INSTRUCTION MANUAL

LW 320 E

BREATHING AIR COMPRESSOR

L&W COMPRESSORS

LENHARDT & WAGNER GMBH

SAFETY PRECAUTIONS

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
- Carry out proper maintenance on the compressor and filtration system
- Care must be taken to avoid the intake of contaminated air in to the compressor
- Do not exceed maximum operating temperatures

Safety Precautions

- Read the operation manual of your compressor carefully
- Allow only qualified personnel 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 disconnected for the power supply 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
- Do not touch any hot compressor / engine parts while doing maintenance work as these may cause injury by burning. Wait until unit has cooled down.

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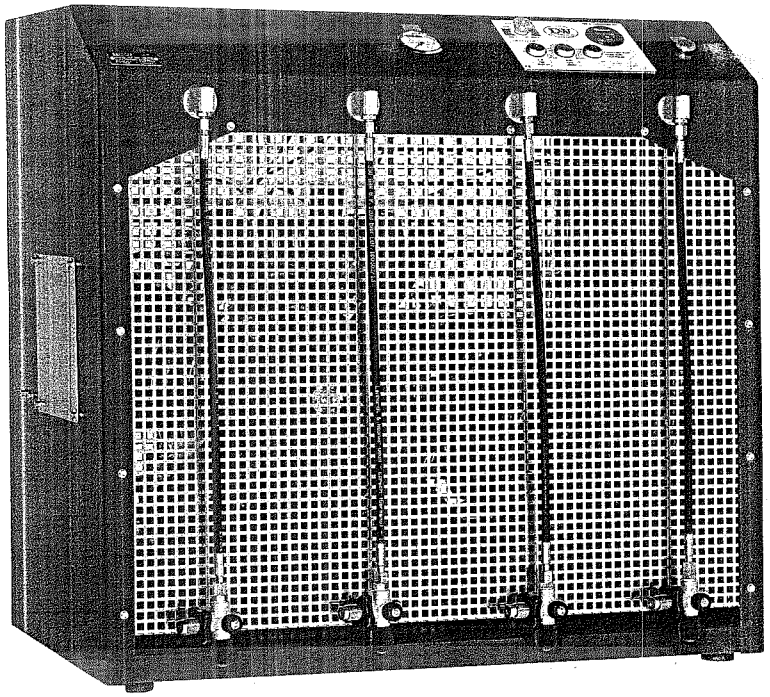
Technical Data	LW 320 E
Delivery Capacity:	280 l/min (9.9 cfm)
Max. Pressure:	350 bar
RPM Compressor:	1,450 min^{-1}
No of Pressure Stages:	3
Cylinder Bore 1st Stage:	Ø 95 mm
Cylinder Bore 2nd Stage:	Ø 40 mm
Cylinder Bore 3rd Stage:	Ø 18 mm
Stroke:	44 mm
Medium:	Air
Intake Pressure:	atmospheric
Oil Pressure:	+3.0 bar (+/- 0.5 bar)
Oil Capacity:	1.8 ltr
Intake Temperature:	0 < + 45°C
Ambient Temperature:	+ 5 < + 45°C
Cooling Air Requirement:	> 2,250 m^3/h
Voltage: *(Special Windings on Request)*	400 V / 3-Phase / 50 Hz
Protection Class Drive Motor	IP 54
Motor Power:	7.5 kW
RPM Motor:	2,890 min^{-1}
Start:	Star / Delta
Noise level:	83 dB[A] @ 1m distance

Dimensions: Depth:	600 mm (23.6")
Length:	1,100 mm (43.3")
Height:	980 mm (38.6")
Weight:	approx. 240 kg
Capacity Filter Housing:	1.7 ltr.

Method of Operation

Air comes through a micro filter into the first stage, is compressed and leaves trough the heat exchanger into a water / oil separator. A short pipe leads the air into the second cylinder and is further compressed, leaving again through a heat exchanger and the second water /oil separator and then compressed in the third stage to the final pressure. The air then goes through the intercooler and into the mole carbon filter. The purified air goes through a safety valve and into the pressure maintaining valve, there to the air manifold and filling hoses or, if required, into an external filling panel.



Installation

The compressor should only be connected by a qualified licensed electrician.
NOTE: Check direction of rotation immediately after the first start !
If the direction of rotation is wrong, the oil pump will not pump oil to the third stage and the piston may cease! Furthermore the unit would not be cooled. When facing the front of the compressor, the direction of rotation should be anticlockwise (check arrow on motor). Don't place compressor closer than 0.5 m to any walls and ensure good ventilation.
NOTE: Pure air intake is very important!

Filling Process

Fill only air tanks which are:

- Suitable for final pressure
- Hydro static tested (check last testing date)

The automatic switch off, or safety valve, has to be checked before tanks can be filled

- Close filling valves
- Start compressor by green push button
- Connect tank to compressor - *Filling valve and tank are still closed* -
- First slowly open filling valve
- Carefully open tank valve
- Fill tank to desired pressure - *watch pressure gauge* -
- Close tank valve
- Close filling valve - *self-venting type* - A hissing sound can be heard
- Disconnect tank from filling connection
- Turn off compressor by red push button

Automatic Condensation Dump System

(Standard Control) The **L&W 320 E** comes as standard with an auto dump system. Magnetic valves open and drain three condensate separators every 15 minutes. We recommend to operate the blue push button - mounted on the dash panel - every 5 to 10 hours, to ensure all three auto dump valves are in working order.

Intake Filter

A micro filter cartridge is used as an air intake filter. We recommend that the filter cartridge should be replaced every 100 working hours at least once a year..
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. The 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 and second stage valves are of plate valve design. The third stage valve uses a spring operated piston in a brass cylinder. This valve sits loose with an O-ring seal in the cylinder head. To change valves no special tools are required.

Lubrication

The crankshaft is lubricated by an oil slinger.
The 1st stage is lubricated by spray oil.
The 2nd and 3rd stage is lubricated by a mechanical oil pump.
1.8 litre of synthetic oil (order no. L&W 000001) is required for an oil change.
NOTE: The oil level never should be lower than the red marking on the oil level indicator glass (located on the compressor crankcase).

Starting the Compressor for the first Time

- Place the compressor in a distance of at least 50 cm to any walls (ambient air temperature max. +45°C)
- Check compressor oil level
- Check if air filter cartridge is in place
- Make sure all filling valves are closed
- Start compressor by green push button
- Check direction of rotation - immediately after start
- Run compressor to max. pressure
- Check if end-pressure switch works at max. pressure
- Check compressor unit for air leaks
- Check auto dump valves for function by pushing the blue push button on the dash panel
- Turn off compressor by red push button
- Release pressure by filling valves

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 indicates problems with either inlet or outlet valve of the next following stage.

NOTE: A faulty safety valve should always be replaced!

Oil / Water Separator

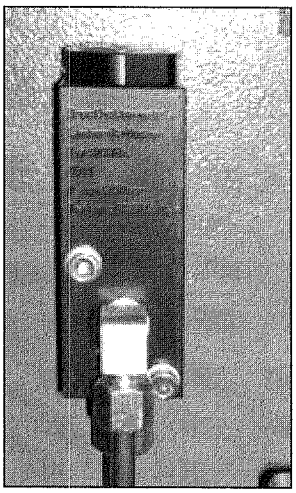
After each stage an oil / water separator (condense separator) is fitted. They were automatically drained every 15 minutes by magnetic valves (auto dumps). The condense separator are free of maintenance. However, we do recommend that they should be cleaned every 1000 working hours. Replace O-rings if necessary.

Automatic Dumps

Condensate will be separated after each stage of compression. All three separators have magnetic valves which were controlled by an electronic timer. The timer is located in the switchboard compartment and activates the dump valves every 15 minutes - interval is adjustable - to release the condensate through the blue poly hoses. We recommend the use of a 20 litre container to collect all condensate. It can then be deposed of like discarded oil. The drain noise is kept to a minimum with a silencer.

Pressure maintaining and non-return valve

The combined pressure maintaining non-return valve is located in the system directly after the final filter housing



Pressure Maintaining Valve

Pressure maintaining valve

The pressure maintaining valve serves to keep the pressure in the final filter housing at a minimum of 150 to 180 bar. This high pressure creates more condensation in the separator/housing that can be mechanically removed (opening the drain valve) before the air is finally purified in the final filter, thus extending the life of the filter cartridge.

When the compressor is started, the pressure will build up in each stage as the compressor runs. The pressure in the final filter housing will increase until the pressure maintaining valve set pressure is reached. As a result of this function, the filling pressure gauge will not show any pressure for approx 1 min after the compressor is started and no air will flow out of the filling valve if opened.

Once the pressure maintaining valve opens, the pressure gauge will respond by climbing quite rapidly (within a few seconds) to the set pressure of the pressure maintaining valve (default 150 to 180 bar).

Adjusting the pressure maintaining valve:

- Open the filling valve to vent the system completely, close the filling valve *(Pressure gauge reads 0 bar)*
- Start the compressor
- Monitor the pressure gauge
- The valve will open and the pressure the gauge climbs to quickly to the set pressure, this should be 150 – 180 bar
- If the pressure setting is outside this valve, adjust the pressure maintaining valve as follows:

Increase the pressure setting:

- Stop the compressor and open the drain valves
- Open the filling valve to vent the system after the pressure maintaining valve *(Pressure gauge reads 0 bar)*
- Loosen the locking screw on the pressure maintain valve
- Using a suitable tool, screw the valve setting screw clockwise to increase the spring tension
- Start the compressor and check the pressure setting, adjust as necessary
- Re-tighten the locking screw
- Check the pressure maintaining opening pressure once again

Decrease the pressure setting:

- Stop the compressor and open the drain valves
- Open the filling valve to vent the system after the pressure maintaining valve *(Pressure gauge reads 0 bar)*
- Loosen the locking screw on the pressure maintain valve
- Using a suitable tool, screw the valve setting screw anti-clockwise to decrease the spring tension
- Start the compressor and check the pressure setting, adjust as necessary
- Re-tighten the locking screw
- Check the pressure maintaining opening pressure once again

Warning:

If the pressure maintaining valve is set at a higher pressure than the maximum working pressure, the final safety valve will blow off before the pressure maintaining valve opens, the pressure gauge will read 0 bar!
After repair work where the pressure maintaining valve is not yet adjusted, the basic setting is the setting screw approx 3 turns in to the housing.

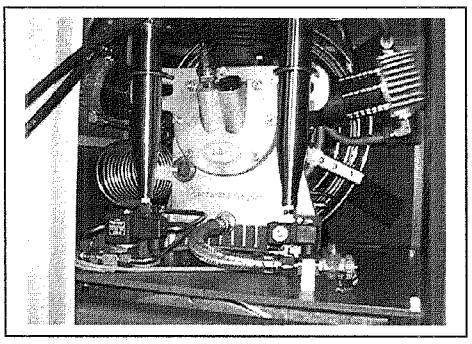
Non-return valve

The non-return valve is located in the system after the pressure maintaining valve and prevent air from flowing back from the filling lines into the final filter housing/compressor block. The non-return valve is operating correctly if the pressure gauge on the filling valve remains constant when the drain valves on the compressor are opened.

Symptom	Problem	Trouble Shooting
Final pressure is not reached	Connections leaking	Re-tighten, clean and/or replace
	Final pressure safety valve blows off	Replace
	Cooling pipe leaking	Replace
	Condensation drain valves	Check tightness, clean and/or replace
	Final pressure switch cuts off (option)	Re-set final pressure cut off
Compressor vibrates excessively	V-Belt tension in sufficient	Tighten V-Belts
	Compressor block and/or prime mover mounting screws loose	Re-tighten
	Shock absorbing feet worn down	Replace
	Uneven surface	Move compressor accordingly
Compressor overheats	Inlet filter cartridge blocked	Replace
	Ambient temperature too high	Improve ambient conditions or run for shorter periods
	Cooling air feed/exhaust not sufficient	Adhere to the installation data
	Inlet hose too long	Reduce the length and/or increase the diameter
	Inlet hose diameter too small	Increase diameter
	Compressor turning in the wrong direction	Ensure correct rotation (phase)
	Suction/pressure valve blocked	Clean and/or replace
Safety valve blows off	Suction / pressure valve in the following stage defect	Clean and/or replace
	Sinter filter in the following stage blocked	Replace
	Safety valve leaks	Replace (do not tamper)
Air tastes of oil	Molecarbon filter needs replacing	Replace
	Incorrect compressor oil	Use only authorised oil type
	Non conform type of filter	Replace with correct filter
	Cylinders and / or piston rings worn	Replace
Delivery rate too low	Suction/pressure valve blocked	Clean and/or replace
	Cylinder / piston rings worn	Replace
	Also see section „final pressure is not reached“	
Automatic condensation drain not functioning *(Option)*	Solenoids defect	Replace
	Cable/wiring defect	Repair
	Timer defect	Replace
	Sinter filter from pneumatic valve blocked	Replace
	Piston in the pneumatic valve blocking	Dismantle pneumatic valve
Automatic condensation drain operates between cycles	Pilot pressure for pneumatic valve too low	Replace suction/pressure valve / safety valve
	Piston seat in the pneumatic valve damaged/contaminated	Clean / Replace
	Timer settings incorrect	Set default settings

