POSEIDON Edition
BAUER KOMPRESSOREN

Instruction Manual

High Pressure
Breathing Air Compressors

PE 250-HE
PE 300-HE

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INTRODUCTION

This manual contains operating instructions and maintenance schedules for the high pressure breathing air compressors

PE 320-HE

WARNING

! Pneumatic high pressure system !

The breathing air produced with the compressor units described in this manual is subject to strict quality standards. Ignoring the operating and maintenance instructions can lead to severe injury or death.

This compressor has been built in accordance with the EC machine regulations 2006/42/EG. Specifications on the noise level in accordance with the machine and product safety law as of 01.05.2004 and the EC machine regulations, chapt. I, section 1.7.4. The machine has been built according to the highest standard of technology and the generally acknowledged safety standards. Nevertheless, operation could still cause danger for the operating personnel or third parties, or result in damage to the machine and other values. The machine may only be used to produce compressed air as specified in this manual. Other use is strictly prohibited.

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ANNEX

Air flow diagram	See Chapter 8, Annex
Schematic diagram	See Chapter 8, Annex
Components parts list	See Chapter 8, Annex

Lubricating oil list	on CD

Applicable parts list	
PE 250-HE, PE 300-HE	TPEH-2/0 (on CD)

Dear customer

We are happy to give you advice on any questions regarding your **BAUER** compressor and help as soon as possible with any arising problems.

You can contact us Mondays to Thursdays from 08^{00} till 16^{30}, Fridays from 08^{00} till 14^{00} on phone no. (089) 78049-0.

If you call the following extensions directly, it will save you time and repeated dialling.

Do you want to order spare parts?

☞ **Customer service** Phone no: (089) 78049-129 or -149
Fax no: (089) 78049-101

Do you have problems with maintenance or repair work?

☞ **Technical customer service** Phone no: (089) 78049-246 or -176
Fax no: (089) 78049-101

Do you need further information regarding your unit, accessories, prices etc.?

☞ **Sales department** Phone no: (089) 78049-138, -185, -154, -205 or -202
Fax no: (089) 78049-103

Are you interested in any training courses?

☞ **Training manager** Phone no: (089) 78049-175
Fax no: (089) 78049-101

Meet us in the internet at: **www.bauer-kompressoren.de**

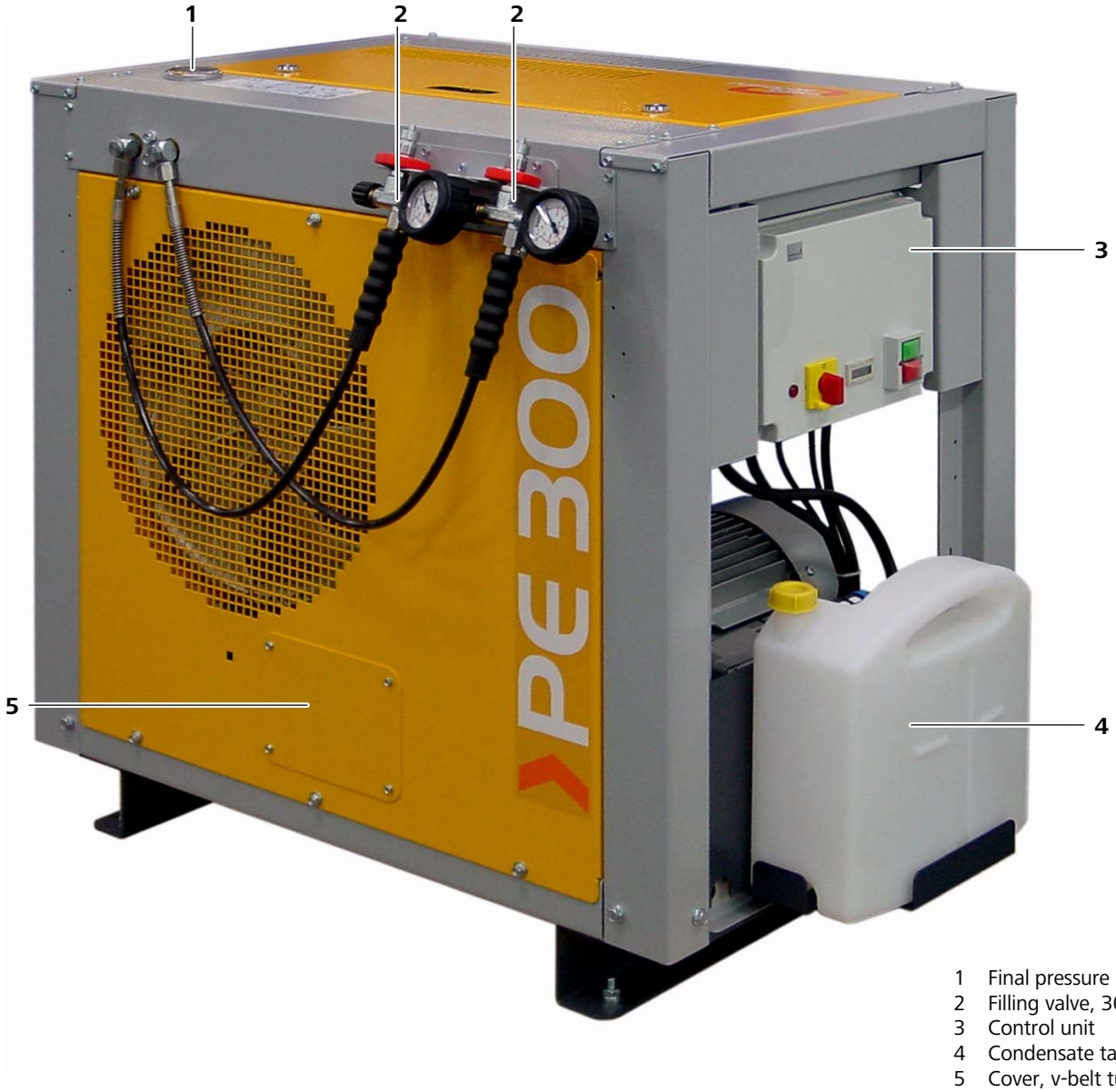
NOTES

Model:
Serial no.:
Date of purchase:
Dealer address/phone no.:

1. GENERAL

PURPOSE AND SHORT DESCRIPTION

The **PE 250-HE** and **PE 300-HE** high pressure compressors are designed to compress air for breathing as required in diving and fire fighting applications. The max. allowable operating pressure (adjusted pressure on final pressure safety valve) is 225 bar or 330 bar depending on the model.



1 Final pressure gauge
2 Filling valve, 300 bar
3 Control unit
4 Condensate tank
5 Cover, v-belt turnbuckle

Fig. 1 Compressor unit PE 300-HE

DESIGN AND MODE OF OPERATION

Design

The compressor unit comprises the following major assemblies:

- drive motor
- filter assembly
- filling assembly
- protection and anti-vibration frame
- automatic condensate drain
- electric control system

Standard equipment:

- Filter system **P31**
- TÜV-approved final pressure safety valve
- Instrument panel with final pressure gauge
- electric control system with automatic switch-off

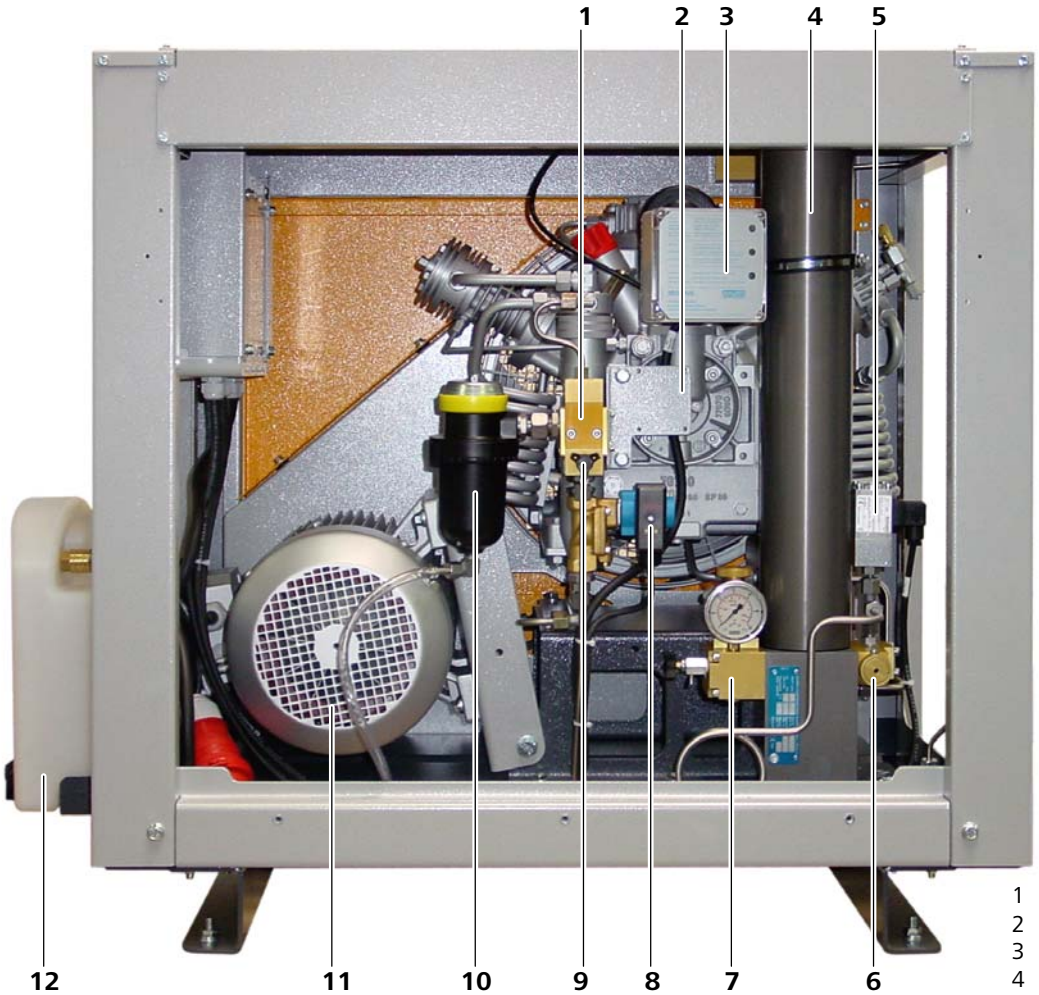
Optional equipment:

- Filter system **P42** with or without **SECURUS** monitoring device
- filling device with 2 filling valves
- filling panel with 4 filling valves (with direct or hose connectors) for filling of 200 and 300 bar bottles
- Air-Kool for increased filter cartridge life time
- B-Timer for monitoring of cartridge saturation.

The compressor units are available with electric motor, only.

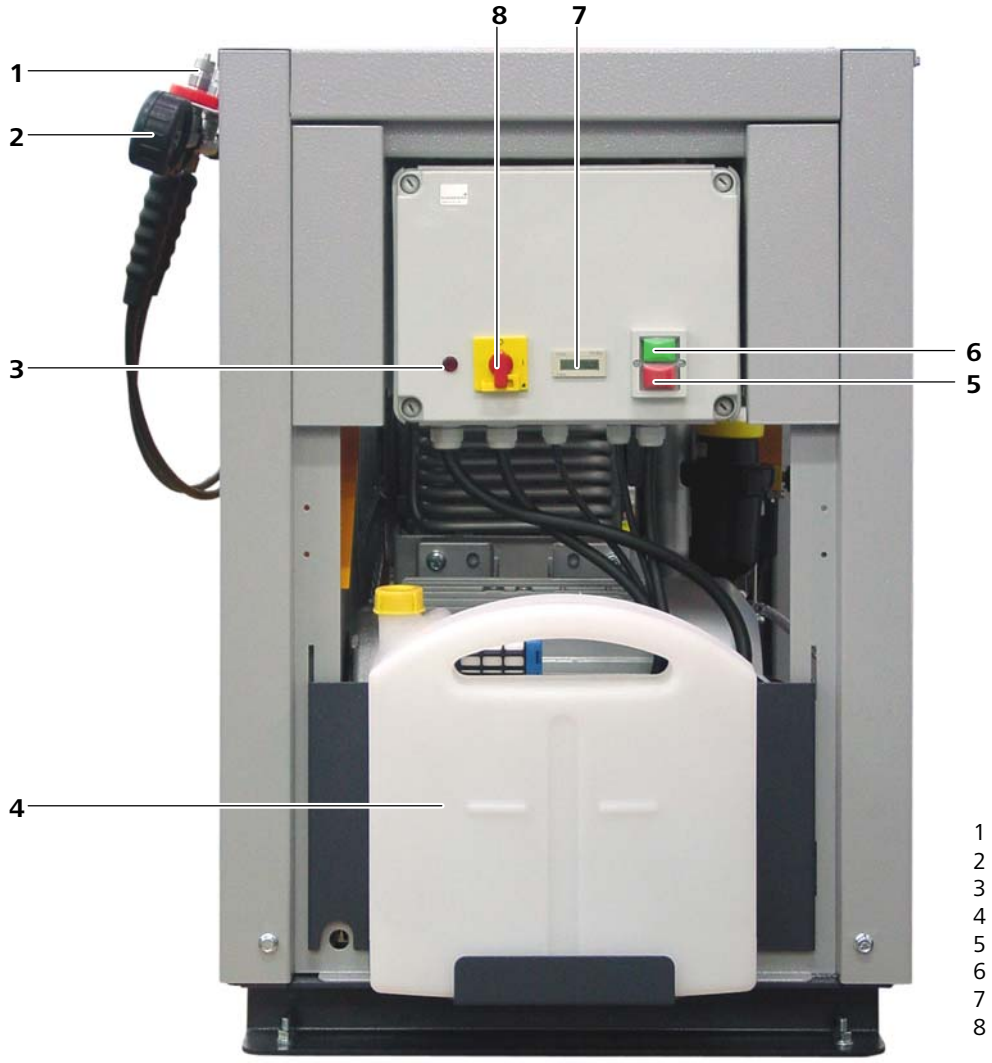
Function

The operating principle, i.e. the way of the air through the compressor, is shown in Fig. 6.



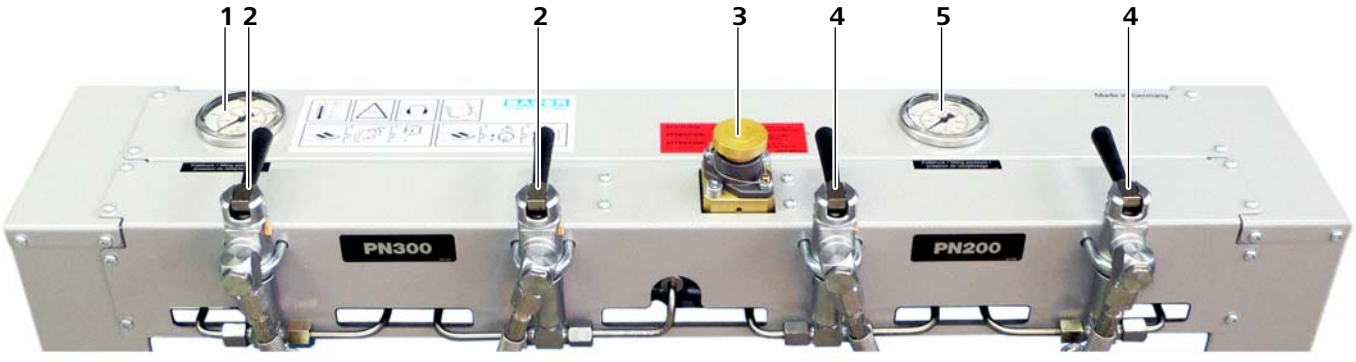
1 Automatic condensate drain
2 Compressor block
3 SECURUS mionitering device
4 Filter P42
5 Final pressure switch
6 Pressure maintaining valve
7 Venting valve w. pressure gauge
8 Timer
9 Condensate drain tap
10 Condensate separator
11 Electric motor
12 Condensate tank

Fig. 2 Compressor unit PE 300-HE, rear view



1 Filling connector PN300
2 Filling pressure gauge
3 Phase-sequence warning light
4 Condensate tank
5 Stop button
6 Start button
7 Hour meter
8 Main switch

Fig. 3 Compressor unit PE 300-HE, right side view



1 Filling pressure gauge 300 bar
2 Filling valve 300 bar
3 Safety valve 200 bar
4 Filling valve 200 bar
5 Filling pressure gauge 300 bar

Fig. 4 Filling panel with two pressure ranges

Compressor block IK120

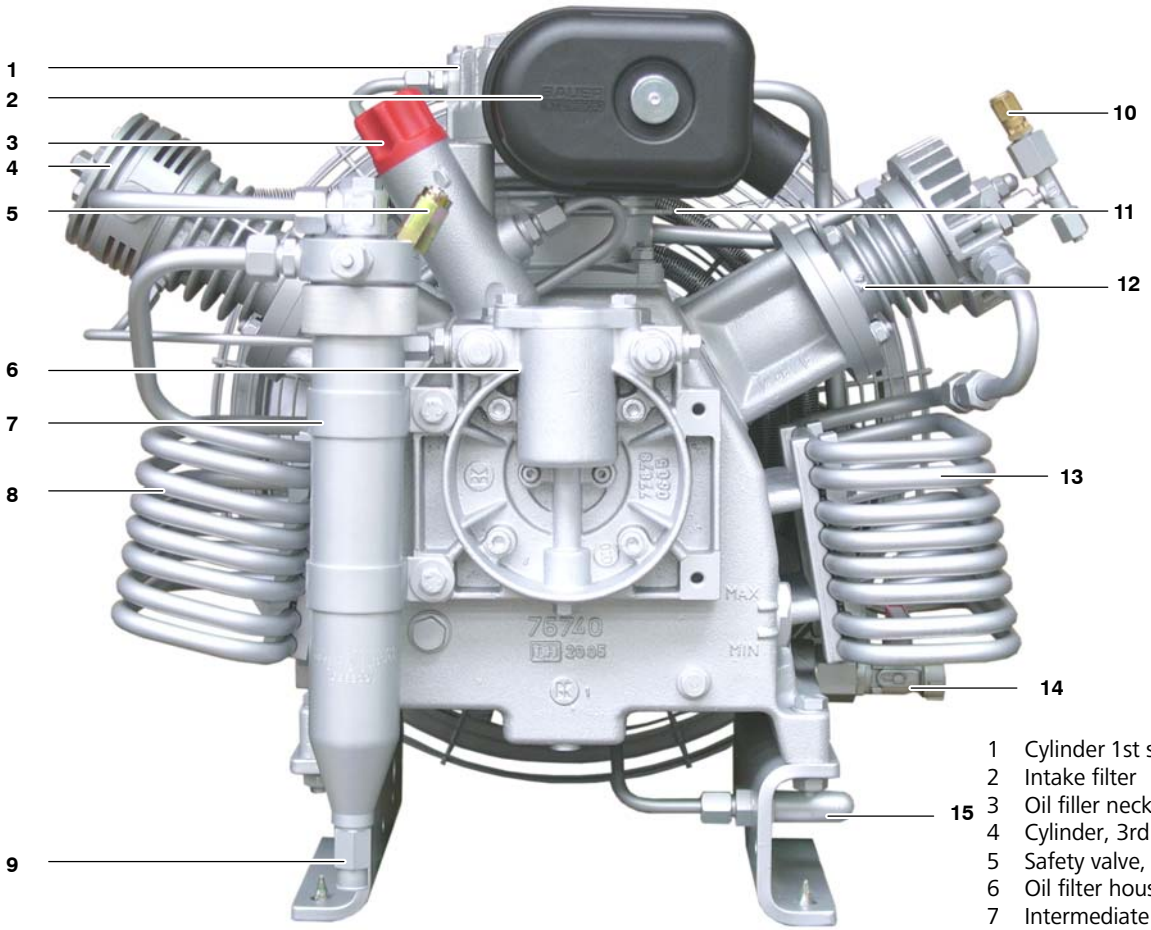
The design of the compressor block is shown in Fig. 5. For the mode of operation refer to the flow diagram, Fig. 6.

The compressor block is used to compress air in the high pressuare range. The max. allowable operating pressure is 350 bar.

The compressor block is of a three stage, three cylinder design. The cylinders are arranged in a W form, 1st stage in the centre, 2nd stage on the right, and 3rd stage on the left side looking from the filter side.

These compressor blocks are particularly suitable for continuous operation because of their rugged design and the corrosion resistant intermediate filter and cooler assemblies. Smooth running is a particular feature of this **BAUER** design. The balance of masses of the 1st rank is zero. The moving parts of the driving gear are all equally balanced. This results in a vibration-free running.

The driving gear is fitted with energy saving cylinder roller bearings. The upper and lower connecting rod bearings are also roller bearings. This allows for an even longer life which lasts at least 30,000 operating hours.



1 Cylinder 1st stage
2 Intake filter
3 Oil filler neck
4 Cylinder, 3rd stage
5 Safety valve, 2nd stage
6 Oil filter housing
7 Intermediate separator, 2nd stage
8 Inter-cooler 2nd stage
9 Condensate drain connector
10 Safety valve, 1st stage
11 After-cooler
12 Cylinder, 2nd stage
13 Inter-cooler 1st stage
14 Oil drain tap
15 Air outlet connector

Fig. 5 Compressor block

Air flow diagram

See Fig. 6. The air is drawn in through intake filter -5, compressed to final pressure in cylinders -1, -2, -3, and -4, and re-cooled by inter-coolers -6, -7 and -8, and after-cooler -9. The safety valves -13, -14, -15 and -16 protect the pressure of the single stages.

The compressed air is purified by interfilters -10 and -11 and filter assembly -12 which is fitted with a Triplex cartridge -17. The interfilters -10 and -11 and filter assembly -12 are drained by condensate drain valves -18. Pressure maintaining valve -19 keeps the pressure constant within filter assembly -12. Through filling hose -20 and filling valves -21 the compressed and purified air is conducted to the bottles to be filled. Filling pressure can be read from pressure gauge -22. 300 bar compressor units are available with a change-over device -23 to fill 200 bar bottles. In this case, safety valve -24 (225 bar) takes over the function of the final safety valve -16 (330 bar).

