

Service Manual

Wheel loaders

580 / 680



Vehicle model	343-00 / 343-01
Starting serial no.	343 00 0001 / 343 01 0001
Edition	2.0
Order number	1000115796

Documentation

Description		Order no.
Service Manual	De	1000115795
	En	1000115796
	Fr	1000115797
Operation manual	De	1000104342
	En	1000104343
	Fr	1000104344
Spare parts list	Model 343-00	1000104356
	Model 343-01	1000104357

Legend

Edition	Issued
1.0	01/2004
1.1	02/2004
2.0	02/2005

Copyright – 2004 Kramer-Werke GmbH, Überlingen

Printed in Germany

All rights reserved

No part of this publication may be reproduced, translated or used in any form or by any means – graphic, electronic or mechanical including photocopying, recording, taping or information storage or retrieval systems –without prior permission in writing from Kramer-Werke GmbH.

The cover features the vehicle with possible optional equipment.



kramerALLRAD®

Kramer-Werke GmbH

Postfach 10 15 63

D-88 645 Überlingen

Document: SERV-HB 343-00 En

Order no.: 1000115796

Edition: 2.0

**Table of contents****Operation**

Important information on this service manual	1-1
Type labels and component numbers	1-2
Vehicle overview	1-4
Inside of cab: overview	1-5
Instrument panel, multifunctional lever and drive lever: overview	1-6

Specifications

Frame	2-1
Engine	2-1
Power train	2-2
Axles	2-3
Brakes	2-3
Steering	2-3
Work hydraulics	2-4
Pilot control	2-4
Additional control circuit + 4th control circuit (option)	2-4
Loader unit	2-5
Electric system	2-6
Fuse box on left and right of steering column	2-6
Main fuse box with relays	2-7
Relays	2-8
Tyres for model 343-00 (580)	2-9
Tyres for model 343-01 (680)	2-9
Weights	2-10
Noise levels	2-10
Vibration	2-10
Tightening torques	2-11
General tightening torques	2-11
Specific tightening torques	2-11
Dimensions model 343-00 (580)	2-12
Dimensions model 343-01 (680)	2-13

Maintenance

Fluids and lubricants	3-1
Maintenance label	3-2
Maintenance plan models 343-00/343-01 (overview)	3-4
Maintenance kits	3-7
Introduction	3-7
Fuel system	3-8
Specific safety instructions	3-8
Refuelling	3-8
Stationary fuel pumps	3-8
Diesel fuel specification	3-8
Bleeding the fuel system	3-9
Replacing the fuel filter	3-9
Cleaning the fuel pump screen filter	3-10
Engine lubrication system	3-11
Checking and filling up the oil level	3-11
Changing engine oil	3-12
Replacing the engine oil filter cartridge	3-13
Engine and hydraulics cooling system	3-14
Specific safety instructions	3-14
Cleaning the oil cooler	3-14
Air filter	3-15
Check once a week of air filter contamination	3-15



Functional check once a week of the dust valve	3-16
Replacing the filter cartridge	3-16
V-belt	3-17
Checking the V-belt tension	3-17
Retightening the V-belt	3-17
Gearboxes and axles	3-18
Checking the oil level in the gearbox	3-18
Filling up the gearbox oil	3-19
Changing the gearbox oil	3-20
Checking the oil level in the rear axle differential	3-21
Filling up the oil level	3-21
Changing the oil	3-21
Checking the oil level in the front axle differential	3-22
Filling up the oil level	3-22
Changing the oil	3-22
Planetary drives: checking and filling up the oil level	3-23
Changing the oil	3-23
Hydraulic system	3-24
Specific safety instructions	3-24
Changing hydraulic oil	3-25
Changing the reflux filter (hydraulic oil tank)	3-26
Replacing the hydraulic oil filter (drive)	3-27
Checking the hydraulic oil level	3-28
Filling up the hydraulic oil	3-28
Monitoring the hydraulic oil reflux filter	3-28
Important information for the use of biodegradable oil	3-29
Checking hydraulic pressure lines	3-30
Specific safety instructions	3-30
Lubrication work	3-31
Lubricating the rear axle oscillation-type bearing	3-31
Lubricating the planetary drive bearing	3-31
Lubricating the pivots on the loader unit	3-32
Maintenance of implements	3-32
Maintenance of the brake system	3-33
Specific safety instructions	3-33
Checking/filling up the brake fluid level	3-33
Tyre maintenance	3-34
Checks once a day	3-34
Checks once a week	3-34
Changing wheels	3-35
Disassembly	3-35
Fitting the wheels	3-35
Electric system	3-36
Specific safety instructions	3-36
Service and maintenance work at regular intervals	3-37
Cables, bulbs and fuses	3-37
Alternator	3-37
Battery	3-37
General maintenance work	3-38
Cleaning	3-38
General instructions for all areas of the vehicle	3-38
Cleaning inside the cab	3-39
Cleaning the outside of the vehicle	3-39
Cleaning the engine compartment	3-39
Screw connections	3-39
Pivots and hinges	3-40



Heating	3-40
Cleaning the dust filter of the heating system	3-40
Engine	
Engine BF4M 2011: overview	4-1
Engine oil cooling	4-2
Fuel system	4-3
Checking and adjusting valve tip clearance	4-4
Replacing the fuel injection pump	4-5
Setting charge-air pressure	4-10
Charge-pressure dependent full-load stop	4-11
Removing/mounting the cylinder head	4-12
Sealing the bleeder valve	4-15
Intake/exhaust manifold	4-15
Engine trouble	4-15
Power train	
Variable displacement pump (20 – 40 kph)	5-1
Hydraulic motor – control element (20 kph)	5-2
Hydraulic motor – hydraulic connections (20 kph)	5-3
Power train diagram (20 kph)	5-4
ECO speed – hydraulic motor with changeover valve	5-5
Top view	5-5
External solenoid valves and test port – ECO speed hydraulic motor	5-6
ECO speed with changeover valve: diagram	5-7
Test report with changeover valve models 343-00 (580), 343-01 (680)	5-8
Towing and transporting the vehicle	5-9
Safety instructions	5-9
Towing	5-9
Check and adjustment instructions with changeover valve	5-10
Adjusting boost pressure	5-10
Checking the hydraulic resistance curve	5-11
Checking high pressure	5-12
Setting engine droop	5-13
Setting control initiation on the hydraulic motor (20 kph)	5-14
Setting control initiation on the hydraulic motor (40 kph ECO-Speed)	5-15
Setting wheel revs (20 – 40 kph version)	5-16
ECO speed – hydraulic motor without changeover valve	5-17
Top view	5-17
Test report without changeover valve models 343-00 (580), 343-01 (680)	5-18
Electric contact – variable displacement pump –	
Y4 Eco speed gearbox (without changeover valve)	5-19
Hydraulic pump proportional valves	5-19
Y4 Eco speed gearbox at 20 kph	5-19
Y4 Eco speed gearbox at 40 kph	5-19
Check of proportional valves by means of current measurement	5-20
Towing and transporting the vehicle	5-21
Safety instructions	5-21
Towing	5-21
Check and adjustment instructions without changeover valve	5-22
Adjusting boost pressure	5-22
Checking high pressure	5-23
Setting engine droop	5-24
Adjustment: Qmax to Qmin on ECO speed hydraulic motor	5-25



ECO speed without changeover valve: diagram	5-26
Adjustment: Qmin to Qmax on ECO speed hydraulic motor	5-27
Setting cardan shaft revs 30 – 40 kph	5-28
Operation: drive electronics (SUSMIC)	5-29
General	5-29
Connecting the SUSMIC-DIA 1	5-29
Diagnosis explained (LED)	5-29
SUSMIC-DIA 1 explained	5-30
Procedures (sensor)	5-30
Menu numbers	5-30
Command numbers	5-30
Error table	5-31
Enabling the SUSMIC-DIA 1	5-32
Disabling the SUSMIC-DIA 1	5-32
Setting the inching pedal sensor	5-33
Sensor error procedure: mode of function	5-34
Checking forwards-reverse control (sensor number 02)	5-35
Checking the rev sensor (sensor number 00)	5-36
Checking the inching pedal sensor (sensor number 01)	5-37
Checking the crawler gear switch signal (sensor number 08)	5-38
Checking drive current resistance (sensor numbers 03, 04 and 05)	5-39
Axles	
Type label – axle	6-1
Front axle screw connections	6-2
Rear axle screw connections	6-3
Drain, fill and check plug – front axle	6-4
Drain, fill and check plug – rear axle	6-5
Tightening torques (Nm) – front axle	6-6
Tightening torques (Nm) – rear axle	6-7
Sealing work	6-8
Input flange – front axle: sealing work	6-8
Input flange – rear axle: sealing work	6-9
Brake cylinder – front axle	6-10
Planetary carrier – planetary drive: sealing work	6-13
Planetary carrier – axle tube: sealing work	6-16
Sealing ring in axle tube: sealing work	6-18
Cylinder – differential lock: sealing work	6-21
Differential lock: overview	6-22
Brakes	
Brake circuit	7-1
Brake diagram	7-2
Service brake	7-3
Important information on the brake system	7-3
Bleeding the brake system with bleed equipment	7-3
Handbrake: overview	7-4
Steering	
Steering circuit	8-1
Steering circuit	8-2
Steering system adjustment	8-3
Function	8-3
Checking a steering ram	8-3
Checking the check block	8-3
Steering valve: overview	8-4
Checking the steering valve	8-4



Hydraulic ports on servostat	8-5
Pressure relief valve – servostat: settings	8-5
Setting the steering sensors	8-5
Front/rear axle steering ram	8-6
Hydraulic system	
Test report model 343-00 (580), 343-01 (680)	9-1
Control valve connections: overview	9-2
Cooling	9-3
Control valve: design	9-4
Pilot control unit: design	9-5
Valve block connections: overview	9-6
Pilot control circuit	9-7
Work hydraulics circuit	9-8
Load stabiliser circuit with hose burst valve	9-9
Load stabiliser: circuit diagram	9-10
Load stabiliser with hose burst valve: circuit diagram	9-11
Load stabiliser with hose burst valve: ports	9-12
Hose burst valve circuit	9-13
Hose burst valve circuit	9-14
4th control circuit (front/rear)	9-15
4th control circuit (front/rear) circuit	9-16
Lift ram: sealing work	9-17
Tilt ram: sealing work	9-18
Control ram (quickhitch frame): sealing work	9-19
Work hydraulics diagram: legend	9-20
Work hydraulics diagram	9-21
Electric system	
Ohm's Law (current, voltage, resistance); power	10-1
Measuring equipment, measuring methods	10-1
Terminal description	10-3
Cable colour coding	10-10
Other colour codes (identical to IEC 757, edition 1983)	10-11
Relays	10-11
Use, mode of function	10-11
Terminal description on relay	10-11



Electric units	10-12
Fuse box on left and right of steering column	10-12
Main fuse box with relays	10-13
Relays: overview	10-14
Steering electronics	10-15
Instrument panel, fuse box, relays: overview	10-16
Legend for wiring diagram	10-18
Wiring diagram	10-19
Legend for wiring harness 1000102654: engine – frame	10-20
Wiring harness: 1000102654: engine – frame	10-21
Legend for wiring harness 1000102655: cab	10-22
Wiring harness 1000102655: cab	10-23
Wiring harness 1000102656: control lever base (option)	10-24
Wiring harness 1000114432: control lever base (standard)	10-25
Wiring harness 1000107783: steering-column control lever	10-26
Wiring harness 1000104307: additional control circuit	10-27
Wiring harness 1000110410: rear lights/clearance lights	10-28
Wiring harness 1000103927 (joystick)	10-29
Electronics between joystick and wiring harness 1000103927	10-29
Wiring harness 1000105214: rotating beacon (option)	10-30
Wiring harness 1000102657: front working light (option)	10-31
Wiring harness 1000103378: load stabiliser (option)	10-32
Wiring harness 1000105007: solenoid valve – load stabiliser (option)	10-33
Wiring harness 1000109524: inching sensor	10-34
Wiring harness 1000104756: crawler gear – potentiometer	10-35
Wiring harness 1000114602: additional control circuit (option)	10-36
Wiring harness 1000102659: bucket repositioning (option)	10-37
Wiring harness 1000108761: lock for long-haul travel – control lever	10-38
Wiring harness 1000108762: lock for long-haul travel – instrument panel	10-39
Wiring harness 1000102660: numberplate light (option)	10-40
Wiring harness 1000110000: air-suspension driver's seat (option)	10-41
Wiring harness 1000108730: air conditioning (option)	10-42
Plug – SUSMIC	10-43
Relay assignment	10-44
Plug and socket connection: steering electronics – steering-column control lever	10-45
Plug and socket connection: fuse box and relay (left)	10-46
Plug and socket connection: fuse box and relay (right)	10-47
Plug and socket connection: cab	10-48
Plug and socket connection: instrument panel	10-48
Plug and socket connections: load stabiliser, speedometer (40 kph), front socket	10-49

Operation



1 Operation

1.1 Important information on this service manual

This service manual contains important information on how to service your vehicle safely, correctly and economically. Therefore, it aims not only at new staff, but it also serves as a reference for experienced users. It helps to avoid dangerous situations and reduce repair costs and downtimes. Furthermore, the reliability and the service life of the vehicle will be increased by following the instructions in the operation manual.

Careful and prudent working is the best way to avoid accidents!

Operational safety and readiness of the vehicle do not only depend on your skill, but also on maintenance and service of the vehicle.

Insist on using original Kramer spare parts when carrying out maintenance and repair work. This ensures operational safety and readiness of your vehicle, and maintains its value.

Your KramerAllrad dealer will be pleased to answer any further questions regarding the vehicle or the service manual.

Abbreviations/symbols

- This symbol stands for a list
 - Subdivision within lists or an activity. Follow the steps in the recommended sequence

 This symbol requires you to carry out the activity described

 This symbol marks the passages in the text describing the effects or results of an activity

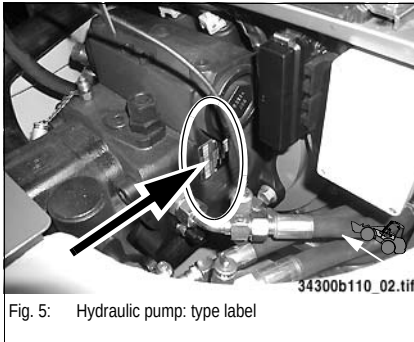
n. s. = not shown

"Option" = optional equipment

Stated whenever controls or other components of the vehicle are installed as an option.

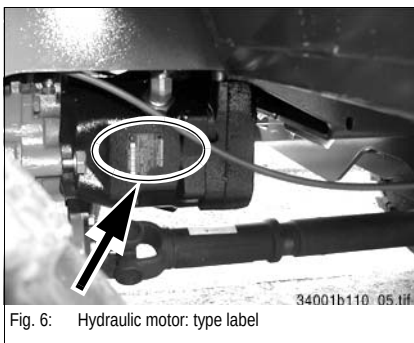


 This symbol shows the driving direction – for better orientation in figures and graphics.



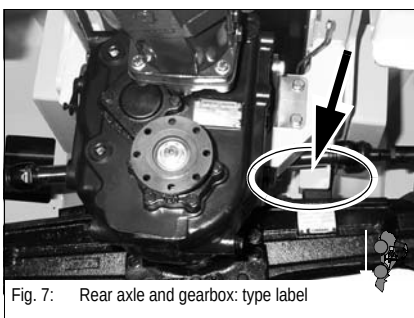
Hydraulic pump number

The type label (arrow) is located on the hydraulic pump housing (next to where the pump is mounted on the diesel engine).



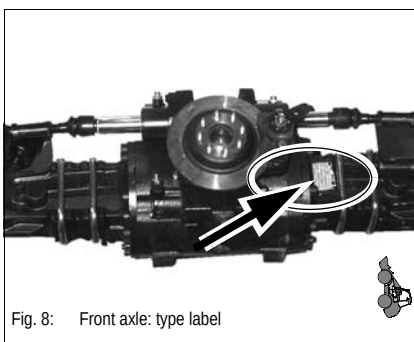
Hydraulic motor number

The type label (arrow) is located above the cardan shaft, on the right of the hydraulic motor.



Rear axle number

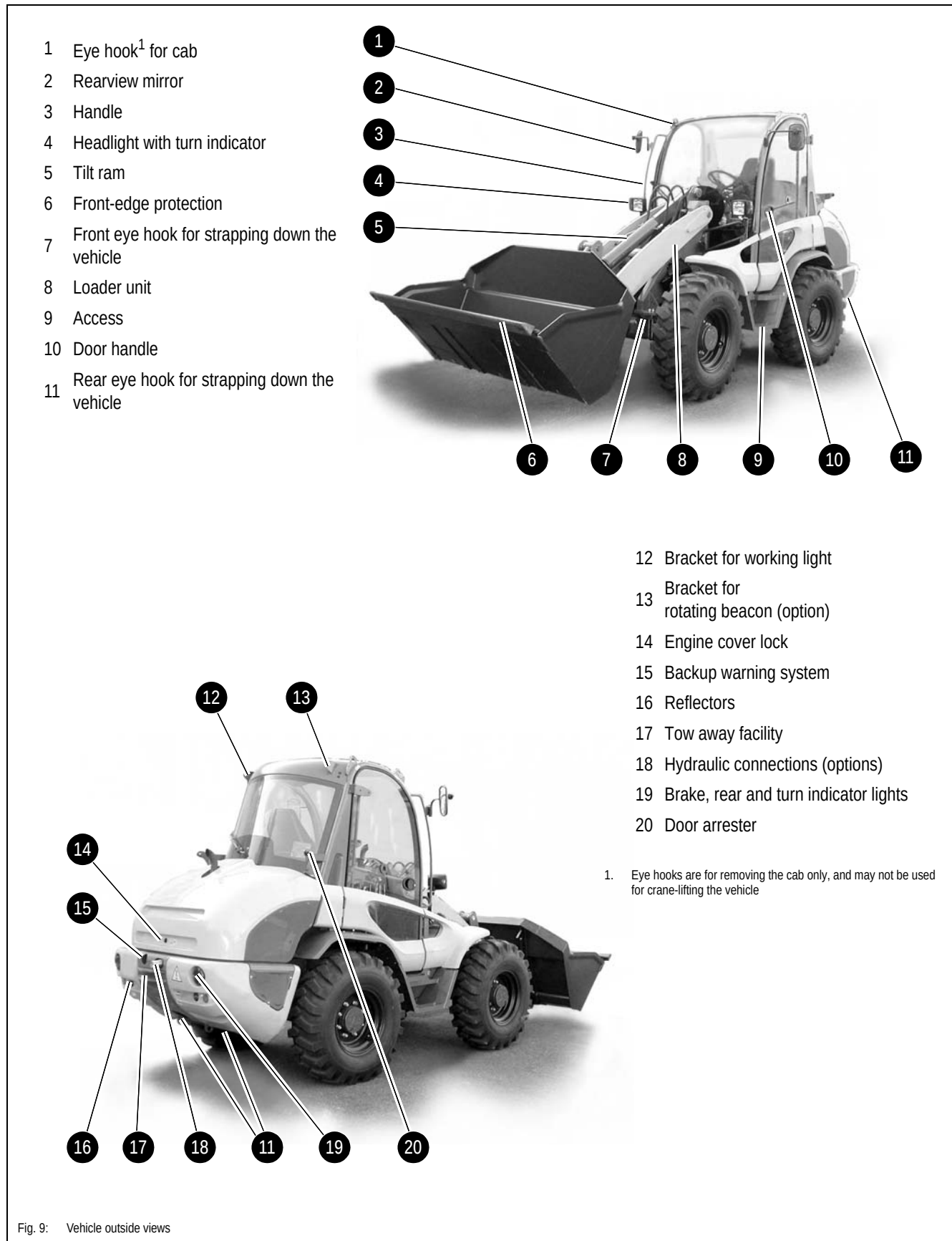
The type label (arrow) is located on the inside of the axle tube, on the left in driving direction (arrow).



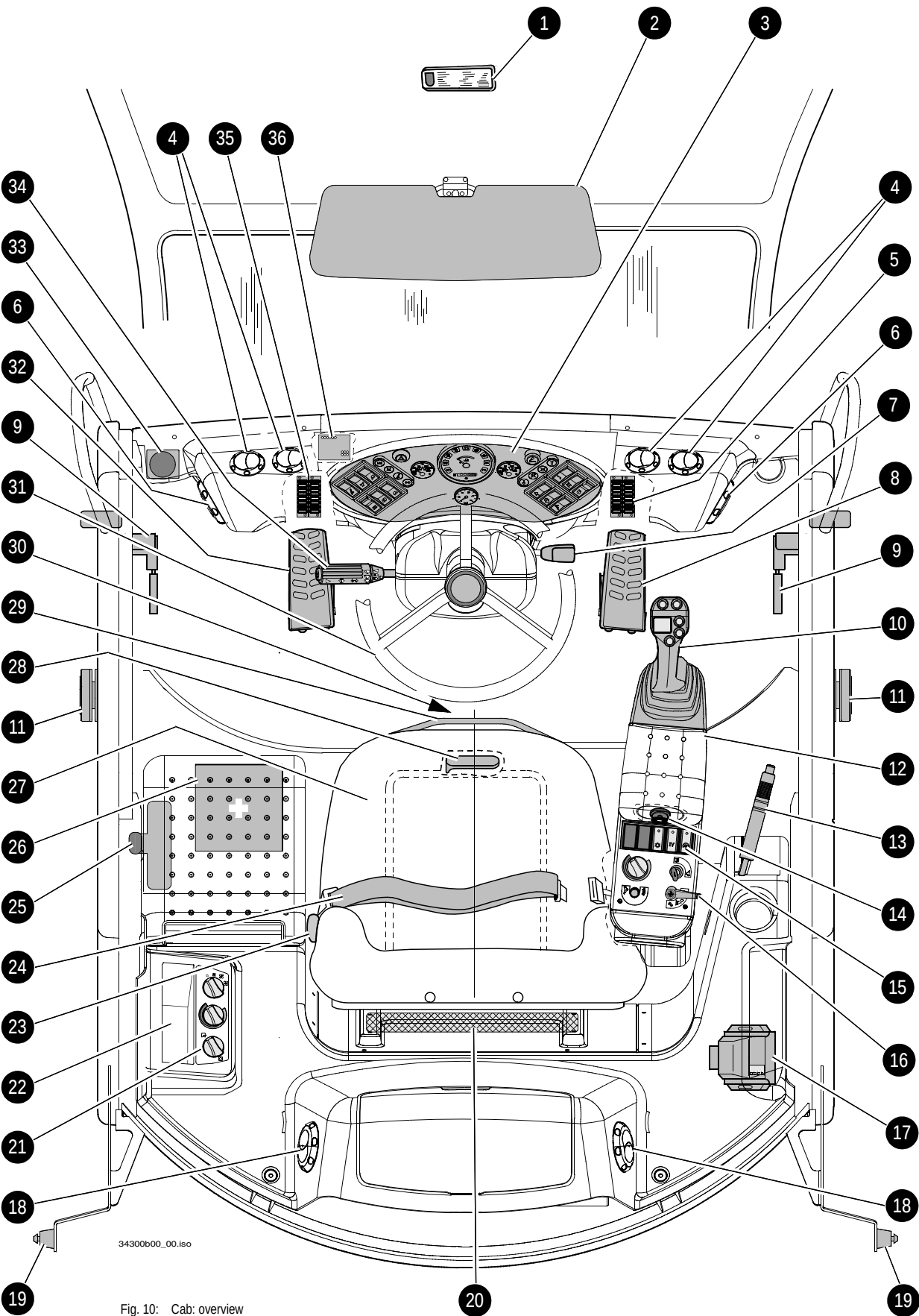
Front axle number

The type label (arrow) is located on the inside of the axle tube, on the right in driving direction (arrow).

1.3 Vehicle overview



1.4 Inside of cab: overview



34300b00_00.iso

Fig. 10: Cab: overview

Pos.	Description
Roof console	
1	Interior light
2	Sun visor
Cab	
3	Instrument panel
4	Air vent – front window
5	Fuse box (right)
6	Air vent – leg room
7	Steering column adjustment
8	Accelerator pedal
9	Door locks
10	Control lever – loader unit
11	Cab door arrester
12	Control lever base
13	Handbrake lever
14	Preheating start switch
15	Switch panel in control lever base
16	Lock for control lever 10 (driving on public roads)
17	Drive electronics (Susmic)
18	Air vent – rear window
19	Bracket – cab door arrester
20	Storage pocket for operation manual
21	Side console
22	Prepared installation for radio (option)
23	Backrest adjustment lever
24	Seat belt
25	Tank – washer system
26	Fixture – first-aid kit
27	Driver's seat
28	Lever – weight adjustment
29	Lever – horizontal seat adjustment
30	Air vent – leg room
31	Hydrostatic steering
32	Service brake pedal (hydrostatic)/inching
33	Brake fluid tank
34	Multifunctional lever
35	Fuse box (left)
36	Steering electronics

Inside of cab: overview

1.5 Instrument panel, multifunctional lever and drive lever: overview

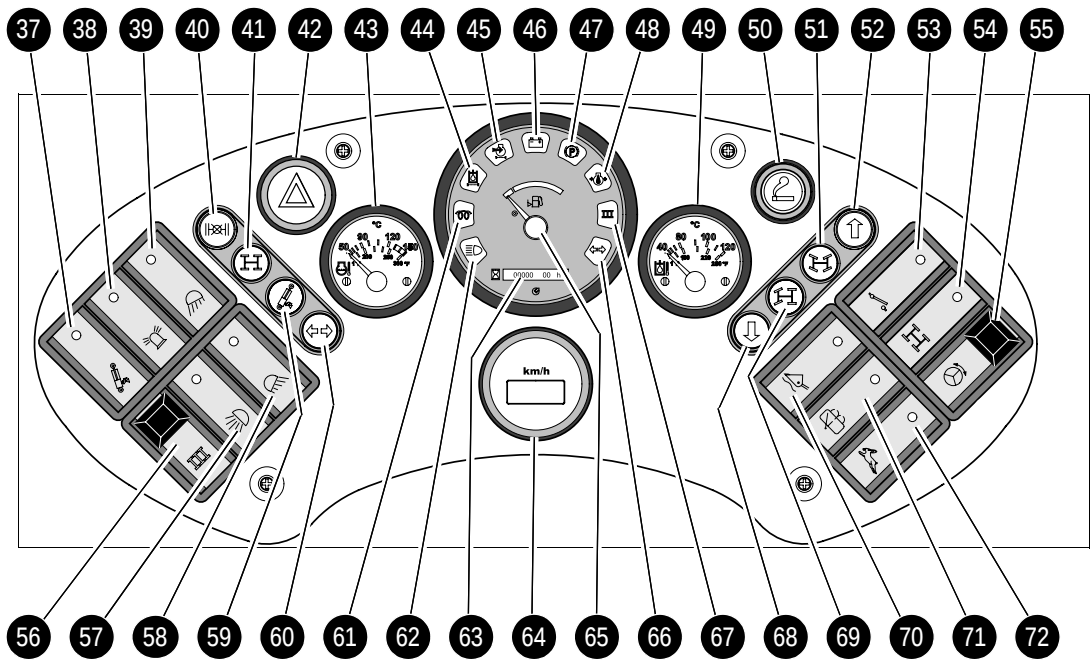


Fig. 11: Instrument panel: overview

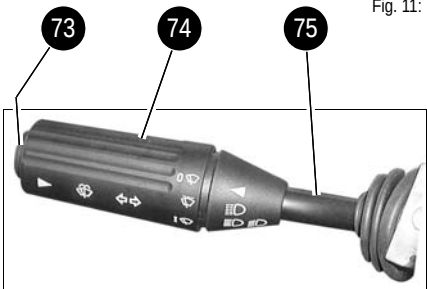


Fig. 12: Multifunctional lever

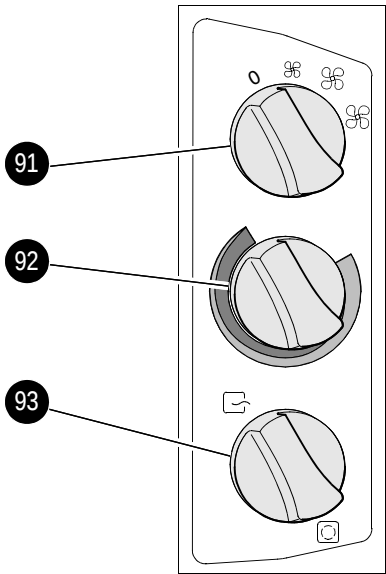


Fig. 13: Switch panel for heating

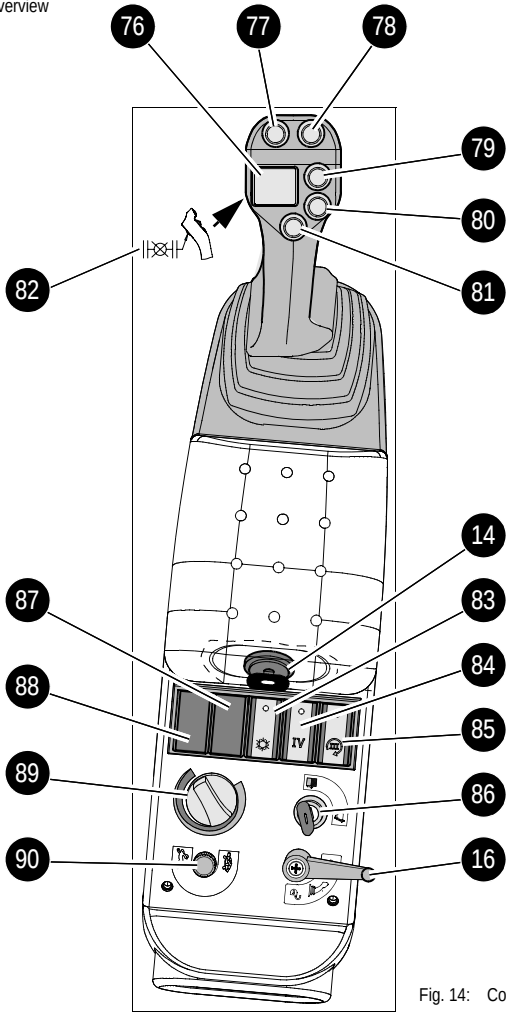


Fig. 14: Control lever base

Pos.	Description
Instrument panel	
37	Switch – quickhitch lock (option)
38	Switch – rotating beacon (option)
39	Switch – front working light (option)
40	Telltale (green) – differential lock
41	Telltale (red) – steering synchronisation
42	Switch – hazard warning system
43	Temperature indicator – diesel engine
44	Telltale (red) – hydraulic oil filter
45	Telltale (yellow) – air filter
46	Telltale (red) – alternator charge function
47	Telltale (red) – handbrake
48	Telltale (red) – engine oil pressure
49	Temperature gauge – hydraulic oil
50	Socket/cigarette lighter
51	Telltale (green) – 4 wheel steering
52	Telltale (green) – FW driving direction
53	Switch – front socket for electrically operated implements (option)
54	Tip switch – steering synchronisation
55	Switch with lock – 4 wheel/front axle steering
56	Switch with lock – 3rd control circuit
57	Switch – lights
58	Switch – rear working light
59	Telltale (yellow) – hose burst valve
60	Telltale (green) – right/left turn indicator
61	Telltale (yellow) – cold starter
62	Telltale (blue) – high beam
63	Hour meter
64	Speedometer – high speed (option)
65	Fuel level indicator
66	Telltale (green) – right/left turn indicator for rear implements
67	Telltale (red) – 3rd control circuit for continuous operation
68	Telltale (green) – RV driving direction
69	Telltale (green) – front axle steering (high speed option)
70	Switch – load stabiliser (option)
71	Switch – rear wiper with tip switch for wiper water
72	Switch – high speed (option)



Pos.	Description
	Multifunctional lever
73	Tip switch – horn
74	Rotary switch and tip switch – front wiper, washer pump
75	Lever – turn indicators, high beam, horn
	Control lever
76	Toggle switch – speed range selection ¹
77	Tip switch – unlock 3rd control circuit (electric operation)
78	Tip switch – lock 3rd control circuit (electric operation)
79	Tip switch – not assigned
80	Tip switch – not assigned
81	Tip switch – neutral speed range ²
82	Tip switch – differential lock
	Control lever console
83	Switch – air conditioning (option)
84	Switch – 4th control circuit (option)
85	Switch – 3rd control circuit for continuous operation (option)
86	Lock – tilt ram (option)
87	Not assigned
88	Not assigned
89	Rotary switch – auxiliary heating (option)
90	Rotary switch – crawler gear potentiometer (option)
	Left side console
91	Rotary switch – heater fan
92	Rotary switch – heater fan temperature regulation
93	Rotary switch – fresh air/recirculated air

1. Joystick can also be equipped with switch for selection of driving direction

2. Tip switch not fitted if joystick is equipped with switch (neutral position in switch) for selection of driving direction



Specifications



2 Specifications

2.1 Frame

Sturdy steel sheet frame, rubber-mounted engine

2.2 Engine

Engine	Model 343-00 (580)	Model 343-01 (680)
Product	Deutz diesel engine	
Model	BF4M 2011	
Design	In line	
No. of cylinders	4	
Displacement	3109 cm ³	
Bore and stroke	94 x 112 mm	
Compression ratio	1:17.5	
Output (as per ISO 9249)	56 kW/76 DIN HP @ 2300 rpm	
Max. torque	270 Nm @ 1600 rpm	
Specific minimum fuel consumption	210 g/kWh	
Fuel injection system	Direct fuel injection	
Firing order	1 – 3 – 4 – 2	
Starting aid	Glow plug	
Max. inclined position (engine no longer supplied with oil):	Max. lateral left/right inclination: 30°/ 57% Max. uphill/downhill inclination: 30°/ 57% Observe tilting limit of the vehicle!	
Oil pressure	3.0 – 4.5 bar @ 2300 rpm	
Valve tip clearance (engine at cold temperature)	Intake valve 0.3 mm Exhaust valve 0.5 mm	



2.3 Power train

Variable displacement pump		
Design		Automotive, infinitely variable hydrostatic axial-piston gearbox
Displacement		0 – 74 cm ³ /rev
Max. service pressure Δp		450 bar
Starting revs		1050 – 1150 rpm @ 50 bar HP
Droop		2250 ± 100 rpm @ 400 bar HP
Boost pump:		
Design		Internal gear pump
Displacement		13 cm ³ /rev
Charging/boost pressure		30 bar @ 1500 rpm
Control		Speed-sensitive, hydraulic displacement adjustment with pressure cut-off
Driving direction		Electrohydraulic control
Inching		Electric (potentiometer)
Variable displacement motor		
Design		Axial piston motor (swash plate design)
Capacity	Standard	37.3 to 80 cm ³ /rev
	High speed (option)	54.7 to 233 cm ³ /rev
Drive speed	Standard	1st speed: 0 – 9.3 kph, FW and RV 2nd speed: 0 – 20 kph, FW and RV
	High speed (option)	1st speed: 0 – 9.3 kph, FW and RV 2nd speed: 0 – 40 kph, FW and RV
Pushing power		41.0 kN



2.4 Axles

Front axle (with 100% differential lock)	
Design	Planetary drive steering axle, rigid screw connection with frame
King-pin inclination	7°
Camber	1.5°
Steering angle	40°
Toe-in	0 mm
Track width	1475 mm
Rear axle (with 100 % differential lock)	
Design	Oscillating planetary drive steering axle
King-pin inclination	7°
Camber	1.5°
Total oscillation angle	+/- 9°
Steering angle	40°
Toe-in	0 mm
Track width	1475 mm

2.5 Brakes

Service brake	
Design	Foot-operated, hydraulic multi-disc brake + hydrostat
Location	Front axle, power train (rear axle)
Effect	On both axles via cardan shaft
Brake fluid	Special hydraulic fluid based on basic mineral oil – see <i>Engine/vehicle fluids and lubricants</i> on page 5-25
Handbrake	
Design	Manual, mechanical disc brake
Location	Front axle input

2.6 Steering

Steering	
Design	Hydrostatic 4 wheel steering with emergency steering features
Steering mode	1 – 4 wheel steering 2 – Front axle steering High speed version: 2nd speed allows for front axle steering only!
Assemblies	Hydraulic pump, servostat with safety valves, 1 steering ram per axle, electronically synchronised
Max. pressure of hydraulic lines	175 – 180 bar
Hydraulic pump	Gear pump Displacement 13 cm ³ /rev
Maximum steering angle	±40°

Specifications



kramerALLRAD®

2.7 Work hydraulics

	Model 343-00 (580)	Model 343-01 (680)
Hydraulic pump	Gear pump	
Displacement	38 cm ³ /rev 84 litres/min @ 2300 rpm	
Control valve	3-fold pilot control	
Max. service pressure	220 bar	
Secondary pressure limiting	Tilt ram	Rod side 270 bar Bottom side 100 bar
	Lift ram	Bottom side 300 bar
Filter	Reflux filter	

2.8 Pilot control

Pilot control pump = boost pump of hydraulic pump	
Displacement	13 cm ³ /rev
Charging/boost pressure	30 bar @ 2300 rpm
Pilot control unit	
Joystick	Four-way lever – control of lift and tilt rams Electric control of lock ram or implements via tip switches
Locked via stop cock with four-way lever and switch (electric system)	Lock against unintentional operation (for long-haul travel and transport)

2.9 Additional control circuit + 4th control circuit (option)

Additional control circuit + 4th control circuit	
Hydraulic pump displacement:	38 cm ³ /rev ≡ 80 l/min @ 2300 rpm
Max. service pressure	240 bar
Front hydraulic ports	
Pressure line:	1 x nw 16 (red)
Unpressurised reflux:	1 x nw 25 (blue)
Rear hydraulic ports	
Pressure line:	1 x nw 16 (red)
Unpressurised reflux:	1 x nw 25 (blue)



2.10 Loader unit

Loader unit with bucket ^{1, 2}	580 (model 340-01)	680 (model 341-01)
Bucket capacity	0.95 m³ according to ISO	1.05 m³ according to ISO
Tipping load	3590 kg	3960 kg
Payload	1710 kg	1890 kg
Bucket width	1950 mm	2050 mm
Dump height	2520 mm	2660 mm
Pin height	3270 mm	3400 mm
Dump reach	750 mm	765 mm
Scraping depth	53 mm	51 mm
Tilt-back angle	50°	
Dump angle	45°	
Breakout force (lift ram)	40.6 kN	
Breakout force (tilt ram)	38.9 kN	41.3 kN
Fork arms (payloads stated for 500 mm load distance)		
Payload, safety factor 1.25:	2400 kg	
Payload, safety factor 1.67:	1790 kg	
Lift height	3050 mm	3150 mm
Movable payload in transport position (safety factor 1.25):	2900 kg	
Movable payload in transport position (safety factor 1.67):	2100 kg	

1. Model 343-00 with tyres 14.5-20
Model 343-01 with tyres 16/70-20
2. Model 343-00 with standard bucket 1000096385
Model 343-01 with standard bucket 1000096390



Specifications

2.11 Electric system

Electric system	
Alternator	12 V 95 A
Starter	12 V 2.3 kW
Battery	12 V 72 Ah
Socket	15 A

Fuse box on left and right of steering column

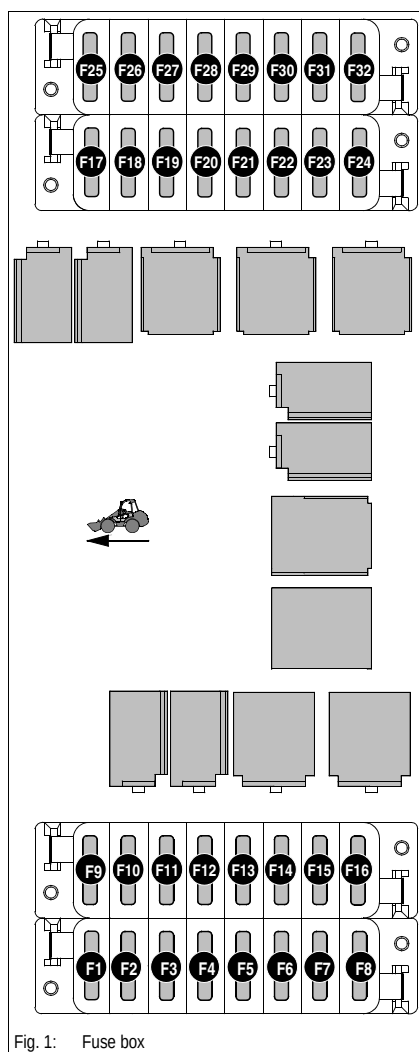


Fig. 1: Fuse box

No.	Rated current (A)	Protected circuit
F1	3	Control lever, reverse driving relay, differential lock relay, forwards driving direction telltale, reverse driving direction telltale
F2	5	Switching relay: front implements, load stabiliser, 3rd control circuit, backup warning system, reversing light
F3	3	Front and rear axle sensor
F4	15	Switching relay wiper 1st/2nd speed, intermittent wipe relay, front wiper, washer pump, horn
F5	15	Right/left low beam, right/left high beam
F6	10	Rear wiper, washer pump
F7	7.5	Brake lights
F8	3	Hour meter, hydraulic temperature indicator, coolant temperature indicator, fuel level indicator, speedometer Telltale: Handbrake, air filter, 3rd control circuit, engine oil pressure, hose burst valve, hydraulic oil filter, alternator
F9	10	Unlock/lock solenoid valve, front socket, solenoid valve differential lock
F10	5	Cutoff solenoid
F11	7.5	Turn indicators
F12	5	Solenoid valve high speed, steering electronics, switch 1st/2nd speed Solenoid valve 4 wheel steering/front axle steering Telltale: 4 wheel steering, front axle steering, synchronism
F13	25	Heater fan, magnetic coupling compressor
F14	10	Susmic (drive electronics)
F15	3	Safe load indicator, load sensor Switching relay: Retract/extend telescopic unit, front socket bucket repositioning, radio
F16	7.5	Solenoid valve: Retract/extend telescopic unit, quickhitch lock, tilt ram lock
F17	7.5	High beam (right)
F18	7.5	High beam (left)
F19	7.5	Low beam (right)



No.	Rated current (A)	Protected circuit
F20	7.5	Low beam (left)
F21	5	Parking light (right), rear light (right), rear clearance light (right), front clearance light (right), switch lights
F22	5	Parking light (left), rear light (left), rear clearance light (left) Front clearance light (left), instrument lights
F23	10	Front/rear working light
F24	10	Rotating beacon
F25	10	Mounting parts
F26	7.5	Solenoid valve 4th control circuit and additional control circuit
F27	7.5	Solenoid valve: Load stabiliser, hose burst valve, bucket repositioning
F28	5	Radio (option)
F29	10	Cigarette lighter
F30	7.5	Turn indicator relay, turn indicator, radio
F31	7.5	Front parking light (right/left), rear light (right/left), rear socket, front socket, switch lights, instrument lights, light for cigarette lighter, interior light
F32	3	High current relay, switching relay heating and starting, telltale for pre-heating

Main fuse box with relays

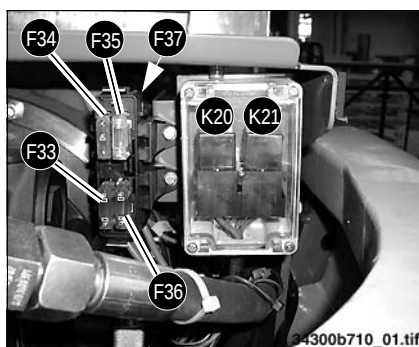


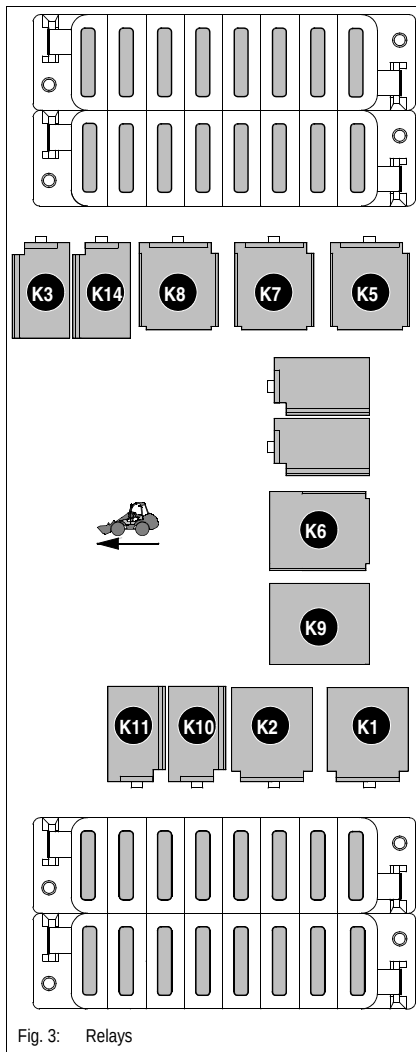
Fig. 2: Main fuse box in the engine compartment

The main fuse box is located in the engine compartment, on the left in driving direction

Fuse no.	Rated current (A)	Protected circuit
F33	50 A	– Main fuse
F34	60 A	– Ignition lock
F35	60 A	– Ignition lock
F36	40 A	– Preheating/start fuse (starter)
F37	10 A	– Multiple quantity valve

Relay no.	Protected circuit
K 20	– Preheating
K 21	– Start

Relays



The relays are installed on the left and right next to the fuse box

Switching relay no.	Protected circuit
K1	High current relay
K2	High current relay
K3	Switching relay – RV
K5	Switching relay – front socket (option)
K6	Turn indicator relay
K7	Switching relay – wiper (1st speed)
K8	Switching relay – wiper (2nd speed)
K9	Intermittent-wipe relay
K10	Switching relay (lock)
K11	Switching relay (unlock)
K14	Switching relay differential lock
	Switching relay – load stabiliser (option)
	Switching relay – bucket repositioning (option)



2.12 Tyres for model 343-00 (580)

Tyre size	Tyre pressure ¹		Wheel rims	
	Front	Rear	Wheel rim	Wheel offset
14.5-20 MPT04 10 PR 132 E	2.5	2.0	11 x 20	20 mm
375/75 R20 XM27 143 B				
375/75 R20 XZSL 148 B				
12.5-20 MPT04 10 PR 132 E			13 x 18	
405/70 R18 SPT9 136 B				
405/70 R20 SPT9 136 B			13 x 20	
425/75 R20 XZSL 148 B				

1. Increase front tyre pressure by 0.5 bar during pallet forks operation!

2.13 Tyres for model 343-01 (680)

Tyre size	Tyre pressure ¹		Wheel rims	
	Front	Rear	Wheel rim	Wheel offset
16/70-20 MPT04 10 PR 141 B	2.75	2.25	13 x 20	20 mm
405/70 R20 SPT9 136 B				
375/75 R20 XZSL 148 B				
14.5-20 MPT04 12 PR 132 E			11 x 20	
375/75 R20 XM27 143 P				
375/75 R20 XZSL 143 P				

1. Increase front tyre pressure by 0.5 bar during pallet forks operation!



2.14 Weights

Weight	Model 343-00 (580)	Model 343-01 (680)
Kerb weight ¹	5300 kg	5450 kg
Gross weight rating	7000 kg	
Front axle weight rating	4250 kg	
Rear axle weight rating	4250 kg	
Max. authorised load for towing facility	6000 kg	

1. With standard bucket, driver and full fuel tank

2.15 Noise levels

Sound power level	Model 343-00 (580)	Model 343-01 (680)
Measured value	102 dB (A)	
Guaranteed value	104 dB (A)	
Noise level in the cab	78 dB (A)	



Important!

Measurement of sound power level according to EC Directive 2000/14 EC. Noise level in the cab measured according to EC Directives 84/532/EEC, 89/514/EEC and 95/27/EEC. Measurements carried out on asphalted surface.

2.16 Vibration

Vibration	
Effective acceleration value for the upper extremities of the body	$< 2.5 \frac{m}{s^2}$
Effective acceleration value for the body	$< 0.5 \frac{m}{s^2}$



2.17 Tightening torques

General tightening torques

Screw dimensions	Tightening torques in Nm ¹		
	8.8	10.9	12.9
M4	3	4	5
M5	5.5	8	10
M6	10	14	16
M8	23	34	40
M10	46	67	79
M12	79	115	135
M14	125	185	220
M16	195	290	340
M18	280	400	470
M20	395	560	660
M22	540	760	890
M24	680	970	1150
M27	1000	1450	1700
M30	1350	1950	2300

1. These values are valid for screws with untreated, non-lubricated surfaces

Specific tightening torques

Description	Tightening torque
Wheel nut	400 ^{±20} Nm
Track-rod end (steering ram)	200 Nm
Piston rod (steering ram/track rod)	250 Nm



2.18 Dimensions model 343-00 (580)

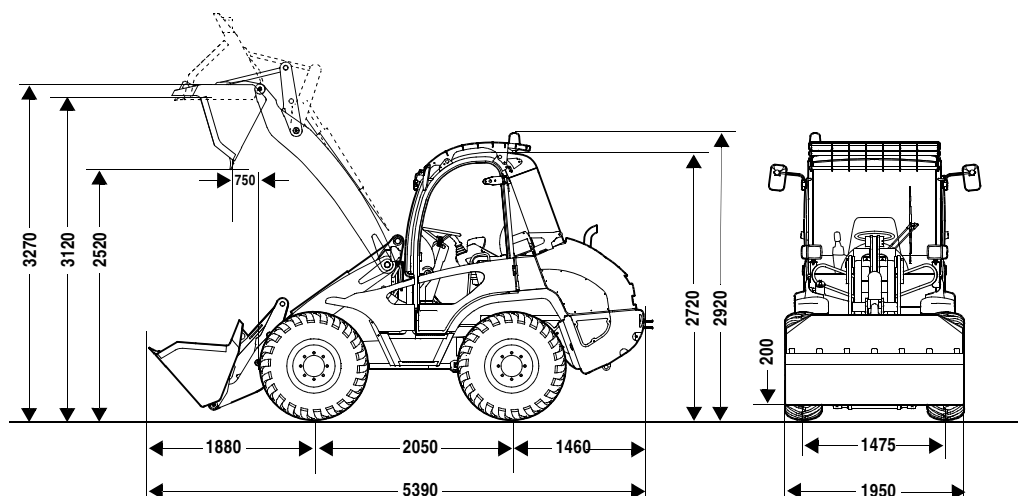


Fig. 4: Vehicle dimensions (model 340)

Dimensions	580 (model 343-00)
Overall length ¹	5390 mm
Overall height ^{2, 3}	2720 mm
Overall height ² with rotating beacon	2920 mm
Overall width without bucket ⁴	1860 mm
Overall width ¹	1950 mm
Ground clearance in transport position of loader unit	200 mm
Ground clearance ² below rear axle gearbox	350 mm
Track width, front/rear	1475 mm
Wheelbase	2050 mm
Turning radius ⁵	2780 mm

1. With standard bucket order no. 1000096385
2. With tyres 14.5-20
3. Overall height with protective screen (FOPS option) 2820 mm
4. With outside mirrors folded in
5. Measured at outer edge of tyres



2.19 Dimensions model 343-01 (680)

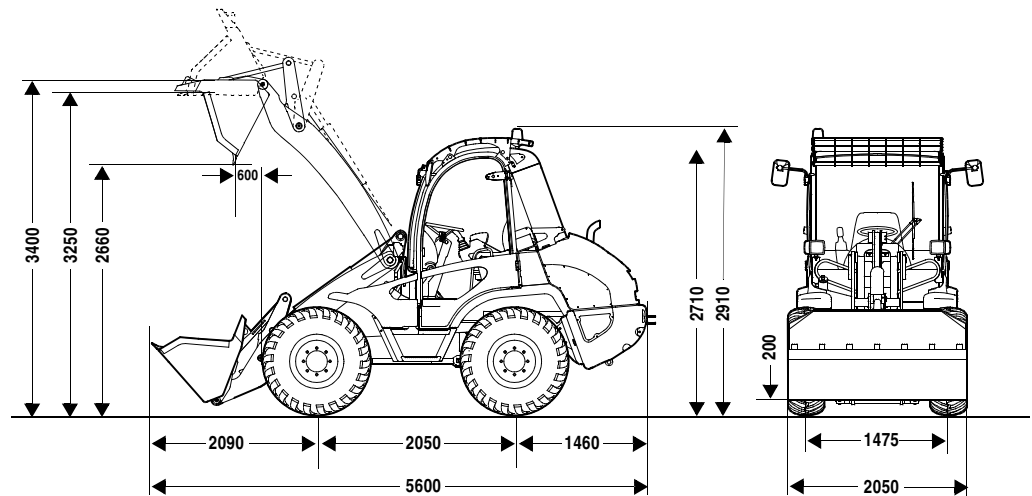


Fig. 5: Vehicle dimensions (model 343-01)

Dimensions	680 (model 343-01)
Overall length ¹	5600 mm
Overall height ^{2, 3}	2710 mm
Overall height ² with rotating beacon	2910 mm
Overall width without bucket ⁴	1880 mm
Overall width ¹	2050 mm
Ground clearance in transport position of loader unit	200 mm
Ground clearance ² below rear axle gearbox	340 mm
Track width, front/rear	1475 mm
Wheelbase	2050 mm
Turning radius ⁵	2790 mm

1. With standard bucket order no. 1000096390
2. With tyres 16/70-20
3. Overall height with protective screen (FOPS option) 2820 mm
4. With outside mirrors folded in
5. Measured at outer edge of tyres



Maintenance



3 Maintenance

3.1 Fluids and lubricants

Component/ application	Engine/vehicle fluid	SAE grade Specification	Season/ temperature	Capacities ¹
Diesel engine	Engine oil with oil filter ²	SAE 10W; EO10 ³	Below -5°C	10.5 ltr.
		SAE 20W20; EO20 ³	-10 to +10°C	
		SAE 30; EO30 ³	5 to 30°C	
		HD-C 10W-40; EO1040B ³	Year-round	
		HD-C 15W-40; EO1540B ³		
20 kph gearbox	Gearbox oil ⁴	80 W 90 API GL5 or SAE 90 LS (hypoid gear oil)	Year-round	1.25 ltr.
40 kph gearbox				4.0 ltr.
Planetary drives – left and right, front axle				1.5 ltr. each
Planetary drives – left and right, rear axle				0.7 ltr. each
Differential – front and rear axle				4.5 ltr. each
Hydraulic oil tank	Engine oil ²	SAE 5 W/30	Up to -25°C	About 85 ltr.
		SAE 5 W/40; EO 0540B ³		
		SAE 10 W/40; EO 0540B ³	Up to -15°C	
		SAE 15 W/40; EO 1540B ³	Up to -10°C	
	Hydraulic oil ⁵	HVLPD 46 (HYD0530 ³)	Year-round	
	Biodegradable oil	AVILUB Syntofluid 46		
PANOLIN HLP Synth 46				
Grease nipples	Multipurpose grease	Lithium-saponified brand-name grease MPG-A ³	Year-round	As required
Battery terminals	Acid-proof grease	SP-B ³	Year-round	As required
Mounting of pins, shafts etc.	Special grease	Optimoly paste “TA” ⁶ White paste	Year-round	As required
Fuel tank	Diesel fuel ⁷	Grade no. 2-D	Over 4°C	About 80 ltr.
		Grade no. 1-D	Below 4°C	
Brake system	Brake fluid ⁸	Agip LHM Super/Shell LHM	Year-round	
Washer system	Cleaning agent	Water + antifreeze	Year-round	About 1.5 ltr.

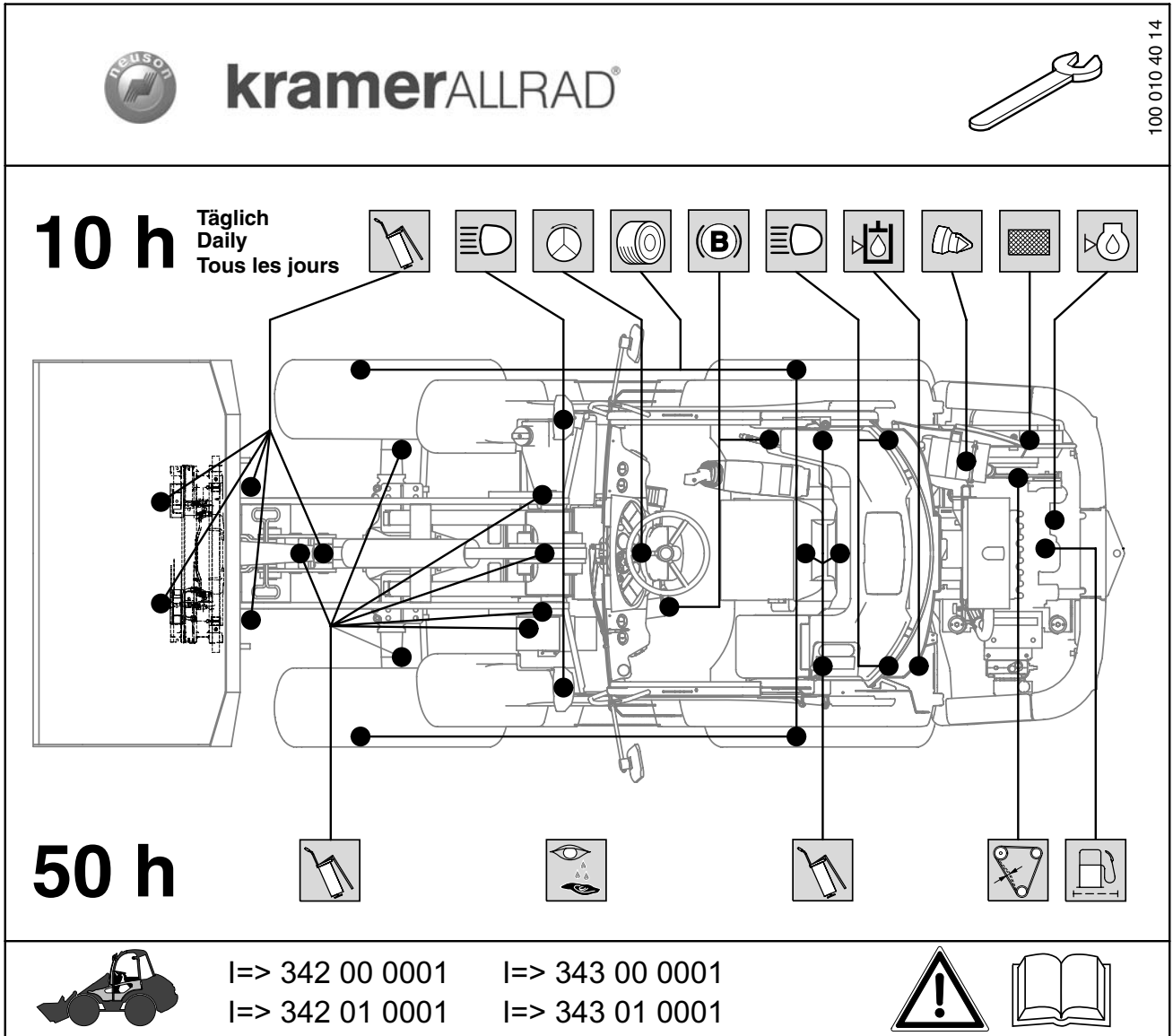
1. The capacities indicated are approximative values; the oil level check alone is relevant for the correct oil level
2. MIL-L-2104C; API CD/CE/CF4; CCMC-D4
3. Abbreviation for lubricants (Hauptverband der Deutschen Bauindustrie e. V. – German construction engineering association)
4. MIL-L-2105B; API-GL5
5. DIN 51 521 T3
6. 250 gr tube, order no.: 0 00 441 32 10
7. DIN 51 601, min 45 cetane
8. Standard: B 71 2710



3.2 Maintenance label

Location: Inside the cab on the rear window

Symbol	Explanation
	Before starting maintenance work, observe the safety instructions in the operation manual!
	Before starting maintenance work, observe the "Maintenance" section in the operation manual!
	Carry out a functional check of the light system!
	Check tyres for damage, pressure and tread depth!
	Carry out a functional check of the steering, synchronise the steering!
	Carry out a functional check of the brake system!
	Check hydraulic oil level. Fill up if necessary!
	Check engine oil level. Fill up if necessary!
	Compress the dust valve
	Check cooler for engine coolant and hydraulic oil for contamination. Clean if necessary!
	Check condition and initial tension of V-belt. Re-tighten or replace if necessary!
	Leakage check: Check for tightness, leakage and chafing: Pipes, flexible lines and screw connections. Rectify if necessary!
	Leakage check: Check the fuel/water separator. Drain water if necessary!
	Lubrication service: Lubricate the assemblies concerned!





3.3 Maintenance plan models 343-00/343-01 (overview)

Work description For service and maintenance work on the implement, please refer to the operation and maintenance manual of the implement manufacturer as well.	Maintenance plan/service hours					
	Delivery inspection	Maintenance work (once a day)	"A" every 50 hours once a week	1st Inspection ¹ at 100 hours	"B" every 500 service hours ² 2nd Inspection	"C" every 1500 service hours once a year
Oil and filter changes () : Carry out the following oil and filter changes (check oil levels after test run): • Engine oil • Engine oil filter • Fuel filter • Air filter insert ³ 4replace safety cartridge every 3rd time the air filter insert is replaced • Gearbox oil in front and rear axle differentials and in rear axle gearbox • Gearbox oil in front and rear axle planetary drives (left and right) • Gearbox oil in 40 kph gearbox (option) • Hydraulic oil⁵ • Hydraulic oil filter insert/reflux • Breather filter – hydraulic oil tank ⁴ • Fine filter drive						
Inspection work () : Check the following material. Refill if necessary: • Engine oil • Hydraulic oil • Gearbox oil in front and rear axle differentials and in rear axle gearbox • Gearbox oil in front and rear axle planetary drives (left and right) • Brake fluid⁶ Check cooler for engine and hydraulic oil for contamination. Clean if necessary ⁷ When using biodegradable oil: Drain the condensation water in the hydraulic oil tank ⁵ Clean dust valve on air filter housing ³ V-belt: check condition and pre-tension. Retighten or replace if necessary ⁸ Check the fuel/water separator. Drain water if necessary						



Work description For service and maintenance work on the implement, please refer to the operation and maintenance manual of the implement manufacturer as well.	Maintenance plan/service hours					
	Delivery inspection	Maintenance work (once a day)	"A" every 50 hours once a week	1st Inspection ¹ at 100 hours	"B" every 500 service hours ² 2nd Inspection	"C" every 1500 service hours once a year
			●	●	●	●
					●	●
				●	●	●
Other inspection work ():						
Heating: clean dust filter, replace every 1500 service hours if necessary ⁹						●
Check and set service and handbrake pads. Replace if necessary				●	●	●
Tyre check (damage, air pressure, tread depth)	●	●	●	●	●	●
Check screws and nuts or screw connections for tightness on the following assemblies/components. Retighten if necessary						
• Engine and engine bearing				●	●	●
• Steering system				●	●	●
• Hydraulic system				●	●	●
• Loader unit (pin locking)				●	●	●
• Axle mounting, axle suspension				●	●	●
• Counterweight (attachment)				●	●	●
• Fastening screws of the propshafts				●	●	●
• Attachment screws of cab				●	●	●
• Wheel nuts	●			●	●	●
Electric system: check electric and earth connections, chafing on wiring harness, battery terminals	●			●	●	●
Lubrication service (): ¹⁰						
Lubricate the following assemblies/components:						
• Rear axle oscillation-type bearing	●		●	●	●	●
• Front and rear axle planetary drive bearings (left and right)	●		●	●	●	●
• Loader unit– see <i>Lubricating the pivots on the loader unit</i> on page 3-32						
• Lift frame bearing	●	●		●	●	●
• Tilt rod bearing	●	●		●	●	●
• Tilt lever bearing	●	●		●	●	●
• Lift ram bearing	●		●	●	●	●



Maintenance

Work description For service and maintenance work on the implement, please refer to the operation and maintenance manual of the implement manufacturer as well.	Maintenance plan/service hours					
	Delivery inspection	Maintenance work (once a day)	"A" every 50 hours once a week	1st Inspection ¹ at 100 hours	"B" every 500 service hours ² 2nd Inspection	"C" every 1500 service hours once a year
	• Tilt ram bearing					
	• Quickhitch facility: Bearing on lift frame					
	• Hinges, joints and fittings (e.g. door arrester)					
	Functional check () : Check the function of the following assemblies/components. Rectify if necessary:					
	• Service and handbrake					
	• Steering system					
	• Lights and electric system					
	Leakage check () : Check for tightness, leakage and chafing: pipes, flexible lines and screw connections of the following assemblies and components. Rectify if necessary:					
	• Air intake line (air filter – engine)					
	• Engine lubrication (engine – filter)					
	• Fuel lines ¹¹					
	• Cooling system (engine – hydraulic oil)					
	• Steering system (flexible lines and rams)					
	• Hydraulic system/loader unit (flexible lines and rams) ¹²					
	• Brake system (flexible lines and rams)					

1. Work to be carried out once after the first 100 service hours. This work must be carried out by an authorised workshop for warranty claims to be acknowledged.
2. Work after the first 500 service hours (2nd inspection) must be carried out by an authorised workshop for warranty claims to be acknowledged
3. Replace filter insert as indicated by the telltale on the instrument panel, however at least every 12 months or 1500 service hours.
4. When working in an acidic environment, replace the filter every 300 service hours!
5. When using biodegradable oil: Drain the condensation water in the hydraulic oil tank every 500 service hours, in any case before the cold season.
6. Replace every 2 years
7. Depending on operation and dust conditions, it may be necessary to clean the cooler more frequently
8. Replace the toothed belt every 3000 service hours or after 5 years at the latest (toothed belt must be replaced by authorised staff)
9. Depending on operation and dust conditions, it may be necessary to replace the dust filter more frequently
10. Lubricate implement according to manufacturer's instructions!
11. Replace flexible fuel leak oil lines every 2 years
12. Replace flexible lines every 6 years (UVV, DIN 20066 part 5)



3.4 Maintenance kits

1000109143	1	Maintenance kit for "1st Inspection"
1000000381	1	➡ Filter
1000000351	1	➡ Oil filter
1000109115	1	➡ Hydraulic oil filter
1000109140	1	➡ Hydraulic oil filter
1000109141	1	➡ Sealing kit
1000109144	1	Maintenance kit for "2nd Inspection"
1000000381	1	➡ Filter
1000000351	1	➡ Oil filter
1000000365	1	➡ Filter cartridge
1000109037	1	➡ Seal
1000109145	1	Maintenance kit "C" once a year
1000000381	1	➡ Filter
1000000351	1	➡ Oil filter
1000109115	1	➡ Hydraulic oil filter
1000109140	1	➡ Hydraulic oil filter
1000109141	1	➡ Sealing kit
1000052149	1	➡ Vent filter
1000109037	1	➡ Seal
1000000365	1	➡ Filter cartridge
1000087796	1	➡ Filter
1000109114	1	➡ Filter

3.5 Introduction

Operational readiness and the service life of vehicles are heavily dependent on maintenance.

Before carrying out service and maintenance work, always read, understand and follow the instructions given in

- Section 2 "SAFETY INSTRUCTIONS" in the operation manual
- The operation manuals of the implements.

Daily service and maintenance work, and maintenance according to maintenance plan "A" must be carried out by a specifically trained driver. All other maintenance work must be carried out by trained and qualified staff only.

The maintenance plans indicate when the maintenance work mentioned below must be carried out (– see *Maintenance plan models 343-00/343-01 (overview)* on page 3-4).



3.6 Fuel system

Specific safety instructions

- Extreme caution is essential when handling fuel – high risk of fire!
- Never carry out work on the fuel system in the vicinity of naked flames or sparks!
- Do not smoke when working on the fuel system or when refuelling!
- Before refuelling, switch off the engine and remove the ignition key!
- Do not refuel in closed rooms!
- Wipe away fuel spills immediately!
- Keep the vehicle clean to reduce the risk of fire!

Refuelling

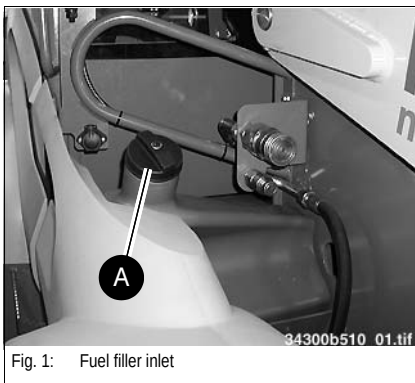


Fig. 1: Fuel filler inlet

Filler inlet A of the fuel tank is located on the right in driving direction, in front of the cab



Danger!

All work involving fuel carries an increased

Danger of fire and poisoning!

- ☞ Do not refuel in closed rooms
- ☞ Never carry out work on the fuel system in the vicinity of naked flames or sparks



Environment!

Use a suitable container to collect the fuel as it drains and dispose of it in an environmentally friendly manner!

Stationary fuel pumps

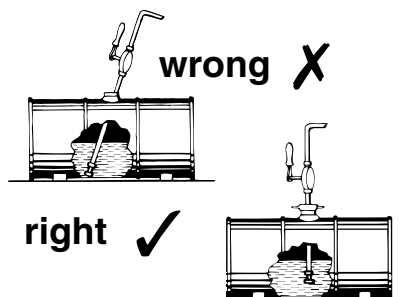


Fig. 2: Refuelling from a barrel

General

Only refuel from stationary fuel pumps. Fuel from barrels or canisters is usually contaminated.

Even the smallest particles of dirt can cause

- Increased engine wear
- Malfunctions in the fuel system and
- Reduced effectiveness of the fuel filters

Refuelling from barrels

If refuelling from barrels cannot be avoided, note the following points (see fig. 2):

- Barrels must neither be rolled nor tilted before refuelling
- Protect the suction pipe opening of the barrel pump with a fine-mesh strainer
- Immerse it down to a max. 15 cm above the floor of the barrel
- Only fill the tank using refuelling aids (funnels or filler pipes) with integral microfilter
- Keep all refuelling containers clean at all times

Use only high-grade fuels

Diesel fuel specification

Grade	Cetane number	Use
• No. 2-D according to DIN 51601	Min. 45	For normal outside temperatures
• No. 1-D according to DIN 51601		For outside temperatures below 4 °C or for operation above 1500 m altitude



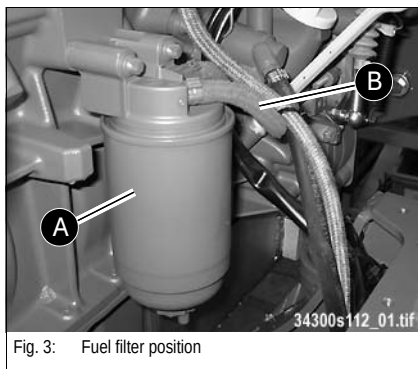
Bleeding the fuel system



Important!

The fuel system of the vehicle is bled automatically

Replacing the fuel filter



Danger!

If the fuel, as it drains, comes into contact with hot engine parts or the exhaust system, there is an increased

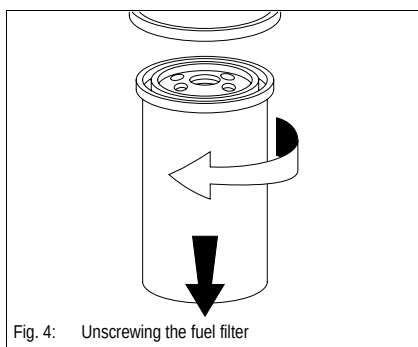
Danger of burns!

⚠ *Never change the fuel filter if the engine is hot*



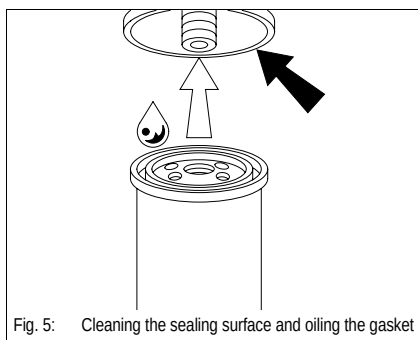
Environment!

Use a suitable container to collect the fuel as it drains and dispose of it in an environmentally friendly manner!

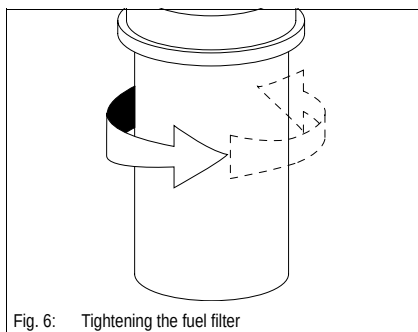


⚠ *Change fuel filter 3/A as follows:*

- Pinch off fuel feed line 3/B with a suitable tool
- Thoroughly clean the outside surfaces of fuel filter 3/A
- Slacken and unscrew fuel filter cartridge using a commercially available tool
- Collect the fuel as it drains



- Clean the sealing surface of the filter carrier if it is fouled
- Lightly oil the rubber gasket of the new filter cartridge or apply a thin coat of clean diesel fuel to it
- Screw on the cartridge by hand until the gasket makes contact



- Tighten the fuel filter cartridge by turning it a further half revolution
- Remove the tool which has been used to pinch off the fuel feed line 3/B
- Make a test run – and check for tightness!
- Dispose of the old fuel filter cartridge by an ecologically safe method



Important!

The fuel system bleeds itself automatically!



Cleaning the fuel pump screen filter



Danger!

If the fuel, as it drains, comes into contact with hot engine parts or the exhaust system, there is an increased

Danger of burns!

⚠ *Never clean screen the filter when the engine is hot!*

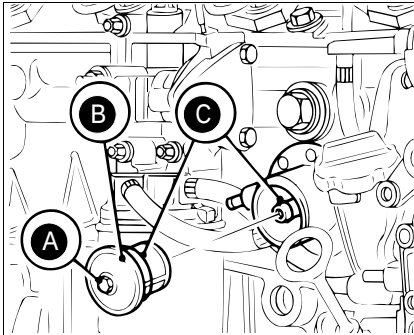


Fig. 7: Removing the screen filter

⚙ *Proceed as follows:*

- Pinch off fuel feed line 3/B with a suitable tool
- Slacken and unscrew hexagon head screw A
- Remove fuel screen B (cover and screen come out together)
- Clean fuel screen B with fuel, replace if necessary
- Position sealing rings C
- Fit fuel screen B (cover with screen) back on
- Tighten hexagon head screw A
- Remove the tool which has been used to pinch off the fuel feed line 3/B
- Make a test run – and check for tightness!



Important!

The fuel system bleeds itself automatically!



3.7 Engine lubrication system



Caution!

If the engine oil level is too high or too low, or if an oil change is overdue, this may cause

Engine damage or loss of output!

- 🔧 Have oil changed by an authorised workshop
– see maintenance plan in the appendix
- 🔧 Use only the engine oil specified
– see Fluids and lubricants on page 3-1

Checking and filling up the oil level



Important!

Check the oil level every 10 service hours or every day.
After switching off a warm engine, wait at least 5 minutes before checking.

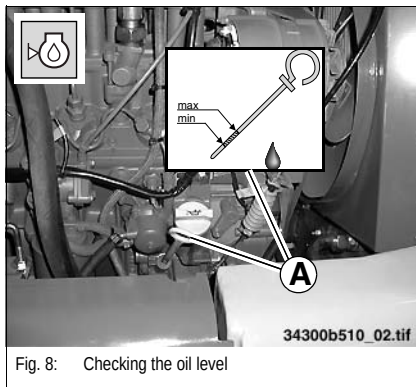


Fig. 8: Checking the oil level

🔧 Proceed as follows:

- Park the vehicle on level ground
- Switch off the engine!
- Apply the handbrake
- Open the engine cover
- Pull out oil dipstick A
- Wipe it with a lint-free cloth
- Push it back in as far as possible
- Withdraw it and read off the oil level

🔧 However if necessary, fill up the oil at the latest when the oil reaches the MIN mark on the oil dipstick A



Environment!

Use a suitable container to collect the engine oil as it drains and dispose of it in an environmentally friendly manner!

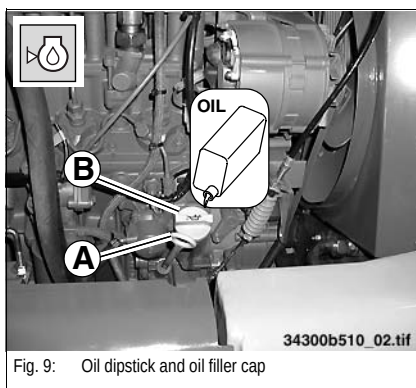
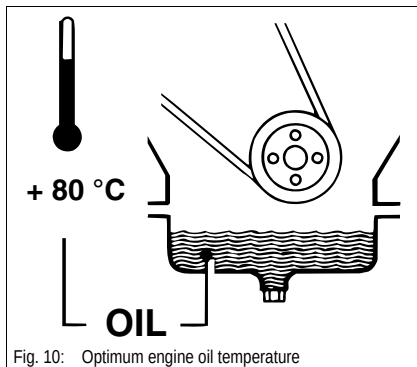


Fig. 9: Oil dipstick and oil filler cap

🔧 Proceed as follows:

- Clean the area around oil filler cap B with a lint-free cloth
- Open filler cap B
- Raise oil dipstick A slightly to allow any trapped air to escape
- Fill with engine oil
- Wait a moment until all the oil has run into the oil sump
- Check the oil level
– see section *Checking and filling up the oil level* on page 3-11
- Fill up if necessary and check the oil level again
- Close the filler cap B
- Push oil dipstick A back in as far as possible
- Completely remove all oil spills from the engine

Changing engine oil



Danger!

Caution when draining hot engine oil –

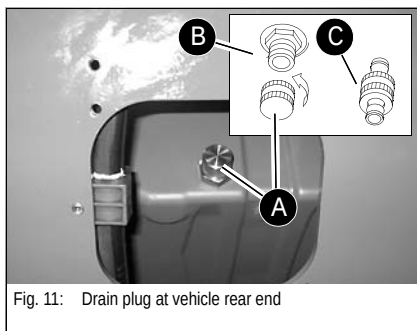
Danger of burns!

- ☞ Wear protective gloves
- ☞ Use suitable tools



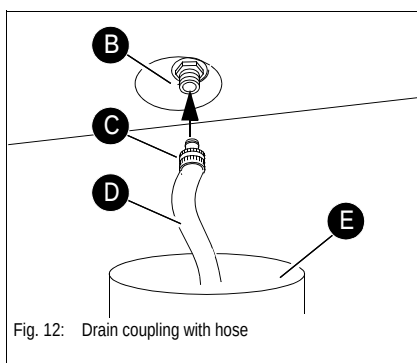
Environment!

Use a suitable container to collect the engine oil as it drains and dispose of it in an environmentally friendly manner!



☞ Change the engine oil as follows:

- Park the vehicle on level ground
- Let the engine run until reaching service temperature (oil temperature about 80°C)
- Stop the engine
- Place an oil drip tray (with a capacity of about 12 litres) under the opening
- Remove the cover from the frame
- Unscrew cap 11/A of oil drain valve 11/B
- Screw in the drain coupling with a sufficiently long hose 12/D, making sure the end of the hose is in oil drip tray 12/E
- ➔ Oil drain valve 12/B opens and the engine oil drains
- Completely drain the oil
- Unscrew drain coupling 12/C
- Screw on cap 11/A of the oil drain valve
- Filling in engine oil– see section *Checking and filling up the oil level* on page 3-11
- Start the engine and run it at low speed for a short time
- Stop the engine
- Wait a moment until all the oil has run into the oil sump
- Check the oil level again
- Fill up if necessary and check again
- Completely remove all oil spills from the engine





Replacing the engine oil filter cartridge

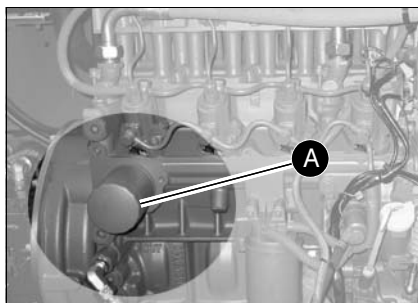


Fig. 13: Engine oil filter position



Danger!

Caution when draining hot engine oil –

Danger of burns!

☞ *Wear protective gloves*



Environment!

Collect the drained engine oil in a suitable container.
Dispose of used oil and filters in an environmentally friendly manner!!

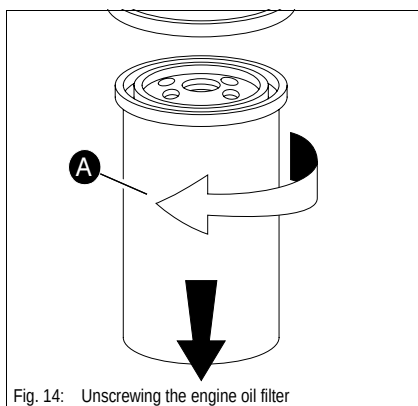


Fig. 14: Unscrewing the engine oil filter

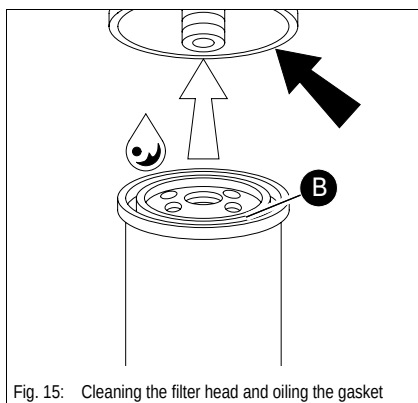


Fig. 15: Cleaning the filter head and oiling the gasket

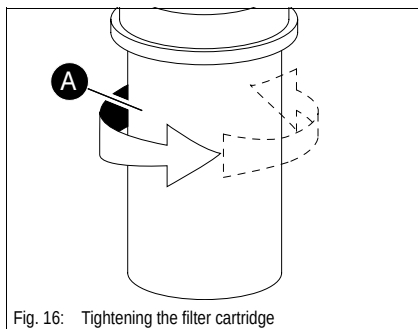


Fig. 16: Tightening the filter cartridge

☞ *Change the filter as follows:*

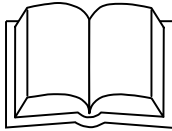
- Stop the engine
- Place a suitable container under the oil filter to collect the oil
- Slacken and unscrew oil filter cartridge A using a commercially available tool
- Make sure the thread adapter is correctly placed in the filter head
- Clean the inside of the filter head
- Apply a thin coat of fresh engine oil to rubber seal 15/B of the new oil filter cartridge
- Tighten the new filter cartridge by hand until the gasket makes contact
- Tighten oil filter cartridge A by hand by about a further half revolution
- Make sure the oil level is correct!
- Run the engine for a short time
- Stop the engine
- Check the seal of oil filter cartridge A and retighten by hand
- Check the oil level and add engine oil if necessary
- Completely remove all oil spills from the engine
- Dispose of the used oil filter in an environmentally friendly manner



3.8 Engine and hydraulics cooling system

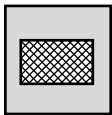
The combined engine/hydraulic oil cooler is located in the engine compartment, on the right in driving direction, next to the engine. It cools the diesel engine, and the hydraulic oil of the drive and work hydraulics.

Specific safety instructions



- Dirt on the cooling ribs reduces the cooler's heat dissipation capacity! To avoid this:
 - ☞ Clean the outside of the cooler at regular intervals. Refer to the maintenance plans in the appendix for the cleaning intervals
 - ☞ In dusty or dirty work conditions, clean more frequently than indicated in the maintenance plans
 - ☞ An insufficient coolant level (engine/hydraulic oil) reduces the heat dissipation capacity as well, and can lead to engine damage! Therefore:
 - ☞ Check the oil level at regular intervals. Refer to the maintenance plan in the appendix for the intervals

Cleaning the oil cooler



Danger!

Warm engine –

Danger of burns!

