Service Manual

Compact loaders

SW 24 ST 35
SW 28 ST 45

Machine models	**S04-01/S04-03**
Edition	**1.0**
Document order no.	**1000327523**
Language	**en**

WACKER NEUSON

1.2 Identification of warnings and dangers

Important indications regarding the safety of the personnel and the machine are identified in this manual with the following terms and symbols:

Danger!

Failure to observe the instructions identified by this symbol can cause injury or death for the operator or other persons.

☞ *Measures for avoiding danger*

Caution!

Failure to observe the instructions identified by this symbol can cause damage to the machine.

☞ *Measures for avoiding danger for the machine*

Notice!

This symbol identifies instructions for a more efficient and economical use of the machine.

Environment!

Failure to observe the instructions identified by this symbol can cause damage to the environment. The environment is in danger if environmentally hazardous material (waste oil, for example) is not subject to proper use or disposal.

1.3 Explanation of symbols and abbreviations

- Identifies a list
  - Subdivision within lists.
    Follow the order of the activity.

☞ *Identifies an activity*

☞ Subdivision of an activity
Follow the order of the activity.

➥ Identifies a result after a list

➥ Subdivision of a result after a list.
Follow the order of the activity.

Cross reference: see page *1-1* (page)

Cross reference: **7** (pos. no. or table no.)

Cross reference: *fig. 1* (fig. no. 1)

Cross references: *– see chapter "5 Operation" on page 5-1* (see chapter)

Cross references: *– see "Operation" on page 5-1* (– see text)

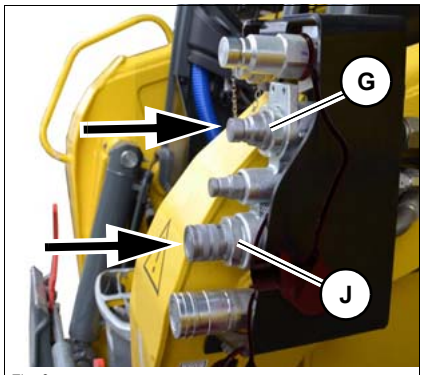


Fig. 9:

Before connecting:

☞ *Press the auxiliary hydraulics connector **G**, and then the auxiliary hydraulics sleeve **J** in the direction of the arrow.*

➥ This releases the pressure in the auxiliary hydraulics circuit.

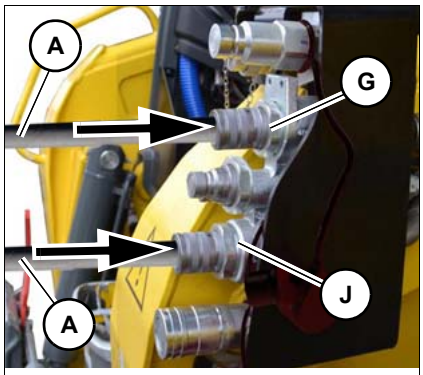


Fig. 10:

Before removing:

☞ *Press the auxiliary hydraulics connector **G**, and then the auxiliary hydraulics sleeve **J** in the direction of the arrow with hoses **A** connected.*

➥ This releases the pressure in the auxiliary hydraulics circuit.

Preparations for releasing the pressure (loader unit/load stabilizer):

The pressure in the **loader unit** and **load stabilizer** circuits has to be released after parking the machine.

☞ *Stop and park the machine.*

☞ *Lower the loader unit completely.*

☞ *Stop the engine.*

☞ *Turn the starting key to position **1**.*

☞ *Lower the safety bar and close the door (option).*

Releasing the pressure in the loader unit

☞ *Move both control levers in all directions repeatedly to release the pressure from the hydraulic system.*

Releasing the pressure in the load stabilizer (option)

☞ *Enable the load stabilizer.*

➥ The loader unit is slightly raised.

☞ *Perform emergency lowering.*

➥ The loader unit is lowered to the ground and the pressure is released from the hydraulic system.