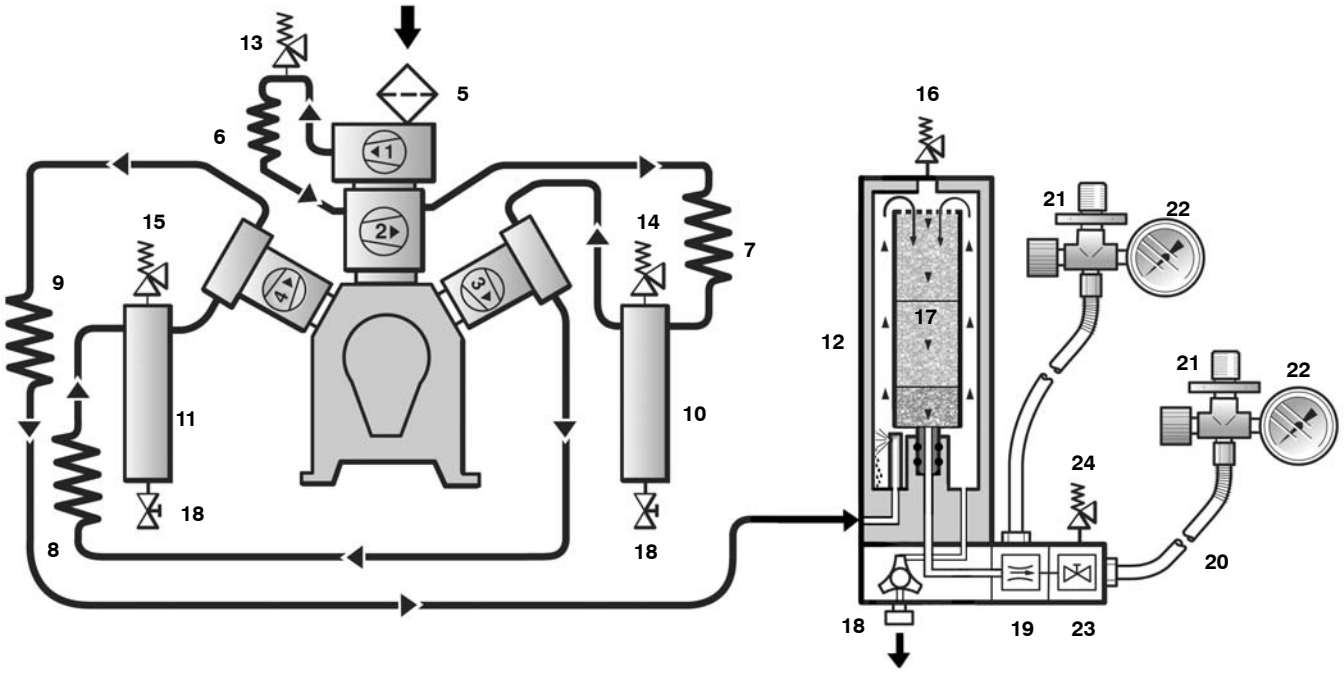


Fig. 6 Air flow diagram with filter system P31

1 Cylinder 1st stage
2 Cylinder 2nd stage
3 Cylinder 3rd stage
4 Cylinder 4th stage
5 Intake filter
6 Cooler 1st stage
7 Cooler 2nd stage
8 Cooler 3rd stage
9 After-cooler
10 Intermediate separator 2nd stage
11 Intermediate separator 3rd stage
12 Filter system P31 (Central filter assembly)
13 Safety valve 1st stage
14 Safety valve 2nd stage
15 Safety valve 3rd stage
16 Final pressure safety valve
17 Triplex filter cartridge
18 Manual condensate drain taps
19 Pressure maintaining valve
20 Filling hose
21 Filling connector
22 Filling pressure gauge
23 Change-over device 300 bar - 200 bar
24 Safety valve 225 bar

TECHNICAL DATA
Compressor unit PE 250-HE

Compressor unit	**PE 250-HE-F02**	
Medium	Breathing air	
Operating pressure	PN 200	PN 300
Delivery[a)]	250 l/min.	250 l/min.
Pressure setting, final pressure safety valve	225 bar	330 bar
Sound pressure level	87 dB(A)	87 dB(A)
Sound power level	101 dB(A)	101 dB(A)
Weight	220 kg	200 kg
Compressor block	**IK120-F07**	
Number of stages	3	
Number of cylinders	3	
Cylinder bore 1st stage	88 mm	
Cylinder bore 2nd stage	36 mm	
Cylinder bore 3rd stage	14 mm	
Piston stroke	40 mm	
Speed	1,470 min^{-1}	
Intermediate pressure 1st stage	6 bar	6.5 bar
Intermediate pressure 2nd stage	45 bar	47 bar
Compressor block oil capacity	2.8 ltrs.	
Oil pressure	5 bar (3 to 6 bar)	
Type of oil	see lubricating oil list	
Max. ambient temperature	+5 ... +45 °C (+43 ... +113 °F)	
Max. permissible inclination [b)]	15°	
Max. permissible operating height	0 ... 2000 m above sea level	
Drive motor	**Three phase squirrel cage**	
Operating voltage	380 - 415 V, 50 Hz; 380 - 480 V, 60 Hz	
Power	5,5 kW (7,5 PS)	
Speed (at 50 Hz)	2,910 min^{-1}	
Size	112 M	
Type of construction	B 3	
Type of enclosure	IP 55	

a) free air delivered at tank filling from 0 to 200 bar ± 5%
b) these values are valid only if the oil level of the compressor in normal position corresponds with the upper mark of the sight gauge and may not be exceeded

Compressor unit PE 300-HE

Compressor unit	**PE 300-HE-F02**	
Medium	Breathing air	
Operating pressure	PN 200	PN 300
Delivery[a)]	300 l/min.	300 l/min.
Pressure setting, final pressure safety valve	225 bar	330 bar
Sound pressure level	87 dB(A)	87 dB(A)
Sound power level	106 dB(A)	106 dB(A)
Weight	230 kg	230 kg
Compressor block	**IK120-F07**	
Number of stages	3	
Number of cylinders	3	
Cylinder bore 1st stage	88 mm	
Cylinder bore 2nd stage	36 mm	
Cylinder bore 3rd stage	14 mm	
Piston stroke	40 mm	
Speed	1,800 min^{-1}	
Intermediate pressure 1st stage	6 bar	6.5 bar
Intermediate pressure 2nd stage	45 bar	47 bar
Compressor block oil capacity	2.8 l	
Oil pressure	3 to 6 bar	
Oil type	see lubricating oil list	
Max. permissible ambient temperature	+5 ... +45 °C (+43 ... +113 °F)	
Max. permissible inclination of compressor[b)]	15°	
Max. permissible operating height	0 ... 2000 m above sea level	
Drive motor	**Three phase squirrel cage**	
Operating voltage	380 - 415 V, 50 Hz; 380 - 480 V, 60 Hz	
Power	7.5 kW (= 10 HP)	
Speed (at 50 Hz)	2,910 min^{-1}	
Size	132 S	
Type of construction	B 3	
Type of enclosure	IP 55	

a) free air delivered at tank filling from 0 to 200 bar ± 5%
b) these values are valid only if the oil level of the compressor in normal position corresponds with the upper mark of the sight gauge and may not be exceeded

2. SAFETY MEASURES

2.1. NOTES AND WARNING SIGNS

Notes and warning signs displayed on compressors according to model, application or equipment.

WARNING

Hot surfaces, do not touch!

Danger of burning by touching cylinders, cylinder heads and pressure lines of individual compressor stages.

WARNING

High voltage!

Life threatening danger of electric shock. Maintenance work on electric units or operating equipment may only be carried out by a qualified electrician or by a person instructed and supervised by a qualified electrician according to electrical regulations.

WARNING

Automatic compressor control, unit may start-up without warning!

Before carrying out maintenance and repair work, switch off at the main switch or disconnect from the mains and ensure unit will not restart.

MANDATORY

Instructions must be read by persons operating the machinery!

The instruction manual supplied and all other applicable instructions, regulations etc. must be read and understood by operating personnel before using the machine.

MANDATORY

Hearing protectors must be worn!

Hearing protectors must be worn when working on a machine which is running.

NOTE

Ensure correct direction of rotation!

When switching on the machine, check the arrow to ensure correct direction of rotation of the drive motor.

2.2. IDENTIFYING THE SAFETY NOTICES

Important instructions concerning the endangerment of personnel, technical safety and operating safety will be specially emphasized by placing the following signs before the instructions.

This notice is used with maintenance work and operating procedures and must be adhered to exactly in order to avoid endangering personnel.

This notice must be complied with in order to avoid damage to or destruction of the machine or its equipment.

This notice advises of technical requirements which the operator must take particular note of.

2.3. FUNDAMENTAL SAFETY NOTICES

2.3.1. Authorized use

- The machine / unit is built according to state of the art technology and established safety technical regulations. Nevertheless, its use can cause danger to life and limb of the operator or third parties or damage to the machine and other equipment.
- Operate the machine / unit only in technically perfect condition in accordance with regulations and safety and danger notices detailed in the instruction manual! In particular, immediately correct faults (or have them corrected) which can impair safety!
- The machine / unit is exclusively for the compression of mediums (air/gas) specified in section A, chapter 1.3. „Technical data". Any other medium or use outside that specified is not authorized. The manufacturer / supplier is not liable for damage resulting from this. The user alone is responsible for this risk. Authorization for use is also under the condition that the instruction manual is complied with and inspection and maintenance requirements are enforced.

2.3.2. Organizational measures

- Keep the instruction manual to hand near the machine / unit at all times in the relevant holder.
- In addition to the instruction manual, observe and comply with universally valid legal and other obligatory regulations regarding accident prevention and environment protection. See chapter 2.4. This can involve, for example, contact with hazardous substances or the provision / wearing of personal protective equipment.
- Personnel engaged to operate the machine must have read the instruction manual before beginning work, especially the safety notices chapter. When work is already underway it is too late. This is particularly relevant for temporary personnel, e.g. maintenance personnel.

- Personnel may not wear long hair loose, loose clothing or jewellery, including rings. There is a danger of injury through, for example, these getting caught or being pulled into the equipment.
- As far as necessary or according to regulations, use personal protective equipment.
- Observe all safety and danger notices on the unit.
- Keep all safety and danger notices on the machine / unit complete and in readable condition.
- If there are any modifications to the unit or operating conditions which may affect safety, stop the unit immediately and inform the person responsible of the fault.
- No modifications may be made to the unit which could impair safety without first obtaining permission from the suppliers. This is also the case with regard to installation and adjustment of safety devices and valves as well as welding of piping and reservoirs.
- Spare parts must always comply with the technical requirements specified by the manufacturer. This is always guaranteed with original spare parts.
- Piping must be thoroughly checked (pressure and visual inspection) by the operator at appropriate time intervals, even if no safety related faults have been noticed.
- Intervals stipulated or given in the instruction manual for recurring checks / inspections must be adhered to.
- Make sure location and operation of fire extinguishers is known.
- Pay attention to fire warning and fire fighting procedures.

2.3.3. Qualifications, fundamental duties

- Work on / with the unit may only be carried out by reliable personnel. Observe the legal minimum age permissible.
- Ensure that only trained personnel work with the machine.
- Establish the responsibilities of the machine operator and establish a procedure for him to inform a third person of unfavourable safety conditions.
- People who are being trained or introduced to the job should only be allowed to work with the unit under constant supervision of an experienced person.
- Work on the electrical equipment of the unit may only be carried out by a qualified electrician or by an instructed person under the direction and supervision of a qualified electrician according to electrotechnical regulations.

2.3.4. Safety notices for operation

- Do not carry out any work if safety is questionable.
- Meet all requirements demanding that the unit is only operated in safe and good working order. Only operate the machine if all protective and safety equipment, e.g. all detachable protective equipment, emergency shut-down devices, soundproofing is provided and in good working order.
- At least once every day, check the unit externally for damage and faults. Inform the person responsible immediately if anything is not as is should be (including operation). If necessary, shut the machine down immediately and make it safe.
- Observe switching on and off processes and monitoring indications according to the instruction manual.
- Before switching on / starting up the unit, ensure that no one can be put at risk through running the unit.
- Carry out the setting, maintenance and inspection processes at the intervals specified in the instruction manual, including replacement of parts / equipment. This work may only be carried out by qualified personnel.
- Clear and make the maintenance area safe as far as necessary.
- If the unit is completely switched off for maintenance and repairwork, ensure that it is protected from unexpected start-up. Turn off main control device and remove the key and / or display a warning sign on the main switch.
- When replacing individual parts and larger assembly groups, they must be carefully fastened to the lifting device so that there is no risk of danger. Use only suitable and technically perfect lifting devices and equipment with sufficient lifting power and strength. Do not linger or work under suspended loads.
- Only entrust an experienced person with the fixing of loads and guiding of crane drivers. The person guiding must remain within sight or in contact with the operator.
- For assembly work above body height, use appropriate safety approved equipment, e.g. ladders and platforms. Do not climb on machine parts. For maintenance work at high levels, wear a safety harness.
- Clean oil, fuel or care products from the machine, in particular the connections and screw joints, before carrying out maintenance / repairwork. Do not use aggressive cleaning fluid. Use a fibre-free cleaning cloth.
- Before cleaning the machine with water or jet of steam (high pressure cleaner) or detergent, cover / seal all openings which for safety and/or operating reasons no water / steam / detergent may penetrate. Electric motor and switch cabinets are particularly at risk.
- When cleaning the operating room, ensure that the temperature sensors of the fire alarm and sprinkler system do not come into contact with hot cleaning fluid, in order to avoid triggering the sprinkler system.
- Completely remove all covers / seals after cleaning.
- After cleaning, check all pressure lines for leaks, loose connections, wear and damage. Immediately eliminate any faults.
- Always retighten any screw connections loosened for maintenance or repairwork.
- If it is necessary to remove safety devices for maintenance and repairwork, these must be replaced and checked immediately after completion of the maintenance or repairwork.
- Ensure safe and environmentally friendly disposal of consumables and old parts.

2.3.5. Particular areas of danger

- Use only original fuses with specified current rating. If there is a failure in the electric energy supply, shut the unit down immediately.
- Work on electric units or operating equipment may only be carried out by a qualified electrician or by a person

under the instruction and supervision of a qualified electrician according to electric technical regulations.
- Machines and unit parts which must undergo inspection, maintenance and repairwork, must be disconnected from the mains supply, if specified. Parts which have been disconnected must first be checked for voltage, then earthed and short-circuited and isolated from live neighbouring parts.
- The electrical equipment of a unit must be regularly checked. Defects, such as loose screw connections or burnt wires, must be rectified immediately.
- If work is to be carried out on live parts, work with a second person who can operate the emergency off switch or the main switch in the case of an emergency. Close off the work area with a red and white safety chain and a warning sign. Only use voltage isolated tools.
- Only personnel with particular knowledge and experience with pneumatics may carry out work on pneumatic equipment.
- Check all pressure lines, hoses and screw connections regularly for leaks and visible damage. Immediately repair any damage. Escaping air under pressure can cause injury and fire.
- Depressurize system and pressure lines before commencing repairwork.
- Pressurized air lines must be laid and mounted by qualified personnel. Connections must not be mixed up. Fittings, length and quality of the piping must correspond to requirements.
- Soundproofing equipment on the unit must be in place and functional during operation.
- The stipulated hearing protectors must be worn.
- With regard to oil, grease and other chemical substances, observe the relevant safety regulations for the product.
- For loading, only use lifting device and equipment with sufficient lifting power and strength.
- Use only suitable transporters with sufficient carrying power. Secure the load properly. Use suitable fixing points.
- If necessary, provide unit with transportation brackets. Display the appropriate notice. Remove transportation brackets in the correct manner before taking into operation.
- Parts which need to be dismantled for transport purposes must be carefully replaced and secured before taking into operation.
- Even when moving the unit only slightly, the unit must be disconnected from all external energy sources. Before putting into use again, reconnect the machine to the mains according to regulations.
- When taking back into operation, proceed according to the instruction manual.

2.3.6. Notices of danger regarding pressure vessels

- Never open or loosen pressure vessel lids or pipe connection parts under pressure; always depressurise the vessel or the unit.
- Never exceed the permissible operating pressure of the vessels!
- Never heat the vessels or any of their parts above the stated, maximum operating pressure.
- Always exchange damaged pressure vessels completely. Individual parts that are subject to pressure loads cannot be purchased as spare parts, since the vessels are tested as a complete part and the documentation considers them as a whole (see pressure vessel documentation, serial-numbers!).
- Always pay attention to the permissible operating mode of the pressure vessels.

  We differentiate:

  - vessels for static load
  - vessels for dynamic load

  <u>Vessels for static load:</u>

  These pressure vessels are permanently under virtually constant operating pressure; the fluctuations of pressure are very small.

  Vessels for this type of load are not marked in a particular way and may be used as long as the vessel inspections, carried out regularly, do not uncover any safety-relevant deficiencies.

  We recommend that aluminium vessels should be exchanged after 15 years at the latest.

  <u>Vessels for dynamic load:</u>

  These pressure vessels may also be used under conditions of changing operating pressure. The pressure may vary between the atmospheric and the maximum admissible operating pressure.

  The pressure vessel documentation and the appropriate notes in the operating manual particularly characterise vessels of this type as being adequate for dynamic loads. In the technical information for these vessels you will find specifications concerning their permissible operating period.

  Due to the variation of the operating pressure, these vessels are subject to a so-called dynamic load, which puts the vessels under great stress. The change between two different pressures is called a load change or cycle. In the technical information for these vessels you will find specifications concerning the permissible number of cycles depending on the fluctuation of the operating pressure.

  Having reached half the permissible number of cycles, the vessel has to be submitted to an internal check, in which the critically stressed areas of the vessels are examined by means of suitable testing methods, in order to ensure the operating safety.

  After having reached the total permissible number of load cycles, the vessel must be exchanged and scrapped.

  Record the number of load cycles in writing if you do not have an automatic cycle-counter.

We recommend that aluminium vessels should be exchanged after 15 years at the latest.

Please pay attention to and follow these measures, for your own safety and that of you employees and customers!

In order not to unnecessarily load the pressure vessels additionally, the non-return valves, that are meant to avoid a drop in pressure, and also the pressure maintaining valves, which should reduce big pressure fluctuations as well, should be checked regularly for internal and external tightness and functionality.

- Check the pressure vessels regularly on the inside and outside for damage from corrosion.
- Be particularly careful with second-hand pressure vessels, when their previous operating mode is not specifically clarified.

2.4. SAFETY REGULATIONS (EC; partly Germany, only)

A compressor is identified by German law as being a filling system if pressure cylinders are filled by the system, especially when these cylinders are made available for third parties. The start-up and operation of compressor systems for use as filling stations is governed by the following regulations:

Pressure vessel directive (Directive 97/23/EC) of 29.05.1997

Operating safety regulations (BetrSichV) of 27.09.2002

Machine safety law (GSG) of 11.05.2001

14th regulation to machine safety law (14. GSGV - pressure vessel regulation) of 03.10.2002

Technical regulations for pressure gases (TRG 400, 401, 402, 730).

If a high pressure compressor is used for filling pressure vessels or for the supply of pneumatic systems, the following regulations apply:

Accident Prevention Regulations (UVV):

BGV A1 of 01. January 2004

Copies of the above regulations are available through the usual outlets, e.g. in Germany from:

Carl Heymanns Verlag
Luxemburger Str. 449
50939 Köln

Beuth-Vertrieb GmbH
Burggrafenstr. 4 - 7
10787 Berlin

The manufacturer has complied with all applicable regulations and the unit is prepared accordingly. If desired, we offer at our Munich site a partial acceptance test according to § 14 BetrSichV. Please contact our Technical Service Department with regard to this. They can also supply our leaflet **□IMPORTANT NOTES FOR CERTIFICATION"**.

According to the operation safety regulations (BetrSichV), all compressor units which will be used as filling stations must undergo an acceptance test by a professional at their location before bringing them into service. If pressure vessels (bottles) are to be filled by the compressor for a third party then the appropriate permission must be obtained from the responsible authority before the acceptance test. As a rule, this is the factory inspectorate. The procedure for obtaining permission is according to TRG 730, guidelines for permission to set up and operate filling stations. The test certificates and documents delivered with the compressor are important and may be requested during the procedure for obtaining permission. In addition, the documents belonging to the unit are important for recurrent inspections and should therefore be carefully kept.

Inspections in accordance with the regulations for prevention of accidents will be carried out by the manufacturer or by a specialist.

No guarantees whatsoever are valid for damage caused or favoured by the non-consideration of these directions for use.

We strongly emphasize these regulations.

3. INSTALLATION, OPERATION, FILLING PROCEDURE

3.1. INSTALLATION OF THE COMPRESSOR UNIT

The compressor frame is equipped with anti-vibration mounts and thus a machine base or special means of securing the compressor are not necessary.

The compressor unit is not seawater resistant. At operation in salty air spray compressor with anticorrosive protection (e. g. Quicksilver Corrosion Guard). Electric driven units should be operated and stored below deck. Units with petrol engine should also be stored below deck after the filling process.

- Ensure adequate ventilation.
- Air must be free from exhaust fumes and hazardous vapours (e.g. smoke, solvent vapours, etc.).
- If possible install unit in such a manner that the compressor fan can get fresh air from outside, for instance through an opening in the wall. Distance from wall should be at least 0.5 meters.

3.2. ELECTRICAL INSTALLATION

For installation of electrical equipment observe the following:

- In the annex of this instruction manual you will find the standard schematic diagrams valid for the respective compressor unit. To connect the compressor control system, use only the diagram contained in the control box of the unit, because any deviations from the standard diagrams according to order are marked there.
- Observe regulations of local electricity supply company.
- Connection must be carried out by an expert only. Units which are operated with 380/400 V are delivered with an electric plug. All other units are delivered without a plug and have to be equipped with a suitable plug depending on the country.
- Ensure correct installation of protective conductor.
- Check conformity of motor and control device tension and frequency with those of electric network.
- Adjust motor protection, thermal overload relay. For start over contactor adjust to motor amperage rating. For start via star-delta contactor adjust to motor amperage rating x 0.58.
  For example: motor amperage rating = 10 Amp.:
  adjust relay to 10 x 0.58 = 5.8 Amp.
- Fuse motor correctly (see table below; use slow-blow fuses, only).

