

Instructions manual

Operating & Maintenance

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**Planer
PL500 (IIIA/T3)
PL500 (IV/T4f)**

**Diesel engine
Cummins QSF 3.8-C130
Cummins QSF 3.8-C**

**Serial number
10000910H0C006249
10000907E0C005599**



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Introduction

The machine

Dynapac Planer PL 500 is a compact, very easy to operate planer with all-wheel drive.

The machine has hydrostatic drives, variably adjustable in 2 speed ranges and hydraulic steering (Orbitrol).

The machine has a maximum milling depth of 200 mm, depending on the variant.

The right chassis leg can be folded in for precision milling along curves etc,

The very tight turning radius makes it possible, for example, to mill around man holes.

Technical modifications, attachments and conversions:

The machine may only be operated with the extension parts, optional equipment and accessories, protection and safety devices authorized by the manufacturer as well as the setting values specified by the manufacture. The manufacture is not liable for damage resulting from unauthorized 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 function are supplemented, is only permitted with the written approval of the manufacturer. If necessary, approval should be sought from the local authorities.

Intended use

PL 500 is mainly intended to be used for roadworks:

- to partially remove layers of asphalt, asphalt concrete and concrete
- remove superficial irregularities in the form of ruts, lateral unevenness and distortions
- to restore the correct surface profile
- roughen up and remove markings
- to carry out preparations in conjunction with laying piping and conduits

The above work requires the underlying surface to be sufficiently stable and strong to withstand the movement of the planer.

The machine is not designed to be used as a towing machine, a winch or lifting device. See "Safety Manual for Planing".

The machine is not intended for using in explosive atmosphere.

Warning symbols



WARNING ! Marks a danger or a hazardous procedure that can result in life threatening or serious injury if the warning is ignored



CAUTION ! Marks a danger or hazardous procedure that can result in damage to the machine or property if the warning is ignored

General

This manual contains instructions for machine operation and maintenance.

The machine must be correctly maintained for maximal performance.

The machine should be kept clean so that any leakages, loose bolts and loose connections are discovered at as early a point in time as possible.

Inspect the machine every day, before starting. Inspect the entire machine so that any leakages or other faults are detected.

Check the ground under the machine. Leakages are more easily detected on the ground than on the machine itself.



THINK ENVIRONMENT ! Do not release oil, fuel and other environmentally hazardous substances into the environment. Always send used filters, drain oil and fuel remnants to environmentally correct disposal.

This manual contains instructions for periodic maintenance normally carried out by the operator.

Additional instructions for the engine can be found in the manufacturer's engine manual.

CE marking and Declaration of conformity

(Applies to machines marketed in EU/EEC)

This machine is CE marked. This shows that on delivery it complies with the basic health and safety directives applicable for the machine in accordance with machinery directive 2006/42/EC and that it also complies with other directives applicable for this machine.

A "Declaration of conformity" is supplied with this machine, which specifies the applicable directives and

Safety - General instructions

(Also read the safety manual)



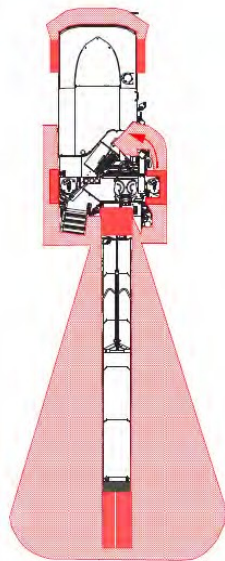
1. Read the entire manual before starting the machine and before carrying out any maintenance. Do not remove the manual from the machine. Replace the instruction manual if lost, damaged or unreadable.
2. The safety manual supplied with the machine must be read by all planer operators. Always follow the safety instructions. Do not remove the manual from the machine.
3. Only trained and/or experienced operators should be allowed to drive the planer. It is prohibited to take passengers on the planer.
4. Never use the planer if it is in need of adjustment or repair.
5. Only climb up or down from the planer when it is stationary. Use the intended grips and rails. Always use the three-point grip (both feet and one hand, or one foot and both hands) when mounting or dismounting from the machine. Never jump down from the machine.
6. Drive carefully on sharp bends.
7. Avoid driving across slopes. Drive straight up or straight down the slope.
8. Make sure that the underlying surface is sufficiently stable.
9. Make sure that there are no obstacles in the direction of travel, on the ground, in front of or behind the planer, or overhead.
10. Drive particularly carefully on uneven ground.
11. Use the safety equipment provided.
12. Keep the planer clean. Immediately remove any dirt or grease from the operator platform. Keep all signs and labels clean and fully legible. Replace damaged plates and labels.
13. Safety measures before refueling:
 - Shut off the engine
 - Do not smoke
 - No naked flame in the vicinity of the machine
 - Ground the filling device nozzle to the tank to avoid sparks
14. Before carrying out repairs or service:
 - Place chocks at the wheels
15. Hearing protection is recommended if the noise level exceeds 80 dB(A). The noise level can vary depending on the equipment on the machine and the surface the machine is being used on.

16. Do not make any changes or modifications to the planer, this could put safety at risk. Changes may only be made following the written approval of Dynapac.
17. Avoid using the planer before the hydraulic fluid has reached its normal working temperature. Braking distances can be longer than normal when the fluid is cold. See instructions in the STOP section.
18. For your own safety, always wear:
 - a helmet
 - work shoes with steel toecaps
 - hearing protection
 - breathing protection while milling, if necessary
 - reflective clothing/high visibility vest
 - work gloves
 - eye protection, if necessary
19. Ensure sufficient ventilation (extraction of air by fan) where the engine is run poorly ventilated spaces.

Safety - when operating



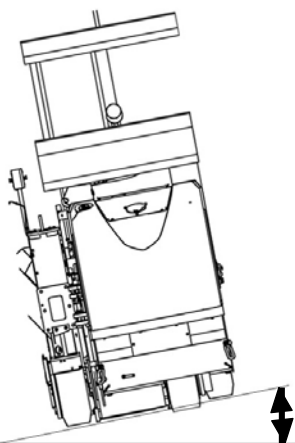
Prevent persons from entering or remaining in the danger area, i.e. a distance of at least 7 m (23 ft) in all directions from operating machines. The operator may allow a person to remain in the danger area, but should then observe caution and operate the machine only when the person is visible or has given clear indications of where he or she is.



Risk zones on the machine

Within these areas there is a risk of being retracted or crushed as a result of rotating, feeding or moving parts.

Fig. Risk zone



Maximum permitted angle of inclination 13° (23%)

Slopes

This angle has been measured on a hard, flat surface with the machine stationary.

The steering angle is zero and water tank is empty.

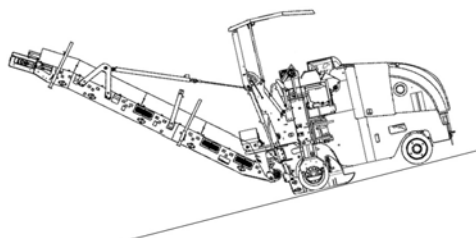
Conveyor turn 30°, and raise 38° from horizontal ground plane, chassis leg folded in, the operating speed and any change in the center of gravity can cause the machine to tip over on slopes with lower gradients



Follow the stated recommendations for maximum permitted angle in the picture.



Don't drive in slopes with chassis legs folded in.



Maximum permitted angle of inclination 6° (11%)



Don't swing chassis leg on slope, machine may back roll or go down by gravity. Risk of crash bystander or tip over.

Fig. Operating on slopes



Where possible, avoid driving across slopes. Drive instead straight up and down sloping ground.

Safety (Optional)

Conveyor

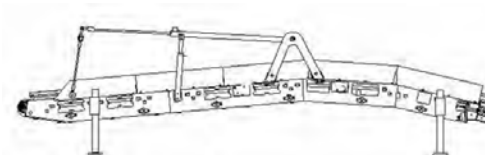


Fig. Conveyor



The machine must not be transported with material on the conveyor. The weight for the conveyor is specified on the unit rating plate. This weight is not included in the machine weight specified on the machine plate.



The operator must make sure that nobody is in the working area while the machine is in use.



Risk of body and crush injuries. The conveyor has rotating parts.



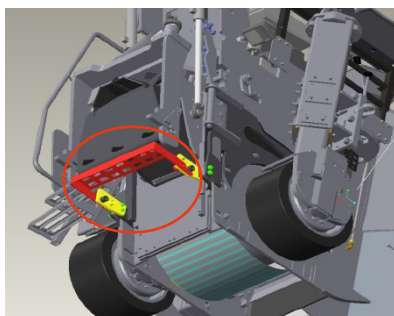
Risk of being retracted. Rotating conveyor.



The conveyor must be returned to its transport position after it has been used.



The overall length of the machine is changed when the conveyor is fitted.



Conveyor guard plate has to be installed when PL500 is not equipped with conveyor.



Risk of foot cut. Rotating milling drum.



**Fig. Hydraulic chassis leg
Extended position**

Hydraulic chassis leg



The operator must make sure that nobody is in the working area while the machine is in use.



The hydraulic chassis leg can be folded in, causing a risk of a crush injury



The chassis leg must be returned to the transport position (extended position) after use.



Don't swing chassis leg on slope, machine may back roll or go down by gravity. Risk of crash bystander or tip over.



Fig. Roof

Roof (option)



Risk of squeeze risk and crush injuries.

Special instructions

Standard lubricants and other recommended oils and fluids

Before leaving the factory, the systems and components are filled with the oils and fluids specified in the lubricant specification. These are suitable for ambient temperatures in the range -15°C to +40°C (5°F - 105°F).



The maximum temperature for biological hydraulic fluid is +35°C (95°F).

Higher ambient temperatures, above +40°C (104°F)

For operation of the machine at higher ambient temperatures, however maximum +50°C (122°F), the following recommendations apply:

The diesel engine can be run at this temperature using normal oil. However, the following fluids must be used for other components:

Hydraulic system - mineral oil Shell Tellus T100 or similar.

Lower ambient temperature - Freeze risk

Make sure that the watering system is empty/drained of water (sprinkler, hoses, tank/s) or that anti-freeze has been added, to prevent the system freezing.

Temperatures

The temperature limits apply to standard versions of planers.

Planers equipped with additional equipment, such as noise suppression, may need to be more carefully monitored in the higher temperature ranges.

High pressure cleaning

Do not spray directly onto electrical components.



Do not use high pressure cleaning for dashboard/display.



The Electrical Drive Control and the computer box may not be washed with high pressure cleaning and not at all with water. Clean them with a dry wiper.



Detergent that can destroy electrical parts, or which is conductive, must not be used.

Place a plastic bag over the fuel filler cap and secure with a rubber band. This is to avoid high pressure water entering the vent hole in the filler cap. This could cause malfunctions, such as the blocking of filters.



Never aim the water jet directly at the fuel tank cap. This is particularly important when using a high-pressure cleaner.



Fire fighting

If the machine catches fire, use an ABC-class powder fire extinguisher.

A BE-class carbon dioxide fire extinguisher can also be used.

Battery handling



When removing batteries, always disconnect the negative cable first.



When fitting batteries, always connect the positive cable first.



Dispose of old batteries in an environmentally friendly way. Batteries contain toxic lead.



Do not use a quick-charger for charging the battery. This may shorten battery life.

Jump starting (24V)



Do not connect the negative cable to the negative terminal on the dead battery. A spark can ignite the oxy-hydrogen gas formed around the battery.



Check that the battery used for jump starting has the same voltage as the dead battery.

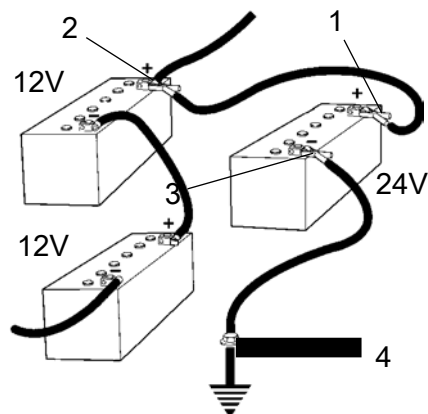


Fig. Jump starting

Turn the ignition and all power consuming equipment off. Switch off the engine on the machine which is providing jump start power.

Jump leads must have 24V.

First connect the jump start battery's positive terminal (1) to the flat battery's positive terminal (2). Then connect the jump start battery's negative terminal (3) to, for example, a bolt (4) or the lifting eye on the machine with the flat battery.

Start the engine on the power providing machine. Let it run for a while. Now try to start the other machine. Disconnect the cables in the reverse order.



Starting gas is not to be used!

Technical specifications

Vibrations - Operator station (ISO 2631)

The vibration levels are measured in accordance with the operational cycle described in EU directive 2000/14/EC on machines equipped for the EU market, nominal speed of diesel engine and milling and transport devices in operation and with vibration switched on, on soft polymer material and with the operator's seat in the transport position.

Measured whole-body vibrations are below the action value of 0.5 m/s² specified in directive 2002/44/EC. (The limit is 1.15 m/s².)

Measured hand/arm vibrations also were below the action level of 2.5 m/s² specified in the same directive. (Limit is 5 m/s²)

Noise level

The noise levels are measured in accordance with the operational cycle described in EU Directive 2000/14/EC on machines equipped for the EU market; nominal speed of diesel engine and milling and transport devices in operation.

Guaranteed sound power level, L_{wA}	97kW	108dB(A)
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PL500

Sound pressure level at the operator's ear (platform), L_{pA}	87dB(A)
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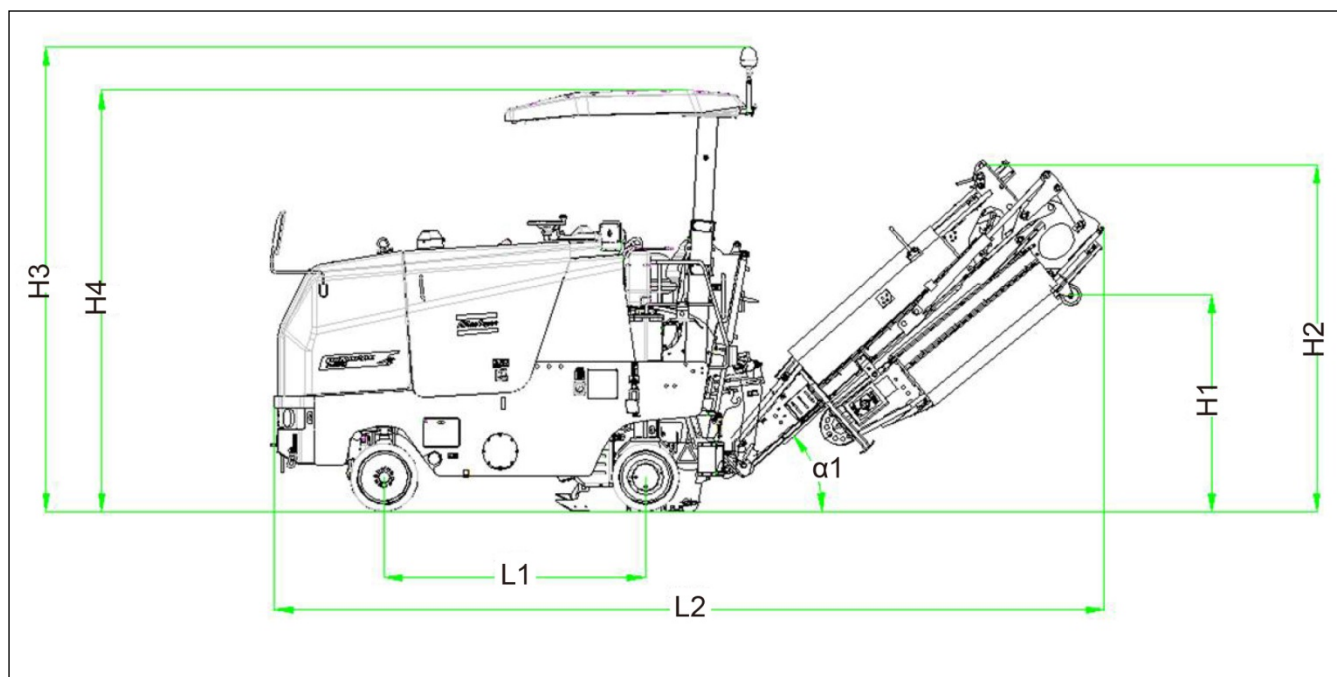
PL500

During operation the above values may differ because of the actual operational conditions.

Electrical system

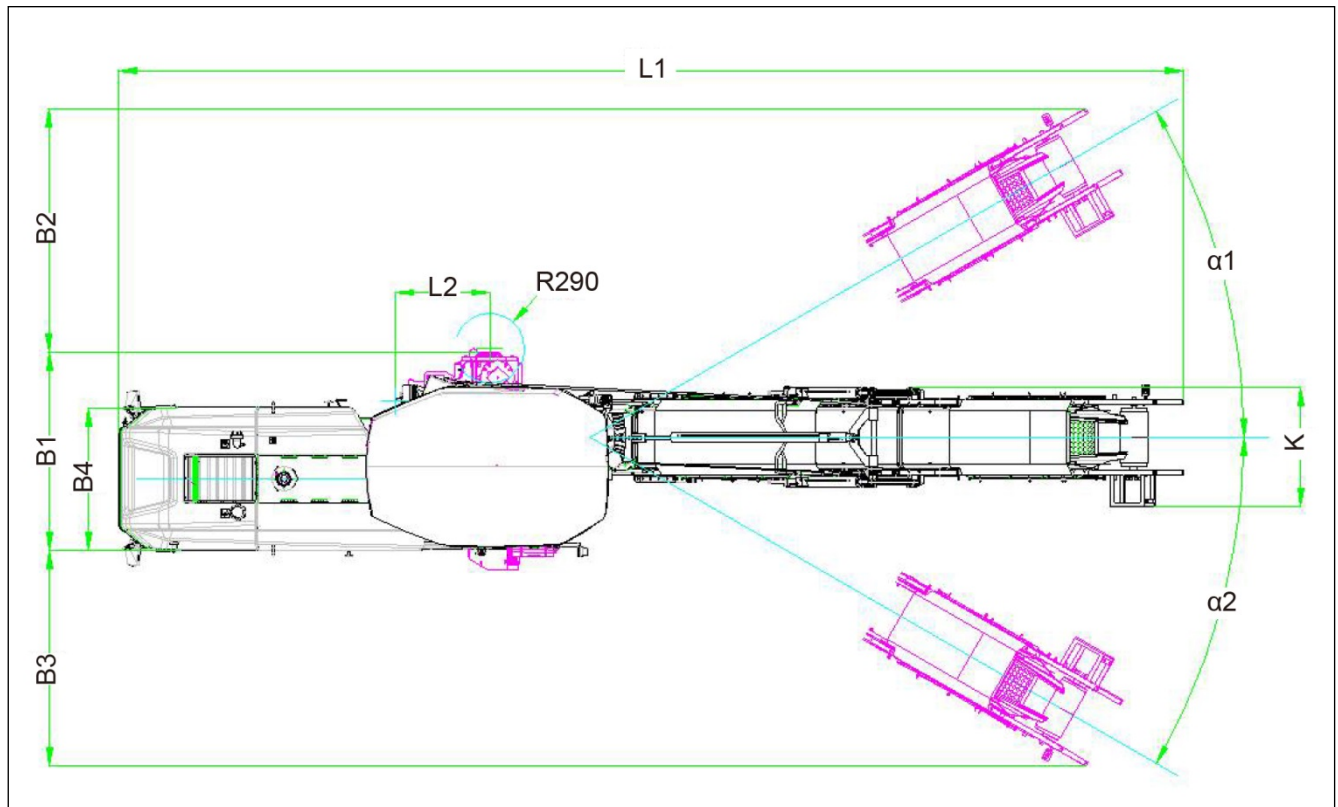
Machines are EMC tested in accordance with EN 13309:2000 'Construction machinery'.

Dimensions, side view



Dimensions	mm	Degree
L1	2173	
L2	6900	
H1	1790	
H2	2865	
H3	3836	
H4	3480	

Dimensions, top view



Dimensions	mm	Degrees
B1	1650	
B2	2200	
B3	1950	
B4	1200	
L1	8790	
L2	780	
$\alpha 1$		30
$\alpha 2$		30
K	980	

Weights and volumes

Weights

PL 500

Transport weight:	7850 kg	17306 lb
Operation weight (CE)	8250 kg	18188 lb
Operation weight, - (full tanks, full range of equipment)	9800 kg	21605 lb
Hydraulic foldable conveyor	950 kg	2094 lb

Fluid volumes

PL 500

Fuel tank	230 L
Engine oil	15L
Hydraulic fluid tank	100 L
Water tank	600 L
Planetary gear, drive wheel	1.5 L
Planetary gear, milling drum drive	6 L
Coolant, engine	20 L
Urea (for T4f ONLY)	19 L
Grease	5 kg

Working capacity

Performance PL 500

Transport speed	12 km/h
Working speed	40 m/min

PL 500

Milling width	500 mm
Milling depth	200 mm
Line spacing	13 mm
Milling diameter (milling drum dia.)	700 mm
Number of milling tool systems KPF301	61

General

Engine

Engine PL 500 (T3)

Manufacturer/type	Cummins QSF3.8-C130
Rated power @ 2500rpm	97 kW
Engine speed	2200 rpm
Cylinder volume	3800cm ³
Fuel type	Diesel
Cooling	Water
Number of cylinders	4

Engine PL 500 (T4f)

Manufacturer/type	Cummins QSF3.8-C
Rated power @ 2100rpm	97 kW
Engine speed	2200 rpm
Cylinder volume	3800cm ³
Fuel type	Ultra Low Sulfur Diesel
Cooling	Water
Number of cylinders	4
Fuel consumption, full load	25.6 l/h
Fuel consumption, 2/3 load	17.1 l/h

Loading system

Belt width, conveyor belt	400mm
Belt speed	4 m/s
Loading capacity (theoretical)	82m ³ /h
Discharge height	3.8 - 4m

Electrical system

Electrical system

Voltage	24 V
High capacity batteries	2 x 12 V, 74 Ah
Alternator	24 V / 70 A
Fuses	See section on fuses

Tightening torque

Tightening torque in Nm (lbf.ft) for oiled or dry bolts tightened with a torque wrench.

Metric coarse screw thread, bright galvanized (fzb):

STRENGTH CLASS:

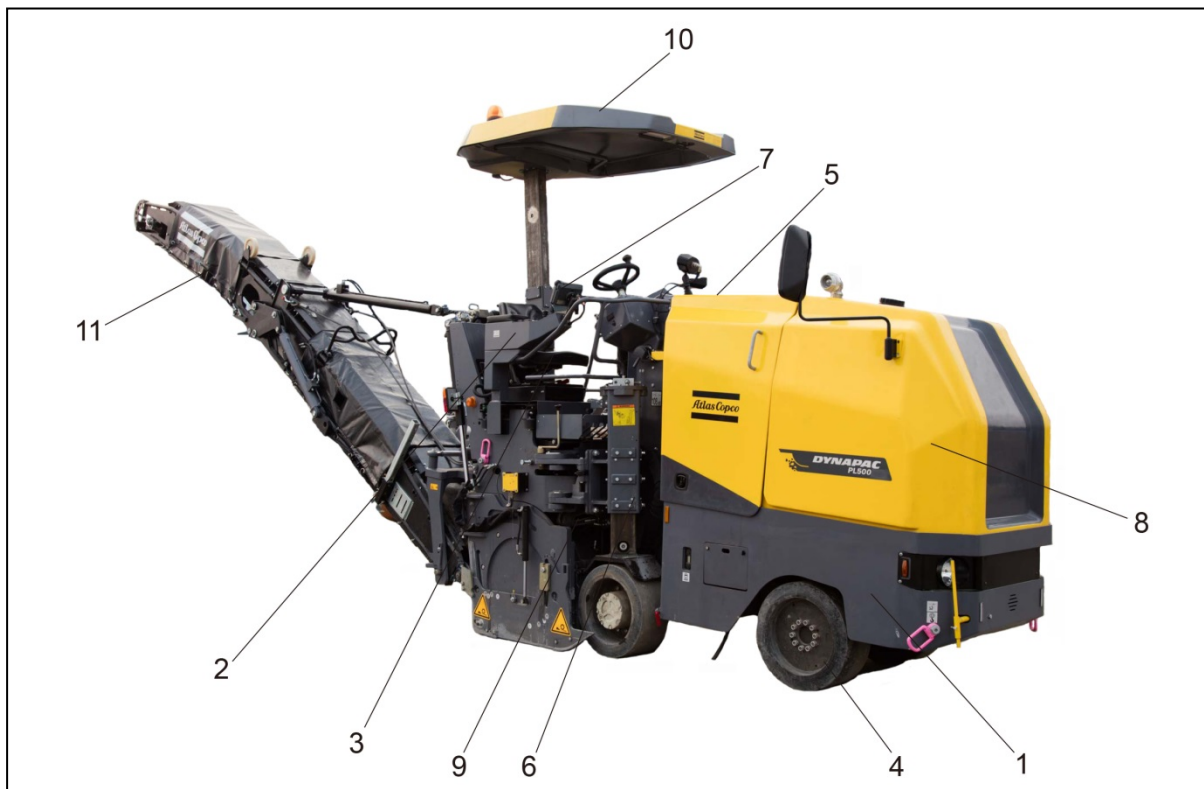
M - thread	8.8, Oiled	8.8, Dry	10.9, Oiled	10.9, Dry	12.9, Oiled	12.9, Dry
M6	8,4	9,4	12	13,4	14,6	16,3
M8	21	23	28	32	34	38
M10	40	45	56	62	68	76
M12	70	78	98	110	117	131
M14	110	123	156	174	187	208
M16	169	190	240	270	290	320
M20	330	370	470	520	560	620
M22	446	497	626	699	752	839
M24	570	640	800	900	960	1080
M30	1130	1260	1580	1770	1900	2100

Metric coarse thread, zinc-treated (Dacromet/GEOMET):

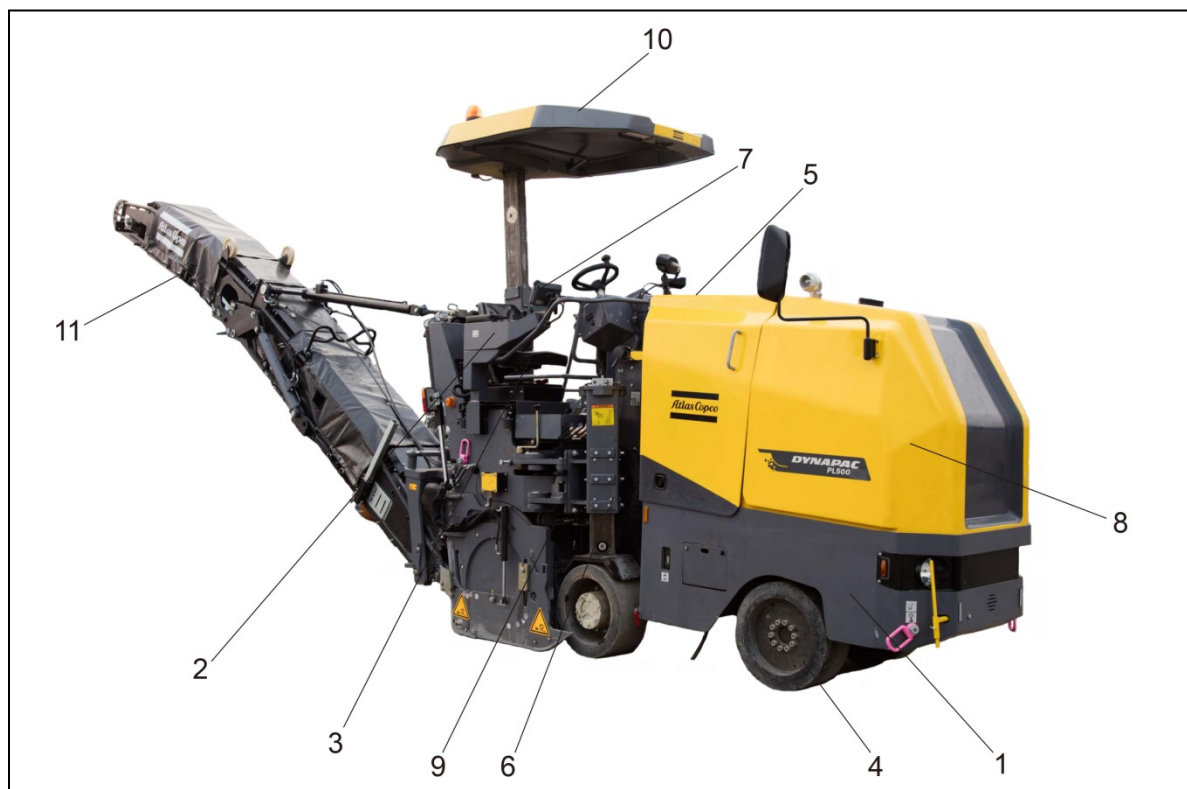
STRENGTH CLASS:

M - thread	10.9, Oiled	10.9, Dry	12.9, Oiled	12.9, Dry
M6	12,0	15,0	14,6	18,3
M8	28	36	34	43
M10	56	70	68	86
M12	98	124	117	147
M14	156	196	187	234
M16	240	304	290	360
M20	470	585	560	698
M22	626	786	752	944
M24	800	1010	960	1215
M30	1580	1990	1900	2360

Descriptions of assemblies and functions



Item	Designation
1	Frame
2	Operator's platform
3	Driver's seat
4	Drive wheel
5	Chassis leg
6	Swivel-mounted chassis leg
7	Milling depth indicator (O)
8	Water tank



Item	Designation
9	Water spray system
10	Protective roof
11	Upper conveyor

Machine description

Construction

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

Operator's control station: The operator's control station, conveniently located at the rear of the machine affording good all-round visibility, can be reached via a ladder and is equipped with a driver's seat on the right-hand side.

From the operator's control station on the right-hand side of the machine, the planer is easy and safe to operate, affording good visibility and corresponding ease of monitoring for the milling process.

Controls at operator's control station: A convenient operating and control element comprising all the requisite switching and display elements.

The securely arranged controls are obviously marked for all applications

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

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

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

Engine: The machine is fitted with a powerful 4-cylinder Cummins turbo diesel engine which effortlessly covers the power requirements 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.

The engine cover is noise-insulated as standard so that operating staff and the

surrounding area are subjected to minimum levels of noise. The engine is available in two versions, first version complying with US EPA T3, EU stage IIIA and China stage III exhaust standard, second version complying with the latest exhaust regulations US EPA T4f and EU stage IV.

Milling Drum: The powered milling drum is located between the two rear chassis legs.

The right-hand chassis leg can be swiveled in front of the milling drum.

The milling drum rotates in the opposite direction to the machine's direction of travel.

The special-purpose bit arrangement equipped with the best bits ensures rapid and clean milling as well as high bit life.

On the standard drum, with a milling width of 500 mm, bits can be replaced via the rear milling drum flap, thereby keeping downtime to a minimum for replacement purposes.

The milling drum is bolted to the housing of the mechanical drive and can be replaced easily and quickly after swiveling aside the right-hand housing plate

Milling depth control: Milling depth control is performed hydraulically, and separately for each chassis leg.

To the left and right sides of the operator's control station are two clearly legible milling depth indicator (option, accessible from display if selected).

Traction unit, steering system, travel drive, brake: The machine equipped with two front wheels, the suspension ensures that the vehicle is always supported on the ground in an optimum manner with the help of a parallelogram-shaped component.

The right-hand chassis leg can be swiveled in front of the milling drum.

The hydraulic all-wheel travel drive has continuously variable adjustment across two speed ranges. The hydraulic travel drives are connected to the wheel hubs by means of planetary gears. This ensures optimum traction and high gradeability.

A multi-disc brake on the rear & front wheel acts as brake.

Water system: The water system comprises a water spraying and cooling system. The water spraying and cooling system operates in the low pressure range.

This system is used to cool and rinse clean the milling bits, and to keep down dust.

The spray nozzles can be easily replaced.
The water tank has a large capacity and is filled from the top or from the bottom (pressure filling).

Loading unit: The cold planer attachment is designed as a rear-loading unit and features a one-piece load transfer system.

Final loading of milling material occurs from the upper conveyor to the transport container or some other loading area outside the milling lane. The belt is wide and its transport speed can be varied. As part of this process, the operating speed of the upper conveyor can be varied across an infinite range from zero to maximum setting.

The belt can then be changed quickly and easily.

The height of the upper conveyor can be adjusted hydraulically over a wide range of heights and the conveyor can also be swiveled to quite a sharp angle on both sides

The full-length cover substantially reduces the dust burden.

The upper conveyor can be dismantled/ assembled very rapidly and can be erected on four integrated legs.

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

Electrical system: 24 volt system with two in-line cold-start high-performance batteries and a 3-phase alternator.

The power supply can be interrupted to ground / earth by the battery's main switch.

Machine description

Identification

Product identification number on the frame

The machine PIN (product identification number) (1) is punched on the front right-hand side of the frame.



1

Fig. 1. PIN Front frame

Machine plate

The machine plate (1) is fixed to the right-hand side of the frame, by the chassis leg.

The plate gives the name and address of the manufacturer, type of machine, PIN (serial number), operating weight, engine power, axle weight front/rear, and year of manufacture.



Fig.PL500

1. Machine plate

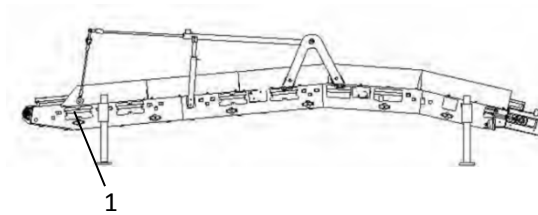
		Dynapac (China) Compaction & Paving Equipment Co., Ltd. 38, Quanwang Rd, Wuging High Tech Ind. Park, Tianjin, China 301700		
Product Identification Number				
Designation	Type	Rated Power	Max axle load front / rear	
		kW	kg	
Gross machinery mass	Operating mass	Max ballast	Month Year of Mfg	
kg	kg	kg		
Made in China				4812 1251 11

Please state the machine's PIN when ordering spares.

100	00123	V	D	A	123456
A	B	C	D	E	F

Explanation of 17PIN serial number

A= Manufacturer
B= Family/Model
C= Check letter
D= No coding
E= Production unit
F= Serial number



Conveyor plate

The plate (1) shows the PIN of conveyor and conveyor serial number.

