Safety and Accident Prevention

1 Introductory remarks

Please read the operating instructions carefully before putting an earth-moving machine into operation and strictly follow the following remarks for a safe operation.

National safety regulations - e.g. the Accident Prevention Regulations, "Earth-Moving Machinery" (VBG 40) and "Vehicles" (VBG 12) in the Federal Republic of Germany - must also be complied with.

In addition to the operating instructions, legal regulations governing road traffic and road safety measures must also be observed. Such requirements could also apply in respect of handling hazardous goods or the wearing of personal safety equipment, for example.

Furthermore, safety laws governing work in particular locations (tunnels, adits, quarries, pontoons, contaminated areas, etc.) must likewise be observed.

2 Correct use

The earth-moving machine with normal shovel equipment is only to be used for work which is suitable for the machine's functions and its attachment.

Such work includes the digging, loading, displacing and dumping out of earth, stones or other materials and the loading of these materials onto lorries, conveyor belts or other means of transportation. The transport of the loading material, however, is mainly carried out by moving the earth-moving machine.

If special attachments, such as Uni-shovel, side dump shovel, sweeper, fork lift attachment etc. are mounted, special jobs can be done with the attachment.

Another or additional application, e.g. for transportation of passengers or using the lifting device as working platform etc. is not considered as correct use. The supplier is not liable for subsequent damage. The enduser himself bears the full risk.

It is part of the correct use to follow the operating and maintenance instructions and to carry out the maintenance as well as to follow the maintenance intervals.

3 General safety notes

It is important to refrain from any working methods which impair safety.

The earth-moving machine may only be used when it is in a safe, operational condition.

The manufacturer's operating instructions must be complied with for operation, maintenance, repair, assembly and transportation.

The plant operator must provide additional special safety instructions, wherever necessary, for specific local conditions.

The operating instructions and any information pertaining to safety must be carefully kept in the driver's cab.

The operating instructions and safety notes must be complete and fully readable.

Safety devices on earth-moving machines must not be deactivated or removed.

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AXLES

Front axle:	make/type	Hurth 176/306 with self-locking diff.
Rear axle:	make/type	Hurth 360/176/54 with self-locking diff.
Lock value:		max. 45%
Front axle:	make/type	Hurth 176/306 with self-locking diff.
Rear axle - fast travel version:	make/type	Clark-Hurth 360/176/51 with self-locking differential

BRAKE SYSTEM

Service brake (four-wheel-brake):		hydraulic 2-circuit brake, oil-immersed disks of both axles
Parking brake (hydraulic hand brake valve):		spring-loaded brake acting on the disks of both axles
Additional brake:		hydrostatic by closed circuit of the transmission
Brake pump (accessory drive):	make	Rexroth
Brake pressure (service brake):	max. bar	60 $^{+6}$
Accumulator charge valve:	make	Rexroth type LT 13
Cut-in / cut-off pressure:	bar	120 - 150
Sequence valve (pressure sequence valve):	bar	Δp 13 (e.g. 60 bar brake pressure means 60 bar at the inching valve and 47 bar at the brake)
Displacement:	cm³/rev.	11
	ltr./min.	24
Opening pressure (parking brake):	bar	15
Setting value, parking brake:	bar	25

LUBRICANTS

Engine:	see engine instruction book
Hydraulic oil:	see Schaeff hydraulic oil recommendation table
Transmission oil:	MIL-L 2105 B or API-GL 5, SAE 85 W 90 LS or SAE 90 LS
Multi-purpose grease:	acc. to DIN 51825. Dripping point over 170° C. With lithium.
Brake medium:	hydraulic oil

MAINTENANCE PARTS

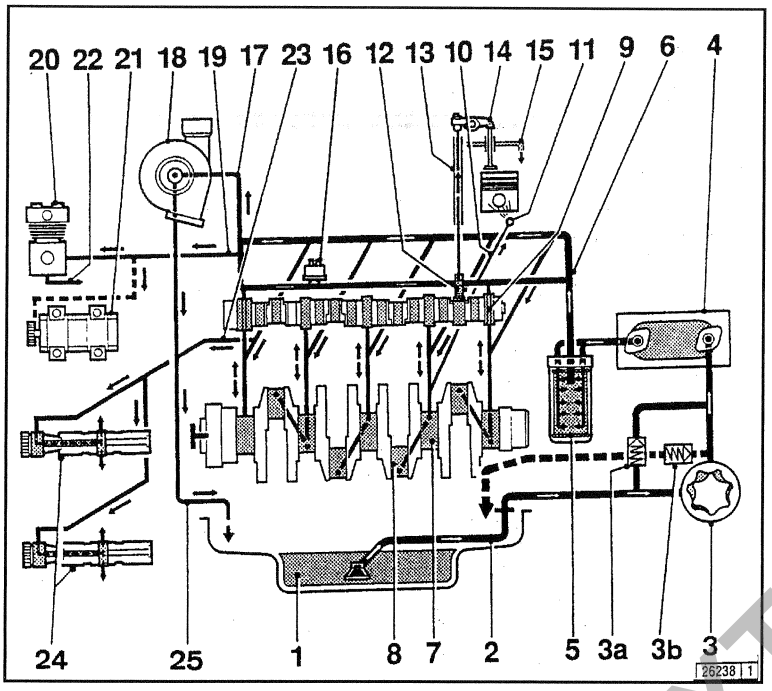
see instruction book

CAPACITIES

		ltr.	
Engine oil - change:	approx.	15.0	engine oil
Hydraulic oil (tank and system):	approx.	170.0	hydraulic oil
Hydraulic oil (change):	approx.	130.0	hydraulic oil
Fuel tank:	approx.	210.0	diesel
Front axle - central housing:	approx.	11.5	transmission oil
Front axle - wheel hub:	approx.	2.35	transmission oil, each
Rear axle - central housing:	approx.	10.5	transmission oil
Rear axle - reduction gearbox:	approx.	3.4	transmission oil
Rear axle - wheel hub:	approx.	2.35	transmission oil, each
Service brake:	connected to the hydraulic system		
Cooling agent:	approx.	46.0	water with anti-corrosive and anti-freeze agent

