

Technical Documentation

HIGH PRESSURE INDUSTRIAL COMPRESSOR UNITS

225 bar

330 bar

Model range MINI-VERTICUS 3



A

DESCRIPTION

B

INSTALLATION, TAKING INTO OPERATION

C

OPERATION

D

MAINTENANCE, REPAIR

E

STORAGE, PRESERVATION

F

DIAGRAMS, DRAWINGS

G

SPARE PARTS CATALOGUE

INTRODUCTION

This manual contains operating instructions and maintenance schedules for the industrial compressor units of the model range

MV 3 "Mini-Verticus"

Model: _____

Serial no.: _____

WARNING**! Pneumatic high pressure system !**

The air produced with this unit must not be used for breathing air supply.

Ignoring the operating and maintenance instructions can lead to severe injury or death.

The machine has been built in accordance with the EC machine regulations 98/37/EG. Specifications on the noise level in accordance with the machine and product safety law as of 01.05.2004 and the EC machine regulations, chapt. I, section 1.7.4. The machine has been built according to the highest standard of technology and the generally acknowledged safety standards. Nevertheless, operation could still cause danger for the operating personnel or third parties, or result in damage to the machine and other values. The machine may only be used to produce compressed air as specified in this manual. Other use is strictly prohibited.

INTRODUCTION**NOTICE****Layout and use of instruction manuals**

Working with pneumatic high pressure systems cannot always be considered safe and one should possess a minimum knowledge of how to operate them. For this reason, please read this instruction manual before operating your unit, to get to know the components and processes.

This instruction manual is made up according to the building block principle. It is divided into 7 sections, whose content varies according to the type of unit, standard or special and of course the accustomed extras, which are available for all our units in large numbers. With this kind of subdivision system, all sections should be in existence, in order to give a complete picture. In other words: even if one particular component is not part of the unit, the relative section will still be kept, although only a notice may be printed there. On the other hand, other sections could be represented more than once if certain units require this. In such a case one only has to refer to the applicable section, all superfluous ones can be removed. This is quite simple due to the ring binding system.

Please note that the circuit diagrams in section F, unless otherwise stated, are the standard circuit diagrams for your specific unit. So please always refer to the circuit diagram enclosed in the compressor unit control box, in which any possible changes are registered.

The same thing applies for the spare parts lists in section G. To avoid misunderstanding when ordering spare parts, we advise you to remove the parts that are not applicable. The spare parts lists that apply to the relative unit are listed in the section Index.

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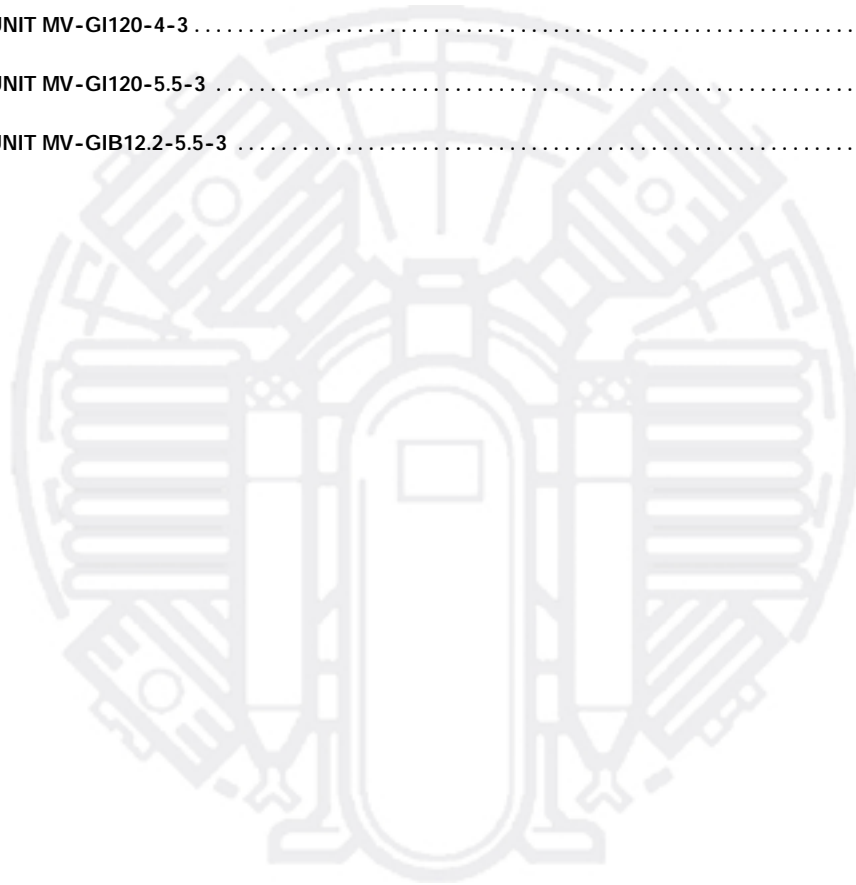


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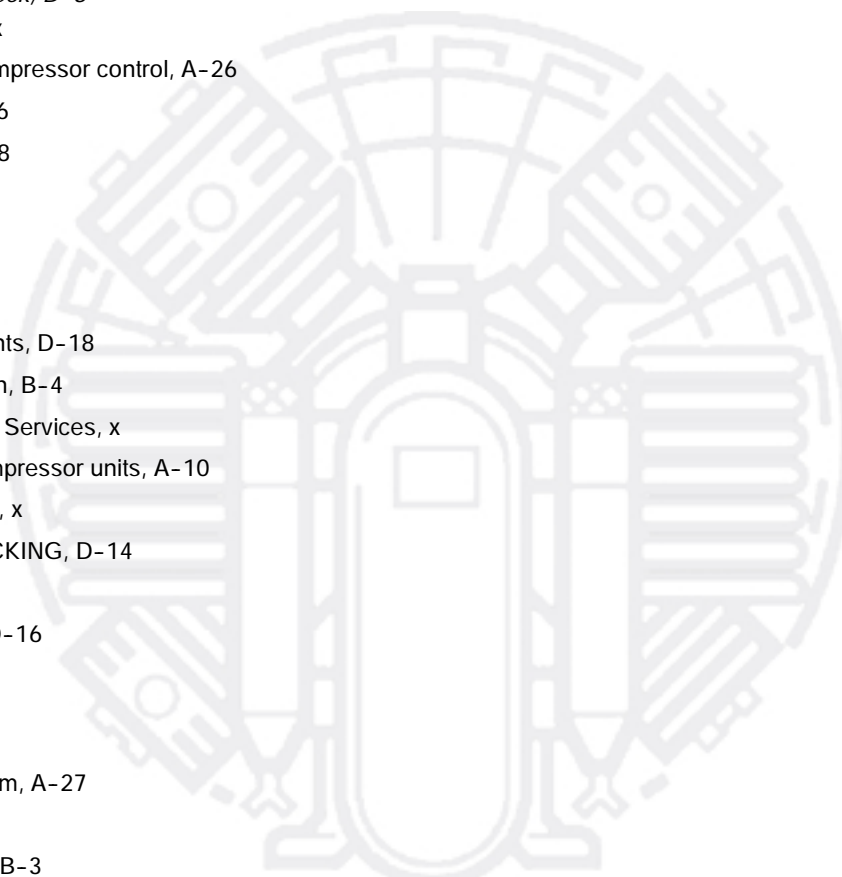
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Change notice

Changes which differ from the previous edition are marked with a vertical line.

Change no.	Change date and changes
0	First Edition October 2006
1	February 2007; Service manual

Dear Customer

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

You can contact us Mondays to Thursdays from 08⁰⁰ to 16³⁰, Fridays from 08⁰⁰ to 15⁰⁰ on phone no. (089) 78049-0.

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

Do you want to order spare parts?

· **Customer Services** Tel: (089) 78049-129 or -149
 Fax: (089) 78049-101

Do you have problems with maintenance or repair work?

· **Technical Customer Services** Tel: (089) 78049-176 or -246
 Fax: (089) 78049-101

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

· **Sales Department** Tel: (089) 78049-138, -154, -185 or -202
 Fax: (089) 78049-103

Are you interested in training courses?

· **Training Manager** Tel: (089) 78049-175
 Fax: (089) 78049-101

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

Section A **Description**

Section B
Installation, Taking into operation

Section C
Operation

Section D
Maintenance, Repair

Section E
Storage, Preservation

Section F
Diagrams, Drawings

Section G
Spare Parts Catalogue





Instruction Manual • Industrial Compressor Units

A. DESCRIPTION

1. GENERAL

1.1. PURPOSE AND SHORT DESCRIPTION

This instruction manual describes the industrial compressor units of the **Mini-Verticus 3** model range. This model range comprises air as well as gas compressor units.

The air compressor units (I models) are designed for compression of industrial air in the high pressure range. The maximum operating pressure of the compressor is 350 bar (5,000 psi).

The gas compressor units (GI, and GIB models) are designed for compression nitrogen in the high pressure range. The maximum operating pressure of the compressors in the GI and GIB series is 350 bar (5,000 psi).

The industrial compressor units of the **MV 3** series are mounted in the **Super-Silent fully enclosed, sound-proof "Mini-Verticus" housing**.

The noise level is less than 70 dB(A).



Fig. 1 High Pressure Compressor Unit, Model range MV 3

- 1 Main switch
- 2 Instrument panel, electric control

- 3 Final pressure gauge
- 4 Condensate collecting tank



Fig. 2 High Pressure Compressor Unit MV 3-I with storage bottle B50

- | | |
|-----------------------------------|--------------------------------|
| 1 Safety valve and pressure gauge | 3 Intermediate pressure gauges |
| 2 Storage bottle B50 | 4 Condensate collecting tank |

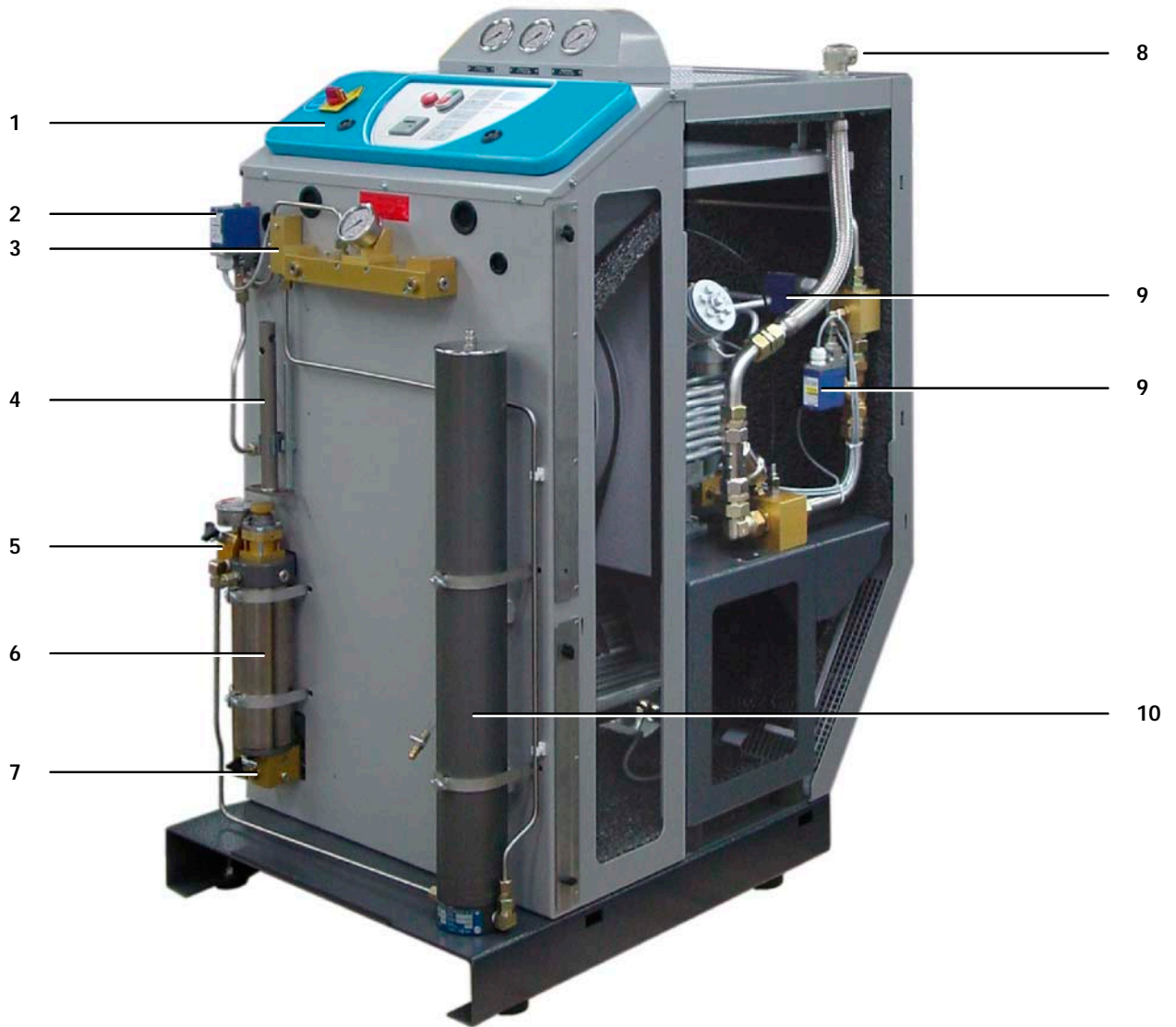


Fig. 3 High pressure compressor unit, model range MV-GIB12.2 with gas intake system and filter system P61*

- | | |
|--------------------------------------|---------------------------|
| 1 Instrument panel, electric control | 6 Oil and Water separator |
| 2 Final pressure switch | 7 Condensate drain valve |
| 3 Non-return valve | 8 Gas inlet connection |
| 4 Filter key | 9 Intake pressure switch |
| 5 Venting valve with pressure gauge | 10 Fine filter |

* Front and side panels removed

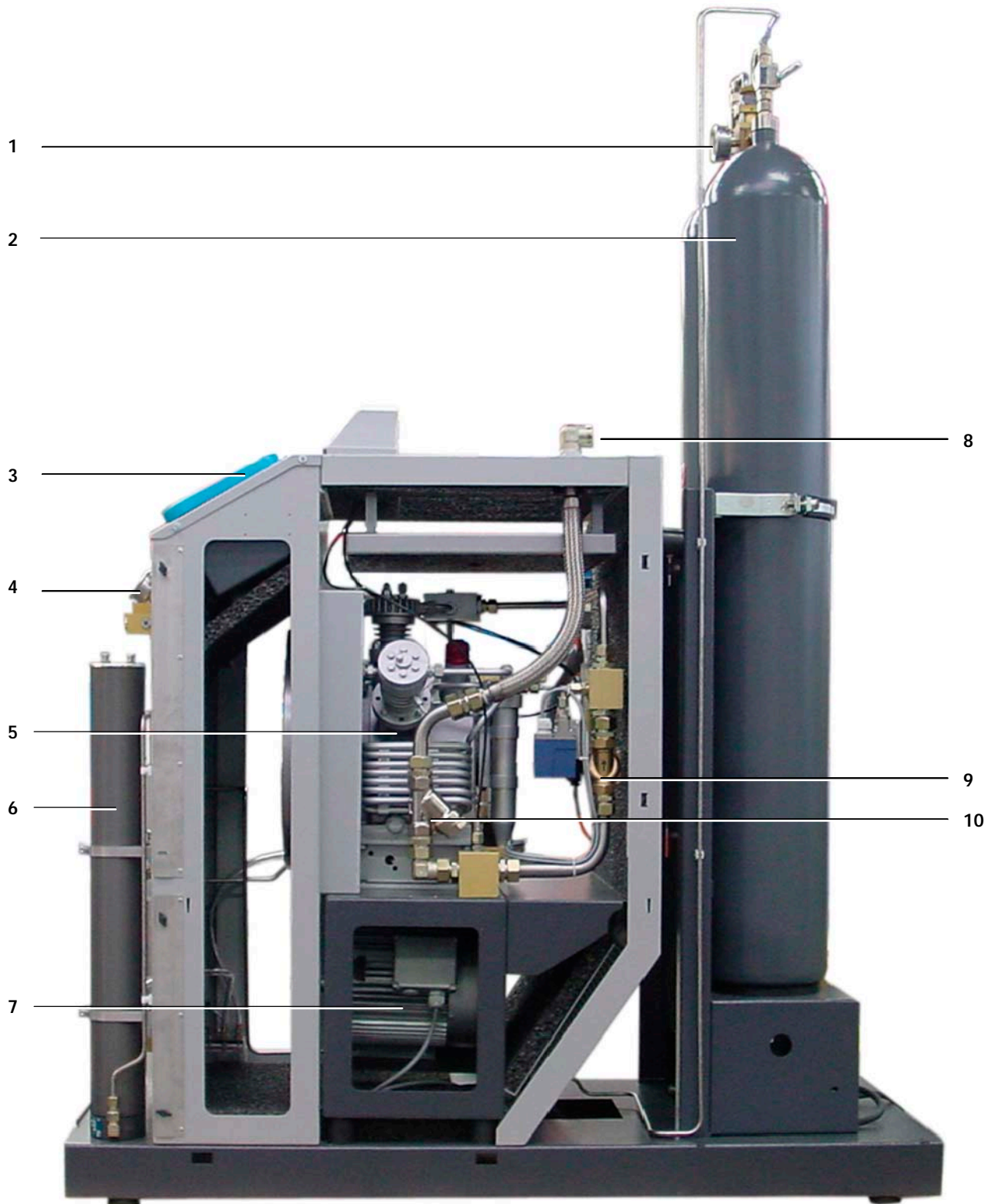


Fig. 4 High pressure compressor unit MV-GIB12.2-5.5-3 with storage bottles, model range MV 3*

- | | |
|---------------------------|------------------------|
| 1 Pressure gauge, storage | 6 Fine filter |
| 2 Storage bottles | 7 Drive motor |
| 3 Compressor control | 8 Gas inlet connection |
| 4 Final pressure switch | 9 Solenoid valve |
| 5 Compressor block | 10 Intake filter |

* Front and side panels removed

Instruction Manual • Industrial Compressor Units

1.2. DESIGN AND MODE OF OPERATION

1.2.1. Design

The compressor unit comprises the following major assemblies:

- compressor block
- drive motor
- frame and housing assembly with instrument panel
- automatic condensate drain
- filter set
- electric control system

All units are equipped as standard as follows:

- TÜV approved final pressure safety valve

- Automatic condensate drain unit and condensate collector tank
- Instrument panel with final pressure gauge and hourmeter.

- Oil pressure control

Optionally, the units can be delivered with:

- Filter system **P41 / P61** for longer cartridge lifetime
- **SECURUS** monitoring unit for the filter system
- Oil pressure gauge
- connection for external warning lamp (with SECURUS monitoring unit, only)

1.2.2. Mode of operation; flow diagram

The path of the medium through the compressor system is shown in the flow diagram in section F.

