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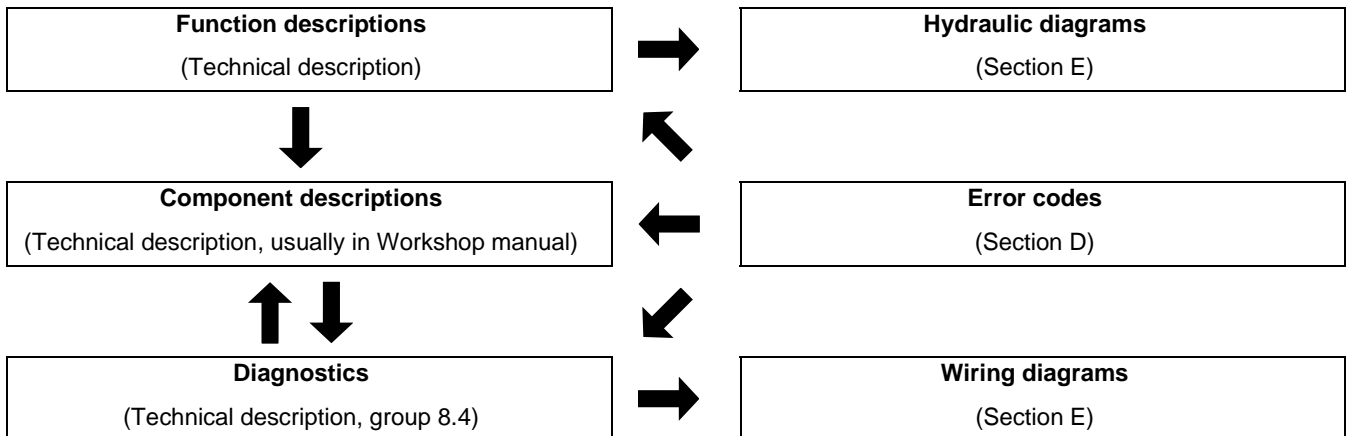
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## References between different information types

The maintenance manual and workshop manual are mainly divided into function groups, see *Workshop manual contents page 5*. Certain parts are broken out as separate parts to increase usability, e.g., "Technical data".

The basic rule of searching for information is to use function groups to find different types of information regarding the function or component in question. As a complement to this, there are references according to the below.



- From Function description to Component description, to enable fast finding of more information about the different components that create a function.
- From Function description to Hydraulic diagram, to enable fast finding of the right hydraulic diagram for the function in question.
- From Component description or Function description to Diagnostics, to enable fast finding of the right diagnostic menu that can be used to check the component (only applies to electrical components).
- From Diagnostics to Wiring diagrams. to enable fast finding of the right circuit diagram for further troubleshooting.
- From Diagnostics to Component description or Function description. To enable fast finding of more information about the component's appearance and position when troubleshooting.
- From Error codes to Diagnostics, to enable fast finding of the right diagnostic menu to troubleshoot component or function in question.
- From Error codes to Function description or Component description, to enable fast finding of more information about components or function.

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# Safety

## General safety information

### Safety concerns everyone!

The safety information concerns everyone who works with the machine! Persons who do not follow the safety instructions given in this manual must make absolutely sure that the work is performed without risks of personal injury and without risk of damage to machine or machine property!

Remember to:

- follow the instructions in this manual
- be trained for the work in question
- follow local laws, safety rules and regulations
- use the correct equipment and tools for the job
- wear the correct clothes
- use common sense and work carefully. Do not take any risks!

Cargotec has in this publication documented and warned for situations and risks that may occur in connection with using as well as service or repairs of the machine during normal circumstances.

That is why it is important that all who work with the machine, or repair or service the machine, read and follow the information in the Workshop Manual and Operator's Manual.

### A near accident is a warning!

A near-accident is an unexpected event where neither persons, machine or property are injured or damaged. However, a near-accident indicates that there is an injury risk and actions must be taken to avoid the risk of injuries.

**Safety precautions**

Store hazardous substance in approved and sealed container.

Make sure that there is no ignition source near flammable or explosive substances.

Make sure that ventilation is adequate or there is an air extraction unit when handling flammable substances.

**Fluid or gas under pressure**

High-pressure lines can be damaged during work, and fluid or gas can stream out.

There may be high pressure in a line even if the pump has stopped. Therefore, gas or fluid can leak out when the connection to the hose is loosened.

A gas cylinder subjected to careless handling can explode, for example, if it falls onto a hard surface. Gas can stream out through damaged valves.

**Risks**

Risk of damage/injuries in connection with work on:

- Hydraulic systems (e.g., working hydraulics and brake system).
- Fuel system.
- Tyre repairs.
- Air conditioning.

**Safety precautions**

- Use safety glasses and protective gloves.
- Never work on a pressurised system.
- Never adjust a pressure limiting valve to a higher pressure than recommended by the manufacturer.
- A hydraulic hose that swells, for example, at a connection, is about to rupture. Replace it as soon as possible! Check connections thoroughly.
- Use fluid when checking for leaks.
- Never blow clothes clean with compressed air.
- Discarded pressure accumulator shall first be depressurised and then punctured before it is discarded (to avoid risk of explosion). Carefully, drill a hole with 3 mm diameter after depressurising.
- Never use your hands directly to detect a leak. A fine high-pressure stream from a hydraulic hose can easily penetrate a hand and causes very severe injuries.

# **C Preventive maintenance**

## **The information is found in the Maintenance Manual**

The information is found in the Maintenance Manual.

For information on how to order the Maintenance Manual, see the section *A Foreword*.

## Table of Contents1 Engine

<b>1</b>	<b>Engine .....</b>	<b>3</b>
1.1	Controls and instruments .....	23
1.1.1	Ignition switch .....	23
1.1.2	Accelerator pedal .....	24
1.2	Fuel system .....	25
1.2.1	Fuel tank .....	25
1.2.2	Sensor, fuel level .....	25
1.6	Air intake and exhaust outlet .....	26
1.6.1	Air cleaning system .....	26
1.6.3	Exhaust system .....	26
1.6.4	Intercooler .....	27
1.7	Cooling system .....	28
1.7.4	Radiator and expansion tank .....	29
1.7.5	Cooling fan .....	30
1.7.7	Coolant .....	32
1.7.10	Engine heater .....	35
1.9	Engine control system .....	36
1.9.1	Control unit, engine .....	36
1.11	Start/stop .....	37
1.11.1	Starter motor .....	37
1.11.2	Stopping device .....	37

