BOGE AIR. THE AIR TO WORK.

BOGE
COMPRESSED AIR SYSTEMS

Operating instructions

Belt-driven screw compressors

Series
S 31-3...S 150-3
SD 40-3...SD 150-3
SF 60-3...SF 150-3
SDF 60-3...SDF 150-3
S 40-3...S 60-3 BLUEKAT

Separate manuals:
Compressor control
Refrigerant compressed air dryer (SD / SDF)
Frequency converter (SF / SDF)

GL ISO 9001 ISO 14001
GL Systems Certification

www.boge.com

Operating instructions for belt-driven screw compressors

- **S 31-3 (22 kW)**
- **S 40-3 / SD 40-3 (30 kW)**
- **S 50-3 / SD 50-3 (37 kW)**
- **S 60-3 / SD 60-3 (45 kW)**
- **S 61-3 / SD 61-3 (45 kW)**
- **S 75-3 / SD 75-3 (55 kW)**
- **S 90-3 / SD 90-3 (65 kW)**
- **S 100-3 / SD 100-3 (75 kW)**
- **S 101-3 / SD 101-3 (75 kW)**
- **S 125-3 / SD 125-3 (90 kW)**
- **S 150-3 / SD 150-3 (110 kW)**

- **SF 60-3 / SDF 60-3 (45 kW)**
- **SF 100-3 / SDF 100-3 (75 kW)**
- **SF 150-3 / SDF 150-3 (110 kW)**

- **S 40-3 BLUEKAT (30 kW)**
- **S 50-3 BLUEKAT (37 kW)**
- **S/SF 60-3 BLUEKAT (45 kW)**

BOGE KOMPRESSOREN
Otto Boge GmbH & Co. KG
Postfach 10 07 13
33507 Bielefeld

Otto-Boge-Straße 1-7
33739 Bielefeld

Phone: +49 5206 601-0
Fax: +49 5206 601-200
Mail: info@boge.com
Net: www.boge.com

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Contents

1.1 General safety instructions

Caution!

Failure to observe the following safety instructions can lead to injuries and damage to the compressor.

Observe the general safety and accident prevention regulations in addition to the information in these operating instructions!

Safety instructions for compressor operation

1. Ensure that no commissioning and maintenance work on the compressor is undertaken until these operating instructions have been read and understood.
2. Only use the compressor for its intended use, as described in these operating instructions.
3. The owner must ensure,
   - that only appropriately trained and authorised personnel work on this compressor,
   - that persons whose ability to react is restricted due to the misuse of e.g. drugs, alcohol, medication etc., are prevented from working on this compressor,
   - that operating, maintenance and repair personnel is fully conversant with all safety instructions, and that these safety instructions are observed,
   - that the compressor is only operated if it is in safe working order.
4. Avoid any way of working which may impair the safety of the compressor.
5. Always wear your compulsory personal protective equipment as protection against injuries from sharp corners or edges when working on the compressor.
6. To avoid dangers from debris or parts lying around, the working area of the compressor must always be kept tidy and clean.
7. Always squat when working on components mounted at low height, never stoop. When working on components mounted higher up, always stand upright and erect.
8. Do not exceed the limit value for the end of compression pressure specified on the type plate.
9. Do not operate the compressor without the attendant protective equipment and safety devices.
   Do not dismantle any built-in safety devices or put them out of operation.
10. Ensure that all safety covers and doors are closed prior to commissioning/ starting up the compressor and that they are not opened during operation.
11. Place the compressor out of operation as described in these operating instructions, when dismantling the safety covers or safety devices for repair or maintenance work. Reattach and close all covers and safety devices immediately upon completion of the repair or maintenance work.
12. Operate the compressor only if any optional accessory equipment used is recommended or authorised by the manufacturer.

13. Undertake conversions and modifications to the compressor only with the prior approval of BOGE, and in compliance with all relevant safety regulations. The manufacturer is not liable for damages resulting from unauthorised modifications to the compressor.
14. Never start the compressor if one or more parts (e.g. cable, plug) are damaged, or if the compressor is not in perfect working order, or if damage is visible or suspected.
15. Observe all safety and danger signs attached to the compressor itself!
16. The compressed air/oil receiver and the BLUEKAT converter are pressure equipment and require testing in accordance with national standards.
17. To avoid damage, special precautions must be taken during (re-)commissioning of compressors with a frequency control if the frequency converter has been disconnected from the power supply for a lengthy period of time (> 12 months). In this case, please contact the BOGE's service department.

Special hazard warnings

– Always wear your compulsory personal protective equipment when working on pressure pipes and connections!
– A protective grid serves to prevent you from accidentally reaching into the impeller in the cooling fan.

Caution: Risk of injury!

Never operate the compressor with the protective grid removed! There is constant danger of accidentally reaching into the impeller in the cooling fan!

Please note that the cooling fan may run on for a certain time even after the compressor has been switched off!

– During operation, the compressor generates a high noise level which may cause permanent hearing damage due to prolonged exposure. The compressor must ALWAYS be operated with its housing closed! Wear additional hearing protection at noise levels of over 80 dB(A)!

Dangers of electricity

Danger: High voltage!

Persons working on the electrical equipment of the compressor are exposed to mortal danger!

- Disconnect from the mains power supply before starting any work on the compressor and use a padlock to prevent the power from being switched on again.
- Only duly authorised professional electricians (e.g. plant electricians) are permitted to carry out work on the electrical system of the machine.
- Inspect the electrical equipment of the compressor at regular intervals for defects such as loose connections or scorched cables and have any defects repaired immediately.
- Have all electrical equipment and fixed electrical installations checked by a professional electrician at least every 4 years.
- Any modifications made after testing must comply with DIN EN 60204-1: 2007.
- Check all safety devices on the machine at regular intervals to ensure they work properly.
- Only use original fuses.

Obligations of the operator

The operator is obliged to,

- operate the compressor only if it is in perfect technical working order,
- provide an automatic cutout device for disconnecting the electrical power supply in the event of a fault to prevent hazards due to electricity.
- check the emergency stop device for the compressor regularly to ensure that nothing is missing and that it works properly,
- assess the hazards of the machine workstations in his area of responsibility and to issue specific user instructions on the basis of this,
- appoint a person who is responsible for the safe operation of the machine as well as the coordination of all service work performed on it,
- avoid stress situations while operating the compressor by implementing appropriate technological and organisational work preparation measures,
- ensure proper lighting at the compressor control panel in line with local health and safety regulations,
- observe the safety data sheets for the lubricants used and make all information specified by the data sheet accessible to personnel,
- provide the compulsory personal protective equipment and stipulate and regularly check the wearing of this protective equipment,
- designate personnel responsible for the various types of work on the machine,
- instruct personnel on a regular basis about the extent of obligations to keep the area around the compressor safe, tidy and in good order.
- in the event that the compressor requires to be dismantled, develop a safe technical means of dismantling the structure, designate persons responsible (for safety at work, supervision, completing the work), supervise the dismantling work and monitor compliance with the safety precautions and instructions drawn up,

Personnel requirements

Work on and with the compressor must only be carried out by personnel duly authorised by the operator of the compressor.

The personnel working on the compressor must observe all industrial safety regulations and user instructions, properly recognize responsibilities and have read and understood the operating instructions. It is essential to wear the compulsory personal protective equipment at all times when working on the compressor!

Personal protective equipment

During all work on the compressor,

- protective clothing,
- chemical resistant gloves,
- slip-resistant safety shoes and
- hearing protection, if applicable,

must be worn.

For special tasks,

- safety helmets (when operating lifting gear to transport equipment) and
- safety goggles (when working on the compressed air system, pneumatic control system and/or on the cooling system of the built-in dryer)

must be worn.

Before working with oils or greases, barrier cream must be applied to the skin. After the work is finished, a skin care product must be applied.

Safety instructions for maintenance and repair of the compressor

Caution!

During repair and maintenance, use only original spare parts, compressor oils and operating materials approved by BOGE.

Danger: High voltage!

When working on the electrical system be aware of the constant danger of contact with live parts!

To prevent danger, the mains connection must be equipped with an automatic circuit breaker!

The automatic circuit breaker must comply with the requirements of DIN EN 60204-1:2007!

– Ensure that maintenance work is carried out by suitably trained persons only.
– Settings, fault rectification and repair work must be carried out by specialists or suitably trained persons only.
– Before carrying out any maintenance or repair work:

1. Switch off the compressor using the OFF button.
2. Press the emergency stop button.
3. Disconnect the compressor from all electric power sources using the circuit breaker.
4. Take preventive action to prevent the current from being inadvertently switched back on.
5. Check to ensure that all current-carrying parts are zero-potential.
6. Earth and short-circuit.
7. Cover or shield adjacent current-carrying parts.
8. Fix a warning label to the control and fill in the name of the person responsible who is authorised to switch on the machine again.
9. Disconnect the compressor from the compressed air network (relieve or block pressure lines).
10. Allow converter to cool off for several hours (applies to screw compressors S 40-3 BLUEKAT...S 60-3 BLUEKAT only).

– Exercise extreme caution during repair or maintenance work during which the compressor needs to be operational.
  Ensure that all persons are at a safe distance from the danger area.
– Ensure that work on electrical equipment is carried out by qualified electricians only.
– Working on current-carrying parts and devices is prohibited. Exceptions are governed by the appropriate regulations, e.g. DIN VDE 0105.
– Before starting work on the electrical system, the power supply must be switched off and a safeguard must be provided to prevent it from being unintentionally switched on again. Immediately after finishing the work, all dismantled covers and safety devices must be refitted.
– The machine operator is responsible for inspecting the compressor daily for externally visible damage and defects, and for immediately reporting any changes (including in operational behaviour).
– When the automatic restart mode (auto-restart) is activated, the compressor will start up automatically following a power failure. This is conditional upon: The network pressure being lower than the set switch-on pressure.

Safety instructions for maintenance and repair of integrated converter (BLUEKAT series)

Caution!

Maintenance and repair work on the integrated converter in the S 40-3 BLUEKAT...S 60-3 BLUEKAT series must be carried out by specially trained BOGE service personnel only.

Failure to observe this can result in physical injury and damage to the compressor system.

Safety instructions for maintenance and repair of the dryer (SD/SDF)

Caution!

Maintenance work and repairs to the refrigerant compressed air dryer (SD/SDF) may be carried out only by BOGE service personnel with the relevant specialist training.

Failure to comply with this requirement can result in physical injury and in damage to the compressor system.

The operator/user must comply with the existing national occupational, operational and safety regulations.

Existing internal works regulations must also be observed.

1. No safety or protection equipment may be altered, adjusted or removed from the dryer, either permanently or temporarily.
2. Use only the correct tools for maintenance and repair work.
3. Use only original spare parts.
4. The system must be switched off and disconnected from the mains power supply before any maintenance or repair works are carried out. Take steps to ensure that the dryer cannot be switched back on again inadvertently.
5. Before removing any pressurised parts of the dryer, actively disconnect all pressure sources from the dryer and vent the dryer to release the pressure.
6. Do not use flammable cleaning agents to clean the equipment.
7. Always pay meticulous attention to cleanliness when carrying out maintenance or repair work. Cover the components and any exposed openings with a clean cloth, paper or adhesive strips to keep out dirt.
8. Never attempt to weld a pressure vessel or change it in any way.
9. Make sure that no tools, loose parts or suchlike are left in the unit.

Handling refrigerants

1. Wear safety glasses and protective gloves.
2. Do not allow liquid refrigerants to come into contact with the skin (as this causes frostbite).
3. Do not breathe in any refrigerant vapours.
4. Ventilate the workroom well to prevent the build up of higher concentrations. Simply opening windows and doors may not be sufficient. The air must be extracted directly from the interface, if possible, or at floor level.
5. Do not smoke. Refrigerants can decompose when exposed to the glow of a cigarette. The resulting substances are toxic and should never be inhaled.
6. Do not allow refrigerants to escape during repair or filling procedures.
7. If concentrations of refrigerants should appear suddenly (due to a burst pipe, for example), leave the room immediately and do not re-enter until the room has been adequately ventilated.
8. Welding and soldering work to refrigerating systems may be carried out only in well ventilated rooms. Refrigerants decompose in the presence of flames and electric arcs.
9. The products of this decomposition are toxic.
10. Before welding or soldering work is carried out on refrigerant systems, the refrigerant must first be removed.
11. A strong smell indicates that the refrigerant is decomposing:
    - Leave the room immediately.
    - Ventilate the room well.

Accident prevention regulations

The operator of a compressor station is responsible for ensuring that it is properly installed, operated and maintained.

Prior to commissioning, operators in the Federal Republic of Germany must have read the currently valid regulations of the German federation of statutory accident insurance institutions for the industrial sector. Among other regulations, the German Ordinance on Industrial Safety and Health (BetrSichV) in particular, is applicable.

The regulations can be obtained from the following locations:

German federation of statutory accident insurance institutions for the industrial sector (Berufsgenossenschaft)
Carl-Heymanns-Verlag KG, Luxemburger Straße 449, D-50939 Köln (publisher)
Beuth Verlag GmbH, Burggrafenstraße 6, D-10787 Berlin (publisher)

If the compressor system is operated outside the Federal Republic of Germany, the accident prevention regulations of the country where the compressor is operated must be observed, in addition to the information contained in these operating instructions. In the event that measures are required above and beyond the legal regulations specified in the Federal Republic of Germany or the information contained in these operating instructions, then it is essential that these are carried out prior to commissioning the compressor plant.

1.2 Introduction

The purpose of these operating instructions is to familiarise the user with the operation and all uses and features of the compressor.

These operating instructions contain important information on how to operate the compressor safely, economically and according to its intended use. Observing these operating instructions will help to prevent danger, reduce repair costs and downtimes and increase the reliability and service life of the compressor. They contain important information on the necessary maintenance and repair work, assists in the event of faults and contains information on spare and wear parts.

These operating instructions must be available at all times to the compressor operating personnel at the place of use.

The operating instructions must be carefully read and applied by all persons authorised to undertake the following work on the compressor:

– Operation, including fault rectification and daily care
– Servicing (maintenance, inspection, repairs)
– Commissioning
– Transport

The compressor and its additional equipment must not be installed and commissioned until the operating instructions have been read and understood.

These operating instructions are intended to complement user instructions based on existing national accident prevention and environmental protection regulations.

In the illustrations, the compressor is shown in part without safety covers or safety devices to provide a better view. However, operating the compressor without these components is prohibited!

Symbols used

In these operating instructions attention is drawn to important safety advice and tips with the following symbols:

Caution: Risk of injury!

This symbol warns of danger to life and limb of the machine operator or other persons.

Attention!

This symbol warns of danger to life and limb of the machine operator or other persons or dangers which might destroy or damage the compressor.

Danger: High voltage!

This symbol warns of danger due to electricity.

This symbol indicates a warning of life-threatening electrical voltage levels. It indicates work which must be performed by skilled electricians only.

Note!
This symbol indicates information and tips on saving energy and prolonging the life of the compressor through careful use.

Symbols on the compressor

Note!
All warning signs on the compressor and in its surroundings must be kept in a legible condition at all times. Missing or damaged signs must be replaced at once!

The following symbols and warning signs are fitted on the compressor:

Warning!
Hot surfaces: Do not touch!

Warning!
Remote-controlled unit. Can start up without warning!

Notice!
Machine operators must read operating instructions for users!

Prohibited!
NEVER open valve before air hose is connected to compressed air system!

Warning of injury to hands!
Work on the belt drive must only be carried out when the compressor is not running and safeguards are in place to prevent it from starting up!

Intended use

Caution!

BOGE compressors, including their accessory equipment, are exclusively intended for the compression of air in industrial applications. The air taken in must not contain any explosive or chemically unstable gases or vapours.
Do not exceed the specified end of compression temperature.

BOGE compressors are designed for stationary operation.
Ensure that they are installed and operated in dry and clean rooms only.

The emergency stop device of the compressor (emergency stop switch/button) is exclusively intended to switch off the compressor in case of emergency.

Operation and control are designed to be carried out by trained and authorised operators.

Foreseeable misuse

Caution!

Never direct the compressed air generated towards persons. This can be life-threatening!

Oil is injected into the pressure chambers of the compressor.
Only use the compressed air generated for breathing purposes, or allow it to come into contact with foods, if it was treated appropriately beforehand.

This BOGE compressor is not explosion-protected.
Do not operate in explosive areas or in a potentially explosive atmosphere!

Do not operate the compressor in rooms in which extreme dust, toxic or flammable vapours and gases may occur.

The emergency stop device of the compressor (emergency stop switch/button) must not be used as a normal means of switching the compressor off.
Use the OFF button to switch the compressor off normally.

The following is not permitted:

– Compressing other media than those specified as the intended use or air containing contaminants.
– Exceeding the end of compression pressure indicated on the type plate.
– Altering the safety devices and safety covers, or putting them out of operation.
– Removing or painting over signs and symbols on the compressor.
– Operation of the compressor by unauthorised or untrained persons.

Intended use of the integrated converter (BLUEKAT series)

In accordance with its intended purpose the BLUEKAT converter is exclusively designed for the treatment of compressed air in screw compressors, by which the hydrocarbons contained in the air are catalytically oxidized.

The catalytic converter operating temperature in the catalyst bed should be approx. 200°C ±5% in the continuous flow mode. In order to avoid prolonged preheating phases and delays in compressed air production, the compressor station should not be unplugged too often.

Only hydrocarbon based oils (synthetic or mineral) may be used as compressor lubricants. All lifetime specifications are based on a maximum additive content of 5%. Silicon based oils must not be used.

Note!

Any modifications not authorized by BOGE to the control and the switch cabinet layout of the converter will invalidate all warranty claims against BOGE.

Note!

Opening and replacement of the converter by any personnel not authorised or trained by BOGE will result in immediately invalidate all warranty claims against BOGE.

Transport damage

BOGE does not accept any liability for breakage or transport damage. Please inspect the compressor immediately after delivery and direct damage claims to the last haulier – even if the packaging is not damaged! To safeguard claims against the haulier we recommend leaving the machine, devices and packing material in the same condition they were in when the damage was detected.

In the event of any other complaints, please inform us within six days of the arrival of the delivery.

Data on the rating plate

Enter the details for your compressor from the rating plate or enclosed data sheet in the illustration below.

This will ensure that in the event of enquiries, you will always have the most important data to hand.

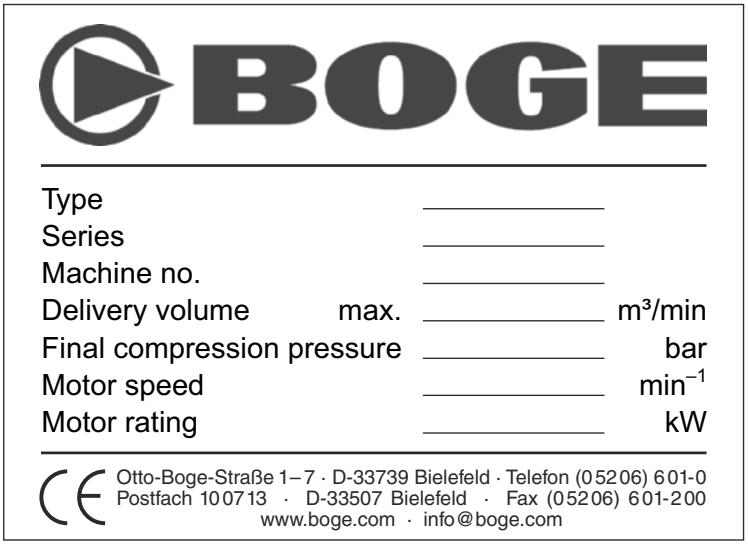


Fig. 1.1: Data on the rating plate

Service

Please do not hesitate to contact BOGE service if you have any questions. Please call:

Telephone: +49 5206 601-140

If you have any queries, please always specify the following data for your compressor to prevent any delays:

– Type
– Year of manufacture
– Machine number

Attention!

Only BOGE service technicians or persons authorised by BOGE in writing may repair or modify the compressor during the warranty period. Otherwise all warranty claims will expire!

2.1 Technical data

Technical data S 31-3...S 100-3 / SD 40-3...SD 100-3, part 1

Type			S 31-3	S 40-3 SD 40-3	S 50-3 SD 50-3	S 60-3 SD 60-3	S 61-3 SD 61-3	S 75-3 SD 75-3	S 90-3 SD 90-3	S 100-3 SD 100-3
Dimensions										
– Height (silenced)		[mm]	1450	1450	1450	1450	1450	1450	1450	1450
– Height (silenced) SD		[mm]	-	1665	1665	1665	1950	1950	1950	1950
– Height (super silenced)		[mm]	1950	1950	1950	1950	1950	1950	1950	1950
– Width (silenced/super silenced)		[mm]	1620	1620	1620	1620	2000	2000	2000	2000
– Depth		[mm]	990	990	990	990	1065	1065	1065	1065
Weight										
– silenced		[kg]	750	842/970	843/971	994/1122	1180/1330	1260/1430	1328/1498	1358/1528
– super silenced		[kg]	780	872/1000	873/1001	1024/1152	1230/1380	1310/1480	1378/1548	1408/1578
Air cooling	Max. sound pressure level accord. to DIN EN ISO 2151:2009	[±3 dB(A)]								
	– silenced / super silenced	[dB(A)]	64/ -	64/ -	73/71	74/72	77/71	79/73	79/73	80/73
	Measurement surface – silenced / super silenced	[dB(A)]	15/ -	15/ -	15/16	15/16	16/17	16/17	16/17	16/17
	Sound power level – silenced / super silenced	[dB(A)]	79/ -	79/ -	88/87	89/88	93/88	95/90	95/90	96/90
Water cooling	Max. sound pressure level accord. to DIN EN ISO 2151:2009	[±3 dB(A)]								
	– silenced / super silenced	[dB(A)]	63/ -	63/ -	72/70	73/71	76/70	78/72	78/72	79/72
	Measurement surface – silenced / super silenced	[dB(A)]	15/ -	15/ -	15/16	15/16	16/17	16/17	16/17	16/17
	Sound power level – silenced / super silenced	[dB(A)]	78/ -	78/ -	87/86	88/87	92/87	94/89	94/89	95/89
Compressor										
Max.final compression temperature		[°C]	110	110	110	110	110	110	110	110
Volume flow according to										
– p_{max} = 8 bar		[m^3/min]	3,88	5,31	6,45	7,30	7,85	9,88	11,35	12,80/ 12,75
– p_{max} = 10 bar		[m^3/min]	3,35	4,77	5,77	6,54	7,10	9,04	10,18	11,00
– p_{max} = 13 bar		[m^3/min]	2,73	3,91	4,92	5,60	6,03 / 5,99	7,45	8,87	9,53
Drive motor										
Rated power		[kW]	22	30	37	45	45	55	65	75
Rated speed										
– 50 Hz		[min^{-1}]	3000	3000	3000	3000	3000	3000	3000	3000
– 60 Hz		[min^{-1}]	3600	3600	3600	3600	3600	3600	3600	3600
Protection type		IP	55	55	55	55	55	55	55	55
Design		IMB	3	3	3	3	3	3	3	3
ISO class			F	F	F	F	F	F	F	F
Electrical connection										
Mains voltage [1) 2)]		[V]	400	400	400	400	400	400	400	400
Frequency [1)]		[Hz]	50	50	50	50	50	50	50	50
Recommended fuse protection [3) 4)]		[A]	63	80	100	125	125	160	160	200

1) Standard equipment. Mains voltages and frequencies are specified on a plate in the switch cabinet.

2) The refrigerant air dryer requires 230 V / 50 Hz.

3) Only for 400 V / 50 Hz. The fuse values change in the case of other mains voltages and frequencies.

4) Use fusible cutouts gL – gG or circuit-breakers with C-characteristic only.

