Hako - Citytrac (8010.11 / 8010.12)

Hako - Citymaster (1433.11 / 1433.12)

Hako - Citycleaner (1433.52)

Schulung/Training
Fehlersuche/Trouble Shooting
Einstelldaten/Adjustments
Baukomponenten/Zulieferer
Components/Suppliers

Contents

5.0 Hydraulic Installations

6.0 Electrical Installations

7.0 Options

Hako - Citytrac 4200
Hako - Citymaster 1200
Hako - Citycleaner

Product Description

1.0 Product description, Hako – Citytrac 4200 / Citymaster 1200

Citytrac Lawnmower:
Flexible working width, 1.50 and 1.80 m with side ejection rear ejection or mulchmower. Cutting height adjustment 3-10 cm.

Citytrac Snow plough and gritting:
Snow clearance with spring-mounted blade, 1.50 and 1.70 m, in combination with hydraulic rollers or combination gritting, 1.20 / 6 m working width

Citytrac Grass-Leaf vacuumunit
In combination with lawnmower to collect directly the grass and leafes. The suction fan is hydraulicly driven

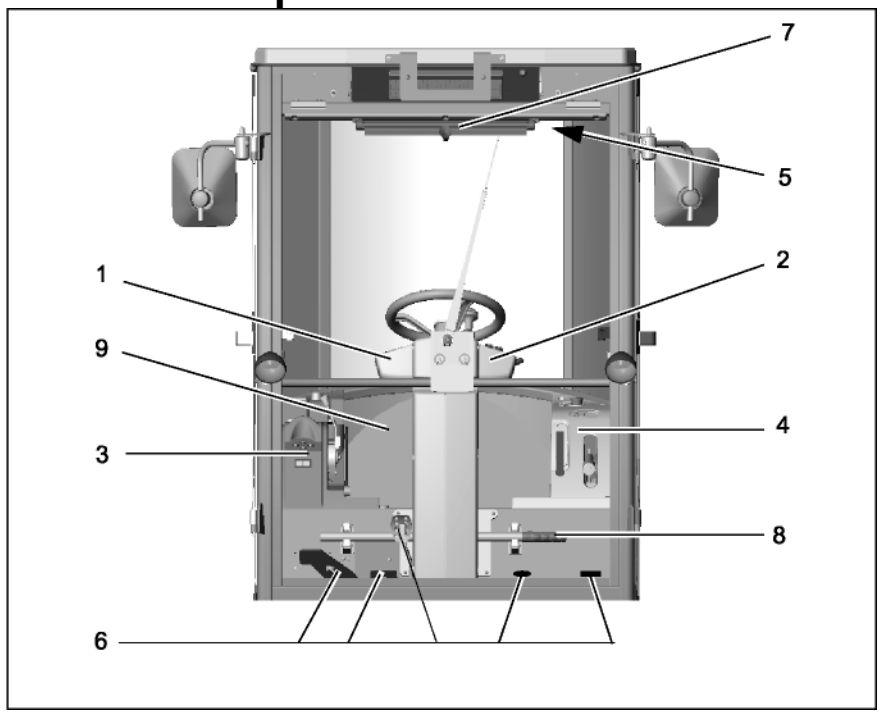
Citymaster Sweeping:
Hydraulically powered suction fan

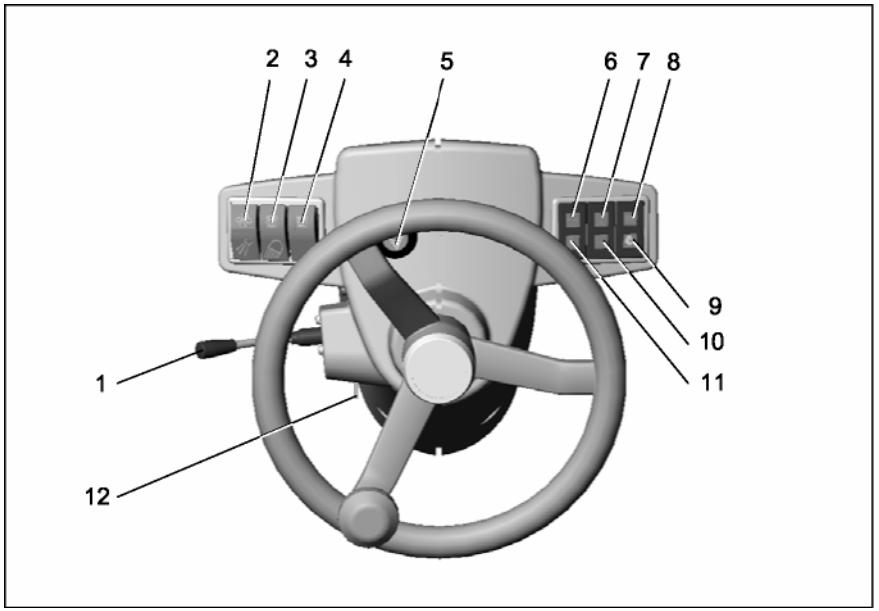
1.0 Product description, Hako – Citytrac 4200 / Citymaster 1200

Citymaster Hand-held suction hose
Optionally equipped with the strong hand-held suction hose for cleaning gutters and drains

Citycleaner
Wet sweeping unit to clean special outdoor surfaces

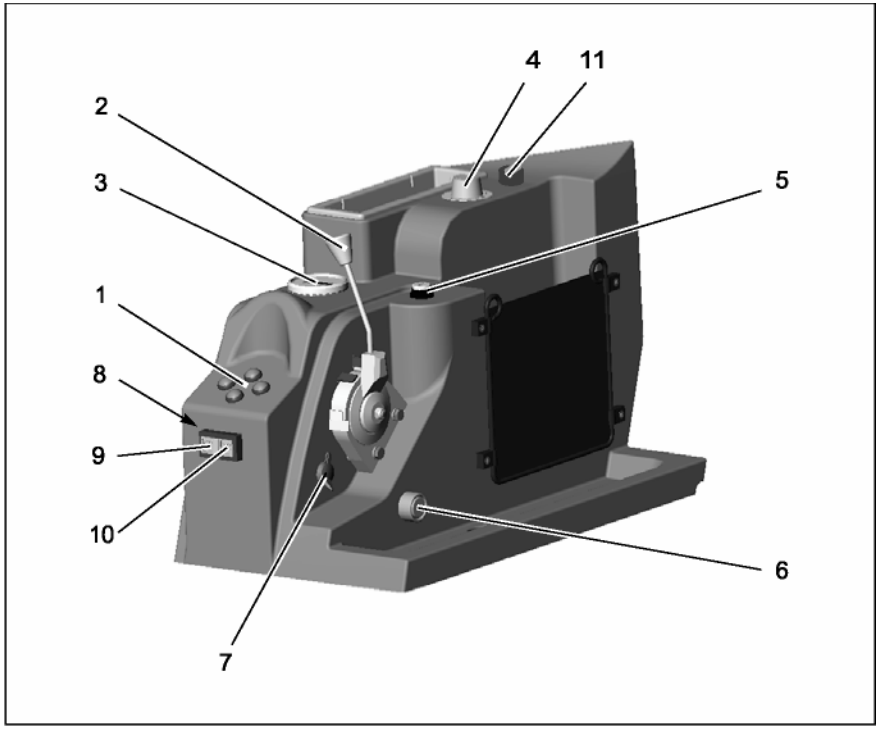
1.2 Short operator manual

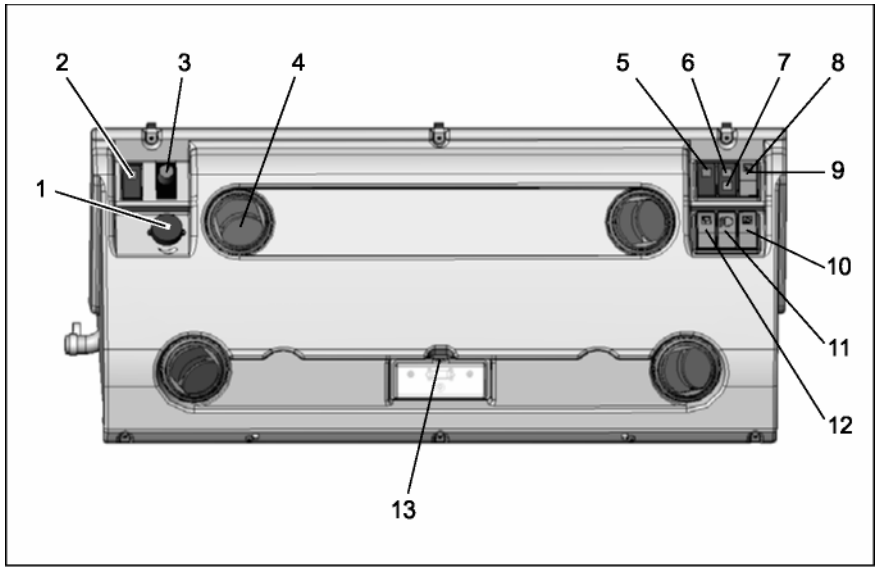




1 control panel r.h.
2 control panel l.h.
3 control console, right
4 control console, left
5 control panel, cabin roof
6 pedals
7 sun blind
8 auxiliary tools
9 driver seat

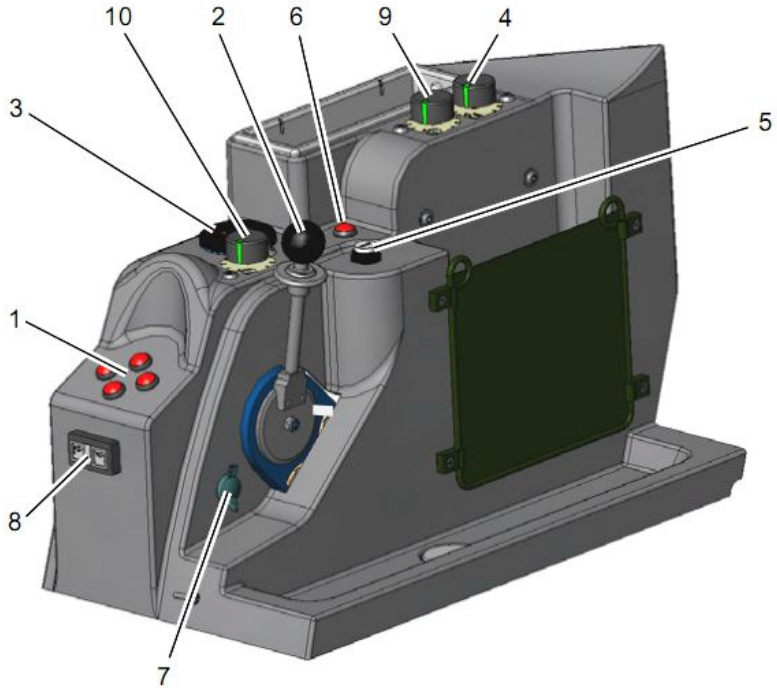
1 cobination switch, flasher/horn
2 rocker switch, suction fan/water pump (mower deck option)
3 working lights
4 rotating beacon
5 hazard flasher
6 pilot lamp, direction indicator
7 pilot lamp, coolant temperatur
8 pilot lamp, battery charge
9 pilot lamp, pre-glowing
10 pilot lamp, oil pressure
11 pilot lamp, low fuel
12 clean water for suction mouth nozzle





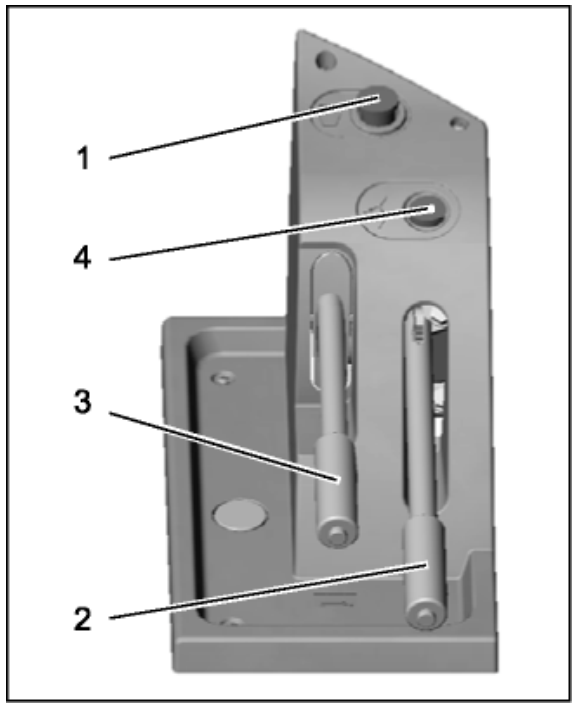
1 keypad, lifting, lowering and pivoting front attachments
2 speed govenor, engine
3 hourmeter
4 speed govenor, side brushes
5 ignition lock
6 reset switch for trip hourmeter
7 socket
8 selector for plough side selection
9 plough, r.h. positio
10 plough, l.h. position
11 Reversing signal ON/OFF (option)

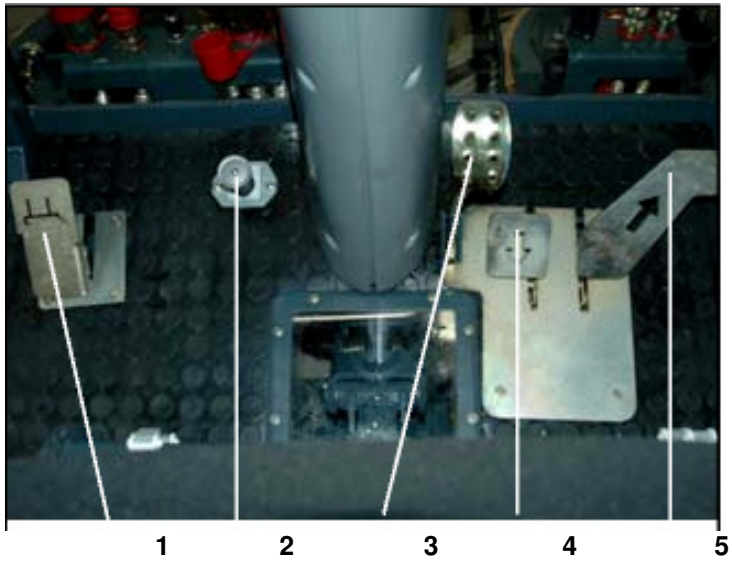
1 heater valve
2 heating, ventilation and a/c (Comfort))
3 rotary switch, fresh air/heater fan
4 air flow openings
5 pilot lamp, parking brake
6 pilot lamp, hydraulic fliud temperatur
7 pilot lamp, dirt hopper lifted
8 switch for implement ground pressure
9 quick discharge of rear spreader (hydr. circuit 2)
10 button for lifting/lowering dirt hopper
11 diving lights /side marker lamps
12 **button,** windscreen wiper switch and washer
13 interior lighting



Spezielle Elemente beim Citycleaner:

1	Tastenfeld Heben und Senken
2	Drehzahlversteller Motor
3	Betriebstsundenzähler
4	Drehzahlversteller für Schrubbaggregat
5	Zündschloß
6	Resettaster für Tagesstunden- / kilometerzähler
7	Steckdose
8	Wahlschalter für hydraulische Zusatzfunktion
9	Wassermenge Schrubbaggregat
10	Andruckverstellung Schrubbaggregat





1 opening for windscreen washer reservoir
2 parking brake
3 lever for recirculation water suction mouth
4 spray water for side brushes

1 coarse particle flap
2 differential lock (option)
3 brake pedal
4 pedal, reverse ride
5 pedal, forward ride

Hako - Citytrac 4200
Hako - Citymaster 1200
Hako - Citycleaner

Technical Data

2.0 Technical data

Vehicle dimensions		CT 4200 DA	CM 1200
Length without attachment devices / with circular brushes	mm	3090	3944
Width without attachment devices	mm	1325	1193
Height above cabin without / with beacon lamp	mm	1995 / 2200	
Wheelbase	mm	1430	
Track gauge, front	mm	998	984
rear	mm	998	984
Turning diameter: outer	mm	5125	5500

Weight			
Unloaden weight acc. to StvZO	kg	1400	1800
Gross vehicle weight	kg	2500	

Axle load		
Permissible axle load front	kg	1500
rear	kg	1500

Engine		
Manufacturer		Yanmar Co. LTD
Type		4 TNV 88 MHW
Method of operation		4-stroke diesel, direct injection
Output	kW	33
Bore / Stroke	mm	88 / 90
No. of cylinders / arrangement		4 cylinder / row
Cubic capacity	cm^3	2190
Idling speed	rpm	1100±50
Operating speed	rpm	2450
Max. speed	rpm	2750 ±25

Valve clearance inlet / outlet (cold)	mm	0.20
Air filter cartridge	Spare part no.::	114 – 347
Backup cartridge	Spare part no.::	114 – 348
Fuel system		
Tank volume	Ltr.	Approx. 60
Fuel filter cartridge	Spare part no.::	114 - 033

Driving speed		
Transport mode (automotive) forwards	kph	0 - 25
reverse	kph	0 - 12
Work mode forwards	kph	0 - 13
reverse	kph	0 - 9

Tyres			
Size		26 x 12.00 – 12/8 PR	195 R 14 C
Load bearing capacity	kg	750	
Air pressure	bar	1.5	3.0
Wheel bolt tightening torque	Nm	130	

Hydraulic system		
Traction drive		Variable displacement pump, Rexroth A10VG
Hydraulic motors with hydr. diff. lock		Sauer Danfoss TMKW 250
2-circuit work hydraulics		

Electrical installations		
Nominal voltage	Volt	12
Starter battery	V/Ah	12/74
Three-phase generator	V/A	12/80
Starter	V/kW	12/2.3

2.2 Overview service

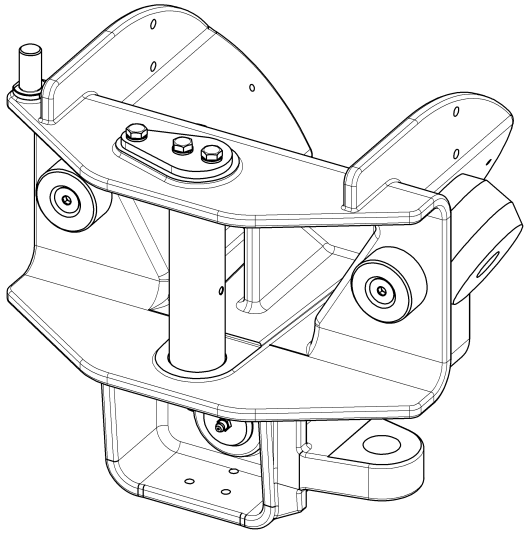
Description	Interval				
	once	250	500	750	1000
Change engine oil and replace filter	50h	x	x	x	x
Check radiator and coolant hoses for leakage	50h	x	x	x	x
Check v-belt at engine for condition and tension	50h	x	x	x	x
Check suction fan for speed, bearing play and soiling	50h	x	x	x	x
Replace fuel filter	50h		x		x
Replace hydraulic return7suction filter cartridge	50h		x		x
Check brake and parking brake function	50h		x		x
Check idling and operation speed	50h		x		x
Check wheel bolts for tight seating (130Nm)	50h				x
Check ball heads of steering cylinder	50h				x
Check fresh air intake filter for cabin fan		x	x	x	x
Check brake fluid level		x	x	x	x
Check wearing plate in dirt hopper		x	x	x	x
Clean air cleaner element		x	x	x	x
Check exhaust system for damages		x	x	x	x
Replace air cleaner element		x	x	x	x
Check water separator at fuel system		x	x	x	x
Replace safety cartridge of air cleaner					x
Check engine air gap inlet/outlet (0,2mm) with cold engine					x
Replace diaphragm in valve bonnet of engine ventilation system					x
Change hydraulic fluid					x
Replace ventilation filter in hydraulic tank					x
Change coolant					x
Change brake fluid					x
Check brake shoes					x
Check tires					x
Replace bowden cables at engine (1x) and drive pump (2x)					x
Articulated joint, check play and rubber damper					x

Hako - Citytrac 4200
Hako - Citymaster 1200
Hako - Citycleaner

Assembly and Mechanical Design

3.1 Articulated 4-wheel chassis

3.1.1 Articulated steering



Pendulum articulated joint with shock absorption

Maintenance:

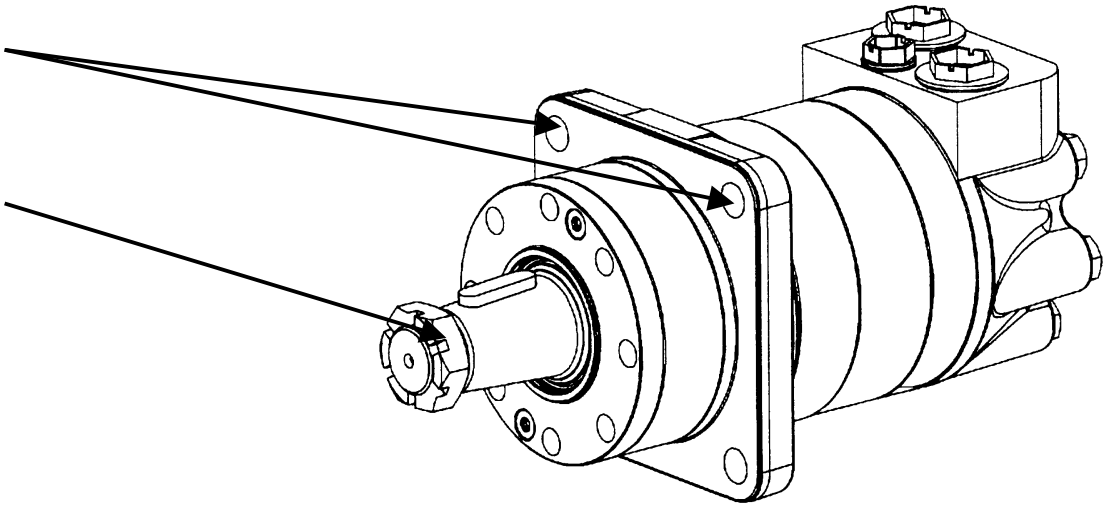
- Grease weekly
- Check condition of rubber stops and for signs of wear

3.1.2 Hydraulic motor

Torque:

Retaining screws **100** Nm

Turn castle nut **350** Nm further until the next pin hole



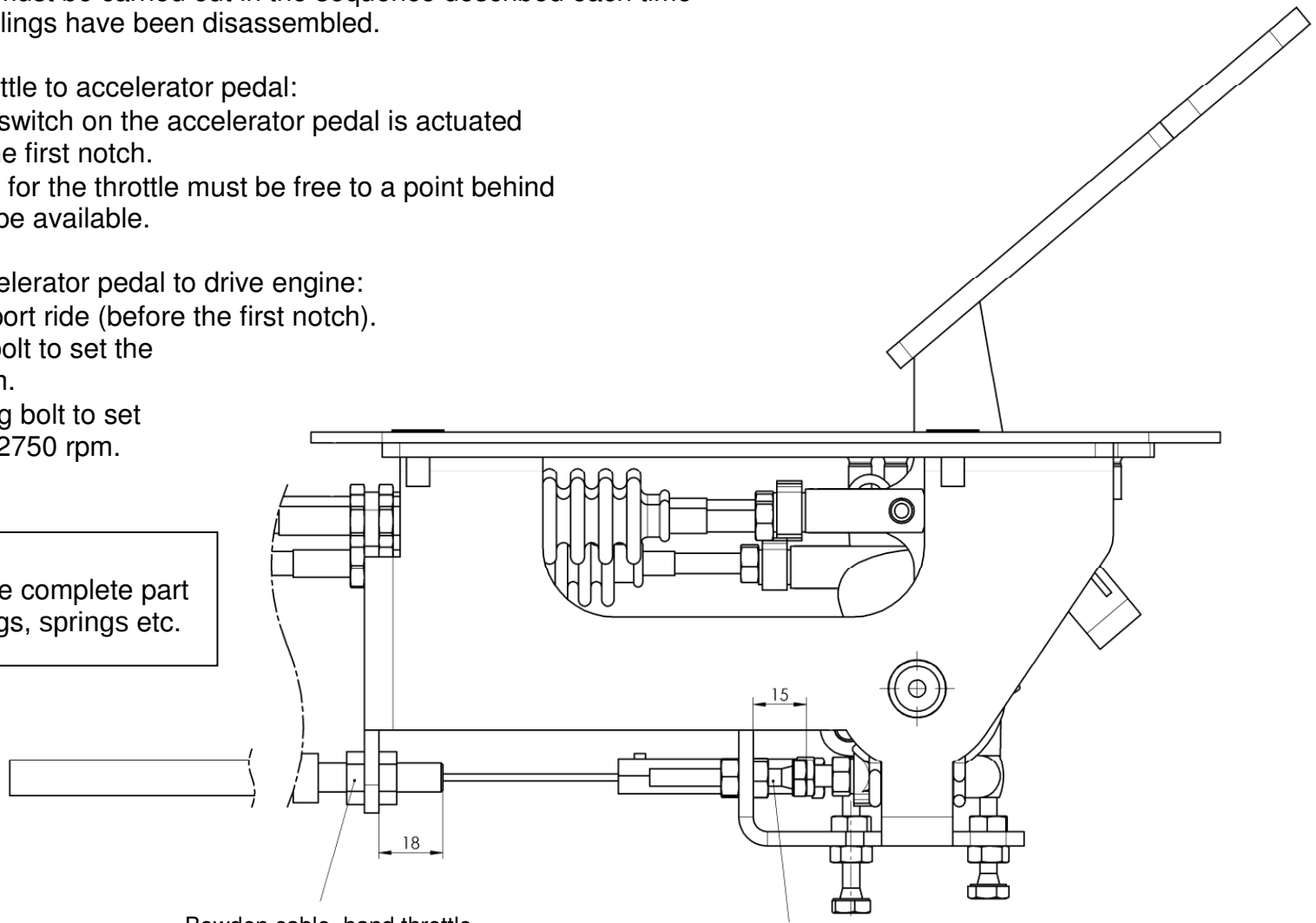
3.2 Accelerator pedal

The following adjustments must be carried out in the sequence described each time the Bowden cables or couplings have been disassembled.

1. Bowden cable from throttle to accelerator pedal:
- Adjust so that the microswitch on the accelerator pedal is actuated when the throttle is at the first notch.
- The entire path of travel for the throttle must be free to a point behind the second notch must be available.

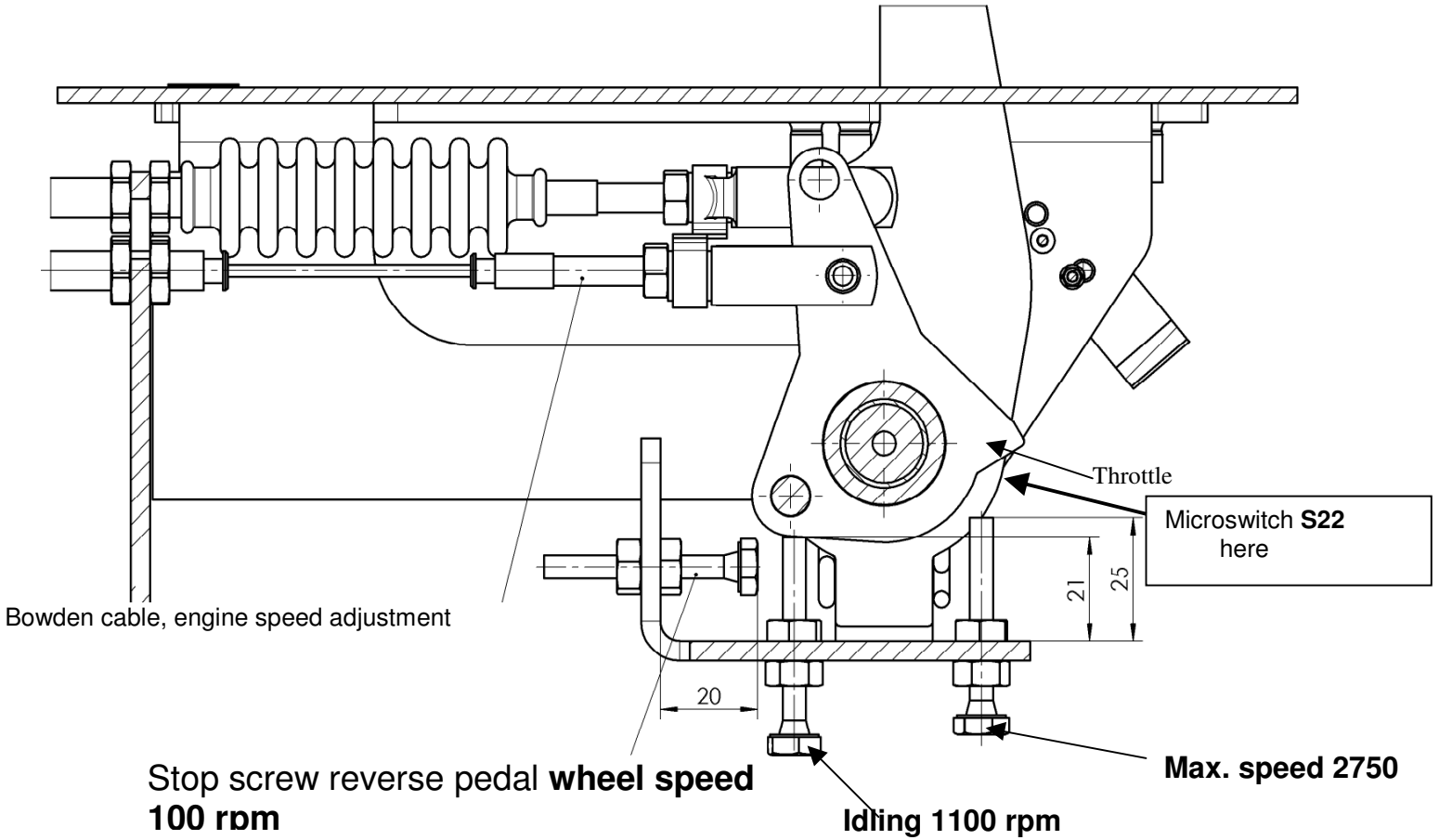
2. Bowden cable from accelerator pedal to drive engine:
- Set the throttle to transport ride (before the first notch). Use the rear adjusting bolt to set the engine to 1100 ± 50 rpm.
- Adjust the front adjusting bolt to set the maximum speed of 2750 rpm.

Attention!
Check each 1000h the complete part for wearout of bushings, springs etc.



3. Bowden cables in the hydraulic pump:

- Raise the front of the machine, set the hand throttle to "Transport mode", actuate the parking brake and secure the machine by positioning chocks against the rear wheels.
- Disconnect both cables from the accelerator pedal and check that the pedals are parallel.
- Hook in the cables for the forward ride and adjust them so that the pump is not moved when the pedals are in a neutral position. Adjust the stop screw so that the average of both front wheel speeds is maximally 225 rpm.
- Hook in the cable for reverse ride and adjust until the average speed is 100 rpm



3.3 Engine hand throttle

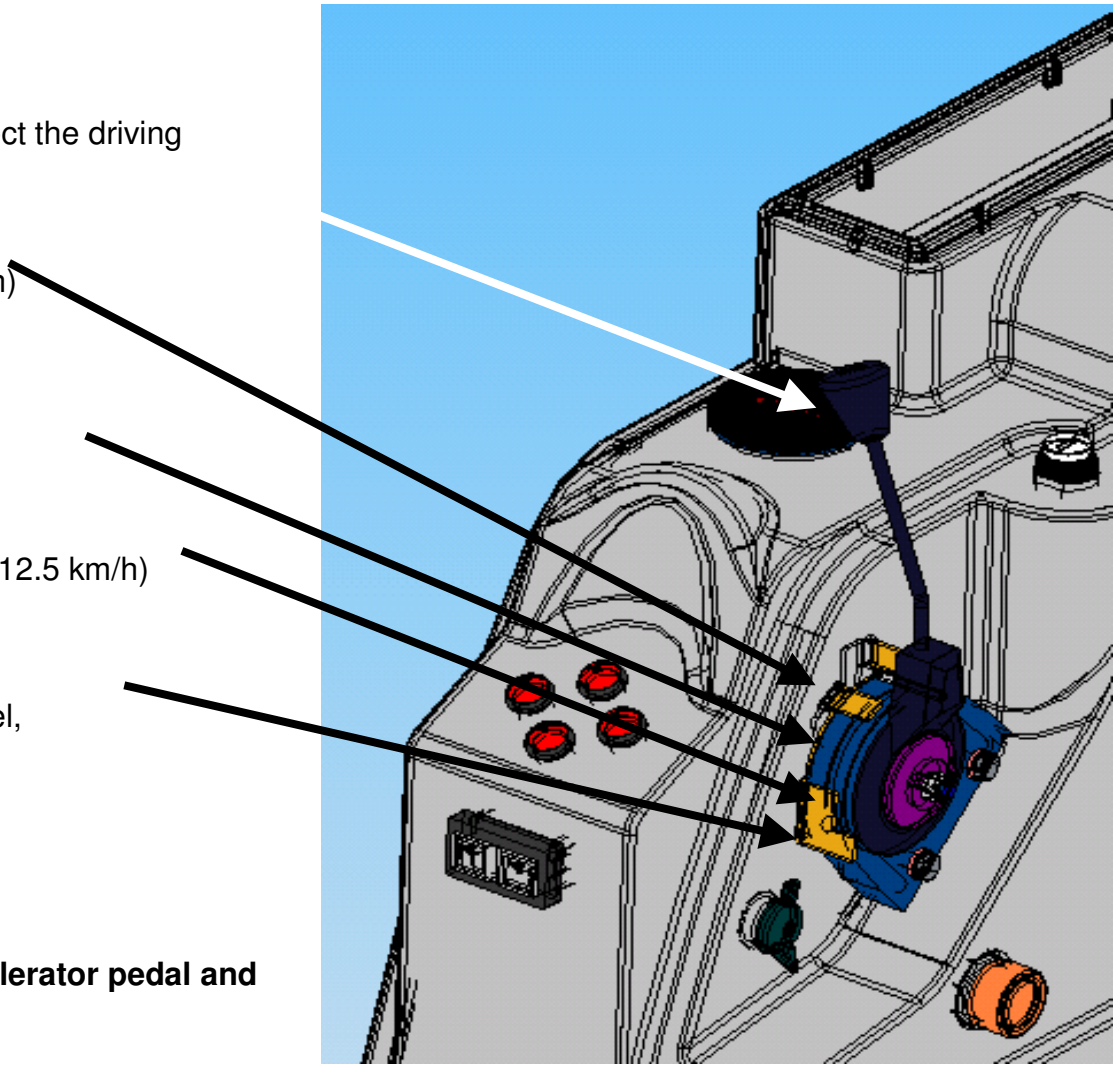
The throttle serves to adjust the engine speed and select the driving mode.