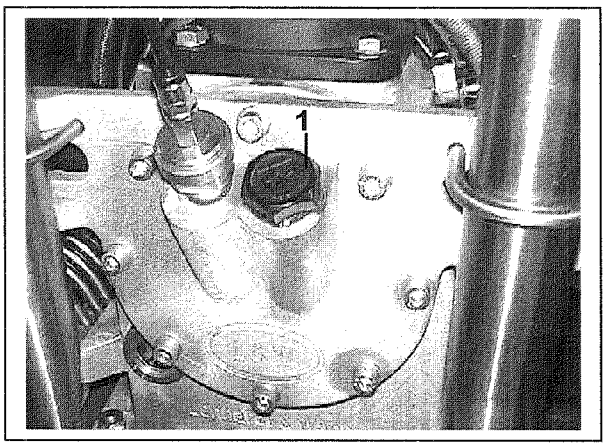
Symptom	Problem	Trouble Shooting
(Option)	Timer defective	Replace
Compressor switches off before final pressure is reached *(Option)*	Final pressure switch not properly set	Reset
	Pressure maintaining valve set too high	Reset
	Fuse/breaker tripped	Refer to the correct fuse ratings for the supply
Filter cartridges times too short	Pressure maintain valve set too low	Reset to 170 bar
	Non conform type of filter	Use only correct filters
	Shelf life exceeded	Adhere to date of expiry
	Packing damaged and / or filter packing opened too long before use	Store properly and open immediately before use
	Ambient temperature too high	Ensure correct and sufficient cooling air feed and exhaust
	Cylinder / piston rings worn	Replace
Excessive oil consumption	Cylinder / piston rings worn	Replace
	Incorrect compressor oil	Use only authorised oil type
	Operating temperature too high	Adhere to operating parameters
	Oil leak in the compressor block	Check relevant components especially shaft seal and replace/re-tighten

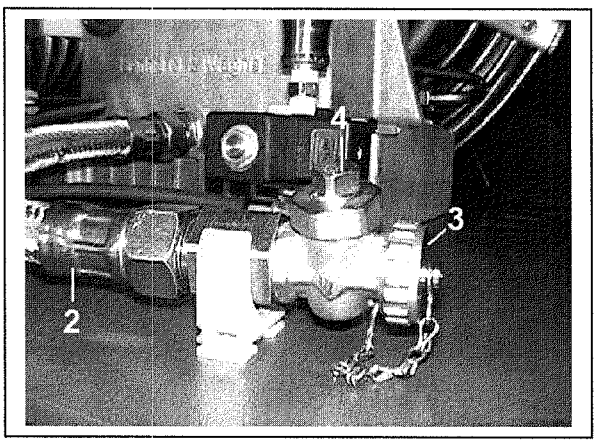
OIL CHANGE INSTRUCTIONS
LW 320 E



For the periodic oil change, please follow the time schedule of the instruction manual.
Only use original L&W synthetic oil 9001/01 (1 ltr bottle) or 9001/12 (12 x 1 ltr bottle packing).

Before changing the oil, be sure the compressor is switched off and cannot be inadvertantly started. Disconnect it from the power supply or by switch off the starter of the gasoline or Diesel engine.





To conduct an oil change, the temperature of the oil must be at least +20°C to allow it to flow easily. In cold climates, the compressor should run first for about 15 minutes, dependent on the ambient temperature;

Oil change

- Unscrew the filling cap anti-clockwise (1)
- Remove the oil drain hose from it´s holder (2)
- Unscrew the drain hose cap anti-clockwise (3)
- Hold the drain hose over a container for waste oil and open the drain valve (4)
- Let the oil drain completely, close valve (4), screw on plug (3) and relocate the hose
- Refill the block with original L&W compressor oil (appr. 1.8 ltr) by using a funnel
- The dipstick (1) should be filled up to the top mark - **DO NOT OVERFILL WITH OIL!!**
- Refit the oil filler cap

The oil change is now completed, **ensure the filling cap (1) is securely refitted.**
The schedule in the maintenance manual will indicate the next oil change or the ECC display.
Ensure the waste oil is disposed of correctly at an approved waste oil point.

Service, Repair and Maintenance

All repair, service and maintenance work is to be carried out when the compressor is stopped, isolated from the power supply and pressure free.
The unit is to be regularly checked for leaks of air/oil, air leaks can be localised using a leak detector or spray

It is recommended that only authorised L&W service technicians carry our repair and service on the bearing of the compressor (crankshaft and connecting rods)

Conservation / storage of the compressor:
If the compressor is not to be used for an extended period of time, we recommend the following conservation work is carried out before the storage:

- ✓ Run the compressor at 200 bar for approx 10 mins (control the flow with the filling valve to maintain the pressure).
- ✓ Replace the oil with new oil.
- ✓ Open the filling valve(s) and run the compressor for a few minutes .
- ✓ Stop the compressor and open the drain valves.
- ✓ Close the filling valves
- ✓ Open the final filter housing and lubricate the O Ring with a food grade grease or silicone grease.
- ✓ Store the compressor in a cool dry place free from dust and contamination. A cover is recommended as long as condensation can be avoided.

De-conservation, commissioning:
After the compressor has been stored, the following Steps are to be taken:

- ✓ If the compressor has been stored for more than 12 Months, we recommend replacing the oil before use.
- ✓ Replace the final purification filter.
- ✓ Check oil level.
- ✓ Inspect the condition of the vee belts, replace if necessary
- ✓ Inspect the filling hoses visually for signs of deterioration, replace as necessary.
- ✓ Open the filling valves and run the compressor for approx 10 minutes with the filling valves open.
- ✓ Close the filing valves and allow the compressor to build up to working pressure.
- ✓ Check the correct safety valve setting and/or pressure switch setting (option).
- ✓ Check all connections and pipe work for leaks.

Once the above steps are completed to satisfaction, the unit is ready to use.

Tightening Torques

LW 320 E / 320 ES

Cylinder Head Bolts	1st Stage	37.5 Nm
Cylinder Flange Bolts	1st Stage	35 Nm
Cylinder Head Bolts	2nd Stage	30 Nm
Cylinder Head Bolts	3rd Stage	30 Nm
Guide Cylinder Flange Bolts	2nd & 3rd Stage	41 Nm
Block Fixing Bolts M10	(8.8)	44 Nm

V-Belts

The compressor block is driven by the engine via 2 V-belts.
Check V-belt condition / tension at least once a month.

In case of high V-belt wear, check the following:

- V-belt tension
- Check if both V-belts are the same length / specification
- Check pulley grooves for marks / scratches / damage
- Check if pulley grooves are free from oil / grease

How to tension the V-belts

Attention: Do not work on hot compressors / engines

- Stop compressor and wait until it has cooled down
- Tilt compressor frame until you can loose all 4
- Slightly loose nuts of motor flange *(use 19mm spanner / socket)*
- Adjust motor tensioning bolt until correct V-belt tension is achieved
  (located next to the motor flange)
  - use 19mm spanner / socket
- Tighten nuts of motor flange
- Check tension of V-belts *(readjust if necessary)*

ATTENTION:

Insufficient V-belt tension leads to higher vibrations and increases the noise level of the compressor unit.
Replace faulty V-belts immediately.
Always use V-belts of identical length / specification.

Instructions for use

L&W PURACON
Humidity Controller

Contents

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For your safety

For correct, effective and safe use of the equipment and to avoid hazards it is essential to read and adhere to the following recommendations.

Strictly follow the instructions for use

Any use of the equipment requires full understanding and strict adherance of these instructions. The apparatus is only to be used for purposes specified here. Attention is drawn to the specific instructions for use of compressor and/or compressed air acoordingly.

Maintenance

The apparatus must be inspected, calibrated and serviced by specialists at regular intervals (and a record kept). We recommend obtaining a service contract with our authorized Service. Repair or calibration should only be carried out by authorized Service technicians

Liability for correct function or damage

The liability for the correct function of apparatus is irrevocably transferred to the owner or operator to the extent that if the equipment has been serviced or repaired by personnel not employed or authorised by Lenhardt & Wagner or when the equipment was used in a manner incompatible with the intended use. Lenhardt & Wagner cannot be held responsible for damage caused by non-compliance with the recommendations given above. The warranty and liability provisions of the terms of sale and delivery of Lenhardt & Wagner are affected by the recommendations given above.

Lenhardt & Wagner GmbH

Intended Use

The instrument is for monitoring the humidity of air/gas in a filling system such as a breathing air filling station using high pressure compressors.

Correctly installed and connected, the instrument monitors and displays the moisture content in a high pressure pipeline. The instrument can be used as a visual reference for the state of purification filters, as an audio alarm for exceeding pre-set moisture levels, or as a safety device for cutting out off a compressor when a pre-set moisture level is exceeded.

Regulations

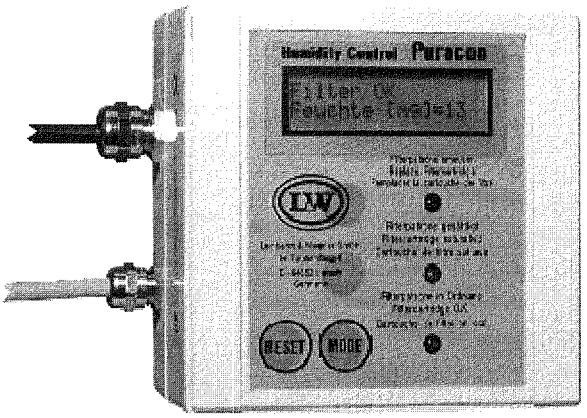
Regulations for the quality of breathing are relavant, as are regulations for the installation and operation of high pressure gas installations and cylinders. In particular, the EN 12021 stipulates a limit of 25 mg/m³ moisture in breathing air as measured from a compressor.

Description

The instrument consists of the following components which make up the standard scope of delivery:

Display unit

The display unit consists of an housing with an LCD display, 3 quick reference LEDs, a mains power cable, an orange sensor cable and two button on the front for Mode and Rest.



The orange sensor cable should only be connected / disconnected when the power supply is off (unplugged). Cables up to 30m length are available as accessories.

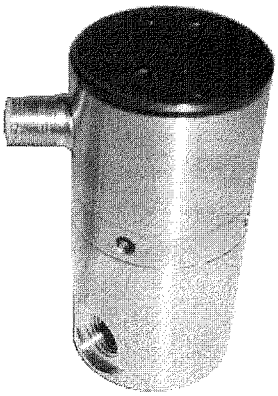
The power supply cable is for use with a standard 230V CE socket with earth, other voltages available on request.

The LCD display shows the present moisture level in mg/m³ and/or self test and alarm messages.

The 3 quick refernce LEDs give a visual indication of the moisture level (factory settings):

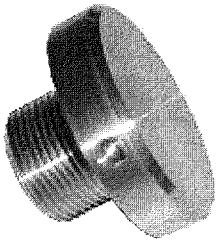
- Green <20 mg/m³
- Yellow 21-25 mg/m³
- Red >25 mg/m³ (cut-off or alarm relay is activated)

Sensor housing



The cylindrical sensor housing consists of two halves screwed into each other and sealed with an O ring. The sensor housing contains the highly sensitive sensor that monitors the moisture content. If a filter is not changed when the display indicates, then water droplets may enter the sensor housing causing faults in the system.

Blind plug



The stainless steel blind plug that is sealed with an o-ring is used to block the lower housing body when the upper body is removed for repair/service. This ensures that the filling station can still function without the humidity controller.

Instructions for use

These instruction form part of the scope of delivery

Installation

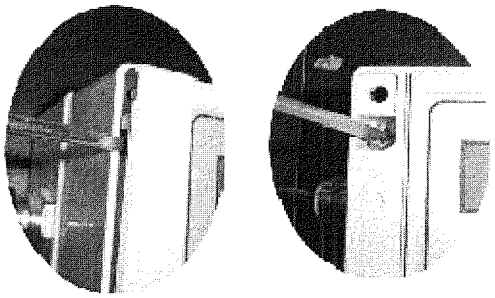
Warning: Before any work is carried out, isolate the power supply to prevent injury.