- ☞ *Wait at least 10 minutes after switching off the engine!*
- ☞ *Wear protective goggles, gloves and clothing!*

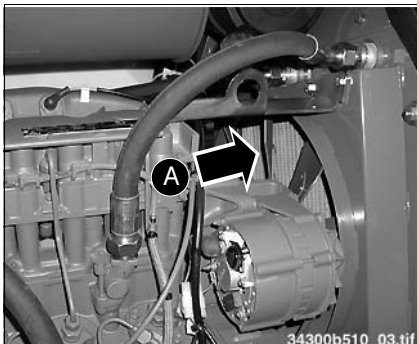


Fig. 17: Cleaning the oil cooler

☞ *Proceed as follows:*

- Park the vehicle on level ground
- Lower the loader unit
- Apply the handbrake
- Switch off the engine and let it cool down
- Switch off the ignition
- Open the engine cover
- Clean the cooling ribs by blowing compressed air from end A of the engine



3.9 Air filter

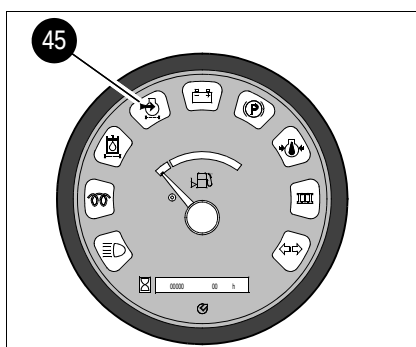


Caution!

The filter cartridge will be damaged if it is washed or brushed out! Bear in mind the following to avoid premature engine wear!

- ☞ Do not clean the filter cartridge
- ☞ Replace the filter cartridge when the telltale comes on
- ☞ Never reuse a damaged filter cartridge
- ☞ Ensure cleanliness when replacing the filter cartridge!

Check once a week of air filter contamination



Telltale 45 on the instrument panel monitors the filter cartridge.

☞ Filter cartridge A must be replaced:

- ➔ If telltale 45 comes on
- ➔ At the latest after 1500 service hours (or once every year)
- see *Replacing the filter cartridge* on page 3-16



Important!

For applications in dusty environment, the air filter is fitted with an extra safety cartridge C. Do not clean the safety cartridge. Replace the safety cartridge every third time maintenance work is carried out!



Caution!

Filter cartridges degrade prematurely when in service in acidic air for longer periods of time. This risk is present for example in acid production facilities, steel and aluminium mills, chemical plants and other nonferrous-metal plants.

- ☞ Replace filter cartridge A and safety cartridge C at the latest after 500 service hours!
- see *Replacing the filter cartridge* on page 3-16

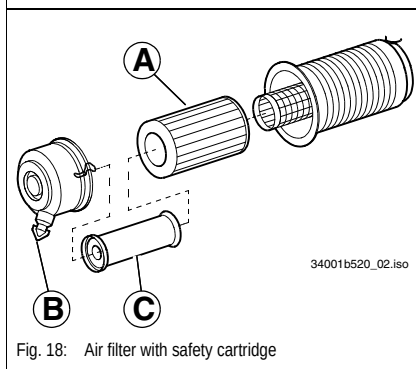


Fig. 18: Air filter with safety cartridge

Functional check once a week of the dust valve

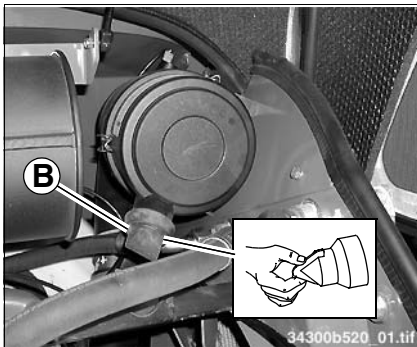


Fig. 19: Air filter – dust valve

The air filter is located in the engine compartment, on the right side of the vehicle

☞ Proceed as follows:

- Stop the engine
- Apply the handbrake
- Squeeze the discharge slot of dust valve B
- Remove hardened dust by compressing the upper area of the valve

☞ Clean the discharge slot if necessary

Replacing the filter cartridge

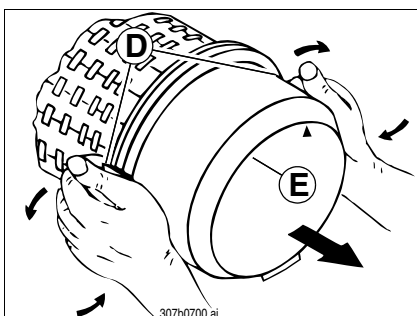


Fig. 20: Removing the lower housing section

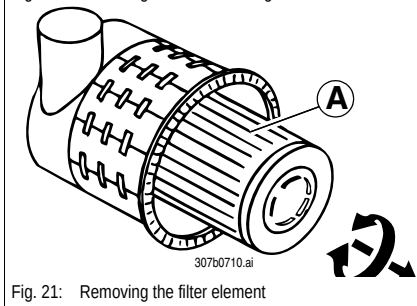


Fig. 21: Removing the filter element

☞ Change filter cartridge A as follows:

- Stop the engine
- Prevent the vehicle from rolling away and remove the ignition key. Open the engine cover
- Fold bow hook D on lower housing section E to the outside
- Remove lower housing section E
- Carefully remove filter cartridge A with slightly turning movements
- In addition, after every 3rd filter replacement:
- Carefully remove safety cartridge 18/C with slightly turning movements
- Make sure all contamination (dust) inside the upper and lower housing sections has been removed
- Carefully insert a new safety cartridge 18/C in the upper housing section
- Carefully insert new filter cartridge A into the upper housing section
- Position lower housing section E (make sure it is properly seated)
- Close bow hook D



3.10 V-belt



Danger!

Only check or retighten/replace the V-belt when the engine is switched off –

Danger of personal injury!

☞ *Switch off the engine before carrying out inspection work in the engine compartment!*



Caution!

Cracked and stretched V-belts cause engine damage

☞ *Have the V-belt replaced by an authorised workshop*

Check the V-belt once a day or every 10 service hours, and retighten if necessary!
Retighten new V-belts after about 15 minutes of running time.

Checking the V-belt tension

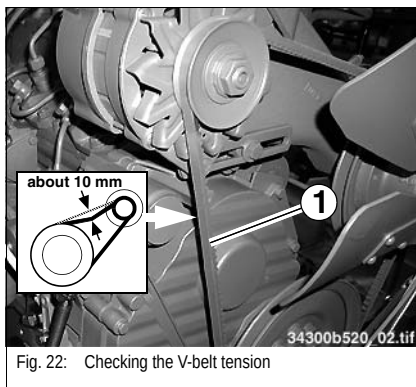


Fig. 22: Checking the V-belt tension

☞ *Check as follows:*

- Stop the engine
- Prevent the vehicle from rolling away and remove the ignition key
- Open the engine cover
- Carefully inspect V-belt 1 for damage
- If the V-belt is damaged:
- Have the V-belt replaced by authorised staff
- Press with your thumb to check whether the V-belt can be deflected between the pulleys by no more than about 10 mm
- Retighten the V-belt if necessary

Retightening the V-belt

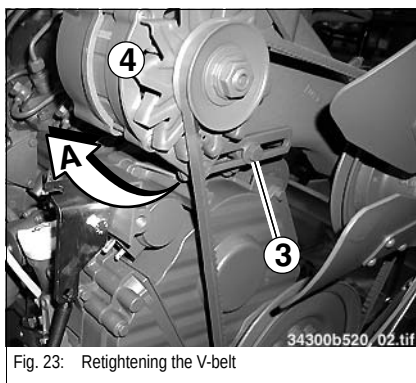


Fig. 23: Retightening the V-belt

☞ *Retighten as follows:*

- Stop the engine
- Prevent the vehicle from rolling away and remove the ignition key
- Open the engine cover
- Slacken fastening screws 3 of alternator 4
- Use a suitable tool to push the alternator in the direction of arrow A until the correct V-belt tension is obtained (fig. 22)
- Keep the alternator in this position, and at the same time retighten fastening screws 3
- Check V-belt tension (fig. 22) again



3.11 Gearboxes and axles

Maintenance of these components is limited to checking the oil levels and to changing the oil at prescribed intervals – see maintenance plans in the appendix.



Important!

The rear axle differential and the 20 kph gearbox have separate oil circuits.

Checking the oil level in the gearbox

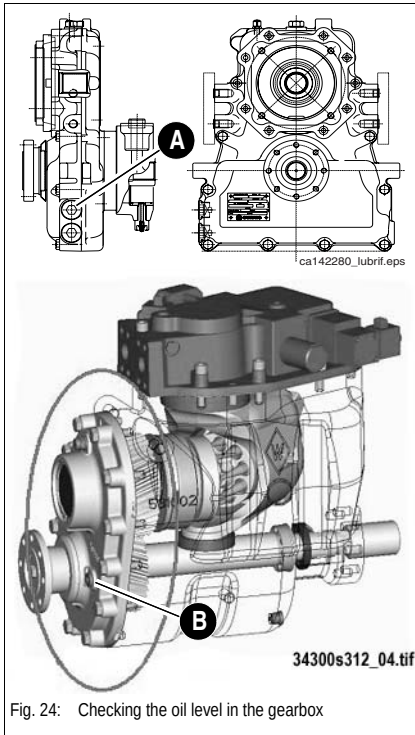


Fig. 24: Checking the oil level in the gearbox

Proceed as follows:

- Park the vehicle on level ground when the gearbox is at operating temperature
- Oil filler and check plug A on the 20 kph gearbox; or
- Oil filler and check plug B on 40 kph gearbox: clean and unscrew while holding a cloth under the opening

If the oil level is below the opening or if the oil level cannot be seen at all:

- Fill up the oil level– see *Filling up the gearbox oil* on page 3-19



Important!

Only use new sealing rings for oil filler and drain plugs.



Environment!

Use a suitable container to collect the gearbox oil as it drains and dispose of it in an environmentally friendly manner!



Filling up the gearbox oil

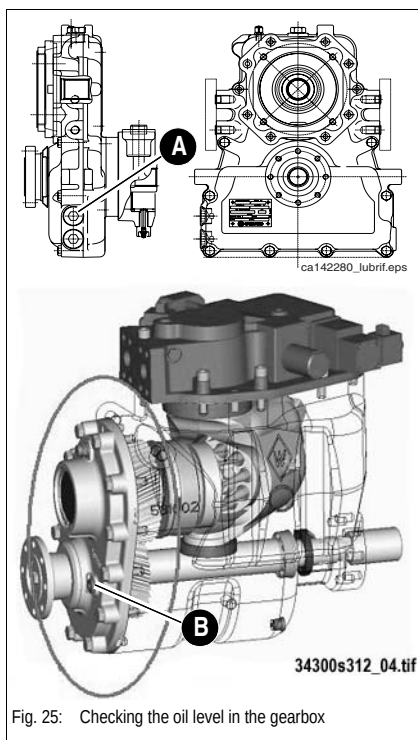


Fig. 25: Checking the oil level in the gearbox

➡ *Proceed as follows:*

- Park the vehicle on level ground when the gearbox is at operating temperature
- Oil filler and check plug A on the 20 kph gearbox; or
- Oil filler and check plug B on 40 kph gearbox: clean and unscrew while holding a cloth under the opening

If the oil level is below the opening or if the oil level cannot be seen at all:

- Fill in oil until it runs out of the filler opening



Important!

Only use new sealing rings for oil filler and drain plugs.



Environment!

Use a suitable container to collect the gearbox oil as it drains and dispose of it in an environmentally friendly manner!

Changing the gearbox oil



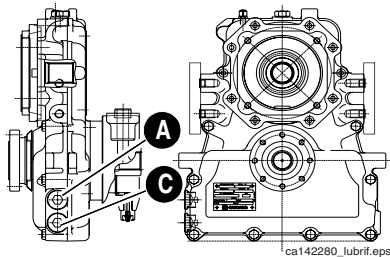
Danger!

Draining hot gearbox oil is hazardous

Danger of burns!

- ☞ Wear protective gloves
- ☞ Use suitable tools, e.g. for unscrewing the oil drain plug!

20 kph gearbox



40 kph gearbox (option)

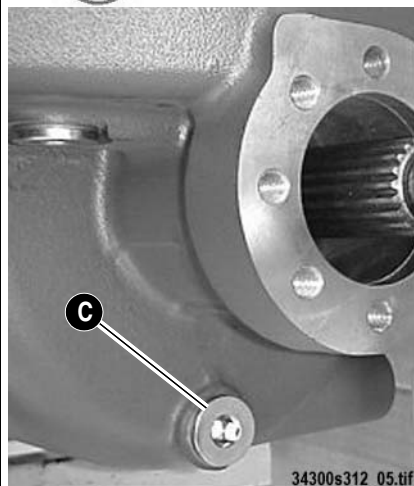
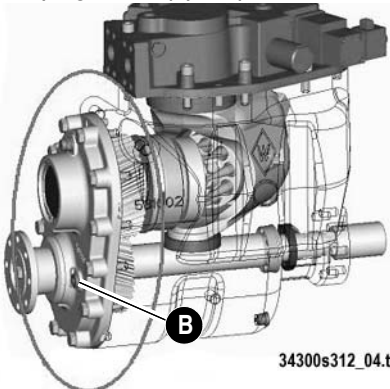


Fig. 26: Changing the gearbox oil

☞ Proceed as follows:

- Park the vehicle on level ground when the gearbox is at operating temperature
- Place a suitable container under the rear axle gearbox to collect the oil
- Unscrew oil filler and check plug A on the 20 kph gearbox; or
- Unscrew oil filler and check plug B on the 40 kph gearbox (option)
- Unscrew oil drain plug C
- Completely drain the old gearbox oil
- Tighten drain plug C with a new sealing ring to make an oil-tight seal
- Fill in oil until it runs out of the filler opening – see *Filling up the gearbox oil* on page 3-19



Important!

Only use new sealing rings for oil filler and drain plugs.



Environment!

Use a suitable container to collect the gearbox oil as it drains and dispose of it in an environmentally friendly manner!



Checking the oil level in the rear axle differential



Important!

The rear axle differential and the gearbox have separate oil circuits.

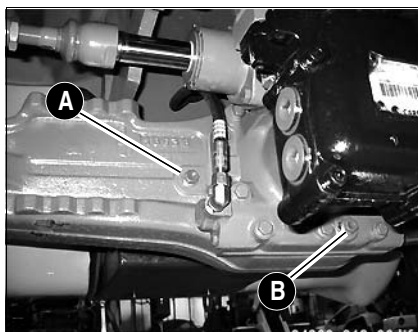


Fig. 27: Oil filler and inspection plug on the differential

Filling up the oil level

➡ Proceed as follows:

- Park the vehicle on level ground when the differential is at operating temperature
- Clean and unscrew oil filler and inspection plug A on the differential while holding a cloth under the opening

If the oil level is below the opening or if the oil level cannot be seen at all:

- Fill up the oil level

If the oil level is correct:

- Tighten oil filler and inspection plug A with a new sealing ring to make an oil-tight seal

➡ Proceed as follows:

- Park the vehicle on level ground when the differential is at operating temperature
- Clean and unscrew oil filler and inspection plug A on the differential
- Fill in oil until it runs out of the filler opening

If the oil level in the differential remains constant:

- Tighten oil filler and inspection plug A with a new sealing ring to make an oil-tight seal

Changing the oil



Danger!

Draining hot gearbox oil is hazardous

Danger of burns!

➡ Wear protective gloves

➡ Use suitable tools, e.g. for unscrewing the oil drain plug!

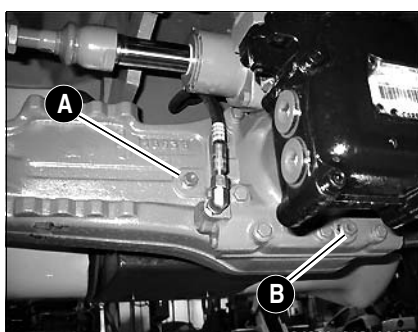


Fig. 28: Oil drain plug on rear axle differential

➡ Proceed as follows:

- Park the vehicle on level ground when the differential is at operating temperature
- Place an adequately sized container under the differential housing of the rear axle to collect the oil
- Clean and unscrew plug A
- Unscrew oil drain plug B
- Completely drain the old gearbox oil
- Tighten drain plug B with a new sealing ring to make an oil-tight seal
- Fill in oil through opening A until it runs out

If the oil level in the differential remains constant:

- Tighten plug A with a new sealing ring to make an oil-tight seal

After carrying out a test run:

- Check the oil level again after about 5 minutes, and fill up if necessary



Checking the oil level in the front axle differential



Important!

Only use new sealing rings for oil filler and drain plugs. Drain oil only after running the vehicle for a longer period of time (operating temperature)!

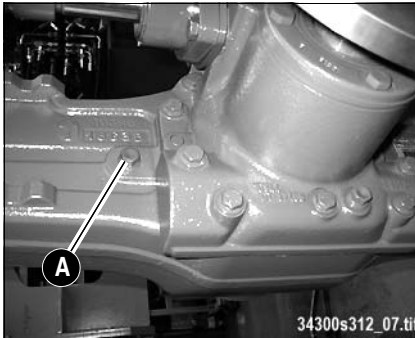


Fig. 29: Oil filler and inspection plug on the differential

Filling up the oil level

☞ Proceed as follows:

- Park the vehicle on level ground
- Clean and unscrew oil filler and inspection plug A on the differential while holding a cloth under the opening

If the oil level is below the opening or if the oil level cannot be seen at all:

- Fill up with oil

If the oil level is correct:

- Tighten oil filler and inspection plug A with a new sealing ring to make an oil-tight seal

☞ Proceed as follows:

- Park the vehicle on level ground
- Clean and unscrew oil filler and inspection plug A on the differential while holding a cloth under the opening
- Fill in oil until it runs out of the filler opening
- Tighten oil filler and inspection plug A with a new sealing ring to make an oil-tight seal

Changing the oil

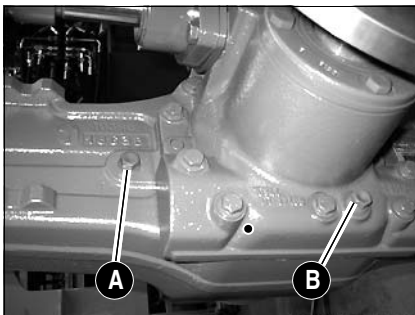


Fig. 30: Oil filler and inspection plug on the differential

☞ Proceed as follows:

- Park the vehicle on level ground when it is at operating temperature
- Place a container under plug B to collect the oil
- Clean and unscrew oil filler and inspection plug A
- Clean and unscrew oil drain plug B
- Completely drain the old oil
- Tighten drain plug B with a new sealing ring to make an oil-tight seal
- Fill in oil until it runs out of filler opening A
- Tighten oil filler and inspection plug A with a new sealing ring to make an oil-tight seal



Planetary drives: checking and filling up the oil level

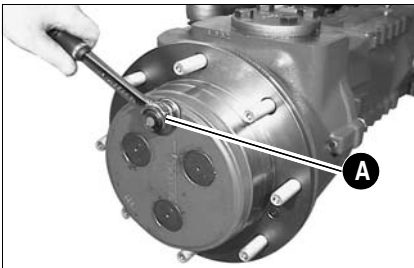


Fig. 31: Oil filler and inspection plug on planetary drive

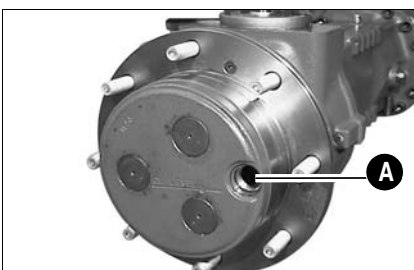


Fig. 32: Oil filler and inspection plug on planetary drive



Important!

Fit new sealing rings! Drain oil only after running the vehicle for a longer period of time!

Proceed as follows:

- Park the vehicle on level ground and secure it against rolling away
- Place plug A in the position shown in fig. 31 (plug must be at the top)
- Clean and unscrew plug A (to release possible overpressure)
- Place plug A in the position shown in fig. 32 (plug must be in horizontal position)
- Remove plug A

If the oil level is below the opening or if the oil level cannot be seen at all:

- Fill up the oil level

Proceed as follows:

- Park the vehicle on level ground
- Place plug A in the position shown in fig. 31 (plug must be at the top)
- Clean and unscrew plug A (to release possible overpressure)
- Place plug 32/A in the position shown in fig. 32 (plug must be in horizontal position)
- Remove plug 32/A
- Fill in fresh oil at opening 32/A until it runs out of the filler opening
- Tighten plug 32/A with a new sealing ring to make an oil-tight seal

Changing the oil

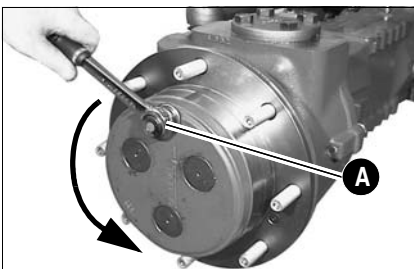


Fig. 33: Oil drain plug on planetary drive

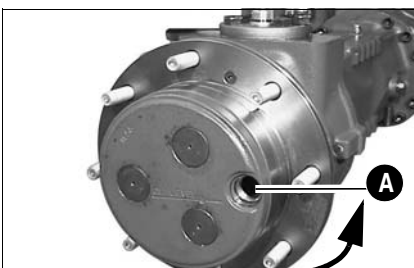


Fig. 34: Oil filler and inspection plug on planetary drive

Proceed as follows:

- Park the vehicle at operating temperature on level ground and secure it against rolling away
- Place a suitable container under drain plug A
- Place plug A in the position shown in fig. 33 (plug must be at the top)
- Clean and unscrew plug A (to release possible overpressure)

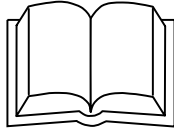
Never raise the vehicle on one side only for the following work!

- Turn planetary drive downward (plug must be at the bottom)
- Remove plug A
- Completely drain the old oil
- Place opening A in the position shown in fig. 34 (plug must be in horizontal position)
- Fill in fresh oil at opening A until it runs out of the filler opening
- Tighten plug A with a new sealing ring to make an oil-tight seal



3.12 Hydraulic system

Specific safety instructions



- All lines carrying hydraulic oil must be depressurised prior to any maintenance and repair work. To do this:
 - Lower all hydraulically controlled implements to the ground
 - Actuate all control levers of the hydraulic control valves several times
 - Apply the handbrake to prevent the vehicle from rolling away before you carry out service and maintenance work
 - Hydraulic oil escaping under high pressure can penetrate the skin and cause serious injuries. Always consult a doctor immediately even if the wound seems insignificant – otherwise serious infections could set in!
 - If the hydraulic oil in the sight glass is cloudy, this indicates that water or air has penetrated the hydraulic system. This may cause damage to the hydraulic pump!
- ☞ *Contact your KRAMER ALLRAD dealer immediately*



Caution!

Insufficient, incorrect or contaminated hydraulic oil –

Danger of severe damage to the hydraulic system!

- ☞ *Take care to avoid contamination when working!*
- ☞ *Always fill in hydraulic oil using the filling screen!*
- ☞ *Only use authorised oils of the same type*
– see Fluids and lubricants on page 3-1
- ☞ *Always fill up the hydraulic oil before the level gets too low*
- ☞ *If the hydraulic system is filled with biodegradable oil, then only use biodegradable oil of the same type for filling up – observe the sticker on the hydraulic oil tank!*
- ☞ *Contact customer service if the hydraulic system filter is contaminated with metal chippings. Otherwise, follow-on damage may result!*



Environment!

Collect hydraulic oil, including biodegradable oil, with a suitable container! Dispose of drained oil and used filters by an ecologically safe method.
Always contact the relevant authorities or commercial establishments in charge of oil disposal before disposing of biodegradable oil.



Changing hydraulic oil



Danger!

Draining hot hydraulic oil and removing the filter element is hazardous –

Danger of burns!

- ☞ Wear protective gloves
- ☞ Release the pressure on the hydraulic system before starting repair work
 - ➡ – see operation manual “Pressure relief on the loader unit”
- ☞ Fit a sufficiently long hose to the oil drain coupling

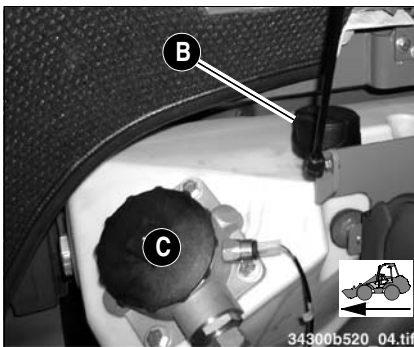


Fig. 35: Hydraulic oil tank



Environment!

Collect hydraulic oil, including biodegradable oil, with a suitable container! Dispose of drained oil by an ecologically safe method!

Always contact the relevant authorities or commercial establishments in charge of oil disposal before disposing of biodegradable oil.

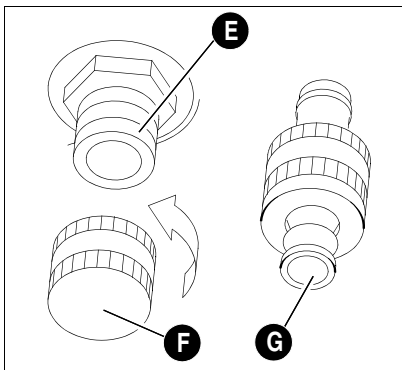


Fig. 36: Hydraulic oil tank: overview

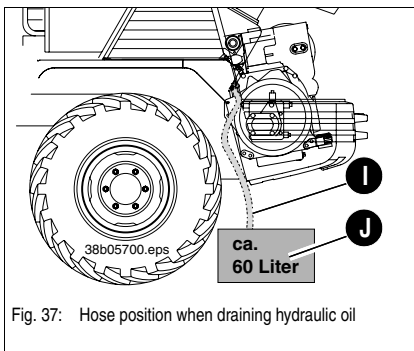


Fig. 37: Hose position when draining hydraulic oil

Proceed as follows:

- ☞ Park the vehicle on level ground
- ☞ Retract all hydraulic rams. To do this:
 - Lower the loader unit completely
 - Tilt the bucket all the way in
- ☞ Switch off the engine and secure the vehicle against rolling away
- ☞ Open the engine cover
- ☞ Unscrew breather filter B to release the pressure in the hydraulic oil tank – there must be no pressure in the system!
- ☞ Place a suitable container J under the rear end of the vehicle (minimum capacity 90 litres)
- ☞ Remove filler cap F from oil drain valve E
- ☞ Put the end of the hose of the oil drain coupling G in container J
- ☞ Screw oil drain coupling G onto oil drain valve E
 - ➡ Oil drain valve G opens and the oil flows into the container
- ☞ Flush out the hydraulic oil tank with a little hydraulic oil
- ☞ Unscrew oil drain coupling G from oil drain valve E
- ☞ Screw filler cap F of oil drain valve E back on
- ☞ Fill in new hydraulic oil
 - ➡ – see Filling up the hydraulic oil on page 3-28
- ☞ Screw on breather filter B, use a new breather filter if necessary
 - ➡ – see Maintenance plan models 343-00/343-01 (overview) on page 3-4
- ☞ Check hydraulic oil filter insert C, replace if necessary
 - ➡ – see Maintenance plan models 343-00/343-01 (overview) on page 3-4



Changing the reflux filter (hydraulic oil tank)



Danger!

Draining hot hydraulic oil and removing the filter element is hazardous –

Danger of burns!

- ☞ *Wear protective gloves*
- ☞ *Release the pressure on the hydraulic system before starting repair work*
 - ➡ – see operation manual “Pressure relief on the loader unit”



Environment!

Collect hydraulic oil, including biodegradable oil, with a suitable container! Dispose of drained oil by an ecologically safe method!

Always contact the relevant authorities or commercial establishments in charge of oil disposal before disposing of biodegradable oil.

Do not fill up the hydraulic oil unless the engine is switched off. Otherwise, hydraulic oil will run out of the filler opening on the hydraulic tank.

☞ *Fill up as follows:*

- Park the vehicle on level ground
- Retract all hydraulic rams
- Switch off the engine
- Apply the handbrake
- Release the pressure on the hydraulic system
- Open the engine cover
- Clean the area around the filler and breather filter B and C with a cloth
- Open breather filter B by hand
- Unscrew cover C
- Remove the filter element by pulling on the bow
- Replace the filter element by a new one
 - ➡ As you mount the new element, check whether the description is identical with the element you have removed
- Screw cover C back on again
- Filling up the hydraulic oil
 - ➡ – see *Filling up the hydraulic oil* on page 3-28

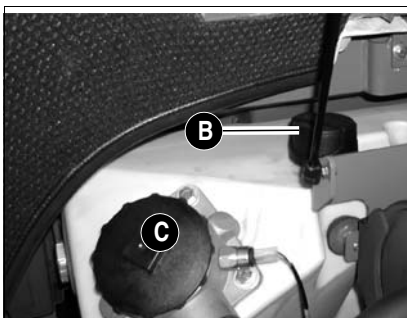


Fig. 38: Hydraulic oil tank



Replacing the hydraulic oil filter (drive)

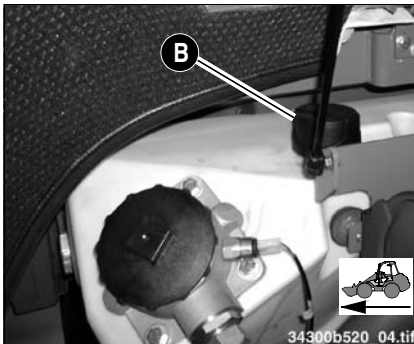


Fig. 39: Hydraulic oil tank



Danger!

Draining hot hydraulic oil and removing the filter element is hazardous –

Danger of burns!

☞ *Wear protective gloves*

☞ *Release the pressure on the hydraulic system before starting repair work*

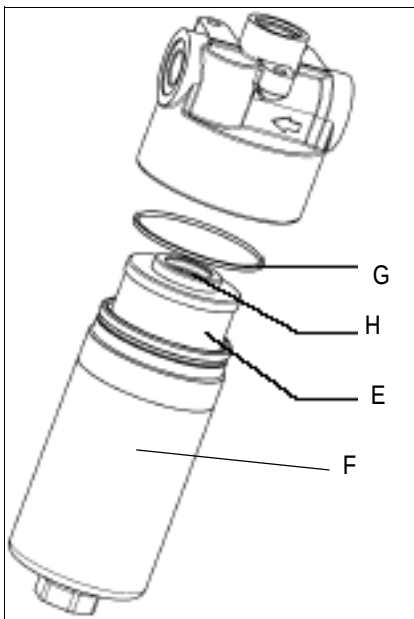
➡ – see operation manual “Pressure relief on the loader unit”



Environment!

Collect hydraulic oil, including biodegradable oil, with a suitable container! Dispose of drained oil by an ecologically safe method!

Always contact the relevant authorities or commercial establishments in charge of oil disposal before disposing of biodegradable oil.



☞ *Proceed as follows:*

- Park the vehicle on level ground
- Retract all hydraulic rams. To do this:
 - Lower the loader unit completely
 - Tilt the bucket all the way in
- Switch off the engine and secure the vehicle against rolling away
- Release the pressure on the hydraulic system
- Open the engine cover
- Unscrew breather filter B to release the pressure in the hydraulic oil tank



Caution!

There must be no pressure in the hydraulic oil system!

- Place a suitable container under the rear end of the vehicle (minimum capacity 10 litres)
- Remove filter housing F
- Replace filter insert E with a new one
- Check seals H – G, replace parts if necessary
- Screw on filter housing F
- Test run
- Check filter elements for leaks
- Checking the hydraulic oil level

➡ – see *Checking the hydraulic oil level* on page 3-28

Checking the hydraulic oil level

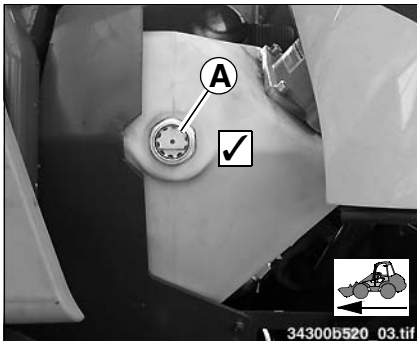


Fig. 40: Oil level sight glass on the hydraulic oil tank

➤ Proceed as follows:

- Park the vehicle on level ground
- Retract all hydraulic rams
- Switch off the engine
- Apply the handbrake
- Open the engine cover
- Check the hydraulic oil level in sight glass A

If the oil level is lower than in fig. A:

- Filling up the hydraulic oil

Filling up the hydraulic oil

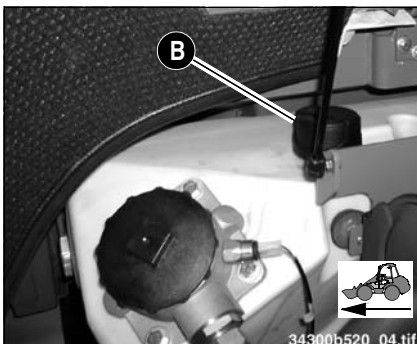


Fig. 41: Hydraulic oil tank

Do not fill up the hydraulic oil unless the engine is switched off. Otherwise, hydraulic oil will run out of the filler opening on the hydraulic tank.

➤ Fill up as follows:

- Park the vehicle on level ground
- Retract all hydraulic rams
- Switch off the engine
- Apply the handbrake
- Open the engine cover
- Clean the area around the filler and breather filter B with a cloth
- Open breather filter B by hand

With the filter insert in place:

- Filling up the hydraulic oil
- Check the hydraulic oil level in the oil level sight glass (40/A)
- Fill up if necessary and check again
- Firmly close breather filter B by hand

Monitoring the hydraulic oil reflux filter

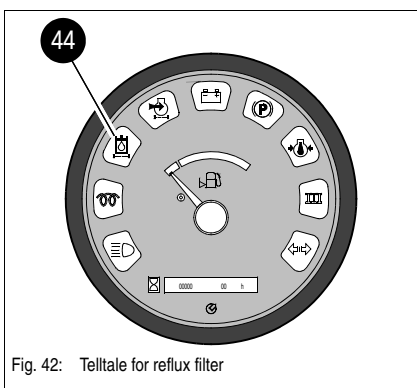


Fig. 42: Telltale for reflux filter

The red telltale 44 on the instrument panel monitors the reflux filter.

The filter element must be replaced by an authorised workshop:

- If telltale 44 comes on when the hydraulic oil is at operating temperature
- At the latest after 1500 service hours (once every year)

In cold weather telltale 44 may come on immediately when the engine is started. This is caused by increased oil viscosity. In this case:

➤ Set engine speed so that telltale 44 goes out

➤ Bear in mind the instructions concerning warmup



Important information for the use of biodegradable oil

- Use only the biodegradable hydraulic fluids which have been tested and approved by Kramer-Werke GmbH – see *section 3.1 Fluids and lubricants* on page 3-1. Always contact Kramer-Werke GmbH for the use of other products which have not been recommended. In addition, ask the oil supplier for a written declaration of guarantee. This guarantee is applicable to damage occurring on the hydraulic components, which can be proved to be due to the hydraulic fluid
- Use only biodegradable oil of the same type for filling up. In order to avoid misunderstandings, a label providing clear information is located on the hydraulic oil tank (next to the filler inlet) regarding the type of oil currently used! Replace missing labels! The joint use of two different biodegradable oils can affect the quality of one of the oil types. Therefore, make sure the remaining amount of initial hydraulic fluid in the hydraulic system does not exceed 8 % when changing biodegradable oil (manufacturer indications)
- Do not fill up with mineral oil – the content of mineral oil should not exceed 2 % in order to avoid foaming problems and to ensure biological degradability
- When running the vehicle with biodegradable oil, the same oil and filter replacement intervals are valid as for mineral oil – see maintenance plans in the appendix
- Have the condensation water in the hydraulic oil tank drained by an authorised workshop every 500 service hours, in any case before the cold season. The water content must not exceed 0.1 % by weight
- The instructions in this operation manual concerning environmental protection are also valid for the use of biodegradable oil
- If additional hydraulic implements are mounted or operated, use the same type of biodegradable oil for these implements to avoid mixtures in the hydraulic system

Subsequent change from mineral oil to biodegradable oil must be carried out by an authorised workshop or by your KRAMER-ALLRAD partner



Checking hydraulic pressure lines Specific safety instructions



Danger!

Caution when checking hydraulic lines, especially when searching for leaks. Hydraulic oil escaping under high pressure can penetrate the skin and cause serious injuries.

Danger of personal injury!

- ☞ *Always consult a doctor immediately, even if the wound seems insignificant – otherwise serious infections could set in!*
- ☞ *Always observe the following instructions:*
 - Retighten leaking screwed fittings and hose connections only when the system is not under pressure; i.e. release the pressure before working on pressurised lines!
 - Never weld or solder faulty or leaking pressure lines and connections. Replace damaged parts with new ones!
 - Never search for leakages with your bare hands, but wear protective gloves!
 - Use paper or wood to check for minor leaks. Never use an unprotected light or naked flame!
 - Have damaged flexible lines replaced by authorised workshops only!

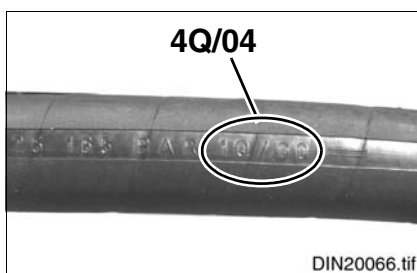
- Leakages and damaged pressure lines must be immediately repaired or replaced by an authorised workshop or after-sales staff.
This not only increases the operating safety of your vehicle but also helps to protect the environment
- Replace hydraulic hoses every 6 years from the date of manufacture, even if they do not seem to be damaged

In this respect, we recommend that you observe all the relevant safety regulations for hydraulic lines, as well as the safety regulations regarding accident prevention and occupational health and safety in your country. Also observe DIN 20066, part 5.

The date of manufacture (month or quarter and year) is indicated on the flexible line.

Example:

The indication "4 Q/04" means manufactured in the 4th quarter of 2004.

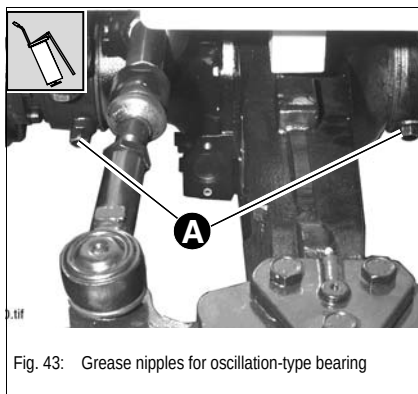




3.13 Lubrication work

Lubricate all lubrication points mentioned below with lithium-saponified brand-name grease – see *Fluids and lubricants* on page 3-1

Lubricating the rear axle oscillation-type bearing



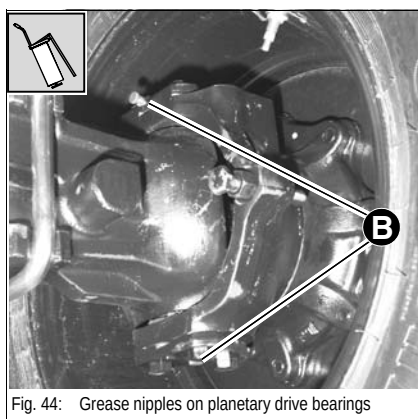
Important!

The vehicle has an oscillation-type rear axle. The bearing must be greased at the latest after every 50 service hours or once a week.

The grease nipple is located above the axle tube, on the left in driving direction.

☞ Lubricate grease nipple A of the oscillation-type bearing

Lubricating the planetary drive bearing



☞ Lubricate grease nipples B (2x) on each planetary drive bearing every 50 service hours or once a week

Lubricating the pivots on the loader unit

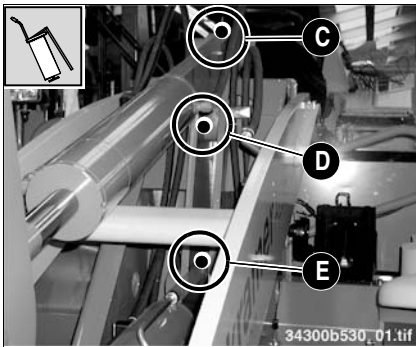


Fig. 45: Lubrication points on frame

Lubricate the following lubrication points on the loader unit of the vehicle:

- ☞ Lubricate grease nipple C on the tilt ram bearing on the frame with grease every 50 service hours (or once a week). Lubricate more frequently when in heavy-duty operation (once a day)
- ☞ Lubricate grease nipple D on the loader unit bearing every 50 service hours (or once a week). Lubricate more frequently when in heavy-duty operation (once a day)
- ☞ Lubricate grease nipple E on the lift ram bearing on the frame every 50 service hours (or once a week). Lubricate more frequently when in heavy-duty operation (once a day)

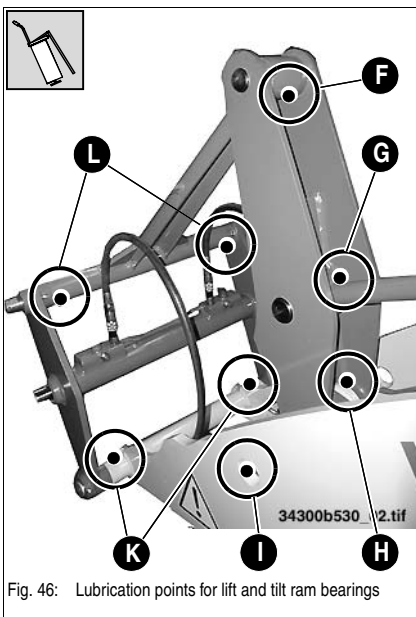


Fig. 46: Lubrication points for lift and tilt ram bearings

- ☞ Lubricate grease nipple F on the tilt rod bearing every 10 service hours (or once a week). Lubricate more frequently when in heavy-duty operation (once a day)
- ☞ Lubricate grease nipple G on the tilt ram bearing every 50 service hours (or once a week). Lubricate more frequently when in heavy-duty operation (once a day)
- ☞ Lubricate grease nipple H on the lift ram bearing every 50 service hours (or once a week). Lubricate more frequently when in heavy-duty operation (once a day)
- ☞ Lubricate grease nipple I on the tilt lever bearing every 10 service hours (or once a week). Lubricate more frequently when in heavy-duty operation (once a day)
- ☞ Lubricate grease nipples J on the quickhitch bearing every 10 service hours (or once a week). Lubricate more frequently when in heavy-duty operation (once a day)
- ☞ Lubricate grease nipples K on the tilt lever bearing every 10 service hours (or once a week). Lubricate more frequently when in heavy-duty operation (once a day)

3.14 Maintenance of implements



Important!

Correct maintenance and service is absolutely necessary for smooth and continuous operation, and for an increased service life of the implements. Please observe the lubrication and maintenance instructions in the implements' operation manuals



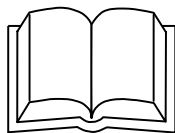
3.15 Maintenance of the brake system



Environment!

Use a suitable container to collect brake fluid as it drains and dispose of it in an environmentally friendly manner!

Specific safety instructions



Checking/filling up the brake fluid level

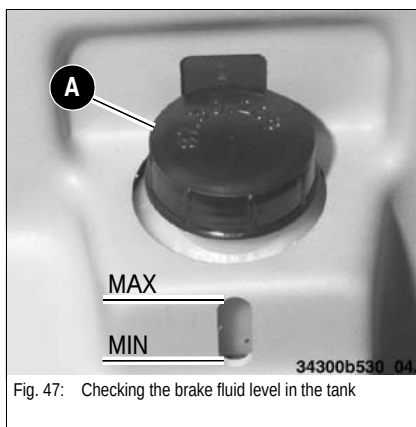


Fig. 47: Checking the brake fluid level in the tank



Danger!

An incorrect brake fluid grade or an insufficient brake fluid level may impair the safety of the brake system –

Accident hazard!

- ☞ Check the brake fluid in the tank at regular intervals
- ☞ Fill up brake fluid up to the upper edge of the sight glass
- ☞ The brake fluid must comply with the specification
– see *Fluids and lubricants* on page 3-1
- ☞ Replace brake fluid every 2 years

If the level is below the upper edge of the sight glass:

- Open tank cover A
- ☞ Fill up brake fluid up to the upper edge of the sight glass



Caution!

Do not use the usual brake fluids (e.g. DOT 4)



3.16 Tyre maintenance



Danger!

Improper tyre repairs constitute an

Accident hazard!

☞ *All repair work on tyres and rims may only be carried out by authorised specialist workshops*

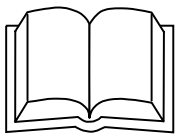


Important!

Refer to the table in section “Specifications” for the authorised tyre types and the correct tyre pressures. Vehicles are also delivered ex works with a tyre table sticker on the front window or on the loader unit bulkhead.

Regular inspection of the tyres.

- Improves operating safety
- Increases the service life of the tyres
- Reduces vehicle downtimes



Checks once a day



☞ *Carry out the following maintenance work once a day:*

- Check tyre pressure
- Check tyres and rims for damage (cracks, ageing etc.) – also on the inside
- Remove foreign bodies from the tyre tread
- Remove traces of oil and grease from the tyres

Checks once a week

☞ *Carry out the following maintenance work once a week:*

- Check tyres for wear and measure tread depth



3.17 Changing wheels



Danger!

Use of wrong tyres or wheels –

Accident hazard!

🔧 Use only wheels and tyres authorised for your vehicle – see page 2-9

🔧 Check the wheel nuts for tightness after every wheel or tyre change



Caution!

The wheels are heavy and can damage the threads on the wheel studs if they are handled incorrectly!

🔧 Use suitable assembly tools, such as covering sleeves for the studs, a jack etc.

Disassembly

🔧 Proceed as follows:

- Park the vehicle on level and firm ground and prevent it from rolling away
- Slightly loosen the wheel nuts of the tyre you want to remove
- Place a jack under the axle beam, making sure it is standing firmly
- Raise the side of the axle from which you want to remove the tyre
- Check the vehicle is standing firmly
- Completely remove the wheel nuts
- Remove the wheel

Fitting the wheels

🔧 Proceed as follows:

- Place the wheel onto the wheel studs
- Tighten all wheel nuts part-way
- Lower the raised axle
- Tighten the wheel nuts to the prescribed tightening torque
– see section 2.17 Tightening torques on page 2-11



3.18 Electric system

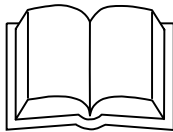


Important!

The vehicle's electric system can be fitted with a battery master switch (option).
The key can be removed in the OFF position

- Before working on the electric system and
- As an antitheft precaution

Specific safety instructions



- The battery contains sulphuric acid! This acid must not be allowed to come into contact with the skin, the eyes, clothing or the vehicle.

Therefore when recharging or working near the battery:

- ☞ Always wear goggles and protective clothing with long sleeves

If acid is spilt:

- ☞ Thoroughly rinse all affected surfaces immediately with plenty of water
- ☞ Thoroughly wash any part of the body touched by the acid immediately with plenty of water and seek medical attention at once!
- During charging in particular, but also during normal battery operation, an oxyhydrogen mixture is formed in the battery cells – danger of explosion!
- Do not attempt to jump-start the vehicle if the battery is frozen or if the acid level is low. The battery may rupture or explode!
- Avoid naked flames and sparks and do not smoke in the vicinity of open battery cells – otherwise the gas produced during normal battery operation may ignite!
- Use only 12 V power sources. Higher voltages will damage the electric components
- When connecting the battery, make sure the poles are not inverted, otherwise sensitive electric components will be damaged
- Do not interrupt voltage-carrying circuits at the battery terminals, because of the danger of sparking!
- Never place tools or other conductive articles on the battery – danger of short circuit!
- Disconnect the negative pole from the battery before starting repair work on the electric system
- Dispose of used batteries properly



Service and maintenance work at regular intervals



Before driving the vehicle:

Check every time before driving the vehicle:

- Is the light system OK?

Once a week:

Check once a week:

- Cable and earth connections
- Chafe marks on wiring harnesses
- Condition of battery terminals

Cables, bulbs and fuses

Always observe the following instructions:

- Defective components of the electric system must always be replaced by an expert. Bulbs and fuses may be changed by unqualified persons
- When carrying out maintenance work on the electric system, pay particular attention to ensuring good contact in leads and fuses
- Blown fuses indicate overloading or short circuits. The electric system must therefore be checked before installing the new fuse
- Only use fuses with the specified load capacity (amperage) – see section 2.11 Electric system on page 2-6

Alternator

Always observe the following instructions:

- Only test run the engine with the battery connected
- When connecting the battery, make sure the poles are not inverted
- Always disconnect the battery before carrying out welding work or connecting a quick battery charger
- Replace a defective charge telltale the soonest possible

Battery

The battery is located at the rear right in the engine compartment. The battery is "maintenance-free", with no need to check the electrolyte level.

Always observe the specific safety instructions!

- Park the vehicle on level ground
- Switch off the engine
- Open the engine cover
- With the battery caps unscrewed:
- Measure acid density with the acid meter

If acid density is below 1.21 kg/l:

- Recharge the battery (make sure it is disconnected!)



3.19 General maintenance work

Cleaning

Cleaning the vehicle is divided into 3 separate areas:

- Inside the cab
- Exterior of the vehicle
- Engine compartment

The wrong choice of cleaning equipment and agents may impair the operating safety of the vehicle on the one hand, and on the other undermine the health of the persons in charge of cleaning the vehicle. It is therefore essential to observe the following instructions.

General instructions for all areas of the vehicle

When using washing solvents

- Ensure adequate room ventilation
- Wear suitable protective clothing
- Do not use flammable liquids, such as petrol or diesel

When using compressed air

- Work carefully
- Wear goggles and protective clothing
- Do not aim the compressed air at the skin or at other people
- Do not use compressed air for cleaning your clothing

When using a high-pressure cleaner or steam jet

- Electric components and damping materials must be covered and not directly exposed to the jet
- Cover the vent filter on the hydraulic oil tank and the filler caps for fuel, hydraulic oil etc.
- Protect the following components from moisture:
 - Engine
 - Electric components such as the alternator, plug and socket connections etc.
 - Control devices and seals
 - Air intake filters etc.

When using volatile and easily flammable anticorrosion agents and sprays:

- Ensure adequate room ventilation
- Do not use unprotected lights or naked flames
- Do not smoke!



Cleaning inside the cab



Caution!

Never use high-pressure cleaners, steam jets or high-pressure water to clean the inside of the cab. Water under high pressure may

- Penetrate into the electric systems and cause short circuits and
- Damage seals and disable the controls!

For cleaning the cab, we recommend using the following aids:

- Broom
- Vacuum cleaner
- Humid cloth
- Bristle brush
- Bucket of water

Cleaning the seat belt:

- Clean the seat belt (which remains fitted in the vehicle) only with a mild soap solution; do not use chemical agents as they may destroy the fabric!



Danger!

In the case of automatic seat belts (option) soiled belts may affect and impair winding and safety –

Only wind the seat belt when it is dry!

Cleaning the outside of the vehicle

The following articles are generally suitable:

- High-pressure cleaner
- Steam jet

Cleaning the engine compartment



Danger!

Clean the engine at engine standstill only –

Danger of personal injury!

Switch off the engine before cleaning



Caution!

When cleaning the engine with a water or steam jet, do not point the jet directly at electric sensors such as the oil pressure switch.

Otherwise the humidity penetrating any such sensors can cause the sensors to corrode and to fail!

Screw connections



- All screw connections must be checked regularly, even if they are not listed in the maintenance plans.
- Tighten loose connections immediately. Refer to section “Specifications” for the tightening torques.

Pivots and hinges



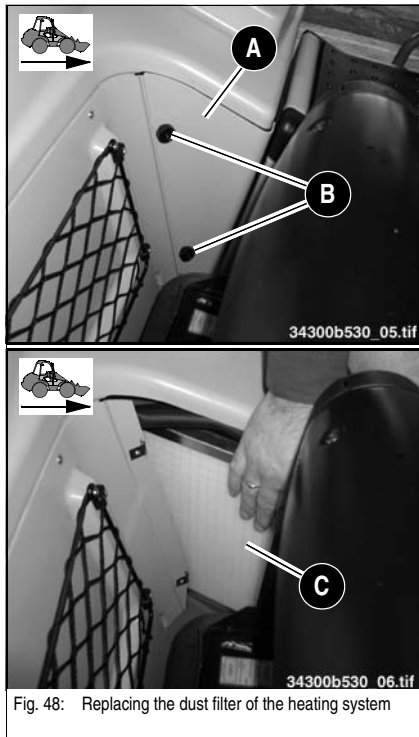
- All mechanical pivot points on the vehicle (e.g. door hinges, joints) and fittings (e.g. door arresters) should be lubricated regularly, even if they are not listed in the lubrication plan.

3.20 Heating

The heating system of the vehicle is equipped with a dust filter or fine dust filter (EU4, option) which must be cleaned at regular intervals and replaced once a year, as appropriate.

It is located in the cab behind the driver's seat.

Cleaning the dust filter of the heating system



A dust filter cleans the air taken in by the heater. Clean the filter with compressed air as required, but at least once a year. The volume of warm air flowing out of the air vents decreases as filter contamination increases.

🔧 *Clean the filter as follows:*

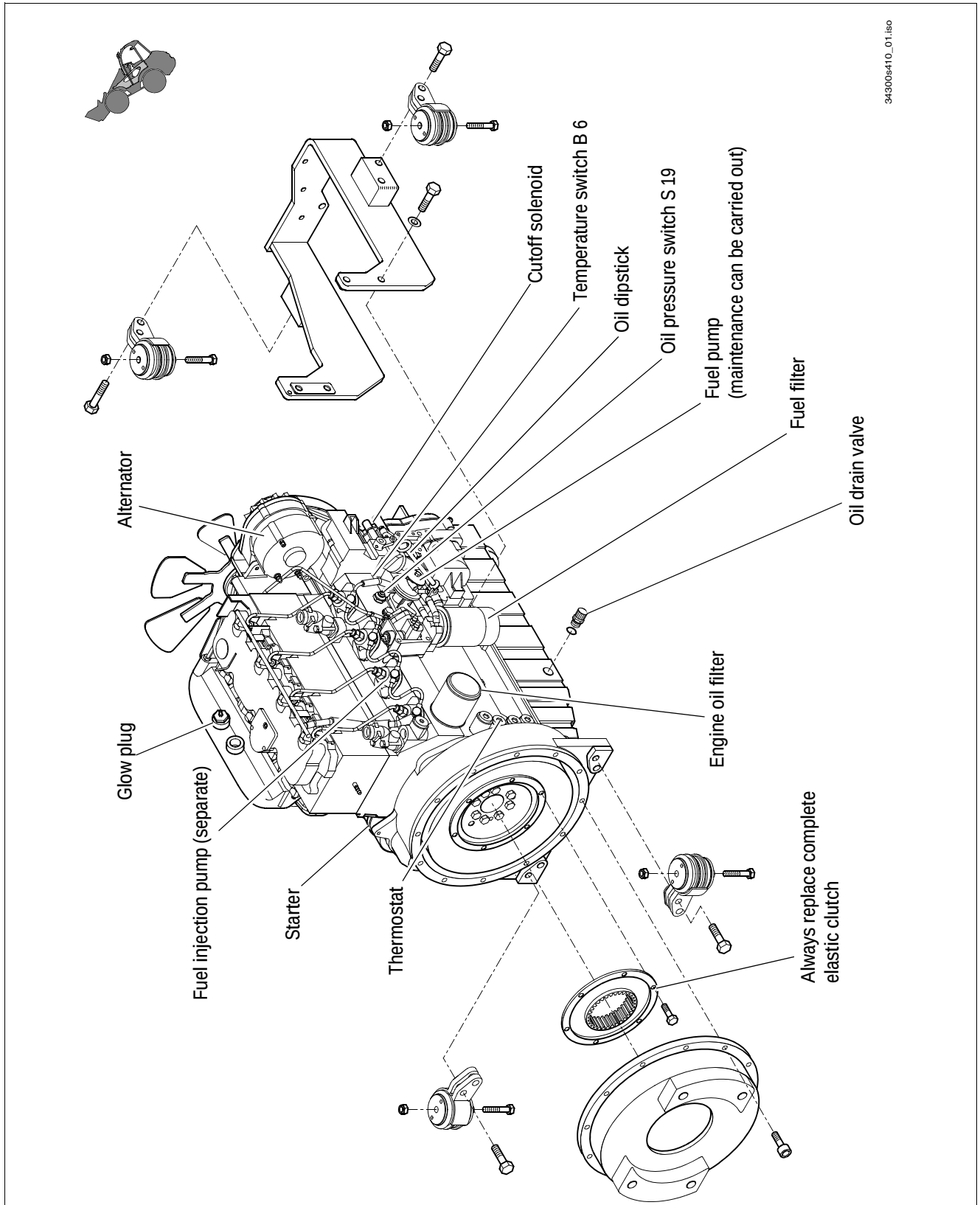
- Remove cover A at the rear left beside the driver's seat. To do this:
- Remove screws B
- Remove dust filter C. To do this:
- Remove the screws
- Clean dust filter C, replace it if necessary
- Install cover A

Engine

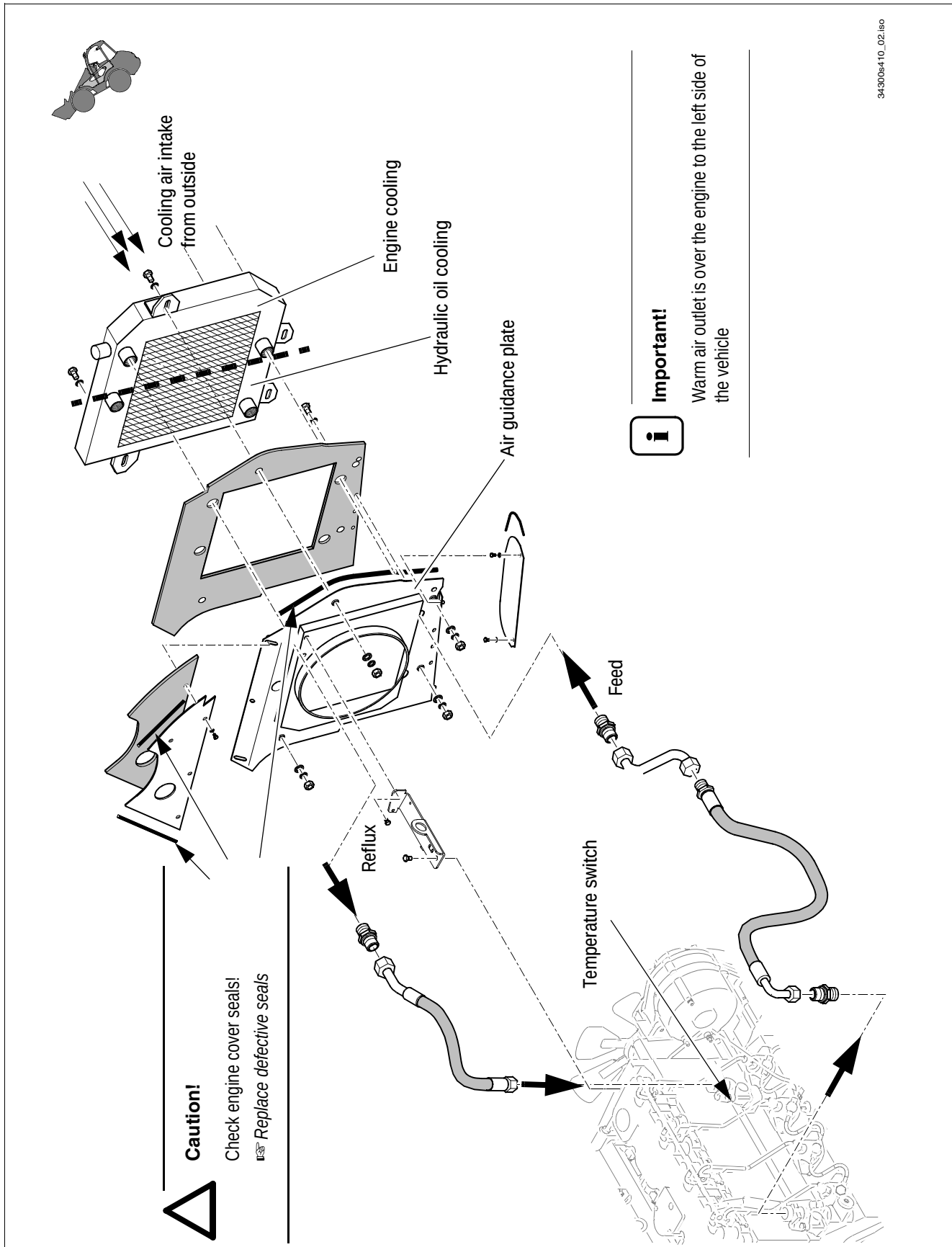


4 Engine

4.1 Engine BF4M 2011: overview

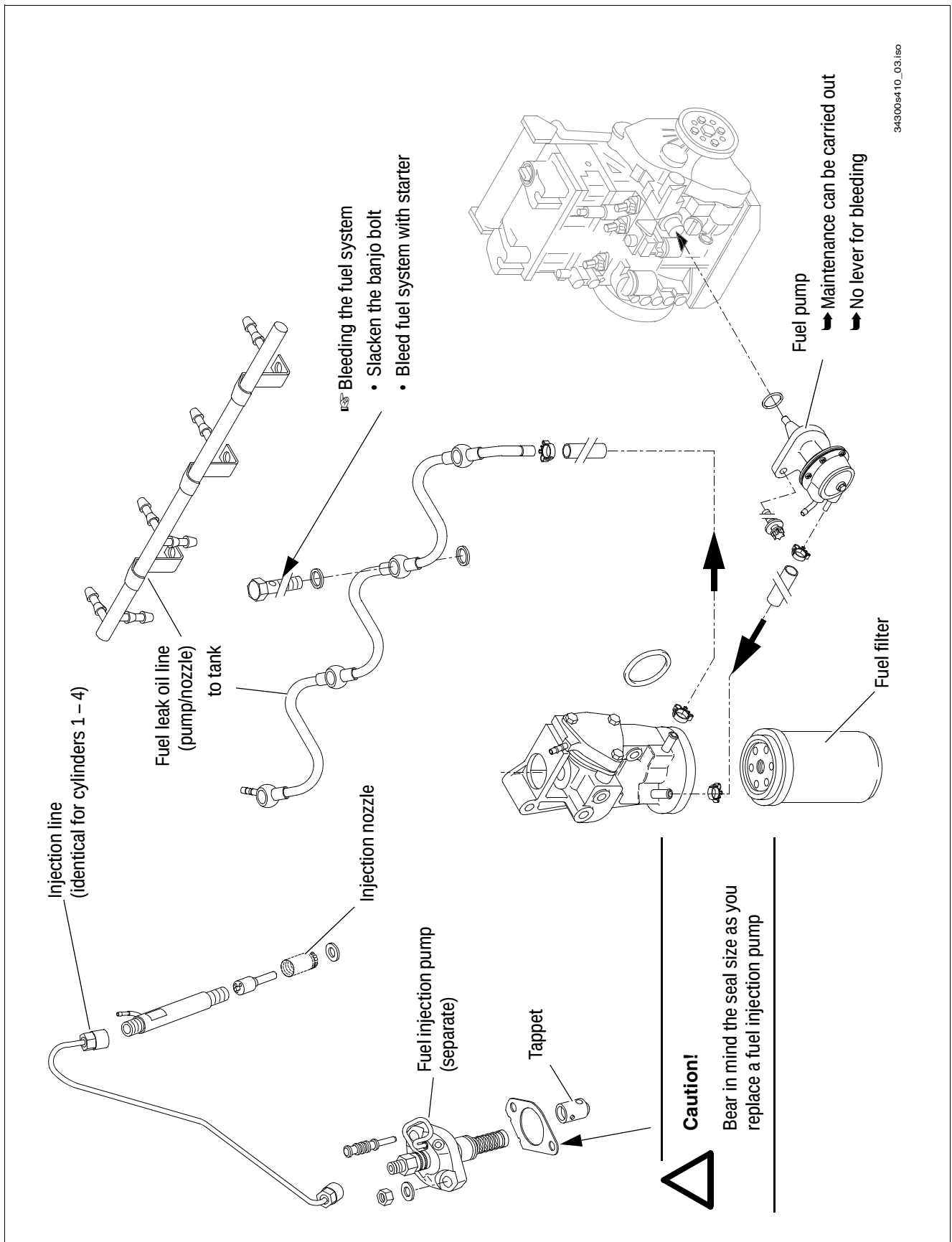


4.2 Engine oil cooling





4.3 Fuel system



4.4 Checking and adjusting valve tip clearance

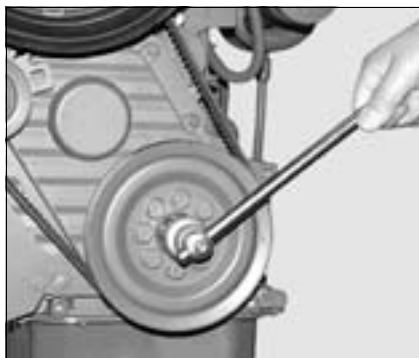


Fig. 49: Turning the engine

☞ *Standard setting of valve tip clearance is possible:*

- ➔ On a cold engine, or on a warm engine after it has cooled down for at least 0.5 h.
- ➔ Oil temperature = 80°C



Important!

Increase valve tip clearance by 0.1 mm every time you change the cylinder head gasket. Set valve tip clearance to standard after 1000 service hours.

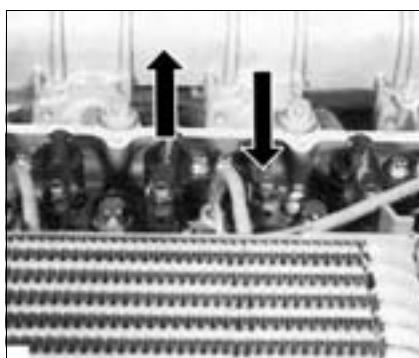


Fig. 50: Valve overlap

The cylinder-head cover has been removed

☞ *Turn the engine until reaching valve overlap, cylinder no. 1*



Important!

Valve overlap means the exhaust valve is not yet closed and the intake valve begins to open. Both push rods cannot be turned



Fig. 51: Setting valve tip clearance

☞ *Set valve tip clearance at each cylinder with the feeler gauge.*

- ➔ Inlet valve tip clearance: 0.3 mm
- ➔ Exhaust valve tip clearance: 0.5 mm

☞ *Tighten the locknut.*

- ➔ Tightening torque: 20 ± 2 Nm
- ➔ Check the setting again with the feeler gauge.



Fig. 52: Placing the cylinder-head cover gasket

☞ Place the gasket.



Fig. 53: Mounting the cylinder-head cover

☞ Slide new rubber hoses onto the overflow line and the fuel injectors as far as they will go.

☞ Mount the cylinder-head cover and the overflow line.

☞ Tighten the screws.

➡ Tightening torque: 8.5 Nm

4.5 Replacing the fuel injection pump

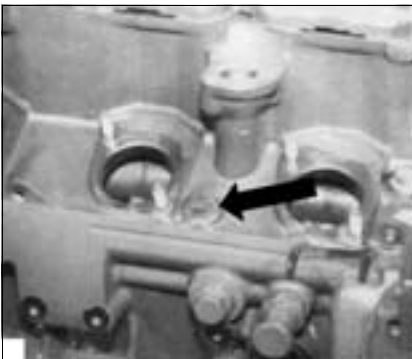


Fig. 54: Crankcase screw plug

☞ Unscrew the screw plug on the crankcase

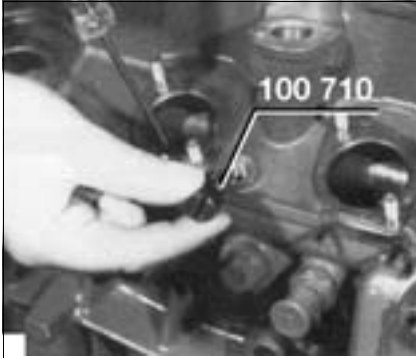


Fig. 55: Setting the adjusting lever

- Set the adjusting lever to centre position.
- Screw in the adjusting pin for the adjusting lever into the crankcase as far as it will go

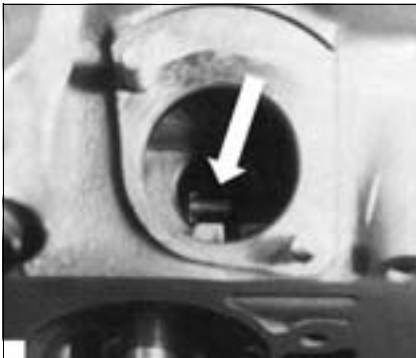


Fig. 56: Camshaft

- Turn the camshaft until the tappet stroke of the cylinder is at lower dead centre

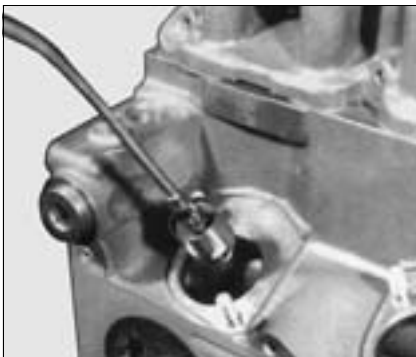


Fig. 57: Mounting the tappets

- Mount the injection pump tappet



Important!

Use a flexible magnetic tool.

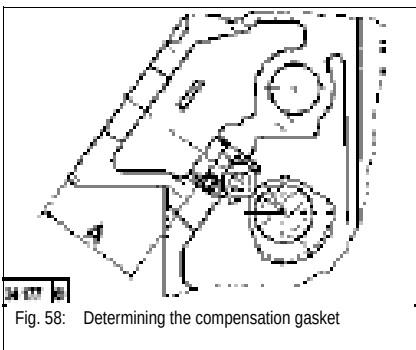


Fig. 58: Determining the compensation gasket

- Determine the compensation gasket

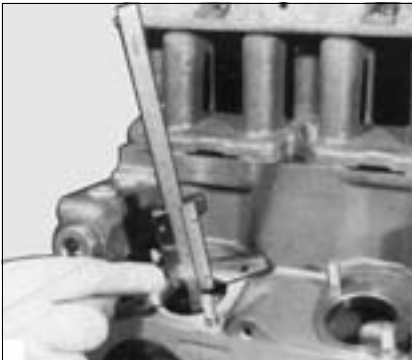


Fig. 59: Measuring the tappet base

➤ Measure dimension "A" from the crankcase base to the tappet base.

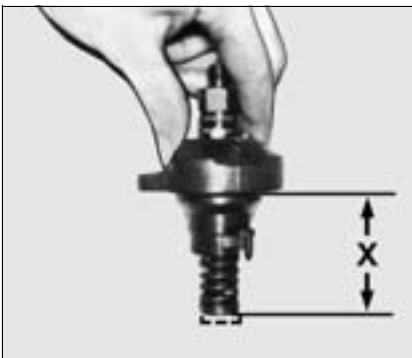


Fig. 60: Fuel injection pump – dimension

➤ Dimension "X" of fuel injection pump = 60 mm



Important!

Dimension "X" is used for calculating the compensation gasket and cannot be measured with the fuel injection pump removed.

➤ Determine the difference between dimensions "X" and "A".

Example:

Dimension "X" = 60.00 mm

- Dimension "A" = 59.35 mm

Difference = 0.65 mm

➤ Select a compensation gasket according to the table and the identification

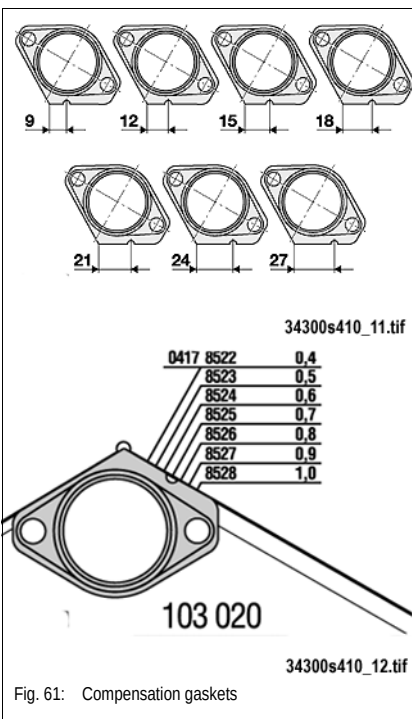


Fig. 61: Compensation gaskets

Difference (mm)	Identification of dimension (mm)
Up to 0.4	9.0
0.401 – 0.5	12.0
0.501 – 0.6	15.0
0.601 – 0.7	18.0
0.701 – 0.8	21.0
0.801 – 0.9	24.0
0.901 – 1.0	27.0

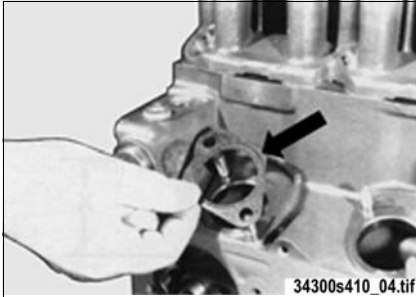


Fig. 62: Placing the compensation gaskets

☞ Place the compensation gaskets as needed



Important!

Make sure they are placed in the correct position.



Fig. 63: Lock pin

☞ Remove the lock pin from the fuel injection pump

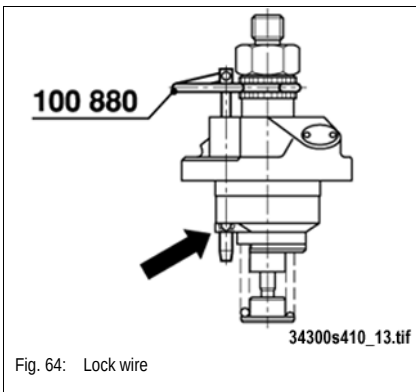


Fig. 64: Lock wire

☞ Make sure the lock wire is locked in the pivot lever before mounting the fuel injection pump

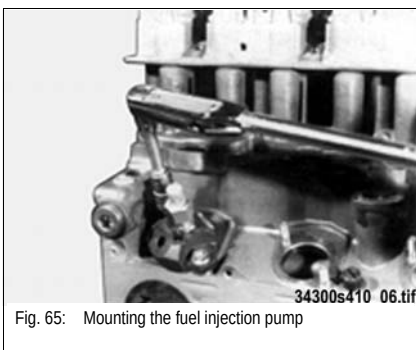


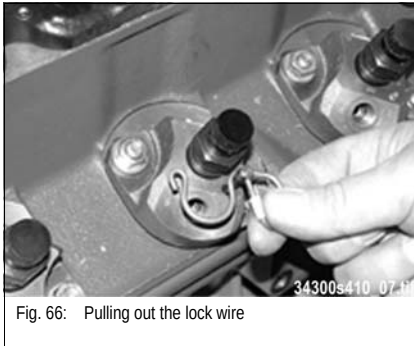
Fig. 65: Mounting the fuel injection pump

☞ Mount the fuel injection pump

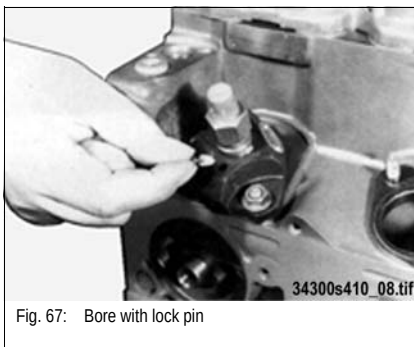
☞ Press the fuel injection pump in evenly as far as it will go

☞ Tighten the nut

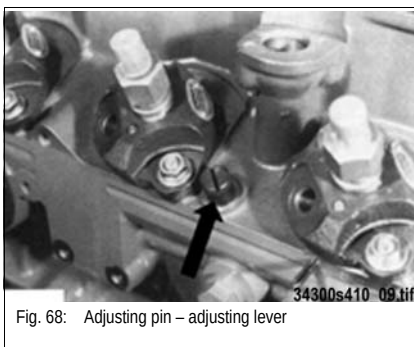
➡ Tightening torque: 21 Nm



Pull out the lock wire



Lock the bore with the lock pin

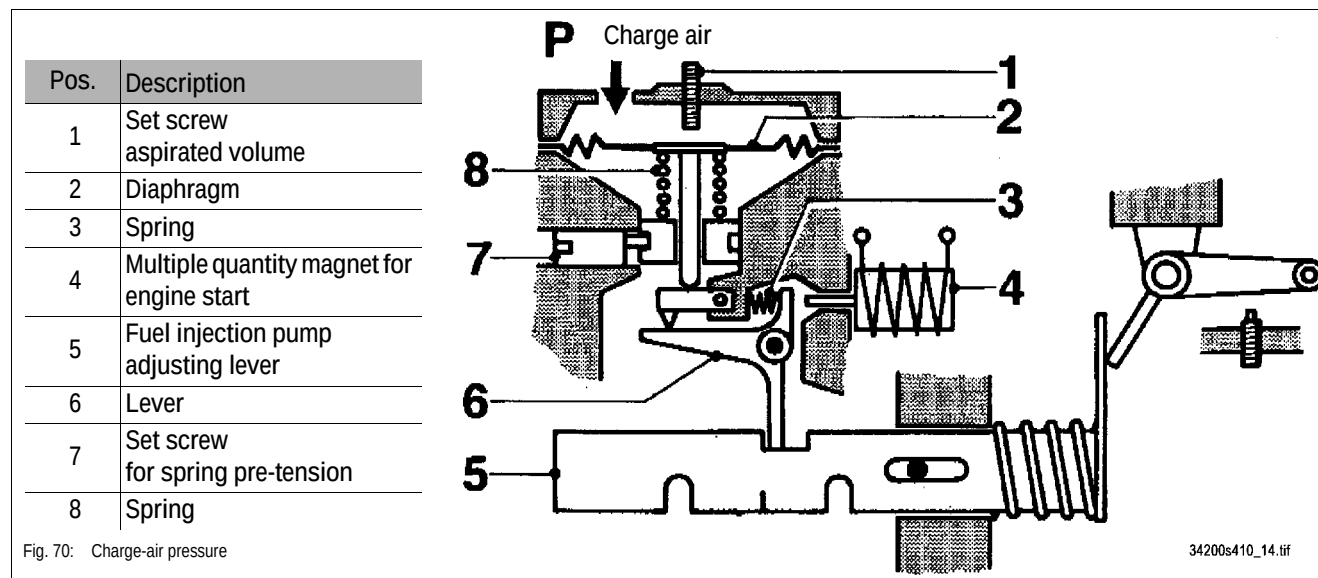


Remove the adjusting pin for the adjusting lever



Tighten the screw plug with a new copper sealing ring
Tightening torque: 18 Nm

4.6 Setting charge-air pressure



- The charge-air pressure acts on diaphragm 2 and on spring 8 which reacts accordingly. This turns bellcrank 6 and sets the adjusting lever to more volume, depending on charge-air pressure.
- At engine standstill, the adjusting lever is blocked by the full-load stop which depends on charge pressure. In order to achieve multiple volume for starting the engine, solenoid 4 presses the mechanism even further as the engine is started
- Set spring pre-tension with eccentric screw 7
 - ➔ Volume released depends on a number of spring features
- Set screw 1 adjusts the intake volume
- Spring 3 ensures the non-positive, clearance-free connection of all components



Charge-pressure dependent full-load stop

The governor is equipped with an extra charge-pressure dependent full-load stop. This avoids carbon particle emissions of supercharged engines if the load suddenly changes from low part-load to full-load. Full-load stop releases only the amount of fuel needed for the available combustion air.

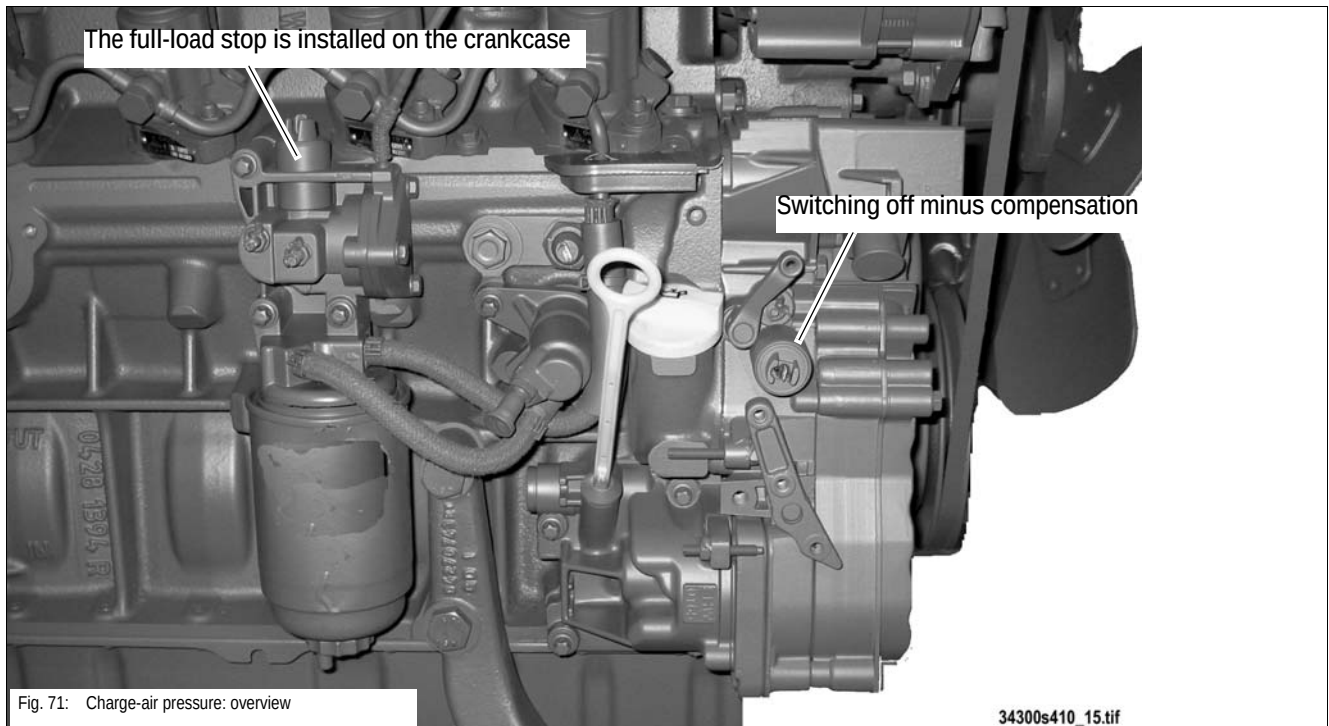


Fig. 71: Charge-air pressure: overview

34300s410_15.tif

Switching off minus compensation

The engine receives more fuel during the start procedure, with the help of the start quantity spring.

In order to keep minus compensation from counteracting and neutralising the additional start quantity, minus compensation is switched off with a solenoid (terminal 50).

In order to do so, the solenoid separates the reversing lever from the compensation lever.

Some injection systems receive too much fuel as engine revs drop, i.e. the engine receives more fuel than fresh air.

➡ The engine smokes

👉 *The fuel quantity must be reduced*

Minus compensation – function

The reversing lever is loosely connected to the compensation lever. If the engine runs under load, engine revs drop and the compensation lever moves towards extra volume.

The reversing lever inverts this movement and the adjusting lever is moved towards less volume.