Up to first notch:
Engine idling; transport mode (2-wheel, max. 25.0 km/h)
Automotive mode; work hydraulics disabled

Behind first notch:
Engine idling; work mode (4-wheel, max. 12.5 km/h)
Automotive mode; work hydraulics enabled

In front of the second notch:
Preferred speed 2450 rpm; work mode (4-wheel, max. 12.5 km/h)
Automotive mode; work hydraulics enabled

End stop position:
Max. engine speed 2750 ± 25 rpm; work mode (4-wheel, max. 12.5 km/h)
Automotive mode; work hydraulics enabled



Attention:
The Bowden cable actuates a cam disk on the accelerator pedal and has no direct connection to the engine.

Hako – Citytrac 4200
Hako – Citymaster 1200
Hako - Citycleaner

Engine

Yanmar 4 TNV 88 (B)M HW

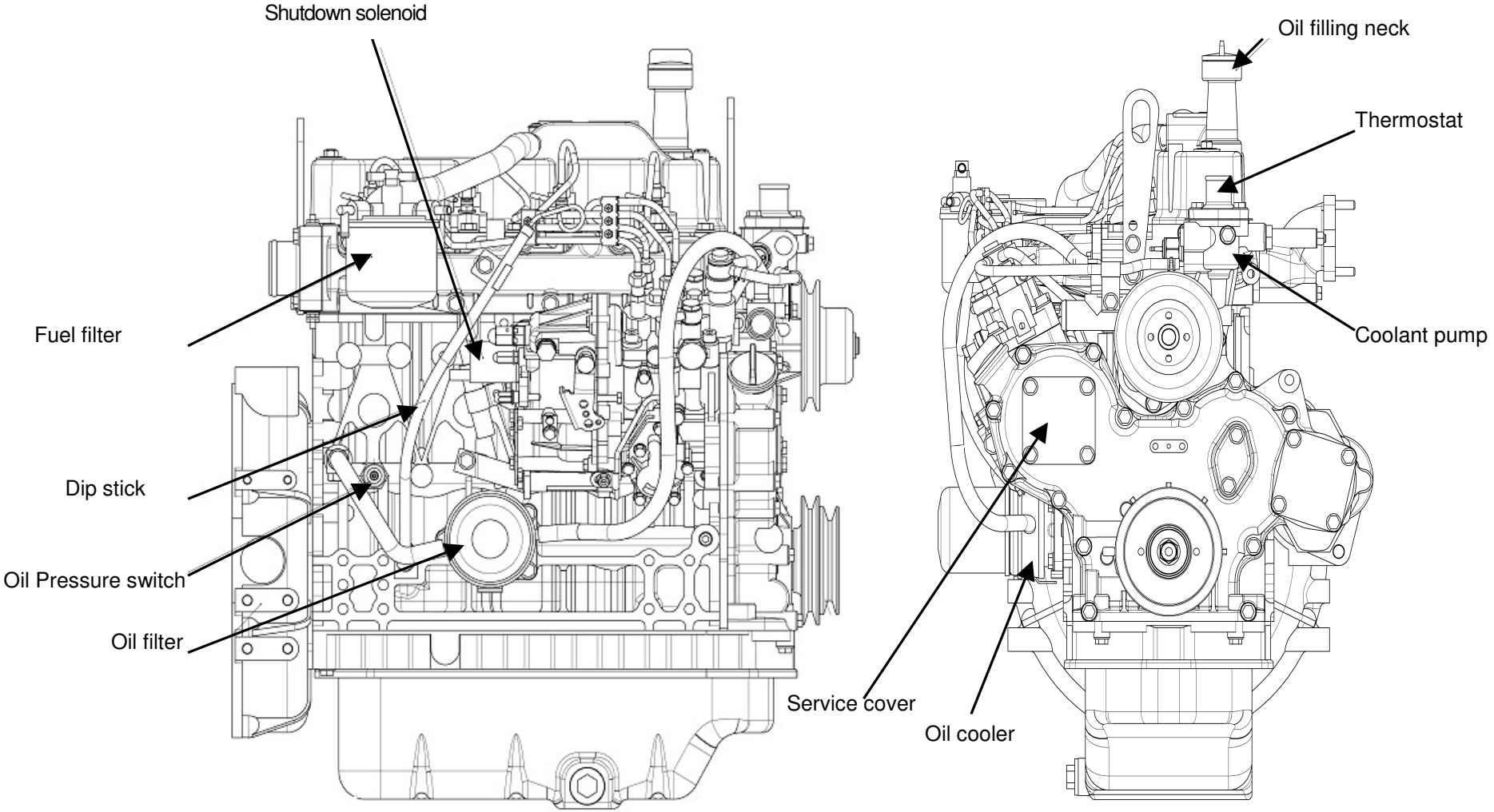
4.1 Engine naming system

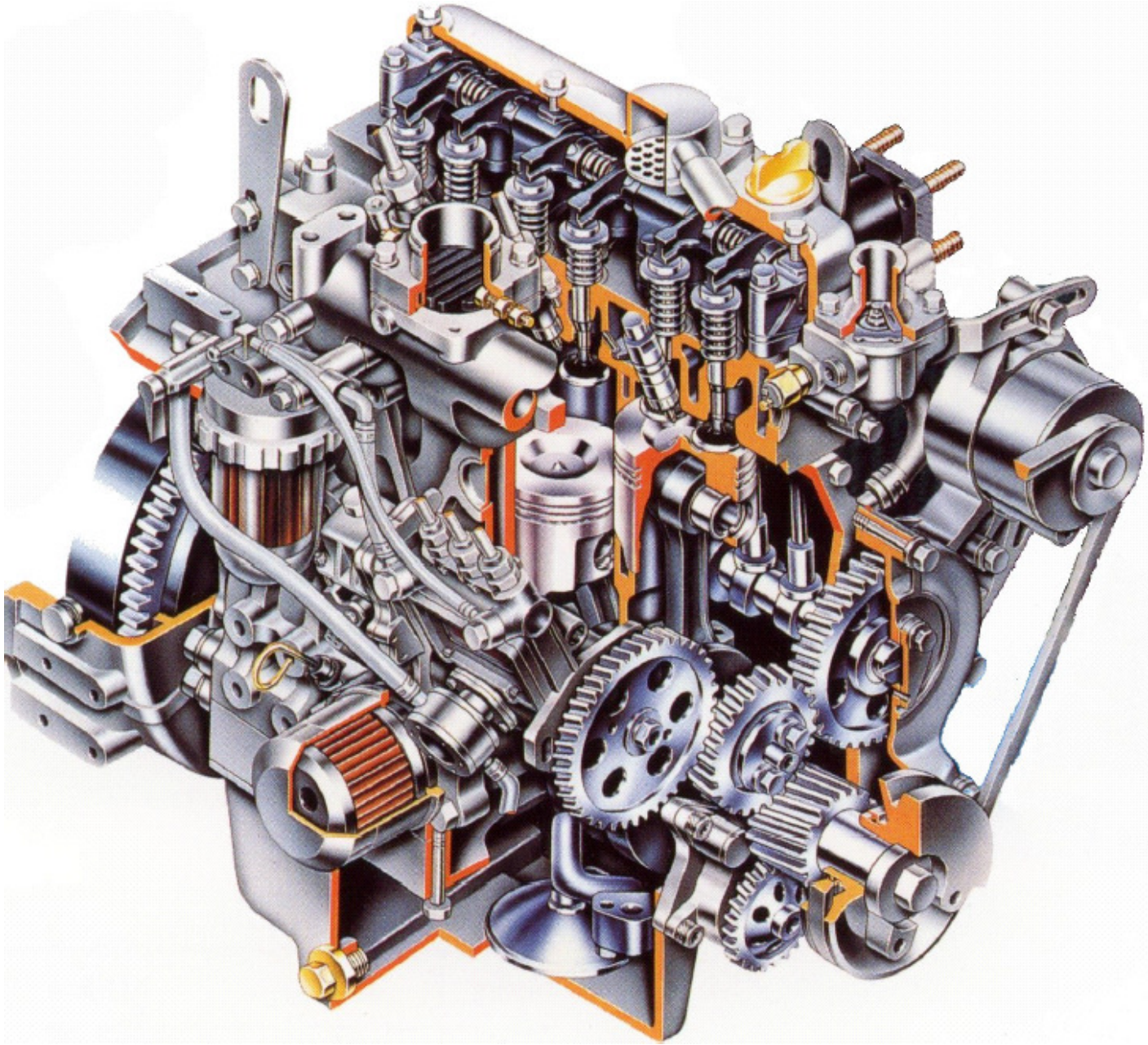
4	TNV	88	(B)M	HW
No. of Cylinders	Model/Series	Cylinder Bore	Speed Range	Hako Plant

4.2 Technical data

Cylinder bore / stroke	mm	88 x 90
Cubic capacity	cm^3	2.190
Ignition sequence		1 – 3 – 4 – 2 (1st cylinder on flywheel)
Direction of rotation		Anticlockwise (viewed from the flywheel side)
Idling speed	rpm	1100 ± 50
Max. speed	rpm	2750 ± 25 (no load)
Preferred speed	rpm	2450
Eingine oil capacity	ltr	8,6 (incl. Filter) Mobiloil DELVCAC 15W-40 (o. similar)

4.3 Overview of components

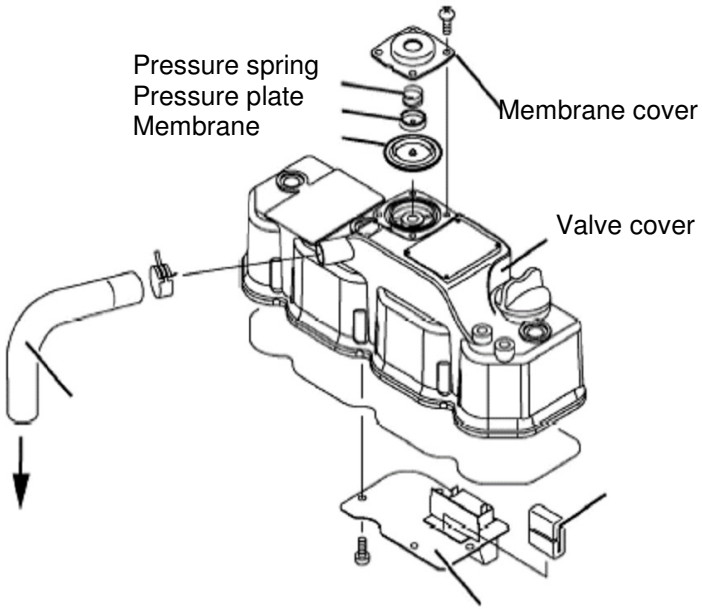


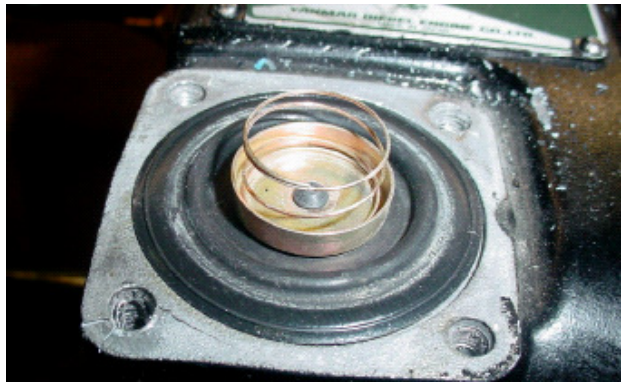


4.4 Crankshaft housing ventilation

Complete the following every 1000 operating hours or every 2 years:

- Check whether any oil or condensate has penetrated between the membrane and cover.

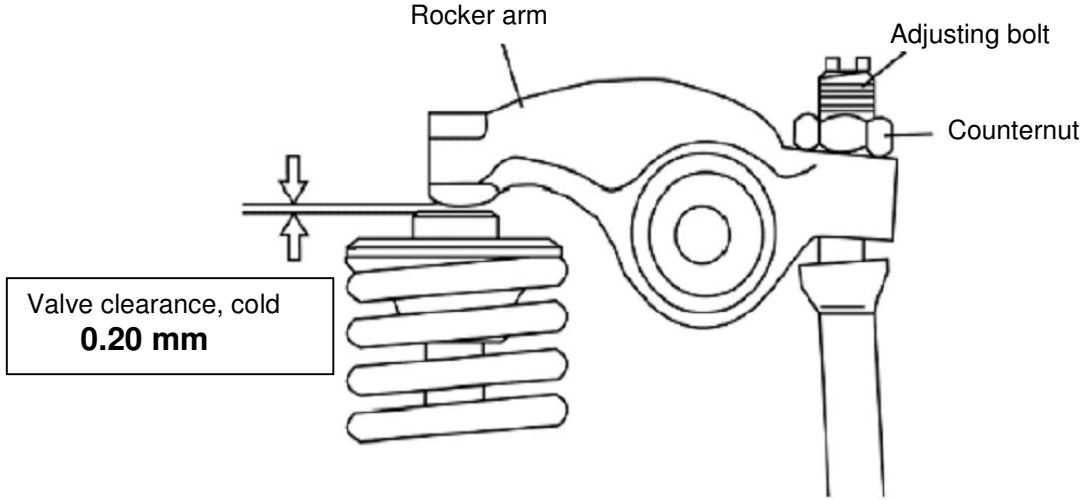


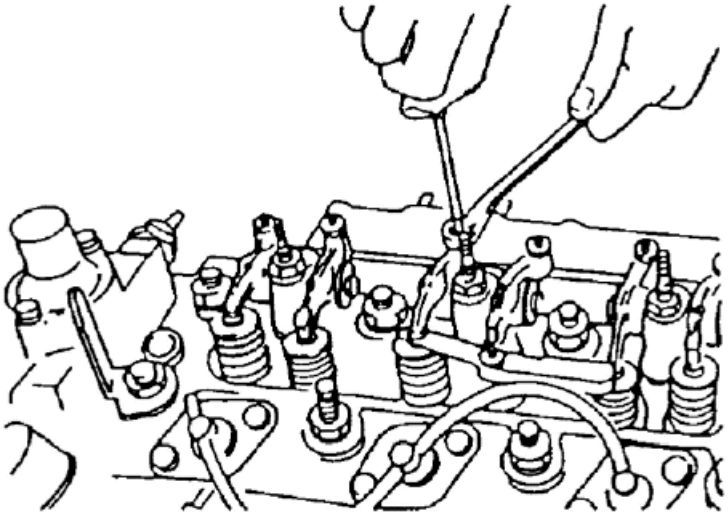


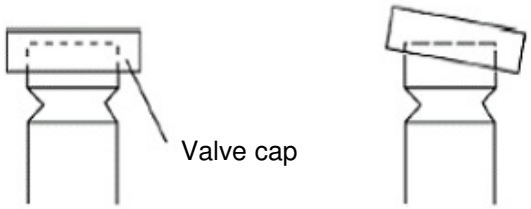
4.5 Valve clearance adjustment

The valve clearance must be checked every 1000 operating hours or at least once a year and readjusted, as necessary.

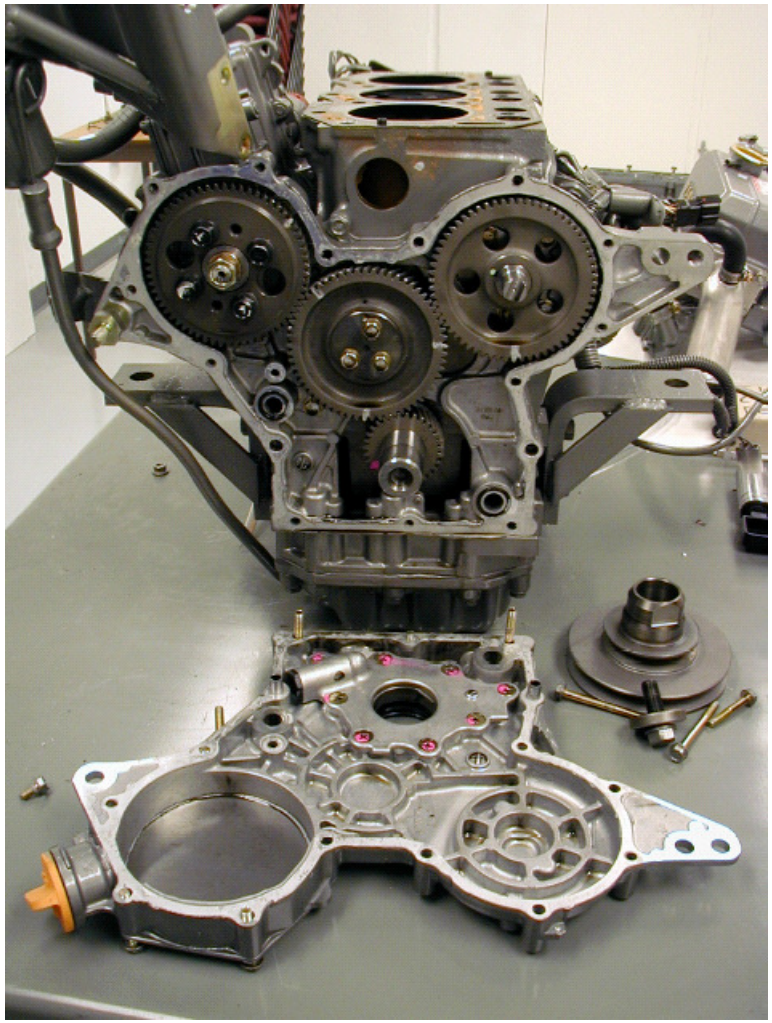
During this maintenance work, check whether the valve caps are set square on the valves or if they have become misaligned due to wear or infiltration of dirt.



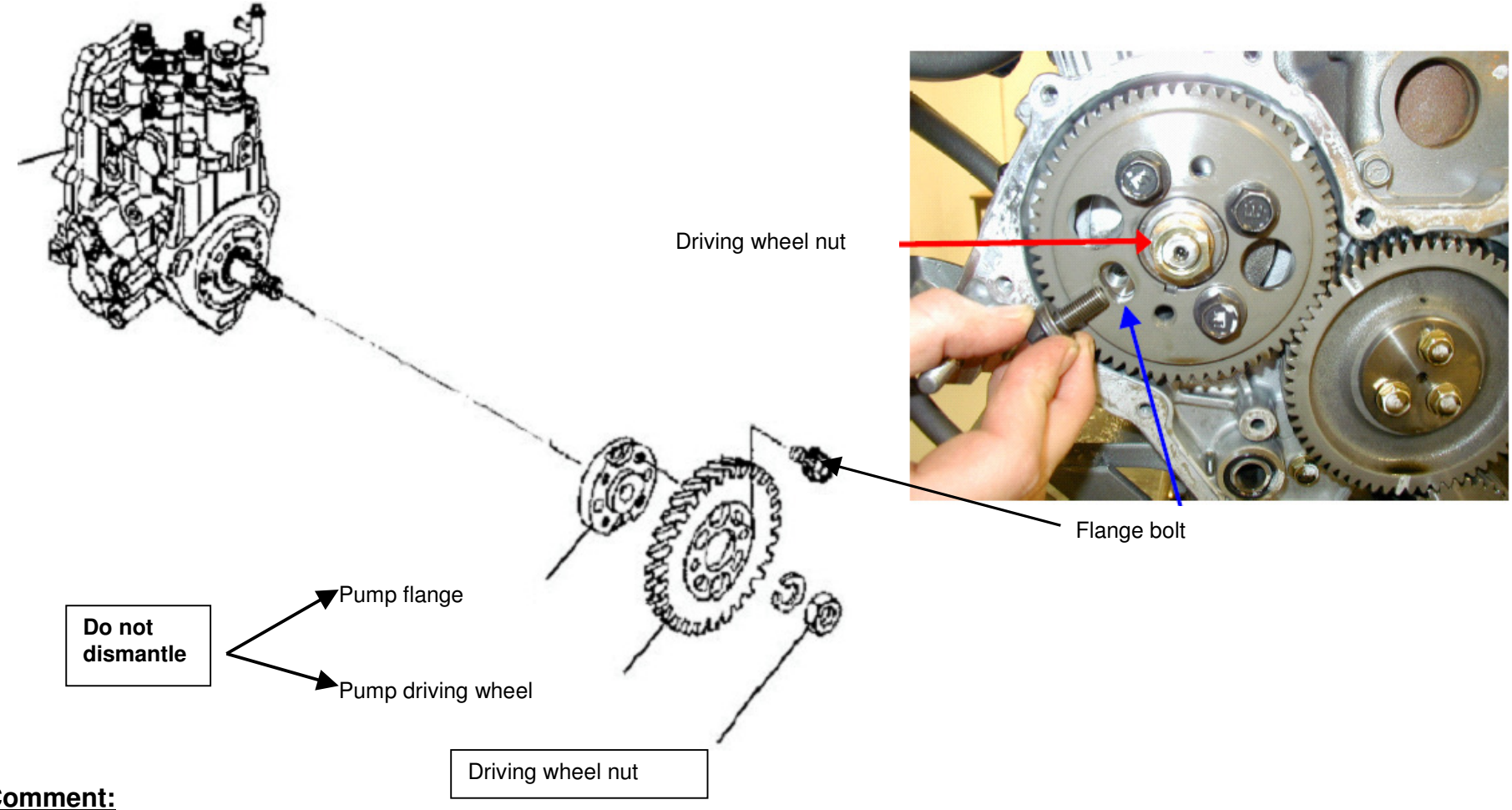




Changing the timing belt **Not applicable**



4.6 Changing the injection pump



Comment:

The pump flange and driving wheel are set up for the engine at the factory. Do not loosen the flange bolts.

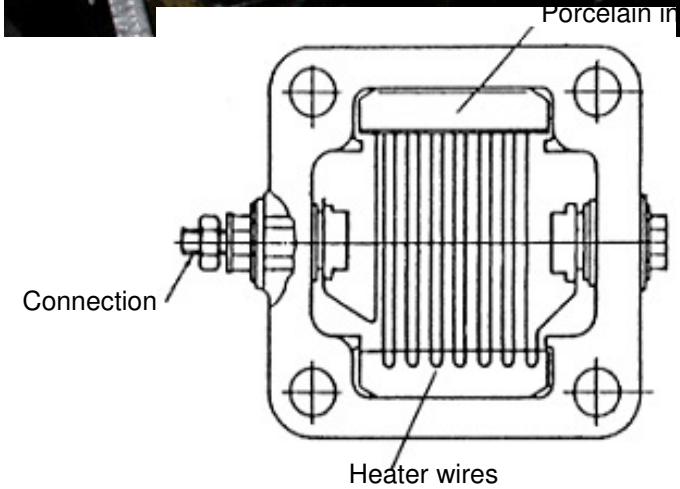
4.7 Engine shutdown solenoid

Break-away starting current: 30 Amp. / 1 second
It is switched on for one second by relay K17 via the timer

Holding current: 1 Amp.

In the event of a voltage drop, a spring pulls the control shaft to "engine shutdown"

(If the shutdown mechanism fails, the engine can be operated to a restricted level after disassembling the solenoid with the **loss of all safety features**.
(In this case, the engine must be switched off by actuating the injection pump.)



Advanced air heating

Output / Power consumption: 400 Watt / 35 Amp.

Resistance: **0.4 Ohm**

From July 2009 the engine will have a preheating by glowplugs.

Hako - Citytrac 4200
Hako - Citymaster 1200
Hako - Citycleaner

Hydraulic Installations

5.1 Safety regulations

- The hydraulic system is under high pressure!

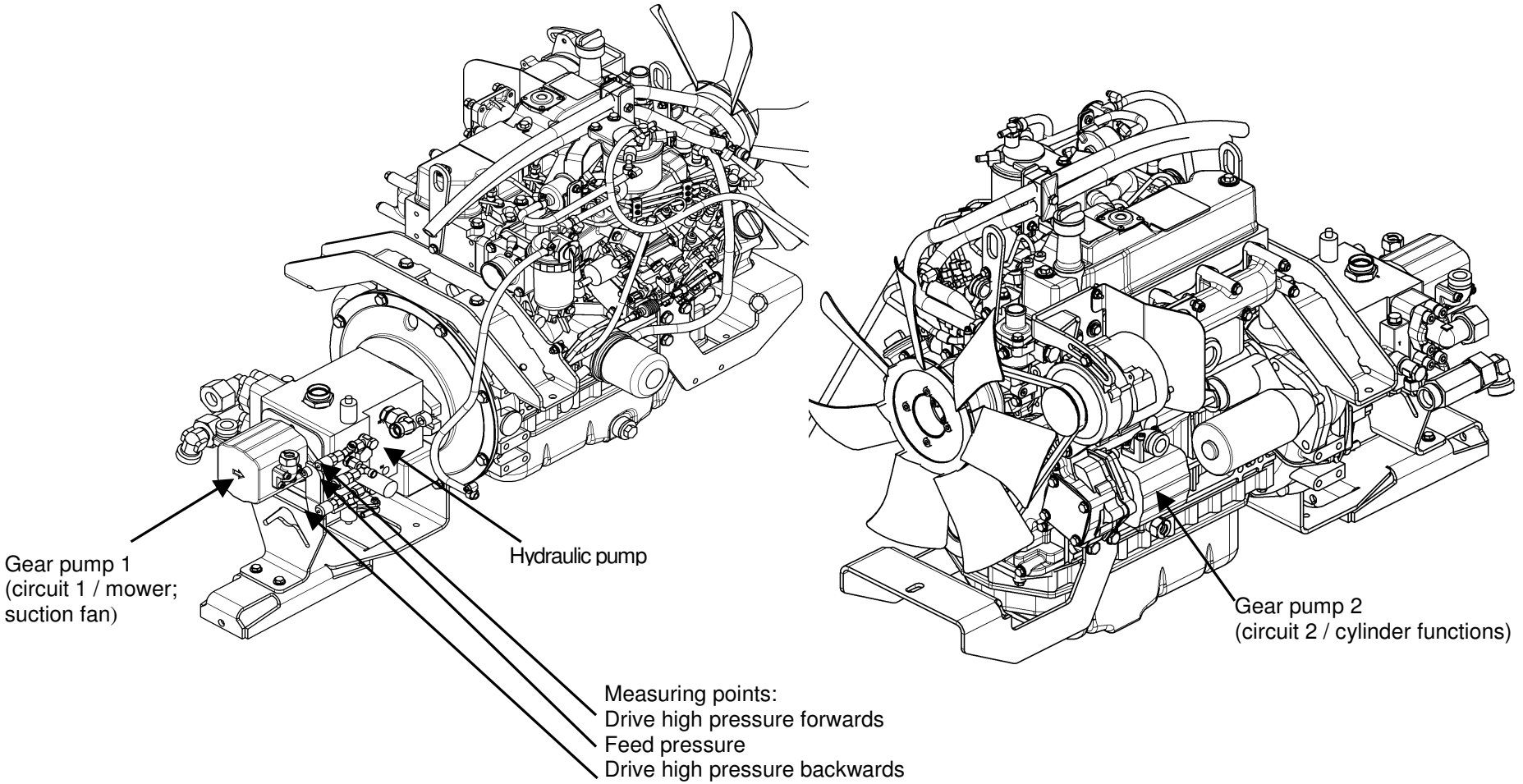
⚠ High-pressure fluids (fuel, hydraulic oil) escaping at high pressure can penetrate the skin and cause severe injuries. Therefore, seek medical attention immediately to prevent the possibility of developing a severe infection!

- Use the applicable tools when searching for leaks to prevent the risk of injury!
- Before starting work on the hydraulic system, it must be depressurised and any devices attached must be lowered!
- When working on the hydraulic system, it is essential to switch the engine off and secure the vehicle against rolling away (parking brake, wheel chock)!
- When connecting hydraulic cylinders and motors, pay strict attention to the method of connecting hydraulic hoses prescribed!
- If connections are swapped, there is a risk of reversed functioning (e.g. raise/lower) - risk of accident!
- Check hydraulic lines at regular intervals and replace them in the event of signs of damage or ageing!
  The replacement hoses must fulfil the technical requirements stipulated by the equipment manufacturer!

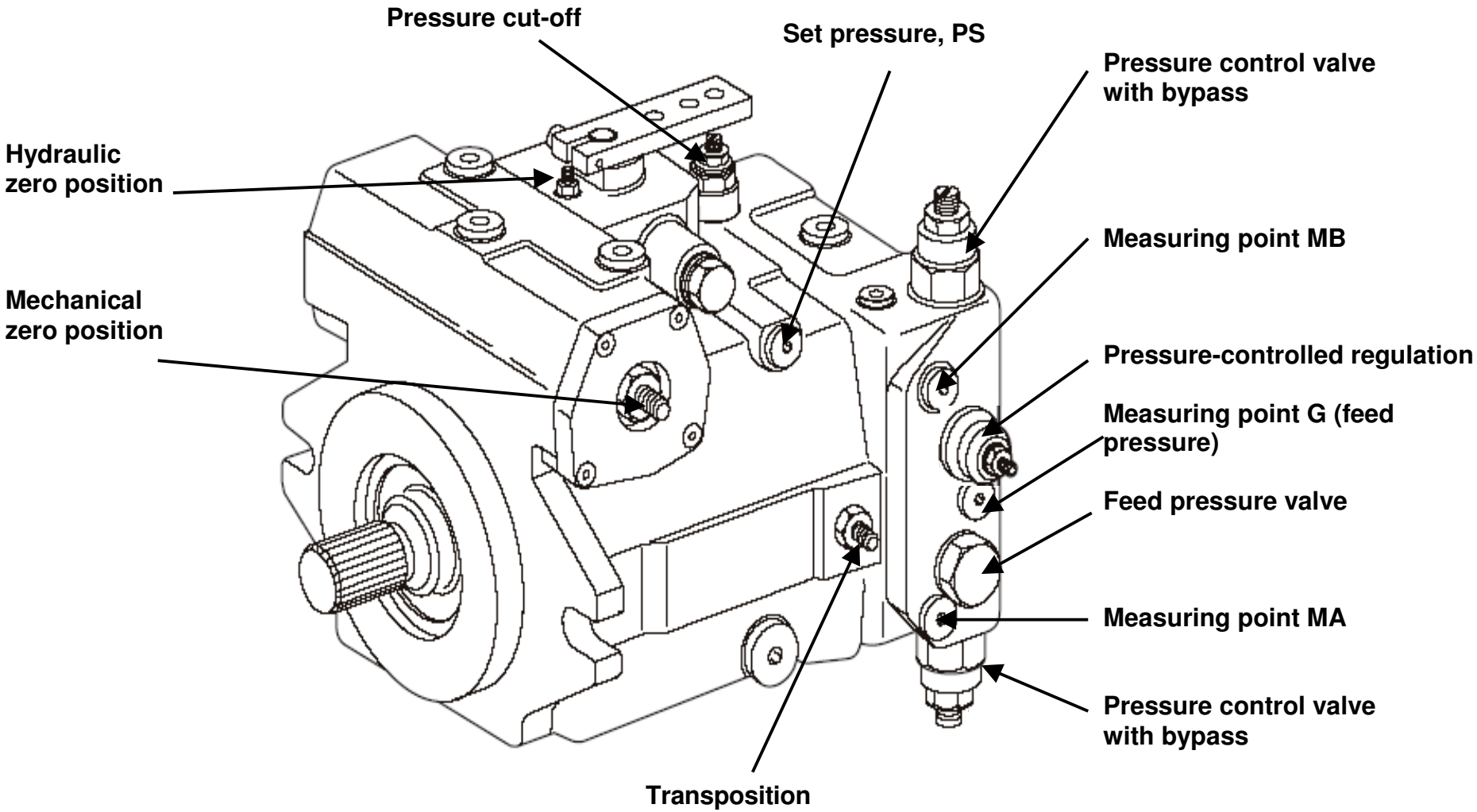
⚠ Dispose of oils, fuel and filters according to the applicable laws!

