

INSTRUCTION MANUAL
&
SPARE PART LIST

LW 230 E

&

LW 280 E



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LW 230 E & LW 280 E

Technical Data	LW 230 E	LW 280 E
Delivery Capacity:	230 l/min	280 l/min
Max. Working Pressure:	350 bar / 5,076 psi	350 bar / 5,076 psi
Compressor RPM:	1060 min ⁻¹	1300 min ⁻¹
Number of Cylinders:	3	3
Drive Motor RPM:	2890 min ⁻¹	2890 min ⁻¹
Power Output:	5.5 kW	7.5 kW
Main Voltage: <i>(Special Windings on Request)</i>	400 V / 3-Phases / 50 Hz	400 V / 3-Phases / 50 Hz
Dimensions:		
Depth:	600 mm	600 mm
Width:	1006 mm	1006 mm
Height:	980 mm	980 mm
Weight:	ca. 220 kgs	ca. 220 kgs



S P E C I F I C A T I O N

- Automatic Dewatering System
- Automatic End-Pressure Stop
- Start-Stop Operation (*incl. adjustable pressure ranges*)
- All-electrical Computer Control System **LW ECC**
- Start / Delta Start
- Emergency Stop Switch
- Pressure Maintaining / Non-Return Valve
- Stainless Steel Water Separators
- High Pressure Filter Housing mounted on Inside of Cabinet
- Automatic Pressure Release after switching off Unit
- Plastic coated Steel Housing
- Filling devices: depends on customer requirements
- Compact Dimensions

Breathing Air Quality according to:
DIN 3188 - EN 12021 - ISO 2533 - BS 4001 & BS 4275

S A F E T Y P R E C A U T I O N S

General Notice

This instruction manual contains the operation and maintenance procedures necessary to safely run your L&W compressor. We strongly recommend to read this manual thoroughly prior to operation and follow all the safety precautions precisely. Damage resulting from any deviation from these instructions is excluded from warranty and liability for this product. Be sure to pay attention to the following points:

- Fill only tanks with a valid hydrostatic test date
- Never exceed the working-pressure rating indicated on the tank
- Do proper maintenance to the filtration system
- Avoid contaminated air to reach the air intake
- Do not exceed maximum operation temperatures

Safety Precautions

- Read the operation manual of your compressor carefully
- Allow only qualified personell to run the compressor
- Do not place any objects on compressor while in operation
- Make sure no person or object can accidentally touch any moving parts while running
- Take care that the intake-air is pure and free of toxic gases
- All work on compressor must be carried out while compressor is plugged off and depressurized
- Check unit regularly for air- & oil leaks
- Never weld damaged high-pressure tubes
- Filling-hoses must be in perfect condition; special attention should be paid to the connecting fittings
- Always disconnect power-cable prior to any work
(*unit can start automatically in "automatic mode"!*)
- Do not touch any highly temperated compressor parts while doing maintenance work. Wait till unit is cooled down.

Installation

The compressor should only be connected by a qualified electrician.
Use a 16 Ampere plug for installation.

NOTE:

Check direction of rotation immediately after the first start. If it is wrong the pistons may cease due to lack of lubrication! Furthermore the unit would not be cooled properly. When facing the front of the compressor - direction of rotation should be anti-clockwise.

Always ensure good room ventilation and pure intake air!

Breathing Air Compressor LW 230 E & LW 280 E



F U N C T I O N A N D O P E R A T I O N

Electronic Drive Motor

Compressor units can be delivered with various drive motors depending on customer requirements. Standard specification is:

5,5 kW (LW 230 E) / 7,5 kW (LW 280 E)

400 V / 3-Phases / 50 Hz, rpm 2890 min⁻¹. - *special windings on request* -

How to tension the V-belts

Attention: Always disconnect main plug before starting any maintenance work
(Compressor can start automatically if in automatic mode!!)

- Stop compressor & disconnect main plug
- Remove front door
- Loose nuts of motor flange (*use 17mm spanner*)
- Adjust tensioning bolt till correct V-belt tension is achieved
- Tighten nuts of motor flange
- Check tension of V-belts (*readjust if necessary*)

ATTENTION:

Unsufficient V-belt tension leads to higher vibrations and increases the noise level while running. Replace faulty V-belts immediatly.

Automatic Dump System

LW 230 E & LW 280 E compressors come as standard with an auto dump system. Two solenoids open and drain three condensate separators (about every 15 minutes). We recommend the use of a 20 litre container to collect all condensate. It can then be disposed of like discarded oil. The drain noise is kept to a minimum with a silencer.

Intake Filter

A micro filter cartridge is used as an air intake filter. We recommend to replace it every 100 working hours (*depends on pollution*) but at least every two years.

A dirty, contaminated filter restricts the airflow, reduces the compressors capacity and causes overheating.

Cylinder Heads and Valves

Inlet and outlet valves are located inside the cylinder heads. The inlet valve opens on the down stroke. The outlet valve opens on the upstroke. All valves should be replaced after 1,500 working hours due to normal wear and tear. To replace valves the cylinder heads have to be removed. All three valves are combined valves. Inlet and outlet valves form one unit. The first stage valve is of plate valve design. The second & third stage valves use a spring operated piston inside a brass cylinder, sealing is done by alloy-ring & cap. To change valves no special tools are required

(2nd & 3rd stage valves have a M6 thread in the body centre, use a bolt to pull out)

Lubrication

The crankshaft & 1st stage cylinder are lubricated by oil splash.

2nd & 3rd stage cylinders are lubricated by mechanical oil pump.

1.8 litre of synthetic compressor oil (order no. LW 000001) is required for an oil change.

NOTE: Oil level should be at least at middle of oil level indicator glass (*non-running machine*) - located on the crankcase

Starting the Compressor for the first Time

- Place the compressor on even ground (air temperature max. +40°C)
- Connect cable & main plug
- Check compressor oil level
- Check if air filter cartridge is in place
- Make sure all filling valves are closed
- Start compressor by key 1
- Check direction of rotation - immediately after the start
- Check “Stop Pressure“ (*see menu page M320*)
- Run compressor to stop pressure
- Check if unit stops
- Restart compressor by key 1
- Check compressor unit for air leaks by “Test Stop without Venting“ (*M440*)
- Check auto dump system for function
- Release pressure by filling valves (*Filling Pressure: 0 bar*)

Safety Valves

Every pressure-stage is equipped with its own safety valve. They protect the unit from over -pressure / load. Safety valves are adjusted to:

1st Stage: 8 bar

2nd Stage: 60 bar

3rd Stage: final pressure

If a safety valve blows it usually indicates problems with either inlet or outlet valve of the following stage.

NOTE: A faulty safety valve has to be replaced immediately!

Oil / Water Separator

Oil / water separators (condensate separators) are fitted after every compression stage which were automatically drained every 15 minutes [*by solenoids (auto dumps)*]. Integrated sinter filters protect the compressor system from unwanted deposits. We recommend to clean the separator bodies & replace the sinter filters (plus required O-rings) every 1000 working hours.

Final Air Purifier (Mole Carbon Filter)

The mole carbon filter housing is mounted to the front side of the compressor cabinet *capacity: 1.7 litre, P_{max}: 350 bar*. Inside the filter housing a jet blows air to the housing body. Oil and water mist condenses and flows to the bottom of the housing. Air then flows through the mole carbon filter cartridge, which purifies the air from moisture and odours.

See chart for intervals:

LW 230 E	1.7 ltr. Housing:	every 71 hours	((@ +20°C)
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LW 280 E	1.7 ltr. Housing:	every 57 hours	((@ +20°C)
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Furthermore the filter life strongly depends on humidity and air temperature. Cartridges are vacuum packed. We recommend to open them just before they will be fitted to the compressor, as they could be saturated with moisture just being exposed to high humidity. To change the filter cartridge stop the compressor. It will then automatically release all remaining air pressure. This can take up to two minutes. Once the unit is depressurized the filter housing cap can be unscrewed with the T-shaped filter tool delivered with the compressor. If any pressure remains in the housing, it will be almost impossible to open the filter housing cap. The filter itself can also be unscrewed with the filter tool to be replaced by a new one. Screw cap on hand tight.

Pressure Maintaining / Non Return Valve

A pressure maintaining / non-return valve is fitted after the mole carbon filter housing. It makes sure that all air leaving the filter system has at least 160 bar - optimising the effectiveness of the filter.

Maintenance

Compressor oil level has to be checked daily.

Compressor oil change intervals:

1st oil change after 25 working hours

2nd oil change after 75 working hours

and subsequently every 200 working hours - but at least once a year -

Only use synthetic compressor oil (order number LW 9001).

About 1.8 litre of oil is required for an oil change.

The mole carbon filter cartridge has to be changed regularly

(see change of mole carbon filter cartridge)

-
- Check connections for leaks every 20 working hours
 - Change inlet air filter every 100 working hours
 - Open & clean condensation separators (first and second stage) every 1000 working hours
 - Replace inlet / outlet valves every 1500 working hours

Trouble Shooting

Compressor does not reach end-pressure

- Check for air leaks on pipe connections, solenoids & heat exchangers
Replace seals or tighten connections
- Check safety valves for air leaks
Replace immediately

Delivery capacity is decreasing

- V-belt tension incorrect: *Adjust or replace*
- Inlet air filter dirty: *Replace*
- Inlet / outlet valves leaking: *Clean or replace*
- Pistons, piston rings and / or cylinders worn: *Replace faulty parts*

Blowing safety valve of 1st / 2nd stage

- Inlet or outlet valve of the following stage is faulty: *Clean or replace*
Do never attempt to adjust or repair safety valves!

