

Operating manual

Rotary screw blower

EBS vac SIGMA CONTROL 2

No.: 902374 03 USE

Manufacturer:

KAESER KOMPRESSOREN SE

96410 Coburg • PO Box 2143 • GERMANY • Tel. +49-(0)9561-6400 • Fax +49-(0)9561-640130

www.kaeser.com

Original instructions
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1 Regarding this Document

1.1 Using this document

This operating or installation manual is part of the machine. It describes the machine as it was at the time of first delivery after manufacture.

- Keep the operating manual in a safe place throughout the life of the machine.
- Pass the operating manual on to the next owner/user.
- Ensure that all amendments received are entered or inserted in the operating manual.
- Enter details from the machine nameplate and individual items of equipment in the tables in chapter 2.

1.2 Further documents

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

- Manufacturer's Declaration or Declaration of Conformity according to applicable directives.
- User Manual for SIGMA CONTROL 2.

Missing documents can be requested from KAESER.

- Ensure that all documents are complete and observe the instructions contained within them.
- Ensure that you provide the data from the nameplate when ordering documents.

1.3 Copyright

This operator manual is copyright protected. Queries regarding use or duplication of the documentation should be referred to KAESER. Correct use of information will be fully supported.

1.4 Symbols and labels

- Please note the symbols and labels used in this document.

1.4.1 Warnings

Warnings indicate danger potentially resulting in personal injury, if the measures specified are not taken.

Warnings indicate three levels of danger identified by the corresponding signal word:

Signal term	Meaning	Consequences of non-compliance
DANGER	Warns of imminent danger	Will very likely result in death or severe injury
WARNING	Warns of potentially imminent danger	May result in death or severe injury
CAUTION	Warns of a potentially dangerous situation	May result in moderate physical injury

Tab. 1 Danger levels and their definition (personal injury)

Warning notes may precede a chapter. They apply to the entire chapter including all sub-sections.

1 Regarding this Document

1.4 Symbols and labels

Example:

⚠ DANGER

The type and source of the imminent danger is shown here!

The possible consequences of ignoring a warning are shown here.

The word "DANGER" indicates that death or severe injury can very likely result from ignoring the warning.

➤ *The measures required to protect yourself from danger are shown here.*

Warning notes referring to a sub-section or the subsequent step are integrated into the procedure and numbered as a step.

Example:

1. **⚠ WARNING** *The type and source of the imminent danger is shown here!*
The possible consequences of ignoring a warning are shown here.
The word "WARNING" indicates that death or severe injury may result from ignoring the warning.
 ➤ *The measures required to protect yourself from danger are shown here.*
2. Always read and comply with warning instructions.

1.4.2 Potential damage warnings

Contrary to the warnings shown above, damage warnings do not indicate potential personal injury.

Damage warnings have only one danger level, identified by this signal word:

Signal term	Meaning	Consequences of non-compliance
NOTE	Warns of a potentially dangerous situation	Damage to property is possible

Tab. 2 Danger levels and their definition (damage to property)

Example:

NOTICE

The type and source of the imminent danger is shown here!

Potential effects when ignoring the warning are indicated here.

➤ *The protective measures against the damages are shown here.*

➤ Carefully read and fully comply with warnings against damages.

1.4.3 Other alert notes and their symbols



This symbol indicates particular important information.

Material Here you will find details on special tools, operating materials or spare parts.

Precondition Here you will find conditional requirements necessary to carry out the task.
The conditional requirements relevant to safety shown here will help you to avoid dangerous situations.

Option H12 ➤ This symbol is placed by lists of actions comprising one stage of a task.
Operating instructions with several steps are numbered in the sequence of the operating steps.
Information relating to one option only are marked with an option code (e.g., H12 indicates that this section applies only to machines with sound enclosure). Option codes used in this operating manual are explained in chapter 2.2.



Information referring to potential problems are identified by a question mark.
The cause is specified in the help text ...
➤ ... as is a solution.



This symbol refers to important information or measures concerning environmental protection.

Further information Further subjects are introduced here.

2 Technical Data

2.1 Nameplate

The machine's nameplate contains the model type and important technical information.

The nameplate is attached to the base frame of the machine and on the side wall of the sound enclosure (Option H12):

EBS 410 CM vac right-hand side wall.

EBS 410 M vac left-hand side wall.

The specified value for the full load current has been calculated including the associated lambda factor. This value can be found in chapter 2.13.2 (Option C38).

The information given on the nameplate relates to the standard inlet conditions of 14.7 psi and +68°F.

➤ Enter the data from the nameplate here as a reference:

Characteristic	Value
Rotary screw blower	
Material No.	
Serial no.	
Ambient temperature	
Rated power	
Rated motor speed	
Full load current	
Electrical connection	
Wiring diagram	
Year of manufacture	

Tab. 3 Nameplate

2.2 Option codes

The table contains a list of possible options.

➤ Enter options here as a reference:

Option	Option code	Available?
Operating mode: Vacuum	B14	✓
Oil level monitoring	C5	✓
Speed monitor	C10	—
Unloaded start valve (AFE)	C11	—
Unloaded start valve with regulating valve (AFR)	C18	—
Under frequency control	C32	✓
START CONTROL (STC)	C33	—

Available: ✓

Not available: —

Option	Option code	Available?
SIGMA FREQUENCY CONTROL (SFC)	C38	✓
Oil temperature monitoring	C39	✓
Communication module: PROFIBUS DP	C41	
Communication module: Modbus RTU	C42	
Communication module: DEVICENET	C43	
Communication module: Modbus TCP	C44	
Communication module: PROFINET IO	C45	
EMERGENCY STOP switching device	C58	
Filter differential pressure switch	F5	✓
Check valve	G1	
Intake from pipe network	H11	✓
Sound enclosure	H12	✓
Exhaust silencer (pipeline)	H16	
Exhaust silencer (diffusion to surroundings)	H19	
Available: ✓		
Not available: —		

Tab. 4 Option codes

2.3 Weight

The values shown are maximum values. The actual weight of individual machines depends on equipment fitted.

Rated power [hp]	Weight [lb]		
	EBS 410 CM vac	EBS 410 M vac	—
30.0	2385	—	—
40.0	2491	—	—
50.0	2762	—	—
60.0	—	3188	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

Tab. 5 Weight

2.4 Drive motor

➤ Copy the data from the motor nameplate/service plate into the table:

Feature	Value
Protection class	IP55
Lubricating interval *[h]	3000
Bearing grease amount DE [g]	
Bearing grease amount NE [g]	

h = operating hours

* The lubricating interval is max. 3000 h, even if a longer interval is indicated on the motor service plate.

Tab. 6 Drive motor

2.5 Recommended lubricating oil

The lubricant type to be used depends on the operating conditions.

	SIGMA FLUID	
	G-680	FGB-680
Description	Synthetic oil	Synthetic oil
Application	Suitable for all applications, except food processing.	Specifically for machines in applications where the compressed air may come into contact with food products.

Tab. 7 Recommended oil

Further information An adhesive label identifying the used lubricant is attached to the blower block.
Information on ordering oil is found in chapter 11.2.

2.6 Lubricating oil charge

The block oil chambers are filled with oil at the factory.

Guide value

	Drive-end	Gear-end
Lubricating oil charge [qt]	1.2 ±15 %	1.5 ±15 %

Tab. 8 Lubricating oil charge

2.7 Permitted working pressure

Undershooting of the minimum working pressure, or overshooting of the maximum working pressure is not permitted. The working pressures during the start and shut-down phases are exceptions. The specified values apply to 14.5 psi of blow-off back pressure.

2 Technical Data

2.8 Permitted pressure drop

	EBS 410 CM vac	EBS 410 M vac
Minimum pressure differential [psi (g)]	2.9	2.9
Maximum pressure differential [psi (g)]	8.0	8.0

Tab. 9 Permitted working pressure

2.8 Permitted pressure drop

Ensure that the pressure drop in the downstream pipes is max. 0.15 psi.



The same applies to machines with exhaust silencer (pipe), option H16.

2.9 Temperature

	EBS 410 CM vac	EBS 410 M vac	—
Maximum block discharge temperature [°F]	320	320	—
Maximum temperature differential [°F] *	115	115	—

*Discharge temperature minus inlet temperature

Tab. 10 Temperature

2.10 Ambient and inlet conditions

The following conditions must be maintained:

- Atmosphere in the immediate vicinity of the machine free of salt.
- The air must be free of chemicals or explosive substances.

	EBS 410 CM vac	EBS 410 M vac	—
Permissible ambient temperature [°F]	32 – 113	32 – 113	—
Permissible inlet temperature [°F]	5 – 113	5 – 113	—
Relative humidity [%]	0 – 80	0 – 80	—

Tab. 11 Ambient and inlet conditions



Differing ambient and inlet conditions require recalculation of the performance data, and are permissible only upon agreement with the manufacturer.

Installation altitude



The maximum permissible installation altitude depends on the main frequency of the machine.

An installation altitude > 3280 ft [AMSL] leads to performance restriction of the machine, which has already been taken into account in the project planning data sheet in chapter 13.4.

Maximum installation altitude AMSL [ft]
3281

Tab. 12 Installation altitude

2.11 Sound emission

Operating state LOAD under the following conditions:

- Nominal speed
- Nominal suction capacity
- Nominal pressure

Measuring condition according to DIN EN ISO 2151 and basic standard ISO 9614-2:

- Measuring distance: 3 ft.
- Tolerance: ± 3 dB(A)
- Sound insulated pipeline

	EBS 410 CM vac	EBS 410 M vac	—
Sound pressure level [dB(A)]	72.0	72.0	—
Sound power level [dB(A)]	89.1	89.5	—

Tab. 13 Sound emission

2.12 Power Supply

Basic requirements

The machine is designed for an electrical supply according to National Electric Code (NEC), edition 2020, particularly article 670 and NFPA 79, edition 2021, particularly section 4.3. 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.

The incoming line within the control panel should be as short as possible.

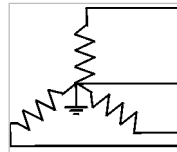
If external sensors or communication lines are to be connected to the machine, use shielded cables and insert the same through EMC fittings into the control panel.

Three-phase

Do **NOT** operate package on any unsymmetrical power supply. Also do **NOT** operate package on power supplies such as a three phase WYE system with center point not solidly grounded or three-phase (open) delta.

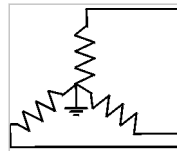
The machine requires a symmetrical three-phase power supply transformer with a WYE configuration output as shown in Figure 1 and Figure 2. In a symmetrical three phase supply the phase angles and voltages are all the same.

Other power supplies are not suitable.



03-S0235

Fig. 1 Three-phase star (wye); 4 wire; center point solidly grounded



03-S0236

Fig. 2 Three-phase star (wye); 3 wire; center point solidly grounded

Further information Please contact an authorized KAESER service representative for options.
The electrical diagram 13.3 contains further specifications for electrical connection.

2.13 Power supply specifications

The following multi-strand copper core wires are given according to 2020 NEC 310.14, 310.15, 310.16 and table 310.16 adjusted 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 2020 NEC 110.14(C). 220.3. 310.14. 310.15. 310.16, 310.15(B)(1), table 310.15(C)(1). 430.6. 430.22. 430.24. 670.4(A) and other local codes.

Dual element time delay fuses are selected according to 2020 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. 2020 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.

2.13.1 Option C33 START CONTROL (STC)

Rated power supply: 460V±10% / 3 / 60Hz

Rated power [hp]	30.0	40.0	50.0	60.0	—	—	—	—	—
Backup fuse [A]	50	63	80	100	—	—	—	—	—
Supply line [AWG]	1x 4x10	1x 4x16	1x 4x25	1x 4x35	—	—	—	—	—

Rated power [hp]	30.0	40.0	50.0	60.0	—	—	—	—	—
Current consumption [A]	41.3	56.8	67.8	81.9	—	—	—	—	—

Tab. 14 Connection data 460V / 3 / 60Hz

Rated power supply: 575V±10% / 3 / 60Hz

Rated power [hp]	30.0	40.0	50.0	60.0	—	—	—	—	—
Backup fuse [A]	40	60	60	80	—	—	—	—	—
Supply line [AWG]	1x 4x8	1x 4x6	1x 4x4	1x 4x3	—	—	—	—	—
Current consumption [A]	33.0	45.5	53.5	67.6	—	—	—	—	—

Tab. 15 Rated power supply 575V±10% / 3 / 60Hz

2.13.2 Option C38 SIGMA FREQUENCY CONTROL (SFC)

Protective conductor requirements

Due to the leakage currents of ≥ 10 mA caused by the anti-interference capacitors in the frequency converter, a minimum diameter of 8 AWG is required for the protective conductor.

Use one of the following options if the protective conductor for the supply cable is smaller than 8 AWG:

- Multicore cable including protective conductor with a minimum cross-section of 8 AWG,
- a minimum cross-section of 8 AWG for the protective conductor alone,
- a second protective conductor with the same cross-section as the supply line,
- automatic deactivation of the power supply as soon as the protective conductor is interrupted.



Note on the lambda factor:

In addition to their fundamental oscillation, non-sinusoidal variables also contain harmonics for which no fixed phase shift angle ϕ (phi) can be specified. Instead, the power factor λ (lambda) must be used. In electrical engineering, the power factor λ denotes the ratio of the active power value P to the apparent power value S.

In the event of deviating network characteristics and therefore lambda value at the user-end, the full load current and supply cable cross-section may need to be reassessed.

Rated power supply: 460V / 3 / 60Hz

Rated power [hp]	30.0	40.0	50.0	60.0	—	—	—	—	—
Backup fuse [A]	50	60	80	90	—	—	—	—	—
Supply line [AWG]	1x 4x4	1x 4x2	1x 4x2	1x 4x1/0	—	—	—	—	—
Current consumption [A]	41.5	53.1	65.8	78.0	—	—	—	—	—
Power factor [λ] (lambda)	0.877	0.921	0.917	0.927	—	—	—	—	—

Tab. 16 Connection data 460V / 3 / 60Hz

2.14 Options

Technical data for the options available for your machine are given in the following.

2.14.1 Option C5 Oil level monitoring

Feature	Data
Max. voltage [V]	48
Switching current [A]	0.5
Switching capacity [hp]	0.03
Type of contact	Normally closed
Degree of protection	IP67

Tab. 17 Oil level monitoring (Option C5)

Further information The electrical diagram in chapter 13.3 contains details of the power supply.

2.14.2 Option C39 Oil temperature monitoring

Feature	Data
Measuring element	PT100
Measuring range [°F]	-58 – +392
Connection	M12x1 circular connection
Switching type	2-conductor switching
Process connection [“]	G 1/4 screw-in thread

Tab. 18 Oil temperature monitoring (Option C39)

Further information The electrical diagram in chapter 13.3 contains details of the power supply.

2.14.3 Option C58 EMERGENCY STOP switching device

Feature	Specification
Supply voltage [V]	24–240
Voltage type	AC/DC

Tab. 19 EMERGENCY STOP switching device (Option C58)

Further information The wiring diagram in chapter 13.3 contains information regarding the electrical connection.

2.14.4 Option G1
Check valve

Nominal pipe size	Max. pressure and back pressure [psi]
DN 150	21.8
—	—

Tab. 20 Check valve (Option G1)

2.14.5 Option H11
Piped inlet

The dimensional drawings in chapter 13.2 include connection dimensions.

2.14.6 Option H12
Fan (sound enclosure)

Rated power [hp]	30.0	40.0	50.0	60.0	—	—	—	—	—
Maximum flow rate [cfm]	1210			2213			—	—	—

Tab. 21 Flow rate

2.14.7 Option H16, H12
Exhaust silencer (pipeline)

The mounting position is shown in the dimensional drawing in chapter 13.2.

2.14.8 Option H19, H12
Exhaust silencer (diffusion to ambient)

The mounting position is shown in the dimensional drawing in chapter 13.2.

3 Safety and Responsibility

3.1 Basic instructions

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

- Danger to life and limb of the operator or third parties,
- Damages to the machine and other material assets.



Disregard of warning or safety instructions can cause serious injuries!

- Read the operating and installation manual carefully and take note of the contents for safe machine operation.
- Use this machine only if it is in a technically perfect condition and only for the purpose for which it is intended; observe all safety measures and the instructions in the service manual!
- Immediately rectify (have rectified) any faults that could be detrimental to safety!

3.2 Specified use

The machine is designed exclusively for the generation of vacuum in a commercial or industrial environment where air as delivery medium is approved for use. Any other use is considered incorrect. The manufacturer is not liable for any damages that may result from incorrect use. The user alone is liable for any risks incurred.

- Comply with the instructions in this operating manual.
- Operate the machine only within its performance limits and under the permitted ambient conditions.
- Operate the machine only when completely installed.

3.3 Improper use

Improper usage can cause damage to property and/or (severe) injuries.

- Only use the machine as intended.
- Use hot cooling air for heating purposes only if there is no risk to the health of humans or animals. If necessary, cooling air should be treated by suitable means.
- Do not allow the machine to take in toxic, acidic, flammable or explosive gases or vapors.
- Do not operate the machine in areas in which specific requirements with regard to explosion protection are in force.
- Intake of solid particles > 0.004 inch is not permitted.
- Persons are not allowed to remain near the exhaust outlet.
- Exhaust air must not be used for breathing purposes.

3.4 User's responsibilities

3.4.1 Observe statutory and universally accepted regulations

This is, for example, nationally implemented European directives and/or applicable national legislation, safety and accident prevention regulations.

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

3.4.2 Qualified personnel

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

Authorized operators possess the following qualifications:

- Are of legal age,
- Are familiar with and adhere to the safety instructions and sections of the service manual relevant to operation,
- Have received adequate training and authorization to operate electrical and vacuum devices.

Authorized installation and maintenance personnel have the following qualifications:

- Are of legal age,
 - Have read, are familiar with and adhere to the safety instructions and sections of the service manual applicable to installation and maintenance,
 - Are completely familiar with the safety concepts and regulations of electrical and vacuum engineering,
 - Are able to recognize the possible dangers of electrical and vacuum devices and take appropriate measures to safeguard persons and property,
 - Have received adequate training in and authorization for the safe installation and maintenance of this machine.
- Ensure that personnel entrusted with operation, installation and maintenance are qualified and authorized to carry out their tasks.

3.5 Dangers

Basic instructions

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

Basic safety instructions are found in this service manual at the beginning of each chapter in the section entitled 'Safety'.

Warning instructions are found before a potentially dangerous task.

3.5.1 Safely handling potential sources of danger

The following describes the various forms of danger that can occur while operating the machine.

Electricity

Touching live components can result in electric shocks, burns or death.

- All power supply lines must be fitted with lockable power supply disconnecting devices by the user.
- Allow only qualified and authorized certified electricians or trained personnel under the supervision of a qualified and authorized certified electrician to carry out work on electrical equipment in accordance with electrical engineering regulations.
- Before commissioning or recommissioning the machine, the operator must ensure adequate protection against electric shock from direct or indirect contact.
- Before starting any work on the electrical equipment:
Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
- Switch off any external power sources.
These may be connections to the electric machine heating for example.
- Use fuses corresponding to machine power.
- Regularly check that all electrical connections are tightened and in an appropriate condition.

Forces of compression

- Do not carry out welding, heat treatment or mechanical modifications on pressurized components, as this adversely affects the components' resistance to pressure.
The safety of the machine is then no longer ensured.

Quality of discharge air

The quality of the discharge air and any substances it may contain depends on the quality of the air drawn from the vacuum network.

- Never breathe in exhaust air.
- Lead exhaust air outdoors to a point far from any persons.

Spring forces

Springs under tension store energy. Uncontrolled release of this energy can cause serious injury or death.

Safety relief valves are heavily spring-loaded.

- Do not open or dismantle any valves.

Rotating components

Touching the fan wheel while the machine is switched on can result in serious injury.

- Do not remove protective guard devices whilst the machine is running.
- Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
- Wear close-fitting clothing and a hair net if necessary.
- Ensure that all covers and safety guards are in place and secured before restarting the machine.

Temperature

High temperatures are generated during compression. Touching hot components may lead to injury.

- Avoid contact with hot components.
They may include the flange connection for the exhaust air, and the connected components and pipelines, blower block, silencer, oil and pressure lines, motors/engines and machine heater.
- Wear protective clothing.
- If work is carried out on or near the machine, take adequate measures to prevent sparks or heat from igniting oil vapors or parts of the machine.

Noise

The sound enclosure absorbs and reduces the machine noise to a comfortable level. This function is only effective if the sound enclosure is closed.

- Wear hearing protection if necessary.

Operating fluids/materials

The operating fluids and materials used can cause adverse health effects. Suitable safety measures must be taken in order to prevent injuries.

- Fire, open flames and smoking must be strictly prohibited.
- Observe safety regulations when handling oils, lubricants and chemical substances.
- Avoid contact with the skin and eyes.
- Do not inhale oil mist and vapors.
- Do not eat or drink while handling lubricants.
- Keep a suitable fire extinguishing agent ready for use.
- Only use operating fluids/materials approved by KAESER.

Unsuitable spare parts

Unsuitable spare parts compromise the safety of the machine.

- Only use spare parts approved by the manufacturer for use in this machine.
- Only use genuine KAESER spare parts on pressure-bearing components.

Converting or modifying the machine

Modifications, additions or conversions to or of the machine can result in unpredictable hazards.

- Do not convert or modify the machine.
- Prior to any technical modification or expansion of the machine, obtain the written approval of the manufacturer.

Extending or modifying the compressed air station

If dimensioned appropriately, safety relief valves reliably prevent any impermissible pressure rise. New dangers may arise if you modify or expand the compressed air station.

- When extending or modifying the compressed air station:
Check the blow-off capacity of the safety relief valves prior to installing the new machinery.
- If the blow-off capacity is insufficient:
Install safety relief valves with a higher blow-off capacity.

3.5.2 Safe machine operation

The following is information supporting you in the safe handling of the machine during individual product life phases.

Personal protective equipment

When working on the machine you may be exposed to dangers that can result in accidents with severe adverse health effects.

- Wear protective clothing as necessary.

Suitable protective clothing (examples):

- Safety work wear
- Protective gloves
- Safety boots
- Eye protection
- Ear protection

Transporting

The weight and size of the machine require safety measures during its transport to prevent accidents.

- Use suitable lifting gear that conforms to local safety regulations.
- Allow transportation only by personnel trained in the safe movement of loads.
- Attach lifting gear only to suitable lifting points.
- Be aware of the center of gravity to avoid tipping.
- Make sure the danger zone is clear of personnel.
- Do not step onto machine components to climb up the machine.

Assembly

- Make sure no power is applied when electrical connections are made.
- Use only electrical cables that are suitable and approved for the surroundings and electrical loads applied.
- Attach or detach pipework only with the machine at atmospheric pressure.
- Use only pressure lines that are suitable and approved for the maximum working vacuum and the intended medium.
- Do not allow connection pipes to be placed under mechanical stress.
- Do not induce any forces into the machine via the connections, so that the compressive forces must be balanced by bracing.
- Do not step onto machine components to climb up the machine.

Installation

A suitable installation location for the machine prevents accidents and faults.

- Install the machine in a suitable compressor room.
- Ensure sufficient and suitable lighting such that the display can be read and work carried out comfortably and safely.
- Ensure accessibility so that all work on the machine can be carried out without danger or hindrance.
- If installed outdoors, the machine must be protected from frost, direct sunlight, dust, rain and splashing water.
- Do not operate in areas in which specific requirements with regard to explosion protection are in force.
- Ensure adequate ventilation.
- Place the machine in such a manner that the working conditions in its environment are not impaired.
- Comply with limit values for ambient temperature and humidity.
- The intake air must not contain any damaging contaminants,
Damaging contaminants are for instance: explosive or chemically instable gases and vapors, acid or base forming substances such as ammonia, chlorine or hydrogen sulfide.
- Do not position the machine in the warm exhaust air flow from other machines.
- Keep suitable fire extinguishing agents ready for use.

Commissioning, operation and maintenance

During commissioning, operation and maintenance you may be exposed to dangers resulting from, e.g., electricity, pressure and temperature. Careless actions can cause accidents with severe adverse effects for your health.

- Allow maintenance work to be carried out only by authorized personnel.
- Wear close-fitting, flame-resistant clothing. Wear protective clothing as necessary.
- Switch off and lock out the power supply disconnecting device, and verify the absence of voltage.
- Check that there is no voltage on floating relay contacts.
- Vent all components and chambers under vacuum to atmospheric pressure.
- Allow the machine to cool down.
- Do not open the sound enclosure while the machine is switched on.
- Do not open or dismantle any valves.
- Use only spare parts approved by KAESER for use in this machine.
- Carry out regular inspections:
for visible damage,
of safety installations,
of the EMERGENCY STOP push button,
of any components requiring monitoring.
- Pay particular attention to cleanliness during all maintenance and repair work. Cover components and openings with clean cloths, paper or tape to keep them clean.
- 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, storage and disposal:

Improper handling of old operating fluids and components represent a danger for the environment.

3 Safety and Responsibility

3.6 Danger areas

- Drain off fluids and dispose of them according to applicable environmental regulations. These include, for example, lubricating oil.
- Dispose of the machine in accordance with local environmental regulations.

3.5.3 Organizational 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.

3.6 Danger areas

The table gives information on areas dangerous to personnel.

Only authorized personnel may enter these areas.

Function	Danger area	Authorized personnel
Transporting	Within a 10 ft radius of the machine.	Installation personnel for transporting preparation. No personnel during transporting.
	Beneath the lifted machine.	No personnel!
Installation	Within the machine. Within 3 ft radius of the machine and its power supply cables.	Installation personnel
Operation	Within a 3 ft radius of the machine.	Operating personnel
Maintenance	Within the machine.	Maintenance personnel
	Within a 3 ft radius of the machine.	

Tab. 22 Danger areas

3.7 Safety devices

Various safety devices ensure safe working with the machine.

- Do not change, bypass or disable safety devices.
- Check safety devices for correct function regularly.
- Do not remove or obliterate labels and notices.
- Ensure that labels and notices are clearly legible.

Further information More information on safety devices is contained in chapter 4, section 4.6.

3.8 Service life of safety functions

In accordance with ISO 13849-1:2015, the category and performance level (PL) of the machine's safety functions have been determined and assessed:

Safety function	Category	Performance Level
EMERGENCY STOP push button	1	c
EMERGENCY STOP switching device (Option C58)		
External EMERGENCY STOP device (Option C58)		

Tab. 23 Category and Performance Level

The safety-relevant components for the safety functions are designed for a service life of 20 years. This service life commences with the initial commissioning of the machine and cannot be extended by the time periods during which it is not in use.

The following components are affected:

- Option C33, START CONTROL (STC):
Star-delta contactor combination
- Option C38, SIGMA FREQUENCY CONTROL (SFC):
Frequency converter
- EMERGENCY STOP push button
- Option C58, EMERGENCY STOP switching device
- Option C58, external EMERGENCY STOP command device

1. As soon as their service life of 20 years has expired, the components of the safety functions must be replaced by an authorized KAESER service representative.
2. Arrange for the reliability of the safety functions to be checked by an authorized KAESER service representative.

3.9 Safety signs

The illustration shows the location of the safety signs on the machine. Table 24 lists the various safety signs used and their meanings.

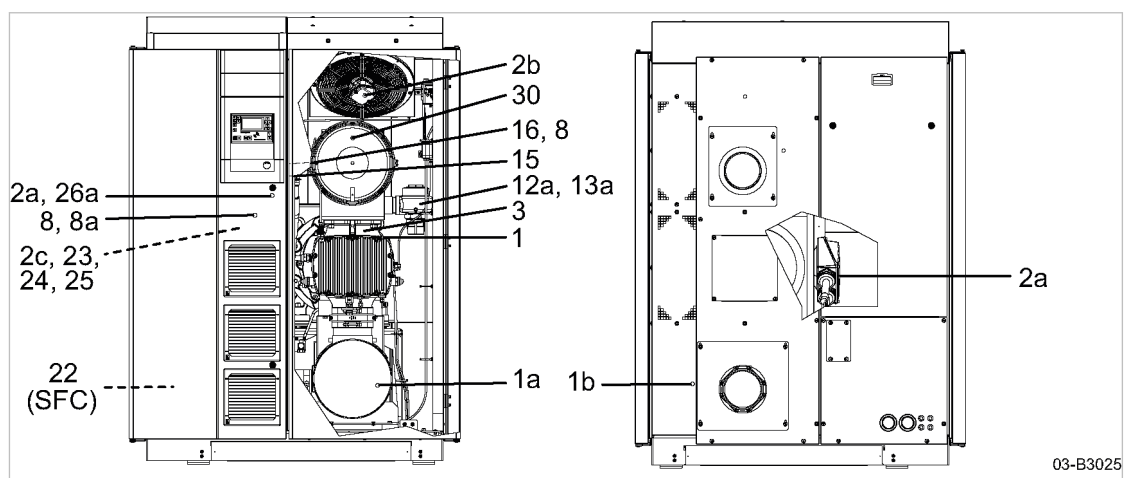


Fig. 3 Location of the safety signs on the machine

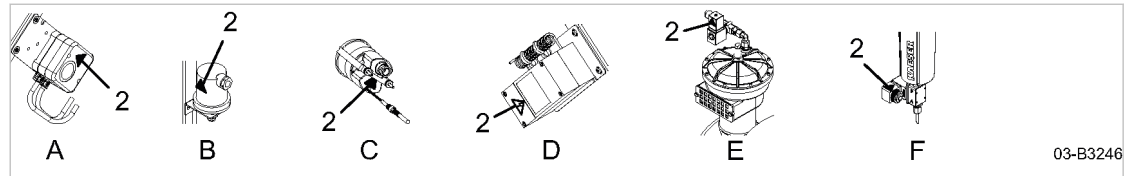


Fig. 4 Safety sign location, electronically actuated components

- | | |
|---|--|
| (A) Filter differential pressure switch | (D) Thermostat |
| (B) Pressure switch | (E) Magnetically actuated valve |
| (C) Temperature display with switching point | (F) Oil chamber ventilation |

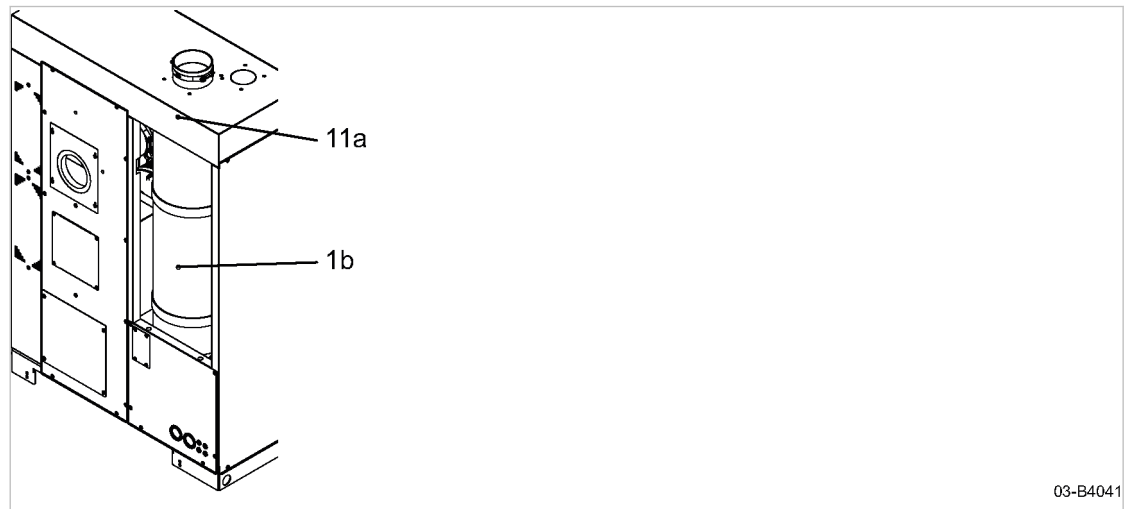


Fig. 5 Safety sign position, blow-off silencer, Option H16, H19

Location	Symbol	Meaning
1 1a 1b		Hot surface! Risk of burns from contact with hot components. ➤ Do not touch the surface. ➤ Wear long-sleeved garments and protective gloves (no synthetics, e.g. polyester).
2 2a 2b 2c		Danger of fatal injury from electric shock! ➤ Before starting any work on the electrical equipment: Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
3		Moving rotors! Risk of serious injury (particularly to the hands) or severed extremities from rotating components. ➤ Only operate the machine with an inlet silencer connected. ➤ Prior to any work on the machine: Switch off the power supply disconnecting device, lock out / tag out the device.
8 8a		Risk of injury to personnel or damage to the machine from incorrect operation! ➤ Ensure that you have read and understood the operating manual and all related safety information before switching on this machine.

