	Control lever upper conveyor	Controls the following functions of the upper conveyor "Swivel", "Raise", "Lower". It also provides infinitely variable control for the conveyor speed.
2	Control lever for travel drive	Is used after system is unlocked for the purposes of driving, steering and braking. In conjunction with the appropriate activated automatic function, when the lever is swivelled out, the Levelling unit, water spray and cooling system and the appropriate loading belt is activated or de-activated in neutral position.
3	Switching table	Consists of an appropriately labelled keypad with predefined push buttons for all work and inspection functions. The operating status of the main functions is displayed by means of LEDs. The system also includes: - ignition lock - rotary switch for work lighting and warning lamps - EMERGENCY STOP impact switch
4	Display indicator	Used in conjunction with the menu bar to display actual statuses, changes in setting values and to provide information about malfunctions
5	Monitor	Enables the driver to view certain concealed areas of the vehicle, i.e. areas which are otherwise outside the driver's range of vision. At the touch of a button, any one of four video camera in different positions can be selected in order to view the desired section.
6	Contrast-setting button	When the button is turned to the left or right, the monitor's contrast setting changes. Depending on the angle of light, the screen can be set to match the operator's needs.
7	Reset button	For accepting the display settings, such as contrast, light, dimmer and timer. The button must be pressed to accept and save settings if these have been changed.



Pult1neu.Tif

Pos.	Designation	Short description
8	Securing handle	To release and secure the operating panel when moving laterally to the desired side of the machine, and for releasing and securing the operating panel when raising or lowering the operating positions for standing or seated operation. STOP The position of the operating panel can only be adjusted if the machine is stationary.
9	Securing handle	To release and secure the operating panel when moving the operating panel beyond the outer edge of the machine. STOP The operating panel can only be adjusted if the machine is stationary.
10	Handle	Left and right on the operating panel for support during the positioning process. STOP The operating panel can only be adjusted if the machine is stationary.
11	Lighting	Two sheathed bulbs for lighting the operating panel
12	Anti-glare panel	Adjustable, protecting the display and monitor from bright sunlight

3.2 Switch panel



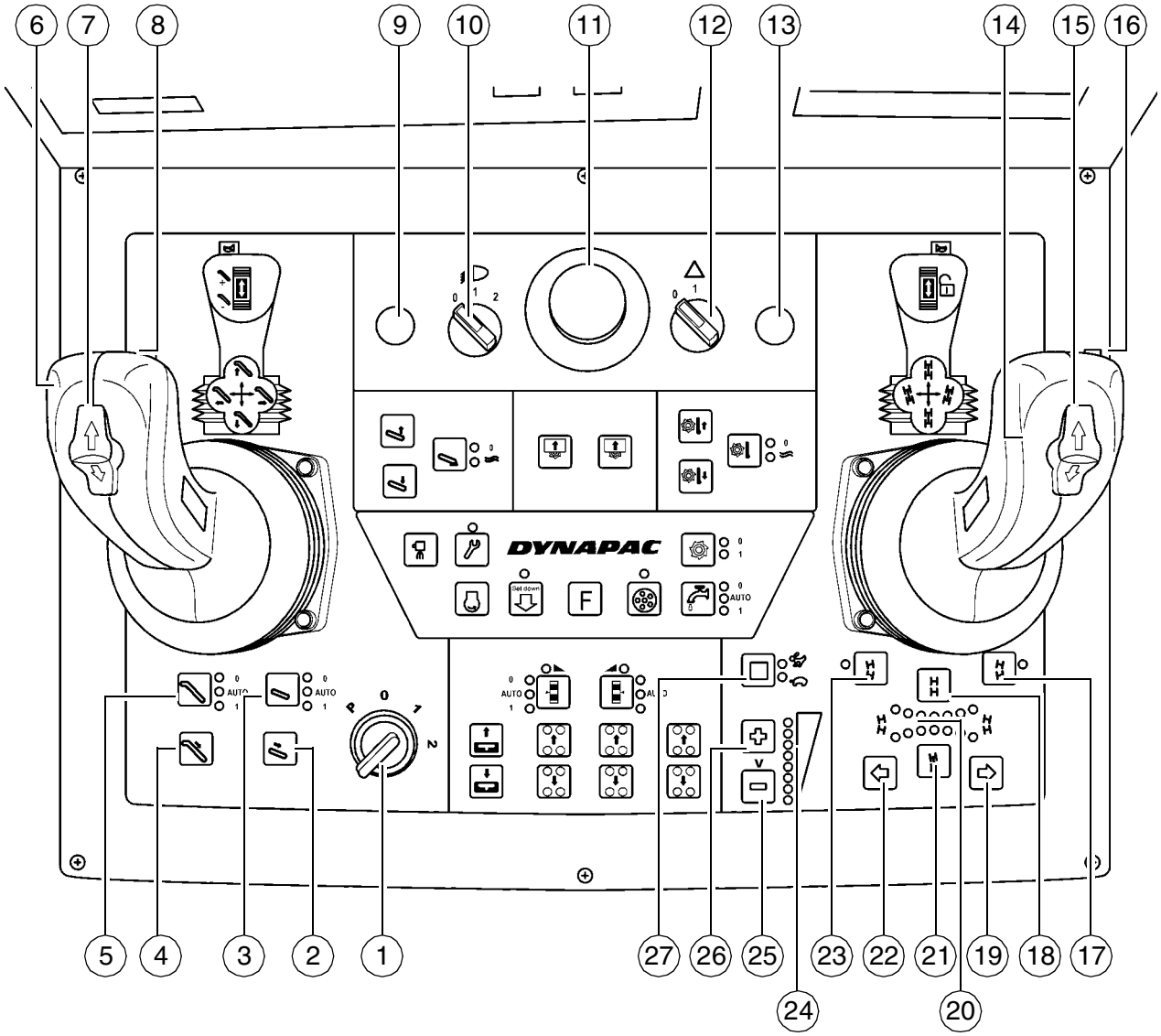
Pult2new_a.Tif

If the machine is fitted with a second, optional control panel, the order of the two control levers and their associated functions are the other way round on the additional control panel.

In such instances, many of the functions can only ever be implemented with a time delay. In this case, only commands from the control panel which first activates the control unit are carried out.

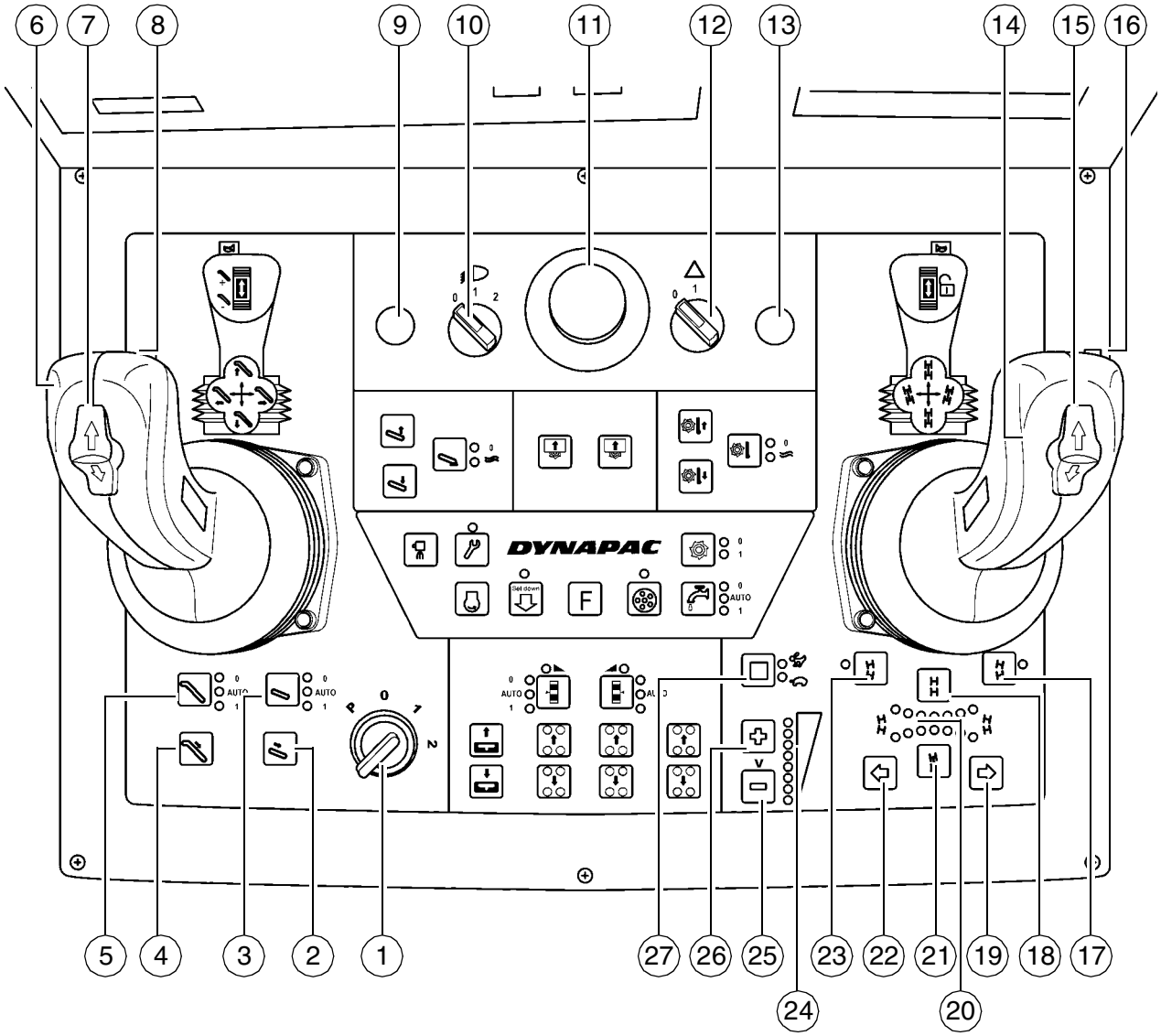
If overlaps occur, functions such as travel drive, steering, forwards travel and upper conveyor control are deactivated for safety reasons. (Error message on display).

Pos.	Designation	Short description
1	Ignition lock	Key positions: - P : Lighting active + hazard flasher can be engaged - 0 : Ignition OFF - 1 : Ignition ON - 2 : Starter function ☞ The engine can only be started if buttons have not been pressed and control levers are not actuated. All buttons are reset if the operator attempts to start the engine. ☞ Key can only be removed in positions P and O.
2	Reversing mode lower conveyor	At the touch of a button, the direction of the lower conveyor is switched over to reversing mode.
3	Mode lower conveyor	There is a choice of three switch positions: - 0 : Transport function for lower conveyor OFF - AUTO : transport function is linked to the control lever. The lower conveyor only starts when the milling procedure begins. The lower conveyor stops or overruns when the milling procedure is interrupted or ended. - 1 : Transport function of the lower conveyor in forwards direction ON ☞ At the touch of a button, the system switches between functions 0 and AUTO. When the button is pressed down for an extended period, function 1 is activated. ☞ The engaged function is confirmed by LED.
4	Reversing mode upper conveyor	At the touch of a button, the transport direction of the upper conveyor is switched over to reversing mode.



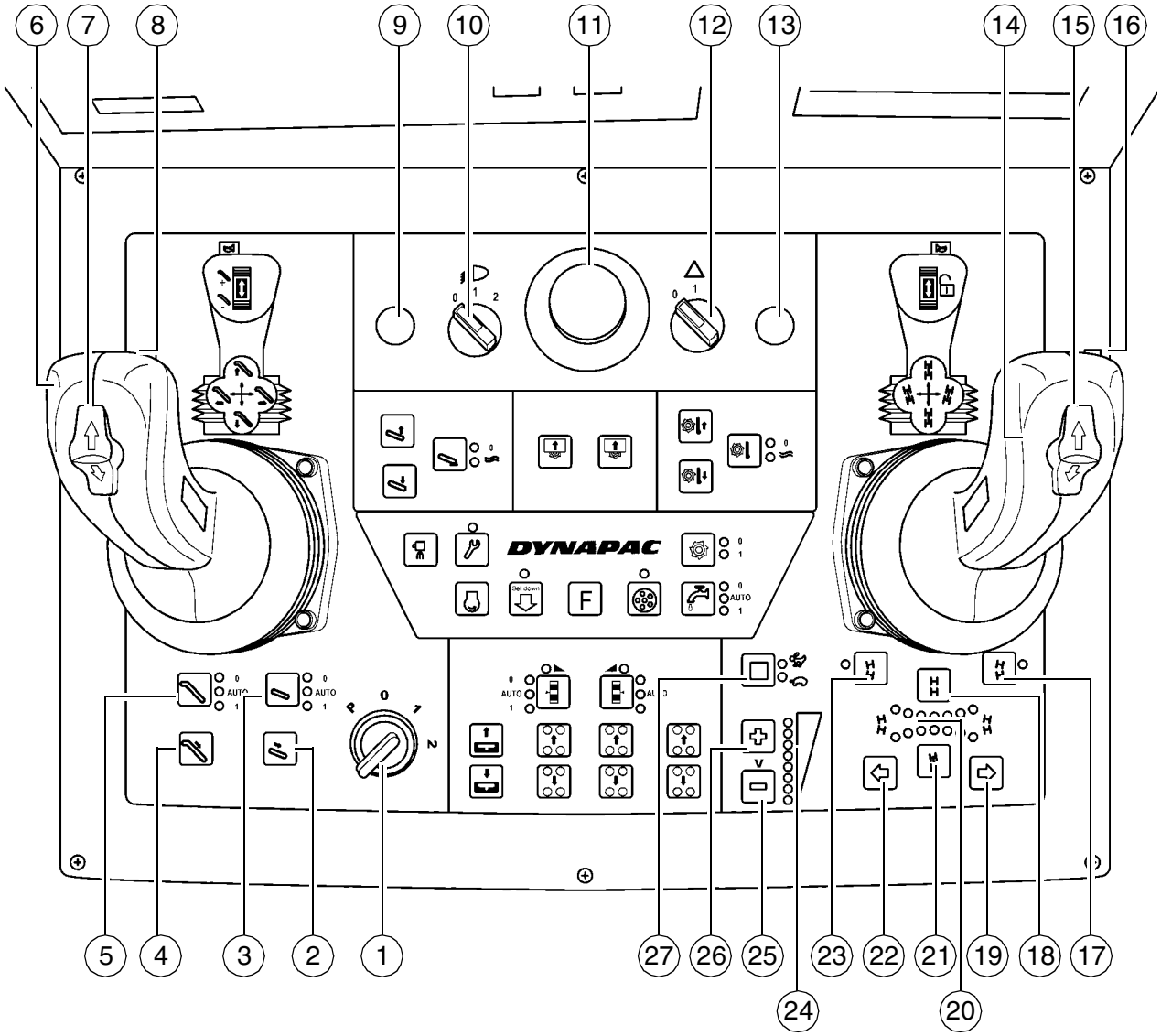
Pult2new_a.Tif

Pos.	Designation	Short description
5	Mode upper conveyor	Three switch positions can be selected: - 0 : upper conveyor transport function OFF - AUTO : transport function is linked to the control lever. The upper conveyor only starts when the milling procedure begins. The upper conveyor stops or overruns when the milling procedure is interrupted or ended. - 1 : transport function of upper conveyor in forwards direction ON ☞ At the touch of a button, the system switches between functions 0 and AUTO. When the button is pressed down for an extended period, function 1 is activated. ☞ The engaged function is confirmed by LED.



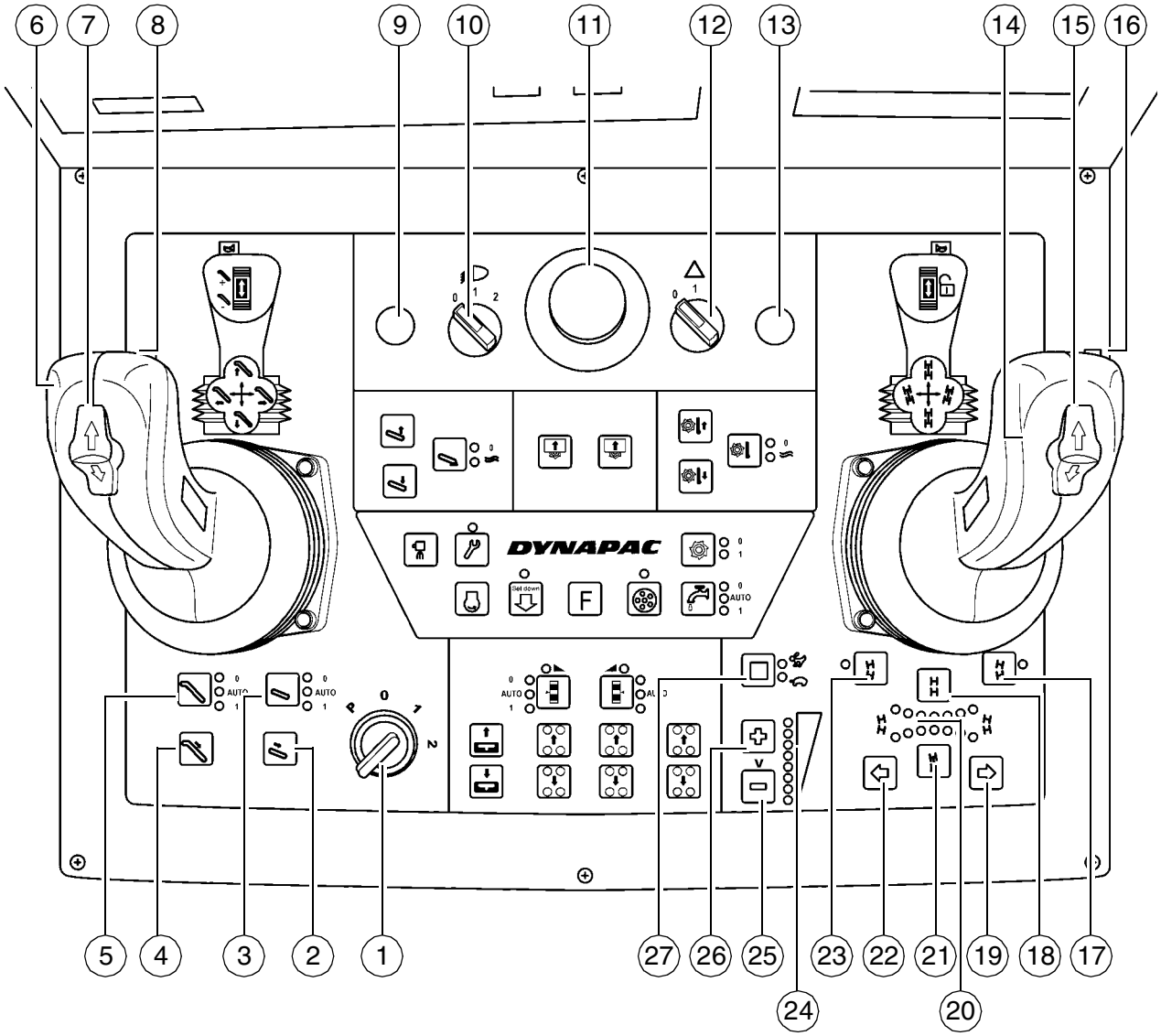
Pult2new_a.Tif

Pos.	Designation	Short description
6	Control lever upper conveyor	Dual-axis control lever for moving the lower conveyor: - Swivel direction, left: swivels the upper conveyor to the left - Swivel direction, right: swivels the upper conveyor to the right - Swivel direction forwards: lowers the upper conveyor - Swivel direction backwards: raises the upper conveyor ☞ The upper conveyor is moved continuously while the control lever is swivelled in the appropriate direction. The speed depends on the deflection angle of the control lever.  Ensure that no-one is standing in the danger area beside the upper conveyor.
7	Slide switch	For simultaneous adjustment of the transport speed of lower conveyor and upper conveyor. - Slide switch into forwards position: Increases speed - Slide switch into backwards position: Reduces speed ☞ Adjustment is only possible while the conveyor belt is running ☞ The speed is adjusted continuously from the maximum to the minimum value while the slide switch is being moved in the appropriate direction. Minimum value is the maximum value of the lower conveyor.  Select a speed which prevents any chippings from spraying off the conveyor accidentally, risking injury to people or causing other forms of damage.
8	Horn	Use when danger threatens and as an acoustic signal when setting off!
9	Not assigned	



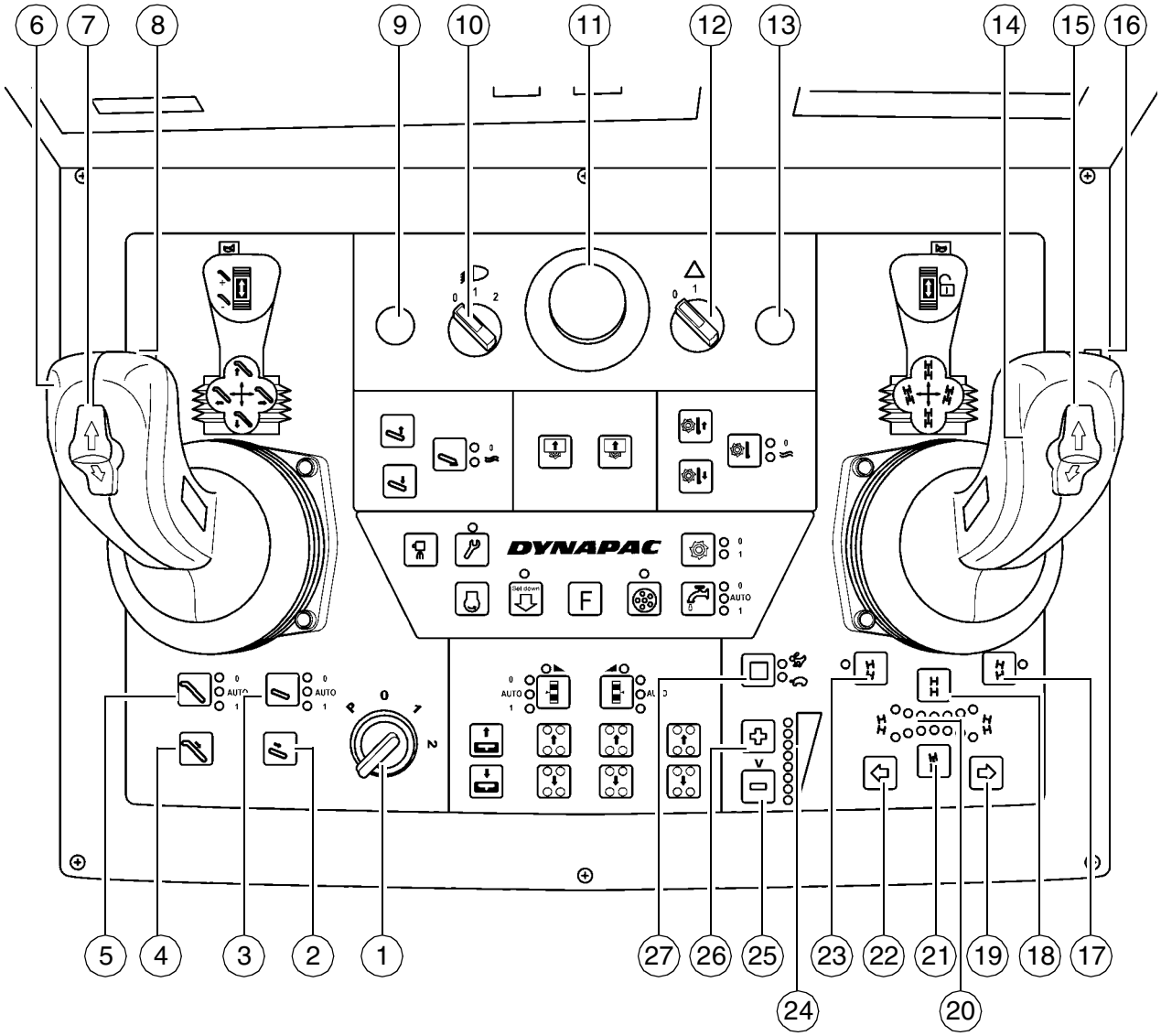
Pult2new_a.Tif

Pos.	Designation	Short description
10	Light switch	Three switch positions can be selected: - 0 : Light OFF - 1 : Travel lighting ON (headlights, tail lights, operating panel lighting) - 2 : Work lighting ON (working lights, tail lights, rotary beacon, operating panel lighting)
11	EMERGENCY STOP button	Press in emergencies (people in danger, risk of collision etc.)! - The engine, drive units and steering are disengaged whenever the EMERGENCY STOP button is pressed. No movement, e.g. of the lower conveyor, is then possible! Risk of accident! - To restart the engine, all EMERGENCY STOP buttons must be in the upright position.
12	Warning lights	Two switch positions can be selected: - 0 : Warning lights OFF - 1 : Warning lights (hazard flashers, rotary beacon) ON ☞ Switch on for safety on roads
13	not assigned	



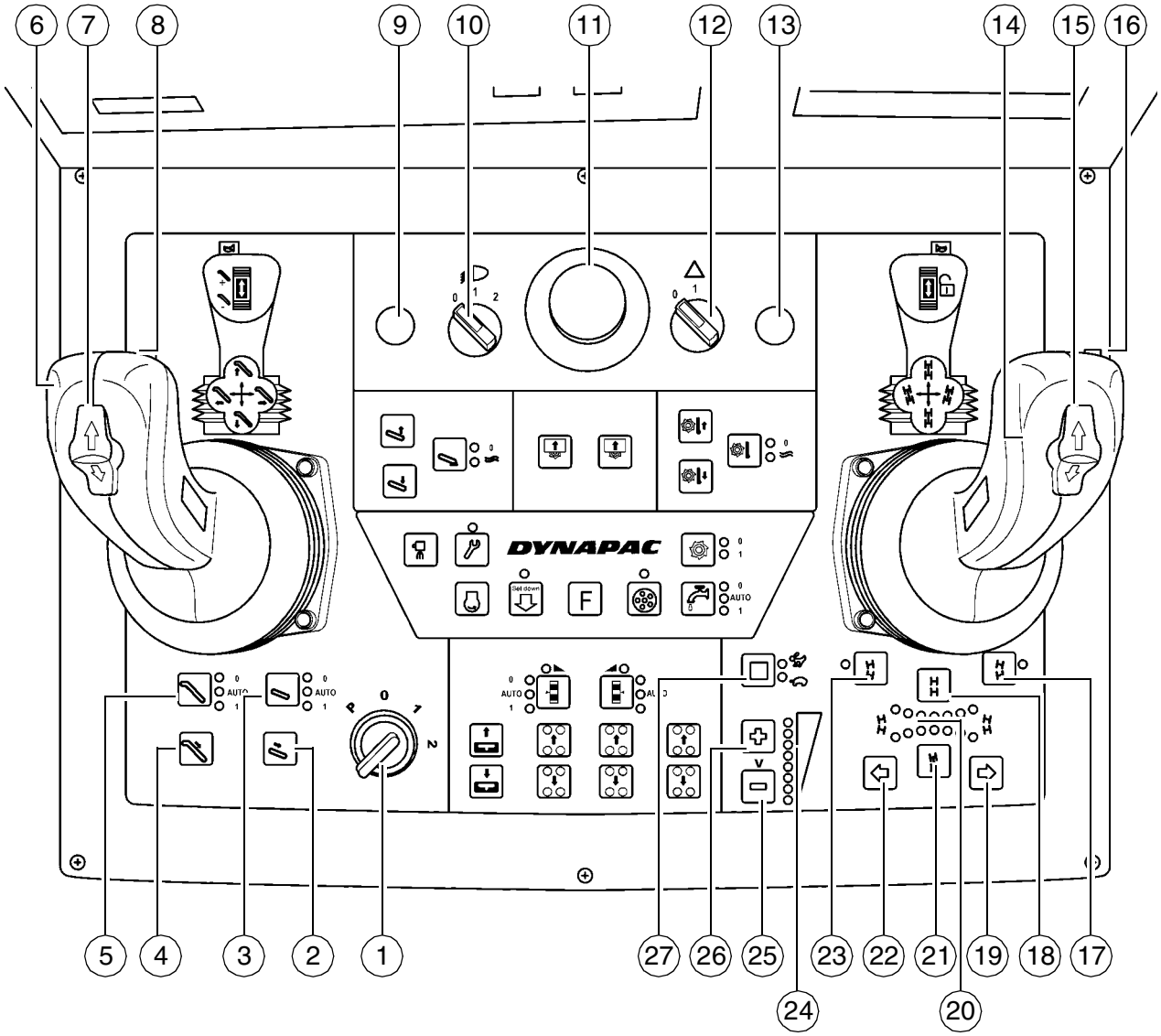
Pult2new_a.Tif

Pos.	Designation	Short description
14	Control lever Travel drive	Dual-axis control lever for controlling the traction. Steering is transmitted electrohydraulically. - Swivel direction left: the machine is steered to the left via the front axle when steering mode is deactivated and by both axles when cornering mode, crab steering and straight-ahead are defined. - Swivel direction right: Turns the vehicle to the right - Swivel direction forwards: Drives the vehicle forwards direction. - Swivel direction backwards: Drives the vehicle in reverse direction. During this steering movement, the milling drum drive is disengaged. ☞ Travel drive steering movements can be performed in all control lever positions even in zero position. Forwards and reverse travel is only possible when swivelling the control lever if the slide switch was previously moved out of its neutral position (sensing signal). ⚠ Vehicle speed is proportional to the angle of the control lever. Large angle = higher speed. Complete extension means max. pre-selected speed. ☞ When reversing, an acoustic signal sounds. If the vehicle is fitted with the optional video system, the reverse travel camera is automatically engaged. STOP Ensure that no-one is standing in the danger area.



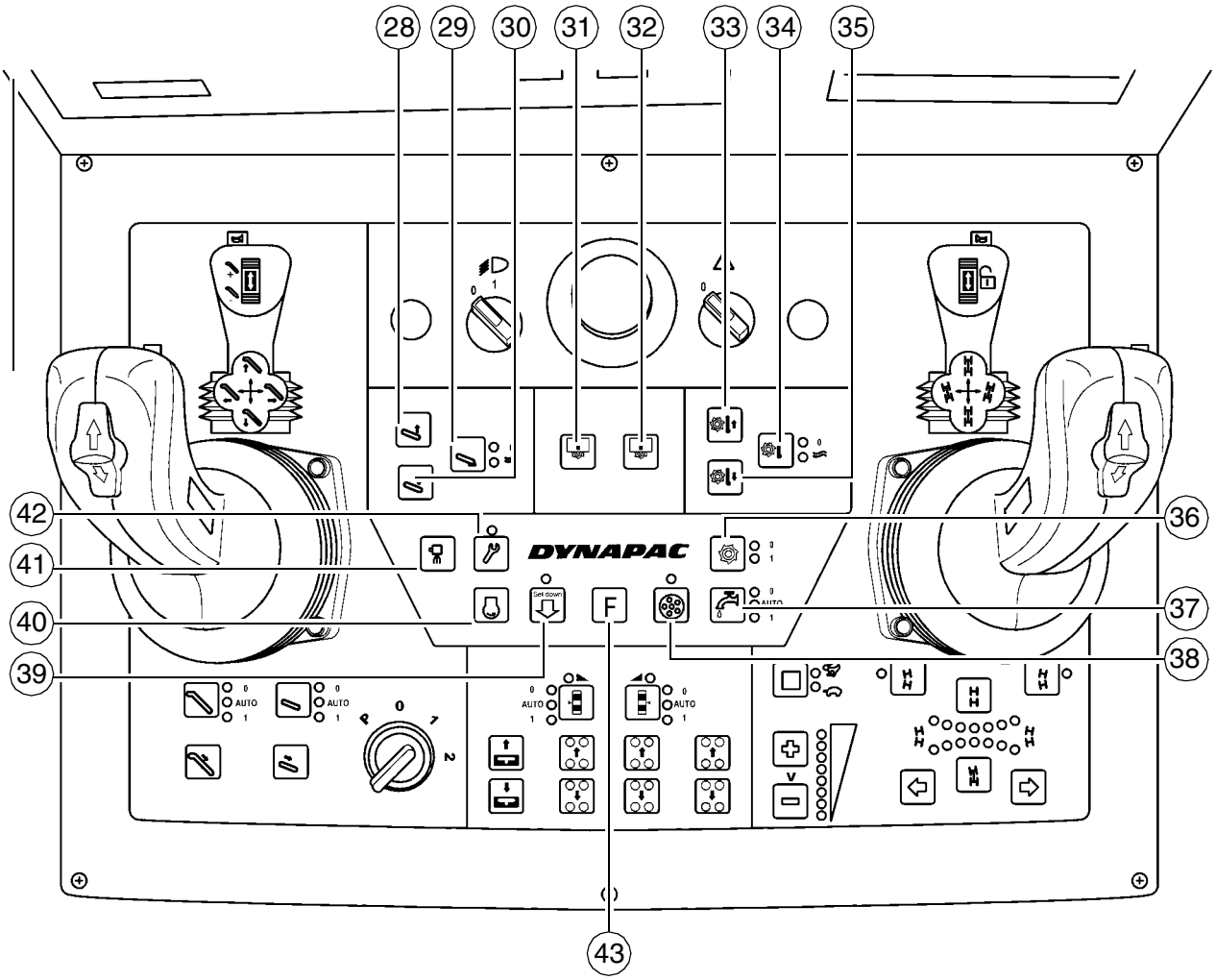
Pult2new_a.Tif

Pos.	Designation	Short description
15	Slide switch	Used for electrical locking / unlocking of the travel drives. To unlock, the switch must be slid forwards. When unlocking, the switch slips back into its neutral position once released. Each time the control lever is pulled over the zero position, the travel drives are locked again. If the machine's direction of travel is to be changed, the slide switch must be pressed again. When pressed, the drive is unlocked for 5 seconds and the engine speed increased.
16	Horn	Use when danger threatens and as an acoustic signal when setting off!
17	Button for "Crab steering"	Setting for drive mode of track drives. Front and rear drives are powered simultaneously. ☞ The engaged function is confirmed by LED. ☞ The function can only be activated with a delay (approx. 1 minute after program start).
18	Straight-ahead travel on front and rear drive units	All drive units are swivelled from their present steering position into the straight-ahead position. The machine is then only steered by the front axle. ☞ The function can only be activated with a delay (approx. 1 minute after program start).
19	Steering rear drive units	The drive units are swivelled to the left for as long as the button remains depressed and remain in the position reached once the button is released. ☞ If this function is engaged, steering mode is deactivated.
20	Position diodes	Indicate the present position of the front and rear drive units. ☞ The function can only be activated with a delay (approx. 1 minute after program start).



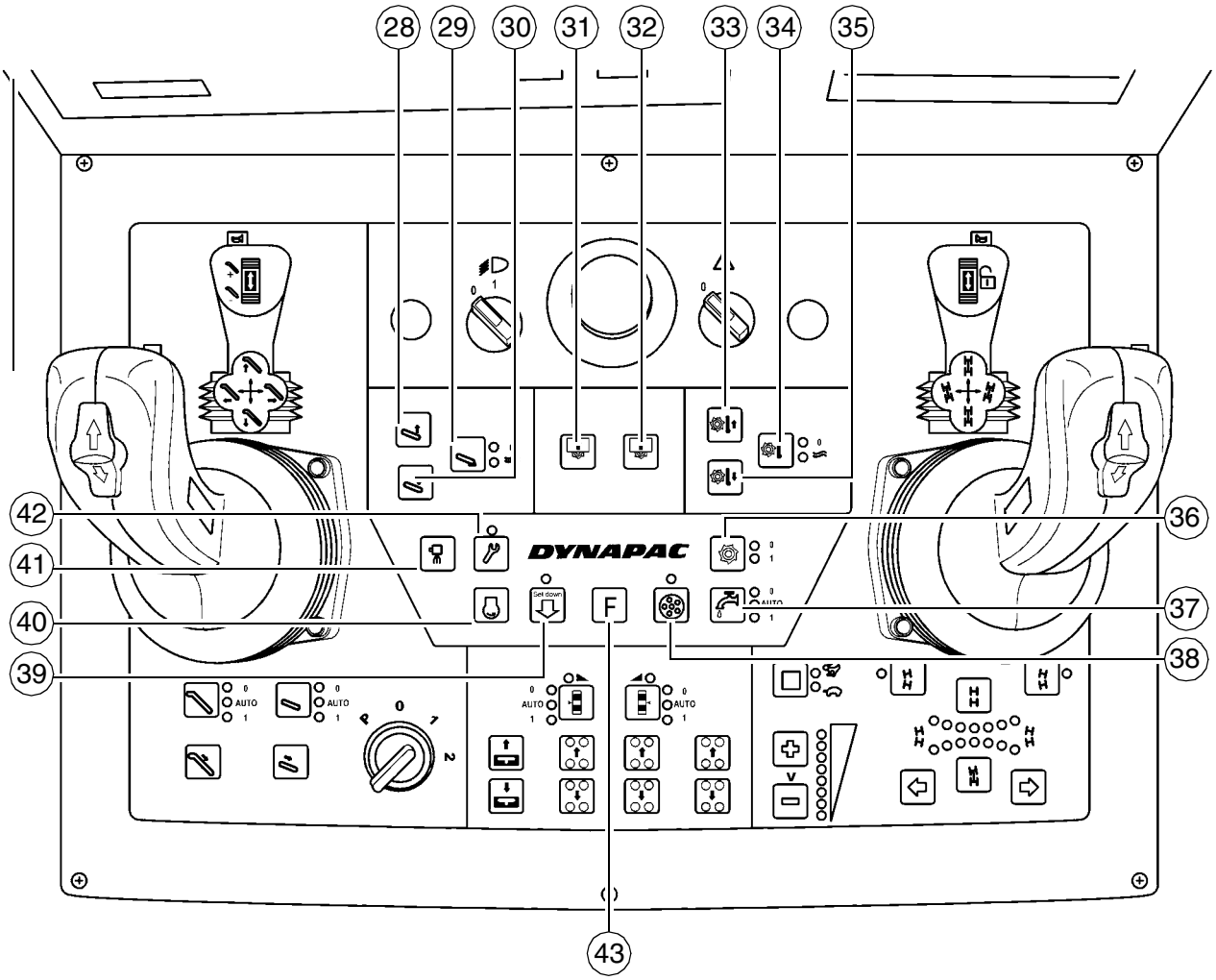
Pult2new_a.Tif

Pos.	Designation	Short description
21	Straight-ahead travel for rear drive units	Both drive units are swivelled out of their present steering positions into the straight-ahead position. The machine is then only steered by the front axle. ☞ The function can only be activated with a delay (approx. 1 minute after program start).
22	Steering of the rear drive units	The drive units are swivelled to the right for as long as the button is depressed and remain in the position reached once the button is released. ☞ If this function is engaged, steering mode is deactivated.
23	Co-ordinated cornering mode	Makes co-ordinated cornering possible. Front and rear steering of the vehicle can be engaged at the touch of a button. ☞ Engaged functions are confirmed by LED.
24	Speed indicator	LEDs tend to indicate the nominal travel speed of the vehicle. ☞ The roadspeed is indicated on a display panel.
25	Speed adjustment (-)	Reduces pre-selected nominal speed in the working gear
26	Speed adjustment (+)	Increases the preselected nominal speed in the working gear.
27	Travel drive fast / slow	Two switch positions can be selected: - Hare: Transport speed - Tortoise: Working speed ☞ The engaged function is confirmed by LED. ☞ The speed indicator changes from m/min to km/h. When changing from operating speed to transport speed, levelling and the milling drum drive are automatically deactivated.



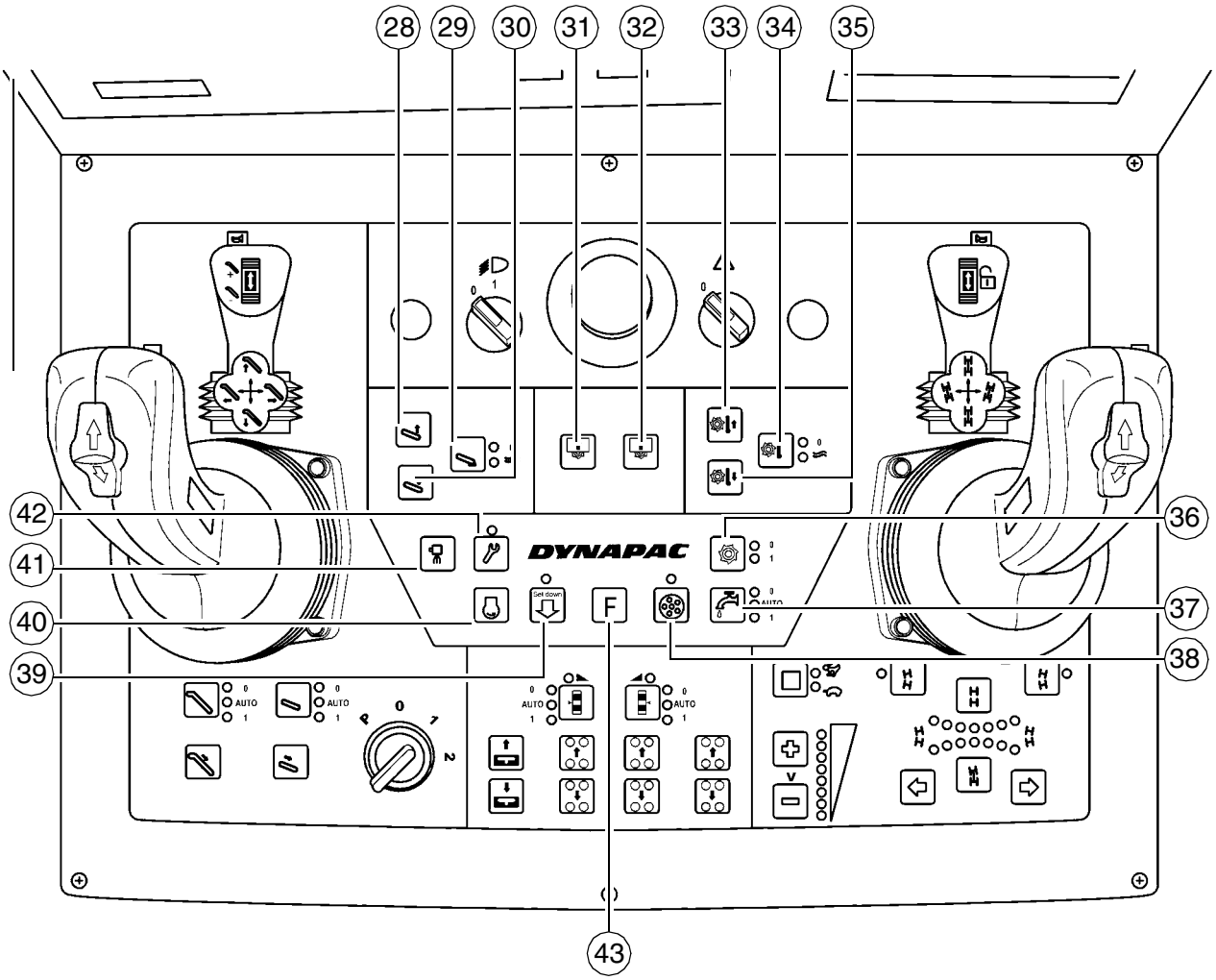
Pult2new_a.tif

Pos.	Designation	Short description
28	Raising the sliding shoe	While the button is being pressed, the sliding shoe continues being raised until it reaches its upper limit position. STOP Danger resulting from raised loads. Do not enter the danger area.
29	Selector button for sliding shoe	Two switch settings can be selected: - 0 : sliding shoe blocked - remains in the position desired - Ý: Sliding shoe in float position (applied load function or relief)) ☞ The engaged function is confirmed by LED.
30	Lowering the sliding shoe	While the button is being pressed, the sliding shoe is lowered continuously until it reaches its lower limit position. ⚠ The sliding shoe may raise the machine.
31	Raising left side board	While the button is being pressed, the left side board is raised continuously until it reaches its upper limit position. When the button is released, the side board automatically returns to its limit position. ☞ When pressing this button, the automatic Levelling device is set to "Standby"! With milling drum housing open: - 1. Press button: side board is raised. - 2. Press button: side board is lowered. STOP Danger resulting from raised loads. Do not enter the danger area. STOP If the engine is switched off, the side board slumps. STOP If the milling drum housing is closed, the side board is lowered automatically.



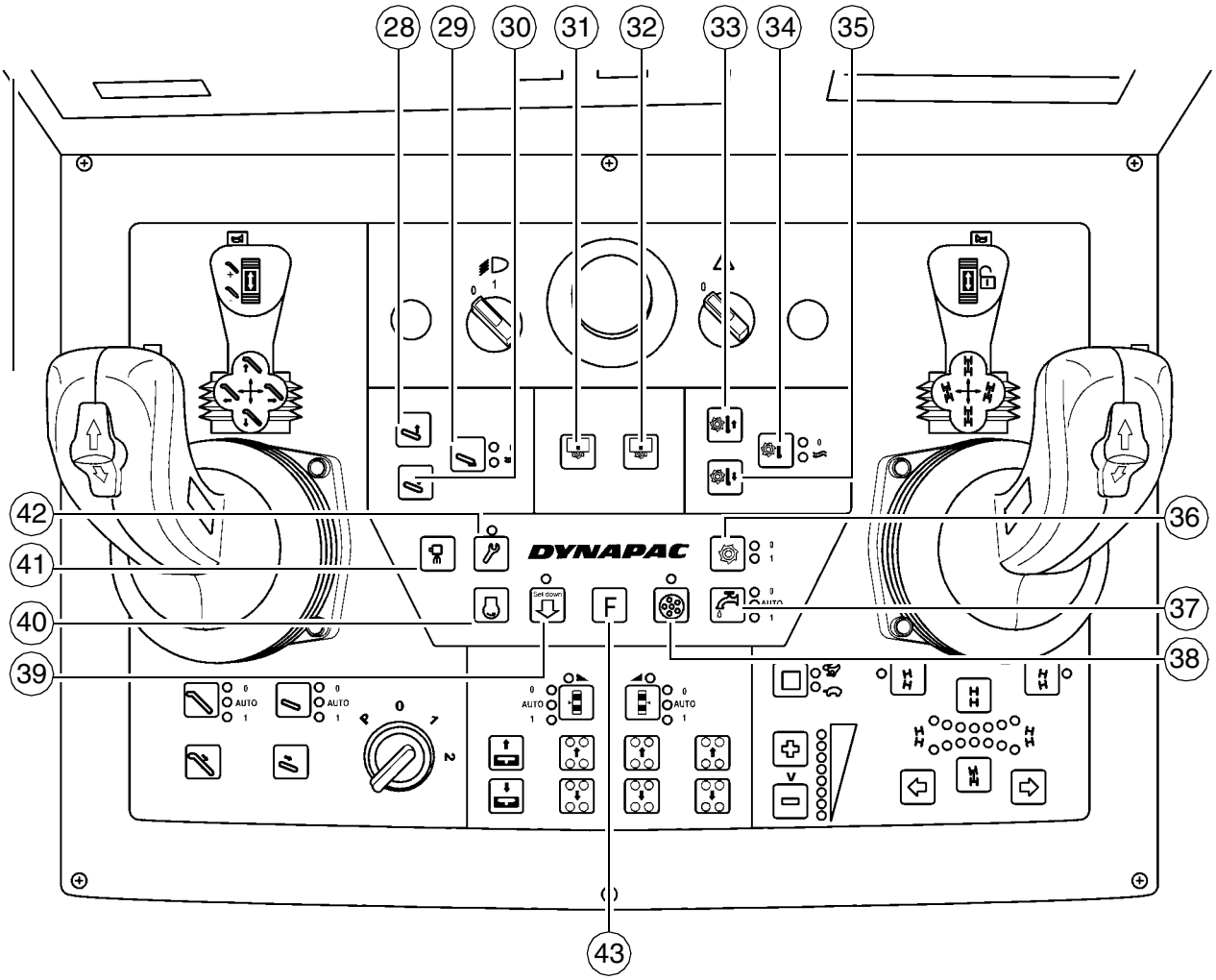
Pult2new_a.tif

Pos.	Designation	Short description
32	Raising right side board	While the button is being pressed, the right side board is raised continuously until it reaches its upper limit position. When the button is released, the side board lowers automatically back down to the lower limit position. ☞ When pressing this button, the automatic Levelling device is set to "Standby"! With milling drum housing open: - 1. Press button: side board is raised. - 2. Press button: side board is lowered. STOP Danger resulting from raised loads. Do not enter the danger area. STOP If the engine is switched off, the side board slumps. STOP If the milling drum housing is closed, the side board is lowered automatically.
33	Raise moldboard	While the button is being pressed, the moldboard is raised continuously until it reaches its upper limit position. STOP Danger resulting from raised loads. Do not enter the danger area.
34	Selector switch Moldboard	Two switch positions can be selected : - 0 : Moldboard blocked - Ý : Moldboard in float position (applied load function or relief) ☞ The engaged function is confirmed by LED. ☞ During profiling operations, the moldboard should always be in float position. Under certain working conditions, it is however possible for the moldboard to dig into the substrate. This problem can be averted by using the blocking function. This can be avoided through use of the blocking or relief function.
35	Lower moldboard	While the button is being pressed, the moldboard is lowered continuously until it reaches its lower limit position. ⚠ The moldbord may raise the machine.