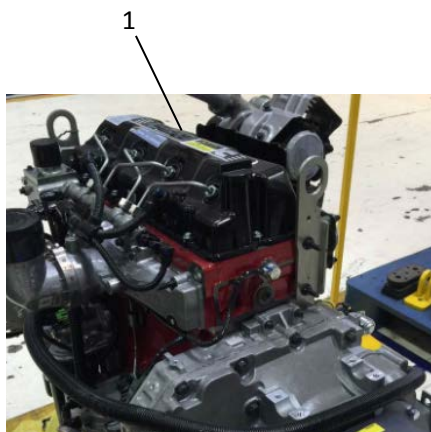


Fig.Engine

1. Type plate

Engine plate

The Engine type plate (1) is located on the cylinder head cover and is accessible when the hood is opened.

The type plate is also placed under the machine plate on the top step to the operator platform.

The plate specifies the type of the engine, its serial number and the engine specification. Please specify the engine serial number when ordering spares. Refer also to the engine manual

Decals

Positioning of labels, right-hand side

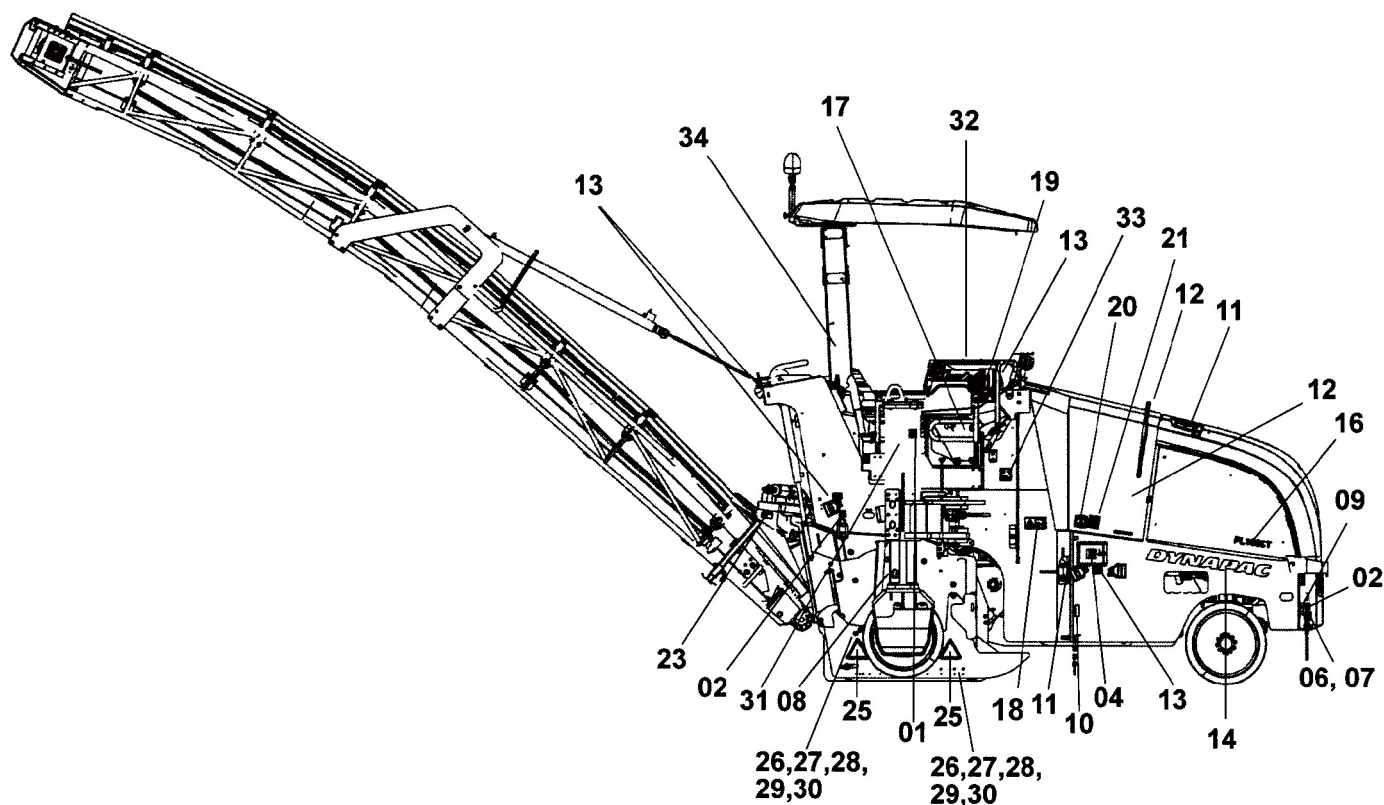


Fig. Location, decals and signs

1	4700357587	Decal "LIFT POINT"	13	4700393959	Battery voltage, 24V
2	4700382751	Decal "TIE DOWN POINT"	14	4700904268	Dynapac template, red
3	4700904835	Decal "BATTERY POWER"		4700904093	Dynapac template, w hite
4	4700991658	Decal "FUEL"	15	4700904263	Dynapac template, red
5	4700272373	Decal "HYDRAULIC OIL LEVEL"		4700904096	Dynapac template, w hite
6	4700904870	Lifting data plate	16	4812116276	Model code, w hite PL1000T
7	4700624016	Blind rivet		4812116277	Model code, red PL1000T
8	4700377742	Reflector, red	17	4700903425	Decal Instruction book holder
9	4700377743	Reflector, w hite	18	4700903422	Safety decal, crushing zone
10	4700377744	Reflector, yellow	19	4700903459	Safety decal, read instruction manual
11	4700991657	Decal "WATER"	20	4700903832	Safety decal
12	4700791642	Safety decal, starting fluid			

Positioning of labels, left-hand side

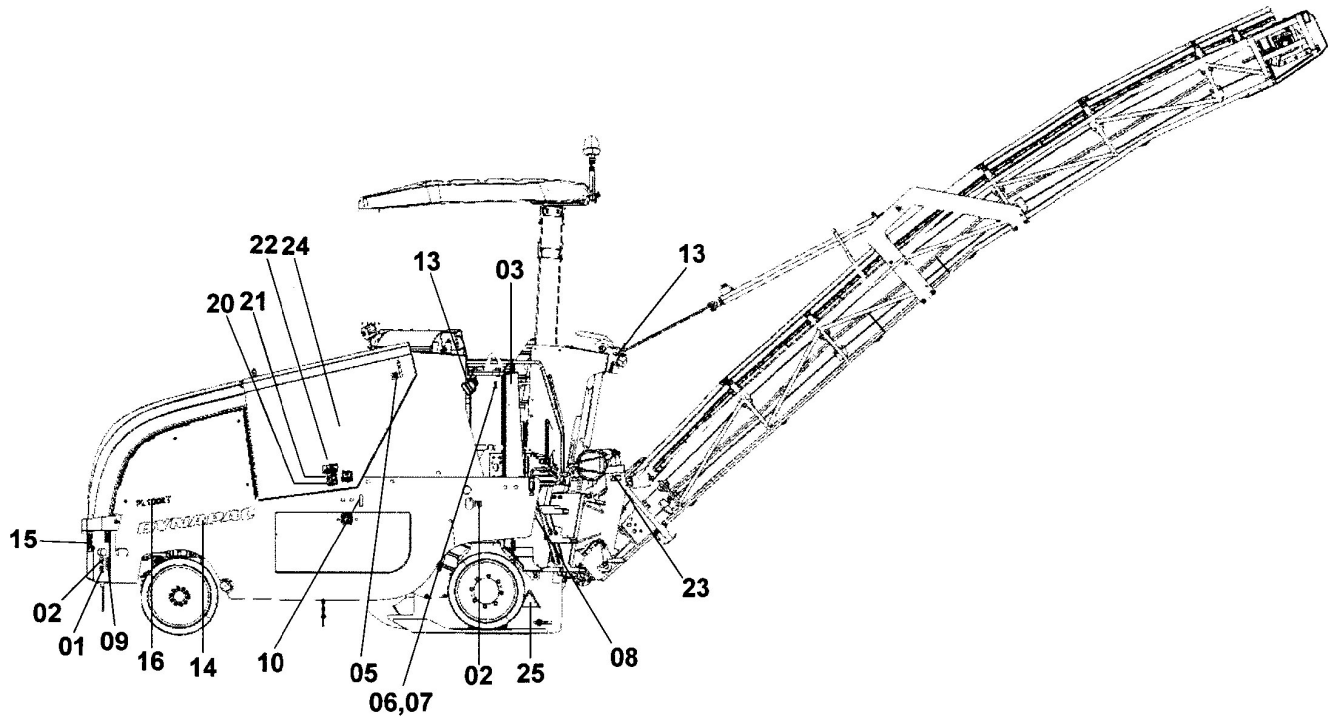


Fig. Location, decals and signs

21	4700903424	Safety decal, hot surface	28	D956052026	Decal, milling depth 16 cm
22	4700904895	Safety decal, brake release	29	D956053006	Decal, milling depth 20 cm
23	4700904785	Safety decal, risk of crushing	30	D956053007	Decal, milling depth 30 cm
24	4700388449	Decal "ENGINE COOLANT FILL"	31	D956052020	Safety decal, tip over
25	D956052007	Safety decal, milling drum	32	4700281898	Decal "EAR PROTECTION"
26	D956053004	Decal, milling depth 4 cm	33	4700791278	Decal "SOUND POWER LEVEL"
27	D956053005	Decal, milling depth 10 cm	34	4700904785	Safety decal, risk of crushing

Safety decals

Always make sure that all safety decals are completely legible, and remove dirt or order new decals if they have become illegible. Use the part number specified on each decal.



4700903832

Warning - Rotating engine components.

Keep your hands at a safe distance from the danger zone.



4700904895

Warning - Brake disengagement

Study the towing chapter before disengaging the brakes.

Danger of being crushed.



4700903424

Warning - Hot surfaces in the engine compartment.

Keep your hands at a safe distance from the danger zone.



4700903459

Warning - Instruction manual

The operator must read the safety, operation and maintenance instructions before operating the machine.



4700791642

Warning - Starting gas

Starting gas is not to be used.



4700903422

Warning - Crush zone, chassis leg.

Risk of personal injury or being crushed.
Maintain a safe distance from the crush zone..



4700904785

Warning – Crush zone

Risk of crush injuries. Keep at a safe distance
from risk zone.



D956052007

Warning – Rotating milling drum.

Maintain a safe distance from the risk zone.



D956052020

Warning – Risk of tipping

The machine is more instable when chassis leg
has been folded in.



4812017008

Warning – Engine ECU protection

Do not disconnect battery switch before 100
seconds after stopping the machine.

Info decals

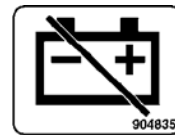
Handbook compartment



Battery voltage



Master switch



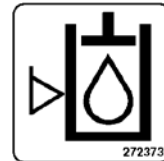
Diesel fuel



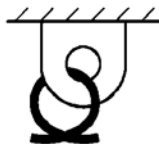
Water



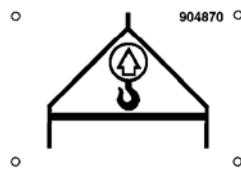
Hydraulic fluid level



Fixing point



Lifting plate



Lift point



Hearing protection



Milling depth



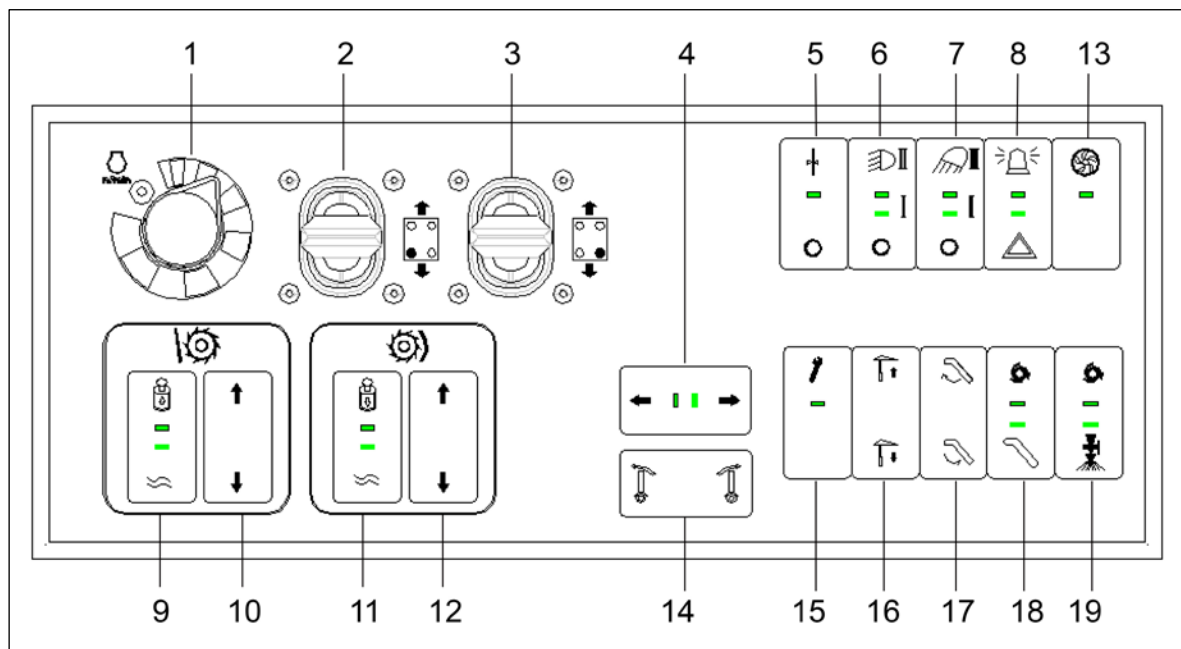
Coolant



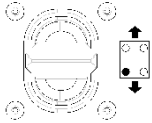
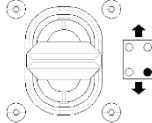
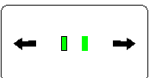
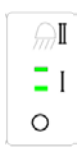
Sound effect level



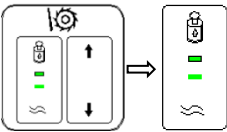
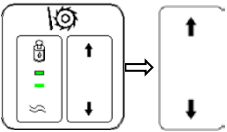
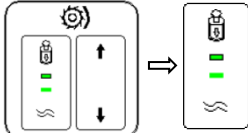
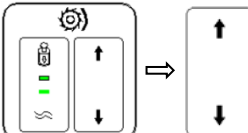
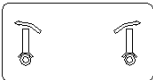
Instruments/Controls Main console

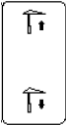


- | | | |
|---------------------------------------|---|--|
| 1. Engine speed potentiometer | 2. Raising/Lowing rear left of vehicle joystick | 3. Raising/Lowing rear right of vehicle joystick |
| 4. Steering lamp | 5. Automatic mode switch | 6. Travel lamp |
| 7. Working lamp | 8. Warning light and beacon | 9. Rear scraper floating and reduce pressure |
| 10. Rear scraper raising and lowering | 11. Front shoe float and pressure increasing | 12. Front shoe lift and down |
| 13. Duster switch | 14. Right rear chassis leg swing switch | 15. Service mode |
| 16. Canopy lift and down | 17. Conveyor fold and unfold | 18. Conveyor Auto and Manu |
| 19. Water spray Auto and Manu | | |

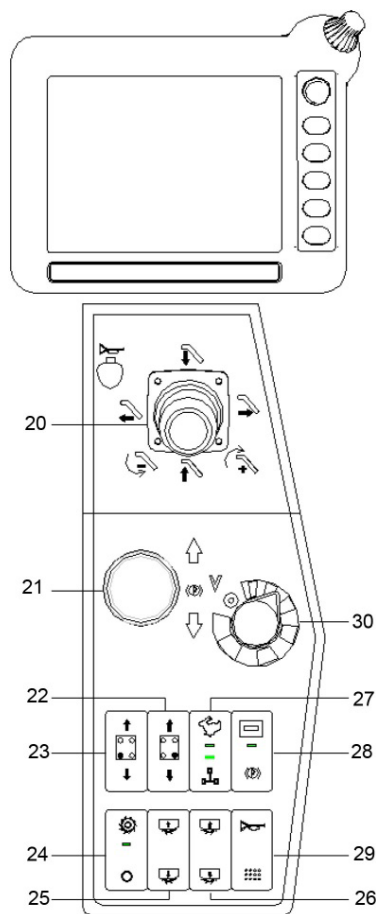
Pos.	Designation	Symbol	Function
1	Engine speed adjustment		Adjust the engine speed by rotating the knob, and the actual data in rpm is indicated in the display.
2	Raising/lowering rear left side of vehicle joystick		<p>While the handle switch is being pulled upward, the rear left strut towers are extended and the body of the vehicle is raised continuously until it reaches its upper limit position;</p> <p>While the handle switch is being pulled downward, the rear left strut towers are retracted and the body of the vehicle is lowered continuously until it reaches its lower limit position.</p> <p>When the system is powered on, it defaults to manual operation. In auto mode, the system including strut towers is changed into manual operation once the switch is actuated; when the switch is released, it is changed back to the auto mode.</p>
3	Raising/lowering rear right side of vehicle joystick		<p>While the handle switch is being pulled upward, the rear right strut tower is extended and the body of the vehicle is raised continuously until it reaches its upper limit position;</p> <p>While the handle switch is being pulled downward, the rear right strut tower is retracted and the body of the vehicle is lowered until it reaches its lower limit position.</p> <p>When the system is powered on, it defaults to manual operation. In auto mode, the system including strut towers is changed into manual operation once the switch is actuated; when the switch is released, it is changed back to the auto mode.</p>
4	Steering lamp		<p>Three- way Non-reset switch.</p> <p>When it's in middle position, steering lamp off;</p> <p>When it's in left position, left side LED steering flasher on;</p> <p>When it's in right position, right side LED steering flasher on;</p> <p>It ticks while steering flasher on, similar to motor vehicle.</p>
5	Automatic mode switch		<p>Three- way reset switch.</p> <p>The system enters into automatic control mode by pressing the upper position of switch, in which the right and left rear strut towers are raised and lowered by the leveling system automatically; LED indicates activation;</p> <p>And it exits from the automatic control system by pressing the lower position.</p> <p>In this mode, the side shields and the sliding shoe are automatically changed into floating state.</p>
6	Travel lamp		<p>Three- way Non-reset switch.</p> <p>The width lamp, head lamp and backlight of control table are lightened simultaneously by pressing the upper position of the switch (position II). The upper LED is activated.</p> <p>The width lamp and back light of control table are lightened by pressing the neutral position of the switch (position I). The lower LED is activated.</p> <p>The lights are turned off by pressing the lower position of the switch. The LED is off.</p>
7	Working lamp		<p>Three- way Non-reset switch.</p> <p>The working light and canopy light are lightened simultaneously by pressing the upper position of the switch (position II). The upper LED is activated.</p> <p>The working light is switched on by pressing the neutral position. The lower LED is activated.</p> <p>The lights are turned off by pressing the lower position. The LED is off.</p>

Machine description

8	Warning light and beacon		The beacon light on the canopy is switched on by pressing the upper position of the switch. The emergency light is switched on by pressing the lower position of the switch.
9	Rear scraper floating and reduce pressure		Three- way Non-reset switch. Press the upper switch, the rear scraper turns to pressure reduce state; Upper LED is on; Press this switch again to cancel the function. Pressure adjustment should be set inside the display. Press the lower switch, rear scraper is in float mode; Lower LED is on; Press this switch again to cancel the function. When switch is in neutral position, rear scraper is in static state. When "Service mode" is on, only floating is available, pressure reduce is unavailable.
10	Rear scraper raising and lowering		Three- way Non-reset switch. Raise/lower the scraper by pressing the upper/lower position of the switch. When "Service mode" is on, the function is unavailable.
11	Sliding shoe float and pressure increasing		Three- way Non-reset switch. Upper switch is activated, sliding shoe is in pressure increase state, upper LED is on. Pressure adjustment should be set inside the display. Lower switch is activated, sliding shoe is in floating state, Lower LED is on. When switch is in neutral position, sliding shoe is in static state. When "Service mode" is on, only floating is available, pressure increasing is unavailable.
12	Sliding shoe lift and down		Three- way Non-reset switch. Lift the sliding shoe by pressing upper switch; Lowering sliding shoe by pressing lower switch; When "Service mode" is on, the function is unavailable.
13	Duster switch		Two- way Non-reset switch The duster starts to work by pressing the upper position of the switch, and LED light is on, and it stops by pressing the lower position.
14	Right rear chassis leg swing switch		Three- way reset switch. The right rear chassis leg is swung forward/backward by pressing the left/right position of the switch; and the function is deactivated when the switch is released.
15	Service mode		Three- way Non-reset switch. The service mode is activated / deactivated by pressing the upper/lower position of the switch, LED indicates activation. The switch can be activated and this mode can be entered into only when the planer is in stationary state and the engine is started. In service mode: <ul style="list-style-type: none"> - The planer fails to travel, and keeps in braking state. - The rotor clutch is disengaged; - The side shields on both sides are available to stop at any position; - The folding function of conveyor is activated, and the conveyor is foldable; - Swing function of right rear chassis leg is activated.

16	Canopy lift and down		Three- way reset switch. Press upper switch canopy raising; press lower switch canopy descending; when release pressing, canopy stops raising or descending.
17	Conveyor fold and unfold		Three- way reset switch. This switch is only valid in service mode. The conveyor starts to be folded by pressing the lower position of switch (need to meet the requirement of the position switch logic of the folding cylinder), and it stops when released. And it starts to be extended by pressing the upper position (need to meet the requirement of the position switch logic of the folding cylinder), and it stops when released. The horn sounds every 2 second during the folding process to remind other people.
18	Conveyor Auto and Manu		Three- way Non-reset switch. The conveyor starts to operate manually by pressing the lower position of the switch, and the lower LED light is on; The conveyor starts to operate automatically by pressing the upper position of the switch, and the upper LED light is on; in this mode, planer is in low-speed working mode. Conveyor starts working when the FNR handle being pushed forward; when the handle is in neutral conveyor will be stopped delay (default set is 3 sec, it is adjustable between 0-6 sec. Adjust from display)
19	Water spray Auto and Manu		Three- way Non-reset switch. The water pump starts to work manually by pressing the lower position of the switch, and lower LED light is on; The water pump starts to work automatically by pressing the upper position of the switch, and upper LED light is on; In this mode, planer is in low-speed working mode. The water pump is switched on when the FNR handle being pushed forward, and it is switched off when the handle is in neutral or being pulled backward.

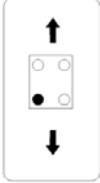
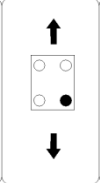
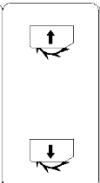
Ergo Control Box



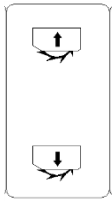
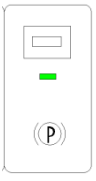
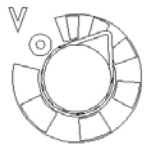
- 20 Conveyor handle switch
- 21 FNR handle
- 22 Right rear strut tower UP-DOWN
- 23 Left rear strut tower UP-DOWN
- 24 Milling drum
- 25 Left side plate UP-DOWN
- 26 Right side plate UP-DOWN
- 27 Travel drive mode
- 28 Parking brake
- 29 Horn
- 30 Work speed adjustment switch

Fig. Ergo Control Box

Pos.	Designation	Symbol	Function
20	Conveyor handle		<p>The conveyor moves downward by pushing the handle forward; it moves upward by pulling the handle backward; it moves to the left by pushing the handle towards the left; and it moves to the right by pushing the handle towards the right.</p> <p>The conveyor speed is increased by rotating the ball handle clockwise; and it is decreased by rotating the ball handle counterclockwise.</p> <p>Press it to sound the horn.</p>
21	FNR handle		<p>The planer moves forward by pushing the FNR handle forward, and it moves backwards by pulling the handle backward.</p> <p>The planer is in braking state when it is in neutral.</p> <p>Vehicle speed is proportional to the pushing angle of FNR handle.</p>

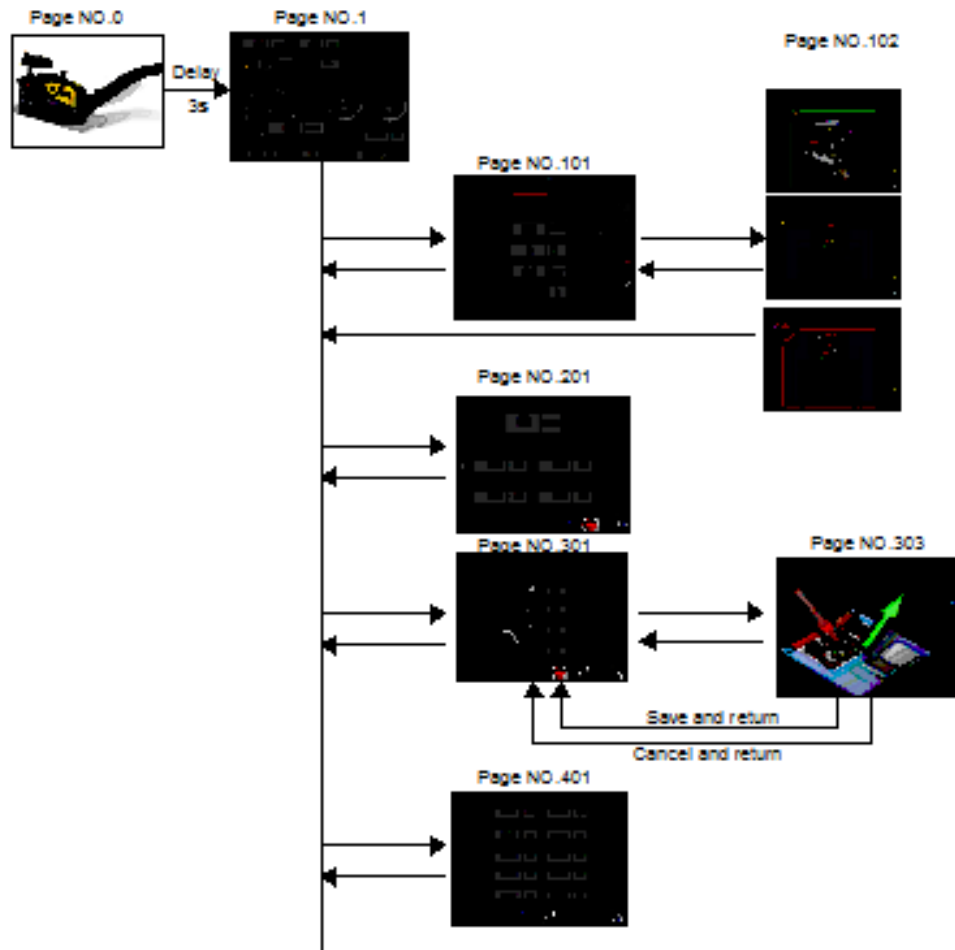
22	Left rear strut tower UP-DOWN		<p>While the upper position of switch is being pressed, the left rear strut tower is extended and the body of vehicle is raised until it reaches its upper limit position;</p> <p>While the lower position of switch is being pressed, the left rear strut tower is retracted and the body of vehicle is lowered until it reaches its lower limit position.</p>
23	Right rear strut tower UP-DOWN		<p>While the upper position of switch is being pressed, the right rear strut tower is extended and the body of vehicle is raised until it reaches its upper limit position;</p> <p>While the lower position of switch is being pressed, the right rear strut tower is retracted and the body of vehicle is lowered until it reaches its lower limit position.</p>
24	Milling drum		<p>Press upper button of the switch, milling drum starts rotating, green LED lights on; press the lower button milling drum stops rotating.</p> <p>Milling drum could only work when planer is not moving.</p> <p>After activating the button, engine rotating speed automatically achieve to 900rpm, milling drum starts to work. By this time, throttle potentiometer is invalid if less than 900rpm. Press the button when throttle is more than 900rpm, system will automatically reducing to 900rpm, and activate milling drum. Then 6 sec later, throttle automatically switch back to original rotating speed.</p> <p>Scraper close, safety signal on, planer work;</p> <p>Scraper open, safety signal off, warning icons show on the display.</p> <p>When moving backwards: Scraper raised to activate B3, milling drum stops.</p>
25	Left side plate UP-DOWN		<p>The left side plate is raised by pressing the upper part of the switch, and the upper LED light is on. The leveling system is on standby state, without any output.</p> <p>It is lowered by pressing the lower position of the switch and the LED light indicates activation.</p>

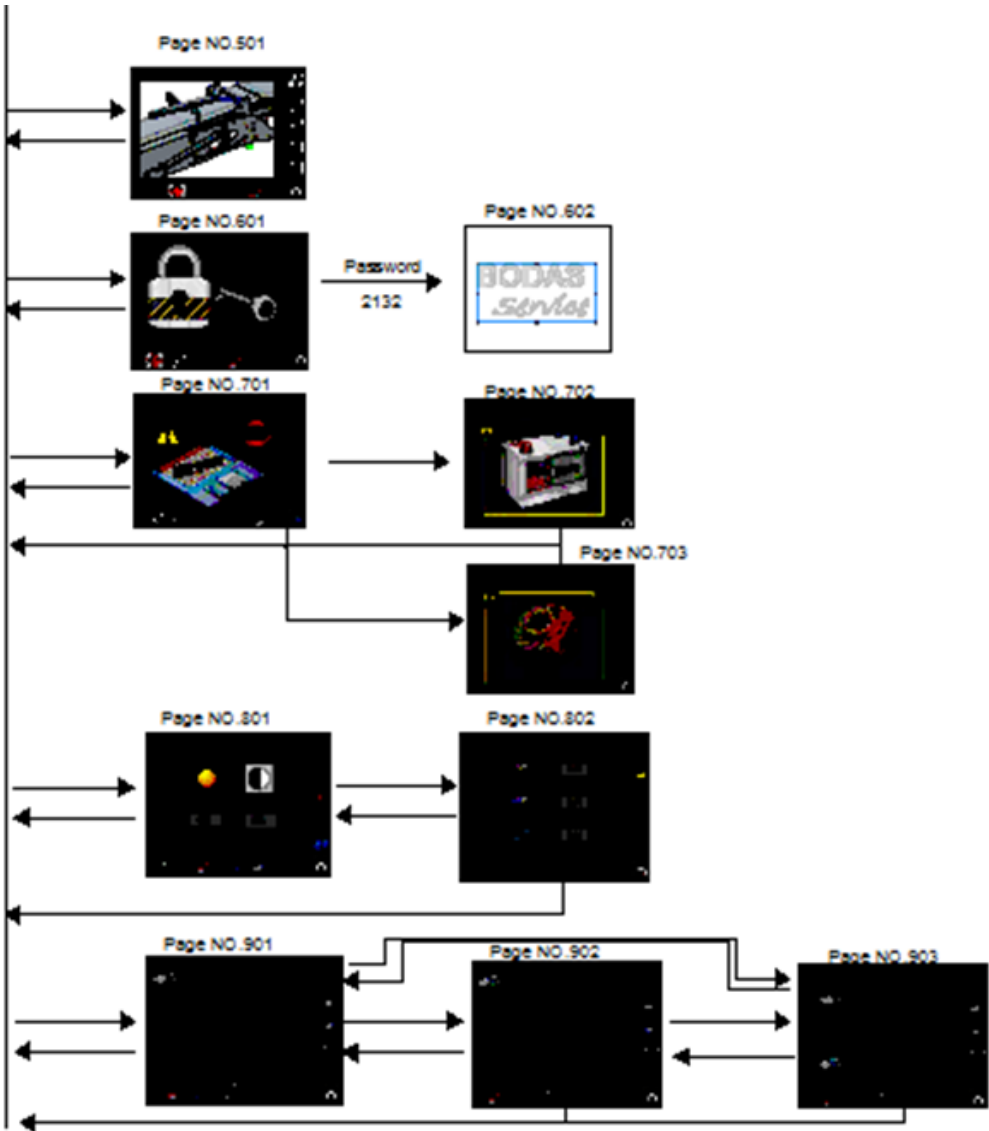
Machine description

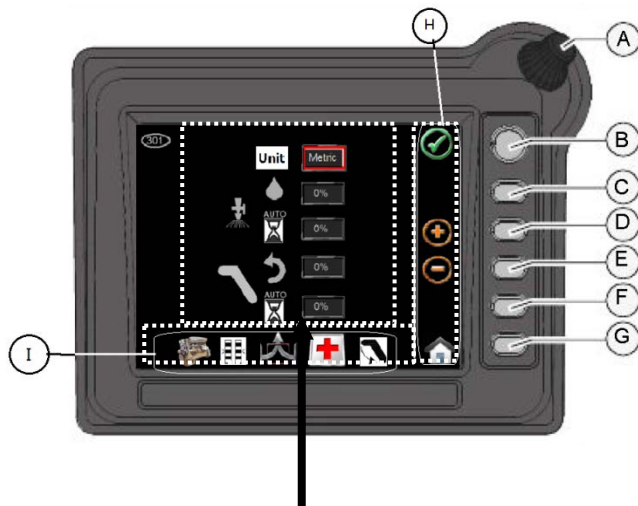
26	Right side plate UP-DOWN		<p>The right side shield is raised by pressing the upper part of the switch, and the upper LED light is on. The leveling system is on standby state, without any output.</p> <p>The right side shield is declined by pressing the lower part of the switch, and the lower LED light is on.</p>
27	Travel drive mode		<p>Press the upper button to activate fast mode (hare), LED light on.</p> <p>Under this mode, milling drum switch is not available; milling drum could not be started.</p> <p>When the switch is in neutral position, the lower speed (tortoise) mode is on, two LED lights are off. System defaults working mode (tortoise) after ignition.</p> <p>After pressing the lower button, machine starts flow divide mode, the lower LED light on. At this moment, propulsion motor is in lower speed mode and flow-split valve is activated.</p>
28	Parking brake		<p>The travelling system of planer is braked by pressing the upper part of switch and the upper LED light is on.</p> <p>The planer cannot be moved under this mode.</p> <p>The planer can be started only when it is in the braking mode.</p> <p>Release the lock mode and press the lower button then deactivate the brake mode, LED lights off. Then planer could start moving.</p>
29	Horn		<p>The horn sounds when the switch is pressed, and stops when it is released.</p>
30	Work speed adjustment switch		<p>Adjust the maximum travelling speed in the working mode (turtle). The set travelling speed in m/min or feet/min is indicated in the display.</p>

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 (see the CAD drawing attached).







Display: Show the information details of the selected "Action" through **Action Menu** by pressing **button B**

Input and operation of display

Rotate encoder A to switch different menu screen, the items in the menu adjacent to the current one are indicated in **Action Menu "I"**.

Press Button B-G to execute functions indicated in **Action list "H"**.

Action menu is including the following items:

- Main
- Engine information
- Engine warning
- Leveling
- Adjustment
- Electrical screen
- Hydraulic
- Fan information
- Calibration
- Warning screen
- System information

Press Button B-G to execute functions indicated in **Action list**.