Pos	Explanation	Signal description	Reference
5	Control unit, frame rear (D797-R) supplies power to the starter motor.	U = 24 V	<i>Starter motor, description (engine alternative Cummins) page 37</i> D5: Diagnostic menu, see section 8 <i>Control system</i> , group 8.4.6.5 <i>ENGINE</i> , menu 5
6	The starter motor cranks the engine.	-	<i>Starter motor, description (engine alternative Cummins) page 37</i>
7	The engine's sensors send signals to the engine control unit (D794), which regulates the injectors so that the engine starts.	-	Section 11 <i>Common electrics</i> , group 11.5.3.10 <i>Engine control unit</i>
8	The accelerator pedal sends the cab control unit (D790-1) a voltage signal proportional to the downward press of the pedal.	U = 0.5–4.5 V Lower voltage than 0.5 V and higher voltage than 4.5 V used to detect malfunction in cable harnesses and controls.	Section 9 <i>Frame, body, cab and accessories</i> , group 9.1 <i>Controls and instruments</i> D8: Diagnostic menu, see section 8 <i>Control system</i> , group 8.4.6.1 <i>ENGINE</i> , menu 1
9	The cab control unit (D790-1) transmits a message with the rpm request on the CAN bus	Checked by control system, error shown with error code.	Section 11 <i>Common electrics</i> , group 11.5.3.1 <i>Cab control unit</i>
10	The engine control unit (D794) controls engine speed.	-	Section 11 <i>Common electrics</i> , group 11.5.3.10 <i>Engine control unit</i>
11	The NO switch for coolant level grounds the control terminal of the coolant level relay (K322) if the coolant level is low in the expansion tank.	Low coolant level: U <sub>K322:85</sub> = 0 V	<i>Cooling system, description page 28</i>
12	Coolant level relay (K322) breaks the circuit to Control unit, engine (D794) if the coolant level is low in the expansion tank.	-	<i>Cooling system, description page 28</i>
13	The engine control unit (D794) transmits engine data and warning messages on the CAN bus.	Checked by control system, error shown with error code.	Section 11 <i>Common electrics</i> , group 11.5.3.10 <i>Engine control unit</i> D13: Diagnostic menu, see section 8 <i>Control system</i> , group 8.4.6.6 <i>ENGINE</i> , menu 6 and 8.4.6.7 <i>ENGINE</i> , menu 7
14	The KID control unit (D795) shows engine data via display figures.	-	Section 11 <i>Common electrics</i> , group 11.5.3.12 <i>KID control unit</i>
15	The fuel level sensor (B757) sends a voltage signal to Control unit, frame rear (D797-R) proportional to the fuel level in the tank.	U = 0.5–4.5 V Lower voltage than 0.5 V and higher voltage than 4.5 V used to detect malfunction in cable harnesses and controls.	<i>Sensor, fuel level, description page 25</i> D15: Diagnostic menu, see section 8 <i>Control system</i> , group 8.4.3.7 <i>CAB</i> , menu 7

## Engine and transmission, separation (engine alternative Cummins QSM11)

### Separation

- 1 Machine in service position, see section *B Safety*.
- 2 Attach hoisting equipment to the engine.
- 3 Disconnect the requisite hoses and cables before separating engine and transmission.

### NOTE

*Drain and collect liquids before detaching hoses.*

- 4 Use a jack to secure the transmission.



- 5 Remove the cover washer.



**Drive belt, extra water pump, replacement (engine alternative Volvo TWD1240VE)**

- 1 Position the cab in the front position.
- 2 Machine in service position, see section *B Safety*.
- 3 Remove the cover plates over the engine and radiator.
- 4 Release the tension on the fan belt.
- 5 Remove the drive belt.



The figure shows engine without cooling fan.

- 6 Fit the new drive belt as illustrated.

---

## 2 Transmission

### Transmission, general

#### Component supplier documentation

The workshop manual only describes components and work descriptions that concern installation in the machine. For descriptions of and instructions for the transmission's components and systems, refer to the supplier documentation.

References to component supplier documentation are only provided in exceptional cases. If information about a component is not found, the component supplier documentation should be used.

Pos	Explanation	Signal description	Reference
22.	Solenoid valve VFS 1/3 (Y6075) controls servo pressure to Valve spool gear selection 1/3.	1200 kPa	Diagnostic menu, see section 8 <i>Control system</i> , group 8.4.7.7 <i>TRANSM</i> , menu 7
23.	The valve slide for gear 1/3 control opens when valve slide gear selection 1/3 is pressurised and leads a pressure signal to the drive control valve.	0-2000 kPa	-
24.	The valve slide for gear 2/4 control opens when valve slide gear selection 2/4 is pressurised and leads a pressure signal to the drive control valve.	0-2000 kPa	-
25.	Valve slide gear selection 2/4 pressurises drive clutch gear 2 or drive clutch gear 4.	0-2000 kPa	-
26.	Valve spool gear selection 1/3 pressurises Drive clutch gear 1 or Drive clutch gear 3.	0-2000 kPa	-
27.	Drive clutch forward locks the transmission in forward drive when the clutch is pressurised.	-	-
28.	Drive clutch gear 2 locks the transmission in gear position 2 when the clutch is pressurised.	-	-
29.	Drive clutch gear 4 locks the transmission in gear position 4 when the clutch is pressurised.	-	-
30.	Drive clutch reverse locks the transmission in reverse drive when the clutch is pressurised..	-	-
31.	Drive clutch gear 1 locks the transmission in gear position 1 when the clutch is pressurised.	-	-
32.	Drive clutch gear 3 locks the transmission in gear position 3 when the clutch is pressurised.	-	-
33.	The transmission oil pump pumps oil through the cooler and supplies the torque converter with oil pressure to run the machine.	85.1 l/min at 1973 rpm	-
34.	The oil filter cleans the oil.	-	-
35.	The bypass valve in the filter bracket leads the oil past the filter if the resistance through the filter becomes too high.	-	-
36.	The oil is distributed to different lubrication points in the transmission.	-	-
37.	The transmission oil cooler cools the oil.	-	-
38.	The torque converter transmits the engine's power to the transmission.	-	-
39.	The safety valve leads the oil back to the sump if the pressure in the torque converter becomes too high.	Opening pressure: 900 kPa	-



- 4 Turn the engine for each bolt to be removed from the flex plate.
- 5 Attach the transmission to an overhead crane.
- 6 Remove the bolts holding together the transmission and engine.



- 7 Carefully separate the transmission and engine.