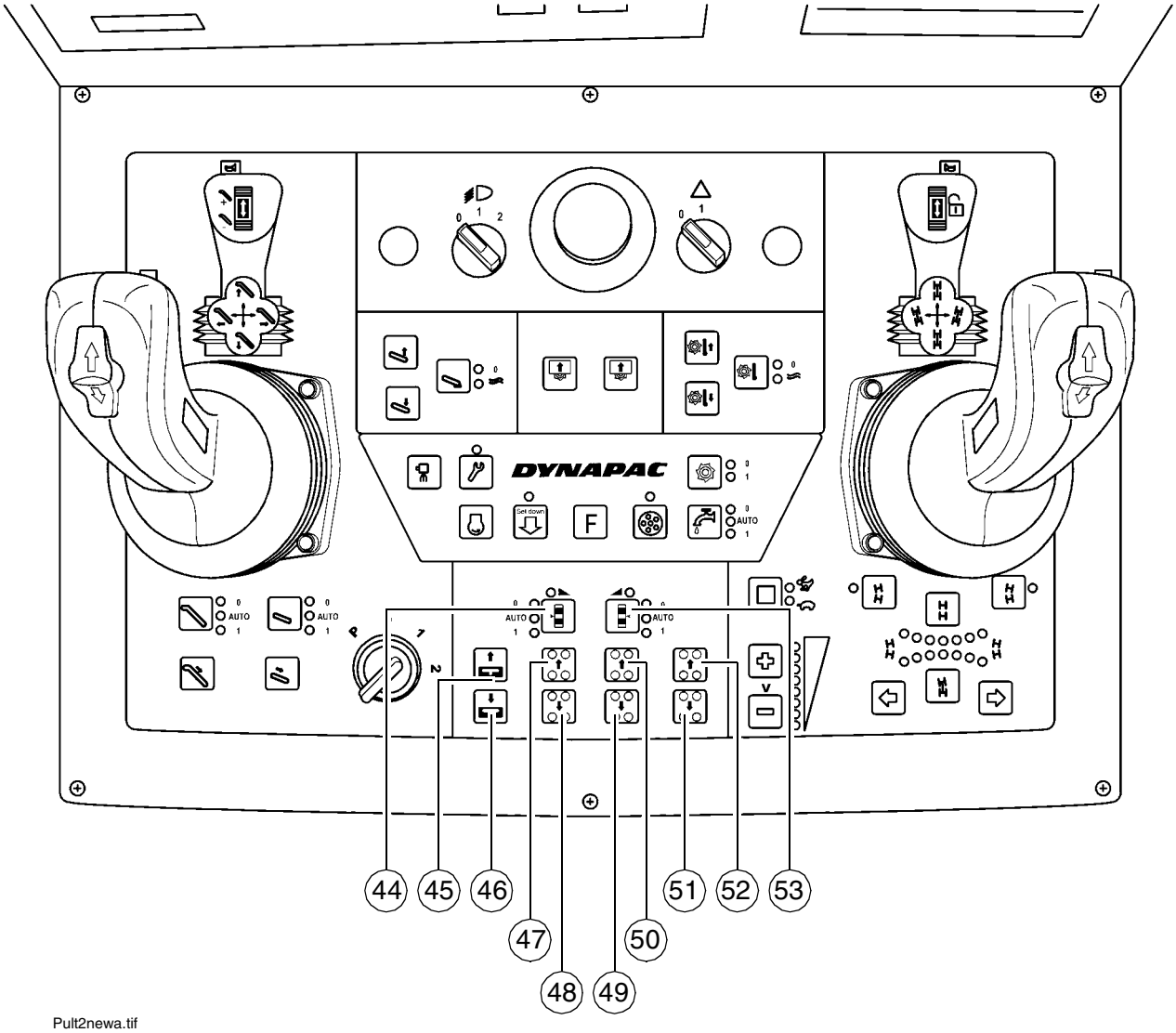
Pult2new_a.tif

Pos.	Designation	Short description
36	Milling drum ON / OFF	Two switch positions can be selected : - 0 : milling drum drive OFF - 1 : milling drum drive ON At the touch of a button the milling drum drive is switched on or off. ☞ The engaged function is confirmed by LED. ⚠ The milling drum drive can only be engaged at idle speed. ☞ The milling drum drive cannot be engaged if the drum flap is open (limit switch), or is disengaged automatically if this is open. ☞ The milling drum drive is disengaged automatically during transport or reverse travel and when raising the machine.
37	Water pump ON / OFF	Three switch positions can be selected : - 0 : Water pump OFF - AUTO : Water sprinkling is linked to the control lever. The water pump only pumps when the milling process starts. The adjustable overrun period is used to end pumping automatically when the milling work is interrupted or completed. Sprinkling is metered in accordance with the rate of machine feed. - 1 : Continuous sprinkling ☞ At the touch of a button, the system switches between functions 0 and 1. When the button is pressed down for an extended period, the AUTO function is activated. ☞ The engaged function is confirmed by LED. STOP This water is definitely not drinking quality! ☞ The button can also be used to operate the high-pressure cleaner. The pump must be switched over for work with the high-pressure cleaner on its high-pressure setting. This is done at the lower front control panel.



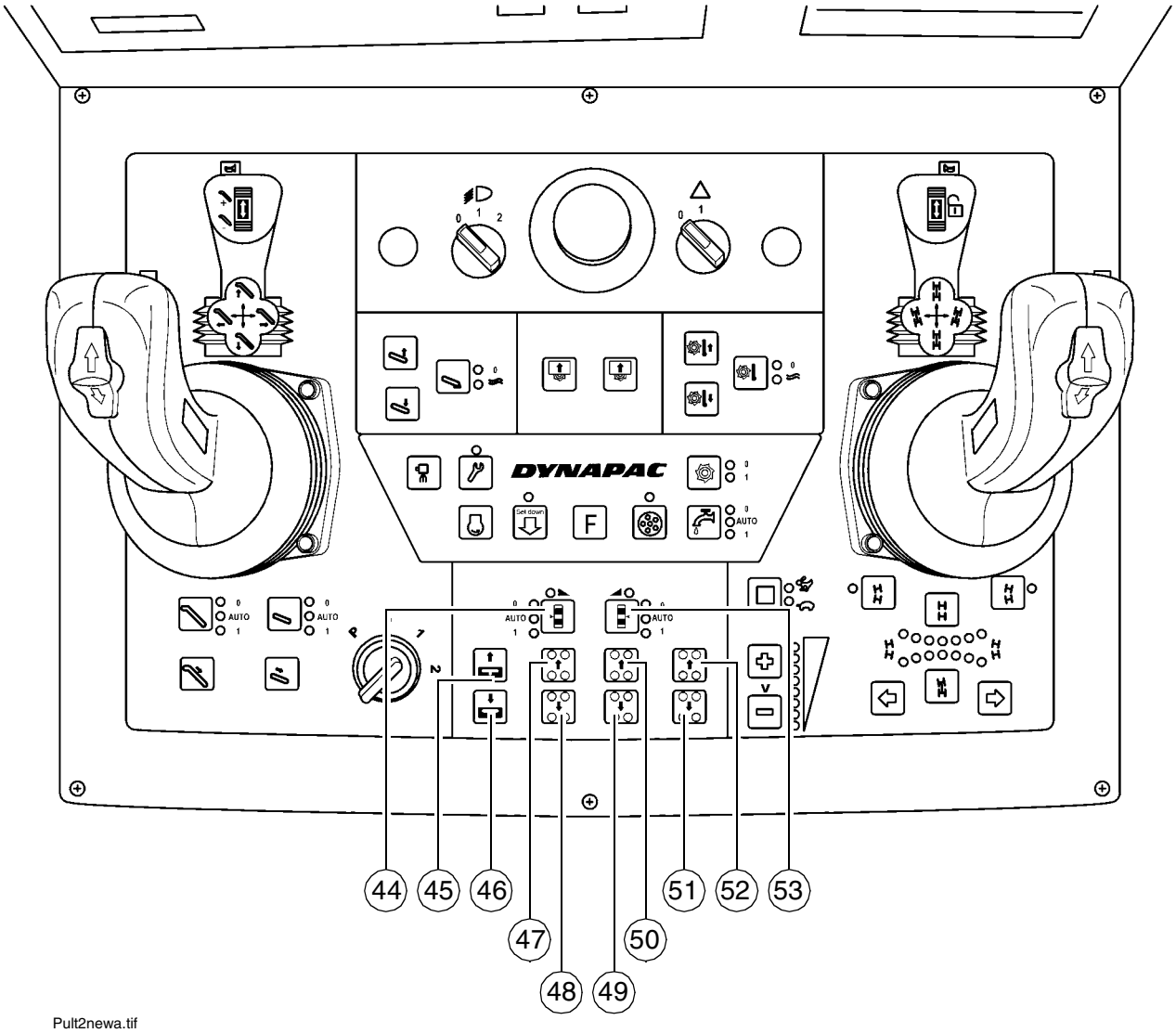
Pult2new_a.tif

Pos.	Designation	Short description
38	Extractor system (○) ON / OFF	This engages the extractor system beside the planing section, the material transfer point between lower and upper conveyors and the discharge area on the upper conveyor. ☞ The engaged function is confirmed by LED.
39	Set-up button (○)	As an aid for start of milling. When stationary, lowers the machine to the preselected grading depth regardless of whether the control lever is released or not. ☞ Activated function is confirmed by LED. ⚠ All automatic functions needed for milling operations must have been set beforehand!
40	Engine speed setting	At the touch of a button a menu for engine speed adjustment appears on the LC display.
41	Video monitoring (○)	This button can be pressed to switch from one monitoring camera to another. Output appears on the monitor (○) on the main operating panel.
42	Service mode	This button can be pressed to raise the engine speed to a specified value. STOP Only ever engage service mode for maintenance work or for repair work.
43	Function key	Press function key together with any of the following keys - 3 - 5 - 29 - 31 - 32 - 34 - 37 - 44 - 53 to call up a settings menu on the LC display in which the appropriate function can be altered or adjusted. ☞ The keys for adjustable functions are identified on the main operating panel by a double frame.



Pult2newa.tif

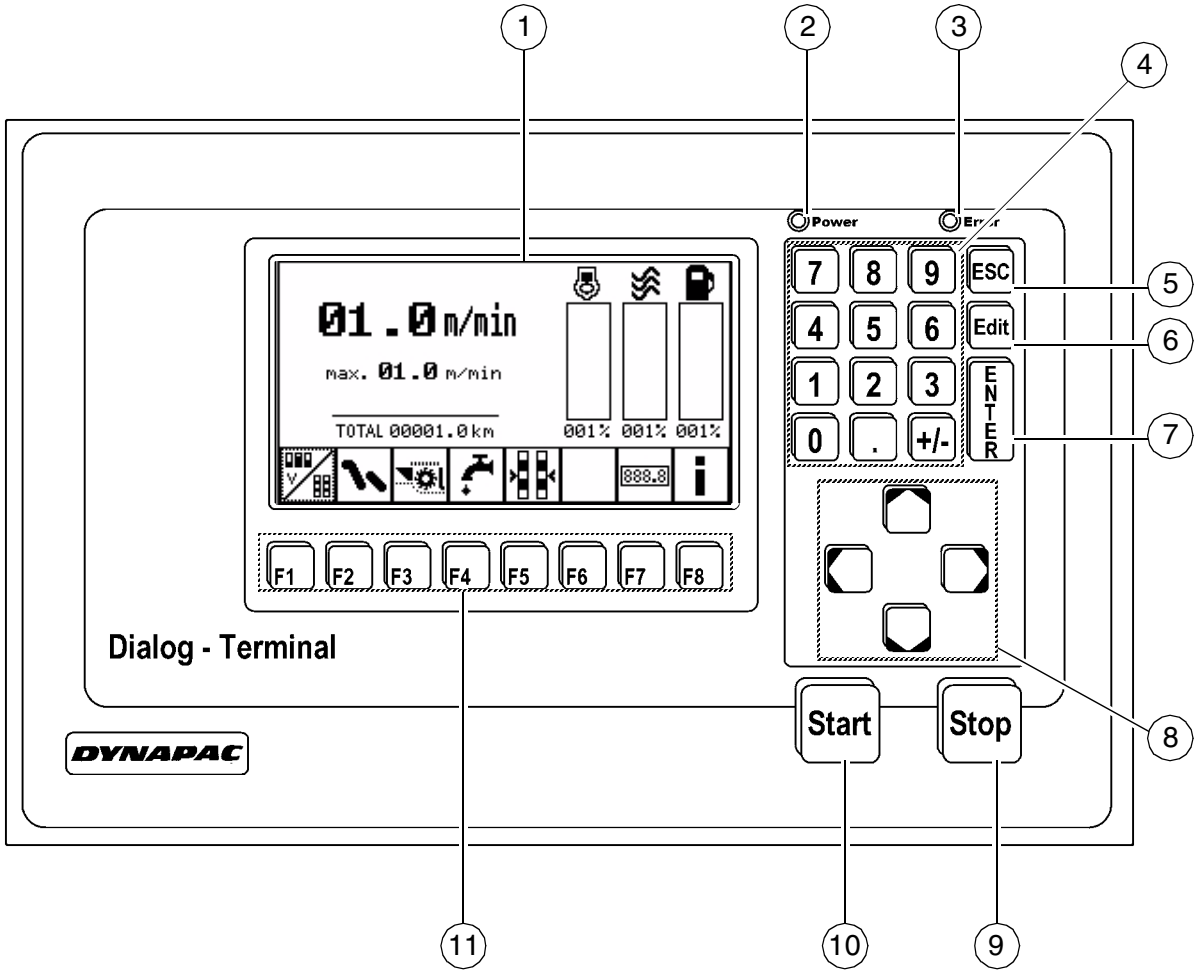
Pos.	Designation	Short description
44	Levelling function, left	Three switch positions can be selected : - 0 : Levelling OFF - AUTO : Levelling engages automatically when the control lever for the travel drive is fully extended (milling mode) - 1 : Levelling ON Levelling active, responds regardless of the control lever (primarily for service mode) ☞ LED above the key indicates which device is connected to the Levelling unit: LED on = slope controller, off = height controller ☞ At the touch of a button, the system switches between functions 0 and AUTO, When the button is pressed down for an extended period, function 1 is activated. ☞ The engaged function is confirmed by LED.
45	Raising vehicle	While the button is being pressed, all traction units are extended continuously until they reach their limit position. ☞ When this function is active, levelling, the milling drum drive, water sprinkling and the conveyor belts are disengaged.
46	Lowering the vehicle	While the button is being pressed, all traction units are retracted continuously until they reach their limit position. ☞ Levelling is disengaged automatically during this function.
47	Raising front left side of vehicle	While the button is being pressed, the front left traction unit is extended continuously until it reaches its limit position. ☞ When this function is active, levelling is disengaged automatically on the left side.
48	Lowering front left side of vehicle	While the button is being pressed, the front left traction unit is retracted continuously until it reaches its limit position. ☞ When this function is active, levelling is disengaged automatically on the left side.



Pult2newa.tif

Pos.	Designation	Short description
49	Raising front right side of vehicle	While the button is being pressed, the front right traction unit is extended continuously until it reaches its limit position. ☞ When this function is active, levelling is disengaged automatically on the right side.
50	Lowering front right side of vehicle	While the button is being pressed, the front right traction unit is retracted continuously until it reaches its limit position. ☞ When this function is active, levelling is disengaged automatically on the right side.
51	Raising rear of vehicle	While the button is being pressed, the rear traction units are extended continuously until they reach their limit position.
52	Lowering rear of vehicle	While the button is being pressed, the rear traction units are retracted continuously until they reach their limit position.
53	Right-hand Levelling function	Three switch positions can be selected : - 0 : Levelling OFF - AUTO : Levelling switches automatically engage for the travel drive when the control lever is fully extended (Milling mode) - 1 : Levelling ON Levelling active, responds regardless of the control lever (primarily for service mode) ☞ LED above the button lights up to show which device is connected to the Levelling unit: LED on = slope controller, off = height controller ☞ At the touch of a button, the system switches between functions 0 and AUTO. When the button is pressed down for an extended period, function 1 is activated. ☞ The engaged function is confirmed by LED.

Display indicator and menu operation



Terminalnew.Tif

Pos.	Designation	Short description
1	LC display	Indicates various operating modes
2	Power LED	Lights up green when the vehicle ignition is switched on
3	Error LED	Lights up red whenever a hardware fault occurs.
4	Numerical keypad box	To enter digits
5	Escape key	For returning to the main menu.
6	not assigned	
7	Enter key	For saving a modified value. ☞ A Setup menu is called up by pressing the Stop and Start buttons together.
8	Cursor keypad	PgUp and PgDn keys can be used to alter a value continuously by holding down the button. The left and right arrow keys can be used for scrolling through the pages in the display's Setup screens
9	Stop key	☞ A Setup menu is called up by pressing the Enter and Start keys together.
10	Start key	☞ A Setup menu is called up by pressing the Enter and Start keys together.
11	Function keys	To operate the menus displayed and for adjustment options.

Basic settings on the display

Setup menu

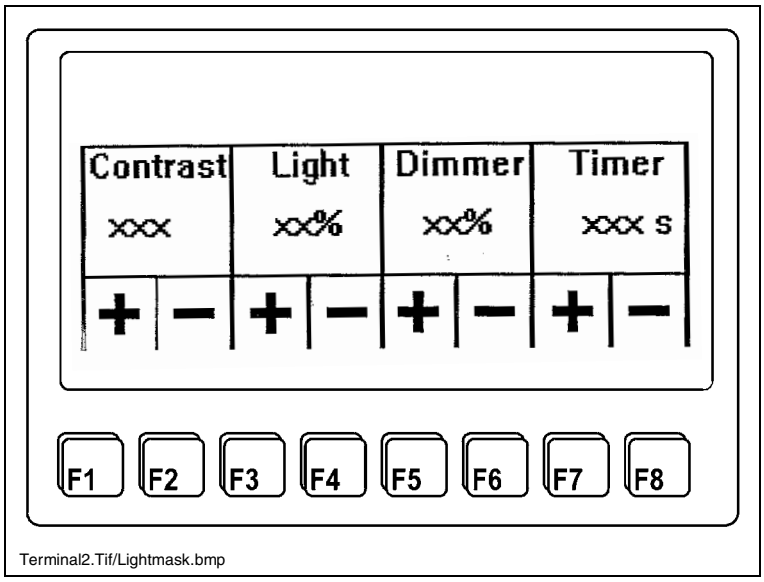
The Setup menu is called up by pressing the Stop, Start and Enter keys together. The left and right arrow keys can be used for scrolling through the pages in the display's Setup screens

☞ The Setup menu can only be quit in Setup screen 3 by pressing the Enter key. The modified values are then accepted.

The following variables can be set:

- Contrast
- Light
- Dimmer
- Timer
- Beep

Setup screen 1



Terminal2.Tif/Lightmask.bmp

Setup screen 1 is used for adjusting Contrast, Light, Dimmer and Timer on the display.

- Contrast: Contrast (0...255) can be altered using the appropriate keys until optimum contrast has been achieved.
- Light: The Light variable sets the background lighting level.
  Value range 0-99% can be set using the appropriate function keys
- Dimmer: The Dimmer variable can be used to automatically dim the background lighting, thereby extending the service life of the fluorescent tubes. Dimming is activated at the touch of a button after a Timer variable has expired. When a key is pressed again, the background lighting is returned to the set value (Variable Light). If no dimming is wished for or permissible, set Dimmer variable to 100 %. Settings are altered using the appropriate function keys.
- Timer: The Timer variable activates the display dimmer (0...255 s) after the last keystroke. This is set using the appropriate function keys.

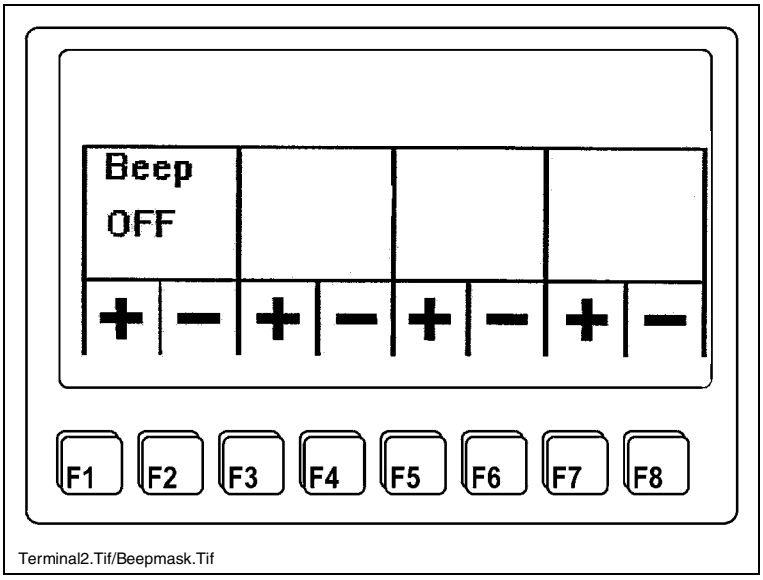
☞ Any changes made are only adopted once the reset button has been pressed.

Setup screen 2

Setup screen 2 is used for setting the Beep tone.

- Beep: The Beep variable (OFF/x sec) is used to set the tone duration of the installed piezo beeper which responds to a keystroke.
  The OFF display signifies that the beeper is switched off.

☞ Any changes made are only adopted once the reset button has been pressed.



Terminal2.Tif/Beepmask.Tif

Setup screen 3

Setup screen 3 displays information about the software being used.
Changes cannot be made in this mask.

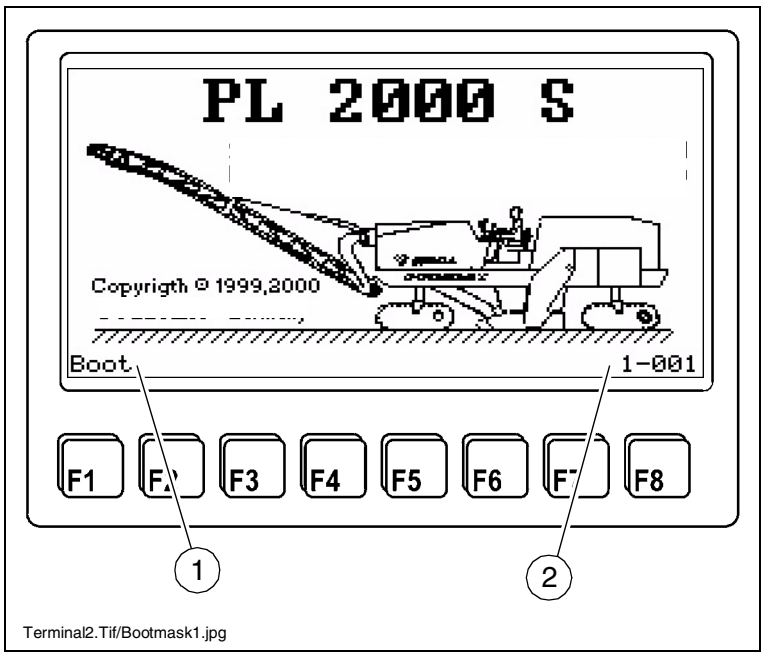
Operation, displays and setting options in the menu

Using the function keys in the display, a large number of job-specific items of data can be set or called up in the various displays.

Once the ignition has been set, the boot screen appears on the display.

- The "BOOT“ display (1) indicates that the software is being loaded from the hard disk.
- The status indicator (2) displays the current status of the program loading process.

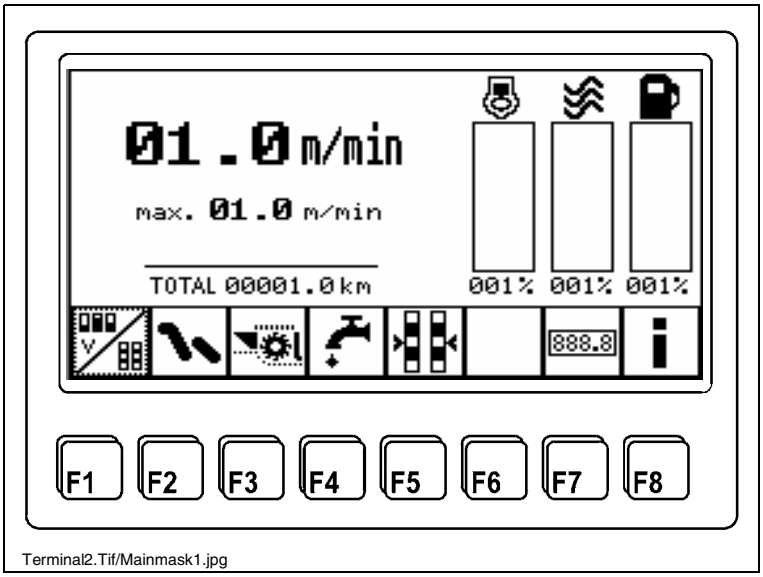
☞ When the vehicle ignition is switched off, the display shows "STOP" at Position (1) while the software is being powered down.



Terminal2.Tif/Bootmask1.jpg

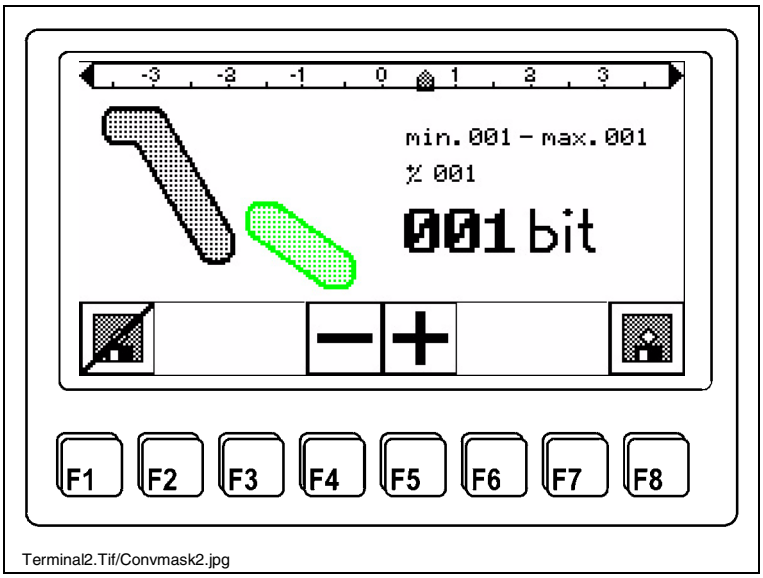
The basics of terminal operation

The graphics displayed above each of the function keys symbolise the screen into which each keystroke is about to take you, or which command is being executed at that time.



Terminal2.Tif/Mainmask1.jpg

If a function mask has + (F4) and - (F5) signs, these keys can be used to alter a value in specified steps. One adjustment step per keystroke. If the cursor panel can be altered using the PgUp and PgDn keys, continuous adjustment is possible by holding down either of these keys. The value desired can also be entered via the numerical keypad.

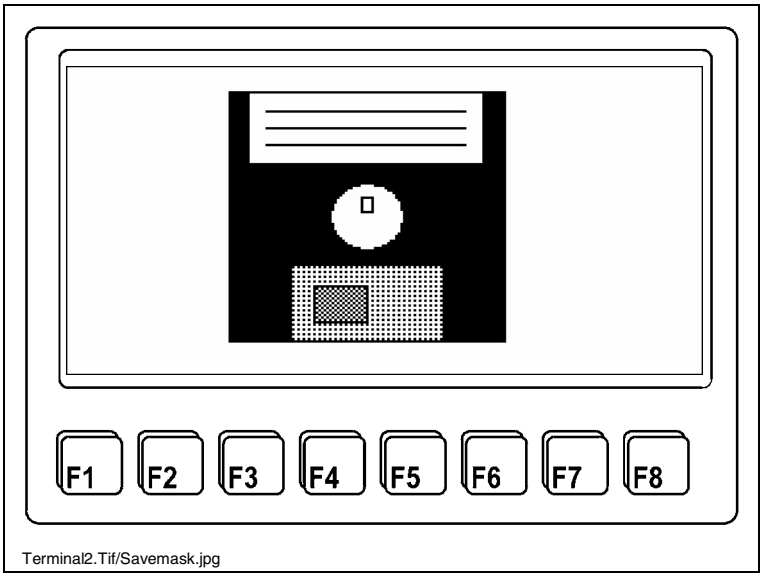


Terminal2.Tif/Convmask2.jpg

If various different components and/or adjustment options can be selected in a given screen, the component or selected function will start to flash.

To save changed values, press the function key (F8) bearing the same symbol as the diskette or press the Enter key.
If the amended value is not being adopted, press the function key (F1) belonging to the scored out diskette.
After either of these operations, or after pressing the Esc key, the system returns you to the main menu.

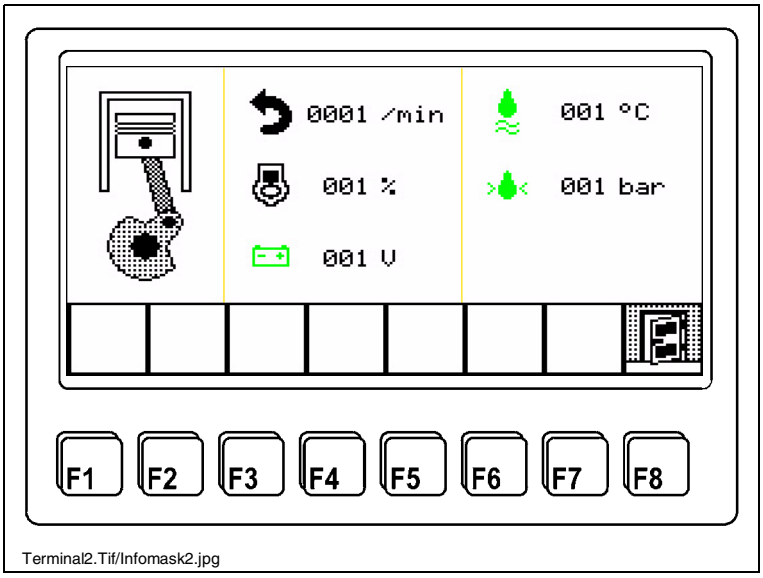
During the save operation, a diskette symbol is shown on the display.



Terminal2.Tif/Savemask.jpg

To return from various screens to the main menu, press the function key bearing the door symbol (F8).

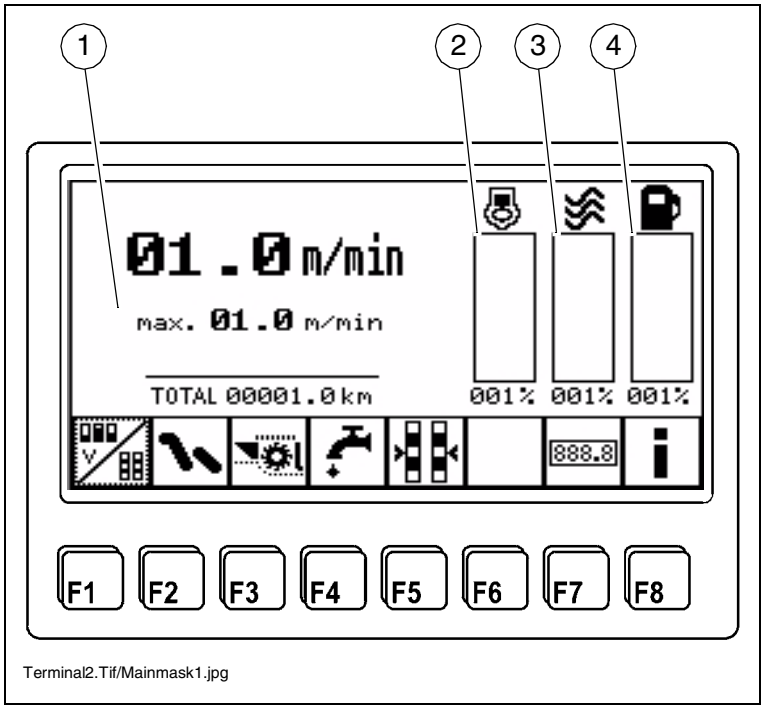
The appropriate information screen appears on the display automatically whenever a specified value falls below, or rises above, that specified level. The flashing symbol indicates the area to which the warning message refers.



Terminal2.Tif/Infomask2.jpg

Information and warning messages

Once the boot process has ended, the main menu appears on the display.



Terminal2.Tif/Mainmask1.jpg

These displays provide an overview of various displays and statuses.

- The actual speed of the vehicle in m/min. and the maximum achievable speed in m/min with the control lever fully extended are shown on the second line of this display (1).
- The bar display (2) and the percentage shown below it indicate the engine load in percent.
  When the engine load changes, the percentage display and graphic display change at the same time.
- The bar display (3) and the percentage display below it indicate the fill level of the water tank. Depending on the fill level, the percentage display and graphic display alter accordingly.

☞ The water tank has a capacity of approx. 3700 litres. A reading of 100% indicates that the tank is filled with 3700 litres.

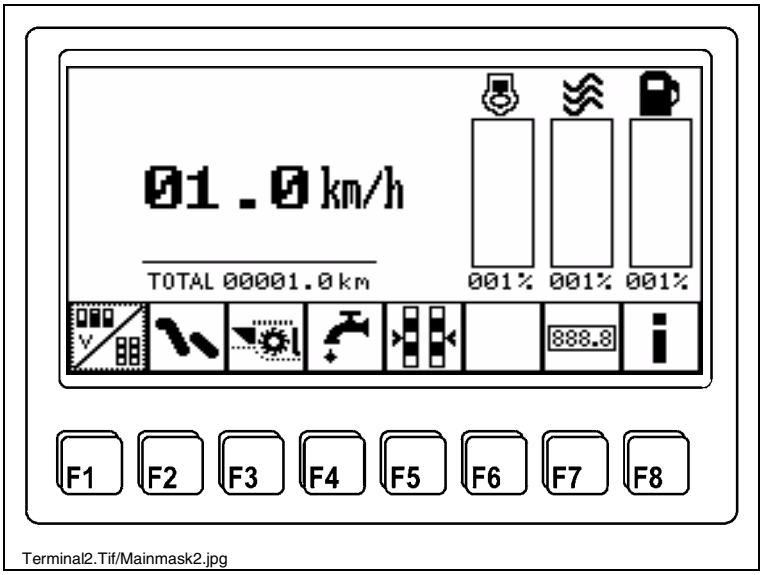
⚠ Since the water spraying and cooling systems are used to reduce dust and to cool and rinse various planer components, thus reducing mechanical wear, always ensure that the water tank is full enough and ensure that it is topped up in good time.

- The bar display (4) and the percentage display below it indicate the fill level of the fuel tank. The percentage display and graphic display will alter to reflect the current fill level.

☞ The fuel tank has a capacity of approx. 1100 litres. A reading of 100% indicates that the tank is filled with 1100 litres.

⚠ To avoid unnecessary maintenance downtime or work caused by running the fuel tank dry, always ensure that there is sufficient fuel in the tank and ensure that it is topped up in good time.

☞ During transport runs, the display shows actual roadspeed in km/h. The display showing maximum achievable roadspeed goes out at this time.

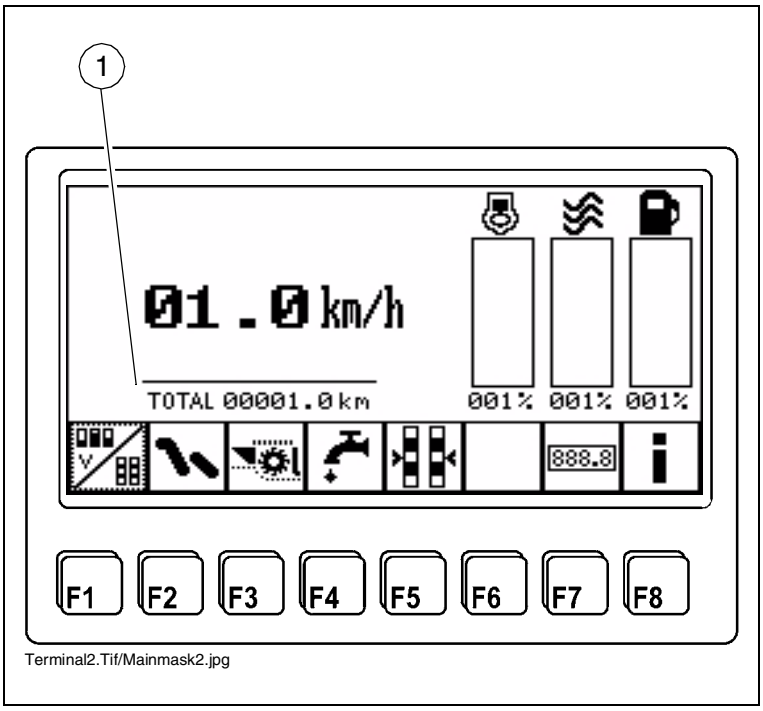


Terminal2.Tif/Mainmask2.jpg

The trip and total in km displays also appear on both screens.

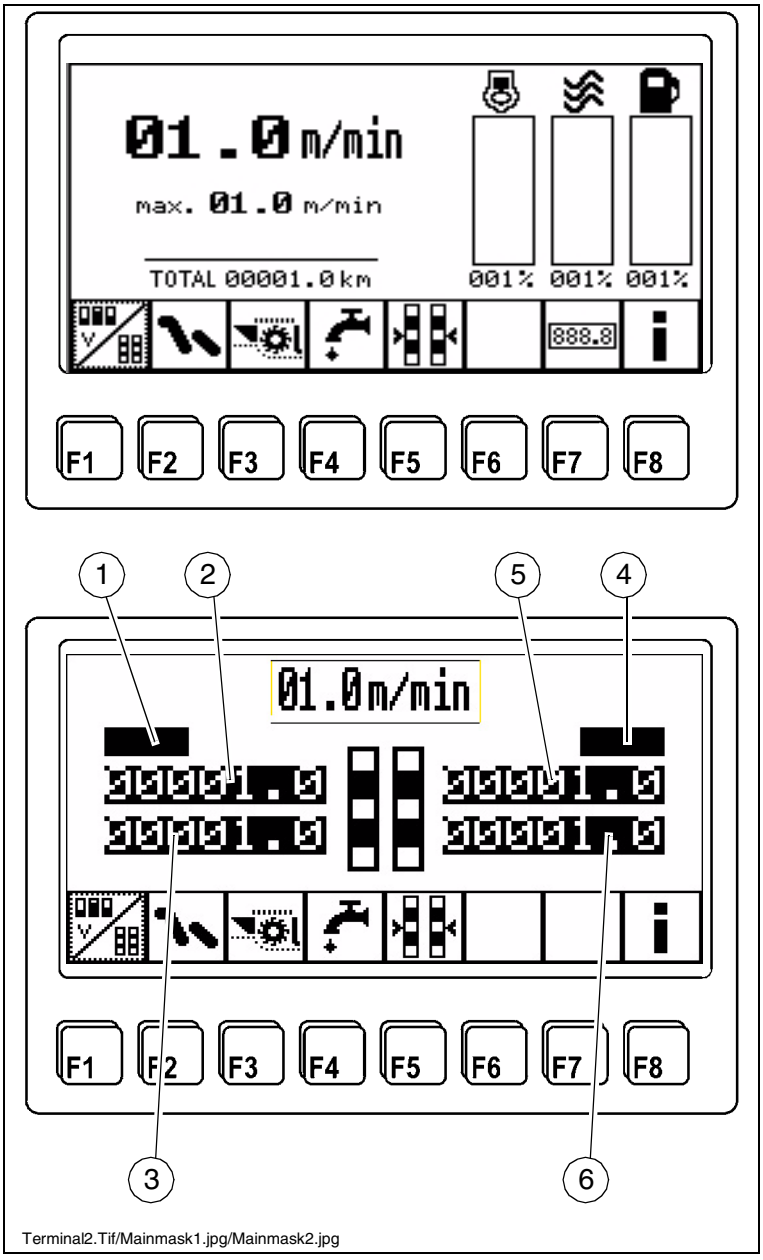
- Total: display showing the total distance travelled by the machine since delivery.
- Trip: display showing the total distance travelled in milling mode.

The trip display can be reset to zero by pressing the relevant function button (F7) twice or by pressing the zero button in the numerical keypad.



Terminal2.Tif/Mainmask2.jpg

By pressing the function key relating to the "Info" symbol (F8), further displays and operating modes can be called up. Another screen can be called up from either of these screens by pressing the (F1) function key:



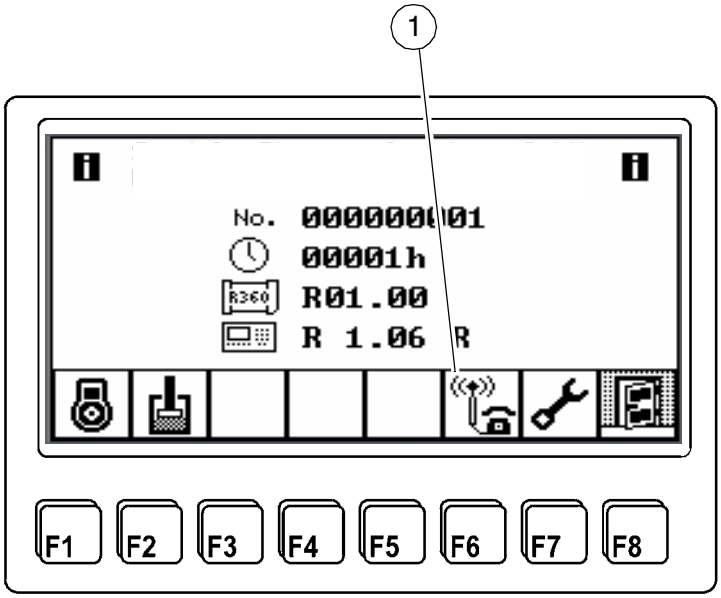
Terminal2.Tif/Mainmask1.jpg/Mainmask2.jpg

This screen displays Levelling data:

- Setting Manual/Auto, left side of vehicle (1)
- Nominal Levelling value, left side of vehicle (2)
- Actual Levelling value, left side of vehicle (3)
- Setting Manual/Auto right side of vehicle (4)
- Nominal Levelling value, right side of vehicle (5)
- Actual Levelling value, right side of vehicle (6)

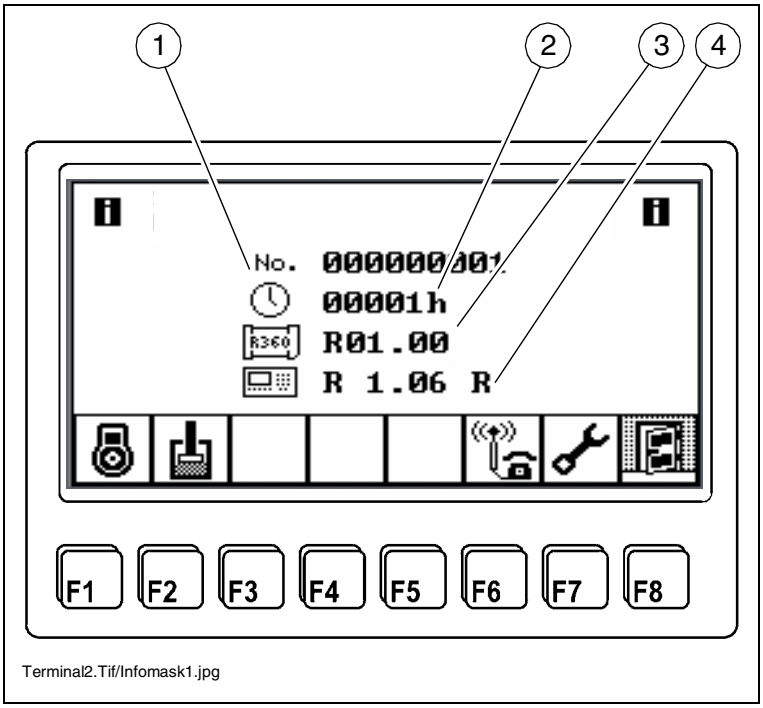
☞ When fitted with a modem (○), an SMS containing the appropriate message and additional data on the general machine status can be sent from many message and warning screens to the service centre responsible.

- Once the function key belonging to the "Modem" symbol has been pressed, the SMS is sent off automatically and therefore assists in faster fault rectification.



Terminal2.Tif/Infomask1.jpg

Info' screen 1



Terminal2.Tif/Infomask1.jpg

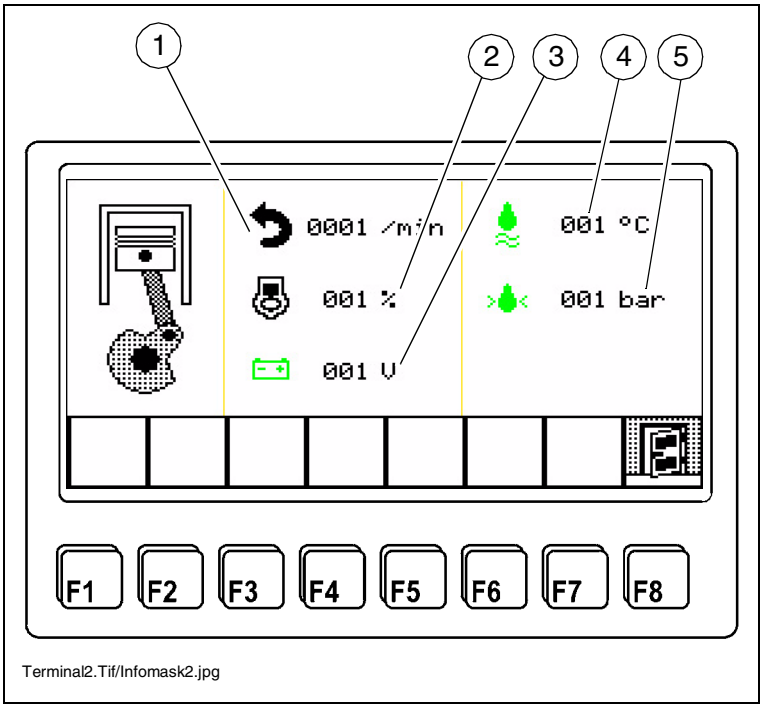
Appears after pressing the function key (F8) relating to the "Info" symbol on that screen, displaying the following data:

- Serial number of machine (1).
- Operating hours counter (2).
  The operating hours are only counted when the engine is running.

☞ Call up daily to ensure compliance with the maintenance intervals.

- Software version of the PLC control unit (3)
- Software version of the display / input terminal (4)

Info' screen 2



Terminal2.Tif/Infomask2.jpg

This Info' screen displays the following engine data and appears on the display automatically as soon as one of the displayed status move beyond its specified minimum or maximum value.

- Present engine speed (1)
- Present engine load (2)
- Vehicle circuit voltage (3)

⚠ If this display is flashing: raise engine speed for a brief period. If the display continues to flash: switch off engine and trace the fault, remedying it if necessary.

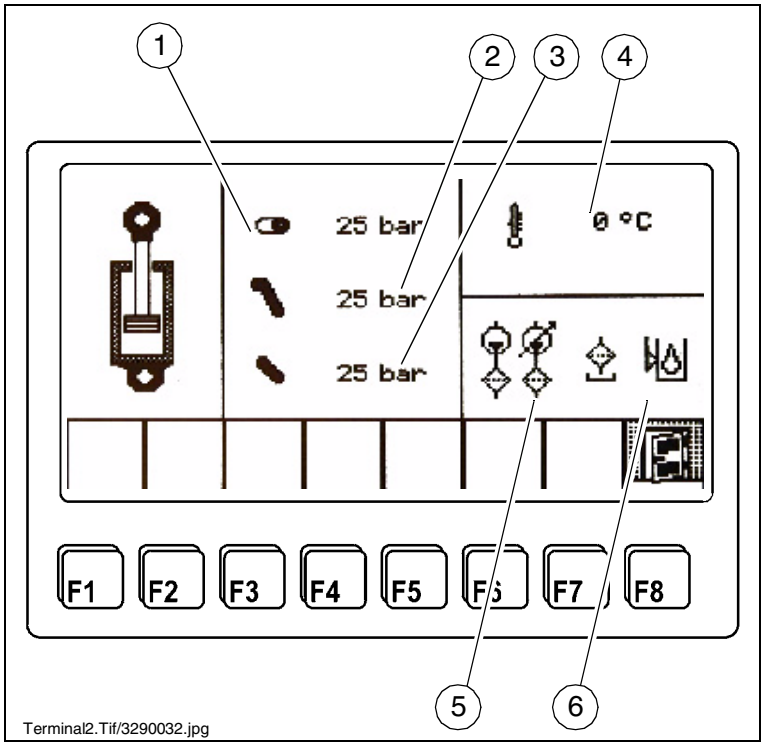
- Water temperature (4)

⚠ If this display flashes: Allow engine to cool down at idle speed, switching off the engine immediately if necessary and checking the coolant level. For additional possible causes, please refer to the engine's Operating Instructions.

- Oil pressure (5)

⚠ If this display flashes: Switch off engine immediately and check the engine oil level. For additional possible causes, please refer to the engine's Operating Instructions.

Info' screen 3



This Info' screen displays the following hydraulic data and appears on the display automatically as soon as one of the displayed statuses move beyond its specified maximum or minimum value.

- Oil pressure in the travel drive (1)
- Oil pressure on the drive for the upper conveyor (2)
- Oil pressure on the drive for the lower conveyor (3)

⚠ If one of the pressure indicators flashes: Switch off the vehicle or the driven element and trace the fault, remedying it if necessary.

- Temperature of the hydraulic oil (4)

⚠ If this display flashes: Switch off the vehicle and allow the engine to cool at idle speed. Trace the cause and remedy if necessary.