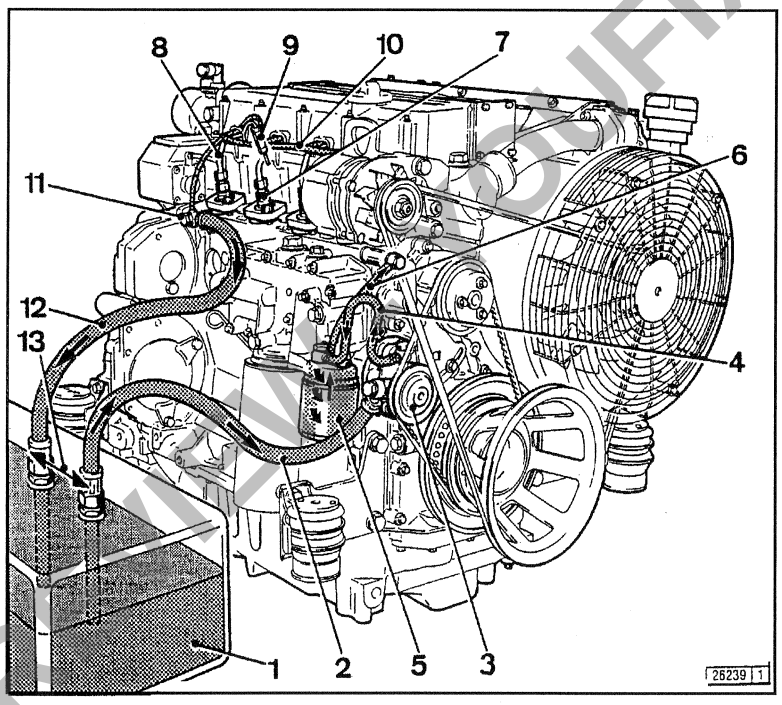
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BF4M 1012 E



1 Oil pan
2 Air intake manifold
3 Lube oil pump
3a Back leak fuel valve
3b Pressure-relief valve
4 Lube oil cooler
5 Lube oil filter
6 Main oil gallery
7 Crankshaft bearing
8 Conrod bearing
9 Camshaft bearing
10 Line to spray nozzle
11 Spray nozzle for piston cooling
12 Tappet w/ control bore for pulse lubrication of rocker arms
13 Pushrod (designed for lube oil supply of rocker arms)
14 Rocker arm
15 Return line to oil pan
16 Oil sensor
17 Oil line to exhaust turbocharger
18 Exhaust turbocharger
19 Oil line to compressor or hydraulic pump
20 Compressor
21 Hydraulic pump
22 Return line to compressor or hydraulic pump
23 Line to mass balancing gear (2x)
24 Counterbalancing shafts
25 Exhaust turbocharger return to crankcase

Lube Oil Circuit Schematic
1012 / 1012 E



1 Fuel tank
2 Line to fuel pump
3 Fuel pump
4 Line to fuel filter
5 Fuel filter
6 Line to injection pumps
7 Injection pump
8 Line to injector
9 Injector
10 Back leak fuel pipe
11 Banjo bolt with pressure-regulating valve
12 Return line to fuel tank
13 Keep this spacing as wide as possible

Fuel System Schematic

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SUBGROUP LIST

Hydraulic system

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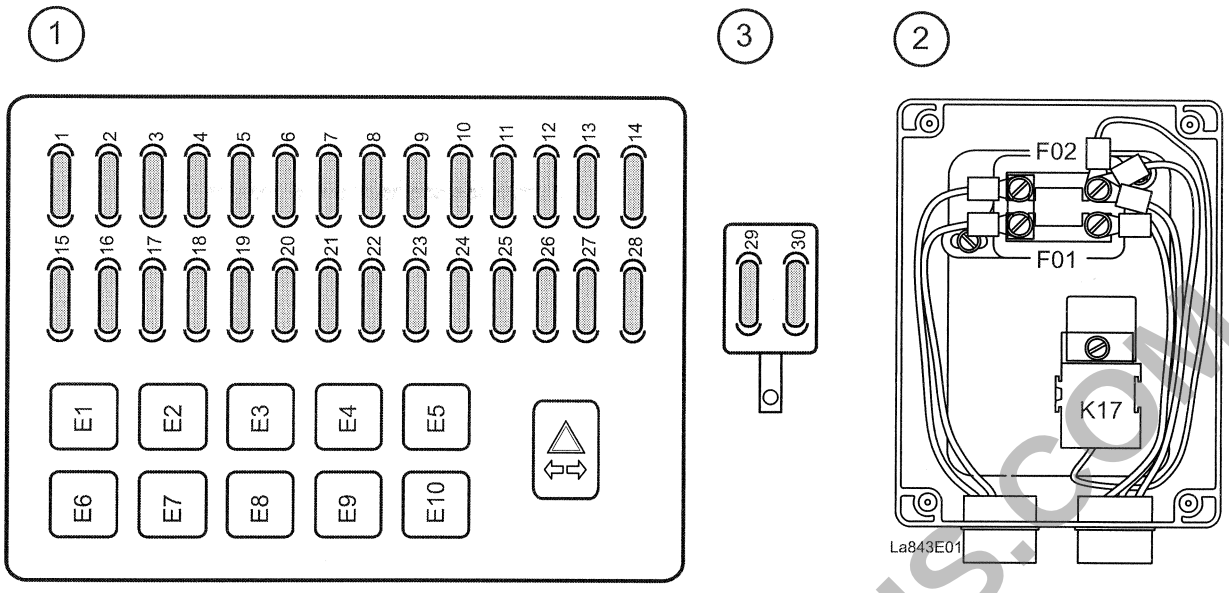
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1 = fuse and relay box.....seat console, bottom right

2 = starter box .....engine compartment dividing wall - tank, right

3 = fuse box .....behind fuse and relay box (pos. 1)

Location	Relay	Function
E 1	--	not assigned
E 2	K 2	Starting safety
E 3	K 3	Travel, reverse
E 4	K 4	Travel, forward
E 5	K 5	Float position
E 6	K 6	Additional valve
E 7	K 7	Additional valve
E 8	K 8	Brake inching
E 9	K 9	Working floodlights, front
E 10	K 10	Working floodlights, rear
	K 11	Flasher transmitter
	K 17	Start-up
	K 18	Pre-heating time control (engine compartment dividing wall - near generator)

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SCHAEFF	Typ/Model/Type **SKL 863**	Datum/Edition/Date **01.2000**
	Benennung/Description/Dénomination **Fuse and relay box - assignment diagram**	Blatt/Page/Feuille **7.11.01**