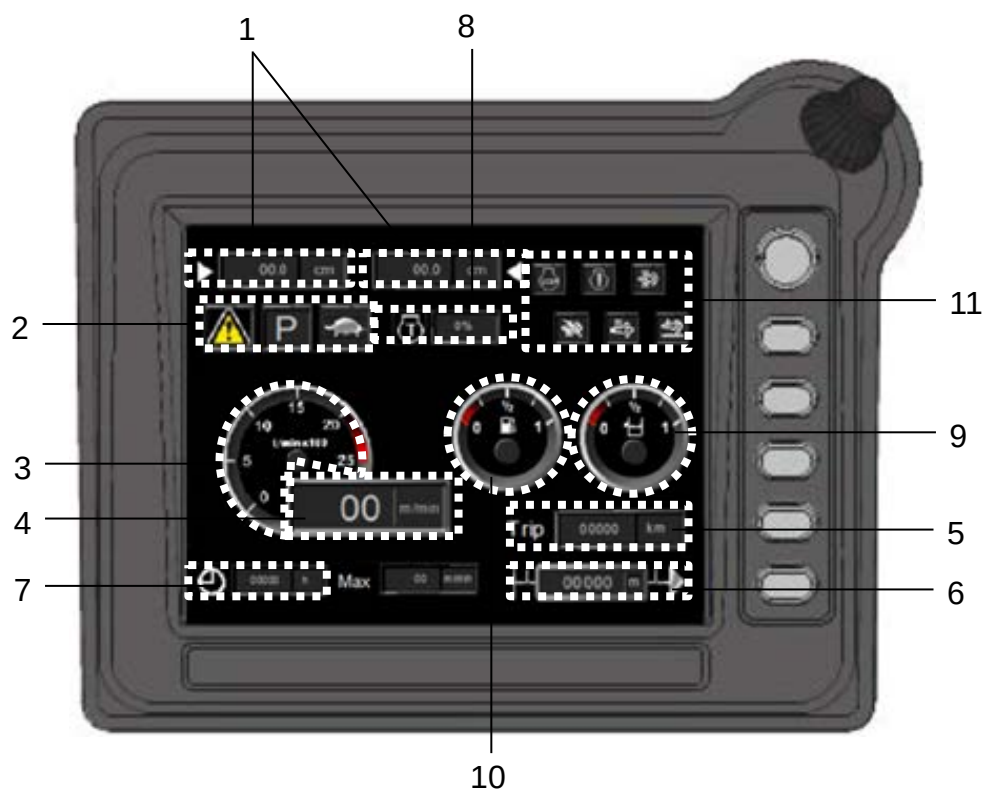


Welcome screen

The system gets electricity once the key switch is turned on. Welcome screen appears in the display, and then the main screen is showed 3 seconds later, meanwhile, all LEDs on the control table are lighted for 3 seconds, the state of vehicle is indicated normally.

Main screen-information and warning messages (Page 1)

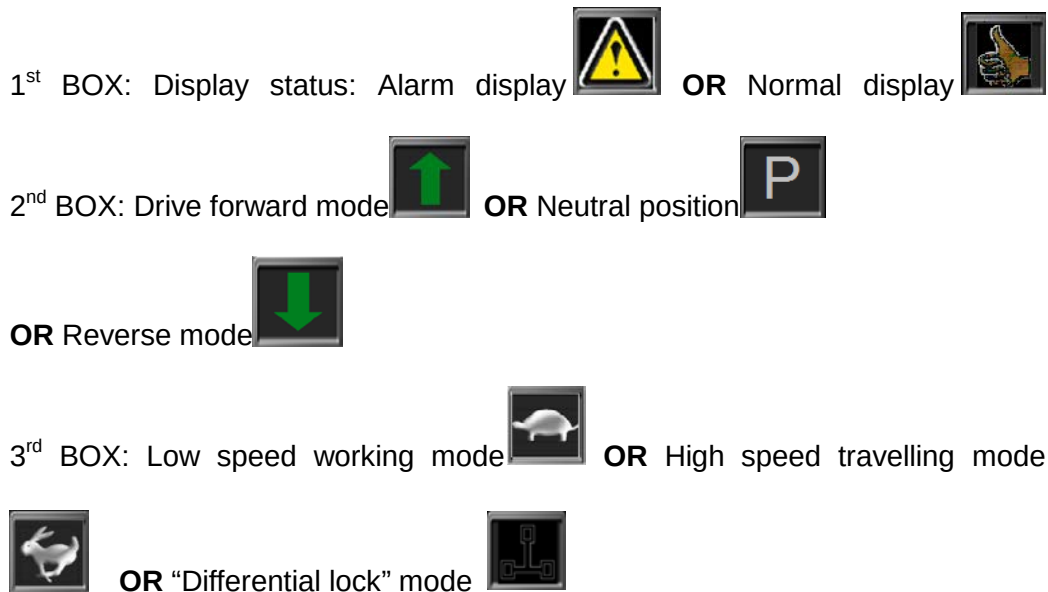
Following the welcome screen, the system enters into the main screen automatically in three seconds later.



The main screen includes the following main parameters:

1. The actual milling depth of the left and right side are shown in the upper area of display, with the unit of cm (inch in British system), resolution ratio of 0.1cm and measuring range of 99.9cm.

2. The system alarm, travelling direction and high/low speed are displayed respectively in three indication box.



3. The engine speed is shown on the left side of display, with the unit of rpm

4. The actual travelling speed is shown on the right of the tachometer, with the measuring range of 99, and unit of m/min (feet in British system). The maximum setting speed is displayed under the meter of actual travelling speed, with the unit of m/min (feet in British system). When the planer is in high speed travelling state (hare), the unit is in km/h (mile in British system), and the maximum speed will not be indicated in the display (neither in the indicator).

5. The total distance travelled by the machine since delivery is indicated at bottom right of the display (the value, with the unit of km, cannot be reset to zero), and the measuring range is 99999, recalculate from 0 when it overflows.

6. The traveled distance travelled in milling mode is shown below the total mileage (reset is allowable, and recalculate when it cleared to zero). Callout the key screen, press Button G for more than 3 seconds and then reset the mileage. And it is recorded only when the planer is in low speed working mode (turtle), the milling drum is turned on and the automatic state is valid. The measuring rang is 99999, and recalculate from 0 after it overflows.

7. The working hours of engine is shown below the tachometer. The measuring range is 99999, and recalculate from 0 when it overflows.

8. The actual torque load of engine is showed in percentage.

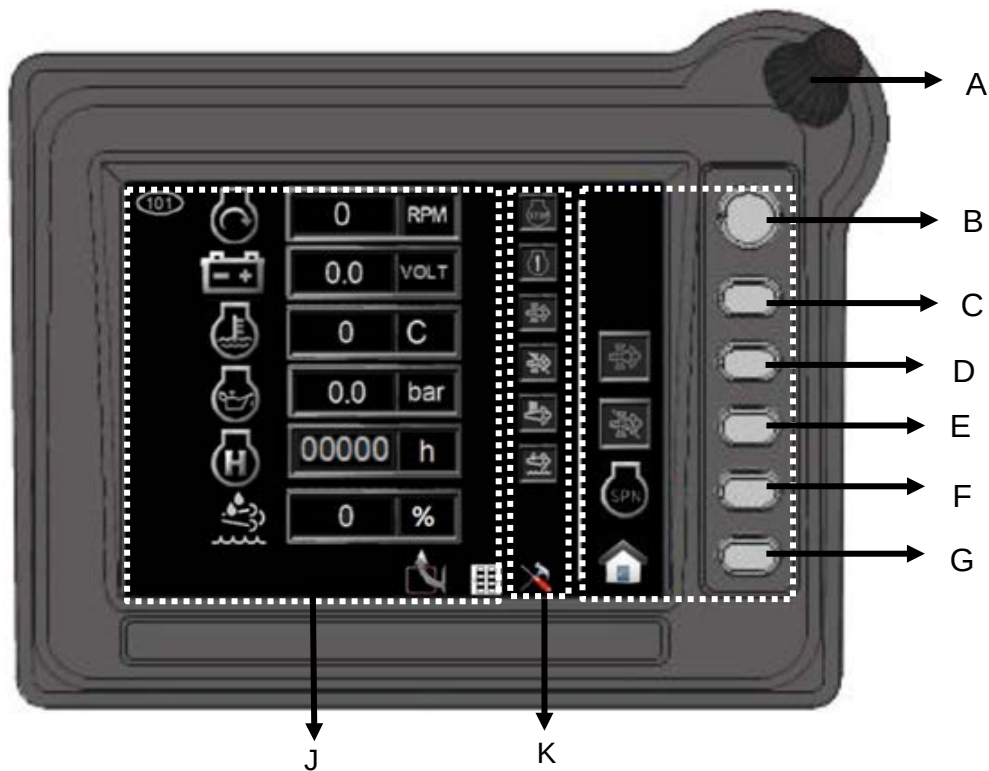
Machine description

9. The level of water tank is indicated in the display.
10. The level of diesel oil is indicated in the display.
11. The engine alarm information is shown at the right corner of display.

Mainly Includes:

Engine fault light		Light effect	
Engine alarm light		Light effect	
Engine regeneration		Light effect	
Engine regeneration prohibition		Light effect	
High post-processing temperature of engine		Light effect	
Low DEF liquid level of engine		Light effect	

Engine Information Screen (Page 101)



- A. Encoder, rotate A to switch to different screen.
- B. Action selection
- D. Press Button C, the post-processing of engine is enforced to regenerate, which is stopped by releasing the button. **For T4f engine ONLY.**
- E. The post processing of engine is prohibited to regenerate and kept in this state until the button is pressed again to cancel regeneration prohibition. **For T4f engine ONLY.** (The state of switch is saved when the power is cut off)
- F. To enter the engine alarming page.
- G. Back to Home page (Main interface).
- J. Information that appear on the screen, including:
 - Real-time rotating speed (rpm)
 - Power voltage (v)
 - Water temperature (°C)
 - Oil pressure (bar)
 - Working hours (h)
 - Liquid level of post-processing urea box
 - The engine's value and parameters displayed in this screen are comes from J1939.
- K. Alarm → Symbol message refer to main screen. Six alarm light signals are displayed in this screen, with the same state as home page.



Engine warning Screen (Page 102)

This screen is used for displaying the engine SPN fault code.

This screen has 3 different states:

1st state: Green interface – The display shows “ENGINE OK”, which indicates no fault code.



2nd state: Yellow interface - The display shows “ENGINE WARNING!”, which indicates that the engine goes wrong. The temporary operation function of the machine can be executed. This issue is required to be addressed as soon as possible to prevent further damage.



3rd state: Red interface - The display shows “STOP ENGINE”, which indicates that the malfunction of the guide engine has reached to the extent of automatically shutting down, or stop engine to prevent from further damage.

Press button B to see the next fault code.
Press button G to return to the main screen.

Fig. Engine warning screen

- **SPN+FMI: Fault code**
- **OC: Frequency**

The fault conditions can be determined by explanation of a number of alarm codes contained in the alarm information screen

See appendix 1 for specific SPN fault code.

Leveling, setting leveling value (Page 201)



The setting value and actual measured value of leveling system are displayed in this screen.

The actual travelling speed of planer is displayed at the upper position of the screen.

1. ► Indicates actual measured value of leveling system

2.  Indicates setting value of leveling system

3.  Indicates the height of two rear strut towers

4. Action menu, corresponding button on the display (3) which controls selecting each action.

Press Button B  to change the value from left to right.

The setting depth of left side is increased by 0.1cm at each time of pressing of Button D , and it is decreased by 0.1cm at each time of pressing Button E . Press and hold for continuous change.

Inputting focus (red frame) switches to the left or right by pressing Button B  at each time.

Machine description

Press Button C  to switch slope mode located at the same side of inputting point (in red frame), **gray means turn off**, and **green means activation** (when the slope mode is activated in one side, the other side is automatically shut down). The display of depth is in percentage when the above-mentioned mode is in activation.

Press Button F  and hold for 3 seconds, the height of both left and right strut tower are set in zero position (and also the zero value is stored).

Press Button G  to return to the main interface.



Adjustment Screen (Page 301)

The following data can be set in this screen:

1. Button on the display. Select corresponding button for each specific action.
2. Action menu, corresponding button on the display (1) which controls selecting each action.
 - Unit of display data (metric or British system)
 - Water pump jet capacity, automatic stop and delay
 - Max. Rotating speed of conveyor, automatic stop and delay
 - Scraper pressure
 - Deducting motor speed (in percentage)
 - Other parameters

Red frame indicate the current setting point.

Press Button B , and the inputting point (in red frame) switches in turn.

Press Button D  or E  to change data.

When the parameter is changed, press button F  to write it in and then enter into the confirmation page.



(Page 303)

Press button C  in this interface, and the system will write previously set parameter, press button F  to discard changes and return to page 301.



Electrical Screen (Page 401)

This screen indicates potentiometer voltage for Max. Working speed and for the engine rotating speed (mV);
 Potentiometer dual voltage of control lever for travel drive in the ergo control box (mV);
 Potentiometer dual voltage of control lever for three strut towers in the control table (mV);

Press Button G  to return to the main screen.

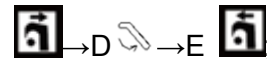


Conveyor folding screen (Page 501)

When pressing Button B  in this screen, the lamplet next to the icon goes red (it is in gray when entering the page every time), and the manually folding function of conveyor is activated.

After activating button B :

To manually fold conveyor, press button F



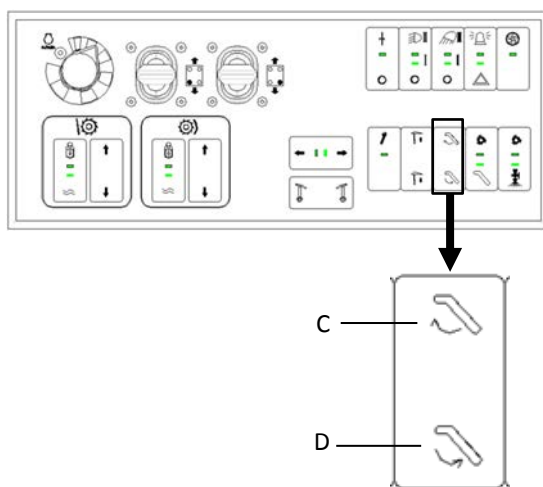
To manually unfold conveyor, press button



(C: unfold; D: fold; E: hook; F: release)

The two indicator lights in the cylinder corresponds to the sensors in the relevant position, green represents connected, gray represents disconnected.

Press Button G to return to the main screen.



(Page 601)

To enter this screen, password is required.

No change in the page if the password is wrong, press Button G  to return to the main screen.

Shift into the calibration screen (BODAS Service) if the password is right.

Parameter setting of BODAS Service requires password protection. Look only on the parameters, no password necessary.



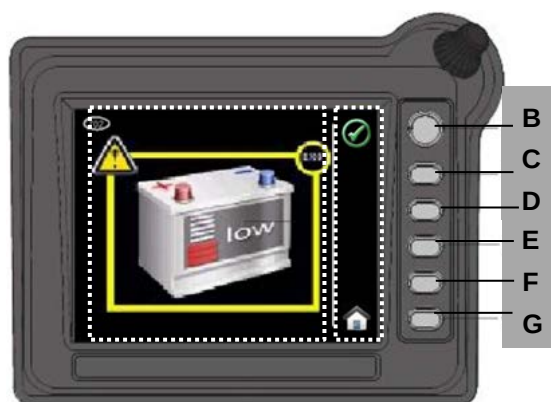
Warning Screen (page 701)

Press Button C  to check current fault, press Button E  to check non-current fault, and press Button G to return to the main screen.

Press Button C  under page 701 to enter into the current fault warning screen.

(Page 702)

The current system alarm is showed in sequence automatically after entering this interface.



Press Button B , the next alarm shows automatically; press Button G to return to the main screen.

Press Button B  See appendix for specific warning information.

Press button E  under Page 701 to enter into the non-current fault warning screen.

(Page 703)

The previously appeared and stored warning information shows in sequence automatically after entering this interface.

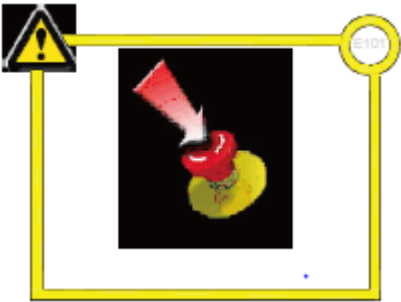


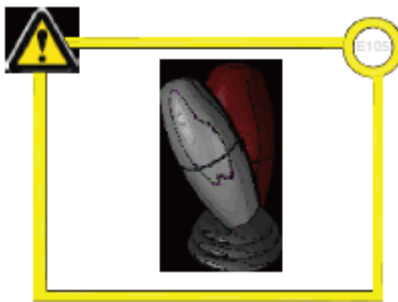
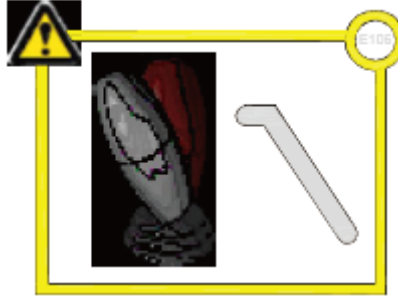
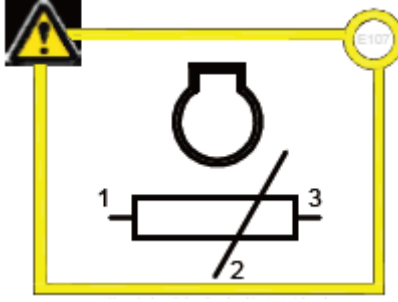
Press Button B , the next alarm shows automatically; press Button F  to clear all stored warning information.

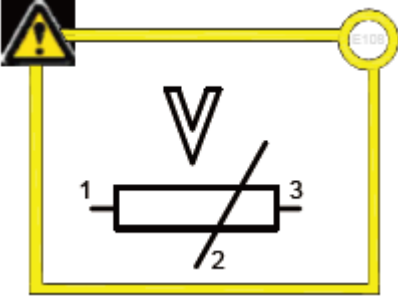
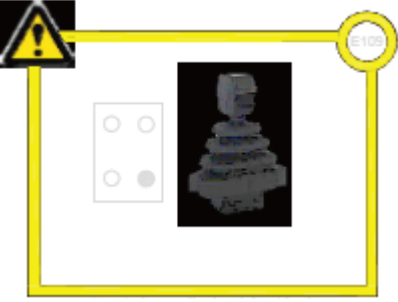
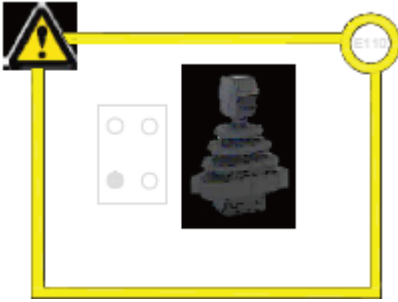
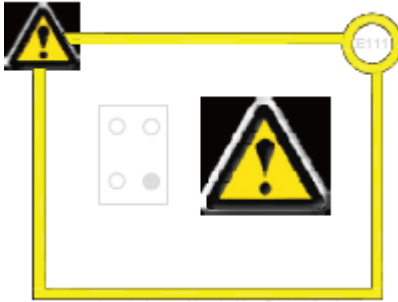
Press Button G  to return to the main screen.

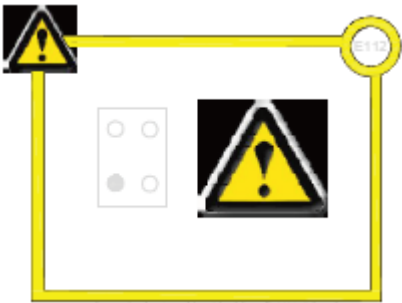
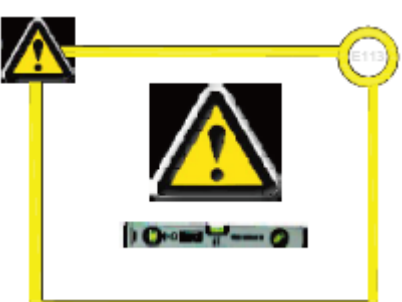
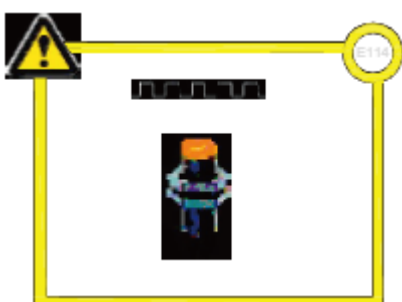
Description of error codes (of page 703), dialog boxes

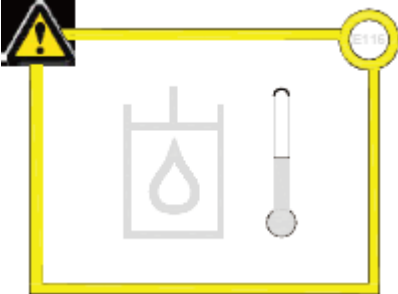
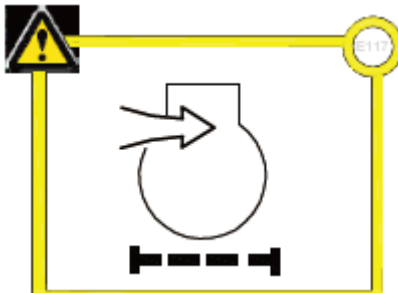
Every fault message has its own error code number. When contacting technical service, specify the error code number and other information from the fault message.

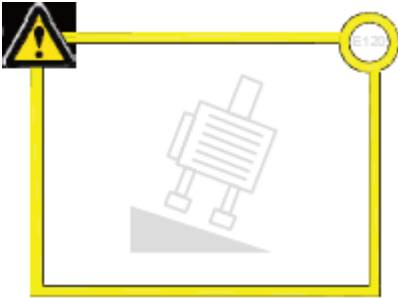
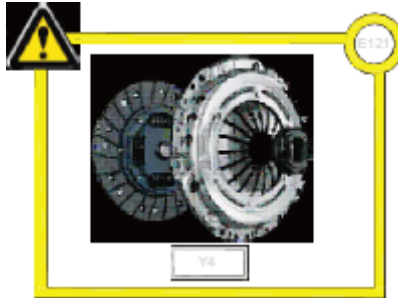
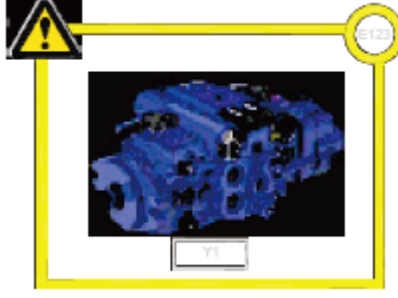
Indication	Error code	Significance
	E101	Emergency stop button on the control table is activated
	E102	Low battery voltage
	E103	CAN communication fault

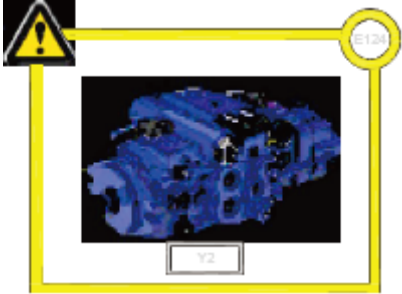
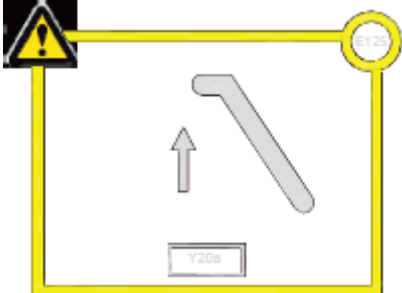
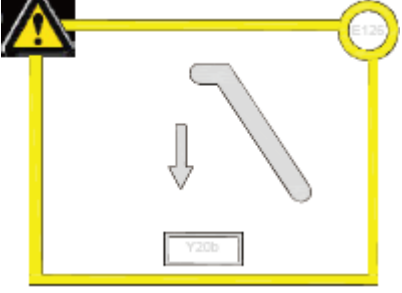
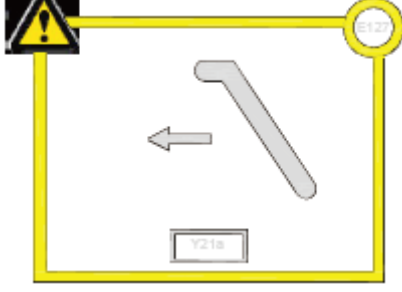
	E104	Fault in leveling system
	E105	Fault on control lever for travel drive
	E106	Fault on control lever for conveyor
	E107	Fault in potentiometer for engine speed

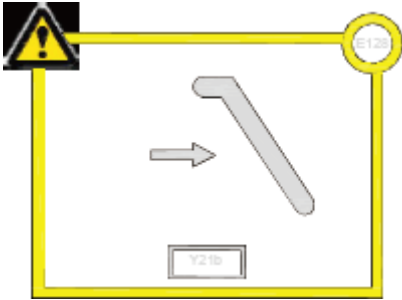
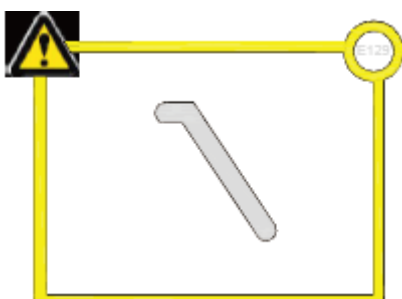
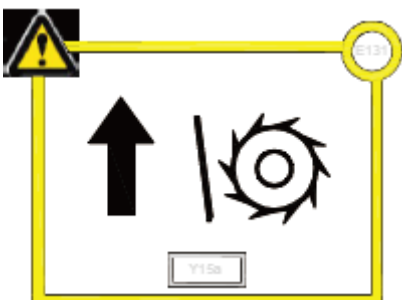
	E108	Fault in potentiometer for travel speed
	E109	Fault on control lever for rear right leg
	E110	Fault on control lever for rear left leg
	E111	Fault on position sensor for rear right leg

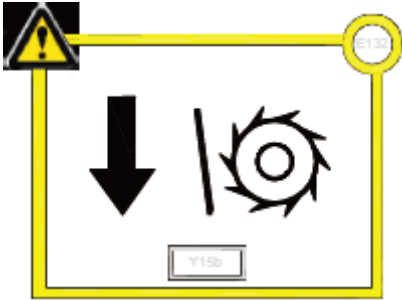
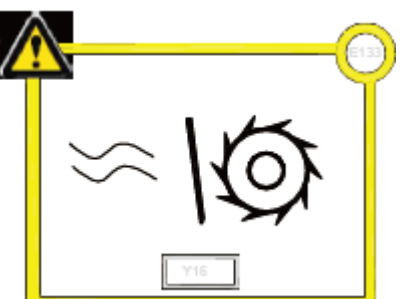
	E112	Fault on position sensor for rear left leg
	E113	Fault on tilt sensor
	E114	Fault on sensor for engine speed
	E115	Fault on sensor for diesel oil level

	E116	Hydraulic oil temperature too high
	E117	Warning, air filter
	E118	Hydraulic oil filter clogging
	E119	Warning, low water level

	E120	Warning, too big inclination angle of planer
	E121	Solenoid valve fault, milling drum drive clutch
	E122	Brake solenoid valve fault, propulsion system
	E123	Proportional valve fault, front propulsion pump

	E124	Tool big inclination angle of planer
	E125	Solenoid valve fault, conveyor lift
	E126	Solenoid valve fault, conveyor descend
	E127	Solenoid valve fault, conveyor swing to the left

	E128	Solenoid valve fault, conveyor swing to the right
	E129	Conveyor fault
	E130	Calibration data hasn't been confirmed or implemented.
	E131	Solenoid valve fault, rear scraper lift

	E132	Solenoid valve fault, rear scraper descend
	E133	Solenoid valve fault, rear scraper float
	E134	A1 controller fault
	E135	A2 controller fault



Display set-up and system information screen (Page 801)

Under the main screen, press F8 to enter this page.

Brightness and contrast set.

Each display can only be set its own brightness and contrast.

Press button D  to increase brightness by 5%, and press Button E  to reduce it by 5%.

Press Button B  to switch to contrast, with the same step size as 5%.

In this screen, press Button F  to enter into the system information page, and press Button G  to return to the main interface.



(Page 802)

Under page 801, press Button F  to enter into the system information interface.

This page indicates the version number of three controllers, two displays and control tables on both left and right side in the electronic control system.

Under this page, press Button C  to return to page 801, and press Button G

 to return to the main interface.

Electrical system

The electrical control system is protected by 45 fuses and 26 relays.

The exact number depends on how much extra equipment the machine has.

The fuse box and relays are placed in the DC BOX.

The machine is equipped with a 24V electrical system and an DC alternator.



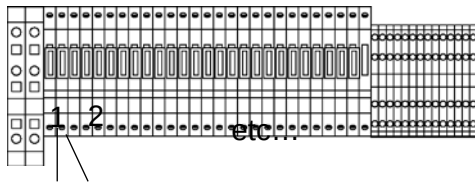
Fig. Engine compartment, positioning of main fuses.

Main Fuses

There are four main fuses, Installed in the right frame below the space before the milling drum.

F1.1 Main fuse	50A
F1.2 Starter motor	30A
F1.3 Preheating	100A
F1.4 Main fuse, alternator	100A

Machine description



Fuses, machine

The figure shows the different positions of the fuses. The table below gives the amperage and function of the fuses. All fuses are flat pin fuses.

Fuses boxes

F1.1	Main fuse	50A	F4.5	Water pump fuse	10A
F1.2	Intake air fuse	100A	F4.6	Rear right wheel swing	10A
F1.3	Motor start fuse	100A	F5.1	Display	10A
F2.1	Ignition switch	10A	F5.3	Leveling system	10A
F2.2	Power supply	50A	F5.4	Slope sensor	5A
F2.3	Engine ECU Power	30A	F6.1	Turning lamp	10A
F2.4	Emergency switch	5A	F6.2	Width lamp	10A
F2.5	DEF supply module heater relay	15A	F6.3	Travel lamp	15A
F2.6	DEF line heater relay	15A	F6.4	Beacon lamp	10A
F2.7	DEF power	10A	F6.5	Working lamp switch	5A
F2.8	DEF relay	5A	F6.6	Working lamp	30A
F3.1	Controller A1	5A	F6.7	Back up alarm	10A
F3.2	Controller A1	30A	F6.8	Conveyor horn	10A
F3.3	Controller A1 Ignition	5A	F6.9	Horn	10A
F3.4	Main console switch	10A	F7.1	Brake lamp	10A
F3.5	Sensor fuse	10A	F7.3	Dust motor	10A
F3.6	Sensor fuse	5A	F7.4	Roof lifter	10A
F3.7	Handrest box switch	10A	F7.5	GPS	5A

F4.1	Controller A2	5A	F7.6	Camera	10A
F4.2	Controller A2	30A	F7.7	24-12VDC	10A
F4.3	Controller A2 Ignition	5A	F7.8	Truck traffic light	10A
F4.4	Sensor fuse	5A	F7.9	Icebox	10A
K0	Start relay		K17	Water lamp relay	
K1	Start command relay		K18	Turning flash relay	
K2	Intake air relay		K19	Travel lamp relay	
K3	Power supply relay		K20	Working lamp relay	
K5	Dust motor relay		K21	Left leveling auto/manual relay	
K8	Right side shield lift alarm flash relay		K22	Left leveling auto/manual relay	
K9	Start lockout relay		K23	Right leveling auto/manual relay	
K10	DEF supply module heater relay		K24	Right leveling auto/manual relay	
K11	DEF line heater relay		K25	Left leveling GND relay	
K12	DEF line heater relay		K26	Right leveling GND relay	
K13	DEF line heater relay		K31	Conveyor horn relay	
K15	Brake lamp relay		K32	Horn relay	
K16	Back up alarm relay		K33	Back up alarm relay	

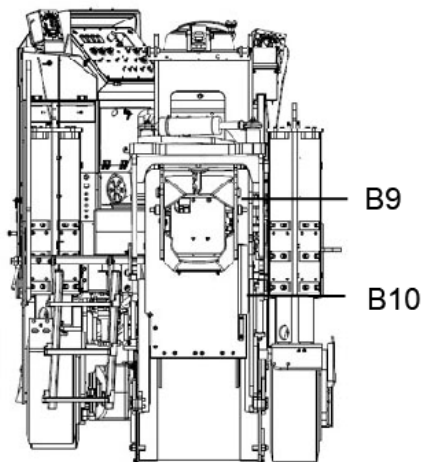


Fig. Machine from back, sensor B9 and B10

Functional description

Safety sensors- scraper

As a safety precaution, there are 2 sensors (inductive sensors) at the rear by the scraper, B9 and B10. If one of the sensors is activated by the rear scraper (or by some other metal), the circuit is broken.

Scraper lock – B9

If sensor B9 is activated, it's not possible to move the planer in forward or reverse direction. You can't engage the clutch for the milling drum.

Milling safety – B10

If the scraper is raised and activates sensor B10 during milling, the milling drum stops automatically as soon as the machine is reversed.

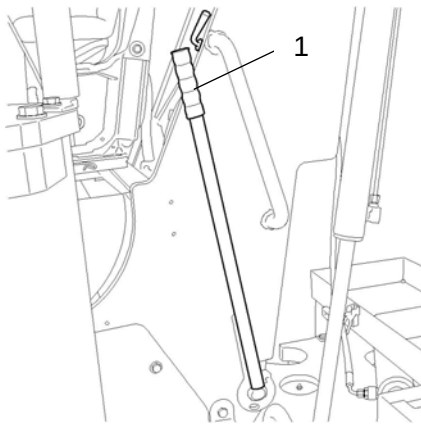


Fig. Locking device, scraper

1. Lock handle

Locking device, scraper

As a safety precaution during maintenance on the milling drum or milling housing, the scraper can be locked automatically in its upper position.

The lock handle is located just to one side behind the driver seat.

To release the catch:

- Press the lock handle to its front position and then lower down the scraper.



Make sure before working that the scraper is secured in its upper position!



Locking pin

Locking pin, ladder

As a safety precaution during operation or maintenance below the ladder. The ladder can be locked in its upper position and prevent it fall down by gravity.

To release the catch:

- Hold the ladder by one hand, release the locking pin by another hand and then lower the ladder.



Make sure before working under the ladder that the ladder is secured in its upper position!



Fig. Working light

Working lights

There are a number of 24 volt placed around the vehicle frame for working lights.