- Contamination indicator on the hydraulic oil filter (5)

⚠ If this display flashes: Hydraulic oil filters are dirty, and flow rate is reduced. Change the filter as soon as possible.
Displays from left to right: pressure filter 1, pressure filter 2, suction filter

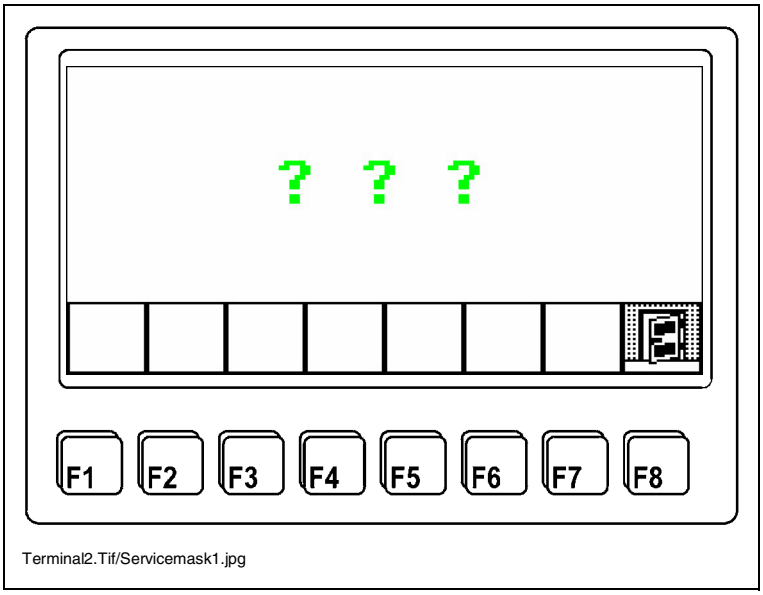
- Hydraulic oil level (6)

⚠ If the display flashes: top up hydraulic oil. If necessary, perform a visual inspection for signs of leakage.

Service mask 1

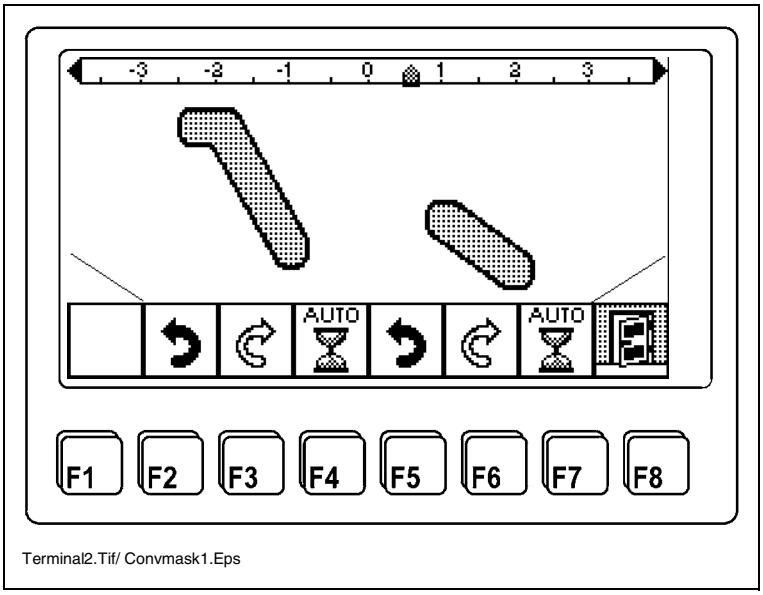
- By entering a password, you can open a screen which offers various different adjustment options.

☞ Refer to the Workshop and Service Handbook for your password and instructions on how to proceed.



Terminal2.Tif/Servicemask1.jpg

Screen for lower and upper conveyors



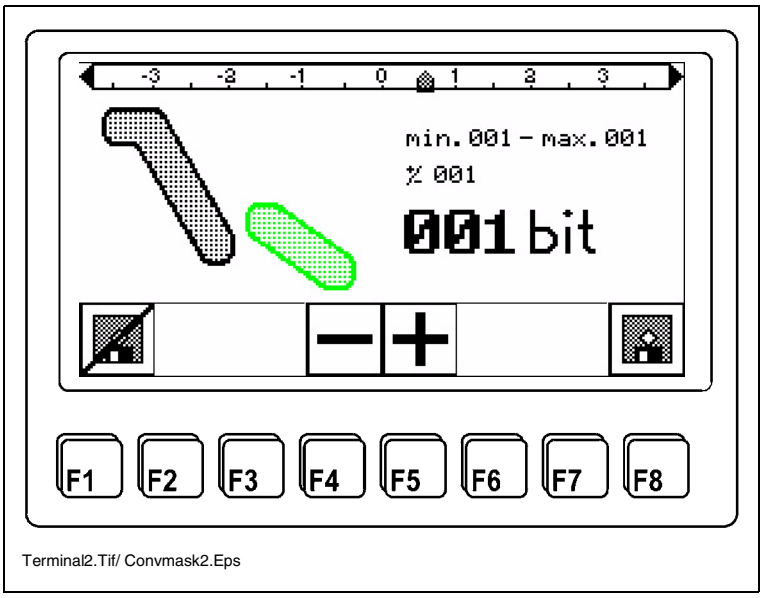
Terminal2.Tif/ Convmask1.Eps

This screen provides information about the following settings.

- Speed of upper conveyor in forwards travel mode (F2)
- Speed of upper conveyor in reverse travel mode (F3)
- Run-on time of upper conveyor (F4)
- Speed of lower conveyor in forwards travel mode (F5)
- Speed of lower conveyor in reverse travel mode (F6)
- Run-on time of lower conveyor (F7)

The setting screen can be called up by pressing the appropriate function key:

The selected element flashes.
The minimum and maximum value and adjustment parameter are displayed.



Terminal2.Tif/ Convmask2.Eps

☞ With the speed setting, the measuring unit is m/s

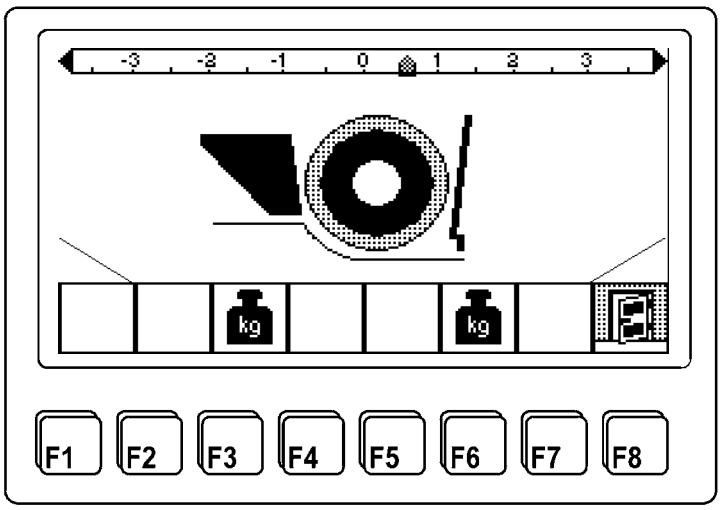
☞ With the run-one time setting, the units are measured in seconds.

- Set the value desired, using the plus / minus buttons, cursor buttons or the numerical keypad.
- You can choose to save, or not save, the amended value by pressing the relevant function key.

Screen for sliding shoe and moldboard

This screen can be used to make the following settings.

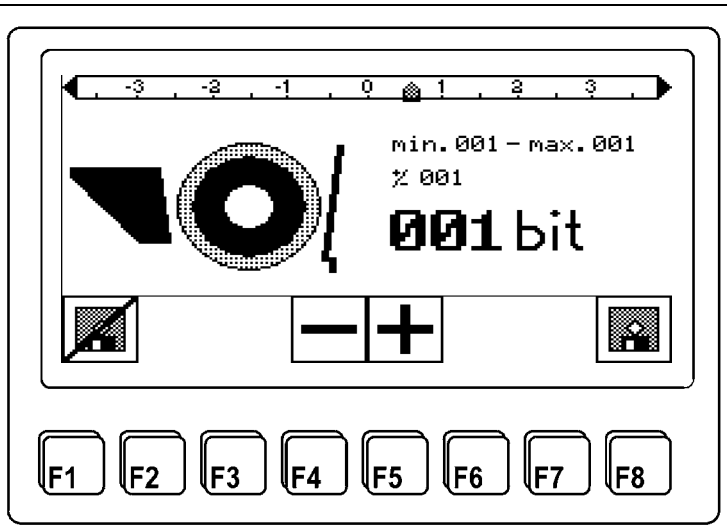
- Pressure setting of sliding shoe (F3)
- Pressure setting of moldboard(F6)



Terminal2.Tif/ Boxmask1.jpg

The setting screen can be called up by pressing the relevant function key:

The selected element flashes.
The minimum and maximum value and the adjustment parameter are all displayed.



Terminal2.Tif/ Boxmask2.jpg

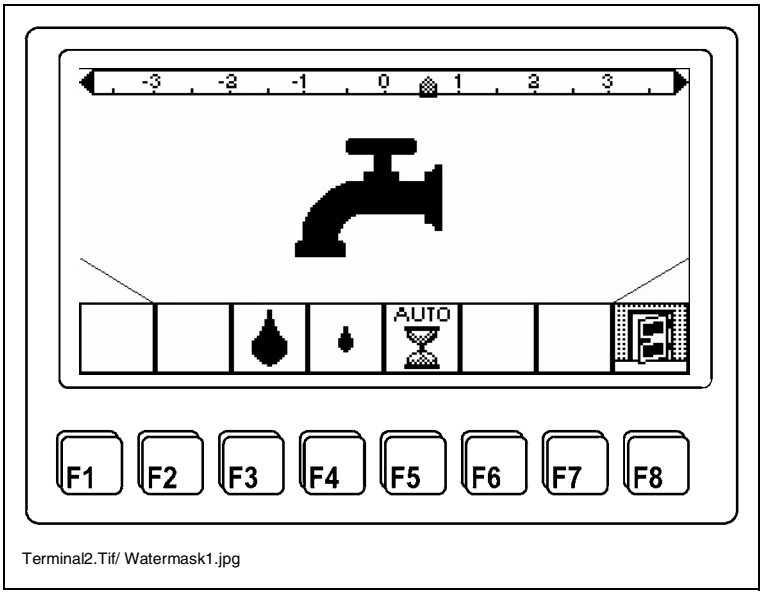
☞ When setting the pressure of the sliding shoe and moldboard, the adjustment is undertaken on a percentage basis.

- Set the value desired, using the plus / minus buttons, cursor buttons or the numerical keypad.

Entering negative figures relieves stress on the component selected.

- Depending on requirements, you can save, or not save, the amended value by pressing the appropriate function key.

Sprinkling screen



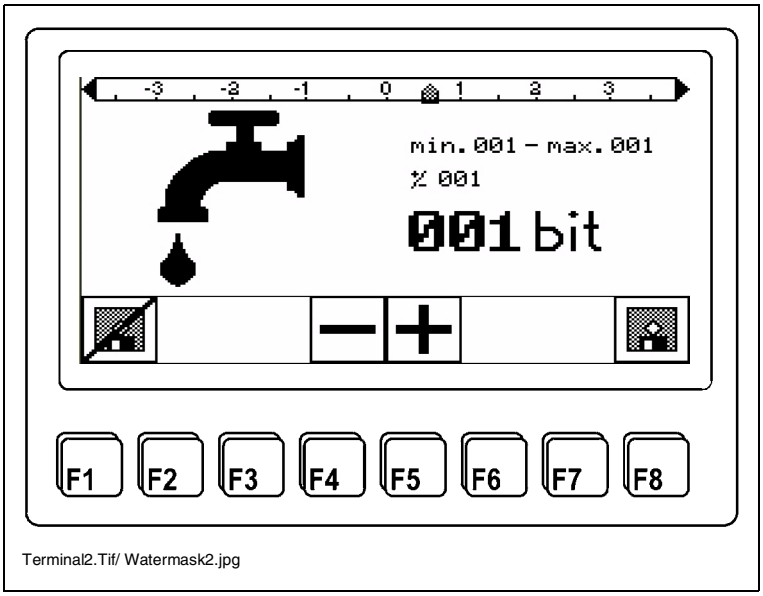
Terminal2.Tif/ Watermask1.jpg

The following settings can be made from this screen.

- Water volume (F3)
- Reduced water volume (F)
- Run-on time for sprinkling (F5)

☞ If the vehicle is not in forwards travel mode while the milling drum is turning, the control unit automatically reduces the volume of water after a preset run-on time. A reduced volume of water is sufficient for cooling purposes. If the control lever for the travel drive is fully extended, the system switches back to the higher water volume setting.

The setting screen is called up by pressing the appropriate function key:



Terminal2.Tif/ Watermask2.jpg

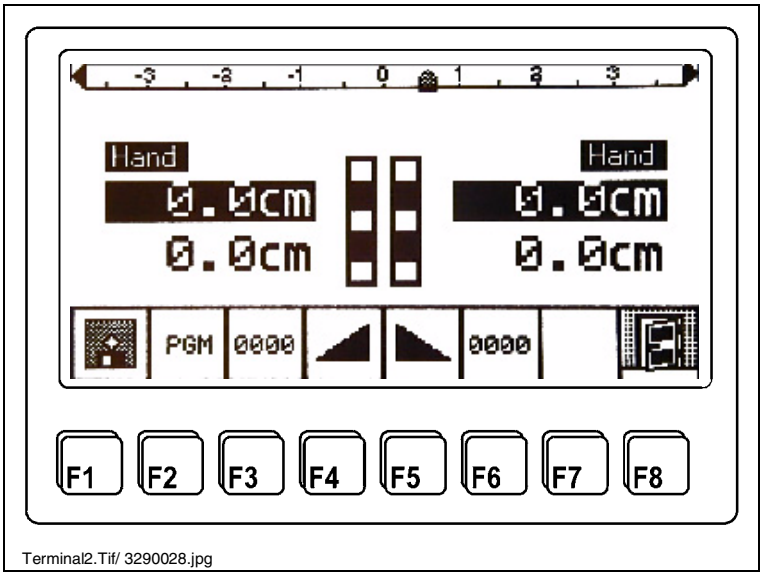
☞ When setting the water volume, a large drop of water flashes. When setting the reduced volume of water, a smaller droplet flashes.

☞ When setting the water volumes, adjustment is made on a percentage basis.

☞ With the run-one time setting, the units are measured in seconds.

- Set the value desired, using the plus / minus buttons, cursor buttons or the numerical keypad.
- You can choose to save, or not save, the amended value by pressing the relevant function key.

Levelling screen



Terminal2.Tif/ 3290028.jpg

The following settings can be made from this screen.

- Call up program for setting off at grading depth (F2)
- Changeover from manual to automatic mode on the left side of the vehicle (F3).
- Changeover from transverse slope controller to height controller (and vice versa):
  -(F4) = left side
  -(F5) = right side

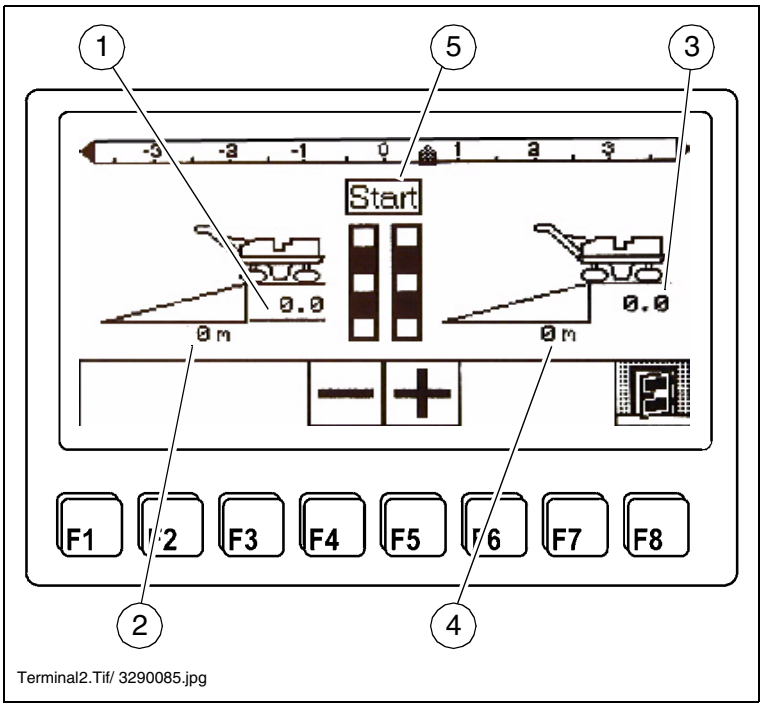
☞ If there is a changeover from transverse slope controller to height controller, the LED display of the keys alters at the same time on the switch panel as well as on the lower control elements.

- Nominal value adjustment for levelling on the right side of the machine (F6)

The screen for setting the length of approach relative to grade is called up by pressing function key (F2) :

Four setting values can be altered:

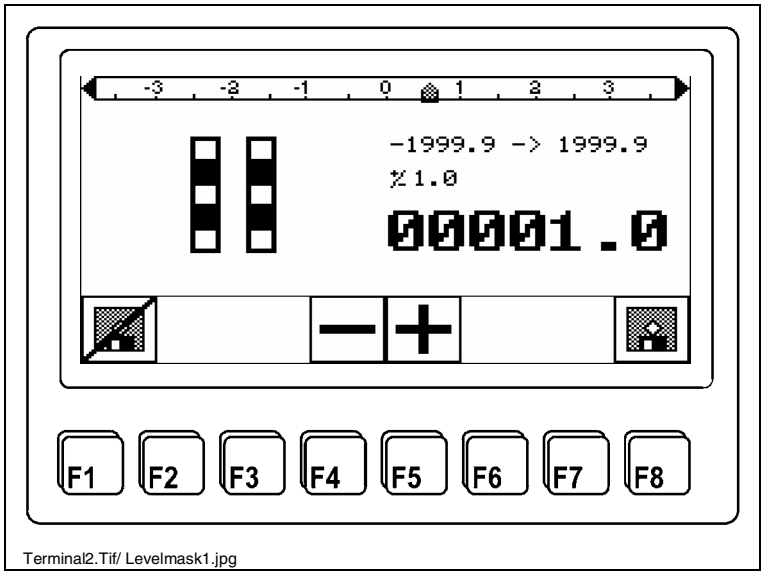
- Grade, left side of machine (1)
- Distance to cover before reaching the preset grade for left side of machine (2)
- Grade, right side of machine (3)
- Distance to cover before reaching the preset grade for right side of machine (4)



Terminal2.Tif/ 3290085.jpg

- Select the desired value using the cursor keys.
  The selected value is underlined on the display panel.
- This function is started or interrupted using the START and STOP keys on the terminal. The switched status (5) is displayed.

The setting screen is called up by pressing the relevant function key (F3) or (F6) for adjusting the nominal value setting for levelling work:

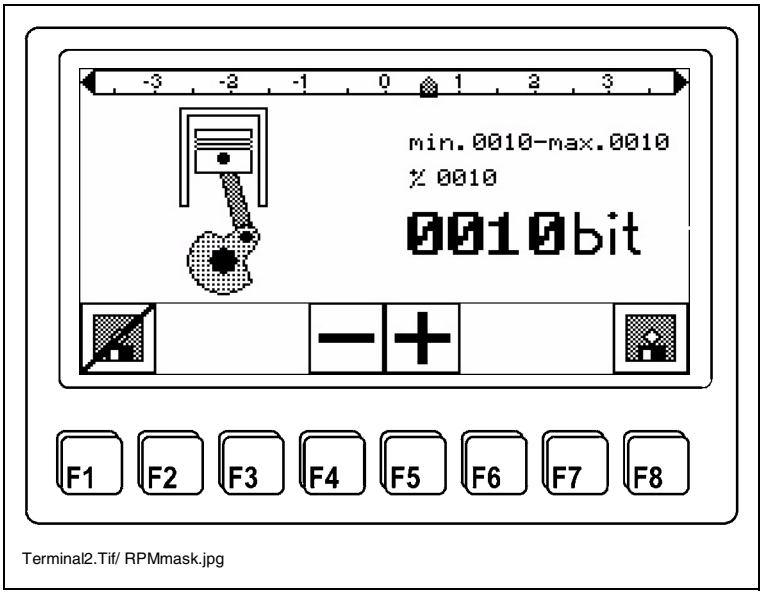


Terminal2.Tif/ Levelmask1.jpg

☞ When setting the nominal value, adjustment is performed on a percentage basis.

- Set the value desired, using the plus / minus buttons, cursor buttons or the numerical keypad.
- You can choose to save, or not save, the amended value by pressing the relevant function key.

Engine speed screen



Terminal2.Tif/ RPMmask.jpg

The setting screen is called up by pressing the appropriate key on the switch panel. The following setting can be made on this screen:

- Changing the engine speed

Minimum and maximum value and the adjustment parameter are displayed.

- Set the value desired, using the plus / minus buttons, cursor buttons or the numerical keypad.
- You can choose to save, or not save, the amended value by pressing the relevant function key.

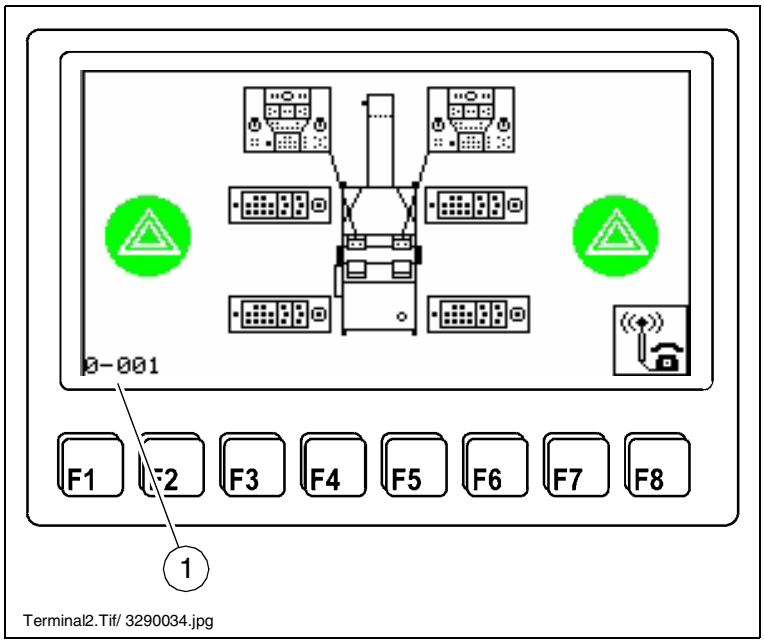
Other displays

EMERGENCY STOP screen

If an EMERGENCY STOP key is pressed, the following message appears on the display:

The EMERGENCY STOP symbol flashes.

☞ When the emergency stop button is pressed, it is not possible to start up the vehicle or any of the other drives.



Terminal2.Tif/ 3290034.jpg

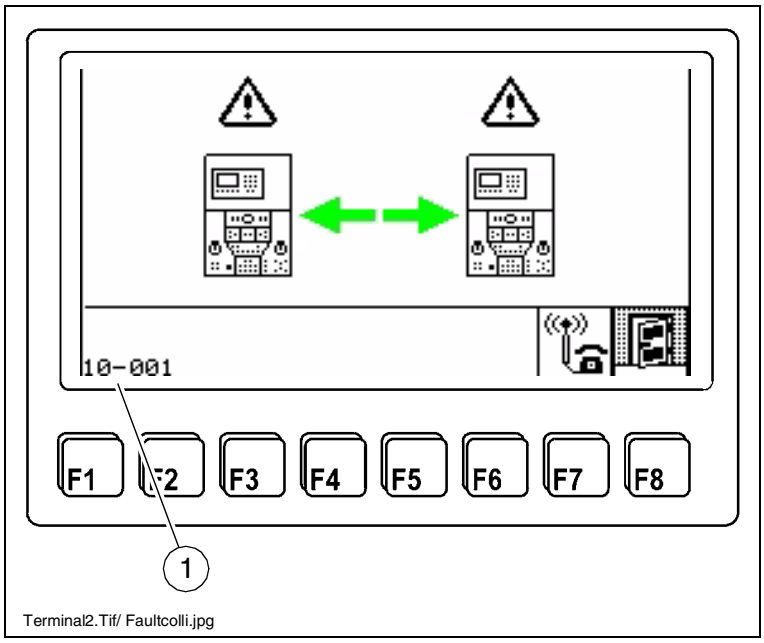
☞ The numeral (1) indicates the screen and should be quoted to Technical Service with any queries to enable the problem to be located rapidly.

Stationary screen with dual control stations

Appears on the display, if the machine is fitted with a second control panel (○) and the control arms are simultaneously used to set contradictory functions.

Both arrows flash.

☞ All machine functions (travel drive, steering, forwards travel, loading conveyor etc.) are stopped immediately.



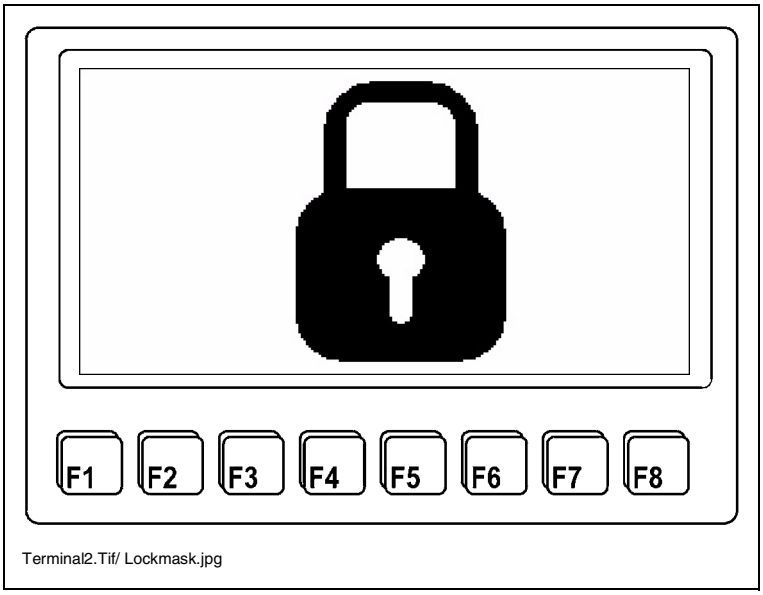
Terminal2.Tif/ Faultcolli.jpg

☞ The numeral (1) indicates the screen and should be quoted to Technical Service with any queries to enable the problem to be located rapidly.

☞ In such instances, many of the functions can only ever be implemented with a time delay. In this case, only commands from the control panel which first activates the control unit are carried out.

Inhibit function screen

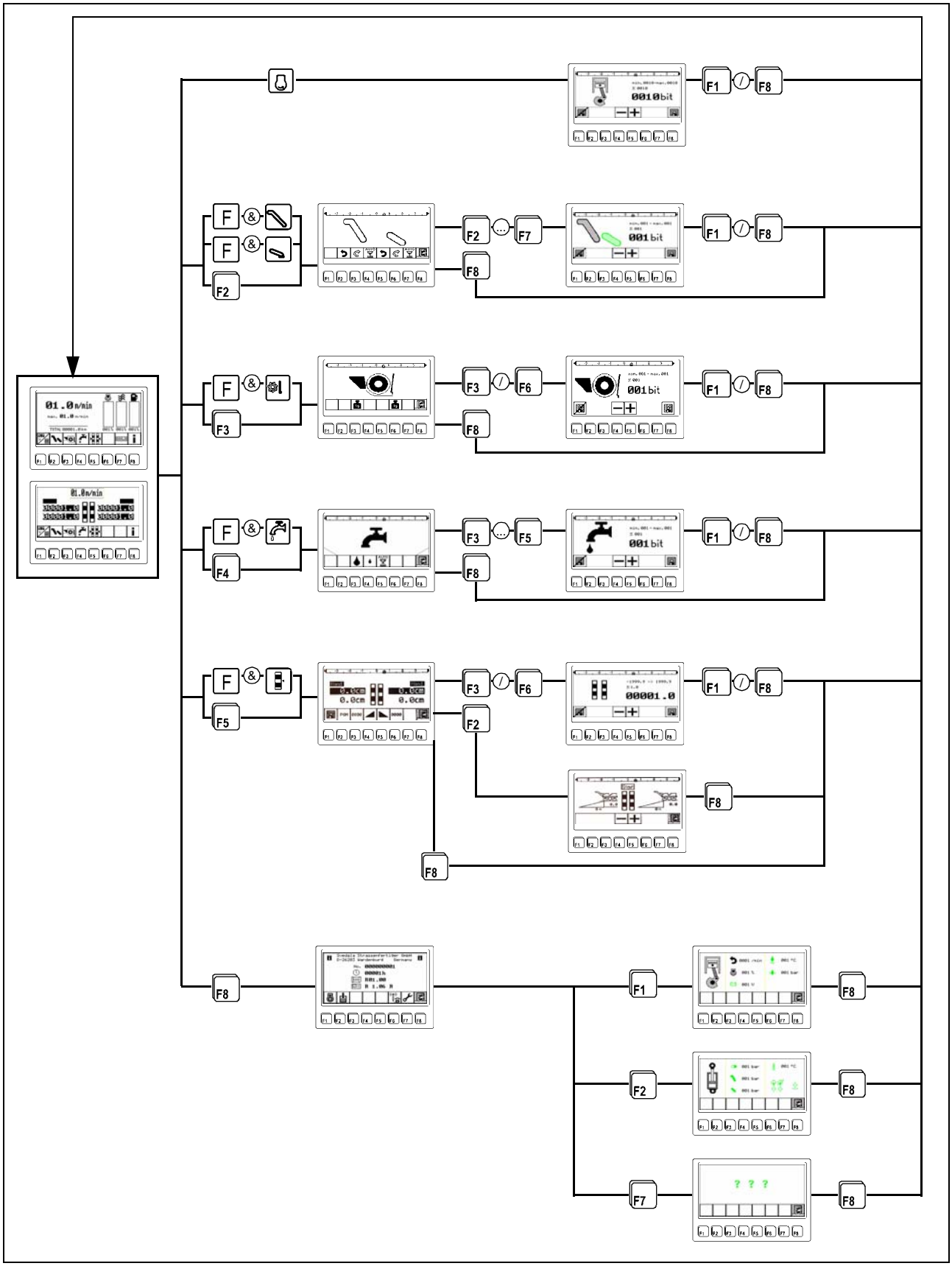
If the vehicle is equipped with an optional second control panel, the lock symbol appears on the control panel display not being used at the time for the various adjustment operations.
This control panel is locked off for the duration of the adjustment work.



Terminal2.Tif/ Lockmask.jpg

Screen structure for setting and display options

The following graphic can be used to clarify the setup of the screen structure and to simplify operation or the procedure to be following during various setting and display operations.

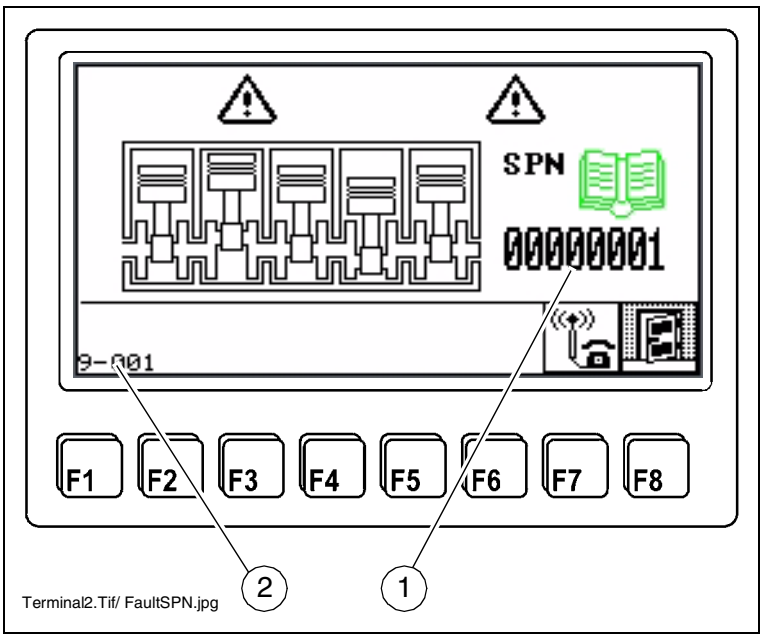


3.3 Error messages and warnings

If faults and malfunctions occur during operation, or if specified engine-specific or machine-specific values are not achieved, or are exceeded, these messages appear on the display screen.
To avoid secondary damage and to prevent accidents, the machine is inhibited automatically to prevent further use.

Engine warnings (I)

These warnings appear on screen automatically and indicate which fault has occurred.



☞ The numeral (1) makes reference to the engine manufacturer's error list located in the Annex.

☞ The numeral (2) identifies a given screen and should be quoted to Technical Service with any queries to enable the problem to be located more rapidly.

- This message can be cleared from screen by pressing button (F8).
  This returns the user to the previous screen.

⚠ The message screens are not displayed again (cyclical fashion) once the (F8) button has been pressed. The message is not displayed again until the next time the machine is started.

☞ If a serious problem occurs the engine will be stopped automatically.
In such case contakt the Technical Service of the engine manafucturer and give details about the fault code.

Engine fault codes

Service Fault Code	Service Description	J1939 FMI	J1939 SPN	J1939 SPN Description
111	Error internal to ECM related to memory hardware failures or internal microprocessor communication failures.	12	629	Controller #1
115	No engine speed signal detected at both engine position sensor circuits.	2	190	Engine Speed
121	No engine speed signal detected at one engine position sensor circuits.	10	190	Engine Speed
122	High voltage detected at intake manifold pressure sensor circuit.	3	102	Boost Pressure
123	Low voltage detected at intake manifold pressure sensor circuit.	4	102	Boost Pressure
131	High voltage detected at throttle position sensor circuit.	3	91	Accelerator Pedal Position
132	Low voltage detected at throttle position sensor circuit.	4	91	Accelerator Pedal Position
133	High voltage detected at remote throttle position sensor circuit.	3	974	Remote Accelerator
134	Low voltage detected at remote throttle position sensor circuit.	4	974	Remote Accelerator
135	High voltage detected at oil pressure sensor circuit.	3	100	Engine Oil Pressure
141	Low voltage detected at oil pressure sensor circuit.	4	100	Engine Oil Pressure
143	Oil Pressure signal indicates oil pressure below the low oil pressure engine protection limit.	18	100	Engine Oil Pressure
144	High voltage detected at coolant temperature sensor circuit.	3	110	Engine Coolant Temperature
145	Low voltage detected at coolant temperature sensor circuit.	4	110	Engine Coolant Temperature
151	Coolant temperature signal indicates coolant temperature above critical threshold.	0	110	Engine Coolant Temperature
153	High voltage detected at intake manifold temperature sensor circuit.	3	105	Intake Manifold #1 Temperature
154	Low voltage detected at intake manifold temperature sensor circuit.	4	105	Intake Manifold #1 Temperature
155	Intake Manifold Temperature signal indicates intake manifold temperature above critical threshold.	0	105	Intake Manifold #1 Temperature
187	Low voltage detected on the ECM voltage supply line to some sensors.	4	620	5 Volts DC Supply
198	ICON Lamp shorted high.	4	612	System Diagnostic Code #2

Service Fault Code	Service Description	J1939 FMI	J1939 SPN	J1939 SPN Description
199	ICON Lamp shorted low.	3	612	System Diagnostic Code #2
212	High voltage detected at oil temperature sensor circuit.	3	175	Engine Oil Temperature #1
213	Low voltage detected at oil temperature sensor circuit.	4	175	Engine Oil Temperature #1
214	Oil Temperature signal indicates oil temperature above critical threshold.	0	175	Engine Oil Temperature #1
216	High voltage detected at air compressor tank pressure sensor circuit.	3	46	Vehicle Wet Tank Pressure
217	Low voltage detected at air compressor tank pressure sensor circuit.	4	46	Vehicle Wet Tank Pressure
218	Voltage at air compressor tank pressure signal indicates air compressor tank pressure is out of range	2	46	Vehicle Wet Tank Pressure
219	Low oil level was detected in the makeup oil tank.	17	1380	Engine Oil Level Remote Reservoir
221	High voltage detected at ambient air pressure sensor circuit.	3	108	Barometric Pressure
222	Low voltage detected at ambient air pressure sensor circuit.	4	108	Barometric Pressure
223	Incorrect voltage detected on the actuator circuit by the ECM.	4	1265	Engine Oil Burn Valve
227	High voltage detected on the ECM voltage supply line to some sensors.	3	620	5 Volts DC Supply
234	Engine speed signal indicates engine speed greater than 2730 rpm.	0	190	Engine Speed
235	Coolant level signal indicates coolant level is below normal range.	1	111	Coolant Level
241	Lost vehicle speed signal.	2	84	Wheel-Based Vehicle Speed
242	Invalid or inappropriate vehicle speed signal detected. Signal indicates an intermittent connection or VSS tampering.	10	84	Wheel-Based Vehicle Speed
245	Less than 6V detected at fan clutch driver. Indicates an excessive current draw from ECM or faulty power supply.	4	647	Fan Clutch Output Device Driver
249	High voltage detected on the ambient air temperature sensor circuit.	3	171	Ambient Air Temperature
254	Less than 6V detected at Fuel Shutoff driver. Indicates an excessive current draw from ECM or faulty power supply.	4	632	Fuel Shutoff Valve
255	Externally supplied voltage detected going to the Fuel Shutoff supply circuit.	3	632	Fuel Shutoff Valve
256	Low voltage detected on the ambient air temperature sensor circuit.	4	171	Ambient Air Temperature

Service Fault Code	Service Description	J1939 FMI	J1939 SPN	J1939 SPN Description
259	Fuel Shutoff Valve is stuck open mechanically or leaking	7	632	Fuel Shutoff Valve
284	Incorrect voltage detected on the ECM voltage supply line to the Crankshaft Engine Position Sensor.	4	1043	Internal Sensor Voltage Supply
285	ECM expected information from a multiplexed device but did not receive it soon enough or did not receive it at all.	9	639	SAE J1939 Datalink
286	ECM expected information from a multiplexed device but only received a portion of the necessary information.	13	639	SAE J1939 Datalink
287	Data error received while multiplexing the throttle pedal and IVS.	19	91	Accelerator Pedal Position
288	Data error received while multiplexing the remote throttle pedal.	19	974	Percent Accelerator Position #2
295	An error in the ambient air pressure sensor circuit was detected by the ECM.	2	108	Barometric Pressure
311	Current detected at the injector for cylinder #1 when voltage is turned OFF.	6	651	Injector Cylinder #1
312	Current detected at the injector for cylinder #5 when voltage is turned OFF.	6	655	Injector Cylinder #5
313	Current detected at the injector for cylinder #3 when voltage is turned OFF.	6	653	Injector Cylinder #3
314	Current detected at the injector for cylinder #6 when voltage is turned OFF.	6	656	Injector Cylinder #6
315	Current detected at the injector for cylinder #2 when voltage is turned OFF.	6	652	Injector Cylinder #2
319	Real Time Clock lost power	2	251	Time
321	Current detected at the injector for cylinder #4 when voltage is turned OFF.	6	654	Injector Cylinder #4
322	No current detected at the injector for cylinder #1 when voltage is turned ON.	5	651	Injector Cylinder #1
323	No current detected at the injector for cylinder #5 when voltage is turned ON.	5	655	Injector Cylinder #5
324	No current detected at the injector for cylinder #3 when voltage is turned ON.	5	653	Injector Cylinder #3
325	No current detected at the injector for cylinder #6 when voltage is turned ON.	5	656	Injector Cylinder #6
331	No current detected at the injector for cylinder #2 when voltage is turned ON.	5	652	Injector Cylinder #2
332	No current detected at the injector for cylinder #4 when voltage is turned ON.	5	654	Injector Cylinder #4
338	Voltage detected on the Idle Shutdown Vehicle Accessory Relay circuit when no voltage was being supplied by ECM.	3	1267	Idle Shutdown Vehicle Accessories Relay Driver

Service Fault Code	Service Description	J1939 FMI	J1939 SPN	J1939 SPN Description
339	Less than 6V detected at Idle Shutdown Vehicle Accessory Relay circuit. Indicates excessive current draw from ECM.	4	1267	Idle Shutdown Vehicle Accessories Relay Driver
341	Severe loss of data from the ECM.	2	630	Calibration Memory
343	Microprocessor communication error inside ECM	12	629	Controller #1
352	Low voltage detected at sensor. Indicates a faulty power supply from ECM for the sensors.	4	1079	5 Volts DC Supply
359	Auto-Start Cycle Aborted.	31	613	System Diagnostic Code #3
378	Low current or open circuit detected at front fueling actuator circuit.	5	633	Fuel Control Valve #1
379	High current detected at front fueling actuator circuit.	6	633	Fuel Control Valve #1
386	High voltage detected on the ECM voltage supply line to some sensors.	3	1079	5 Volts DC Supply
387	High voltage detected on the ECM voltage supply line to the throttle(s).	3	1043	Internal Sensor Voltage Supply
388	Less than 6V detected at Engine Brake Circuit #1. Indicates excessive current draw or faulty ECM power supply.	11	1072	Engine (Compression) Brake Output #1
392	Less than 6V detected at Engine Brake Circuit #2. Indicates excessive current draw or faulty ECM power supply.	11	1073	Engine (Compression) Brake Output #2
393	Less than 6V detected at Engine Brake Circuit #3. Indicates excessive current draw or faulty ECM power supply.	11	1112	Engine (Compression) Brake Output #3
394	Low current or open circuit detected at front timing actuator circuit.	5	635	Timing Actuator #1
395	High current detected at front timing actuator circuit.	6	635	Timing Actuator #1
396	Low current or open circuit detected at rear fueling actuator circuit.	5	1244	Fuel Control Valve #2
397	High current detected at rear fueling actuator circuit.	6	1244	Fuel Control Valve #2
398	Low current or open circuit detected at rear timing actuator circuit.	5	1245	Timing Actuator #2
399	High current detected at rear timing actuator circuit.	6	1245	Timing Actuator #2
415	Oil pressure signal indicates oil pressure below the very low oil pressure engine protection limit.	1	100	Engine Oil Pressure
418	Water has been detected in fuel system.	15	97	Water In Fuel Indicator

Service Fault Code	Service Description	J1939 FMI	J1939 SPN	J1939 SPN Description
419	An error in the intake manifold pressure sensor signal was detected by the ECM.	2	1319	Boost Pressure
422	Voltage detected simultaneously on both high & low coolant level signals or no voltage detected on either circuits.	2	111	Coolant Level
428	High voltage detected at Water in Fuel sensor circuit.	3	97	Water In Fuel Indicator
429	Low voltage detected at Water in Fuel sensor circuit.	4	97	Water In Fuel Indicator
431	Both the idle validation off-idle and on-idle signals indicate the same voltage reading.	2	558	Accelerator Pedal Low Idle Switch
432	Idle validation switch voltages are opposite (complimentary) but disagree with a valid throttle position signal.	13	558	Accelerator Pedal Low Idle Switch
433	Intake manifold pressure sensor voltage indicating a high pressure reading.	2	102	Boost Pressure
434	Battery voltage to low or insufficient amount of time for battery power to the ECM for powering down after key off.	2	627	Power Supply
435	An error in the oil pressure sensor signal sensor was detected by the ECM.	2	100	Engine Oil Pressure
441	Battery Voltage Below Normal Operating level.	18	168	Electrical Potential (Voltage)
442	Battery Voltage above Normal Operating level.	16	168	Electrical Potential (Voltage)
443	Low voltage detected on the ECM voltage supply line to the throttle(s).	4	1043	Internal Sensor Voltage Supply
449	Excessive fuel supply pressure detected at the fuel pressure sensor.	16	94	Fuel Delivery Pressure
451	High voltage detected on the front rail pressure sensor circuit.	3	157	Injection Metering Rail #1 Pressure
452	Low voltage detected on the front rail fuel rail pressure circuit.	4	157	Injection Metering Rail #1 Pressure
465	High voltage detected at the wastegate actuator #1 circuit when no voltage was being supplied by the ECM.	3	1188	Turbocharger 1 Wastegate Drive
466	Less than 6V detected at wastegate actuator #1, indicating excessive current draw or faulty ECM output circuit.	4	1188	Turbocharger 1 Wastegate Drive
469	Invalid bunk thermostat signal detected.	2	614	System Diagnostic Code #4
474	Low voltage detected on starter lockout relay circuit when energized or voltage detected when circuit de-energized.	2	1321	Starter Solenoid Lockout Relay Driver Circuit
475	Less than 6V detected at air compressor governor indicating excessive current draw or faulty ECM output circuit.	4	1351	Air Compressor Actuator Circuit

Service Fault Code	Service Description	J1939 FMI	J1939 SPN	J1939 SPN Description
476	High voltage detected at the electronic air compressor governor actuator circuit by the ECM.	3	1351	Air Compressor Actuator Circuit
482	Low fuel supply pressure was detected at the fuel pressure sensor.	18	94	Fuel Delivery Pressure
483	High voltage detected on the rear rail pressure sensor circuit.	3	1349	Injector Metering Rail #2 Pressure
484	Low voltage detected on the rear rail pressure sensor circuit.	4	1349	Injector Metering Rail #2 Pressure
485	An unexpectedly high rail pressure was detected on the rear three cylinders.	16	1349	Injector Metering Rail #2 Pressure
486	An unexpectedly low rail pressure was detected on the rear three cylinders.	18	1349	Injector Metering Rail #2 Pressure
491	High voltage detected at the wastegate actuator #2 circuit when no voltage was being supplied by the ECM.	3	1189	Turbocharger 2 Wastegate Drive
492	Less than 6V detected at wastegate actuator #2, indicating excessive current draw or faulty ECM output circuit.	4	1189	Turbocharger 2 Wastegate Drive
496	Low voltage detected on the ECM voltage supply line to the camshaft engine position sensor.	11	1043	Internal Sensor Voltage Supply
536	Low voltage detected on autoshift low gear circuit when energized or voltage detected when circuit de-energized.	11	718	Autoshift Low Gear Actuator
537	Low voltage detected on autoshift high gear circuit when energized or voltage detected when circuit de-energized.	11	717	Autoshift High Gear Actuator
538	Low voltage detected on autoshift neutral gear circuit when energized or voltage detected when circuit de-energized.	11	719	Autoshift Neutral Actuator
541	ICON interlock driver error.	31	615	System Diagnostic Code #5
544	Autoshift failure; at least three shift attempts were missed.	7	611	System Diagnostics Code #1
546	High voltage detected at the fuel pressure sensor circuit.	3	94	Fuel Delivery Pressure
547	Low voltage detected at the fuel pressure sensor circuit.	4	94	Fuel Delivery Pressure
551	No voltage detected simultaneously on both the idle validation off-idle and on-idle circuits.	4	558	Accelerator Pedal Low Idle Switch
553	An unexpectedly high rail pressure was detected on the front three cylinders.	16	157	Injection Metering Rail #1 Pressure
559	An unexpectedly low rail pressure was detected on the front three cylinders.	18	157	Injection Metering Rail #1 Pressure

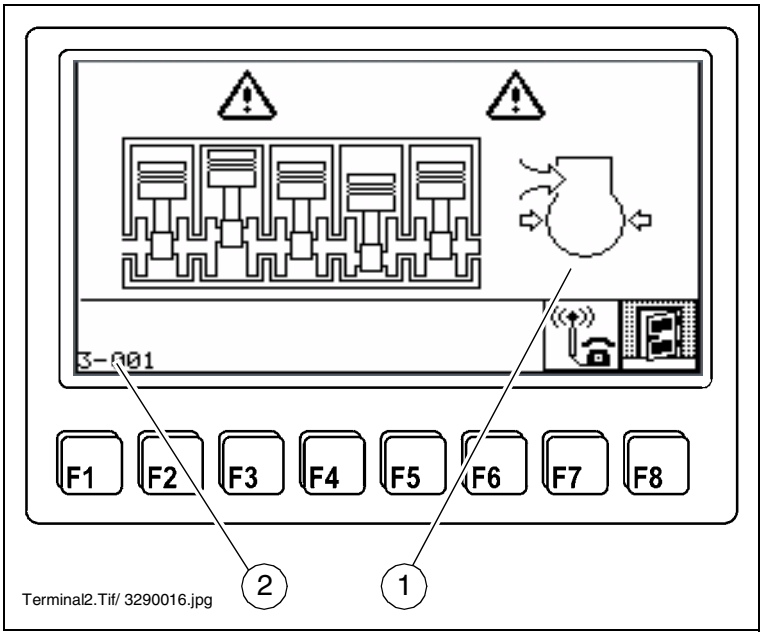
Service Fault Code	Service Description	J1939 FMI	J1939 SPN	J1939 SPN Description
581	High voltage detected at the fuel inlet pressure sensor circuit.	3	1381	Fuel Supply Pump Inlet Pressure
582	Low voltage detected at the fuel inlet pressure sensor circuit.	4	1381	Fuel Supply Pump Inlet Pressure
583	Out-of-range low voltage detected at the fuel inlet pressure sensor circuit.	18	1381	Fuel Supply Pump Inlet Pressure
588	High voltage detected at the engine alarm driver circuit.	3	611	System Diagnostic Code #1
589	Low voltage detected at the engine alarm driver circuit.	4	611	System Diagnostic Code #1
595	Turbo overspeed protection fault.	16	103	Turbocharger 1 Speed
596	Battery voltage above normal operational range.	16	167	Alternator Potential (Voltage)
597	Battery voltage below normal operational range.	18	167	Alternator Potential (Voltage)
598	Very low battery voltage, critical level.	1	167	Alternator Potential (Voltage)
697	High voltage detected at the ECM Internal Temperature sensor circuit.	3	1136	Engine ECU Temperature
698	Low voltage detected at the ECM Internal Temperature sensor circuit.	4	1136	Engine ECU Temperature
731	Engine speed/position #2 - Mechanical misalignment between camshaft and crankshaft sensors.	7	723	Engine Speed Sensor #2
753	Cam Synchronization Error between the camshaft and crankshaft engine position sensors.	2	723	Engine Speed Sensor #2
755	Incorrect fueling was detected on the front three cylinders.	7	157	Injector Metering Rail #1 Pressure
758	Incorrect fueling was detected on the rear three cylinders.	7	1349	Injector Metering Rail #2 Pressure
774	Low current or open circuit detected at electronic air compressor driver circuit.	5	46	Vehicle Wet Tank Pressure
775	Minor pressure leak for the air compressor pneumatic circuit.	17	46	Vehicle Wet Tank Pressure
776	Major pressure leak for the air compressor pneumatic circuit.	18	46	Vehicle Wet Tank Pressure
951	A power imbalance between cylinders was detected by the ECM.	2	166	Rated Engine Power

Engine warnings (II)

These warnings appear on screen automatically and indicate which fault has occurred.

