POSEIDON Edition
BAUER KOMPRESSOREN

Operating Instructions and Spare Parts Catalog

High pressure breathing air compressors

200 / 300 / 420 bar

PE 300-VE
PE 320-VE
PE 400-VE
PE 500-VE
PE 550-VE
PE 600-VE
PE 700-VE
PE 850-VE

A DESCRIPTION

B ERECTION; COMMISSIONING

C OPERATION

D MAINTENANCE; REPAIR

E STORAGE; CONSERVATION

F PLANS; DIAGRAMS; DRAWINGS

G SPARE PARTS LISTS

INTRODUCTION

This manual contains information and instructions for operating and maintaining the high pressure breathing air compressors

PE-VE

Model: _____

Serial No.: _____

CAUTION

! Pneumatic high pressure station !

The breathing air generated by thecompressors described here is subject to strict quality requirements. Non-observance of the operating and warning instructions can lead to impairment of health or can be fatal.

The compressors have been built in accordance with the EU Machinery Guideline 2006/42/EU. Details of noise emission in accordance with equipment and product safety law dated 01.05.2004 and EU Machinery Guideline, App. I, Section 1.7.4.ff. The plant has been constructed according to state-of-the-art technology and recognised safety-technological regulations. Even so, its use can give rise to danger to the operator or third parties and/or detriment to the plant and other material property. The plant is designed exclusively for the compression of breathing air. Any other use is considered to be not intended. The manufacturer/supplier can assume no liability for damage resulting from this type of usage:

PE-VE/05/14

Edition May 2014

INTRODUCTION

NOTE

STRUCTURE AND USE OF THE OPERATING INSTRUCTIONS

Handling pneumatic high pressure systems is not without danger and requires certain specific minimum knowledge and skill for operation. For this reason, please read the operating instructions to acquire familiarity with the components and processes.

This operating instruction manual is structured in accordance with the modular principle. It is sub-divided into 7 sections whose content varies according to the type of plant, standard and ancillary equipment and, of course, the special accessories that are available in large numbers for our plant. In this structuring principle, all sections will need to be included for reasons of completeness and consistent numbering, i.e.: even if a specific component is not present in the plant, the relevant sections is retained, but there will just be a relevant note in this location.

With reference to the circuit diagrams in section F, you must note that, unless otherwise indicated, these are standard circuit diagrams for the specific type of plant. Please therefore always use the circuit diagrams in the switchgear box of the compressor plant where any modifications will have been made.

With respect to the spare parts lists in section G, it can be that components appear several times if the type of plant requires this. In this case only the ones applicable must be taken into account. In order to prevent mistakes when ordering spare parts we recommend removing the parts that do not apply. This is easy to do because of the ring-binder structure of the documentation. The spare parts lists applicable to the particular plant are listed in the index for section G.

CONTENTS

CONTENTS

CONTENTS

LIST OF FIGURES

LIST OF FIGURES

INDEX

Note regarding changes

Change no.	Date of change
0	June 2011, prod. stat. 03
1	October 2012, compressor block and technical data modification
2	December 2013; oil change intervals
3	May 2014; new B-Control Micro
4	
5	

Dear BAUER customer,

we would be pleased to answer all questions regarding your **BAUER** compressor installation as quickly as possible, if any problems arise.

You can reach our **HQ** Mon–Thurs from 8 a.m. to 4.30 p.m., Fridays 8 a.m. to 3 p.m. on +49 (0) 89 78049-0.

Direct dialling of the following numbers will save you time and avoid re-dialling.

Do you want to order spare parts?

☞ **Customer service, spare parts** Tel: +49 (0)89 78049-129 or -149
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Fax: +49 (0)89 78049-101

Do you need further information concerning your installation, accessories, prices etc.?

☞ **Sales, breathing air** Tel: +49 (0)89 78049-138, -185, -154 or -202
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Fax: +49 (0)89 78049-103

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or contact us via the internet at: **www.bauer-kompressoren.de.**

NOTES

Section A
Description

Section B
Erection, Commissioning

Section C
Operation

Section D
Maintenance, Repair

Section E
Storage, Conservation

Section F
Plans, Diagrams, Drawings

Section G
Spare parts lists

A. DESCRIPTION

1. GENERAL

1.1. APPLICATION AND SHORT DESCRIPTION

This handbook describes the breathing air compressor units in the **PE-VE** range:

PE 300-VE
PE 400-VE
PE 550-VE
PE 700-VE
PE 850-VE
PE 320-VE-420
PE 500-VE-420
PE 600-VE-420

The compressor units are used as stationary filling stations for the compression of air for breathing in the high-pressure range PN 200 and/or PN 300 and PN 420 bar, mainly to fill bottles for diving or breathing protection applications.

The compressor units of the PE-VE series are not designed for industrial application, especially continuous operation, and must not be used for such purposes.

The breathing air units are divided into two variants:

PE range in **open version**

PE range in **Super-Silent version**

The open version can be upgraded to the Super-Silent version at any time.

The noise level of the Super-Silent version is 70 dB(A) to 77 dB(A) ±2 dB(A) as per ISO3744.

All units are fitted as standard with a TÜV type -approved end pressure safety valve, fully automatic compressor control system and KAA (automatic condensate drain) with a 10 l condensate collection vessel.

The PE 300-, PE 400- and PE 550 units are fitted as standard with filtering systems **P42**, PE 700-, and the PE 850 units are fitted with the filtering system **P61**. The PE 320 and PE 500 units are fitted with the **P41-420** and the PE 600 units are fitted with the **P61-420** filtering system.

All units can be fitted with an additional unit consisting of a **filling rail** for one or two pressure ranges. As an option, you can fit the **SECURUS** filter saturation monitor and the condensate collection vessel with **40 l condensate vessel**.

1.2. STRUCTURE AND METHOD OF OPERATION

Structure

The compressor unit consists of the main components:

- Compressor block
- Drive motor
- Framework and cladding
- Filter system
- Automatic condensate drain
- Electrical equipment
- Filling panel[a)]

The structure of the compressor unit can be seen in Fig. 1 to Fig. 3.

Method of operation; piping schematic

The method of operation, i.e. the route of the medium through the compressor unit is shown in the piping schematic in section F.

a) Additional equipment as per order

Fig. 1 Compressor unit, PE-VE serie in open version

1 Main switch
2 Condensate collection vessel 10 litres
3 Compressor control system
4 Compressor block

Fig. 2 Compressor unit, PE-VE serie in Super-Silent version

1 Main switch
2 Condensate collection vessel 10 litres
3 Compressor control system
4 Cooling air inlet

Fig. 3 Compressor unit, PE-VE 850 in Super-Silent version

1 Main switch
2 Filter venting valve
3 Compressor control system
4 Cooling air inlet

Compressor block

General points

Quiet running is a particular characteristic of the BAUER design. The mass balance 1st degree is zero. Balancing is fine-adjusted by maintenance of the weights of all moving parts of the drive system. This ensures vibration-free running. The drive unit is carried in energy-saving cylinder roller bearings. The top and bottom connecting rod bearings are also roller bearings. This considerably extends the working life.

Compressor block IK120

The compressor blocks **IK120** serve to compress air in the high pressure range. The maximum permitted operating pressure is 350 bar.

The compressor blocks are structured in 3 stages, with 3 cylinders. The three cylinders are arranged in W formation: the 1st stage cylinder is vertically in the middle, the 2nd stage cylinder on the right and the 3rd stage cylinder on the left.

The structure of the compressor block can be seen in Fig. 4. The piping schematic in section F. shows the method of operation.

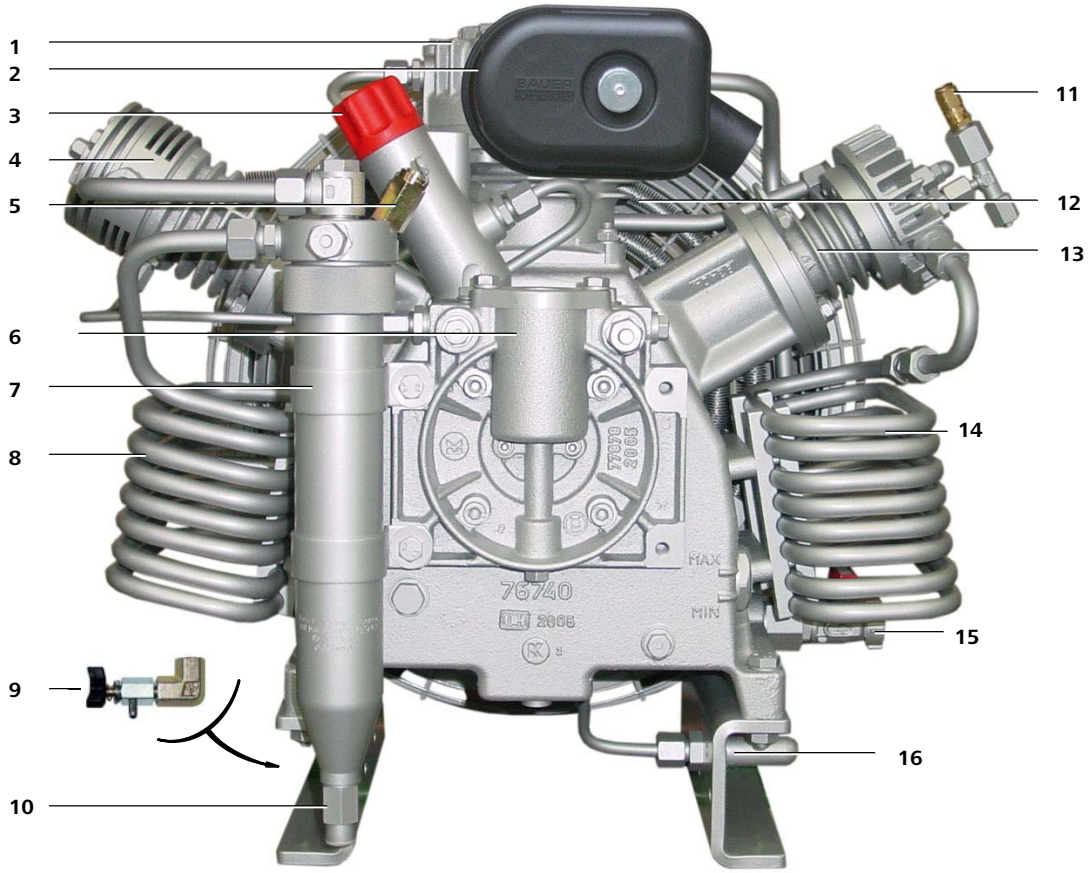


Fig. 4 Compressor block, front view

1 Cylinder 1st stage
2 Suction filter
3 Oil filler spigot
4 Cylinder 3rd stage
5 Safety valve 2nd stage
6 Oil filter housing
7 Intermediate separator 2nd stage
8 Intermediate cooler 2nd stage
9 Condensate manual drain cock
10 Condensate drain fitting
11 Safety valve 1st stage
12 After-cooler
13 Cylinder, 2nd stage
14 Intermediate cooler, 1st stage
15 Oil drain cock
16 Compressed air outlet

Compressor block IK12.14

The compressor block IK12.14 serves to compress the air in the high pressure range up to 420 bar. It is 4 stage, with 3 cylinders. The three cylinders are arranged in W formation: the stage cylinders 1st and 2nd phase are located vertical in the middle, cylinder 3rd stage to the right, 4th stage filter to the left.

The structure of the compressor block can be seen in Fig. 5. The piping schematic in section F. shows the method of operation.

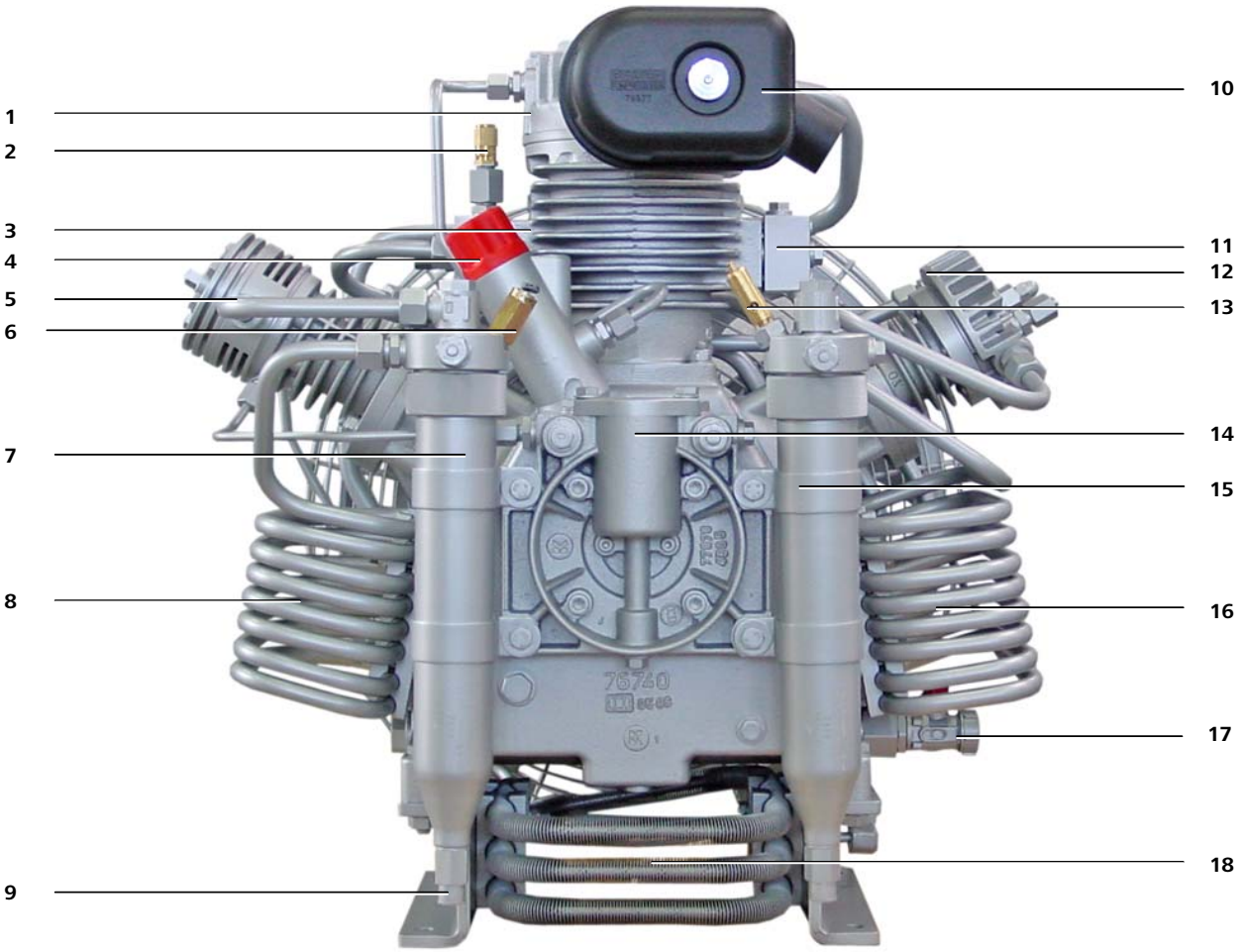


Fig. 5 Compressor block IK12,14

1 Valve head 1st stage
2 Safety valve 1st stage
3 Suction spigot 2nd stage
4 Oil filler spigot
5 Valve head 4th stage
6 Safety valve 3rd stage
7 Intermediate separator 3rd stage
8 Intermediate cooler 3rd stage
9 Condensate drain fitting
10 Suction filter
11 Pressure spigot 2nd stage
12 Valve head 3rd stage
13 Safety valve 2nd stage
14 Oil filter housing
15 Intermediate separator 2nd stage
16 Intermediate cooler 2nd stage
17 Oil drain cock
18 After cooler

Compressor blocks IK150, IK180 and IK18.1

The compressor blocks **IK150** and **IK180** serve to compress air in the high pressure ranges PN 200 and PN 300 bar for breathing air applications. The maximum permissible operating pressure (the setting of the end pressure safety valve) is 225 bar or 330 bar for breathing air applications.

Compressor block **IK18.1** serves for air compression in the high pressure range PN420 for breathing air applications. The maximum permissible operating pressure (the setting of the end pressure safety valve) is 420 bar for breathing air applications.

The compressor blocks are, with the exception of the IK18.1, 4 stage and with 4 cylinders, where the cylinders of the 1st and 2nd and the 3rd and 4th stages are arranged opposite each other in each case. The compressor block IK18.1 is 5 stage with four cylinders. In this block, the 1st and 3rd stages, and the 2nd/4th and 5th stages are opposite each other. 2nd and 4th stage are housed in a common stepped cylinder.

The cylinder of the 4th and 5th stage are lubricated by pressurised oil. the lubrication of the other cylinders is by centrifugal lubrication.

The structure of the compressor block can be seen in Fig. 6 to Fig. 8. The piping schematic in section F shows the method of operation.

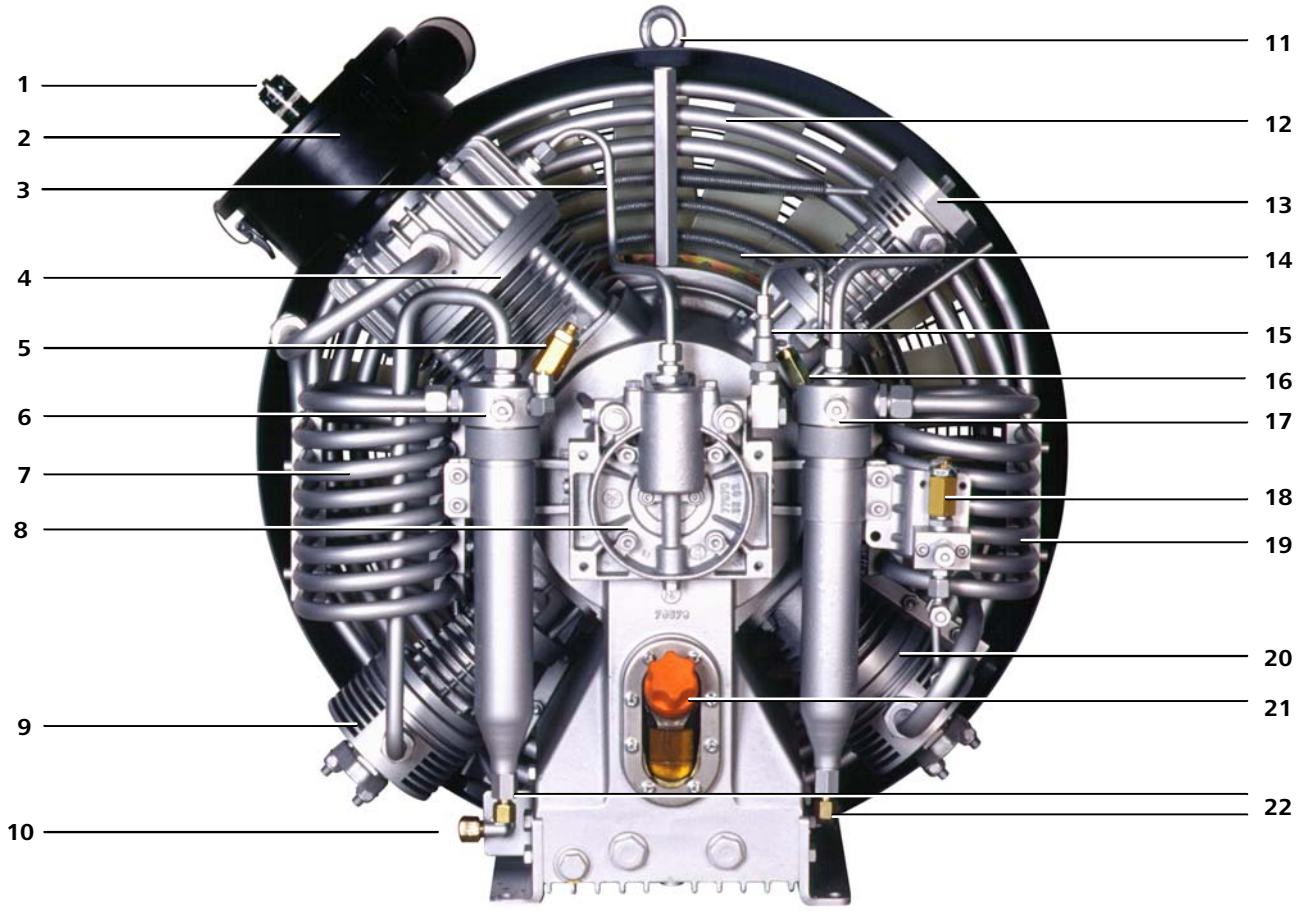


Fig. 6 Compressor block IK150, front view

1 Maintenance indicator
2 Suction filter
3 Return line, crankcase venting
4 Cylinder 1st stage
5 Intermediate pressure safety valve, 2nd/3rd stage
6 Intermediate separator, 2nd stage
7 Intermediate cooler, 2nd/3rd stage
8 Oil pump housing
9 Cylinder 3rd stage
10 Compressed air outlet
11 Load eye
12 Intermediate cooler 1st stage
13 Cylinder 4th stage
14 After cooler 4th stage
15 Oil pressure regulator
16 Intermediate pressure safety valve 3rd/4th stage
17 Intermediate separator 3rd stage
18 Intermediate pressure safety valve 1st/2nd stage
19 Intermediate cooler 3rd/4th stage
20 Cylinder 2nd stage
21 Oil filler spigot with sight glass
22 Condensate drain screwed fitting

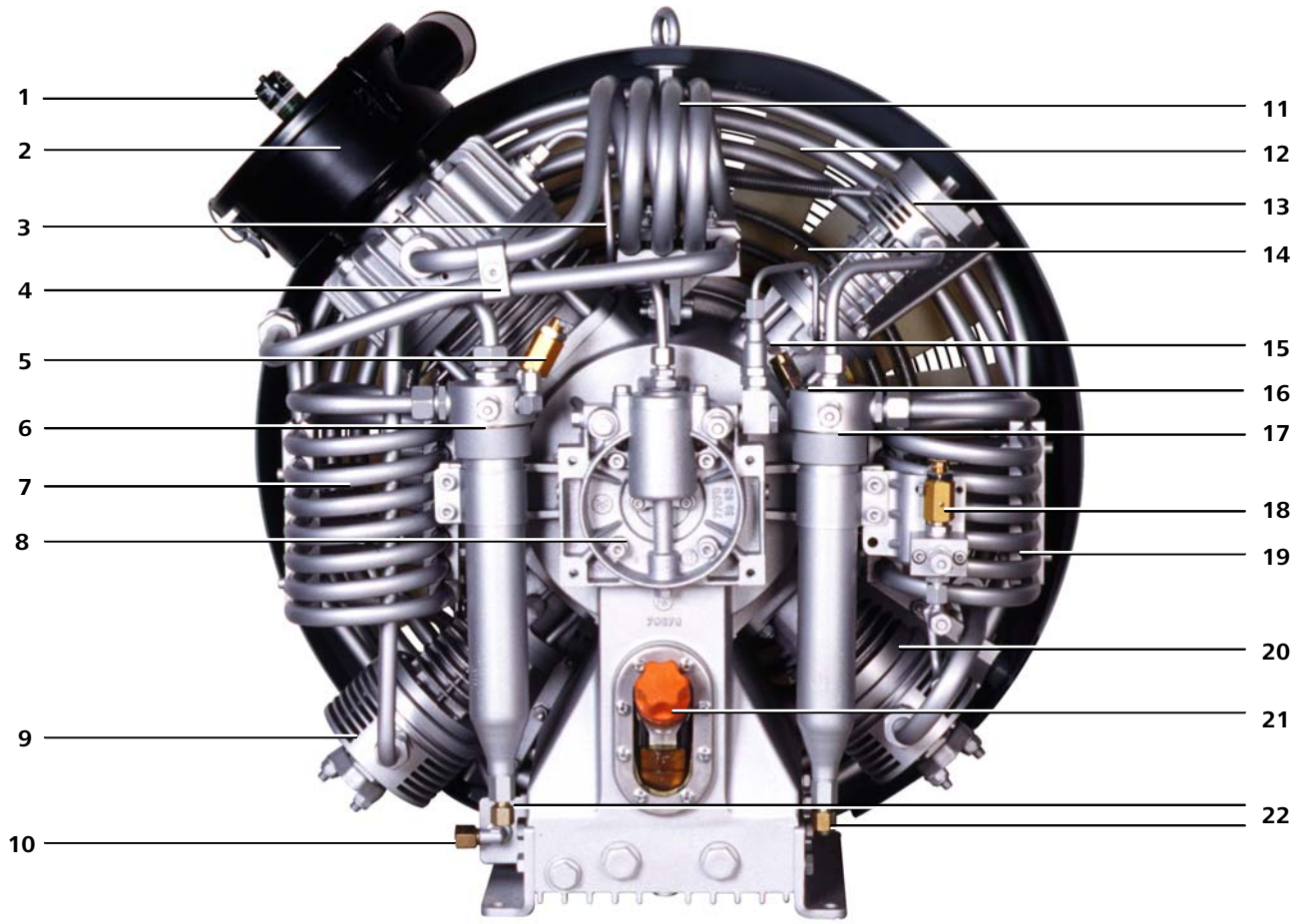


Fig. 7 Compressor block IK180, front view

1 Maintenance indicator
2 Suction filter
3 Return line, crankcase venting
4 Cylinder 1st stage
5 Intermediate pressure safety valve, 2nd/3rd stage
6 Intermediate separator, 2nd stage
7 Intermediate cooler, 2nd/3rd stage
8 Oil pump housing
9 Cylinder 3rd stage
10 Compressed air outlet
11 Intermediate cooler 1st/2nd stage
12 Intermediate cooler 1st stage
13 Cylinder head 4th stage
14 After cooler
15 Oil pressure regulator
16 Intermediate pressure safety valve 3rd/4th stage
17 Intermediate separator 3rd stage
18 Intermediate pressure safety valve 1st/2nd stage
19 Intermediate cooler 3rd/4th stage
20 Cylinder 2nd stage
21 Oil filler spigot with sight glass
22 Condensate drain screwed fitting

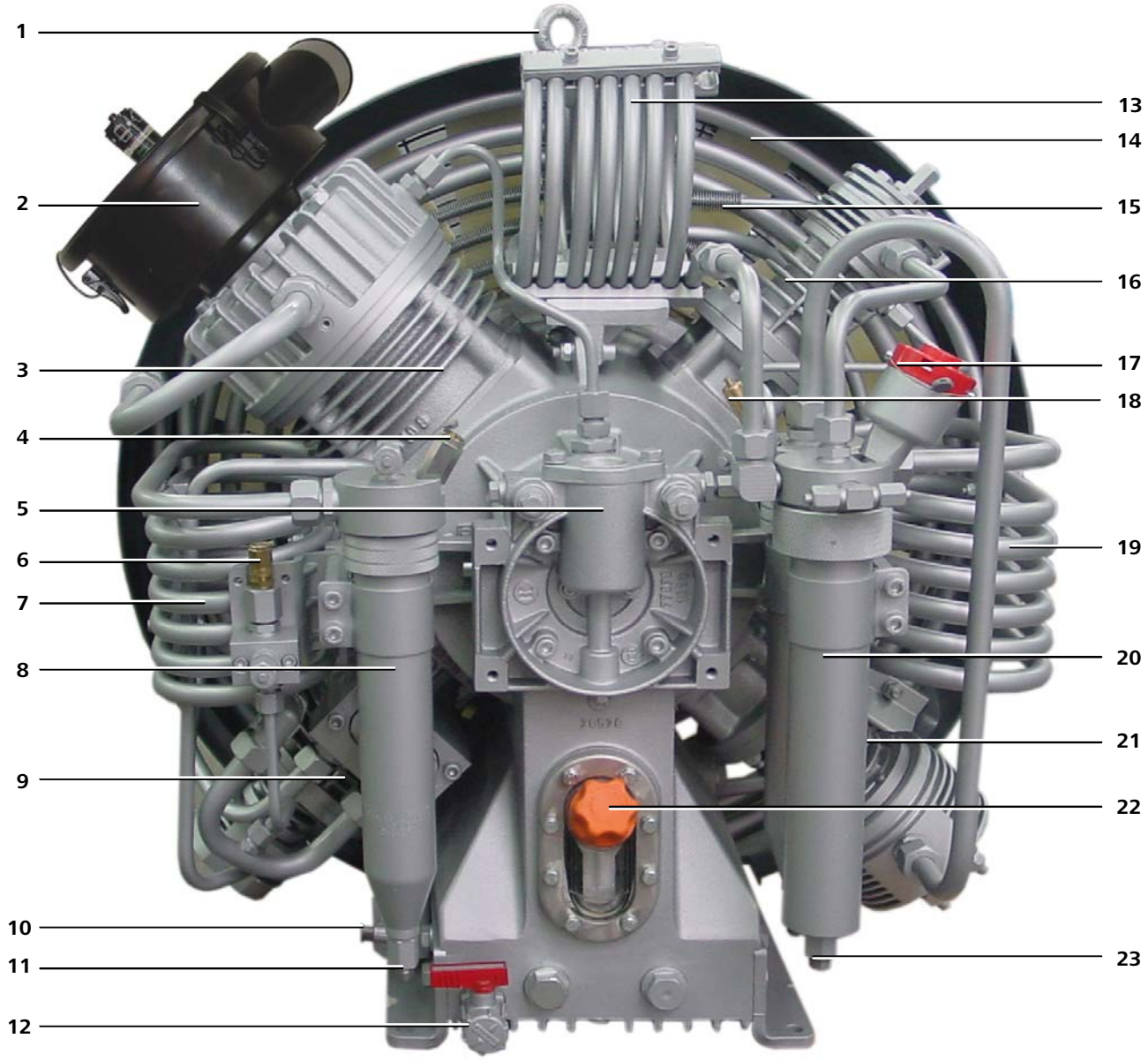


Fig. 8 Compressor block IK18.1, front view

1 Lifting eye
2 Suction filter
3 Cylinder 1st stage
4 Intermediate pressure safety valve, 3rd stage
5 Oil filter housing
6 Intermediate pressure safety valve, 1st stage
7 Intermediate cooler, 3rd stage
8 Intermediate separator, 3rd stage
9 Cylinder 2nd/4th stage
10 Compressed air outlet, 5th stage
11 Condensate drain screwed fitting
12 Oil drain cock
13 Intermediate cooler, 4th stage
14 Intermediate cooler 1st stage
15 After cooler, 5th stage
16 Cylinder 5th stage
17 Intermediate pressure safety valve, 4th stage
18 Intermediate pressure safety valve, 3rd stage
19 Intermediate cooler, 2nd stage
20 Intermediate separator, 4th stage
21 Cylinder 3rd stage
22 Oil filler spigot with sight glass
23 Condensate drain screwed fitting

2. LUBRICATION

2.1. FUNCTION DESCRIPTION

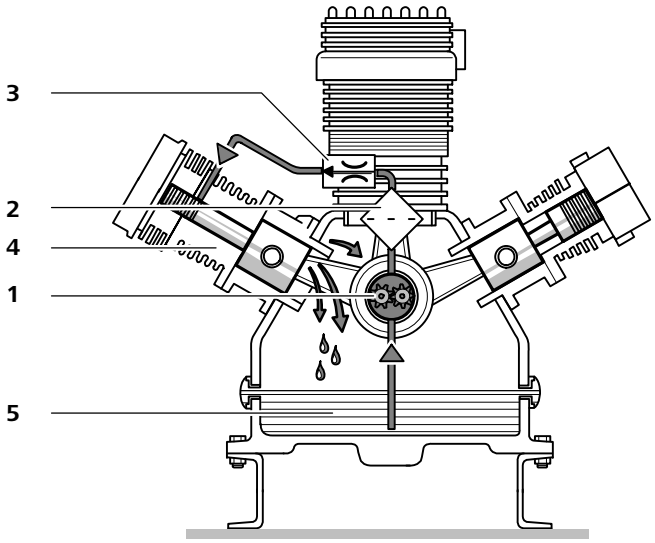
2.1.1. Compressor blocks IK120, IK12.14

The compressor is fitted with a pressurised oil lubrication system. The oil pressure is generated by a slow-running geared pump. It is approx. **4.5 bar** (3 to 6 bar).

On this oil pump the lubrication is only ensured if the direction of rotation is correct. Incorrect direction of rotation will lead to damage to the cylinder block.

The oil pump drive (1, Fig. 9) is from the crankshaft. The oil pump delivers oil from the sump (5) in the crankcase via the fine filter (2) and a minimum pressure regulating valve (3) to the cylinder of the last stage (4). The oil is distributed by the guide piston and lubricates all the moving parts in the compressor.

The regulating valve facilitates the oil pressure indicator on a pressure gauge and the monitoring by the electronic compressor control system.



1 Oil pump
2 Fine filter
3 Minimum pressure regulating valve
4 Cylinder 4th stage
5 Oil sump

Fig. 9 Compressed oil lubrication IK120, IK12.14

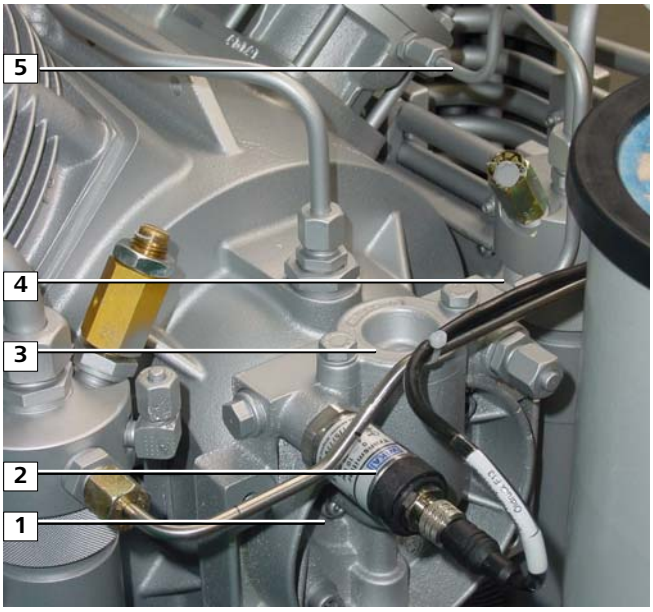
2.1.2. Compressor blocks IK150, IK18.1, K180

The compressor is fitted with a pressurised oil lubrication system. The oil pressure is generated by a slow-running geared pump. It is approx. **4.5 bar** (3 to 6 bar).

This oil pump only runs in the correct direction. Otherwise no oil pressure will be built up and this can lead to severe damage to the compressor block.

The oil pump drive is from the crankshaft. The oil pump delivers oil from the sump in the crankcase via the fine filter (2) and a minimum pressure regulating valve (4) to the cylinder of the stage 4. The oil is distributed by the guide piston and lubricates all the moving parts in the compressor.

The regulating valve facilitates the oil pressure indicator on a pressure gauge and the monitoring by the electronic compressor control system.



1 Oil pump casing
2 Oil pressure sensor
3 Oil filter casing
4 Oil pressure regulating valve
5 Injection line cylinder last stage

Fig. 10 Compressed oil lubrication IK150, IK18.1, IK180

2.2. OIL TYPES

The use of the correct lubricating oils is decisive for the internal care of the compressor. Depending on the application of the compressor unit, the requirements of the oil being used are:

- low residue formation
- no carbon deposits in the valves
- good corrosion protection
- emulsification of condensed water in crankcase
- for breathing air compressors and with additional physiological and toxicological suitability

The exclusive use of high-quality branded oils is essential because of the thermal loads encountered. In order to ensure perfect operation, we recommend using only those oils listed in our lubricating oil list and tested and approved by us.

The up-to-date list is on the CD delivered with the unit. Request updated lists from BAUER customer service on a regular basis.

For operating the compressor unit we recommend exclusive use of **BAUER** special compressor oils as per the oil list. These oils have been tried and tested at ambient temperatures of between +5 °C and +45 °C. At low ambient temperatures you will need compressor heating that is capable of heating the compressor unit up to +5 °C.

Our compressor installations are filled in the factory with lubricating oil, order No. N28355.

3. INTAKE FILTER

3.1. FUNCTION DESCRIPTION

3.1.1. Compressor block IK120

As a suction filter we use a Mikronik dry filter, see Fig. 11. This is fitted with a replaceable Mikronik filter insert (1). The suction spigot is connected using a plastic hose, through which the air is drawn in from the cooling air chute.

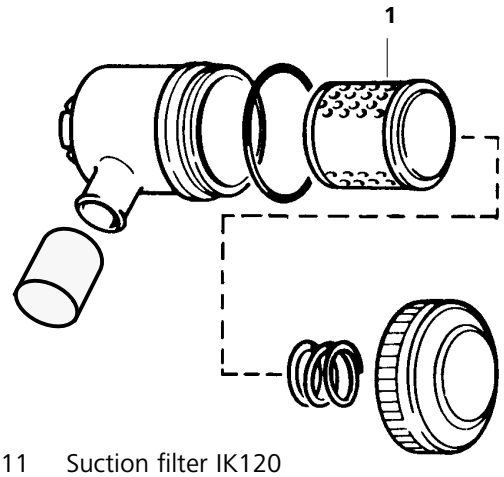


Fig. 11 Suction filter IK120

3.1.2. Compressor block IK12.14

As the suction filter we use a Mikronik dry filter, see Fig. 12. This is fitted with a replaceable Mikronik filter insert (1). The suction spigot is connected using a plastic hose, through which the air is drawn in from the cooling air chute.