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Inspection plan

To be carried out by trained specialist dealer personnel

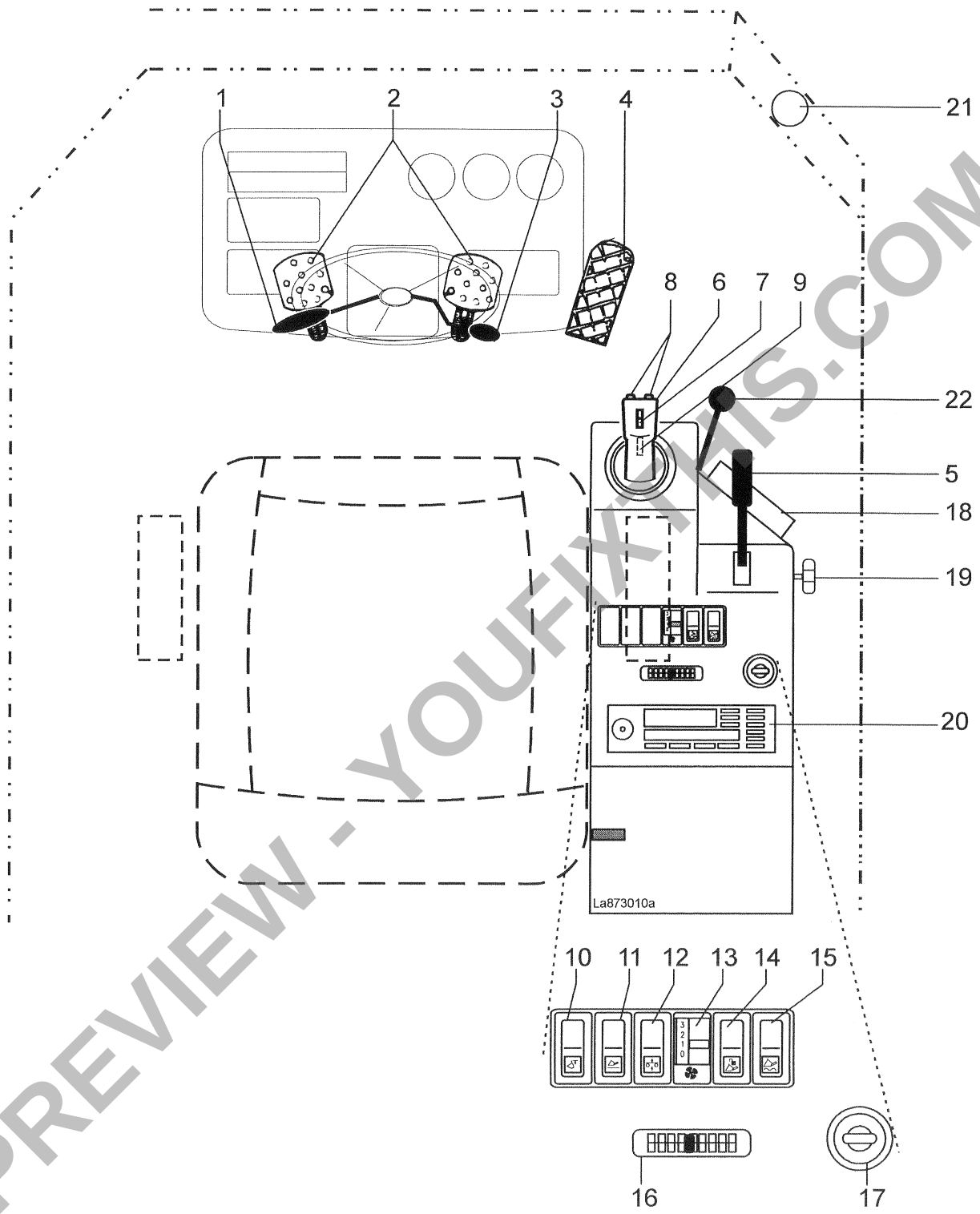
O = *Checking, maintenance* X = *Replacement*		Operating hours							min 2x year-ly	min 1x year-ly
	Perform work with machine at operating temperature	100	500	1000	1500	2000	2500	3000		
1	Check whether machine-specific instruction book is in the machine	O	O	O	O	O	O	O		
2	Change engine oil	X	X	X	X	X	X	X		X
3	Change engine oil filter	X	X	X	X	X	X	X		X
4	Drain water from fuel tank	O	O	O	O	O	O	O	O	
5	Change fuel filter		X	X	X	X	X	X		X
6	Clean fuel pump and screen	O	O	O	O	O	O	O		O
7	Check air intake	O	O	O	O	O	O	O		
8	Change air filter - main cartridge	**acc. to service indicator**								X
9	Change air filter - safety cartridge **1)**	**as required**								
10	Clean cooling fins of combined hydraulic oil/ water radiator. In case of high exposure to dust, shorten the cleaning intervals.	O	O	O	O	O	O	O		
11	Check antifreeze level in coolant									O
12	Change coolant **1)**	**as required**								
13	Check V-belt tension	O	O	O	O	O	O	O		
14	Check engine mounts and pump attachments	O	O	O	O	O	O	O		
15	Check engine speed adjustment, top-end and bottom-end idle speed	O	O	O	O	O	O	O		
16	Check valve lash of engine and adjust if necessary	O		O		O		O		O
17	Check condition of engine breather and clean **1)**					O				
18	Check acid level and connections of battery	O	O	O	O	O	O	O		
19	Clean dust filter for cab ventilation or replace	O	O	X	O	X	O	X		X
20	Check condition of tyres, tyre pressure and tightness of wheel nuts	O	O	O	O	O	O	O		
21	Check secure fastening of axles and cardan shaft	O	O	O	O	O	O	O		
22	Check bearing bushes and bolts of work equipment and replace if necessary	O	O	O	O	O	O	O		
23	Check bushes and bolts of the articulation and the articulated steering and replace if necessary.	O	O	O	O	O	O	O		
24	Check that door catches function perfectly, replace if necessary	O	O	O	O	O	O	O		

1) at least every 2 years

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Operator controls and display elements



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TEREX SCHAEFF	Typ/Model/Type **SKL 873 SP** **from s/n.: 873/0171 up to 873/0273**	Datum/Edition/Date **01.2004**
	Benennung/Description/Dénomination **Operation**	Blatt/Page/Feuille **9.13.03**