☞ The graphics (1) indicate the type of fault.

☞ The numeral (2) identifies a given screen and should be quoted to Technical Service with any queries to enable the problem to be located more rapidly.

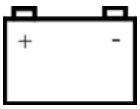


- This message can be cleared from screen by pressing button (F8).
  This returns the user to the previous screen.

⚠ The message screens are not displayed again (cyclical fashion) once the (F8) button has been pressed. The message is not displayed again until the next time the machine is started.

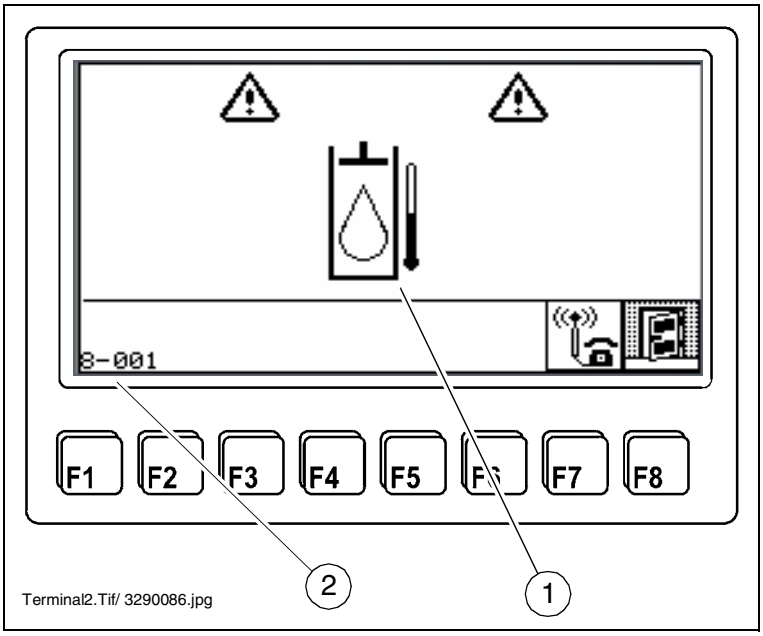
Key to component and status symbols

Warning	Symbol	Action
Oil temperature		Allow engine to heat up at slightly raised idle speed.
Oil pressure		⚠ Switch off engine immediately! Check engine oil level. If necessary, carry out a visual inspection for signs of leakage.
Coolant water level		⚠ Switch off engine immediately! Top up coolant. If necessary, carry out a visual inspection for signs of leakage. STOP When hot, the system is pressurised! Risk of scalding!
Coolant temperature		⚠ Switch off engine immediately! Check coolant water level. If necessary, carry out a visual inspection for signs of leakage. STOP When hot, the system is pressurised! Risk of scalding!
Coolant pressure		⚠ Switch off engine immediately! Check coolant water level. If necessary, carry out a visual inspection for signs of leakage. STOP When hot, the system is pressurised! Risk of scalding!
Air temperature		Check inlet air line
Air pressure		Check air outlet line

Designation	Symbol	Action
Engine speed		Reduce engine speed (possible coasting mode)
Engine stop solenoid		Check wiring on stop solenoid. If necessary, call Service.
Fuel temperature		If necessary, top up fuel tank or carry out visual inspection for signs of leakage. Check fuel return line.
Injector nozzles		⚠ Call Service!
Battery (undervoltage)		Check generator, drive belts. If necessary, call Service.

Warnings for hydraulic and water circuits

These warnings appear on screen automatically and indicate which fault has occurred.



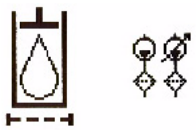
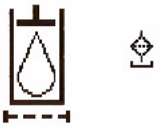
☞ The graphics (1) indicate the type of fault.

☞ The numeral (2) identifies a given screen and should be quoted to Technical Service with any queries to enable the problem to be located more rapidly.

- This message can be cleared from screen by pressing button (F8). This returns the user to the previous screen.

⚠ The message screens are not displayed again (cyclical fashion) once the (F8) button has been pressed. The message is not displayed again until the next time the machine is started.

Key to component and status symbols

Designation	Symbol	Action
Hydraulic oil temperature		Allow the hydraulic oil to cool down. Check the hydraulic oil level. Check radiator for signs of contamination.
Hydraulic oil level		Top up hydraulic oil. If necessary, carry out a visual inspection for signs of leakage.
Hydraulic filter (pressure filter)		Replacing filter elements
Hydraulic filter (return flow filter)		Replacing filter element
Water filter		Replacing filter element

Error messages, electrical system

These error messages appear on screen automatically and indicate what type of fault has just occurred.

- The graphic (1) indicates which machine function is affected.
- The graphic (2) indicates that a wire break or a short circuit has just occurred.

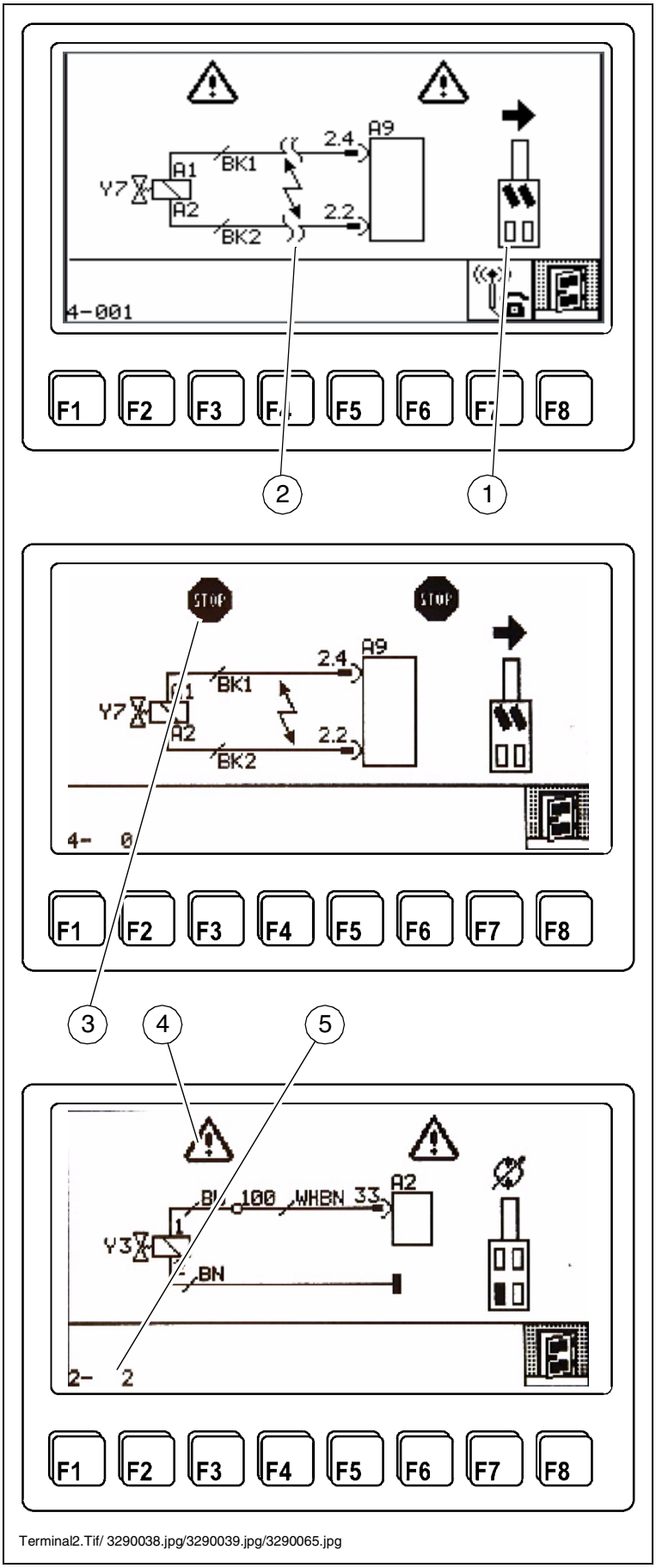
- Whenever the "Stop" (3) symbol is displayed, the machine is switched off automatically. The fault is so serious that the machine cannot be restarted and operated again until the fault has been rectified.
- If the "Caution" (4) symbol appears on screen, you can continue operating the machine at your own discretion.

⚠ The faults should however be remedied as soon as possible for safety reasons and to prevent secondary damage.

☞ The numeral (5) designates the screen and should be quoted to Technical Service with any queries to enable the problem to be located more rapidly.

- The message can be cleared from screen by pressing button (F8).
  This returns the user to the previous screen.

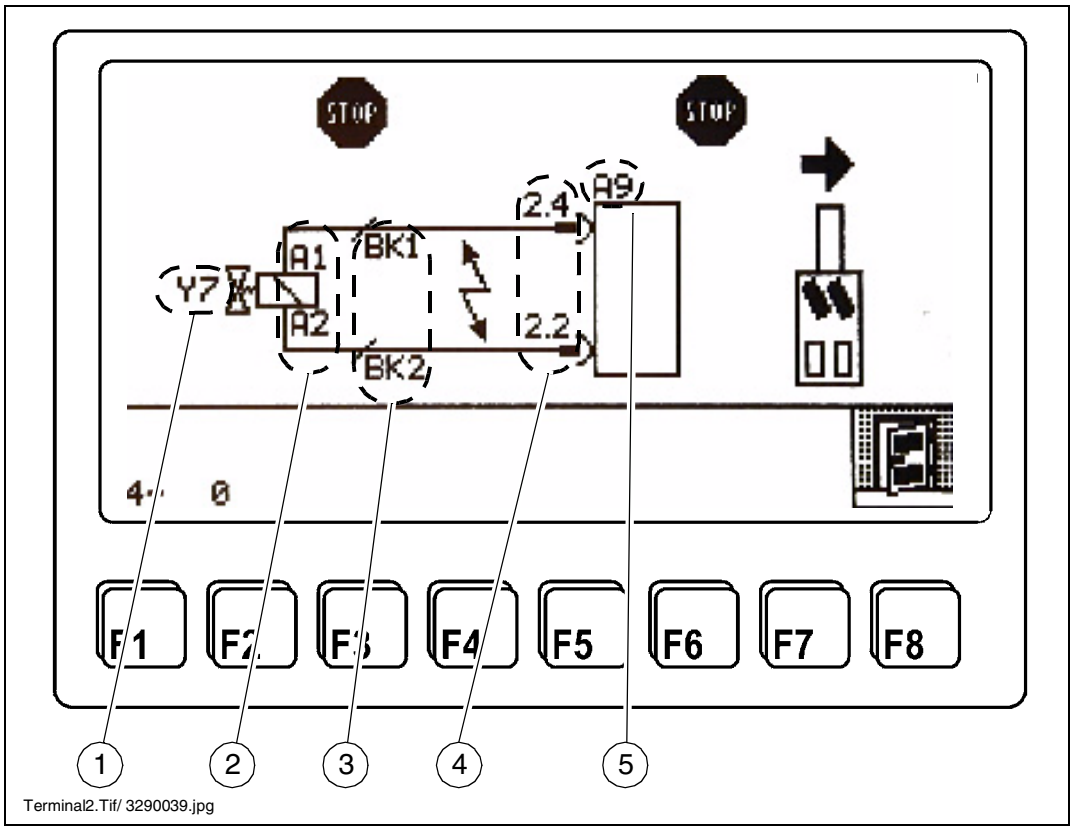
☞ If the "Stop" symbol appears on screen, the message cannot be cleared.



Terminal2.Tif/ 3290038.jpg/3290039.jpg/3290065.jpg

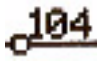
⚠ The message screens are not displayed again (cyclical fashion) once the (F8) button has been pressed. The message is not displayed again until the next time the machine is started.

To enable the fault to be located precisely, additional information is provided in the error message. This means that any fault can be rectified swiftly.



Display No.	Description
1	Designation of electrical components in the circuit
2	Designation of controller
3	Cable colour
4	Connection to slave
5	Designation of slave

Key to electrical components

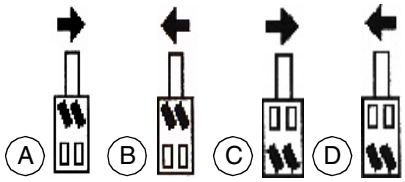
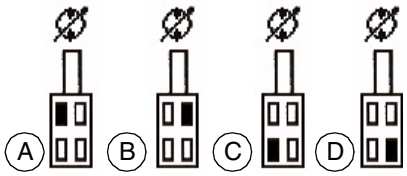
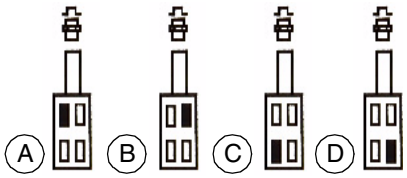
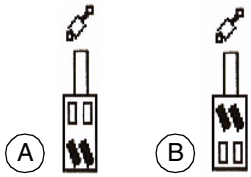
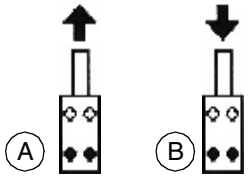
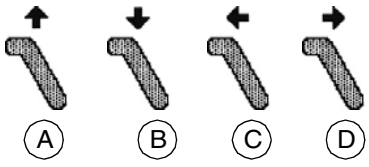
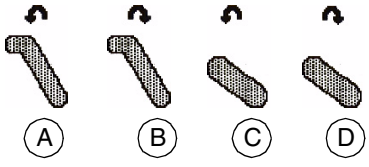
Meaning	Symbol
Solenoid valve (example of valve designation according to circuit diagram Y3)	
Potentiometer	
Hall effect sensor	
Inductive sensor (example of sensor for detecting the steering angle)	
Electrical fuse (example of fuse F 3.4)	
Connector (example of connector 41)	
Terminal (example of terminal 104)	

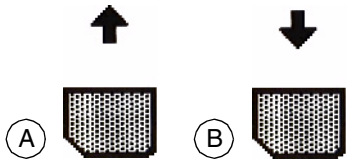
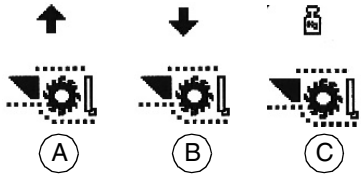
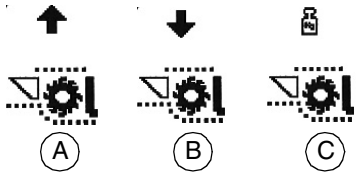
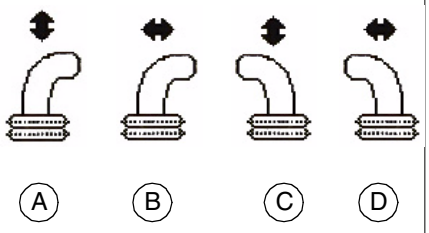
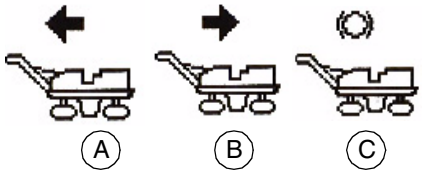
Key to colour codes

Abbreviation	Colour
BK	black
BN	brown
BU	blue
GN	green
GR	grey
PK	pink
RD	red
VI	violet
WH	white
YE	yellow

In addition, with multi-colour cables, the abbreviations can be grouped together.
Example: GRBK = grey/black

Key to function and component symbols

Meaning	Display mode
- A: Front traction units, right steering movement - B: Front traction units, left steering movement - C:Rear traction units, right steering movement - D: Rear traction units, left steering movement	
- A: Drive on front left traction unit - B: Drive on front right traction unit - C: Drive on rear left traction unit - D: Drive on rear right traction unit	
- A: Sensor on front left traction unit - B: Sensor on front right traction unit - C: Sensor on rear left traction unit - D: Sensor on rear right traction unit	
- A: Steering control of rear drive units - B: Steering control of front drive units	
- A: Raising rear traction units - B: Lowering rear traction units	
- A: Raising upper conveyor - B: Lowering upper conveyor - C: Swivel upper conveyor to left - D: Swivel upper conveyor to right	
- A: Forwards drive for upper conveyor - B: Reverse drive for upper conveyor - C: Forwards drive for lower conveyor - D: Reverse drive for lower conveyor	

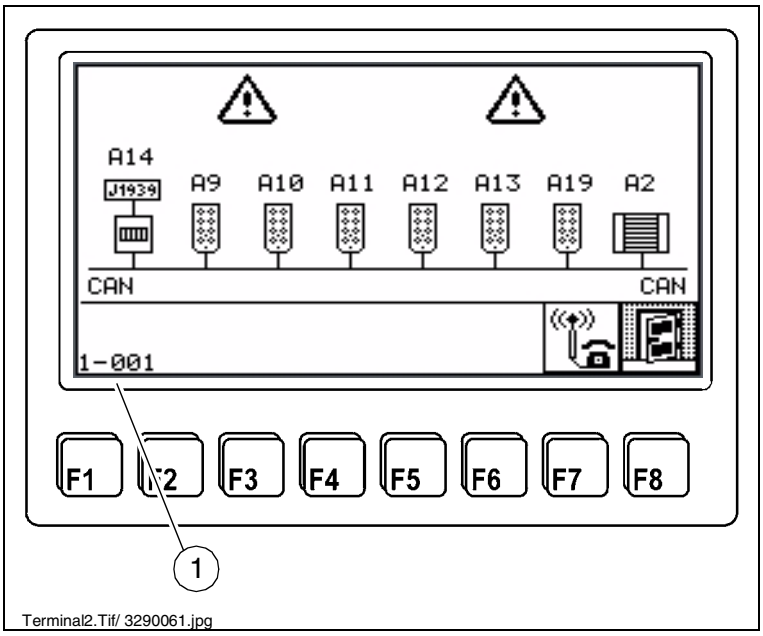
Meaning	Display
- A: Raising side board - B: Lowering side board	
- A: Raising sliding shoe - B: Lowering sliding shoe - C: Applying load to sliding shoe	
- A: Raising moldboard - B: Lowering moldboard - C: Applying load to moldboard	
- A: Travel drive 1st operating panel, drive axle - B: Travel drive 1st operating panel, steering axle - C: Travel drive 2nd operating panel, drive axle - D: Travel drive 2nd operating panel, steering axle	
- A: Travel drive, forwards - B: Travel drive, reverse - C:Travel drive, brake function	

Other possible error messages and warnings

Error message, slave / gateway

Appears on screen whenever a fault occurs on one of the slaves, on the gateway or on a master module.

- The affected component flashes.
- The message can be cleared from screen by pressing button (F8).
  This returns the user to the previous screen.



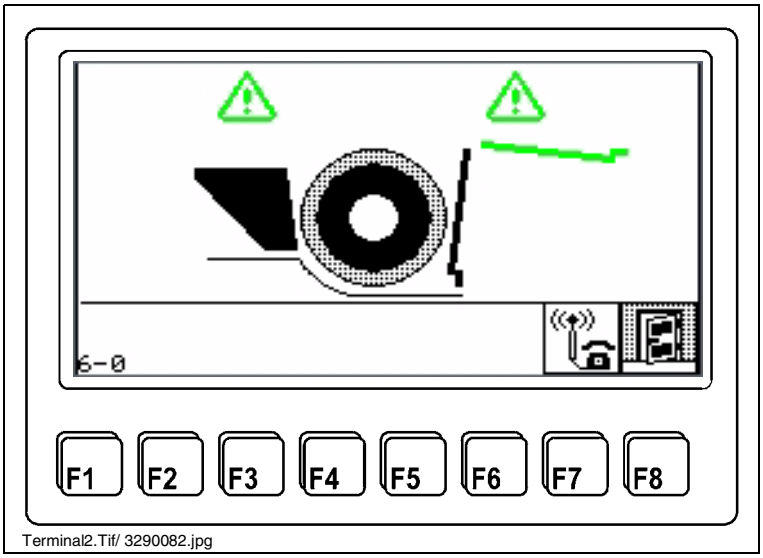
Terminal2.Tif/ 3290061.jpg

☞ The numeral (1) identifies the screen and should be quoted to Technical Service with any queries to enable the problem to be located more rapidly.

Error message, moldboard

Appears on screen if the moldboard is not closed.

- The message can be cleared from screen by pressing button (F8).
  This returns the user to the previous screen.

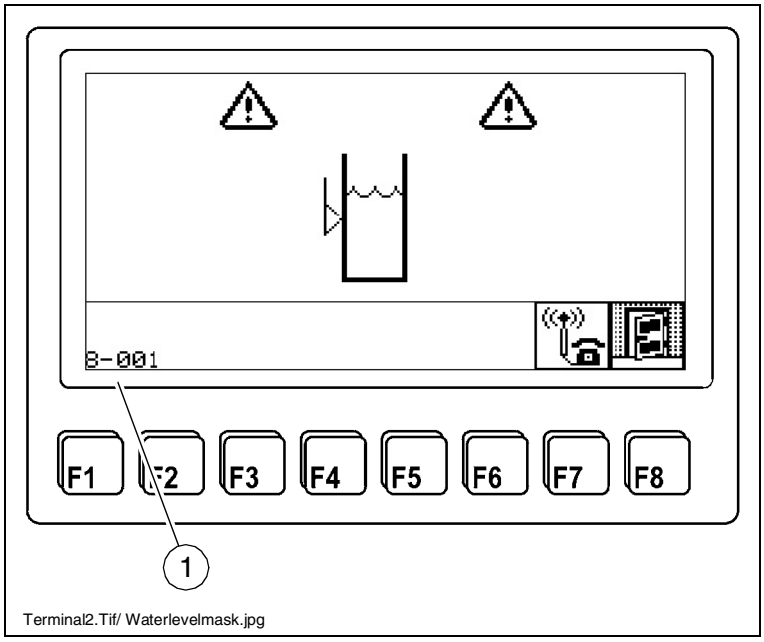


Terminal2.Tif/ 3290082.jpg

Water level warning

If the water level falls below a defined level, the water pump is deactivated and locked so that it cannot be reactivated.
The warning is shown in the display.
Running dry could damage the water pump.

⚠ In order to prevent excess wear on the milling tools and a heavy build up of dust, milling should be stopped until the water has been topped up.



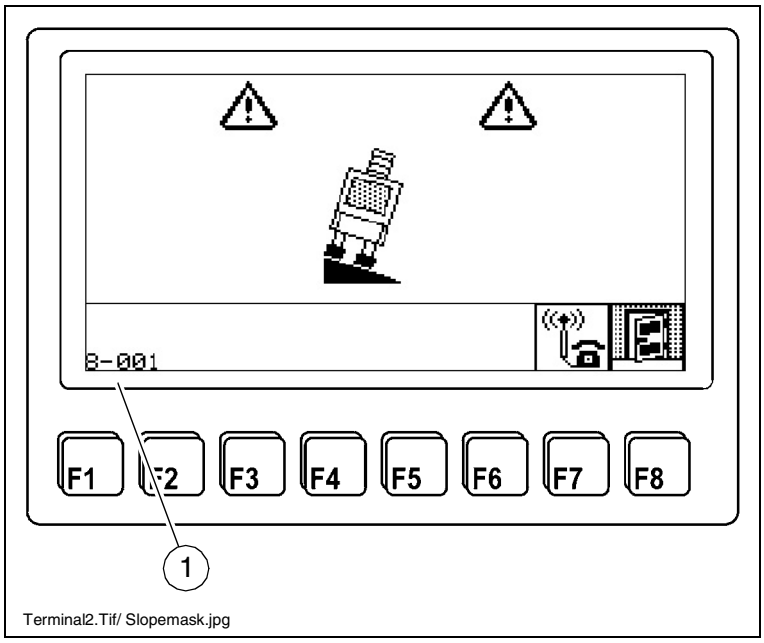
Terminal2.Tif/ Waterlevelmask.jpg

Warning
Machine tilt

This warning message appears on screen as soon as the machine tilt is more than 10 % in order to warn the operator that the machine may tip.

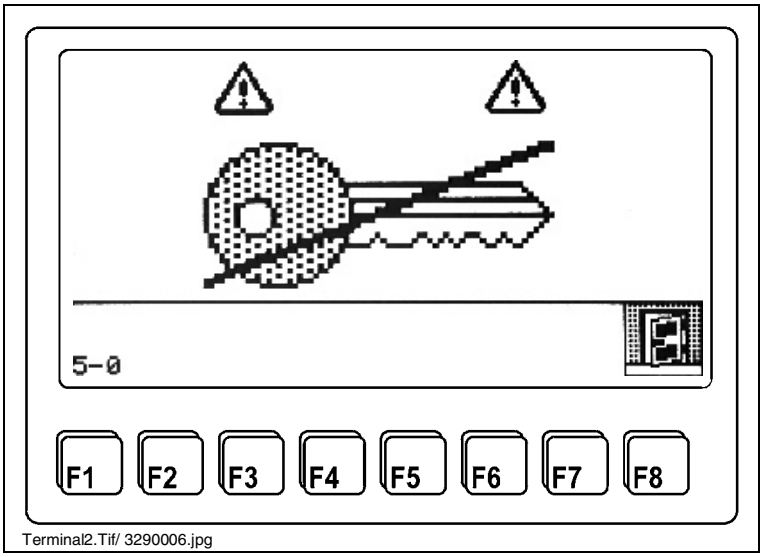
☞ If the tilt reaches more than 11 %, the levelling function is automatically deactivated.

STOP Greater tilts MUST be avoided. Risk of tipping!



Terminal2.Tif/ Slopemask.jpg

Start inhibit



Terminal2.Tif/ 3290006.jpg

Appears on screen if other controls are operated during the start-up procedure.

It is only possible to start the engine if none of the controls of the lower operating panels or the second operating panel are being activated.

The start inhibit is also activated under the following circumstances:

- The onboard computer does not detect the neutral position of the control lever for travel drive and discharge conveyor.

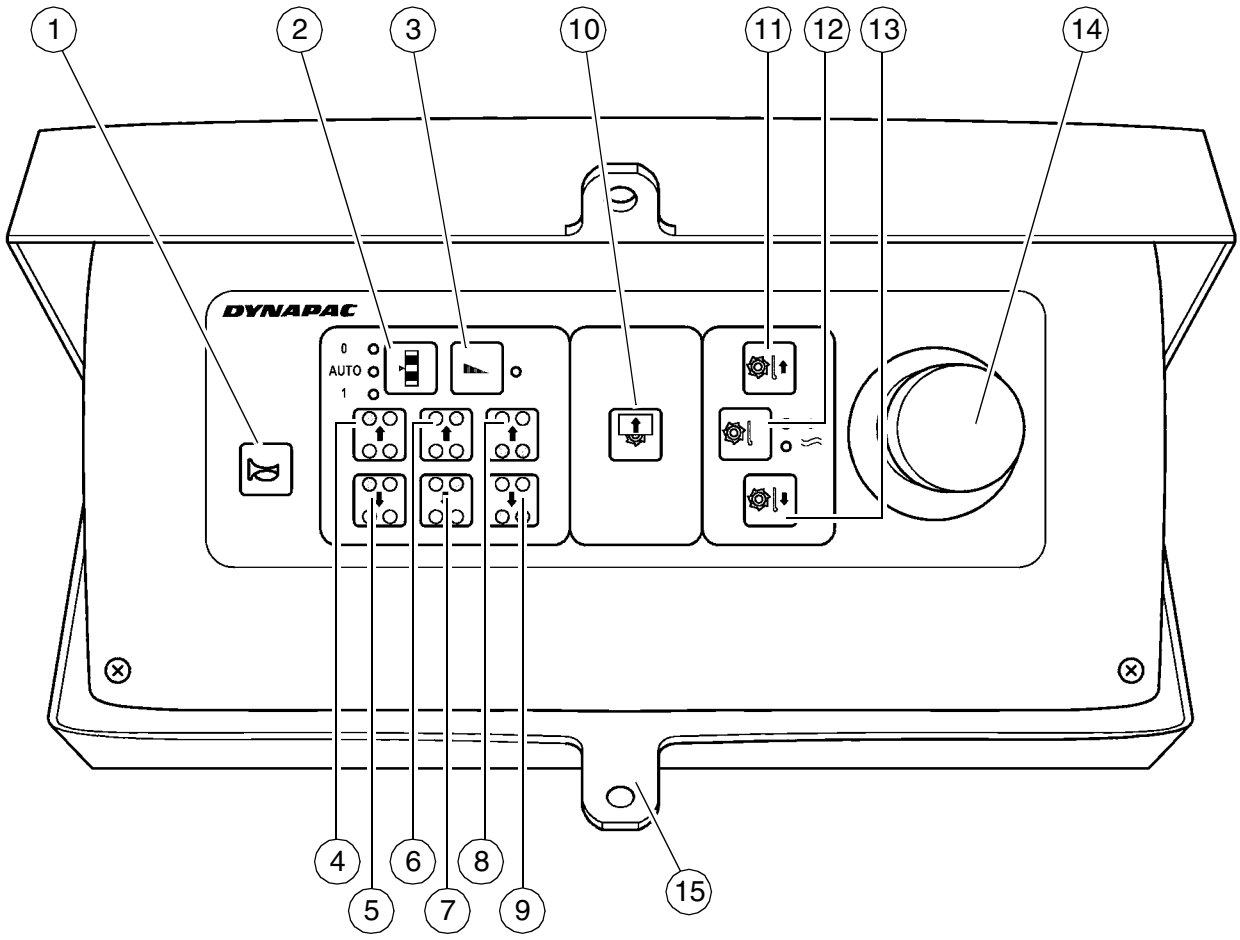
☞ In this instance, electronically adjust the control lever or if necessary inform the aftersales service.

- The drive motor does not start because the starter is not functioning or turns for more than 15 seconds.

☞ In this instance, check the power supply of the starter and starter relay or if necessary inform the engine manufacturer's service department.

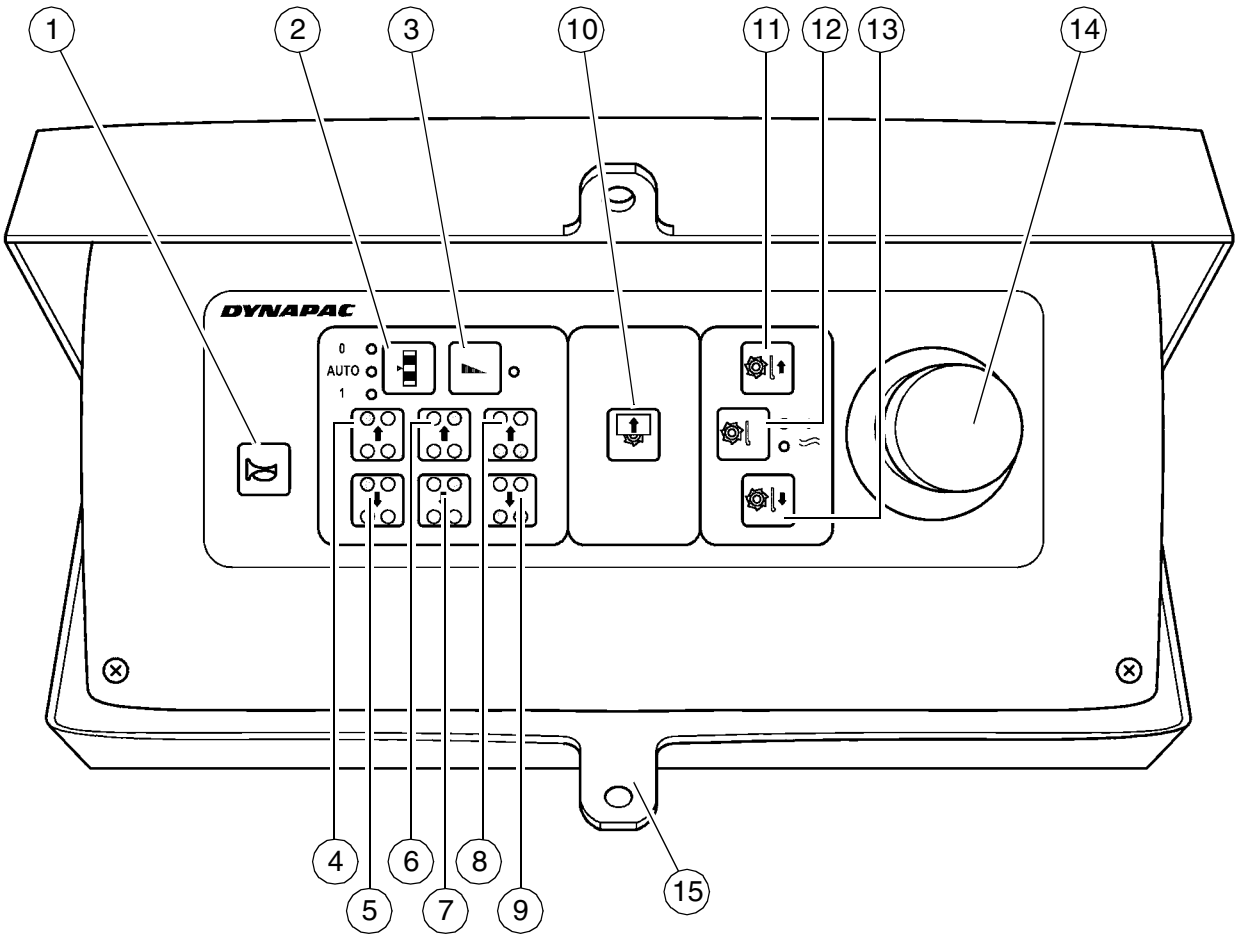
- The message can be cleared from screen by pressing button (F8).
  This returns the user to the previous screen.

3.4 Lower rear control panel



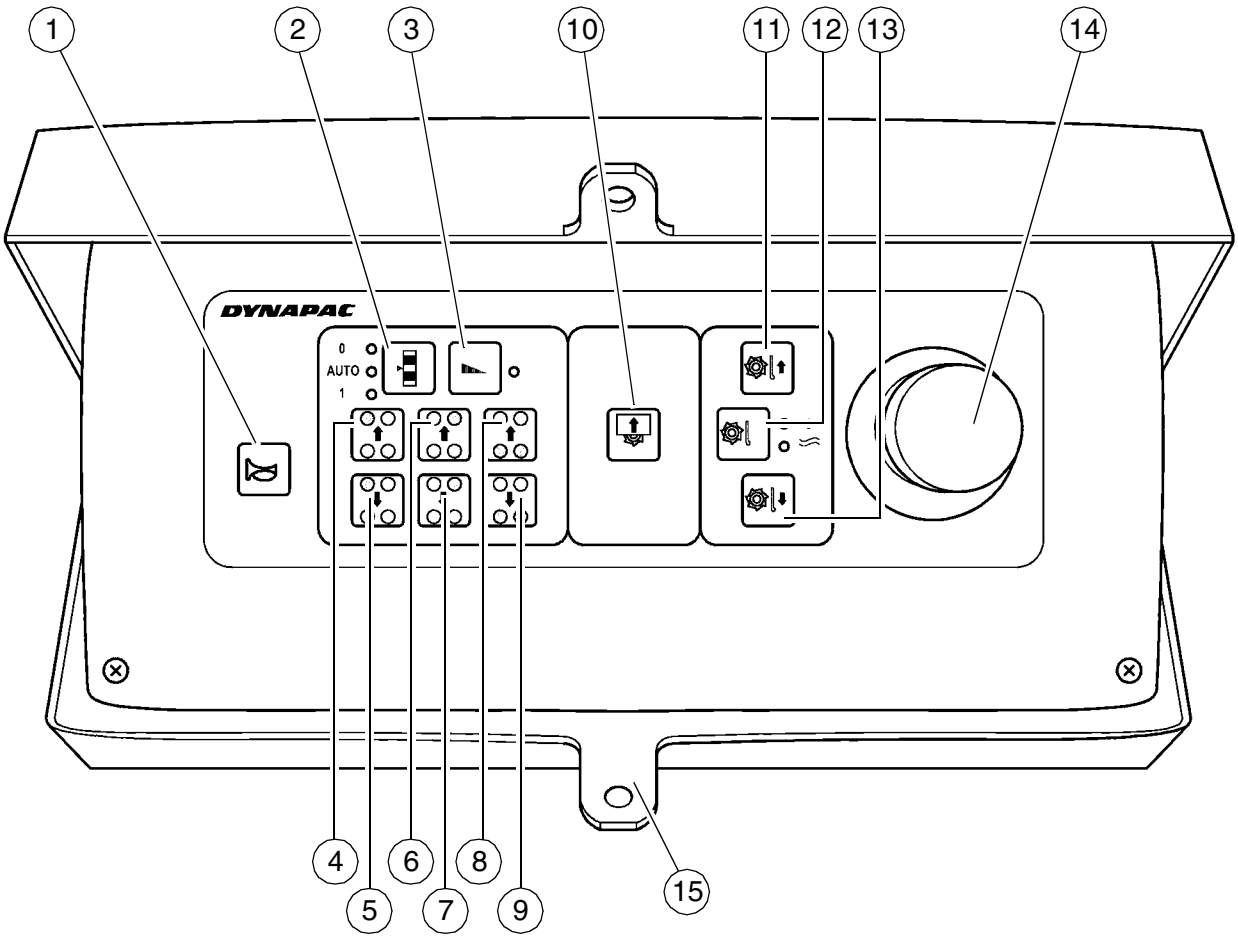
Pult3new.Tif

Pos.	Designation	Short description
1	Horn	Press when danger threatens and use as an acoustic signal when setting off!
2	Levelling function	Two switch positions can be selected: - 0 : Levelling OFF - AUTO : Levelling switches on automatically whenever the control lever for the travel drive is fully extended. ☞ The levelling function (1) can only be engaged from the upper operating panel. - 1 : Levelling ON appears on screen. ☞ The engaged function is confirmed by LED. ☞ The control element controls the function on the side of the vehicle on which the control element is located.
3	Sensor changeover	Sensor changeover between slope controller and height sensor for MOBA-matic in conjunction with MOBA control unit. ☞ Access only possible from one side! ☞ LED beside the key indicates which device is connected to the Levelling unit: LED ON = slope controller
4	Raising front left machine	While the button is being pressed, the front left traction unit is extended continuously until it reaches its limit position. ☞ When this function is active, levelling is disengaged automatically on the left side.
5	Lowering front left side of machine	While the button is being pressed, the front left traction unit is retracted continuously until it reaches its limit position. ☞ When this function is active, levelling is disengaged automatically on the left side.



Pult3new.Tif

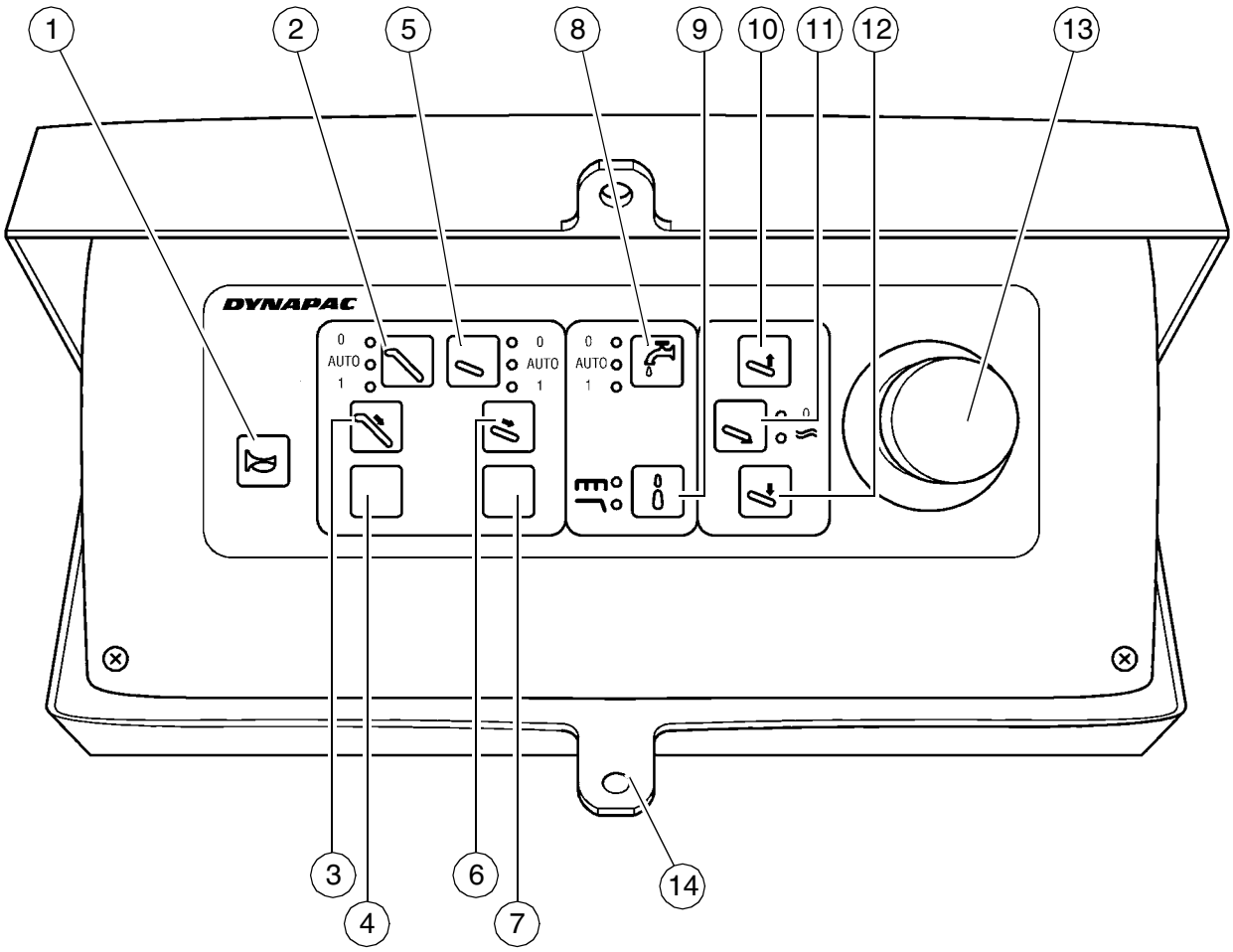
Pos.	Designation	Short description
6	Raising front right side of machine	While the button is being pressed, the front right traction unit is extended continuously until it reaches its limit position. ☞ When this function is active, levelling is disengaged automatically on the right side.
7	Lowering front right side of machine	While the button is being pressed, the front right traction unit is retracted continuously until it reaches its limit position. ☞ When this function is active, levelling is disengaged automatically on the right side.
8	Raising rear of vehicle	While the button is being pressed, the rear traction units are extended continuously until they reach their limit position.
9	Lowering rear of vehicle	While the button is being pressed, the rear traction units are retracted continuously until they reach their limit position.
10	Raising the side board	While the button is being pressed, the side board (on the side on which the control panel is fitted) is raised continuously until it reaches its limited position. When the button is released, the side board automatically lowers back down to the lower limit position. ☞ Each control element only controls the function on the same side of the vehicle as itself. ☞ While the button is being pressed, the automatic leveller is set to "Standby". With milling drum housing open: - 1. Press button: side board is raised. - 2. Press button: side board is lowered. STOP Danger resulting from raised loads. Do not enter the danger area. STOP If the engine is switched off, the side board slumps. STOP If the milling drum housing is closed, the side board is lowered automatically.



Pult3new.Tif

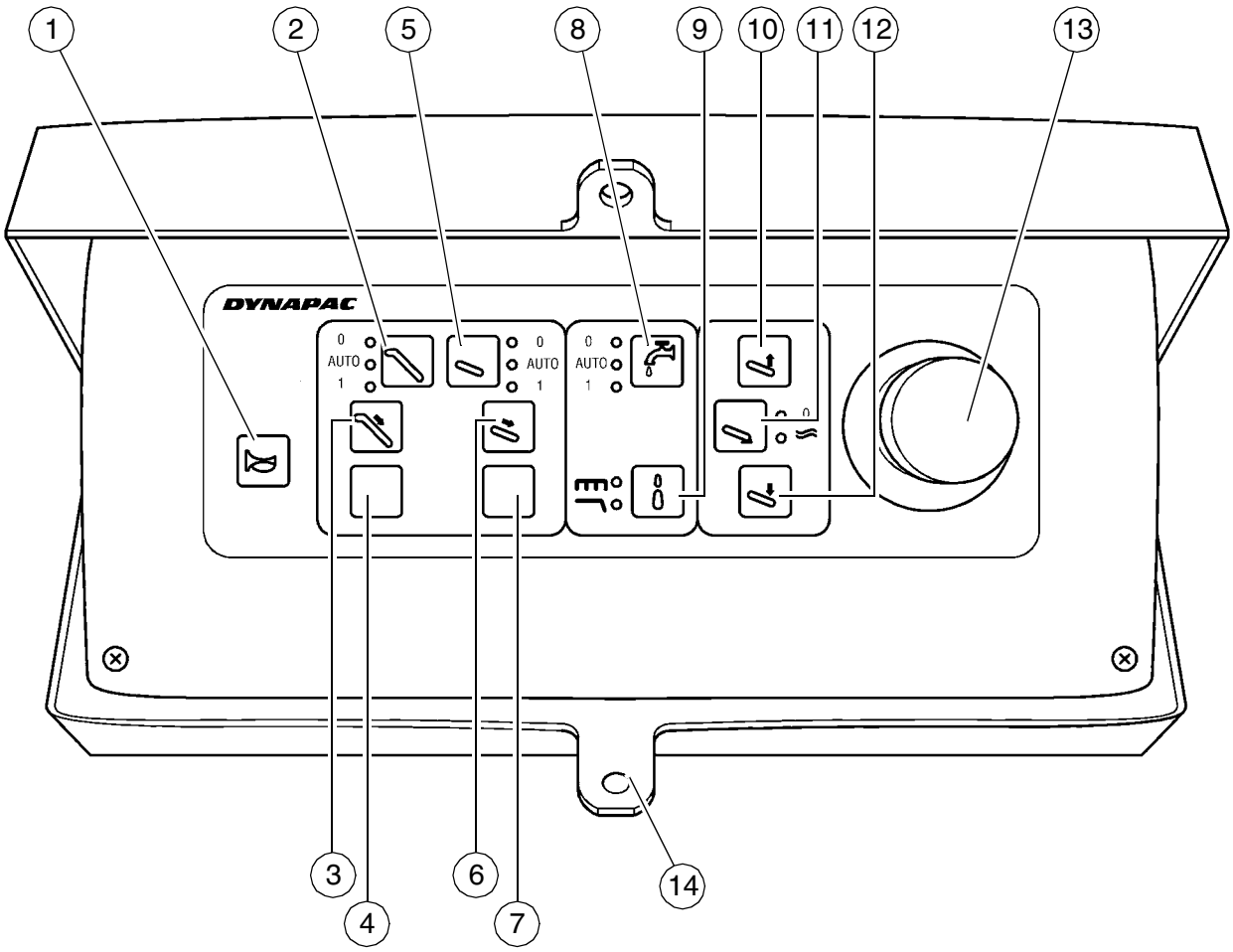
Pos.	Designation	Short description
11	Raising the moldboard	While the button is being pressed, the moldboard is raised continuously until it reaches its limit position. STOP Danger resulting from raised loads. Do not enter the danger area.
12	Selector switch Moldboard	Two switch positions can be selected : - 0 : Moldboard blocked - Ý : Moldboard in float setting (applied load function or relief) ☞ The engaged function is confirmed by LED. ☞ During profiling operations the moldboard should always be in its float setting. Under certain working conditions, it is however possible for the moldboard to dig into the substrate. This problem can be averted by using the blocking function. This can be prevented through the use of the blocking or relief function.
13	Lowering the moldboard	While the button is being pressed, the moldboard is lowered continuously until it reaches its limit position. ⚠ The moldbord may raise the machine.
14	EMERGENCY STOP button	Press in emergencies (people in danger, risk of collision etc.) - The engine, drive units and steering are disengaged whenever the EMERGENCY STOP button is pressed. No movement, e.g. of the lower conveyor, is then possible! Risk of accident! - Before the engine can be restarted, all EMERGENCY STOP buttons must be raised.
15	Retaining tab	☞ Secure and padlock operating panel housings at the end of work or during transport operations!