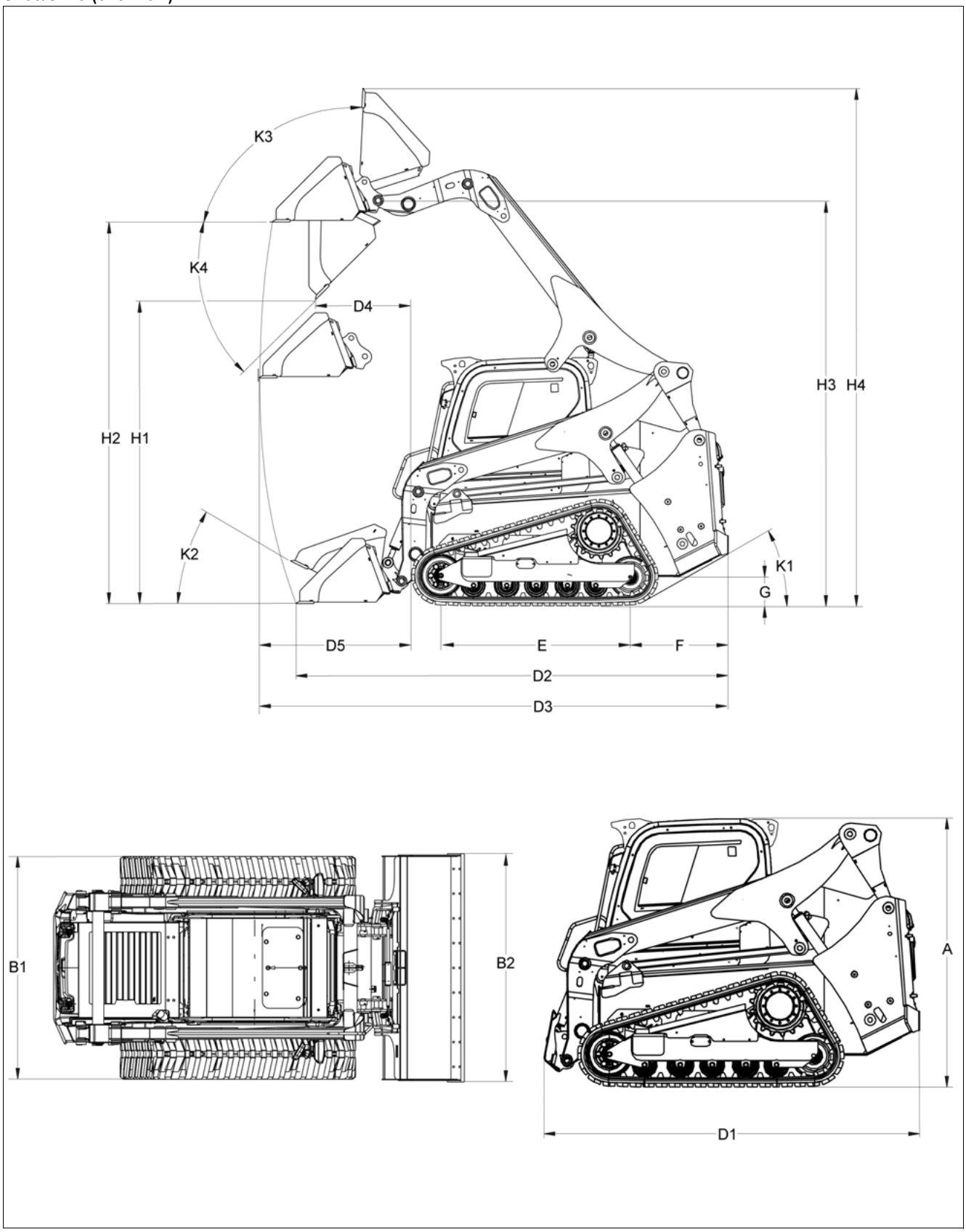
Ground clearance/ground pressure

Ground clearance		
Ground clearance	SW24	235 mm (9.3 in)
	SW28	230 mm (9.1 in)
	ST35	255 mm (10 in)
	ST45	250 mm (10 in)
Ground pressure	SW24	--
	SW28	--
	ST35	0.31 kg/cm^2 (4.4 lbs/in^2)
	ST 35 narrow tracks	0.44 kg/cm^2 (6.25 lbs/in^2)
	ST45	0.32 kg/cm^2 (4.4 lbs/in^2)
	ST45 narrow tracks	0.45 kg/cm^2 (6.4 lbs/in^2)

2.13 Payload/stability

Not available.

ST35/ST45 (overview)



3.5 Maintenance plan

Daily maintenance (operator)		
Symbol	**Inspection work** (Check the following engine/machine fluids. Check the oil levels after a test run and add oil if necessary)	Page
	Check the fluids and lubricants (engine oil, engine coolant, hydraulic oil)	*3-31*, *3-36*, *3-54*
	Check the radiators (for example water, hydraulic oil) for dirt, clean them if necessary	*3-36*
	Check the fuel radiator for dirt, clean it if necessary	*3-36*
	Lubricate the machine according to the lubrication plan	*3-8*
	Check the water separator (prefilter) and fuel filter: drain water if necessary	*3-25*
	Check the tires and rims (damage, inflation pressure, tread depth)	*3-61*
	Check the tracks (damage, tension, profile)	*3-61*
	Check the engine air intake	*3-40*
	Check pin lock	--
	Check line fixtures	--
	Check the indicator lights and acoustic warning devices	--
	Check the service and parking brake function	--
	Check the hydraulic couplings for dirt	--
	Check the threaded fittings of the protective structures (rollbar, cabin, for example) for tightness	--
	Clean the lights/light system, signaling systems	--

Raising/lowering the cabin

Caution!

Crushing hazard by raising or lowering the cabin!

Raising or lowering the cabin can cause serious injury or death.

- *All persons must stay clear of the cabin as you lower it.*
- *Remove all loose objects inside the machine, or store them safely.*
- *Always close and lock the door before raising the cabin.*

The cabin can be raised in two different ways.

- Position 1: half raised, loader unit lowered.

Fig. 18: Half raised

- Position 2: completely raised, loader raised.

Fig. 19: Completely raised

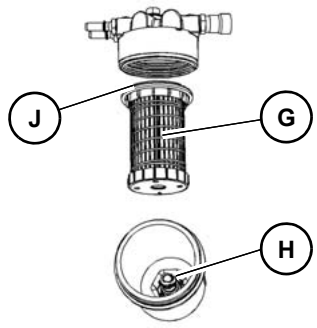


Fig. 46: Replacing the fuel filter

☞ *Turn fuel filter **G** anticlockwise and remove it from the filter housing.*

☞ *Insert and screw a new fuel filter **G** onto threads **H** in filter housing **F**.*

☞ *Apply clean engine oil to O-ring seal **J**.*

☞ *Install filter housing **F** and align it with mark **B**.*

☞ *Bleed the fuel system – see Bleeding the fuel system on page 3-29.*

☞ *Check the fuel filter for tightness after a short test run.*

☞ *Close the engine and radiator cover.*

☞ *Lock the radiator cover.*

☞ *Dispose of the old fuel filter in an environmentally friendly manner.*

Environment!

Use a suitable container to collect fluids and lubricants as they flow out and dispose of them in an environmentally friendly manner.

Bleeding the fuel system

Caution!

Burn hazard due to hot engine components!

Can cause serious burns.

☞ *Stop the engine and let it cool down.*

☞ *Wear protective equipment.*

Bleed the fuel system in the following cases:

- After removing and fitting the fuel filter, prefilter or the fuel lines back on again.
- If the fuel tank is run empty.
- If the machine is put into operation after having been out of operation for more than 30 days.

If the engine runs smoothly for a while and then stops, or if it does not run smoothly:

☞ *Stop the engine.*

☞ *Raise the safety bars.*

☞ *Remove the starting key and carry it with you.*

☞ *Bleed the fuel system again as described above.*

☞ *Check for leaks after starting the engine.*

☞ *Have a Wacker Neuson service center perform a check if necessary.*

3.11 Air filter

Important information regarding the air filter

☞ *Store filters in their original packaging and in a dry place.*

☞ *Check air filter attachments, air intake hoses and the air filter element for damage, and immediately repair or replace them if necessary.*

☞ *Check the screws at the induction manifold and the clamps for tightness.*

Air filter monitoring

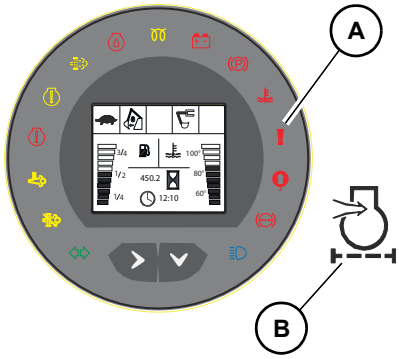


Fig. 58: Multifunctional display (symbolic representation)

Damage to diesel engine due to dirty air filter.

- Replace the air filter elements if the indicator light “General malfunction” **A** illuminates red, the buzzer sounds and symbol **B** appears in the multifunctional display.
- Do not clean air filter elements, replace them.
- Do not use any damaged air filter elements.

Replacing the air filter

Notice!

Damage to air-filter elements when in use in acidic air for longer periods of time.

- Replace the air filter elements according to the multifunctional display, every 1000 o/h or once a year at the latest.
- Replace after 50 o/h when in extensive use in environments with acidic air, such as acid production facilities, steel and aluminum mills, chemical plants and other nonferrous-metal plants, independently of the multifunctional display.