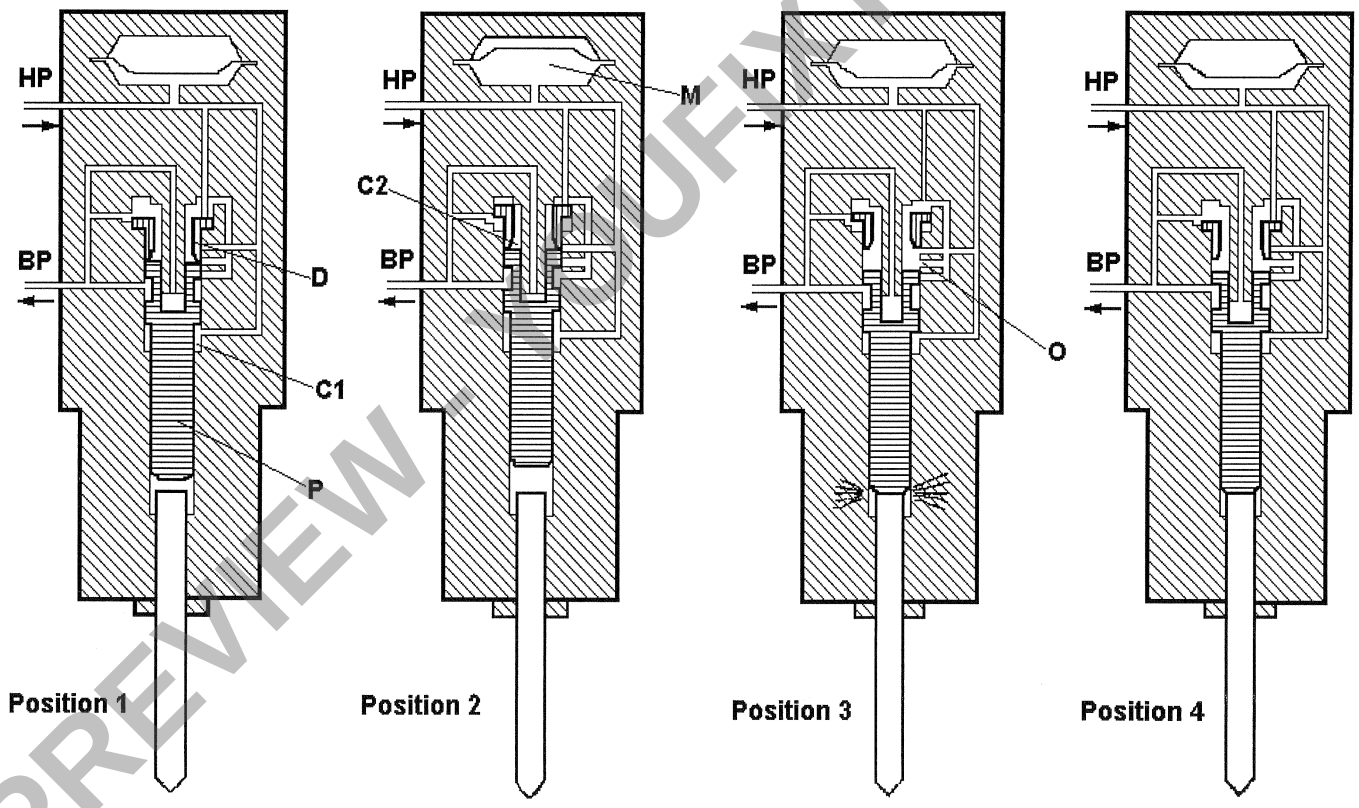
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Pos. 1
Hydraulic oil (HP) pushes the piston (P) upward via the chamber (C1).

Pos. 2
During this upward movement the piston (P) pushes the control valve (D) upward until stop.
At this moment the pressure increases in the chamber (C2) which is filled via a notch between the piston (P) and the control valve (D).
At the same time the membrane (M) is lifted and the nitrogen of the accumulator is compressed.

Pos. 3
The force applied on the upper part of the piston (P) increases in comparison to the lower part of the piston. This results in an accelerated downward movement, the oil quantity which also required in this case is supplied by the pressure accumulator.
In the course of this downward movement the piston (P) opens the channel (O) leading to a downward movement of the control valve (D). The piston (P) meets the chisel on its long way down.

Pos. 4
On its way the control valve (D) interrupts the filling of the chamber (C2).
Thus a connection with the return line (BP) is created.



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Overview of assembly tools for pistons with piston rings HR11 / HR12 / HR13 / HR14 / HR16 / HR18

Cylinder function	Cylinder number	Piston ϕ / Rod ϕ	Machine Type	Assembly Tool Number
Boom / Dipperstick	6 5005 400 00 6 5005 405 00 6 5005 410 00	70/35	HR11/12/13	6 9500 300 02
Dipperstick	6 5004 265 00	63/35	HR11/12	6 9500 300 01
Bucket	6 5004 811 00	63/40	HR11/12/13	6 9500 300 01
Dozer blade	6 5004 065 00	63/30	HR11/12/13	none

Cylinder function	Cylinder number	Piston ϕ / Rod ϕ	Machine Type	Assembly Tool Number
Boom	6 5006 375 00	80/40	HR14	6 9500 300 03
Dipperstick	6 5005 695 00	70/40	HR14	6 9500 300 02
Bucket	6 5005 835 00	70/35	HR14	6 9500 300 02
Articulation	6 5006 430 00	80/40	HR14/HR16	6 9500 300 03
Dozer blade	6 5007 297 00	90/40	HR14/HR16	none

Cylinder function	Cylinder number	Piston ϕ / Rod ϕ	Machine Type	Assembly Tool Number
Boom	6 5007 545 00	90/45	HR16	6 9500 300 04
Dipperstick	6 5005 845 00	70/45	HR16	6 9500 300 02
Bucket	6 5005 855 00	70/35	HR16	6 9500 300 02

Cylinder function	Cylinder number	Piston ϕ / Rod ϕ	Machine Type	Assembly Tool Number
Boom	6 5009 200 00	100/50	HR18	6 9500 300 05
Dipperstick	6 5007 870 00	90/55	HR18	6 9500 300 04
Bucket	6 5005 860 00	70/45	HR18	6 9500 300 02
Articulation	6 5007 870 00	90/55	HR18	6 9500 300 04
Dozer blade new	6 5011 470 00	110/50	HR18	none
Dozer blade old	6 5009 100 00	100/45	HR18	none

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SERVICE-MANUAL

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HR 31	HR 41
HS 41	HS 41 M
HS 41 MM	

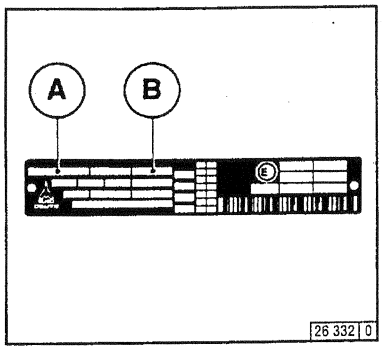
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5 Setting Instructions
6 Functioning Description
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01.2005
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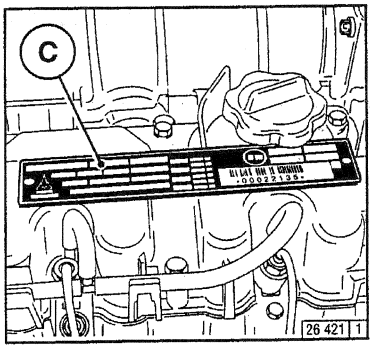
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Rating Plate



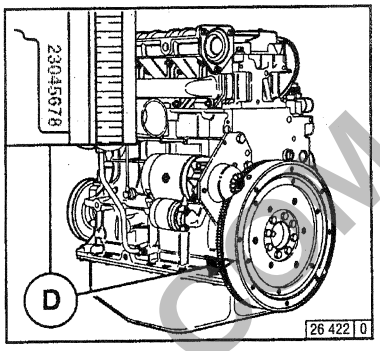
The model **A**, the engine serial number **B** and the performance data are stamped on the rating plate.
The model and engine serial number must be given when ordering parts.