Technical data S 101-3...S 150-3 / SD 101-3...SD 150-3, part 1

Type			S 101-3 SD 101-3	S 125-3 SD 125-3	S 150-3 SD 150-3
Dimensions					
– Height (silenced)		[mm]	1760	1760	1760
– Height (silenced) SD		[mm]	2255	2255	2255
– Height (super silenced)		[mm]	2255	2255	2255
– Width (silenced/super silenced)		[mm]	2365	2365	2365
– Depth		[mm]	1315	1315	1315
Weight					
– silenced		[kg]	2047/2213	2067/2233	2132/2298
– super silenced		[kg]	2107/2273	2127/2293	2192/2358
Air cooling	Max. sound pressure level accord. to DIN EN ISO 2151:2009	[±3 dB(A)]			
	– silenced / super silenced	[dB(A)]	76/72	79/74	79/74
	Measurement surface				
	– silenced / super silenced	[dB(A)]	17/18	17/18	17/18
	Sound power level				
	– silenced / super silenced	[dB(A)]	93/90	96/92	96/92
Water cooling	Max. sound pressure level accord. to DIN EN ISO 2151:2009	[±3 dB(A)]			
	– silenced / super silenced	[dB(A)]	75/71	78/73	76/73
	Measurement surface				
	– silenced / super silenced	[dB(A)]	17/18	17/18	17/18
	Sound power level				
	– silenced / super silenced	[dB(A)]	92/89	95/91	93/91
Compressor					
Max.final compression temperature		[°C]	110	110	110
Volume flow according to					
– p_{max} = 8 bar		[m^3/min]	13,90	15,75	18,44
– p_{max} = 10 bar		[m^3/min]	12,05	14,25	16,25
– p_{max} = 13 bar		[m^3/min]	11,10	11,80	14,25
Drive motor					
Rated power		[kW]	75	90	110
Rated speed					
– 50 Hz		[min^{-1}]	3000	3000	3000
– 60 Hz		[min^{-1}]	3600	3600	3600
Protection type		IP	55	55	55
Design		IMB	3	3	3
ISO class			F	F	F
Electrical connection					
Mains voltage [1) 2)]		[V]	400	400	400
Frequency [1)]		[Hz]	50	50	50
Recommended fuse protection [3) 4)]		[A]	200	250	250

1) Standard equipment. Mains voltages and frequencies are specified on a plate in the switch cabinet.

2) The refrigerant air dryer requires 230 V / 50 Hz.

3) Only for 400 V / 50 Hz. The fuse values change in the case of other mains voltages and frequencies.

4) Use fusible cutouts gL – gG or circuit-breakers with C-characteristic only.

Technical data S 31-3...100-3 / SD 40-3...SD 100-3, part 2

Type			S 31-3	S 40-3 SD 40-3	S 50-3 SD 50-3	S 60-3 SD 60-3	S 61-3 SD 61-3	S 75-3 SD 75-3	S 90-3 SD 90-3	S 100-3 SD 100-3
Oil filling quantity										
Oil receiver volume		[l]	46	46	46	46	71	71	71	71
Total oil filling quantity		[l]	28	28	28	28	42	42	42	42
Oil topping up quantity between min. + max.		[l]	6	6	6	6	8	8	8	8
Intake air temperature										
– min.		[°C]	+ 5	+ 5	+ 5	+ 5	+ 5	+ 5	+ 5	+ 5
– max.		[°C]	+ 40	+ 40	+ 40	+ 40	+ 40	+ 40	+ 40	+ 40
Air cooling	Cooling air requirement									
	– free-standing installation	[m^3/h]	9000	11000	13000	13000	13000	16000	17200	18400
	– with supply and exhaust duct	[m^3/h]	4500	5500	6500	6500	6500	8000	8600	9200
	– free fan compression	[Pa]	20	20	60	60	60	60	60	60
	– free fan pressure	[mm WS]	2	2	6	6	6	6	6	6
Water cooling	Cooling air requirement									
	– free-standing installation	[m^3/h]	2000	2000	2000	2000	2000	2000	2000	2000
	– with supply and exhaust duct	[m^3/h]	1000	1000	1000	1000	1000	1000	1000	1000
	Required cooling water quantity									
	– delta t = 15 K	[m^3/h]	1,200	1,630	2,010	2,450	2,450	3,000	3,540	4,090
	– delta t = 30 K	[m^3/h]	0,600	0,815	1,005	1,225	1,225	1,500	1,770	2,045
	Max. cooling water quantity	[m^3/h]	3,5	3,5	3,5	3,5	4,2	4,2	4,2	4,2
	Cooling water inlet temperature									
	– min.	[°C]	+ 5	+ 5	+ 5	+ 5	+ 5	+ 5	+ 5	+ 5
	– max.	[°C]	+ 30	+ 30	+ 30	+ 30	+ 30	+ 30	+ 30	+ 30
	Cooling water outlet temperature									
	– max.	[°C]	+ 45	+ 45	+ 45	+ 45	+ 45	+ 45	+ 45	+ 45
	Cooling water pressure									
	– min.	[bar]	2	2	2	2	2	2	2	2
	– max.	[bar]	10	10	10	10	10	10	10	10
Operating pressure sensor [1] (factory settings)										
– p_{max} = 8 bar:	Switch-off press. p_{max}	[bar]	8	8	8	8	8	8	8	8
	Switch-on press. p_{min}	[bar]	7	7	7	7	7	7	7	7
– p_{max} = 10 bar:	Switch-off press. p_{max}	[bar]	10	10	10	10	10	10	10	10
	Switch-on press. p_{min}	[bar]	9	9	9	9	9	9	9	9
– p_{max} = 13 bar:	Switch-off press. p_{max}	[bar]	13	13	13	13	13	13	13	13
	Switch-on press. p_{min}	[bar]	12	12	12	12	12	12	12	12
Safety valve										
Activation pressure at:										
– p_{max} = 8 bar		[bar]	11	11	11	11	11	11	11	11
– p_{max} = 10 bar		[bar]	11	11	11	11	11	11	11	11
– p_{max} = 13 bar		[bar]	14	14	14	14	14	14	14	14

[1] Compressors for other operating pressures $p_{min} = p_{max} - 1$ bar.

Technical data S 101-3...S 150-3 / SD 101-3...SD 150-3, part 2

Type			S 101-3 SD 101-3	S 125-3 SD 125-3	S 150-3 SD 150-3
Oil filling quantity					
Oil receiver volume		[l]	120	120	120
Total oil filling quantity		[l]	65	65	65
Oil topping up quantity between min. + max.		[l]	10	10	10
Intake air temperature					
– min.		[°C]	+ 5	+ 5	+ 5
– max.		[°C]	+ 40	+ 40	+ 40
Air cooling	Cooling air requirement				
	– free-standing installation	[m³/h]	20000	32000	32000
	– with supply and exhaust duct	[m³/h]	10000	16000	16000
	– free fan compression	[Pa]	60	60	60
	– free fan pressure	[mm WS]	6	6	6
Water cooling	Cooling air requirement				
	– free-standing installation	[m³/h]	3400	3400	3400
	– with supply and exhaust duct	[m³/h]	1700	1700	1700
	Required cooling water quantity				
	– delta t = 15 K	[m³/h]	4,090	4,900	6,000
	– delta t = 30 K	[m³/h]	2,045	2,450	3,000
	Max. cooling water quantity	[m³/h]	9,0	9,0	9,0
	Cooling water inlet temperature				
	– min.	[°C]	+ 5	+ 5	+ 5
	– max.	[°C]	+ 30	+ 30	+ 30
	Cooling water outlet temperature				
	– max.	[°C]	+ 45	+ 45	+ 45
	Cooling water pressure				
	– min.	[bar]	2	2	2
	– max.	[bar]	10	10	10
Operating pressure sensor [1] (factory settings)					
– p_{max} = 8 bar:	Switch-off press. p_{max}	[bar]	8	8	8
	Switch-on press. p_{min}	[bar]	7	7	7
– p_{max} = 10 bar:	Switch-off press. p_{max}	[bar]	10	10	10
	Switch-on press. p_{min}	[bar]	9	9	9
– p_{max} = 13 bar:	Switch-off press. p_{max}	[bar]	13	13	13
	Switch-on press. p_{min}	[bar]	12	12	12
Safety valve					
Activation pressure at:					
– p_{max} = 8 bar		[bar]	11	11	11
– p_{max} = 10 bar		[bar]	11	11	11
– p_{max} = 13 bar		[bar]	14	14	14

[1] Compressors for other operating pressures $p_{min} = p_{max} - 1$ bar.

Technical Data SF 60-3...SF 150-3 / SDF 60-3...SDF 150-3, part 1

Type			SF 60-3	SDF 60-3	SF 100-3	SDF 100-3	SF 150-3	SDF 150-3
Dimensions								
– Height (silenced)		[mm]	1450	1730	1450	1950	1765	1765
– Height (silenced)		[mm]	1950	1950	1950	1950	2260	2260
– Width (silenced/super silenced)		[mm]	1670	1670	2000	2000	2370	2370
– Depth		[mm]	990	990	1065	1065	1315	1315
Weight								
– silenced		[kg]	1057	1122	1388	1538	2200	2366
– super silenced		[kg]	1087	1152	1438	1588	2260	2426
Air cooling	Max. sound pressure level accord. to DIN EN ISO 2151:2009	[±3 dB(A)]						
	– silenced / super silenced	[dB(A)]	74/72	74/72	74/72	80/73	79/74	79/74
	Measurement surface – silenced / super silenced	[dB(A)]	15/16	15/16	16/17	16/17	17/18	17/18
	Sound power level – silenced / super silenced	[dB(A)]	89/88	89/88	98/90	96/90	96/92	96/92
Water cooling	Max. sound pressure level accord. to DIN EN ISO 2151:2009	[±3 dB(A)]						
	– silenced / super silenced	[dB(A)]	73/71	-	79/72	-	78/73	-
	Measurement surface – silenced / super silenced	[dB(A)]	15/16	-	16/17	-	17/18	-
	Sound power level – silenced / super silenced	[dB(A)]	88/87	-	95/89	-	95/91	-
Compressor								
Max. final compression temperature		[°C]	110	110	110	110	110	110
Volume flow according to								
– p_{max} = 8 bar		[m^3/min]	1,58 – 7,30	1,58 – 7,30	2,91 – 12,80	2,91 – 12,80	4,64 – 18,44	4,64 – 18,44
– p_{max} = 10 bar		[m^3/min]	1,43 – 6,53	1,43 – 6,53	2,58 – 11,00	2,58 – 11,00	4,27 – 16,25	4,27 – 16,25
– p_{max} = 13 bar		[m^3/min]	1,19 – 5,67	1,19 – 5,67	2,09 – 9,53	2,09 – 9,53	2,97 – 14,25	2,97 – 14,25
Drive motor								
Rated power		[kW]	45	45	75	75	110	110
Rated speed – 50 Hz		[min^{-1}]	3000	3000	3000	3000	3000	3000
Protection type		IP	55	55	55	55	55	55
Design		IMB	3	3	3	3	3	3
ISO-class			F	F	F	F	F	F
Electrical connection								
Mains voltage [1) 2)]		[V]	400	400	400	400	400	400
Frequency [1)]		[Hz]	50	50	50	50	50	50
Recommended fuse protection [3) 4)]		[A]	125	125	200	200	250	250

1) Standard equipment. Mains voltages and frequencies are specified on a plate in the switch cabinet.

2) The refrigerant air dryer requires 230 V / 50 Hz.

3) Only for 400 V / 50 Hz. The fuse values change in the case of other mains voltages and frequencies.

4) Use fusible cutouts gL – gG or circuit-breakers with C-characteristic only.

Technical Data SF 60-3...SF 150-3 / SDF 60-3...SDF 150-3, part 2

Type			SF 60-3	SDF 60-3	SF 100-3	SDF 100-3	SF 150-3	SDF 150-3
Oil filling quantity								
Oil receiver volume		[l]	46	46	71	71	120	120
Total oil filling quantity		[l]	28	28	42	42	65	65
Oil topping up quantity between min. + max.		[l]	6	6	8	8	10	10
Intake air temperature								
– min.		[°C]	+ 5	+ 5	+ 5	+ 5	+ 5	+ 5
– max.		[°C]	+ 40	+ 40	+ 40	+ 40	+ 40	+ 40
Air cooling	**Cooling air requirement**							
	– free-standing installation	[m^3/h]	13000	13000	18400	18400	32000	32000
	– with supply and exhaust duct	[m^3/h]	6500	6500	9200	9200	16000	16000
	– free fan pressure	[Pa]	60	60	60	60	60	60
	– free fan pressure	[mm WS]	6	6	6	6	6	6
Water cooling	**Cooling air requirement**							
	– free-standing installation	[m^3/h]	2000	2000	2000	2000	3400	3400
	with supply and exhaust duct	[m^3/h]	1000	1000	1000	1000	1700	1700
	Required cooling water quantity							
	– delta t = 15 K	[m^3/h]	2,450	2,450	4,090	4,090	6,000	6,000
	– delta t = 30 K	[m^3/h]	1,225	1,225	2,045	2,045	3,000	3,000
	Max. cooling water quantity	[m^3/h]	3,5	3,5	4,2	4,2	9,0	9,0
	Cooling water inlet temperature							
	– min.	[°C]	+ 5	+ 5	+ 5	+ 5	+ 5	+ 5
	– max.	[°C]	+ 30	+ 30	+ 30	+ 30	+ 30	+ 30
	Cooling water outlet temperature							
	– max.	[°C]	+ 45	+ 45	+ 45	+ 45	+ 45	+ 45
	Cooling water pressure							
	– min.	[bar]	2	2	2	2	2	2
	– max.	[bar]	10	10	10	10	10	10
Operating pressure transmitter [1] (factory settings)								
– p_{max} = 8 bar:	Switch-off press. p_{max}	[bar]	8	8	8	8	8	8
	Switch-on press. p_{min}	[bar]	7,5	7,5	7,5	7,5	7,5	7,5
– p_{max} = 10 bar:	Switch-off press. p_{max}	[bar]	10	10	10	10	10	10
	Switch-on press. p_{min}	[bar]	9,5	9,5	9,5	9,5	9,5	9,5
– p_{max} = 13 bar:	Switch-off press. p_{max}	[bar]	13	13	13	13	13	13
	Switch-on press. p_{min}	[bar]	12,5	12,5	12,5	12,5	12,5	12,5
Safety valve								
Activation pressure at:								
– p_{max} = 8 bar		[bar]	11	11	11	11	11	11
– p_{max} = 10 bar		[bar]	11	11	11	11	11	11
– p_{max} = 13 bar		[bar]	14	14	14	14	14	14

[1] Compressors for other operating pressures $p_{min} = p_{max} - 0,5$ bar.

Technical Data S 40-3 BLUEKAT...S 60-3 BLUEKAT, part 1

Type			S 40-3 BLUEKAT	S 50-3 BLUEKAT	S 60-3 BLUEKAT	SF 60-3 BLUEKAT
Dimensions						
– Height (super silenced)		[mm]	1950	1950	1950	1950
– Width (super silenced)		[mm]	2270	2270	2270	2270
– Depth		[mm]	960	960	960	960
Weight, approx.		[kg]	1100	1320	1350	1400
Air cooling	Max. sound pressure level accord. to DIN EN ISO 2151:2009	[±3 dB(A)]				
	– silenced/super silenced	[dB(A)]	67/ -	- /72	-/72	- /72
	Measurement surface					
	– silenced/super silenced	[dB(A)]	17,4	17,4	17,4	17,4
	Sound power level					
	– silenced/super silenced	[dB(A)]	84,4/ -	- /89,4	-/89,4	-/89,4
Water cooling	Max. sound pressure level accord. to DIN EN ISO 2151:2009	[±3 dB(A)]				
	– silenced/super silenced	[dB(A)]	66/ -	- /71	-/71	- /71
	Measurement surface					
	– silenced/super silenced	[dB(A)]	17,4	17,4	17,4	17,4
	Sound power level					
	– silenced/super silenced	[dB(A)]	83,4/ -	- /88,4	-/88,4	-/88,4
Compressor						
Max.final compression temperature		[°C]	110	110	110	110
Volume flow according to:						
– p_{max} = 8 bar		[m^3/min]	5,31	6,45	7,30	1,58...7,30
– p_{max} = 10 bar		[m^3/min]	4,77	5,77	6,54	1,43...6,53
– p_{max} = 13 bar		[m^3/min]	3,91	4,92	5,60	1,19...5,67
Drive motor						
Rated power		[kW]	30	37	45	45
Rated speed						
– 50 Hz		[min^{-1}]	3000	3000	3000	3000
– 60 Hz		[min^{-1}]	3600	3600	3600	3600
Protection type		IP	55	55	55	55
Design		IMB	3	3	3	3
ISO-class			F	F	F	F
Electrical connection						
Mains voltage [1]		[V]	400	400	400	400
Frequency [1]		[Hz]	50	50	50	50
Recommended fuse protection [2] [3]		[A]	100	125	125	125

[1] Standard equipment. Mains voltages and frequencies are specified on a plate in the switch cabinet.

[2] Only for 400 V / 50 Hz. The fuse values change in the case of other mains voltages and frequencies.

[3] Use fusible cutouts gL – gG or circuit-breakers with C-characteristic only.

Technical Data S 40-3 BLUEKAT...S 60-3 BLUEKAT, part 2

Type			S 40-3 BLUEKAT	S 50-3 BLUEKAT	S 60-3 BLUEKAT	SF 60-3 BLUEKAT
Oil filling quantity						
Oil receiver volume		[l]	46	46	46	46
Total oil filling quantity		[l]	28	28	28	28
Oil topping up quantity between min. + max.		[l]	6	6	6	6
Intake air temperature						
– min.		[°C]	+ 5	+ 5	+ 5	+ 5
– max.		[°C]	+ 40	+ 40	+ 40	+ 40
Air cooling	Cooling air requirement					
	– free-standing installation	[m^3/h]	9000	13000	13000	13000
	– with supply and exhaust duct	[m^3/h]	4500	6500	6500	6500
	– free fan pressure	[Pa]	20	60	60	60
	– free fan pressure	[mm WS]	2	6	6	6
Water cooling	Cooling air requirement					
	– free-standing installation	[m^3/h]	2000	2000	2000	2000
	– with supply and exhaust duct	[m^3/h]	1000	1000	1000	1000
	Required cooling water quantity					
	– delta t = 15 K	[m^3/h]	1,630	2,010	2,450	2,450
	– delta t = 30 K	[m^3/h]	0,815	1,005	1,225	1,225
	Max. cooling water quantity	[m^3/h]	3,5	3,5	3,5	3,5
	Cooling water inlet temperature					
	– min.	[°C]	+ 5	+ 5	+ 5	+ 5
	– max.	[°C]	+ 30	+ 30	+ 30	+ 30
	Cooling water outlet temperature					
	– max.	[°C]	+ 45	+ 45	+ 45	+ 45
	Cooling water pressure					
	– min.	[bar]	2	2	2	2
	– max.	[bar]	10	10	10	10
Operating pressure transmitter [1] (factory settings)						
– p_{max} = 8 bar:	Switch-off press. p_{max}	[bar]	8	8	8	8
	Switch-on press. p_{min}	[bar]	7	7	7	7
– p_{max} = 10 bar:	Switch-off press. p_{max}	[bar]	10	10	10	10
	Switch-on press. p_{min}	[bar]	9	9	9	9
– p_{max} = 13 bar:	Switch-off press. p_{max}	[bar]	13	13	13	13
	Switch-on press. p_{min}	[bar]	12	12	12	12
Safety valve Activation pressure at:						
– p_{max} = 8 bar		[bar]	11	11	11	11
– p_{max} = 10 bar		[bar]	11	11	11	11
– p_{max} = 13 bar		[bar]	14	14	14	14

[1] Compressors for other operating pressures $p_{min} = p_{max} - 1$ bar.

2.2 Operating principle of compressor

Functional principle of the air end

The air end operates according to the displacement principle. In the housing, the main and secondary rotors are driven by means of an electric motor and V-belts.

Both screws have screw-shaped profiles, intermeshing without contact. Together with the housing wall, these rotors form chambers which gradually reduce in size along the direction of air flow. Rotation of the rotors causes the air taken in to be compressed to the final pressure in the chambers.

During compression oil is continuously injected into the air end. This has a cooling, sealing and lubricating function.

Air circuit

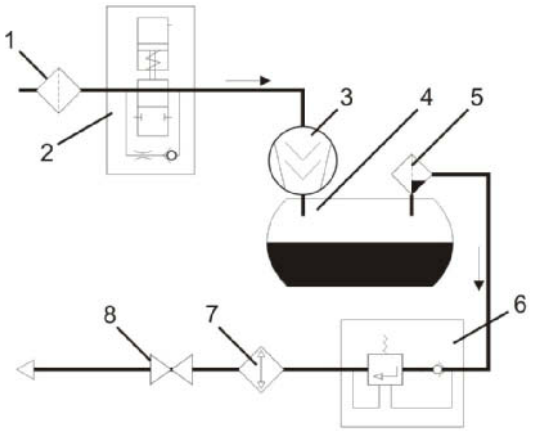


Fig. 2.1: Components of the air circuit

1 Intake filter
The intake filter cleans the air suctioned by the air end.

2 Intake regulator
The intake regulator opens (load operation) or closes (idling operation or standstill) the suction line depending on the operating condition of the compressor.

3 Air end
The air end compresses the air which is sucked in.

4 Compressed air-oil separator vessel
The compressed air separates from the oil under the force of gravity in the compressed air/oil vessel.

5 Oil separator
The oil separator separates the residual oil contained in the compressed air.

6 Minimum pressure non-return valve
The minimum pressure non-return valve does not open until the system pressure has increased to 3.5 bar. This causes a rapid build-up of the system pressure and ensures lubrication in the starting phase. Once the compressor has been switched off, the check valve prevents the compressed air from flowing back out of the mains line.

7 Compressed air aftercooler (air cooled or water cooled)
The compressed air is cooled in the compressed air aftercooler, causing the water contained in the air to condensate.

8 Stop valve
The screw compressor can be isolated from the mains using the stop valve.

Oil circuit

The oil injected into the air end has the following function:

– It dissipates the compression heat (cooling).
– It seals the gaps between the rotors and between the rotors and the housing.
– It lubricates the bearings.

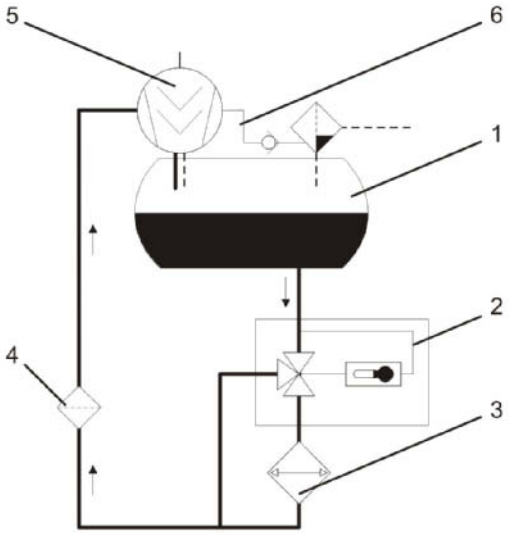


Fig. 2.2: Components of the oil circuit

1 Compressed air-oil vessel
The oil separated from the compressed air through the force of gravity collects in the compressed air-oil vessel. The system pressure forces it out of the vessel into the air end.

2 Thermostatic oil control valve
Depending on the oil temperature, the thermostatic oil control valve either allows the oil to pass through the oil cooler or through a bypass (e.g. in the starting phase).
Thus the oil constantly maintains its optimum operating temperature.

3 Oil cooler (air or water cooled)
The oil cooler cools down the hot oil to operating temperature.

4 Oil filter
The oil filter traps impurities in the oil.

5 Air end
The injected oil returns to the compressed air-oil vessel together with the compressed air. This is separated through gravity.

6 Drainage line
The air end suctions the residual oil which collects in the oil separator back into the oil circuit via a drainage line.

2.3 BLUEKAT operation principle

The screw compressors of the BLUEKAT series (S 40-3 BLUEKAT...S 60-3 BLUEKAT) are equipped with an integrated converter for catalytic separation of oil residues contained in the compressed air. During the oxidation process, the converter serves to break up residual oil particles from the air compressed by the compressor into carbon dioxide and water. The treated compressed air is classified as oil-free (class 0) according to DIN ISO 8573-1.

Fig. 2.3: Overview BLUEKAT: compressor (grey section) with integrated converter

As for the screw compressors of the BLUEKAT series, the converter is installed downstream of the compressor. Prior to the oil separation process the compressed produced by compressor **(1)** is first heated up in plate heat exchanger (2) (see figure below).

After escaping from the plate heat exchanger the heated compressed air is fed into converter (3) which is filled with catalytic material. The catalytic material is kept at operating temperature (200 °C) by means of an electrically powered heating. At the same time the heating also heats up the incoming compressed air. Due to the heat build-up the oil particles in the compressed air are able to react with the catalytic material. When impacting on the catalyst surface the oil particles (hydrocarbons are completely burnt (oxidized).

The heated oil free compressed air is fed back to plate heat exchanger (2) after the treatment process. While being in the plate heat exchanger it releases part of its heat energy to the compressed air (still to be treated) flowing from the compressor into the plate heat exchanger which is now able to heat up prior to the oxidation process while the already treated compressed air cools off at the same time. In order to further cool off it is then fed into an aftercooler (4). The compressed air escapes at a temperature of 30 – 35°C and can be fed into a compressed air receiver for further use. The condensate which is built up in the compressed air receiver conforms to industrial water quality and may be discharged accordingly.

