SERVICE MANUAL USE

Booster

Model: N 502–G

GL–Nr.: 1_2005_00360–000_00USE

Part No.: $#an

Serial No.: .....

KAESER COMPRESSORS

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1 Regarding this Document

1.1 Handling the Document

The service manual is part of the machine.

☞ Keep the service manual in a safe place throughout the life of the machine.

☞ Pass the manual on to the next owner/user of the machine.

☞ Ensure that all amendments received are entered in the manual.

☞ Enter details from the machine nameplate and individual equipment in the table in chapter 2 ”Technical Specifications”.

1.2 Further Documents

Included with this Service Manual are documents intended to assist in the safe operation of the machine:

- certificate of acceptance / operating instructions for the pressure vessel

☞ Make sure all documents are complete and observe the instructions contained in them.

Missing documents can be requested from KAESER.
Always quote the data on the nameplate.

1.3 Copyright

1.4 Symbols and Identification

1.4.1 Warning notices

DANGER

Here are given the type and source of the danger.

Here are consequences of ignoring the warning notice.
The word ’DANGER’ means that death or severe injury can result if the warning notice is ignored.

☞ Here are given the measures to protect yourself from the danger.

☞ Always read and comply with warning notices.

Danger levels

Warning notices indicate three levels of danger signified by the word below the danger symbol.

Signal word	Meaning	Consequences of non−compliance
DANGER	Warns of imminent threatening danger	Death or severe injury may result
WARNING	Warns of a possible threat of danger	Death or severe injury or serious damage to the machine is possible
CAUTION	Warns of a possibly dangerous situation	Light injury or damage to property possible

1.4.2 Other notices and symbols

☞ This symbol indicates that a task is to be carried out.

 This symbol identifies environmental protection measures.

 This symbol refers to particularly important information.

2 Technical Specifications

The model designation and important technical information are given on the machine's nameplate.

☞ Please enter the data from the nameplate here:

Model	
Part no.	
Serial no.	
Year	
Initial press.	
Displ.	
Max. working pressure	
Voltage	
Hz/RPM	
Phase	
HP	
Package FLA	
Drive Motor FLA	
FOR SERVICE REFER TO EQUIPMENT NUMBER	

Tab. 1 Nameplate

2.1 Weight

Maximum weights are shown. Actual weights of individual machines are dependent on equipment fitted. Weight data marked * relate to machines with sound enclosures.

	Weight [lb]
N 502 – G	1014 / 1609*

* Machine with sound enclosure

Tab. 2 Machine weights

2.2 Compressor block

2.3 Compressor block

Model		N 502			
Inlet pressure [psig]		**75**	**110**	**145**	**190**
Theoretical inlet volume [cfm]		103.8	146.9	190	241.9
Capacity at various discharge pressure [cfm]	145 psig	86.2	129.9	–	–
	215 psig	81.2	124.3	167	–
	290 psig	76.6	119.4	161.7	216.1
	360 psig	71.3	114	156.1	201.3
	435 psig	–	108.4	150.8	195.6
	500 psig	–	103.1	145.1	190.7
	580 psig	–	–	139.5	185.4
	650 psig	–	–	133.8	179.7
Number of cylinders	2				

Tab. 3 Block data

2.4 Ambient conditions

Max. height above sea level at place of installation* [ft.]	3000
Ambient temperature** [˚F]	40 – 104

* Higher elevation permissible only after consultation with the manufacturer

** The switching frequency of the motor must be reviewed for higher ambient temperatures, (see chapter 2.10).

Tab. 4 Ambient conditions

2.5 Pressure

Maximum working pressure: see nameplate

Maximum working pressure [psig]	**Pressure relief valve blow–off setting [psig]**
145	160
215	290
290	330
360	405
435	480
500	550
580	638
650	696

Tab. 5 Aftercooler relief valve blowoff pressures

Maximum working pressure [psig]	Pressure relief valve blow–off setting [psig]
145 – 650	232

Tab. 6 Venting line relief valve blowoff pressures

Further data on pressure relief valves can be found in chapter 13.2.

2.6 Sound Pressure Level

Operational state:

- under LOAD at rated speed, rated air flow and rated pressure.

Measurement conditions:

- free–field measurement to CAGI/PNEUROP PN8 NTC 2.3 at 1 m distance

	Sound pressure level [dB(A)]	Sound pressure level with enclosure [dB(A)]
N 502–G	78	68

Tab. 7 Sound Pressure Level

2.7 Motor and Power

2.7.1 Drive Motor

Model		N 502–G			
Inlet pressure [psig]		**75**	**110**	**145**	**190**
Rated motor power / motor shaft power at final pressure [hp]	145 psig	15.0 /7.6	15.0 / 7.5	–	–
	215 psig	15.0 / 9.1	15.0 /9.2	15.0 / 9.8	–
	290 psig	15.0 / 10.6	15.0 / 11	15.0 / 11.5	15.0 / 12.2
	360 psig	15.0 /11.8	15.0 /12.7	15.0 / 13.4	15.0 / 14.2
	435 psig	–	20.0 / 14.3	20.0 / 15.1	20.0 / 16.3
	500 psig	–	20.0 / 15.9	20.0 / 17.0	20.0 / 18.4
	580 psig	–	–	25.0 / 18.8	25.0 / 20.4
	650 psig	–	–	25.0 / 20.6	25.0 / 21.7
Rated motor speed [min^{-1}]		3600			
Enclosure protection*					

* Enter the information on the motor nameplate in the table

Tab. 8 Drive motor data

Drive motor switching frequency

Tab. 9 Drive Motor Switching Frequency

Model	N 502–G		
Rated motor power [hp]	15	20	25
Maximum frequency of motor starts per hour	15	12	12

Tab. 10 Drive Motor Switching Frequency

2.7.2 Compressor:

	N 502
Nominal compressor speed [min^{-1}]	970

Tab. 11 Compressor specifications

2.8 Oil Recommendations

Lubrication of an air compressor is essential to reliable operation. Carbon and varnish can form in compressor oils. These deposits block the flow of lubricant and cause excessive wear and failure of moving parts. Contamination of the oil can allow the formation of acids, causing extensive internal corrosion. Water may be condensed decreasing the oil's lubricity.

KAESER COMPRESSORS has several lubricants available that are specially formulated to match these demands. They feature excellent lubricity, outstanding demulsibility (ability to separate from water), and long life.

M–SERIES SEMI–SYNTHETIC LUBRICANTS

- M–Series SIGMA compressor fluids are the highest quality petroleum lubricants. M–150 is specially blended to provide reliable performance in KAESER reciprocating compressors.

S–SERIES SYNTHETIC LUBRICANTS

- S–Series SIGMA compressor oils are formulated from the most advanced synthetic lubricants. These "synthetic" lubricants begin as high quality petroleum feed stock. They are then refined, processed and purified into fluids with very consistent molecular structure. These oils are carefully blended to produce extremely lubricants with superior properties. SIGMA synthetic lubricants feature all the advantages of both PAO and diester fluids.
- S–150 lubricant is recommended for compressors operating in ambient temperatures between 40 °F and 105 °F.

Specialty KAESER LUBRICANTS

- FG–150 synthetic hydrocarbon based food grade lubricant is designed for use in reciprocating compressors in the application where incidental food contact may occur with the discharge air. This lubricant meets the requirements of the FDA Regulation 21 CRF §178.3570 and is USDA H–1 approved. FG–150 is approved for canning, food packing, meat and poultry processing and other applications where incidental food contact may occur.

KAESER synthetic lubricant should be stored in a protected location to prevent contamination. Do not re–use drums; flush and send to reconditioner.

Although the KAESER synthetic is not highly flammable, it will burn. While KAESER synthetic compressor oil is less flammable than equal viscosity mineral oils, it cannot be classified as a fire–resistant fluid. It has a flash point above 460 °F. Since the user has total control over the conditions of the compressor lubricant, he assumes total responsibility for its safe usage.

Material Safety Data Sheets are available for each lubricant from your authorized KAESER Service representative.

- **Compatibility:**
  FG–150 is similar to mineral oil in its compatibility with paints, seals, gaskets and hoses. The typical precautions are required when changing over from mineral oil to KAESER synthetic hydrocarbon based lubricant.
  Never mix lubricants of different types or brands.

When switching from mineral oil to a synthetic oil, the plant's system materials must be re–evaluated. Certain plastics are not compatible with synthetic oils. The following is a partial list of acceptable and not recommended materials:

ACCEPTABLE		NOT RECOMMENDED
Viton	Celcon	PVC
High Nitrile Buna N	Neoprene	ABS
Teflon	SBR Rubber	
Epoxy Paint	Low Nitrile Buna N	
Oil Resistant Alkyd	Acrylic Paint	
Nylon	Lacquer	
Delrin	Polystyrene	

Polycarbonate bowls can be etched by any synthetic lubricant.
We recommend replacement with metal bowls, or the addition of metal guards.

2.8.1 Oil charge

	Total charge [quart]	Top–up quantity [quart] (Minimum – Maximum)
N 502	3.2	0.4

Tab. 12 Compressor block oil charge

2.9 Electrical Connections

See electrical diagrams in chapter 2.9.2.

2.9.1 Power supply

The machine is designed for an electrical supply according to National Electric Code (NEC) NEC – 670, particulary NFPA 79, section 5.7. In the absence of any user–specified alternatives, the limits given in these standards must be adhered to. Consult manufacturer for any other specific power supply.

Three–phase

Do NOT operate package on any unsymmetrical power supply. Also do NOT operate package on power supplies like, for example, a three–phase (open) delta or three–phase star with non–earthed neutral.

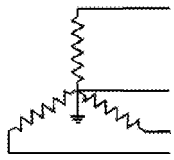
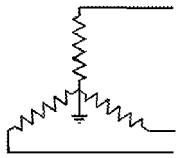


Fig. 1 Three–phase star (wye); four wire; earthed neutral



2.9.2 Power supply specifications

The following multi–strand copper core wires are given according to 2005 NEC 310.15, Table 310.16 for 40 °C ambient temperature.

If other local conditions prevail, like for example high temperature, the cross section should be checked and adjusted according to 2005 NEC 110.14©, 220.3, 310.15, Table 310.16, 430.6, 430.22, 430.24 and other local codes.

Dual element time delay fuses are selected according to 2005 NEC 240.6, 430.52 and tables 430.52, 430.248 and 430.250.

We strongly suggest using a separate copper conductor for the equipment GROUNDING. NEC Table 250.122 will point out the "minimum size", however, we recommend a ground conductor the same size as the power leads, if local codes allow.

Rated power supply: 575 V/3 – ph/60 Hz

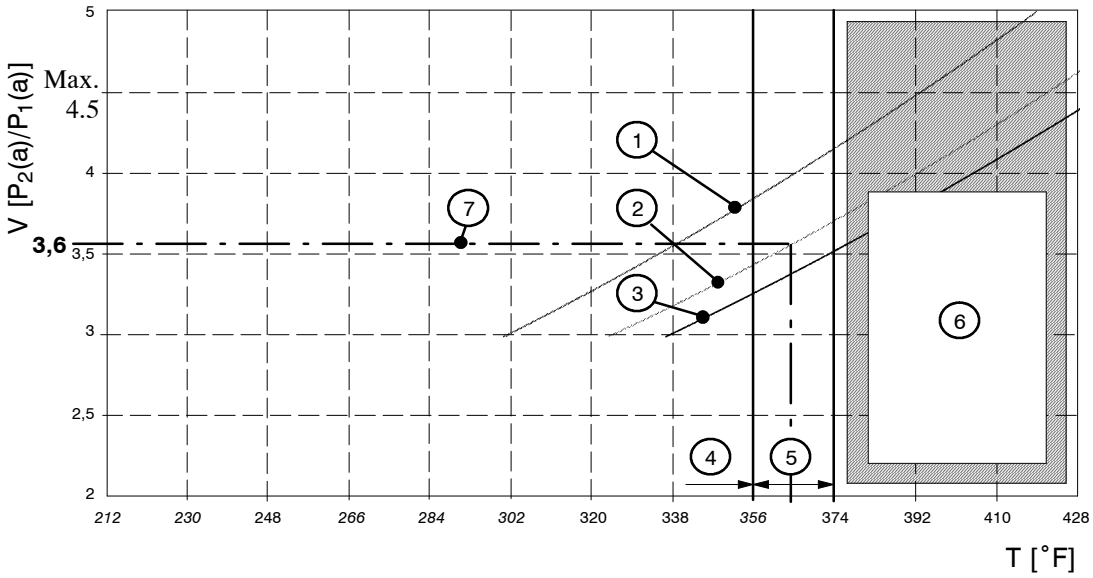
	Mains fuses [A]	Supply cable	Consumption [A]
N 502 – G	25	AWG 10	18.7

Tab. 13 Supply

2.10 Machine Duty Cycle

The permissible duty cycle of the machine is related to the compression ratio (final pressure P_2 absolute / inlet pressure P_1 absolute), the ambient temperature and the compressed air inlet temperature.

The maximum compression ratio is 4.5:1



Tab. 14 Machine duty cycle

V Compression ratio
T Discharge temperature
1 Ambient temperature 86 °F, inlet temperature 95 °F
2 Ambient temperature 104 °F, inlet temperature 113 °F
3 Ambient temperature 113 °F, inlet temperature 122 °F
4 Duty cycle up to 100%
5 Duty cycle up to 80%
6 prohibited zone
7 Example (inlet pressure 174 psig, discharge pressure 653 psig)

$$\text{Duty cycle [\%]} = \frac{\text{time under load}}{\text{time under load + standstill time}} \times 100$$

☞ Duty cycle = the proportion of time on load to the total duration of an operating cycle.

Example:

Inlet pressure: 174 psig

Discharge pressure: 653 psig

Compression ratio: 667 psi (a) / 189 psi (a) = 3.6

Ambient temperature: 104 °F, inlet temperature 113 °F

$$\frac{\text{24 minutes}}{\text{30 minutes}} \times 100\ \% = 80\ \%$$

3 Safety and Responsibility

DANGER

Disregard of these instructions can result in serious injury.

☞ Read the service manual carefully and take notice of the contents for safe machine operation.

The machine is manufactured to the latest engineering safety standards and acknowledged safety regulations. Nevertheless, dangers can arise through its operation:

- Danger to life and limb of the operator or third parties
- Detrimental to the machine and property.

☞ Use this machine only if it is in a technically perfect condition and only for the purpose for which it is intended, observing all safety measures and the instructions in the service manual.

☞ In particular, immediately rectify (have rectified) any faults that could be detrimental to safety.

3.1 Proper Use

- The machine is intended solely for industrial use in generating compressed air. Any other use is considered incorrect. The manufacturer is not liable for any damages resulting from unspecified use or application. The responsibility, in case, lies solely with the user.
- Specified use also includes compliance with the instructions in this manual.

☞ Operate the machine only within its performance limits and under the permitted ambient conditions.

3.2 Improper Use

☞ Never direct compressed air at persons or animals.

☞ Do not use untreated compressed air for breathing purposes.

☞ Do not use untreated compressed for any application that will bring it into direct contact with food products.

☞ Cooling air, warmed after passing through the machine, may be used for heating purposes but only when it poses no health risk to humans or animals. If necessary, the warmed cooling air should be treated to render it harmless.

☞ Do not allow the machine to take in toxic, acidic, flammable of explosive gases or vapors.

☞ Do not operate the machine in areas in which specific requirements with regard to explosion protection are applied.

3.3 User's Responsibilities

Observe statutory and accepted regulations.

Observe relevant statutory and accepted regulations during installation, operation and maintenance of the machine.

For example: nationally applied European directives and/or valid national legislation, safety and accident prevention regulations.

3.3.1 Qualified personnel

Ensure that operating, installation and maintenance personnel are qualified and authorized to carry out their tasks.

These are people who, by virtue of their training, knowledge and experience as well as their knowledge of the prevailing conditions, can assess the work to be done and recognize the possible dangers involved.

Operating personnel

Authorized operating personnel:

- must be adult,
- must be conversant with and adhere to the safety instructions and sections of the service manual relevant to operation of the machine,
- must have received adequate training and authorization to operate electrical and compressed air devices
- in the case of machines with refrigeration dryers, they must have training and qualification for safe operation of refrigeration devices.

Installation and maintenance personnel

Authorized installation and maintenance personnel:

- must be adult,
- must have read, be conversant with and adhere to the safety instructions and sections of the service manual applicable to installation and maintenance,
- must be fully conversant with the safety concepts and regulations of electrical and compressed air engineering,
- in the case of machines with refrigeration dryers, must be conversant with safety concepts and regulations relating to refrigeration equipment,
- must be able to recognize the possible dangers of electrical and compressed air devices and take appropriate measures to safeguard persons and property,
- in the case of machines with refrigeration dryers, must be able to recognize the possible dangers of refrigeration devices and take appropriate measures to safeguard persons and property,
- must have received adequate training and authorization for the safe installation and maintenance on these machines.

3.3.2 Adherence to inspection schedules and accident prevention regulations

The machine is subject to local inspection schedules.

3.4 Dangers

The general safety instructions in this chapter show possible dangers and how to deal with them.

Special safety instructions are found in this service manual at the beginning of each chapter or directly before operating instructions.

3.4.1 Safely dealing with sources of danger

Information concerning the various forms of danger that can arise in connection with machine operation are found here.

Electricity

- ☞ Allow only qualified electricians or trained personnel under the supervision of a qualified electrician to carry out work on electrical equipment according to electrical engineering regulations.
- ☞ Before initial start–up, make sure that adequate protection against electric shock from direct or indirect contact with the machine is provided and checked.
- ☞ Isolate all phases of the main power supply.
- ☞ Check and ensure that no power is present.
- ☞ Switch off any external power sources.
  These could be connections to floating contacts or electrical machine heating, for example.
- ☞ Use fuses corresponding to machine power.
- ☞ Check regularly that all electrical connections are tight and in order.

Pressure forces

Compressed air is contained energy. Uncontrolled release of this energy can cause serious injury or death.

Before working on a pressurized system:

- ☞ close shut–off valves or otherwise isolate the machine from the compressed air system to ensure that no compressed air can flow back into the machine,
- ☞ vent all pressurized components and enclosures.
- ☞ Do not carry out welding, heat treatment or mechanical modifications to pressurized components (e. g. pipes and vessels) as this influences the component's resistance to pressure.
  The safety of the machine is then no longer ensured.

Compressed air quality

- ☞ Install appropriate air treatment systems before using compressed air from this machine as breathing air and/or for the processing of foodstuffs.
- ☞ Never directly inhale compressed air.
- ☞ Use foodstuff–compatible compressor oil whenever compressed air can come into contact with foodstuffs.

Spring tension

Springs under tension or compression represent contained energy. Uncontrolled release of this energy can cause serious injury or death.

Pressure relief valves and check valves are spring loaded.

- ☞ Do not open or dismantle such valves.

Rotating components

Touching the fan while the machine is running can result in serious injury.

- ☞ Do not open the enclosure or covers while the machine is running.
- ☞ Isolate all phases of the main power supply.
- ☞ Check and ensure that no power is present.
- ☞ Wear close–fitting clothes and a hair net, if necessary.
- ☞ Make sure all covers and safety guards are in place and secured before starting.

Temperature

- ☞ Avoid contact with hot components.
  These include compressor blocks, compressed air pipes, coolers, motors and machine heaters, for example.
- ☞ Wear protective clothing.
- ☞ If welding is carried out on or near the machine take adequate measures to ensure that sparks or heat cannot ignite parts of the machine or oil vapours.

Noise

- ☞ Operate the machine only with full soundproofing.
- ☞ Wear hearing protection if necessary.
  The pressure relief valve blowing off can be particularly loud.

Operating materials

- ☞ Strictly forbid fire, open flame and smoking.
- ☞ Follow safety regulations when dealing with lubricants and chemical substances.
- ☞ Avoid contact with skin and eyes.
- ☞ Do not inhale oil mist or vapor.
- ☞ Do not eat or drink while handling cooling and lubricating fluids.
- ☞ Keep suitable fire extinguishing agents ready for use.
- ☞ Use only KAESER approved operating materials.

Unsuitable spare parts

- ☞ Use only spare parts approved by the manufacturer for use in this machine. Unsuitable spare parts compromise the safety of the machine.
- ☞ Use only genuine KAESER parts for pressurized components.

Conversion or modification of the machine

- ☞ Modifications or changes to the machine may only be carried out by an authorized KAESER Service representative.

Extension or modification of the compressed air system

- ☞ If a compressed air system is to be extended or modified, check the blow–off capacity of the safety relief valves on air receivers and pipework before installing the new machines.
- ☞ Safety relief valves of insufficient blowoff capacity must be replaced by valves with a higher capacity.

3.4.2 Safe machine operation

Information on safe conduct when handling the machine is found here.

Transport

- ☞ Use suitable lifting gear that conforms to local safety regulations.
- ☞ Attach lifting gear only to suitable lifting points on the machine.
- ☞ Note the centre of gravity to avoid danger of the machine tipping over.
- ☞ Make sure the danger zone is clear of personnel.

Installation

- ☞ Make sure no power is applied when electrical connections are made.
- ☞ Only use only electrical cables that are suitable and approved for the surroundings and electrical loads applied.
- ☞ Never dismantle compressed air pipes until they are fully vented.
- ☞ Only use pressure lines that are suitable and approved for the maximum working pressure and the intended medium.
- ☞ Do not allow connection pipes to be placed under mechanical stress.
- ☞ Do not step onto machine components to climb up the machine.

Installation

- ☞ Install the machine in a suitable compressor room.
  If installed outdoors, the machine must be protected from frost, direct sunlight, dust, rain and splashing water.
- ☞ The machine is not explosion–proof.
  Do not operate in areas in which specific requirements with regard to explosion protection are in force.
  For instance, the requirements of the ATEX directive 94/9/EC ”Equipment and Protective Systems for use in Explosive Atmospheres”.
- ☞ Ensure adequate ventilation.
- ☞ Ensure the required ambient conditions are kept to:
  - Ambient temperature and humidity.
  - Clean compressed inlet air from the low pressure network with no damaging contaminants.
  - Compressed inlet air from the low pressure network free of explosive or chemically unstable gases and vapours.
  - Compressed inlet air from the low pressure network free of acid/alkaline forming substances, particularly ammonia, chlorine or hydrogen sulphide.
- ☞ Do not position the machine in warm exhaust air from other machines.
- ☞ Ensure accessibility so that all work on the machine can be carried out without danger or hindrance.