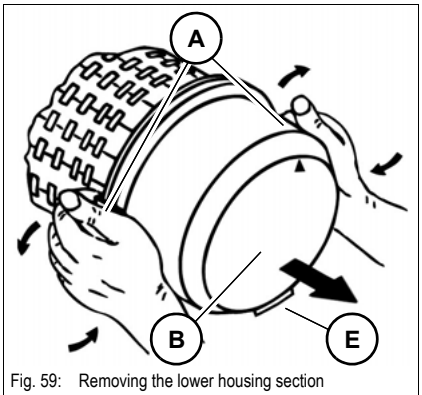


Fig. 59: Removing the lower housing section

☞ *Stop and park the machine. Stop the engine. See “Preparing lubrication”.*

☞ *Open the radiator and engine cover.*

☞ *Remove dirt and dust from the air filter housing and the area around it.*

☞ *Fold bow clips **A** on lower housing section **B** to the outside.*

☞ *Remove the lower housing section **B**.*

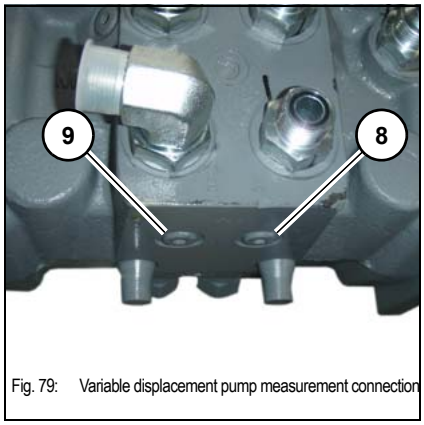


Fig. 79: Variable displacement pump measurement connection

Pos.	Designation	
8	Variable displacement pump measurement connection	Ma1
9	Variable displacement pump measurement connection	Ma2
10	Control valve measurement connection	Ma3

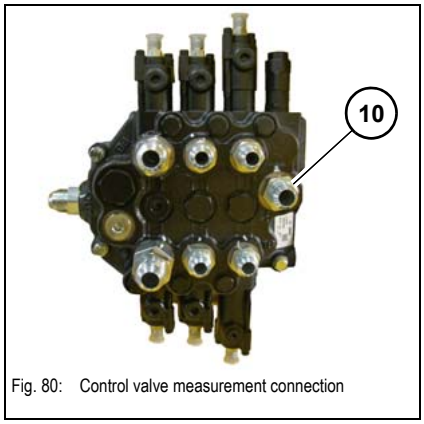


Fig. 80: Control valve measurement connection

Checking the main pressure (P1 & P2)

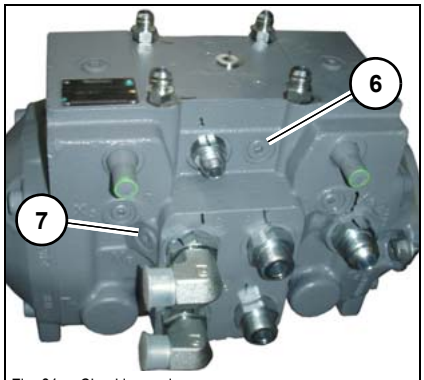


Fig. 81: Checking main pressure

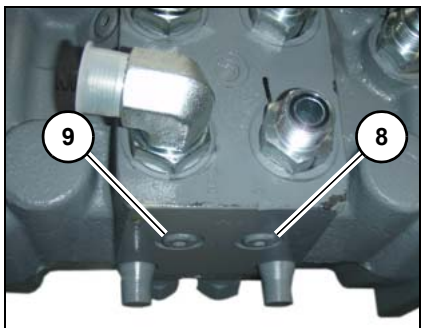


Fig. 82: Checking main pressure

☞ *Stop and park the machine. Stop the engine.*

☞ *Raise the cabin – see Raising/lowering the cabin on page 3-19.*

☞ *Remove plugs **6**, **7**, **8** and **9** from the variable displacement pump with a suitable tool.*

☞ *Install the measurement connections with a suitable tool and connect them with the measuring instrument.*

☞ *Route the wiring so as to avoid damage.*

☞ *Lower the cabin – see Raising/lowering the cabin on page 3-19.*

☞ *Start the engine.*

☞ Check the pressure at maximum engine speed.

☞ *Keep the machine in a firm position so that the wheels cannot turn with the control lever in final position (for example drive against a mound).*

☞ Travel forward.

☞ *Keep the machine in a firm position so that the wheels cannot turn with the control lever in final position (for example drive against a mound).*

☞ Travel in reverse.

☞ *Check and make a note of the pressure values – see Test report on page 3-52.*

☞ *Stop the engine.*

☞ *Raise the cabin.*

☞ *Remove the measurement connections.*

☞ *Install plugs **6**, **7**, **8** and **9** with a suitable tool.*

☞ *Lower the cabin.*

Replacing the boost-pressure filter

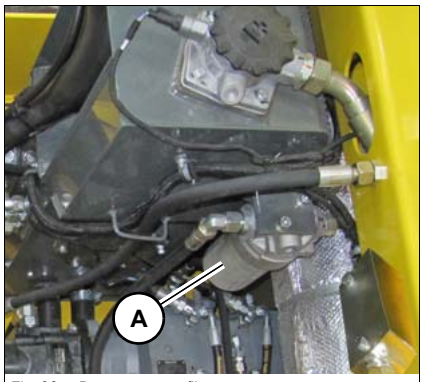


Fig. 96: Boost-pressure filter

- Boost-pressure filter **A** is located under the cabin, on the hydraulic oil reservoir

☞ *Stop and park the machine. Stop the engine. See “Preparing lubrication”.*

☞ *Remove the starting key and carry it with you.*

☞ *Let the engine cool down.*

☞ *Actuate the reservoir ventilation to release pressure.*

☞ *Raise the cabin – see Raising/lowering the cabin on page 3-19.*

☞ *Place a suitable container under the filter housing to collect the hydraulic oil as it flows out.*

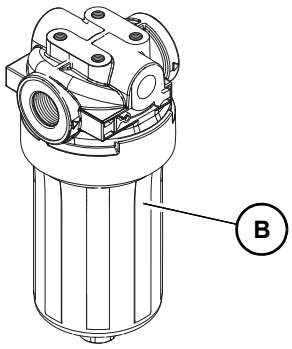


Fig. 97: Boost-pressure filter (symbolic representation)

☞ *Remove filter housing **B** with a suitable tool.*

☞ *Remove the old filter element.*

☞ *Insert the new filter element.*

☞ *Install filter housing **B**.*

☞ *Check the hydraulic oil level and add oil if necessary.*

☞ *Lower the cabin.– see Raising/lowering the cabin on page 3-19*

☞ *Completely remove all hydraulic oil spills.*

☞ *Dispose of the replaced filter element in an environmentally friendly manner.*

Environment!

Use a suitable container to collect fluids and lubricants as they flow out and dispose of them in an environmentally friendly manner.

Checking the hydraulic system for leaks

Notice!

Leaks and damaged pressure lines must be immediately repaired or replaced by a Wacker Neuson service center. This not only increases the operating safety of the machine but also helps to protect the environment.

- Leaks and damaged pressure lines must be immediately repaired or replaced.
- Have hydraulic hoses replaced every 6 years from the date of manufacture, even if they do not seem to be damaged.

- Do not operate the machine with leaking or damaged hydraulic system components.
- Retighten leaking threaded fittings and hose connections only when the system is not under pressure. Release the pressure before working on pressurized lines.
- Do not weld or solder damaged or leaking pressure lines and threaded fittings, but have them replaced.
- Wear protective equipment.