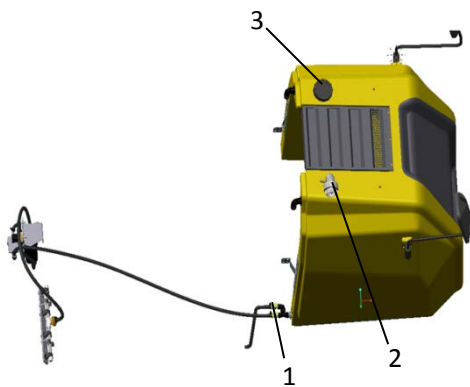


Fig. Water tank

- 1. **Ball valve**
- 2. **Coupling**
- 3. **Tank cap**

Emptying/Filling water tank

Emptying:

- Wring the ball valve (1) and allow all the water to run out. Close the ball valve afterwards.

Filling takes place via the filler cap (3). Alternatively, filling can be done via a pressure hose.

- Connect the pressure hose to the coupling (2) and tighten.
- Open the filler cap (3) for better ventilation.

Start filling.

The water level in the tank is shown in the level indicator from display.



Fig. Panel protection

Panel protection

There is a vandalism protection on each drive panel. Close and lock after finishing work.



Fig. Milling housing
1. Slide plate

Hydraulic front plate - Milling housing

The hydraulic front plate is located on the milling housing and is operated from the main control panel.

The front plate prevents the spreading of milled material.

When the front plate is set in the "floating" position on the main control panel, the slide plate (1) follows irregularities in the ground and thereby controls the front plate.

Floating mode is recommended when milling.

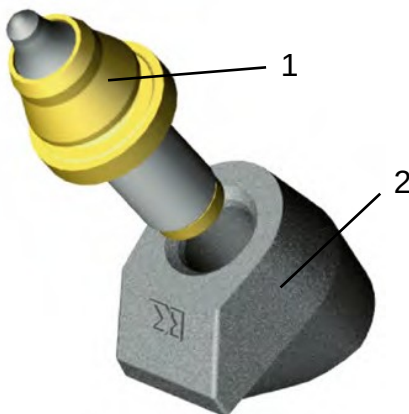


Fig. Quick coupling system
1. Bits
2. Tool holder

Bits - Tool holder

System: C10HD

The double action quick coupling system C10HD consists of:

1. Bits
2. Tool holder

Typical wear marks on tool holder

	New, unused tool holder
	Heavy wear on the tool contact surfaces or wear ring - replace immediately
	Heavy wear on the tool contact surfaces or wear ring - replace immediately
	Heavy wear on sides, replace immediately

Typical wear marks on bits

The condition of bits, wear rings and tooth holders should be checked several times a day. Replace immediately if there are visible signs of wear or damage.

	New, unused milling bit
	Worn milling bit, replace immediately
	Eroded milling bit, replace immediately
	One-side worn milling bit, replace immediately
	Worn milling bit, replace immediately
	Broken milling bit, replace immediately
	Broken milling bit, replace immediately

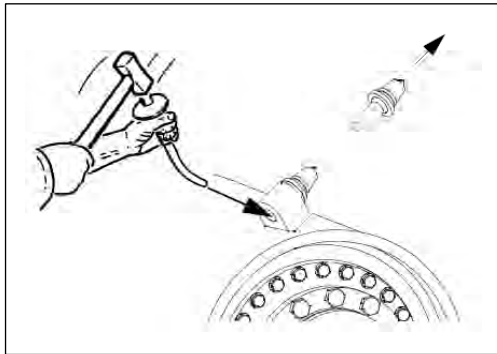


Fig. Removing bits

Bits - Checking - Fitting/Removing

The condition of the bits should be checked several times a day. Replace immediately if there are visible signs of wear, unusual vibrations during milling or other damage.

Removing of damaged or worn bit.

Place the hammer punch in the hole on the back of the tool holder and knock out the bit with a hammer.

Clean the holes and contact surfaces before fitting new teeth!

Fitting new bit:

- Knock the new bits in the tool holders with a hammer.

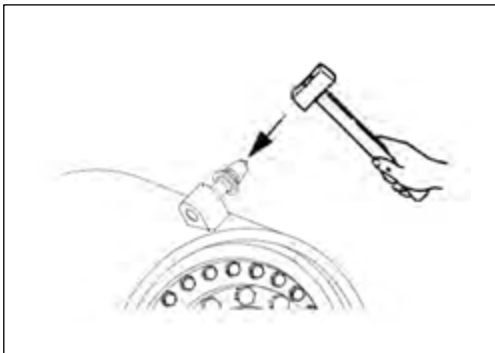


Fig. Fitting bits



***Use copper, brass or plastic hammers!
Steel hammers can damage the tip of the bits!***

Make sure after fitting that the bits can rotate and is not jammed = less wear on tool

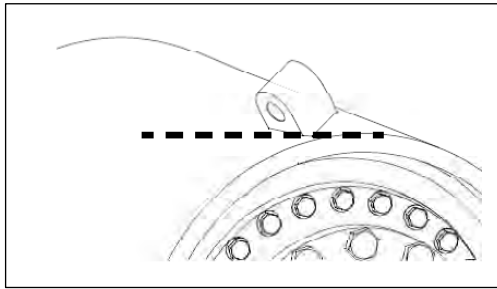


Fig. Cut defective tool holder

Tool holder - Checking/Replacing

The tool holders are only replaced when they are defective.

- Remove the defective holder. Carefully clean the contact surface.
- Place the new holder, with inserted bits, on the drum and weld on.

Make sure the tip of the bit is on the same position as before.

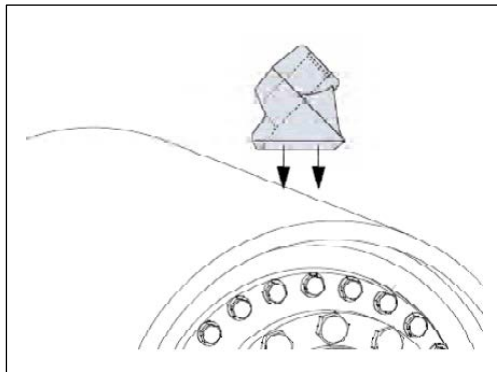


Fig. Position new tooth holder

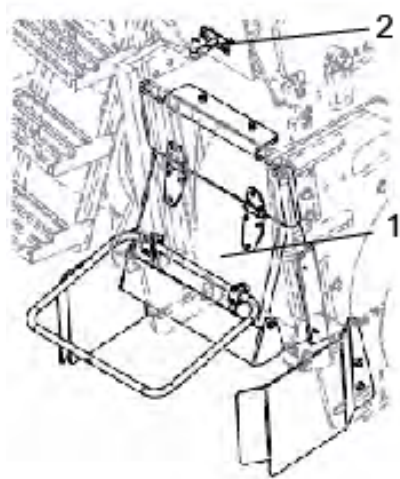


Fig. Milling housing

- 1. Rear opening door**
- 2. Mounting**

Rear door – Milling housing

This option can only be installed if the machine is not equipped with a conveyor belt.

Instead of the scraper's entire unit, the machine can be equipped with a rear opening door (1). This door is hinged, and during servicing can be opened and hooked in place on a mounting (2).

The door prevents the spreading of milled material..

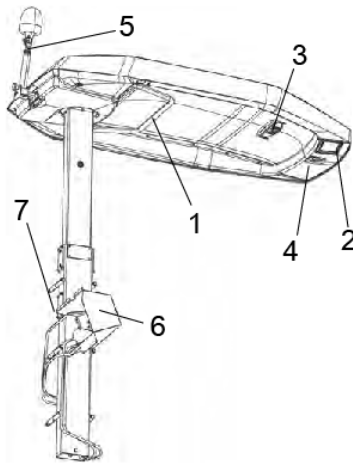


Fig. Roof

- 1.Handle, sideways movement
- 2.Welcome lamp 3.Reading light
- 4.Hook 5. Rotation beacon
- 6.Power pack
- 7.Lever, emergency raising of roof

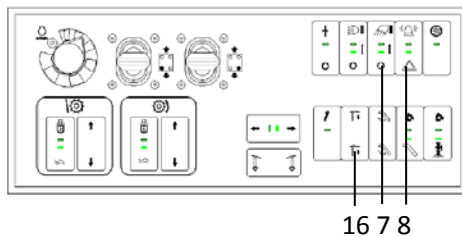


Fig. Control panel

- 7. Working lamp
- 8. Warning light and beacon
- 16. Canopy lift and down

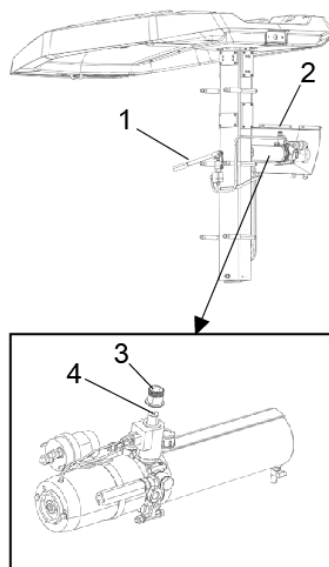


Fig. Roof

- 1. Lever, manual 2. Protection, power pack
- 2. Cap, solenoid 4. Valve

Roof (option)

The roof has two adjustment options, vertical and horizontal:

Press up the handle (1) and push the roof manually to the required position. When the handle is released, the roof is locked in its current position.

Raise/lower the roof with button (8) on the main control panel.



Observe the risk of crushing injuries when folding the roof up/down.

- Welcome lamp (2) are lit with button (7) on the main control panel. Welcome lamp could be lit for 20 sec by switch on the Master switch, then turn off automatically. When turn off the ignition key the welcome lamp could be lit for 20 sec then turn off automatically.
- The reading light (3) is lit at the lamp. 3 positions: Off/on/map lighting.
- Hook (4), used during transport to secure the roof in the lowered position.
- Rotating beacon (5). Started on the main control panel (8)
- Power pack (2)
- Lever (7). Manually raising of roof.

Raise/lower the roof manually

If required the roof can manually be raised/lowered with switch (16).

Raise the roof manually:

- By manually pumping the lever (1), the roof will raise.

Lower the roof manually:

- Unscrew protection for power pack (2).
- Unscrew the solenoid cap (3).
- Use a screwdriver to push the valve (4) down and keep it in position while pumping the lever (1) at the same time, the roof will lower.
- Refit the solenoid cap and the protection for power pack after use.

See switch function description from “**Machine description**” chapter.

Operation

Before starting

Checks before starting

Before starting the diesel engine:

- Remember to carry out daily maintenance. See the maintenance instructions.
- Walk round the machine and check that there is no visible damage or leakage.
- Check the safety and protection devices.

Master switch – Switching on

Remember to carry out daily maintenance. Refer to the maintenance instructions.

The battery disconnecter is placed behind the driver seat. Turn the key to the On position. The planer is now supplied with power.

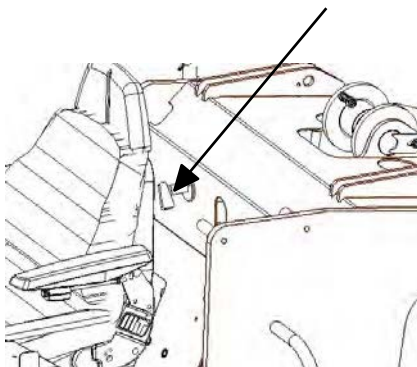


Fig. Battery disconnecter

Operator's seat – Adjustment

Adjust the operator's seat so that the position is comfortable and so that the controls are within easy reach.

The seat can be adjusted as follows.

- Length adjustment (1).
- Side adjustment (2).
- Weight adjustment (3).
- Backrest adjustment (4).

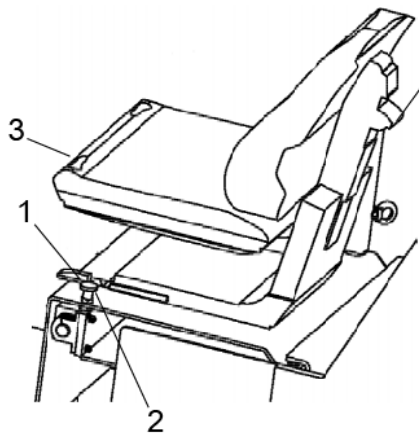


Fig. Driver seat

1. Lock lever - Length adjustment
2. Lock screw - Side adjustment
3. Weight adjustment
4. Backrest lifting



Always make sure that the seat is secure before beginning operation.



Fig. Panel protection

Take away the panel protection

Take away the panel protection on the panel before starting.

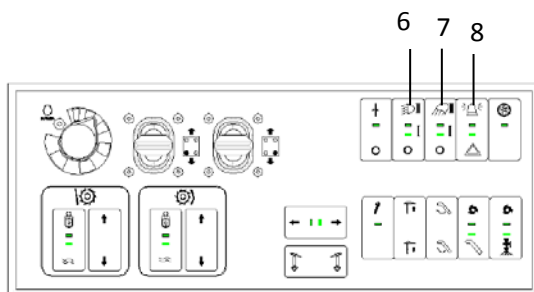


Fig. Main control

Instrument and lamp checks

Turn the ignition key to position ON, and check the warning lamps.

Check that the lighting switch (6), working light (7) and beacon switch (6), working light (7) and beacon switch (8) work.

For more lamp function description of 6,7,8, see page 31.



Fig. Dialog box101

1. Working hours, display

Checking the working hours

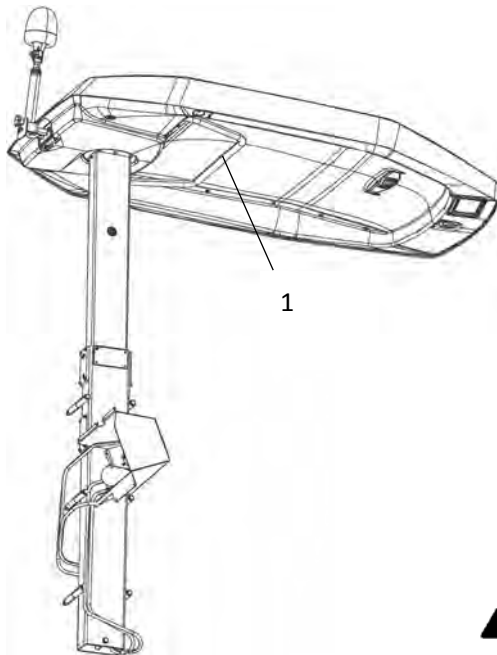
Check the number of working hours (1) to see if additional maintenance is necessary.

See switch function description from "Machine description" chapter.



View

Before starting, make sure that the view forwards and backwards is unobstructed.



Roof adjustment (Option)

The roof has two adjustments, vertically and horizontally.

Sideways movement can be performed by pressing up the handle (1) and manually pushing the roof to the required position. When the handle is released, the roof is locked in its current position.

Raise/lower the roof with the button on the main control panel.



***Risk of crushing injuries
when raising/lowering the roof.***

Fig. Roof

2. Lever, sideways movement

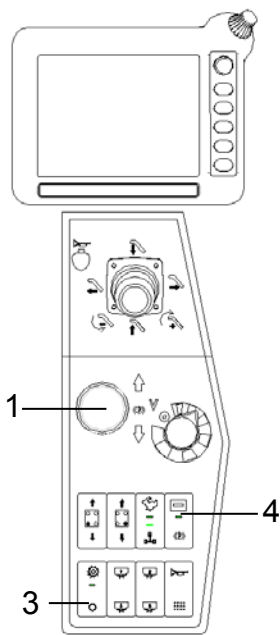


Fig. Ergo control box

1. Forward/reverse joystick
3. Milling drum drive
4. Parking brake

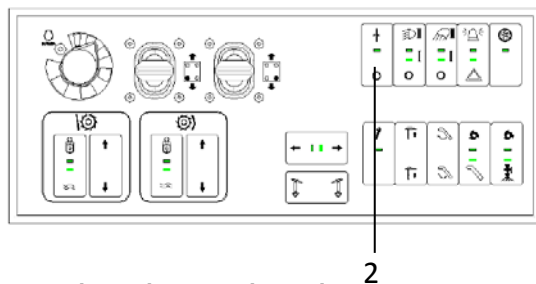


Fig. Main control panel

2. Height adjustment

Starting

Starting the engine

Make sure that the emergency stop is not activated.

Put the forward/reverse joystick (1) in neutral, making sure that the height adjustment (2) is in the middle position and the milling drum drive (3) in position 0,

The diesel engine cannot be started if the joystick is in another position.

Activate parking brake (4), the LED light is on, then start the diesel engine.

Turn the ignition key (4) to position 2 to start the engine. Release as soon as the engine starts.



Do not run the starter motor for too long (max.30 seconds). If the engine will not start, wait a minute before trying again.



Allow the engine to idle for a few minutes with no load to warm up, longer if the air temperature is below +10°C (50°F). The milling drum should be engaged. If the warning message appears on the screen, milling work must not be started. First check the oil filter and the oil level

See switch function description from "**Machine description**" chapter.



Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.



When starting and driving a cold machine with cold hydraulic fluid, the braking distance will be longer than when the fluid reaches normal working temperature.

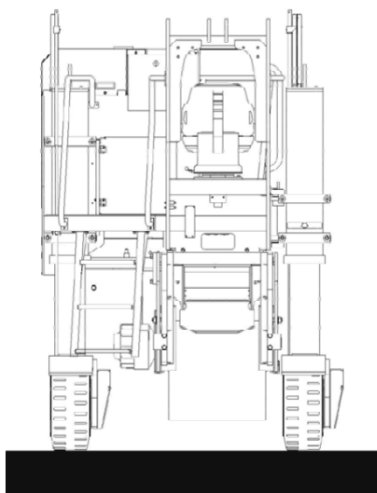


Fig. Positioning

Driving

Positioning

Machine height.

Driving the machine



Under no circumstances is the machine to be operated from the ground. The operator must be standing on the platform or sitting in the driver's seat at all times when the machine is in operation.

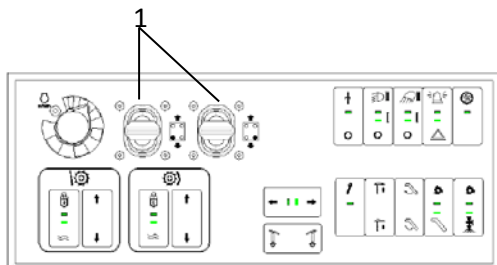


Fig. Main control panel

Raise the machine through joystick (1) so that the milling drum clears the ground (about 20 cm). Check that the steering is working by turning the steering wheel once to the right and once to the left while the planer is stationary.



Make sure that the work area in front and behind the planer is clear.

See switch function description from “Machine description” chapter.

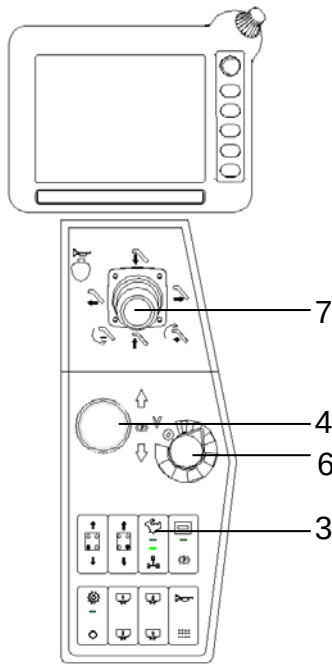


Fig. Ergo control box

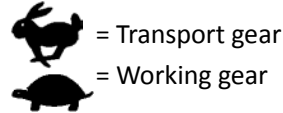
3. Gear position switch

4. Forward/reverse joystick

6. Speed setting

7. Control joystick, conveyor

- Set the gear position switch (3) in transport mode to move the machine at transport speed.



The transport gear must only be used when driving the machine on a smooth surface

- Put the speed control for the engine (5) at full power.
 - Adjust to the desired speed with the "Speed setting" knob (6).
 - Carefully move the forward/reverse joystick (4) forwards or backwards, depending on which direction of travel is required. Note that the safety catch under the control knob must be lifted up to move the control out of neutral!
- The speed increases the further the lever is moved away from the neutral position.
- When necessary, steer the conveyor belt with control joystick (7).

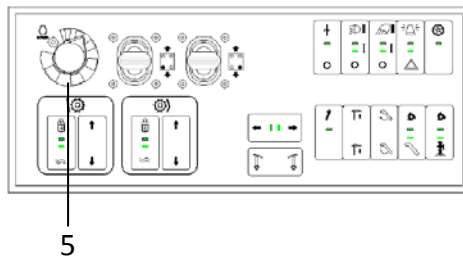


Fig. Main control

5. Speed control, diesel engine



The speed should always be controlled using the forward/reverse joystick and never by changing the engine speed.

Check while driving that the gauges show normal readings. Stop the planer and engine immediately in the event of abnormal values. Check and correct any faults; see also chapter on maintenance and the engine manual.

See switch function description from "**Machine description**" chapter.

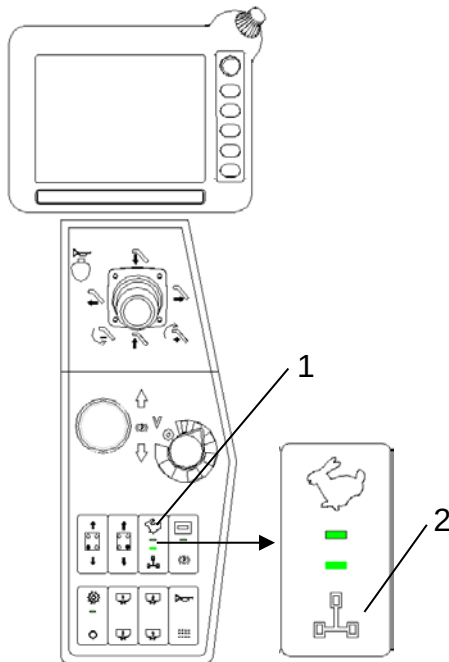


Fig. Ergocontrol box

1. Gear position switch
2. Differential lock position

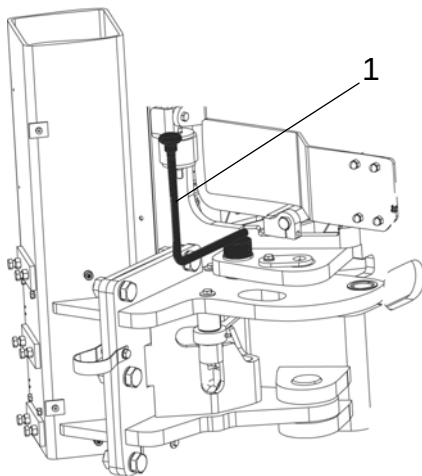


Fig. Swivel chassis leg

1. Pin

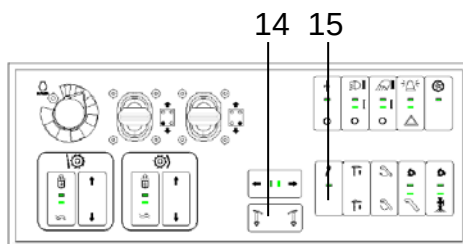


Fig. 14. Right rear chassis leg swing switch
15. Service mode

Driving on the difficult surfaces

Drive wheels

If the machine should get stuck and the wheels start to spin, put the gear position switch (1) in the “differential lock” (2) position.



The control lever must be in the middle position when the gear position switch is changed.

When the machine has regained a hold, return the switch to the original position.

See switch function description from “Machine description” chapter.

Swivel chassis leg, hydraulic

The right-hand chassis leg can be folded in to the side of the machine when necessary.



The driver seat must be pushed in when the chassis leg is folded in.

Lower the machine to ground level and raise up the chassis leg to the upper position.

1. Pull out the pin (1) and swing the chassis leg towards the machine using the knob (2) on the control panel.
2. Secure the chassis leg and insert the pin again.



Don't swing chassis leg on slope, machine may back roll or go down by gravity. Risk of crash bystander or tip over.

Lower the machine to ground level and rise up the chassis leg to the upper position.

1. Press button 15 to activate service mode.
2. Press button 14, lock pin pulled up, rear chassis leg start swiveling to target position then lock pin locked again.

Raise the machine to original position.

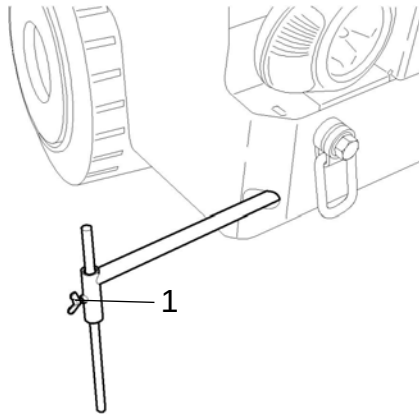


Fig. Pointer

1. Adjusting screw, wingnuts

Pointer

The pointer is placed on the vehicle frame. In extended position it helps the driver to manoeuvre the machine when milling. The extension length and depth is adjusted with wingnuts (1).

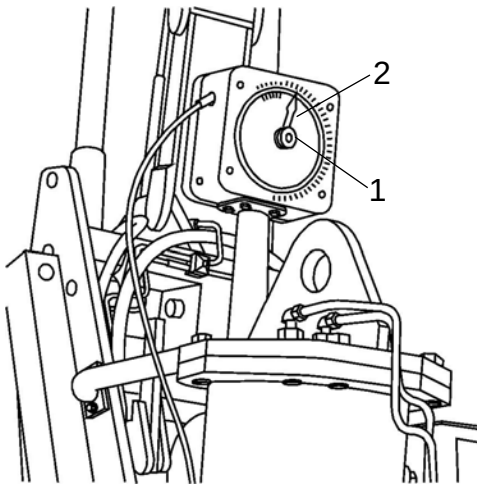


Fig. Milling depth indicator

1. Retaining screw
2. Indicator

Milling/Levelling

Milling depth indicator, adjustment

There is an adjustable milling depth indicator on each chassis leg.

The right-hand chassis leg's indicator has a scale for the position of both sides:

- Chassis leg extended
- Chassis leg withdraw

Set the required reading on the indicator by releasing the retaining screw (1) and adjusting the indicator (2). Tighten the retaining screw.



The machine must never be reset until individual adjustment can be carried out!



The stroke length for each chassis leg is shown in centimeters and inches.

Option, could be viewed from display.

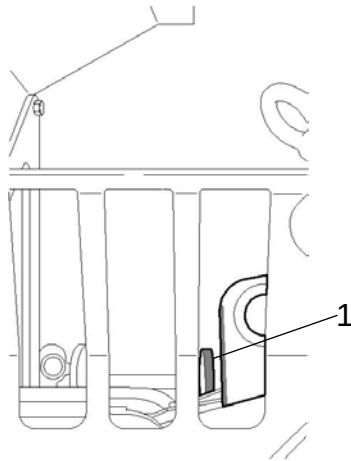


Fig. Milling edge mark

Indication of milling edge

Under the floor by the driver seat there is mark that shows the right-hand milling edge on the machine.

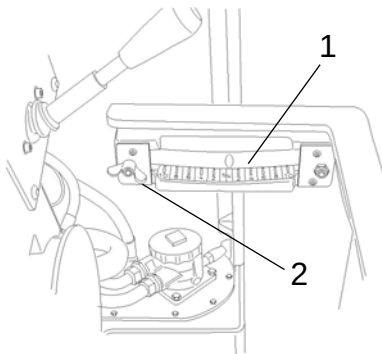


Fig. Scale

- 1. Scale**
- 2. Set screw**

Spirit level

There is a spirit level on the control platform to show the sideways angle of the machine.

The marking (1) indicates the angle on the scale.

The spirit level can be adjusted with the set screw (2).

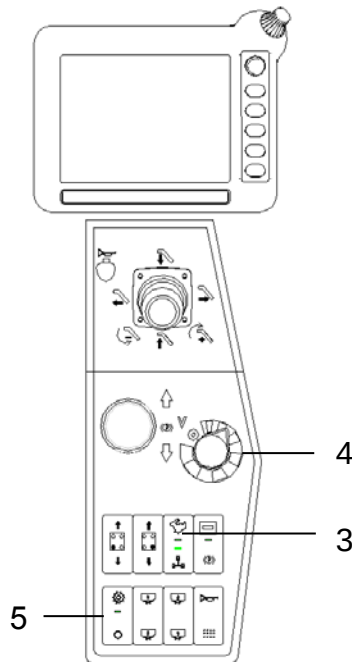


Fig. Ergo control box
3. Gear position switch

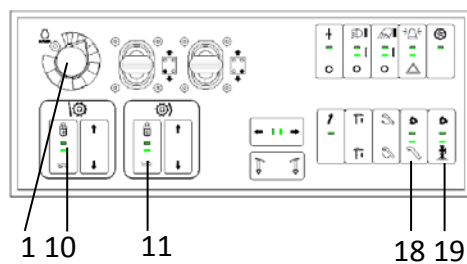


Fig. Control panel
1. Speed control, diesel engine
4. Speed setting
5. Milling drum drive
10. Position selector, scraper
11. Position selector, slide shoe
18. Position adjustment, conveyor belt
19. Water pump

Milling preparations

- ! Check that all the hydraulic functions on the machine are activated before milling!
- ! Do not start milling if a warning lamp goes on in the display! Check that the fluid level and make sure the hydraulic filter is not contaminated.
- ! If the scraper is raised and activates sensor B9, it is not possible to drive the machine forwards or backwards and the coupling to the milling drum cannot be activated

Make sure that the milling depth indicator is reset. (See section milling depth indicator, adjustment)

Activate the following functions on the ergonomic and control panels:

- Put the gear position switch (3) one of the working mode.
- Put the milling drum drive (5) in the ON position.
- Set the speed control for the engine (4) at full power.
- Put the water pump (19) in the AUTO or 1 position.
- Turn the speed control (1) to the required speed.
- Put the position selector for the scraper (10) in floating mode.
- Put the position selector for the front shield (11) in floating mode.
- Set the position adjuster for the conveyor belt (18) in the AUTO or 1 position.

See switch function description from "Machine description" chapter.

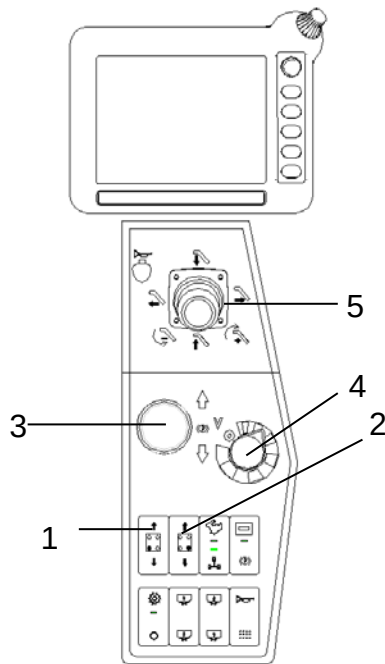


Fig. Ergo control box

- 1. Chassis leg, left
- 2. Chassis leg, right
- 3. Gear position switch
- 5. Control joystick, conveyor belt



Fig. Control panel

- 4. Speed setting, conveyor belt



**Fig. Automatic leveling system
Easy Level (Option)**

Milling without automatic leveling

When all preparations have been completed the milling can start while the machine is stationary:

- Carefully lower the machine to the required milling depth (1,2). The milling depth is shown on the respective milling depth indicators.
- Move the machine by moving the control lever (3) from neutral.
- Adjust the speed of the conveyor belt if necessary with the preset control (4).
- If necessary, steer the conveyor belt with the control joystick (5).



The sprinkler system and the conveyor belt's automatic functions are engaged when the control lever is activated.



If the scraper is raised and activate sensor B10 during milling, the milling drum stops as soon as the machine is reversed.

See switch function description from “**Machine description**” chapter.

Milling with automatic leveling (option)

Atlas Copco Dynapac's “Easy Level” leveling system provides automatic control of the milling drum in the vertical plane. The system is optional, and its operation is described in a separate manual for the leveling system.

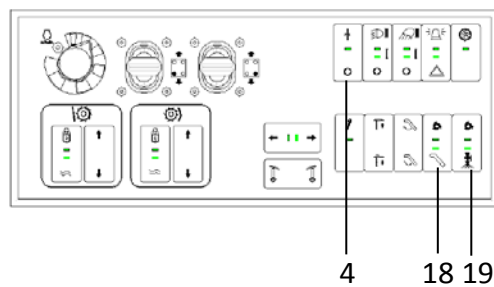


Fig. Control panel

4 Automatic mode

18. Position adjuster, conveyor

19. Water pump

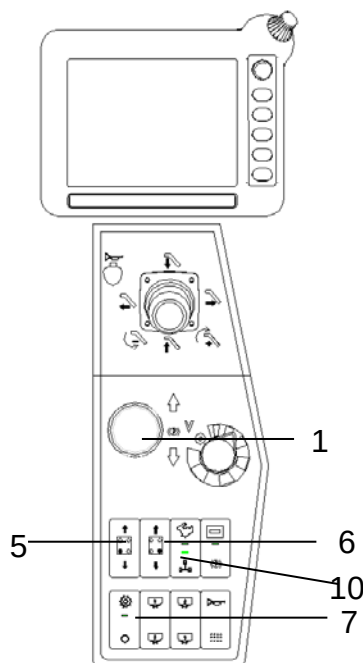


Fig. Ergo control box

1.Control lever

5.Chassis leg, left

6.Chassis leg, right

7. Milling drum drive

10. Gear position switch

Stop milling

- Stop the machine and put the control lever (1) in neutral.
- If automatic leveling has been used, switch off this function by putting the Automatic mode switch (4) in position 0.
- Raise the machine level with switches for chassis leg left (5) and chassis leg right (6) until the requisite ground clearance is reached.
- Allow the milling drum drive (7), water pump (19) and conveyor belt (18) to run for a few seconds and then switch off these functions.

Drive away from the area:

- Put the gear position switch (10) in transport mode.

Drive the machine forward by moving the control lever (1) slowly forward

See switch function description from **"Machine description"** chapter.

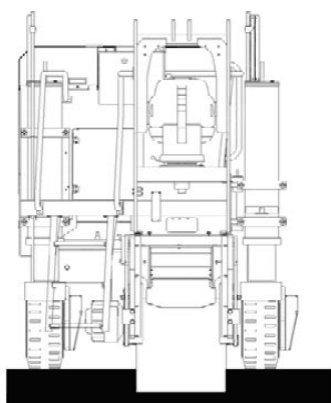


Fig. Milling position

Milling instruction

Milling position

Machine lowered – Milling drum lowered.

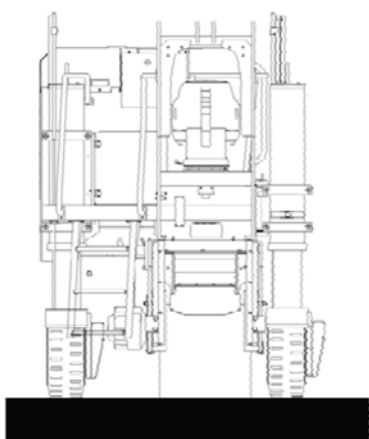


Fig. Resetting

Resetting milling depth

The milling drum is run at low rotational speed. Lower the drum until the teeth scrape against the ground, along the full width of the drum.