5.2 Hydraulic pumps

5.2.1 Overview of pump location



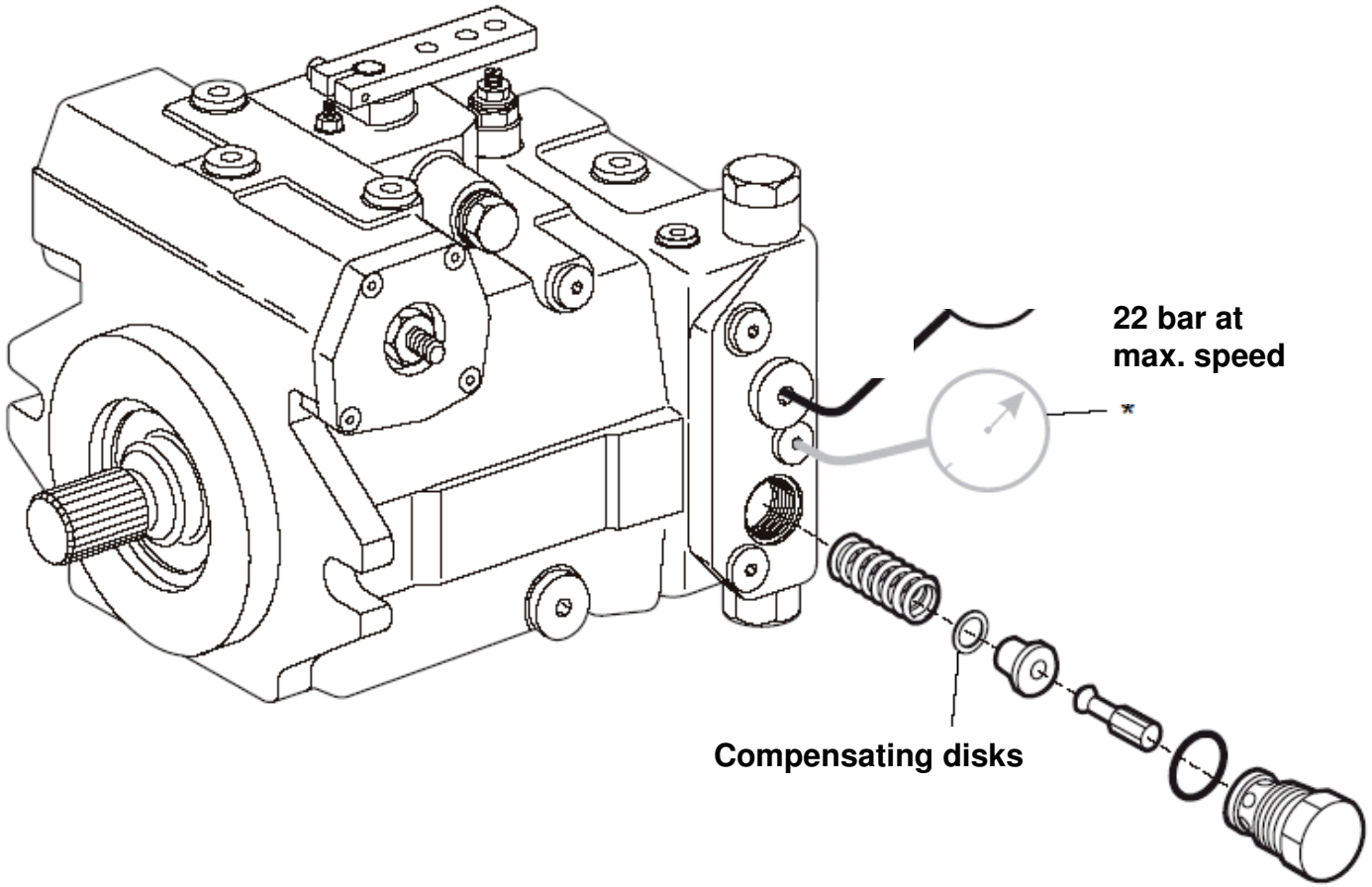
5.2.2 Variable displacement pump – Bosch Rexroth A 10VG with pressure cut-off and pressure-controlled regulation



Feed pressure adjustment

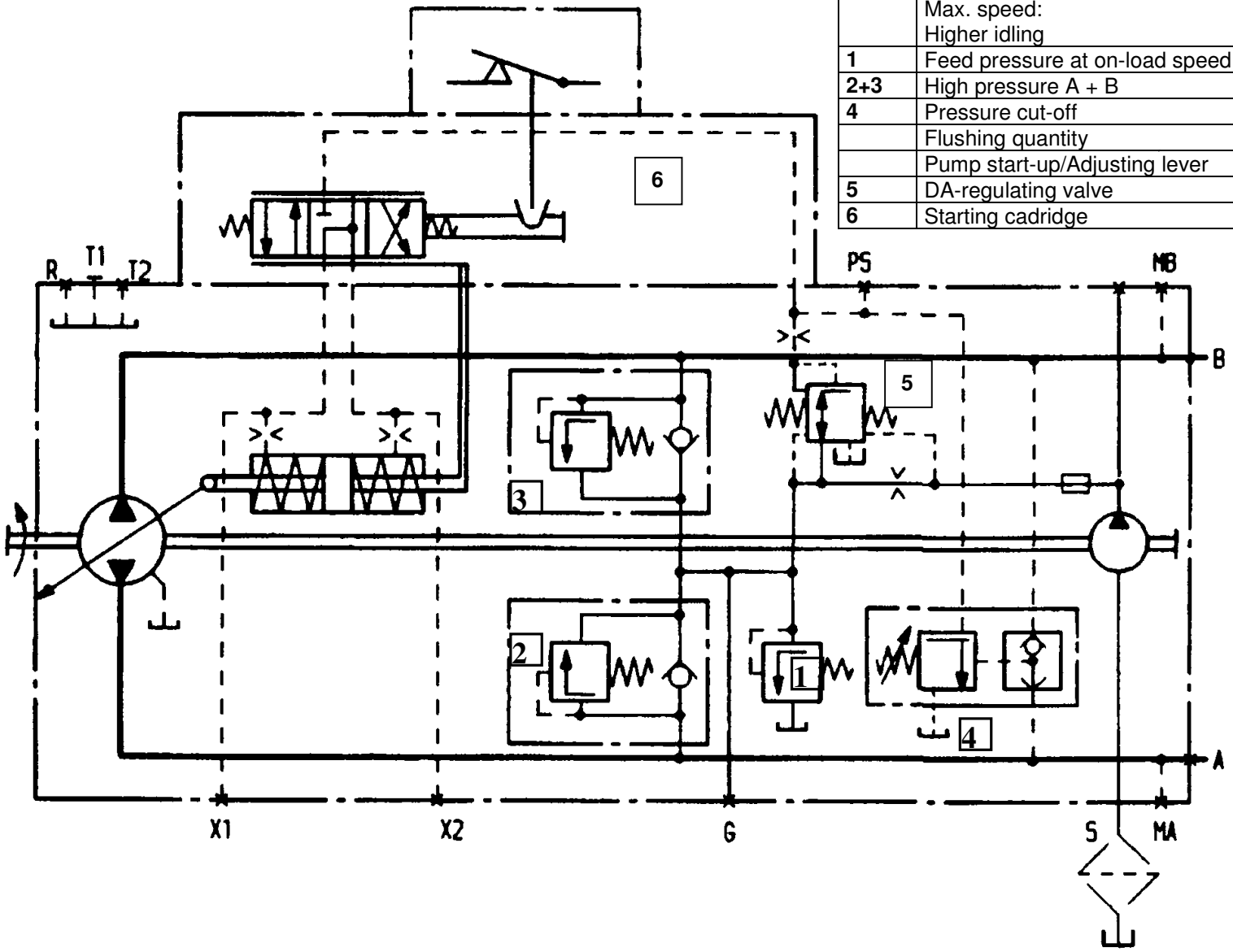
Comment:

Only check at operating temperature



5.2.3 Technical data and set values

	Feed volumes / Revolutions	cm^3	46
	Max. speed: Higher idling	rpm	2750 ±25
1	Feed pressure at on-load speed	bar	22
2+3	High pressure A + B	bar	322
4	Pressure cut-off	bar	295 + 5
	Flushing quantity	l/min	11
	Pump start-up/Adjusting lever	> °	2
5	DA-regulating valve		
6	Starting cadridge		



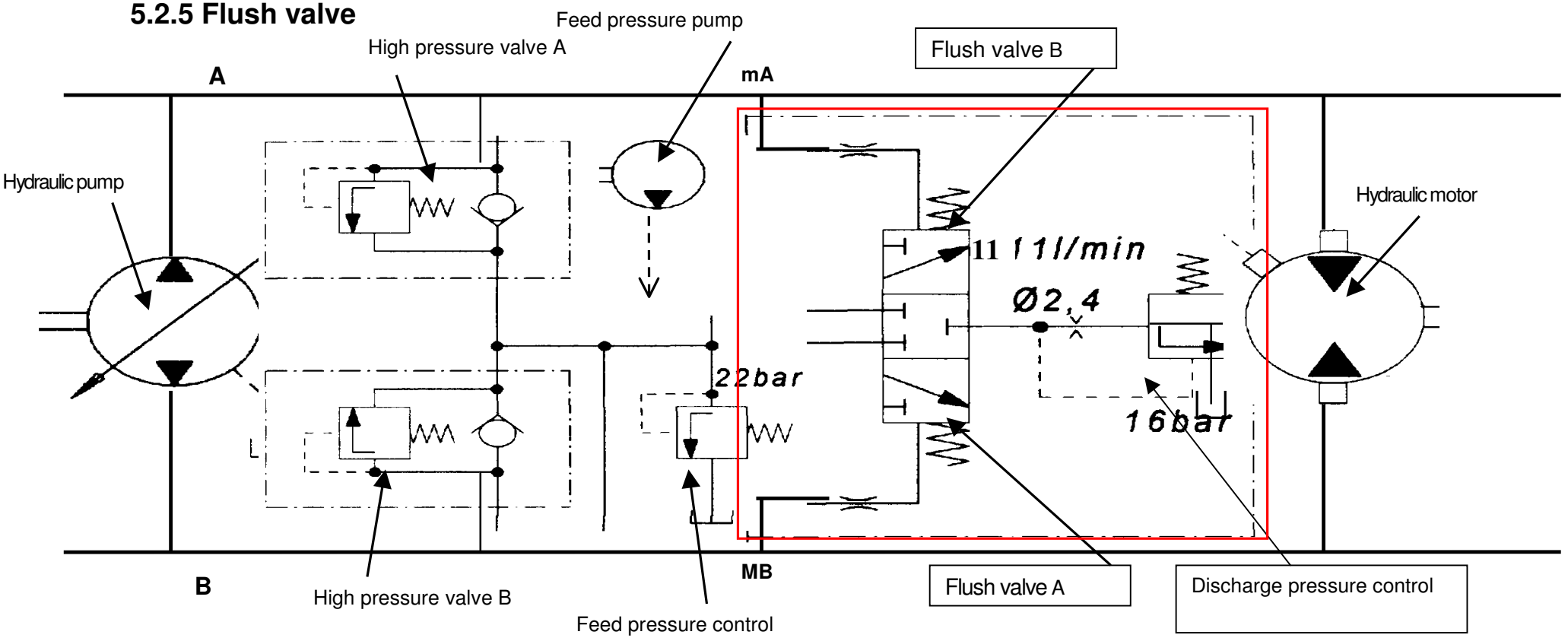
5.2.4 Hydraulic pump description

The swash plate variable displacement pump feeds 0 – 110 l/min, continually adjustable, in both directions. When at high pressure, both outlets are set to 322 bar (Pos. 2 + 3)(pressure relief valve).
The integrated feed pump supplies a maximum of 30 l/min to compensate for oil leakage, to change a defined quantity of oil for cooling and for diverse control functions.

The feed pump draws oil from the tank via the suction return flow filter (Pos. 204) and feeds it to the non-return valves which are integrated in the pressure relive valves (Pos. 2 + 3). The maximum feed pressure is limited to 22 bar by the feed pressure valve (Pos.1). The non-return valve to which high pressure is not applied enables feed to the variable displacement pump circuit.
At the same time, the feed pressure is generated via the starting cartridge for the mechanical-hydraulic control units.
Depending on the DA - regulating valve (pos.5), actuating the accelerator pedal causes the feed pressure to be supplied to the set piston which moves the hydraulic pump's pivoting disk in the required direction and angle (feed volume/driving speed).
If the pressure at the hydraulic motors meets with resistance (gradient/obstruction) which causes a pressure increase in excess of 290bar, the overpressure is relieved, by the pressure cut-off valve, to the tank. Cause of this, the pressure will be hold at 290bar. The function of the pressure cut-off valve is to limit the power of the pump (feed volume x pressure) to the maximum allowed value. The pressure relief valves (Pos. 2 + 3) are used for safety reasons. Normally they are never activ.

The set feed pressure is measured at measuring points G.
The set cut-off pressure is measured at measuring points MA and MB when the wheels are blocked.
To measure the relive valve pressure, the cut-off valve has to be set to a value over 325bar. Then the relive pressure can be measured at the points MA and MB.
After this the pressure cut-off valve must be set back to 290bar!
The correct feed pressure is a basic condition for generating high pressure.

5.2.5 Flush valve



The task of the output valve, which is connected parallel to the high pressure lines from the traction drive, is to supply oil at 11 l/min from the depressurised high pressure line to the tank. This is necessary to replace the warmed oil in the closed circuit with cold oil.

The high pressure (drive pressure) actuates the valve, whereby a connection of the return flow line to the pump is diverted by an aperture to the quantity control and via a pressure control valve (16 bar) to the tank. The pressure control valve prevents the feed pressure dropping below 16 bar.
The feed pressure controlled at 22 bar for controlling the switching valve (front/all-wheel drive) and controlling the differential valve is extracted at connection G on the hydraulic pump.

When rear-wheel drive is switched off, the all-wheel drive valve establishes a connection to the flow and return flow of the wheel motors to compensate for loss of oil through leakage. When this switch position is set, the feed pressure is approx. 1 – 2 bar lower, depending on the tolerance and wear of the motors.

In the event of wheel or motor damage evident due to high oil loss, the feed pressure may drop until a functional fault occurs in the respective system.

In the case of too low a feed pressure and high pressure:

1. **Check the towing aid (bypass) for signs of leaks.**
2. **Check the flush valve for impermissible leaks.**
3. **Check the wheel motors for impermissible losses due to oil leakage (max. 2.5 l/min per engine at max. speed).**

5.2.6 Gear pump, ZP 1

Constant gear pump, Sauer / Sundstrand SNP 2/19 (46 l/min)

Hydraulic oil supply for pump circuit 1

(attachment devices, e.g. mower mode, suction fan mode)

5.2.7 Gear pump, ZP 2

Constant gear pump, Sauer / Sundstrand SNP 2/17 (36 l/min)

Hydraulic oil supply for pump circuit 2

(steering, front attachment support, tipping platform / container support, pivot attachment devices; spreading mode; circular brush mode; suction device support; mulchmower compound circuit)

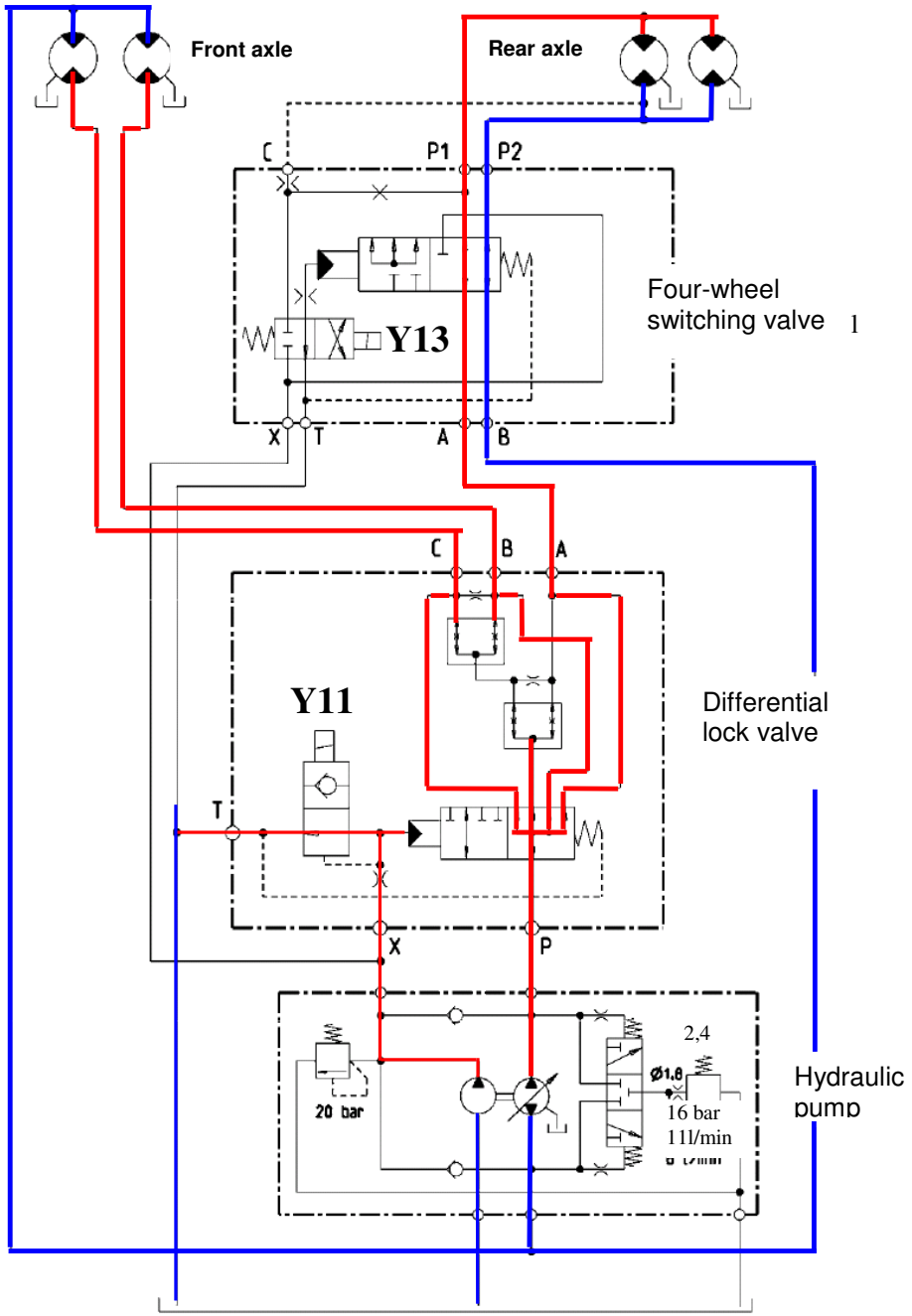
5.3 Traction drive

Hydraulic pump

5.3.1 System diagram

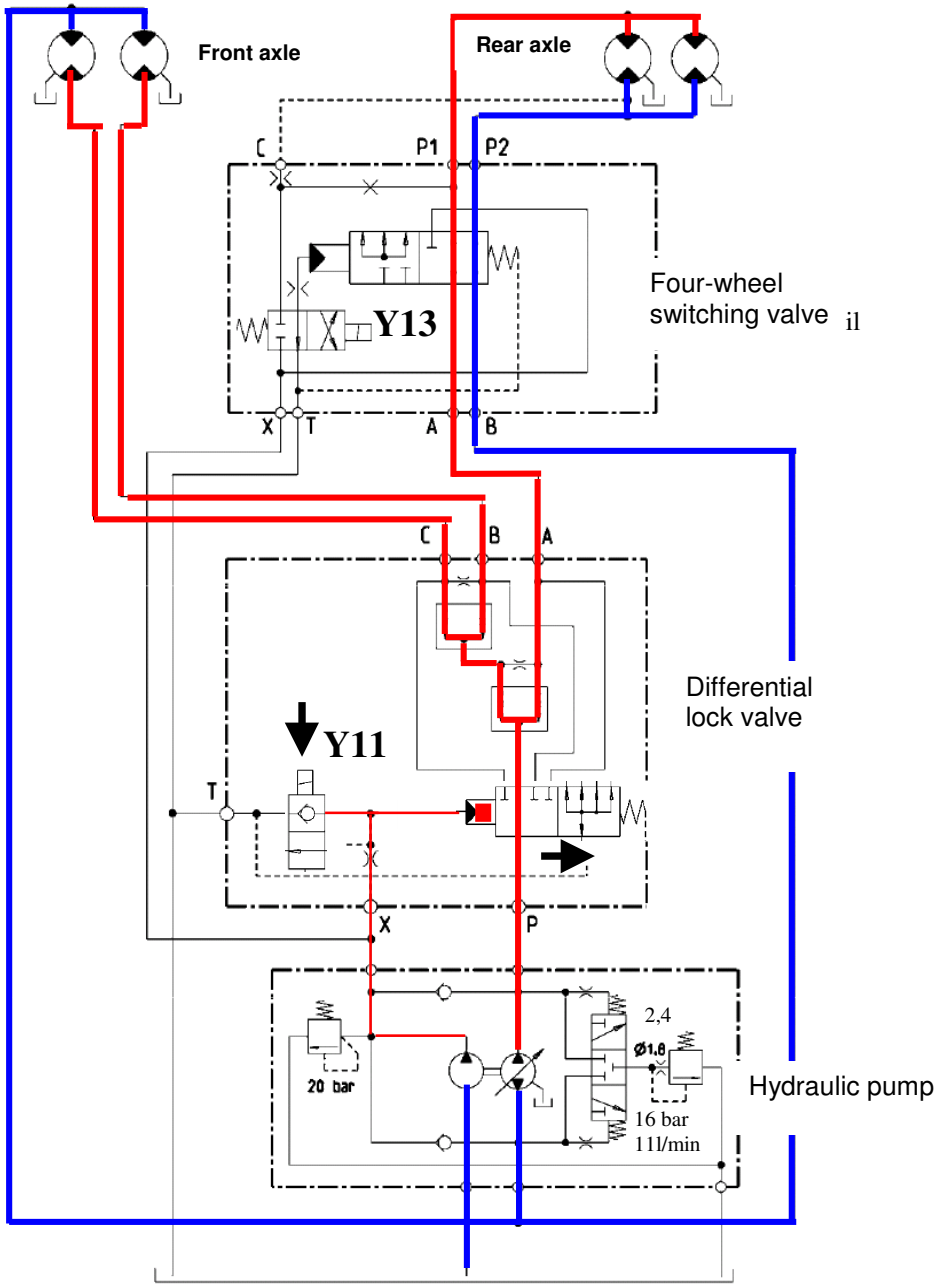
Four-wheel drive on
(Y13 not activated / not energised!)

Differential lock off
(Y11 not activated / not energised!)



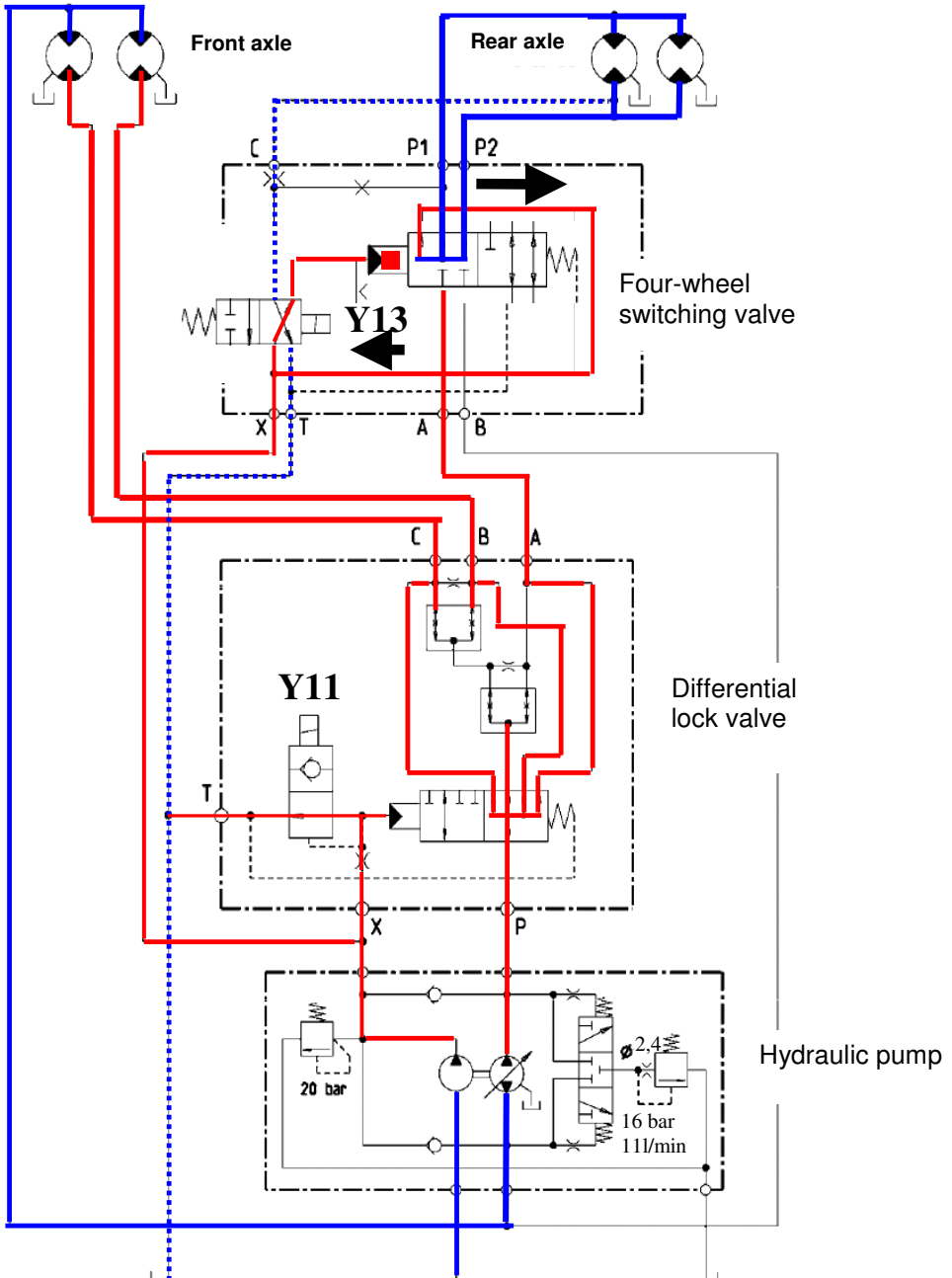
Four-wheel drive on
(Y13 not activated / not energised)

Differential lock on
(Y11 activated / energised)



Front-wheel drive on, 25 km/h
(four-wheel drive off)
(Y13 activated / energised)

Differential lock off
(Y11 not activated / not energised)



5.3.2 Differential locking valve

The volume flow supplied from the hydraulic pump for forward drive is fed to the differential locking valve (P) (Pos. 216).
When (Y11) is not is its active state, it is possible to bypass the current divider and distribute the current to the wheel motors (A,B,C) as required.

Comment:
It is only possible to activate the differential lock valve (Y11 energized) **in "work ride / four-wheel" mode.**

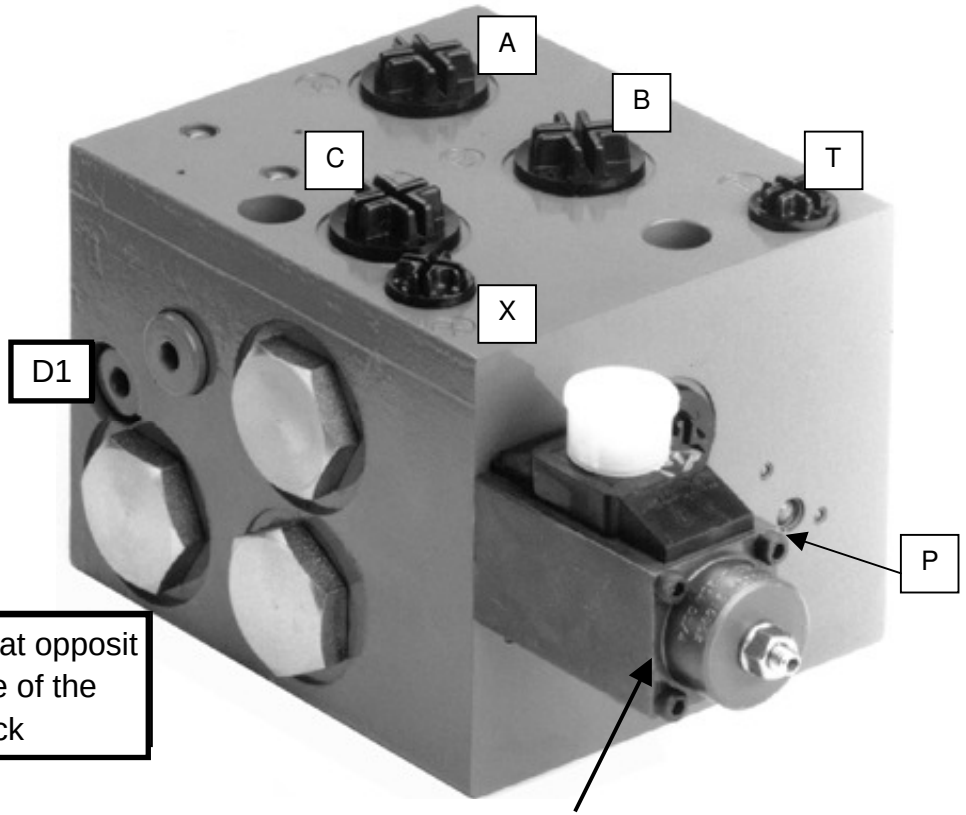
If the differential locking valve is activated (Y11 energized), the solenoid valve interrupts the outflow of the feed pressure to the tank and the distributing valve is actuated hydraulically.

The differential locking valve is basically comprised of two double-action current dividers, (dividing and accumulating) and a distributing valve to optionally bypass the current divider.

When activated, the hydromotors are automatically switched parallel and the three outputs of the current divider are supplied with a load-independent component current, according to the proportions selected.
This ensures that, in the event of unfavourable ground conditions, the maximum pump pressure is applied at the blocked wheel.
Two compensation nozzles, arranged between the outputs A, B and C enable a certain partial compensation and prevent the wheels distorting.

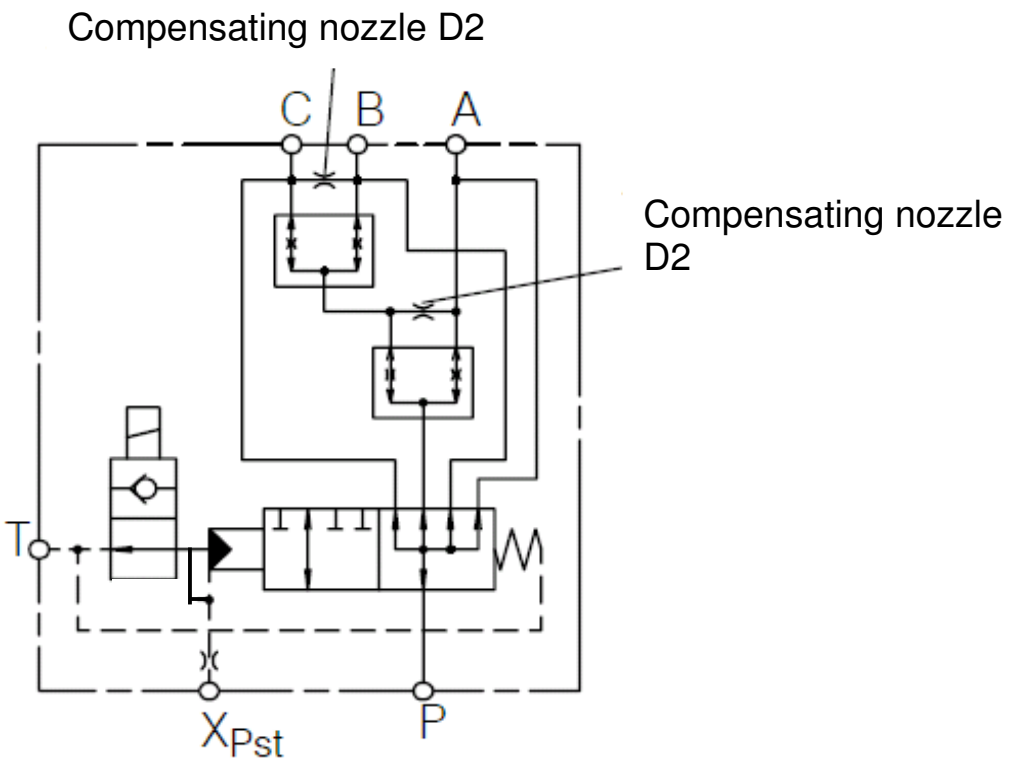
Part distribution:

A: 50% drive, rear-wheel
B: 25% drive, front right
B: 25% drive, front left



D2 at opposit side of the block

Y 11 / approx. 5.7 Ω



Differential locking valve

Possible faults	Possible causes
Diff. locking valve does not switch on	No power at the solenoid (coil: approx. 5.7 Ω)
	Feed pressure too low or not provided
	Aperture in connection X is blocked
	Series piston jams
	O–ring on series piston is defect
Valve switches – pump is pressurised	Consumer is blocked (wheel stands still)
	Divider piston jammed
	Aperture bore in divider piston blocked

5.3.3 Switching valve, work/transport mode

As it progresses, the volume flow from the shut-off unit (output A) to the rear wheel motors is applied to the switching valve (input A).

When in an inactive state (Y13), the volume flow is fed to the rear wheel motors (all-wheel drive).

The two rear motors are connected in series so that the volume flow can be divided as required.