---

## Table of Contents 3 Driveline/Axle

<b>3</b>	<b>Driveline/axle</b> .....	<b>3</b>
3.2	Propeller shaft .....	3
3.3	Drive axle .....	4

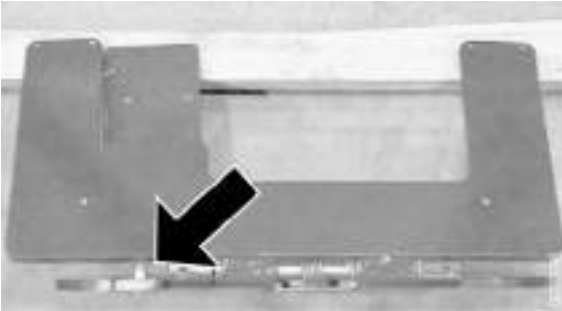
## 4 Brakes

### 4.1 Controls and instruments

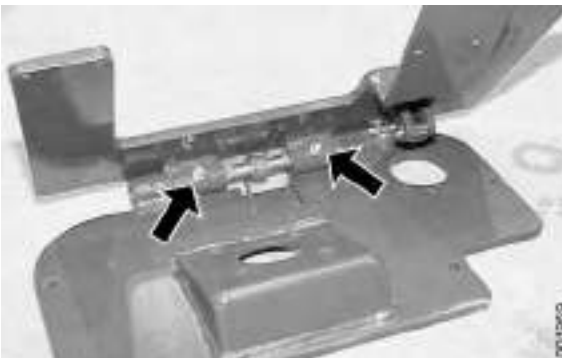
#### 4.1.1 Brake pedal

##### Brake pedal, checking and adjusting

- 1 Clean the floor round the brake pedal and check that nothing is obstructing the movement of the brake pedal.
- 2 Check that the brake pedal springs back adequately and that the clearance between brake pedal and brake valve is 1–1.5 mm. If needed, adjust the brake pedal's stop bolt to correct clearance.
- 3 Check that the pedal moves easily.



Stop screw for adjusting clearance between brake pedal and brake valve. (The illustration shows a loose brake pedal.)



Lubrication points, brake pedal. (The illustration shows a loose brake pedal.)

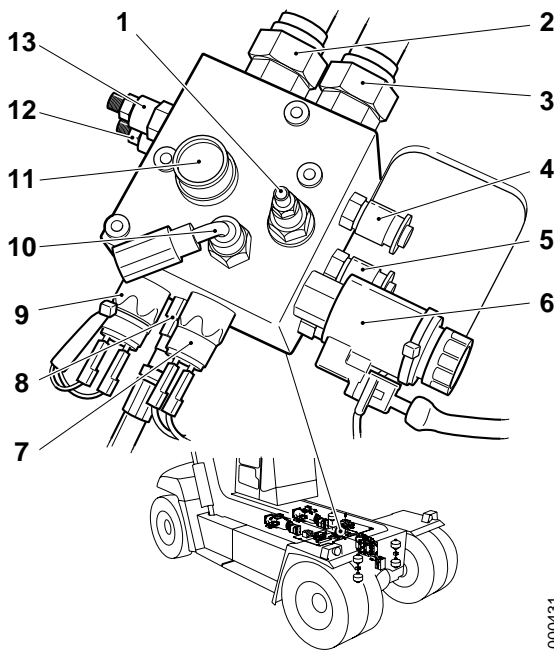
- 4 Lubricate the pedal hinge with "EP2" universal grease.
- 5 Check that the rubber pad on the brake pedal is intact and that the pattern is not worn away. Replace as necessary.
- 6 Check the brake valve; see *Brake valve, checking page 20*.

##### Brake pedal, replacement

### NOTE

*Read the safety instructions for oil before working, see section B Safety.*

- 1 Turn off the engine and the main electrical power.
- 2 Depressurise the brake and hydraulic systems, see section *B Safety*.
- 3 Detach the brake valve from the brake pedal.  
Secure the brake valve on the cab's underside and remove the brake valve attaching bolt.



1. Safety valve
2. Connection from pump (P)
3. Wheel brake connection (T)
4. Measuring outlet, pump pressure (P)
5. Measuring outlet, accumulator pressure (M)
6. Solenoid valve parking brake (Y642)
7. NC switch, parking brake (GHB) (S200)
8. Connection, accumulators (ACC)
9. NC switch, brake fluid pressure (LB) (S204)
10. Connection, parking brake caliper (HB)
11. Drain valve
12. Main valve, charging
13. Pressure limiting valve

### 4.3.3 Accumulator charging valve

#### Accumulator charging valve, description

The accumulator charging valve distributes oil from the hydraulic oil pump between pressure storage and cooling of the wheel brakes. The accumulator charging valve is fitted on the beam in front of the gear-box in the engine compartment.

The accumulator charging valve stores pressure by guiding the oil to the accumulators. The wheel brakes are cooled by oil being guided to the drive axle cooling circuit and then on to the brake system cooler.

The accumulator charging valve prioritises charging of the accumulators above cooling. A restriction of the charging means that a small quantity of oil also flows to cooling during accumulator charging. At idling speed the flow from the pump is so small that all oil flows to pressure storage.

The drain valve (position 11) is used to relieve the pressure in the accumulators to the tank. The valve opens a connection between the accumulators and the wheel brake's cooling circuit. The oil is drained through the wheel brake to the tank.

There is a measuring outlet for measuring the accumulator pressure (position 5) and pump pressure (position 4) on the accumulator charging valve. The pressures are individual to each machine and each are specified on the pressure plate on the left-hand frame member, see section 10 *Common hydraulics*. The accumulator charging valve also houses the parking brake solenoid valve (position 6), brake fluid pressure NC switch (position 9) and parking brake NC switch (position 7).

- *Solenoid valve parking brake, description page 33*
- *NC switch, brake oil pressure, description page 25*
- *Parking brake NC switch, description page 37*

#### Accumulator charging, checking and adjustment

##### NOTE

*Read the safety instructions for oil before working, see section B Safety.*

- 1 Machine in service position, see section *B Safety*.
- 2 Check accumulator charging; see *Brake fluid pump, check page 7*.

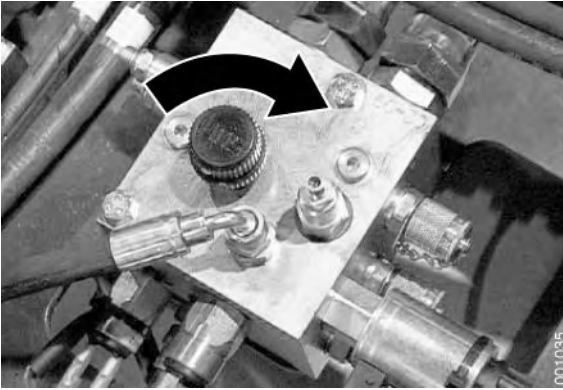
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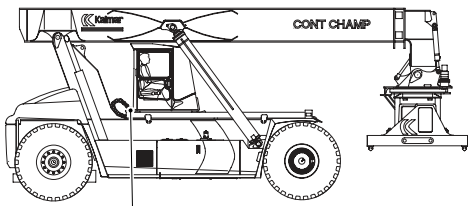
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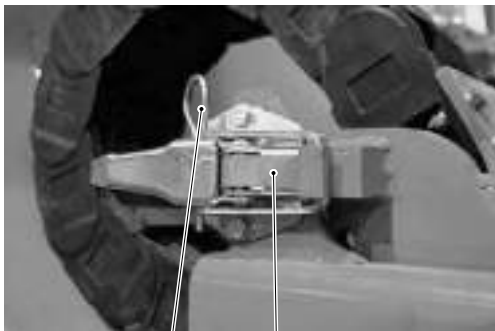
- 12 Close the drain valve on the accumulator charging valve.