3.5 Front lower control panel



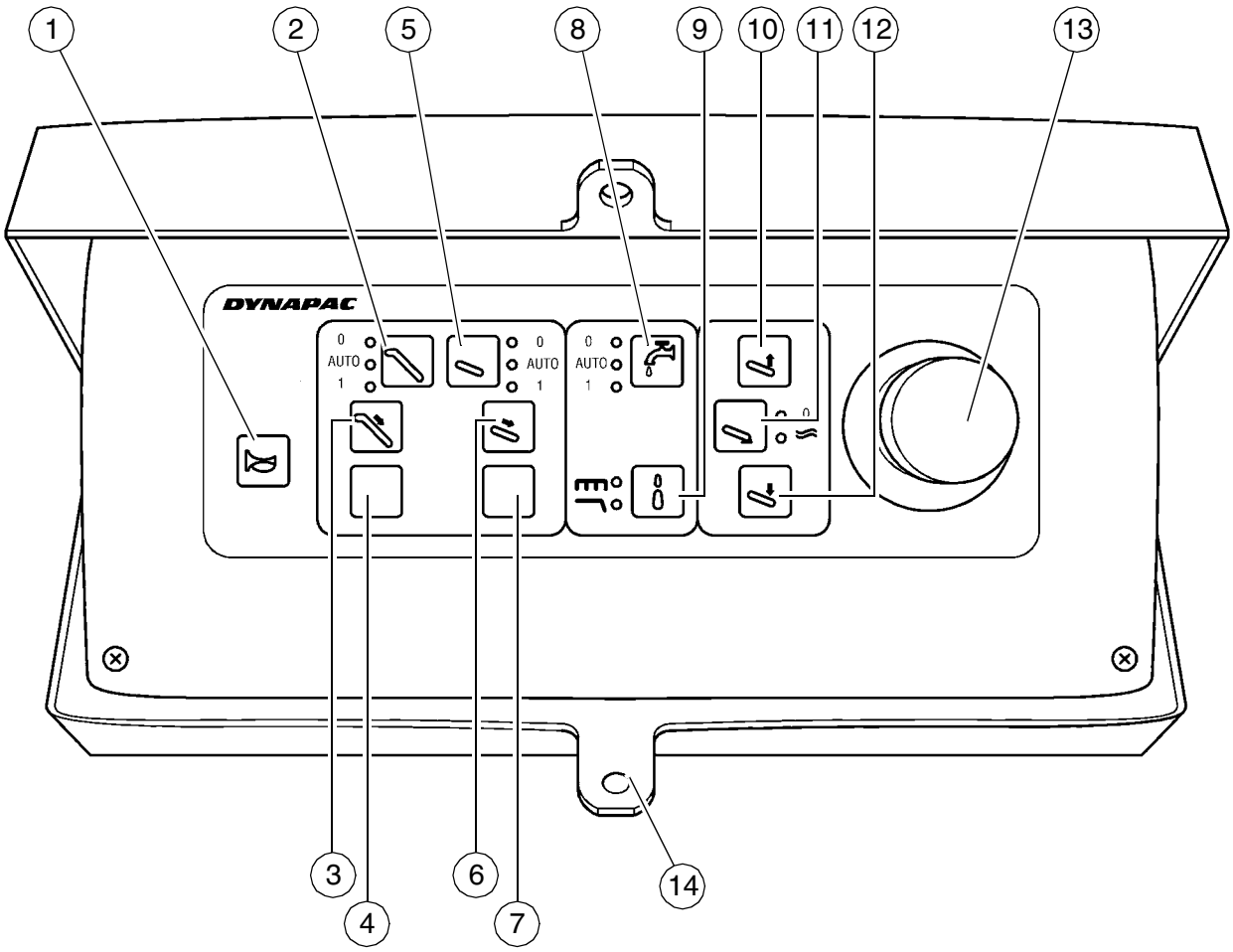
Pult4new.Tif

Pos.	Designation	Short description
1	Horn	Use when danger threatens and as an acoustic signal when setting off!
2	Mode upper conveyor	Three switch positions can be selected: - 0 : transport function of lower conveyor OFF - AUTO : Function of the lower conveyor is engaged by moving the travel drive control lever forwards to obtain forwards motion. - 1 : Transport function of the lower conveyor in forwards direction ON ☞ At the touch of a button, the system switches between functions 0 and AUTO. When the button is pressed down for an extended period, function 1 is activated. ☞ The engaged function is confirmed by LED.
3	Reversing mode, upper conveyor	At the touch of a button the direction of travel of the upper conveyor is switched to reverse direction.
4	not assigned	
5	Mode lower conveyor	Three switch positions can be selected: - 0 : Transport function of lower conveyor OFF - AUTO : Function of the lower conveyor is engaged by moving the travel drive control lever forwards to obtain forwards motion. - 1 : Transport function of the lower conveyor in forwards direction ON ☞ At the touch of a button, the system switches between functions 0 and AUTO. When the button is pressed down for an extended period, function 1 is activated. ☞ The engaged function is confirmed by LED.
6	Reversing mode, lower conveyor	At the touch of a button the direction of travel of the lower conveyor is switched to reverse direction.
7	not assigned	



Pult4new.Tif

Pos.	Designation	Short description
8	Water pump ON / OFF	Three switch positions can be selected : - 0 : Water pump OFF - AUTO : Sprinkling starts when the control lever is fully extended - 1 : Continuous sprinkling ☞ At the touch of a button, the system switches between functions 0 and AUTO. When the button is pressed down for an extended period, function 1 is activated. ☞ The engaged function is confirmed by LED. STOP This water is definitely not drinking quality! ☞ In addition, this button can be used to operate the high-pressure cleaner (○). The pump must be changed over to high-pressure mode using key (9) for any work involving the high-pressure cleaner.
9	Selector switch Sprinkling / High-pressure cleaner	There is a choice of two operating modes: - ⊓⊓⊓ : sprinkling of the milling drum - ⌐ : high-pressure cleaner operation ☞ At the touch of a button, you can change between these two functions. ☞ The engaged function is confirmed by LED. ☞ The high-pressure cleaner only operates if the water pump is switched to position "1" and if the milling drum drive and the travel drive are switched off. ⚠ When cleaning, never direct water jet of high-pressure cleaner towards electrical components such as sensors, connection boxes, operating panels, electric distributors etc.! 



Pult4new.Tif

Pos.	Designation	Short description
10	Raising the moldboard	While the button is being pressed, the moldboard is raised continuously until it reaches its limit position. STOP Danger resulting from raised loads. Do not enter the danger area.
11	Selector switch Moldboard	Two switch positions can be selected : - 0 : sliding shoe blocked - remains in the position desired - Ý : Moldboard in float setting (applied load function or relief) ☞ The engaged function is confirmed by LED.
12	Lowering moldboard	While the button is being pressed, the moldboard is lowered continuously until it reaches its limit position. ⚠ The sliding shoe may raise the machine.
13	EMERGENCY STOP button	Press in emergencies (people in danger, threat of collision etc.) - When the EMERGENCY STOP key is pressed, the engine, traction units and steering are all switched off (i.e. disabled). It is then no longer possible to move components such as the lower conveyor! Risk of accident! - To restart the engine, all EMERGENCY STOP buttons must be raised.
14	Retaining tab	☞ Secure and padlock operating panel housings at the end of work or during transport operations!

4 Controls

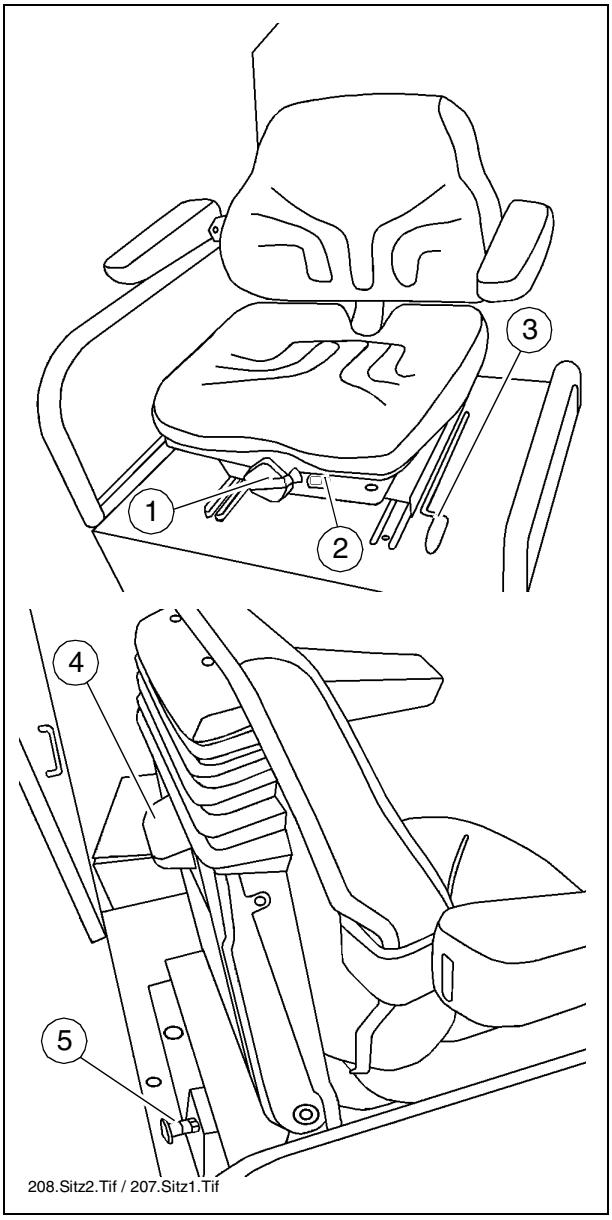
4.1 Controls at operator's control station

Driver's seat on left / right

A driver's seat can be found on both the left and right. The seat should be set to the driver's requirements before work is started.

- To set the correct seat hardness, fold the crank on the handwheel (1) forwards and rotate until the approximate weight of the driver appears on the display (2).
- To set the correct distance from the operating panel, pull lever (3) upwards and slide the seat forwards or backwards as required.
- Pull up the grip recess (4) on the back of the seat and set the height of the backrest.
- Should the driver's seat have to be moved beyond the outer edge of the machine, the locking button (5) must be pulled and the complete seat bracket moved in the appropriate direction.

The armrests (○) can also be swivelled upwards.

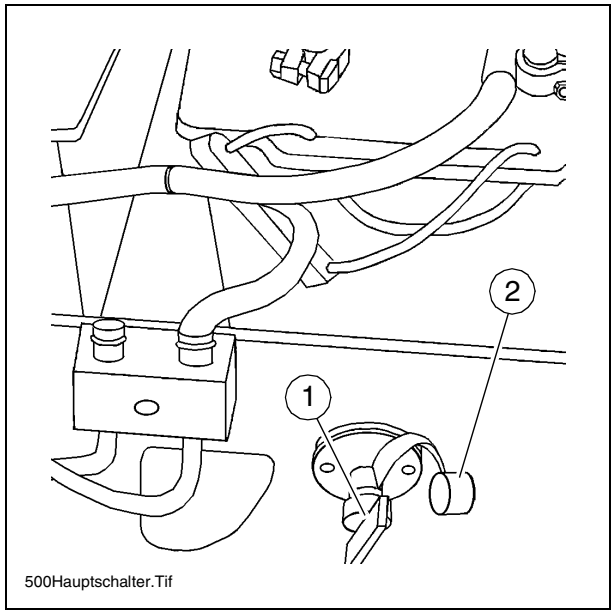


208.Sitz2.Tif / 207.Sitz1.Tif

STOP Risk of accident! If possible, always select the operator's control station on the nearside, i.e. furthest away from oncoming traffic.

STOP Always ensure that the operating panel and driver's seat are correctly locked into place.

Battery's main switch



500Hauptschalter.Tif

The battery's main switch can be found under the right-hand bottom lid. It separates the power supply from the battery for the main fuse.

The safeguard of the bottom lid can be opened using a square wrench.

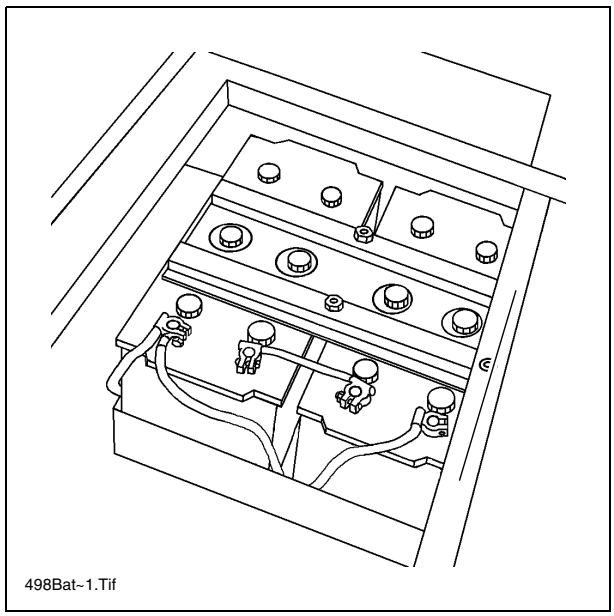
STOP Use a supporting pole to secure the opened bottom lid.

- To deactivate the master switch, turn to the left and remove.
- Cover aperture with protective cap (2).

☞ 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".

Batteries


498Bat~1.Tif

The batteries of the 24 volt system can be found under the right-hand bottom lid.

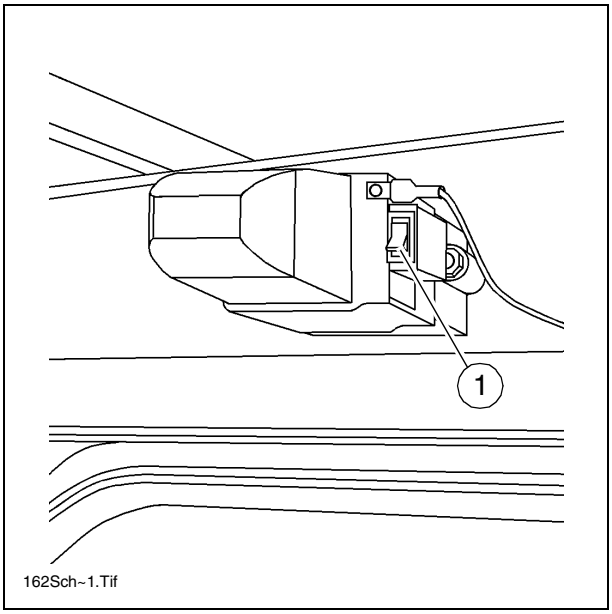
☞ For the specifications, refer to Chapter B "Technical data".
For maintenance, refer to Chapter "Maintenance".

⚠ Only undertake external starting in accordance with the instructions (refer to Section "Starting machine, external starting (starting aid)".

Windscreen wipers

There is one windscreen wiper motor on both the left and right under the windows in the folding semi-cab.

- When necessary, engage the windscreen wipers by pressing the switch (1).



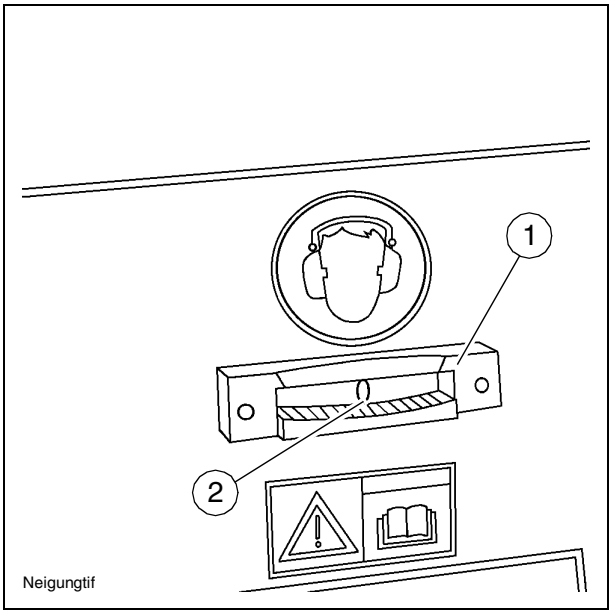
Always ensure that the operator has a clear view. Replace damaged or worn wiper blades in good time.

Tilt display

A tilt display (1) can be found in the centre of the front panel in the operator's control station.

The tilt display is used to provide a visual estimate of the size of the machine's present tilt.

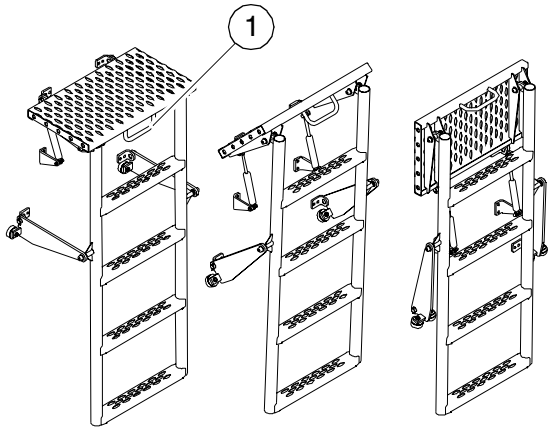
- The indicator ball in the sight glass shows the machine tilt on the scale fitted below the sight glass.



A warning message is displayed on the operating panel once the tilt exceeds 10%.

In certain situations, when the machine tilt exceeds 10 %, there is a risk of tipping! Risk of accident!

Folding ladder



Aufstieg.cdr

A robust ladder with slip-free steps can be found on both the left and right.
The ladder on the right-hand side of the machine can be folded up.

- Use handle (1) to push ladder up, folding it into place.
- To unfold, use handle (1) pull ladder down, unfolding ladder into place.

☞ The lower segment of the ladder, on the right-hand side of the machine, can be taken off once the two retaining cotter pins have been removed.

STOP Danger of crushing! Do not reach into the joint area during the folding process as there is a risk that fingers and hands will be crushed.

STOP Never climb up/down ladders on the machine during travel. Hold tight when climbing up and down ladders.

Guardrail

There is one guardrail on both the left and right between the ladders and operator's control stations.
The guardrails must be set up as required and once the operator's control station has been entered.

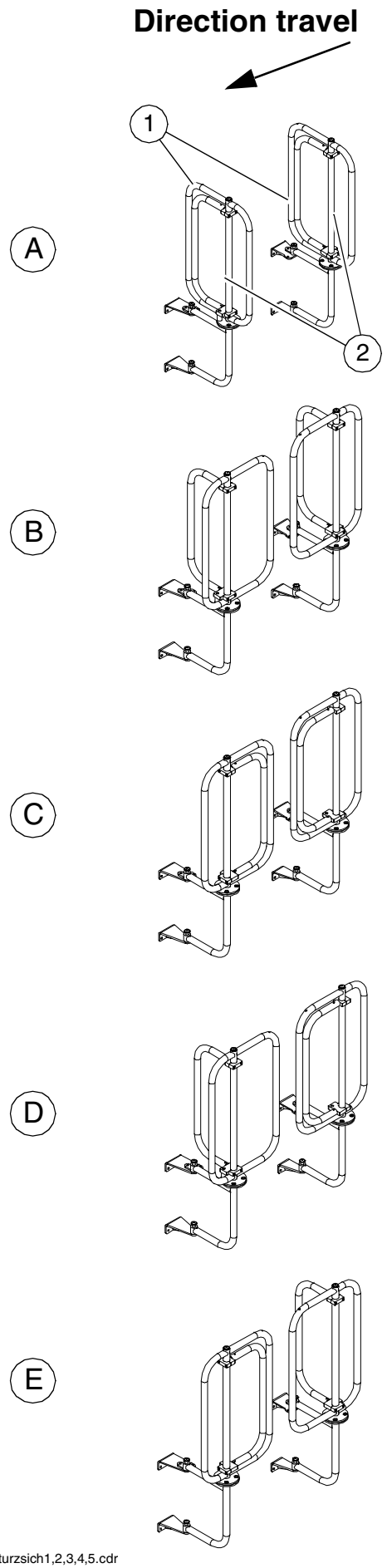
Each of the guardrails consists of two outer sections (1) and two inner sections (2).

- To adjust the guardrail, raise the outer section (1) and after swivelling into the retaining bracket through 90°, lower it back, pointing in the right direction.

The diagrams shown here indicate the different situations in which the guardrails should be set up. (Diagrams show left-hand side of the machine, viewed from outside.)

- (A) Open guardrail - to enter and exit the operator's control station
- (B) Guardrails externally locked (driver's seat and operating panel set up in normal position)
- (C) Guardrails externally and internally locked (driver's seat and operating panel moved beyond the outer edge of the vehicle.)
- (D) Guardrails (externally and internally) locked at rear, front outer section locked (driver's seat moved beyond the outer edge of the vehicle, operating panel set up in normal position.)
- (E) Guardrails (externally and internally) locked out front, front outer section locked (driver's seat set up in normal position, operating panel moved beyond the outer edge of the vehicle.)

STOP Danger of crushing! Do not reach into the joint area during the folding process as there is a risk that fingers and hands will be crushed.



Hydraulic folding roof operations

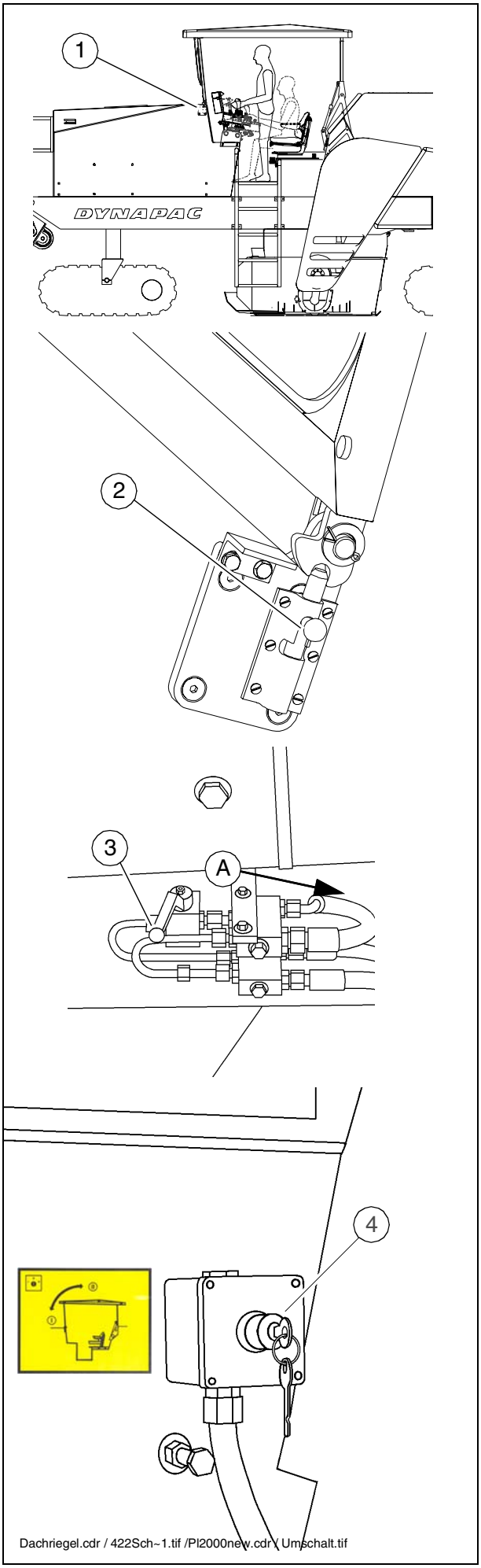
The hydraulically folded roof is locked to the front suspension of the left and right-hand side of the machine by a retaining bracket (1).
The key-operated switch (4) for actuating the folding roof and hood hydraulics can be found to the left of the belt drive's protective box.

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

- Slide down the spring-loaded detent pins (2) on both sides of the machine.
- Check that the changeover valve (3) (under the compensation tank behind the maintenance flap) is in position (A).
- To lower the roof, turn the key-operated switch (4) to the left until the roof has lowered to its minimum level.

STOP Risk of crushing! Ensure that no one reaches into the joint areas or the areas into which the roof is to be lowered during the folding process as there is a risk that fingers and hands will be crushed.

- To raise the roof again, turn the key-operated switch (4) to the right until the roof has raised to its maximum height.
- Allow detent pins (2) on both sides of the machine to engage.



Hydraulic hood operations

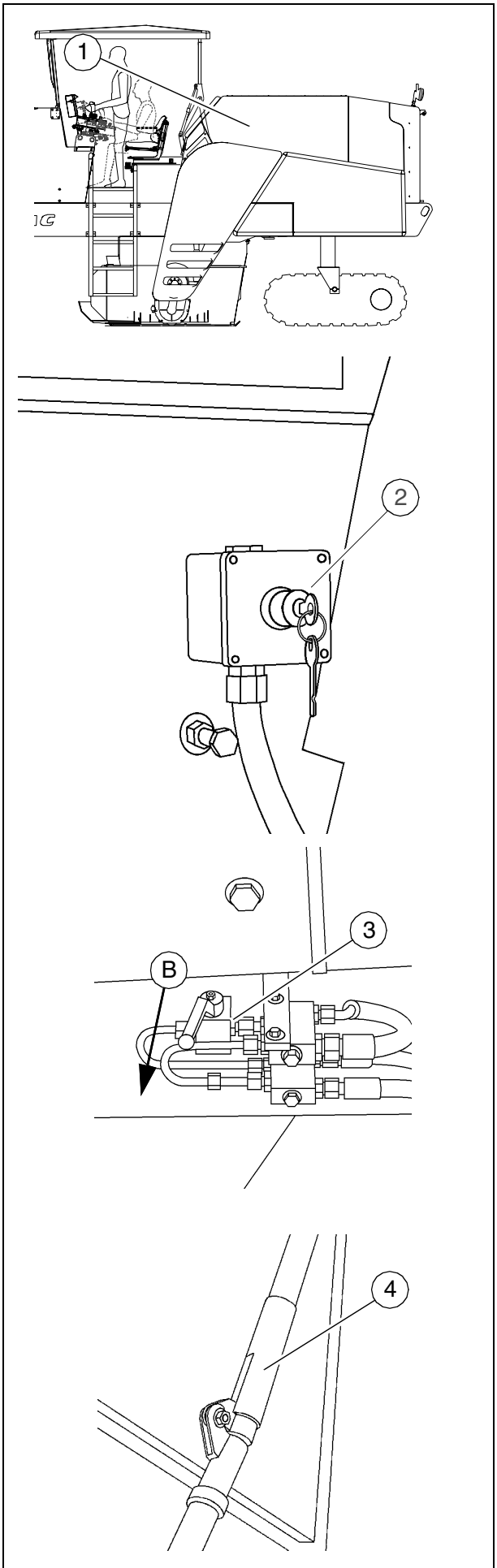
The machine's engine hood (1) can be opened and closed hydraulically and provides good access to the various monitoring and maintenance points.
The key-operated switch (4) for actuating the folding roof and hood hydraulics can be found to the left of the belt drive's protective box.

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

- Check that the changeover valve (3) (under the compensation tank behind the maintenance flap) is in position (B).
- Turn key-operated switch (2) to the left until the hood is opened to its maximum level.
- To lock in this open position, slide the slotted detent sleeves (4) on both sides over the joint.

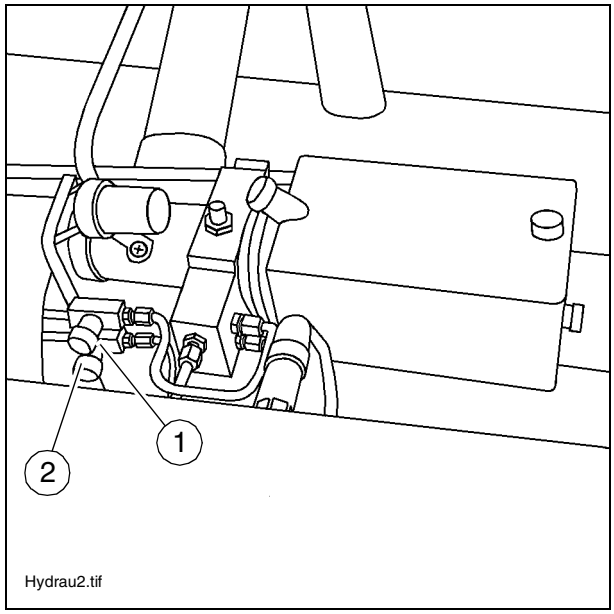
STOP Risk of crushing! Ensure that no one reaches into the joint areas or the areas into which the roof is to be lowered during the folding process as there is a risk that fingers and hands will be crushed.

- In order to close the hood again, the two detent sleeves (4) have to first be slid away from the joints.
- Turn key-operated switch (2) to the right until the hood is fully closed.



Dachriegel.cdr / 422Sch~1.tif /Pl2000new.cdr / Umschalt.tif / Hülse1.tif

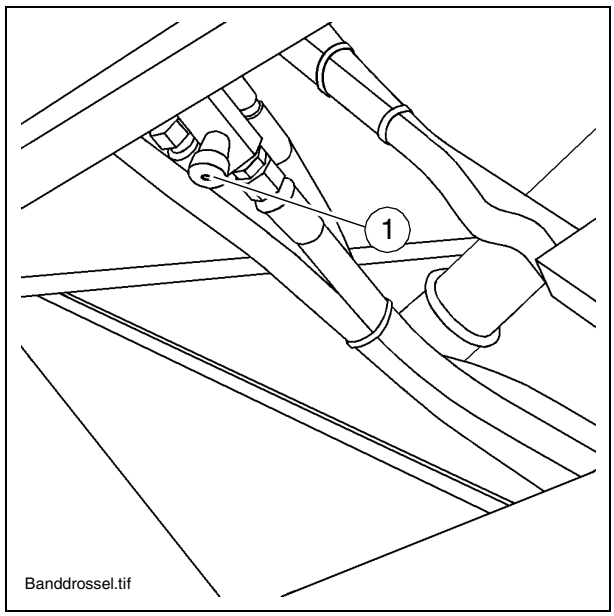
Throttle valves for deployment speed of hood and roof



The hydraulic unit for hood and roof operation can be found behind the maintenance flap of the operator's control station.
There are two throttle valves on the unit for setting the hood and roof deployment speed.

- Upper throttle valve (1): sets hood deployment speed
  Turn adjustment button clockwise = reduces deployment speed
  Turn anti-clockwise = increases deployment speed.
- Upper throttle valve (1): sets roof deployment speed.
  Turn adjustment button clockwise = reduces deployment speed.
  Turn anti-clockwise = increases deployment speed.

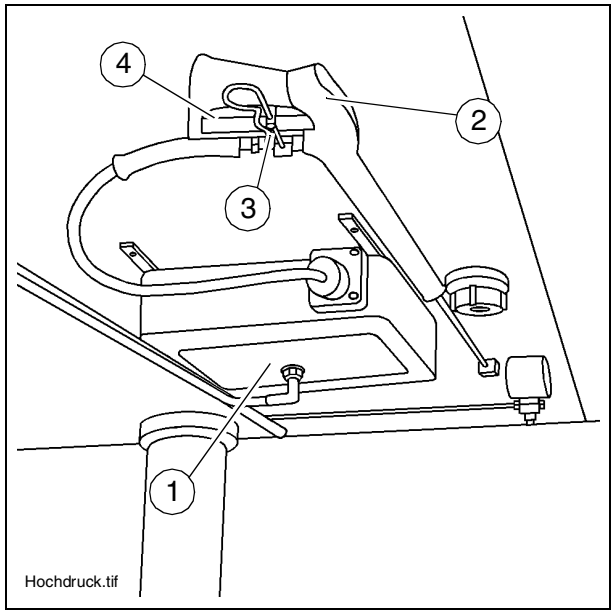
Throttle valve for lowering speed of discharge conveyor



The throttle valve (1) can be found on the left-hand side of the machine under the water tank cover.

- Turn adjustment button clockwise
  = decreases lowering speed.
- Turn anti-clockwise
  = increases lowering speed.

High pressure cleaner



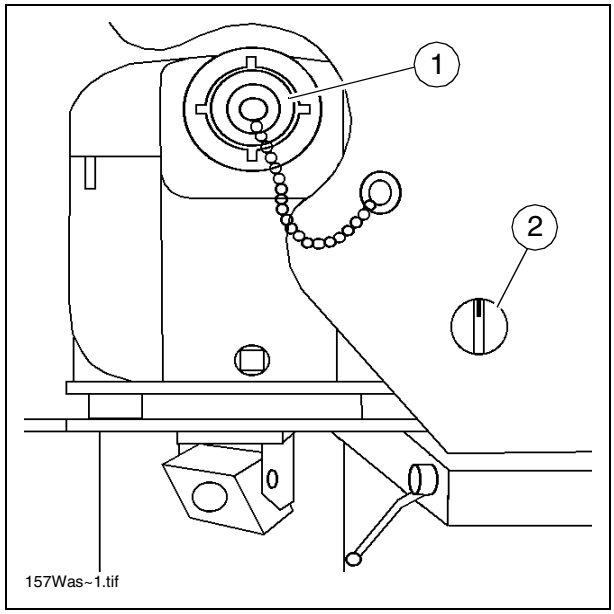
The hose package (1) of the high pressure cleaner can be found on the underside of the vehicle frame at the rear of the machine.
The spray pistol (2) is locked in its detent by a cotter pin (3).

- Remove cotter pin.
- Remove spray pistol from bracket.
- Pull hose out of fixture until you hear a click.
  When released, the hose automatically engages here.
- The hose will automatically roll back up again if pulled and released again.
- The high-pressure jet is started by pressing the trigger (4).
  (Only if the high pressure cleaner function is activated)

When cleaning heavily contaminated areas, note that particles of dirt may be flung in all directions. Danger of accidents.

When cleaning, never direct water jet of high-pressure cleaner towards electrical components such as sensors, connection boxes, operating panels, electric distributors etc.!

Filling pump for water tank



The filling pump for the water tank is located at the front left of the machine.

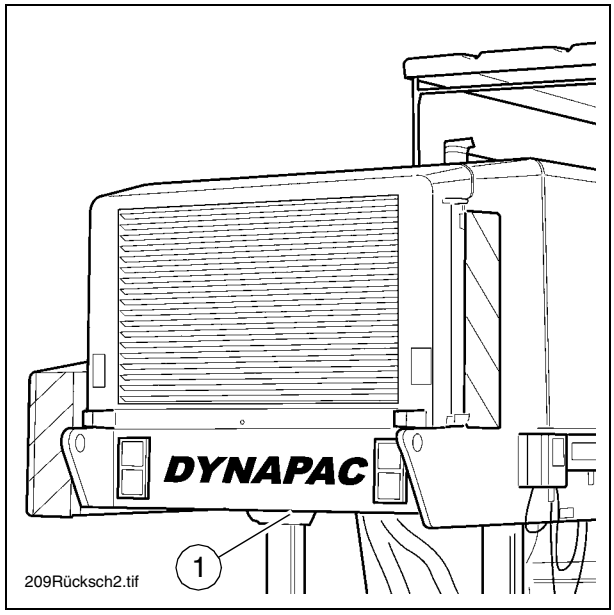
To fill the water tank:

- unscrew seal cap (1) (if necessary use wrench)
- attach suction line and tighten.
- start filling process by pressing switch (2).
- switch off filling pump as soon as the level of water required is reached in the water tank (monitor using the LCD display on the operating panel).

☞ An overflow can be found on the underside of the machine. Excess water flows out through this if overfilled.

⚠ Ensure that the water is not too heavily contaminated because this may result in lengthy filter changes and cleaning work in the tank.

Water filling (pressure fill) connection for water tank



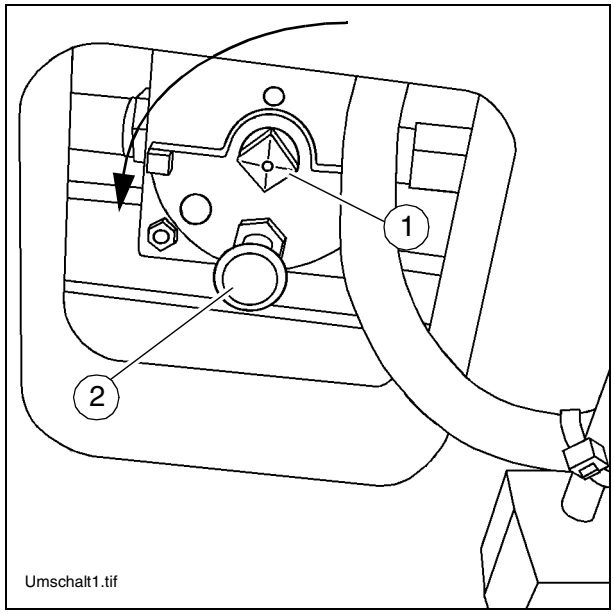
The connection (1) for the water tank's pressure fill can be found on the rear underside of the machine.

To fill the water tank:

- open lock cock.
- unscrew seal cap (if necessary use wrench)
- attach pressure pipe and tighten.
- signal to the operator of the external filling pump that the filling process can be started.
- switch off the filling pump as soon as the level of water required in the water tank is reached (monitor using LCD display on the operating panel).
- close the lock cock again before removing the filling hose.

☞ An overflow can be found on the underside of the machine. Excess water flows out through this if overfilled.

Changeover for separate circuits of rear strut towers



For some maintenance and repair work, the rear strut towers will have to be individually operated.
The joint hydraulic circuit will have to be separated in such instances.
The changeover equipment can be found on the underside of the machine, between the two rear strut towers.

To separately operate the strut towers:

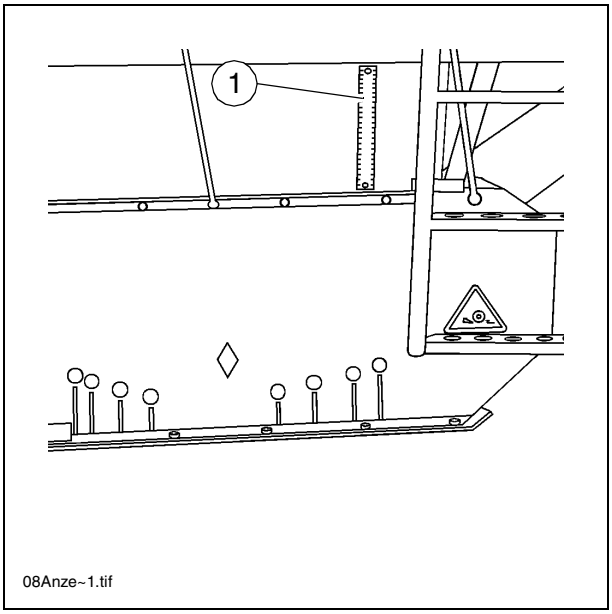
- raise machine to the height required and support.
- place appropriate lever or wrench on the square-head (1).
- remove retaining pin and grip.
- turn changeover valve anti-clockwise until the second detent bore (3) is under the retaining pin.
- allow retaining pin to engage.
- the traction unit legs can now move separately using the traction unit buttons on the rear side control panels.

☞ Once maintenance and/or repair work is complete, turn the changeover valve back to its original position so that the traction unit legs are moved together again.

Grading depth display

One grading depth display, indicating cm and/or inches, is located on both sides of the milling housing. This provides additional visual assistance in addition to the levelling equipment.

- The upper edge of the side shield serves as a reference and indicates the depth of the engaged milling drum on the display (1).

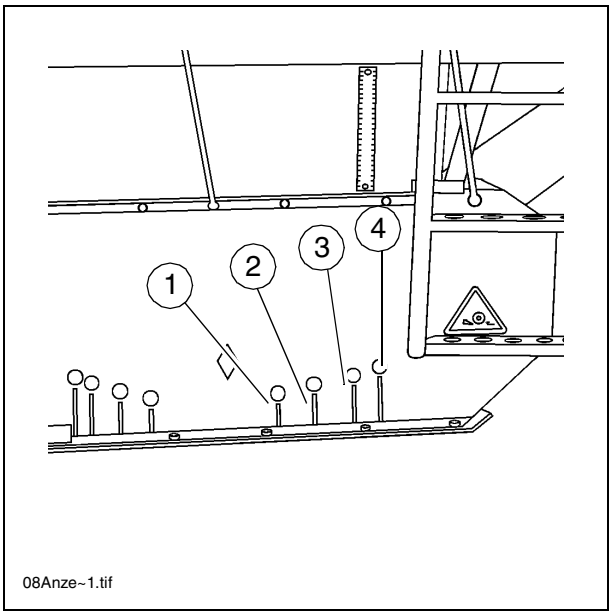


Milling drum operational check

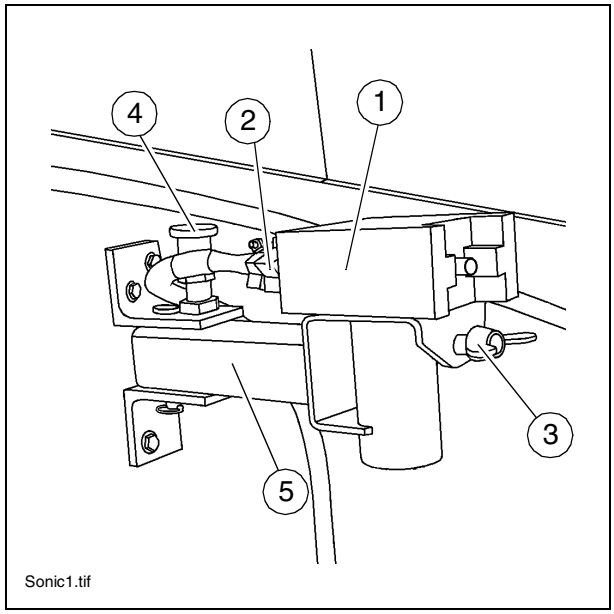
Several control marks can be found on both side shields and, depending on the grating depth, indicate the extent to which the milling drum is engaged.

The control marks are used as assistance, e.g. if milling is to be conducted as close as possible to an obstacle (e.g. drain cover).

- Control marks are available for the following grading depths: 4 cm (1), 10 cm (2), 20 cm (3), 30 cm (4).
- The slots in the side shield under the marks are used as a reference line and indicate the minimum possible distance between the milling drum and obstacle at which no damage will be caused.



Ultrasonic sensor on side shield (optional)



Sonic1.tif

One ultrasonic sensor (1) can be found above the side shield on either side of the machine for height sensing of the side shield.

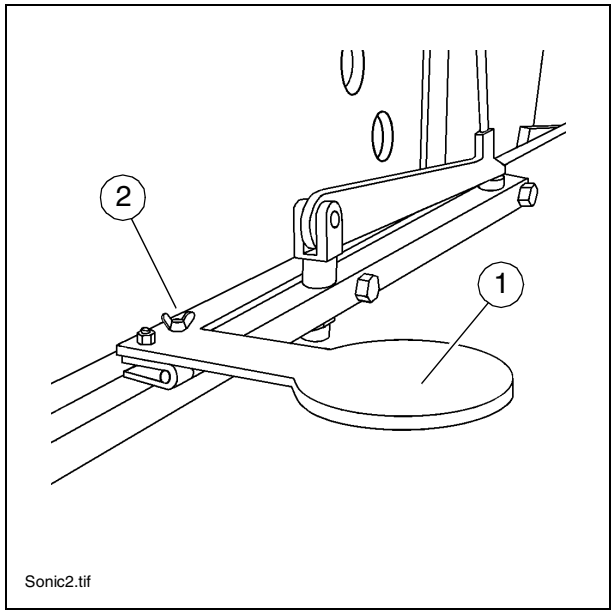
If ultrasonic sensing is not required, the sensor can be removed.

- Unfasten connection cable (2)
- Unfasten wing screw (3), remove sensor.

The bracket can be folded to the side for transport or if the sensor is not being used.

- Remove interlock bolt (4)
- Swivel retaining fixture (5) to one side, allow interlock bolt to engage again.

Reflector on ultrasonic sensor (optional)



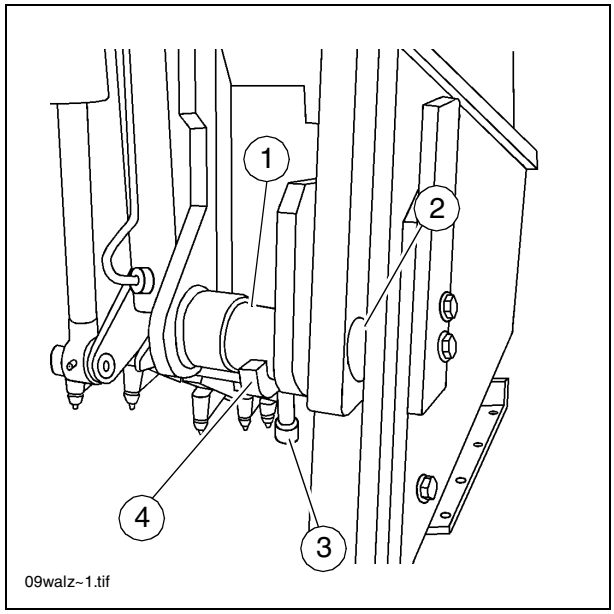
Sonic2.tif

There is a reflector (1) on the side shield of each side of the machine.
The reflector is fastened directly onto the side shield and moves up and down with this.
The reduced and/or lengthened measuring stretch is recorded by the ultrasonic sensor and is used as a control parameter for the levelling unit.

The reflected can be folded down for transport or if ultrasonic sensing is not being used.

- Remove wing screw (2), fold reflector down
- Re-fit wing screw (2).

Interlock on scraper flap



One interlock for the scraper flap can be found on either side on the back of the drum box.

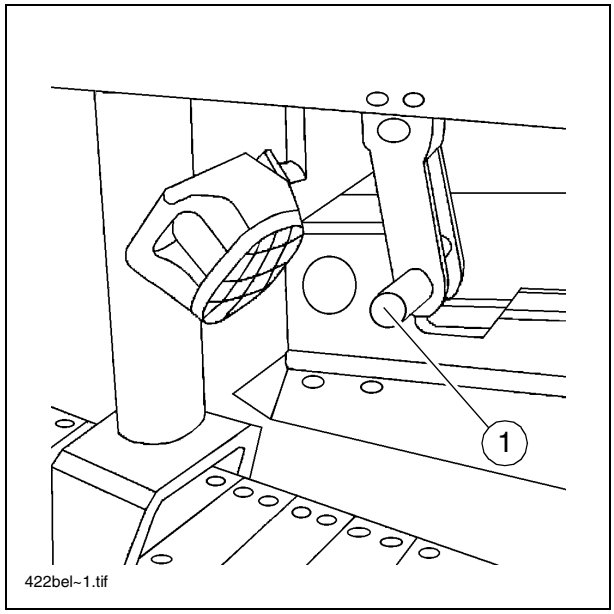
The interlock must be released before the scraper flap can be opened.

When interlocked, the bolt (1) is in the detent bore (2).

Unlocking procedure:

- Use handle (3) to rotate interlock bolt upwards and slide towards the centre of the vehicle, via the sliding interlock (4).
- Rotate the bolt downwards so that the handle lies on the inner side of the sliding interlock (4).

Retaining hook of scraper flap



The retaining hook for the scraper flap can be found on the right-hand side of the machine.

When the scraper flap is opened, this automatically engages in the retaining hook.
The limit switch is also activated

STOP Only open the scraper flap once the milling drum drive and the travel drive have been switched off.

☞ Refer to limit switch of scraper flap

Unlocking procedure:

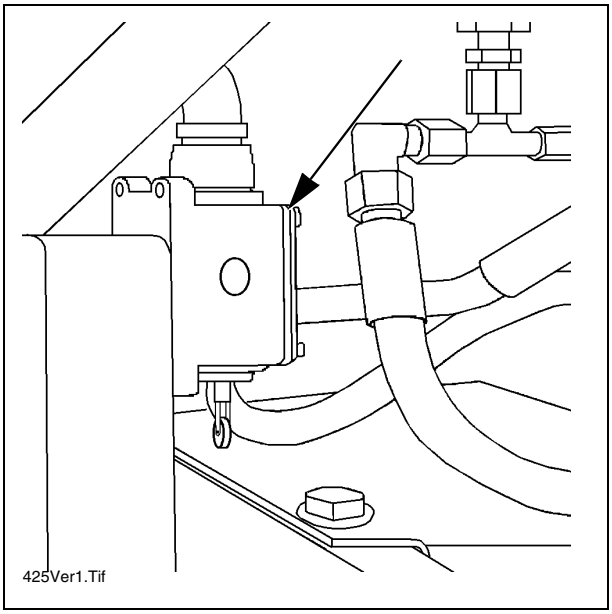
- Use the appropriate controls to open the scraper flap so wide that the retaining hook is disengaged.
- Swivel retaining hook upwards on collar (1) and grip.
- Use appropriate controls to close the scraper flap completely.

Limit switch of scraper flap

The limit switch can be found behind the milling drum housing on the frame of the left-hand side of the machine.

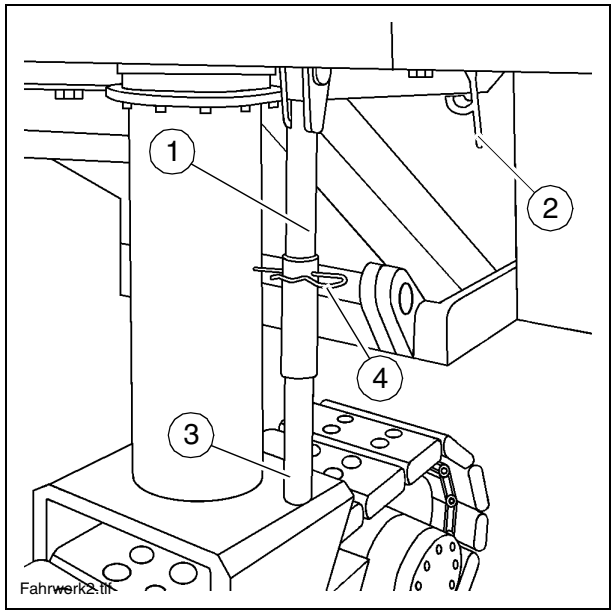
The limit switch serves as a safety measure and is actuated as soon as the scraper flap is opened.