Fuse table

PE 250	**V**	**127**	**230**	**240**	**400**	**415**	**440**	**500**	**600**	**660**
3-phase, 5.5 kW (star-delta starting)	A	50	25	25	16	16	16	10	10	10
3-phase, 5.5 kW (direct starting)	A	63	35	35	20	20	20	16	16	16
PE300										
3-phase, 7.5 kW (star-delta starting)	A	50	35	35	20	16	16	16	16	10
3-phase, 7.5 kW (direct starting)	A	63	35	35	25	25	25	20	16	16

3.3. OPERATION

Preparation for operation

WARNING **The compressors described in this manual are not suitable for compression of oxygen. EXPLOSION occurs if an oil lubricated compressor is operated with pure oxygen or gases with an oxygen content of more than 21%!**

All compressor units are tested prior to delivery to the customer, so after correct installation of the unit there should be no problem putting it into operation, observing the following points:

- **Prior to first operation** read Instruction Manual carefully. Make sure that all persons handling the compressor and the filling station are familiar with the function of all controls and monitors. Particularly observe chapter 2. SAFETY REGULATIONS.
- **Before taking unit into operation** after a standstill period of 2 years or more change compressor oil. When using a mineral oil change oil after one year.
- **Immediately after switching on the system for the first time** check the direction of rotation of the motor for compliance with the arrow on the unit. If motor turns in the wrong direction, the phases are not connected properly. Shut down unit immediately and interchange two of the three phase leads in the switch box. Never change leads at the motor terminal board.
- **Prior to first operation** or operation subsequent to repair work operate unit for at least 10 minutes with open condensate valves (pressureless) to ensure proper lubrication of all parts before pressure is built up. To keep

drain valves open, loosen screw (3, Fig. 7) on coil (1) and pull timer (2) from solenoid valve.

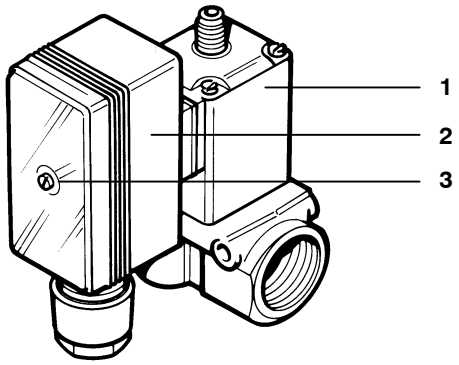
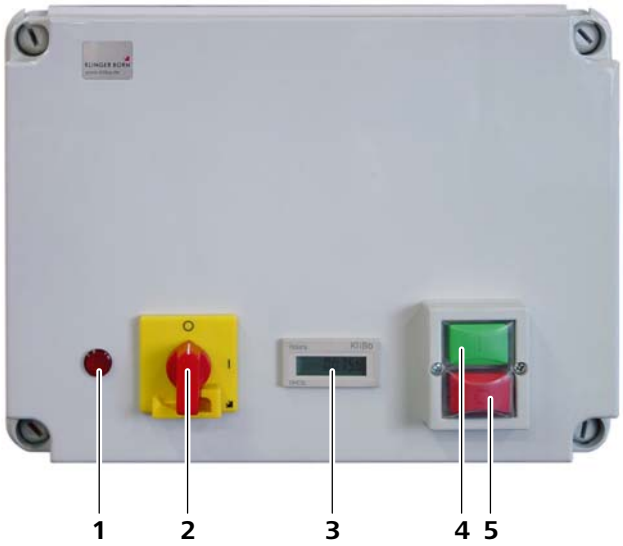


Fig. 7 Solenoid valve with timer

- Prior to each operation check the oil level according to chapter 4.4.1. and determine whether maintenance is necessary in accordance with Service manual
- Every time the unit is started up check all systems for proper operation. If any malfunction is observed stop unit immediately and find the cause of the fault or call the service department.

3.4. STARTING THE UNIT

- Place main switch (2, Fig. 8) to 1.
- Press ON button (4).



1 Warning light, phase sequence alarm
2 Main switch
3 Hour meter
4 ON button
5 OFF button

Fig. 8 Compressor control unit

- As soon as final pressure is reached and final pressure safety valve blows off, open condensate drain valves and drain condensate - unit is ready for filling operation.

3.5. FILLING PROCEDURE

General

WARNING **Ensure intake air is free from noxious gas (CO), exhaust fumes and solvent vapour. On units employing petrol or diesel engine it is most important to use an intake hose and observe that only clean air is drawn in. The intake hose is also recommended for units with electric engine. When operating the unit in areas with possibly high CO contents, the CO removal filter cartridge is recommended for electric driven units, also. Note that for CO contents of more than 25 ppmV in the intake air the allowed limits cannot be guaranteed even with a CO removal filter cartridge, resulting in a life-threatening CO concentration! Also, due to chemical reaction of CO with hopcalite, warming up of the cartridge and danger of fire may result.**

WARNING **Filling hoses must be in satisfactory condition and threads undamaged. Pay particular attention to damage on the interface from hose fitting to hose. If the casing is scored, hose must be discarded.**

The filling valve connection is of the manual type and permits connection to air tanks without using tools. An O-ring is provided for self-sealing due to internal overpressure. Compressed air tank filling valves for a pressure in excess of 200 bar are standardized (DIN 477, sheet 5) and connectors for 200 and 300 bar are different and cannot be mixed up. **The use of adapters is not allowed!**

To ensure safe air tank removal after filling, the valve has an integral venting bore. Therefore always close tank valve first before closing filling valve. During filling procedure bottles will warm up due to recompression. After removing, allow to cool down, bottles may then be reconnected and topped up to the respective maximum filling pressure.

WARNING **To meet the CO_2 maximum rating value in breathing air bottles, please observe the two following chapters "Intake air quality" and "Scavenging the compressor unit".**

Intake air quality

At routine tests, CO_2 values beyond the permissible values are noted from time to time. Closer investigations often show that the compressed air is taken from rooms in which one or more persons are working. At insufficient ventilation, the CO_2 value in the surrounding air can increase quite fast because of the exhaling of CO_2. CO_2 values from 1,000 to 5,000 ppm_V in workrooms are not unusual (MAK-value (max. workroom concentration) is 5,000 ppm_V). Another additional increase is caused by cigarette smoking, producing approx. 2g CO_2 ($\approx$ 2,000 ppm_V) per cigarette. These pollutions add up to the basic pollution of approx. 400 ppm_V. The technically caused excessive increase of CO_2 during the filling process and the CO_2 peak at taking the unit into operation. **Because of the reasons stated above and for your own**

security, the filling of breathing air bottles is not allowed in rooms used as workrooms.

Scavenging the compressor unit

CO_2 is present in the atmosphere with a natural amount of 350 to 400 ppm_V. The molecular sieve used in the purifier for drying the breathing air is, as well as other capabilities, able to adsorb CO_2 which is accumulated in the cartridge. After shut-down of the compressor, adsorbed CO_2 may be desorbed again due to the partial pressure decrease. The now free CO_2 then gets washed out of the cartridge when the compressor is started again. To avoid increased CO_2 contents in the compressed breathing air, we recommend to flush the compressor unit 1 to 2 minutes prior to connecting the bottles, i.e. to let the air escape into the surroundings.

Connecting the bottles

- Connect air bottle to filling valve (see Fig. 9).

On models of 300 bar rated filling pressure do not attach bottles unless rated for this pressure (note pressure stamped on tank neck).

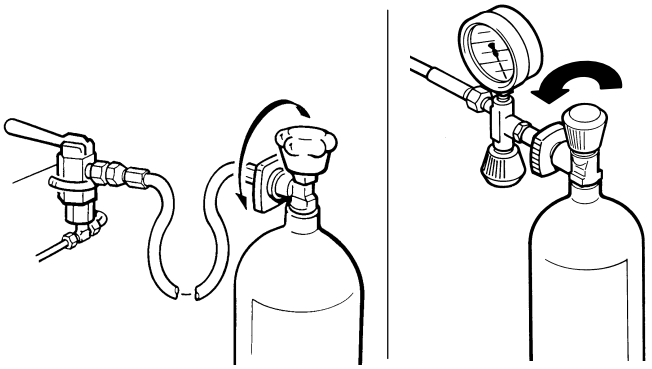


Fig. 9 Connecting air bottle

- Air bottles with international filling connector can be connected with filling adaptor (PN 79375) to the German filling connector (see Fig. 10).

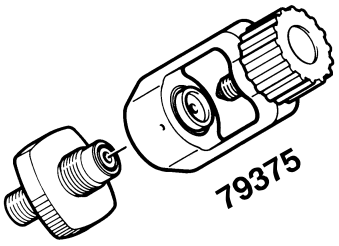


Fig. 10 International filling connector

The international connector is not permitted in the Federal Republic of Germany. In other countries it is allowed only for pressures up to 200 bar (2,850 psi).

Filling the bottles

- Open filling valve (1, Fig. 11).
- Open bottle valve (2) - bottle will be filled. Drain condensate regularly during filling. On units with automatic condensate drain check that condensate is drained regularly.

The filling procedure should not be interrupted for more than 10 minutes to avoid increased CO_2-values in the air filled into the bottles.

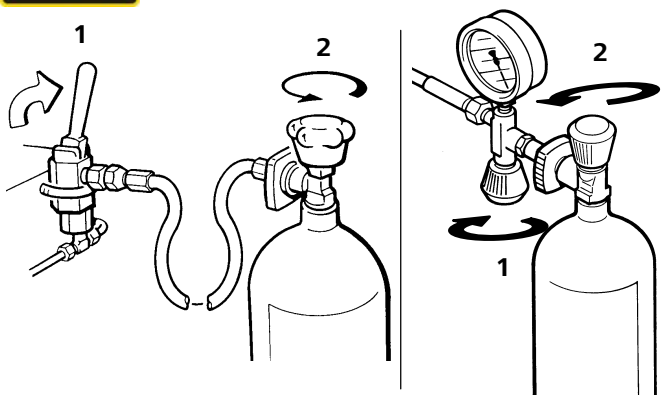


Fig. 11 Filling air bottle

Removing the bottles

- Upon reaching final bottle pressure **close bottle valve first** (1, Fig. 12)**, then filling valve** by returning handle to closed position (2).
- Remove compressed air bottle.

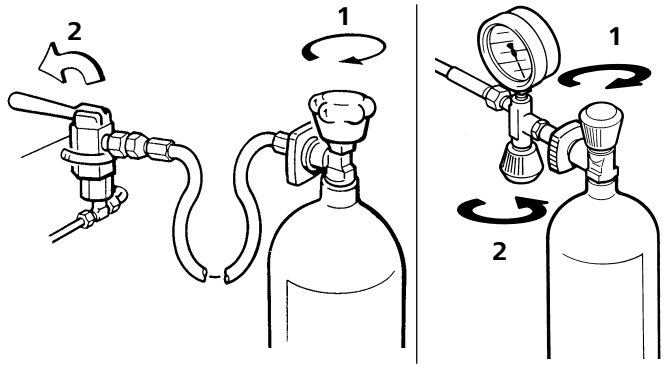


Fig. 12 Removing air bottle

3.6. SHUT-DOWN PROCEDURE

- Press OFF button (5, Fig. 8).
- Place main switch (2) to 0.
- Drain condensate from intermediate separator and final separator by means of the drain taps. On units with automatic condensate drain check that condensate is drained regularly.
- Vent unit by means of filling valve to approx. 80 bar (1,150 psi). Close all valves again to prevent moisture entering the filter and resulting saturation of the cartridge.

- Check the oil level in the compressor and top up, if necessary. Also check whether the compressor needs servicing in accordance with maintenance schedule - see service manual.

3.7. B-TIMER (optional)

Introduction

Read operating instructions carefully before operating the unit.

The settings in the setup menu are essential for the correct indication of the filter capacity. Without correct settings, the B-Timer can be used as an hourmeter, only!

Make sure that the pressure maintaining valve of the compressor is adjusted to 150 bar (factory setting, see chapter 4.5.5.) and is working properly to ensure correct indication of the filter capacity and compressor operation recognition.

Description

The **B-Timer** (Fig. 13) is a self-activating mini-computer that counts the operating hours of the compressor and calculates the saturation of the filter cartridge from time, temperature, cartridge type, and delivery rate of the compressor. It displays operating hours, cartridge lifetime, and all maintenance due for the compressor. The **B-Timer** does neither need external power nor any other connection to the pressure system. It is simply fastened to the filter housing which has to be monitored, by means of a clamp, and is therefore the ideal filter control device for all mobile compressor units, especially for portable petrol or diesel driven scuba diving models. In addition, the B-Timer can be mounted easily to any unit as an upgrade device.

Authorized use

This unit is to be used exclusively as operating status monitoring device and does not release the user from additional surveillance and testing of the breathing air quality of the filter system according to national standards (e.g. EN 12021). With the **B-Timer**, this is ***not*** possible!

The **B-Timer** may only be used with the filter systems P21, P31 and P41. The respective filter cartridge numbers are stored in the software. Other use is strictly prohibited. The manufacturer and the supplier void all responsibility for risk, damage or injury resulting from failure to follow these instructions.

Please observe the operating limits of the unit:

Operating temperature range 0° C to +50 °C,
Storage temperature -20° C bis +70 °C
Protection class IP65 (Protection against contact with wire, dust, and jet of water
Vibration ±3g in operation
max. 95% humidity, not condensating

Function

The B-Timer display shows the following functions:

- Operating hours of the compressor unit
- Cartridge lifetime in % by means of four segments in the cartridge symbol.

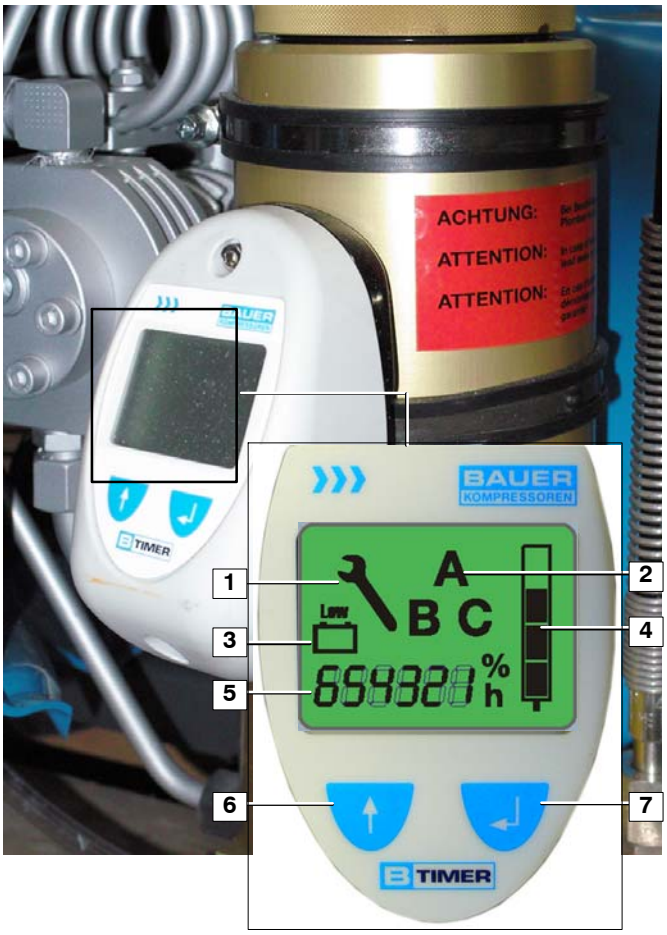


Fig. 13 B-Timer

1 Key symbol (maintenance due)
2 Letter symbol (maintenance type)
3 Low battery symbol
4 Cartridge saturation indicator
5 Operating hours or cartridge number
6 Mode select key
7 Enter key

- Flashing last segment and change from operating hours indication to cartridge part no. if capacity is equal or less than 20% of the original lifetime.
- Indication of compressor maintenance due by means of letter symbols and operating hours.
  A = 500 hours or 1 year
  B = 1000 hours or 2 years
  C = 2000 hours or 4 years
- Battery symbol indicating that the lithium battery is low and has to be changed. ***All data are stored and will not be lost when changing battery.***

The **B-Timer** is operated using the mode select and the enter keys.

Error indication

If the temperature sensor in the unit should be defective, an error message □Error 1" or □Error 2" is shown at the display (Fig. 14). In this case the unit should not be used but sent to the factory or the nearest BAUER representative for repair.

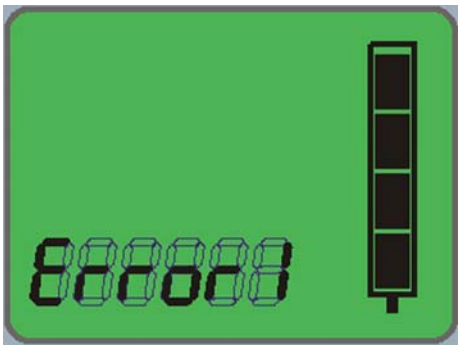


Fig. 14

Battery change

The battery (1, Fig. 15) is merely plugged into the holder.

To change the battery remove two bolts and separate housing from base plate. Remove plug (2) and pull out battery.

Make sure to use the same type battery (BAUER part no. 82743).

Fig. 15 Battery

Operation

The B-Timer is activated when starting the compressor. Compressor operation is indicated by the flashing □h" symbol.

To switch on the B-Timer press one of the keys on the display. Main menue will be displayed (Fig. 16).

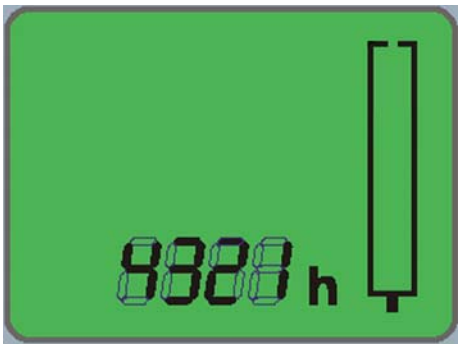


Fig. 16

If no key is pressed within 1 minute, the indication will return to the main menue. After 2 minutes the B-Timer is switched off, if no compressor operation is detected.

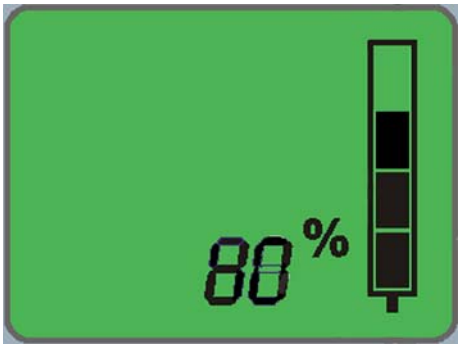


Fig. 17

Function Display

To *display* the desired function, press the select key (↑).

Press ↑ key. Remaining filter capacity is shown, Fig. 17)

Press ↑ key again. Remaining operating hours to service interval A (500 hours or annually) are shown (Fig. 18).

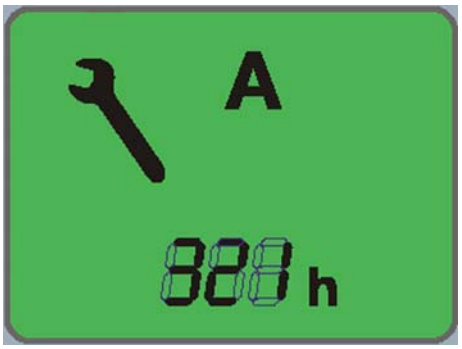


Fig. 18

Press ↑ key again. Remaining operating hours to service interval B (1000 hours or annually) are shown (Fig. 19).

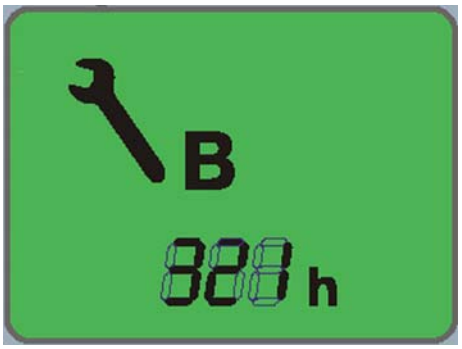


Fig. 19

Press ↑ key again. Remaining operating hours to service interval C (2000 hours or biennially) are shown (Fig. 20).

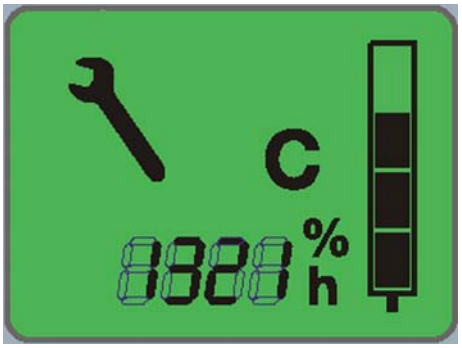


Fig. 20

Press ↑ key. Filter cartrige number is shown (Filter symbol flashing, Fig. 21).

Press ↑ key again. Display returns to the main menue.

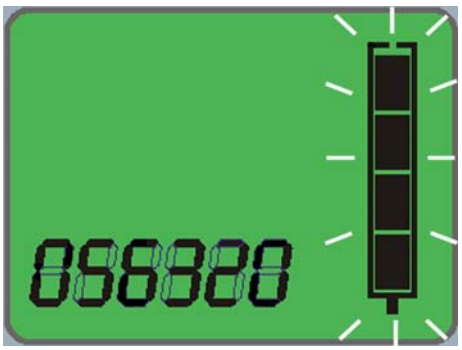


Fig. 21

Reset

The filter capacity must not be reset unless a new filter cartridge has been fitted!

To ***reset*** the filter capacity or the A, B, and C maintenance intervals, press ↵ key for more than 5 seconds from the respective maintenance interval display (Fig. 22).

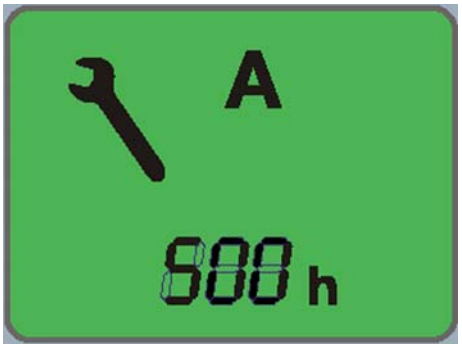


Fig. 22

Setup

To ***enter the setup*** for the different functions of the **B-Timer** press the ↑ and ↲ keys on the display simultaneously for more than 5 seconds from the cartridge number display (Fig. 21). Filter symbol starts flashing (Fig. 23) indicating the setup mode.

Under **setup A** the filter cartridge number is set. To change cartridge type, press ↲ key for 3 seconds, the number starts flashing. Press the ↑ key to select the correct number, press ↲ key to accept the new setting.

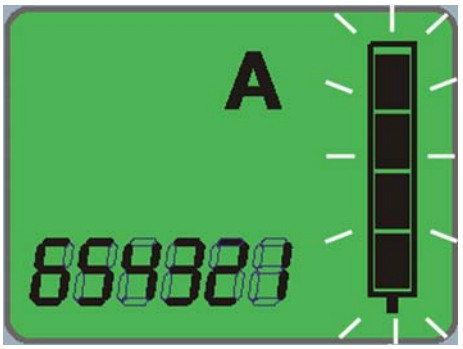


Fig. 23

Numbers beginning with 999 require a special adjustment:

Press ↲ key for 3 seconds. Press the ↑ key to select 999000, the last 0 starts flashing. Press the ↑ key to select the correct number, then press ↲ key: the second 0 will start flashing, proceed as above and finally adjust the 3rd 0 accordingly.