### NOTE

*Check that the accumulator drain valve is fully closed and tighten the lock ring.*



- 13 On machines with manual sliding cab. Secure the cab in the rear-most position with the cab locks.
- 14 Turn on the main electric power and start the engine. Run the engine at idling speed.
- 15 Test the brakes a couple of times.
- 16 Check that the brake valve's connections are sealed tightly.
- 17 Bleed the wheel brakes' brake cylinders, see *Wheel brakes, bleeding page 29*.



**A**

**B**      **C**

000270

- A. Location, lock handle  
 B. Lock pin  
 C. Lock handle for securing cab

### 4.5.3 M-valve parking brake

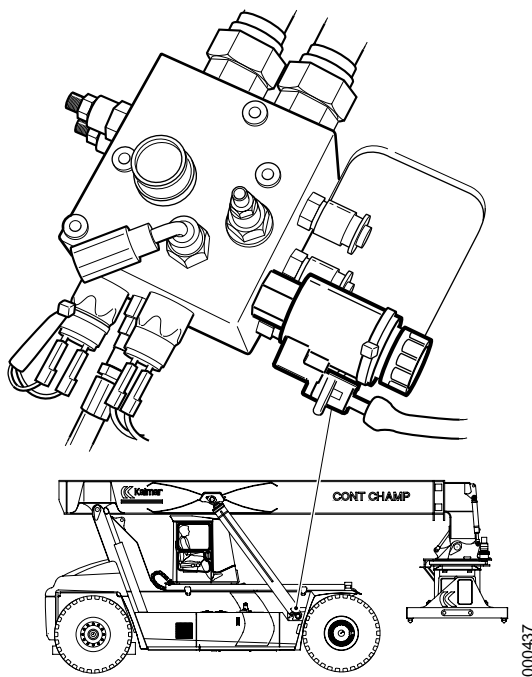
#### Solenoid valve parking brake, description

The parking brake solenoid valve (Y642) activates the parking brake. The solenoid valve is fitted on the accumulator charging valve, which is fitted on the lifting beam in front of the gearbox in the engine compartment, see *Accumulator charging valve, description page 13*.

The solenoid valve opens a connection between the accumulators and the parking brake calliper at activation. This means that the parking brake calliper is pressurised and the parking brake is disengaged. When the voltage feed to the solenoid valve is cut off, the connection between the accumulators and parking brake calliper is terminated. Instead, a connection between the parking brake calliper and tank is opened and the parking brake applied. This means that the parking brake is applied if the machine loses electrical power or if the brake system becomes depressurised.

The solenoid valve is supplied with voltage by Control unit, frame front (D797-F) on activation.

The signal can be checked from the diagnostic menu, see section *8 Control system*, group *8.4.5.5 HYD, menu 5*.



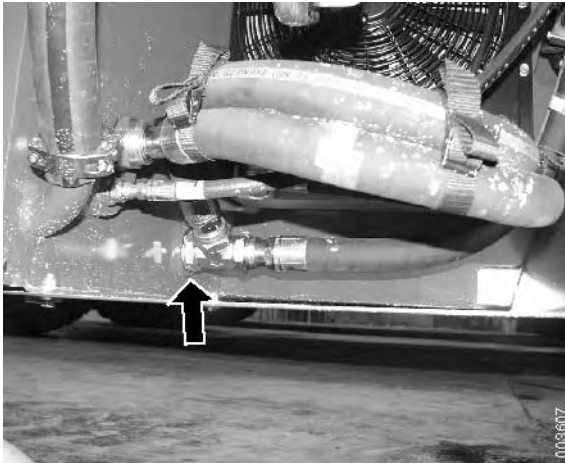
#### Solenoid valve parking brake, checking

## DANGER

**The machine may start to roll. Risk of crushing.**

**Block the wheels so that the machine cannot start to roll when the parking brake is released.**

- 1 Start the engine and run the engine at idling speed until the warning lamp for brake pressure goes out and the accumulator charging valve changes to cooling.
- 2 Turn off the engine and turn the start key to position I.
- 3 Release the parking brake with switch parking brake and check that the parking brake's brake caliper releases. The brake caliper should be able to move.
- 4 Activate the parking brake with the parking brake switch and check that the parking brake's brake caliper is applied.



### Thermo-bypass valve, replacement

#### NOTE

Read the safety instructions for oil before working, see section *B Safety*.

- 1 Machine in service position, see section *B Safety*.
- 2 Depressurise the brake and hydraulic systems, see section *B Safety*.
- 3 Drain the brake fluid tank; see *Brake system fluid, changing page 46*.
- 4 Remove the thermo-bypass valve located inside the hydraulic oil tank.

#### NOTE

Note how the valve is fitted.

- 5 Fit in reverse order.

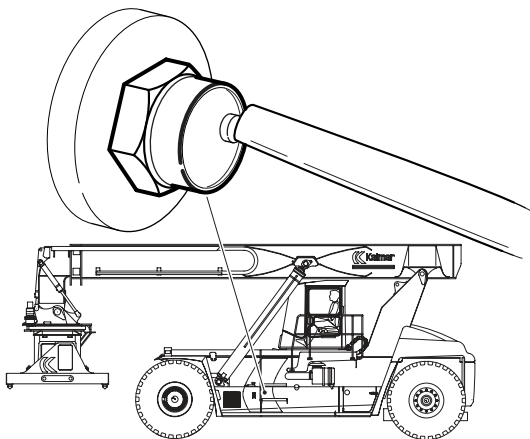
## 4.8.10 Sensor brake oil temperature

### Brake fluid temperature sensor, description

The brake fluid temperature sensor (B762) detects the temperature of the brake system fluid. The sensor is mounted on the rear short side of the brake fluid tank and therefore takes the accumulated heat in the brake system fluid into account.

The brake fluid temperature sensor (B762) is supplied voltage by Control unit, frame front (D797-F) and sends the control unit a voltage signal proportional to temperature.

The signal can be checked from the diagnostic menu, see section *8 Control system*, group *8.4.5.2 HYD, menu 2*.



### Brake fluid temperature sensor, replacement

#### NOTE

Read the safety instructions for oil before working, see section *B Safety*.