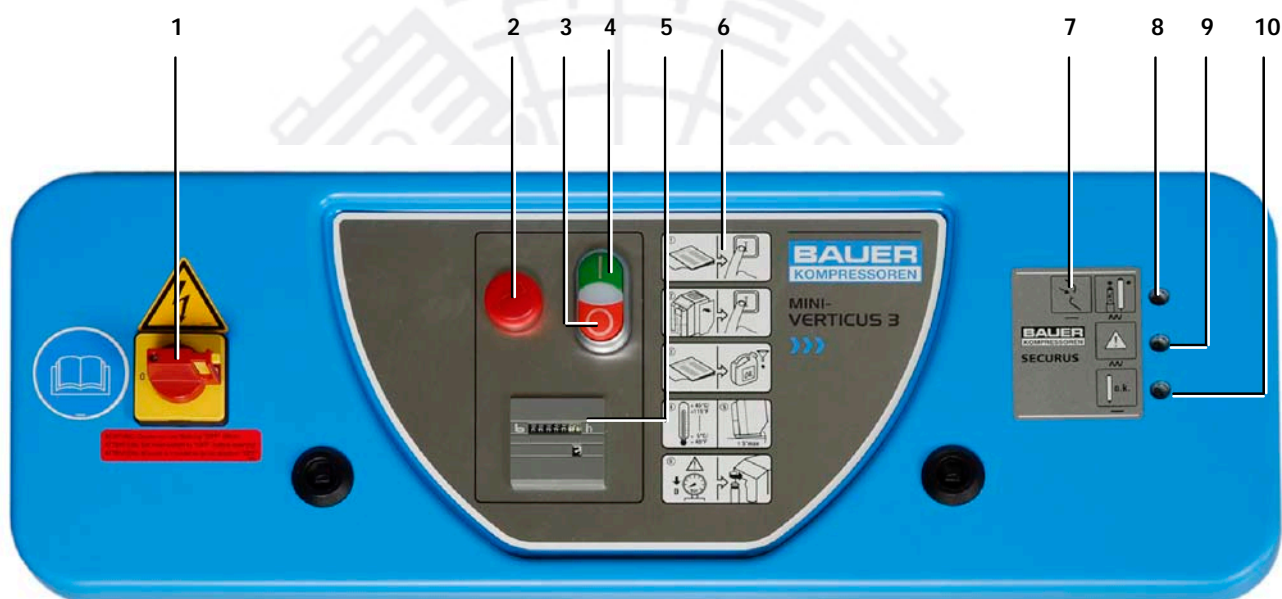


Fig. 5 Instrumental Panel

- 1 Main switch
- 2 Oil pressure warning light
- 3 OFF button
- 4 ON button
- 5 Hourmeter
- 6 Short instruction
- 7 Short instruction SECURUS monitoring unit for the filter system
- 8 SECURUS indicating light green
- 9 SECURUS warning light yellow
- 10 SECURUS warning light red

1.2.3. Compressor block

The assembly of the compressor block is shown in Fig. 6

The compressor blocks IK100 and IK120 are designed to compress air in a high pressure level. The maximum working pressure is 350 bar.

The compressor blocks IK100-GI and IK120-GI are designed to compress nitrogen in a high pressure level. The maximum working pressure is 350 bar.

The compressor blocks are of a three stage, three cylinder design (Fig. 6). The cylinders are arranged in a W form, 1st stage in the centre, 2nd stage on the right, and 3rd stage on the left side looking from the filter side.

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

The driving gear is fitted with three bearings. It is here that the energy saving cylinder roller bearings are put to use. The upper and lower connecting rod bearings are also roller bearings. This allows for an even longer life which lasts at least 30,000 operating hours. All valves have free access for time saving maintenance. There is no need for dismantling of pipes or pressure gauges.

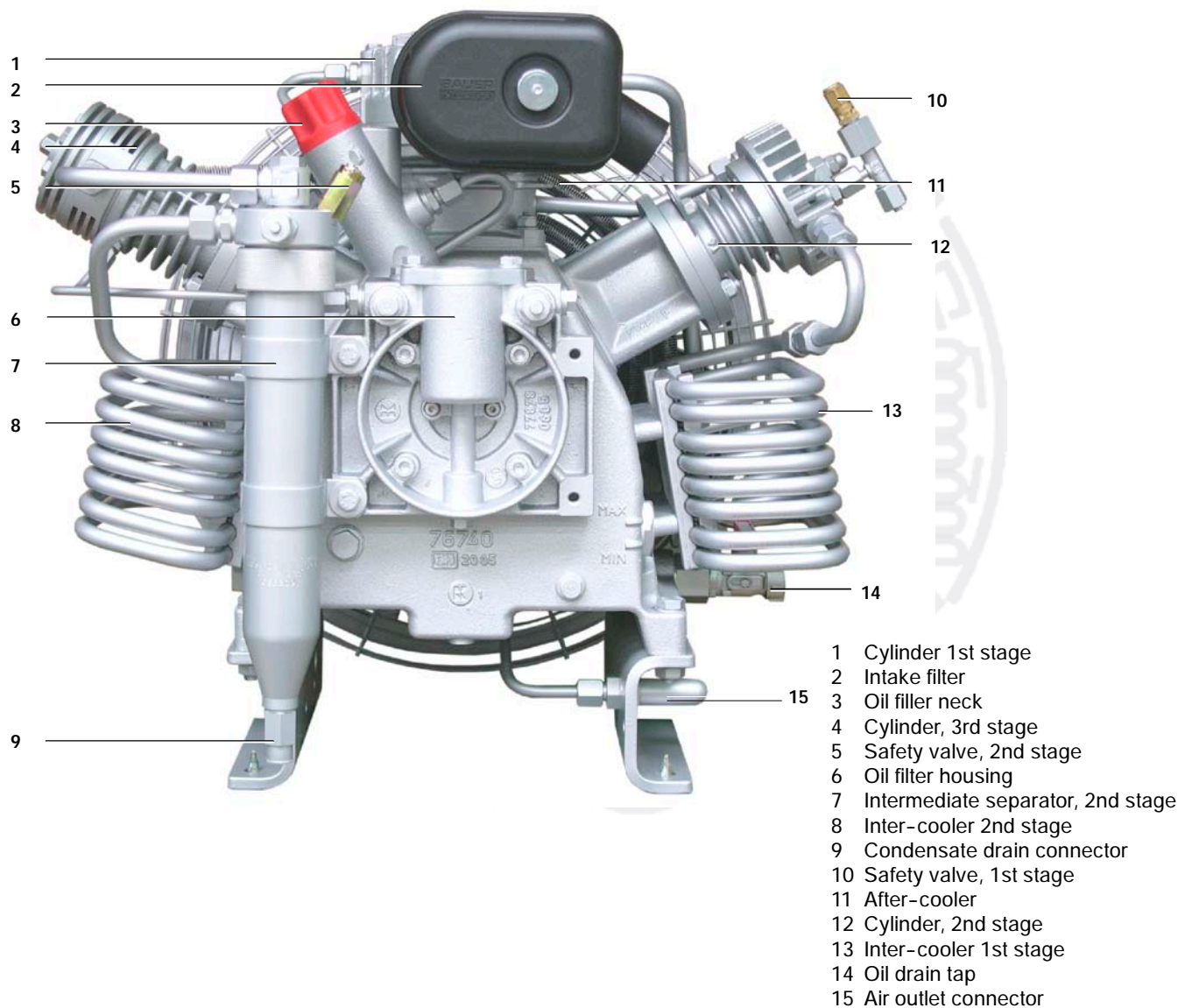


Fig. 6 Compressor block IK120, front view

Instruction Manual • Industrial Compressor Units

BK12.2

The compressor block **BK12.2** are designed to repressing of nitrogen in a high pressure level. The maximum working pressure is 350 bar.

The compressor blocks are of a two stage, three cylinder design (Fig. 7). The cylinders are arranged in a W form, 1st stage on the right and in center and 2nd stage on the left, looking from the filter side.

The cylinders are lubricated by the lubricating system.

The assembly of the compressor block is shown in Fig. 7

The mode of operation is shown by the flow diagram in chapter F.

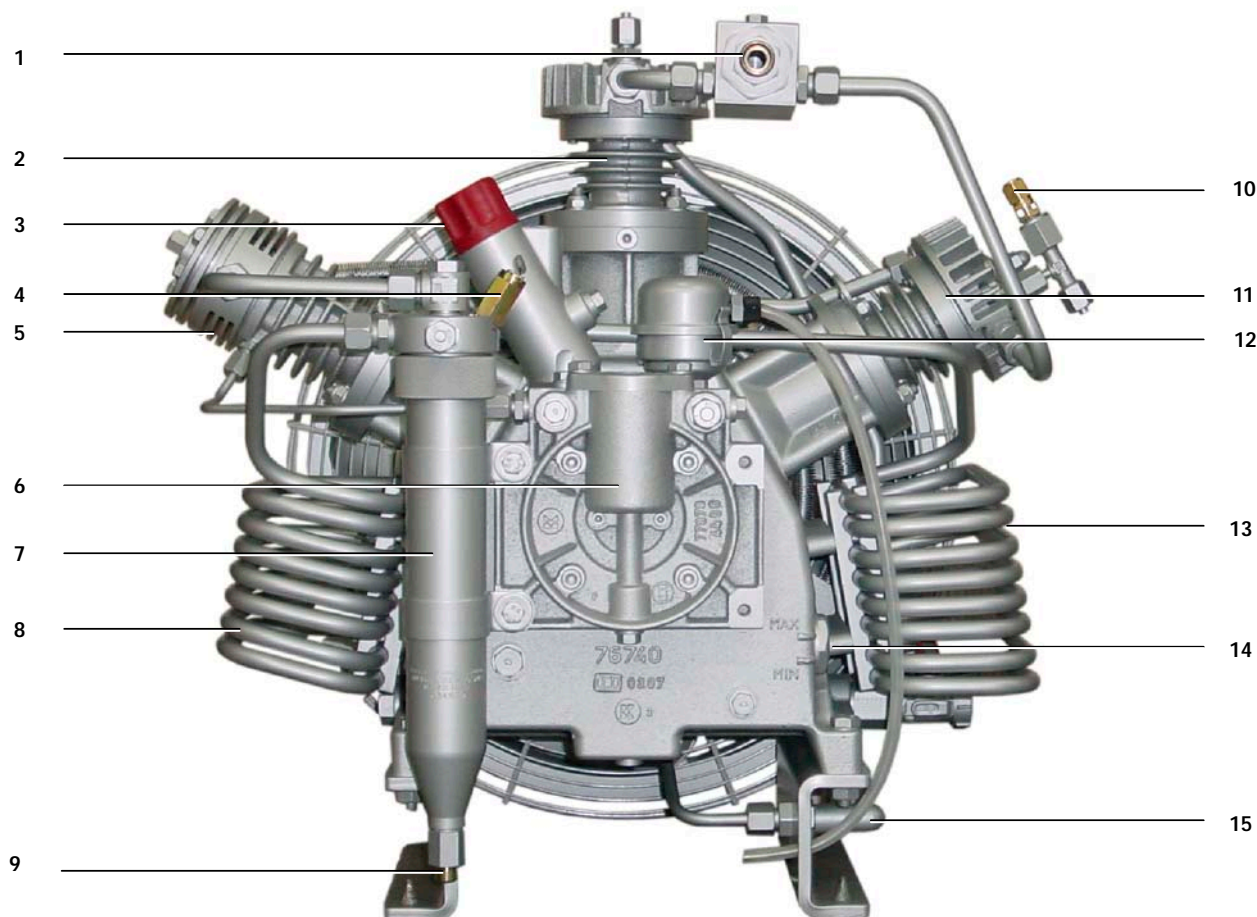


Fig. 7 Compressor block BK12.2

- 1 Intake connection
- 2 Cylinder 1st. stage, center
- 3 Oil filling pipe
- 4 Safety valve, 2nd. stage
- 5 Cylinder, 2nd. stage
- 6 Oilfilter housing
- 7 Intermediate separator, 2nd. stage
- 8 Intermediate cooler, 2nd. stage
- 9 Condensate drain connection
- 10 Safety valve, 1st. stage
- 11 Cylinder, 1st. stage, right
- 12 Crankcase venting
- 13 Intermediate cooler, 1st. stage
- 14 Oil sight gauge
- 15 Pressure outlet

1.3. TECHNICAL DATA



To minimize multiple quotations, the common features are listed under General, all compressor block and motor data are listed in 1.3.4. and 1.3.5., respectively.

1.3.1. Industrial compressor units for air up to 350 bar

General:

Medium	air
Intake pressure	atmospheric
Operating pressure	90 – 350 bar
Adjustment, final pressure safety valve	max. 365 bar
Adjustment, final pressure sensor	max. 350 bar
Max. ambient temperature	+5 to +45 °C
Allowable altitude	0 ... 2000 m above sea level
Max. inclination of compressor ^{a)}	10°
Oil type	refer to oil list
Operating voltage	380-440 V, 50-60 Hz
Control voltage	24 V, 50-60 Hz
Type of motor	3 phase squirrel cage motor
Type of construction	B3
Protection class	IP54

<u>Compressor unit</u>	<u>MV-I100-3-3</u>	<u>MV-I100-4-3</u>	<u>MV-I120-4-3</u>	<u>MV-I120-5.5-3</u>
Compressor block	IK100-F07	IK100-F07	IK120-F07	IK120-F07
Delivery ^{b)}	85 l/min	125 l/min	170 l/min	215 l/min
.....	3 cfm	4.4 cfm	6 cfm	7,6 cfm
Pressure setting, pressure switch	according to order			
Pressure setting, final pressure safety valve	according to order			
Noise level	70 dB(A)	70 dB(A)	70 dB(A)	70 dB(A)
Speed	900 min ⁻¹	1270 min ⁻¹	1200 min ⁻¹	1470 min ⁻¹
Drive input	2,2 kW	3,3 kW	3,7 kW	4,7 kW
Drive motor power	3 kW	4 kW	4 kW	5,5 kW
Weight, approx.	255 kg	255 kg	260 kg	260 kg

Subject to change without prior notice

- a) These values are valid only if the oil level of the compressor in normal position corresponds to the upper mark of the oil sight glass and may not be exceeded.
- b) Free air delivered at tank filling from 0 to 200 bar ± 5% or 300 bar ± 5% for 420 bar units.

TECHNICAL DATA (Cont.)

1.3.2. Industrial compressor units for nitrogen up to 350 bar

General:

Medium	nitrogen
Intake pressure	atmospheric
Operating pressure	90 - 350 bar
Adjustment, final pressure safety valve	max. 365 bar
Adjustment, final pressure sensor	max. 350 bar
Max. ambient temperature	+5 to +45 °C
Allowable altitude	0 ... 2000 m above sea level
Max. inclination of compressor ^{a)}	10°
Oil type	refer to oil list
Operating voltage	380-440 V, 50-60 Hz
Control voltage	24 V, 50-60 Hz
Type of motor	3 phase squirrel cage motor
Type of construction	B3
Protection class	IP54

Compressor unit MV-GI100-3-3 ... MV-GI100-4-3 ... MV-GI120-4-3 MV-GI120-5.5-3

Compressor block	IK100-GI-F06	IK100-GI-F06	IK120-GI-F06	IK120-GI-F06
Delivery ^{b)}	85 l/min	125 l/min	170 l/min	215 l/min
.....	3 cfm	4.4 cfm	6 cfm	7,6 cfm
Pressure setting, pressure switch	according to order			
Pressure setting, final pressure safety valve	according to order			
Noise level	70dB(A)	70dB(A)	70dB(A)	70dB(A)
Speed	900 min ⁻¹	1270 min ⁻¹	1200 min ⁻¹	1470 min ⁻¹
Drive input	2,2 kW	3,3 kW	3,7 kW	4,7 kW
Drive motor power	3 kW	4 kW	4 kW	5,5 kW
Weight, approx.	255 kg	255 kg	260 kg	260 kg

1.3.3. Booster compressor units for nitrogen up to 350 bar

Compressor unit GIB 12.2-5.5-3

Compressor block	BK12.2-F07
Medium	nitrogen
Intake pressure	5 to 11 barü
Operating pressure	200 - 350 bar
Delivery with 5 bar intake pressure	200 l/min
.....	7cfm
Delivery with 11 bar intake pressure	475 l/min
.....	17 cfm
Adjustment, final pressure safety valve	max. 365 bar
Adjustment, final pressure sensor	bar
Sound level, lesser than	70 dB(A)
Speed	1250 min ⁻¹
Drive input	5,5 kW
Drive motor power	5,5 kW
Weight, approx.	260 kg

Subject to change without prior notice

- a) These values are valid only if the oil level of the compressor in normal position corresponds to the upper mark of the oil sight glass and may not be exceeded.
- b) Free air delivered at tank filling from 0 to 200 bar ± 5% or 300 bar ± 5% for 420 bar units.

TECHNICAL DATA (Cont.)

1.3.4. Compressor blocks

Compressor blocks, air

Compressor block IK100-F07, mod.7

No. of stages	3
No. of cylinders	3
Cylinder bore 1st stage	70 mm
Cylinder bore 2nd stage	36 mm
Cylinder bore 3rd stage	14 mm
Piston stroke	40 mm
Direction of rotation (viewing at flywheel)	counter-clockwise
Intermediate pressure 1st stage	3,5 ... 4 bar
Adjustment, Safety valve 1st. stage	8 bar
Intermediate pressure 2nd stage	35 ... 40 bar
Adjustment, Safety valve 2nd. stage	60 bar
Compressor block oil capacity	2.8 l
Oil type	refer to chapter 2. lubrication
Oil pressure	5 bar

Compressor block IK120-F07, mod.7

No. of stages	3
No. 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 (viewing at flywheel)	counter-clockwise
Intermediate pressure 1st stage	6 ... 6,5 bar
Adjustment, Safety valve 1st. stage	8 bar
Intermediate pressure 2nd stage	38 ... 45 bar
Adjustment, Safety valve 2nd. stage	60 bar
Compressor block oil capacity	2.8 l
Oil type	refer to chapter 2. lubrication
Oil pressure	5 bar

Compressor blocks, nitrogen

Compressor block IK100-GI-F06, mod.6

No. of stages	3
No. of cylinders	3
Cylinder bore 1st stage	70 mm
Cylinder bore 2nd stage	36 mm
Cylinder bore 3rd stage	14 mm
Piston stroke	40 mm
Direction of rotation (viewing at flywheel)	counter-clockwise
Intermediate pressure 1st stage	3,5 ...4 bar
Adjustment, Safety valve 1st. stage	8 bar
Intermediate pressure 2nd stage	35 ... 40 bar
Adjustment, Safety valve 2nd. stage	60 bar
Compressor block oil capacity	2.8 l
Oil type	refer to chapter 2. lubrication
Oil pressure	5 bar

Subject to change without prior notice

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<u>Compressor block</u>	<u>IK120-GI-F06, mod.6</u>
No. of stages	3
No. 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 (viewing at flywheel)	counter-clockwise
Intermediate pressure 1st stage	6 ...6,5 bar
Adjustment, Safety valve 1st. stage	8 bar
Intermediate pressure 2nd stage	38 ... 45 bar
Adjustment, Safety valve 2nd. stage	60 bar
Compressor block oil capacity	2.8 l
Oil type	refer to chapter 2. lubrication
Oil pressure	5 bar

Compressor blocks, booster

<u>Compressor block</u>	<u>BK12.2-F07, mod.7</u>
No. of stages	2
No. of cylinders	3
Cylinder bore 1st stage (left)	32/60 mm
Cylinder bore 1st stage (center)	32/60 mm
Cylinder bore 2nd stage (right)	15/60 mm
Piston stroke	40 mm
Drive input	max. 5,5 kW
Intermediate pressure 1st stage	40 ...78 bar
Adjustment, Safety valve 1st. stage	80 bar
Direction of rotation (viewing at flywheel)	counter-clockwise
Compressor block oil capacity	2.8 l
Oil pressure	4,5 bar ± 1,5 bar
Oil type	refer to chapter 2. lubrication

TECHNICAL DATA (Cont.)