3 Safety and Responsibility

3.9 Safety signs

Location	Symbol	Meaning
11a		Danger of burns from hot gases! ➤ Do not enter the danger zone. ➤ Wear long-sleeved garments and protective gloves (no synthetics, e.g. polyester).
12a		Serious injury or death can result from loosening or opening component that is under pressure and heavily spring loaded! ➤ Do not open or dismantle the valve. ➤ Contact an authorized KAESER service representative if a fault occurs.
13a		Serious injury or death can result from loosening or opening component under pressure! ➤ Depressurize all pressurized components and enclosures. ➤ Ensure the machine remains depressurized. ➤ Check that machine is depressurized.
15		Injury and/or contamination can result from breathing compressed air! Contamination of food can result from using untreated compressed air for food processing! ➤ Never breathe untreated compressed air. ➤ Air from this compressor must meet OSHA 29CFR1910.134 and FDA 21CFR178.3570 standards, if used for breathing or food processing. Use proper compressed air treatment.
16		Noise due to open removable access panel for the sound enclosure (Option H12)! ➤ Damage to hearing. ➤ Always wear ear protection.
22		Option C38, SIGMA FREQUENCY CONTROL (SFC): Danger to life from high protective conductor current! ➤ Ensure sufficient dimensions for the protective conductor. ➤ Before starting any work on the electrical equipment: Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage. ➤ Before starting work on the frequency converter or intermediate circuit capacitors, wait for at least 5 minutes.
23		Danger of fatal injury from touching electrically live components! ➤ Switch off and lock out / tag out the power supply disconnecting device and check that no voltage is present.
24		Risk of electric shock! ➤ If the interrupter has tripped current-carrying components of the controller should be examined and replaced if damaged to reduce the risk of fire or electric shock.
25		Risk of electric shock! ➤ To maintain overcurrent short-circuit, and ground-fault protection, the manufacturer's instructions for setting the interrupter must be followed to reduce the risk of fire or electric shock.

3 Safety and Responsibility

3.10 In emergency

Location	Symbol	Meaning
26a		Danger of fatal injury from electrical voltage and charged capacitors! ➤ Before starting any work on the electrical equipment: Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage. ➤ Following shutdown of the power supply disconnecting device, wait for 5 minutes before opening the control cabinet/connector box. ➤ Before starting work on the frequency converter or intermediate circuit capacitors, wait for at least 5 minutes.
30		Danger of bursting from excessive pressure! ➤ Always remove the inlet silencer cover when checking the direction of rotation.

Tab. 24 Safety signs

3.10 In emergency

3.10.1 Correct fire fighting

Suitable extinguishing agents

- Foam
- Carbon dioxide
- Sand or dirt

Unsuitable or unsafe extinguishing agents

- Strong jet of water

1. Keep calm.
2. Give the alarm.
3. Switch off the power supply disconnecting device, if possible.
4. Move to safety.
 - Warn persons in danger.
 - Help incapacitated persons.
 - Close the doors.
5. Try to extinguish the fire if you have the skill to do so.

3.10.2 Remove lubricating oil from the skin.

- Eye contact:
Rinse eyes thoroughly with lukewarm water and seek medical assistance.
- Skin contact:
Wash off immediately.

3.11 Environmental protection

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



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

3.12 Warranty

This operator 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.

In addition, 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 original spare parts and operating materials.

- Obtain confirmation from KAESER that your specific operating conditions are suitable.

4 Design and Function

4.1 Enclosure

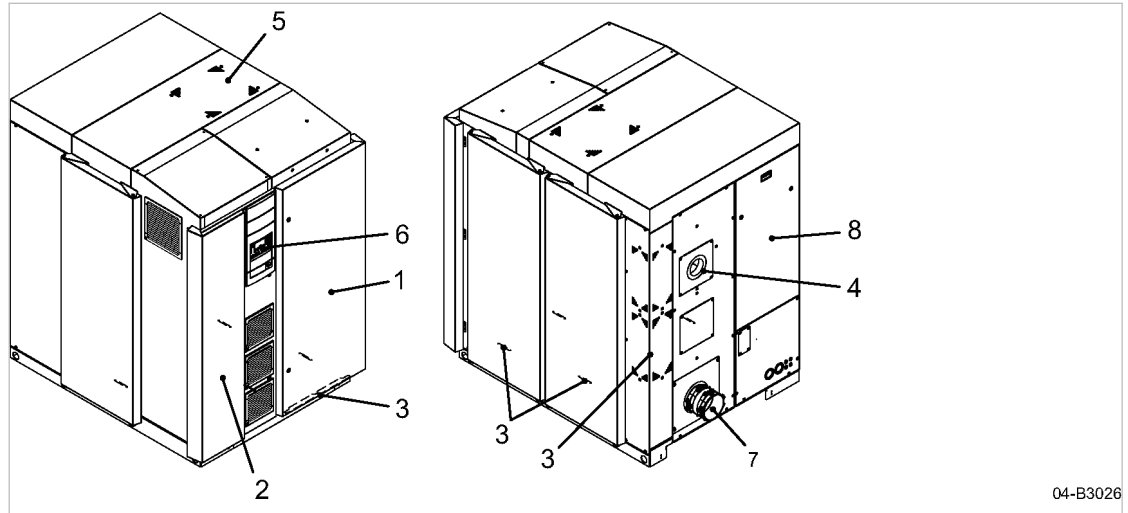


Fig. 6 Enclosure overview

- | | |
|------------------------|------------------------------|
| ① Maintenance door | ⑤ Cooling air outlet |
| ② Control cabinet door | ⑥ SIGMA CONTROL 2 controller |
| ③ Cooling air inlet | ⑦ Exhaust air outlet |
| ④ Intake air inlet | ⑧ Removable access panel |

The sound enclosure features a removable access panel ⑧.

The control cabinet door ② and maintenance door ① can be swung open.

Use the key supplied with the machine to open the latches.

When closed, the sound enclosure fulfils the following functions:

- Sound insulation
- Protection against contact with components
- Airflow control

The sound enclosure is not suitable for the following uses:

- Walking on, standing on or sitting on.
- As a place to rest or store any kind of load.

Process air flow

Intake air is drawn into the inlet silencer via the intake line.

Air is discharged through the exhaust air outlet ⑦.

Cooling air flow

The drive motor fan draws cooling air through the cooling air inlet ③ into the sound enclosure to cool the drive motor and the machine.

The cooling air flow is boosted by a fan inside the sound enclosure. Hot air is conveyed outside in order to prevent the machine from overheating.

4.2 SIGMA CONTROL 2 operating panel

4.2.1 Keys

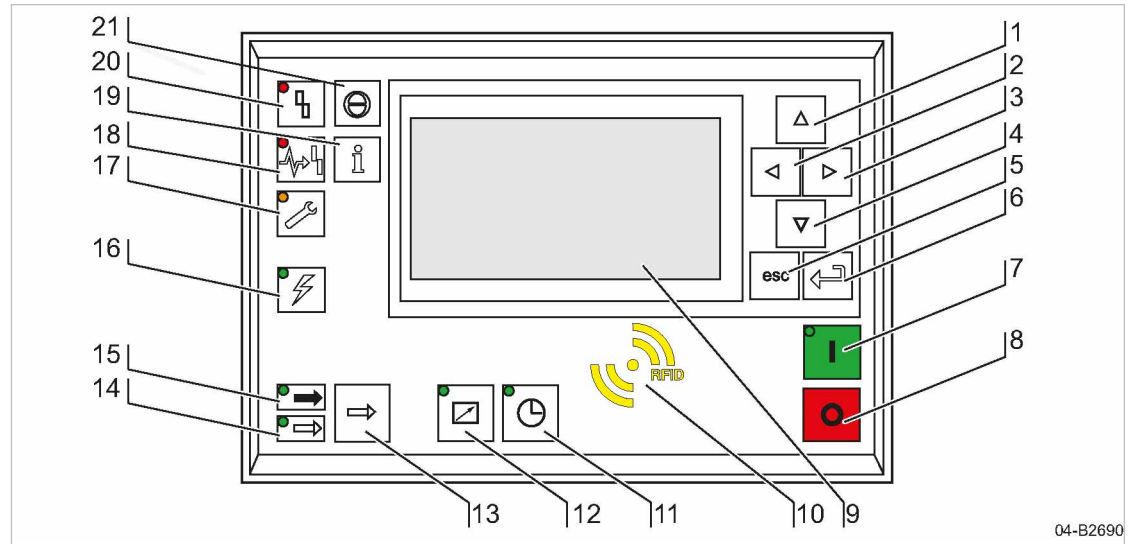


Fig. 7 Indicating and operating elements

Item	Name	Function
①	«Up»	Scrolls up the menu options. Increases a parameter value.
②	«Left»	Jumps to the left. Moves the cursor position to the next left field.
③	«Right»	Jumps to the right. Moves the cursor position to the next right field.
④	«Down»	Scrolls down the menu options. Reduces a parameter value.
⑤	«Escape»	Returns to the next higher menu option level. Exits the Edit mode without saving.
⑥	«Enter»	Jumps to the selected menu option. Exits the Edit mode and saves.
⑦	«ON»	Switches the machine on.
⑧	«OFF»	Switches the machine off.
⑩	RFID	RFID sensor field for user log-in with RFID Equipment Card.
⑪	«Timer control»	Switches timer control on and off.
⑫	«Remote control»	Switches remote control on and off.
⑬	«LOAD/IDLE»	Toggles between the LOAD and IDLE operating modes.
⑲	«Information & Events»	Displays the event memory.
⑳	«Reset»	Signifies recognition of alarms and warning messages. If permissible: Resets the fault counter (RESET).

Tab. 25 Controls

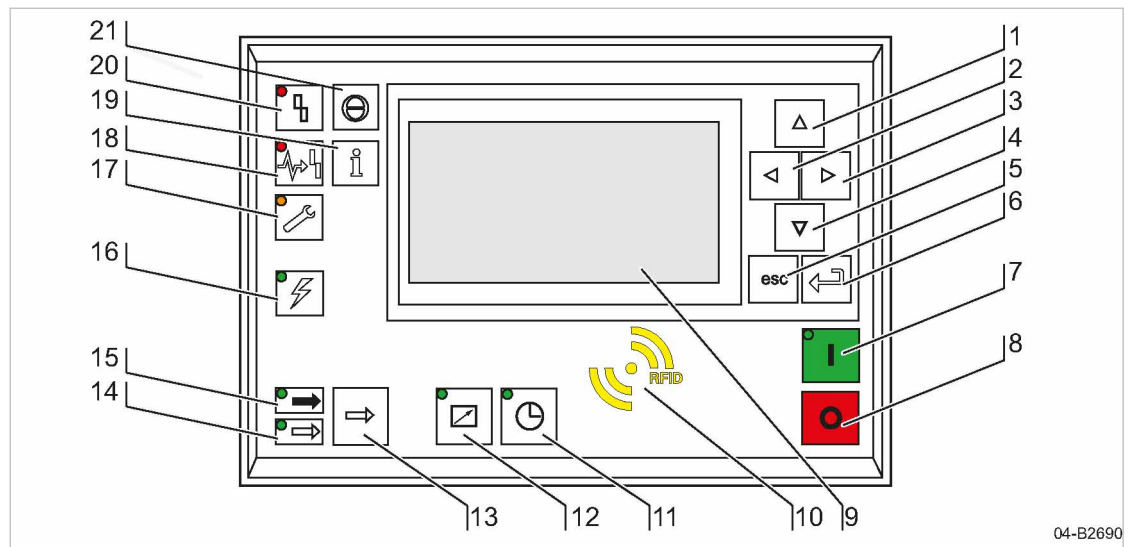
4.2.2 LEDs


Fig. 8 Indicating and operating elements

Item	Name	Function
⑦	<i>ON</i>	Display illuminates green when the machine switched on.
⑨	<i>Display</i>	Graphic display with 8 lines and 30 characters per line.
⑪	<i>Timer control</i>	Continuous green light when the machine is controlled by the timer.
⑫	<i>Remote control</i>	Continuous green light when the machine is in remote control.
⑭	<i>IDLE</i>	Continuous green light when the machine is running in IDLE. Flashes when the «LOAD/IDLE» toggle key is pressed.
⑮	<i>LOAD</i>	Continuous green light when the machine is running in LOAD.
⑯	<i>Controller on</i>	Continuous green light when voltage is applied to the controller.
⑰	<i>Warning</i>	Flashes in yellow in the following events: ■ Maintenance necessary. ■ Warning message
⑱	<i>Communications error</i>	Continuous red light to indicate a faulty communication connection without machine shut-down.
⑳	<i>Fault</i>	Flashes red to indicate a machine fault. Continuous red light after acknowledgement.

Tab. 26 Display elements

4.2.3 RFID sensor field

RFID is the abbreviation for “**R**adio **F**requency **I**dentification” and enables the identification of persons or objects.

Placing a suitable transponder in front of the RFID sensor field of the controller will automatically activate the communication between transponder and SIGMA CONTROL 2.

A suitable transponder is the RFID Equipment Card. Two of them have been provided with the machine.

Typical application:

- Operators log on at the machine.
(Manual input of the password not required)



The RFID Equipment Cards are carefully packed in a plastic sleeve.
This plastic sleeve is attached to the rear of the controller in the control cabinet.

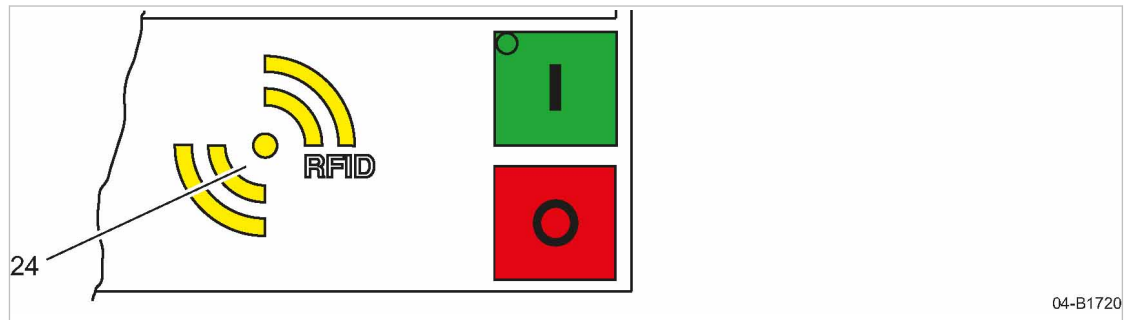


Fig. 9 RFID sensor field

Item	Name	Function
24	RFID	RFID sensor field for the communication with a RFID Equipment Card or RFID Key.

Tab. 27 RFID sensor field

Further information More information about the use of RFID technology is provided in the SIGMA CONTROL 2 operating manual.

4.3 Machine

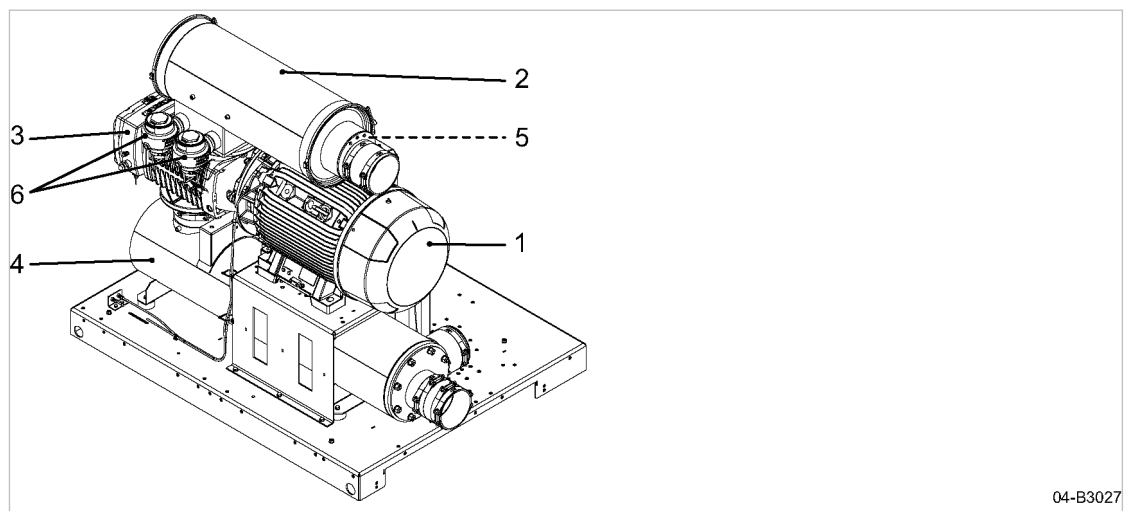


Fig. 10 Machine

- | | |
|------------------|---------------------------|
| ① Drive motor | ④ Outlet silencer |
| ② Inlet silencer | ⑤ Check valve (option G1) |
| ③ Blower block | ⑥ Safety relief valve |

The blower block ③ is driven by the drive motor (electric motor) ①.

Air is drawn into the inlet silencer ② and through an air filter where it is filtered.

The air is then pushed from the blower block vertically and into the outlet silencer (4).

4.4 Blower block

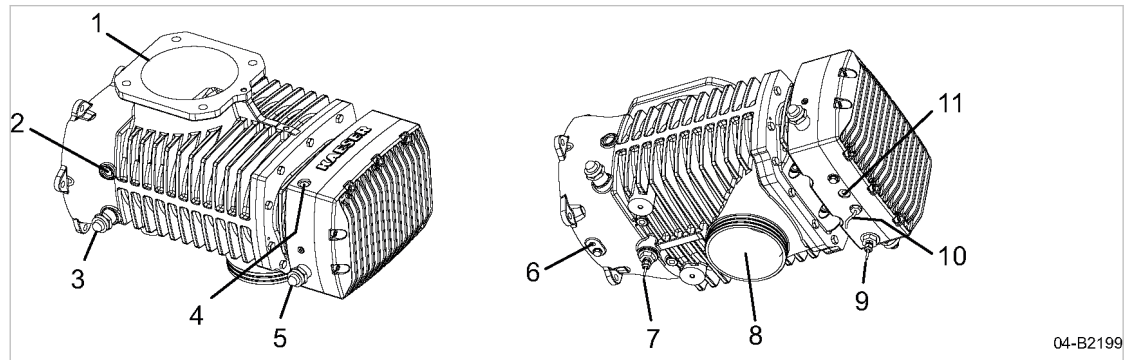


Fig. 11 Blower block

- | | |
|------------------------------------|------------------------------------|
| ① Flange connection, intake side | ⑦ Oil level monitoring, drive side |
| ② Drive-end oil inlet | ⑧ Discharge port connection |
| ③ Drive-end oil sight glass | ⑨ Oil level monitoring, gear side |
| ④ Gear-end oil inlet | ⑩ Oil temperature monitoring |
| ⑤ Gear-end oil sight glass | ⑪ Oil drain connection, gear side |
| ⑥ Oil drain connection, drive side | |

A pair of rotors turn in opposite directions within a casing. The rotors are synchronized by timing gears on one end. Air is trapped between the rotors and the casing and moved round to the discharge side.

As there is no contact between the rotors themselves and the casing, oil film lubrication is not required.

4.5 Safety relief valve

The safety relief valve protects the vacuum system from excessive vacuum. It is factory set.

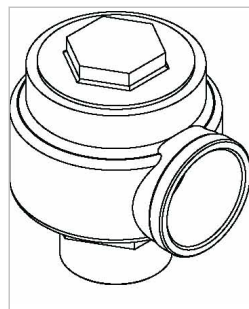


Fig. 12 Safety relief valve

4.6 Safety devices

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

- Safety relief valve:
This valve protects the vacuum system from excessive vacuum. It is factory set.

- Covers over moving parts and electrical connections:
These protect against accidental contact.
- Sound enclosure (Option H12):
The sound enclosure prevents excessive noise emission.
- Drive motor with 3 PTC thermistors:
Motor protection against overheating in connection with the user's protection cut-out.

4.7 Compensator

The compensator has the following functions:

- Inlet and exhaust side connection to silencers and accessories
- Isolates the machine vibrations from the piping

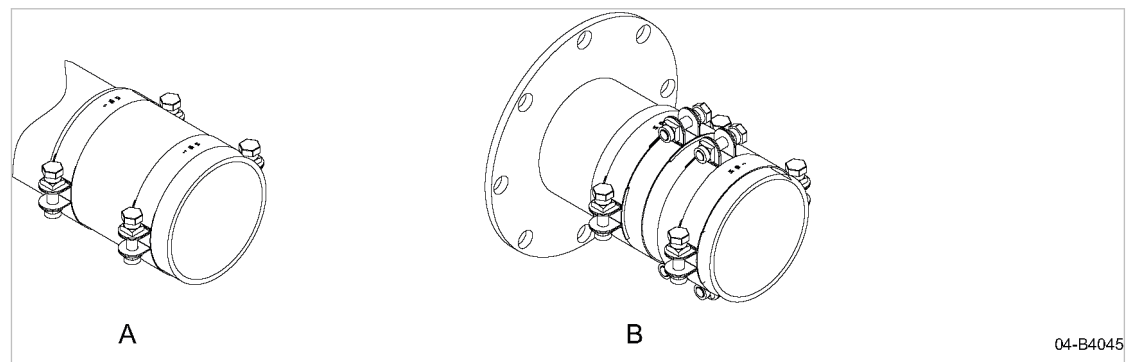


Fig. 13 Compensator

- (A) Compensator, suction side
- (B) Compensator, exhaust side

4.8 Automatic starting

Depending on the settings in the controller, the machine can automatically start after a power failure or external deactivation.

You must be logged in with the RFID Equipment Card in order to activate or deactivate this option.
Option deactivated (factory setting):

- Machine remains deactivated after a network power failure.

Option activated:

- Machine automatically restarts after the voltage supply has returned.

Further information Note the instructions in the operating manual supplied with SIGMA CONTROL 2 for activating and deactivating this function.

4.9 Floating relay contacts

Floating relay contacts are provided for the transfer of operational state (messages).

Information on location, loading capacity, and type of contact can be found in the electrical diagram.



If the floating relay contacts are connected to an external voltage source, voltage may be present even when the machine is isolated from the power supply.

4.10 Options

The options available for your machine are described below.

4.10.1 Option C5 Oil level monitor

The oil level switch monitors the lubricant level of the blower block.

Two float-type level sensors monitor the level of oil in the drive and gear-end oil chambers. If the oil level falls below the minimum level, a switching contact is opened.

The controller registers the signal, displays an alarm message and shuts down the machine.

4.10.2 Option C39 Oil temperature monitoring

The Pt100 sensor of the oil temperature monitoring continuously records the lubricant temperature at the gear side of the blower block. The machine controller evaluates the sensor. Two threshold values are pre-set.

When these threshold values are reached, the controller displays a warning or alarm message:

- Warning message at a lubricant temperature of $\geq 239^{\circ}\text{F}$,
the machines does **not** shut down.
- Alarm message at a lubricant temperature of $\geq 266^{\circ}\text{F}$,
the machine shuts down.

This warning or alarm message is provided as a group message for external analysis.

4.10.3 Option C58 EMERGENCY STOP switching device

The following describes the options for completing a KAESER machine with regard to the requirements for functional safety. This is achieved via an external EMERGENCY STOP command device (e.g. red push button) installed at the user-end, in combination with the internal, factory-fitted option C58. The corresponding user-end components (e.g. external EMERGENCY STOP command device, button, etc.) do not comprise part of the delivery scope from KAESER.

Knowledge and application of the EN13849 standard on the part of the installer/completer is a prerequisite for augmenting the machine with an external EMERGENCY STOP device. Alternative options for achieving conformity with the Machinery Directive are not the subject of this document and are not supported by KAESER. Additional measures not described in this document may be necessary to meet the requirements for functional safety.

EMERGENCY STOP command device

EMERGENCY STOP command devices must be clearly indicated with a red switch actuator which does not self-reset following activation, and, if possible, with a yellow background. Depending on the area of application, the following types of switch actuator may be used:

- Push-button switch
- Pull-cord switch
- Footplate or foot switch

EMERGENCY STOP switching device

Internally installed component (generally a safety relay) for implementing the safety functions on a blower.

EMERGENCY STOP device

Consists of an EMERGENCY STOP command device and an EMERGENCY STOP switching device

**4.10.4 Option G1
Check valve**

The check valve prevents a reversal of the normal air flow direction.
The valve is closed when the machine is at standstill.
The check valve is integrated in the intake silencer.

**4.10.5 Option H11
Piped inlet**

Air is drawn into the block through the inlet silencer.

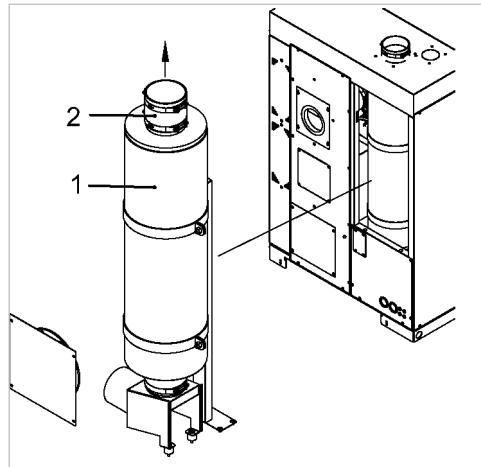
**4.10.6 Option H16, H12
Exhaust silencer (pipeline)**

The exhaust silencer reduces noise emission.

 WARNING

Danger of burns from hot components!

- *Wear long-sleeved clothing and protective gloves.*



04-B3044

Fig. 14 Exhaust silencer (pipeline)

- ① Silencer
- ② Compensator
(connection to pipeline)

The exhaust air generated during the compression (vacuum) process passes through a compensator ② on the silencer ① into a flexible pipeline.

The exhaust air can reach temperatures up to max. of 320 °F in the silencer.

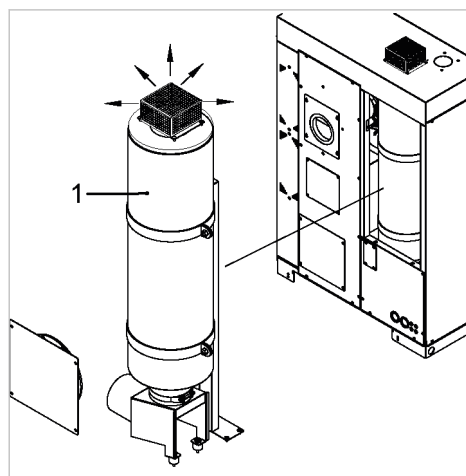
4.10.7 Option H19, H12 Exhaust silencer (diffusion to surroundings)

The exhaust silencer reduces noise emission.

⚠ WARNING

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

- *Wear long-sleeved clothing and protective gloves.*
- *Do not inhale the exhaust air.*



04-B3045

Fig. 15 Exhaust silencer (diffusion to surroundings)

- ① Silencer

The exhaust air generated during the compression (vacuum) process is diffused out through the silencer  into the surrounding atmosphere.

The exhaust air may reach temperatures up to a max. of 320 °F.

5 Installation and Operating Conditions

5.1 Ensuring safety

The conditions in which the machine is installed and operated have a decisive impact on safety. Warning instructions are located before a potentially dangerous task.



Disregard of warning instructions can cause serious injuries!

Complying with safety instructions

Disregard of safety warnings can cause unforeseeable dangers!

- 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 vapors or parts of the machine.
- Do not store flammable material in the vicinity 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.
- Ensure sufficient and suitable lighting such that the display can be read and work carried out comfortably and safely.
- Keep suitable fire extinguishing agents ready for use.
- Comply with the permissible ambient and intake conditions.
- Ensure the correct composition of the intake air:
 - Clean with no damaging contaminants (e.g., dust, fibers, fine sand).
 - Free of explosive or chemically unstable gases or vapors.
 - Free of acid/alkaline forming substances, particularly ammonia, chlorine or hydrogen sulfide.

Noise

The sound enclosure absorbs and reduces the machine noise to a comfortable level. This function will be effective only if the sound enclosure is closed.

- If necessary, wear hearing protection or take hearing protection measures on-site.

5.2 Installation conditions

5.2.1 Determining installation location and clearances

The machine is intended for installation in a suitable machine room. Information on wall clearances and ventilation is given below.



The clearances specified are recommended clearances and ensure unhindered access to all machine parts.

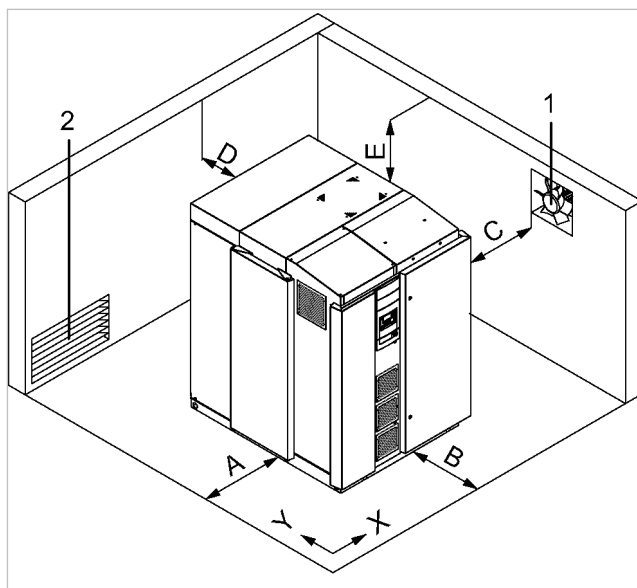
- Please consult with an authorized KAESER service representative if you cannot comply with these recommendations.
- Prior to setting up the machine, check the inclination of the machine foundation by using a level.

Precondition The machine foundation in the transverse direction $\boxtimes$ (X-direction) must be level, with a max. inclination of 0.8° .

The machine foundation in the longitudinal direction $\boxdot$ (Y-direction) must be level, with a max. inclination of 2.0° .

The foundation must be firm and capable of bearing the weight of the machine.

If the installation conditions cannot be met, the machine must be aligned by means of the lubricating oil levels in the blower aircend, see chapter 6.3.



05-B3028

Fig. 16 Recommended positioning of the machine, minimum dimensions [in.]

$\boxtimes$	See table 28	$\boxtimes$	Transverse direction
$\boxdot$	43.3	$\boxdot$	Longitudinal direction
$\boxtimes$	See table 28	1	Exhaust fan
$\boxdot$	39.4	2	Ventilation inlet air opening
$\boxtimes$	32.0		

➤ Determine clearances $\boxtimes$ and $\boxdot$.

Type	Installation type	Clearance $\boxtimes$ [in.]	Clearance $\boxdot$ [in.]
EBS 410 CM vac	Installation beside another machine	3.9	3.9
EBS 410 M vac	Installation beside another machine	5.9	5.9
EBS 410 CM vac, EBS 410 M vac	Installation beside a wall	11.8	11.8
EBS 410 M vac with exhaust silencer, Op- tion H16, H19	Installation beside another machine or Installation beside a wall	11.8	11.8

Tab. 28 Recommended installation, minimum dimensions

- If the ambient temperature is too low: Ensure that the compressor room is adequately heated.
- Ensure accessibility so that all work on the machine can be carried out hazard-free and without obstruction.
- Do not position the machine in the hot exhaust air flow from other machines.

- When installing multiple machines, ensure that all inlet and exhaust air openings are arranged on one side.
- Observe any additional clearances that may be specified in local occupational health & safety and building regulations, so that escape and rescue routes may safely be accessed, even when the machine housing is open.

5.2.2 Ensuring adequate ventilation



If the ventilation is insufficient, a partial vacuum can be created in the machine room.

- Ensure that the flow rate of inlet air is at least the same as the flow rate taken by the machine and exhaust fan from the machine room.
- Ensure that a sufficient amount of oxygen is available for any individuals entering the machine room.
- Ensure that the machine and exhaust fan can only be operated when the ventilation inlet air opening is open.
- Keep the inlet and exhaust openings free from obstructions so that the cooling air can flow freely through the machine room.

6 Installation

6.1 Ensuring safety

Follow these instructions to ensure safe installation.

Warning instructions are provided prior to any potentially dangerous task.



Disregarding warning instructions can result in life-threatening injuries!

Observing safety instructions

Ignoring safety instructions can result in unforeseen dangers.

- Follow the instructions in chapter 3 “Safety and Responsibility”.
- Installation work must only be carried out by authorized personnel!
- Ensure that no personnel are working on the machine.
- Ensure that all panels are closed.

Working on live components

Touching live components can result in electric shocks, burns or death.

Dangerous voltages remain in the frequency converter and intermediate circuit capacitors for some time after the power has been disconnected.

When the frequency converter is open, live components are exposed.

- Work on electrical equipment may only be carried out by authorized electricians.
- Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
- Before starting work on the frequency converter or intermediate circuit capacitors, wait for at least 5 minutes.
- Check that there is no voltage on floating contacts.

Working at the vacuum system

The following safety instructions relate to any work on components that could be under pressure.

- Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
- Vent all components and chambers under vacuum to atmospheric pressure.
- Do not open or dismantle any valves.

Working on the drive system

Touching live components can result in electric shocks, burns or death.

Touching the fan wheel while the machine is switched on can result in serious injury.

- Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
- Do not open any of the panels while the machine is switched on.

Further information

Information regarding authorized personnel can be found in chapter 3.4.2.

Information regarding dangers and their avoidance can be found in chapter 3.5.

6.2 Reporting transport damage

1. Check the machine for visible and hidden transport damage.
2. Inform the carrier and the manufacturer in writing of any damage without delay.

6.3 Aligning the machine



If all the installation conditions contained in chapter 5.2 have been met, the machine should not need to be aligned.

If the installation conditions contained in chapter 5.2 cannot be met, the machine must be aligned by means of the lubricating oil levels in the blower block.

Adjusting the lubricating oil level in a transverse direction (90° to the motor axis)

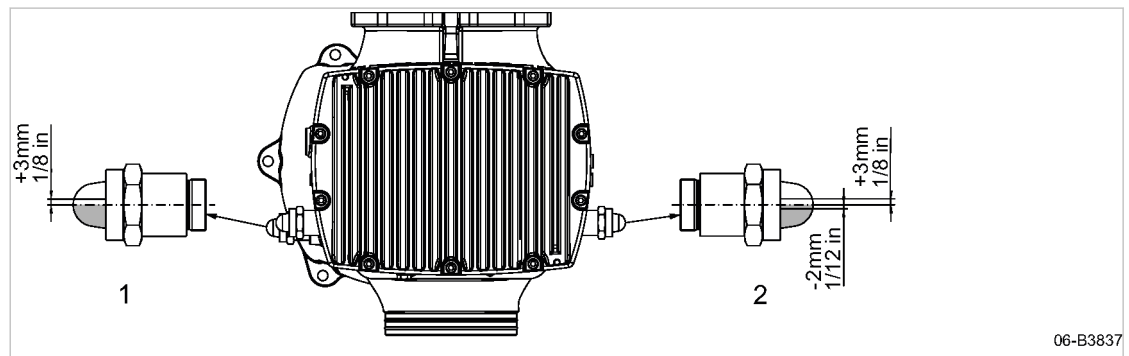


Fig. 17 Adjusting the lubricating oil level in a transverse direction (90° to the motor axis)

- ① Oil sight glass, gear-end (side of control cabinet)
- ② Oil sight glass, gear-end (side of sound enclosure)

- Open the maintenance door.
- Visually check that the lubricating oil levels reach the center of oil sight glasses ① and ②.
- Chock the machine feet until the lubricating oil levels in the two oil sight glasses deviate from one another by no more than 0.20 in.
- If the lubricating oil levels do not reach the center of both oil sight glasses, the lubricating oil must be replenished, see chapter 10.6.

Adjusting the lubricating oil level in a longitudinal direction (motor axis)



The gear-end and drive-end oil chambers of the blower block are not connected.

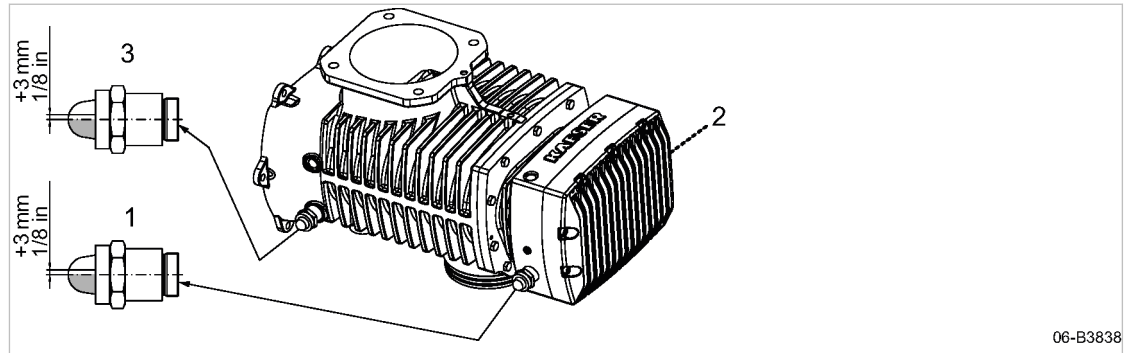


Fig. 18 Adjusting the lubricating oil level in a longitudinal direction (motor axis)

- ① Oil sight glass, gear-end (side of control cabinet)
- ② Oil sight glass, gear-end (side of sound enclosure)
- ③ Oil sight glass, drive-end

- Visually check that the lubricating oil level in oil sight glass ③ deviates from the center by no more than 0.12 in.
If necessary, increase the oil level at the drive-end of the blower block by replenishing the lubricating oil, see chapter 10.6.

6.4 Anchoring the Machine

Suitable fastening elements are delivered with the machine.

Precondition The machine is aligned in accordance with chapter 6.3.

- Use appropriate fixing bolts to anchor the machine to the floor and prevent it from shifting.

Further information The foundation plan is included in the dimensional drawing in chapter 13.2.

6.5 Connecting the power supply

Precondition The power supply disconnecting device is switched off, lock out and tag out the device, the absence of any voltage has been verified.
The tolerance limits of the power supply are within the tolerance limits of the rated machine voltage.

Option C38, SIGMA FREQUENCY CONTROL (SFC):

The voltage in the intermediate circuit capacitors of the frequency converter is reduced.

1. The power supply must only be connected by authorized installation personnel or authorized certified electricians.
2. Carry out protection measures as stipulated in relevant regulations and in national accident prevention regulations. In addition, observe the regulations of the local electricity supplier.
3. Select supply cable conductor cross-sections and fusing in accordance with local regulations and chapter 2.13.
4. Test the overcurrent protective device to ensure that the time it takes to shut down in response to a fault is within the permitted limit.

6 Installation

6.5 Connecting the power supply

5. The user is required to fit the machine with a lockable power supply disconnecting device. This could be, for example, a load disconnect switch with fused input. If a circuit breaker is used it must be suitable for the motor starting characteristics.
6. Check that the control transformer is connected according to the supply voltage. If not, reconnect the control transformer to suit the power supply voltage.
7. **⚠ DANGER** *Danger of fatal injury from electric shock!*
 - *Switch off and lock out the power supply disconnecting device and verify the absence of voltage.*
8. Connect the machine to the power supply.
9. Properly close openings, cable glands, etc.

Further information The wiring diagram in chapter 13.3 contains further details of the power supply connection.

Connecting the control cabinet

The machine can be operated at full power at the rated voltage with a tolerance of $\pm 5\%$.

If the supply voltage deviates from the rated voltage, the control transformer's (component T11) cable bridge should be changed to correspond to the actual main power supply.

1. Select supply cable conductor cross—sections and fusing in accordance with local regulations and chapter 2.13.
2. Connect the control cabinet (note clockwise phase rotation!).

6.5.1 Option C32 Under frequency control



If the machine is delivered by KAESER including the frequency converter, the regulation behavior and operating mode of the frequency converter will be preset.

- Adapt and optimize the actual properties to the customer system on-site.
- Comply with the following provisions if you operate machines with a frequency converter:
 - Operate the machine only within its performance limits and under the permitted ambient conditions.
 - The speed change should be approx. 5 Hz per second. This value applies also for the starting ramp from standstill to reaching minimum frequency. Deviating settings, either slower or faster, may be possible after verification by an authorized KAESER SERVICE representative.
 - The frequency converter may be switched to a motor in standstill only, in order to avoid malfunctions.
 - The automatic restart of the machine is **not** preset for safety-relevant reasons.

6.5.2 Option C58 Connecting the EMERGENCY STOP switching device

The following describes the options for completing a KAESER machine with regard to the requirements for functional safety. This is achieved via an external EMERGENCY STOP command device (e.g. red push button) installed at the user-end, in combination with the internal, factory-fitted option C58. The corresponding user-end components (e.g. external EMERGENCY STOP command device, button, etc.) do not comprise part of the delivery scope from KAESER.

Knowledge and application of the EN13849 standard on the part of the installer/completer is a prerequisite for augmenting the machine with an external EMERGENCY STOP device. Alternative options for achieving conformity with the Machinery Directive are not the subject of this document and are not supported by KAESER. Additional measures not described in this document may be necessary to meet the requirements for functional safety.

- Please note the following points when connecting the EMERGENCY STOP switching device:
 - The external EMERGENCY STOP device is designed as a Category 1 subsystem with a minimum of one function channel.
 - Fundamental safety principles must be implemented and proven components must exclusively be used. The appropriate durability of safety-related components for the prevailing ambient conditions must be guaranteed.
 - The user-installed external switching element / user-installed external switching elements (EMERGENCY STOP command device) must achieve a minimum of Performance Level c.
 - The EMERGENCY STOP command devices, incl. contacts, must be fitted where they are easily visible and must fulfill the requirements of the applicable standards EN 60947–5–1, EN 60947–5–5 and EN 13850, as well as any applicable country-specific laws and regulations.
 - The corresponding PFHD value [1/h] must be lower than ($<$) $1.8 \times 10^{-6}/h$. The customer guarantees the fulfilment of the category and performance level requirements.
 - The connection must be established using single strands/multicore cables laid in a cable duct within a dedicated electrical installation area, thus protecting them against mechanical damage.
 - The design of the clamping points and plug-in connections in the signal pathway must correspond to the applicable standards and requirements (base material, paint coat, creepage distances and clearances) stipulated in Tables D.5, D.6 and D.7 of EN13849–2, so that safety-related short circuits in the signal pathway can be avoided.
 - KAESER assumes no responsibility for the conformity of the complete machine. Whosoever has produced an assembly of machines is considered to be the manufacturer (“completer”) of the same and is thus responsible for the compliance of that assembly as a whole with the safety and health protection requirements of the Machinery Directive and EMC Directive, as well as any applicable country-specific laws and regulations. In the absence of such compliance, the Declaration of Conformity supplied to the client by KAESER shall cease to be valid.
 - The manufacturer of an assembly of machines is obliged to complete the safety functions and to create the documentation for the required reliability of the safety functions (performance level required).

6.5.2.1 Machine safety functions

You can find a complete overview of the machine's safety functions in chapter 3.8.



Both shutdown via the main contactor and shutdown via the STO function of the converter must correspond to Stop Category 0 in accordance with ISO 13850.

6.5.2.2 Probability of failure

In accordance with ISO 13849-1:2015, the manufacturer is required to determine the probability of failure, in the form of an "MTTFd" (Mean Time To Dangerous Failure) value, for the assessment of every safety function on a machine. The MTTFd is a mean value for the length of time for which the machine can be operated until it becomes likely that a safety-relevant component will fail, resulting in a dangerous situation. For this reason, the minimum requirements stipulated in this document for the MTTFd value of the external EMERGENCY STOP components must be adhered to. Compliance with this value is the responsibility of the operator. The corresponding PFHD value [1/h] must be lower than ($<$) $1.8 \times 10^{-6}/h$. The customer guarantees the fulfilment of the category and PL requirements.

6.5.2.3 Safety function: External EMERGENCY STOP device

The internal, factory-installed EMERGENCY STOP command device for the EMERGENCY STOP device safety function is located on the control side (control cabinet door with SIGMA CONTROL 2 controller). This must not be changed. By connecting the EMERGENCY STOP switching device (Option C58), a further, external EMERGENCY STOP device can be used. Operating the machine is permissible only in conjunction with a functional EMERGENCY STOP device. The drive motor must be shut down using either the internal or external EMERGENCY STOP device.

 WARNING

➤ *A non-functional EMERGENCY STOP device can cause severe injury or death!*

1. Operate the machine only with a functional EMERGENCY STOP device.



For the EMERGENCY STOP device safety function, either a single-channel structure of Category 1 (one function channel only) or a dual-channel structure of Category 2 (one function channel and one test channel) can be established.

In the case of the external EMERGENCY STOP device (Option C58), the safety relay -K60 is integrated into the pathways for the EMERGENCY STOP device. For details of the external wiring for the EMERGENCY STOP switching device and connection of the external EMERGENCY STOP command device, please see the corresponding wiring diagram BMK -K60 and the operating manual for the safety relay PNOZ X 24-240V UC, 787302.

One contact from the EMERGENCY STOP device is factory-wired to the controller in order to trigger the EMERGENCY STOP fault message on the SIGMA CONTROL 2 controller display, and to prevent an automatic restart after the EMERGENCY STOP command device has been unlocked.

Further information The wiring diagram in chapter 13.3 contains further details regarding the electrical connection.

6.6 Connecting to the vacuum network

Material Torque wrench

Precondition Vacuum network at atmospheric pressure.



Non-return or check valves must be installed in systems that are to remain under vacuum when the machine is shut down.

- Consult an authorized KAESER service representative on a suitable check valve and expert installation.

1. Make the vacuum network connection with compensator or flexible hose line and install with the following torques:

Connection to customer's pipeline	Torque [lbf-ft]
Compressor with hose clamps	15
Compressor with screwed joint M20*	—

* Manually tighten screws equally, torque at 37 lbf-ft and subsequently retighten crosswise with torque according to table.

Tab. 29 Compensator torques

2. Support the weight of the pipework and any other connecting components.
3. Install a suitable pipeline to lead discharge air outdoors.

Further information The dimensional drawing in chapter 13.2 provides information regarding the connection of the pipeline.

6.7 Option H12

Fitting the cover plate

A cover plate for the transport opening at the machine's base frame is included with the delivery. Install this cover plate after the machine is installed.

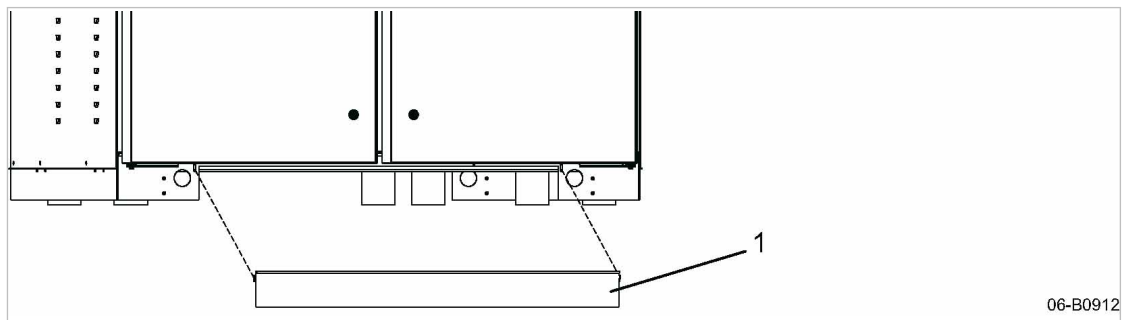


Fig. 19 Fitting the cover plate

- ① Cover plate

➤ Screw the cover plate to the base frame.

7 Initial Start-up

7.1 Ensuring safety

This chapter provides instructions for safe commissioning of the machine.
Warning instructions are provided prior to any potentially dangerous task.



Disregarding warning instructions can result in life-threatening injuries!

Observing safety instructions

Ignoring safety instructions can result in unforeseen dangers.

- Follow the instructions in chapter 3 “Safety and Responsibility”.
- Commissioning tasks may only be carried out by authorized installation personnel!
- Ensure that no personnel are working on the machine.
- Ensure that all panels are closed.

Working on live components

Touching live components can result in electric shocks, burns or death.

Dangerous voltages remain in the frequency converter and intermediate circuit capacitors for some time after the power has been disconnected.

When the frequency converter is open, live components are exposed.

- Work on electrical equipment may only be carried out by authorized electricians.
- Before starting work on the frequency converter or intermediate circuit capacitors, wait for at least 5 minutes.
- Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
- Check that there is no voltage on floating contacts.

Working at the vacuum system

The following safety instructions relate to any work on components that could be under pressure.

- Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
- Vent all components and chambers under vacuum to atmospheric pressure.
- Do not open or dismantle any valves.

Working on the drive system

Touching live components can result in electric shocks, burns or death.

Touching the fan wheel while the machine is switched on can result in serious injury.

- Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
- Do not open any of the panels while the machine is switched on.

Further information Information regarding authorized personnel can be found in chapter 3.4.2.
Information regarding dangers and their avoidance can be found in chapter 3.5.

7.2 Instructions to be observed before commissioning

Incorrect or improper commissioning can cause injury to persons and damage to the machine.

- Commissioning may be carried out only by authorized installation and service personnel who have been trained on this machine.

Special measures for recommissioning after storage/standstill

Storage period/ standstill longer than	Measure
12 months	➤ Change the lubricating oil. ➤ Re-grease the drive motor bearings if they are not of the permanently-greased type. ➤ Have the frequency converter smoothing capacitors formed (refreshed) by an authorized KAESER service representative.
36 months	➤ Have the overall technical condition checked by an authorized KAESER service representative.

Tab. 30 Recommissioning after storage/standstill

7.3 Checking installation and operating conditions

- Check and confirm all the items on the checklist before commissioning the machine.

Check:	See chapter	Confirmed?
➤ Have all packing materials, tools and transport securing devices been removed from the machine?	—	
➤ Are the operators completely familiar with the applicable safety regulations?	—	
➤ Have all of the installation conditions been fulfilled?	5	
➤ Is the machine firmly anchored to the floor without stress?	6.4	
➤ Are the tolerance limits of the power supply network within the permissible tolerance limits of the rated machine voltage?	—	
➤ Are the cable cross-sections and fuse ratings sufficient?	2.13	
➤ Has a lockable power supply disconnecting device been installed at the user-end?	6.5	
➤ Has the electrical connection for the control cabinet been checked?	6.5	
➤ Has a suitable check valve been professionally installed?	6.6	
➤ Has the connection to the vacuum network been made with a hose or compensator?	6.6	
➤ Has the drive motor direction of rotation been checked?	7.6	
➤ Have all electrical connections been checked for tightness?	—	
➤ Is there adequate lubricating oil in the gear- and drive-end of the blower block? (Check oil sight glass)	10.5	

Check:	See chapter	Confirmed?
➤ Are the removable access panel and any other removable panels fitted and secured, maintenance door closed and locked? (Option H12)	4.1	

Tab. 31 Installation conditions checklist

7.3.1 Option C58 EMERGENCY STOP switching device



The following list of tests is suitable for verifying the correct structure and cabling for the signal exchange. It does not, however, represent a comprehensive testing specification.

⚠ WARNING

Incorrect cabling can cause serious injury or death!

- *Only operate the machine after first checking the safety functions.*

- Check all the safety functions on the checklist.

To be checked	Confirmed?
➤ Does the drive motor stop when the internal and external EMERGENCY STOP command devices are activated?	
➤ Does the EMERGENCY STOP device switch the correct switching element?	
➤ Does the drive motor stop in the event of an open circuit in the wiring for the internal and external EMERGENCY STOP devices?	
➤ Does the absence of an acknowledgement from the main contactor prevent start-up? (Option C33)	
➤ Does the drive motor stop in the event of an open circuit when activating the main contactor? (Option C33)	
➤ Does the drive motor stop in the event of an open circuit in the acknowledgement from the main contactor? (Option C33)	
➤ Does the main contactor output (option C33) on the SIGMA CONTROL 2 controller switch the correct switching element?	
➤ Does the machine start via the «ON» key?	
➤ Does the drive motor stop via the «OFF» key?	
➤ Does the drive motor stop in the event of a fault with the machine?	
➤ Does the drive motor stop in the event of a fault with the external EMERGENCY STOP device?	
➤ Does the drive motor stop in the event of a loss of supply voltage to the machine?	
➤ Does the drive motor stop in the event of a loss of supply voltage to the external EMERGENCY STOP device?	

Tab. 32 Check safety functions

7.4 Configuring the controller

- Configure the controller as described in the SIGMA CONTROL 2 operating manual.

7.5 Setting the display language

The controller can display message text in several languages.

You can set the language for texts on the display. This setting will be retained even when the machine is switched off.

1. In operating mode, switch to the main menu with the «Enter» key.
2. Press the «UP» or «DOWN» keys until the current language is shown as active line:

6.1 bar 80.0 °C	
Deutsch	Current language (active line)
►1 xxxxxxxxxx	Submenu
►2 xxxxxxxxxx	Submenu
►3 xxxxxxxxxx	Submenu
►4 xxxxxxxxxx	Submenu
►5 xxxxxxxxxx	Submenu
►6 xxxxxxxxxx	Submenu

3. Use the «Enter» key to switch to setting mode.
The language display flashes.
4. Move to the required language with «UP »or «DOWN».
5. Confirm the setting with the «Enter» key.

Result The display texts are now in the selected language.

Further information Detailed information can be found in the SIGMA CONTROL 2 operating manual.

7.6 Checking the direction of rotation for the drive motor

The machine is designed for a clockwise phase sequence.

Should the direction of rotation for the drive motor be wrong, the direction of flow through the machine will be reversed and pressure will rise in the inlet pipe.

A phase sequence relay is installed in the machine control cabinet, which only sends a release signal to the controller when a clockwise direction of rotation is detected.

The controller will report a fault if the direction of rotation is a counterclockwise. In this case, interchange phases L1 and L2 of the supply line(s). The fault can then be acknowledged.

Material Phase sequence indicator

NOTICE

Incorrect direction of rotation!

This may result in damage to the machine from intake of foreign articles or excessive vacuum.

- *Ensure the correct direction of rotation.*

1. Remove the filter maintenance cover from the inlet silencer or inlet filter and/or remove the non-return valve on the inlet side.
2. Verify the direction of rotation using a phase sequence indicator on the machine supply lines.
3. If the direction of rotation is incorrect, exchange phases L1 and L2 of the supply lines.



If you do not have access to a phase sequence indicator:

- Arrange for the phase sequence to be checked by an authorized KAESER service representative

7.7 Starting the machine for the first time

Precondition No personnel are working on the machine.
All access doors are closed.
All removable panels are in place and secured.

1. Allow the machine to come to ambient temperature before switching on for the first time to avoid the build up of condensation.
2. Switch on the power supply disconnecting device.
After the controller has carried out a self-test, the green *Controller Voltage* LED is lit continuously.
3. If required:
Change the display language as described in chapter 7.5.
4. Press the «ON» key.
The green *IDLE* LED lights continuously.
The drive motor runs up.



- Watch for any faults occurring in the first hours of operation.
- After the first 50 operating hours, check all electrical connections and tighten where necessary.

8 Operation

8.1 Switching the machine on and off

Always switch the machine on via the «ON» key and off via the «OFF» key.

A power supply disconnecting device has been installed at the user-end.

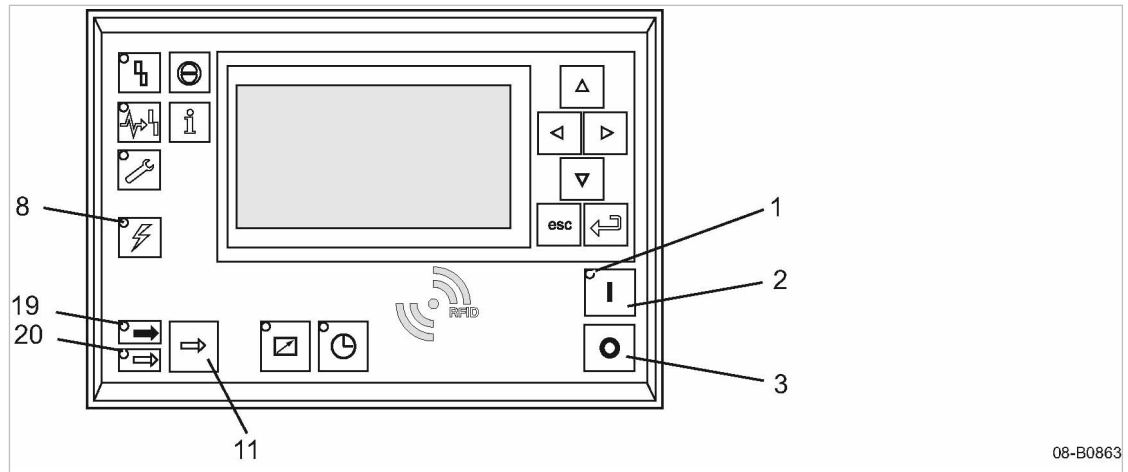


Fig. 20 Switching the machine on and off

- | | |
|--|-------------------|
| ① <i>ON</i> LED | ⑪ «LOAD/IDLE» key |
| ② «ON» key | ⑲ <i>LOAD</i> LED |
| ③ «OFF» key | ⑳ <i>IDLE</i> LED |
| ⑧ <i>Voltage applied to controller</i> LED | |

8.1.1 Switching on

Precondition No personnel are working on the machine.
 No personnel are inside the machine.
 The control cabinet and maintenance doors are closed and locked.
 The removable access panel and any other removable panels are fitted and secured.

1. Switch on the power supply disconnecting device.
 The *Voltage applied to controller*LED illuminates in green.
2. Press the «ON» key.
 The *ON*LED illuminates in green.



Maximum frequency of motor starts per hour: As required

Automatic restart

In the event of a power failure, the machine is **not** locked off against automatically restarting when power returns.

It can restart automatically as soon as the power is restored.

- For activating and deactivating this function, note the instructions in the SIGMA CONTROL 2 operating manual.

8.1.2 Switching off

1. Press the «OFF» key.

When the machine switches to IDLE (as per configuration) and during the fan run-on time, the *ON*LED flashes. The *ON*LED is extinguished as soon as the automatic shutdown procedure has completed.

2. Switch off and lock out / tag out the power supply disconnecting device.

Result The *Voltage applied to controller*LED is extinguished. The machine is switched off and disconnected from the power supply.



In exceptional cases, you may wish to shut the machine down immediately and not wait until the automatic shutdown procedure has completed.

- If so, press the «OFF» key for a second time.

8.2 Switching off in an emergency and switching on again

The EMERGENCY STOP push-button is located to the right of the control panel.

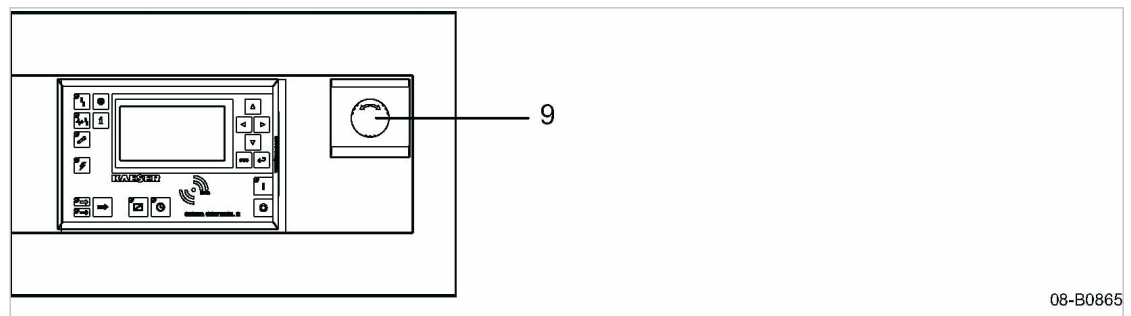


Fig. 21 Switching off in an emergency

⑨ EMERGENCY-STOP push button

Switching off

- Press the EMERGENCY STOP push button.

Result The EMERGENCY STOP push button remains latched after actuation. The compressor's pressure system is vented and the machine is prevented from automatically re-starting.

Switching on

Precondition The fault has been rectified

1. Turn the EMERGENCY STOP push button in the direction of the arrow to unlatch it.
2. Acknowledge any existing alarm messages.

Result The machine can now be started again.

8.2.1 Option C58 External EMERGENCY STOP device

Switch-off during an emergency can alternatively be controlled via option C58.

Precondition For correct installation, see chapter 6.5.2,
For checking the safety functions, see chapter 7.3.1.

Switching off

- Press the external EMERGENCY STOP command device.

Result The EMERGENCY STOP command device remains locked after it has been activated.
The machine is secured against automatically restarting.

Switching on

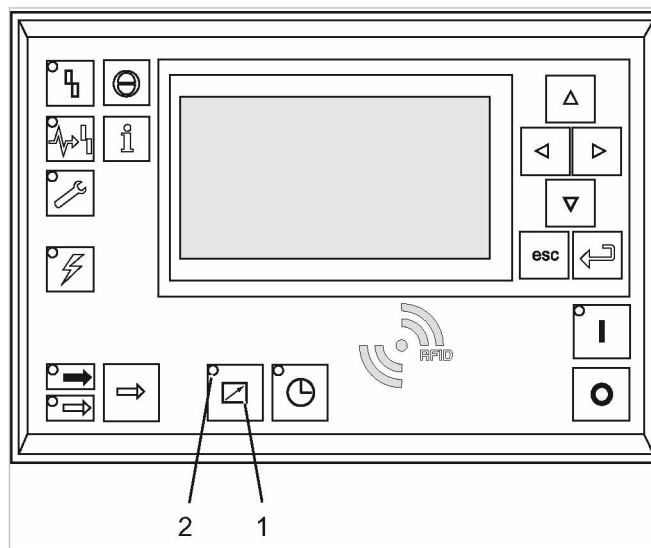
Precondition The fault has been rectified

1. Unlock the external EMERGENCY STOP command device by turning in the direction of the arrow.
2. Acknowledge any existing fault messages.

Result The machine can now be restarted.

8.3 Switching on and off from a remote control center

Precondition A link to the remote control center exists.



08-B1721

Fig. 22 Switching on and off from a remote control center

- ① «Remote control» key
- ② *Remote control* LED

1. Attach an easily seen notice to the machine that warns of remote operation.

⚠ WARNING

Remote control: Risk of injury caused by unexpected starting!

- Make sure that the power supply disconnecting device is switched off before commencing any work on the machine.

Tab. 33 Machine identification

2. Label the starting device in the remote control center as follows:

⚠ WARNING

Remote control: Risk of injury caused by unexpected starting!

- Before starting, make sure that no one is working on the machine and that it can be safely started.

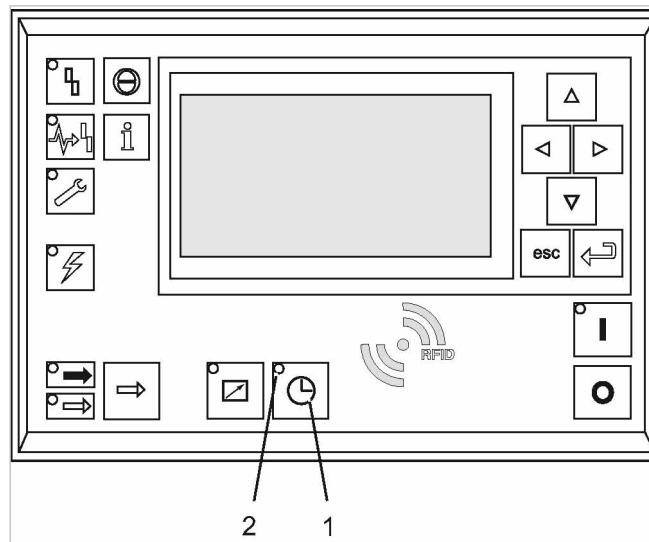
Tab. 34 Remote control identification

3. Press the «Remote control» key.

Result The *Remote control*/LED lights. The machine can be remotely controlled.

8.4 Switching on and off with the clock (timer)

Precondition The clock is programmed.



08-B1722

Fig. 23 Switching on and off with the clock (timer)

- ① «Timer control» key
- ② *Timer control* LED

1. Attach an easily seen notice warning of time-controlled operation:

⚠ WARNING

Time control: Risk of injury caused by unexpected starting!

- Make sure that the power supply disconnecting device is switched off before commencing any work on the machine.

Tab. 35 Machine identification

2. Press «Timer control».

Result The *Timer control*/LED lights. The machine is switched on and off by the clock (timer).

8.5 Option H12**Checking the ventilator fan function (sound enclosure)****NOTICE**

Overheating inside the sound enclosure!

A standstill of the ventilator can result in a breakdown of the blower block or other components.

- *If the ventilator stops, immediately provide an alternative flow of cooling air through the sound enclosure.*

- Check that air is actually being blown out of the enclosure cooling air outlet, e.g. by holding a sheet of paper in front of the outlet.

Further information An authorized KAESER service representative can advise on suitable measures.

8.6 Interpreting operation messages

The controller will automatically display operation messages informing you about the current operational state of the machine.

Operating messages are identified with the letter B.

Further information Detailed information can be found in the SIGMA CONTROL 2 operating manual.