The puracon may be already installed in a compressor or a filling station, or may need to be installed in an existing system as follows:

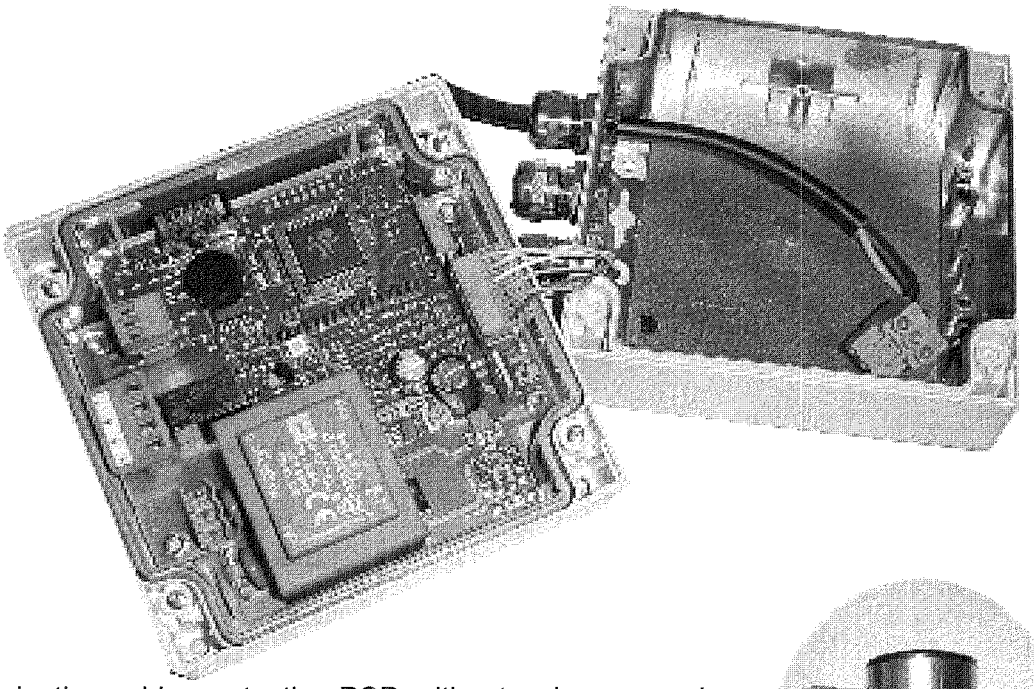
Display

Remove the two plastic covers from the front of the display, unscrew the four screws which join the front cover and the rear cover.

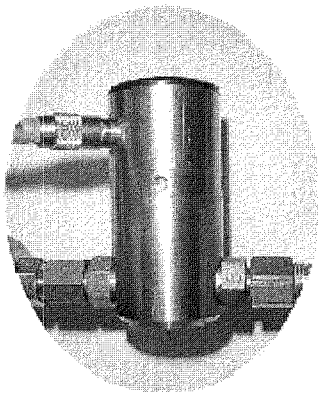
When the display is opened, the two cables can be unplugged from the printed circuit board (PCB) and the front cover including PCB placed in a safe place.



The rear cover can now be mounted onto a wall or panel with 4 screws (not included). The two cables are located on the left hand side.



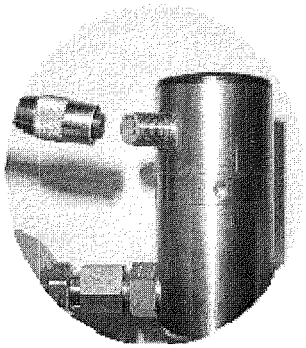
Plug in the cables onto the PCB without using excessive force and refit the front cover and the two plastic strips.



Sensor

The sensor housing should be vertically mounted in the high pressure pipeline after a non return/pressure maintaining valve. A non return valve is recommended in the outlet of the housing towards the filling panel. The connections should be made with suitable ermeto connections by a qualified technician. There is no particular direction of flow.

Care is to be taken that no burrs or debris remains in the pipeline.



Sensor cable

The sensor cable plug has a guide inside for the sensor housing socket to prevent incorrect connections. Do not use excessive force when plugging the cable in, and screw down the plug finger tight.

***Warning*:** Do not connect/disconnect the sensor cable when the power supply is on.

Power supply

If the Puracon is to be connected to a standard electric socket, simply plug in the CE plug into an earthed socket. The standard units require 210 – 250V AC, 40-60 Hz. other voltages available on request.

If the Puracon is to be connected into a compressor's power supply, the cable in the electrical distibution box of the compressor is to be shielded, the shielding can be connected to a suitable metal connection. A qualified electrician is recommended for carrying out this work.

Electrical connections

1 PE Earth green/yellow cable)
2 L1 240V AC or +12V / +24V (special version)
3 Neutral or Return in -12V / -24V (special version)
4 Free
5 Off (Relay switched. Motor off)
6 On (Relay switched, motor can be started) Relay voltage <40V AC or <2V DC
7 Common connection

Operation

When the power supply is turned on, or when the compressor is turned on, the puracon will start a self test sequence.

Language selection

Press Reset

Press and hold Mode, press Reset

When a Peep is heard and the display goes blank, release Mode

"**Language**" will appear in the display

After hearing a peep, press Mode and keep it pressed

When the desired language appears in the display, release Mode

A long beep signal appears at the end of the selection.

Display

The display will show the actual humidity in the system and display the value in mg/m³ on the LCD accompanied by an LED as follows.

After the compressor has been standing for some time or after a filter change, there will be remaining moisture in the system that will be displayed as a value higher than 20 mg/m³ with a yellow or red LED. When the compressor air starts to flow through the system, the remaining moisture will be flushed out of the system and the moisture level will reduce.

Errors

If and error is shown in the display, the unit can be re-set by pressing and then releasing the Reset button. The system will restart and carry out a self test. Pressing Reset at any time will return the unit to the normal monitoring mode.

The following errors may appear in the display:

Error 1 Mositure, defective or contaminated sensor

Error 2 Mositure, value outside normal parameters or out of calibration

Error 3 -

Error 4 Default is missing, data loss in memory, cross connection

Error 5 Senasor cable is defective or broken, no monitoring

If this error remains, replace the sensor cable.

Error 10 Voltage for sensor supply <7 volt> 10 volt

Error 11 Voltage for processor supply <4.7 volt>5.3 volt

Error 12 12V DC Supply <10 volt> 14 volt

Error 13 15V AC/DC transformer <13 Volt> 17 Volt

If the error remains on the display after reset, then the unit must be returned to an authorised repair facility.

Sensor calibration

The sensor is subject to a natural aging process with an expected life of approx. 6 years. The sensor should be calibrated every 2 years. This calibration requirement is not necessary if independent air/gas quality assurance measures are taken (at least once a year).

Removal of sensor and display for return

For the regular calibration or if the unit has a defect and must be sent back for repair, the unit can be dismantled as follows:

Sensor cable

Ensure the power supply is isolated and unplug the sensor cable from the sensor housing.

Sensor housing

Ensure that the sensor hosuing is vented and pressure free. The upper part of the sensor housing can be unscrewed from the lower housing using a suitable "C" spanner.

Fit the blanking plug into the lower housing to seal the system and allow continued use (without humidity monitoring).

Display

Remove the two plastic strips from the front of the display, remove the 4 screws and pull the front display half away from the rear halve carefully.

Unplug the two (or three) cables from the PCB.

Return the front half of the display and the upper sensor unit to an authorised repair facility or to a Lenhardt & Wagner facility. It is not necessary to include the cables with the returned unit.

Technical data

Display

Dimensions (L x W x H):	120 x 120 x 60 mm
Installation dimensions:	150 x 120 x 60 mm
Weight	approx. 800 g
Voltage (standard unit)	210 - 250 V AC 6VA
Frequency	40 - 60Hz
Protection class	IP65
Relay	<40V DC/<2A DC

Sensor

Dimensions (L x Ø):	95 x 45 mm
Installation dimensions:	95 x 100 mm
Weight:	approx. 800 g
Maximum pressure:	330bar
Protection class:	IP65
Working temperature	+5 - +50°C

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FILTERCHANGE
Stationary L&W 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, order numbers:

1.7 litre Housing: 000002 (Breathing Air)
Option: **2.3 litre Housing: 000003** (Breathing Air)

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

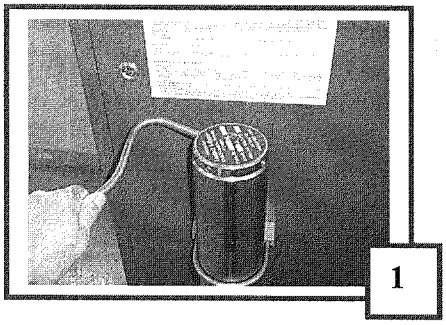
Before changing the filter cartridge, make sure the compressor is switched off and cannot be inadvertantly started. Disconnect it from the power supply or remove the key from the starter (Diesel types}.

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 opreated 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 change

- Unscrew the filter housing cap anti-clockwise, first with the special cartridge key and later by hand (1)
- Place the other end of the cartridge key in the filter cartridge in the filter housing (2)
- Unscrew the filter cartridge anti-clockwise and pull the cartridge out of the housing (3)
- Check O-ring for wear and grease thread of top cap
- Open the sealing of the new filter cartridge and use the cartridge key to place it in the filter housing (3)
- Screw in the new filter cartridge clockwise with the cartridge key hand tight (2)
- Refit the cap of the filter housing clockwise, first by hand and than by 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 that the saturated filter cartridge is disposed of correctly at an approved waste point.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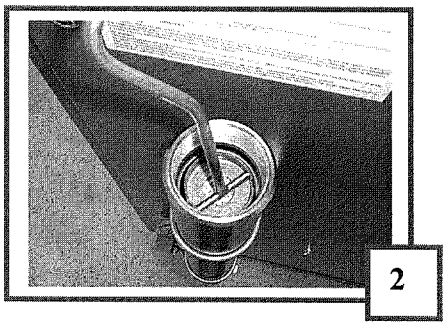
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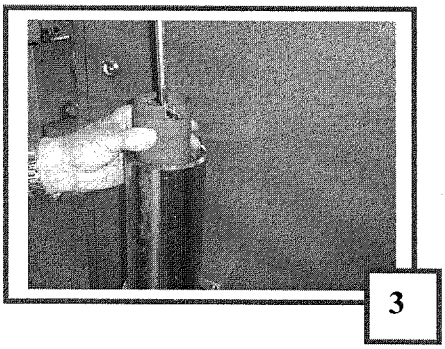

3

ELECTRONIC COMPRESSOR CONTROL

LW ECC

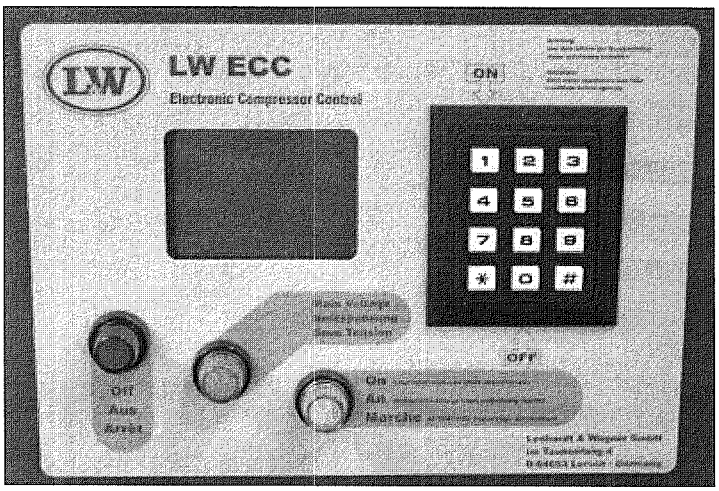
Various L&W compressors are equipped with the all-electrical computer supported control system LW ECC – as an option.
It is easy to operate and allows multiple and individual settings.

LW EEC Features:

- **LCD-Display with key pad**
- **Coloured LEDs for ON / OFF / Main Voltage indication**
- **Automatic- & semi-automatic operation mode**
- **Automatic dump system**
- **Integrated counter for operation hours**
- **Integrated counter for load cycles**
- **Maintenance intervals automatically displayed**
- **Required service part numbers automatically displayed**
- **Fully adjustable pressure ranges for start and stop**
- **Various warning messages will be displayed**
- **Check of end-pressure safety valve possible**
- **Auto switch-off when system is not running**
- **Extentable by additional modules (external filling panel)**
- **Easy to operate menu**
- **Warning messages** *("Housing Open" / "Emergency Switch")*
- **Load-free start cycles**
- **Star / Delta start**

LW ECC OPTIONS:

- **Oil Pressure Control**
- **Oil Temperature Control**
- **Cylinder Head Temperature Control**
- **Inter Stage Pressure Monitoring**
- **PIN Controlled Access**
- **Ambient Air Temperature Control**
- **Master / Slave Option**
  (if more than one ECC equipped compressors are combined)



ECC CONTROLLER

Immediately after the compressor has been connected to power,
the ECC-display comes up with the following menu:

MAINMENU

Charging	0 min
Total	0,0 h
Start : 1	Stop : 0
Help: *	OFF
Final Press	0 bar

Present filling time in minutes
Total operation hours
Key 1 to start compressor / Key 0 to stop compressor
** Key leads to submenus* *Current operation state = Off*

Present filling pressure

The following keys can now be used:

Key	*Function*
1	**Start** - *Starts the compressor*
0	**Stop** - *Stops the compressor*
*	**Leads to the submenus**

After typing the * key the following menu appears:

SELECTION MENU M100

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

Key 2 leads to submenu "Display"
Key 3 leads to submenu "Settings"
Key 4 leads to submenu "Test"
Key 5 leads to submenu "Statistics"
Key 6 leads to submenu "Maintenance"
Key 7 leads to submenu "Operation mode"
Key # leads back to submenu "Mainmenu"

(M100) tells that you are currently on menu page 100.

Remark:
Beside the listed numbers, the compressor unit can always be started / stopped by using keys 1 and 0.