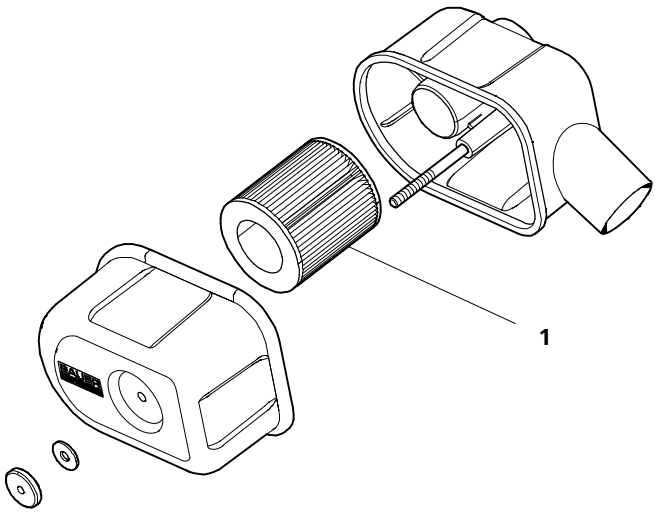
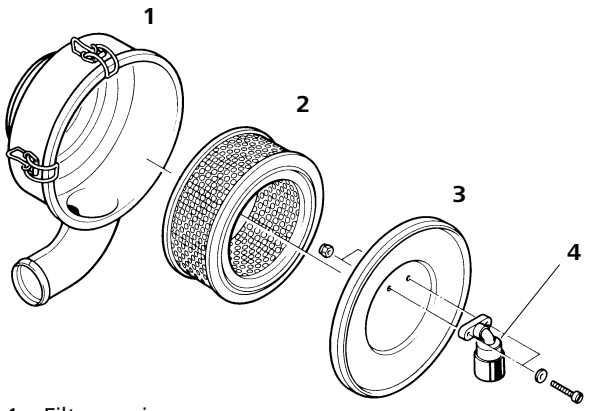


Fig. 12 Suction filter IK12.14

3.1.3. Compressor blocks IK150, IK18.1, IK180

As a suction filter we use a dry filter as shown in Fig. 13. The Mikronik filter insert (2) is replaceable. In addition, the filter is fitted with an indicator (4) which changes from green to red when the filter is contaminated.



1 Filter casing
2 Filter element
3 Cover
4 Maintenance indicator

Fig. 13 Suction filter IK150, IK18.1, IK180

3.1.4. Suction spigot (optional)

As standard, the air is drawn through the cooling air channel and via a plastic hose to the suction filter. On the Super-Silent installations an intake spigot can be mounted in the roof. This permits the suction of the air from an external source, e.g. from a different room or from outdoors. See compressor unit drawing in section F.

4. INTERMEDIATE SEPARATOR

4.1. FUNCTION DESCRIPTION

As standard, intermediate separators are fitted after the 2nd and 3rd stages, on the 3-stage compressor IK120 only after the 2nd stage. These have the task of separating the condensate produced during cooling and thus of providing the next compressor stage with cleaned air.

Separation of the liquid water and oil content is by centrifugal force on a distributor plate.

The pressure vessel is dynamically loaded. It is designed for operation up to a specific number of load cycles at the max. permissible pressure fluctuation range. 1 load cycle = 1 pressure approach + 1 pressure departure. The separator must be subjected to an internal examination by the expert technician latest when half the number of load cycles has been reached. After the max. number of load cycles have been reached, the separator must be replaced. Arranging the tests is the responsibility of the operator.

The load cycles are counted by the cycle counter P14 in the compressor control system and can be read off there at any time.

The max. permissible number of load cycles is listed in the pressure vessel operating instructions which is supplied on CD with each compressor unit.

4.2. INTERMEDIATE SEPARATOR AFTER 1ST STAGE (OPTION)

For operation of the installation under difficult conditions, particularly at high temperatures and/or higher air humidity, we can use an additional separator after the 1st stage. The structure of this separator corresponds to that described above.

5. FILTER SYSTEM

The compressor unit PE 300-, PE 400-, and PE 550 are fitted, as standard, with the filter system **P42.** The compressor unit PE 700 and PE 850 are fitted with the **P61** filter system.

The 420 bar compressor unit PE 320, and PE 500 are fitted with the filter system **P41-420** and the PE 600 compressor unit is fitted with the filter system **P61-420**.

5.1. FILTER SYSTEM P42

The filter system (Fig. 14) consists of the following main component modules:

- Separator, integrated in the filter base
- End pressure safety valve
- Non-return valve between the separator and the fine after-cleaner
- Fine after-cleaner
- **SECURUS monitoring device**
- Vent valve with pressure gauge
- Pressure retainer/non-return valve

The system is integrated in the compressor installation, i.e. the filters are fixed to the frame. Measurement of the cartridge saturation immediately in the filter cartridge on filter systems with the **SECURUS** monitoring device permits continuous monitoring of the breathing air preparation and thus the dryness of the air during the preparation phase.

5.1.1. End separator

The compressed air coming from the last stage is cooled down in the after-cooler to approx. 10 to 15 °C above ambient temperature and then comes to the oil and water separator, see 6, Fig. 14. The oil and water separator is integrated in the base of the filter and reliably filters out the liquid oil and water particles.

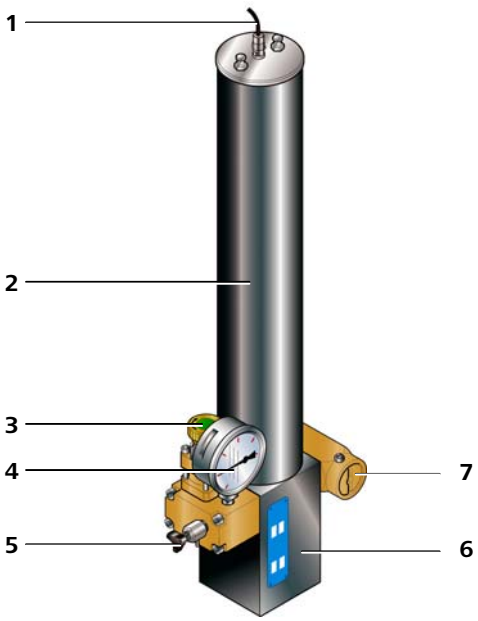
5.1.2. Purifier

Structure

The compressed air vessel (2, Fig. 14) consists of an anodised aluminium alloy pipe, pipe outside diameter 100 mm, equipped with a fine thread on both ends. The air inlet and outlet are located in the screwed-on filter base. For connecting thread see Technical Data, Chap. A-14.

On filters with SECURUS monitoring, the upper fitting is equipped with a pressure-tight electrical bushing. The BNC plug socket located in this area is used to connect the coaxial cable for the measuring probe which leads to the control unit.

For a description of the electrical system see 5.3.2.



1 SECURUS connection[a)]
2 Purifier
3 End pressure safety valve
4 Pressure gauge
5 Venting valve
6 Filter base with integrated separator
7 Pressure retention valve

Fig. 14 Filter system P42

5.1.3. Cartridge safety device

A cartridge safety device is fitted to prevent the filter system from being operated without a cartridge by accident. The filter base is fitted with a venting hole for this purpose (Fig. 15). This hole is closed off with two O-rings on the cartridge spigot when a cartridge is fitted.

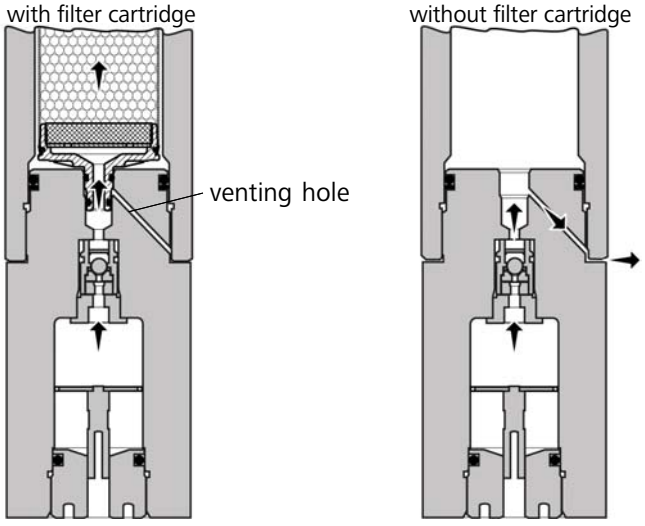


Fig. 15 Cartridge Safety Device

Without a cartridge you cannot build up the pressure and filling is therefore not possible!

Without a cartridge, the hole is exposed and the air can escape to the atmosphere and no pressure can build up, thus ensuring that unfiltered air is not delivered. The venting hole also serves for checking the O-rings on the cartridge spigot.

If air flows out of the venting hole, although a cartridge is fitted, then the O-rings or the cartridge spigot are/is defective or have/has been damaged in fitting. Remove the cartridge and check. If necessary, replace the cartridge or the O-rings.

The pressure vessel is dynamically loaded. It is designed for operation up to a specific number of load cycles at the max. permissible pressure fluctuation range. 1 load cycle = 1 pressure approach + 1 pressure departure. The separator must be subjected to an internal examination by the expert technician latest when half the number of load cycles has been reached. After the max. number of load cycles have been reached, the separator must be replaced. Arranging the tests is the responsibility of the operator.

The load cycles are counted by the cycle counter P14 in the compressor control system and can be read off there at any time.

The max. permissible number of load cycles is listed in the pressure vessel operating instructions which is supplied on CD with each compressor unit.

5.2. FILTER SYSTEM P41 AND P61

The filter system (Fig. 16) consists of the following main component modules:

- Oil and water separator (end separator)
- Non-return valve between the separator and the fine after-cleaner
- Fine after-cleaner
- SECURUS monitoring device[a)]
- Vent valve with pressure gauge
- Pressure retainer/non-return valve

The system is integrated in the compressor installation, i.e. the filters are fixed to the frame. Measurement of the cartridge saturation immediately in the filter cartridge on filter systems with the **SECURUS** monitoring device permits continuous monitoring of the breathing air preparation and thus the dryness of the air during the preparation phase.

5.2.1. Final separator

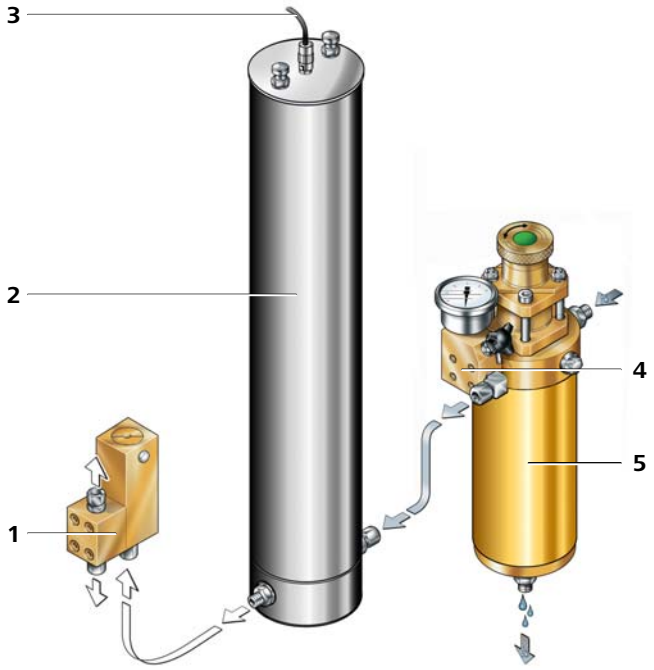
The compressed air coming from the last stage is cooled down in the after-cooler to approx. 10 to 15 °C above ambient temperature and then comes to the oil and water separator, see 5, Fig. 16. The oil and water separator reliably filters out the liquid oil and water particles.

The pressure vessel is dynamically loaded. It is designed for operation up to a specific number of load cycles at the max. permissible pressure fluctuation range. 1 load cycle = 1 pressure approach + 1 pressure departure. The separator must be subjected to an internal examination by the expert technician latest when half the number of load cycles has been reached. After the max. number of load cycles have been reached, the separator must be replaced. Arranging the tests is the responsibility of the operator.

The load cycles are counted by the compressor control system and can be read off there at any time.

The max. permissible number of load cycles is listed in the pressure vessel operating instructions which is supplied on CD with each compressor unit.

a) Additional equipment



1 Pressure retainer/non-return valve
2 Fine after-cleaner
3 SECURUS connection[a)]
4 Non-return valve with venting valve and pressure gauge
5 Oil and water separator

Fig. 16 Filter system, 420 bar compressor unit

5.2.2. Fine after-cleaner

Structure

The compressed air vessel (2, Fig. 16) consists of an anodised aluminium alloy pipe, pipe outside diameter 100 mm, equipped with a fine thread on both ends. The air inlet and outlet are located in the screwed-on filter base. For connecting thread see Technical Data, Chap. A-14.

On filters with SECURUS monitoring, the upper fitting is equipped with a pressure-tight electrical bushing. The BNC plug socket located in this area is used to connect the coaxial cable for the measuring probe which leads to the compressor control unit.

For a description of the electrical system see 5.3.2.

5.3. METHOD OF OPERATION

5.3.1. General points

The replaceable cartridges, designed as adsorption filters, are suitable for

- air drying
- adsorption of aroma materials (oil vapour)

The quality of the breathing air meets the national and international standards, such as

- DIN EN 12021
- STANAG 1079 MW
- British Standard 4001
- US CGA Spec. G.7.1

5.3.2. SECURUS monitoring device

In contrast to other filter systems, the **SECURUS** filter system allows functional monitoring of the breathing air cleanliness values even during the preparation phase and, in effect, independent of influences such as

- Environmental temperature
- Air humidity
- Temperature behaviour of the compressor and the breathing air preparation system.

Exceeding the cartridge service life is prevented because the warning signal indicates saturation of the cartridge in good time. The warning signal is emitted at approx. 95 % cartridge saturation.

If the cartridge is not changed when the warning signal lights up then the **SECURUS** filter system automatically switches the compressor unit off when the cartridge is completely exhausted (at 100 % cartridge saturation).

If a cartridge is not fitted, the compressor cannot be started.

The **SECURUS** system operates with self-safety, if the line between the control unit and the measuring probe is interrupted, the compressor switches off.

All cartridges must be changed as per Chap. D-5. when the warning system lights up or at the latest after the compressor unit has been shut down by the SECURUS monitoring system.

5.3.3. Filter cartridges

Depending on the air quality required, there are various different cartridges available, see following table.

Order No.	Filter system	Cartridge filling[a)]	SECURUS measuring probe	Distance
062565	P42 P41-420	MS/MS/ AC/MS	---	H_2O/OIL
061686	P42 P41-420	MS/MS/ AC/MS	●	H_2O/OIL
058826	P61 P61-420	MS/MS/ AC/MS	---	H_2O/OIL
060036	P61 P61-420	MS/MS/ AC/MS	●	H_2O/OIL

6. PRESSURE RETAINER/NON-RETURN VALVE

6.1. GENERAL POINTS

The pressure retention valve ensures that adequate pressure builds up in the filters, even at the start of the filling process, and thus that constant, optimum filtering is carried out. In addition, this ensures perfect operation of the last stage.

The pressure retention valve thus limits the load change in the fine after-cleaner to the difference between the set value, i.e. 160 or 280 bar and the set end pressure i.e. 225, 330 or 420 bar and thus extends the service life of the pressure vessel.

An additional non-return valve is fitted between the oil and water separator and the fine after-cleaner. It prevents a pressure drop in the fine after-cleaner when draining off the condensate and thus extends the service life of the fine after-cleaner.

6.2. 225/330 BAR COMPRESSOR UNIT

After the filter system there is a pressure retention valve (1, Fig. 17) and a non-return valve (2). See also the piping schematic in section F. of the operating instructions.

The setting on the pressure maintaining valve is approx. 160 bar.

6.3. 420 BAR COMPRESSOR UNIT

After the filter system there is a pressure maintaining valve and a non-return valve. See also the piping schematic in sec-

a) MS = molecular sieve, AC = activated charcoal

tion F of the operating instructions. The combined pressure maintaining and non-return valve is located between the oil and water separator and the fine after-cleaner on the filter plinth.

The setting on the pressure maintaining valve is approx. 280 bar.

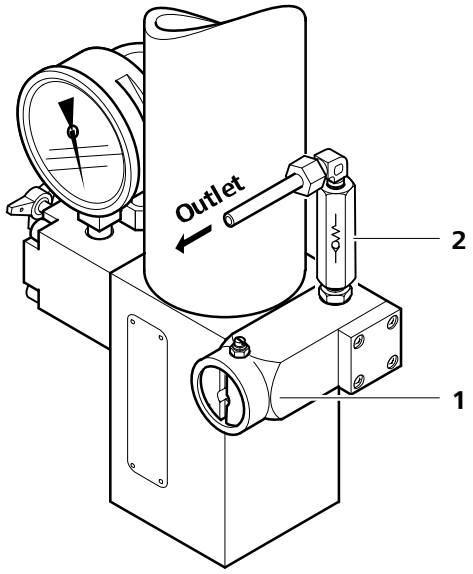


Fig. 17 Pressure maintaining and non-return valve, 220/330 bar compressor unit

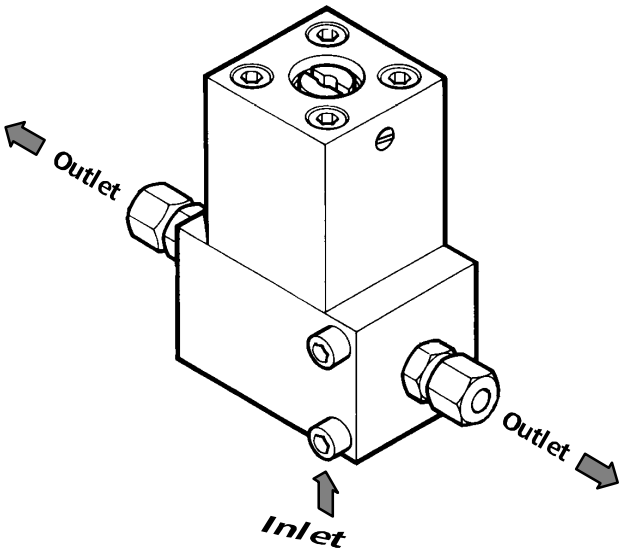


Fig. 18 Pressure maintaining and non-return valve, 420 bar compressor units

7. SAFETY VALVES

All stages in the compressor are protected by safety valves.

The setting of the safety valves is as follows:

Compressor block	1st stage	2nd stage	3rd stage	4th stage	5th stage
IK120	9,9 bar	60 bar	350 bar	---	---
IK12.14	5 bar	24 bar	95 bar	420 bar	---
IK150	5 bar	24 bar	95 bar	350 bar	---
IK180	5 bar	24 bar	95 bar	350 bar	---
IK18.1	6 bar	24 bar	80 bar	180 bar	500 bar

All valves are set in the factory to the pressure applicable for each individual stage and sealed. The safety valve of the **last stage** (final pressure safety valve) is set to the pressure agreed at the time of the order, see 14., Technical data, but with a maximum value as detailed above.

8. PRESSURE GAUGE

Compressor end pressure and oil pressure are monitored on the display of the **B-CONTROL MICRO** on all installations.

Digital end pressure display see Chapter A.11.

Pressure gauges are additional equipment. If present,the pressure gauges must show the values listed in Chapter A.1.3, Technical Data during operation.

PE-VE/05/14

9. VALVES

The valve heads of the individual stages form the upper section of the cylinder. The mounts for the intake and pressure valves are located in the valve heads. The valves are actuated by the movement of air during the stroke of the piston. During the downwards movement of the piston, the intake valve is opened by the air flowing in. When the piston moves upwards, the suction valve closes and the pressure valve is opened by the start of the compression, see Fig. 19.

The suction and pressure valve of the 1st stage of the compressor blocks is a combined plate valve under the valve head (Fig. 20).

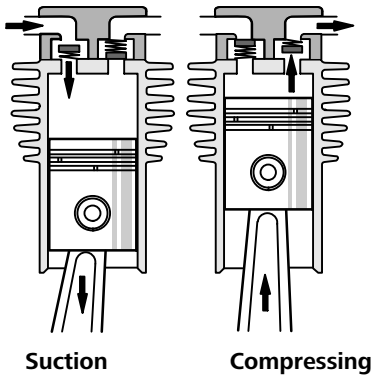
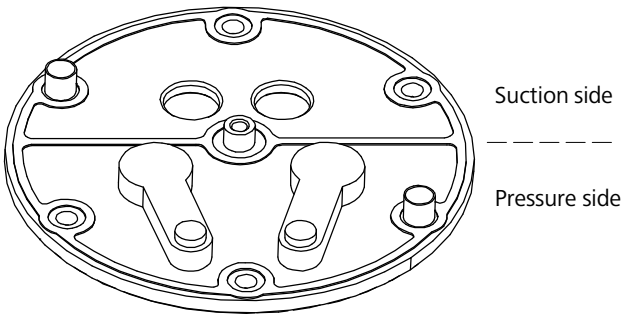


Fig. 19 Valve operating process

Plan view, IK120, IK12.14



Plan view, IK150, IK180

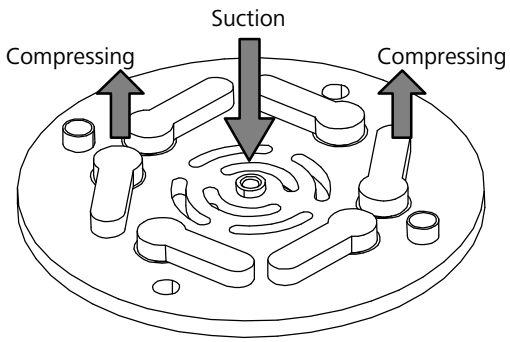


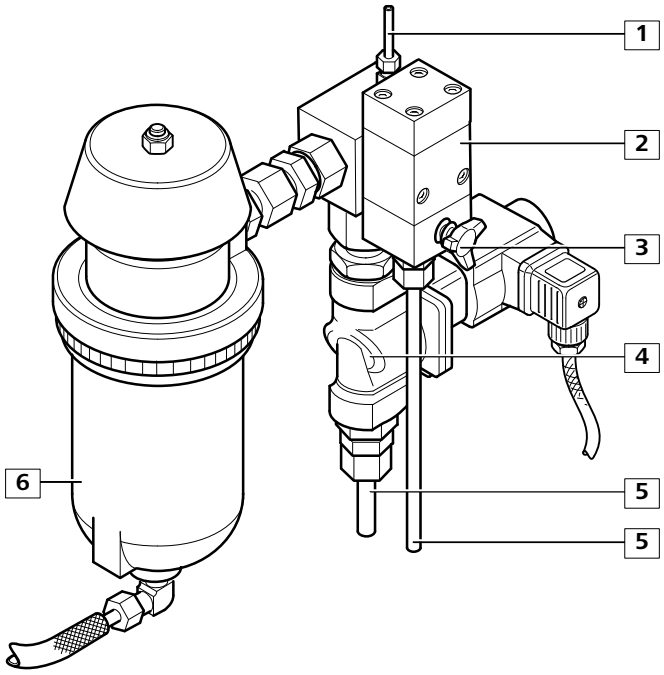
Fig. 20 Plate valve 1st stage

10. AUTOMATIC CONDENSATE DRAIN

10.1. PE 300

Every 15 minutes, the automatic condensate drain (Fig. 21) removes water from the intermediate separators during operation and the oil and water separator after the last stage. In addition, the automatic condensate drain is designed so that this filter removes the water when the compressor unit is switched off and unloads the compressor when the compressor unit is started up.

Every 15 minutes the power supply to the solenoid valve (3, Fig. 21) is interrupted by the timer for approx. 10 seconds. The solenoid valve opens and the condensate is drained from the intermediate separator. The drop in pressure in the intermediate separator means that the pilot pressure for the condensate drain valve (1) on the central filter is also lost. The servo piston of the condensate drain valve is vented and the pilot pressure is released through the venting hole. The valve piston of the condensate drain valve is lifted by the air pressure in the central filter, the valve opens and the condensate drains away. After 10 seconds has passed the solenoid valve is energised again and closes, the pressure builds up again and the pilot pressure acts on the valve piston. The condensate drain valve closes.



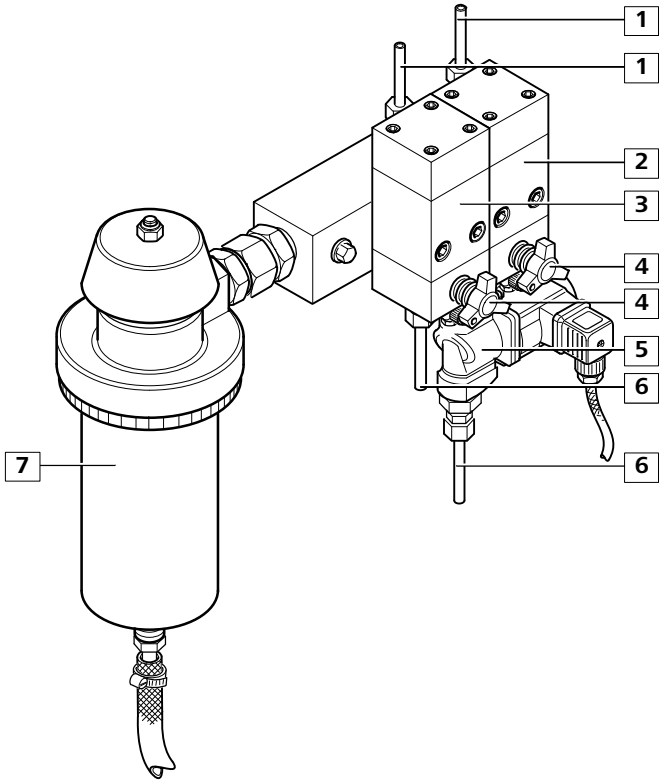
1 Pilot pressure, inlet line
2 Condensate drain valve, 3rd stage
3 Manual drain cock
4 Solenoid valve, condensate drain 2nd stage
5 Condensate, inlet line
6 Condensate separator/silencer

Fig. 21 Automatic condensate drain

10.2. PE 400

Every 15 minutes, the automatic condensate drain (Fig. 22) removes water from the intermediate separators during operation and the oil and water separator after the last stage.

In addition, the automatic condensate drain is designed so that this filter removes the water when the compressor unit is switched off and unloads the compressor when the compressor unit is started up.



1 Pilot pressure, inlet line
2 Condensate drain valve intermediate separator 3rd stage
3 Condensate drain vlave filter system
4 Manual drain cock
5 Solenoid valve condensate drain 2nd stage
6 Condensate, inlet line
7 Condensate separator/silencer

Fig. 22 Automatic condensate drain

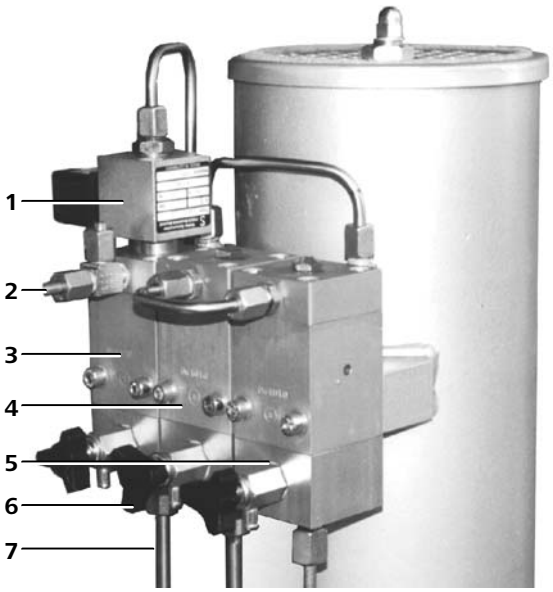
Every 15 minutes the power supply to the solenoid valve (4, Fig. 22) is interrupted by the timer for approx. 10 seconds. The solenoid valve opens and the condensate is drained from the intermediate separator after the 2nd stage. The drop in pressure in the intermediate separator means that the pilot pressure for the condensate drain valve (1) on the intermediate separator after the 3rd stage is also lost. The valve opens and the condensate is drained away. This, in turn, results in a pressure drop in the intermediate separator after the 3rd stage, which provides the pilot pressure for the condensate drain valve (2) for the oil and water separator – the condensate drain valve (2) removes water as described above.

After 10 seconds has passed the solenoid valve (4) is energised again and closes, the pressure builds up again and the pilot pressure acts on the valve piston. The condensate drain valves close.

10.3. PE 320, PE 550, PE 700, PE 850

Every 15 minutes, the automatic condensate drain (Fig. 23) removes water from the intermediate separators during operation and the oil and water separator after the last stage.

In addition, the automatic condensate drain is designed so that this filter removes the water when the compressor unit is switched off and unloads the compressor when the compressor unit is started up.



1 3 way solenoid valve
2 Pilot pressure connection
3 Condensate drain valve 2nd stage
4 Condensate drain valve 3rd stage
5 Condensate drain valve oil/water separator 4th stage
6 Manual drain cock
7 Condensate inlet

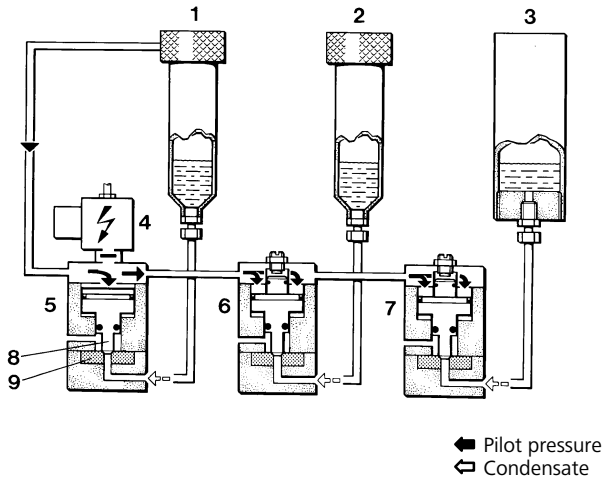
Fig. 23 Automatic condensate drain

Function in normal operation

The condensate drain valves are actuated pneumatically via an electrical signal via solenoid valves. The required pilot pressure for the solenoid valve is branched off at the intermediate separator of the 2nd stage.

When starting, the condensate drain valves (5, Fig. 24), (6) and (7) are open.

When the compressor is switched on, the 3/2-way solenoid valve (4) is energised and opens. This allows pilot pressure to enter the condensate drain valves (5), (6) and (7). The valve plungers (8) are pushed against the valve seats (9) and the condensate drain valves close. The compressor builds up pressure and delivers to the consumer.



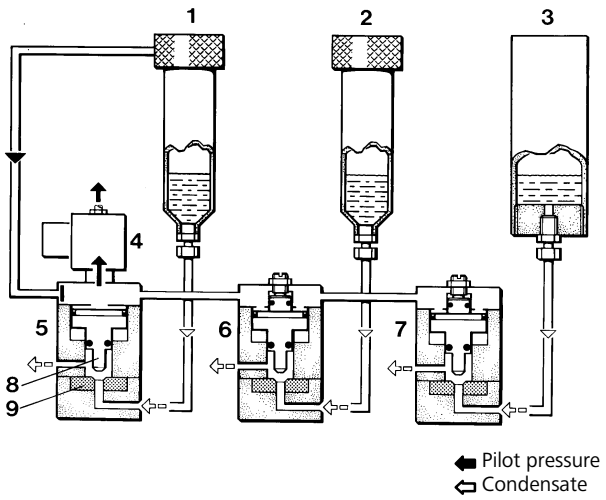
1 Intermediate separator 2nd/3rd stage
2 Intermediate separator 3rd/4th stage
3 Oil and water separator after the 4th stage
4 3-way solenoid valve
5 Condensate drain valve 2nd stage
6 Condensate drain valve 3rd stage
7 Condensate drain valve 4th stage
8 Valve piston
9 Valve seat

Fig. 24 Normal operation

Condensate drain

Every 15 minutes the power supply to the solenoid valve (4, Fig. 25) is interrupted by the timer for approx. 6 seconds. The servo plungers (8) on the condensate drain valves (5), (6), and (7) are bled of air. The valve plungers are lifted up by the valve seats (9) and the condensate is drained.

After the 6 seconds has expired, the solenoid valves (4) open again, the pilot air then applies pressure to the servo plungers and the condensate drain valves close.



1 Intermediate separator 2nd/3rd stage
2 Intermediate separator 3rd/4th stage
3 Oil and water separator after the 4th stage
4 3-way solenoid valve
5 Condensate drain valve 2nd stage
6 Condensate drain valve 3rd stage
7 Condensate drain valve 4th stage
8 Valve piston
9 Valve seat

Fig. 25 Condensate drain operation mode

10.4. PE 500, PE 600

Every 15 minutes, the automatic condensate drain (Fig. 26) removes water from the intermediate separators during operation and the oil and water separator after the last stage.In addition, the automatic condensate drain is designed so that this filter removes the water when the compressor unit is switched off and unloads the compressor when the compressor unit is started up.

The condensate drain valve for the 2nd stage (1, Fig. 27) is a deenergised open 2-way solenoid valve; the condensate drain valves for the 3rd to 5th stages are actuated pneumatically by an electrical signal via solenoid valves. The required pilot pressure for the solenoid valve is branched off at the intermediate separator of the 2nd stage.

Function in normal operation

When the compressor is switched on, the solenoid valve (1, Fig. 28) gets power and closes, 3/2 way solenoid valve (5) gets power and opens, solenoid valve (6) remains deenergised and closed. This allows pilot pressure only to enter the condensate drain valves (2) and (3). The valve plungers (7) are pushed against the valve seats (8) and the condensate drain valves close.

When starting, the condensate drain valves (1) (2) and (3) are opened and the condensate drain valve (4) is closed by spring pressure.

The condensate drain valve (4) does not receive pilot pressure. It remains closed by spring pressure and the pressure that builds up. The compressor now builds the pressure up and delivers to the connected consumers.

Condensate drain

Every 15 minutes the power supply to the solenoid valve (1, Fig. 295) is interrupted by the timer for approx. 6 seconds. The servo plungers (7) on the condensate drain valves (2) and (3) are bled of air. The valve plungers are lifted up by the valve seats (8) and the condensate is drained from the intermediate separators. After the 6 seconds has expired, the solenoid valve (5) opens again, the pilot air then applies pressure to the servo plungers and the condensate drain valves (3) and (4) close.

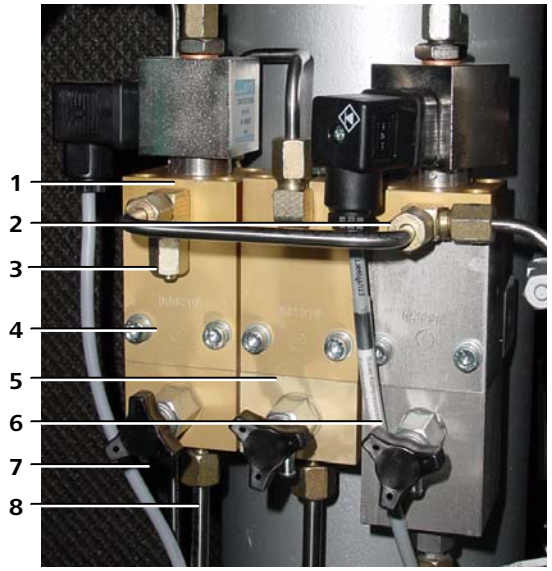


Fig. 26 Automatic condensate drain system IK18.1

1 3/2 way solenoid valve for 3rd and 4th stage
2 3/2 way solenoid valve for 5th stage
3 Pilot pressure inlet
4 Condensate drain valve 3rd stage
5 Condensate drain valve 4th stage
6 Condensate drain valve 5th stage
7 Manual drain cock
8 Condensate inlet line

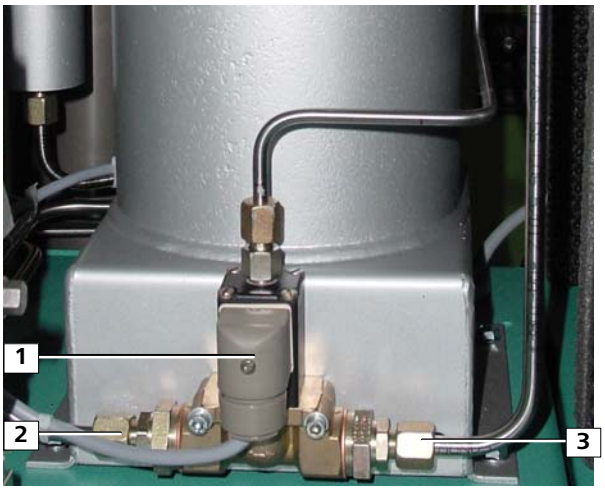


Fig. 27 Condensate drain valve 2nd stage IK18.1

1 Condensate drain valve 2nd stage
2 Condensate inlet from separator
3 Condensate outlet to the collection vessel

Also every 15 minutes, but not synchronously with the solenoid valve (5), the 3/2 way solenoid valve (6) gets power for approx. 3 seconds and opens. The pilot pressure pushes the servo plunger on the condensate drain valve (4) downwards, the valve plunger (7) is lifted off the valve seat (8) and the condensate is drained from the end separator. After the 3 seconds has expired, the solenoid valve (6) closes again, the feed of the pilot pressure is interrupted and the condensate drain valve (4) closes by spring pressure and the pressure from the compressor stage.

The air is directed via an activated charcoal bed so that only clean and odour-free air flows out of the condensate collection vessel, as required by the TRG regulations.

The condensate collection vessel is connected to the compressor unit condensate outlet fitting by a hose. For PE-VE compressor unit, the G 3/4" inlet fitting is used.