4.7 Removing/mounting the cylinder head



Fig. 72: Determining the cylinder-head gasket

☞ Determine the cylinder-head gasket's identification (see circle)

Piston projection (mm)	Identification (slot)
0.530 – 0.690	1 slot
0.691 – 0.760	2 slots
0.761 – 0.830	3 slots

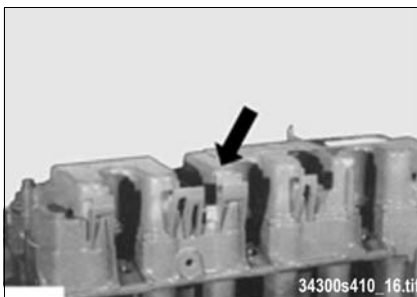


Fig. 73: Removing the cylinder-head cover

☞ Remove the cylinder-head cover

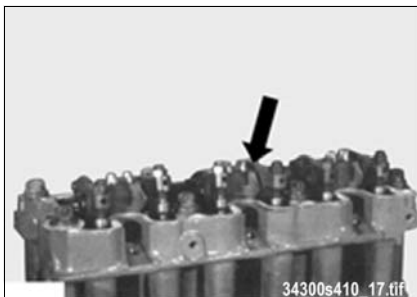


Fig. 74: Removing the rocker arm bracket

☞ Remove the rocker arm brackets

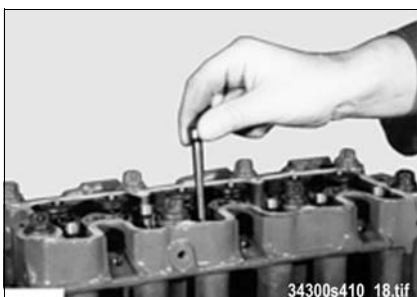
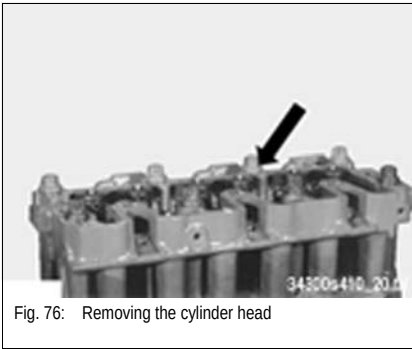
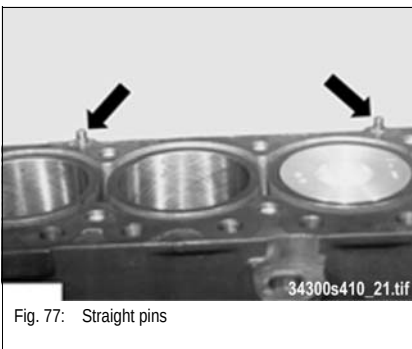


Fig. 75: Removing the valve tappets

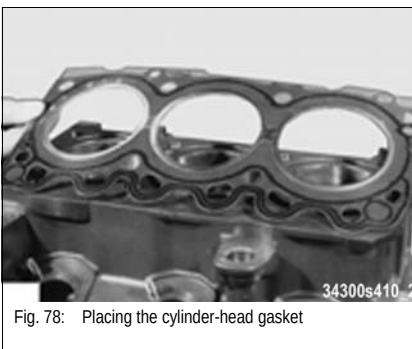
☞ Remove the valve tappets



☞ Carefully raise the cylinder head from the engine block



☞ Make sure the straight pins are in their positions.

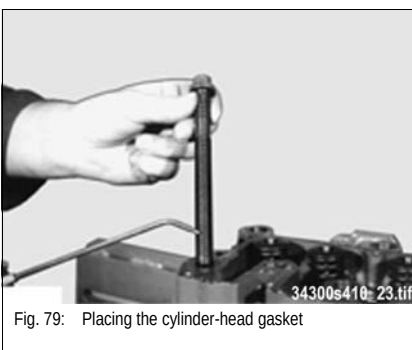


☞ Place the cylinder-head gasket



Caution!

The sealing surfaces must be clean and free of oil



☞ Check the length of the cylinder-head bolts

☞ 150 ± 0.8 mm

☞ Mount the cylinder head

☞ Apply a thin coat of oil to the cylinder-head bolts

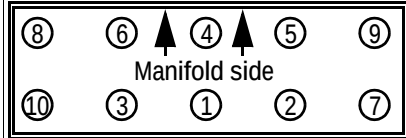


Fig. 80: Mounting the cylinder-head bolts

☞ Mount the cylinder-head bolts

➡ Tightening torque:

- 1st pass 30 Nm
- 2nd pass 80 Nm
- 3rd pass 160 Nm
- Angle for retightening: 90°



Caution!

Bear in the mind the order for tightening the cylinder-head bolts!

☞ See figure

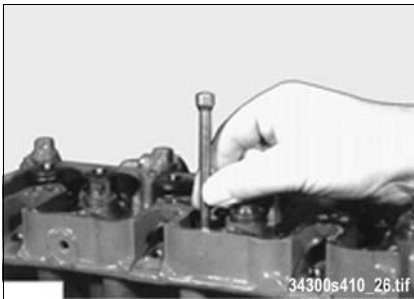


Fig. 81: Inserting the push rods

☞ Insert the push rods

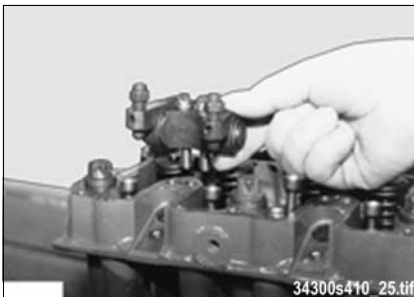


Fig. 82: Mounting the rocker arm bracket

☞ Mount the rocker arm bracket and align it with the push rods

➡ Tightening torque: 21 Nm

☞ Set valve tip clearance

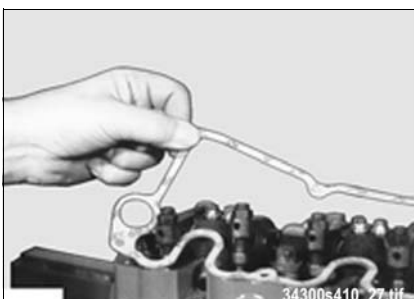


Fig. 83: Mounting the cylinder-head cover

☞ Place the gasket for the cylinder-head cover

☞ Mount the cylinder-head cover

➡ Tightening torque: 8.5 Nm



Sealing the bleeder valve



Fig. 84: Bleeder valve

- Remove the cover
- Clean the bleeder valve
- Mount a new O-ring
- Mount the cover
- Tightening torque: 8.5 Nm

Intake/exhaust manifold



Fig. 85: Intake manifold seals

- Mount new gaskets
- Mount the intake/exhaust manifold

Tightening torque

- Intake manifold: 21 Nm
- Exhaust manifold 55 Nm

4.8 Engine trouble

Problem	Possible causes
Engine does not start or is not easy to start	Handbrake not applied
	Steering-column control lever not in neutral
	Engine starting temperature too low
	Wrong SAE grade of engine lubrication oil
	Fuel quality does not comply with specifications
	Defective or flat battery
	Loose or oxidised cable connections in starter circuit
	Defective starter, or pinion does not engage
	Wrong valve tip clearance
	Defective fuel injector
Engine starts, but does not run smoothly or faultless	Fuel quality does not comply with specifications
	Wrong valve tip clearance
	Injection line leaks
	Defective fuel injector



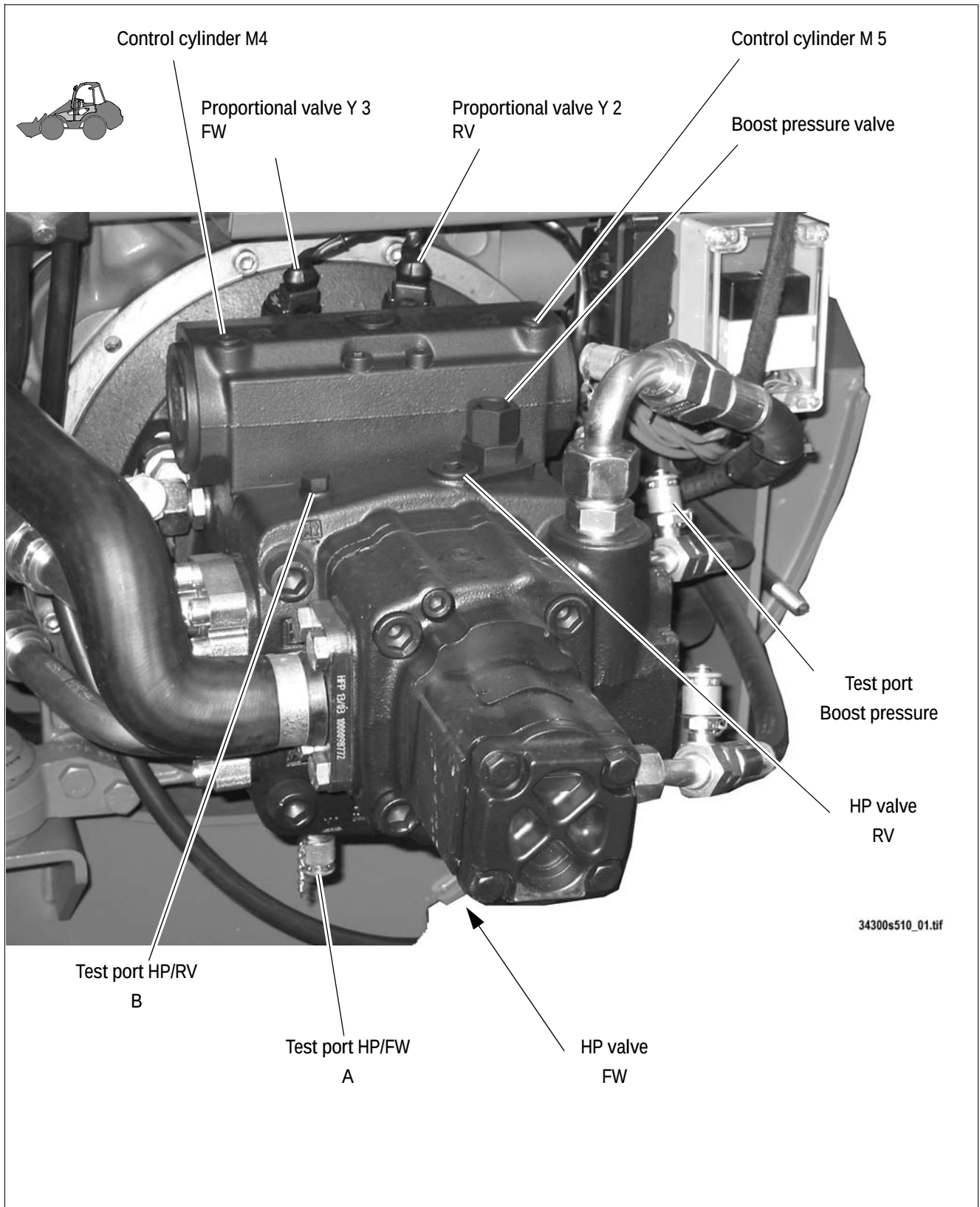
Problem		Possible causes
Engine overheats. Temperature warning system responds		Oil level too low
		Oil level too high
		Air filter fouled
		Defective air filter maintenance switch or gauge
		Oil cooler fins fouled
		Defective fan, torn or loose V-belt
		Cooling air heats up
		Resistance in cooling system too high, flow capacity too low
		Defective fuel injector
Insufficient engine output		Oil level too high
		Fuel quality does not comply with specifications
		Air filter fouled
		Defective air filter maintenance switch or gauge
		Wrong valve tip clearance
		Injection line leaks
		Defective fuel injector
Engine does not run on all cylinders		Injection line leaks
		Defective fuel injector
Insufficient or no engine oil pressure		Oil level too low
		Engine inclination too high
		Wrong SAE grade of engine lubrication oil
Engine oil consumption too high		Oil level too high
		Engine inclination too high
Engine smoke	Blue	Oil level too high
		Engine inclination too high
	White	Engine starting temperature too low
		Fuel quality does not comply with specifications
		Wrong valve tip clearance
		Defective fuel injector
	Black	Air filter fouled
		Defective air filter maintenance switch or gauge
		Wrong valve tip clearance
		Defective fuel injector

Power train



5 Power train

5.1 Variable displacement pump (20 – 40 kph)





5.2 Hydraulic motor – control element (20 kph)



Driving direction identification Y 13 (FW/energised)
VT/GN

1 – 2 speed Y 4
(1st speed energised)
BN



Flush valve

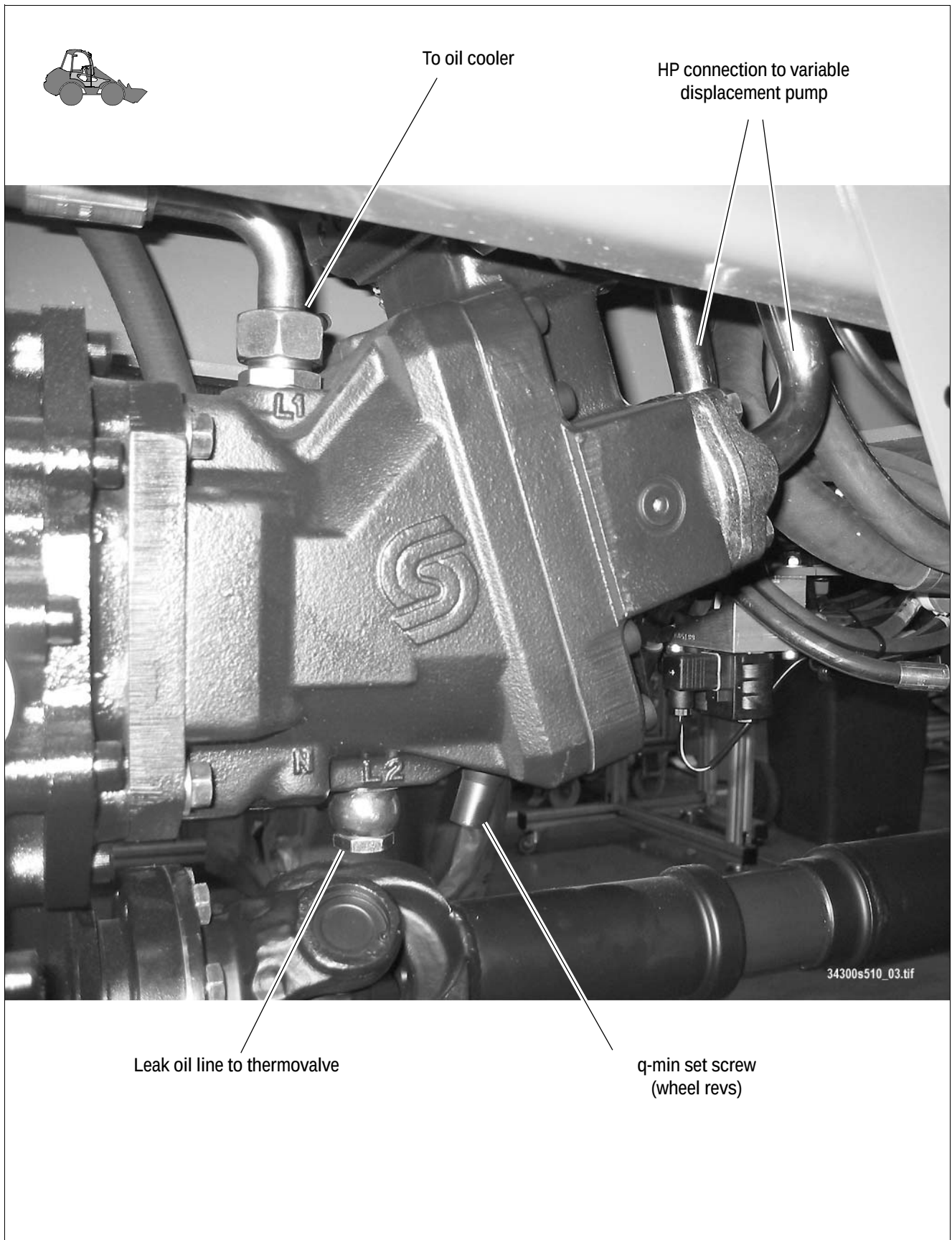
Test port
(control initiation)

Set screw
(control initiation)

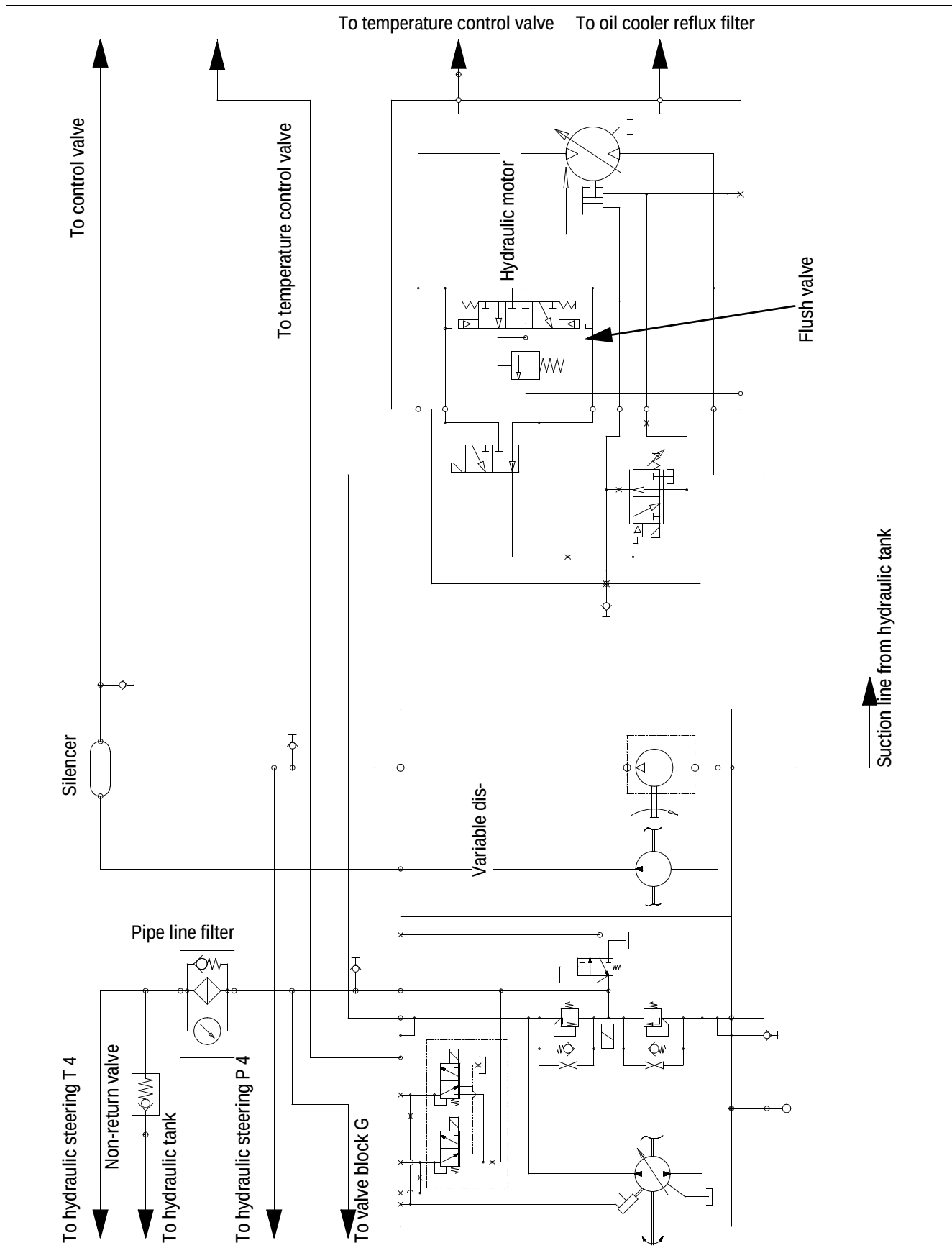
34300s510_02.tif



5.3 Hydraulic motor – hydraulic connections (20 kph)



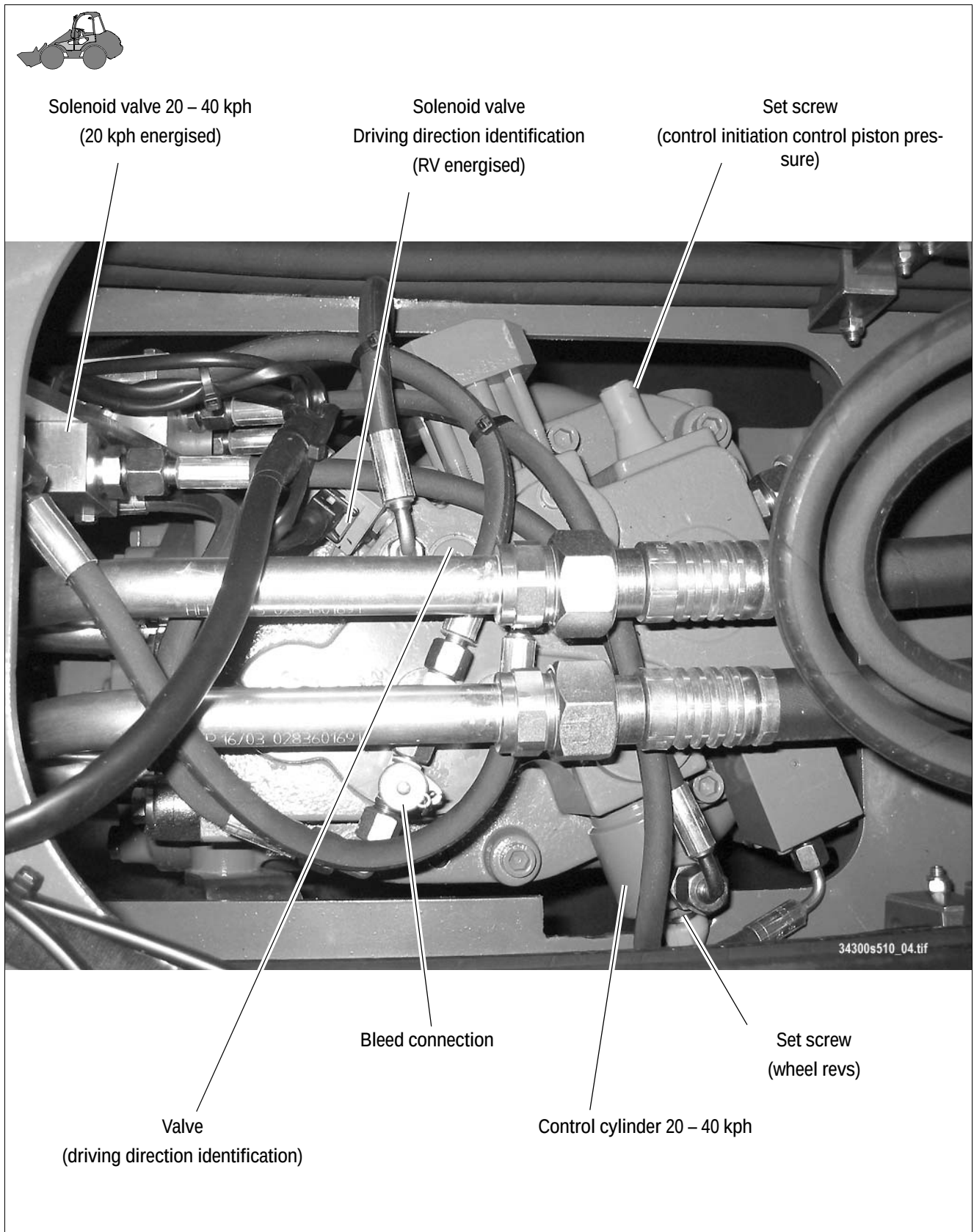
5.4 Power train diagram (20 kph)



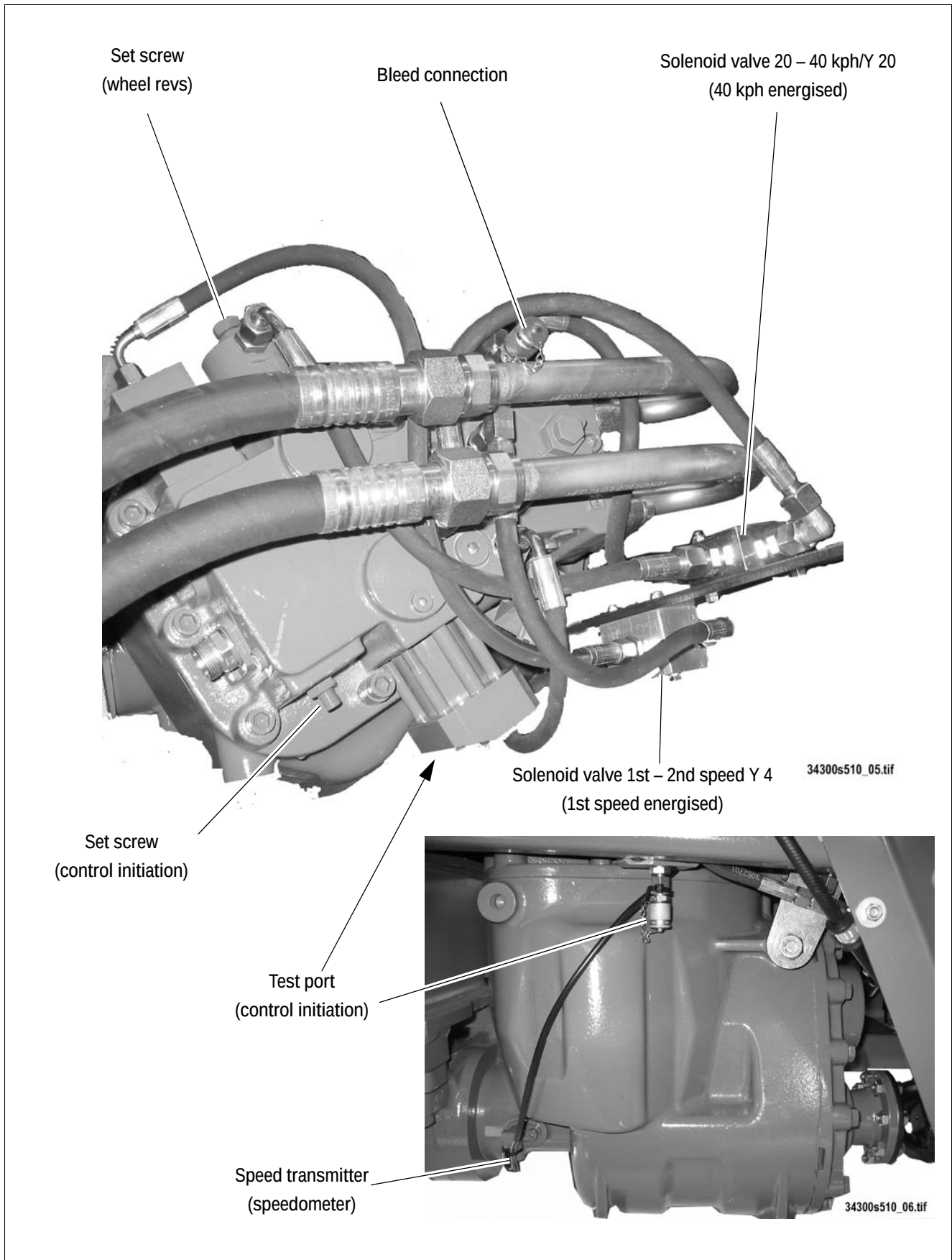


5.5 ECO speed – hydraulic motor with changeover valve

Top view

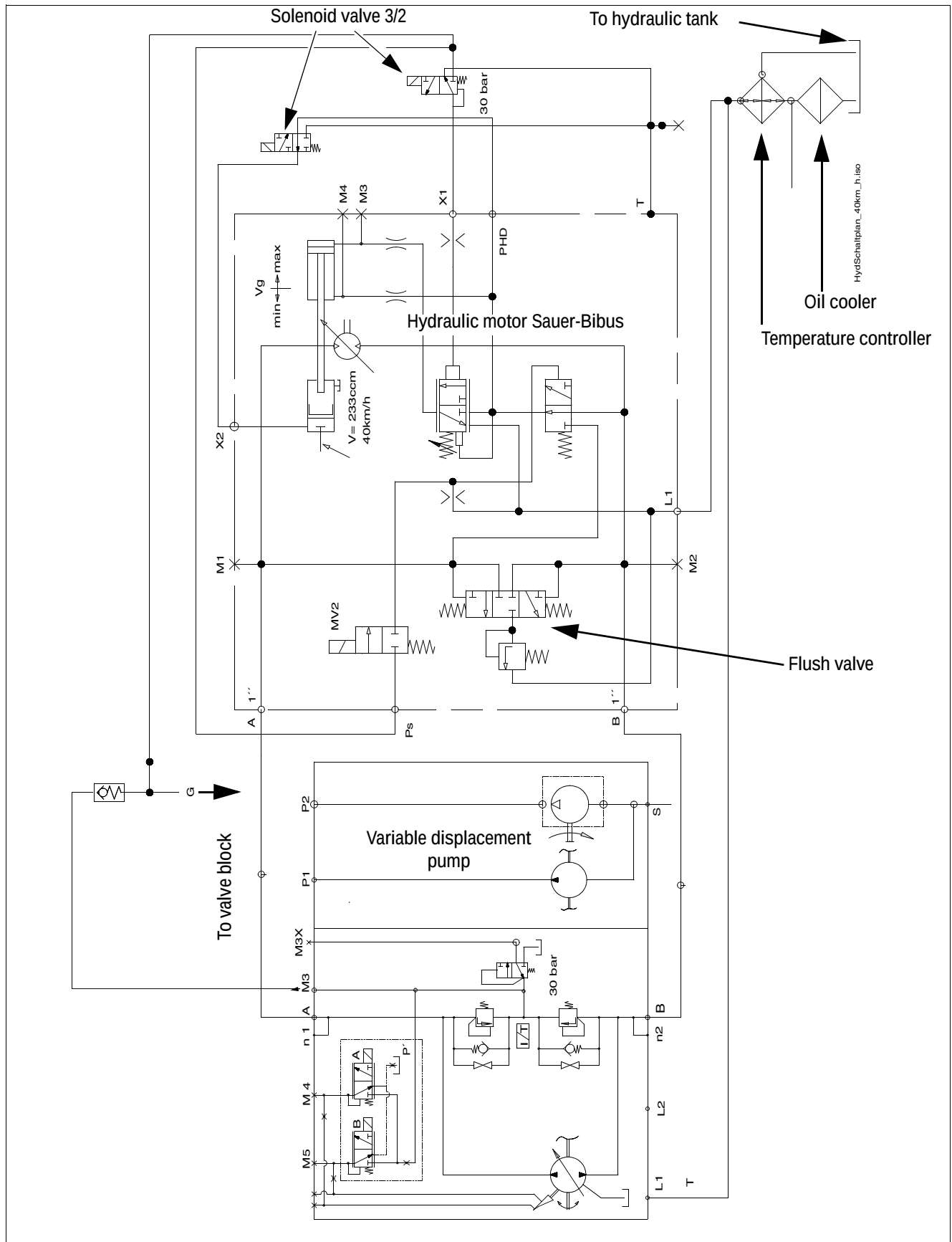


External solenoid valves and test port – ECO speed hydraulic motor





5.6 ECO speed with changeover valve: diagram





5.7 Test report with changeover valve models 343-00 (580), 343-01 (680)

Model: _____	Prod. no. variable displacement pump _____	Prod. no. variable displacement motor _____	Serial no. _____
-----------------	---	--	---------------------

Test conditions:	Rated oil temperature: 50 – 60 °C Rated driving direction: FW
------------------	--

See page:	Test features:	Notes:		Nominal value: (rpm)	✓
	Min. idling speed		1050 – 1080 min ¹		
	Max. idling speed		2430 – 2470 min ¹		
5-10	Boost pressure	Max. engine revs	30 – 35 bar		
	Starting revs	2nd speed	1050 – 1150 min ¹		
5-12	High pressure Drive pressure	2nd speed braked max. engine revs	460 – 490 bar		
5-11	Hydraulic resistance curve	2nd speed braked @ 2000 rpm	Over 300 bar		
5-13	Engine droop	1st speed braked max. engine revs 225 – 235 bar	2250 – 2350 min ¹		

Hydraulic motor settings

5-14, 5-15	Control piston pressure control initiation	2nd speed after braking	190 – 210 bar		
5-16,	Wheel speed 20 kph version 30 kph version 40 kph version	max. engine revs 225 – 235 bar	 95 – 100 min ¹ 156 – 160 min ¹ 198 – 202 min ¹		
	Cardan shaft revs	20 kph 30 kph 40 kph	1520 – 1600 rpm 2496 – 2560 rpm 3168 – 3232 rpm		



5.8 Towing and transporting the vehicle

Safety instructions

- The vehicle may only be towed using suitable towing equipment (towing bar or cable) in connection with suitable towing facilities, such as a towing coupling, hooks and eyes!
- Move off slowly!
Make sure no-one is dangerously close to the towing bar
- The vehicle may only be towed with a cable if the service brakes and steering are fully operational!

Towing



Danger!

Turning the steering wheel requires greater effort if the diesel engine breaks down. Take this into account, especially when towing the vehicle!

☞ Use a towing bar!



Caution!

The hydrostatic power train can be damaged when towing the vehicle!

☞ Switch off the engine!

☞ Short-circuit the hydraulic circuit before towing (see below)

☞ Do not tow the vehicle for more than 100 meters and do not tow it faster than 3 – 4 kph!

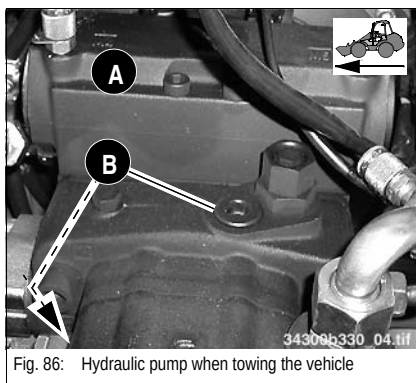


Fig. 86: Hydraulic pump when towing the vehicle

Tow away the vehicle as follows:

☞ Set the drive to neutral

☞ Apply the handbrake

☞ Stop the engine

☞ Fit an adequately sized towing bar to the towing facilities

☞ Switch over HP relief valves B on the hydraulic pump A. To do this:

- Unscrew high pressure valves B (upper and lower) by 4 turns with an allen key

☞ If possible, run the engine at idling speed when towing the vehicle



Caution!

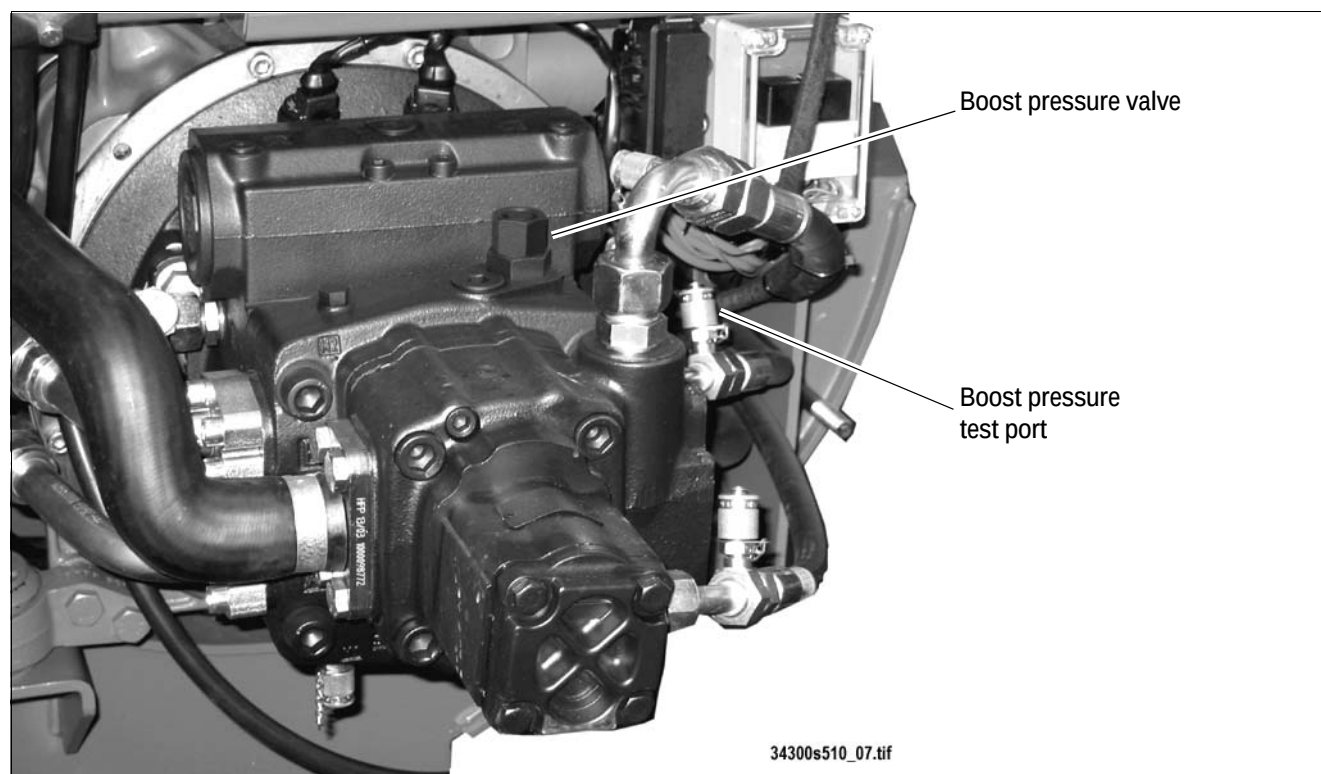
Screw high pressure valves B back in and tighten to 85 Nm after towing the vehicle

5.9 Check and adjustment instructions with changeover valve

Adjusting boost pressure

Tools required:

- 2 x pressure manometer 600 bar
- 2 x pressure manometer 60 bar
- Impulse tachometer



Check/adjust boost pressure as follows:

- ☞ Move the drive lever to neutral
- ☞ Apply the handbrake
- ☞ Connect the 60 bar pressure manometer to the test port
- ☞ Start the diesel engine and set max. revs
 - ➡ Boost pressure at max. engine revs: 30 – 35 bar

If boost pressure is too low:

- ☞ Screw in the boost pressure valve

If boost pressure is too high:

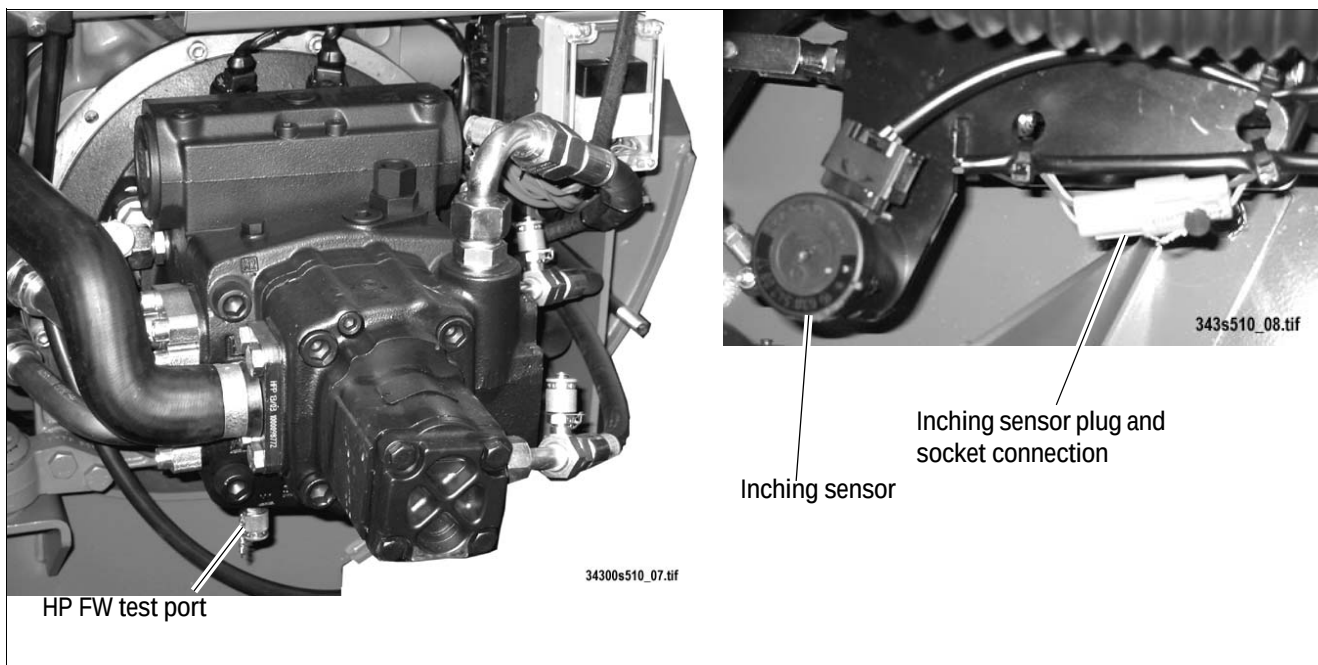
- ☞ Screw out the boost pressure valve



Setting engine droop

Tools required:

- Pressure gauge (600 bar)
- Impulse tachometer



Check/adjust engine droop as follows:

- ☞ Safely jack up the vehicle at the front and rear
- ☞ Switch off the ignition
- ☞ Remove the plug from the inching sensor



Caution!

Disconnecting the inching sensor plug with the ignition switched on disables the drive electronics data (SUSMIC), which must be entered again!
(– see *Enabling the SUSMIC-DIA 1* on page 5-32)

- ☞ Connect the pressure manometer to the test port (high pressure FW)
- ☞ Connect the impulse tachometer to the diesel fuel injection line
- ☞ Start the engine
- ☞ Move the drive lever to 1st speed (FW)
- ☞ Set the diesel engine to maximum revs
- ☞ Slowly brake the vehicle with the service brake to 225 – 235 rpm
 - ➡ Maximum diesel engine revs must be 2250 – 2350 rpm

If diesel engine revs are too low:

- ☞ Check the diesel engine

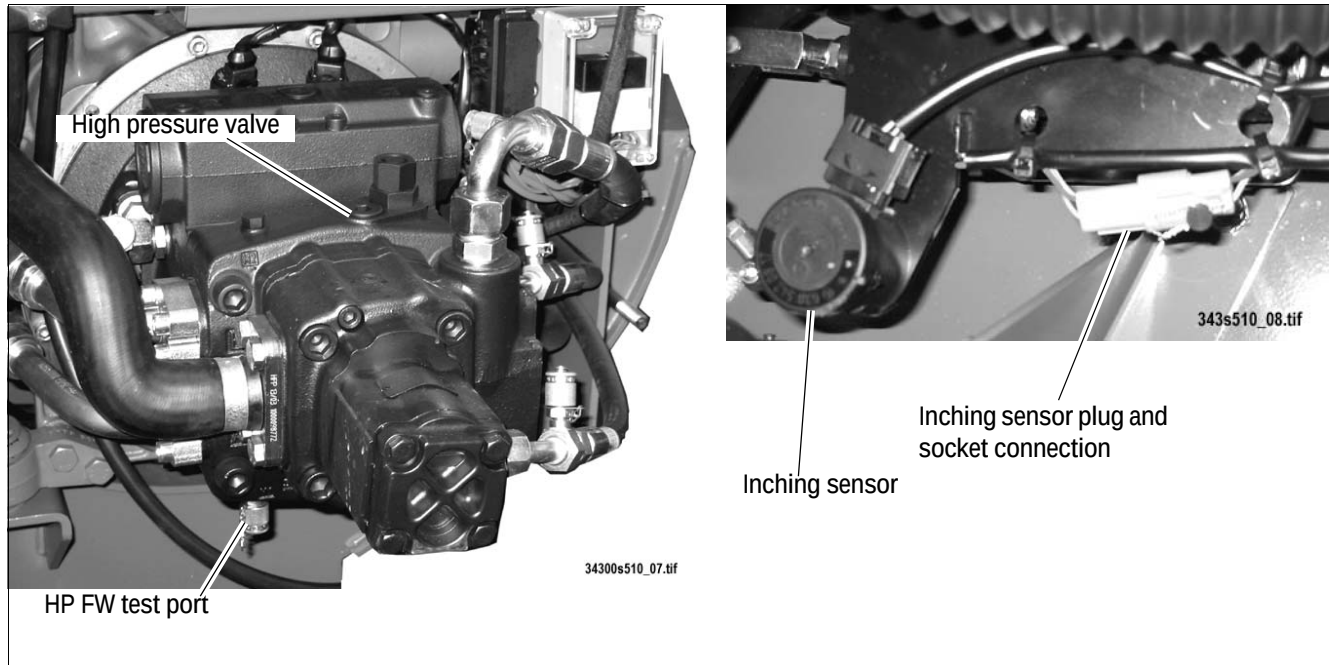
If high pressure is too low at prescribed engine revs:

- ☞ Check the variable displacement pump and the hydraulic motor

Checking high pressure

Tools required:

- Pressure gauge (600 bar)



Check high pressure as follows:

- ☞ Switch off the ignition
- ☞ Remove the plug from the inching sensor



Caution!

Disconnecting the inching sensor plug with the ignition switched on disables the drive electronics data (SUSMIC), which must be entered again (– see *Enabling the SUSMIC-DIA 1* on page 5-32)

- ☞ Connect the pressure gauge
- ☞ Start the diesel engine and move the drive lever to 1st speed range (forwards)
- ☞ Drive the vehicle against hydraulic resistance
 - ➔ Do not allow the wheels to spin (use the service brake if required)
- ☞ Read the pressure manometer
 - ➔ High pressure must be 460 – 490 bar



Important!

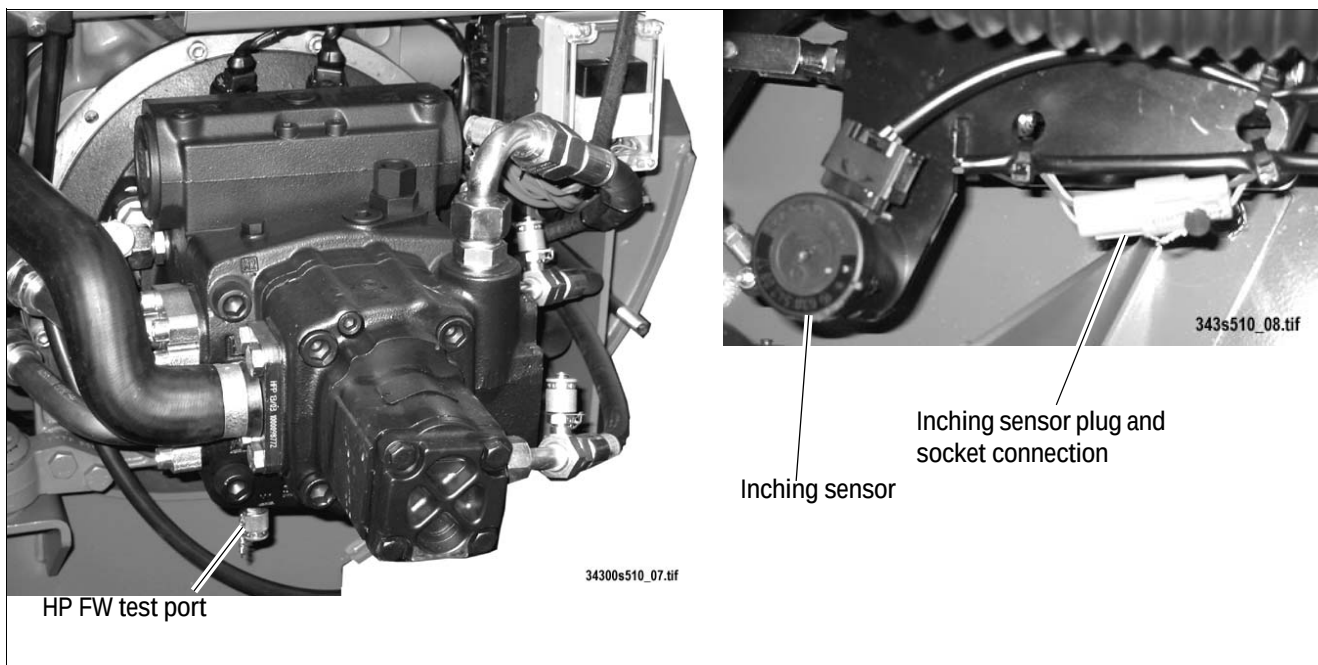
It is not possible to adjust the high pressure valves



Setting engine droop

Tools required:

- Pressure gauge (600 bar)
- Impulse tachometer



Check/adjust engine droop as follows:

- ☞ Safely jack up the vehicle at the front and rear
- ☞ Switch off the ignition
- ☞ Remove the plug from the inching sensor



Caution!

Disconnecting the inching sensor plug with the ignition switched on disables the drive electronics data (SUSMIC), which must be entered again!
(– see *Enabling the SUSMIC-DIA 1* on page 5-32)

- ☞ Connect the pressure manometer to the test port (high pressure FW)
- ☞ Connect the impulse tachometer to the diesel fuel injection line
- ☞ Start the engine
- ☞ Move the drive lever to 1st speed (FW)
- ☞ Set the diesel engine to maximum revs
- ☞ Slowly brake the vehicle with the service brake to 225 – 235 rpm
 - ➡ Maximum diesel engine revs must be 2250 – 2350 rpm

If diesel engine revs are too low:

- ☞ Check the diesel engine

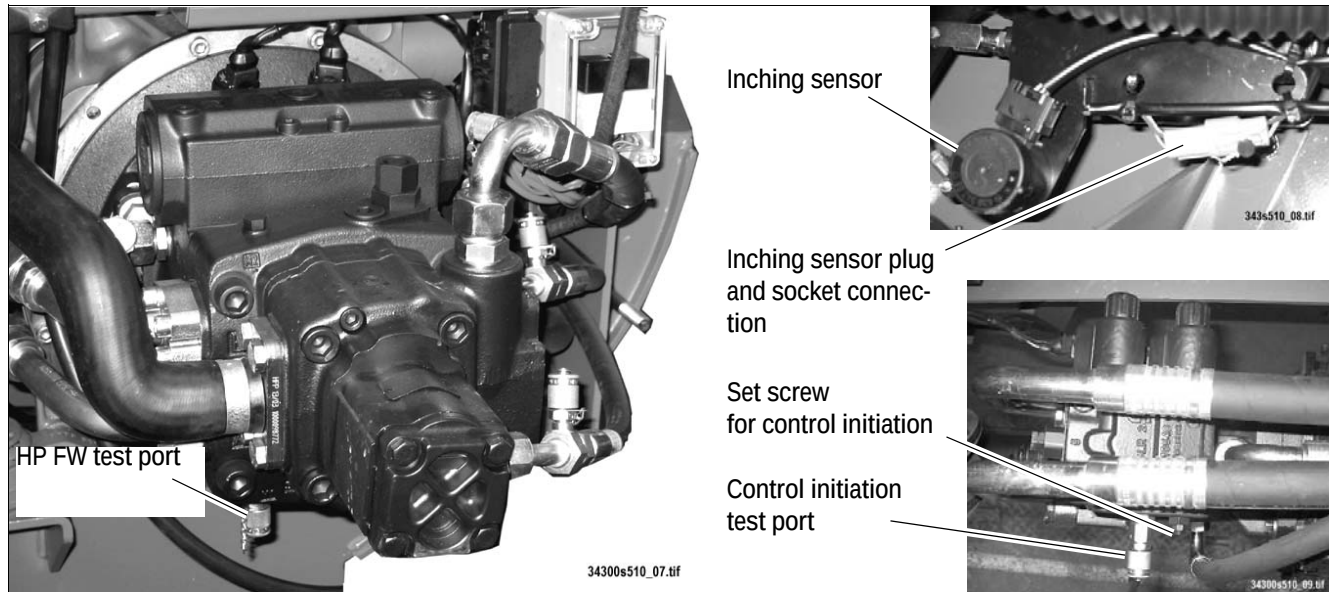
If high pressure is too low at prescribed engine revs:

- ☞ Check the variable displacement pump and the hydraulic motor

Setting control initiation on the hydraulic motor (20 kph)

Tools required:

- 2 x pressure manometer 600 bar



Check/adjust control initiation as follows:

- ☞ Safely jack up the vehicle at the front and rear
- ☞ Switch off the ignition
- ☞ Remove the plug from the inching sensor



Caution!

Disconnecting the inching sensor plug with the ignition switched on disables the drive electronics data (SUSMIC), which must be entered again!
(– see *Enabling the SUSMIC-DIA 1* on page 5-32)

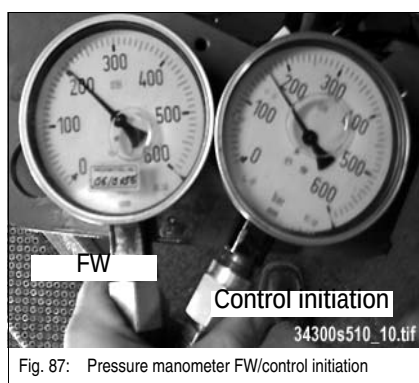


Fig. 87: Pressure manometer FW/control initiation

- ☞ Connect the pressure manometer to the test port (HP FW and control initiation)
- ☞ Move the drive lever to 2nd speed (FW)
- ☞ Set the diesel engine to maximum revs
- ☞ Slowly brake the vehicle with the service brake
 - ➔ High pressure and control initiation both rise
 - ➔ Control initiation 190 – 210 bar
- ☞ As soon as the pressure manometer for control initiation slowly drops:
 - ➔ Read the pressure manometer FW
 - ➔ Control initiation

Setting: control initiation starts later

- ☞ Screw in the set screw

Setting: control initiation starts sooner

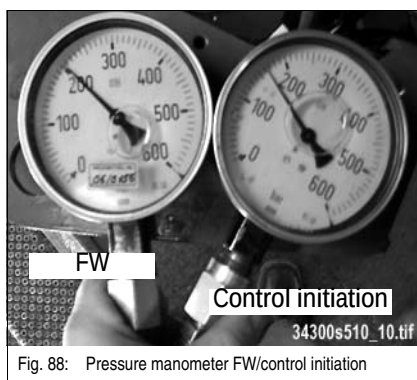
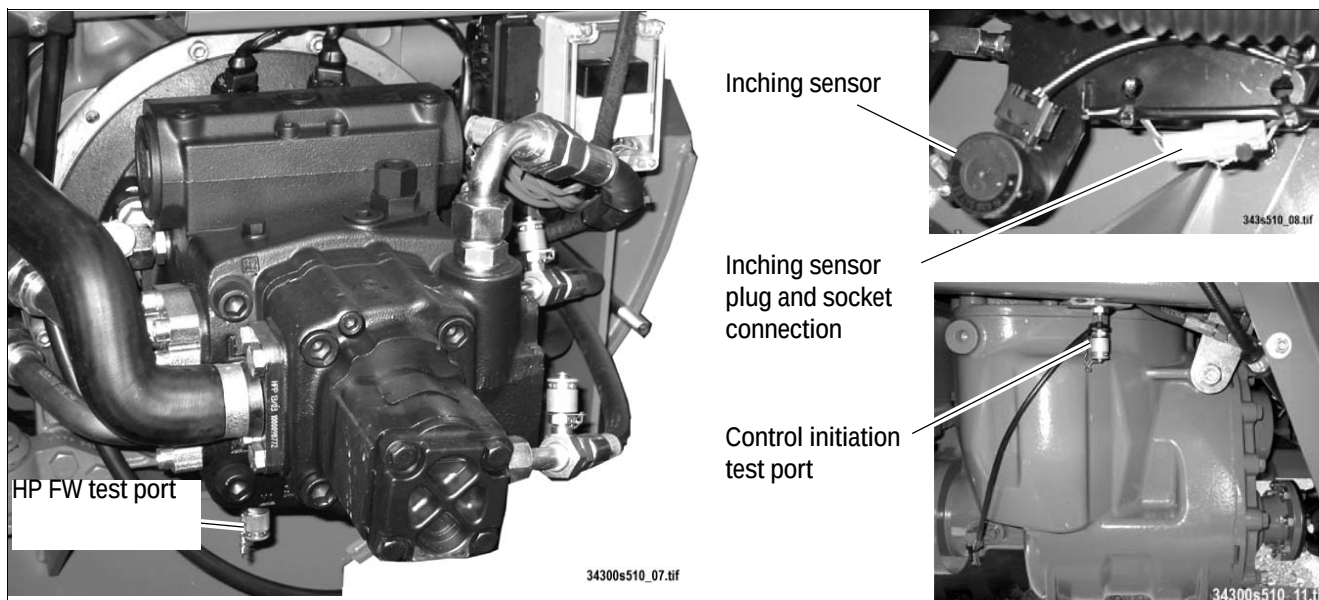
- ☞ Unscrew the set screw



Setting control initiation on the hydraulic motor (40 kph ECO-Speed)

Tools required:

- 2 x pressure manometer 600 bar



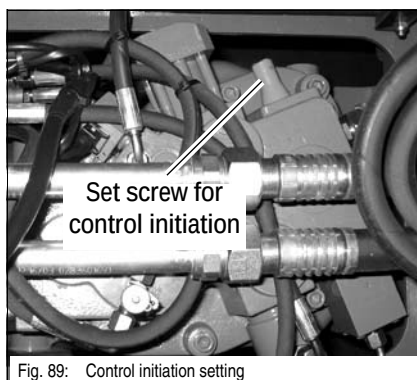
Check/adjust control initiation as follows:

- ☞ Safely jack up the vehicle at the front and rear
- ☞ Switch off the ignition
- ☞ Remove the plug from the inching sensor



Caution!

Disconnecting the inching sensor plug with the ignition switched on disables the drive electronics data (SUSMIC), which must be entered again!
(– see *Enabling the SUSMIC-DIA 1* on page 5-32)



- ☞ Connect the pressure manometer to the test port (HP FW and control initiation)
- ☞ Move the drive lever to 2nd speed (FW)
- ☞ Set the diesel engine to maximum revs
- ☞ Slowly brake the vehicle with the service brake
 - ➔ High pressure and control initiation both rise
 - ➔ Control initiation 190 – 210 bar
- ☞ As soon as the pressure manometer for control initiation slowly drops:
 - ➔ Read the pressure manometer FW
 - ➔ Control initiation

Setting: control initiation starts later

- ☞ Screw in the set screw

Setting: control initiation starts sooner

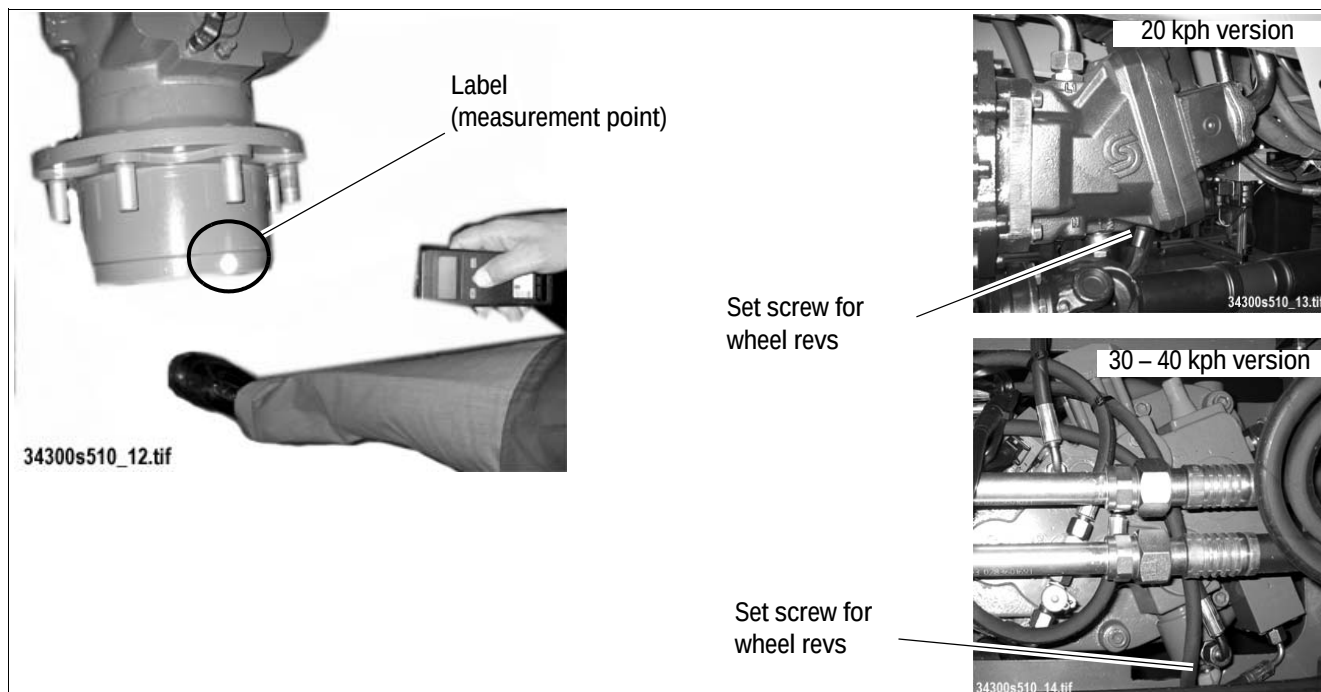
- ☞ Unscrew the set screw



Setting wheel revs (20 – 40 kph version)

Tools required:

- Tachometer (infrared)



Check/adjust wheel revs as follows:

- ☞ Safely jack up the vehicle at the front and rear
- ☞ Move the drive lever to 2nd speed (FW)
 - ➡ Bear in mind steering electronics
- ☞ Set the diesel engine to maximum revs
- ☞ Measure wheel revs at the wheel hub with the tachometer

Prescribed wheel revs

- 20 kph version
 - ➡ 95 – 100 rpm
- 30 kph version
 - ➡ 156 – 160 rpm
- 40 kph version
 - ➡ 198 – 202 rpm

Lower wheel revs

- ☞ Screw in the set screw

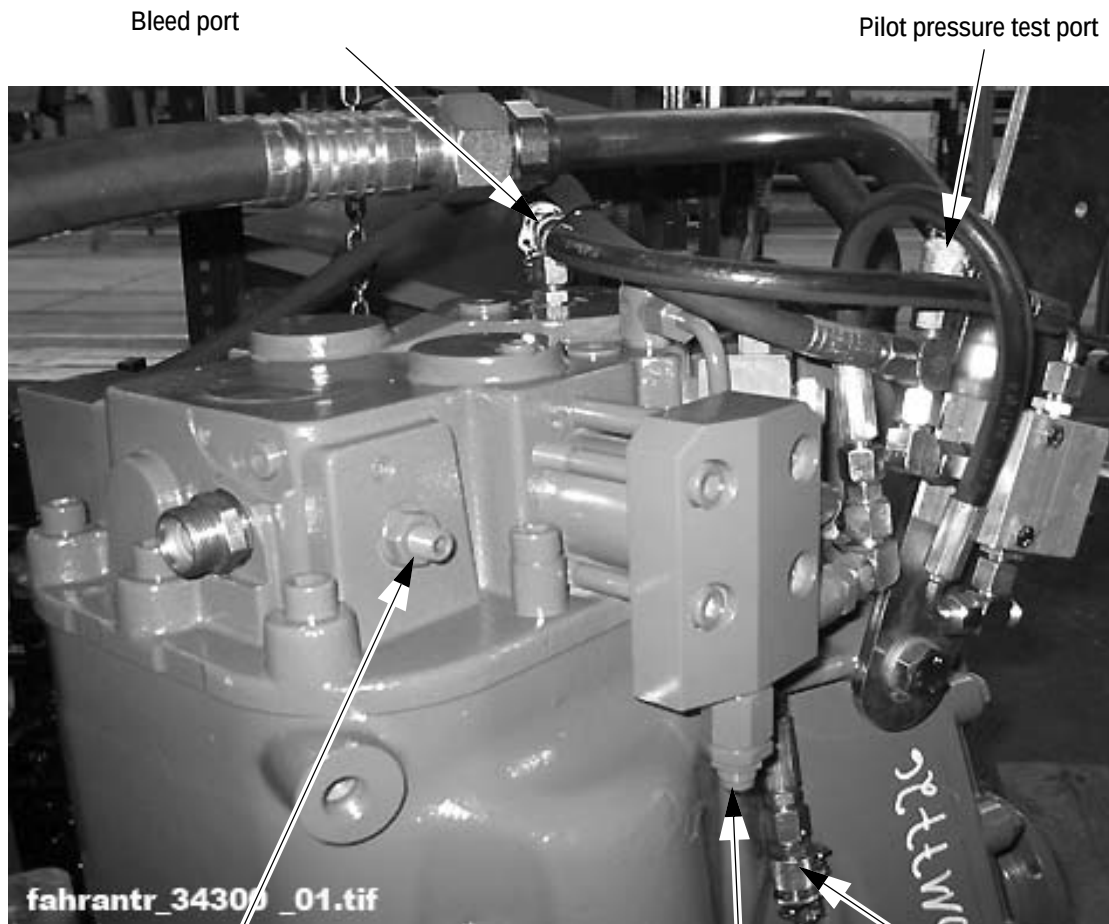
Higher wheel revs

- ☞ Unscrew the set screw



5.10 ECO speed – hydraulic motor without changeover valve

Top view



Turn set screw from Qmax to Qmin
(pressure gauge must show 60 bar)



Caution!

Raise engine revs minimally

⚠ Otherwise pressure rises far beyond 60 bar

Turn set screw
from Qmin to Qmax
(pressure gauge must show 600 bar)

Test port for Qmax – Qmin
and Qmin – Qmax



5.11 Test report without changeover valve models 343-00 (580), 343-01 (680)

Model: _____	Prod. no. variable displacement pump _____	Prod. no. variable displacement motor _____	Serial no. _____
-----------------	---	--	---------------------

Test conditions:	Rated oil temperature: 50 – 60 °C Rated driving direction: FW
------------------	--

See page	Test features:	Notes:		Nominal value: (rpm)	✓
----------	----------------	--------	--	----------------------	---

Measurements on hydraulic pump

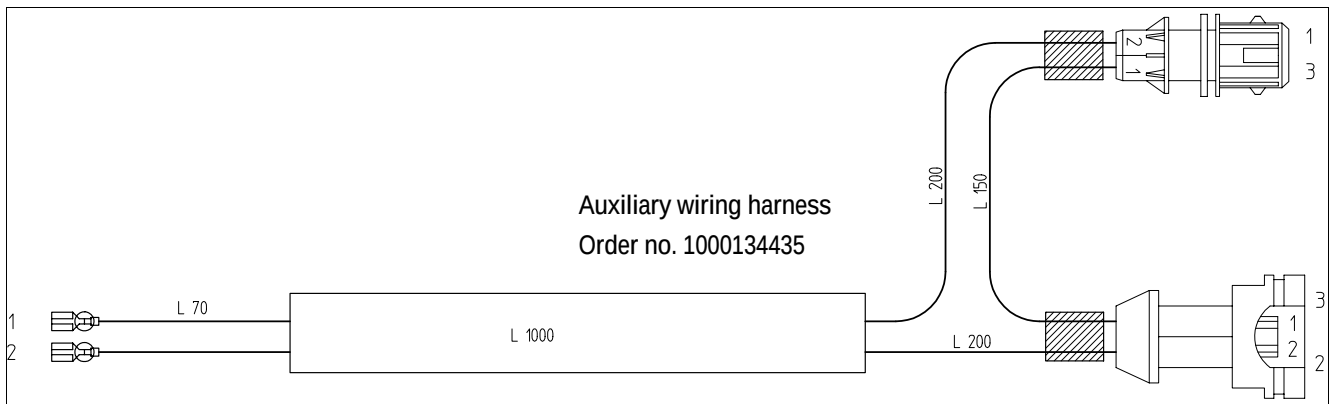
	Min. idling speed	Measured on crankshaft	1050 – 1080 min ⁻¹		
	Max. idling speed	Measured on crankshaft	2430 – 2470 min ⁻¹		
	Boost pressure	At max. revs	30 – 35 bar		
	Boost pressure drop	Upon reaching starting revs	1 – 2 bar		
	Starting revs	Measured on crankshaft	1150 – 1250 rpm		
	High pressure	2nd speed range against hydraulic resistance at max. revs	460 – 490 bar		
	Engine droop (diesel engine)	Measured on crankshaft. 1st speed range full throttle 225 – 235 bar.	2050 – 2200 rpm		

Measurement of Eco speed hydraulic motor

	Driving direction identification	Electric contact Y 13	Reverse		
	Adjustment from Qmax to Qmin.	Raise diesel revs until M3 rises to 10 bar.	Pilot pressure 6 – 8 bar		
	Adjustment from Qmin to Qmax	Max. revs, braked from 20 to 15 kph	50 – 100 rpm over engine droop (diesel engine)		
	Cardan shaft revs	Measured on cardanshaft			
	30 kph		2496 – 2560 rpm		
	40 kph		3168 – 3232 rpm		



5.12 Electric contact – variable displacement pump – Y4 Eco speed gearbox (without changeover valve)



Hydraulic pump proportional valves

Engine revs rpm	mA
800	0
1050	540
1750	700
2350	1150
2400	1300
Neutral	1500

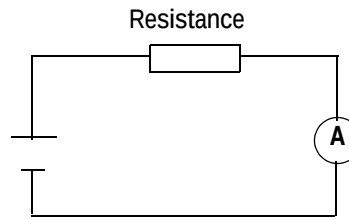
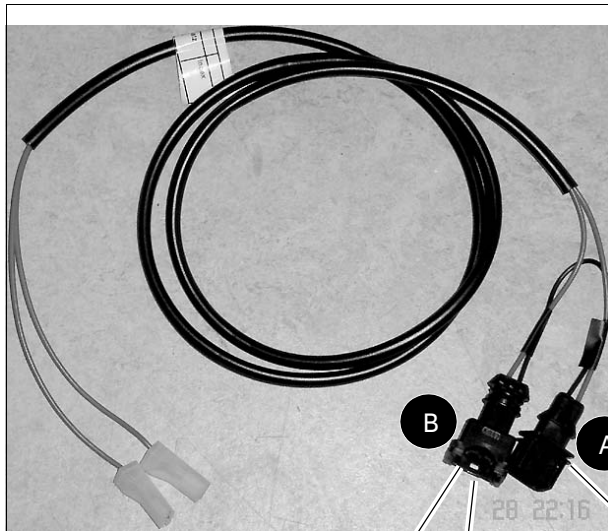
Y4 Eco speed gearbox at 20 kph

Engine revs rpm	mA
950	0
1000	450
1800	1025
2000	1068

Y4 Eco speed gearbox at 40 kph

Engine revs rpm	mA
950	0
1000	450
2200	1100
2300	1225

5.13 Check of proportional valves by means of current measurement

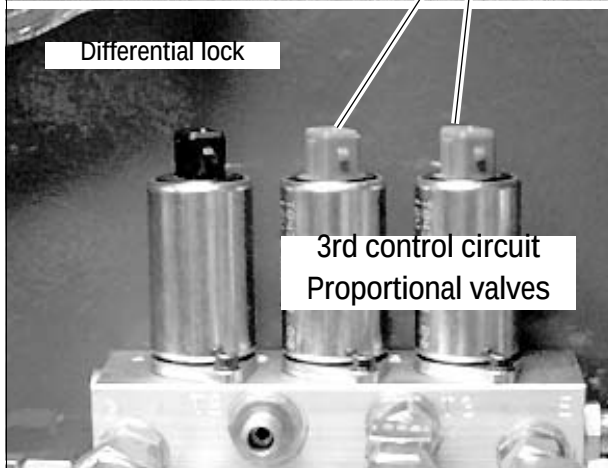


Background:

- Current is measured in series connection.

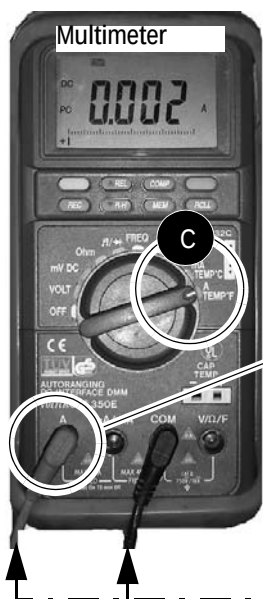
Wiring diagram is as follows.

➔ Direct voltage at 150 Hz



Auxiliary wiring harness order no. 1000134435:

- ☞ Connect with the removed plug A of the proportional valves
- ☞ and connect plug B with the proportional valves



Plug in the multimeter measuring cables as follows.

- ☞ Red measuring cable in red ampere socket
- ☞ Black measuring cable in black multimeter socket
- ☞ Connect the measuring cables with the auxiliary wiring harness D
- ☞ Adjust the rotary switch in measuring range C to current measurement

➔ Current to be measured in the ampere range

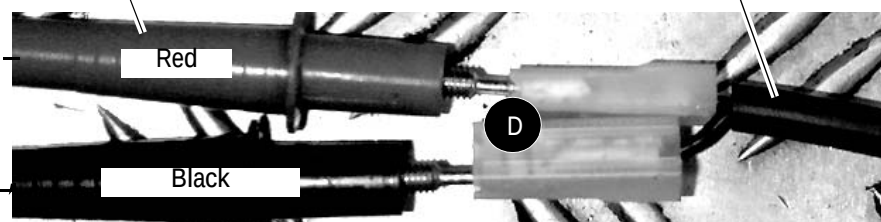
Red ampere socket

Measuring cable

Red

Black

Auxiliary wiring harness





5.14 Towing and transporting the vehicle

Safety instructions

- The vehicle may only be towed using suitable towing equipment (towing bar or cable) in connection with suitable towing facilities, such as a towing coupling, hooks and eyes!
- Move off slowly!
Make sure no-one is dangerously close to the towing bar
- The vehicle may only be towed with a cable if the service brakes and steering are fully operational!

Towing



Danger!

Turning the steering wheel requires greater effort if the diesel engine breaks down. Take this into account, especially when towing the vehicle!

☞ Use a towing bar!



Caution!

The hydrostatic power train can be damaged when towing the vehicle!

☞ Switch off the engine!

☞ Short-circuit the hydraulic circuit before towing (see below)

☞ Do not tow the vehicle for more than 100 meters and do not tow it faster than 3 – 4 kph!

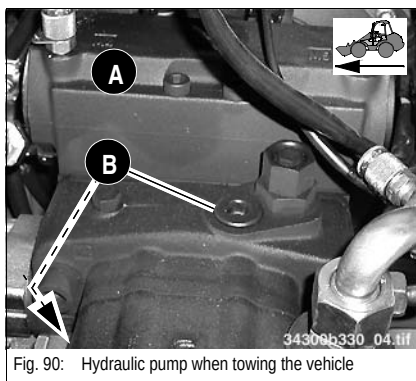


Fig. 90: Hydraulic pump when towing the vehicle

Tow away the vehicle as follows:

☞ Set the drive to neutral

☞ Apply the handbrake

☞ Stop the engine

☞ Fit an adequately sized towing bar to the towing facilities

☞ Switch over HP relief valves B on the hydraulic pump A. To do this:

- Unscrew high pressure valves B (upper and lower) by 2 1/2 turns with an allen key

☞ If possible, run the engine at idling speed when towing the vehicle



Caution!

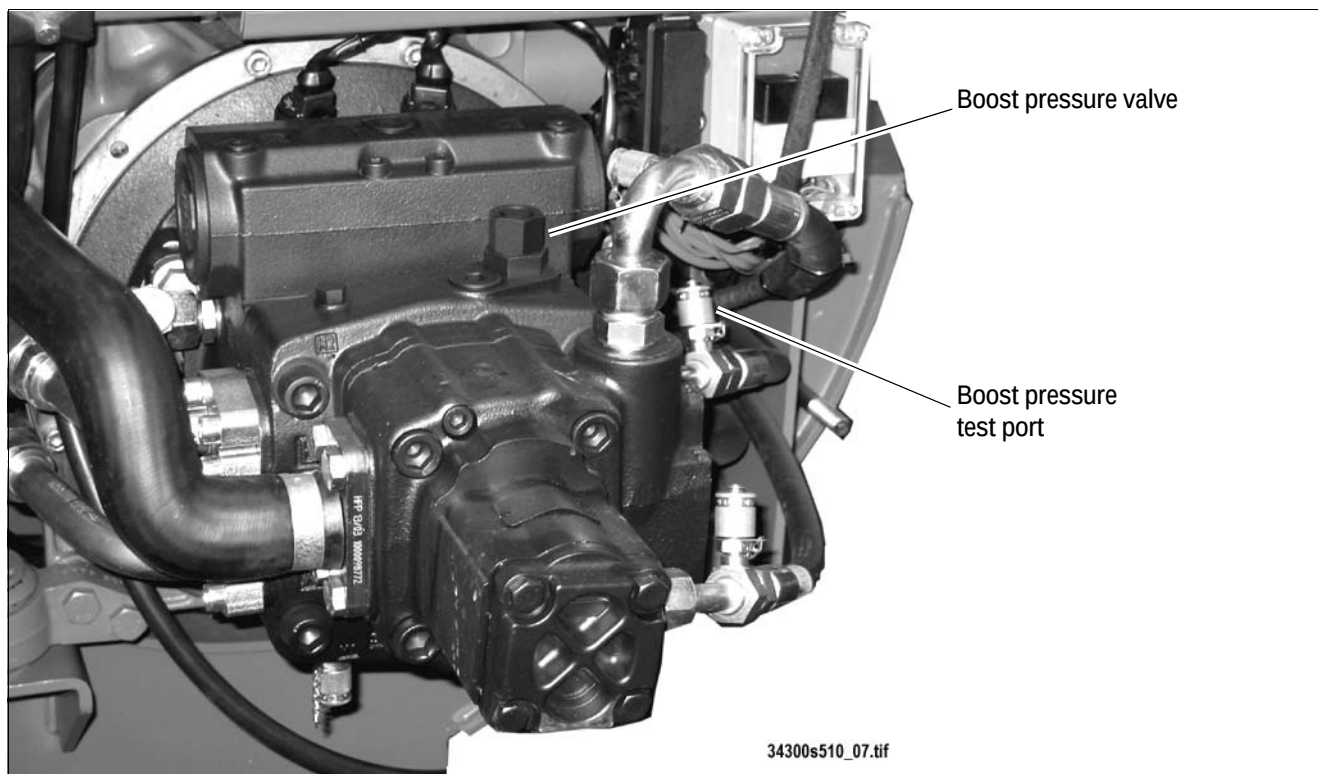
Screw high pressure valves B back in and tighten to 85 Nm after towing the vehicle

5.15 Check and adjustment instructions without changeover valve

Adjusting boost pressure

Tools required:

- 2 x pressure manometer 600 bar
- 2 x pressure manometer 60 bar
- Impulse tachometer



Check/adjust boost pressure as follows:

- ☞ Move the drive lever to neutral
- ☞ Apply the handbrake
- ☞ Connect the 60 bar pressure manometer to the test port
- ☞ Start the diesel engine and set max. revs
 - ➡ Boost pressure at max. engine revs: 30 – 35 bar

If boost pressure is too low:

- ☞ Screw in the boost pressure valve

If boost pressure is too high:

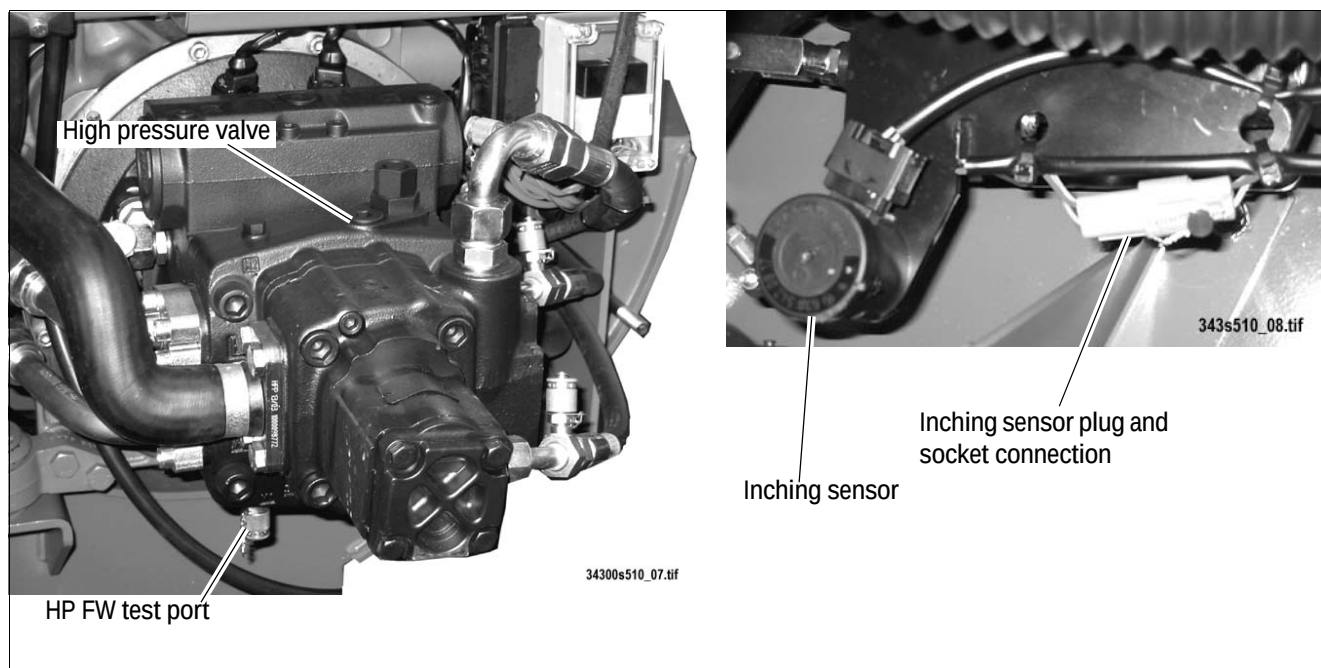
- ☞ Screw out the boost pressure valve



Checking high pressure

Tools required:

- Pressure gauge (600 bar)



Check high pressure as follows:

- Switch off the ignition
- Remove the plug from the inching sensor



Caution!

Disconnecting the inching sensor plug with the ignition switched on disables the drive electronics data (SUSMIC), which must be entered again (– see *Enabling the SUSMIC-DIA 1* on page 5-32)

- Connect the pressure gauge
- Start the diesel engine and move the drive lever to 1st speed range (forwards)
- Drive the vehicle against hydraulic resistance
 - Do not allow the wheels to spin (use the service brake if required)
- Read the pressure manometer
 - High pressure must be 460 – 490 bar



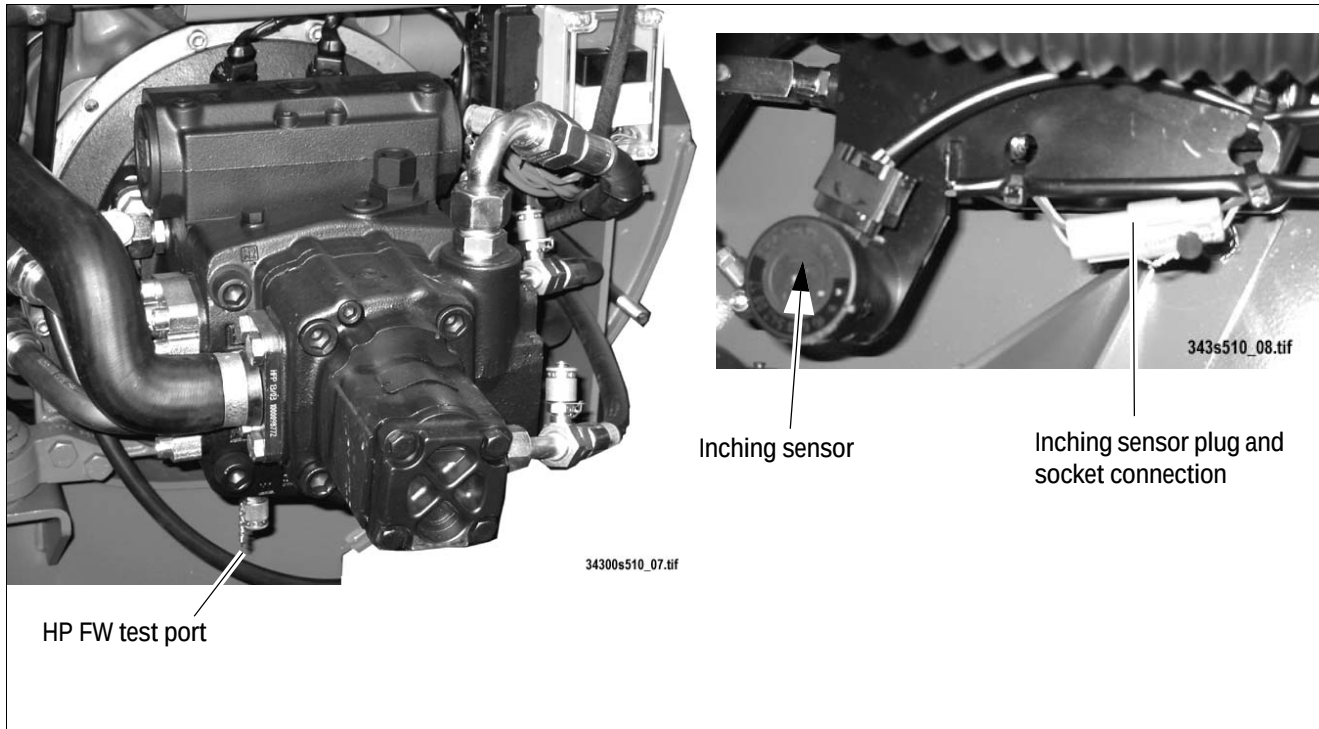
Important!