Pressing the ↑ key, display changes to **setup B** for the delivery setting. Filter symbol starts flashing (Fig. 24). To change delivery (in ltrs./min.), press ↲ key for 3 seconds, the 1st digit starts flashing. Press the ↑ key to select the correct number, press ↲ key to accept the new setting. Repeat procedure for the other two digits

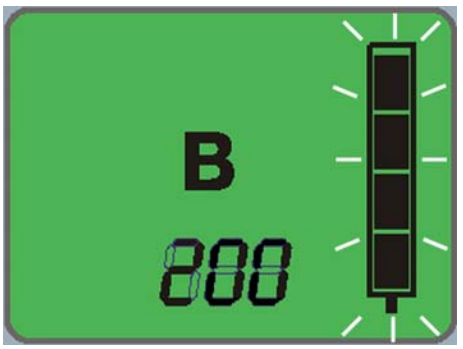


Fig. 24

Pressing the ↑ key again, display changes to **setup C** for the pressure range setting. Filter symbol starts flashing (Fig. 25). To change pressure, press ↲ key for 3 seconds. Press the ↑ key to select the correct pressure (200, 300 or 200/300), press ↲ key to accept the new setting.

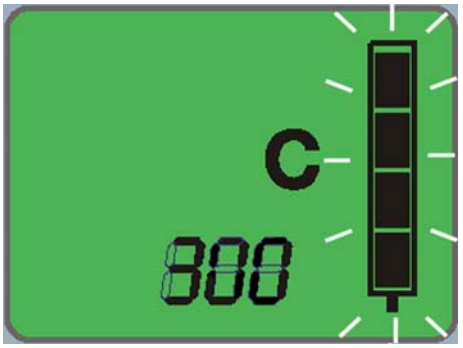


Fig. 25

After finishing setup and fitting a new cartridge, the filter capacity has absolutely to be reset, see □*Reset*" above.

Pressing the ↑ key again, display changes to the menue for **adjusting the operating hours**. Press ↲ key for 2 seconds, the last digit will start flashing. Press the ↑ key to select the correct number, then press ↲ key etc., until all digits are set. Then pressing the ↑ key twice will lead back to the main menue, Pressing the the ↑ key and the ↲ key gives the possibility to readjust the hours again, if required.

4. MAINTENANCE

4.1. MAINTENANCE RECORD

We recommend that all maintenance work is recorded in the service book delivered with every compressor unit, showing the date and details of the work carried out. This will help to avoid expensive repairwork caused by missed maintenance work. If it is necessary to claim against the warranty, it will help to have proof that regular maintenance work has been carried out and that the damage has not been caused by insufficient maintenance. Please refer to section 23 of our general terms and conditions.

4.2. MAINTENANCE INSTRUCTIONS

WARNING **Always shut down and decompress the complete system prior to carrying out any work on the compressor.**

WARNING **Never repair pressure lines by soldering or welding.**

Check the complete system for leakage from time to time by brushing all fittings and couplings with soapy water or spraying with leak test spray. Repair any leakage.

Only use original spare parts for maintenance or repair work.

Change TRIPLEX longlife cartridge according to chapter 4.5.3.!

The used cartridge must be disposed of according to local regulations.

Maintenance of drive motor/engine according to manufacturer's operating instructions.

For units with B-Timer, observe the maintenance informations on the display

4.3. MAINTENANCE SCHEDULE

The maintenance schedule is contained in the service manual delivered with every compressor unit.

4.4. MAINTENANCE WORK

This chapter contains the maintenance work as well as a short functional description for each component. For trouble-shooting information refer to 4.6.

4.4.1. LUBRICATION

FUNCTIONAL DESCRIPTION

The compressor is provided with a low pressure lubrication system. The oil pressure is produced by a low reving gear pump. The oil pressure is approximately **5 bar**.

The oil pump (1, Fig. 26) is coupled to and driven by the crankshaft. It pumps oil from the oil sump (5) through the oil fine filter (2) and a minimum pressure valve (3) to the 3rd stage cylinder. The oil is then distributed by the guide piston of the 3rd stage (4) and lubricates all moving parts of the compressor block.

The minimum pressure valve allows for oil pressure indication at a pressure gauge and electronic oil pressure monitoring.

TYPE OF OIL

For proper care and maintenance of the compressor, using the correct oil is of vital importance. Depending on the application of the compressor the requirements placed on the oil are:

- low deposits
- no carbonizing effect, especially in the valves
- good anti-corrosive properties
- emulsification of the condensate in the crankcase
- for breathing air application, also physiological and toxicological suitability.

Due to the thermal load on the compressor only high quality oil should be used. You are recommended to restrict oils to those which have been approved by us and are listed in our lubricating oil list.

The current oil list is provided in the annex. Order this list regularly through the BAUER Technical Service Department.

These oils are tested in our compressors and have proved excellent quality under ambient temperatures between +5 °C (41 °F) and +45 °C (113 °F). For lower temperatures, a heating device is required which is capable of pre-heating the crankcase up to +5 °C (41 °F).

All our compressor units are delivered ex-works with lubricating oil N28355 (filled into the crankcase or as consignment, depending on the model).

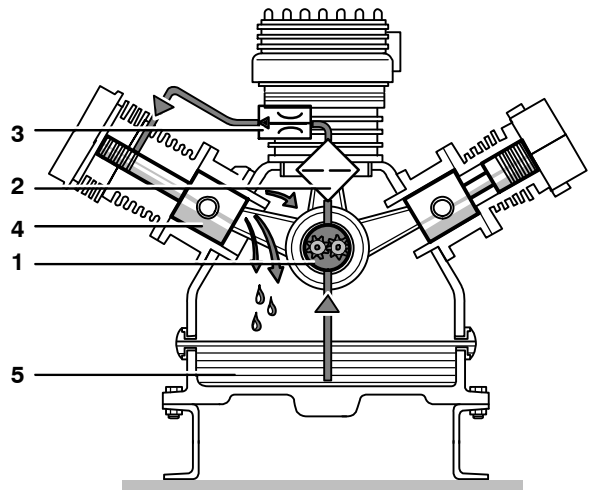


Fig. 26 Lube oil circuit

OIL LEVEL CHECK

Check oil level at sight gauge on either side of compressor block every day prior to putting compressor into operation. Oil level must be between minimum and maximum notches, see Fig. 27. Oil level must never be below minimum mark as this will cause severe damages due to lack of lubrication. Oil level must also not exceed maximum as this will cause excessive lubrication of compressor and result in valves sooting up.

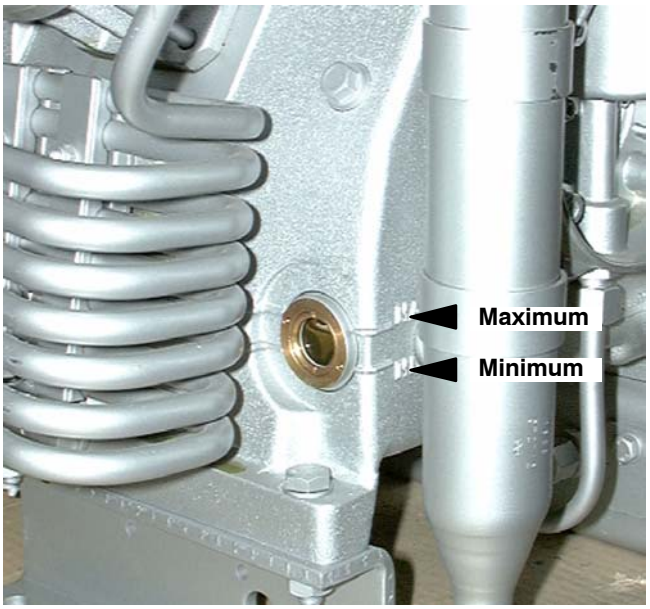


Fig. 27 Oil sight gauge

OIL CHANGE INTERVALS

For units equiped with B-Timer, observe the maintenance informations on the display.

Synthetic oils	every 2,000 operating hours, at least biennially

OIL CAPACITY

Oil capacity	approx. 2.8 liters

OIL PACKAGES

BAUER compressor oil is available in various quantities, refer to oil list in the annex.

OIL CHANGE

- Run compressor warm.
- Remove red cap from oil filler neck (1, Fig. 28).
- Drain oil while still warm by means of oil drain plug. On units equipped with oil drain hose remove hose union nut from coupling at hose bracket. Collect oil in a suitable container. Exchange gasket and reinstall plug.

Replace oil filter with every oil change, otherwise the bypass valve would open if filter is clogged, and the oil would circulate without being filtered!

- Remove two screws (1, Fig. 29) with a 13 mm spanner. Remove cover (2).
- Remove oil filter (1, Fig. 30) from rubber gasket at cover.
- Mount a new filter element (P/N N25326) and replace and fasten cover.
- Fill new oil through filler neck to Max.- mark at sight gauge.
- Pour oil in slowly, wait a few minutes, then put unit into operation.

Fig. 28 Oil filler neck

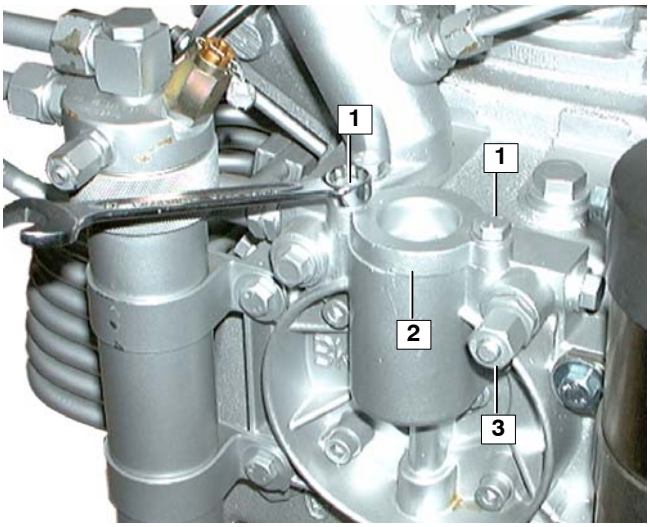


Fig. 29 Removing the cover

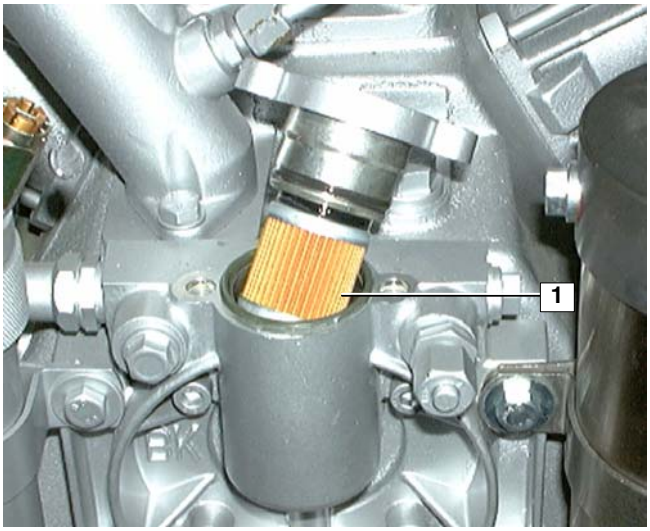


Fig. 30 Replacing the oil filter

4.5. VENTING OIL PUMP

If no or low oil pressure builds up after starting the unit- especially after maintenance or repair work, or if the unit should have been running in the wrong direction due to a wrong phase sequence - venting of the oil pump may be necessary. Proceed as follows:

- With the compressor running and all condensate drain valves open to avoid pressure being built up during this procedure, unscrew screw cap and plug (3, Fig. 29) three turns and wait until oil pours out free of air bubbles. Re-tighten plug and cap nut.

4.5.1. INTAKE FILTER

DESCRIPTION

A dry micronic filter is used to filter intake air, see Fig. 31.

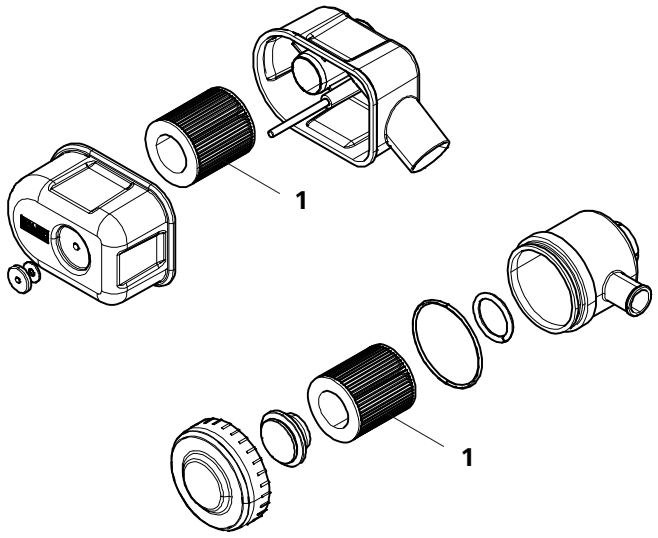


Fig. 31 Intake filter

MAINTENANCE

The filter cartridge must be cleanded or changed at regular intervals according to maintenance schedule in the service manual.

WARNING **Do not use any cleaning fluids which are a hazard to respiration.**

- Remove cover.
- Remove micronic filter cartridge (1, Fig. 31).
- Clean filter housing inside with a damp cloth. Take care to prevent dust from entering intake pipe. Replace O-ring if necessary.
- Insert new filter cartridge.
- Replace cover.

4.5.2. INTERMEDIATE SEPARATOR

DESCRIPTION

An intermediate separator is mounted on the compressor after the 2nd and 3rd stage. The separators are designed to remove water and oil accumulating due to cooling the air down after the compression process.

Separation is achieved by means of centrifugal action provided by a vortex plate.

LIFETIME

WARNING **The separators are subject to dynamic load. They are designed for a certain number of load cycles, which originate from an abrupt pressure loss at condensate drain (1 load cycle i.e. condensate drain = 1 depressurization, 1 pressurization). After reaching the max. number of load cycles the separators must be replaced, otherwise the housing may burst due to material fatigue. Refer to the pressure vessel operating manual delivered on CD with the unit.**

The maximum recommended amount of four load cycles per hour should not be exceeded. If it is possible to regulate the

operation of the unit to such a degree as to achieve four load cycles per hour, in our opinion this would be an optimum between usage and actual life.

To avoid exceeding the max. number of load cycles the operating hours should be recorded in the service manual. On units with compressor control the operating hours are readable on the hour meter.

MAINTENANCE

Proper operation of the individual compression stages will rely on the intermediate separator being properly serviced.

Drain condensate every 15 to 30 minutes from the separator or ensure that the automatic condensate drain unit drains regularly (see chapter 4.5.9.).

4.5.3. FILTER SYSTEM

FILTER SYSTEM P31

APPLICATION AND SUMMARY DESCRIPTION

The air leaving the final stage is cooled in the after-cooler to approx. 10 - 15 °C (18 - 27 °F) above ambient temperature and then enters filter system **P31** with **TRIPLEX** longlife cartridge (Fig. 33).

The filter assembly consists of separator and cartridge chamber. In the separator underneath the cartridge chamber, liquid oil and water particles are reliably separated from the compressed medium by a pipe nozzle. Residual oil and water vapors are then removed by the **TRIPLEX** longlife cartridge. The quality of the breathing air produced conforms to DIN EN 12021.

LIFETIME

WARNING **The filter system is subject to dynamic load. It is designed for a certain number of load cycles, which originate from an abrupt pressure loss at condensate drain (1 load cycle i.e. condensate drain = 1 depressurization, 1 pressurization). Acc. to no. 15 of the annex II to the German pressure vessel regulations the filter housing has to be inspected internally by an expert after having reached half of the determined number of load cycles. The inspections have to be arranged by the operator. After reaching the max. number of load cycles the filter assembly must be replaced, otherwise the housing may burst due to material fatigue. Refer to the pressure vessel operating manual delivered on CD with the unit.**

The maximum recommended amount of four load cycles per hour should not be exceeded. If it is possible to regulate the operation of the unit to such a degree as to achieve four load cycles per hour, in our opinion this would be an optimum between usage and actual life.

CARTRIDGE SAFETY BORE

The filter system **P31** is designed to prevent pressurizing in the absence of the filter cartridge. A bore provided in the filter bottom is sealed air-tight only if the cartridge is in place (Fig. 32).

No pressure build up without cartridge!

Without cartridge the venting bore is not sealed, the air escapes into the atmosphere, no pressure can be built up and thus it is ensured, that unfiltered air is not supplied to the consuming device.

The venting bore is also used to check the O-rings on the cartridge pin. If air is leaking out of the venting bore even though a cartridge is installed, the O-rings are either broken or were damaged on installation.

Remove and check cartridge. If necessary replace cartridge or O-rings.

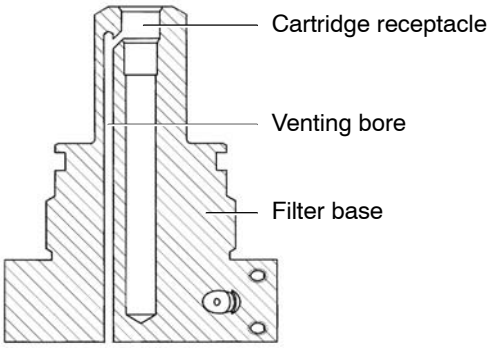


Fig. 32 Safety bore

GENERAL INSTRUCTIONS FOR FILTER MAINTENANCE

- **Depressurize** system before starting any maintenance work.
- **Dry** inside of filter housing with a clean cloth before installing new cartridge and check for corrosion. Change if necessary.
- **Lubricate** threads and O-rings as well as threaded part of cartridge with white petrolatum DAB 9 order no. N19091 or WEICON WP 300 white order no. N19752.
- **Record** number of pressure bottles and/or operating hours to ensure exact attention to maintenance intervals.
- **Change** cartridge before reactivating a compressor unit after out-of-service periods of more than 3 months.
- **Leave** cartridge in the filter as long as unit is out of service.
- **Keep** all condensate drain valves and taps closed. Keep a minimum pressure of approx. 50 to 80 bar (700 to 1,100 psi) within the system to prevent moisture entering the compressor piping and filter system.
- The nozzle type separator is maintenance-free.

FILTER CARTRIDGES

New filter cartridges are vacuum-packed and can be stored for two years (refer to date on the cartridge). A defective vacuum package cannot protect the cartridge appropriately against environmental influences during storage. Should the package be damaged, do not use the cartridge.

To avoid any danger to your health or damage to your unit, change used up cartridges in good time.

Never fill used up cartridges yourself! The filter material was chosen specifically by **BAUER**-KOMPRESSOREN for each kind of application.

Pay attention to cleanliness an hygiene when changing the filter.

FILTER SERVICE LIFETIME

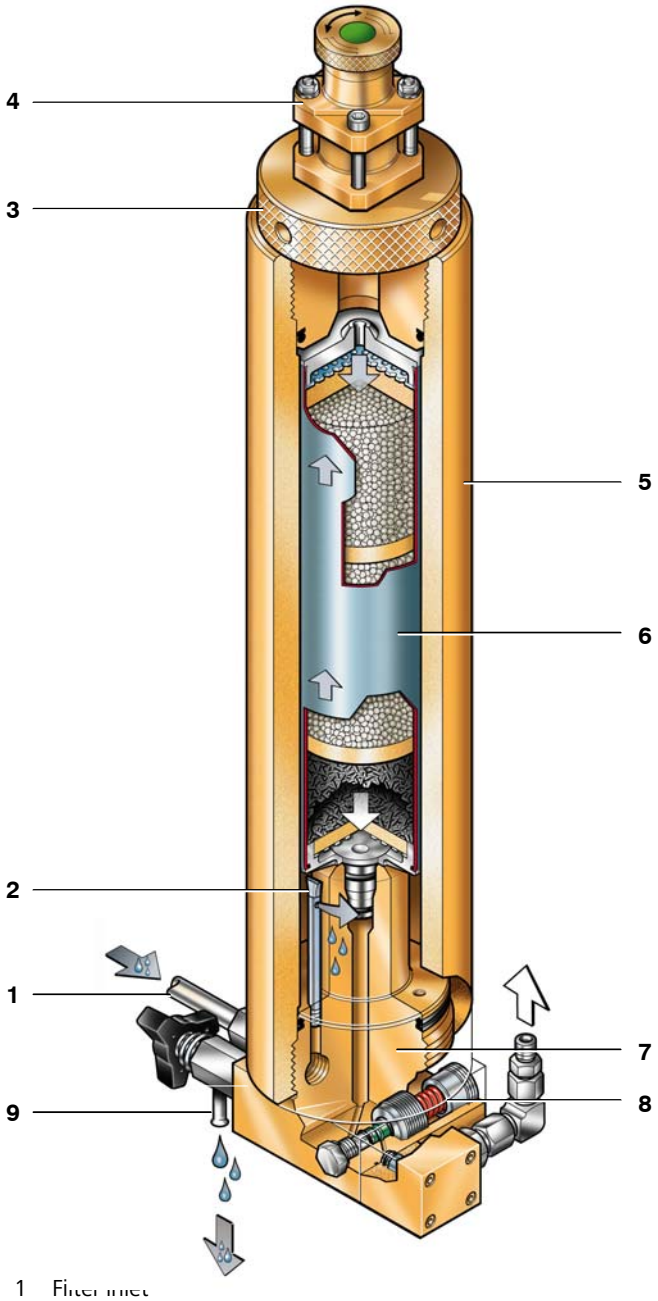
For units equiped with B-Timer, observe the maintenance informations on the display.

The number of operating hours or the amount of possible bottle fillings per filter cartridge can be determined by the tables on page 26 taking into consideration the ambient temperature and the cartridge used.

These tables contain calculated cartridge lifetime data, that refer to defined and constant operating conditions. Tolerances at bottle fillings and different operating temperatures can lead to considerable divergences compared to data given, which therefore can only serve as reference values for the user.

Cartridge 80110

Example with PE 250: at an ambient temperature of 20°C, 165 to 205 10-ltr-bottles can be filled with a TRIPLEX-cartridge, which is equivalent to 22 to 27 compressor operating hours at a filling pressure of 200 bar.



1 Filter inlet
2 Jet pipe
3 Filter head
4 Final pressure safety valve
5 Housing
6 Triplex cartridge
7 Filter base
8 Pressure maintaining valve
9 Condensate outlet

Fig. 33 Filter system P31

CARTRIDGE CHANGE

Never remove replacement cartridge from packaging prior to actual use otherwise highly sensitive molecular sieve will absorb water vapour from surrounding air and cartridge saturated and thus be ruined.

- Depressurize filter system by opening condensate drain valves.
- Remove filter head (3, Fig. 33).
- Extract old cartridge and insert a new one.
- Screw in filter head to the stop, without use of force.