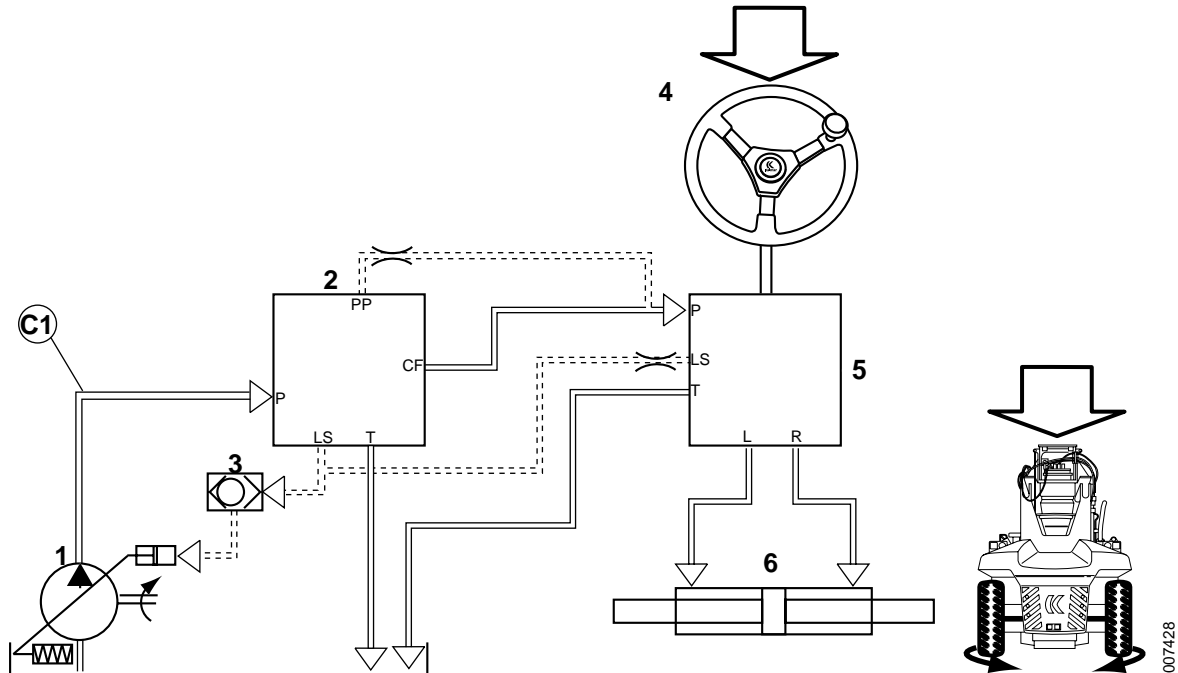
- 1 Machine in service position, see section *B Safety*.
- 2 Drain the brake fluid tank; see *Brake system fluid, changing page 46*.
- 3 Disconnect the wiring from the fluid temperature sensor.
- 4 Remove the fluid temperature sensor.

#### NOTE

Check that the O-rings are intact and fitted correctly.

- 5 Connect the cabling to the sensor.

**Power assisted system, function description  
(hydraulic oil pump alternative Sauer-Danfoss)**



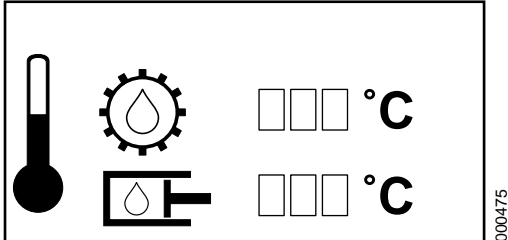
Pos	Explanation	Signal description	Reference
1	The hydraulic oil pump 2 pumps oil to the priority valve.	See pressure plate on left frame beam.	Section 10 Common hydraulics, group 10.4.2 Axial piston pump with variable displacement
2	The priority valve prioritises pressure supply to the steering valve over the working hydraulics. The priority valve also transmits a control signal to the hydraulic oil pump 2.	Checked by control system, error shown with error code.	Priority valve, description (hydraulic oil pump alternative Rexroth) page 14
3	The shuttle valve selects the strongest load signal to the main pump if hydraulic functions are activated at the same time as the steering wheel is turned.	Checked by control system, error shown with error code.	Section 10 Common hydraulics, group 10.5.3 Shuttle valve
4	The steering wheel is turned and acts on the steering valve's input shaft.	-	Section 9 Frame, body, cab and accessories, group 9.1 Controls and instruments
5	The steering valve pumps pressurised oil to the steering cylinder and transmits a load signal to the main pumps.	-	Steering valve, description page 20
6	The steering cylinder turns the wheels.	-	Steering cylinder, description page 23

Hydraulic diagram, basic machine

### Steering pressure, checking (hydraulic oil pump alternative Sauer-Danfoss)

#### NOTE

Read the safety instructions for oil before working, see section B Safety.



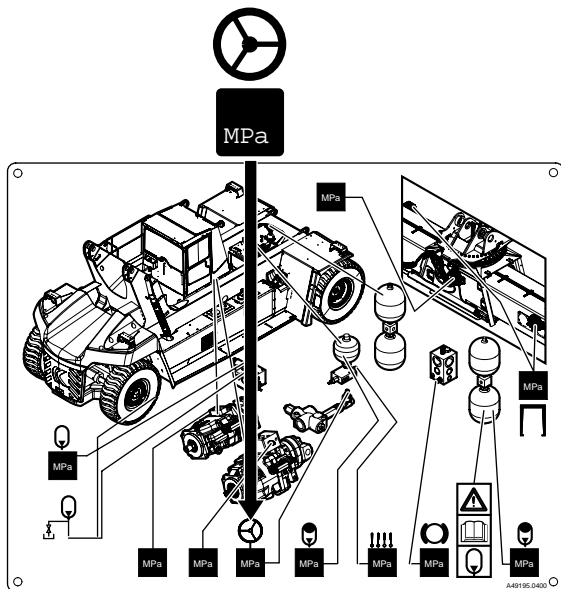
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Operating menu, hydraulic oil temperature



Measuring outlet, hydraulic oil pumps

- 1. Hydraulic oil pump 1
- 2. Hydraulic oil pump 2



- 1 Operate and warm up the machine so that the hydraulic oil reaches operating temperature, 50 °C.
- 2 Machine in service position, see section B Safety.
- 3 Depressurising removed.
- 4 Connect the pressure gauge to the measuring outlet for hydraulic oil pump 2.
- 5 Start the engine and increase engine speed to approx. 1200 rpm.
- 6 Turn the steering wheel fully and read pump pressure during steering wheel movement. Compare this to the steering pressure on the hydraulics plate. The max. pressure measured on the pump should be **1.5 MPa** more than the steering pressure on the hydraulics plate.
- 7 Stop the engine and turn the starter key to position I.
- 8 Depressurising removed.
- 9 Turn the start key to position 0 and turn off the main electric power.
- 10 Remove the pressure gauge and fit the protective cap on the measuring outlet.

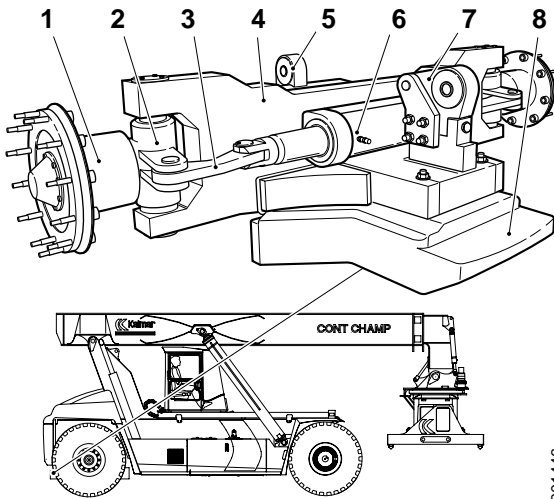
## 5.2.6 Link arm

### Link arm, description

The link arm transfers the lateral movement of the steering cylinder to turning the wheel spindles.