Operation

- ☞ Carry out regular inspections:
  - for visual damage,
  - of safety devices,
  - of parts needing monitoring.
- ☞ Never operate machines drawing in air from the surroundings without an air filter.
- ☞ Where the machine is equipped with a sound enclosure make sure it is closed during operation to ensure safety and function (correct cooling).

Maintenance

- ☞ Make sure the machine is disconnected from electrical power and vented before commencing any work.
- ☞ Wear close–fitting, flame–resistant clothing. Wear protective clothing as necessary.
- ☞ Do not leave any loose components, tools or cleaning rags on or in the machine.
- ☞ Components removed from the machine can still be dangerous:
  Do not attempt to open or destroy any components taken from the machine.

Decommissioning / disposal

- ☞ Drain out fluids and dispose of according to environmental regulations.
  These include, for example, lubricating oil or compressor oil.
- ☞ Dispose of the machine in accordance with local environmental regulations.

3.4.3 Taking organisational measures

- ☞ Designate personnel and their responsibilities.
- ☞ Give clear instructions on reporting faults and damage to the machine.
- ☞ Give instructions on fire reporting and fire–fighting measures.

3.4.4 Hazard areas

The table gives information on the hazard areas dangerous to personnel.

Only authorized personnel may enter these areas.

Action	Hazard area	Authorised personnel
Transport	10 ft. perimeter around the machine	Installation personnel for preparation of transport. No personnel during transport.
	Beneath the lifted machine.	No personnel!
Installation	Within the machine. 3 ft. perimeter around machine and power supply cables.	Installation personnel
Operation	3 ft. perimeter around the machine	Operating personnel
Maintenance	Within the machine. 3 ft. perimeter around the machine	Maintenance personnel

Tab. 15 Hazard areas

3.5 Safety Devices

Do not change, bypass or disable safety devices.

Do not remove or obliterate labels and notices.

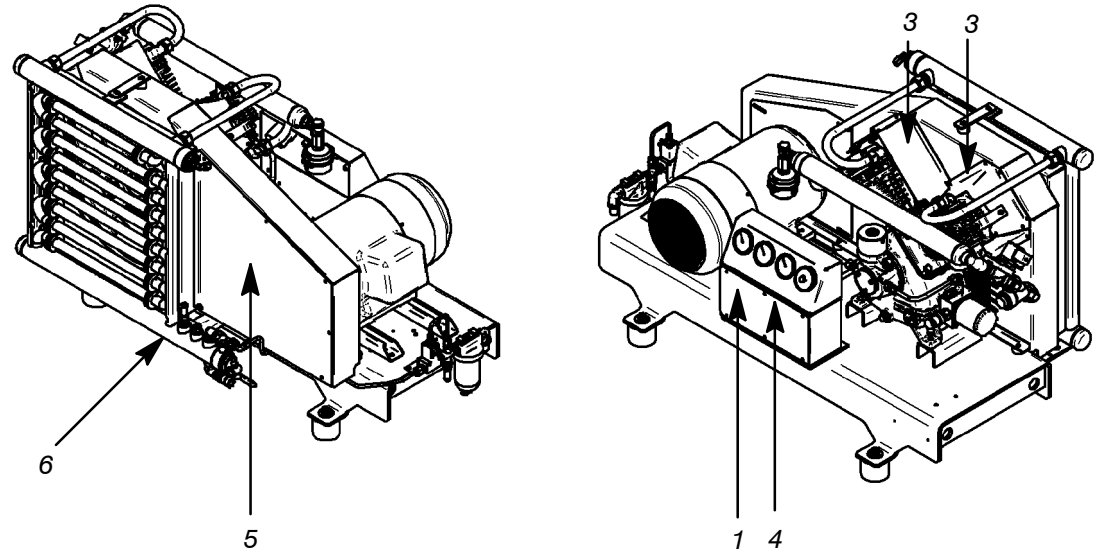
Ensure that labels and notices are clearly legible.

More information on safety devices is contained in chapter 4 'Design and Function', section 4.3 'Safety Devices'.

3.6 Safety Signs

The table lists the various safety signs used and their meanings. The diagram shows the positions of the signs on the machine.

Position	Sign	Meaning
1		**Voltage** Touching electrically live components can cause serious injury or death. ☞ Isolate completely from power supply (all conductors) and ensure that the power supply cannot be switched on again (locked off). ☞ Check that no voltage is present.
2		**Hot surface** Danger of burns from touching hot components. ☞ Do not touch the surface ☞ Let the machine cool down. ☞ Wear long–sleeved garments (not synthetics such as polyester) and protective gloves.
3		**Automatic starting** Servere injury could result from rotation components, electrical voltage and air pressure. ☞ Isolate completely from power supply (all conductors) and ensure the supply cannot be switched on again (lock off). ☞ Check that no voltage is present.



3.7 Emergencies

3.7.1 Fire fighting

☞ Immediately disconnect the machine's voltage supply.

If applicable:

☞ Cooling water: Shut – off cooling water supply.

Suitable extinguishing agents:

- Foam
- Powder
- Carbon dioxide
- Sand or earth

Unsuitable or unsafe extinguishing agents:

- Intense water jet.

3.7.2 Compressor Oil

Skin contact:

☞ wash off immediately

Eye contact:

☞ rinse thoroughly with lukewarm water and seek medical assistance.

If necessary, request a copy of the safety data sheet for KAESER compressor oils.

3.8 Environmental Protection

Do not allow compressor oil to escape to the environment or into the sewage system.

Store and dispose of operating materials and replaced parts in accordance with local environment protection regulations. Observe national regulations. This applies particularly to parts contaminated with compressor oil.

Do not allow condensate to flow into the sewage system.

Collect condensate in a suitable container and dispose of in accordance with environment regulations. Observe national regulations.

Obtain advice from KAESER on suitable drain lines and containers.

3.9 Warranty

This service manual contains no independent warranty commitment.
Our general terms and conditions of business apply with regard to warranty.

A condition of our warranty is that the machine is used for the purpose for which it is intended under the conditions specified.
Due to the multitude applications for which the machine is suitable the obligation lies with the user to determine its suitability for his specific application.

☞ Obtain confirmation from the manufacturer that the machine is suitable for your specific application.

Furthermore, we accept no warranty obligation for:

- the use of unsuitable parts or operating materials,
- unauthorized modifications,
- incorrect maintenance,
- incorrect repair.

Correct maintenance and repair includes the use of genuine KAESER spare parts and operating materials.

4 Design and Function

4.1 Machine Overview

4.1.1 Primary components

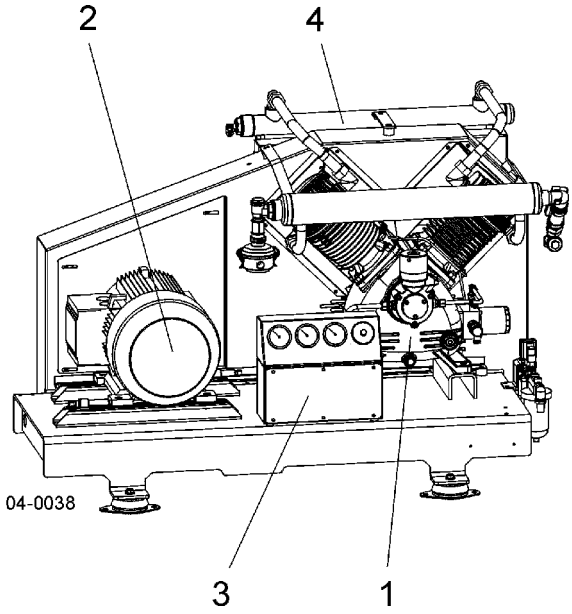


Fig. 2 Major Components

1 Compressor block
2 Drive motor
3 Terminal box
4 Compressed air aftercooler

4.1.2 Function

Items in brackets [ ] correspond to the P & I diagram in chapter 13.1.1.

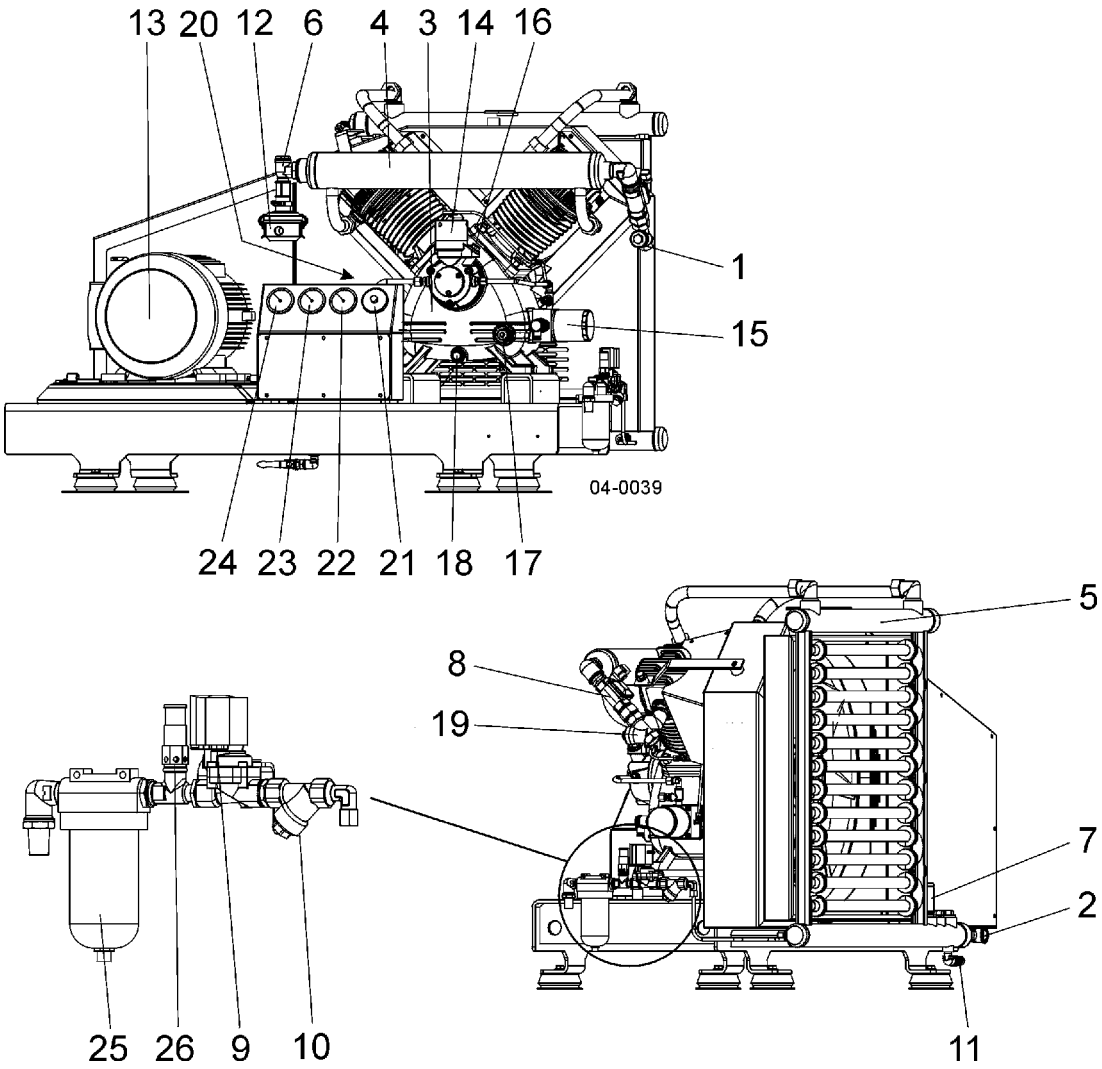


Fig. 3 Machine Layout

1 *Inlet port; inlet from the low−pressure network*
2 *Compressed air outlet to the high−pressure network*
3 *Compressor block, compresses the inlet air [1]*
4 *Collecting pipe, collects the incoming air and allows it to settle*
5 *Aftercooler; collects the compressed air, allows it to settle and dissipates the heat of compression through the cooling fins [13]*
6 *Check valve; prevents the escape of compressed air to the atmosphere under LOAD [21.1]*
7 *Safety valve; protects the compressor block against excessive pressure [22]*
8 *Solenoid valve on the compressed air inlet [8]*
9 *Solenoid valve; vents the machine during the STANDSTILL phase [13.3]*
10 *Dirt trap in the venting line; protects the solenoid valve [13.2]*
11 *Condensate drain [13.1]*
12 *Air filter; cleans the inlet air during the IDLE phase [21]*
13 *Electric motor; drives compressor block [3]*
14 *Crankcase vent with oil filter [1.3]*
15 *Crankcase oil filter; cleans the compressor oil circulated by the pump integrated in the crankcase [1.15]*
16 *Oil filler*
17 *Oil level sight glass*
18 *Oil drain plug*
19 *Dirt trap in the compressed air inlet; cleans the compressed inlet air [19]*
20 *Dirt trap in the oil circuit; protects the oil pump [1.10]*
21 *Temperature gauge switch; measures the compressed air discharge temperature and switches the machine off if maximum temperature is reached [20]*
22 *Oil pressure gauge [1.9]*
23 *Inlet pressure gauge [17]*
24 *Final pressure gauge [17.2]*
25 *Filter; traps condensate and dirt [13.13]*
26 *Safety valve; protects the filter from excessive pressure [13.5]*

Machine

Air from a low pressure compressed air network is drawn through the inlet port and collecting pipe into the machine's compression chamber. It is drawn in through the valve plate in the cylinder head during the downward travel of the piston from the top dead centre to the bottom dead centre positions. The air drawn into the compression chamber is compressed by the piston's upward stroke. When the pressure in the chamber exceeds that in the exhaust port, the exhaust valve opens.

The compressed air passes through the aftercooler to the compressed air outlet.

4.1.3 Short description

The compressor block is driven by an electric motor via V−belts.

The block has two cylinders.

The belt pulley on the compressor crankshaft also serves as a fan to blow a stream of cooling air over the machine. Cooling fins on the cylinder and cylinder head dissipate heat.

Two solenoid venting valves are installed to allow an unloaded compressor start.

- A solenoid valve (closed when de−energized) prevents the flow of low pressure air into the machine during standstill.
- A second valve (open when de−energized) vents pressure in the pipe between the machine outlet and the user's check valve during STANDSTILL.

Points needing lubrication are supplied by an oil pump. In a parallel circuit oil is pumped through a filter and returned to the crankcase. A pressure switch shuts down the machine if the oil pressure is too low.

A pressure switch ensures that the compressor only runs within the permitted inlet pressure range.

A filter is installed in the venting line. Controlled by a solenoid valve (open when de–energized), accumulating liquid (condensate and dirt) is trapped in the filter bowl. A safety relief valve is installed to protect the filter.

4.2 Operating and Control Modes

4.2.1 Operating modes

There are three operating modes:

- LOAD: The solenoid inlet valve is open and the solenoid venting valve is closed. The compressor block delivers compressed air to the compressed air system.
  The drive motor runs under full load.
- IDLE: The solenoid inlet valve is closed. The check valve isolates the machine from the compressed air system. The aftercooler vents via the solenoid venting valve.
  A small volume of air circulates from the air filter on the inlet collector pipe into the compressor block and through the solenoid venting valve back to the atmosphere.
  The drive motor runs without load and consumes very little power.
- STANDSTILL: The solenoid inlet valve is closed. The check valve isolates the machine from the compressed air system. The aftercooler is vented by the solenoid venting valve.
  The drive motor is stopped.

4.2.2 Control modes

Using the selected control mode, the controller switches the compressor between the three operational modes to maintain system pressure between the set minimum and maximum values independent of actual air consumption.

4.3 Safety Devices

4.3.1 Existing safety devices

The following safety devices are provided and may not be modified:

- Safety relief valve
  The safety relief valve protects the system from excessive pressure. This is factory set.
- The housing and covers for moving parts and electrical connections.
  Protect against accidental contact.

4.3.2 Safety devices required

The user must provide adequate safety and regulating devices for safe operation of the machine.

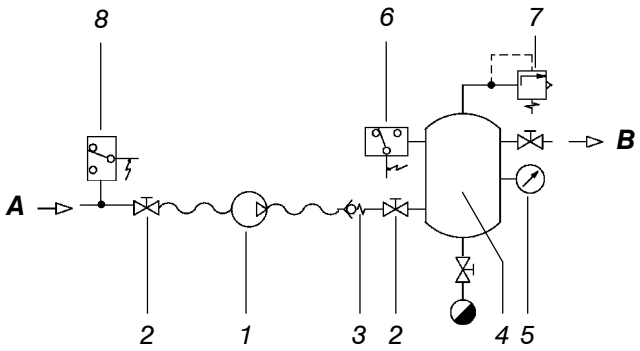


Fig. 4 Safety devices required

A	*Connection from the low pressure network*	*4*	*Pressure vessel.*
B	*Connection to the high pressure network*	*5*	*Pressure gauge*
1	*Machine*	*6*	*Pressure switch*
2	*Shut–off valve*	*7*	*Safety relief valve*
3	*Check valve*	*8*	*Pressure switch monitoring inlet pressure*

Motor protection

The machine may only be used with a correctly set motor protection device.

Failure to observe this invalidates warranty rights.

To ensure shut down in the event of a fault, three–phase motors must be equipped with thermal overload protection.

Protective devices include:

- overload protection cut–out
- motor protection switch

See motor nameplate for rated motor current.

Pressure switch

A pressure switch must be provided that controls the compressor within permitted pressure limits and regulates system pressure in the network.

- Cut out: at the latest when the maximum working pressure is reached.
- Cut in: at a pressure related to the compressor's permissible duty cycle.

Check valve

The sizing of the check valve is dependent on the maximum working pressure and the cross–section of the connection between the compressor and the air network.

Install a check valve to prevent backflow of compressed air out of the network.

Install the valve between the compressed air outlet and the user's shut off valve.

Provide means of venting in the pipeline between the machine and the check valve and between the check valve and the user's shut–off valve.

Pressure gauge

The pressure gauge should be selected to suit maximum working pressure.

Safety relief valve

Install a safety relief valve to protect the air receiver against an impermissible rise in pressure.

Pressure switch monitoring inlet pressure

Monitoring of inlet pressure is mandatory.

Install an inlet pressure switch to ensure safe operation of the compressor.

Installation possibilities:

- in the inlet line, or
- in the upstream air receiver

4.4 Accessories

4.4.1 Sound enclosure (see chapter 6.7)

The compressor may be retrofitted with a sound enclosure to reduce noise emission.

5 Installation and Operating Conditions

5.1 Surroundings

☞ Strictly forbid fire, open flame and smoking.

☞ If welding is carried out on or near the machine, take adequate measures to prevent sparks or heat from igniting oil vapours or parts of the machine.

☞ The machine is not explosion–proof.
Do not operate in areas in which specific requirements with regard to explosion protection are in force.
For instance, the requirements of ATEX directive 94/9/EC ”Equipment and protective systems intended for use in potentially explosive atmospheres”.

☞ Ensure that required ambient conditions are kept to:

- Ambient temperature and humidity
- Clean compressed inlet air from the low pressure network with no damaging contaminants.
- Compressed inlet air from the low pressure network free of explosive or chemically unstable gases and vapours.
- Compressed inlet air from the low pressure network free of acid/alkaline forming substances, particularly ammonia, chlorine or hydrogen sulphide.

☞ Keep suitable fire extinguishing agents ready for use.

5.2 Installation Conditions

5.2.1 Place of Installation and Distances

Pre–condition: The floor must be level, firm and capable of bearing the weight of the machine.

The distances given are recommended and ensure unhindered access to all machine parts.
Please consult authorized KAESER Service representative if they cannot be kept to.

☞ If installed outdoors, the machine must be protected from frost, direct sunlight, dust and rain.

☞ Ensure accessibility so that all work on the machine can be carried out without danger or hindrance.

CAUTION

Damage to the machine by hot exhaust air.

☞ If the machine is installed together with other plant (compressors, refrigeration dryers, etc.), then under no circumstances may hot cooling air from other plant be directed to the cooling air inlet end of the compressor.

5.2.2 Prevention of thermal problems

- Ensure adequate air inlet and outlet apertures in the room (see chapter 5.2.3).
- Correct location of the apertures (constant airflow).
- Correct machine positioning (all machines must be able to draw in cool fresh air).
- Hot exhaust air must leave the room by the shortest direct path.
- Make sure the maximum duty cycle is not exceeded (see chapter 2.10).

