

SERVICE MANUAL

Screw Compressor

Model: CSD

No.: 9_5700_06E

Manufacturer:

KAESER KOMPRESSOREN GmbH

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1 Regarding this Document

1.1 Using the Document

The service manual is part of the machine.

- ✎ Keep the service manual in a safe place throughout the life of the machine.
- ✎ Pass the manual on to the next owner/user of the machine.
- ✎ Ensure that all amendments received are entered in the manual.
- ✎ Enter details from the machine nameplate and individual equipment in the table in chapter 2 "Technical Specifications".

1.2 Further Documents

Included with this service manual are documents intended to assist in the safe operation of the machine:

- certificate of acceptance / operating instructions for the pressure vessel,
- manufacturer's declaration or declaration of conformity in accordance with applicable directives,
- SIGMA CONTROL service manual.

✎ Make sure all documents are complete and take notice of the their contents.

Request the supply of any missing documents from KAESER.

Make sure you give the data from the nameplate.

1.3 Copyright

This service manual is copyright protected. Please contact KAESER if you have any queries regarding the use and duplication of this documentation. We will gladly help you in the appropriate use of the information.

1.4 Symbols and Identification

1.4.1 Warnings



DANGER

Here are given the type and source of the danger.

The possible consequences of ignoring a hazard warning are shown here. The word 'DANGER' means that death or severe injury can result if the warning notice is ignored.

- ✎ Here are given the measures to protect yourself from the danger.
- ✎ Always read and comply with warning notices.

Danger levels

Warning notices indicate three levels of danger identified by the signal word under the danger symbol.

Signal word	Meaning	Consequences of ignoring
DANGER	Warning of an imminent threat of danger	Death or serious injury may result.
WARNING	Warning of possible danger	Death or severe injury or serious damage to the machine is possible.
CAUTION	Warning of a possibly dangerous situation.	Light injury or material damage is possible.

1.4.2 Other notices and symbols

This symbol indicates a task to be carried out.



This symbol identifies environmental protection measures.




This symbol indicates particularly important information.

2 Technical Specification

Model designation and important technical information is found on the machine's nameplate. The nameplate is located on the outside of the machine:

- above the cooler, or
- on the rear of the machine.

 Please enter here the data from the nameplate:

Model	
Material (part) no.	
Serial no.	
Year of manufacture	
Rated power	
Motor speed	
Maximum working pressure	
Ambient temperature	

Tab. 1 Nameplate

A summary of the included options helps to relate the service manual information to your machine.

Please enter details of options.

Option	Code	Exists
Air cooling	K1	
Water cooling	K2	
Cooling air filter mat	K3	
Machine mountings	H1	
Prepared for heat recovery	W1	
Internal heat recovery $\Delta T = 25K$	W2	
Internal heat recovery $\Delta T = 55K$	W3	
Modulating control	C1	
Transformer power supply for refrigeration dryer	T2	

Tab. 2 Options

2.1 Weight

Maximum weights are shown. Actual weights of individual machines are dependent on equipment fitted.

	CSD 82	CSD 102	CSD 122
Weight [kg]	1300	1350	1400

Tab. 3 Machine weights

2.2 Temperature

	CSD 82	CSD 102	CSD 122
Minimum cut-in temperature [°C]	3	3	3
Typical airend discharge temperature during operation [°C]	75 – 100	75 – 100	75 – 100
Max. airend discharge temp. (automatic shut-down) [°C]	110	110	110

Tab. 4 Machine temperatures

2.3 Ambient Conditions

	CSD 82	CSD 102	CSD 122
Maximum elevation [m]	1000	1000	1000
Ambient temperature [°C]	3 – 45	3 – 45	3 – 45
Inlet air / cooling air temperature [°C]	3 – 45	3 – 45	3 – 45
Maximum relative inlet air humidity at 31 °C [%]	100	100	100
Maximum relative inlet air humidity at 45 °C [%]	50	50	50

* Higher elevation permissible only after consultation with the manufacturer

Tab. 5 Ambient Conditions

2.4 Pressure

See nameplate for maximum working pressure

Maximum working pressure [bar]	Blow-off setting of the pressure relief valve [bar]		
	CSD 82	CSD 102	CSD 122
8	11.5	11.5	11.5
8.5	11.5	11.5	11.5
11	14	14	14
12	16	16	16
15	16	16	16

Tab. 6 Pressure relief valve setting

2.5 Free air delivery

Supply frequency 50 Hz

Maximum working pressure [bar]	Delivery [m³/min]		
	CSD 82	CSD 102	CSD 122
8	8.3	10.1	12.0
11	6.9	8.2	10.0
15	5.4	6.6	8.0

Tab. 7 Delivery (50 Hz)

Supply frequency 60 Hz

Maximum working pressure [bar]	Delivery [m ³ /min]		
	CSD 82	CSD 102	CSD 122
8.5	8.4	10.0	12.0
12	6.6	8.3	9.9
15	5.3	6.5	8.2

Tab. 8 Delivery (60 Hz)
2.6 Sound Pressure Level

Operational state

- under load at rated speed, rated delivery and rated pressure.