The used cartridge must be disposed of according to local regulations.

CONDENSATE DRAINAGE

Drain condensate from separator and cartridge chamber regularly by slowly opening drain valves

- before changing cartridge
- before each filling procedure
- during filling procedure every **15 minutes**.

Slowly open left tap first, then right tap approx. 1/3 turn to the left, until condensate is completely drained. The taps close by spring pressure, if necessary tighten by hand to make sure they are completely air-tight.

For units equipped with an automatic condensate drain system refer to chapter 4.5.9.

1. Filter cartridge 80100: Filter cartridge lifetime [hours]			
Filling pressure p = 200 bar		**PE 250**	**PE 300**
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	Flow capacity Q [l/min]	Flow capacity Q [l/min]
		250	300
10	20 - 24	48 - 38	40 - 32
15	25 - 29	36 - 29	30 - 24
20	30 - 34	27 - 22	23 - 18
25	35 - 39	21 - 17	17 - 14
30	40 - 44	16 - 13	13 - 11
35	45 - 49	13 - 10	11 - 9
40	50 - 54	10 - 8	8 - 7
Filling pressure p = 300 bar		**PE 250**	**PE 300**
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	Flow capacity Q [l/min]	Flow capacity Q [l/min]
		250	300
10	20 - 24	72 - 57	60 - 48
15	25 - 29	54 - 43	45 - 36
20	30 - 34	41 - 33	34 - 28
25	35 - 39	31 - 26	26 - 21
30	40 - 44	24 - 20	20 - 17
35	45 - 49	19 - 16	16 - 13
40	50 - 54	15 - 12	12 - 10

Filter cartridge 80100: Bottle fillings [number] mass of molecular sieve mMS [g] = 311							
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	Moisture content of air, 100% satured X [g/m³]	Volume of processed air Va [m³] at pressure p [bar]		Number of bottle fillings n and bottle size		
			200	300	7 l	10 l	12 l
10	20 - 24	17,31 - 21,80	719 - 571	1078 - 856	513 - 408	359 - 285	299 - 238
15	25 - 29	23,07 - 28,79	539 - 432	809 - 648	385 - 309	270 - 216	225 - 180
20	30 - 34	30,40 - 37,63	409 - 331	614 - 496	292 - 236	205 - 165	171 - 138
25	35 - 39	39,65 - 48,64	314 - 256	471 - 384	224 - 183	157 - 128	131 - 107
30	40 - 44	51,21 - 62,41	243 - 199	364 - 299	174 - 142	121 - 100	101 - 83
35	45 - 49	65,52 - 79,28	190 - 157	285 - 235	136 - 112	95 - 78	79 - 65
40	50 - 54	83,08 - 99,85	150 - 125	225 - 187	107 - 89	75 - 62	62 - 52

Bottle filling volume VF [m³]		
Bottle size	at pressure p [bar]	
l [ltr.]	200	300
7	1,4	2,1
10	2	3
12	2,4	3,6

Number of bottle fillings n=
processed volume of air / bottle filling volume = Va / VF

Bottle filling volume: VF [m³] = p [bar] x l [l] / 1000 [l/m³]

Volume of air wich can be processed: Va [m³] = 0,2 x mMS [g] / (X [g/m³] / p [bar]) = 0,2 x p [bar] x mMS [g] / X [g/m³]

Lifetime of filter cartridge: tp [h] = Va [m³] / (Q [m³/min] x 60 [min/h])

FILTER SYSTEM P42 (OPTION)

PURPOSE AND SHORT DESCRIPTION

Filter system **P42** (Fig. 34) consists of:
- Final separator, integrated in filter base part
- Non-return valve between separator and purifier
- High pressure purifier
- **SECURUS** sensor head
- Venting valve with pressure gauge and final pressure safety valve
- Pressure maintaining valve

The system is integrated into the compressor unit, i.e. the filters and other components are mounted on the frame, the pressure maintaining valve is situated at the filling panel. If the **SECURUS** monitoring system is provided, the breathing air regeneration process and the degree of dryness of the air are continuously monitored during the regeneration process by measuring the cartridge saturation within the filter cartridge.

The influences of
- ambient temperature
- ambient humidity
- temperatures of the compressor and regeneration system are taken into consideration.

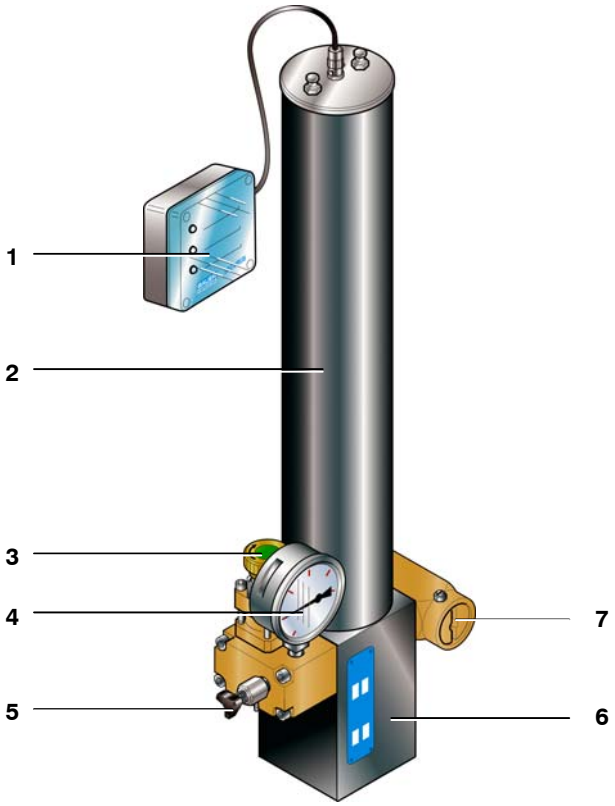
The exchangeable **SECURUS** cartridges are designed for
- drying of air
- adsorption of aromatic components (aerosols)
- partial conversion of CO into CO_2
- partial adsorption of CO_2

The quality of the breathing air produced conforms to the national and international
- DIN EN 12021
- STANAG 1079 MW
- British Standard 4001
- US CGA Spec. G.7.1
- Canada CSA Standard Z 180.1
- Australian Army Standard 5017

It is impossible to exceed the cartridge utilization time since a preliminary warning message indicates the approaching saturation of the cartridge. Depending on the size of compressor used, the prewarning message will appear between 1 and 7 hours prior to cartridge saturation. If the cartridge is not replaced after indication of the preliminary warning message, the **SECURUS** filter system will automatically shut down the compressor as soon as the cartridge has been exhausted. The compressor cannot be turned on as long as no cartridge has been inserted.

The **SECURUS** filter system operates in the FAIL-SAFE mode: the compressor will be shut down if the circuit between the control unit and the sensor is interrupted.

As soon as the preliminary warning message appears or, at the latest, after the SECURUS monitoring unit has shut down the system, the cartridge must be changed.



1 **SECURUS** monitoring unit Oil and water separator
2 Purifier Non-return and venting valve w. pressure gauge
3 Final pressure safety valve
4 Pressure gauge
5 Venting valve
6 Final separator
7 Pressure maintaining valve
Fig. 34 Filter system P42 with **SECURUS** monitoring

Final Separator

The air leaving the final stage is cooled in the after-cooler to approx.10 to 15 °C (18-27 °F) above ambient temperature and then enters the oil and water separator. The oil and water separator is standard for all industrial compressors and part of the breathing air purification system and separates reliably liquid oil and water particles from the compressed air.

Maintenance

Lifetime

The oil and water separator is subject to dynamic load. It is designed to withstand a certain no. of load cycles. (1 load cycle = 1 pressurization, 1 depressurization) at the specified pressure range. The oil and water separator must be replaced when the maximum permissible no. of load cycles has been reached. Refer to the pressure vessel operating manual delivered on CD with the unit.

The maximum recommended amount of four load cycles per hour should not be exceeded. If it is possible to regulate the operation of the unit to such a degree as to achieve four load

cycles per hour, in our opinion this would be an optimum between usage and actual life.

To avoid exceeding the max. number of load cycles the operating hours should be recorded in the service manual. On units with compressor control the operating hours are readable on the hour meter.

Condensate drain

The condensate produced by the re-cooling after the compression process has to be drained regularly by means of the manual condensate drain valves

- before start-up of the compressor unit
- during operation every 30 minutes, at high humidity every 15 minutes.

For units equipped with an automatic condensate drain system refer to chapter 4.5.9.

Purifier

The filter housing consists of an anodized aluminium alloy pipe with 100 mm external diameter. Both ends are provided with fine threads on the inside.

The screw-in filter bottom contains inlet and outlet. For connector threads see specifications, chapter 1.

The upper screw connection contains a pressure resistant bushing for the electrical connections. The coaxial cable which leads from the sensor to the control unit is connected to the BNC connector located there.

Filter cartridges

New filter cartridges are vacuum-packed and can be stored for two years (refer to date on the cartridge). A defective vacuum package cannot protect the cartridge appropriately against environmental influences during storage. Should the package be damaged, do not use the cartridge.

To avoid any danger to your health or damage to your unit, change used up cartridges in good time.

Never fill used up cartridges yourself! The filter material was chosen specifically by **BAUER**-KOMPRESSOREN for each kind of application.

Pay attention to cleanliness an hygiene when changing the filter.

The cartridge tube is made of aluminium. Cover and bottom consist of pressure diecast aluminium. The cartridge cover contains the sensor for the monitoring function and the clip to facilitate changing of the cartridge.

Cartridge change

- On filter systems with SECURUS monitoring, unscrew nut and pull off cable plug.
- Unscrew the filter head (1) with the special spanner (2) supplied with the unit.
- Pull out used cartridge by means of its clip (3).
- Remove new cartridge from packing and protective caps from both ends of cartridge.
- Insert new cartridge into housing and push down firmly.
- Replace filter head, screw in by hand and tighten with the special spanner.

Filter replacement intervals

The number of operating hours or the amount of possible bottle fillings per filter cartridge can be determined by the tables of the page 26 taking into consideration the ambient temperature and the cartridge used.

These tables contain calculated cartridge lifetime data, that refer to defined and constant operating conditions. Tolerances at bottle fillings and different operating temperatures can lead to considerable divergences compared to data given, which therefore can only serve as reference values for the user.

Cartridge 062565 is the normal TRIPLEX-cartridge for electric units.

Example with PE 250: at an ambient temperature of 20°C, 432 to 534 10-ltr-bottles can be filled with one cartridge, which is equivalent to 57 to 71 compressor operating hours at a filling pressure of 200 bar.

The used cartridge must be disposed of according to local regulations.

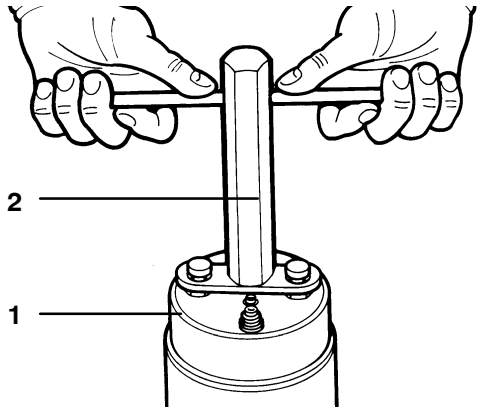


Fig. 35 Removing the filter head

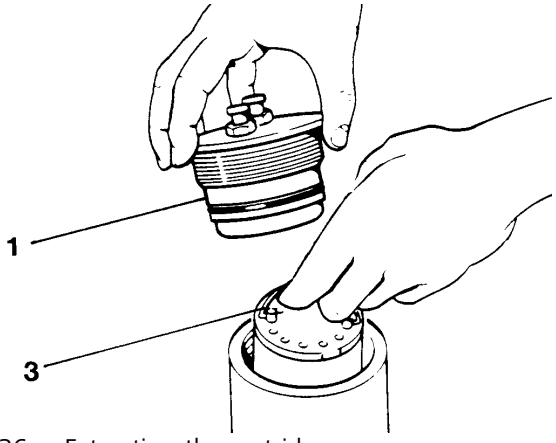


Fig. 36 Extracting the cartridge

1. Filter cartridge 062565: Filter cartridge lifetime [hours]			
Filling pressure p = 200 bar		**PE 250**	**PE 300**
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	Delivery Q [l/min]	Delivery Q [l/min]
		250	300
10	20 - 24	125 - 99	104 - 83
15	25 - 29	94 - 75	78 - 63
20	30 - 34	71 - 57	59 - 48
25	35 - 39	54 - 44	46 - 37
30	40 - 44	42 - 35	35 - 29
35	45 - 49	33 - 27	28 - 23
40	50 - 54	26 - 22	22 - 18
Filling pressure p = 300 bar		**PE 250**	**PE 300**
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	Delivery Q [l/min]	Delivery Q [l/min]
		250	300
10	20 - 24	187 - 148	156 - 124
15	25 - 29	140 - 112	117 - 94
20	30 - 34	106 - 86	89 - 72
25	35 - 39	82 - 67	68 - 56
30	40 - 44	63 - 52	53 - 43
35	45 - 49	49 - 41	41 - 34
40	50 - 54	39 - 32	33 - 27

Filter cartridge 062565: Bottle fillings [number] mass of molecular sieve mMS [g] = 812							
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	Moisture content of air, 100% satured X [g/m³]	Volume of processed air Va [m³] at pressure p [bar]		Number of bottle fillings n and bottle size		
			200	300	7 l	10 l	12 l
10	20 - 24	17,31 - 21,80	1876 - 1490	2815 - 2235	1340 - 1064	938 - 745	782 - 621
15	25 - 29	23,07 - 28,79	1408 - 1128	2112 - 1692	1006 - 806	704 - 564	587 - 470
20	30 - 34	30,40 - 37,63	1068 - 863	1603 - 1295	763 - 617	534 - 432	445 - 360
25	35 - 39	39,65 - 48,64	819 - 668	1229 - 1002	585 - 477	410 - 334	341 - 278
30	40 - 44	51,21 - 62,41	634 - 520	951 - 781	453 - 372	317 - 260	264 - 217
35	45 - 49	65,52 - 79,28	496 - 410	744 - 615	354 - 293	248 - 205	207 - 171
40	50 - 54	83,08 - 99,85	391 - 325	586 - 488	279 - 232	195 - 163	163 - 136

Bottle filling volume VF [m³]		
Bottle size	at pressure p [bar]	
l [ltr.]	200	300
7	1,4	2,1
10	2	3
12	2,4	3,6

Number of bottle fillings n=
processed volume of air / bottle filling volume = Va / VF

Bottle filling volume: VF [m³] = p [bar] x l [l] / 1000 [l/m³]

Volume of air wich can be processed: Va [m³] = 0,2 x mMS [g] / (X [g/m³] / p [bar]) = 0,2 x p [bar] x mMS [g] / X [g/m³]

Lifetime of filter cartridge: tp [h] = Va [m³] / (Q [m³/min] x 60 [min/h])

4.5.4. FILLING VALVE MAINTENANCE

Only carry out maintenance work on filling valves when the filling panel is depressurized.

Filling valve with hand wheel

To protect filling valve against contamination a sintered metal filter is screwed in the filling valve body.

- Unscrew pressure gauge (3, Fig. 37) from filling valve body (1).
- Screw off sintered metal filter (2) with a suitable screw driver.
- To clean filter element, the best method is to use hot soapy water and to blow dry with compressed air. Replace if heavily soiled.
- Screw in filter element,.
- Seal pressure gauge with PTFE tape or Loctite 243 and screw in tight to desired position.

Filling valve with rocking lever

The sintered metal filter (1, Fig. 38) is situated in the lower part of the filling valves. It separates small particles from the compressed air. We recommend that you clean it regularly. To do so, unscrew T connection on the filling valve. Remove sintered metal filter with a screwdriver (step 4, Fig. 38) and clean filter in warm soapy water. Dry the filter and replace it. Tighten properly with the screwdriver. Replace the sintered metal filter if there are signs of damage.

Certain components, such as piston and gaskets, can become dented during operation. In this case, they must be replaced.

- First of all remove pin and lever (steps 1 and 2, Fig. 38)
- Remove the lower part from the upper part of the filling valve (step 3, unscrew).
- Remove and replace the sealing cone (3) in the lower part. Then remove and replace O-ring (4), valve seat (5) and piston (8) in the upper part. Ensure parts are correctly replaced.

Before mounting the piston (8), fill the groove between the two o-rings (7) with a special grease. Mount piston from the top.

- Screw the lower part of the filling valve onto the upper part, tighten properly.
- Control and, if necessary, change o-rings.

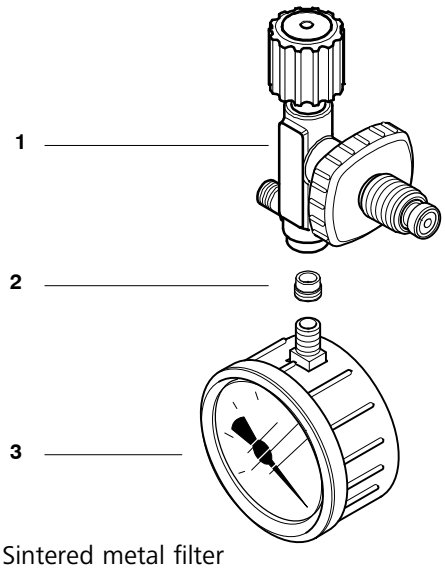


Fig. 37 Sintered metal filter

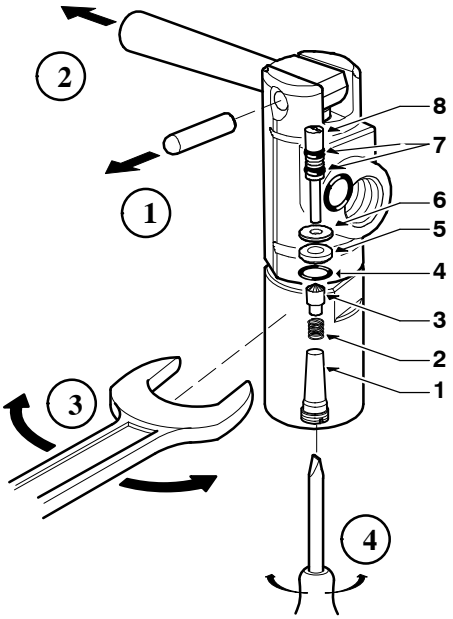


Fig. 38 Filling valve on external filling panel

4.5.5. PRESSURE MAINTAINING VALVE

DESCRIPTION

A pressure maintaining valve is integrated in the P31 filter base (Fig. 39).

It ensures that pressure is built up in the filter even from the start of delivery, thus achieving a constant, optimum filtration. It will also guarantee proper working conditions for the final stage cylinder.

The pressure maintaining valve is adjusted to **150 ±10 bar.**

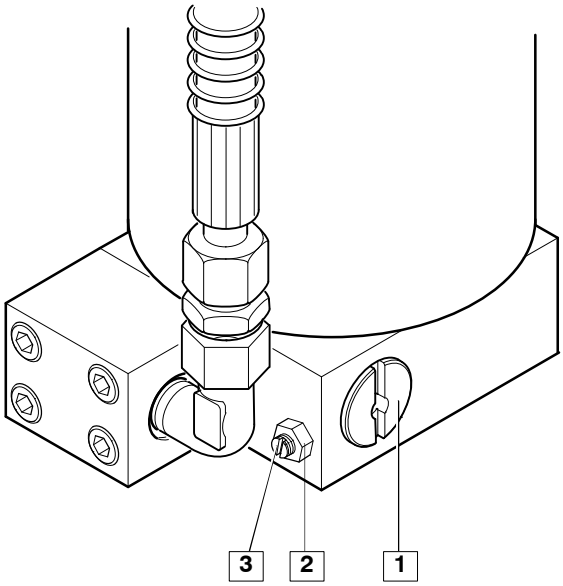


Fig. 39 Pressure maintaining valve, P31

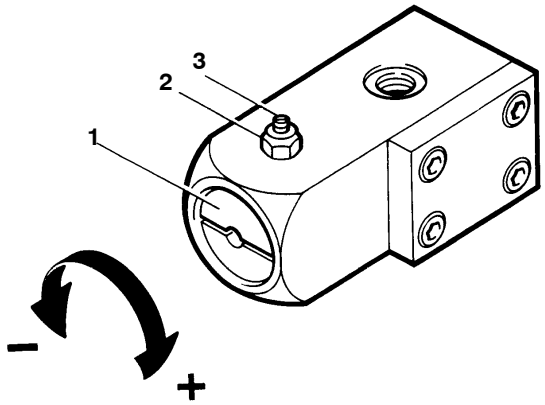


Fig. 40 Pressure maintaining valve, P42

MAINTENANCE

The pressure maintaining valve (Fig. 39) is adjusted at the factory to the required pressure and normally does not require regular maintenance or readjustment. In case of readjustment becoming necessary, loosen jam nut (2) and set screw (3). Adjust screw (1) to the required pressure using a suitable screw-driver.

Clockwise = increase pressure
Counter-clockwise = decrease pressure

4.5.6. SAFETY VALVES

DESCRIPTION

All compressor stages are protected by safety valves.

The safety valves are adjusted to the corresponding pressure and sealed at the factory. The safety valve for protection of the last stage is mounted on top of the filter system P31 or P41 oil and water separator, respectively, and is adjusted to the operating pressure of the unit (see chapter 1, Technical Data), **225 bar (3,200 psi)** or **330 bar (4,700 psi).**

MAINTENANCE

Checking function

Bauer-Kompressoren, as the manufacturer, recommends annual testing. We recommend replacement because intermediate pressure safety valves can only be tested with considerable expenditure. Replacement kits are available for our compressors from our customer service.

The final pressure safety valve has to be checked regularly. For this purpose the safety valve can be vented manually. Turn knurled knob on top of the valve clockwise until valve blows off (Fig. 41).

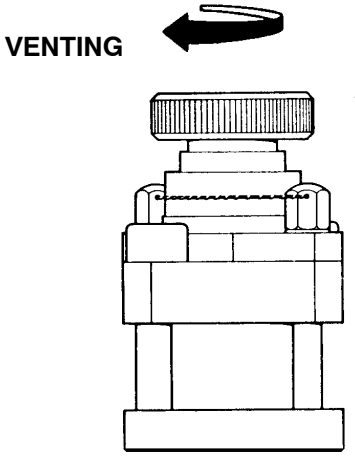


Fig. 41 Venting the final pressure safety valve

This just ensures that the valve is functional and will release pressure in case of a malfunction. To check the blow-off pressure value refer to "Blow-off pressure check".