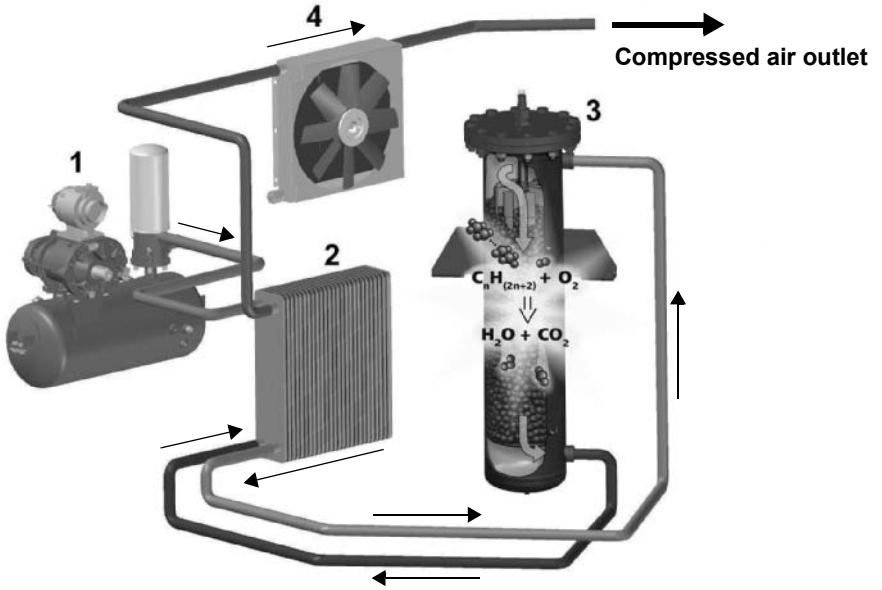


Fig. 2.4: BLUEKAT functional diagram including compressed air flow direction

2.4 Compressor control

Network pressure

For the compressor, the pressure downstream of the non-return valve is known as the network pressure. The control system switches the compressor on and off during operation depending on the network pressure.

Operating states

All screw compressor controls are based on three basic operating states:

1. **Load operation**
   - The compressor delivers its maximum amount of compressed air.
   - It consumes its maximum amount of energy.
2. **Idling operation**
   - The compressor runs but does not deliver any compressed air.
   - It consumes approx. 75% less energy than in load operation.
   - When compressed air is required, it switches to load operation with out delay.
   - Idling operation reduces switching frequencies which can damage the drive motor, and reduces wear of the system.
3. **Standstill ready for operation**
   - The compressor is standing still but ready for operation.
   - When compressed air is required, it switches automatically to load operation.

Operating modes

The two most important operating modes are achieved by combining the three operating states:

1. **Intermittent operation**
   In intermittent operation the energy balance is perfect.
   - The compressor operates in load operation.
   - Upon reaching the switch-off pressure p_{max} the compressor switches to standstill. It does not consume any energy.
   - Once the pressure has dropped to the switch-on pressure p_{min} the compressor switches back to load operation.
2. **Continuous operation**
   Continuous operation limits the drive motor switching cycles and reduces wear to the system.
   - The compressor operates in load operation.
   - Upon reaching the switch-off pressure p_{max} the compressor switches to idling operation.
   - Once the pressure has dropped to the switch-on pressure p_{min} the compressor switches from idling operation back to load operation.

Compressed air production control (BLUEKAT series)

Attention!

Risk of damage to integrated converter by switching the equipment on and off.

Do not switch off BLUEKAT converter but always leave it in standby mode, even with the compressor switched off, to maintain the operating temperature of the converter!

The BLUEKAT converter must only be disconnected from the power supply for the purpose of maintenance and/or repair!

As for compressors of the BLUEKAT series (S 40-3 BLUEKAT...S 60-3 BLUEKAT) the compressed air production depends on the operating state of the integrated converter.

After connection of the compressor to the power supply the integrated converter will start the **preheating phase** in order to reach its operating temperature (approx. 200 °C).

As long as the converter has not reached its operating temperature, the control system of the compressor will block compressed air production since the oil separation process in the converter is unable to start as yet meaning that no oil free compressed air would be available. The compressor is in the **"operational availability standby mode"** (see “Operating states” page 24).

As soon as the integrated converter has reached its operating temperature (approx. 200°C), it switches from the preheating phase into the "operation" mode while automatically transmitting this information onto the control system of the compressor. As soon as the switch-on pressure is achieved, the control system allows the compressor to switch to load operation (see “Operating states” page 24). The compressor will now start to produce compressed air while the converter is ready for treatment of the compressed air.

If the integrated converter exceeds its operating temperature ("overtemperature") the heating of the converter switches off automatically. This information is transmitted to the compressor control system which blocks the compressor's release for compressed air production and puts it back into the **"operational availability standby mode"**.

Note!

Automatic switching of the compressor availability state when reaching theswitch-off pressure is effected irrespectively of the operating state of the converter(as with compressors without integrated converter).

The compressor either switches into the operational availability standby mode or back into the idle mode and stops producing compressed air.

Controlled operation (frequency control)

If the pressure has dropped below the switch-on pressure p_{min} the compressor starts and operates in load operation.

Once the operation pressure p_{target} has been exceeded the control is activated and reduces the speed.

If the pressure has dropped below the operating pressure p_{target} the control is activated and increases the speed.

Upon reaching the switch-off pressure p_{max} the compressor switches to idling-operation.

The settings for p_{min} and p_{max} are effected by the parameterisation of the BASIC/ FOCUS.

For the BASIC control the setting for p_{target} is effected at the potentiometer R3 in the compressor switch cabinet.

For the FOCUS control the setting for p_{target} is effected via parameterisation of the control.

Short operating times

Attention!

During short operating times, the compressor does not reach its operating temperature. It operates below the dew point. The condensate generated due to physical causes mixes with the oil. The lubricating ability of the oil is reduced. This leads to damage to the air end and to the integrated converter (BLUEKAT series). It is of utmost importance to consult BOGE if you operate your system with short operating times.

2.5 Control devices

Operating pressure transmitter

The operating pressure transmitter (1) controls the operation of the compressor within the set switching limits.

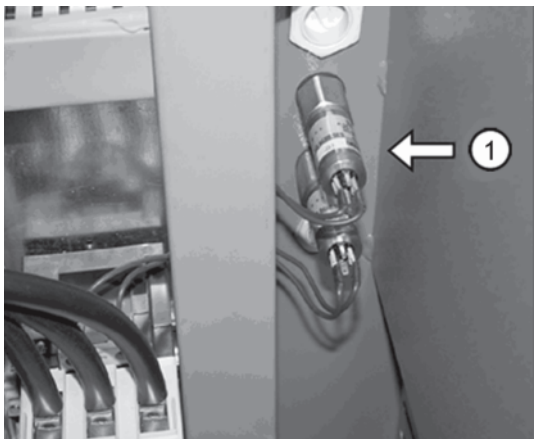


Fig. 2.5: Operating pressure transmitter

Switch-on pressure p_{min}

If the network pressure drops to the set switch-on pressure p_{min}, the compressor switches on.

Switch-off pressure p_{max}

If the network pressure increases to the switch-off pressure p_{max}, the compressor either switches off (intermittent operation) or switches to idling operation (continuous operation).

Proportional controller (optional accessory for S series)

The proportional controller is an additional control device intervening in the sequences of the intake regulator.

The intake regulator only opens as far as necessary to supply the current compressed air requirement. Thus the compressor saves compression energy.

A compressor with proportional controller is able to supply its 'delivered quantity variable between 0% and 100%. However, the energy consumption does not reduce accordingly. Therefore, a control is only practical between 50% and 100% of the delivered quantity.

The proportional controller is factory set to a delivered quantity between 50% and 100% of the compressor capacity.

The proportional controller closes when the desired delivered quantity has dropped below 50% of the compressor capacity. The compressor then operates in idling operation (continuous operation) or switches off (intermittent operation).

2.6 Safety and monitoring devices

General information

The safety devices guarantee a high degree of operational safety, in connection with the BOGE monitoring system.

When one of the safety devices responds, the control system reacts as follows:

– The compressor is immediately switched off.
– A flashing fault number in the left field of the display indicates the cause of the fault.

Caution: Risk of injury!

Do not operate the compressor without built-in safety devices!

Do not dismantle the safety devices or put them out of operation!

The following monitoring devices are standard for BOGE control systems:

Safety temperature limiting device

The safety temperature limiting device switches the compressor off as soon as the maximum permissible final compression temperature has been reached. If the temperature drops below the minimum temperature, the compressor will not start. In the event that the safety temperature limiting device intervenes in compressor operation:

– Switch off the compressor (OFF button).
– Acknowledge fault.
– Rectify the fault.
– Switch on the compressor (ON-button).

Safety temperature limiter on the integrated converter (BLUEKAT series)

The safety temperature limiter on the integrated converter (S 40-3 BLUEKAT... S 60-3 BLUEKAT) serves to switch off the heating when the temperature in the converter runs too high (limit value 250°C). In such a case, the compressor's release for compressed air production is automatically blocked.

The temperature inside the converter starts dropping. Both heating and compressor do not automatically restart operation due to temperature failure. Use converter temperature control to restart. Also see “Converter faults (BLUEKAT series)” on page 53.

Caution!

Restart of compressor station only after consultation with your local BOGE distribution partner or BOGE service personnel.
It is imperative to determine the cause of the failure prior to restarting the compressor station.

Additional Monitoring Devices

Additional monitoring devices are located on the switch cabinet of the integrated converter (S 40-3 BLUEKAT...S 60-3 BLUEKAT). These include a temperature control unit with display serving to retrieve temperature information on the converter. In addition, there are three indicator lights on the switch cabinet serving to indicate the operating state of the converter:

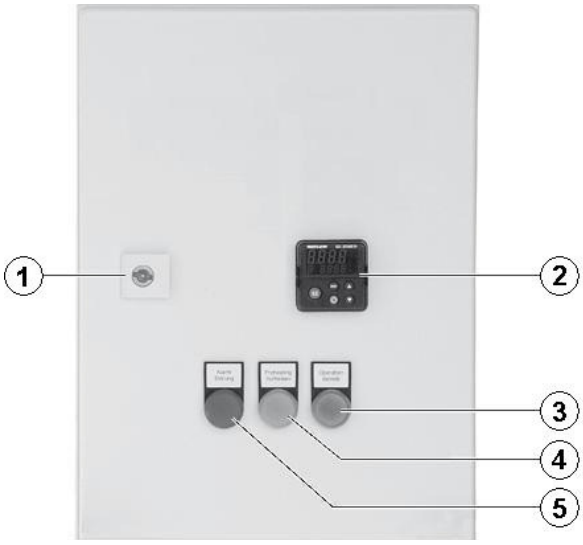


Fig. 2.6: Switch cabinet with monitoring devices

1 Switch cabinet lock
2 Temperature control
3 Indicator lamp "Operation Betrieb", green
4 Indicator lamp "Preheating Aufheizen“, yellow
5 Indicator lamp "Alarm Störung“, red

The display of the temperature control unit allows you to recall the following temperature information:

– The actual value (top) and the target value (below) of the temperature (in °C) inside the converter are shown in the display as standard.
– Pressing the green button once causes the container bed temperature (in °C) to be displayed.
– Pressing the green button twice causes the current control mode to be displayed.
– Pressing the green button three times causes the heating performance (in %) to be displayed
– Pressing the green button four times causes the state of the self-optimisation to be displayed.
– Pressing the green button five times causes the idle target value (in °C) to be displayed
– Pressing the green button again enables you to return to the standard display.
– Pressing the reset button enables you to immediately return to the standard display.

Caution!

The settings of the temperature control are completely programmed at the factory.

Any changes to the presettings for the temperature and other parameters may only be carried out by BOGE or, after consultation with BOGE, by BOGE authorized service personnel.

Any unauthorized changes to the parameters may cause damage to the compressor station or result in reduction of the compressed air quality.

Lighting of the indicator lamps serves to indicate:

Indicator lamp	Meaning
Preheating Aufheizen (yellow)	The temperature inside the converter is below the temperature which is needed to release compressed air production. The indicator lamp does not indicate whether the heating is functioning properly or is in the process of heating.
Operation Betrieb (green)	As soon as the necessary temperature inside the converter is reached for enabling compressed air production, the yellow indicator lamp extinguishes before the green lamp lights up. At the same time, the compressor initialises compressed air production.
Alarm Störung (red)	The indicator lamp „Alarm Störung “ lights up in case of – overtemperature inside the converter.

Table 2.1: Indicator lamps / Meanings

Safety valve

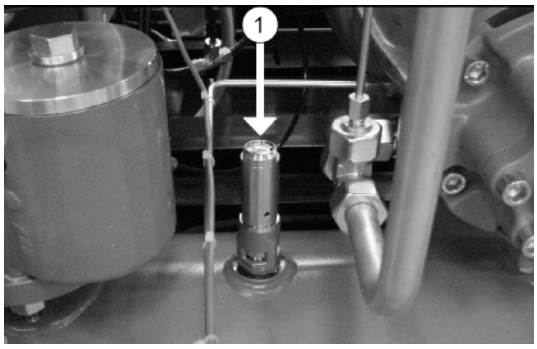


Fig. 2.7: Safety valve

Safety valve (1) on the compressed air/oil vessel prevents the maximum admissible pressure being exceeded.

Caution: Risk of injury!

When the maximum pressure is exceeded (e.g. incorrect setting of the operating pressure switch), the entire delivery volume of the compressor is ejected!

Monitoring the drive and fan motor

The drive motor is monitored by PTC resistors.

The fan motor is monitored by overcurrent/overload release units

Rotational direction monitoring (optional accessory)

The pressure switch checks the rotational direction of the drive motor each time the system starts up.

System pressure build-up (optional accessory)

The system pressure build-up unit monitors the system pressure build-up when the compressor starts up.

2.7 Water cooling

Water cooling

BOGE screw compressors are available in water or air-cooled design.

In the standard version, the oil and compressed air aftercoolers are connected in series on the water side. A parallel connection is possible as an option.

Serial connection

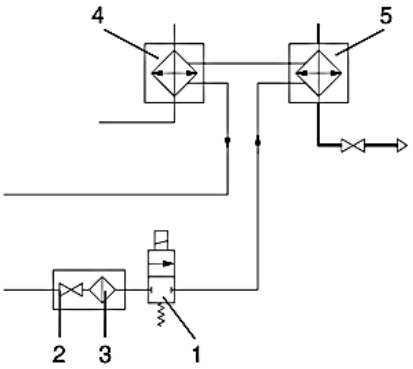


Fig. 2.8: Serial connection

Parallel connection

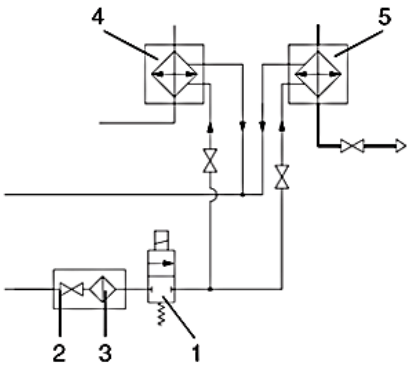


Fig. 2.9: Parallel connection

1 Cooling water solenoid valve
The cooling water solenoid valve closed the cooling water supply when the compressor switches off.

2 Cooling water stop valve
The compressor may be separated from the cooling water supply by means of the stop valve (e.g. for maintenance or repair work).

3 Dirt trap (provided by customer)
The dirt trap protects the cooling unit against sedimenting. Pore size: max. 0.6 mm.

4 Oil cooling unit

5 Compressed air aftercooler
The water cooling units are designed for specific standard cooling water quantities, temperatures and pressures (see "Technical data"). For individually fluctuating values, they are designed according to the specified order data.

2.8 Cooling water

Water connection (for water cooling)

The cooling water must have the following properties:

Electrical conductivity	– > 50 µS/cm at pH-value 7 – 9
Carbonate hardness ($CaCO_3$)	– < 15° dH
Total hardness	– < 21° dH
Cooling water pressure	– max. 10.0 bar
	– min. 2.0 bar
Cooling water inlet temperature	– max. + 30 °C
	– min. + 5 °C
Max. cooling water quantity	– see "Technical data".

Cooling water quality

The cooling units are fitted with non-ferrous heat exchangers, as standard. To avoid damage to these components and to guarantee long term functionality, ensure that the substances contained in the cooling water used do not exceed the following values.

Substances	Symbol	max. admissible concentration [mg/l]
Ammonia	NH_3	< 2.0
Chloride < 70°C	Cl	100
Free chlorine	Cl	< 0.5
Iron	Fe	< 0.2
Free agressive carbon dioxide	CO_2	< 20
Manganese	Mn	< 0.1
Nitrate	NO_3	< 100
Oxygen	O_2	< 2
Silicon oxide	SiO_2	< 8
Sulphate	SO_4	< 60
Total dissolved substances	TDS	< 30

Table 2.2: Maximum admissible concentration of the substances

Note!

If the specified limit values are exceeded, use cooling units made of other materials.

Please consult BOGE's service department.

Attention!

If the cooling water data changes, the cooling units may have to be reconfigured. Incorrectly configured cooling units may cause malfunctions and cause the compressor to switch off!

Please consult BOGE.

3.1 Transport and storage

General information

Please observe the generally accepted safety and accident prevention regulations when transporting the compressor. BOGE accepts no liability for damage caused by improper transport!

Attention!

The transport of the compressor must only be carried out by adequately instructed and authorised personnel!

The capacity of the lifting gear (lifting cart or forklift truck) must correspond atleast to that of the compressor / the system (see section entitled “Technical data” on page 13)!

Note the position of the centre of gravity prior to lifting the compressor! The position of the centre of gravity is specified both in the attached dimensioned drawing and on the compressor packaging.

Any loose or pivoting parts must be removed before lifting the unit.

Lifting rings on individual components (such as electric motors) are only intended for lifting individual components, not for lifting the entire compressor!

The compressor is delivered filled with oil. Do not tilt during transport!

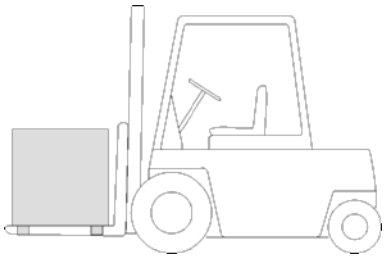
Transport the compressor to the installation site as described in the sections which follow.

How to transport the compressor

Using forklift truck or lifting cart

Attention!

Improper transportation can damage the compressor. During transport, the safety covers must not be subjected to any forces or loads.



Ensure that the forks are underneath the base frame of the compressor (see illustration).

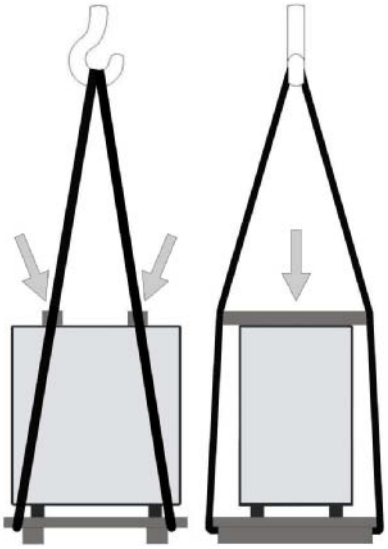
Fig. 3.1: Transport with forklift truck

Crane transport

Attention!

Improper transportation can damage the compressor. During transport, the safety covers must not be subjected to any forces or loads.

- Lift the compressor only with the transport pallet provided.
- Protect the compressor with shoring (refer to arrows in the illustration).
- Remove the shoring and transport blocks.
- Use only suitable lifting straps with a minimum length of approx. 8 metres!



Place the loops of the lifting strap underneath the compressor transport pallet provided from one head end to the other.

The loops of the lifting straps must **not** be attached to the suction filter. Furthermore, they must **not** be attached to the lug on the motor.

Fig. 3.2: Crane transport

Intermediate storage

In case the compressor is not installed immediately after delivery, it must be stored in a sheltered location. It must be ensured that during the intermediate storage neither dust nor humidity can get enter.

Note!

In the case of intermediate storage, please observe the specifications and directionson the permissible environmental influences (see section entitled "3.2 Compressor room: Installation conditions for horizontal or free-standing compressed air receivers").

We do not accept any liability for damage occurring as a consequence of improper storage!

In the event of extended intermediate storage you should consult BOGE's service department.

Following intermediate storage of more than two months, please observe the instructions for commissioning after an extended standstill (see section entitled "3.5 Commissioning").

3.2 Compressor room

Installation conditions for horizontal or free-standing compressed air receivers

Caution!

- Protect compressed air receivers from damage due to mechanical effects (e.g. falling objects)..
- Ensure that the compressed air receiver and its equipment can be operated from a safe location.
- Provide safety areas and maintain safety clearances.
- Ensure that the compressed air receiver stands securely. It must also not shift or tilt due to external forces. This also includes the additional weight exerted during pressure testing!
- The compressed air receiver must **not** be bolted to the floor.
- Ensure that the compressed air receiver is easily accessible from all sides (for periodic testing). Refer to the attached dimensioned drawing for details of the operating and maintenance areas which must be provided.
- Ensure that the factory label is clearly visible.
- Ensure that compressed air receivers are adequately protected against corrosion.
- Only use the compressed air receiver for compressors operating with cut-in and cut-out mode if the pressure fluctuation range amounts to $\Delta p \leq 20\%$ of the maximum operating pressure.

Installation surface

A level industrial floor without foundation is adequate for the installation of the compressor No special fastening elements are required.

Attention!

Make sure that external vibrations or shock are not able to impact on the compressor station (particularly where compressors of the BLUEKAT series with integrated converter are concerned).

Fire protection

The following applies to rooms in which compressors with oil injection cooling are to be installed:

Caution!

- For compressors with motor ratings **exceeding 40 kW,** and for compressors of the BLUEKAT series, ensure that the compressor room is equipped with special fire protection.
- Install compressors with motor ratings **exceeding 100 kW** 100 kW in a separate fire protected room.

Requirements of fire protected compressor rooms:

- Walls, ceilings, floor and doors must be designed in **fire protection class F30** or higher.
- Flammable liquids must never be stored in the compressor room.
- The floor around the compressor must be made of non-flammable material.
- Leaking oil must not be able to spread out over the floor.
- No inflammable materials must be located within a radius of at least 3 metres around the compressor.
- No inflammable machine parts, such as cable ducts, may run overhead of the compressor.

Sound protection

Only install compressors in workrooms if the sound pressure level of their measurement surfaces does not exceed 85 dB (A).

Admissible ambient temperatures

The compressor room must be clean, dry, cool and free of dust.

Admissible ambient temperatures (see also "Technical data“).

Maximum ambient temperature (for air cooling): + 40°C

Minimum ambient temperature: + 5°C

Attention!

Failure to observe the admissible ambient temperature may lead to the following problems:

- The compressor will switch off when the admissible final compression temperature is exceeded or undercut.
- Pipe lines and valves will freeze up at low temperatures.
- Damage due to the reduced lubricating ability of the compressor oil.

Measures to be taken to ensure that the admissible ambient temperatures are maintained:

- Avoid any pipe lines or units radiating heat in the vicinity of the compressor, or insulate them well.
- Never install the compressor in the cooling air flow of other machines.
- Provide the supply air openings with adjustable louvres to ensure that temperatures do not go below the minimum temperature in winter.
- Use the anti-freeze function (only in "ready for operation" mode)

Frost protection

The compressor must be installed so that it is frost-protected. The BOGE anti-freeze device is a standard feature. It protects the safety devices from freezing up at ambient temperatures up to –10°C.

Ventilation

If the following instructions are not observed, the admissible final compression temperature may be exceeded. In this case, the compressor will switch off automatically

Caution!

Arrange the compressor intake openings or ducts in such a way that dangerous admixtures (e.g. explosive or chemically unstable materials) cannot be drawn in.

Ventilation openings (free-standing installation)

– Arrange supply air openings close to the floor.
– Arrange exhaust air openings in the ceiling or at the top of the wall.
– The required cross sections for the supply openings (as well as for the flaps and weather protection grids) are indicated in the table.

Supply and exhaust air ducts

– Ensure that the flow rate in the ducts does not exceed 4 m/s.
– Never position cooling air ducts directly on the compressor. Always use a compensator to avoid distortion and the transfer of vibrations.

Fans

Ensure that the heated exhaust air is not taken in again.
If necessary, the heated air must be extracted by fans.

To ensure perfect cooling even at higher temperatures in the summer, the fans must be designed as follows:

– The capacity of the fan must be approx. 10 - 15% greater than the sum of the total amount of cooling air required for all the machines that are operated in the room.
– For free-standing installation, the cooling air requirement specified in the table corresponds to the required fan capacity.

Supply air filter

– Equip the compressor with supply air filter mats if the compressor room is contaminated with dust (option).