The setting of the steering wheels cannot be adjusted. If the link arms are deformed in a way that changes the setting of the steering wheels, they must be replaced.

The link arms must be turned to the right direction, otherwise they can be damaged by the rims with large wheel angles.



001446

1. Wheel hub
2. Wheel spindle
3. Link arm
4. Steering axle
5. Suspension
6. Steering cylinder
7. Rear mounting
8. Counterweight

## 5.2.7 Wheel spindle

### Wheel spindle, general

See section 6 *Suspension* , group 6.2.2 *Wheel spindle*.

## 5.2.8 Wheel hub

### Wheel hub, general

See section 6 *Suspension* , group 6.2.3 *Wheel hub*.

## 5.2.9 Shuttle valve

### Shuttle valve, description

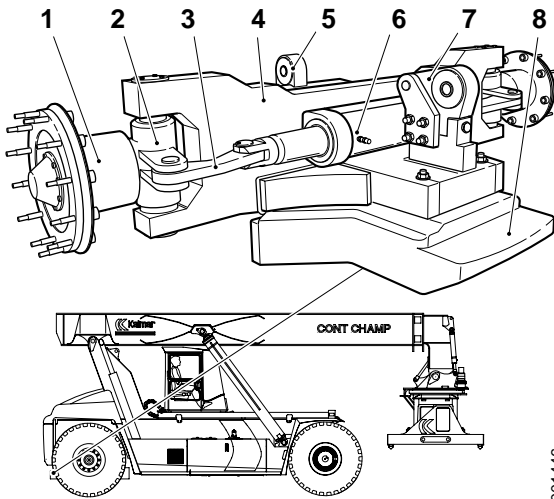
See section 10 *Common hydraulics* , group 10.5.3 *Shuttle valve*.

## 6.2.1 Steering axle cradle

### Steering axle cradle, description

The steering axle is pendulum suspended with a double-acting steering cylinder. The construction comprises a minimum of moving parts to minimise service points and simplify maintenance.

The frame suspension comprises maintenance-free parts. The rear suspension is designed with a leading knee which is used to indicate too low load on the steering axle, a so-called mechanical overload system, see section 8 *Control system*, group 8.2.1 *Overload System*.



001446

1. Wheel hub
2. Wheel spindle
3. Link arm
4. Steering axle
5. Front mounting
6. Steering cylinder
7. Rear mounting
8. Counterweight

### Steering axle cradle, replacement



## DANGER

**Steering axle and machine are very heavy.**

**Risk of pinch injury!**

**It is not permissible to go under a machine which has been lifted by a jack or similar. For machine weights, please refer to section F *Technical data*.**

- 1 Clean the steering axle and its surrounding area.
- 2 Stop the engine and turn the starter key to position I.
- 3 Depressurise the brake and hydraulic systems, see section *B Safety*.
- 4 Turn the start key to position 0 and turn off the main electric power.

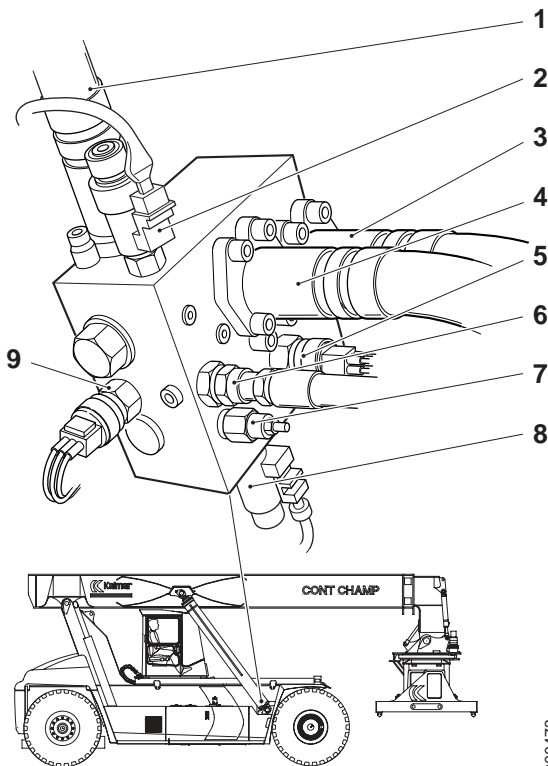


- 25 Fit the bearing casing and fill it with grease.
- 26 Grease the wheel bearing with grease through the grease nipple.  
Lift the seal ring's lip with a small screwdriver to facilitate the escape of air. Grease until grease comes out at the seal.
- 27 Fit the wheel.
- 28 Remove the support and lower the steering wheel.

---

7.8.9	Relief valve, attachment .....	129
7.8.10	Pipes and hoses .....	129
7.9	Load carrier .....	130
7.9.1	Twistlocks .....	130
7.9.2	Lifting jacks .....	144
7.10	Other functions .....	172
7.10.1	Support jacks .....	172
7.10.2	Weight indicator .....	181
7.10.3	Container counter .....	187
7.10.4	Synchronised lift .....	192

Pos	Explanation	Signal description	Reference
11	The accumulator stores servo pressure. The non-return valve in the pressure reducer makes it possible to store the pressure when the engine is shut off.	See pressure plate on left frame beam.	<i>Accumulator servo circuit, description page 18</i>
12	The servo filter cleans the servo oil before the control valve.	-	<i>Servo filter, description page 16</i>
13	With boom down Control unit, frame front (D797-F) activates Servo valve, blocking right (Y6001) and Servo valves, blocking left (Y6002).	U = 24 V	Section 11 <i>Common electrics</i> , group 11.5.3.2 <i>Control unit, frame front</i> D13: Diagnostic menu, see section 8 <i>Control system</i> , group 8.4.8.2 <i>BOOM</i> , menu 2
14	With boom down Servo valve, blocking right (Y6001) and Servo valve, blocking left (Y6002) act on the blocking valves in the valve blocks for left and right lift cylinder respectively.	-	<i>Lift cylinder valve block, description page 23</i> D13: Diagnostic menu, see section 8 <i>Control system</i> , group 8.4.8.2 <i>BOOM</i> , menu 2
15	With boom up the blocking valves in the valve blocks are opened for left and right lift cylinder respectively by the hydraulic pressure from the control valve. With boom down the blocking valve opens so that the pressure from the lift cylinder can be released.	-	<i>Lift cylinder valve block, description page 23</i>
16	The lift cylinders' piston side is pressurised and the boom is lifted.	-	<i>Lift cylinder, description page 27</i>
17	<b>Regeneration</b> The lift cylinder hydraulic pressure sensor, piston side left (B768-L1) sends Control unit, frame front (D797-F) a voltage signal proportional to oil pressure.  <b>NOTE</b> <i>Regeneration is not possible in the proximity of end position or in the event of overload.</i>	$U_{B768-L1/1} = 5 \text{ V}$ $U_{B768-L1/2} = 0 \text{ V}$ $U_{B768-L1/5} = 0.5\text{-}4.5 \text{ V}$ Regeneration is activated when the pressure in the lift cylinders is 8.5 MPa. Regeneration is stopped if the pressure reaches 18.5 MPa.	<i>Lift cylinder hydraulic pressure sensor, description page 32</i> D17: Diagnostic menu, see section 8 <i>Control system</i> , group 8.4.10.3 <i>OP</i> , menu 3
18	Control unit, frame front (D797-F) activates solenoid valve, regeneration right (Y6051) and solenoid valve, regeneration left (Y6052) if the pressure is sufficiently low for regeneration.	U = 24 V	Section 11 <i>Common electrics</i> , group 11.5.3.2 <i>Control unit, frame front</i> D18: Diagnostic menu, see section 8 <i>Control system</i> , group 8.4.8.3 <i>BOOM</i> , menu 3
19	The regeneration servo valve pressurised the regeneration valve.	-	<i>Lift cylinder valve block, description page 23</i>