1.3.5. Drivemotors

All motors:

Model	3 phase squirrel cage motor
Type of construction	B3
Protection class	IP55
Operating voltage	380-440 V, 50-60 Hz
Control voltage	24 V, 50-60 Hz

Drive motor 3 kW

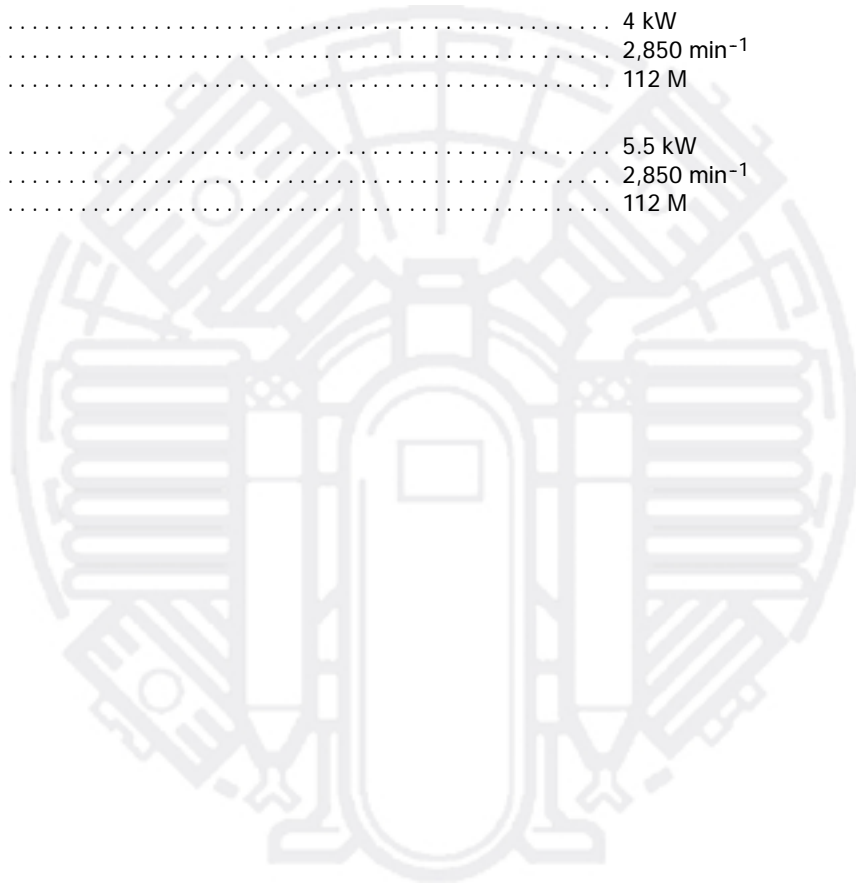
Power	3 kW
Speed	2,850 min ⁻¹
Size	90 L

Drive motor 4 kW

Power	4 kW
Speed	2,850 min ⁻¹
Size	112 M

Drive motor 5.5 kW

Power	5.5 kW
Speed	2,850 min ⁻¹
Size	112 M



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TECHNICAL DATA (Cont.)

1.3.6. High pressure filter assemblies

General

Service pressure, standard	225/330 bar
Service pressure, max.	350 bar
Flow rate	P41 max. 450 l/min P61 max. 600 l/min
Regenerated volume of air, referenced to 1 bar abs, 20°C, flow rate 200 l/min against p = 200 bar (2,900 psi)	P41 1,500 m ³ ; with CO cartridge 1100 m ³ P61 2,200 m ³ ; with CO cartridge 1,700 m ³
Operating temperature range	+5 ... +50°C
Residual water contents	< 10 mg/m ³
Residual oil vapour contents	< 0.1 mg/m ³
Residual CO contents	< 5 ppm _v
Residual CO ₂ contents	< 500 ppm _v
Pressure dew point	-20 °C, 3 mg/m ³ at 300 bar

Oil and water separator:

External diameter	95 mm
Length	306 mm
Water volume	0.54 l
Weight	9 kg
Tube connections (intake and outlet)	G 1/4"
Max. no. of load cycles	see pressure vessel documentation in chapter F

Purifier:

External diameter	100 mm
Length	P41: 620 mm; P61: 835 mm
Water volume	P41: 2.1 l; P61: 2.85 l
Weight	P41: 8 kg; P61: 10.6 kg
Tube connections (intake and outlet)	G 3/8"

Electrical specifications

Assemblies used	1 SECURUS indicator
	1 Filter housing with pressure resistant conductor bushing
	1 Sensor inside the SECURUS cartridge
Operating voltages of the SECURUS indicator unit	190 ... 250 V, 50 ... 60 Hz or
	110 ... 127 V, 50 ... 60 Hz or
	12 ... 24 V DC
Power consumption of the SECURUS indicator unit	AC version 3 VA
	DC version 2 W
Contact components	3 N/O contacts for preliminary warning and for compressor shut-off
Contacts switching current	6 Amps/250 Volts
Protection class for SECURUS indicator unit	IP65
Dimensions of the SECURUS indicator unit	120 x 120 x 55 mm (L x W x H)
Mains connections and switching outputs via terminals	

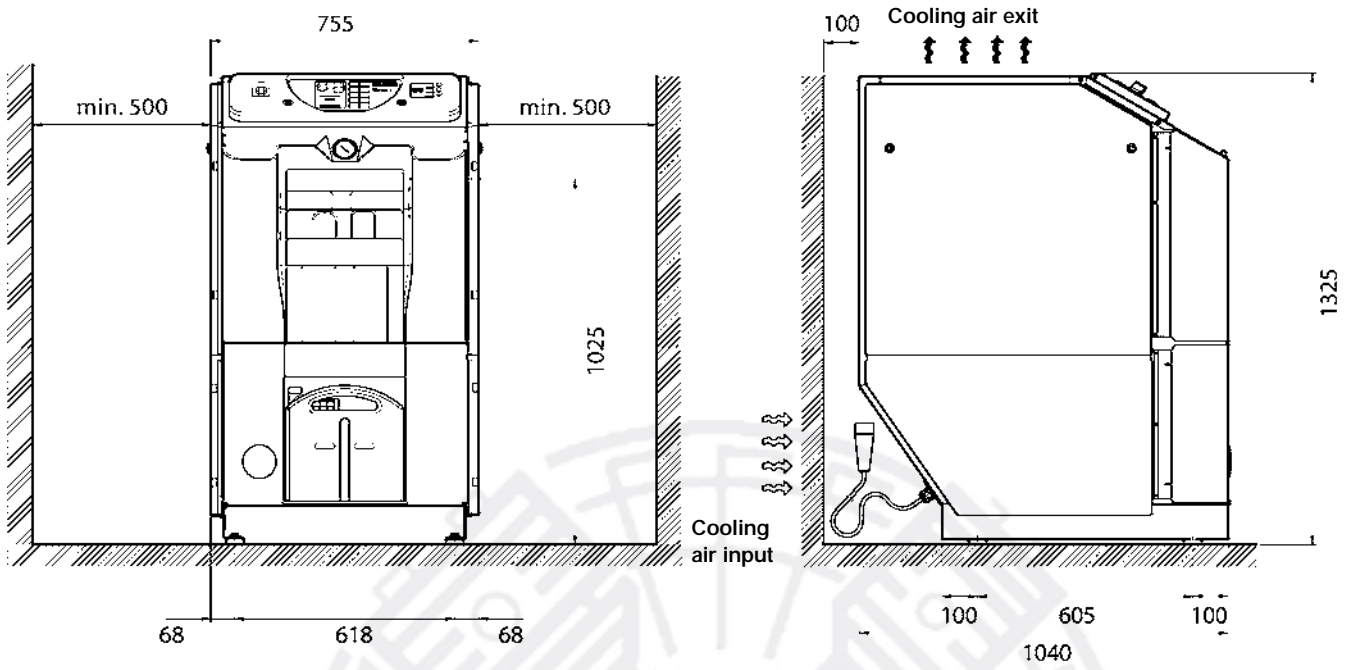


Fig. 8 Dimensions (in mm)

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2. LUBRICATION SYSTEM

2.1. FUNCTIONAL DESCRIPTION

The compressor is provided with a forced-feed lubrication (Fig. 9). The oil pressure is produced by a low revving gear pump (1, Fig. 9). The oil pressure is approximately 5 bar.



This oil pump will operate in the correct sense of rotation, only. Otherwise, no oil pressure will be built up resulting in damage of the compressor block.

The oil pump (1, Fig. 9) is coupled to and driven by the crankshaft. It pumps oil from the oil sump (5, Fig. 9) through the oil fine filter (Fig.8, Pos.2) and a minimum pressure valve (3, Fig. 9) to the 3rd stage cylinder. The oil is then distributed by the guide piston (4, Fig. 9) of the 3rd stage and lubricates all moving parts of the compressor block.

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

2.2. TYPE OF OIL

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

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

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



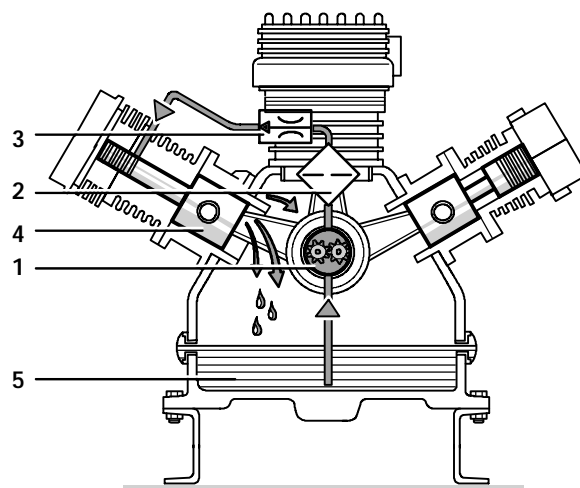
The current oil list is provided in section F . Order this list regularly through the BAUER Technical Service Department.

For operation under difficult conditions such as continuous running and/or high ambient temperatures we recommend the use of **BAUER** high performance compressor oils, only, according to the oil list. These oils are tested in our compressors and have proved excellent quality under ambient temperatures between +5 °C (41 °F) and +45 °C (113 °F). For lower temperatures, a heating device is required which is capable of pre-heating the crankcase up to +5 °C (41 °F).



All our compressor units are delivered ex-works with lubricating oil N28355.

For operation under less severe conditions we can also recommend mineral compressor oils which are suitable for operation under ambient temperatures between +5 °C (41 °F) and +35 °C (95 °F). Here also, pre-heating is required for lower temperatures.



- 1 Oil pump
- 2 Oil filter
- 3 Min. pressure valve
- 4 Guide piston

Fig. 9 Lube oil system

2.2.1. Changing the oil type



To avoid severe damage to the compressor unit when changing the oil type, follow the measures given in section D 2.

2.3. OIL PRESSURE MONITORING

Oil pressure monitoring is performed by means of a pressure switch (1, Fig. 10). See chapter A 11.3.7.

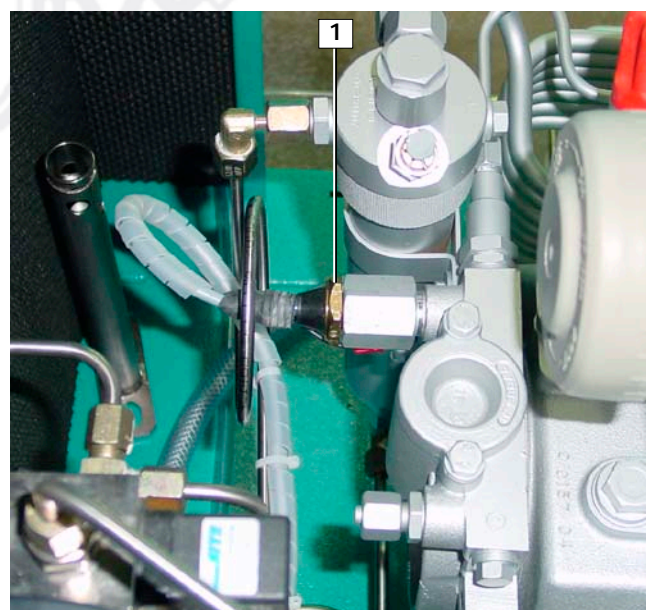


Fig. 10 Oil pressure switch

3. INTAKE FILTER

3.1. Compressor units for air applications

A dry micronic filter is used to filter intake air, see Fig. 11. It is fitted with a replaceable filter cartridge (1, Fig. 11).

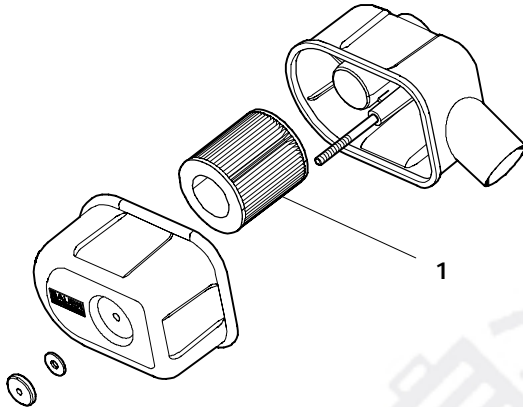


Fig. 11 Intake filter

3.2. Compressor units for gas applications

3.2.1. Gas intake system

The gas compressor draws the medium to be compressed from a line system, a gas balloon, or from gas bottles.

In order for the compressor to work satisfactorily, it is essential to supply the medium at a constant pressure. Therefore, a pressure reducer in the intake line is necessary if the supply pressure is above atmospheric pressure or fluctuating (e.g. when emptying gas bottles). For the maximum allowable intake pressure refer to the Technical Data section, 1.3. An intake expansion tank between pressure reducer and compressor is also necessary. It compensates for the pressure surges caused by the piston of the 1st stage.

For the designations in the following description refer to this flow diagram in section F.

3.2.1.1. Intake system

The medium flows through the gas inlet connection A (8, Fig. 10), through the in-line filter A7 (3, Fig. 10) and through the solenoid-non return valve Y5 (5, Fig. 10) into the intake expansion tank (2, Fig. 10).

Pneumatic monitoring of the intake pressure is carried out by means of a safety valve U6 (4, Fig. 10). In addition, the intake pressure is monitored by pressure sensors F12.1 F12.2 (6, 7, Fig. 10) and by pressure gauge P19 (1, Fig. 10) as well.

3.2.1.2. Intake pressure reducing

The medium flows through gas inlet connection A, over the in-line filter A7 (1, Fig. 13) to pressure reducer J1 (4) and solenoid-non return valve Y5 (5) into the compressor block. The pressure reducer reduces the supply pressure to the correct intake pressure. For the max. allowable intake pressure refer to the Technical Data section, 1.3.

Supply pressure is secured by safety valve U12 (2) and is indicated at pressure gauge P23 (3). The intake pressure is monitored by the pressure sensors F11.1 and F12.2 (7) and is indicated by pressure gauge P19.

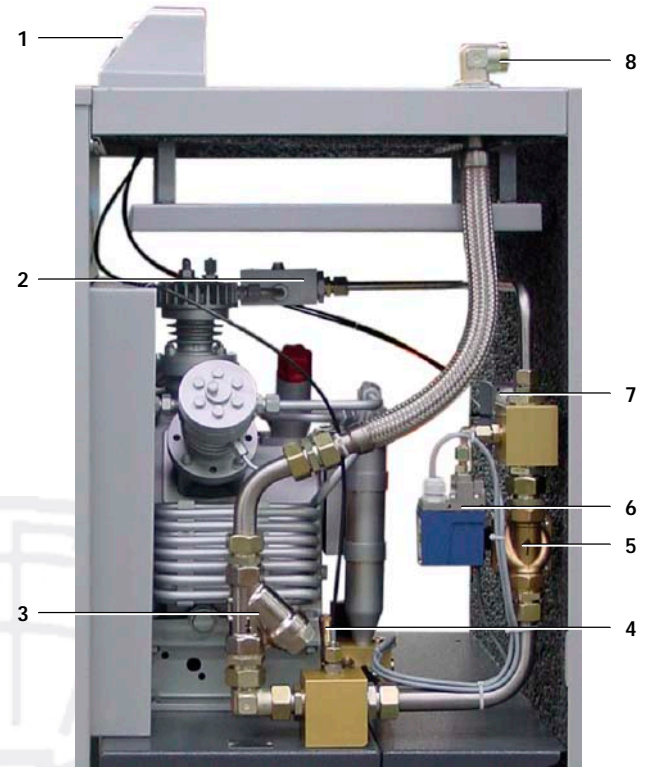


Fig. 12 Intakesystem

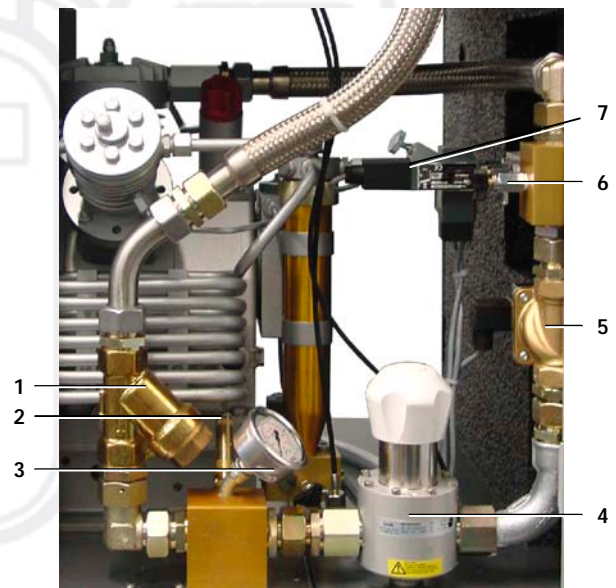


Fig. 13 Intake pressure reducing

3.2.2. Intake shut-off valve

An electromagnetic shut-off valve (Y5) is provided in the gas intake line before the intake filter. It is open during operation and is closed when the compressor is shut down, preventing gas loss from the pipe system.

3.2.3. Venting the intake line

Compressor shuts off automatically when the intake pressure exceeds the adjusted values on the intake pressure switches. If the max. allowable intake pressure has been exceeded, it is necessary to vent the intake line before restarting the compressor. Vent the intake line with the help of the venting valve (6, Fig. 13) and readjust the intake pressure with the help of the pressure reducer (4).

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4. INTERMEDIATE SEPARATOR

An intermediate separator is mounted on the 2nd stage. This separator is designed to remove water and oil accumulating due to cooling the medium down after the compression process. Separation is achieved by means of centrifugal action provided by a vortex plate.

4.1. INTERMEDIATE SEPARATOR AFTER 1ST. STAGE (OPTIONAL)

For severe environmental conditions, especially high temperatures and humidity, an additional separator after the 1st stage can be provided. Refer to flow diagram in chapter F. This separator is similar to the separators as described above.

5. FINAL SEPARATOR / FILTER SYSTEM

5.1. PURPOSE AND SHORT DESCRIPTION

All Mini-Verticus compressor units can be fitted with filter system P41 or with filter system P61. By both filter systems is the mode of operation the same. The difference is a higher filter cartridge life time of the P61 system.

Filter system **P41/P61** (Fig. 14) consists of:

- Separator with final pressure safety valve
- Non-return valve between separator and purifier
- High pressure purifier
- **SECURUS** sensor head^{a)}
- Venting valve with pressure gauge
- Pressure maintaining/non-return valve

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

5.2. FUNCTION

5.2.1. Securus monitoring unit

Unlike other filter systems the **SECURUS** filter system ensures continuous monitoring of the compressed air purification parameters while the air is still in the regeneration process. The influences of

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

The exchangeable **SECURUS** cartridges are designed for

- drying of air
- adsorption of aromatic components (aerosols)
- partial conversion of CO into CO₂
- partial adsorption of CO₂

The quality of the breathing air produced conforms to the national and international

a) Optional

- DIN EN 12021
- STANAG 1079 MW
- British Standard 4001
- US CGA Spec. G.7.1
- Canada CSA Standard Z 180.1
- Australian Army Standard 5017

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

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



As soon as the preliminary warning message appears or, at the latest, after the **SECURUS** monitoring unit has shut down the system, the cartridges of all filters within the systems must be changed according to D-5.2.2.