Once the switch has been actuated, as an additional safety measure, the clutch and belt tensioner of the milling drum drive cannot be actuated and the machine cannot be operated.



For safety purposes, always ensure that the limit switch is functioning correctly!

Traction unit supports



One separable traction unit support can be found as a safety measure on every traction unit.

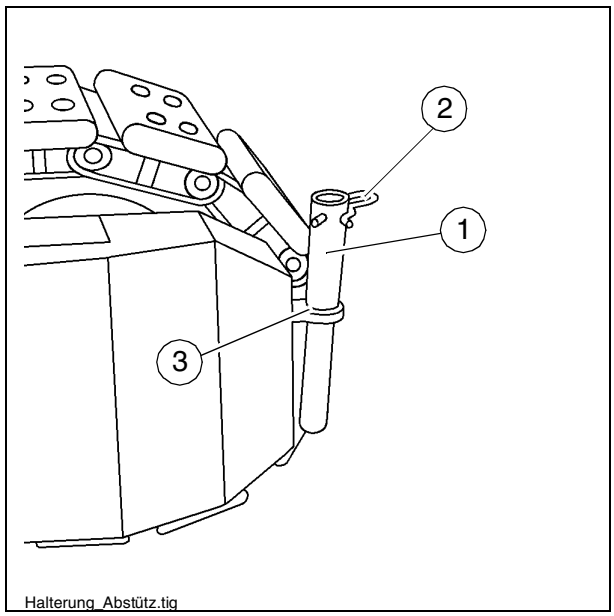
The complete traction unit support is used for retaining purposes during maintenance and repair work.
In order to achieve a lower transport height, the upper section of the separable support is used on the trailer during transport.

STOP The full length of the traction until supports should be placed under the machine during all maintenance and repair work.

If the machine is lowered unintentionally, wedge-shaped supports advance automatically into the recesses provided in the locating plates and therefore prevent the machine from being lowered further.

- Extend traction units to their maximum limit position.
- Remove complete supports (1) from the retaining tabs (2) and swivel down.
- If necessary, dismantle lower section (3) of support. Remove spring cotter pin (4) for this purpose.
- Ensure that the support is above the hollow of the support plate.
- For transport purposes and before starting work, return the supports to the retaining tabs.

Support brackets



If the lower sections of the traction unit support have to be dismantled, there is a storage space inside traction units for them.

To prevent loss, always place the dismantled lower sections of the traction unit supports (1) and corresponding cotter spring pins (2) in the support brackets (3) provided for this purpose.

"Scraper flap function changeover" valve

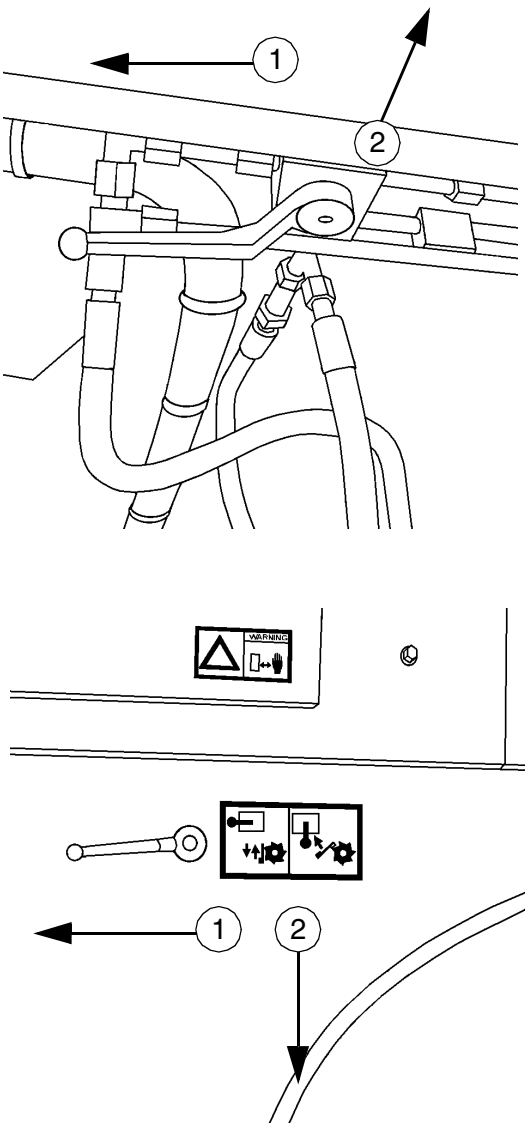
You will find the valve for changing over between raise and lower scraper flap / swivel scraper flap functions on the right-hand side of the machine, behind the milling drum box, on the underside of the frame or on the side of the frame.

- Switch position (1): raise / lower scraper flap.

- Switch position (2): swivel scraper flap (open/close).

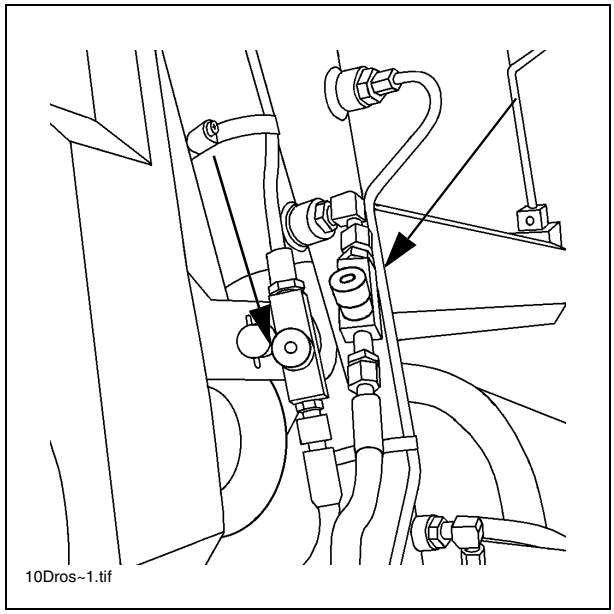
Switch position (1) should only be selected for the working site, switch position (2) is used for maintenance and repair work.

Observe safety precautions when the scraper flap is open.



531heb~1.Tif, 428Heb~1.Tif

Scraper flap throttle valves

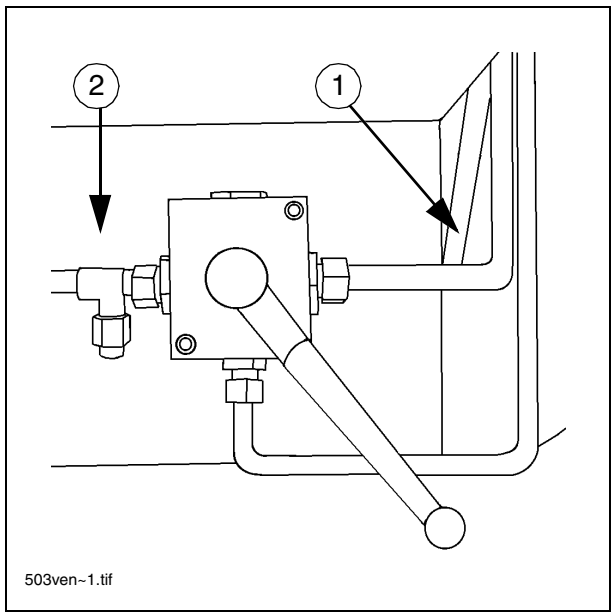


Throttles for setting the volumetric flow can be found on the hydraulic cylinders of the scraper flap.

If the scraper flap is not raised smoothly, the extension and/or insertion speed of the appropriate cylinder can be changed.

- Use the adjusting wheel to turn the throttle until the scraper rises and lowers smoothly.
- Turn to the right = greater volumetric flow, higher speed
  Turn to the left = smaller volumetric flow, lower speed.

"Upper conveyor function change-over" valve

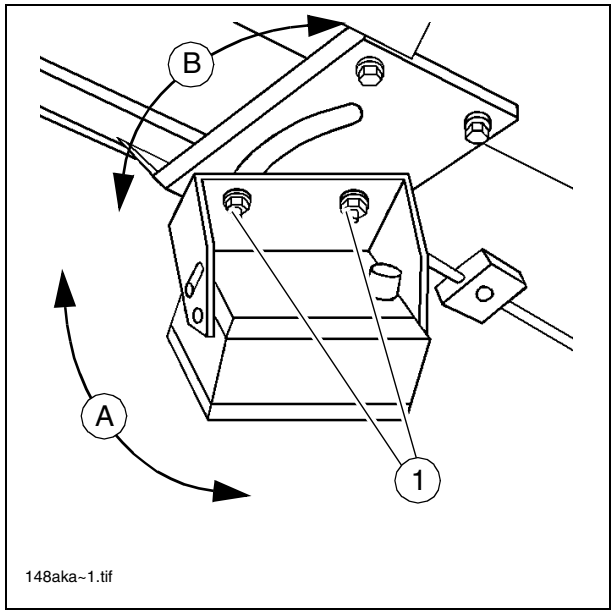


The valve for changing over between upper conveyor in operating position / upper conveyor in floating position function can be found on the left-hand side of the machine, in the front section of the inside of the frame.

- Switch position (1): upper conveyor in operating position.
- Switch position (2): upper conveyor in floating position (transport position)

Switch position (1) is for the working site and should be selected for transport tasks during which the upper conveyor is rigidly placed on the trailer, i.e. no swivel movements.
Switch position (2) should be selected for transport tasks during which the upper conveyor is flexibly mounted, e.g. placed on a support fixture on the tractor machine of the trailer.

Monitoring camera (○)



Four video cameras are fitted to the machine to observe the area of the milling track in front of the front drive unit, the area of the sliding shoe in front of the milling drum housing, the area of the scraper flap behind the milling drum housing and the area of the rear track during reverse.
If necessary, the cameras can be swivelled and individually set up.

- To swivel around axis (A), swivel the camera in the bracket up or down.
- To swivel around axis (B), unfasten the screws (1), swivel camera bracket and camera into the position required and re-tighten screws (1) correctly.

Compressed air system

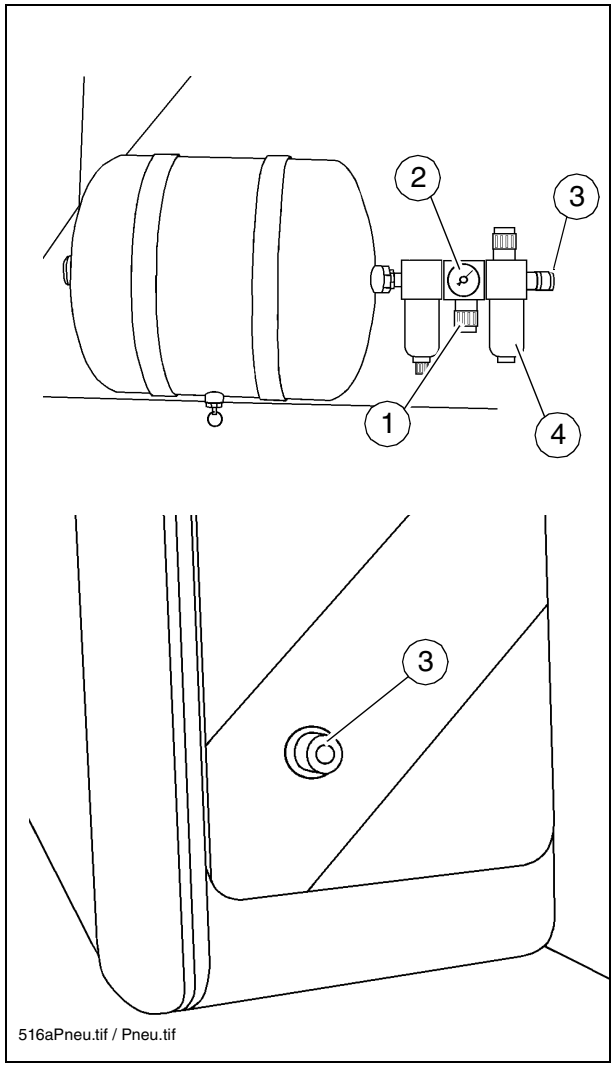
The compressed air tank and connected maintenance unit can be found behind the storage room flap on the left-hand side of the machine.

There is a maintenance unit on the compressed air tank. This unit separates water from the air and enriches the airflow with a fine veil of oil and therefore ensures that the components connected have a longer service life.

- The air pressure required can be set on the pressure reducer (1).
- The pressure level set is indicated on the pressure gauge (2).
- Various compressed air tools (e.g. the pneumatic cutting tool driver) can be connected to the clutch (3).

☞ The compressed air coupling is accessible from outside and can be found on the rear of the storage area cabinet.

⚠ When using the compressed air tools, ensure that the oiler (4) is filled with oil under pressure.



516aPneu.tif / Pneu.tif

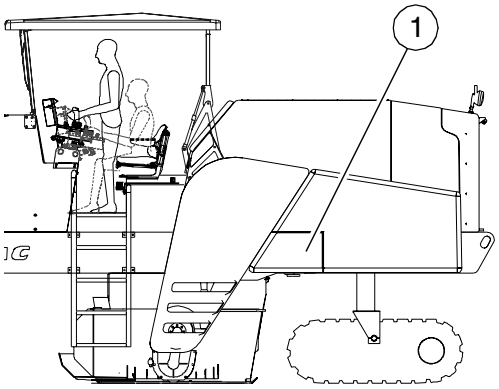
Storage area and protective flaps

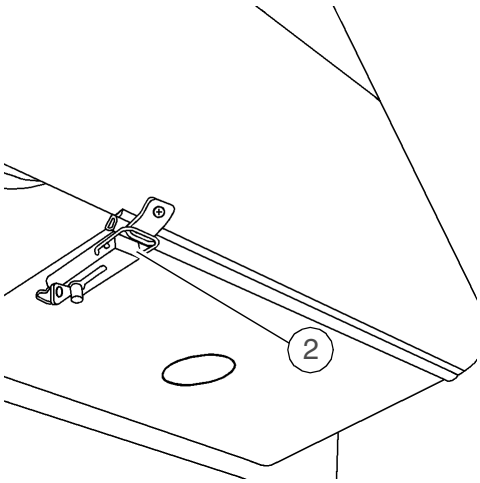
The section of the storage area and protective flap which covers the operating side panels and the levelling device (1) can be folded for operations.

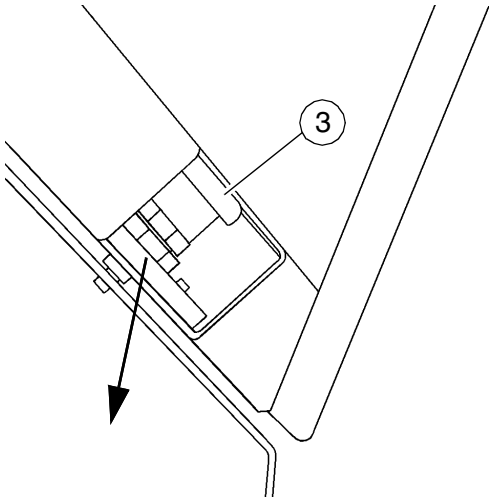
- Open latch (2) and raise flap.
- Pull detent (3) and now move the foldable section inwards.
- Press the two flap sections together so that both bracket sections (4) are pressed into one another.
- Close flap and again lock with latch (2).

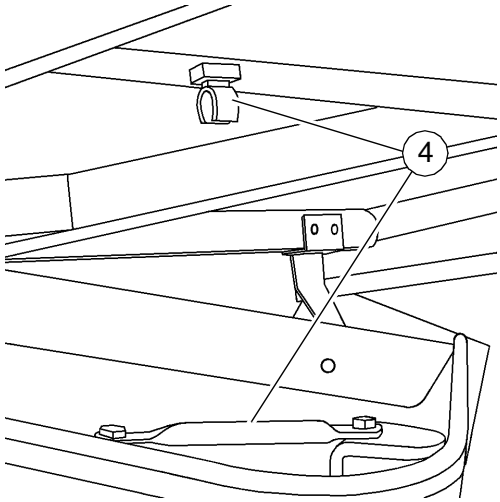
☞ To close the flap, proceed in reverse order.

STOP Risk of crushing! Ensure that no one reaches into the joint areas during the folding process as there is a risk that fingers and hands will be crushed.



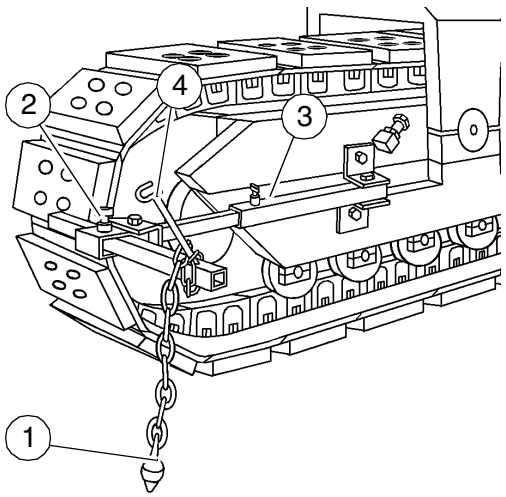






Versch1.tif / Arreti1.tif / Arreti2.tiff /Pl2000new.cdr

Plumbline fixture



12Peil~1.tif

A removable plumbline fixture can be found on both front drive units.

The plumbline fixture can be used to work along one particular longitudinal mark which is at a specified distance from the machine.
The machine should then be controlled ensuring that the suspended plumbline (1) is above the mark.

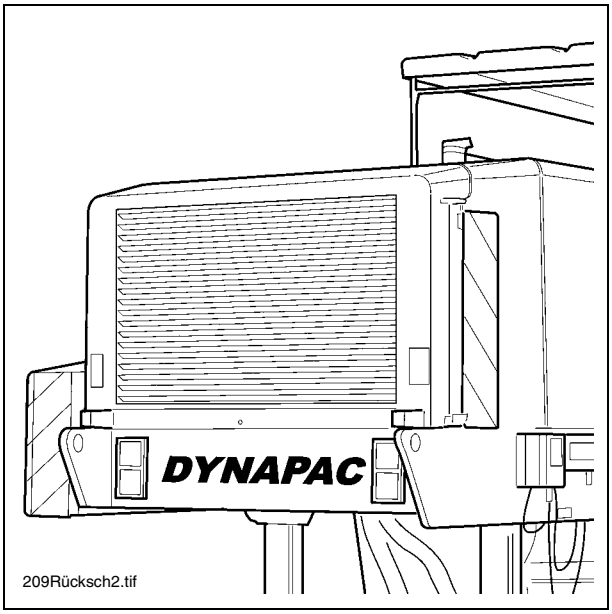
- To set the distance to the mark, unfasten wing screw (2), move the pipe into the position required and re-tighten the wing screw correctly.
- To remove the plumbline fixtures, unfasten wing screw (3) and pull the fixture out of the bracket.
- If the plumbline fixture is not used for some time, the chain can be used to hang the plumbline in the bracket (4).

Swivel-mounted warning sign

The swivel-mounted warning sign is located on the rear of the machine, on the right.

The sign should be swivelled out if this side of the machine is on the offside, closest to passing traffic or if the machine is driven on public highways.

- Slightly raise the warning sign so that the detent pin no longer reaches into the bore.
- Swivel the sign through 90° and lower into the detent bore.

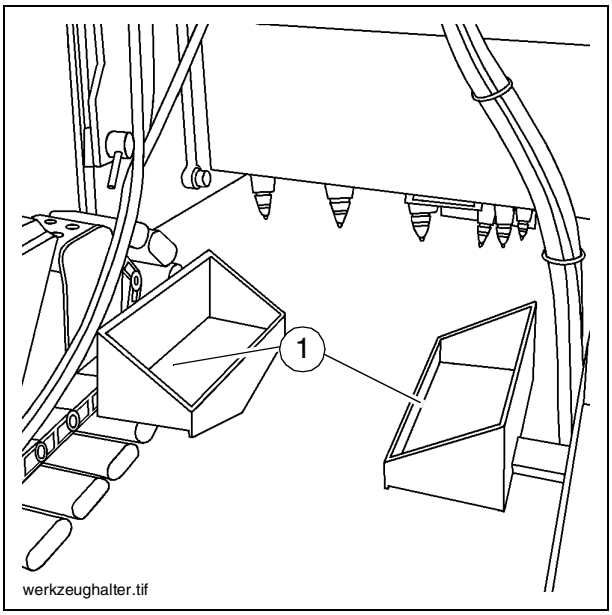


209Rücksch2.tif

STOP To transport the machine, fold in the warning sign. Danger of accidents, very wide vehicle.

Tool holder

A console (1) is fitted on each of the inner sides of the rear traction units. These can be used to store bit boxes or toolboxes.
During operation, the parts needed can be safely transported in this location. During maintenance work, these areas provide better access to tools.



werkzeughalter.tif

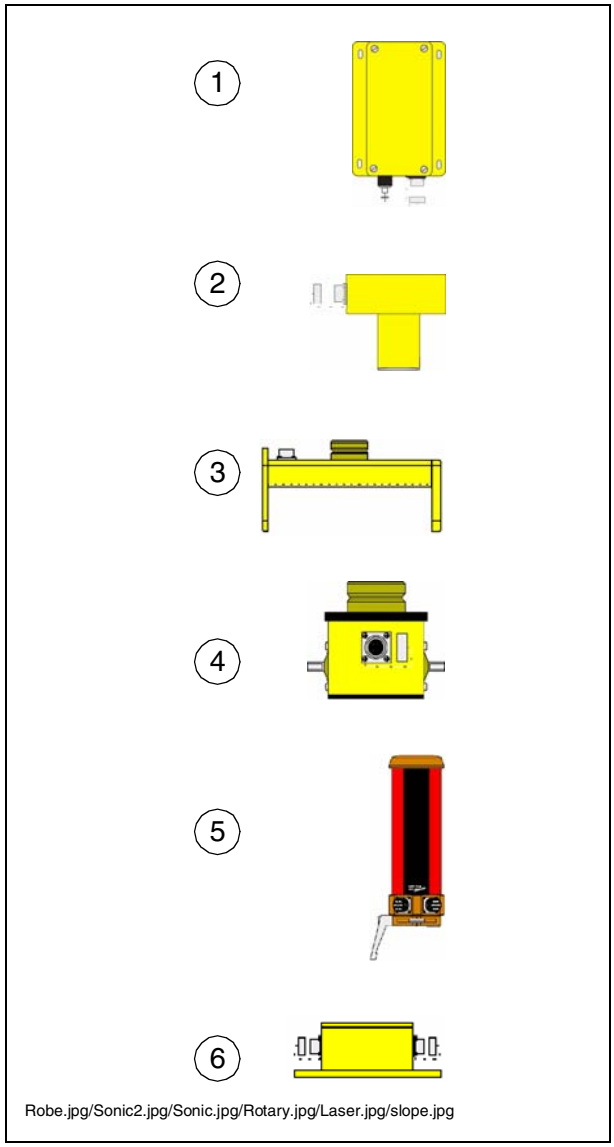
5 Levelling unit

5.1 MOBA-matic type

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

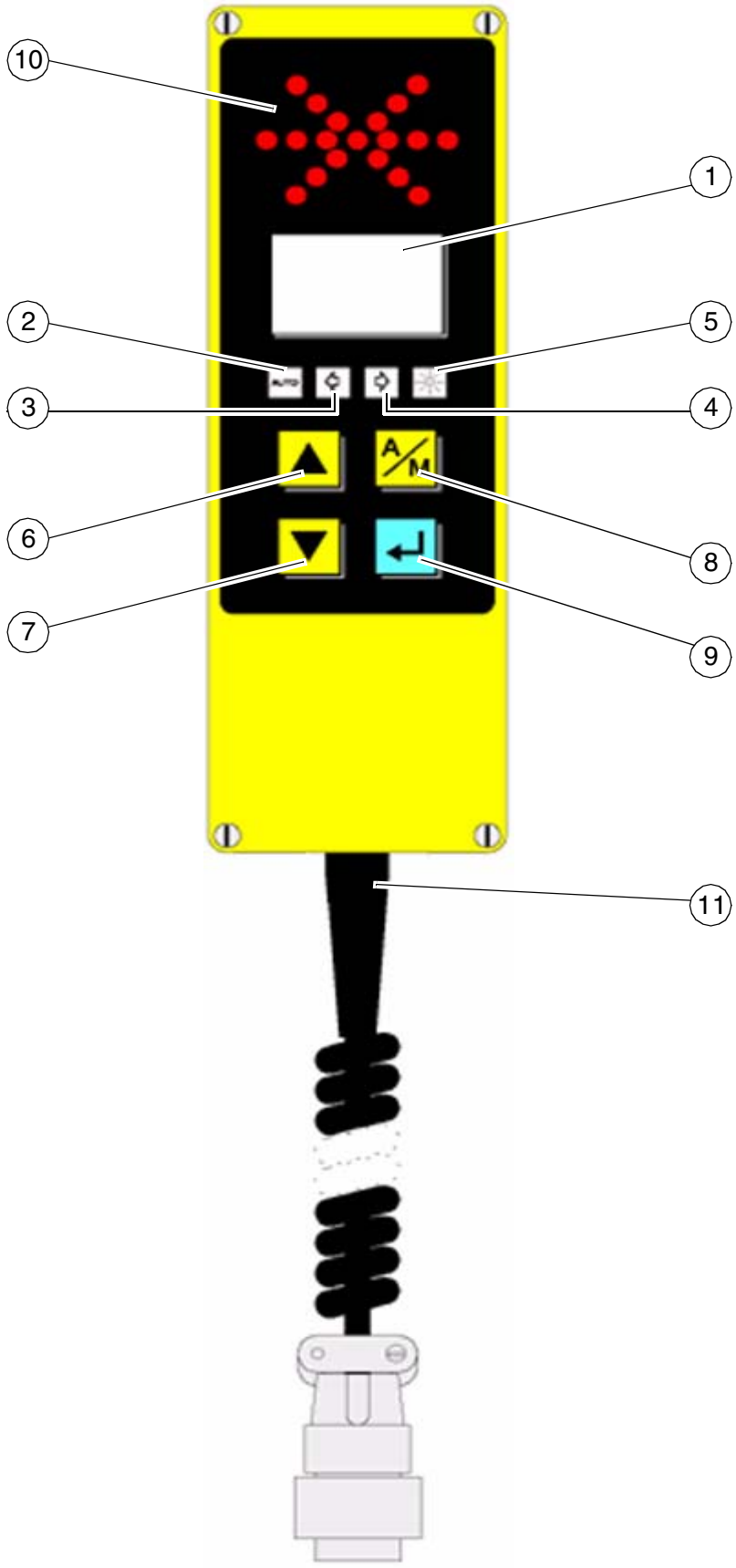
The Moba-matic is available with a large number of sensor combinations.

- (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)



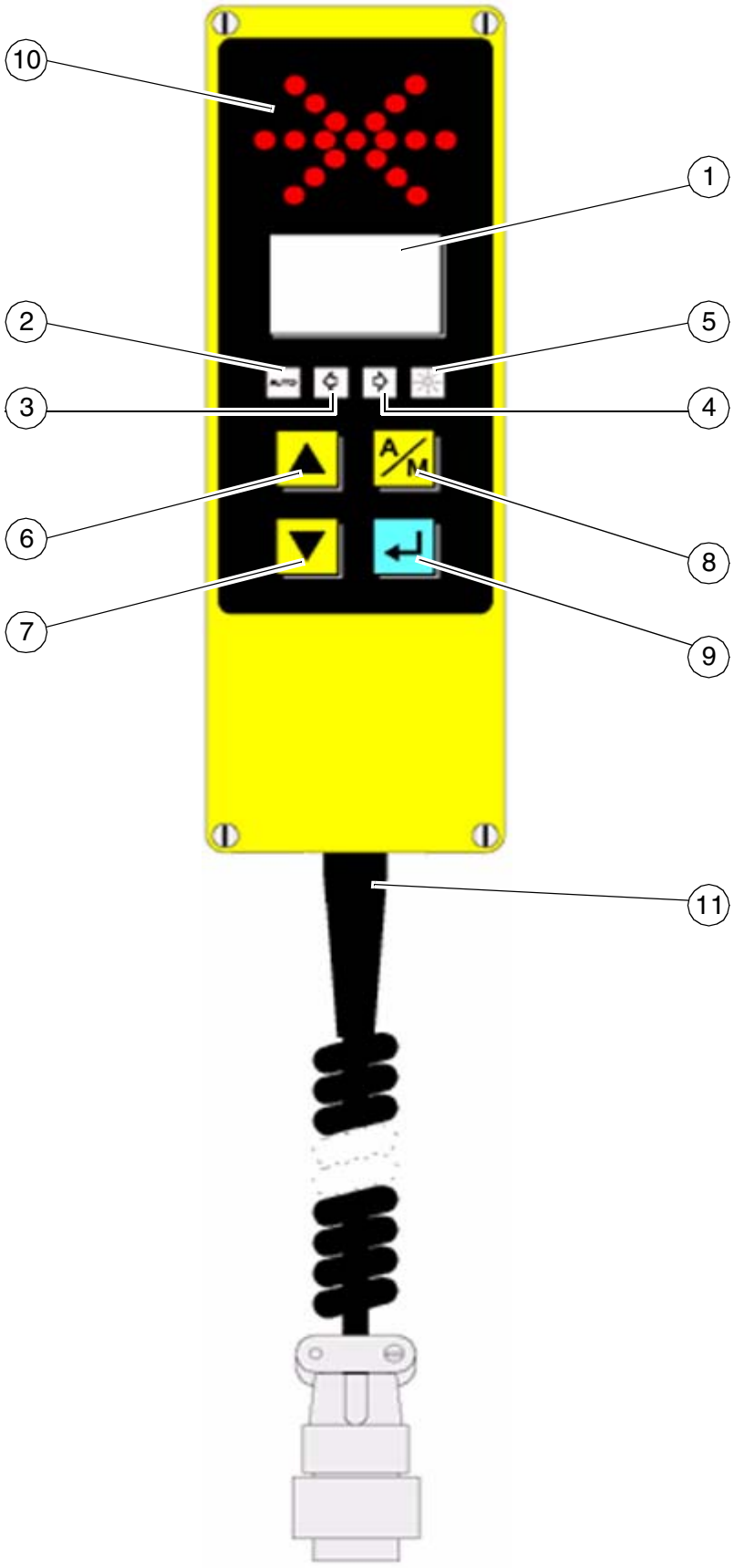
Robe.jpg/Sonic2.jpg/Sonic.jpg/Rotary.jpg/Laser.jpg/slope.jpg

As standard, the machine is fitted with two digital controllers and two cable tension sensors or ultrasonic sensors (Digi-Sonic) which act on the side boards.
The use of a transverse slope sensor (Digi-Slope) and the other sensor types is optional.
The digital controller automatically detects the sensor connected during setting and briefly indicates this through the sensor detection.



Moba1can.jpg

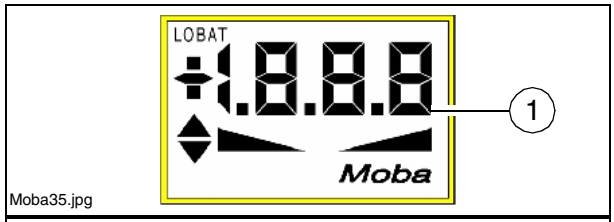
Item.	Designation	Brief description
1	Liquid crystal display	Display can be easily read, even when the light is poor, thanks to the integrated lighting.
2	Function lamp "AUTO"	Three operating modes are available: - Lamp off: Stand by position - direct adjustment of grading depth and slope possible in manual mode. The display indicates the nominal value selected. - Lamp on: Machine operating in automatic mode (automatic mode has been activated on the main operating panel). The display indicates the nominal value selected. - Lamp flashes: Machine operating in semi-automatic mode (stand by position or pre-settings for grading depth/ slope possible). The display indicates the actual value of the grading depth adopted.
3	Direction lamp "LEFT"	☞ The direction lamp is a special function for wire cable sensing with Sonic-Ski (○). When using ground sensing, the lamp is of no significance. Three operating modes are available: - Lamp off: sensing cable running centrally. - Lamp on: sensing cable running slightly offset. - Lamp flashes: sensing cable running outside the measurement area, correction required ⚠ If the lamp flashes, bring Sonic-Ski back into central position. If the second direction lamp flashes at the same time, an alarm has been activated. If the alarm is activated, an immediate correction is required! If necessary, interrupt the milling process!
4	Direction lamp "RIGHT"	☞ The direction lamp is a special function for wire cable sensing with Sonic-Ski (○). When using ground sensing, the lamp is of no significance. Three operating modes are available: - Lamp off: sensing cable running centrally. - Lamp on: sensing cable running slightly offset. - Lamp flashes: sensing cable running outside the measurement area, correction required ⚠ If the lamp flashes, bring Sonic-Ski back into the central position. If the second direction lamp flashes at the same time, an alarm has been activated. If the alarm is activated, an immediate correction is required! If necessary, interrupt the milling process!



Moba1can.jpg

Item.	Designation	Brief description
5	Cable lamp	☞ The cable lamp is a special function with Sonic-Ski (○). Two operating modes are available: - Lamp on: cable mode active. The cable mode has been activated from manual mode by simultaneously pressing the UP and DOWN buttons. - Lamp off: ground mode active (create mean value). ☞ During ground sensing, the Sonic-Ski is fitted in a longitudinal direction, during cable sensing, the Sonic-Ski is fitted in a transverse direction.
6	UP button	To increase the nominal value. The machine responds in automatic or manual mode (change to actual value). 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. Machine response in automatic or manual mode (change to actual value). Machine does not respond in semi-automatic mode (only for pre-selections, i.e. nominal value specifications.)
8	Automatic/manual button	To changeover between automatic and manual mode (hand-controlled operation)
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. 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	For connection with the connection box. (Connection to vehicle circuit voltage)

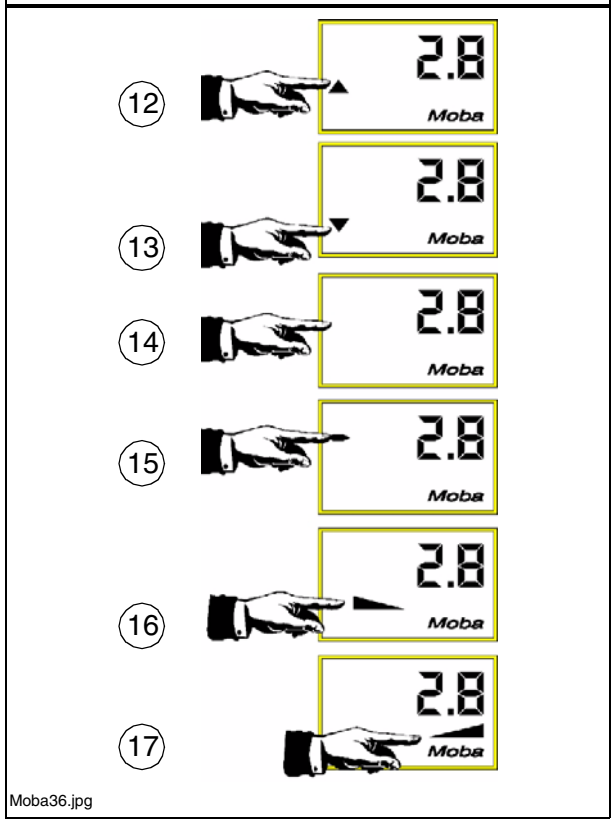
6.1 Liquid crystal display (1)



Moba35.jpg

The display symbols have the following meanings:

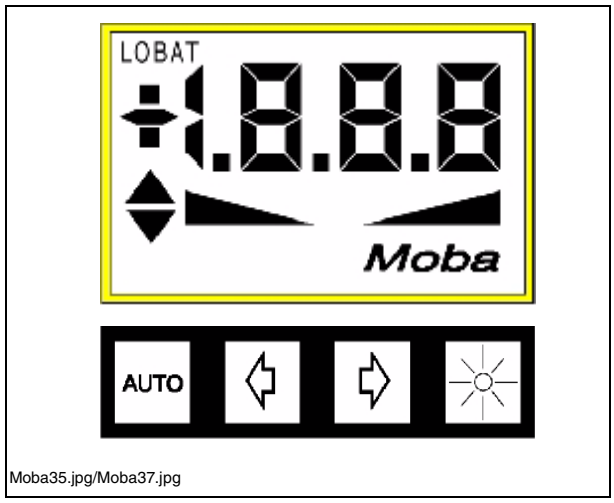
Symbol	Meaning
ARROWS RAISE (12) / LOWER (13)	Controlled controller output
Value without prefix (14)	Positive display value
Value with negative prefix (15)	Negative display value
Bar dropping to the right (16)	Slope to the right
Bar dropping to the left (17)	Slope to the left



Moba36.jpg

Activation message

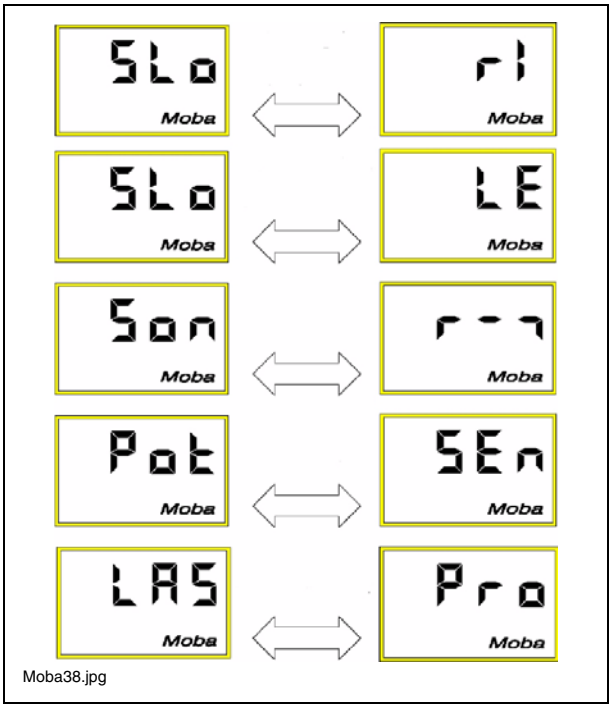
A display test is conducted once the digital controller has been activated. During this test, all segments of the LC display and all function lamps are activated for approx. 2 seconds. Should symbols not appear on the display, please contact After-Sales Service.



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.

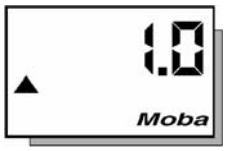
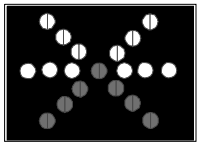
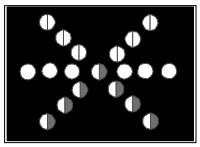
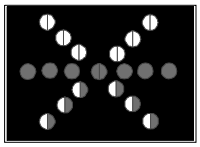
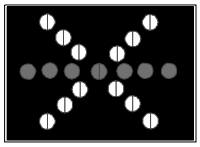
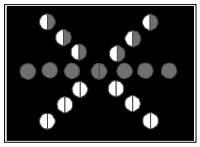
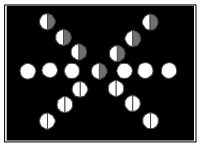
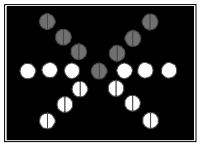


Moba38.jpg

⚠ If the sensor has been changed, the controller continues to issue the alternating sensor message until this message is acknowledged (by pressing any button). This should remind the user that the sensor has been changed and that the settings for the sensor are being checked accordingly.

LED display

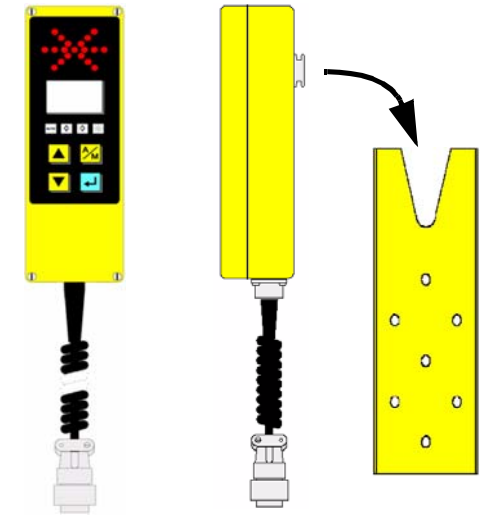
The LED‘s are only used to provide the operator with a better display of the status of each of the activated valve outputs. Its display is simply an enlarged and detailed depiction of the function of the arrow symbols on the LC display.
The LED display is particularly useful when the operator is at a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

Connection:

The two digital controllers, on the back of which you will find a knob, are moved from above into the brackets which are located directly next to the lower control on the rear section of the machine and/ or on the rear side of the machine frame.

☞ If equipped appropriately, you have the option of fitting both controllers next to one another on one side of the machine or on the rear of the machine.



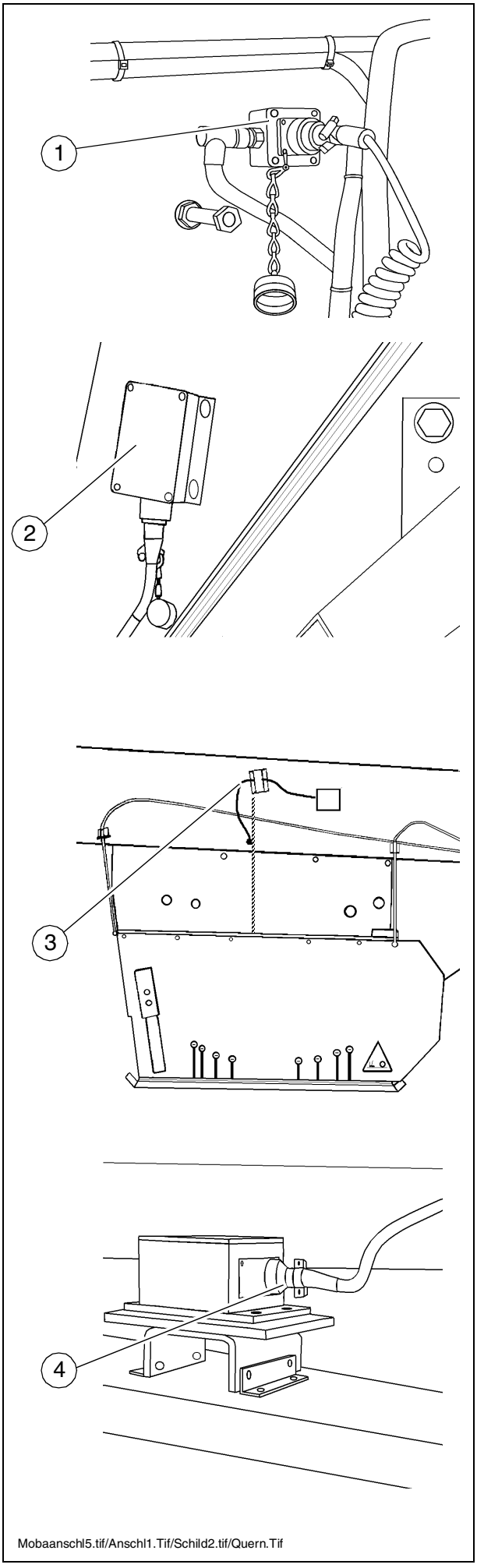
Moba1can.cdr/Halt.jpg/Halt2.jpg

If previously removed, the plug connections should then be established.

- The two connection boxes (1) are located very close to the controller on the underside of the machine frame. The connection to the controller is established via two sockets.
- The cable tension sensor for the side shield of the left-hand side of the machine (2) can be found behind the flap of the powered belt housing.
- The cable tension sensor for the side shield of the right-hand side of the machine (3) can be found directly on the machine frame above the shield.
- The transverse slope sensor (4) is housed in the centre of the rear section of the milling drum housing. The left-hand socket (viewed in direction of travel) is provided for the connection. The connections of the right-hand side remain unassigned.

Proceed as follows during the connection process:

- Unscrew protective cap from connector
- Fit connector in position determined by plastic ridge on receptor, and groove in side of connector.
- Firmly screw on cap ring to secure the connector.

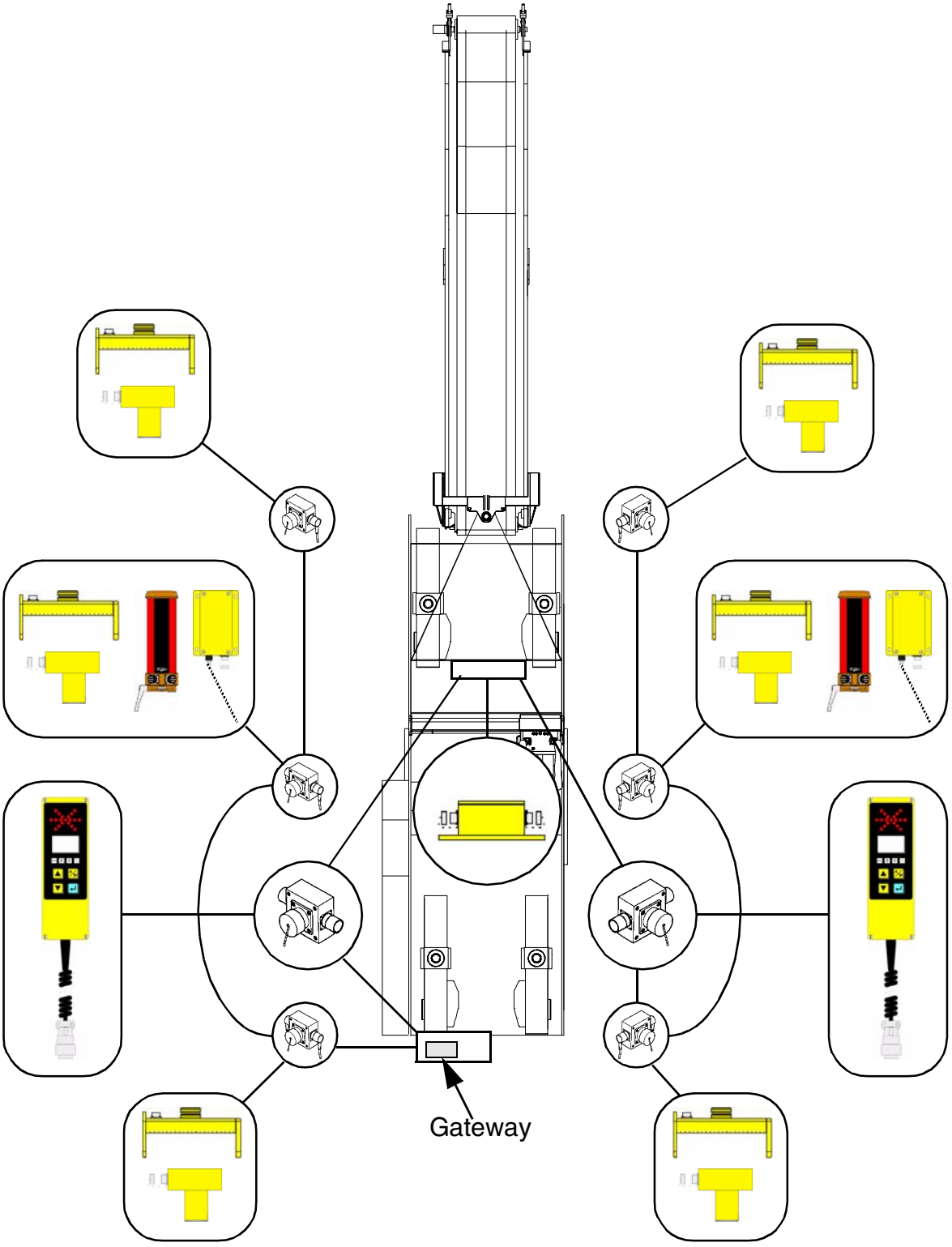


Mobaanschl5.tif/Anschl1.Tif/Schild2.tif/Quern.Tif

Equipping with other sensors / conversion

For the option of equipping the machine with other or additional sensors, the devices shown can be connected to the individual connection points on the machine.
The connection points are located on the machine frame to the left and right

- At front: inside machine frame
- At centre: outside machine frame
- At rear: underside of machine frame



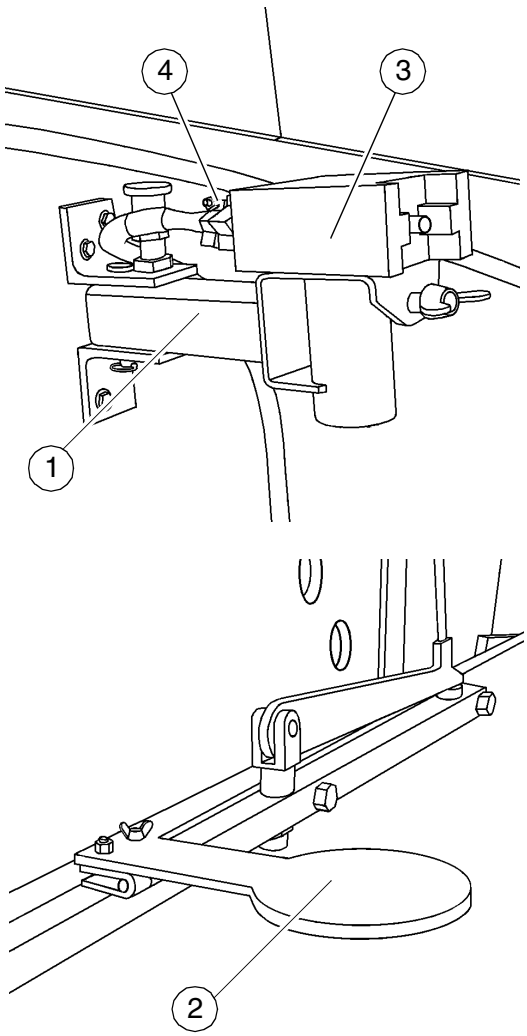
If working with optional ultrasound height sensing on the side shield, the associated equipment must be set up.