1. Connection, rod side, lift cylinder (C-)
2. Solenoid valve regeneration (Y6051 or Y6052)
3. Pressure feed connection (VA)
4. Connection tank (T)
5. Pressure sensor, piston side (C+M)
6. Draining servo valves (D)
7. Shock valve
8. Solenoid valve blocking (Y6001 or Y6002)
9. Pressure sensor, rod side (C-M)

## 7.2.7 Valve block lift cylinder

### Lift cylinder valve block, description

The lift cylinder valve block directs oil to the lift cylinder and is mounted directly on the lower part of the lift cylinder. The valve block comprises the blocking valve, regeneration valve, non-return valve and shock valve.

#### Blocking valve

The blocking valve prevents unwanted lowering and angling of the lift cylinders. The blocking valve holds the load by ensuring that the connection to the lift cylinder's piston side is closed. (The pressure passes through a restriction as blocking pressure and holds the valve slide closed.)

Servo valve blocking actuates the blocking valve. The servo valve is controlled electrically with Solenoid valve, blocking left (Y6002) and Solenoid valve, blocking right (Y6001), which are activated by Control unit, frame front (D797-F).

The signal can be checked from the diagnostic menu, see section 8 *Control system*, group 8.4.8.2 *BOOM*, menu 2.

#### Regeneration valve

The regeneration valve directs oil from the rod side of the cylinder back to the piston side. This allows the oil to be re-used during lifting. For more information on regeneration see *Lifting/lowering, function description page 11*. The regeneration valve is regulated by the regeneration servo valve.

The regeneration servo valve actuates the regeneration valve. The servo valve is regulated electrically with solenoid valve, regeneration right (Y6051) or solenoid valve, regeneration left (Y6052), which are activated by Control unit, frame front (D797-F).

The signal can be checked from the diagnostic menu, see section 8 *Control system*, group 8.4.8.3 *BOOM*, menu 3.

#### Shock valve

The shock valve protects the hydraulic system against pressure surges which can occur when operating with a load. The shock valve opens a connection between the lift cylinder piston side and tank if the pressure becomes too high.

#### Non-return valve

The non-return valve prevents oil from going the wrong way during regeneration.

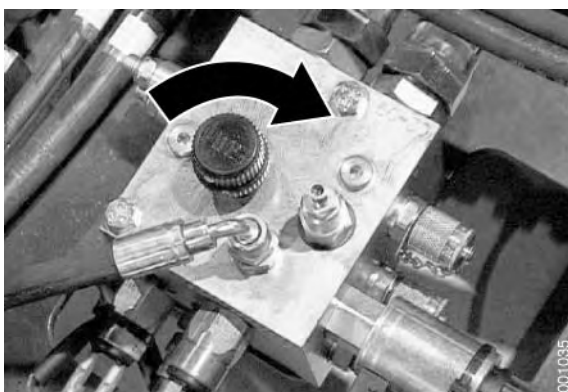
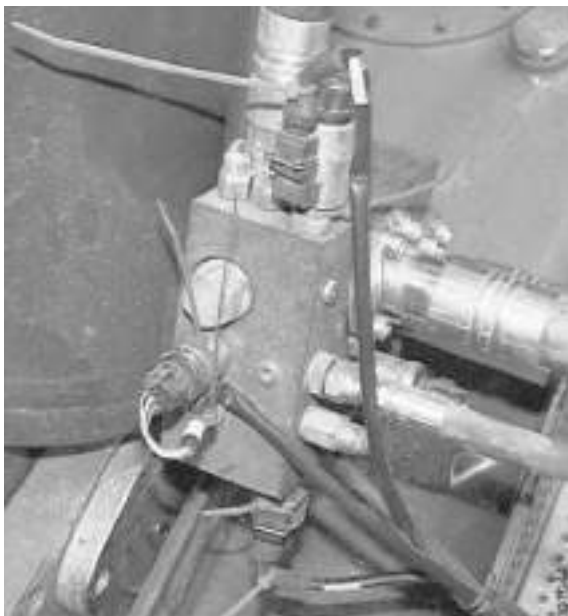
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- 5 Fit the new sensor.

## NOTE

*Check that the O-rings are intact and fitted correctly.*

- 6 Connect the cable harness to the hydraulic pressure sensor.
- 7 Clamp the cable harness as before.

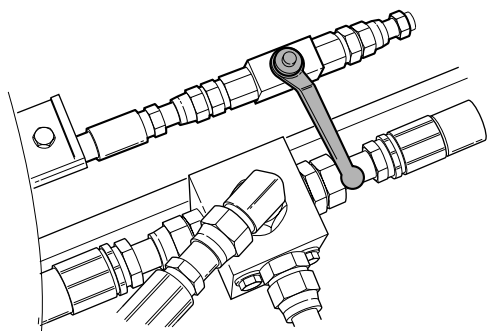


- 8 Close the drain valve on the accumulator charging valve.

## NOTE

*Check that the accumulator drain valve is fully closed and tighten the lock ring.*

- 9 Close the relief valve for top lift.



Relief valve for top lift, the figure shows a closed valve.

## CAUTION

**Hydraulic oil may be directed the wrong way.**

**Risk of damage to the fine filter for hydraulic oil.**

**Check that the relief valve for top lift is closed before starting the engine.**

- 10 Turn on the main electric power and start the engine.