Reset the scale for the milling depth.



Resetting must be performed on both the withdrawn and extended chassis legs. Always reset on a horizontal, not inclined surface.

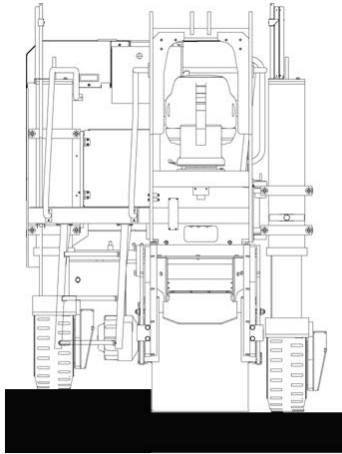


Fig. Surface milling

Surface milling

With extended right chassis leg:

The right chassis leg goes in the already milled and cleaned first track.

Depth setting:

- right = 0
- Left = required milling depth

With withdrawn right chassis leg:

The right chassis leg drives in front of the milling drum when it has still not been milled.

Depth setting:

Same milling depth on right and left side.

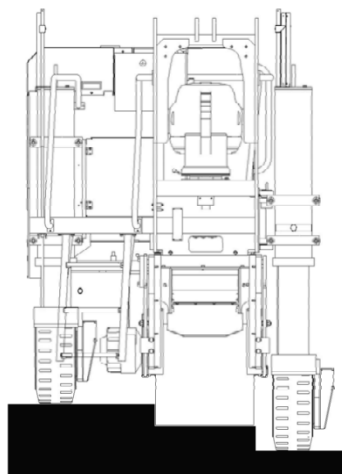


Fig. Milling at edge of roadway at shoulders

Milling at edge of roadway or at shoulders

Depth setting:

- Left - required milling depth.
- Right - required milling depth + shoulder height, alternatively with planer horizontal.



The planer must always be maintained in horizontal position when assuming the milling position!

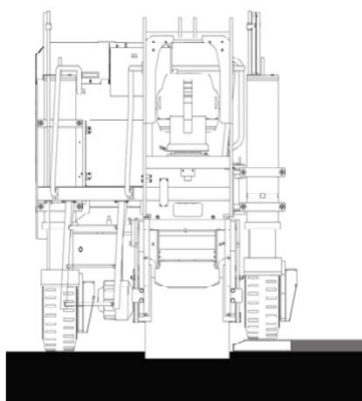


Fig. Milling at curb edge with extended chassis leg

Milling at curb edge with folded out chassis leg.

Advantages:

- High milling precision
- Precise milling surface
- Direct milling to curb edge is possible.

Disadvantages:

- In some circumstances it is not possible to achieve the required milling depth.



Don't fold out chassis leg on slope!

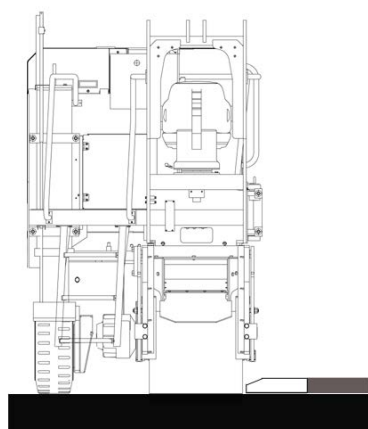


Fig. Milling at curb edge with withdraw chassis leg

Milling at curb edge with folded in chassis leg

Advantages:

- Max milling depth achieved
- Direct milling to curb edge is possible.

Disadvantages:

- Less milling precision.
- Machine is very sensitive to irregularities.



Don't fold out chassis leg on slope!

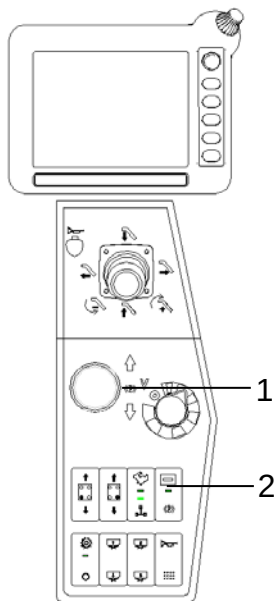


Fig. Ergo control box
1. Control joystick
2. Parking brake



Fig. 2. Ignition switch
3. Emergency stop

Braking

Normal braking

The control lever (1) is normally used to brake. The hydrostatic transmission brakes the machine when the lever is moved to neutral.

Parking brake

Setting the control joystick (1) in neutral stops the machine and activates the parking brake (Multi-disc in rear motor).

Secondary brake



Turn ignition key (2) to 0 position. The diesel engine stops, the hydrostatic transmission brakes and the Multi-disc in the motor actuates.

Turn the ignition to position "II" to start up the diesel engine.

Emergency braking



For emergency braking, press the emergency stop (1), hold the steering wheel firmly and be prepared for a sudden stop. The engine stops.



After activating the emergency braking, when restart, firstly turn off the master switch, release the emergency braking, wait a few seconds, then turn on the master switch and ignition lock.

When emergency stop is activated: The diesel engine stops, the hydrostatic transmission brakes and the Multi-disc in the rear motor actuates.

After emergency braking, turn ignition switch (2) to position "II" to start the diesel engine.

See switch function description from "**Machine description**" chapter.



Fig. Display, hours of operation



Fig. 2. Ignition switch

Parking

Parking/Switching off

Always park the machine on the most level surface. Lower the machine until the milling drum almost.

Before leaving the machine:

- Read off status for working hours (1) and check if any maintenance is need before switching off the machine.
- Switch off the engine and pull out the ignition switch (2) Close the tamper inhibitors and lock.



NOTE: After switch off the ignition lock, wait for 100 seconds then turn off the master switch!

See switch function description from “**Machine description**” chapter.

Master switch

At the end of the shift, switch off the battery disconnecter and remove the key.

This will prevent battery discharging and will also make it difficult for unauthorized persons to start and operate the machine. Lock the service doors/covers.

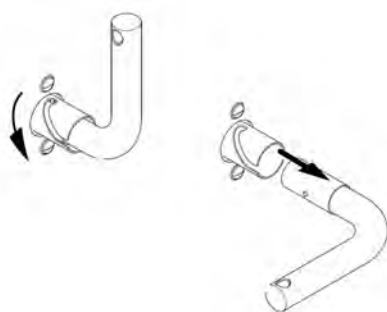


Fig. Battery disconnector



NOTE: After switch off the ignition lock, wait for 100 seconds then turn off the master switch!

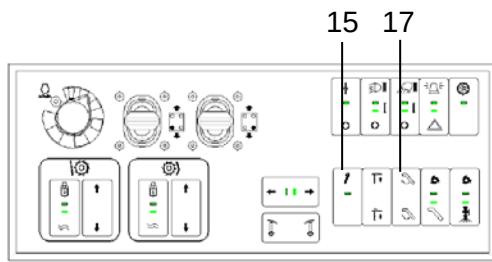


Fig. Control panel

15. Service mode

17. Conveyor fold and unfold

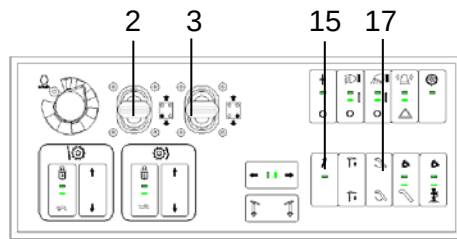
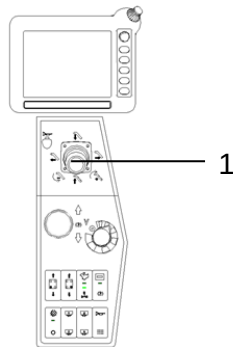
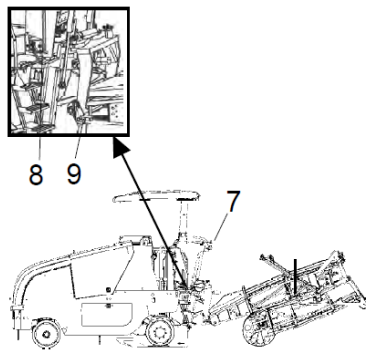
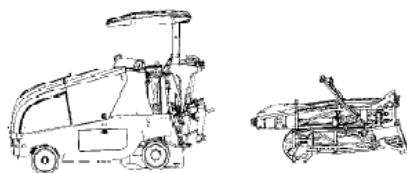
Folding/unfolding conveyor

Raise the machine to the highest position.

Activate service mode (15).

Fold / Unfold conveyor by pressing conveyor folding switch (17).

See switch function description from “**Machine description**” chapter.



Uncoupling of conveyor (foldable)

Raise the machine to its upper most position with joystick (2) & (3).

Raise the conveyor to its upper most position with conveyor hand switch (1).

Activate service mode (15).

Fold conveyor by pressing conveyor folding switch (17).

Lower the conveyor with conveyor hand switch (1), until the belt is completely laying on the ground.

Disconnect the steel cords and lifting cylinder from the machine frame, insert the cylinder with conveyor hand switch (1).

Release the four couplings from the hydraulic circuit and fit the protective caps. Disconnect the electric connector (8).

Undo the lock (9) carefully drive the machine away from the conveyor.

See switch function description from “**Machine description**” chapter.

Fig. Control panel + Ergonomic panel

- 1. Conveyor hand switch**
- 2. Joystick, left**
- 3. Joystick, right**
- 7. Cylinder**
- 8. Couplings, 4 p.**
- 9. Lock**
- 15. Service mode**
- 17. Conveyor fold and unfold**

Long-term parking



The following instructions should be followed when long term parking (more than one month).

Before using the planer again attend to the items marked with a “below”.

Wash the machine and touch up the paint finish to avoid rusting.

Treat exposed parts with anti-rust agent, lubricate the machine thoroughly and apply grease to unpainted surfaces.

Battery

*Remove the battery from the machine, clean, grease the cable connectors (terminals) and trickle charge the battery once a month. The battery is otherwise maintenance free.

Engine

*See the manufacturer's instructions in the engine manual.

Watering system

*Empty the water tank and all hoses of water. Empty the filter housing and the water pump. Undo all sprinkler nozzles.

See maintenance sections for “Watering system - draining”.

Hoods, tarpaulin

*Lower the instrument cover over the instrument panel.

*Cover the entire planer with a tarpaulin. A gap must be left between the tarpaulin and the ground.

*If possible, store the planer indoors and ideally in a building where the temperature is constant.

If the machine is stationary for over 6 months to 1 year the following items must also be attended to.

*Drain off the engine oil and fill the diesel engine with an approved conservation oil.

Fuel tank

Fill the fuel tank completely full to prevent condensation.

Hydraulic reservoir

Fill the hydraulic reservoir to the uppermost level mark.
(see under the heading 'Every 10 hours of operation.')



Fig. Machine ready to be lifted, side view

Miscellaneous

Lifting

Lifting the planer

There are 4 lifting points on the machine by which to lift the machine.

Lifting takes place with a lifting yoke so that the chains/lines are kept vertical.

Dismantle conveyor before lifting.

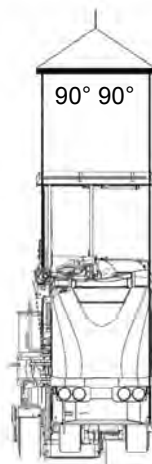


Fig. Machine ready to lifted, front view



The right chassis leg must be folded out and locked with the pin.



The lifting weight of the machine is shown on the lifting plate on the right front frame and the left rear frame.



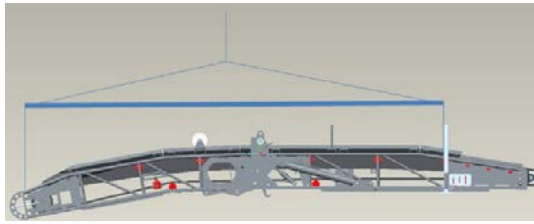
Lifting equipment such as chains, steel wires, straps and lifting hooks must be dimensioned in accordance with the relevant safety regulations for the lifting equipment.



Stand well clear of the hoisted machine! Make sure that the lifting hooks are properly secured.



The machine must be held in a horizontal position when lifted!

Lifting the conveyor

There are four lifting holes on the conveyor head and support legs. Attached the lifting yokes to the conveyor, lifting takes place with a lifting yoke chains/ropes are kept vertical.

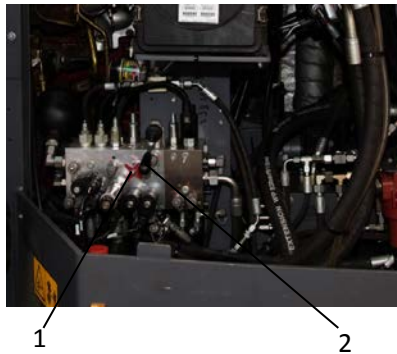


Fig. Brake release valve

1. Manual shut-off valve
2. Pump handle

Towing/Recovery

The planer can be moved up to 300 meters as per the following alternatives.

Releasing the brakes and pump



Chock the wheels to prevent the planer from moving; the machine can start to roll when the brakes are released hydraulically

- Turn the manual shut-off valve (1) handle clockwise to the bottom.
- Pump with the pump handle until the brake are released.



The brakes release at a pressure of 30 bar.

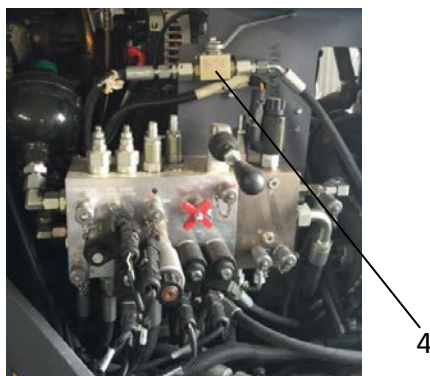


Fig. Ball valve – in closed position

In order to release the drive system during towing, the valve (4) above the control block must be opened:

Towing position: Valve in open position (lengthwise) Operating position: Valve in closed position (see fig. 4)

Reset brake: Undo the lock nut and unscrew the stop screw a few turns. Tighten the lock nut. Set the valve in "Operation" position.

Towing the planer



The planer must be braked on the engine during towing. There is no braking capacity on the planer now.



The planer must be towed slowly, max. 3 km/h, and only for a short distance; max. 300 metres.

When towing a machine the towing device must be connected in 2 eyes.



Recovery/towing in only 1 of the eyes is prohibited!

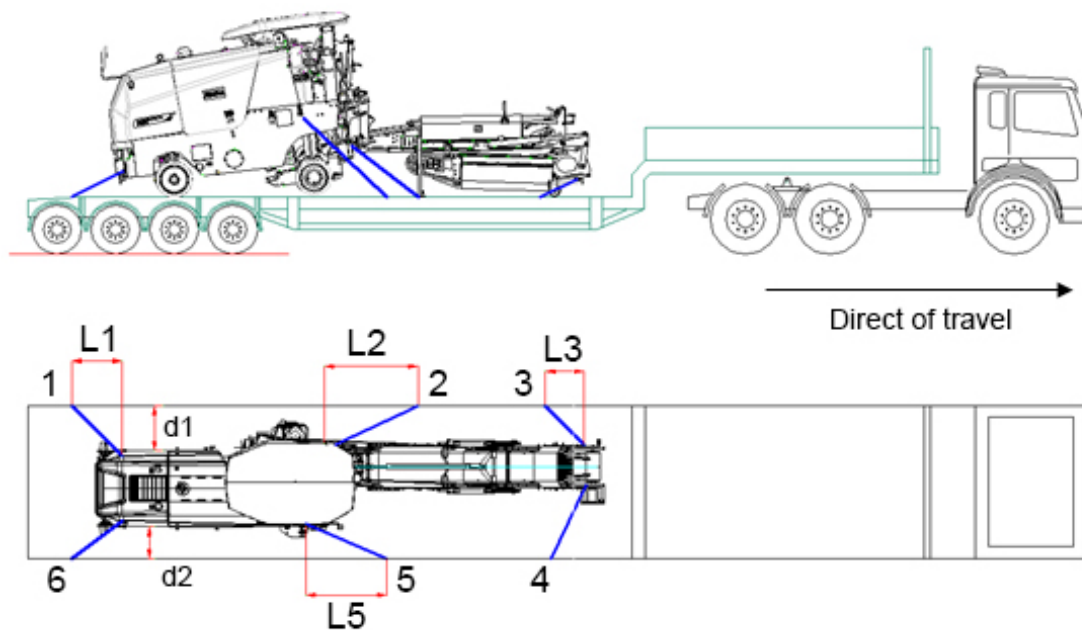
The tow load must only amount to 4 tons per eye.

Transport

Machine prepared for transport

Securing PL500 for loading

Securing the PL500 compact planer from Dynapac for transport.
(The instructions also apply to machine without conveyor.)



The right chassis leg must be folded out and locked before transport and lifting; follow the instructions under respective headings.

1-6 = single lashings, i.e. one lashing with two parts, one end on the machine, another end on the platform.

The lashings' permitted distance interval in meters			
1, 2, 5, 6: Single lashings, LC at least 6 tonnes (60 KN)			
3, 4: Single lashings, LC at least 1 tonnes (10 KN)			
L1	L2	L3	L5
0.4 – 0.9	1.5 – 2.0	0.5 - 2	1.3 – 2.0

Load carrier

- The machine must always be reversed up the ramp with the rear end pointing in the direction of travel of the transport vehicle.
- When loaded, the planer is not centered laterally on the platform, refer fig 1 dimension, $d1=d2=600\text{mm} \pm 50\text{mm}$
- The steering angle of the front wheels must be zero.
- The drive motor of wheel/track should be locked.
- Lower the machine until the milling drum is just above the ground (approx. 5 cm), or if wooden supports are used the drum should rest lightly against them.
- Lower the rear scraper, front guard and left/right shields to the lowest position.
- Lower the roof to its lowest position. Extruding control equipment must be retracted, or removed.
- The parking brake is applied and in good working condition and stop the engine.
- If the conveyor belt is mounted, lash it as per fig. 1
- Chock all machine wheels/tracks, strongly recommend non-slip mat under wheel/track to increase the friction factor.
- The contact surfaces must be clean, wet or dry, and free from frost, ice and snow.
- The lashing mounts on the load carrier have LC/MSL at least 10 tonnes.

Lashings

- The lashings 1-6 comprise a lashing strap or chain with a permitted load (LC/MSL) of at least in table 1.
- The lashings are re-tightened as required, the lashing preload should follow the lashing supplier instruction.
- Each of lashings 1-6 is a single lashing. One end on the machine, another end on the platform.
- Lashings in the same direction are placed in different lashing mounts on the trailer.
- The lashing hooks must not lose grip if the lashings become slack.
- The lashings are protected against sharp edges and corners.
- The lashings are located symmetrically in pairs on the right and left sides.



Make sure that the lashing equipment, e.g. chains, blocks and attachments in the transport vehicle, are approved and have the requisite breaking strain for the mode of transport. The lashing must be held tensioned during the entire transport.

Operating instructions – Summary



1. **Follow the SAFET INSTRUCTIONS specified in the Safety Manual.**
2. Make sure that all instructions in the MAINTENANCE are followed.
3. Turn the master switch to the ON position.
4. Check that all switches are in position 0 and the Forward/Reverse control is in neutral.
5. Start the engine and allow it to warm up.
6. Set the gear position switch in the required position.
7. Adjust the engine RPM to the desired position.
8. Set the travel speed to the desired position.
9. Check that the milling drum clears the ground, at least 10cm. Raise the machine if necessary.



10. **Drive the planer. Operate the forward/reverse lever with care.**



11. **Check the brakes. Remember that the braking distance will be longer if the hydraulic fluid is cold.**



12. **IN AN EMERGENCY:**
 - **Press the emergency stop**
 - **Hold the steering wheel firmly**
 - **Brace yourself for a sudden stop**
13. When parking:
 - Set the forward/reverse control in NEUTRAL.
 - Chock the wheels.
14. When lifting: - Refer to the relevant section in the Instruction Manual
15. When towing: - Refer to the relevant section in the Instruction Manual.
16. When transporting: - Refer to the relevant section in the Instruction Manual.
17. Retrieval: - Refer to the relevant section in the Instruction Manual.

Preventive maintenance

Complete maintenance is necessary for the machine to function satisfactorily and at the lowest possible cost.

The maintenance section includes the periodic maintenance that must be carried out on the machine.

The recommended maintenance intervals assume that the machine is used in a normal environment and working conditions.

Acceptance and delivery inspection

The machine is tested and adjusted before it leaves the factory.

On arrival, before delivery to the customer, delivery inspection must be conducted as per the check list in the warranty document.

Any transport damage must be immediately reported to the transport company.

Warranty

The warranty is only valid if the stipulated delivery inspection and the separate service inspection have been completed as per the warranty document, and when the machine has been registered for starting under the warranty.

The warranty is not valid if damage has been caused by inadequate service, incorrect use of the machine, the use of lubricants and hydraulic fluids other than those specified in the manual, or if any other adjustments have been made without the requisite authorization.

Maintenance – Lubricants and symbols

DYNAPAC/ATLAS COPCO

 Always use high-quality lubricants and the amounts recommended. Too much grease or oil can cause overheating, resulting in rapid wear.

Fluid volumes

PL 500

Fuel tank	230 L
Engine oil	15L
Hydraulic fluid tank	100 L
Water tank	600 L
Planetary gear, drive wheel	1.5 L
Planetary gear, milling drum drive	6 L
Coolant, engine	20 L
Urea	50 L
Grease	5 kg

Maintenance- Maintenance Schedule

- | | | |
|-----------------------------|----------------------------------|-----------------|
| 1. Engine oil | 11. Refuelling | 21. Side plates |
| 2. Oil filter | 12. Scraper | 22. Coupling |
| 3. Fuel filter | 13. Water tank, filling | 23. Chassis leg |
| 4. Hydraulic filter | 14. Sprinkler system | |
| 5. Hydraulic fluid level | 15. Planetary gear, milling drum | |
| 6. Hydraulic fluid, filling | 16. Planetary gear, drive wheel | |
| 7. Milling drum/housing | 17. Conveyor belt | |
| 8. Hydraulic fluid cooler | 18. Drive belt, milling drum | |
| 9. Coolant | 19. Drive belt, diesel engine | |
| 10. Air cleaner | 20. Battery | |

Schedule

Service and maintenance points

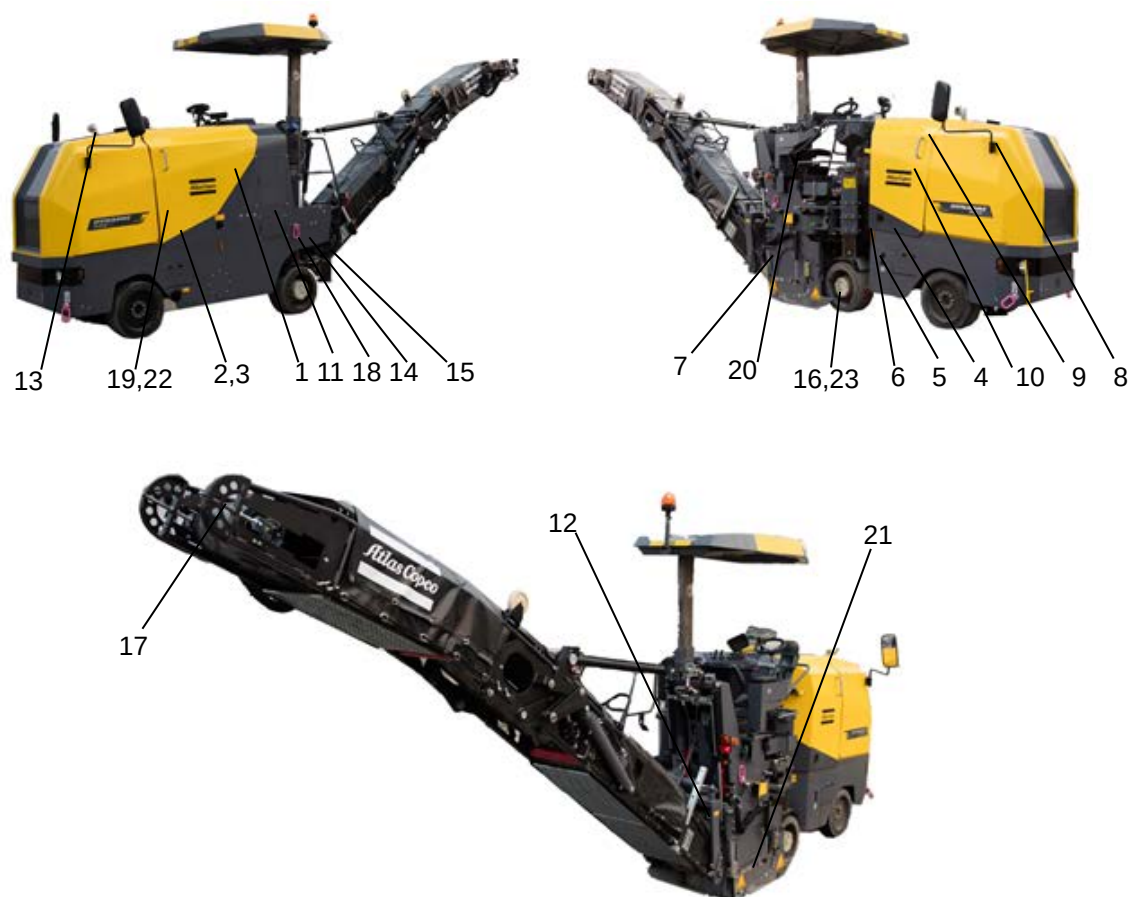


Fig. Service and maintenance points

General

Periodic maintenance should be carried out after the number of hours specified. Use the daily, weekly etc. periods where number of hours cannot be used.

-  Remove all dirt before filling, when checking oils and fuel and when lubricating using oil or grease.
-  The manufacturer's instructions found in the engine manual also apply.
-  Where both operational hours and time intervals are specified, maintenance should be carried out at the point in time that occurs first.

After the FIRST 10 hours of operation

Pos. in fig	Action	Comment
23	Pump drive - adjusting the belt tension	See chapter "Pump drive - adjusting the belt tension" (2000h)
24	Adjust slide plates, chassis leg	See section "Check slide plates, chassis leg" (250 hours)

Every 10 hours of operation (Daily)

Refer to the contents to find the page number of the sections referred to!

Pos. in fig	Action	Comment
	Before starting up for the first time on that day	
1	Check the oil level in diesel engine	Refer to the engine manual
5	Check the fluid level in the hydraulic reservoir	Top up if necessary
11	Fill fuel tank	
4	Check filter indicator, high pressure filter	
4	Check filter indicator, suction and return filter	
13	Fill the water tank	
14	Check the sprinkler system	
14	Check water filter	Replace filter if necessary
7	Check condition of milling tool and tool holder.	Replace if necessary. See section Function description
17	Check function and condition of conveyor (belt rollers, belt tension)	Adjust/replace if necessary
17	Check steel wire, conveyor belt	Adjust/replace if necessary
18	Check belts, drive belt for milling drum	
19	Check belt system, diesel engine	Refer to the engine manual
	Check brakes/emergency stop	
21	Check side shields	
21	Check front shield	
3	Drain the fuel prefilter	
8	Clean hydraulic fluid cooler	

Every 50 hours of operation (Weekly)

Refer to the contents to find the page number of the sections referred to!

Pos. in fig	Action	Comment
10	Check/clean air filter and dust container	Replace as required
15	Check oil level in planetary gear/drive wheel	Top up if necessary
15	Check oil level, gearbox	
	Lubricate as per items	
17	Check rubber parts, conveyor belt	
12	Check scraper, milling housing	

After the FIRST 100 hours of operation

Refer to the contents to find the page number of the sections referred to!

Pos. in fig	Action	Comment
7	Check bolted joints, milling housing, drum.	See section "Check bolted joints - Milling housing" (1,000 hours)

After the FIRST 250 hours of operation

Refer to the contents to find the page number of the sections referred to!

Pos. in fig	Action	Comment
15	Change oil in planetary gear, drive wheel	See section "Chassis leg, drive wheel - Planetary gear, oil draining" (2,000 hours)
15	Adjust visible screws/nuts, planetary gear/drive wheel	

Every 250 hours of operation (Monthly)

Refer to the contents to find the page number of the sections referred to!

Pos. in fig	Action	Comment
20	Check condition of batteries	Top up if necessary
	Check condition of fan	
10	Clean air filter unit	
24	Check slide plates, chassis leg	Adjust if necessary

Every 500 hours of operation (Every three months)

Refer to the contents to find the page number of the sections referred to!

Pos. in fig	Action	Comment
3	Change engine oil and oil filter	Refer to the engine manual
3	Change the engine fuel filter	Refer to the engine manual
3	Replace engine fuel prefilter/clean water separator	
6	Check hydraulic reservoir cap/vent	
	Check hydraulic hoses	Replace if necessary
22	Check clutch lining	
13	Empty and clean water tank	

Every 1000 hours of operation (Every six months)

Refer to the contents to find the page number of the sections referred to!

Pos. in fig	Action	Comment
3	Check engine valve clearances	Refer to the engine manual
22	Lubricate clutch bearings	
7	Check tightening torque of bolted joints, milling housing, drum	Tighten if necessary
15	Check visible screws/nuts, planetary gear/drive wheel	Tighten if necessary

Every 2000 hours of operation (Yearly)

Refer to the contents to find the page number of the sections referred to!

Pos. in fig	Action	Comment
6	Change the hydraulic fluid	
23	Replace belt for pump drive	
4	Replace hydraulic filter unit	
4	Replace return fluid filter, suction side	
15	Change oil in planetary gear, drive wheel	
15	Change oil in drum gearbox	
19	Replace diesel engine drive belts	
11	Drain and clean the fuel tank	

Maintenance – 10h



***Place the planer on a level surface.
The engine must be switched off and the service switch actuated (on control panel) during all checks and adjustments, unless otherwise specified.***



***Ensure that there is good ventilation (air extraction) if the engine is run indoors.
Risk of carbon monoxide poisoning.***



When filling liquid, the machine must be horizontal on level ground.



Diesel engine Check oil level



Take care not to touch any hot parts of the engine when removing the dipstick. Risk of burns.

The dipstick is placed behind the left cover in the engine compartment

Pull up the dipstick (1) and check that the oil level is between the upper and lower marks. For further details, refer to the engine's instruction manual.



The machine must be lowered down over the rear chassis legs and the engine must be horizontal when filling (2) and checking.

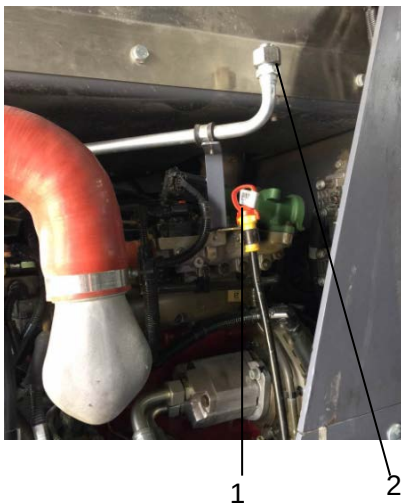
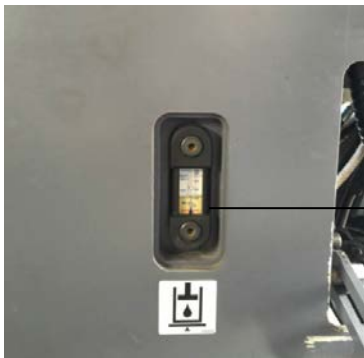


Fig. Engine compartment

- 1. Dipstick**
- 2. Filling**



Hydraulic reservoir - Check fluid level

Place the planer horizontally on a level surface and check that the oil level in the sight glass (1) is between the max and min markings. The sight glass is located on the right-hand side of the machine. Top up with the type of hydraulic fluid specified in the lubricant specification, if the level is too low

Fill if necessary through filler pipe (2).



Fig. Hydraulic reservoir

1. Sight glass
2. Filler pipe



Fuel tank – Filling

Fill the fuel tank every day to avoid formation of condensation.

Follow the engine manufacturer's specifications for diesel fuel.

The lockable filler cap (1) is located below the left cover for the engine.



Fig. 1. Filler cap



**Never refuel while the engine is running.
Do not smoke and avoid spilling fuel.**

The tank holds 250 litres of fuel.



Check the high pressure hydraulic filter

The filter unit must be replaced when the indicator shows red, or after an interval of 2000 h.



After repairs to the hydraulic system all filters must be checked after 10 working hours, and replaced when necessary



Release the hydraulic pressure by turning the service switch OFF/ON 10 times before replacing the filter



Fig. High pressure hydraulic filter
1. Filter indicator

Water tank – Filling

Check the level in the water tank on the level indicator from the display.

Unscrew the filler cap (3) and fill with clean water.

Alternatively the tank can filled via a pressure hose.

Pressure hose filling:

- Connect the pressure hose to the coupling (2) and tighten.
- Open the filler cap (3) for better ventilation.
- Open the ball valve (1).

Start filling.

- Turn off the tap before removing the hose.

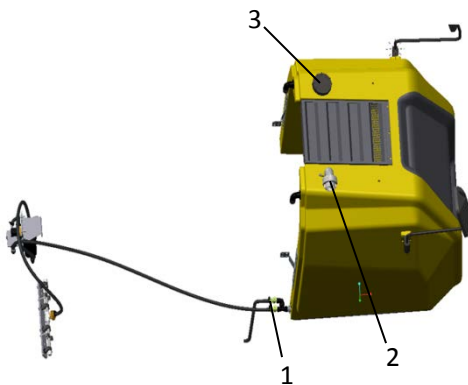


Fig. Water tank
1. Ball valve
2. Coupling
3. Filler cap



Only additive: A small amount of ecofriendly antifreeze.



Fig. 1 . Return suction filter



Check return suction filter – suction side

The filter (1) unit must be replaced when an alarm is shown in the display, or at interval of 2000 h.



After repairs to the hydraulic system all filters must be checked after 10 working hours, and replaced when necessary.

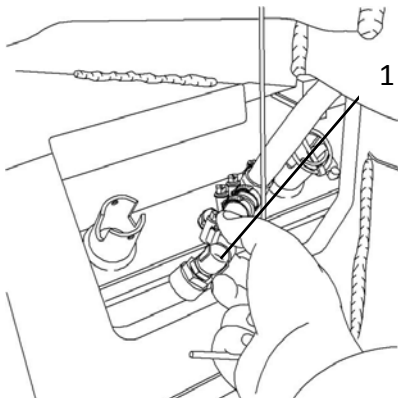


Fig. Sprinkler nozzle
1 Nozzle



Sprinkler system/nozzle

The nozzles are located on the milling housing.