Rating Plate Location



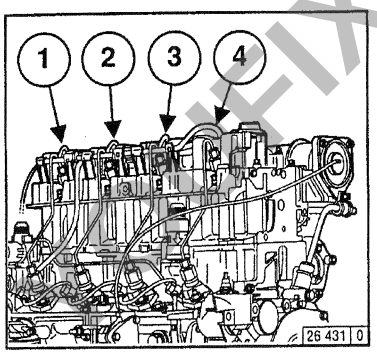
The rating plate **C** is attached to the valve cover.

Engine Serial Number



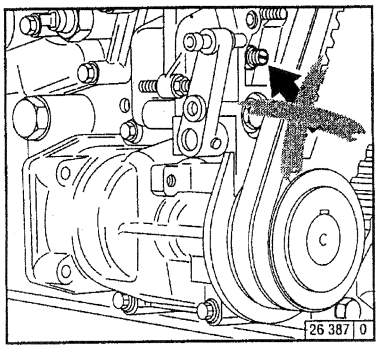
The engine serial number **B** is stamped on the crankcase **D** as well as the rating plate.

Cylinder Numbering



Cylinders are numbered consecutively, beginning at the flywheel end.

Fuel Delivery Lock



The manufacturer shall not be held liable for damages resulting from adjustments made to the regulator by the operator.
The lock screws are protected in order to prevent this:

1. with locking paint on model:
   torque balancer
2. with plastic protective cap on model:
   without torque balancer.

Adjustments to the regulator are to be carried out only by authorized DEUTZ SERVICE - specialists.

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SUBGROUP LIST

Hydraulic system

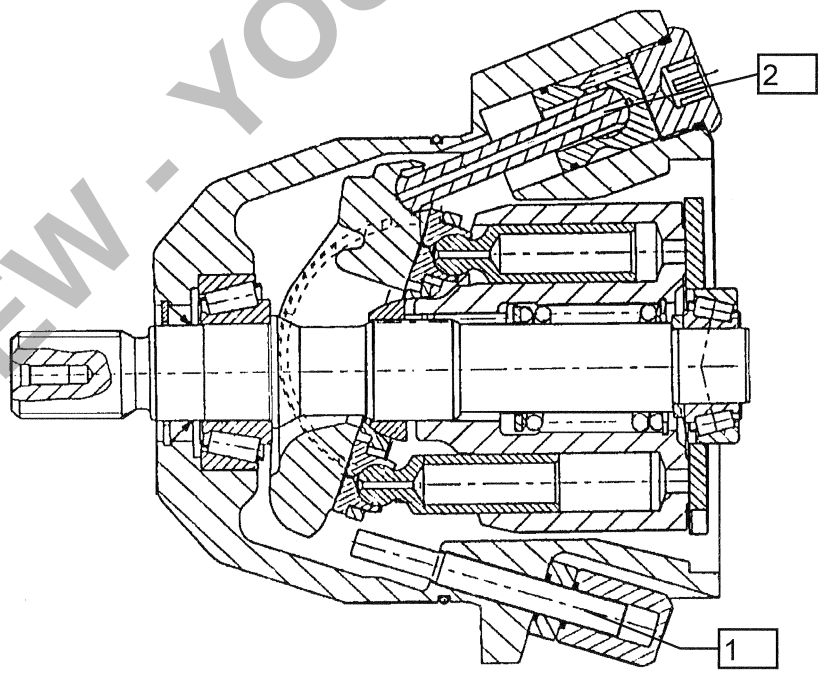
Diagrams - schemes

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- Operate the machine until it reaches a hydraulic oil temperature of + 60° C (jack up)
- Connect 600 bar - gauge to gauge port of the valve bank VOAC L90LS
- The circuit pressures have to be nearly identical in „forward“ and „reverse“ position as well as on the „right“ and on the „left“
- Circuit pressures: Travel range I approx. 100 bar with both tracks
  Travel range II approx. 120 bar with both tracks
- Apply colour markings at both travel gears (sprocket side)
- Set diesel engine to max. rpm (2,500 min^{-1})
- Select travel range I (tortoise)
- Adjust the spool stroke limitation at the valve bank VOAC L 90 LS in such a manner that an rpm value of 23 - 24 min^{-1} is reached at the sprocket when both tracks are operated „forward“ and „reverse“
- Setting of travel range II (rabbit) **(up to serial no. 121/0160)**
  Adjust swash plate stop bolt (1) at the right and left travel motor in such a manner that a value of 42 min^{-1} is reached at each sprocket
- Travel range II (rabbit) **(from serial no. 121/0161)**
  not adjustable any more. There is no setscrew (1).



1 - swash plate stop bolt
2 - piston quick / slow

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SUBGROUP LIST
Functioning description