- Swivel out the sensor brackets (1) from both sides of the machine.
- Fold up the two reflectors (2).
- Fit the ultrasonic sensors (3) in the retaining fixtures.
- Establish plug connection (4), secure with cap.

STOP 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 the thread of the plug connections and the cable connections free of dirt and grease to avoid poor 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.

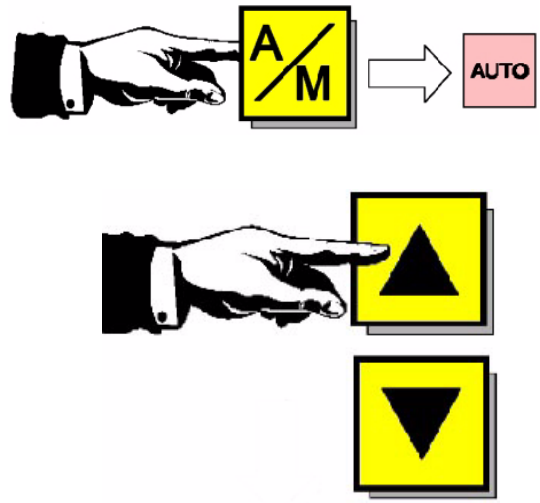


Sonic1.tif/Sonic2.tif

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

UP/DOWN buttons

These buttons are used to change the nominal value in automatic and manual mode, i.e. the machine responds to the press of a button and depending on the sensor connected, either changes its grading depth or slope. The newly set nominal value does not need to be confirmed using the SET button in these operating modes.



Moba23.jpg/Moba39.jpg

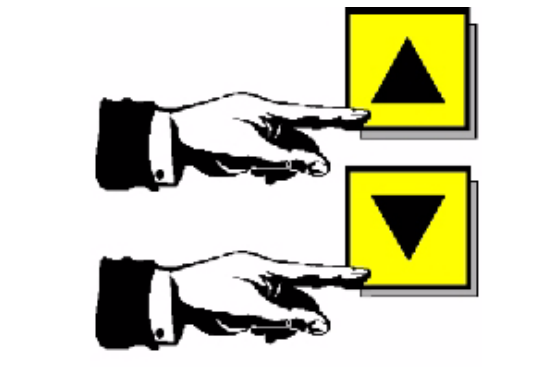
In semi-automatic mode, the nominal value is specified, i.e. the machine will not yet respond and only responds in automatic mode once the machine has been shifted back into automatic mode.

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

- height sensors: continuously in 1/10 stages, in cm, inches of feet depending on setting selected
- transverse slope sensors: in 1/10%, 5/100% or 2/100% depending on transverse slope resolution selected

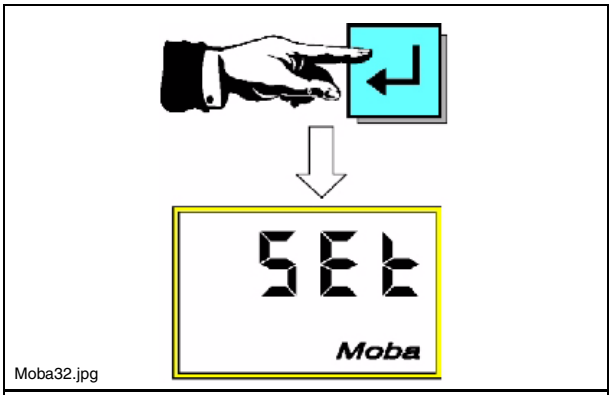
UP/DOWN buttons (pressed at same time)

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

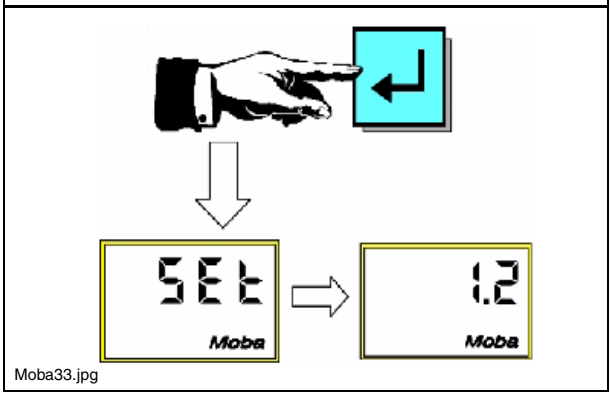
SET button

- 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

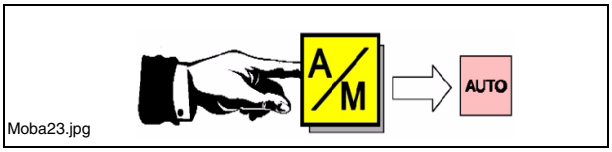
- If when using the height sensors, the actual value or a pre-selected value is to be adopted as the nominal value following changeover into automatic mode, the SET button should only be briefly pressed, otherwise calibration to zero is conducted (refer to zero setting)



Moba33.jpg

6.2 Basic settings

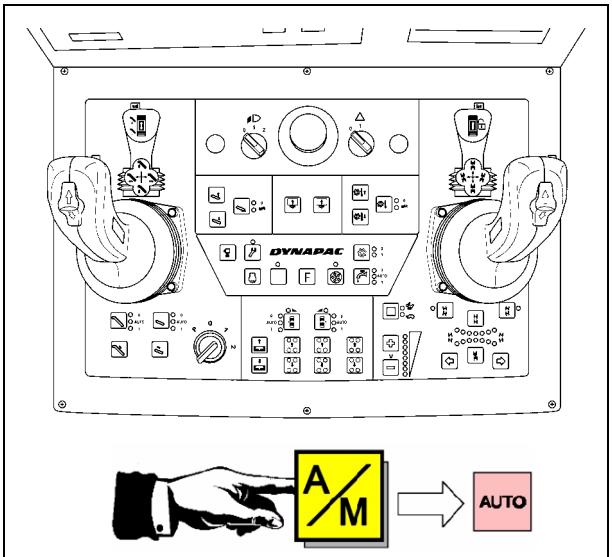
Always conduct all basic settings in manual mode!
(Function lamp off)



Moba23.jpg

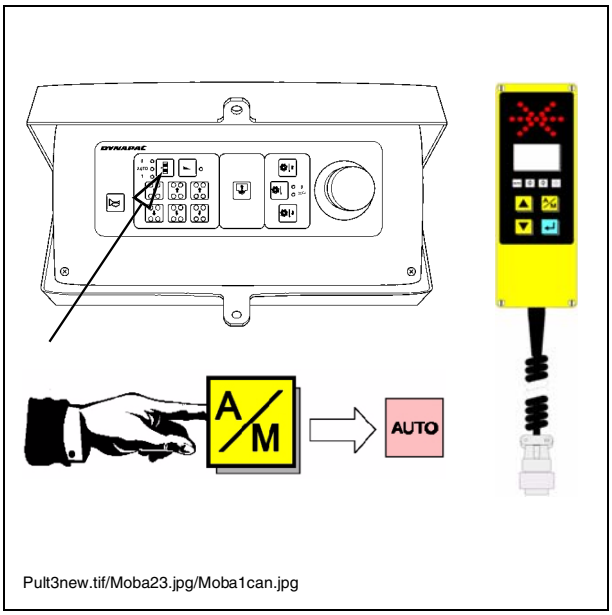
☞ The levelling equipment **cannot** activate automatic mode via the digital controller.

During milling, the automatic mode setting can only be conducted from the main operating panel of the upper 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.



Pult2new.tif/Moba23jpg

During the milling process, there is also the option of choosing between automatic mode ("AUTO" position) and semi-automatic mode ("0" position) using the rear side operating panel.



Pult3new.tif/Moba23.jpg/Moba1can.jpg

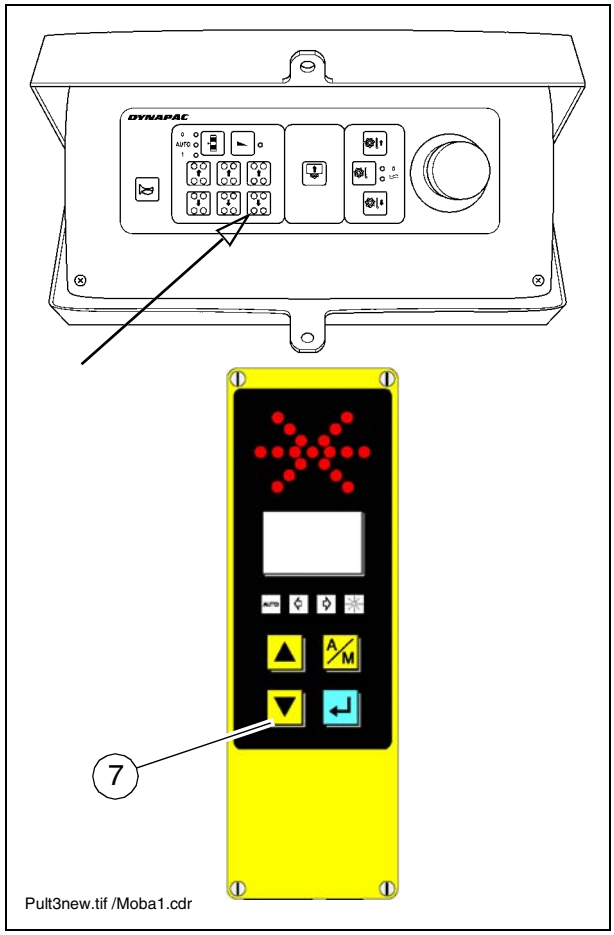
6.3 Calibration to zero

Initial situation for calibration to zero

- Sensors and controllers are fitted, all connection cables are connected.
- The machine is standing on as smooth and level the surface as possible, without any slopes, and is smoothly lowered via the strut towers so that the milling drum is just above the ground.
- The side boards are lowered
- The milling drum is activated, the diesel engine runs at idle speed.
- The scraper board is raised slightly and provides a clear line of sight to the rotating milling drum and the ground.

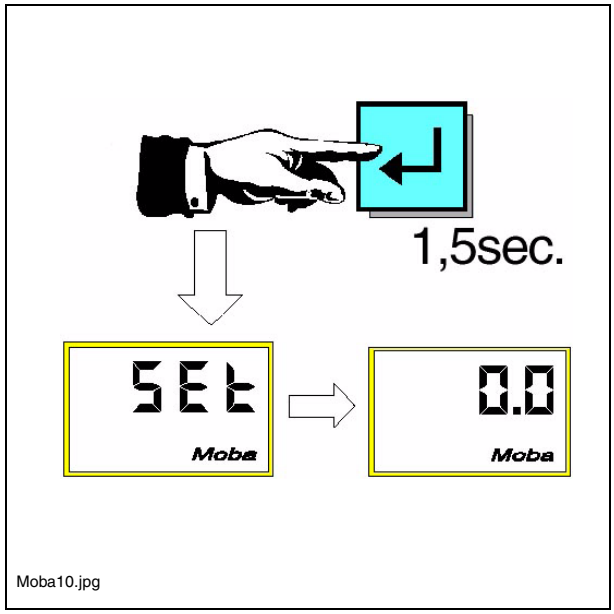
Other tasks

- Use the appropriate function key on the side control panel to lower the machine (lower slightly more at the rear than the front) without however letting the rotating milling drum touch the ground.
- 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 cutting tool tips scratch against the base.
- Both side boards lie evenly on the ground, the machine is horizontal (front and rear at the same height).



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 shield.

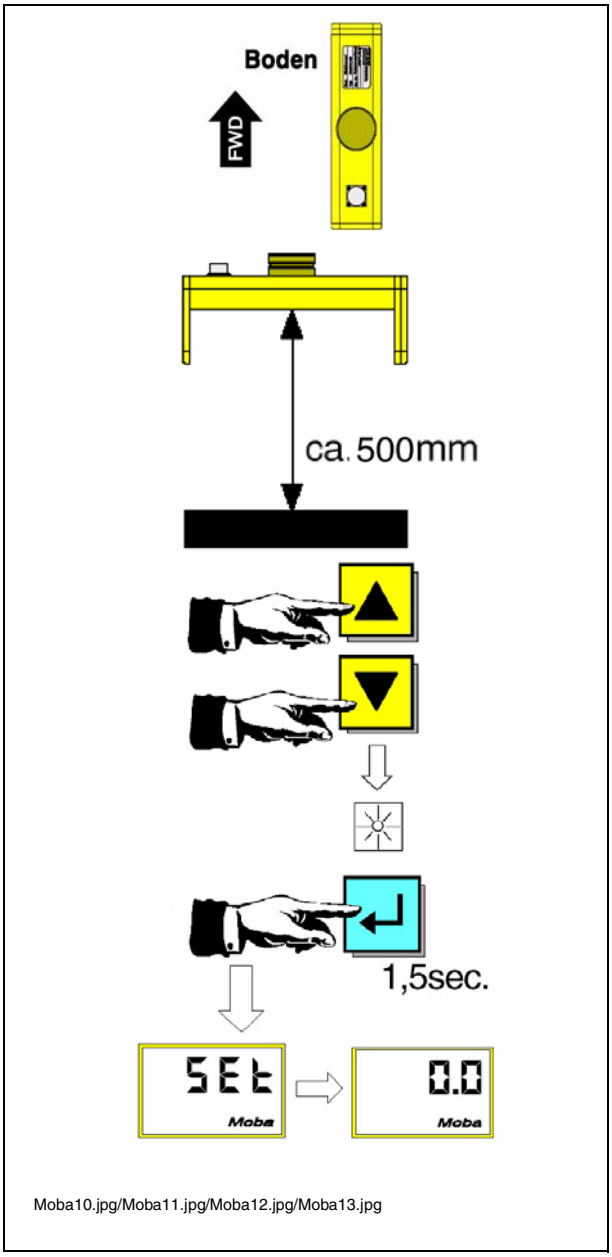


Moba10.jpg

Calibration to zero for the Sonic-Ski during ground sensing

☞ Initial situation and tasks as previously described.

- During ground sensing, the Sonic-Ski must operate in a longitudinal direction and should be moved into its bracket so that it is approx. 500 mm above the ground.
- Ground mode is activated by pressing the UP/DOWN buttons at the same time - the cable lamp is off.
- 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.

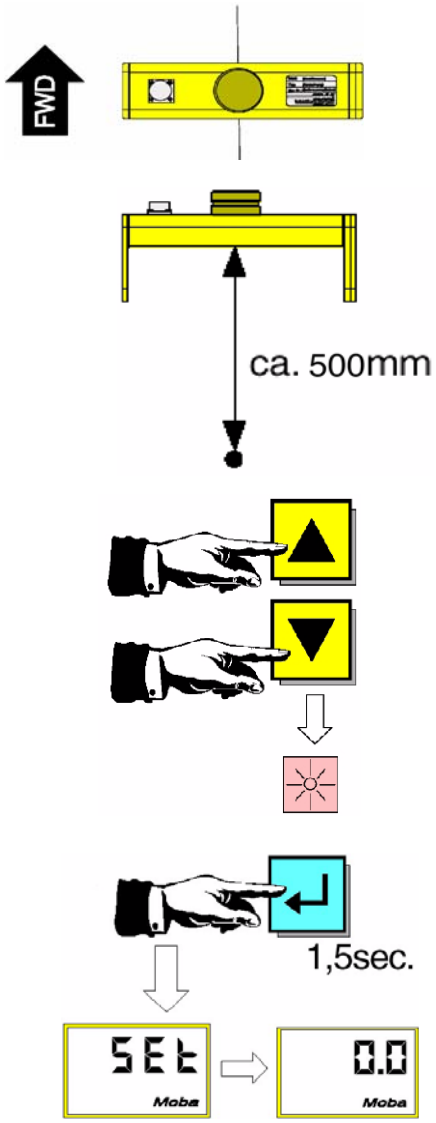


Moba10.jpg/Moba11.jpg/Moba12.jpg/Moba13.jpg

Calibration to zero for the Sonic-Ski during cable sensing

☞ Initial situation and tasks as previously described.

- During cable sensing, the Sonic-Ski must operate in a transverse direction and should be moved into its bracket so that it is located centrally at a distance of approx. 500 mm above the cable
- Cable mode is activated by pressing the UP/DOWN buttons at the same time - the cable lamp is on.
- Hold down the input key of the appropriate controller (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

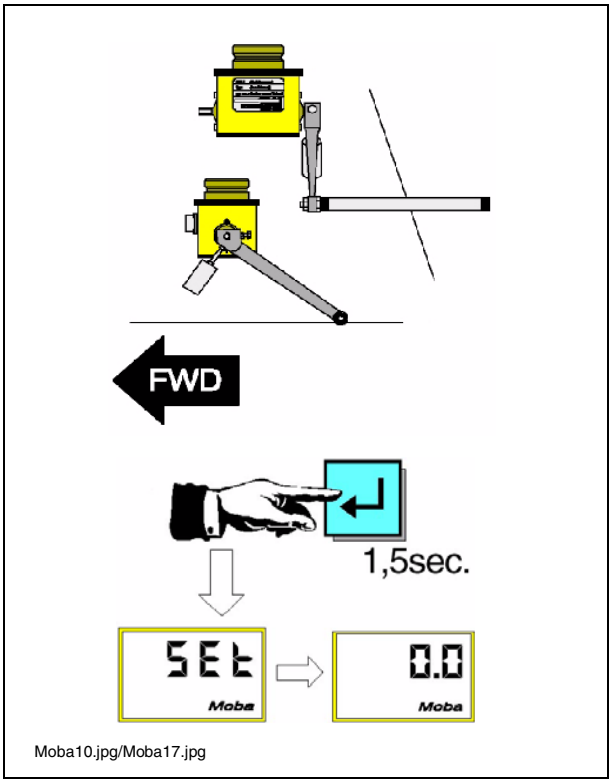


Moba10.jpg/Moba14.jpg/Moba15.jpg/Moba16.jpg

Calibration to zero of the Digi-Rotary sensor (rotary arm sensor) during cable sensing

☞ Initial situation and tasks as previously described.

- The Digi-Rotary sensor should be moved into its bracket so that its sensing tube applies slight pressure on the cable and is centrally located. The pressure can be set using a counterweight.
- Hold down the input key of the appropriate controller (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

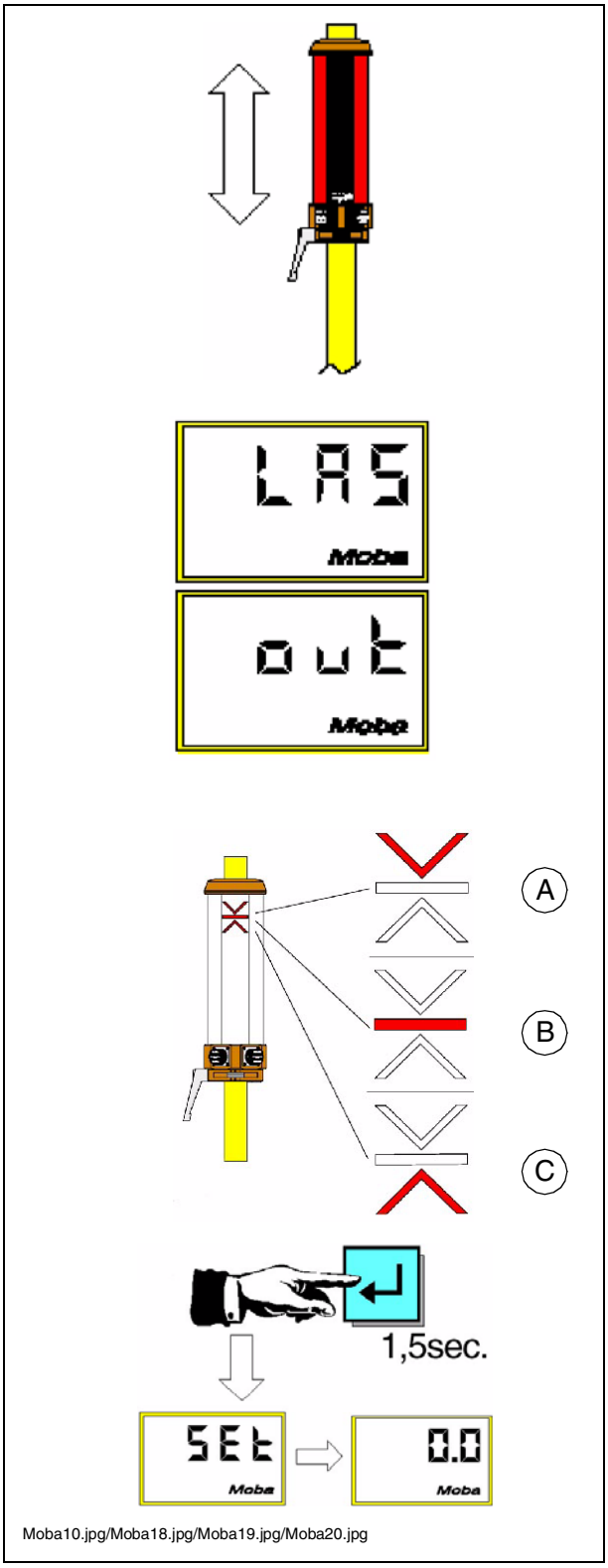


Moba10.jpg/Moba17.jpg

Calibration to zero for the laser receiver LS 250

☞ Initial situation and tasks as previously described.

- The laser receiver should be slid into its brackets so that the laser beam of the transmitter occurs centrally
- If the laser beam does not occur in the reception window, this is indicated in the controller display.
- Firstly slide the receiver upwards until one of the LED´s on the LS-250 lights up.
- LED (A): The laser receiver must be moved downwards.
- LED (B): The laser receiver is set up correctly.
- LED (C): The laser receiver must be moved upwards.
- Hold down the input key of the appropriate controller (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.



Moba10.jpg/Moba18.jpg/Moba19.jpg/Moba20.jpg

6.4 Actual value calibration

Digi-Slope sensor (transverse slope sensor)

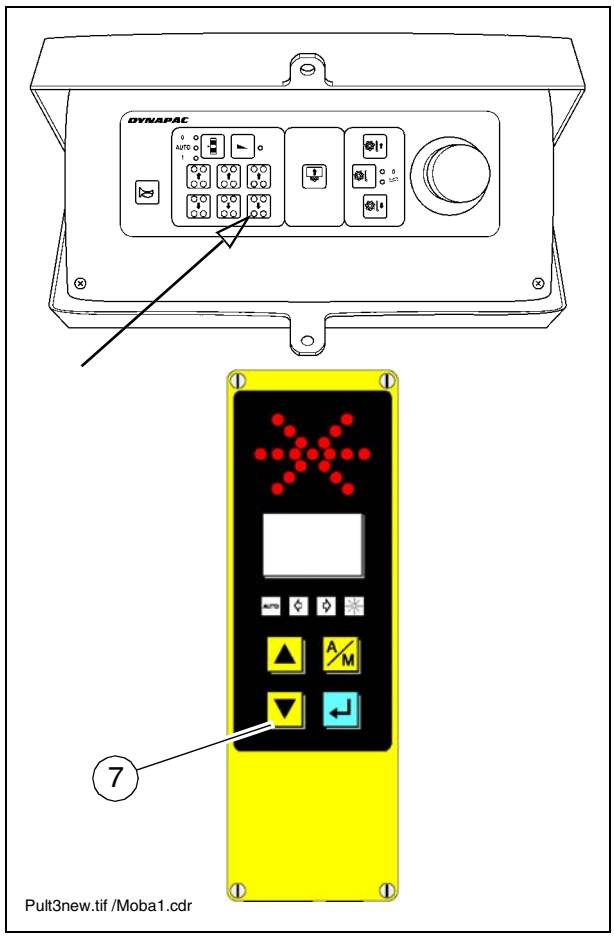
During this process, the actual value display of both digital controllers is compared with the actual slope angle of the machine / milling drum

Initial situation for actual value calibration

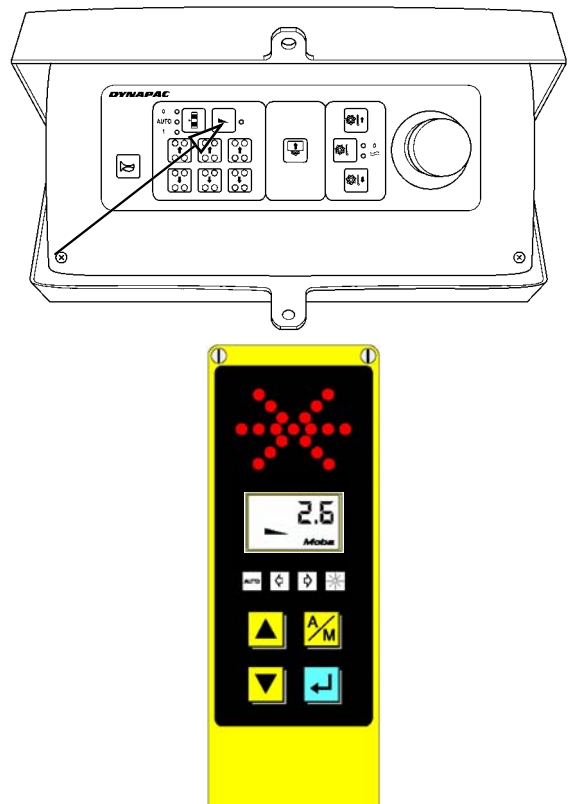
- Sensors and controllers are fitted, all connection cables are connected.
- The machines is standing on as smooth and level the surface as possible, without any slope, and is smoothly lowered via the strut towers so that the milling drum is just above the ground.
- The side boards are lowered.
- The milling drum is activated, the diesel engine runs at idle speed.
- The scraper board is raised slightly and provides a clear line of sight to the rotating milling drum and the ground.

Other tasks

- Use the appropriate function key on the side control panel to lower the machine (lower slightly more at the rear than the front) without however letting the rotating milling drum touch the ground.
- 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 cutting tool tips scratch the base.
- Both side boards lie evenly on the ground, the machine is horizontal (front and rear at the same height).



- Use the appropriate function key of the machine's rear side operating unit to engage the transverse slope sensor (position diode on operating panel lights up)
- The transverse slope symbol and an actual slope value of the grader / milling drum (in %) which deviates from the real slope value of the milled ground appear in the controller's display window.
- The real slope value is calculated directly behind the milling drum box (in %) with the assistance of a highly accurate spirit level.

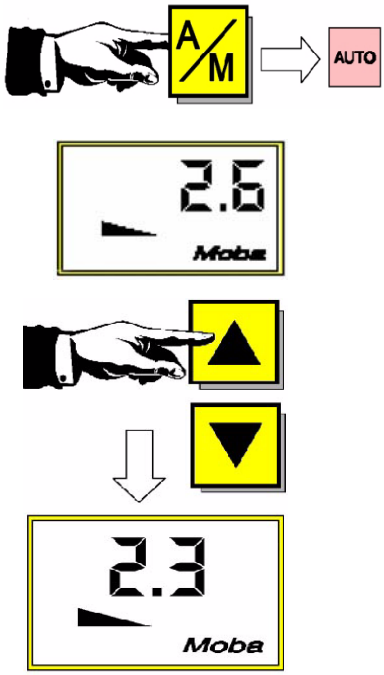


Pult3new.tif /Moba1.cdr

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.

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

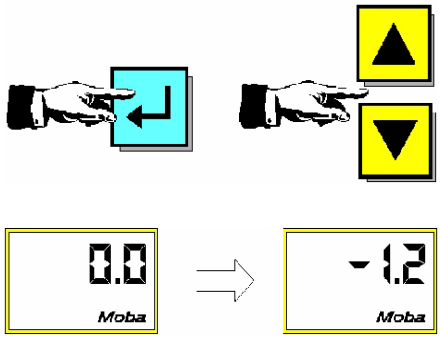
- The A/M button is used to change over to manual mode, the "Auto" function lamp is off.
  The display shows the actual value.
- Press and hold down the input key. "SET" appears on the display, then the display changes again to the actual value.
- The input key remains depressed and the actual value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



Moba21.jpg /Moba23.jpg/Moba25.jpg

Height sensors

- By pressing the UP and/or DOWN button, together with the SET input key, the actual value (display value) can be changed in manual mode without the operating point being affected. This is done to correct the value displayed to the actual grading depth value
- This actual value correction can be made at any time, i.e. even in automatic mode during milling.



Moba26.jpg /Moba27.jpg

6.5 Other settings

The levelling equipment is finely tuned to the machine. All parameters have been set perfectly and ensure perfect operation so that under normal circumstances the user will not have to make any changes to the pre-set values.

All values are checked again and changed if necessary when the machine is handed over/during machine instruction.

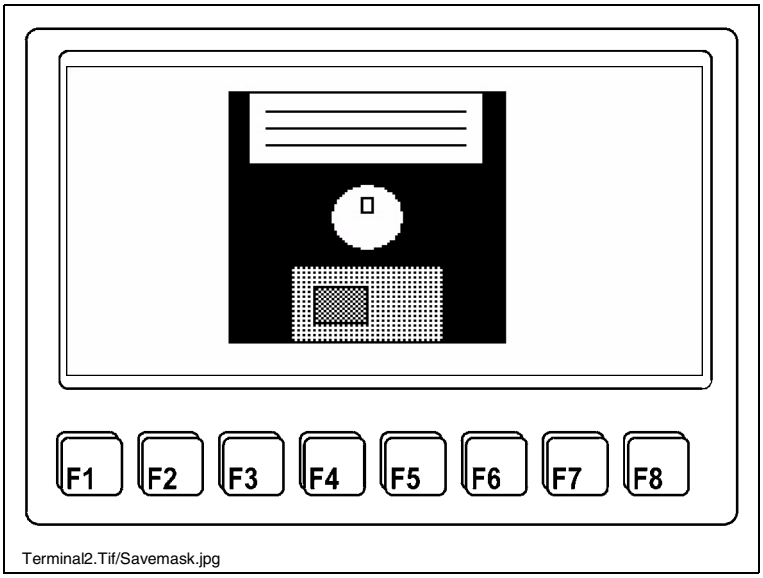
Should faults nevertheless occur, various key combinations can be used to access various menu items so that parameter settings such as:

- control precision level
- control width
- unit of measurement (centimetre, inch, foot)
- setting accuracy (transverse slope resolution in stages of: 0.1%; 0.05%; 0.02%)

can be checked and reset.

⚠ New parameter settings must be saved once they have been entered in the "levelling unit" menu screen of the main operating panel if they are to be retained.

☞ Please contact our service team if you experience problems when setting the parameter values.



Terminal2.Tif/Savemask.jpg

☞ Control window setting on digital controller

For effective milling operations, the control window is usually deactivated so that all grading depths required can be set directly and as quickly as possible. This may however result in the planer moving into dangerous positions if unforeseen events affect the grading depth setting and monitoring.
For example, such events include:

- a grade sensor suddenly loses its reference (e.g. the tensioned cable for Sonic-Ski during cable sensing or the cable tension sensor if the side panel jams)
- if the transverse slope sensor has been set incorrectly (incorrect direction of slope) and the levelling equipment has been activated
- in automatic mode, the machine has been lowered from its upper position with the transverse slope sensor activated

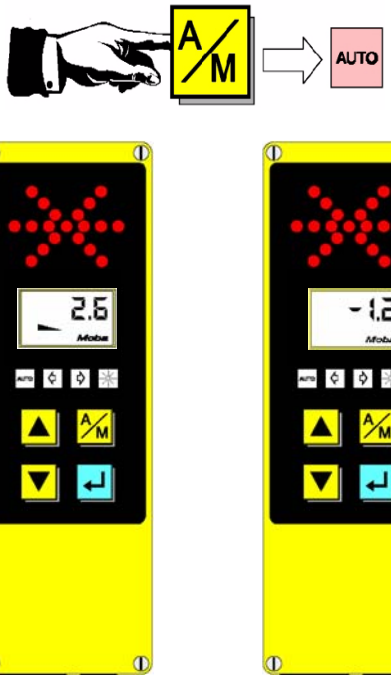
In each of these instances, the movement of the machine must be stopped either by deactivating the levelling equipment or by pressing the EMERGENCY STOP button.

Safety can be enhanced by specifying the control width, thereby restricting any uncontrolled and undesired machine movement to a defined safe value. When using this operating variant, operators must however accept complicated and time-consuming operations. The earliest imaginable for milling operations with cable sensing would be setting the control window to a maximum of 6 cm.

6.6 Operating the Moba-matik 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 profiling have been conducted on the machine
- The A/M button is switched to semi-automatic mode (AUTO function lamp flashing)
- The nominal grading depth values and/or the nominal slope value has been pre-selected.



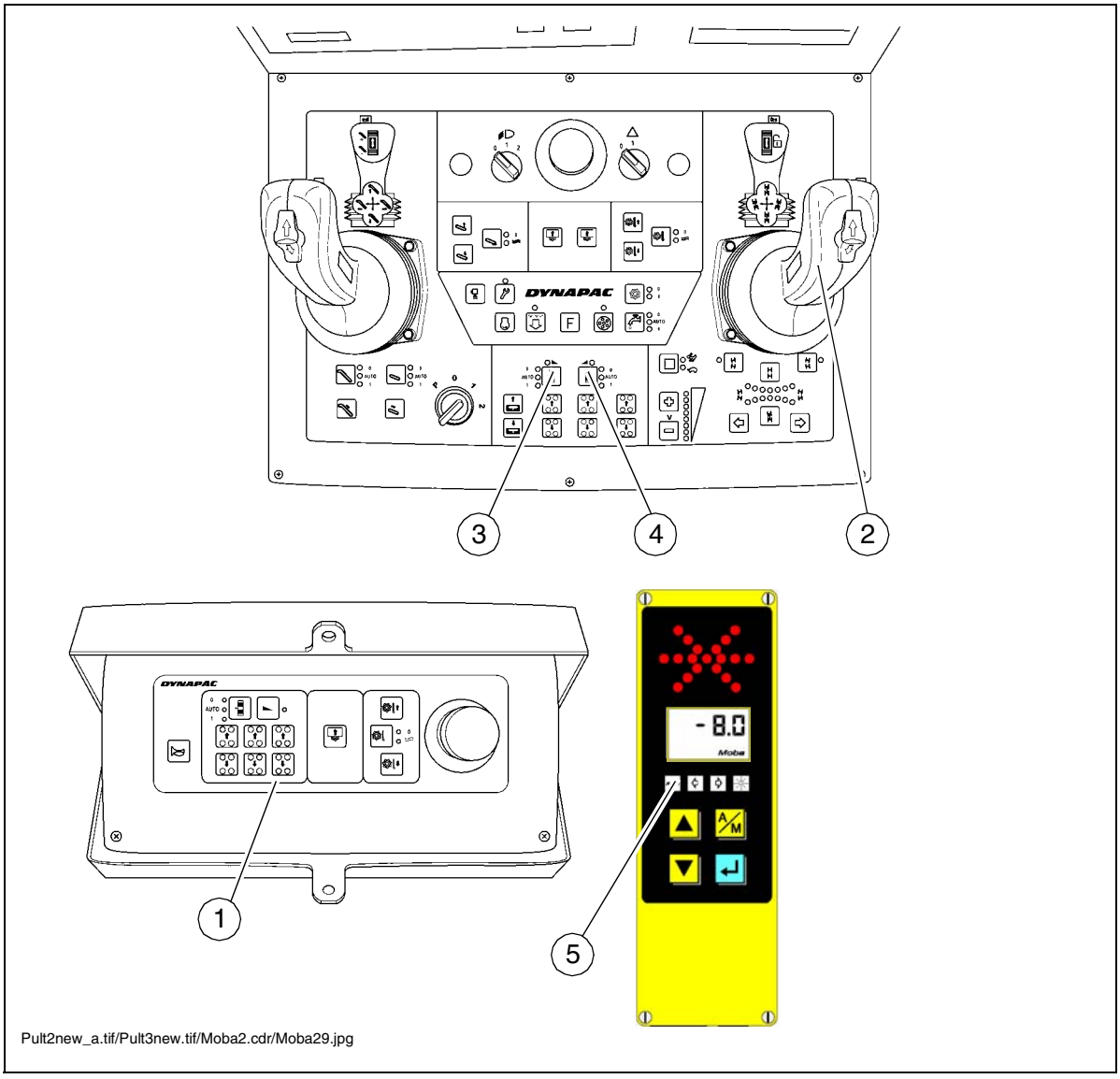
Moba23.jpg/Moba1.cdr/Moba21.jpg/Moba28.jpg

6.7 Other tasks for adopting the initial position for milling:

Milling with height sensors

Use button (1) of rear side control panel to lower grader via the rear strut towers so that the baseplates of the side boards touch the ground in the rear area.

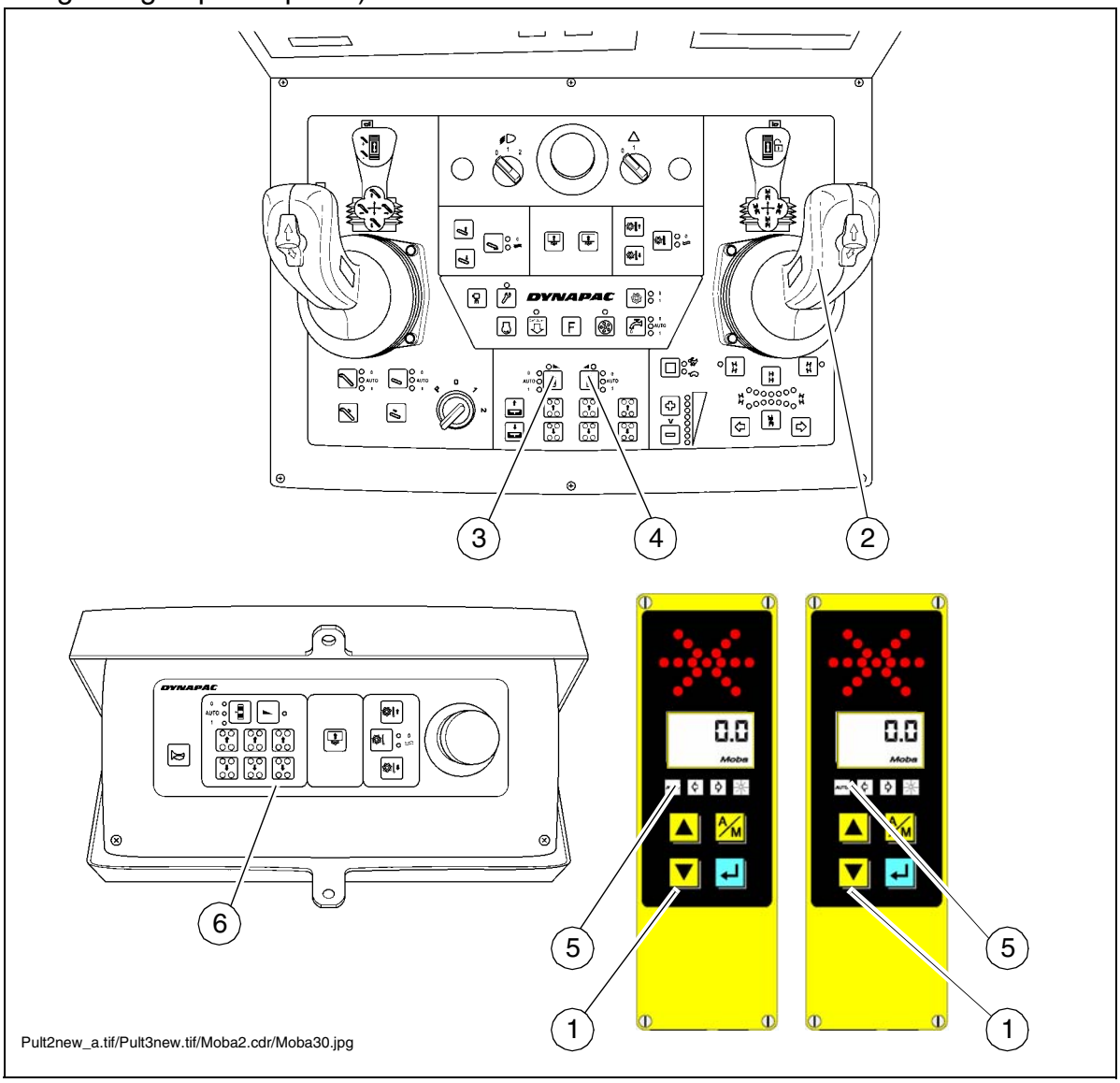
When starting to grade with offset (i.e. lower machine immediately to grading depth required):



Pult2new_a.tif/Pult3new.tif/Moba2.cdr/Moba29.jpg

- Activate automatic function of levelling equipment via the main operating panel (control lever (2), function keys (3),)(4)) (AUTO function lamp (5) lights up) and allow the machine to lower to the pre-selected grading depth while at a standstill. At the same time, use the function key (1) of the lower operating unit to control down so that the machine dips to a horizontal position and in its final position is tilted slightly more to the rear than the front. This milling position should be retained during the entire milling process, even if the grading depth is changed via the digital controller.

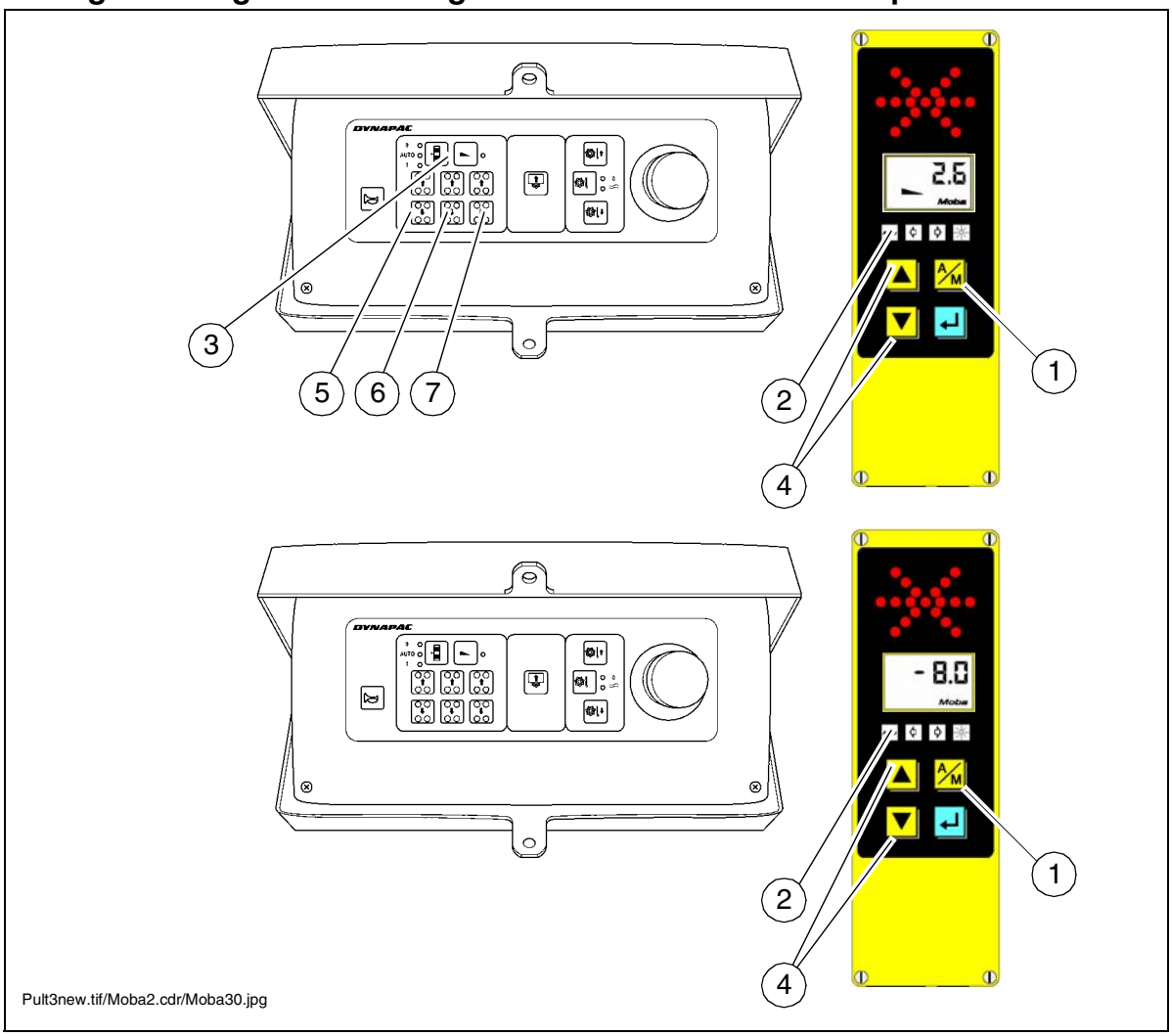
When starting to grade without offset (i.e. lower machine gradually from zero to the grading depth required):



Pult2new_a.tif/Pult3new.tif/Moba2.cdr/Moba30.jpg

- In semi-automatic mode, use the DOWN buttons (1) to set the nominal value 0 on both digital controllers. Both controllers are jointly attached to one side of the machine. Activate automatic function of the levelling equipment via the main control panel (control lever (2), function key (3), (4)) (AUTO (5) function lamp lights up) and allow the machine to lower to height zero while at a standstill.
  When the advance starts, use the DOWN buttons (1) to slowly set the nominal value and then use the function key (6) of the rear side operating units to "push" the machine into the correct milling position.

Milling with height sensors together with the transverse slope sensor



Pult3new.tif/Moba2.cdr/Moba30.jpg

Initial position:

- The machine is lowered to the zero cutting depth position, the A/M buttons (1) of both controllers are switched to semi-automatic mode (AUTO function lamps (2) flashing).
- The transverse slope sensor has been activated on the appropriate side of the machine using the function key (3) of the rear side operating unit (position diode lights up)
- The UP / DOWN buttons (4) are used to set the nominal values required (grading depth (here -8 cm), transverse slope (here 2.6% down to the right) on the digital controls for the corresponding sides.
- Lower machine to grading depth

STOP

Risk of tipping!

The transverse slope sensor responds after the grade sensor! To prevent accidents on dangerous transverse slopes, never lower the machine from its upper position when the transverse slope sensor has already been activated. Instead, lower the machine using both grade sensors in automatic mode or lower the machine evenly using manual adjustment, with the aid of the function keys (5), (6), (7) on the rear side operating unit. Continue until close to the cutting depth required (note direction of slope!) Only then should the transverse slope sensor be activated.

6.8 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. ● Check cable connections, change if necessary. ● Change sensor.
Son out **SLo out** **Pot out** **LAS out**	Measured value of the corresponding sensor outside the allowable range.	Outputs inhibited in automatic mode.	● Check sensor setting or check its direction. ● Change sensor.
Son dEF **SLo dEF**	Controller detects a defective sensor.	Outputs inhibited in automatic mode.	● Check cable connections, change if necessary. ● Change sensor.
Err 2	Data loss of the battery backed up memory.	Outputs inhibited in automatic mode.	● Acknowledge an alarm with any button. ● Set working position again (zero and setpoint).
Err 3 **Err 4** **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. ● Set working position again (zero point and setpoint).

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 cutting tools 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 - on main control panel - on the side control units	Check with engine running: Engine must shut down immediately after actuation. The button engages and must be pulled out so that the engine can be started again. Warning signal and warning information via display indicator
Horn - on main control panel - on the side control units	Briefly press horn knob. Horn signal must sound.
Reverse travel warning device	Check with engine running. Acoustic signal must sound during reverse travel.
Lighting - Operating headlight - Rotary beacons - Hazard flasher	Lights must function, keep headlight glass clean.
Steering system	Check with engine running: Machine in straight-ahead travel position, steering system responds in sync with the steering lever adjustment, uniform steering locks in all steering variants (when in co-ordinated steering mode and in crab steering mode, the rear axle does however respond with a slight delay). Precise straight-ahead position of front and rear axle once the appropriate function keys have been pressed.

Check!	How?
Traction unit - drive transmission	Check with engine running: Machine accelerates, hesitates and brakes smoothly both in the drive and working gear. When tracks encounter different levels of traction, anti-slip control responds (track in question slips briefly and then immediately rotates again at the speed of the other tracks).
Traction unit - strut towers	Check with engine running: Smooth extension and retraction.
Limit switch of drum flap	Check with engine running: The limit switch opens when the drum flap is opened - clutch of milling drum drive disengaged, - belt tensioner relieved. milling drum and travel drives cannot be activated on the main operating panel.
Belt tensioner	Secure tensioning and releasing of powered belt when the engine is running as well as engagement and/or disengagement of the milling drum. Check bracket and seat of a centring screws.
Drum flap - Retaining and detent pins	Check with engine running: The drum flap opens and closes smoothly. Both retaining pins can be slid in and out easily. The detent pin automatically engages and locks the drum flap in its open position.
Side shields	Check with engine running: - Smooth raising up to upper position at the touch of a button and automatic lowering when the button is released - When the drum flap is opened, smooth raising up to upper position at the touch of a button. Side shield is not lowered when button is released. Side shield only lowered at the touch of a button.