Oil smell in the air

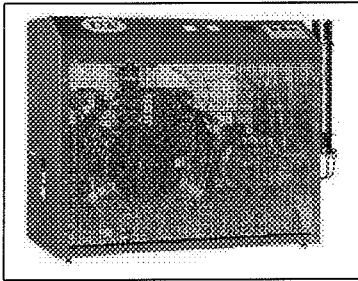
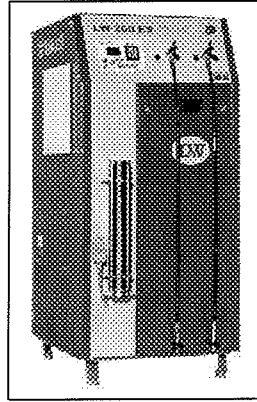
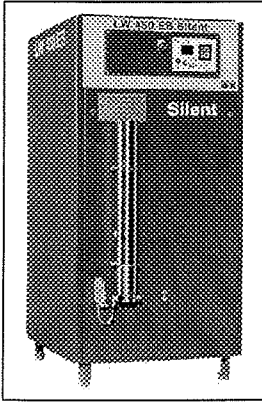
- Mole carbon filter cartridge is saturated: *Replace immediately*
- Use of wrong type of oil: It is important to use synthetic compressor oil

Compressor runs too hot

- Poor room ventilation: *Room temperature should not exceed +40°C*
- Cooling air in-/outlet is restricted
- Air intake filter is dirty: *Replace*
- Intake hose is too long or too small in diameter
- Faulty inlet / outlet valves: *Clean or replace*
- Wrong direction of rotation



FILTER CARTRIDGE REPLACEMENT INSTRUCTION SHEET L&W STATIONARY COMPRESSORS



For the periodic filter cartridge change, please follow the time schedule in the instruction manual or the PURACON humidity control indication;
Only use the original filtercartridges 8005 and 8022 (8022 only for the 450 EF Low Noise type)

Do not open the sealing of the new filter cartridge yet !

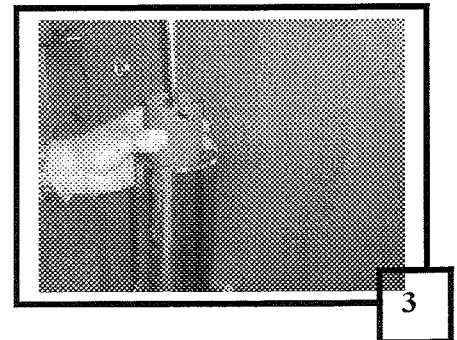
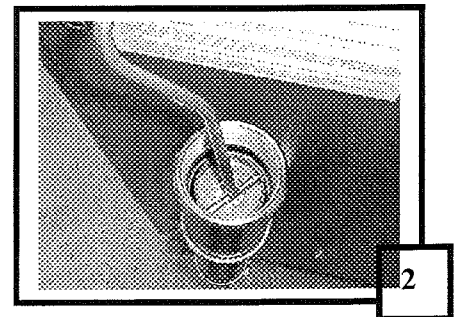
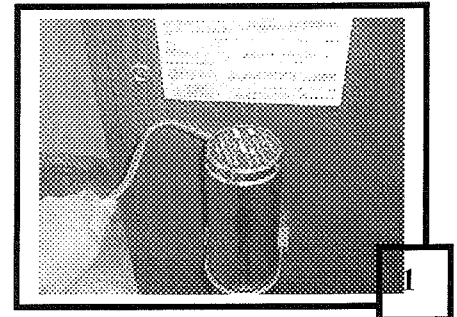
Before changing the filter cartridge, be sure the compressor is switched off and cannot be inadvertently started. Disconnect it from the power supply or remove the key from the starter (Diesel types).

After switching off the compressor, the automatic drain opens and the pressure in filter housing will be released, this can take up to two minutes.

If only a hand operated drain is mounted, the drain valve of the combined separator / filter housing after the third stage has to be opened to release the pressure.

Filter cartridge replacement:

- Unscrew the filter housing cap anti-clockwise, first with the special cartridge key and then by hand (1)
- Place the other end of the cartridge key in the filter cartridge inside the filter housing (2)
- Unscrew the filter cartridge anti-clockwise and pull the cartridge out of the housing (3)
- Open the packing of the new filter cartridge and place it with the cartridge key in the filter housing (3)
- Screw in the new filter cartridge with the cartridge key hand tight (2)
- Refit the cap of the filter housing clockwise, first by hand and then with the filter key, hand tight (1)
- Close the drain valve of the separator / filter housing if only the hand operated drain is mounted



The filter cartridge replacement is now completed, ensure the old filter cartridge is disposed of correctly at an approved waste point.

Conservation of Compressor

If the compressor will not be used for a long period of time the following steps should be carried out:

- Run compressor for about 10 to 15 minutes
 - Open filling valves and let compressor run for another five minutes
 - Turn compressor off - *Auto dumps will automatically release condensate* -
 - Close all filling valves
 - Open the mole carbon filter housing. Lubricate thread with Vaseline and close the housing (used filter cartridge can remain inside)
 - Compressor should be stored dry & dust free
-

Re-starting the compressor (after conservation)

Before re-starting the compressor the following steps should be carried out:

- Change oil (if the compressor was out of use for more than 12 months)
- Check air intake filter
- Replace the mole carbon filter cartridge
- Check oil level
- Start compressor by green push button
- Run the compressor with open filling valves for 5 minutes
- Close filling valves
- Drive compressor up to 200 bar and check connections for leaks
- Drive compressor to final pressure
- Check if end pressure switch is working

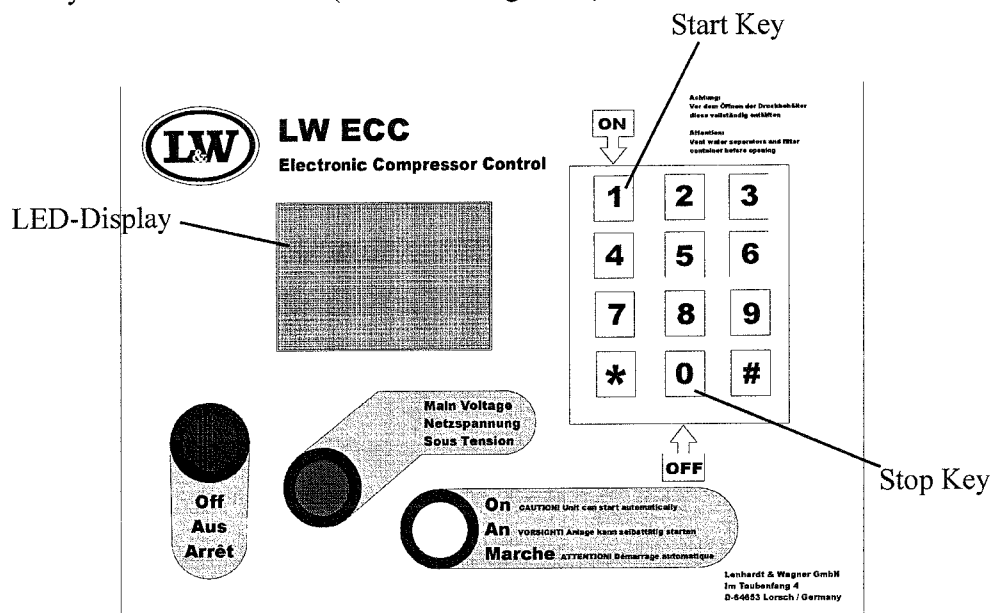
ELECTRONIC COMPRESSOR CONTROL LW ECC

LW 230 E & LW 280 E compressors are equipped with the all-electrical, computer supported control system **LW ECC**.

It is very easy to operate and allows multiple & individual settings.

Compressor Control System LW ECC

- Graphic capable LCD-Display with Keys
- Automatic- & Semi-Automatic Operation Mode
- Automatic Dump System
- Integrated Counter for Operation Hours
- Maintenance Intervals automatically displayed
- Spare Part Numbers automatically displayed
- Fully adjustable Pressure Ranges
- Easy to operate Menu
- Faults will be displayed
- Check of End-pressure Safety Valve possible
- Remote Controlled Maintenance / Fault Analysis by Modem possible
- Extentable by additional Modules (external Filling Panel)



Immediately after connecting the compressor, the ECC-display shows the following mainmenu:

MAINMENU

Charging	0 min	<i>Present filling time in minutes</i>
Total	0,0 h	<i>total operation hours</i>
Start : 1	Stop : 0	<i>Key 1 to start compressor / Key 0 to stop compressor</i>
Help: *	OFF	<i>* Key leads to submenus Current Operation State = Off</i>
End Press.	0 bar	<i>Present Filling Pressure</i>

The following keys are activated in this menu:

<i>Key</i>	<i>Function</i>
1	Start - Starts the compressor (any time)
0	Stop - Stops the compressor (any time)
*	Leads to the submenus

After typing *key the following menu appears:

SELECTION MENU

M100

Selection:	
2	Readings
3	Settings
4	Test
5	Statistics
6	Maintenance
7	Operation Mode
(M100)	Return : #

Key 2 lead to submenu "Readings"
Key 3 lead to submenu "Settings"
Key 4 lead to submenu "Test"
Key 5 lead to submenu "Statistics"
Key 6 lead to submenu "Maintenance"
Key 7 lead to submenu "Operation Mode"
Key # leads back to "Mainmenu"

[(M100) tells that you are presently on menu page 100]

Remark:

Beside the listed numbers, keys 1 + 0 are always activated to start / stop the compressor unit

READINGS MENU**M200****Readings:**

- 2 End Pressure
- 3 Press. Stage 1
- 4 Press. Stage 2
- 5 Temperature A
- 6 Temperature B
- 9 Close

(M200) Return : #

Key 2 shows the current filling pressure

*Key 3 shows the current pressure of the 1st stage**

*Key 4 shows the current pressure of the 2nd stage**

*Key 5 shows the current temperature of the 3rd stage**

*Key 6 shows the current temperature inside the cabinet**

Key 9 lead back to "Selection Menu"

Key # leads back to "Mainmenu"

** = Option*

[(M200) tells that you are presently on menu page 200]