Cooling air requirement

Please refer to the following table for the cooling air requirement and size of the supply air openings for your compressor Ensure that flaps and weather protection grids have the necessary free cross section. We generally recommend contacting a specialist company for performing the duct construction work and planning.

Type	Drive rating	Air cooling [1]				Water cooling	
		Cooling air requirement for free standing unit	Necessary inlet opening for free standing unit	Cooling air requirement for installation with ducting	Necessary free duct cross-section	Cooling air requirement for free standing unit	Necessary inlet opening for free standing unit
	(kW)	[m³/h]	[m²]	[m³/h]	[m²]	[m³/h]	[m²]
S 31-3	22	9.000	1,10	4.500	0,35	2.000	0,25
S 40-3...SD 40-3	30	11.000	1,35	5.500	0,42	2.000	0,25
S 50-3...SD 50-3	37	13.000	1,60	6.500	0,48	2.000	0,25
S 60-3...SD 60-3 S 61-3...SD 61-3	45	13.000	1,60	6.500	0,48	2.000	0,25
S 75-3...SD 75-3	55	16.000	2,00	8.000	0,59	2.000	0,25
S 90-3...SD 90-3	65	17.200	2,15	8.600	0,64	2.000	0,25
S 100-3...SD 100-3	75	18.400	2,30	9.200	0,68	2.000	0,25
S 101-3...SD 101-3	75	20.000	2,50	10.000	0,74	3.400	0,45
S 125-3...SD 125-3	90	32.000	4,00	16.000	1,18	3.400	0,45
S 150-3...SD 150-3	110	32.000	4,00	16.000	1,18	3.400	0,45
SF 60-3...SDF 60-3	45	13.000	1,60	6.500	0,48	2.000	0,25
SF 100-3...SDF 100-3	75	18.400	2,30	9.200	0,68	2.000	0,25
SF 150-3...SDF 150-3	110	32.000	4,00	16.000	1,18	3.400	0,45
S 40-3 BLUEKAT	30	11.000	1,35	5.500	0,42	2.000	0,25
S 50-3 BLUEKAT	37	13.000	1,60	6.500	0,48	2.000	0,25
S 60-3 BLUEKAT	45	13.000	1,60	6.500	0,48	2.000	0,25
SF 60-3 BLUEKAT	45	13.000	1,60	6.500	0,48	2.000	0,25

[1] The cooling air requirement is based on a 4°C difference between the ambient temperature and the outside temperature.

Table 3.1: Cooling air demand, cross-sections of openings and ducts required

Ventilation possibilities

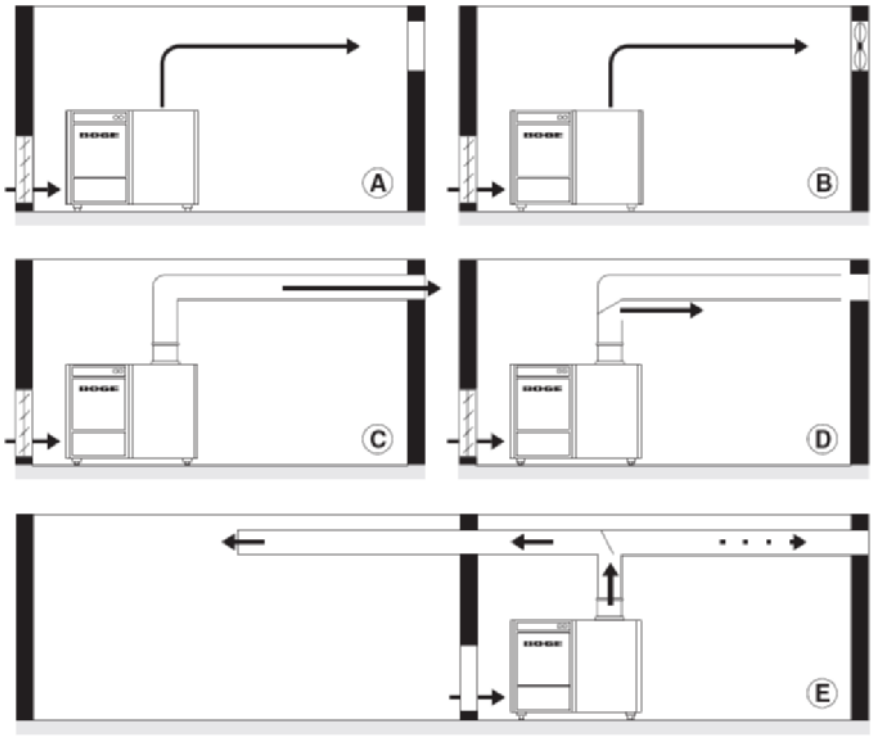


Fig. 3.3: Ventilation possibilities

A Supply and exhaust air openings in the outside walls (free-standing installation)

B Supported by exhaust air fan

C Exhaust air duct into the open

D Exhaust air duct with recirculation flap
Hot exhaust air is mixed with the cold ambient air, as required.
Thus preventing the plant from freezing up at temperatures below freezing.

E Using the hot exhaust air for heating
In the winter, the hot exhaust air is used for heating rooms.
In summer it is directed into the open.

Condensate disposal

The air taken in contains water in form of vapour, which turns into condensation during compression.

Attention!

The condensate contains oil. Never dispose of it in the public sewage system without prior treatment (exception to this: the built-up condensate of compressors of the BLUEKAT series does not contain any residual oil. The condensate is to be treated as industrial water).

Strictly observe the effluent disposal laws of your local authorities. Comply with the Water Act!

BOGE recommends using an oil/water separator (not for compressors in the BLUEKAT series)

The **BOGE oil/water separator** is used to separate the oil from the condensate. The cleaned water can be fed directly into the public sewage system. The oil is collected in a separate container. Dispose of the oil according to environmental regulations.
If the oil emulsifies due to special operating conditions, use an emulsion cracking plant.

3.3 Installation

General information

BOGE compressor units are supplied ready for connection. Only the work described in the following paragraphs needs to be carried out during the installation.

Caution!

Any installation work must only be carried out by appropriately trained persons or specialists (BOGE service personnel).

Lay all energy supply lines in a trip-proof and barrier-free manner so that potential accidents are avoided!

Prior to delivery, each compressor is subjected to a trial run in the factory. It is carefully tested and set. However, the possibility of damage occurring during transport cannot be excluded.

- Please inspect the compressor immediately after delivery and direct damage claims to the last haulier – even if the packing is not damaged! To safeguard claims against the haulier we recommend leaving the machine, devices and packing material in the same condition as they were in when the damage was detected.
- Prior to commissioning, check the compressor for external damage due to transport.
- Observe the compressor very closely during commissioning and the following trial run.
- If malfunctions occur, switch off the compressor immediately and inform the BOGE's service department.

Checking the scope of delivery

The scope of delivery depends on your order.
Prior to commissioning, please check whether all the parts required have been delivered. Please check the order confirmation for any possible accessory equipment.

The scope of delivery includes the following component parts:

– Operating instructions
– Switch cabinet key
– Electric circuit diagram (in the compartment of the switch cabinet)
– List of electrical equipment (in the compartment of the switch cabinet)
– Spare parts list

Installing the compressor

1. Remove the packaging around and inside the compressor.

Attention!

The compressor may only be set in operation if the rubber feet have been fitted! If the feet have been removed for transportation, it is essential that they be fitted again before the compressor is set in operation!

2. Install the compressor and align it horizontally. The compressor must stand firmly on the ground on all feet.

Connecting the compressor to the compressed air network

– Connect the compressor to the compressed air network or a compressed air receiver.
  For this, use a BOGE high pressure hose.

Note!

Do not install a non-return valve in the pressure line.

The compressor is already equipped with a non-return valve.

Connecting the cooling water (optional accessory)

Caution: Risk of injury!

Risk of injury due to pressurised water when connecting the cooling water system!

Close external water mains prior to connection!

The connection must only be carried out by authorised and qualified personnel!

The pipework for the cooling water circuit in the compressor was fully installed in the factory.

Only the following work must be performed during installation:

1. Check, whether the water supply has the required data, see "Water connection (for water cooling)".
2. and whether the cooling water quality is adequate, see "Cooling water quality".
3. Connect the cooling water supply and discharge line to the water supply (cf. dimensioned drawing).

The following additional components must be provided by the customer when installing the water cooling unit:

– **Dirt trap**
  The dirt trap at the cooling water inlet protects the cooling units against sediment collecting. Pore width: max. 0.6 mm
– **Expansion vessel and safety valve**

Attention!

If the stop valves in the supply and discharge lines are simultaneously closed in a closed cooling system, an enclosed chamber will result. If the water heats up in this room, it will expand and the pressure will increase.

Install an **expansion vessel** and a **safety valve** to prevent damage to the cooling units.

Removing the transport securing bolts

The drive unit frame is bolted to the basic frame for transport. To remove the transport securing bolts:

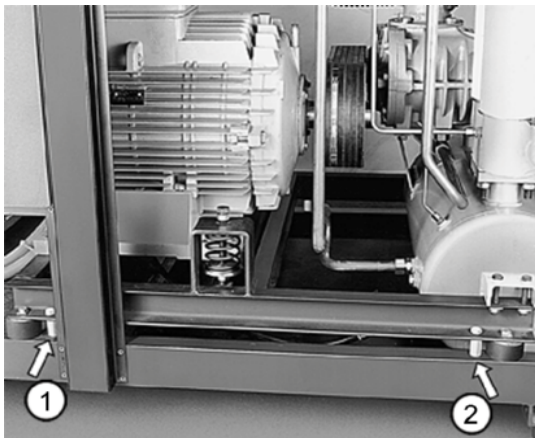


Fig. 3.4: Removing the transport securing bolts

1. Remove the four bolts (1) and (2) marked in red (two on each long side) together with their spacer sleeves.

Activating the belt tensioning device

The V-belts are slackened for transport.

Activate the GM belt tensioning device prior to commissioning by lowering the motor plate.

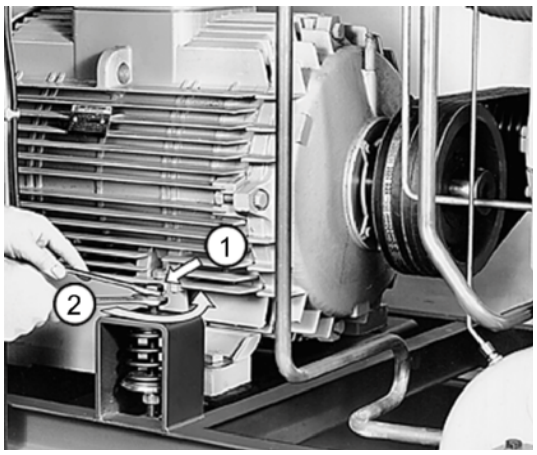


Fig. 3.5: Activating the belt tension

1. Hold the bolt head (1) with a spanner to prevent it from turning.
2. Turn the counternut (2) upwards in an anticlockwise direction until it is against the bolt head.

The belt tensioning device is activated. It automatically sets the correct V-belt tension in every operating mode.

Checking the oil level

BOGE compressors are supplied with a full oil filling.

Prior to commissioning, check the oil level as described in the section entitled "Maintenance".

3.4 Electrical connection

Danger: High voltage!

Ensure that work on the electrical equipment of the compressor is only carried out by authorised electricians

Observe current national and international regulations (such as the German VDE regulations, DIN/EN directives) and local safety regulations.

Also observe the regulations of your local power supply company regarding the load rating of your power supply.

Before starting any work:

1. Disconnect the compressor from all electric power sources using the circuit breaker.
2. Take preventive action to prevent the current from being inadvertently switched back on.
3. Check to ensure that all current-carrying parts are zero-potential.
4. Earth and short-circuit.
5. Cover or shield adjacent current-carrying parts.

Danger: High voltage!

If the drive has a frequency converter (SF/SDF):

– Wait until the fan has stopped and all indicator LEDs have gone off after switching off the power supply.

– Wait another 5 minutes before starting work.

Do not open any guards or safety covers until this time has elapsed.

Power disconnecting device

Each compressor unit must be equipped with a power disconnecting device according to DIN EN 60204-1:2007.

Rated voltage

The data of your mains supply (operating voltage, control voltage, type of current, frequency,...) must be identical with the data on the rating plate on the switch cabinet.

In the event of deviations, please contact BOGE's service department or your supplier.

Please refer to the section on "Technical data" for details of the fuses required.

Connecting the leads

– Check to ensure that all terminals in the switch cabinet are firmly tightened. If necessary, retighten the screw connections.
– Route the lead cable through the PG screw connection
– Connect leads L1, L2, L3, N, Pe (PEN) firmly to the power supply terminal. A clockwise rotational field must be created.
– After the first 50 operating hours, retighten the electrical connections.

Note!

In the case of the screw compressors S 40-3 BLUEKAT...S 60-3 BLUEKAT, the power supply to the integrated converter is provided through the electrical connection for the compressor.

Drive with frequency converter

Danger: High voltage!

Depending upon operational conditions, electrical drive systems with a frequency converter may have an earth leakage current above 10 mA.

Therefore the required precautions according to EN 60204-1:2007 and EN 50178:1998 must be taken as soon as the compressor is electrically connected.

A permanently installed connection is required.

One or more of the following qualifications for the protective earth conductor must be fulfilled:

1. The protective earth conductor must have a minimum cross-section of 10 mm^2 Cu along the whole of its length.
2. If the protective conductor has a minimum cross-section of less than 10 mm^2 Cu hat, a second conductor with at least the same cross-section must be provided
   up to the point at which the protective conductor has a minimum cross-section of more than 10 mm^2.
3. Automatic interruption of the power supply if the conductivity of the protective earth conductor is lost.

   Please observe any additional national rules and regulations.

Caution: Risk of injury!

Prior to any work on the compressor:

1. Press the emergency stop button, disconnect the power supply using the mains disconnection device and affix a padlock to prevent it from being switched on again unintentionally.
2. Check to ensure that all conducting machine parts are voltage free.
3. Depressurise all areas under pressure.
4. Allow converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

Never omit a single safety step! Otherwise, you will risk injuries due to restarting, electric shock or self-releasing parts.

Caution!

If the automatic restart (Auto-Restart) is activated, the compressor may restart automatically after a voltage failure

This is conditional upon: The net pressure being lower than the set switch-on pressure.

3.5 Commissioning

Note!

We recommend drawing up a commissioning certificate in which the test results during the commissioning process can be recorded.

Caution: Risk of injury!

Commissioning must only be carried out by authorised and qualified personnel with the necessary experience!

Always wear protective gloves when working on the compressor to avoid bruising fingers or hands while opening or closing components!

Check installation requirements

Attention!

Make sure that the compressor is installed in compliance with the installation requirements!

Prior to starting up the compressor for the first time, check to ensure whether the transport securing device was removed correctly and the GM the belt tensioning device was activated (see chapter "3.3 Installation")!

Record the test results in the commissioning certificate.

Checking the rotational direction of drive and fan motor

Attention!

Always check the rotational direction of the drive and fan motor prior to commissioning.

Even brief operation in the wrong direction of rotation (more than approx. 5 seconds) may cause the total destruction of the air end!

Record the test results in the commissioning certificate.

Caution!

Ensure that the rotational direction coincides with the rotational direction arrow on the air end.

1. Re-enable the mains disconnecting device.
2. Switch the compressor on and immediately off again to check the rotational direction.

Change direction of rotation

Caution: Risk of injury!

Press the emergency stop switch/button, disable the mains disconnection device and secure it with a padlock to prevent it from being switched on again inadvertently.

Allow the converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

– Interchange two phases (L1, L2 or L3) in the power cable.

Check compressed air outlet for leak tightness

Caution: Risk of injury!

Work on the compressed air system may only be carried out by authorised and qualified personnel with the necessary experience!

Always wear protective clothing and goggles!

Immediately after switching on the machine, the connection for the compressed air outlet must be checked for leak tightness!

Keep an appropriate safe distance from the compressor during the inspection!

1. Re-enable the mains disconnecting device.
2. To conduct the inspection, switch on the compressor and check the compressed air outlet for tightness
3. Switch the compressor off.

Caution: Risk of injury!

Press the emergency stop switch/button, disable the mains disconnection device and secure it with a padlock to prevent it from being switched on again inadvertently.

Allow the converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

– If necessary: have any leakages remedied by experienced expert personnel.

Record the test results in the commissioning certificate.

Opening the stop valves

Open ball valve at the compressor output.

For water cooling: Open the stop valve at the water inlet.

Checking for leaks

Caution: Risk of injury!

In case of leakages in the cooling water and/or oil circuit there is a risk of slipping or falling due to cooling water or oil spills!

Have all connections of the oil or water cooling circuit checked for leakages by authorised and qualified personnel!

During the inspection, slip-resistant safety shoes and protective clothing must be worn!

Undertake the following to prevent leaks:

– Check the screw connections of the ducting and retighten, if necessary.
– Check to ensure that the oil filter and oil separator are hand tight seated.

Conduct trial run

1. Re-enable the mains disconnecting device.
2. Use ON button on compressor control to switch on compressor.
   → Compressor starts operating.
   → When the factory-set switch-off pressure is reached, the compressor cuts off automatically.
3. Check network pressure on control display.
4. If necessary, reset operating pressure (pressure target value).
   → The compressor is ready for operation.
   → For control function see control display.
5. Switch off compressor after several hours of trial operation under maximum working load.

Record the test results in the commissioning certificate.

For S 40-3 BLUEKAT...S 60-3 BLUEKAT

1. Re-enable the mains disconnecting device.
2. Use the ON button on the compressor control to switch on the compressor.
   → The integrated converter starts preheating. The yellow indicator lamp "Preheating Aufheizen“ on the switch cabinet of the converter lights up. The compressor remains in the "operational availability standby mode".
   → After approx. 15 to 45 minutes (depending on the residual heat inside the converter and the ambient temperature) the converter reaches its operating temperature / release temperature.
   → The yellow indicator lamp extinguishes and the green indicator lamp ("Operation Betrieb)") lights up. As soon as the switch-on pressure is achieved, the control system allows the compressor to switch to load operation.
   The compressor will now start to produce compressed air while the converter is ready for treating the compressed air.
3. Switch off the compressor after several hours of trial operation under maximum working load.

Record the test results in the commissioning certificate.

Attention!

Risk of damage to integrated converter by switching the equipment on and off.

Do not switch off BLUEKAT converter but always leave it in standby mode, even with the compressor switched off, to maintain the operating temperature of the converter!

The BLUEKAT converter must only be disconnected from the power supply for the purpose of maintenance and/or repair!

Note!

When using the compressor control to switch off the compressor, the heater for the converter remains in operation. This avoids prolonged preheating phases before the next load operation.

Commissioning following extended stoppages

If an extended stoppage is scheduled, you should contact BOGE's service department beforehand.

Following an extended stoppage of more than 2 months, fill a small amount of oil into the suction controller prior to starting the compressor!

Attention!

Only fill the suction controller with the grade of oil used to operate the compressor.

Never mix different grades or brands of oil.

Caution: Risk of injury!

Press the emergency stop button, disconnect the power supply using the mains disconnection device and affix a padlock to prevent it from being switched on again unintentionally.

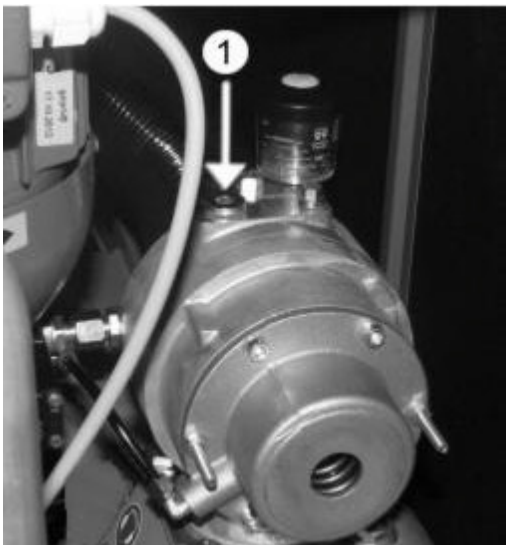


Fig. 3.6: Suction controller

1. Unscrew the plug from the suction controller (1).

The following compressor oil quantities must be filled into the suction controller:

Model	Compressor oil quantity [l]
S(D) 31-3...S(D) 60-3, S(D)F 60-3 + BLUEKAT-Modelle	approx. 0.5
S(D) 61-3...S(D) 100-3, S(D)F 100-3	approx. 2.5
S(D) 101-3...S(D) 150-3, S(D)F 150-3	approx. 5.0

Tab. 3.2: Compressor oil quantity

2. Screw plug back in again.
3. Turn compressor stage using the pulley by hand 5- to 10 times to spread the oil evenly.

Note!

In the case of screw compressors of the BLUEKAT series, please note that in the event of prolonged operational shutdowns for several days during which the compressor station is disconnected from the power supply, restarting the compressor requires a preheating phase of 15 to 45 minutes since the converter has completely cooled down.

Refrigerant compressed air dryer

Before commissioning the refrigerant compressed air dryer read the attached operating instructions.

Caution: Risk of injury!

Maintenance work and repairs to the refrigerant compressed air dryer (SD/SDF) may be carried out only by BOGE service personnel with the relevant specialist training.

Failure to comply with this requirement can result in physical injury and in damage to the compressor system.

Observe the " Safety instructions for maintenance and repair of the dryer (SD/SDF)“, on page 6, when dealing with the refrigerants used.

3.6 Dismantling

Note!

To avoid danger when dismantling the compressor, please consult BOGE's service department:

Telephone: +49 5206 601-140

Caution!

Dismantling the compressor must only be carried out byauthorised and qualified personnel with the necessary experience!

Observe all information in the attached operation instructions regarding safe dismantling of the refrigerant compressed air dryer and safe disposal of the refrigerant!

Danger: High voltage!

All work on the electrical installation must only be carried out by authorised and skilled electricians!

Prior to starting the work, the power cable to the switch cabinet must be disconnected from the mains and measures taken to prevent it from being switched on again unintentionally!

The converter needs to entirely cool down prior to restarting operation (only screw compressors S 40-3 BLUEKAT...S 60-3 BLUEKAT).

4.1 General information

The tables on the following pages give information on the possible causes of operating faults and action which can be taken to rectify them (please also refer to the operating instructions for the compressor control).

Caution!

Ensure that any work undertaken to rectify faults is carried out by qualified personnel or specialists only .

Ensure that components which have a safety function are adjusted, repaired or replaced only by BOGE service personnel. This applies in particular to any work carried out on the integrated converter in screw compressors of the BLUEKAT series.

Please contact BOGE's service department at the following telephone number if you have any questions.

Telephone: +49 5206 601-140

4.2 General faults

Fault	Possible cause	Rectification
Not delivered, no pressure build-up, max. pressure 0.5 bar	System components in the compressor are leaking	Check oil and compressed air lines inside the compressor; tighten and/or reseal screw connections, if necessary
	Minimum pressure valve is faulty	Close ball valve and check whether pressure builds up; if so, open ball valve again immediately; replace minimum pressure valve
	Solenoid venting valve does not close	Check solenoid valve and replace, if necessary
	Suction regulator does not open	Suction regulator or solenoid valve is defective; check and replace, if necessary
	V-belts are torn	Fit new v-belts
Compressor system does not start up 	No electric power to compressor	Check electrical connection
	Fuses are defective	Check the mains fuses and control fuses and replace if necessary
	Compressor system has not vented properly	Check unloading valve and replace, if necessary
	Voltage fluctuations in the electrical mains power supply	Ensure constant voltage in accordance with IEC 38
	Compressor oil is very viscous due to low ambient temperature	Heat up the compressor system (additional heater available as an optional accessory)
	Converter fault	see “Converter faults (BLUEKAT series)” on page 53.

Fault	Possible cause	Rectification
Oil in suction filter 	Minimum pressure non-return valve is leaking	Check the minimum pressure non-return valve and replace, if necessary
	Suction regulator is leaking	Check the suction controller and replace, if necessary
	Cutout triggered by emergency-off switch	Normally switched off with **O**-key
Excessive oil consumption 	Drain line is blocked	Dismantle and clean drain line
	Defective oil separator element	Check oil separator and replace, if necessary
	Oil filling level too high	Drain off oil
Safety valve blows 	Operating pressure setting altered from original setpoint	Set operating pressure to maximum permissible pressure of the screw compressor
	Defective safety valve	Replace safety valve
System pressure does not decrease when switching off 	Venting valve does not open	Check venting valve and replace, if necessary
	Non-return valve is leaking	Examine non-return valve and replace, if necessary

4.3 Converter faults (BLUEKAT series)

Fault	Possible cause	Rectification
Converter fault – compressor does not start 	Incorrect converter temperature settings	Settings of converter temperature controller to be checked by BOGE service personnel and to be reparameterised if necessary
	No temperature build-up inside converter	Have converter heater checked by BOGE service personnel and repaired / replaced if necessary
	Converter faulty	Have converter checked by BOGE service personnel and replaced if necessary
Converter fault – compressor unexpectedly discontinues compressed air production and fails to restart automatically 	Temperature inside converter-too high ("excess temperature")	Have converter / converter temperature controller / heater checked by BOGE service personnel and repaired / replaced if necessary
	Temperature drop inside converter and prolonged under temperature	Have converter / heater checked by BOGE service personnel and repaired / replaced if necessary
Converter fault – excessively long time until compressed air production is enabled 	Temperature build-up inside converter insufficient	Have converter heater checked by BOGE service personnel and repaired / replaced if necessary

5.1 BOGE Duotherm BPT

Function

The heat recovery system **BOGE Duotherm BPT** utilizes the heat energy released during compression to produce hot water free of charge (e.g. for production systems or to supply a heater).