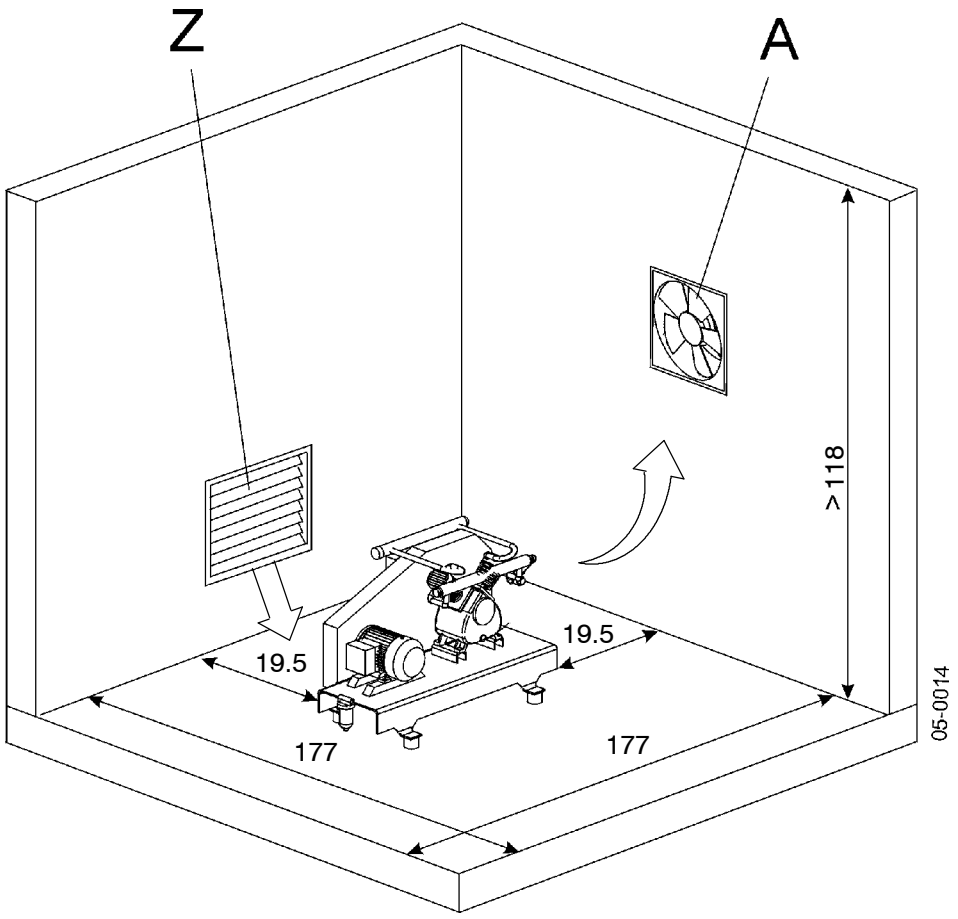


Fig. 5 Machine installation recommendation, dimensions [inches]

A Extractor fan
Z Cooling air inlet aperture

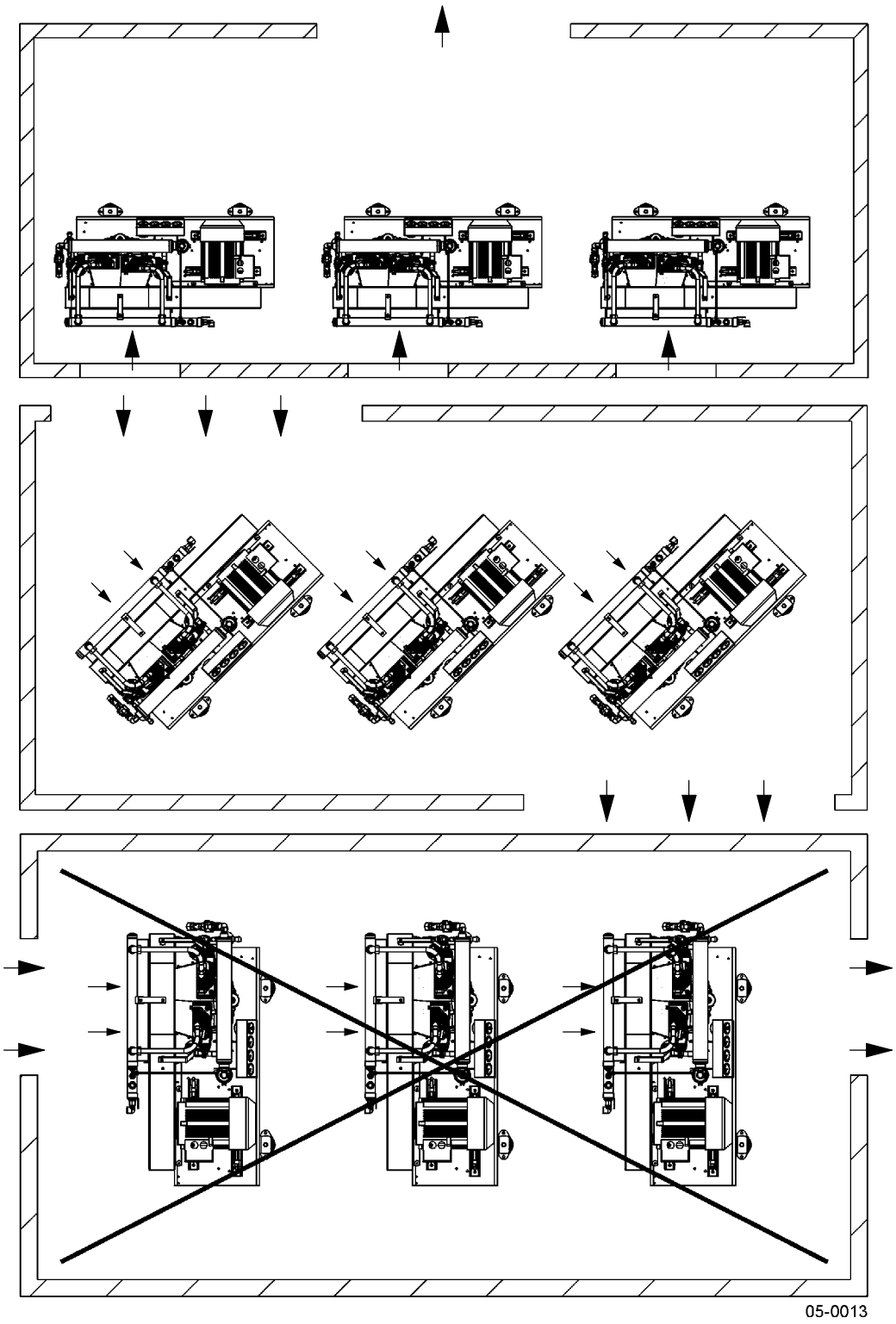


Fig. 6 Installation recommendation, with other machines

5.2.3 Ventilation

Values given are minimum guide values.

If cooling air is insufficient a dangerous vacuum can build up in the compressor room.

- ☞ Make sure that cooling air flows around the machine.
- ☞ Ensure that the volume of air flowing into the compressor room is at least equivalent to that being removed by the exhaust fan.
- ☞ Make sure that the machine and exhaust fan can only operate when the inlet aperture is actually open.

Model	**N 502 – G**		
Rated motor power [hp]	15	20	25
Inlet aperture [sq.ft]	10	16	16
Extractor fan (A) for forced ventilation: Required air flow [cfm] under natural static thrust conditions and max. duty cycle (△T 10K)	1942	2648	3237

Tab. 16 Ventilation

5.2.4 Operation in a compressed air system

When the machine is connected to a copmpressed air system, the system working pressure must not exceed the permissible inlet and working pressures of the machine.

Do not hesitate to contact authorized KAESER Service representative in this respect.

6 Installation

6.1 Safety

DANGER

Dangerous voltage!

There is danger of fatal injury caused by contact with live components.

☞ Isolate all phases of the main power supply.
(switch off the mains supply disconnecting device)

☞ Ensure that the power supply cannot be switched on again (locked off).

☞ Check that no voltage is present.

WARNING

Uncontrolled discharge of compressed air!

Serious injury or death can result from loosening or opening components under pressure.

☞ Vent all pressurized components and chambers completely.

CAUTION

Solenoid valves and check valves are spring–loaded.

☞ Isolate the machine from the air main by closing the user's compressed air inlet and outlet shut–off valves.

☞ Inlet and outlet pressure gauges must read 0 psig.

Installation work may only be carried out by authorised personnel!

All function parts are factory set.
Do not change these settings without the permission of the manufacturer.

6.2 Reporting Transport Damage

☞ Check the machine for visible and hidden transport damage.

☞ Inform the carrier and the manufacturer in writing of any damage found.

6.3 Fitting Equalising Shims

CAUTION

There is a danger of tipping because of a shift of the center of gravity and weight of the machine.

☞ Drive a fork lift carefully under the machine and lift slightly.

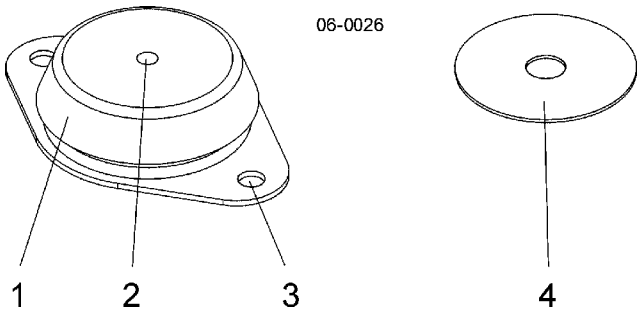


Fig. 7 Equalising shim

1 Machine mounting
2 Threaded hole for fixing the mounting under the machine
3 Holes for anchor bolts to fix the mounting to the floor
4 Shim to correct for uneven floor level

☞ Determine the positions where the shims are to be installed.

☞ Lift the machine.

☞ Remove the bolts retaining the corresponding machine mountings.

☞ Insert the shim between the compressor and the machine mounting.

☞ Bolt down the machine mounting.

If the machine is equipped with a sound enclosure, the rear panel of the enclosure must be fitted before the machine mountings are bolted to the floor.

☞ Lower the machine and bolt the machine mountings to the floor with anchor bolts.

6.4 Making the Compressed Air Connections

Pre–condition: The compressed air system is at atmospheric pressure.

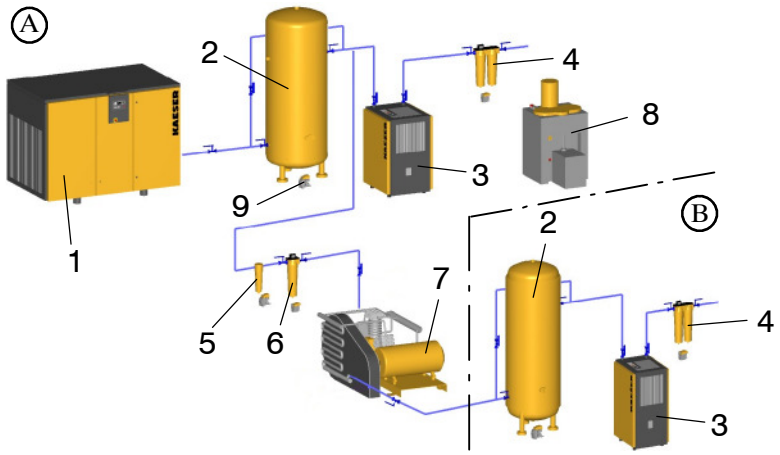


Fig. 8 Schematic diagram of compressed air connections

A Low pressure network (73 – 190 psig)
B High pressure network (up to 653 psig)
1 Rotary screw compressor
2 Air receiver
3 Refrigeration dryer
4 Microfilter combination
5 Optional cyclone separator
6 Microfilter
7 Booster
8 Oil/water separator
9 Condensate drain

6.4.1 Connection to the low–pressure system

☞ Connecting to the low pressure system via a pipe connection.

Pipe connection:

- Swan neck

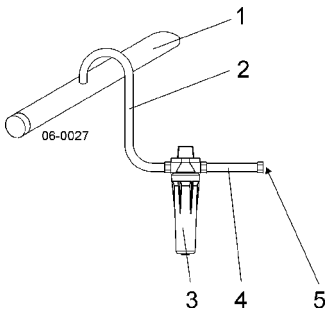


Fig. 9 Low pressure system connection

1 Compressed air pipe
2 Low pressure system
3 Microfilter
4 Hose
5 Machine (low pressure compressed air inlet)

A microfilter must be installed to ensure safe operation of the machine.

This removes condensate and dirt from the air.

☞ Installing a hose connection between the microfilter and the machine.

Inlet air quality at the machine:

- Humidity: max. 100% (drip free)
- Particles: ≦ 1 µm

The machine must run in IDLE for approximately three minutes before shutdown to ensure that the inlet pipe is dry (IDLE control is compulsory).

6.4.2 Connection to the high–pressure system

☞ Connect the machine to the high–pressure system via a hose.

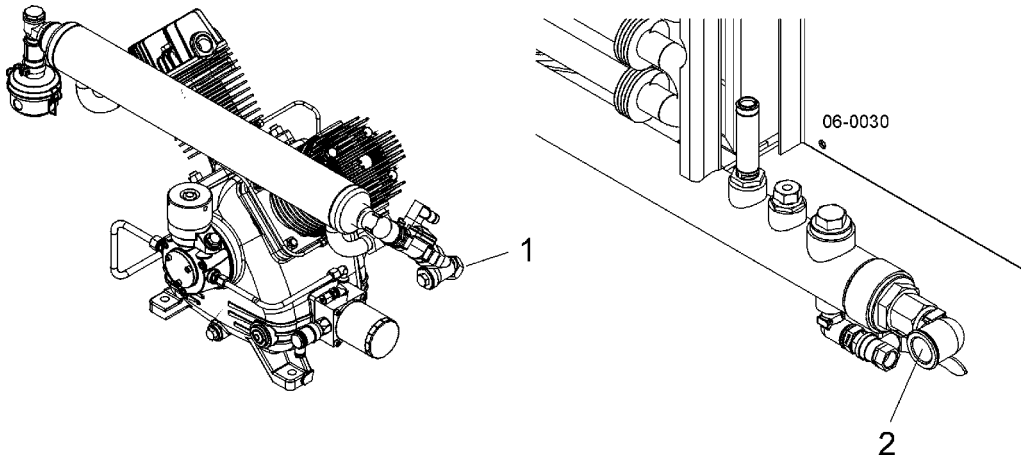


Fig. 10 High pressure system connection

1 Machine (low pressure compressed air inlet)
2 Machine (high pressure compressed air outlet)

6.5 Making the Power Supply Connection

Main power supply and overcurrent protection must be installed by a qualified electrician in accordance with NEC, OSHA, and any applicable local codes.

Use wire conductor dimensions and fuse ratings in accordance with local regulations. Guide values are given in chapter 2.9.

☞ The user must provide the machine with a lockable supply–disconnecting device. This could be, for example, a disconnect switch with fuses. If a circuit breaker is used it must be suitable for the motor starting characteristics.

Before initial start–up:

☞ Connect the machine to the main power supply as detailed in the electrical diagram in chapter 13.1.3.

☞ If a star–delta starter is used, the electrical diagrams are supplied with the controller.

6.6 Controller Design

Use a controller designed to EN 60 204 for the connection to the power supply.

The machine is fitted with a normally closed solenoid valve in the compressed air inlet and a normally open solenoid valve in the venting line.

The following components are already wired in the terminal box fixed to the machine, see diagram in chapter 13.1.3.

– Five cables are fed into the terminal box:

1	Oil pressure switch (17 psig).
2	Inlet pressure switch (to be installed by user)
3	Solenoid valve on the inlet
4	Solenoid valve in the venting line
5	Temperature gauge switch with floating relay contacts

– One cable is fed out of the terminal box:

1	Cable for oil pressure switch, inlet pressure switch (user's), solenoid valves in the air inlet and venting line.

The additional electrical components required for the controller should be designed to suit the motor power (see chapter 2.7).

The motor and cables from the terminal box are wired in the controller.
Note the following:

– The oil pressure switch (1.2 bar) must be bypassed during the motor run–up phase and switch the machine off at a pressure of < 14.5 psig

– The user's inlet pressure switch must switch the machine ON at a pressure higher than p_{ON} and to IDLE at a pressure lower than p_{OFF}.

If a lower final pressure is required, the inlet pressure set on the inlet pressure switch (see chapter 7.6) can also be changed, corresponding to the compression ratio.

The ratio of inlet to final pressure should not be higher than 1:4.5

CAUTION

If the pressure in the inlet pipe falls below p_{OFF} under LOAD, the user's inlet pressure switch will switch the machine to IDLE.

If, during IDLE, the inlet pressure falls below p_{OFF}, the machine will only switch to LOAD again when pressure p_{ON} is reached.

Inlet pressure switch (fitted by the user)	System pressure switch fitted by the user	Machine
$p > p_{ON}$	$p_{min} < p < p_{max}$	starts up
$p > p_{OFF}$	$p < p_{max}$	runs under LOAD
$p > p_{OFF}$	$p = p_{max}$	switches to IDLE
$p > p_{OFF}$	$p = p_{min}$	switches to LOAD *
$p < p_{OFF}$	$p_{min} < p < p_{max}$	switches to IDLE *
$p < p_{ON}$	$P_{min} < p < p_{max}$	remains or switches to IDLE *

* It is useful to allow for these controller alarms by indicating them with a signal.

Tab. 17 Pressure switch settings

p Pressure in the inlet line
p_{ON} Cut–in pressure of the user's inlet pressure switch
p_{OFF} Cut–out pressure of the user's inlet pressure switch
p_{min} Cut–in point of the user's system pressure switch
p_{max} Cut–out point of the user's system pressure switch

Example of a machine with 145 psig inlet pressure and 653 psig final pressure:

p_{ON} = 145 psig; p_{OFF} = 138 psig
p_{min} = 609 psig; p_{max} = 653 psig

6.7 Sound Enclosure (accessory)

The compressor may be retrofitted with a sound enclosure to reduce noise emission.

The sound enclosure is supplied ready assembled. It must be dismantled for fitting to the machine.

DANGER

Dangerous voltage!

There is danger of fatal injury caused by contact with live components.

☞ Isolate all phases of the main power supply.
(switch off the mains supply disconnecting device)

☞ Ensure that the power supply cannot be switched on again (locked off).

WARNING

Uncontrolled discharge of compressed air!

Serious injury or death can result from loosening or opening components under pressure.

☞ Close shut–off valves or otherwise isolate the machine from the compressed air system to ensure that no compressed air can flow back into the machine.

☞ Vent all pressurized components and chambers completely.

☞ The machine pressure gauge must read 0 psig.

6.7.1 Dismantling the sound enclosure

Note how the parts fit together.

☞ Open the snap fasteners and dismantle the enclosure.

6.7.2 Fitting the sound enclosure

Pre–condition: sufficient space around and above the machine, suitable lifting gear.

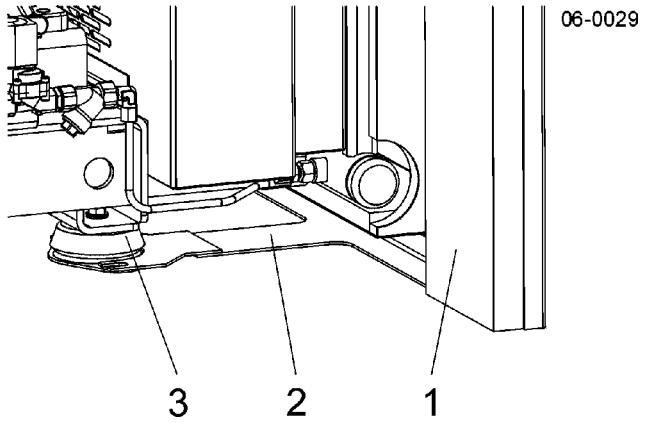


Fig. 11 Screw together the rear panel

1 Rear panel
2 Machine mounting bracket
3 Machine mounting

☞ If necessary, use suitable lifting gear to place the machine in its final operating position. (the belt guard is to the rear of the machine)

☞ Slide the rear panel with the mounting bracket onto the machine mountings and screw together.

☞ Lead the power supply cables through the rear panel and connect up according to the electrical diagrams.

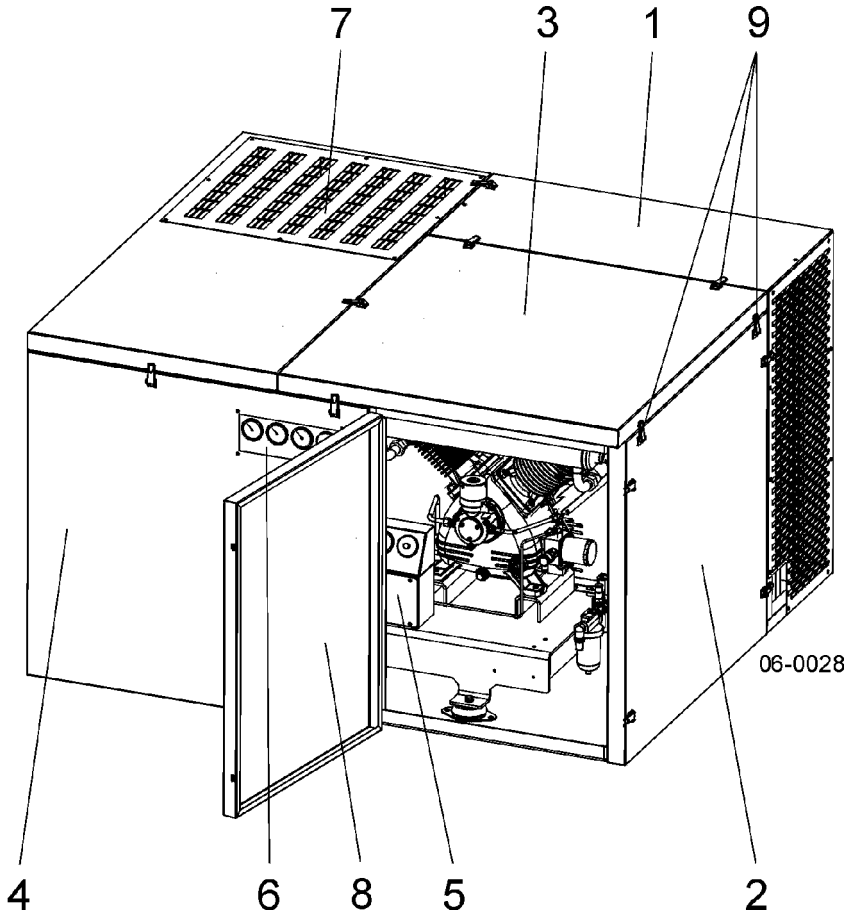


Fig. 12 Fitting the sound enclosure

1 *Rear panel*
2 *Side panel*
3 *Cover panel*
4 *Front panel*
5 *Terminal box*
6 *Control and instrument panel*
7 *Exhaust air aperture for the axial extractor fan*
8 *Door*
9 *Snap fastener*

☞ Use the copper pipe provided with the enclosure to connect the high–pressure gauge (final pressure p2) onto the compressed air cooler. (see P+I diagram for the connection point)

☞ Position the side panels to the rear panel and secure with the snap fasteners.

☞ Feed a flexible hose through the aperture in the enclosure and connect the machine to the low pressure air network.

☞ Feed a flexible hose through the aperture in the enclosure and connect the machine to the high pressure air network.

☞ Position the front and top panels and secure with snap fasteners.

☞ Connect the axial extractor fan supply according to the electrical diagrams.