SETTINGS MENU**M300****Settings:**

- 2 Stop Pressure
- 3 Restart Pressure

- 9 Close

(M300) Return : #

Key 2 leads to submenu "Set Stop Pressure"

Key 3 leads to submenu "Set Restart Pressure"

Key 9 leads to submenu "Selection"

Key # leads back to "Mainmenu"

Remark:

Restart pressure is only valid if compressors runs in automatic mode (see M700)

Set Stop Pressure**M320**

Set
Stop Pressure:

Actual: 330 bar

7 New Value:
>> XXX bar
(050, , 333)

8 Confirm

(M320) Return: #

Current stop pressure

Key 7 if stop pressure should be changed

XXX indicates modified stop pressure

Chooseable pressure range for stop pressure

Key 8 confirms new stop pressure

Key # leads back to "Mainmenu"

Set Restart Pressure**M330**

[only valid if compressor runs in automatic mode (M700)]

Set
Restart Pressure:

Actual: 180 bar

7 New Value:
>> XXX bar
(030, , 310)

8 Confirm

(M330) Return: #

Current restart pressure

Key 7 if restart pressure should be changed

XXX indicates modified stop pressure

Chooseable pressure range for restart pressure

Key 8 confirms new restart pressure

Key # leads back to "Mainmenu"

Remark:

Restart pressure must be at least 20 bar lower than current stop pressure

TEST MENU**M400**

Test:

2 Solenoids

3 Safety Valve

4 Test Stop

9 Close

(M400) Return : #

Key 2 leads to submenu "Test Solenoids"

Key 3 leads to submenu "Test Safety Valve"

Key 4 leads to submenu "Test Stop without Venting"

Key 9 leads back to submenu "Selection"

Key # leads back to "Mainmenu"

Test Solenoids**M420**

Test Solenoids:	
3	open
7	close
9	Close
(M420)	Return : #

*Key 3 opens solenoids**Key 7 closes solenoids**Key 9 leads back to submenu "Test"**Key # leads back to "Mainmenu"***Remark:**

This menu can not be left when solenoids are open (*reclose first by key 7*)

Test Safety Valve**M430**

Test Safety Valve:	
Close Filling Valves !	
5 Start	0 Stop
9 Close	
(M430)	Return : #

*Key 5 to start test**Key 0 to stop test**Key 9 leads back to submenu "Test"**Key # leads back to "Mainmenu"***Remark:**

Please close all filling valves /-panels before the test start. Compressor will run up to its maximum pressure, which is limited by the end-pressure safety valve. It will not stop at "Stop Pressure" (see menu M320).

Test Stop**M440**

Test Stop without Venting:	
5	Stop
6	Vent
Pressure	188 bar
9	Close
(M440)	Return : #

*Key 5 stops compressor during run
Key 6 vents compressor after test is finished
Shows current filling pressure
Key 9 leads back to submenu "Test"
Key # leads back to "Mainmenu"*

Remark:

This test can only be carried out after compressor has been started (key 1). The main reason for it is to check the unit for air leaks

STATISTICS MENU**M500**

Statistics	
Operation Hours:	15,2 h
Start Cycles:	48
Max Press	338 bar
9	Close
(M500)	Return : #

*Total operation hours of compressor unit
Total number of compressor starts
Maximum working pressure of unit (set by safety valve test)
Key 9 leads back to submenu "Selection"
Key # leads back to "Mainmenu"*

Remark:

Key 5 in this menu shows the version of the ECC software installed (M505)

MAINTENANCE MENU**M600**

Remaining Hours:	
Oil Change	14 h
Sinter Filt	989 h
Silencer	4989 h
Valves	5989 h
8 Change done	
9 Close	
(M600) Return : #	

Shows remaining hours of the components listed on left hand side (next oil change in 14 hours, ...)

Key 8 leads to submenu "Receipt Maintenance"

Key 9 leads back to submenu "Selection"

Key # leads back to "Mainmenu"

Remark:

System will display a message when any of the listed parts should be replaced, plus in addition the matching **L&W** spare part numbers.

Receipt Maintenance**M680**

Receipt Maintenance	
2	Oil Change
3	Sinter Filters
4	Silencer
5	Valves
9	Close
(M680) Return : #	

Key 2 receipts oil change

Key 3 receipts change of sinter filters

Key 4 receipts change of silencer

Key 5 receipts change of valves

Key 9 leads back to submenu "Remaining Hours"

Key # leads back to "Mainmenu"

Display confirms any reset of "Remaining Hours" with the following message:

Receipt Maintenance	
Operation Hours Meter Set!	
9	Close
(M680) Return : #	

Key 9 leads back to submenu "Remaining Hours"

Key # leads back to "Mainmenu"

OPERATION MODE MENU**M700****Operation Mode:**

2	Automatic
3	Semi-Automatic
4	Top Up
5	Language
9	Close
(M700)	Return : #

*Key 2 activates automatic mode (storage tanks)**Key 3 activates semi-automatic mode**Key 4 activates top up mode (option)**Key 5 leads to "Language Menu"**Key 9 leads back to submenu "Selection"**Key # leads back to "Mainmenu"***Remark:**

Current modes are displayed in fat letters

Attention:

Compressor can start automatically in automatic mode (depending on restart pressure, see M330).

Never work on a unit which is connected to main voltage

HAZARD:**Remove main plug before doing any maintenance work****Language Menu****M704****Language:**

2	German
3	English
4	French
5	Italian
6	
7	
(M704)	Return : #

*Key 2 activates german language**Key 3 activates english language**Key 4 activates french language**Key 5 activates italian language**Key 6 leads back to submenu "Operation Mode"**Key 7 leads back to submenu "Operation Mode"**Key # leads back to "Mainmenu"*



Warranty

Twelve Months Limited Warranty

Important:

For warranty claims this Warranty Registration form must be presented

L&W compressors are warranted against defects in workmanship and materials for a period of twelve months after purchase by the original owner, provided the compressor is run with synthetic compressor oil - subject to and in accordance with the terms and conditions set forth below:

This warranty does not cover damage to the product resulting from improper useage, improper maintenance, neglect of care, alteration or unauthorised repair. The warranty will automatically become void if proper preventive maintenance procedures have not been followed as outlined in the operations manual for this product.

If a claim under this warranty appears to be necessary, return the product, freight repaid, to your **L&W** dealer. Include your name, address and warranty registration. The claim will be honoured and the product repaired at no charge and returned in what your **L&W** dealer determines a reasonable amount of time, provided all necessary parts are in stock. All repairs not covered under the terms of this warranty will be made at the owners expense.

This warranty is non-transferable from the original owner.


The warranty will be extended for the time the product has been in warranty repair. This warranty and operations manual should be kept with the compressor at all times.

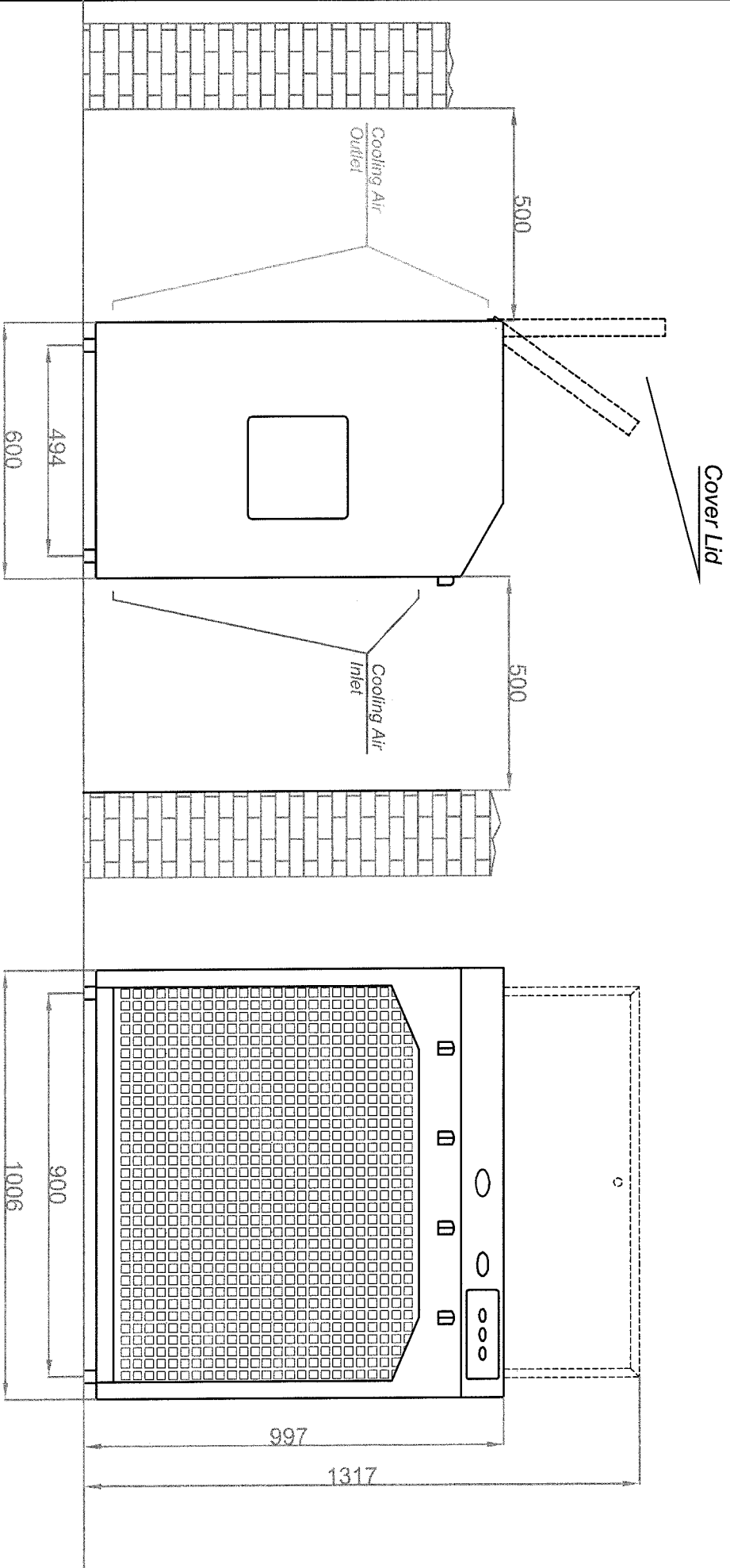




MAINTENANCE LIST LW 230 E & LW 280 E

Maintenance Work	Intervals	Qty.	Order No.
Replace Filter Cartridge <i>Filter Capacity 1.7 ltr.:</i>	LW 230 E: every 71 working hours (@ +20 °C) LW 280 E: every 57 working hours (@ +20 °C)	1	LW 300/450 8005
Check Oil Level	once a day (before 1 st Start)		
Oil Change	1 st Oil change after 25 working hours (in total) 2 nd Oil change after 75 working hours (in total) 3 rd Oil change after 275 working hours (in total) thereafter every further 200 working hours - but at least once a year	1800 ml per Fill	LW 300/450 9001
Replace Air Intake Cartridge	depends on pollution - but at least every two years	1	LW 300/450 7017
Check V-Belts	every 50 working hours	2	LW 260 0035E
Replace Valves 1 st Stage 2 nd Stage 3 rd Stage	every 1500 working hours	1 1 1	LW 260 0092 LW 260 0084 LW 260 0064