8.7 Acknowledging alarm and warning messages

Messages are displayed on the "new value" principle:

- Message coming: LED flashes
- Message acknowledged: LED illuminates
- Message going: LED off

or

- Message coming: LED flashes
- Message going: LED flashes
- Message acknowledged: LED off

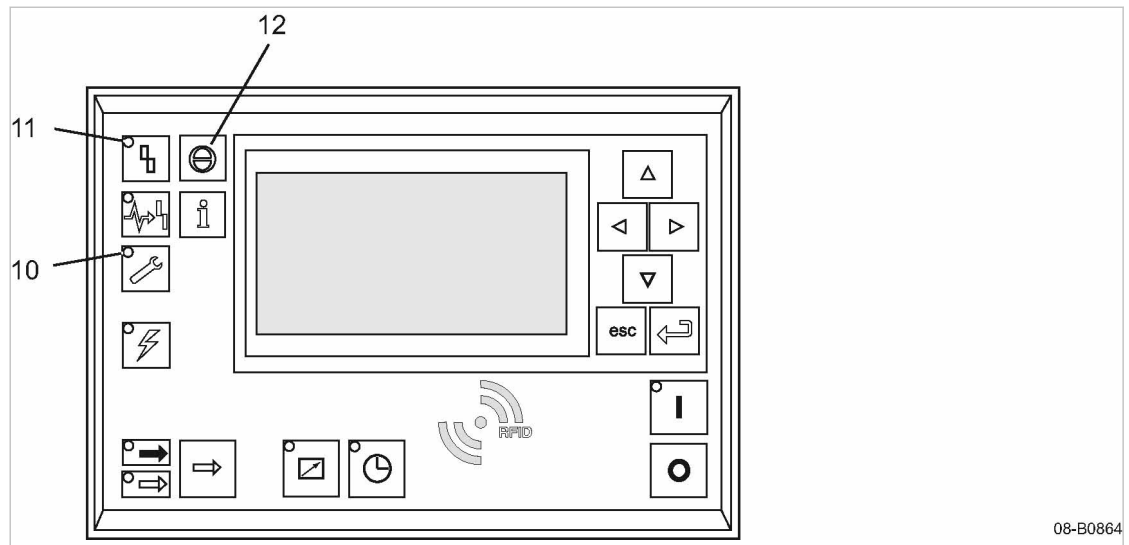


Fig. 24 Acknowledging messages

- 10 *Warning* LED (yellow)
- 11 *Alarm* LED (red)
- 12 «Acknowledge» key

Alarm message

An alarm shuts the machine down automatically. The red *Alarm* LED flashes. The system displays the appropriate message.

Precondition The fault has been rectified.

- Acknowledge the message with the «Acknowledge» key.
The *Alarm* LED extinguishes.
The machine is again ready for operation.



If the machine was switched off with the EMERGENCY STOP button:

- Unlatch the EMERGENCY STOP button (turn in direction of the arrow) before acknowledging the alarm message.

Further information Please refer to the SIGMA CONTROL 2 operating manual for a list of possible fault messages during operation.

Warning message

If maintenance work is to be carried out or if the warning is displayed before an alarm, the yellow *Warning* LED flashes.

The system displays the appropriate message.

Precondition The danger of an alarm is passed, maintenance has been carried out.

- Acknowledge the message with the «Acknowledge» key.
The *Warning* LED extinguishes.

Further information Please refer to the SIGMA CONTROL 2 operating manual for a list of possible warning messages during operation.

9 Fault Recognition and Rectification

9.1 Basic instructions

Fault messages are classified in various categories:

- Warning:
 - Warning messages *W*
- Fault (with indication):
 - Alarm messages *S*
 - System messages *Y*
 - Diagnostic messages *D*
- Other faults (without indication): See chapter 9.2

The messages valid for your machine are dependent on how the individual machine is equipped.

1. Do not attempt fault rectification measures other than those given in this manual!
2. In all other cases:
Have the fault rectified by an authorized KAESER SERVICE representative.

Further information See the operating manual of SIGMA CONTROL 2 for details regarding the various messages.

9.2 Other faults

Fault	Possible cause	Remedy
Unusual noise when running.	Too much backlash in the timing gears.	Contact an authorized KAESER service representative.
	Too much play in the rotor bearings.	Contact an authorized KAESER service representative.
	Rotors not synchronized.	Maintain the pressure differential and speed shown in the specification. Contact an authorized KAESER service representative.
Blower block runs too hot.	Pressure differential too great.	Check and correct pressure differential.
	Clogged inlet filter reducing air intake volume.	Clean the inlet filter.
	Rotor plays too high.	Contact an authorized KAESER service representative.
	Leakage due to incorrect installation of pressure-bearing components.	Contact an authorized KAESER service representative.
Oil leaks from the gas drain.	Oil level too high.	Drain off lubricating oil until the correct level is reached.
Oil leaking from around the drive shaft.	Sliding ring seal defective.	Contact an authorized KAESER service representative.
Low intake flow volume.	Intake resistance too high.	Clean the inlet filter.

Fault	Possible cause	Remedy
Black film on the oil sight glasses.	Oil not changed at the correct interval.	Change the lubricating oil. Clean or renew the sight glass.
	Insufficient lubricating oil.	Change the lubricating oil. Clean or renew the sight glass.
	Oil overheated.	Contact an authorized KAESER service representative.
	Blower aircend overloaded.	Contact an authorized KAESER service representative.
Water in the oil.	Condensate build-up by prolonged storage and high humidity.	Change the lubricating oil.
Safety relief valve activates.	Inadmissible operating state, operating pressure too high.	Bring the machine to a permissible operational state or shut down.

Tab. 36 Other faults and remedies

9.3 Option H12 Sound enclosure faults

Alarm	Possible cause	Remedy
Overheating inside the sound enclosure!	Fan defective or turning in the wrong direction.	Check connection. Contact an authorized KAESER service representative.
	Flow of cooling air blocked.	Check and clean cooling air apertures. Check the cooling air inlet temperature.
	Drive motor overloaded.	Check operating conditions.
	Leakage due to incorrect installation of pressure-bearing components.	Contact an authorized KAESER service representative.

Tab. 37 Faults and remedies (option H12)

10 Maintenance

10.1 Ensuring safety

Follow the safety instructions below to ensure safe maintenance of the machine.

Warning instructions are provided prior to any potentially dangerous task.



Disregarding warning instructions can result in life-threatening injuries!

Observing safety instructions

Ignoring safety instructions can result in unforeseen dangers.

- Follow the instructions in chapter 3 “Safety and Responsibility”.
- Allow maintenance work to be performed by authorized personnel only!
- Ensure that no personnel are working on the machine.
- Ensure that all panels are closed.

Working on live components

Touching live components can result in electric shocks, burns or death.

Dangerous voltages remain in the frequency converter and intermediate circuit capacitors for some time after the power has been disconnected.

When the frequency converter is open, live components are exposed.

- Work on electrical equipment may only be carried out by authorized electricians.
- Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
- Before starting work on the frequency converter or intermediate circuit capacitors, wait for at least 5 minutes.
- Check that there is no voltage on floating contacts.

Working at the vacuum system

The following safety instructions relate to any work on components that could be under pressure.

- Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
- Vent all components and chambers under vacuum to atmospheric pressure.
- Do not open or dismantle any valves.

Working on the drive system

Touching live components can result in electric shocks, burns or death.

Touching the fan wheel while the machine is switched on can result in serious injury.

- Switch off the power supply disconnecting device, lock out / tag out the device, verify the absence of any voltage.
- Do not open any of the panels while the machine is switched on.

Further information

Information regarding authorized personnel can be found in chapter 3.4.2.

Information regarding dangers and their avoidance can be found in chapter 3.5.

10.2 Maintenance schedule

10.2.1 Logging maintenance work



- The maintenance intervals given are those recommended for average operating conditions.
- Maintenance tasks should be carried out more frequently where operating conditions are unfavorable (e.g. dusty atmosphere) or when the equipment is in constant use.
 - Adjust the maintenance intervals with regard to local installation and operating conditions.

- Keep a log of all maintenance and service work.

This enables the frequency of individual maintenance tasks and deviations from our recommendations to be determined.

Further information A prepared list is provided in chapter 10.13.

10.2.2 Resetting maintenance interval counters

Depending on the way a machine is equipped, sensors and/or maintenance interval counters monitor the operational state of important functional devices. Required maintenance work is shown on the SIGMA CONTROL 2.

Precondition Maintenance performed and,
Maintenance message acknowledged.

- Reset the maintenance interval counter as described in the SIGMA CONTROL 2 operating manual.

10.2.3 Regular maintenance tasks

The table below lists the required maintenance tasks.



If operating conditions are unfavorable (e.g. dusty atmosphere) or if the equipment is in constant use, maintenance tasks must be carried out more frequently (shorter intervals).

- Carry out maintenance tasks in a timely manner, taking the ambient and operating conditions into consideration:

Interval	Maintenance task	See chapter
At least 50 hours after initial commissioning	Check that all electrical connections are secure and tighten if necessary.	–
Up to 500 h or monthly	Control cabinet: Visually checking the filter mat.	10.3
	Check the lubricating oil level.	10.5
	Check the air filter.	10.8
Up to 1000 h	Clean the machine.	10.9
Up to 3000 h At least once a year	Drive motor bearings with re-greasing facility: Re-grease the motor bearings	10.10.1
Up to 3000 h At least once a year	Change the FGB-680 lubricating oil.	10.7

h = operating hours

Interval	Maintenance task	See chapter
Annually	Check the safety relief valve.	10.11
	Check the EMERGENCY STOP push button.	10.12
	Check that all electrical connections are secure and tighten if necessary.	–
Up to 6000 h At least every 2 years	Control cabinet: Change the filter mat.	10.3
	Change the G-680 lubricating oil.	10.7
	Change the air filter.	10.8

h = operating hours

Tab. 38 Regular maintenance tasks

10.2.4 Regular service tasks

The table below lists necessary service tasks.

- Only an authorized KAESER service representative should carry out service work.
- Have service tasks carried out in a timely manner, taking the ambient and operating conditions into account:

Interval	Service task
Up to 12000 h At least every 4 years	Gearbox ventilation:
	Check the solenoid valve and replace filter cartridge.
Up to 36000 h	Frequency converter fan: Replace the fan.
	Control cabinet fan: Replace the fan.
	Sound enclosure fan: Replace the fan.
	Option G1, maintain the check valve.
	Gearbox ventilation: Replace the solenoid valve.
Up to 60000 h At least every 8 years	Replace the compensators.
Up to 60000 h At least every 10 years	Drive motor bearings with re-greasing facility: Replace the motor bearings.
	Replace sliding ring seal.
	Service oil filler hoses.
	Gearbox ventilation: Replace the vacuum pump.
At least every 20 years	Replace safety-relevant components of the safety functions.

h = operating hours

Tab. 39 Regular service tasks

10.3 Control cabinet: Check or replace the filter mats

A filter mat is positioned behind each ventilation grill. Filter mats protect the control cabinet from the ingress of dirt. Should the filter mats become clogged, adequate cooling for the components inside can no longer be guaranteed. In such a case, replace the filter mats.

Material Spare part (if required)

Precondition The power supply disconnecting device is switched off, lock out / tag out the device, the absence of any voltage has been verified.

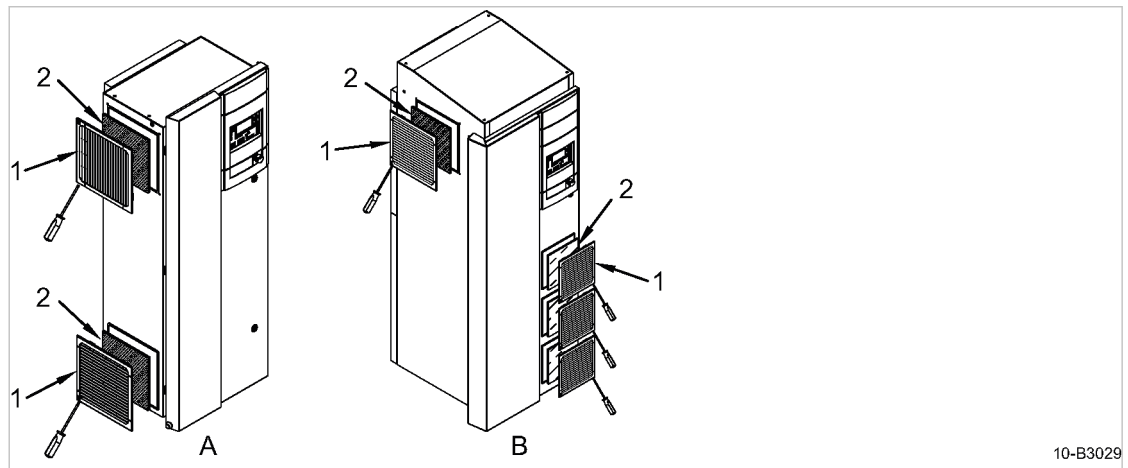


Fig. 25 Control cabinet ventilation

- (A) EBS 410 CM vac
- (B) EBS 410 M vac

- (1) Ventilation grill
- (2) Filter mat

1. Carefully remove the ventilation grill and take out the filter mat.
2. Check filter mat for clogging.
3. Change the filter mat if clogged or if the change interval has expired.
4. Insert the filter mat in the frame and latch in the ventilation grill.



Dispose of old filter mats in accordance with environmental protection guidelines.

10.4 Option H12 Sound enclosure

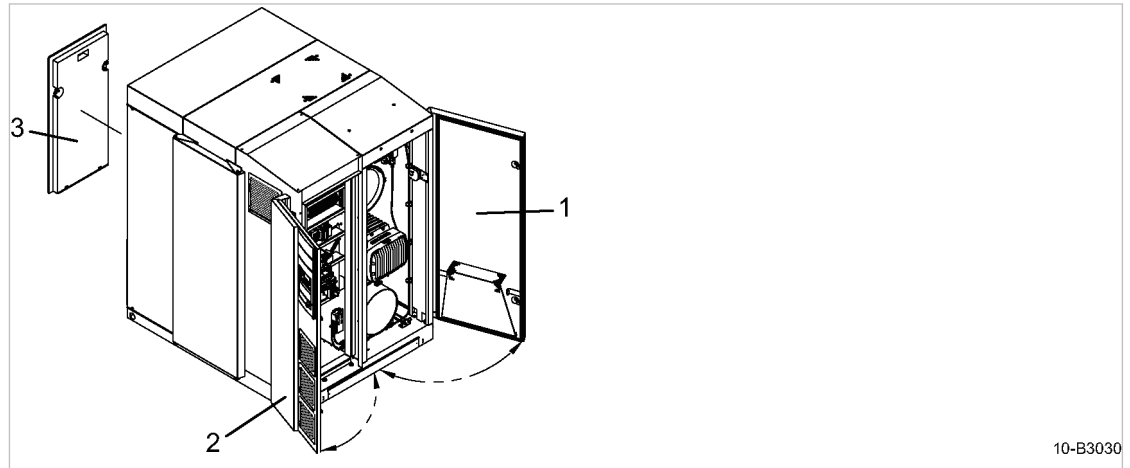


Fig. 26 Sound enclosure

- ① Maintenance door
- ② Control cabinet door
- ③ Removable access panel

- When performing maintenance, detach the removable access panel ③ and, if necessary, open the control cabinet door ② and maintenance door ①.



Use the key supplied with the machine to open the latches.

10.5 Checking the lubricating oil level

Only check the lubricating oil level when the machine is switched off, since the lubricating oil level on the oil sight glass changes constantly during operation.



The oil chambers on the control and drive side of the blower airoend are not connected to each other.

⚠ WARNING

Risk of burns from hot components!

- *Wear long-sleeved clothing and protective gloves.*

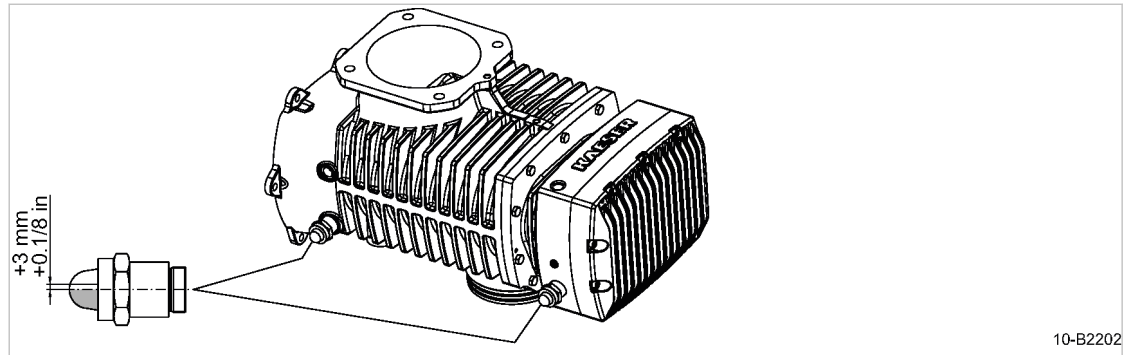


Fig. 27 Checking the lubricating oil level

1. Check the lubricating oil level at the oil sight glass on the control and drive side.
2. Top off lubricating oil as soon as the lubricating oil level has dropped more than 0.08 inches below the middle of the oil sight glass.

10.6 Replenishing lubricating oil

A sticker on the blower block specifies the type of oil to be used.



Prior to any work requiring an opening of the vacuum system, the machine must be fully vented to atmospheric pressure.

Material Wrench
Lubricating oil
Sealing ring

Precondition The power supply disconnecting device is switched off,
lock out / tag out the device,
the lubricating oil level has settled.

⚠ WARNING

Danger of burns from hot components and oil!

- *Wear long-sleeved garments and protective gloves.*

NOTICE

Unsuitable lubricating oil can damage the blower block!

- *Never mix different types of oil.*
- *Never top off with a different type of oil to that already used in the blower block.*

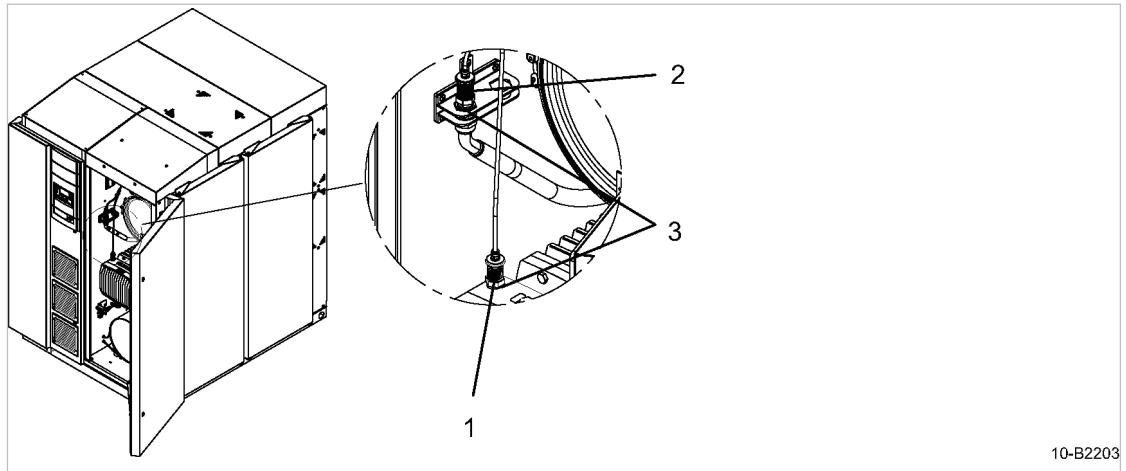


Fig. 28 Replenishing lubricating oil

- ① Gear-end oil inlet
- ② Drive-end oil inlet
- ③ Sealing ring

1. Use the wrench to slowly open oil inlet ① and/or ②.
2. Top off until the level is in the center of the sight glass.
3. Clean sealing ring ③ and check for damage. Replace any damaged sealing ring.
4. Insert sealing ring and close oil inlet ① and/or ②, tighten nuts with the wrench.
5. Visually check for leaks.

10.7 Changing the lubricating oil

The following sequence must be maintained:

1. Return the oil chamber ventilation lubricating oil.
2. Change the blower block lubricating oil.

10.7.1 Returning the oil chamber ventilation lubricating oil

During the ventilation of the blower block oil chambers, lubricating oil is separated and collects in the filter housing of the oil chamber ventilation. The return process is initiated by activating a menu item of the SIGMA CONTROL 2 controller.

Precondition The machine is ready to be switched on or is running, password access level 2 has been activated, the operation display is shown.

1. Open the *<Maintenance>* menu.
2. Use the «Up» or «Down» keys to select the *<Oil Service>* row.
3. Press «Enter».
The check box flashes.
4. Press the «Up» key.
The check box is activated.
5. Press the «Enter» key.
<Oil service> is activated.

Result Collected lubricating oil from the oil chamber ventilation filter housing is returned to the gear-end oil chamber of the blower block. The return process takes approx. 3 min and ends when the check-mark in the check box is extinguished.

Further information Press «Escape» repeatedly to leave this menu.

10.7.2 Changing the blower block lubricating oil



Prior to any work requiring an opening of the vacuum system, the machine must be fully vented to atmospheric pressure.

Drain lubricating oil at an block temperature of at least 77°F to ensure sufficiently low viscosity.

Drain the oil thoroughly from the blower block:

- Gear end
- Drive end

Material Wrench
Lubricating oil
Lubricating oil receptacle,
Sealing ring

Precondition Oil chamber ventilation lubricating oil has been returned, the power supply disconnecting device is switched off, lock out / tag out the device, verify the absence of any voltage.

⚠ WARNING

Danger of burns from hot components and oil

- *Wear long-sleeved garments and protective gloves.*

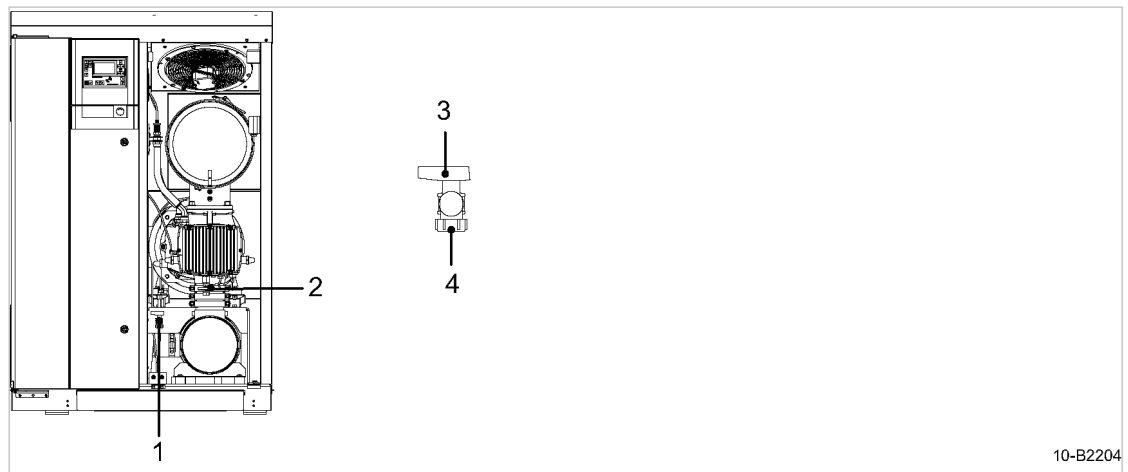


Fig. 29 Change the lubricating oil

- | | |
|------------------------------|-------------------|
| ① Drive-end oil drain device | ③ Oil drain valve |
| ② Gear-end oil drain device | ④ Caps |

Draining the lubricating oil

1. Prepare an oil receptacle.

2. Use the wrench to slowly open the oil inlets of the gear and drive side, items ① and ② in Fig. 28.
3. Screw off caps ④ of gear and drive end, secure against re-closing and ensure that the oil can flow freely.
4. Open oil drain valves ③ and let lubricating oil drain out.



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

Filling with fresh lubricating oil

1. Fill with fresh lubricating oil.
2. Allow the lubricating oil drain valves to remain open until lubricating oil begins to drain (bleeding the lubricating oil drain lines).
3. Close the lubricating oil drain valves ③ at the gear and drive side.
4. Top off lubricating oil until the level is in the center of each oil sight glass.
5. Screw on the caps ④ at the gear and drive side.
6. Clean the sealing rings and check for damage. Replace any damaged sealing rings.
7. Insert sealing rings and close oil inlets, tighten nuts with the wrench.
8. Visually check for leaks.

10.8 Air filter maintenance

The air filter protects the vacuum system contained in the scope of delivery from ingress of dirt.

NOTICE

*Machine damage caused by unsuitable air filter!
Dirt can enter the vacuum system and cause damage to the machine.*

➤ Use only genuine KAESER replacement air filters.



The air filter cannot be cleaned.

10.8.1 Air filter maintenance



Prior to any work requiring an opening of the vacuum system, the machine must be fully vented to atmospheric pressure.

Material Spare parts

Precondition The power supply disconnecting device is switched off, lock out and tagout the device, the absence of any voltage has been verified. The machine has cooled down.

⚠ WARNING

Danger of burns from hot components!

➤ Wear long-sleeved clothing and protective gloves.

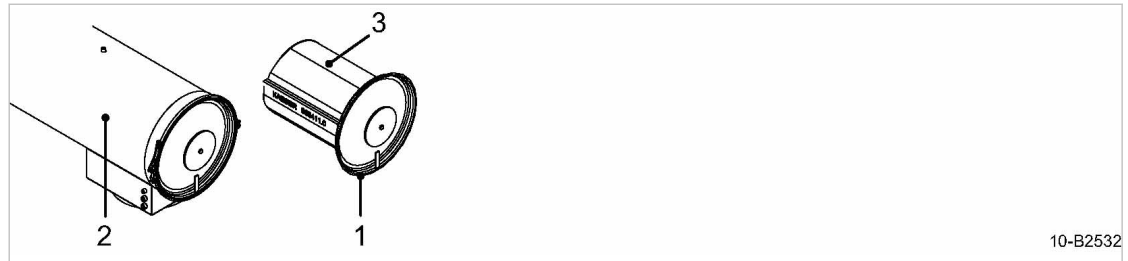


Fig. 30 Changing the air filter

- ① Cover
- ② Inlet silencer
- ③ Air filter

1. Open the snap fastener on the inlet silencer cover.
2. Remove the cover ① with air filter ③.
3. Loosen the Velcro strip and remove the air filter ③.
4. Clean all parts and sealing surfaces.
5. Place the new filter around the perforated inlet port and secure with the Velcro strip.
6. Attach the cover to the inlet silencer.

10.9 Machine cleaning

Regularly clean the machine. This ensures reliable cooling of the machine. The frequency is mainly dependent on local operating conditions.



Clogged machines are indicative of unfavorable ambient conditions. Such ambient conditions clog the cooling air ducts in the machine's interior and the motors resulting in increased wear and tear.

Material Brush and/or compressed air
Protective gloves
Face mask and safety goggles (if required)
Vacuum cleaner

Precondition The power supply disconnecting device is switched off,
the device is locked off,
the absence of any voltage has been verified.
The machine has cooled down.

1. Open the sound enclosure (Option H12).
Dismantle panels in order to clean the cooling air ducts of the drive motor.
2. Dry brush the machine or blow off with compressed air.
3. Vacuum off dirt.
4. Close sound enclosure (Option H12).
Replace and lock panels.



The machine cannot be cleaned?

- Have severe clogging removed by an authorized KAESER service representative.

10.10 Motor maintenance

The maintenance required depends on the motor type.

Material Grease gun with UNIREX N3 bearing grease
Cleaning cloth

10.10.1 Drive motor with regreasable bearings

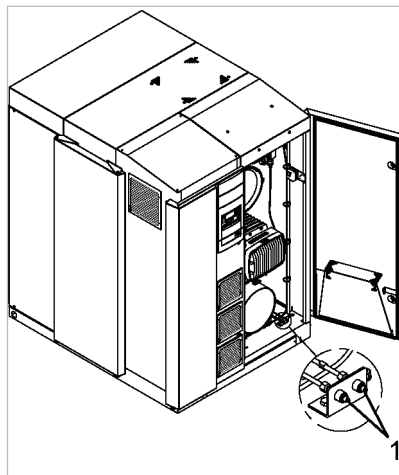


Only use UNIREX N3 high-temperature grease when lubricating the motor bearings. Damage to bearings resulting from the use of alternative brands of grease is excluded from the warranty.

The required quantity of grease is stated on the motor maintenance plate.

Precondition The motor is running.

1. **⚠ WARNING** *Noise due to operation of machine without sound enclosure or Noise due to open sound enclosure / maintenance door (Option H12)! Risk of damage to hearing.*
 - Wear ear protection.
2. **⚠ WARNING** *Risk of burns from hot components!*
 - Wear long-sleeved clothing and protective gloves.
 - Proceed with caution.
3. **NOTICE** *Damage to the drive motor from incorrect regreasing! If the motor is switched off, the new bearing grease will not be distributed correctly and instead will be pressed unused into the old grease chamber.*
 - Only regrease the bearings when the motor is running.
4. The motor bearings must be replaced during the course of regular servicing by an authorized KAESER service representative.



10-B3031

Fig. 31 Maintenance of a drive motor with regreasing device

① Grease fitting

1. Open the maintenance door in the sound enclosure.
2. Clean the grease fittings ① with a cloth before greasing.

3. Regrease both bearings using a grease gun.



The hose line with hose clips leads to the motor bearings NE.

The hose line without hose clips leads to the motor bearings DE.

4. Close and lock the maintenance door.

Further information The regreasing interval and required quantity of grease can be found in chapter 2.4.

10.10.2 Fan motor

The motor bearings are permanently lubricated. No regreasing is necessary.

- The fan must be replaced during the course of regular maintenance by an authorized KAESER service representative.

10.11 Testing the safety relief valve

Precondition The machine is switched off.
The machine is fully vented to atmosphere.

- Check the safety relief valve for free movement.

The valve opens as soon as maximum working pressure is exceeded.

- Never operate the machine without a correctly functioning safety relief valve.
- Do **not** adjust the safety relief valve.
- Replace a defective safety relief valve.

10.12 Testing the EMERGENCY STOP push button

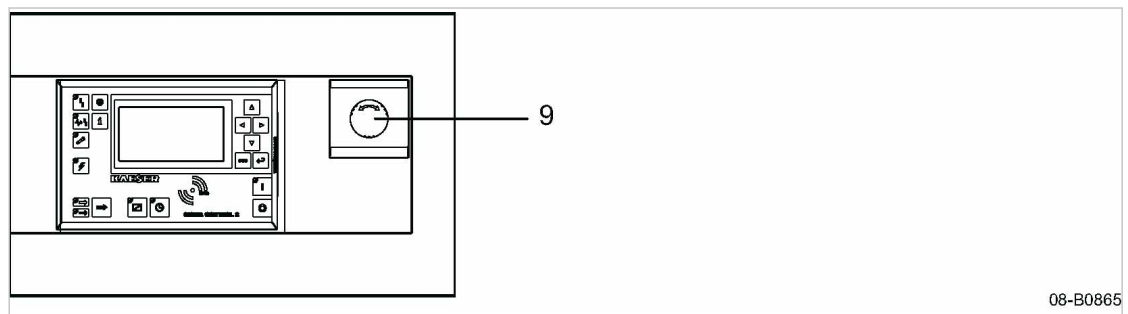


Fig. 32 Testing the EMERGENCY STOP push button

⑨ EMERGENCY STOP push button

Precondition The drive motor is running.

1. Press the EMERGENCY STOP push button.

The drive motor comes to a standstill, the machine's internal pressure system is vented and the machine is secured against automatically restarting.



Should the drive motor not come to a standstill:

The safety function of the EMERGENCY STOP push button can no longer be assured.

- Shut down the machine immediately and contact an authorized KAESER service representative.

2. Unlock the EMERGENCY STOP push button by turning in the direction of the arrow.
3. Acknowledge the alarm message.



Option C58 with external EMERGENCY STOP command device must be checked in the same way.

10.13 Documenting maintenance and service work

Machine equipment number:

- Enter any maintenance and service work carried out in the table below.

Tab. 40 Logged maintenance tasks

11 Spares, Operating Materials, Service

11.1 Note the nameplate

The nameplate contains all information to identify your machine. This information is essential to us in order to provide you with optimal service.

- Please give the information from the nameplate with every inquiry and order for spares.

11.2 Ordering spare parts and operating fluids/materials

KAESER spare parts and operating fluids/materials are original KAESER products. They are specifically selected for use in KAESER machines.

⚠ WARNING

There is a risk of personal injury or damage to the machine resulting from the use of unsuitable spare parts or operating fluids/materials!

Non-Kaeser parts and operating fluids/materials may be unsuitable or of poor quality and can damage the machine or impair its proper function.

Personal injury may result from damage.

- Use only original parts and operating fluids/materials.
- Have an authorized KAESER service representative carry out regular repair and maintenance.