If the machine does not start, the plug–in contact for the axial extractor is not plugged in.

☞ Install the instrument panel in the enclosure.

☞ Connect the high–pressure gauge (final pressure p2) to the copper pipe.

☞ Connect the machine to an external controller.

7 Initial Start–Up

7.1 Safety

DANGER

Dangerous voltage!

Contact with live components can cause serious injury or death.

☞ Isolate all phases of the main power supply.
(switch off the mains supply disconnecting device)

☞ Ensure that the power supply cannot be switched on again (locked off).

☞ Check that no voltage is present.

WARNING

Uncontrolled discharge of compressed air!

Serious injury or death can result from loosening or opening components under pressure.

☞ Close shut–off valves or otherwise isolate the machine from the compressed air system to ensure that no compressed air can flow back into the machine.

☞ Vent all pressurized components and chambers completely. Inlet and final pressure gauges must read 0 psig.

The start–up may only be carried out by authorized personnel!

Before switching on ensure that:

- no one is working on the machine,
- all panels are in place and secured,

7.2 Before Every Start–Up

Only a competent specialist may start the machine.

Incorrect or improper start–up can cause damage to the machine.

Special measures for start–up after storage

Storage period longer than...	Remedy
12 months	☞ Change the oil. ☞ Have the motor bearings checked by an authorized KAESER Service representative.
36 months	☞ Have the overall technical condition checked by an authorized KAESER Service representative.

7.3 Checking Installation and Operational Conditions

Check and confirm all the items in the checklist before starting the machine.

	Check that	Chapter	OK?
1	☞ Are all the installation conditions fulfilled?	5.2	
2	☞ User's lockable supply disconnecting device installed?	2.9	
3	☞ Does the power supply conform to the specifications on the nameplate?	2	
4	☞ Are the supply cable core cross–sections and fuse ratings adequate?	2.9.2	
5	☞ Have all electrical connections been checked for tightness?		
6	☞ Have shut–off valves been installed on the inlet and outlet?	6.4	
7	☞ Is the connection to the compressed air system made with a flexible hose?	6.4	
8	☞ Is there sufficient oil in the crankcase? (oil level in the red zone of the sight glass)	10.6	
9	☞ Is the overload protection cut–out set correctly with regard to the power supply?	7.4	
10	☞ Are the operators fully conversant with safety regulations?		
11	☞ Is the machine anchored to the floor?	6.3	
12	☞ Are all access doors closed and latched (sound enclosure) and all removable panels in place and secured?		
13	☞ Has an inlet pressure switch been installed by the user in the inlet or buffer receiver?	4.3.2	
14	☞ Make sure that no other compressed air components are located in the machine's hot exhaust air flow?	5.2.2	

Tab. 18 Installation conditions checklist

7.4 Setting the Overload Protection Cut–Out

Three–phase motors may only be operated with a correctly set overload protection cut–out.
Operating the machine without adequate overload protection is not permitted.
Operating without overload protection invalidates the warranty.

Drive motor: direct online starting

The overload protection cut–out is to be installed in the user's controller and set–up correspondingly.
It ensures shutdown of the machine at levels of current above its set value (rated motor current).

To prevent voltage fluctuations, temperature influences or component tolerances triggering the overload protection cut–out, the setting can be up to 10% higher than the rated motor current.

If the machine is shut down by the thermal overload protection cutout:

- ☞ Allow the motor to cool down.
- ☞ Switch the machine on again.

Drive motor: star–delta starting

In the star–delta configuration the phase current is fed via the overload protection cutout. This phase current is 0.58 times the rated motor current (see motor nameplate).

To prevent voltage fluctuations, temperature influences or component tolerances triggering the overload protection cutout, the setting can be up to 10% higher than the arithmetical phase current.

7.5 Checking Direction of Rotation

The machine is designed for a clockwise phase sequence.

- ☞ Check the direction of rotation with a phase sequence meter.
- ☞ If the drive motor turns in the wrong direction, swap motor supply phases L1 and L2.

Alternatively, the direction of rotation can be checked by briefly switching the machine on and off again.

- ☞ Switch the machine off as soon as the direction of rotation is seen and compare it with the arrow on the belt guard.

7.6 Installing the inlet pressure switch

Dangerous voltage!

DANGER Contact with live components can cause serious injury or death.

- ☞ Isolate all phases of the main power supply.
  (switch off the mains supply disconnecting device)
- ☞ Ensure that the power supply cannot be switched on again (locked off).
- ☞ Check that no voltage is present.

Safe operation of the machine is only guaranteed with inlet pressure monitoring.

Inlet pressure monitoring must be installed in the inlet pipe or on the air receiver upstream.

- ☞ See manufacturer's specification and and pressure diagram for the pressure switch setting.

7.6.1 Machine switching frequency from STANDSTILL to LOAD

Limited adjustment of the switching frequency from STANDSTILL to LOAD is possible by adjusting the switching differential. This is achieved by adjusting the inlet pressure switch setting.

See chapter 2.7.1 for maximum switching frequency from STANDSTILL to LOAD per hour.

7.7 Initial start–up

CAUTION

Make sure the direction of rotation is correct when starting the machine.

☞ Switch the machine on from the external control unit.

Pre–condition: Machine connected to the power supply.
User's air inlet and outlet shut–off valves open.

☞ Switch on the main power supply disconnecting device.

The machine switches to the LOAD mode and delivers compressed air.

Keep an eye on the machine during the first few hours of operation to ensure that it is operating correctly.

After the first 50 operating hours, carry out the following work:

☞ Check that all electrical connections are secure.

☞ Check the V–belt tension.

7.8 Measuring the Air Receiver Charging Time

The air receiver charging time should be measured while the machine is new so that its performance can be checked and compared at a later date.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

☞ Measure the air receiver charging time.

Machine model*	Receiver volume* [gal]	Receiver charging time from ... to ... psig [min:sec]*

* Enter model, volume and charging time in the table.

Tab. 19 Receiver charging time

☞ Switch off the machine and the supply disconnecting device.

8 Operation

8.1 Switching on and off with the external controller.

Automatic restart

DANGER Serious injury is possible.

The machine restarts automatically when power returns after a power supply failure.

The machine starts automatically when pressure in the high–pressure network falls below cut–in pressure.

Pre–condition: An external control unit is required to operate the machine.

Switch on and off by means of an external controller.

The power supply disconnecting device is installed by the user.

8.1.1 Switching on

Compressed air!

WARNING Serious injury is possible.

- ☞ Never direct compressed air at persons or animals.
- ☞ Ensure that:
  - no one is working on the machine,
  - all panels are in place,
  - no parts of the machine are colder than +37˚ F.

☞ Switch on the main power supply disconnecting device.

☞ Switch the machine on from the external controller.

The machine can start when the inlet pressure higher is than the cut–out pressure of the inlet pressure switch.

8.1.2 Shutdown

☞ Shutting down the machine from the external control unit.

☞ Switch off and lock out the main power supply disconnecting device.

8.2 Shutdown by Safety Devices

8.2.1 Shutdown caused by the oil pressure switch

The machine is shut down when the oil pressure upstream of the filter is too low.

8.2.2 Shutdown caused by the temperature gauge switch

The machine is shut down when the maximum permissible compressed air discharge temperature is exceeded.

8.2.3 Operating mode changed by the user's inlet pressure switch

If there is insufficient inlet pressure (less than p_{OFF}) the machine is switched to IDLE to prevent overheating (see chapter 6.6).

9 Fault Recognition and Rectification

Inform authorized KAESER Service representative if the fault cannot be rectified by the action suggested.

Do not attempt rectification measures other than those given in this manual.

The alarm indications valid for your machine are dependant on the individual equipment.

9.1 Fault Diagnosis

Fault	Possible cause	Remedy
Machine does not start.	Fuse blown or circuit breaker tripped.	Check motor connections and fuses (circuit breakers).
	Defective contact in the user's pressure switch.	Replace pressure switch.
	Overload protection cut–out tripped.	Allow the drive motor to cool down.
	Drive motor defective; bearing damage or windings shorted	Contact authorized KAESER Service representative
	Compressor block defective.	Contact authorized KAESER Service representative
	Controller defective.	Contact authorized KAESER Service representative
	The axial exhaust fan plug–in contact is not plugged in.	Plug in the contact.
	The temperature gauge switch has shut down the machine.	Reduce the ambient temperature.
Machine starts with difficulty.	The solenoid valve is not opening.	Replace the solenoid valve.
	Bearing damage.	Contact authorized KAESER Service representative
	Piston seized due to insufficient or incorrect oil.	Contact authorized KAESER Service representative
	Fault in the power supply.	Check power supply.
	Oil level too high.	Drain out some oil.

Fault	Possible cause	Remedy
Machine runs hot.	Ambient temperature too high.	Reduce the ambient temperature.
	Inlet pressure too low.	Check the inlet pressure switch.
	Compression ratio too high.	Reduce the compression ratio.
	Wrong direction of rotation.	Swap the L1 and L2 connections to the drive motor.
	Fan cannot draw air freely.	Arrange unrestricted flow of air to the fan.
	The sound enclosure extractor fan airflow is obstructed.	Arrange unrestricted flow of air from the exhaust fan.
	Valve plate leaking air or coked.	Check or clean the valve plate.
	Valve reed broken.	Replace valve plate.
Overload protection cut–out trips out after a short time.	Fault in the power supply.	Check power supply.
	Motor fault.	Contact authorized KAESER Service representative
Overload protection cut–out trips out after a long time.	Current too high because of low supply voltage.	Check power supply cable cross–sections. Check and tighten connection terminals.
Compressor runs continuously but final pressure is not reached.	Valve plate leaking air or coked.	Check or clean the valve plate.
	Valve reed broken.	Replace valve plate.
	Machine leaks air.	Seal leak or replace leaking part.
	Leakage from an air consumer connected to the network.	Check possible leakage points.
	The air demand is greater than the machine's air delivery capacity.	Increase the inlet pressure within permissible limits or install a larger machine.
	Solenoid valve blows off continuously. Solenoid coil is defective.	Replace the solenoid valve.
Machine cuts in and out too often.	User's air receiver filled with condensate.	Drain condensate
Whistling sound from the cylinder head.	Cylinder head bolts loose. Gasket defective.	Tighten cylinder head bolts. Replace gasket.
The safety relief valve blows off before the cut–out pressure is reached.	User's pressure switch incorrectly set.	Check setting.
	Valve spring defective.	Replace the pressure relief valve.
	Dirt or foreign bodies on the valve seat.	Let the safety relief valve blow off briefly.

Fault	Possible cause	Remedy
Machine uses too much oil.	Viscosity too low.	Fill with oil specified in the service manual.
	Crankcase venting defective.	Clean or renew the crankcase vent.
	Piston rings worn or broken.	Contact authorized KAESER Service representative
Filter in the venting line clogged	Liquid flows out of the damper.	Check and empty the filter.

Tab. 20 Faults and Remedies

10 Maintenance

10.1 Safety

Any disregard of these instructions and/or incorrect handling may result in serious injuries.

DANGER

High Voltage!

There is danger of fatal injury caused by touching electrically live components.

☞ Isolate all phases of the main power supply.
(switch off the mains supply disconnecting device)

☞ Ensure that the power supply cannot be switched on again (lock out).

WARNING

Uncontrolled discharge of compressed air!

Serious injury or death can result from loosening or opening components under pressure.

☞ Close shut–off valves or otherwise isolate the machine from the compressed air system to ensure that no compressed air can flow back into the machine.

☞ Completely vent all pressurized components and chambers.

☞ The machine pressure gauge must read zero.

CAUTION

Check valves and solenoid valves are spring–loaded.

☞ Close shut–off valves or otherwise isolate the machine from the compressed air system to ensure that no compressed air can flow back into the machine.

☞ Completely vent all pressurized components and chambers.

☞ The machine pressure gauge must read zero.

CAUTION

Hot surface

☞ Do not touch the surface

☞ Wear long–sleeved clothing and protective gloves.

CAUTION

Leakage

Leaks result in loss of oil and reduced performance.

Damage or complete breakdown can result.

☞ Carry out a trial run after maintenance and service work.

☞ Carry out a visual check of the machine.

Maintenance work may only be carried out by authorised personnel!

Before switching on again ensure that:

- no one is working on the machine,
- all panels are in place and secured,
- all access doors are closed.

10.2 Maintenance Schedule

Maintenance intervals are recommendations only and should be adjusted to suit installation and operating conditions.

☞ Keep a log of all maintenance and repair work.

This enables the frequency of individual maintenance tasks to be compared with KAESER's recommendations. A prepared list is provided in chapter 10.18.

10.2.1 Regular maintenance tasks

Carry out maintenance tasks more frequently when operating conditions are unfavourable (e. g. dusty atmosphere) or when the equipment is in frequent use.

Interval	Maintenance task	See chapter
Daily or every 24 h	Check the crankcase oil level.	10.6
Before initial start–up, after 24 h and after changing the V–belts	Check the V–belt tension.	10.15.1
50 h after initial start–up	Check that all electrical connections are tight.	
Weekly	Check and empty the filter.	10.11
1000 h after initial start–up	Change the oil.	10.7
Annually	Air filter maintenance.	10.3
	Check and clean the dirt trap.	10.10
	Check V–belt tension.	10.15.1
	Check the safety relief valve.	10.12
	Check that all electrical connections are tight.	
Every 1000 h	Maintain the check valve.	10.13
	Maintain the dirt trap.	10.10
	Maintain the aftercooler and check for leaks.	10.4
Every 2000 h	Change the crankcase oil filter.	10.9
	Change the oil filter in the crankcase vent.	10.8
Every 3000 h	Change the microfilter element.	10.17
Every 12,000 h	Replace the solenoid valve.	10.14
	Change the V–belts.	10.15.2
Variable, see chapter 10.2.2	Change the oil.	10.2.2

h = operating hours

Tab. 21 Regular maintenance tasks

10.2.2 Oil change intervals

The duty cycle and ambient conditions are important criteria for the number and length of the change intervals.

RECOMMENDED KAESER LUBRICANTS			
SIGMA LUBRICANT	DESCRIPTION	MAXIMUM RECOMMENDED CHANGE INTERVAL*	
		First Oil Change	Subsequent Oil Change
M – 150	ISO 100 Semi – Synthetic Lubricant	50 Hours	1,000 Hours
S – 150	ISO 100 Synthetic Lubricant	100 Hours	2,000 Hours

* Oil changes may need to be more frequent depending on ambient conditions. When high ambient temperatures or dirty conditions are present, oil changes may be necessary every 500 hours (1,000 hours for synthetic) or even shorter intervals. Oil change intervals required should be determined through periodic oil analysis.

Tab. 22 Oil change intervals lubricants

SPECIALTY KAESER LUBRICANTS (Refer to product information to determine suitability.)			
SIGMA LUBRICANT	DESCRIPTION	MAXIMUM RECOMMENDED CHANGE INTERVAL*	
		First Oil Change	Subsequent Oil Change
FG – 150	ISO 46 Food Grade Synthetic Lubricant	500 Hours	1,000 Hours

* Oil changes may need to be more frequent depending on ambient conditions. When high ambient temperatures or dirty conditions are present, oil changes may be necessary every 500 hours (1,000 hours for synthetic) or even shorter intervals. Oil change intervals required should be determined through periodic oil analysis.

Tab. 23 Oil change intervals speciality lubricants

10.2.3 Regular service work

Only authorized KAESER Service representatives should carry out service work.

When operating conditions are unfavourable (e. g. dusty atmosphere or high ambient temperature) or if the equipment is in constant use, service work must be carried out more frequently.

Interval	Regular service work	See chapter
Up to 4000 h	Check cylinder head and valves.	10.16
Up to 12000 h, at the latest every 3 years	Change motor bearings.	10.5
Up to 12000 h	General machine overhaul.	

h = operating hours

Tab. 24 Regular service work

10.3 Air Filter Maintenance

Equipment: Compressed air for blowing out.
Solvent–based cleaning agent.
Spare parts (as required).

Pre–condition: Machine switched off.
Power supply disconnecting device locked out.
Machine cooled down.

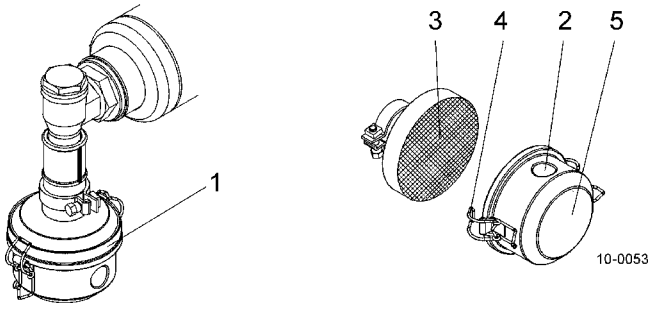


Fig. 13 Air filter maintenance

1 Air filter
2 Inlet air opening
3 Air filter insert
4 Retaining clip
5 Cover

The air filter insert consists of an oil–wetted fibre mesh.

Removing the air filter:

☞ Unscrew the air filter (1) from the collecting pipe.

☞ Release the retaining clips (4) and take off the cover.

Cleaning the air filter:

☞ Blow out the cover (5) and the insert (3) with dry compressed air (< 70 psig).

☞ Clean sealing faces.

☞ Wet the filter insert (3) with a little oil after cleaning the air filter.

If the insert is heavily contaminated, clean with a solvent–based fluid or water jet.
Observe safety regulations.

Replace the air filter if it has already been cleaned a number of times.

Replacing the air filter

☞ Position the cover over the insert and close the retaining clips.

☞ Attach the filter to the collecting pipe again.

The filter air inlet must face downwards.

☞ Switch on the main power supply disconnecting device.

10.4 Cleaning the Aftercooler and Checking for Leaks.

10.4.1 Cleaning the aftercooler

Equipment: Brush
Vacuum cleaner

Pre–condition: Machine switched off.
Power supply disconnecting device locked out.
The machine is cooled down.

Check the cooler regularly for clogging. The interval is heavily dependent on local operating conditions.

Clogging causes overheating and machine damage.

Avoid dust disturbance. Wear a face mask if necessary.

Do not use sharp implements to clean the cooler. The cooler could be damaged.

A heavily clogged cooler should be cleaned by an authorized KAESER Service representative.

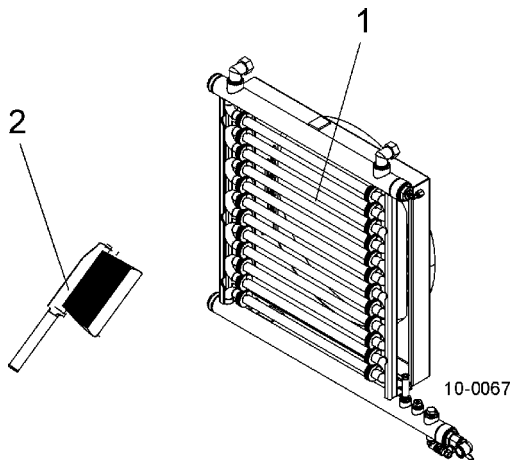


Fig. 14 Cleaning the aftercooler

1 Aftercooler
2 Brush

☞ Dry brush the cooler (1) and use a vacuum cleaner to suck up the dirt.

10.4.2 Checking for leaks

Pre–condition: Machine switched off.
Power supply disconnecting device locked out.
The machine is cooled down.

Pay especial attention to aging and corrosion of the cooler materials under long term operating conditions. Condensate can escape from a leak point.

If there is a leak in the cooler, stop the machine immediately and repair the leak.

☞ Have an authorized KAESER Service representative check the aftercooler for leaks at least every two years.

10.5 Drive Motor Maintenance

Drive motor:

The drive motor bearings are permanently greased and need no re–greasing.

10.6 Checking the Oil Level and Topping up the Oil

Check the level in the oil sight glass daily and before restarting after a long period of shutdown.

Pre–condition: Machine switched off.
User's inlet and outlet shut–off valves closed.

10.6.1 Checking the oil level

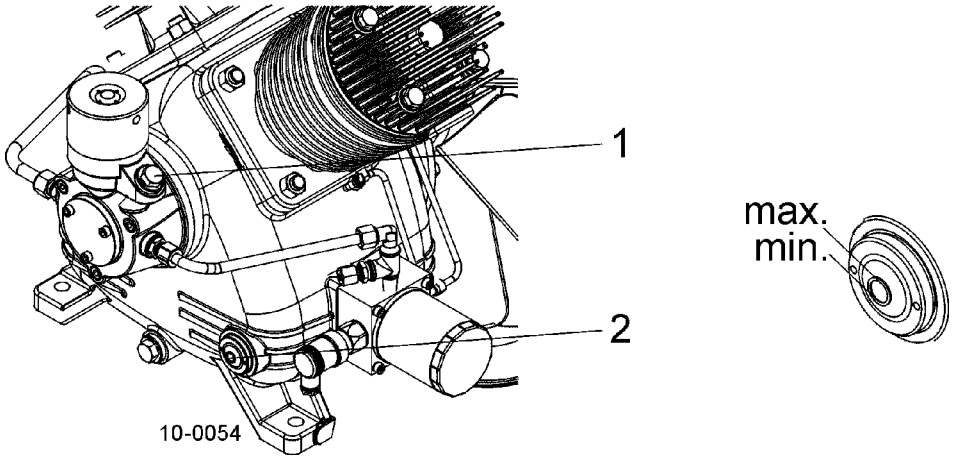


Fig. 15 Checking the oil level

1 Oil filler plug
2 Oil sight glass

☞ Check the oil level.

Top up when the oil level falls to the minimum mark.

10.6.2 Topping up the compressor oil

Equipment: Compressor oil

Pre–condition: Power supply disconnecting device is locked out.
The machine is cooled down.

WARNING

Risk of explosion from the compressor oil.

Fatal injuries can be caused by the ignition of oil mist and vapors.

☞ Avoid fire, naked flame and do not smoke!

CAUTION

The machine can be damaged by unsuitable oil.

☞ Never mix different types of oil.

☞ Top up with the same type of oil as is already in the machine (see service manual).

Topping up the compressor oil:

☞ Remove the oil filler plug.

☞ Top up the oil slowly.

☞ Replace the filler plug afterwards.