Changing the oil

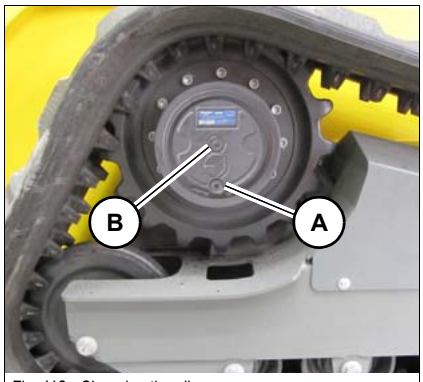


Fig. 112: Changing the oil

☞ *Position the machine so that filler plug **A** is at the bottom.*

☞ *Stop and park the machine. Stop the engine. See “Preparing lubrication”.*

☞ *Remove the starting key and carry it with you.*

☞ *Let the engine cool down.*

☞ *Place a suitable container under the filler plug.*

☞ *Remove filler plugs **A** and **B** with a suitable tool.*

➥ The oil flows out of the opening.

☞ *Position the machine so that filler plug **A** is at the top.*

☞ add oil through opening **A** until it flows out slightly through opening **B**.

☞ *Install filler plugs **A** and **B** with a suitable tool.*

☞ *Move the machine a few metres.*

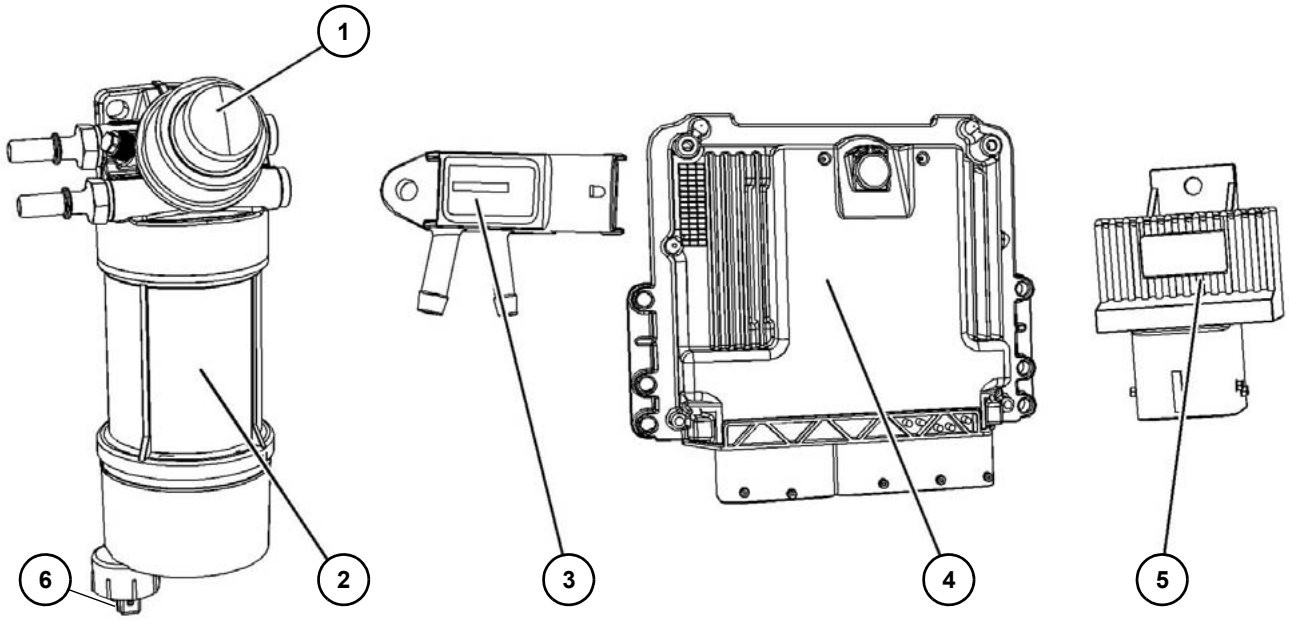
☞ *Check the oil level.*

➥ If the oil level is not correct:

☞ Repeat the procedure.

Environment!

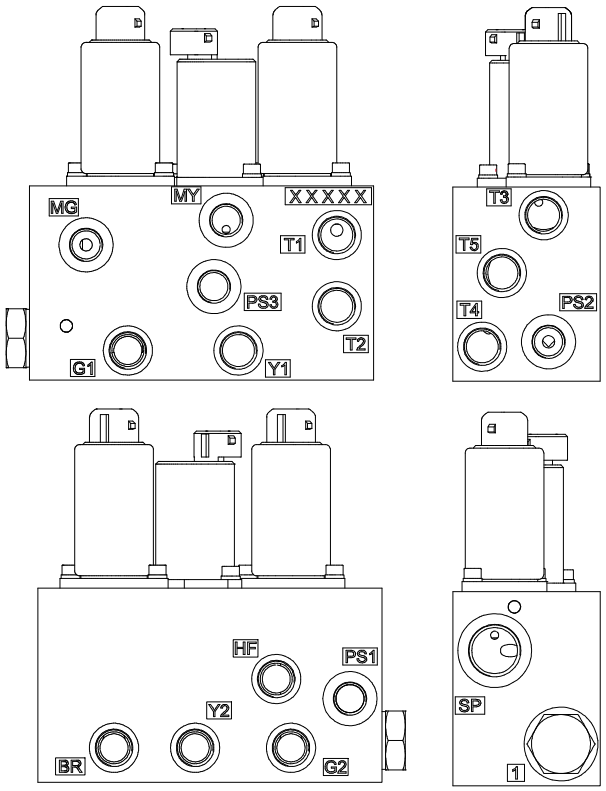
Use a suitable container to collect fluids and lubricants as they flow out and dispose of them in an environmentally friendly manner.

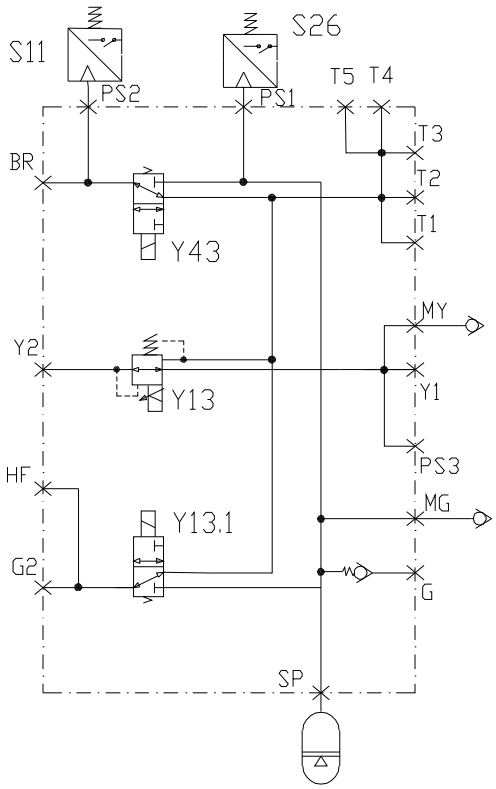


Pos.	Designation
1	Manual fuel pump
2	Fuel prefilter
3	Differential pressure sensor
4	Electronic engine control unit
5	Glow plug relay
6	Water-in-fuel sensor