Pos	Explanation	Signal description	Reference
9	The shuttle valve forwards the strongest load signal if several functions are activated simultaneously.	-	Section 10 <i>Common hydraulics</i> , group 10.5.3 <i>Shuttle valve</i>
10	The hydraulic oil pumps pump oil from the hydraulic oil tank.	See pressure plate on left frame beam.	Section 10 <i>Common hydraulics</i> , group 10.4.2 <i>Axial piston pump with variable displacement</i>
11	The pressure reducer reduces pressure from the hydraulic oil pumps to servo pressure.	See pressure plate on left frame beam.	<i>Pressure reducer</i> , description page 16
12	Servo pressure is stored in the accumulator. The non-return valve in the pressure reducer makes it possible to store the pressure when the engine is shut off.	See pressure plate on left frame beam.	<i>Accumulator servo circuit</i> , description page 18
13	The servo filter filters the oil before the control valve.	-	<i>Servo filter</i> , description page 16
14	For boom in Control unit, frame rear (D797-R) activates Servo valve, blocking extension (Y6050).	U = 24 V	<i>Valve block extension cylinder</i> , description page 47 D14: Diagnostic menu, see section 8 <i>Control system</i> , group 8.4.8.2 <i>BOOM</i> , menu 2
15	For boom in Servo valve, blocking extension (Y6050) actuates the blocking slide in valve block, extension cylinder.	-	<i>Valve block extension cylinder</i> , description page 47
16	For boom out the blocking slide is opened in valve block, extension cylinder by the hydraulic pressure from the control valve.  For boom in the blocking valve opens and releases pressure from the extension cylinder.	-	<i>Valve block extension cylinder</i> , description page 47
17	Extension cylinder extends or retracts the boom.	-	<i>Extension cylinder</i> , description page 47
18	<b>Regeneration</b> The lift cylinder hydraulic pressure sensor, piston side left (B768-L1) sends Control unit, frame front (D797-F) a voltage signal proportional to the cylinder pressure in the lift cylinders.	$U_{B768-L1/1} = 5 \text{ V}$ $U_{B768-L1/2} = 0 \text{ V}$ $U_{B768-L1/3} = 0.5\text{--}4.5 \text{ V}$	<i>Lift cylinder hydraulic pressure sensor</i> , description page 32 D18: Diagnostic menu, see section 8 <i>Control system</i> , group 8.4.10.3 <i>OP</i> , menu 3
19	Control unit, frame front (D797-F) sends information about the pressure in the lift cylinders.	Checked by control system, error shown with error code.	Section 11 <i>Common electrics</i> , group 11.5.3.2 <i>Control unit, frame front</i>

### 7.3.10 Lift boom

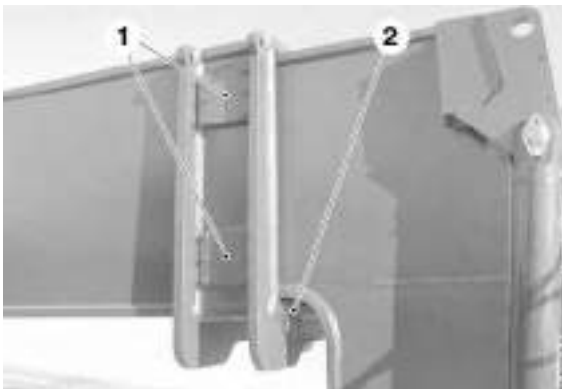
#### Lift boom, general

See *Lift boom, description page 35*.

#### Slide plates, lift boom, replacement

#### NOTE

*When adjusting the side-mounted slide plates, it is important to check the clearance for the whole travel of the boom and that the inner boom is centred in the outer boom.*



1. Side-mounted slide plates
2. Lower slide plates

#### Front slide plates

- 1 Move the boom to the lowest position with the inner boom extended approx. 50 cm.
- 2 Remove the cover plate for the side-mounted slide plates and remove the spacer plates and slid plate.
- 3 Fit in the reverse order.
- 4 Check the clearance between the boom and slide plate, the clearance should be **1 mm**, adjust with spacer plates as required.

#### NOTE

*Inner boom must be centred in the outer boom.*

- 5 Remove the lock screws and the slide plates' brackets, and pull out the upper slide plates and the spacer plates.
- 6 Unload the lower slide plates, lift the inner boom at the front edge and use wooden shims.



## WARNING

#### Risk of pinch injury!

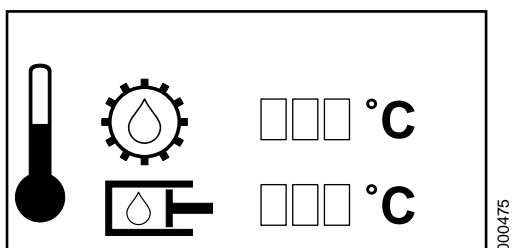
**Secure the inner boom relative to the outer boom with wooden blocks.**

- 7 Remove the lock screws, slide plates' brackets and pull out the lower slide plates.
- 8 Transfer the nuts for the lock screws for the lower slide plates to the new slide plates.
- 9 Fit the new lower slide plates, lock screws and brackets.
- 10 Remove the wooden blocks and ease down the inner boom so that it rests on the lower slide plates.
- 11 Transfer the nuts for the lock screws for the upper slide plates to the new slide plates.
- 12 Fit the new slide plates, spacer plates, lock screws and brackets.

## Attachment control valve, checking hydraulic pressure

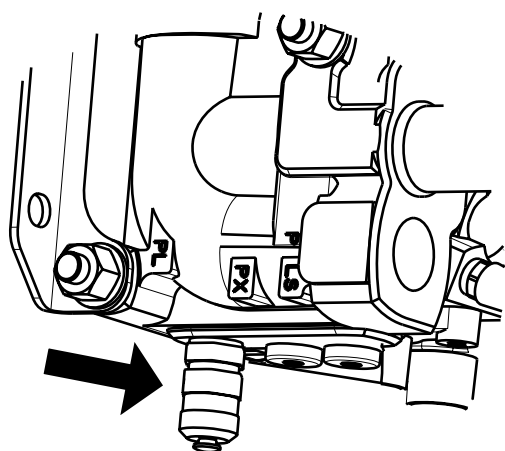
### NOTE

Read the instructions for oil before working; see section B Safety.



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Operating menu, hydraulic oil temperature



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Measuring outlet, control valve, attachment

- 1 Operate and warm up the machine so that the hydraulic oil is at operating temperature, at least 50 °C. As an alternative, operate until the cooling fan is activated.
- 2 Machine in service position, see section B Safety.

- 3 Connect a pressure gauge to measuring outlet PL on the attachment control valve.
- 4 Start the engine and run it at idling speed. Check the pressures in the attachment's different functions by letting each function go to its end-position and then reading off the pressure gauge.

Function	Pressure
Side shift	16.0 MPa
Spreading	12.0 MPa
Rotation	15.0 MPa
Tilt control	15.0 MPa
Levelling	15.5 MPa
Twistlocks	Same as feed pressure.
Overheight jacks, lowering	10.0 MPa
Lifting jacks, knee in/out	10.0 MPa
Lifting jacks, jack up/down	13.0 MPa
Lifting jacks, clamping	13.0 MPa

- 5 Remove the pressure gauge and fit the protective cap on the measuring outlet.

## 7.4.4 Shuttle valve

### Shuttle valve, description

See section 10 Common hydraulics , group 10.5.3 Shuttle valve.

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