Do not top up above the maximum mark on the oil sight glass.

Starting the machine and carrying out a trial run.

☞ Open the user's inlet and outlet shut–off valves.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

☞ After about 10 minutes, check the oil level and top up again, if necessary.

☞ Switch off the machine and visually check for leaks.

10.7 Changing the Oil

Equipment: Compressor oil
Oil catchment container

Pre–condition: Machine at operating temperature.
Machine switched off.
Power supply disconnecting device locked out.
User's inlet and outlet shut–off valves closed.

CAUTION

Danger of burning from hot components and scalding from escaping oil.

Dispose of the old oil in accordance with valid environmental protection regulations.

Drain the oil completely from the compressor block.

☞ Wear long–sleeved clothing and gloves.

☞ Work with caution.

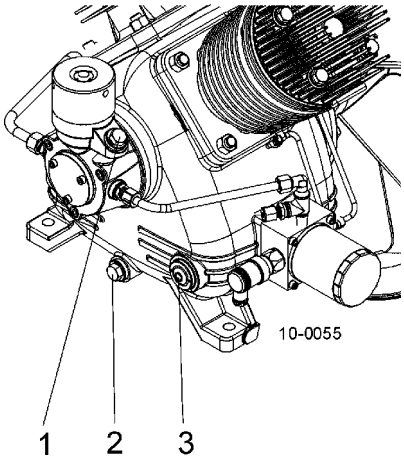


Fig. 16 Changing the oil, compressor block

1 Oil filler
2 Oil drain plug
3 Oil level sight glass

The first charge of oil must be changed after about 1000 operating hours.

Further oil changes depend on operating conditions.

Change the oil immediately if it becomes milky white. This indicates a high condensate content that reduces the oil's lubricating effect. This could damage the machine.

WARNING

Risk of explosion from the compressor oil.

Fatal injuries can be caused by the ignition of oil mist and vapours.

☞ Avoid fire, naked flame and do not smoke!

CAUTION

The machine can be damaged by unsuitable oil.

☞ Never mix different types of oil.

☞ Top up with the same type of oil as is already in the machine (see service manual).

Changing the compressor oil:

☞ Remove the plug from the oil filler (1).

☞ Position the oil catchment container.

☞ Remove the oil drain plug (2) and allow the oil to drain into the oil catchment container.

☞ Screw in the oil drain plug again together with the ring seal.

☞ Top up with new oil to the maximum mark on the oil sight glass.

☞ Replace the filler plug afterwards.

Starting the machine and carrying out a trial run:

☞ Open the user's inlet and outlet shut–off valves.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

☞ After about 10 minutes, check the oil level and top up again, if necessary.

☞ Switch off the machine and visually check for leaks.

10.8 Changing the Oil Filter in the Crankcase Vent

Equipment: Oil filter element

Pre–condition: Machine switched off.
Power supply disconnecting device locked out.
The machine is cooled down.
User's inlet and outlet shut–off valves closed.

CAUTION

Danger of burning from hot components and scalding from escaping oil.

☞ Wear long–sleeved clothing and gloves.

☞ Work with caution.

WARNING

Do not use the machine without the crankcase venting function.

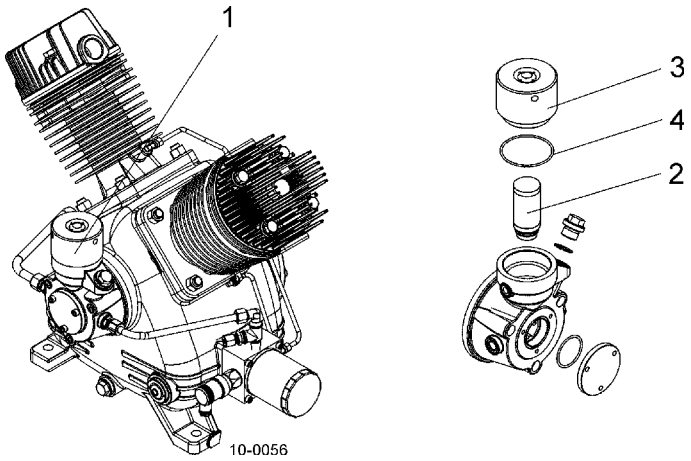


Fig. 17 Changing the oil filter in the crankcase vent

1 Casing vent
2 Oil filter element
3 Venting cap
4 O–ring

The oil filter element must be changed after 2000 operating hours.

☞ Unscrew the cap (3) from the crankcase vent (1).

CAUTION

Escaping oil mist is damaging to health.

☞ Do not inhale oil mist and vapours.

☞ Avoid contact with skin and eyes.

☞ Withdraw the filter element (2).

Dispose of the old element in accordance with valid environmental protection regulations.

☞ Insert a new filter element (2).

☞ Replace the cap (3) in the crankcase vent and check that the O–rings (4) are properly seated.

Starting the machine and carrying out a trial run:

☞ Open the user's inlet and outlet shut–off valves.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

☞ Check the oil level after about five minutes and top up if necessary.

☞ Switch off the machine and visually check for leaks.

10.9 Changing the Crankcase Oil Filter

Equipment: Oil filter
Oil catchment container
Cleaning rags.

Pre–condition: Machine switched off.
Power supply disconnecting device locked out.
The machine is cooled down.
User's inlet and outlet shut–off valves closed.

CAUTION

Danger of burning from hot components and scalding from escaping oil.

☞ Wear long–sleeved clothing and gloves.

☞ Work with caution.

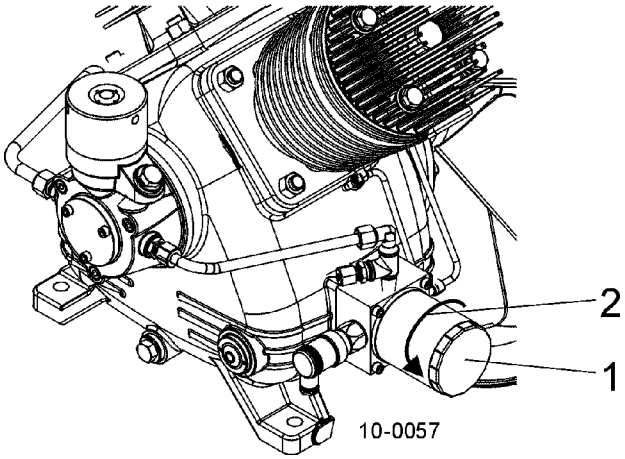


Fig. 18 Changing the crankcase oil filter

1 Oil filter
2 Direction of rotation to unscrew the filter

Change the oil filter for the first time after 1000 operating hours, along with the oil.

A further oil filter change is necessary:

- after 2000 operating hours, or
- after every oil change, or
- if the oil pressure switch has shut down the machine because the oil pressure has fallen below the permissible value.

Changing the oil filter:

CAUTION

Escaping oil mist is damaging to health.

☞ Do not inhale oil mist and vapors.

☞ Avoid contact with skin and eyes.

Dispose of parts and materials contaminated with oil in accordance with environmental protection regulations.

☞ Unscrew the oil filter anticlockwise; catch oil spillage and dispose of correctly.

☞ Clean sealing faces with a clean rag.

☞ Lightly oil the new filter's O–ring.

Screw on the new filter with the hand only. Do not use a tool.

☞ Turn the oil filter clockwise by hand to tighten.

Starting the machine and carrying out a trial run:

☞ Open the user's inlet and outlet shut–off valves.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

☞ Check the oil level after about five minutes and top up if necessary.

☞ Switch off the machine and visually check for leaks.

10.10 Maintaining the Dirt Trap

Equipment: Compressed air for blowing out.
Cleaning agents

Pre–condition: Machine switched off.
Power supply disconnecting device locked out.
The machine is cooled down.
User's inlet and outlet shut–off valves closed.

10.10.1 Dirt traps in the inlet and venting lines.

CAUTION **Hot components – danger of burns!**

☞ Wear long–sleeved clothing.

☞ Work with caution.

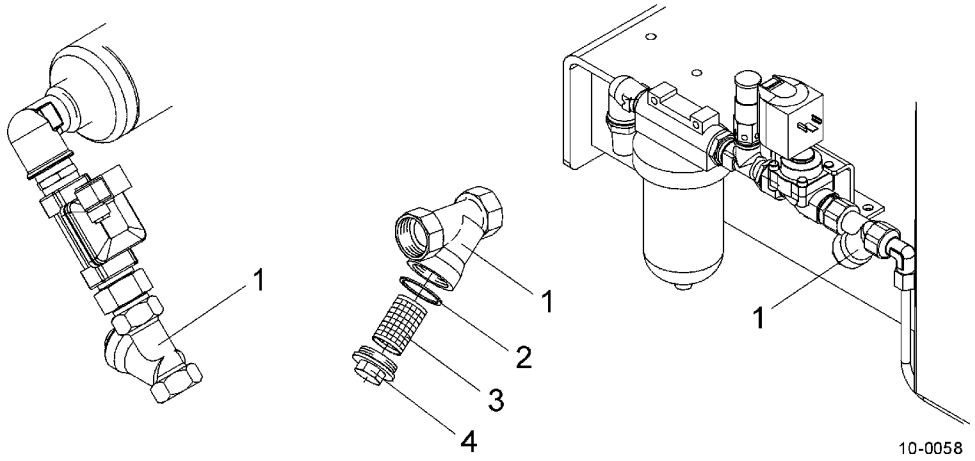


Fig. 19 Dirt traps in the inlet and venting lines.

1 Dirt trap
2 Gasket or O–ring
3 Dirt trap strainer
4 Screw plug

Clean the dirt trap:

- when a fault occurs in IDLE, or
- when a fault occurs during unloaded starting, or
- annually.

Cleaning the dirt trap strainer:

☞ Remove the screw plug.

☞ Remove and clean the gasket or O–ring.

☞ Remove the strainer and blow clean.

☞ Re–assemble all parts.

Starting the machine and carrying out a trial run:

☞ Open the user's inlet and outlet shut–off valves.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

☞ Stop the machine after five minutes and visually check for leaks.

10.10.2 Dirt trap in the crankcase.

CAUTION

Hot components – danger of burns!

☞ Wear long–sleeved clothing.

☞ Work with caution.

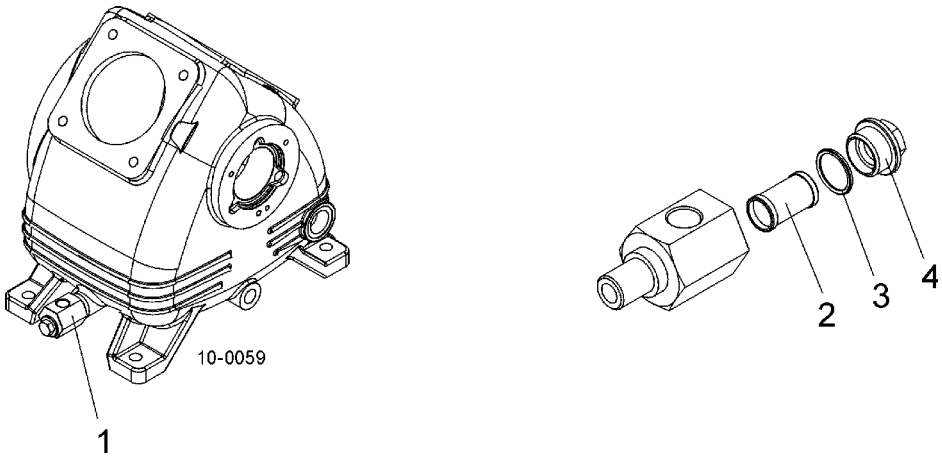


Fig. 20 Dirt trap in the crankcase

1 Dirt trap
2 Dirt trap strainer
3 O–ring
4 Screw plug

Clean the dirt trap:

- if a fault occurs because of insufficient oil pressure, or
- annually.

Cleaning the dirt trap strainer:

☞ Remove the screw plug and O–ring.

☞ Remove the dirt trap strainer.

☞ Clean the strainer and O–ring.

☞ Re–assemble all parts.

Starting the machine and carrying out a trial run:

☞ Open the user's inlet and outlet shut–off valves.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

☞ Stop the machine after five minutes and visually check for leaks.

10.11 Checking and Emptying the Filter

Equipment: Compressed air for blowing out.
Catchment container
Spare parts (as required).

Pre–condition: Machine switched off.
Power supply disconnecting device locked out.
User's inlet and outlet shut–off valves closed.

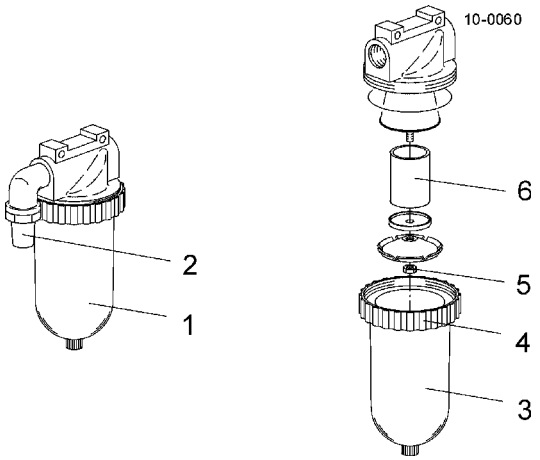


Fig. 21 Checking and emptying the filter

1 Filter
2 Damper
3 Filter bowl
4 Fitting
5 Nut
6 Sintered filter insert

The damper must be able to blow off freely to ensure proper operation of the machine.
Connection of a pipe downstream of the filter is not allowed.

☞ The bowl must be checked weekly and emptied regularly.

☞ Clean the sintered filter insert when necessary.

Checking and emptying:

The bowl must be emptied immediately if liquid is seen to drip from the damper.

☞ Prepare a catchment container.

Dispose of the liquid in accordance with valid environmental protection regulations.

☞ Loosen the fitting and remove the bowl.

☞ Empty the bowl into the catchment container and flush out with warm water.

Clean the damper and sintered filter insert.

☞ Blow out the damper with compressed air (< 70 psig).

☞ Remove the retaining nut and the sintered filter insert.

☞ Clean the insert and blow through from the inside to the outside.

☞ Re–assemble in the reverse order as described above.

Starting the machine and carrying out a trial run:

☞ Open the user's inlet and outlet shut–off valves.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

☞ Stop the machine after five minutes and visually check for leaks.

10.12 Checking the Safety Relief Valve

Pre–condition: Machine switched off under LOAD.
Power supply disconnecting device locked out.
The machine is cooled down.
User's inlet and outlet shut–off valves closed.

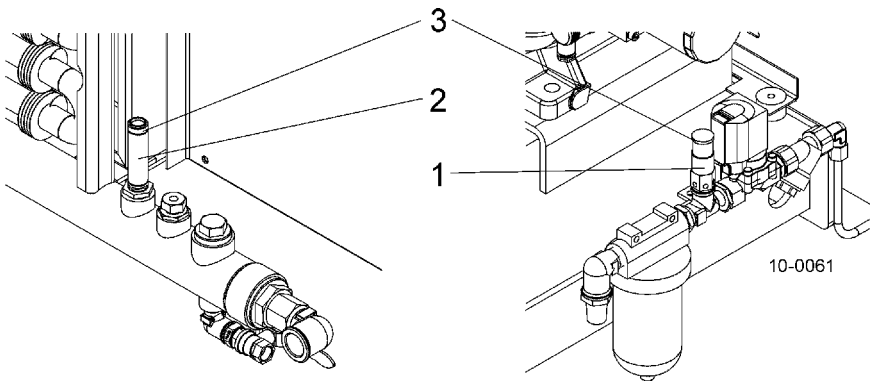


Fig. 22 Checking the pressure relief valve

1 Safety relief valve in the venting line.
2 Safety relief valve on the aftercooler.
3 Knurled knob

The safety relief valve should be activated at regular intervals or at least once a year to prevent it from sticking.

WARNING

The pressure relief valve will blow off.

Excessive noise is caused when the safety relief valve blows off.
There is danger of injury from bursting components and compressed air.

☞ Wear ear and eye protection.

If the maximum permissible working pressure at the discharge end is exceeded the pressure relief valve (2) opens, blowing off excessive air to protect the compressor and the air consumers.

The machine may only be operated with a correctly functioning pressure relief valve.

Adjusting the safety valve is not permitted and doing so invalidates all liability.

☞ Turn the knurled knob on the safety relief valve anticlockwise until air blows off. Then turn the knurled knob back to its original position.

CAUTION

Do not over tighten the knurled knob.

☞ Have a defective safety valve replaced by authorized KAESER Service representative.

To check blowoff pressure the pressure relief valve (1) must be removed from the machine by an authorized KAESER Service representative and checked on a test rig.

☞ Open the user's inlet and outlet shut–off valves.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

10.13 Maintaining the Check Valve

Equipment: Compressed air for blowing out.
Cleaning rags.
Spare parts (as required)

Pre–condition: Machine switched off.
Power supply disconnecting device locked out.
Machine fully vented to atmospheric (pressure gauge reads 0 psig).
The machine is cooled down.
User's inlet and outlet shut–off valves closed.

The check valve is mounted on the collecting pipe (header). It prevents compressed air escaping to the atmosphere when the machine is running.

CAUTION

Hot components -- danger of burns!

☞ Wear long–sleeved clothing and gloves.

☞ Work with caution.

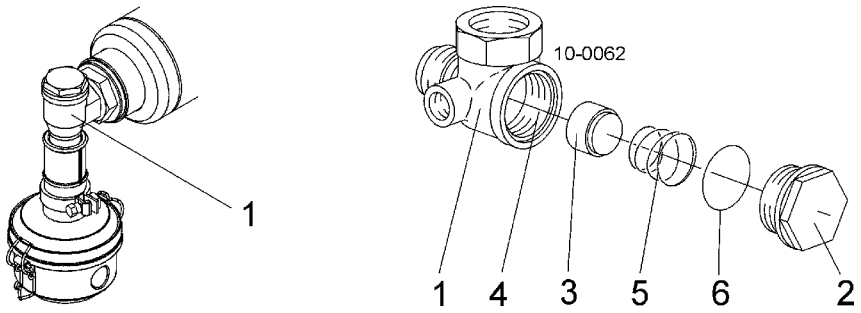


Fig. 23 Cleaning the check valve

1	*Check valve*	*4*	*Valve seat*
2	*Screw plug*	*5*	*Spring*
3	*Valve cone*	*6*	*O–ring*

Cleaning the check valve:

☞ Remove the screw plug (2).

☞ Clean the valve cone (3) and seat (4).

Replace the valve cone (3), spring (5) and O–ring (6) if they are badly worn.

Replace the check valve if the valve seat is damaged.

☞ Insert the valve cone (3), spring (5) and O–ring (6) in the valve seat.

☞ Screw in the plug (2).

Starting the machine and carrying out a trial run:

☞ Open the user's inlet and outlet shut–off valves.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

☞ Switch off the machine and visually check for leaks.

10.14 Replacing the Solenoid Valve

Ingress of dirt during operation can prevent the valve from sealing. To ensure trouble–free operation, the solenoid valve should be replaced every 12,000 operating hours.

Equipment: Spare part

Pre–condition: Machine switched off.
Power supply disconnecting device locked out.
Machine fully vented to atmospheric (pressure gauge reads 0 psig).
The machine is cooled down.
User's inlet and outlet shut–off valves closed.

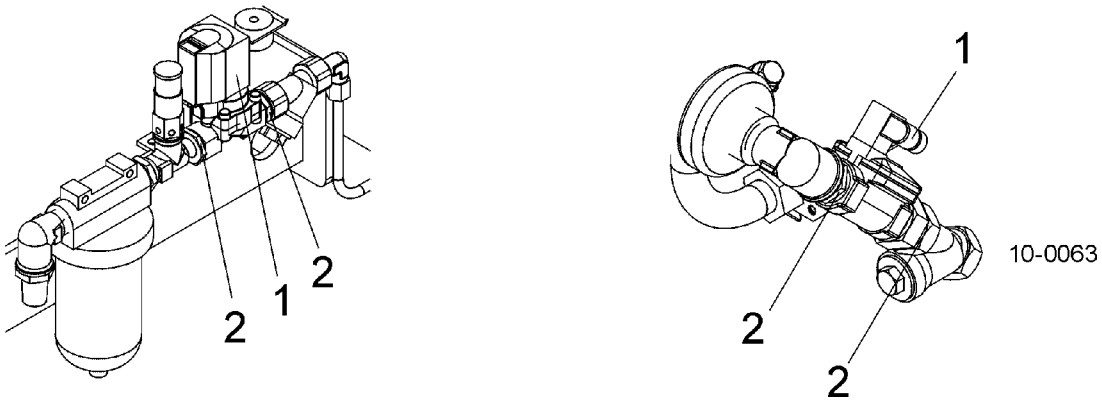


Fig. 24 Replacing the solenoid valve

1 Connecting socket
2 Fitting

☞ Withdraw the plug to isolate the solenoid valve from the power supply.

☞ Undo the fitting.

☞ Remove the valve.

☞ Clean the pipework upstream of the valve.

When mounting the new solenoid valve make sure the flow direction is correct as indicated by the arrow on the casing.

Do not use the solenoid as a lever.

☞ Screw the fitting into the new solenoid valve using PTFE sealing tape.

☞ Re–install the solenoid valve in the compressed air line.

Starting the machine and carrying out a trial run:

☞ Open the user's inlet and outlet shut–off valves.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

☞ Switch off the machine and visually check for leaks.

10.15 V–belt Maintenance

10.15.1 Check the belts and their tension.

Pre–condition: Machine switched off.
Power supply disconnecting device locked out.
Machine fully vented to atmospheric (pressure gauge reads 0 psig).
The machine is cooled down.
User's inlet and outlet shut–off valves closed.