Problem		Possible causes
Excessive development of	white smoke	Low coolant temperature
		Separate cylinder not working correctly
		Valve clearance
		Fuel grade
		Low compression (cylinder pressure)
	Black smoke	Electronically regulated pump/nozzle units
		Air-intake and exhaust system
		Turbocharger
		Separate cylinder not working correctly
		Low compression (cylinder pressure)
		Valve clearance
Excessive valve clearance		Lubrication
		Rocker arm
		Valve linkage
		Hydraulic tappet
		Camshaft
		Valve stems
		Rocker-arm shaft
Mechanical knocking of engine		Additional equipment
		Valve train components
		Piston
		Connecting rod and main bearing
Engine backfires, does not run smoothly or is unstable		Air-intake and exhaust system
		Fuel supply
		Throttle lever sensor
		Fuel injection pump
		Low compression (cylinder pressure)
		Electronically regulated pump/nozzle units
		Separate cylinder not working correctly

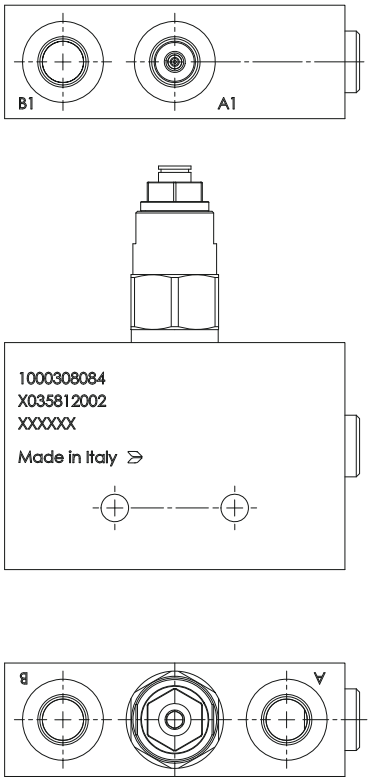
5.3 Pilot oil supply unit

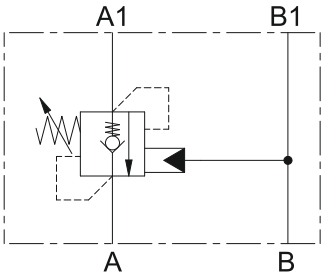




Pos.	Designation
PS1	Connection of S26 pump pressure switch
PS2	Connection of S11 parking brake pressure switch
BR	To connection “Z” of hydraulic motor on the left and right
Y2	ISO controls: connection “P” of joystick (left) H controls: connection “P” of joystick (left and right)
HF	To connection “P” of proportional valve
G2	ISO controls: connection “P” of joystick (right)
SP	Accumulator connection
G	From connection “G” of hydraulic pump
MG	Measurement connection
Y1	From connection “G” of hydraulic pump
MY	Measurement connection
T1	Reservoir connection
Y43	Parking brake solenoid valve
Y13	Drive safety valve
Y13.1	Operating hydraulics safety valve

Hose burst valve (option)

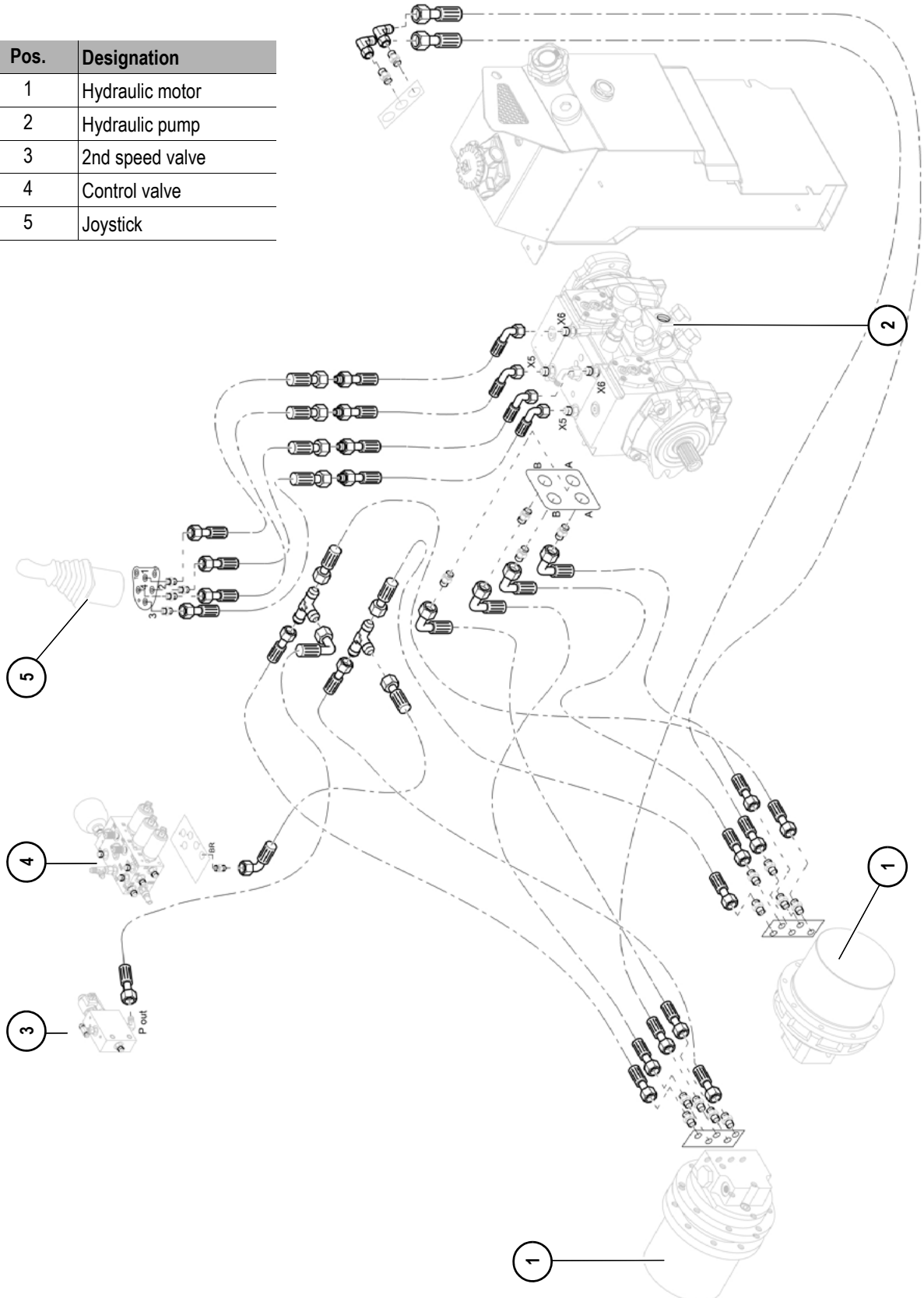




Pos.	Designation
A	From connection “B” of control valve bucket
B	From connection “A” of control valve bucket
A1	Bucket rod side
B1	Bucket base side