It is not possible to adjust the high pressure valves

Setting engine droop

Tools required:

- Pressure gauge (600 bar)
- Impulse tachometer



- ☞ Check/adjust engine droop as follows:
- ☞ Safely jack up the vehicle at the front and rear
- ☞ Switch off the ignition
- ☞ Remove the plug from the inching sensor



Caution!

Disconnecting the inching sensor plug with the ignition switched on disables the drive electronics data (SUSMIC), which must be entered again!
(– see *Enabling the SUSMIC-DIA 1* on page 5-32)

- ☞ Connect the pressure manometer to the test port (high pressure FW)
- ☞ Connect the impulse tachometer to the diesel fuel injection line
- ☞ Start the engine
- ☞ Move the drive lever to 1st speed (FW)
- ☞ Set the diesel engine to maximum revs
- ☞ Slowly brake the vehicle with the service brake to 225 – 235 rpm
 - ➔ Maximum diesel engine revs must be 2050 – 2200 rpm

If diesel engine revs are too low:

- ☞ Check the diesel engine

If high pressure is too low at prescribed engine revs:

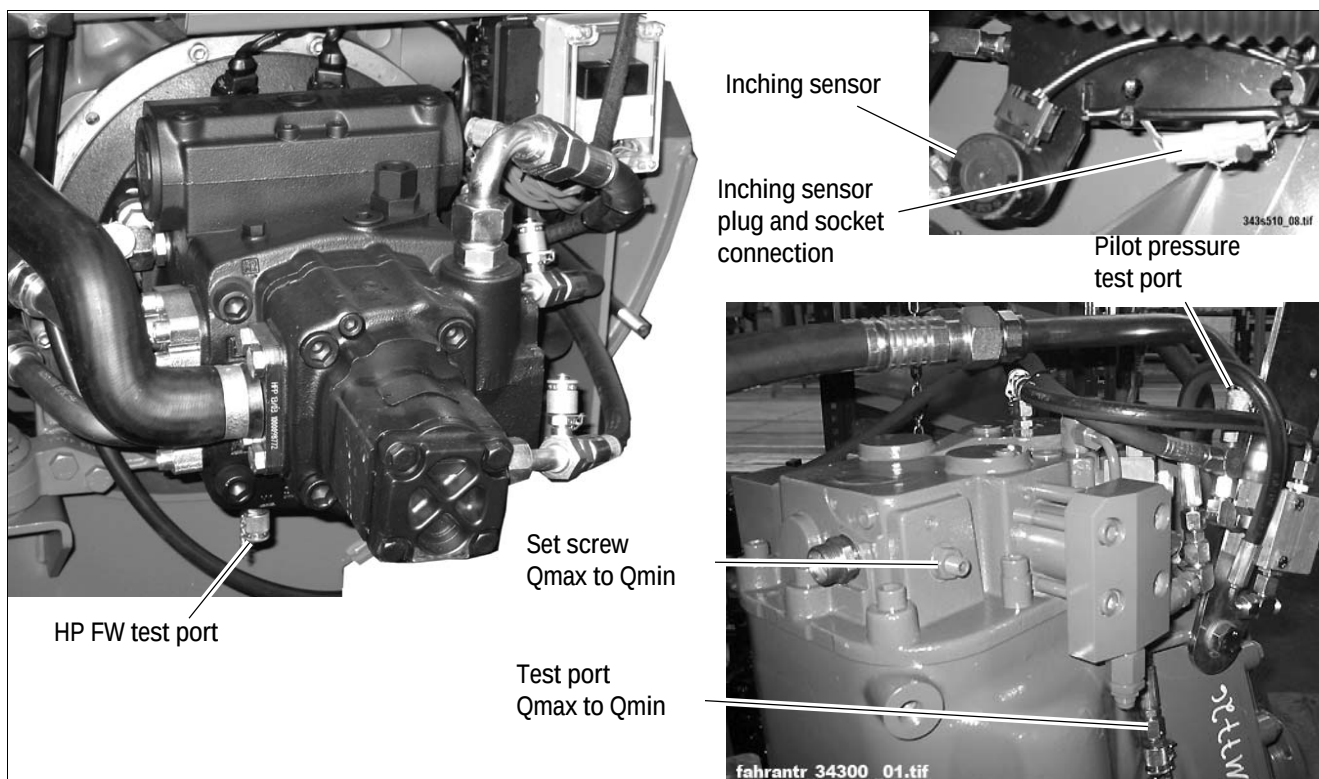
- ☞ Check the variable displacement pump and the hydraulic motor



Adjustment: Qmax to Qmin on ECO speed hydraulic motor

Tools required:

- 2 x 60 bar pressure gauge



Check/adjust Qmax – Qmin as follows:

- ☞ Safely jack up the vehicle at the front and rear
- ☞ Switch off the ignition
- ☞ Remove the plug from the inching sensor

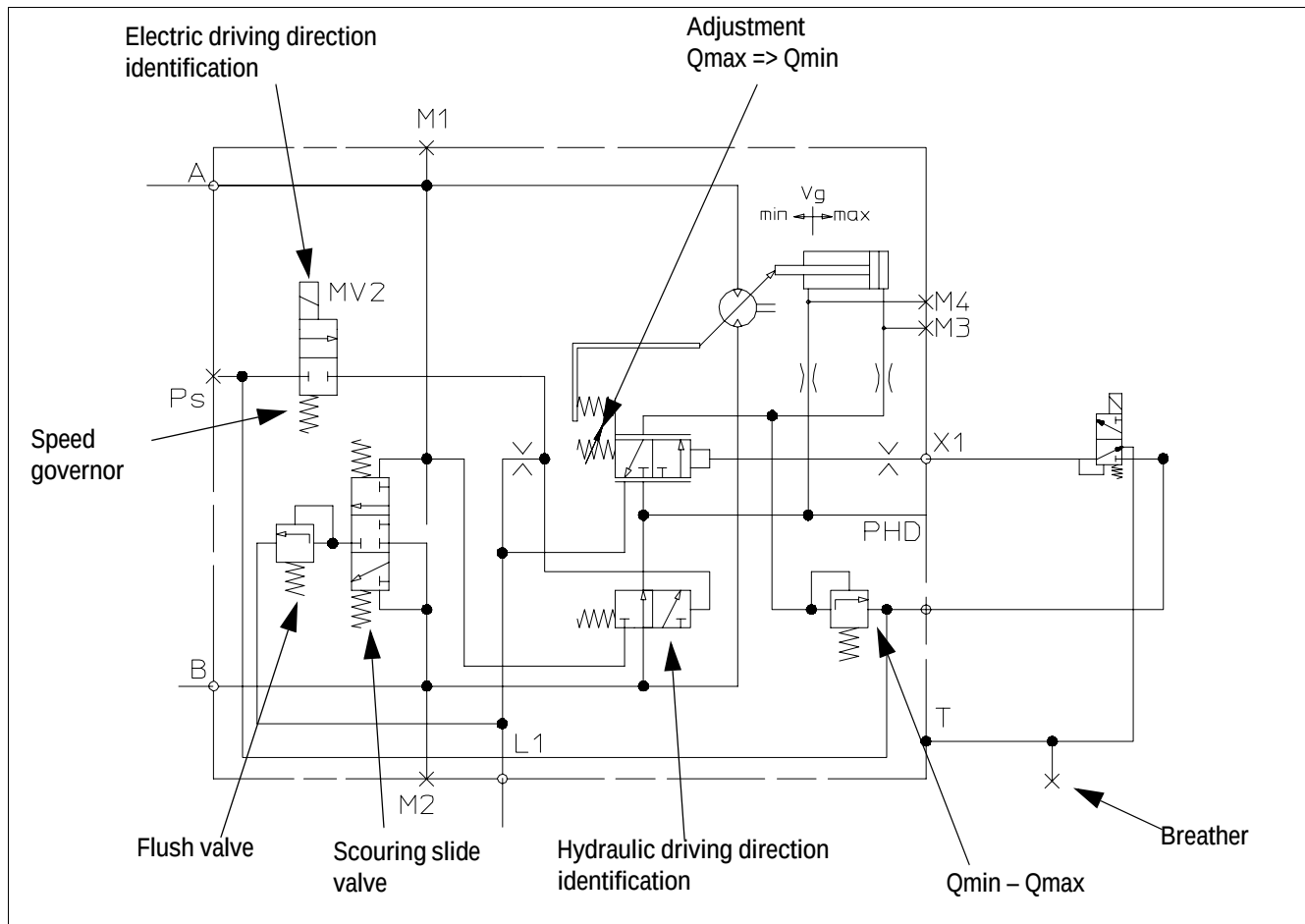


Caution!

Disconnecting the inching sensor plug with the ignition switched on disables the drive electronics data (SUSMIC), which must be entered again!
(– see *Enabling the SUSMIC-DIA 1* on page 5-32)

- ☞ Connect the pressure gauge to the pilot pressure test port and to Qmax – Qmin.
- ☞ Move the drive lever to 2nd speed (FW)
- ☞ Slowly raise diesel revs until pressure at test port Qmax – Qmin rises to about 10 bar.

5.16 ECO speed without changeover valve: diagram



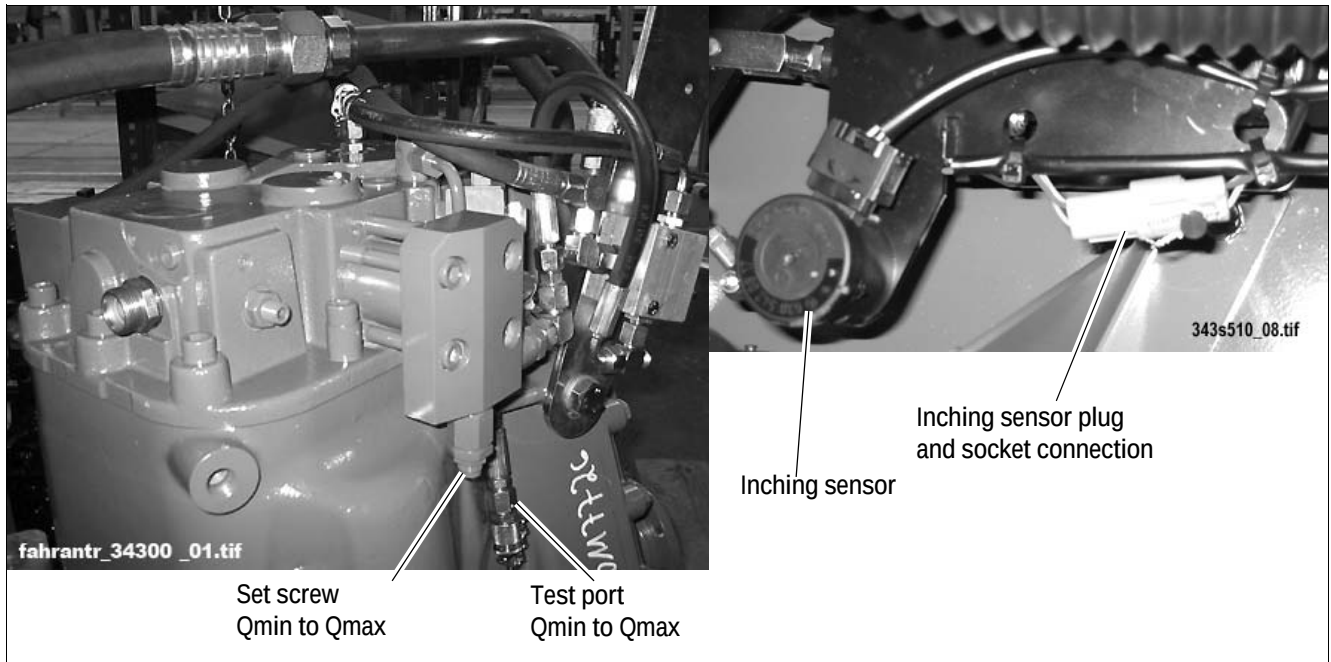
- ☞ Pilot pressure must be at 6 – 8 bar
- ☞ Screw in set screw Qmax – Qmin if pilot pressure is too low
- ☞ Unscrew set screw Qmax – Qmin if pilot pressure is too high



5.17 Adjustment: Qmin to Qmax on ECO speed hydraulic motor

Tools required:

- 1x tachometer for the diesel revs



Check/adjust Qmin – Qmax as follows:

- ☞ Safely jack up the vehicle at the front and rear
- ☞ Switch off the ignition
- ☞ Remove the plug from the inching sensor



Caution!

Disconnecting the inching sensor plug with the ignition switched on disables the drive electronics data (SUSMIC), which must be entered again!
(– see *Enabling the SUSMIC-DIA 1* on page 5-32)

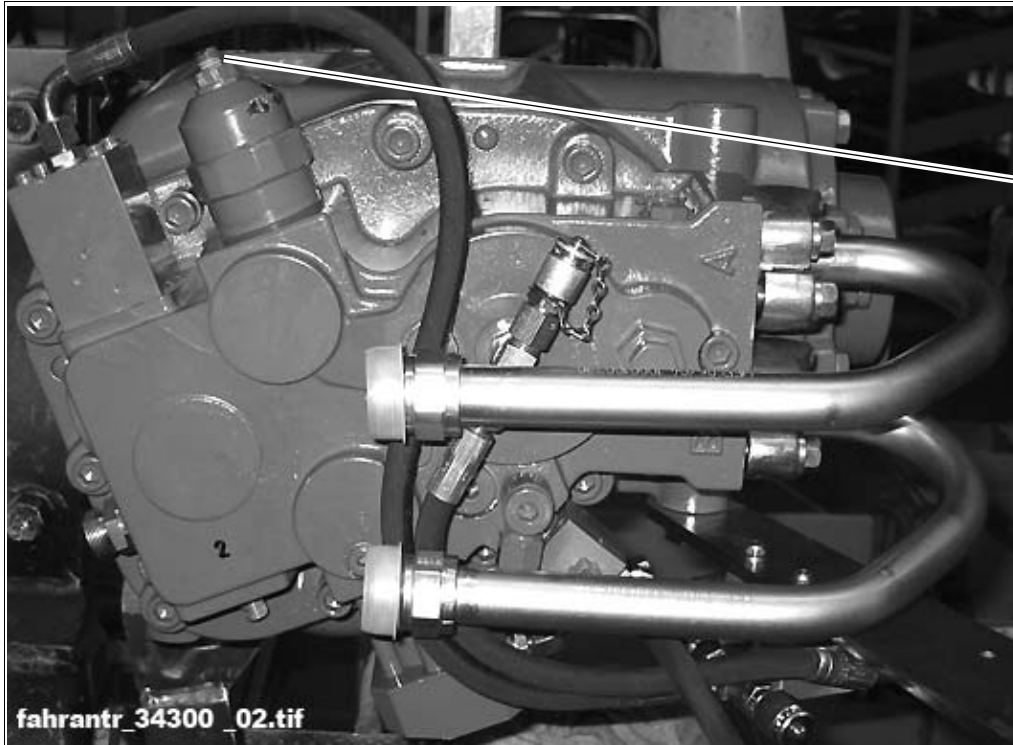
- ☞ Connect the tachometer
- ☞ Move the drive lever to 2nd speed range
- ☞ Diesel engine to max. revs
- ☞ Reduce speed with the service brake, from full throttle in 2nd speed range to to 15 kph
- ☞ Diesel revs must then be 50 – 100 rpm higher than engine droop (diesel engine) 2050 – 2200 rpm.
- ☞ Screw in the set screw if diesel revs are too high
- ☞ Screw out the set screw if diesel revs are too low



5.18 Setting cardan shaft revs 30 – 40 kph

Tools required

- Tachometer (infrared)



Set screw for
cardan shaft revs

☞ Screw in

➡ Cardan shaft revs are reduced

☞ Unscrew

➡ Cardan shaft revs are increased



5.19 Operation: drive electronics (SUSMIC)

General

The hardware and software of the SAUER-DANFOSS mobile computers of the SUSMIC series has been designed to enable dialogs for purposes of commissioning, optimisation and service with specifically designed equipment.

The SUSMIC-DIA 1 service unit described below allows the user to systematically search for errors and malfunctions, and to change and check system parameters.

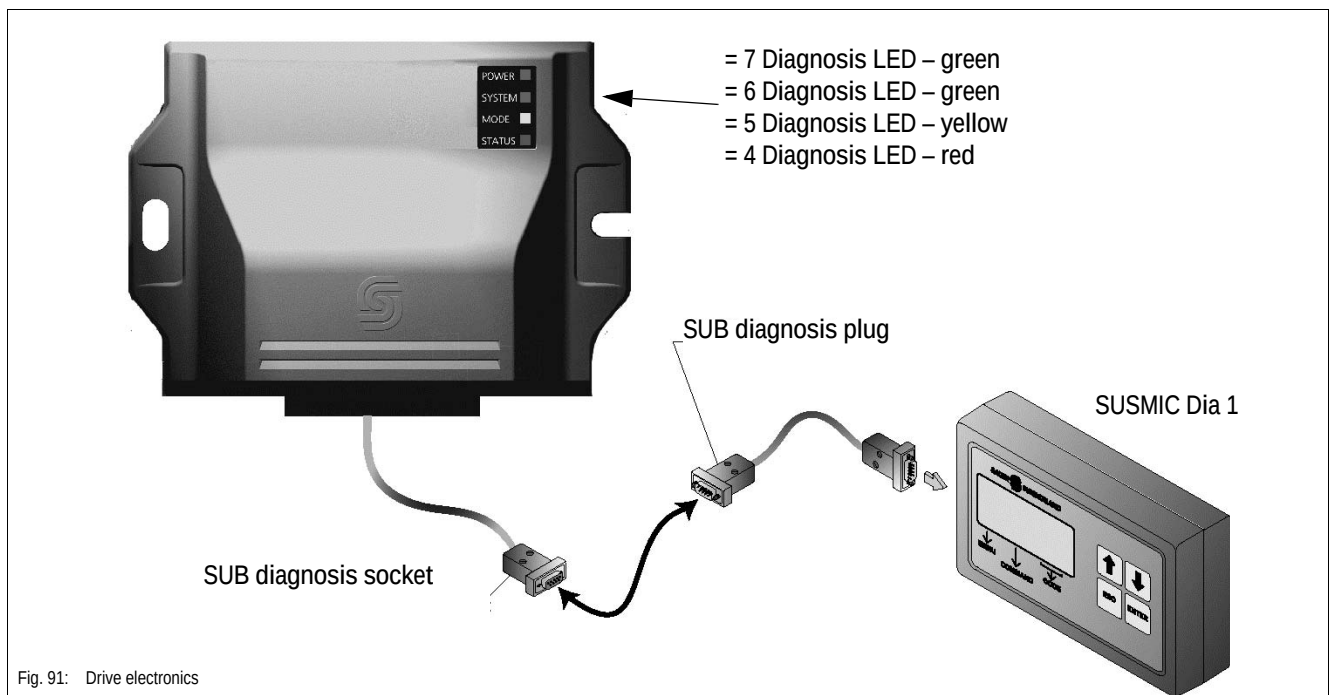


Caution!

The SUSMIC-DIA 1 service unit is not splash-proof!

Connecting the SUSMIC-DIA 1

- Connect the SUB-D diagnosis plug with the diagnosis socket on the vehicle.



Diagnosis explained (LED)

Diagnosis LED red – error check

- ➡ Comes on in the case of an error

Diagnosis LED yellow – software check

- ➡ Blinks at about 1 Hz (slowly) if software is error-free
- ➡ Blinks at about 10 Hz (fast) if no software is loaded

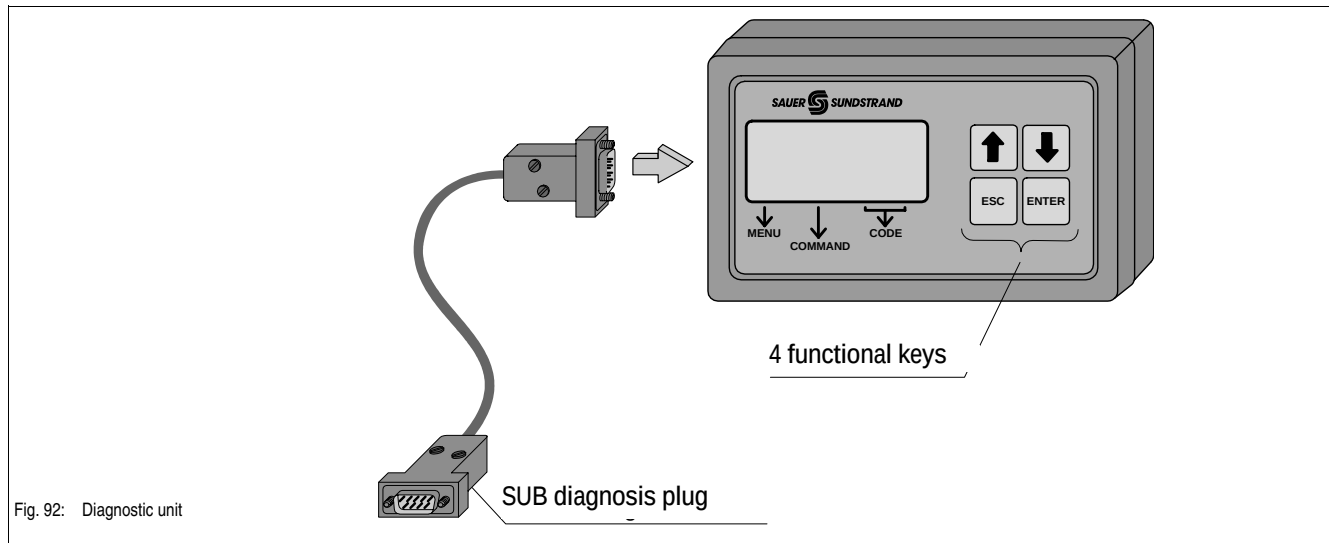
Diagnosis LED green – 5 V DC internal power supply

- ➡ Comes on if internal 5 V DC is OK

Diagnosis LED green – ignition on

- ➡ Comes on if battery voltage is OK after switching on ignition

SUSMIC-DIA 1 explained



Procedures (sensor)

The SUSMIC-DIA 1 has 3 procedures:

- Reading the sensors
- Error diagnosis
- Checking the sensors

Menu numbers

The SUSMIC-DIA 1 menus have the following numbers:

- ➔ 7: Disconnect
- ➔ 0: Main menu
- ➔ 1: Sensor setup
- ➔ 2: Sensor error
- ➔ 3: Sensor check

Command numbers

The SUSMIC-DIA 1 commands have the following numbers:

- ➔ 0: Set Max
- ➔ 1: Set Mid
- ➔ 2: Set Min
- ➔ 3: Set Def
- ➔ 4: Increase
- ➔ 5: Input error
- ➔ 6: Status display
- ➔ 7: Status display


Error table

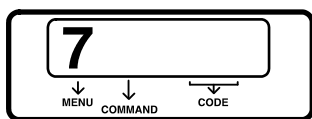
System error			
Signal from	LED Error code	DIA 1 error no.	Cause
Sensor voltage	- 0 0 0	01	Sensor voltage not in valid range
Sensor error			
Signal from	LED error code	DIA 1 error no.	Cause
Default parameter check sum	- - - -	17	Parameter not assigned
Inching/brake pedal parameter check sum		18	Included in sensor 1
Inching/brake pedal sensor	- - 0 0	19	Setup not carried out Value to small Value to high
Rev transmitter	0 0 - 0	20	No rev signal whilst starting the vehicle
Proportional valve current	- 0 - 0	21	Short circuit, open wiring
Forwards-reverse control	0 - - 0	22	FW and RV short-circuited
Rev transmitter	- - - 0	23	Rev signal interrupted
Hydraulic motor current	0 0 0 -	24	Short circuit, open wiring
Crawler gear parameter check sum		25	Included in sensor 1
Crawler gear potentiometer	- 0 0 -	26	Value too small, value too high
Engine rev transmitter	0 0 - -	27	Engine speed interrupted
Not used			

Legend:

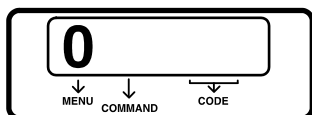
0 = short blinking sign

- = long blinking sign

Enabling the SUSMIC-DIA 1

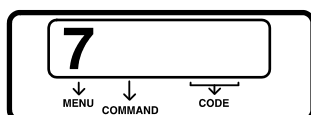


- Set ignition to "OFF".
- Once the SUSMIC-DIA 1 is connected to the SUSMIC electronics and ignition is switched on, the following appears on the display:



- Enable the communication software with **ENTER**.
- The display shows:
- In the main menu, **▲** and **▼** calls the required procedure. **ENTER** starts the procedure.
- During the procedures, the electronics (SUSMIC) runs without output function, i.e. it is disabled.

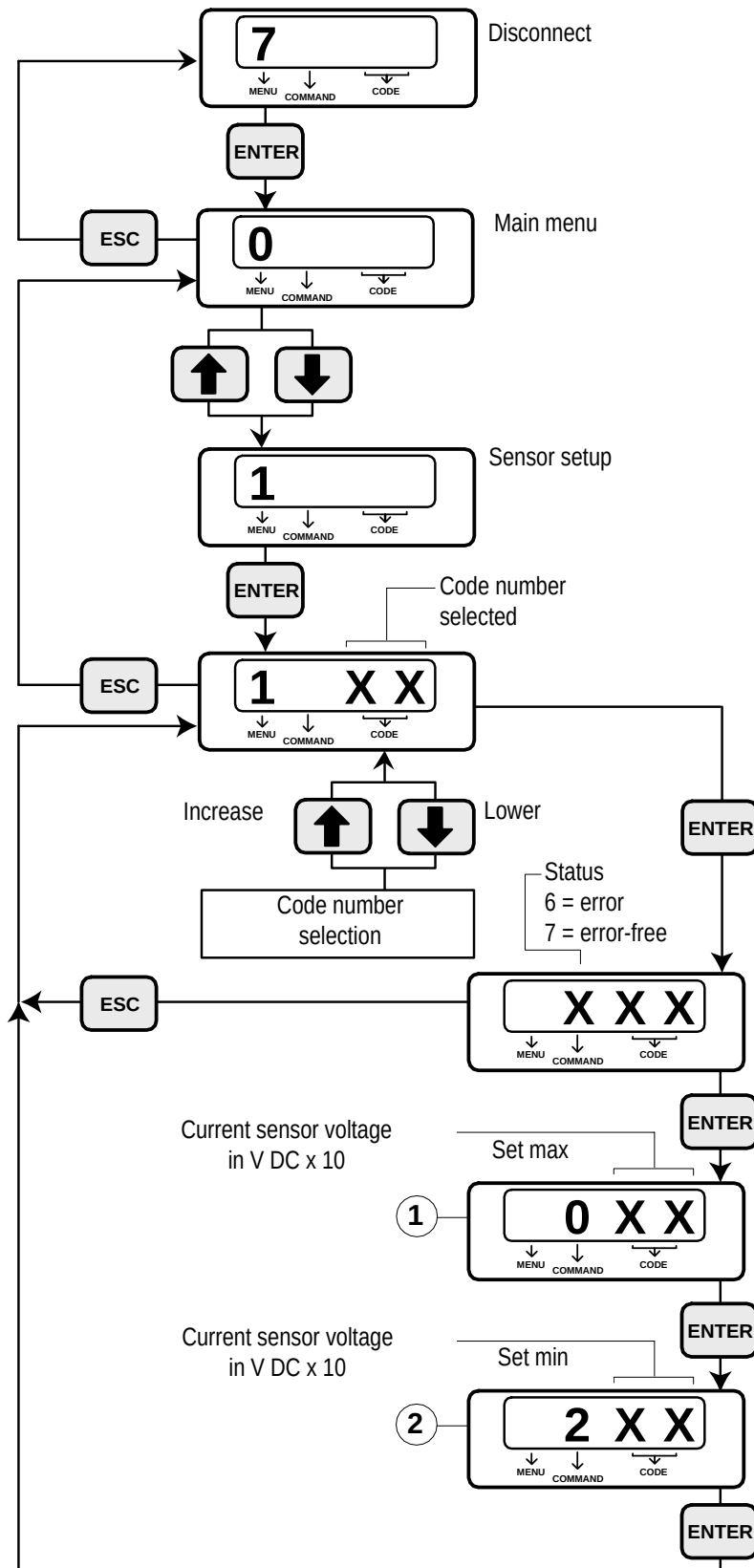
Disabling the SUSMIC-DIA 1



- The main menu and all other menus can be quit with **ESC**.
- **ESC** shows the following on the display:
- The communication link may be interrupted only if menu number "7" appears on the display.



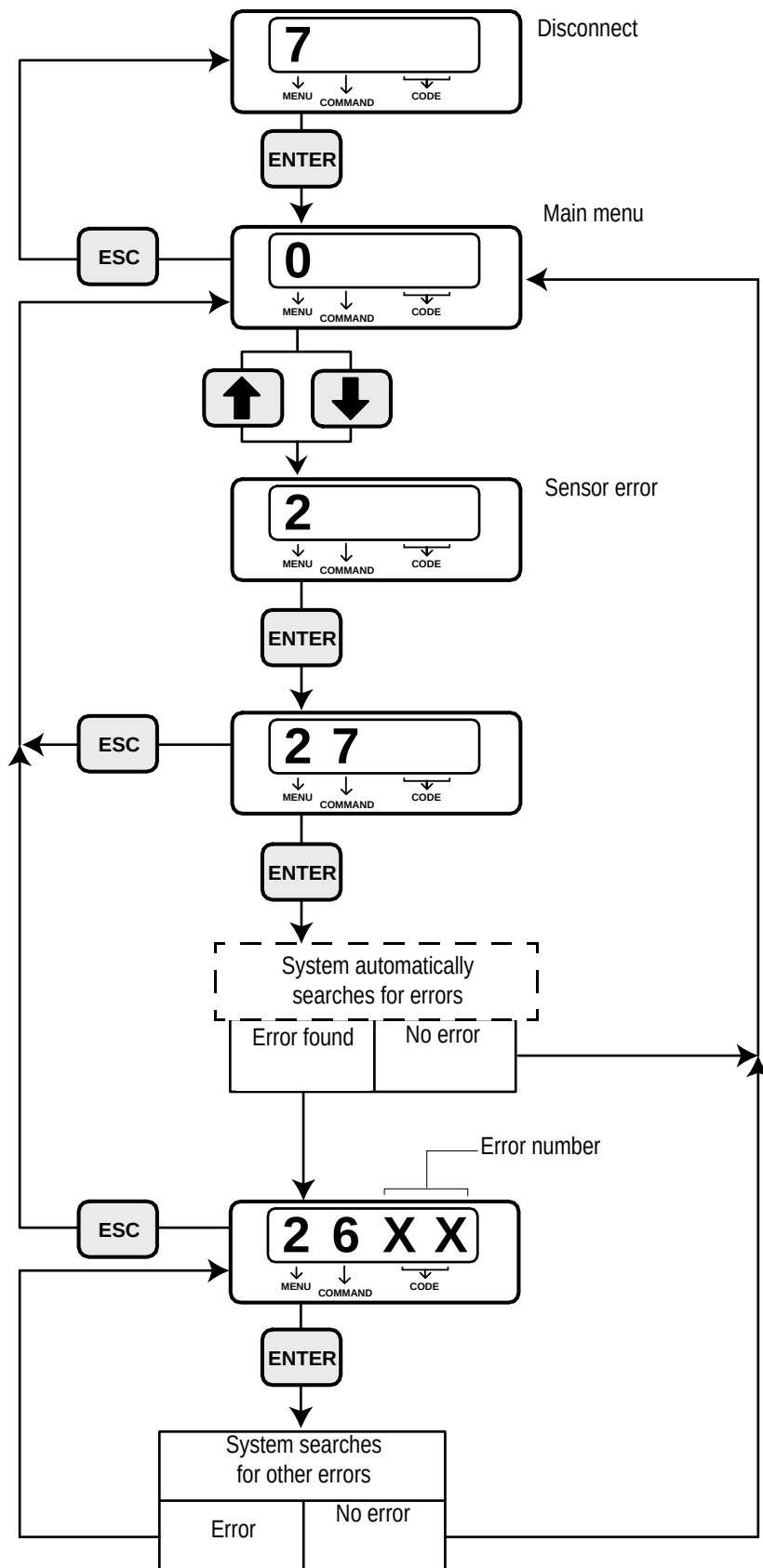
Setting the inching pedal sensor



- **ENTER** enables the main menu.
- **↑** or **↓** selects the sensor setup procedure.
- **ENTER** enables the setup procedure.
- **↑** or **↓** selects the menu number.
 - 02 = Inching pedal sensor
 - 03 = Crawler gear potentiometer (no function)
- **ENTER** enables the setup procedure selected. 6 or 7 appear as command digits.
- **ESC** quits this setup without modifications.
- **ENTER** starts this setup.
- 0 appears as command digit. Set the potentiometer to max. position (turn clockwise).
- Press **ENTER**
 - 2 appears as command digit. Set the potentiometer to min. position (turn counter-clockwise).
- Press **ENTER**



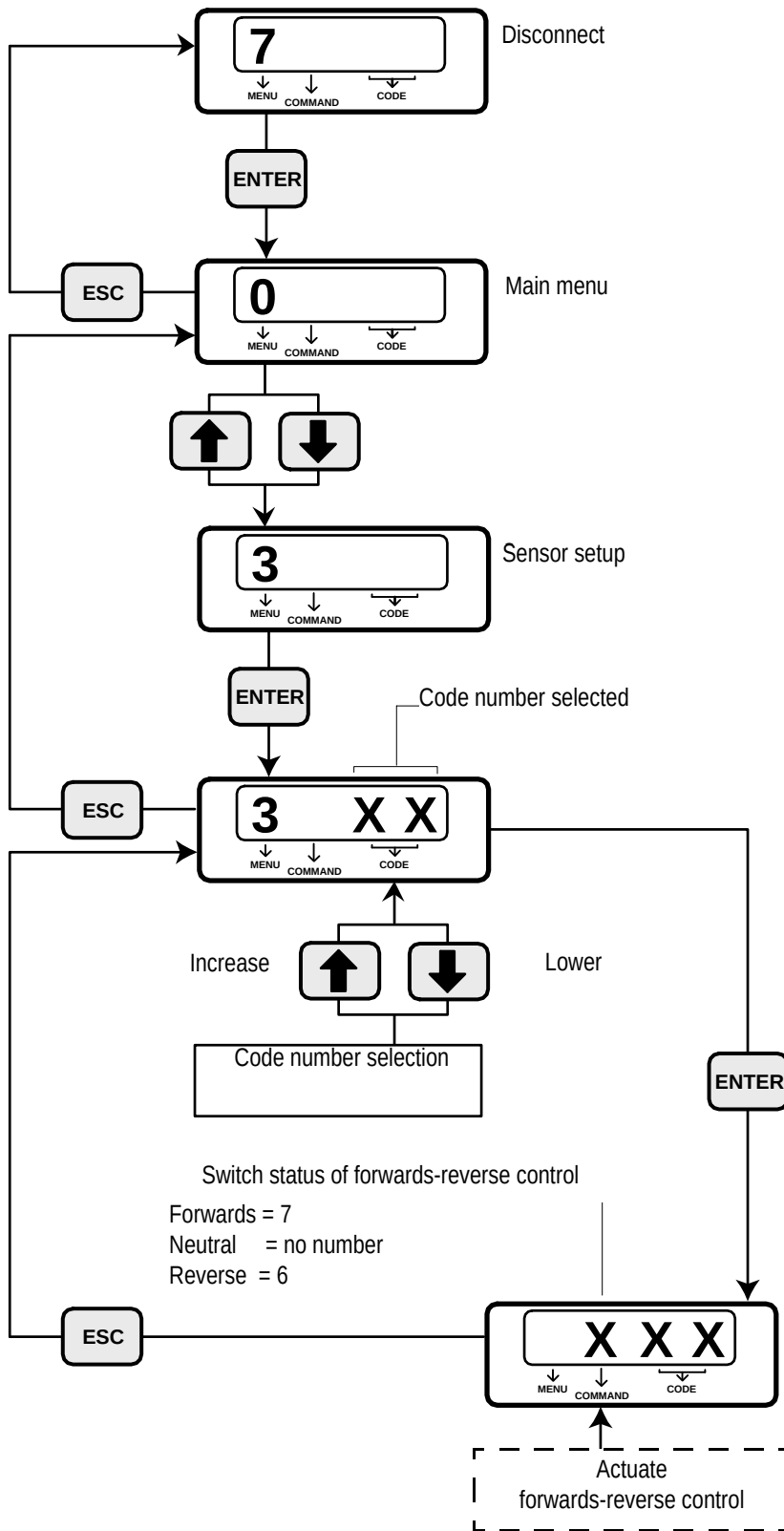
Sensor error procedure: mode of function



- **ENTER** enables the main menu.
- **▲** or **▼** selects the sensor error procedure.
- **ENTER** enables the error procedure. 7 appears as command digit.
- **ESC** quits this procedure without searching for errors.
- **ENTER** starts the error procedure and starts the search for errors.
- Errors are shown on the display and 6 appears as the command digit.
- Pressing **ENTER** again shows other errors.
- **ESC** quits the search for errors.
- If no error is found, the system automatically returns to the main menu.
- Check the error with the help of the error list (7.2).



Checking forwards-reverse control (sensor number 02)



- **ENTER** enables the main menu.

- **▲** or **▼** selects the sensor check procedure.

- **ENTER** enables the sensor check procedure.

- Select sensor number 02 with **▲** or **▼**.

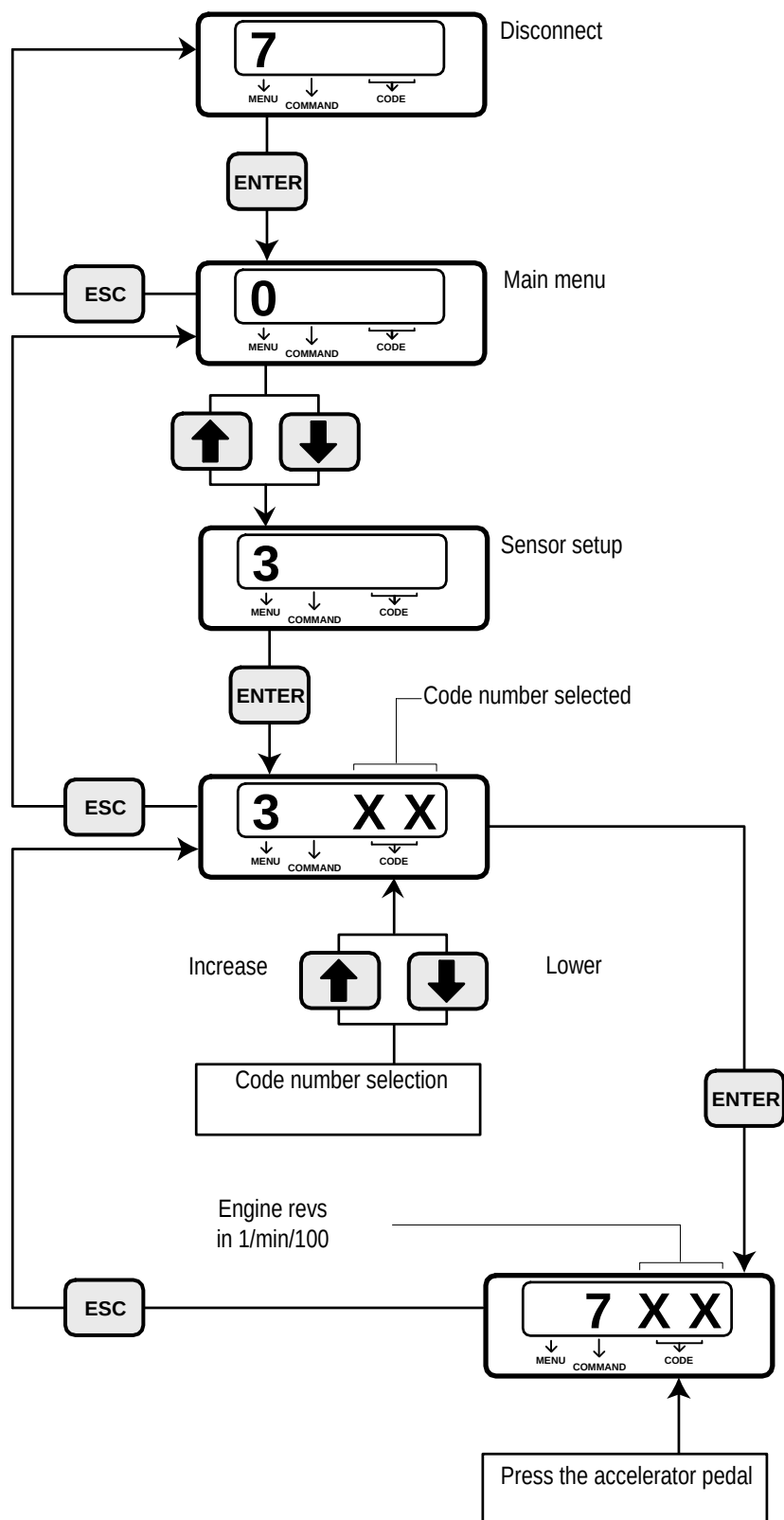
- **ENTER** enables display mode.

- Forwards = 7 as command digit
- Neutral = no command digit
- Reverse = 6 as command digit

- **ESC** quits the menu.



Checking the rev sensor (sensor number 00)

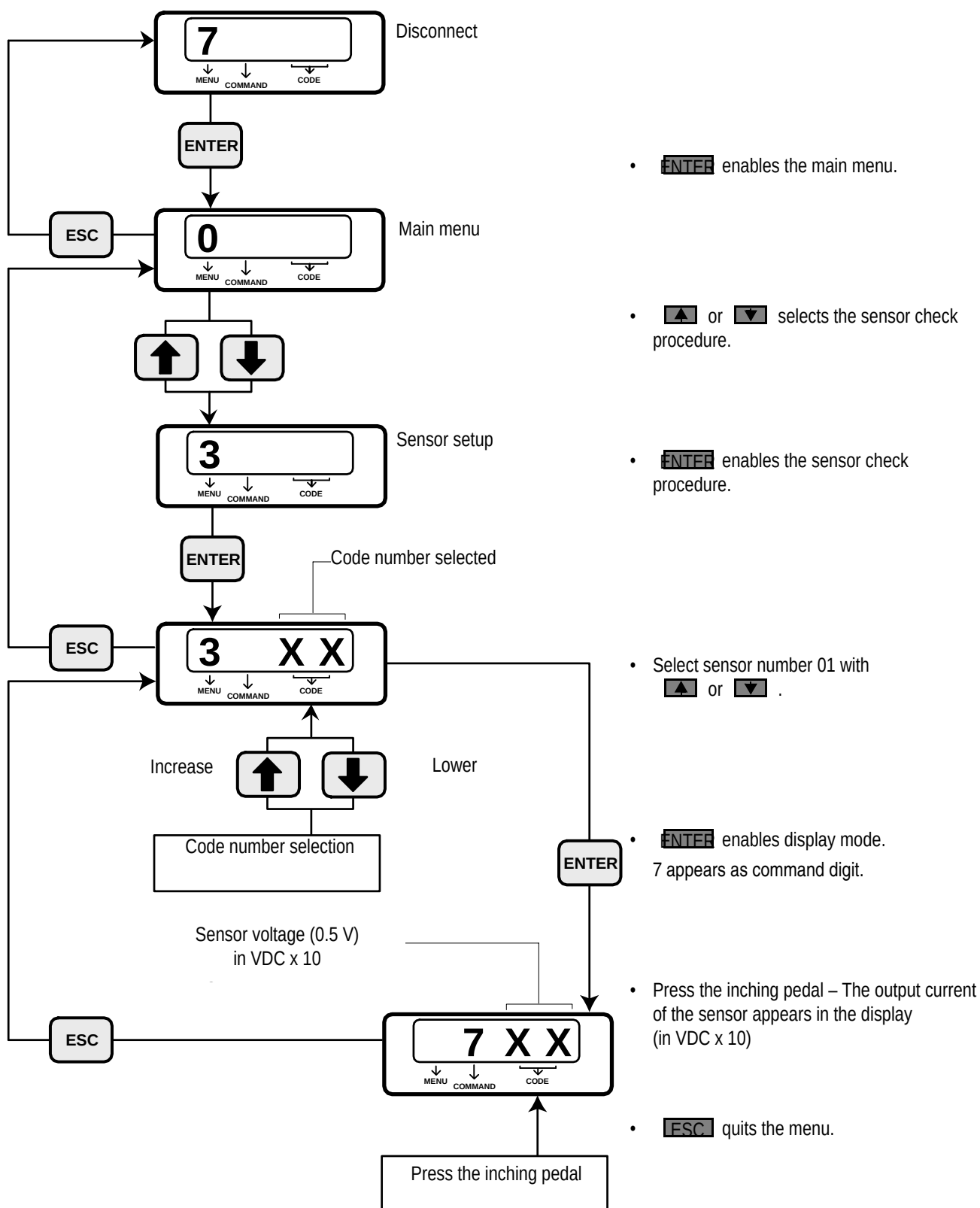
**Caution!**

The engine must run during this procedure.

- **ENTER** enables the main menu.
- **▲** or **▼** selects the sensor check procedure.
- **ENTER** enables the sensor check procedure.
- Select sensor number 00 with **▲** or **▼**.
- **ENTER** enables display mode. 7 appears as command digit.
- Press the accelerator pedal – The output value of the sensor appears in the display (in 1/min/100)
- **ESC** quits the menu.

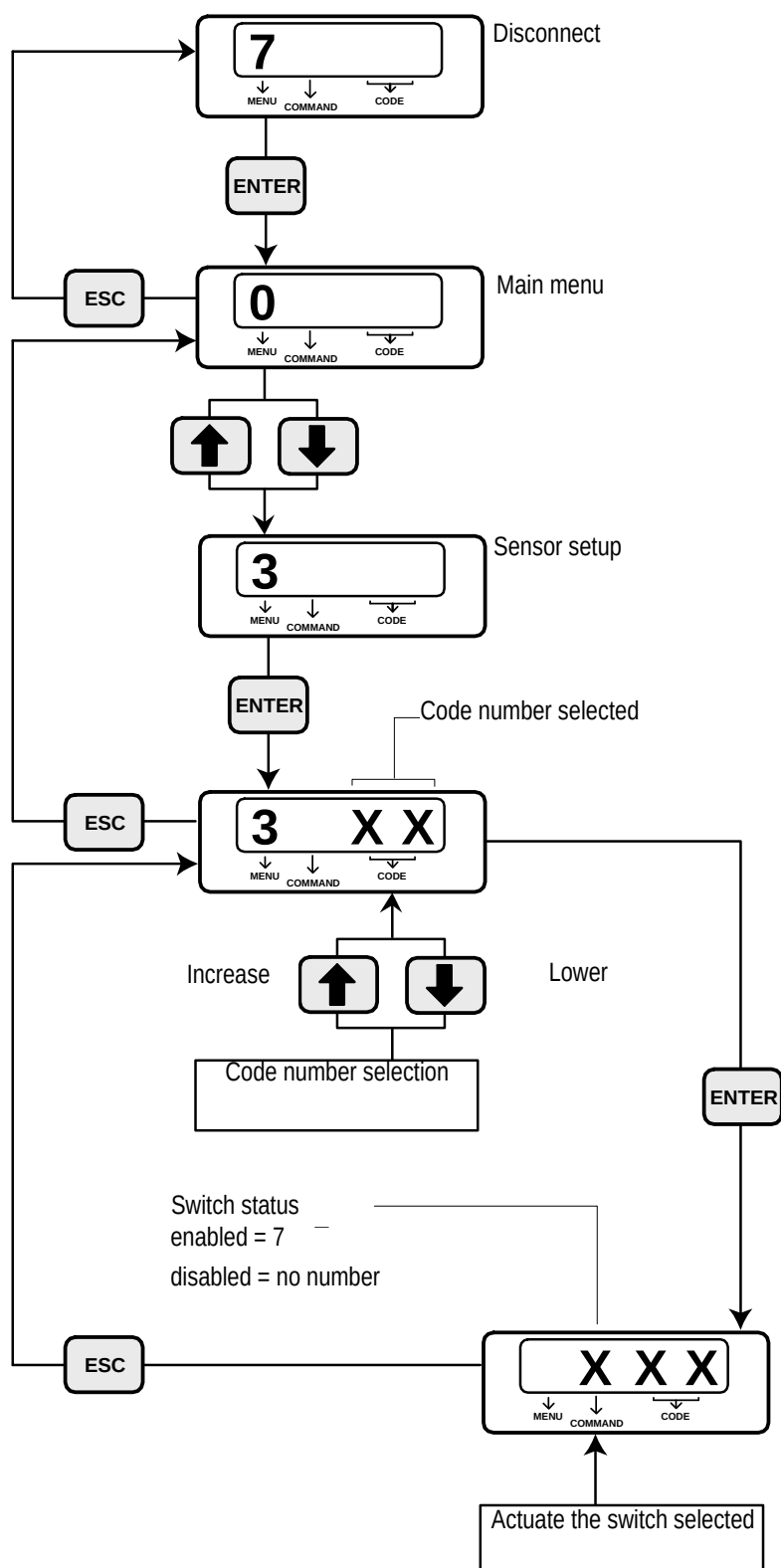


Checking the inching pedal sensor (sensor number 01)





Checking the crawler gear switch signal (sensor number 08)



- **ENTER** enables the main menu.

- **▲** or **▼** selects the sensor check procedure.

- **ENTER** enables the sensor check procedure.

- Select sensor number 08 with **▲** or **▼**.

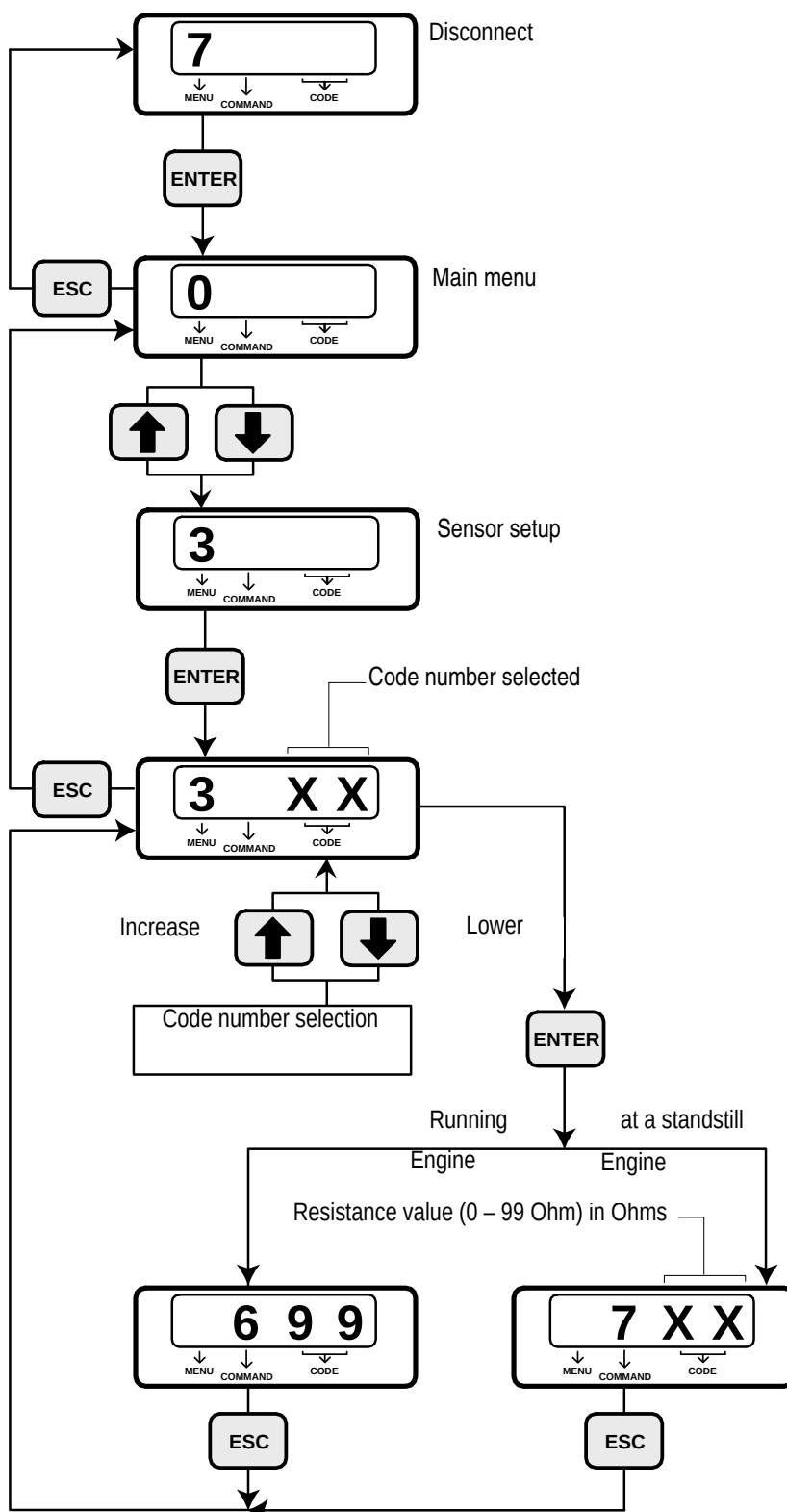
- **ENTER** enables display mode.

- Enabled = 7 as command digit
- Disabled = 6 as command digit

- **ESC** quits the menu.



Checking drive current resistance (sensor numbers 03, 04 and 05)

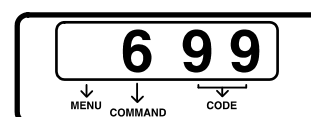
**Caution!**

The engine must be at a standstill during these procedure.

- **ENTER** enables the main menu.
- **▲** or **▼** selects the sensor check procedure.
- **ENTER** enables the sensor check procedure.
- Select the sensor number with **▲** or **▼**.
 - 03 = pump drive current resistance FW
 - 04 = pump drive current resistance RV
 - 05 = engine drive current resistance
- **ENTER** enables display mode. 7 appears with the engine at a standstill, 6 as a command digit with the engine running.
 - 00 = short circuit
 - 99 = open wiring

**Caution!**

With the engine running, the following always appears on the display:



- **ESC** quits the menu.



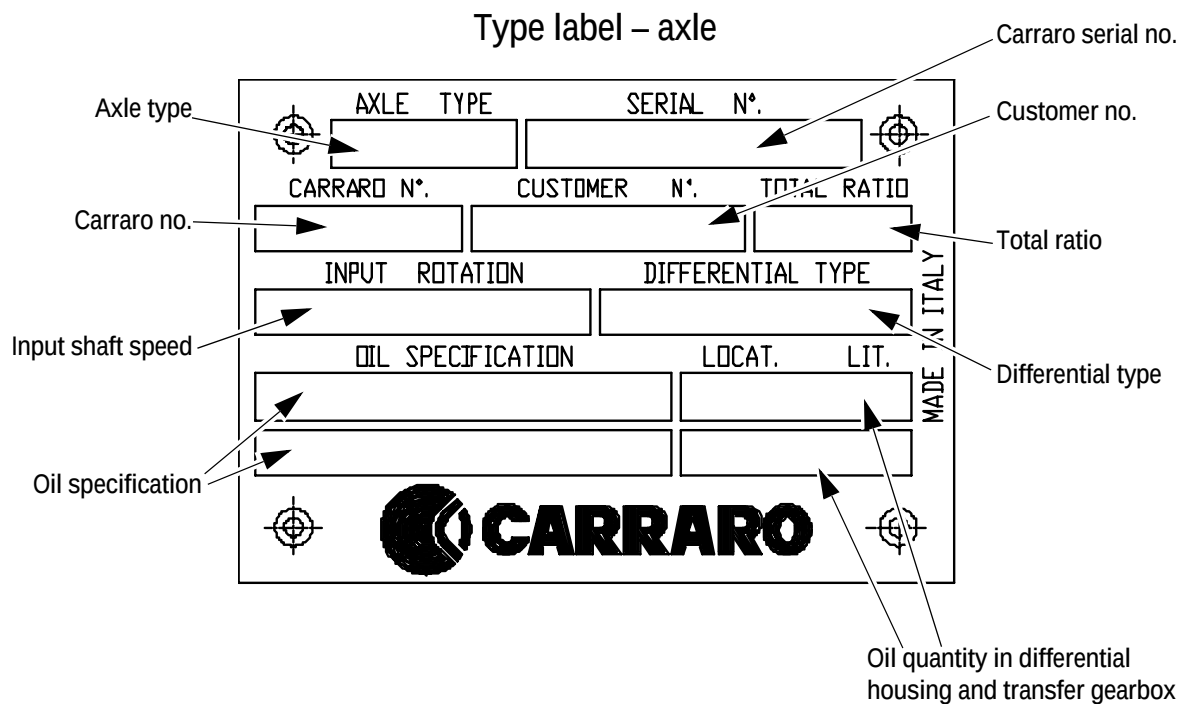
Axles



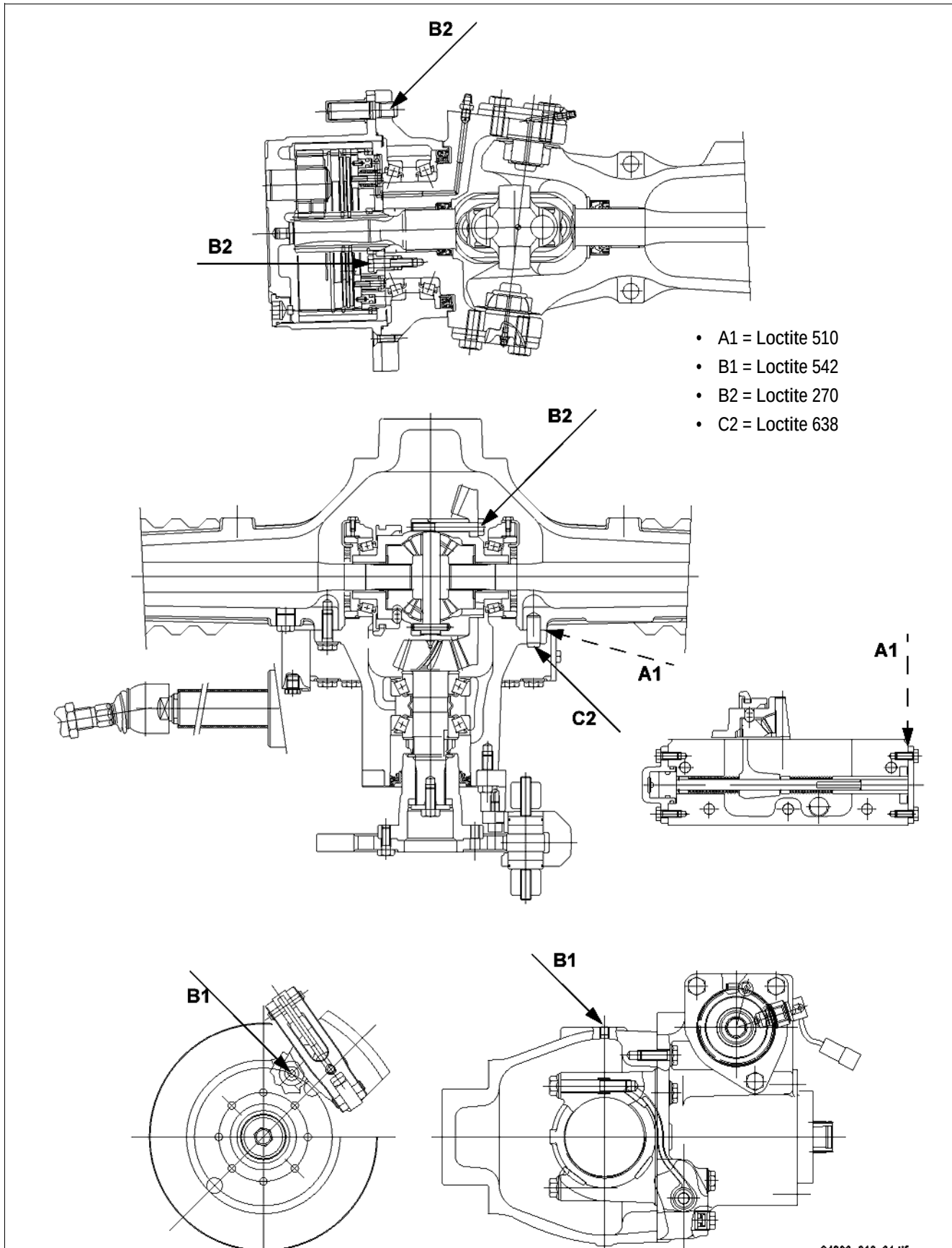
6 Axles

6.1 Type label – axle

Type label contains all axle data

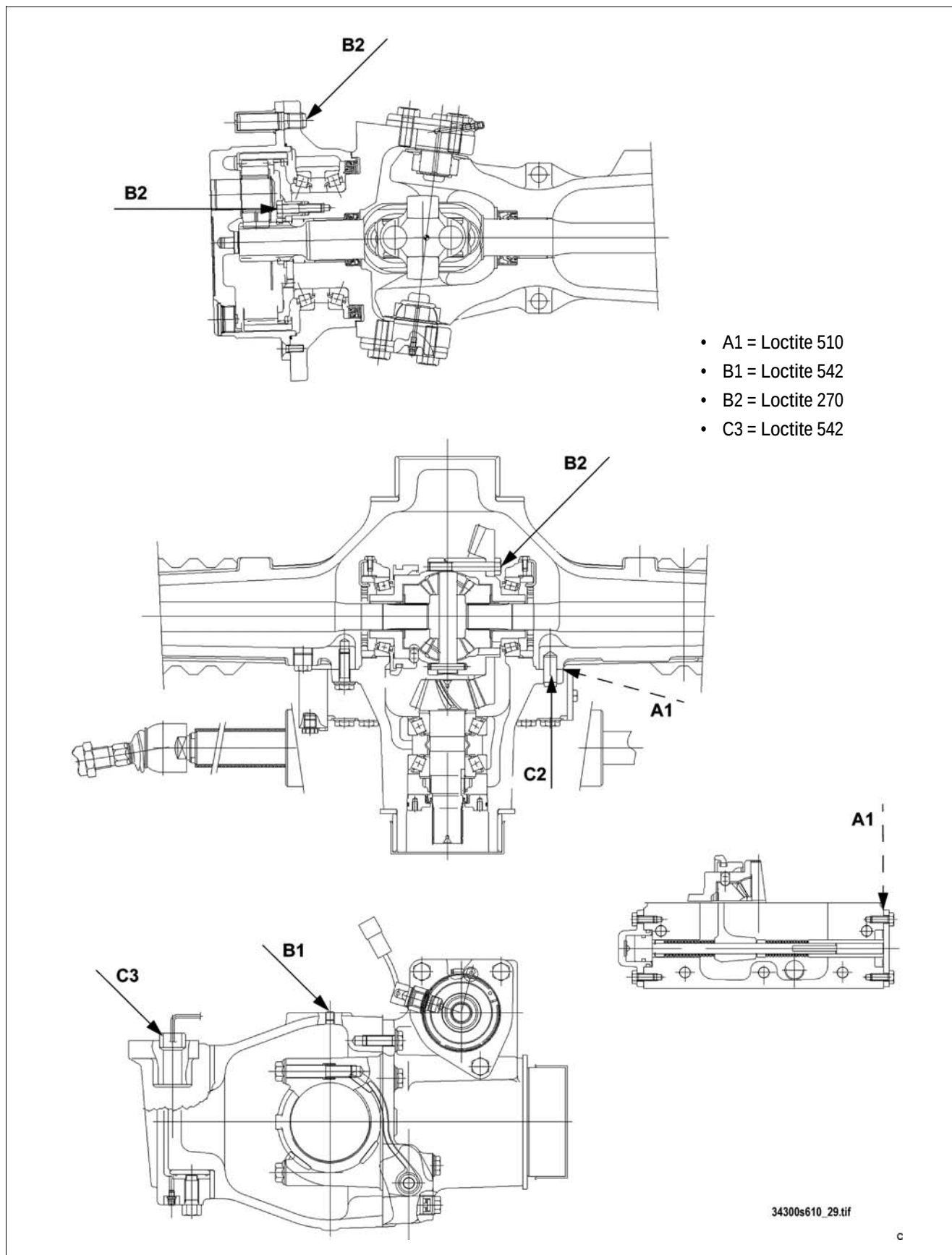


6.2 Front axle screw connections

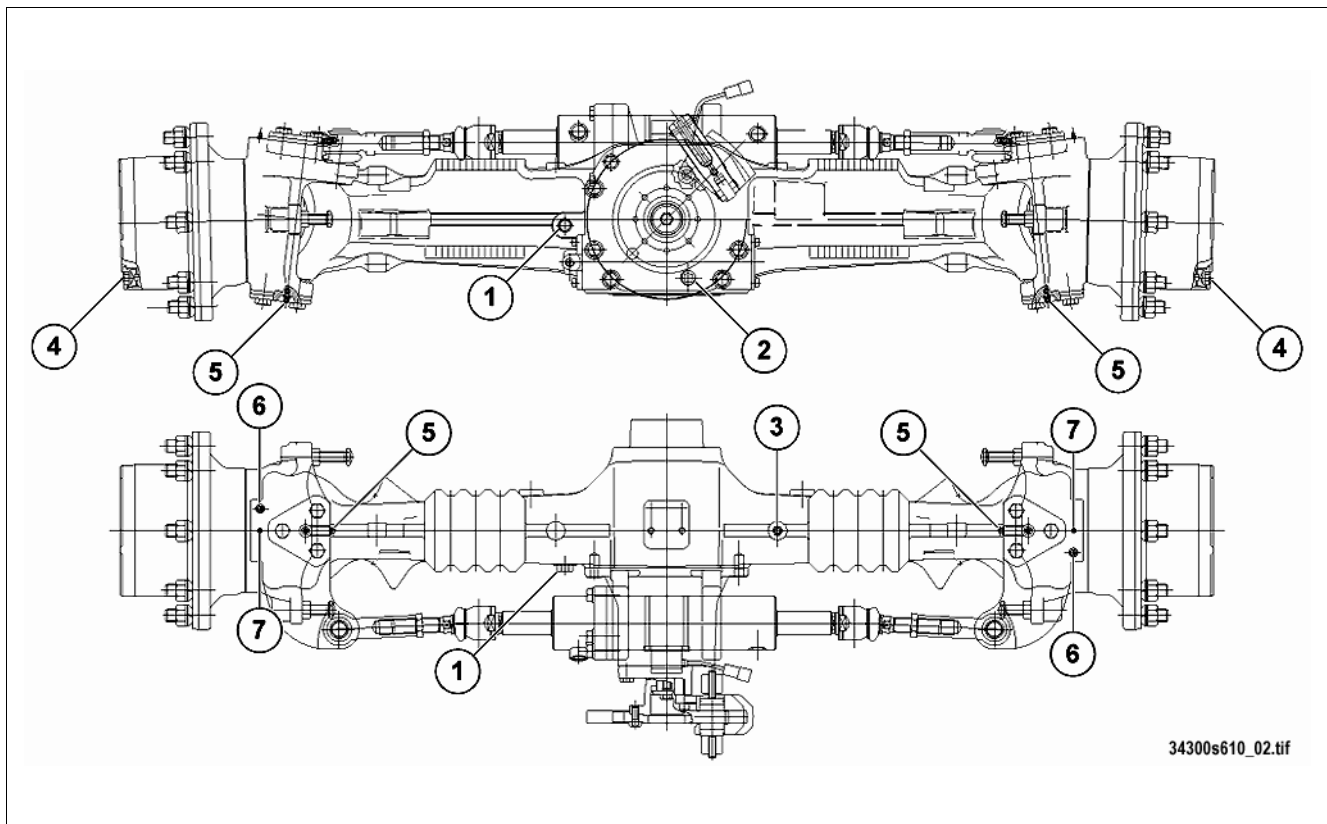




6.3 Rear axle screw connections



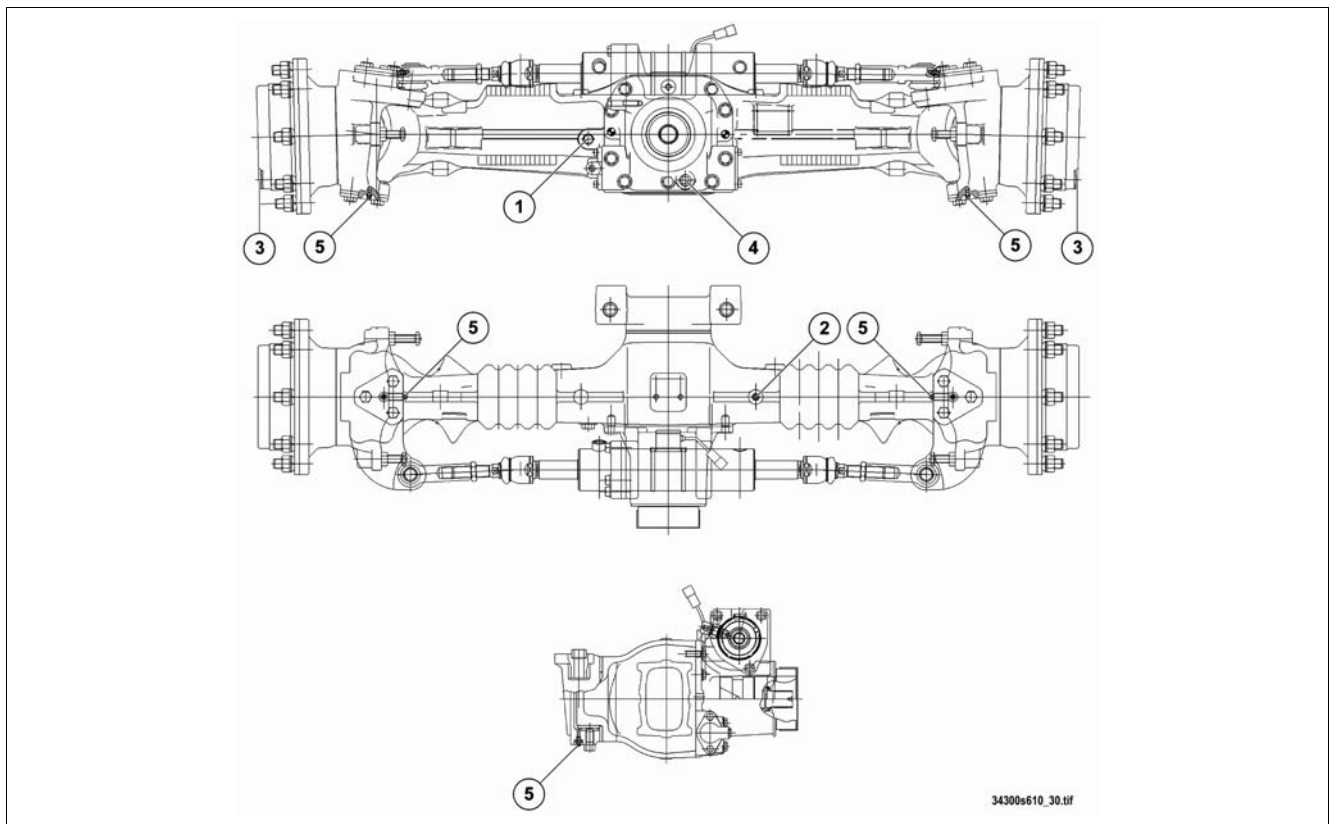
6.4 Drain, fill and check plug – front axle



Pos	Description
1	Oil filler and check plug
2	Drain plug – differential
3	Breather
4	Oil filler and drain plug – planetary drive
5	Lubrication points (grease nipples)
6	Brake connection
7	Brake bleeder

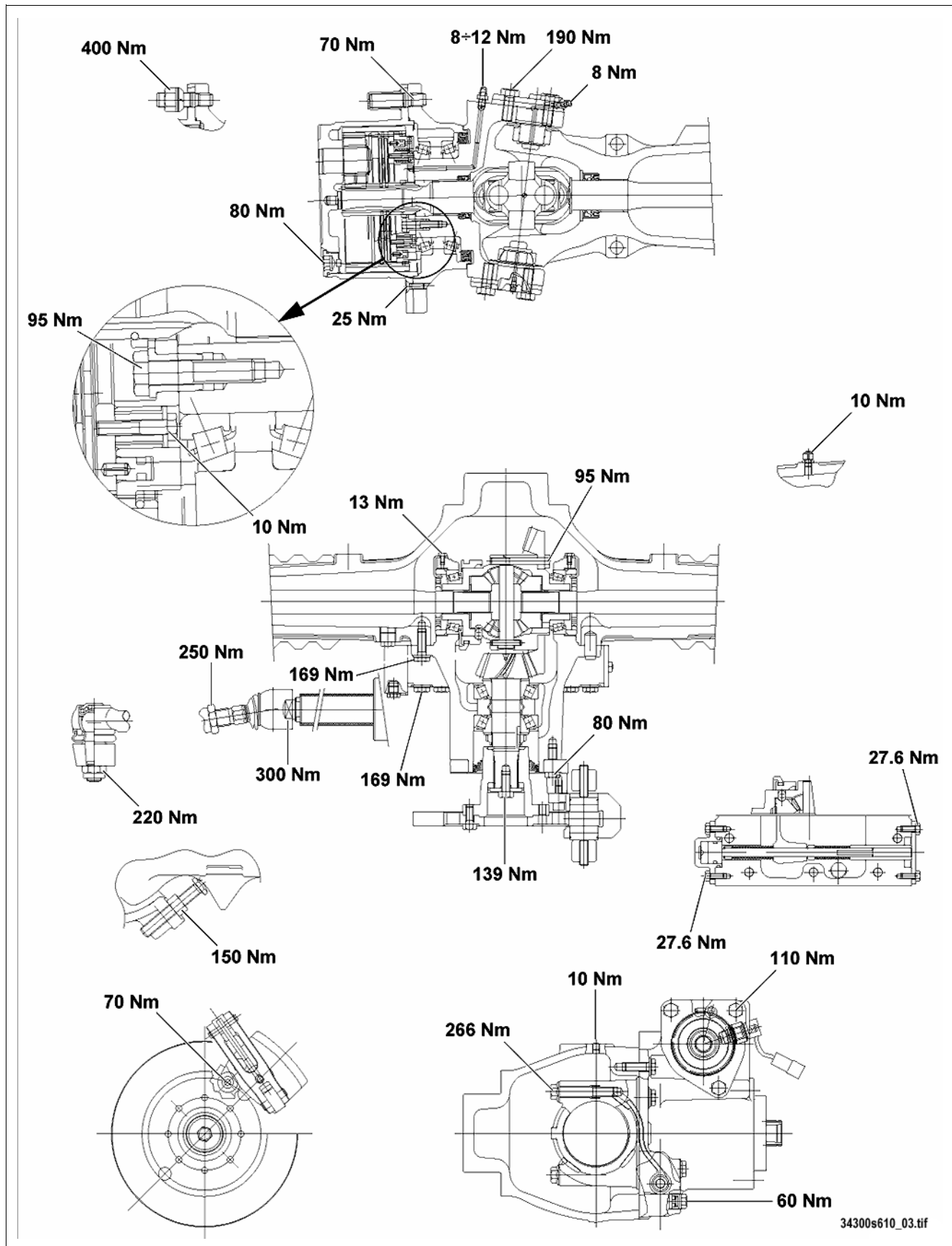


6.5 Drain, fill and check plug – rear axle



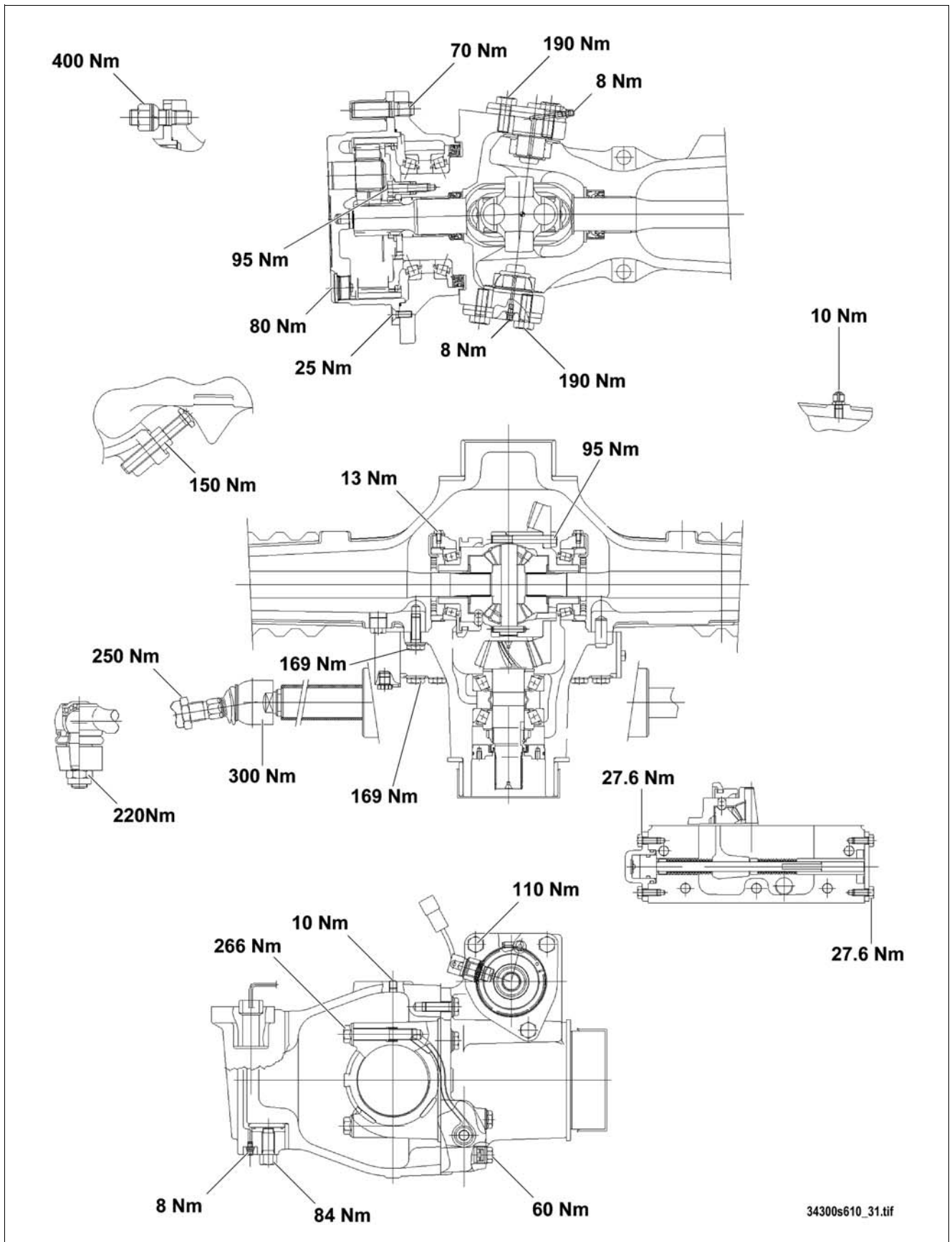
Pos	Description
1	Oil filler and check plug
2	Breather
3	Oil filler and drain plug – planetary drive
4	Drain plug
5	Lubrication points (grease nipples)

6.6 Tightening torques (Nm) – front axle



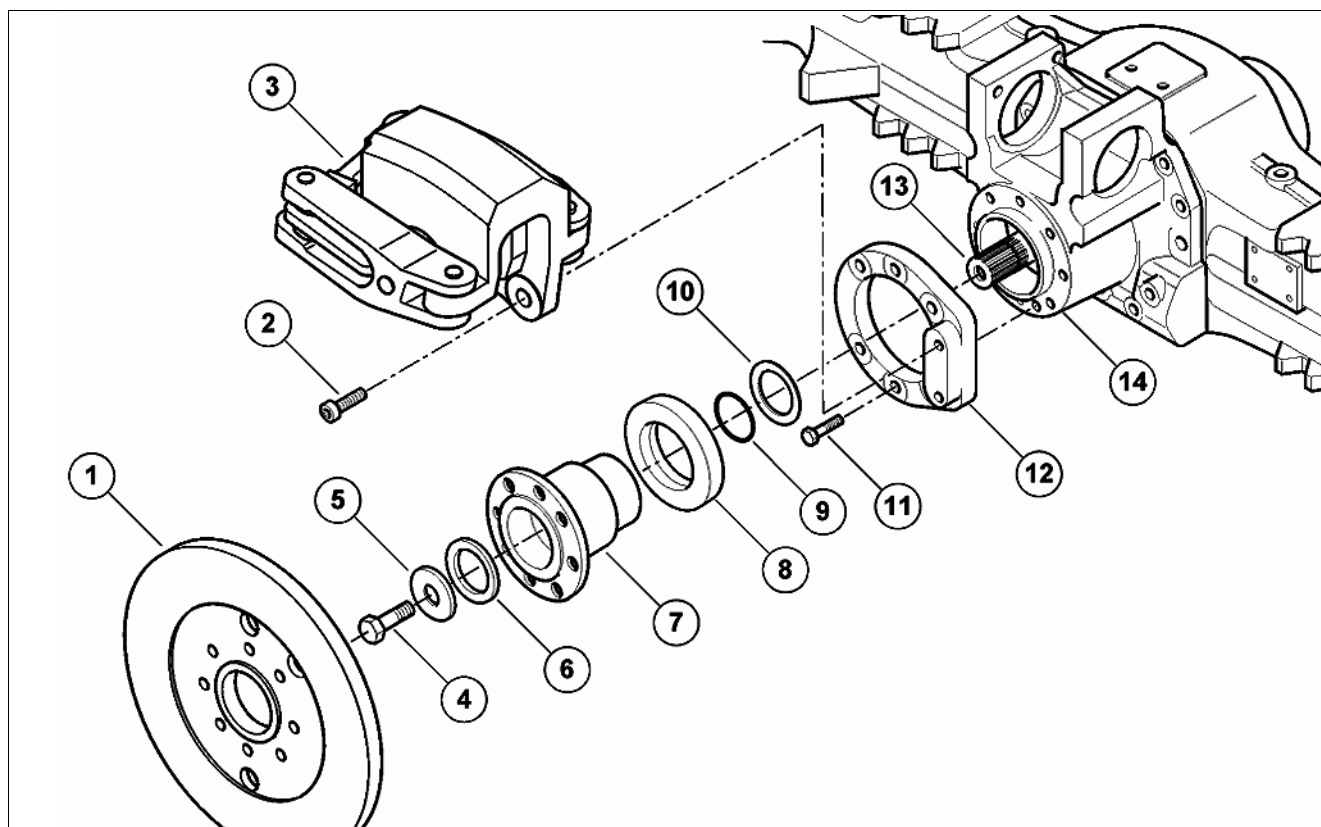


6.7 Tightening torques (Nm) – rear axle



6.8 Sealing work

Input flange – front axle: sealing work



Environment!

Collect the drained oil in a suitable container and dispose of it by an ecologically safe method!