MAINTENANCE LIST LW 230 E & LW 280 E			
Maintenance Work	Intervals	Qty.	Order No.
Check Pressure Maintaining- / Non Return Valve	every 200 working hours		
Check Safety Devices	at least once a year This should only be done by professional engineers		
Check Pressure Pipes for Air Leaks	every 200 working hours		
Clean Pressure Pipes	dependts on pollution - but at least every two years		
Check Condition of Filling Hoses	once a day (before the 1 st fill)		
Replace Sinter Filter of Condensate Valve	1 st change after 1000 working hours thereafter every 2000 working hours	1	LW 300/450 2011 b
Clean Oil-/Water Separators	every 1000 working hours - but at least once a year		
Replace Sinter Filters of Water Separators 1 st Stage 2 nd Stage 3 rd Stage	every 1000 working hours every 1000 working hours every 1000 working hours	1 1 1	LW 260 0121 LW 260 0121 LW 300/450 10004
Replace Silencer	every 500 Working Hours	1	LW 300/450 2014
Check / Retorque Connections & Bolts	after 15 working hours - thereafter every 500 working hours		



Installation Guide

LW 280 E

LENHARDT & WAGNER GMBH

Datum: 15.11.2004

SPARE PART LIST LW 230 E / LW 280 E



Qty.	Description	Order No.
1	Filling Valve Body	LW 160 / 190 240
1	Connection M16 x 1.5 mm / 10 L	LW 160 / 190 245
1	Bleed Valve Stem	LW 160 / 190 246
1	Shut-Off Valve Stem	LW 160 / 190 247
1	Shut-Off Valve Collar	LW 160 / 190 248
2	Hand Wheel Nut	LW 160 / 190 249
1	Filling Valve Wheel \varnothing 35 mm	LW 160 / 190 250
1	Bleed Valve Wheel \varnothing 27 mm	LW 160 / 190 251
1	HP Seat	LW 160 / 190 255
1	Packing Washer	LW 160 / 190 256
1	Washer Copper \varnothing 8 x 14 x 1 mm	LW 160 / 190 257
1	Washer Copper \varnothing 4 x 6 x 3 mm	LW 160 / 190 258
1	Worm Screw M3 x 8 mm	LW 160 / 190 259
1	O-Ring	LW 160 / 190 260
1	O-Ring	LW 160 / 190 261
1	O-Ring Filling Valve Neck 200 bar	LW 160 / 190 262
1	O-Ring Filling Valve Neck 300 bar	LW 160 / 190 264
12	Washer	LW 160 / 190 276
1	Filling Hose M16 x 1.5 mm Lenght: 0.75m	LW 160 / 190 4021a
1	Filling Valve Neck 200 bar	LW 160 / 190 4044
1	DIN Hand Wheel 200 bar - black	LW 160 / 190 4045
1	DIN Hand Wheel 300 bar - red	LW 160 / 190 4046
1	Filling Valve Neck 300 bar	LW 160 / 190 4048
1	Filling Valve compl. (without Filling Hose)	LW 160 / 190 4057
1	Bolt	LW 260 0036
1	Locking Washer	LW 260 0037
1	Prime Mover Pulley Wheel	LW 260 0038
1	Prime Mover 7,5 kW (LW 280 E)	LW 260 0040
1	Prime Mover 5,5 kW (LW 230 E)	LW 260 0041
4	Dome Headed Bolt	LW 260 0042
1	Tensioning screw	LW 260 0043
1	Flywheel	LW 260 0044
11	Ventilator Blade	LW 260 0045
1	Mounting Ring	LW 260 0046
1	Oil Pump Cover	LW 260 0047
1	Shaft Seal Ring	LW 260 0048
1	Pump Drive	LW 260 0049
2	Roller	LW 260 0050
1	Pump Cover	LW 260 0051
1	O-Ring	LW 260 0052
1	Bearing Flange	LW 260 0053
1	O-Ring	LW 260 0054
2	Main Bearing	LW 260 0055
1	Spacer	LW 260 0056
1	Woodruff Key Crankshaft	LW 260 0057
1	Crankshaft	LW 260 0058

SPARE PART LIST LW 230 E / LW 280 E



Qty.	Description	Order No.
3	Big End Bearing	LW 260 0059
1	Thrust Washer	LW 260 0060
1	Circlip	LW 260 0061
12	Cylinder Head Bolt	LW 260 0062
1	Cylinder Head, 3 rd Stage	LW 260 0063
1	Valve Assembly, 3 rd Stage complete	LW 260 0064
1	Cylinder, 3 rd Stage	LW 260 0065
2	O-Ring	LW 260 0066
2	Guide Cylinder, 3 rd Stage	LW 260 0067
2	O-Ring	LW 260 0068
1	Piston Ring Set, 3 rd Stage	LW 260 0069
1	Piston, 3 rd Stage	LW 260 0070
4	Circlip	LW 260 0071
1	Guide Piston	LW 260 0072
1	Circlip	LW 260 0073
2	Small End Bearing	LW 260 0074
2	Piston Pin	LW 260 0075
2	Connecting Rod, 2 nd & 3 rd Stage	LW 260 0076
1	Crankcase	LW 260 0077
1	Seal	LW 260 0078
1	Crank Case Cover	LW 260 0079
1	O-Ring	LW 260 0080
1	Piston, 2 nd Stage	LW 260 0081
1	Piston Ring Set 2 nd Stage complete	LW 260 0082
1	Cylinder, 2 nd Stage	LW 260 0083
1	Valve Assembly, 2 nd Stage complete	LW 260 0084
1	Cylinder head, 2 nd Stage	LW 260 0085
1	Connecting Rod, 1 st Stage	LW 260 0086
1	Small End Bearing	LW 260 0087
1	Piston, 1 st Stage	LW 260 0088
1	O-Ring	LW 260 0089
1	Cylinder, 1 st Stage	LW 260 0090
12	Screw	LW 260 0091
1	Valve Assembly, 1 st Stage complete	LW 260 0092
4	90° Connection	LW 260 0093
4	Sealing ring	LW 260 0094
4	Nut	LW 260 0095
1	Connection pipe	LW 260 0096
1	Connection pipe	LW 260 0097
5	90° Connection	LW 260 0098
14	Sealing ring	LW 260 0099
12	Nut	LW 260 0100
1	T-Piece	LW 260 0101
1	Connection	LW 260 0102
1	Oil Pressure Feed 2 nd Stage	LW 260 0103
1	Oil Pressure Feed 3 rd Stage	LW 260 0104

SPARE PART LIST LW 230 E / LW 280 E



Qty. Description

Order No.

1	Oil Pump supply pipe	LW 260 0105
1	Cooling Spiral 1 st Stage	LW 260 0106
1	Cooling Spiral 2 nd Stage	LW 260 0107
1	Cooling Spiral 3 rd Stage	LW 260 0108
3	Cooling Spiral Mount	LW 260 0109
3	Cooling Spiral Mount	LW 260 0110
6	Cooling Spiral Mount	LW 260 0111
6	Cooling Spiral Clamp	LW 260 0112
8	Bolt	LW 260 0113
4	Bolt	LW 260 0114
1	Hose, Crank Case Breather	LW 260 0115
1	Oil Filling Cap	LW 260 0116
1	Pressure Relief Valve, 2 nd Stage - 60 bar	LW 260 0117
2	Sinter Filter Housing	LW 260 0118
2	O-Ring Guide	LW 260 0119
2	O-Ring, Sinter Filter	LW 260 0120
2	Sinter Filter (<i>incl. O-Ring for Sinter Filter</i>)	LW 260 0121
2	Clamp	LW 260 0122
2	Water Separator	LW 260 0123
2	Plug	LW 260 0124
1	90° Connection	LW 260 0125
2	Nut	LW 260 0126
1	Condensation Drain Pipe 2 nd Stage	LW 260 0127
1	Condensation Connecting Pipe	LW 260 0128
1	T-Piece	LW 260 0129
1	Magnet Valve 2 nd Stage	LW 260 0130
2	90° Connection for Hose	LW 260 0131
1	Condensation Drain Hose, 1 st Stage	LW 260 0132
1	Cooling Spiral	LW 260 0133
1	Mounting Bracket	LW 260 0134
1	Mounting Plate	LW 260 0135
1	Mounting Block for Safety Valve w/o cert. G3/8"	LW 260 0136
1	Mounting Block for Safety Valve with cert.	LW 260 0137
2	High Pressure Hose	LW 260 0138
1	Condensation Drain Hose, 2 nd & 3 rd Stages	LW 260 0139
1	Condensation Drain Hose	LW 260 0140
1	Pipe	LW 260 0141
1	Reducer	LW 260 0142
1	Pipe	LW 260 0143
1	Pressure Sensor	LW 260 0146
1	Crush Washer	LW 260 0147
1	Pressure Sensor Connection	LW 260 0148
1	Pipe	LW 260 0149
1	Pipe	LW 260 0151
1	Pipe	LW 260 0152
11	Screw	LW 260 0153

SPARE PART LIST LW 230 E / LW 280 E



Qty. Description

Order No.