Checking blow-off pressure

Check blow-off pressure of the final pressure safety valve regularly, see service manual. Pump unit to final pressure with shut-off valve closed until safety valve blows off. Check blow-off pressure of safety valve at pressure gauge.

4.5.7. PRESSURE GAUGE

DESCRIPTION

The compressor unit is equipped with a final pressure gauge (Fig. 42). The red marking on it shows the max. allowable operating pressure.

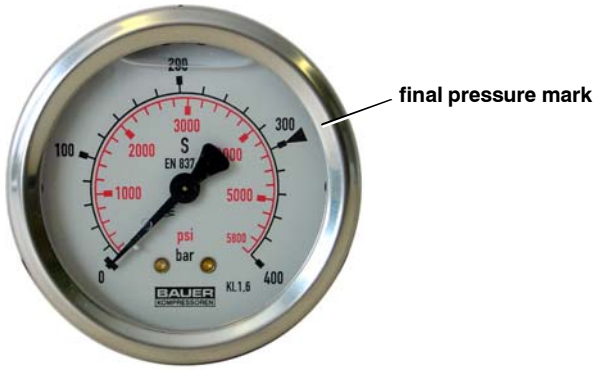


Fig. 42 Final pressure gauge

MAINTENANCE

We recommend that the final pressure gauge is checked from time to time. For this purpose we have developed a special test pressure gauge with an adaptor which immediately recognizes any deviations in readings (see High Pressure Accessories Catalogue).

Slight deviations during operation are normal and can be ignored. Excessive inaccuracy will require the pressure gauge to be replaced.

4.5.8. VALVES

FUNCTIONAL DESCRIPTION

The valve heads of the individual stages form the top part of the cylinders. The intake and pressure valves are fitted inside the valve heads.

Note that the valves are operated by the flow of the medium. On the suction stroke, the intake valves open and the medium flows into the cylinders. At the start of the compression stroke the intake valve closes and the medium opens the pressure valve, Fig. 43.

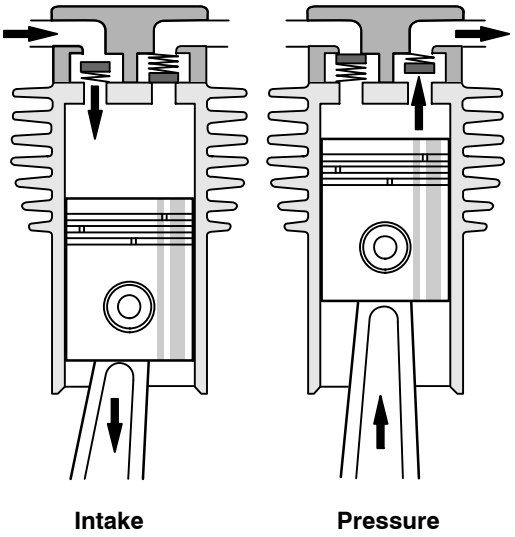


Fig. 43 Valve operation

Intake and pressure valve of the 1st stage is a combined plate valve under the valve head (Fig. 44).

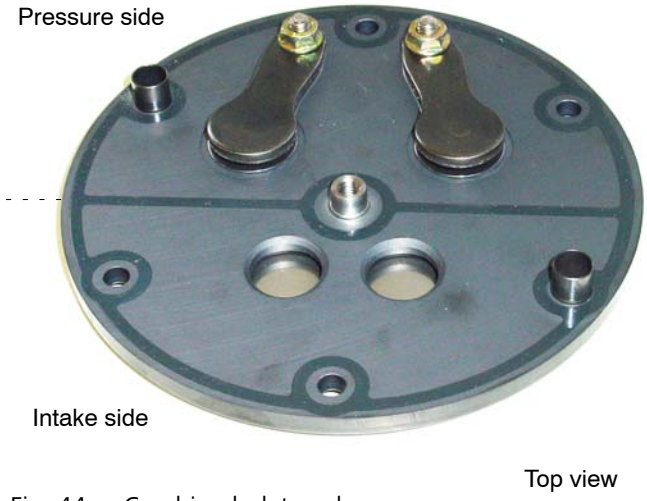


Fig. 44 Combined plate valve

GENERAL INSTRUCTIONS FOR CHANGING THE VALVES

- **Always replace** valves as a complete set.
- **Carefully clean** dirty valves. Never use a sharp tool for this purpose. Soak the valves in diesel oil or petroleum and clean with soft brush.

- **Lubricate** valves before mounting with Weicon AS 040, part no. N19753, or equivalent.
- **Observe** the correct sequence when fitting together again.
- **Check** individual components for excessive wear. If the valve seat and valve disks are dented, replace the valves.
- **Valve head screws** must be tightened with a torque wrench (see tightening torque values section 7.
- **Check** the valve space in the valve heads for dirt and clean, if necessary.
- **Use only** satisfactory gaskets and O-rings on reassembly.
- **After finishing** all maintenance work on the valves, turn the compressor manually using the flywheel and check whether all items have been correctly installed.
- **30 minutes after restarting** the compressor unit stop unit, let it cool down to ambient temperature and re-tighten valve studs and cap nuts. Otherwise valves could work loose due to setting of the gaskets.

VALVE CHANGE

Changing the valves should be performed by trained personnel, only.

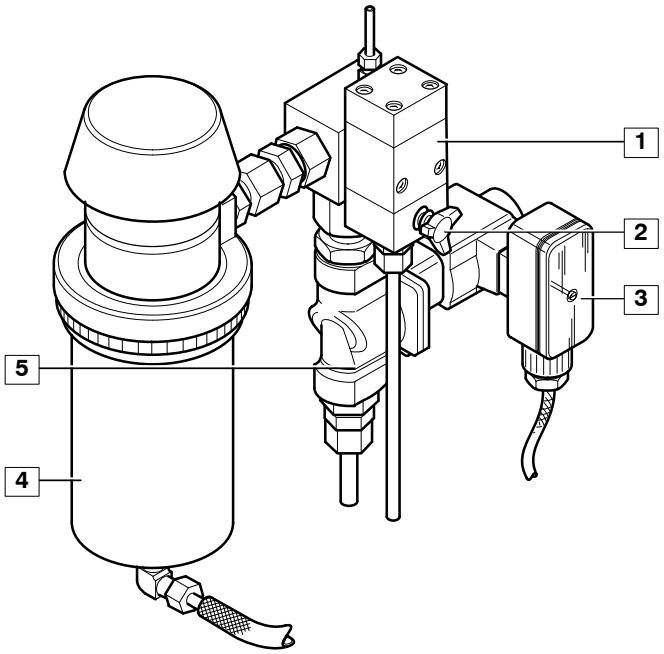
Valve change is described in the workshop manual which is available through the **BAUER** technical service.

4.5.9. AUTOMATIC CONDENSATE DRAIN

DESCRIPTION

The automatic condensate drain unit (Fig. 45) drains the intermediate separators and the oil and water separator after the last stage every 15 minutes during operation. In addition, the automatic condensate drain is designed to drain these filters after shut-down of the compressor unit and to unload the compressor during the starting phase.

Every 15 minutes, 3/2-way solenoid valve is deenergized for approx. 10 seconds by the timer. The solenoid valve opens and drains the condensate from the 2nd stage intermediate separator. Due to the pressure loss in intermediate separator the control pressure for condensate drain valve for the TRIPLEX filter is also removed. The servo-piston of the condensate drain valve is unloaded, the control pressure vented through the relief port. The piston of the drain valve is raised by pressure from the filter, the valve opens, and condensate is drained. After 10 seconds, the solenoid valve closes again, control pressure builds up at drain valve, and the valve closes.



1 Condensate drain valve, 3rd stage
2 Manual drain tap
3 Timer
4 Condensate separator/silencer
5 Solenoid valve, condensate drain 2nd stage

Fig. 45 Automatic condensate drain unit

CONDENSATE DRAIN PIPING AND COLLECTOR

The outlet opening of the condensate drain manifold is connected to a condensate drain separator. It separates the condensate from the air escaping together with the condensate from the filters. The air passes through a silencer and is released into the open air, the condensate is collected in a condensate tank. An additional silencer is mounted on top of the tank. The condensate tank should be emptied at regular in-

tervals. The maximum condensate level is marked with a black line.

Due care must be taken to ensure that any oil which may be drained with the condensate will not pollute the environment. For example, the drain pipe can be directed into a collecting vessel or into drain facilities incorporating oil separators.

Dispose of condensate according to local regulations!

MAINTENANCE

The condensate drain valve for the oil and water separator is fitted with a manual drain tap to check correct operation of the automatic system.

- Open the manual drain valves (2, Fig. 45) once a week.

This must be carried out immediately after the automatic system has drained the condensate. Observe the drainage of condensate when opening the manual drain valves. If the system drains a lot of condensate this is a sign that the system or the corresponding condensate drain valves are not working properly or that condensate drain intervals are to long. Find the fault and remedy accordingly. If hardly any condensate emerges, the automatic system is operating properly. For fault correction, see also chapter 4.6. "Trouble-shooting".

Maintenance of the condensate separator

The condensate separator element must be replaced regularly according to the maintenance schedule. Proceed as follows:

- Remove the self-locking nut (1, Fig. 46), the metal cover (2) and the filter (3).

Reinstallation:

- Insert a new filter element (3).
- Replace the metal cover (2) and secure it with the self-locking nut (1).

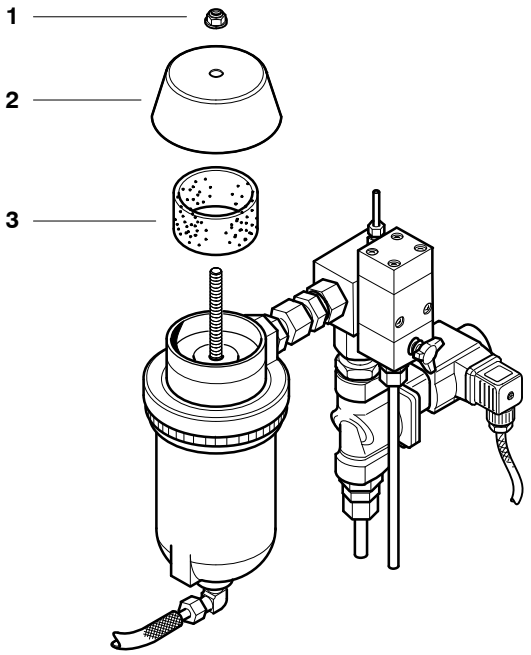


Fig. 46 Condensate separator

4.5.10. ELECTRICAL SYSTEM

This section describes the standard electric control system of the compressor unit. The amount of built-in components varies depending on order.

For schematic diagrams, see annex.

The electrical equipment of the compressor unit consists of:
- drive motor
- electric control system, containing:

- switch box containing air break contactor or star-delta contactor with time relay
- final pressure switch F16
- timer for automatic condensate drain

To start the electric motor and enable the functioning of the controls as well as the monitors, the following components are essential:
- main switch and main fuse, both to be installed by the customer.

Drive engine

The compressor unit is driven by an electric motor by means of V-belts. Check the V-belts regularly for tension and wear. See chapter 4.5.11. Except for external cleaning, the drive motor requires no servicing. The motor bearings may need lubricating, depending on the model. Please observe the instructions written on the motor.

Semi-automatic compressor control

Unit switches off automatically when the final pressure is reached in the pressure system connected to the compressor. Restart the unit manually by pressing operation button 1 on the control and monitoring unit.

Pressure switch

Switching **on** and/or **off** of the compressor unit is controlled by pressure switch F16. The upper threshold value is adjustable as follows.

OFF max. = 350 bar[a)] **OFF min. = 200 bar**

In case of readjustment becoming necessary, open cover (2, Fig. 47). Adjust screw (1) to the required pressure using a 6 mm allen key.

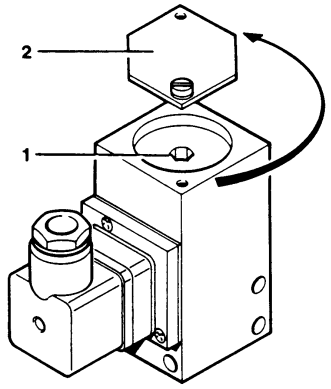


Fig. 47 Final pressure switch

Electrical connection of the automatic condensate drain

For electrical connection of the automatic condensate drain see the schematic diagram in the annex of this manual.

The factory set condensate drain intervals are valid for 20 °C (68 °F) air temperature of the surrounding air. It is possible to shorten the condensate drain interval when operating the unit at a higher temperature. Adjust the electrical timer as follows.

Adjustment of the condensate drain timer

Example: standard setting:
- Condensate drain interval = 15 min.
- Drain time = 6 s.

Adjust the electric timer as follows:

- Remove cover by undoing the screw.
- Ensure that DIP switches 1 to 8 at timer are set to OFF.
- Place DIP switches 3 and 8 to ON as shown in A, Fig. 49. In this preliminary configuration, the condensate drain interval can be adjusted in seconds. (See also Bürkert instructions in the annex).
- Switch on power.
- Adjust switch-on time with potentiometer t_{on} assigned to DIP switches 1 to 3 (preliminary 15 seconds). Turn potentiometer fully ccw. The desired switch-on time of 15 seconds wihtin the range setting of 1.5 to 30 seconds is approx. between 5 and 7 o'clock (Fig. 50). The exact position has to be found with a stop watch.
- Then adjust drain time with potentiometer t_{off} assigned to DIP switches 6 to 8 (6 seconds). Turn potentiometer fully ccw, then start turning cw. The desired switch-on time of 6 seconds within the range setting of 1.5 to 30 seconds is approx. between 2 and 4 o'clock (Fig. 50). The exact position has to be found with the stop watch.
- Finally place DIP switches 3 to OFF and 1 to ON as shown in B, Fig. 49. In this configuration the preliminary

a) Max. possible setting value; for max. allowable value refer to chapter 1., Technical data

condensate drain interval is converted in a range setting of 1.5 to 30 min. The setting of time is proportional: setting 15 sec in the time range 1.5...30 sec (preliminary setting) becomes 15 min when changing the range to 1.5...30 min (final setting). The operating time will now be 15 minutes.

Fig. 48 Condensate drain timer

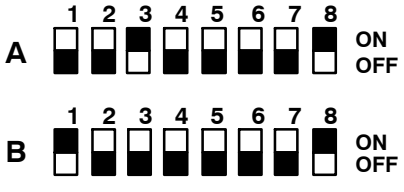


Fig. 49 DIP switch adjustment

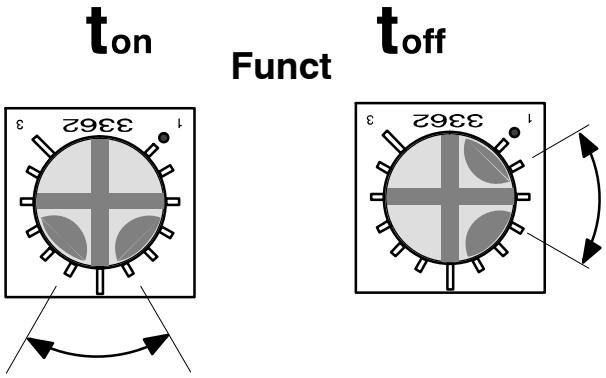


Fig. 50 Potentiometer setting

4.5.11. COMPRESSOR DRIVE SYSTEM

GENERAL

The compressor is driven by the drive motor through a V-belt. The drive motor normally needs no servicing except outer cleaning from time to time. Depending on manufacturer and model, greasing of the bearings may be necessary. Observe respective notes on the motor.

CHECKING THE DRIVE BELT

The best tension for a belt drive is the lowest possible, where the belts under full load do not slip. A rough value for this is when the belt deflects **10 to 20 mm** when pressed with thumb pressure between the two pulleys (Fig. 51).

- Readjust V-belts after the first 25 operating hours.
- Check V-belts for damage or wear according to service booklet.
- If necessary, replace.

ADJUSTING THE V-BELT TENSION

The units are equipped with a hinged motor plate. To check v-belt tension and tighten the v-belt remove cover (5, Fig. 1).

- Loosen the counter-nuts of the turnbuckle (1, Fig. 52).
- Tghten the motor plate by turning the hexagon (2) until correct tension of the v-belt (3) is achieved.
- Tighten counter-nuts.
- Replace cover.

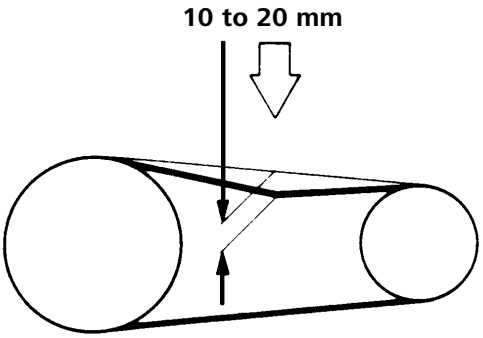


Fig. 51 Checking the v-belt tension

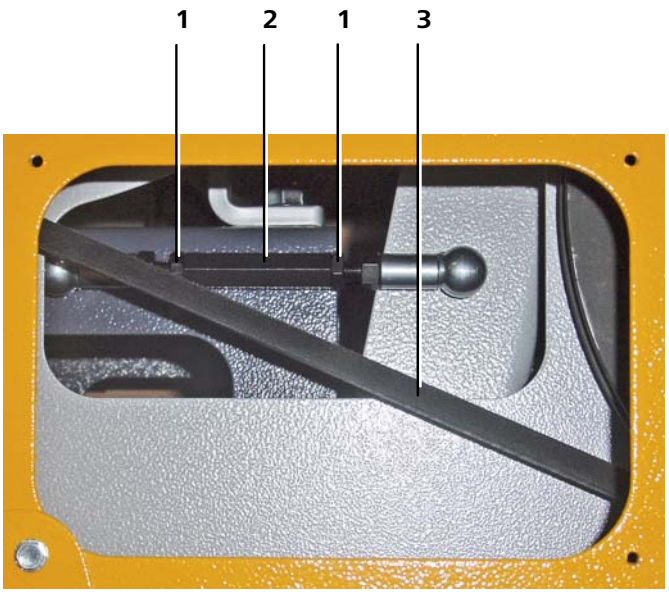


Fig. 52 Einstellen der Keilriemenspannung

4.5.12. COOLING SYSTEM

GENERAL

The cylinders of the compressor block, the intermediate coolers and the after-cooler are air-cooled.

For this purpose, the compressor is equipped with a fanwheel. It draws the cooling air through the fanwheel cover from the surroundings.

Refer to chapter 3. for proper installation and cooling air supply.

For maximum ambient temperature, see Technical Data, chapter 1.

4.6. TROUBLE-SHOOTING

Trouble	Cause	Remedy
Drive motor (electric)		
Motor will not start	Electric circuitry faulty	Before attempting to make any repairs, check all fuses, terminal connections, wire leads, make sure that motor data complies with mains supply
Drive system		
V–belt excessively worn out; black residue on v–belt cover	Misalignment of v-belt pulleys	readjust
Compressor block		
No oil pressure	Low oil level	Check oil level, see chapter 4.4.1.
Oil foam in the crankcase	Last stage piston worn	Operate compressor with final stage valve head removed. If oil flows continuously out of cylinder, replace piston and liner
	Last stage outlet valve defective	Replace
Compressor output insufficient	Condensate drain valve(s) and/or fittings leaking	Tighten and reseal
	Premature opening of final safety valve	Clean final safety valve and readjust
	Piston rings worn	Replace
	Excessive piston clearance	Replace
	Pipes leaking	Re-tighten
Safety valves between individual stages releasing pressure	Intermediate pressure too high	Check valves - see chap. 4.5.8. - Service and clean valves
	Valves not closing properly	
Compressor running too hot	Insufficient supply of fresh cooling air	Check location: max. ambient temperature + 45 °C (113 °F)
	Intake or outlet valves not closing properly	Check and clean valves, replace as necessary
	Wrong direction of rotation	See arrow on compressor and remedy accordingly
Oil residue in delivered air	Improper maintenance of filters, filter cartridge saturated	Remedy filters, change filter cartridges
	Wrong oil type	Use right oil type (see oil list) and clean sooted valves

Trouble	Cause	Remedy
Automatic Condensate Drain (optional)		
Drain valves do not close	No control air	Check control air line
	Drain valves leaking	Dismantle drain valve and clean
Drain valves do not open	Condensate drain valve piston jammed	Dismantle drain valve, clean or replace valve
Solenoid valve does not close	Solenoid valve faulty	Check solenoid valve and replace if necessary
	No electrical signal	Check for voltage from timer
Solenoid valve does not open	Solenoid valve faulty	Check solenoid valve and replace if necessary
	Continuous electrical signal	Check electrical control circuit and timer
Unsatisfactory drainage (lot of condensate from manual valves)	Nozzle in 3rd stage drain valve clogged	Remove nozzle, clean Note: 3rd stage 0,8 mm ∅

5. STORAGE, PRESERVATION

GENERAL

If the compressor is put out of service for more than six months, the unit should be preserved in accordance with the following instructions:

Make sure the compressor is kept indoors in a dry, dust free room. Only cover the compressor with plastic if it is certain that no condensation will form under the sheet. Nevertheless, the sheet should be removed from time to time and the unit cleaned on the outside.

The compressor is not salt–water resistant! If not in use keep unit in a dry place.

If this procedure cannot be followed and/or the compressor is going to be taken out of service for more than 2 years, please contact our Technical Service Department for special instructions.

PREPARATION

Before preserving the compressor unit, run it warm and when it reaches the specified service pressure, keep it running for approx. 10 minutes.

Then carry out the following:

- Check all pipes, filters and valves (also safety valves) for leakage.
- Tighten all couplings, as required.
- After 10 minutes, open the filling valves or the outlet valve and run the compressor at the set minimum pressure (pressure maintaining valve, see chapter 4.5.5.) for approx. 5 minutes.
- After these 5 minutes, shut the system down. Drain condensate from separators. Depressurize unit. Shut filling valves/outlet valve.
- Open filters and grease threads.
- **Ensure that filter cartridge remains in the filter!** This will prevent oil entering filling lines as a result of preservation procedures.
- Remove intake filter from manifold and all intake lines from valve heads.
- Let compressor unit cool down.

PRESERVING THE COMPRESSOR

- Turn the compressor on and spray a small amount (approx. 10 ccm/0.6 cu. in.) of compressor oil into the valve head inlet port while the compressor is running. Do not let the compressor warm up too much, to keep oil sticky.
- Shut compressor unit off.
- Close all valves.
- Place the dust cap onto the inlet port.

PRESERVING THE MOTOR/ENGINE

Preserve the motor/engine according to the instructions of the motor/engine manufacturer.