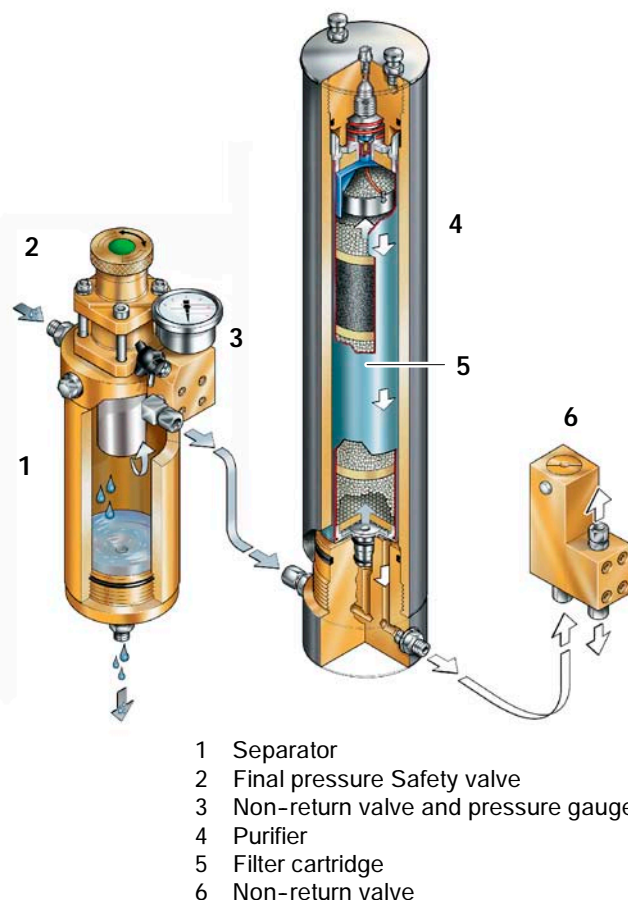


Fig. 14 Filtersystem

5.2.2. Final Separator

The air leaving the final stage is cooled in the after-cooler to approx. 10 to 15 °C (18–27 °F) above ambient temperature and then enters the oil and water separator (Fig. 14). The oil and water separator is part of the breathing air purification system. The oil and water separator is filtering liquid oil and water particles from the compressed air.



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

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

Filter cartridges

Part no.	Filter system	Cartridge contents ^{a)}	SECURUS sensor	Length mm	Elimination
062565	P41	MS/MS/AC/MS	---	503	H ₂ O/Oil
061686	P41	MS/MS/AC/MS	F	513	H ₂ O/Oil
061687	P41	MS/MS/AC/MS/HP	F	513	H ₂ O/Oil/CO
058826	P61	MS/MS/AC/MS	---	705	H ₂ O/Oil
060036	P61	MS/MS/AC/MS	F	705	H ₂ O/Oil
060037	P61	MS/MS/AC/MS/HP	F	705	H ₂ O/Oil/CO

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

5.2.3. Purifier

The filter housing (4, Fig. 14) consists of an anodized aluminium alloy pipe with 100 mm external diameter. Both ends are provided with fine threads on the inside.

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

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

For description of the electrical operation refer to para. 5.2.5.

5.2.4. Filter cartridges

Different cartridges are available depending on the required air quality. See specifications, and parts list. (5, Fig. 14) and the following table show the internal construction of the filter cartridges.

a) MS = Molecular Sieve, AC = Activated Charcoal, HP = Hopcalite

5.2.5. SECURUS indicator unit
Function

The **SECURUS** indicator unit (Fig. 10) receives signals concerning the condition of the drying agent inside the filter cartridge from the attached sensors and furnishes appropriate control signals whenever the preset threshold values have been reached.

The four operating conditions of the **SECURUS** system are reported by three relays (normally open contacts). Simultaneously with the closing of the relay contacts, built-in luminescent diodes illuminate: (Refer to Fig. 10)

Conditions of Securus-System	Cartridge conditions and Plant conditions
1. Continuous green	Unit in operation
2. Flashing yellow	Cartridge change pre-warning
3. Flashing red	Compressor shut-down because cartridge is used up
4. Continuous red	Compressor shut-down because of missing cartridge or cable failure

If yellow diode is flashing, the green diode will continue to illuminate because unit is still operational with the yellow light on. If no lamp is on, which means that no relay contact is closed, the **SECURUS** indicator unit is receiving no operating voltage or the electronics within the unit have failed.

After applying operating voltage to the unit it will take about 0.5 seconds to close the respective relay contact and to light the applicable diode. During this time the status of the cartridge is being checked.



Fig. 15 Securus indicator unit

- 1 Green indicating light
- 2 Yellow warning light
- 3 Red warning light

5.2.6. Electrical connection

See diagram in chapter F.

6. PRESSURE MAINTAINING / NON-RETURN VALVE

A pressure maintaining and a non-return valve (1, Fig. 10) are provided downstream of the filter system. Refer to flow diagram in section F. The combined pressure maintaining/non-return valve is mounted at the manifold block (2, Fig. 10) on the rear side of the instrument panel.

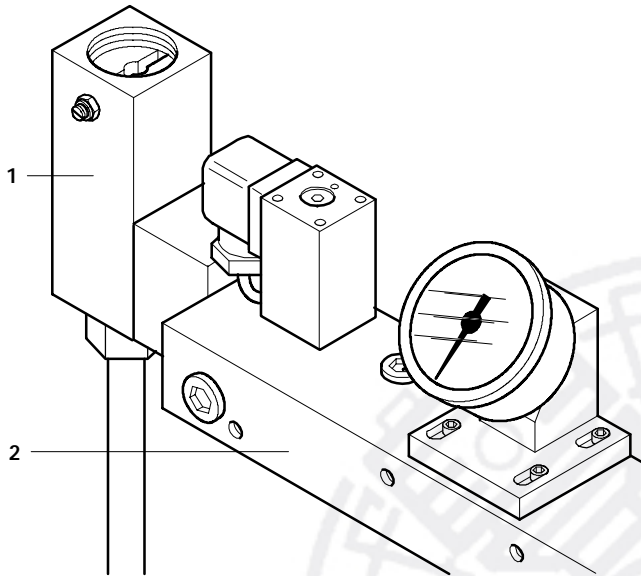


Fig. 16 Pressure Maintaining / Non-return valve

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

The adjustment of the pressure maintaining valve is approx. 150 bar.

An additional non-return valve is mounted after the oil and water separator - flanged directly to the filter head. It prevents already filtered medium from flowing back from the downstream filters when draining condensate from the oil and water separator.

7. SAFETY VALVES

All compressor stages are protected by safety valves. The adjustment of the safety valves is as follows:

Compressor block	1st stage	2nd stage	3rd stage
IK100	9 bar	60 bar	365 bar
IK120	9 bar	60 bar	365 bar
BK12.2	80 bar	365 bar	---

The safety valve for protection of the **last stage** is adjusted according to order, see 1.3., Technical Data, but maximally to the values given above.

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8. PRESSURE GAUGES

The intermediate pressure, the operating pressure and the oil pressure of the compressor can be monitored by means of pressure gauges in the instrument panel.

The pressure in the final compressor stage can be monitored by the final pressure gauge. For indicating the intermediate pressure and the oil pressure can be attached additional pressure gauges in the instrument panel. They are optional extras for all MV3-I units.

8.1. INTERMEDIATE PRESSURE GAUGE (Optional)

The correct values are given in chapter A-1.3., Technical Data.

8.2. OIL PRESSURE GAUGE (Optional)

Correct oil pressure indication should read **5 bar**.

If not, check the lube oil circuit or adjust the oil pressure. See chapter D-2.

8.3. FINAL PRESSURE GAUGE

The final pressure gauge shows a mark indicating the maximum operating pressure.



Fig. 17 Final pressure gauge

9. VALVES

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

Note that the valves are operated by the flow of the medium. On the suction stroke, the intake valves open and the medium flows into the cylinders. At the start of the compression stroke the intake valve closes and the medium opens the pressure valve, Fig. 18.

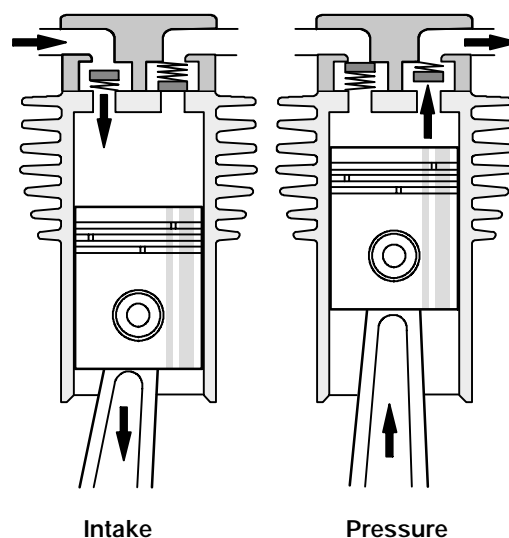


Fig. 18 Valve operation

10. AUTOMATIC CONDENSATE DRAIN

The automatic condensate drain unit (Fig. 10 and Fig. 20) drains the intermediate separator and the oil and water separator after the last stage every 15 minutes during operation. In addition, the automatic condensate drain is designed to drain these filters after shut-down of the compressor unit, and to unload the compressor during the starting phase.

The automatic condensate drain system operates electrically and comprises the following main items:

- Two condensate drain valves (1, Fig. 10 and Fig. 20), one for the intermediate separator (5, Fig. 10) and one for the oil and water separator (5, Fig. 20) after the last stage. The condensate drain valves are open current-less.
- Two solenoid valve (2, Fig. 10 and 3, Fig. 20) mounted on top of the condensate drain valve.
- A condensate collecting tank.
- Two electrical timers. The timers are mounted in the compressor control box.

10.1. CONDENSATE COLLECTOR

The condensate drain valves are connected to a collecting tank at the front of the unit. A filter/silencer is mounted on top of the tank. It separates the oil particles from the air escaping together with the condensate from the filters. The condensate collecting tank should be emptied at regular intervals. For this purpose the tank is connected to the collecting hoses (4, Fig. 10 and Fig. 20) with a quick fitting and can be removed easily.

10.2. ELECTRICAL CONNECTION

For electrical connection of the automatic condensate drain system refer to the schematic diagrams in section F.

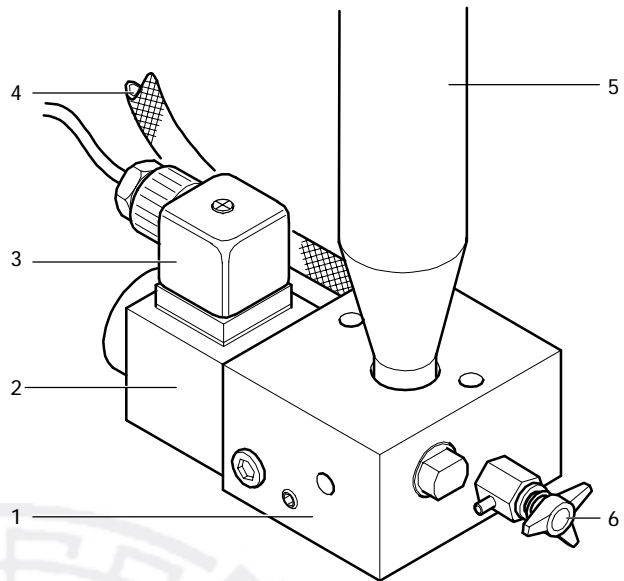


Fig. 19 Condensate drain, 2nd stage

- 1 Condensate drain
- 2 Lift magnet
- 3 Connector
- 4 Condensate output
- 5 Intermediate separator
- 6 Drain tap

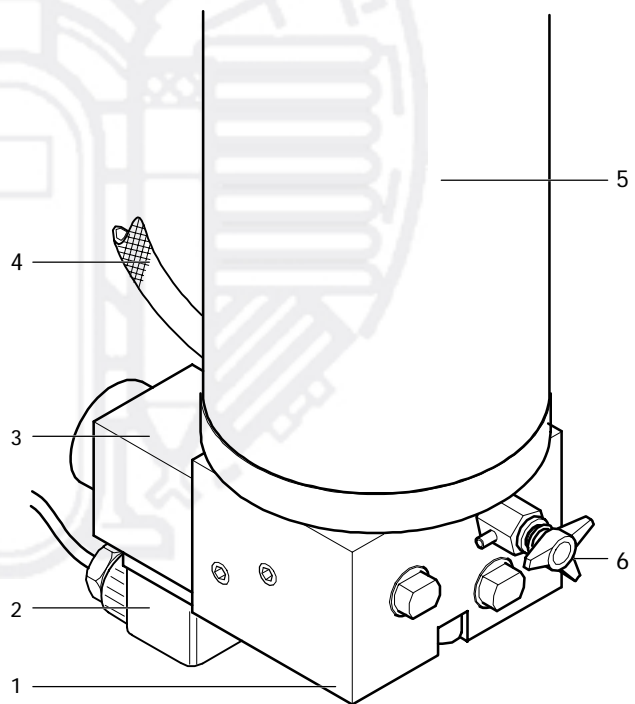


Fig. 20 Condensate drain, 3rd stage

- 1 Condensate drain
- 2 Connector
- 3 Lift magnet
- 4 Condensate output
- 5 Final separator
- 6 Drain tap

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11. ELECTRICAL SYSTEM

11.1. GENERAL

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



For schematic diagrams, see section F.

The electrical equipment of the compressor unit consists of:

- drive motor M1
- electric control system, containing:
 - final pressure switch F16
 - switch box containing air break contactor K1 or star-delta contactor K1-K3 with time relay K4 for drive motor
 - timer K10 for automatic condensate drain
 - service switch S3
 - oil pressure monitoring relay K20
 - cycle counter P14

- ON/OFF- button (S1/S2) with operation signal lamp (H1)
- main switch S0
- hour meter P1
- oil pressure switch F13
- oil pressure- warning light H2

To start the electric motor and enable the functioning of the controls as well as the monitors, the following components are essential:

- main switch Q1 and
- main fuse, both to be installed by the customer.

11.2. DRIVE MOTOR

The compressor unit is driven by an electric motor by means of V-belts.

Except for external cleaning, the drive motor requires no servicing. The motor bearings may need lubricating, depending on the model. Please observe the instructions written on the motor.

11.3. ELECTRICAL CONTROL

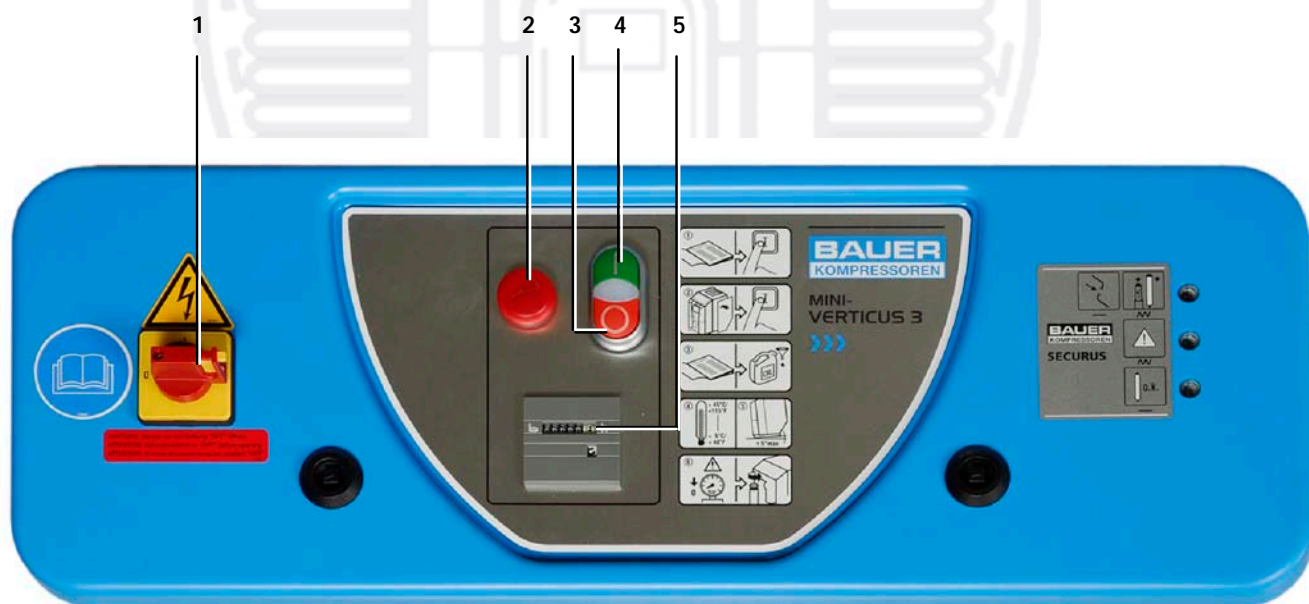


Fig. 21 Compressor control

- 1 Main switch S0
- 2 Oil pressure- warning light H2
- 3 OFF- button S1
- 4 ON- button S2
- 5 Hour meter P1

11.3.1. Semi-automatic compressor control

Unit switches off automatically when the final pressure is reached in the pressure system connected to the compressor. Restart the unit manually by pressing operation button S2 on the control and monitoring unit.

11.3.2. Fully automatic compressor control

Unit switches off automatically when the final pressure is reached in the pressure system connected to the compressor. Restart of the unit is performed automatically if pressure drops to the lower set value. Operation switch S2 and main switch S0 must be switched on.

11.3.3. Final pressure switch

Switching on and/or off of the compressor unit is controlled by pressure switch F16.



With the semi-automatic compressor control, only the upper switching point is adjustable.

The upper threshold value is adjustable as follows:

OFF max. = 400 bar^{a)} OFF min. = 100 bar

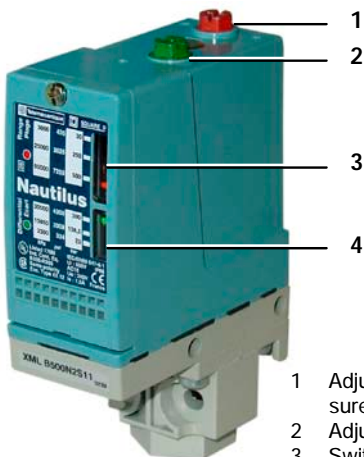


- 1 Adjustment screw, switch-off pressure
- 2 Electric connector

Fig. 22 Final pressure switch for semi-automatic operation

With the fully automatic compressor control, upper and lower-threshold values are adjustable as follows:

OFF max. = 500 bar OFF min. = 30 bar
 Max. hysteresis in upper range = 300 bar
 Min. hysteresis in lower range = 23 bar
 Min. hysteresis in upper range = 52,6 bar



- 1 Adjust. screw, switch-off pressure
- 2 Adjust. screw, hysteresis
- 3 Switch-off pressure indicator
- 4 Hysteresis indicator

Fig. 23 Final pressure switch for automatic operation

11.3.4. Cycle counter

The cycle counter is mounted in the switch box and labelled P14 (1, Fig. 10). It counts the electrical control pulses for the automatic condensate drain unit and hence the accumulated amount of load cycles of the installed oil and water separator after the last compressor stage. Refer to chapter 5.