8	Screw	LW 260 0154
8	Screw	LW 260 0155
2	Connection	LW 260 0156
8	Screw	LW 260 0157
2	T-Piece	LW 260 0158
1	Crank Case Breather	LW 260 0159
2	Bolt	LW 260 0160
1	Seal, Safety Valve w/o cert.	LW 260 0161
1	Cover Electro Box	LW 260 0162
11	Washer	LW 260 0162
1	Housing <i>compl.</i>	LW 260 0163
1	Back Grating	LW 260 0164
1	Front Grating	LW 260 0165
1	Maintenance Cover	LW 260 0166
1	ECC Display Unit, complete	LW 260 0167
1	O-Ring	LW 260 0168
2	High Pressure Filling Hose	LW 260 0169
1	Seal	LW 260 0170
1	Union Condensation Valve	LW 260 0171
2	Nut	LW 260 0172
2	Screw	LW 260 0173
2	Screw	LW 260 0174
4	Connecting Unit	LW 260 0175
1	Pressure Pipe	LW 260 0176
1	Pressure Pipe	LW 260 0177
1	Pressure Pipe	LW 260 0178
8	Washer	LW 260 0179
8	Bolt	LW 260 0180
1	Nut	LW 260 0181
1	Connecting Pipe	LW 260 0182
1	Pressure Pipe	LW 260 0183
1	Pressure Pipe	LW 260 0184
1	Condensate Pipe	LW 260 0185
1	Bracket for Condensate Filter	LW 260 0186
2	Fixing Bows	LW 260 0187
2	Bracket for Endfilter Housing	LW 260 0188
2	O-Ring	LW 260 0189
2	O-Ring	LW 260 0190
6	Nut	LW 260 0191
3	Lamp Holder	LW 260 0192
1	LED White	LW 260 0193
1	LED Glass Yellow	LW 260 0194
1	LED Glass Red	LW 260 0195
1	Lamp Glass White	LW 260 0196
1	Lamp Glass Yellow	LW 260 0197
1	Lamp Glass Red	LW 260 0198

SPARE PART LIST LW 230 E / LW 280 E



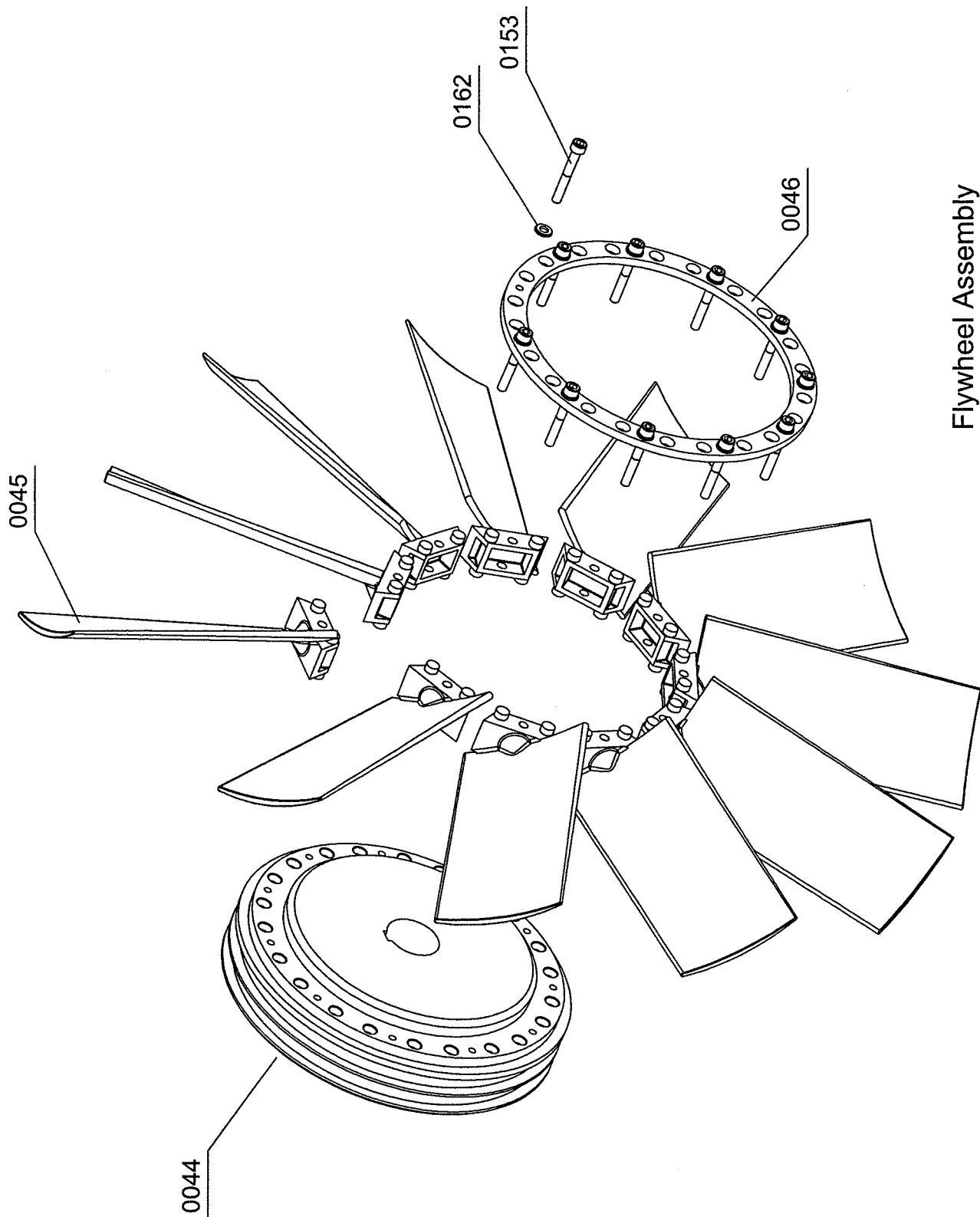
Qty.	Description	Order No.
1	Housing Cover	LW 260 0199
1	Safety Switch	LW 260 0200
4	Bolt	LW 260 0201
4	Plastic Feed	LW 450 1002
2	Fixing Bracket	LW 450 1011
1	Magnet Valve 1 st Stage	LW 450 2009
1	Condensation Bleed Off Valve	LW 450 2011
1	Repair Kit for Condensation Valve	LW 450 2011a
1	Silencer	LW 450 2014
1	Oil/Water Separator 2 nd /3 rd Stage	LW 450 2015
1	Inlet Flange	LW 450 3000
4	90° Connection	LW 450 3001
1	Reducer	LW 450 3002
3	Connection	LW 450 3004
1	90° Connection	LW 450ES 3005
3	90° Connection	LW 450 3010
2	Double Nipple	LW 450 3013
1	Hose Coupling	LW 450 3015
1	Hose Coupling - straight -	LW 450ES 3015
4	Connection	LW 450 3016
1	Reduction	LW 450 3021
1	Connections	LW 450 3022
2	Filling Connector DIN 200 bar	4044
2	Hand Wheel 200 bar - Black	4045
2	Hand Wheel 300 bar - Red	4046
2	Filling Connector DIN 300 bar	4048
1	Safety Valve 225 bar (<i>with test certificate and TÜV</i>)	4052
1	Safety Valve 330 bar (<i>with test certificate and TÜV</i>)	4053
1	Sinter Filter for Condensation Valve	4200
4	Nut M8	LW 450 6005
14	Nut M10	LW 450 6006
28	Washer	LW 450 6010
2	Clamp	LW 450 6021
2	Mounting Screws	LW 450 6026
6	Lock Nut	LW 450 6027
1	Safety Valve 225 bar (<i>without test certificate</i>)	LW 450 7007
1	Safety Valve 330 bar (<i>without test certificate</i>)	LW 450 7008
1	Inlet Filter Housing, complete.	LW 450 7016
1	Clamp	LW 450 7016a
1	Inlet Filter Cover	LW 450 7016b
1	Inlet Filter Cartridge	LW 450 7017
1	Oil Level Glass	LW 450 7021
2	Circlip	LW 450 7026a
1	Piston Pin	LW 450 7026b
1	Piston Ring Set, 1 st Stage complete	LW 450 7027
1	Copper Seal, 1 st Stage Valve	LW 450 7030a