Check!	How?
Grab bars	Check with engine running: Grab bars can be connected with detent pins when the side shield is raised. Grab bars automatically release themselves from the detent pins when the downwards button is pressed.
Sliding shoe	Check with engine running: - Smooth extension and retraction at touch of a button with full pressure - Smooth extension in floating position at touch of a button.
Scraper	Check with engine running: - Smooth extension and retraction at touch of a button with full pressure - Smooth extension in floating position at touch of a button.
Upper conveyor	Check with engine running: Belt tension, forwards and reversing mode, smooth raising, lowering, swivelling.
Lower conveyor	Check with engine running: Belt tension, forwards and reversing mode
Safety device	Fastening, check condition and function.
Water system	Check: - Function of spray nozzles.
Weather protecting sun roof	Check: - Raising and lowering - Interlock - Condition of roof and all-round panels.
Other equipment: - Engine panels - Lateral flaps	Check that panels and flaps are secure.

☞ In addition to the tasks listed in the checklist, a visual check should be conducted of all components, equipment, functions.
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

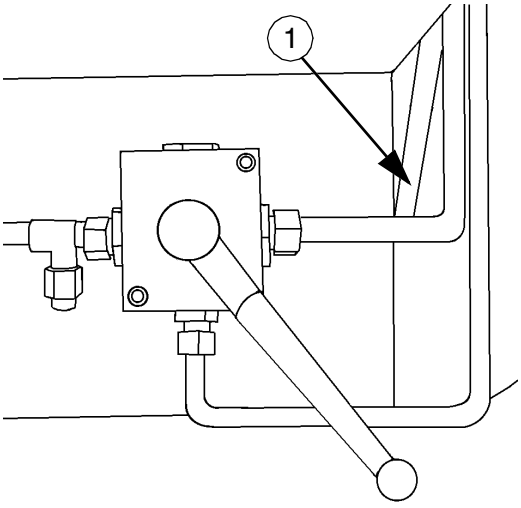
The following should be done before the diesel engine can be started and the machine can be operated:

- Daily machine maintenance.

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

- Check the safety and protection equipment.

Check the position of the lever for changing over the upper conveyor.
If necessary, move the lever into operating position (1).

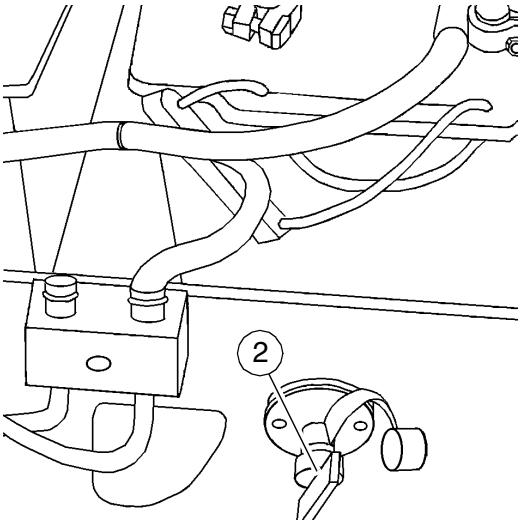


503ven~1.tif

If necessary:

- Align and secure folding roof.
- Fold up ladder and secure.
- Open control panels and side operating units.
- Set up control panel (driver's seat, operating panel, guardrails).

- Switch on battery's main switch (2).



500Hauptschalter.Tif

- Insert ignition key (3) in position "P" in the ignition. No lights should be switched on when starting the machine. This preserves the battery.
- Switch ignition on (pos. 1).

☞ Start screen appears on the display, position diodes of main operating panel light up.

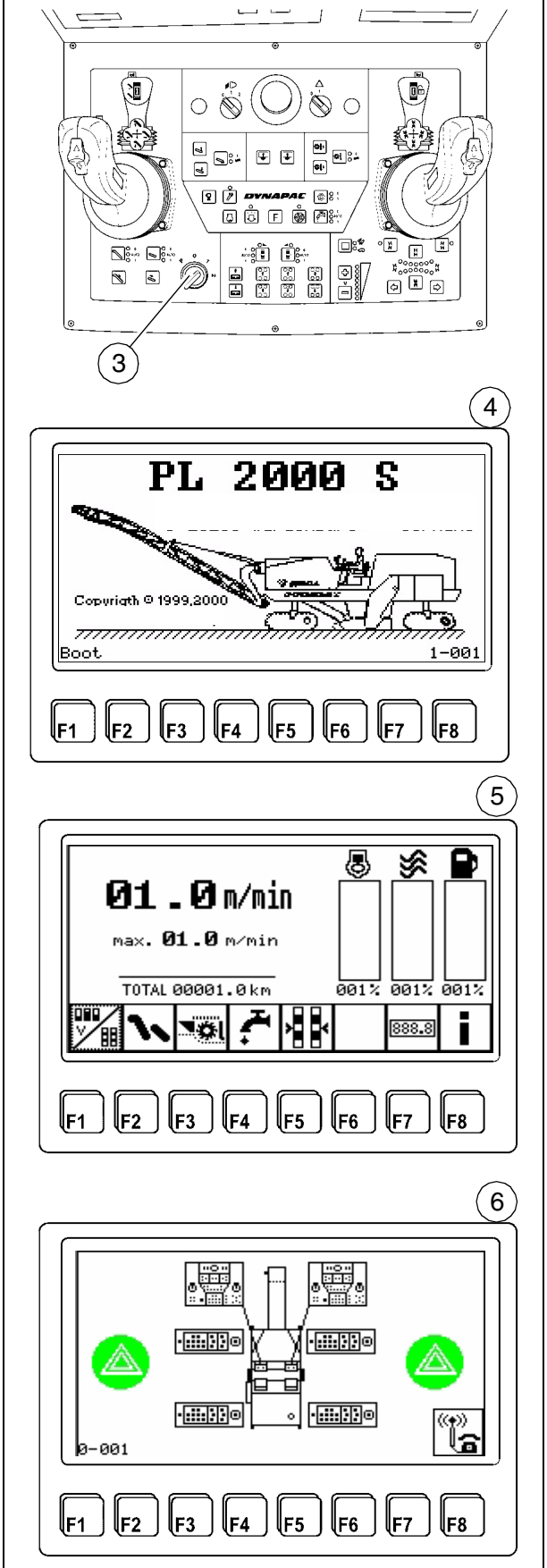
- Wait until the on-board computer has booted up ("BOOT" display in start screen (4)).
- Once the booting procedure is complete, the main screen (5) appears on the display.
- Turn ignition key into pos. 2 to start the diesel engine.

STOP Press the horn before starting.

☞ The machine cannot be started if the control lever and function keys are not in position 0 or if one of the emergency-stop buttons is pressed. ((6) shown on display)

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

- Once the diesel engine has started, release the ignition key.
- The ignition key automatically jumps back to pos.1.
- Use the display to check the operating and setting values, correct if necessary.
- Allow the machine to warm up if necessary.



Pult2new_a.tif/Terminal2.tif/Bootmask1.jpg/Mainmask1.jpg/3290034.jpg

External starting (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:

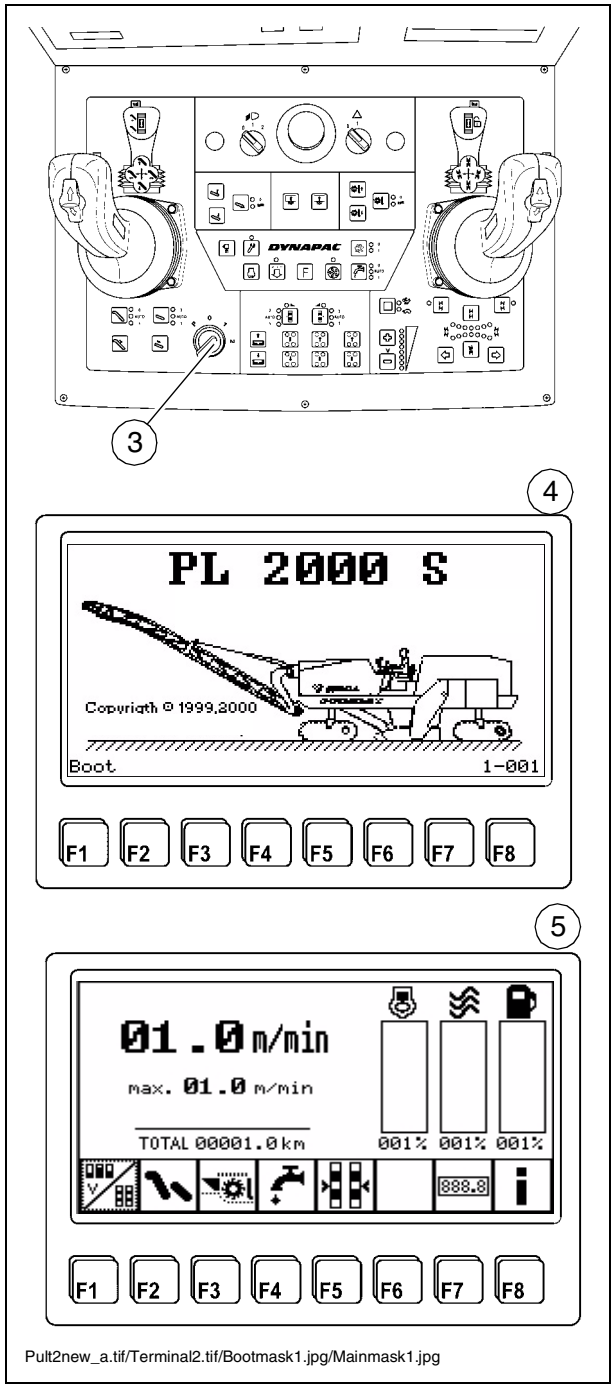
- Use appropriate cables to connect up source of power.

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

- Insert ignition key (3) in position "P" in the ignition.
- Switch on ignition (pos. 1).

Start screen appears on display, position diodes of main operating panel light up.

- Wait until the non-board computer has booted up ("BOOT" displayed on start screen (4)).
- Once the booting procedure is complete, the main screen (5) appears on the display.
- Turn ignition key into pos. 2 to start the diesel engine.
- Once the diesel engine has started, release the ignition key.
- The ignition key automatically jumps back to pos.1.



Pult2new_a.tif/Terminal2.tif/Bootmask1.jpg/Mainmask1.jpg

Once the engine is running:

- disconnect external source of power.

When using starter aid spray, note 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.

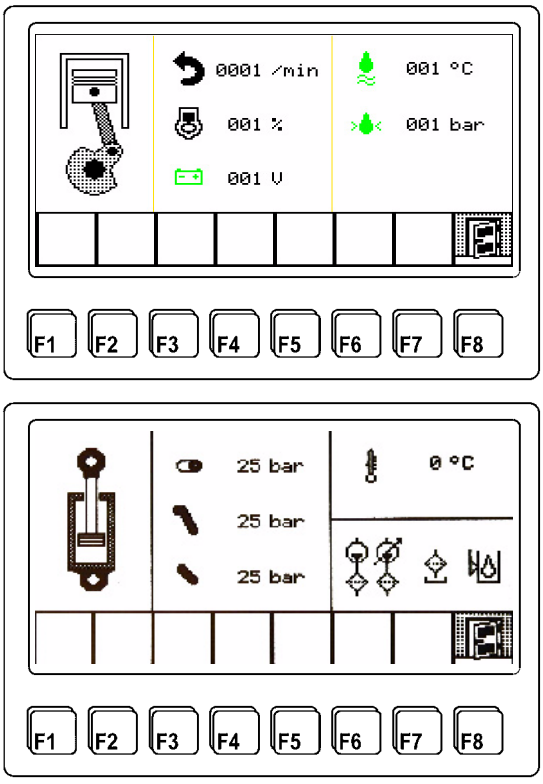
☞ The optimum operating values of a warm machine are:

- engine: 60 - 110°C coolant temperature, 2.4 - 2.8 bar oil pressure at idle speed.
- hydraulic system: 45 - 85°C hydraulic oil temperature.

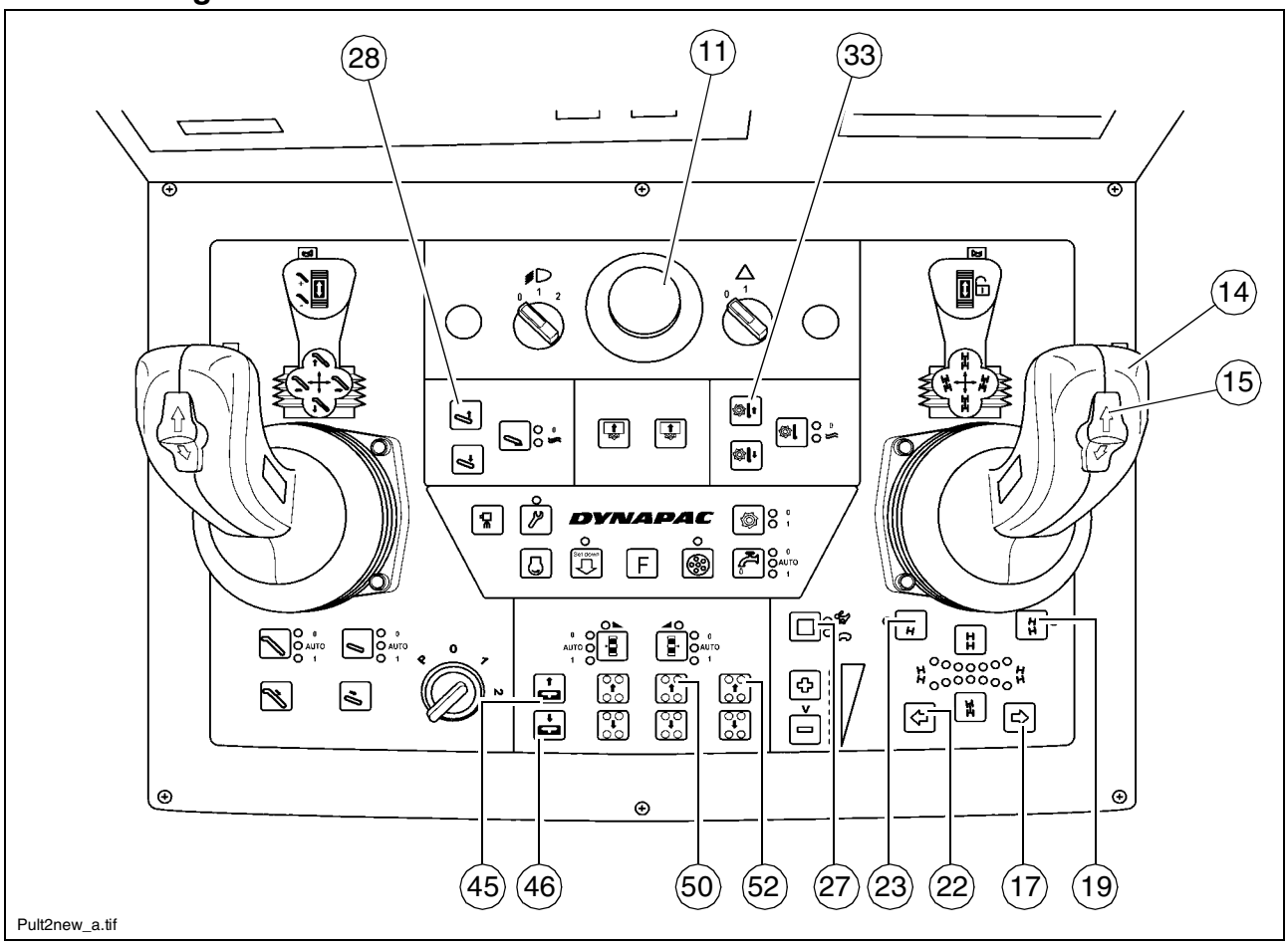
The temperatures and pressure levels can be called up from the info screens 2 and 3.

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

☞ If the outside temperatures are low, it is possible that the display indicator will not appear after the machine start. In this instance, the display must be reset via set-up screen 1 as is described in the "Basic settings on the display" Section.



Terminal2.tif/Infomask2.jpg/3290032.jpg



- Smoothly raise the machine by pressing button (45) or buttons (46), (50), (52) until the distance required between the machine and ground has been reached.

⚠ Never fully raise the machine for driving purposes!
Risk of tipping!

- Slightly raise sliding shoe by pressing button (28).
- Slightly raised scraper board by pressing button (33).
- Engage driving gear by pressing button (27) (position diode next to hare symbol activated).
- Check whether all other position diodes of the main operating panel are switched to "0", if necessary,press button to change over.

⚠ Always engage the warning lights (rotary beacons and hazard flasher) and unfold the warning sign when moving the machine!

- Slide unlocking switch (15) of right-hand control lever (14) forwards and at the same time side the control lever in the direction of travel required until the machine starts to move.
- The unlocking switch can be released as soon as the machine moves.

☞ When changing the direction of travel, the travel drive is electrically locked in the centre position of the control lever and has to be unlocked again!

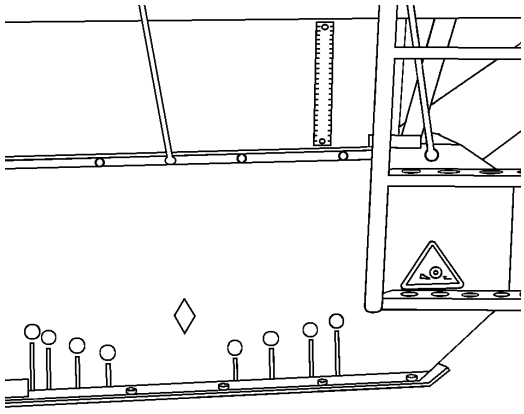
The control lever is used to steer the front axle in all positions (even at a standstill, in centre position of drive lever).
If greater manoeuvrability is required, the rear axle can be activated as a steering axle (buttons (17), (19), (22), (23)).
The approximate position of the drive units can be read from the light diodes (20).
The machine height can be changed during travel by pressing buttons (45), (46), (50), (52).

In an emergency, press the emergency-stop button (14) or one of the emergency-stop buttons on the side operating units.

Milling (preparation)

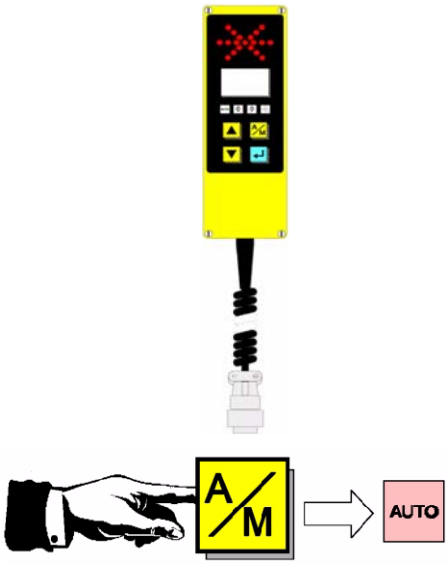
- Drive the machine to the milling section and lower manually as far as possible (side boards are lowered, milling drum does not quite touch the ground).
- Correct start position with the help of the reference points on side boards for various grading depths (4, 10, 20, 30 cm).

☞ Example: Grading starts
once the milling drum has been inserted to the grading depth of 4 cm required, exactly on the rear 4 cm mark.



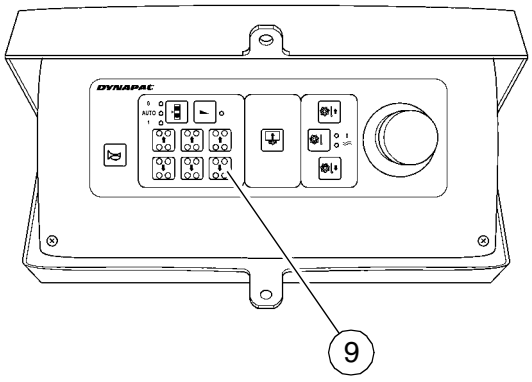
08Anze~1.tif

- Switch the A/M button of the digital controller to semi-automatic ("AUTO" function lamp flashing).
- Set grading depth and/or slope on both controllers. (Precondition: the zero and/or actual value calibration has already been conducted)



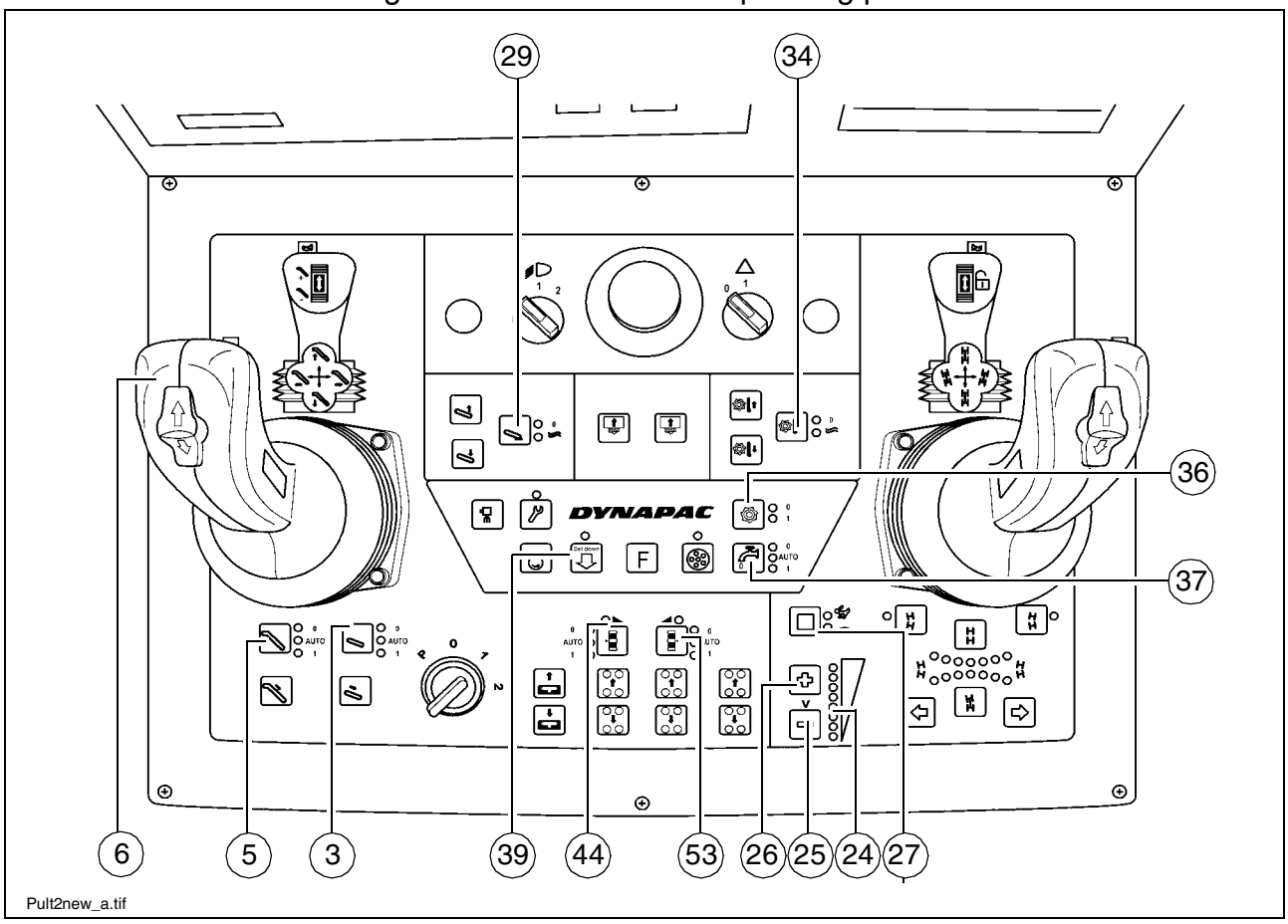
Moba1canjpg/Moba23.jpg

- Lower the machine, by pressing the button (9) of the rear side control unit, via the rear strut towers until the baseplates of the side boards touch the ground in the rear area.



Pult3new.tif

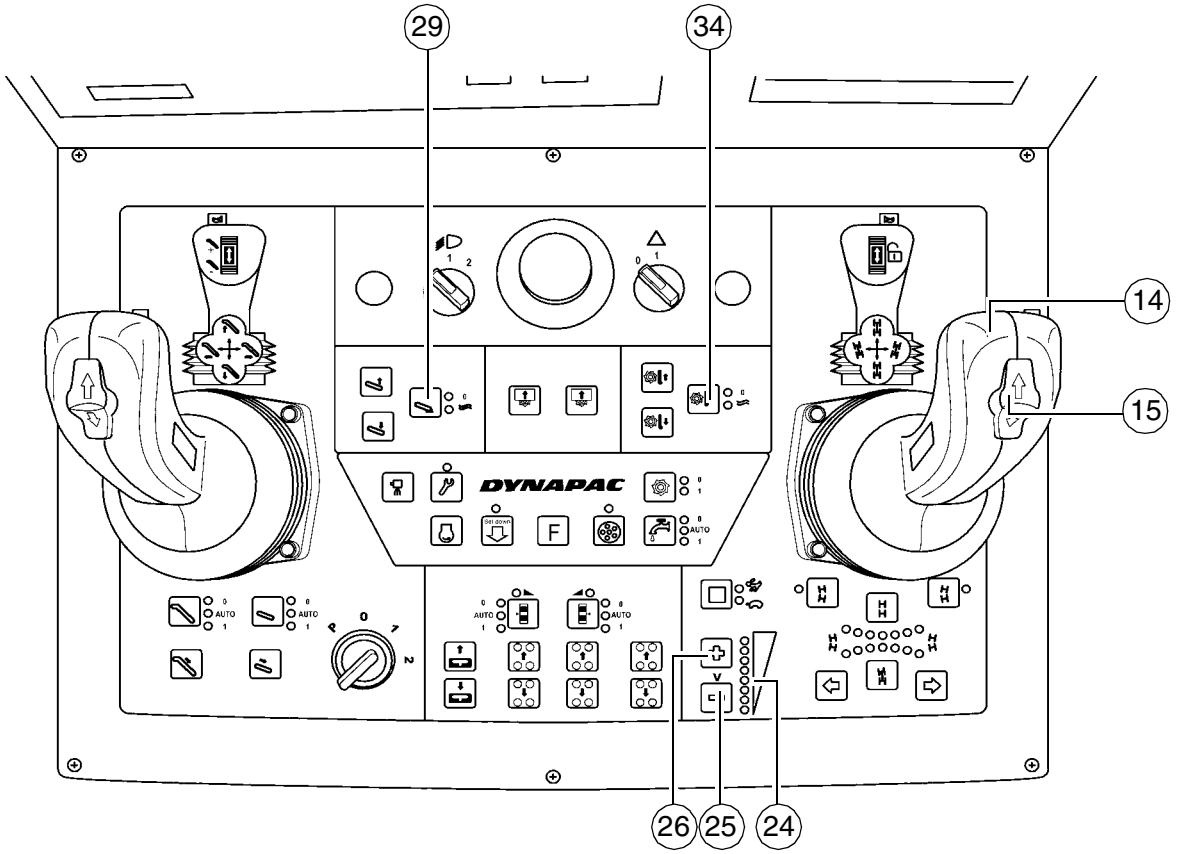
Activate the following functions on the main operating panel:

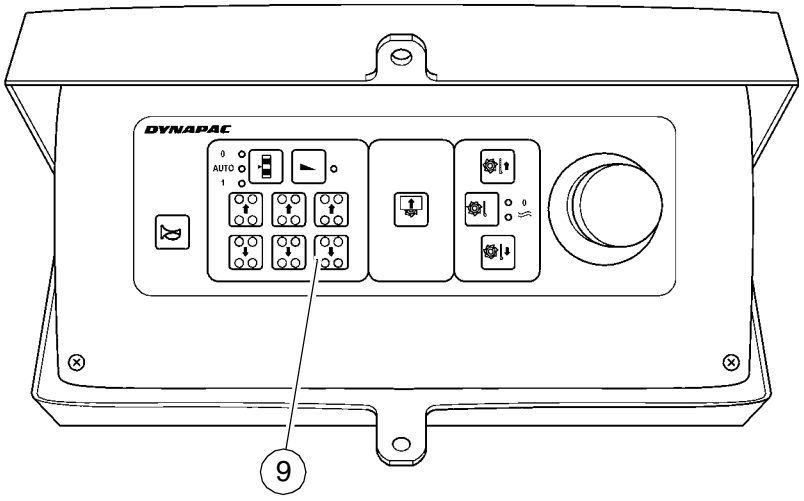


Pult2new_a.tif

Item.	Button	Position
27	Transport/working gear	Working gear (tortoise mode)
25/26	Set operating speed to zero	Light diodes (24) are off
36	Milling drum ON / OFF	Milling drum drive ON
34	Selector switch for moldboard	Floating position
29	Selector switch for sliding shoe	Floating position
5	Upper conveyor mode	AUTO
6	Control lever for upper conveyor	Position upper conveyor for the loading process
3	Lower conveyor mode	AUTO
37	Water pump ON / OFF	AUTO
44	Levelling function, left	AUTO
53	Levelling function, right	AUTO
39 (○)	Set-up button	Function activated

☞ The automatic function of the scraper, sliding shoe, upper and lower conveyor, water spray equipment can also be activated or deactivated from the lower control panels.





Pult2new_a.tifPult3new.tif

Once all the preparations for milling are complete, the machine is ready for milling, the automatic levelling device is activated from the main control panel and the machine is lowered to the depth required while at a standstill.

- Release control lever (14) by pressing slide switch (15) and gently slide forwards out of central point (within dead band range).
- At the same time, use the function key (9) of the rear side control unit control down so that the machine dips into a horizontal position and in its final position is tilted slightly more at the rear than at the front.

☞ This milling position should be retained during the entire milling process, even if the grading depth is changed via the digital controller.

- Set the milling speed required by pressing button (26) or (25).
  The machine starts to move.
- Depending on the setting, the speed display (24) lights up.

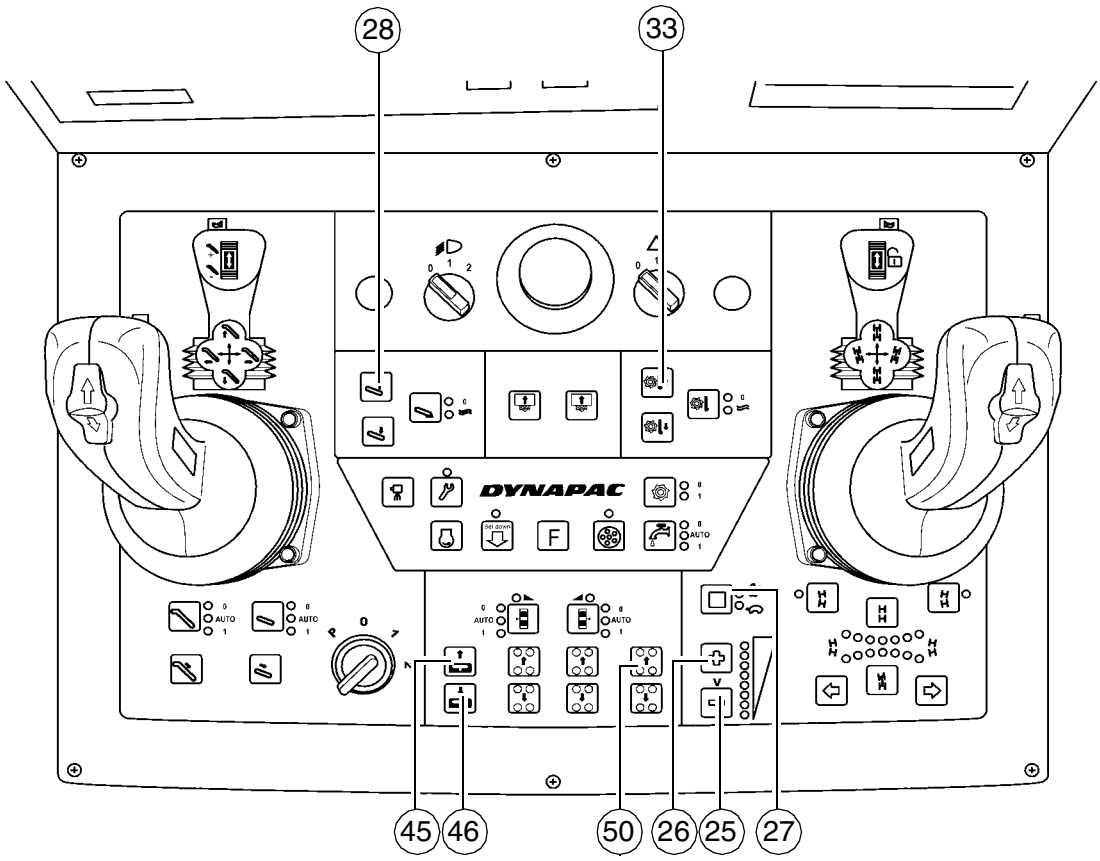
☞ The speed reached is shown on the display.

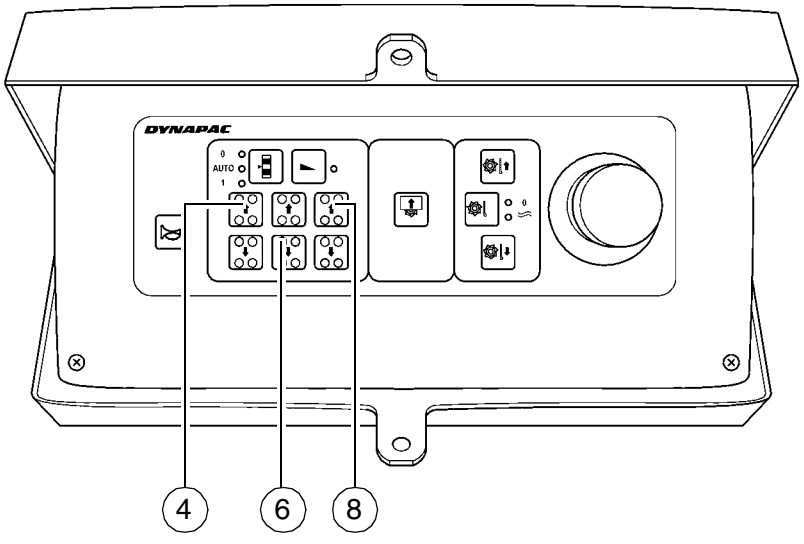
☞ Other settings can also be made on the levelling equipment.

Milling operations using set-up button

☞ If the machine is fitted with two operating panels and equipped for simultaneous operation, the set-up button (39) then assigned the function task can be used to simply lower the machine when stationary.
Milling drum, automatic levelling device and all other automatic functions needed for milling operations must be activated in advance.
The simultaneous control lever need not be used to lower the machine in this function so that the risk of forward motion can be ruled out.
Once the grading depth and position required has been reached in this way by activating the set-up button (LED active), release one of the two control levers and slide forwards (LED of set-up button (39) is deactivated).
The machine begins to move forwards and all preset automatic functions are activated.

Ending the milling procedure





Pult2new_a.tifPult3new.tif

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

☞ Depending on the cutting depth, the end of the cut will be at the height of the reference point marked on the side boards.

- To remove the milled product from the conveyor belts, let the lower and upper conveyors run on as is necessary.

☞ The run-on times can be set in the lower and upper conveyor menu.

- Smoothly raise the machine by pressing button (45) or buttons (46), (50), (52) of the main control panel or by
- pressing buttons (4), (6), (8) of the rear side control unit until the distance required between the machine and ground is reached.

⚠ Never fully raise the machine for driving purposes!
Risk of tipping!

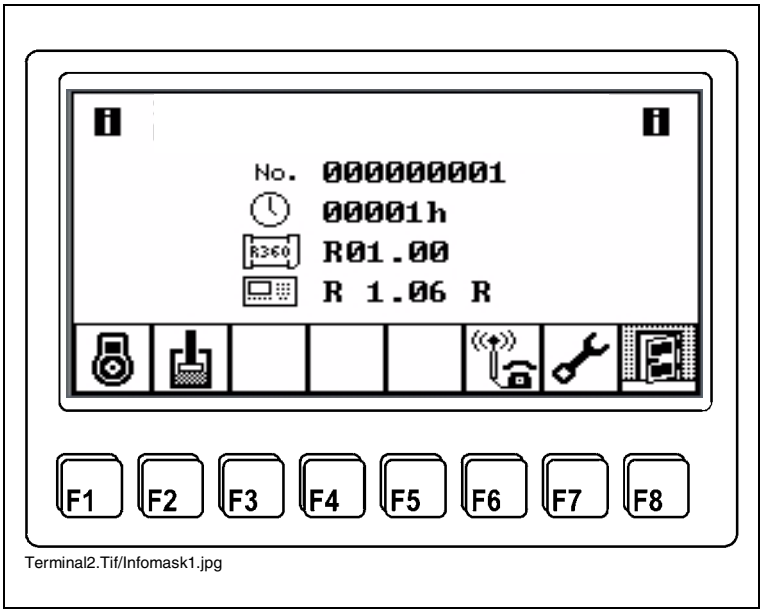
- Slightly raise sliding shoe by pressing button (28).
- Slightly raise scraper board by pressing button (33).
- Change all other position diodes of the main control panel over to "0".
- Change driving gear back to transport speed by pressing button (27) (position diode next to hare symbol activated).

☞ The driving speed **cannot** be controlled in transport gear by pressing button (25) or (26)!

Parking the machine

Before parking the machine, read the operating hours counter and check whether any maintenance work is to be conducted.

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, the upper conveyor lowered and, if possible, swivelled into a safe area.



Terminal2.Tif/Infomask1.jpg

- Lower scraper, sliding shoe and side boards.
- 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.
- Close protective covers of the side control elements and lock.
- Fold up ladder on the right-hand side of the machine.
- Close guardrail.
- Safely store loose components and accessories such as removable spotlights or parts of the levelling equipment.
- Deploy folding roof, remove key.
- Close all bottom lids, hoods and storage rooms.
- Fold out full length of traction unit supports so that the vehicle cannot be lowered should attempts be made to do so.

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.

Also secure and lock the operating panels using the protective covers provided.

⚠ The storage temperature must not be greater than +70°C or less than - 20°C!
If the temperature rises above or falls below these values, appropriate protective measures should be taken, especially for the on-board computer and the LC displays.

☞ 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.

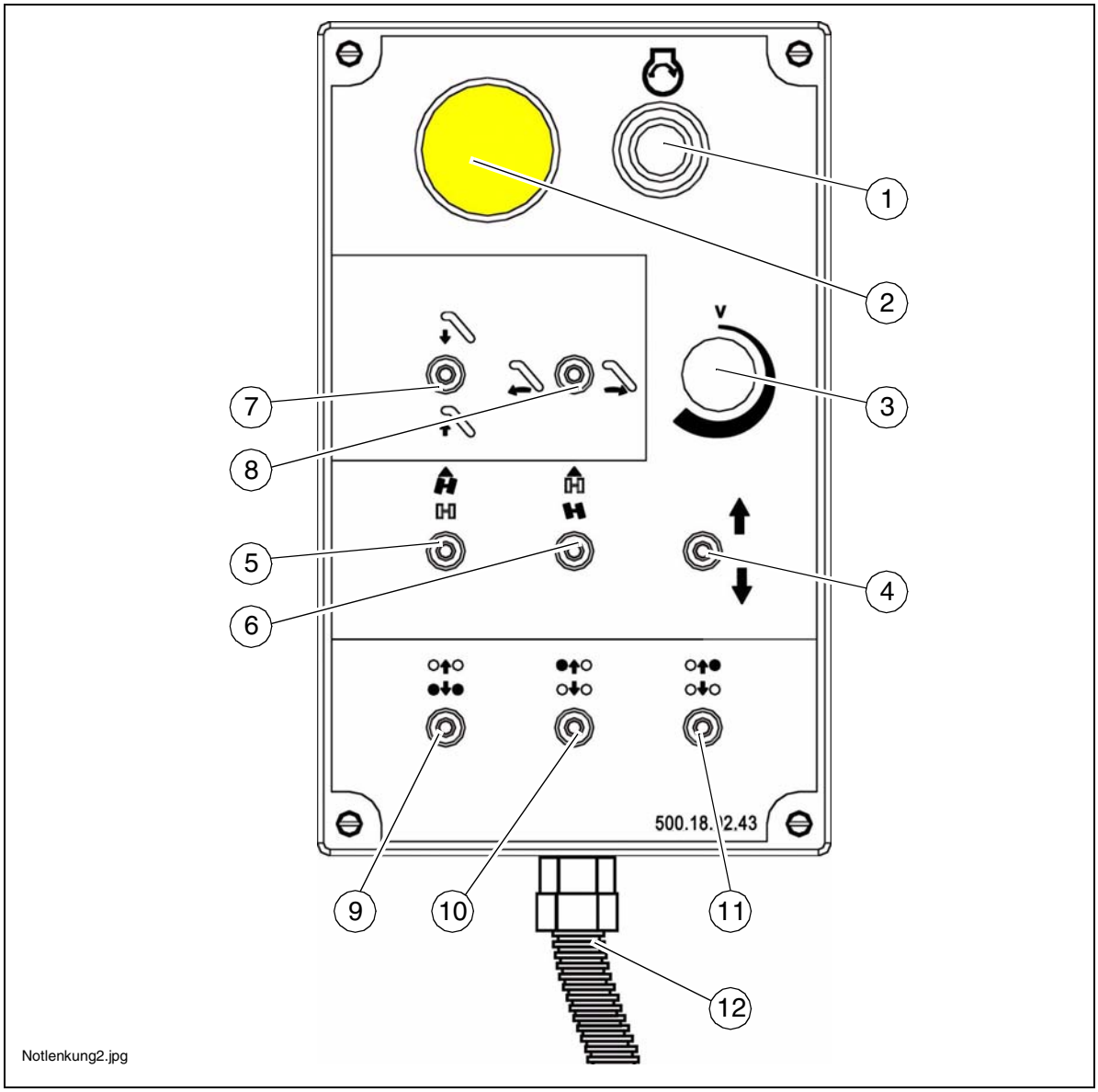
⚠ If the machine is not used for a long period of time, we would recommend preserving all polished metal parts with an appropriate agent and therefore protecting them from corrosion. This applies in particular to the traction unit supports and piston rods of hydraulic cylinders.

8 Emergency steering unit

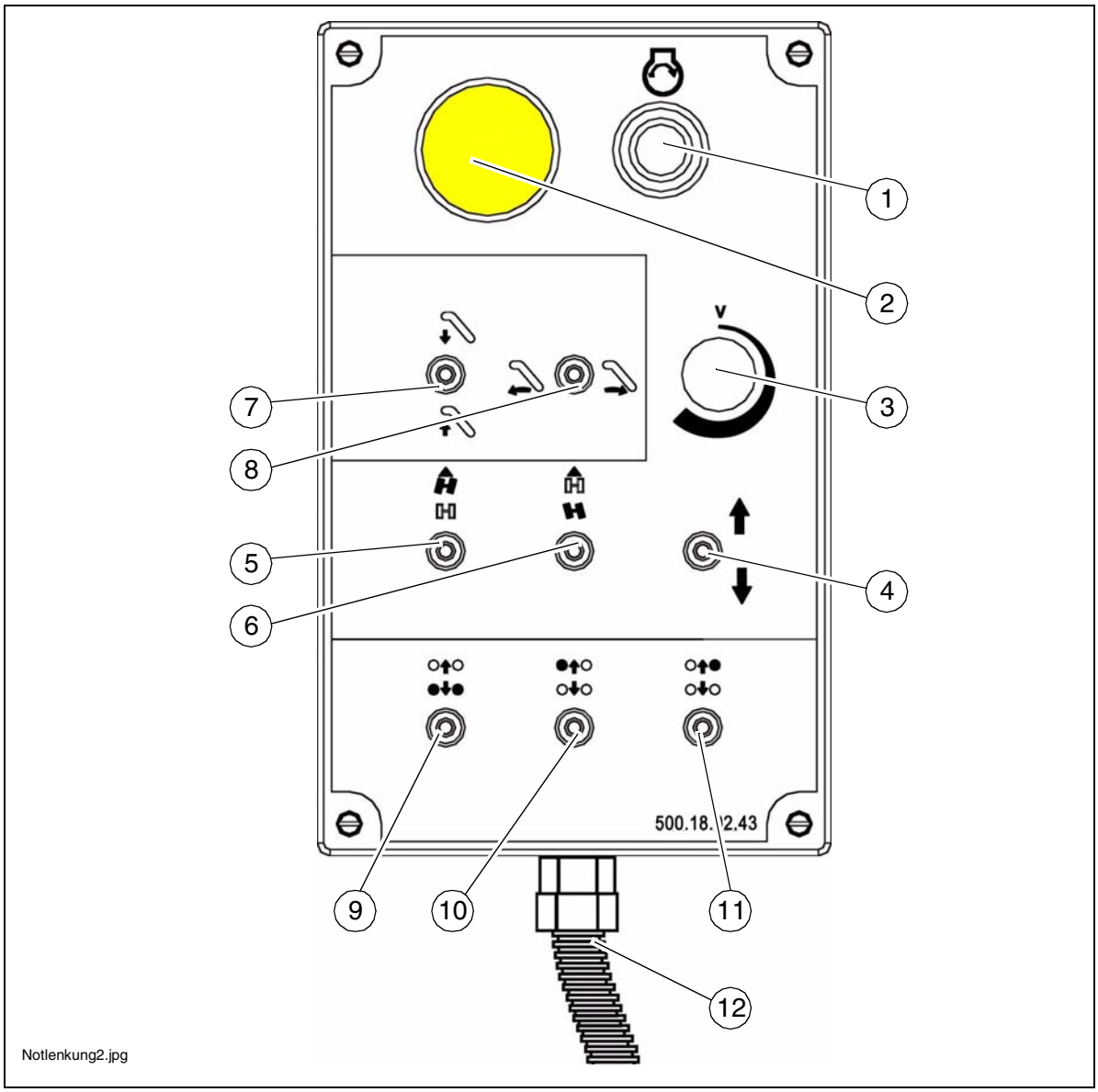
Should a fault occur near the electronic drive control system, the vehicle can be operated and loaded from the construction site or danger area using an emergency unit. The emergency unit is an optional tool and can be supplied with the vehicle.
This emergency steering unit provides the operator with the following functions:

- Engine start
- Steering movement for discharge conveyor
- Steering for front drive unit pair
- Steering for rear drive unit pair
- Retracting and protruding the traction unit supports
- Forwards and reverse direction of travel with speed selection
- Function stop for all movements

All electrical connections needed are established via the emergency steering unit four-pin connector and the socket located behind the engine compartment flap. The socket is secured by a protective cap.



Item	Designation	Brief description
1	Starter	Press to restart the engine. ☞ To prevent the batteries from discharging, do not press start button for more than 15 seconds ☞ The ignition on the main control panel must be switched on. (Ignition key in position 1)
2	EMERGENCY STOP button	Press in an emergency (people in danger, threat of collision etc.)! - All functions of the emergency steering unit are deactivated and blocked by pressing the EMERGENCY STOP button. STOP To turn off the engine, an EMERGENCY STOP button on the vehicle has to be pressed.
3	Preselection controller Travel drive	This is used to set the speed which is to be attained when activating the direction of travel switch.
4	Switch Direction of travel	- Top shift position: forwards direction of travel - Bottom shift position: reverse direction of travel
5	Front drive unit pair steering movement	- Left shift position links: front drive unit pair is steered to the left - Right shift position: front drive unit pair is steered to the right STOP Ensure that there is no-one in the machine's danger area!
6	Rear drive unit pair steering movement	- Left shift position: rear drive unit pair is steered to the left - Right shift position: rear drive unit pair is steered to the right STOP Ensure that there is no-one in the machine's danger area!
7	Raise and lower discharge conveyor	- Top shift position: discharge conveyor is lowered - Bottom shift position: discharge conveyor is raised. STOP Ensure that there is no-one in the discharge conveyor's danger area!


1
2
3
4
5
6
7
8
9
10
11
12
V
500.18. 2.43
Notlenkung2.jpg

Item	Designation	Brief description
8	Swivel discharge conveyor	- Left shift position: discharge conveyor is swivelled to the left - Right shift position: discharge conveyor is swivelled to the right STOP Ensure that there is no-one in the discharge conveyor's danger area!
9	Raise/lower rear of machine	- Top shift position: the rear traction units are extended to their limit position for as long as the switch is pressed. - Bottom shift position: the rear traction units are retracted to their limit position for as long as the switch is pressed.
10	Raise front left of machine	- Top shift position: the front left traction unit is extended to its limit position for as long as the switch is pressed. - Bottom shift position: the front left traction unit is retracted to its limit position for as long as the switch is pressed. STOP Risk of tipping! Note slope angle of machine!
11	Raise front right of machine	- Top shift position: the front right traction unit is extended to its limit position for as long as the switch is pressed. - Bottom shift position: the front right traction unit is retracted to its limit position for as long as the switch is pressed. STOP Risk of tipping! Note slope angle of machine!
12	Connection cable	The connection cable with the four-pin connector is plugged into the socket provided for this purpose in the engine compartment behind the engine compartment flap.