DISPLAY MENU M200

	Display I:	
2	Press. Stage 1	*Key 2 shows current pressure of the 1st stage**
3	Press. Stage 2	*Key 3 shows current pressure of the 2nd stage*
4	Press. Stage 3	*Key 4 shows curent pressure of the 3rd stage*
5	Cyl. Head Temp.	*Key 5 shows temperature of the final stage cylinder head*
6	Oil Temp.	*Key 6 shows the oil temperature*
7	Display II	*Key 7 shows Display II*
(M200)	Return#	*Key # leads back to "Mainmenu"*

By pressing key 2 the following informations appear:

Charging	0 min
Total	0,0 h
Start:1	Stop: 0
Help:*	OFF
Press.	0 bar
1st Stage	0,0 bar

Use keys 3 to 6 to change between values displayed in this line

** = Option*

Option:

If the compressor unit features two different pressure ranges, both pressures can be displayed in the main menu by pressing key 8.
(text of line 3 changes to „Press. 200/300").

Display II:

Press.		Temp.	
4:	0	C:	0
5:	0	D:	0
6:	0	E:	0
7:	0	F:	0
	bar		°C

Key # leads back to "Mainmenu".

SETTINGS M300

	Settings:
	Automatic
2	Stop pressure
3	Restart Press.
	Semi-Automatic
4	Stop Pressure
9	Close
(M300)	Return: #

Key 2 leads to submenu "Set Stop Pressure" (in automatic mode)
Key 3 leads to submenu „Set Restart Pressure" (in automatic mode)

Key 4 leads to submenu „Set Stop Pressure" (in the semi-automatic mode)
Key 9 leads back to "Selection menu"
Key # leads back to "Mainmenu"

Remark:
Use menu M700 to change between "Automatic" and "Semi-Automatic" mode.
Restart pressure can only be setted in "Automatic Mode".

SET STOP PRESSURE (Automatic Mode) M320

(Only in automatic mode, see menu M700))

	Set
	Stop Pressure:
Actual: 330 bar	
7	New Value:
	>> XXX bar
	(050,, 333)
8	Confirm
(M320)	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"

SET RESTART PRESSURE (Automatic Mode) M330

(Only in automatic mode, see menu M700)

Set		
Restart Pressure:		
Actual: 180 bar		*Current restart pressure*
7	New value:	*Key 7 if restart pressure should be changed*
	>> XXX bar	*XXX indicates modified restart pressure*
	(030,, 310)	*Chooseable pressure range for restart pressure*
8	Confirm	*Key 8 confirms new restart pressure*
(M330)	Return : #	*Key # leads back to „Mainmenu“*

Remark:
Restart pressure must be at least 20 bar lower that current stop pressure.

SET STOP PRESSURE (Semi-Automatic Mode) M340

(Only in semi-automatic mode, see menu M700)

Set		
Stop Pressure:		
Actual: 180 bar		*Current stop pressure*
7	New Value:	*Key 7 if stop pressure should be changed*
	>> XXX bar	*XXX indicates modified stop pressure*
	(030,, 310)	*Chooseable pressure range for stop pressure*
8	Confirm	*Key 8 confirms new stop pressure*
(M340)	Return : #	*Key # leads back to “Mainmenu”*

TEST MENU M400

Test:		
2	Solenoids	*Key 2 leads to submenu “Test Solenoids”*
3	Safety Valve	*Key 3 leads to submenu “Test Safety Valve”*
4	Test-Stop	*Key 4 leads to submenu “Test Stop without Venting“*
9	Close	*Key 9 leads back to submenu “Selection”*
(M400)	Return : #	*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 unless solenoids have been closed 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:
Close all filling valves /-panels before you run the safety valve test.
Compressor will run up to its maximum pressure, which is limited by the setting of 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	0 bar
9	Close
(M440)	Return : #

Key 5 stops compressor during test run
Key 6 vents compressor after leak search has been finished
Shows current filling pressure
Key 9 leads back to submenu „Test"
Key # leads back to „Mainmenu"

Remark:
Test Stop can only be carried out after compressor has been started *(key 1).* Main purpose of it is to check compressor 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:
Press key 5 to get information on which ECC software version is currently installed on your system (M505), i.e.: .
By pressing key 2 you get the total load cycles of the filter housing.

MAINTENANCE MENU M600

Hours remaining	
Oil change	14 h
Sinter filt	989 h
Silencer	4989 h
Valves	5989 h
Oil filter	1000 h
8 Change done	
(M600) Return : #	

Shows remaining hours of listed components (i.e. next oil change in 14 hours,...)

Key 8 leads to submenu "Receipt Maintenance"
Key # leads back to „Mainmenu"

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

CONFIRM MAINTENANCE M680

Confirm Maintenance	
2	Oil change
3	Sinter filters
4	Silencer
5	Valves
6	Oil filter
(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 6 receipts oil filter
Key # leads back to „Mainmenu"

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

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

Key 9 leads back to submenu "Hours remaining"
Key # leads back to „Mainmenu"

OPERATION MODE MENU M700

Operation Mode:	
2	Automatic
3	**Semi-Automatic**
9	Close
(M700)	Return : #

Key 2 activates automatic mode
Key 3 activates semi-automatic mode

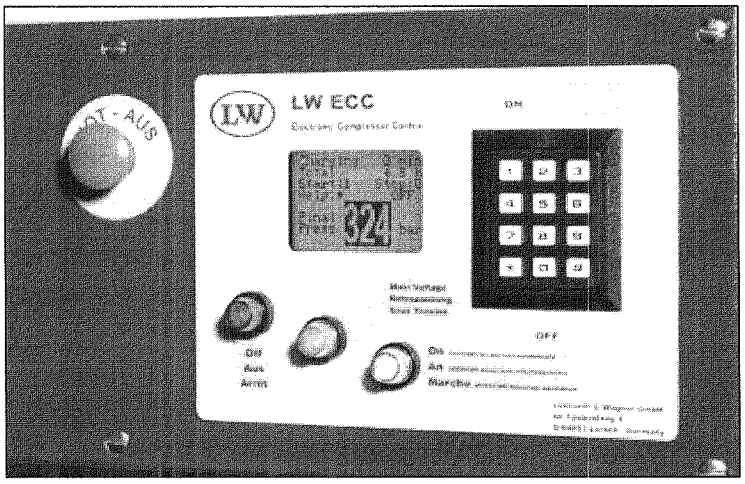
Key 9 leads back to submenu „Selection“
Key # leads back to „Mainmenu“

Remark:
See also menu 300.
Activated modes are always displayed in bolt letters
(above example: Semi-Automatic)

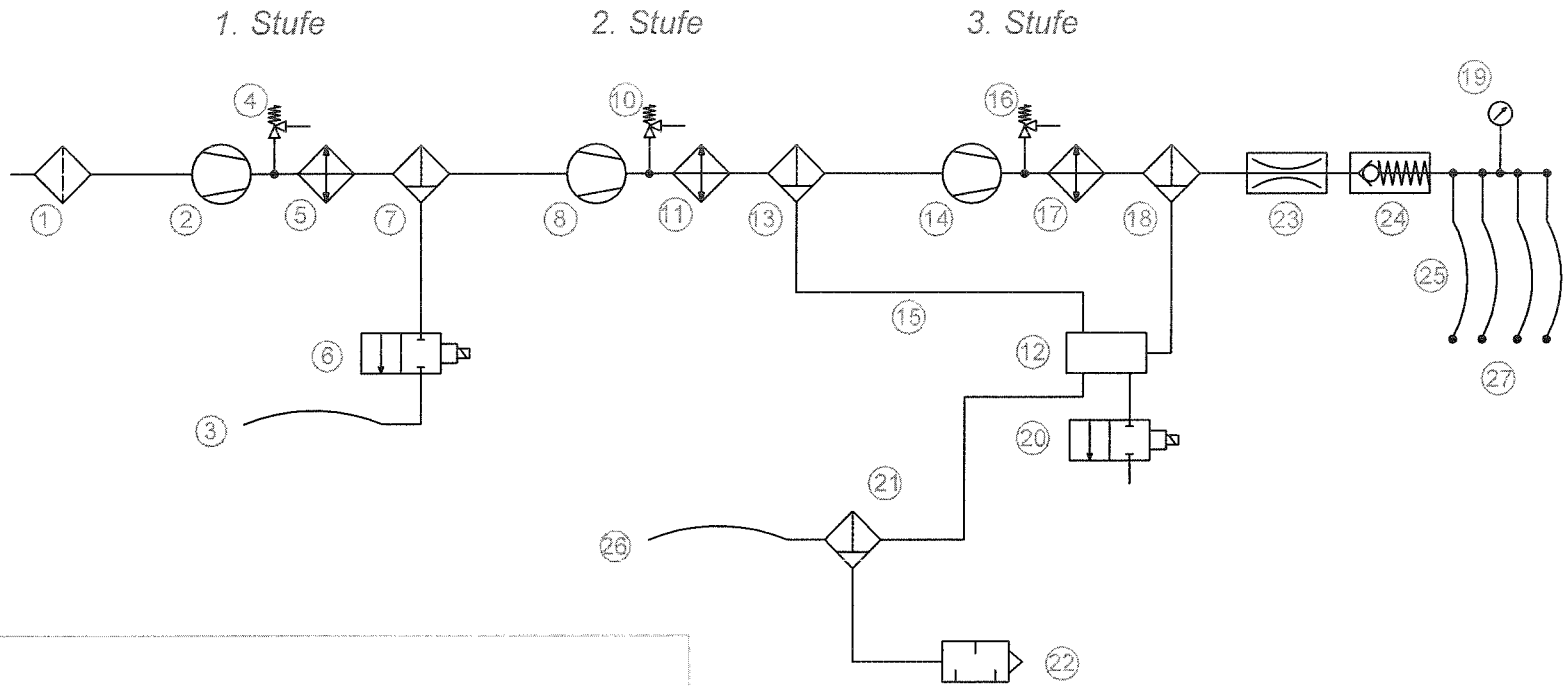
Attention:
Compressor can start automatically if automatic mode is activated
(depending on restart pressure, see M330) !!

Never work on a unit which is connected to main power!
Always pull main plug before doing any maintenance work!

RISK OF ACCIDENT during maintenance work!!



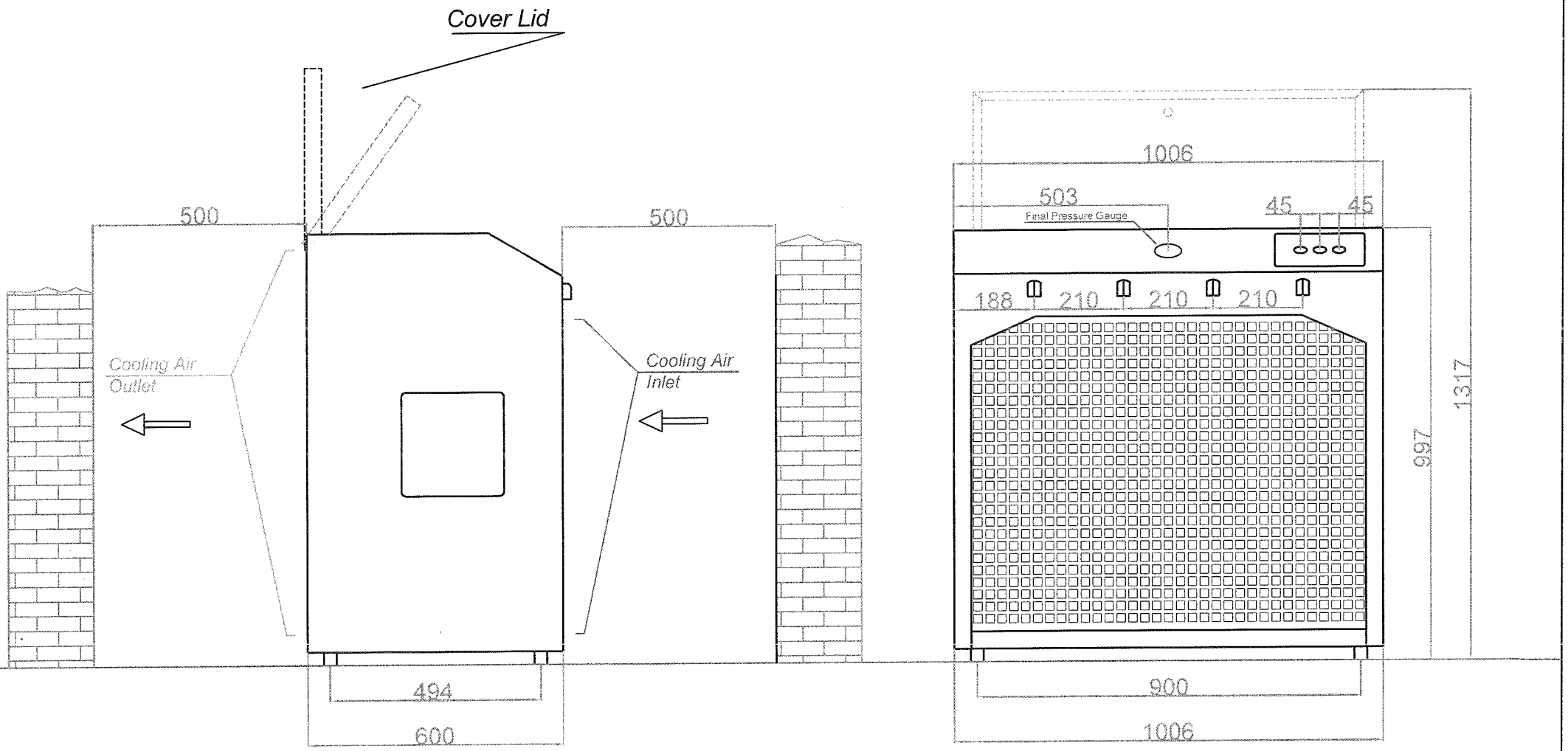
ECC Display



Flow Diagram

1 Intake Filter
2 1st Pressure Stage
3 Condensate Drain Hose
4 Safety Valve 1st Stage
5 Heat Exchanger
6 Condensate Solenoid
7 Oil- / Water Separator
8 2nd Pressure Stage
9 Condensate Drain Hose
10 Safety Valve 2nd Stage
11 Heat Exchanger
12 Pneumatic Condensate Valve
13 Oil- / Water Separator
14 3rd Pressure Stage
15 Control Pressure 2nd Stage
16 Safety Valve 3rd Stage
17 Heat Exchanger
18 Oil- / Water Separator
19 Pressure Gauge
20 Solenoid
21 Condensate Drain Final Stage
22 Silencer
23 Pressure Maintaining Valve
24 Non-Return Valve
25 High Pressure Hose
26 Condensate Drain Hose
27 Tank Connector *(DIN / Yoke or CGA)*