SPARE PART LIST LW 230 E / LW 280 E

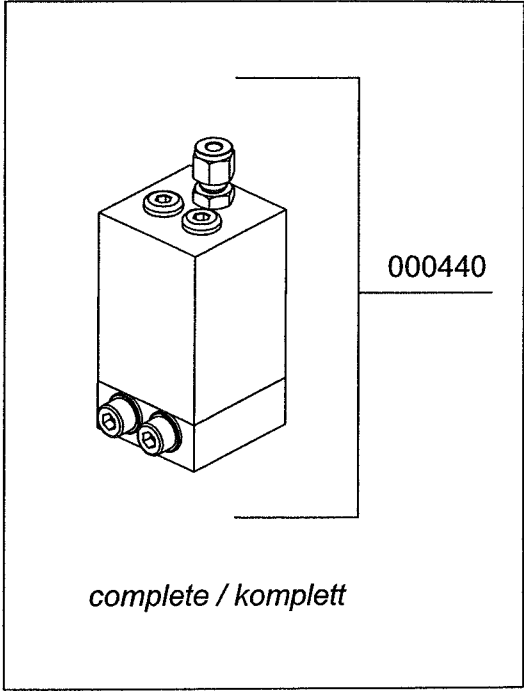
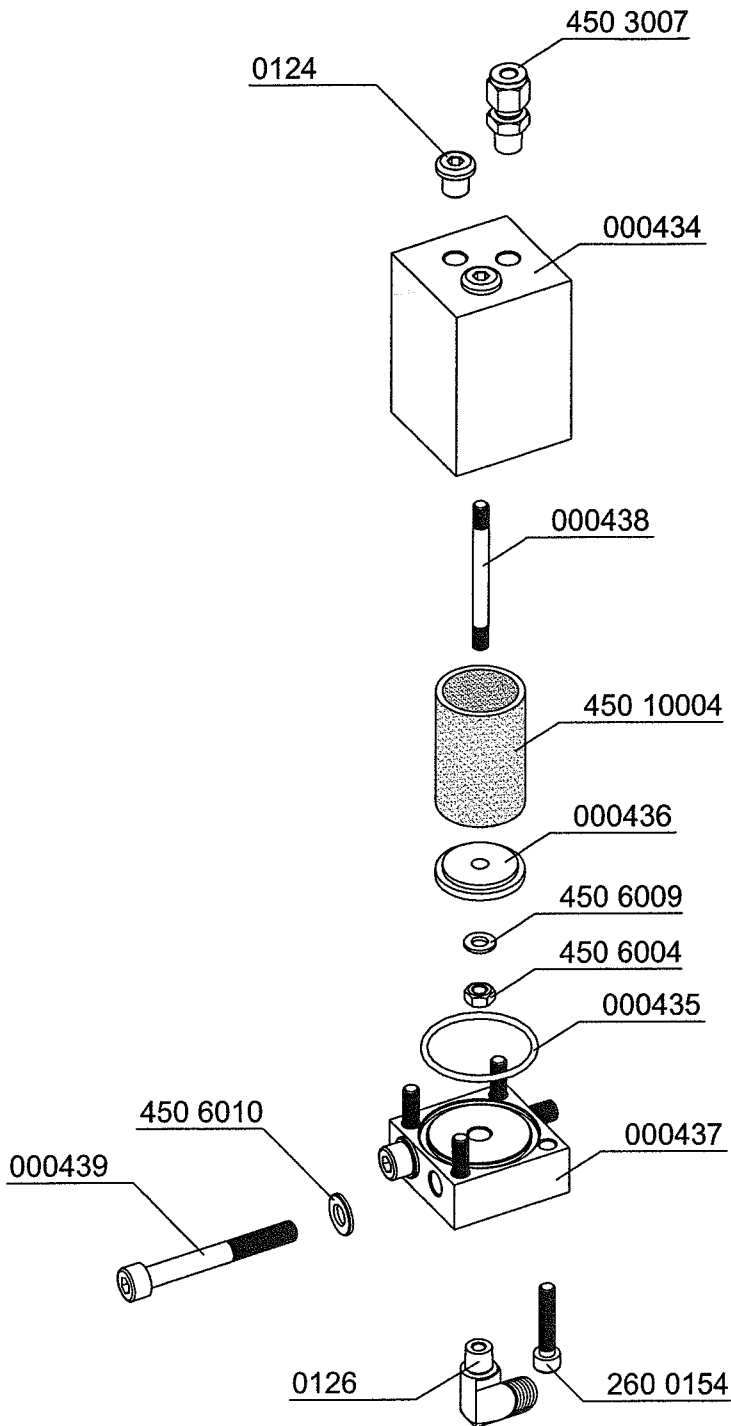
Qty. Description

Order No.

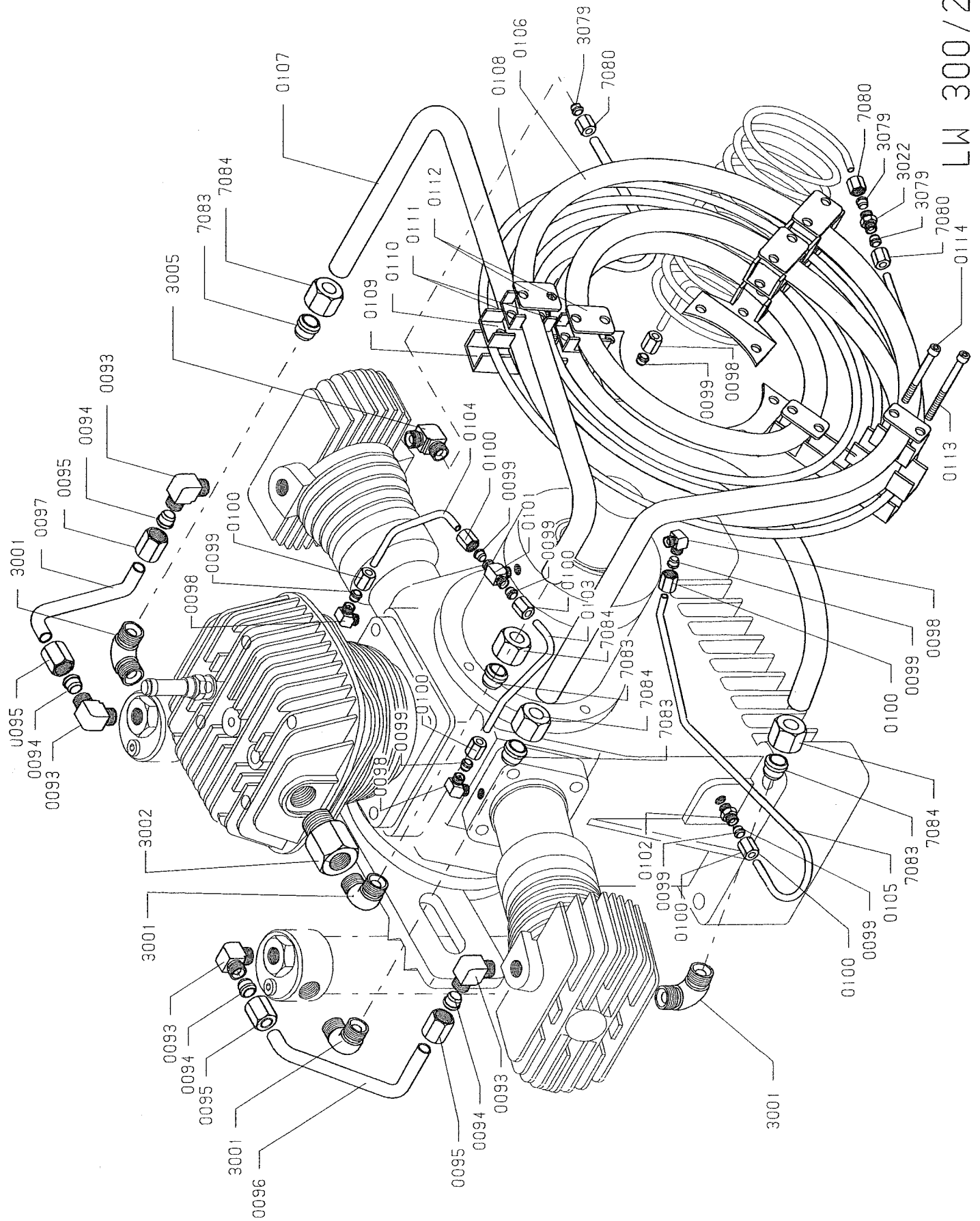
1	Upper Gasket, Valve 1 st Stage	LW 450 7030b
1	Cylinder Head, 1 st Stage	LW 450 7031
1	Pressure relief Valve 1 st Stage	LW 450 7033
4	Cylinder Head Bolt	LW 450 7045
16	Lock Washer	LW 450 7047
1	Connection	LW 450ES 7067
1	Oil Drain Hose	LW 450ES 7068
1	Plug	LW 450ES 7069
1	Woodruff Key	LW 450ES 7074
11	Sealing ring	LW 450 7079
11	Nut	LW 450 7080
4	Sealing ring	LW 450 7083
4	Nut	LW 450 7084
4	Screw	LW 450 7087
1	Filter Housing 1,7 ltr., P _{max} : 350 bar	LW 450 8004
1	Pressure Maintaining & Non Return Valve	LW 450 8006a
1	Filter Housing 2,3 ltr., P _{max} : 350 bar	LW 450 8021
1	Sinter Filter	LW 450 10004