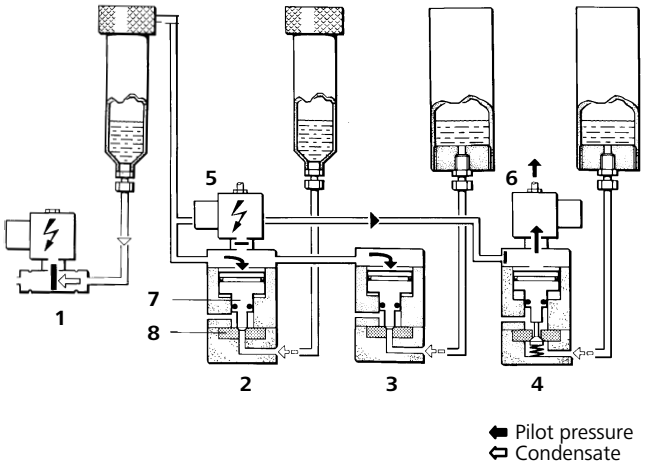


Fig. 28 Automatic condensate drain in normal operating mode

1 Condensate drain valve 2nd stage
2 Condensate drain valve 3rd stage
3 Condensate drain valve 4th stage
4 Condensate drain valve 5th stage
5 3/2 way solenoid valve
6 3/2 way solenoid valve
7 Valve plunger
8 Valve seat

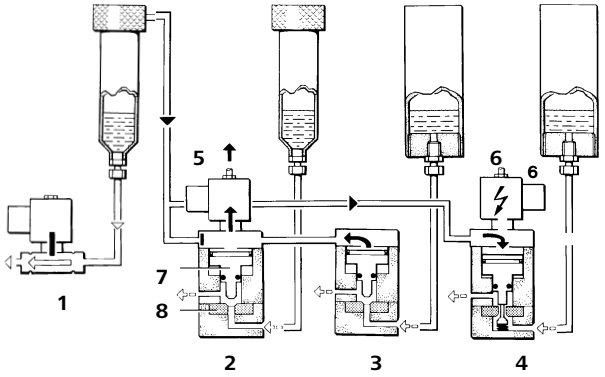


Fig. 29 Condensate drain

10.5. START-UP UNLOADING

The start-up unloading of the compressor is carried out by the solenoid valve only being powered when changing from star to delta (see Circuit Diagram in the appendix to the operating instructions). This means that it is open during the start-up phase. In addition, there will be no pilot air available immediately after switching on. Only when the compressor is running at nominal speed and the full delivery of air is available, does the pilot air go to the condensate drain valves. These close and the compressor supplies the consumer unit.

10.6. STANDSTILL WATER REMOVAL

When the compressor unit is switched off the solenoid valve becomes deactivated and opens. The condensate from the intermediate separators is drained away.

The valve pistons in the remaining condensate drain valves in the intermediate separators are lifted up by the residual pressure in the separators and the compressor unit is thus drained of water when at a standstill.

10.7. CONDENSATE COLLECTION VESSEL 40 L (OPTION)

The compressor unit can, as an option, also be fitted with a 40 l condensate collection vessel. It serves for central collection of the condensate that is produced and separates the condensate and air.

Electrical connection

When fitting the coil (1, Fig. 30), take care with the top and bottom symbols on the coil. On one side there is an open switch symbol (3), and a closed one (2) on the other side, see Fig. 30.

The switching function can be inverted by turning the coil round.

Technical data

Tank volume:	approx. 60 l
Condensate capacity:	approx. 40 l
Activated charcoal content:	3,700 g
Connecting hose, length	1,150 mm

Dimensions: approx. 410 mm x 330 mm x 1,000 mm (L x W x H).

Function

The condensate is drained by the automatic draining system on the compressor unit and is then directed to the condensate outlet fitting. The hose from the collection system is connected at this point.

The condensate enters at the connection (1, Fig. 31) into the collection vessel and is directed down into the vessel (3) by the tube (2). The pipe (2) is filled with steel wool (4). The air that enters with the condensate is dispersed by the activated charcoal (5) in the filter head (6) and is directed into the open air. The activated charcoal is covered with several layers of fleece (7). The vessel and the filter head are connected by a tensioning strap (8). The system is made safe by a safety valve (9) which blows off at a pressure of more than 0.2 bar. The level of condensate can be seen on the indicator (11) and can be monitored electrically by the level switch (10).

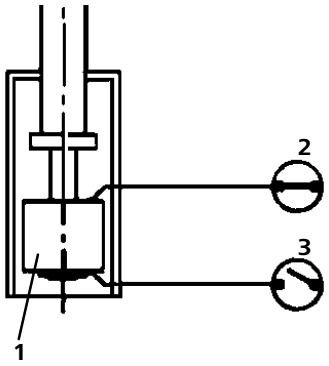


Fig. 30 Level switch assembly

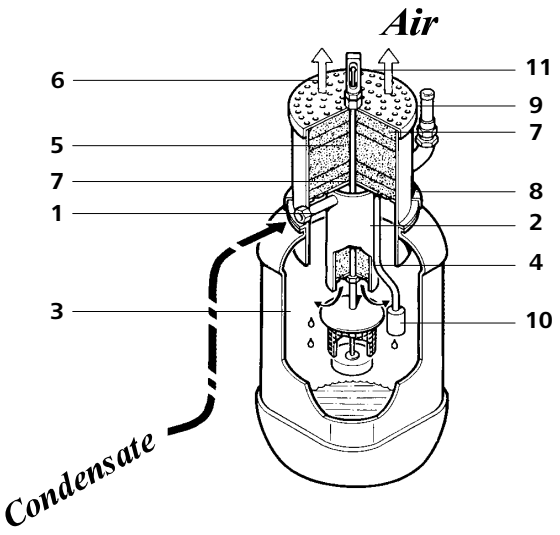


Fig. 31 Method of functioning

1 Condensate inlet level indicator
2 Tube
3 Plastic drum
4 Steel wool
5 Plastic drum
6 Filter head
7 Fleece
8 Tension strip
9 Safety valve
10 Level switch
11 Level indicator

10.8. CONDENSATE DISPOSAL

The condensate must be disposed of in accordance with the German waste laws as special waste which must be monitored (waste key No. 54405)!

11. ELECTRICAL EQUIPMENT

11.1. GENERAL

In this section we describe the standard electrical control systems and electronic monitoring systems.

Circuit diagrams see section F.

The electrical equipment of the compressor includes:

- Drive motor M1
- Electrical control system with:
  - Main switch Q1/emergency stop switch
  - End pressure sensor F16
  - Motor contactor K1 or star-delta contactor K1-K3 with timer K4

In order to switch on the electric motor and for the function of the electronic control systems and electronic monitoring systems you will always need:

- Main switch,
- Main fuse; both to be provided by the customer.

11.2. COMPRESSOR CONTROL SYSTEM B-CONTROL MICRO

11.2.1. General

The **BAUER B-Control Micro** is a freely-programmable electronic compressor control system. Communication with the operator is via a colour display and various different cursor buttons. The compressor control system is specially programmed for **BAUER** compressors.

The compressor control system facilitates, among other things, the display and monitoring of all operationally relevant parameters, the determination and monitoring of the maintenance intervals and the recording of all messages. In addition, the compressor control system offers three freely-configurable operating modes to be chosen:

- **Semi-automatic**: the compressor switches off after manual starting of the compressor when the final pressure is reached (one pressure value or both pressure values, depending on the configuration). Automatic switching on again after the pressure falls below the switch-on pressure does not take place in this operating mode.
- **Fully automatic**: after the compressor is started manually using the ON button, the control system operates depending on the pressure. If the final pressure or compressor stop value is exceeded (one pressure or both pressure values, depending on the configuration) the compressor switches off. If the pressure falls below the switch-on pressure or the compressor start value (interlinked two switch-on values depending on the configuration), automatic incorporation of the compressor takes place. This repeats until the compressor is switched off manually.
- **Combined operation**: the B-Control Micro allows up to 4 compressors to be controlled as slaves in a so-called combined operation (networked operation). The master installation requires a B-Control II control system. A combined operation compressor installation generally serves to provide increased air demand with reliability and, to this end, to switch the compressors OFF and ON, so that the pressure in the target vessel, or the level in the source (glassblowing) is kept as constant as possible and to balance the running times of the compressor as far as possible. The running of compressors in a combined operation provides redundancy which ensures compressed air supply in the event of a fault or when maintenance is being carried out. The programmed basic/peak load operation makes sure that the required volume is always provided, independent of the pressure drop, and that the basic load is transferred on a time basis from compressor to compressor. The compressors can either be called up actively, i.e. via a bus system with appropriately equipped control system (B-Control Micro or B-Control extended), or passively by remote on/off contacts. The control via simple switching contacts also allows the connection of older compressor installations with Comp-Tronik control. In order to ensure optimum function of the combined unit it is necessary to adapt the operating parameters according to the application concerned. That is the task of an experienced plant operator or customer service technician. This instruction manual describes the settable parameters, but it cannot go deeper into the specific settings for these diverse applications and ambient conditions.
- **Nitrox Blending:** this function is still in the programming phase and will be realised in the near future.

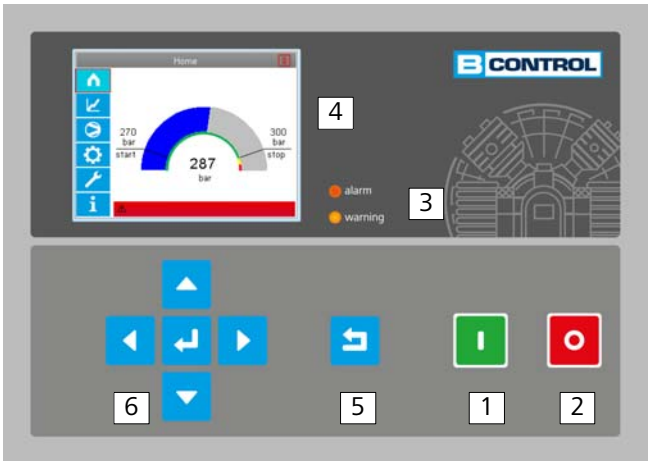


Fig. 32 B-Control Micro

4 Compressor ON
5 Compressor OFF
6 Filter display
7 Colour display

8 Back button
9 Navigation buttons

11.2.2. Safety

<u>Warning of dangerous electrical voltage</u>
Touching the equipment can result in electrocution. Work on electrical systems or operating equipment may only be carried out by an electrical technician or other trained persons working under the supervision of an electrical technician and must be performed in accordance with electrotechnical regulations.

All covers must be kept closed during operation.

Any data exchange or each installation of software using a data carrier (e.g. memory card, CD-ROM, USB Memory Stick, etc.) or via networks such as the Internet presents potential risks to the system. It is the sole responsibility of the user to avoid these dangers and to protect the system by the use of appropriate measures, such as virus protection programmes, firewalls etc., and by using only software from trusted sources.

- Do not make any changes to the programmes (software).
- The machine/installation should only be used in a technically perfect condition and in an intended, safety and danger aware method, taking into account the operating instructions! In particular, faults that have a negative effect on safety must be immediately rectified!
- This equipment is intended exclusively for the control of **BAUER** compressor installations. Any type of usage that falls outside this scope is classified as improper usage. Damage resulting from this is not the liability of the manufacturer/supplier. The user alone bears the risk of this. Intended use includes compliance with the operating instructions.
- All persons who handle electrical components and equipment that is fitted in electrical components must be earthed.
- Measuring instruments and devices must be earthed.
- Measuring tips on potential-free measuring instruments must be briefly be earthed on suitable earthed surfaces before being used to take measurements.

11.2.3. Operation

For detailed information concerning the control system please refer to the circuit diagrams of the B-Control system supplied with the unit.

Electrical circuit diagrams see control system of the compressor installation.

In the displays in the following description we have sample values from one of many possible configurations. The values actually displayed can therefore deviate from those shown here.

Control and monitoring elements

The operating panel consists of an LCD colour display and 6 function keys for controlling all functions on the compressor installation. See Fig. 33. Selection of the function boxes is by using the cursor buttons.

The boxes have the following functions:

1 Main menu
2 Measured values display
3 Compressor Setup
4 B-Control Setup
5 Maintenance
6 Info screen, warning-error messages

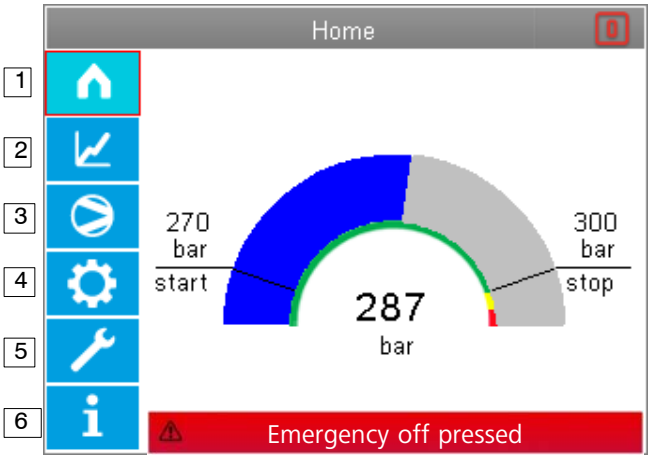


Fig. 33 Operating and display elements

General operation:

The selection frame is moved using the cursor buttons via the function boxes on the display. Each selection is made using the Enter button. The selection frame is shown by a red unfilled rectangle having a line thickness of 3 pixels around the specific selected function box (e.g. in Fig. 33 around Item 1).

If no action is taken after 10 minutes the display goes back to the start page.

Menu and navigation

The LCD display contains important information concerning the combination installation.

Start page

Fig. 34. This page is displayed after booting the control system. The page continues to be displayed as long as no menu operation has been carried out. If no menu operation is carried out, 10 minutes after the last operator step has been carried out, the system jumps back to this page and logging out takes place automatically.

The main constituent of the start page is the final pressure display as a quasi-analogue arc display and with the digital display located centrally in the arc. The current pressure is shown by the blue arc increasing in intensity from the left (0 degree position) to the right (180 degree position). In the 180° arc the start value of the compressor and the stop value of the compressor (reference point 1) are each shown by a line.

The inner arc is shown in green from 0° to the stop point, in yellow from the stop value to the top switching point of the sensor channel selected under regulating point 1, and in red from there to the 180° end of the scale.

There is a digital residual fill display under the final pressure display. The expected time required is constantly calculated from the pressure increase per unit time as soon as the compressor is running and the display is adapted accordingly. The residual filling time display only becomes active when an actual pressure increase can be measured. In the period after starting the compressor, no pressure increase can be expected, because of the system characteristics, since we first fill the filter vessel and the final separator in the system before the pressure increase can be measured after the pressure retention valve on the pressure sensor. In this period the digital time display shows an egg-timer. On the top right we show the consumption degree of the filter by a symbolic filter cartridge. The symbol empties segment by segment in accordance with the filter saturation calculation and the SECURUS measurement. When the SECURUS pre-warning limit is reached, the symbol is shown in orange; when the SECURUS saturation limit is reached, the symbol is shown in red.

Right at the bottom we show the last active alarm that was created, i.e. the extract of the top line of the current message list.

If the alarm is an error, the background colour is red, if the alarm is a warning, the background colour is yellow. The line is not visible if there is no alarm.

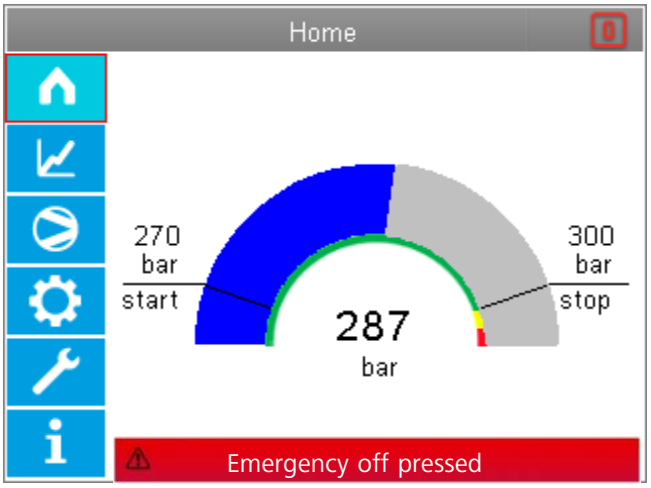


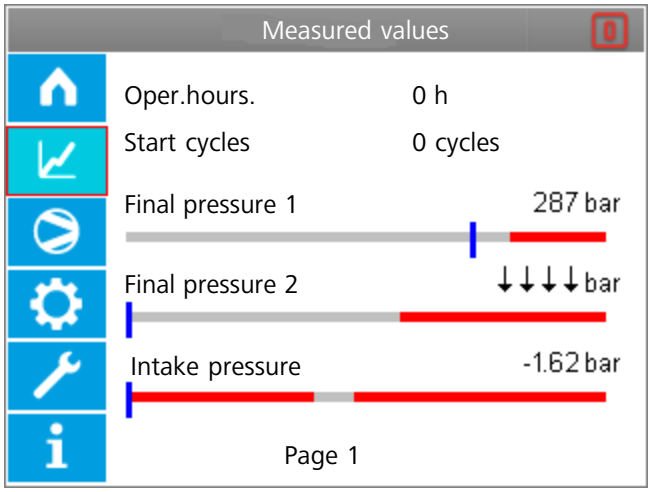
Fig. 34 Start page

Measured values (Page 1)

Page 1 shows:

- Operating hours
- Start cycles
- Final pressure 1
- Final pressure 2
- Intake pressure

Display of the analogue measured values is by bar graph with additional digital display. The blue vertical bar shows the current measured value. The red area of the value axis shows the scale area over or under the parametrised threshold value (depending on the existing threshold value).

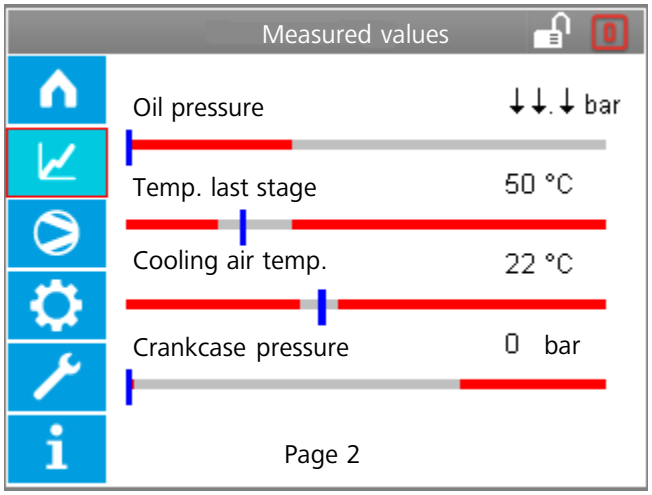


Measured values (Page 2)

Page 2 shows:

- Oil pressure
- Temperature last stage
- Cooling air temperature
- Crankcase pressure

The measured values are displayed as per Page 1, with a bar graph.

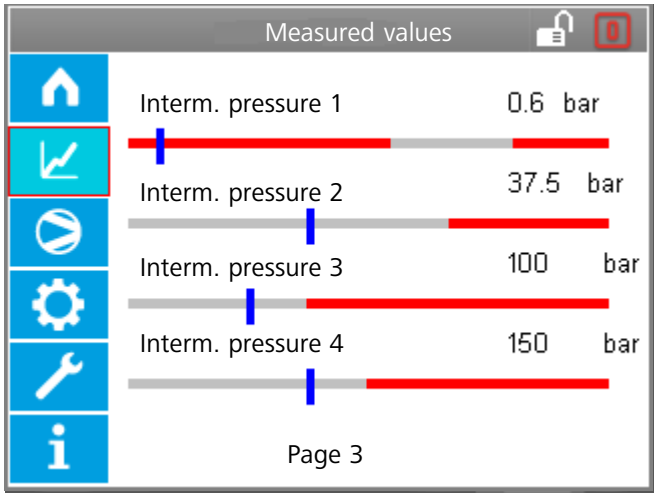


Measured values (Page 3)

Page 3 shows:

- Intermediate pressure 1
- Intermediate pressure 2
- Intermediate pressure 3
- Intermediate pressure 4

The measured values are displayed as per Page 1, with a bar graph.

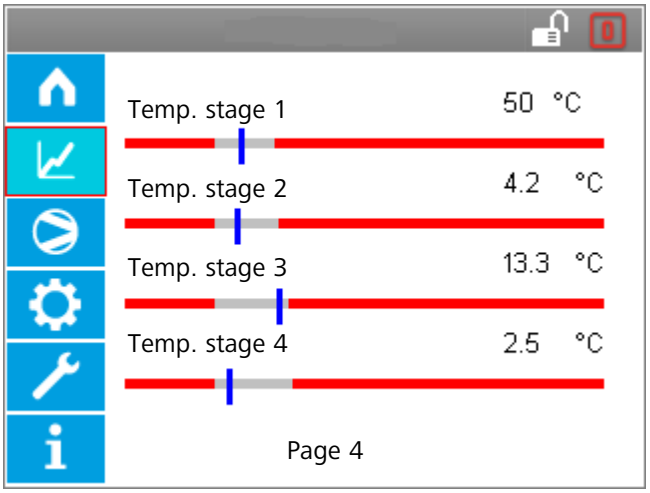


Measured values (Page 4)

Page 4 shows:

- Temperature stage 1
- Temperature stage 2
- Temperature stage 3
- Temperature stage 4

The measured values are displayed as per Page 1, with a bar graph.

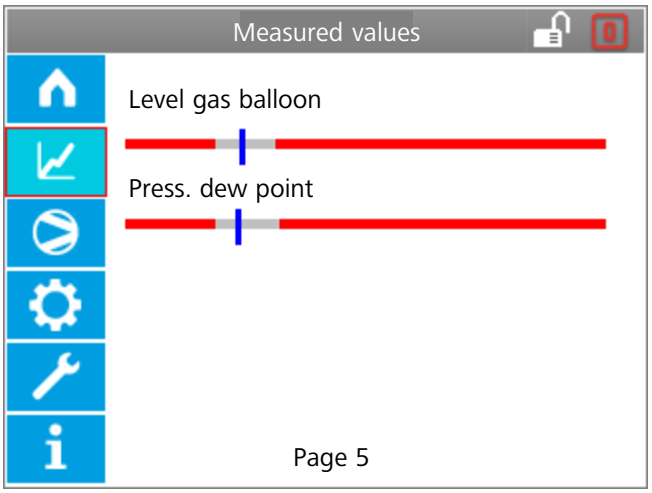


Measured values (Page 5)

Page 5 shows:

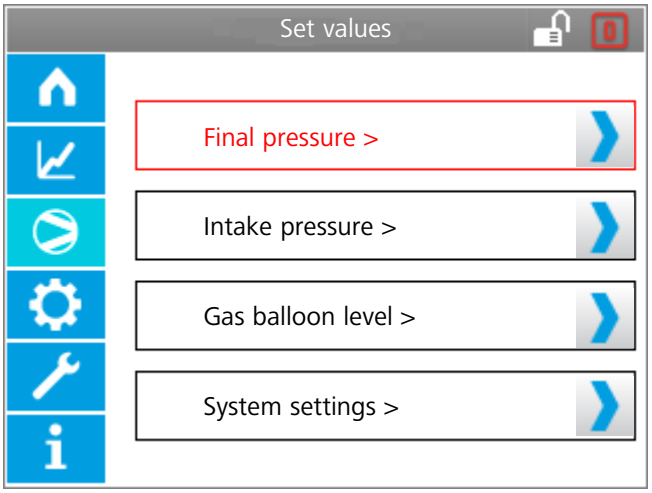
- Level gas balloon
- Pressure dew point

The measured values are displayed as per Page 1, with a bar graph.



Compressor Setup

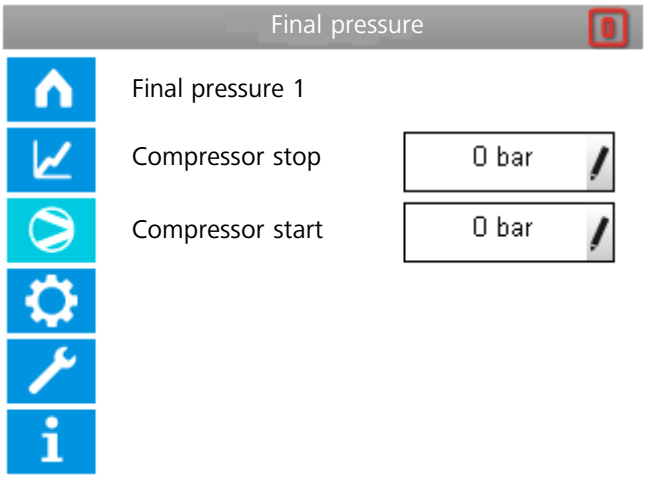
The "Final pressure" box is always shown. The boxes intake pressure or gas balloon level only if the individual sensors are registered.



Final pressure

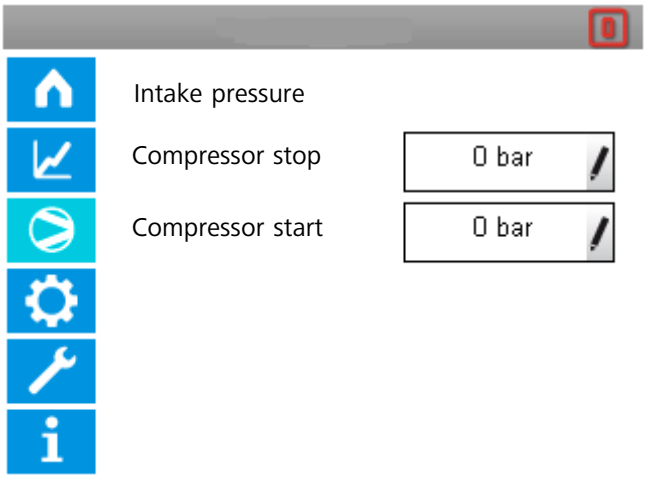
Setting for final pressure 1 & 2.

Final pressure 2 is only displayed if the final pressure sensor 2 is also registered.



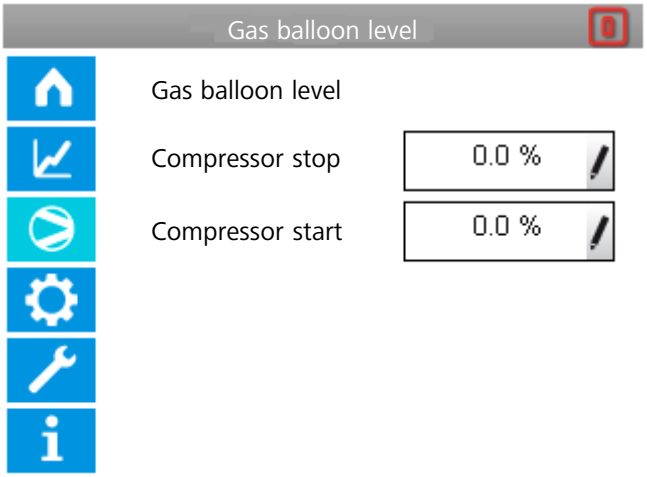
Intake pressure

You must take account of the fact that the compressor stop value is under the compressor start value. The compressor thus stops if the intake pressure falls below the parametrised value and starts again if the pressure rises above the compressor start value.



Gas balloon level (optional)

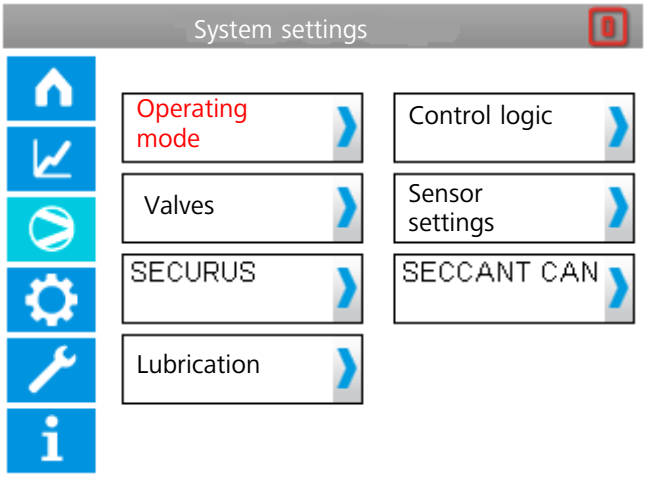
You must take account of the fact that the compressor stop value is under the compressor start value. The compressor thus stops if the level of the gas balloon falls below the parametrised value and starts again if the level rises above the compressor start value.



System settings:

The following options are available for selection:

- **Operating modes**
- **Control logic**
- **Valves (condensate valves)**
- **Sensor settings**
- **SECURUS**
- **SECCANT CAN**
- **Lubrication**



Operating mode (Example 1)

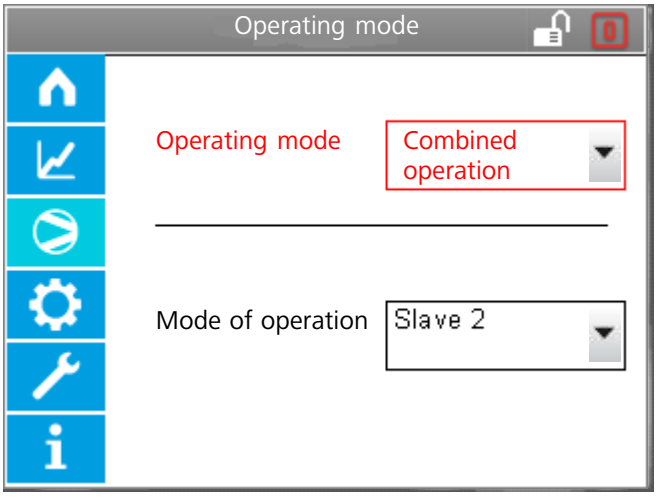
The following operating types are available for selection:

- **Fully automatic**
- **Semi-automatic**
- **Combined**
- **Nitrox Blending**

For combination and Nitrox Blending additional selection boxes are displayed in each case (otherwise hidden).

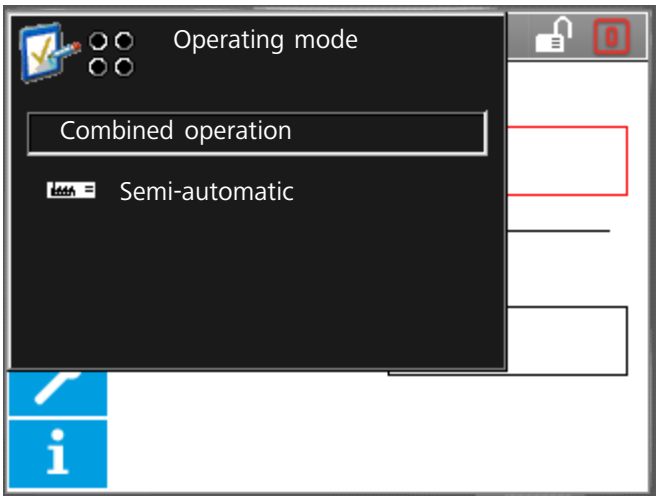
Left in the example for the combined operating mode. You can then select here at which slave addresses the compressor is to be run.

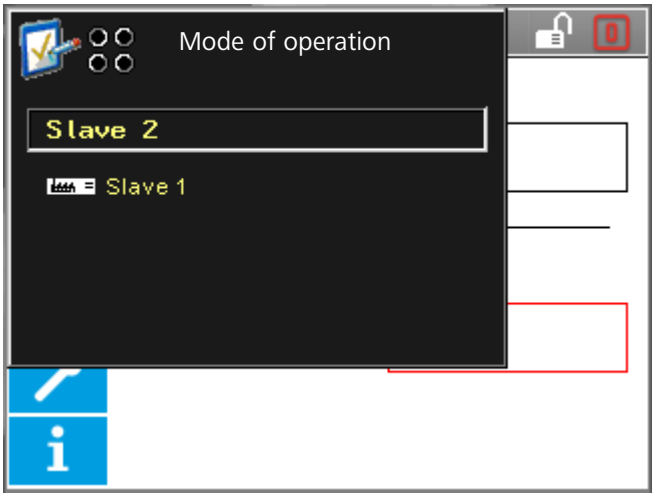
Description of operating modes see Chapter 11.2.1.



Operating mode (dropdown operating mode)

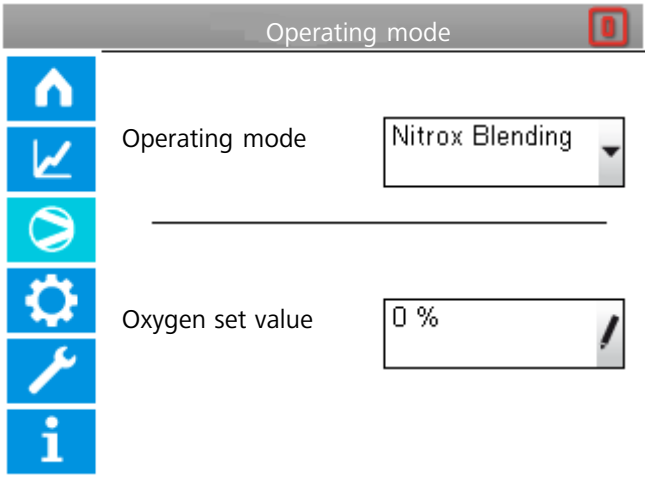
The selection window for the operating type appears as a dropdown in the actual operating type window.





Operating mode (Example 2)

If the operating mode Nitrox Blending is selected, the input box for the desired oxygen concentration appears. Edit from level "OPERATION"



Control logic

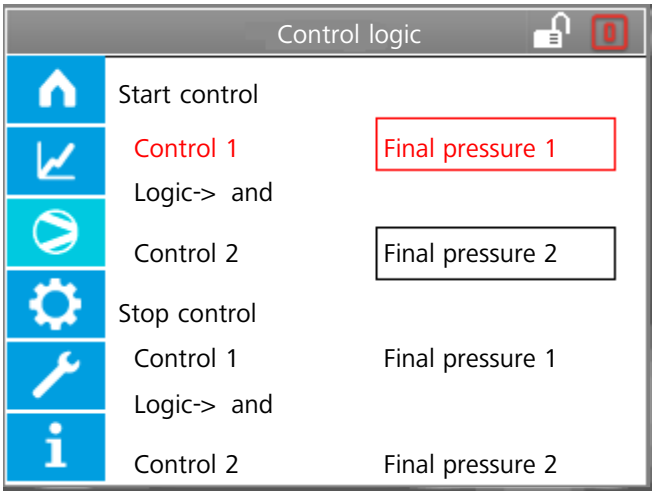
On the **Control logic** screen the regulating parameters are stipulated for controlling the compressor or combination installation.

Control 1, control 2: selection between final pressure 1, final pressure 2, intake pressure, gas balloon analogue, gas balloon digital.

Intake pressure, gas balloon analogue, gas balloon digital are only used for gas compression installation.

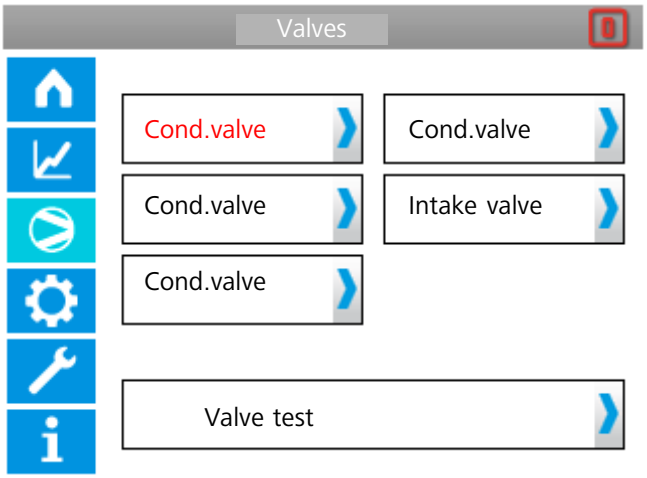
Interlink between control 1 and 2: selection between AND and OR, i.e. whether one or both control points or both need to be reached in order to start or stop the compressor.

Entitlement to editing from level "SERVICE"



Valves

Branching to the valve configuration and the valve test. Non-registered valves are not displayed unless "CONFIG" registered.



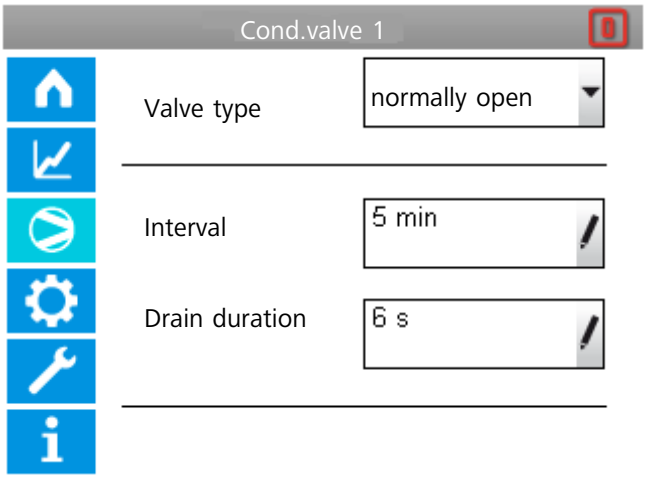
Condensate valve 1-4

Intake valve (Example condensate valve 1)

This page repeats for condensate valves 1 to 4. For valve type the following can be selected: logged off, normally open, normally closed.

For the intake valve the page is slightly different. Valve type only logged off, normally closed. Instead of interval time, start delay (in secs.) and instead of blow-off time switch off delay.