LW 320 E / LW 320 ES
LENHARDT & WAGNER GMBH



Installation Guide

LW 320 E

LENHARDT & WAGNER GMBH

Datum: 30.01.2012

MAINTENANCE LIST LW 320 E

Maintenance Work	Intervals	Qty.	Order No.
Replace Filter Cartridge ***Filter Capacity 1.7 ltr.:***	LW 320 E: every 53 working hours *(@ +20 °C)*	1	000002
Check Oil Level	once a day *(before 1st Start)*		
Oil Change	1st Oil change after 25 working hours *(in total)* thereafter every further 1,000 working hours - but at least once a year	1,800 ml per oil change	000001 (1 Litre)
Replace Air Intake Cartridge	depends on pollution - but at least every two years	1	000170
Check V-Belts	every 50 working hours	2	001685
Replace In- & Outlet Valves ***1st Stage*** ***2nd Stage*** ***3rd Stage***	every 1,500 working hours	 1 1 1	 002093 000542 000543
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		

MAINTENANCE LIST LW 320 E

Maintenance Work	Intervals	Qty.	Order No.
Clean Pressure Pipes	depends on pollution - but at least every two years		
Check Condition of Filling Hoses	once a day *(before the 1st fill)*		
Replace Sinter Filter of Condensate Valve	1st change after 1,000 working hours thereafter every 2,000 working hours	1	000188
Clean Oil-/Water Separators	every 1000 working hours - but at least once a year		
Replace Sinter Filters of Water Separators ***1st Stage*** ***2nd Stage*** ***3rd Stage***	 every 1,000 working hours every 1,000 working hours every 1,000 working hours	 1 1 1	 002123 002123 000184
Replace Silencer	every 500 working hours	1	000178
Check / Re-torque Connections & Bolts	after 15 working hours - thereafter every 500 working hours		

SPARE PARTS LIST LW 320 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 ∅ 35 mm	LW 160 / 190 250
1	Bleed Valve Wheel ∅ 27 mm	LW 160 / 190 251
1	HP Seat	LW 160 / 190 255
1	Packing Washer	LW 160 / 190 256
1	Washer Copper ∅ 8 x 14 x 1 mm	LW 160 / 190 257
1	Washer Copper ∅ 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 320 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 PARTS LIST LW 320 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, 3rd Stage	LW 260 0063
1	Valve Assembly, 3rd Stage complete	LW 260 0064
1	Cylinder, 3rd Stage	LW 260 0065
2	O-Ring	LW 260 0066
2	Guide Cylinder, 3rd Stage	LW 260 0067
2	O-Ring	LW 260 0068
1	Piston Ring Set, 3rd Stage	LW 260 0069
1	Piston, 3rd 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, 2nd & 3rd 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, 2nd Stage	LW 260 0081
1	Piston Ring Set 2nd Stage complete	LW 260 0082
1	Cylinder, 2nd Stage	LW 260 0083
1	Valve Assembly, 2nd Stage complete	LW 260 0084
1	Cylinder head, 2nd Stage	LW 260 0085
1	Connecting Rod, 1st Stage	LW 260 0086
1	Small End Bearing	LW 260 0087
1	Piston, 1st Stage	LW 260 0088
1	O-Ring	LW 260 0089
1	Cylinder, 1st Stage	LW 260 0090
12	Screw	LW 260 0091
1	Valve Assembly, 1st 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 2nd Stage	LW 260 0103
1	Oil Pressure Feed 3rd Stage	LW 260 0104

SPARE PARTS LIST LW 320 E

Qty.	Description	Order No.
1	Oil Pump supply pipe	LW 260 0105
1	Cooling Spiral 1st Stage	LW 260 0106
1	Cooling Spiral 2nd Stage	LW 260 0107
1	Cooling Spiral 3rd 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, 2nd 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 *(incl. O-Ring for Sinter Filter)*	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 2nd Stage	LW 260 0127
1	Condensation Connecting Pipe	LW 260 0128
1	T-Piece	LW 260 0129
1	Magnet Valve 2nd Stage	LW 260 0130
2	90° Connection for Hose	LW 260 0131
1	Condensation Drain Hose, 1st 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, 2nd & 3rd 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 PARTS LIST LW 320 E

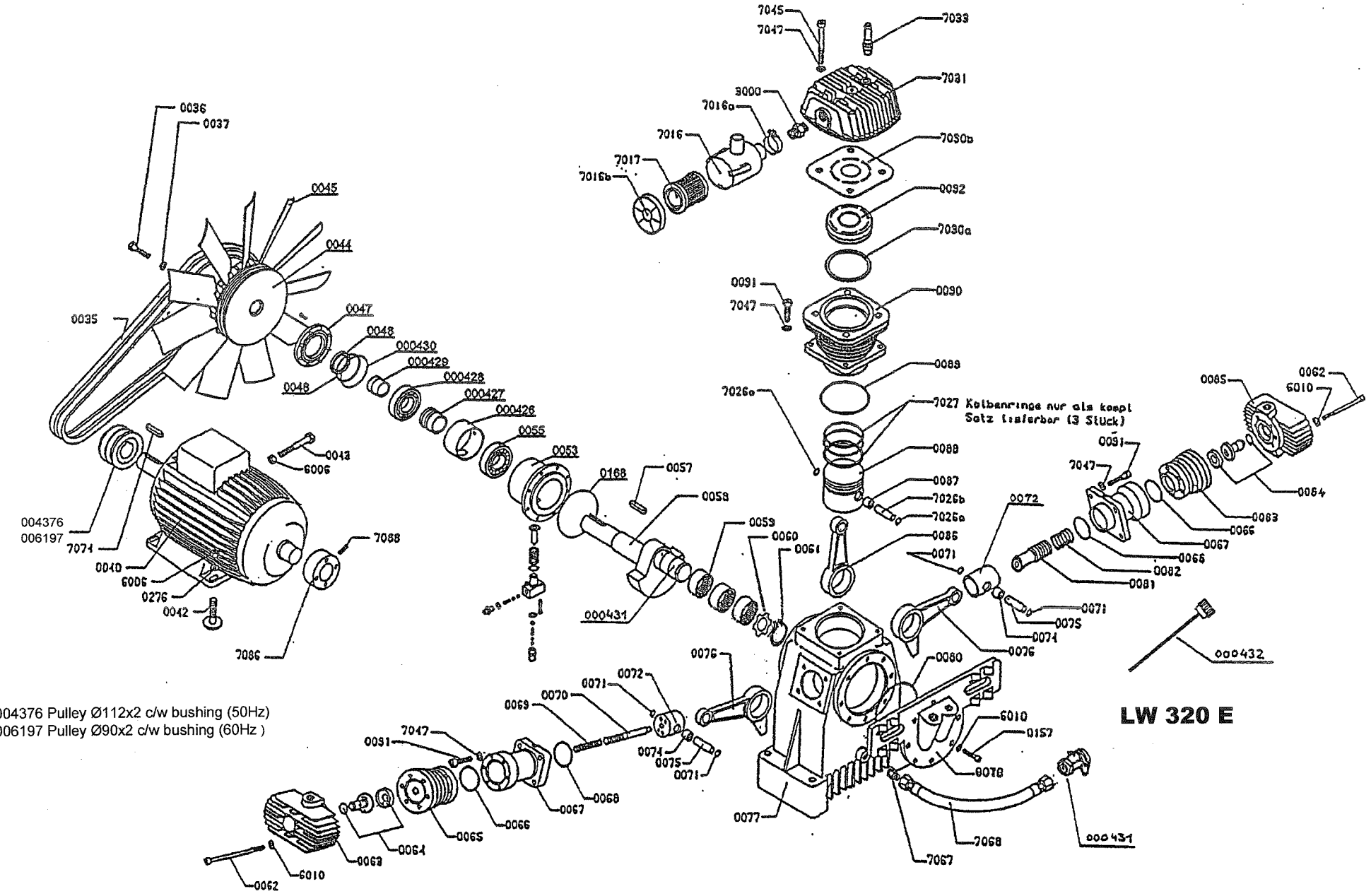
Qty.	Description	Order No.
8	Screw	LW 260 0154
8	Screw	LW 260 0155
2	Connection	LW 260 0156
8	Screw	LW 260 0157
2	T-Piece	LW 260 0158
1	Crank Case Breather	LW 260 0159
2	Bolt	LW 260 0160
1	Seal, Safety Valve w/o cert.	LW 260 0161
1	Cover Electro Box	LW 260 0162
11	Washer	LW 260 0162
1	Housing *compl.*	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 PARTS LIST LW 320 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 1st 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 2nd/3rd 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 *(with test certificate and TÜV)*	4052
1	Safety Valve 330 bar *(with test certificate and TÜV)*	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 *(without test certificate)*	LW 450 7007
1	Safety Valve 330 bar *(without test certificate)*	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, 1st Stage complete	LW 450 7027
1	Copper Seal, 1st Stage Valve	LW 450 7030a

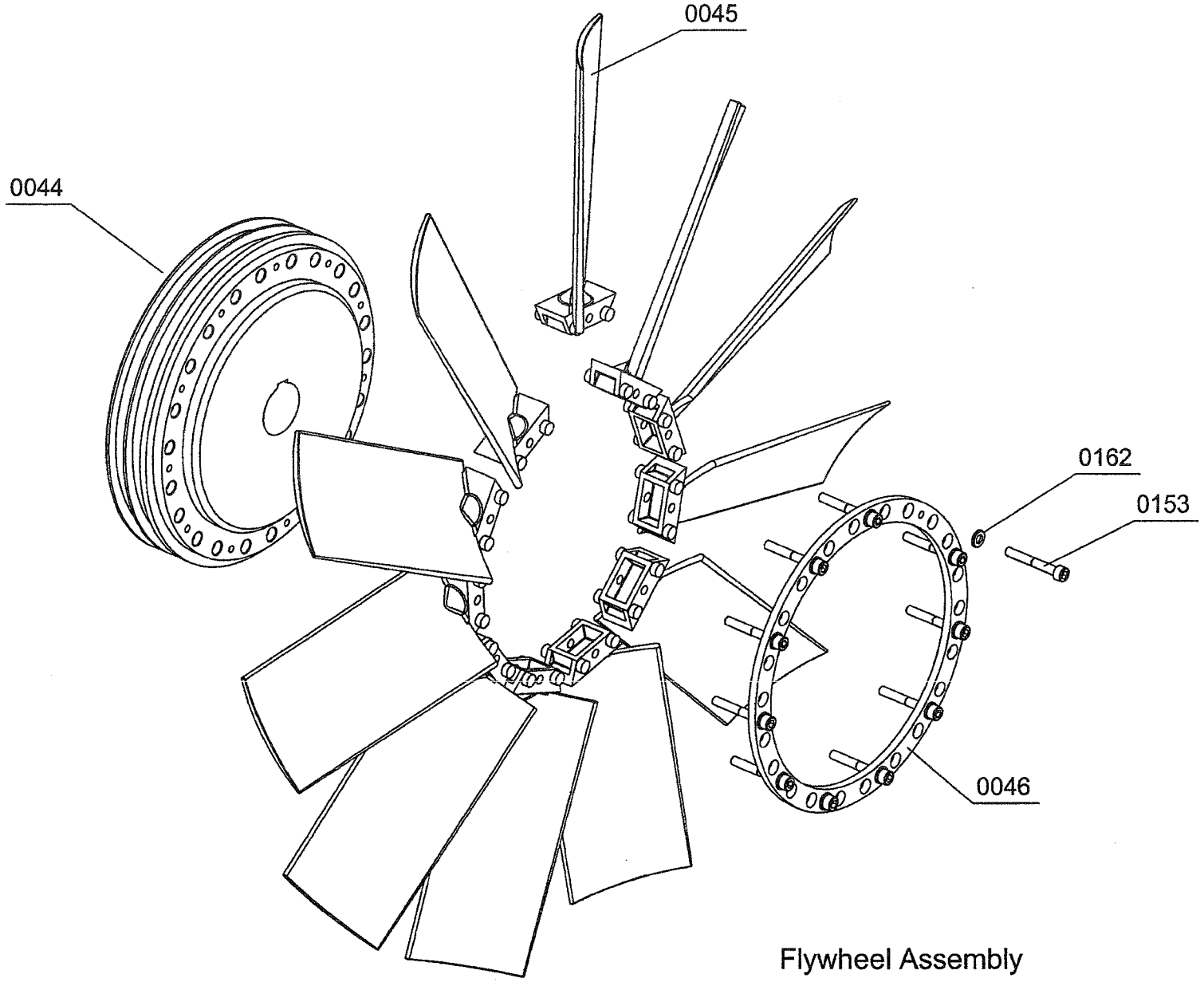
SPARE PARTS LIST LW 320 E

Qty.	Description	Order No.
1	Upper Gasket, Valve 1st Stage	LW 450 7030b
1	Cylinder Head, 1st Stage	LW 450 7031
1	Pressure relief Valve 1st 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