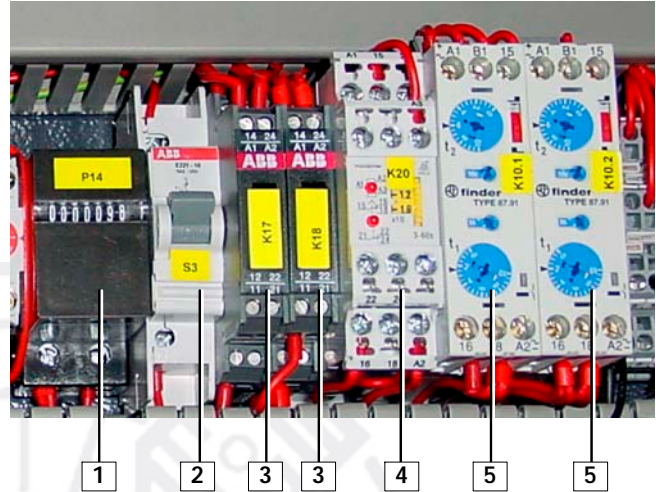


Fig. 24 Monitoring instruments

- 1 Cycle counter P14
- 2 Service switch S3
- 3 Time relay for oil pressure monitoring K20
- 4 Auxiliary relays K17, K18
- 5 Timer for automatic condensate drain unit K10

11.3.5. Service switch

The switch is labelled S3 (2, Fig. 10). In position "0" the compressor operates normally, i.e. the unit is switched OFF automatically by the pressure switch. In position "1" the pressure switch F16 is overridden.



Use this switch position for servicing purposes only, e.g. checking the blow-off pressure of the safety valves. The unit will not shut off automatically when switch is in this position.

a) = Maximum possible operating pressure; for maximum allowable operating pressure, refer to Technical Data, A1. 3.

11.3.6. Timer for automatic condensate drain unit

Timer K10 (5, Fig. 10) controls the automatic condensate drain unit. For description refer to chapter A.10.

K10 is an industrial time relay with one change-over contact. The plus- and intervaltime for the control unit of the automatic condensate drain will adjusted with the two adjuster t1 and t2. The sliding switch is adjusted to give a puls first. At factory the adjuster t1 is set of 15 min. and t2 is set of 6 sec. to drain the condensate.

11.3.7. Oil pressure monitoring

The oil pressure monitoring ensures that the compressor is operated with the correct oil pressure. Missing or low oil pressure causes the compressor to be switched off and the red warning lamp (3, Fig. 21) at the instrument panel to be illuminated. At start, the missing oil pressure is overridden for 40 seconds.

11.3.8. Control voltage, transformer

The complete control system including all the unit's contactors and solenoid valves are operated with a control voltage of 24 V AC. This control voltage is generated by a transformer.

The primary voltage is taken from 2 phases of a three-phase network. The transformer has a terminal strip on the primary side with connection possibilities for different supply voltages. The control system can therefore be adjusted quickly to the above-mentioned voltages. Only the power unit (contactor and overload relay) has to be individually adjusted to the motor current.

Technical data

Power 50 VA

Primary voltage: 200, 208, 220 V 50/60 Hz
400, 415, 440 V 50/60 Hz

Secondary voltage: 24 V ± 10%

11.4. ELECTRONIC FILTER MONITORING UNIT

Refer to chapter A.5.

12. COMPRESSOR DRIVE SYSTEM

As standard, the compressor is driven by the drive motor through V-belts. Direction of rotation is left, looking at the cooling fan, i.e. clockwise standing in front of the unit. Observe arrow on compressor.

V-belt tension is adjusted automatically by the weight of the motor. The motor is mounted on a hinged motor plate.

13. COOLING SYSTEM

The cylinders of the compressor block, the intermediate coolers and the after-cooler are air-cooled. For this purpose, the compressor is equipped with a fanwheel which draws the cooling air through the fanwheel cover from the surroundings. The fanwheel is driven by the drive motor V-belt and is also used as the flywheel.

The cooling air outlet can be selected by removing and re-mounting the cover plate as required.

For installation of the unit ensure sufficient cooling air supply. Refer to section B.

For maximum ambient temperature, see Technical Data, chapter 1.3.



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B. INSTALLATION, OPERATION

1. INSTALLATION OF THE COMPRESSOR UNIT

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

For installation observe the following:

1.1. COMPRESSOR ROOM CONDITIONS

- The compressor room must be clean, dust-free, dry and as cool as possible.
- Avoid direct exposure to sunlight; if possible, choose north side of building.
- Additional heat producing units or line systems should not be installed in the same room or should be well isolated.
- The floor must be capable of taking the load of the system weight.
- Locate the unit as level as possible; For the max. allowable inclination refer to Technical Data in section A.
- Ensure adequate ventilation. Remember: room temperature = cooling air temperature! **Min. = +5 °C, max. = +45 °C.**

1.2. LOCATING THE UNIT

- If possible install unit in such a manner that the compressor fan can draw fresh air from outside, for instance through an opening in the wall as low as possible.
- Ensure that an adequate exhaust air opening is provided, as high as possible.
- Locate compressor as close to the air intake opening as possible.
- Locate unit so as to absolutely avoid intake of warm or hot cooling air.
- Observe the minimum distances as listed below.

Minimum distance from wall, rear side: 0.1 m

Minimum distance from wall, intake side: 0.5 m

See also unit drawing in section F.

1.3. NATURAL VENTILATION

Natural ventilation is the most simple and commonly used. It is created by convection and is sufficient if no thermal overload is expected, i.e. for units with small drive motors, for intermittent operation or in moderate climates this is the ideal method of cooling the compressor unit.

The inlet and outlet air openings are dependent on:

- the power of the electric motor
- the height difference between air intake and outlet openings
- the air volume of the compressor room.

Air intake and outlet openings		
Power (kW)	Room volume / Height difference	
	V = 50 m ³ Δh = 2 m	
	Intake	Outlet
2.2 - 3	0.24 m ²	0.20 m ²
4	0.30 m ²	0.25 m ²
5.5	0.42 m ²	0.35 m ²
Power (kW)	Room volume / Height difference	
	V = 100 m ³ Δh = 3 m	
	Intake	Outlet
2.2 - 3	0.12 m ²	0.10 m ²
4	0.12 m ²	0.10 m ²
5.5	0.24 m ²	0.20 m ²
Power (kW)	Room volume / Height difference	
	V = 200 m ³ Δh = 4 m	
	Intake	Outlet
2.2 - 3	--	--
4	--	--
5.5	0.12 m ²	0.10 m ²



For further information on the installation of air cooled compressors, see our Installation Manual which can be obtained from BAUER Customer Services, P.O. 710260, D-81452 Munich

2. ELECTRICAL INSTALLATION

For installation of electrical equipment observe the following:

- In section F. you will find the standard schematic diagrams valid for the respective compressor unit. To connect the compressor control system, use only the diagram contained in the control box of the unit, because any deviations from the standard diagrams according to order are marked there.
- Observe regulations of local electricity supply company.
- Connection should be carried out by an expert only.
- Ensure correct installation of protective conductor.
- Check conformity of motor and control device tension and frequency with those of electric network.
- The necessary cabling, main fuse and a main switch (load-break switch) are to be provided by the customer. Ensure that the main switch is for one unit only and is clearly and immediately recognizable. Fusing must be according to the electricity supply company's regulations. For units not connected through a plug, but permanently installed, a main switch must be provided which has a contact gap of 3 mm minimum on each pole.
- Adjust motor protection, thermal overload relay. For start over contactor adjust to motor amperage rating. For start via star-delta contactor adjust to motor amperage rating x 0.58. For example: motor amperage rating = 10 Amp.: Adjust relay to 10 x 0.58 = 5.8 Amp.

- Fuse motor correctly (see following table; use slow-blow fuses, only).

FUSE TABLE

Motor type	V	125	220	240	400	415	440	500	600	660
3-phase, 3 kW (star-delta)	A	25	16	16	10	10	10	10	6	4
3-phase, 3 kW (direct starting)	A	35	20	20	16	16	10	10	6	6
3-phase, 4 kW (star-delta)	A	35	20	20	10	--	10	10	10	6
3-phase, 4 kW (direct starting)	A	35	25	25	16	--	16	16	10	10
3-phase, 5.5 kW (star-delta)	A	50	25	25	16	16	16	10	10	10
3-phase, 5.5 kW (direct starting)	A	63	35	35	20	20	20	16	16	16

3. TAKING INTO OPERATION

3.1. PREPARATION FOR OPERATION



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

- Prior to **first** operation read Instruction Manual carefully. Make sure that all persons handling the compressor and the filling station are familiar with the function of all controls and monitors. Observe the WARNINGS in chapter C-1.1.
- Depending on the model range, some compressor units are delivered **without** oil in the crankcase. In this case, the first filling quantity is delivered separately in the consignment. Prior to **first** operation fill with oil according to chapter D-2. After taking unit into operation after a standstill period of 2 years or more change compressor oil. When using a mineral oil change oil after one year.
- Prior to **each** operation check the oil level according to chapter D-2. and determine whether maintenance is necessary in accordance with chapter D-1.2.



The oil pump will operate in the correct sense of rotation, only. Otherwise, no oil pressure will be built up resulting in damage of the compressor block.

- **Immediately** after switching on the system for the first time check the direction of rotation of the motor for compliance with the arrow on the unit. If motor turns in the wrong direction, the phases are not connected properly. Shut down unit immediately and interchange two of the three phase leads in the switch box. **Never** change leads at the **motor** terminal board.

- Prior to **first** operation or operation subsequent to maintenance or repairwork, turn the compressor manually using the flywheel to ensure that all parts are turning free. Check that all fastening bolts and threaded pipes are secure and sealed, if necessary tighten them to the correct torque value.
- Open the outlet valve, this must be open during operation. Close only for servicing the compressor to avoid gas escaping from connected receivers.
- **Every time** the unit is started up check all systems for proper operation. If any malfunction is observed stop unit **immediately** and find the cause of the fault or call the service department.
- Prior to **first** operation or operation subsequent to repair work operate unit for at least 10 minutes with open condensate valves (pressureless) to ensure proper lubrication of all parts before pressure is built up. To keep drain valves open, loosen screw (1, Fig. 28) and pull plug (2, Fig. 25) from solenoid valve (3, Fig. 26) of all condensate drain valves (4, Fig. 27).

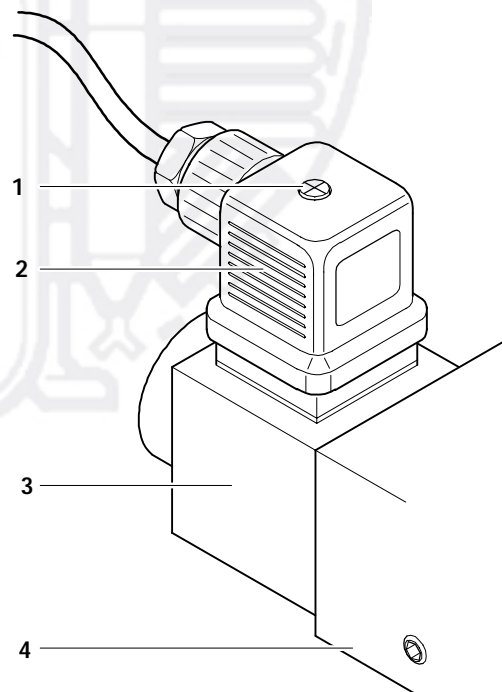


Fig. 28 Lift magnet connector

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C. OPERATION

1. SAFETY MEASURES

1.1. NOTES AND WARNING SIGNS

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



WARNING

Hot surfaces, do not touch!

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



WARNING

High voltage!

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



WARNING

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

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



MANDATORY

Instructions must be read by persons operating the machinery!

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



MANDATORY

Hearing protectors must be worn!

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

NOTE



Ensure correct direction of rotation!

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

1.2. IDENTIFYING THE SAFETY NOTICES

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



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



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



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

1.3. FUNDAMENTAL SAFETY NOTICES

1.3.1. Authorized use

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

1.3.2. Organizational measures

- Keep the instruction manual to hand near the machine / unit at all times in the relevant holder.
- In addition to the instruction manual, observe and comply with universally valid legal and other obligatory regulations regarding accident prevention and environment protection. See chapter 1.4. This can involve, for example, contact with hazardous substances or the provision / wearing of personal protective equipment.
- In addition to the instruction manual, provide supplementary instructions for supervision and monitoring duties taking into consideration exceptional factors e.g. with regard to organization of work, production, personnel employed.
- Personnel engaged to operate the machine must have read the instruction manual before beginning work, especially the safety notices chapter. When work is already underway it is too late. This is particularly relevant for temporary personnel, e.g. maintenance personnel.
- At the very least, supervise temporary personnel's work in accordance with the instruction manual, taking into account safety and danger factors.

- Personnel may not wear long hair loose, loose clothing or jewellery, including rings. There is a danger of injury through, for example, these getting caught or being pulled into the equipment.
 - As far as necessary or according to regulations, use personal protective equipment.
 - Observe all safety and danger notices on the machine / unit.
 - Keep all safety and danger notices on the machine / unit complete and in readable condition.
 - If there are any modifications to the machine / unit or operating conditions which may affect safety, stop the machine / unit immediately and inform the department / person responsible of the fault.
 - No modifications may be made to the machine / unit which could impair safety without first obtaining permission from the suppliers. This is also the case with regard to installation and adjustment of safety devices and valves as well as welding of piping and reservoirs.
 - Spare parts must always comply with the technical requirements specified by the manufacturer. This is always guaranteed with original spare parts.
 - Do not carry out programme changes (software) to the programmable control system.
 - Piping must be thoroughly checked (pressure and visual inspection) by the operator at appropriate time intervals, even if no safety related faults have been noticed.
 - Intervals stipulated or given in the instruction manual for recurring checks / inspections must be adhered to.
 - It is absolutely essential that the workplace is appropriately equipped for maintenance measures.
 - Make sure location and operation of fire extinguishers is known.
 - Pay attention to fire warning and fire fighting procedures.
- 1.3.3. Qualifications, fundamental duties**
- Work on / with the machine / unit may only be carried out by reliable personnel. Observe the legal minimum age permissible.
 - Only employ trained personnel, clearly establish responsibility of personnel for operation, maintenance and repairwork.
 - Ensure that only trained personnel work with the machine.
 - Establish the responsibilities of the machine operator and establish a procedure for him to inform a third person of unfavourable safety conditions.
 - People who are being trained or introduced to the job should only be allowed to work with the machine / unit under constant supervision of an experienced person.
 - Work on the electrical equipment of the machine / unit may only be carried out by a qualified electrician or by an instructed person under the direction and supervision of a qualified electrician according to electrotechnical regulations.
 - Work on gas equipment may only be carried out by qualified personnel.
- 1.3.4. Safety notices for operation**
- Do not carry out any work if safety is questionable.
 - Meet all requirements demanding that the machine / unit is only operated in safe and good working order. Only operate the machine if all protective and safety equipment, e.g. all detachable protective equipment, emergency shut-down devices, soundproofing is provided and in good working order.
 - At least once every day, check the machine / unit externally for damage and faults. Inform the department / person responsible immediately if anything is not as it should be (including operation). If necessary, shut the machine down immediately and make it safe.
 - If there are any malfunctions, shut the machine / unit down immediately and make it safe. Correct faults immediately (or have them corrected).
 - Observe switching on and off processes and monitoring indications according to the instruction manual.
 - Before switching on / starting up the machine / unit, ensure that no one can be put at risk through running the machine / unit.
 - Carry out the setting, maintenance and inspection processes at the intervals specified in the instruction manual, including replacement of parts / equipment. This work may only be carried out by qualified personnel.
 - Before carrying out any exceptional work or repairwork, operating personnel should be informed. Call the supervisor.
 - For all work concerning operation, change in production, conversion or regulating of the machine / unit and its safety measures such as inspection, maintenance and repairwork, observe the switching on and off processes in the instruction manual and the notices for maintenance work.
 - Clear and make the maintenance area safe as far as necessary.
 - If the machine / unit is completely switched off for maintenance and repairwork, ensure that it is protected from unexpected start-up. Turn off main control device and remove the key and / or display a warning sign on the main switch.
 - When replacing individual parts and larger assembly groups, they must be carefully fastened to the lifting device so that there is no risk of danger. Use only suitable and technically perfect lifting devices and equipment with sufficient lifting power and strength. Do not linger or work under suspended loads.
 - Only entrust an experienced person with the fixing of loads and guiding of crane drivers. The person guiding must remain within sight or in contact with the operator.
 - For assembly work above body height, use appropriate safety approved equipment, e.g. ladders and platforms. Do not climb on machine parts. For maintenance work at high levels, wear a safety harness.
 - Clean oil, fuel or care products from the machine, in particular the connections and screw joints, before carrying out maintenance / repairwork. Do not use aggressive cleaning fluid. Use a fibre-free cleaning cloth.
 - Before cleaning the machine with water or jet of steam (high pressure cleaner) or detergent, cover / seal all openings which for safety and/or operating reasons no water / steam / detergent may penetrate. Electric motor and switch cabinets are particularly at risk.
 - When cleaning the operating room, ensure that the temperature sensors of the fire alarm and sprinkler system do not come into contact with hot cleaning fluid, in order to avoid triggering the sprinkler system.

- Completely remove all covers / seals after cleaning.
- After cleaning, check all pressure lines for leaks, loose connections, wear and damage. Immediately eliminate any faults.
- Always retighten any screw connections loosened for maintenance or repairwork.
- If it is necessary to remove safety devices for maintenance and repairwork, these must be replaced and checked immediately after completion of the maintenance or repairwork.
- Ensure safe and environmentally friendly disposal of consumables and old parts.

1.3.5. Particular areas of danger

- Use only original fuses with specified current rating. If there is a failure in the electric energy supply, shut the machine / unit down immediately.
- Work on electric units or operating equipment may only be carried out by a qualified electrician or by a person under the instruction and supervision of a qualified electrician according to electric technical regulations.
- Machines and unit parts which must undergo inspection, maintenance and repairwork, must be disconnected from the mains supply, if specified. Parts which have been disconnected must first be checked for voltage, then earthed and short-circuited and isolated from live neighbouring parts.
- The electrical equipment of a machine / unit must be regularly checked. Defects, such as loose screw connections or burnt wires, must be rectified immediately.
- If work is to be carried out on live parts, work with a second person who can operate the emergency off switch or the main switch in the case of an emergency. Close off the work area with a red and white safety chain and a warning sign. Only use voltage isolated tools.
- Only carry out welding, burning and grinding work on the machine / unit when specifically approved. There can, for example, be a risk of fire or explosion.
- Before carrying out welding, burning or grinding work, clean the machine / unit and surrounding area from dust and flammable material and ensure there is adequate ventilation (danger of explosion!).
- When working in small rooms, observe any national regulations.
- Only personnel with particular knowledge and experience with pneumatics may carry out work on pneumatic equipment.
- Check all pressure lines, hoses and screw connections regularly for leaks and visible damage. Immediately repair any damage. Escaping air or gas under pressure can cause injury and fire.
- Depressurize system and pressure lines before commencing repairwork.
- Pressurized air lines must be laid and mounted by qualified personnel. Connections must not be mixed up. Fittings, length and quality of the piping must correspond to requirements.
- Soundproofing equipment on the machine / unit must be in place and functional during operation.
- The stipulated hearing protectors must be worn.