Entitlements: Valve type: from level "CONFIG" and times from level "OPERATION"

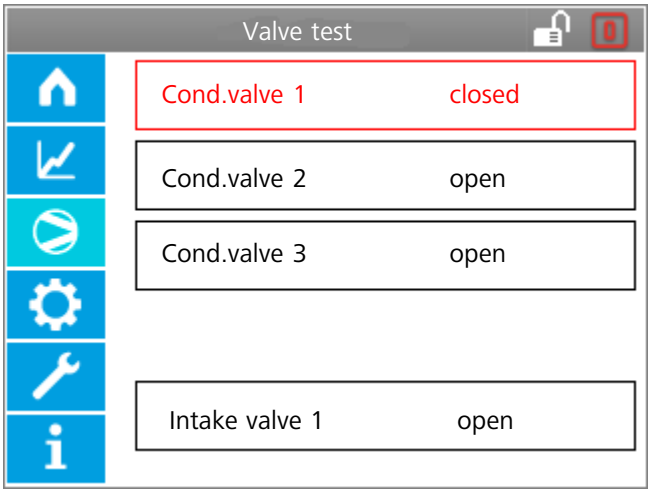


Valve test

Here we show on the one hand, the current condition of the condensate valves/intake valve (open/closed) non- registered valves are not shown.

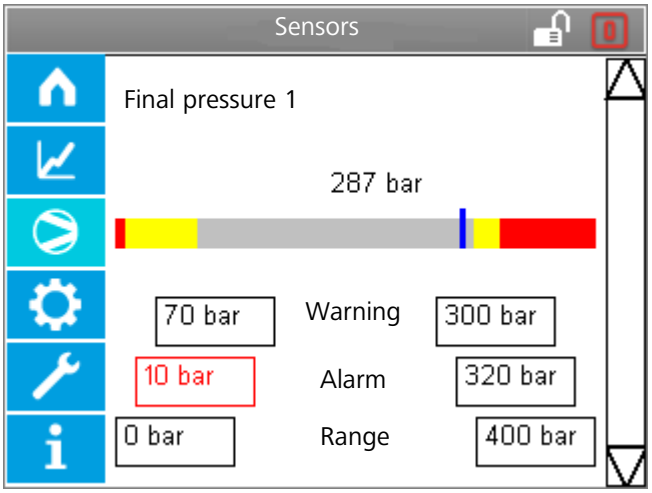
For valve testing you can select the individually desired valve using the cursor buttons and then opening or closing manually with the ENTER button. If you leave the page, the test status of the valves is cancelled.

Test mode Edit from level "OPERATION"



Sensor settings (Page 1)

Setting the sensor values. Each analogue channel occupies one page. The threshold/warning values are shown per sensor according to the equipment level.



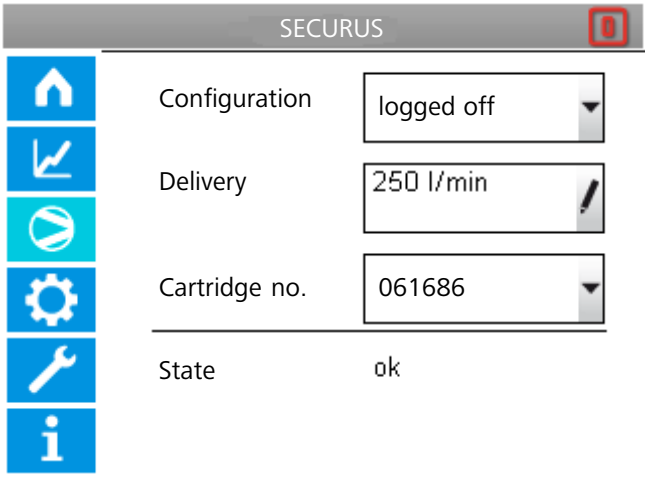
SECURUS

Entitlement to editing from level "SERVICE"

The **SECURUS** and **SECCANT CAN** screens provide the operating data of each individual unit. These screens are configured in the factory and normally do not need to be modified. If the installation is updated by replacing one or both units, the values can only be set by expert staff and at an appropriate access authorisation and in the configuration level.

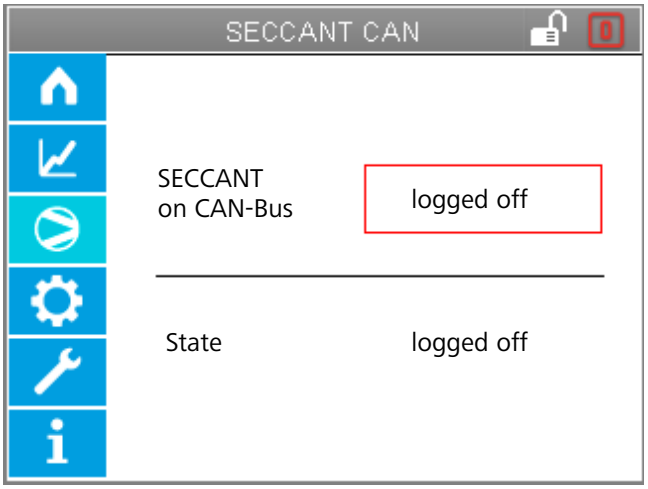
With "registered, warning only" no error message "filter saturated" is triggered.

The statement of the delivery quantity and the cartridge article number is required for the new preparatory calculation of the used filter cartridge capacity



SECCANT CAN

Entitlement to editing from level "SERVICE"



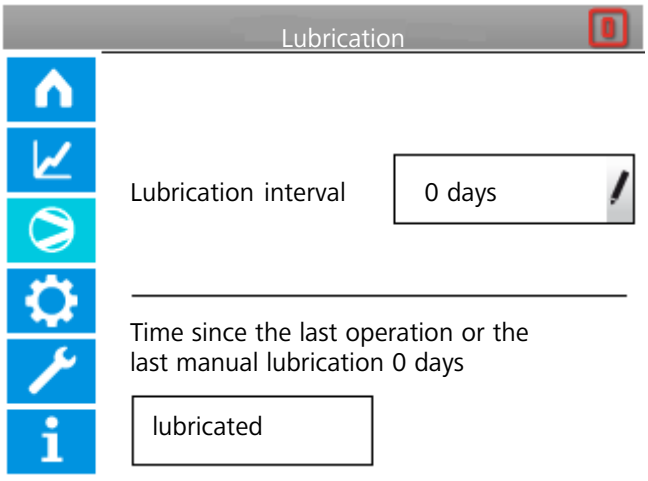
Lubrication

For certain types of compressor, after extended periods of standstill, pre-lubrication of the crankshaft, the pistons and the bearings is necessary before taking them back into service. This is carried out manually in accordance with the details provided in the operating instruction manual.

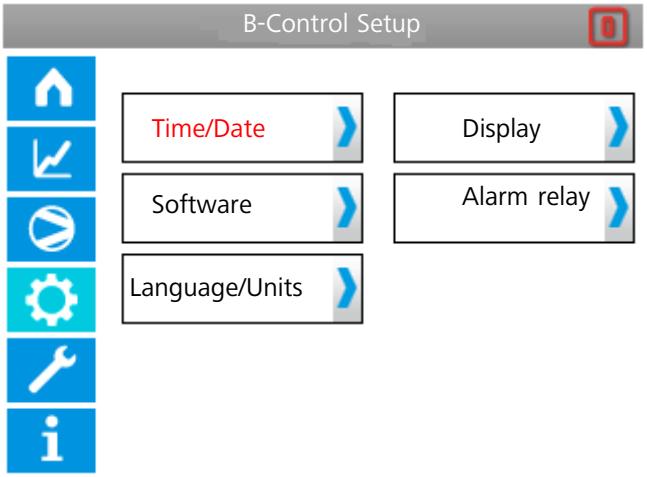
This page shows the lubrication interval to be complied with and when the last manual lubrication of the compressors was carried out.

This value can be edited from level "CONFIG". If the value is "0", monitoring is not carried out. The tick is a button function, released from level "SERVICE".

When actuated we reset the counter that counts the time since the last operation or the last manual confirmed lubrication.



B-Control Setup

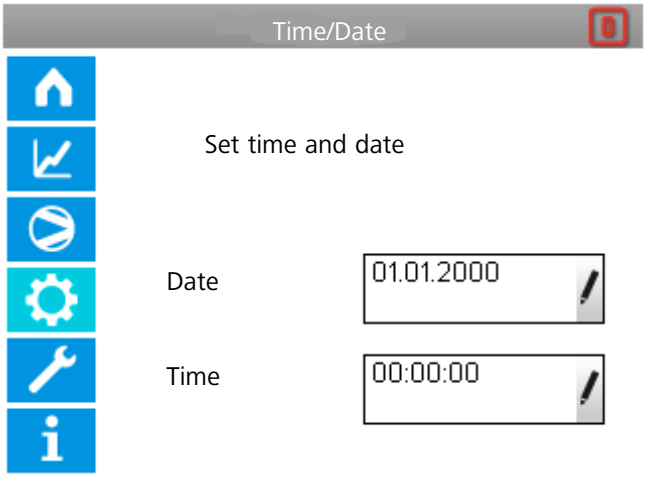


Time/Date

Display and setting the current time and date.

Release Edit from level "Operation"

The operating hours counter can only be seen and edited only from level "Admin".

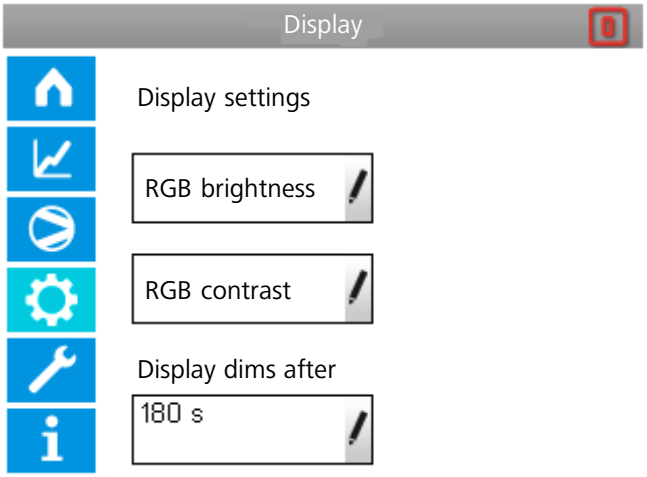


Display

Basic setting brightness

Display background lighting and time setting dimmed until background lighting since last interaction.

Edit released from level "SERVICE"



Software

Header: Plant No., Software version

Entitlements:

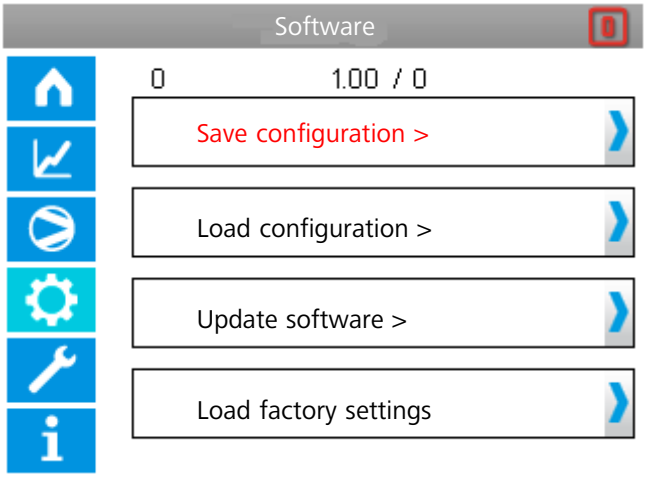
Save configuration,

Load configuration,

Update software

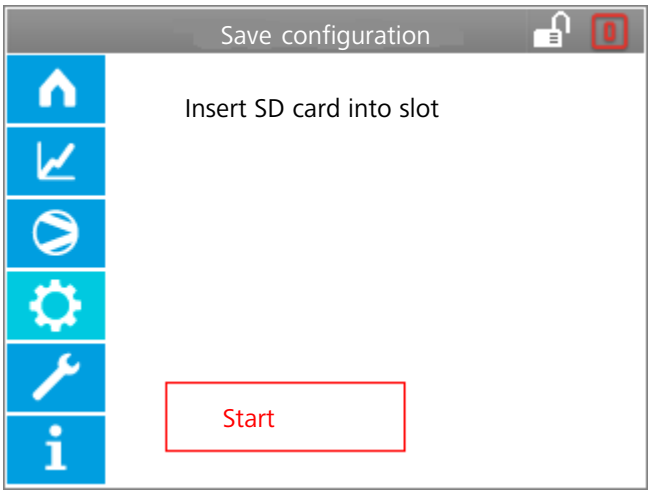
since level "SERVICE".

Load factory settings from level "OPERATION".

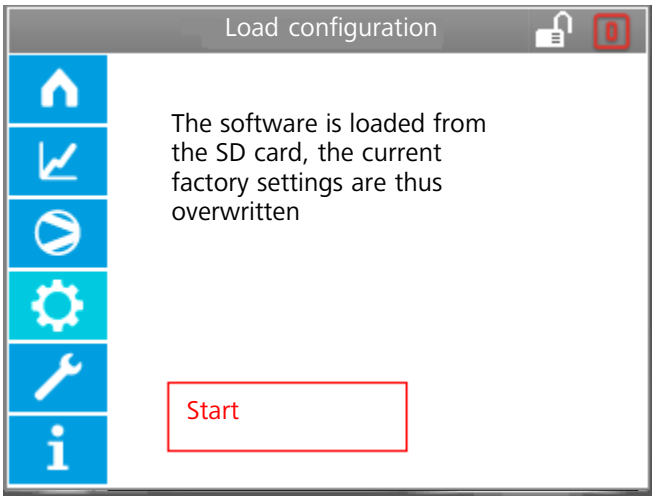


Save configuration

This function is used to write the current configuration data active in the programme, in other words all the values listed in the configuration table into a file on the SD card. If no SD card is inserted or if the creation and writing of the file was unsuccessful for any other reason, a corresponding message appears.



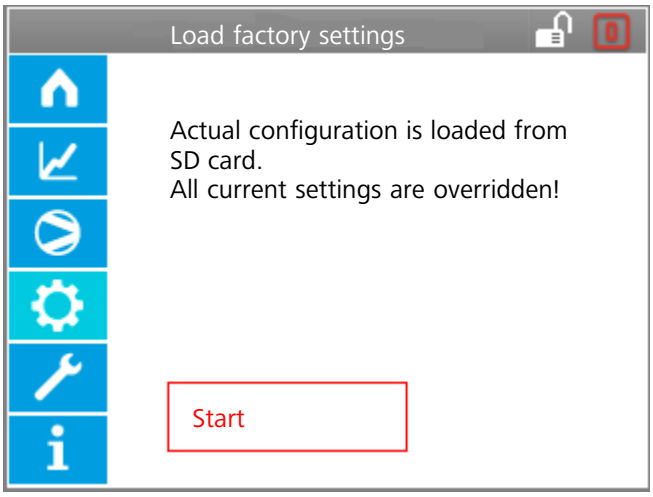
Load configuration



Load factory settings

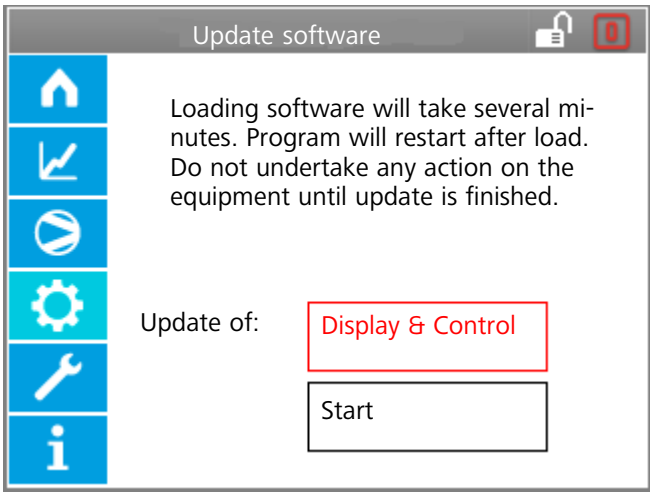
This setting restores the original BAUER settings that were present when the plant was delivered.

The current saved configuration



Update software

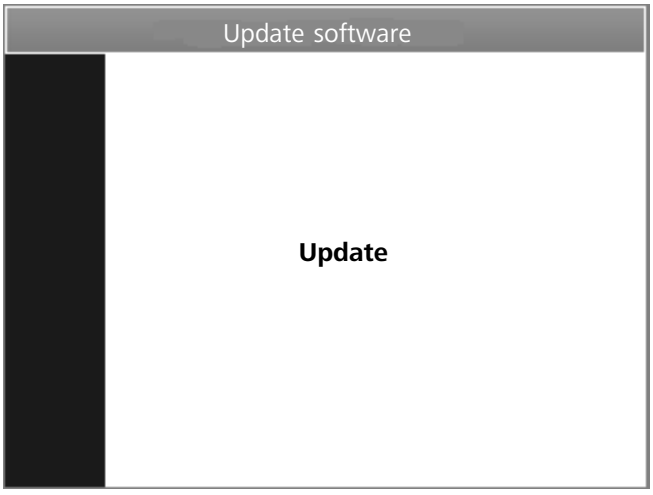
Loading a software update from the SD card. Here we decide whether the software for the display unit or for the IO unit is to be loaded.



Update software

Updating takes several minutes.

During this period we either display this image, or the screen is completely black.

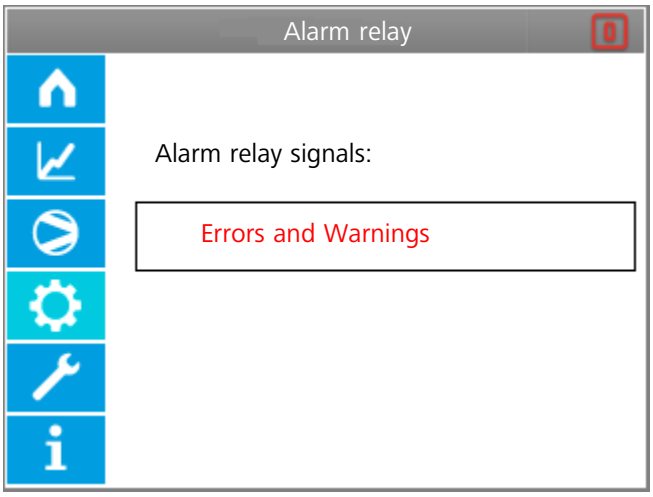


Message relay

For the alarm relay three different operating modes can be configured. Standard mode "only errors" is that only error can allow the relay to drop out (Fail Safe).

In the mode "Errors and warnings flashing" the relay drops out in the event of errors, for warnings the relay flashes in the cycle 1 sec. on, 1 sec. off. If an error and a warning exist, the relay is continuously dropped out (error has priority).

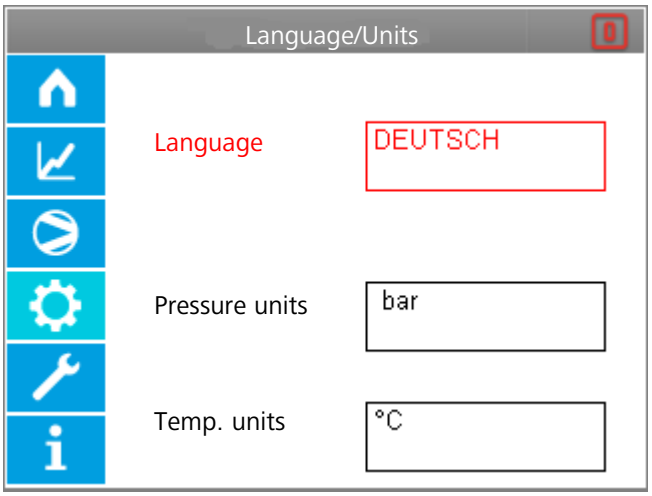
In the mode "Errors and warnings" the relay drops out both in the event of a warning and also in the event of an error.



Language /Units

On this page we make the region-specific settings. The language selection can be made without logging in. For the selection of the pressure units is possible from level "Operation".

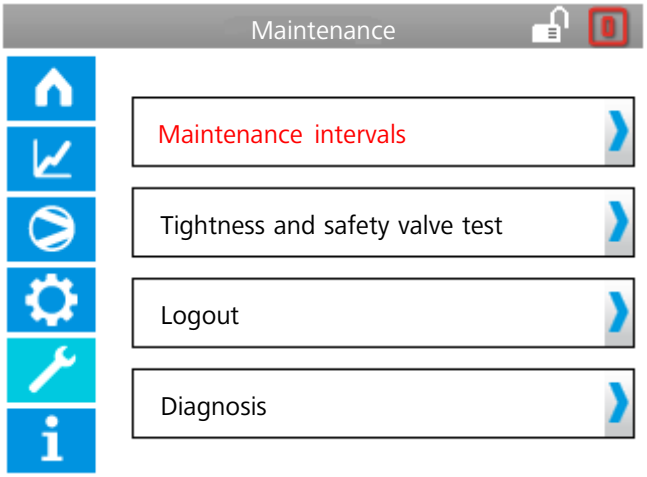
Selection pressure units: bar, Mpa, psi (all relative) ; Temperature units: °C, K, °F.



Maintenance

The **Maintenance** screen stipulates the maintenance intervals and show the momentary values of the compressor.

The box for Diagnosis is only displayed if the operator is logged in as an Administrator.



Maintenance intervals

Total operating hours, start cycles and the target and actual values of the maintenance work to be carried out:

Main maintenance (every 4,000 operating hours)

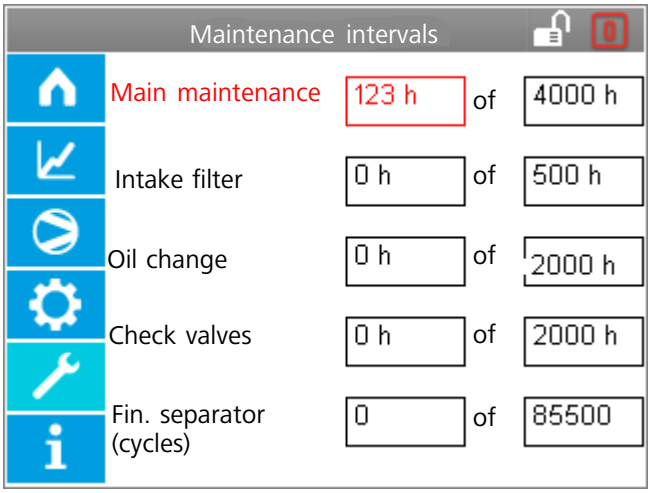
Intake filter maintenance (every 500 operating hours)

Oil change (every 2,000 operating hours)

Valve test (every 2,000 operating hours) and

Replacement of the final separator (indicated cycles x 10)

The first column shows the expired time (actual running time) since the last maintenance. The second column the set running time. The maintenance alarm is generated at 90% of the set running time. The values can be freely edited in each case using an input box. The maintenance is reset by entering "0" in the expired time.

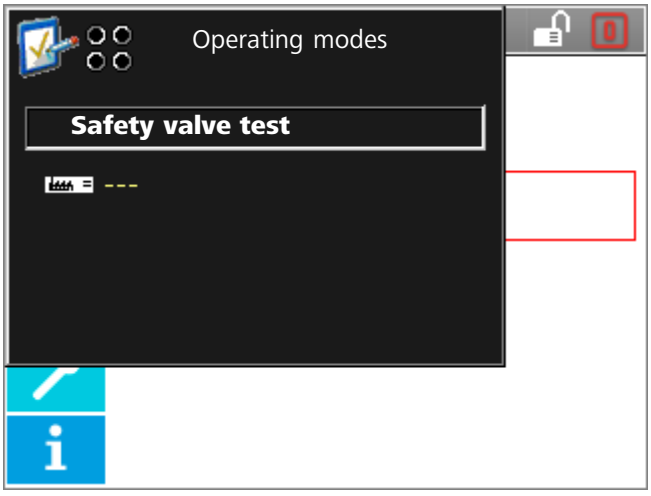


Tightness & safety valve test

Selection tightness test OR safety valve test, or everything deselected.

Selection Tightness test/safety valve test are interlocked against each other. Release from level "SERVICE"

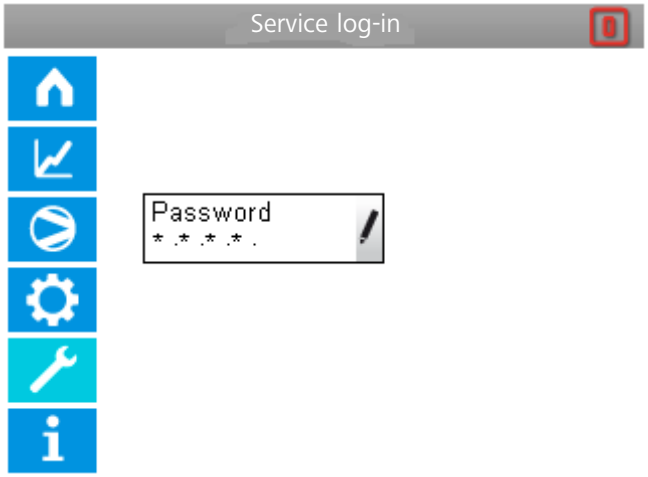
Safety valve test: the compressor is started manually and only switches off after pressing the *0* button. The final pressure sensors are switched off and the compressor can build up pressure against the safety valves without any hindrance. This procedure can be used to carry out a test.



This operating mode must only be run under supervision.

If the function "**Tightness test**" is activated, the compressor is started manually and then switches off automatically after the final pressure has been reached. Bleeding of the condensate valves is blocked for entire duration, the compressor comes to a standstill at the prevailing excess pressure after switching off automatically. This permits simple density and leak testing.

Log-in (registration)



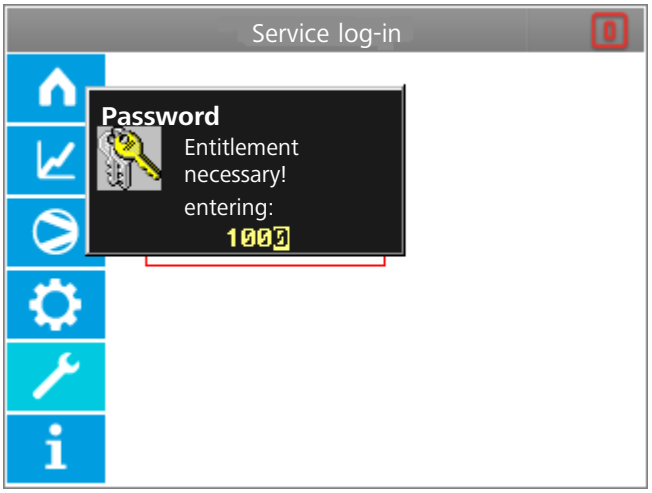
There are 4 registration levels:

- OPERATION
- SERVICE
- CONFIG
- ADMIN

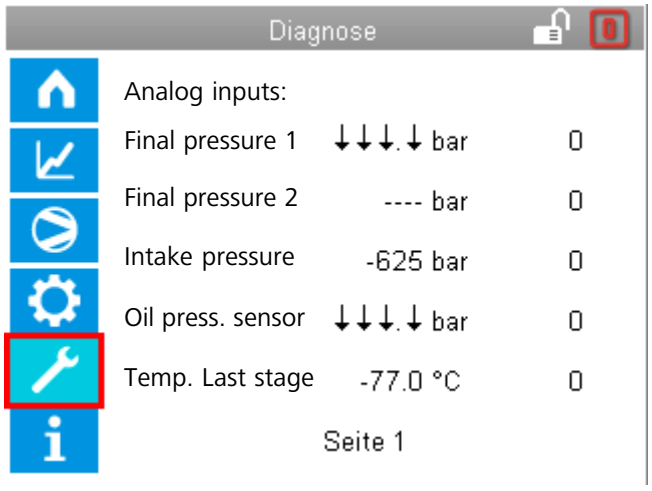
The higher level has, in each case also the entitlement for the lower levels.

Log-in (registered)

When a user is registered an open key symbol appears in the header line and, in the maintenance menu, the log-out button appears instead of the logout button.



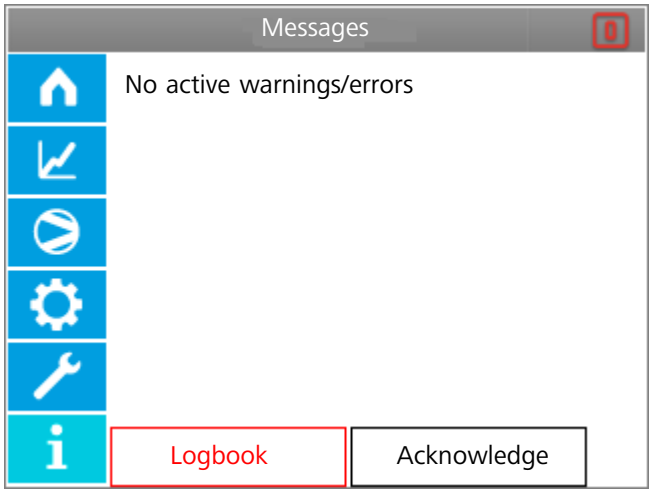
Diagnosis



Current message list

(empty)

There are no active warnings/errors. Right at the bottom of the page there is a button to open logbook or the message history.

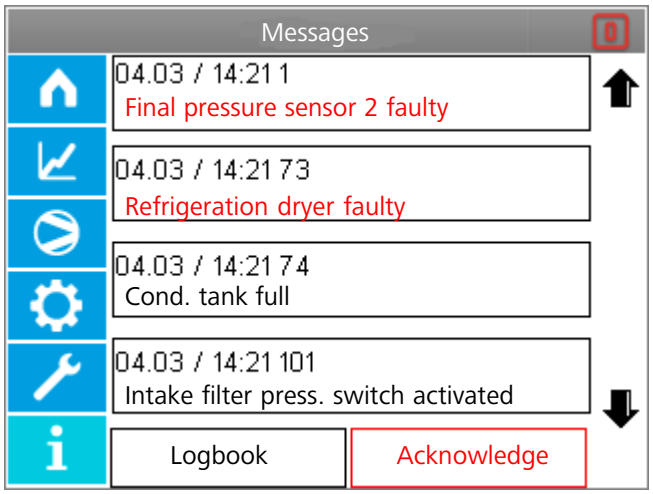


Current message list

(filled)

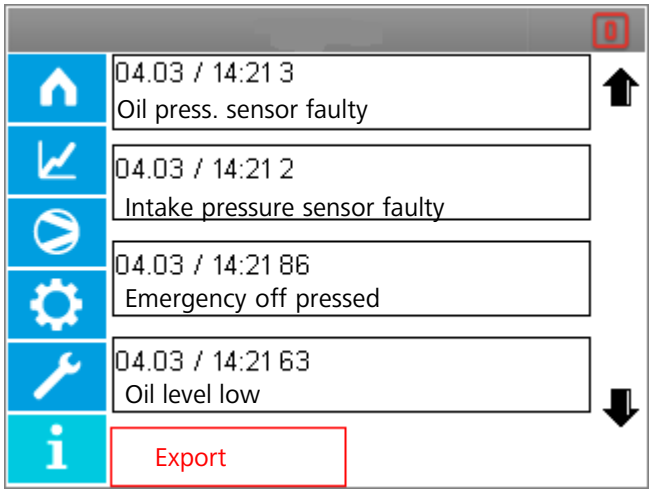
If there are more messages than the page can accommodate, you can scroll through the messages using the Up/ Down buttons. The button for the logbook always remains right at the bottom of the page.

The messages are, in each case, with time stamp, message number and message text (according to language selection). The display of one icon per message does not occur, instead we indicate the difference between warning and error by the use of a different colour for the individual message.



Historical list of messages (Page 1)

Display of historical messages. Each warning/error that occurs (optional compressor Start/Stop) is entered in the logbook. The logbook operates on the FIFO principle. Via the button "Logbook export" the logbook is exported in semicolon separated text format to the SD card. Entitlement for logbook exporting from level "OPERATION".



12. DRIVE SYSTEM

The compressor is driven, as standard, via a single or two V-belts (depending on the power rating). The direction of rotation of the compressor is to the left when looking onto the flywheel and to the right when looking from the front of the compressor unit. Observe the direction of rotation arrow on the compressor unit.

The motor is mounted on a hinged bracket. The V-belts are therefore tensioned by the weight of the motor.

13. COOLING

The cylinders, the intermediate coolers and the after-cooler of the compressor block are air-cooled. For this reason, the compressor block is fitted with a fan wheel. This draws the cooling air through the fan wheel cover. The fan wheel also serves as the flywheel for driving the compressor.

The cooling air outlet can be chosen at will by remounting the exhaust air chute[a)] : either upwards or to the back, see Fig. 35.

When the compressor unit is being erected make sure that there is adequate cooling air available. see section B.

Also take account of the max. permissible ambient temperature, see Technical Data, Chapter A-14.

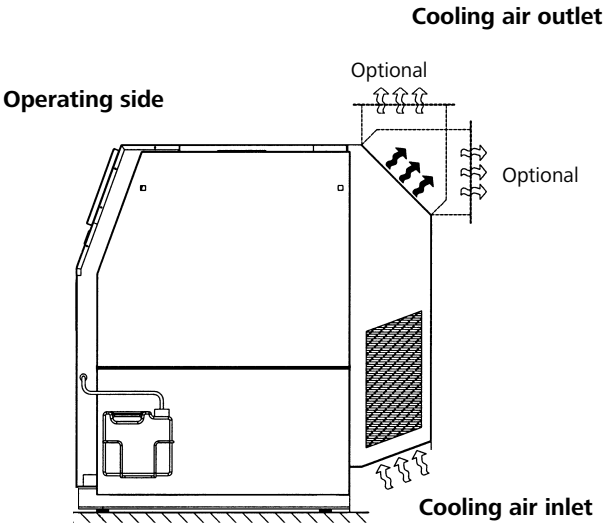


Fig. 35 Cooling air routing

a) Additional equipment as per order

14. TECHNICAL DATA

Modifications reserved

To prevent quoting the same figures several times, the entire set of details concerning the compressor unit is listed under General Points. For the same reason, the technical data for the associated compressor blocks and drive motors are listed under 14.3. and 14.4.

14.1. COMPRESSOR UNIT 225 TO 330 BAR:

General points:

Medium	Air
Suction pressure	Atmospheric
Operating pressure PE 300, 400, 550, 700, 850	225 to 330 bar
Setting, end pressure safety valve 200 bar compressor unit	max. 225 bar
Setting. end pressure safety valve 300 bar compressor unit	max. 330 bar
Permissible ambient temperature	+5 ... +45 °C
Permissible altitude	0 ... 1,500 m above sea level
Noise level, Super-Silent installation, approx.	70 ±2 dB(A) to 77 ±2 dB(A)
Oil type	See oil list in section F.
Operating voltage, standard	380-415-440 V, 600-690 V, 50 Hz
Control voltage	24 V DC, 50/60 Hz
Type of drive motor	3-phase squirrel cage motor
Type	B3
Protection class	IP55

compressor unit	**PE 300-VE**	**PE 400-VE**	**PE 550-VE**
Compressor block	IK120	IK12.14	IK150
Delivery quantity[a)]	300 l/min	400 l/min	550 l/min
	(18 m^3/h)	(24 m^3/h)	(33 m^3/h)
Setting end pressure safety valve as per order	as per order	as per order	as per order
Setting end pressure sensor	as per order	as per order	as per order
Filter system	P42	P42	P42
Speed	1,800 min^{-1}	1,800 min^{-1}	1,230 min^{-1}
Electric motor power	7.5 kW	11 kW	11 kW
Permissible inclination of compressor[b)]	5°	5°	5°
Weight, approx.[c)]	353 kg	394 kg	468 kg

compressor unit	**PE 700-VE**	**PE 850-VE**
Compressor block	IK180	IK180
Delivery volume [a)]	700 l/min	850 l/min
	(42 m^3/h)	(51 m^3/h)
Setting end pressure safety valve as per order	as per order	as per order
Setting end pressure sensor	as per order	as per order
Filter system	P61	P61
Speed	1,400 min^{-1}	1,800 min^{-1}
Electric motor power	15 kW	18.5 kW
Permissible inclination of the compressor [b)]	5°	5°
Weight, approx. [c)]	493 kg	506 kg

a) Free volume of air when filling bottles from 0 to 200 bar ±5 %

b) This value applies only if the oil level in the compressor comes up to the top mark in the oil sight glass when the compressor is in the normal position, and this value must not be exceeded.

c) Super-Silent VE compressor unit; open VE compressor unit approx. -90 kg

TECHNICAL DATA (CONT.)

14.2. COMPRESSOR UNIT 420 BAR:

General points:

Medium	Air
Suction pressure	Atmospheric
Operating pressure PE 320, 500, 600	225 to 420 bar
Setting, end pressure safety valve 420 bar compressor unit	max. 420 bar
Permissible ambient temperature	+5 ... +45 °C
Permissible altitude	0 ... 1,500 m above sea level
Noise level, Super-Silent compressor unit, approx.	70 ±2 dB(A) to 77 ±2 dB(A)
Oil type	See oil list in section F.
Operating voltage, standard	380-415-440 V, 600-690 V, 50 Hz
Control voltage	24 V DC, 50/60 Hz
Type of drive motor	3-phase squirrel cage motor
Type	B3
Protection class	IP55

compressor unit	**PE 320-VE**	**PE 500-VE**	**PE 600-VE**
Compressor block	IK12.14	IK18.1	IK18.1
Delivery volume[a)]	320 l/min (19 m^3/h)	500 l/min (30 m^3/h)	560 l/min (36 m^3/h)
Setting end pressure safety valve as per order	as per order	as per order	as per order
Setting end pressure sensor	as per order	as per order	as per order
Filter system	P41-420	P41-420	P61-420
Speed	1,450 min^{-1}	1,170 min^{-1}	1,490 min^{-1}
Electric motor power	7.5 kW	11 kW	15 kW
Permissible inclination of compressor[b)]	5°	5°	5°
Weight, approx.[c)]	395 kg	435 kg	450 kg

Modifications reserved

a) Free volume of air for bottle filling from 0 to 300 bar ±5 %

b) This value applies only if the oil level in the compressor comes up to the top mark in the oil sight glass when the compressor is in the normal position, and this value must not be exceeded.

c) Super-Silent VE compressor unit; open VE compressor unit approx. -90 kg

TECHNICAL DATA (CONT.)