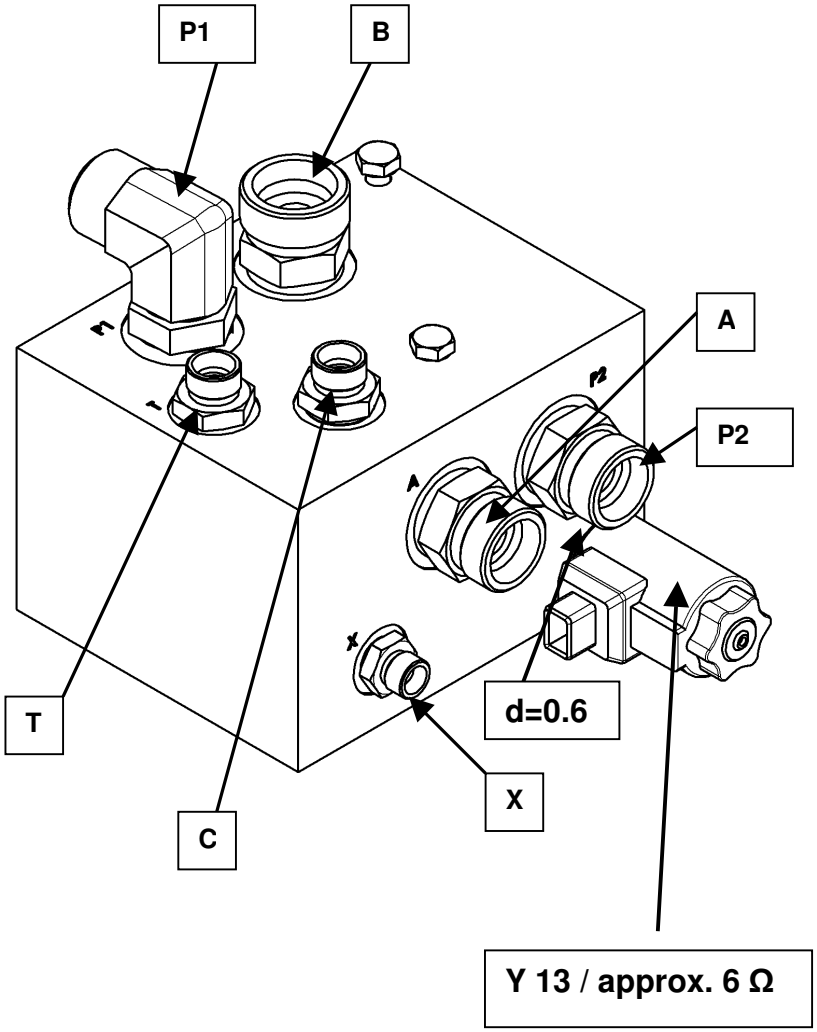
The slower work mode results from distribution of the feed quantity to 4 wheel motors.

When activated (Y13 energised), the solenoid valve switches the feed pressure to the distributing valve and activates it hydraulically.

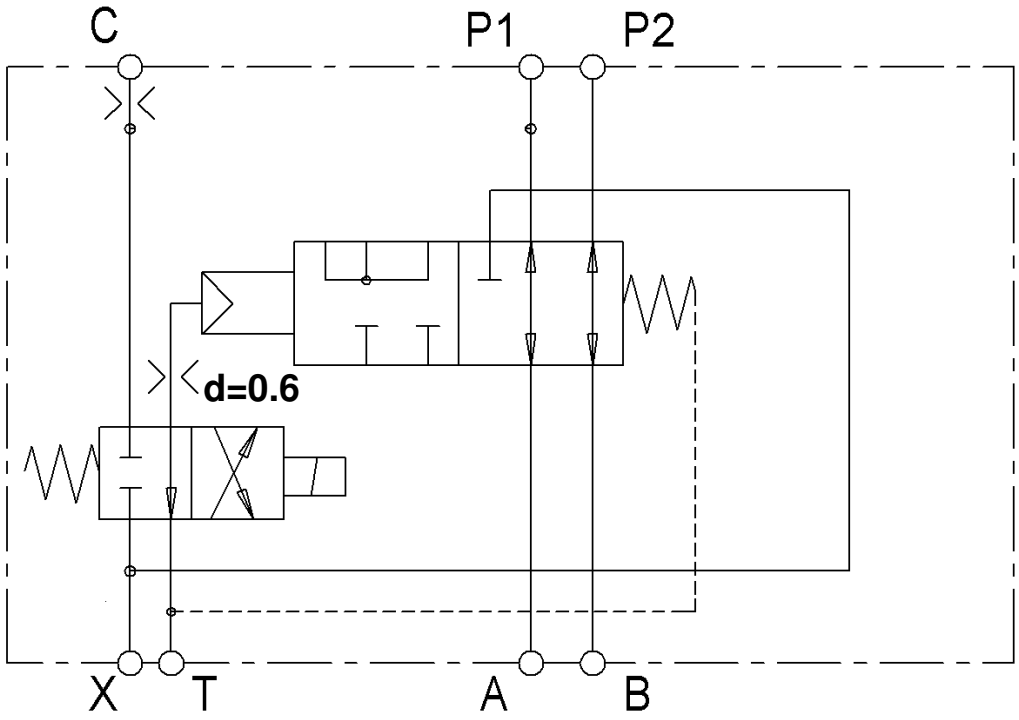
When at this switch setting (drive on roads), the distributing valve connects the feed side with the outflow side and the feed pressure. At the same time, a connection from the outflow side of the motors (C), used to exchange the warmed oil, is established to the tank via an aperture.

The feed (A) to the switching terminal is blocked so that the oil quantity supplied by the pump only needs to be distributed **to the two front motors**.

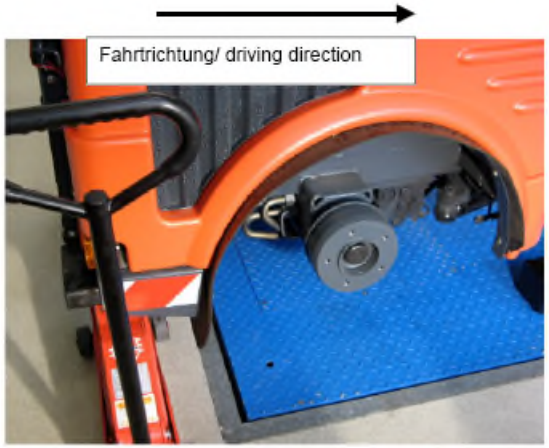
This results in the faster transport mode.



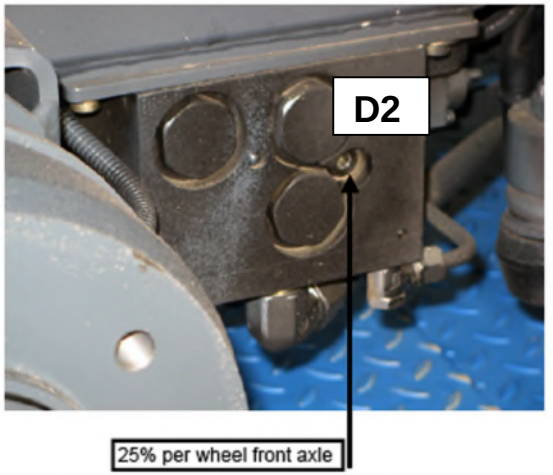
A = Feed/Return flow from differential lock
B = Return flow/Feed from the hydraulic pump
P1 = Feed/Return flow from the hydraulic motor
P2 = Return flow/Feed from the hydraulic motor
X = Feed pressure
T = Tank
C = Outflow



D2 Sperre Vorderräder 25% pro Rad
D2 Differential lock front 25% per wheel

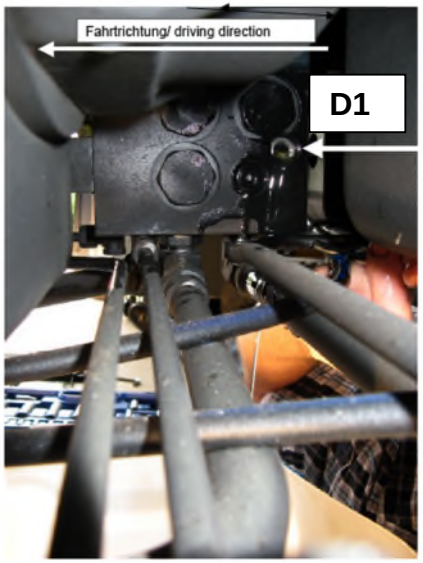


D2 Sperre Vorderräder 25% pro Rad
D2 Differential lock front 25% per wheel



Schnitt CC, Düse D2, M10X1, 0.8mm, Sperre 25% Vorderräder, zwischen B und C

D1 Sperre zwischen Vorder- und Hinterachse, 50% per Achse
D1 Diffential lock between front and rear axle, 50% per axle. View from machine side.



SchnittD-D

Düse D1, M10X1, Bohrung 0.8mm unbedingt gegen StopfenD1-0 austauschen.
100% Sperre zwischen Vorderachse und Hinterachse.

Sicht von hinten auf das Ventil (Rückseite)!

100% rear axle view from rear side

Bei Traktionsproblemen Düse D1 gegen eine Stopfen M10X1 austauschen.

In case of traction problems, replace the nozzle D1 with a plug (thread M10X1 mm).

Switching valve four-wheel / front-wheel drive

Possible faults	Possible causes
Valve does not switch	No power at solenoid magnet (coil approx. 6 Ω)
	Feed pressure too low or not provided
	Aperture d = 0.6 blocked
	Solenoid precontrol valve defect
	Main control piston jam

Faults: In the case of transport mode, the end speed of 25 km/h is not reached

Possible causes:
Engine does not reach the final speed: Air filter is blocked; fuel filter is blocked.
The valve Y13 (wheel motors connected in series) is not energised.
Solution:
Clean the air filter or fuel filter, change them if necessary and check whether the engine reaches the end speed when idling (2750 rpm +/- 25 rpm (no load applied))

Check the electrical system and clear the fault.

1. Is power applied to Y13?
a) Is the hand throttle in transport mode position?
b) Check fuses F6, F14.
c) Energise Y13 directly; if valve Y13 now switches properly (25 km/h is reached), the electrical test can continue.
d) Contacts on the Y13 connector are in order (no corrosion, contacts fit correctly in the connector; B+ on Pin 1; B- on Pin 2 of X41). Check the resistance of coils on Y13 (set value: approx. 6 Ω).
e) Switch the relays K1 and K6 through (refer to circuit diagram).

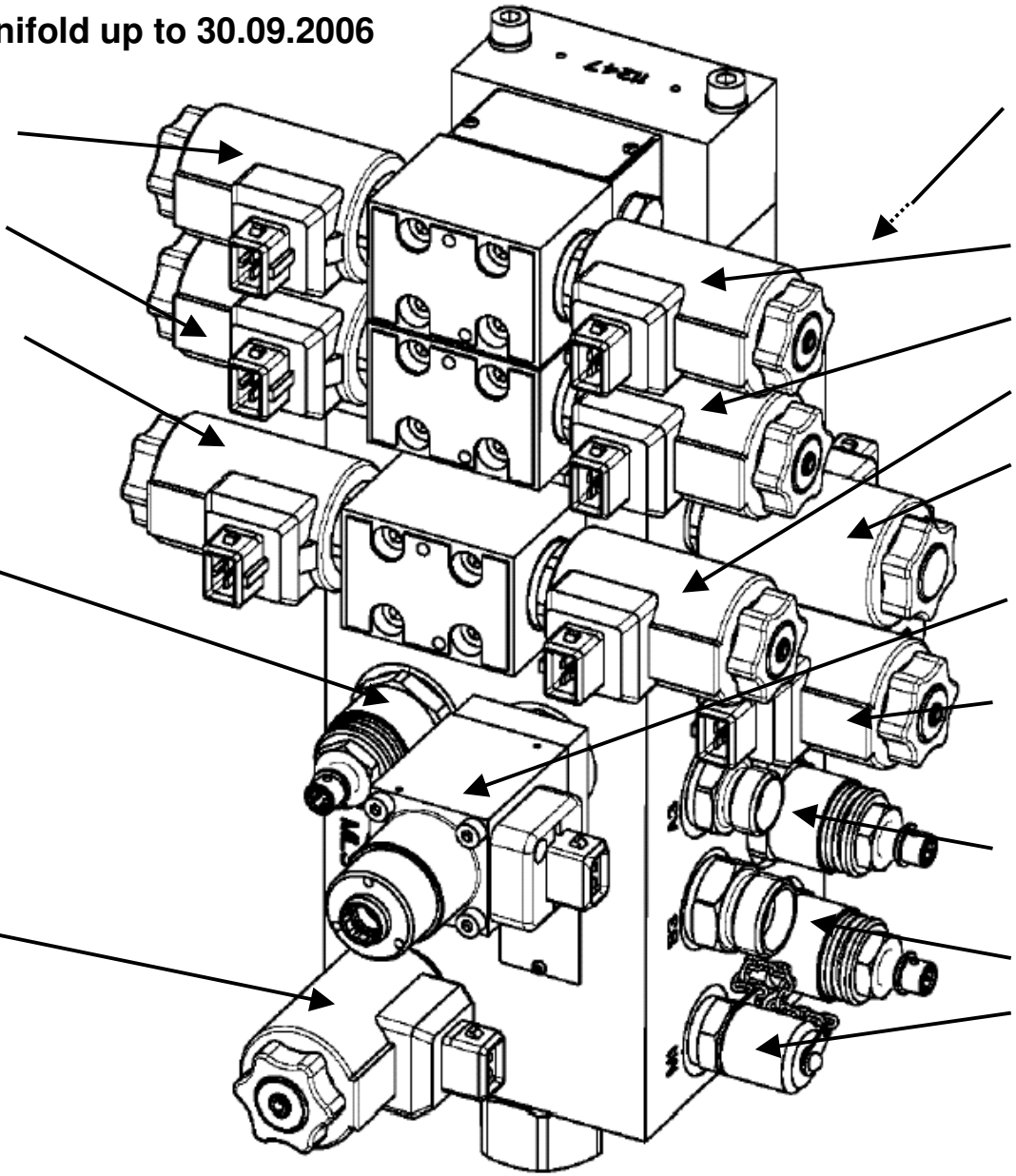
When the electrical system test is completed successfully, without fault clearance:

2. Y13 does not switch mechanically.
Possible cause: Valve Y13 is stiff or jammed.
Solution:
Disassemble Y13 and clean it; in the event of defect mechanical parts, the valve must be replaced (refer to Pages 36 + 37 for details).
Note:
The jamming of valves is caused to 80% by contaminated hydraulic oil. Please filter the hydraulic system using a bypass filter system to clean the hydraulic oil, otherwise more faults can be expected on other valves!

Note:
When changing the hydraulic oil, it is essential to ensure that the system is only filled with filtered hydraulic oil. To do this, the filling and filter systems must use filters not in excess of 5µ!

5.4 Work hydraulics

5.4.1.1 Valve manifold up to 30.09.2006



Y 9 : Raise container (approx. 6 Ω)

Y 8 : Pivot brushes up (approx. 6 Ω)

Y 3 : Raise front attachment support (approx. 6 Ω)

Pressure control valve : 195 bar

Y 4 : CT 4200 mower/ CM 1200 fan (approx. 6 Ω)

M2 : Measuring connection P2 (at rear of manifold)

Y10 : Lower container (approx. 6 Ω)

Y7 : Pivot brushes (approx. 6 Ω)

Y2 : Lower front attachment support (approx. 6Ω)

Y12 : Front attachment support float/lower (approx. 6 Ω)

Y5 : Proportional valve side brushes/spreader (approx. 6Ω)

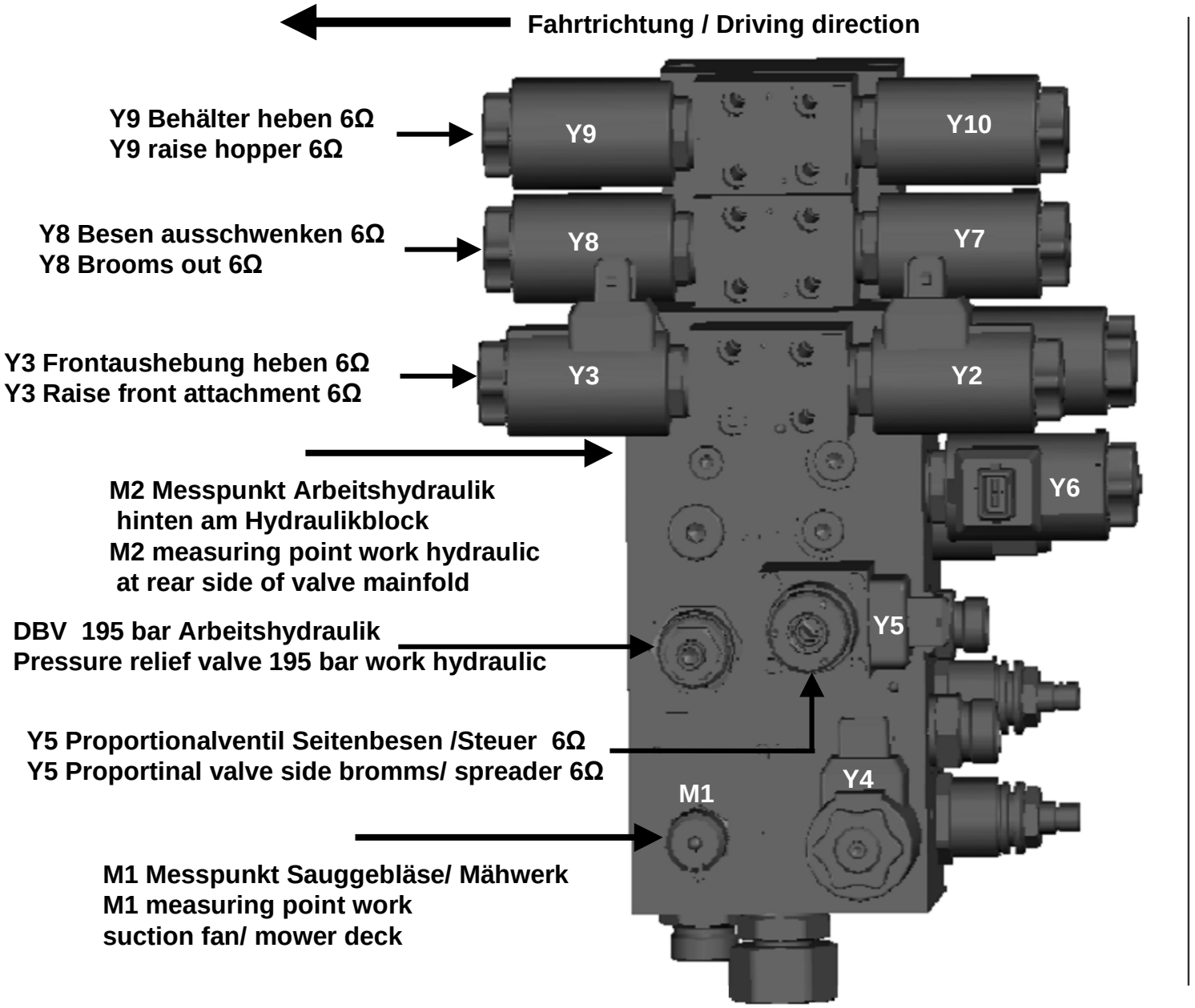
Y6 : Work hydraulics on (circulation off) (approx. 6 Ω)

Pressure control valve : 60 bar

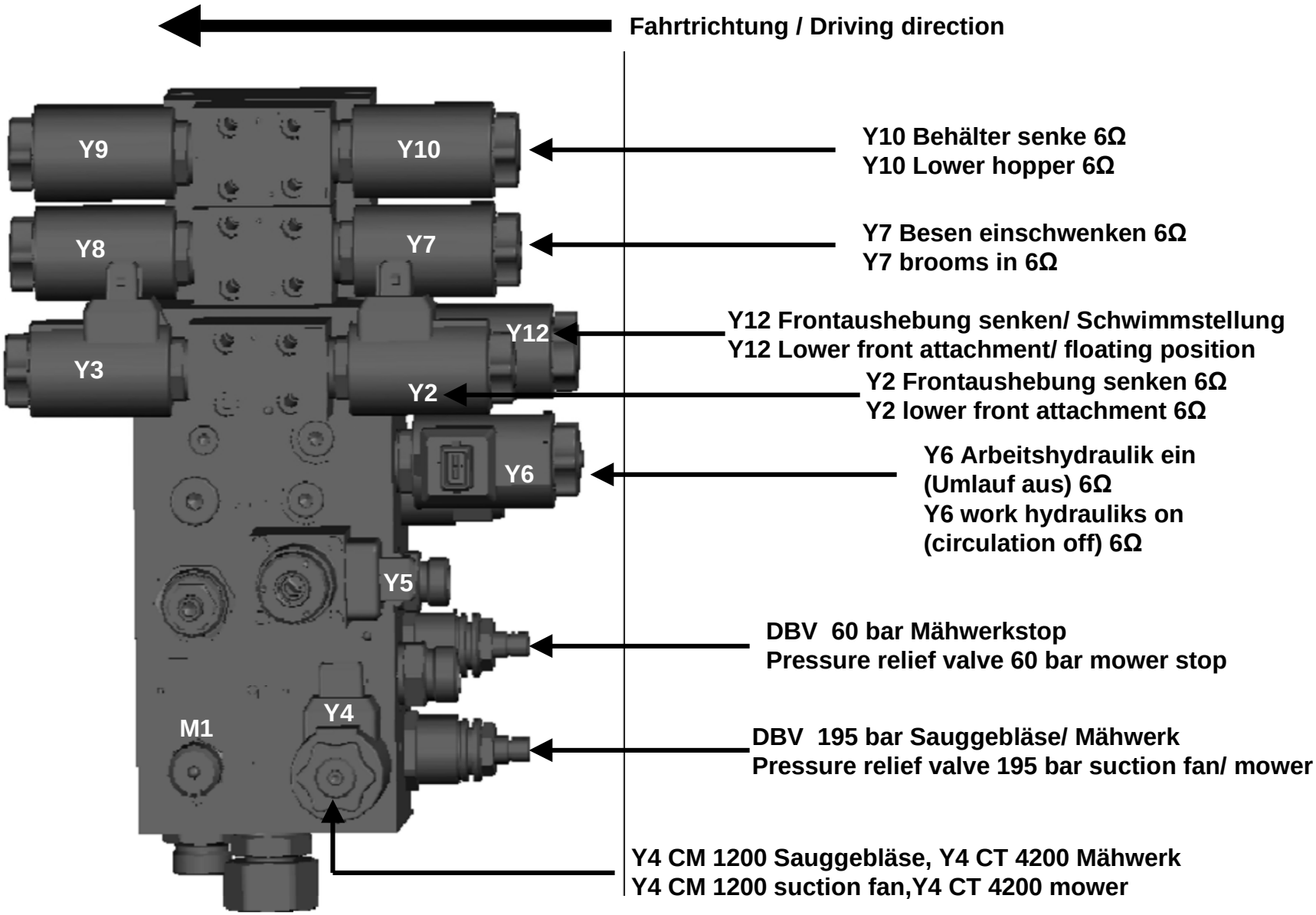
Pressure control valve: 195 bar

M1 : Measuring connection P1

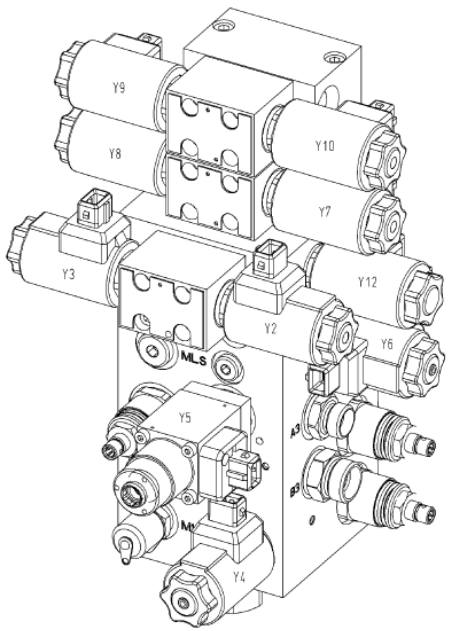
5.4.1.2 Steuerblock neu ab 30.09.2006:Valve mainfold new from 30.09.2006

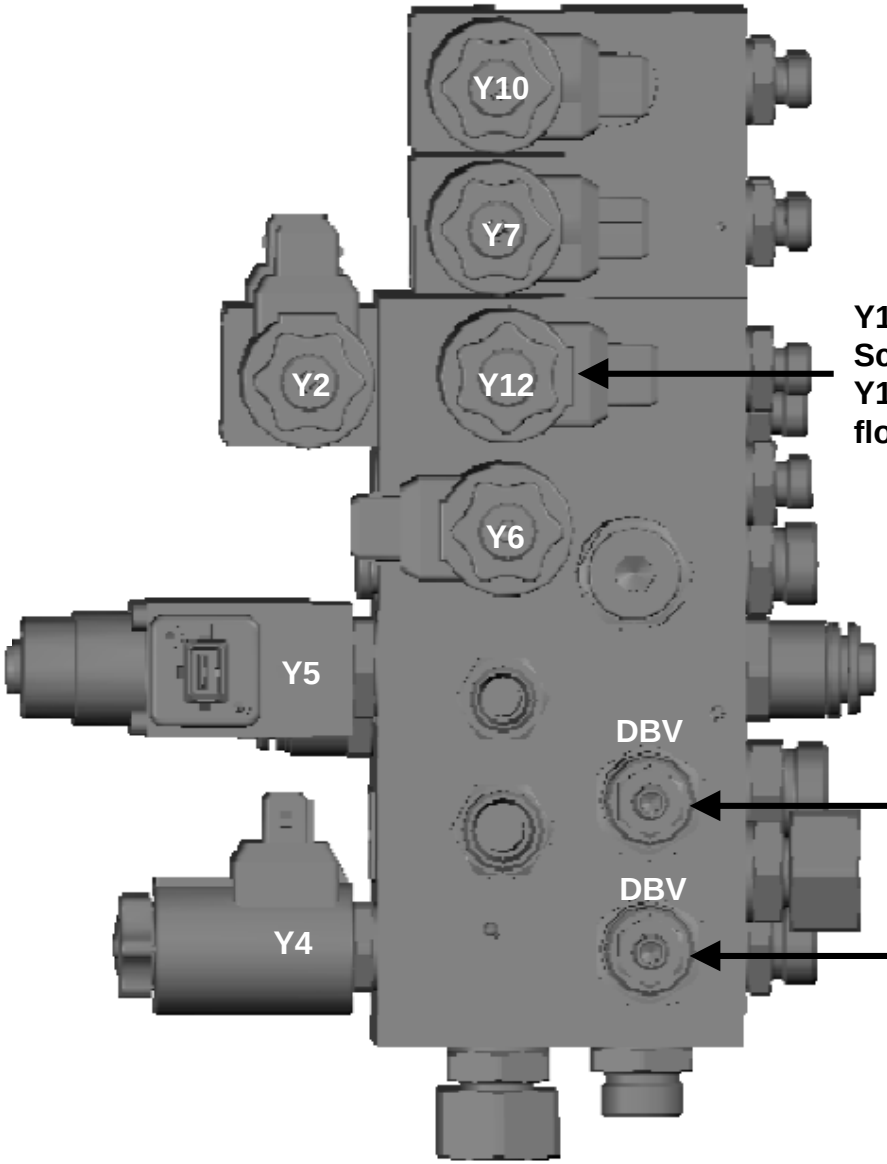


5.4.1.2 Steuerblock neu ab 30.09.2006:Valve mainfold new from 30.09.2006



5.4.1.2 Steuerblock neu ab 30.09.2006:Valve mainfold new from 30.09.2006





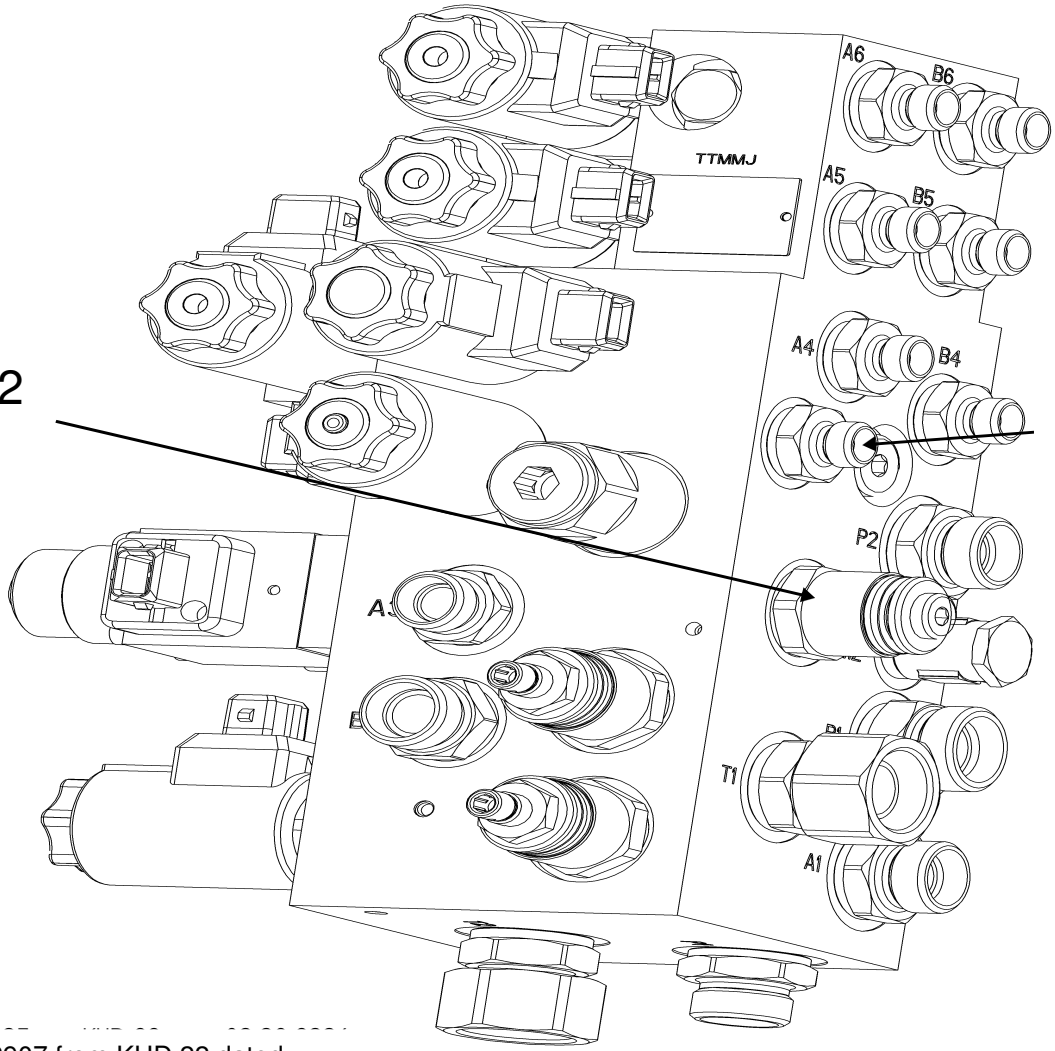
Y12 Frontaushebung senken/ Schwimmstellung 6Ω
Y12 Lower front attachment/ floating position 6Ω

DBV 60 bar Mähwerkstop
Pressure relief valve 60 bar mower stop

DBV 195 bar Sauggebläse/ Mähwerk
Pressure relief valve 195 bar suction fan/ mower

5.4.1.2 Valve manifold, new from 30.09.2006

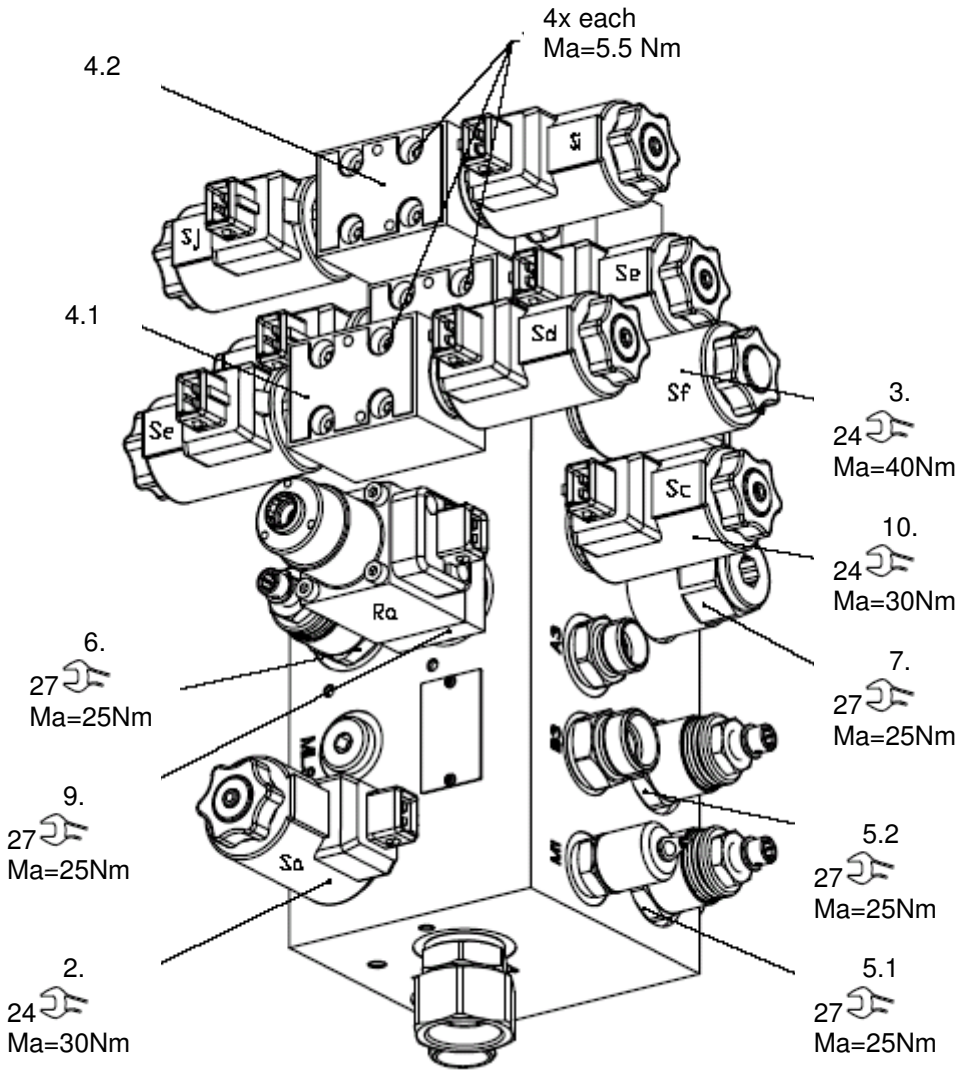
Current regulating valve added at Pos M2