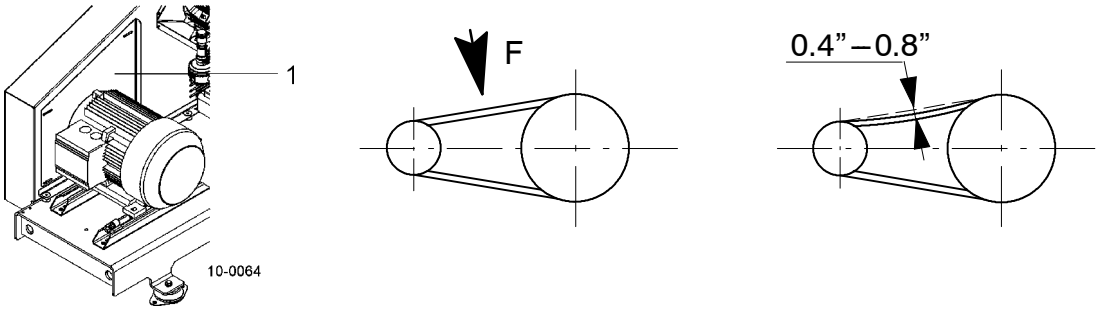


Fig. 25 Checking the V–belt tension

1 Guard plate
F Force

Visually checking for damage:

☞ Remove the guard plate.

☞ Turn the pulley by hand so that all of the belt can be inspected for damage.

☞ Change any damaged belts immediately.

Check belt tension and adjust if necessary.

Check belt tension on initial start–up and after 24 operating hours.

☞ Remove the guard plate.

☞ Push the belt with the thumb.

If the belts can be deflected more than 0.8” they should be tensioned.

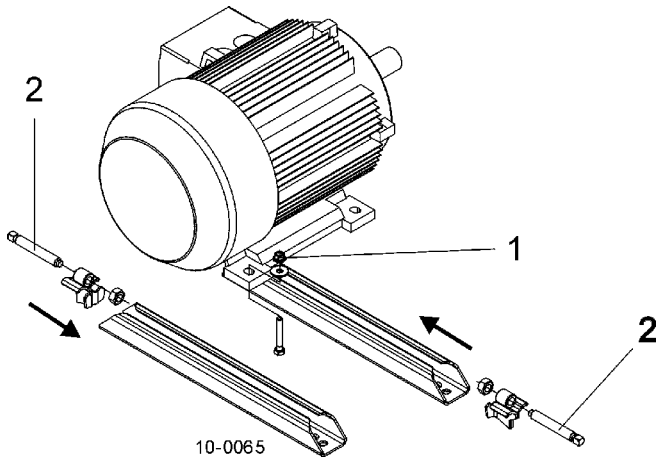


Fig. 26 Tensioning the belts

1 Hexagonal nut
2 Square–headed bolt

☞ Loosen the hexagonal nuts on the motor mountings and the square–headed bolts in the tensioning rails.

☞ Shift the motor until the belts are tensioned again, i.e. there is only 0.4”–0.8” movement.

☞ Tighten the hexagonal nuts on the motor feet and the square–headed bolts in the tensioning rails again.

☞ Replace the guard plate.

10.15.2 Changing the V–belts

Equipment: Set of V–belts

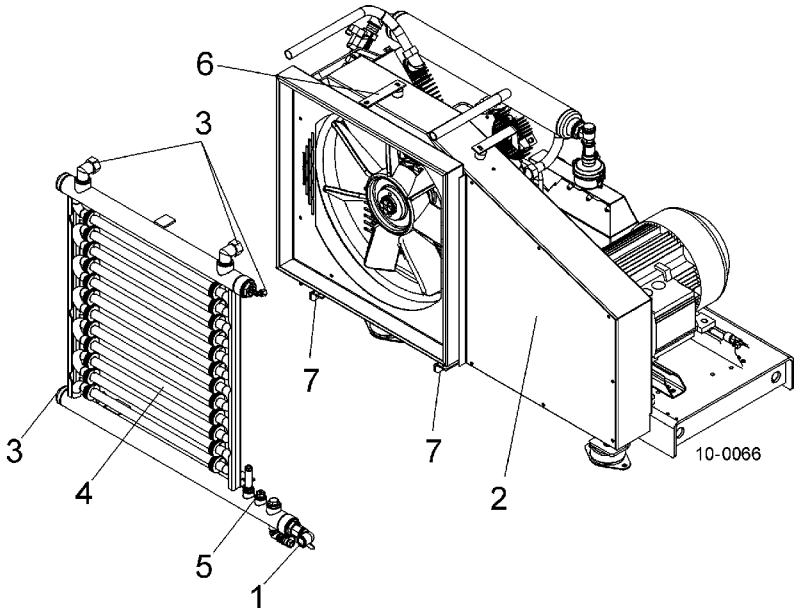


Fig. 27 Changing the V–belts

1	*Air network connection*	*5*	*Temperature gauge switch sensor*
2	*Belt guard (external part)*	*6*	*Bracket rail*
3	*Fittings*	*7*	*Bracket*
4	*Air cooler*		

☞ Remove the guard outer part (2).

☞ Remove the fittings (3) from the air cooler (4).

☞ Unscrew the temperature gauge switch sensor (5) from the air cooler.

☞ Detach the air cooler from the supporting bracket and rail (6 / 7).

☞ Unscrew the air duct from the belt guard outer part.

☞ Loosen the hexagonal nuts on the motor mountings and the square–headed bolts in the tensioning rails.

☞ Push the motor back towards the compressor block until the belts can be slipped off the pulleys.

☞ Lay the new V–belts loosely over the motor and compressor block pulleys.

☞ Shift the motor to tension the belts so that there is only 0.4”–0.8” movement in the belt.

☞ Tighten the hexagonal nuts on the motor mounts and the square–headed bolts in the tensioning rails again.

☞ Reassemble in the reverse order.

☞ Check tension after the new belts have been in operation for 24 hours.

Replacement V–belts must be of exactly the same length (a set) and absolutely impervious to oil. For this reason we recommend that only genuine KAESER V–belts are used.
V–belts must always be changed as a set.

Starting the machine and carrying out a trial run:

☞ Open the user's inlet and outlet shut–off valves.

☞ Switch on the main power supply disconnecting device.

☞ Switch on the machine.

10.16 Inspecting or Replacing the Cylinder Head and Valves

The condition of the valves can be assessed by measuring the receiver charging time and comparing this with the charging time when the machine was new.

10.16.1 Inspect the cylinder head and valves

The cylinder head and valves must be inspected after 4000 operating hours.

☞ Start the machine and measure the receiver charging time.

The valves should be checked for coking if there is a significant difference in the measured charging time with the charging time when the machine was new (see chapter 7.8).

10.16.2 Clean the cylinder head and valves

Equipment: Compressed air for blowing out.
Cleaning rags.
Brush
Spare parts (as required)

Pre–condition: Machine switched off.
Power supply disconnecting device locked out.
Machine fully vented to atmospheric (pressure gauge reads 0 psig).
The machine is cooled down.
User's inlet and outlet shut–off valves closed.

If the valves are faulty they must be replaced.

☞ Remove the cylinder head shoulder studs and lift off the head.

☞ Remove the cap nut (if one is fitted).

☞ Check the head and valves for coking and clean if necessary.

☞ After cleaning the cylinder head and valves, mount the head with the gasket and tighten the securing screws diagonally.

Tightening torque of the cylinder head screws

	Shoulder stud M_A [Nm]
N502 – G	80

Tab. 25 Shoulder stud tightening torque

☞ Have authorized KAESER Service representative renew the cylinder head and valves.

☞ A general overhaul of the machine should be carried out by an authorized KAESER Service representative after 12,000 operating hours.

Starting the machine and carrying out a trial run:

- ☞ Open the user's inlet and outlet shut–off valves.
- ☞ Switch on the main power supply disconnecting device.
- ☞ Switch on the machine.
- ☞ Switch off the machine and visually check for leaks.

10.17 Changing the Microfilter Element.

To ensure trouble–free operation, the element in the microfilter fitted in the inlet pipe should be changed every 3000 operating hours (see chapter 6.4.1)

To ensure reliable operation and prevent damage to the machine it is imperative that the stipulations regarding cleaning are kept to.

10.18 Logging Maintenance Work

Machine number:

Date	Maintenance task carried out	Operating hours	Signature

Tab. 26 Logged maintenance tasks

11 Spares, Operating Materials, Service

11.1 Note the nameplate

Make sure to quote the data on the nameplate **for all enquiries and spare parts orders**.

11.2 Ordering Consumable Parts and Operating Materials

WARNING

Personal injury or machine damage may result from the use of unsuitable spare parts or operating materials.

Unsuitable or poor quality consumable parts and operating materials may damage the machine or impair its proper function.

Damage to the machine can also result in personal injury.

☞ Use only genuine KAESER parts and operating materials quoted.

☞ Have an authorized KAESER Service representative carry out regular maintenance.

KAESER consumable parts and operating materials are genuine spares. They are designed for use in KAESER machines.

Machine

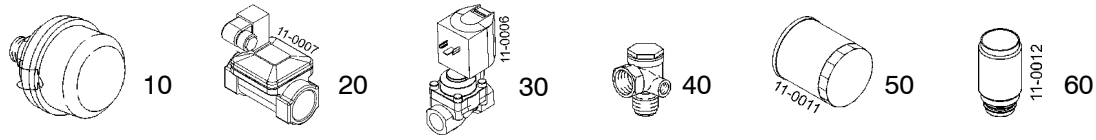


Fig. 28 Consumable machine parts

Name	Quantity	Number
Air filter	1	10
Solenoid valve on the inlet	1	20
Solenoid valve for venting	1	30
Check valve	1	40
Oil filter in the crankcase	1	50 / 6.1901.10010
Filter element in the crankcase vent	1	60 / 9.2147.0
Set of V–belts	1	6.2580.0

Tab. 27 Consumable parts

11.3 Maintenance Agreement

☞ Arrange a SIGMA AIR SERVICE maintenance agreement

Benefits to you:
lower costs and higher compressed air availability.

SIGMA AIR SERVICE offers you:

- authorized service technicians with KAESER factory training,
- increased operational reliability ensured by preventive maintenance,

- energy savings achieved by avoidance of pressure losses,
- optimum conditions for operation of the compressed air system,
- the security of genuine KAESER spare parts.
- increased legal certainty as all regulations are kept to.

11.4 Service Addresses

Addresses of KAESER are given at the end of this manual.

11.5 Spare Parts for Service and Repair

Any inspection, maintenance or repair tasks not described in this manual should be carried out only by an authorized KAESER Service representative.

12 Decommissioning, Storage and Transport

12.1 Decommissioning

De–commissioning is necessary when the machine:

- will not be needed for some time,
- is to be moved to another location,
- is no longer needed,
- is to be scrapped.

Temporarily decommissioning

Pre–condition: The machine can be started at regular intervals.

☞ Run the machine once a week under load for at least 30 minutes to ensure corrosion protection.

Long–term decommissioning

Pre–condition: Before taking out of service the machine should be run under load for at least 30 minutes.
Machine switched off and fully vented.
The supply disconnecting device is switched off and locked out.

☞ The machine to cool down completely.

☞ Spray the valves and cylinder bore with Shell Ensis 20 preserving oil.

The oil does not need to be removed when re–commissioning.

☞ Drain condensate.

☞ All air and electrical connections are disconnected.

☞ Spray electrical contacts and terminal with a protective lacquer.
(e.g. Rivalto, W.S.X.)

12.2 Packing

Equipment: Desiccant
Plastic sheeting
Wooden transport crate

Pre–condition: Machine is decommissioned.
Machine is dry and cooled down.

☞ Wrap the machine in plastic sheeting.

☞ Place desiccant inside the plastic sheeting.

Transport packing

A wooden crate is required for overland transport to protect the machine from mechanical damage.

Consult an authorized KAESER service agent for advice on packing for sea or air transport.

12.3 Storage

Pre–condition: The machine must be adequately packed.

CAUTION

Moisture and frost.

- ☞ Store the machine in a dry, frost–free room.
- ☞ Prevent entry of moisture and condensation.

Advice can be obtained from KAESER on suitable storage and initial start–up.

Moisture can lead to corrosion, particulary on the machine.

Frozen moisture can demage components, diaphragms, valves and gaskets

12.4 Transport

Transport only with a forklift truck, a pallet truck or by slings from a crane hook.

Make sure the lifting equipment is adequate for the weight of the machine.

Forklift truck

Pre–condition: Machine must stand on a suitable transport medium (pallet).

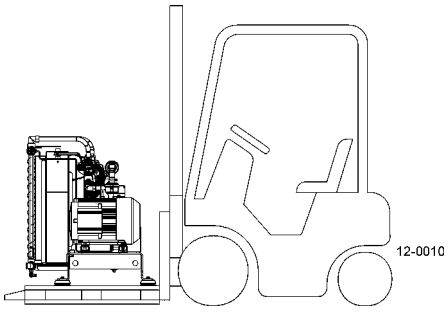


Fig. 29 Transport using a forklift truck.

Slung from a crane hook.

Pre–condition: The slings must not damage any part of the machine.

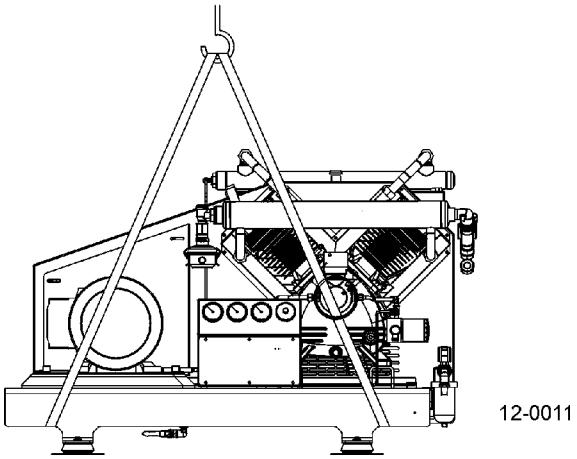


Fig. 30 Transporting slung from a crane hook.

12.5 Disposal

Pre–condition: Machine is decommissioned.

When disposing of a machine, drain out all liquids and remove dirty filters.

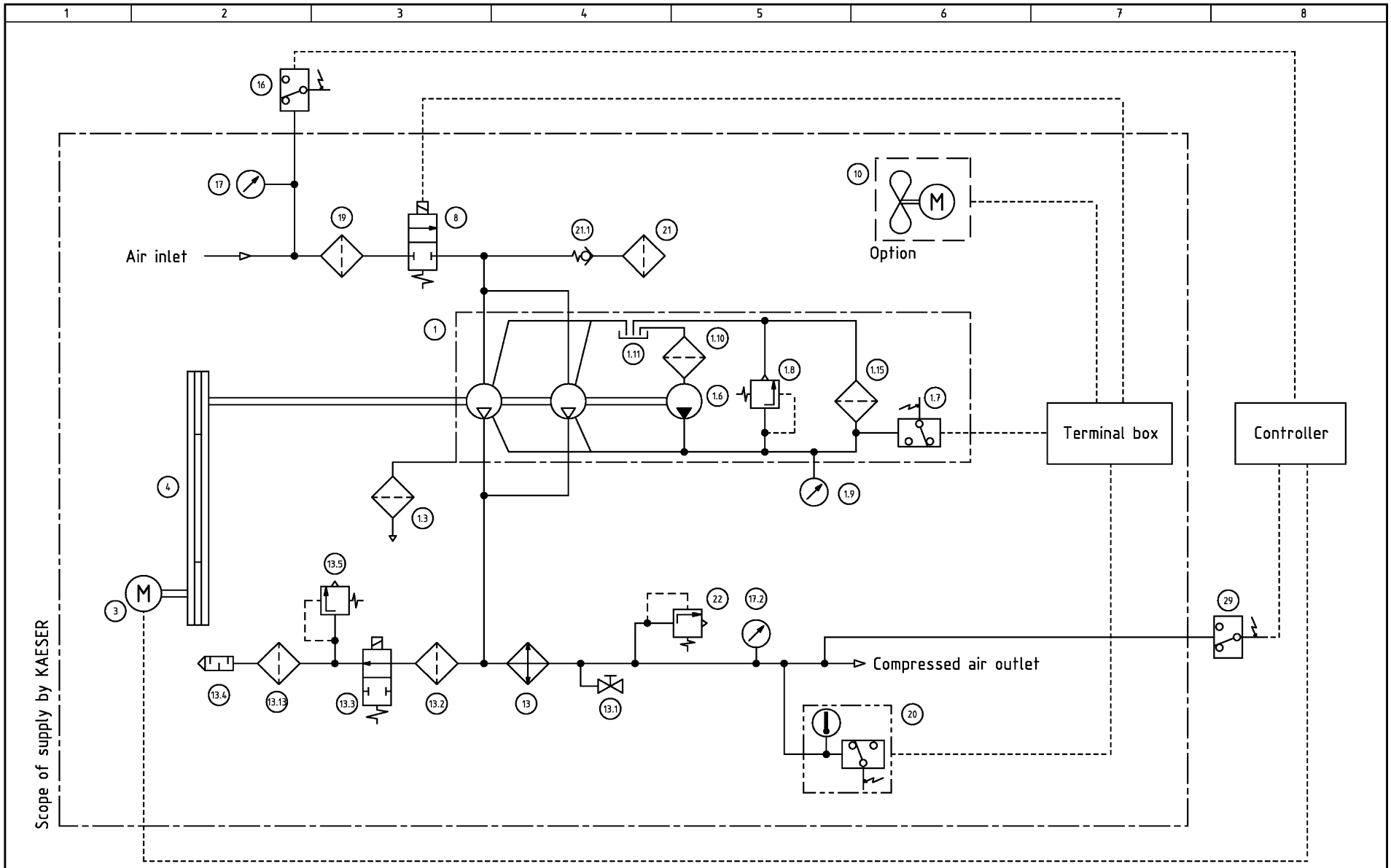
Parts contaminated with oil must be disposed of in accordance with local environment protection regulations.

- ☞ Completly drain the oil from the machine.
- ☞ Remove used all dirty filters.
- ☞ Hand the machine over to an authorized disposal expert.

13 Annex

13.1 Diagrams and Drawings

13.1.1 Pipeline and instrument flow diagram (P&I diagrams)

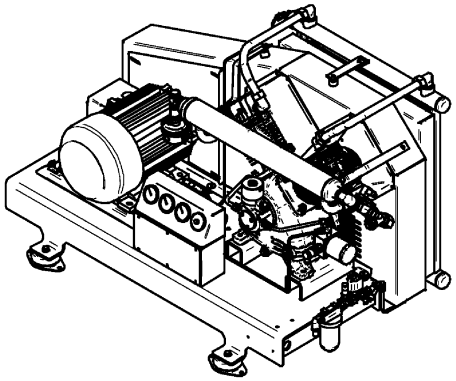


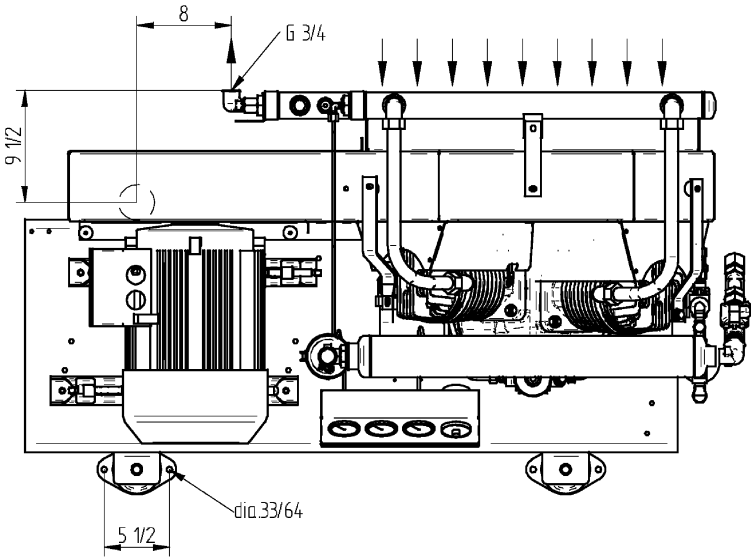
c				Datum	20.01.2006		KAESER KOMPRESSOREN	P&I Diagram N 253-G/N 351-G/N 502-G	
b				Bearb.	Plau				
a				Gepr.	Martin				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: FKKN253-GST-00142.00	FKKN253-GST-00142.01 Blatt 1 USE

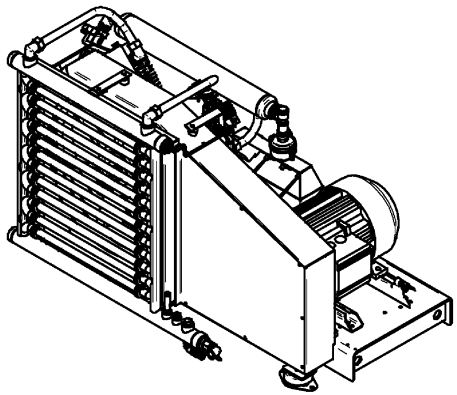
1	Piston pumpblock
1.3	Crankcase vent with oil filter
1.6	Oil pump
1.7	Pressure switch - Oil pressure
1.8	Overflow valve
1.9	Pressure gauge
1.10	Dirt trap
1.11	Crankcase
1.15	Oil filter - Oil pump
3	Drive motor
4	Flywheel
8	Solenoid valve (closed when de-energised)
10	Fan motor
13	Air aftercooler
13.1	Shut-off valve - Condensate drain
13.2	Dirt trap
13.3	Solenoid valve (open when de-energised)
13.4	Silencer
13.5	Safety relief valve
13.13	Filter
16	Pressure switch - Initial pressure
17	Pressure gauge - Initial pressure
17.2	Pressure gauge - Final pressure
19	Dirt trap
20	Temperature gauge switch + Indication
21	Air filter - Inlet air in idle mode
21.1	Check valve
22	Safety relief valve
29	System air pressure switch

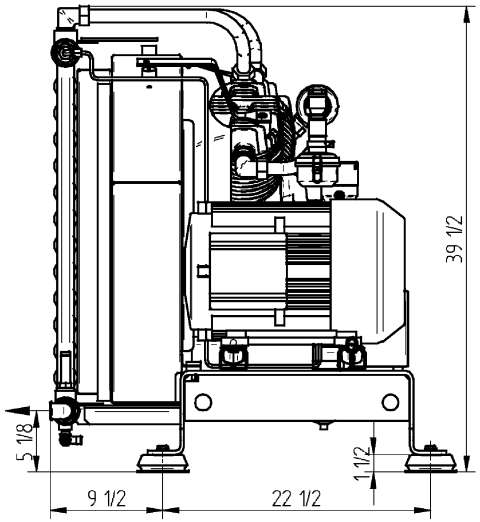
c				Datum	20.01.2006		KAESER KOMPRESSOREN	P&I Diagram legend N 253-G/N 351-G/N 502-G	
b				Bearb.	Plau				
a				Gepr.	Martin				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: FKKN253-GST-00142.00	FKKN253-GST-00142.01	Blatt 2
										USE

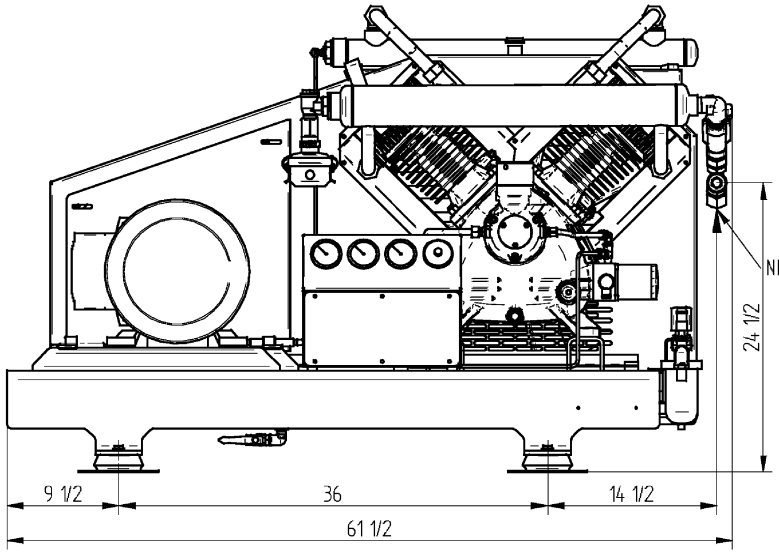
13.1.2 Dimensional drawing

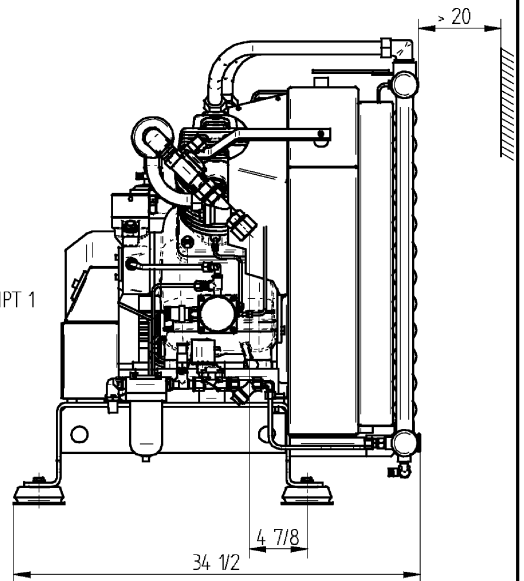












Entwicklungsbedingte Änderungen vorbehalten. Zeichnung darf nur über CAD geändert werden.