🔧 Replace the rotary shaft seal

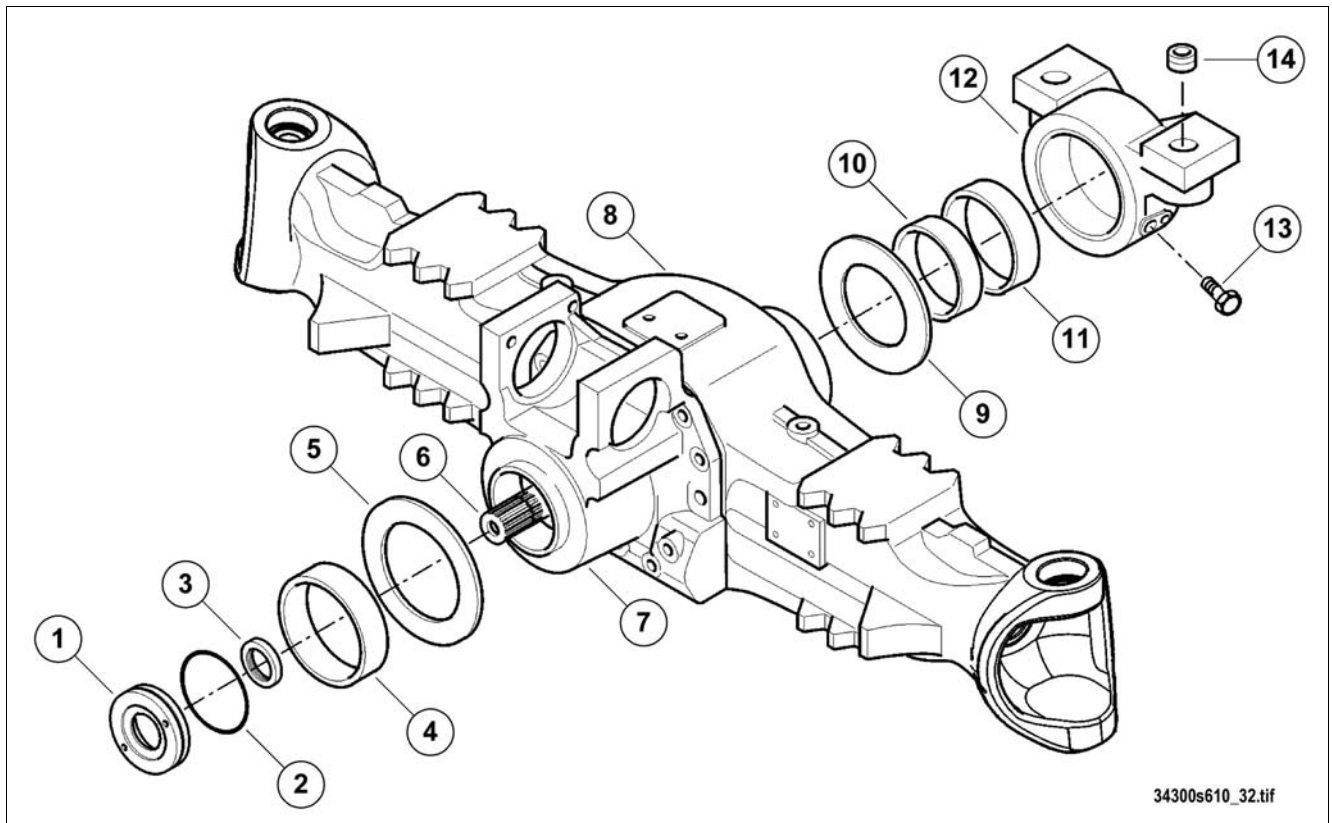
- Remove screw 2
- Remove brake calliper 3
- Remove brake disc 1 from flange 7
- Remove screw 11
- Remove bracket 12 (brake calliper)
- Replace rotary shaft seal 8 with a new one
- Assembly in reverse order
- Fill in oil

Tightening torque:

- ➡ Screw 4 139 Nm
- ➡ Screw 2 70 Nm

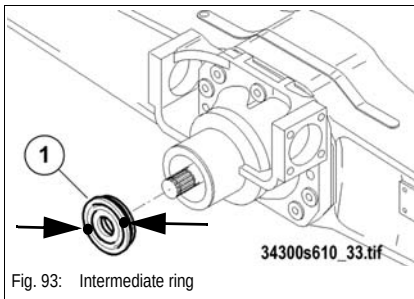


Input flange – rear axle: sealing work

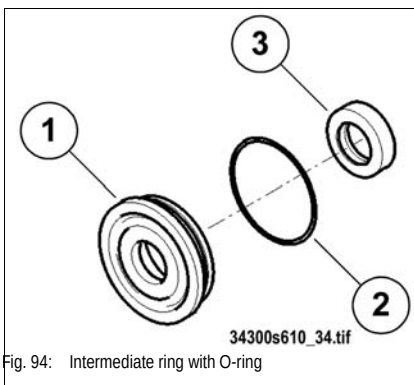


Environment!

Collect the drained oil in a suitable container and dispose of it by an ecologically safe method!

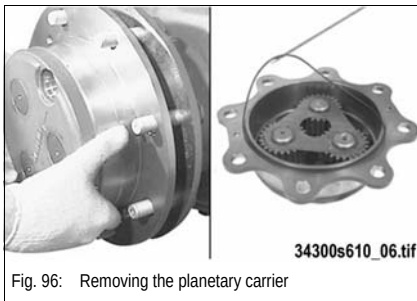
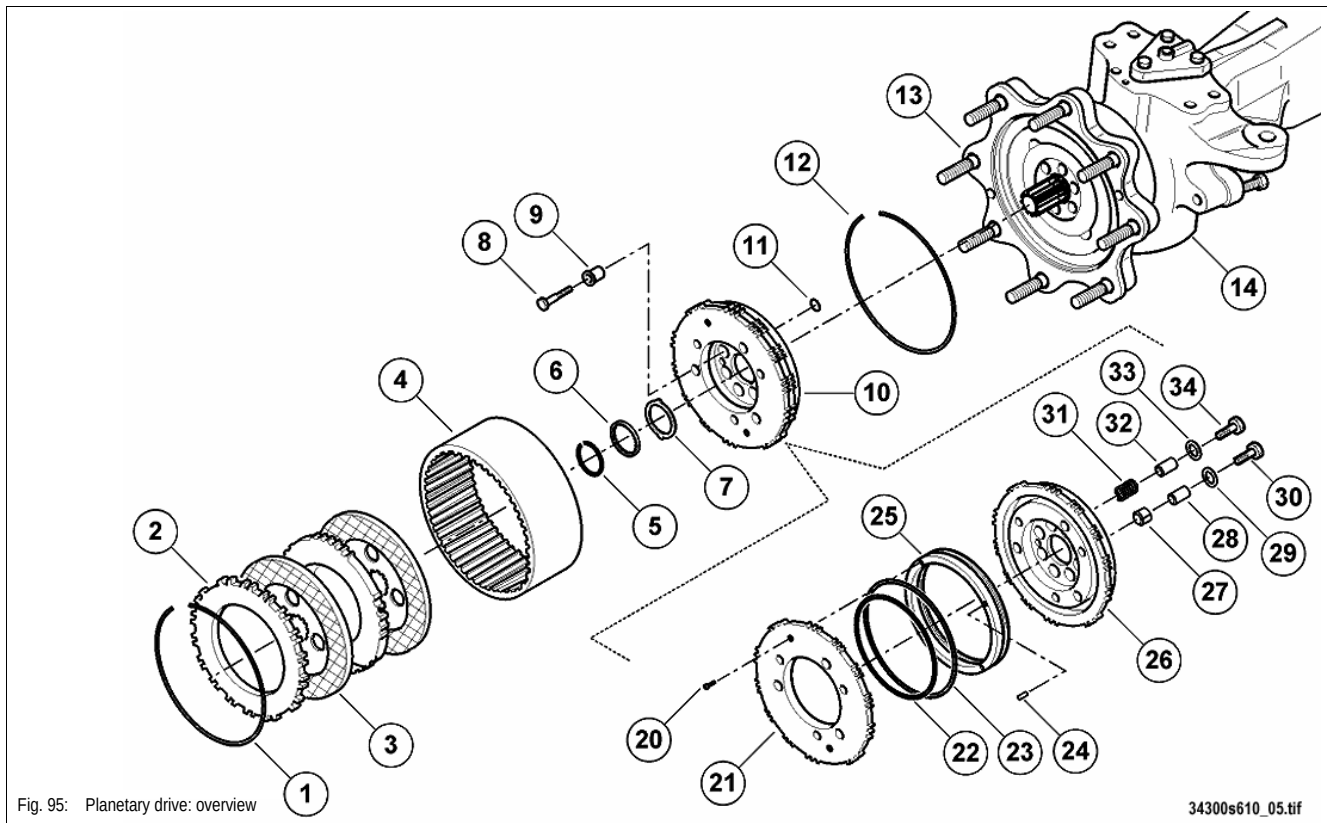


- 20 kph version: remove the hydraulic motor and the transfer gearbox
- 30 – 40 kph version: remove ECO speed gearbox
- Remove intermediate ring 1 with an impact extractor
 - ➡ Threaded bore M 6 (see arrow)



- Remove O-ring 2 and sealing ring 3 from the intermediate ring
- Clean the intermediate ring
- Insert O-ring 2 and sealing ring 3 in the intermediate ring
- Mount intermediate ring 1 in the differential housing with an adapter
- Fill in oil

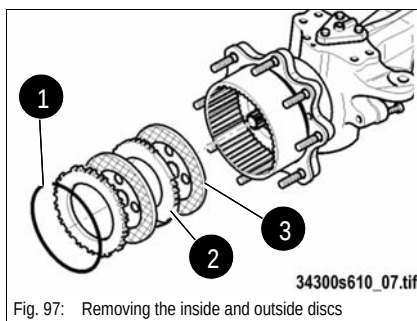
Brake cylinder – front axle



Environment!

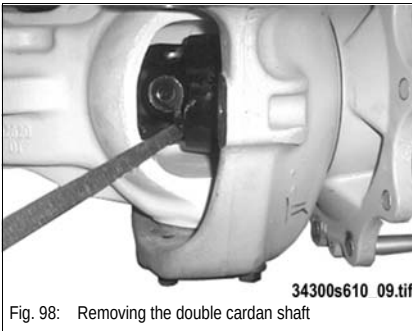
Collect the drained oil in a suitable container and dispose of it by an ecologically safe method!

☞ Remove the planetary carrier

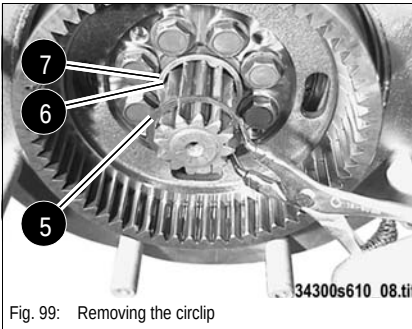


☞ Remove circlip 1

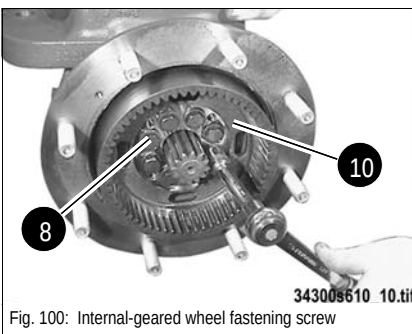
☞ Remove inside and outside discs 2 and 3



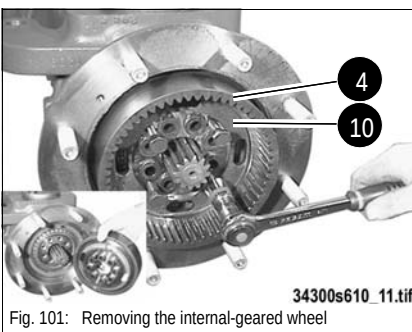
➤ Press the double cardan shaft to the outside with a tyre mounting lever



➤ Remove circlip 5 and washers 6 and 7

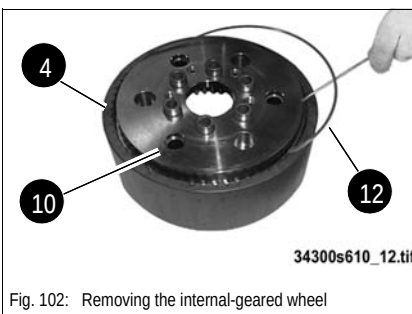


➤ Remove fastening screws 8 from drive disc 10



➤ Mount extractor screws M 10 in the threaded bores and

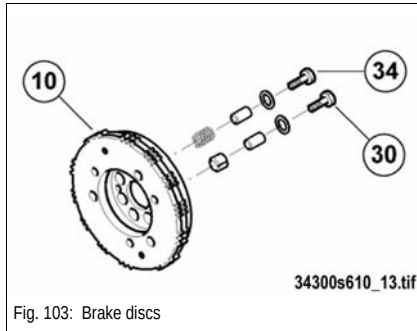
➤ Extract internal-geared wheel 4 and drive disc 10



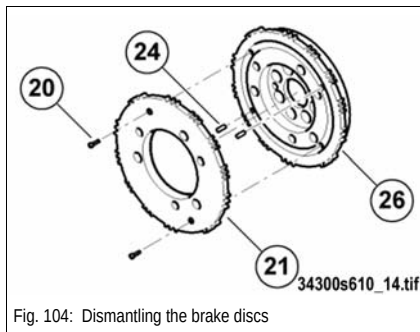
➤ Remove O-ring 11 (see fig. on page 6-10)

➤ Remove circlip 12

➤ Remove drive disc 10 from internal-geared wheel 4

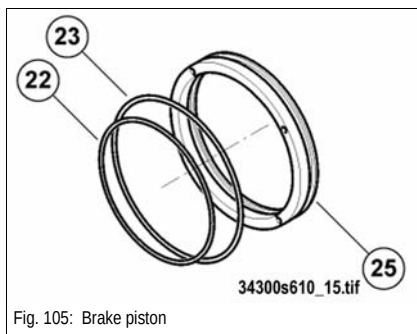


✎ Dismantle the self-adjusting brake disc



✎ Remove fastening screws 20

✎ Remove brake disc 21 from brake piston 26



✎ Remove brake piston 25 and

✎ Replace sealing rings 22/23

✎ Assembly in reverse order

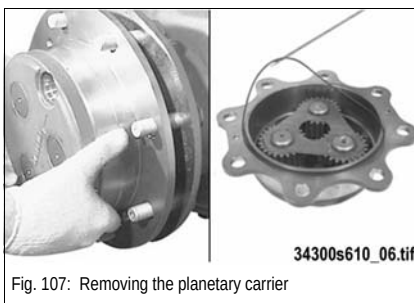
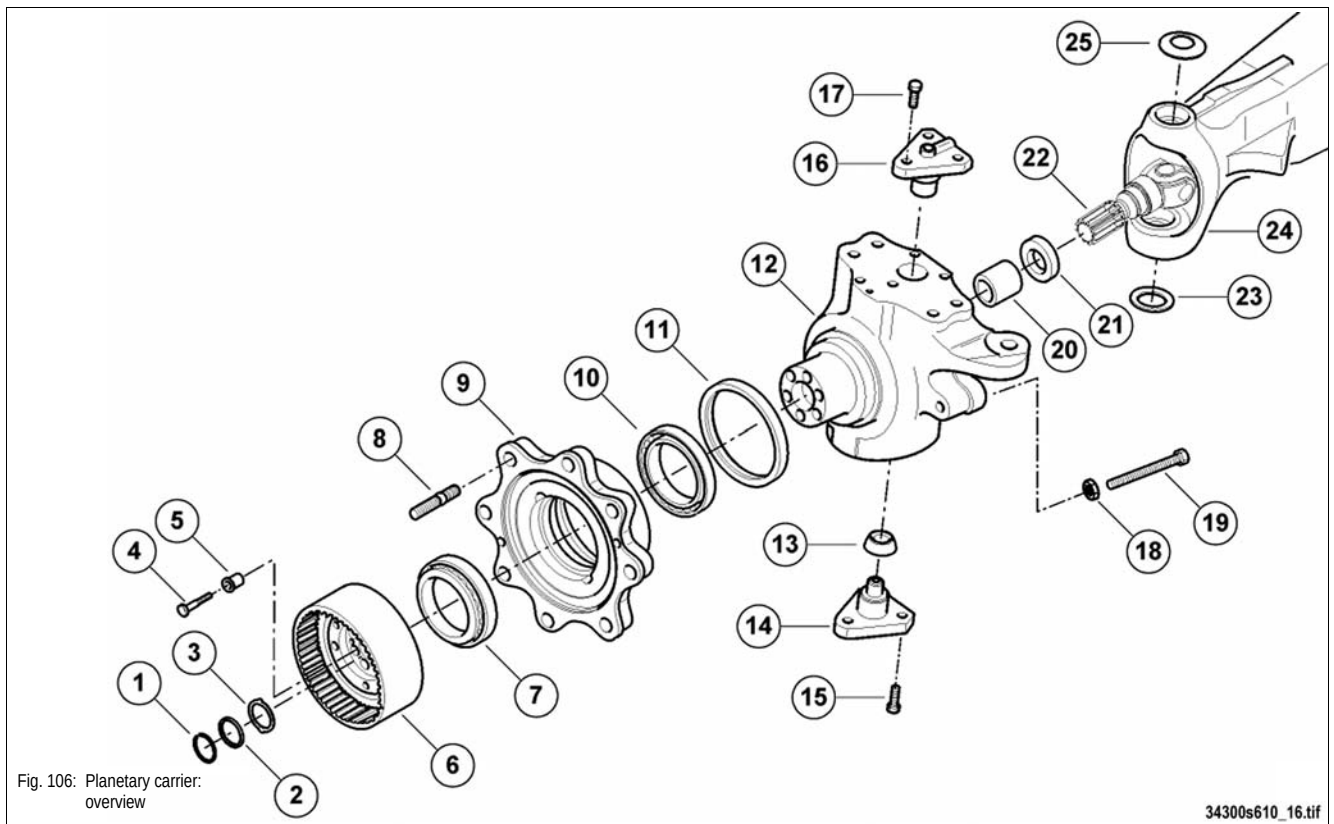
➡ "Tightening torques (Nm) – front axle" on page 6-6

✎ Fill in oil

✎ Bleed the brakes



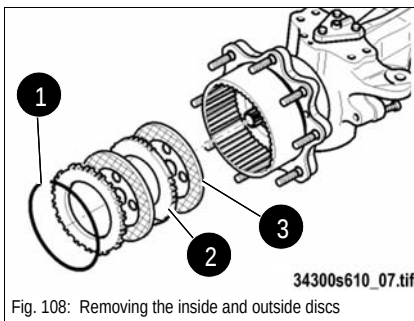
Planetary carrier – planetary drive:
sealing work



Environment!

Collect the drained oil in a suitable container and dispose of it by an ecologically safe method!

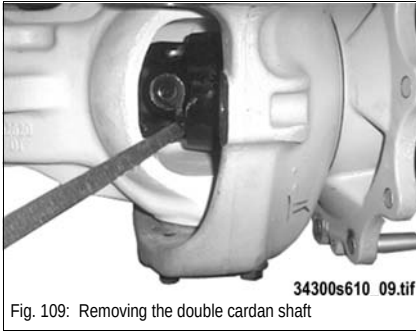
➤ Remove the planetary carrier



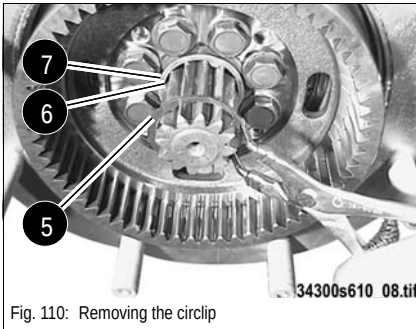
Front axle only

➤ Remove circlip 1

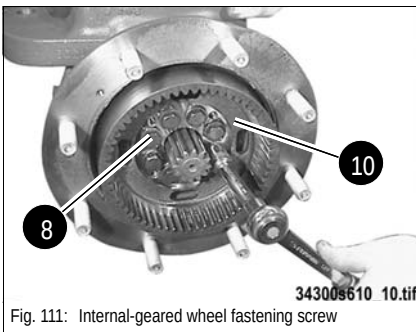
➤ Remove inside and outside discs 2 and 3



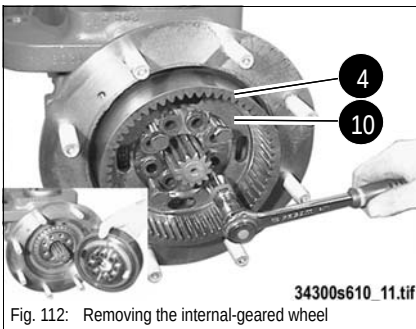
➤ Press the double cardan shaft to the outside with a tyre mounting lever



➤ Remove circlip 5 and washers 6 and 7



➤ Remove fastening screws 8 from drive disc 10



➤ Mount extractor screws M 10 in the threaded bores and

➤ Extract internal-gear wheel 4 and drive disc 10

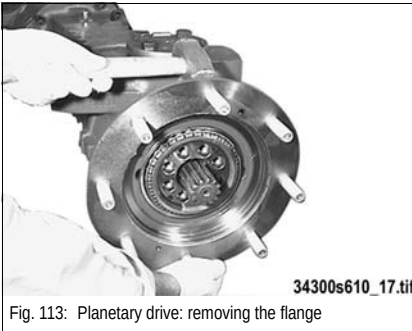


Fig. 113: Planetary drive: removing the flange

☞ Planetary drive: remove the flange with a tyre mounting lever or a plastic hammer

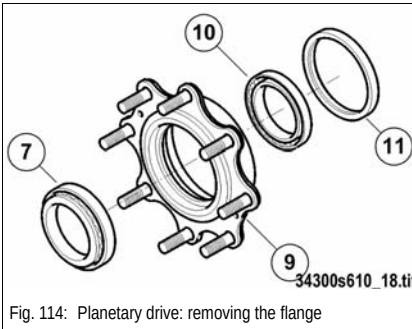


Fig. 114: Planetary drive: removing the flange

☞ Remove sealing 11



Caution!

Do not damage the seat of the rotary shaft seal in the planetary drive as you remove it

☞ Carefully remove rotary shaft seal 10 with a tyre mounting lever



Fig. 115: Planetary drive: sealing ring

☞ Use an adapter to mount the sealing ring

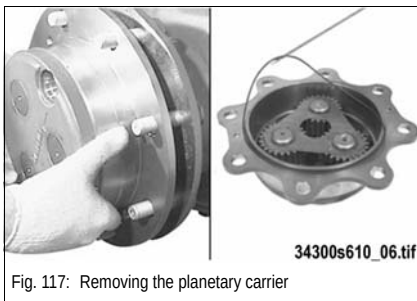
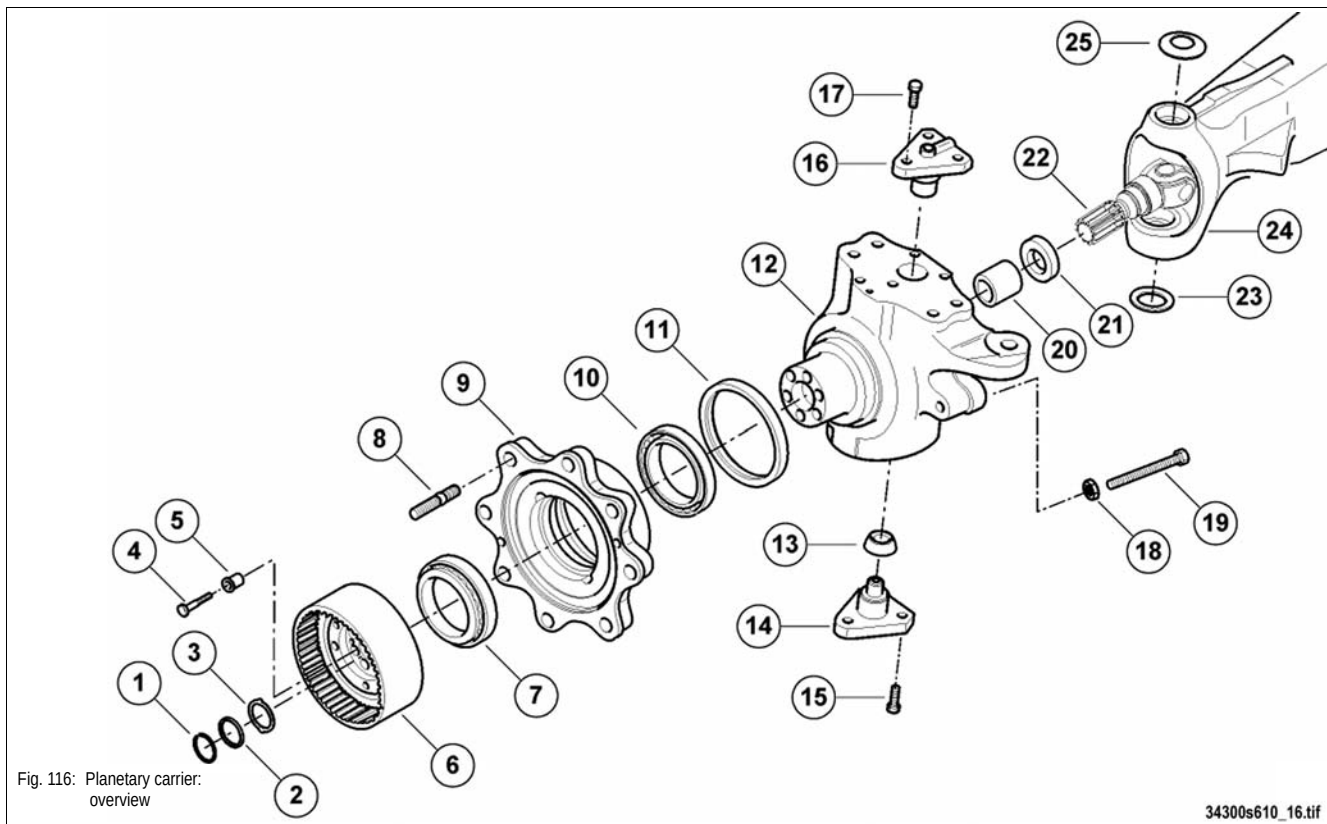
☞ Assembly in reverse order

☞ "Tightening torques (Nm) – front axle" on page 6-6

☞ Fill in oil

☞ Bleed the brakes

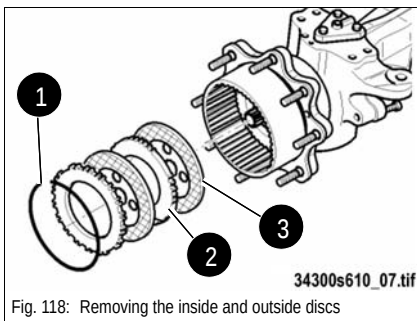
Planetary carrier – axle tube: sealing work



Environment!

Collect the drained oil in a suitable container and dispose of it by an ecologically safe method!

☞ Remove the planetary drive



Front axle only

☞ Remove circlip 1

☞ Remove inside and outside discs 2 and 3



Fig. 119: Removing the double cardan shaft

➤ Press the double cardan shaft to the outside with a tyre mounting lever

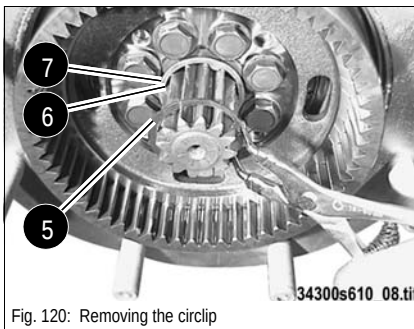


Fig. 120: Removing the circlip

➤ Remove circlip 5 and washers 6 and 7



Danger!

Be careful when removing the planetary drive –

Danger of personal injury!

➤ Use a strap or cable to secure the planetary carrier onto a lifting tackle or other lifting gear to avoid damage or personal injury



Fig. 121: Planetary carrier – axle tube: attachment

- Remove fastening screws 15 and 17 from bearing pins 14 and 16
- Remove the upper and lower bearing pins with an extractor screw
- Carefully remove the complete planetary carrier from the axle tube



Caution!

Do not damage the seat of the rotary shaft seal in the planetary carrier as you remove it

➤ Carefully remove the rotary shaft seal with a tyre mounting lever

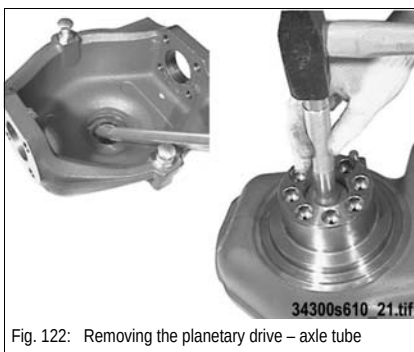
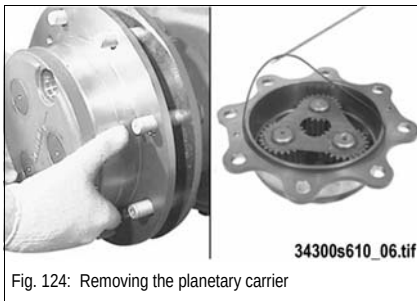
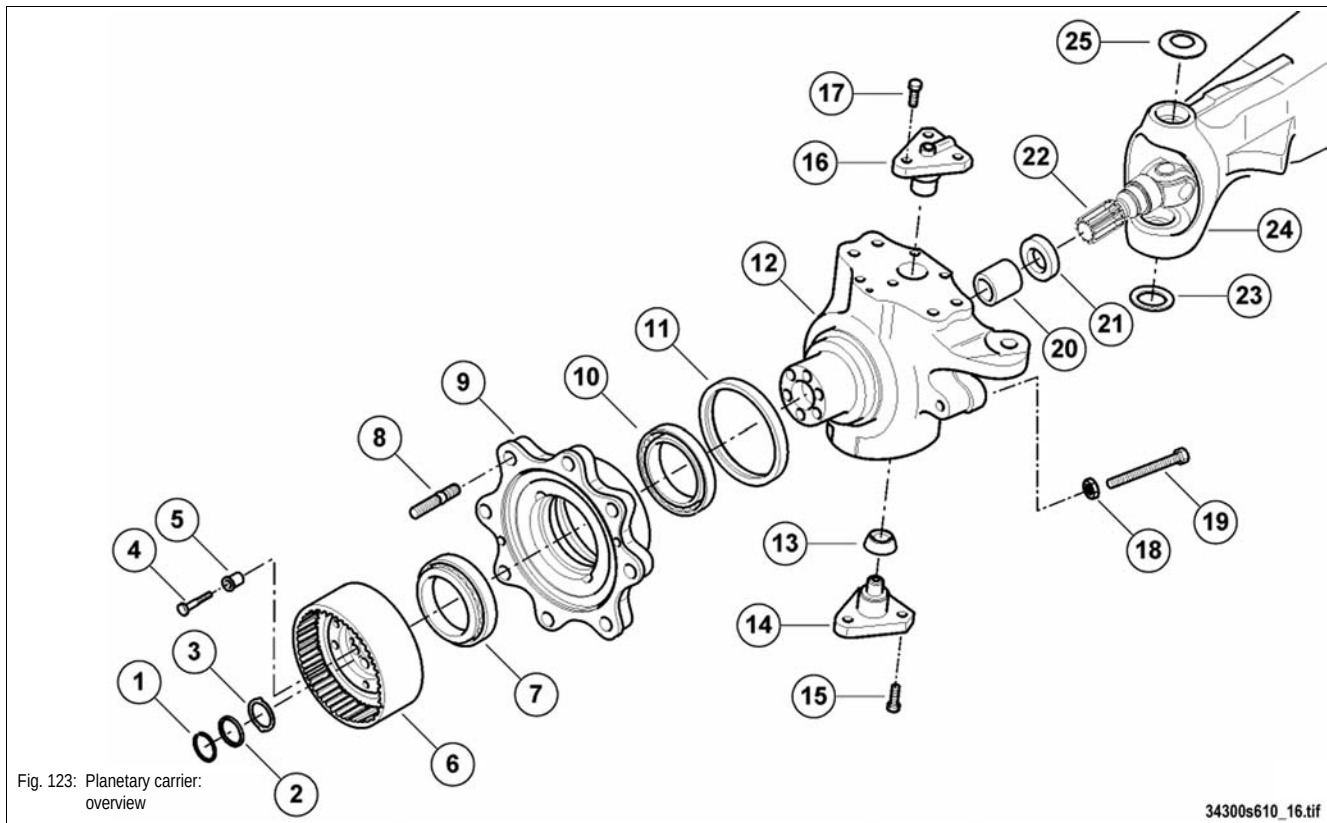


Fig. 122: Removing the planetary drive – axle tube

- Remove the sealing ring with a suitable tool
- Clean the housing
- Use an adapter to mount the sealing ring
- Assembly in reverse order
 - "Tightening torques (Nm) – front axle" on page 6-6
 - Settings do not need to be paid attention to when assembling the planetary drive. Pos. 23 and 25 are fixed spring caps (see "Planetary carrier: overview" on page 6-16)
- Fill in oil
- Bleed the brakes

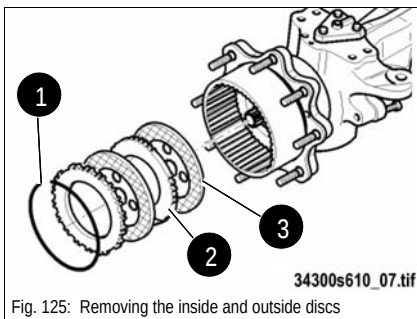
Sealing ring in axle tube: sealing work



Environment!

Collect the drained oil in a suitable container and dispose of it by an ecologically safe method!

☞ Remove the planetary carrier



Front axle only

☞ Remove circlip 1

☞ Remove inside and outside discs 2 and 3



Fig. 126: Removing the double cardan shaft

➤ Press the double cardan shaft to the outside with a tyre mounting lever

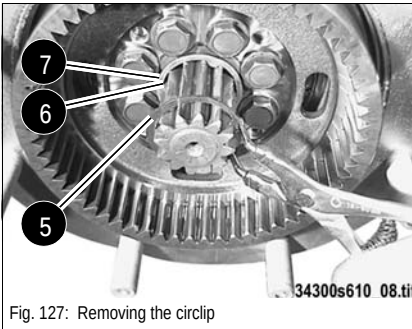


Fig. 127: Removing the circlip

➤ Remove circlip 5 and washers 6 and 7



Danger!

Be careful when removing the planetary carrier –

Danger of personal injury!

➤ Use a strap or cable to secure the planetary carrier onto a lifting tackle or other lifting gear to avoid damage or personal injury



Fig. 128: Planetary carrier – axle tube: attachment

➤ Secure the planetary carrier with suitable lifting gear

➤ Remove fastening screws 15 and 17 from bearing pins 14 and 16

➤ Remove the upper and lower bearing pins with an extractor screw

➤ Carefully remove the complete planetary carrier from the axle tube

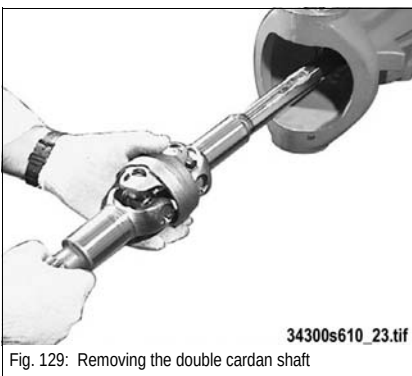


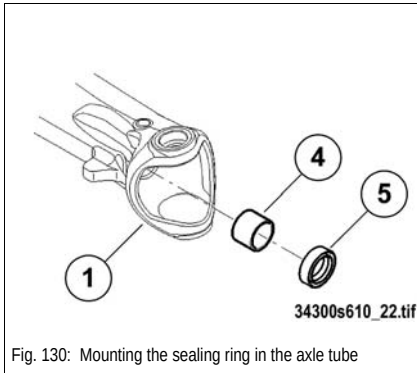
Fig. 129: Removing the double cardan shaft

➤ Pull the double cardan shaft out of the axle tube



Important!

The brake discs and the differential lock remain in the axle tube as you pull out the double cardan shaft.



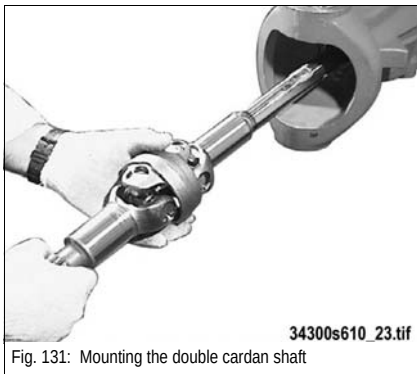
☞ Mount sealing ring 5 with an adapter



Caution!

The rotary shaft seal can be damaged when fitting the double cardan shaft.

☞ Wrap thin protective tape around the profile of the double cardan shaft, so that the tape can be removed after assembly.



☞ Carefully insert the double cardan shaft into the axle tube

☞ Mount the planetary drive

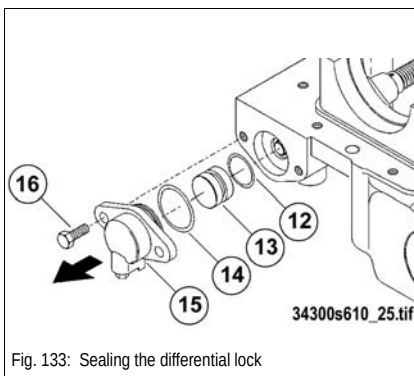
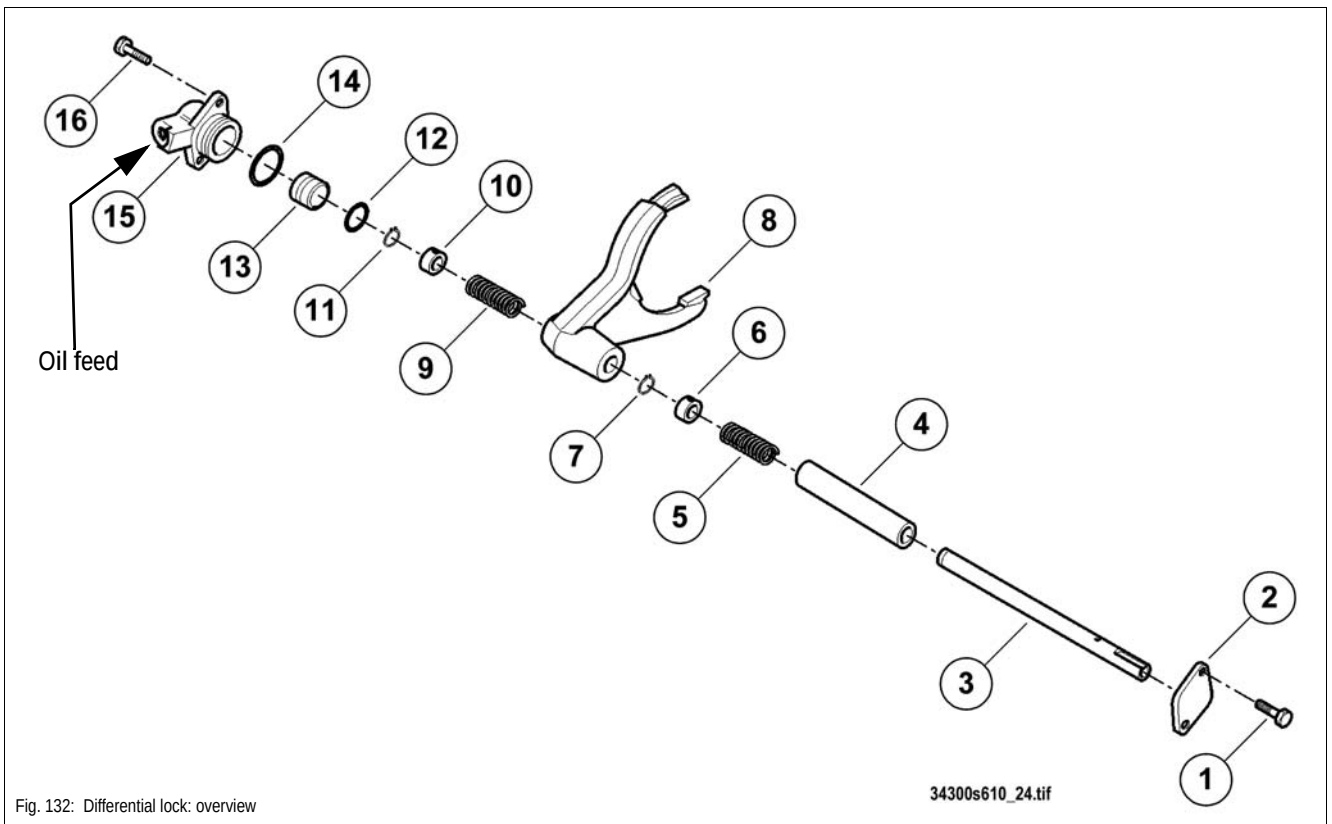
➡ "Tightening torques (Nm) – front axle" on page 6-6

☞ Fill in oil

☞ Bleed the brakes

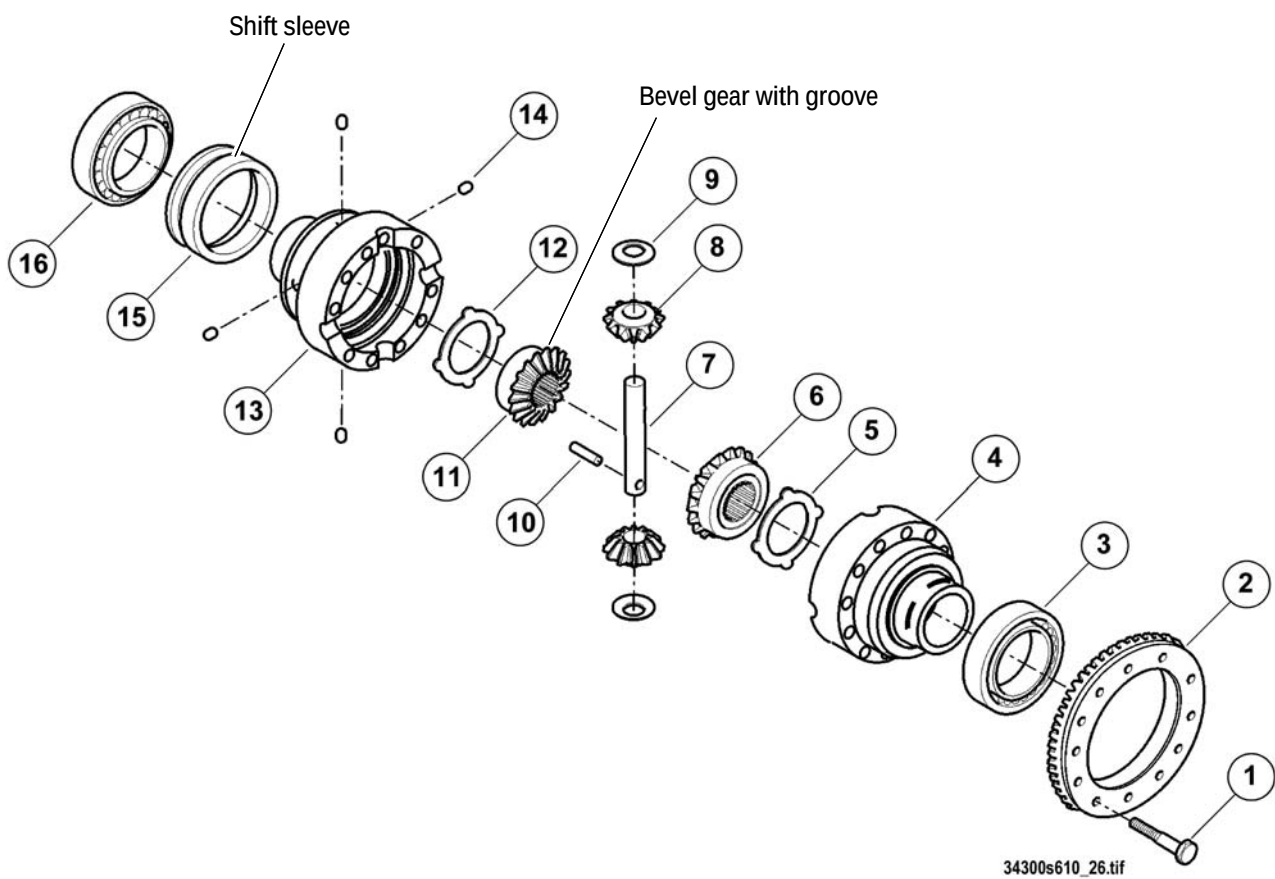
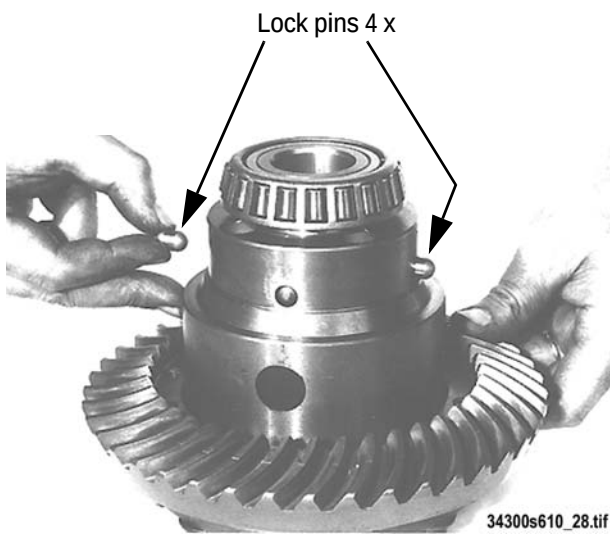


Cylinder – differential lock: sealing work



- Remove screw 16
- Remove cover 15 from the differential housing
- Remove piston 13 from the cover
- Replace O-rings 12 (piston) and 14 (cover)
- Mount the piston in the cover
- Mount cover 15 with screws 16 on the differential housing

Differential lock: overview

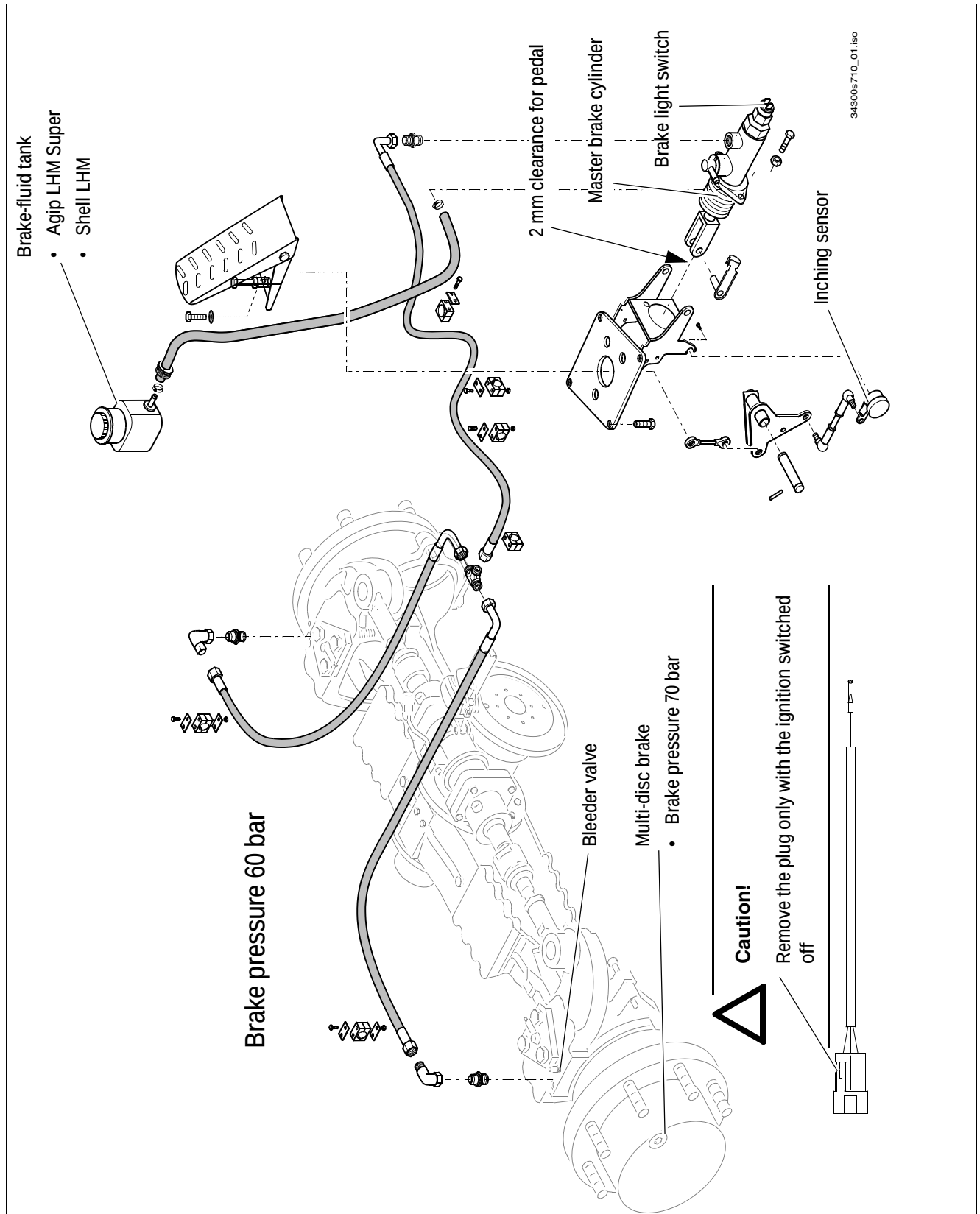


Brakes

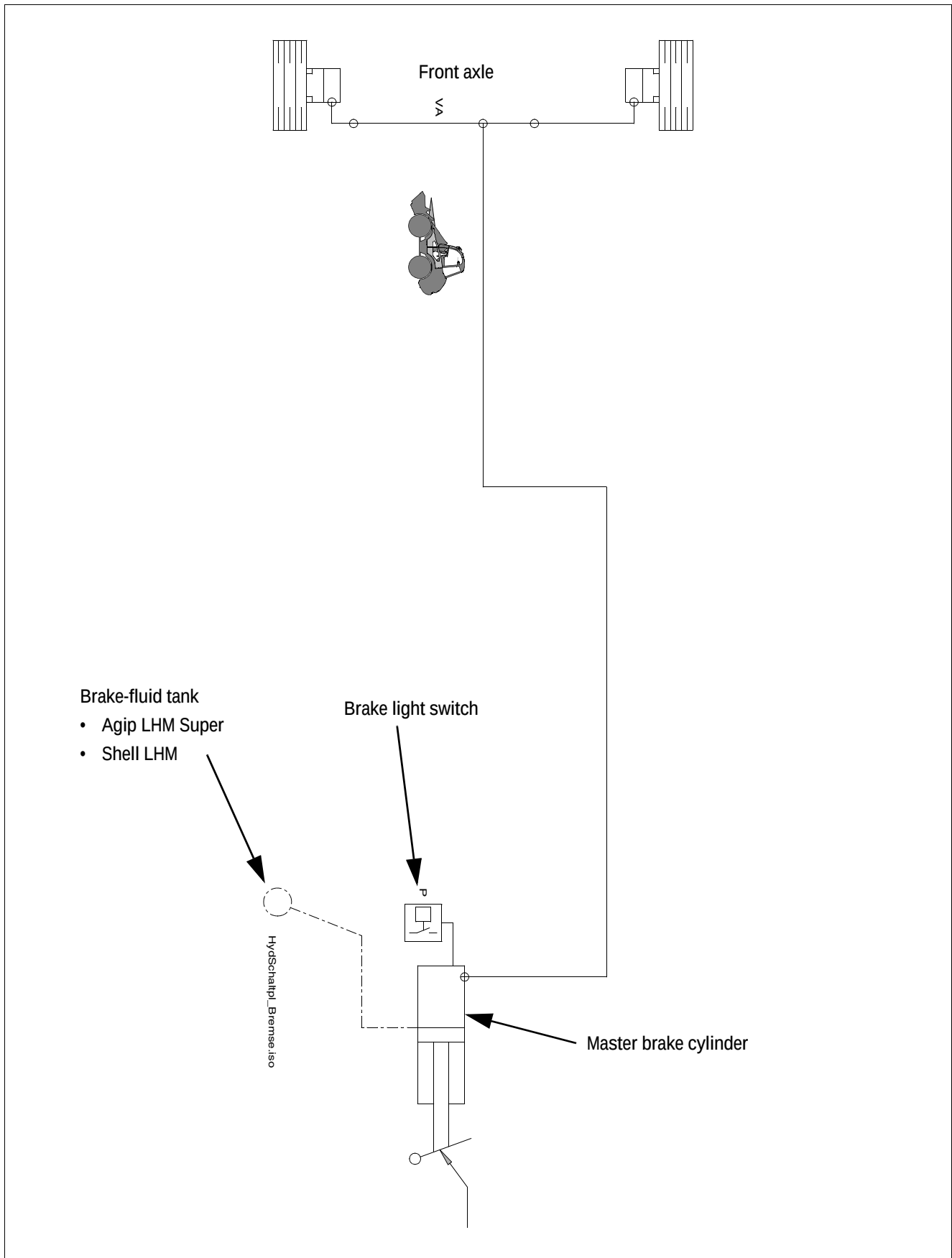


7 Brakes

7.1 Brake circuit



Brake diagram





7.2 Service brake

Important information on the brake system



Caution!

For reasons of safety the brake/inching valve and the pressure accumulator may be dismantled and repaired by authorised specialist staff only. Otherwise replace the complete unit.

In order to avoid damage to the seals in the brake system:

- ☞ Use brake fluid Agip LHM Super or Shell LHM
- ☞ Make sure old brake fluid in the bleed equipment is fully replaced by the brake fluid specified above – no mixtures!

Bleeding the brake system with bleed equipment

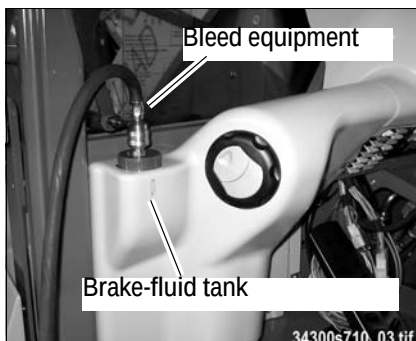


Fig. 134: Bleeding the brake-fluid tank

- ☞ Connect the bleed equipment to the brake-fluid tank (left-hand side access)
- ☞ Use brake fluid Agip LHM Super or Shell LHM



Fig. 135: Bleeding the brakes

- ☞ Connect a hose from the tank to the front axle bleed valves
- ☞ Open the bleed valves
- ☞ Press down the brake pedal
 - ☞ This supports bleeding
- ☞ Bleed the brake system until there is no more air or bubbles in it

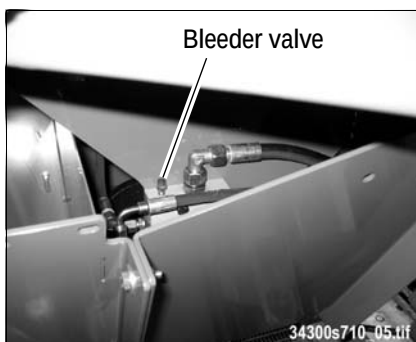
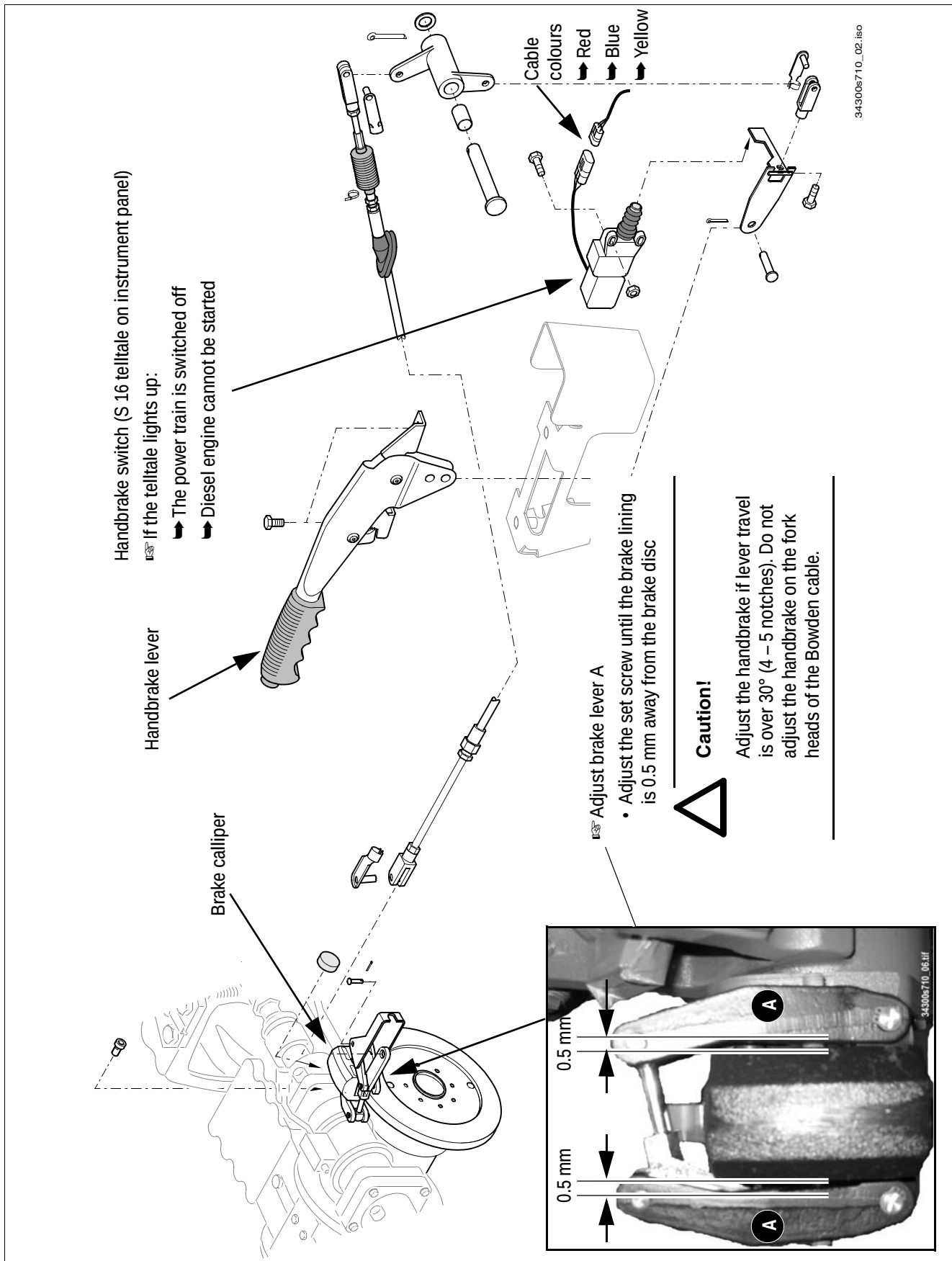


Fig. 136: Bleeding the inching valve

- ☞ Bleed the inching valve (in driving direction on the left, near the access)

Handbrake: overview

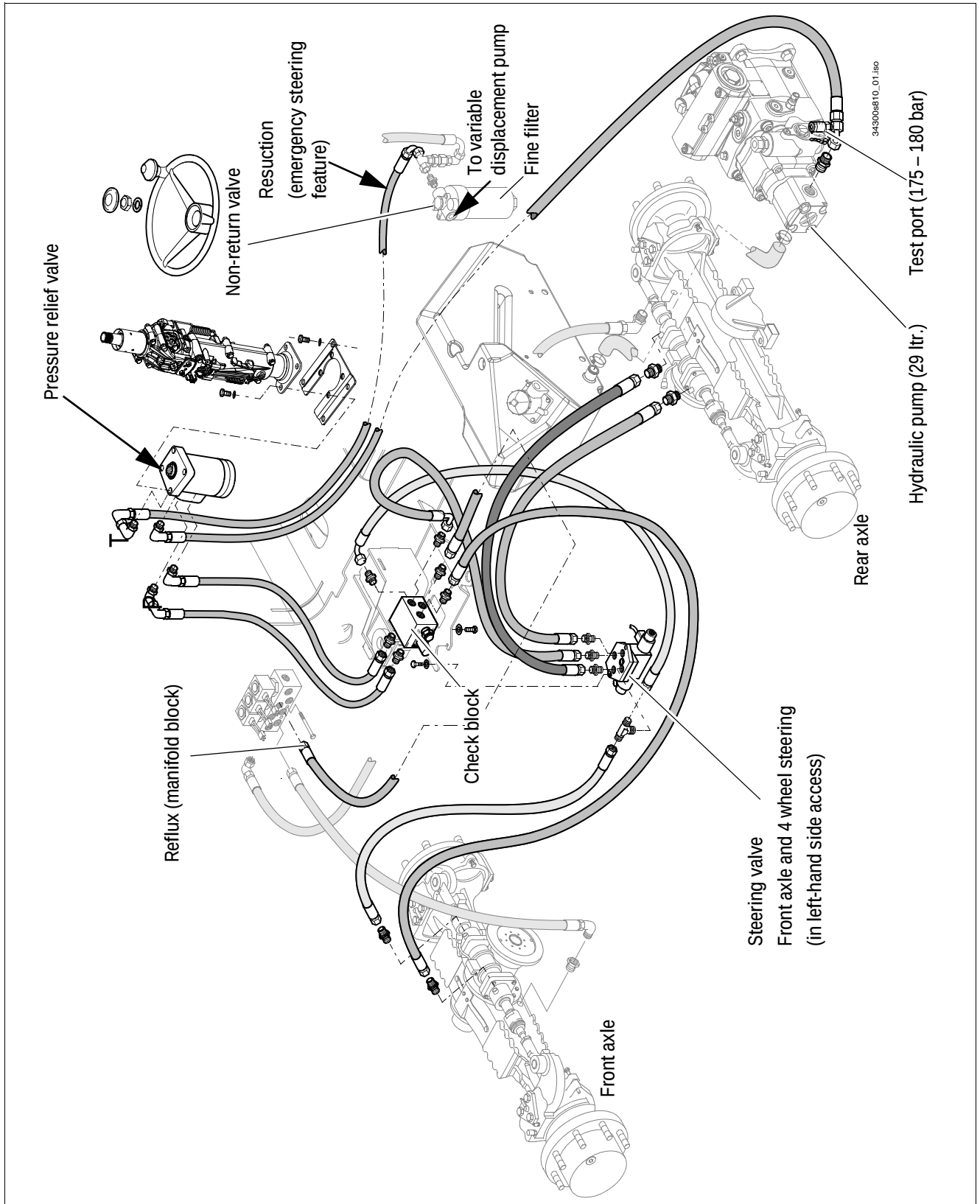


Steering



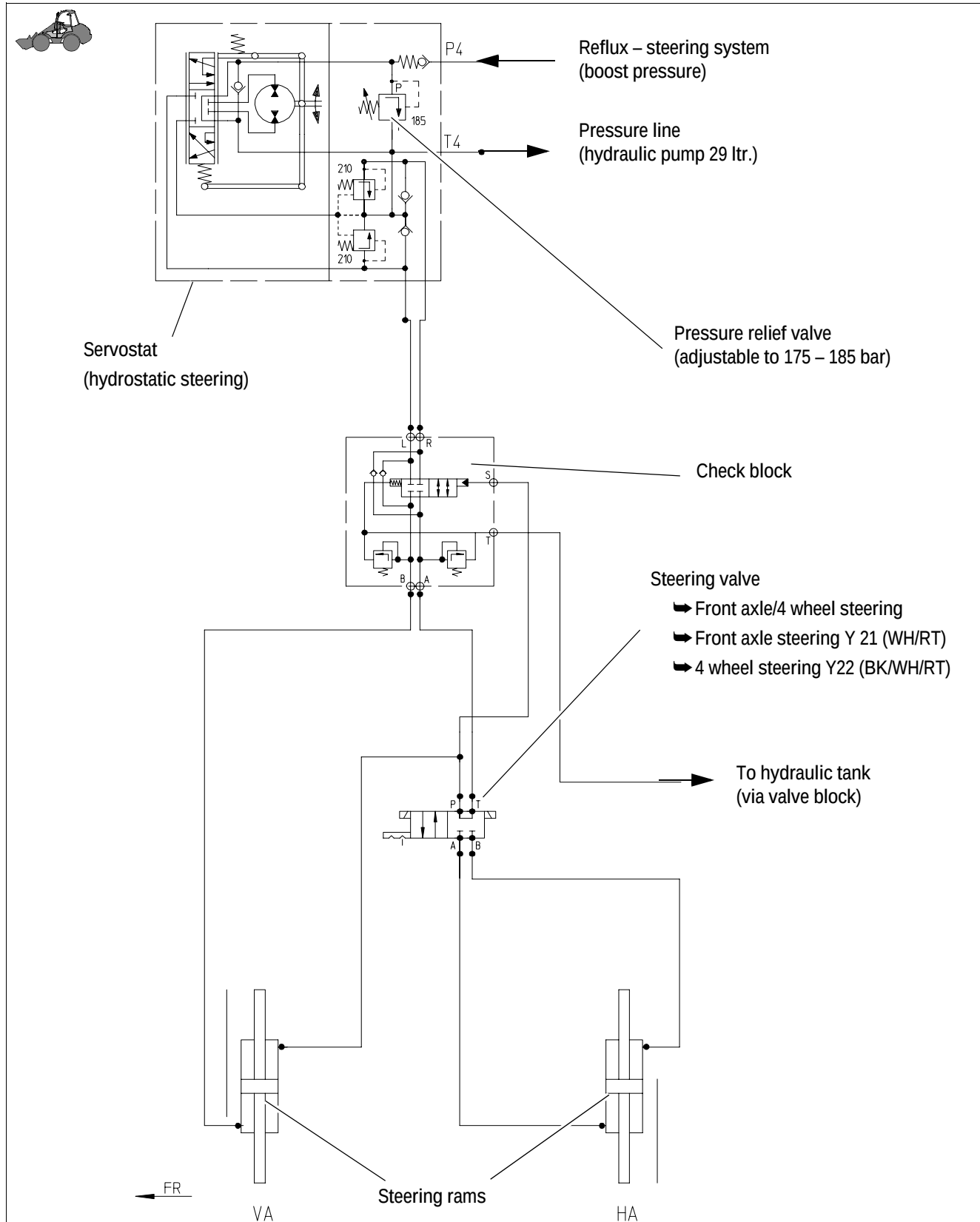
8 Steering

8.1 Steering circuit



8.2 Steering circuit

- Steering synchronisation, steering sensor, steering electronics (on the analogy of 21 series)





8.3 Steering system adjustment

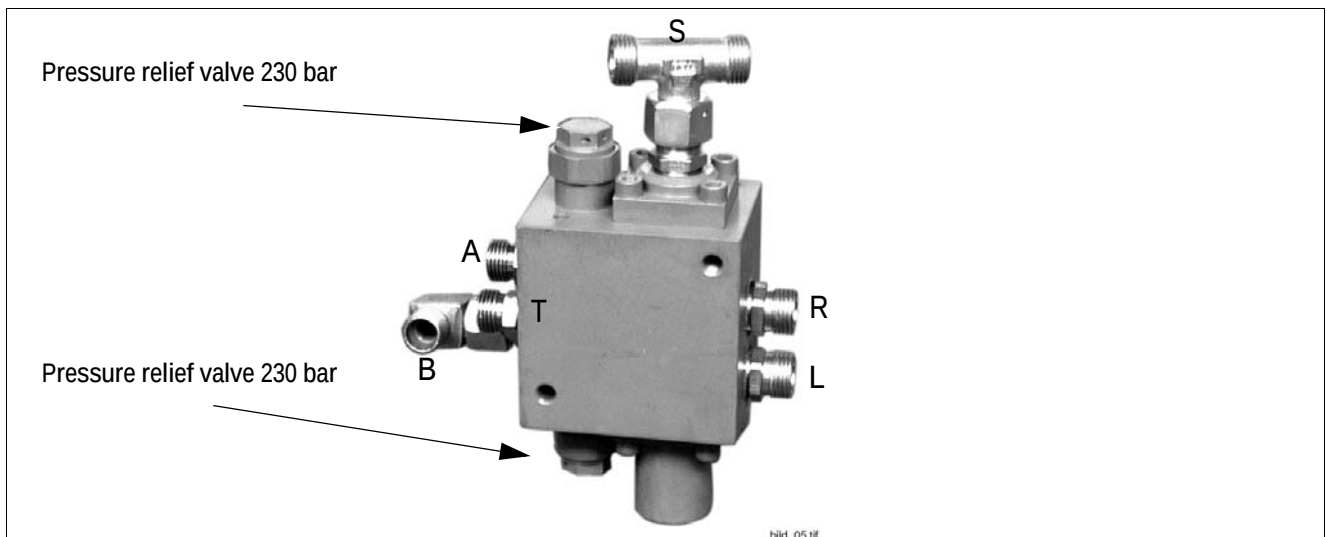
Function

Steering is carried out by means of 2 steering rams. Both steering rams are connected together on one side of the chamber, the steering valve and the check block are located in between. Each of these components has a certain amount of leakage which means hydraulic oil escapes between the front and rear steering rams. This oil is no longer replenished whilst steering since pressure is applied to only one side of the front or rear steering ram when steering to the left or right. This is why synchronising several times a day is normal, depending on the use the vehicle is put to.

Checking a steering ram

- Apply pressure to the steering ram in centre position, i.e. block one side with a sleeve.
- Remove the hydraulic lines. The connecting piece to the manual pump must have a micro port and a stop cock
- Raise pressure to 150 bar; pressure is allowed to drop to about 20 bar in 10 minutes
- Then carry out a low-pressure test at 10 bar; no pressure drop in the process!

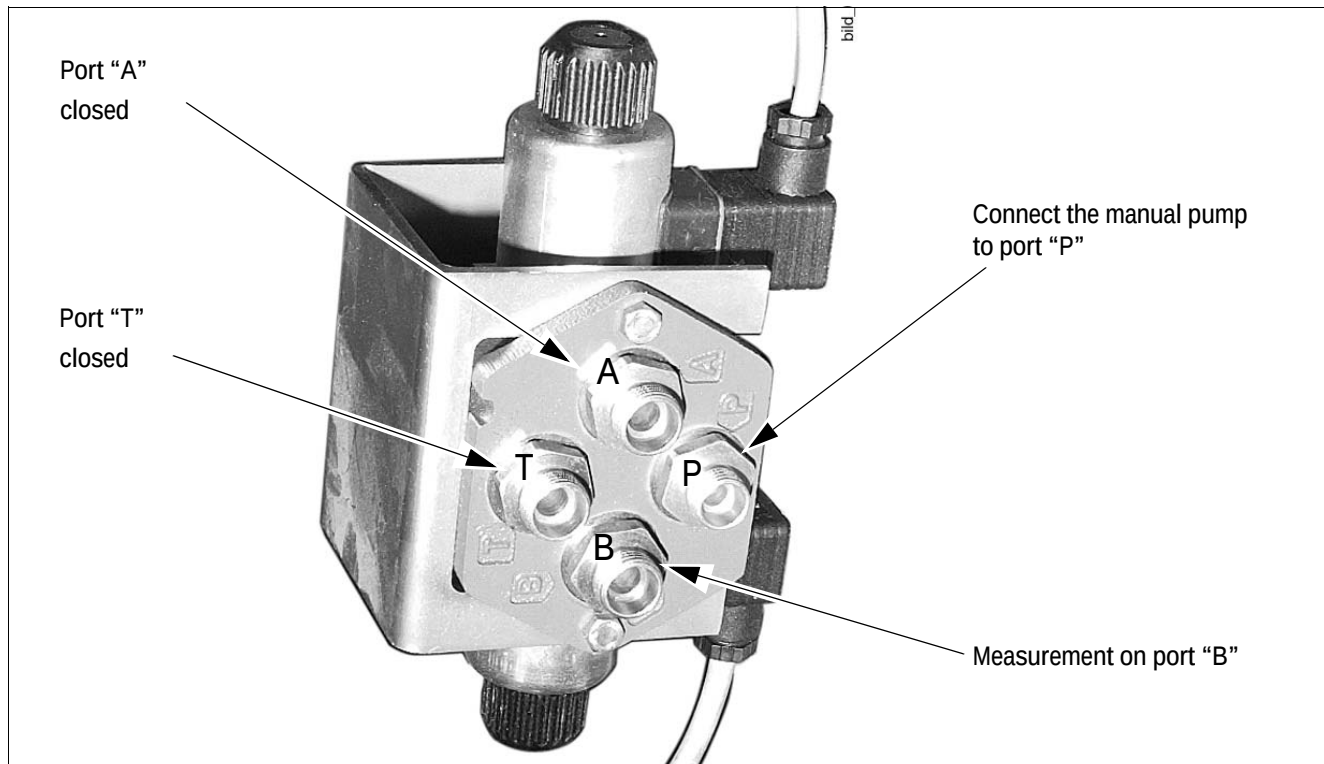
Checking the check block



☞ Checking the check block

- Connect the manual pump to port "S" – 250 bar; no pressure drop in the process
- Connect the manual pump to port "A", pressure must rise to 230 bar in the process, until the pressure relief valve opens
- Measure leakage on "R" < 15 cm³/min – P = 230 bar
- Connect the manual pump to port "B", pressure must rise to 230 bar in the process, until the pressure relief valve opens. Leakage on L < 15 cm³/min – P = 230 bar
- Apply 15 bar pressure to manual pump port "T"; no pressure drop allowed in the process

8.4 Steering valve: overview



Checking the steering valve

How to check:

- ☞ Use the screw connection to screw the solenoid valves and the connecting plate together, bear in mind the position. Port "P"
- ☞ Check the electric controls of the solenoid valves, then move to position "A".
- ☞ Fill the solenoid valves with hydraulic oil and close ports "A" and "T" with plugs
- ☞ P: connect the port with the manual pump
- ☞ B: port to test tube

Test:

- ☞ Increase pressure to 160 bar with the manual pump. Once the transparent hose is bled, clock the time with a stopwatch. Keep the pressure constant at 160 bar for 1 minute.