Machine

Name	Number
Filter mat, control cabinet	1100 / 1150
Air filter	1250
Lubricating oil	1600

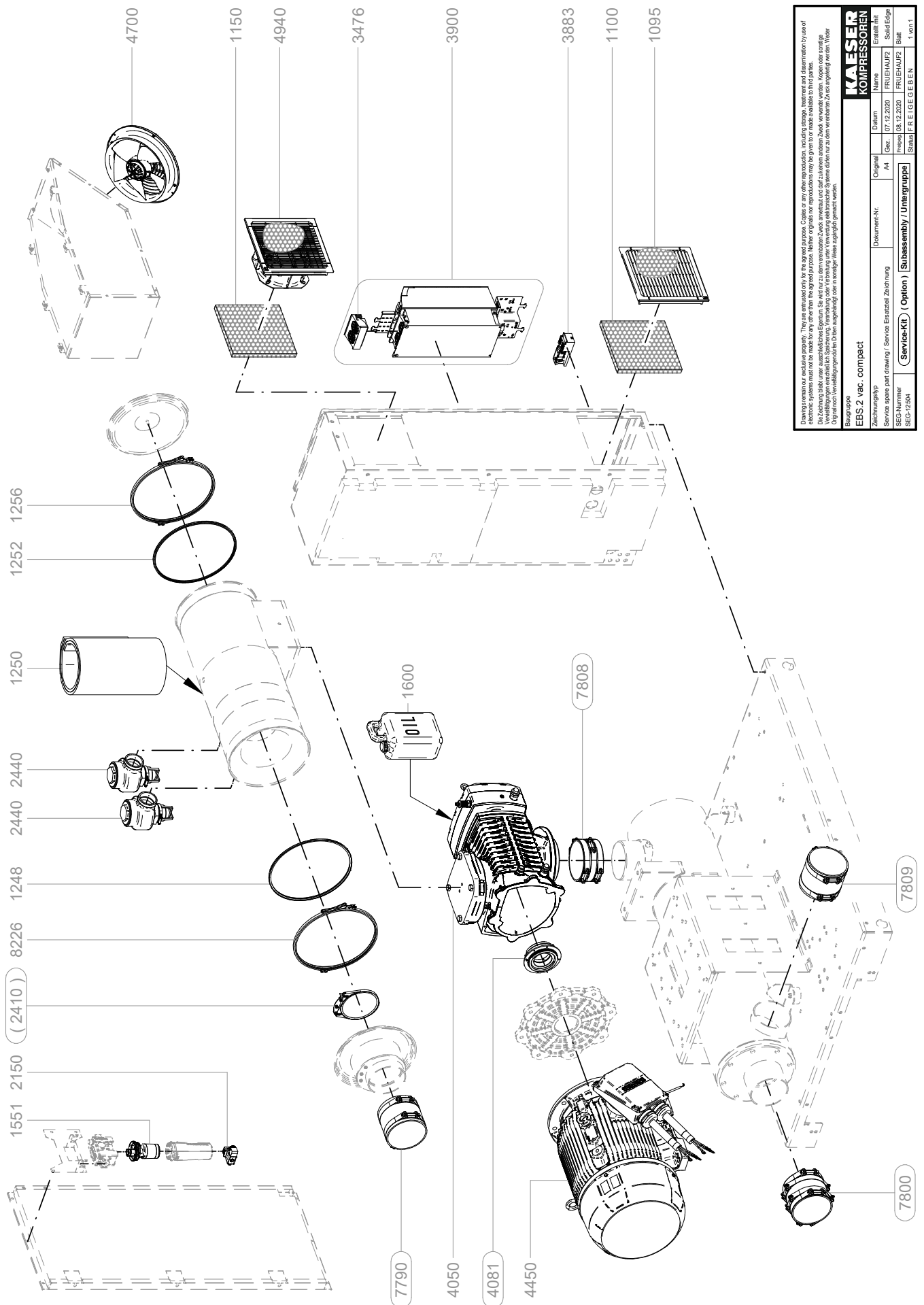
Tab. 41 Ordering spares and operating fluids/materials

11.3 Spare parts for maintenance and repair

Use this spare parts list to plan your material requirement according to operating conditions and to order the required spare parts.



- Make sure that any service (preventive maintenance) or repair tasks not described in this Operating Manual are carried out by authorized KAESER service representative only.



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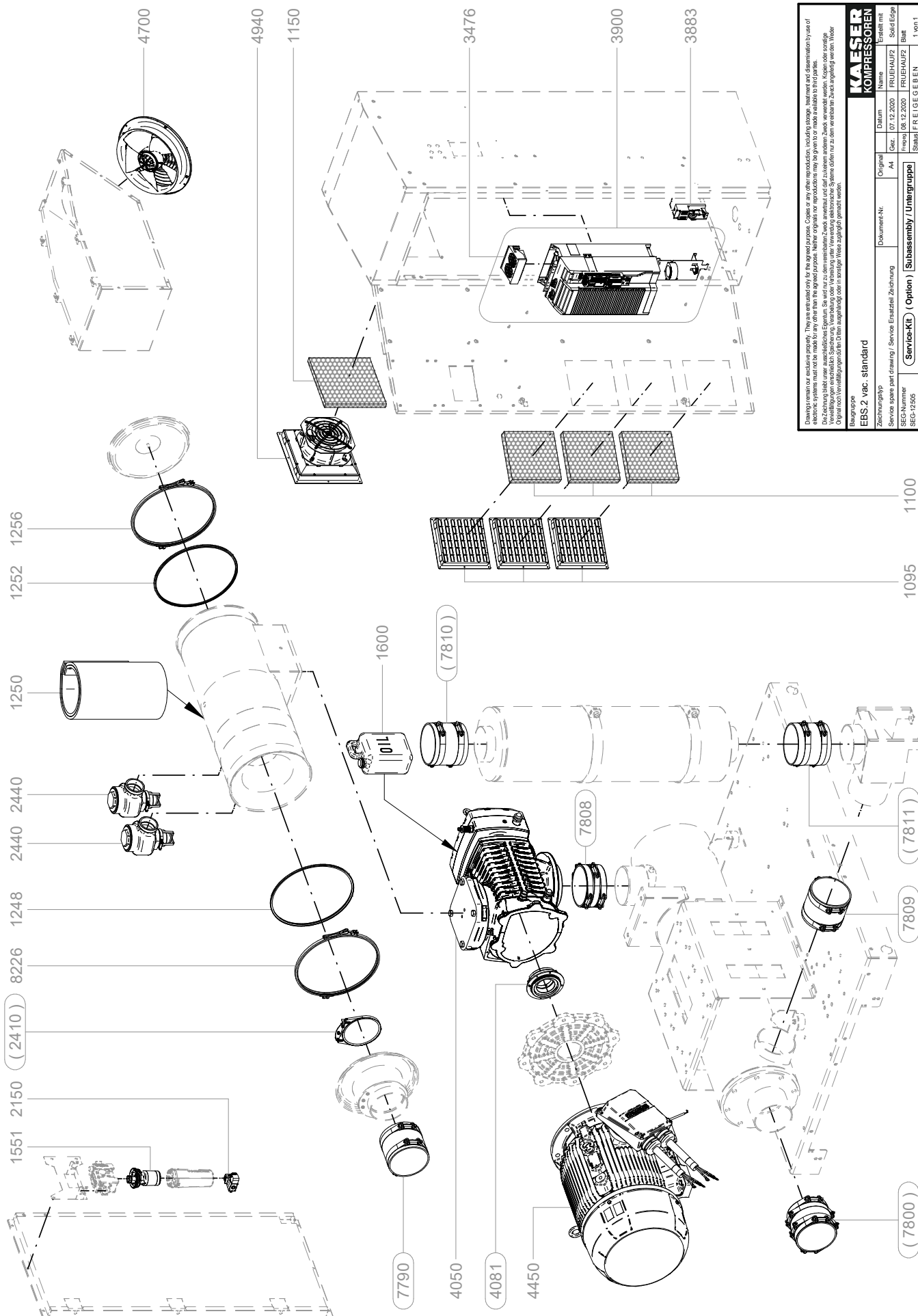
KAESER KOMPRESSOREN		Name: _____ Einzelteil-Nr.: _____	
Datum: _____		Original: _____	
Zeichnungs-Nr.: _____		A4	
Service spare part (drawing) / Service Ersatzteil Zeichnung		Gz.: 07.12.2020 Freigegeben: 08.12.2020 Inhouse: 07.12.2020 Status: FREIGEGEBEN	
EBS 2 vac. compact		(Service-Kit) (Option)	
Basissgruppe: _____		Subassembly / Untergruppe: _____	
SEG-Nummer: _____ SEG: 19204		1 von 1	

Legend		KAESER KOMPRESSOREN
	EBS.2 vac. compact	SEL-4529_01 E

Item	Description	Option
1095	Control cabinet breather	
1100	Filter mat, control cabinet	
1150	Filter mat, converter cabinet	
1248	Inlet silencer gasket	
1250	Air filter insert	
1252	Inlet silencer gasket	
1256	Canopy fastener	
1551	Microfilter element	
1600	SIGMA FLUID	
2150	Control valve	
2410	Vacuum limiting valve	x
2412	Overhaul kit, Swing check valve	
2440	Vacuum limiting valve	
3883	Oil mist pump	
3900	Frequency converter	
3476	FC-fan motor	
4050	SIGMA blower block	
4081	Gear flange seal	
4450	Drive motor	
4451	Drive motor bearing kit	
4700	Fan unit	
4940	Control cabinet fan SFC	
7790	Compensator, air inlet	
7800	Compensator, air outlet	
7808	Intermediate compensator	
7809	Intermediate compensator	
8226	Quick-release fastener kpl.	

Please quote the part number and serial number of the machine together with the item number and the description of the part when ordering.

Before and during all work, be sure to read and follow the safety and service instructions in the machine's service manual!



KAESER KOMPRESSOREN					
Original	Original	Original	Original	Original	Original
SEB-Nummer	SEB-Nummer	SEB-Nummer	SEB-Nummer	SEB-Nummer	SEB-Nummer
SEB-12/205	SEB-12/205	SEB-12/205	SEB-12/205	SEB-12/205	SEB-12/205
EBS 2 vac standard					
Zachnungstyp: Service spare part drawing / Service Ersatzteil Zeichnung					
Date: 07.12.2020					
Reviz: 08.12.2020					
Status: F R E G E B E N					
1 von 1					

Legend		KAESER KOMPRESSOREN
	EBS.2 vac. compact	SEL-4530_01 E

Item	Description	Option
1095	Control cabinet breather	
1100	Filter mat, control cabinet	
1150	Filter mat, converter cabinet	
1248	Inlet silencer gasket	
1250	Air filter insert	
1252	Inlet silencer gasket	
1256	Canopy fastener	
1551	Microfilter element	
1600	SIGMA FLUID	
2150	Control valve	
2410	Swing check valve	x
2412	Overhaul kit, Swing check valve	
2440	Vacuum limiting valve	
3883	Oil mist pump	
3900	Frequency converter	
3476	FC-fan motor	
4050	SIGMA blower block	
4081	Gear flange seal	
4450	Drive motor	
4451	Drive motor bearing kit	
4700	Fan unit	
4940	Control cabinet fan SFC	
7790	Compensator, air inlet	
7800	Compensator, air outlet	
7808	Intermediate compensator	
7809	Intermediate compensator	
8226	Quick-release fastener kpl.	

Please quote the part number and serial number of the machine together with the item number and the description of the part when ordering.

Before and during all work, be sure to read and follow the safety and service instructions in the machine's service manual!

11.4 KAESER AIR SERVICE

KAESER AIR SERVICE offers:

- authorized KAESER service representatives 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.

➤ Why not sign a KAESER AIR SERVICE maintenance agreement!

Result Your advantage:
lower costs and higher compressed air availability.

11.5 Completing the contamination declaration

Every company (user) is responsible for the health and safety of its employees. This extends to personnel who carry out servicing work at the user or service contractor.

A Declaration of Contamination must be completed and signed whenever maintenance or repair work is to be carried out on the machine.

1. Contact KAESER SERVICE and request the contamination declaration form.
2. Attach a copy of the Declaration of Contamination to the **outside** of the packing.

12 Decommissioning, Storage and Transport

12.1 Decommissioning

Decommissioning is required under circumstances such as the following:

- The machine is (temporarily) not required.
- The machine is to be transported to another location.
- The machine is to be scrapped.

Temporary decommissioning

Precondition The machine can be started at regular intervals.

- Allow the machine to run once per week at operating temperature for at least 30 minutes, in order to ensure protection against corrosion.

Long-term decommissioning



Decommissioning the machine for long periods can lead to corrosion damage and should be avoided.
KAESER will be glad to assist you with any queries relating to proper storage and decommissioning.

Precondition The power supply disconnecting device is switched off,
lock out / tag out the device,
the absence of all voltage has been verified.
The machine is fully vented.

1. Allow the machine to cool down completely.
2. Disconnect all connecting lines and the power supply.
3. Store the machine in a dry, frost-proof room.

12.2 Packing

A wooden crate is required for overland transport to protect the machine from mechanical damage. Other measures must be taken for the transport of machines by sea or air. Please contact an authorized KAESER SERVICE for more information.

Material Protective plastic sheeting
Wooden transport crate

Precondition The machine is decommissioned.
The machine is dry and cooled down.

1. Wrap the machine fully in plastic sheeting.
2. Protect the machine in a wooden crate against mechanical damages.

12.3 Transport

12.3.1 Safety

Weight and center of gravity determine the most suitable method of transportation. Both are specified in the dimensional drawing in chapter 13.2.

Precondition Transport only by pallet truck, forklift truck or lifting gear by personnel trained in the safe transportation of loads.

- Ensure the danger area is clear of personnel.

12.3.2 Transport machine with a pallet truck or forklift truck

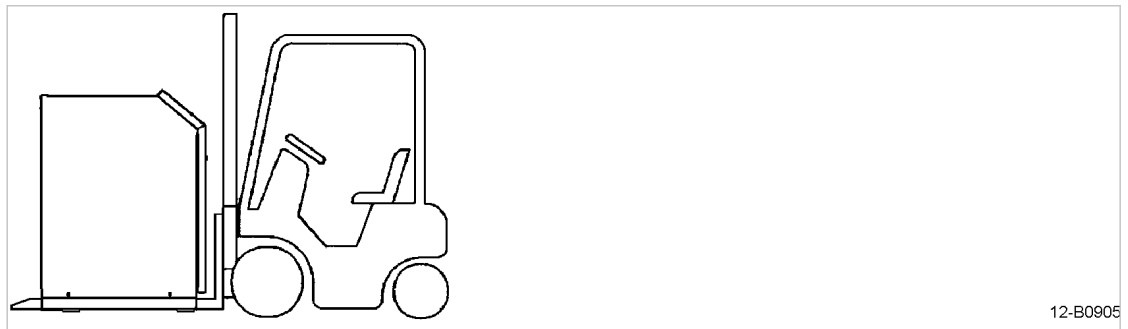


Fig. 33 Transport

1. Remove the cover sheet from the sound enclosure's frame (see chapter 6.7).
2. Take note of the center of gravity.
3. Drive the pallet truck fully or forklift truck beneath the entire machine and transport with care.

12.4 Storage

Humidity can lead to corrosion, particularly on the surfaces of the blower block.



KAESER will be glad to assist you regarding any questions concerning correct storage and decommissioning.

⚠ CAUTION

Moving rotors!

Risk of injury from crushing or severing of limbs.

- *Do not reach into the blower block.*

NOTICE

Moisture and frost can damage the machine.

- *Prevent the ingress of moisture and formation of condensation.*
- Store the machine in a dry, frost-proof room.
- Seal off the inlet and discharge ports to prevent the ingress of dirt.
- Change the lubricating oil annually.

Following long-term storage

Longer downtimes lead to corrosion damage and should be avoided.

- Observe the procedures for assembly and initial commissioning.

12.5 Disposal

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

Precondition The machine is decommissioned.

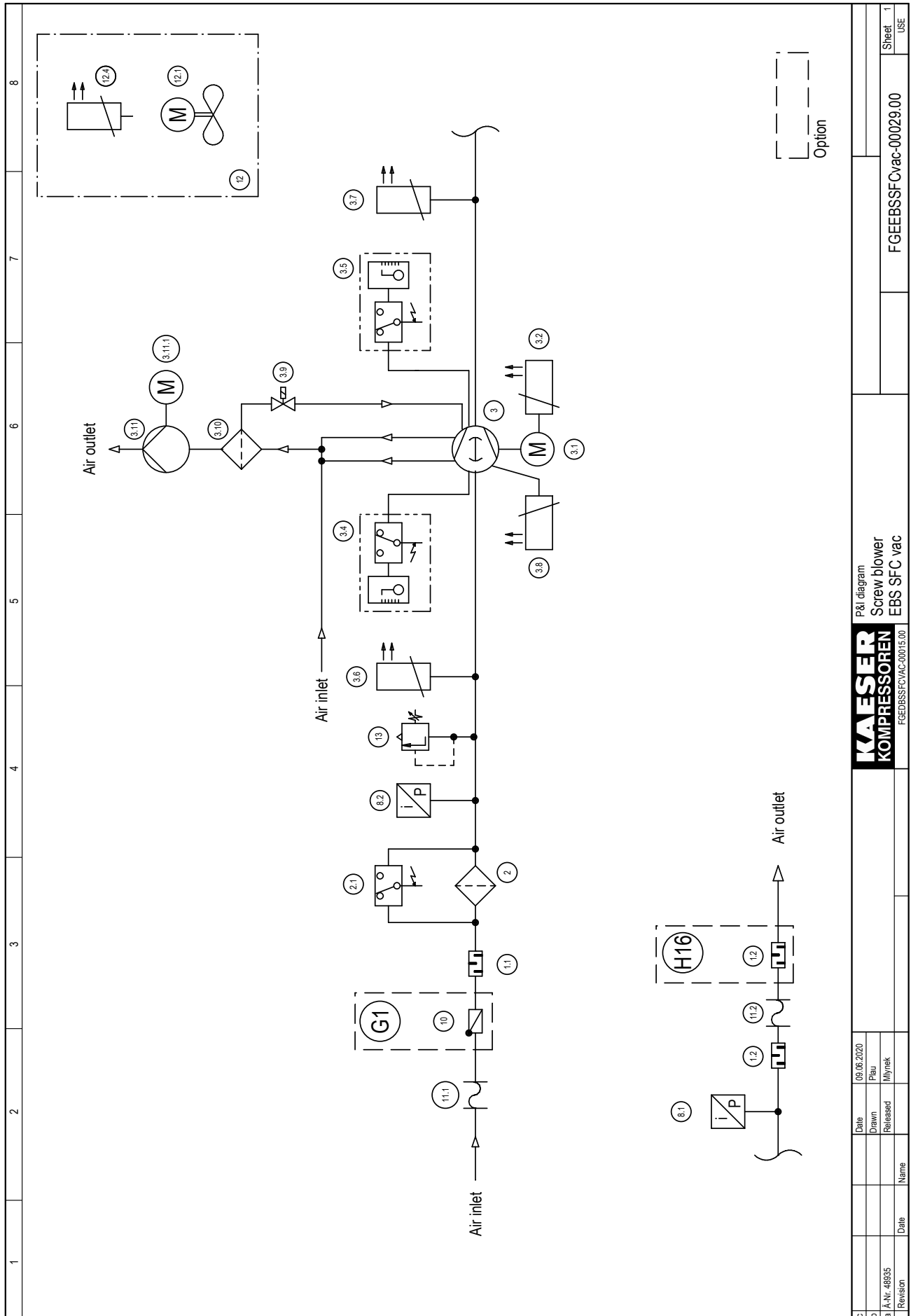
1. Completely drain the oil from the machine.
2. Remove old filters.
3. Hand the machine over to an authorized disposal expert.



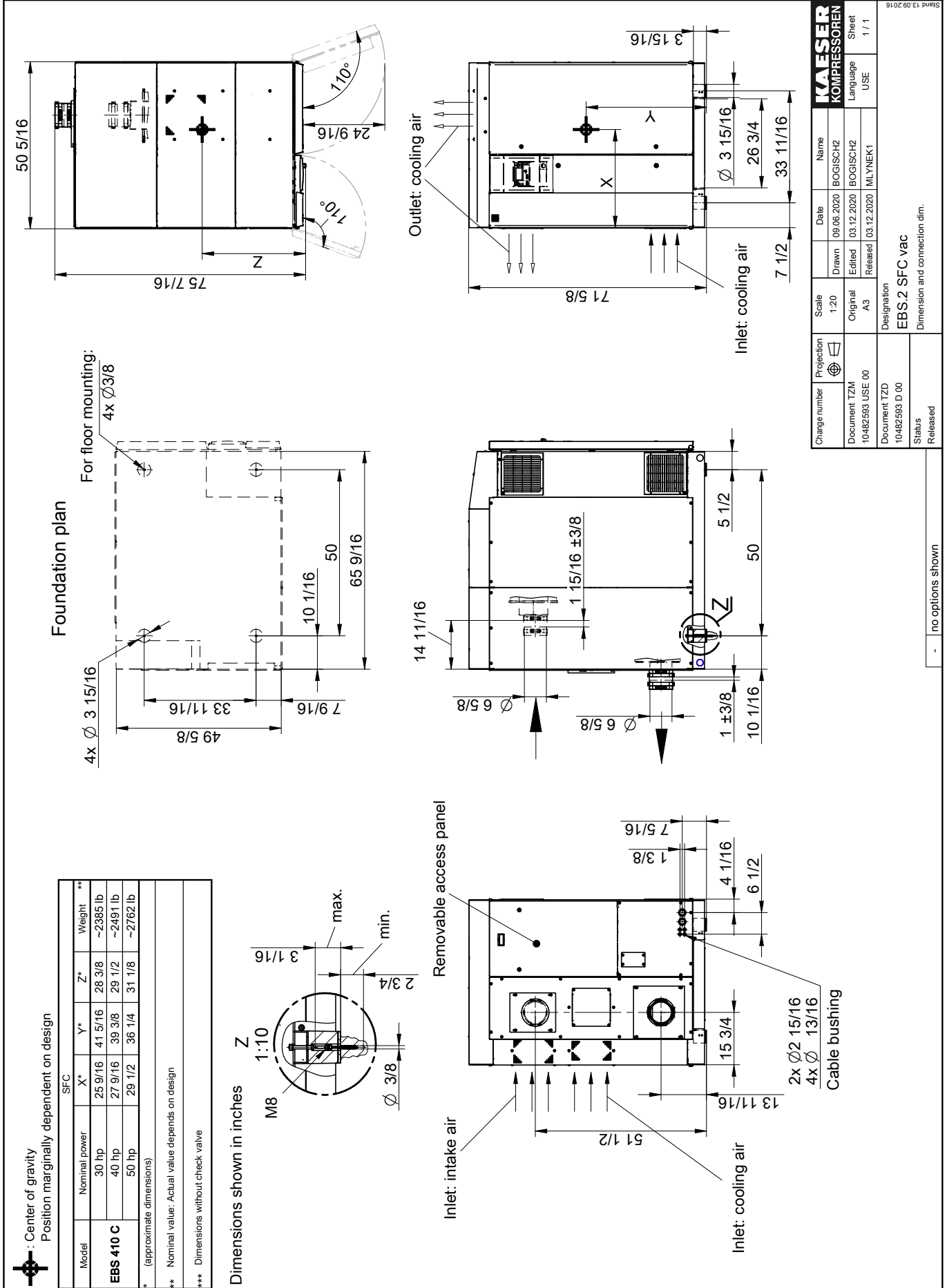
- Components contaminated with oil must be disposed of in accordance with local environmental protection regulations.

13 Annex

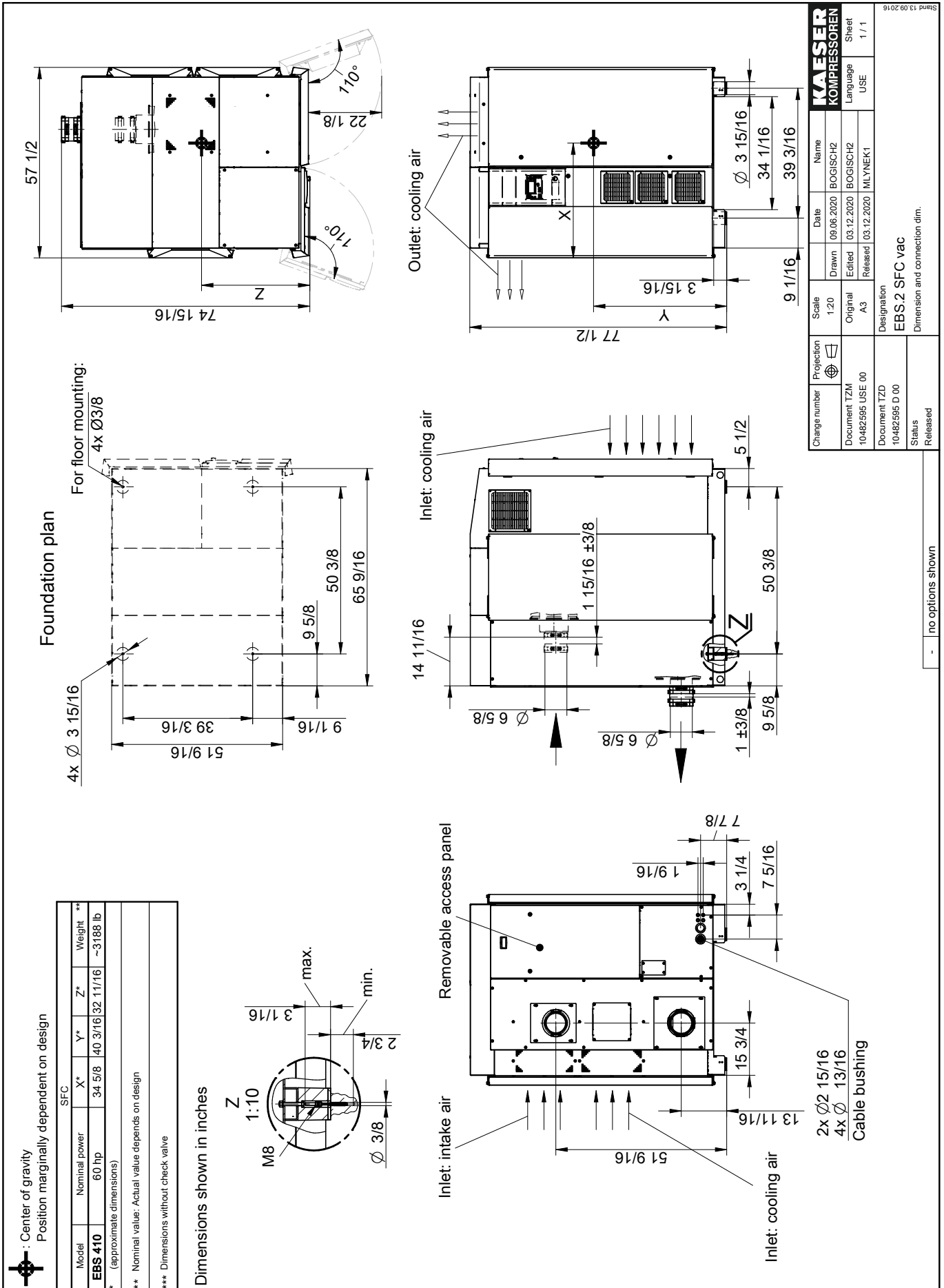
13.1 Pipeline and instrument flow diagram (P+I diagram)

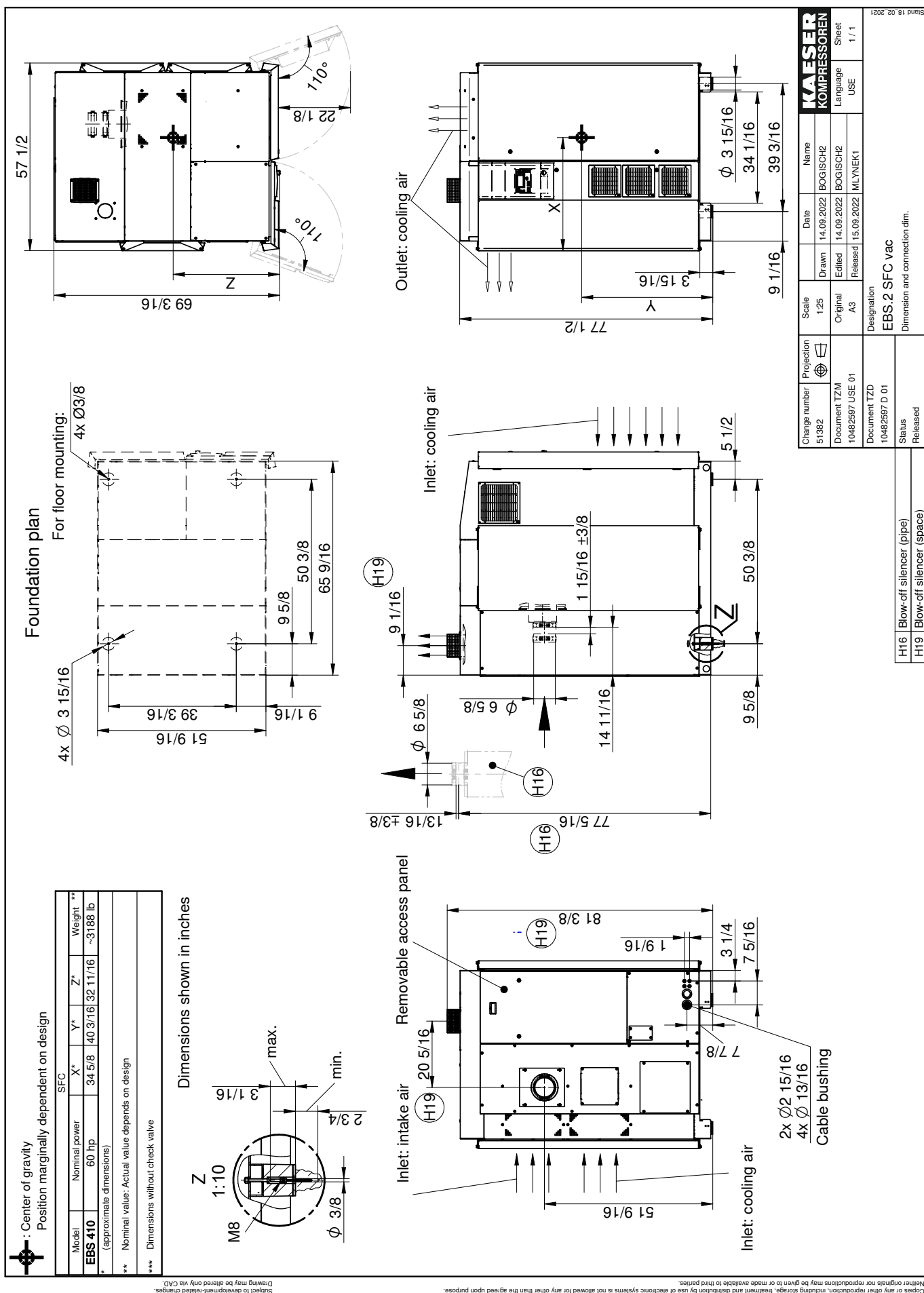


13.2 Dimensional drawing**13.2.1 EBS 410 CM vac**



13.2.2 EBS 410 M vac





13.3 Electrical Diagram

1	2	3	4	5	6	7	8
Wiring Diagram Blower with frequency converter Siemens Sinamics + Sigma Control 2 (SC2) CBS.2: 10hp-30hp (7,5kW-22kW) DBS.2: 20hp-50hp (15kW-37kW) EBS.2: 30hp-100hp (22kW-75kW) FBS.2: 60hp-150hp (45kW-110kW) Power supply: WYE system with center point solidly grounded ATTENTION !!! The document gives collective information on power supply voltages and frequencies for all machines. The voltage and frequency and local conditions under which any particular machine may be used are given on the nameplate of the machine and in the accompanying service manual. The drawings remain our exclusive property. They are entrusted only for the agreed purpose. Copies or any other reproductions, including storage, treatment and dissemination by use of electronic systems must not be made for any other than the agreed purpose. Neither originals nor reproductions must be forwarded or otherwise made accessible to third parties. manufacturer: KAESER KOMPRESSOREN SE Postfach 2143 96410 Coburg							
KAESER KOMPRESSOREN SXB.XFC-U3030.03 cover page Blower xFC+SC2 CBS.2 / DBS.2 / EBS.2 / FBS.2 DXB.XFC-U3032.04 1 Sht.							
c			Date	14.02.2023	USE		
b			Drawn	M.Zeeth			
a			Released	M.Zeeth			
A	Change	Date	Name				