- With regard to oil, grease and other chemical substances, observe the relevant safety regulations for the product.
- For loading, only use lifting device and equipment with sufficient lifting power and strength.
- Appoint trained guide personnel for lifting operations.
- Machines may only be lifted with a lifting device and by trained personnel according to instructions in the instruction manual (fixing points for fixing equipment etc.).
- Use only suitable transporters with sufficient carrying power.

Secure the load properly. Use suitable fixing points.

- If necessary, provide machine / unit with transportation brackets. Display the appropriate notice. Remove transportation brackets in the correct manner before taking into operation.
- Parts which need to be dismantled for transport purposes must be carefully replaced and secured before taking into operation.
- Even when moving the machine / unit only slightly, the machine / unit must be disconnected from all external energy sources. Before putting into use again, reconnect the machine to the mains according to regulations.
- When taking back into operation, proceed according to the instruction manual.

1.3.6. Notices of danger regarding pressure vessels

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

We differentiate:

- vessels for static load
- vessels for dynamic load

Vessels for static load:

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

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

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

Vessels for dynamic load:

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

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

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

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

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

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

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

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

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

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

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

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

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

b- Operating safety regulations (BetrSichV) of 27.09.2002

c- Machine safety law (GSG) of 11.05.2001

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

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

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

f- Accident Prevention Regulations (UVV):

- BGV A1 of 01. January 2004

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

Carl Heymanns Verlag
Luxemburger Str. 449
50939 Köln

Beuth-Vertrieb GmbH
Burggrafenstr. 4 - 7
10787 Berlin

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

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

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

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

We strongly emphasize these regulations.

Instruction Manual • Industrial Compressor Units

2. OPERATION

2.1. PREPARATION FOR OPERATION

WARNING

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

1 Make sure that all persons handling the compressor and the filling station are familiar with the function of all controls and monitors. In particular, observe the safety warnings in chapter C-1.

2 Make sure, that all covers are closed.

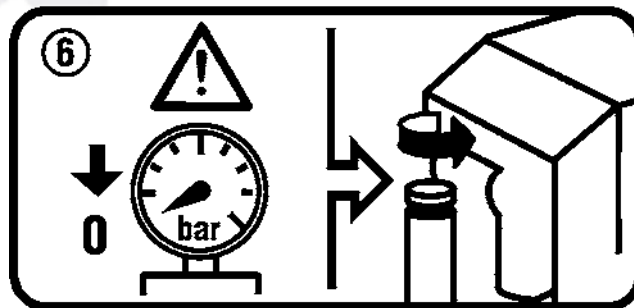
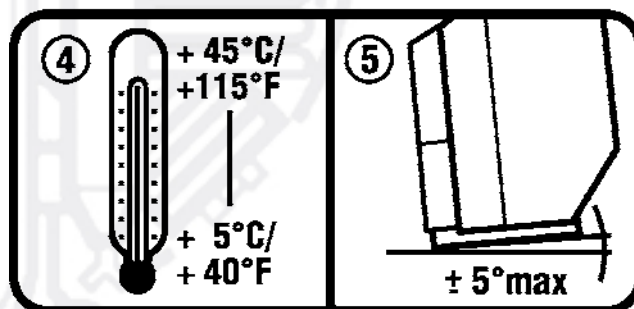
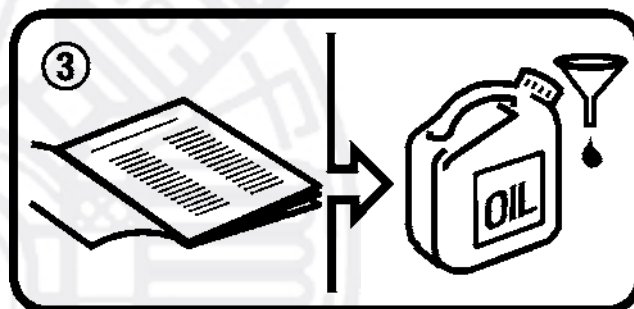
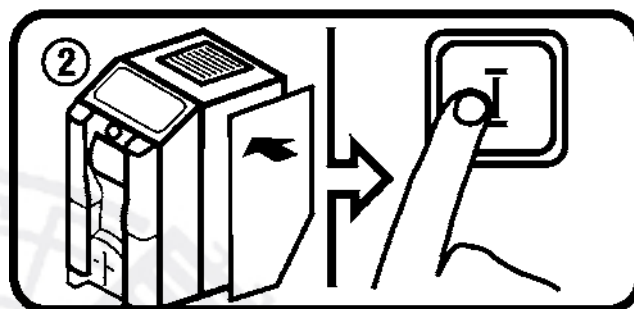
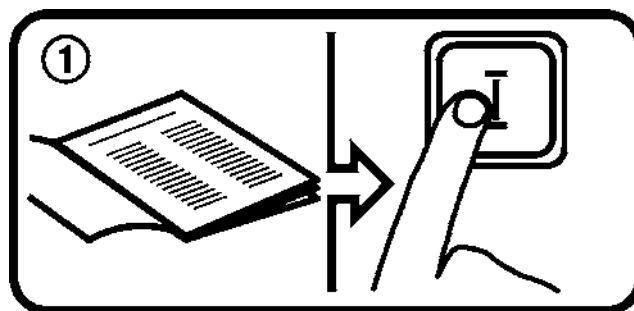
3 Prior to **each** operation check the oil level according to chapter D-2. and determine whether additional maintenance is necessary in accordance with section D.

4 Ensure proper ventilation. Note that room temperature = cooling air temperature !
Min. = +5 °C, max. = +45 °C.

5 Install unit level. Max. allowable inclination = 5°.

6 Make sure that the compressor unit is depressurized by means of the venting valve, before you open the filter.

7 **Every time** the unit is started up check all systems for proper operation. If any malfunction is observed stop unit **immediately** and find the cause of the fault or call the service department.



2.2. STARTING THE UNIT

- Main switch must be set to 1 (ON).



Knocking, audible when starting, is due to the last stage floating piston. This knocking disappears as soon as there is pressure between the stages, and the piston is running synchronous with the other pistons. Therefore, this knocking can be ignored.



The automatic condensate drain unit drains the filters during two minutes after shutdown of the compressor unit. The compressor unit should not be started before the depressurization is finished!

- Push green ON button - unit will start.

2.3. SHUTDOWN PROCEDURE

- Push red OFF button - unit will stop.
- Set main switch to 0 (OFF).

WARNING

Always set the main switch to 0 (OFF) when servicing the compressor unit.



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D. MAINTENANCE, REPAIR

1. GENERAL

1.1. MAINTENANCE RECORD


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

1.2. MAINTENANCE WORK


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

WARNING Always disconnect the system from mains supply prior to carrying out any work on compressor systems with electric drive motor.

WARNING Never repair pressure lines by soldering or welding.


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

 Only use original spare parts for maintenance or repair work.

 For filter cartridge change intervals refer to chapter D-5 !

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

1.3. MAINTENANCE INTERVALS


 All maintenance intervals refer to normal operating conditions. Operating the compressor under extreme conditions like high temperatures, humidity, continuous operation may shorten the intervals significantly. If in doubt, please contact our service dept.

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

2. LUBRICATION SYSTEM

2.1. OIL LEVEL CHECK

Check oil level at sight gauge on either side of compressor block every day prior to putting compressor into operation. Oil level must be between minimum and maximum notches, see Fig. 29. Oil level must never be below minimum mark as this will cause severe damages due to lack of lubrication. Oil level must also not exceed maximum as this will cause excessive lubrication of compressor and result in valves sooting up.

 At each oil change unscrew and remove the oil sight glass and clean the prism inside. Check gasket and screw in the oil sight glass again. (Torque approx. 10 Nm)

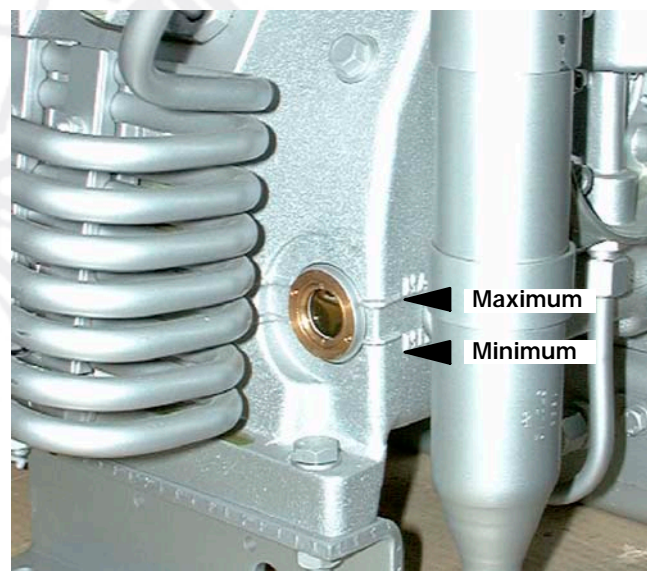


Fig. 29 Oil sight gauge

2.2. OIL CHANGE INTERVALS

Mineral oils	every 1,000 operating hours, at least annually
Synthetic oils	every 2,000 operating hours, at least biennially


2.3. OIL CAPACITY

Oil capacity	approx. 2.8 liters
--------------	--------------------

2.4. OIL PACKAGES

BAUER compressor oil is available in various quantities, refer to oil list in section F.

2.5. CHANGING THE OIL TYPE

 To avoid severe damage to the compressor unit when changing the oil type, the following measures should be strictly adhered to:

- Drain oil completely while still warm.
- Check valves, coolers, separators, purifiers, and all pneumatic tubes and hoses for deposits.

If deposits are detected, perform the following:

- Change or clean valves, coolers, separators, purifiers, and all pneumatic tubes and hoses from deposits.
- Replace oilfilter, if it's available.
- Fill compressor with the new oil.
- After approx. 100 operating hours check lubricating oil for degree of contamination, and change oil again if necessary.
- Refill compressor with same oil, only.

2.6. OIL CHANGE



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

- Run compressor warm.
- Remove red cap from oil filler neck (1, Fig. 30).
- Drain oil while still warm by means of oil drain plug. On units equipped with oil drain hose remove hose union nut from coupling at hose bracket. Collect oil in a suitable container. Exchange gasket and reinstall plug.
- Remove two screws (1, Fig. 31) with a 13 mm spanner. Remove cover (2).
- Remove oil filter (1, Fig. 32) from rubber gasket at cover.
- Mount a new filter element (P/N N25326) and replace and fasten cover.
- Fill new oil through filler neck to Max.- mark at sight gauge.
- Pour oil in slowly, wait a few minutes, then put unit into operation.

2.7. VENTING OIL PUMP



To avoid severe damage to the compressor unit observe this notice.

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

- With the compressor running and all condensate drain valves open to avoid pressure being built up during this procedure, unscrew screw cap and plug (3, Fig. 31) three turns and wait until oil pours out free of air bubbles. Retighten plug and cap nut.

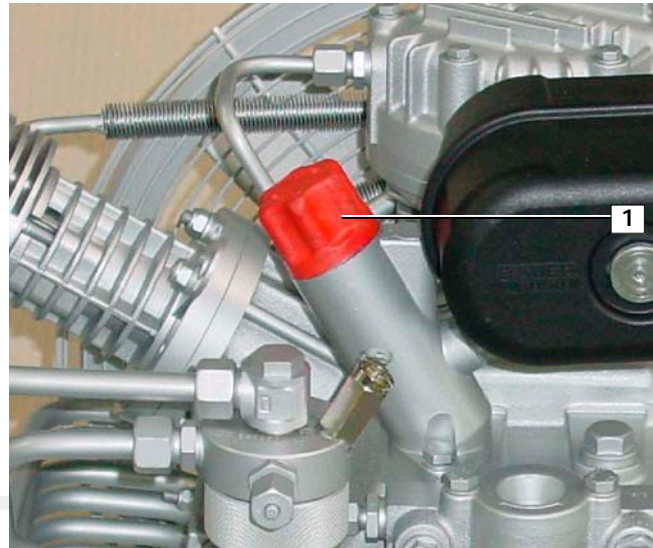


Fig. 30 Oil filler neck

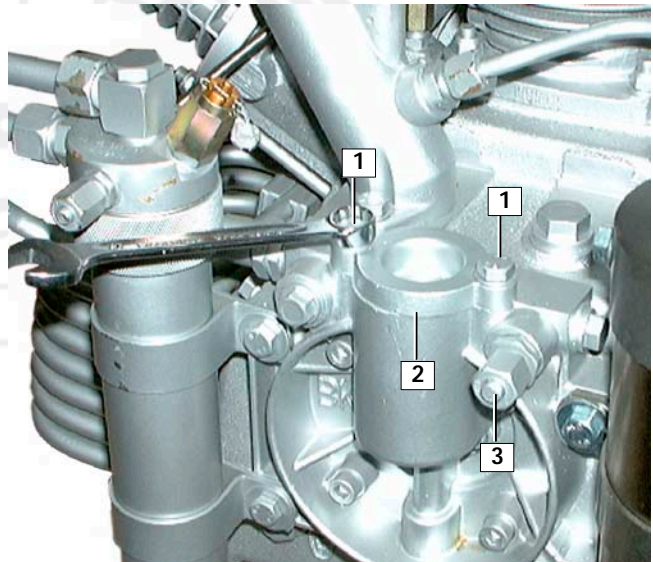


Fig. 31 Removing the cover

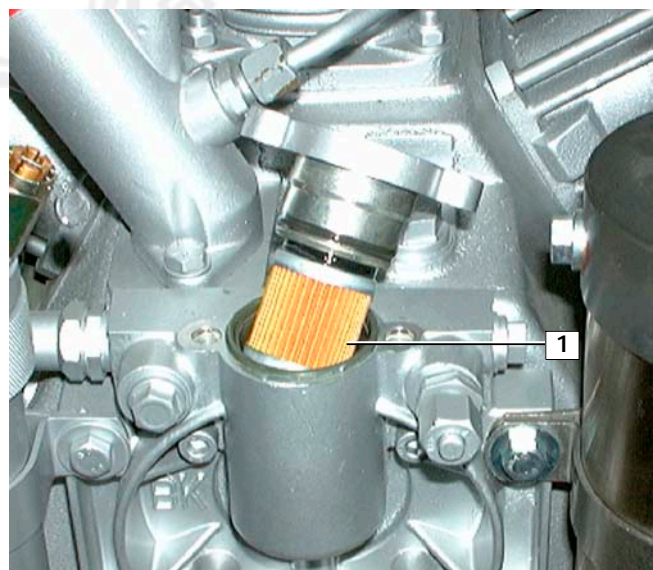


Fig. 32 Replacing the oil filter

3. INTAKE FILTER

3.1. COMPRESSOR UNIT FOR AIR APPLICATIONS

The filter cartridge must be cleaned or changed at regular intervals. The intervals depend on the air taken in by the compressor. In heavy dust conditions monthly or even weekly servicing can be necessary. In all conditions, observe the minimum intervals according to maintenance schedule in chapter D-1.2.

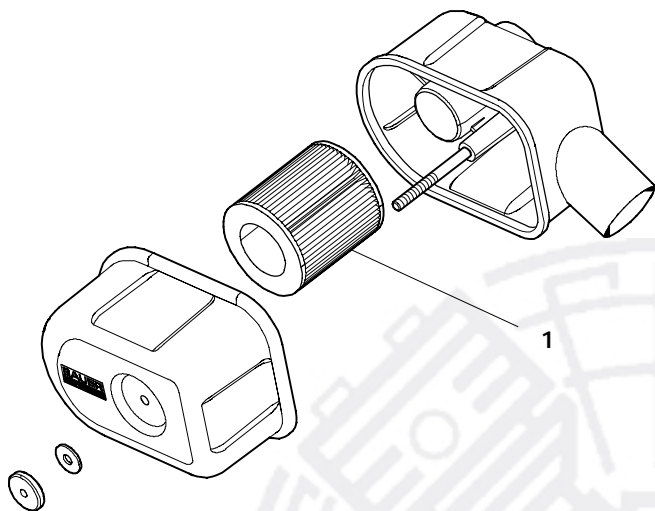


Fig. 33 Intake filter

To clean, remove cover and spring (1, Fig. 33), take out micronic filter cartridge (1) and clean with brush or by blowing air inside out. Turn cartridge through 90° when replacing. Replace dirty cartridge once it has been turned three times and thus used on all sides.

Clean filter housing inside with a damp cloth. Take care to prevent dust from entering intake pipe.

3.2. COMPRESSOR UNIT FOR GAS APPLICATIONS

The intervals for cleaning the particular filters in the gas intake-line is depending on the constitution of the medium. The filter must be cleaned according chapter D.1. or minimum annually.

4. INTERMEDIATE SEPARATOR

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

4.1. CONDENSATE DRAIN

Drain condensate every 15 to 30 minutes from these separators or ensure that the automatic condensate drain unit drains regularly. See chapter 10.

5. FINAL SEPARATOR / FILTER SYSTEM

5.1. OIL AND WATER SEPARATOR

5.1.1. Lifetime



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

The cycles are counted by the cycle counter of the compressor control unit. Refer to chapter A-11. After the max. number of load cycles have been reached, the separator must be exchanged.

5.1.2. Condensate drain

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

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

For automatic condensate drain system refer to chapter D-10.

5.2. FILTER SYSTEM

5.2.1. General instructions

- **Depressurize** system before starting any maintenance work. The filter line can be vented manually with the venting valve, wait until the pressure gauge reads zero.
- **Dry** inside of filter housing with a clean cloth before installing new cartridge and check for corrosion.
- **Lubricate** threads and O-rings as well as end of cartridge with both o-rings with white petrolatum. Apply sparingly. See chapter 15.
- **Observe** number of operating hours as indicated on hour meter to ensure exact attention to the maintenance intervals.
- **Change** cartridge before reactivating a compressor unit which has been out of service for more than 6 months.
- **Leave** cartridge in the filter as long as unit is out of service.
- **Keep** all condensate drain valves and shut-off valves closed. Keep a minimum pressure of approx. 50 to 80 bar (700 to 1,100 psig) within the system to prevent moisture entering the compressor piping and filter system.

5.2.2. Cartridge change

- On filter systems with SECURUS monitoring, unscrew nut and pull off cable plug.
- Unscrew the filter head (1, Fig. 34) with the special spanner (2, Fig. 34) supplied with the unit.
- Pull out used cartridge by means of its clip (3, Fig. 35).
- Remove new cartridge from packing and protective caps from both ends of cartridge.
- Insert new cartridge into housing and push down firmly.
- Replace filter head, screw in by hand and tighten with the special spanner.

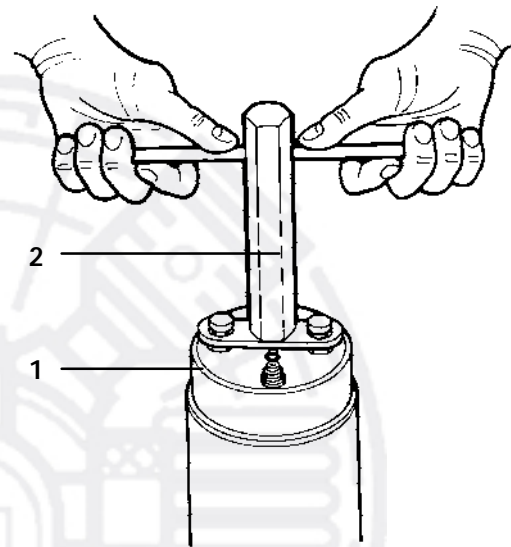


Fig. 34 Removing the filter head

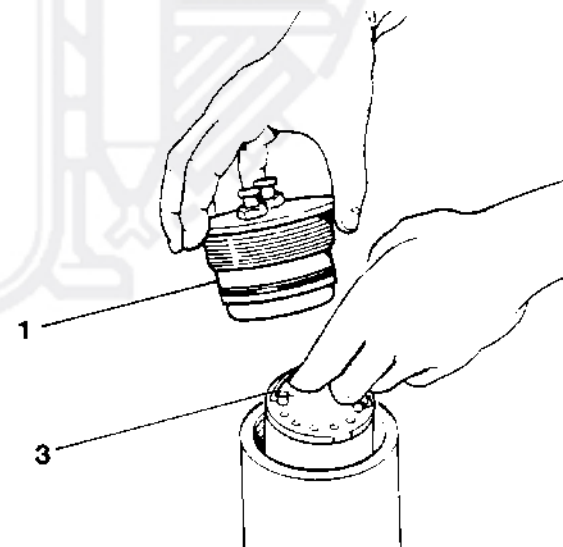


Fig. 35 Extracting the cartridge

5.2.3. Filter replacement intervals



On filter systems with SECURUS monitoring system the saturation of the cartridge is indicated by LED's at the monitor display.