14.3. COMPRESSOR BLOCKS

Compressor block	**IK120**
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
Direction of rotation (looking onto the flywheel)	to the left
Intermediate pressure 1st stage	approx. 8 bar
Intermediate pressure 2nd stage	approx. 50 bar
Compressor block oil volume	2.8 l
Oil pressure	4.5 bar ± 1.5 bar

Compressor block	**IK12.14**
Number of stages	4
Number of cylinders	3
Cylinder bore 1st stage	105 mm
Cylinder bore 2nd stage	105/88 mm
Cylinder bore 3rd stage	28 mm
Cylinder bore 4th stage	12 mm
Piston stroke	40 mm
Direction of rotation (looking onto the flywheel)	to the left
Intermediate pressure 1st stage	approx. 4.2 bar
Intermediate pressure 2nd stage	approx. 18 bar
Intermediate pressure 3rd stage	approx. 82 bar
Compressor block oil volume	2.8 l
Oil pressure	4.5 bar ± 1.5 bar

Compressor block	**IK150**
Number of stages	4
Number of cylinders	4
Cylinder bore 1st stage	120 mm
Cylinder bore 2nd stage	60 mm
Cylinder bore 3rd stage	32 mm
Cylinder bore 4th stage	14 mm
Piston stroke	50 mm
Direction of rotation (looking onto the flywheel)	to the left
Intermediate pressure 1st stage	approx. 4.5 bar
Intermediate pressure 2nd stage	approx. 17 bar
Intermediate pressure 3rd stage	approx. 73 bar
Compressor block oil volume	6 l
Oil pressure	4.5 bar ± 1.5 bar

Modifications reserved

TECHNICAL DATA (CONT.)

Compressor block IK180

Number of stages	4
Number of cylinders	4
Cylinder bore 1st stage	130 mm
Cylinder bore 2nd stage	60 mm
Cylinder bore 3rd stage	32 mm
Cylinder bore 4th stage	14 mm
Piston stroke	50 mm
Direction of rotation (looking onto the flywheel)	to the left
Intermediate pressure 1st stage	approx. 4.5 bar
Intermediate pressure 2nd stage	approx. 20 bar
Intermediate pressure 3rd stage	approx. 85 bar
Compressor block oil volume	6 l
Oil pressure	4.5 bar ± 1.5 bar

Compressor block IK18.1

Number of stages	5
Number of cylinders	4
Cylinder bore 1st stage	120 mm
Cylinder bore 2nd stage	85/60 mm
Cylinder bore 3rd stage	32 mm
Cylinder bore 4th stage	18 mm
Cylinder bore 5th stage	10 mm
Piston stroke	50 mm
Direction of rotation (looking onto the flywheel)	to the left
Intermediate pressure 1st stage	2.9 ... 4.3 bar
Intermediate pressure 2nd stage	13 ... 15 bar
Intermediate pressure 3rd stage	42 ... 48 bar
Intermediate pressure 4th stage	121 ... 168 bar
Compressor block oil volume	6 l
Oil pressure	4.5 bar ± 1.5 bar

Modifications reserved

TECHNICAL DATA (CONT.)

14.4. DRIVE MOTORS

General points

Type of drive motor . . . . . 3-phase squirrel cage motor
Type B3
Protection class IP55
Operating voltage . . . . . Multi-voltage

Drive motor 7.5 kW

Power . . . . . 7.5 kW
Size . . . . . A132 S
Speed . . . . . 2,900 r.p.m.
Weight . . . . . 50 kg

Drive motor 11 kW

Power . . . . . 11 kW
Size . . . . . A160 M
Speed . . . . . 2,930 r.p.m.
Weight . . . . . 98 kg

Drive motor 15 kW

Power . . . . . 15 kW
Size . . . . . A160 M
Speed . . . . . 2,935 r.p.m.
Weight . . . . . 108 kg

Drive motor 18.5 kW

Power . . . . . 18.5 kW
Size . . . . . A160 M
Speed . . . . . 2,935 r.p.m.
Weight . . . . . 129 kg

TECHNICAL DATA (CONT.)

14.5. FILTER SYSTEM

14.5.1. P42 and P61

Operating pressure, standard	225/330 bar
Operating pressure, max.	350 bar
Flow rate	P42: max. 550 l/min. P61: max. 850 l/min.
Preparable air volume referred to 20 °C to 300 bar.	P42: 1,600 m^3 (1,540 m^3 with SECURUS) P61: 2,480 m^3 (2,420 m^3 with SECURUS)
Deployment temperature range	+5 ... +50 °C
Residual water content	< 10 mg/m^3
Residual oil content	< 0.1 mg/m^3
Pressure dew point	-20 °C, corresponding to 3 mg/m^3 at 300 bar

14.5.2. P41-420 and P61-420

Operating pressure, standard	225/330/420 bar
Operating pressure, max.	420 bar
Flow rate	P41-420: max. 450 l/min. P61-420: max. 600 l/min.
Preparable air volume referred to 20 °C to 200 bar.	P41: 1,058 m^3 (901 m^3 with CO cartridge P61: 2,200 m^3 (1,700 m^3 with CO cartridge)
Deployment temperature range	+5 ... +50 °C
Residual water content	< 10 mg/m^3
Residual oil content	< 0.1 mg/m^3
Pressure dew point	-20 °C, corresponding to 3 mg/m^3 at 300 bar

14.5.3. Oil and water separator:

Outside diameter	95 mm
Length	306 mm
Filter content	0.54 l
Weight	Approx. 11 kg
Pipe connections	G ¼“
Max. number of load cycles	See pressure vessel operating instructions in section F.

14.5.4. Fine after-cleaner:

Filter system	P41-420	P61-420
Outside diameter	114.5 mm	114.5 mm
Length	639.5 mm	835 mm
Filter content	2.1 l	2.85 l
Weight	7.7 kg	---
Pipe connections	G ⅜“	G ⅜“

Modifications reserved

Section A
Description

Section B
Erection, Commissioning

Section C
Operation

Section D
Maintenance, Repair

Section E
Storage, Conservation

Section F
Plans, Diagrams, Drawings

Section G
Spare parts lists

B. ERECTION, COMMISSIONING

1. ERECTION

The frame of the compressor unit is fitted with vibration element mounts. Foundations or any other fixing down is not required.

During installation, please note the following:

1.1. COMPRESSOR ROOM

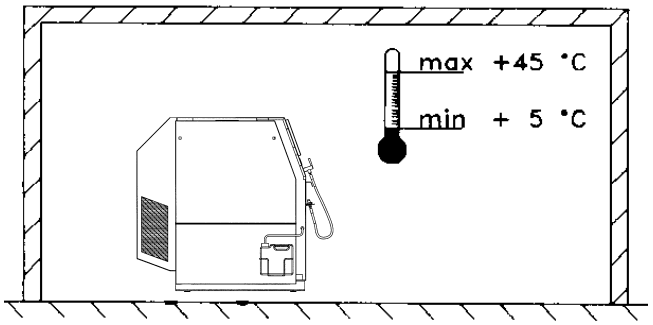


Fig. 36 Room temperature

- The compressor room should be clean, dust-free, dry, and as cool as possible.
- Avoid direct sunlight. If possible, choose the north side of the building.
- Additional equipment or piping systems which produce heat should not be installed in the same room, or should be adequately insulated.
- The substrate must be suitable for the weight of the unit.
- Install the station in a horizontal position. See Techn. Data in section A. for the max. permissible inclination.
- Ensure adequate ventilation. Caution: room temperature = cooling temperature!
  Min. = +5 °C, max. = +45 °C. Fig. 36.

1.2. ERECTION

- As far as possible you should install the unit in such a way that the cooling fan on the compressor can draw in cool air from the outside, e.g. through a hole in the wall, mounted as low as possible.
- Make sure that there is an adequate exhaust opening and that it is mounted as high up as possible.
- Install the compressor as close as possible to the intake opening.
- Install the unit in such a way that intake of heated up or even hot cooling air is avoided.
- The following listed minimum distances must be maintained.

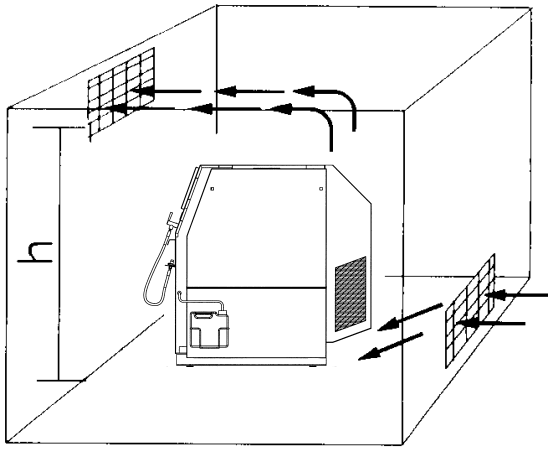


Fig. 37 Erection of the unit

1.3. NATURAL VENTING

Natural ventilation is the simplest form of ventilation. It is produced practically automatically by heating or cooling. It is adequate if no thermal overload is to be expected. On unit with low drive power ratings, with intermittent operation or in moderate climates, this is the ideal method of cooling the compressor. The suction and exhaust openings depend on:

- the drive power rating of the electric motor,
- the difference in height between the suction and exhaust openings,
- the air volume of the compressor room.

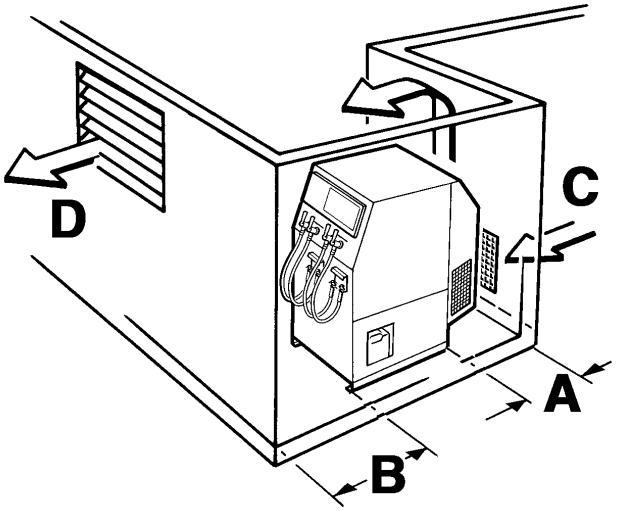


Fig. 38 Erection with natural ventilation

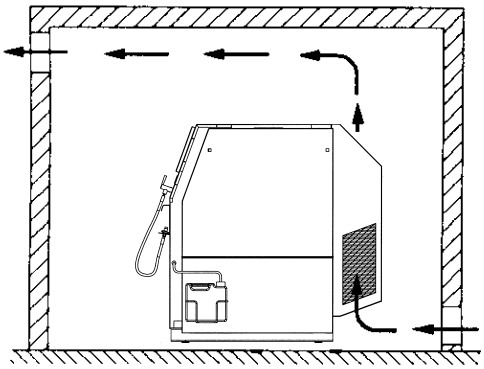
A Minimum distance from wall, suction side:
Standard unit: 0.5 m,
Super-Silent unit: 0 m
B Minimum distance from wall, exhaust side: 0.75 m
(can be omitted when installing in front of an opening)
C Suction opening (see Table 1)
D Exhaust opening (see Table 1)

Table 1 provides an overview of the required parameters. If this cannot be achieved you must use forced ventilation, see 1.4.

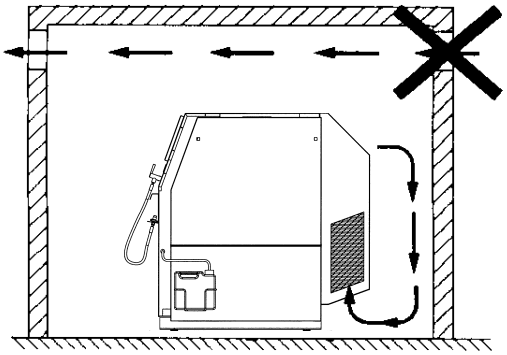
Air inlet and outlet openings						
Motor power rating (kW)	Room volume/height difference					
	$V = 50\ m^3$ $\Delta h = 2\ m$		$V = 100\ m^3$ $\Delta h = 3\ m$		$V = 200\ m^3$ $\Delta h = 4\ m$	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
7.5	0.90 m^2	0.75 m^2	0.60 m^2	0.50 m^2	0.24 m^2	0.20 m^2
11	1.38 m^2	1.15 m^2	0.90 m^2	0.75 m^2	0.54 m^2	0.45 m^2
15	1.92 m^2	1.60 m^2	1.45 m^2	1.20 m^2	0.90 m^2	0.75 m^2
18.5	2.30 m^2	1.92 m^2	1.47 m2	1.44 m^2	1.08 m^2	0.90 m^2

Table 1 Inlet and outlet openings

Fig. 39 to Fig. 41 show erection examples with natural ventilation.

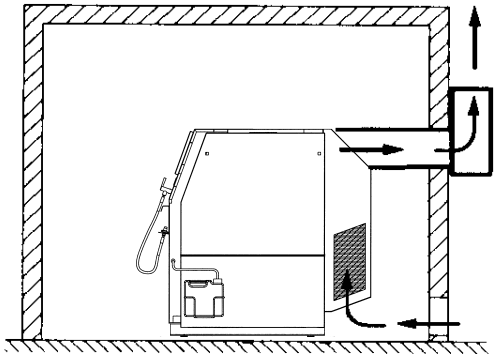


Correct: Air inlet low down, cooling air flows through the unit

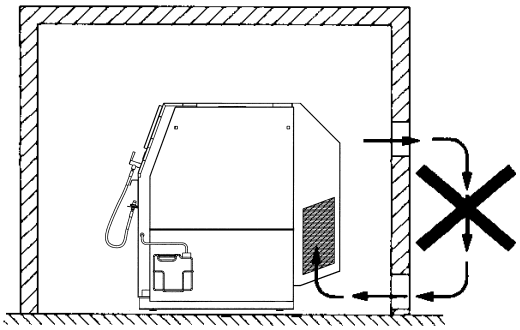


Incorrect: Air inlet too high, cooling air does not reach the unit

Fig. 39 Erection with natural ventilation, Example 1

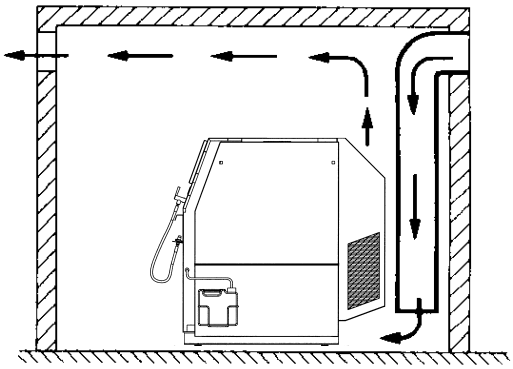


Correct: Air outlet directed upwards, cooling circuit not possible

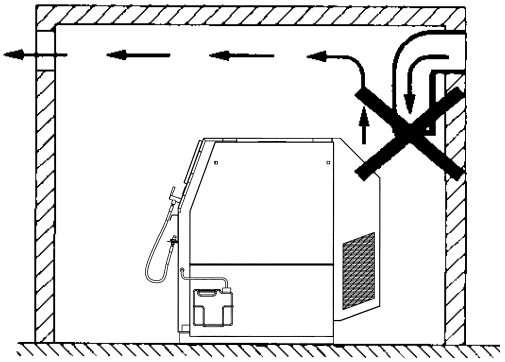


Incorrect: The hot air is not dissipated, circulates and is drawn in again.

Fig. 40 Erection with natural ventilation, Example 2



Correct: Cooling air is directed directly into the unit



Incorrect: Cooling air does not reach the inlet opening, inlet duct is too short

Fig. 41 Erection with natural ventilation, Example 3

1.4. FORCED VENTILATION

With drive power ratings in excess of 11 kW, natural ventilation may no longer be adequate. Under certain conditions, this can also apply to lower drive power ratings, e.g.:

- if the compressor has to be installed in a very small room,
- if the cooling openings are not large enough,
- if other equipment with higher rates of heat development operate in the same room, or
- if two or more compressors operate in the same room.

The basic rule is: Forced ventilation is required when natural ventilation does not prevent the room temperature from rising above the permissible maximum ambient temperature quoted in Chapter 14.

Cooling air flow

The necessary cooling air flow is calculated using the following equation:

$$\text{Required cooling flow rate } [m^3/h] = 360 \times \text{drive power rating } [kW]$$

The following equation can be used to calculate the cross section of the cooling air duct:

$$\text{Duct cross section } [m^2] = \frac{\text{Cooling air flow } [m^3/h]}{\text{Flow speed } [m/s] \times 3{,}600}$$

The recommended flow speed is 3 to 5 m/s, max. 10 m/s.

Example: Drive power rating 11 kW

Cooling airflow = 360 x 11 = 3,960 m^3/h
Duct cross section = 3,960 : (5 x 3,600) = 0.22 m^2

Ventilation types

There are various different types of forced ventilation:

- free blowing out with room fan
- ducted ventilation with or without additional fan[a)]
- ducted ventilation with circulation flap and additional fan[a)]

With correct method of operation free blow-out with a fan for all PE-VE compressor unit should be adequate.

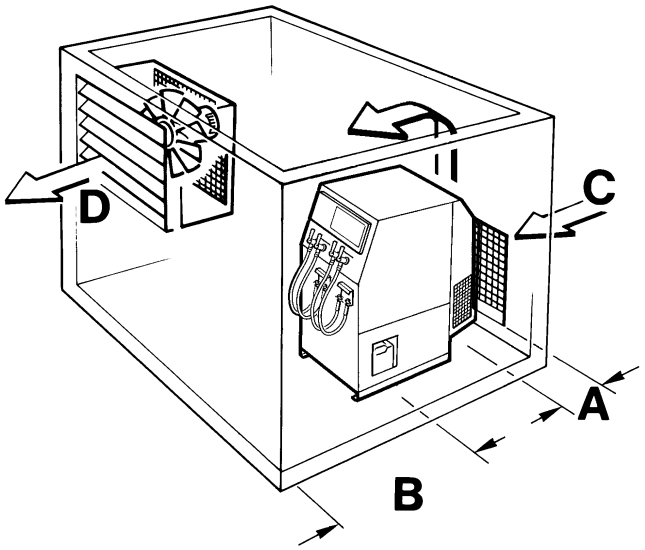
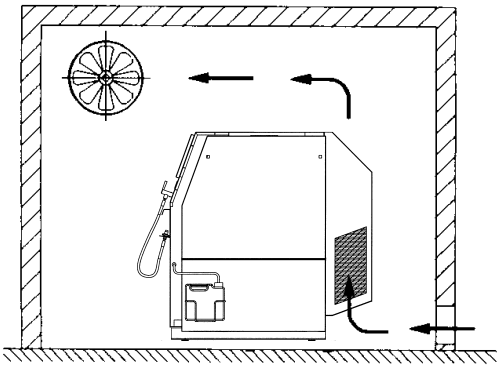


Fig. 42 Erection with forced ventilation

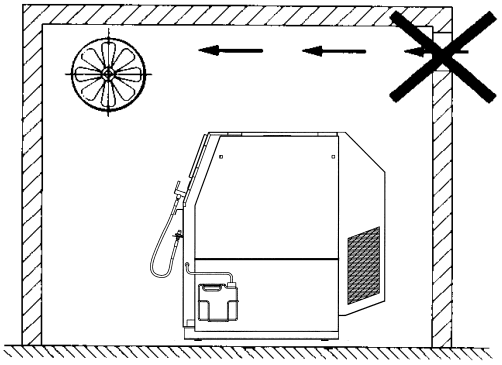
A Minimum distance from wall, suction side:
Standard unit: 0.5 m,
Super-Silent unit: 0 m
B Minimum distance from wall, exhaust side: 0.75 m
(can be omitted if the erection is in front of an opening)
C Suction opening
D Exhaust opening

a) CAUTION: Make sure that the maximum counter-pressure in the inlet and outlet duct of Δ_p = 0.5 mbar = 5 mm W.G. (measured at a distance of 1 m) is not exceeded.

Fig. 43 and Fig. 44 show a few possible examples for forced ventilation by free blow-out.

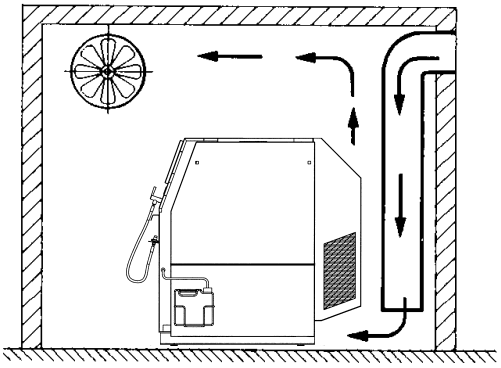


Correct: The air flows along an intended flow line through the compressor

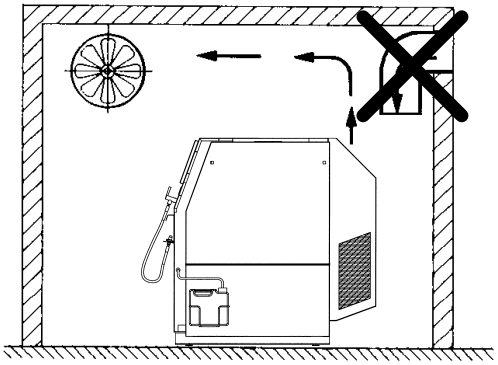


Incorrect: The cooling air "draws" through

Fig. 43 Erection with forced ventilation, Example 1



Correct: The cooling air is directed downwards through a ventilation duct



Incorrect: Length of the ventilation duct inadequate

Fig. 44 Erection with forced ventilation, Example 2

2. ELECTRICAL INSTALLATION

You must take account of the following when installing the electrical equipment:

- In section F of this operating instruction manual contains the standard circuit diagrams for the configuration of the unit type. When connecting the compressor control system use only the circuit diagram provided in the switchgear cabinet since any changes required for the specific contract with respect to the standard circuit diagrams will be entered here.
- Observe the local electrical supply company (EVU)'s regulations.
- The connection should only be carried out by an expert technician.
- Check for perfect protection line laying.
- Check that the motor voltage, switchgear voltage and frequency agree with the mains voltage and mains frequency.
- The customer must supply the required cabling, main fuses and a main switch (power circuit breaker). Ensure clear and direct allocation of the main switch to the installation. The fuses must be in agreement with the regulations of the responsible electrical supply company. With rigidly wired installations you must fit an isolator for isolation from the mains having a contact opening distance of at least 3 mm at each terminal.
- Set the thermal motor protection over-current relay to the motor nominal current for direct switching, and, with star-delta switching to a motor nominal current of x 0.58: Example: Motor nominal current = 10 A, setting to 5.8 A.
- If the motor is not already secured in the framework of unit control, the following guideline values are applicable (see following table; use slow-acting fuses).

FUSE TABLE

Motor type	V	125	230	240	**400**	415	440	500	600	660
3-phase AC 7.5 kW (star-delta wiring)	A	50	35	35	**20**	16	16	16	16	10
Three phase AC 7.5 kW (direct switching)	A	63	35	35	**25**	25	25	20	16	16
3-phase AC 11 kW (star-delta switch-on)	A	--	50	50	**25**	25	25	20	20	16
Three phase AC 11 kW (direct switching)	A	--	63	50	**35**	35	35	25	25	25
3-phase AC 15 kW (star-delta switch-on)	A	--	63	63	**35**	35	35	25	25	20
Three phase AC 15 kW (direct switching)	A	--	80	80	**50**	35	35	35	35	25
3-phase AC 18.5 kW (star-delta wiring)	A	--	80	63	**50**	50	35	35	25	25
Three phase AC 18.5 kW (direct switching)	A	--	100	80	**63**	50	50	50	35	35

3. FILLING PANEL CONNECTION (OPTION)

The breathing air unit can be fitted with external filling panels as additional equipment. The following points must be observed when connecting the filling panels:

The connection of the filling panel on the compressor unit is carried out in accordance with the piping layout and circuit diagram in section F.

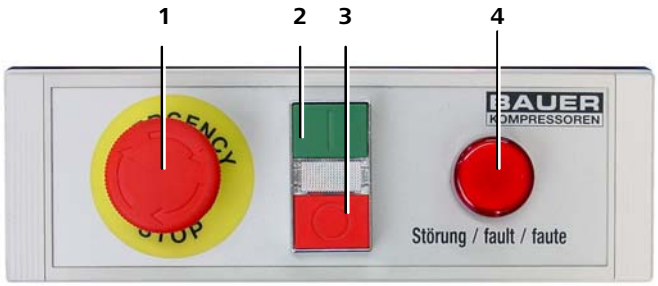
A pneumatic line and, depending on the model, one or two electrical cables must be laid on site.

- A pneumatic line (stainless steel pipe 8x1mm diameter) connects the isolating valve on the compressor unit with the inlet to the filling panel.
- The electrical cable from the operating section is connected to the compressor control system (S1 and S2, remote ON or OFF)
- The electrical cable from the pressure sensor (HU filling panels, i.e. only for two pressure ranges) is connected to the compressor control system (F16.2), see circuit diagram in section F.

The compressor unit can be switched on and off via the operating section. Error messages are displayed on the fault indicator lamp and the compressor unit is switched off. For a detailed description of the compressor control system see Chapter A11.

3.1. Electrical connection

The connection of the operating section for the compressor control system is carried out in accordance with the circuit diagram of the compressor control system of the compressor unit associated with the filling panel.



1 Emergency stop button
2 On button
3 Off button
4 Fault warning light

Fig. 45 Operating section filling panel

4. COMMISSIONING

4.1. MEASURES TO TAKE PRIOR TO COMMISSIONING

All compressor units are checked before delivery in the factory so that commissioning can be carried out after proper erection, installation and successful acceptance tests. However, the following points must always be observed.

- Read the operating manual carefully. Make sure that all persons who operate the compressor or the compressed air station are familiar with the function of all the operating and indicator elements. Pay particular attention to the warning instructions in Chapter C.
- Depending on the type of compressor, some compressors are delivered without any oil in the crankcase. Check this before starting for the first time and, if necessary, fill up with compressor oil as per Chapter D-2. When starting up after an extended period of storage, or standstill times in excess of 2 years (or 1 year when using mineral based oil) drain the oil off and fill with new compressor oil.
- When starting up for the first time or if commissioning after maintenance or repair work, turn the compressor over by hand using the flywheel to check that all components are capable of moving freely. Check all fixing bolts and pipe fittings for tightness and leaks and, if necessary, tighten to the prescribed torque value.
- Carry out an oil level check as per Chapter D-2. before starting on each occasion and check that the maintenance work as per the maintenance booklet, Chapter D.1 have been carried out.
- When starting up for the first time or when commissioning after maintenance work, allow the compressor to run with open condensate drain valves for 10 minutes in order to ensure perfect lubrication before starting to build up the pressure. To do this, release the screw (3, Fig. 46) and remove the plug (2) from the solenoid valve coil (1).
- Check the direction of rotation of the motor immediately after switching on with the direction of rotation arrow on the unit. If the direction of rotation is incorrect then the phasing is wrong. In this case, switch the unit off **immediately** and swap two of the three phases at the inlet terminals in the switchgear box. Under no circumstances should you make any changes in the motor terminal box.

The compressor block will, in theory, compress in both directions of rotation, but the cooling of all compressor blocks is considerably reduced if the direction of rotation is incorrect. In addition, the system lubrication is not guaranteed if the direction of rotation is incorrect and this will have damage to the compressor block as a result.

- Whenever commissioning is performed, check that all the station components are in perfect working order. If any display irregularities, switch off the station immediately and locate and rectify any errors or get in touch with the Customer Service department.
- Open the outlet cock. These must remain open during operation. The cock should only be closed for maintenance work on the compressor so that no air is lost, e.g. from the storage vessels.

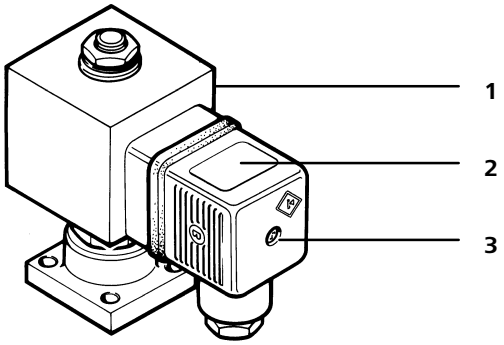


Fig. 46 Solenoid valve plug

Section A
Description

Section B
Erection, Commissioning

Section C
Operation

Section D
Maintenance, Repair

Section E
Storage, Conservation

Section F
Plans, Diagrams, Drawings

Section G
Spare parts lists

C. OPERATION

1. SAFETY MEASURES

1.1. INFORMATION AND WARNING SYMBOLS

Meanings of information and warning symbols which may be attached to the compressor or its components depending on their design and intended use.

Warning

Do not touch hot surfaces!

The danger of burning exists primarily when touching cylinders, cylinder heads and the pressure lines of the individual compressor stages.

Warning

Warning of dangerous electrical voltage

Touching the equipment can result in electrocution. Work on electrical systems or operating equipment may only be carried out by an electrical technician or other trained persons working under the supervision of an electrical technician and must be performed in accordance with electrotechnical regulations.

Warning

The machine has an automatic control system and can start up without warning!

Switch the main switch off for maintenance and repair work or remove the mains plug and secure the machine against switching on again.

Command

The instructions must be read by the personnel who are tasked with activities on the machine.

This operating instruction manual and all other applicable instructions, directions, regulations etc. must be read and understood by the personnel before starting the activity on the machine.

Command

Wear ear defenders!

Ear defenders must be worn when working on the running machine.

NOTE

Make sure the direction of rotation is correct!

When switching the machine on check the direction of rotation of the drive motor as indicated by the arrow.

1.2. HOW SAFETY INFORMATION IS LABELLED

Important instructions that have a bearing on the level of danger to which persons are exposed, as well as technical safety and operational safety, are given particular emphasis as shown below. The symbols precede the relevant measures and have the following meanings:

Indicates working and operational procedures which must be adhered to precisely in order to prevent persons being put in a dangerous situation.

Strict compliance with this information is necessary in order to prevent the machine or its equipment from being damaged or destroyed.

This refers to technical requirements to which the operator must pay particular attention.

1.3. FUNDAMENTAL SAFETY INFORMATION

1.3.1. Intended usage

- The machine/station has been constructed in line with both the state of the art and recognised safety-related regulations. Despite this, its usage can pose a risk to life and limb for the user or third parties, and can have adverse effects on the machine and other property.
- The machine/installation should only be used in a technically perfect condition and in an intended, safety and danger aware method, taking into account the operating instructions! In particular, faults that have a negative effect on safety must be immediately rectified!
- The machine/unit is exclusively for the compression of the medium (air/gas) quoted in section A, Chap.14. Technical Data. Any type of usage that falls outside this scope is classified as improper usage. Damage resulting from this is not the liability of the manufacturer/supplier. The user alone bears the risk of this. Intended usage also implies observance of the operating manual and adherence to inspection and maintenance conditions.

1.3.2. Organisational measures

- Always keep the operating manual close to hand at the location where the machine/station is used, in a compartment or holder designed for this purpose and labelled appropriately.
- In addition to the operating instructions observe and advise the generally applicable binding regulations for accident prevention and for environmental protection. Extracts see Chap.1.4. These obligations can also include, e.g. the handling of hazardous materials or the provision/ wearing of personal protection equipment.

- Add instructions to the operating manual, including supervisory and reporting duties, in order to make provision for particular aspects of operation in terms of how work is divided up, work processes, and which personnel are deployed, for example.
- Personnel charged with carrying out activities on the machine must have read the operating manual and, in particular, this safety information chapter before they commence work; Leaving it until work has already begun is too late. This particularly applies to those personnel who will only be working on the machine from time to time (during maintenance, for example).
- As a minimum requirement, carry out occasional checks to ensure that personnel are working in a way that shows they are conscious of both safety issues and potential risks, and that they are complying with the operating manual.
- The personnel must not have loose long hair, loose clothing or jewellery, including rings. There is a danger of injury e.g. by being caught up or being drawn in.
- Use personal protection equipment if required or demanded by the regulations.
- Observe all the safety and danger warnings on the machine/unit.
- Keep all the safety and danger warnings on the machine/unit in a fully legible condition.
- If changes occur in the machine/station or in its operating behaviour and these could impact on safety, stop the machine/station immediately and report the fault to the department/person responsible.
- Do not make any unauthorised changes, additions or modifications to the machine/station which could compromise safety. This also applies to installation, the setting of safety equipment and valves, as well as welding on the pipelines and containers.
- Spare parts must comply with the technical requirements set out by the manufacturer. This is always guaranteed when using original spare parts.
- Do not make any program (software) changes to programmable control systems.
- The operator must perform quality control procedures (pressure inspection, visual inspection) on hose lines at appropriate intervals, even if they do not show any obvious signs of defects that could impact on safety.
- Adhere to the prescribed intervals or those specified in the operating manual for recurrent tests/inspections.
- A set of tools suitable for the work to be carried out is imperative for carrying out the servicing measures.
- Advise the location and method of operation of the fire extinguishers.
- The fire alarm and fire-fighting facilities must be observed.

1.3.3. Qualification, basic duties

- Work on/with the machine/station may only be carried out by reliable personnel. Ensure that statutory minimum age limits are observed.
- Deploy only trained personnel or personnel who have undergone instruction. Clearly define the responsibilities that personnel have in terms of operation, maintenance and repairs.
- Make sure that only authorised personnel work on/use the machine.
- Establish who is in charge of the machine and give him/her authorisation to reject any instructions by third parties that are in breach of safety procedures.
- Only allow apprentices or other personnel who are undergoing instruction or general training to work on/use the machine/station while under constant supervision by an experienced member of staff.
- Work on the electrical equipment in the machine/station may only be carried out by an electrical technician or other trained persons working under the guidance and supervision of an electrical technician and must be performed in accordance with electrotechnical regulations.
- Work on gas-related equipment must only be carried out by personnel who have undergone training in this field.

1.3.4. Safety information during operation

- Refrain from any working practices which may compromise safety.
- Take measures to ensure that the machine/station is only ever operated in a safe and correctly functioning state. Only operate the machine if all protection equipment and safety-related equipment (e.g. detachable protection equipment, emergency off equipment and noise reduction devices) are present and functioning correctly.
- Check the machine/station for outwardly noticeable damage and defects at least once a day. Report any changes that have occurred (including those affecting the operating behaviour) to the department/person responsible immediately. If necessary, stop and secure the machine immediately.
- In the event of malfunctions, stop and secure the machine/station immediately. Rectify faults without delay (or arrange to have them rectified by someone else).
- Switch the machine/station on and off and manage indicator displays as stipulated in the operating manual.
- Before switching on the machine/station or starting it up, make sure that there is no risk of it harming anyone whilst in operation.

- Adhere to the activities and dates for setting, maintenance and inspection as stipulated in the operating manual, including specific information on replacing parts/fitting components. These activities may only be carried out by specialist personnel.
- Inform the operating personnel about the special tasks and service work before starting the execution. Nominate a supervisor.
- For all work that affects the operation, product adaption, changeover or setting of the machine/unit and its safety-relevant equipment and inspection, maintenance and repair, observe the switching on and switching off procedures in accordance with the operating instructions and instructions for servicing work.
- Service area to be made and secured as large as possible if required.
- If the machine/unit is switched off completely for maintenance and repair work you must ensure that it is secured against unexpected starting up. Lock the main command equipment and remove the key, and/or hang a warning sign on the main switch.
- Individual parts and larger sub-assemblies must be securely suspended in lifting tackle when replacing, so that no danger can be created. Use only suitable and technically perfect lifting tackle and load carrying equipment having adequate carrying capacity. Do not stand or work under suspended loads.
- Use only experienced persons for slinging the loads and the instruction of the crane driver. The instructor must be in view of the operator or be in voice contact.
- When working above head height you must use access equipment and working platforms provided for the purpose or other safety-compliant equipment. Do not use machine parts as access aids. When carrying out maintenance work at higher levels you must wear fall arresting equipment.
- Begin maintenance/repair work by cleaning any oil, fuel or cleaning agents off the machine; in particular, the connections and screw fittings. Do not use aggressive cleaning agents. Use lint-free cleaning cloths.
- Before cleaning the machine with water, a steam jet (high pressure cleaner) or other cleaning agents, cover or seal off all openings that must not be penetrated by water/steam/cleaning agents for reasons of safety and/or functionality. Electric motors and control cabinets are particularly at risk.
- When carrying out cleaning work in the machine room, make sure that the temperature sensor on the fire alarm and extinguisher equipment does not come into contact with hot cleaning agents to prevent triggering the extinguisher equipment.
- The covers/adhesive bonding must be removed completely after cleaning.
- After cleaning, inspect all lines for leaks, loose connections, chafe marks and damage. Repair any defects detected immediately.
- During maintenance and repair work, any screw connections that have been loosened must always be tightly screwed back in again.
- If safety equipment needs to be removed for maintenance and repair purposes, it must be reattached and inspected as soon as the maintenance and repair work is complete.
- Make sure that auxiliary materials and replacement parts are disposed of safely and in an environmentally-friendly manner.