Start the sprinkler system and make sure that no nozzles (1) are clogged. Clean any blocked nozzles if necessary.

Release the pipe together with the nozzles from their attachments. Clean the nozzles with a wire brush. Remove the nozzle if necessary for replacement or more carefully cleaning.



When fitting new nozzles, make sure that the flat jet of water is directed sideways towards the milling drum.

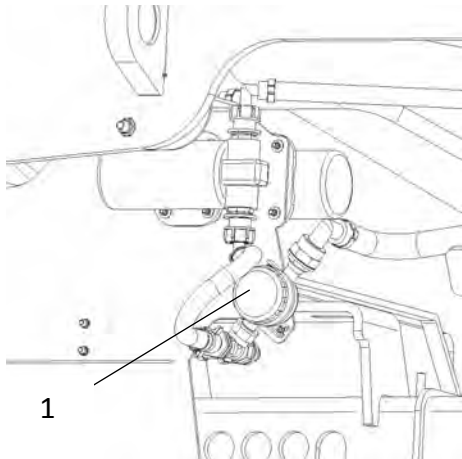


Fig. Water filter
1. Filter element, strainer

Water filter – Checking/Replacing

Filter element, strainer (1) must be replaced in the event of damage.

Cleaning should be performed daily.

Clean/replace filter:

- Check that the water pump is not in operation.
- Undo the filter cap by hand. Clean filter holder and cap



Recycle old filters for waste disposal!

Check after replacing that the seal is correctly positioned!

- Insert the filter element, tighten the filter cap by hand

Sprinkler system – Draining



Remember that there is a risk of freezing during the winter. Empty the tank, pump, filter and lines, or mix antifreeze in the water

Empty water from the water tank (see section "Emptying/Filling water tank")

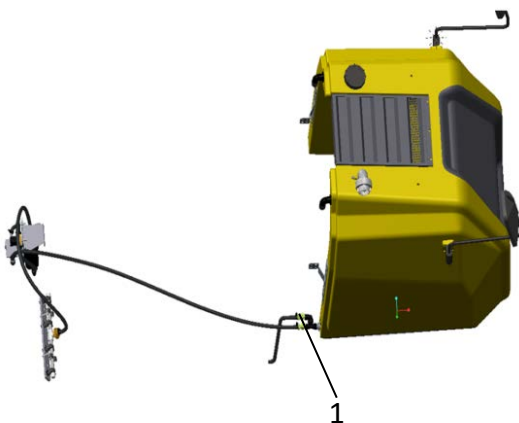


Fig. Pump system
1. Ball valve

Turn off the pumps on the control panel. Undo the ball valve (1) to drain the water.

Start the water pump and allow the water to run off. Turn off the pump when the lines and filter are empty. The pump must not be operated when empty, do not allow it to run for more than 30 seconds!

Refit the coupling.

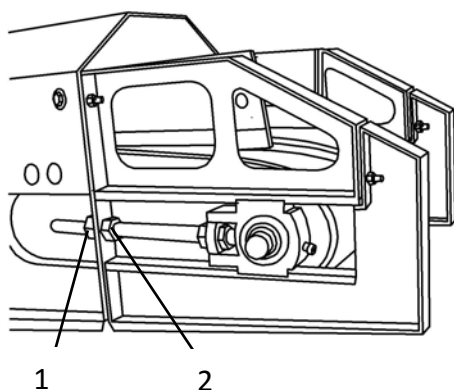


**Fig. Conveyor belt
Belt tension**

- 2. Lock nuts**
- 3. Adjuster nuts**

Check of belt tension – belt rollers, conveyor belt

Check the belt rollers, conveyor belt and screw unions for visible damage or wear.

Adjust the belt as soon as it sags. During the first working hours the belt will expand considerably, and will repeatedly need to be tensioned.

Increase the tension:

- Release the lock nuts (1) on both sides of the tensioning device.
- Adjust the tension on both sides with the adjuster nuts (2). Use a U-spanner. Tighten the lock nuts after adjusting.



If the belt runs to one side of the belt roller, adjust the left or right spindle by tightening or releasing

Align the belt rollers if they do not tension sufficiently:

- Release the attachment plate on the belt roller and turn slightly.
Right adjustment of belt roller = push left belt roller forward.
Left adjustment of belt roller = push right belt roller forward.

Milling drum – Drive belt – Replace

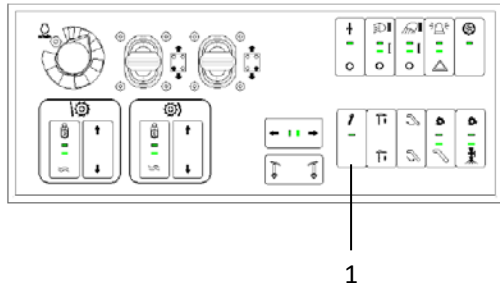


Fig. Control panel, right side
4. Service switch

The belt drive consists of two compound belts and is located on the left side of the milling section.

The belts are always replaced in pairs.



Replace damaged and worn belts immediately



The slots in the V-belt must be carefully cleaned before fitting new belts.



Make sure not to accidentally start the engine!

- Set the service switch on the control panel in position 1.

Remove the belt guard before carrying out maintenance.

The belt tensioner releases and the belts can be removed and replaced.

Check also the condition of the pulleys.



Fig. 1. Emergency stop
3. Ignition switch



Brake function/Emergency stop – Check

Checking the emergency stop

Drive the planer slowly forward. Hold the steering wheel firmly and brace yourself for a sudden stop.

Push in the emergency stop (1). The planer should come to a sudden stop and the engine should switch off.

After checking the emergency stop, set the forward/reverse joystick (2) in neutral.

Pull up the emergency stop (1). Start the engine. The planer is now ready for operation.



Check the brakes by carrying out the following:

Checking reserve brake function

Drive the planer slowly forward. Hold the steering wheel firmly and brace yourself for a sudden stop.

Turn the ignition switch (3) to position 0. The planer should come to a sudden stop.

After this check, turn the ignition key to position 1. The planer is now ready for operation.

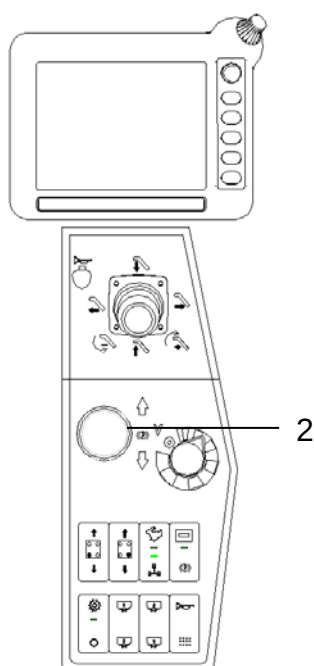


Fig. 2. Forward/reverse lever

See also Operating section in the manual.

See switch function description from “Machine description” chapter.

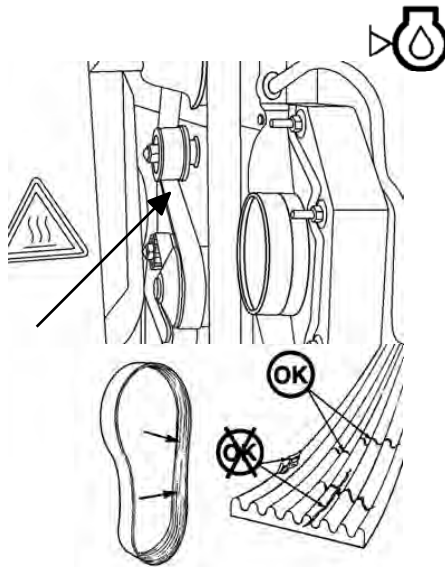


Fig. Drive belt



Diesel engine – Checking the drive belt

Visually check the drive belt every day for damage.

For maintenance of the drive belt, see engine manual

Side shield – Check

The side shields are located on each side of the milling drum.

Check that the side shields (1, 2) are properly secured and slide in their tracks without jamming. Clean the tracks daily.

Replace side plates/wearing parts if necessary.

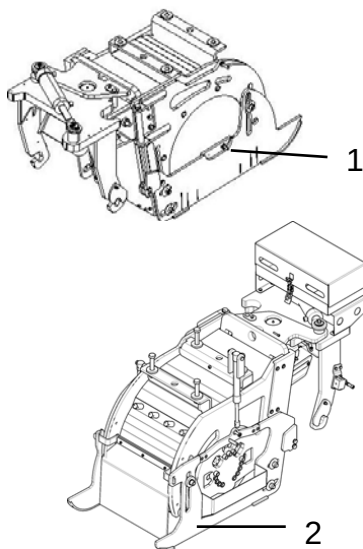


Fig. Side shield

1. Side shield, right side
2. Side shield, left side



1

Fig. Milling housing, right side

1.Wear plate

Wear plate of side shield – Replace

Replace the worn wear plate (1) on the side shield.



Take the requisite safety precautions when removing!



Water separator, fuel prefilter – Draining

Drain the prefilter according to interval or error message from engine electronics.

Draining:

Screw on the drain valve of water separator (1) and drain the liquid until only clear diesel fuel runs out.

Close the drain valve by hand.

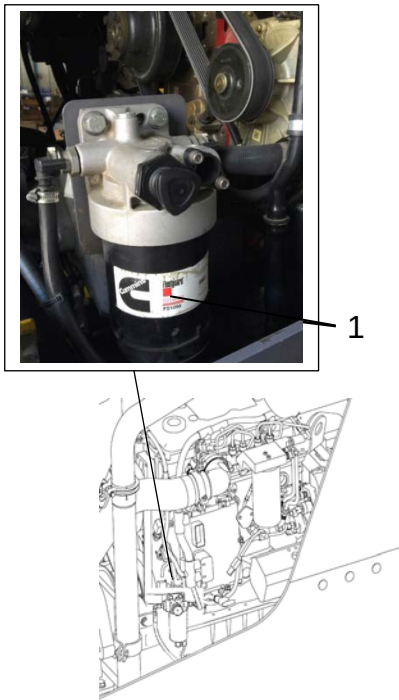


Fig. 1. Water separator



Clean cooler

Make sure that the air flow through the cooler is unobstructed. Dirty coolers are blown clean with compressed air or washed clean using a high-pressure water cleaner.

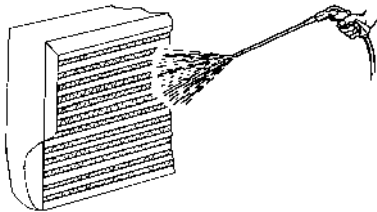


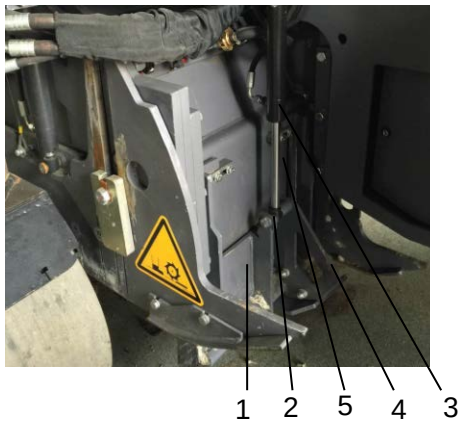
Fig. Cooler



Take care when using a high-pressure water jet. Do not hold the nozzle too near the cooler.



Wear protective goggles when working with compressed air or high-pressure water jets.



Check hydraulic front plate – Milling housing

Check daily:

- The function for raising, lowering and setting the front plate in floating mode. (Main control panel)
- Hydraulic cylinder (3)
- Condition of slide shoe (4) and front plate (1)
- Bolted joint between front plate and slide rail (5), on both sides of the milling housing.

Fig. Milling housing

- 1. Hydraulic front plate**
- 2. Hinged points**
- 3. Hydraulic cylinder**
- 4. Slide shoe**
- 5. Slide rail**

Maintenance – 50h



Place the planer on a level surface. The engine must be switched off and the service switch actuated (on control panel) during all checks and adjustments, unless otherwise specified.



Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.



Air cleaner – Emptying



Clean the air cleaner when operated in extremely dusty environments.

Fig. Air cleaner

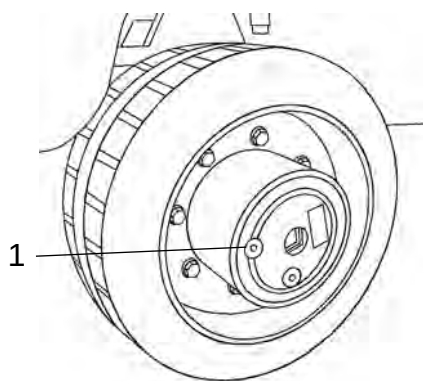


Fig. Planetary gear/position for refilling

1. Filler plug

Chassis leg, drive wheel Planetary gear - Check of oil level

Place the planer so that the filler plug (1) in the planetary gear is at "9 o'clock".

Fill with oil to lower edge of level hole.

Use transmission oil. See the lubrication specification.

Clean and refit the plug

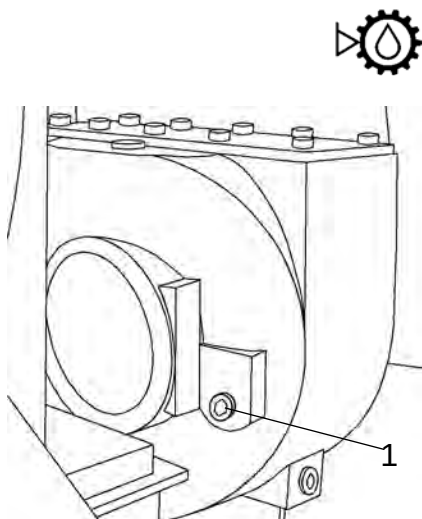


Fig. Level check-drum gearbox

2. Filler plug

Drum gearbox - Checking the oil level

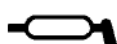
Position the planer horizontally.

Unscrew the filler plug (1).

Ensure that the oil level reaches up to the lower edge of the plug hole.

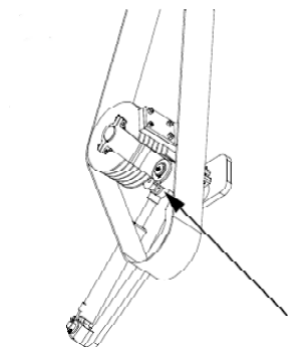
Top off with oil to the right level if the level is low. Use transmission oil according to the lubricant specification.

Clean and refit the plug.



Lubrication points

Belt tensioner

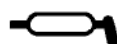


1 grease nipple is located on the belt tensioner. 3 pump strokes with manual grease gun

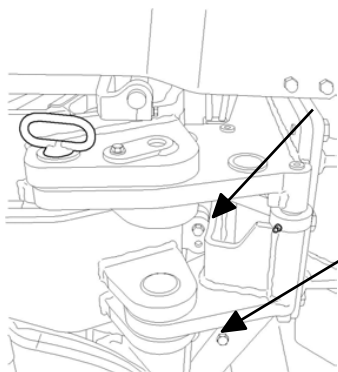


Use grease as per the lubricant specification

Fig. Belt tensioner, milling drum drive



Chassis leg, right side



2 grease nipples are located on the chassis leg joint. 5 pump strokes with manual grease gun.



Use grease as per the lubricant specification

Fig. Chassis leg, right side, grease nipples

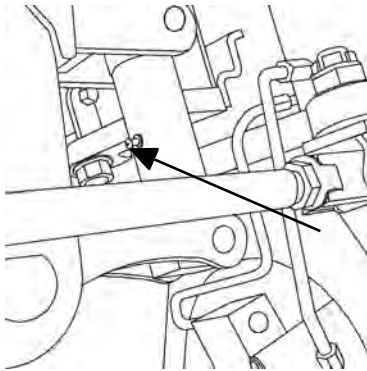
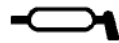


Fig. Guide, two-wheel variant, grease nipples



Guide, two-wheel variant

2 grease nipples located at guide on underside of machine. 5 pump strokes with manual grease gun.



Use grease as per the lubricant specification

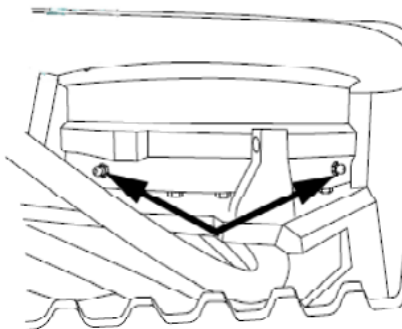
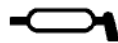


Fig. Guide, one-wheel variant, grease nipples



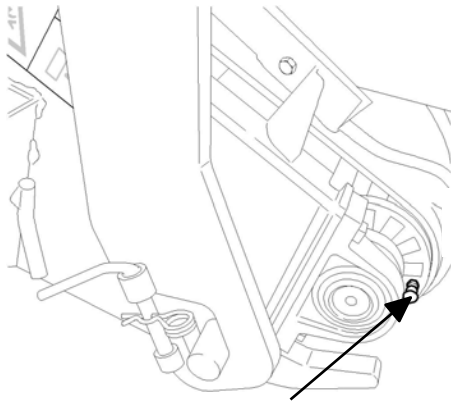
Guide, two-wheel variant

4 grease nipples located at guide on underside of machine. 5 pump strokes with manual grease gun.



Use grease as per the lubricant specification

Conveyor - reversing (option)



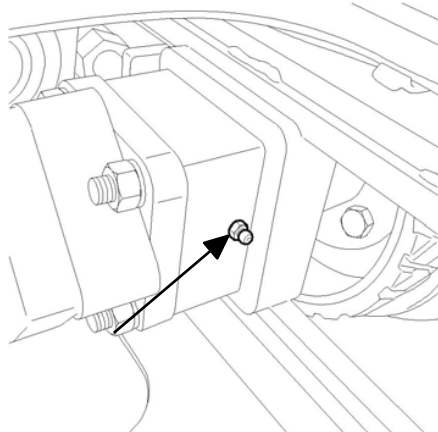
2 grease nipples located on each side of conveyor tension bearing. 3 pump strokes with manual grease gun.



Use grease as per the lubricant specification

Fig. Conveyor belt, tension bearing, grease nipples

Conveyor - drive (option)

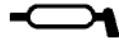
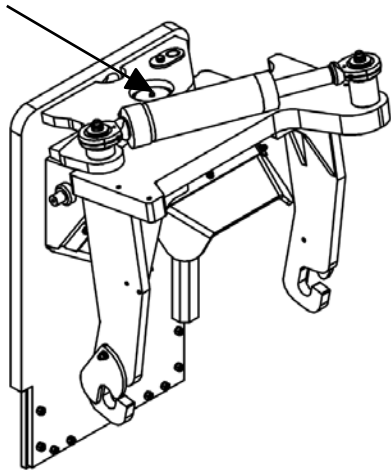


2 grease nipples located on each side of conveyor drive. 3 pump strokes with manual grease gun



Use grease as per the lubricant specification

Fig. Conveyor belt, drive, grease nipples

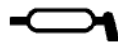
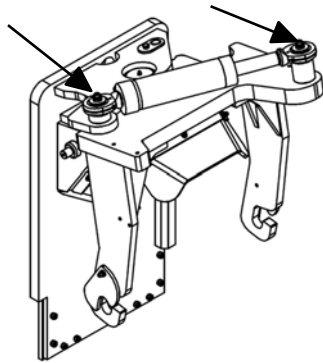
**Conveyor belt – swivel bracket**

1grease nipple located at conveyor belt mounting, at bearing. 1 pump stroke with manual grease gun.



Use grease as per the lubricant specification

Fig. Conveyor belt mounting

**Hydraulic cylinder**

Grease nipples are located on hydraulic cylinder bearings. 3 pump strokes with manual grease gun.



Use grease as per the lubricant specification

Fig. Hydraulic cylinder

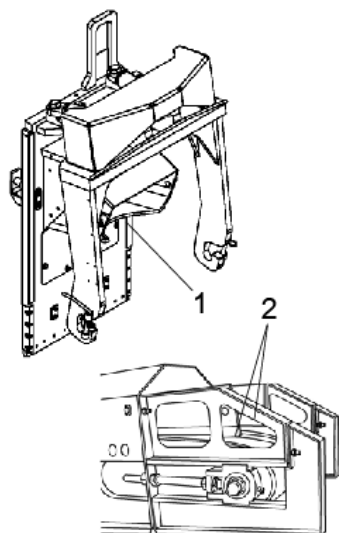


Fig. Rubber parts, conveyor belt

- 1. Collector funnel**
- 2. Side guide, conveyor belt**

Check of funnel rubber – sealing rubber, side guides

The rubber parts on the conveyor belt must be visually checked after damage.

- Collector funnel (1)
- Side guide, conveyor belt (2)

The rubber parts are fitted with screw unions.

Remove damaged/worn parts and fit new ones

Check of scraper tool, milling housing

The scrapers must be replaced when they are worn.

- Raise the machine, lower down the milling drum cover and raise the side shields to the upper position.

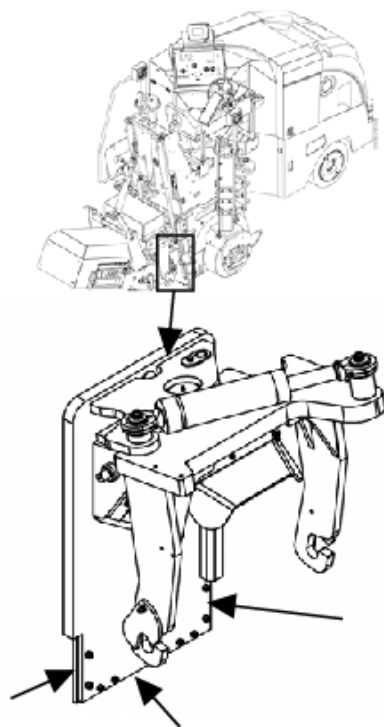


Fig. Scraper tool, wearing parts



Make sure that the diesel engine cannot be started.



Make sure that the cover is secured!

- Check the wear surfaces, as shown in diagram. Release the retaining screws and remove the worn scrapers.

- Clean the contact surface before fitting new scrapers. Adjust to the required height.

Maintenance - 250h



Place the planer on a level surface. The engine must be switched off and the service switch actuated (on control panel) during all checks and adjustments, unless otherwise specified.



Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.

Battery

Checking the electrolyte level

The batteries are located under the seat bracket. Release the screws (1) and swing up the seat bracket.

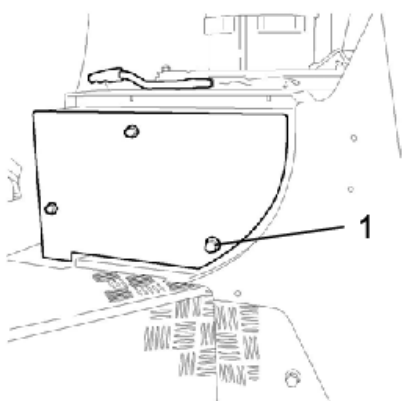


Fig. Battery compartment



Make sure there are no naked flames in the vicinity when checking the fluid level. Explosive gas is produced in the battery.



Wear safety goggles. The battery contains acid, which is corrosive. In the event of contact with the acid, rinse with water.



When disconnecting the battery, always disconnect the negative cable first. When connecting the battery, always connect the positive cable first.

The cable shoes should be clean and tightened. Corroded cable shoes should be cleaned and greased with acid-proof Vaseline.

Coolant level – Check

Check that coolant level is between the max/min marks.



Take great caution if the radiator cap must be opened while the engine is hot. Wear protective gloves and goggles.

Fill, if needed, with a mixture of 50% water and 50% anti-freeze. See the lubrication specifications in these instructions and in the engine manual.



Fig. Expansion tank
1. Filler cap



The machine must be in transport mode to ensure better ventilation of the engine when refilling.



Flush the system every other year and change the coolant. Make sure also that the air flow through the cooler is unobstructed.



1

2

Fig. Air cleaner

- 1. Clips**
- 2. Cover**

Air filter – Change main filter

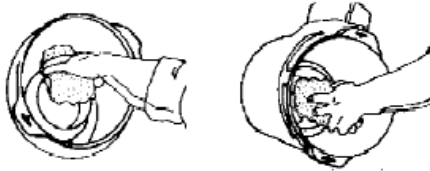
Release the clips (1), pull off the cover (2), and pull out the main filter.

Clean the air cleaner if necessary, see section Air cleaner - Cleaning.

When replacing the main filter, insert a new filter and refit the air cleaner in the reverse order.

When refitting the cover, make sure that the dust valve is positioned downwards.

Wipe clean on both sides of the outlet pipe



Inner edge of outlet pipe

Outer edge of outlet pipe

Air cleaner – Cleaning

Wipe clean the inside of the cover (2) and the filter housing. See the previous illustration.

Wipe also both surfaces for the outlet pipe; see adjacent figure



Check that the hose clamps between the filter housing and the suction hose are tight and that the hoses are intact. Inspect the entire hose system, all the way to the engine.

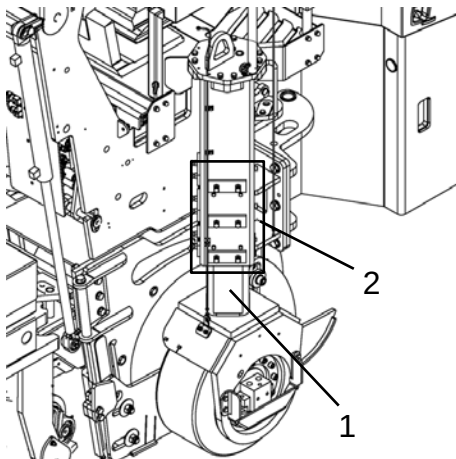


Fig. Chassis leg, slide plate

1. Slide surface

2. Set screws

Slide plates, chassis leg – Check

There are several slide plates on both chassis legs. The clearance on both chassis leg guides is first adjusted after 10 working hours and then every 2000 hours



The slide surfaces (1) on all 4 sides of the leg should always be well greased!



The chassis leg must be unloaded during the adjustment!

Adjust the clearance

The clearance on both chassis leg guides is adjusted with 6 separate slide plates.

- Undo the lock nut, tighten the set screw by hand and then lock with the lock nut (2).

There must be no play on the chassis leg after adjusting. Continue to adjust if necessary.

Maintenance - 500h



Place the planer on a level surface. The engine must be switched off and the service switch actuated (on control panel) during all checks and adjustments, unless otherwise specified.



Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.

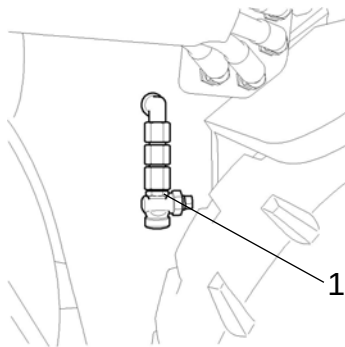


Fig. 1.Drain cock



Diesel engine – Oil change – Filter replacement

The drain cock for the oil (1) is located on the right side of the machine frame.



Place a suitable container under the drain plug. Collect up the oil and hand in to waste disposal station.



Danger of being burned when draining hot oil. Protect your hands.

Recycle old filters for waste disposal.



Open the cover on the drain cock.
Fit a hose (option).

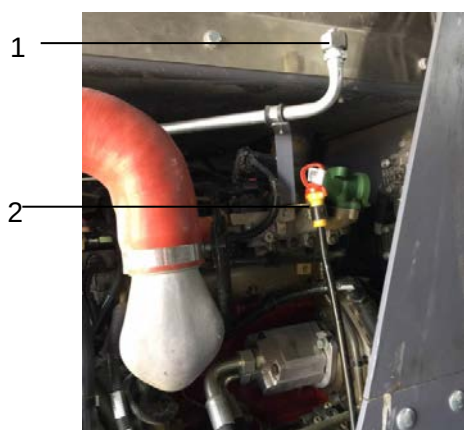


Fig. Engine compartment

1. Filler cap, engine oil
2. Dipstick
3. Engine oil filter

Open the drain cock with a spanner and allow all the oil to run out.

Close the cock, remove the hose and refit the cover.

Replace engine oil filter (3)

The oil filter is located on the engine block behind the right cover for the engine compartment.

Release the filter and clean the contact surface. Lubricate the seal on the new filter. Fill the filter with oil and fit in place. Tighten by hand. Check the seal and oil pressure indicator.

Fill with new engine oil, see lubricant specification for the correct grade of oil.

Check the dipstick (2) to ensure that the oil level is correct. Refer to the engine manual for details.



Fuel filter – Replacement

Release the fuel filter and clean the contact surface.

Lubricate the seal on the new filter. Tighten the filter by hand.

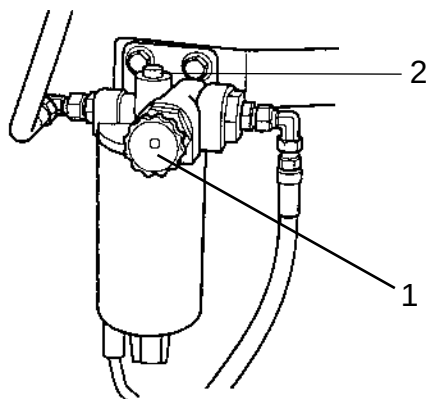
Bleed the filter, see chapter Fuel filter - Bleeding the filter.



Fig. 1. Fuel filter



Fuel filter – Bleeding the filter



Pull out the pump handle. (1)
Open the bleeder screw (2). (Bleed during pumping / filling the filter)

Pump until resistance is felt during the pumping, whereby the filter is filled with fuel.

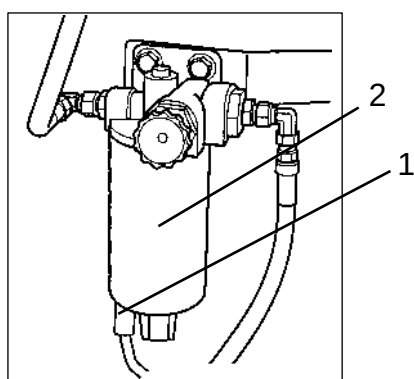
Close the bleeder screw and screw on the pump handle.

Fig. Pre filter

- 1. Pump knob
- 2. Bleeder screw



Water separator, fuel prefilter – Replacement



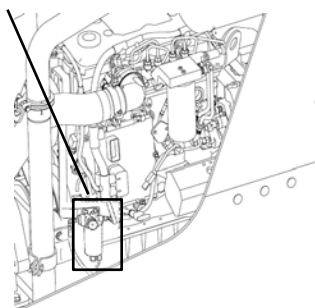
Remove the water sensor contact. (1)

Remove the filter cartridge (2) with suitable tool (filter spanner or filter strap) and unscrew.

Clean the filter holder sealing surface.

Oil in the seal on the filter cartridge and screw the lower holder tight by hand.

Reconnect the water sensor contact.



Bleed the filter, see chapter Fuel filter - Bleeding the filter.



Hydraulic reservoir cap – Check



1

Fig. Engine compartment
1. Filler cap

Unscrew the filler cap and check that it is not clogged. The air must have a free passage through the cap in both directions.

If clogged in either direction, clean with a little diesel oil and blow with compressed air until free passage is assured, or replace the cap with a new one.



Wear protective goggles when working with compressed air.



Wear protective gloves when working with diesel.



Hydraulic hoses – Check

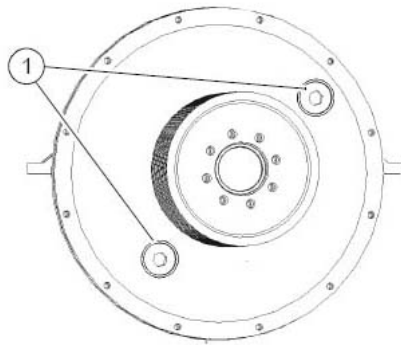


Fig. Hydraulic hoses

Check the condition of the hydraulic hoses, and immediately replace defective hoses.

Clutch lining – Check

The clutch is located behind the engine fly wheel.



Make sure that the engine cannot be accidentally started!

Check the clutch lining:

- Remove the inspection covers (1) on the clutch housing.

- Check the wear on the outer linings: Measure between mark A and B

A - B = Y mark. (max 12 mm)

B Clutch in new condition = 3 mm

Max wear (Y-mark) = 12 mm

A

If maximum wear has been reached, replace the outer lining.

- Close the covers after inspection.

Check is made at engaged clutch and disengaged engine.

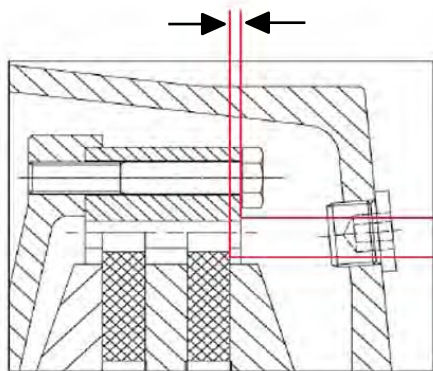


Fig. Hydraulic hoses

Water tank – Emptying / Cleaning

Empty the tank before cleaning, open the ball valve (1) and allow all the water to run out.

- Clean the tank with water and a suitable detergent. Close the tap before filling up.

- Fill up with new water, see chapter "Water tank-Filling".

Remember that there is a risk of freezing during the winter. Empty the tank, lines and pump.

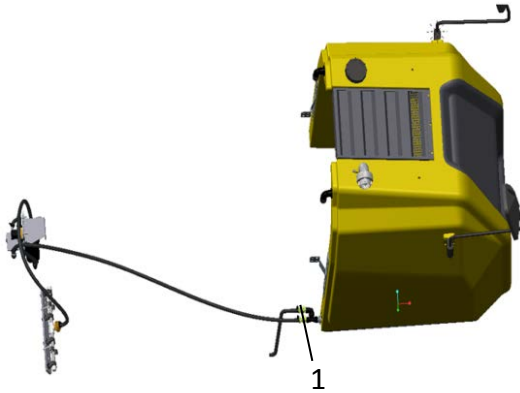


Fig. Water tank
1. Ball valve

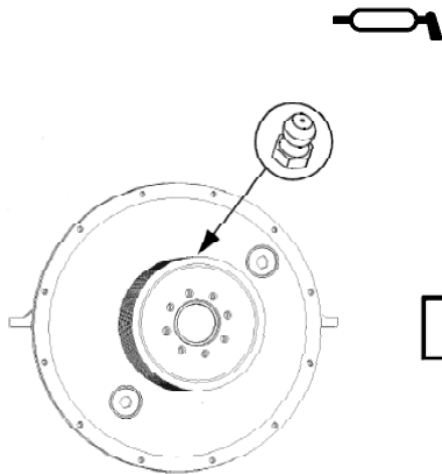
Maintenance - 1000h



Place the planer on a level surface. The engine must be switched off and the service switch actuated (on control panel) during all checks and adjustments, unless otherwise specified.



Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.



Clutch bearing

1 grease nipple is located behind the pulley. 5 pump strokes with manual grease gun.



Use grease as per the lubricant specification.

Fig. Clutch bearing, grease nipple

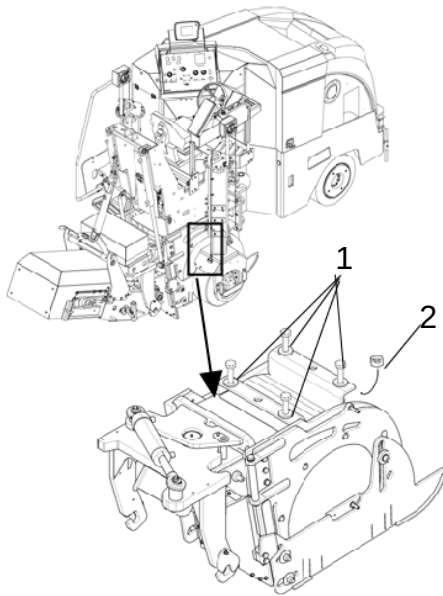


Fig. Milling housing – Screw unions

Tightening torque bolted joints – Milling housing

The connection between the milling housing and machine frame must be checked / retightened with a torque wrench after the first 100 working hours and then every 1000 hours.

This is done on the milling house nuts (2). The screws (1) are held in the machine frame.

Tightening torque: 1060 Nm.

Maintenance - 2000h



Place the planer on a level surface. The engine must be switched off and the service switch actuated (on control panel) during all checks and adjustments, unless otherwise specified.



Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.



Hydraulic reservoir Fluid change



Take care when draining the hydraulic fluid. Wear protective gloves and goggles.

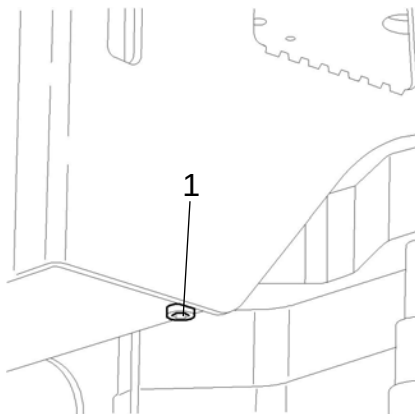


Fig. Engine compartment under hydraulic reservoir, left side
1.Oil plug

The drain plug (1) is located under the machine on the left side.

Place a container under the plug.

Release the oil plug and allow all the oil to run out.

Refit the drain plug with a new seal.

Hand in the drained oil to a waste disposal station.

Fill with fresh hydraulic fluid. Refer to the lubricants specification for grade information.

To replace the hydraulic fluid filter, see chapter "High-pressure hydraulic filter Replacement".

Start the engine and operate the hydraulic functions. Check the level in the reservoir and top off as required

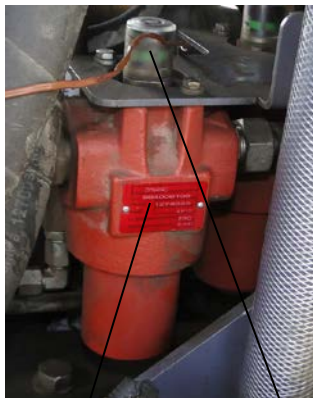


Fig. High-pressure hydraulic filter

- 1. **Filter**
- 2. **Indicator**

High-pressure hydraulic filter – Replacement

-  The filter units must always be replaced in pairs!
-  The engine must be running when replacing the filter!
-  Release the hydraulic pressure by turning the service switch OFF/ON 10 times before replacing the filter!

When the indicator (2) indicates red, the filter must be replaced. Release the filter holder with an Allen key. Unscrew by hand.



Remove the filter (1) and hand in to a waste disposal station. This is a disposable filter and cannot be cleaned.

-  Make sure that the old seal is not left on the filter head. Leakage will otherwise occur between the new and old seal.

Thoroughly clean the sealing surfaces on the filter head. Apply a thin coat of fresh hydraulic fluid on the new filter seal. Screw tight the filter by hand.

Red indicator (2) resets itself automatically after replacement.



1

Fig. Engine compartment
1. Filter housing cover

Return oil filter suction side – Replacement



Remove the filter (1) and deliver to special waste handling. This is a single-use filter and cannot be cleaned.

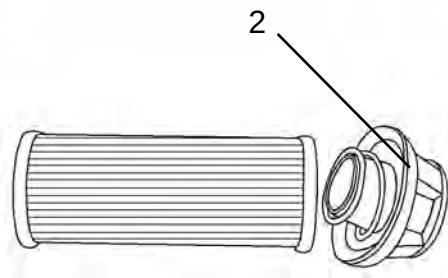


Fig. Filter unit
2. Handle

The return oil filter is located on the hydraulic reservoir behind the right service cover for the engine compartment and must be replaced every 2000 hours or once a year.

- Release the filter housing cover (1) by unscrewing the square bolts.
- Lift out the complete filter unit from the housing and remove the handle (2) from the used filter unit.
- Fit the handle on the new filter unit and put the complete filter insert in the filter housing.
- Refit the filter housing cover.

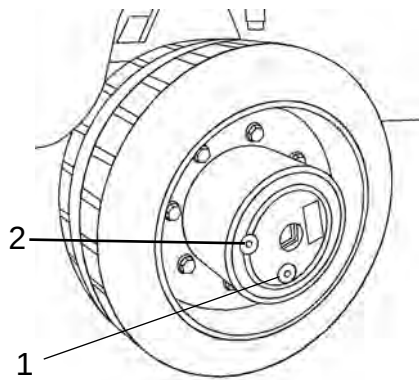


Fig. Planetary gear/position for refilling

1. **Drain plug**
2. **Filler plug**



Chassis leg, drive wheel – Planetary gear, oil draining

The oil is first changed after 250 working hours and then every 2000 hours, but at least once a year.

Position the planer so that the drain plug (1) in the planetary gear is at "6 o'clock" and the filler plug (2) at "9 o'clock".

- Unscrew the drain plug.. Drain the oil into a container.

Oil should be taken to your local waste disposal station.

- Screw tight the drain plug.

- Fill new oil through the filler hole the the lower edge of the level hole. Use transmission oil. See lubrication specification. Screw tight the filler plug.



Drum gearbox – Oil change

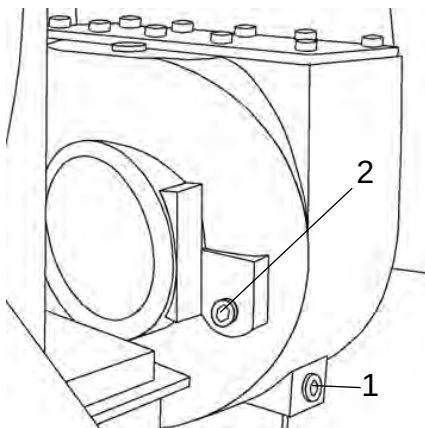


Fig. Drum gearbox

1. **Drain plug**
2. **Filler plug**

The oil is first changed after 250 working hours and then every 2000 hours, but at least once a year.

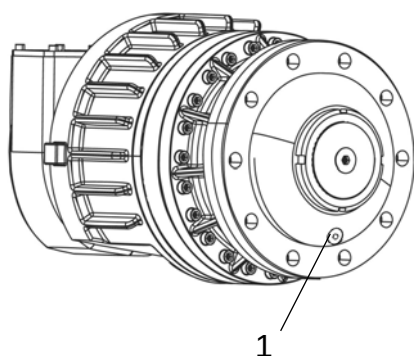


Fig. Drum gear

1. Drain plug

Position the planer on a level surface.

Clean and remove the filler plug (2). Remove the drain plugs by the drum gearbox (1) and by the drum gear (1), and drain the oil into a suitable container.

Refit the drain plugs (1) and fill carefully until the oil reaches the plug hole (2). Wait until the oil has run over in the drum gear, then check the level and top up if required, in accordance with "Drum gearbox - Checking the oil level".

Use transmission oil according to the lubricant specification.



Clean and replace the filler plug (1).

Hand in the drained oil to a waste disposal station



Fuel tank – Drainage

Water and sediment in the fuel tank are removed via the drainage plug in the bottom of the fuel tank.



Be very careful during draining. Do not drop the plug or else all the fuel will flow out.

The draining should be done when the planer has been stationary for a prolonged period, e.g. overnight. The fuel level should be as low as possible.

The planer should preferably have been standing with the drain plug somewhat lower, so that water and sediment will collect at the drain plug (1). Drain as follows:

Place a container under the plug (1).

Remove the plug and drain the water and sediment until only pure fuel runs from the plug. Refit the plug

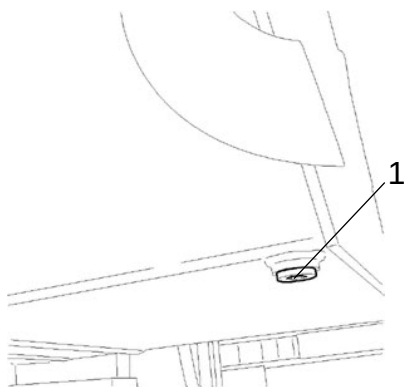


Fig. Fuel tank

1. Drain plug

Disposal

Correctly sorted disposal must be carried out after replacing wear and spare parts and after the machine has been withdrawn from service (scrapped).

The materials must be sorted correctly according to metal, plastic, electronic scrap, various operating substances etc.

Any oil greasy parts (hydraulic hoses, lube pipes etc.) must be treated separately.

Electric devices, accessories and packaging should be recycled in an environment-friendly manner.

Always observe the local regulations.

Appendix

Appendix 1: Engine Fault Code

Service Fault Code	Service Description	J1939		J1939 SPN Description
		SPN	FMI	
111	Engine Control Module Critical Internal Failure - Bad intelligent device or component	629	12	Controller #1
115	Engine Magnetic Speed/Position Lost Both of Two Signals - Data erratic, intermittent or incorrect	612	2	System Diagnostic Code #2
122	Intake Manifold 1 Pressure Sensor Circuit - Voltage above normal, or shorted to high source	102	3	Engine Intake Manifold #1 Pressure
123	Intake Manifold 1 Pressure Sensor Circuit - Voltage below normal, or shorted to low source	102	4	Engine Intake Manifold #1 Pressure
124	Intake Manifold 1 Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level	102	16	Engine Intake Manifold #1 Pressure
131	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source	91	3	Accelerator Pedal Position 1
132	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source	91	4	Accelerator Pedal Position 1
133	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source	974	3	Remote Accelerator Pedal Position
134	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source	974	4	Remote Accelerator Pedal Position
135	Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage above normal, or shorted to high source	100	3	Engine Oil Pressure
141	Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage below normal, or shorted to low source	100	4	Engine Oil Pressure
143	Engine Oil Rifle Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level	100	18	Engine Oil Pressure
144	Engine Coolant Temperature 1 Sensor Circuit - Voltage above normal, or shorted to high source	110	3	Engine Coolant Temperature
145	Engine Coolant Temperature 1 Sensor Circuit - Voltage below normal, or shorted to low source	110	4	Engine Coolant Temperature
146	Engine Coolant Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level	110	16	Engine Coolant Temperature

Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
147	Accelerator Pedal or Lever Position 1 Sensor Circuit Frequency - Data valid but below normal operating Range	91	1	Accelerator Pedal Position 1
148	Accelerator Pedal or Lever Position Sensor 1 - Data valid but above normal operational range - Most Severe Level	91	0	Accelerator Pedal Position 1
151	Engine Coolant Temperature - Data valid but above normal operational range – Most Severe Level	110	0	Engine Coolant Temperature
153	Intake Manifold 1 Temperature Sensor Circuit - Voltage above normal, or shorted to high source	105	3	Engine Intake Manifold 1 Temperature
154	Intake Manifold 1 Temperature Sensor Circuit - Voltage below normal, or shorted to low source	105	4	Engine Intake Manifold 1 Temperature
155	Intake Manifold 1 Temperature - Data valid but above normal operational range – Most Severe Level	105	0	Engine Intake Manifold 1 Temperature
187	Sensor Supply 2 Circuit - Voltage below normal, or shorted to low source	3510	4	Sensor supply voltage 2
195	Coolant Level Sensor 1 Circuit - Voltage above normal, or shorted to high source	111	3	Engine Coolant Level
196	Coolant Level Sensor 1 Circuit - Voltage below normal, or shorted to low source	111	4	Engine Coolant Level
197	Coolant Level - Data Valid But Below Normal Operating Range - Moderately Severe Level	111	18	Engine Coolant Level
221	Barometric Pressure Sensor Circuit - Voltage above normal, or shorted to high	108	3	Barometric Pressure
222	Barometric Pressure Sensor Circuit - Voltage above normal, or shorted to low source	108	4	Barometric Pressure
227	Sensor Supply 2 Circuit - Voltage above normal, or shorted to high source	3510	3	Sensor supply voltage 2
234	Engine Crankshaft Speed/Position - Data valid but above normal operational range - Most Severe Level	190	0	Engine Speed

Appendix

Service Fault Code	Service Description	J1939_SPN	FMI	J1939_SPN Description
235	Coolant Level - Data valid but below normal operational range - Most Severe level	111	1	Engine Coolant Level
238	Sensor Supply 3 Circuit - Voltage below normal, or shorted to low source	3511	4	Sensor supply voltage 3
239	Sensor Supply 3 Circuit - Voltage above normal, or shorted to high source	3511	3	Sensor supply voltage 3
241	Wheel-Based Vehicle Speed - Data erratic, intermittent or incorrect	84	2	Wheel-Based Vehicle Speed
242	Wheel-Based Vehicle Speed Sensor Circuit tampering has been detected - Abnormal rate of change	84	10	Wheel-Based Vehicle Speed
245	Fan Control Circuit - Voltage below normal, or shorted to low source	647	4	Engine Fan Clutch 1 Output Device Driver
249	Ambient Air Temperature Sensor 1 Circuit - Voltage above normal, or shorted to high source	171	3	Ambient Air Temperature
256	Ambient Air Temperature Sensor 1 Circuit - Voltage below normal, or shorted to	171	4	Ambient Air Temperature
271	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage below normal, or shorted	1347	4	Engine Fuel Pump Pressurizing Assembly #1
272	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage above normal, or shorted	1347	3	Engine Fuel Pump Pressurizing Assembly #2
281	Engine Fuel Pump Pressurizing Assembly 1 - Mechanical system not	1347	7	Engine Fuel Pump Pressurizing Assembly #3
285	SAE J1939 Multiplexing PGN Timeout Error - Abnormal update rate	639	9	J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link)
286	SAE J1939 Multiplexing Configuration Error - Out of Calibration	639	13	J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link)

Service Fault Code	Service Description	J1939		J1939 SPN Description
		SPN	FMI	
288	SAE J1939 Multiplexing Remote Accelerator Pedal or Lever Position Sensor System - Received Network Data In Error	974	19	Remote Accelerator Pedal Position
291	Proprietary Datalink Error (OEM/Vehicle Datalink) - Abnormal update rate	625	9	Proprietary Datalink
292	Auxiliary Temperature Sensor Input 1 - Special Instructions	441	14	Auxiliary Temperature 1
293	Auxiliary Temperature Sensor Input 1 Circuit - Voltage above normal, or shorted to high source	441	3	Auxiliary Temperature 1
294	Auxiliary Temperature Sensor Input 1 Circuit - Voltage below normal, or shorted to low source	441	4	Auxiliary Temperature 1
296	Auxiliary Pressure Sensor Input 2 - Special Instructions	1388	14	Auxiliary Pressure #2
297	Auxiliary Pressure Sensor Input 2 Circuit - Voltage above normal, or shorted to high source	1388	3	Auxiliary Pressure #2
298	Auxiliary Pressure Sensor Input 2 Circuit - Voltage below normal, or shorted to low source	1388	4	Auxiliary Pressure #2
322	Injector Solenoid Driver Cylinder 1 Circuit - Current below normal or open circuit	651	5	Engine Injector Cylinder #01
323	Injector Solenoid Driver Cylinder 5 Circuit - Current below normal or open circuit	655	5	Engine Injector Cylinder #05
324	Injector Solenoid Driver Cylinder 3 Circuit - Current below normal or open circuit	653	5	Engine Injector Cylinder #03
325	Injector Solenoid Driver Cylinder 6 Circuit - Current below normal or open circuit	656	5	Engine Injector Cylinder #06
331	Injector Solenoid Driver Cylinder 2 Circuit - Current below normal or open circuit	652	5	Engine Injector Cylinder #02
332	Injector Solenoid Driver Cylinder 4 Circuit - Current below normal or open circuit	654	5	Engine Injector Cylinder #04
338	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage above normal, or shorted to high source	1267	3	Idle Shutdown Vehicle Accessories Relay Driver Circuit
339	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage below normal, or shorted to low source	1267	4	Idle Shutdown Vehicle Accessories Relay Driver Circuit
343	Engine Control Module Warning Internal Hardware Failure - Bad intelligent device or component	629	12	Controller #1

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Service Fault Code	Service Description	J1939_SPN	FMI	J1939_SPN Description
349	Transmission Output Shaft Speed - Data Valid But Above Normal Operating Range - Moderately Severe Level	191	16	Transmission Output Shaft Speed
351	Injector Power Supply - Bad intelligent device or component	3597	12	ECU Power Output Supply Voltage #1
352	Sensor Supply 1 Circuit - Voltage below normal, or shorted to low source	3509	4	Sensor supply voltage 1
386	Sensor Supply 1 Circuit - Voltage above normal, or shorted to high source	3509	3	Sensor supply voltage 1
415	Engine Oil Rifle Pressure - Data valid but below normal operational range - Most Severe Level	100	1	Engine Oil Pressure
418	Water in Fuel Indicator - Data Valid But Above Normal Operating Range - Least Severe Level	97	15	Water In Fuel Indicator
428	Water in Fuel Indicator Sensor Circuit - Voltage above normal, or shorted to high source	97	3	Water In Fuel Indicator
429	Water in Fuel Indicator Sensor Circuit - Voltage below normal, or shorted to low source	97	4	Water In Fuel Indicator
431	Accelerator Pedal or Lever Idle Validation Switch - Data erratic, intermittent or incorrect	558	2	Accelerator Pedal 1 Low Idle Switch
432	Accelerator Pedal or Lever Idle Validation Switch Circuit - Out of Calibration	558	13	Accelerator Pedal 1 Low Idle Switch
435	Engine Oil Rifle Pressure - Data erratic, intermittent or incorrect	100	2	Engine Oil Pressure
441	Battery 1 Voltage - Data Valid But Below Normal Operating Range - Moderately Severe Level	168	18	Battery Potential / Power Input 1
442	Battery 1 Voltage - Data Valid But Above Normal Operating Range - Moderately Severe Level	168	16	Battery Potential / Power Input 1
449	Injector Metering Rail 1 Pressure - Data valid but above normal operational range - Most Severe Level	157	0	Engine Injector Metering Rail 1 Pressure
451	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage above normal, or shorted to high source	157	3	Engine Injector Metering Rail 1 Pressure
452	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage below normal, or shorted to low source	157	4	Engine Injector Metering Rail 1 Pressure
483	Injector Metering Rail 2 Pressure Sensor Circuit - Voltage above normal, or shorted to high source	1349	3	Engine Injector Metering Rail 2 Pressure

Service Fault Code	Service Description	J1939_		J1939_SPN Description
		SPN	FMI	
488	Intake Manifold 1 Temperature - Data Valid But Above Normal Operating Range – Moderately Severe Level	105	16	Engine Intake Manifold Temperature
489	Transmission Output Shaft Speed - Data Valid But Below Normal Operating Range - Moderately Severe Level	191	18	Transmission Output Shaft
497	Multiple Unit Synchronization Switch - Data erratic, intermittent or incorrect	1377	2	Engine Synchronization
515	Sensor Supply 6 Circuit - Voltage above normal, or shorted to high source	3514	3	Sensor supply voltage 6
516	Sensor Supply 6 Circuit - Voltage below normal, or shorted to low source	3514	4	Sensor supply voltage 6
523	Auxiliary Intermediate (PTO) Speed Switch Validation - Data erratic, intermittent or incorrect	611	2	System Diagnostic Code #1
527	Auxiliary Input/Output 2 Circuit - Voltage above normal, or shorted to high source	702	3	Auxiliary I/O #02
529	Auxiliary Input/Output 3 Circuit - Voltage above normal, or shorted to high source	703	3	Auxiliary I/O #03
546	Fuel Delivery Pressure Sensor Circuit - Voltage above normal, or shorted to high source	94	3	Engine Fuel Delivery Pressure
547	Fuel Delivery Pressure Sensor Circuit - Voltage below normal, or shorted to low source	94	4	Engine Fuel Delivery Pressure
553	Injector Metering Rail 1 Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level	157	16	Engine Injector Metering Rail 1 Pressure
555	Crankcase Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level	101	16	Engine Crankcase Pressure
556	Crankcase Pressure - Data valid but above normal operational range - Most Severe Level	101	0	Engine Crankcase Pressure
559	Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level	157	18	Engine Injector Metering Rail 1 Pressure
584	Starter Relay Driver Circuit - Voltage above normal, or shorted to high source	677	3	Engine Starter Motor Relay
585	Starter Relay Driver Circuit - Voltage below normal, or shorted to low source	677	4	Engine Starter Motor Relay

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Service Fault Code	Service Description	J1939		J1939 SPN Description
		SPN	FMI	
595	Turbocharger 1 Speed - Data Valid But Above Normal Operating Range - Moderately Severe Level	103	16	Engine Turbocharger 1 Speed
599	Auxiliary Commanded Dual Output Shutdown - Special Instructions	640	14	Engine External Protection Input
649	Engine Oil Change Interval - Condition Exists	1378	31	Engine Oil Change Interval
687	Turbocharger 1 Speed - Data Valid But Below Normal Operating Range - Moderately Severe Level	103	18	Engine Turbocharger 1 Speed
689	Engine Crankshaft Speed/Position - Data erratic, intermittent or incorrect	190	2	Engine Speed
691	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage above normal, or shorted to high source	1172	3	Engine Turbocharger 1 Compressor Intake Temperature
692	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage below normal, or shorted to low source	1172	4	Engine Turbocharger 1 Compressor Intake Temperature
731	Engine Speed / Position Camshaft and Crankshaft Misalignment - Mechanical system not responding or out of adjustment	723	7	Engine Speed 2
741	Turbocharger 1 Compressor Intake Pressure Circuit - Voltage above normal, or shorted to high source	1176	3	Engine Turbocharger 1 Compressor Intake Pressure
742	Turbocharger 1 Compressor Intake Pressure Circuit - Voltage below normal, or shorted to low source	1176	4	Engine Turbocharger 1 Compressor Intake Pressure
743	Turbocharger 1 Compressor Intake Pressure - Data erratic, intermittent or incorrect	1176	2	Engine Turbocharger 1 Compressor Intake Pressure
771	Brake Switch Circuit - Voltage below normal, or shorted to low source	597	4	Brake Switch
778	Engine Camshaft Speed / Position Sensor - Data erratic, intermittent or incorrect	723	2	Engine Speed 2

Service Fault Code	Service Description	J1939_		J1939_SPN Description
		SPN	FMI	
1117	Power Supply Lost With Ignition On - Data erratic, intermittent or incorrect	3597	2	ECU Power Output Supply
1141	Injector Solenoid Driver Cylinder 2 - Mechanical system not responding or out of adjustment	652	7	Engine Injector Cylinder #02
1142	Injector Solenoid Driver Cylinder 3 - Mechanical system not responding or out of adjustment	653	7	Engine Injector Cylinder #03
1143	Injector Solenoid Driver Cylinder 4 - Mechanical system not responding or out of adjustment	654	7	Engine Injector Cylinder #04
1144	Injector Solenoid Driver Cylinder 5 - Mechanical system not responding or out of adjustment	655	7	Engine Injector Cylinder #05
1145	Injector Solenoid Driver Cylinder 6 - Mechanical system not responding or out of adjustment	656	7	Engine Injector Cylinder #06
1239	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage above normal, or shorted to high source	2623	3	Accelerator Pedal #1 Channel 2
1241	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage below normal, or shorted to low source	2623	4	Accelerator Pedal #1 Channel 2
1242	Accelerator Pedal or Lever Position Sensor 1 - Data erratic, intermittent or incorrect	91	2	Accelerator Pedal Position 1
1358	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source	91	3	Accelerator Pedal Position 1
1359	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source	91	4	Accelerator Pedal Position 1
1427	Overspeed Shutdown Relay Driver Diagnostic has detected an error - Condition Exists	4185	31	Overspeed Shutdown Relay Driver
1428	Low Oil Pressure (LOP) Shutdown Relay Driver Diagnostic has detected an error - Condition Exists	4186	31	Low Oil Pressure Shutdown Relay Driver

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Service Fault Code	Service Description	J1939		J1939 SPN Description
		SPN	FMI	
1429	High Engine Temperature (HET) Shutdown Relay Driver Diagnostic has detected an error - Condition Exists	4187	31	High Engine Temperature Shutdown Relay Driver
1431	Pre-Low Oil Pressure Warning Relay Driver Diagnostic has detected an error - Condition Exists	4188	31	Pre-Low Oil Pressure Indicator Relay Driver
1432	Pre-High Engine Temperature Warning Relay Driver Diagnostic has detected an error - Condition Exists	4223	31	Pre-High Engine Temperature Warning Relay Driver
1515	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Received Network Data In Error	91	19	Accelerator Pedal Position 1
1539	Auxiliary Pressure Sensor Input 1 Circuit - Voltage above normal, or shorted to high source	1387	3	Auxiliary Pressure #1
1239	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage above normal, or shorted to high source	2623	3	Accelerator Pedal #1 Channel 2
1241	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage below	2623	4	Accelerator Pedal #1 Channel 2
1242	Accelerator Pedal or Lever Position Sensor 1 - Data erratic, intermittent or incorrect	91	2	Accelerator Pedal Position 1
1358	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source	91	3	Accelerator Pedal Position 1
1359	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source	91	4	Accelerator Pedal Position 1
1427	Overspeed Shutdown Relay Driver Diagnostic has detected an error - Condition Exists	4185	31	Overspeed Shutdown Relay
1428	Low Oil Pressure (LOP) Shutdown Relay Driver Diagnostic has detected an error - Condition	4186	31	Low Oil Pressure Shutdown Relay Driver
1429	High Engine Temperature (HET) Shutdown Relay Driver Diagnostic has detected an error - Condition Exists	4187	31	High Engine Temperature Shutdown Relay
1431	Pre-Low Oil Pressure Warning Relay Driver Diagnostic has detected an error - Condition exist	4188	31	Pre-Low Oil Pressure Indicator Relay Driver
1432	Pre-High Engine Temperature Warning Relay Driver Diagnostic has detected an error - Condition Exists	4223	31	Pre-High Engine Temperature Warning Relay
1515	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System	91	19	Accelerator Pedal Position 1

Service Fault Code	Service Description	J1939_		J1939_SPN Description
		SPN	FMI	
1539	Auxiliary Pressure Sensor Input 1 Circuit - Voltage above normal, or shorted to high source	1387	3	Auxiliary Pressure #1
1678	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature Sensor - Voltage above normal, or shorted to high source	3031	3	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature
1679	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature - Data erratic, intermittent or incorrect	3031	2	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature
1682	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Input Lines - Condition Exists	3362	31	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Input Lines
1683	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Voltage above normal, or shorted to high source	3363	3	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater
1684	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Voltage below normal, or shorted to low source	3363	4	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater
1685	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Voltage below normal, or shorted to low source	3364	4	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
1686	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Voltage above normal, or shorted to high source	3364	3	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
1691	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level	5298	18	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Sever level
1694	Aftertreatment 1 Outlet NOx Sensor - Data erratic, intermittent or incorrect	3226	2	Aftertreatment 1 Outlet NOx
1695	Sensor Supply 5 - Voltage above normal, or shorted to high source	3513	3	Sensor supply voltage 5
1696	Sensor Supply 5 - Voltage below normal, or shorted to low source	3513	4	Sensor supply voltage 5
1712	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Data Valid But Below Normal Operating Range - Moderately Severe Level	3363	18	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater
1713	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Data Valid But Above Normal Operating Range - Moderately Severe Level	3363	16	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater

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Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
1714	Aftertreatment Diesel Exhaust Fluid Quality - Out of Calibration	3364	13	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
1715	Aftertreatment Diesel Exhaust Fluid Quality - Root Cause Not Known	3364	11	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
1843	Crankcase Pressure Circuit - Voltage above normal, or shorted to high source	101	3	Engine Crankcase
1844	Crankcase Pressure Circuit - Voltage below normal, or shorted to low source	101	4	Engine Crankcase Pressure
1852	Water in Fuel Indicator - Data Valid But Above Normal Operating Range – Moderately Severe Level	97	16	Water In Fuel Indicator
1866	Exhaust Gas Recirculation Differential Pressure - Data erratic, intermittent or incorrect	411	2	Engine Exhaust Gas Recirculation 1 Differential Pressure
1885	Aftertreatment 1 Intake NOx Sensor Circuit - Voltage below normal, or shorted to low source	3216	4	Aftertreatment 1 Intake NOx
1887	Aftertreatment 1 Outlet NOx Sensor Circuit - Voltage below normal, or shorted to low source	3226	4	Aftertreatment 1 Outlet NOx
1896	EGR Valve Controller - Out of Calibration	2791	13	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control
1898	VGT Actuator Controller - Out of Calibration	641	13	Engine Variable Geometry Turbocharger Actuator #1
1938	ECU Power Output Supply Voltage 1 - Data Valid But Below Normal Operating Range - Moderately Severe Level	3597	18	ECU Power Output Supply Voltage #1
1942	Crankcase Pressure - Data erratic, intermittent or incorrect	101	2	Engine Crankcase Pressure
1961	EGR Valve Control Circuit Over Temperature - Data Valid But Above Normal Operating Range - Least Severe Level	2791	15	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control

Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
1962	VGT Actuator Driver Over Temperature (Calculated) - Data Valid But Above Normal Operating Range - Least Severe Level	641	15	Engine Variable Geometry
1974	Crankcase Pressure - Data Valid But Above Normal Operating Range - Least Severe Level	101	15	Engine Crankcase Pressure
1976	VGT Actuator Driver Over Temperature (Calculated) - Data Valid But Above Normal Operating Range - Least Severe Level	641	15	Engine Variable Geometry
2182	Engine Brake Actuator Driver 1 Circuit - Voltage above normal, or shorted to high source	1072	3	Engine (Compression) Brake Output
2183	Engine Brake Actuator Driver 1 Circuit - Voltage below normal, or shorted to low source	1072	4	Engine (Compression) Brake Output
2185	Sensor Supply 4 Circuit - Voltage above normal, or shorted to high source	3512	3	Sensor supply voltage 4
2186	Sensor Supply 4 Circuit - Voltage below normal, or shorted to low source	3512	4	Sensor supply voltage 4
2198	VGT Actuator Driver Circuit - Root Cause Not Known	641	11	Engine Variable Geometry Turbocharger Actuator #1
2265	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage above normal, or shorted to high source	1075	3	Engine Electric Lift Pump for Engine Fuel Supply
2266	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage below normal, or shorted to low source	1075	4	Engine Electric Lift Pump for Engine Fuel Supply
2272	EGR Valve Position Circuit - Voltage below normal, or shorted to low source	27	4	Engine Exhaust Gas Recirculation 1 Valve Position
2273	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage above normal, or shorted to high source	411	3	Engine Exhaust Gas Recirculation 1 Differential Pressure
2274	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage below normal or shorted to low source	411	4	Engine Exhaust Gas Recirculation 1 Differential Pressure
2288	Turbocharger 1 Speed - Data Valid But Above Normal Operating Range - Least Severe Level	103	15	Engine Turbocharger 1 Speed
2311	Electronic Fuel Injection Control Valve Circuit - Condition Exists	633	31	Engine Fuel Actuator 1 Control Command

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Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
2321	Engine Crankshaft Speed/Position - Data erratic, intermittent or incorrect	190	2	Engine Speed
2322	Engine Camshaft Speed / Position Sensor - Data erratic, intermittent or incorrect	723	2	Engine Speed 2
2346	Turbocharger Turbine Intake Temperature - Data Valid But Above Normal Operating Range - Least Severe	2789	15	Engine Turbocharger 1 Calculated Turbine Intake Temperature
2349	EGR Valve Control Circuit - Current below normal or open circuit	2791	5	Engine Exhaust GasRecirculation 1 (EGR1) Valve Control
2353	EGR Valve Control Circuit - Current above normal or grounded circuit	2791	6	Engine Exhaust GasRecirculation 1 (EGR1) Valve Control
2357	EGR Valve Control Circuit - Mechanical system not responding or out of adjustment	2791	7	Engine Exhaust GasRecirculation 1 (EGR1) Valve Control
2363	Engine Brake Actuator Driver Output 2 Circuit - Voltage below normal, or shorted to low source	1073	4	Engine (Compression) Brake Output
2367	Engine Brake Actuator Driver Output 2 Circuit - Voltage above normal, or shorted to high source	1073	3	Engine (Compression) Brake Output
2372	Fuel Filter Differential Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level	95	16	Engine Fuel Filter
2373	Exhaust Gas Pressure Sensor 1 Circuit - Voltage above normal, or shorted to high source	1209	3	Engine Exhaust Gas Pressure 1
2374	Exhaust Gas Pressure Sensor 1 Circuit - Voltage below normal, or shorted to low source	1209	4	Engine Exhaust Gas Pressure 1
2375	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage above normal, or shorted to high source	412	3	Engine Exhaust Gas Recirculation 1 Temperature
2376	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage below normal, or shorted to low source	412	4	Engine Exhaust Gas Recirculation 1 Temperature
2377	Fan Control Circuit - Voltage above normal, or shorted to high source	647	3	Engine Fan Clutch 1 Output Device Driver