Quantity divider on A2 has moved here

- Also refer to retrofit kit 97056907 from KUD 22 dated 30.08.2006

5.4.1.3 Starting moment, valve manifold components



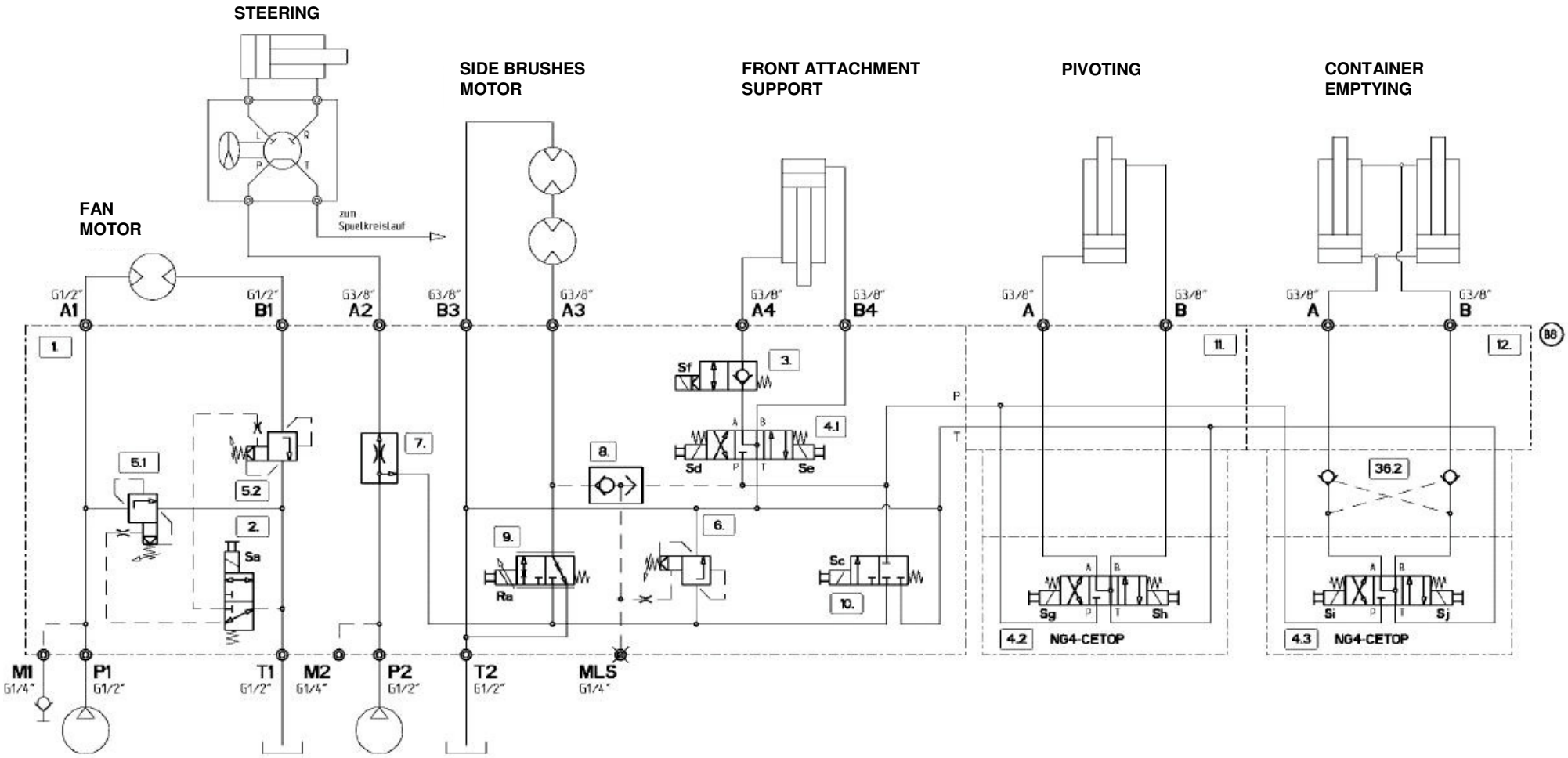
5.4.14 Measuring values at individual solenoid valves

Caution: Measuring tolerance of +/- 20% due to diffrent measuring devices

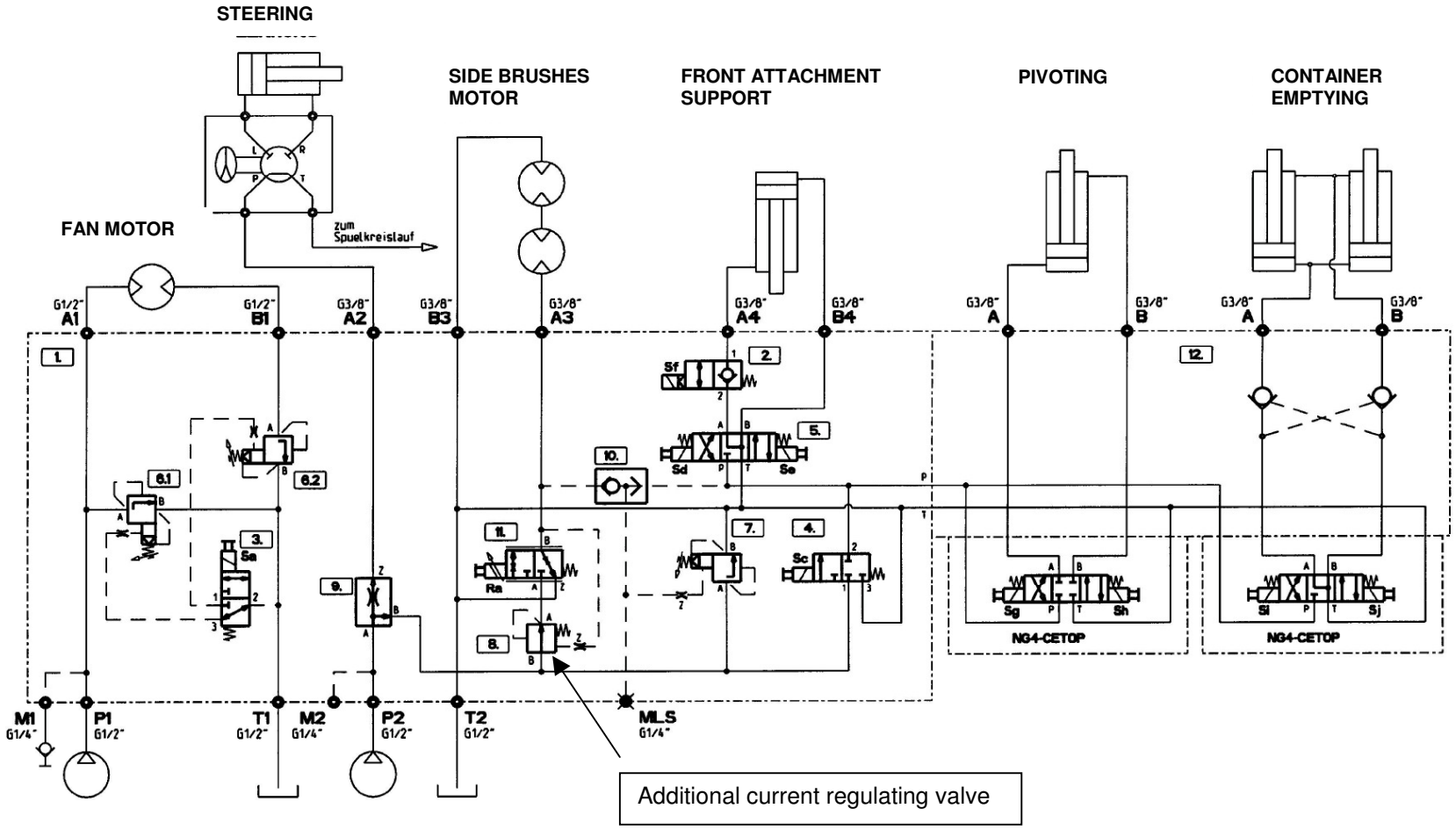
	Beschreibung- Description	**Spannung (V) Voltage(V)**	**Stromstärke (A) Current flow (A)**	**Widerstand der Spule (Ω) Resistance of the coil (Ω)**
Y2	Hydraulikventil Geräteträger senken Hydraulic valve front carrier down	12V	2000mA	6Ω
Y3	Hydraulikventil Geräteträger heben Hydraulic valve frontcarrier up	12V	2000mA	6Ω
Y4	Hydraulikventil Sauggebläse ein/ Mähwerk ein Hydraulic valve vacuum fan (suction turbine) on/ mower on	12V	2000mA	6Ω
Y5	Proportionalventil Seitenbesen/ Streuer Proportional valve side brooms/ spreader	4- 6.5V	780- 1060mA	6Ω
Y6	Hydraulikventil Umlauf aus; Arbeitshydraulik ein Hydraulic valve circulation off; work hydraulic on	12V	2000mA	6Ω
Y7	Hydraulikventil Besen auf (Besen ausschwenken) Hydraulic valve brooms wide (brooms	12V	2000mA	6Ω
Y8	Hydraulikventil Hydraulic valve	12V	2000mA	6Ω
Y9	Hydraulikventil Behälter heben Hydraulic valve hopper up	12V	2000mA	6Ω
Y10	Hydraulikventil Behälter senken Hydraulic valve hopper down	12V	2000mA	6Ω
Y11	Hydraulikventil Differentialsperre ein (Option) Hydraulic valve diff gear on (option)	12V	2100mA	5.7Ω
Y12	Hydraulikventil Geräteträger Schwimmstellung Hydraulic valve front carrier relaesed	12V	2000mA	6Ω

	Beschreibung- Description	Spannung (V) Voltage(V)	Stromstärke (A) Current flow (A)	Widerstand der Spule (Ω) Resistance of the coil (Ω)
Y13	Hydraulikventil Radmotore 2/4 ein (Radmotore ein 25km/h) Hydraulic valve wheel motors 2/4 on (wheel motor on 25 km/h)	12V	2000mA	6Ω
Y16	Hydraulikventil Geräteträger drücken **(Option Citycleaner)** Hydraulic valve front carrier pressure **(Option Citycleaner)**	0.95- 2.5V	150- 450mA	6.3Ω
Y17	Hydraulikventil Geräteträger Schwimmstellung **(Opt.Citycleaner)** Hydraulic valve front carrier released (floating) **(Opt.Citycleaner)**	12V	1280mA	9.1Ω
Y18	Hydraulikventil Umschaltung Druck/ Entlastung **(Opt.Citycleaner)** Hydraulic valve weight/ unweight **(Opt.Citycleaner)**	12V	1765mA	6.1Ω
Y19	Hydraulikventil Vordruck **(Opt.Citycleaner)** Hydraulic valve input pressure **(Opt.Citycleaner)**	12V	1825mA	6.2Ω

5.4.2.1 Valve manifold system diagram before 30.09.2006



5.4.2.2 Valve manifold system diagram from 30.09.2006



5.4.3 Valve manifold function description

The oil is fed (46 l/min) from the gear pump ZP1 to connection P1 in the valve manifold. If valve Y4 (Pos.2) is not energised (CT 4200 mower drive; CM 1200 suction fan), the drive is switched off because the combined pressure control/circulation valve (Pos. 5.3.3) DVPA-2 is opened via the pump side control line and the oil flows either via the bypass or through the oil cooler (Pos.205) and return flow suction filter (Pos.204), depending on its temperature, back into the hydraulic oil tank. The circulating pressure is approx. 8 bar with an oil temperature of 50°C. All the measurements for the drive must be taken at measuring point M1.

If valve Y4 (Pos.2) is energised (CT 4200 mower drive, CM 1200 suction fan), the drive is switched on. Y4 switches the connection of the control line of the pressure control valve to the hydraulic oil tank. The force of the spring in the DBV takes effect and a maximum of 195 bar can be generated (measuring point M1)

Note: If the pressure control valve needs to be replaced, it is essential to set the pressure control valve to the prescribed pressure (195 bar).

If the drive is switched off (Y4 is no longer energised), the control slide moves from valve Y4 back to its initial position and the connection of the control line from pressure control valve 5.1 is reconnected to the hydraulic oil tank. The hydraulic oil can then flow via the pressure control valve again into the hydraulic oil tank. The circulation pressure is approx. 8 bar.
At the same time, the control line to pressure control valve 5.2 is closed by the control slide in Y4, the force of the spring in pressure control valve 5.2 then takes effect so that pressure control valve 5.2 opens at 60 bar. This ensures that the front attachment device (CT 4200 mower drive) comes to a stop within 7 seconds (work safety).

Note: If the pressure control valve needs to be replaced, it is essential that the pressure control valve is set to the prescribed pressure (60 bar). In this case, the pressure control valve 5.1 and 5.2 must be swapped over for the adjustment process.

The oil from the gear pump ZP2 is fed via connection P2 to the valve manifold (approx. 36 l/min) up to the feed quantity distributor (Pos.7). At this point, a constant 8 l/min. is extracted at connection Z for the steering. A further 28 l/min. are available at connection B for the remaining functions in the manifold.

If no consumer is switched on (raise/lower front attachment support, pivot front attachment devices,

raise/lower loading platform/container), the pressure regulator (Pos. 6) is opened via the control line on the pump side.
The oil then flows back through the open pressure regulator via connection T2 into the hydraulic oil tank.

If proportional valve Y5 (Pos. 9) is activated (energised), a quantity of oil adjustable between 5 and 20 l/min flows to the hydraulic clutch (Pos. 147 / A3). This additional quantity is also used for those front attachment devices which require an increased quantity of hydraulic oil (e.g. mulchmower). The pressure regulator (Pos. 6) is closed by Y5 via the control line and shuttle valves (Pos. 8). The mechanical spring then takes effect against the oil flow and a maximum of 195 bar can be generated before the pressure regulator (DBV) opens and enables the connection to the hydraulic oil tank.

In order to activate the raise front attachment support / pivot front attachment devices / raise platform/container functions, valve Y6 (Pos.10) is always triggered parallel. The hydraulic oil is fed to the valves (Y2 + Y3, Y7 + Y8, Y9 + Y10) via the connecting valve Y6. In addition, Y6 also closes the pressure regulator via the control line and shuttle valve (Pos. 8). The mechanical spring then restricts the flow of oil and a maximum of 195 bar is possible before the pressure regulator (DBV) opens and the connection to the hydraulic oil tank is enabled (also refer to the description of Y5).

Note: In the event of a fault on the connecting valve Y6 (Pos.10) (electrical/mechanical), the downstream valves (Y2 + Y3 (Pos. 4.1), Y7 + Y8 (Pos. 4.2), Y 9 + Y10 Pos. 4.3)) are not supplied with oil, i.e. following a failure of the work hydraulics, always check Y6 first.

When the proportional valve Y5 (Pos. 9) is energised, between 5 and 20 litres can be distributed to the consumers in a continuously variable adjustment. When the maximum quantity of 20 l/min is extracted at the quick-release coupling (Pos. 147) at the front or rear of the device, only approx. 8 l/min can be used for the following functions (raise/lower front attachment support, pivot front attachment device, raise/lower loading platform/container).

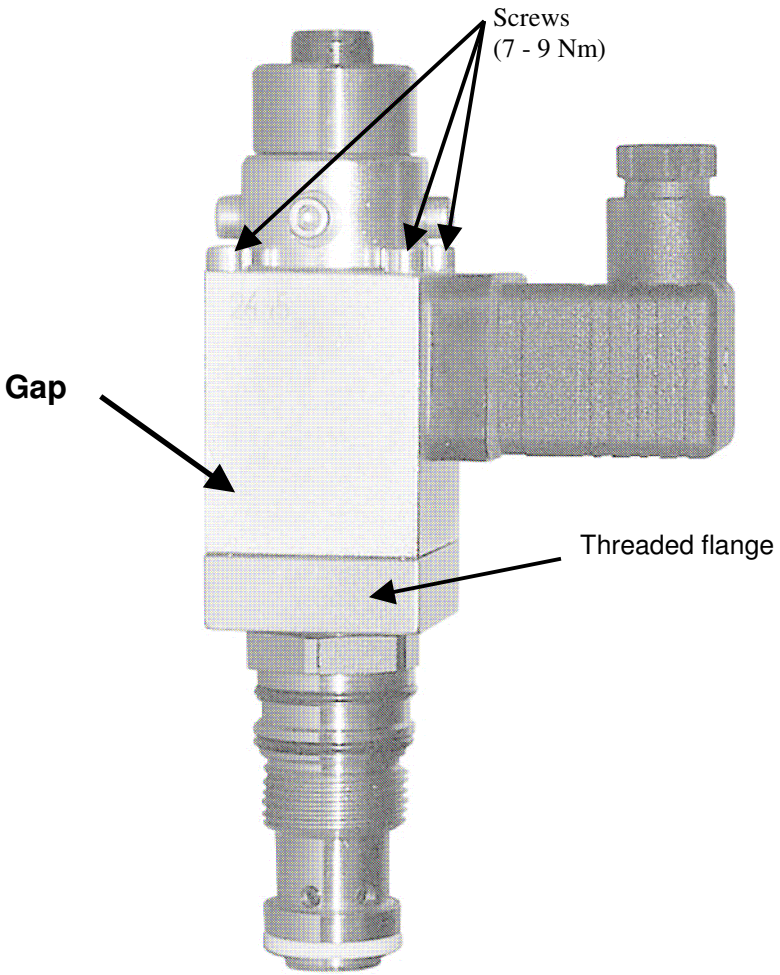
If these functions only work when the potentiometer has been moved to its lower setting when the maximum quantity is extracted, the feed quantity of the pump for these functions must be checked and readjusted using the A1 electronics as necessary.

A connection must be produced between the quick-release couplings for the attachment devices (Pos. 147/A3 and 151/B3).

If the hand throttle has been pivoted to the stop position of the second notch (preferred speed), the engine speed must be set to approx. 2450 rpm. A quick-release coupling with a short hose must be connected to one of the quick-release couplings for the "pivot attachment device" function (Pos. 148 and 150).
A coding plug must be connected for enabling "side brushes spreading mode". When the above speed is set, the potentiometer is fully open and "pivot attachment device" is actuated, the feed quantity from this line should be between 6 and 8 litres per minute.
In the case of an adaptation, the maximum quantity for the proportional valve must be set to the maximum quantity using the **trimming potentiometer** provided on the control unit.

Note: If the A1 electronics are replaced, the minimum quantity must also be set to 5 ± 0.25 litre using the relevant trimming potentiometer, measured on the flow for the side brushes/spreading mode (Pos.149).

5.4.4 Proportional throttle cartridge



Attention:

When disassembling the throttle cartridge, pay attention that the threaded flange **is only turned clockwise** to align the coils.
There must be a gap between the bodies of the coils and the flange.

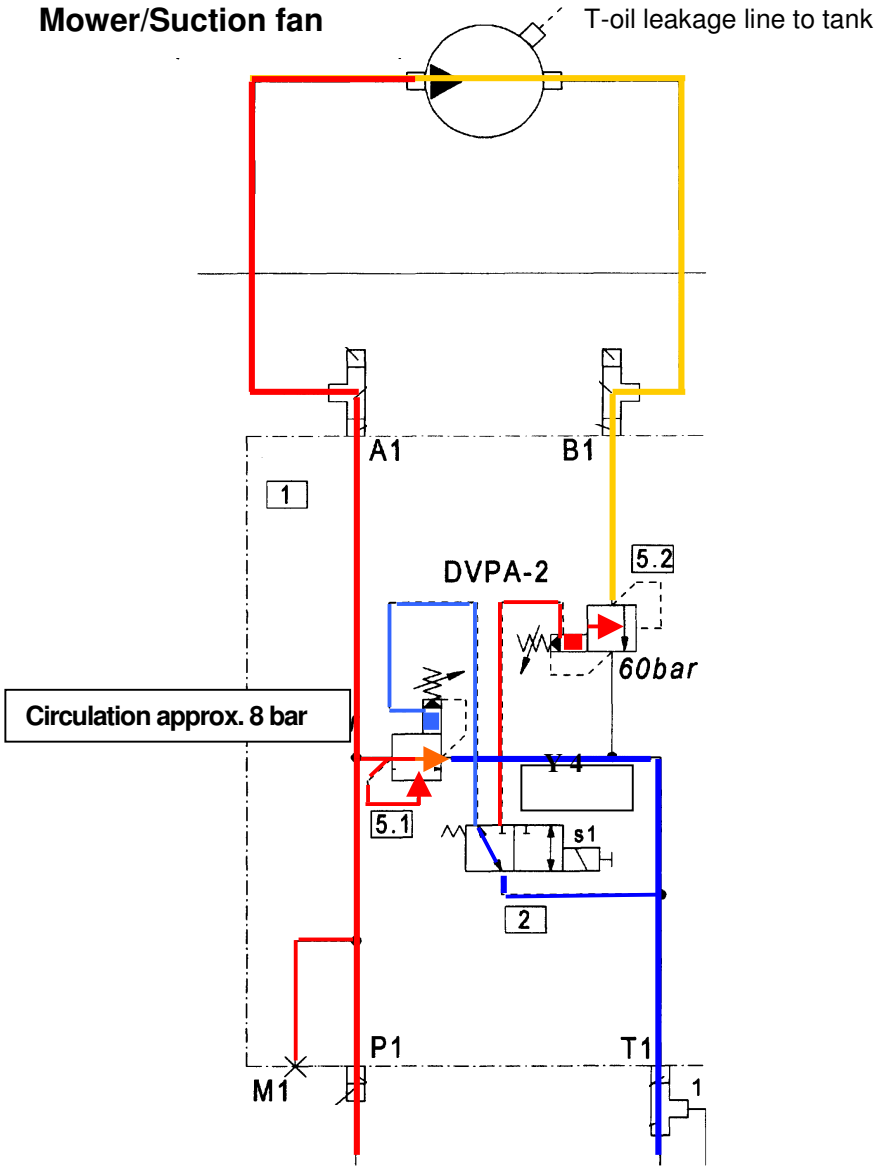
Coil resistance: 6.5 Ohm

5.4.5 Functions, system diagram

CT 4200 mower off;
CM 1200 suction fan off
(Y4 not connected)

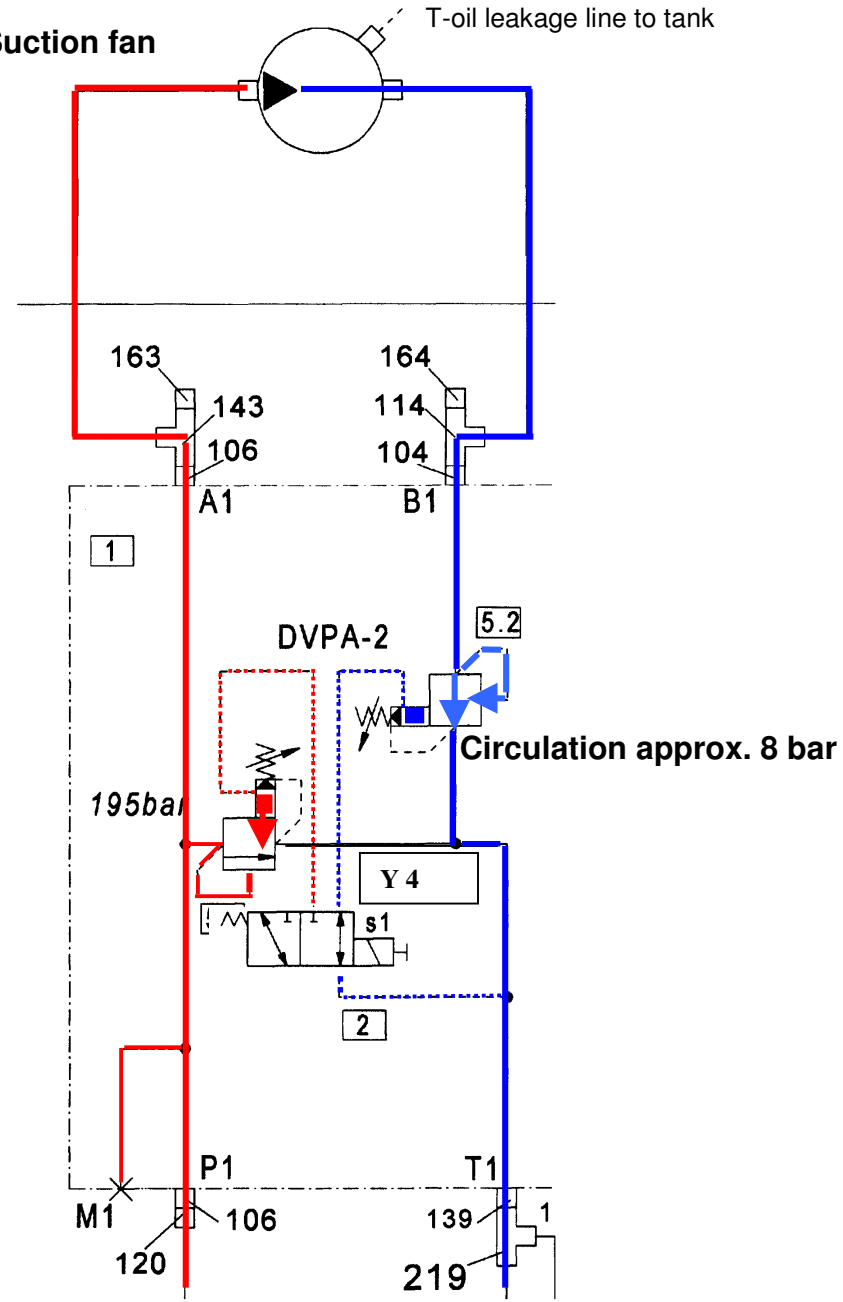
Through the valve Y4 is the tankline of the hydraulic servo controlled pressure relief valve 195bar open. At the same time is the pressure relief vale 60bar closed. Therefore the oil flow is goping directly to the tank. In the system is only the circulation pressure of appr. 8bar.

Mower/Suction fan



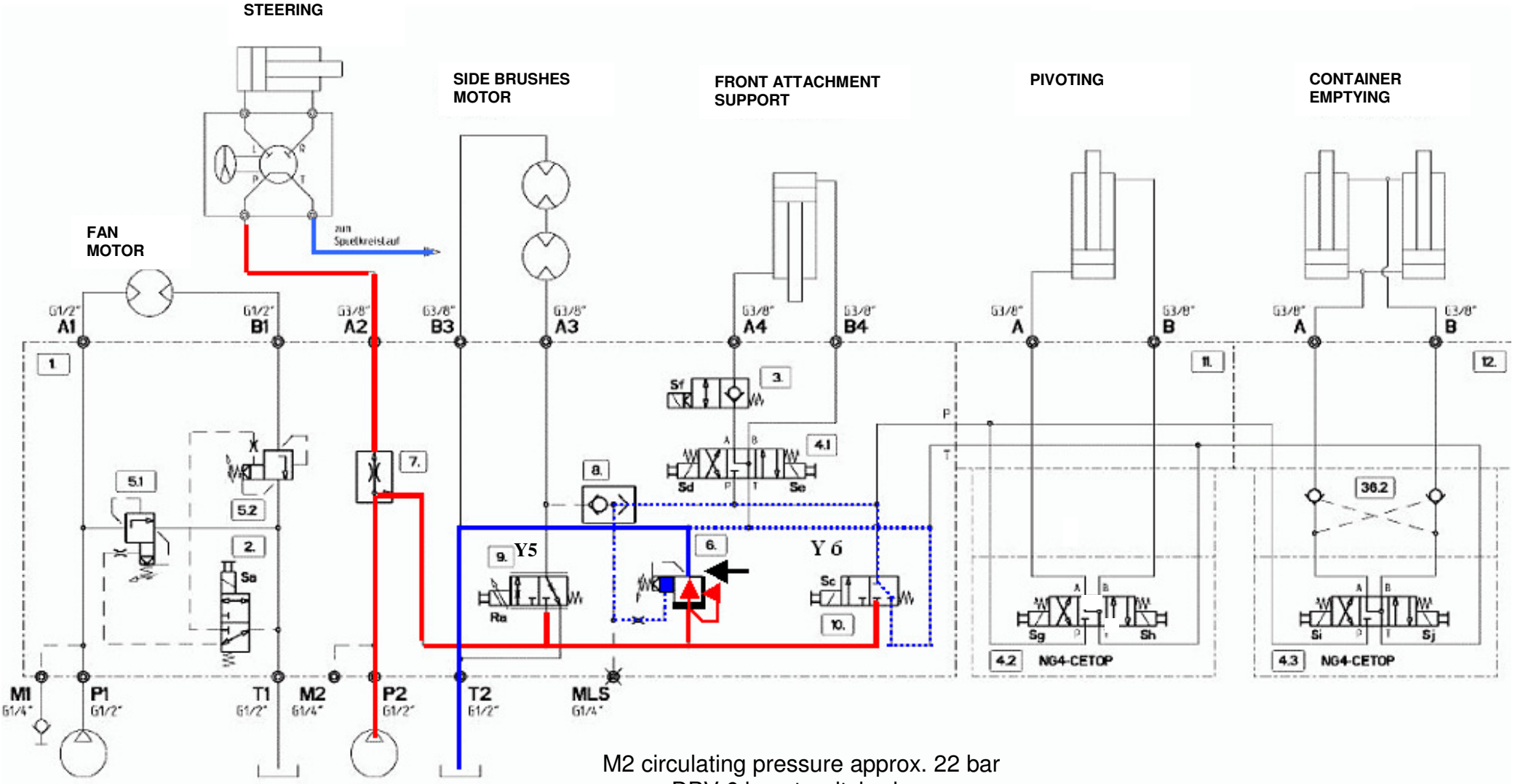
CT 4200 mower on;
CM 1200 suction fan on
(Y4 connected)

Mower/Suction fan



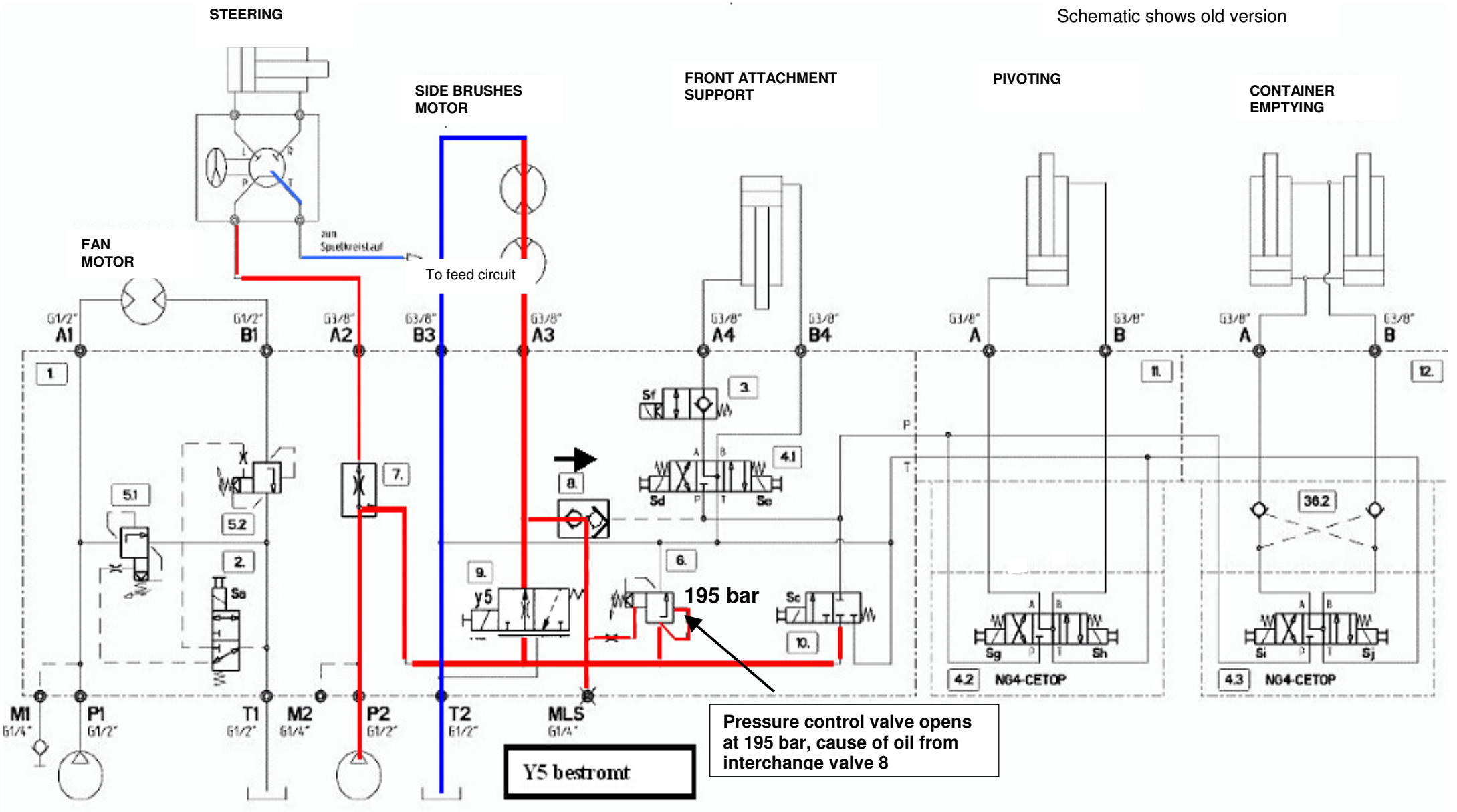
CT 4200 spreader off;
CM 1200 side brushes off
(Y5 not connected)