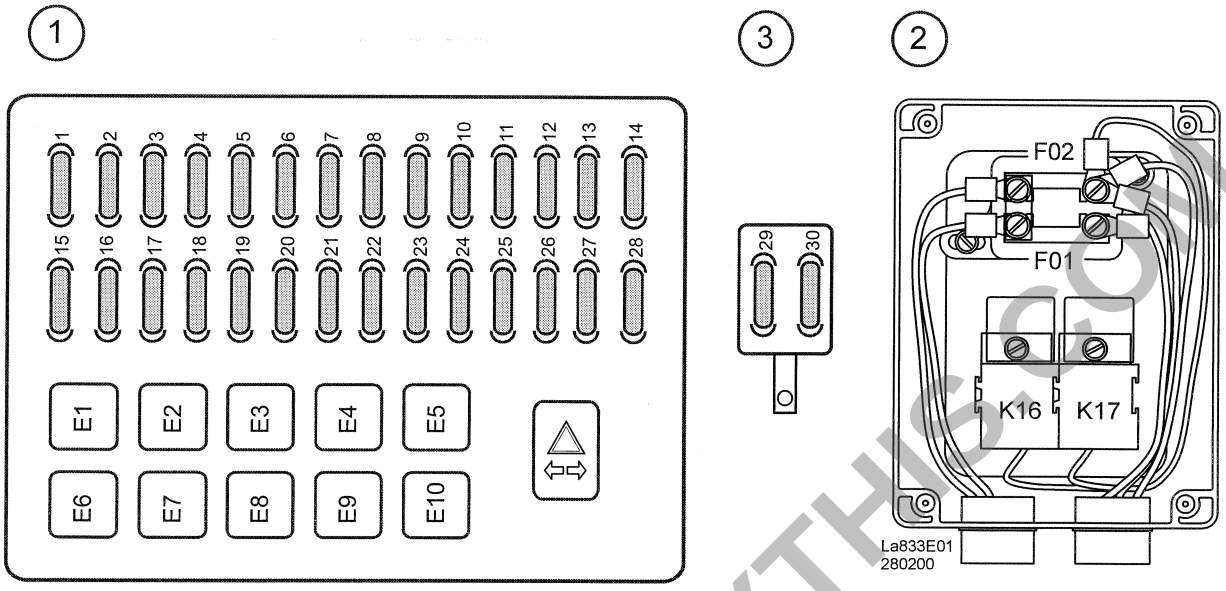
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Electrical system

Fuse and relay box - Assignment diagram



1 = Fuse and relay box ..... Seat console, right, bottom

2 = Starter box ..... Engine compartment dividing wall - tank side, right

3 = Fuse box ..... Behind fuse and relay box (pos. 1)

Location	Relay	Function
E 1	--	not assigned
E 2	K 2	Starting safeguard
E 3	K 3	Travel, in reverse
E 4	K 4	Travel, forward
E 5	K 5	Float position
E 6	K 6	Additional valve
E 7	K 7	Additional valve
E 8	K 8	Brake inching
E 9	K 9	Working floodlight, front
E 10	K 10	Working floodlight, rear
⇕▷	K 11	Flasher transmitter
	K 13	Pre-heat relay (engine compartment dividing wall - near generator)
	K 16	Shut-off
	K 17	Start-up

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Inspection plan
To be carried out by trained specialist dealer personnel

O = *Checking, maintenance* X = *Replacement*		Operating hours							min 2x year-ly	min 1x year-ly
Perform work with machine at operating temperature		100	500	1000	1500	2000	2500	3000		
1	Check whether machine-specific instruction book is in the machine	O	O	O	O	O	O	O		
2	Change engine oil	X	X	X	X	X	X	X		X
3	Change engine oil filter	X	X	X	X	X	X	X		X
4	Drain water from fuel tank	O	O	O	O	O	O	O	O	
5	Change fuel filter		X	X	X	X	X	X		X
6	Check air intake	O	O	O	O	O	O	O		
7	Change air filter - main cartridge	**acc. to service indicator**								X
8	Change air filter - safety cartridge **1)**	**as required**								
9	Clean cooling fins of combined hydraulic oil/water radiator. ⚠ *In case of high exposure to dust, shorten the cleaning intervals.*	O	O	O	O	O	O	O		
10	Check antifreeze level in coolant									O
11	Change coolant **1)**	**as required**								
12	Check V-belt tension	O	O	O	O	O	O	O		
13	Check engine mounts and pump attachments	O	O	O	O	O	O	O		
14	Check engine speed adjustment, top-end and bottom-end idle speed	O	O	O	O	O	O	O		
15	Check valve lash of engine and adjust if necessary			O		O		O		
16	Check injection nozzles **2)**			O		O		O		
17	Replace crankcase breather in valve cover **1)**					X				
18	Check acid level and battery connections	O	O	O	O	O	O	O		
19	Clean dust filter for cab ventilation and replace if necessary	O	O	X	O	X	O	X		X
20	Check condition of tires, tire pressure and tightness of wheel nuts	O	O	O	O	O	O	O		
21	Check secure fastening of axles and propeller shaft	O	O	O	O	O	O	O		
22	Check bearing bushings and bolts of work equipment and replace if necessary	O	O	O	O	O	O	O		
23	Check bushings and bolts of the articulation and the articulated steering and replace if necessary.	O	O	O	O	O	O	O		
24	Check that door catches function perfectly, and replace if necessary	O	O	O	O	O	O	O		
25	Check electrical indicating and warning elements, and lighting system	O	O	O	O	O	O	O		

1) at least every 2 years

2) every 3,000 operating by trained personnel

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SUBGROUP LIST

Operation

SKL 823	9.03
SKL 823 Basic	9.04
SKL 833	9.05
SKL 833 Basic	9.06
SKL 843	9.07
SKL 853	9.09
SKL 877	9.15
SCL 515	9.20
SKS 633	9.35
SKB 2000	9.45
SMB 2041	9.46
HML 21	9.48
HML 51S	9.54
HR 21	9.62
HR 22	9.63
HR 31	9.64
HR 41	9.66
HS 41	9.84
HS 41M	9.85

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In this Service Manual the individual components of the Schaeff construction machinery range as well as the functions and adjustments of the aggregates installed are described.

The hydraulic and electrical diagrams as well as cut-off views in connection with the operating manual and parts catalogue are to facilitate the repair and maintenance work.

We have purposely left out assembly and working steps as major repairs are normally carried out by experienced and qualified workshop personnel familiar with these type of repairs.

When carrying out a repair, safety and cleanliness at the workplace are essential. The use of excellent tools and the replacement of sealing parts at every repair should be self-evident.

Unless any special values are indicated, screw fittings are to be tightened using correct torque specifications.

This Service Manual is issued by the Customer Service Department of Messrs. Schaeff. It is to develop the after-sales service of Schaeff construction machinery together. The Service Bulletins we issue for your information can serve as a supplement.

This Manual is kept up-to-date through periodic supplements.