PREVENTIVE MAINTENANCE DURING STORAGE

Run the compressor **once every 6 months** as described in the following:

- Remove the dust cap from the inlet port and insert the intake filter.
- Open the filling valves or the outlet valve and let the unit run for approx. 10 minutes or until the pressure gauges indicate the correct values.
- Stop the compressor.
- Open condensate drain valves and release compressed air. Close condensate drain valves again.
- Carry out preservation procedure according to chapter "preserving the compressor"

CHANGING THE LUBE OIL FOR PRESERVING

- After prolonged storage, the oil will age in the compressor and engine. It should be drained after **2 years** at the latest and replaced with fresh oil.
- The stated period can only be attained when the crankcase is sealed during the preservation period in accordance with the preservation requirements.
- After changing the oil, turn the compressor and the engine or run them for the required period.
- Check the lubrication of the compressor when putting the unit into operation once every six months or when turning the compressor. The oil pump is functioning properly when oil can be seen flowing through the sight glass of the oil pressure regulator and if the oil pressure gauge indicates the prescribed pressure.

REACTIVATING THE COMPRESSOR UNIT

- Remove the dust cap from the inlet port and insert the intake filter.
- Check the oil level of the compressor.
- Check the motor/engine according to the manufacturer's instructions.
- Only applicable for units equipped with a filter system: open the purifier and change all filter cartridges.
- Run the compressor warm with open filling valves or outlet valve for approx. 10 minutes.
- Check the oil pressure on the pressure gauge. If there is any fault, check the lubrication of the compressor.
- After 10 minutes, close the filling valves or the outlet valve and run the unit up to final pressure until the final pressure safety valve blows.
- Check the inter-pressure safety valves for leakage.
- Establish cause of any fault from the trouble-shooting table, chapter 4.6., and remedy.
- Stop the system when running properly, the compressor is then ready for operation.

6. REPAIR INSTRUCTIONS

GENERAL

Preventive maintenance usually involves replacing the valves, gaskets and sealing rings as well as carrying out the maintenance work.

Repair work can be carried out on the compressor block to a certain extent but a certain experience and skill is necessary. It should be noted, however, that

- no repair should be carried out on the crankdrive nor on the bearings
- safety valves are not repaired but always replaced completely.

For all further repair instructions refer to applicable workshop manual.

7. TABLES

TIGHTENING TORQUE VALUES

Unless otherwise specified in text, the following torque values apply. All valve head screws require torque wrench tightening! The indicated torque values are valid for bolts in greased condition. Replace self-retaining nuts on reassembly.

Bolt or swrew	Thread	max. torque
Hex and allen head	M 6	10 Nm (7 ft.lbs)
Hex and allen head	M 8*	25 Nm* (18 ft.lbs)
Hex and allen head	M 10	45 Nm (32 ft.lbs)
Hex and allen head	M 12	75 Nm (53 ft.lbs)
Hex and allen head	M 14	120 Nm (85 ft.lbs)
Hex and allen head	M 16	200 Nm (141 ft.lbs)
Pipe connections (swivel nuts):		Finger-tight + 1/2 turn

TORQUE SEQUENCE

Tighten valve head and cylinder bolts/nuts equally in the sequence shown in Fig. 53.

Be sure to tighten all parts in **cold** condition only.

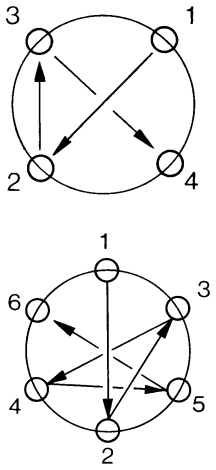


Fig. 53 Torque sequence

LUBRICATION CHART

Usage	Lubricants
Rubber and plastic parts, filter housing threads	WEICON WP 300 WHITE part no. N19752 or BAUER special grease part no. 072500
Sealing rings	BAUER special grease part no. 072500
Shaft seal (seal) Shaft seal (shaft)	BAUER special grease part no. 072500 Klüber SK 01-205
Screws, bolts, threads	WEICON ANTI-SEIZE AS 040 P part no. N19753 or equivalent compound with copper or MoS_2 additives

For lubricating oils refer to oil list in chapter 8.

ADHESIVE AND SEALANT CHART

Usage	Adhesives and Sealants
Screws	Loctite 2701
Seals for conical threads	Loctite 243
Metal - metal seals High temperature connections, e.g. valve heads, cylinders	Temperature resistant compound, e.g. WACKER E10, part no. N18247
Paper gaskets	Loctite FAG 2

TESTING AGENTS

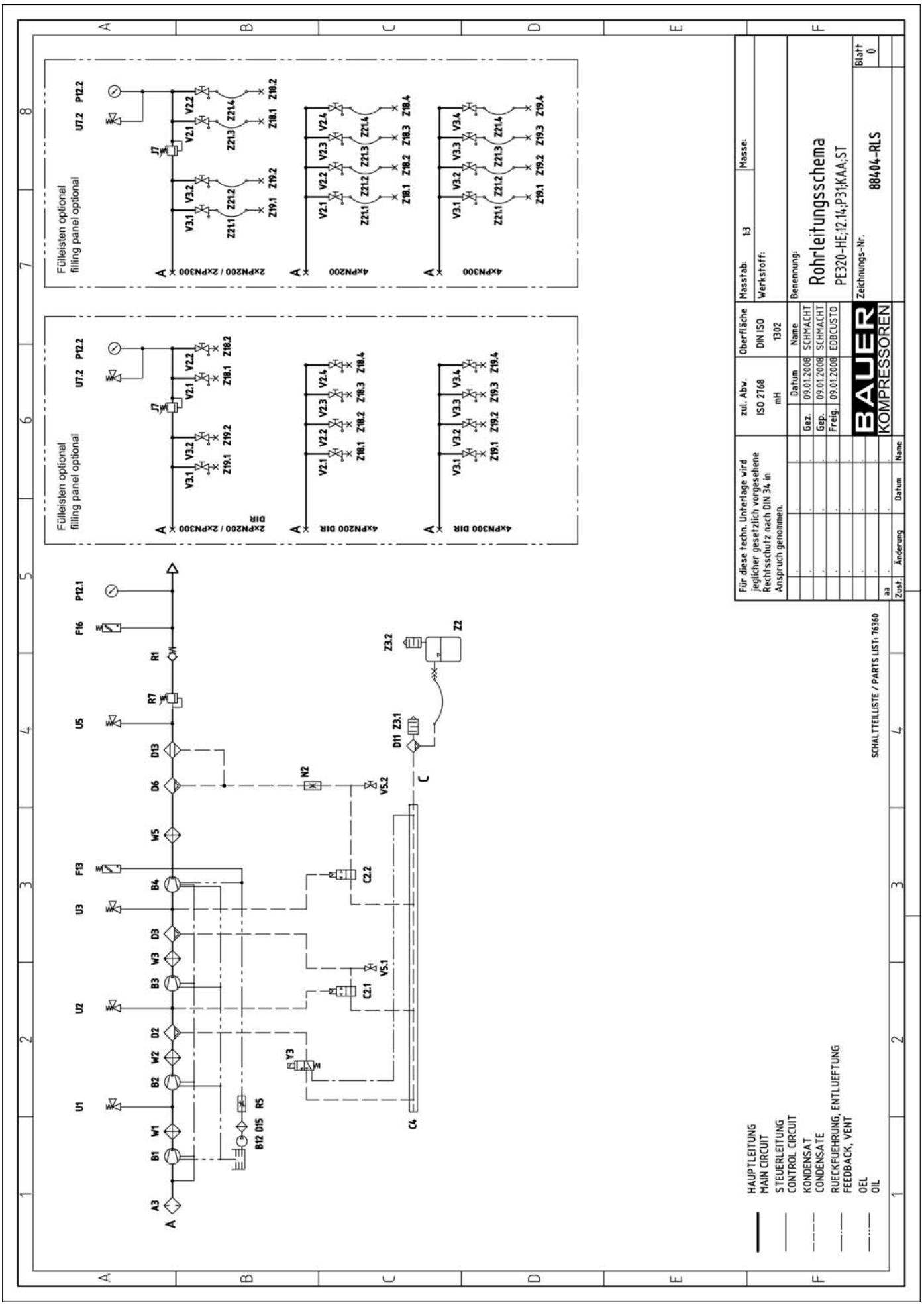
Usage	Testing agents
Tube connectors, tubes	Leakage test spray, part no. FM0089

* Exception: mounting bolts of final pressure safety valve: 10 Nm

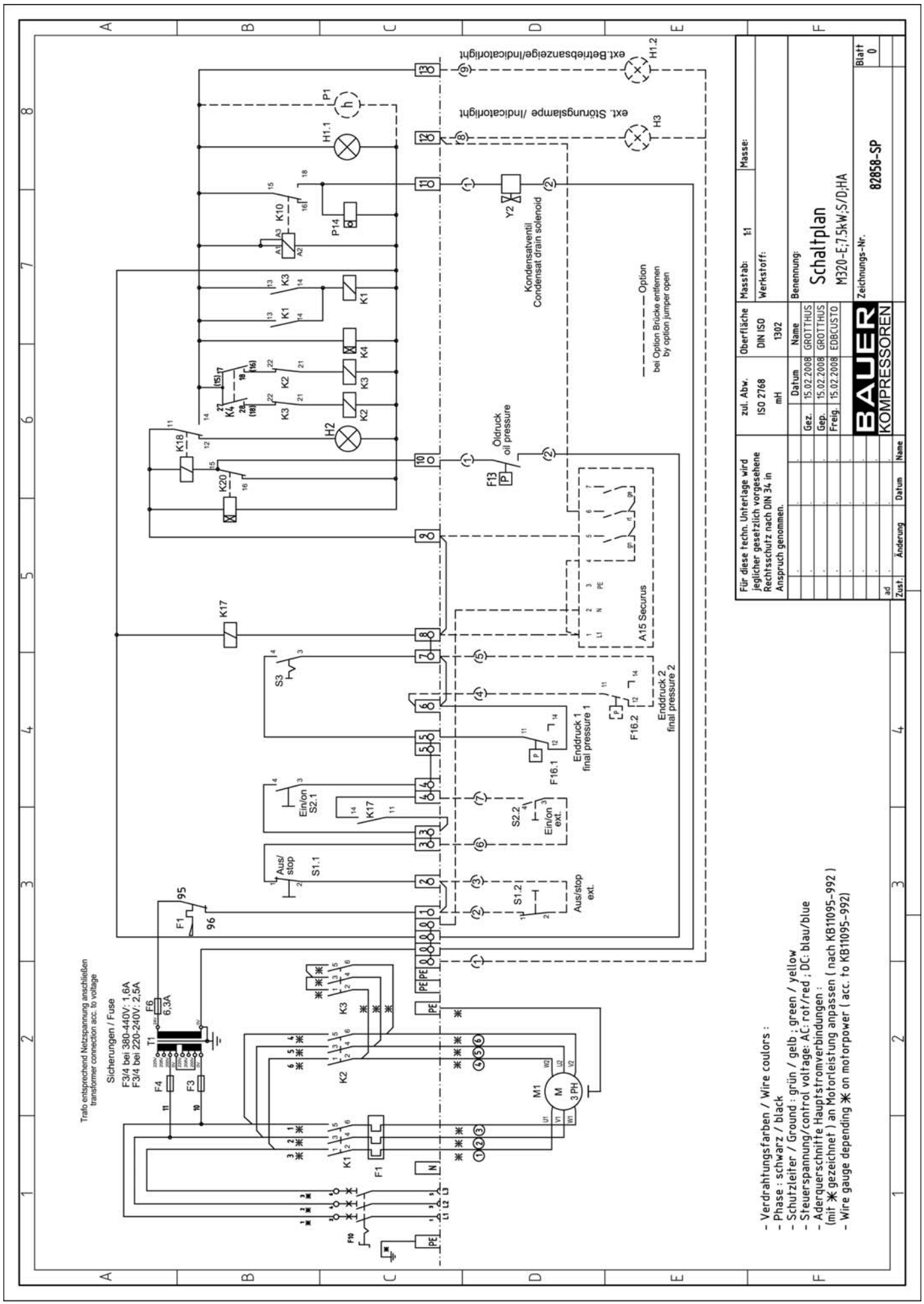
8. ANNEX

- **Air flow diagram**
  Schematic diagrams
  Lubricating oil list
  Parts lists

Air flow diagram



Schematic diagram



Components parts list

Pos.	Bezeichnung	Designation	Désignation
A	**Baugruppen**	**Assemblies**	**Assemblages**
A	Eingang, Kompressor	Intake, compressor	Entrée, compresseur
A1	BC2 Electronic Control	BC2 Electronic Control	BC2 surveillance électronique
A2	Umsetzer für eigensichere Stromkreise	Converter for inherent circuits	Convertisseur pour circuits auto-protégés
A3	Ansaugfilter, Mikronik	Intake filter, micronic	Filtre d'aspiration micronique
A4	BC6 Electronic Control	BC6 Electronic Control	BC6 surveillance électronique
A5	Ansaugfilter, Mikronik, gasdicht	Intake filter, micronic, gastight	Filtre d'aspiration micronique, étanche aux gaz
A7	Partikelfilter, Eingang	Particle separator, intake	Filtre particules, entrée
A9	Öl-Überwachungsgerät	Oil monitor	Dispositif de surveillance d'huile
A11	SECCANT	SECCANT	SECCANT
A15	SECURUS-Meldegerät	SECURUS indicator unit	Dispositif de surveillance SECURUS
B	**Kompressor Block**	**Compressor block**	**Bloc compresseur**
B	Ausgang, Kompressor	Outlet, compressor	Sortie, compresseur
B1	Verdichtungsstufe 1	Compressor, stage 1	1er étage de compression
B2	Verdichtungsstufe 2	Compressor, stage 2	2e étage de compression
B3	Verdichtungsstufe 3	Compressor, stage 3	3e étage de compression
B4	Verdichtungsstufe 4	Compressor, stage 4	4e étage de compression
B5	Verdichtungsstufe 5	Compressor, stage 5	5e étage de compression
B6	Temperaturfühler für A1/A2/F16	Temperature sensor for A1/A2/F16	Sonde de température pour A1/A2/F16
B7	Geber für Tankanzeige P4	Fuel level transmitter for P4	Sonde pour niveau de combustible
B8	Meßfühler für Niveau-Control A9	Sensor for Oil Niveau Control A9	Sonde pour contrôle de niveau d'huile
B12	Ölpumpe	Oil pump	Pompe à huile
C	**Kondensat-Ablaßautomatik**	**Automatic condensate drain**	**Purge automatique des condensats**
C	Ausgang, Kondensat	Outlet, condensate	Sortie, condensats
C1	4fach Kondensat-Ablaßventil	Quadruple condensate drain valve	Vanne de purge quadruple
C2	Kondensat-Ablaßventil, o. Steuerdr. offen	Condensate drain valve, N/O	Vanne de purge, ouverte sans air de commande
C3	Kondensat-Ablaßventil, o. Steuerdr. geschl.	Condensate drain valve, N/C	Vanne de purge, fermée sans air de commande
C4	Kondensat-Sammelleiste	Condensate manifold	Listeau collecteur de condensats
C5	Entlastungsventil	Discharge valve	Vanne de décharge
C6	Sammelleiste allgem.	Manifold, general	Listeau, généralement
D	**Filter**	**Filters**	**Filtres**
D1	Zwischenabscheider 1./2. Stufe	Intermediate separator, 1st/2nd stage	Séparateur intermédiaire, 1er/2e étage
D2	Zwischenabscheider 2./3. Stufe	Intermediate separator, 2nd/3rd stage	Séparateur intermédiaire, 2e/3e étage
D3	Zwischenabscheider 3./4. Stufe	Intermediate separator, 3rd/4th stage	Séparateur intermédiaire, 3e/4e étage
D4	Zwischenabscheider 4./5. Stufe	Intermediate separator, 4th/5th stage	Séparateur intermédiaire, 4e/5e étage
D5	Mikroabscheider, letzte Stufe	Oil and water separator, micro-cartridge type, last stage	Séparateur d'huile et d'eau à micro-cartouche, dernier étage
D6	Drallabscheider, letzte Stufe	Oil and water separator, centrifugal type, last stage	Séparateur d'huile et d'eau centrifuge, dernier étage
D7	Düsenabscheider, letzte Stufe	Oil and water separator, jet type, last stage	Séparateur d'huile et d'eau à buse, dernier étage
D8	Feinnachreiniger, AC	Purifier, AC	Epurateur, AC
D9	Trockner, MS	Dryer, MS	Sécheur, MS
D10	Abscheider, Schmierölkreislauf	Separator, lube oil circuit	Séparateur, circulation du lubrifiant
D11	Abscheider, Kondensat	Separator, condensate	Séparateur, condensats
D12	CO-Abscheider	Filter for CO removal	Séparateur de CO
D13	Filter, MS-AC	Filter, MS-AC	Filtre, MS-AC
D14	Partikelfilter	Particle separator	Filtre de particules
D15	Ölfilter	Oil filter	Filtre d'huile
D16	CO_2-Abscheider	Filter for CO_2 removal	Séparateur de CO_2
D17	Abscheider Kurbelgehäuse-Entlüftung	Separator, crankcase vent	Séparateur, désaération du carter
D18	Aero-Guard	Aero-Guard	Aero-Guard
E	**Verschiedenes**	**Miscellaneous**	**Instruments diverses**
E1	Beleuchtung (allgemein)	Lighting (general)	Eclairage (général)
E2	Netzstecker	Mains plug	Prise réseau
E3	Heizung, allg.	Heater, general	Chauffage, général
E4	Heizstab, Filter	Heater, filter unit	Radiateur du filtre
E5	Heizstab, Ölsumpf	Heater, oil sump	Radiateur du filtre
E6	Zündkerze	Spark plug	Bougie
E7	Isolierstück	Isolating device	Isolant
F	**Schutzeinrichtungen**	**Safety devices**	**Instruments de sécurité**
F1	Bi-Relais für Motor M1	Bi-metal relay for motor M1	Bi-relais pour moteur M1
F2	Thermistorrelais für M1	Thermistor relay for motor M1	Relais thermique pour moteur M1
F3	Steuersicherung in L1	Control fuse in L1	Fusible de commande dans L1
F4	Steuersicherung in L2	Control fuse in L2	Fusible de commande dans L2
F5	Steuersicherung in L3	Control fuse in L3	Fusible de commande dans L3
F6	Steuersicherung 1 nach Steuertrafo	Control fuse 1 after control transformer	Fusible de commande 1 après transformateur
F7	Steuersicherung 2 nach Steuertrafo	Control fuse 2 after control transformer	Fusible de commande 2 après transformateur
F10	Hauptsicherung	Main fuse	Fusible principal
F11.1	Druckwächter bzw. -sensor, Zwischendruck 1./2. Stufe min.	Pressure switch or sensor, interm. pressure, 1st/2nd st. min	Manostat ou sonde, pression intermédiaire 1er/2e étage min.
F11.12	Druckwächter bzw. -sensor, Zwischendr. 1./2. Stufe min./max	Pressure switch or sensor, interm. press, 1st/2nd st. min./max	Manostat ou sonde, pression interméd. 1er/2e ét. min./max.
F11.2	Druckwächter bzw. -sensor, Zwischendruck 1./2. Stufe max.	Pressure switch or sensor, interm. pressure, 2nd/3rd st. max.	Manostat ou sonde, pression intermédiaire 2e/3e étage
F11.3	Druckwächter bzw. -sensor, Zwischendruck 2./3. Stufe	Pressure switch or sensor, interm. pressure, 3rd/4th st.	Manostat ou sonde, pression intermédiaire 3e/4e étage
F11.4	Druckwächter bzw. -sensor, Zwischendruck 3./4. Stufe	Pressure switch or sensor, interm. pressure, 4th/5th st.	Manostat ou sonde, pression intermédiaire 4e/5e étage
F11.5	Druckwächter bzw. -sensor, Zwischendruck 4./5. Stufe	Pressure switch or sensor, interm. pressure, 4th/5th st.	Manostat ou sonde, pression intermédiaire 4e/5e étage
F12.1	Druckwächter bzw. -sensor, Ansaugdruck, min.	Pressure switch or sensor, min. intake press.	Manostat ou sonde, pression min. d'aspiration
F12.2	Druckwächter bzw. -sensor, Ansaugdruck, max.	Pressure switch or sensor, max. intake press.	Manostat ou sonde, pression max. d'aspiration
F13	Druckwächter bzw. -sensor, Öldruck	Pressure switch or sensor, oil pressure	Manostat ou sonde, pression d'huile
F14	Druckwächter bzw. -sensor, Eingangsdruck	Pressure switch or sensor, intake pressure	Manostat ou sonde, pression d'entrée
F15	Strömungswächter, Öldruck	Flow switch, oil pressure	Contrôle-débit, pression d'huile