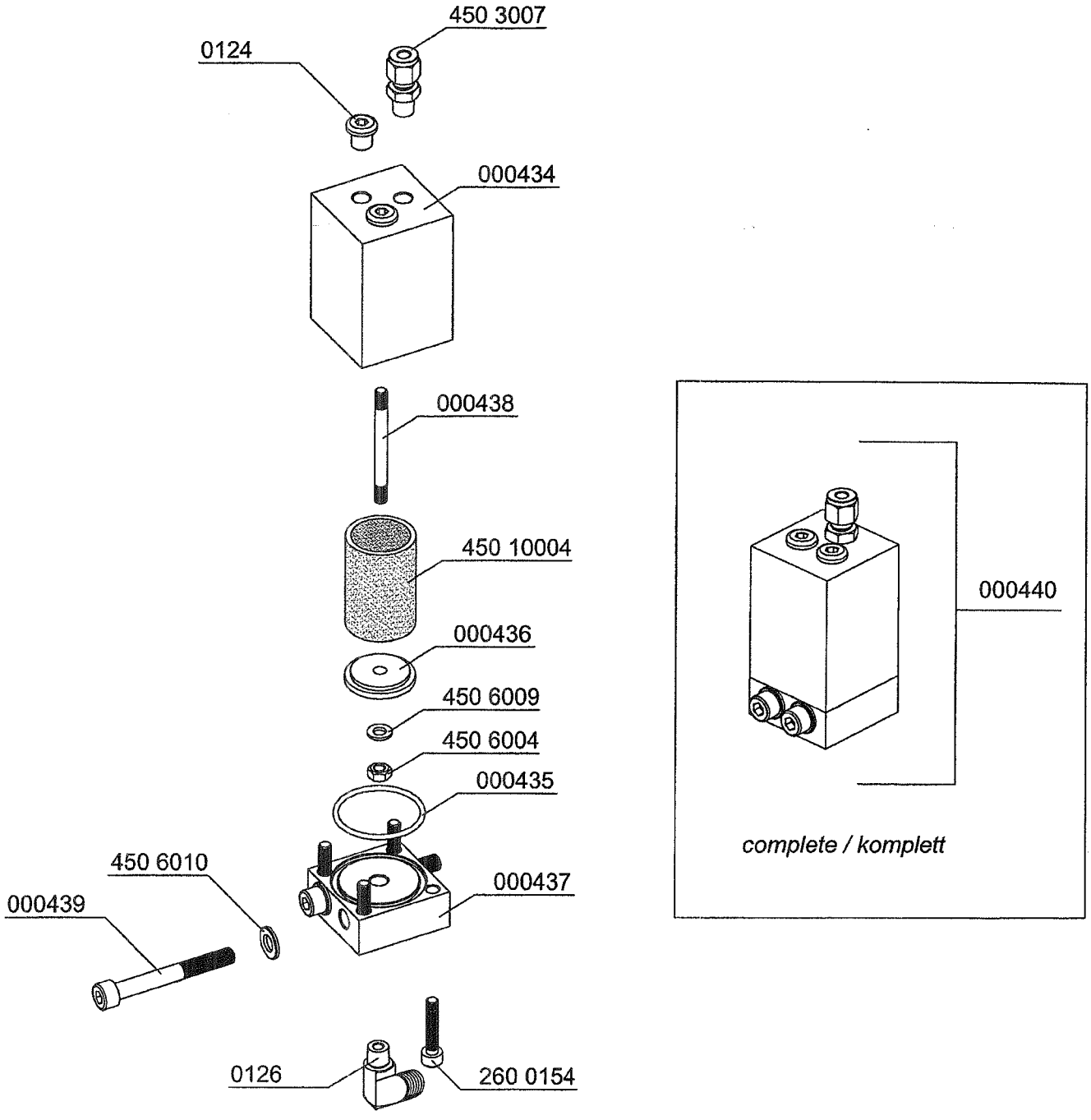


004376 Pulley Ø112x2 c/w bushing (50Hz)
006197 Pulley Ø90x2 c/w bushing (60Hz)

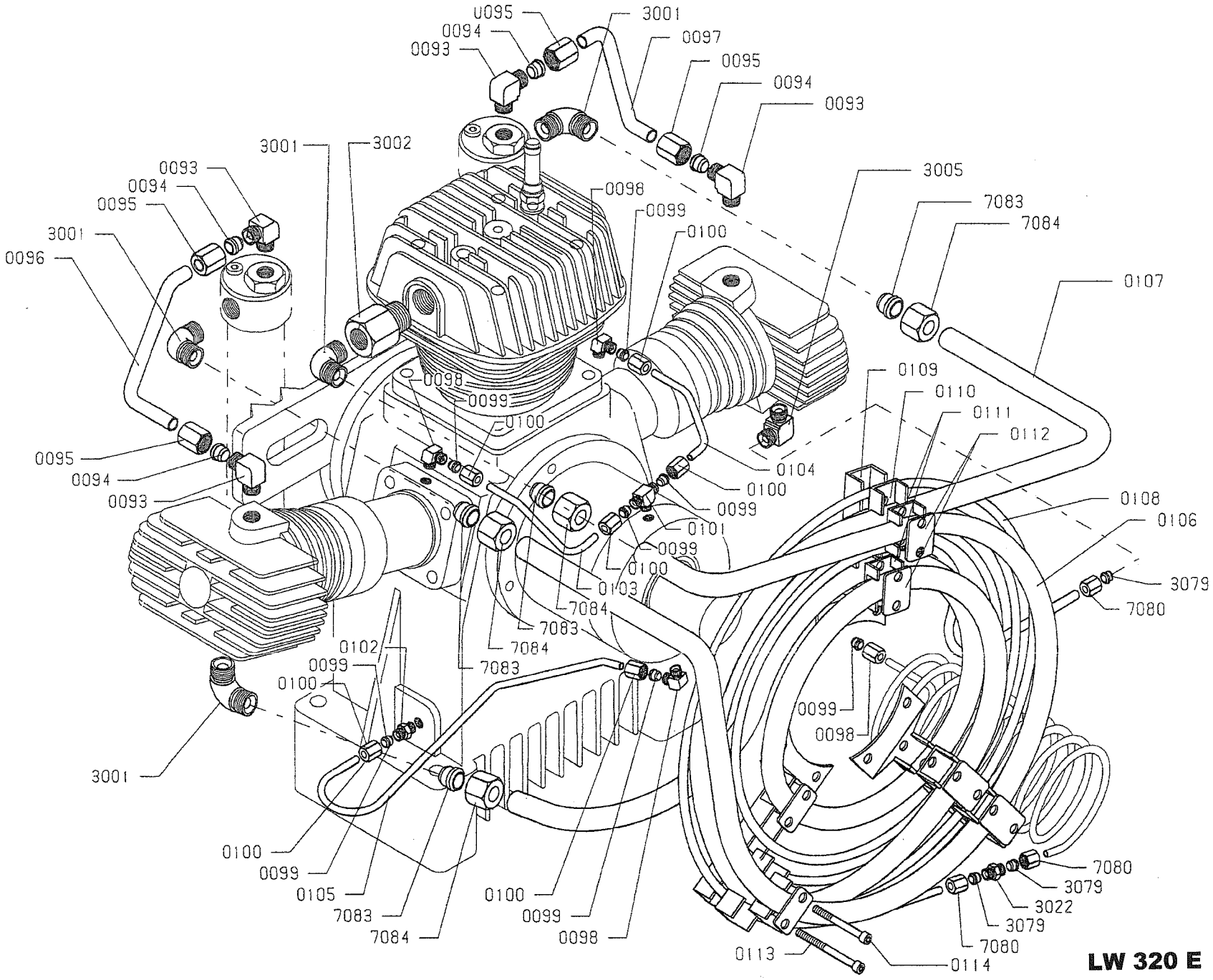
LW 320 E



Flywheel Assembly
Schwungrad



Oilfilter Assembly
Zusammenbau Ölfilter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3001
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3002
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3001
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0100
3005
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0112
0104
0100
0099
0101
0099
0100
0103
7084
7083
7084
7083
0102
0099
0100
0095
0094
0093
0098
0099
0100
0104
0100
0099
0101
0099
0100
0103
7084
7083
0102
0099
0100
3001
0100
0099
0105
7083
7084
0100
0099
0098
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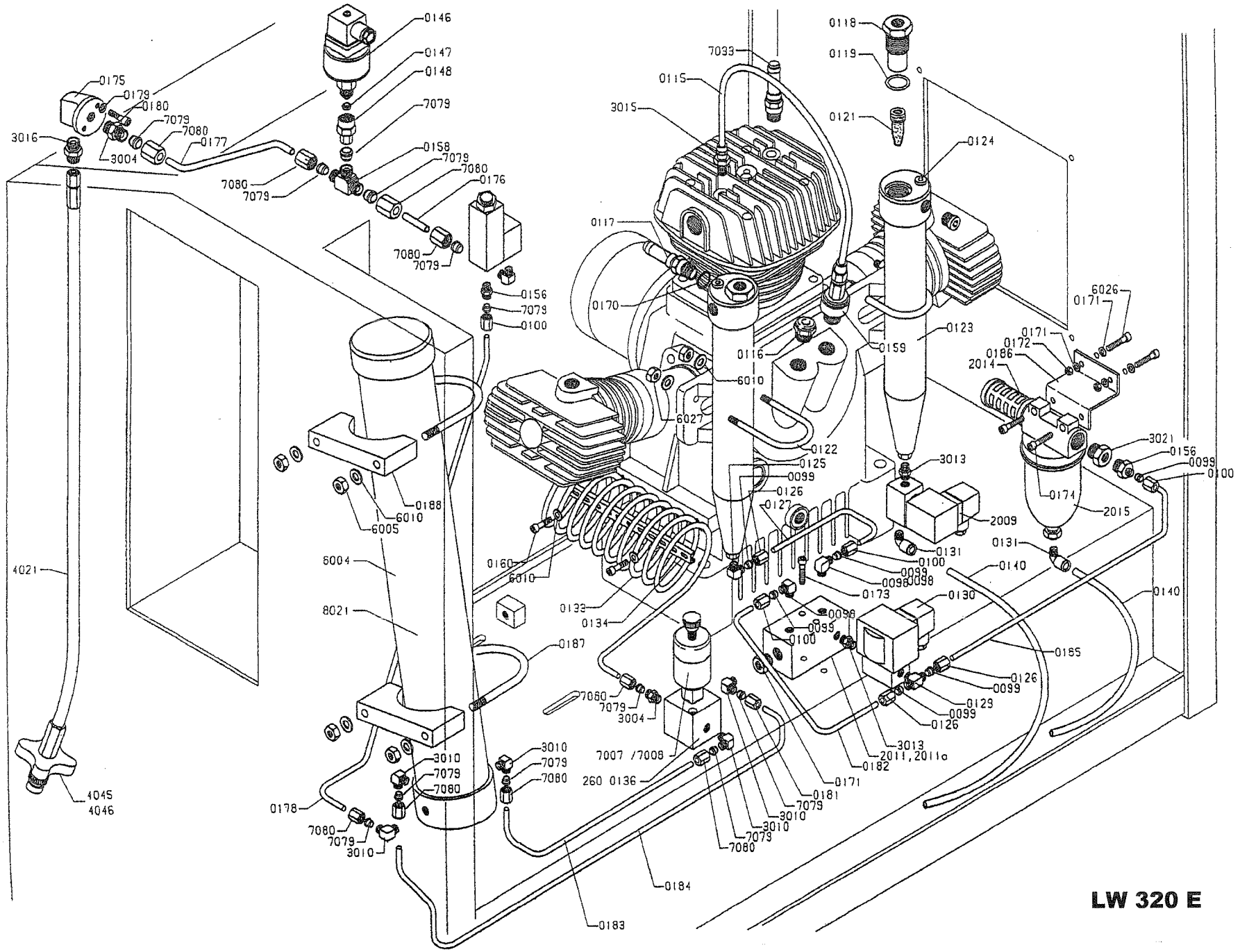
0113
0114
LW 320 E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0148
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0177
3016
3004
0158
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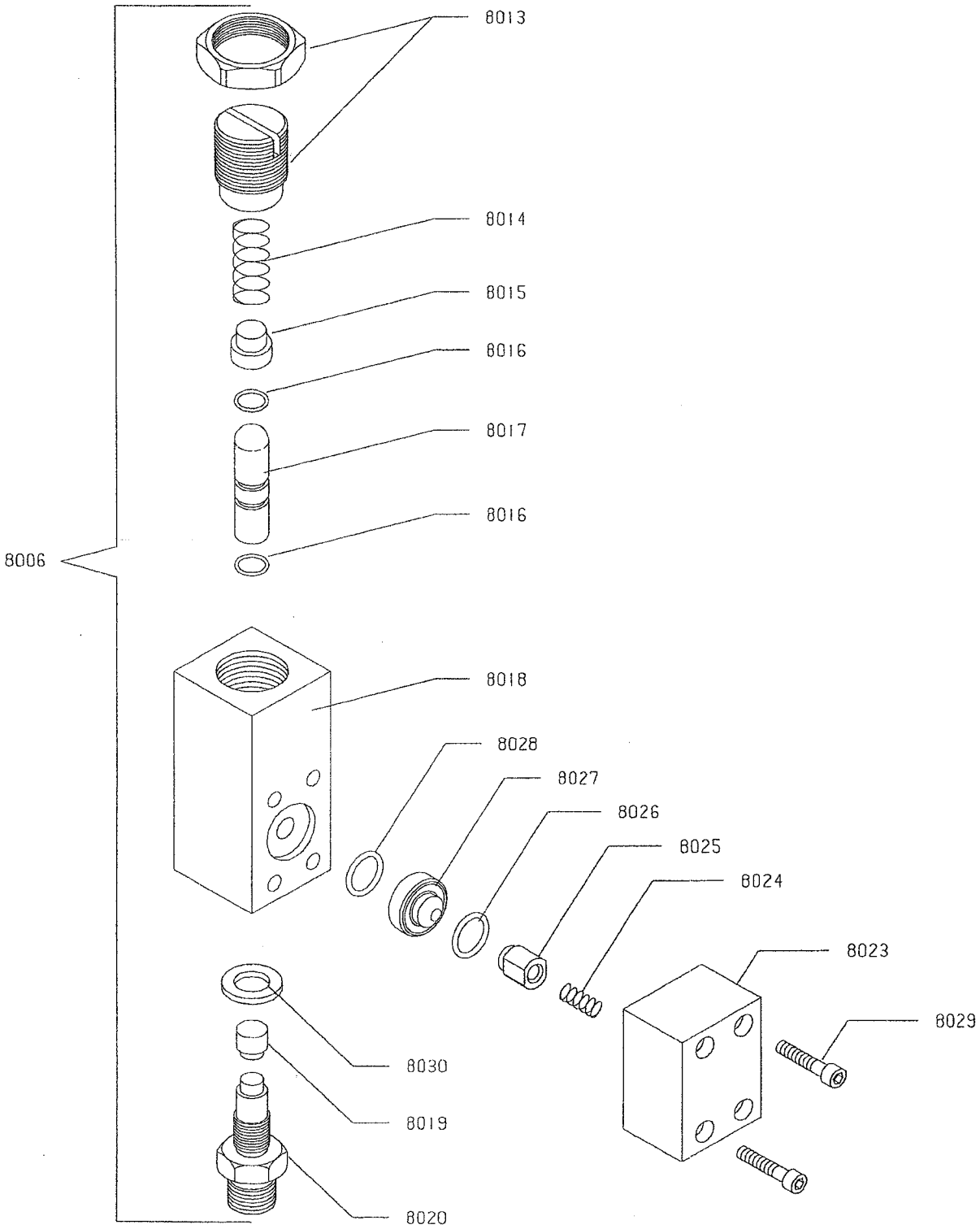
0176
7080
7079
7080