1.3.5. Particular sources of danger

- Only use original fuses with the current stipulated. In the event of faults in the electrical power supply, switch off the machine/station immediately.
- Work on electrical systems or operating equipment may only be carried out by an electrical technician or other trained persons working under the guidance and supervision of an electrical technician and must be performed in accordance with electrotechnical regulations.
- Where stipulated, machine and station components requiring inspection, maintenance and repair work must be switched to a de-energised state. Once the components have been isolated from the supply, first check that they are de-energised and then short-circuit them before also isolating neighbouring energised components.
- The electrical equipment in a machine/station must be checked on a regular basis. Defects such as loose connections or scorched cables must be rectified immediately.
- If work on live parts is required, enlist a second person who can activate the emergency off switch or main switch in order to trip the voltage in an emergency. Cordon off the working area with a red and white safety chain and a warning sign. Only use insulated tools.
- Execute welding, flame-cutting and grinding work on the machine/unit only when the work has been specifically approved. e.g. there may be a danger of fire or explosion.
- Clean the machine/unit and surroundings of dust and flammable materials and ensure adequate ventilation (danger of explosion) before welding, flame-cutting and grinding.
- When working in confined spaces, follow national regulations where applicable.
- Work on pneumatic devices must only be carried out by persons having special skills and experience with pneumatics.
- All lines, hoses and screwed fittings should be checked regularly for leaks and externally detectable damage. Any damage must be rectified immediately. Compressed air and gases coming out can cause injuries and fires.

- Before commencing repair work, depressurise any sections of the system and pressure lines that are going to be opened.
- Lay and fit the compressed air lines properly. Do not swap the connections over. The fittings, length and quality of the hoses must comply with requirements.
- The noise protection equipment on the machine/unit must be in the protection position when the equipment is running.
- Wear the specified personal ear defenders.
- When handling oils, grease and other chemical substances you must observe the safety regulations applicable to the product.
- When loading/unloading, use only lifting tackle and load carrying equipment having adequate carrying capacity.
- Nominate an expert supervisor for the lifting procedure.
- Lift the machines properly using only lifting equipment.
- Use only a transport vehicle having adequate carrying capacity.
- Secure the load in a reliable manner. Use suitable lashing points.
- Fit transport securing devices to the machine/unit for transporting if necessary. Fix the relevant sign. Remove the transport securing devices properly before commissioning/re-starting.
- Carefully re-fit and secure the parts removed for transport purposes before re-starting.
- Isolate the machine/unit from all external energy supplies, even if the location to be changed is over a small distance. Connect the machine properly to the mains again before re-starting.
- Proceed as described in the operating manual when re-commissioning the machine.

1.3.6. Danger instructions for handling pressure vessels

- Never open or release the vessel covers or pipe connectors under pressure; always de-pressurise the vessel or unit first.
- Never exceed the permissible vessel operating pressure.
- Never heat the vessel or other individual parts above the stated maximum operating temperature.
- Damaged pressure vessels should always be replaced completely.

  Pressurised vessel components cannot be obtained as spare parts because the vessels are only ever tested and documented as a unit (see pressure vessel documentation, serial numbers!).
- Always observe the permissible operating method of the pressure vessel.

We differentiate between:

- Vessels for static loading

- Vessels for swelling (dynamic) loading.

<u>- Vessels for static loading:</u>

These pressure vessels are under virtually constant operating pressure, and the pressure fluctuations are only very small. Vessels for this type of loading are not specially marked and can be operated as long as no safety-relevant faults are found during the regular vessel repeat testing procedures.

We recommend replacing aluminium vessels after latest 15 years.

<u>- Vessels for swelling loading:</u>

These pressure vessels can also be operated under fluctuating operating pressures. The pressure can fluctuate between atmospheric pressure and the maximum permissible operating pressure.

Vessels for this type of loading are specially designated for swelling loads in the pressure vessel documentation and with the relevant instructions in the operating instruction manual. The details covering the permissible operating duration can be found in the technical documents for these vessels.

Because of the fluctuating operating pressure, these vessels are subjected to a so-called swelling load, which represents a particularly high level of loading for the vessel. The change between two different pressures is designated as a load change, two load changes, i.e. one pressure approch and one pressure reduction, are a cycle. The details covering the permissible number of cycles can be found in the technical documents for these vessels,depending on the fluctuation of the operating pressure.

When half the permissible number of cycles is reached, the vessel must be subjected to an internal test which includes testing the critically loaded vessel areas using suitable test procedures in order to ensure operational safety.

After reaching the full number of permissible cycles, the vessel must be replaced and scrapped.

Note down the number of cycles run if there is no automatic cycle counter.

We recommend replacing aluminium vessels after latest 15 years.

These measures must always be taken and observed for your own safety and the safety of your colleagues and customers!

In order not to load the pressure vessel unnecessarily, you should always check the non-return valves, that are intended to prevent a drop in pressure, and also the pressure retention valves, which are also intended to prevent large pressure fluctuations, at regular intervals for internal and external leaks and functionality.

- Check your pressure vessels regularly internally and externally for corrosion damage.
- Take particular care with used pressure vessels if their previous operating mode has not been clarified.

1.4. SAFETY REGULATIONS

The following regulations and provisions must be observed for commissioning and operation of compression unit as filling unit:

a- Pressure Equipment Directive (PED) of 29/05/1997

b- German Ordinance on Industrial Safety and Health (BetrSichV) of 27/09/2002

c- German Equipment Safety Act (GSG) of 11/05/2001

d- 14. German ordinance for the equipment safety statute (14th GSGV – Pressure equipment ordinance) dated 03.10.2002

If a high pressure compressor is used for filling pressurised gas containers (cylinders) or for supplying pneumatic systems, the following apply to commissioning and operation within the Federal Republic of Germany:

f- The statutory accident prevention regulations (UVV) set out by accident prevention and insurance associations, including, in particular:

- **BGV A1 dated 01. January 2004**

The above ordinances can be obtained from publishing houses specialising in regulations, such as:

Carl Heymanns Verlag
Luxemburger Str. 449
50939 Cologne, Germany

Beuth-Vertrieb GmbH
Burggrafenstr. 4 - 7
10787 Berlin, Germany

The manufacturer observes all regulations which are of relevance to its activities, and designs its stations accordingly. If required, at our Munich factory we can offer a component testing service prior to commissioning, in accordance with section 14 of the German Ordinance on Industrial Safety and Health. If you wish to take advantage of this, please get in touch with our Technical Customer Service department. They will also provide our **"Important instructions for the approval process and the testing of filling unit before commissioning".**

This pamphlet is also available for download from our Internet site (www.bauer-kompressoren.de).

In accordance with the German Ordinance on Industrial Safety and Health (BetrSichV), compressor stations used as filling stations must be subjected to an acceptance test at the installation site by an expert prior to commissioning. If the compressor is going to be used for filling pressurised gas containers (cylinders) which are intended for others, the station must be licensed by the relevant authority before acceptance testing can take place. This authority will generally be the trade supervisory office. Licensing procedures must be followed in accordance with the German TRG 730, Richtlinie für das Verfahren der Erlaubnis zum Errichten und Betreiben von Füllanlagen (Technical Rule on Licensing Procedures for Constructing and Operating Filling Stations). The test certificates and documents supplied with the compressor are important and must be included in the application documents as part of the licensing procedures. The station documents that relate to recurrent tests also have an important role to play and must, therefore, be stored carefully.

Tests governed by accident prevention regulations are carried out by the manufacturer or a specialist.

No liability can be assumed for damage that is directly or indirectly caused by a failure to heed these regulations.

We strongly urge you to pay heed to these regulations.

2. COMMISSIONING

2.1. MEASURES TO TAKE PRIOR TO COMMISSIONING

CAUTION **The use of the compressors described in this instruction manual for compressing oxygen is strictly prohibited. When there is contact between oil-lubricated compressors and oxygen or media that contain more than 21 % there is severe danger of fire or explosion!**

- Make sure that all persons who operate the compressor or the compressed air station are familiar with the function of all the operating and indicator elements. Pay particular attention to the warning instructions in Chapter C-1.1.
- Carry out an oil level check as per Chapter D-2. before starting on each occasion and check that the maintenance work as per the maintenance booklet have been carried out.
- Whenever commissioning is performed, check that all the station components are in perfect working order. If any display irregularities, switch off the station immediately and locate and rectify any errors or get in touch with the Customer Service department.

2.2. STARTING THE UNIT

- Set main switch (1, Fig. 47) to 1.
- Press the green ON button (5) – the unit starts up.

Provided that there is no alarm message and the pressure is below the set hysteresis. If the existing pressure is greater than the set end pressure for the automatic restarting of the compressor, the compressor control system runs in stand-by mode.

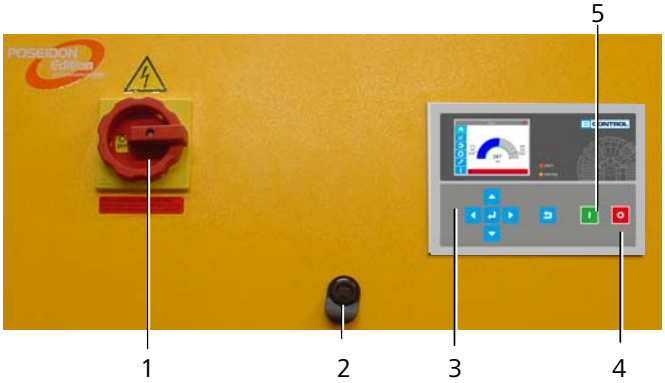


Fig. 47 Operating panel

1 Main switch/emergency stop switch
2 Lock switchgear cabinet
3 B-Control Micro
4 Off button
5 On button

2.3. FILLING MODE (breathing air unit with integrated or external filling panel)

2.3.1. General points

CAUTION **Make sure that the air drawn in is free from toxic gases (CO), exhaust gases or solvent vapours. When operating the unit in rooms where elevated CO values can arise, we recommend the filter cartridge for CO removal. You must note that, if the value exceeds 25 ppmV CO in the intake air, even the use of the CO cartridge cannot guarantee that the permissible threshold values can be maintained and that, as a result, there is danger to life from CO poisoning. In addition, reaction between CO and hopcalite can cause the cartridge to heat up and lead to fire risk.**

CAUTION **High pressure hoses must be in perfect working order at all times. Connection threads must be dimensionally correct and free from defects. In particular, look out for damage at the transition point between the hose fitting and hose itself. If the outer hose covering is torn, do not continue to use the hose. If this happens, applications involving pressure pose a risk to safety.**

The cylinder connection on the filling valve or filling hose is designed to be handled manually. Thanks to the way in which it is constructed, it enables compressed air cylinders to be connected without the use of tools. The seal is created by the internal overpressure, using an O-ring.

The standardisation of compressed air cylinder valve outlets for compressed air above 200 bar (DIN 477, Part 5) means that there are different cylinder connections for nominal filling working pressure levels of 200 bar and 300 bar. This prevents incorrect filling processes from taking place. **The use of intermediate pieces is prohibited!**

To enable you to remove the cylinders after filling without creating a hazardous situation, the filling valve is equipped with an integrated deaeration device. For this reason, you must make sure that the cylinder valve is closed first before you close the filling valve.

During filling, the compressed air cylinders heat up by means of what is known as anodic coating sealing in the cylinder. Allow the cylinder to cool after removing it: this causes the pressure in the cylinder to drop. The cylinders can then be reconnected and filled until the relevant nominal filling working pressure is achieved.

2.3.2. Suction air quality

Routine tests have shown that, time and again, the CO_2 content in the breathing air bottles is excessive. Closer investigation has often shown that compressed air comes from rooms where people are continuously present. Breathing with inadequate ventilation causes the CO_2 value in the air in the room to rise very rapidly. Thus, CO_2 values of 1,000 to 5,000 ppm_V in workrooms are not unusual (the MAK value is 5,000 ppm_V).

A further additional increase is caused by cigarette smoke, and each cigarette releases approx. 2 g CO_2 (≈2,000 ppm_V). These loads add to the basic load of approx. 400 ppm_V, the technically governed CO_2 excess during filling and the CO_2 peak during starting (see 2.3.3.). **For the stated reasons you must, for your own safety, not use air from rooms that are used as workrooms for filling the breathing air bottles.**

2.3.3. Flushing the compressor unit

CO_2 has a natural content in the atmosphere of 350 – 400 ppm_V. The molecular sieve used for drying is, amongst other things, capable of adsorbing CO_2. This increases in the cartridge. After the compressor unit has been switched off, adsorbed CO_2 can be desorbed again as a result of the particle pressure dropping. This no longer bound CO_2 is then flushed out of the cartridge when the unit is started again.

To prevent increased CO_2 values in the compressed breathing air we recommend, **before connecting** and filling the compressed air bottles, flushing for 1 – 2 minutes, i.e. by releasing the compressed air to the atmosphere by opening the flushing valve (1, Fig. 48).

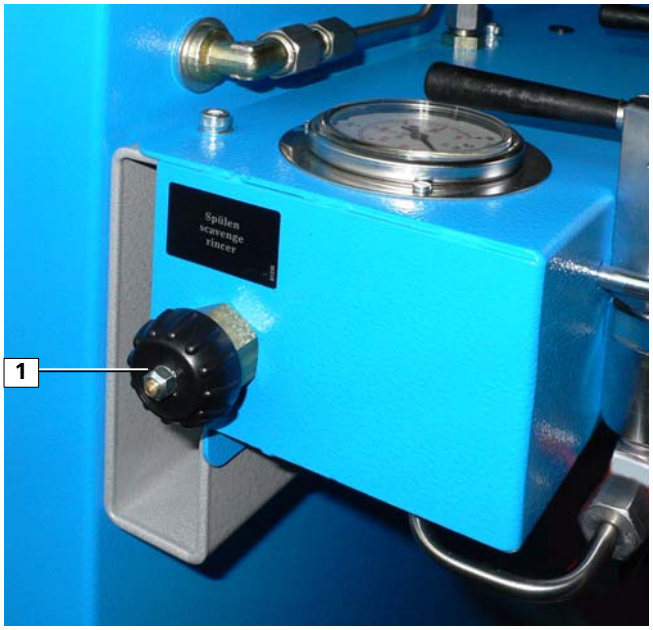


Fig. 48 Flushing valve

2.3.4. Connecting the compressed air cylinders

– Connect the compressed air cylinder to the cylinder connection (see Fig. 50).

Only cylinders that are approved for a 300 bar pressure level may be connected to 300 bar connections (refer to the stamp on the shoulder of the cylinder).

– Compressed air cylinders with an international filling connection can be connected either to a German filling connection using the cylinder connection with order no. 08487, or directly to the hose connection using the cylinder connection with order no. 03147 (see Fig. 49).

International filling connections (A-clamps) are not permitted in Germany. Furthermore, this type of connection is only suitable for a nominal working pressure of up to 200 bar, and structural features mean that it cannot be connected to the 300 bar models.

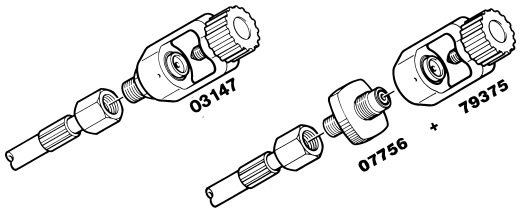


Fig. 49 International filling connection

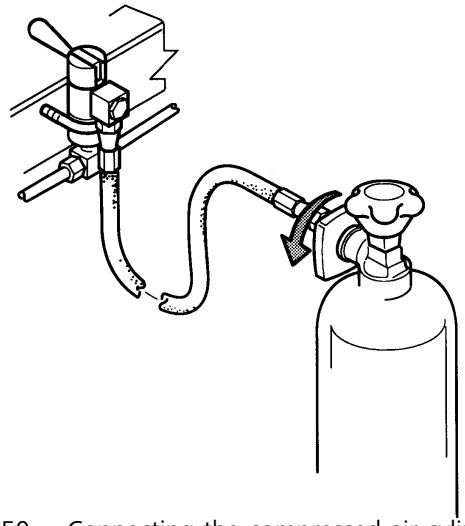


Fig. 50 Connecting the compressed air cylinders

2.3.5. Filling the compressed air cylinders

– Move the fiilling valve lever to the filling position (see Fig. 51).

– Open the cylinder cock and the compressed air cylinder will be filled. You should drain condensate at regular intervals during the filling process or you should make sure that the automatic condensate drain removes water at regular intervals.

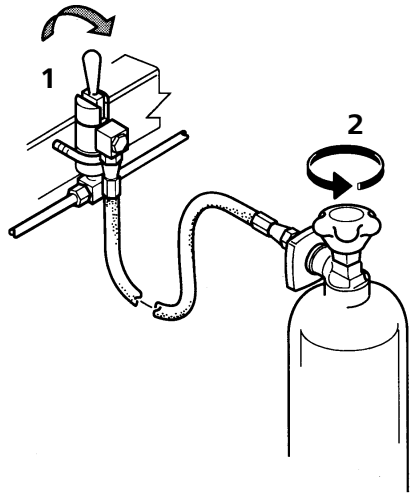


Fig. 51 Filling the compressed air cylinders

2.3.6. Removing the compressed air cylinders

– After reaching the end pressure, you should first close the **cylinder cock and then close the filling valve** by moving the filling valve lever over.

– Removing the compressed air cylinder (see Fig. 52).

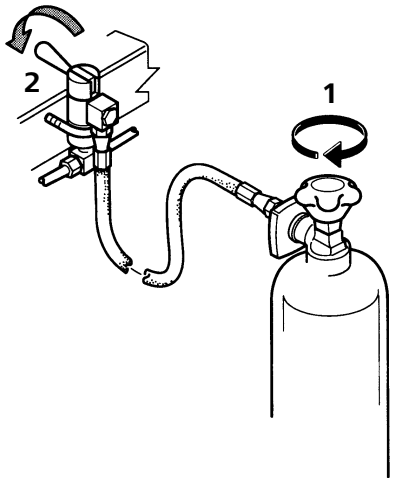


Fig. 52 Removing the compressed air cylinders

2.3.7. Switch-over valve

Filling panels for 2 pressure ranges (PN200/PN300) and featuring a switch-over valve that can be used to switch from one pressure range to the other can only be used for one pressure range at a time. You can switch to the 200 bar level by opening the cut-off valve. Although the 300 bar filling valves remain pressurised, it is only possible to use up to 200 bar. The structure of the 300 bar filling connections (right hand side) makes it impossible to connect 200 bar cylinders to them.

The deaeration valve must be opened and the 300 bar line deaerated to at least 200 bar before switching from 300 bar to 200 bar (i.e. to the lower pressure range); otherwise, the manometer may be damaged or destroyed.

CAUTION **Open the switch-over valve slowly in order to prevent pressure surges. If filling hoses are not in use, it is essential that they are hung up on their holders from the bottom on the filling panel to ensure that, if a filling valve is opened accidentally, the stream of air that escapes does not cause the filling hose to move around in an uncontrolled manner, as this can lead to serious injuries.**

2.3.8. Pressure reducer

Filling panels for 2 pressure ranges (PN200/PN300) and pressure reducers can be used for two pressure ranges at the same time, i.e. simultaneous filling of cylinders at 200 bar and 300 bar is possible in this location!

The pressure reducer used in the filling panels is steplessly adjustable and has a high level of regulating accuracy.

Max. primary pressure	420 bar
Secondary pressure (regulation range)	0.1 to 280 bar
Temperature range	-10 °C to +100 °C
Standard throughput	32 m^3

There is a particle filter with 20 µ fitted on the inlet side of the pressure reducer.

2.4. SWITCHING THE UNIT OFF

– Push red OFF button (4, Fig. 47) – unit switches off.

– Set main switch (1) to 0.

Section A
Description

Section B
Erection, Commissioning

Section C
Operation

Section D
Maintenance, Repair

Section E
Storage, Conservation

Section F
Plans, Diagrams, Drawings

Section G
Spare parts lists

D. MAINTENANCE, SERVICING

1. GENERAL

1.1. EVIDENCE OF MAINTENANCE

To show evidence of regular maintenance activities, we recommend using the service log book supplied with the station, in which details of all work carried out should be entered together with the date on which it took place. This helps to prevent the need for costly repairs as a result of neglecting to carry out maintenance work. please confirm their usage by dating and signing them. In the event of warranty claims being made, providing evidence of this nature will help you to prove that this work has been carried out and that damage cannot be attributed to insufficient maintenance. In this respect, we refer to point 23 of our General Terms and Conditions.

1.2. MAINTENANCE WORK

CAUTION

Carry out all maintenance and repair work on the compressor unit when the unit is at a standstill and is depressurised. Cut off the power supply before undertaking any kind of work.

CAUTION

Do not solder or weld pressure lines.

Check the entire station for leaks on a regular basis. To do this, brush soapy water onto all fittings and screw connections. Repair any leaks.

Only original parts may be used for maintenance and repair work of any kind.

Maintenance intervals for filter systems (cartridge change) see D.5.

Saturated cartridges are special waste! Disposal in accordance with the German Federal and Lander Waste Statutes and the local waste legislations (as per DIN safety datasheet Item 5.5 Disposal).

Service the motor in accordance with the instructions provided by the motor manufacturer.

1.3. MAINTENANCE INTERVALS

The maintenance intervals are as per the maintenance booklet delivered with each unit.

2. LUBRICATION

2.1. OIL LEVEL CHECK

Check the oil level in the oil sight glass every day before starting work.

The oil level must be between the two marks in the oil sight glass, see Fig. 53 or Fig. 54. It must never be allowed to fall below the min. mark, and must not be higher than the max. mark, since the compressor will otherwise be over-lubricated and the valves will get a carbon deposit.

2.2. OIL CHANGE INTERVALS

Synthetic oils	Every 2,000 operating hours, but at least biennially

2.3. OIL CHANGE VOLUMES

Oil change volume, IK120, IK12.14	2.8 litres
Oil change volume, IK150, IK18.1, IK180	6.0 litres

2.4. OIL GASKETS

BAUER compressor oil can be supplied in various different packing units, see oil list in section F.

2.5. OIL CHANGE

At each oil change, unscrew the oil sight glass (only compressor blocks IK120 and IK12.14) and clean the inside (prism). Check the gasket, screw the oil sight glass back in position.
(torque approx. 10 Nm.)

- The oil change should be carried out as near as possible to the operating temperature.
- Unscrew the red plastic cap on the oil filler spigot (1, Fig. 55 or Fig. 56) on the crankcase.

– Remove the oil drain screw on the crankshaft or, on unit with a drain hose, remove the sealing cap on the frame or on the cladding and collect the oil in a suitable vessel. Replace the seal and refit the closing screw.

– Remove the two bolts (1, Fig. 57) with a 13 mm spanner. Remove cover (2).

– Remove the oil filter (1, Fig. 58) with cover out of the casing and pull off from the rubber seal on the cover.

– Place a new filter element (order No. N25326) and replace the cover and fix in position.

– Pour fresh oil in up to the max. level on the oil sight glass.

– After filling, wait a few minutes before starting the unit.

The oil filter must always be replaced every time the oil is changed. If the oil is contaminated, the bypass valve in the filter opens and oil circulates without filtration!

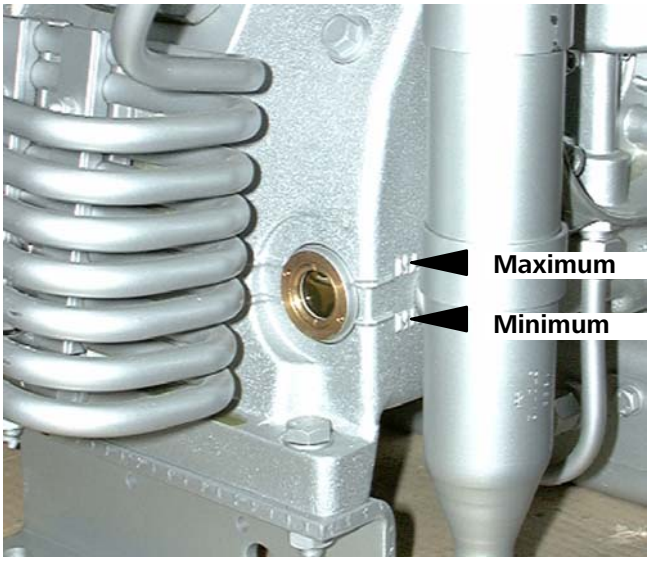


Fig. 53 Oil sight glass IK120, IK12.14

Fig. 54 Oil sight glass IK150, IK18.1, IK180

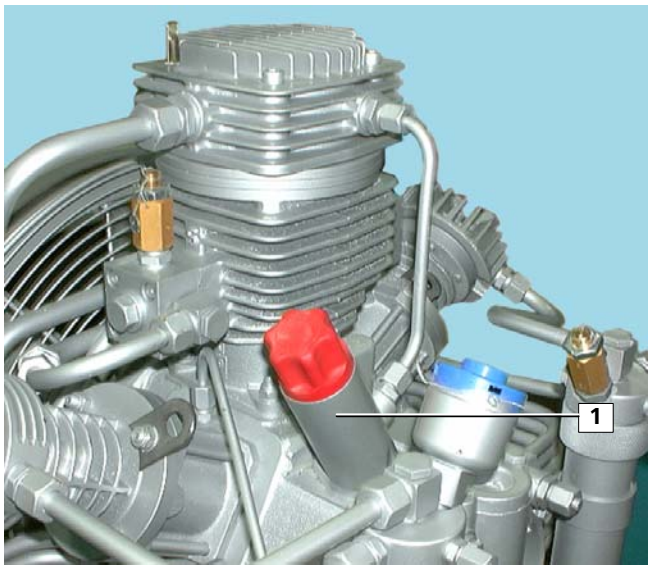


Fig. 55 Oil filler spigot IK120, IK12.14

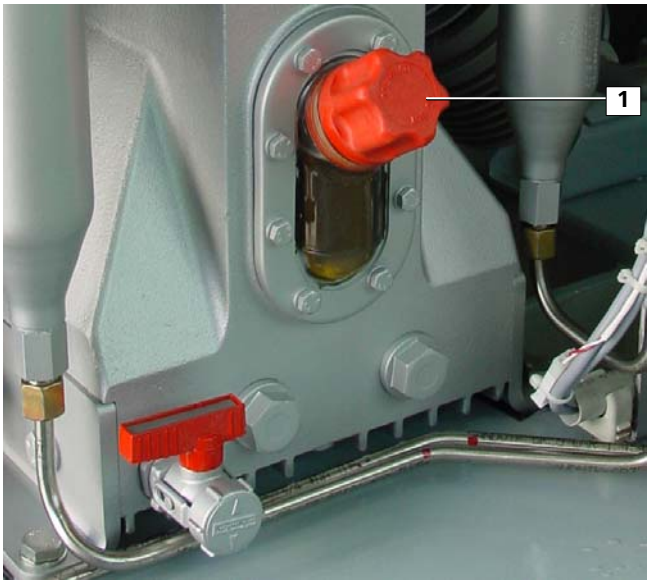


Fig. 56 Oil filler spigot IK150, IK18.1, IK180

2.6. VENTING THE OIL PUMP

To prevent severe damage to the unit you must always follow the following instructions:

If oil pressure does not build up after the compressor has started up – particularly after maintenance and repair work, or if the unit has been operated in the wrong direction by mistake – it may be necessary to bleed the oil pump. Proceed as follows:

– With the compressor running and with the condensate drain valves open, remove the plug (3, Fig. 57) and wait until oil comes out without bubbles. Replace the plug.

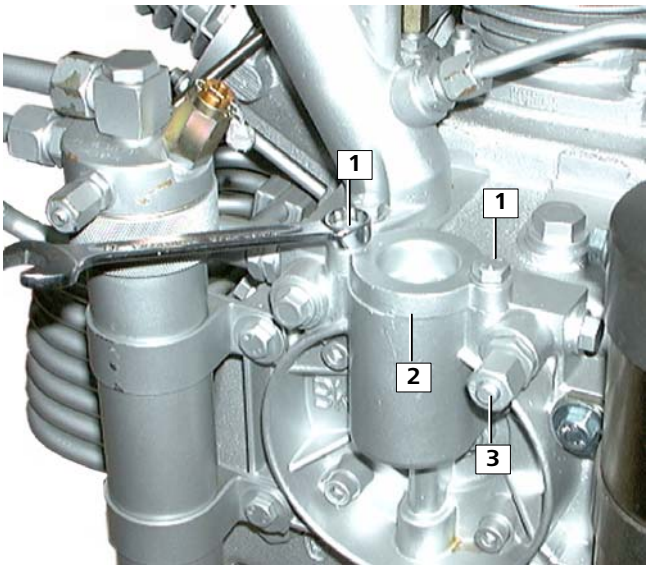


Fig. 57 Unscrewing the cover

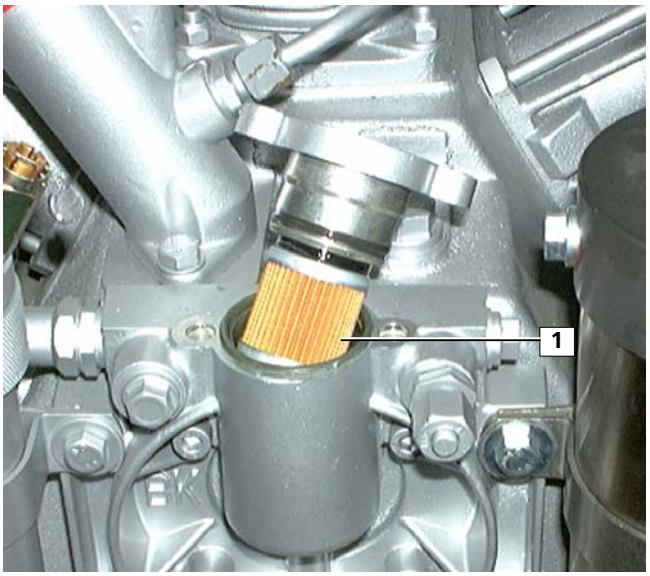


Fig. 58 Changing the oil filter

3. INTAKE FILTER

3.1. MAINTENANCE

The filter insert must be cleaned or replaced regularly. The maintenance intervals are dependent on the condition of the air being drawn in. If there is a lot of dust it may be necessary to carry out maintenance monthly or even weekly. In any case, the minimum intervals quoted in the maintenance booklet must be observed.

3.1.1. IK120

The filter insert must be cleaned regularly. For the maintenance intervals see the maintenance booklet.

Take the Mikronik filter insert (1) out of the casing and brush it out or blow it out with dry air. Replace the O-ring in the casing.

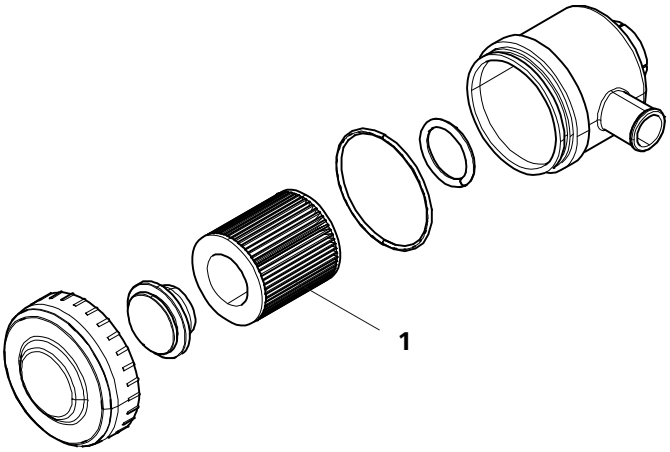


Fig. 59 Suction filter IK120

3.1.2. IK12.14

– Unscrew knurled nut and remove the cover.
– Remove filter element (1, Fig. 59).

– Clean the filter casing with a damp cloth. Make sure that no dust gets into the intake tube.

– Insert new element.

– Refit the cover.

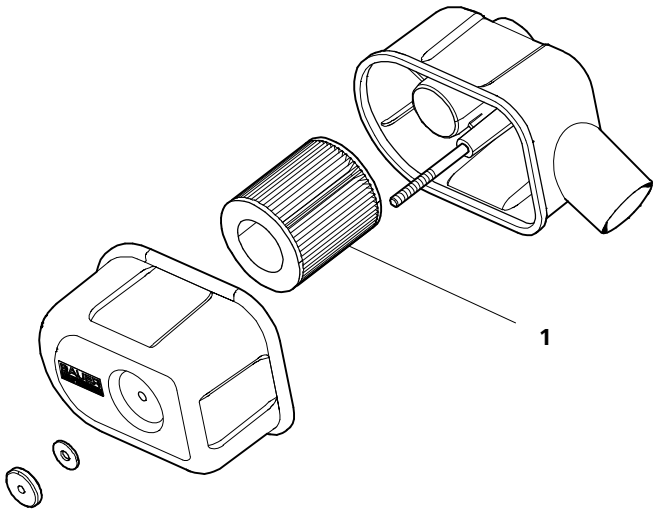


Fig. 60 Suction filter IK12.14

3.1.3. IK150, IK18.1, IK180

The negative pressure in the suction filter is monitored by the maintenance indicator (4, Fig. 61). If the maximum permissible negative pressure is exceeded. the indicator changes to red. If the filter is blocked, this can also lead to a switch-off caused by the min./max. pressure sensors on the electronic monitoring unit! See also section A.11. In this case, the filter element (2) must be replaced as follows.

– Release the four clamps and remove the cover (3).

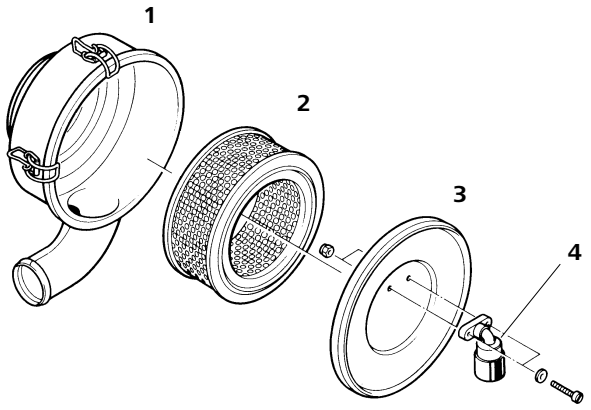
– Remove filter element (2).

– Clean the filter casing with a damp cloth. Make sure that no dust gets into the intake tube.

– Insert new element.

– Refit the cover.

– Reset the maintenance indicator: press the reset button.



1 Filter casing
2 Filter element
3 Cover
4 Maintenance indicator

Fig. 61 Suction filter IK150, IK18.1, IK180

4. INTERMEDIATE SEPARATOR

The pressure vessel is dynamically loaded. It is designed for operation up to a specific number of load cycles at the max. permissible pressure fluctuation range. 1 load cycle = 1 pressure approach + 1 pressure departure. The separator must be subjected to an internal examination by the expert technician latest when half the number of load cycles has been reached. After the max. number of load cycles have been reached, the separator must be replaced. Arranging the tests is the responsibility of the operator.

The load cycles are counted by the cycle counter P14 in the compressor control system and can be read off there at any time.

The max. permissible number of load cycles is listed in the pressure vessel operating instructions which is supplied on CD with each compressor unit.

4.1. MAINTENANCE

The intermediate separators are maintenance-free, except for regular condensate draining.

4.1.1. Condensate drain

Make sure that the automatic condensate drain removes water every 15 minutes (see Chapter D-10.).

5. FILTER SYSTEM

5.1. OIL AND WATER SEPARATORS

5.1.1. Sintered filter cartridge (only for 420 bar unit)

The sintered filter cartridge and oil and water separator must be cleaned regularly. For the maintenance intervals see the maintenance booklet.

Removing the micro-cartridge:

- Release the pipe from the elbow or non-return valve (2, Fig. 62).
- Unscrew the filter head (3).
- Unscrew the micro-cartridge (1) from the filter head (3).
- Unscrew the middle screw (4) from the cartridge to be able to remove the sintered filter inserts.
- Wash the filter inserts in a grease dissolving hot soap solution and blow out with compressed air.

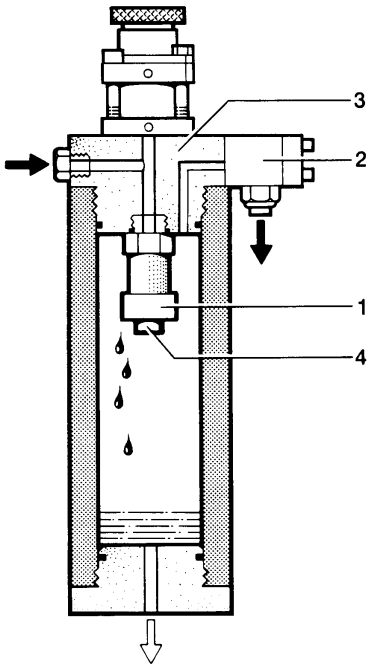


Fig. 62 Oil and water separator, 420 bar

5.1.2. Service life

The pressure vessel is dynamically loaded. It is designed for operation up to a specific number of load cycles at the max. permissible pressure fluctuation range. 1 load cycle = 1 pressure approach + 1 pressure departure. The oil and water separator must be subjected to an internal examination by the expert technician latest when half the number of load cycles has been reached. The oil and water separator must be replaced after the max. number of load cycles has been reached. Arranging the tests is the responsibility of the operator.

The load cycles are counted by the cycle counter in the compressor control system and can be read off there at any time.

The max. permissible number of load cycles is listed in the pressure vessel operating instructions which is supplied on CD with each compressor unit.