Lfd. Nr.	Benennung		Zeichnungsnummer (Kunde)	Zeichnungsnummer (Hersteller)	Blatt	Anlagenkennzeichen
No.	Name		Drawing No. (customer)	Drawing No. (manufacturer)	Page	Unit designation
1	cover page	CBS 2 / DBS 2 / EBS 2 / FBS 2		DXB.XFC-U3032.04	1	
2	list of contents			ZXB.XFC-U3032.04	1	
3	general instructions	instructions + option		UXB.XFC-U3032.04	1	
4	component legend	component legend		UXB.XFC-U3032.04	2	
5	electrical component parts list	Common parts		UXB.XFC-U3032.04	3	
6	electrical component parts list	Common parts		UXB.XFC-U3032.04	4	
7	electrical component parts list	performance-related components		UXB.XFC-U3032.04	5	
8	electrical component parts list	performance-related components		UXB.XFC-U3032.04	6	
9	electrical component parts list	performance-related components		UXB.XFC-U3032.04	7	
10	electrical component parts list	performance-related components		UXB.XFC-U3032.04	8	
11	electrical component parts list	performance-related components		UXB.XFC-U3032.04	9	
12	electrical component parts list	performance-related components		UXB.XFC-U3032.04	10	
13	wiring diagram	input voltage		SXB.XFC-U3032.04	1	
14	wiring diagram	power unit		SXB.XFC-U3032.04	2	
15	wiring diagram	power unit vent		SXB.XFC-U3032.04	3	
16	wiring diagram	power unit vent		SXB.XFC-U3032.04	4	
17	wiring diagram	control voltage		SXB.XFC-U3032.04	5	
18	wiring diagram	control		SXB.XFC-U3032.04	6	
19	wiring diagram	Oil return + SC2 + IOM		SXB.XFC-U3032.04	7	
20	wiring diagram	IOM-configuration		SXB.XFC-U3032.04	8	
21	wiring diagram	digital inputs IOM		SXB.XFC-U3032.04	9	
22	wiring diagram	analog inputs IOM		SXB.XFC-U3032.04	10	
23	wiring diagram	Relay-outputs IOM		SXB.XFC-U3032.04	11	
24	wiring diagram	frequency converter		SXB.XFC-U3032.04	12	
25	wiring diagram	User's controller EMERGENCY STOP		SXB.XFC-U3032.04	13	
26	wiring diagram	Handling terminals		SXB.XFC-U3032.04	14	
27	wiring diagram	Feed line connection		SXB.XFC-U3032.04	15	
28	wiring diagram	Feed line connection		SXB.XFC-U3032.04	16	
29	terminal connection	-X0,-X11,-X12,-X13.1,-X13.2,-X14		KXB.XFC-U3032.04	1	
30	terminal connection	-X15,-X16,-X21,-X22		KXB.XFC-U3032.04	2	
31	terminal connection	-X100		KXB.XFC-U3032.04	3	
32	lay-out	Switchboard 10-50hp / 7.5-37kW		AXB.XFC-U3032.04	1	
33	lay-out	Switchboard 60-150hp / 45-110kW		AXB.XFC-U3032.04	2	

c

b

a

B Change

Date

Drawn

Released

Date

14.02.2023

M.Zeeh

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Name

list of contents

KAESER

KOMPRESSOREN

1

page

1

Sheet

ZXB.XFC-U3032.04

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1	2	3	4	5	6	7	8
general instructions ATTENTION !!! Install supplies, grounding and shock protection to local safety regulations. Do not make or break live plug-in connectors. control cabinet wiring for non-designated conductors with multi-standard stranded conductors primary circuits: black 2,5mm² H07V-K, 14AWG UL-Style 1015, CSA-TEW red 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW white 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW blue 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW white/blue 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW orange 1,5mm² H07V-K, 16AWG UL-Style 1015, CSA-TEW green/yellow H07V-K, UL-Style 1015, CSA-TEW control voltage AC 24/1 15V: control voltage AC 24/1 15V grounded: control voltage DC 24V: control voltage DC 24V grounded: external voltage: ground conductor:							
type / option B13 = mode of operation overpressure B14 = mode of operation Vacuum C38 = SIGMA FREQUENCY CONTROL (SFC) C58 = EMERGENCY STOP-switching device H30 = High altitude installation > 1.000 m.ü.NN / m.a.s.l							

c				Date	14.02.2023	general instructions		=	
b				Drawn	M.Zeeh	Blower xFC+SC2		+	
a				Released	M.Zeeh	instructions + option			
Change				Date	Name				UXB.XFC-U3032.04
									page 1
									10 Sht

1	2	3	4	5	6	7	8
-B1/-B4 -B5 -B24 -B40/-B43 -B55 -B60 -B70 -B80/-B81	pressure transducer (4...20mA) differential pressure switch filter clogging overload Relay vent motor temperature probe Pt100 Blower temperature probe Pt100 oil temperature monitoring temperature probe Pt100 blower motor thermostat soundproofing casing oil level switch				-T1 -T11 -T12 -T21 -T45 -X0 -X11 -X12 -X15 -X16 -X21 -X22 -X100 -K20 -X1 -X2 -X3 -X4 -X5 -X6 -K21 -X1 -X2 -X3 -X4 -X5,-X9 -X6 -X7 -X8 -X11...-X13 -X14...-X17 -X18...-X29 -X30...-X32	frequency converter control transformer 24+115V AC transformer 230V AC control voltage supply 24V DC isolating amplifier terminal strip, power supply terminal strip, control SC2-IOM digital outputs SC2-IOM digital inputs frequency converter analog signals control voltage 24V-DC frequency converter 24V-DC EMERGENCY STOP (external/customer)	
-1FU -2FU -3FU -4FU -8FU -10FU -12FU -29FU	fuse control voltage tapping primary control fuse control transformer secondary control fuse control transformer fuse ventilator soundproofing casing fuse controller ventilator fuse 24V-AC primary fuse transformer ventilator soundproofing casing (FBS.2) fuse phase sequence relay				Main Control System SC2 MCS		
-F86	Surge protective device (Canada only)				Ethernet IO-BUS RS485-FC (USS-Bus) communication module SD card slot ground connection		
-K10 -K20 -K21 -K29 -K50 -K51 -K55 -K60	solenoid valve Oil return SIGMA CONTROL 2 (SC2) (MCS) SIGMA CONTROL 2 (SC2) (IOM-Modul) phase sequence relay coupling relay controller ventilator coupling relay ventilator coupling relay Oil return EMERGENCY STOP-switching device (optional)				IO-Modul SC2 IOM-1 inside IO-Bus input IO-Bus output digital inputs power supply unit and Transistor outputs Relay outputs analog input 0-20mA analog input Pt100 digital inputs external analog inputs 0-20mA analog inputs Pt100 digital inputs digital outputs		
-M1 -M4 -M8 -M10	blower motor ventilator soundproofing casing controller ventilator vacuum pump Gear housing ventilation						
-Q4	contactor ventilator soundproofing casing						
-R1 -R3.1 -R3.2 -R11	line commutation reactor ferrit bead power supply ferrit bead Motor cable interference suppression filter						
-S1 -S9	EMERGENCY STOP pushbutton REMOTE reset fault message						

c			Date	14.02.2023	component legend Blower xFC+SC2 component legend	=	+	UXB.XFC-U3032.04	page 2	10 Sht.
b			Drawn	M.Zeeh						
a			Released	M.Zeeh						
C	Change	Date	Name							

		Common parts	Common parts		
model		CBS.2 + DBS.2 + EBS.2 10-100hp / 7,5-75 kW	FBS.2 60-150hp / 45-110kW		
machine power supply		380 V / 460 V - 60 Hz	380V / 460V - 60Hz		
pressure transducer	-B1 Huba Control	894786.0 0.-1200mbar	894786.0 0.-1200mbar		
pressure transducer	-B4 Huba Control	894787.0 0.1200mbar	894787.0 0.1200mbar		
differential pressure switch	-B5 Dungs	893307.00010 setting: 14,1 in.W.C.	893307.00010 setting: 14,1 in.W.C.		
temperature probe	-B40/-B43	895251.10010	895251.10010		
oil temperature (C39)	-B55 Wika	895603.00100 Pt100	895603.00100 Pt100		
thermostat soundproofing casing	-B70 . Jumo	894861.11000 heatTHERM-R-2 30-80°C setting: 60°C	894861.11000 heatTHERM-R-2 30-80°C setting: 60°C		
oil level switch (C5)	-B80/-B81 Elobau	894631.0	894631.0		
fuse	-1FU Gould	(3x) - 7.3161.00190 ATQR 8 A - 600 V - class CC	(3x) - 7.3161.00190 ATQR 8A - 600V - class CC		
fuse	-2FU Gould	(2x) - 7.3317.1 ATQR 3 A - 600 V - class CC	(2x) - 7.3317.1 ATQR 3A - 600V - class CC		
fuse	-3FU Gould	(1x) - 7.3161.00160 ATQR 5 A - 600 V - class CC	(1x) - 7.3161.00160 ATQR 5A - 600V - class CC		
fuse	-8FU Gould	(1x) - 7.3304.00010 ATDR 2 A - 600 V - class CC	(1x) - 7.3304.00010 ATDR 2A - 600V - class CC		
fuse	-10FU	895637.0 5x20 0,315 A-T 250 VAC	895637.0 5x20 0,315A-T 250VAC		
fuse	-29FU Gould	(3x) - 7.3304.00010 ATDR 2 A - 600 V - class CC	(3x) - 7.3304.00010 ATDR 2 A - 600 V - class CC		
fuse socket	-1FU/-29FU -2FU -3FU/-8FU Wöhner	3-pole (2x) - 7.3320.00060 2-pole (1x) - 7.3320.00070 1-pole (2x) - 7.3320.00050 class CC - Ambus Easy Switch	3-pole (2x) - 7.3320.00060 2-pole (1x) - 7.3320.00070 1-pole (2x) - 7.3320.00050 class CC - Ambus Easy Switch		
solenoid valve	-K10 bürkert	895601.0 24V-DC 8W	895601.0 24V-DC 8W		
Blower control	-K20 Prodrive	7.7601.0 SC2MCS	7.7601.0 SC2MCS		
Blower control	-K21 Prodrive	7.7602.1 SC2IOM-1	7.7602.1 SC2IOM-1		
phase sequence relay	-K29 Siemens	7.7830.00610 3UG4615-2CR20	7.7830.00610 3UG4615-2CR20		
coupling relay	-K50 Wieland	7.3149.03660 24DC-1W-250V6A-F	7.3149.03660 24DC-1W-250V6A-F		
coupling relay	-K51 Wieland	7.3149.03660 24DC-1W-250V6A-F	7.3149.03660 24DC-1W-250V6A-F		
coupling relay	-K55 Siemens	7.8237.00340 3RH2122-2JB40 DC 17-30 V AC-15: 240 V/10 A	7.8237.00340 3RH2122-2JB40 DC 17-30V AC-15: 240V/10A		
Fortsetzung: nächstes Blatt					

electrical component parts list		Blower xFC+SC2		Common parts	
KAESER KOMPRESSOREN					
Date	14.02.2023	Drawn	M.Zeith	Released	M.Zeith

[illegible]

		performance-related components					10 SH page 5
model		10 hp CBS.2 (7,5 kW)	15 hp CBS.2 (11 kW)	20 hp CBS.2 (15 kW)	25 hp CBS.2 (18,5 kW)	30 hp CBS.2 (22 kW)	
machine power supply		380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	" +
overload relay soundproofing casing	-B24 . Siemens	7.8741.00010 3RB3016-1RB0 0,10-0,40 A / S00 setting: 0,24 A NEC 430.32(C) incremental setting: 0,27 A	7.8741.00010 3RB3016-1RB0 0,10-0,40 A / S00 setting: 0,24 A NEC 430.32(C) incremental setting: 0,27 A	7.8741.00010 3RB3016-1RB0 0,10-0,40 A / S00 setting: 0,24 A NEC 430.32(C) incremental setting: 0,27 A	7.8741.00010 3RB3016-1RB0 0,10-0,40 A / S00 setting: 0,24 A NEC 430.32(C) incremental setting: 0,27 A	7.8741.00010 3RB3016-1RB0 0,10-0,40 A / S00 setting: 0,24 A NEC 430.32(C) incremental setting: 0,27 A	
Surge protective device	-F86 Dehn	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	
fuse	-4FU Gould	7.3315.1 (3x) ATQR 0,75 A 600 V cl. CC	7.3315.1 (3x) ATQR 0,75 A 600 V cl. CC	7.3315.1 (3x) ATQR 0,75 A 600 V cl. CC	7.3315.1 (3x) ATQR 0,75 A 600 V cl. CC	7.3315.1 (3x) ATQR 0,75 A 600 V cl. CC	
fuse socket	-4FU Wöhner	3-pole (1x) - 7.3320.00060 class CC	3-pole (1x) - 7.3320.00060 class CC	3-pole (1x) - 7.3320.00060 class CC	3-pole (1x) - 7.3320.00060 class CC	3-pole (1x) - 7.3320.00060 class CC	
Blower motor	-M1 . Siemens	895685.0 380V-Y 3000U/min	895686.0 380V-Y 3000U/min	895687.0 380V-Y 3000U/min	895688.0 370V-Y 3000U/min	895689.0 380V-Y 3000U/min	
vent motor soundproofing casing	-M4 . ebm	895240.0 W2D250 380 V-D/60 Hz / 0,23 A 460 V-D/60 Hz / 0,26 A	895240.0 W2D250 380 V-D/60 Hz / 0,23 A 460 V-D/60 Hz / 0,26 A	895240.0 W2D250 380 V-D/60 Hz / 0,23 A 460 V-D/60 Hz / 0,26 A	895240.0 W2D250 380 V-D/60 Hz / 0,23 A 460 V-D/60 Hz / 0,26 A	895240.0 W2D250 380 V-D/60 Hz / 0,23 A 460 V-D/60 Hz / 0,26 A	CBS.2 performance-related components
vent motor control cabinet	-M8 . Ruebsamen	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	
line commutation reactor	-R1 Siemens	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	
Tape-wound core	-R3.1 -R3.2 Magnetec	7.8538.0 (M112) 1x 7.8538.0 (M112)	7.8538.0 (M112) 1x 7.8538.0 (M112)	7.8538.0 (M112) 1x 7.8538.0 (M112)	7.8538.0 (M112) 1x 7.8538.0 (M112)	7.8538.0 (M112) 1x 7.8538.0 (M112)	
interference suppression filter	-R11 Siemens	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	
frequency converter	-T1 . control unit	7.8833.01120 6SL3210-1PE23-8AL0 7.7830.00710 6SL3244-0BB12-1BAx	7.8833.01120 6SL3210-1PE23-8AL0 7.7830.00710 6SL3244-0BB12-1BAx	7.8833.01120 6SL3210-1PE23-8AL0 7.7830.00710 6SL3244-0BB12-1BAx	7.8833.01130 6SL3210-1PE24-5AL0 7.7830.00710 6SL3244-0BB12-1BAx	7.8833.01140 6SL3210-1PE26-0AL0 7.7830.00710 6SL3244-0BB12-1BAx	
instrument panel	. Siemens	---	---	---	---	---	
motor cable	-W211	8 AWG / 4G10 mm² 600 V - 90°C EMV	8 AWG / 4G10 mm² 600 V - 90°C EMV	6 AWG / 4G16 mm² 600 V - 90°C EMV	4 AWG / 4G25 mm² 600 V - 90°C EMV	4 AWG / 4G25 mm² 600 V - 90°C EMV	
connection	-W280.1/2	8 AWG / 10 mm² 600 V - 90°C	8 AWG / 10 mm² 600 V - 90°C	6 AWG / 16 mm² 600 V - 90°C	4 AWG / 25 mm² 600 V - 90°C	4 AWG / 25 mm² 600 V - 90°C	
supply terminals	-X0: U1/N1/W1/GRD	894864.00010 894864.00020 (Canada) 14-4 AWG/2,5-16 mm² Wieland fig. 2, Sht. 13 16 mm fig. 1, Sht. 14	894864.00010 894864.00020 (Canada) 14-4 AWG/2,5-16 mm² Wieland fig. 2, Sht. 13 16 mm fig. 1, Sht. 14	3x 895314.0 3x 895314.00010 4x 895314.00040 8-1 AWG / 10-50 mm² Wago fig. 3, Sht. 13 30 mm fig. 1, Sht. 15	3x 895314.0 3x 895314.00010 4x 895314.00040 8-1 AWG / 10-50 mm² Wago fig. 3, Sht. 13 30 mm fig. 1, Sht. 15	3x 895314.0 3x 895314.00010 4x 895314.00040 8-1 AWG / 10-50 mm² Wago fig. 3, Sht. 13 30 mm fig. 1, Sht. 15	
supply	Handling Stripped length X connection						Name Date

model		performance-related components					6 page 10 Sht.
		20 hp DBS.2 (15 kW)	25 hp DBS.2 (18,5 kW)	30 hp DBS.2 (22 kW)	40 hp DBS.2 (30 kW)	50 hp DBS.2 (37 kW)	
machine power supply		380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	" + UXB.XFC-U3032.04
overload relay soundproofing casing	-B24 . Siemens	7.8741.00020 3RB3016-1NB0 0,32-1,25 A / S00 setting: 0,51 A NEC 430.32(C) incremental setting: 0,57 A	7.8741.00020 3RB3016-1NB0 0,32-1,25 A / S00 setting: 0,51 A NEC 430.32(C) incremental setting: 0,57 A	7.8741.00020 3RB3016-1NB0 0,32-1,25 A / S00 setting: 0,51 A NEC 430.32(C) incremental setting: 0,57 A	7.8741.00020 3RB3016-1NB0 0,32-1,25 A / S00 setting: 0,51 A NEC 430.32(C) incremental setting: 0,57 A	7.8741.00020 3RB3016-1NB0 0,32-1,25 A / S00 setting: 0,51 A NEC 430.32(C) incremental setting: 0,57 A	
Surge protective device	-F86 Dehn	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	
fuse	-4FU Gould	7.3161.00390 (3x) ATQR 1,0 A, 600 V cl. CC	7.3161.00390 (3x) ATQR 1,0 A, 600 V cl. CC	7.3161.00390 (3x) ATQR 1,0 A, 600 V cl. CC	7.3161.00390 (3x) ATQR 1,0 A, 600 V cl. CC	7.3161.00390 (3x) ATQR 1,0 A, 600 V cl. CC	
fuse socket	-4FU Wöhner	3-pole (1x) - 7.3320.00060 class CC	3-pole (1x) - 7.3320.00060 class CC	3-pole (1x) - 7.3320.00060 class CC	3-pole (1x) - 7.3320.00060 class CC	3-pole (1x) - 7.3320.00060 class CC	
Blower motor	-M1 . Siemens	895687.0 380V-Y 3000U/min	895688.0 370V-Y 3000U/min	895689.0 380V-Y 3000U/min	895690.0 380V-Y 3100U/min	895692.0 380V-D 3000U/min	electrical component parts list DBS.2 performance-related components
vent motor soundproofing casing	-M4 . ebm	895596.0 W2D300 380 V-Y/60 Hz / 0,55 A 460 V-Y/60 Hz / 0,55 A	895596.0 W2D300 380 V-Y/60 Hz / 0,55 A 460 V-Y/60 Hz / 0,55 A	895596.0 W2D300 380 V-Y/60 Hz / 0,55 A 460 V-Y/60 Hz / 0,55 A	895596.0 W2D300 380 V-Y/60 Hz / 0,55 A 460 V-Y/60 Hz / 0,55 A	895596.0 W2D300 380 V-Y/60 Hz / 0,55 A 460 V-Y/60 Hz / 0,55 A	
vent motor control cabinet	-M8 . Ruebsamen	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	
line commutation reactor	-R1 Siemens	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	
Tape-wound core	-R3.1 -R3.2 Magnetec	7.8538.0 (M112) 1x 7.8538.0 (M112)	7.8538.0 (M112) 1x 7.8538.0 (M112)	7.8538.0 (M112) 1x 7.8538.0 (M112)	7.8538.0 (M112) 1x 7.8538.0 (M112)	7.8538.0 (M112) 2x 7.8538.0 (M112)	
interference suppression filter	-R11 Siemens	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---	
frequency converter	-T1 .	7.8833.01120 6SL3210-1PE23-8AL0	7.8833.01130 6SL3210-1PE24-5AL0	7.8833.01140 6SL3210-1PE26-0AL0	7.8833.01150 6SL3210-1PE27-5AL0	7.8833.01150 6SL3210-1PE27-5AL0	KAESER KOMPRESSOREN
control unit	7.7830.00710 .	7.7830.00710 6SL3244-0BB12-1BAx	7.7830.00710 6SL3244-0BB12-1BAx	7.7830.00710 6SL3244-0BB12-1BAx	7.7830.00710 6SL3244-0BB12-1BAx	7.7830.00710 6SL3244-0BB12-1BAx	
instrument panel	--- .	---	---	---	---	---	
	Siemens	---	---	---	---	---	
motor cable	-W211	6 AWG / 4G16 mm² 600 V - 90°C EMV	4 AWG / 4G25 mm² 600 V - 90°C EMV	4 AWG / 4G25 mm² 600 V - 90°C EMV	2 AWG / 4G35 mm² 600 V - 90°C EMV	4 AWG / 4G25 mm² 600 V - 90°C EMV	
connection	-W280	6 AWG / 16 mm² 600 V - 90°C	4 AWG / 25 mm² 600 V - 90°C	4 AWG / 25 mm² 600 V - 90°C	2 AWG / 35 mm² 600 V - 90°C	2 AWG / 35 mm² 600 V - 90°C	Date 14.02.2023 Drawn M.Zeeth Released M.Zeeth Name Date C Change
supply terminals	-X0: U1/V1/W1/GRD	3x 895314.0 3x 895314.00010 4x 895314.00040 8-1 AWG / 10-50 mm² Wago fig. 3, Sht. 13 30 mm fig. 1, Sht. 15	3x 895314.0 3x 895314.00010 4x 895314.00040 8-1 AWG / 10-50 mm² Wago fig. 3, Sht. 13 30 mm fig. 1, Sht. 15	3x 895314.0 3x 895314.00010 4x 895314.00040 8-1 AWG / 10-50 mm² Wago fig. 3, Sht. 13 30 mm fig. 1, Sht. 15	3x 895314.0 3x 895314.00010 4x 895314.00040 8-1 AWG / 10-50 mm² Wago fig. 3, Sht. 13 30 mm fig. 1, Sht. 15	3x 895314.0 3x 895314.00010 4x 895314.00040 8-1 AWG / 10-50 mm² Wago fig. 3, Sht. 13 30 mm fig. 1, Sht. 15	
supply	Handling Stripped length X connection						

model	performance-related components				=	+	UXB.XFC-U3032.04	page 7 10 Sht.
	30 hp EBS.2 (22 kW)	40 hp EBS.2 (30 kW)	50 hp EBS.2 (37 kW)					
machine power supply	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz					
overload relay soundproofing casing	-B24 Siemens 7.8741.00010 3RB3016-1RB0 0,10-0,40 A / S00 setting: 0,24 A NEC 430.32(C) incremental setting: 0,27 A	7.8741.00010 3RB3016-1RB0 0,10-0,40 A / S00 setting: 0,24 A NEC 430.32(C) incremental setting: 0,27 A	7.8741.00010 3RB3016-1RB0 0,10-0,40 A / S00 setting: 0,24 A NEC 430.32(C) incremental setting: 0,27 A					
Surge protective device	-F86 Dehn 7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G					
fuse	-4FU Gould 7.3315.1 (3x) ATQR 0,75 A 600 V cl. CC	7.3315.1 (3x) ATQR 0,75 A 600 V cl. CC	7.3315.1 (3x) ATQR 0,75 A 600 V cl. CC					
fuse socket	-4FU Wöhner 3-pole (1x) - 7.3320.00060 class CC	3-pole (1x) - 7.3320.00060 class CC	3-pole (1x) - 7.3320.00060 class CC					
Blower motor	-M1 Siemens 895689.0 380V-Y 3000U/min	895690.0 380V-Y 3100U/min	895692.0 380V-D 3000U/min					
vent motor soundproofing casing	-M4 ebm 895240.0 W2D250 380 V-D/60 Hz / 0,23 A 460 V-D/60 Hz / 0,26 A	895240.0 W2D250 380 V-D/60 Hz / 0,23 A 460 V-D/60 Hz / 0,26 A	895240.0 W2D250 380 V-D/60 Hz / 0,23 A 460 V-D/60 Hz / 0,26 A					
vent motor control cabinet	-M8 Ruebsamen 7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A	7.2751.00360 LV600 (1Ph/N/GRD) 115 V/60 Hz, 80W 0,7 A					
line commutation reactor	-R1 Siemens integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---					
Tape-wound core	-R3.1 -R3.2 Magnetec 7.8538.0 (M112) 1x 7.8538.0 (M112)	7.8538.0 (M112) 1x 7.8538.0 (M112)	7.8538.0 (M112) 2x 7.8538.0 (M112)					
interference suppression filter	-R11 Siemens integrated (-T1) ---	integrated (-T1) ---	integrated (-T1) ---					
frequency converter control unit instrument panel	-T1 Siemens 7.8833.01140 (FSC) 6SL3210-1PE26-0AL0 7.7830.00710 6SL3244-0BB12-1BAx 7.7830.00100 6SL3255-0AA00-4CA1	7.8833.01150 (FSC) 6SL3210-1PE27-5AL0 7.7830.00710 6SL3244-0BB12-1BAx 7.7830.00100 6SL3255-0AA00-4CA1	7.8833.01150 (FSC) 6SL3210-1PE27-5AL0 7.7830.00710 6SL3244-0BB12-1BAx 7.7830.00100 6SL3255-0AA00-4CA1					
motor cable	-W211 4 AWG / 4G25 mm² 600 V - 90°C EMV	2 AWG / 4G35 mm² 600 V - 90°C EMV	4 AWG / 4G25 mm² 600 V - 90°C EMV					
connection	-W280.1/2 4 AWG / 25 mm² 600 V - 90°C	2 AWG / 35 mm² 600 V - 90°C	2 AWG / 35 mm² 600 V - 90°C					
supply terminals U1/V1/W1/GRD Handling Stripped length X connection supply	-X0: 3x 895314.0 3x 895314.00010 4x 895314.00040 8-1 AWG / 10-50 mm² Wago fig. 3, Sht. 13 30 mm fig. 1, Sht. 15	3x 895314.0 3x 895314.00010 4x 895314.00040 8-1 AWG / 10-50 mm² Wago fig. 3, Sht. 13 30 mm fig. 1, Sht. 15	3x 895314.0 3x 895314.00010 4x 895314.00040 8-1 AWG / 10-50 mm² Wago fig. 3, Sht. 13 30 mm fig. 1, Sht. 15					

electrical component parts list

EBS.2 22-37kW (30-50hp)