7079
0156
7079
0100
4021
4045
4046
6004
8021
0188
6010
6005
0160
6010
0133
0134
0187
7080
7079
3004
3010
7079
7080
0178
7080
7079
3010
3010
7079
7080
0184
0183
260 0136
7007 /7008
0182
0171
0181
7079
3010
7079
7080
3013
2011, 2011a
0126
0099
0129
0099
0126
0185
0130
0173
0098
0099
0098
0100
0140
0131
0100
0099
0098
0126
0127
0099
0125
0122
6027
6010
0116
0170
0117
7033
0115
3015
0121
0119
0118
0124
0123
0159
6026
0171
0171
0172
0186
2014
3021
0156
0099
0100
0174
2015
2009
3013

LW 320 E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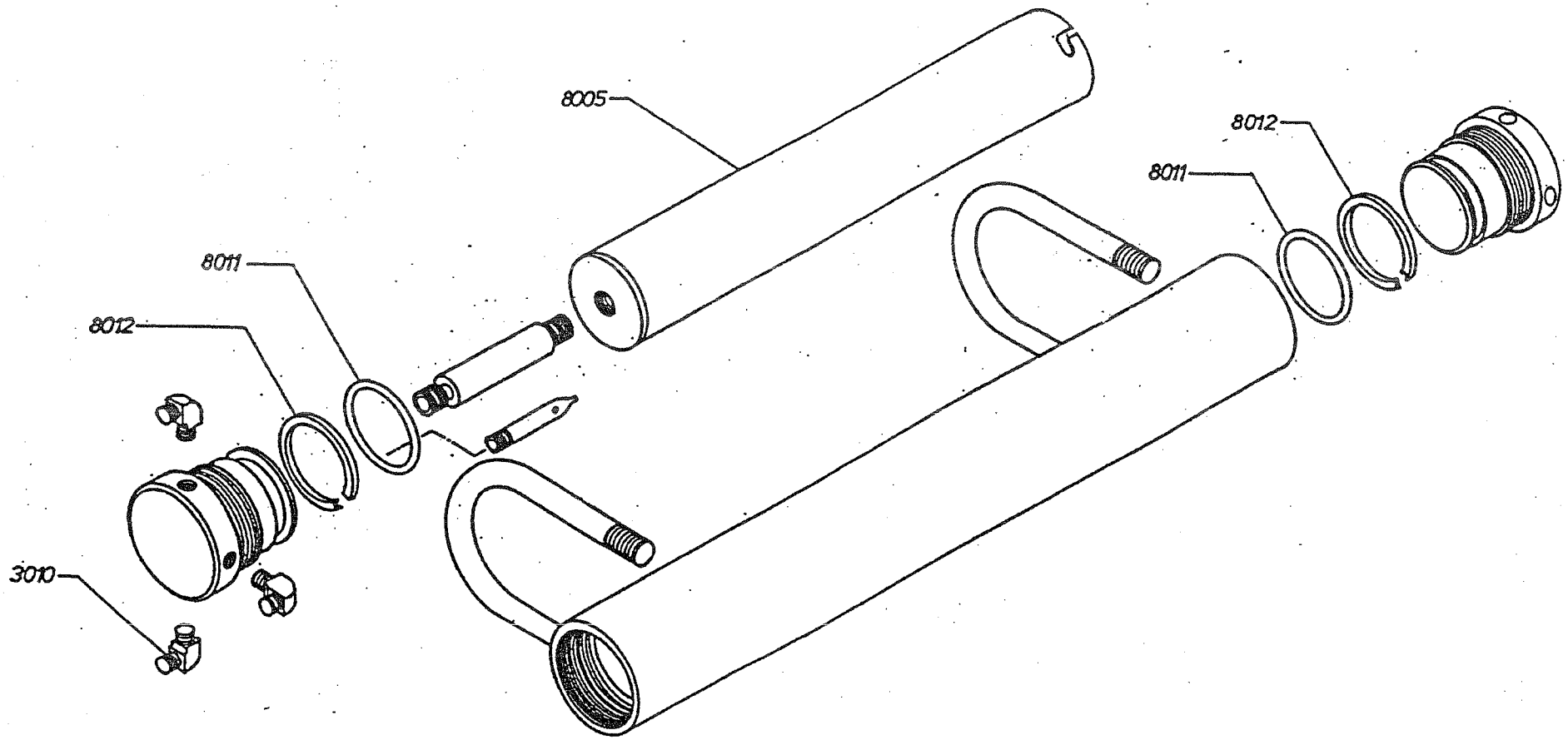
8019
8020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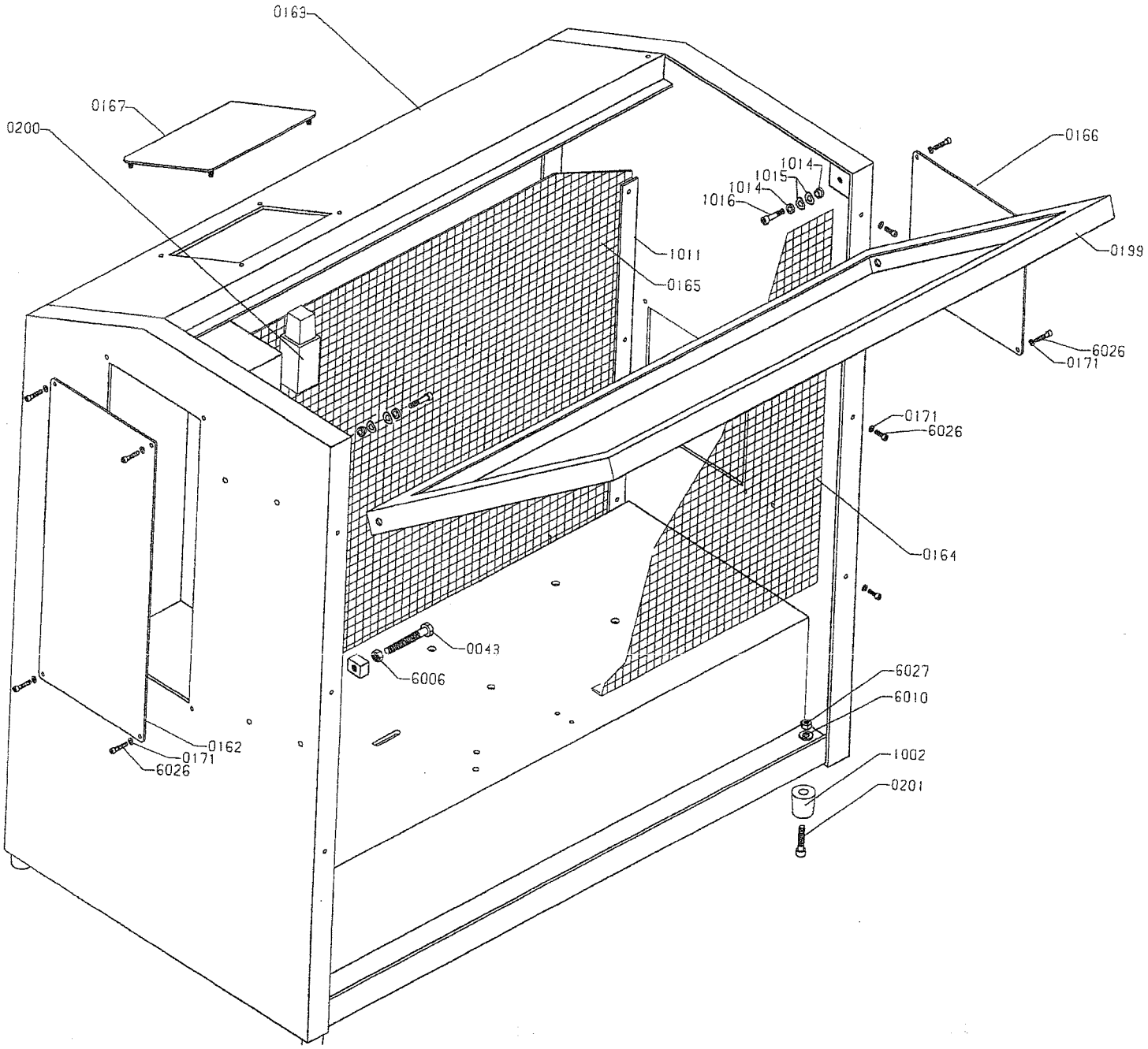
8011
8012
3010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0200
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1014
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1014
1016
1011
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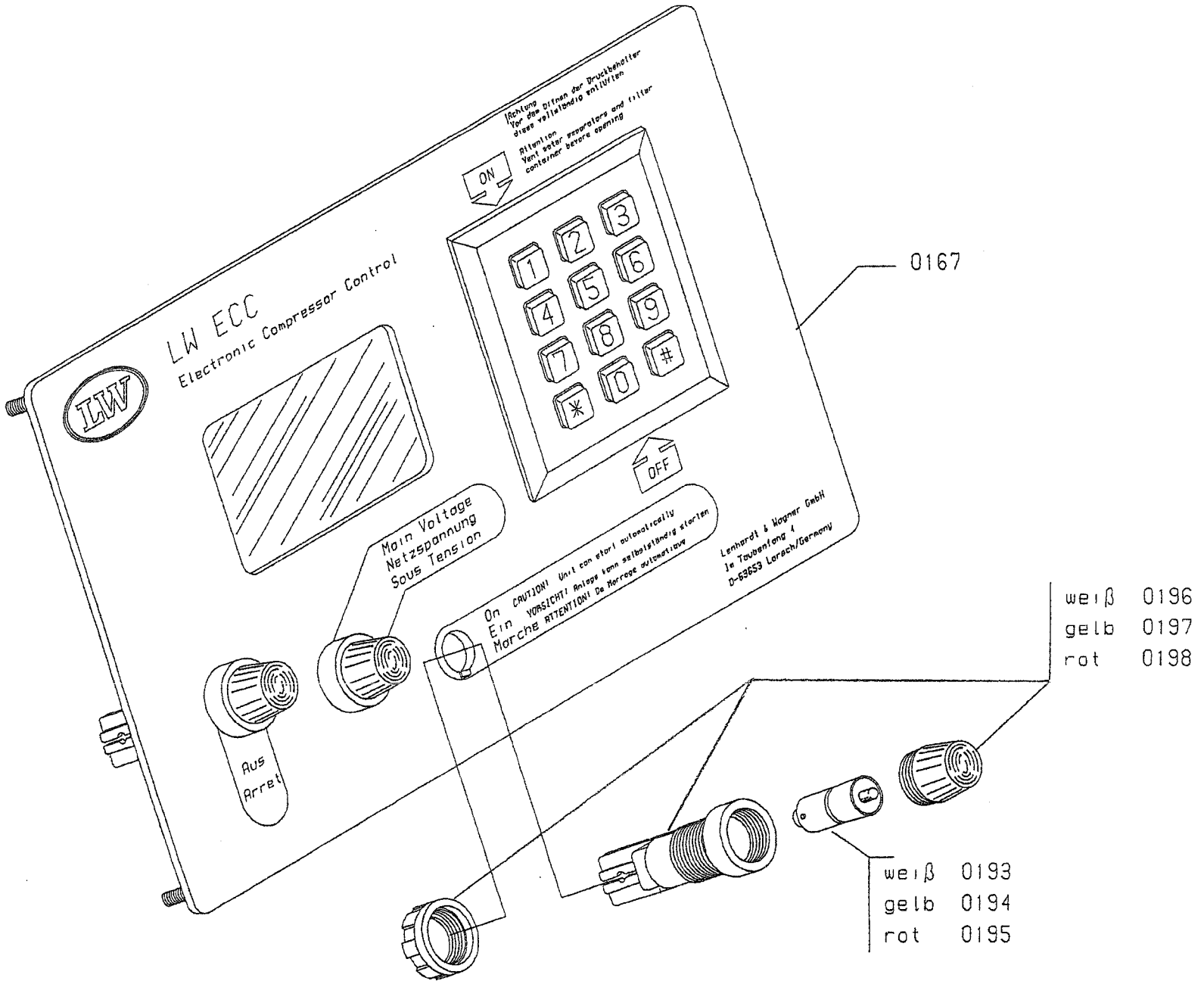
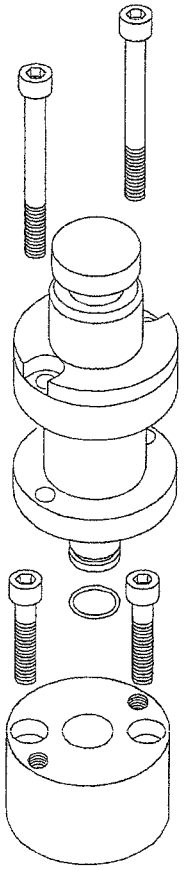
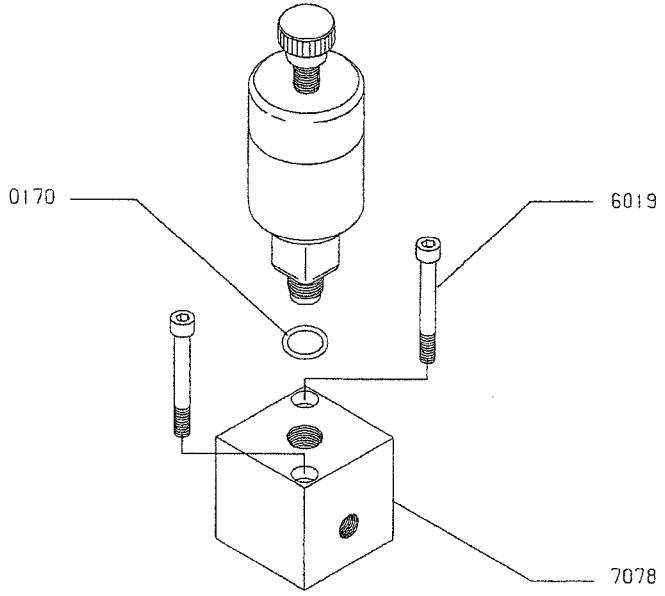
0043
6006
6027
6010
1002
0201
0162
0171
6026