5.1.3. Condensate drain

The condensate that is produced during cooling the compressed air must be drained regularly using the condensate drain valve

- before each start of the unit
- during operation, every 30 minutes, and at higher air humidity levels, every 15 minutes

(on unit with automatic condensate drain see Chapter D.10.).

5.2. FINE AFTER-CLEANER

5.2.1. General notes

Please always observe:

- The **filter** must only be maintained in a de-pressurised condition. The filter circuit can be vented using the hand valve on the venting valve with pressure gauge. Wait until the pressure on the gauge has fallen to zero before the pressure vessel is opened.
- Every time the cartridge is replaced, the **filter housing** must be wiped out internally with a clean cloth. Check for corrosion. Replace damaged parts.
- Apply a little white Vaseline or Never-Seez White to the **thread** and O-ring on the filter head. Also apply very sparingly to the mounting spigot of the cartridge with the two O-rings.
- Note the **number** of the filled compressed air vessels or the operating hours in order to provide precise compliance with the maintenance intervals.
- The **cartridges** must remain in the filters, even over longer standstill periods, to absorb the moisture that pentrates.
- **After** the unit has been at a standstill for longer than 6 months, the cartridge must be changed before re-commissioning.

– **All** condensate drain cocks and isolating cocks must remain closed. Residual pressure of 50 to 80 bar to be left in the unit. This prevents moisture from the ambient air from penetrating into the pipework of the compressor.

5.2.2. Cartridge changing

The filter cartridges are vacuum-packed in their new condition and can be stored for two years (see best before date on the cartridge). Defective vacuum packing cannot protect the cartridge adequately from environmental influences in storage. Make sure that the packaging is not damaged.

In order to avoid risks to your health and to prevent damage to your unit, you should replace used up filter cartridges in good time.

Never refill used up cartridges yourself! The filter material is specially selected by BAUER compressors for the individual application.

Take care with cleanliness and hygiene when changing the filter.

– Pull the plug on the **SECURUS** cable out of the coupling. First release the union nut.

– Drain the vessel completely via the venting valve.

– Unscrew the fitting (1, Fig. 63) using the supplied special spanner (2).

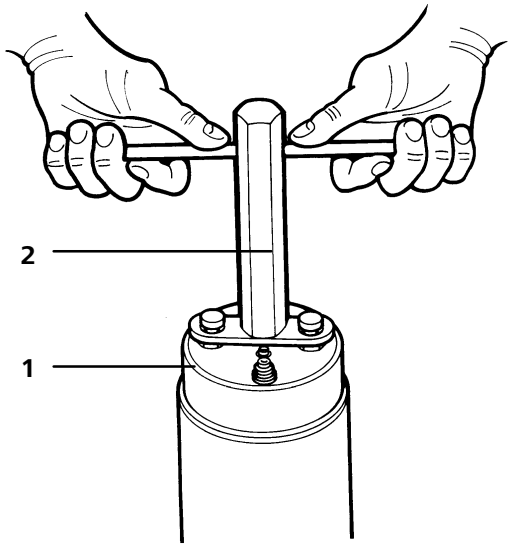


Fig. 63 Unscrewing the filter

– Pull out the cartridge using the handle (2, Fig. 64).

– Remove the new cartridge out of the packaging and remove the protection caps from both ends!

– Insert the cartridge in the housing and push it firmly down into the mounting.

– Place the fitting (1) back into position, screw in by hand and tighten using the special spanner.

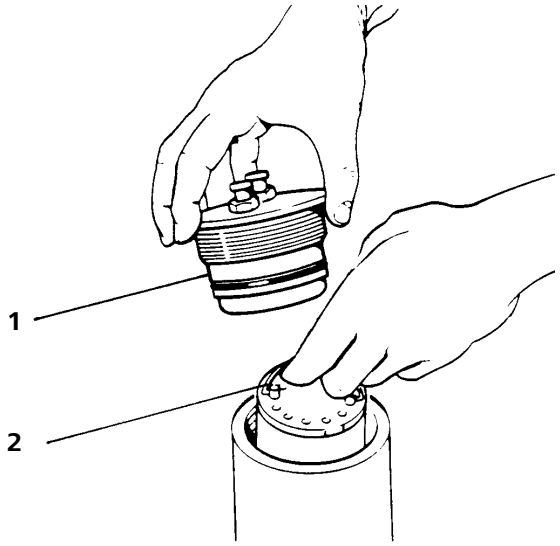


Fig. 64 Cartridge changing

5.2.3. Cartridge replacement intervals

The details provided in the following tables are probable service life figures for the filter systems without Securus monitoring. On filter systems with Securus monitoring, the actual saturation signal is provided by the compressor control system.

The determination of the operating hours counter or the number of possible cylinder fillings per filter cartridge is carried out using the tables on the following pages, with consideration of the ambient temperature and the cartridge being used.

These tables contain calculated cartridge service life figures which refer to defined and constant operating conditions. Tolerances in the cartridge filling and varying operating temperatures can lead to considerably deviations from the stated details which can, as a result, only be considered to be reference values for the operator.

Saturated cartridges are special waste! Disposal in accordance with the German Federal and Lander Waste Statutes and the local waste legislations (as per DIN safety datasheet Item 5.5 Disposal).

Filter system P42; Filter cartridge 062565: Cartridge service life [hours]				
Filling pressure p = 200 bar		Delivery volume Q [l/min]		
Ambient temperature tU [°C]	Temperature in end separator tAb [°C]	300	400	550
10	20–24	110 – 87	82 – 65	60 – 48
15	25–29	82 – 66	62 – 49	45 – 36
20	30–34	63 – 50	47 – 38	34 – 28
25	35–39	48 – 39	36 – 29	26 – 21
30	40–44	37 – 30	28 – 23	20 – 17
35	45–49	29 – 24	22 – 18	16 – 13
40	50–54	23 – 19	17 – 14	12 – 10
Filling pressure p = 300 bar		Delivery volume Q [l/min]		
Ambient temperature tU [°C]	Temperature in end separator tAb [°C]	300	400	550
10	20–24	165 – 131	123 – 98	90 – 71
15	25–29	124 – 99	93 – 74	67 – 54
20	30–34	94 – 76	70 – 57	51 – 41
25	35–39	72 – 59	54 – 44	39 – 32
30	40–44	56 – 46	42 – 34	30 – 25
35	45–49	43 – 36	33 – 27	24 – 20
40	50–54	34 – 29	26 – 21	19 – 16

Filter cartridge 062565: Cylinder fillings [number] molecular sieve mass in mMS [g] = 855							
Ambient temperature tU [°C]	Temperature in end separator tAb [°C]	Air humidity, saturated X [g/m³]	Prepared air volume Va [m³] at pressure p [bar]		Number of cylinder cylinder fillings and cylinder size, at 300 bar		
			200	300	7 l	10 l	12 l
10	20–24	17.31 – 21.8	1,976 – 1,569	2,964 – 2,353	2,117 – 1,121	1,482 – 784	1,235 – 654
15	25–29	23.07 – 28.79	1,482 – 1,188	2,224 – 1,782	1,588 – 849	1,112 – 594	927 – 195
20	30–34	30.4 – 37.63	1,125 – 909	1,688 – 1,363	1,205 – 649	844 – 454	703 – 379
25	35–39	39.65 – 48.64	863 – 703	1,294 – 1,055	924 – 502	647 – 352	539 – 293
30	40–44	51.21 – 62.41	668 – 548	1,002 – 822	716 – 391	501 – 274	417 – 228
35	45–49	65.52 – 79.28	522 – 431	783 – 647	559 – 308	391 – 216	326 – 180
40	50–54	83.08 – 99.85	412 – 343	617 – 514	441 – 245	309 – 171	257 – 143

Cylinder fill volume VF [m³]		
Cylinder size	At pressure p [bar]	
l [ltr.]	200	300
7	1.4	2.1
10	2	3
12	2.4	3.6

Number of cylinder fillings =
prepared air volume / cylinder fill volume = Va / VF

Cylinder fill volume: VF [m³] = p [bar] x l [l] / 1,000 [l/m³]

Prepared air volume: Va [m³] = 0.2 x mMS [g] / (X [g/m³] / p [bar]) = 0.2 x p [bar] x mMS [g] / X [g/m³]

Filter cartridge service life:
tp [h] = Va [m³] / (Q [m³/min] x 60 min/h])

Filter system P41; Filter cartridge 062565: Cartridge service life [hours]			
Filling pressure p = 420 bar		Delivery volume Q [l/min]	
Ambient temperature tU [°C]	Temperature in end separator tAb [°C]	320	500
10	20–24	216 – 172	138 – 110
15	25–29	162 – 130	104 – 83
20	30–34	123 – 99	79 – 64
25	35–39	94 – 77	60 – 49
30	40–44	73 – 60	47 – 38
35	45–49	57 – 47	37 – 30
40	50–54	15 – 37	29 – 24

Filter cartridge 062565: Cylinder fillings [number] molecular sieve mass in mMS [g] = 855						
Ambient temperature tU [°C]	Temperature in end separator tAb [°C]	Air humidity, saturated X [g/m³]	Prepared air volume Va [m³] at pressure p [bar]	Number of cylinder cylinder fillings and cylinder size, at 420 bar		
			420	7 l	10 l	12 l
10	20–24	17.31 – 21.8	4,149 – 3,294	2,964 – 1,569	2,075 – 1,098	1,729 – 915
15	25–29	23.07 – 28.79	3,113 – 2,495	2,224 – 1,188	1,557 – 832	1,297 – 693
20	30–34	30.4 – 37.63	2,363 – 1,909	1,688 – 909	1181 – 636	984 – 530
25	35–39	39.65 – 48.64	1,811 – 1,477	1,294 – 703	906 – 492	755 – 410
30	40–44	51.21 – 62.41	1,402 – 1,151	1,002 – 548	701 – 384	584 – 320
35	45–49	65.52 – 79.28	1,096 – 906	783 – 431	548 – 302	457 – 252
40	50–54	83.08 – 99.85	864 – 719	617 – 343	432 – 240	360 – 200

Cylinder fill volume VF [m³]	
Cylinder size	At pressure p [bar]
l [ltr.]	420
7	2.94
10	4.2
12	5.04

Number of cylinder fillings =
prepared air volume / cylinder fill volume = Va / VF

Cylinder fill volume: VF [m³] = p [bar] x l [l] / 1,000 [l/m³]

Prepared air volume: Va [m³] = 0.2 x mMS [g] / (X [g/m³] / p [bar]) = 0.2 x p [bar] x mMS [g] / X [g/m³]

Filter cartridge service life:
tp [h] = Va [m³] / (Q [m³/min] x 60 min/h])

Filter system P61; Filter cartridge 058826: Cartridge service life [hours]			
Filling pressure p = 200 bar		Delivery volume Q [l/min]	
Ambient temperature tU [°C]	Temperature in end separator tAb [°C]	700	850
10	20–24	71 – 57	59 – 47
15	25–29	54 – 43	44 – 35
20	30–34	41 – 33	33 – 27
25	35–39	31 – 25	26 – 21
30	40–44	24 – 20	20 – 16
35	45–49	19 – 16	16 – 13
40	50–54	15 – 12	12 – 10
Filling pressure p = 300 bar		Delivery volume Q [l/min]	
Ambient temperature tU [°C]	Temperature in end separator tAb [°C]	700	850
10	20–24	107 – 85	88 – 70
15	25–29	80 – 64	66 – 53
20	30–34	61 – 49	50 – 41
25	35–39	47 – 38	38 – 31
30	40–44	36 – 30	30 – 24
35	45–49	28 – 23	23 – 19
40	50–54	22 – 19	18 – 15

Filter cartridge 058826: Cylinder fillings [number] molecular sieve mass in mMS [g] = 1297							
Ambient temperature tU [°C]	Temperature in end separator tAb [°C]	Air humidity, saturated X [g/m³]	Prepared air volume Va [m³] at pressure p [bar]		Number of cylinder cylinder fillings and cylinder size, at 300 bar		
			200	300	7 l	10 l	12 l
10	20–24	17.31 – 21.80	2,997 – 2,380	4,496 – 3,570	3,211 – 1,700	2,248 – 1,190	1,873 – 992
15	25–29	23.07 – 28.79	2,249 – 1,802	3,373 – 2,703	2,409 – 1,287	1,687 – 901	1,406 – 751
20	30–34	30.40 – 37.63	1,707 – 1,379	2,560 – 2,068	1,828 – 985	1,280 – 689	1,067 – 574
25	35–39	39.65 – 48.64	1,308 – 1,067	1,963 – 1,600	1,402 – 762	981 – 533	818 – 444
30	40–44	51.21 – 62.41	1,013 – 831	1,520 – 1,247	1,085 – 594	760 – 416	633 – 346
35	45–49	65.52 – 79.28	792 – 654	1,188 – 982	848 – 467	594 – 327	495 – 273
40	50–54	83.08 – 99.85	624 – 520	937 – 779	669 – 371	468 – 260	390 – 216

Cylinder fill volume VF [m³]		
Cylinder size	At pressure p [bar]	
l [ltr.]	200	300
7	1.4	2.1
10	2	3
12	2.4	3.6

Number of cylinder fillings =
prepared air volume / cylinder fill volume = Va / VF

Cylinder fill volume: VF [m³] = p [bar] x l [l] / 1,000 [l/m³]

Prepared air volume: Va [m³] = 0.2 x mMS [g] / (X [g/m³] / p [bar]) = 0.2 x p [bar] x mMS [g] / X [g/m³]

Filter cartridge service life: tp [h] = Va [m³] / (Q [m³/min] x 60 min/h])

Filter system P61; Filter cartridge 058826: Cartridge service life [hours]		
Filling pressure p = 420 bar		Delivery volume Q [l/min]
Ambient temperature tU [°C]	Temperature in end separator tAb [°C]	600
10	20–24	175 – 139
15	25–29	131 – 105
20	30–34	100 – 80
25	35–39	76 – 62
30	40–44	59 – 48
35	45–49	46 – 38
40	50–54	36 – 30

Filter cartridge 058826: Cylinder fillings [number] molecular sieve mass in mMS [g] = 1297						
Ambient temperature tU [°C]	Temperature in end separator tAb [°C]	Air humidity, saturated X [g/m³]	Prepared air volume Va [m³] at pressure p [bar]	Number of cylinder cylinder fillings and cylinder size, at 420 bar		
			420	7 l	10 l	12 l
10	20–24	17.31 – 21.80	6,294 – 4,998	4,496 – 2,380	3,147 – 1,666	2,622 – 1,388
15	25–29	23.07 – 28.79	4,722 – 3,784	3,373 – 1,802	2,361 – 1,261	1,968 – 1,051
20	30–34	30.40 – 37.63	3,584 – 2,895	2,560 – 1,379	1,792 – 965	1,493 – 804
25	35–39	39.65 – 48.64	2,748 – 2,240	1,963 – 1,067	1,374 – 747	1,145 – 622
30	40–44	51.21 – 62.41	2,127 – 1,746	1,520 – 831	1,064 – 582	886 – 485
35	45–49	65.52 – 79.28	1,663 – 1,374	1,188 – 654	831 – 458	693 – 382
40	50–54	83.08 – 99.85	1,311 – 1,091	937 – 520	656 – 364	546 – 303

Cylinder fill volume VF [m³]	
Cylinder size	At pressure p [bar]
l [ltr.]	420
7	2.94
10	4.2
12	5.04

Number of cylinder fillings =
prepared air volume / cylinder fill volume = Va / VF

Cylinder fill volume: VF [m³] = p [bar] x l [l] / 1,000 [l/m³]

Prepared air volume: Va [m³] = 0.2 x mMS [g] / (X [g/m³] / p [bar]) = 0.2 x p [bar] x mMS [g] / X [g/m³]

Filter cartridge service life:
tp [h] = Va [m³] / (Q [m³/min] x 60 min/h])

6. PRESSURE RETAINER/NON-RETURN VALVE

6.1. GENERAL POINTS

For setting the pressure retention valve see section A-6.

The pressure retention valve must be checked regularly in accordance with maintenance booklet for internal and external leaks and for function. It normally needs no re-adjustment.If it has been adjusted, you can re-adjust the opening pressure. See 6.2. or 6.3.

How can we find the opening pressure of the pressure retention valve?

As long as the pressure delivered by the compressor is below the set opening pressure on the pressure retention valve, the display on the end pressure gauge shows zero, the pressure increase before the pressure retention valve can be watched on the pressure gauge on the venting valve on the end separator. As soon as the pressure retention valve starts to open, the display on the compressor control system shows the starting pressure increase. The value can be checked on the pressure gauge on the filter system.

6.2. 220/330 BAR UNIT

If the setting of the opening pressure has changed, it can be adjusted using the screw (1, Fig. 65). First release the locknut (3) and unscrew the setting screw (2) slightly.

Turning to the right increases the pressure, turning to the left reduces the pressure.

6.3. 420 BAR UNIT

If the setting of the opening pressure has changed, it can be adjusted using the screw (1, Fig. 66). First unscrew the setting screw (2) slightly.

Turning to the right increases the pressure, turning to the left reduces the pressure.

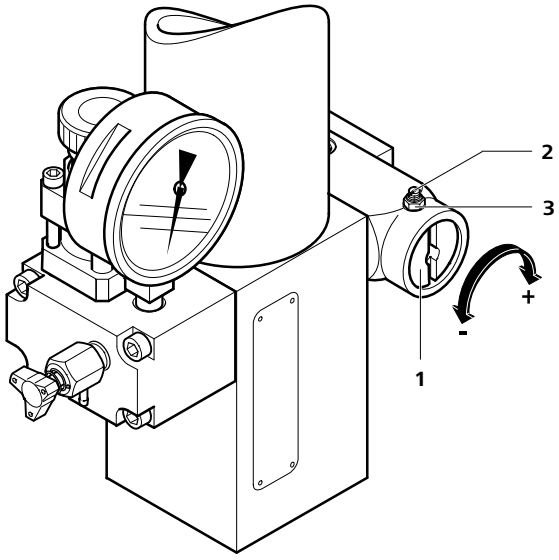


Fig. 65 Pressure retention valve, 220/330 bar unit

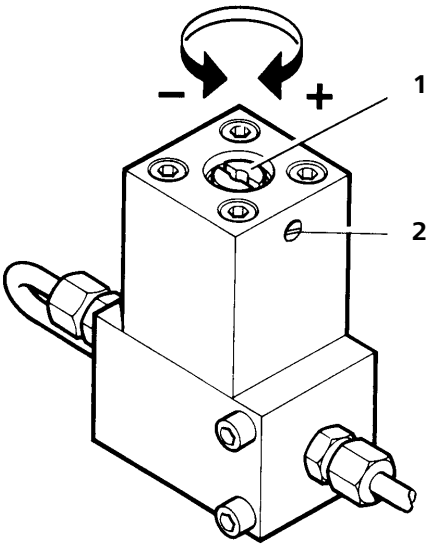


Fig. 66 Pressure retention valve, 420 bar unit

7. SAFETY VALVES

7.1. CHECKING THE 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 safety valve on the last stage, i.e. the Final pressure safety valve must be checked regularly for function. See maintenance booklet. The safety valves can be pressurised for this purpose. The pressurisation will only check that the valve is capable of functioning. For checking the actual blow-off pressure see 7.2.

7.1.1. 225/330 bar unit

The end pressure safety valve is mounted on the end separator. To vent, turn the knurled knob on the top of the safety valve to the right until it blows off (Fig. 67).

7.1.2. 420 bar unit

On high pressure unit at 420 bar, the end pressure safety valve is not on the separator but is rather mounted on an adapter on the frame. On this valve you can use the lever on the side to vent (Fig. 68).

We recommend not exceeding an end pressure setting of 80 % to prevent damage to the safety valve!

7.2. CHECKING THE BLOW-OFF PRESSURE

The blow-off pressure of the final pressure safety valve should be checked regularly in the framework of the periodic maintenance work. See maintenance booklet. Run the unit in the "Safety valve test" mode. See Chap. A-11.

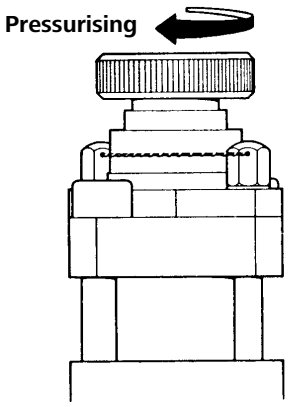


Fig. 67 End pressure safety valve, 225/330 bar

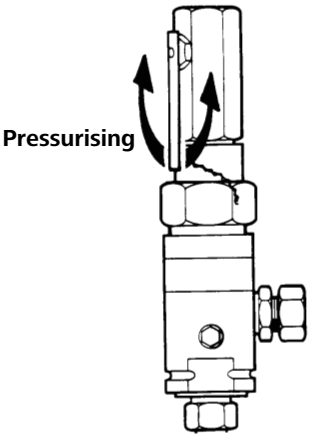


Fig. 68 End pressure safety valve, 420 bar

8. PRESSURE GAUGE (ADDITIONAL EQUIPMENT)

We recommend testing the manometer on a regular basis. To this end we have developed a special testing manometer featuring an adapter, which can be used to check deviations in the displayed values immediately.

See high pressure accessories catalogue.

Allowances should be made for minor deviations during operation. If the manometer shows large inaccuracies, however, it will need to be replaced.

9. VALVES

9.1. VALVE MAINTENANCE – GENERAL POINTS

- The **valves** must only be changed in sets.
- **Contaminated valves** should be cleaned carefully. Do not use any sharp tools. Soak the valves in diesel oil or paraffin. Clean using a soft brush.
- Observe the **correct sequence** when re-assembling.
- Check the **individual parts** for excessive wear. If the valve seats and valve plates are showing indentations replace the valves.
- Always use a torque wrench to tighten the **valve head screws**! Tightening torque see Chapter D.15.
- Check the **valve chambers** in the valve heads for contamination and clean if required.
- Check the **seals** and O-rings for perfect condition when re-assembling.
- **After** all maintenance work on valves, turn the compressor over by hand at the flywheel in order to determine that all parts have been fitted correctly.
- **30 minutes** after re-starting, switch the unit off, allow it to cool and tighten the valve head bolts again to the prescribed tightening torque. The settling of the seals can otherwise lead to loosening of the valves.

9.2. CHANGING THE VALVES

Changing the valves on the compressor must only be carried out by trained personnel.

The valve replacement is described in the workshop manual which can be obtained from **BAUER** customer service.

10. AUTOMATIC CONDENSATE DRAIN

10.1. GENERAL

You must take measures to ensure that the oil that is drained off with the water cannot have a detrimental effect on the environment, e.g. the drain lines must lead to collection vessels or into drain devices that are equipped with oil separators.

The condensate must be disposed of in accordance with the German waste laws as special waste which must be monitored (waste key No. 54405)!

10.2. MAINTENANCE

The condensate drain valves for the intermediate separators and the final separators are equipped with manual drain valves to be able to check the automatic condensate drain system.

Service the automatic condensate drain system as follows:

– Every week you should open the manual condensate drain cocks on each filter one after the other.

This should be carried out immediately after the automatic condensate drain system has removed the water. Observe the condensate drain from the manual drain cocks. If a lot of condensate comes out the automatic condensate drain valve is not operating properly. Find the cause and eliminate it. If virtually no condensate comes out the automatic system is working properly. In the event of a fault see faultfinding, Chapter D-15.

10.3. MAINTENANCE OF THE CONDENSATE SEPARATOR

The filter elements of the condensate separator must be replaced regularly in accordance with the maintenance schedule.

– Remove the self-locking nut (1, Fig. 69), remove the sheet metal hood (2) and remove the filter element (3).

– Insert the new filter element from the repair kit.

– Place the metal cap (2) in position and fix with self-locking nut (1).

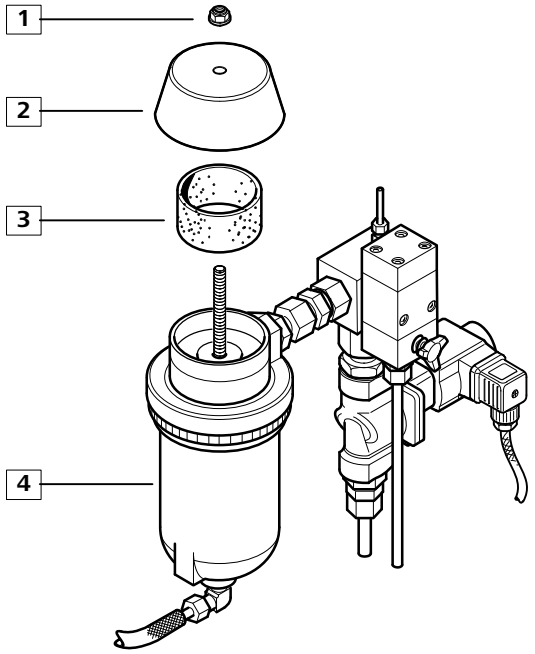


Fig. 69 Condensate separator

10.4. MAINTENANCE OF THE ACTIVATED CHARCOAL FILTER IN THE CONDENSATE VESSEL

(only on unit with 40 l condensate vessel)

Replace the activated charcoal and filter mats in the filter element as per the maintenance booklet.

Designation	Order No.	Required amount
Activated charcoal	N65	3,700 g
Filter mats	72,207	4

10.5. MAINTENANCE OF THE FLOAT SWITCH

(only on unit with 40 l condensate vessel)

The float switch must be cleaned from time to time in order to prevent it from sticking caused by oil residues.

PE-VE/05/14

11. ELECTRICAL SYSTEM

11.1. ELECTRIC MOTOR

The drive motor itself normally does not require any maintenance except for occasional external cleaning. Depending on the type of motor fitted, lubrication can, however, be required on the bearings. Please observe the instructions on the motor itself.

11.2. ELECTRICAL EQUIPMENT

On compressor units which are fitted with compressor control systems you must check all the screwed terminal connections in the switchgear box for tightness at least once a year. This applies particularly to contacts on the power contactors.

Connections with spring tension terminals are maintenance-free.

The safety checks as per BGV or DIN VDE must be carried out independently by the operator.

11.3. B-CONTROL ALARM LIST

B-Control Micro Alarm List
B-Kool faulty
B-Kool temp. low
B-Kool temp. high
Cond.Cont. full
Emergency off
Fact. def. destroyed
Maintenance soon
Maintenance due
Motor protection temp.
Motor protection inp.
Motor sensor fail
Oil press. low
Oil sensor fail
Pressure1 Sensor fail
Pressure2 Sensor fail
Press. 1 Hightrip
Press. 2 Hightrip
Seccant faulty
Securus faulty
Securus offline
Securus prewarn
Securus saturated
Suct. sensor fault
Suction pres. high
Suction pres. low
Temp. last stage low
Temp. sensor fail
Temp. last stage high

11.4. TROUBLE-SHOOTING

Fault message	Cause	Remedy
Suction pressure sensor is defective	Line is defective or short circuit	Check the line as per the circuit diagram.
	Sensor is defective	Replace the sensor.
Suction pressure is too low	Gas supply pressure is inadequate	Adjust the gas supply. See the operating instructions for the compressor.
	Inlet valve is closed	Open the inlet valve completely.
Suction pressure is too high	Gas supply pressure is too high	Adjust the supply pressure. See the operating instructions for the compressor.
B-Kool is defective	Line is defective or short circuit	Check the line.
	B-Kool is faulty	Repair the cold dryer. See the operating instructions for the unit.
B-Kool temperature is too low	B-Kool is faulty	Repair the cold dryer. See the operating instructions for the unit.
B-Kool temperature is too high	B-Kool is faulty	Repair the cold dryer. See the operating instructions for the unit.
Final pressure sensor 1 is defective	Line is defective or short circuit	Check the line as per the circuit diagram.
	Sensor is defective	Replace the sensor.
Final pressure sensor 2 is defective	Line is defective or short circuit	Check the line as per the circuit diagram.
	Sensor is defective	Replace the sensor.
Condensate vessel is full	Excess condensate	Empty the condensate vessel.
Motor circuit breaker tripped	Too many consumers at a time	Check the complete installation.
	Fault in one phase	Check the mains.
	Incorrect setting	Set the automatic machine as per the circuit diagram.
	Automatic machine is defective	Check the automatic machine and replace it if necessary.
	Motor overloaded	Compressor is defective. Contact the BAUER Customer Service.
Emergency-stop triggered	Emergency-stop pressed	Check the Emergency-stop key and reset it.
Oil pressure is too low	Oil level is too low	Refill oil. See the operating instructions for the compressor.
	Oil pump is defective	Contact the BAUER Customer Service.
	Incorrect direction of rotation	Two of the three phases in the switchgear box of the compressor are interchanged. See the operating instructions for the compressor.
Oil pressure sensor is defective	Line is defective or short circuit	Check the line as per the circuit diagram.
	Sensor is defective	Replace the sensor.
	Motor is connected incorrectly	Two of the three phases in the switchgear box of the compressor are interchanged. See the operating instructions for the compressor.

Fault message	Cause	Remedy
SECURUS offline	Fault in the CAN bus	Check the CAN bus.
SECURUS is defective	SECURUS sensor or line is defective	Check the SECURUS sensor and line and replace them if necessary.
SECURUS preliminary warning	Filter cartridge will soon be saturated	Order a filter cartridge.
SECURUS is saturated	Filter cartridge is saturated	Replace the filter cartridge.
SECCANT is defective	SECCANT or line is defective	Check the line; rectify the fault.
Temperature sensor of the last stage is defective	Line is defective or short circuit	Check the line as per the circuit diagram.
	Sensor is defective	Replace the sensor.
Temperature of the last stage is too low	Compressor is too cold	Check and/or increase the room temperature. See the operating instructions for the compressor.
	Room ventilation is inadequate	Improve the ventilation of the compressor room. See the operating instructions for the compressor.
Temperature of the last stage is too high	Compressor is defective	Contact the BAUER Customer Service.
	Room ventilation is inadequate	Improve the ventilation of the compressor room. See the operating instructions for the compressor.
Compressor is soon due for maintenance	Target times will be reached soon	Prepare for the compressor maintenance; procure parts.
Compressor is due for maintenance	Target times reached	Carry out the compressor maintenance activities.
Default factory settings data damaged (incorrect checksum)	Software error	Contact the Customer Service.

Alarm messages B-Control Micro

No.	English [en]
0	Final pressure 1 sensor faulty
1	Final pressure 2 sensor faulty
2	Intake pressure sensor faulty
3	Oil press. sensor faulty or direction of rotation incorrect
4	Interm. press. sensor 1 faulty
5	Interm. press. sensor 2 faulty
6	Interm. press. sensor 3 faulty
7	Interm. press. sensor 4 faulty
8	Crankcase pressure sensor faulty
9	Press. dew point sensor faulty
10	Level sensor level gas balloon faulty
11	Temperature sensor cooling air faulty
12	Last stage temp. sensor faulty
13	Temperature sensor stage 1 faulty
14	Temperature sensor stage 2 faulty
15	Temperature sensor stage 3 faulty
16	Temperature sensor stage 4 faulty
17	Temperature sensor gas discharge faulty
18	Temp.sensor Spare Ch.18 faulty
19	Sensor Spare Ch.19 faulty
20	Sensor Spare Ch.20 faulty
21	Sensor Spare Ch.21 faulty
22	Sensor Spare Ch.22 faulty
23	Sensor Spare Ch.23 faulty
24	Spare
25	Spare
26	Safety final pressure 1 reached
27	Safety final pressure 2 reached
28	Intake pressure too low
29	Intake pressure too high
30	Oil pressure too low
31	Interm. press. stage 1 min.
32	Interm. press. stage 1 max.
33	Interm. press. stage 2 max.
34	Interm. press. stage 3 max.
35	Interm. press. stage 4 max.
36	Crankcase pressure min.
37	Crankcase pressure max.
38	Press. dew point high
39	Press. dew point too high
40	Gas balloon level too low
41	Gas balloon level too high

No.	English [en]
42	Temperature cooling air too low
43	Temperature cooling air too high
44	Temperature last stage too low
45	Temperature last stage too high
46	Temperature stage 1 too high
47	Temperature stage 2 too high
48	Temperature stage 3 too high
49	Temperature stage 4 too high
50	Temperature gas discharge too high
51	Temp.sensor Spare Ch.18 min.
52	Temp.sensor Spare Ch.18 max.
53	Spare Ch.19 min.
54	Spare Ch.19 max.
55	Spare Ch.20 min.
56	Spare Ch.20 max.
57	Spare Ch.21 min.
58	Spare Ch.21 max.
59	Spare Ch.22 min.
60	Spare Ch.22 max.
61	Spare Ch.23 min.
62	Spare Ch.23 max.
63	Oil level too low
64	Motor protection/automatic case
65	Cooling system defective
66	Ventilator motor protection triggered
67	Spare
68	SECURUS faulty
69	SECURUS filter pre-warning
70	SECURUS filter saturated
71	SECCANT faulty
72	SECCANT CAN faulty
73	Refrigeration dryer faulty
74	Condensate vessel is full
75	Spare
76	Spare
77	Spare
78	Spare
79	Spare
80	Spare
81	Spare
82	Spare
83	Spare
84	Spare

No.	English [en]
85	Spare
86	Emergency off pressed
87	SECURUS+ temperature measurement error
88	SECURUS offline
89	Spare
90	Spare
91	Maintenance due
92	Spare
93	Spare
94	Spare
95	Spare
96	Spare
97	Factory default memory inconsistent
98	Processy data memory inconsistent
99	Parameter memory inconsistent -> factory settings have been loaded!
100	No configuration found! -> blocked
101	Intake filter press. switch activated
102	Spare
103	Spare
104	Spare
105	Pre-lubrication required
106 to 159	Spare

B-Control Micro trouble shooting

No.	Fault message	Cause	Remedy
0	Final pressure sensor 1 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
1	Final pressure sensor 2 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
2	Intake pressure sensor faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
3	Oil pressure sensor faulty or direction of rotation incorrect	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
		Motor is connected incorrectly	Two of the three phases in the switchgear box of the compressor are interchanged. See the operating instructions for the compressor.
4	Interm. press. sensor 1 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
5	Interm. press. sensor 2 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
6	Interm. press. sensor 3 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
7	Interm. press. sensor 4 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
8	Crankcase pressure sensor defective	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
9	Press. dew point sensor faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
10	Level sensor level gas balloon faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
11	Temperature sensor cooling air faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
12	Temperature sensor last stage faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.

No.	Fault message	Cause	Remedy
13	Temperature sensor stage 1 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
14	Temperature sensor stage 2 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
15	Temperature sensor stage 3 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
16	Temperature sensor stage 4 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
17	Temperature sensor gas discharge faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
18	Temp.sensor Spare Ch.18 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
19	Sensor Spare Ch.19 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
20	Sensor Spare Ch.20 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
21	Sensor Spare Ch.21 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
22	Sensor Spare Ch.22 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
23	Sensor Spare Ch.23 faulty	Line faulty or short circuit	Check the line as per the circuit diagram.
		Sensor faulty	Replace the sensor.
24	Spare		
25	Spare		
26	Safety final pressure 1 reached	Final pressure 1 incorrectly set	Check pressure settings and sensor values.
		Final pressure sensor 1 faulty	See error message 0.
27	Safety final pressure 2 reached	Final pressure 2 incorrectly set	Check pressure settings and sensor values.
		Final pressure sensor 2 faulty	See error message 1.
28	Intake pressure too low	Gas supply pressure is inadequate	Adjust the gas supply. See the operating instructions for the compressor.
		Inlet valve closed.	Open inlet valve.

No.	Fault message	Cause	Remedy
29	Intake pressure too high	Gas supply pressure too high	Adjust the gas supply. See the operating instructions for the compressor.
30	Oil pressure too low	Oil level too low	Refill oil. See the operating instructions for the compressor.
		Oil pump faulty	Contact the BAUER Customer Service.
		Incorrect direction of rotation	Two of the three phases in the switchgear box of the compressor are interchanged. See the operating instructions for the compressor.
31	Interm. press. stage 1 min.	Pressure valve stage 1 faulty	Contact the BAUER Customer Service.
		Compressor block defective	
32	Interm. press. stage 1 max.	Inlet valve stage 2 faulty	Contact the BAUER Customer Service.
		Connection (line, cooler, intermediate filter) between stages 1 and 2 blocked	
33	Interm. press. stage 2 max.	Inlet valve stage 3 faulty	Contact the BAUER Customer Service.
		Connection (line, cooler, intermediate filter) between stages 2 and 3 blocked	
34	Interm. press. stage 3 max.	Inlet valve stage 4 faulty	Contact the BAUER Customer Service.
		Connection (line, cooler, intermediate filter) between stages 3 and 4 blocked	
35	Interm. press. stage 3 max.	Inlet valve stage 5 faulty	Contact the BAUER Customer Service.
		Connection (line, cooler, intermediate filter) between stages 4 and 5 blocked	
36	Crankcase pressure min.	Gas supply for crankcase too low	Check or adjust the gas supply for crankcase. See the operating instructions for the compressor.
37	Crankcase pressure max.	Gas supply for crankcase too high	Check or adjust the gas supply for crankcase. See the operating instructions for the compressor.
		Supply quantity of exhaust compressor too low	Check compressor.
		Supply quantity of compressor too low	Check compressor.
38	Press. dew point too high pre-warning	Filter cartridge is almost saturated	Ordering a filter cartridge
39	Press. dew point too high/filter lifetime	Filter cartridge saturated	Replacing filter cartridge
40	Level gas balloon too low	Gas supply of gas balloon too low	Adjusting the settings of the installation.
		Supply quantity of compressor too high	Adjusting the settings of the installation.
41	Level gas balloon too high	Gas supply of gas balloon too high	Adjusting the settings of the installation.
		Supply quantity of compressor too low	Adjusting the settings of the installation.