The plate heat exchanger is connected in the main stream of the hot oil. It consists of stainless steel plates which are soldered together. These form two separate ducting systems. Compressor oil and water run through these ducts with opposite directions of flow. The hot oil transfers its heat to the colder water through the plates.

Installation

As a rule, the plate heat exchanger is installed in the compressor in the factory and comes equipped with all the necessary pipework. Only the following work needs to be carried out during installation:

– Connect the supply and discharge water pipelines to the pipeline system. Route the pipelines to prevent stresses and vibrations from being transmitted to the heat exchanger.
– Provide venting and draining facilities.

The customer must provide the following components for installation:

– Stop valves
  Stop valves in the water supply and discharge lines enable the heat exchanger to be removed easily
– Expansion vessel and safety valve.

Attention!

If the stop valves in the water supply and discharge lines are closed simultaneously, an enclosed space is created. If the water in this space is heated, it expands and the pressure increases.

An expansion vessel and safety valve must therefore be installed to prevent the plate heat exchanger from becoming damaged.

– Dirt trap (pore size: max. 0.6 mm)
  The dirt trap at the water inlet protects the plate heat exchanger against dirt deposits if the water is very dirty.
– Flushing connections
  The flushing connections serve to clean the plate heat exchanger.

Free-standing installation

The plate heat exchanger may also be installed as a free-standing unit or retrofitted by the customer.

Normally, the plate heat exchanger is held in place by the pipelines. However, when installing larger types of heat exchanger, the customer may have to provide a bracket.

Commissioning

Proceed as follows during commissioning:

– Check oil level in the oil circuit. If necessary, top up with oil.
– Slowly open the stop valves in the water supply and discharge line.
– Avoid pressure hammers!
– Vent the pipelines.

Maintenance

Limescale, oxides as well as grease or oil will be deposited in the ducts in the plate heat exchanger during operation
Regular cleaning will prevent thick deposits clogging individual ducts of the plate heat exchanger.

Cleaning intervals

Excessively soiled or hard water:	6 months
Moderately soiled water, surface water:	1 year
Lightly soiled water:	3 years

Recommended cleaning agents

Grease or oil deposits: Paraffin

Oxide or limescale deposits: formic acid, acetic acid or citric acid

Attention!

Always observe the instructions of the cleaning agent manufacturer!

Cleaning methods

Flushing:

- First close all stop valves in the supply lines.
- Close all stop valves in the discharge lines.
- Wait until the plate heat exchanger has cooled down.
- Open the flushing connections and drain the plate heat exchanger.
- Flush out the plate heat exchangers.
  For this purpose, pump one of the above mentioned cleaning agents through the plate heat exchangers for an extended period of time.
- After flushing, rinse the plate heat exchanger thoroughly with water (e.g. using a pressure washer).

Enhance the cleaning action by the following measures:

- Use a larger mass flow rate than for standard operation.
- Flush the cleaning agent through the plate heat exchanger in the opposite direction to standard operation.

Allow to react (tenacious soiling):

- Dismantle plate heat exchanger.
- Fill plate heat exchanger with one of the above-mentioned cleaning agents.
- Allow the cleaning agent to act for at least six hours. Point the connections upward to allow any gases that may occur to escape.
- After cleaning, rinse the plate heat exchanger thoroughly with water (e.g. using a pressure washer).

Note!

If the cleaning measures specified above are not sufficient, you should have the exchanger cleaned by a service company. Boge's service department will recommend contracting companies on request.

5.2 BOGE Duotherm BSW

Function

The safety heat exchanger **BOGE Duotherm Plus BSW** is approved for drinking water. It is integrated in the main stream of the hot compressor oil. The additional safety it provides in comparison with the plate heat exchanger results from the following measures:

– **Separation of the circuits**
  In this heat exchanger, the oil and water circuits are completely separated by a confining liquid.
  The confining liquid transmits the heat. In the event of heat exchanger damage, this prevents the oil and water from mixing.
  It is impossible, therefore, for the drinking water to become contaminated.

– **Pressure control device**
  A pressure control device responds immediately to a burst or fractured pipe within the system, emitting a pulse which can be individually processed (e.g. alarm, switching off the system).

Note!

Set the pressure control device to a value at least 20% lower than the minimum pressure of the media used.

Operating conditions

Minimum water pressure:	0.5 bar
Maximum water pressure:	16 bar
Maximum oil pressure:	16 bar
Maximum pressure of the confining liquid:	10 bar
Maximum temperature (oil and water):	100 °C

Note!

Exceeding the maximum temperature will result in malfunctioning. A false alarm will be triggered.

Commissioning

Proceed as follows during commissioning:

– Check the oil level in the oil circuit.
– Gradually open the valves on the water side.
– Avoid pressure hammers!
– Vent the pipelines.
– Any residual air contained in the heat exchanger will be carried along by the media conveyed and will escape through the system.

Maintenance

The safety circuit, including the pressure control device and the expansion vessel, forms a closed, maintenance-free system.

Attention!

Do not open the system under any circumstances.
Opening the system will put the operation and safety of the heat exchanger at risk!

If confining liquid escapes as a result of damage, send the heat exchanger to BOGE for repair.

6.1 Safety instructions for maintenance

Caution!

Ensure that maintenance work is only carried out by qualified professionals or appropriately trained persons.

– Prior to starting any maintenance work, always take the compressor out of operation as described in these operating instructions before removing any safety covers or safety devices. Refit the safety covers or safety devices immediately after completion of the maintenance work.
– Heavy components may only be lifted up by various persons in due consideration of the local industrial safety regulations.
– Only use original spare parts, compressor oils and operating materials released by BOGE for the maintenance work.
– With an activated automatic restart (Auto-Restart) the compressor may restart automatically after a voltage failure.
  Prerequisite: The net pressure is lower than the set switch-on pressure.

Caution: Risk of injury!

Always adhere to the prescribed operating method described below for all maintenance work. Never omit a single safety step!

Otherwise you will risk injury from restarting, electric shock or parts which may fly off.

Prior to all maintenance work:

1. Switch off the compressor using the OFF button.
2. Press Emergency Stop button.
3. Open mains disconnection device and secure against unintentional switch on by means of a padlock.
4. Fix a warning label to the control and fill in the name of the person responsible who is authorized to switch on the machine again.
5. Check to ensure that all machine elements are definitely currentless.
6. Prior to starting work let cool down all hot components of the compressor to 50°C
7. Allow converter to cool off for several hours (only screw compressors S 40-3 BLUEKAT...S 60-3 BLUEKAT).
8. Separate the compressor from the compressed air network by closing the ball valve at the compressed air outlet.
9. Vent the compressor.
   To this effect open the safety valve on the combined compressed air-oil receiver as follows:
   - Turn the knurled nut counterclockwise until you can feel a resilient resistance.
   - Turn the knurled nut a little further.
     Any possibly existing air will escape.
     The system pressure gauge will indicate a pressure of 0 bar.
   - Once the residual air has completely escaped from the system, firmly retighten the knurled nut.
10. Remove all safety cladding necessary to perform the maintenance work.

Once the maintenance work has been concluded:

11. Reattach all removed safety cladding.
12. Open the ball valve at the compressed air outlet.
13. Prior to switching on again, check whether anyone else is working on the compressor.
14. Remove warning sign not until then and release mains disconnecting device.
15. Unlock Emergency Stop button.

6.2 The BOGE maintenance concept

Through the compressor control, your compressor has an integrated monitoring system which sends you a maintenance message in good time to inform you about any important maintenance work that needs to be carried out.

The essential maintenance intervals for the compressor are set in the control by BOGE service personnel during commissioning, depending upon the environmental conditions.

This enables the most important maintenance work to be carried out regularly, and so achieve a sustainable effect, in order to reduce compressor wear to a minimum and guarantee a long life.

Maintenance through BOGE customer service

Have your compressor inspected and maintained in a full service by BOGE customer service every 3,000 operating hours or once a year.

Note!

Maintenance contract!

Enter into a maintenance contract with BOGE.

BOGE's service department will maintain your compressor professionally at regular intervals. Besides retaining your warranty entitlement, it will ensure maximum safety and reliability for your compressed air supply.

List of maintenance and service work

S 31-3...S 150-3

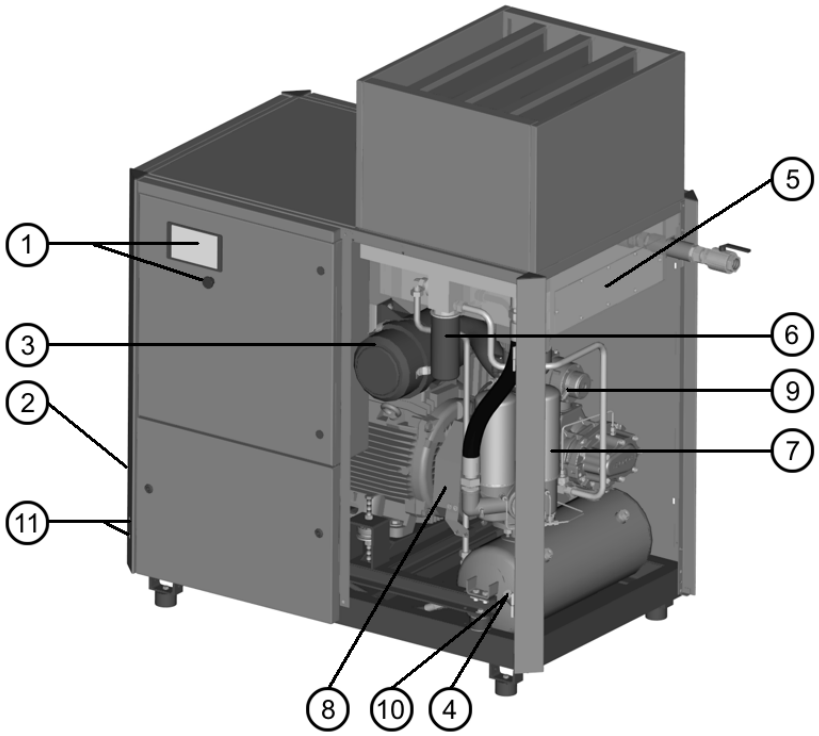


Fig. 6.1: Maintenance work S 31-3...S 150-3

1 Check pressure / final compressor temperature / system relief / emergency stop button
2 Check / change (if necessary) supply air filter
3 Check suction filter
  – Clean filter and cartridge
  – Change filter cartridge
4 – Check oil level
  – Top up oil
5 Clean compressed air/oil cooler externally
6 Change oil filter
7 Change oil separator
8 Check / change V-belt
9 After extended stoppages: Fill the suction controller with oil:
10 Oil change
11 (Lubricate motor bearings)

Refrigerant compressed air dryer at SD 40-3...SD 150-3

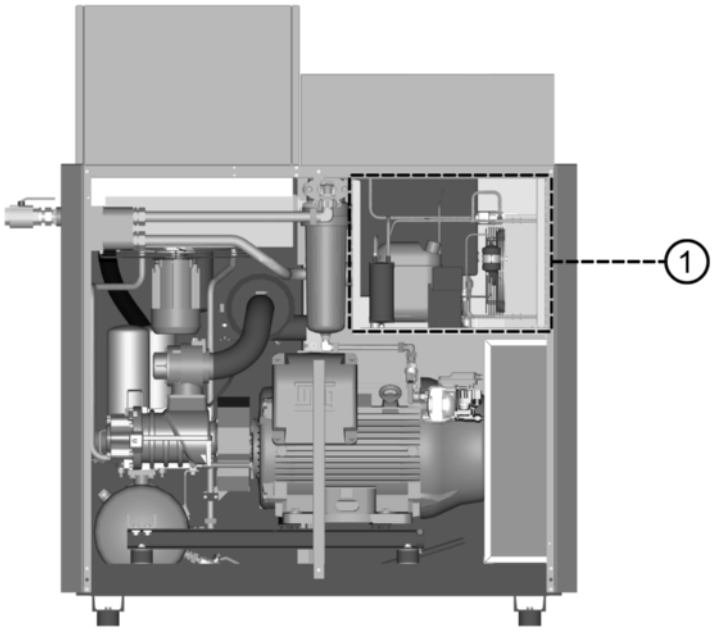


Fig. 6.2: SD 40-3...SD 150-3

1 Refrigerant compressed air dryer

Caution!

Maintenance work and repairs to the refrigerant compressed air dryer (SD/SDF) may be carried out only by BOGE service personnel with the relevant specialist training.

Failure to comply with this requirement can result in physical injury and in damage to the compressor system.

S 40-3 BLUEKAT...S 60-3 BLUEKAT (compressor)

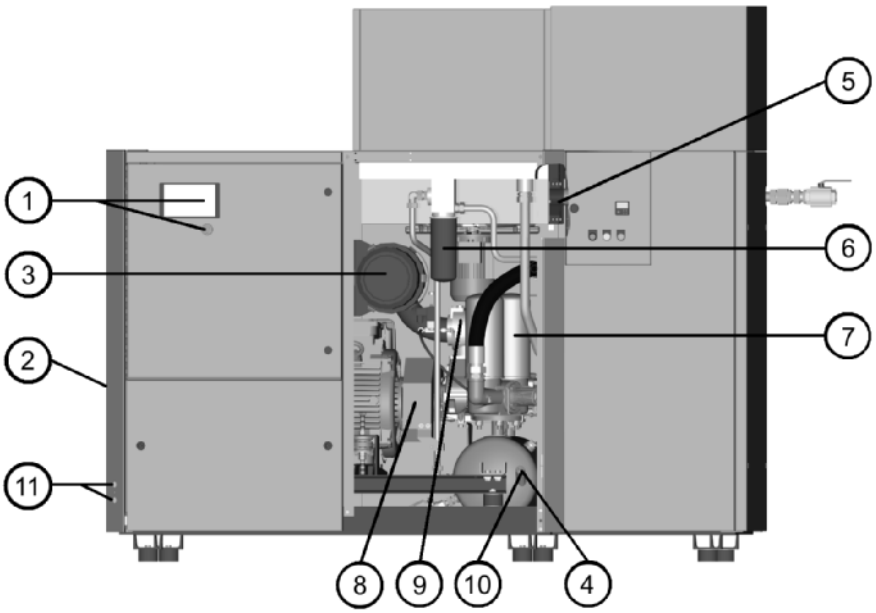


Fig. 6.3: Maintenance work for S 40-3 BLUEKAT...S 60-3 BLUEKAT

1 Check pressure / final compressor temperature / system relief / emergency stop button
2 Check / change supply air filter (optional accessory)
3 Check suction filter
  – Clean filter and cartridge
  – Change filter cartridge
4 – Check oil level
  – Top up oil
5 Clean compressed air/oil cooler externally
6 Change oil filter
7 Change oil separator
8 Check / change V-belt
9 After extended stoppages: Fill the suction controller with oil:
10 Oil change
11 (Lubricate motor bearings)

S 40-3 BLUEKAT...S 60-3 BLUEKAT (Converter)

Caution!

Maintenance and repair work on integrated converter of the S 40-3 BLUEKAT...S 60-3 BLUEKAT series may be carried out by specially trained BOGE service personnel only.

Failure to observe this may cause physical injury and damage to the compressor station.

Maintenance intervals

The maintenance intervals specified in the following table refer to average operation and ambient conditions.

Extreme conditions may require shorter maintenance intervals.

The first table contains maintenance and repair work that should be carried out by the customer himself at regular intervals between the annual service carried out by BOGE service personnel. The intervals between this maintenance work are shorter (weekly / monthly / every 1,500 operating hours).

The intervals between the maintenance and repair work specified in the second table are longer (every 3,000 / 9,000 operating hours, or once a year / every two years). To retain your warranty entitlement, BOGE recommends that you have this work carried out by BOGE service personnel.

The maintenance work in the third table applies only to the converter in the BLUEKAT series (S 40-3 BLUEKAT...S 60-3 BLUEKAT) and will also be carried out by BOGE service personnel.

Note!

Note down any maintenance work completed in the table on the last page. This will facilitate troubleshooting by BOGE's service department.

Maintenance work between (annual) service

The following maintenance and repair work can be carried out yourself and will ensure that your compressor operates trouble-free in the periods between the fixed service dates.

Maintenance work	Page
Weekly:	
Check compressor for leaks - visual inspection	–
Check final compression temperature (target value: 70...100°C)	Control
Check system relief on system pressure display (target value 0 – 1.5 bar)	Control
Check and if necessary change supply air filter (optional accessory)	65
Monthly:	
Check function of emergency stop button	Control
Check and if necessary adjust operating pressure	Control
Check that screw connections on the compressor are fully tightened	–
Clean suction filter	65
Check oil level and top up as required	65
Every 1,500 operating hours:	
Clean oil cooler	65
Check that the electrical connections are fully tightened	–

Table 6.1: Maintenance work between service intervals

Maintenance work at fixed service intervals

To retain your warranty entitlement, BOGE recommends that you have the following maintenance and repair work carried out by certified BOGE service personnel using original spare parts. For the regular intervals, maintenance kits are available in the form of "servicepacs" and "cairpacs" which contain the maintenance and wear parts necessary (except V-belt).

Attention!

If you use a different oil instead of Syprem S:

it is essential that you contact the BOGE service department to determine the required oil change intervals.

Maintenance work (BOGE service personnel)		Page
Every 3,000 operating hours [1] (or once a year):		
Check compressor for leaks		–
Change the suction controller (after it has been cleaned twice + every 3,000 operating hours)		65
Check the minimum pressure valve and repair if necessary with the repair kit		–
Have the safety valve checked (by BOGE service personnel only)		65
Check the oil regulator and repair if necessary with the repair kit [2]		–
Change nozzle with dirt trap (only up to S (DF) 60-3, incl. BLUEKAT)		–
Change oil filter [2]		65
Change oil separator [2]		65
Check V-belt		65
Every 9,000 operating hours[1] (or every 2 years):		
Check / change V-belt		65
Check the suction controller and if necessary replace or repair (with the repair kit)		–
Check solenoid valve and replace, if necessary		–
Change oil [2]		81
Special maintenance intervals (see also page 65 onwards):		
Flush out oil circuit	Maintenance interval: – If oil strongly contaminated. – Before changing the type of oil.	
Lubricate drive motor bearings lubrication/ replacement (for motors with no automatic lubrication device)	For details of the lubrication/replacement intervals (for motors with no automatic lubrication device): See the information given on the type plate of the drive motor.	
Have proportional regulation (optional accessory) checked	every 3,000 operating hours	

[1] If the compressor is not used very often, the maintenance must be carried out at the intervals specified weekly/monthly/once a year/every 2 years) irrespective of the number of operating hours.

[2] The specified intervals apply only when using BOGE Syprem S compressor oil. If a different oil is used, different intervals will apply! Other service life periods may also be possible depending on the ambient temperature. In this case have the oil analysed by your BOGE customer service!

Table 6.2: Maintenance work at fixed service intervals

Converter maintenance intervals S 40-3...S 60-3 BLUEKAT.

Caution!

Maintenance and repair work on integrated converter of the S 40-3 BLUEKAT...S 60-3 BLUEKAT series must be carried out by specially trained BOGE service personnel only.

Failure to observe this may cause physical injury and damage to the compressor station.

Maintenance work
Every 3,000 operating hours[1] (or once a year):
Have electric cable connection inspected for tight fit and have connection checked
Have parameter settings on control checked
Visual check of converter for damage or corrosion
Full functional check
Replacement of inserts in module for variable volume flow and particle filter after inspection and according to manufacturer's specifications (if available)
After 20,000 operating hours[1] (after 3 years at the latest):
Air quality check
After 5 years:
Replacement of electrical components (electrical kit)
Converter replacement

[1] If the compressor is not used very often, the maintenance must be carried out at the intervals specified weekly/ monthly/once a year/every 3 years) irrespective of the number of operating hours.

Table 6.3: Maintenance work on the converter

Note!

In the event that the converter needs to be replaced, the old converter can be returned to BOGE for disposal or recycling.

If this is not possible, we recommend that the old converter is handed over to a waste disposal contractor in its complete, undismantled state for disposal or recycling purposes.

Please contact BOGE's service department if you have any queries regarding disposal.

Telephone: +49 5206 601-140

General information concerning the lubricants used

Caution: Risk of injury!

Oil presents a potential danger to health and environment due to their additives.

- Avoid contact with skin and eyes.
  Wear protective gloves made of resistant synthetic material.
  Wash yourself thoroughly after contact with oils.
- Do not inhale the fumes or mist.
- Protect your environment.
  Ensure that no oil is spilt.
- Fire, naked flames and smoking is strictly prohibited when handling oil

We recommend using only oil according to the following specification:

- Viscosity range of 55 mm²/s at 40°C.
- Minimum viscosity at 100°C of 8 mm²/s.
- Maximum viscosity at 0°C of 1,000 mm²/s.
- Compliance with FZG test according to DIN ISO 14635-1 with failure load stage 10.
- (Test Method A/8,3/90 min 10).
- Excellent oxidation stability: Meets requirements of Pneurop oxidation test.
- Antifoam – additives.
- Additives to prevent residue formation.
- Compatibility with all used sealing materials like
  Neoprene, FPM, PTFE, FKM (Viton) and acrylic and epoxy resin paints.
- Flash point > 230°C.
- Additives for excellent demulsifying properties.
- Additives for corrosion protection of metallic surfaces.
- Excellent oxidation stability: Rotating bomb oxidation Test (ASTM D 2272) higher than 2,400 minutes.
- Meets VDL requirements DIN 51 506 for lube oils (including Pneurop test).
- Or you use BOGE compressor oil **Syprem S**.

Attention!

Never mix different oil types and brands.
The additives may be incompatible. It may lead to foam formation, premature ageing or loss of lubricating ability.

Disposal of used operating material

Attention!

The handling and disposal of mineral oils is subject to legal regulations. It is an offence not to ensure correct and safe disposal of old oil!

Please instruct one of the known service companies to dispose of used operating materials or deliver them to an authorized disposal point

Observe the following points when disposing of old oil:

– Never mix the oil with other material or liquids.
– Used oil filters and oil separator cartridges require special waste treatment and must be kept separate from normal waste!

Pressure hoses

Caution!

Risk of injury and damage to compressor due to obsolete pressure hoses!

Never use pressure hoses beyond the prescribed service life!

Check hoses and connections regularly for leakages! Check the service life of the hoses and replace them in due time!

As replacement only use original spare parts released by BOGE!

Used pressure hoses are not permitted as a replacement!

Spare and wearing parts

Caution!

Only use original spare parts, compressor oils and operating materials releasedby BOGE for repair and maintenance work.

BOGE is not liable for any damage resulting from the use of other spare parts or operating materials.

Attention!

If the nozzle and dirt trap are clogged with dirt (only up to S (DF) 60-3, incl. BLUEKAT), this can considerably increase oil consumption!

6.3 Maintenance work between scheduled services

The following sections contain a description of the maintenance work to be carried out between (annual) services. This work is listed in table on page 65. Perform the work at the intervals specified.

Weekly: Inspect / replace supply air filter (optional accessory)

Check the function of the optional supply air filter mats:

– 1x monthly, but at least every 500 operating hours.
– If the air intake is very contaminated, this should be carried out at more frequent intervals.

Change the supply air filter mats:

– If a dirt crust has become deposited on the filter mats.
– If the final compression temperature rises to 4° to 5°C above the target value (the dirt crust on the filter mat prevents the provision of an adequate cooling air supply).

Note!

Keep a packet of spare filter mats in reserve at all times!

Changing the supply air filter mats

1. Switch off the compressor with the OFF button.

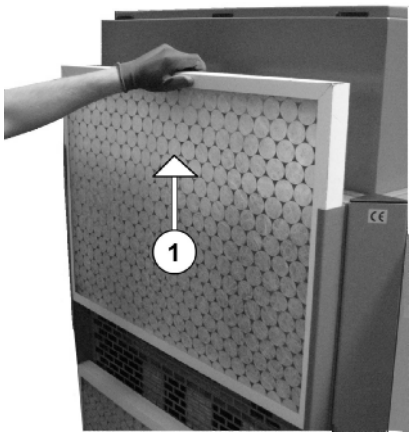
Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.