Measuring conditions:

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

	CSD 82	CSD 102	CSD 122
Sound pressure level (50Hz) [dB(A)]	69	69	71
Sound pressure level (60Hz) [dB(A)]	70	70	72

Tab. 9 Sound Pressure Level
2.7 Motor and Performance
2.7.1 Compressor motor:

	CSD 82	CSD 102	CSD 122
Rated power [kW]	45	55	75
Rated speed [rpm] (50 Hz)	2965	2965	2978
Rated speed [rpm] (60 Hz)	3568	3568	3580
Enclosure protection	IP 55	IP 55	IP 55
Motor bearing greasing [operating hours]	2000	2000	2000
Grease requirement, each bearing [g]*			

* Transfer data from motor nameplate to the table

Tab. 10 Compressor motor data
2.7.2 Fan Motor
Air cooling (option K1)

	CSD 82	CSD 102	CSD 122
Rated power [kW]**	1,1 / 1,1	1,1 / 1,1	1,5 / 1,1
Nominal speed [rpm]**	940/1120	940/1120	930/1120
Enclosure protection	IP 54	IP 54	IP 54
Motor bearing greasing [operating hours]**	– / –	– / –	2000 / –
Grease requirement, each bearing [g]**	– / –	– / –	3 / –

** 50/60 Hz

Tab. 11 Fan motor data (option K1)

Water Cooling (option K2)

	CSD 82	CSD 102	CSD 122
Rated power [kW]**	0,12 / 0,17	0,12 / 0,17	0,12 / 0,17
Nominal speed [rpm]**	2500 / 2700	2500 / 2700	2500 / 2700
Enclosure protection	IP 54	IP 54	IP 54

** 50/60 Hz

Tab. 12 Fan motor data (option K2)

2.8 Cooling oil

Ordering: see 'Spare Parts, Operating Materials, Service' chapter 11.

2.8.1 Recommended cooling oil

A sticker showing the type of oil filled is to be found near the oil separator filling port.

	SIGMA FLUID PLUS / S-460	SIGMA FLUID MOL	SIGMA FLUID FGL / FGH
Description	Synthetic oil	Mineral oil	Synthetic oil
Application:	Standard oil for all applications except in connection with foodstuff.	Standard oil for all applications except in connection with foodstuff. Especially suitable for lightly utilized machines.	Specially for use in compressors where the air comes in direct contact with foodstuff.
Authorization	—	—	USDA H-1, NSF Approved for the manufacture of foodstuff packaging, meat and poultry processing and other food processing.
Viscosity at 40 °C	70 mm ² /s (DIN 51562-1) / 45 mm ² /s (D 445; ASTM test)	44 mm ² /s (DIN 51562-1)	50.7 / 70 mm ² /s (D 445; ASTM test)
Viscosity at 100 °C	10.6 mm ² /s (DIN 51562-1) / 7,2 mm ² /s (D 445; ASTM test)	6.8 mm ² /s (DIN 51562-1)	8.2 / 10.4 mm ² /s (D 445; ASTM test)
Flash point	260 °C (ISO 2592) / 238 °C (D 92; ASTM test)	220 °C (ISO 2592)	254 °C (D92; ASTM test)
Density at 15 °C	843 / 864 kg/m ³ (ISO 12185)	—	—
Pour point	-39 °C (ISO 3016) / -46 °C (D 97; ASTM test)	-33 °C (ISO 3016)	—
Demulsibility at 54 °C	30 min (ISO 6614) / 40/40/0/10 min (D1401; ASTM-Test)	—	—

Tab. 13 Recommended cooling oil

2.8.2 Cooling Oil Volumes

	CSD 82	CSD 102	CSD 122
Total charge [l] (option K1)	36	36	36
Total charge [l] (option K2)	28	28	28
Top-up volume [l] (minimum – maximum)	4	4	4
Additional volume [l] (option W2)	4	4	4
Additional volume [l] (option W3)	3	3	3
Additional volume [l] (option W1) *			

* Input the additional volume corresponding to your heat recovery system.

Tab. 14 Cooling oil volumes

2.9 Electrical Connection

See electrical diagrams in chapter 13.1.4.

2.9.1 Power supply

The machine is designed for an electrical supply in accordance with EN60204–1 (IEC 204–1), section 4.3. In the absence of user-specified alternatives, the limits given in this standard must be adhered to. It is recommended that the supplier and user confer and agree on the basis of EN60204–1, annex B.

The machine requires a symmetrical three-phase power supply.

In a symmetrical three-phase supply the phase angles and voltages are all the same.

General requirements

The machine may only be operated from an earthed TN or TT three-phase supply.

Connection to an IT supply is not permitted without further measures (insulation monitoring).

Further requirements

Further requirement for the three-phase supply apply to machines with:

- frequency-controlled drive,
- integrated refrigeration dryers powered from a transformer,
- separate refrigeration dryers powered from a transformer.