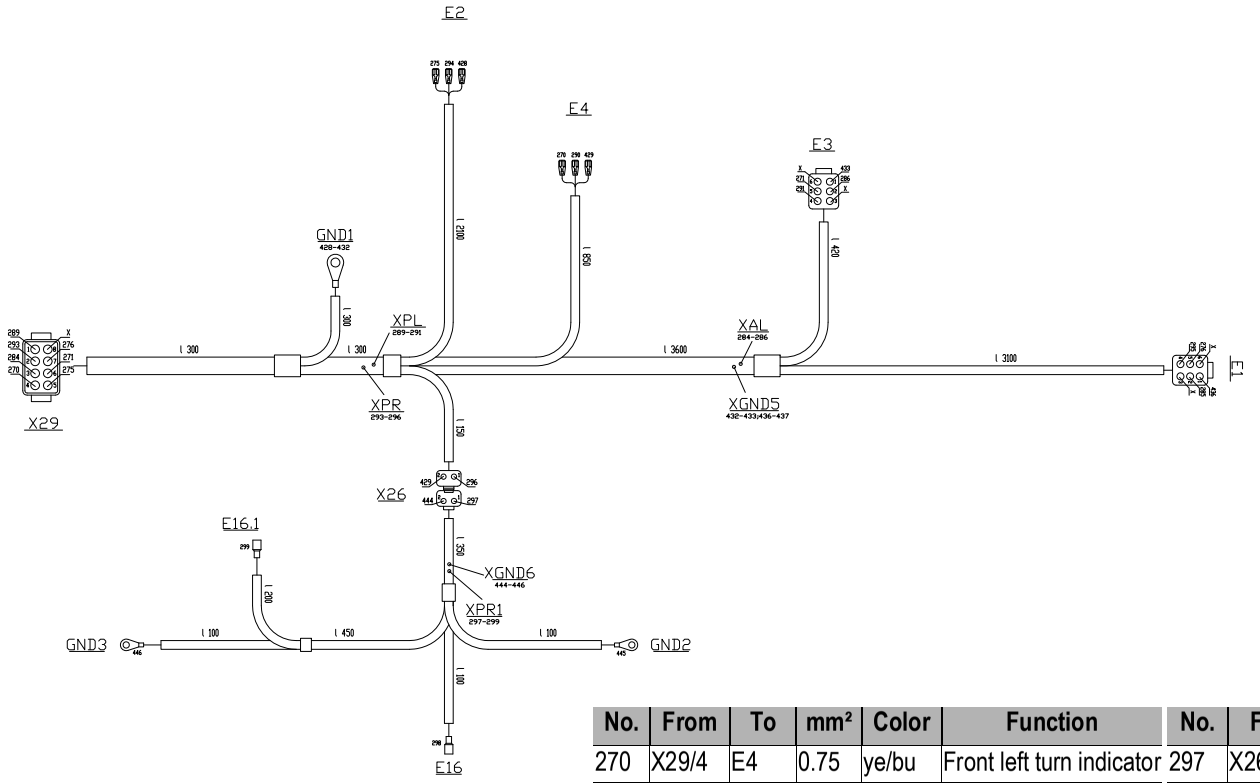
Drive diagram ST35-45

Pos.	Designation
1	Hydraulic motor
2	Hydraulic pump
3	2nd speed valve
4	Control valve
5	Joystick



Wiring harnesses (overview)

6.6 STVO (Austrian road traffic regulations) wiring harness



No.	From	To	mm²	Color	Function
270	X29/4	E4	0.75	ye/bu	Front left turn indicator
271	X29/6	E3/5	0.75	ye/bu	Rear left turn indicator
275	X29/5	E2	0.75	ye/gn	Front right turn indicator
276	X29/7	E1/5	0.75	ye/gn	Rear right turn indicator
284	X29/3	XAL	1	ye/rd	Low beam
285	E1/2	XAL	1	ye/rd	Low beam
286	E3/2	XAL	1	ye/rd	Low beam
289	X29/1	XPL	1	ye/rd	Clearance light (left)
290	E4	XPL	1	ye/rd	Clearance light (left)
291	E3/4	XPL	1	ye/rd	Clearance light (left)
293	X29/2	XPR	1	ye/rd	Clearance light (right)
294	E2	XPR	1	ye/rd	Clearance light (right)
295	E1/4	XPR	1	ye/rd	Clearance light (right)
296	X26/1	XPR	1	ye/rd	Clearance light (right)
297	X26.1/1	XPR1	1	ye/rd	Clearance light (right)
298	E16	XPR1	1	ye/rd	Clearance light (right)
299	E16.1	XPR1	1	ye/rd	Clearance light (right)
428	GND1	E2	1	bk	Ground
429	GND1	E4	1	bk	Ground
430	GND1	X26/2	1	bk	Ground
432	GND1	XGND5	1.5	bk	Ground
433	E3/1	XGND5	1	bk	Ground
436	E1/1	XGND5	1	bk	Ground
437	Y25/2	XGND5	1	bk	Ground
444	XGND6	X26.1/2	1	bk	Ground
445	XGND6	GND2	1	bk	Ground
446	XGND6	GND3	1	bk	Ground

397	GND4	XM2/4	1	bk	Ground
461	V1/4	XV1	1	bu	Terminal 15 controller
462	V1/3	XV1	1	bu	Terminal 15 controller
463	XE1/15	XV1	1	bu	Terminal 15 controller