Schematic shows old version

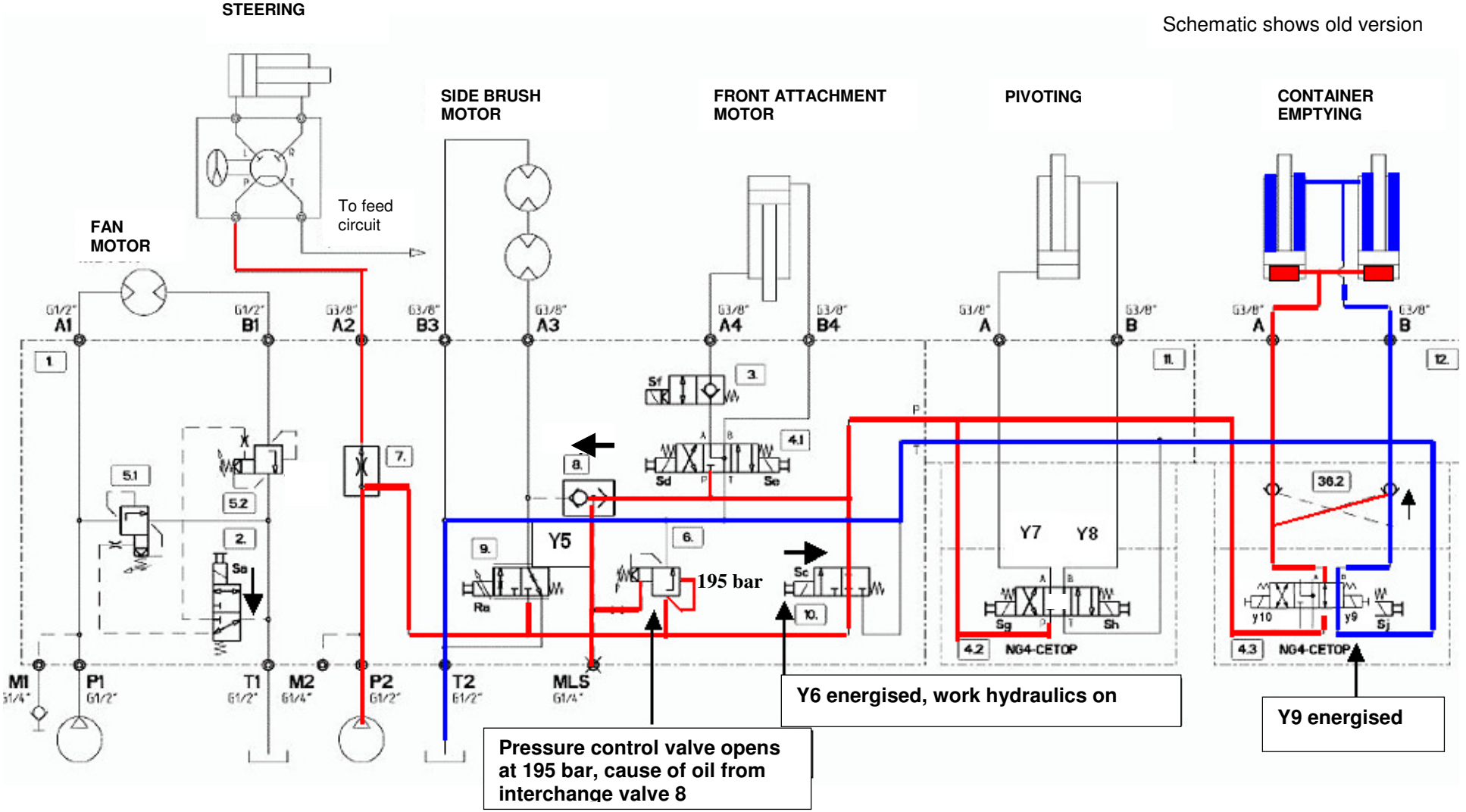


M2 circulating pressure approx. 22 bar
cause DBV 6 is not switched

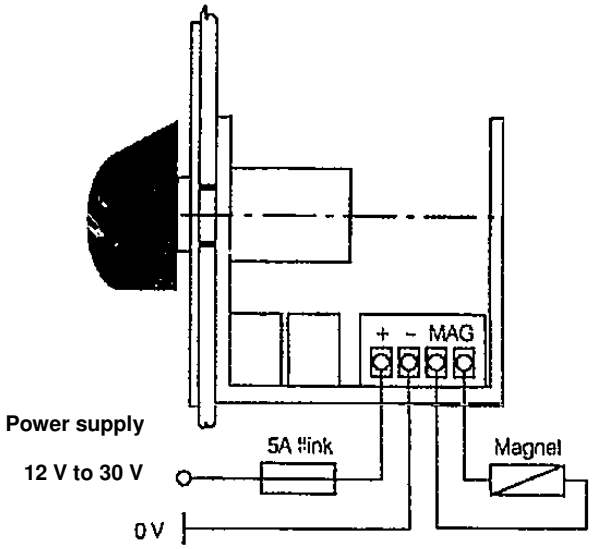
CT 4200 spreader on;
CM 1200 side brushes on
(Y5 connected)

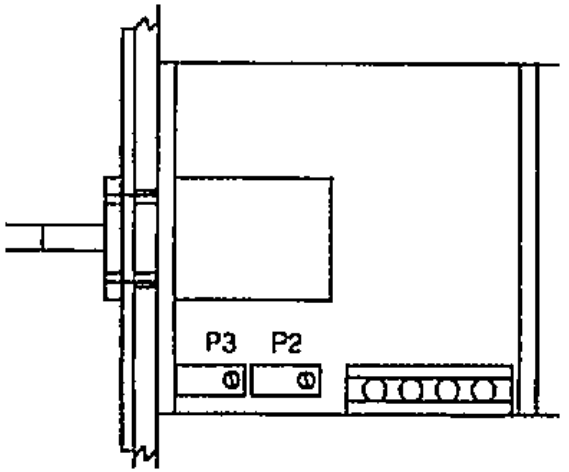


Circulation off,
Work hydraulics on
(Y6 and at least one consumer connected)



5.4.6 Control unit proportional valve (A1); Part Number 00562670





P3 max P2 min

The control unit regulates a proportional magnet on the quick-release coupling Pos.147 (side brush, spreader, compound circuits, mulchmower) for the hydraulic quantity.
The current regulation ensures the current flowing through the magnet remains constant even when the power supply fluctuates or the magnet heats up.
The set value is defined by means of a potentiometer integrated in the circuit. The potentiometer is equipped with an On/Off switch.
The value of the minimum current (min) and maximum current (max) can be adjusted using two trimming potentiometers.

Setting/Controlling the output current

1. Connect the coding plug for enabling the "side brush spreading mode".
2. Disconnect one of the two cables from the magnet's "MAG" terminal on the control card.
3. Connect the ammeter with a measuring range of 500 – 2500 mA between the "MAG" terminal and the cable to the coil. **Note:** Measure the Amp. current in series
4. Switch on the machine ignition, move the throttle to its work mode position.
5. Switch the potentiometer on via the latching point and set to Minimum.
6. Set the minimum current (min) **P2** to **780 mA,** with the trimming potentiometer, which corresponds to **5 l/min**.
7. Set the potentiometer to Maximum.
8. Set the maximum current (max) **P3** to **1060 mA** with the trimming potentiometer, which corresponds to **20 l/min**. (The magnet current must not exceed 2500 mA because A1 and the coil Y5 could be damaged.)
9. Check the two current values set
10. Disconnect the measuring devices and complete the machine.

---- Do not forget to disconnect the service plug 01144380 ----

5.4.7 Hydraulic connections for front attachment devices

1)
Pivot front attachment devices forwards/back
(e.g.: snowblade, brushes)

2)
Pivots front attachment devices forwards/back
(e.g.: snowblade, brushes)

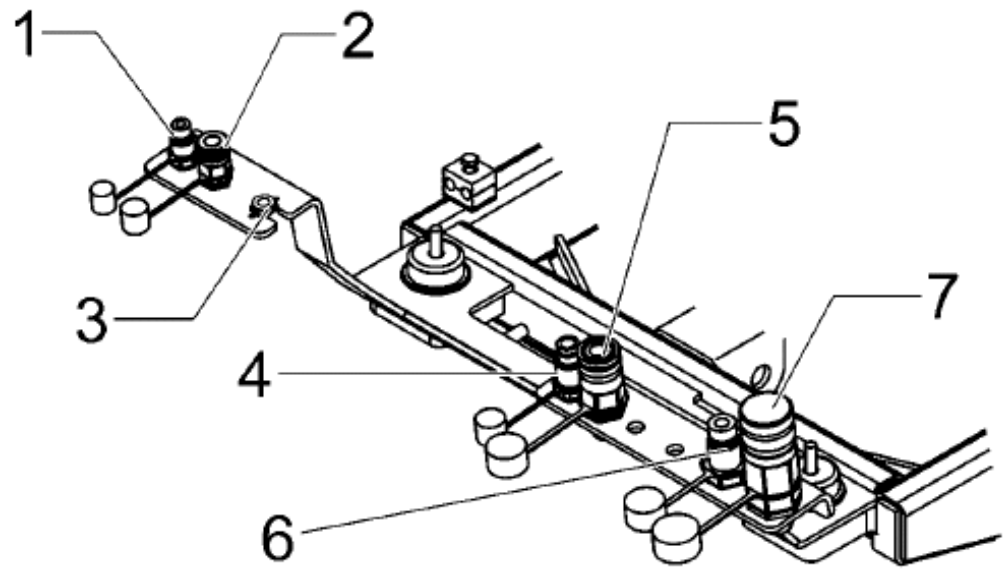
3)
Coding plug for attachment detection/lighting

4)
Proportional regulation (maximum 20 litres) forward
(e.g.: compound circuit mulchmowers, side brush drive

5)
Proportional regulation (maximum 20 litres) back
(e.g.: side brush drive)

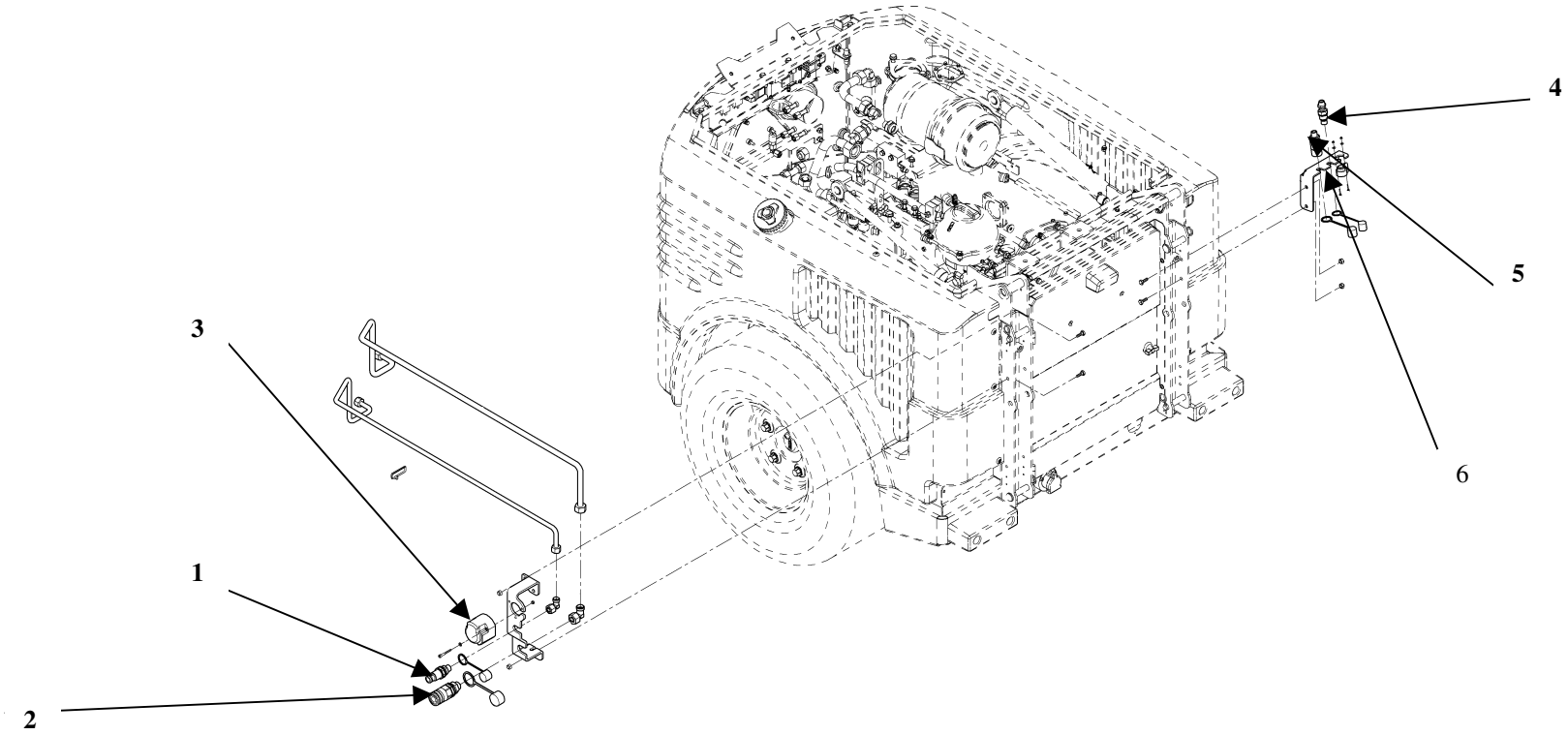
6)
Work pump (maximum 46 litres) forward
(e.g.: mowers, brushes)

7)
Work pump reverse
(e.g,: mowers, brushes, mulchmowers)

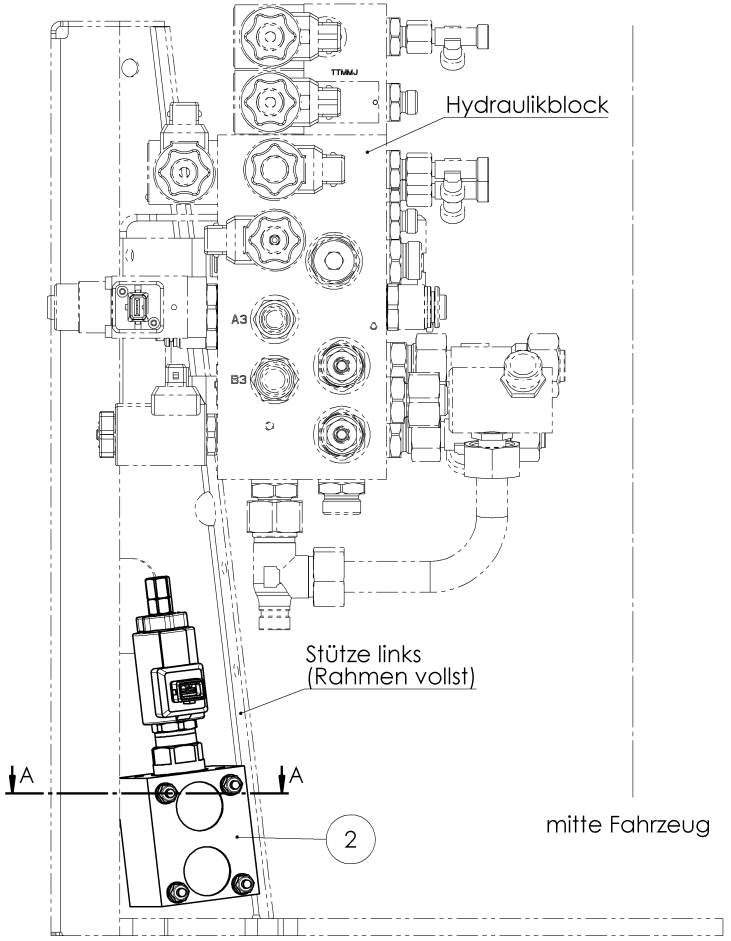


5.4.8 Rear connections

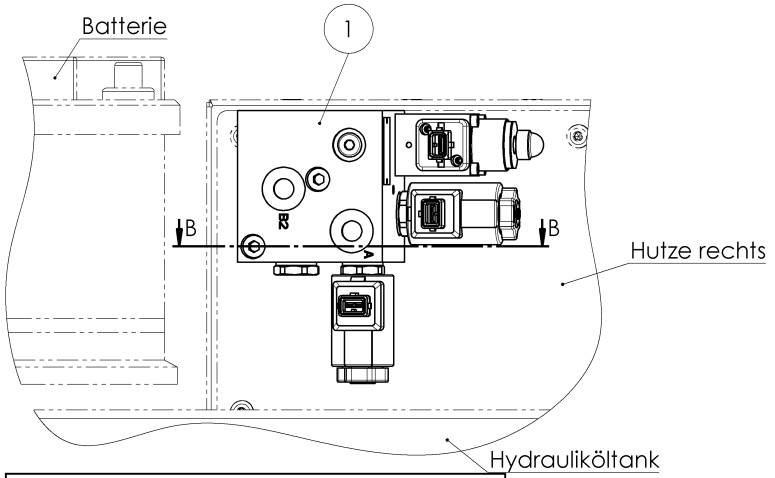
1) Proportional regulation (max 20ltr) forward
   (e.g. spreader, suction gras-leaf collector)
2) Proportional regulation return
3) Plug X60
4) Proportional regulation (max 20ltr) forward
   (e.g. trailer ext. hydraulic, hopper gras-leaf collector)
5) Proportional regulation return return
6) Plug X64



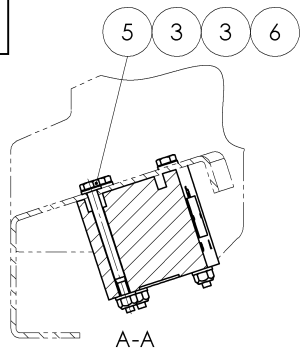
5.5 Citycleaner Hydraulic

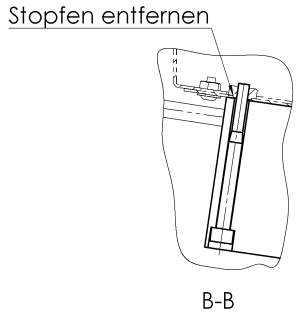


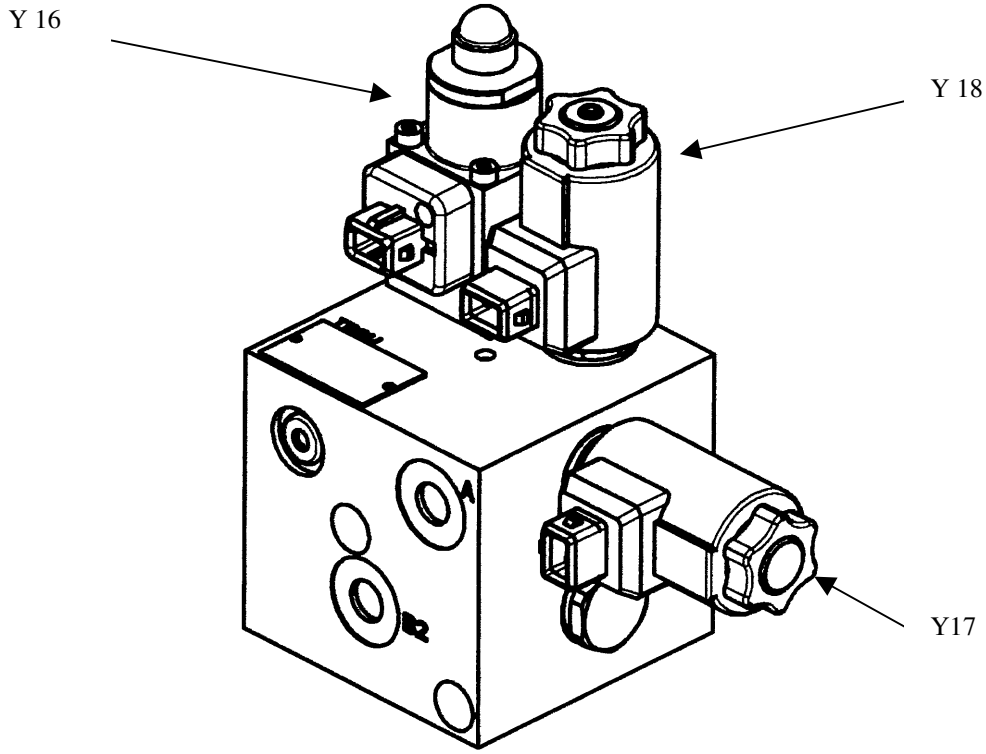
View
Rear frame in driving direction to hydraulic valve block



View
Rear frame from middle to right side
hydraulic tank

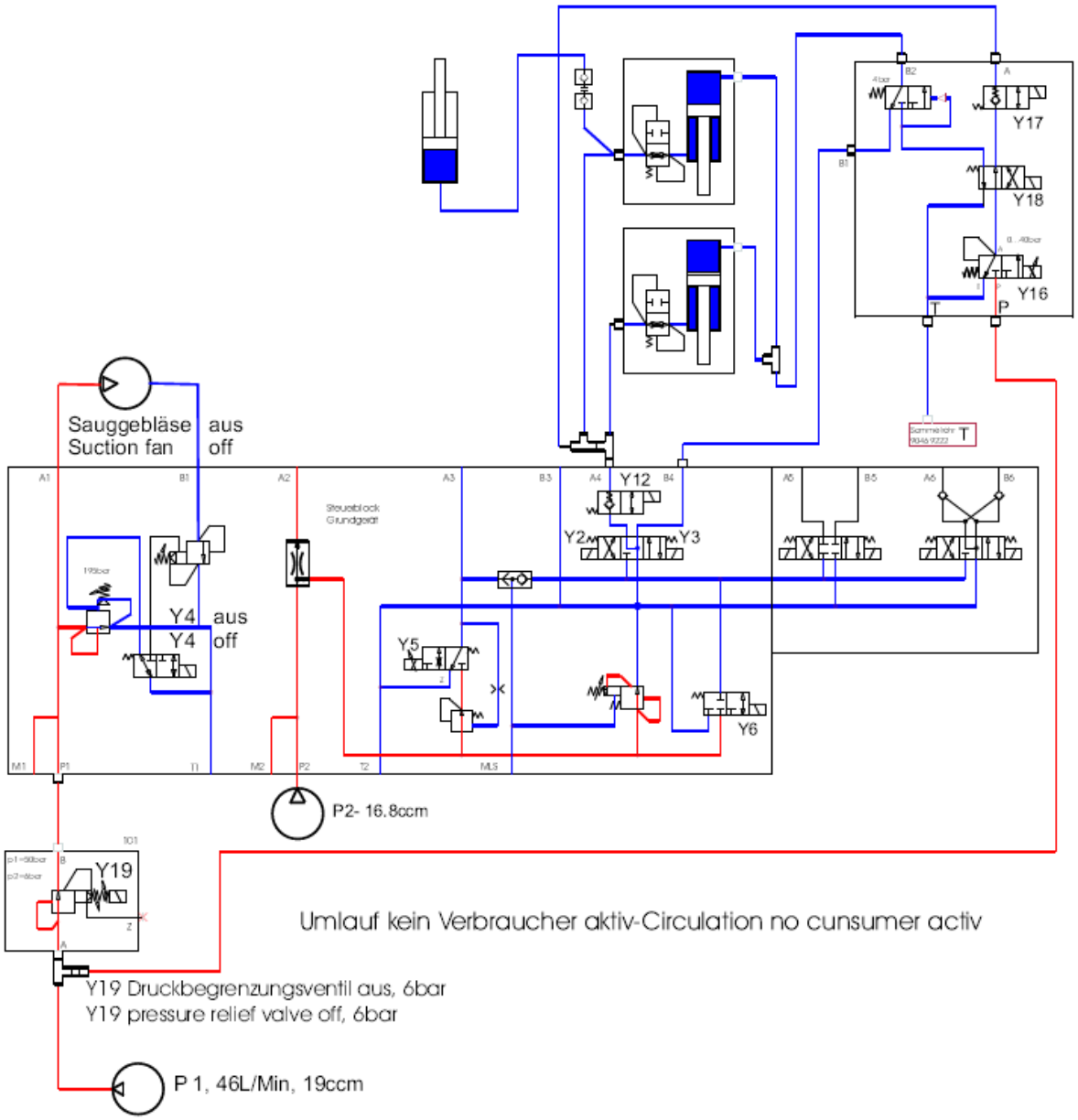






Valve block scrubdeck-surface pressure-regulation

Hydraulik Citycleaner (6150) - Hydraulic Citycleaner (6150)



Y2 Hydraulikventil Geräteträger senken
Y2 Hydraulic valve front carrier down

Y3 Hydraulikventil Geräteträger heben
Y3 Hydraulic valve front carrier up

Y4 Hydraulikventil Gebläse ein- aus
Y4 Hydraulic valve suction fan on- off

Y6 Hydraulikventil Umlauf ein- aus
Y6 Hydraulic valve circulation on- off

Y12 Hydraulikventil
Geräteträger Schwimmstellung
Y12 Hydraulic valve front carrier released

Y16 Propventil Geräteträger drücken
Y16 Prop. Valve front carrier pressure
(0.95 - 2.5V, 150 - 450 mA)

Y17 Geräteträger Schwimmstellung
Y17 Hydraulic valve front carrier released

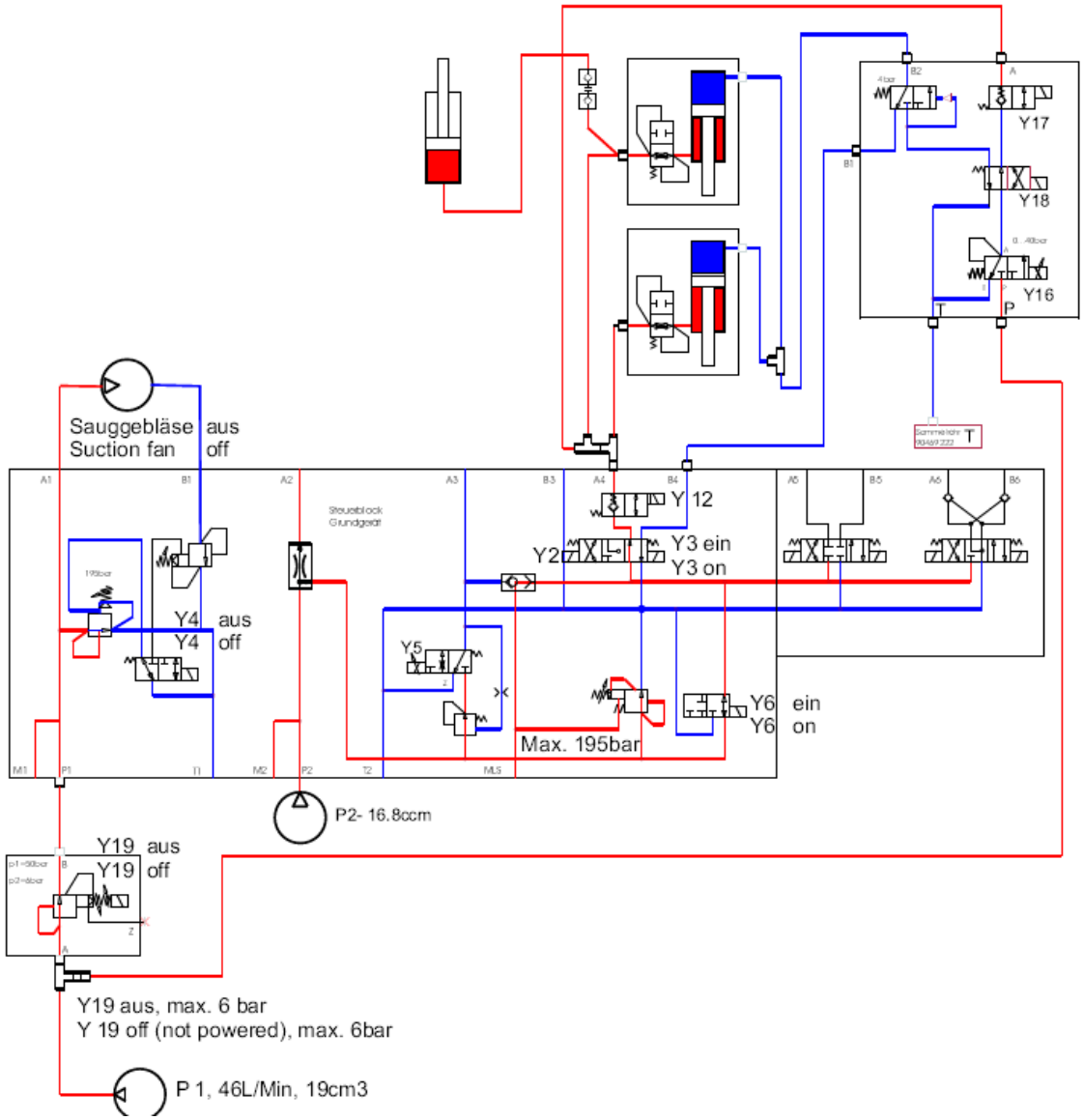
Y18 Hydraulikventil Umschaltung
Druck- Entlastung Geräteträger
Y18 Hydraulic valve weight- unweight
front carrier

Y19 Umschaltbares Druckbegrenzungsventil
nicht geschaltet max. 6bar
geschaltet max. 50bar
Y19 Pressure relief valve
not powered max. 6 bar
powered max. 50 bar

Blau, Tank,blue Tank
Rot, Pumpe, red pump

Hydraulik Citycleaner (6150) - Hydraulic Citycleaner (6150)

Frontgeräteträger heben, Y6 und Y3 sind geschaltet- Lifting front lift, Y6 and Y3 are powered



Y2 Hydraulikventil Geräteträger senken
Y2 Hydraulic valve front carrier down

Y3 Hydraulikventil Geräteträger heben
Y3 Hydraulic valve front carrier up

Y4 Hydraulikventil Gebläse ein- aus
Y4 Hydraulic valve suction fan on- off

Y6 Hydraulikventil Umlauf ein- aus
Y6 Hydraulic valve circulation on- off

Y12 Hydraulikventil
Geräteträger Schwimmstellung
Y12 Hydraulic valve front carrier released

Y16 Propventil Geräteträger drücken
Y16 Prop. Valve front carrier pressure
(0.95 - 2.5V, 150 - 450mA)

Y17 Geräteträger Schwimmstellung
Y17 Hydraulic valve front carrier released

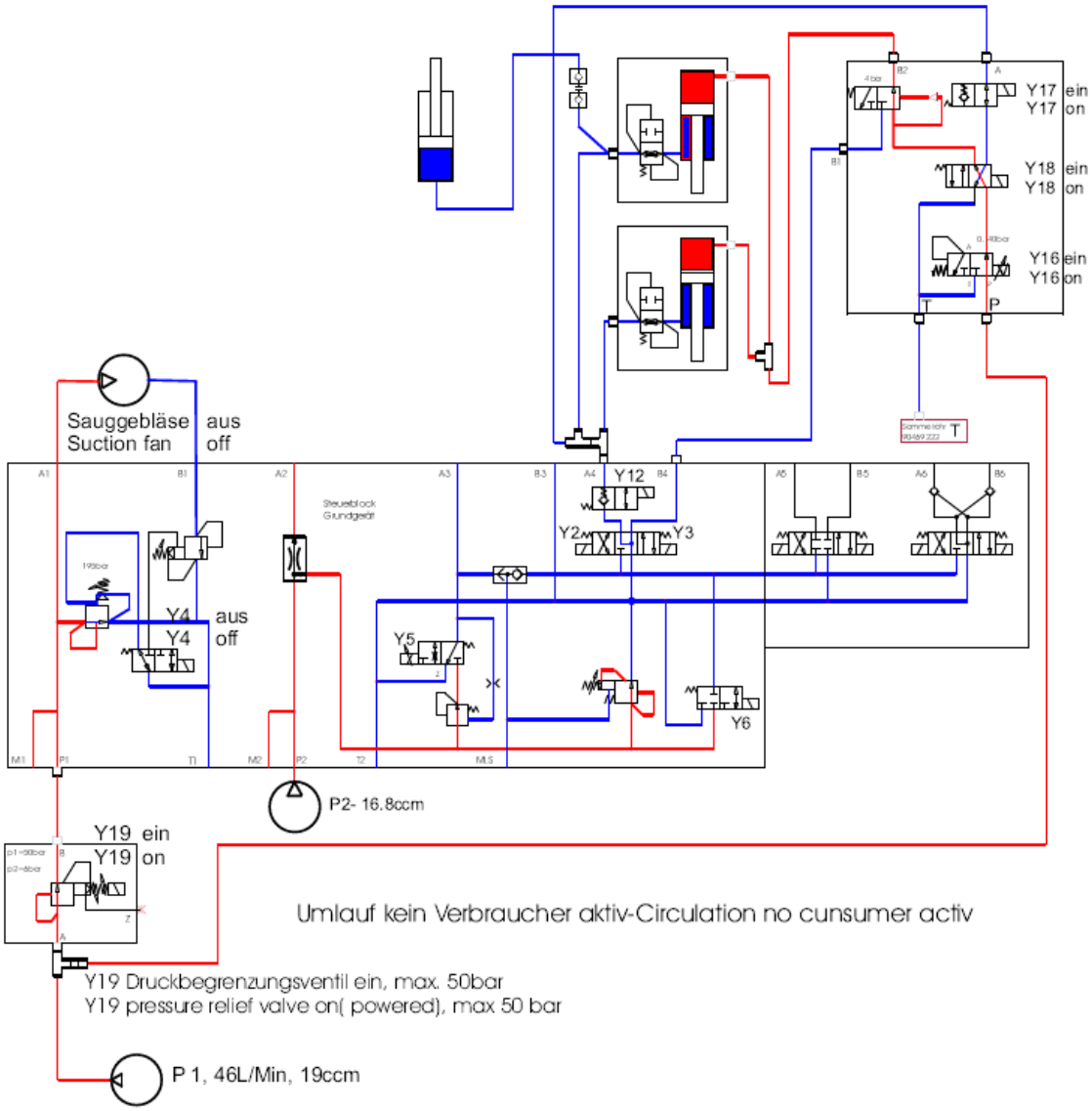
Y18 Hydraulikventil Umschaltung
Druck- Entlastung Geräteträger
Y18 Hydraulic valve weight- unweight
front carrier

Y19 Umschaltbares Druckbegrenzungsventil
nicht geschaltet max. 6bar
geschaltet max. 50bar
Y19 Pressure relief valve
not powered max. 6 bar
powered max. 50 bar

Blau, Tank,blue Tank
Rot, Pumpe, red pump

Hydraulik Citycleaner (6150) - Hydraulic Citycleaner (6150)

Prop. Druck, Druck am Frongeräteträger, Y16, Y17 und Y18 sind geschalted - Prop weight, weight front lift, Y16, Y17 and Y18 are powered



Y2 Hydraulikventil Geräteträger senken
Y2 Hydraulic valve front carrier down

Y3 Hydraulikventil Geräteträger heben
Y3 Hydraulic valve front carrier up

Y4 Hydraulikventil Gebläse ein- aus
Y4 Hydraulic valve suction fan on- off

Y6 Hydraulikventil Umlauf ein- aus
Y6 Hydraulic valve circulation on- off

Y12 Hydraulikventil
Geräteträger Schwimmstellung
Y12 Hydraulic valve front carrier released

Y16 Propventil Geräteträger drücken
Y16 Prop. Valve front carrier pressure
(0.95 - 2.5V, 150 - 450mA)

Y17 Geräteträger Schwimmstellung
Y17 Hydraulic valve front carrier released

Y18 Hydraulikventil Umschaltung
Druck- Entlastung Geräteträger
Y18 Hydraulic valve weight- unweight
front carrier

Y19 Umschaltbares Druckbegrenzungsventil
nicht geschaltet max. 6bar
geschaltet max. 50bar
Y19 Pressure relief valve
not powered max. 6 bar
powered max. 50 bar

Blau, Tank,blue Tank
Rot, Pumpe, red pump

Hako – Citytrac 4200
Hako – Citymaster 1200
Hako - Citycleaner

Electrical Installations

6.1 Safety information

Attention!