Evaluation

- ☞ Direct reading off the test tube (ml)
- ☞ Enter the result in the test report PP 82070/01

Test criterion

- ➡ Kramer value 14 cm³/min with cold oil
- ➡ Kramer test shows a max. 14 cm³/min = OK --> accepted



8.5 Hydraulic ports on servostat

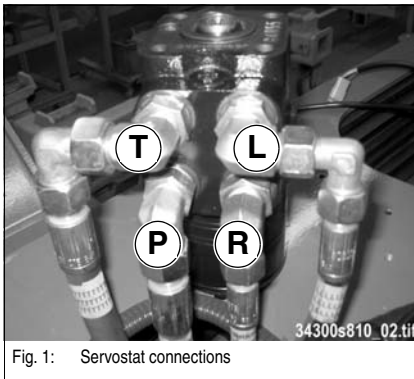


Fig. 1: Servostat connections

- P = hydraulic pump => servostat
- T = servostat => boost pressure filter => variable displacement pump
- L = servostat => check block => front axle steering ram
- R = servostat => check block => rear axle steering ram

8.6 Pressure relief valve – servostat: settings

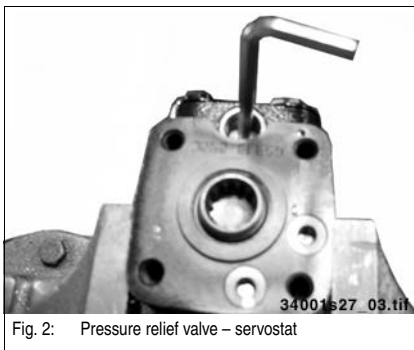


Fig. 2: Pressure relief valve – servostat

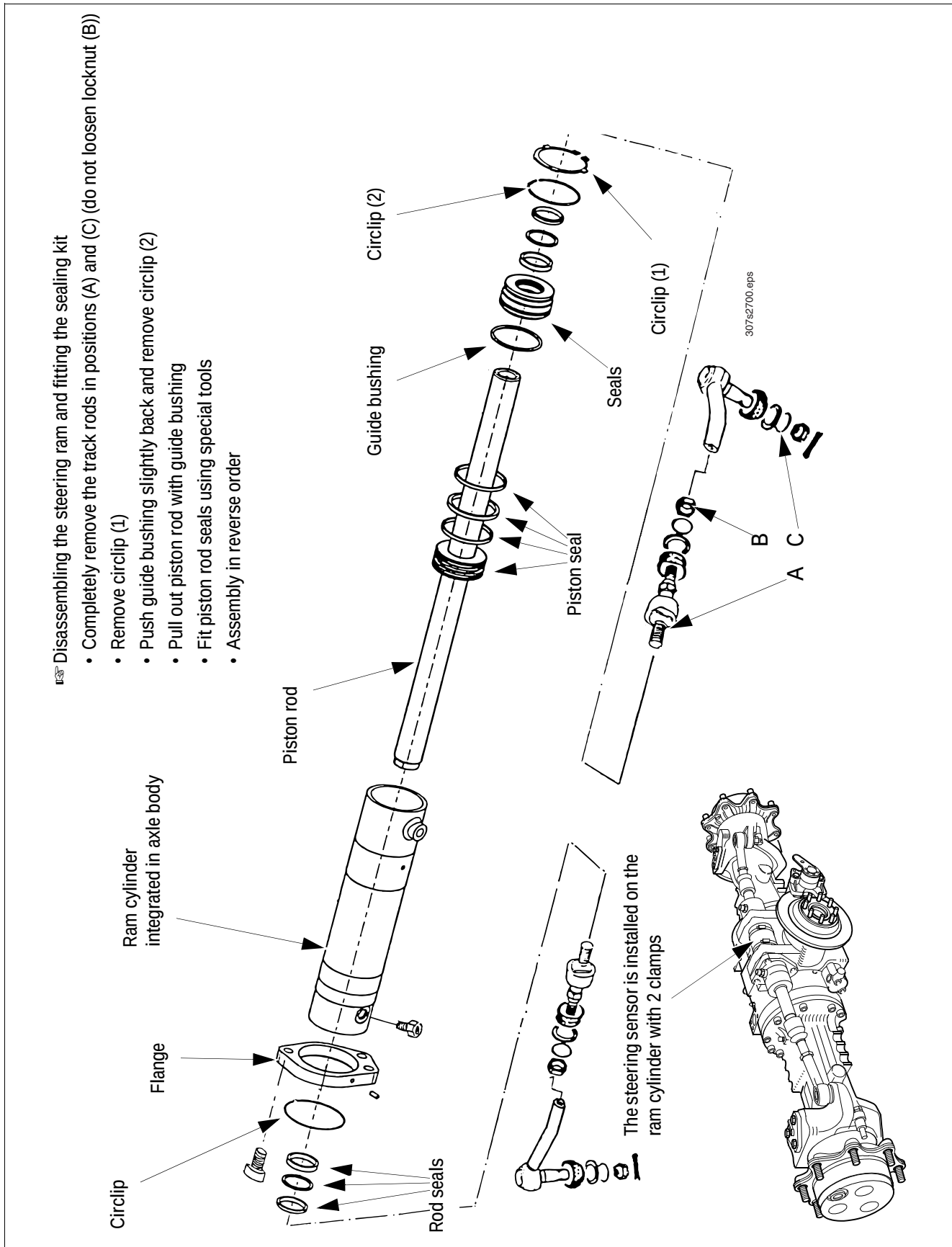
➤ Proceed as follows:

- Remove the plug
- Set pressure to 175 bar with an allen key (Ø 6 mm)
- Mount the plug

8.7 Setting the steering sensors

- Set the axle with the parallelism checked to straight-ahead position (steering angle 0°)
- Connect electric supply
- Slacken the clamps on the steering sensor
- Determine the sensor's band width (about 4 mm) by shifting the sensor on the steering ram
 - ➡ The light-emitting diode on the sensor lights up
- Shift the sensor to the left until the light emitting diode goes out
 - ➡ Draw a mark in this position
- Shift the sensor to the right until the light emitting diode goes out
 - ➡ Draw a mark in this position
- Position the sensor exactly in the middle of the band width
- Tighten the clamps on the steering sensor
 - ➡ Make sure the position of the sensor clamps allows free access

8.8 Front/rear axle steering ram



Hydraulic system



9 Hydraulic system

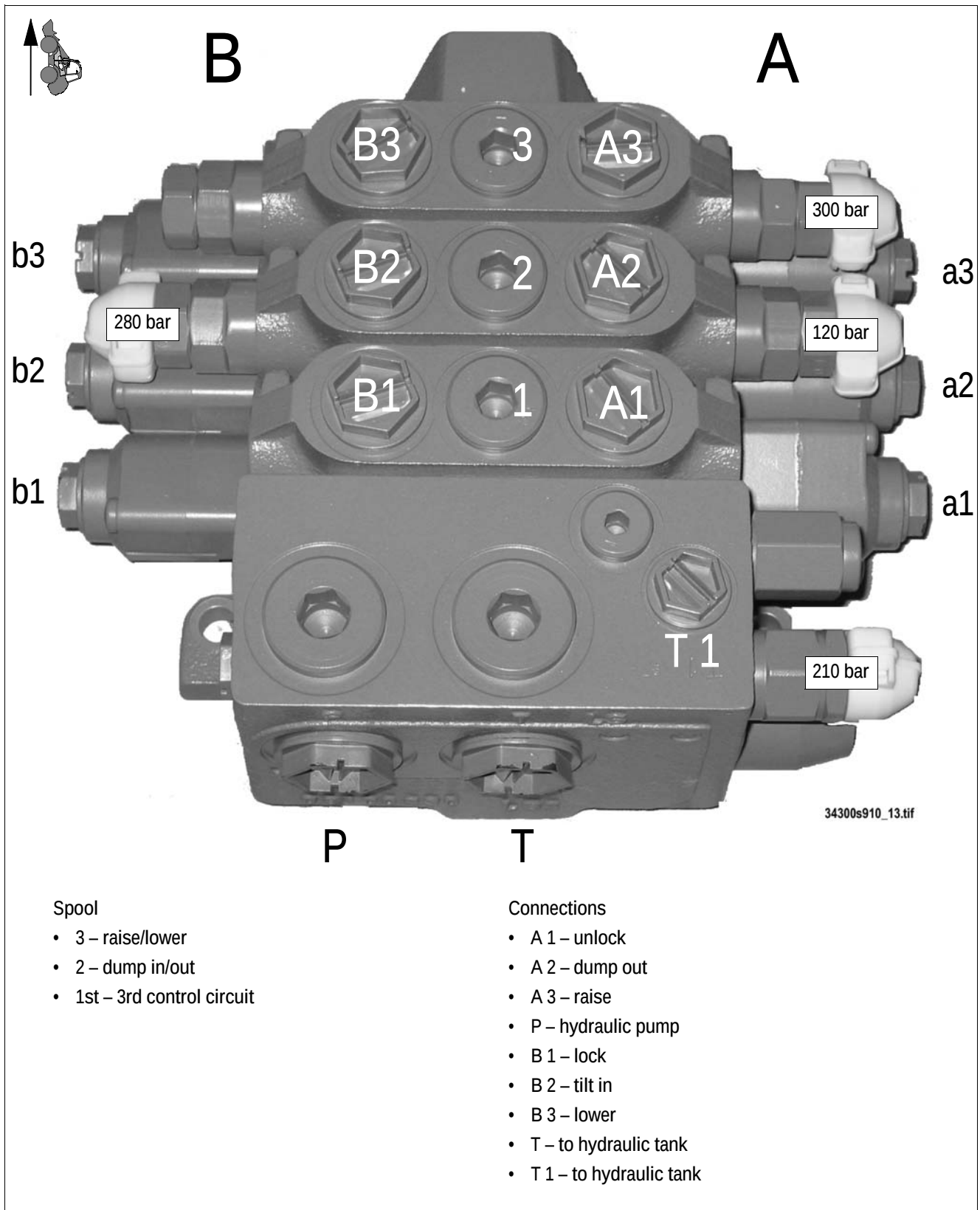
9.1 Test report model 343-00 (580), 343-01 (680)

Model: _____	Prod. no. variable displacement pump _____	Prod. no. variable displacement motor _____	Serial no. _____
-----------------	---	--	---------------------

Test conditions:	Rated oil temperature: 50 – 60 °C Rated driving direction: FW
------------------	--

See page:	Test features:	Notes:	Rated value:	Actual value:	✓
	Min. idling speed		1050 – 1080 rpm		
	Max. idling speed		2430 – 2470 rpm		
	Work hydraulics	Max. engine revs	205 – 220 bar		
	Tilt pressure	At engine revs 920 – 980 rpm	100 – 120 bar		
	Steering pressure	Max. engine revs	205 – 225		
	Loader unit lowering	At T _{oil} = 50°C P _{cyl} = 100 bar T = 10 min	Lift ram max. 9.5 mm Tilt ram max. 11 mm		
Additional hydraulic control circuits (optional version only)					
	Displacement	180 bar service pressure at full throttle	80 l/min front or 80 l/min rear		

9.2 Control valve connections: overview



Spool

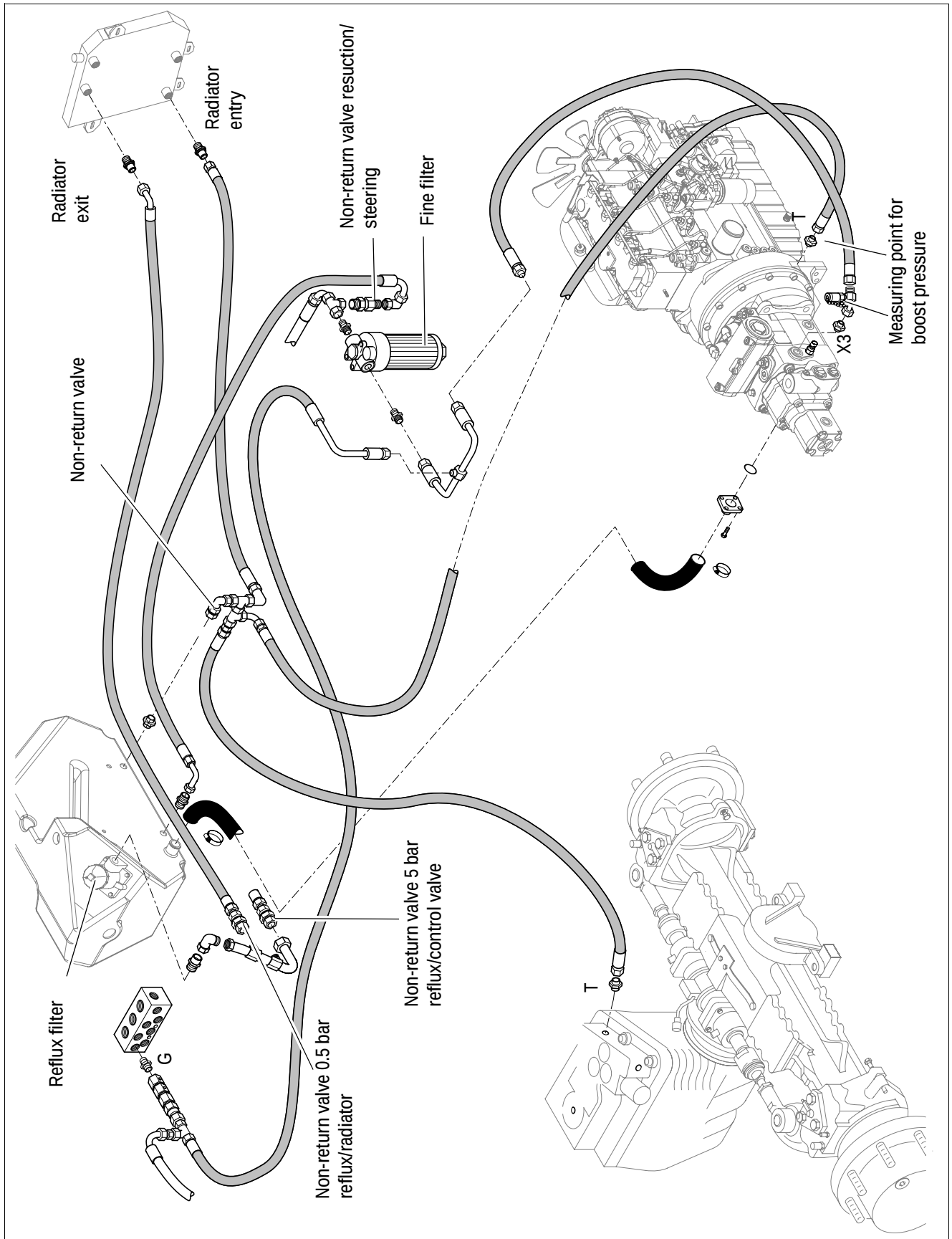
- 3 – raise/lower
- 2 – dump in/out
- 1st – 3rd control circuit

Connections

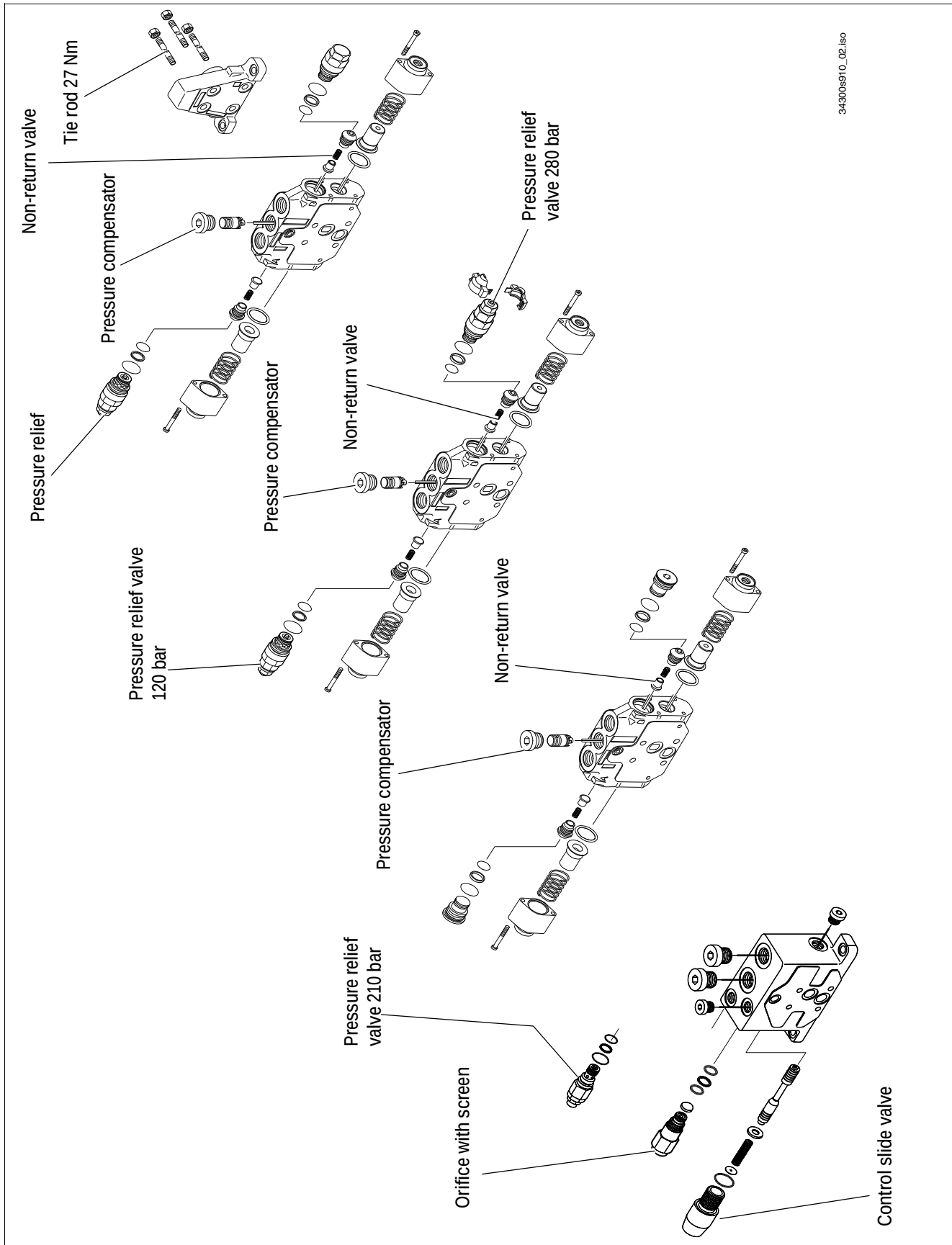
- A 1 – unlock
- A 2 – dump out
- A 3 – raise
- P – hydraulic pump
- B 1 – lock
- B 2 – tilt in
- B 3 – lower
- T – to hydraulic tank
- T 1 – to hydraulic tank



9.3 Cooling

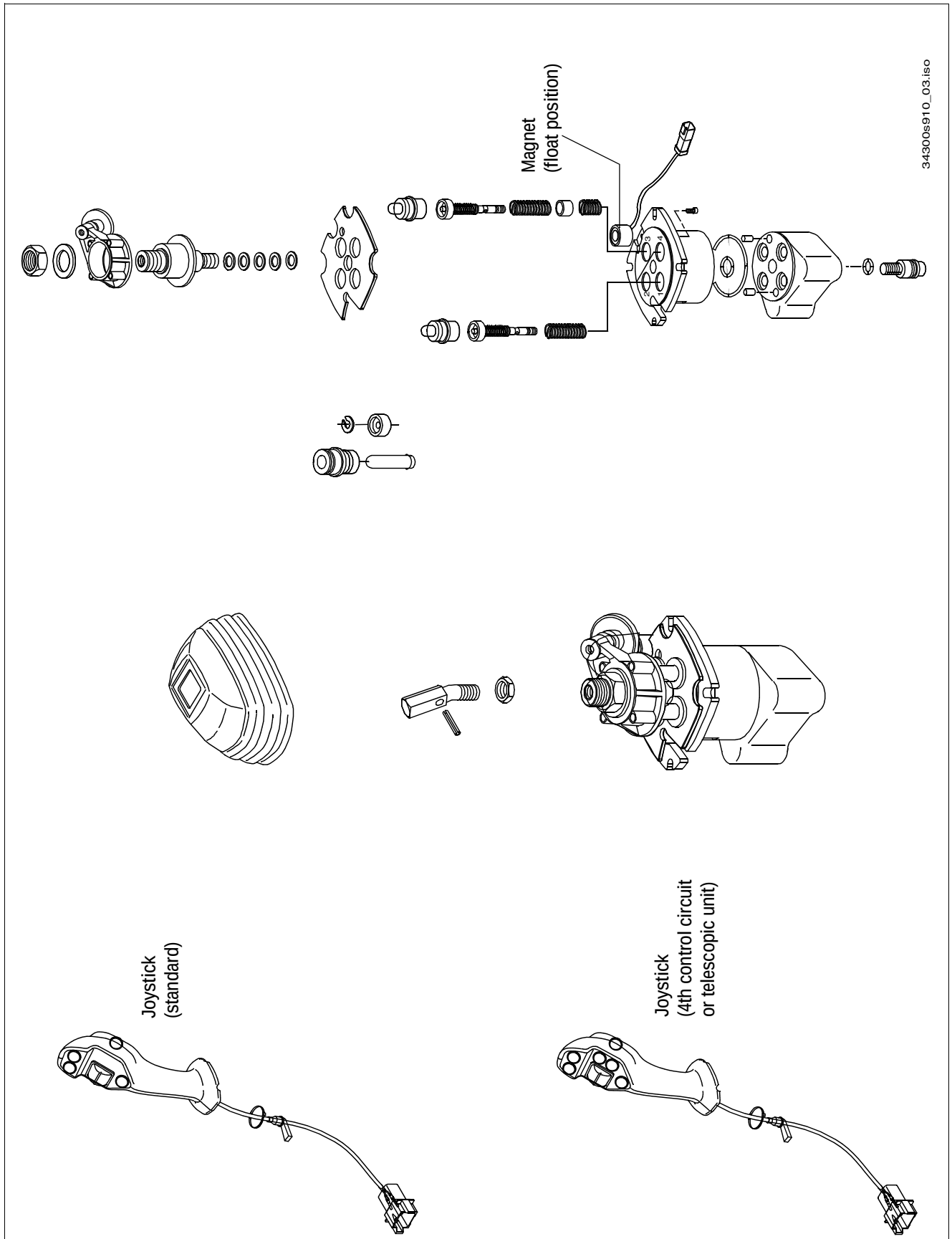


9.4 Control valve: design

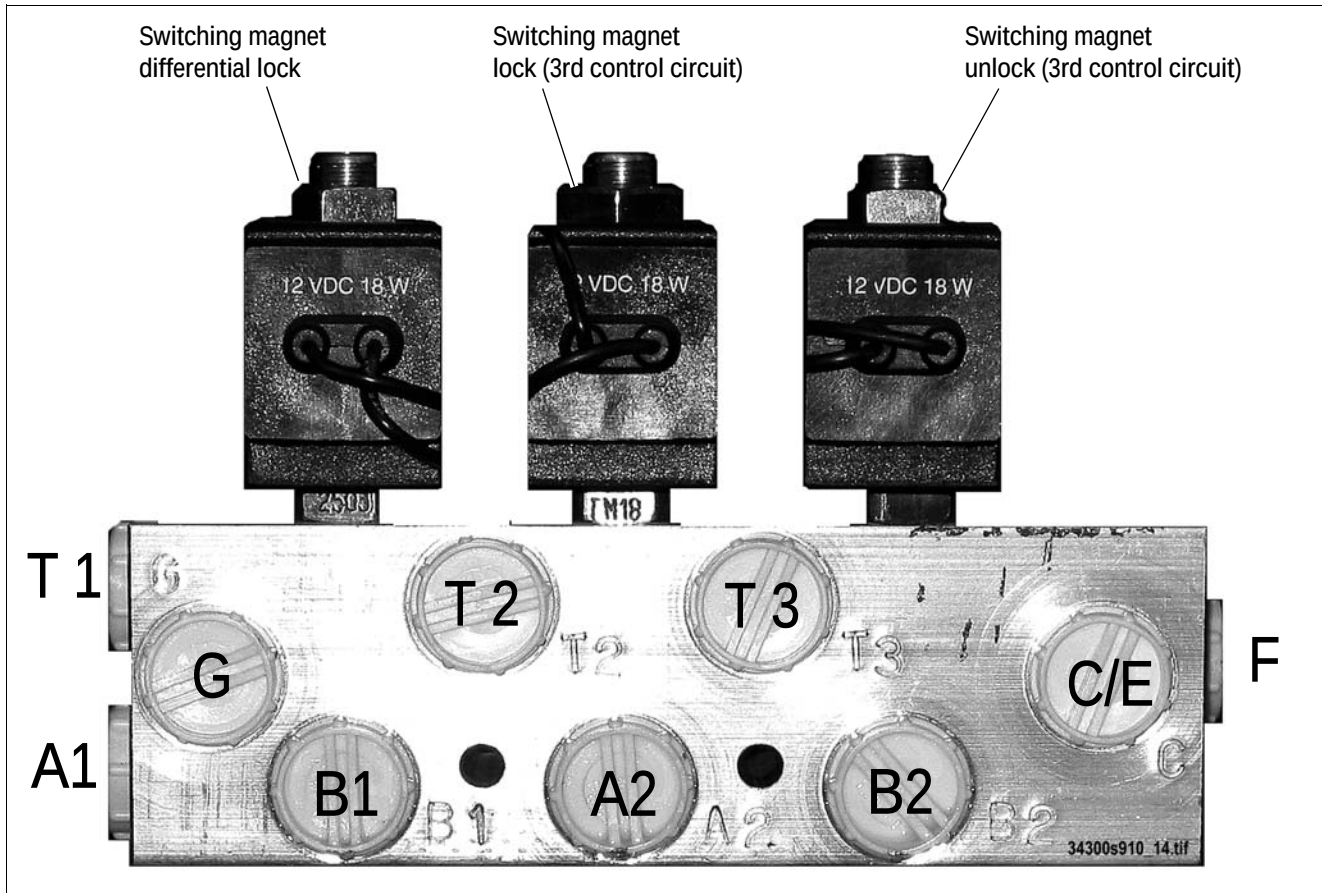




9.5 Pilot control unit: design



9.6 Valve block connections: overview

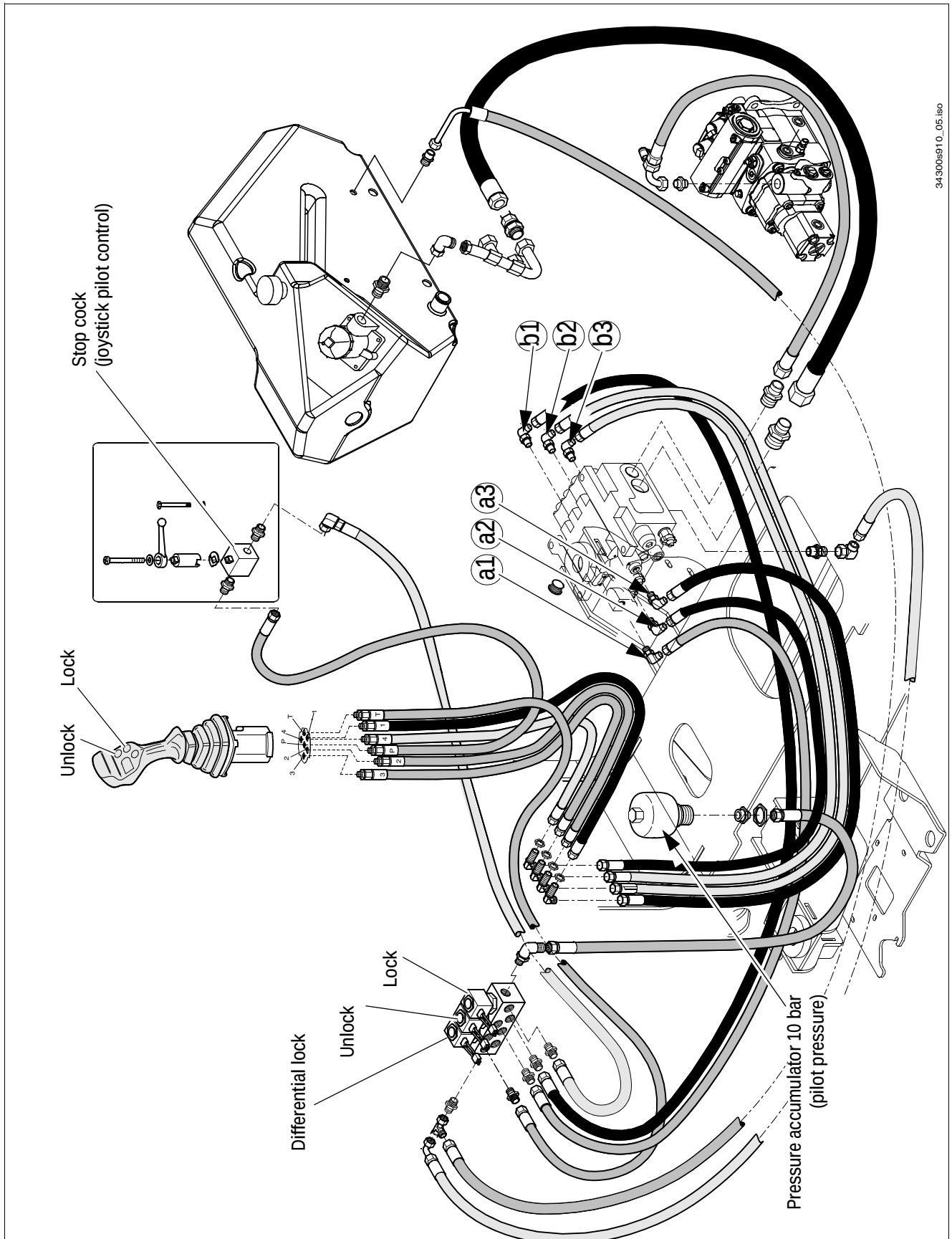


Connections

- T 3 – reflux from check block (steering system)
- T 1 – reflux from hydraulic tank (valve block and control valve)
- T 2 – reflux from control valve T
- A 1 – to differential lock (rear axle)
- A 2 – to control valve a 1 (unlock 3rd control circuit)
- B 1 – to differential lock (front axle)
- B 2 – to control valve b 1 (lock 3rd control circuit)
- G – steering system reflux oil supply/pipe line filter
- C/E – to pilot valve connection P
- F – pressure accumulator



9.7 Pilot control circuit



34300s910_05.iso

9.8 Work hydraulics circuit

Unlock
(3rd control circuit)

Lock
(3rd control circuit)

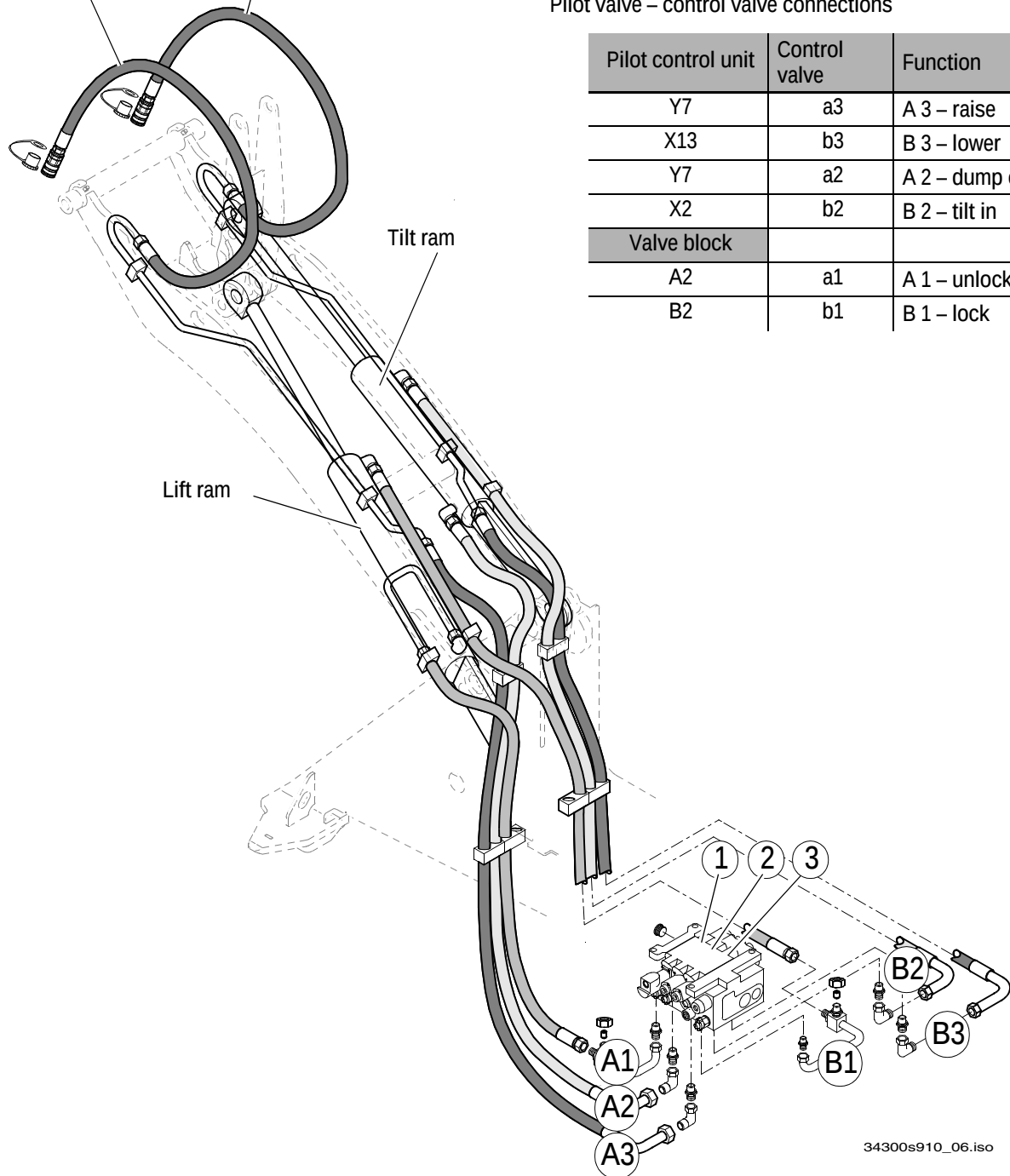
- 1 – raise/lower (loader unit)
- 2 – dump in/out
- 3 – 3rd control circuit

Pilot valve – control valve connections

Pilot control unit	Control valve	Function
Y7	a3	A 3 – raise
X13	b3	B 3 – lower
Y7	a2	A 2 – dump out
X2	b2	B 2 – tilt in
Valve block		
A2	a1	A 1 – unlock
B2	b1	B 1 – lock

Tilt ram

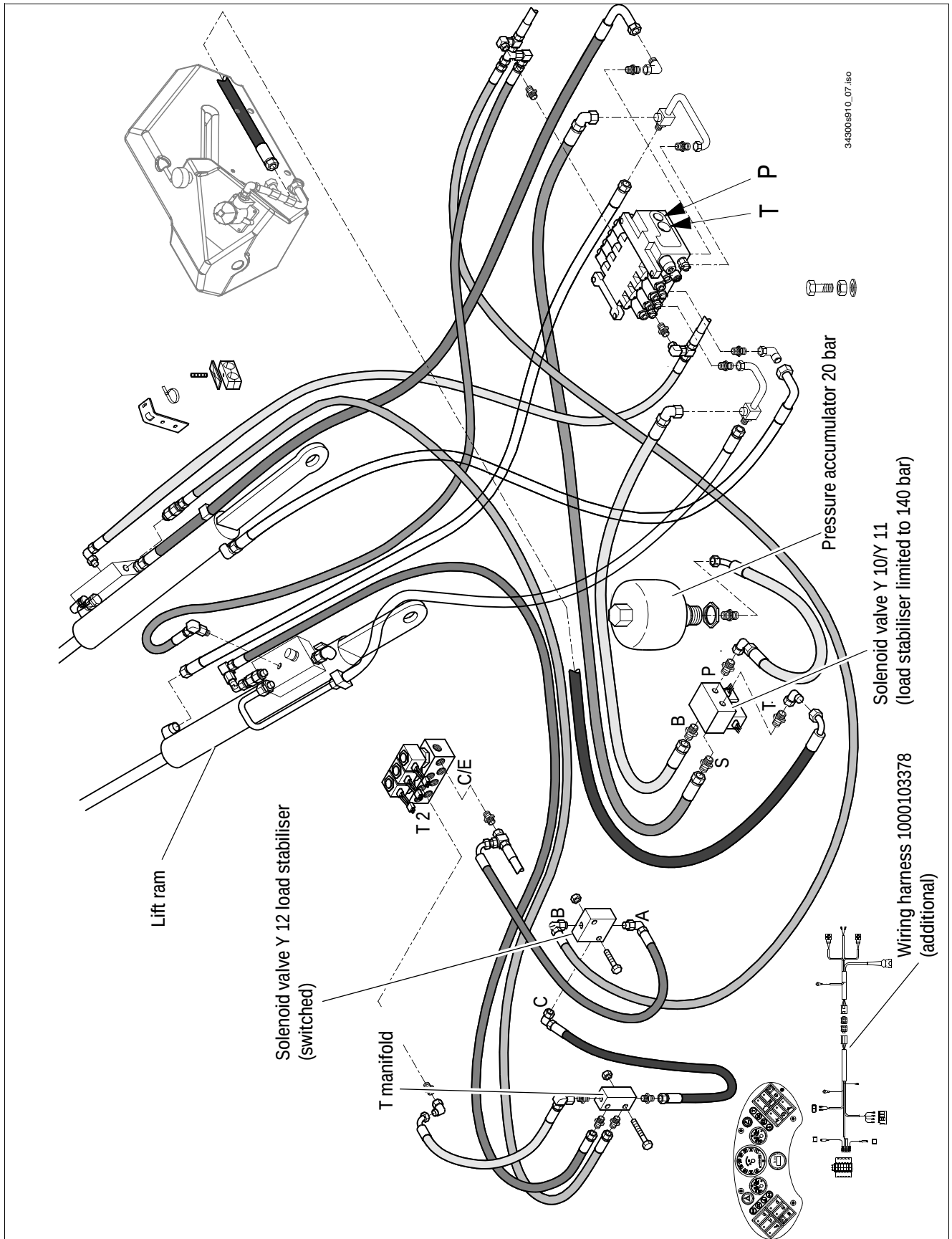
Lift ram



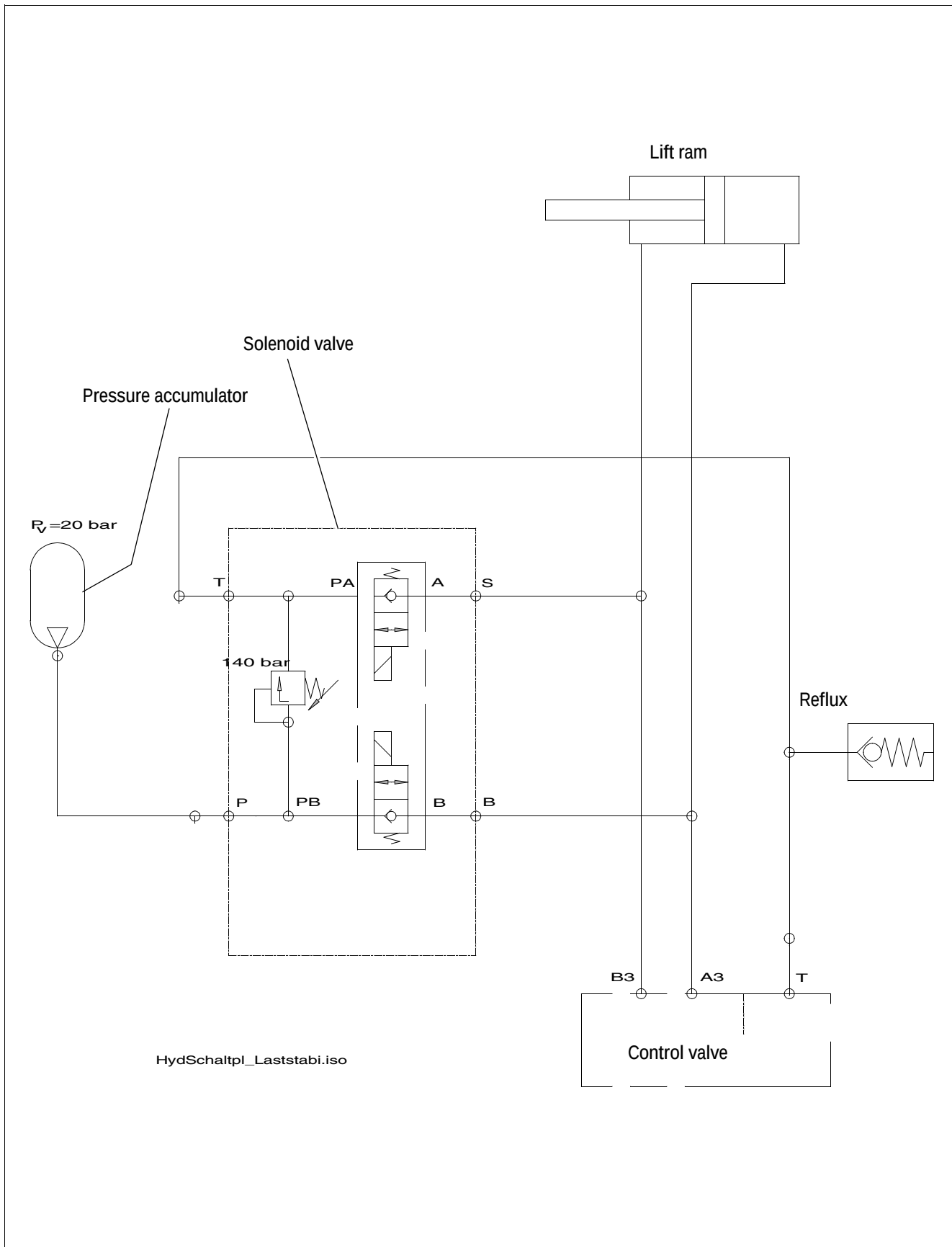
34300s910_06.iso



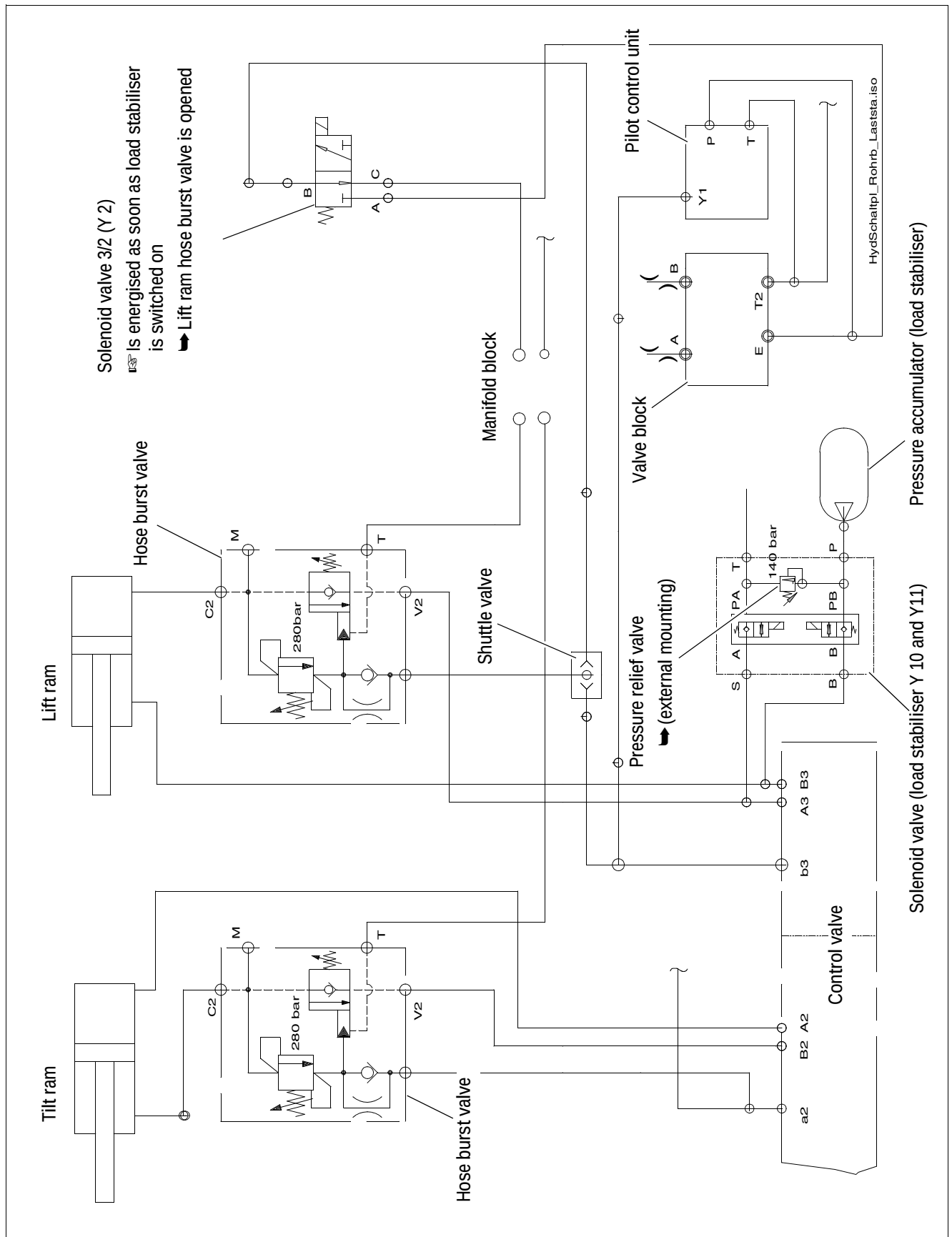
9.9 Load stabiliser circuit with hose burst valve



9.10 Load stabiliser: circuit diagram



9.11 Load stabiliser with hose burst valve: circuit diagram

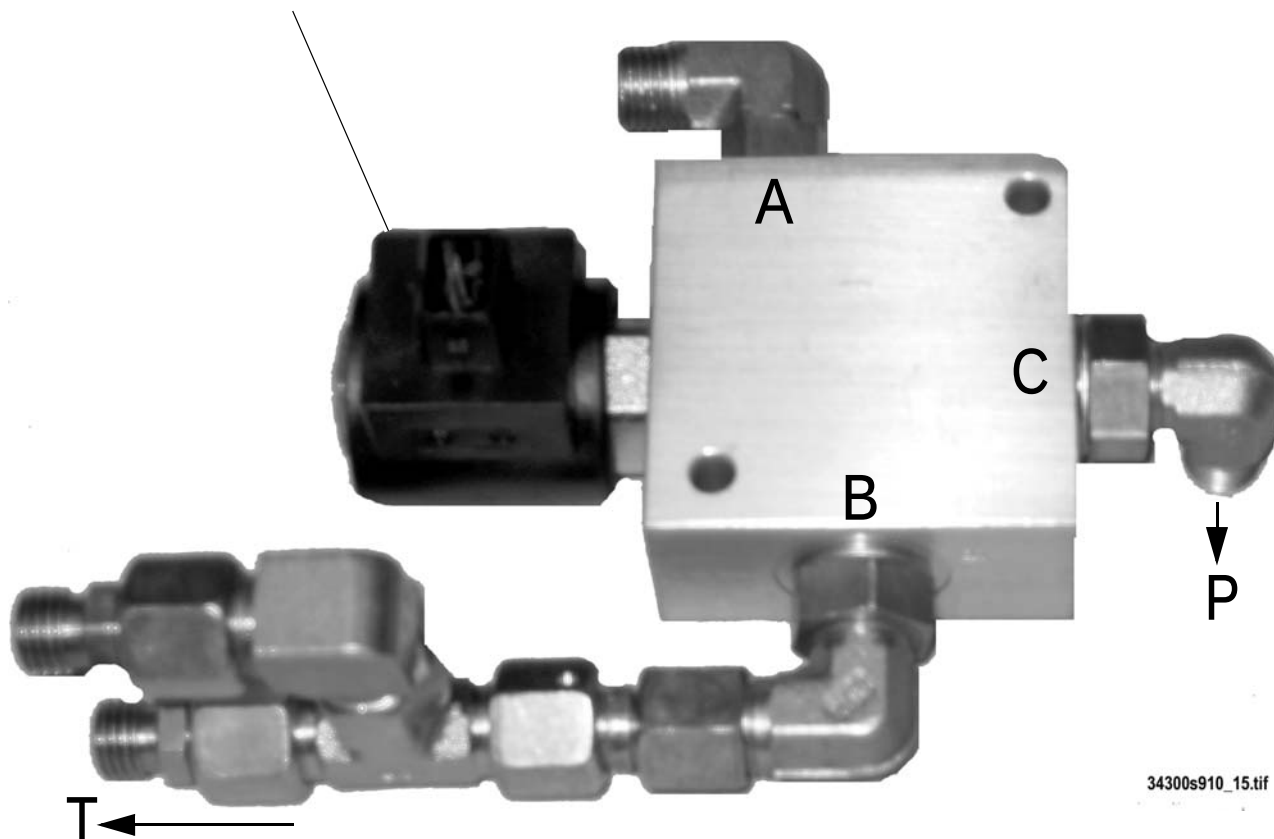


9.12 Load stabiliser with hose burst valve: ports

Solenoid valve 3/2 (Y 2)

☞ Is energised as soon as load stabiliser is switched on

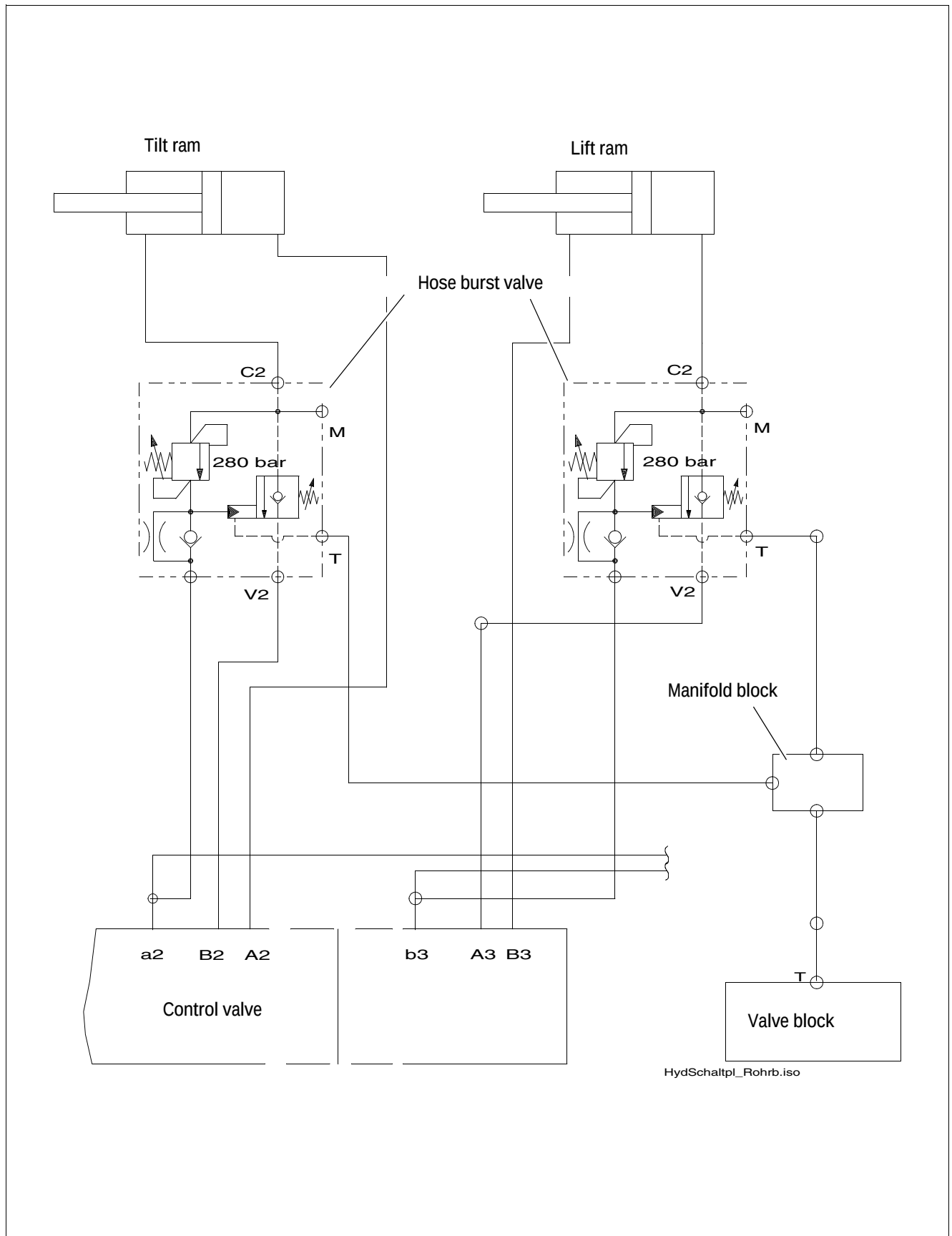
☛ Lift ram hose burst valve is opened



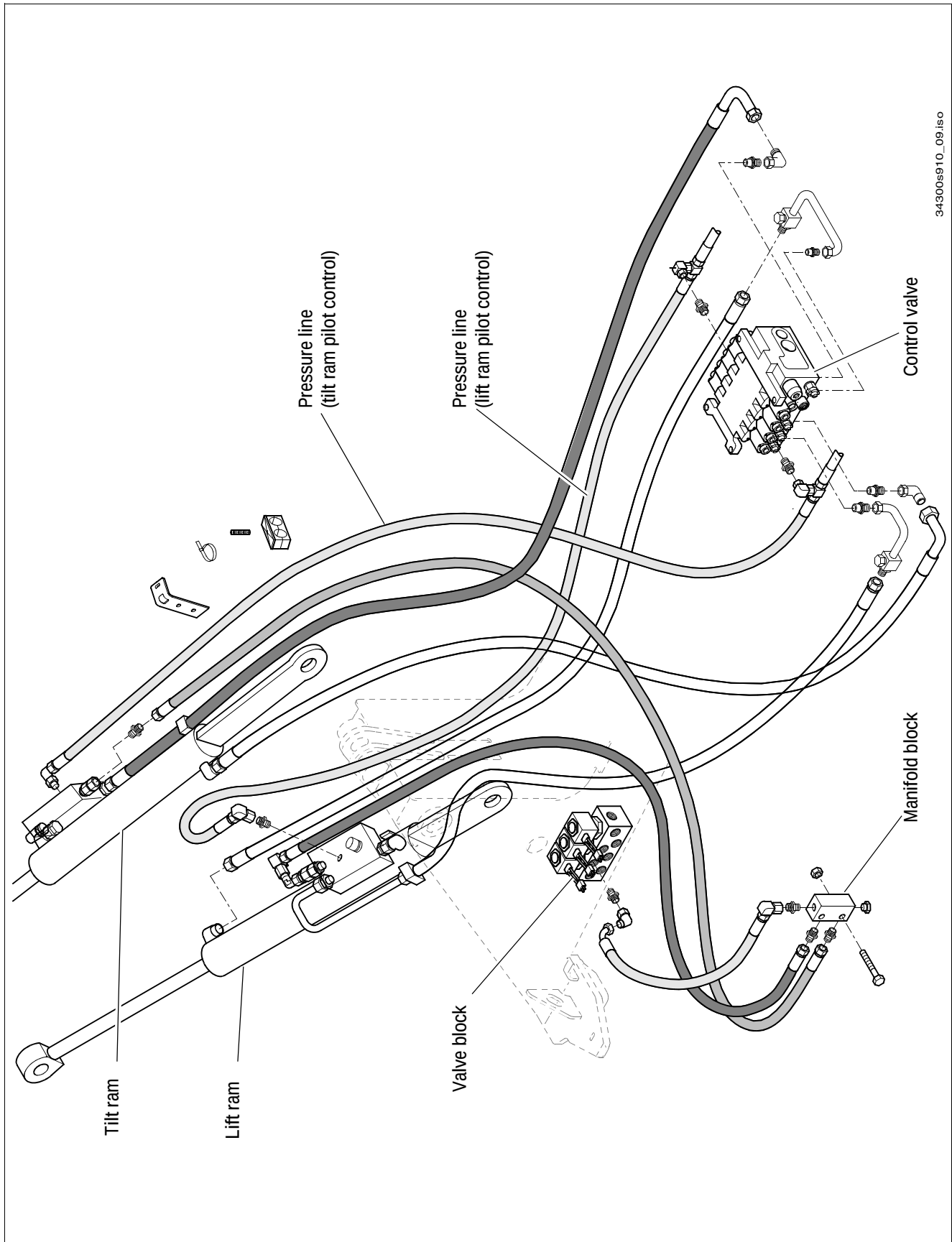
34300s910_15.tif



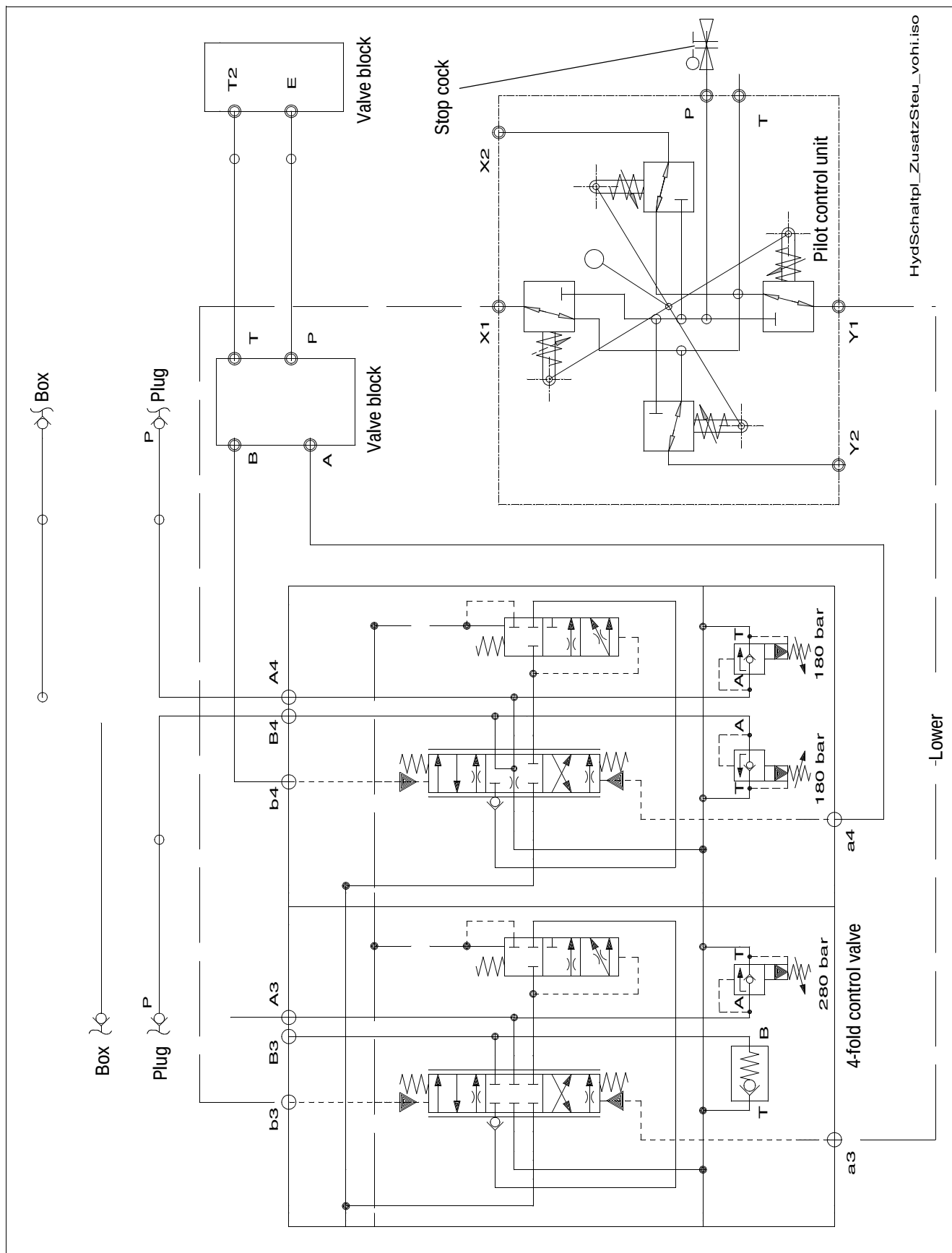
9.13 Hose burst valve circuit



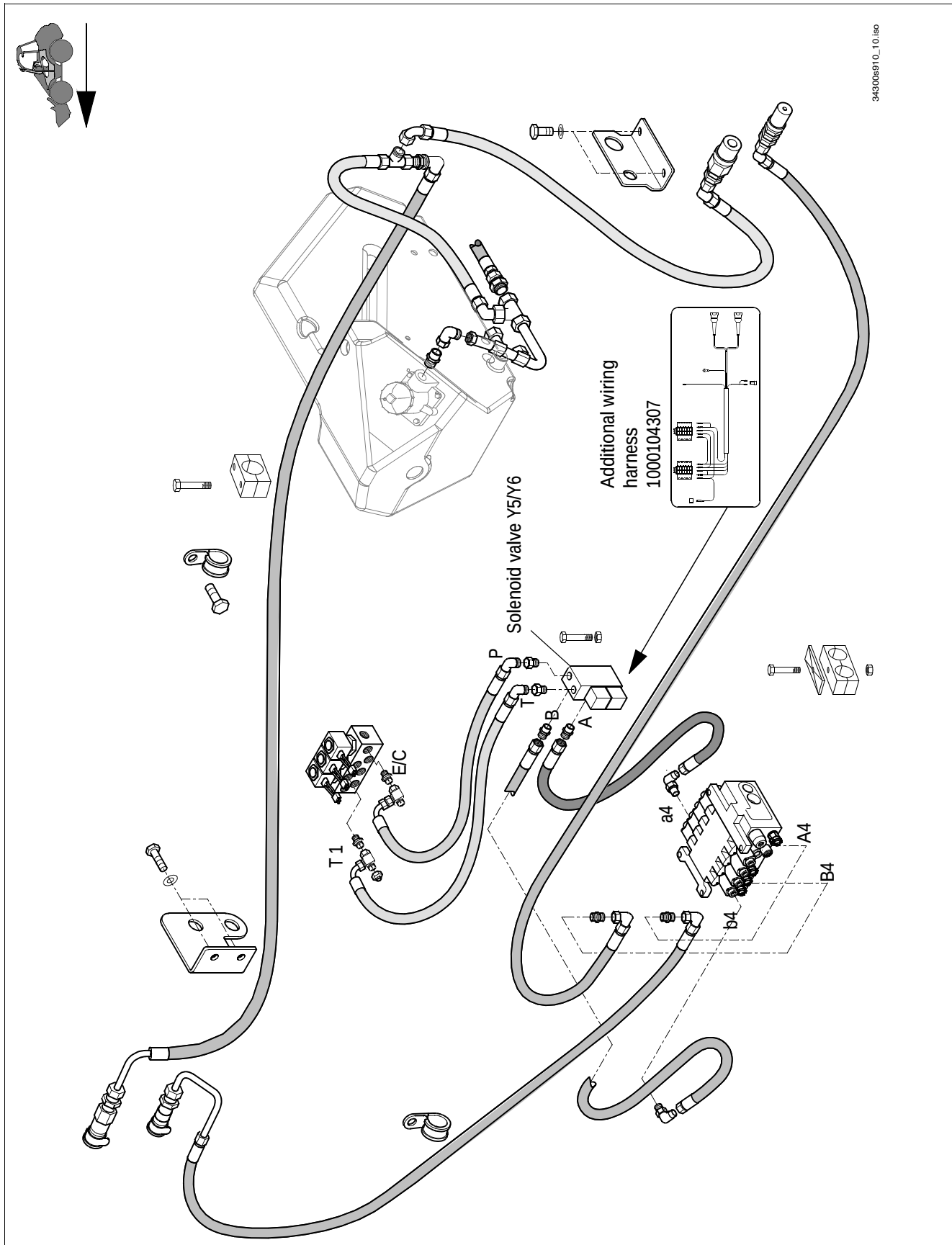
9.14 Hose burst valve circuit



9.15 4th control circuit (front/rear)

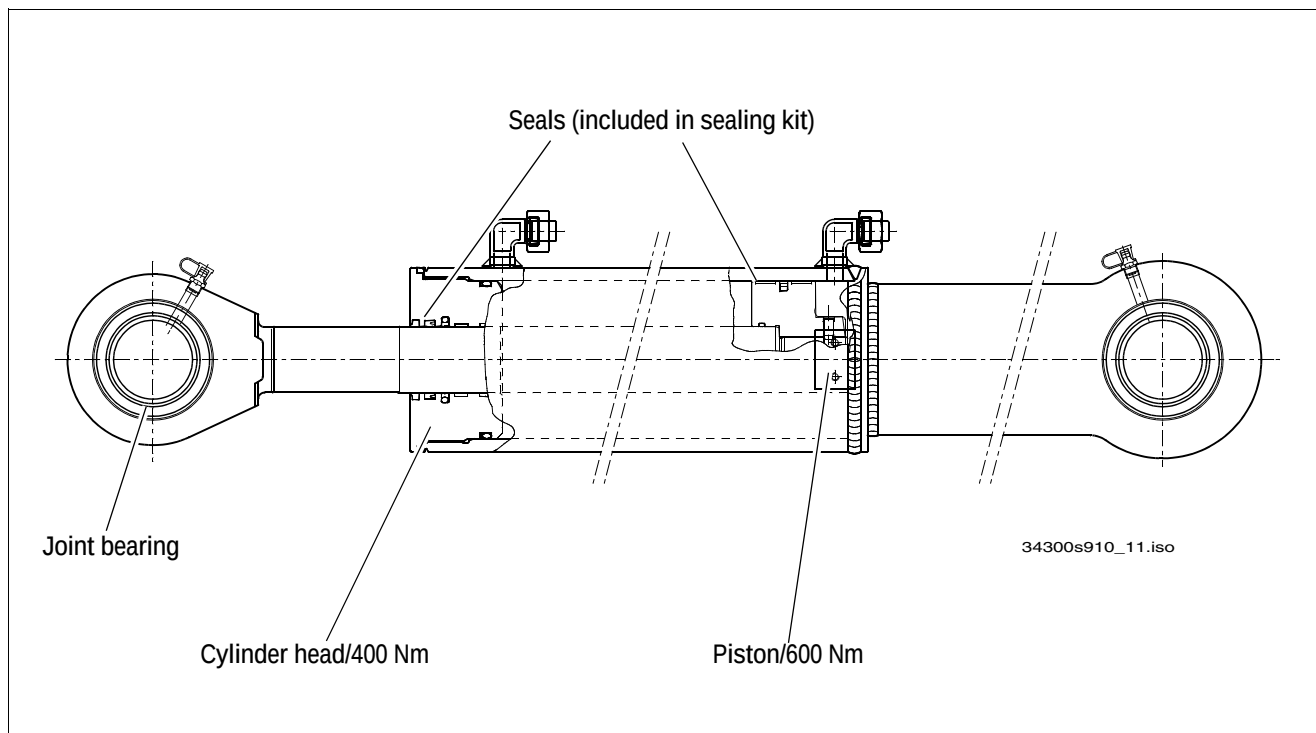


9.16 4th control circuit (front/rear) circuit





9.17 Lift ram: sealing work



Disassembly/assembly

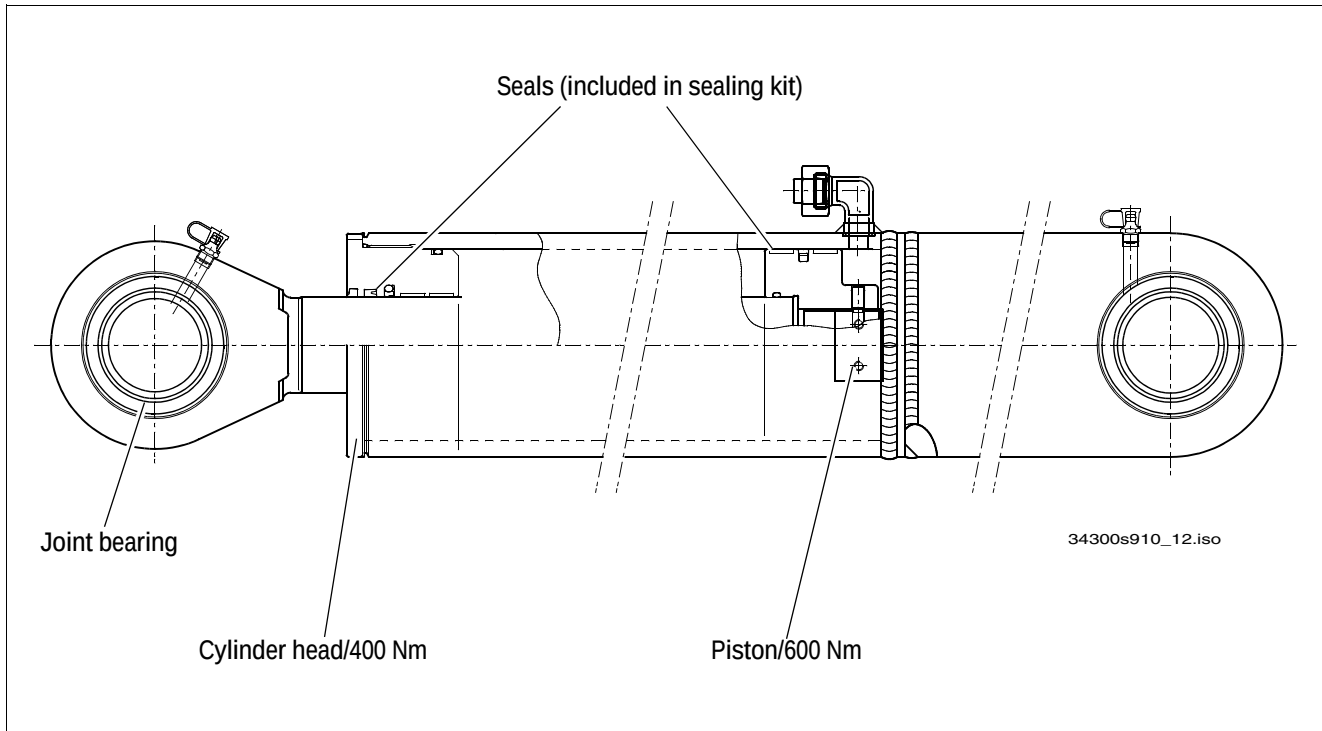
- 🔧 Unscrew cylinder head with special key
- 🔧 Pull out piston rod
- 🔧 Remove threaded pin on piston
- 🔧 Unscrew piston from piston rod
- 🔧 Replace complete sealing kit
 - ➡ Sealing kit includes all seals, sleeves and threaded pins
 - ➡ Calibrate piston seal when replacing it
- 🔧 Assembly in the reverse order
 - ➡ Bear in mind the tightening torques



Caution!

Special tools required for sealing the ram

9.18 Tilt ram: sealing work



Disassembly/assembly

- ✎ Unscrew cylinder head with special key
- ✎ Pull out piston rod
- ✎ Remove threaded pin on piston
- ✎ Unscrew piston from piston rod
- ✎ Replace complete sealing kit
 - ➔ Sealing kit includes all seals, sleeves and threaded pins
 - ➔ Calibrate piston seal when replacing it
- ✎ Assembly in the reverse order
 - ➔ Bear in mind the tightening torques

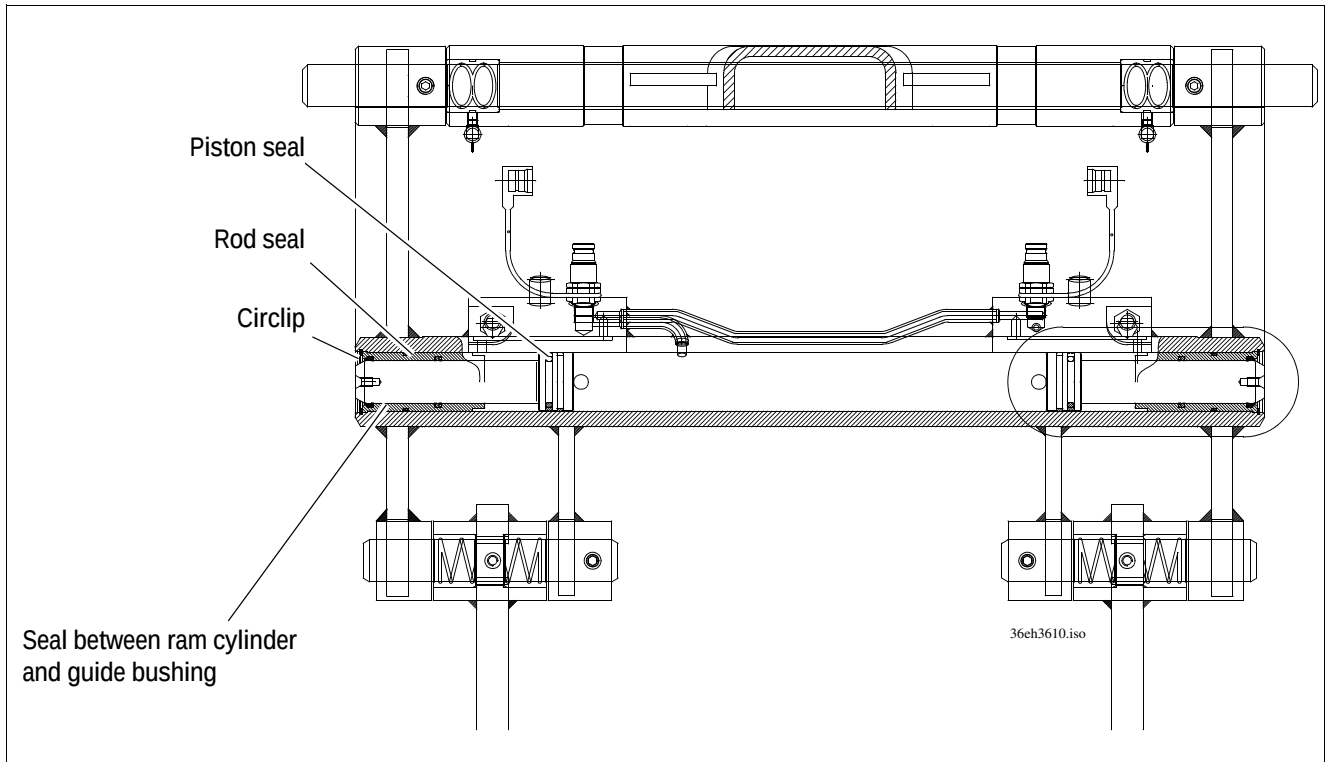


Caution!

Special tools required for sealing the ram



9.19 Control ram (quickhitch frame): sealing work



Disassembly/assembly

- Depressurise the quickhitch ram control circuit
- Remove the circlip
- Drive out the piston with an impact extractor M 8
- Renew the seal between piston rod and guide bushing
 - ➡ Replace complete sealing kit
- Assembly in the reverse order



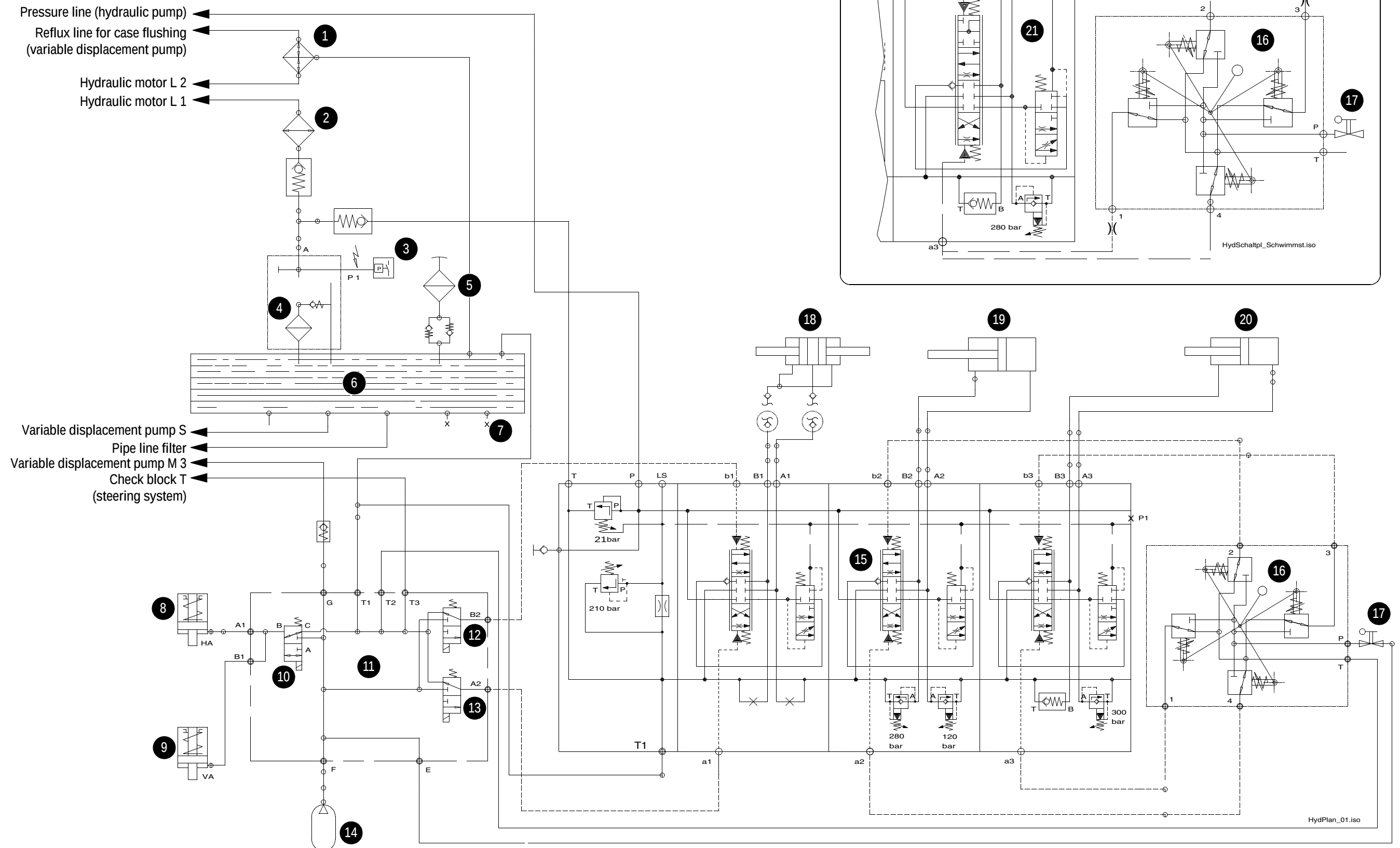
Caution!

Special tools required for sealing the ram



9.20 Work hydraulics diagram: legend

Ref.	
1	Oil temperature controller
2	Oil cooler
3	Pressure switch
4	Reflux filter
5	Vent filter
6	Hydraulic oil tank
7	Temperature sensor
8	Rear axle differential lock
9	Front axle differential lock
10	Solenoid valve for differential lock
11	Valve block (cpl)
12	Solenoid valve (lock 3rd control circuit)
13	Solenoid valve (unlock 3rd control circuit)
14	Pressure accumulator
15	Control valve (3-fold)
16	Pilot control unit
17	Stop cock (road travel)
18	Control ram (3rd control circuit)
19	Tilt ram
20	Lift ram
21	Control valve (float position)



Hydraulic system

**kramer**ALLRAD®

Notes:

[illegible]

Electric system



10 Electric system

10.1 Ohm's Law (current, voltage, resistance); power

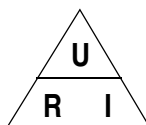
It describes the interrelation between current, voltage and resistance.

Current "I" – Ampere (A)

Voltage "U" – Volt (V)

Resistance "R" – Ohm (Ω W)

Mnemonic:



Output

Power "P" – Watt (W)

$$P = U \times I = R \times I^2 = U^2/R$$

10.2 Measuring equipment, measuring methods

Multi-function measuring device

- Measurements of values (U, R, I, f)
- Continuity test
- Diode test

Calculate measuring range using known data (P, U, R, I)
and set before measuring!

Observe AC/DC basic setting.

➡ AC = alternating current/voltage;

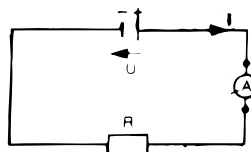
➡ DC = direct current/voltage

Test device with acoustic and optical signal output

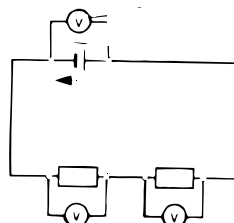
- Continuity test in de-energised vehicle electric system and of wiring harnesses

Measuring methods – multifunction measuring device

- Measuring current (ignition switched on):



- Black cable in COM socket (earth),
- red cable in A socket or mA socket; connect in series to consumer.
- Measuring voltage (ignition switched on):



- Black cable in COM socket (earth),
- red cable in V socket;
- connect in parallel to consumer.
- Measuring resistance (ignition switched off):
- Black cable in COM socket (earth),
- red cable in Ω -socket;
- connect in parallel to consumer (see measuring voltage).

Test lamp

The test lamp serves to test lines and functions with the ignition switched on.

- Line test (testing voltage):

Connect test lamp between test point (live cable) and vehicle earth or between test point (earth line) and a live cable.

- Functional check (testing current):

Connect test lamp between a connection on the consumer to be tested and the connection line.



10.3 Terminal description

(extract from DIN 72 552)

Terminal descriptions and cable descriptions are not identical because equipment with different terminal descriptions can be connected to both ends of a cable. If there are not enough terminal descriptions (multiple plug and socket connections), the terminals are marked with continuous number or letter codes without any standardised function assignment.

Terminal	Meaning
1	Ignition coil, ignition distributor Low voltage
1a	Ignition distributor with two separate electric circuits to ignition contact breaker I
1b	to ignition contact breaker II
2	Short-circuit terminal (magneto ignition)
4	Ignition coil, ignition distributor High voltage
4a	Ignition distributor with two separate electric circuits from ignition coil I, terminal 4
4b	from ignition coil II, terminal 4
15	Switched plus behind battery (output ignition [drive] switch)
15a	Output at dropping resistor to ignition coil and starter
17	Preheating start switch Start
19	Preheat
30	Battery Input from + battery terminal, direct
30a	12/24 V battery changeover relay Input from + terminal of battery II
31	Return line to battery Minus terminal or earth, direct
31b	Return line to battery Minus terminal or earth, via switch or relay (switched negative)
31a	12/24 V battery changeover relay Return line to minus terminal of battery II
31c	Return line to minus terminal of battery I



Terminal	Meaning
	Electric motors
32	Return line ¹⁾
33	Main terminal connection ¹⁾
33a	Self-parking switch-off
33b	Shunt field
33f	For second lower speed
33g	For third lower speed
33h	For fourth lower speed
33L	Counterclockwise rotation
33R	Clockwise rotation
	Starter
45	Separate starter relay, output; Starter, input (main current)
45a	Two-starter parallel operation Starting relay for engagement current Output starter I, Input starters I and II
45b	Output starter II
48	Terminal on starter and on start-repeating relay (to monitor starting)
	Turn indicator unit (pulse generator)
49	Input
49a	Output
49b	Output, 2nd turn indicator circuit
49c	Output, 3rd turn indicator circuit
	Starter
50	Starter control (direct)
	Battery changeover relay
50a	Output for starter control
	Starter control
50b	with parallel operation of 2 starters with sequential control
	Starting relay for sequential control of the engagement current during parallel operation of 2 starters
50c	Input at starting relay for starter I
50d	Input at starting relay for starter II



Terminal	Meaning
50e	Start locking relay
50f	Input
50g	Output
50h	Start repeat relay
51	Input
51e	Output
51	AC alternator
51e	Direct current voltage at rectifier
51e	Direct current voltage at rectifier with choke coil for daytime driving
52	Trailer signals
52	Signals from trailer to towing vehicle
53	Wiper motor, input (+)
53a	Wiper (+), self-parking switch-off
53b	Wiper (shunt winding)
53c	Electric window washer pump
53e	Wiper (brake winding)
53i	Wiper motor with permanent magnet and third brush (for higher speed)
54	Trailer signal
54	For lamp combinations and trailer plug connections
54g	Brake lights
54g	Pneumatic valve for additional retarding brake, electromagnetically actuated
55	Fog lights
56	Headlight
56a	High beam and high beam telltale
56b	Low beam
56d	Headlight flasher contact
57	Side marker light for motorcycles (also for cars, trucks etc. in other countries)
57a	Parking light
57L	Parking light (left)
57R	Parking light (right)

Electric system

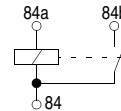


kramerALLRAD®

Terminal	Meaning
58	Side marker, rear, numberplate and instrument panel lights
58b	Rear light changeover for single-axle tractors
58c	Trailer plug-and-receptacle assembly for single-conductor rear light cable with fuse in trailer
58d	Variable-intensity instrument panel lights, side marker and rear light
58L	Left
58R	right, numberplate light
59	AC alternator (magneto alternator)
59a	Alternating voltage, output, rectifier, input
59b	Charging armature, output
59c	Rear light armature, output
59c	Brake light armature, output
61	Alternator charge telltale
71	Tone sequence control device
71	Input
71a	Output to horns 1 + 2 low
71b	Output to horns 1 + 2 high
72	Alarm switch (rotating beacon)
75	Radio, cigarette lighter
76	Loudspeaker
77	Door valve control



Terminal	Meaning
	Switches (break contact and changeover switches)
81	Input
81a	1st output, break side
81b	2nd output, break side
	Make-contact switch
82	Input
82a	1st output
82b	2nd output
82z	1st input
82y	2nd input
	Multiple position switch
83	Input
83a	Output, position 1
83b	Output, position 2
83L	Output, left-hand side position
83R	Output, right-hand side position
	Current relay
84	Input, actuator and relay contact
84a	Output, actuator
84b	Output, relay contact





Terminal	Meaning
	Switching relay – output, actuator (end of winding negative or earth)
	Input, actuator
	Start of winding
85	Start of winding or 1st winding
86	Winding tap or 2nd winding
86a	
86b	



Terminal	Meaning
87	Relay contact for break and changeover contacts
87a	Input
87b	1st output (break side)
87c	2nd output
87z	3rd output
87y	1st input
87x	2nd input
	3rd input
88	Relay contact for make-contact
	Input
88a	Relay point for make-contact and changeover contacts (make side)
88b	1st output
88c	2nd output
	3rd output
88z	Relay contact for make-contact
88y	1st input
88x	2nd input
	3rd input
Alternator and governor	
B+	Battery positive
B-	Battery negative
D+	Dynamo positive
D-	Dynamo negative
DF	Dynamo field
DF 1	Dynamo field 1
DF 2	Dynamo field 2
U, V, W	Three-phase alternator – three-phase terminals
Turn indicator (turn indicator unit)	
C	First telltale
C0	Main terminal connection for separate indicator circuits actuated by the turn indicator switch
C2	Second telltale
C3	Third telltale (e.g. when towing two trailers)
L	Indicator light (left)
R	Indicator light (right)



10.4 Cable colour coding

The cables are colour-coded according to DIN 72551 Part 4. However, this standard has been withdrawn and is not currently valid. Refer to the 21 pin cab/frame interface or the explanation in the wiring harness drawings for other colours not listed in this DIN standard

Extract from DIN 72551, sheet 4

From	Line to	Basic colour	Identification colour
Ignition coil I	Ignition distributor (low-voltage ignition lead)	Green	-
Ignition coil II	Ignition distributor (low-voltage ignition lead)	Green	Red
Battery	Starter	Black	-
Battery	Earth (if bare earth lead is not used)	Black	-
Starter	Alternator	Red	-
Starter	Control panel (30)	Red	-
Light switch (30)	Ignition switch (30)	Red	-
Control panel (30) or light switch (30)	Fuse	Red	-
Fuse	Hand lamp, radio, clock etc.	Red	-
Control panel (15/54)	Heater plug and starter switch; heater-plug telltale	Black	-
Heater plug and starter switch; heater-plug telltale	Glow plugs	Black	-
Ignition switch (15/54)	Ignition coil	Black	-
Ignition switch or control panel (54/15/61a)	Telltale	Black	-
Control panel or ignition switch (15/54)	Fuse	Black	-
Fuse box	Brake light	Black	Red
Fuse box	Turn indicator switch	Black	White-green
Turn indicator switch	Turn indicator (left)	Black	White
Turn indicator switch	Turn indicator (right)	Black	Green
Telltale	Turn indicator	Light blue	-
Fuse	Cigarette lighter	Black	-
Fuse	Heated window	Black	Yellow-red
Fuse	1st horn	Black	Yellow
Fuse	2nd and 3rd horn	Black	Yellow-light blue
Horns	1 pole horn pushbutton (earth)	Brown	-
Fuse	Wipers	Black	Purple
Battery charge telltale	Terminal 61 of alternator or reverse current cutout	Light blue	-
Fuse	Main beam telltale	Light blue	White
Oil pressure gauge (indicator)	Oil pressure switch	Light blue	Green
Fuel level indicator	Fuel tank	Light blue	Black
Tyre-pressure warning device	Tyre-pressure drop indicator	Light blue	Yellow
Control panel bzw. Lichtschalter	Low beam switch	White	Black
Low beam switch (a)	Fuse	White	-
Fuse	Main headlight (left)	White	-
Fuse	Main headlight (right)	White	-
Low beam switch (b)	Fuse	Yellow	-
Fuse	Low beam (left)	Yellow	-
Fuse	Low beam (right)	Yellow	-
Control panel or light switch (58)	Fuse	Grey	-
Fuse	Rear light, side light and parking light left	Grey	Black
Fuse	Numberplate light (combined with rear left light)	Grey	Black
Fuse	Rear light, side light and parking light (right)	Grey	Red
Fuse	Numberplate light (combined with rear right light)	Grey	Red
Fuse	Numberplate light (only if special line is laid)	Grey	-
Fuse	Dome light	Red	-
Control panel (57)	Fuse	Grey	Green
Control panel bzw. Lichtschalter	Instrument panel light	Grey	Red
All consumers except the battery earth lead if the use of bare lines is not possible	Earth	Brown	-
Battery changeover switch (50)/starter pushbutton or heater plug and starter switch	Starter	Black	-



Other colour codes (identical to IEC 757, edition 1983)

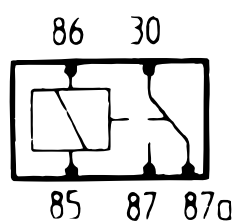
Colour	Code old	Code new
Black	sw	BK
Brown	br	BN
Red	rt	RD
Orange	or	OG
Yellow	ge	YE
Green	gn	GN
Blue	bl	BU
Violet	vi	VT
Grey	gr	GY
White	ws	WH
PK	rs	PK
Gold	-	GD
Turquoise	tk	TQ
Silver	-	SR

10.5 Relays

Use, mode of function

Relays are used for switching electric loads (high currents) whereby the control power of the relay coil is relatively low. Relays can therefore be controlled by micro electronics or micro switches (e.g. touchpad keyboards, sensors). The switch contacts can be make-contact, break-contact or changeover switches. These undertake the actual switching function.