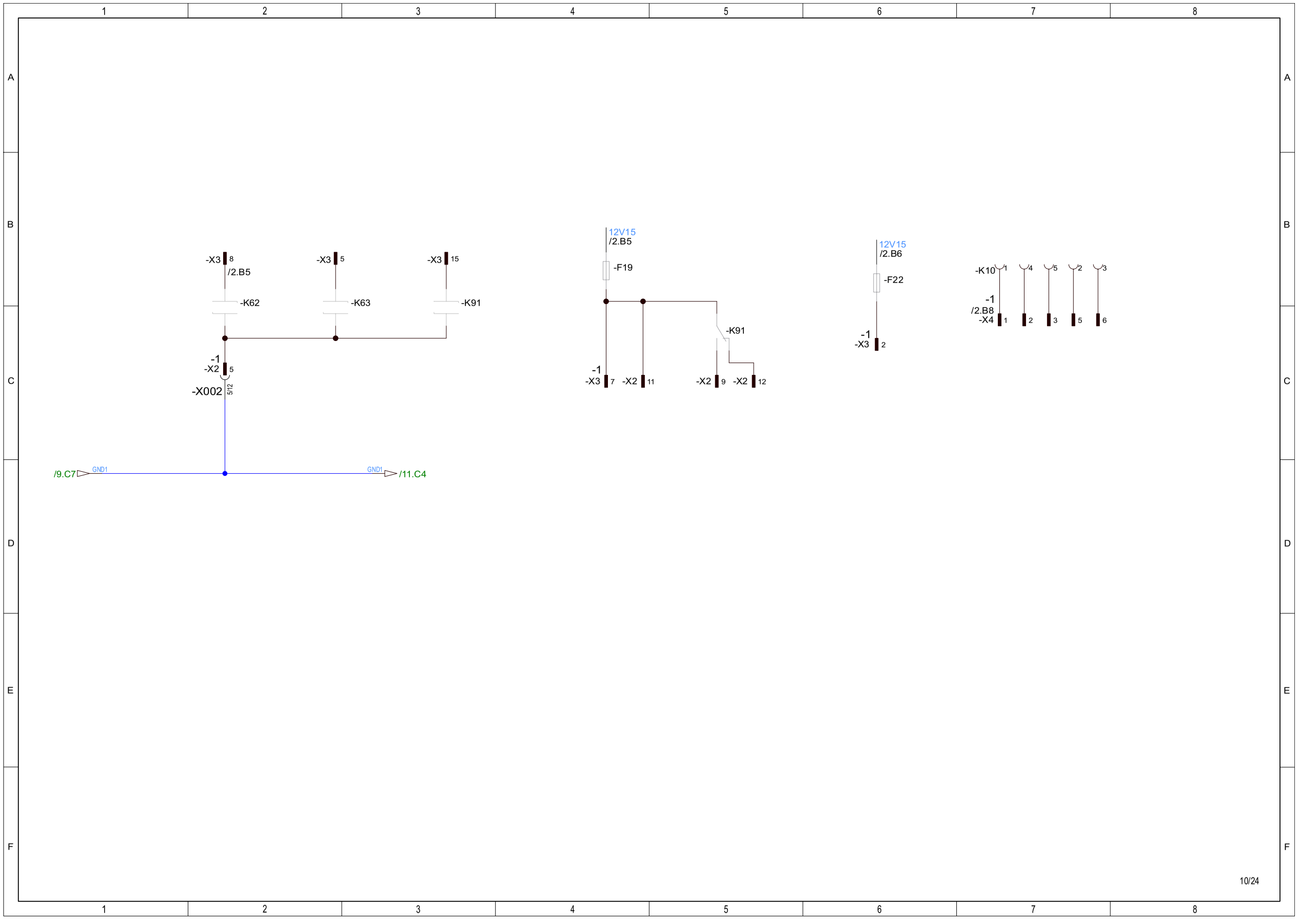
7.4 Wiring diagram (legend)

Pos. (BMK)	Designation
A001	Radio
B001	Fuel indicator
B002	Horn
B003	Traveling signal
B006	Engine temperature sensor
B007	Hydraulic oil temperature sensor
B011	Loudspeaker
B012	Loudspeaker
B074	Auxiliary hydraulics switch
B075	Attachment control switch
E001	High, low beam (right)
E002	Rear right light
E003	High, low beam (left)
E004	Rear left light
E007	Rear working light
E008	Rear working light
E009	Front working light
E010	Front working light
E014	Interior light
E015	12 V power outlet
E016	Numberplate light
E017	Numberplate light
F901	Main fuse 50 A
F902	Main fuse 50 A
F004	MVCU inputs (10 A)
F005	Diesel engine electronics (5 A)
F006	Diesel engine electronics (15 A)
F007	Diesel engine electronics (15 A)
F008	Crankcase breather preheating (10 A)
F009	Bat+ controller (10 A)
F010	Air conditioning (20 A)
F011	Starter (15 A)
F012	Wiper (15 A)
F013	Fan (15 A)
F014	12 V power outlet (15 A)
F015	Working light/interior light (15 A)
F016	Working light/interior light (15 A)
F017	Rotating beacon (10 A)
F018	12 V 15 diesel engine (10 A)
F019	10A
F020	MVCU inputs (10 A)
F021	MVCU Main Vehicle Control Unit (20 A)

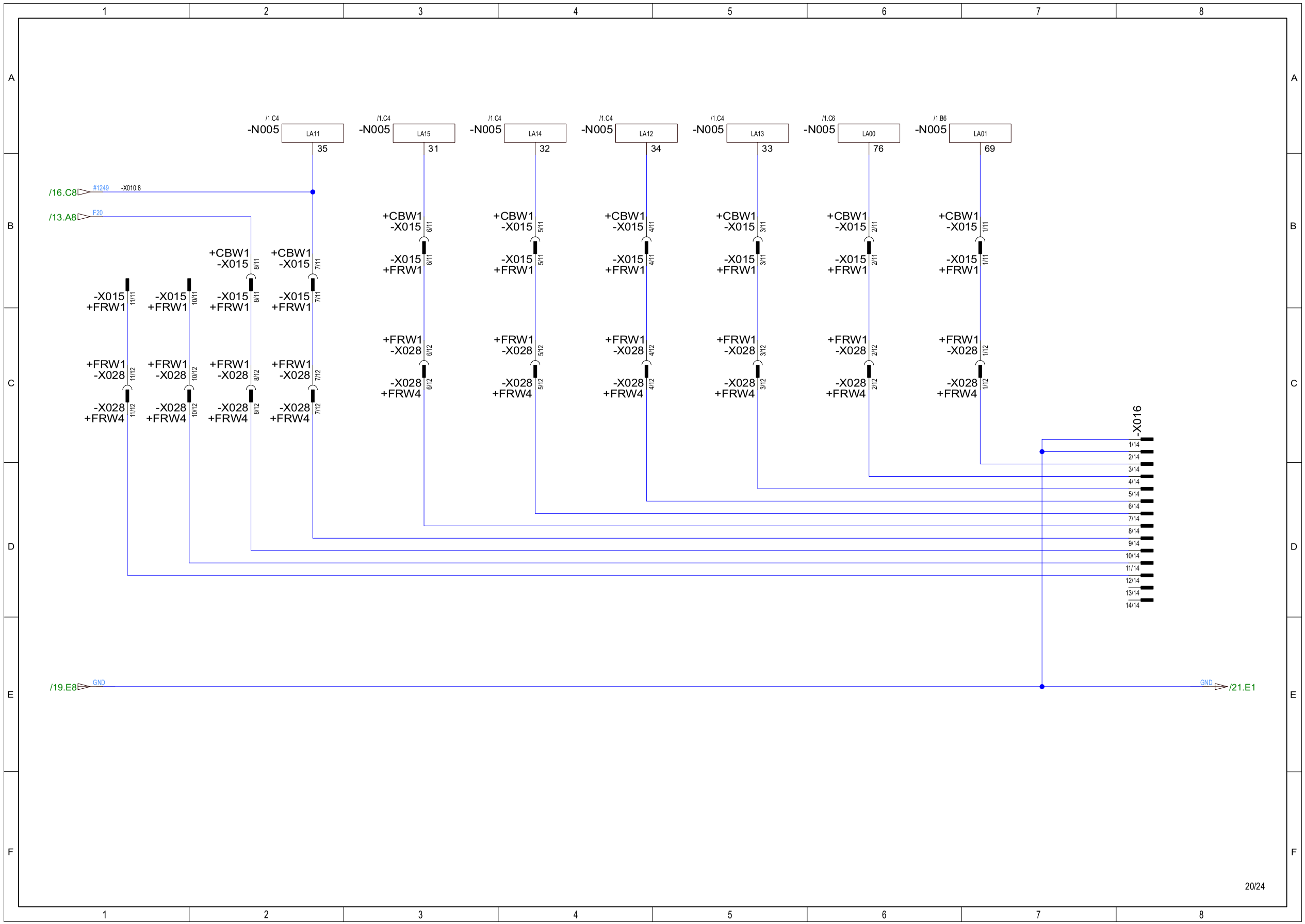
Pos. (BMK)	Designation
F022	10A
F023	Hazard warning switch (10 A)
F024	Side marker lights (10 A)
F025	Low beam (10 A)
G001	Alternator
G002	Battery
H28	Rotating beacon
K901	Main relay 12 V/15
K902	Preheating relay
K001	Diesel engine main relay
K007	Start high-current relay
K088	Horn relay
K090	Air conditioning relay
M001	Starter
M002	Wiper motor
M004	Fan
M005	Front wipe/wash pump
M009	Fuel pump
M012	Air conditioning fan
N003	Glow control unit
N004	Diesel engine electronics
N005	MVCU Main Vehicle Control Unit
N018	Telematik
N023	Jog dial
N024	Joystick (left)
N025	Joystick (right)
P014	Indicating instrument
R001	Glow plug
R011	Accelerator pedal
R037	Crankcase breather preheating
S001	Preheating start switch
S002	Engine oil pressure switch
S004	Air filter
S005	Hydraulic oil pressure switch
S011	Parking brake pressure switch
S012.1	Turn indicator push button
S012.2	Turn indicator push button
S014	Light switch (StVO)
S015	Heating switch
S016	Working light switch
S018	Rotating beacon switch
S019	Hazard warning switch