- When working on the engine and the electrical installations, always disconnect the battery (minus pole).

Notes on the three-phase generator

- Only allow the engine to run with the battery connected.
- Do not use a charger as a cold start device.
- Disconnect the battery before starting any recharging or electric welding on the device.

6.2 Basic principles, electrical engineering circuit diagram (terminal plan/wiring diagram)

Circuit and wiring plans are always comprised of the drawings and reference lists.
The reference lists always contain all the machine components.
The letter assignment is organised as follows:

- A electronics, control units
- B sensors, transducers
- C capacitors
- E headlights, lighting, indicators
- F fuses
- G batteries, generators
- H control lamps
- K relays
- M starter, electric motors, stroke elements, pumps
- R resistors, potentiometers, glow plugs
- S switches, buttons
- V diodes
- X connectors, potential distributor
- Y valves, solenoid valves, proportional solenoid valves, magnetic clutches

Every component is identified by a letter and chronological number, e.g.: M1 relates to a starter, M2 a pump, M3 an electric motor, etc.

Plugs and connectors on electronic components are identified by A1; X1 or A1;X2.
Plugs and connectors with several pins are identified by A1; X1:1 or A1; X1:2 etc..

Connectors or potential distributors which are not located on an electronics component are only identified by X1, X2 etc.

Circuit diagram:

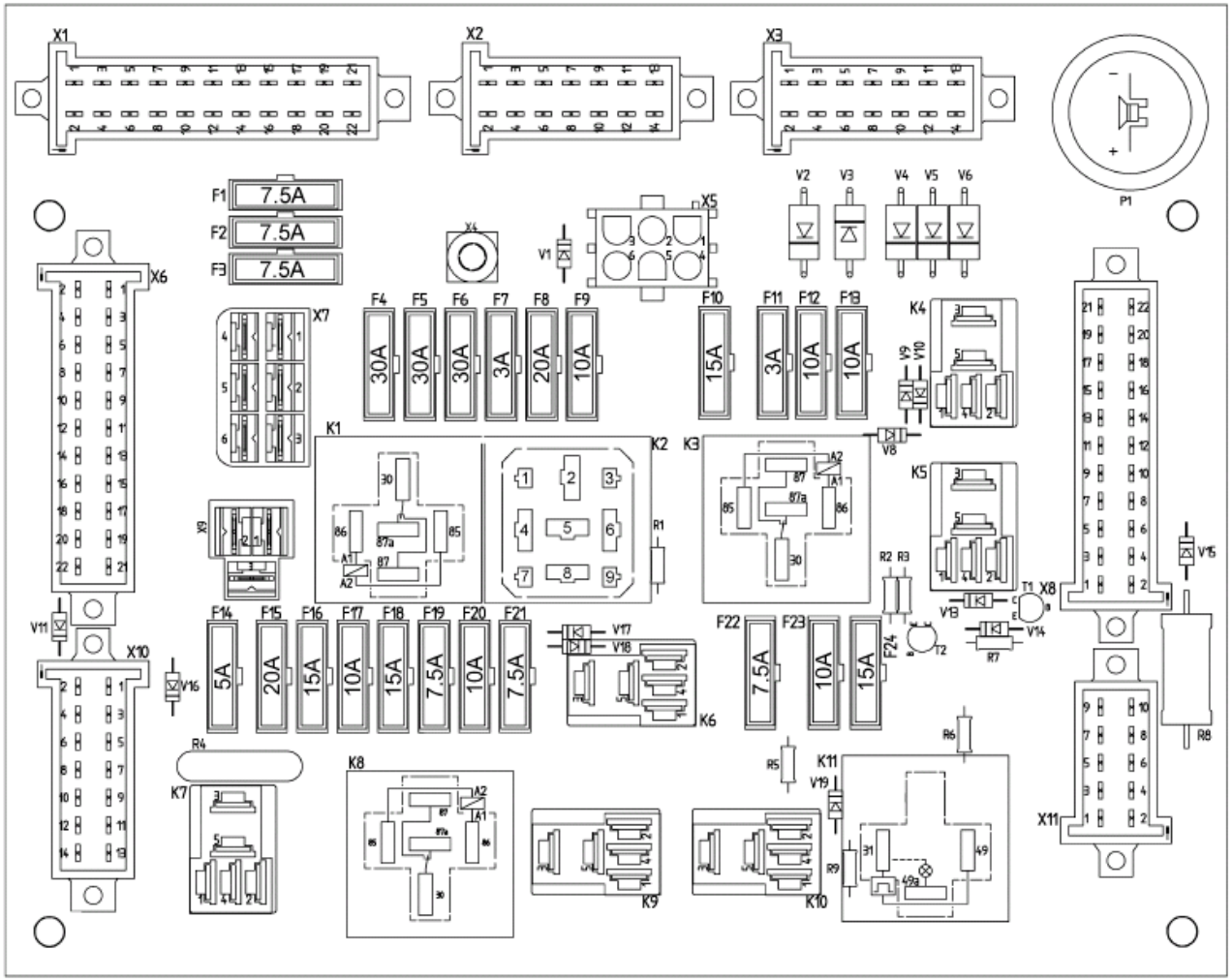
The circuit diagram depicts the connections between the individual components within the entire machine. The functional organisation of the system can be seen on the circuit diagram.

Wiring diagram:

In addition to the information on the circuit diagram, the wiring diagram illustrates all the components, such as connectors, plugs, cables, cable harnesses etc., as they are installed in the corresponding machines. Each cable harness is identified by a number. This number can be used to order the respective cable harness from Hako (e.g. 97-06 415-8). Cable harnesses are produced individually according to customer orders.

6.3 Fuse box PCB

F1 : Parking, rear light, right
F2 : Parking, rear left license plate light
F3 : Flashing alarm lamps, interior lighting
F4 : Pre-fuse 58 / 50
F5 : Pre-fuse 15
F6 : Pre-fuse 75
F7 : Control unit controller, seat contact
F8 : Fan condenser (air-conditioning unit)
F9 : 12 V socket, radio terminal 30
F10: Heater fan, controller
Air-conditioning unit
F11: Y6 Circulation off
F12: Operating hour counter, radio terminal 15
F13: Hydraulic valves
F14: Y13 Work mode / all-wheel off
F15: Work circuit control unit, seat contact
F16: Driving lights, front
F17: Windscreen wiping/washing system
F18: Work headlights
F19: Engine control, K1 (75)
F20: Indicators
F21: Wedge plough, spreader, quick emptying
F22: Proportional valve Y4 + Y5
F23: Y11 Diff. lock, water pump
F24: Hazard lights



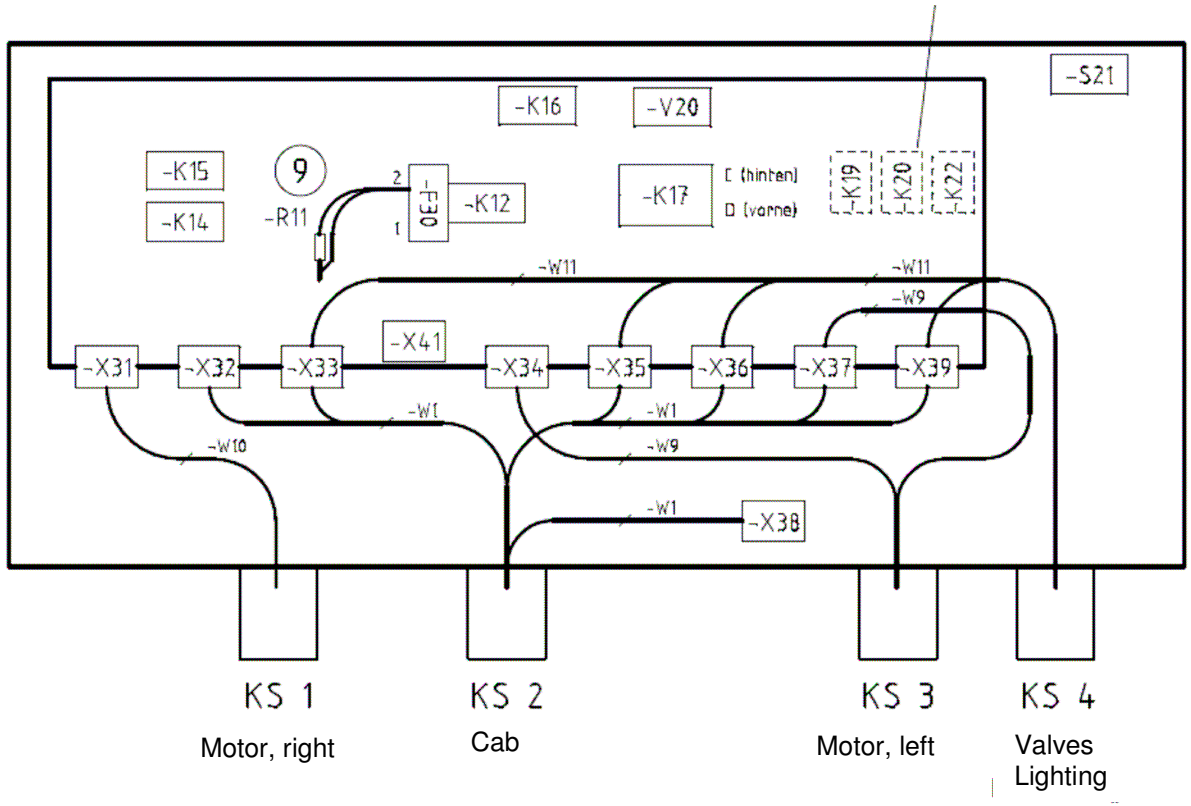
K 1 : Relay voltage 75
K 2 : Control unit, seat contact
K 3 : Relay fan/clutch air-conditioning unit
K 4 : Lock, front attachment support floating
K 5 : Proportional valve connection
K 6 : Work - Transport mode change-over
K 7 : Restart protector, mower (locking)
K 8 : Windscreen wiper interval (option)
K 9 : Enable mower (seat contact B8 > mower switch S5)
K10: Suction fan/mower relay on
K11: Indicator relay

Identification	Name	Order No.
F1, F2, F3; F19; F21; F22	Fuse link C7.5 A	50-955
F9; F12; F13; F17; F20: F23	Fuse link C10 A	73-363
F10; F16; F18; F24	Fuse link C15 A	73-364
F8; F15	Fuse link C20 A	50-036
F4; F5; F6	Fuse link C30 A	15-206
F14	Fuse link C5 A	90-612
F7; F11	Fuse link C3 A	105-705
K1; K3	Small relay	74-477
K2	Control unit, seat contact	114-118
K4; K5; K6; K7; K9; K10	Relay with snubber resistor	114-117
K11	Indicator transducer	109-274

6.4 Fuse box, trailer

View of junction box

-K19, -K20 and -K22 (OPTION) mounted on junction box lid



Motor, right

Cab

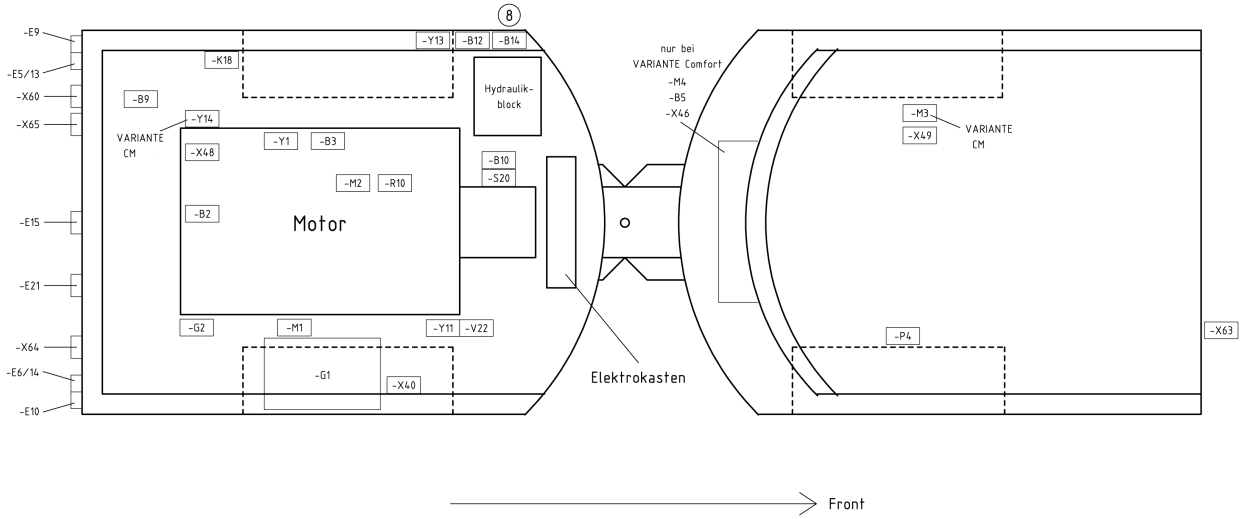
Motor, left

Valves
Lighting

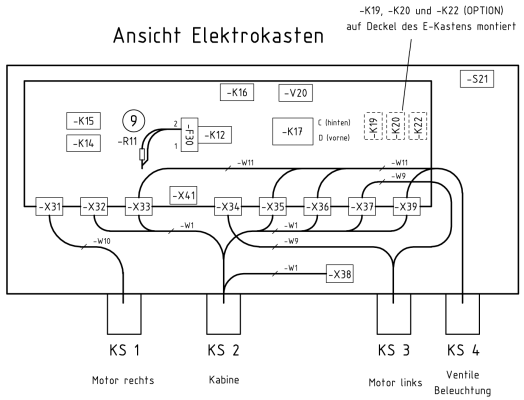
F30 = Main fuse
00874760
K12 = Preheating control unit
01144400
K14 = Cooling water level control unit
01081390
K15 = Cooling water level relay
00744770
K16 = Timer, fuel valve
01141150
K17 = Relay, fuel valve
01041700
K19 = Relay, enable starter
00744770
K20 = Relay, dynamo (option)
00744770
K22 = Relay, reversing signal (option)
00744770
R11 = Series resistor, preheating control unit
19245018
S21 = Limit switch, container/platform
01161460
V20 = Diode, fuel valve
01144370

6.5 Overview of electrical components

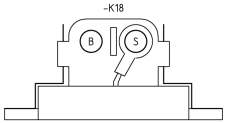
Gesamtansicht der Maschine



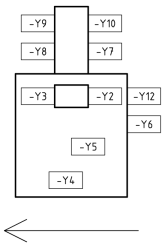
Ansicht Elektrokasten



Ansicht Anlasser-Steuergerät

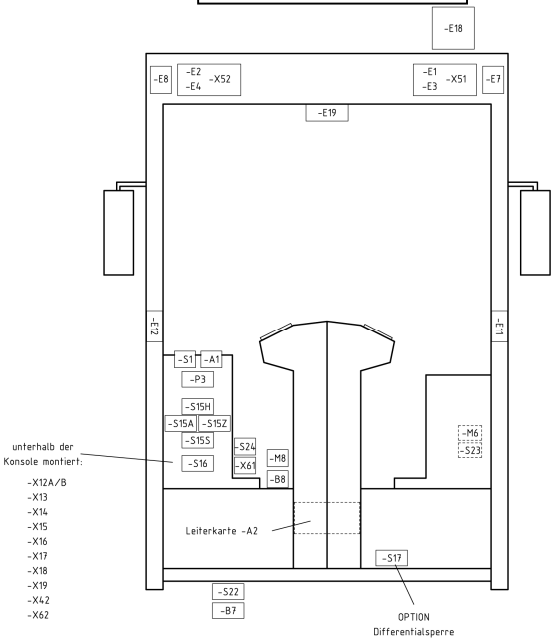


Ansicht Hydraulikblock

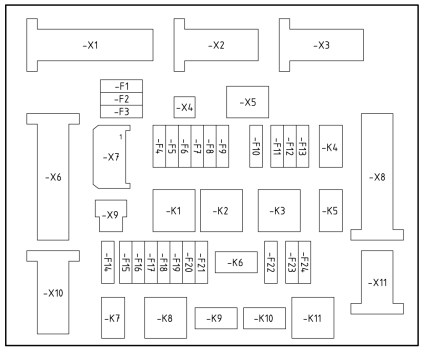


Overview machine

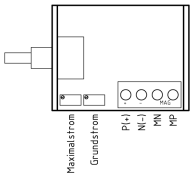
Frontview cab



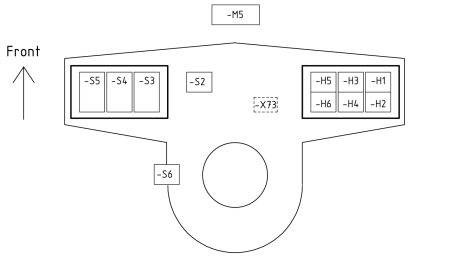
Look at circuit board A2



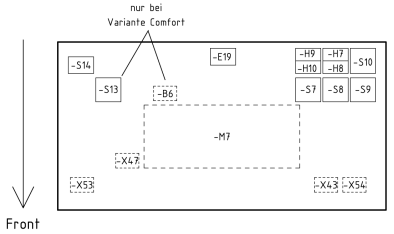
Connectors control unit A1



View steering column

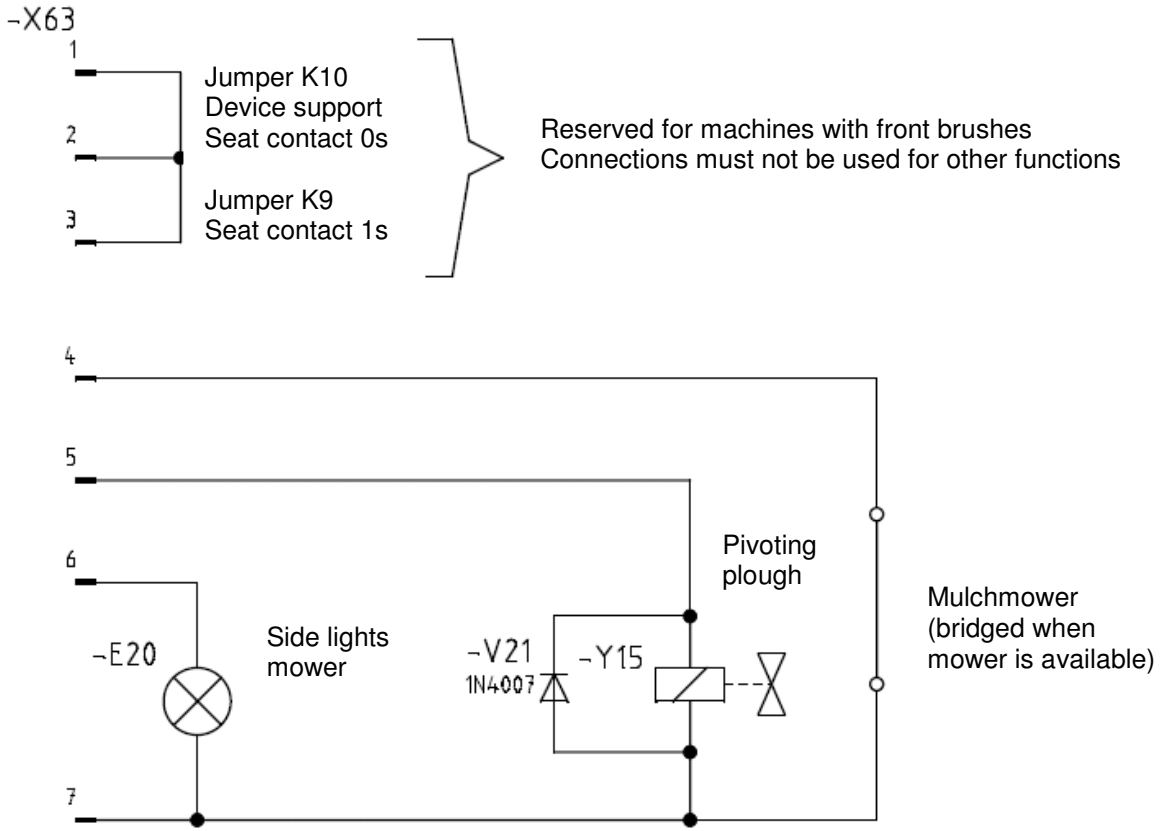


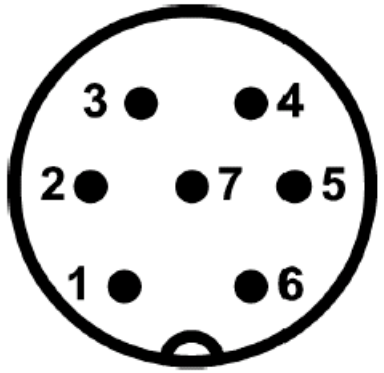
View roof consol (inside cab)



6.6 Front attachment device connector X63 7-pin

This connector serves mainly for enabling/disabling certain hydraulic functions
Pins 1 – 5 are provided for this. Pin 6 is for the lighting and Pin 7 is the PE connection.





(View of pin contacts)

Connector
Order no.: 114-372

Service plug
Order no.: 114-438

No jumpers

Operation as Citytrac with mower

- The hydraulic circuit is only activated after switching on the “mower circuit”.
- The attachment switches off automatically when the front attachment support is raised.
- The hydraulic circuit is switched off immediately the driver leaves the seat and must be reactivated after the seat contact has been closed again by switching it "off and on again".

Jumper, pin 1 to pin 2:

Optional operation as Citymaster or Citytrac **(not for mower operation)**

- The hydraulic circuit is only activated after switching on the “mower circuit”.
- When the front attachment support is raised, the attachment device runs again (till September 2008).
- The attachment switches off automatically when the front attachment support is raised (from September 2008).
- The hydraulic circuit is switched off one second after the driver leaves the seat and must be reactivated after the seat contact has been closed again by switching it "off and on again".

Can be used for attachment devices which should continue to run after being raised. Is not currently used by Hako.

Jumper, pin 4 to pin 7:

Operation as Citymaster or Citytrac with mulchmower (hydraulic compound circuit) or spreader

- This enables the continual operation of the proportional hydraulic circuit.

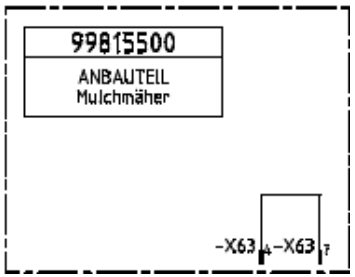
The connector necessary to implement this bridging function belongs to the scope of delivery of the attachment device.

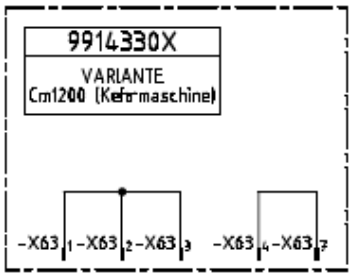
Jumper pin 1 to pin 2; pin 2 to pin 3 and pin 4 to pin 7:

Operation as CM1200

- The hydraulic circuit is only activated after switching on the “mower circuit“.
- When the front attachment support is raised, the attachment device runs again (till September 2008).
- The attachment switches off automatically when the front attachment support is raised (from September 2008).
- The hydraulic circuit is **not** switched off when the driver leaves the seat.
- This enables the continual operation of the proportional hydraulic circuit.

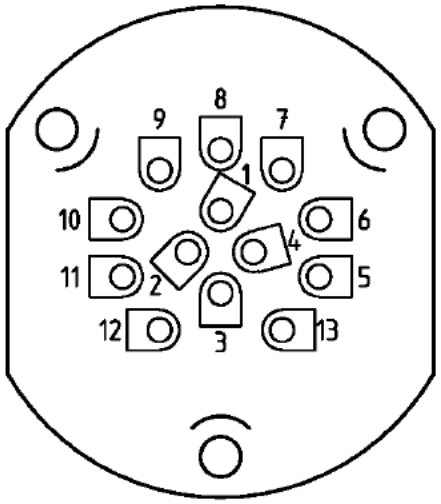
There is a connector (cable harness W17) for this jumper which belongs to the functional scope of the brush unit. It is assigned spare part no. **01161150**





6.7 Rear attachment device connector X60 13-pin

This connector fulfils several functions. It serves the lighting, coding and power supply.



Pin assignment

1	Drive direction indicator, left (L)
2	Open at X13:1
3	Earth (31)
4	Drive direction indicator, right (R)
5	Rear light, right (58R)
6	Brake lights (54)
7	Rear light, left (58L)
8	Reversing light (option)
9	Not connected
10	Power supply for F23
11	Earth (31)
12	Spreader coding
13	Not connected

Jumper, pin 3 to pin 12:

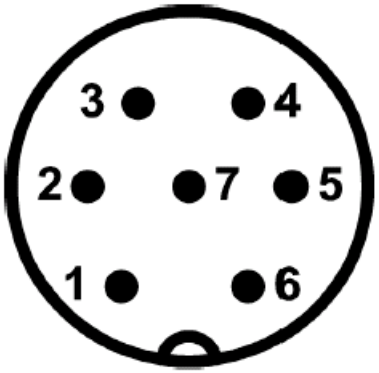
Operation as Citymaster or Citytrac with path depending spreader

- This enables the continual operation of the proportional hydraulic circuit, depending of the way/speed

The connector necessary to implement this bridging function belongs to the scope of delivery of the attachment device.

6.8 Rear attachment device connector X64 7-pin

This connector fulfils several functions. It serves the lighting, coding and power supply.



View of the pin contacts

Pin assignment

1 Speedometer
2 Power supply for F23
3 Open at X13:2
4 Spreader coding
5 Switch signal S16
6 Rear light, right (58R)
7 Earth (31)

Jumper, pin 4 to pin 7:

Operation as Citymaster or Citytrac with grass and leaf vacuum

- This enables the continual operation of the proportional hydraulic circuit.

The connector necessary to implement this bridging function belongs to the scope of delivery of the attachment device. The connector (grass skip connection cable) to operate the grass-leaf vacuum 8380 has serial no. **97715767**.

6.9 Switching functions

Work ride/Work mode (e.g. mower on)

1. G1:P (battery+) to fuse F6 (30A) (refer to Point 5 for further circuitry).

2. G1:P (battery+) flows via the fuse F5 (30A) to S1 (key-operated switch) terminal 19. If S1 is connected, B+ flows via terminal 58 to F19 (7.5A), F7 (3A) and F15 (20A).

3. 3. B+ flows via F7 to K2:3 (seat contact control unit) and B8:2 BN (seat contact switch).
   B+ flows via F15 (20A) to K2:1 and K2:2

4. If the seat contact switch B8 is closed, K2 connects relay K9 (enable mower) via Pin 5.

5. B+ flows via fuse F19 (7.5A) to K1:86; B- (earth) is connected via X40 and M1:50 to K1:85. Relay K1 is connected. B+ flows via F6, K1:30, K1:87 to fuse F13 (10A) an on to switch S22 (work ride/work mode switch). B+ flows via the closed switch S22 to relay K6:86. The relay connects B+ via K6:30 to K6:87 and further to F22 (7.5A) to switch S5 (mower/fan on) and to K7:30. At the same time, B+ is connected to K7:86 via the open switch S5 (converter). Relay K7 is switched and B+ is connected via K7:30 and K7:87 to K9:30. K9 is switched by the seat contact control unit and seat contact switch. (The seat contact switch must be closed).
   Switch S15 (lower device support) connects B+ via S15:1 and S15:2 and diode V8 to relay K4:86. The relay switches back and enters automatic lock. Simultaneously, solenoid valve Y12 is energised via K4:30 / K4:87 and the brush unit is lowered.
   B+ is switched parallel to K10:86 and the mower is enabled. S15 and K10 control the mower/fan is switched off when the device support is raised and switched on again when lowered.
   When the driver leaves the seat, K9 disconnects after 1 second and K7 is released from its lock, i.e. to switch the mower/fan on again, the seat contact must be closed and switch S5 first turned to zero and then switched on again so that the mower/fan can start up again.

Attention!
Important safety function! Never bypass!

Fault:

Mower does not start up:

Is Y4 (mower/fan on solenoid valve) energised?
Yes: Measure coil resistance on Y4: should be 5.9 Ohm. If resistance is ok, check whether Y4 is mechanically jammed.
Solution: Clean; replace if necessary.

No: Complete following tests:
Test fuses F5, F19, F7, F15, F6, F22.
Test switches S1, B8 (seat contact) S5, S15, S22.
Test relays K1,K4, K6, K7, K9, K10. Check that B+ is applied at K2 on pins 1, 2, 3;
B- at pin 6. If the seat contact B8 is closed, B- must be connected at pin 4 via X 42 and B8. B+ must now be connected to K9:86 via pin 5. K9 closes.

Fault:

Engine does not start:

Seat contact switch B8 is not actuated.
Fuse F5, F7, F15 or F30 is defect.
Seat contact switch B8 is dedect.
Zero position switch drive pump S20 not actuated.
Fuse F19 defect.
Seat contact switch S20 defect.