KAESER
KOMPRESSOREN

Date 14.02.2023

Drawn M.Zeeth

Released M.Zeeth

Name

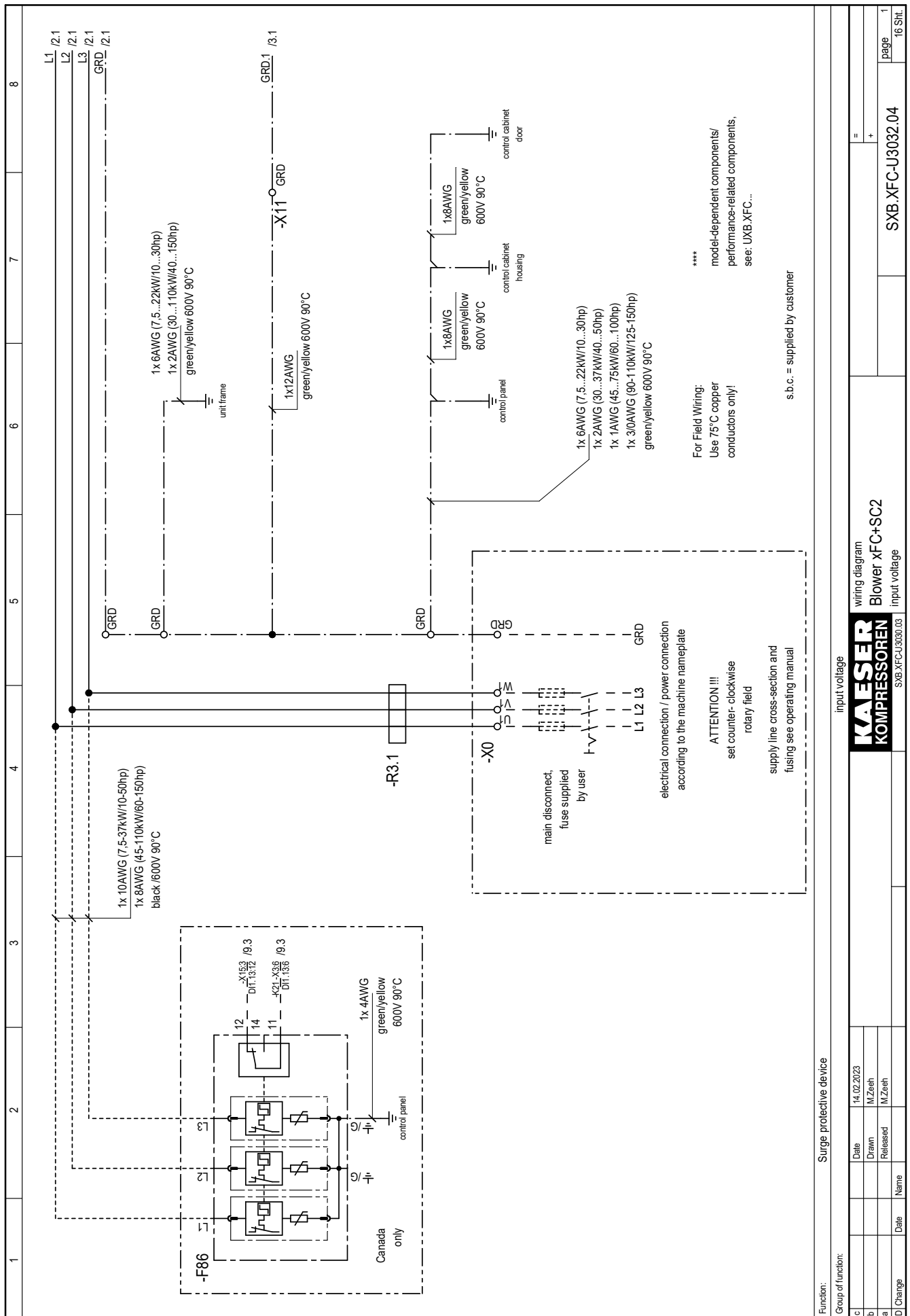
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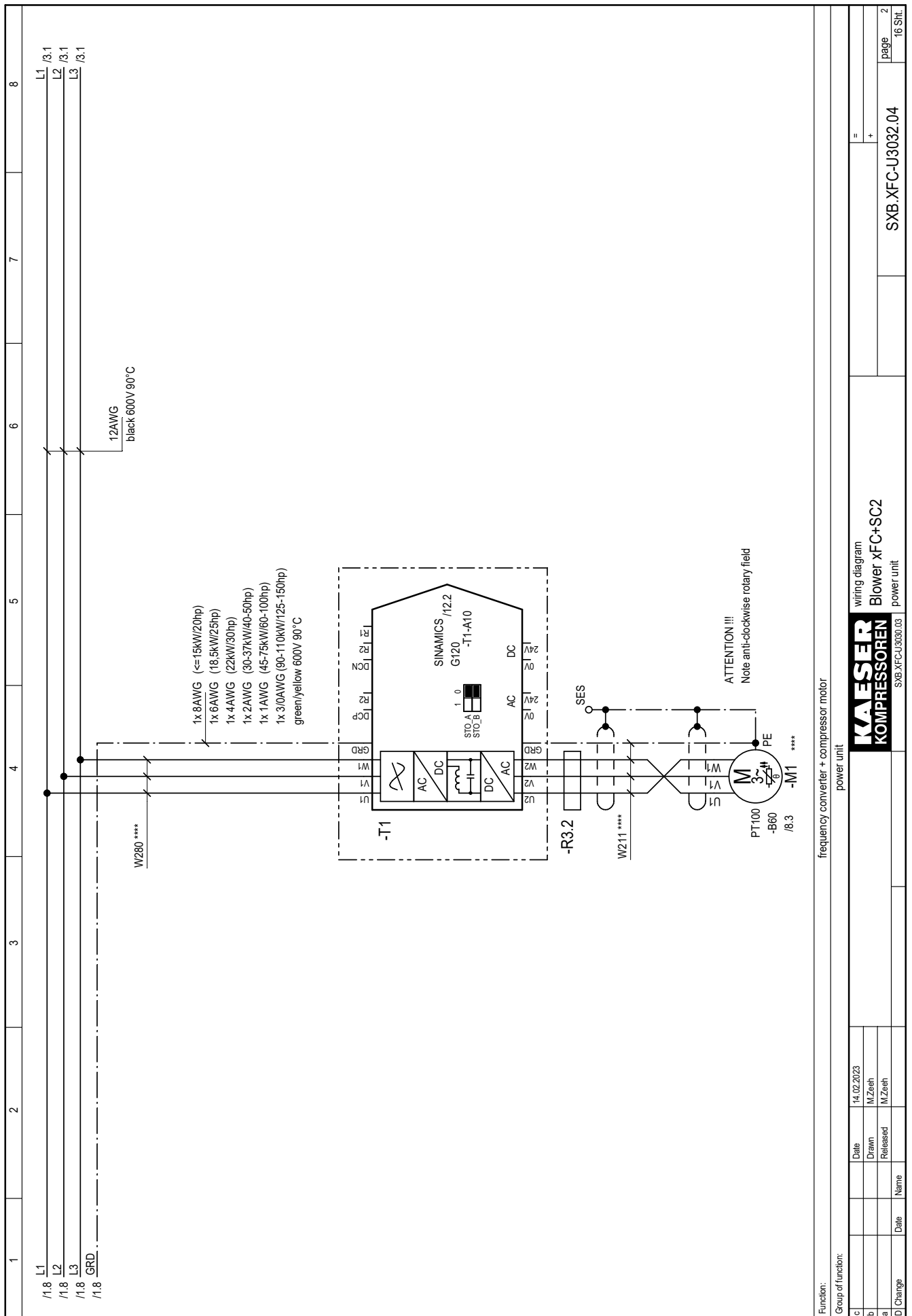
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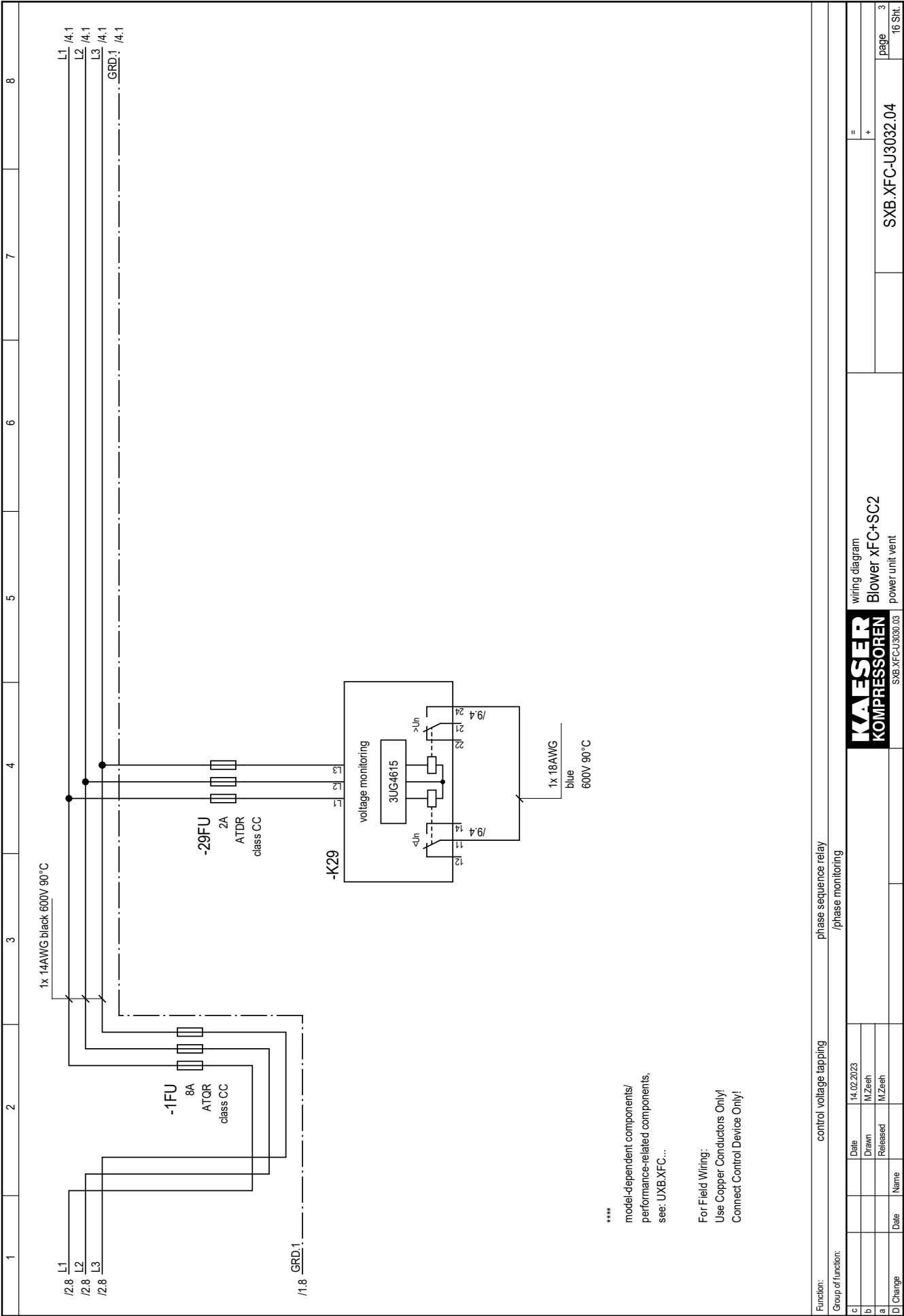
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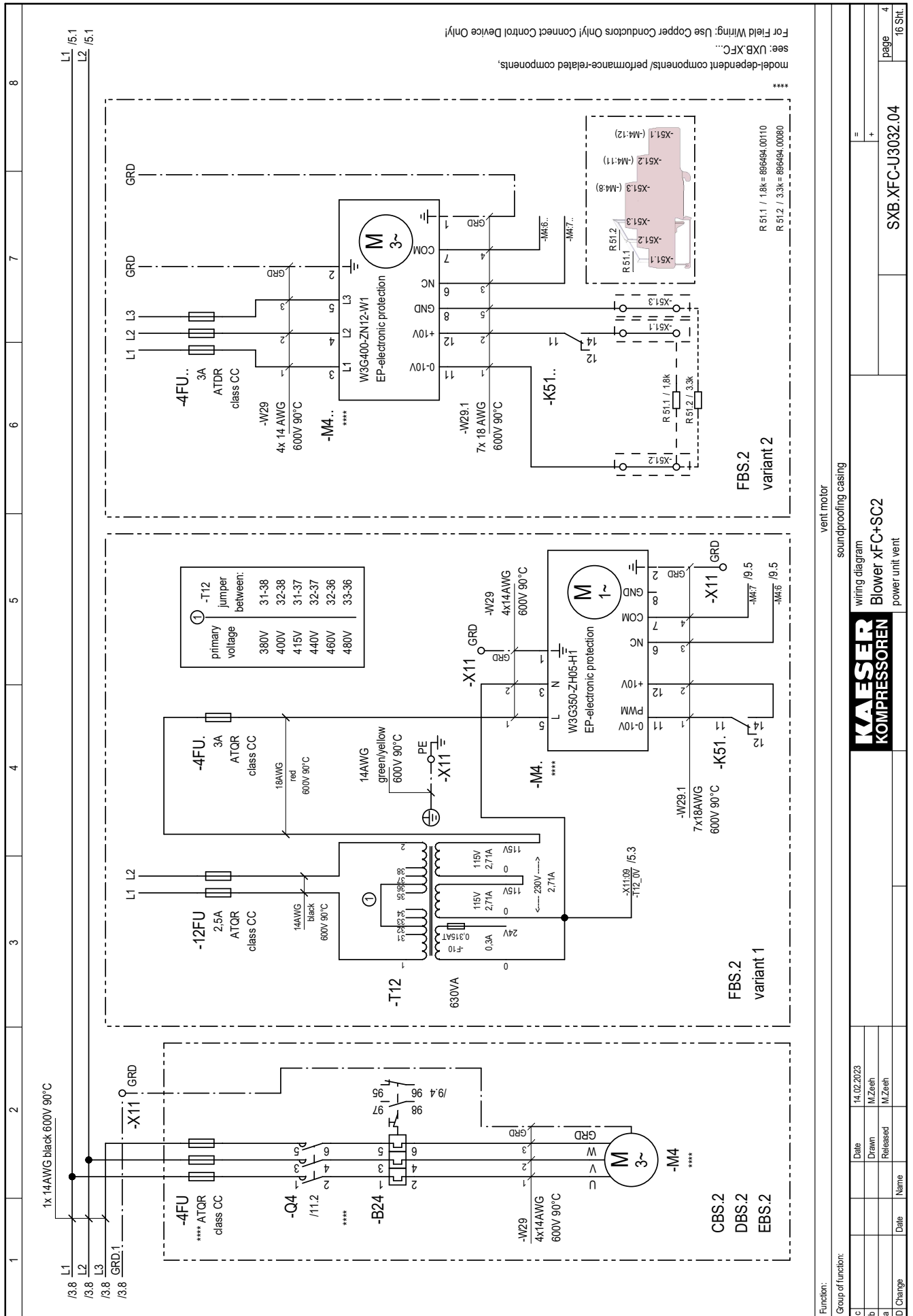
		performance-related components					page 9 of 10 Sht.
model		60 hp FBS.2 (45 kW)	75 hp FBS.2 (55 kW)	100 hp FBS.2 (75 kW)	125 hp FBS.2 (90 kW)	150 hp FBS.2 (110 kW)	
machine power supply		380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	" +
Surge protective device	-F86 Dehn	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	7.8669.00020 DG MU 3PY 480 3W+ G	
fuse -M4: variant 1	-4FU Gould	7.3317.1 (1x) ATQR 3 A - 600 V class CC	7.3317.1 (1x) ATQR 3 A - 600 V class CC	7.3317.1 (1x) ATQR 3 A - 600 V class CC	7.3317.1 (1x) ATQR 3 A - 600 V class CC	7.3317.1 (1x) ATQR 3 A - 600 V class CC	electrical component parts list
fuse -M4: variant 1	-12FU Gould	7.3313.1 (2x) ATQR 2,5 A - 600 V cl. CC	7.3313.1 (2x) ATQR 2,5 A - 600 V cl. CC	7.3313.1 (2x) ATQR 2,5 A - 600 V cl. CC	7.3313.1 (2x) ATQR 2,5 A - 600 V cl. CC	7.3313.1 (2x) ATQR 2,5 A - 600 V cl. CC	
fuse -M4: variant 2	-4FU Gould	(3x) - 7.3161.00350 ATDR 3 A 600 V class CC	(3x) - 7.3161.00350 ATDR 3 A 600 V class CC	(3x) - 7.3161.00350 ATDR 3 A 600 V class CC	(3x) - 7.3161.00350 ATDR 3 A 600 V class CC	(3x) - 7.3161.00350 ATDR 3 A 600 V class CC	FBS.2 45-110kW (60-150hp) performance-related components
fuse socket	-4FU -12FU Wöhner	1-pole - 7.3320.00050 2-pole - 7.3320.00070 3-pole - 7.3320.00060 class CC - Ambus Easy	1-pole - 7.3320.00050 2-pole - 7.3320.00070 3-pole - 7.3320.00060 class CC - Ambus Easy	1-pole - 7.3320.00050 2-pole - 7.3320.00070 3-pole - 7.3320.00060 class CC - Ambus Easy	1-pole - 7.3320.00050 2-pole - 7.3320.00070 3-pole - 7.3320.00060 class CC - Ambus Easy	1-pole - 7.3320.00050 2-pole - 7.3320.00070 3-pole - 7.3320.00060 class CC - Ambus Easy	
coupling relay	-K51 Wieland	7.3149.03660 24DC-1W-250V6A-F	7.3149.03660 24DC-1W-250V6A-F	7.3149.03660 24DC-1W-250V6A-F	7.3149.03660 24DC-1W-250V6A-F	7.3149.03660 24DC-1W-250V6A-F	KAESER KOMPRESSOREN
Blower motor	-M1 Siemens	895693.0 380V-Y	895694.0 380V-Y	895696.0 380V-D	895697.0 380V-D	895698.0 380V-D	
vent motor soundproofing casing -M4: variant 1	-M4 . . ebm	895849.0 W3G350-ZH05-H1 230 V/60 Hz 500W - 2,3 A	895849.0 W3G350-ZH05-H1 230 V/60 Hz 500W - 2,3 A	895849.0 W3G350-ZH05-H1 230 V/60 Hz 500W - 2,3 A	895849.0 W3G350-ZH05-H1 230 V/60 Hz 500W - 2,3 A	895849.0 W3G350-ZH05-H1 230 V/60 Hz 500W - 2,3 A	Fortsetzung: nächstes Blatt
vent motor soundproofing casing -M4: variant 2	-M4 . . ebm	895850.0 W3G400-ZN12-W1 380 V - 1150W - 1,90 A 460 V - 1150W - 1,60 A	895850.0 W3G400-ZN12-W1 380 V - 1150W - 1,90 A 460 V - 1150W - 1,60 A	895850.0 W3G400-ZN12-W1 380 V - 1150W - 1,90 A 460 V - 1150W - 1,60 A	895850.0 W3G400-ZN12-W1 380 V - 1150W - 1,90 A 460 V - 1150W - 1,60 A	895850.0 W3G400-ZN12-W1 380 V - 1150W - 1,90 A 460 V - 1150W - 1,60 A	
vent motor control cabinet	-M8 . . x	7.2751.00360 LV600 (Ruebsamen) 115 V/60 Hz, 1/N/PE 80W 0,70 A	7.2751.00360 LV600 (Ruebsamen) 115 V/60 Hz, 1/N/PE 80W 0,70 A	7.2751.00360 LV600 (Ruebsamen) 115 V/60 Hz, 1/N/PE 80W 0,70 A	895854.0 SK 3244.110 (Rittal) 230V/60 Hz, 1/N/PE 145W 1,25 A	895854.0 SK 3244.110 (Rittal) 230V/60 Hz, 1/N/PE 145W 1,25 A	Date 14.02.2023
line commutation reactor	-R1 Siemens	integrated ---	integrated ---	integrated (-T1) ---	integrated ---	integrated (-T1) ---	
Tape-wound core	-R3.1 -R3.2 Magnetec	7.8538.00020 (M113) 1x 7.8538.00020 (M113)	7.8538.00020 (M113) 1x 7.8538.00050 (M115)	7.8538.00020 (M113) 1x 7.8538.00050 (M115)	7.8538.00020 (M113) 1x 7.8538.00050 (M115)	7.8538.00020 (M113) 1x 7.8538.00050 (M115)	Drawn M.Zeeh
interference suppression filter	-R11 Siemens	integrated ---	integrated ---	integrated ---	integrated ---	integrated ---	
frequency converter	-T1 . . Siemens	7.8833.01170 6SL3210-1PE31-1AL0 7.7830.00710 6SL3244-0BB12-1BAx	7.8833.01180 6SL3210-1PE31-5AL0 7.7830.00710 6SL3244-0BB12-1BAx	7.8833.01190 6SL3210-1PE31-8AL0 7.7830.00710 6SL3244-0BB12-1BAx	7.8833.01200 6SL3210-1PE32-1AL0 7.7830.00710 6SL3244-0BB12-1BAx	7.8833.01210 6SL3210-1PE32-5AL0 7.7830.00710 6SL3244-0BB12-1BAx	Released M.Zeeh
transformer	-T12 . Block	7.2238.10090 USTE630 - 630 VA 208-600 V/2x 115 V+ 24 V	7.2238.10090 USTE630 - 630 VA 208-600 V/2x 115 V+ 24 V	7.2238.10090 USTE630 - 630 VA 208-600 V/2x 115 V+ 24 V	7.2238.10090 USTE630 - 630 VA 208-600 V/2x 115 V+ 24 V	7.2238.10090 USTE630 - 630 VA 208-600 V/2x 115 V+ 24 V	
motor cable	-W211 (EMV)	2/0 AWG / 4G70 mm² 600 V - 90°C EMV	3/0 AWG / 4G95 mm² 600 V - 90°C EMV	2x 1 AWG / 4G50 mm² 600 V - 90°C EMV	2x 2/0 AWG / 4G70 mm² 600 V - 90°C EMV	2x 3/0 AWG / 4G95 mm² 600 V - 90°C EMV	Phone
connection	-W280.1/2	1 AWG / 50 mm² 600 V - 90°C	2/0 AWG / 70 mm² 600 V - 90°C	3/0 AWG / 95 mm² 600 V - 90°C	2x 1 AWG / 50 mm² 600 V - 90°C	2x 2/0 AWG / 70 mm² 600 V - 90°C	

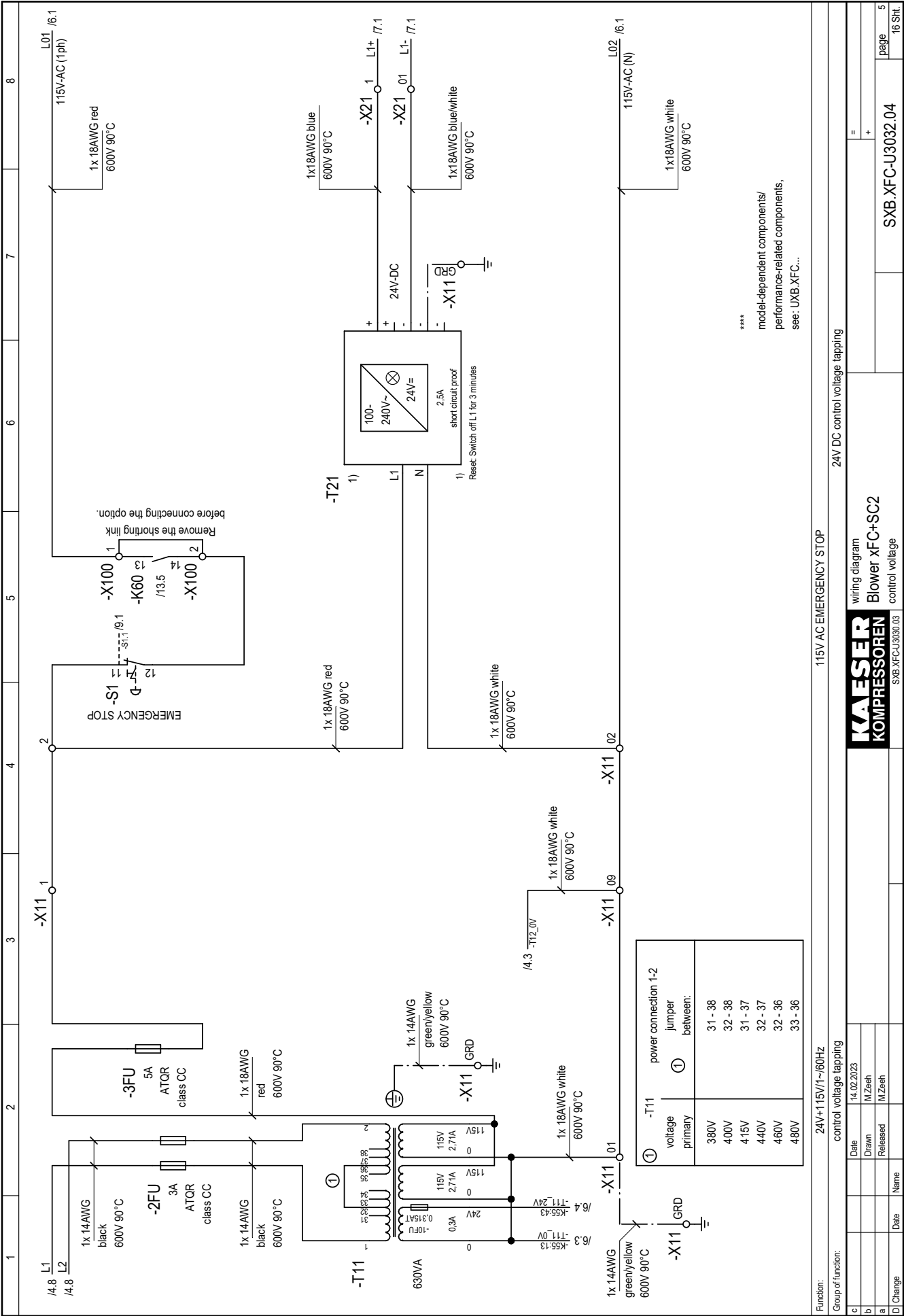
model		performance-related components					" + UXB.XFC-U3032.04		10 page 10 Sht.	
		60 hp FBS.2 (45 kW)	75 hp FBS.2 (55 kW)	100 hp FBS.2 (75 kW)	125 hp FBS.2 (90 kW)	150 hp FBS.2 (110 kW)				
machine power supply		380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz	380 V / 460 V - 60 Hz				
supply terminals		-X0: U1/V1/W1/GRD	3x 894385.0 3x 894385.00010 3x 894385.00040 4-4/0 AWG / 25-95 mm² Wago	3x 894385.0 3x 894385.00010 3x 894385.00040 4-4/0 AWG / 25-95 mm² Wago	3x 894385.0 3x 894385.00010 3x 894385.00040 4-4/0 AWG / 25-95 mm² Wago	6x 894385.0 3x 894385.00010 3x 894385.00040 4-4/0 AWG / 25-95 mm² Wago	6x 894385.0 3x 894385.00010 3x 894385.00040 4-4/0 AWG / 25-95 mm² Wago			
Handling		fig. 3, Sht. 13	fig. 3, Sht. 13	fig. 3, Sht. 13	fig. 3, Sht. 13	fig. 3, Sht. 13	fig. 3, Sht. 13			
Stripped length X		36 mm	36 mm	36 mm	36 mm	36 mm	36 mm			
connection		fig. 1, Sht. 15	fig. 1, Sht. 15	fig. 1, Sht. 15	fig. 2, Sht. 15	fig. 2, Sht. 15	fig. 2, Sht. 15			
supply										

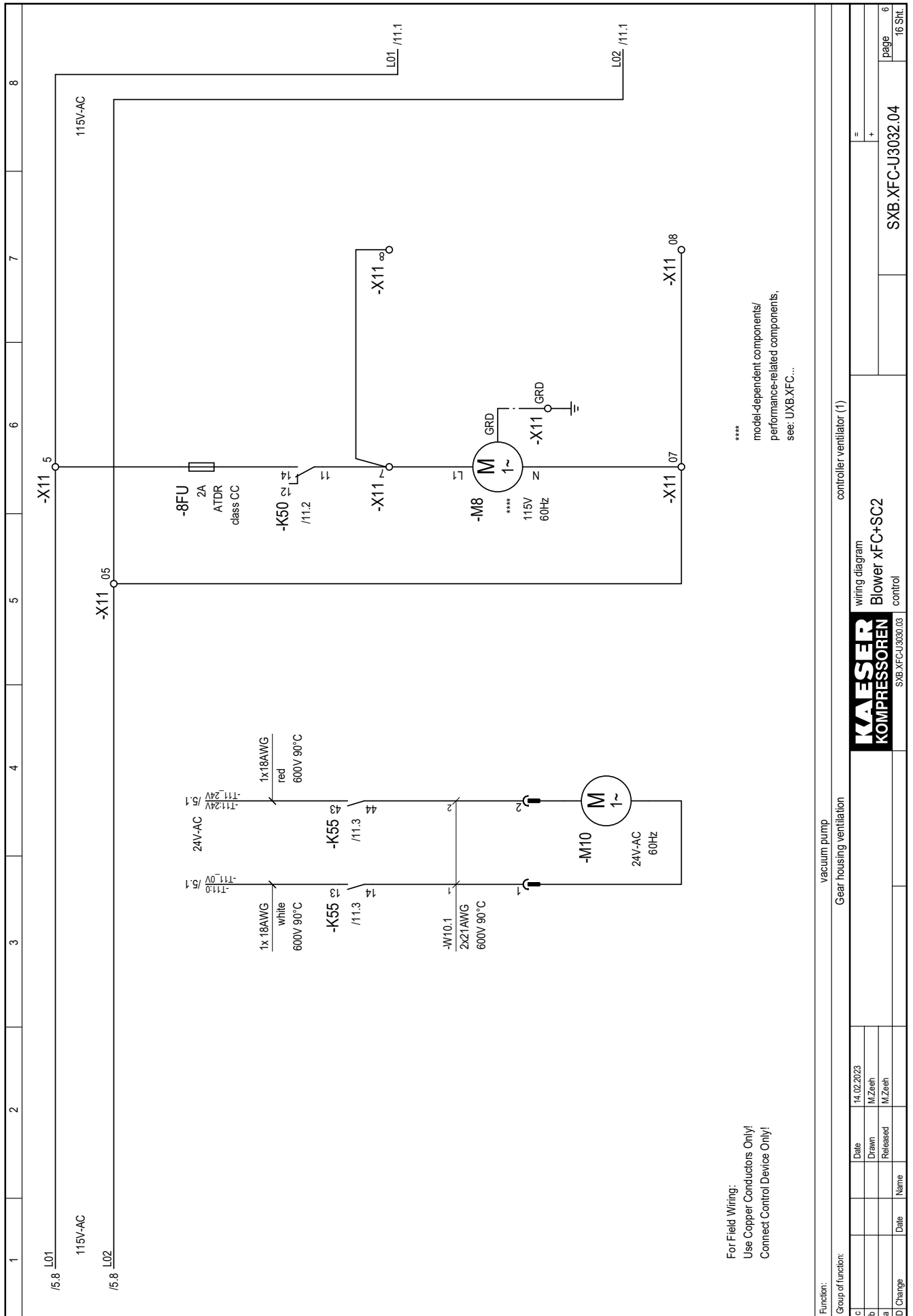


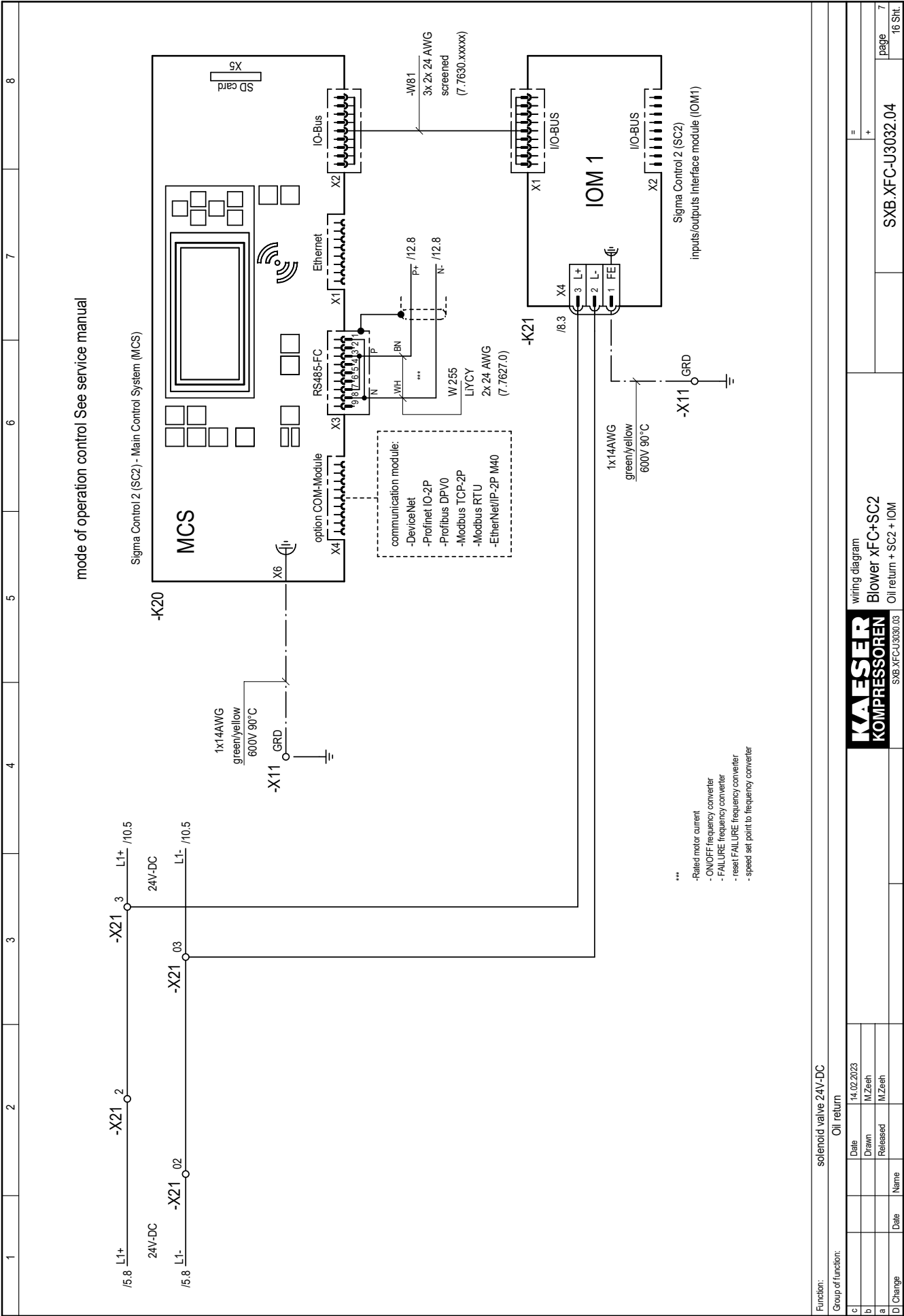












Function: solenoid valve 24V-DC

Group of function: Oil return

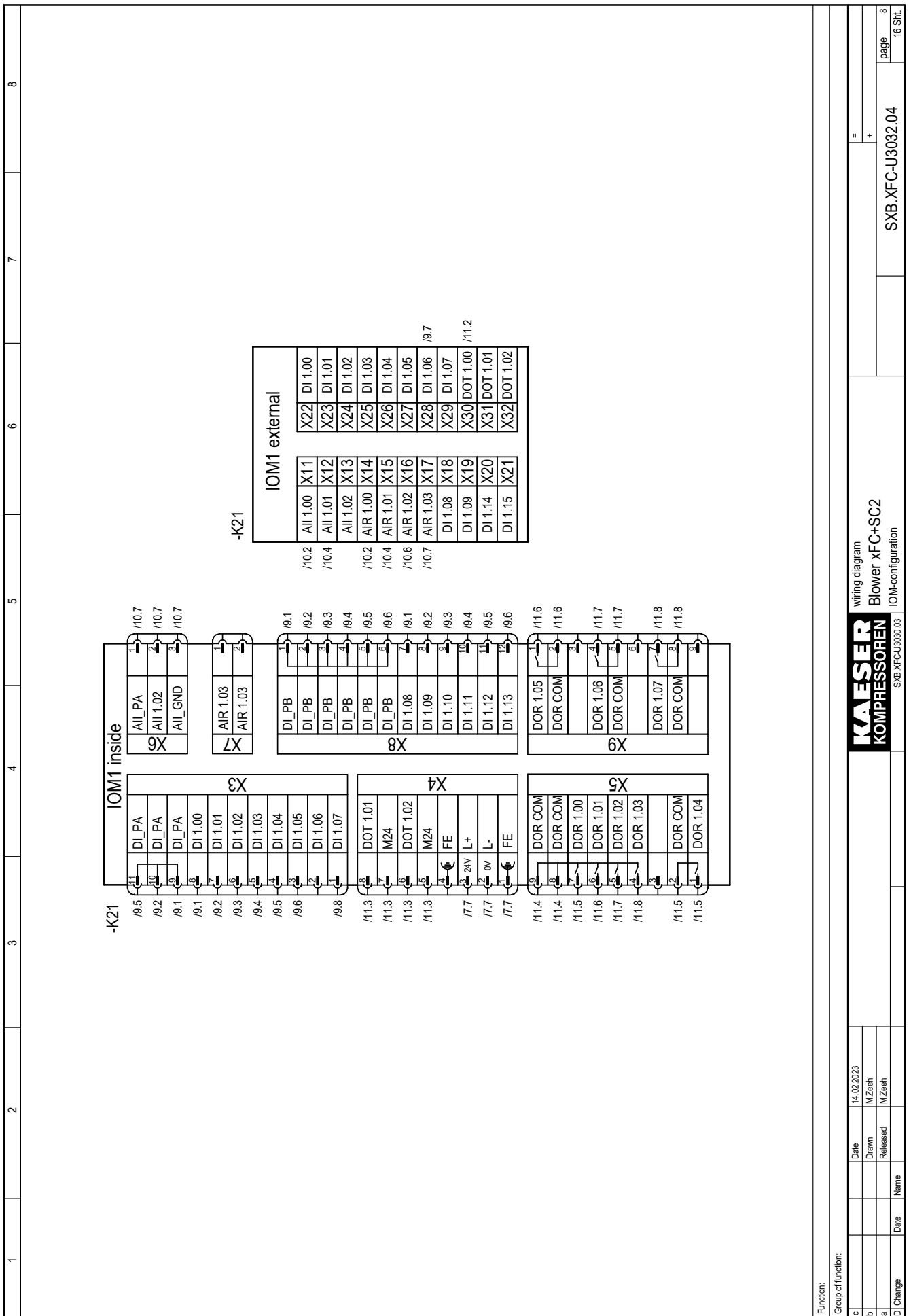
c				Date	14.02.2023
b				Drawn	M.Zeeth
a				Released	M.Zeeth
D	Change		Date	Name	

KAESER
KOMPRESSOREN
SXB.XFC-U3030.03

wiring diagram
Blower xFC+SC2
Oil return + SC2 + IOM

SXB.XFC-U3032.04

page 7
16 Sht.