Caution: Risk of injury!

Caution: Beware of the danger of sustaining cuts from sharp sheet metal parts on the filter mat.

It is essential that you wear protective gloves!



2. Draw the filter mat (1) upwards out of its holder.
3. Insert a new mat in the holder.

Fig. 6.4: Changing the supply air filter mats

Monthly: Clean the suction filter

Clean the suction controller to remove dirt:

– 1x monthly, but at least every 500 operating hours.
– If the air intake is very contaminated, this should be carried out at more frequent intervals.

Removing the filter cartridge

1. Switch off the compressor with the OFF button.

Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.

Allow converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

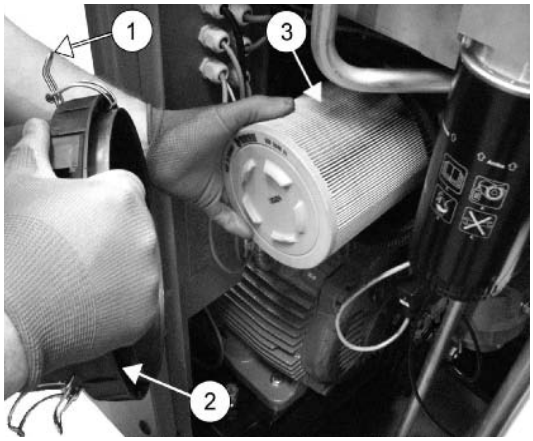


Fig. 6.5: Taking the suction filter out

2. Remove the cover on the maintenance side.
3. Undo the clips (1) on the filter housing.
4. Remove the lid (2) of the filter housing.
5. Take out the filter cartridge (3).

Cleaning the filter cartridge

Attention!

Do not clean filter cartridges in liquids.

Do not use any hard objects when cleaning to avoid damaging the filter paper.

If damage is detected or the filter cartridge has already been cleaned twice, the filter cartridge must be replaced with a new one.

1. Tap on the filter cartridge using the palm of your hand to knock out any coarse dust.
2. Blow out fine dust **from the inside to the outside** using dry compressed air (maximum pressure 5 bar).
3. Clean the sealing surface of the filter cartridge.

Fitting the filter cartridge

1. Insert filter cartridge (3) into the filter housing.
2. Replace the lid (2) on the filter housing.
3. Fasten the clips (1) on the filter housing.
4. Put the cover back on on the maintenance side

Monthly: Check oil level / top up with oil if necessary

Check the oil level:
- Before using the compressor for the first time:
- After this, once a month.

Top up with oil:
- If the oil level has sunk below the "min" mark (see diagram in Fig. 6.6).

Attention!

Always use the same oil type when topping up. Never mix different oil types and brands.

Check oil level / top up with oil if necessary

1. Switch off the compressor with the OFF button.

Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.

Allow converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

2. Closing the ball valve at the compressed air outlet.
3. Remove the cover on the maintenance side.
4. Vent compressor fully (as described at the start of this section).
5. Wait approx. 3 minutes to permit the oil to settle.

Caution: Risk of injury!

Danger of burning due to hot oil!

Always wear your compulsory personal protective equipment when working on the compressor!

6. Remove plug (2) of oil filling socket (1) (see figure below).
7. Check oil level.
   → The oil level must not drop below the "min." mark (see figure below).
8. If necessary, top up with oil to the lower edge of the thread ("max." mark) on the oil filling socket (see figure below).
9. Screw plug (2) back in (see figure below).
10. Put the cover back on on the maintenance side
11. Open ball valve at the compressed air outlet.

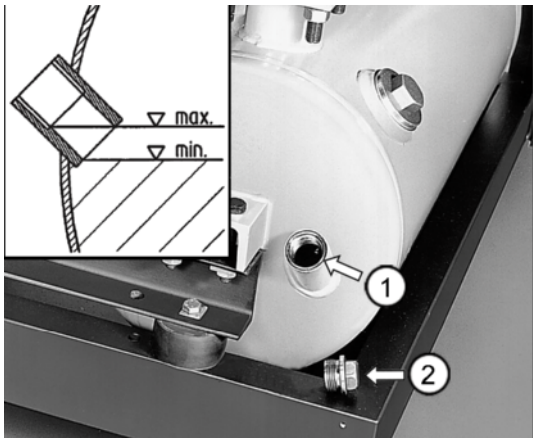


Fig. 6.6: Checking the oil level, topping up with oil

Every 1,500 operating hours: Clean the oil cooler (air cooling)

Clean the air/oil cooler:

– After 1,500 operating hours.
– In the case of compressors in the BLUEKAT series, once a year by BOGE service personnel during the annual service.

Note!

The service life of the compressed air/oil cooling unit depends on the degree of soiling (dust, oil vapour) of the suctioned cooling air. Extreme external soiling of the cooling unit leads to an increased temperature in the oil circuit.

Cleaning the compressed air/oil cooler

1. Switch off the compressor with the OFF button.

Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.

Allow converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

2. Remove the right side of the sound insulation hood.
3. Remove the maintenance opening on the cooling air duct box.

Attention!

Do not use sharp objects to clean the cooler!

Sharp objects could damage the cooler.

4. Remove accumulated dirt with a fibre brush.
5. Blow out the dirt with compressed air (1) in the opposite direction to the normal cooling air flow (see figure below).

6. Extract the blown out dirt directly with an industrial vacuum cleaner (2) (see the illustration below).
7. Screw the maintenance opening on again onto the cooling air duct box.
8. Put right side of the sound insulation hood back on again.

Fig. 6.7: Cleaning the compressed air/oil cooler

Note!
If the cooling unit is excessively soiled (cleaning is no longer possible with compressed air), have it disassembled and cleaned by BOGE customer service.

Every 1,500 operating hours: Clean the oil cooler / air cooler (water cooling)

Clean the oil cooler and the air cooler in the case of water cooling:
– After 1,500 operating hours.
– In the event of excessive lime deposits and dirt.

Note!
The service life of the cooler depends on the level of contamination and hardness of the cooling water. In the event of excessive contamination, check the cooling unit correspondingly earlier.

Carry out the cleaning as described for plate heat exchangers.

6.4 Maintenance work during scheduled services

The following sections contain a description of the maintenance work to be carried out between (annual) services. This work is listed in table on page 66. To retain your warranty entitlement, BOGE recommends that you have this work carried out by certified BOGE service personnel using original spare parts.

Every 3,000 operating hours / once a year: Change the suction filter cartridge

Change the suction filter cartridge:

– If it is damaged.
– After it has been cleaned twice.
– Depending on the level of dirt, either after 3,000 operating hours or once a year during the annual service.

Changing filter cartridge

1. Switch off the compressor with the OFF button.

Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.

Allow converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

2. Take out old filter cartridge (as described in “Removing the filter cartridge” on page 71).
3. Insert new old filter cartridge (as described in “Fitting the filter cartridge” on page 71).

Every 3,000 operating hours / once a year: Have safety valve checked

Caution: Risk of injury!

Have the function of the safety valve checked by BOGE service personnel only.

Interval: After approx. 3,000 operating hours, but at least once a year.

Every 3,000 operating hours / once a year: Change the oil filter

Change the oil filter:

– After 3,000 operating hours, but not less than once a year.
– Every time an oil change is carried out!

Change the oil filter

1. Switch the compressor off with the OFF button.

Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.

Allow converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

2. Close ball valve at the compressed air outlet.
3. Remove the cover on the maintenance side.
4. Vent the compressor fully (as described at the beginning of this section).
5. Wait approx. 3 minutes to allow the oil to settle.

Caution: Risk of injury!

Danger of burning due to hot oil!

Wear protective gloves while working!

6. Unscrew dirty oil filter (3) by hand or with a strap wrench in the direction shown by the arrows on the oil filter (see illustration below).
   → Catch the draining oil and dispose of it properly in line with environmental regulations

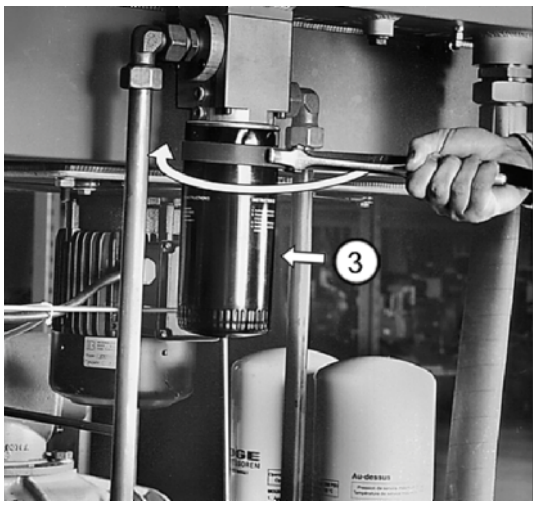


Fig. 6.8: Changing the oil filter

7. Fill the new oil filter (3) with compressor oil.
8. Lightly oil the seal on the new oil filter.
9. Screw in new oil filter by hand.

Attention!

Do not use tools to screw on the new oil filter!

You might damage the oil filter or its sealing ring.

A hand-tight fit of the oil filter is sufficient.

10. Put the cover back on on the maintenance side
11. Open ball valve at the compressed air outlet.
12. Switch the compressor on and let it heat up until it reaches the operating temperature.
13. Switch the compressor off with the OFF button.

Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.

Allow converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

14. Check the oil filter again for leaks and tighten by hand, if necessary (procedure as described above).
15. Check oil level. If necessary, top up with oil to offset any losses.

Every 3,000 operating hours / once a year: Change the oil separator

Change the oil separator:

- If the difference between network and system pressure exceeds 0.8 bar.
- If warning message "8" appears on the control system display (if option is installed).
- After 3,000 operating hours, but not less than once a year.

Caution: Risk of injury!

If the prescribed maintenance intervals are not observed, the oil separators might become blocked In this case, the differential pressure will increase until the safety valve blows.

1. Switch the compressor off with the OFF button.

Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.

Allow converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

2. Close ball valve at the compressed air outlet.
3. Remove cladding on the maintenance side.
4. Vent compressor fully (as described at the start of this section).
5. Wait approx. 3 minutes to allow the oil to settle.

Caution: Risk of injury!

Danger of burning due to hot oil!

Wear protective gloves while working!

6. Unscrew soiled oil separators (4) by hand or use a strap wrench, turning counterclockwise (see figure below).
   → Catch the draining oil and dispose of it properly in line with environmental regulations

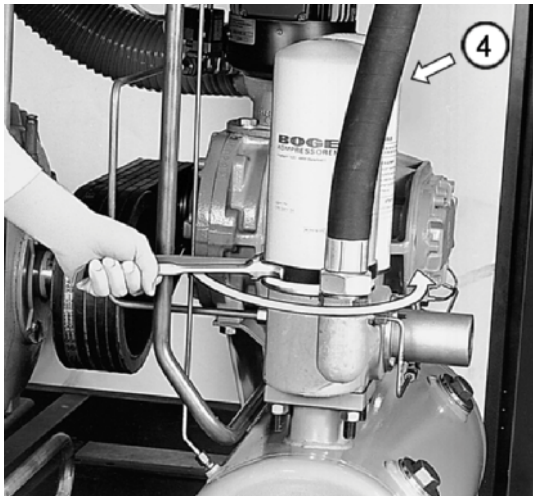


Fig. 6.9: Change the oil separator

7. Lightly oil the sealing rings of the new oil separator.
8. Screw in new oil separators by hand.

Attention!

Do not use tools to screw in the new oil separators!
You might damage the oil separators or their sealing rings.
A hand tight seating of the oil separators is sufficient

9. Put the cover back on on the maintenance side
10. Open ball valve at the compressed air outlet.
11. Switch the compressor on and let it heat up until it reaches the operating temperature.
12. Switch the compressor off with the OFF button.

Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.

Allow converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

13. Check the oil separator for leaks once again and tighten by hand if necessary (procedure as described above).

Every 3,000 operating hours / once a year: Check V-belt

Check the V-belt:

– After 3,000 operating hours, but at least once a year to look for signs of damage.

Every 9,000 operating hours: Change V-belt

Change the V-belt:
- If damage is visible.
- After 9,000 operating hours.

Change the V-belt:

1. Switch off the compressor with the OFF button.

Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.

Allow converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

2. Remove the cover on the maintenance side.
3. Remove the belt guard.

To release the tension on the V-belt:

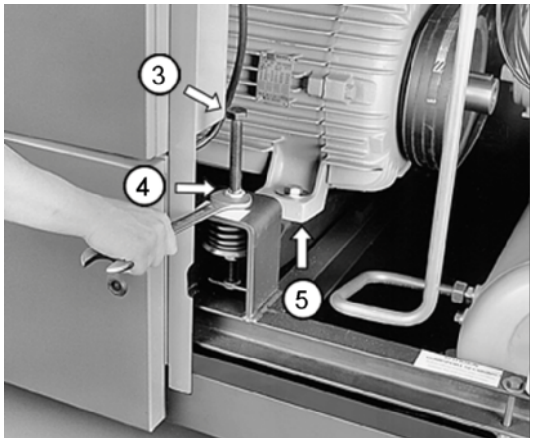


Fig. 6.10: Changing the V-belt

4. Secure screw head (3) of the tensioning device with a spanner to prevent it from turning.
5. Turn locknut (4) clockwise.
6. Raise the motor in the direction shown by the arrow (5) until the V-belts are fully slackened.
7. Remove the slackened belts from the belt pulleys.
8. Fit new V-belts on the belt pulleys on the motor and compressor.

Attention!

The new V-belts must be exactly the same length.

Only change the V-belts as a complete set!

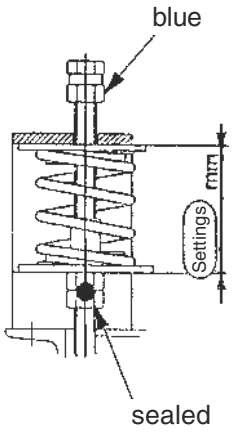
To tension the V-belt:

9. Lower the motor again. For this purpose, secure screw head (3) against turning,
10. then turn locknut (4) counterclockwise and lock by means of the screw head.

    → The V-belts are automatically correctly tensioned by the BOGE GM drive system.

11. Fit belt protection
12. Put the cover back on on the maintenance side

Settings of the GM-drive systems with standard motors



As to the setting value for the corresponding motor we refer to the table below.

Type	Pressure [bar]	Setting [mm] / 50 Hz	Setting [mm] / 60 Hz
S 31-3	8 / 10 / 13	108 / 107 / 106	–
S 40-3, SD 40-3	8 / 10 / 13	106 / 107 / 103	103 / 103 / 97
S 50-3, SD 50-3	8 / 10 / 13	103 / 103 / 104	98 / 99 / 94
S 60-3, SD 60-3	8 / 10 / 13	120 / 121 / 121	125 / 125 / 126
S 61-3, SD 61-3	8 / 10 / 13	117 / 117 / 115	118 / 117 / 116
S 75-3, SD 75-3	8 / 10 / 13	115 / 116 / 115	114 / 113 / 112
S 90-3, SD 90-3	8 / 10 / 13	107 / 108 / 109	113 / 114 / 113
S 100-3, SD 100-3	8 / 10 / 13	82 / 83 / 85	80 / 90 / 90
S 101-3, SD 101-3	8 / 10 / 13	118 / 105 / 104	110 / 109 / 102
S 125-3, SD 125-3	8 / 10 / 13	128 / 119 / 93	123 / 122 / 110
S 150-3, SD 150-3	8 / 10 / 13	141 / 130 117	147 / 136 / 124
SF 100-3, SDF 100-3	8 / 10 / 13	93 / 95 / 95	93 / 95 / 95
SF 150-3, SDF 150-3	8 / 10 / 13	141 / 130 / 117	147 / 136 / 124
SF 60-3, SDF 60-3	8 / 10 / 13	124	95
S 40-3 BLUEKAT	8 / 10 / 13	106 / 107 / 103	103 / 103 / 97
S 50-3 BLUEKAT	8 / 10 / 13	103 / 103 / 104	98 / 99 / 94
S 60-3 BLUEKAT SF 60-3 BLUEKAT	8 / 10 / 13	120 / 121 / 121	125 / 125 / 126

Tab. 6.4: Settings with standard motors

Note!

The settings shown in the table are fixed by the manufacturer and may not be changed. Slight deviations are allowed and compensated by the GM drive system.

The current settings are also shown on the GM drive system. With special versions the settings on the sticker may deviate from the standard values.

Every 9,000 operating hours / every 2 years: Oil change

Change the oil:

– In the case of Syprem S:
  After 9,000 operating hours, but after two years at the latest.

Attention!

If you use a different oil instead of Syprem S:

it is essential that you contact the BOGE service department to determine the required oil change intervals.

Note!

The service life of the oil, the oil filter and oil separators is reduced under the following conditions:

– When the compressor is operated at extreme ambient temperatures.
– When the intake air is extremely contaminated.

Oil change (see also Figs. 6.11 to 6.13):

Before changing the oil, an air cushion must be built up. The combined compressed air/oil receiver is located at the lowest point of the system. Therefore, a light air cushion (approx. 1.5 bar system pressure) must be applied to drain the oil. This pressure forces the oil through the drain hose into a suitable collecting vessel. To build up an air cushion:

1. Switch the compressor off with the OFF button.
2. Remove the cover on the maintenance side.
3. Place the end of the oil drain hose into a suitable collecting vessel (6).
4. Remove the cap nut (5) from the switch cabinet.
5. Close off the vent hole of the solenoid valve with the cap nut.

Attention!

Never use any tools to screw on the cap nut!

They might damage the solenoid valve.

Caution: Risk of injury!

Danger of burning due to hot oil!

Always wear protective gloves when working on the compressor!

6. During the output phase, press the OFF button on the compressor, and after approx, 3 seconds, or after a residual pressure of 2 bar, shut down the compressor with the emergency stop button.

Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.

To drain off the **old** oil:

7. Slowly open the stop valve.
8. The pressure of the air cushion forces the oil into the collecting vessel.
9. Once the compressed air/oil receiver has been completely drained, close the stop valve.
10. Remove the cap nut from the solenoid valve.
11. Unscrew the oil plug (7) on the compressed air/oil cooler.
12. Drain off residual oil (max. 5 litres) into a suitable container.
13. Reinsert the oil plug.
14. Change oil filter (procedure as described above).
15. Change oil separators (procedure as described above).

To fill up with **new** oil:

16. Fill up to the edge of the thread of the filling socket (max.) (procedure as described above).

Attention!

After each oil change you have to fill a small quantity of oil into the suction controller before starting the compressor.

For oil quantity and procedure see section entitled "3.5 Commissioning: Commissioning following extended stoppages".

Attention!

Always fill with the same oil type as previously used. Never mix different oil types and brands.

The oil circuit must be flushed through prior to changing the oil type.

17. Reattach the cover on the maintenance side.
18. Conduct trial run.
19. Switch the compressor off with the OFF button.

Caution: Risk of injury!

Press the emergency stop button, use the mains disconnection device to isolate the compressor from the power supply and fix a padlock to prevent the power from being switched on again unintentionally.
Allow converter to cool off (only screw compressors S 40-3 BLUEKAT... S 60-3 BLUEKAT).

20. Check the oil filter and oil separator for leaks.
21. If necessary, tighten the oil filter and oil separator by hand (procedure as described above).
22. Check oil level (procedure as described above).
23. If necessary, top up with oil to offset any losses.

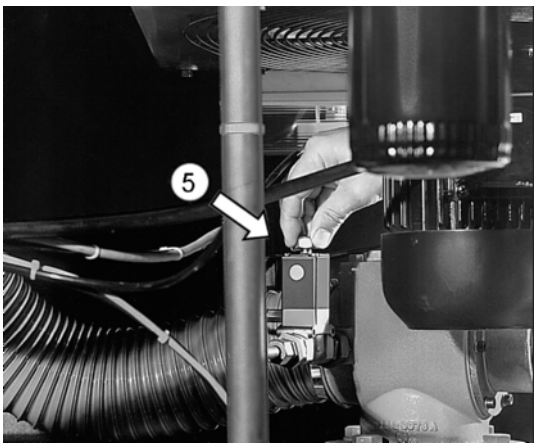


Fig. 6.11: Solenoid valve on the suction controller with the cap nut screwed on

Fig. 6.12: Drain off old oil from oil/compressed air receiver

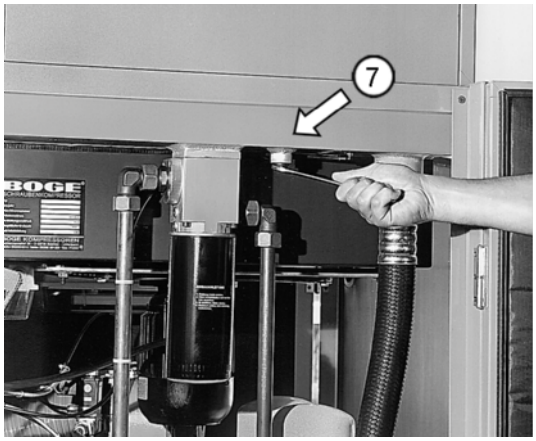


Fig. 6.13: Drain off residual oil from compressed air/oil cooler

6.5 Special maintenance work

Flush out oil circuit

Flushing the oil circuit with clean oil becomes necessary:

– When the oil is excessively soiled.
– Prior to changing the oil type.

Attention!

Detailed information on flushing with BOGE oils can be obtained from the following service number:

Telephone: +49 5206 601-140

Drive motors with permanent lubrication

The bearings of the drive motors are generally provided with a maintenance free permanent lubrication.

Under normal operating conditions (refrigerant temperature max. 40°C, continuous operation) the bearings are maintenance free for the entire service life.

The service life decreases or increases as thermal stress increases or decreases (due to increased or reduced refrigerant temperature).

Attention!

Have BOGE service dismantle the bearings and install new bearings once the specified service life has expired.

Drive motors with lubrication device

Motors with lubricating devices are easily recognised by the two grease nipples on the top of the cover. Additionally stickers on the compressor refer to the lubricating device (see illustration below).

Fig. 6.14: Grease nipples of the lubricating device

Check to determine which motor is integrated in your compressor and service the motor accordingly. Lubricate the bearings of the drive motor at the prescribed intervals so as not to sustain damage due to lack of lubricant.

On motors with lubricating devices, regular greasing forms part of the scope of maintenance. The lubrication intervals, quantity and type of grease are given on the type plate or a separate plate. For lubrication, the required quantity is pressed through the nipple into the bearing with a grease gun while the compressor is running.

Drive motors with automatic lubricating equipment

Read the attached operating instructions carefully before putting the automatic lubrication device into operation.

Caution: Risk of injury!

Always exercise great caution when lubricating the bearings with the compressor running and observe all safety precautions. Never put your hand in the area of the V-belt and the fan wheel. Fitted safety devices and cladding may not be removed.

Attention!

Always use the same type of grease for lubrication. The lubricating ability can be sharply reduced if different types of greases are mixed.

If you intend to use a different type of grease:

– Have the bearings removed and thoroughly cleaned by BOGE service personnel prior to filling with new grease.

Please always observe the specified lubrication intervals and quantities of grease.

Over-greasing and an excess of lubricant can also destroy the bearings.

Have proportional regulation checked (Optional accessory for S series)

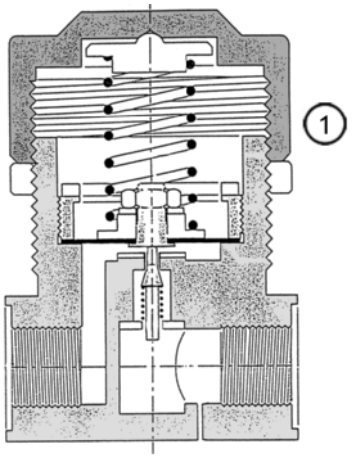
Check:

– After approx. 3,000 operating hours, but at least once a year.

1. Setting the operating pressure sensor

Switch-on pressure: p_{min} = Final compression pressure – 1 bar.

Switch-off pressure: p_{max} = Final compression pressure.



2. Setting the proportional controller

Displace the control range of the proportional controller by turning cap (1).

– Increase pressure level: Turn cap clockwise.
– Reduce pressure level: Turn cap anticlockwise.

Fig. 6.15: Setting the proportional controller

Note!

Always set the proportional controller higher than the lowest operating pressure value (p_{min})!

3. Pressure switch for infinitely variable capacity control

The low pressure switch for the infinitely variable capacity control limits the reduction of the quantity delivered and switches the compressor to idling mode or off completely if the quantity delivered falls below 50%.