Terminal description on relay



Zero-centre relay

- 86 = Start of coil (control line)
- 85 = End of coil (earth)
- 30 = Input (load line)
- 87 = Make-contact switch output (load line)
- 87 a= Break-contact switch output (load line)



10.6 Electric units

Units	
Alternator	12 V 95 A
Starter	12 V 2.3 kW
Battery	12 V 72 Ah
Socket	15 A

10.7 Fuse box on left and right of steering column

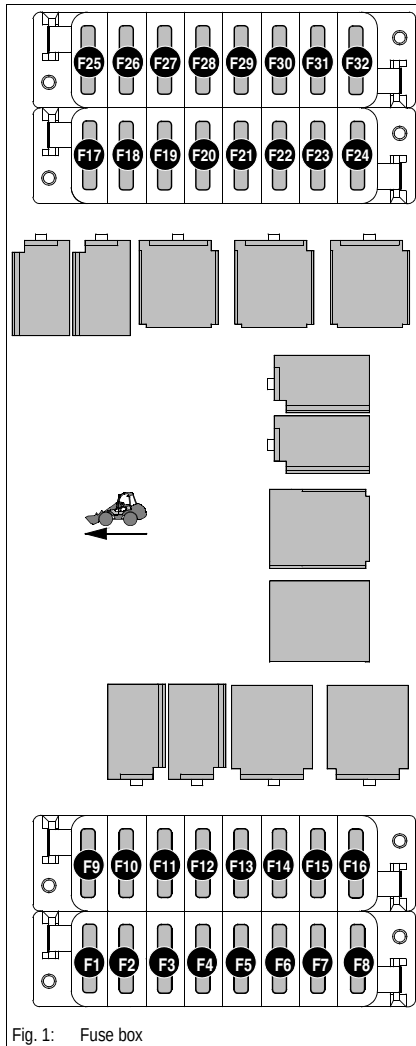


Fig. 1: Fuse box

No.	Rated current (A)	Protected circuit
F1	3	Control lever, reverse driving relay, differential lock relay, forwards driving direction telltale, reverse driving direction telltale
F2	5	Switching relay: front implements, load stabiliser, 3rd control circuit, backup warning system, reversing light
F3	3	Front and rear axle sensor
F4	15	Switching relay wiper 1st/2nd speed, intermittent wipe relay, front wiper, washer pump, horn
F5	15	Right/left low beam, right/left high beam
F6	10	Rear wiper, washer pump
F7	7.5	Brake lights
F8	3	Hour meter, hydraulic temperature indicator, coolant temperature indicator, fuel level indicator, speedometer Telltale: Handbrake, air filter, 3rd control circuit, engine oil pressure, hose burst valve, hydraulic oil filter, alternator
F9	10	Unlock/lock solenoid valve, front socket, solenoid valve differential lock
F10	5	Cutoff solenoid
F11	7.5	Turn indicators
F12	5	Solenoid valve high speed, steering electronics, switch 1st/2nd speed Solenoid valve 4 wheel steering/front axle steering Telltale: 4 wheel steering, front axle steering, synchronism
F13	25	Heater fan, magnetic coupling compressor
F14	10	Susmic (drive electronics)
F15	3	Safe load indicator, load sensor Switching relay: Retract/extend telescopic unit, front socket bucket repositioning, radio
F16	7.5	Solenoid valve: Retract/extend telescopic unit, quickhitch lock, tilt ram lock
F17	7.5	High beam (right)
F18	7.5	High beam (left)
F19	7.5	Low beam (right)



No.	Rated current (A)	Protected circuit
F20	7.5	Low beam (left)
F21	5	Parking light (right), rear light (right), rear clearance light (right), front clearance light (right), switch lights
F22	5	Parking light (left), rear light (left), rear clearance light (left) Front clearance light (left), instrument lights
F23	10	Front/rear working light
F24	10	Rotating beacon
F25	10	Mounting parts
F26	7.5	Solenoid valve 4th control circuit and additional control circuit
F27	7.5	Solenoid valve: Load stabiliser, hose burst valve, bucket repositioning
F28	5	Radio (option)
F29	10	Cigarette lighter
F30	7.5	Turn indicator relay, turn indicator, radio
F31	7.5	Front parking light (right/left), rear light (right/left), rear socket, front socket, switch lights, instrument lights, light for cigarette lighter, interior light
F32	3	High current relay, switching relay heating and starting, telltale for pre-heating

10.8 Main fuse box with relays

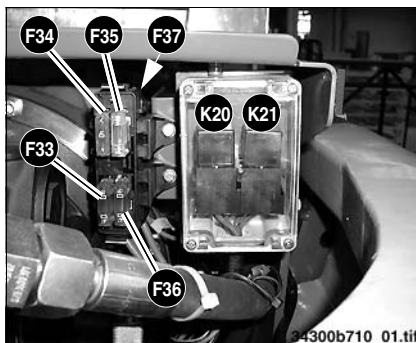


Fig. 2: Main fuse box in the engine compartment

The main fuse box is located in the engine compartment, on the left in driving direction

Fuse no.	Rated current (A)	Protected circuit
F33	50 A	– Main fuse
F34	60 A	– Ignition lock
F35	60 A	– Ignition lock
F36	40 A	– Preheating/start fuse (starter)
F37	10 A	– Multiple quantity valve

Relay no.	Protected circuit
K 20	– Preheating
K 21	– Start

10.9 Relays: overview

The relays are installed on the left and right next to the fuse box

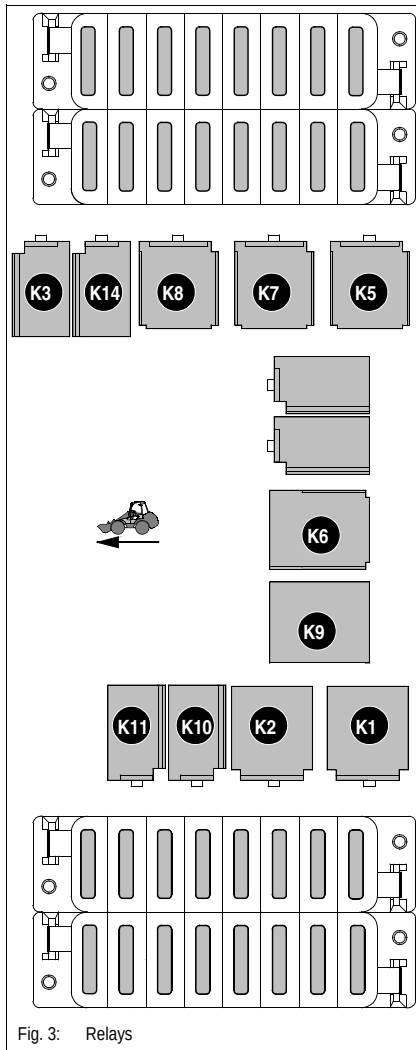
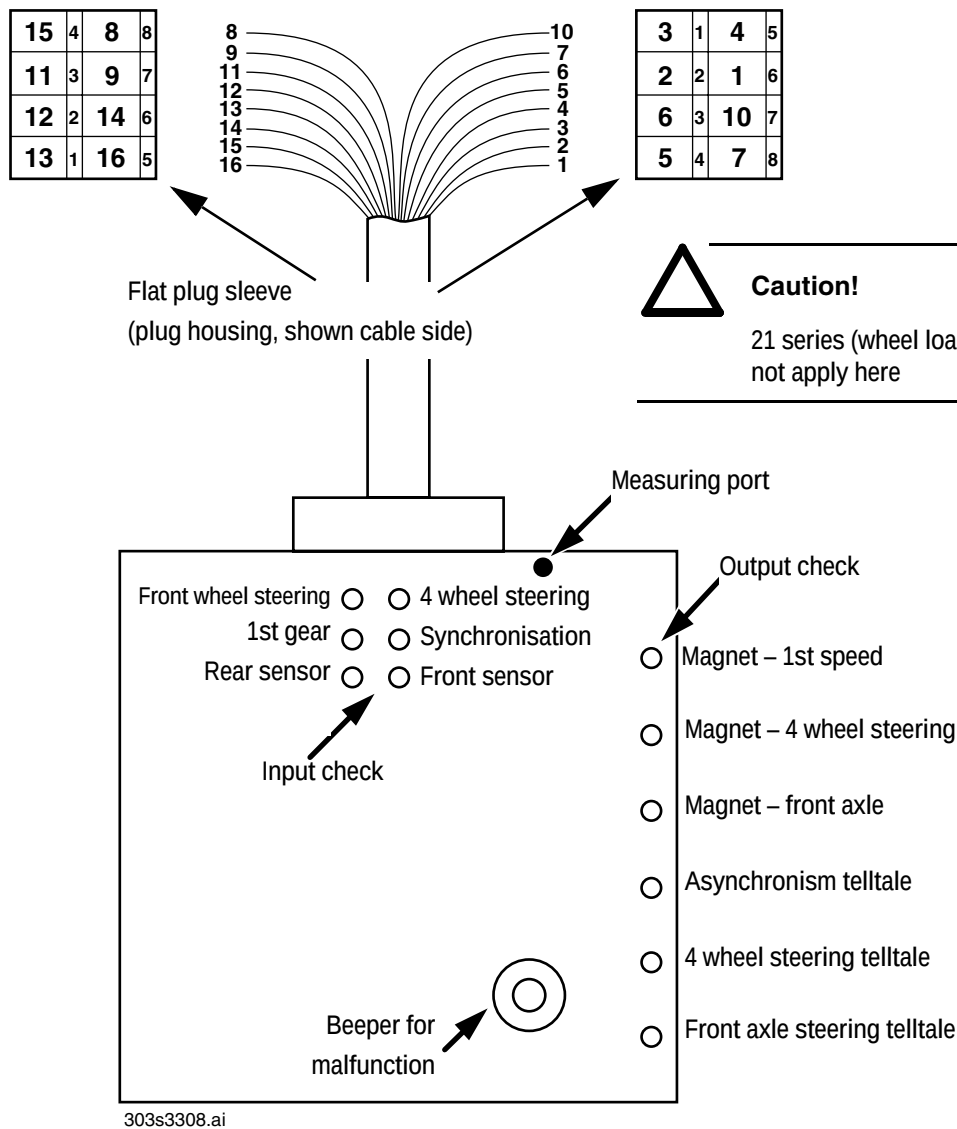


Fig. 3: Relays

Switching relay no.	Protected circuit
K1	High current relay
K2	High current relay
K3	Switching relay – RV
K5	Switching relay – front socket (option)
K6	Turn indicator relay
K7	Switching relay – wiper (1st speed)
K8	Switching relay – wiper (2nd speed)
K9	Intermittent-wipe relay
K10	Switching relay (lock)
K11	Switching relay (unlock)
K14	Switching relay differential lock
	Switching relay – load stabiliser (option)
	Switching relay – bucket repositioning (option)



10.10 Steering electronics



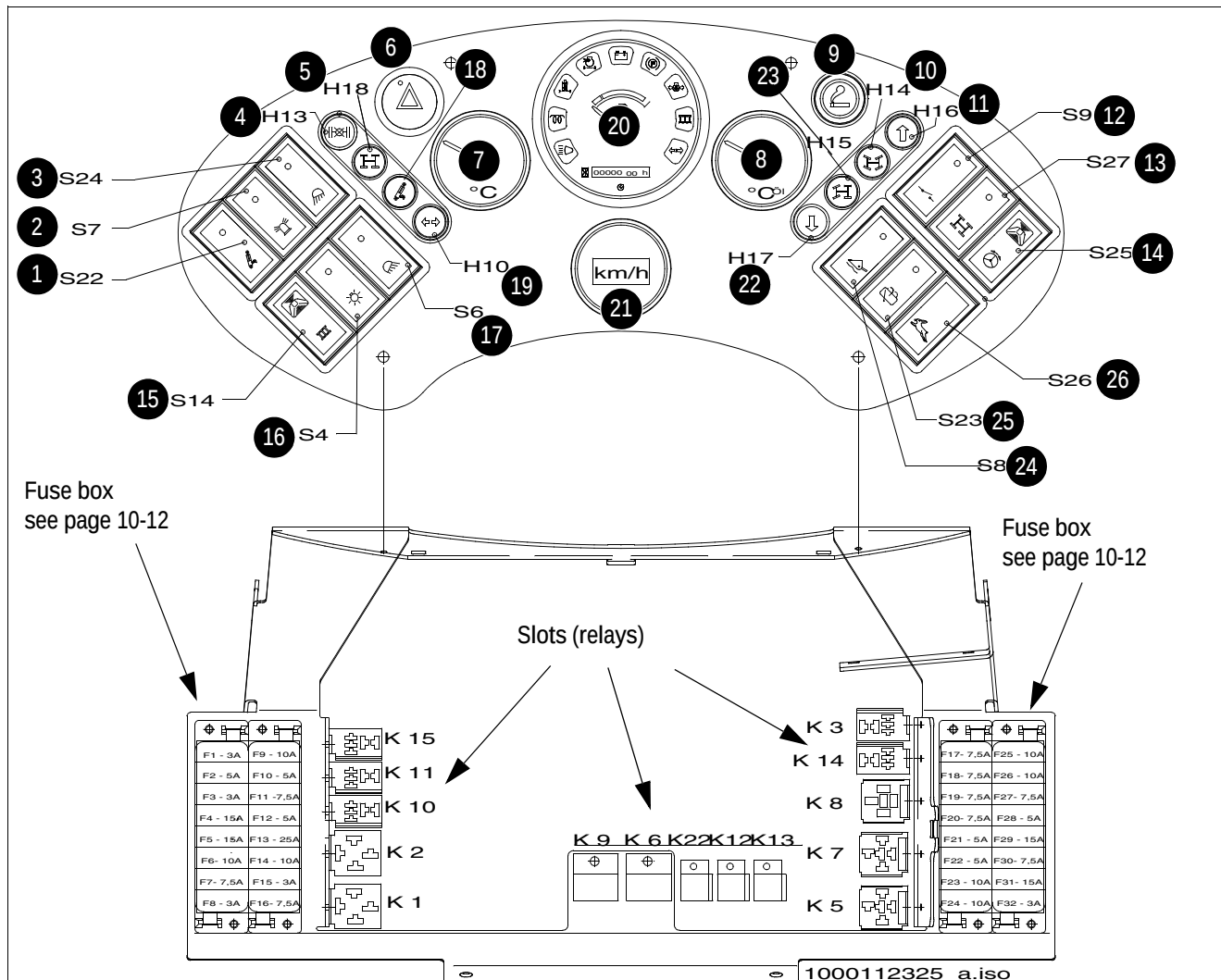
Cable assignment

No.	Function	mm ²
1	Input – synchronisation tip switch	0.75
2	Input – 4 wheel steering	0.75
3	Input – front axle steering	0.75
4	Input – rear sensor	0.75
5	Input – front sensor	0.75
6	Input – 1st speed	0.75
7	Input – earth	0.75
8	Input – earth	0.75
9	Input – tip switch (electronics OFF)	0.75

Cable assignment

No.	Function	mm ²
10	Input – supply point +12 V	0.75
11	Output – 1st speed	0.75
12	Input – 4 wheel steering	0.75
13	Input – front axle steering	0.75
14	Input – synchronisation telltale	0.75
15	Input – 4 wheel steering telltale	0.75
16	Input – front axle steering telltale	0.75

10.11 Instrument panel, fuse box, relays: overview



Pos.	Description
1	Switch – quickhitch lock (option)
2	Switch – rotating beacon (option)
3	Switch – front working light (option)
4	Telltale (green) – differential lock
5	Telltale (red) – steering synchronisation
6	Switch – hazard warning system
7	Temperature indicator – diesel engine
8	Temperature gauge – hydraulic oil
9	Socket/cigarette lighter
10	Telltale (green) – 4 wheel steering
11	Telltale (green) – FW
12	Switch – front socket for electrically operated implements (option)
13	Tip switch – steering synchronisation
14	Switch with lock – 4 wheel/front axle steering
15	Switch with lock – 3rd control circuit

Pos.	Description
16	Switch – lights
17	Switch – rear working light
18	Telltale (yellow) – hose burst valve
19	Telltale (green) – right/left turn indicator
20	Indicator
21	Speedometer (option)
22	Telltale (green) – RV
23	Telltale (green) – front axle steering (high speed option)
24	Switch – load stabiliser (option)
25	Switch – rear wiper
26	Switch – high speed (option)

Wiring harnesses: overview



10.12 Legend for wiring diagram

No.	Description	Section	Loc.
A1	Radio	B21	Opt.
B1	Fuel indicator	K5	
B2	Horn	K15	
B3	Backup warning system	H14	Opt.
B4	Front axle steering sensor	K12	
B5	Rear axle steering sensor	K12	
B6	Temperature sensor – engine oil	K5	
B7	Temperature sensor – hydraulic oil	K5	
B8	Load sensor – strain gauge	K19	Opt.
B9	Speed sensor	K3	Opt.
B10	Diesel engine speed	K3	
B11	Loudspeaker	C20	Opt.
B12	Loudspeaker	C20	Opt.
B13	Proximity switch	L24	Opt.
D1	Steering electronics	C11	
D2	Control lever	B7	
E1	Front right parking light	K15	
E2	Rear right light	K14	
E3	Front left parking light	K15	
E4	Rear left light	K14	
E5	High, low beam (right)	J14	
E6	High, low beam (left)	J15	
E7	Rear working light	H22	
E8	Front working light	H21	Opt.
E9	Front working light	H21	Opt.
E10	Interior light with switch	G17	
E11	Cigarette lighter with light	B14	
E12	Rear working light	H22	Opt.
E13	Numberplate light	J13	Opt.
F1..F3 2	Fuses	A4-21	
F33	Main fuse	J1	
F34/ F35	Main fuse	J1	
F36	Preheating/start fuse	K2	
F37	Fuse – multiple quantity valve	L2	
G1	Alternator	L4	
G2	Battery	L1	
H1	High beam telltale	B5	
H2	Preheating telltale	B5	
H4	Engine oil pressure telltale	B5	
H5	Alternator charge telltale	B5	
H6	Air filter telltale	B5	
H7	Hydraulic oil filter telltale	B5	
H8	Hose burst valve telltale	H20	
H9	Rear implement turn indicator telltale	B5	
H10	Vehicle turn indicator telltale	D13	
H11	Handbrake telltale	B5	
H12	3rd control circuit telltale	B5	
H13	Differential lock telltale	H8	

No.	Description	Section	Loc.
H14	4 wheel steering telltale	D11	
H15	Front axle steering telltale	D11	
H16	FW telltale	D6	
H17	RV telltale	D6	
H18	Synchronism telltale	D10	
H21	Front right turn indicator	J16	
H22	Rear right turn indicator	K13	
H23	Front left turn indicator	K16	
H24	Rear left turn indicator	K13	
H25	Brake lights	K16	
H26	Brake lights	K16	
H27	Rotating beacon	G22	Opt.
H28	Rotating beacon	G22	Opt.
H29	Reversing light	K14	
H30	Reversing light	K14	
K1	High-current relay	C3	
K2	High-current relay	C4	
K3	Switching relay – RV	D7	
K5	Switching relay – front socket	G16	Opt.
K6	Turn indicator relay	C13	
K7	Switching relay – wiper (1st speed)	D17	
K8	Switching relay – wiper (2nd speed)	D18	
K9	Intermittent-wipe relay	D18	
K10	Switching relay (lock)	H7	
K11	Switching relay (unlock)	H6	
K12	Switching relay – retract telescopic unit	G18	Opt.
K13	Switching relay – extend telescopic unit	G18	Opt.
K14	Switching relay – differential lock	H7	
K15	Switching relay – load stabiliser	G20	
K20	High current relay – preheating	K2	
K21	High current relay – start	K2	
K22	Switching relay – bucket repositioning	G24	Opt.
M1	Starter	L2	
M2	Front wiper motor	E17/18	
M3	Rear wiper motor	D14	
M4	Fan motor	H13	
M5	Front wipe/wash pump	D18	
M6	Rear wipe/wash pump	D14	
M7	Air-suspension seat	D22	Opt.
N1	Drive electronics	D-J2	
P1	Hour meter	C4	
P2	Fuel level indication	B5	
P3	Temperature gauge – engine oil	G5	
P4	Temperature gauge – hydraulic oil	G5	
P5	Speedometer	G4	Opt.
P6	Safe load indicator	G19	Opt.
R1	Glow plug	L2	
R4	Inching pedal	H3	

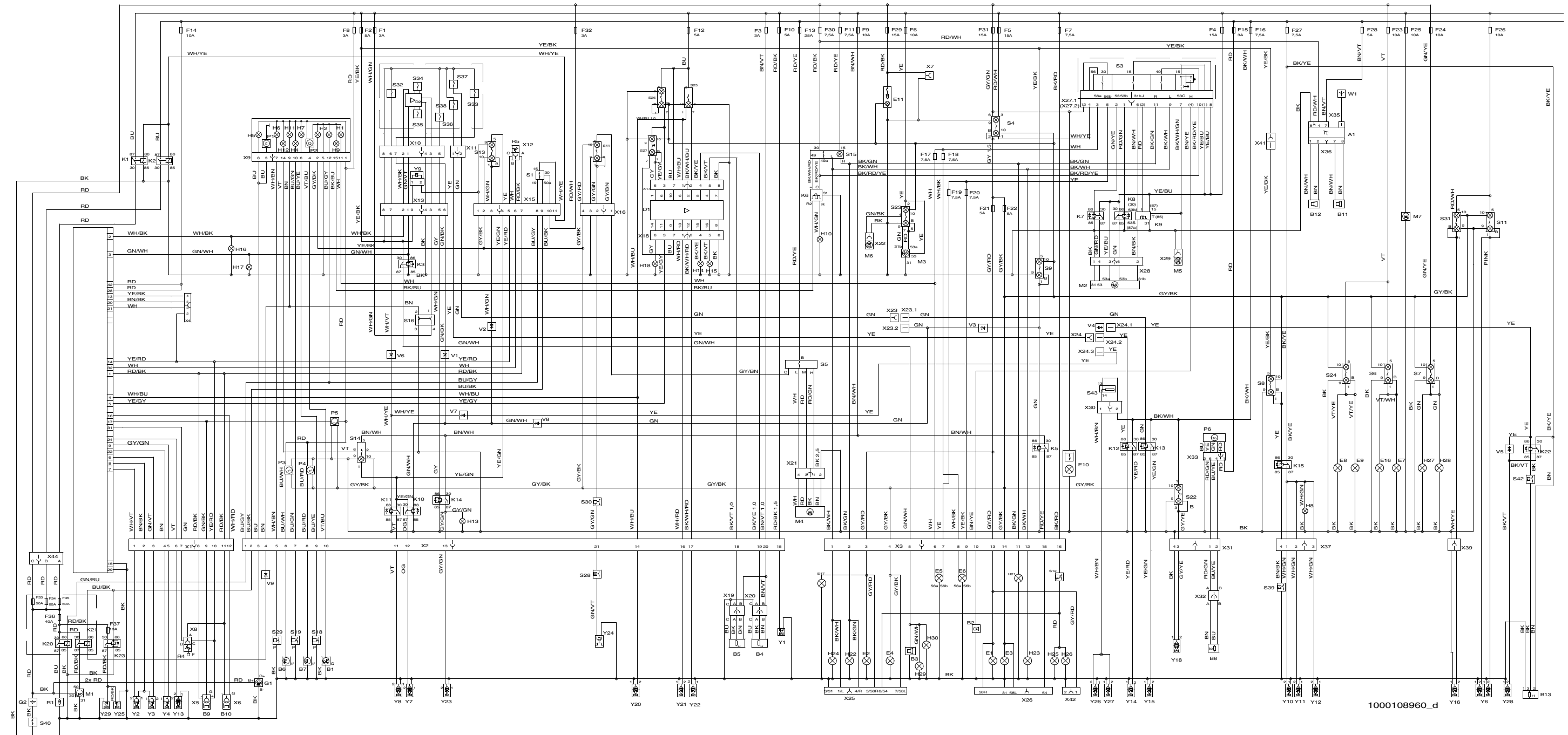
No.	Description	Section	Loc.
R5	Crawler gear potentiometer	C8	Opt.
S1	Preheating start switch	C9	
S3	Steering-column control lever (left)	B17-19	
S4	Light switch	B15	
S5	Heating switch	F13	
S6	Rear working light switch	F22	
S7	Rotating beacon switch	F22	Opt.
S8	Load stabiliser switch	F20	Opt.
S9	Front socket switch	D16	Opt.
S11	Switch – additional control circuit	C23	Opt.
S12	Brake light switch	J16	
S13	Continuous operation of 3rd control circuit	C8	
S14	Functional switch – 3rd control circuit	G6	
S15	Hazard warning light switch	C13	
S16	Handbrake switch	E7	
S18	Pressure switch – hydraulic oil	K5	
S 19	Pressure switch – engine oil	K5	
S22	Switch – quickhitch lock	H18	Opt.
S23	Switch – rear wiper/washer	D14	
S24	Switch – front working light	F21	Opt.
S25	Switch – steering mode/high speed	B11	
S26	Switch – 1st/2nd speed	B10	
S27	Tip switch – synchronism	C10	
S28	Pressure switch – air conditioning	J9	Opt.
S29	Pressure switch – air filter	K5	
S30	Temperature switch – air conditioning	H10	Opt.
S31	Switch – additional function	C23	Opt.
S32	Tip switch – unlock	B6	
S33	Tip switch – lock	B8	
S34	Tip switch – FW	B7	
S35	Tip switch – RV	B7	
S36	Tip switch – differential lock	B7	
S37	Extend telescopic unit/front socket	B7	
S38	Retract telescopic unit/bucket repositioning	B7	
S39	Pressure switch – load stabiliser	J20	Opt.
S40	Battery master switch	L1	Opt.
S41	Switch – air conditioning	C9	Opt.
S42	Pressure switch – bucket repositioning	H24	Opt.
S43	Key-operated switch – tilt ram lock	G17	Opt.
V1..V	3 Blocking diode		
V4	Blocking diode	E17	Opt.
V5	Blocking diode	G24	Opt.
V6..V	9 Blocking diode		
X1	11 pole connection – Susmic data	D-G4	
X2	21 pole connection – engine/valves	J4-12	
X3	17 pole connection – lights	J13-17	
X4	6 pole connection – diagnosis unit	E/F3	

No.	Description	Section	Loc.
X5	3 pole connection – speed sensor	L3	
X6	2 pole connection – speed transmitter	L3	
X7	2 pole connection – auxiliary heating	A15	
X8	3 pole connection – inching potentiometer	H4	
X9	15 pole connection – indicating instrument	C4-6	
X10	6 pole connection – joystick	C6/7	
X11	3 pole connection – joystick telescopic unit	C7	Opt.
X12	3 pole connection – crawler gear potentiometer	C8	
X13	9 pole connection – armrest joystick	D6/7	
X14	3 pole connection – joystick 3rd control circuit	C6	
X15	2 pole connection – armrest switch	D8/9	
X16	4 pole connection – armrest air conditioning	D9	Opt.
X17	8 pole connection – steering electronics	C11	
X18	8 pole connection – steering electronics	D11	
X19	3 pole connection – rear axle steering sensor	K11	
X20	3 pole connection – front axle steering sensor	K12	
X21	4 pole connection – heating	H12	
X22	2 pole connection – rear wipe/wash pump	D14	
X23	1 pole joystick socket S37	E14	
X23.1	1 pole plug – extend telescopic unit	E14	
X23.2	1 pole plug – front socket	E14	
X24	1 pole joystick socket S38	E17	
X24.1	1 pole plug – bucket repositioning	E17	
X24.2	1 pole plug – retract telescopic unit	E17	Opt.
X24.3	1 pole connection – switchover (3rd to 4th control circuit)	E17	Opt.
X25	7 pole rear socket	L13/14	
X26	4 pole front socket	L15/16	
X27.1	8 pole connection – steering-column control lever	B17-19	
X27.2	6 pole connection – steering-column control lever	B17-19	
X28	6 pole connection – front wiper	D18	
X29	2 pole connection – front wipe/wash pump	D19	
X30	2 pole connection – tilt ram lock	F18	Opt.
X31	2 pole connection – strain gauge	J19	Opt.
X32	2 pole connection – strain gauge	J19	Opt.
X33	6 pole connection – safe load indicator	G19	Opt.
X34	1 pole connection – load stabiliser	F19	Opt.
X35	8 pole connection – radio power supply	B20	Opt.
X36	8 pole connection – radio loudspeakers	C20	Opt.

No.	Description	Section	Loc.
X37	5 pole connection – load stabiliser	J20	Opt.
X39	2 pole connection – additional function	J22/23	Opt.
X41	1 pole connection – load stabiliser	D20	Opt.
X42	2 pole connection – clearance lights	L17	
X44	3 pole connection – power supply	J1	
Y1	Cutoff solenoid	K12	
Y2	Solenoid valve RV	L3	
Y3	Solenoid valve FW	L3	
Y4	Solenoid valve 1st/2nd speed	L4	
Y5	Solenoid valve for 4th control circuit (front)	L23	Opt.
Y6	Solenoid valve – additional control circuit	L23	Opt.
Y7	Solenoid valve – lock	L7	
Y8	Solenoid valve – unlock	L6	
Y9	Magnet – float position	C7	Opt.
Y10	Solenoid valve – load stabiliser	L20	Opt.
Y11	Solenoid valve – load stabiliser	L20	Opt.
Y12	Solenoid valve – hose burst valve	L20	Opt.
Y13	Solenoid valve – driving direction identification	L4	
Y14	Solenoid valve – retract telescopic unit	L18	Opt.
Y15	Solenoid valve – extend telescopic unit	L18	Opt.
Y16	Solenoid valve for 4th control circuit (rear)	L23	Opt.
Y18	Solenoid valve – quickhitch lock	L18	Opt.
Y20	Solenoid valve – high speed	L10	Opt.
Y21	Solenoid valve – front axle steering	L11	
Y22	Solenoid valve – 4 wheel steering	L11	
Y23	Solenoid valve – differential lock	L7	
Y24	Electro-magnetic clutch – compressor	K10	Opt.
Y25	Multiple quantity valve	L2	
Y26	Solenoid valve – tilt ram lock	L17	Opt.
Y27	Solenoid valve – tilt ram lock	L17	Opt.
Y28	Solenoid valve – bucket repositioning	L23	Opt.

Legend for wiring diagram

10.13 Wiring diagram



1000108960_d



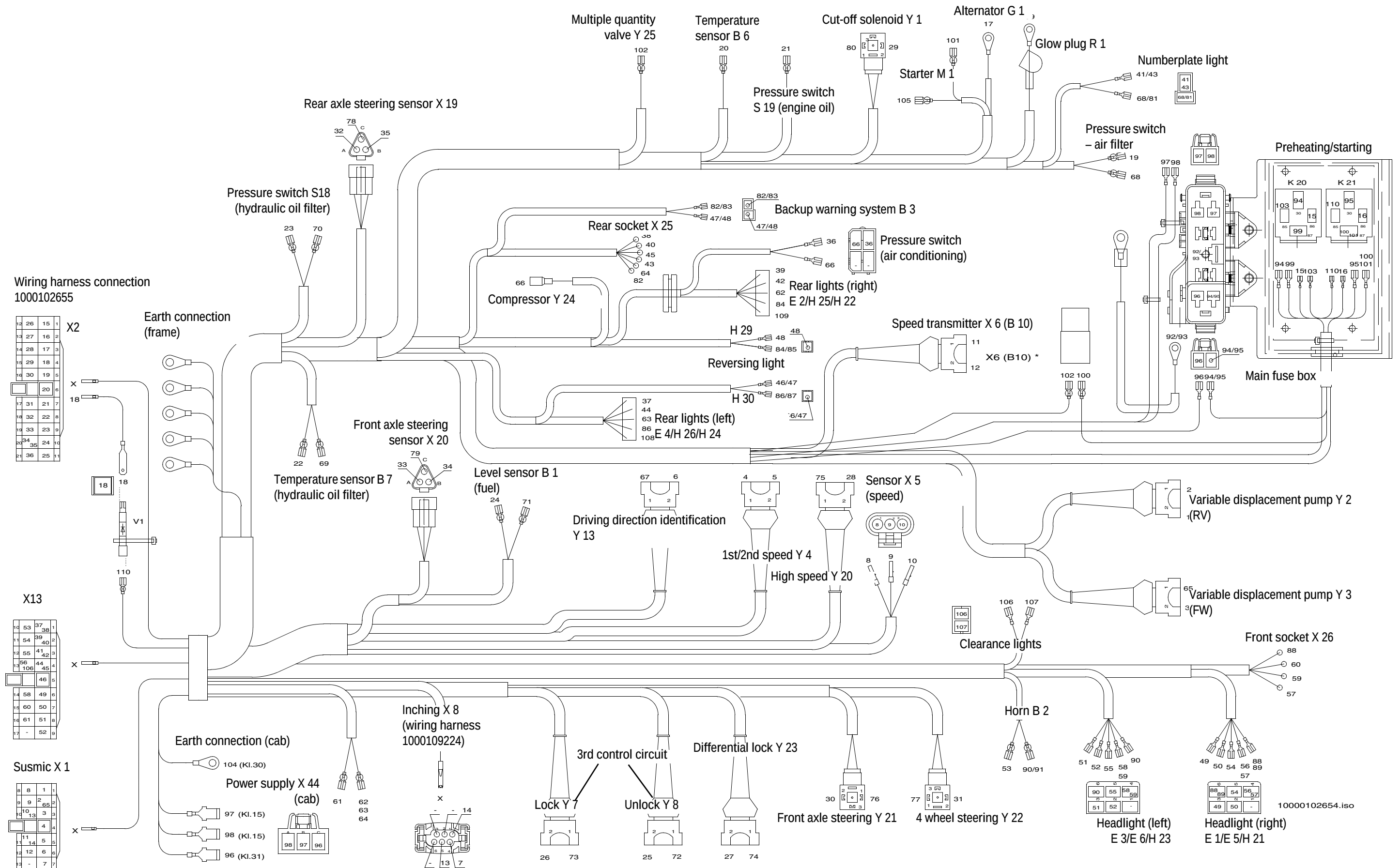
10.14 Legend for wiring harness 1000102654: engine – frame

No.	Up to	To	Col-our	mm²
1	X1 (1) 13 pole plug and socket connector – Susmic data connection	Y2 (2) solenoid valve – RV	WH/VT	1
2	X1 (2) 13 pole plug and socket connector – Susmic data connection	Y2 (1) solenoid valve – RV	BN/BK	1
3	X1 (3) 13 pole plug and socket connector – Susmic data connection	Y3 (2) solenoid valve – FW	GN/VT	1
4	X1 (4) 13 pole plug and socket connector – Susmic data connection	Y4 (1) 1st/2nd speed solenoid valve	BN	1
5	X1 (5) 13 pole plug and socket connector – Susmic data connection	Y4 (2) 1st/2nd speed solenoid valve	GY/GN	1
6	X1 (6) 13 pole plug and socket connector – Susmic data connection	Y13 (2) solenoid valve – driving direction identification	VT	1
7	X1 (7) 13 pole plug and socket connector – Susmic data connection	X8 (B) 3 pole plug and socket connector – inching potentiometer	GN	1
8	X1 (8) 13 pole plug and socket connector – Susmic data connection	X5 (-) (1) 3 pole connection – speed sensor	RD/BN	1
9	X1 (9) 13 pole plug and socket connector – Susmic data connection	X5 (2) (signal) 3 pole connection – speed sensor	GN/BK	1
10	X1 (10) 13 pole plug and socket connector – Susmic data connection	X5 (3) (+) 3 pole connection – speed sensor	YE/RD	1
11	X1 (11) 13 pole plug and socket connector – Susmic data connection	X6 (1) connection – speed transmitter	RD/BN	1
12	X1 (12) 13 pole plug and socket connector – Susmic data connection	X6 (2) connection – speed transmitter	WH/RD	1
13	X1 (10) 13 pole plug and socket connector – Susmic data connection	X8 (C) 3 pole plug and socket connector – inching potentiometer	YE/RD	1
14	X1 (11) 13 pole plug and socket connector – Susmic data connection	X8 (A) 3 pole plug and socket connector – inching potentiometer	RD/BN	1
15	X2 (1) 21 pole plug and socket connector – engine/valve connection	K20 (86) high current relay – preheating	BU/GY	1
16	X2 (2) 21 pole plug and socket connector – engine/valve connection	K21 (86) high current relay – start	BU/BK	1
17	X2 (3) 21 pole plug and socket connector – engine/valve connection	G1 Alternator D+	BU	1
18	X2 (4) 21 pole plug and socket connector – engine/valve connection	V1 Blocking diode	BN	1
19	X2 (5) 21 pole plug and socket connector – engine/valve connection	S29 Pressure switch – air filter	WH/BN	1
20	X2 (6) 21 pole plug and socket connector – engine/valve connection	B6 Temperature sensor – engine coolant	BU/WH	1
21	X2 (7) 21 pole plug and socket connector – engine/valve connection	S19 Pressure switch – engine oil	BU/GN	1
22	X2 (8) 21 pole plug and socket connector – engine/valve connection	B7 Temperature sensor – hydraulics	BU/RD	1
23	X2 (9) 21 pole plug and socket connector – engine/valve connection	S18 Pressure switch – hydraulic reflux filter	BU/YE	1
24	X2 (10) 21 pole plug and socket connector – engine/valve connection	B1 Fuel level sensor	VT/BU	1
25	X2 (11) 21 pole plug and socket connector – engine/valve connection	Y8 (2) unlock solenoid valve	VT	1
26	X2 (12) 21 pole plug and socket connector – engine/valve connection	Y7 (2) lock solenoid valve	OG	1
27	X2 (13) 21 pole plug and socket connector – engine/valve connection	Y23 (2) differential lock solenoid valve	GY/GN	1
28	X2 (14) 21 pole plug and socket connector – engine/valve connection	Y20 (2) solenoid valve – high speed	WH/BU	1
29	X2 (15) 21 pole plug and socket connector – engine/valve connection	Y1 (2) cutoff solenoid	RD/BK	1.5
30	X2 (16) 21 pole plug and socket connector – engine/valve connection	Y21 (2) solenoid valve – front axle steering	WH/RD	1
31	X2 (17) 21 pole plug and socket connector – engine/valve connection	Y22 (2) solenoid valve – 4 wheel steering	BK/WH/RD	1
32	X2 (18) 21 pole plug and socket connector – engine/valve connection	X19, B5 3 pole (A) plug and socket connector – rear axle steering sensor	BK/VT	1

No.	Up to	To	Col-our	mm²
33	X2 (19) 21 pole plug and socket connector – engine/valve connection	X20, B4 3 pole (A) plug and socket connector – front axle steering sensor	BK/YE	1
34	X2 (20) 21 pole plug and socket connector – engine/valve connection	X20, B4 3 pole (B) plug and socket connector – front axle steering sensor	BN/VT	1
35	X2 (20) 21 pole plug and socket connector – engine/valve connection	X19, B5 3 pole (B) plug and socket connector – rear axle steering sensor	BN/VT	1
36	X2 (21) 21 pole plug and socket connector – engine/valve connection	S28 Pressure switch – air conditioning	GN/BN	1
37	X3 (1) 17 pole plug and socket connector – lights connection	H24 Rear left turn indicator	BK/WH	1
38	X3 (1) 17 pole plug and socket connector – lights connection	X25 Rear socket, turn indicator 1/L	BK/WH	1
39	X3 (2) 17 pole plug and socket connector – lights connection	H22 Rear right turn indicator	BK/GN	1
40	X3 (2) 17 pole plug and socket connector – lights connection	X25 Rear socket, turn indicator 4/R	BK/GN	1
41	X3 (3) 17 pole plug and socket connector – lights connection	E17 Numberplate lights	GY/RD	1
42	X3 (3) 17 pole plug and socket connector – lights connection	E2 Rear right light	GY/RD	1
43	E17 Numberplate lights	X25 Rear socket, clearance light 5/58 R	GY/RD	1
44	X3 (4) 17 pole plug and socket connector – lights connection	E4 Rear left light	GY/BK	1
45	X3 (4) 17 pole plug and socket connector – lights connection	X25 Rear socket 7/58L	GY/BK	1
46	X3 (5) 17 pole plug and socket connector – lights connection	H30 Reversing light	GN/WH	1
47	H30 Reversing light	B3 Backup warning system	GN/WH	1
48	B3 Backup warning system	H29 Reversing light	GN/WH	1
49	X3 (6) 17 pole plug and socket connector – lights connection	E5 (56a) 6 pole (3) plug and socket connector – high beam (right)	WH	1
50	X3 (7) 17 pole plug and socket connector – lights connection	E5 (56b) 6 pole (2) plug and socket connector – low beam (right)	YE	1
51	X3 (8) 17 pole plug and socket connector – lights connection	E6 (56a) 6 pole (3) plug and socket connector – high beam (left)	WH/BK	1
52	X3 (9) 17 pole plug and socket connector – lights connection	E6 (56b) 6 pole (2) plug and socket connector – low beam (left)	YE/BK	1
53	X3 (10) 17 pole plug and socket connector – lights connection	B2 Horn	BN/YE	1
54	X3 (11) 17 pole plug and socket connector – lights connection	H21 (5) 6 pole plug and socket connector – front right turn indicator	BK/GN	1
55	X3 (12) 17 pole plug and socket connector – lights connection	H23 (5) 6 pole plug and socket connector – front left turn indicator	BK/WH	1
56	X3 (13) 17 pole plug and socket connector – lights connection	E1 (4) 6 pole plug and socket connector – front right parking light	GY/RD	1
57	E1 (4) 6 pole plug and socket connector – front right parking light	X26 Front socket 58R	GY/RD	1
58	X3 (14) 17 pole plug and socket connector – lights connection	E3 (4) 6 pole plug and socket connector – front left parking light	GY/BK	1
59	E3 (4) 6 pole plug and socket connector – front left parking light	X26 Front socket 58L	GY/BK	1
60	X3 (15) 17 pole plug and socket connector – lights connection	X26 Front socket 54	RD/YE	1.5
61	X3 (16) 17 pole plug and socket connector – lights connection	S12 Brake light switch	BK/RD	1
62	S12 Brake light switch	H25 Brake light (right)	RD	1
63	S12 Brake light switch	H26 Brake light (left)	RD	1
64	S12 Brake light switch	X25 Rear socket 6/54	RD	1
65	X1 (2) 13 pole plug and socket connector – Susmic data connection	Y3 (1) solenoid valve – FW	BN/BK	1
66	S28 Pressure switch – air conditioning	Y24 Compressor connection	GN/VT	1
67	Y13 (1) solenoid valve – driving direction identification	Frame earth connection	BK	1
68	S29 Pressure switch – air filter	E17 Numberplate lights	BK	1
69	B7 Temperature sensor – hydraulics	Frame earth connection	BK	1

No.	Up to	To	Col-our	mm²
70	S18 Pressure switch – hydraulic reflux filter	Frame earth connection	BK	1
71	B1 Fuel level sensor	Frame earth connection	BK	1
72	Y8 (1) unlock solenoid valve	Frame earth connection	BK	1
73	Y7 (1) lock solenoid valve	Frame earth connection	BK	1
74	Y23 (1) differential lock solenoid valve	Frame earth connection	BK	1
75	Y20 (1) solenoid valve – high speed	Frame earth connection	BK	1
76	Y21 (1) solenoid valve – front axle steering	Frame earth connection	BK	1
77	Y22 (1) solenoid valve – 4 wheel steering	Frame earth connection	BK	1
78	X19 (C) 3 pole plug and socket connector – rear axle steering sensor	Frame earth connection	BK	1
79	X20 (C) 3 pole plug and socket connector – front axle steering sensor	Frame earth connection	BK	1
80	Y1 (1) cutoff solenoid	Frame earth connection	BK	1
81	E17 Numberplate lights	Frame earth connection	BK	1
82	X25 Rear socket 3/31	B3 Backup warning system	BK	1
83	B3 Backup warning system	Frame earth connection	BK	1
84	E2/H25/H22 Rear right light	H29 Reversing light	BK	1
85	H29 Reversing light	Frame earth connection	BK	1
86	E4/H26/H24 Rear left light	H30 Reversing light	BK	1
87	H30 Reversing light	Frame earth connection	BK	1
88	X26 Front socket 31	E1/E5/H21 6 pole (6) plug and socket connector – right headlight	BK	1
89	E1/E5/H21 6 pole (6) plug and socket connector – right headlight	Frame earth connection	BK	1
90	E3/E6/H23 6 pole (6) plug and socket connector – left headlight	B2 Horn	BK	1
91	B2 Horn	Frame earth connection	BK	1
92	Battery connection	Main fuse box	RD	10
93	Battery connection	Main fuse box	RD	10
94	2 pole plug (blue) main fuse box	K20 (30) high current relay – preheating	RD	6
95	2 pole plug (blue) main fuse box	K21 (30) high current relay – start	RD	2.5
96	2 pole plug (blue) main fuse box	X44 (C) 3 pole power supply plug	RD	10
97	2 pole plug (grey) main fuse box	X44 (B) 3 pole power supply plug	RD	10
98	2 pole plug (grey) main fuse box	X44 (A) 3 pole power supply plug	RD	10
99	K20 (87) high current relay – preheating	R1 Glow plug	BU	6
100	K21 (87) high current relay – start	K23 (86) relay – minus compensation	BU/BK	1
101	K21 (87) high current relay – start	M1 starting motor terminal 50	RD/BK	2.5
102	K23 (87) relay – minus compensation	Y25 Multiple quantity valve	RD/BK	1
103	K20 (85) high current relay – preheating	Frame earth connection	BK	1
104	Cab earth connection	Frame earth connection	BK	6
105	M1 Starter	Frame earth connection	BK	1
106	X3 (13) 17 pole plug and socket connector – lights connection	X42 (1) 2 pole plug and socket connector – clearance lights	GY/RD	1
107	X42 (2) 2 pole plug and socket connector – clearance lights	Frame earth connection	BK	1
108	E4/H26/H24 Rear left light	Frame earth connection	BK	1
109	E2/H25/H22 Rear right light	Frame earth connection	BK	1
110	V1 Blocking diode	K21 (85) high current relay – start	BN	1
111	ñ	ñ	ñ	ñ
112	K20 (30) high current relay – preheating	F37 Fuse	RD	1
113	K20 (85) high current relay – preheating	K23 (85) relay – minus compensation	BK	1
114	K23 (30) relay – minus compensation	F37 Fuse	RD	1

Legend for wiring harness 1000102654: engine – frame



Electric system

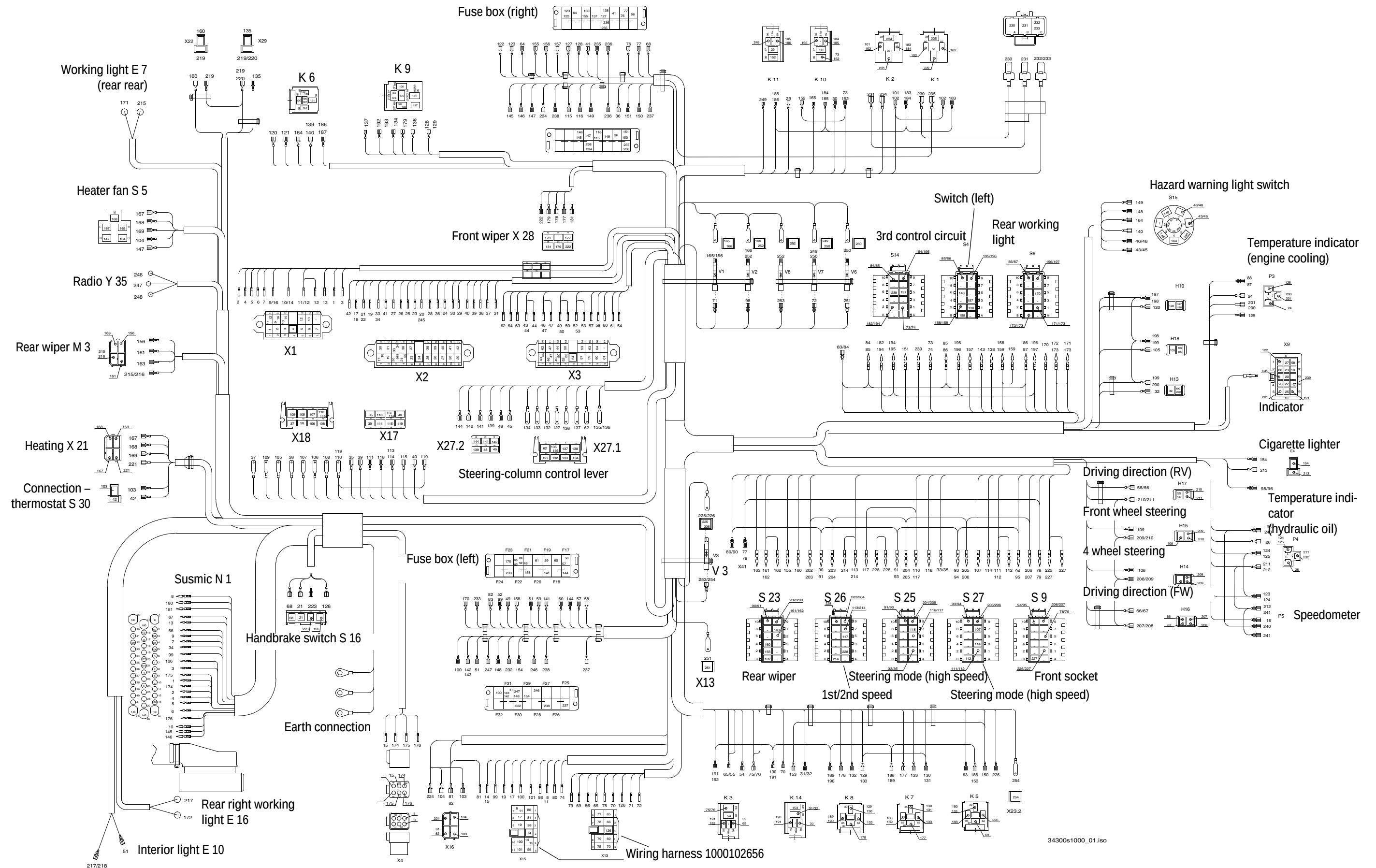


kramerALLRAD®

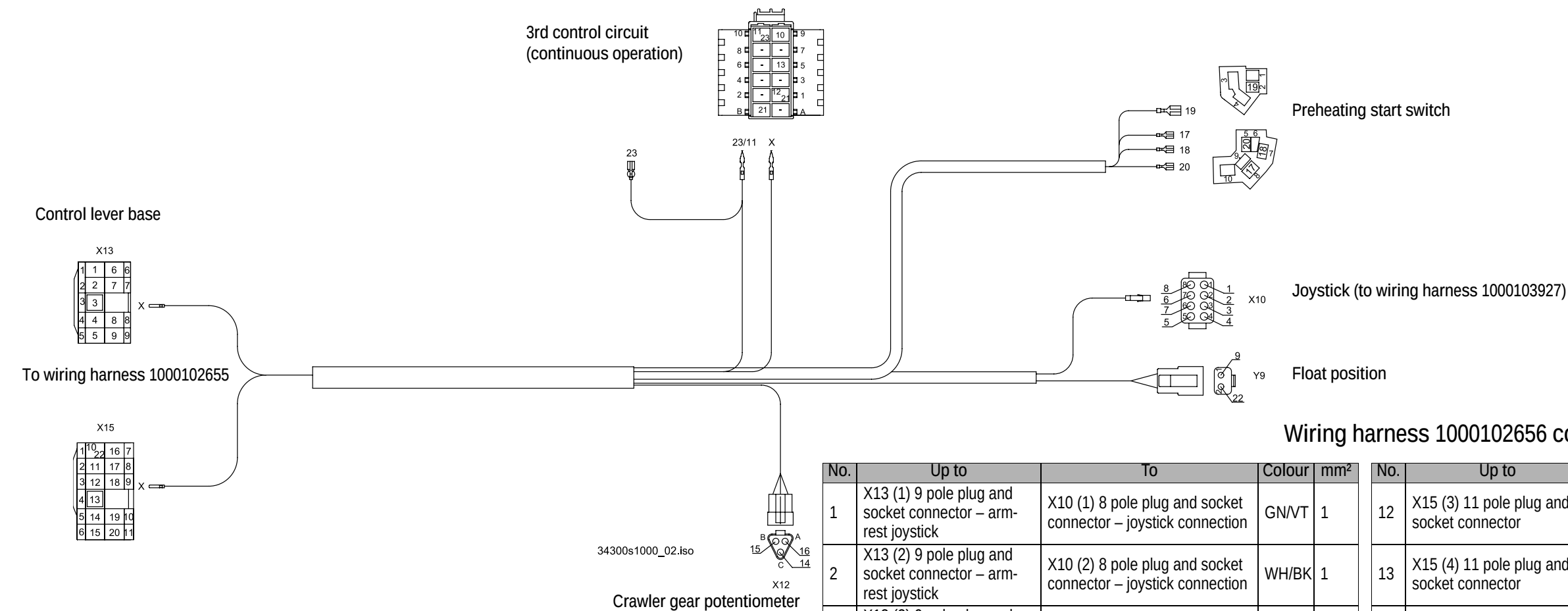
10.16 Legend for wiring harness 1000102655: cab

No.	Up to	To	Col.	No.	Up to	To	Col.	No.	Up to	To	Col.	No.	Up to	To	Col.	No.	Up to	To	Col.
1	X1 (1) 13 pole plug and socket connector – Susic data connection	N1 (7) RV driving direction	WH/VT	32	K14 (87) switching relay – differential lock	H13 Differential lock telltale	GY/GN	70	X13 (5) 9 pole plug and socket connector – armrest joystick	K14 (86) switching relay – differential lock	GY	112	X17 (3) 8 pole plug and socket connector – steering electronics	S27 (3) tip switch – synchronisation	YE/GY	149	Fuse F9 (A)	S14 (5) function switch – 3rd control circuit	BN/WH
2	X1 (2) 13 pole plug and socket connector – Susic data connection	N1 (8) drive direction valves – current monitoring	BN/BK	33	X2 (14) 21 pole plug and socket connector – engine/valve connection	S25 (1) switch – steering mode/high speed	WH/BU	71	X13 (6) 9 pole plug and socket connector – armrest joystick	V1 Lock blocking diode	GN/BK	113	X17 (7) 8 pole plug and socket connector – steering electronics	Fuse F12 (D) steering electronics	BU	150	K10 (30) lock switching relay	K11 (30) unlock switching relay	YE/GN
3	X1 (3) 13 pole plug and socket connector – Susic data connection	N1 (6) FW driving direction	GN/VT	34	X2 (14) 21 pole plug and socket connector – engine/valve connection	N1 (4) signal input – steering mode	WH/BU	72	X13 (7) 9 pole plug and socket connector – armrest joystick	V7 Blocking diode	WH/VT	114	Fuse F12 (D) steering electronics	S25 (5) switch – steering mode/high speed	BU	151	K5 (30) switching relay – front socket	K14 (30) switching relay – differential lock	BN/WH
4	X1 (4) 13 pole plug and socket connector – Susic data connection	N1 (22) 1st/2nd speed solenoid valve (+)	BN	35	S25 (1) switch – steering mode/high speed	X17 (1) 8 pole plug and socket connector – steering electronics	WH/BU	73	K10 (30) lock switching relay	S14 (1) function switch – 3rd control circuit	YE/GN	115	S25 (5) switch – steering mode/high speed	S26 (5) 1st/2nd gear switch	BU	152	Fuse F29 (E) cigarette lighter	E11 cigarette lighter	RD/BK
5	X1 (5) 13 pole plug and socket connector – Susic data connection	N1 (9) 1st/2nd speed solenoid valve (-)	GY/GN	36	X2 (15) 21 pole plug and socket connector – engine/valve connection	Fuse F10 (B) cutoff solenoid	RD/BK	74	X15 (4) 11 pole plug and socket connector – armrest switch	S14 (1) function switch – 3rd control circuit	YE/GN	116	X17 (2) 8 pole plug and socket connector – steering electronics	S25 (7) switch – steering mode/high speed	BK/WH/BU	153	Fuse F6 (F) rear wiper	S23 (2) rear wiper switch	YE
6	X1 (6) 13 pole plug and socket connector – Susic data connection	N1 (24) solenoid valve – driving direction identification	VT	37	X2 (16) 21 pole plug and socket connector – engine/valve connection	X18 (1) 8 pole plug and socket connector – steering electronics (front axle)	WH/RD	75	X13 (9) 9 pole plug and socket connector – armrest joystick	K3 (30) switching relay – RV	YE/BK	117	X17 (8) 8 pole plug and socket connector – steering electronics	X18 (8) 8 pole plug and socket connector – steering electronics	BK	154	Fuse F6 (F) rear wiper	M3 (1) rear wiper (53a)	YE
7	X1 (7) 13 pole plug and socket connector – Susic data connection	N1 (31) inching potentiometer	GN	38	X2 (17) 21 pole plug and socket connector – engine/valve connection	X18 (2) 8 pole plug and socket connector – steering electronics (rear axle)	BK/WH/RD	76	K3 (30) switching relay – RV	Fuse F2 (B)	YE/BK	118	H10 Turn indicator telltale (vehicle)	K6 (87), (R) turn indicator relay	WH/WH/BU	155	Fuse F5 (E) lights	S4 (3) light switch	RD/WH
8	X15 (7) 11 pole plug and socket connector – armrest	N1 (1) sensor (-)	RD/BK	39	X2 (18) 21 pole plug and socket connector – engine/valve connection	X17 (5) 8 pole plug and socket connector – steering electronics (rear axle)	BK/VT	77	Fuse F2 (B)	X41 1 pole plug and socket connector – load stabiliser connection	YE/BK	119	X9 (15) 15 pole plug and socket connector – indicating instrument	K6 (30), (R2) turn indicator relay	GN/BU	156	S4 (2) light switch	Fuse F21 (5) lights	GY
9	X1 (9) 13 pole plug and socket connector – Susic data connection	N1 (17) signal input – speed sensor	GN/BK	40	X2 (19) 21 pole plug and socket connector – engine/valve connection	X17 (4) 8 pole plug and socket connector – steering electronics (front axle)	BK/YE	78	X41 1 pole plug and socket connector – load stabiliser connection	S9 (5) front socket switch	YE/BK	120	X9 (1) 15 pole plug and socket connector – indicating instrument	Fuse F8 (H) telltales	RD	157	S4 (2) light switch	S4 (B) light switch	GY
10	X1 (10) 13 pole plug and socket connector – Susic data connection	N1 (14) sensor (+)	YE/RD	41	X2 (20) 21 pole plug and socket connector – engine/valve connection	Fuse F3 (C) steering sensors	BN/VT	79	S9 (5) front socket switch	X13 (8) 9 pole plug and socket connector – armrest joystick	YE/BK	121	Fuse F8 (H) telltales	P5 (3) speedometer	RD	158	S23 (5) rear wiper switch	S23 (B) rear wiper switch	RD
11	X15 (7) 11 pole plug and socket connector – armrest	X1 (8) 13 pole plug and socket connector – Susic data connection	RD/BK	42	X2 (21) 21 pole plug and socket connector – engine/valve connection	S30 Thermostat	GY/GN	80	X15 (1) 11 pole plug and socket connector – armrest switch	X13 (8) 9 pole plug and socket connector – armrest joystick	YE/BK	122	P5 (3) speedometer	P4 (+) temperature indicator – hydraulics	RD	161	S23 (7) rear wiper switch	M3 (3) rear wiper (31b)	GN
12	X1 (8) 13 pole plug and socket connector – Susic data connection	X1 (11) 13 pole plug and socket connector – Susic data connection	RD/BK	43	X3 (1) 17 pole plug and socket connector – lights connection	S15 (L/6) left turn indicator	BK/WH	81	X15 (2) 11 pole plug and socket connector – armrest switch	X16 (4) 4 pole plug and socket connector – air conditioning	GY/BK	123	P4 (+) temperature indicator – hydraulics	P3 (+) level indicator (diesel fuel)	RD	162	S15 (49/4) hazard warning light switch	K6 (+/86) turn indicator relay	BK/WH/RD
13	X1 (12) 13 pole plug and socket connector – Susic data connection	N1 (16) signal input – speed transmitter	WH/RD	44	X3 (1) 17 pole plug and socket connector – lights connection	X3 (12) 17 pole plug and socket connector – lights connection	BK/WH	82	Fuse F22 (F)	X16 (4) 4 pole plug and socket connector – air conditioning	GY/BK	124	X13 (3) 9 pole plug and socket connector – armrest joystick	S16 (4) handbrake switch	RD	163	V1 Blocking diode	K10 (86) lock switching relay	GN/WH
14	X1 (10) 13 pole plug and socket connector – Susic data connection	X15 (5) 11 pole plug and socket connector – armrest	YE/RD	45	X27.2 (1) 6 pole plug and socket connector – steering-column control lever	S15 (L/6) left turn indicator	BK/WH	83	Fuse F22 (F)	1 pole plug and socket connector, search light	GY/BK	125	X27.1 (1) 8 pole plug and socket connector – steering-column control lever	Fuse F4 (D) front wiper	YE/BU	164	V1 Blocking diode	V2 Blocking diode	GN/WH
15	X15 (5) 11 pole plug and socket connector – armrest	X4 (2) 6 pole plug and socket connector – diagnosis	YE/RD	46	X3 (2) 17 pole plug and socket connector – lights connection	S15 (R/7) right turn indicator	BK/GN	84	1 pole plug and socket connector, search light	S14 (10) switch – 3rd control circuit	GY/BK	126	Fuse F4 (D) front wiper	K9 (15/87)) wipe/wash intermittent relay	YE/BU	165	S5 (L) switch – heater fan	X21 (4) heater fan	WH
16	X1 (9) 13 pole plug and socket connector – Susic data connection	P5 (1) speedometer – speed signal	GN/BK	47	X3 (2) 17 pole plug and socket connector – lights connection	X3 (11) 17 pole plug and socket connector – lights connection	BK/GN	85	S14 (10) switch – 3rd control circuit	S4 (10) light switch	GY/BK	127	K9 (15/87)) wipe/wash intermittent relay	K8 (30) front wiper (2nd speed)	YE/BU	166	S5 (M) switch – heater fan	X21 (3) heater fan	RD
17	X2 (1) 21 pole plug and socket connector – engine/valve connection	X15 (8) 11 pole plug and socket connector – armrest S1 (19)	GN/BU	48	X27.2 (2) 6 pole plug and socket connector – steering-column control lever	S15 (R/7) right turn indicator	BK/GN	86	S4 (10) light switch	S6 (10) switch – rear working light	GY/BK	128	K8 (30) front wiper (2nd speed)	K7 (30) front wiper (1st speed)	YE/BU	168	Fuse F23 (G) working light	S6 (5) switch – rear working light	VT
18	X2 (1) 21 pole plug and socket connector – engine/valve connection	X9 (12) 15 pole plug and socket connector – indicating instrument (H2)	GN/BU	49	X3 (3) 17 pole plug and socket connector – lights connection	Fuse F21 (E) parking light (right)	GY/RD	87	S6 (10) switch – rear working light	P3 Temperature indicator – diesel engine coolant	GY/BK	129	K7 (30) front wiper (1st speed)	X28 (3) front wiper (53a)	YE/BU	169	S6 (1) rear working light	E7 Rear working light (left)	VT/WH
19	X2 (2) 21 pole plug and socket connector – engine/valve connection	X15 (9) 11 pole plug and socket connector – armrest S1 (50a)	BU/BK	50	X3 (3) 17 pole plug and socket connector – lights connection	X3 (13) 17 pole plug and socket connector – lights connection	GY/RD	88	P3 Temperature indicator – diesel engine coolant	X9 (2) 15 pole plug and socket connector – indicating instrument, instrument panel lights	GY/BK	130	X27.1 (2) 8 pole plug and socket connector – steering-column control lever	K8 (86) front wiper (2nd speed)	RD/GN	171	S6 (1) rear working light	S6 (B) rear working light	VT/WH
20	X2 (3) 21 pole plug and socket connector – engine/valve connection	X9 (8) 15 pole plug and socket connector – indicating instrument (H5)	BU	51	Fuse F31 (G) parking light	E10 Interior light	GY/GN	89	Fuse F22 (F) lights	1 pole plug and socket connector, search light	GY/BK	131	X27.1 (3) 8 pole plug and socket connector – steering-column control lever	K7 (86) front wiper (1st speed)	GN	172	N1 (21) RxD	X4 (3) 6 pole plug and socket connector	WH
21	X2 (4) 21 pole plug and socket connector – engine/valve connection	S16 (2) handbrake switch	BN	52	X3 (4) 17 pole plug and socket connector – lights connection	Fuse F22 (F) parking light (left)	GY/BK	90	1 pole plug and socket connector, search light	S23 (10) rear wiper switch	GY/BK	132	X27.1 (4) 8 pole plug and socket connector – steering-column control lever	K9 (53M(30)) wipe/wash intermittent relay	BN/WH	173	N1 (20) TxD	X4 (5) 6 pole plug and socket connector	BN/BK
22	X2 (4) 21 pole plug and socket connector – engine/valve connection	X9 (9) 15 pole plug and socket connector – indicating instrument (H11)	BN	53	X3 (4) 17 pole plug and socket connector – lights connection	X3 (14) 17 pole plug and socket connector – lights connection	GY/BK	91	S23 (10) rear wiper switch	S25 (10) switch – steering mode/high speed	GY/BK	133	X27.1 (6) 8 pole plug and socket connector – steering-column control lever	X29 2 pole plug and socket connector – wipe/wash pump M5	BK/WH/GN	174	N1 (13) earth	X4 (4) 6 pole plug and socket connector	YE/BK
23	X2 (5) 21 pole plug and socket connector – engine/valve connection	X9 (7) 15 pole plug and socket connector – indicating instrument (H6)	WH/BN	54	X3 (5) 17 pole plug and socket connector – lights connection	K3 (87) switching relay RV	GN/WH	92	S25 (10) switch – steering mode/high speed	S27 (10) tip switch – synchronisation	GY/BK	134	X27.1 (6) 8 pole plug and socket connector – steering-column control lever	K9 (T(85)) wipe/wash intermittent relay	BK/WH/GN	175	K7 (87) switching relay – front wiper (1st speed)	X28 (4) 6 pole plug and socket connector – front wiper (53)	GN/RD
24	X2 (6) 21 pole plug and socket connector – engine/valve connection	P3 (G) temperature indicator – engine oil	BU/WH	55	K3 (86) switching relay RV	H17 RV driving telltale	GN/VT	93	S27 (10) tip switch – synchronisation	S9 (10) front socket switch	GY/BK	135	X27.1 (7) 8 pole plug and socket connector – steering-column control lever	K9 (I) wipe/wash intermittent relay	RD	176	K8 (87) switching relay – front wiper (2nd speed)	X28 (6) 6 pole plug and socket connector – front wiper (53b)	GN
25	X2 (7) 21 pole plug and socket connector – engine/valve connection	X9 (10) 15 pole plug and socket connector – indicating instrument (H4)	BU/GN	56	H17 RV driving telltale	N1 (3) signal input – RV driving	GN/VT	94	S9 (10) front socket switch	E11 cigarette lighter	GY/BK	136	X27.1 (8) 8 pole plug and socket connector – steering-column control lever	S4 (1) light switch	WH/YE	177	K9 (53S/87a) switching relay – front intermittent wiper	X28 (2) 6 pole plug and socket connector – front wiper (31b)	BN/BK
26	X2 (8) 21 pole plug and socket connector – engine/valve connection	P4 (G) temperature indicator – hydraulics	BU/RD	57	X3 (6) 17 pole plug and socket connector – lights connection	Fuse F17 (A) high beam (right)	WH	95	E11 cigarette lighter	P4 Temperature indicator – hydraulics	GY/BK	137	X27.2 (3) 8 pole plug and socket connector – steering-column control lever	K6 (C(85)) turn indicator relay	BK/RD/YE	178	N1 (15) drive electronics – earth	Earth connection	BK
27	X2 (9) 21 pole plug and socket connector – engine/valve connection	X9 (6) 15 pole plug and socket connector – indicating instrument (H7)	BU/YE	58	Fuse F17 (A) high beam (right)	X9 (11) 15 pole plug and socket connector – indicating instrument H1	WH	96	X15 (3) 11 pole plug and socket connector – armrest switch	V2 Lock blocking diode	WH/GN	138	K6 (C85) turn indicator relay	S15 (49a/5) hazard warning light switch	BK/RD/YE	179	N1 (29) drive electronics – earth	Earth connection	BK
28	X2 (10) 21 pole plug and socket connector – engine/valve connection	X9 (4) 15 pole plug and socket connector – indicating instrument P2	VT/BU	59	X3 (7) 17 pole plug and socket connector – lights connection	Fuse F19 (C) low beam (right)	YE	97	X15 (6) 11 pole plug and socket connector – armrest switch	N1 (32) signal input – crawler gear potentiometer	WH	139	X27.2 (5) 8 pole plug and socket connector – steering-column control lever	Fuse F19 (3) low beam	YE	180	S14 (2) switch – 3rd control circuit	Earth connection	BK
29	X2 (11) 21 pole plug and socket connector – engine/valve connection	K11 (87) unlock switching relay	VT	60	X3 (8) 17 pole plug and socket connector – lights connection	Fuse F18 (B) high beam (left)	WH/BK	98	X15 (10) 11 pole plug and socket connector – armrest switch	Fuse F32 (H) preheating start switch (30)	RD/WH	140	X27.2 (4) 8 pole plug and socket connector – steering-column control lever	Fuse F31 (G) parking light/headlight flasher	GY/GN	181	K2 (85) high current relay	K1 (85) high current relay	BK
30	X2 (12) 21 pole plug and socket connector – engine/valve connection	K10 (87) lock switching relay	OG	61	X3 (9) 17 pole plug and socket connector – lights connection	Fuse F20 (D) low beam (left)	YE/BK	99	X15 (11) 11 pole plug and socket connector – armrest switch	K2 (86) switching relay terminal	WH/YE	141	Fuse F31 (G) parking light/headlight flasher	S4 (6) light switch	GY/GN	182	K2 (85) high current relay	K10 (85) mini-relay	BK
31	X2 (13) 21 pole plug and socket connector – engine/valve connection	K14 (87) switching relay – differential lock	GY/GN	62	X3 (10) 17 pole plug and socket connector – lights connection	X27.1 (5) 8 pole plug and socket connector – steering-column control lever (horn)	BN/YE	100	K2 (86) switching relay terminal 15	K1 (86) switching relay terminal 15	WH/YE	142	X27.2 (6) 8 pole plug and socket connector – steering-column control lever	Fuse F17 (1) high beam	WH	183	K10 (85) mini-relay	K11 (85) mini-relay	BK
				63	X3 (15) 17 pole plug and socket connector – lights connection	K5 (87) switching relay – front yeast	RD/YE	101	X16 (2) 4 pole plug and socket connector – air conditioning	S30 Thermostat	GY/GN	143	Fuse F14 (F) drive electronics	N1 (28) power supply – drive electronics	RD	184	K11 (85) mini-relay	K6 (87a) turn indicator relay	BK
				64	X3 (16) 17 pole plug and socket connector – lights connection	Fuse F7 (G) brake lights	BK/RD	102	X16 (1) 4 pole plug and socket connector – air conditioning	S5 (C) heater fan switch	GY/BN	144	Fuse F14 (F) drive electronics	N1 (42) power supply – drive electronics	RD	185	K6 (87a) turn indicator relay	Earth connection	BK
				65	X13 (1) 9 pole plug and socket connector – armrest joystick	K3 (86) switching relay – RV	GN/VT	103	X18 (6) 8 pole plug and socket connector – steering electronics	H18 Synchronism telltale	GY	145	Fuse F13 (E) heater fan	S5 (B) switch – heater fan	RD/YE	186	K5 (85) switching relay – front socket	K7 (85) switching relay – 1st wiper speed	BK
				66	X13 (2) 9 pole plug and socket connector – armrest joystick	H16 FW driving telltale	WH/BK	104	X18 (3) 8 pole plug and socket connector – steering electronics	N1 (5) signal input – 1st/2nd speed	YE/GY	146	Fuse F30 (F) turn indicators	S15 (30/3) hazard warning light switch	RD/BK	187	K7 (85) switching relay – 1st wiper speed	K8 (85) switching relay – 2nd wiper speed	BK
				67	H16 FW driving telltale	N1 (2) signal input – FW driving	WH/BK	105	X18 (4) 8 pole plug and socket connector – steering electronics	H14 4 wheel steering telltale	BK/YE	147	Fuse F11 (C) turn indicators	S15 (15/1) hazard warning light switch	RD/YE	188	K8 (85) switching relay – 2nd wiper speed	K14 (85) mini-relay – differential lock	BK
				68	S16 (1) handbrake switch	Fuse F1 (A) joystick	WH/GN	106	X18 (5) 8 pole plug and socket connector – steering electronics	H15 Front axle steering telltale	BK/VT	148	Fuse F9 (A)	K5 (30) switching relay – front socket	BN/WH	189	K14 (85) mini-relay – differential lock	K3 (85) mini-relay – RV	BK
				69	X13 (4) 9 pole plug and socket connector – armrest joystick	Earth connection	BK	107	X18 (8) 8 pole plug and socket connector – steering electronics	Earth connection	BK					190	K3 (85) mini-relay – RV	K9 (31/86) wipe/wash intermittent relay	BK
								108	X17 (6) 8 pole plug and socket connector – steering electronics	S27 (1) tip switch – synchronisation	GY					191	K9 (31/86) wipe/wash intermittent relay	Earth connection	BK
								109	S27 (1) tip switch – synchronisation	S27 (B) tip switch – synchronisation	GY					192	S14 (2) switch – 3rd control circuit	S14 (9) switch – 3rd control circuit	BK
								110	S26 (7) 1st/2nd gear switch		YE/GY					193	S14 (9) switch – 3rd control circuit	S4 (9) light switch	BK
								111								194	S4 (9) light switch	S6 (9) switch – rear working light	BK
																195	S6 (9) switch – rear working light	H10 Turn indicator telltale (vehicle)	BK
																196	H10 Turn indicator telltale (vehicle)	H18 Hose burst valve telltale	BK
																197	H18 Hose burst valve telltale	H13 Differential lock telltale	BK
																198	H13 Differential lock telltale	P3 (earth) temperature indicator – diesel engine coolant	BK
																199	P3 (earth) temperature indicator – diesel engine coolant	X9 (5) 15 pole plug and socket connector – indicating instrument	BK

10.17 Wiring harness 1000102655: cab



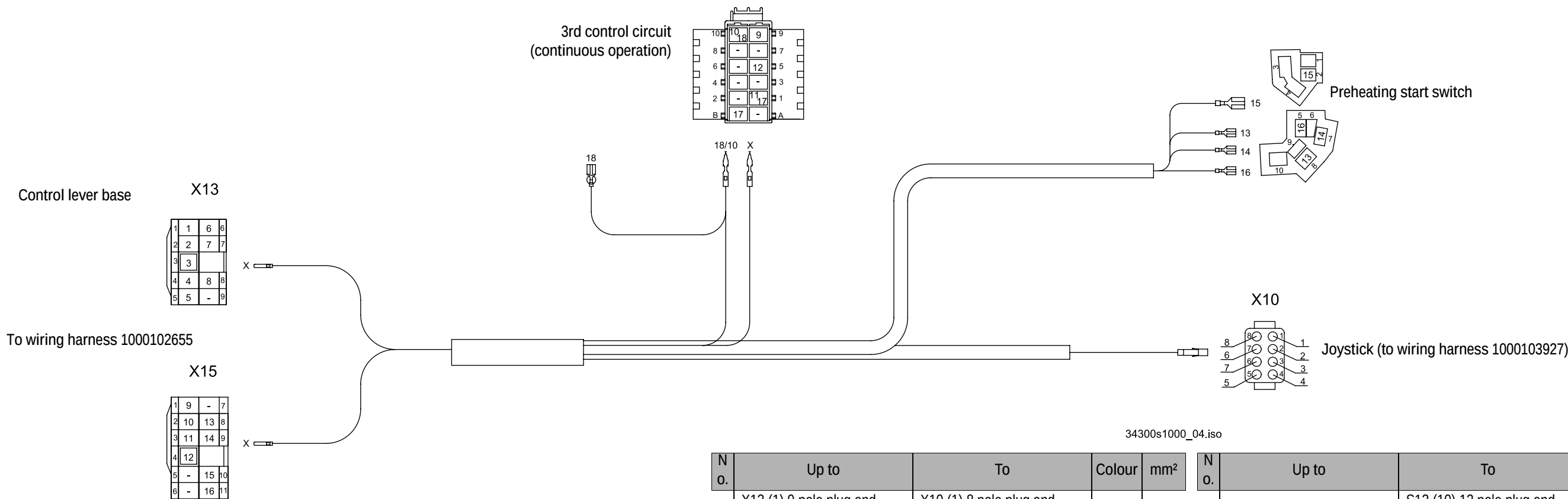
10.18 Wiring harness 1000102656: control lever base (option)



Wiring harness 1000102656 control lever base (option)

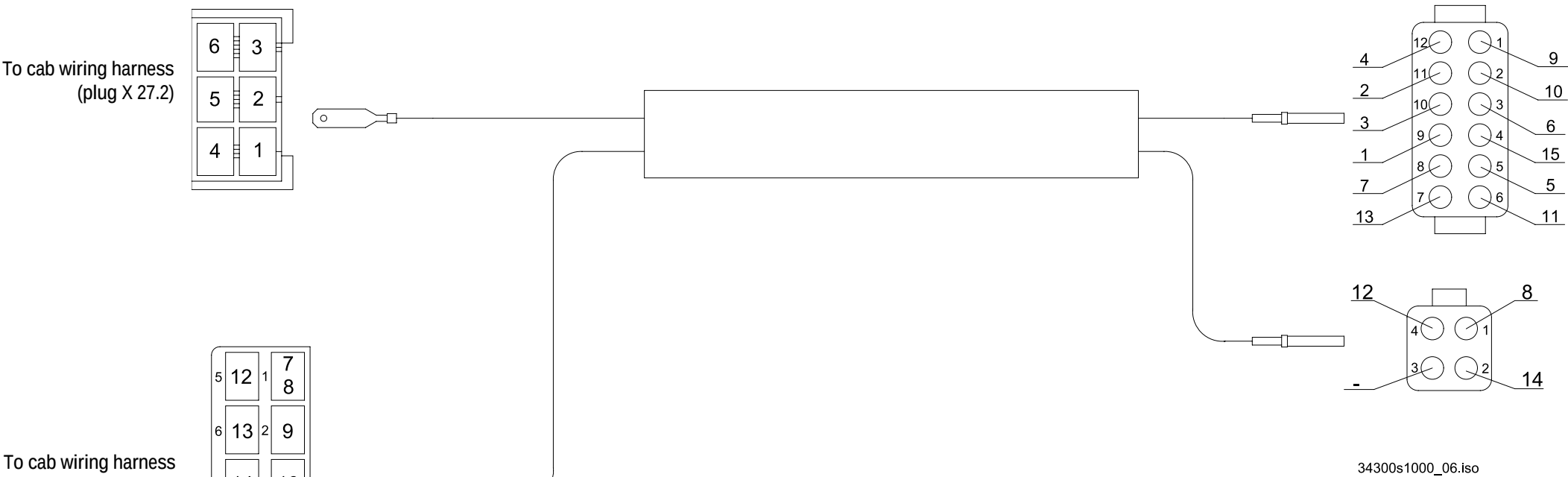
No.	Up to	To	Colour	mm ²	No.	Up to	To	Colour	mm ²
1	X13 (1) 9 pole plug and socket connector – arm-rest joystick	X10 (1) 8 pole plug and socket connector – joystick connection	GN/VT	1	12	X15 (3) 11 pole plug and socket connector	S13 (1) 12 pole plug and socket connector – continuous operation of 3rd control circuit	WH/GN	1
2	X13 (2) 9 pole plug and socket connector – arm-rest joystick	X10 (2) 8 pole plug and socket connector – joystick connection	WH/BK	1	13	X15 (4) 11 pole plug and socket connector	S13 (5) 12 pole plug and socket connector – continuous operation of 3rd control circuit	YE/GN	1
3	X13 (3) 9 pole plug and socket connector – arm-rest joystick	X10 (3) 8 pole plug and socket connector – joystick connection	WH/GN	1	14	X15 (5) 11 pole plug and socket connector	X12 (C) 3 pole plug and socket connector – crawler gear potentiometer	YE	1
4	X13 (4) 9 pole plug and socket connector – arm-rest joystick	X10 (4) 8 pole plug and socket connector – joystick connection	BN/YE	1	15	X15 (6) 11 pole plug and socket connector	X12 (B) 3 pole plug and socket connector – crawler gear potentiometer	WH	1
5	X13 (5) 9 pole plug and socket connector – arm-rest joystick	X10 (5) 8 pole plug and socket connector – joystick connection	GY	1	16	X15 (7) 11 pole plug and socket connector	X12 (A) 3 pole plug and socket connector – crawler gear potentiometer	RD/BK	1
6	X13 (6) 9 pole plug and socket connector – arm-rest joystick	X10 (7) 8 pole plug and socket connector – joystick connection	GN/BK	1	17	X15 (8) 11 pole plug (K20), (86) preheating relay	S1 (8), terminal 19 preheating start switch	GN/BU	1
7	X13 (7) 9 pole plug and socket connector – arm-rest joystick	X10 (6) 8 pole plug and socket connector – joystick connection	WH/VT	1	18	X15 (9) 11 pole plug (K21), (86) starting relay	S1 (7), terminal 50a preheating start switch	BU/BK	1
8	X13 (8) 9 pole plug and socket connector – arm-rest joystick	X10 (8) 8 pole plug and socket connector – joystick connection	YE/GN	1	19	X15 (10) 11 pole plug (F32, 3A)	S1 (2), terminal 30 preheating start switch	RD/WH	1
9	X13 (9) 9 pole plug and socket connector – arm-rest joystick	Y9 (1) 2 pole plug and socket connector – float position	YE/BK	1	20	X15 (11) 11 pole plug (K2 (86))	S1 (5), terminal 15 preheating start switch	WH/YE	1
10	X15 (1) 11 pole plug and socket connector	S13 (9) 12 pole plug and socket connector – continuous operation of 3rd control circuit	BK	1	21	S13 (1) 12 pole plug and socket connector – continuous operation of 3rd control circuit	S13 (B) 12 pole plug and socket connector – continuous operation of 3rd control circuit	WH/GN	1
11	X15 (2) 11 pole plug and socket connector	S13 (10) 12 pole plug and socket connector – continuous operation of 3rd control circuit	GY/BK	1	22	Y9 (2) 2 pole plug and socket connector – float position	X15 (1) 11 pole plug and socket connector	BK	1
					23	S13 (10) 12 pole plug and socket connector – continuous operation of 3rd control circuit	Connection – search light	GY/BK	1

10.19 Wiring harness 1000114432: control lever base (standard)



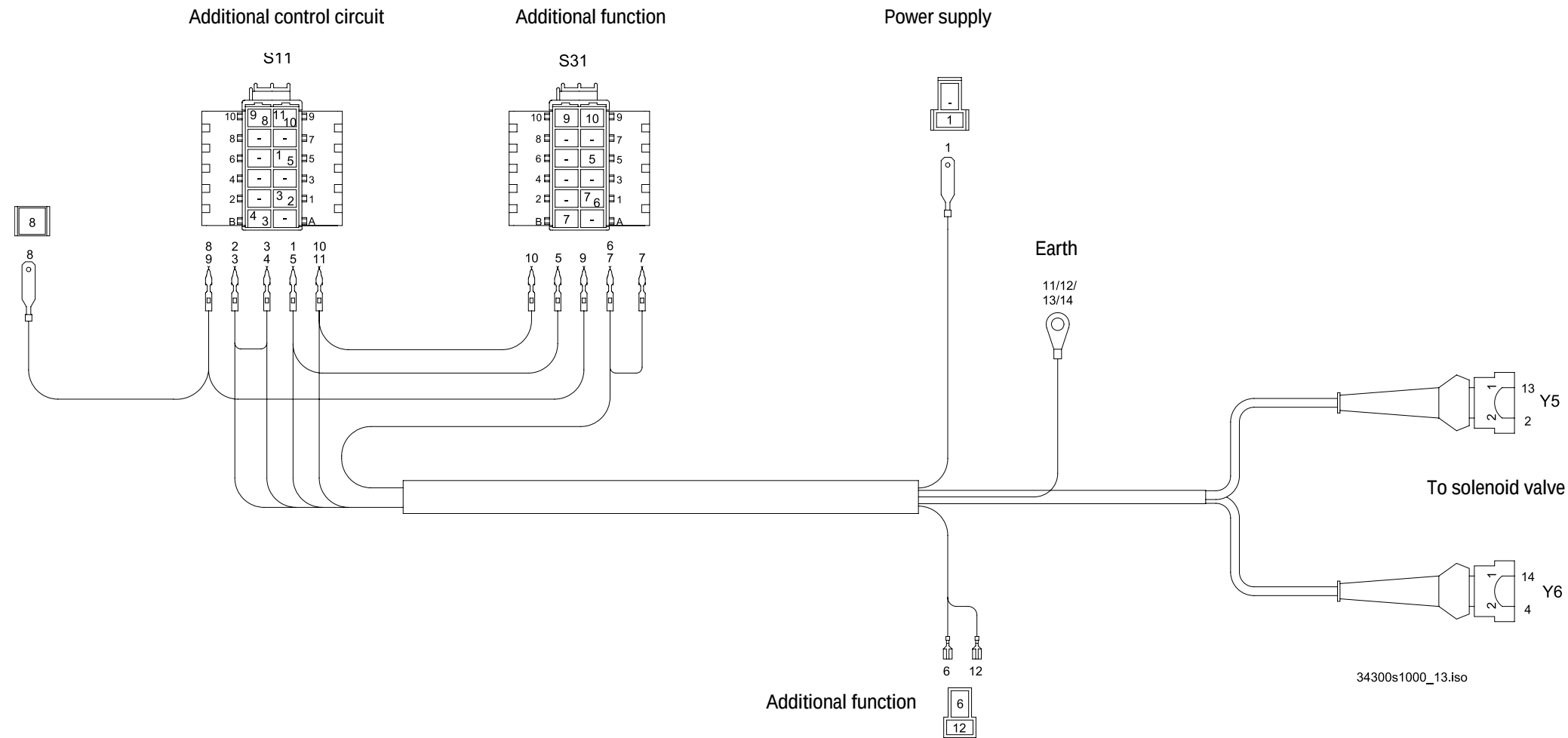
34300s1000_04.iso									
N o.	Up to	To	Colour	mm ²	N o.	Up to	To	Colour	mm ²
1	X13 (1) 9 pole plug and socket connector – armrest joystick	X10 (1) 8 pole plug and socket connector – joystick connection	GN/VT	1	1 0	X15 (2) 11 pole plug and socket connector	S13 (10) 12 pole plug and socket connector – continuous operation of 3rd control circuit	GY/BK	1
2	X13 (2) 9 pole plug and socket connector – armrest joystick	X10 (2) 8 pole plug and socket connector – joystick connection	WH/BK	1	1	X15 (3) 11 pole plug and socket connector	S13 (1) 12 pole plug and socket connector – continuous operation of 3rd control circuit	WH/GN	1
3	X13 (3) 9 pole plug and socket connector – armrest joystick	X10 (3) 8 pole plug and socket connector – joystick connection	WH/GN	1	1	X15 (4) 11 pole plug and socket connector	S13 (5) 12 pole plug and socket connector – continuous operation of 3rd control circuit	YE/GN	1
4	X13 (4) 9 pole plug and socket connector – armrest joystick	X10 (4) 8 pole plug and socket connector – joystick connection	BN/YE	1	1	X15 (8) 11 pole plug (K20), (86) preheating relay	S1 (8), terminal 19 preheating start switch	GN/BU	1
5	X13 (5) 9 pole plug and socket connector – armrest joystick	X10 (5) 8 pole plug and socket connector – joystick connection	GY	1	1	X15 (9) 11 pole plug (K21), (86) starting relay	S1 (7), terminal 50a preheating start switch	BU/BK	1
6	X13 (6) 9 pole plug and socket connector – armrest joystick	X10 (7) 8 pole plug and socket connector – joystick connection	GN/BK	1	1	X15 (10) 11 pole plug (F32, 3A)	S1 (2), terminal 30 preheating start switch	RD/WH	1
7	X13 (7) 9 pole plug and socket connector – armrest joystick	X10 (6) 8 pole plug and socket connector – joystick connection	WH/VT	1	1	X15 (11) 11 pole plug (K2 (86))	S1 (5), terminal 15 preheating start switch	WH/YE	1
8	X13 (8) 9 pole plug and socket connector – armrest joystick	X10 (8) 8 pole plug and socket connector – joystick connection	YE/GN	1	1	S13 (1) 12 pole plug and socket connector – continuous operation of 3rd control circuit	S1 (B) 12 pole plug and socket connector – continuous operation of 3rd control circuit	WH/GN	1
9	X15 (1) 11 pole plug and socket connector	S13 (9) 12 pole plug and socket connector – continuous operation of 3rd control circuit	BK	1	1	S13 (10) 12 pole plug and socket connector – continuous operation of 3rd control circuit	Connection – search light	GY/BK	1