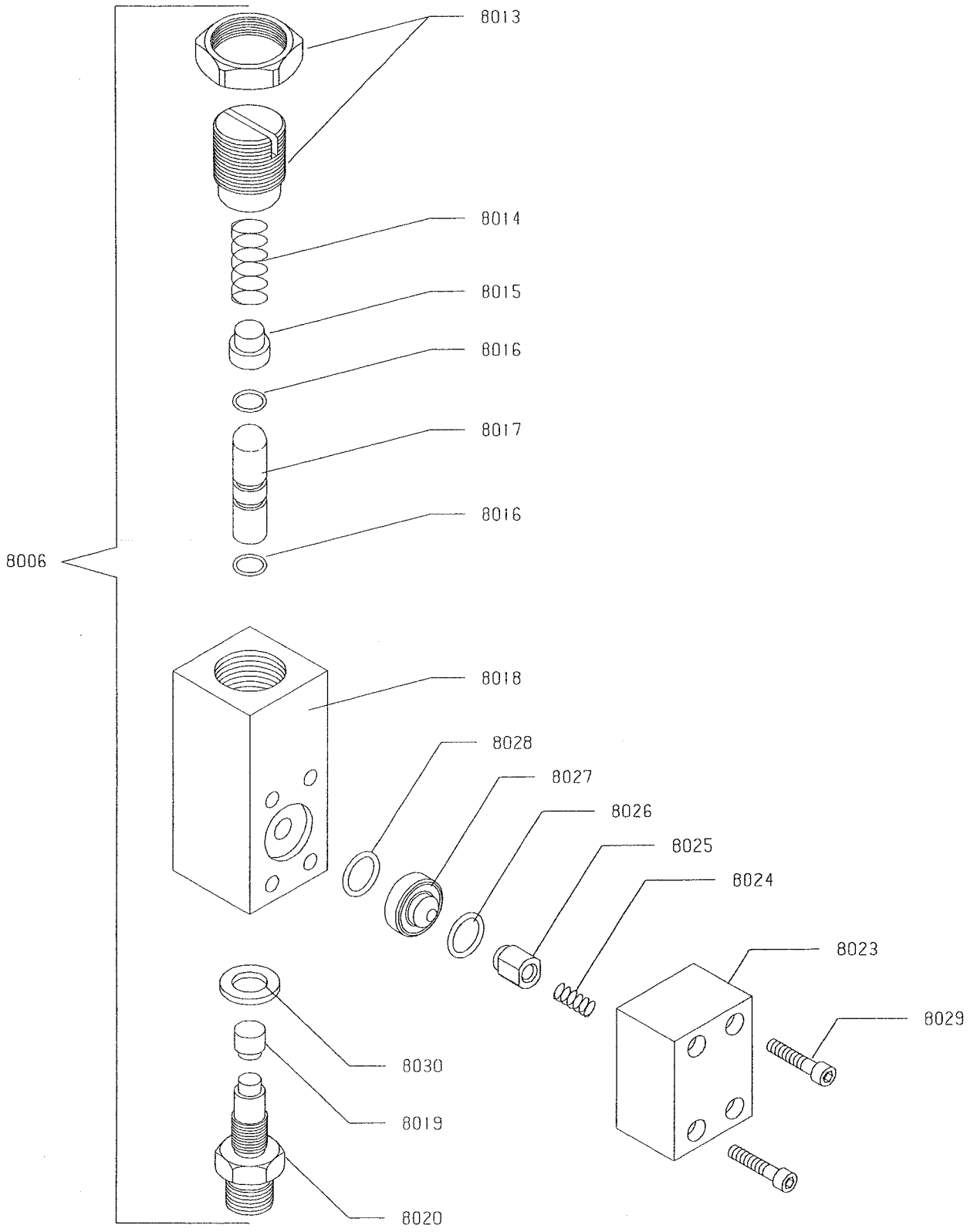
Flywheel Assembly
Schwungrad



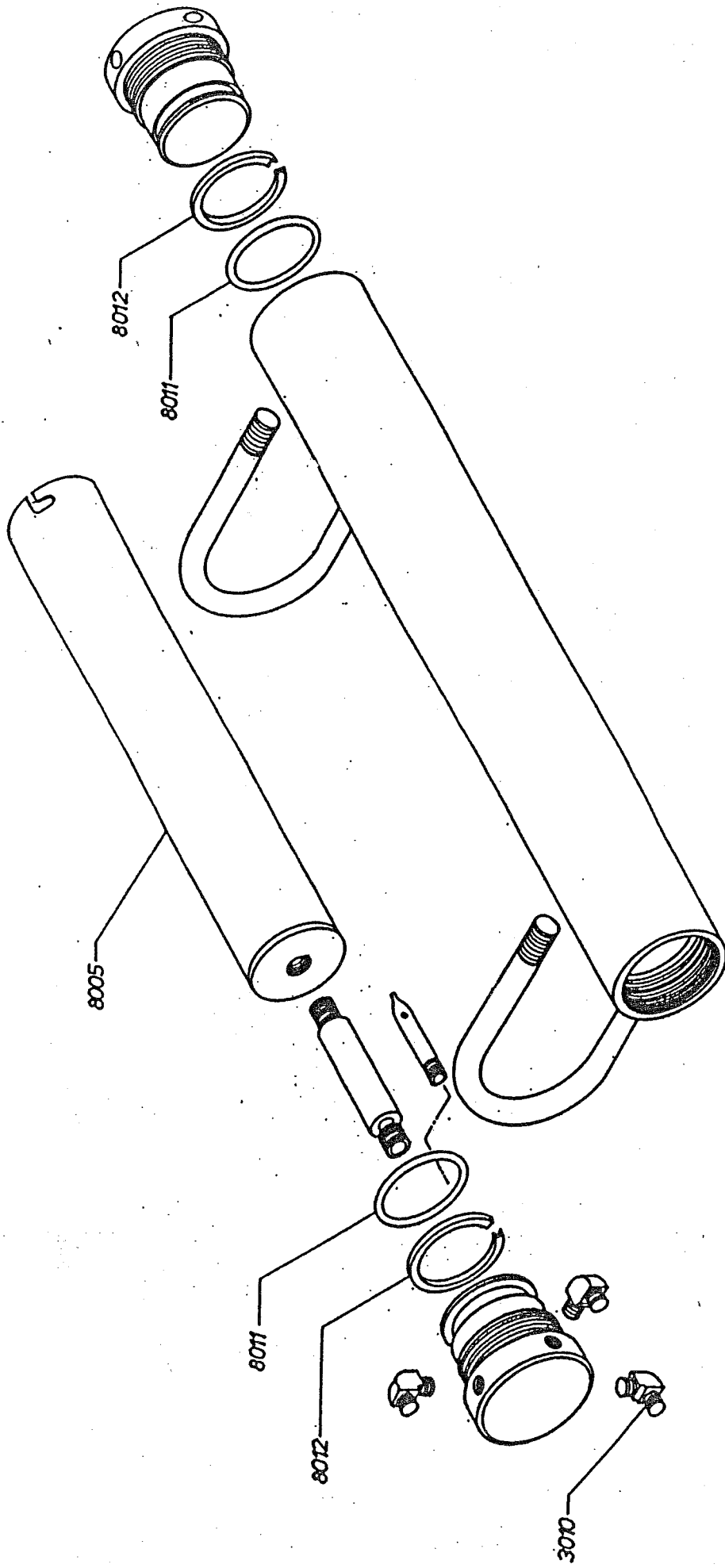
Oilfilter Assembly
Zusammenbau Ölfilter

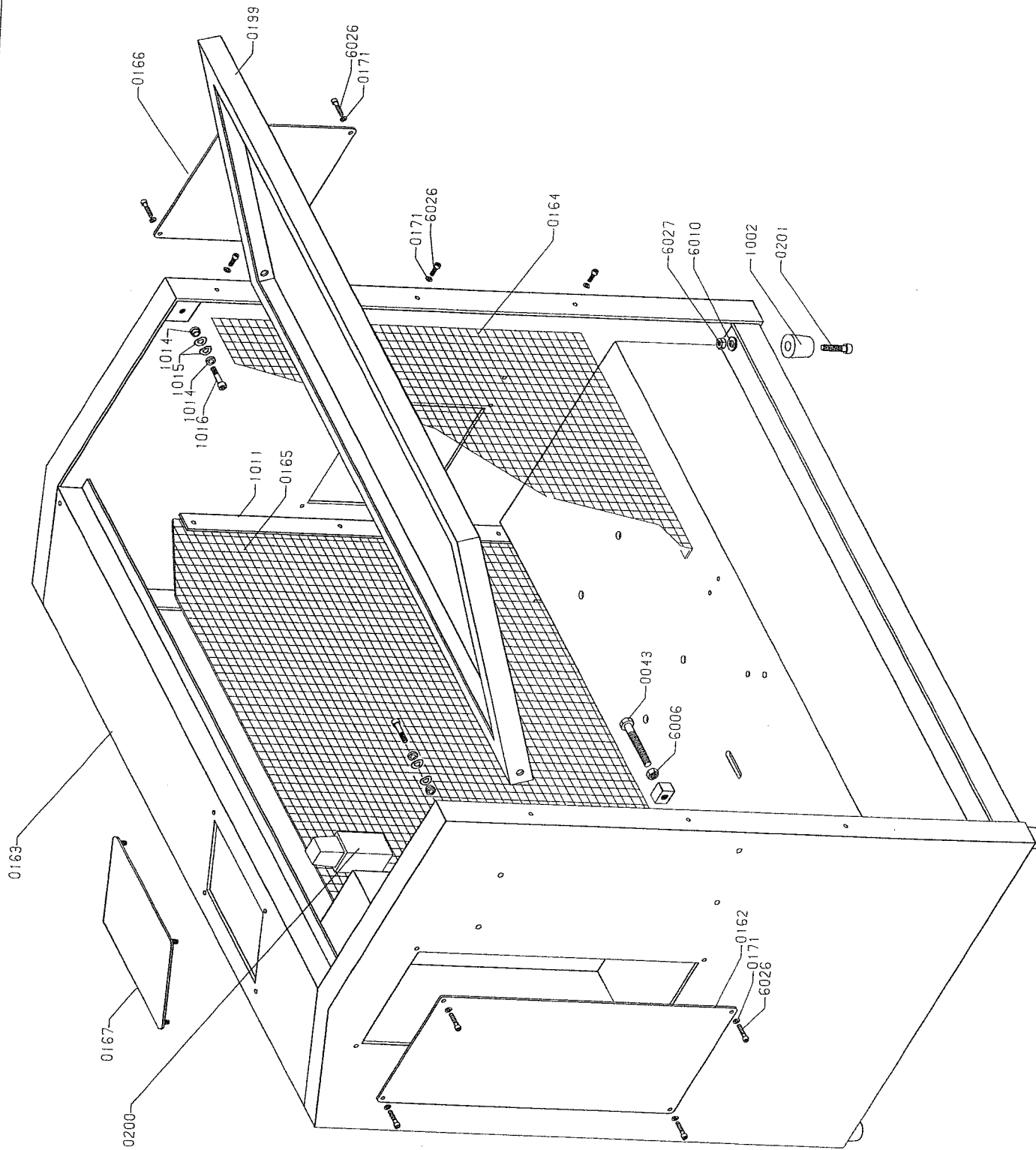


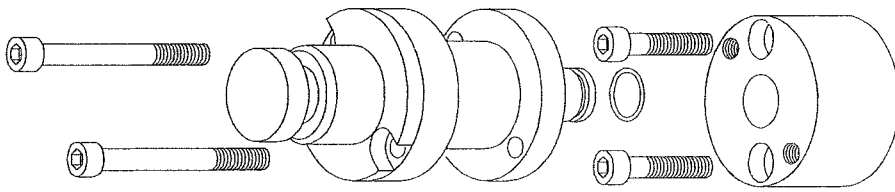
LW 300/260 E



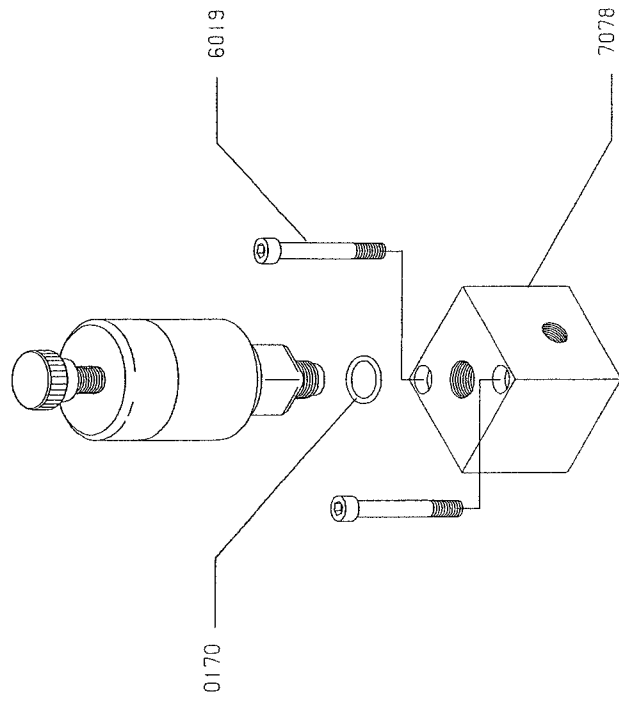
LW 260 E