	Tag	Name
Gez.	20.04.2005	Oehrl1
Gepr.		
Freigeg.	21.04.2005	Schaef1
Maßstab		Ersatz für

N 502-G

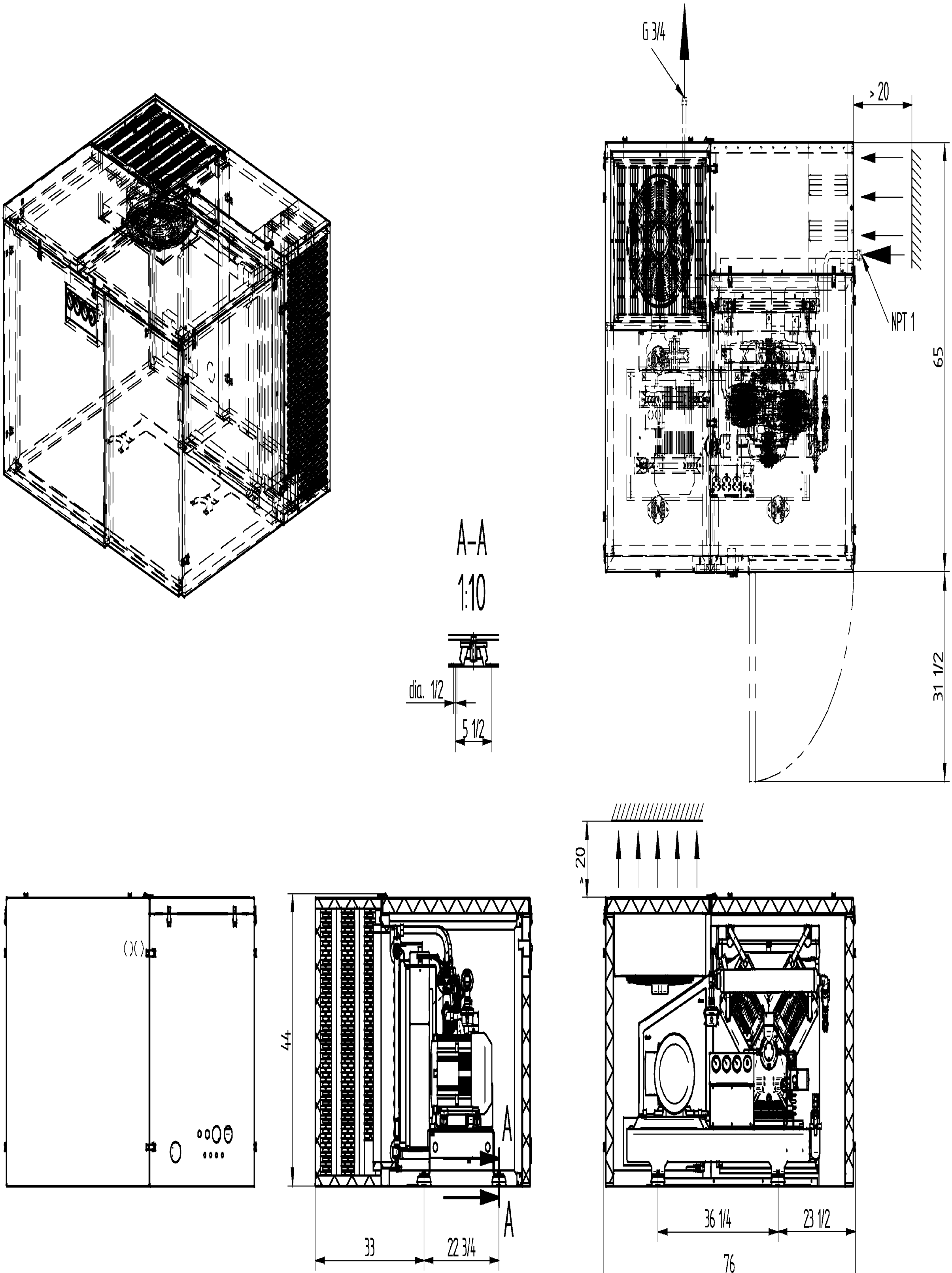
KAESER KOMPRESSOREN

K1_2005_00040

1005924.2 0 00

A-Index

Entwicklungsbedingte Änderungen vorbehalten. Zeichnung darf nur über CAD geändert werden.



	Tag	Name		
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Gepr.				
Freigeg.	06.09.2007	Schaef1		K1_2005_00240 (A-Index)
Maßstab	1:20		Ersatz für	10126688 D 00

13.1.3 Electrical Diagram

Wiring Diagram

booster compressor

with START-Control

terminalbox

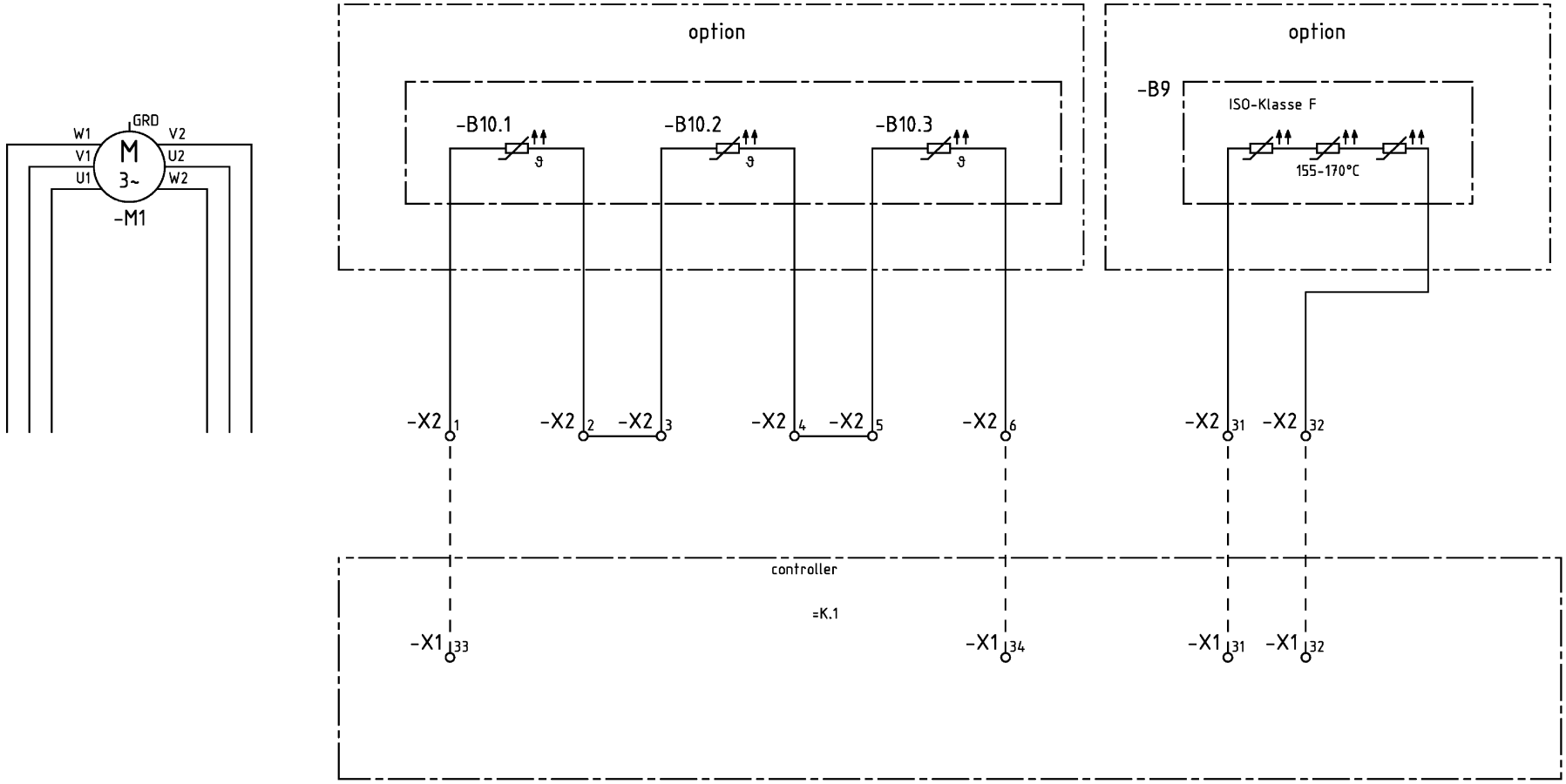
N 253-G, N 351-G, N 502-G, N 753-G - N 2001-G

manufacturer: KAESER COMPRESSORS
96450 COBURG
GERMANY

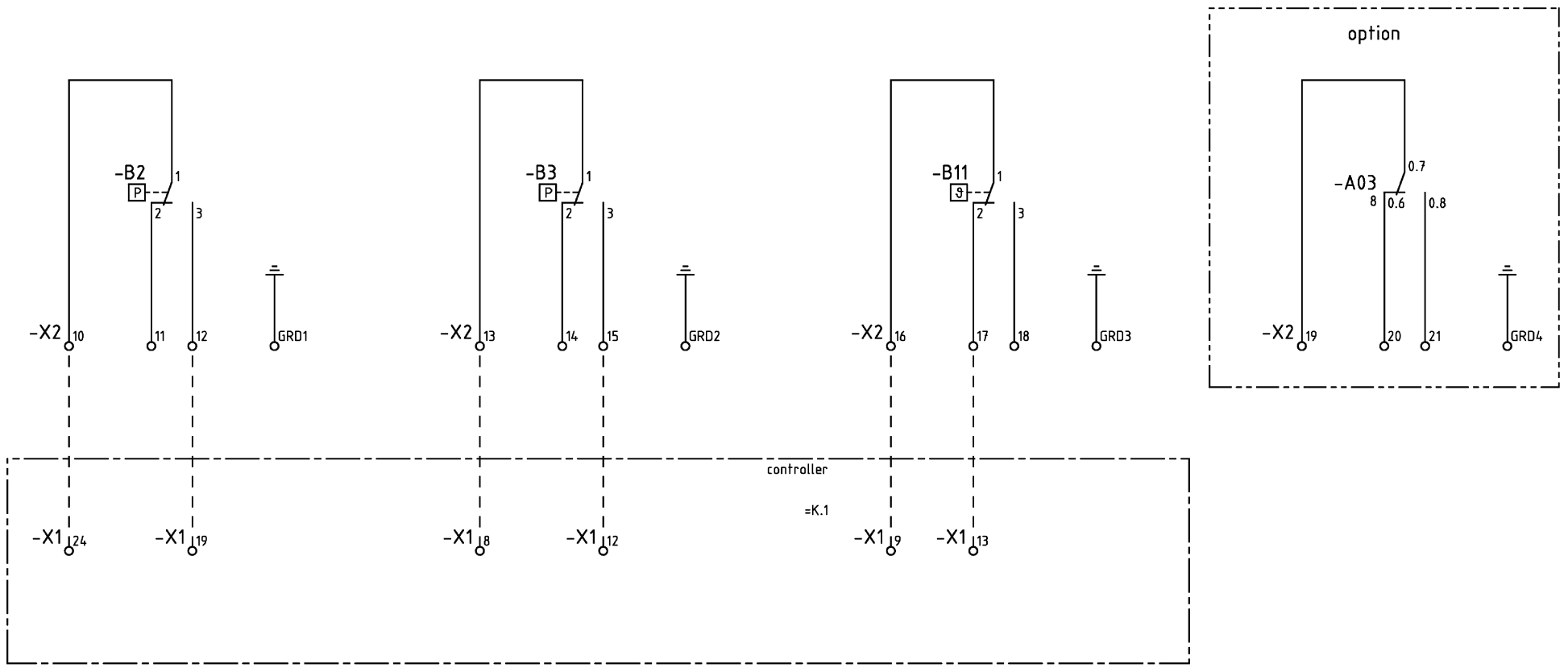
c				Datum	18.02.2005 USE		KAESER KOMPRESSOREN	cover page booster compressor N 253-G - N 2001-G	=
b				Bearb.	Sitter				+
a				Gepr.	Dusch				
A	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: UKKU1004_00	DKK-U1003.00	Blatt 1 Bl.

Lfd. Nr. No.	Benennung Name		Zeichnungsnummer (Kunde) Drawing No. (customer)	Zeichnungsnummer (Hersteller) Drawing No. (manufacturer)	Blatt Page	Anlagenkennzeichen Unit designation
1	cover page	N 253-G - N 2001-G		DKK-U1003.00	1	
2	list of contents			ZKK-U1003.00	1	
3	wiring diagram	N 253-G - N 2001-G		SKK-U1003.00	1	
4	wiring diagram	N 253-G - N 2001-G		SKK-U1003.00	2	
5	wiring diagram	N 253-G - N 2001-G		SKK-U1003.00	3	
6	wiring diagram	N 253-G - N 2001-G		SKK-U1003.00	4	
7	wiring diagram	N 253-G - N 2001-G		SKK-U1003.00	5	
8	component legend	N 253-G - N 2001-G		SKK-U1003.00	6	
9	terminal connection	terminal strip -X2		KKK-U1003.00	1	
10	terminal connection	terminal strip -X4,-X04		KKK-U1003.00	2	

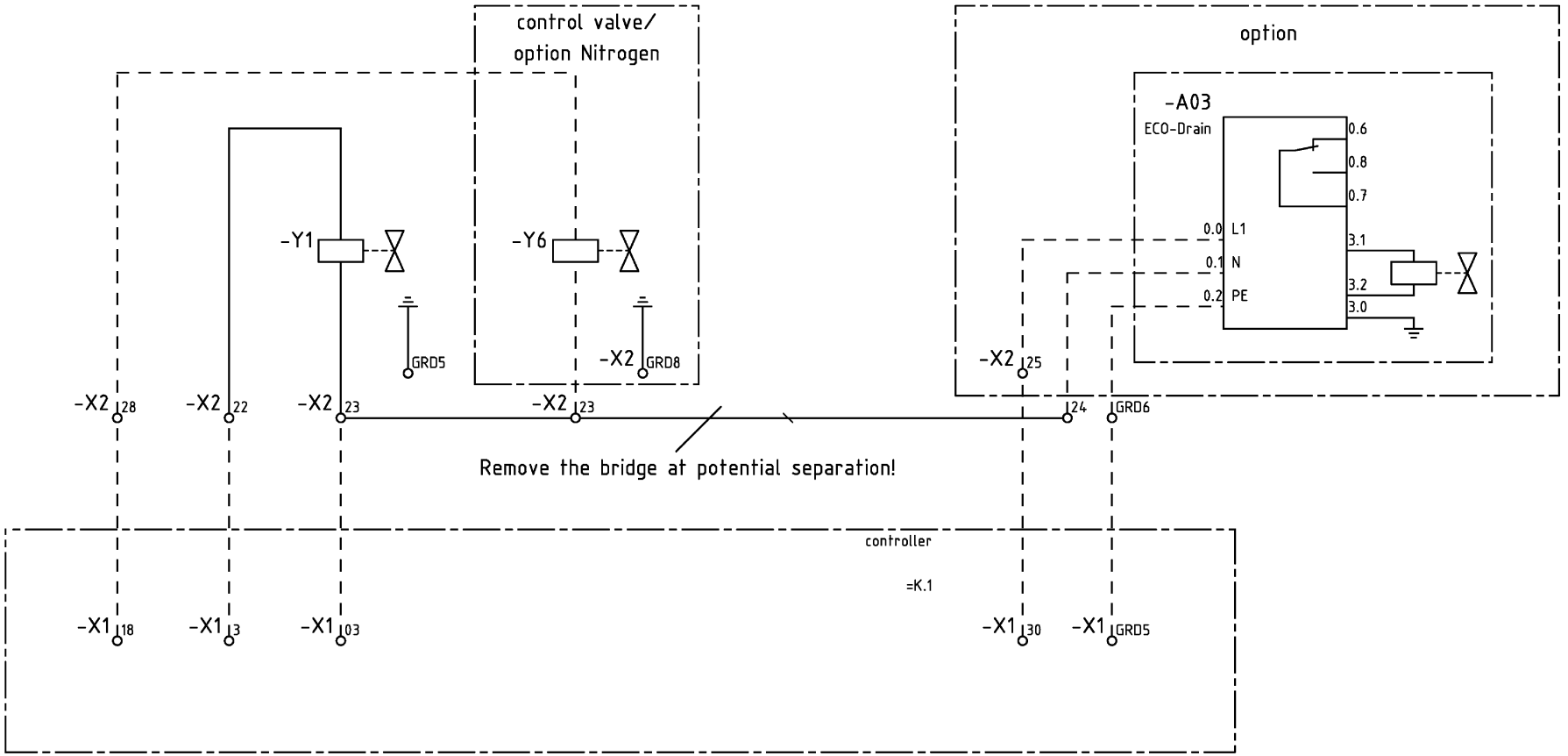
c				Datum	18.02.2005		KAESER KOMPRESSOREN	list of contents booster compressor N 253-G - N 2001-G	=	
b				Bearb.	Sitter				+	
a				Gepr.	Dusch					
B	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung:		ZKK-U1003.00	Blatt 1 Bl.



Function:	compressor motor				thermistor airend discharge temperature -function monitors-				thermistor, compressor motor (option)	
Group of function:										
c				Datum	18.02.2005		KAESER KOMPRESSOREN	wiring diagram	=	
b				Bearb.	Sitter			booster compressor	+	
a				Gepr.	Dusch			N 253-G - N 2001-G		
D	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: UKKU1004_00	SKK-U1003.00	Blatt 1 Bl.



Function:	pressure switch -initial pressure		pressure switch -oil pressure		excessive temperature switch		FAILURE condensate drain (option)			
Group of function:										
c				Datum	18.02.2005		KAESER KOMPRESSOREN	wiring diagram	=	
b				Bearb.	Sitter			booster compressor	+	
a				Gepr.	Dusch			N 253-G - N 2001-G		
D	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: UKKU1004_00	SKK-U1003.00	Blatt 2 Bl.