The number of operating hours or the amount of possible bottle fillings per filter cartridge can be determined by the tables of pages D-11 to D-15 taking into consideration the ambient temperature and the cartridge used.

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



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

6. **PRESSURE MAINTAINING / NON-RETURN VALVE**

For pressure adjustment see chapter A-6.

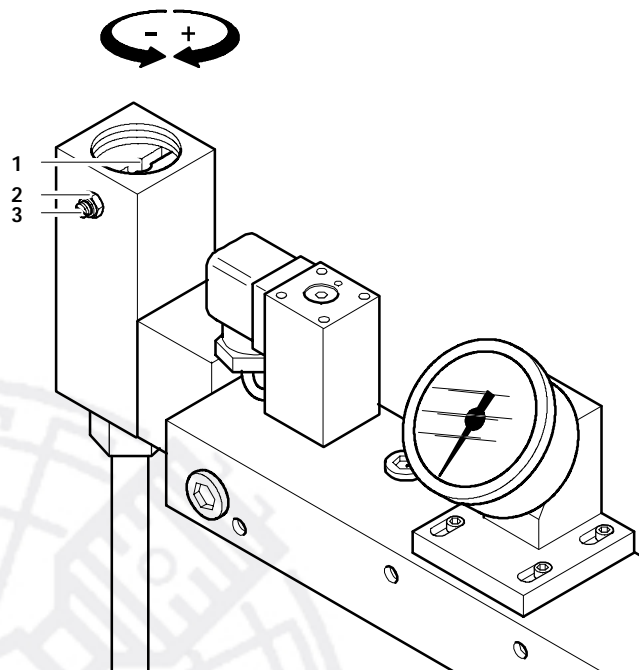


Fig. 36 Pressure Maintaining / Non-Return Valve

The pressure maintaining valve is adjusted at the factory to the required pressure and normally does not require regular maintenance or readjustment. In case of readjustment becoming necessary, loosen jam nut (2, Fig. 36) and set screw (3, Fig. 36). Adjust screw (1, Fig. 36) to the required pressure using a suitable screwdriver.

How to determine the opening pressure of the pressure maintaining valve:

As long as the pressure built up by the compressor is below the adjusted opening pressure of the pressure maintaining valve, the final pressure indication remains at zero. But, the pressure building up **in front** of the pressure maintaining valve can be read from the pressure gauge mounted at the final separator.

At this moment, read the opening pressure from the pressure gauge at the separator.

Clockwise = increase pressure
Counter-clockwise = decrease pressure

7. SAFETY VALVES

7.1. OPERATING CHECK

The final pressure safety valve has to be checked regularly before starting each filling process. See chapter D-1.2.

For this purpose the safety valve can be vented manually. We recommend that a final pressure setting of 80 % should not be exceeded, to avoid damaging the safety valve. This just ensures that the valve works and will release pressure in case of a malfunction. To check the blow-off pressure value refer to D 7.2.

The safety valve is mounted on top of the final separator. Turn knurled knob on top of the valve clockwise until valve blows off (Fig. 37).

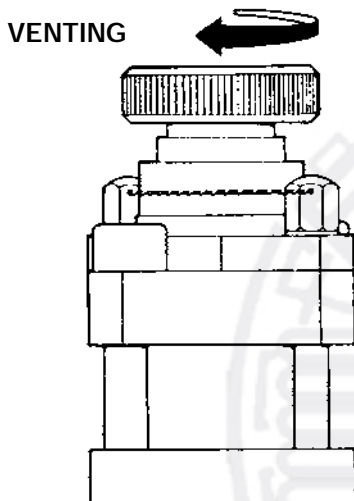


Fig. 37 Venting the final pressure safety valve

7.2. BLOW-OFF PRESSURE CHECK

Check blow-off pressure of the final pressure safety valve regularly, see maintenance schedule chapter D-1.2. Pump unit to final pressure with shut-off valve closed until safety valve blows off. Check blow-off pressure of safety valve at pressure gauge.



Set service switch S3 to "ON" to disable the final pressure switch.

1. Filter system P41; Filter cartridge 62504: Filter cartridge lifetime [hours]					
Filling pressure p = 200 bar		MV-I100-3-3	MV-I100-4-3	MV-I120-4-3	MV-I120-5.5-3
		Delivery Q [l/min]			
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	85	125	170	215
10	20 - 24	414 - 328	281 - 223	207 - 164	164 - 130
15	25 - 29	310 - 249	211 - 169	155 - 124	123 - 98
20	30 - 34	236 - 190	160 - 129	118 - 95	93 - 75
25	35 - 39	181 - 147	123 - 100	90 - 74	71 - 58
30	40 - 44	140 - 115	95 - 78	70 - 57	55 - 45
35	45 - 49	109 - 90	74 - 61	55 - 45	43 - 36
40	50 - 54	86 - 72	59 - 49	43 - 36	34 - 28
Filling pressure p = 300 bar		MV-I100-3-3	MV-I100-4-3	MV-I120-4-3	MV-I120-5.5-3
		Delivery Q [l/min]			
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	85	125	170	215
10	20 - 24	621 - 493	422 - 335	310 - 246	245 - 195
15	25 - 29	466 - 373	317 - 254	233 - 187	184 - 147
20	30 - 34	353 - 285	240 - 194	177 - 143	140 - 113
25	35 - 39	271 - 221	184 - 150	135 - 110	107 - 87
30	40 - 44	210 - 172	143 - 117	105 - 86	83 - 68
35	45 - 49	164 - 135	111 - 92	82 - 68	65 - 54
40	50 - 54	129 - 108	88 - 73	65 - 54	51 - 43

Filter cartridge 062504: Bottle fillings [number] mass of molecular sieve mMS [g] = 913				
Ambient temperature tU [°C]	Temperature in final separator tAb [°C]	Moisture content of air 100% saturated X [g/m ³]	Volume of processed air Va [m ³] at pressure p [bar]	
			200	300
10	20 - 24	17,31 - 21,8	2110 - 1675	3165 - 2513
15	25 - 29	23,07 - 28,79	1583 - 1268	2375 - 1903
20	30 - 34	30,4 - 37,63	1201 - 971	1802 - 1456
25	35 - 39	39,65 - 48,64	921 - 751	1382 - 1126
30	40 - 44	51,21 - 62,41	713 - 585	1070 - 878
35	45 - 49	65,52 - 79,28	557 - 461	836 - 691
40	50 - 54	83,08 - 99,85	440 - 366	659 - 549

Volume of processed air: $V_a [m^3] = 0,2 \times mMS [g] / (X [g/m^3] / p [bar]) = 0,2 \times p [bar] \times mMs [g] / X [g/m^3]$

Filter cartridge lifetime: $t_p [h] = V_a [m^3] / (Q [m^3/min] \times 60 [min/h])$

2. Filter system P41; Filter cartridge 062565: Filter cartridge-lifetime [hours]					
Filling pressure p = 200 bar		MV-I100-3-3	MV-I100-4-3	MV-I120-4-3	MV-I120-5.5-3
		Delivery Q [l/min]			
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	85	125	170	215
10	20 - 24	552 - 438	375 - 298	276 - 219	218 - 173
15	25 - 29	414 - 332	282 - 226	207 - 166	164 - 131
20	30 - 34	314 - 254	214 - 173	157 - 127	124 - 100
25	35 - 39	241 - 196	164 - 134	120 - 98	95 - 78
30	40 - 44	187 - 153	127 - 104	93 - 77	74 - 61
35	45 - 49	146 - 120	99 - 82	73 - 60	58 - 48
40	50 - 54	115 - 96	78 - 65	57 - 48	45 - 38
Fülldruck p = 300 bar		MV-I100-3-3	MV-I100-4-3	MV-I120-4-3	MV-I120-5.5-3
		Delivery Q [l/min]			
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	85	125	170	215
10	20 - 24	552 - 438	375 - 298	276 - 219	218 - 173
15	25 - 29	414 - 332	282 - 226	207 - 166	164 - 131
20	30 - 34	314 - 254	214 - 173	157 - 127	124 - 100
25	35 - 39	241 - 196	164 - 134	120 - 98	95 - 78
30	40 - 44	187 - 153	127 - 104	93 - 77	74 - 61
35	45 - 49	146 - 120	99 - 82	73 - 60	58 - 48
40	50 - 54	115 - 96	78 - 65	57 - 48	45 - 38

Filter cartridge 062565: Bottle fillings [number] mass of molecular sieve mMS [g] = 812				
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	Moisture content of air 100% saturated X [g/m ³]	Volume of processed air Va [m ³] at pressure p [bar]	
			200	300
10	20 - 24	17,31 - 21,80	1876 - 1490	2815 - 2235
15	25 - 29	23,07 - 28,79	1408 - 1128	2112 - 1692
20	30 - 34	30,40 - 37,63	1068 - 863	1603 - 1295
25	35 - 39	39,65 - 48,64	819 - 668	1229 - 1002
30	40 - 44	51,21 - 62,41	634 - 520	951 - 781
35	45 - 49	65,52 - 79,28	496 - 410	744 - 615
40	50 - 54	83,08 - 99,85	391 - 325	586 - 488

Volume of processed air: $V_a [m^3] = 0,2 \times mMS [g] / (X [g/m^3] / p [bar]) = 0,2 \times p [bar] \times mMs [g] / X [g/m^3]$

Filter cartridge lifetime: $t_p [h] = V_a [m^3] / (Q [m^3/min] \times 60 [min/h])$

3. Filter system P61; Filter cartridge 058825: Filter cartridge-lifetime [hours]					
Filling pressure p = 200 bar		MV-I100-3-3	MV-I100-4-3	MV-I120-4-3	MV-I120-5.5-3
		Delivery Q [l/min]			
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	85	125	170	215
10	20 - 24	655 - 520	445 - 354	327 - 260	259 - 206
15	25 - 29	491 - 394	334 - 268	246 - 197	194 - 156
20	30 - 34	373 - 301	254 - 205	186 - 151	147 - 119
25	35 - 39	286 - 233	194 - 158	143 - 117	113 - 92
30	40 - 44	221 - 182	150 - 123	111 - 91	87 - 72
35	45 - 49	173 - 143	118 - 97	86 - 71	68 - 57
40	50 - 54	136 - 114	93 - 77	68 - 57	54 - 45
Filling pressure p = 300 bar		MV-I100-3-3	MV-I100-4-3	MV-I120-4-3	MV-I120-5.5-3
		Delivery Q [l/min]			
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	85	125	170	215
10	20 - 24	982 - 780	668 - 530	491 - 390	388 - 308
15	25 - 29	737 - 590	501 - 402	368 - 295	291 - 233
20	30 - 34	559 - 452	380 - 307	280 - 226	221 - 179
25	35 - 39	429 - 350	292 - 238	214 - 175	170 - 138
30	40 - 44	332 - 272	226 - 185	166 - 136	131 - 108
35	45 - 49	259 - 214	176 - 146	130 - 107	103 - 85
40	50 - 54	205 - 170	139 - 116	102 - 85	81 - 67

Filter cartridge 062504: Bottle fillings [number] mass of molecular sieve mMS [g] = 1445				
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	Moisture content of air 100% saturated X [g/m ³]	Volume of processed air Va [m ³] at pressure p [bar]	
			200	300
10	20 - 24	17,31 - 21,8	3339 - 2651	5009 - 3977
15	25 - 29	23,07 - 28,79	2505 - 2008	3758 - 3011
20	30 - 34	30,4 - 37,63	1901 - 1536	2852 - 2304
25	35 - 39	39,65 - 48,64	1458 - 1188	2187 - 1782
30	40 - 44	51,21 - 62,41	1129 - 926	1693 - 1389
35	45 - 49	65,52 - 79,28	882 - 729	1323 - 1094
40	50 - 54	83,08 - 99,85	696 - 579	1044 - 868

Volume of processed air: $V_a [m^3] = 0,2 \times mMS [g] / (X [g/m^3] / p [bar]) = 0,2 \times p [bar] \times mMs [g] / X [g/m^3]$

Filter cartridge lifetime: $t_p [h] = V_a [m^3] / (Q [m^3/min] \times 60 [min/h])$

4. Filter system P61; Filter cartridge 058826: Filter cartridge-lifetime [hours]					
Filling pressure p = 200 bar		MV-I100-3-3	MV-I100-4-3	MV-I120-4-3	MV-I120-5.5-3
		Delivery Q [l/min]			
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	85	125	170	215
10	20 - 24	577 - 458	393 - 312	289 - 229	228 - 181
15	25 - 29	433 - 347	295 - 236	217 - 174	171 - 137
20	30 - 34	329 - 266	224 - 181	164 - 133	130 - 105
25	35 - 39	252 - 205	171 - 140	126 - 103	100 - 81
30	40 - 44	195 - 160	133 - 109	98 - 80	77 - 63
35	45 - 49	153 - 126	104 - 86	76 - 63	60 - 50
40	50 - 54	120 - 100	82 - 68	60 - 50	48 - 40
Filling pressure p = 300 bar		MV-I100-3-3	MV-I100-4-3	MV-I120-4-3	MV-I120-5.5-3
		Delivery Q [l/min]			
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	85	125	170	215
10	20 - 24	866 - 688	589 - 468	433 - 344	342 - 272
15	25 - 29	650 - 521	442 - 354	325 - 260	257 - 206
20	30 - 34	493 - 398	335 - 271	247 - 199	195 - 157
25	35 - 39	378 - 308	257 - 210	189 - 154	149 - 122
30	40 - 44	293 - 240	199 - 163	146 - 120	116 - 95
35	45 - 49	229 - 189	156 - 129	114 - 95	90 - 75
40	50 - 54	180 - 150	123 - 102	90 - 75	71 - 59

Filter cartridge 062504: Bottle fillings [numbers] mass of molecular sieve mMS [g] = 1274				
Ambient temperature tU [°C]	Temperature of final separator tAb [°C]	Moisture content of air 100% saturated X [g/m³]	Volume of processed air Va [m³] at pressure p [bar]	
			200	300
10	20 - 24	17,31 - 21,8	2944 - 2338	4416 - 3506
15	25 - 29	23,07 - 28,79	2209 - 1770	3313 - 2655
20	30 - 34	30,4 - 37,63	1676 - 1354	2514 - 2031
25	35 - 39	39,65 - 48,64	1285 - 1048	1928 - 1572
30	40 - 44	51,21 - 62,41	995 - 817	1493 - 1225
35	45 - 49	65,52 - 79,28	778 - 643	1167 - 964
40	50 - 54	83,08 - 99,85	613 - 510	920 - 766

Volume of processed air: $V_a [m^3] = 0,2 \times mMS [g] / (X [g/m^3] / p [bar]) = 0,2 \times p [bar] \times mMs [g] / X [g/m^3]$

Filter cartridge lifetime: $t_p [h] = V_a [m^3] / (Q [m^3/min] \times 60 [min/h])$

5. Filter system P61; Filter cartridge 068622: Filter cartridge-lifetime [hours] Activated charcoal-Masse mAC [g] = 648							
Delivery Q [l/min]							
85	125	170	215	260	320	370	450
1270	864	635	502	415	338	292	240

Volume of processed air: $V_a [m^3] = 0,2 \times mMS [g] / (X [g/m^3] / p [bar]) = 0,2 \times p [bar] \times mMs [g] / X [g/m^3]$

Filter cartridge lifetime: $t_p [h] = V_a [m^3] / (Q [m^3/min] \times 60 [min/h])$

8. PRESSURE GAUGES

If the values listed in section A are exceeded and the safety valve of the corresponding stage blows off, this is an indication that the downstream compressor stage is not working properly. See section A-9.

We recommend that pressure gauges are checked from time to time. For this purpose we have developed a special test pressure gauge with an adaptor which immediately recognizes any deviations in readings.

See **High Pressure Accessories Catalogue no. 8550/7.92.**

Slight deviations during operation are normal and can be ignored. Excessive inaccuracy will require the pressure gauge to be readjusted or sent back for repair.

9. VALVES

9.1. GENERAL INSTRUCTIONS FOR CHANGING THE VALVES

- **Always replace valves** as a complete set.
- **Carefully clean** dirty valves. Never use a sharp tool for this purpose. Soak the valves in diesel oil or petroleum and clean with soft brush.
- **Lubricate** valves before installing with Weicon AS 040, order no. N19753, or equivalent.
- **Check** individual components for excessive wear. If the valve seat and valve disks are dented, replace the valves.
- **Valve head screws** must be tightened with a torque wrench (see tightening torque values chapter D-15).
- **Check** the valve space in the valve heads for dirt and clean, if necessary.
- **Use only** satisfactory gaskets and O-rings on reassembly.
- **Observe** the correct sequence when fitting together again.
- **After finishing** all maintenance work on the valves, turn the compressor manually using the flywheel and check whether all items have been correctly installed.
- **30 minutes after restarting** the compressor unit stop unit, let it cool down to ambient temperature and retighten valve studs and cap nuts. Otherwise valves could work loose due to setting of the gaskets.
- **Remove and check** the valves every **1000 operating hours**.
- **Replace** the valves every **2000 operating hours** to avoid fatigue failure.

9.2. VALVE CHANGE

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

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

10. AUTOMATIC CONDENSATE DRAIN

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



Dispose of the condensate according to local regulations!

10.1. CHECKING THE AUTOMATIC DRAIN

The condensate drain valves for the intermediate separators and for the oil and water separator are provided with manual drain valves to check correct operation of the automatic system.

The automatic condensate drain system must be serviced as follows:

- Open all manual drain valves on the separators one after the other, once a week.

This must be carried out immediately after the automatic system has drained the condensate. Observe the drainage of condensate when opening the manual drain valves. If the system drains a lot of condensate this is a sign that the system or the corresponding condensate drain valves are not working properly. Find the fault and remedy accordingly. If hardly any condensate emerges, the automatic system is operating properly. For fault correction, see section D-14. "Trouble-shooting".

11. ELECTRICAL SYSTEM

11.1. CHECKING THE TERMINALS

On compressor units with factory-installed electric compressor control system, check all screw-type terminals regularly, at least annually, especially the power relay terminals.

All spring-loaded terminals are maintenance-free.

Besides that, the operator is responsible to ensure that all required safety checks acc. to BGV and DIN VDE are carried out.

11.2. ADJUSTMENT OF FINAL PRESSURE SWITCH

11.2.1. Semi-automatic compressor control

The pressure switch is adjusted to the required pressure acc. to order. If readjustment is necessary, open cover (2, Fig. 38) and adjust screw (1) with a 6 mm allen key to the required pressure.