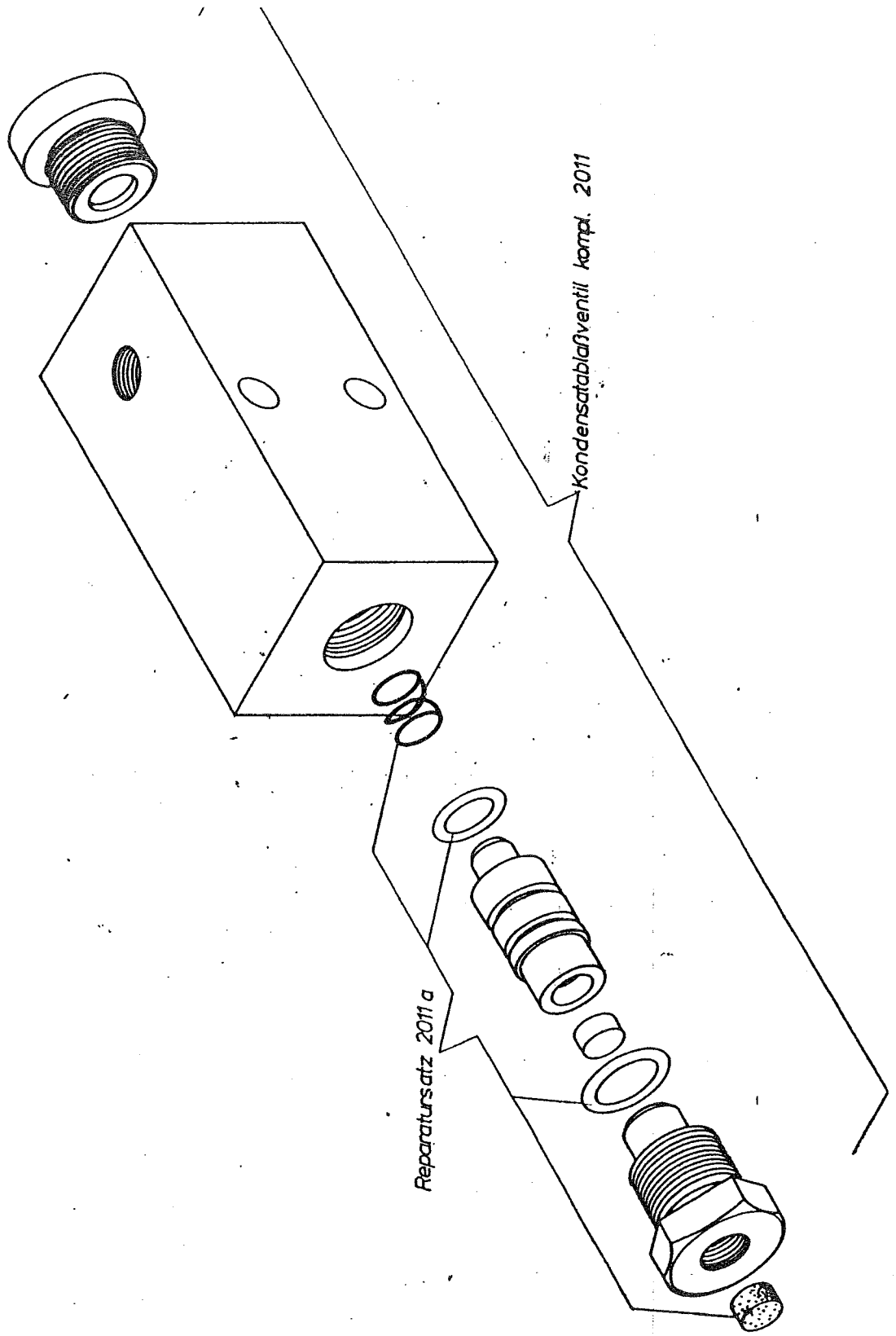




225 bar 4052
330 bar 4053

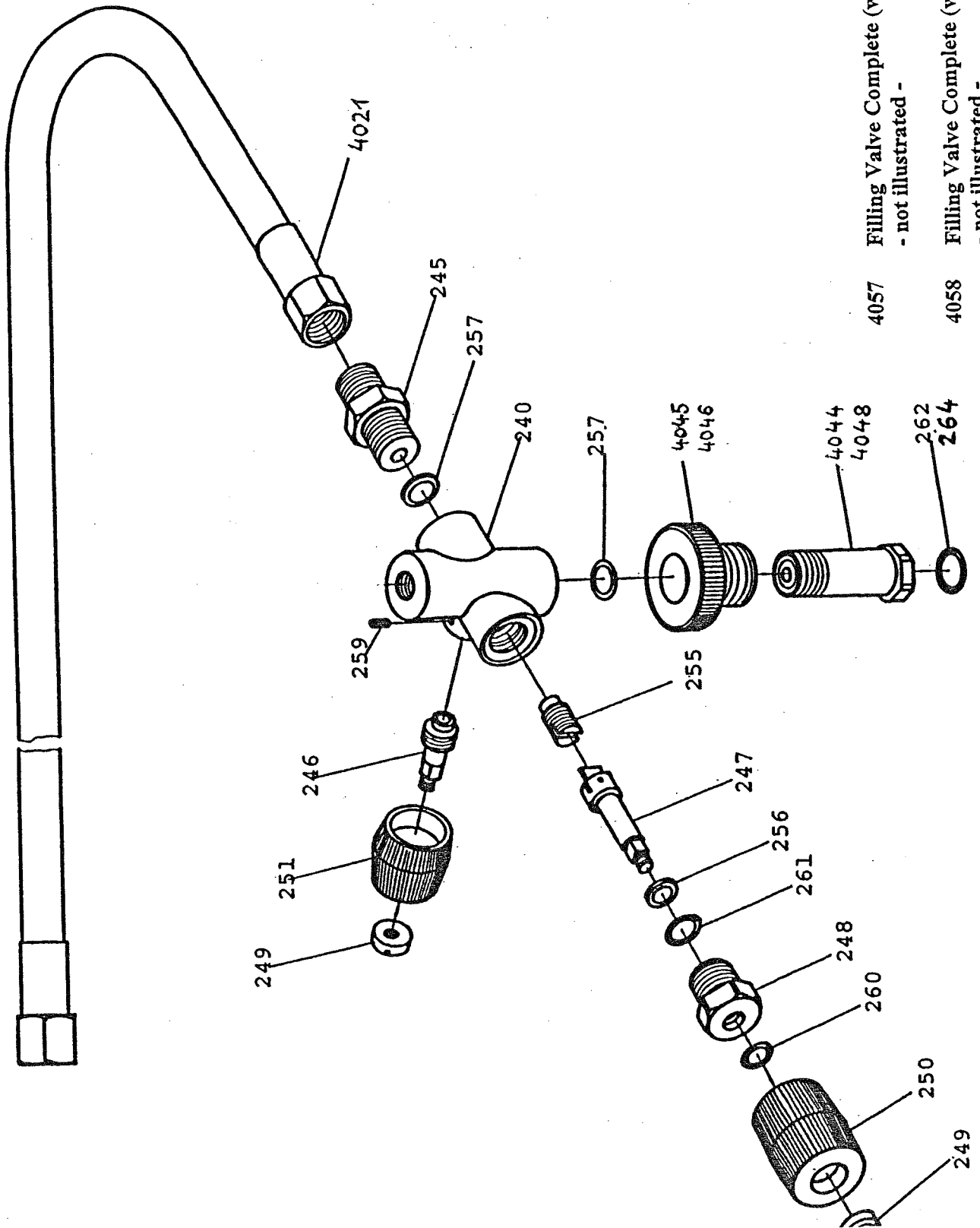


225 bar 7007
330 bar 7008



Kondensatablaufventil kompl. 2011

Reparaturatz 2011 a



4057 Filling Valve Complete (without hose)
- not illustrated -

4058 Filling Valve Complete (without hose & pressure gauge)
- not illustrated -