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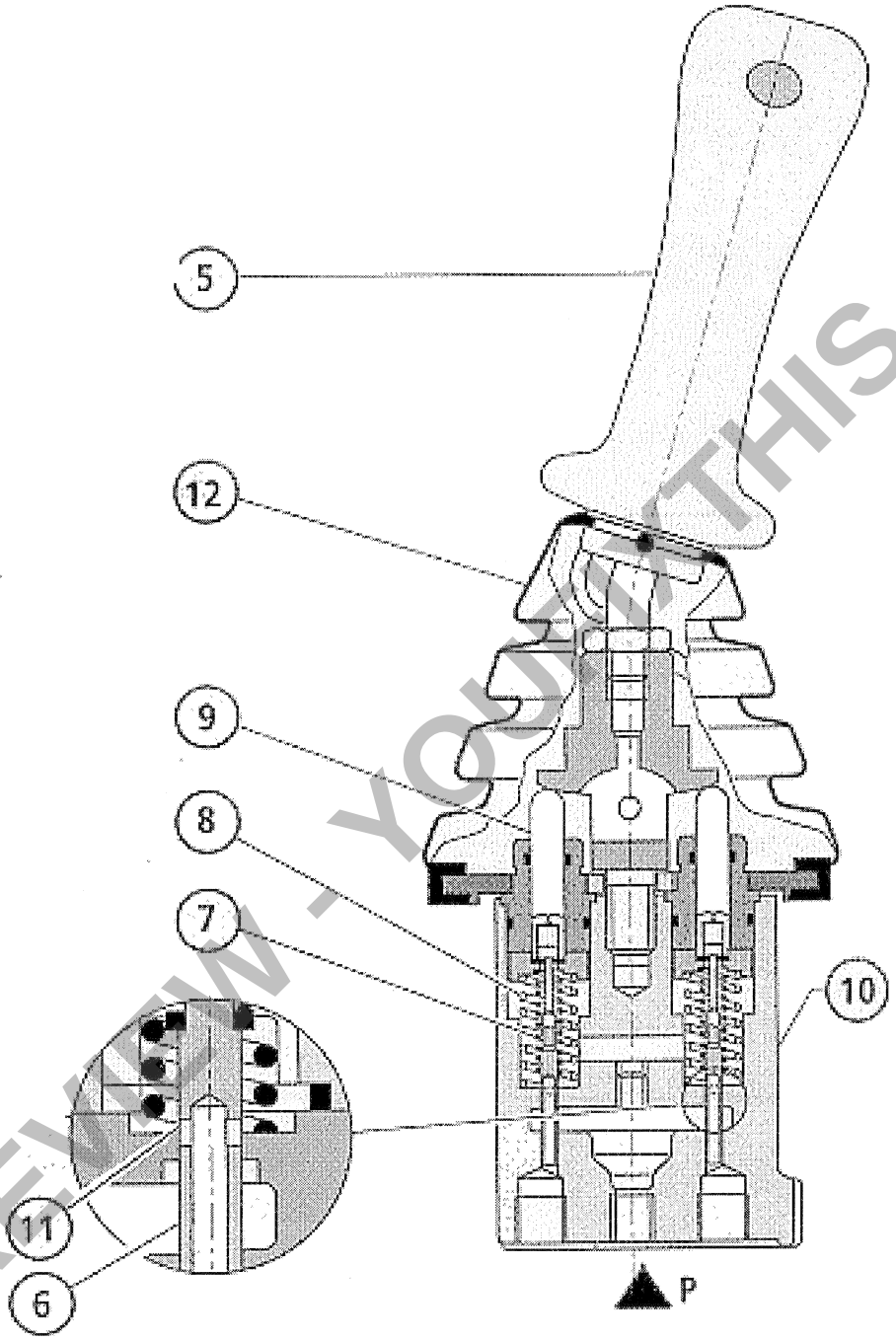
Pos. Item Rep. No.	Deutsch	English	Français
01	Drehdurchführung	Rotary transfer	Joint tournant
02	Verstellmotor - *Fahren*	Variable displacement motor - *travel*	Moteur à cylindrée variable - translation
03	Hydraulikzylinder – Abstützen	Hydraulic cylinder – outrigger	Vérin hydraulique - stabilisateur
04	Betriebsbremse - Kreis 2 *Hinterachse*	Service brake - circuit 2 *rear axle*	Frein de service - circuit 2 *essieu AR*
05	Betriebsbremse - Kreis 1 *Vorderachse*	Service brake - circuit 1 *front axle*	Frein de service - circuit 1 *essieu AV*
06	Hydraulikzylinder– Lenken *Vorderachse*	Hydraulic cylinder - steering *front axle*	Vérin hydraulique - direction *essieu AV*
07	Federspeicherzylinder - Feststellbremse	Spring loaded cylinder - parking brake	Cylindre à ressort accumulé - frein de stationnement
08	Wegeventil *Pendelachsverriegelung*	Control valve *oscillating axle lock*	Distributeur *verrouillage de l'essieu oscillant*
09	Hydraulikzylinder - Pendelachsverriegelung	Hydraulic cylinder – oscillating axle lock	Vérin hydraulique - verrouillage de l'essieu oscillant
10	Belüftungsfilter	Vent valve	Filtre d'aération
11	Rücklauffilter	Return filter	Filtre de retour
12	Saugfilter	Suction filter	Filtre d'aspiration
13	Rücklaufsammler **5bar**	Return line collector **5bar**	Collecteur de retour **5bar**
14	Abschaltventil	Shut-off valve	Valve de coupure
15	Drossel	Throttle	Etrangleur
16	Öltemperaturregler	Oil temperature regulator	Régulateur de température d'huile
17	Ölkühler	Oil cooler	Refroidisseur d'huile
18	Dreifachzahnradpumpe	Triple gear pump	Triple pompe à engrenages
19	Dieselmotor	Diesel engine	Moteur diesel
20	Vorsteuergerät – Fußpedal *Fahren*	Pilot-operated valve – pedal *travel*	Distributeur à commande assistée - pédale *translation*
21	Verstellpumpe – *Fahren*	Variable displacement pump - *travel*	Pompe à débit variable - translation
22	Verstellpumpe – *Arbeiten*	Variable displacement pump - *working*	Pompe à débit variable - *équipement*
23	Drehwerkgetriebe *Drehantrieb*	Swing gear *swing drive*	Reducteur d'orientation *entraînement d'orientation*
24	Hydromotor *Drehantrieb*	Hydraulic motor *swing drive*	Moteur hydraulique *entraînement d'orientation*
25	Relaisventil *Schwenkbremse*	Relay valve *swing brake*	Clapet-relais *frein d'orientation*
26	Wegeventil **Y22** *Schwenkdruckhochschaltung*	Solenoid valve **Y22** *high torque swing*	electro-vanne **Y22** *élevation pression d'orientation*
27	Sammler	Collector	Collecteur
28	Wechselventil	Shuttle valve	Selecteur