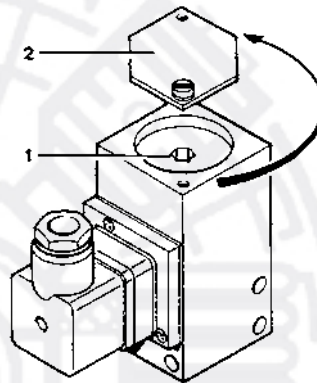


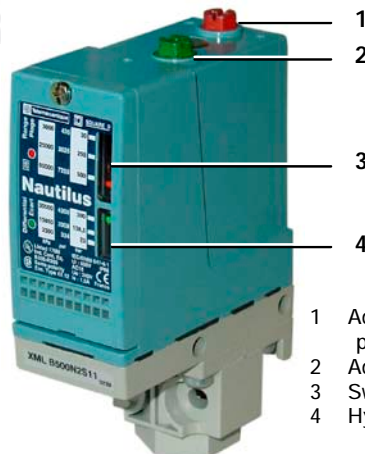
Fig. 38 Final pressure switch, semi-automatic control unit

11.2.2. Fully automatic compressor control

Both, upper (switch off) and lower (switch on) pressure can be adjusted with this type of pressure switch (Fig. 39).



The required maximum pressure is always adjusted first, using the red screw (1) followed by the adjustment of the minimum pressure with the green screw (2).



- 1 Adjustment screw, switch-off pressure
- 2 Adjustment screw, hysteresis
- 3 Switch-off pressure indicator
- 4 Hysteresis indicator

Fig. 39 Final pressure switch for fully automatic operation

12. COMPRESSOR DRIVE SYSTEM

12.1. ELECTRIC DRIVE MOTOR

The drive motor normally needs no servicing except outer cleaning from time to time. Depending on manufacturer and model, greasing of the bearings may be necessary. Observe respective notes on the motor.

12.2. V-BELTS

V-belt tension is adjusted automatically by the weight of the motor. The motor is mounted on a hinged motor plate.

Check the V-belt regularly for damage and wear (see section D-1.2.)

Replace if necessary. If more than one V-belt is installed, always replace the complete set.

13. REPAIR INSTRUCTIONS

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

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

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



For all further repair instructions refer to applicable workshop manual.



14. TROUBLE-SHOOTING

Trouble	Cause	Remedy
Compressor unit		
Compressor unit doesn't start (gas compressors)	Intake pressure too low	Control intake pressure and readjust as necessary - see A.3.2.3.
	Intake pressure too high	Control intake pressure and readjust as necessary - see A.3.2.3.
Drive Motor		
Motor will not start	Electric circuitry faulty	Before attempting to make any repairs, check all fuses, terminal connections, wire leads, make sure that motor data complies with mains supply
	Wrong phase sequence; control relay triggered.	Correct phase sequence acc. to chapter B.3.1.
Compressor Block		
Compressor does not attain final pressure	Condensate drain valve(s) and/or fittings leaking	Tighten and reseal
	Premature opening of final safety valve	Clean final safety valve and readjust
	Piston rings worn	Replace
	Excessive piston clearance	Replace
Compressor output insufficient	Pipes leaking	Re-tighten
Safety valves between individual stages releasing pressure	Intermediate pressure too high	Check valves - see D-9.
	Valves not closing properly	
Compressor running too hot	Insufficient supply of fresh cooling air	Check location max. ambient temperature + 45 °C (110 °F)
	Intake or outlet valves not closing properly	Check and clean valves, replace as necessary
	Wrong direction of rotation	See arrow on compressor and remedy accordingly
Automatic Condensate Drain		
Drain valves do not close	No control air	Check control air line
	Drain valves leaking	Dismantle drain valve and clean
Drain valves do not open	Condensate drain valve piston jammed	Dismantle drain valve, clean or replace valve
Solenoid valve does not close	Solenoid valve faulty	Check solenoid valve and replace if necessary
	No electrical signal	Check for voltage from timer
Solenoid valve does not open	Solenoid valve faulty	Check solenoid valve and replace if necessary
	Continuous electrical signal	Check electrical control circuit and timer
Unsatisfactory drainage (lot of condensate from manual valves)	Drain valves clogged	Dismantle drain valves, clean

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15. TABLES

15.1. TIGHTENING TORQUE VALUES



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

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

15.2. TORQUE SEQUENCE

Tighten valve head and cylinder bolts/nuts equally in the sequence shown in Fig. 40.

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

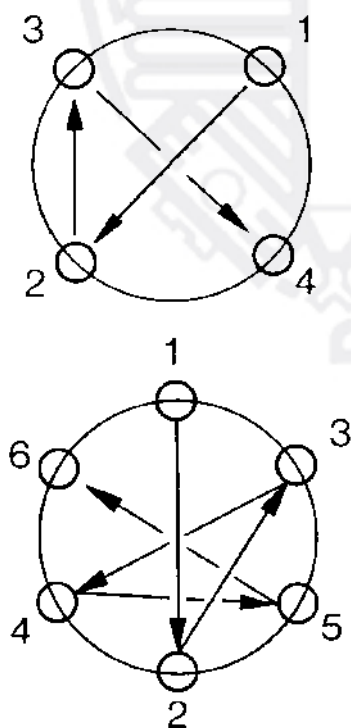


Fig. 40 Torque sequence

MV-1/02/07

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

15.3. LUBRICATION CHART

Usage	Lubricants
Rubber and plastic parts, filter housing threads	WEICON WP 300 WHITE part no. N19752 or BAUER special lubricant P/N 072500
Sealing rings	BAUER special lubricant P/N 072500
Shaft seal (seal) Shaft seal (shaft)	BAUER special lubricant P/N 072500 Klüber SK 01-205
Screws, bolts, threads	WEICON ANTI-SEIZE AS 040 P part no. N19753 or equivalent compound with copper or MoS ₂ additives

For all lubricating oils refer to chapter 2 or lubricating oil list available through **BAUER** Service Department.

15.4. ADHESIVE AND SEALANT CHART

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

15.5. TESTING AGENTS

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

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E. STORAGE, PRESERVATION

1. GENERAL

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

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

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

2. PREPARATION

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

Then carry out the following:

- Check all pipes, filters and valves (also safety valves) for leakage.
- Tighten all couplings, as required.
- After 10 minutes, open the filling valves or the outlet valve and run the compressor at the set minimum pressure (pressure maintaining valve, (see chapter A-6.) for approx. 5 minutes.
- After these 5 minutes, shut the system down. Drain condensate from separators. Depressurize unit. Shut filling valves/outlet valve.
- Open filters and grease threads.

On units equipped with a filter system please observe the following:

- **Ensure that filter cartridges remain in filters!**
This will prevent oil entering filling lines as a result of preservation procedures.
- Remove intake filter from manifold and all intake lines from valve heads.
- Let compressor unit cool down.

3. PRESERVING THE COMPRESSOR

- Turn the compressor on and spray a small amount (approx. 10 cm³ of compressor oil into the valve head inlet port (compressors with dual 1st stage: **each** of the inlet ports) while the compressor is running. Do not let the compressor warm up too much, to keep oil sticky.
- Shut compressor unit off.
- Close all valves.
- Place the dust cap onto the inlet port.

4. PRESERVING THE MOTOR/ENGINE

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

5. PREVENTIVE MAINTENANCE DURING STORAGE

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

- Remove the dust cap from the inlet port and insert the intake filter.
- Open the filling valves or the outlet valve and let the unit run for approx. 10 minutes or until the pressure gauges indicate the correct values.
- Stop the compressor.
- Open condensate drain valves and release compressed air. Close condensate drain valves again.
- Carry out preservation procedure according to para.3.

5.1. CHANGING THE LUBE OIL FOR PRESERVING

- After prolonged storage, the oil will age in the compressor and engine. It should be drained after **2 years** at the latest and replaced with fresh oil.
- The stated period can only be attained when the crankcase is sealed during the preservation period in accordance with the preservation requirements.
- After changing the oil, turn the compressor and the engine or run them for the required period. See paras. 3. and 4.
- Check the lubrication of the compressor when putting the unit into operation once every six months or when turning the compressor.

The oil pump is functioning properly when oil can be seen flowing through the sight glass of the oil pressure regulator and if the oil pressure gauge indicates the prescribed pressure.

6. REACTIVATING THE COMPRESSOR UNIT

- Remove the dust cap from the inlet port and insert the intake filter.
- Check the oil level of the compressor.
- Check the motor/engine according to the manufacturer's instructions.
- Only applicable for units equipped with a filter system: open the purifier and change all filter cartridges.
- Run the compressor warm with open filling valves or outlet valve for approx. 10 minutes.
- Check the oil pressure on the pressure gauge or the oil flow in the sight glass. If there is any fault, check the lubrication of the compressor.

- After 10 minutes, close the filling valves or the outlet valve and run the unit up to final pressure until the final pressure safety valve blows. To do so, override the pressure switch, if installed on the unit (refer to chapter A-11.).
- Check the inter-pressure safety valves for leakage.
- Establish cause of any fault from the trouble-shooting table, section D-14., and remedy.
- Stop the system when running properly, the compressor is then ready for operation.



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F. DIAGRAMS, DRAWINGS

1. FLOW DIAGRAMS

Flow diagrams	No.
Flow diagram MV3-I	according to order

2. SCHEMATIC DIAGRAMS

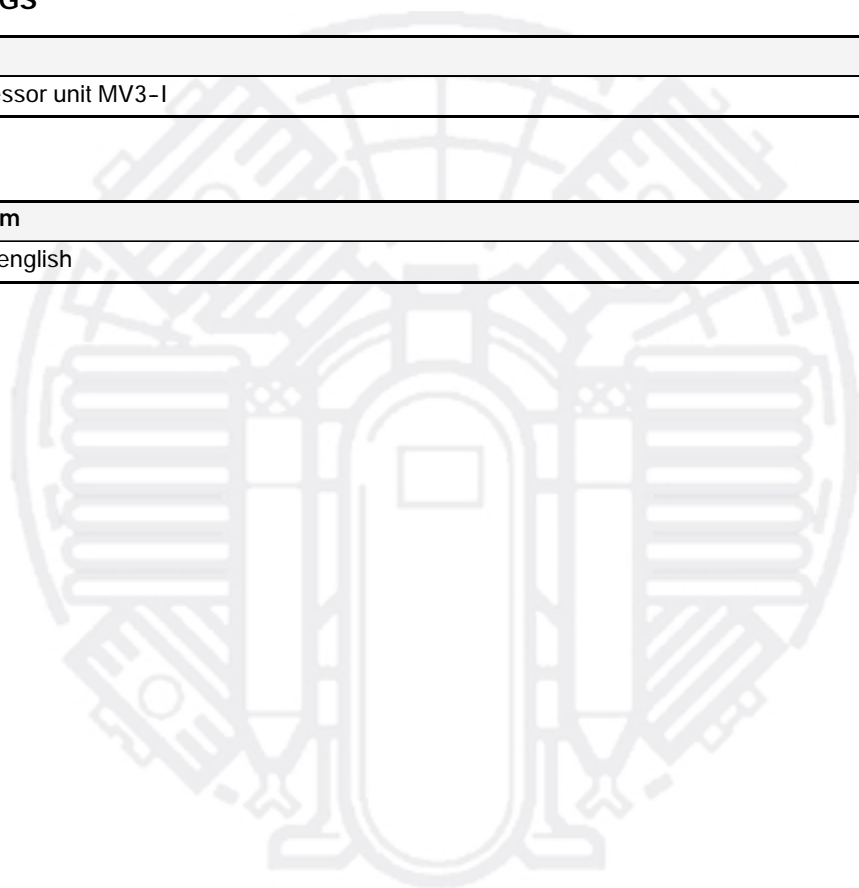
Drawing	No.
Schematic diagram	according to order
Electric part list	76360

3. DRAWINGS

List	No.
Drawing of compressor unit MV3-I	

4. LISTS

Schematic diagram	Dwg.-No.
Lubrication oil list, english	70851



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G. PARTS LISTS

1. COMPRESSOR UNIT MV-I100-3-3

Applicable spare parts lists:	Code
Compressor block IK100-F07	A1.7
Filter system	B64
Automatic condensate drain unit	C75
Instrument panel	D17-I
Frame and panelling	E28-I
Drive system	F16-I
Compressor control system	G68
Accessories ^{a)} :	
Storage batteries	G7
Air-Kool	G64
Intake system	G70

2. COMPRESSOR UNIT MV-I100-4-3

Applicable spare parts lists:	Code
Compressor block IK100-F07	A1.7
Filter system	B64
Automatic condensate drain unit	C75
Instrument panel	D17-I
Frame and panelling	E28-I
Drive system	F16-I
Compressor control system	G68
Accessories ^{a)} :	
Storage batteries	G7
Air-Kool	G64
Intake system	G70

3. COMPRESSOR UNIT MV-I120-4-3

Applicable spare parts lists:	Code
Compressor block IK120-F07	A1.7
Filter system	B64
Automatic condensate drain unit	C75
Instrument panel	D17-I
Frame and panelling	E28-I
Drive system	F16-I
Compressor control system	G68
Accessories ^{a)} :	
Storage batteries	G7
Air-Kool	G64
Intake system	G70

a) optional extras according to order

4. COMPRESSOR UNIT MV-I120-5.5-3

Applicable spare parts lists:	Code
Compressor block IK120-F07	A1.7
Filter system	B64
Automatic condensate drain unit	C75
Instrument panel	D17-I
Frame and panelling	E28-I
Drive system	F16-I
Compressor control system	G68
Accessories ^{a)} :	
Storage batteries	G7
Air-Kool	G64
Intake system	G70

5. COMPRESSOR UNIT MV-GI100-3-3

Applicable spare parts lists:	Code
Compressor block IK100-GI-F06	A41.6
Filter system	B64
Automatic condensate drain unit	C75
Instrument panel	D17-I
Frame and panelling	E28-I
Drive system	F16-I
Compressor control system	G68
Accessories ^{a)} :	
Storage batteries	G7
Air-Kool	G64
Intake system	G70

6. COMPRESSOR UNIT MV-GI100-4-3

Applicable spare parts lists:	Code
Compressor block IK100-GI-F06	A41.6
Filter system	B64
Automatic condensate drain unit	C75
Instrument panel	D17-I
Frame and panelling	E28-I
Drive system	F16-I
Compressor control system	G68
Accessories ^{a)} :	
Storage batteries	G7
Air-Kool	G64
Intake system	G70

7. COMPRESSOR UNIT MV-GI120-4-3

Applicable spare parts lists:	Code
Compressor block IK120-GI-F06	A41.6
Filter system	B64
Automatic condensate drain unit	C75
Instrument panel	D17-I
Frame and panelling	E28-I
Drive system	F16-I
Compressor control system	G68
Accessories ^{a)} :	
Storage batteries	G7
Air-Kool	G64
Intake system	G70

8. COMPRESSOR UNIT MV-GI120-5.5-3

Applicable spare parts lists:	Code
Compressor block IK120-GI-F06	A41.6
Filter system	B64
Automatic condensate drain unit	C75
Instrument panel	D17-I
Frame and panelling	E28-I
Drive system	F16-I
Compressor control system	G68
Accessories ^{a)} :	
Storage batteries	G7
Air-Kool	G64
Intake system	G70

9. COMPRESSOR UNIT MV-GIB12.2-5.5-3

Applicable spare parts lists:	Code
Compressor block BK12.2-F07	A92.7
Filter system	B64
Automatic condensate drain unit	C75
Instrument panel	D17-I
Frame and panelling	E28-I
Drive system	F16-I
Compressor control system	G68
Accessories ^{a)} :	
Storage batteries	G7
Air-Kool	G64
Intake system	G70






Lubricating oil list

1. GENERAL

After extensive tests with many different kinds of lubricants, we have decided to authorize the following brands of oil for use in **BAUER** compressors under the given operating conditions.

This list is up to date at the time of printing and will be reviewed continuously. Should your list or your instruction manual be older, please request the latest edition from **BAUER** Customer Services. When using any of the oils listed below, please follow the oil change intervals and the oil filling level described for the equivalent **BAUER** compressor oil in the instruction manual of your unit.

Oil type			Use						Ambient temperature
Brand name	Designation	Type	A Breathing air	N Nitrox	I Industrial air	G Helium, Argon	C CNG	GI Nitrogen	+5 ...+45 °C
	Special Compressor oil Part no. N28355 b) c)	S	+	+	+	+	-	+	+
	Special Compressor oil Part no. N22138 a)	M	+	-	+	-	-	-	+
	Special Compressor oil Part no. N26303 b)	S	-	-	-	-	+	-	+

Oil type

S	synthetic oil
M	mineral oil

Application

A	approved for breathing air application with BAUER air purification systems
N	approved for nitrox application with BAUER membrane unit
I	suitable for industrial air compressor units
G	suitable for gas compressor units for dry and highly pure gases
C	suitable for compressed natural gas compressors (CNG filling stations)
GI	suitable for gas compressor units for nitrogen
a)	oil change every 1000 operating hours
b)	oil change every 2000 operating hours
c)	oil change every 1000 operating hours in case of nitrox application

Suitability

+	= suitable
Z	= partly suitable
-	= not suitable

2. TYPE OF OIL

Due to the thermal load on the compressor only high quality oil should be used. You are recommended to restrict oils to those which have been approved by us and are listed in the instruction manual or in the lubricating list on page 1.

Our compressor units are delivered ex works with lubricating oil filled into the crankcase or as consignment, depending on the model, as follows:

Breathing air compressor units:	BAUER Special Compressor oil, part no. N28355
Nitrox compressor units:	BAUER Special Compressor oil, part no. N28355
Industrial air and gas compressor units:	BAUER Special Compressor oil, part no. N28355
CNG compressor units:	BAUER Special Compressor oil, part no. N26303

For operation under difficult conditions, such as continuous running and/or high ambient temperatures, we only recommend the BAUER special synthetic compressor oils acc. to the list on the previous page. These have proved excellent quality under ambient temperatures between +5 °C and +45 °C. For lower temperatures a compressor heating device is required which is capable of pre-heating the unit up to +5 °C.

For operation under less severe conditions, and for intermittent operation, i.e. when the compressor is not used for longer periods between the operating periods, we also recommend the use of the mineral oil acc. to the list on the previous page. This oil is suitable for ambient temperatures between +5 °C and +45 °C. Here also, a pre-heating device will be required if ambient temperatures should fall below +5 °C.

2.1. Changing the Oil Type

CAUTION

To avoid severe damage to the compressor unit when changing to another oil type, the following measures should be strictly adhered to.

- Drain mineral oil while still warm.
- Check valves, coolers, separators, purifiers and all pneumatic tubes and hoses for deposits.

If deposits are present, perform the following steps:

- Remove deposits or change valves, coolers, separators, purifiers and all pneumatic tubes and hoses.
- Change oil filter, if applicable.
- Fill compressor with the new oil.
- After approx. 100 operating hours, replace oil filter again (if applicable) and change oil.
- Top up with same oil type.

3. OIL CHANGE

Mineral oil	every 1000 operating hours, at least annually
Synthetic oil	every 2000 operating hours, at least every two years
Oil change volume	see compressor unit operating manual

BAUER compressor oil is available in the following quantities:

Oil quantity	Oil type	Synthetic oil N28355	Synthetic oil N26303	Mineral oil N22138
0.5 ltr. bottle		Best.-Nr. N28355-0,5	not available	Best.-Nr. N22138-0,5
1 ltr. bottle		part no. N28355-1	part no. N26303-1	part no. N22138-1
5 ltr. container		part no. N28355-5	part no. N26303-5	part no. N22138-5
20 ltr. container		part no. N28355-20	part no. N26303-20	part no. N22138-20