Function:	control valve: N 253-G, N 351-G, N 502-G	
Function: combined control/vent valve	control valve Nitrogen: N 753-G - N 2001-G	condensate drain
Group of function:		

c				Datum	18.02.2005		KAESER KOMPRESSOREN	wiring diagram booster compressor N 253-G - N 2001-G	=
b				Bearb.	Sitter				+
a				Gepr.	Dusch				
D	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: UKKU1004_00		SKK-U1003.00 Blatt 3 Bl.

option

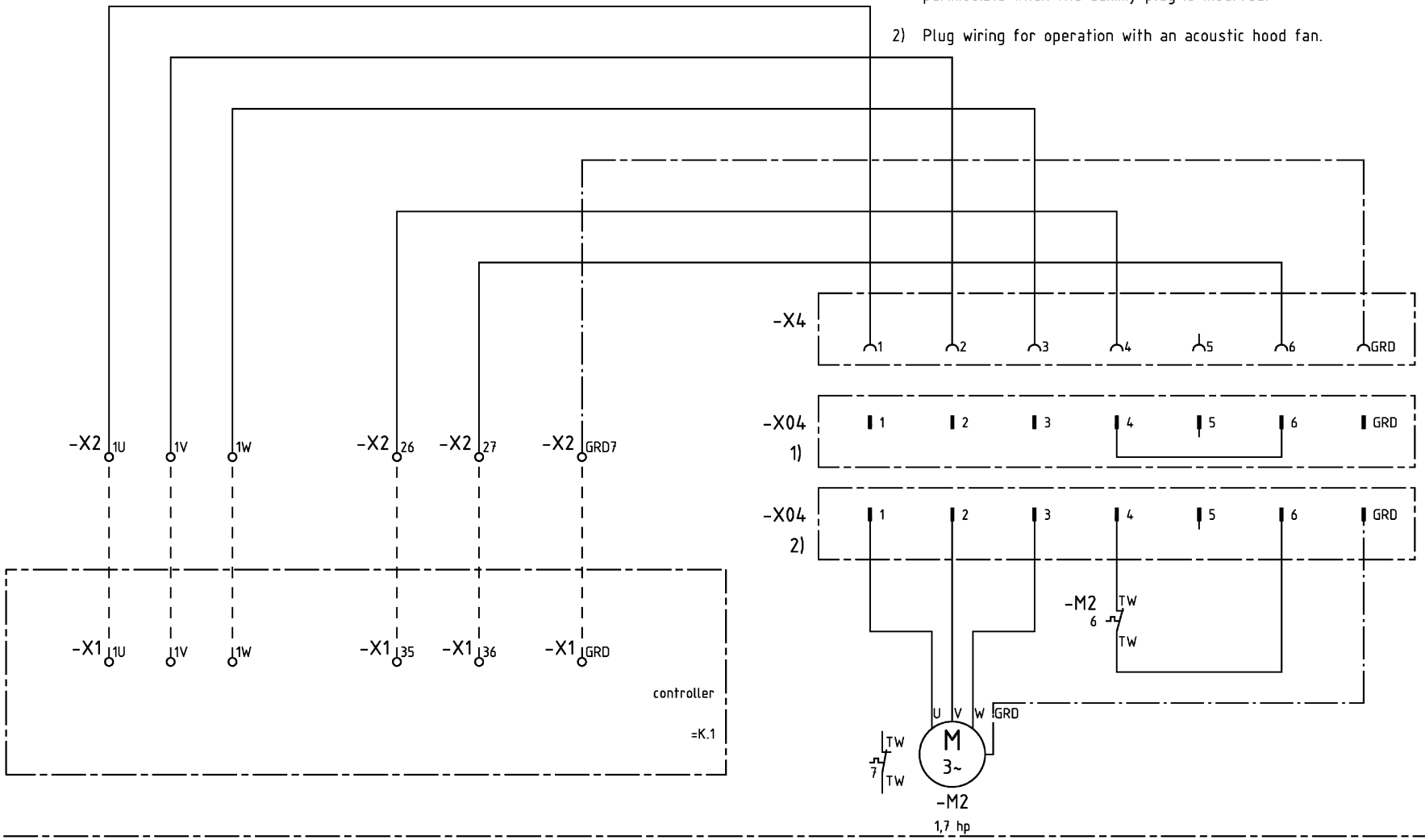
soundproofing casing

ATTENTION !!!

1) Plug wiring for operation without an acoustic hood fan.

Operation without an acoustic hood fan is only possible and permissible when the dummy plug is inserted.

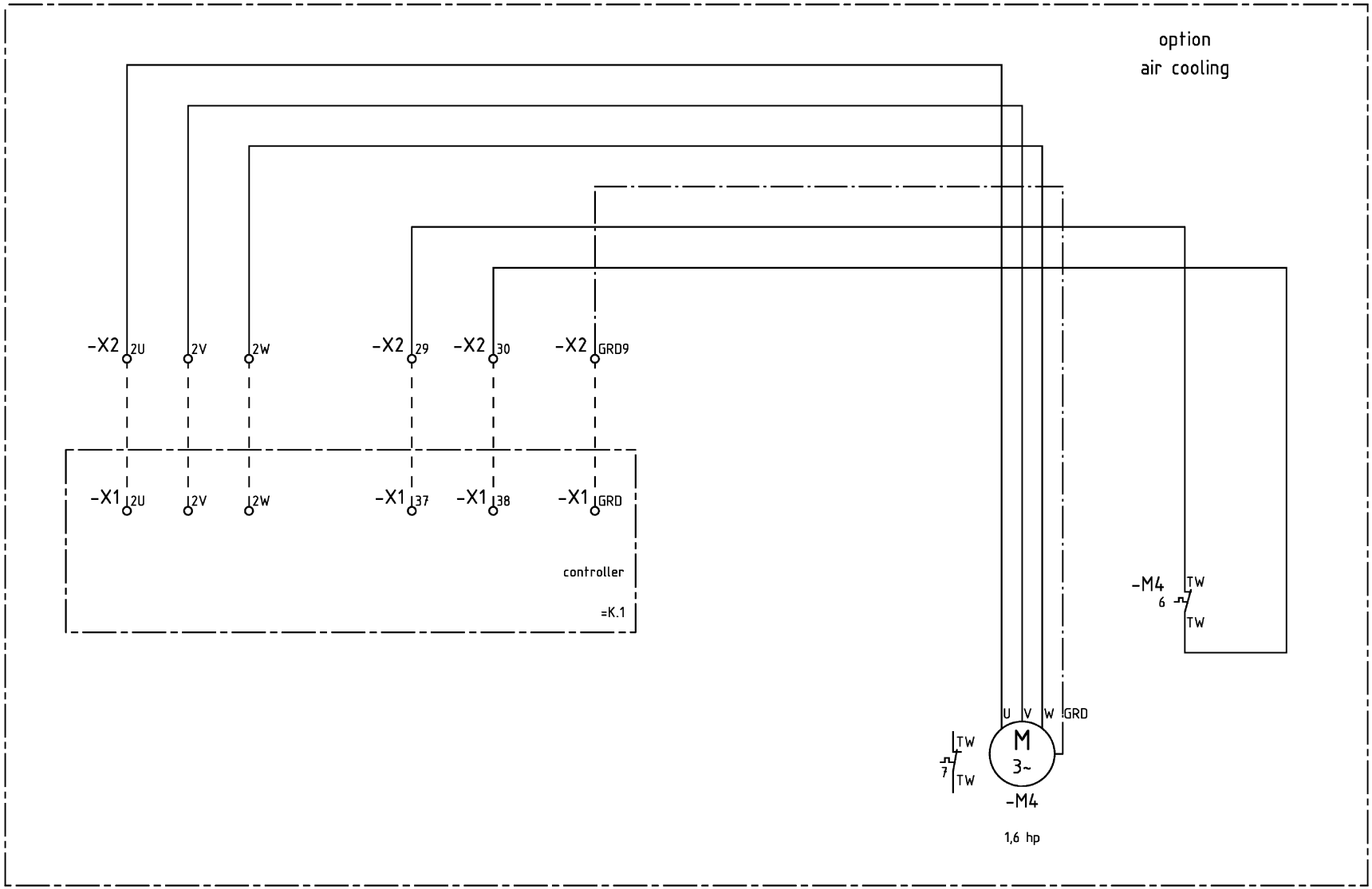
2) Plug wiring for operation with an acoustic hood fan.



Function:

Group of function: ventilator, soundproofing casing

c				Datum	18.02.2005		KAESER KOMPRESSOREN	wiring diagram booster compressor N 253-G - N 2001-G	=	
b				Bearb.	Sitter				+	
a				Gepr.	Dusch					
D	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: UKKU1004_00		SKK-U1003.00	Blatt 4 Bl.



Function:

Group of function: ventilator, air cooler

c				Datum	18.02.2005		KAESER KOMPRESSOREN	wiring diagram	=	
b				Bearb.	Sitter			booster compressor	+	
a				Gepr.	Dusch			N 253-G - N 2001-G		
D	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: UKKU1004_00		SKK-U1003.00	Blatt 5 Bl.

-A03	ECO-Drain (automatic condensate drain) (option)
-B2	pressure switch initial pressure
-B3	pressure switch oil pressure
-B10.1, -B10.2, -B10.3	thermistor airend discharge temperature
-B11	excessive temperature switch
-M1	compressor motor
-X2	terminal strip, control

option

-Y1	control valve, combined control/vent valve (normally closed)
-M4	vent motor
-Y6	control valve and valve Nitrogen (normally open)
-B9	thermistor, compressor motor

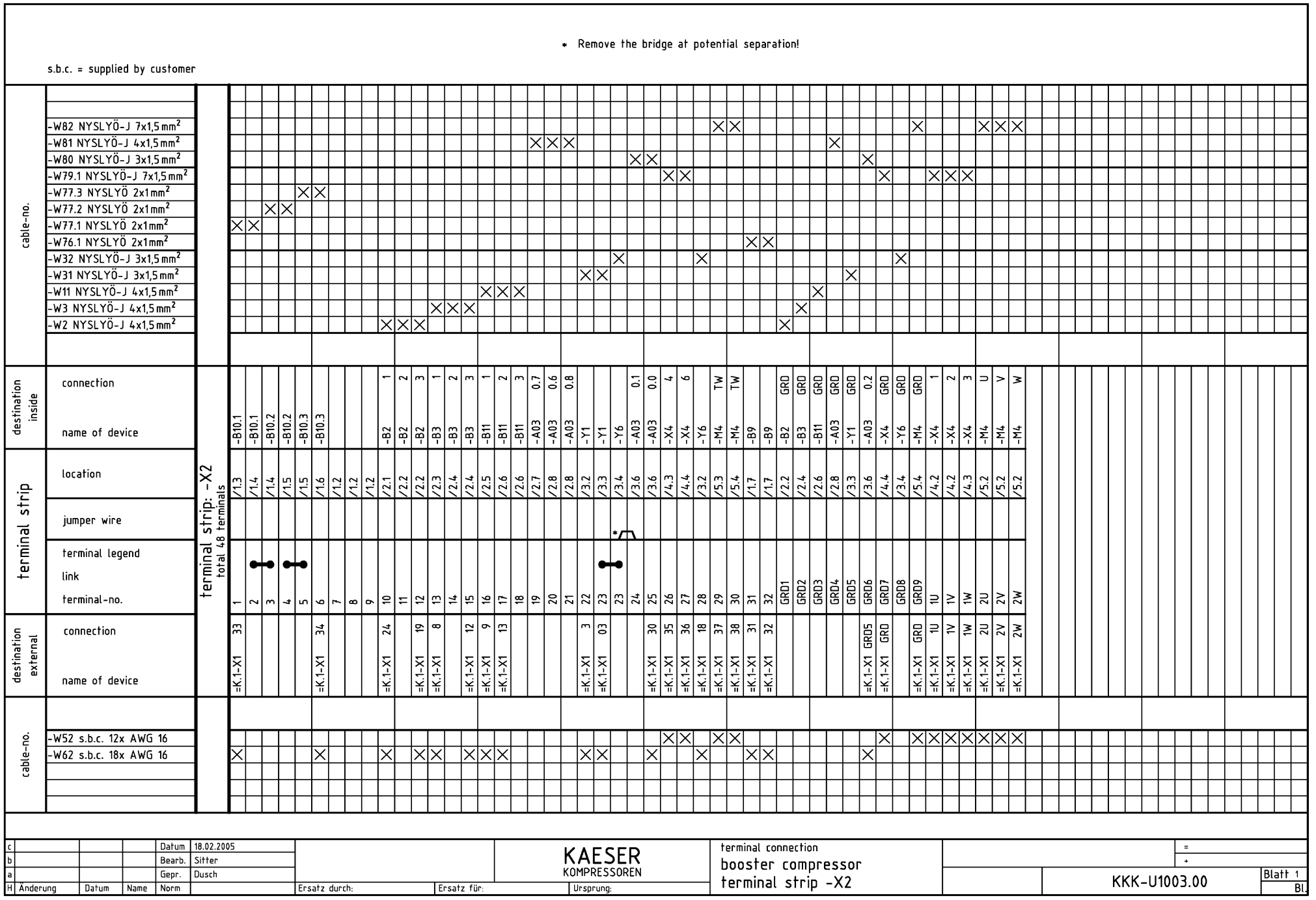
option soundproofing casing

-M2	vent motor
-X4,-X04	plug-connector

c				Datum	18.02.2005		KAESER KOMPRESSOREN	component legend booster compressor N 253-G - N 2001-G	=
b				Bearb.	Sitter				+
a				Gepr.	Dusch				
E	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: UKKU1004_00	SKK-U1003.00	Blatt 6 Bl.

* Remove the bridge at potential separation!

s.b.c. = supplied by customer



c				Datum	18.02.2005	KAESER KOMPRESSOREN	terminal connection booster compressor terminal strip -X2
b				Bearb.	Sitter		
a				Gepr.	Dusch		
H	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für: / Ursprung:	KKK-U1003.00 Blatt 1 Bl.

cable-no.	destination inside	terminal strip	destination external	cable-no.	terminal strip: -X4 total 7 terminals								terminal strip: -X04 total 14 terminals																			
	connection	location	connection																												
	name of device	jumper wire	name of device																												
		terminal legend																													
		link terminal-no.			1	2	3	4	5	6	GRD		1	1	2	2	3	3	4	4	5	5	6	6	GRD	GRD						
		location			/4.6	/4.6	/4.6	/4.7	/4.7	/4.8	/4.8		/4.6	/4.6	/4.6	/4.6	/4.6	/4.6	/4.7	/4.7	/4.7	/4.7	/4.8	/4.8	/4.8	/4.8						
		jumper wire																													
		terminal legend																													
		link terminal-no.			1U	1V	1W	26		27	GRD7		U	1	V		W		TW				TW	6	GRD							
		connection			-X2	-X2	-X2	-X2		-X2	-X2		-M2	1	-M2	2	-M2	3	-M2	4	5	5	-M2	6	-M2	GRD						
		name of device																													
													1)		1)		1)		1)				1)		1)							
	-W79.1 NYSLYÖ-J 7x1,5 mm²				X	X	X	X		X	X																					
	-W79.2 NYSLYÖ-J 7x1,5 mm²												X		X		X		X				X		X						

1) option: Plug wiring for operation without an acoustic hood fan.

c				Datum	18.02.2005		KAESER KOMPRESSOREN	terminal connection booster compressor terminal strip -X4,-X04	=	
b				Bearb.	Sitter				+	
a				Gepr.	Dusch					
H	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	KKK-U1003.00	Blatt 2 Bl.

13.2 Pressure Relief Valve Data Sheet

SAFETY VALVES

Design SVW/SVWN/SVWC	DN 8	PN 50	-25 bis 180 °C	Type tested

Applications:

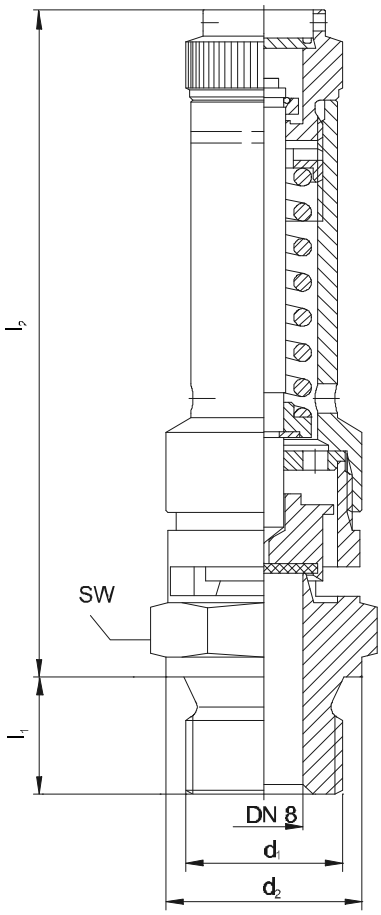
⇨ Suitable for compressed, similar non-inflammable and non-toxic gases; free discharge, not suitable for fluids and vapours.

Types:

SVW ⇨ 2.0401 (brass)
SVWC ⇨ 1.4104 (stainless steel)
SVWN ⇨ 1.4571 (stainless steel)

Characteristics:

Opening design +++ elastic seal (Viton) +++ spring of stainless steel +++ lifting device +++ connection thread according to DIN 3852 +++ mark of typetest TÜV +++ TÜV similar test and certificate (DIN EN 10204 / Germanischer Lloyd).



connection (d_1)	set pressure [bar]	d_2 [mm]	l_1 [mm]	l_2 [mm]	SW SVW	SW SVWN SVWC
M 16x1,5	00,30 – 14,20	20	12	63	20	22
	14,21 – 40,00			75		
	40,01 – 50,00			82		
G 1/4 A	00,30 – 14,20	18	10	63		
	14,21 – 40,00			75		
	40,01 – 50,00			82		
G 3/8 A	00,30 – 14,20	20	12	63		
	14,21 – 40,00			75		
	40,01 – 50,00			82		
G 1/2 A	00,30 – 14,20	24	14	63	24	24
	14,21 – 40,00			75		
	40,01 – 50,00			82		

Order term: (Please pay attention to advices at the reverse)

z.B. SVW 8 – 11 bar – G ¼ A – ...

- ... special design
- G ¼ A connection thread
- 11 bar set pressure
- 8 nominal diameter
- SVW design

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SAFETY VALVES

Design SVW/SVWN/SVWC	DN 8	PN 50	-25 bis 180 °C	Type tested

Discharge capacity

p_e [bar]	qm [m³/h] bei 0°C/760 Torr
0,3	13,6
0,8	19,3
0,9	37,6
1,4	48,1
1,9	58,6
2	69,2
2,5	81,2
3	93,2
3,5	105,1
4	117,1
5	141,0
6	165,0
7	188,9
8	212,8
9	236,4
10	260,7
11	284,6
12	308,6
13	332,5
14	356,4
15	380,4
16	404,3
17	428,2
18	452,2
19	476,1
20	500,0
21	524,0
22	547,9

p_e [bar]	qm [m³/h] bei 0°C/760 Torr
23	571,8
24	595,8
25	619,7
26	643,6
27	667,6
28	691,5
29	715,4
30	739,4
31	763,3
32	787,2
33	811,2
34	835,1
35	859,0
36	883,0
37	906,9
38	930,8
39	954,8
40	978,7
41	1.002,6
42	1.026,6
43	1.050,5
44	1.074,4
45	1.098,4
46	1.122,3
47	1.146,3
48	1.170,2
49	1.194,1
50	1.218,1

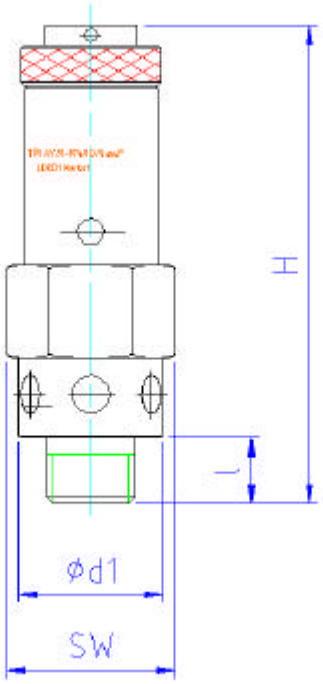
Discharge capacities by 10% accumulation over the set pressure.

General notes:

Working temperautre for safety valves type SVWC –10 to 180°C.
Valves are delivered tested and sealed. Special designs (other connection thread, e. g. nickel-plated) on inquery.
Ordering safety valves please declare medium, temperature and other relevant details (if possible).
 Safety notes and direction of maintenance you will find at backsite of our test certification or an inqury.

Sicherheitsventil / safety valve Typ L08

Zulassung / homologation :	CE 97/23/EG
Druckbereich / pressure range:	0,3-47,0 bar
Anschlussgewinde / inlet connection :	G ¼“, G 3/8 oder / or G 1/2“
Ausgangsgewinde / outlet connection:	frei abblasend / free outlet
Nennweite / nominal size:	8 mm
Temperaturbereich / temperature range:	-10°C bis + 180°C



AnschlußGewinde Threaded connection	Druckbereich Pressure range (bar)	H (mm)	l (mm)	Drehmoment Torque (Nm)	Schlüsselweite Width across (mm)	d1 (mm)
G ¼	0,3-0,9	72	10	14	22	21,8
	9,4-21,0	81	10	14	22	21,8
	21,1-47,0	88	10	14	24	23,8
G 3/8	0,3-0,9	72	10	40	22	21,8
	9,4-21,0	81	10	40	22	21,8
	21,1-47,0	88	10	40	24	23,8
G ½	0,3-0,9	73	12	65	27	26,8
	9,4-21,0	82	12	65	27	26,8
	21,1-47,0	90	12	65	27	26,8
M 18 x 1,5	0,3-0,9	72	10	40	22	21,8
	9,4-21,0	81	10	40	22	21,8
	21,1-47,0	88	10	40	24	23,8

Bezeichnung /	Werkstoff / material
Gehäuse / body	Messing / brass
Dichtung / seal	Elastomere (Silikon (0,3-2,3 bar, VITON 2,4-47 bar)
Kegel / cone	Messing / brass
Zugstange / spindle	Messing / brass
Einstellschraube / adjusting screw	Messing / brass
Druckfeder / spring	Stahl/steel EN 10270-1 DH

Sicherheitsventil / safety valve Typ L08

Leistungsdaten / flow rate**

Druck / Set pressure (bar)	m3/h	l/min
1	46	758
2	69	1157
3	67	1116
4	85	1410
5	102	1697
6	132	2208
7	151	2516
8	171	2848
9	190	3166
10	209	3483
12	248	4133
14	286	4767
16	325	5405
18	364	6067
20	402	6701
22	445	7450
24	479	7983
26	517	8625
28	555	9266
30	599	9983
32	632	10548
34	671	11189
36	709	11830
38	748	12471
40	796	13267
42	825	13753
44	863	14394
46	902	15035
47	921	15356

**Die angegebenen Leistungen werden bei 10% (PE <1 bar, + 0,1bar) Druckanstieg erreicht, gemessen mit Druckluft bei 20°C. Für andere Gase und Temperaturen ändern sich die Abblaseleistungen.
**The specified rates are measured at 10% (PE <1 bar, + 0,1 bar) pressure rise over the set pressure with compressed air at 20°C. The blow-off rates are different for other gases and temperatures