X4

DOT 1.01	/11.3
M24	/11.3
DOT 1.02	/11.3
M24	/11.3
FE	/11.3
L+	/11.3
L-	/11.3
FE	/11.3

X5

DOR COM	/11.4
DOR COM	/11.4
DOR 1.00	/11.5
DOR 1.01	/11.6
DOR 1.02	/11.7
DOR 1.03	/11.8
DOR COM	/11.5
DOR 1.04	/11.5

-K21

Function:

Group of function:

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wiring diagram

Blower xFC+SC2

IOM-configuration

c

b

a

D Change

Date

14.02.2023

Drawn

M.Zeeth

Released

M.Zeeth

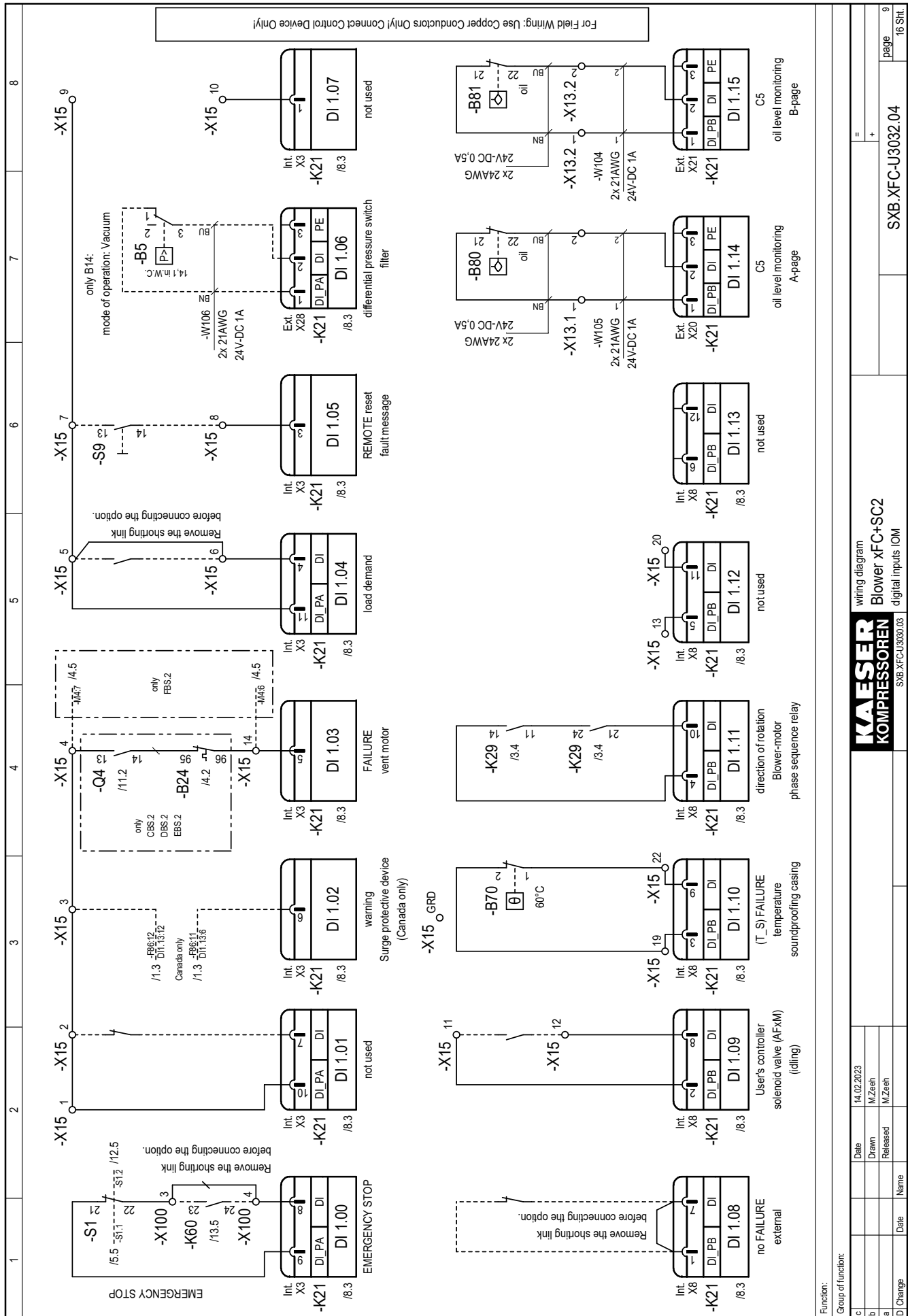
Name

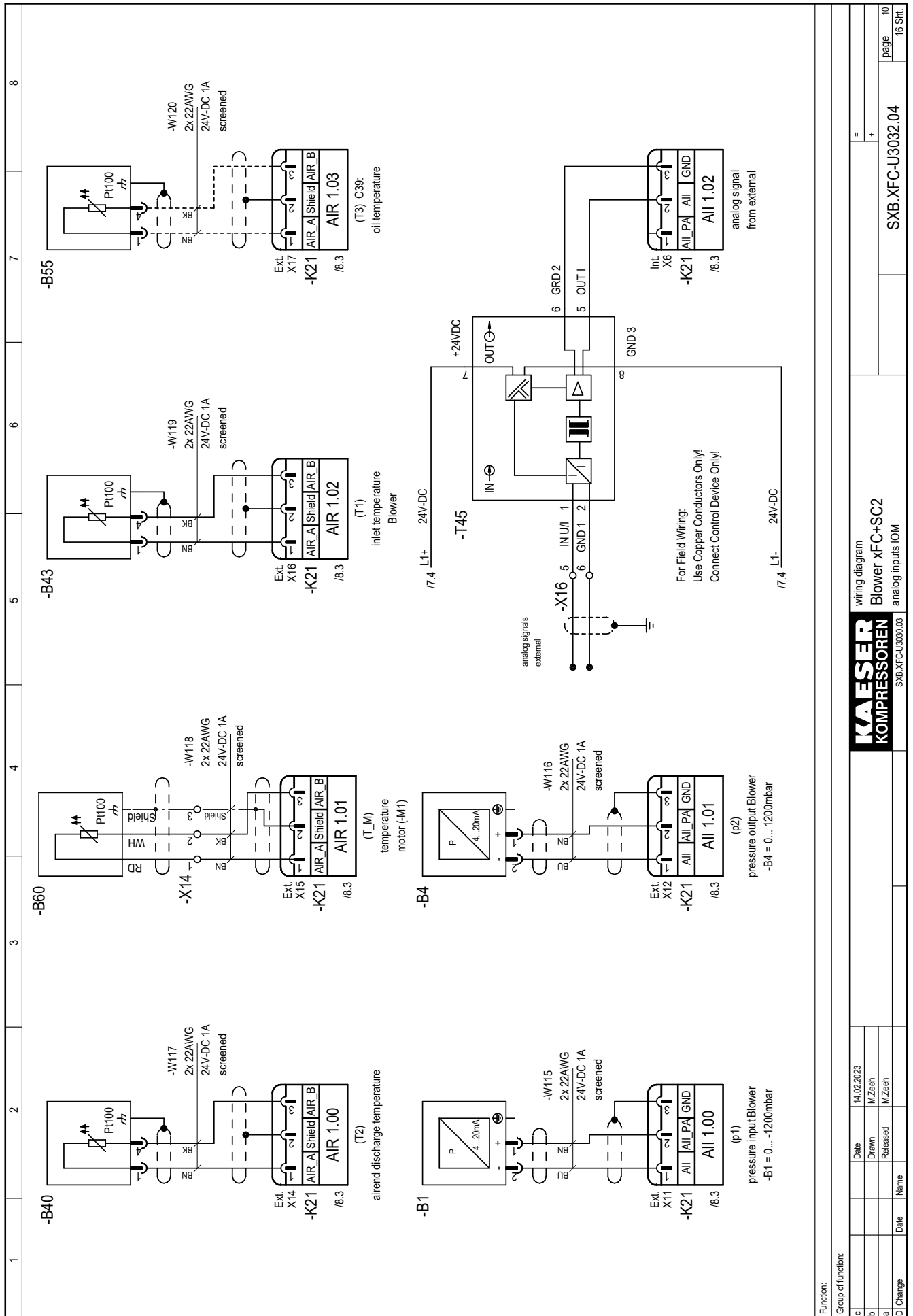
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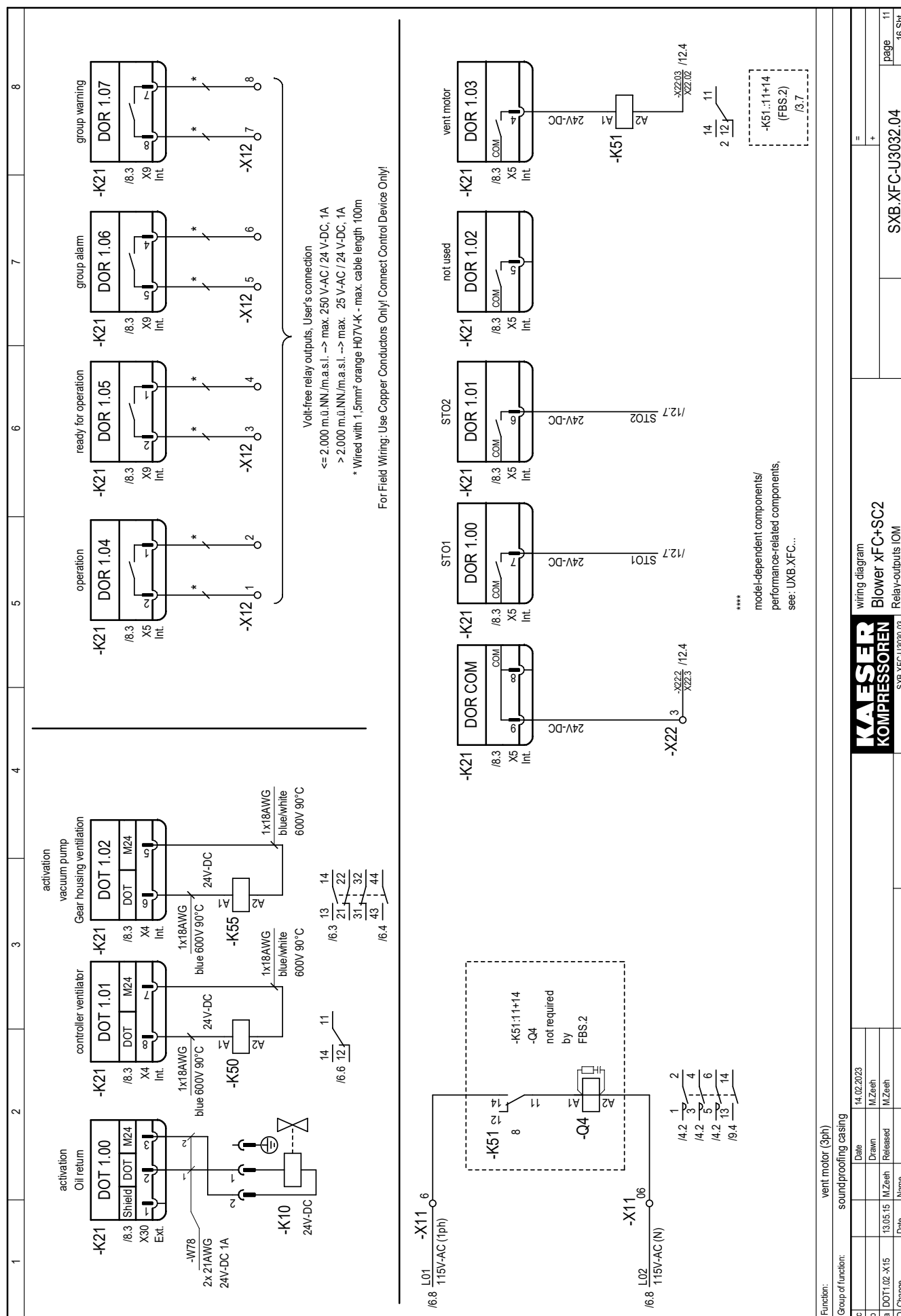
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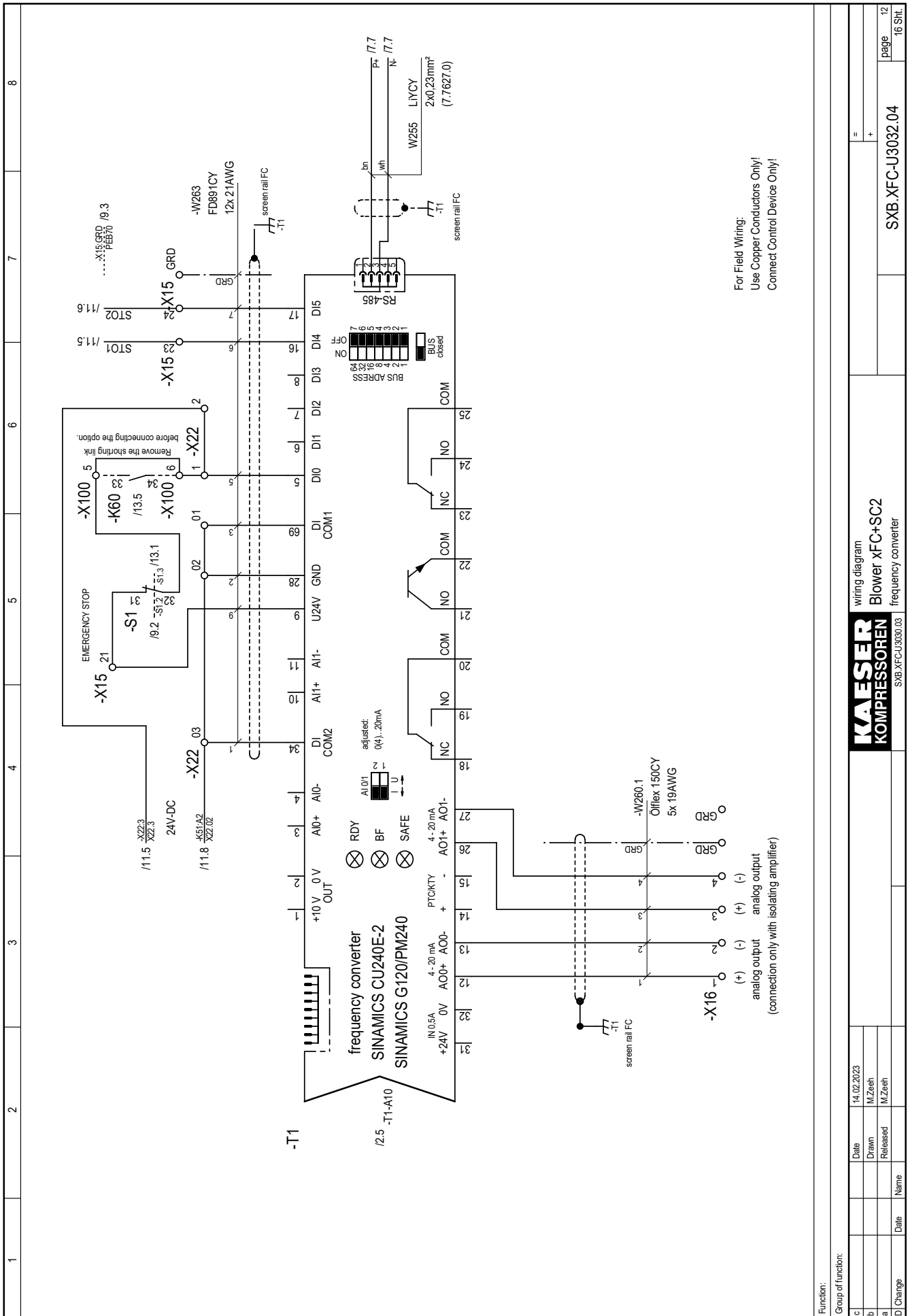
16 Sht.

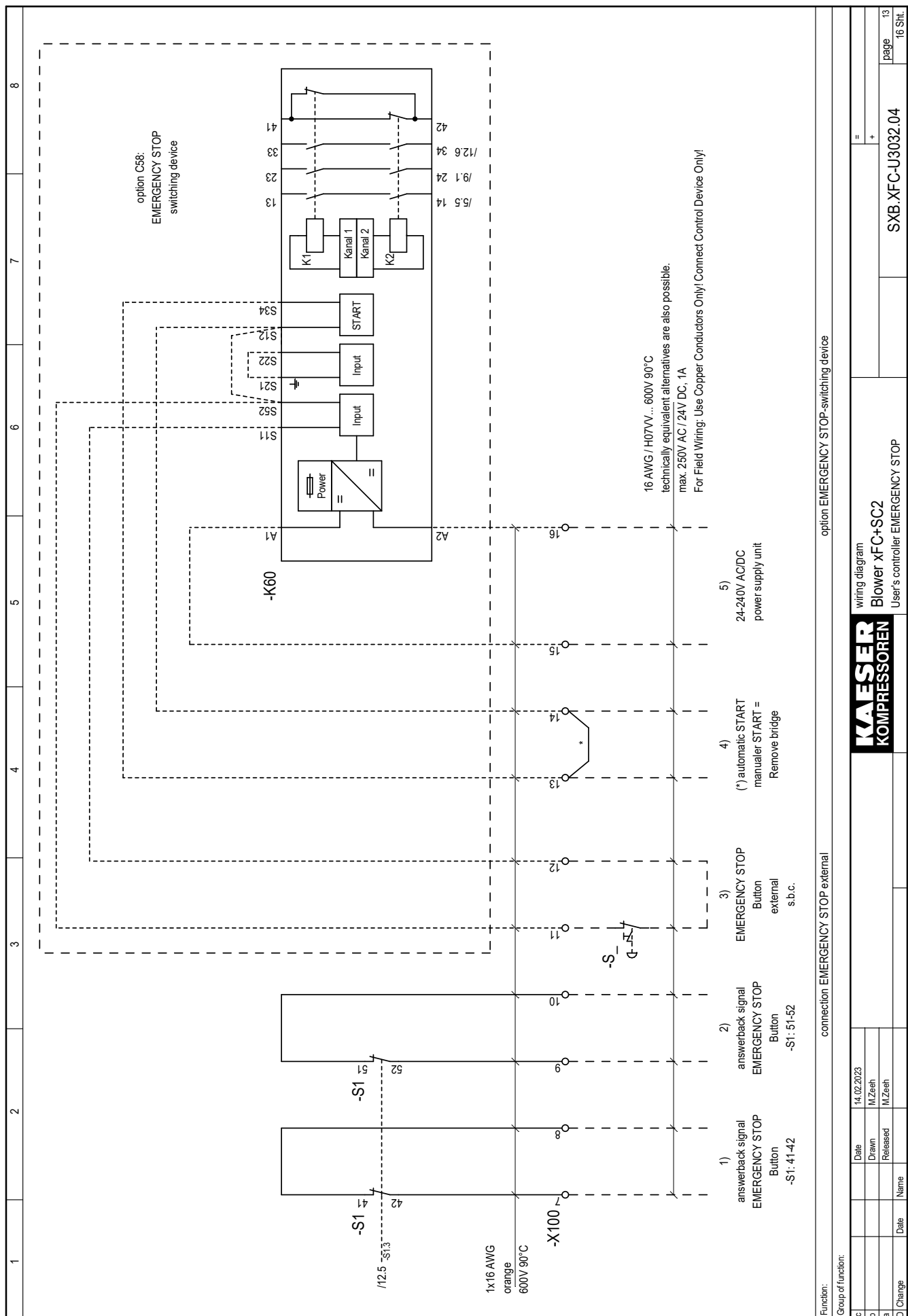
page 8











8

7

6

5

4

3

2

1

fig.: 1 Handling control line terminal

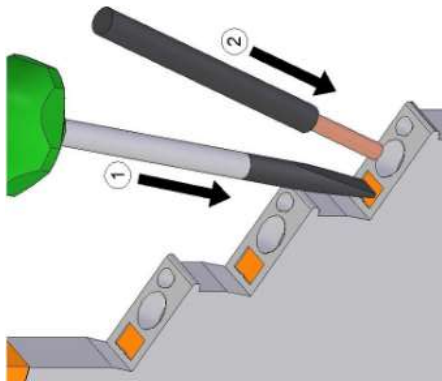


fig.: 2 Handling supply terminals

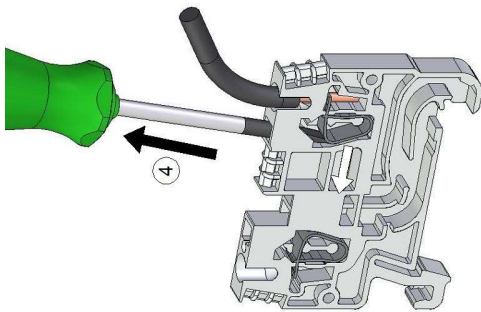
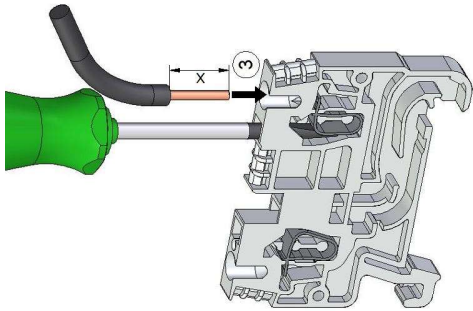
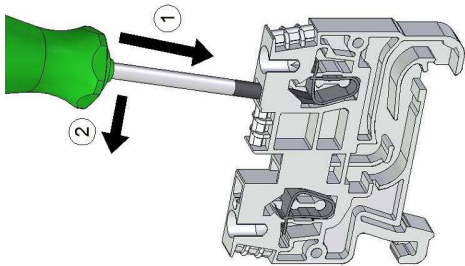
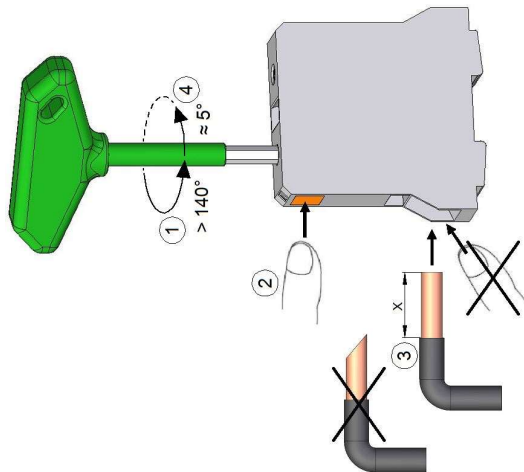


fig.: 3 Handling supply terminals



Function:

Group of function:

c	Date	14.02.2023
b	Drawn	M.Zeith
a	Released	M.Zeith
d	Change	

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wiring diagram
Blower xFC+SC2
Handling terminals

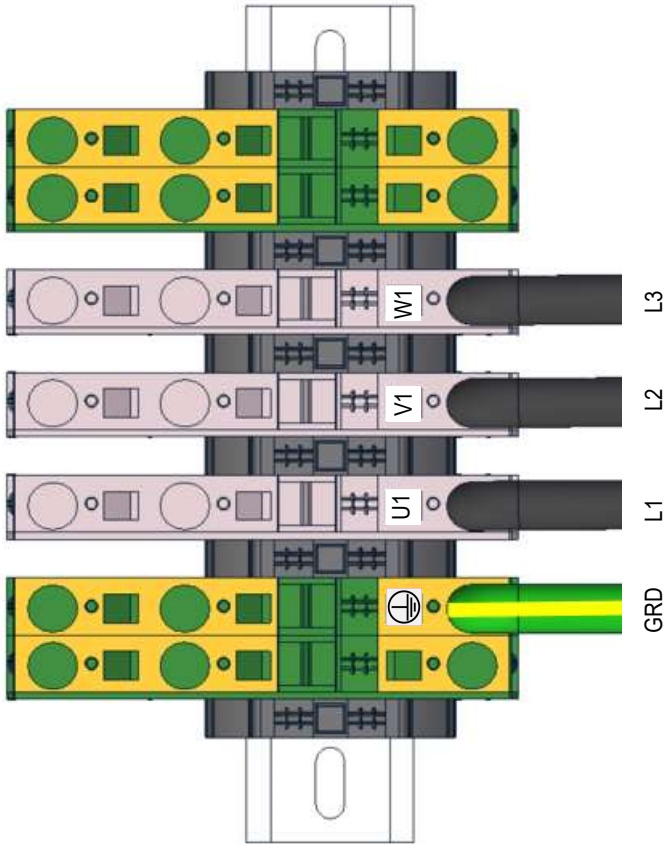
SXB.XFC-U3030.03

SXB.XFC-U3032.04

page 14
16 Sht.

1 2 3 4 5 6 7 8

fig.: 1 Feed line connection



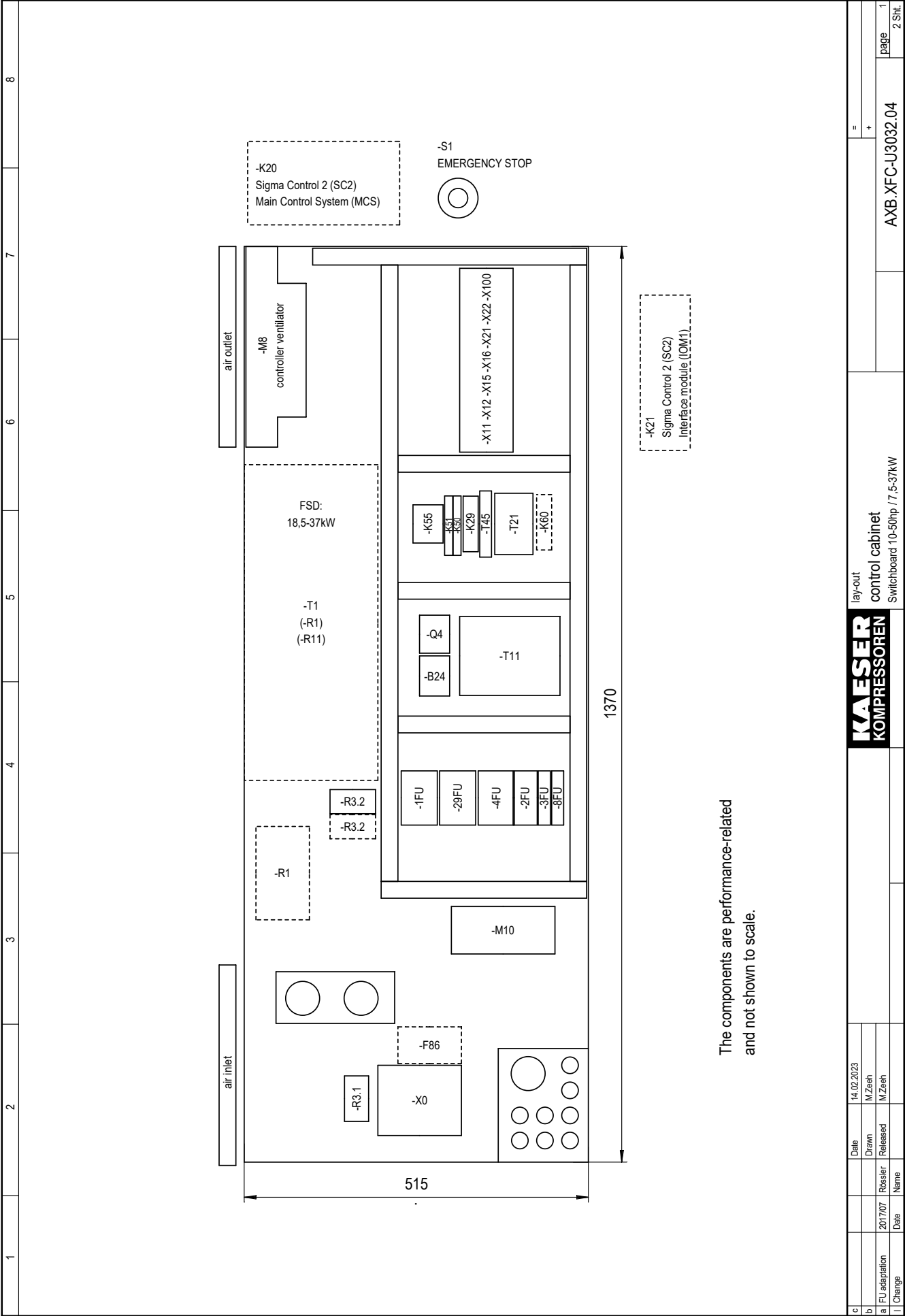
Function:				wiring diagram				=		+		page 15		16 Sht.	
Group of function:				Blower xFC+SC2				SX.B.XFC-U3032.04							
c			Date	14.02.2023											
b			Drawn	M.Zeeth											
a			Released	M.Zeeth											
D	Change		Date		Name										

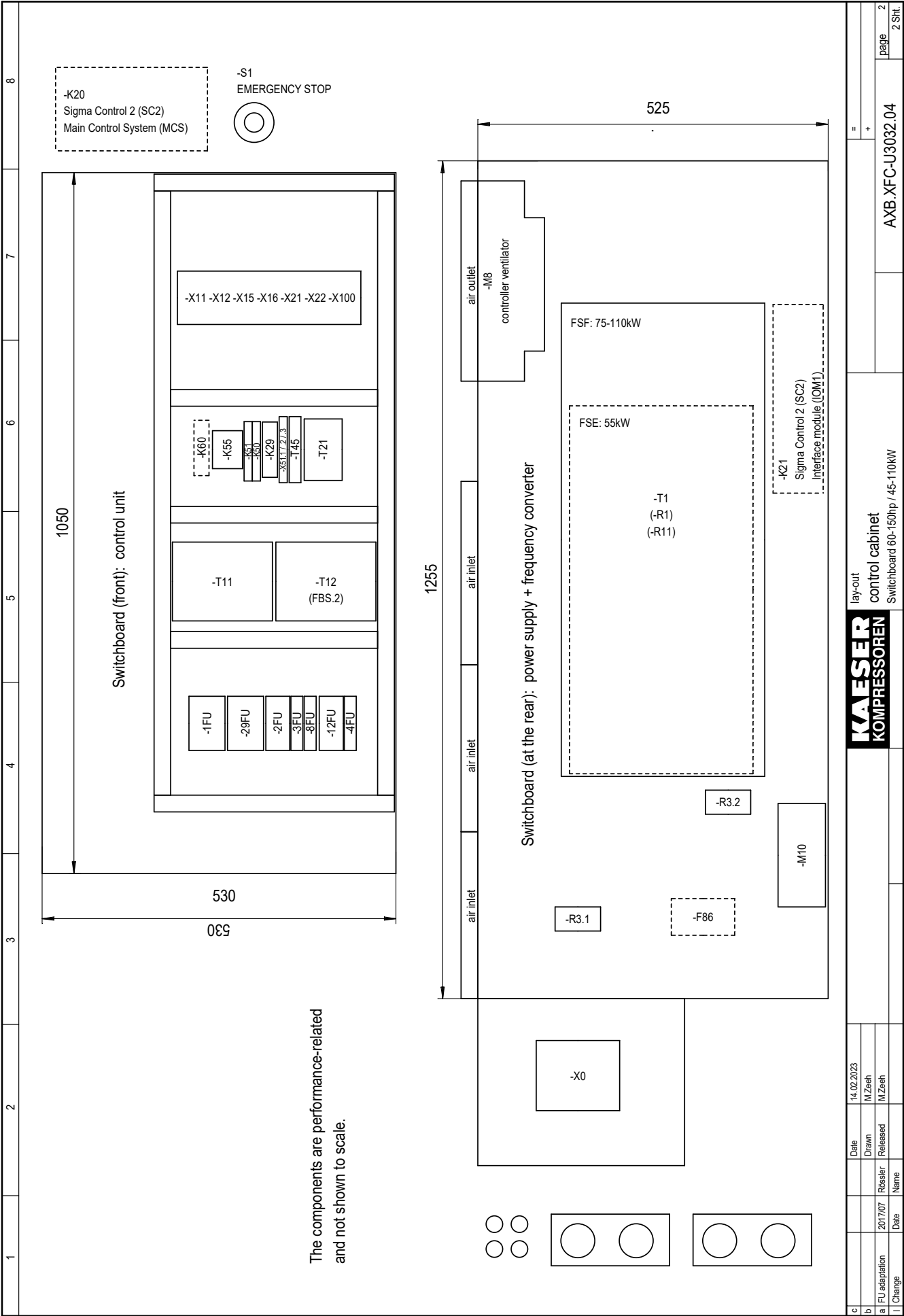


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13.4 Project planning data