Pos. (BMK)	Designation
S020	Wiper/washer switch
S021	High-speed switch
S026	Pump pressure switch
S028	Switch for operating hydraulics lock
S029	Left-hand safety switch
S032	Parallel lift switch
S040	Quickhitch lock switch
S043	Travel alarm switch
S044	Load stabilizer push button
S051	Air conditioning switch
S052	Air conditioning pressure switch
S054	Air conditioning temperature switch
S055	Horn push button
S065	Parking brake switch
S107	Engine temperature switch
S119	Regeneration switch
S147	Travel speed control push button
S150	Attachment controls 2 push button
S151	Attachment controls 3 push button
S152	Attachment controls 4 push button
S153	Hammer push button
Y001	Cutoff solenoid
Y002	Travel speed control
Y003	High-speed valve
Y011	Parallel-lift valve
Y013	Drive safety valve
Y013.1	Operating hydraulics safety valve
Y020	Load stabilizer valve
Y021	Load stabilizer valve
Y025	Quickhitch lock solenoid valve
Y031	Magnetic clutch (compressor)
Y033	High-Flow valve
Y037	Valve for operating-hydraulics lock (left)
Y038	Valve for operating-hydraulics lock (right)
Y041	Additional control circuit solenoid valve
Y042	Additional control circuit solenoid valve
Y043	Parking brake solenoid valve
Y049	Fan valve

Central electrics spare



Attachment controls



Special tools

Quickhitch pressure sensor	B098	517097		
Joystick stabilizer blade	B099	517097		
Joystick swivel stabilizer blade	B100	517097		
Supply contacts (electrical system)	**BAT**	**517400-517449**		
Supply contact	BAT1	517400		
Supply contact	BAT2	517401		
Supply contact	BAT3	517402		
Supply contact	BAT4	517403		
Supply contact	BAT5	517404		
Supply contact	BAT6	517405		
Supply contact	BAT7	517406		
Supply contact	BAT8	517407		
Supply contact	BAT9	517408		
Electronics (electrical system)	**D**	**517450-517499**	**or see also Electronics N**	
Steering electronics	D001	516700 – 516799		0x1
Control lever electronics	D002	516500 – 516549	Joystick (right)	0xEB
			Joystick (right) red.	0xED
		516550 – 516599	Joystick (left)	0x92
			Joystick (left) red.	0x93
CAN keyboard 1	D003	519951 – 520000		0xC8
CAN keyboard 2	D004	520001 – 520050		0xC9
CAN keyboard 3	D005	520051 – 520100		0xCA
CAN keyboard 4	D006	520101 – 520150		0xCB
CAN keyboard 5	D007	520151 – 520200		0xCC
CAN keyboard 6	D008	520201 – 520250		0xCD
Lights (electrical diagram)	**E**	**517500-517549**		
Front right parking light	E001	517500		
Rear right light	E002	517501		
Front left parking light	E003	517502		
Rear left light	E004	517503		
High, low beam (right)	E005	517504		
High, low beam (left)	E006	517505		
Rear working light	E007	517506		
Rear working light	E008	517507		
Front working light	E009	517508		
Front working light	E010	517509		
Loader unit working light	E011	517510		
Chassis/telescopic boom working light	E012	517511		
Chassis/telescopic boom working light	E013	517512		
Interior light	E014	517513		
12 V power outlet	E015	517514		
Numberplate light	E016	517515		
Clearance lights	E017	517516		
Clearance lights	E018	517517		
Side working light	E019	517518		

Telescopic boom working light switch	S060	519009		
Fuel preheater switch	S061	519010		
Mirror adjustment switch	S062	519011		
Float position/hose burst valve switch	S063	519012		
Reversing fan	S064	519013		
Parking brake switch	S065	519014		
Neutral push button	S066	519015		
Bucket repositioning/front socket push button	S067	519016		
Automatic coupling/tipping trailer changeover switch	S068	519017		
Additional control circuit I-0-II switch	S069	519018		
Raise/lower tipping trailer I-0-II push button	S070	519019		
Automatic coupling unlock push button	S071	519020		
Frame leveling switch	S072	519021		
Crab steering switch	S073	519022		
Fuel preheater temperature switch	S074	519023		
Rear/front stabilizer leg switch	S075	519024		
Front stabilizer leg switch	S076	519025		
Rear stabilizer leg switch	S077	519026		
Travel pressure switch	S078	519027		
Changeover switch to 3rd boom segment	S079	519028		
Steering direction	S080	519029		
Pressure switch (right stabilizer leg)	S081	519030		
Pressure switch (left stabilizer leg)	S082	519031		
Creep gear potentiometer switch	S083	519032		
Switch for cutoff of hydraulic functions	S084	519033		
Switch for joystick cutoff during road travel (lock for long-haul travel)	S085	519034		
Error code call push button	S086	519035		
Door contact switch	S087	519036		
Mirror heating switch	S088	519037		
Pressure switch for automatic engine speed setting	S089	519038		
Automatic engine speed setting switch	S090	519039		
Central lubrication system push button	S091	519040		
Option switch/push button	S092	519041		
Push button (fuel-filling pump ON)	S093	519042		
Push button (fuel-filling pump OFF)	S094	519043		
Switch (full tank)	S095	519044		
Boost pressure switch	S096	519045		
Manual throttle switch	S097	519046		
Quickhitch pressure switch	S098	519047		
Changeover switch for rear hydraulic connection/3-point mount	S099	519048		
Pedal position switch	S100	519049		
Control lever push button for additional function	S101	519050		
Plunger switch	S102	519051		
Plunger switch	S103	519052		
Operator presence switch	S104	519053		