Solution:

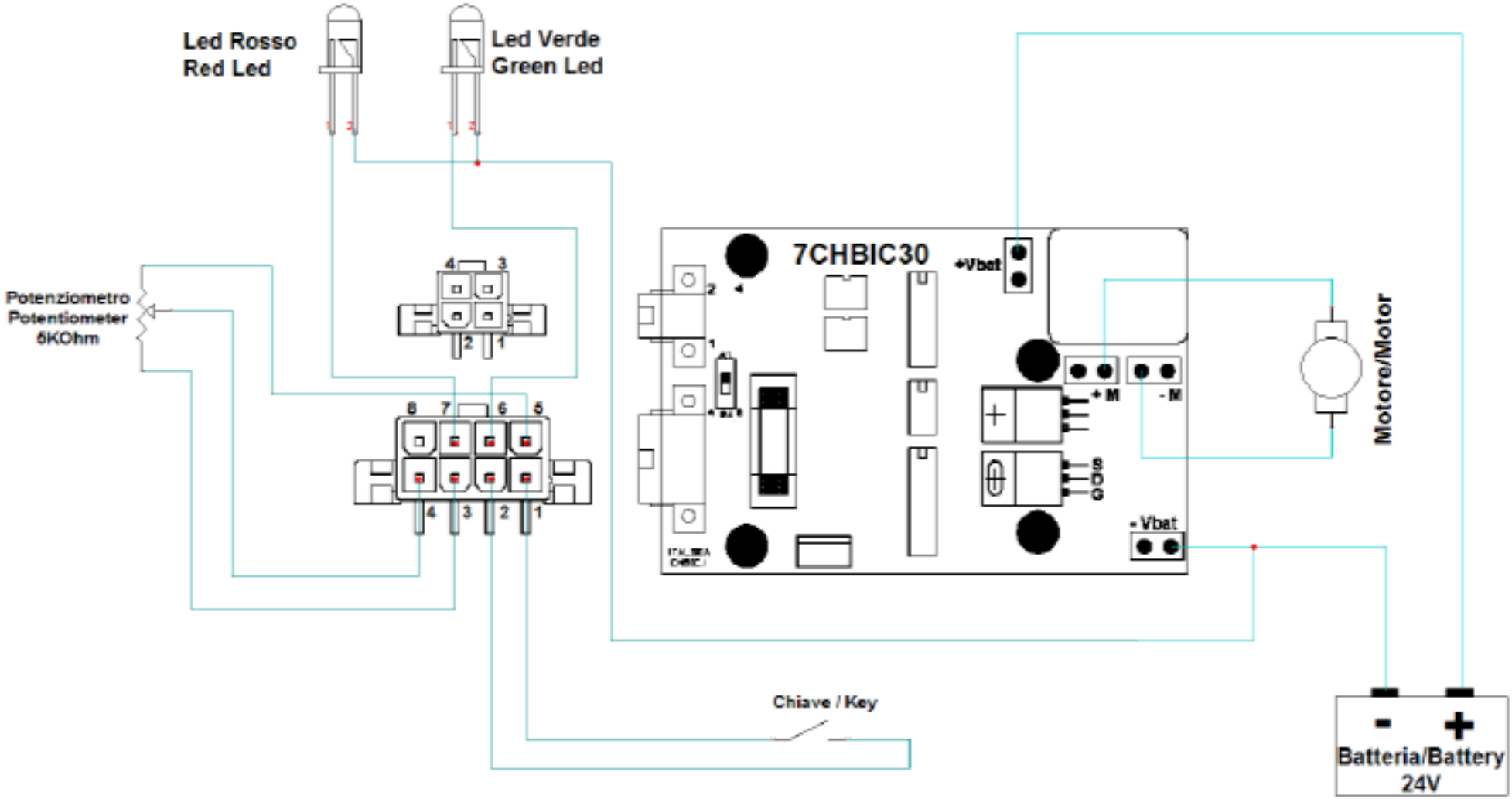
Actuate seat contact switch B8.
Check fuses F5, F7, F15 and F30, replace as necesarry.
Check seat contact swith B8, replace if necesary. When the driver is seated on the seat, B8 earth (B-) must be swithed through vom X42 to K2:4.
Check the inputs at K2 are ok, check K2; replace, if necessary.
Check fuse F19; replace as necessary.
Check the input from S20 to K2:7. The zero position switch drive pump S20 must be switched switched trough (B+ from F19 to X36:3, X34:1 to K2:7, in zero position. Check at relay socket K2.
Are the inputs at K2 ok, check K2 and replace as necessary.

Caution:

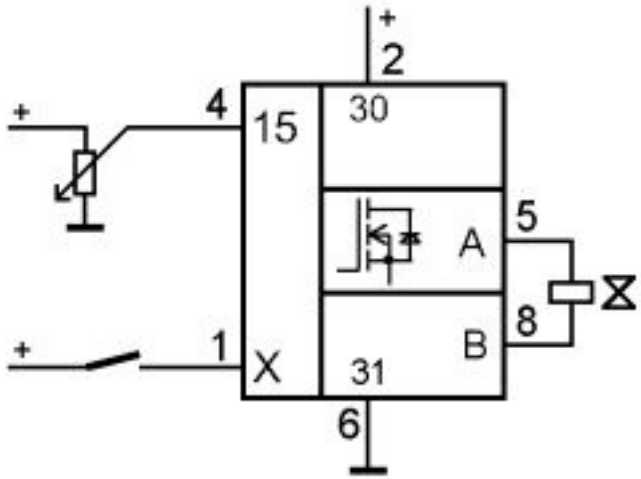
The seat contact switch B8 and the zero position switch drive pump S20 has to be bridged only for testing!
If B8 or S20 are bridged longer than 8hours, you cant´t start the engine!

If other test and checks are necessary, it is essential to use the function wiring and circuit diagrams!

6.10 Controller water regulation (A5) Option Citycleaner (6150.00)



6.11 Relais surface pressure (A4 Option)



Pin	Typ	Funktion
X	2.8	Digitaleingang *Parameterumschaltung*
30	6.3	Versorgungsspannung
15	6.3	Analogeingang *Spannung Sollwert (0..15V)*
A	6.3	Ausgang *Proportionalventil/1*
31	6.3	Masse
B	6.3	Ausgang *Proportionalventil/2*

Digital input

Power supply

Analog input

Output prop. valve 1
Ground
Output prop. valve 2

Hako - Citytrac 4200
Hako - Citymaster 1200
Hako - Citycleaner

Options

7.1 Multipurpose packet (1437)

The multipurpose packet is an option **only available ex works**. It enables the use of additional connections and functions (base on universal devices) especially for the CM1200. Individual components are also available as options for the CT4200.

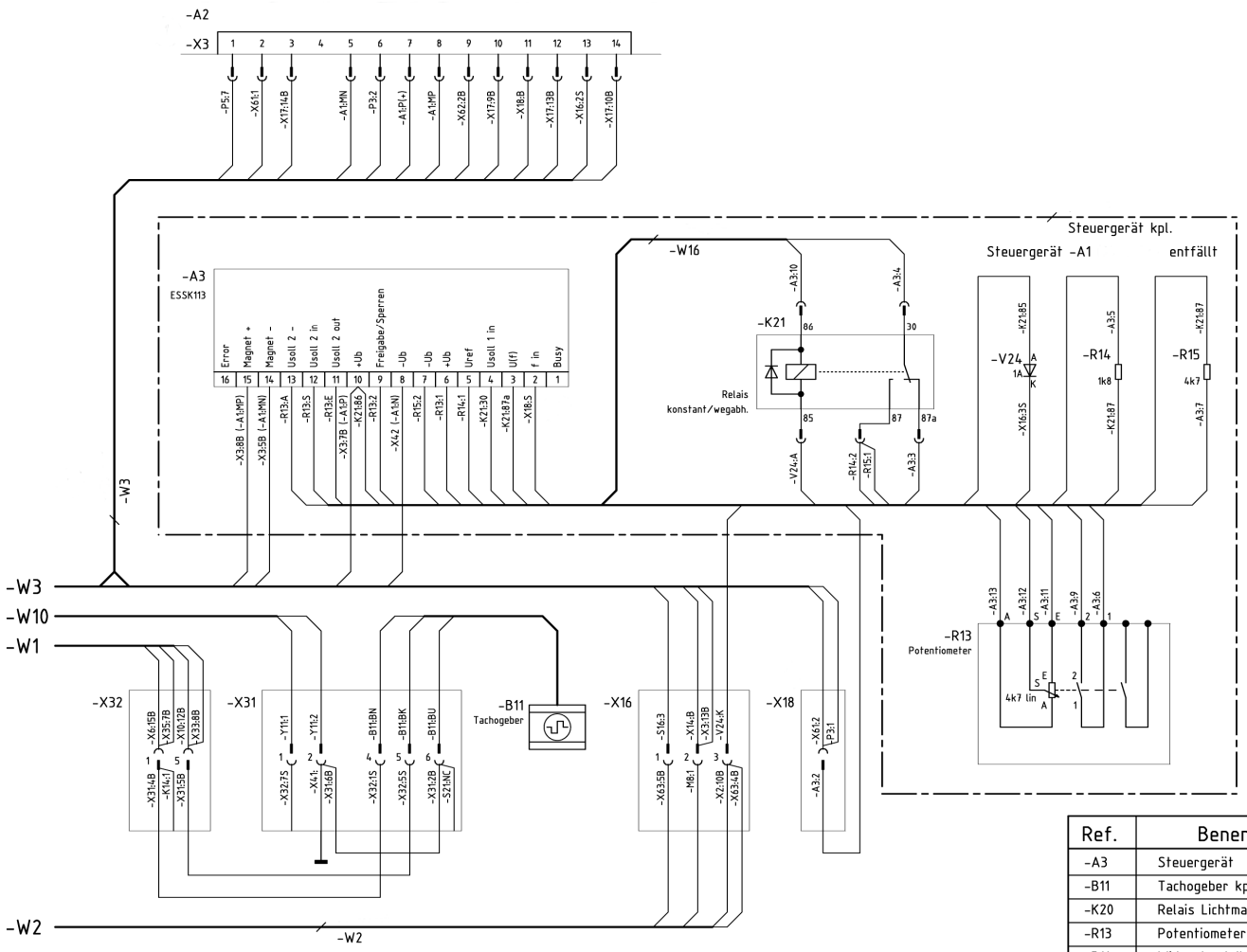
The multipurpose packet is comprised of:
- A foot pedal for the differential lock (standard CT4200)
- Path-dependent spreading (option for CT4200)
- Rear attachment connections (standard CT4200)
- Differential lock (standard CT4200)
- Loading platform (standard CT4200)
- Front attachment support (standard CT4200)
- Support for sweeper unit and container changing

7.1.1 Path-dependent scattering (1443)

The path-dependent spreader is basically comprised of two components.
1) Speed sensor
   To detect the speed or the path
2) Control PCB (A3)
   To control the spreading quantity

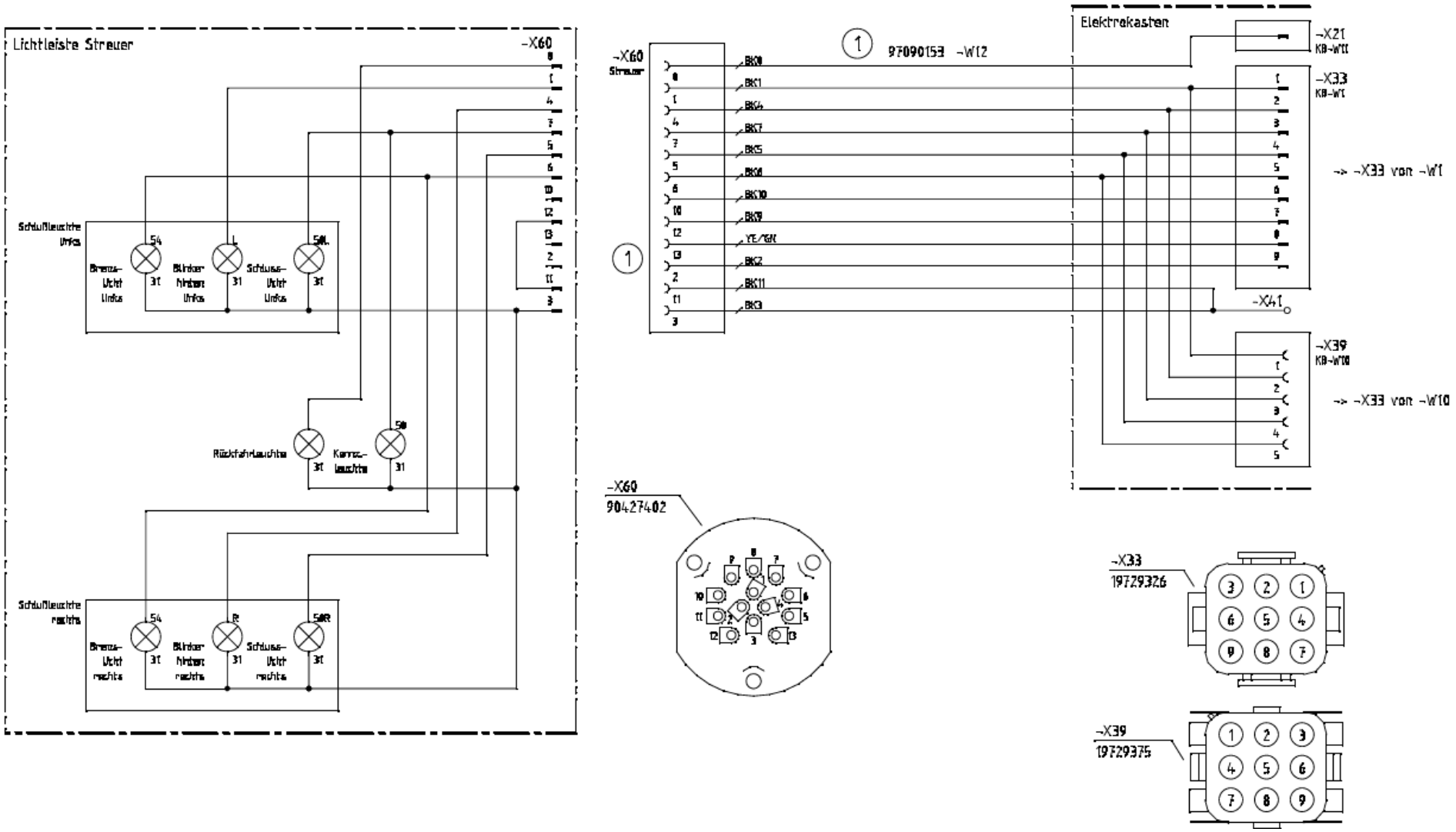
The additionally needed coding plug is delivery of the spreader manufacturer

7.1.1.1 Electrical plan

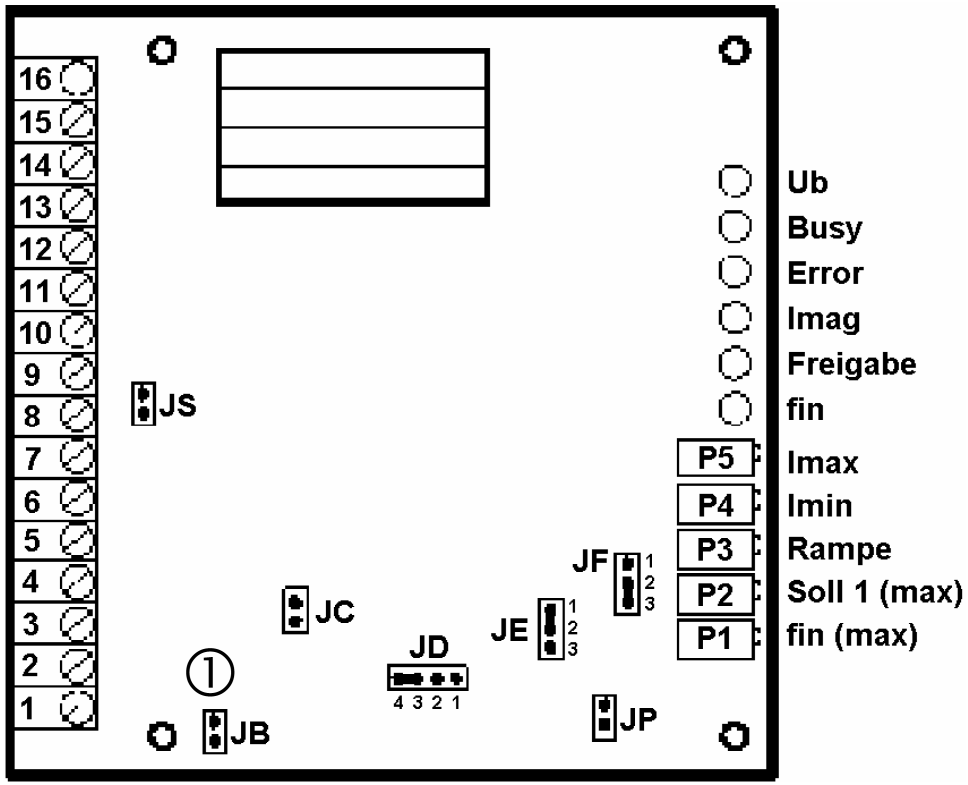


Ref.	Benennung
-A3	Steuergerät
-B11	Tachogeber kpl.
-K20	Relais Lichtmaschine
-R13	Potentiometer 4k7 lin mit Schalter
-R14	Widerstand 1k8
-R15	Widerstand 4k7
-V24	Diode 1A

A3 = Control unit, B11 = Speedometer compl., K20 = Generator relay, R13 = Potentiometer with switch, R14 = Resistor, R15 = Resistor, V24 = Diode


Lichtleiste Streuer
-X60
Schlußleuchte links
Bremslicht links
Blinker hinten links
Schlußlicht links
Schlußleuchte rechts
Bremslicht rechts
Blinker hinten rechts
Schlußlicht rechts
Rückfahrleuchte
Kennzeichenleuchte
Elektrokasten
-X60 Streuer
97090153 -W12
-X21 KB-W11
-X33 KB-W1
-> -X33 von -W1
-X41
-X39 KB-W10
-> -X33 von -W10
-X60 90427402
-X33 19729326
-X39 19729375

7.1.1.2 Control unit (A3 Option path depence spreader control))



Terminal strip
PIN

Trimming potentiometer
P1 to P5

P5 = Adjust max. control current
P4 = Adjust min. control current
P3 = Gradient of control curve
P2 = Trim output signal
P1 = Trim frequence/ voltage converter

A control PCB, supplied as a spare part, is preconfigured. Therefore, readjustment should not be necessary. If the results of spreading are not satisfactory and the cause of the error appears to be the setting on the PCB, a readjustment can be made. The aim of this readjustment is to set the min. (4 l/min) and max.(20 l/min) flow rate for the spreader.

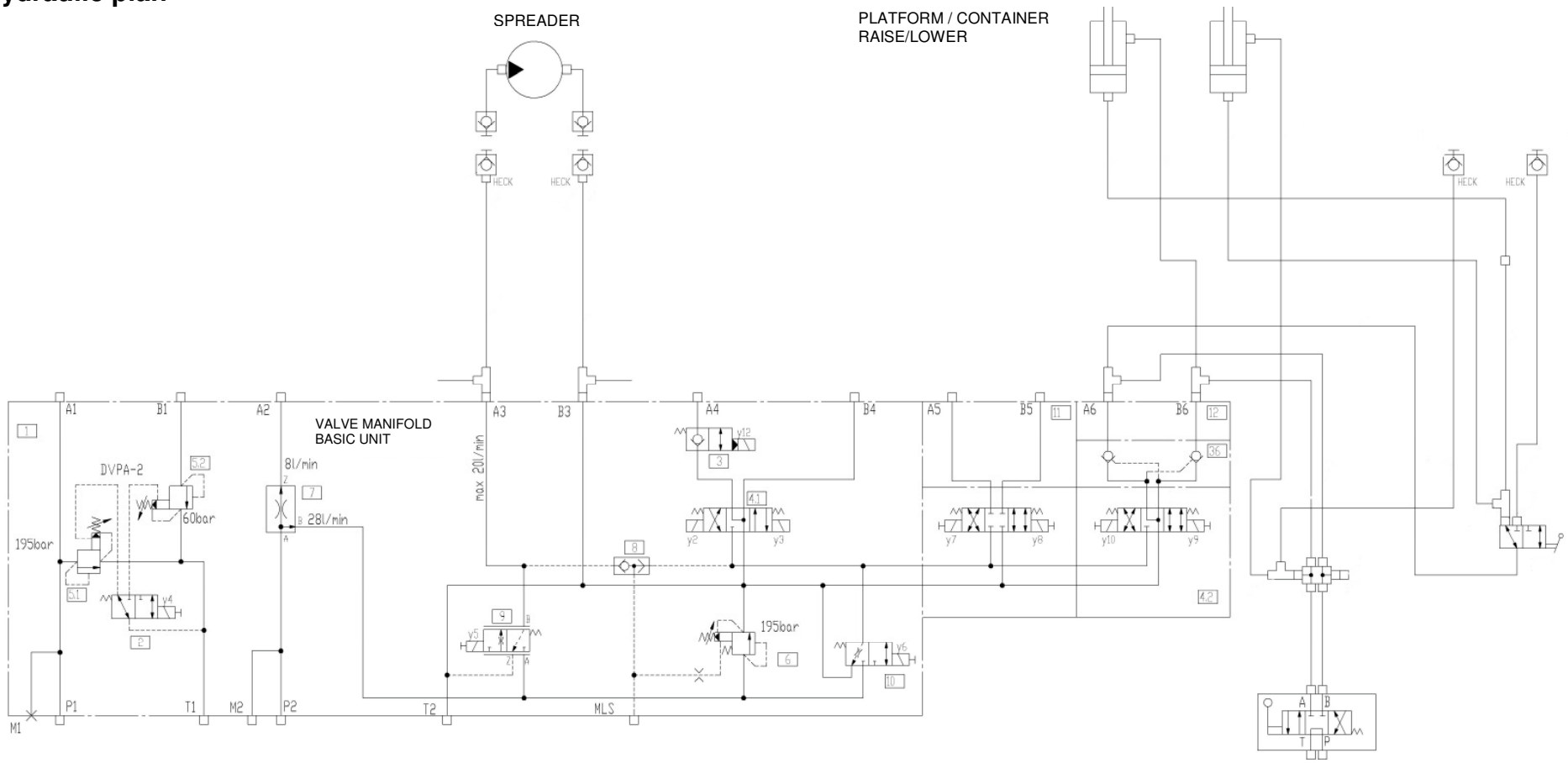
Procedure

1) Jack up the device on one side.
2) Connect the test plug 01144380 to the front attachment device connector X63.
3) Switch on the differential lock.
4) Allow the device to run forwards, set the speed on the mileometer to 12 kph (**ATTENTION** only drive for a short time otherwise the hydraulic system could be damaged**!**)
5) Measure the voltage between A3 PIN4 and A3 PIN8 (the set value is 5.8 V)
6) Mount the jumper on the rear attachment device connector X60 PIN3 on PIN12
7) Measure the voltage between A3 PIN4 and A3 PIN8 again. The value should be identical to the previous one.
8) If the values are not identical, readjust using the trimming potentiometer **P1**.
9) Measure the voltage between A3 PIN11 and A3 PIN8 => 5.8 V (set value)
10) If the values are not identical (5.8 V), readjust using the trimming potentiometer **P2**.
11) Turn the trimming potentiometer **P3** anticlockwise as far as possible.
12) Turn the spreader adjusting potentiometer R13 (driver's cab) anticlockwise as far as possible (min. setting).
13) Measure the current between A3 PIN14 and A3 PIN15.
14) Adjust the current value using trimming potentiometer **P4** so that valve Y5 feeds **4 l/min** (current value measured approx. 780 mA).
15) Turn the spreader adjusting potentiometer R13 (driver's cab) clockwise as far as possible (max. setting).
16) Measure the current between A3 PIN14 and A3 PIN15.
17) Adjust the current value using trimming potentiometer **P5** so that valve Y5 feeds **20 l/min** (current value measured approx. 1060 mA).

The adjustment is thus complete. **ATTENTION** Disconnect the test plug from test connector X63 and the jumper on X60**!**

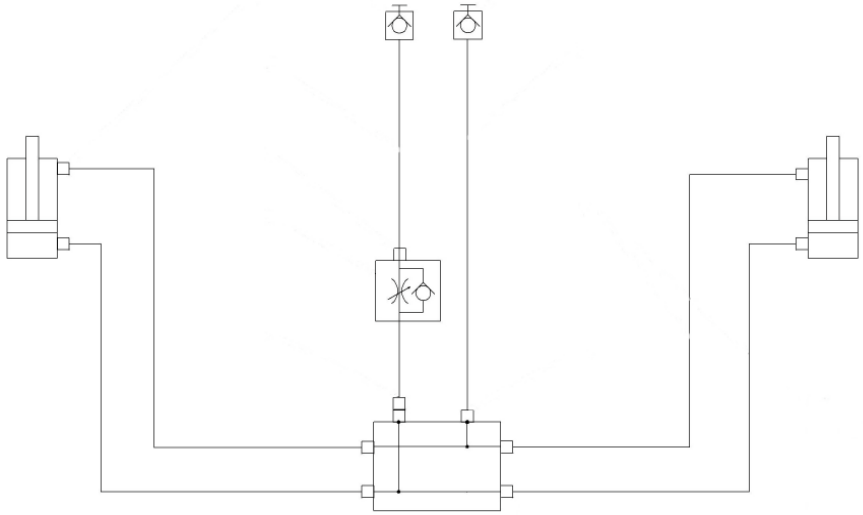
7.1.2 Rear connections

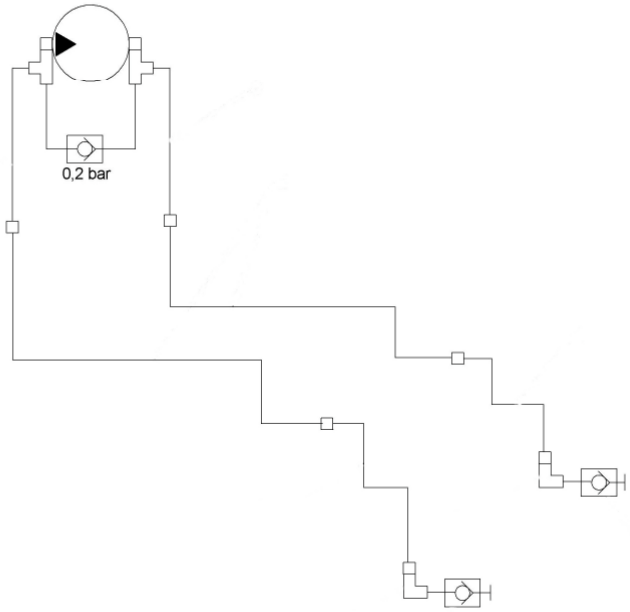
Hydraulic plan



7.2 Grass and leaf vacuum (8380)

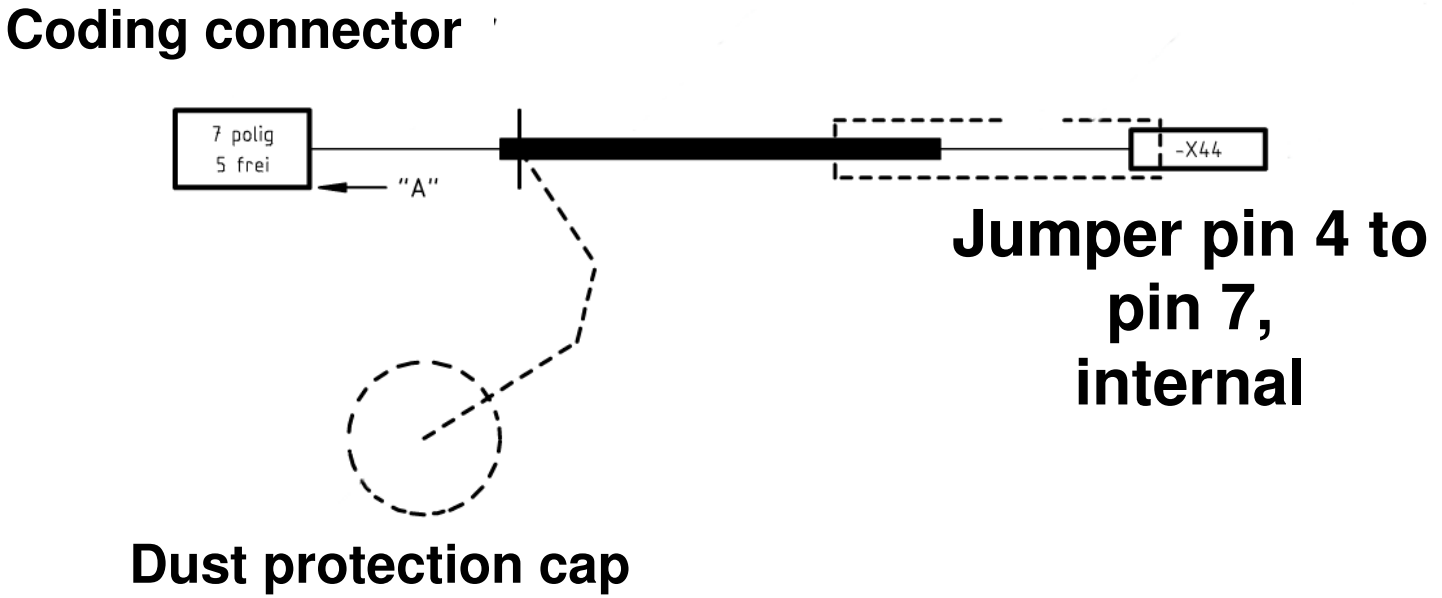
Hydraulic plan





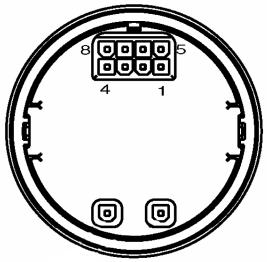
Hydraulic diagram:	Container lifting cylinder	Suction fan
Connection to	Rear connections in FR, right	Rear connections in FR left

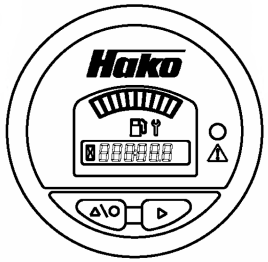
Coding connector



If the vehicle (CM 1200 or CT4200) is not equipped with the multipurpose packet, and thus equipped with the rear attachment device connector X64, the coding connector can also be connected on the front attachment device connector X63. To do this, simply remove the unconnected cable from the grass container.

7.3 Work mileometer (1442)



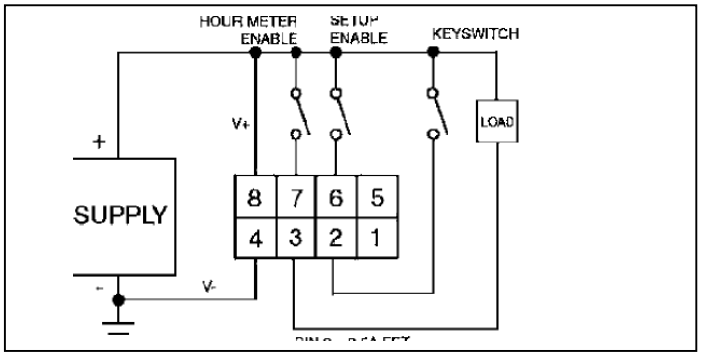


Functions:

Total operating hours counter (1/1 h display)
Total mileage (kilometres)
Work operating hours can be reset (1/10 h display)
Work mileage can be reset (1/10 h display)
Time (24 h format)
Speed (1/10 h display)

- Tank-Reserve optional (LED blinkend und Schaltausgang)

PIN	Function
1	Tank transducer (voltage against GND)
2	Operating voltage 15
3	Switch output against GND
4	Earth 31
5	Speed sensor (PNP according to +12 V)
6	Configuration on (+12 V)
7	Work hours / Mileage on (+12V)
8	Operating voltage 30



Operation

The clock runs as long as voltage is applied to Pin 8 (30) (starting at 00:00). When the operating voltage is applied to Pin 2 (15), the time appears in the 7-segment display. On pressing the left-hand button briefly (< 3 s), the working hours appear, press again and the mileage appears, followed by the total operating hours, then the total mileage and finally the speed. Pressing the button again calls the clock back into the display etc. The work hours, work mileage, total operating hours, total mileage and division factor (refer to configuration) are retained at an Pin 8 or Pin 2 even when no power is supplied.
The total operating hour counter continues to counts as long as voltage is applied to Pin 8 and Pin 2. The tank transducer is then evaluated and the tank content depicted in the bar graph display. In addition, the pulses received at Pin 5 from the wheel motor sensor is divided by a dividing factor and saved as the total mileage.
The speed display indicates the current speed with a delay of 2 s.
These display indicators cannot be adjusted by the operator.

The work hour counter counts when voltage is applied to Pin 7 in addition to Pin 8 and Pin 2. The work mileage counter also counts the pulses divided by the dividing factor at Pin 5.

Select the button depicting a clock (see above) to set the time. Then press the button longer than 3 s until the hour digits flash. The hour setting can then be incremented using the right-hand button.

On reaching the correct digit, press the button to set the minute. When the minute digits flash use the right-hand button to increment the value displayed.

Press the button again to end programming of the time.

This button appears in order to set the work hours and mileage to zero.

Then press both buttons simultaneously for 3 sec until the work hours indicator flashes and a further 3 s until the setting returns to zero.

Setting

To set the dividing factor for the work hours and total mileage counters as well as the speed indicator, a voltage is applied to Pin 8 and Pin 2 (Display on) and to configuration input Pin 6. Press the button longer than 3 s until the four-character dividing factor is displayed and its highest unit flashes. The decimal places 0 to 9 of the dividing factor can then be set analogue to setting the time, using the buttons (select and end) and (increment), beginning at the highest decimal place. The dividing factor corresponds to the number of pulses provided by the speed generator at Pin 5 per 0.1 unit (0.1 km or 0.1 mi). It is set to value 3537 at the factory (km for CM 1200).

If a voltage is applied to Pin 1, the bar graph display is activated and the icon appears:

Voltage at PIN 1	Function
0 V	Bar graph and icon (tank indicator) off
Greater than or equal to 0.5 V	Segment 1 and 2 of the bar graph indicator alternating on / red LED flashing / switching output PIN 3 against GND
Greater than or equal to 1 V	Segment 1 and 2 on in alternation
Greater than or equal to 1.5 V	Segment 1 to 3 on
Greater than or equal to 2 V	Segment 1 to 4 on
Greater than or equal to 2.5 V	Segment 1 to 5 on
Geater than or equal to 3 V	Segment 1 to 6 on
Greater than or equal to 3.5 V	Segment 1 to 7 on
Greater than or equal to 4 V	Segment 1 to 8 on
Greater than or equal to 4.5 V	Segment 1 to 9 on
Greater than or equal to 5 V	All segments on

7.4 High pressure cleaner (1139)