Pos.	Bezeichnung	Designation	Désignation
F16	Druckwächter bzw. -sensor, Ausgangsdruck	Pressure switch or sensor, outlet pressure	Manostat ou sonde, pression de sortie
F17	Pegelschalter, Öl	Level switch, oil	Interrupteur, niveau d'huile
F18	Druckwächter bzw. -sensor, Flaschendruck	Pressure switch or sensor, bottle pressure	Manostat ou sonde, pression des bouteilles
F19	Druckwächter bzw. -sensor, Zwischendr.-Sammelüberw.	Pressure switch or sensor, interm. press., coll. monit.	Manostat ou sonde, pression interméd., surveillance collective
F20	Temperaturwächter bzw. -sensor 1. Stufe	Temperature switch or sensor 1st stage	Contrôleur ou sonde de température 1er étage
F21	Temperaturwächter bzw. -sensor 2. Stufe	Temperature switch or sensor 2nd stage	Contrôleur ou sonde de température 2e étage
F22	Temperaturwächter bzw. -sensor 3. Stufe	Temperature switch or sensor 3rd stage	Contrôleur ou sonde de température 3e étage
F23	Temperaturwächter bzw. -sensor 4. Stufe	Temperature switch or sensor 4th stage	Contrôleur ou sonde de température 4e étage
F24	Temperaturwächter bzw. -sensor 5. Stufe	Temperature switch or sensor 5th stage	Contrôleur ou sonde de température 5e étage
F25	Thermostat, Heizung	Temperature switch or sensor, heater	Contrôleur ou sonde de température, chauffage
F26	Pegelschalter, Kondensat	Level switch, condensate	Interrupteur, niveau de condensats
F27	Kühllufttemperaturwächter bzw. -sensor	Cooling air temperature switch or sensor	Contrôleur ou sonde d'air refroidissante
F28	Temperatursensor, Eingang	Temperature sensor, inlet	Sonde de température, entrée
F29	Druckwächter bzw. -sensor, Kurbelgehäusedruck	Pressure switch or sensor, crankcase pressure	Manostat ou sonde, pression du carter
F30	Druckwächter/-sensor, allgem.	Pressure switch/sensor, general	Manostat ou sonde, généralement
F31	Temperturwächter bzw. -sensor letzte Stufe	Temperature switch or sensor final stage	Contrôleur ou sonde de température dernier étage
F32	Phasenfolgewächter	Phase sequence control relay	Détecteur d'ordre de phases
F33	Pegelschalter, Gasblase	Level switch, gas balloon	Interrupteur, ballon à gaz
F34	Temperaturwächter bzw. -sensor, allgemein	Temperature switch or sensor, general	Contrôleur ou sonde de température, généralement
G	**Generatoren, Stromversorgung**	**Generators, power supply**	
G1	Starterbatterie	Starter battery	Batterie
G2	Lichtmaschine	Generator	Dynamo
H	**Meldeeinrichtungen**	**Indicators**	**Voyants**
H1	Meldeleuchte, EIN	Indicator light, "ON"	Voyant témoin, "marche"
H2	Meldeleuchte, Störung BC2/6	Indicator light, BC2/6 fault	Voyant témoin, panne BC2/BC6
H3	Meldeleuchte, Störung SECURUS	Indicator light, SECURUS fault	Voyant témoin, panne SECURUS
H4	Meldeleuchte, Warnung	Indicator light, warning	Voyant témoin, avertissement
H5	Meldeleuchte, Überlast	Indicator light, overload	Voyant témoin, surcharge
H6	Meldeleuchte,	Indicator light,	Voyant témoin,
H7	Meldeleuchte, Ladekontrolle	Indicator light, battery charging	Voyant témoin, charge du batterie
H8	Meldeleuchte, Vorwarnung SECURUS	Indicator light, SECURUS pre-warning	Voyant témoin, avertissement SECURUS
J	**Druckminderer**	**Pressure reducers**	**Détendeurs**
J1	Druckminderer, Ansaugdruckred., 1. St.	Pressure reducer, int. press. reduct., 1st st.	Détendeur, réduction de la pression d'aspiration, 1er étage
J2	Druckminderer, Ansaugdruckred., 2. St.	Pressure reducer, int. press. reduct., 2nd st.	Détendeur, réduction de la pression d'aspiration, 2e étage
J3	Steuerdruckminderer, 1. Stufe	Control pressure reducer, 1st stage	Détendeur, pression de commande, 1er étage
J4	Steuerdruckminderer, 2. Stufe	Control pressure reducer, 2nd stage	Détendeur, pression de commande, 2e étage
J5	Domdruckminderer, 1. Stufe	Dome pressure reducer, 1st stage	Détendeur à dôme, 1er étage
J6	Domdruckminderer, 2. Stufe	Dome pressure reducer, 2nd stage	Détendeur à dôme, 2e étage
J7	Druckminderer, Reduzierstation	Pressure reducer, press. red. unit	Détendeur, dispositif de réduction de pression
K	**Relais, Schütze**	**Relays, Circuit breakers**	**Relais**
K1	Motorschütz 1 (Netz-Schütz bei Stern-Dr.)	Main contactor 1	Contacteur de moteur 1
K2	Dreieck-Schütz 1	Delta contactor 1	Contacteur triangle 1
K3	Stern-Schütz 1	Star contactor 1	Contacteur étoile 1
K4	Stern-Dreieck-Zeitrelais 1	Star-delta switching relay	Relais temporisé étoile-triangle 1
K5	Motorschütz 2 (Netz-Schütz bei Stern-Dr.)	Main contactor 2	Contacteur de moteur 2
K6	Dreieck-Schütz 2	Delta contactor 2	Contacteur triangle 2
K7	Stern-Schütz 2	Star contactor 2	Contacteur étoile 2
K8	Stern-Dreieck-Zeitrelais 2	Star-delta timer 2	Relais temporisé étoile-triangle 1
K9	Hilfsschütz (für Taster-Steuerung)	Aux. contactor (for push-button control)	Contacteur aux. (pour commande interrupteur à touche)
K10	Taktgeber f. Kondensatautomatik	Timer for automatic condensate drain	Minuterie pour purge automatique des condensats
K11	Taktgeber f. SECCANT	Timer for SECCANT unit	Minuterie pour SECCANT
K12	Stromstoßrelais f. SECCANT	Impulse relay for SECCANT	Relais d'impulsion pour SECCANT
K13	Nachlaufrelais f. SECCANT	Time delay relay for SECCANT	Relais à retardement pour SECCANT
K15	Nachlaufrelais f. Kondensatablaß	Time delay relay for condensate drain	Relais à retardement pour purge automatique des condensats
K16	Hilfsschütz allg.	Aux. contactor, general purpose	Contacteur auxiliaire général
K17	Hilfsschütz allg.	Aux. contactor, general purpose	Contacteur auxiliaire général
K18	Hilfsschütz allg.	Aux. contactor, general purpose	Contacteur auxiliaire général
K19	Hilfsschütz allg.	Aux. contactor, general purpose	Contacteur auxiliaire général
K20	Zeitrelais, Freigabe Öldrucküberwachung	Timing relay, oil pressure monitor enable	Relais temporisé, libération de la surveillance de press. d'huile
K21	Hilfsrelais f. potentialfreie Meldung 1	Aux. relay for potential-free message 1	Relais auxiliaire pour message sans potentiel 1
K22	Hilfsrelais f. potentialfreie Meldung 2	Aux. relay for potential-free message 2	Relais auxiliaire pour message sans potentiel 2
K23	Hilfsrelais f. potentialfreie Meldung 3	Aux. relay for potential-free message 3	Relais auxiliaire pour message sans potentiel 3
K24	Hilfsrelais f. potentialfreie Meldung 4	Aux. relay for potential-free message 4	Relais auxiliaire pour message sans potentiel 4
K25	Hilfsrelais f. potentialfreie Meldung 5	Aux. relay for potential-free message 5	Relais auxiliaire pour message sans potentiel 6
K26	Hilfsrelais f. potentialfreie Meldung 6	Aux. relay for potential-free message 6	Relais auxiliaire pour message sans potentiel 6
K27	Kontaktschutz-Hilfsrelais	Contact protection relay	Relais auxiliaire. pour protection de contacts
K28	Hilfsrelais, allg.	Aux. relay, general purpose	Contacteur auxiliaire général
K29	Not-Aus-Schaltgerät	Emergency OFF switch	Interrupteur d'arrêt d'urgence
K30	Schaltuhr	Timer	Minuterie
L	**Spulen**	**Coils**	**Bobines**
L1	Zündspule an Ottomotoren	Ignition coil	Bobine pour moteurs à 4 temps
M	**Motoren**	**Motors**	**Moteurs**
M1	Antriebsmotor 1	Drive motor 1	Moteur d'entraînement 1
M2	Antriebsmotor 2	Drive motor 2	Moteur d'entraînement 2
M3	Startermotor	Starter motor	Moteur démarreur

Pos.	Bezeichnung	Designation	Désignation
N	**Düsen**	**Nozzles**	**Buses**
N1	Düse, Steuermedium	Nozzle, control medium	Buse du milieu de commande
N2	Drossel	Restrictor	Soupape d'étranglement
P	**Meßgeräte**	**Gauges**	**Mètres**
P1	Betriebsstundenzähler, Kompressor	Hourmeter, compressor	Compteur horaire, compresseur
P2	Spannungsmesser, Batterie	Voltmeter	Voltmètre, batterie
P3	Strommesser, Batterie	Amperemeter	Ampèremètre, batterie
P4	Tankanzeige	Fuel gauge	Jauge à combustible
P5	Drehzahlanzeige	Tachometer	Tachymètre
P6	Betriebsstundenzähler, Filter	Hourmeter, filter	Compteur horaire, filtre
P7	Manometer, Zwischendruck 1./2. Stufe	Pressure gauge, interm. pressure 1st/2nd st.	Manomètre, pression interm. 1er/2e étage
P8	Manometer, Zwischendruck 2./3. Stufe	Pressure gauge, interm. pressure 2nd/3rd st.	Manomètre, pression interm. 2e/3e étage
P9	Manometer, Zwischendruck 3./4. Stufe	Pressure gauge, interm. pressure 3rd/4th st.	Manomètre, pression interm. 2e/3e étage
P10	Manometer, Zwischendruck 4./5. Stufe	Pressure gauge, interm. pressure 4th/5th st.	Manomètre, press. interm. 2e/3e étage
P11	Manometer, Enddruck	Pressure gauge, final pressure	Manomètre, pression finale
P12	Manometer, Flaschendruck	Pressure gauge, bottle pressure	Manomètre, pression des bouteilles
P13	Anzeige, Zylindertemp.	Cylinder temperature gauge	Jauge de température du cylindre
P14	Zyklenzähler	Cycle counter	Compteur des cycles
P15	Kontaktmanometer, Enddruck	Contact pressure gauge, final pressure	Manomètre à contact, pression finale
P16	Kontaktmanometer, Zwischendruck	Contact pressure gauge, intermediate pressure	Manomètre à contact, pression intermédiaire
P17	Kontaktmanometer, Ansaugdruck	Contact pressure gauge, intake pressure	Manomètre à contact, pression d'aspiration
P18	Schaltuhr	Clock relay timer	Minuterie de contact
P19	Manometer, Ansaugdruck	Pressure gauge, intake pressure	Manomètre, pression d'aspiration
P20	Manometer, Filterstrecke	Pressure gauge, filter assy.	Manomètre, système de filtration
P21	Manometer, Steuerdruck	Pressure gauge, control pressure	Manomètre, pression de commande
P22	Manometer, Ansaug-Zwischendruck	Pressure gauge, intake inter-pressure	Manomètre, pression interm. d'aspiration
P23	Manometer, Eingangsdruck	Pressure gauge, inlet pressure	Manomètre, pression d'entrée
P24	Manometer, Öldruck	Pressure gauge, oil pressure	Manomètre, pression d'huile
P25	Manometer, Ausgangsdruck	Pressure gauge, outlet pressure	Manomètre, pression de sortie
P26	Manometer, Regenerationsdruck	Pressure gauge, regeneration pr.	Manomètre, pression régénérative
P27	Thermometer 1. Stufe	Temperature gauge 1st stage	Thermomètre 1er étage
P27	Thermometer 2. Stufe	Temperature gauge 2nd stage	Thermomètre 2e étage
P27	Thermometer 3. Stufe	Temperature gauge 3rd stage	Thermomètre 3e étage
P27	Thermometer 4. Stufe	Temperature gauge 4th stage	Thermomètre 4e étage
P27	Thermometer 5. Stufe	Temperature gauge 5th stage	Thermomètre 5e étage
P28	Thermometer Eingangstemperatur	Temperature gauge inlet temp.	Thermomètre température d'entrée
P29	Füllstandsanzeiger	Level indicator	Indicateur du niveau
P30	Manometer, Kurbelgehäusedruck	Pressure gauge, crankcase pressure	Manomètre, pression du carter
P31	Taupunktmeßgerät	Dew point indicator unit	Dispositif de surveillance du point de rosée
P32	Thermometer, Austritt Air-Kool	Temperature gauge, Air-Kool outlet	Thermomètre, sortie Air-Kool
P33	Manometer, Kondensatbehälter	Pressure gauge, condensate tank	Manomètre, collecteur de condensat
Q	**Starkstrom-Schaltgeräte**	**High voltage switches**	**Interrupteurs**
Q1	Hauptschalter	Main switch	Interrupteur principal
R	**Rückschlag-, Regulierventile**	**Non-return, regulating valves**	**Clapets, regulateurs**
R1	Rückschlagventil	Non-return valve	Clapet anti-retour
R2	Rückschlagventil nach Druckhalteventil	Non-return valve after pressure maint. valve	Clapet anti-retour après clapet de maintien de pression
R3	Drossel-Rückschlagventil	One way restrictor	Clapet anti-retour avec étranglement
R4	Regulierventil	Regulating valve	Regulateur
R5	Öldruck-Regulierventil	Oil pressure regulating valve	Régulateur de la pression d'huile
R6	Durchfluß-Regulierventil	Flow control valve	Régulateur du débit
R7	Druckhalteventil	Pressure maintaining valve	Clapet de maintien de pression
R8	Druckhalte-/Rückschlagventil	Pressure maintaining/non-return valve	Clapet de maintien de pression et anti-retour
S	**Schalter**	**Switches**	**Interrupteurs**
S0	Hauptschalter, Steuerspannung	Main control switch	Interrupteur principal, tension de commande
S1	Steuertaster "0" bzw. "0-I"	Control push-button "0" or "0-I"	Interrupteur de commande "0" ou "0-I"
S2	Steuertaster "I"	Control push-button "I"	Interrupteur de commande "I"
S3	Serviceschalter	Service switch	Interrupteur de service
S4	Wahlschalter 1	Selector switch 1	Commutateur sélecteur 1
S5	Wahlschalter 2	Selector switch 2	Commutateur sélecteur 2
S6	Steuerschalter SECCANT	Control switch SECCANT	Interrupteur de commande SECCANT
S7	NOT-AUS-Taster	Emergency OFF button	Bouton d'arrêt d'urgence
S9	Zündverteiler an Ottomotoren	Ignition distributor, engine	Distributeur sur moteur à combustion interne
S10	Schalter, Zapfsäule	Switch, dispenser	Interrupteur, colonne de distribution de gaz naturel
T	**Transformatoren**	**Transformers**	**Transformateurs**
T1	Steuertrafo 1	Control transformer 1	Transformateur de commande 1
T2	Steuertrafo 2	Control transformer 2	Transformateur de commande 2
U	**Sicherheitsventile**	**Safety valves**	**Soupapes de sûreté**
U1	Sicherheitsventil Zwischendruck 1./2. Stufe	Safety valve interm. pressure 1st/2nd stage	Soupape de sûreté, pression intermédiaire1er/2e étage
U2	Sicherheitsventil Zwischendruck 2./3. Stufe	Safety valve interm. pressure 2nd/3rd stage	Soupape de sûreté, pression intermédiaire 2e/3e étage
U3	Sicherheitsventil Zwischendruck 3./4. Stufe	Safety valve interm. pressure 3rd/4th stage	Soupape de sûreté, pression intermédiaire 3e/4e étage
U4	Sicherheitsventil Zwischendruck 4./5. Stufe	Safety valve interm. pressure 4th/5th stage	Soupape de sûreté, pression intermédiaire 4e/5e étage
U5	Sicherheitsventil, Enddruck	Safety valve, final pressure	Soupape de sûreté, pression finale
U6	Sicherheitsventil, Ansaugdruck	Safety valve, intake pressure	Soupape de sûrete, press. d'aspiration
U7	Sicherheitsventil, Flaschendruck	Safety valve, bottle pressure	Soupape de sûreté, press. de bouteille
U8	Sicherheitsventil, Druckminderer	Safety valve, pressure reducer	Soupape de sûreté du détendeur
U9	Sicherheitsventil, Kondensatbehälter	Safety valve, condensate receiver	Soupape de sûreté du récipient de condensat
U10	Leerlaufventil	Pressure relief valve	Soupape de marche à vide
U11	Sicherheitsventil, Kurbelgehäuseüberdruck	Safety valve, crankcase pressure	Soupape de sûreté, pression du carter
U12	Sicherheitsventil, Eingangsdruck	Safety valve, inlet pressure	Soupape de sûrete, pression d'entrée

Pos.	Bezeichnung	Designation	Désignation
V	**Ventile, Hähne**	**Valves and taps**	**Vannes**
V1	Füllventil, allgemein	Filling valve, general	Vanne de remplissage, général
V2	Füllventil, 200 bar	Filling valve, 200 bar	Vanne de remplissage, 200 bar
V3	Füllventil, 300 bar	Filling valve, 300 bar	Vanne de remplissage, 300 bar
V4	Abgangshahn	Outlet valve	Vanne de sortie
V5	Handkondensatablaßhahn	Condensate drain valve	Vanne de purge des condensats
V6	Entlüftungsventil	Venting valve	Vanne de décharge
V7	Umschalthahn	Switch-over valve	Vanne à boisseaux sphériques
V8	Absperrhahn	Shut-off valve	Vanne d'arrêt
V9	Umschaltventil	Switch-over valve, manual	Vanne sélecteur
V10	4/2-Wege-Kugelhahn	4/2-way globe valve	Vanne 4/2 voies
V11	Absperrventil	Shut-off valve	Vanne d'arrêt
V12	Ölablaßhahn	Oil drain tap	Robinet de purge de condensat
W	**Kühlung**	**Cooling system**	**Refroidissement**
W1	Zwischenkühler 1./2. Stufe	Intercooler 1st/2nd stage	Refroidisseur 1er/2e étage
W2	Zwischenkühler 2./3. Stufe	Intercooler 2nd/3rd stage	Refroidisseur 2e/3e étage
W3	Zwischenkühler 3./4. Stufe	Intercooler 3rd/4th stage	Refroidisseur 3e/4e étage
W4	Zwischenkühler 4./5. Stufe	Intercooler 4th/5th stage	Refroidisseur 4e/5e étage
W5	Nachkühler	Aftercooler	Refroidisseur final
W6	Air-Kool	Air-Kool	Air-Kool
X	**Klemmen, Anschlüsse**	**Terminals, couplings**	**Bornes, Raccords**
X1	Klemmenleiste 1, Leistungsteil	Terminal strip 1, power section	Planche à bornes 1, puissance
X2	Klemmenleiste 2, Steuerung	Terminal strip 2, control section	Planche à bornes 2, commande
X3	Klemmenleiste 3, Schaltleiste	Terminal strip 3, terminal box	Planche à bornes 3, boîtier de branchement
X4	Klemmenleiste 4, sonstige Leiste	Terminal strip 4, other	Planche à bornes 4, autres boîtiers
X5	Steckdose, allgem.	Receptacle, general	Prise de courant, générale
XP...	Druckgeber	Pressure transmitter	Capteur de pression
XT...	Temperaturgeber	Temperature transmitter	Capteur de température
Y	**Magnetventile**	**Solenoid valves**	**Electrovannes**
Y1	Magnetventil, Anlaufentlastung	Solenoid valve, start unloading	Electrovanne, soulagement au démarrage
Y2	2-Wege-Magnetventil, Kondensatabl.	2-way-solenoid valve, condens. drain	Electrovanne 2-voies, purge des condensats
Y3	3-Wege-Magnetventil, Kondensatabl	3-way-solenoid valve, condens. drain	Electrovanne 3-voies, purge des condensats
Y4	Magnetventil, Kondensatablaß	Solenoid valve, condensate drain	Electrovanne, purge des condensats
Y5	Magnetventil, Ansaugabsperrung	Solenoid valve, intake shut-off	Electrovanne, coupure d'aspiration
Y6	Magnetventil, Vergaserabsperrung	Solenoid valve, carburettor shut-off	Electrovanne, coupure du carburateur
Y7	Magnetventil, Zuschaltautomatik	Solenoid valve, autom. selector unit	Electrovanne, sélecteur automatique
Y8	Magnet v. Kraftstoffabsperrung	Solenoid valve, fuel shut-off	Electrovanne, coupure de carburant
Y9	Hubmagnet, Dieselmotorabstellung	Solenoid for diesel engine shut-down	Electro-aimant pour arrêt du moteur Diesel
Y10	Magnetventil, Leerlaufregulierung	Solenoid valve, idle speed control	Electrovanne, régulation de la marche à vide
Y11	Magnetventil, SECCANT, Umsteuerung	Solenoid valve, SECCANT, change-over	Electrovanne, SECCANT, commutation
Y12	Magnetventil, SECCANT, Entlastung	Solenoid valve, SECCANT, unloading	Electrovanne, SECCANT, soulagement
Y13	Magnetventil, Steuerleitung	Solenoid valve, control line	Electrovanne, pression de commande
Y14	Magnetventil, Absperrung	Solenoid valve, shut-off	Electrovanne, d'arrêt
Y15	Magnetventil, Druckausgleich	Solenoid valve, pressure balance	Electrovanne, compensation de pression
Y16	Magnetventil, Bypass	Solenoid valve, bypass	Electrovanne, bypass
Y17	Proportionalventil	Solenoid valve, proportional	Electrovanne, proportionnelle
Z	**Zubehör**	**Accessories**	**Accessoires**
Z1	Kondensatbehälter, gasdicht	Condensate receiver, gastight	Récipient des condensats, étanche aux gaz
Z2	Kondensatbehälter	Condensate receiver	Récipient des condensats
Z3	Schalldämpfer	Silencer	Silencieux
Z4	Trockner SECCANT II	Adsorb. dryer SECCANT II	Sécheur SECCANT II
Z5	Trockner SECCANT III	Adsorb. dryer SECCANT III	Sécheur SECCANT III
Z6	Trockner SECCANT G	Adsorb. dryer SECCANT G	Sécheur SECCANT G
Z7	Trockner SECCANT G ex	Adsorb. dryer SECCANT G ex	Sécheur SECCANT G ex
Z8	Kältetrockner KT I	Refrigerative dryer KT I	Sécheur refrigérant KT I
Z9	Kältetrockner KT II	Refrigerative dryer KT II	Sécheur refrigérant KT II
Z10	Kältetrockner KT III	Refrigerative dryer KT III	Sécheur refrigérant KT III
Z11	Kältetrockner KT I plus	Refrigerative dryer KT I plus	Sécheur refrigérant KT I plus
Z12	Kältetrockner KT II plus	Refrigerative dryer KT II plus	Sécheur refrigérant KT II plus
Z13	Drehzahlregler	Speed controller	Régulateur de vitesse
Z14	Pneumatischer Drehantrieb	Pneumatic rotary actuator	Commande tournante pneumatique
Z15	Trockner SECCANT IV	Adsorb. dryer SECCANT IV	Sécheur SECCANT IV
Z16	Speicherflasche	Storage tank, receiver	Bouteille de stockage
Z17	Pufferbehälter	Buffer tank	Réservoir-tampon
Z18	Flaschenanschluß 200 bar	Bottle connector, 200 bar	Raccord de bouteille, 200 bar
Z19	Flaschenanschluß 300 bar	Bottle connector, 300 bar	Raccord de bouteille, 300 bar
Z20	Schnellkupplung	Quick connector	Raccord rapide
Z21	Füllschlauch	Filling hose	Tuyau flex. de remplissage
Z22	Verbindungsschlauch	Connecting hose	Tuyau flex. de connexion
Z23	Prüfanschluß	Test connector	Raccord de contrôle
Z24	Schlauchanschluß	Hose connector	Raccord pour tuyau
Z25	Abreißkupplung	Tear off coupling	Raccord de sécurité
Z26	Pneumatisches 2/2-Wegeventil	Pneumatic 2/2-way valve	Robinet pneumatique 2/2-voies