No.	Fault message	Cause	Remedy
42	Temperature cooling air too low	Room ventilation is inadequate	Adjust the ventilation of the compressor room. See the operating instructions for the compressor.
43	Temperature cooling air too high	Room ventilation is inadequate	Improve the ventilation of the compressor room. See the operating instructions for the compressor.
44	Last stage temp. too low	Compressor too cold	Check and/or increase the room temperature. See the operating instructions for the compressor.
		Room ventilation is inadequate	Improve the ventilation of the compressor room. See the operating instructions for the compressor.
		Water cooling set incorrectly	Check water cooling. See the operating instructions for the compressor.
45	Last stage temp. high	Compressor faulty	Contact the BAUER Customer Service.
		Room ventilation is inadequate	Improve the ventilation of the compressor room. See the operating instructions for the compressor.
		Water cooling set incorrectly	Check water cooling. See the operating instructions for the compressor.
46	Temperature stage 1 too high	Temperature of medium too high	Check medium temperature and cool medium if necessary. See the operating instructions for the compressor.
47	Temperature stage 2 too high	Temperature of medium too high	Check medium temperature and cool medium if necessary. See the operating instructions for the compressor.
48	Temperature stage 3 too high	Temperature of medium too high	Check medium temperature and cool medium if necessary. See the operating instructions for the compressor.
49	Temperature stage 4 too high	Temperature of medium too high	Check medium temperature and cool medium if necessary. See the operating instructions for the compressor.
50	Temperature gas discharge too high	Temperature of medium too high	Check medium temperature and cool medium if necessary. See the operating instructions for the compressor.
51	Temp.sensor Spare Ch.18 min.	Ambient temperature too low (below -30 °C)	Wait until ambient temperature has risen.
52	Temp.sensor Spare Ch.18 max.	Ambient temperature too high (over +45 °C)	Wait until ambient temperature has dropped.
53	Spare Ch.19 min.		
54	Spare Ch.19 max.		
55	Spare Ch.20 min.		
56	Spare Ch.20 max.		
57	Spare Ch.21 min.		
58	Spare Ch.21 max.		
59	Spare Ch.22 min.		
60	Spare Ch.22 max.		

No.	Fault message	Cause	Remedy
61	Spare Ch.23 min.		
62	Spare Ch.23 max.		
63	Oil level too low	Not enough oil	Refill oil. See the operating instructions for the compressor.
64	Motor protection/automatic case	Too many consumers at the same time	Check the complete installation.
		Fault in one phase	Check the mains.
		Incorrect setting	Set the automatic machine as per the circuit diagram.
		Automatic machine faulty	Check the automatic machine and replace it if necessary.
		Motor overloaded	Compressor faulty. Contact the BAUER Customer Service.
65	Cooling system defective	Frequency converter on ventilator defective	Check frequency converter.
		Motor protection on water pump has responded	Check pump for freedom of movement. Check motor protection setting. See electrical circuit diagram. Reset motor protection.
66	Ventilator 1 motor protection triggered	Ventilator overloaded	Check ventilator for resetting. Check cabling. Reset protection switch.
		Incorrect setting	Set the automatic machine as per the circuit diagram.
		Automatic machine faulty	Check the automatic machine and replace it if necessary.
67	Spare		
68	SECURUS faulty	SECURUS sensor or line faulty	Check the SECURUS sensor and line and replace them if necessary.
69	SECURUS filter pre-warning	Filter cartridge will soon be saturated	Order a filter cartridge.
70	SECURUS filter saturated	Filter cartridge is saturated	Replace the filter cartridge.
71	SECCANT faulty		Rectify the error.
72	SECCANT CAN faulty	Bus line, bus line connection defective	Check bus line and repair.
73	Refrigeration dryer faulty	Error in refrigeration dryer	Repair the refrigeration dryer. See the operating instructions for the unit.
74	Condensate vessel full	Excess condensate	Empty the condensate vessel.
75	Spare		
76	Spare		
77	Spare		
78	Spare		
79	Spare		
80	Spare		
81	Spare		
82	Spare		

No.	Fault message	Cause	Remedy
83	Spare		
84	Spare		
85	Spare		
86	Emergency off pressed	Emergency off pressed	Check the Emergency off and reset it.
87	SECURUS+ temperature measurement error		
88	SECURUS offline		____
89	Spare		
90	Spare		
91	Maintenance due	Target times reached	Carry out the compressor maintenance activities.
92	Spare		
93	Spare		
94	Spare		
95	Spare		
96	Spare		
97	Factory default memory inconsistent	Error when saving or memory faulty	Re-saving; if occurring repeatedly replace the control system.
98	Processy data memory inconsistent	Error when saving or memory faulty	Re-saving; if occurring repeatedly replace the control system.
99	Parameter memory inconsistent -> factory settings have been loaded!	Error when saving or memory faulty	Re-saving; if occurring repeatedly replace the control system.
100	No configuration found! -> blocked	Incorrect software	Contact the Customer Service.
101	Intake filter press. switch activated	Filter element blocked	Replace filter element.
102	Spare		
103	Spare		
104	Spare		
105	Pre-lubrication required	System too long not in operation	Carry out pre-lubrication; see compressor operating instruction manual.
106 to 159	Spare		

12. DRIVE SYSTEM

12.1. ELECTRIC MOTOR

The electric motor itself does not need any maintenance apart from occasional external cleaning. Lubrication may be needed, depending on the model and manufacturer. Observe the relevant instructions on the motor.

12.2. V-BELTS

- Check the V-belts as per the maintenance schedule, see maintenance booklet, for damage and wear.
- If necessary, they should be replaced, and if there are more than one belt, the entire set should be replaced.

13. MAINTENANCE OF THE FILLING VALVES

The maintenance work on the filling panels are limited to the cleaning and replacement of the filling valves and the checking of the safety valves.

Only perform maintenance work on filling valves while the filling station is in a depressurised state.

Switch the compressor off and open the filling valves. Then remove the filling valves.

13.1. MAINTENANCE

13.1.1. Removing filling valves

Remove the retaining clamp for the filling valves. To do this, remove the nuts on the interior of the filling panel, slacken the cap nuts for the connected lines, and remove the lines from the filling valve.

13.1.2. Cleaning/replacing the sinter filters

See Fig. 70.

The sinter filter (1) is located in the lower part of the filling valve. It filters tiny particles from the sealed breathing air. It is recommended that you clean sinter filters on a regular basis.

Unscrew the T screw connection on the filling valve. Remove the sinter filter with the aid of a screwdriver and wash it in warm, soapy water, then dry it off and reinstall it, using the screwdriver to ensure it is tightly screwed in. Replace the sinter filter if it is damaged.

13.1.3. Replacing damaged parts

Indentations may appear in certain parts, such as pistons or seals, during operation. If this occurs, they will need to be replaced (see Fig. 70).

The parts required are included in the repair kit for filling valves, order No. N5052.

Remove the straight pin and lever (steps 1 and 2).

First unscrew the lower part of the filling valve from the upper part (step 3).

Remove the spring (2) and conical nipple (3) from the lower part and replace them with new ones. Then remove the O-ring (4), spherical seat (5), plate (6) and piston (8) from the top part and replace them with new ones. Ensure they are installed in the correct position.

Before installing the piston (8), fill the groove between the 2 O-rings (7) with special grease. Insert the piston from above.

Screw the lower part of the filling valve back onto the top part and tighten it.

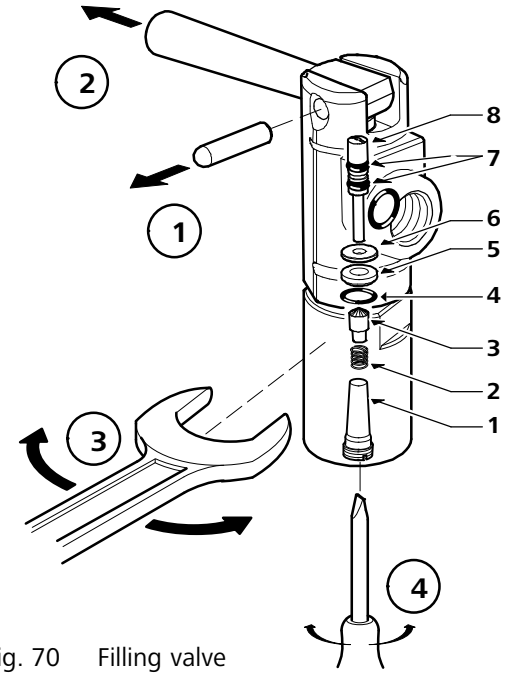


Fig. 70 Filling valve

14. SERVICING

The service work to be carried out by the operator is limited to the replacement of valves, seals and sealing rings and the replacement of damaged parts within the framework of the regular maintenance work, as per the maintenance booklet.

All additional repair work, not described in this operating instruction manual, may only be carried out by authorised customer service. In particular, you should
– Not carry out repairs to the drive unit and the bearings yourself,
– Only replace safety valves and filter vessel as a complete set.

15. FAULT-FINDING

Fault	Cause	Remedy
Drive motor		
Motor does not start	Fault in the electrical power supply	Check the line, the fuses, and compare the motor data with the mains supply
Compressor block		
No oil pressure	Air in the oil pump	Vent the oil pump and the line, see Chap. D-2.
The compressor does not achieve final pressure	Line and/or condensate drain valve(s) leaking (see also fault-finding Automatic condensate drain system)	Tighten and seal, clean the valve and, in the case of wear, replace
	Final pressure safety valve blows off too early	Clean the valve and reset
	Piston rings stuck or worn	Free the piston rings or replace them
	Piston clearance too large	Check the clearance and replace parts
Delivery performance drops off	Pipe leaking	Tighten connections
Intermediate pressure safety valve blows off	Intermediate pressure too high, valves leaking	Check valves, see Chapter D-9. Maintenance and cleaning the valves.
Compressor getting too hot	Cooling air feed inadequate	Check erection. Max. ambient temperature +45 °C
	Suction/pressure valve leaking	Check valves and replace if necessary
	Direction of rotation incorrect	See arrow on unit; rectify
Taste of oil in the air	Filter not serviced, filter cartridges saturated; incorrect oil type	Service the filter, replace the filter cartridges, use approved oil, see oil list. Carbonised valves should be cleaned.

Fault	Cause	Remedy
Electrical equipment		
Control system does not switch on	No control voltage present	Check infeed line
	Control fuse defective	Replace fuse, rectify the cause
	Control voltage circuit interrupted because the line and the terminals loose	Tighten the terminals
	Thermal over-current relay has responded	Rectify the faults as described below
Thermal over-current relay for drive motor responds	Power consumption too great	Check compressor drive
	Over-current relay set too low	Rectify the setting
Control system does not switch off, final pressure safety valve blows off	Final pressure monitor too high	Rectify the setting
	Final pressure safety valve defective	Replace the safety valve
Automatic condensate drain		
Condensate drain valves does not close	Condensate drain valve leaking because of contamination	Remove drain valve and clean
Condensate drain valves do not open	Condensate drain valve plunger blocked	Remove drain valve, clean and replace if necessary
	No pilot pressure present	Check feed
Solenoid valve does not close	Solenoid valve defective	Check solenoid valve. If necessary replace the whole set
	Solenoid valve not getting power	Check electrical control system and check timer
Solenoid does not open	Solenoid valve defective	Check solenoid valve. If necessary replace the whole set
	Continuous power to solenoid valve	Check electrical control system and check timer
Inadequate water removal (a lot of condensate when the manual drain cocks are opened)	Jets in the drain valves in 3rd and 4th stages blocked	Unscrew the jets and clean

B-Control Micro Alarmliste

No.	Deutsch [de]
0	Enddrucksensor 1 defekt
1	Enddrucksensor 2 defekt
2	Ansaugdrucksensor defekt
3	Öldrucksensor defekt oder Drehrichtung falsch
4	Zw.drucksensor 1.St. defekt
5	Zw.drucksensor 2.St. defekt
6	Zw.drucksensor 3.St. defekt
7	Zw.drucksensor 4.St. defekt
8	Kurbelgehäusedrucksensor defekt
9	Drucktaupunktsensor defekt
10	Levelsensor Niveau Gasblase defekt
11	Temperatursensor Kühlluft defekt
12	Temperatursensor LS defekt
13	Temperatursensor Stufe 1 defekt
14	Temperatursensor Stufe 2 defekt
15	Temperatursensor Stufe 3 defekt
16	Temperatursensor Stufe 4 defekt
17	Temperatursensor Gasaustritt defekt
18	Temp.sensor Reserve Ch.18 defekt
19	Sensor Reserve Ch. 19 defekt
20	Sensor Reserve Ch. 20 defekt
21	Sensor Reserve Ch. 21 defekt
22	Sensor Reserve Ch. 22 defekt
23	Sensor Reserve Ch. 23 defekt
24	Reserve
25	Reserve
26	Sicherheitsenddruck 1 erreicht
27	Sicherheitsenddruck 2 erreicht
28	Ansaugdruck zu niedrig
29	Ansaugdruck zu hoch
30	Öldruck zu niedrig
31	Zwischendruck 1 Stufe min.
32	Zwischendruck 1 Stufe max.
33	Zwischendruck 2. Stufe max.
34	Zwischendruck 3. Stufe max.
35	Zwischendruck 4. Stufe max.
36	Kurbelgehäusedruck min.
37	Kurbelgehäusedruck max.
38	Drucktaupunkt hoch
39	Drucktaupunkt zu hoch
40	Niveau Gasblase zu niedrig
41	Niveau Gasblase zu hoch

No.	Deutsch [de]
42	Temperatur Kühlluft zu niedrig
43	Temperatur Kühlluft zu hoch
44	Temperatur letzte Stufe zu niedrig
45	Temperatur letzte Stufe zu hoch
46	Temperatur Stufe 1 zu hoch
47	Temperatur Stufe 2 zu hoch
48	Temperatur Stufe 3 zu hoch
49	Temperatur Stufe 4 zu hoch
50	Temperatur Gasaustritt zu hoch
51	Temp.sensor Reserve Ch.18 min.
52	Temp.sensor Reserve Ch.18 max.
53	Reserve Ch.19 min
54	Reserve Ch.19 max
55	Reserve Ch.20 min
56	Reserve Ch.20 max
57	Reserve Ch.21 min
58	Reserve Ch.21 max
59	Reserve Ch.22 min
60	Reserve Ch.22 max
61	Reserve Ch.23 min
62	Reserve Ch.23 max
63	Ölniveau zu niedrig
64	Motorschutz / Automatenfall
65	Kühlsystem gestört
66	Lüfter Motorschutz ausgelöst
67	Reserve
68	SECURUS gestört
69	SECURUS Filterwechsel Vorwarnung
70	SECURUS Filter gesättigt
71	SECCANT gestört
72	SECCANT CAN gestört
73	Kältetrockner gestört
74	Kondensatbehälter voll
75	Reserve
76	Reserve
77	Reserve
78	Reserve
79	Reserve
80	Reserve
81	Reserve
82	Reserve
83	Reserve
84	Reserve

No.	Deutsch [de]
85	Reserve
86	Not-Aus ausgelöst
87	SECURUS+ Temperaturmessung gestört
88	SECURUS offline
89	Reserve
90	Reserve
91	Wartung fällig
92	Reserve
93	Reserve
94	Reserve
95	Reserve
96	Reserve
97	Speicher für Werkseinstellungen inkonsistent
98	Speicher für Prozessdaten inkonsistent
99	Parameterspeicher inkonsistent -> Werkseinstellungen wurden geladen!
100	keine gültige Konfig vorhanden! -> gesperrt
101	Druckschalter Ansaugfilter ausgelöst
102	Reserve
103	Reserve
104	Reserve
105	Vorschmierung notwendig
106 - 159	Reserve

B-Control Micro Fehlersuche

Nr:	Fehlermeldung	Ursache	Abhilfe
0	Enddrucksensor 1 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
1	Enddrucksensor 2 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
2	Ansaugdrucksensor defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
3	Öldrucksensor defekt oder Drehrichtung falsch	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
		Motor falsch angeschlossen	Zwei der drei Phasen im Schaltkasten des Kompressors miteinander vertauschen. Siehe Bedienungsanleitung des Kompressors.
4	Zw.drucksensor 1.St. defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
5	Zw.drucksensor 2.St. defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
6	Zw.drucksensor 3.St. defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.

Nr:	Fehlermeldung	Ursache	Abhilfe
7	Zw.drucksensor 4.St. defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
8	Kurbelgehäusedrucksensor defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
9	Drucktaupunktsensor defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
10	Levelsensor Niveau Gasblase defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
11	Temperatursensor Kühlluft defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
12	Temperatursensor letzte Stufe defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
13	Temperatursensor Stufe 1 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
14	Temperatursensor Stufe 2 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
15	Temperatursensor Stufe 3 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
16	Temperatursensor Stufe 4 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
17	Temperatursensor Gasaustritt defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
18	Temp.sensor Reserve Ch.18 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
19	Sensor Reserve Ch. 19 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
20	Sensor Reserve Ch. 20 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
21	Sensor Reserve Ch. 21 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
22	Sensor Reserve Ch. 22 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
23	Sensor Reserve Ch. 23 defekt	Leitung defekt oder Kurzschluss	Leitung gemäss Schaltplan prüfen.
		Sensor defekt	Sensor ersetzen.
24	Reserve		
25	Reserve		
26	Sicherheitsenddruck 1 erreicht	Enddruck 1 falsch eingestellt	Druckeinstellungen und Sensorwerte prüfen.
		Enddrucksensor 1 defekt	Siehe Fehlermeldung 0.

Nr:	Fehlermeldung	Ursache	Abhilfe
27	Sicherheitsenddruck 2 erreicht	Enddruck 2 falsch eingestellt	Druckeinstellungen und Sensorwerte prüfen.
		Enddrucksensor 2 defekt	Siehe Fehlermeldung 1.
28	Ansaugdruck zu niedrig	Gasversorgungsdruck nicht ausreichend	Gasversorgung nachjustieren. Siehe Bedienungsanleitung des Kompressors.
		Eingangsventil geschlossen.	Eingangsventil öffnen.
29	Ansaugdruck zu hoch	Gasversorgungsdruck zu hoch	Gasversorgung nachjustieren. Siehe Bedienungsanleitung des Kompressors.
30	Öldruck zu niedrig	Ölstand zu niedrig	Öl nachfüllen. Siehe Bedienungsanleitung des Kompressors.
		Ölpumpe defekt	BAUER-Kundendienst kontaktieren.
		Falsche Drehrichtung	Zwei der drei Phasen im Schaltkasten des Kompressors miteinander vertauschen. Siehe Bedienungsanleitung des Kompressors.
31	Zwischendruck 1 Stufe min.	Druckventil 1. Stufe defekt	BAUER-Kundendienst kontaktieren.
		Kompressorblock defekt	
32	Zwischendruck 1 Stufe max.	Ansaugventil 2. Stufe defekt	BAUER-Kundendienst kontaktieren.
		Verbindung (Leitung, Kühler, Zwischenfilter) zwischen 1. und 2. Stufe verstopft	
33	Zwischendruck 2 Stufe max.	Ansaugventil 3. Stufe defekt	BAUER-Kundendienst kontaktieren.
		Verbindung (Leitung, Kühler, Zwischenfilter) zwischen 2. und 3. Stufe verstopft	
34	Zwischendruck 3 Stufe max.	Ansaugventil 4. Stufe defekt	BAUER-Kundendienst kontaktieren.
		Verbindung (Leitung, Kühler, Zwischenfilter) zwischen 3. und 4. Stufe verstopft	
35	Zwischendruck 4 Stufe max.	Ansaugventil 5. Stufe defekt	BAUER-Kundendienst kontaktieren.
		Verbindung (Leitung, Kühler, Zwischenfilter) zwischen 4. und 5. Stufe verstopft	
36	Kurbelgehäusedruck min.	Gasversorgung für Kurbelgehäuse zu niedrig	Gasversorgung für Kurbelgehäuse prüfen bzw. justieren. Siehe Bedienungsanleitung des Kompressors.
37	Kurbelgehäusedruck max.	Gasversorgung für Kurbelgehäuse zu hoch	Gasversorgung für Kurbelgehäuse prüfen bzw. justieren. Siehe Bedienungsanleitung des Kompressors.
		Liefermenge des Absaugkompressors zu niedrig	Kompressor prüfen.
		Liefermenge des Kompressors zu niedrig	Kompressor prüfen.
38	Drucktaupunkt zu hoch Vorwarnung	Filterpatrone fast gesättigt	Filterpatrone bestellen
39	Drucktaupunkt zu hoch / Filterstandzeit	Filterpatrone gesättigt	Filterpatrone austauschen
40	Niveau Gasblase zu niedrig	Gasversorgung der Gasblase zu niedrig	Einstellungen der Anlage justieren.
		Liefermenge des Kompressors zu hoch	Einstellungen der Anlage justieren.
41	Niveau Gasblase zu hoch	Gasversorgung der Gasblase zu hoch	Einstellungen der Anlage justieren.
		Liefermenge des Kompressors zu niedrig	Einstellungen der Anlage justieren.

Nr:	Fehlermeldung	Ursache	Abhilfe
42	Temperatur Kühlluft zu niedrig	Raumbelüftung ungeeignet	Belüftung des Kompressorraums anpassen. Siehe Bedienungsanleitung des Kompressors.
43	Temperatur Kühlluft zu hoch	Raumbelüftung ungeeignet	Belüftung des Kompressorraums verbessern. Siehe Bedienungsanleitung des Kompressors.
44	Temperatur LS zu niedrig	Kompressor zu kalt	Raumtemperatur prüfen bzw. erhöhen. Siehe Bedienungsanleitung des Kompressors.
		Raumbelüftung ungeeignet	Belüftung des Kompressorraums verbessern. Siehe Bedienungsanleitung des Kompressors.
		Wasserkühlung falsch eingestellt	Wasserkühlung prüfen. Siehe Bedienungsanleitung des Kompressors.
45	Temperatur LS zu hoch	Kompressor defekt	BAUER-Kundendienst kontaktieren.
		Raumbelüftung ungeeignet	Belüftung des Kompressorraums verbessern. Siehe Bedienungsanleitung des Kompressors.
		Wasserkühlung falsch eingestellt	Wasserkühlung prüfen. Siehe Bedienungsanleitung des Kompressors.
46	Temperatur Stufe 1 zu hoch	Temperatur des Mediums zu hoch	Temperatur des Mediums prüfen ggf. Medium kühlen. Siehe Bedienungsanleitung des Kompressors.
47	Temperatur Stufe 2 zu hoch	Temperatur des Mediums zu hoch	Temperatur des Mediums prüfen ggf. Medium kühlen. Siehe Bedienungsanleitung des Kompressors.
48	Temperatur Stufe 3 zu hoch	Temperatur des Mediums zu hoch	Temperatur des Mediums prüfen ggf. Medium kühlen. Siehe Bedienungsanleitung des Kompressors.
49	Temperatur Stufe 4 zu hoch	Temperatur des Mediums zu hoch	Temperatur des Mediums prüfen ggf. Medium kühlen. Siehe Bedienungsanleitung des Kompressors.
50	Temperatur Gasaustritt zu hoch	Temperatur des Mediums zu hoch	Temperatur des Mediums prüfen ggf. Medium kühlen. Siehe Bedienungsanleitung des Kompressors.
51	Temp.sensor Reserve Ch.18 min.	Umgebungstemperatur zu niedrig (unter -30 °C)	Warten bis Umgebungstemperatur gestiegen ist.
52	Temp.sensor Reserve Ch.18 max.	Umgebungstemperatur zu hoch (über +45 °C)	Warten bis Umgebungstemperatur gesunken ist.
53	Reserve Ch.19 min		
54	Reserve Ch.19 max		
55	Reserve Ch.20 min		
56	Reserve Ch.20 max		
57	Reserve Ch.21 min		
58	Reserve Ch.21 max		
59	Reserve Ch.22 min		
60	Reserve Ch.22 max		

Nr:	Fehlermeldung	Ursache	Abhilfe
61	Reserve Ch.23 min		
62	Reserve Ch.23 max		
63	Ölstand zu niedrig	Zu wenig Öl	Öl nachfüllen. Siehe Bedienungsanleitung des Kompressors.
64	Motorschutz / Automatenfall	Zu viele Verbraucher gleichzeitig	Gesamtinstallation prüfen.
		Störung auf einer Phase	Netz prüfen.
		Einstellung falsch	Automat gemäss Schaltplan einstellen.
		Automat defekt	Automat prüfen ggf. ersetzen.
		Motor überbelastet	Kompressor defekt. BAUER-Kundendienst kontaktieren.
65	Kühlsystem gestört	Frequenzwandler des Lüfters defekt	Frequenzwandler prüfen.
		Motorschutz der Wasserpumpe ausgelöst	Pumpe auf freigängigkeit prüfen. Motorschutzeinstellung prüfen. Siehe Schaltplan. Motorschutz zurückstellen.
66	Lüfter 1 Motorschutz ausgelöst	Lüfter überbelastet	Lüfter auf zurückstellenprüfen. Verkabelung prüfen. Schutzschalter zurücksetzen.
		Einstellung falsch	Automat gemäss Schaltplan einstellen.
		Automat defekt	Automat prüfen ggf. ersetzen.
67	Reserve		
68	SECURUS gestört	SECURUS-Sensor oder Leitung defekt	SECURUS-Sensor und Leitung prüfen ggf. ersetzen.
69	SECURUS Filterwechsel Vorwarnung	Filterpatrone bald gesättigt	Filterpatrone bestellen.
70	SECURUS Filter gesättigt	Filterpatrone gesättigt	Filterpatrone erneuern.
71	SECCANT gestört		Fehler beheben.
72	SECCANT CAN gestört	Bus-Leitung, -Anschluss defekt	Bus-Leitung prüfen und reparieren.
73	Kältetrockner gestört	Fehler im Kältetrockner	Kältetrockner reparieren. Siehe Betriebsanleitung des Aggregats.
74	Kondensatbehälter voll	Zu viel Kondensat	Kondensatbehälter leeren.
75	Reserve		
76	Reserve		
77	Reserve		
78	Reserve		
79	Reserve		
80	Reserve		
81	Reserve		
82	Reserve		
83	Reserve		
84	Reserve		
85	Reserve		
86	Not-Aus ausgelöst	Not-Aus gedrückt	Not-Aus prüfen und zurückstellen.

Nr:	Fehlermeldung	Ursache	Abhilfe
87	SECURUS+ Temperaturmessung gestört		
88	SECURUS offline		____
89	Reserve		
90	Reserve		
91	Wartung fällig	Zielzeiten erreicht.	Kompressor warten.
92	Reserve		
93	Reserve		
94	Reserve		
95	Reserve		
96	Reserve		
97	Speicher für Werkseinstellungen inkonsistent	Fehler beim Speichern oder Speicher defekt	Neuspeichern; bei wiederholtem Auftreten Steuerung austauschen
98	Speicher für Prozessdaten inkonsistent	Fehler beim Speichern oder Speicher defekt	Neuspeichern; bei wiederholtem Auftreten Steuerung austauschen
99	Parameterspeicher inkonsistent -> Werkseinstellungen wurden geladen!	Fehler beim Speichern oder Speicher defekt	Neuspeichern; bei wiederholtem Auftreten Steuerung austauschen
100	keine gültige Konfig vorhanden! -> gesperrt	Falsche Software	Kundendienst kontaktieren.
101	Druckschalter Ansaugfilter ausgelöst	Filterelement zugesetzt	Filterelement austauschen
102	Reserve		
103	Reserve		
104	Reserve		
105	Vorschmierung notwendig	Anlage zu lange nicht in Betrieb	Vorschmierung durchführen; siehe Kompressor-Betriebsanleitung
106 bis 159	Reserve		

16. TABLES

16.1. BOLT TORQUE TABLE

Unless otherwise stated, the following torques are to be used. Always use a torque wrench to tighten the valve head screws. The quoted values apply to greased bolts. Self-locking nuts must not be re-used and must be replaced.

Type of bolt	Thread	Max. torque
Hexagonal bolts Socket head bolts	M 6	10 Nm (7 ft.lbs)
Hexagonal bolts Socket head bolts	M 8	25 Nm (18 ft.lbs)
Hexagonal bolts Socket head bolts	M 10	45 Nm (32 ft.lbs)
Hexagonal bolts Socket head bolts	M 12	75 Nm (53 ft.lbs)
Hexagonal bolts Socket head bolts	M 14	120 Nm (85 ft.lbs)
Hexagonal bolts Socket head bolts	M 16	200 Nm (141 ft.lbs)
Pipe fittings (cutting ring fittings)		Hand tight + 1/2 turn

16.2. BOLT TIGHTENING SEQUENCE

Tighten all valve head and cylinder fixing bolts and nuts evenly in the sequence shown in Fig. 71.

Make sure that all parts are tightened only in a **cold condition**!

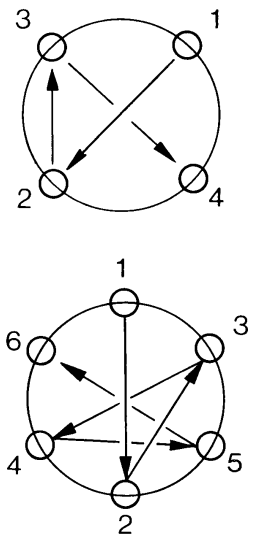


Fig. 71 Tightening sequence

16.3. LUBRICANT TABLE

Application range	Lubricant
Rubber and plastic parts, filter housing thread	WEICON WP 300 white Order No. N19752 or **BAUER**-Special grease Order No. 072500
O-Rings	**BAUER**-Special grease Order No. 072500
Shaft seal rings (Ring) Shaft seal rings (Shaft)	**BAUER**-Special grease Order No. 072500 Klüber SK 01-205
Bolts, pins, threaded pins	WEICON ANTI-SEIZE AS 040 P, Order No. N19753 or similar material with copper or MoS_2 additive

For all compressor oils see the **lubrication oil list** available from the **BAUER** customer service.

16.4. ADHESIVE AND SEALANT TABLE

Application range	Adhesive and sealants
Bolt locking, gluing in of threaded studs	Loctite 2701
Sealing conical threads	Loctite 243
Sealing metal-metal High temperature connections, e.g. valve heads, cylinders	Temperature-resistant sealant, e.g. Wacker E10, Order No. N18247
Paper gaskets	Loctite FAG 2

16.5. TEST MATERIAL TABLE

Application range	Test material
Fittings, lines	Leak detection spray Order No. FM0089

Section A
Description

Section B
Erection, Commissioning

Section C
Operation

Section D
Maintenance, Repair

Section E
Storage, Conservation

Section F
Plans, Diagrams, Drawings

Section G
Spare parts lists

E. STORAGE, CONSERVATION

1. GENERAL

If compressor unit is to be taken out of service for a period longer than six months, you must provide conservation in accordance with the following instructions.

The storage of the compressors should be in dry, dust-free rooms. Covering the unit with plastic sheeting is only recommended if you can ensure that no condensation will be produced under the sheeting. When the unit is covered you should lift the sheeting from time to time and clean the unit.

If the described conservation instructions cannot be carried out or if the storage period extends to a period of longer than 2 years then special instructions should be requested.

2. PREPARATORY WORK

Before executing the conservation work you must bring the compressor unit to operating temperature and then continue for another 10 minutes after reaching the prescribed operating pressure.

The following checks must be made:

- Leak test of all pipes, filters and valves (including the safety valve).
- After the 10 minutes open the drain cock and run the unit at the set minimum pressure (pressure retaining valve, see Chapter A--6) for approx. 5 minutes.
- Stop the unit after this 5 minute period. Drain the condensate from the intermediate filters and the final separator. This reduces the pressure to zero bar. Close the filling cocks and drain cock again.

CAUTION **The unit must always be de-pressurised!**

- Open the fittings on the filters and lubricate the thread.
- Tighten all fittings.

On unit where there is a filter system fitted, please note:

- **Leave the filter cartridges in the filters!**
  This prevents oil from the conservation procedure from reaching the pipes and filling fittings behind the filter.
- Allow the compressor unit to cool.

3. CONSERVATION WORK

- Re-start the compressor unit. Then spray a small amount (approx. 10 cm^3) of compressor oil into the intake openings of the valve heads whilst the compressor is running. Do not allow the compressor to run too long in order to prevent over-heating of the oil, thus reducing its adhesive properties.
- Switch the unit off.
- Close the outlet cock.

4. CONSERVATION WORK FOR THE DRIVE MOTOR

Treat the motor as per the instructions issued by the motor manufacturer.

5. MAINTENANCE WORK DURING STORAGE

Start the unit every six months as described below:

- Open the outlet cock.
- Run the unit for approx. 10 minutes. On compressors with pressurised oil lubrication make sure that it is working properly (oil in sight glass of the oil pressure regulating valve or oil pressure gauge).
- Stop the unit.
- Open the condensate drain cocks and release the pressure. Close the cocks again.
- Carry out the conservation work as per 3.

5.1. LUBRICATION OILS DURING CONSERVATION

- After an extended period of storage the oil in the compressor and the motor will age. For this reason, you should drain the old off after max. 2 years and then replace it with new oil.
- The quoted period is only reached when the crankcase is closed off during the storage in accordance with the conservation regulations.
- Turn the compressor and the motor over again after the oil change or start it up for the prescribed time period. Refer to 3. and 4.
- During the six-month brief start-up or when turning the compressor unit over, check the pressurised oil lubrication of the compressor.
  The delivery of the oil pump is in order if oil flows through the sight glass of the oil pressure regulating valve or if the oil pressure gauge shows the prescribed oil pressure.

6. DE-CONSERVATION WORK

- Check the oil level in the compressor.
- Handle the motor in accordance with the instructions provided by the motor manufacturer.
- On unit where there is a filter system fitted, please note: Open the fine post-cleaner and replace the filter cartridges.
- Start the compressor unit with open outlet cock and run for approx. 10 minutes to warm up.
- When doing so, check the oil flow in the sight glass or oil pressure at the pressure gauge. If there are any faults, check the pressurised oil lubrication.
- After 10 minutes warming-up time, close the outlet cock and run the unit to final pressure until the final pressure safety valve blows off. To do this, run the unit up to the final pressure with the drain cock closed until the safety valve blow off. Compare the blow-off pressure of the safety valve with the pressure gauge.
- Check the intermediate pressure safety valve for leaks.
- In the event of faults, you must normally determine the cause from the fault-finding table, Chapter D-15. and rectify the fault.
- If the operation is in order, stop the unit and the compressor unit is ready for operation.

Section A
Description

Section B
Erection, Commissioning

Section C
Operation

Section D
Maintenance, Repair

Section E
Storage, Conservation

Section F
Plans, Diagrams, Drawings

Section G
Spare parts lists

F. PLANS, DIAGRAMS, DRAWINGS

The plans and drawings below are found on the CD delivered with the unit. They are are filed in the directory listed in column „Dir.“

1. PIPING PLANS

Piping plans	Dir.	Drwg. No.
225/330 bar units		
PE300-VE	RI	125572-02-RLS
PE300-VE with SECURUSplus	RI	125572-03-RLS
PE400-VE, PE550-VE, PE700-VE, PE850-VE	RI	125572-01-RLS
PE400-VE, PE550-VE, PE700-VE, PE850-VE with SECURUSplus	RI	125572-RLS
420 bar units		
PE320-VE, PE500-VE	RI	88490-05-RLS
PE320-VE, PE500-VE with SECURUSplus	RI	88490-04-RLS
PE600-VE	RI	88490-07-RLS
PE600-VE with SECURUSplus	RI	88490-11-RLS
Schematic parts list, valid for all flow diagrams	RI	76360

2. CIRCUIT DIAGRAMS

Circuit diagrams	Dir.	No.
Compressor plant circuit diagram	SP	Order-dependent
Switching parts list electrics, applicable to all circuit diagrams	SP	76360

3. PLANT DRAWINGS

Unit drawings	Dir.	Drwg. No.
Drawing compressor unit, open version PE-VE	ZG	125533
Drawing compressor unit, Super-Silent version PE-VE	ZG	125534

4. LISTS

List	Dir.	No.
Lubrication oil list	Lists	70851

5. PRESSURE EQUIPMENT OPERATING INSTRUCTIONS

6. MAINTENANCE BOOKLET

Section A
Description

Section B
Erection, Commissioning

Section C
Operation

Section D
Maintenance, Repair

Section E
Storage, Conservation

Section F
Plans, Diagrams, Drawings

Section G
Spare parts lists

G. SPARE PARTS LISTS

1. COMPRESSOR UNITS 225 BAR AND 330 BAR

Corresponding spare parts lists:	Code
PE-VE Compressor unit	TPEV-3/1
Compressor block	See Chap. G-3.
Filter system	B33._
Automatic condensate drain	C60._-E
Framework and cladding	E26._-E
Drive system	F14._-E
Compressor control	G59._-E

2. COMPRESSOR UNITS 420 BAR

Corresponding spare parts lists:	Code
PE-VE Compressor unit	TPEV-420-3/1
Compressor block	See Chap. G-3.
Filter system	B34._
Automatic condensate drain	C89._
Framework and cladding	E26._-E
Drive system	F14._-E
Compressor control	G59._-E

3. COMPRESSOR BLOCKS

Corresponding spare parts lists:	Code
IK120	A1.7
IK12.14	A17.6
IK150	A3.12
IK180	A20.7
IK18.1	A15.8

4. ACCESSORIES

ACCESSORIES[a)]	Code
Filling panels, Verticus models	G47
Filling panels, KAP models	G14
40l. condensate collection system	G44
Suction device	G60._-A

a) as per order