10.20 Wiring harness 1000107783: steering-column control lever



Wiring harness 1000107783 steering-column control lever

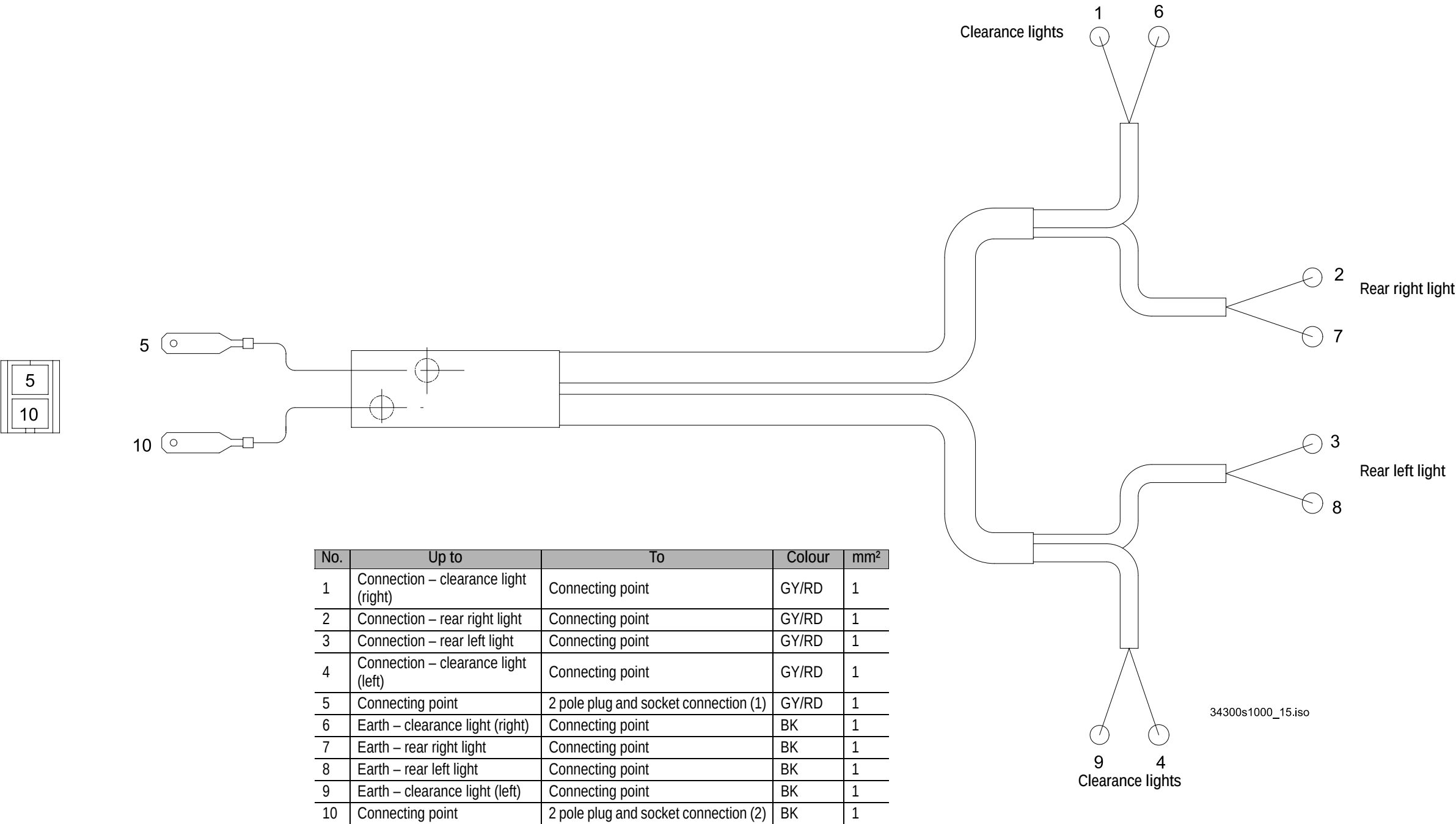
No.	Up to	To	Colour	mm²	No.	Up to	To	Colour	mm²
1	Valeo (1) 6 pole turn indicator (left)	COBO (9) 12 pole	BK/WH	1	11	Valeo (4) 8 pole wiper 31b	COBO (6) 12 pole	BN/WH	1
2	Valeo (2) 6 pole turn indicator (right)	COBO (11) 12 pole	BK/GN	1	12	Valeo (5) 8 pole horn	COBO (4) 4 pole	BN/YE	1
3	Valeo (3) 6 pole turn indicator input 49a	COBO (10) 12 pole	BK/RD/YE	1	13	Valeo (6) 8 pole wipe/wash 53c	COBO (7) 12 pole	BK/WH/GN	1
4	Valeo (4) 6 pole lights terminal 30 (15/1)	COBO (12) 12 pole	GY/GN	1.5	14	Valeo (7) 8 pole intermittent wiper J	COBO (2) 4 pole	RD	1
5	Valeo (5) 6 pole low beam 56b	COBO (5) 12 pole	YE	1.5	15	Valeo (8) 8 pole lights power supply 56	COBO (4) 12 pole	WH/YE	1.5
6	Valeo (6) 6 pole high beam 56a	COBO (3) 12 pole	WH	1.5					
7	Valeo (1) 8 pole wiper power supply	COBO (8) 12 pole	YE/BU	1.5					
8	Valeo (1) 8 pole horn power supply	COBO (1) 4 pole	YE/BU	1.5					
9	Valeo (2) 8 pole wiper 53b	COBO (1) 12 pole	RD/GN	1					
10	Valeo (3) 8 pole wiper 53	COBO (2) 12 pole	GN/YE	1					



No.	Up to	To	Colour	mm ²
1	Power supply	S11 (5) switch – additional control circuit	RD/WH	1
2	S11 (1) switch – additional control circuit	Y5 (2) solenoid valve	PK	1
3	S11 (1) switch – additional control circuit	S11 (B) switch – additional control circuit	PK	1
4	S11 (B) switch – additional control circuit	Y6 (2) solenoid valve	PK	1
5	S11 (5) switch – additional control circuit	S31 (5) switch – additional function	RD/WH	1
6	S31 (1) switch – additional function	2 pole plug and socket connector, additional function	WH/YE	1
7	S31 (1) switch – additional function	S31 (B) switch – additional function	WH/YE	1
8	S11 (10) switch – additional control circuit	1 pole plug and socket connector	GY/WH	1
9	S11 (10) switch – additional control circuit	S31 (10) switch – additional function	GY/BK	1
10	S11 (9) switch – additional control circuit	S31 (9) switch – additional function	BK	1

No.	Up to	To	Colour	mm ²
11	S11 (9) switch – additional control circuit	Earth	BK	1
12	2 pole plug and socket connector, additional function	Earth	BK	1
13	Y5 (1) solenoid valve	Earth	BK	1
14	Y6 (1) solenoid valve	Earth	BK	1

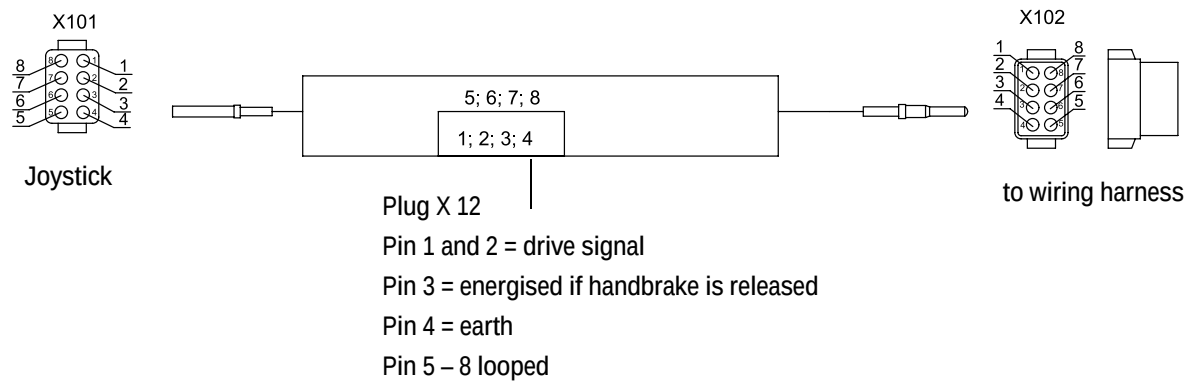
10.22 Wiring harness 1000110410: rear lights/clearance lights



Wiring harness 1000110410 rear lights/clearance lights



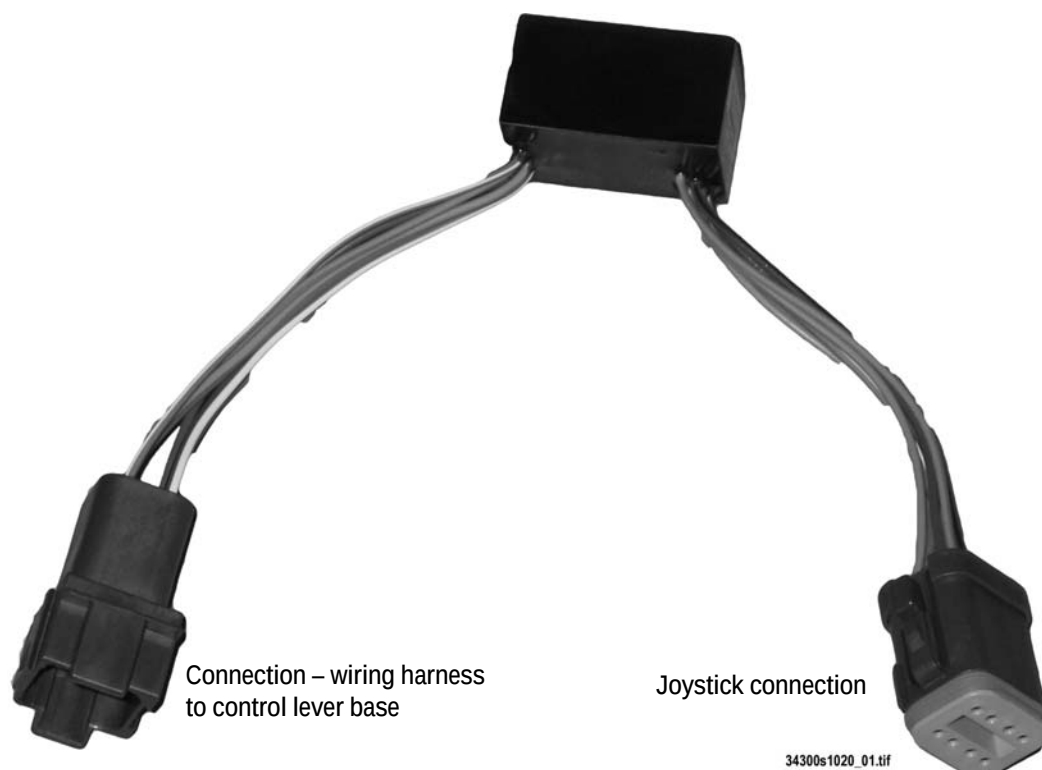
10.23 Wiring harness 1000103927 (joystick)



No.	Up to	To	Colour	mm ²
1	X101 (1) 8 pole plug and socket connector, signal S35	X102 (1) 8 pole plug and socket connector, RV signal Y2	WH/VT	
2	X101 (2) 8 pole plug and socket connector, signal S34	X102 (2) 8 pole plug and socket connector, FW signal Y3	BN/BK	
3	X101 (3) 8 pole plug and socket connector, power supply	X102 (3) 8 pole plug and socket connector, power supply	GN/VT	
4	X101 (4) 8 pole plug and socket connector, earth	X102 (4) 8 pole plug and socket connector, earth	BN	

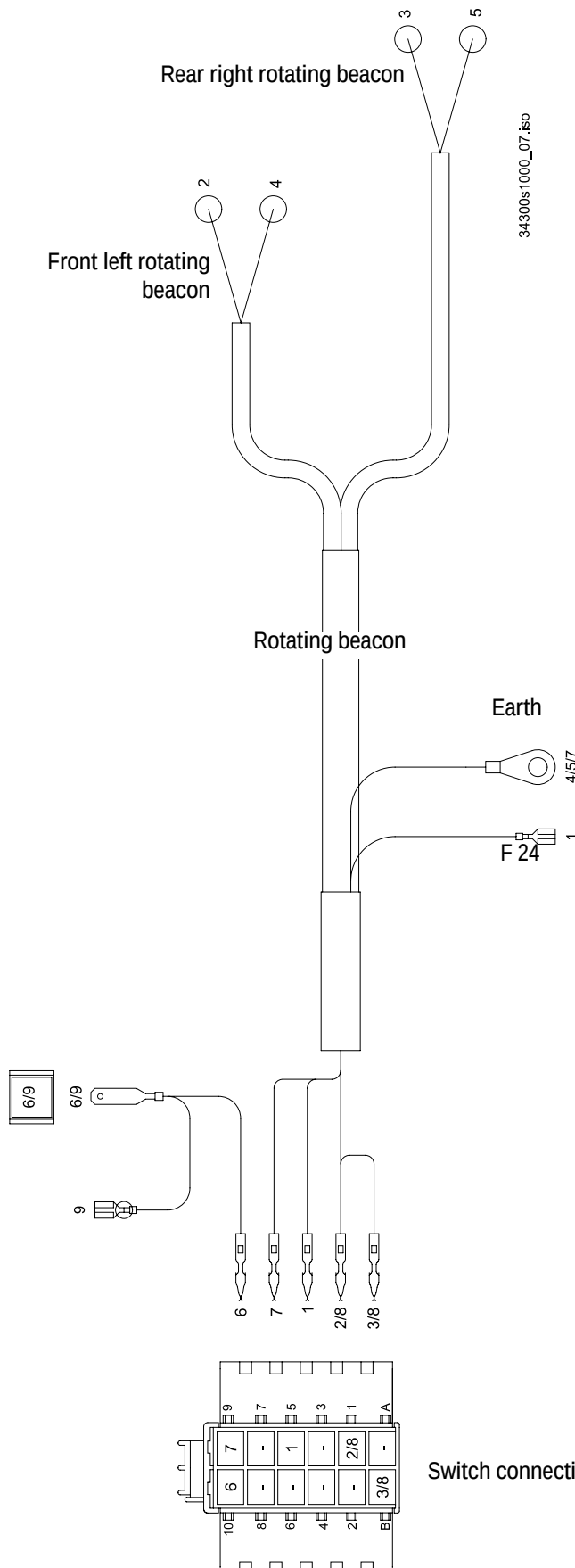
No.	Up to	To	Colour	mm ²
5	X101 (5) 8 pole plug and socket connector, signal S36	X102 (5) 8 pole plug and socket connector, signal K14	GY/GN	
6	X101 (6) 8 pole plug and socket connector, signal S33	X102 (6) 8 pole plug and socket connector, signal K10	VT	
7	X101 (7) 8 pole plug and socket connector, signal S32	X102 (7) 8 pole plug and socket connector, signal K11	GN	
8	X101 (8) 8 pole plug and socket connector, voltage S32, S33	X102 (8) 8 pole plug and socket connector, switch K14	RD/BN	

10.24 Electronics between joystick and wiring harness 1000103927



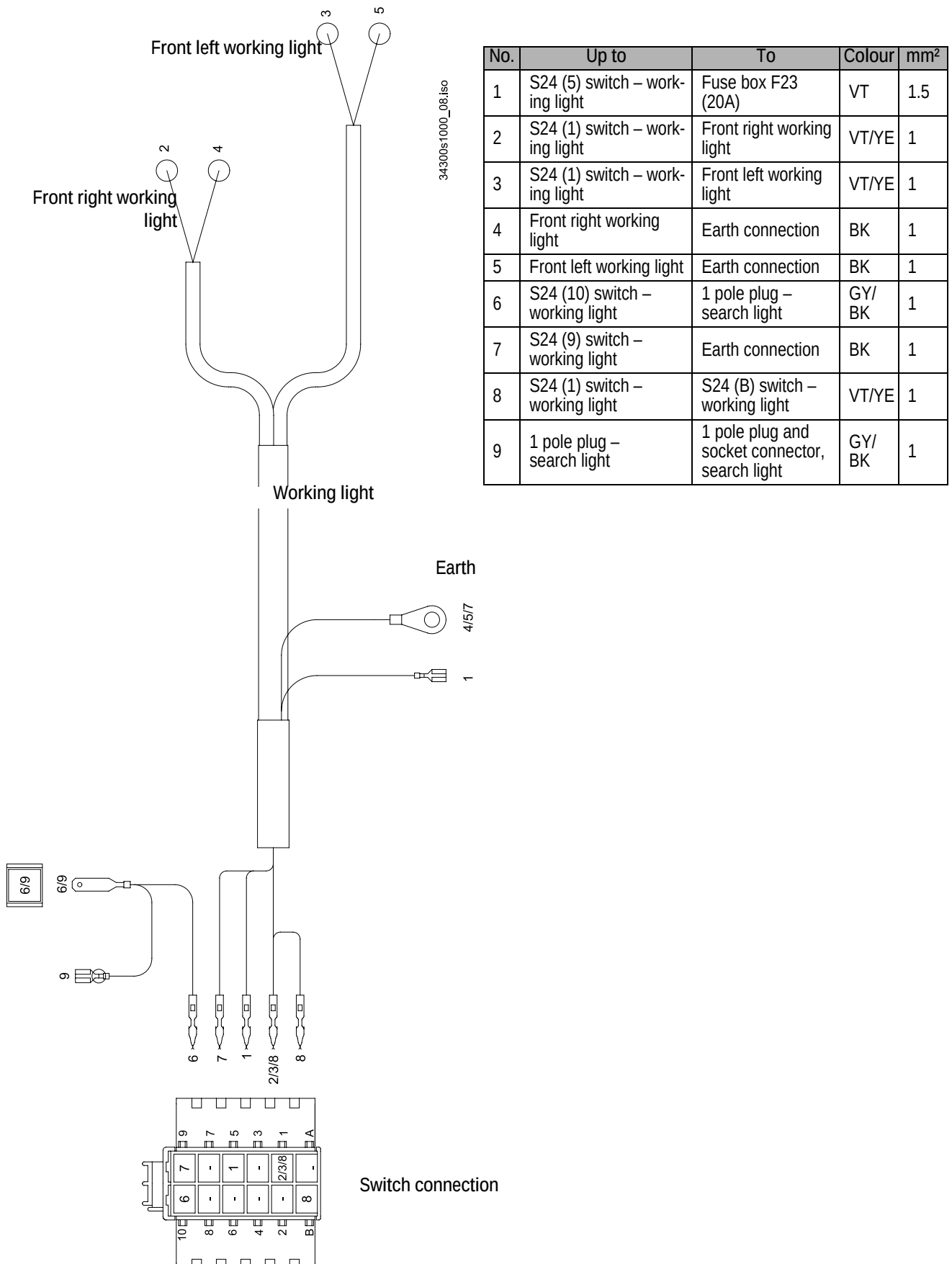


10.25 Wiring harness 1000105214: rotating beacon (option)





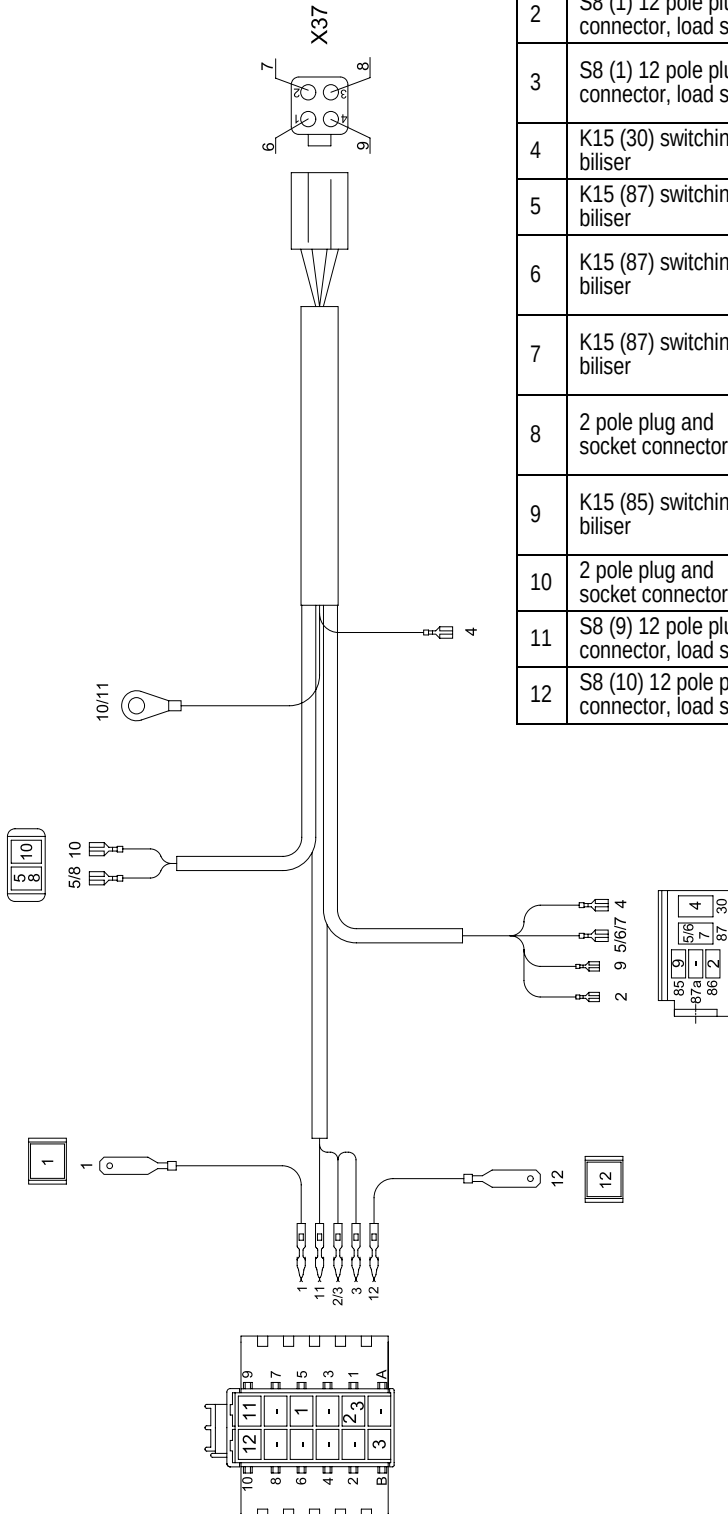
10.26 Wiring harness 1000102657: front working light (option)



Electric system

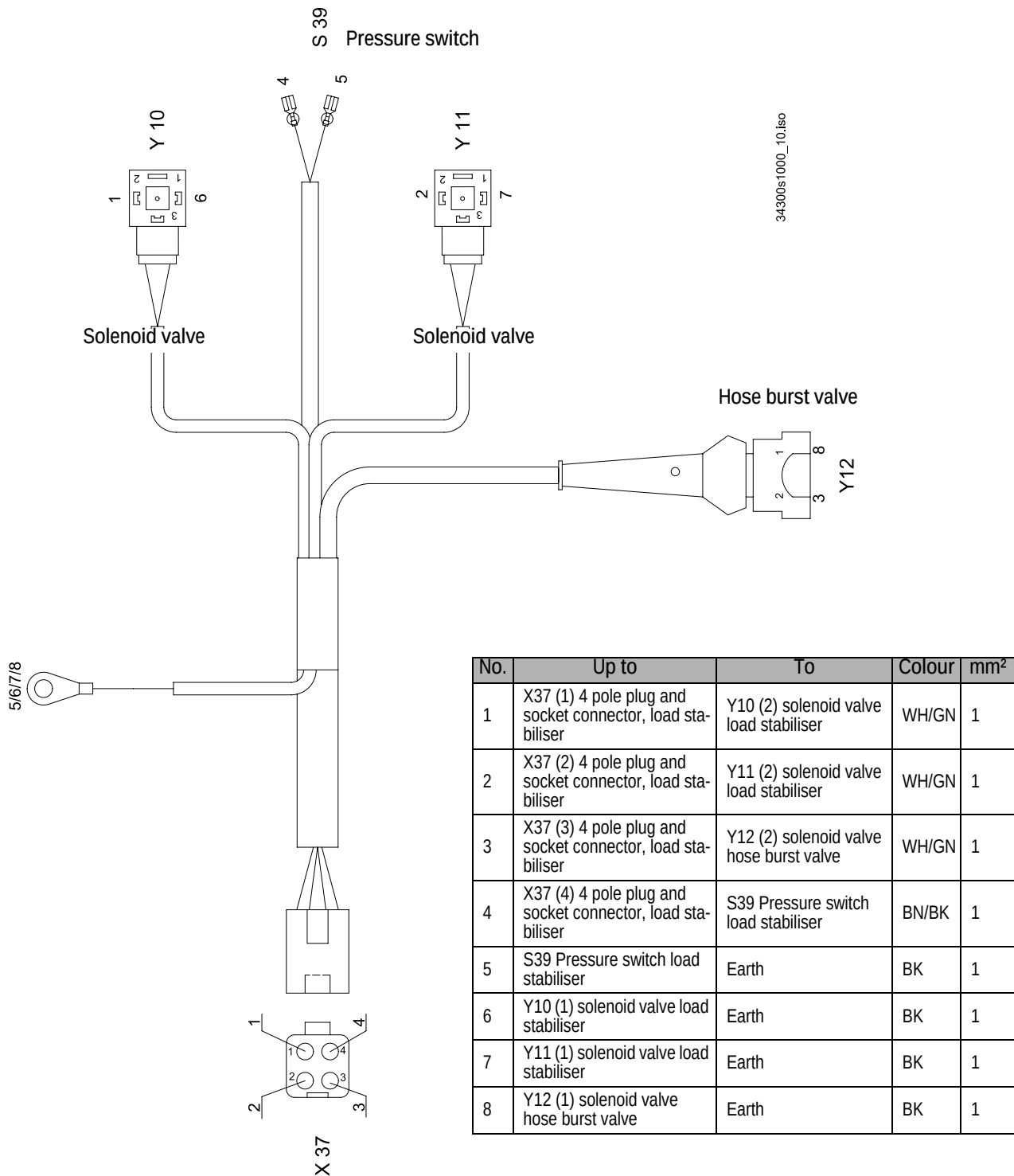
10.27 Wiring harness 1000103378: load stabiliser (option)

No.	Up to	To	Colour	mm ²
1	S8 (5) 12 pole plug and socket connector, load stabiliser	X41 1 pole plug and socket connector – power supply	YE/BK	1
2	S8 (1) 12 pole plug and socket connector, load stabiliser	K15 (86) switching relay, load stabiliser	YE	1
3	S8 (1) 12 pole plug and socket connector, load stabiliser	S8 (B) 12 pole plug and socket connector, load stabiliser	YE	1
4	K15 (30) switching relay, load stabiliser	Fuse connection F27	BK/YE	1
5	K15 (87) switching relay, load stabiliser	2 pole plug and socket connector, telltale	WH/GN	1
6	K15 (87) switching relay, load stabiliser	X37 (1) 4 pole plug and socket connector, solenoid valve	WH/GN	1
7	K15 (87) switching relay, load stabiliser	X37 (2) 4 pole plug and socket connector, solenoid valve	WH/GN	1
8	2 pole plug and socket connector, telltale	X37 (3) 4 pole plug and socket connector, solenoid valve	WH/GN	1
9	K15 (85) switching relay, load stabiliser	X37 (4) 4 pole plug and socket connector, pressure switch	BN/BK	1
10	2 pole plug and socket connector, telltale	Earth	BK	1
11	S8 (9) 12 pole plug and socket connector, load stabiliser	Earth	BK	1
12	S8 (10) 12 pole plug and socket connector, load stabiliser	1 pole plug and socket connector, search light	GY/BK	1



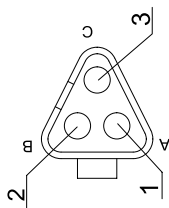


10.28 Wiring harness 1000105007: solenoid valve – load stabiliser (option)

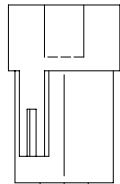


Connection
– load stabiliser wiring harness

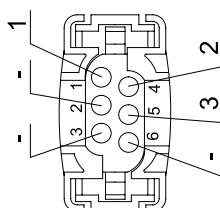
10.29 Wiring harness 1000109524: inching sensor



34300s1000_11.iso



X 3

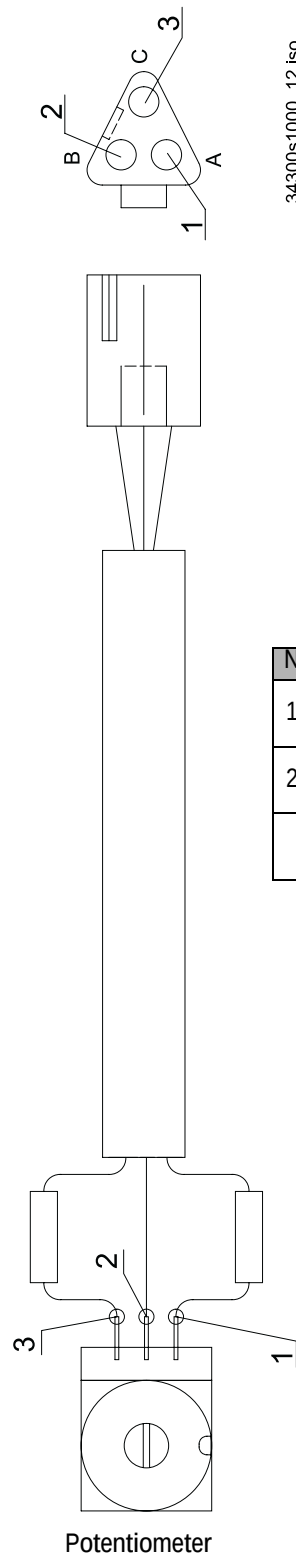


Wiring harness connection
1000102654

No.	Up to	To	Colour	mm ²
1	6 pole (1) plug and socket connector	3 pole (A) plug and socket connector (-)	RD	0.75
2	6 pole (4) plug and socket connector	3 pole (B) plug and socket connector (signal)	GN	0.75
3	6 pole (5) plug and socket connector	3 pole (C) plug and socket connector (+)	YE	0.75



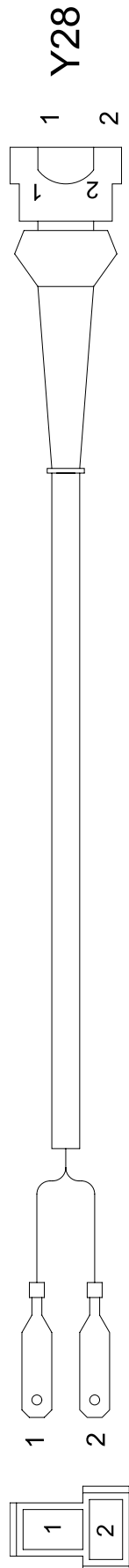
10.30 Wiring harness 1000104756: crawler gear – potentiometer



No.	Up to	To	Colour	mm ²
1	X12 (A) 3 pole plug – sensor (-)	Rotary potentiometer via resistance (68 Ohm)	RD/ BK	1
2	X12 (B) 3 pole plug – signal	Rotary potentiometer – centre tap	WH	1
	X12 (C) 3 pole plug – sensor (+)	Rotary potentiometer via resistance (68 Ohm)	YE	1



10.31 Wiring harness 1000114602: additional control circuit (option)

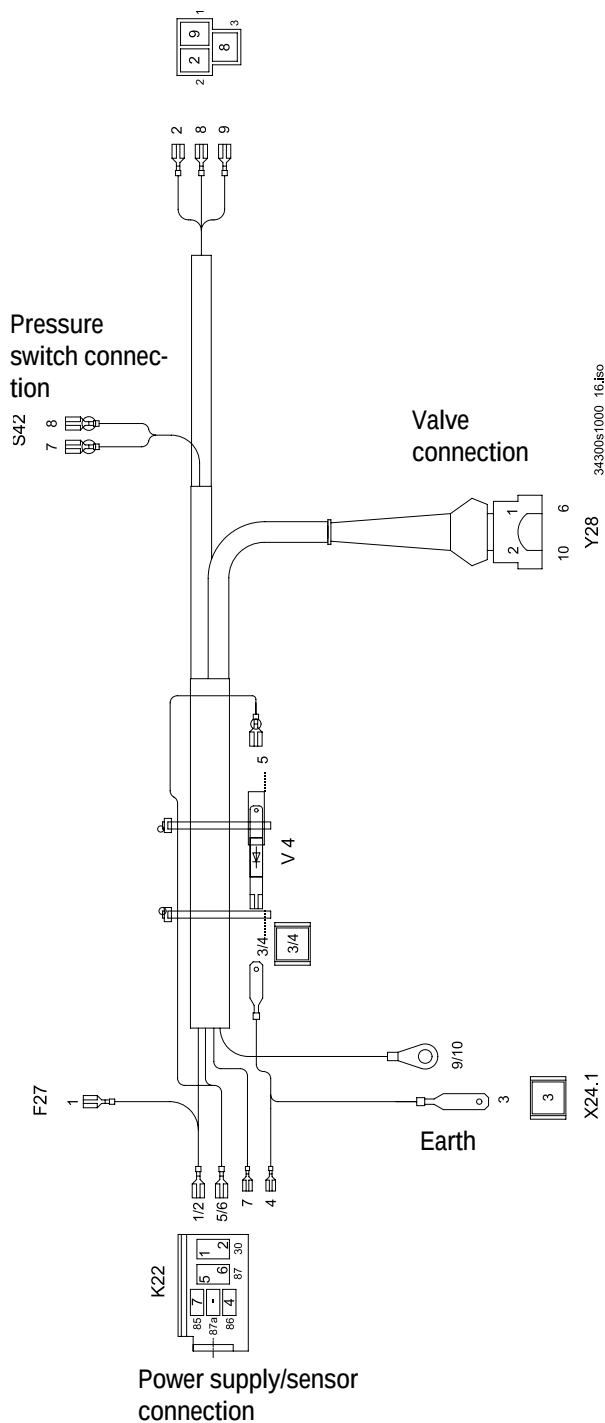


34300s1000_14.iso

No.	Up to	To	Colour	mm ²
1	2 pole plug and socket connection (1)	Y28 (1) 2 pole plug and socket connection	WH/ YE	1
2	2 pole plug and socket connection (2)	Y28 (2) 2 pole plug and socket connection	BK	1

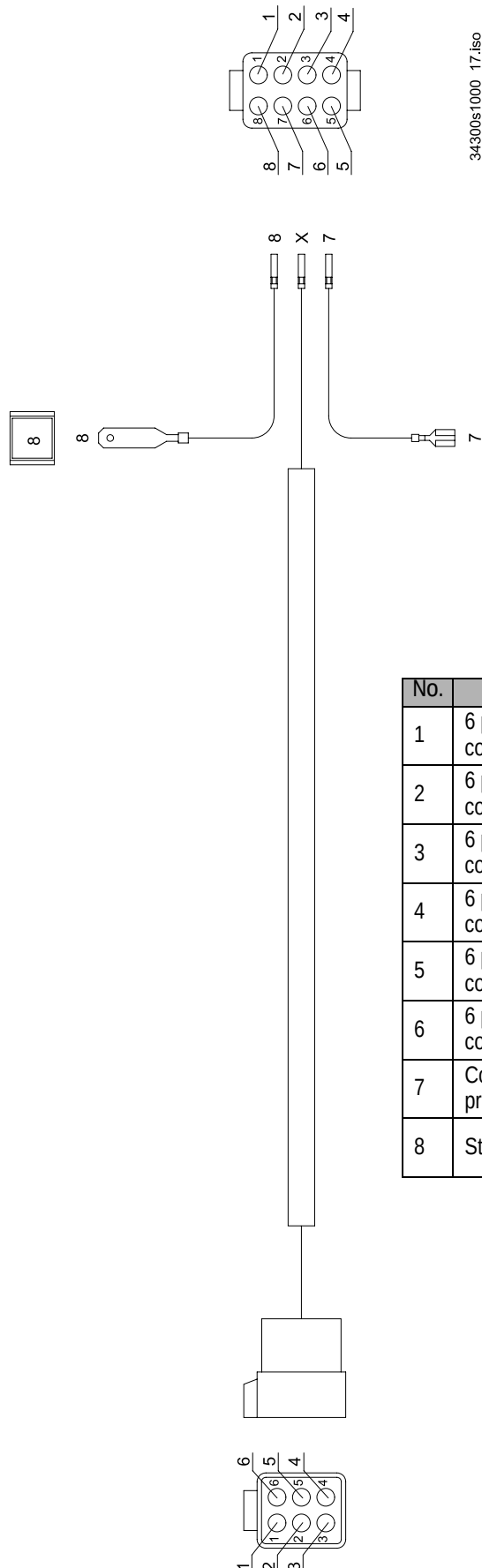
10.32 Wiring harness 1000102659: bucket repositioning (option)

Sensor connection



No.	Up to	To	Colour	mm ²
1	F27 Power supply – sensor	K22 (30) switching relay – bucket repositioning	BK/ YE	1
2	K22 (30) switching relay – bucket repositioning	3 pole plug and socket connector (2) – sensor connection	BN	1
3	Diode connection V4	1 pole plug and socket connector	YE	1
4	K22 (86) switching relay – bucket repositioning	Diode connection V4	YE	1
5	K22 (87) switching relay – bucket repositioning	Diode connection V4	BK/VT	1
6	K22 (87) switching relay – bucket repositioning	Valve/solenoid valve connection (1)	BK/VT	1
7	K22 (85) switching relay – bucket repositioning	S42 Pressure switch connection	BK	1
8	S42 Pressure switch connection	3 pole plug and socket connector (2) – sensor connection	BK	1
9	3 pole plug and socket connector (1) – sensor connection	Earth connection	BK	1
10	Valve/solenoid valve connection (2)	Earth connection	BK	1

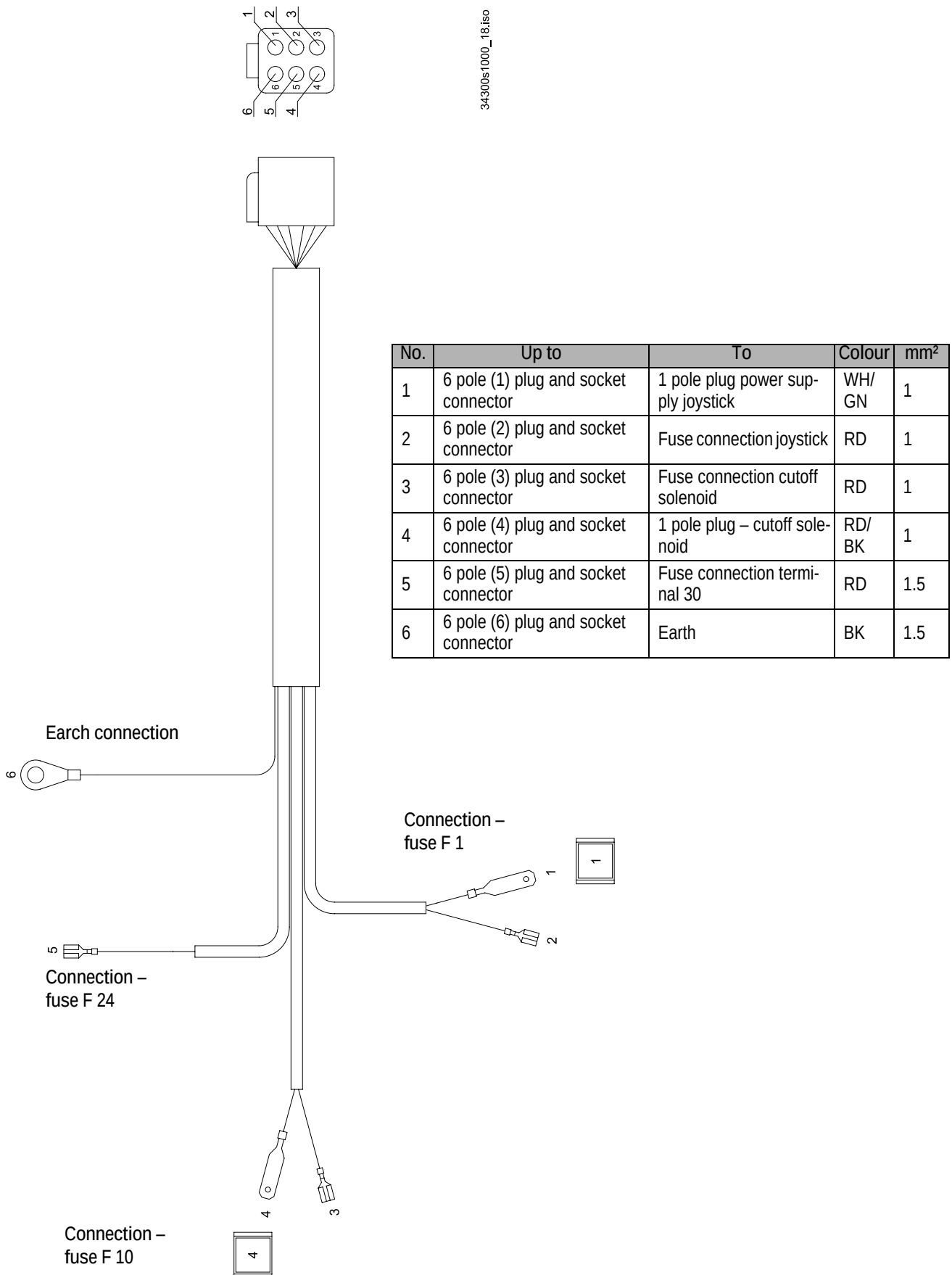
10.33 Wiring harness 1000108761: lock for long-haul travel – control lever



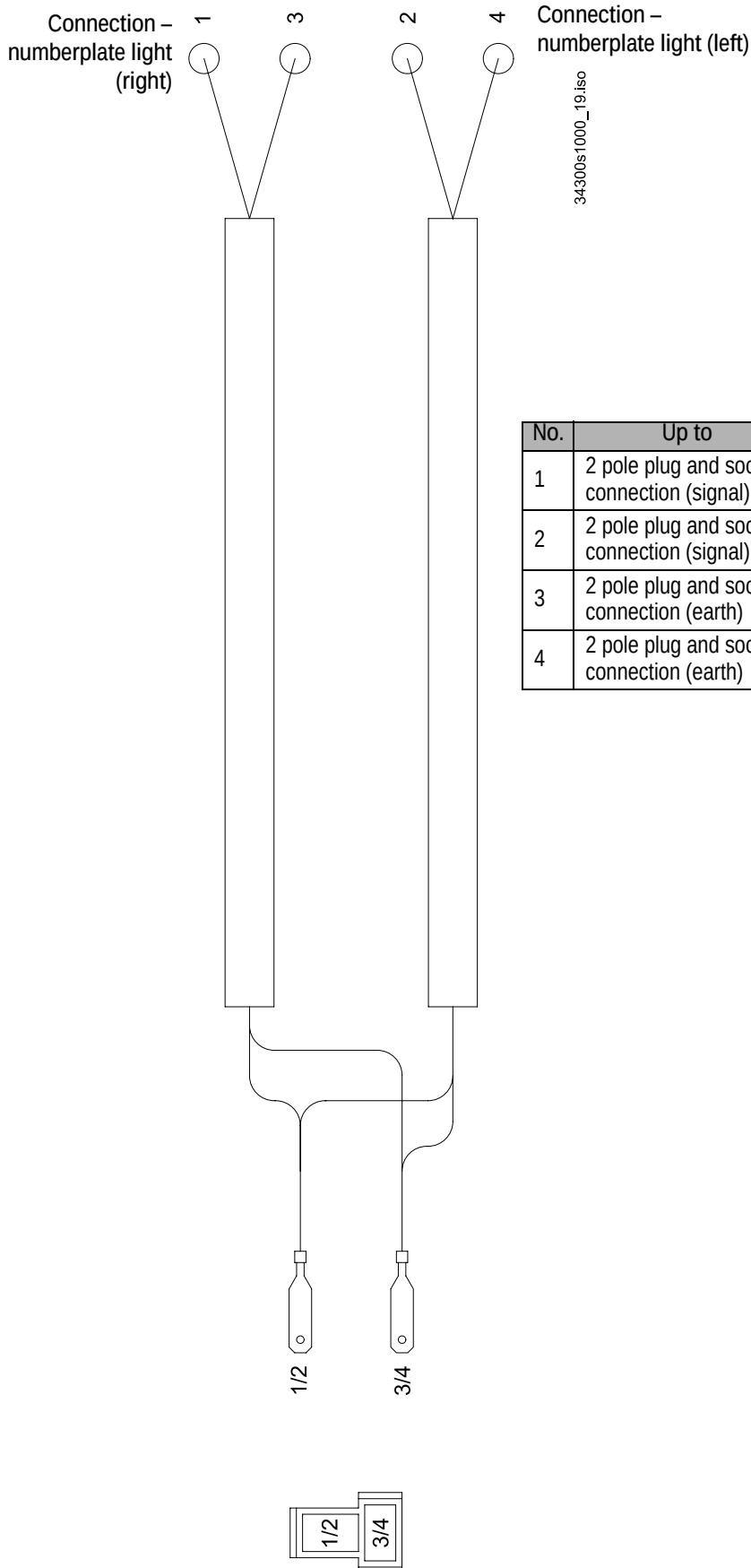
No.	Up to	To	Colour	mm ²
1	6 pole (1) plug and socket connection	8 pole (1) plug and socket connector	WH/ GN	1
2	6 pole (2) plug and socket connection	8 pole (2) plug and socket connector	RD	1
3	6 pole (3) plug and socket connection	8 pole (3) plug and socket connector	RD	1
4	6 pole (4) plug and socket connection	8 pole (4) plug and socket connector	RD/ BK	1
5	6 pole (5) plug and socket connection	8 pole (5) plug and socket connector	RD	1
6	6 pole (6) plug and socket connection	8 pole (6) plug and socket connector	BK	1
7	Connection terminal 50a (7) preheating start switch	8 pole (7) plug and socket connector	BU/ BK	1
8	Starting relay connection	8 pole (8) plug and socket connector	BU/ BK	1



10.34 Wiring harness 1000108762: lock for long-haul travel – instrument panel



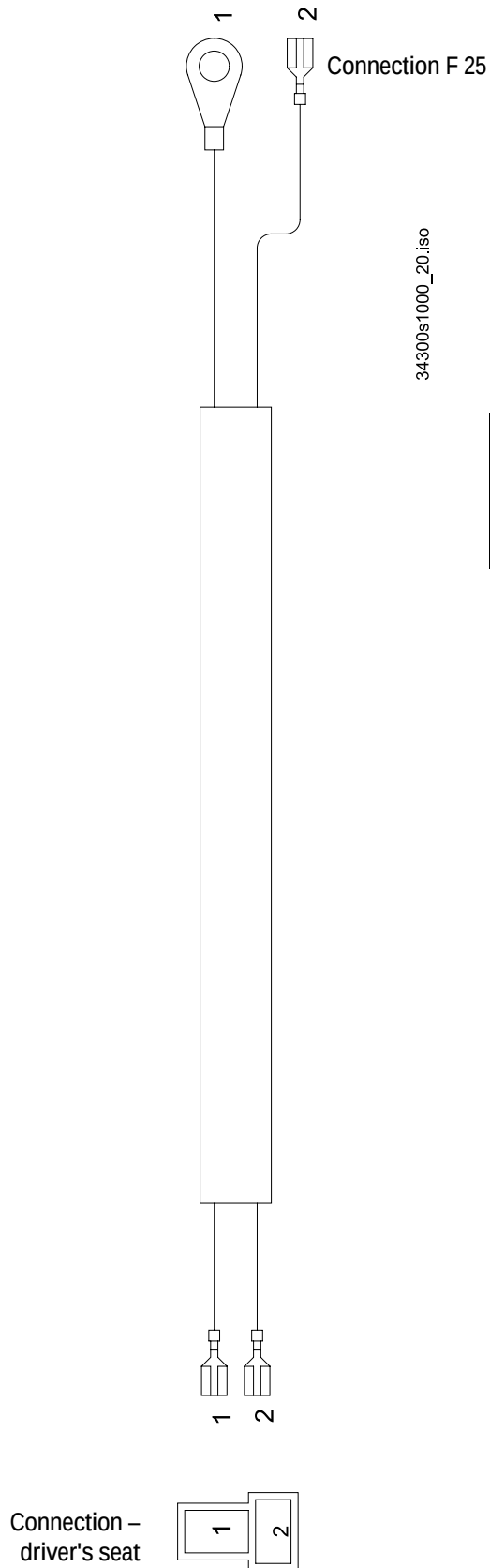
10.35 Wiring harness 1000102660: numberplate light (option)



No.	Up to	To	Colour	mm ²
1	2 pole plug and socket connection (signal)	Numberplate light (right)	GY/ RD	1
2	2 pole plug and socket connection (signal)	Numberplate light (left)	GY/ RD	1
3	2 pole plug and socket connection (earth)	Numberplate light (right)	BK	1
4	2 pole plug and socket connection (earth)	Numberplate light (left)	BK	1



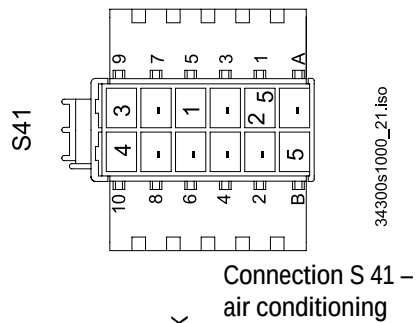
10.36 Wiring harness 1000110000: air-suspension driver's seat (option)



No.	Up to	To	Colour	mm²
1	2 pole plug and socket connection	Earth	BK	1
2	2 pole plug and socket connection	Connection	RD/ YE	1



10.37 Wiring harness 1000108730: air conditioning (option)

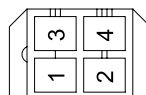


X

No.	Up to	To	Colour	mm ²
1	X14 (1) 4 pole plug and socket connector	S41 (5) 12 pole plug and socket connector – air conditioning	GY/ BN	1
2	X14 (2) 4 pole plug and socket connector	S41 (1) 12 pole plug and socket connector – air conditioning	GY/ GN	1
3	X14 (3) 4 pole plug and socket connector	S41 (9) 12 pole plug and socket connector – air conditioning	BK	1
4	X14 (4) 4 pole plug and socket connector	S41 (10) 12 pole plug and socket connector – air conditioning	GY/ BK	1
5	S41 (1) 12 pole plug and socket connector – air conditioning	S41 (B) 12 pole plug and socket connector – air conditioning	GY/ GN	1

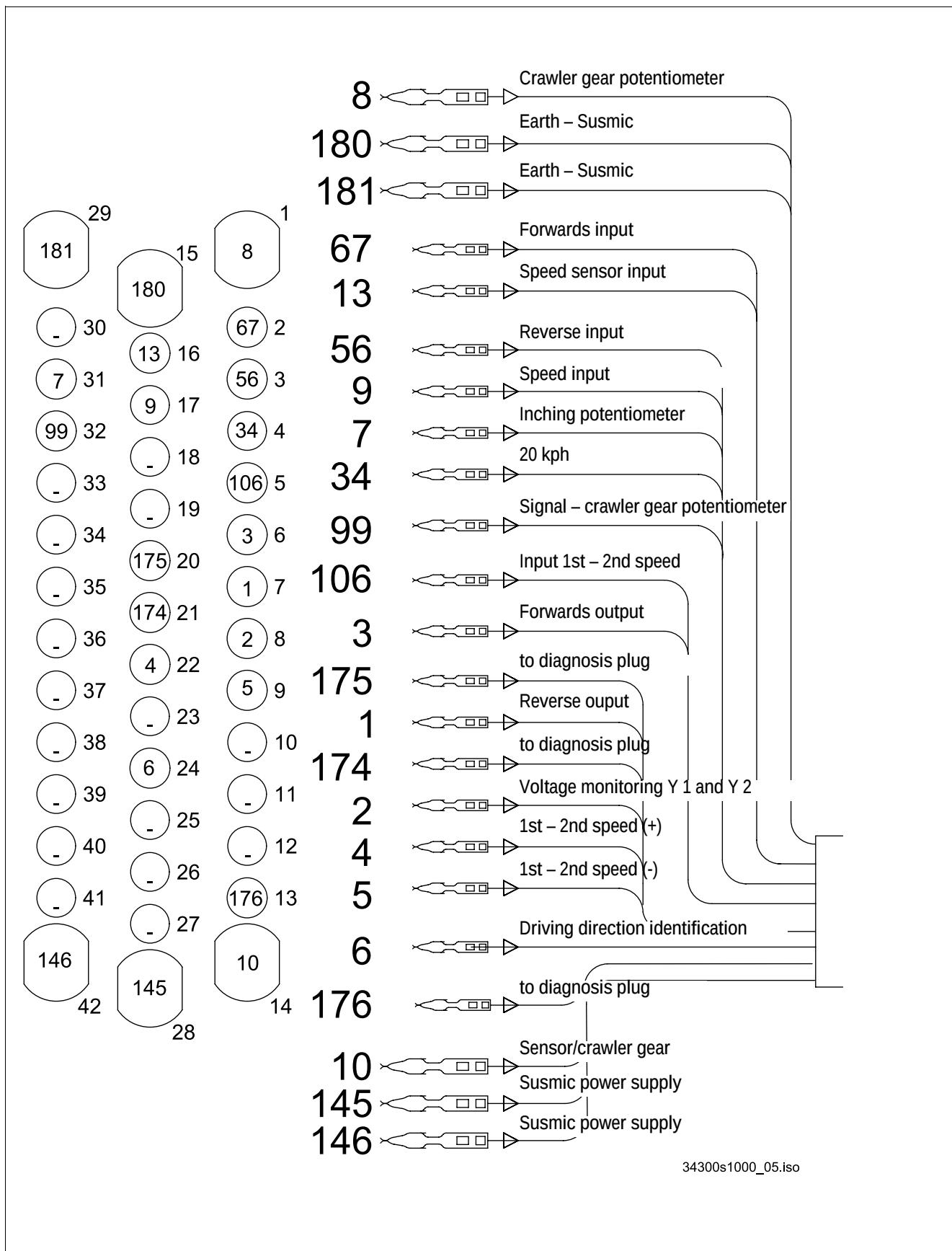


X14

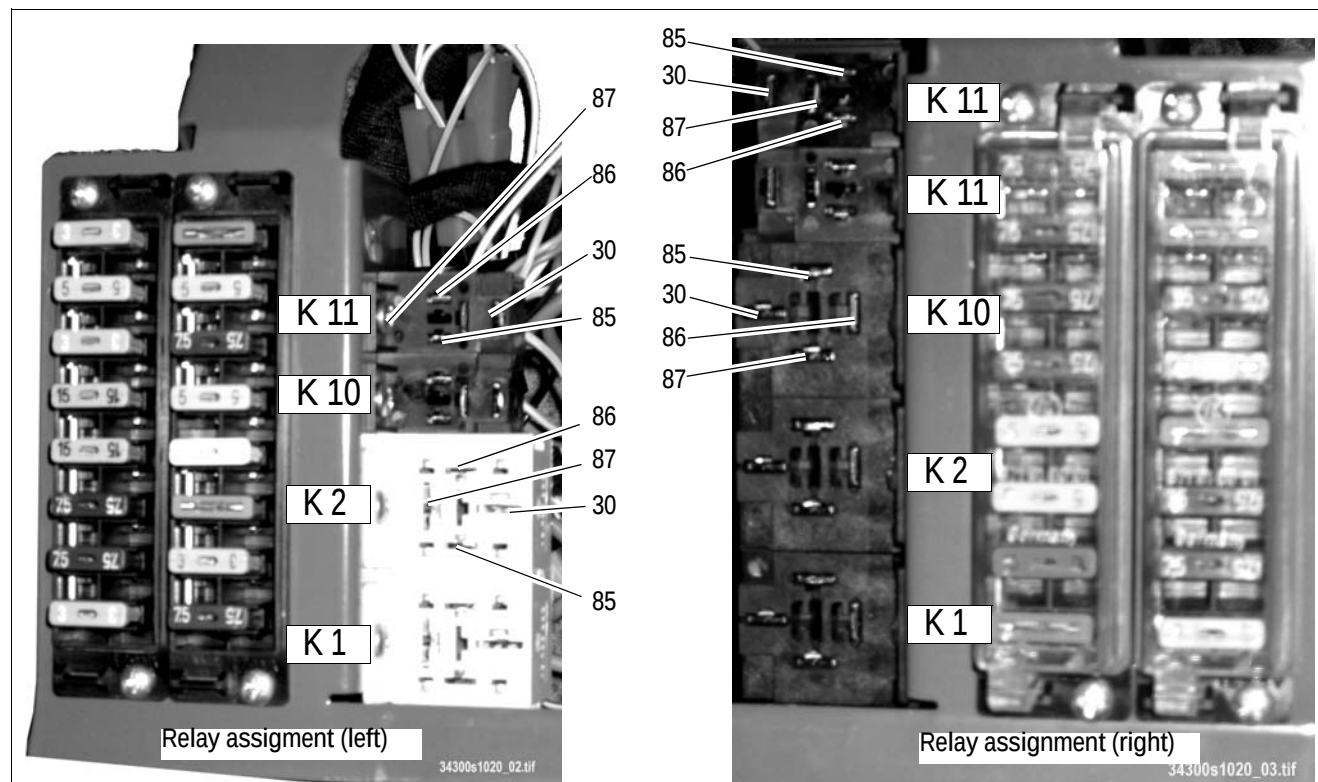




10.38 Plug – SUSMIC

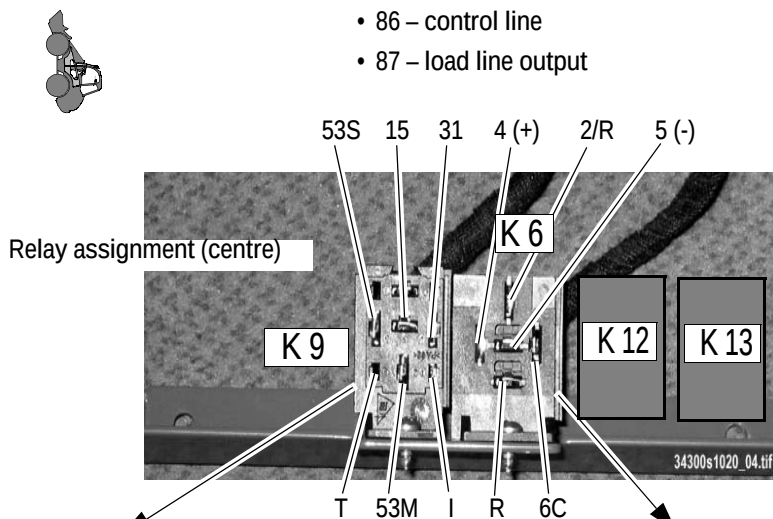


10.39 Relay assignment



Overview of terminals

- 30 – load line input
- 85 – earth
- 86 – control line
- 87 – load line output



Wiper relay K 9: overview

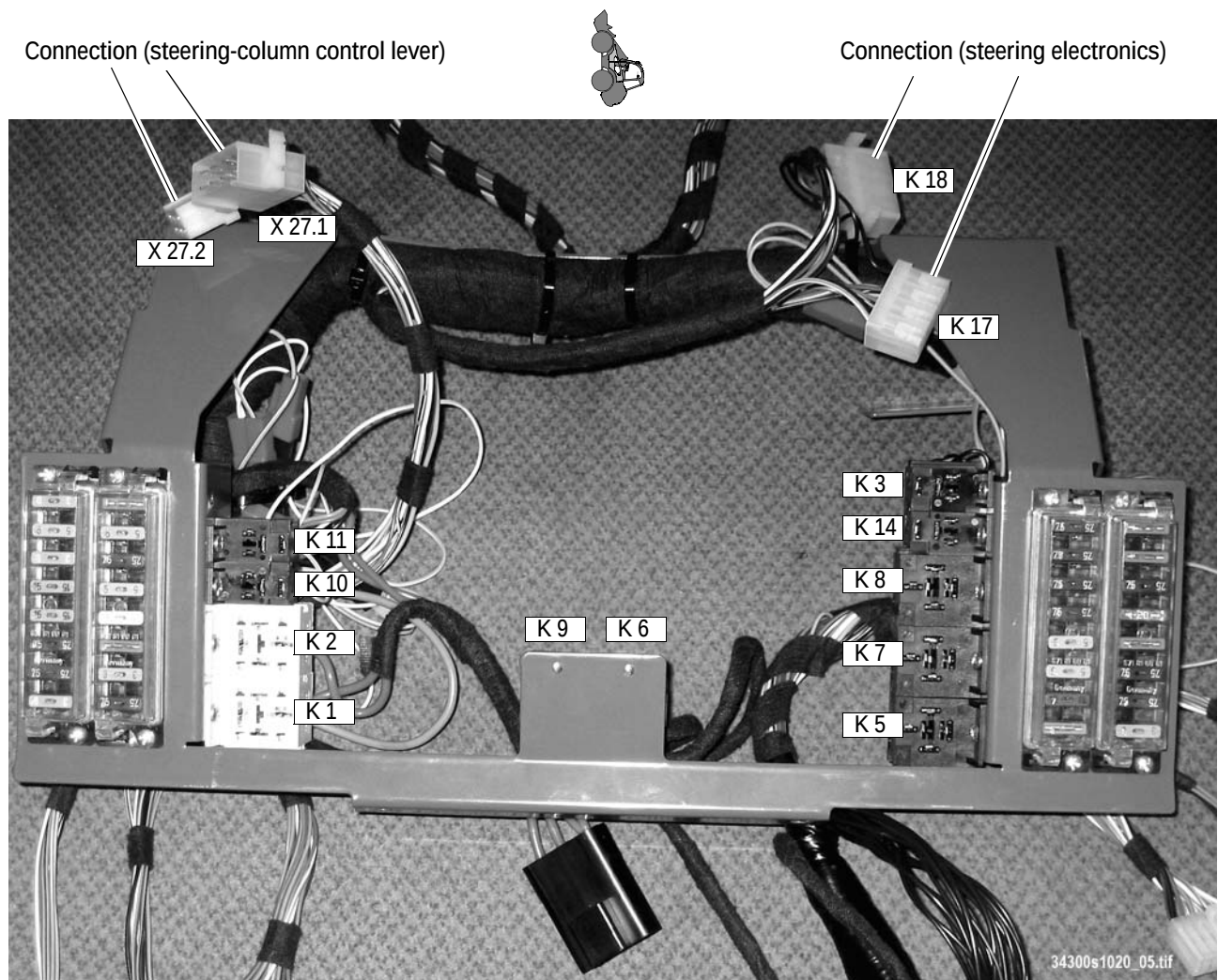
- I – intermittent signal
- 15 – switched circuit (+)
- 31 – earth (-)
- 53S – wiper circuit
- 53M – switched earth (-)
- T – pump circuit (washer fluid)

Turn indicator relay K 6: overview

- R – vehicle telltale
- 2/R – rear implements telltale
- C – turn indicator output
- 4(+) – to hazard switch
- 5(-) – earth
- 6C

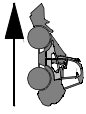


10.40 Plug and socket connection: steering electronics – steering-column control lever



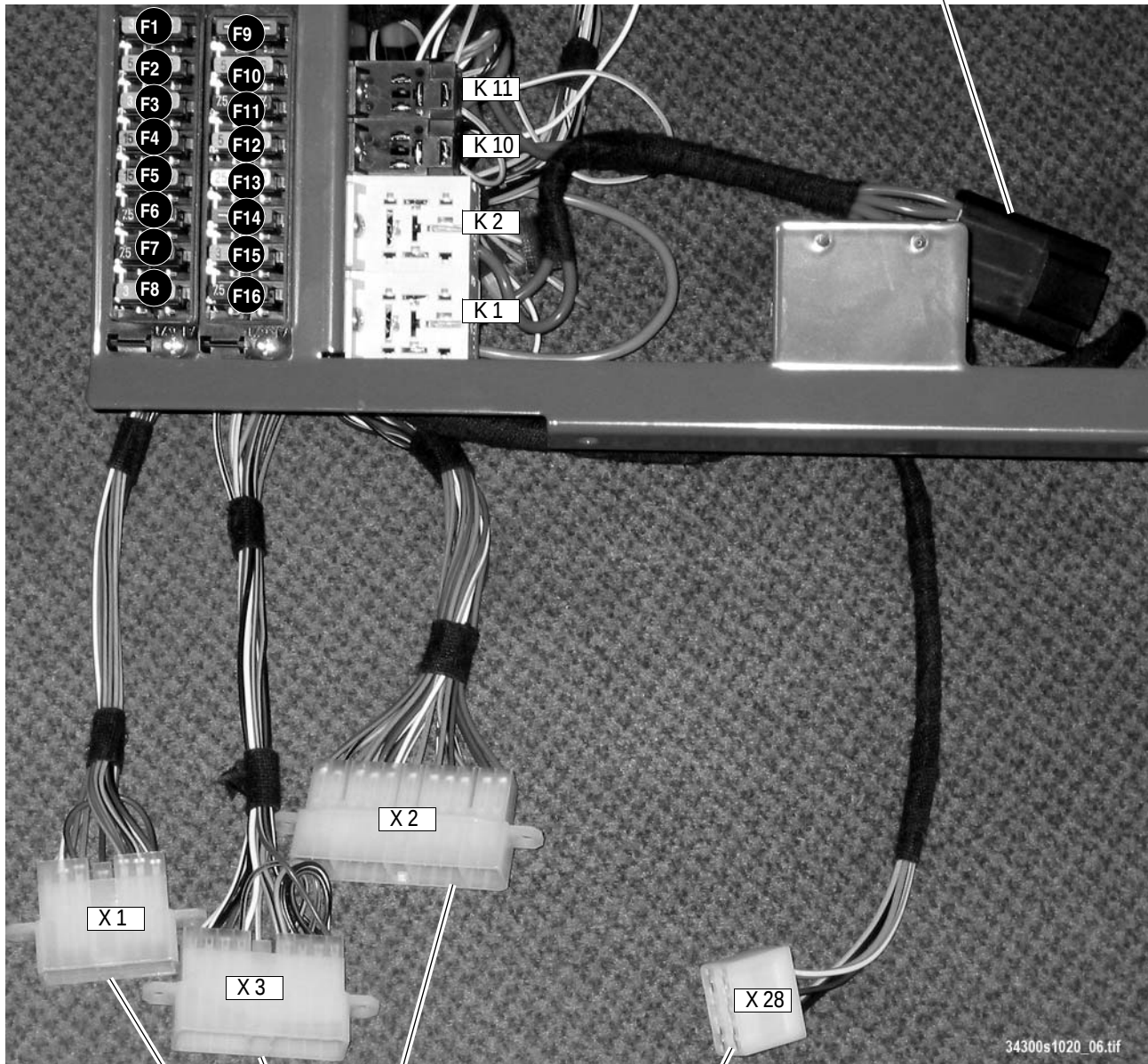
- K 6 – turn indicator relay
- K 9 – intermittent wipe relay

10.41 Plug and socket connection: fuse box and relay (left)



- K 1 – high current relay (upper current path 15)
- K 2 – high current relay (lower current path 15)
- K 10 – relay (lock 3rd control circuit)
- K 11 – relay (unlock 3rd control circuit)

Connection – power
(to K 1/K 2/terminal 30)

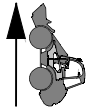


Connection – wiring har-
ness
(engine – frame)

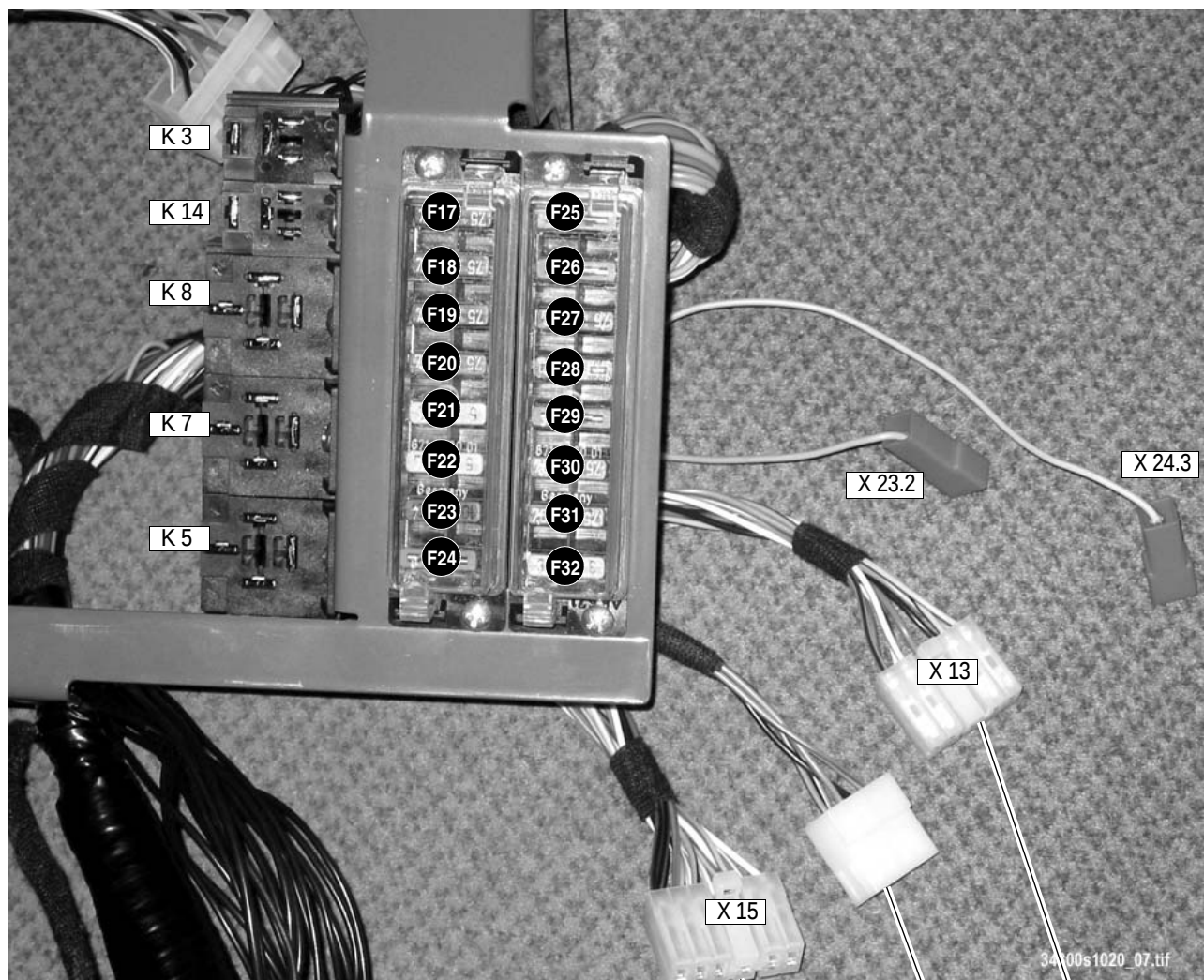
Connection (front window wiper)



10.42 Plug and socket connection: fuse box and relay (right)



- K 5 – optional front socket
- K 7 – wiper speed 1
- K 8 – wiper speed 2
- K 14 – differential lock
- K 3 – drive (RV)
- X 23.2 – 3rd to 4th control circuit changeover (green)
- X 24.3 – 3rd to 4th control circuit changeover (yellow)

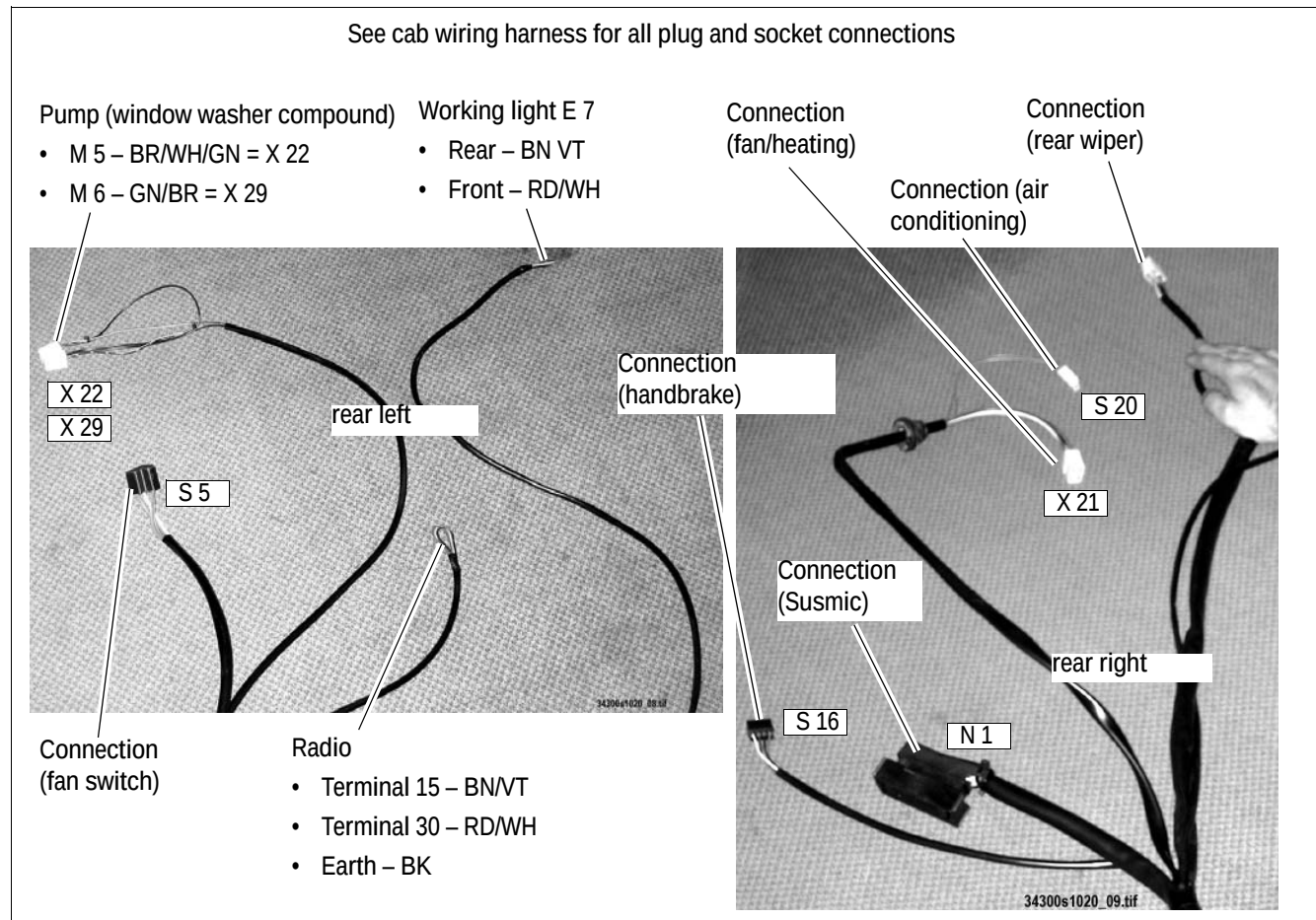


Connection (control lever base)

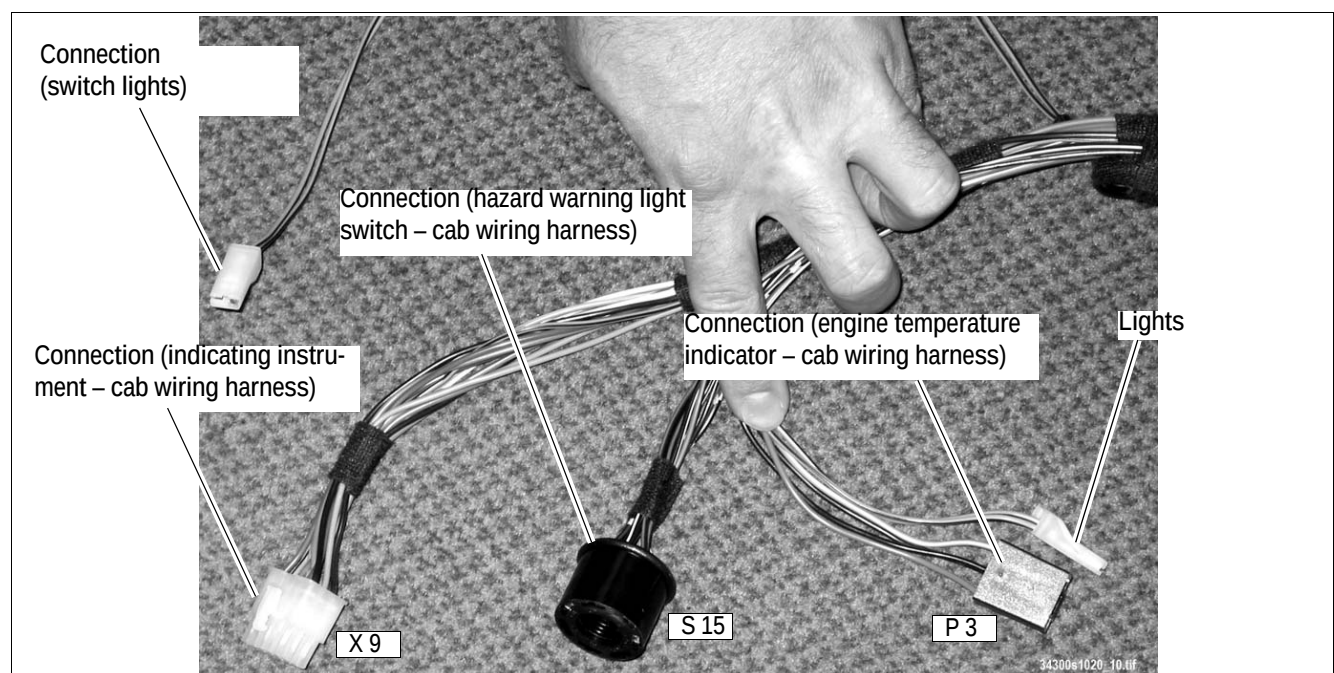
Connection (air conditioning)

Connection (joystick)

10.43 Plug and socket connection: cab

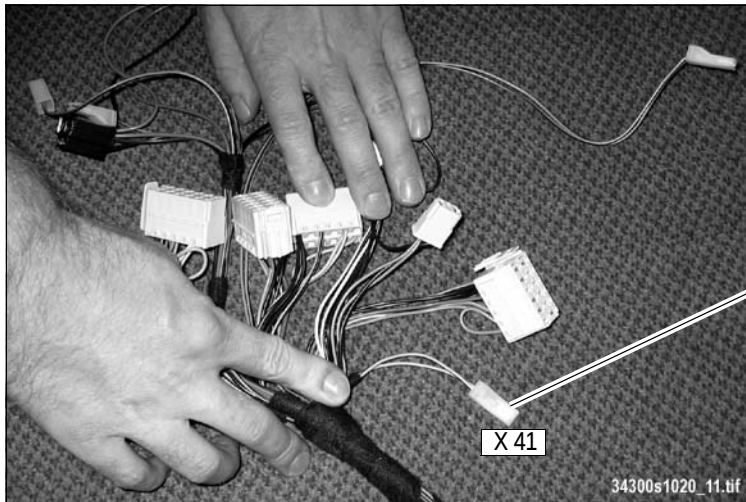


10.44 Plug and socket connection: instrument panel





10.45 Plug and socket connections: load stabiliser, speedometer (40 kph), front socket



Load stabiliser connection (option)

X 41 – YE/BK

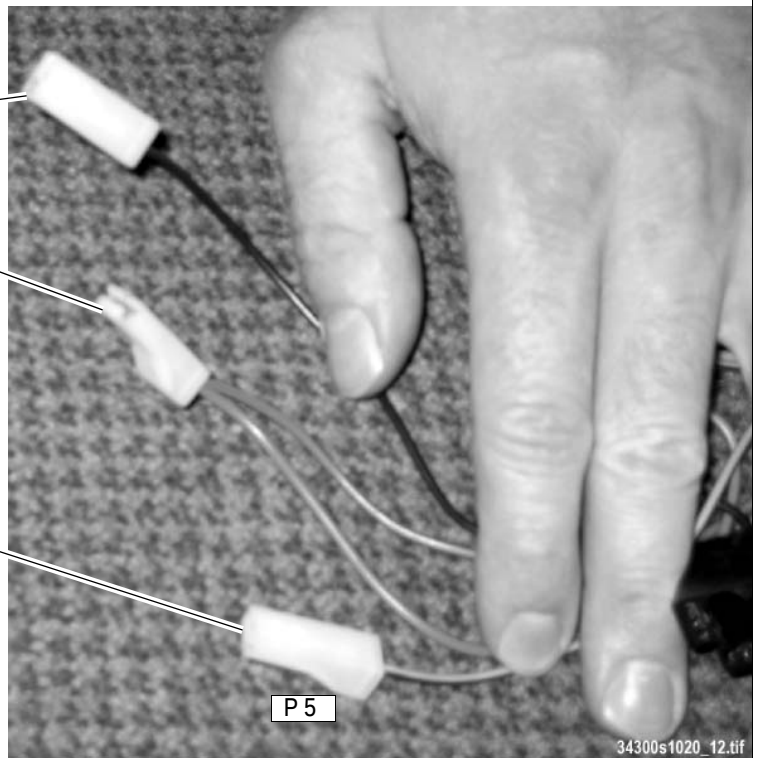
X 41

34300s1020_11.tif

Connection
(earth BK)

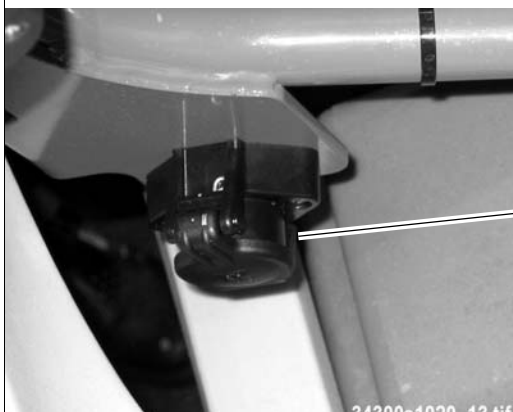
Power supply R (+)
from F 8 to slot 3

Connection GN/BK slot 1
speedometer signal transmitter –
cab wiring harness



P 5

34300s1020_12.tif



Front socket (on the left in driving direction,
wiring harness is mounted on headlight bracket)

34300s1020_13.tif

[illegible]

NK Lifton Limited
Station Road Ind Park
Brompton-on-Swale
Richmond, North Yorkshire, DL 107 SN
United Kingdom
Phone (+44) 1748 81 06 66
Fax (+44) 1748 81 07 77
e-Mail enquiries@kramer.uk.com
www.nklifton.com

NeusonKramerFrance SA
43, rue du Landy - 93211 Saint Denis
Laplaine cedex
tél +33 (0) 141624162
fax +33 (0) 141624165
e-mail info@neusonkramerfrance.fr
www.neusonkramerfrance.fr

Kramer-Werke GmbH
Postfach 10 15 63
D-88645 Überlingen / Bodensee
Telefon +49 (0) 7551 / 802-460
Fax +49 (0) 7551 / 802-234
e-Mail info@kramer.de
www.neusonkramer.com