6.6 Spare parts and accessory equipment

List of spare and wear parts (for maintenance)

Designation
Filter mat for supply air filter (optional accessory)
BOGE Syprem S special lubricant for screw compressors
Set of V-belts
Lubricant for drive motor bearings
servicepac for oil/air service: Oil filter, oil separator, suction filter cartridge, gaskets, nozzle with dirt trap (only up to S (DF) 60-3, incl. BLUEKAT)
cairpac 3000 – Full maintenance kit for 3,000 operating hour service: Oil filter, oil separator, suction filter cartridge, gaskets (repair kit), oil regulator (repair kit), nozzle with dirt trap (only up to S (DF) 60-3, incl. BLUEKAT)
Solenoid valve

Replacement parts for converter (BLUEKAT series)

Note!

Stocks of spare parts are continuously updated by BOGE. If you need any replacement parts for the converter in the BLUEKAT series, please contact your local BOGE field representative or your nearest BOGE contracting company.

Or contact your BOGE spare parts service:

Telephone: +49 5206 601-120

List of available accessory equipment

Designation
Accessory equipment for compressed air treatment
Oil/water separator
Frost protection device
Condensate drain
BOGE DUOTHERM BPT Plate heat exchanger
BOGE DUOTHERM-PLUS BSW Safety heat exchanger

Attention!

When ordering, please specify the data on the rating plate:

- Type
- Year of manufacture
- Machine number

7.1 Directives and standards complied with

The compressor conforms to the following guidelines and standards:

Guidelines:

– Machinery Directive 2006/42/EC
– Pressure Equipment Directive 97/23/EC
– EMC Directive 2004/108/EC
– Low Voltage Directive 2006/95/EC
– Simple Pressure Vessels Directive 2009/105/EC

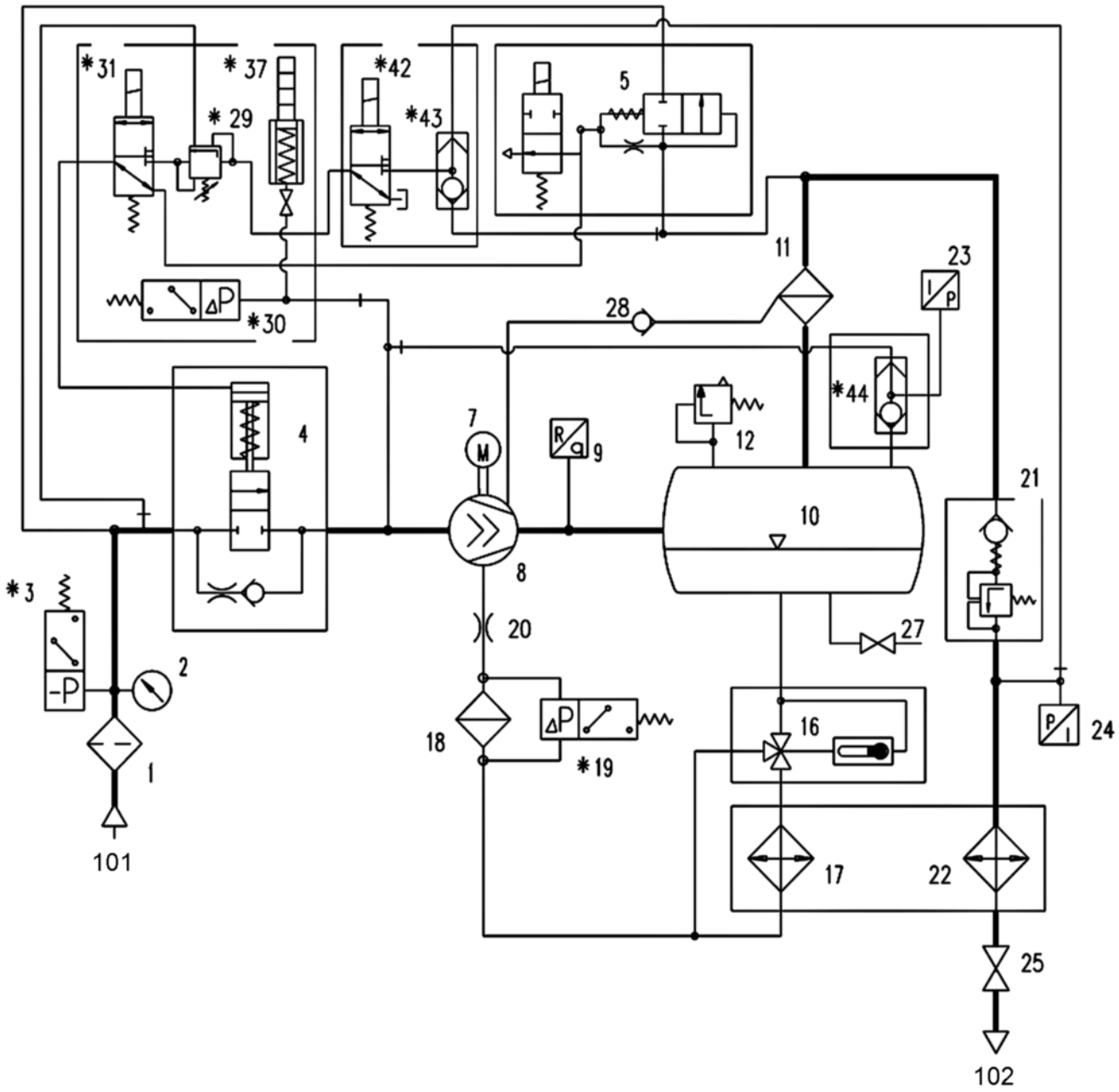
Applied harmonized standards

– DIN EN 1012-1:2011
– DIN EN ISO 12100:2011
– DIN EN 60204-1 / VDE 0113-1:2007
– DIN EN 61000-6-2 / VDE 0839-6-2:2006
– DIN EN 61000-6-4 / VDE 0839-6-4:2007

7.2 Flow chart

On the following pages you will find the individual flow charts for the different machine types and components.

Air cooled version, standard

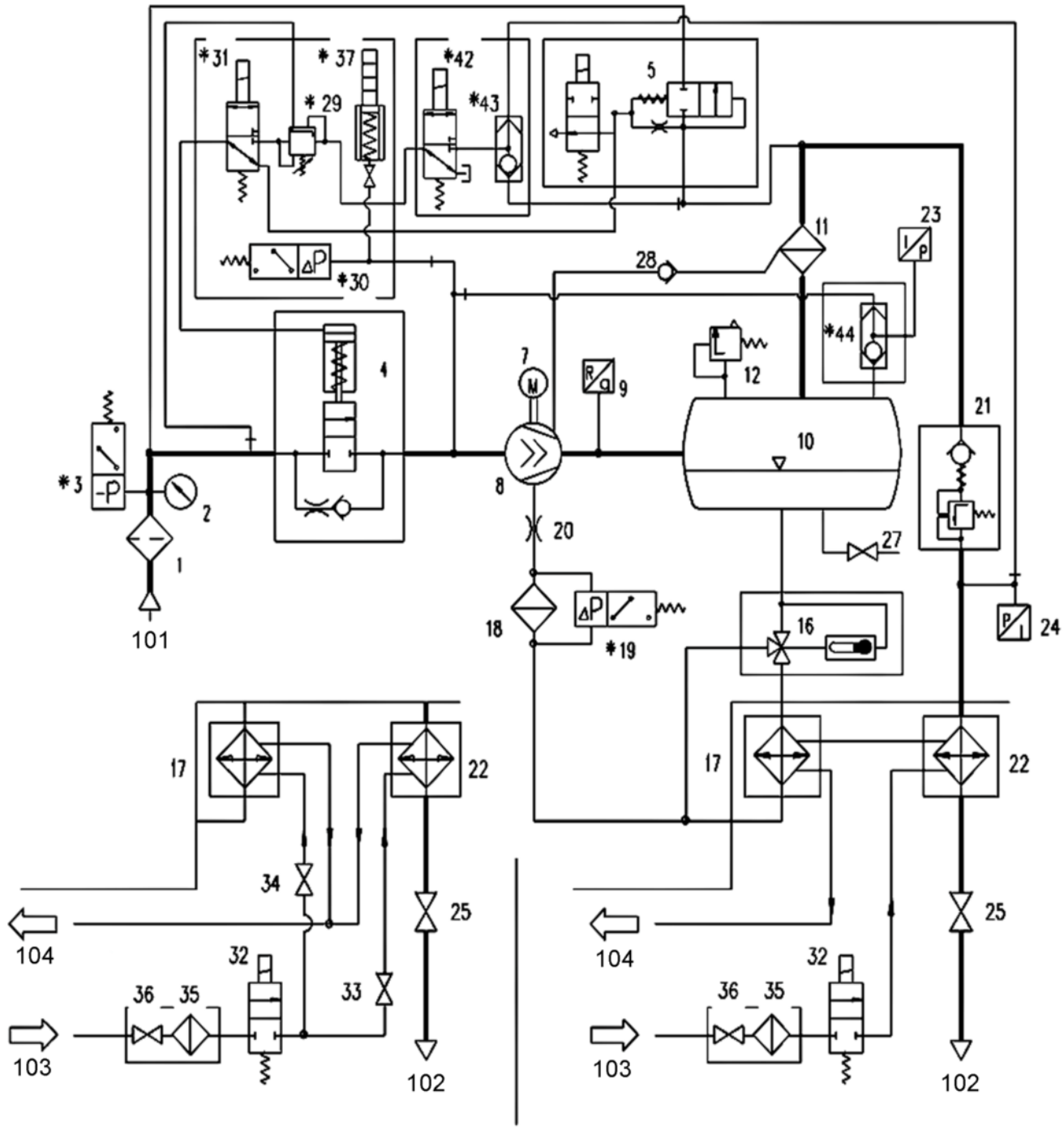


101 Intake air INLET
102 Compressed air OUTLET

1 Suction filter
2 Maintenance display (from 30 kW)
3 Vacuum switch (for suction filter monitoring) *
4 Suction controller
5 Ventilation and regulation control valve
7 Drive motor
8 Compressor air end
9 Sensor for final compression temperature
10 Combined compressed air/oil receiver
11 Oil separator
12 Safety valve
16 Thermostatic oil control valve
17 Oil cooler
18 Oil filter
19 Differential pressure switch (for oil filter monitoring) *
20 Oil throttle
21 Minimum pressure non-return valve
22 Compressed air aftercooler
23 Pressure sensor for system pressure
24 Pressure sensor for network pressure
25 Stop valve, compressed air outlet
27 Stop valve, oil drainage
28 Non-return valve drainage line (up to 75 kW)
29 Proportional controller *
30 Differential pressure switch for proportional controller *
31 3/2-way solenoid valve for proportional controller (for standard control, throughput here) *
37 Free air delivery display for proportional controller *
42 3/2-way solenoid valve for suction controller regulation *
43 Double non-return valve (items 42 + 43 = rapid-start valve) *
44 Double non-return valve (monitoring of rotational direction) *

* Optional accessory

Water cooled version, serial connection – parallel connection



Parallel connection * Series-connected circuit

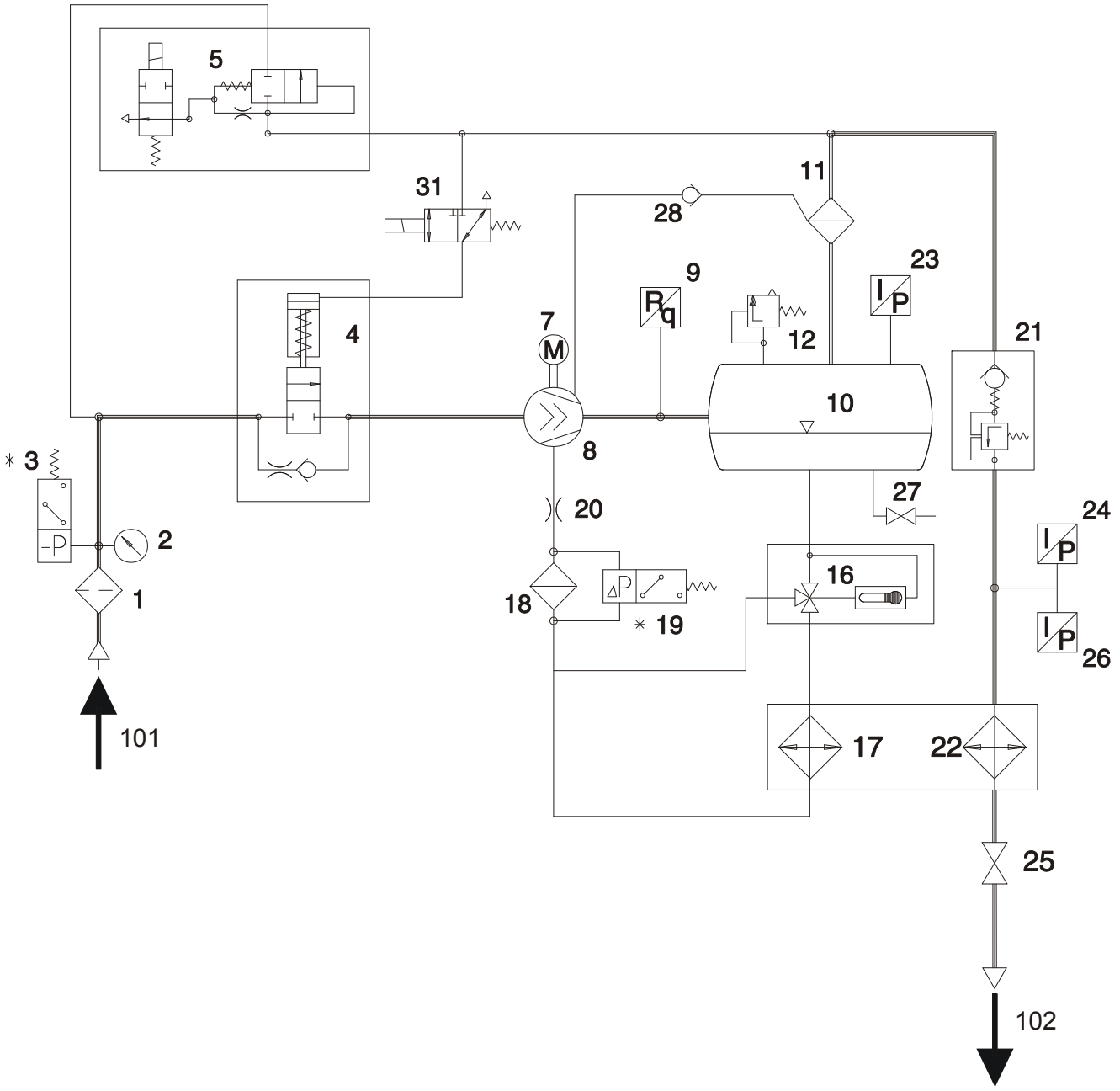
101 Intake air INLET
102 Compressed air OUTLET
103 Water INLET
104 Water OUTLET

1 Suction filter
2 Maintenance display (from 30 kW)
3 Vacuum switch (for suction filter monitoring) *
4 Suction controller
5 Ventilation and regulation control valve
7 Drive motor
8 Compressor air end
9 Sensor for final compression temperature
10 Combined compressed air/oil receiver
11 Oil separator
12 Safety valve
15 Thermostatic oil control valve
17 Oil cooler
18 Oil filter
19 Differential pressure switch (for oil filter monitoring) *
20 Oil throttle
21 Minimum pressure non-return valve
22 Compressed air aftercooler
23 Pressure sensor system pressure
24 Pressure sensor network pressure
25 Stop valve, compressed air outlet
27 Stop valve, oil drainage
28 Non-return valve drainage line (up to 75 kW)
29 Proportional controller *
30 Differential pressure switch for proportional controller *
31 3/2-way solenoid valve for suction control regulation *
(for standard control, throughput here) *
32 2/2-way solenoid valve
33 Control valve water supply (preadjusted)
34 Control valve water supply (preadjusted)
37 Free air delivery display for proportional controller *
42 3/2-way solenoid valve for suction control regulation *
43 Double non-return valve (items 42 + 43 = rapid-start valve) *
44 Double non-return valve (monitoring of rotational direction) *

* Optional accessory

To be provided by customer:
35 Dirt trap
36 Stop valve

Air cooled version, frequency controlled

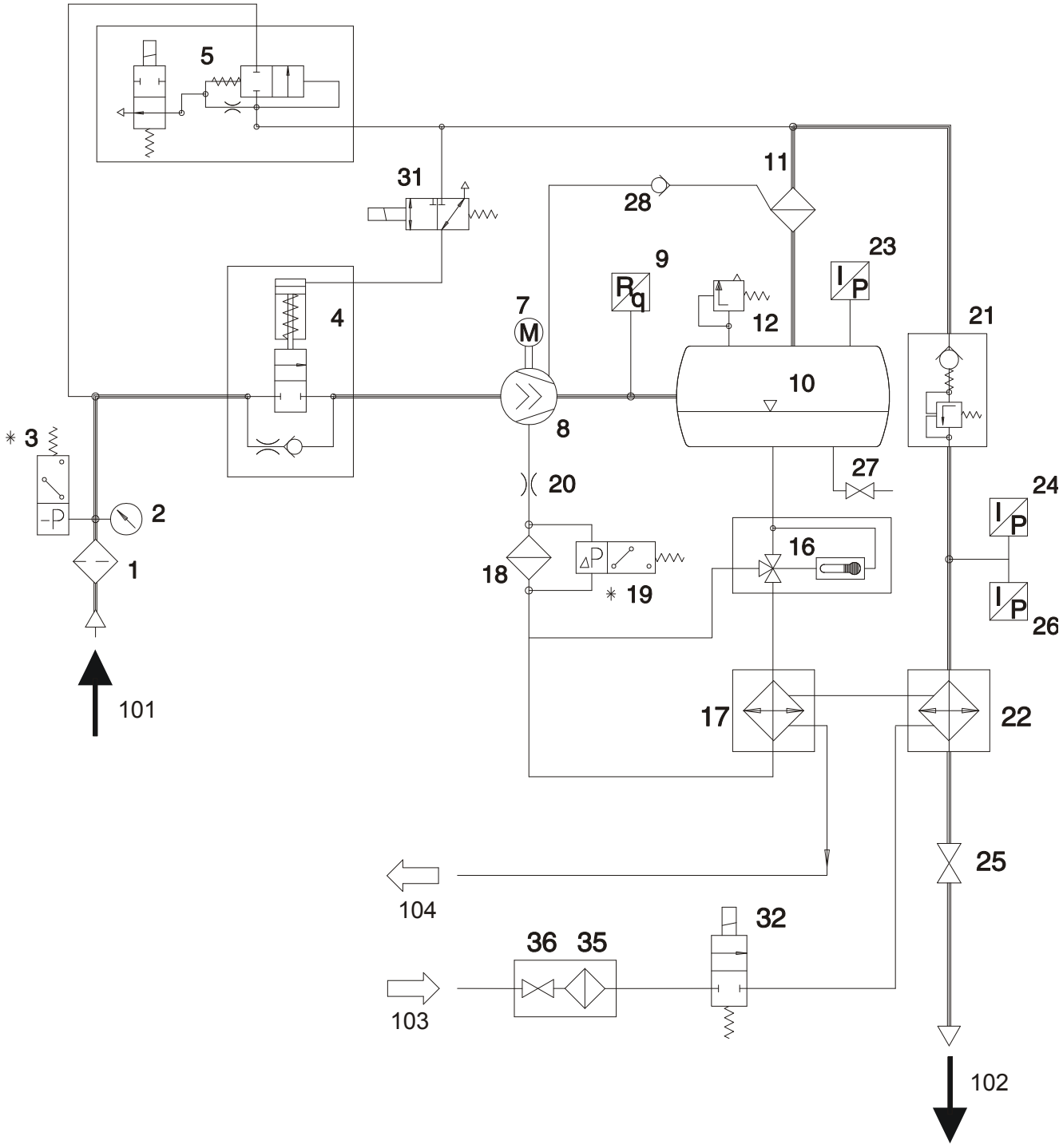


101 Intake air INLET
102 Compressed air OUTLET

1 Suction filter
2 Maintenance display
3 Vacuum switch (for suction filter monitoring) *
4 Suction controller
5 Ventilation and regulation control valve
6 Pressure switch (for rotational direction, system relief and V-belt monitoring) *
7 Drive motor
8 Compressor air end
9 Final compression temperature display and switch
10 Combined compressed air/oil receiver
11 Oil separator
12 Safety valve
13 Differential pressure switch (for oil separator monitoring) *
13 System pressure switch (for system pressure build-up and monitoring) *
15 Safety pressure switch (for pressure limitation) *
16 Thermostatic oil control valve
17 Oil cooler
18 Oil filter
19 Differential pressure switch (for oil filter monitoring) *
20 Oil throttle
21 Minimum pressure non-return valve
22 Compressed air aftercooler
23 Operating pressure switch
24 Pressure sensor, compressor network pressure
24.1 Pressure gauge (system pressure)
25 Stop valve, compressed air outlet
26 Pressure sensor for network pressure (frequency converter)
27 Stop valve, oil drainage
27.1 Stop valve, oil drainage (oil cooler, 75 - 250 kW)
28 Non-return valve drainage line (up to 75 kW)
31 3/2-way solenoid valve

* Optional accessory

Water cooled version, serial connection – frequency controlled



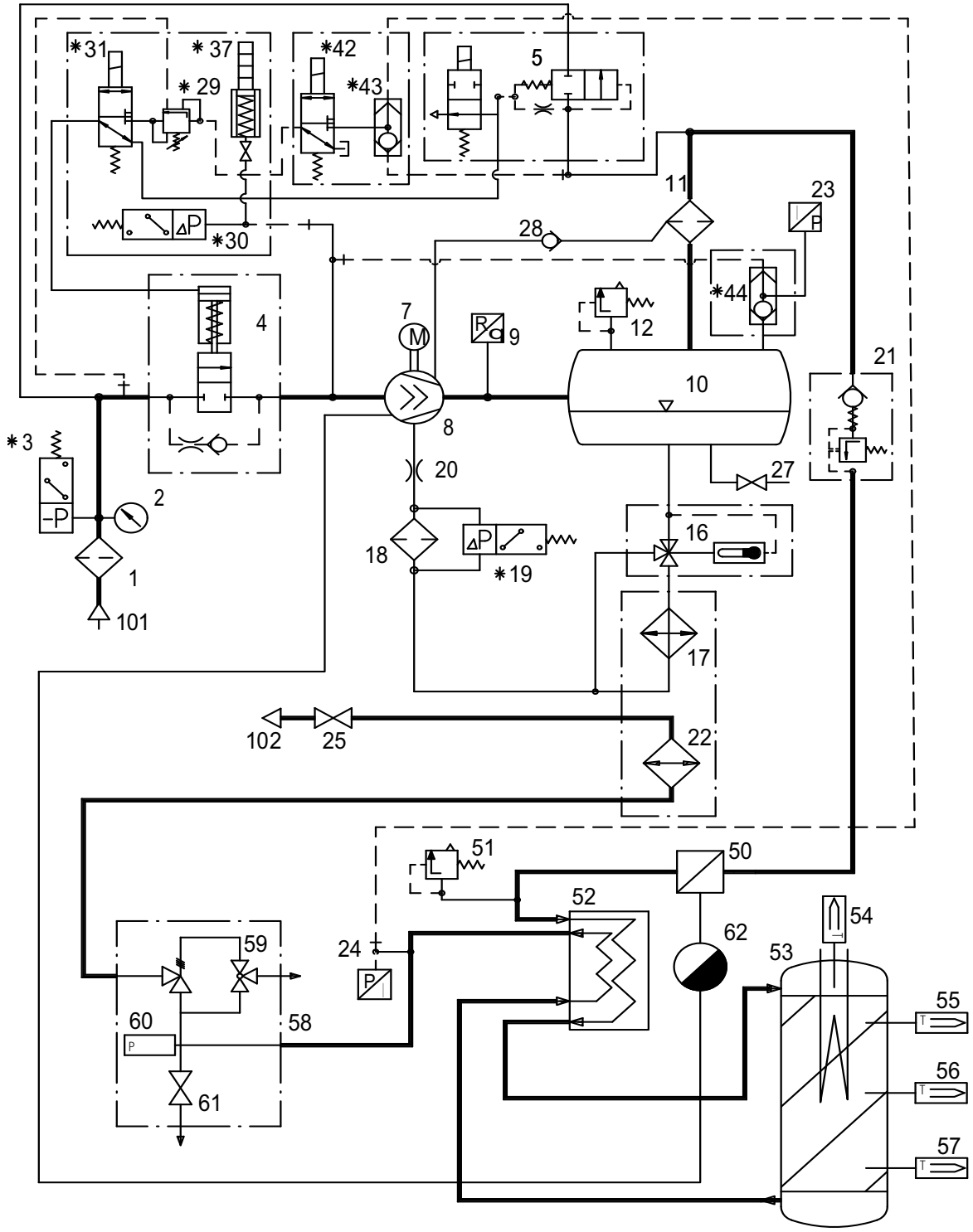
101 Intake air INLET
102 Compressed air OUTLET
103 Water INLET
104 Water OUTLET