Service Fault Code	Service Description	J1939_ SPN		J1939_ SPN Description
2387	VGT Actuator Driver Circuit (Motor) - Mechanical system not responding or out of adjustment	641	7	Engine Variable Geometry Turbocharger Actuator #1
2448	Coolant Level - Data Valid But Below Normal Operating Range - Least Severe Level	111	17	Engine Coolant
2449	VGT Actuator Controller - Out of Calibration	641	13	Engine Variable Geometry Turbocharger
2468	Engine Crankshaft Speed/Position - Data Valid But Above Normal Operating Range - Moderately Severe Level	190	16	Engine Speed
2554	Exhaust Gas Pressure 1 - Data erratic, intermittent or incorrect	1209	2	Engine Exhaust Gas Pressure 1
2555	Engine Intake Air Heater 1 Circuit - Voltage above normal, or shorted to high source	729	3	Engine Intake Air Heater Driver #1
2556	Engine Intake Air Heater 1 Circuit - Voltage below normal, or shorted to low source	729	4	Engine Intake Air Heater Driver #1
2557	Auxiliary PWM Driver 1 Circuit - Voltage above normal, or shorted to high source	697	3	Auxiliary PWM Driver #1
2558	Auxiliary PWM Driver 1 Circuit - Voltage below normal, or shorted to low source	697	4	Auxiliary PWM Driver #1
2571	Engine Charge Air Cooler Outlet Temperature - Voltage above normal, or shorted to high source	2630	3	Engine Charge Air Cooler 1 Outlet Temperature
2572	Engine Charge Air Cooler Outlet Temperature - Voltage below normal, or shorted to low source	2630	4	Engine Charge Air Cooler 1 Outlet
2634	VGT Actuator Controller - Bad intelligent device or component	641	12	Engine Variable Geometry Turbocharger Actuator #1
2635	VGT Actuator Driver Circuit - Condition Exists	641	31	Engine Variable Geometry Turbocharger Actuator #1
2636	VGT Actuator Driver Circuit - Abnormal update rate	641	9	Engine Variable Geometry Turbocharger Actuator #1
2637	Aftertreatment 1 Diesel Oxidation Catalyst Face Plugged - Root Cause Not Known	5018	11	Aftertreatment Diesel Oxidation

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Service Fault Code	Service Description	J1939_		J1939_SPN Description
		SPN	FMI	
2638	Aftertreatment 1 Diesel Oxidation Catalyst Conversion Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level	5298	18	Aftertreatment 1 Diesel Oxidation Catalyst
2646	Engine Coolant Temperature - Condition Exists	110	31	Engine Coolant Temperature
2659	Engine Coolant Temperature - Condition Exists	110	31	Engine Coolant Temperature
2754	Engine Diesel Particulate Filter Intake Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level	81	16	Engine Diesel Particulate Filter Intake Pressure
2771	Aftertreatment 1 Outlet NOx Sensor - Abnormal update rate	3226	9	Aftertreatment 1 Outlet NOx
2961	Exhaust Gas Recirculation Temperature - Data Valid But Above Normal Operating Range - Least Severe Level	412	15	Engine Exhaust Gas Recirculation 1 Temperature
2962	Exhaust Gas Recirculation Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level	412	16	Engine Exhaust Gas Recirculation 1 Temperature
2964	Intake Manifold 1 Temperature - Data Valid But Above Normal Operating Range - Least Severe Level	105	15	Engine Intake Manifold #1 Temperature
2976	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Temperature - Data erratic, intermittent or incorrect	3361	2	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit
2998	Engine Torque Limit Feature - Special Instructions	1632	14	Engine Torque Limit Feature
3139	Engine Air Shutoff Circuit - Voltage above normal, or shorted to high source	3667	3	Engine Air Shutoff Status
3141	Engine Air Shutoff Circuit - Voltage below normal, or shorted to low source	3667	4	Engine Air Shutoff
3142	Aftertreatment 1 SCR Intake Temperature Sensor Circuit - Voltage above normal, or shorted to high source	4360	3	Aftertreatment 1 SCR Catalyst Intake Gas
3143	Aftertreatment 1 SCR Intake Temperature Sensor Circuit - Voltage below normal, or shorted to low source	4360	4	Aftertreatment 1 SCR Catalyst Intake Gas Temperature
3144	Aftertreatment 1 SCR Intake Temperature Sensor - Data erratic, intermittent or incorrect	4360	2	Aftertreatment 1 SCR Catalyst Intake Gas Temperature

Service Fault Code	Service Description	J1939_		J1939_SPN Description
		SPN	FMI	
3146	Aftertreatment 1 SCR Outlet Temperature Sensor Circuit - Voltage above normal, or shorted to high source	4363	3	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature
3147	Aftertreatment 1 SCR Outlet Temperature Sensor Circuit - Voltage below normal, or shorted to low source	4363	4	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature
3148	Aftertreatment 1 SCR Outlet Temperature Sensor - Data erratic, intermittent or incorrect	4363	2	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature
3151	Aftertreatment 1 SCR Catalyst System Missing - Condition Exists	4794	31	Aftertreatment 1 SCR Catalyst System
3164	Aftertreatment 1 SCR Intake Temperature - Data Valid But Above Normal Operating Range - Least Severe	4360	15	Aftertreatment 1 SCR Catalyst Intake Gas Temperature
3165	Aftertreatment 1 SCR Outlet Temperature - Data valid but above normal operational range - Most Severe	4363	0	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature
3186	Tachograph Output Shaft Speed - Abnormal update rate	1623	9	Tachograph output shaft speed
3213	Tachograph Output Shaft Speed - Received Network Data In Error	1623	19	Tachograph output shaft speed
3228	Aftertreatment 1 Intake NOx Sensor - Data erratic, intermittent or incorrect	3216	2	Aftertreatment 1 Intake NOx
3229	Aftertreatment 1 SCR Intake Temperature - Data valid but above normal operational range - Most Severe Level	4360	0	Aftertreatment 1 SCR Catalyst Intake Gas Temperature
3231	Aftertreatment 1 SCR Intake Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level	4360	16	Aftertreatment 1 SCR Catalyst Intake Gas Temperature
3232	Aftertreatment 1 Intake NOx Sensor - Abnormal update rate	3216	9	Aftertreatment 1 Intake NOx
3235	Aftertreatment 1 SCR Outlet Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level	4363	16	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature

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Service Fault Code	Service Description	J1939		J1939 SPN Description
		SPN	FMI	
3237	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Voltage above normal, or shorted to high source	4340	3	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State
3238	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Voltage below normal, or shorted to low source	4340	4	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State
3239	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Voltage above normal, or shorted to high source	4342	3	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State
3241	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Voltage below normal, or shorted to low source	4342	4	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State
3242	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Mechanical system not responding or out of adjustment	3363	7	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater
3251	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature - Data Valid But Above Normal Operating Range	4765	16	Aftertreatment Diesel Oxidation Catalyst Intake
3258	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Current below normal or open circuit	4340	5	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State
3261	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Current below normal or open circuit	4342	5	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State
3298	Anti-theft Encryption Seed - Out of Calibration	1194	13	Anti-theft Encryption Seed Present Indicator
3313	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voltage below normal, or shorted to low source	4765	4	Aftertreatment Diesel Oxidation Catalyst Intake Temperature
3314	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voltage above normal, or shorted to high source	4765	3	Aftertreatment Diesel Oxidation Catalyst Intake
3315	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature - Data erratic, intermittent or incorrect	4765	2	Aftertreatment Diesel Oxidation Catalyst Intake Temperature

Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
3319	Aftertreatment 1 Diesel Particulate Filter Outlet Temperature Sensor Circuit - Voltage above normal, or shorted to high source	3246	3	Aftertreatment 1 Diesel Particulate Filter Outlet Gas Temperature
3326	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Abnormal update rate	91	9	Accelerator Pedal Position 1
3328	Transmission Output Shaft Speed - Abnormal update rate	191	9	Transmission Output Shaft Speed
3329	J1939 Network #2 - Data erratic, intermittent or incorrect	1231	2	J1939 Network #2
3331	J1939 Network #3 - Data erratic, intermittent or incorrect	1235	2	J1939 Network #3
3341	Engine Air Filter Differential Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level	107	16	Engine Air Filter 1 Differential Pressure
3418	Transmission Output Shaft Speed - Received Network Data In Error	191	19	Transmission Output Shaft Speed
3419	Sensor Supply 7 Circuit - Voltage above normal or shorted to high source	5125	3	Sensor supply voltage 7
3421	Sensor Supply 7 Circuit - Voltage below normal, or shorted to low source	5125	4	Sensor supply voltage 7
3422	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Voltage above normal, or shorted to high source	4344	3	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State
3423	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Voltage below normal, or shorted to low source	4344	4	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State
3425	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Current below normal or open circuit	4344	5	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State
3488	Anti-Lock Braking (ABS) Controller - Abnormal update rate	563	9	Anti-Lock Braking (ABS) Active
3497	Aftertreatment 1 Diesel Exhaust Fluid Tank Level - Data Valid But Below Normal Operating Range - Least Severe Level	1761	17	Aftertreatment 1 Diesel Exhaust Fluid Tank Level

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Service Fault Code	Service Description	J1939		J1939_SPN Description
		SPN	FMI	
3498	Aftertreatment 1 Diesel Exhaust Fluid Tank Level - Data Valid But Below Normal Operating Range - Moderately Severe Level	1761	18	Aftertreatment 1 Diesel Exhaust Fluid Tank Level
3525	Wheel-Based Vehicle Speed - Received Network Data In Error	84	19	Wheel-Based Vehicle Speed
3527	Accelerator Pedal or Lever Idle Validation Switch - Received Network Data In Error	558	19	Accelerator Pedal 1 Low Idle Switch
3531	Ambient Air Temperature - Abnormal update	171	9	Ambient Air Temperature
3543	NOx limits exceeded due to Insufficient Reagent Quality - Condition Exists	4094	31	NOx limits exceeded due to Insufficient Diesel Exhaust Fluid Quality
3545	Aftertreatment 1 Outlet NOx Sensor - Abnormal rate of change	3226	10	Aftertreatment 1 Outlet NOx
3547	Aftertreatment Diesel Exhaust Fluid Tank Empty - Condition Exists	4096	31	NOx limits exceeded due to Empty Diesel Exhaust Fluid
3555	Engine Wait to Start Lamp - Abnormal update rate	1081	9	Engine Wait to Start Lamp
3558	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit - Voltage above normal, or shorted to high source	3361	3	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit
3559	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit - Voltage below normal, or shorted to low source	3361	4	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit
3562	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage above normal, or shorted to high source	5491	3	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay
3563	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage below normal, or shorted to low source	5491	4	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay
3567	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Current below normal or open circuit	5394	5	Aftertreatment Diesel Exhaust Fluid Dosing Valve
3568	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Mechanical system not responding or out of adjustment	5394	7	Aftertreatment Diesel Exhaust Fluid Dosing Valve
3571	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Voltage above normal, or shorted to high source	4334	3	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure
3572	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Voltage below normal, or shorted to low source	4334	4	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure

Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
3574	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data Valid But Below Normal Operating Range	4334	18	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure
3575	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data Valid But Above Normal Operating Range	4334	16	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure
3577	Aftertreatment Diesel Exhaust Fluid Return Valve - Voltage above normal, or shorted to high source	4376	3	Aftertreatment 1 Diesel Exhaust Fluid Return Valve
3578	Aftertreatment Diesel Exhaust Fluid Return Valve - Voltage below normal, or shorted to low source	4376	4	Aftertreatment 1 Diesel Exhaust Fluid Return Valve
3582	Aftertreatment SCR Catalyst Conversion Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level	4364	18	Aftertreatment 1 SCR Conversion Efficiency
3583	Aftertreatment 1 Outlet NOx Sensor Heater - Abnormal rate of change	5031	10	Aftertreatment 1 Outlet Gas NOx Sensor Heater Ratio
3596	Aftertreatment 1 Diesel Exhaust Fluid Pressure Sensor - Data erratic, intermittent or incorrect	4334	2	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure
3613	SAE J1939 Multiplexing PGN Timeout Error - Abnormal update rate	111	9	SAE J1939 Multiplexing PGN Timeout
3614	Coolant Level Sensor - Received Network Data in Error	111	19	SAE J1939 Multiplexing PGN Timeout
3633	Engine Fan Clutch 2 Control Circuit - Voltage above normal, or shorted to high source	5484	3	Engine Fan Clutch 2 Output Device Driver
3634	Engine Fan Clutch 2 Control Circuit - Voltage below normal, or shorted to low source	5484	4	Engine Fan Clutch 2 Output Device Driver
3641	Transmission Output Retarder - Abnormal update rate	748	9	Transmission Output Retarder
3649	Aftertreatment 1 Intake NOx Sensor Heater - Abnormal rate of change	5024	10	Aftertreatment 1 Intake Gas NOx Sensor Heater Ratio
3681	Aftertreatment 1 Outlet NOx Sensor Power Supply - Data erratic, intermittent or incorrect	3228	2	Aftertreatment 1 Outlet Gas Sensor Power Status
3682	Aftertreatment 1 Intake NOx Sensor Power Supply - Data erratic, intermittent or incorrect	3218	2	Aftertreatment 1 Intake Gas Sensor Power Status

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Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
3697	Engine Control Module Calibration Memory - Bad intelligent device or component	630	12	Engine Control Module Calibration Memory
3712	Aftertreatment SCR Operator Inducement - Data valid but above normal operational range - Most Severe level	5246	0	Aftertreatment SCR Operator Inducement Severity
3714	Engine Protection Torque Derate - Condition Exists	1569	31	Engine Protection Torque Derate
3717	Aftertreatment 1 Outlet NOx Sensor - Out of Calibration	3226	13	Aftertreatment 1 Outlet NOx
3718	Aftertreatment 1 Intake NOx - Out of Calibration	3216	13	Aftertreatment 1 Intake NOx
3724	Battery 1 Voltage - Data Valid But Below Normal Operating Range - Least Severe Level	168	17	Battery Potential / Power Input 1
3725	Aftertreatment 1 Intake NOx Sensor - Abnormal rate of change	3216	10	Aftertreatment 1 Intake NOx
3726	Aftertreatment 1 Intake NOx - Data Valid But Above Normal Operating Range - Moderately Severe Level	3216	16	Aftertreatment 1 Intake NOx
3727	High Pressure Common Rail Fuel Pressure Relief Valve - Mechanical system not responding or out of adjustment	5571	7	High Pressure Common Rail Fuel Pressure
3737	Engine Starter Mode Overcrank Protection - Condition Exists	1675	31	Engine Starter Mode
3741	High Pressure Common Rail Fuel Pressure Relief Valve - Data valid but above normal operational range	5571	0	High Pressure Common Rail Fuel Pressure Relief Valve
3748	Aftertreatment 1 Intake NOx Sensor - Data not Rational - Drifted High	3216	20	Aftertreatment 1 Intake NOx
3749	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High	3226	20	Aftertreatment 1 Outlet NOx
3751	Aftertreatment SCR Catalyst System - Mechanical system not responding or out of adjustment	4792	7	Aftertreatment SCR Catalyst
3755	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Data erratic, intermittent or incorrect	5394	2	Aftertreatment Diesel Exhaust Fluid Dosing Valve
3765	Auxiliary Temperature Sensor Input 2 Circuit - Voltage above normal, or shorted to high source	442	3	Auxiliary Temperature 2

Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
3766	Auxiliary Temperature Sensor Input 2 Circuit - Voltage below normal, or shorted to low source	442	4	Auxiliary Temperature 2
3843	Cruise Control Disable Command - Abnormal update rate	5603	9	Cruise Control Disable Command
3844	Cruise Control Pause Command - Condition Exists	5605	31	Cruise Control Pause Command
3845	Cruise Control Disable Command - Condition Exists	5603	31	Cruise Control Disable Command
3867	Aftertreatment Diesel Exhaust Fluid Quality - Data Valid But Below Normal Operating Range - Moderate Severe Level	3364	18	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
3868	Aftertreatment Diesel Exhaust Fluid Quality - Abnormal update rate	3364	9	Aftertreatment 1 Diesel Exhaust Fluid Tank 1
3876	Aftertreatment Diesel Exhaust Fluid Quality Sensor - Mechanical system not responding or out of adjustment	3364	7	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
3877	Aftertreatment Diesel Exhaust Fluid Quality Sensor - Bad intelligent device or component	3364	12	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
3878	Aftertreatment Diesel Exhaust Fluid Quality - Data erratic, intermittent or incorrect	3364	2	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
4151	Aftertreatment Diesel Particulate Filter Temperature Sensor Module - Abnormal update rate	5742	9	Aftertreatment Diesel Particulate Filter Temperature
4152	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Abnormal update rate	5743	9	Aftertreatment Selective Catalytic Reduction Temperature
4155	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay - Voltage Above Normal, or Shorted to high source	5746	3	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay
4156	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay - Voltage below normal, or shorted to low source	5746	4	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay
4157	Aftertreatment Diesel Exhaust Fluid Return Valve - Mechanical system not responding or out of adjust	4376	7	Aftertreatment 1 Diesel Exhaust Fluid Return Valve

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Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
4158	Aftertreatment Diesel Particulate Filter Temperature Sensor Module - Bad intelligent device or component	5742	12	Aftertreatment Diesel Particulate Filter Temperature Sensor Module
4159	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Bad intelligent device or component	5743	12	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module
4161	Aftertreatment Diesel Particulate Filter Temperature Sensor Module - Voltage Above Normal, or Shorted to high source	5742	3	Aftertreatment Diesel Particulate Filter Temperature Sensor Module
4162	Aftertreatment Diesel Particulate Filter Temperature Sensor Module - Voltage below normal, or shorted to low source	5742	4	Aftertreatment Diesel Particulate Filter Temperature Sensor Module
4163	Aftertreatment Diesel Particulate Filter Temperature Sensor Module-Data Valid But Above Normal Operating Range	5742	16	Aftertreatment Diesel Particulate Filter Temperature Sensor Module
4164	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Voltage Above Normal, or Shorted to high source	5743	3	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module
4165	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Voltage below normal, or Shorted to low source	5743	4	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module
4166	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Data Valid But Above Normal	5743	16	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module
4168	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater - Voltage Above Normal, or Shorted to High	5745	3	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater
4169	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater - Voltage below normal, or shorted to low source	5745	4	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater
4171	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater - Data Valid But Below Normal Operating Range	5745	18	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater
4213	Aftertreatment Regeneration Inhibit Switch - Data erratic, intermittent or incorrect	3695	2	Aftertreatment Regeneration Inhibit Switch

Service Fault Code	Service Description	J1939		J1939_SPN Description
		SPN	FMI	
4215	Anti-Lock Braking (ABS) Active - Condition Exists	563	31	Anti-Lock Braking (ABS) Active
4241	Aftertreatment Diesel Exhaust Fluid Quality - Received Network Data In Error	3364	19	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
4243	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 - Abnormal Rate of Change	3515	10	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2
4249	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature - Abnormal Rate of Change	4337	10	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature
4251	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Temperature - Abnormal Rate of Change	5798	10	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Temperature
4261	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module - Root Cause Not Known	5743	11	Aftertreatment Selective Catalytic Reduction Temperature Sensor Module
4277	Aftertreatment Diesel Exhaust Fluid Quality - Abnormal Rate of Change	3364	10	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
4437	J1939 Network #4 - Data erratic, intermittent or incorrect	1668	2	J1939 Network #4 - Data erratic
4484	Engine Air Shutoff - Mechanical System Not Responding or Out of Adjustment	3667	7	Engine Air Shutoff
4517	Vehicle Identification Number - Out of Calibration	237	13	Vehicle Identification Number
4533	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature Sensor Circuit - Voltage above normal, or shorted to high source	4766	3	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature Sensor Circuit
4534	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature Sensor Circuit - Voltage below normal, or shorted to low source	4766	4	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature Sensor Circuit
4572	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature - Abnormal Update Rate	3031	9	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature

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Service Fault Code	Service Description	J1939		J1939_SPN Description
		SPN	FMI	
4585	Aftertreatment 1 SCR Catalyst System - Special Instructions	4792	14	Aftertreatment 1 SCR Catalyst System
4677	SAE J1939 Multiplexing PGN Timeout Error - Abnormal update rate	639	9	J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link)
4731	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature Sensor - Out of Calibration	3031	13	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature
4732	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Out of Calibration	1761	13	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature
4734	Auxiliary Input/Output 1 - Special Instructions	701	14	Auxiliary I/O #01
4737	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature - Root Cause Not Known	3031	11	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature
4739	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Root Cause Not Known	1761	11	Aftertreatment 1 Diesel Exhaust Fluid Tank Level
4741	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Current below normal or open circuit	3364	5	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
4742	Aftertreatment Diesel Exhaust Fluid Quality Sensor Circuit - Current above normal or grounded circuit	3364	6	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality
4743	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 Sensor Circuit - Current below normal or open circuit	3515	5	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2
4744	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 Sensor Circuit - Current above normal or grounded	3515	6	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2
4745	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 - Root Cause Not Known	3515	11	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2

Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
4768	Aftertreatment 1 Diesel Exhaust Fluid Property - Root Cause Not Known	3521	11	Aftertreatment 1 Diesel Exhaust Fluid Property
4769	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Abnormal Rate of Change	1761	10	Aftertreatment 1 Diesel Exhaust Fluid Tank Level
4789	Fan Speed - Data Valid but Above Normal Operational Range - Most Severe Level	1639	0	Fan Speed
4791	Fan Speed - Data Valid but Below Normal Operational Range - Most Severe Level	1639	1	Fan Speed
4842	Aftertreatment Diesel Exhaust Fluid Quality - Data Valid But Above Normal Operating Range - Least Severe Level	3364	15	Aftertreatment Diesel Exhaust Fluid Quality
4863	Aftertreatment SCR Operator Inducement Active - Condition Exists	5245	31	Aftertreatment Selective Catalytic Reduction Operator Inducement
4951	Maintain ECU Power Lamp - Voltage Above Normal, or Shorted to High Source	6655	3	ECU Power Lamp
4952	Maintain ECU Power Lamp - Voltage Below Normal, or Shorted to Low Source	6655	4	ECU Power Lamp
4956	Variable Geometry Turbocharger Actuator Software - Out of Calibration	6713	13	Variable Geometry Turbocharger Actuator
4957	Variable Geometry Turbocharger Actuator Software - Condition Exists	6713	31	Variable Geometry Turbocharger Actuator
5177	VGT Actuator Driver Circuit - Abnormal update rate	6713	9	VGT Actuator Driver Circuit
5183	Fan Blade Pitch Position Sensor Circuit - Voltage Above Normal, or Shorted to High source	520784	3	Fan Blade Pitch Position Sensor Circuit
5184	Fan Blade Pitch Position Sensor Circuit - Voltage Below Normal, or Shorted to Low Source	520784	4	Fan Blade Pitch Position Sensor Circuit
5185	Fan Blade Pitch - Mechanical system not responding or out of adjustment	520784	5	Fan Blade Pitch
5221	Engine Air Shutoff Status - Data erratic, intermittent or incorrect	3667	2	Engine Air Shutoff Status
5248	Tachograph Output Shaft Speed - Out of Calibration	1623	13	Tachograph Output Shaft Speed

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Service Fault Code	Service Description	J1939_SPN		J1939_SPN Description
5278	Aftertreatment 1 Diesel Exhaust Fluid Dosing System Frozen - Condition Exists	6802	31	
5291	Engine Emergency Shutdown Switch Activated - Condition Exists	520808	31	Engine Emergency Shutdown Switch Activated
5292	Excessive Time Since Last Engine Air Shutoff Maintenance Test - Condition Exists	520809	31	Excessive Time Since Last Engine Air Shutoff Maintenance Test
5386	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Erratic, Intermittent, or Incorrect	4766	2	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature
5387	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Valid But Above Normal Operating Range - Most Severe Level	4766	0	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature
5388	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level	4766	16	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature
5389	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature - Data Valid But Above Normal Operating Range - Least Severe Level	4766	15	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature
5391	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Abnormal Update Rate	6882	9	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module
5392	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Bad Intelligent Device or Component	6882	12	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module
5393	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Voltage Above Normal or Shorted to High Source	6882	3	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module
5394	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Voltage Below Normal or Shorted to Low Source	6882	4	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module
5395	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Root Cause Not Known	6882	11	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module
5396	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module - Data Valid But Above Normal Operating Range - Moderately Severe Level	6882	16	Aftertreatment Diesel Oxidation Catalyst Temperature Sensor Module

Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
5576	Engine Air Filter Differential Pressure - Data Valid But Above Normal Operating Range - Least Severe Level	107	15	Engine Air Filter 1 Differential Pressure
5585	High Pressure Common Rail Fuel Pressure Relief Valve - Data Valid But Above Normal Operating Range - Least Severe Level	5571	15	High Pressure Common Rail Fuel Pressure Relief valve
5617	Aftertreatment 1 Diesel Oxidation Catalyst System- Special Instruction	524286	31	Aftertreatment 1 Diesel Oxidation Catalyst System
5631	SCR System Cleaning Inhibited Due to System Timeout - Condition Exists	6928	31	SCR System Cleaning Inhibited Due to System Timeout
5632	SCR System Cleaning Inhibited Due to Inhibit Switch - Condition Exists	6918	31	SCR System Cleaning Inhibited Due to Inhibit Switch
5653	SCR Operator Inducement Override Switch - Abnormal Update Rate	6881	9	SCR Operator Inducement Override Switch
5654	SCR Operator Inducement Override Switch - Out of Calibration	6881	13	SCR Operator Inducement Override Switch
5939	Machine Constrained Operation- Abnormal Update Rate. No Communication or an invalid data transfer rate has been detected on the J1939 data link between the ECM and the machine electronic control unit.	520968	9	
5941	Machine Constrained Operation- Received Network Data in Error. The received J1939 datalink message was not valid.	520968	19	
6256	Battery 1 Voltage - Data Valid But Above Normal Operating Range - Moderately Severe Level	168	16	Battery Potential / Power Input 1
6257	Battery 1 Voltage - Data Valid But Below Normal Operating Range - Moderately Severe Level	168	18	Battery Potential / Power Input 1
6258	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage above normal, or shorted to high source	1075	3	Engine Electric Lift Pump for Engine Fuel Supply
6259	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage below normal, or shorted to low source	1075	4	Engine Electric Lift Pump for Engine Fuel Supply

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Service Fault Code	Service Description	J1939 SPN		J1939 SPN Description
6263	Fan Control Circuit - Voltage above normal, or shorted to high source	647	3	Engine Fan Clutch 1 Output Device Driver
6264	Fan Control Circuit - Voltage below normal, or shorted to low source	647	4	Engine Fan Clutch 1 Output Device Driver
6265	Aftertreatment 1 Diesel Particulate Filter System - Mechanical system not responding or out of adjustment	3936	7	Aftertreatment 1 Diesel Particulate Filter System
6336	Crankcase Breather Filter Heater Circuit - Voltage above normal, or shorted to high source	862	3	Crankcase breather Heater Circuit
6337	Crankcase Breather Filter Heater Circuit - Voltage below normal, or shorted to low source	862	4	Crankcase breather Heater Circuit
6418	Engine Brake Actuator Driver 1 Circuit - Voltage above normal, or shorted to high source	1072	3	Engine (Compression) Brake Output #1
6419	Engine Brake Actuator Driver 1 Circuit - Voltage below normal, or shorted to low source	1072	4	Engine (Compression) Brake Output #1
6421	Engine Brake Actuator Driver Output 2 Circuit - Voltage above normal, or shorted to high source	1073	3	Engine (Compression) Brake Output #2
6422	Engine Brake Actuator Driver Output 2 Circuit - Voltage below normal, or shorted to low source	1073	4	Engine (Compression) Brake Output #2
6456	Engine Fan Clutch 2 Control Circuit - Voltage above normal, or shorted to high source	5484	3	Engine Fan Clutch 2 Output Device Driver
6457	Engine Fan Clutch 2 Control Circuit - Voltage below normal, or shorted to low source	5484	4	Engine Fan Clutch 2 Output Device Driver
6458	Aftertreatment 1 Intake NOx Sensor - Data not Rational - Drifted High	3216	20	Aftertreatment 1 Intake NOx
6459	Aftertreatment 1 Intake NOx Sensor - Data not Rational - Drifted High	3216	20	Aftertreatment 1 Intake NOx
6462	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High	3226	20	Aftertreatment 1 Outlet NOx
6463	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High	3226	20	Aftertreatment 1 Outlet NOx

Service Fault Code	Service Description	J1939 SPN	J1939_FMI	J1939_SPN Description
6464	Aftertreatment 1 Outlet NOx Sensor - Data not Rational - Drifted High	3226	20	Aftertreatment 1 Outlet NOx
6467	Fan Speed - Data Valid but Above Normal Operational Range - Most Severe Level	1639	0	Fan Speed
6468	Fan Speed - Data Valid but Below Normal Operational Range - Most Severe Level	1639	1	Fan Speed
	Fan Speed- Data Erratic, Intermittent, or Incorrect	1639	2	Fan Speed
6471	Fan Blade Pitch Position Sensor Circuit - Voltage Above Normal, or Shorted to High Source	520784	3	Fan Blade Pitch Position Sensor Circuit
6472	Fan Blade Pitch Position Sensor Circuit - Voltage Below Normal, or Shorted to Low Source	520784	4	Fan Blade Pitch Position Sensor circuit
6473	Fan Blade Pitch - Mechanical system not responding or out of adjustment	520784	5	Fan Blade Pitch
6475	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Mechanical system not responding or out of adjustment	3363	7	Aftertreatment 1 Diesel Exhaust Fluid Tank 1
6476	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Data Valid But Below Normal Operating Range - Moderately Severe Level	3363	18	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater
6477	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage above normal, or shorted to high source	5491	3	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay
6478	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage below normal, or shorted to low source	5491	4	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay
6479	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Voltage above normal, or shorted to high source	3363	3	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater
6481	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater - Voltage below normal, or shorted to low source	3363	4	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater
6482	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Current below normal or open circuit	4340	5	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State

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Service Fault Code	Service Description	J1939		J1939 SPN Description
		SPN	FMI	
6483	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Current below normal or open circuit	4342	5	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State
6484	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Current below normal or open circuit	4344	5	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State
6493	Electronic Throttle Control Actuator Driver Circuit-Voltage above normal, or shorted to high source	3464	3	Electronic Throttle Control Actuator Driver Circuit
6494	Electronic Throttle Control Actuator Driver Circuit-Voltage above normal, or shorted to low source	3464	4	Electronic Throttle Control Actuator Driver Circuit
6496	Electronic Throttle Control Actuator Driver Circuit-Voltage above normal, or shorted to high source	3464	3	Electronic Throttle Control Actuator Driver Circuit
6497	Engine Intake Throttle Actuator Position Sensor Circuit- Voltage above normal, or shorted to high source	51	3	Engine Intake Throttle Actuator Position Sensor Circuit
6498	Engine Intake Throttle Actuator Position Sensor Circuit- Voltage above normal, or shorted to low source	51	4	Engine Intake Throttle Actuator Position Sensor Circuit
6499	ECU Power Output Supply Voltage 1 - Data Valid But Below Normal Operating Range - Moderately Severe Level	3597	18	ECU Power Output Supply Voltage #1
6511	Maintain ECU Power Lamp - Voltage Above Normal, or Shorted to High Source	6655	3	ECU Power Lamp
6512	Maintain ECU Power Lamp - Voltage Below Normal, or Shorted to Low Source	6655	4	ECU Power Lamp
6513	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater - Data Valid But Below Normal Operating Range	5745	18	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater
6517	Aftertreatment SCR Catalyst Conversion Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level	4364	18	Aftertreatment 1 SCR Conversion Efficiency

Service Fault Code	Service Description	J1939 SPN	FMI	J1939 SPN Description
6521	Aftertreatment Outlet NOx Sensor Circuit- Voltage below normal or shorted to low source	3226	4	Aftertreatment Outlet NOx Sensor Circuits
6522	Coolant Level Sensor 1 Circuit - Voltage above normal, or shorted to high source	111	3	Engine Coolant Level
6523	Coolant Level Sensor 1 Circuit - Voltage below normal, or shorted to low source	111	4	Engine Coolant Level
6524	Engine Oil Temperature Sensor 1 Circuit - Voltage above normal, or shorted to high source	175	3	Engine Oil Temperature 1
6525	Engine Oil Temperature Sensor 1 Circuit - Voltage below normal, or shorted to low source	175	4	Engine Oil Temperature 1
6526	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Out of Calibration	1761	13	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature
6527	Aftertreatment Diesel Exhaust Fluid Return Valve - Mechanical system not responding or out of adjust	4376	7	Aftertreatment 1 Diesel Exhaust Fluid Return Valve
6529	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay - Voltage Above Normal, or Shorted to high source	5746	3	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Heater Relay
6531	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Voltage above normal, or shorted to high source	4340	3	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State
6532	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Circuit - Voltage below normal, or shorted to low source	4340	4	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State
6533	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Voltage above normal, or shorted to high source	4342	3	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State
6534	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Circuit - Voltage below normal, or shorted to low source	4342	4	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State
6535	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Voltage above normal, or shorted to high source	4344	3	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State

Appendix

Service Fault Code	Service Description	J1939		J1939 SPN Description
		SPN	FMI	
6536	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Voltage below normal, or shorted to low source	4344	4	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State
6537	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay - Mechanical system not responding or out of adjustment	5491	7	Aftertreatment 1 Diesel Exhaust Fluid Line Heater Relay
6539	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature - Data erratic, intermittent or incorrect	4765	2	Aftertreatment Diesel Oxidation Catalyst Intake Temperature
6551	Aftertreatment 1 Diesel Particulate Filter Outlet Pressure Sensor Circuit - Voltage above normal, or shorted to high source	3610	3	Aftertreatment Diesel Particulate Filter Outlet
6552	Aftertreatment 1 Diesel Particulate Filter Outlet Pressure Sensor Circuit - Voltage below normal, or shorted to low source	3610	4	Aftertreatment Diesel Particulate
6553	Aftertreatment 1 Diesel Particulate Filter Outlet Pressure - Data erratic, intermittent or incorrect	3610	2	Aftertreatment Diesel Particulate Filter Outlet Pressure
6556	Engine Intake Air Heater 1 Circuit - Voltage above normal, or shorted to high source	729	3	Engine Intake Air Heater Driver #1
6557	Engine Intake Air Heater 1 Circuit - Voltage below normal, or shorted to low source	729	4	Engine Intake Air Heater Driver #1
6559	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature Sensor - Voltage below normal, or shorted to low source	3031	4	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature
6562	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Sensor - Root Cause Not Known	1761	11	Aftertreatment 1 Diesel Exhaust Fluid Tank Level
6563	Auxiliary Intermediate (PTO) Speed Switch Validation - Data erratic, intermittent or incorrect	611	2	System Diagnostic Code #1
6565	Aftertreatment 1 Outlet NOx Sensor - Abnormal rate of change	3226	10	Aftertreatment 1 Outlet NOx
6568	Aftertreatment Regeneration Inhibit Switch - Data erratic, intermittent or incorrect	3695	2	Aftertreatment Regeneration Inhibit Switch
6581	Aftertreatment 1 Outlet NOx Sensor Heater - Abnormal rate of change	5031	10	Aftertreatment 1 Outlet Gas NOx Sensor Heater Ratio
6597	SCR System Cleaning Inhibited Due to System Timeout - Condition Exists	6928	31	SCR System Cleaning Inhibited Due to System Timeout



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