LW ECC
Electronic Compressor Control
LW
ON
OFF
Main Voltage
Netzspannung
Sous Tension
Aus
Arret
On
Ein
Marche
Lenhardt & Wagner GmbH
D-83653 Lorach/Germany
0167
weiß 0196
gelb 0197
rot 0198
weiß 0193
gelb 0194
rot 0195



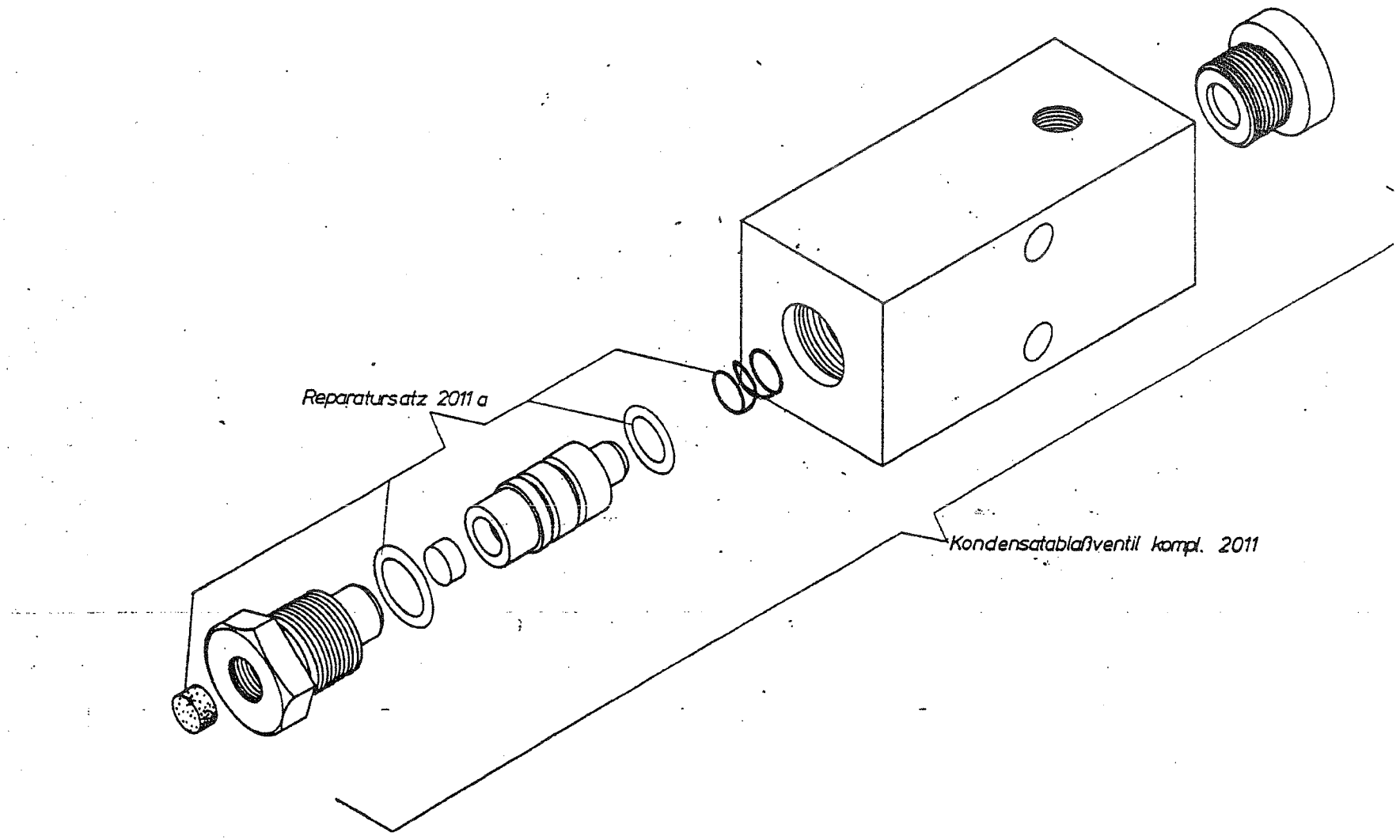
225 bar 4052

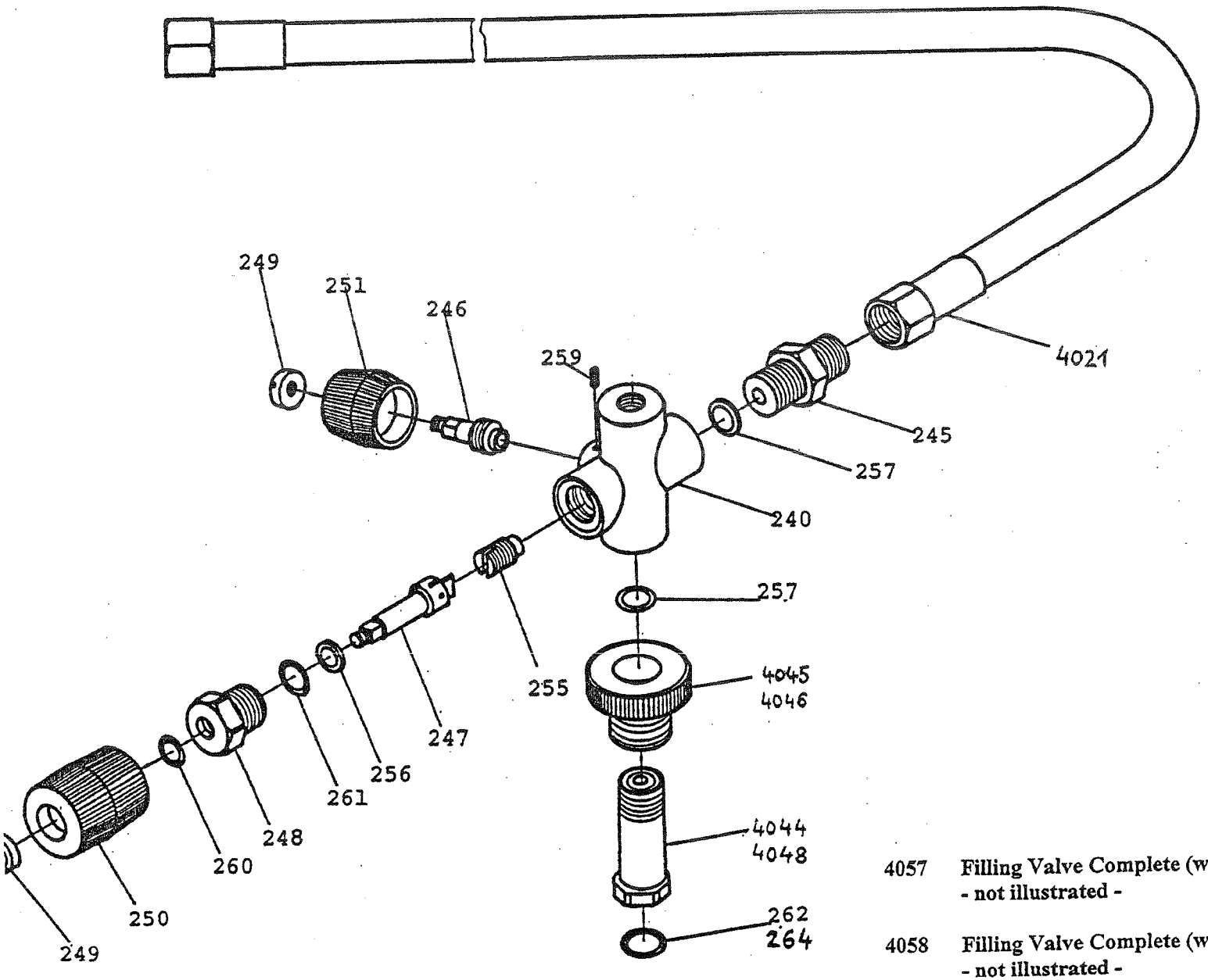
330 bar 4053



225 bar 7007

330 bar 7008


Reparatursatz 2011 a
Kondensatablaßventil kompl. 2011



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

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