1 Suction filter
2 Maintenance display
3 Vacuum switch (for suction filter monitoring) *
4 Suction controller
5 Air relief and regulation control valve
6 Pressure switch (for rotational direction, system relief and V-belt monitoring) *
7 Drive motor
8 Compressor air end
9 Final compression temperature display and switch
10 Combined compressed air/oil receiver
11 Oil separator
12 Safety valve
13 Differential pressure switch (for oil separator monitoring) *
14 System pressure switch (for system pressure build-up and monitoring) *
15 Safety pressure switch (for pressure limitation) *
16 Thermostatic oil control valve
17 Oil cooler
18 Oil filter
19 Differential pressure switch (for oil filter monitoring) *
20 Oil throttle
21 Minimum pressure non-return valve
22 Compressed air aftercooler
23 Operating pressure switch
24 Pressure gauge
25 Stop valve, compressed air outlet
26 Pressure sensor for network pressure (frequency converter)
27 Stop valve, oil drainage
28 Non-return valve drainage line (up to 75 kW)
31 3/2-way solenoid valve
32 2/2-way solenoid valve
34.1 Bypass valve *

* Optional accessory

To be provided by customer:
35 Dirt trap
36 Stop valve

BLUEKAT series, air cooled version

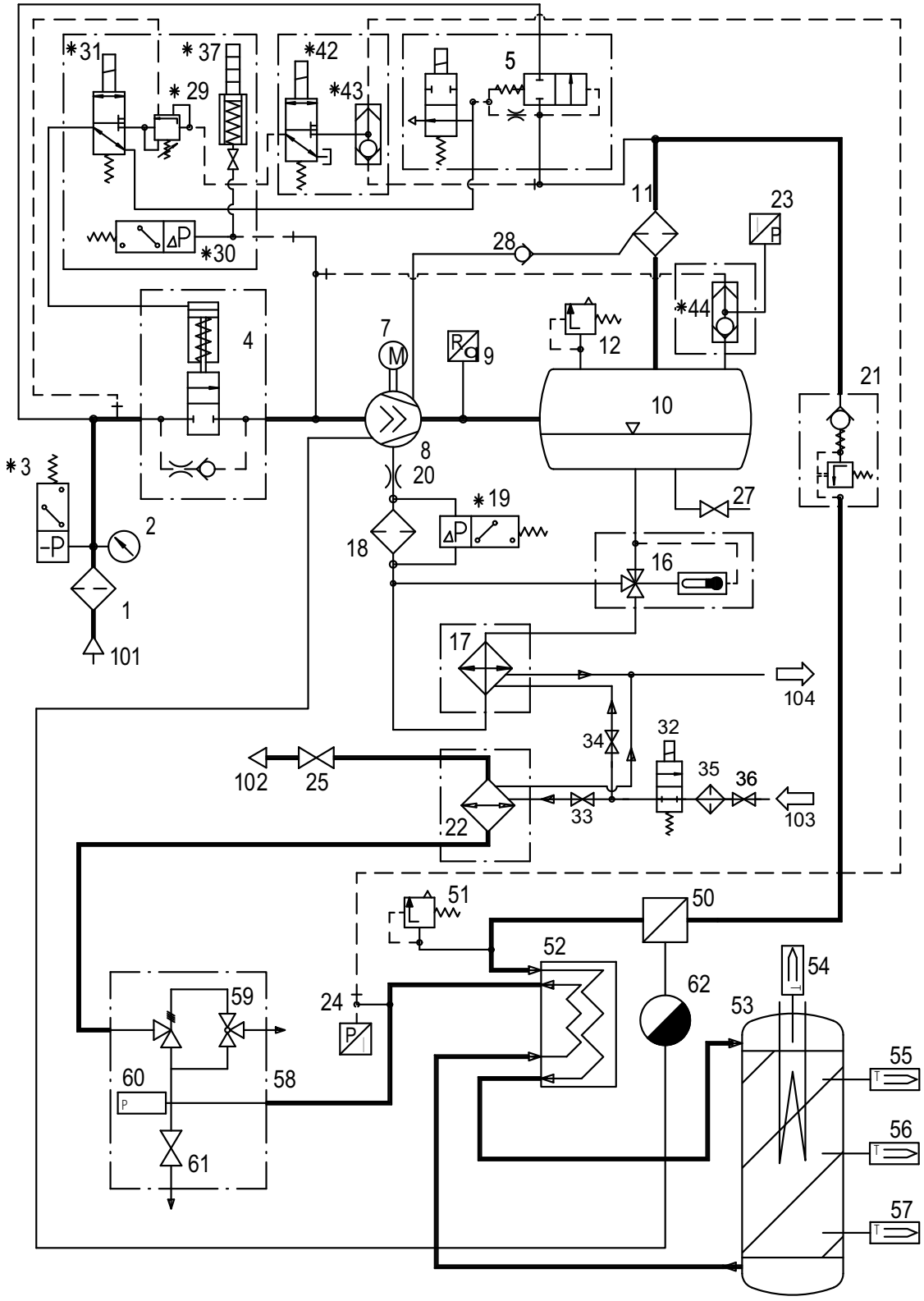


101 Intake air INLET
102 Compressed air OUTLET

1 Suction filter
2 Maintenance display (from 30 kW)
3 Vacuum switch (for suction filter monitoring) *
4 Suction controller
5 Air relief and regulation control valve
7 Drive motor
8 Compressor air end
9 Sensor for final compression temperature
10 Combined compressed air/oil receiver
11 Oil separator
12 Safety valve
16 Thermostatic oil control valve
17 Oil cooler
18 Oil filter
19 Differential pressure switch (for oil filter monitoring) *
20 Oil throttle
21 Minimum pressure non-return valve
22 Compressed air aftercooler
23 Pressure sensor network pressure
24 Pressure gauge
25 Stop valve, oil drainage
27 Stop valve, oil drainage
28 non-return valve drainage line (up to 75 kW)
29 Proportional controller *
30 Differential pressure switch for proportional controller *
31 3/2-way solenoid valve for proportional controller (for standard control, throughput here) *
37 Free air delivery display for proportional controller *
42 3/2-way solenoid valve for suction control regulation *
43 Double non-return valve (items 42 + 43 = rapid-start valve) *
44 Double non-return valve (Monitoring of rotational direction) *
50 Filter
51 Safety valve
52 Heat exchanger
53 Converter
54 Heating cartridge with thermocouple
55 Thermocouple
56 Thermocouple *
57 Thermocouple *
58 Pressure retaining shut-off valve (DHSV)
59 DHSV solenoid valve
60. Gauge
61 Relief ball valve
62 Condensate discharge valves, automatic

* Optional accessory

BLUEKAT series, water cooled version, parallel connection

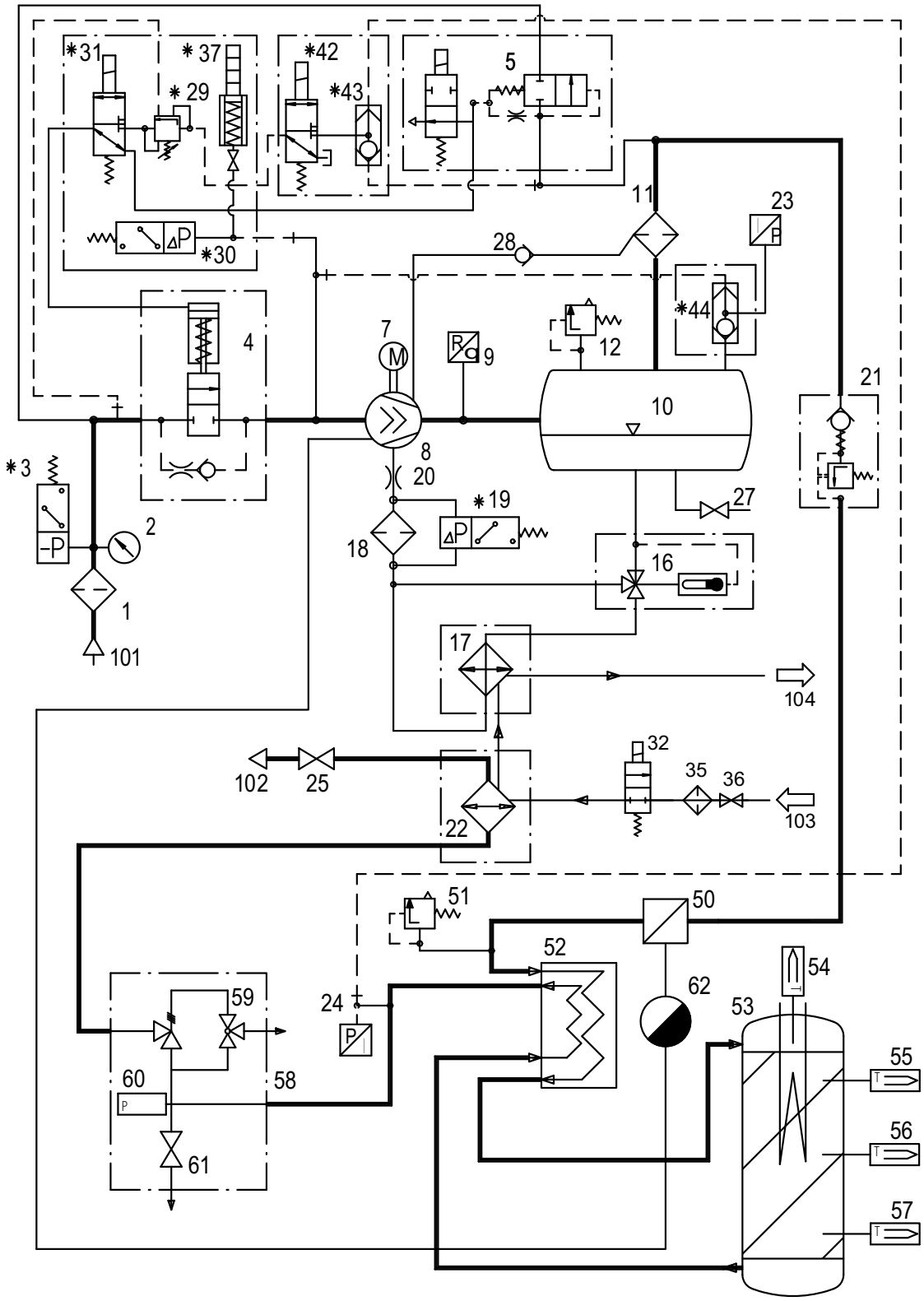


101 Intake air INLET
102 Compressed air OUTLET
103 Water INLET
104 Water OUTLET

1 Suction filter
2 Maintenance display (from 30 kW)
3 Vacuum switch (for suction filter monitoring) *
4 Suction controller
5 Air relief and regulation control valve
7 Drive motor
8 Compressor air end
9 Sensor for final compression temperature
10 Combined compressed air/oil receiver
11 Oil separator
12 Safety valve
16 Thermostatic oil control valve
17 Oil cooler
18 Oil filter
19 Differential pressure switch (for oil filter monitoring) *
20 Oil throttle
21 Minimum pressure non-return valve
22 Compressed air aftercooler
23 Pressure sensor for system pressure
24 Network pressure compressor
25 Stop valve, compressed air outlet
27 Stop valve, oil drainage
28 Non-return valve drainage line (up to 75 kW)
29 Proportional controller *
30 Differential pressure switch for proportional controller *
31 3/2-way solenoid valve for proportional controller (for standard control, throughput here) *
32 2/2-way solenoid valve
33 Regulating valve water supply (preset)
34 Regulating valve water supply (preset)
35 Dirt trap
36 Stop valve
37 Free air delivery display for proportional controller *
42 3/2-way solenoid valve for suction control regulation *
43 Double non-return valve (items 42 + 43 = rapid-start valve) *
44 Double non-return valve (Monitoring of rotational direction) *
50 Filter
51 Safety valve
52 Heat exchanger
53 Converter
54 Heating cartridge with thermocouple
55 Thermocouple
56 Thermocouple *
57 Thermocouple *
58 Pressure retaining shut-off valve (DHSV)
59 DHSV solenoid valve
60 Gauge
61 Relief ball valve
62 Condensate discharge valves, automatic

* Optional accessory

BLUEKAT series, water cooled version, serial connection

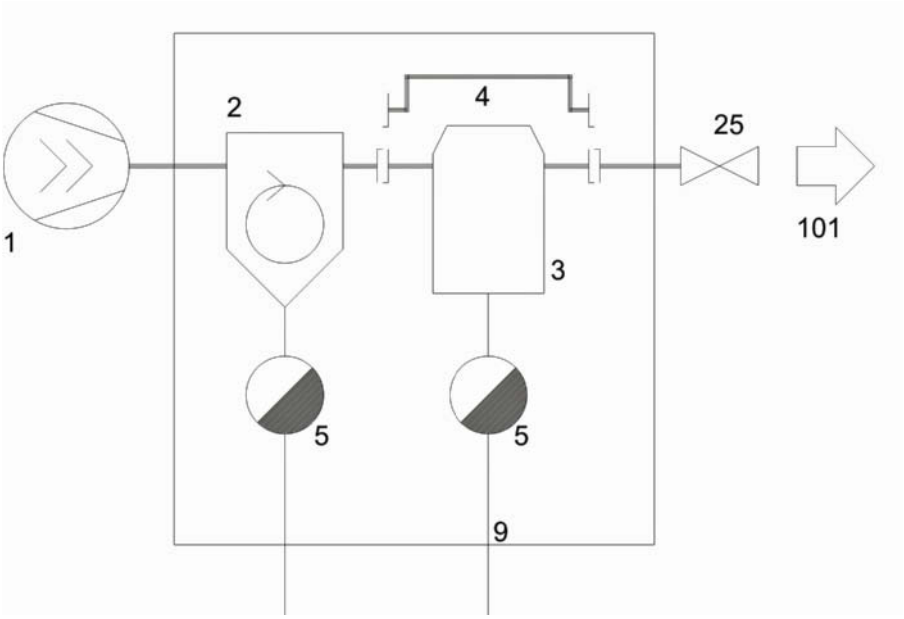


101 Intake air INLET
102 Compressed air OUTLET
103 Water INLET
104 Water OUTLET

1 Suction filter
2 Maintenance display (from 30 kW)
3 Vacuum switch (for suction filter monitoring) *
4 Suction controller
5 Air relief and regulation control valve
7 Drive motor
8 Compressor air end
9 Sensor for final compression temperature
10 Combined compressed air/oil receiver
11 Oil separator
12 Safety valve
16 Thermostatic oil control valve
17 Oil cooler
18 Oil filter
19 Differential pressure switch (for oil filter monitoring) *
20 Oil throttle
21 Minimum pressure non-return valve
22 Compressed air aftercooler
23 Pressure sensor for system pressure
24 Network pressure compressor
25 Stop valve, compressed air outlet
27 Stop valve, oil drainage
28 Non-return valve drainage line (up to 75 kW)
29 Proportional controller *
30 Differential pressure switch for proportional controller *
31 3/2-way solenoid valve for proportional controller (for standard control, throughput here) *
32 2/2-way solenoid valve
35 Dirt trap
36 Stop valve
37 Free air delivery display for proportional controller *
42 3/2-way solenoid valve for suction control regulation *
43 Double non-return valve 42(items 42 + 43 = rapid-start valve) *
44 Double non-return valve (monitoring of rotational direction) *
50 Filter
51 Safety valve
52 Heat exchanger
53 Converter
54 Heating cartridge with thermocouple
55 Thermocouple
56 Thermocouple *
57 Thermocouple *
58 Pressure retaining shut-off valve (DHSV)
59 DHSV solenoid valve
60 Pressure gauge
61 Relief ball valve
62 Condensate discharge valves, automatic

* Optional accessory

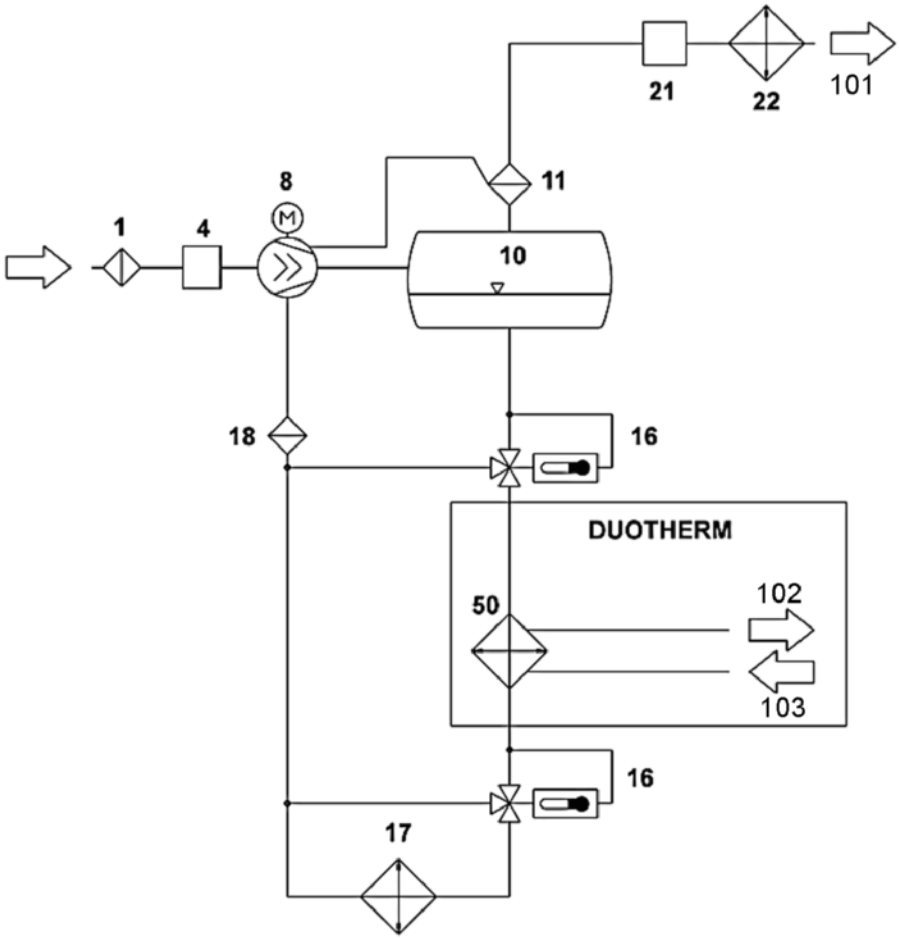
SD / SDF



101 Compressed air OUTLET

1 Screw compressor (see also flow diagram)
2 Cyclone separator
3 Refrigerant compressed air dryer
4 Bypass
5 Drain
9 Condensate
25 Non-return valve compressed air exhaust

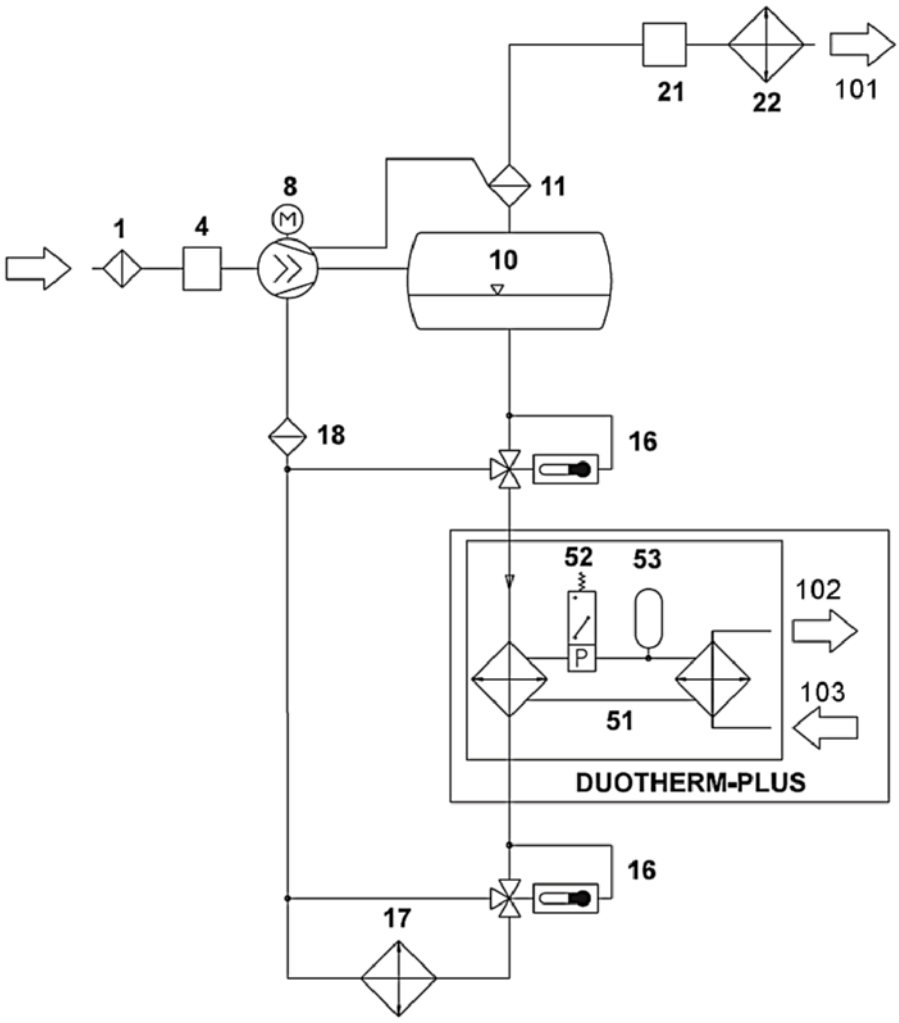
BOGE Duotherm BPT plate heat exchanger



101 Compressed air OUTLET
102 Feed line
103 Return line

1 Suction filter
4 Suction controller
8 Compressor air end
10 Combined compressed air/oil receiver
11 Oil separator
16 Thermostatic oil control valve
17 Oil cooler
18 Oil filter
21 Minimum pressure non-return valve
22 Compressed air aftercooler
50 Heat exchanger

BOGE Duotherm-Plus BSW safety heat exchanger



101 Compressed air OFF
102 Feed line
103 Return line

1 Suction filter
4 Suction controller
8 Compressor air end
10 Combined compressed air/oil receiver
11 Oil separator
16 Thermostatic oil control valve
17 Oil cooler
18 Oil filter
21 Minimum pressure non-return valve
22 Compressed air aftercooler
51 Safety heat exchanger
52 Pressure monitor for leakage
53 Compensation vessel

7.3 List of maintenance and service work

Please record any maintenance work you have completed in the appropriate column																	
Date	*Operating hours*	*Network pressure*	*System pressure*	*Tempe-rature*	*Intake filter* *	*Oil filter*	*Oil-level* **	*Oil separator*	*Cooling unit cleaning*	*Motor maintenance*	*Comp. air dryer Oil/water separator Filter Drain*	*Converter maintenance*	*Remarks*				

* *Cl = Cleaning*
Ch = Change

** *C = Check*
Ch = Change

Please record any maintenance work you have completed in the appropriate column

Date	*Operating hours*	*Network pressure*	*System pressure*	*Tempe-rature*	*Intake filter* *	*Oil filter*	*Oil-level* **	*Oil separator*	*Cooling unit cleaning*	*Motor mainte-nance*	*Comp. air dryer Oil/water separator Filter Drain*	*Converter mainte-nance*	*Remarks*

* *Cl = Cleaning*
Ch = Change

** *C = Check*
Ch = Change

Please record any maintenance work you have completed in the appropriate column

Date	*Operating hours*	*Network pressure*	*System pressure*	*Tempe-rature*	*Intake filter* *	*Oil filter*	*Oil-level* **	*Oil separator*	*Cooling unit cleaning*	*Motor maintenance*	*Comp. air dryer Oil/water separator Filter Drain*	*Converter maintenance*	*Remarks*

* *Cl = Cleaning*
Ch = Change

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Ch = Change

Please record any maintenance work you have completed in the appropriate column

Date	*Operating hours*	*Network pressure*	*System pressure*	*Tempe-rature*	*Intake filter* *	*Oil filter*	*Oil-level* **	*Oil separator*	*Cooling unit cleaning*	*Motor mainte-nance*	*Comp. air dryer Oil/water separator Filter Drain*	*Converter mainte-nance*	*Remarks*

* *Cl = Cleaning*
Ch = Change

** *C = Check*
Ch = Change