Typ / Model / Type / Tipo	HML 42	ab Fz.-Id.nr.. 4200 / 0100 HYDRAULIKSCHALTPLAN from s/n: 4200 / 0100 HYDRAULIC DIAGRAMM à partir du n/s: 4200 / 0100 PLAN HYDRAULIQUE desde el no.: 4200 / 0100 PLANO HIDRAULICO	Datum / Edition / Date / Fecha	01.2004
Benennung / Description / Dénomination / Denominación	**Legende Legend Légende Leyenda**		Blatt / Page / Feuille / Página	4.53.12

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Pilot-operated valve type 4 TH 5

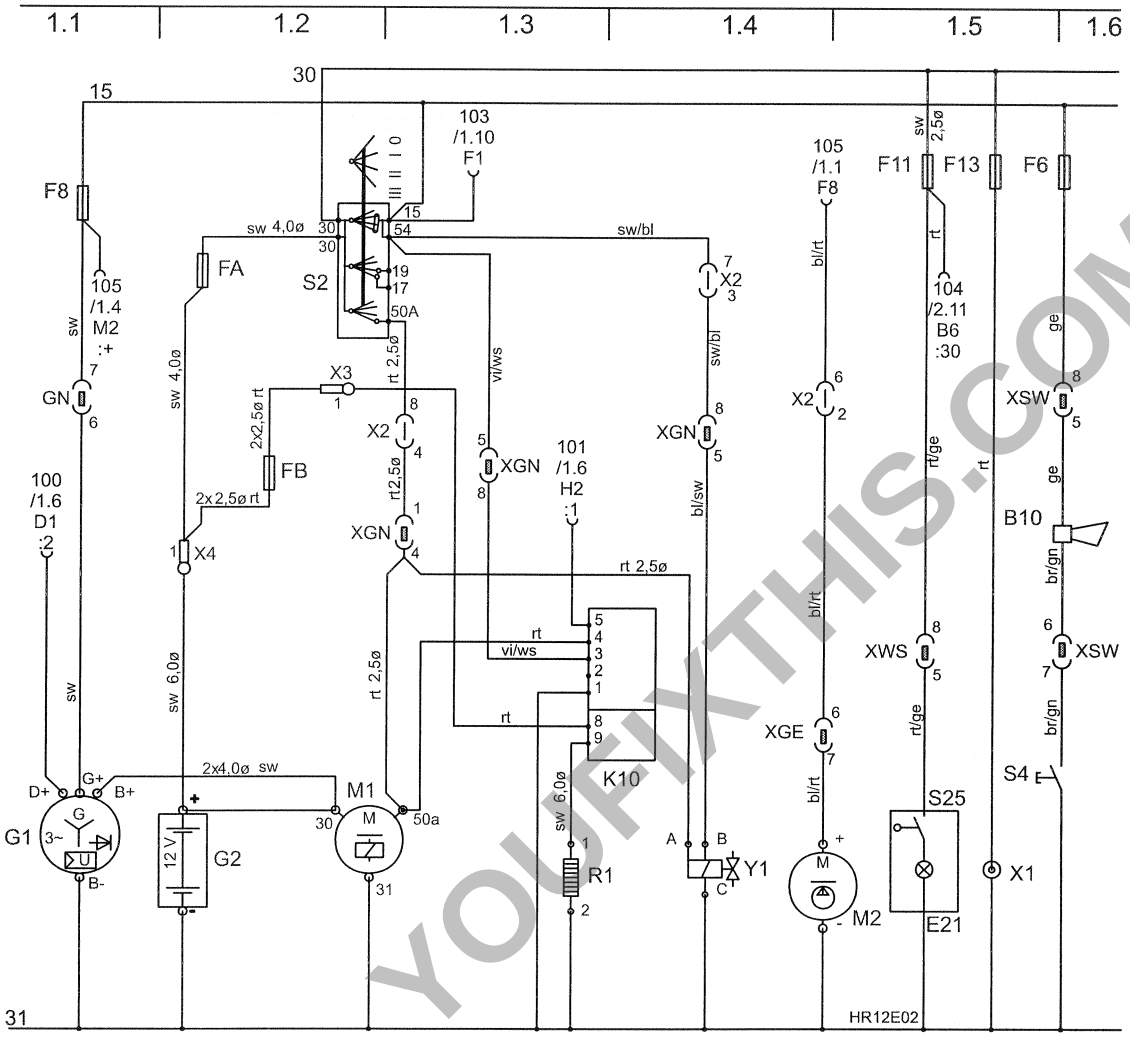


6.100.02/01.2000

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1 Power supply	2 Start-up & pre-heat system	3 Engine shut-off, fuel pump	4 Internal light, socket, horn



Section Qty.	Desig-nation	Device
1		***Power supply***
1.1	G1	Generator
1.2	G2	Battery
1.1	N2	Fuel pump, generator
2		***Start-up, pre-heat system***
1.2	S2	Pre-heat/ starter switch
1.2	FA	Main fuse
1.2	FB	Fuse, pre-heat system
1.3	K10	Pre-heating time control unit
1.3	R1	Glow plugs
1.2	M1	Starter

Section Qty.	Desig-nation	Device
3		***Engine shut-off, fuel pump***
1.4	Y1	Engine shut-off
1.4	M2	Fuel pump
4		***Internal light, socket, horn***
1.5	F11	Internal light, radio
1.5	E21, S25	Internal light
1.5	F13	Fuse, socket
1.5	X1	Socket
1.6	S4	Horn button
1.6	B10	Horn

SCHAEFF	Typ/Model/Type **HR 14 (from serial no. 356/1431)**	Datum/Edition/Date **01.2000**
	Benennung/Description/Dénomination **Wiring diagram**	Blatt/Page/Feuille **7.76.02**

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- check the piston rod for damage, replace if necessary

- check both bearings, item 3, for wear and tear, replace if necessary

- remove the old seals

Attention:
- do not damage the seal surfaces at the bushing and piston when removing the old seals

- replace all seals and rub with oil

Carry out the assembly in reverse order

- clean the piston rod thread (free from grease)

- screw the new nut (free from grease) item 6 onto the piston rod, secure with Loctite 270.
  Tightening torque of nut: 450 Nm

- check the inside of the cylinder barrel for scratches, damage, bulges, etc.

- insert the piston rod into the cylinder barrel

- grease the thread of the bushing

- screw the bushing in the cylinder barrel
  Tightening torque: see chapter 1

- mount the cylinder, connect it and move it carefully and slowly to end stroke (on both sides)

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SUBGROUP LIST
Electrical system
Fuse assignment diagrams / wiring diagrams

SKL 823	7.03
SKL 823 Basic	7.04
SKL 833	7.05
SKL 833 Basic	7.06
SKL 843	7.07
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