The machine may only be connected to earthed TN and TT three-phase mains supplies where the star point is earthed.

The machine may not be connected to a three-phase supply where one of the phases is earthed as this can lead to dangerous voltage surges.

Connection to an IT supply is not permitted without further measures (insulation monitoring, specially designed frequency converter, etc.).

2.9.2 Power supply specifications

The following conductor cross-sections (multicore Cu) and fusing (HRC fuse slow-blow) are given according to VDE 0100, parts 430 and 523, for ambient temperatures of 30° C and laying method C. If other conditions prevail (higher temperature, non-standard cable laying or cable lengths above 50 m) the cross-section should be checked and adjusted accordingly.

Rated power supply 230V ±10%, 3-ph, 50Hz

	CSD 82	CSD 102	CSD 122
Mains fuses [A]	200	224	–
Supply cable [mm ²]	4 x 95	4 x 120	–

	CSD 82	CSD 102	CSD 122
Power consumption [A] (option K1)	154	189	–
Power consumption [A] (option K2)	151	185	–

*Tab. 15 Power supply details 230V/3/50Hz***Rated power supply 400V ±10%, 3–ph, 50Hz**

	CSD 82	CSD 102	CSD 122
Mains fuses [A]	100	125	160
Supply cable [mm ²]	4 x 35	4 x 50	4 x 70
Power consumption [A] (option K1)	89	108	139
Power consumption [A] (option K2)	87	107	136

*Tab. 16 Power supply details 400V/3/50Hz***Rated power supply 230V ±10%, 3–ph, 60Hz**

	CSD 82	CSD 102	CSD 122
Mains fuses [A]	200	224	–
Supply cable [mm ²]	4 x 95	4 x 120	–
Power consumption [A] (option K1)	160	191	–
Power consumption [A] (option K2)	151	185	–

*Tab. 17 Power supply details 230V/3/60Hz***Rated power supply 380V ±10%, 3–ph, 60Hz**

	CSD 82	CSD 102	CSD 122
Mains fuses [A]	125	125	160
Supply cable [mm ²]	4 x 50	4 x 50	4 x 70
Power consumption [A] (option K1)	99	114	148
Power consumption [A] (option K2)	97	112	145

*Tab. 18 Power supply details 380V/3/60Hz***Rated power supply 440V ±10%, 3–ph, 60Hz**

	CSD 82	CSD 102	CSD 122
Mains fuses [A]	100	125	160
Supply cable [mm ²]	4 x 35	4 x 50	4 x 70
Power consumption [A] (option K1)	84	102	124
Power consumption [A] (option K2)	82	100	122

*Tab. 19 Power supply details 440V/3/60Hz***Rated power supply 460V ±10%, 3–ph, 60Hz**

	CSD 82	CSD 102	CSD 122
Mains fuses [A]	100	125	160
Supply cable [mm ²]	4 x 35	4 x 50	4 x 70
Power consumption [A] (option K1)	80	97	119
Power consumption [A] (option K2)	79	95	117

Tab. 20 Power supply details 460V/3/60Hz

2.10 Water cooling (option K2)

2.10.1 Design data

Cooling water temperature rise 10 K

	CSD 82	CSD 102	CSD 122
Max. permissible inlet temperature [°C]	40	40	40
Cooling water volume [m ³ /h]	4.4	5.4	6.3
Water pressure drop [bar]	1.2	1.7	2.4

Tab. 21 Water cooling design data (10 K)

Cooling water temperature rise 30 K

	CSD 82	CSD 102	CSD 122
Max. permissible inlet temperature [°C]	20	20	20
Cooling water volume [m ³ /h]	1.5	1.8	2.1
Water pressure drop [bar]	0.5	0.5	0.5

Tab. 22 Water cooling design data (30 K)

Cooler specification

Material of manufacture	1.4401
Solder	Copper
Maximum working pressure (cooling water end) [bar]	10
UNsuitable cooling medium	Seawater Consult Kaeser before using cooling water solutions
Max. permissible discharge temperature [°C]	70

Tab. 23 Cooler specification; water cooling

2.10.2 Cooling Water Quality



Do not use the cooling water as drinking water.
If a leak occurs, oil can contaminate the cooling water.

It is imperative that measures for cooling water treatment and filtration are carried out.

The addresses of companies specialising in cooling water analysis and the supply of suitable equipment for its treatment can be obtained from KAESER.

To avoid operational breakdowns caused by a corroded or clogged cooler, the cooling water must meet the following requirements:

pH value	7.5 to 9
Hardness [dH]	4,0–8,5
Chloride (Cl) [mg/l]	< 150
Free chlorine gas (Cl ₂) [mg/l]	< 1
Sulphate (SO ₃) [mg/l]	< 1

Dissolved iron (Fe) [mg/l]	< 0.2
Hydrogen carbonate (HCO ₃) [mg/l]	70–300
Sulphate (SO ₄) [mg/l]	< 70
HCO ₃ / SO ₄	> 1
Electrical conductivity [μS/cm]	10–500
Ammonia (NH ₃) [mg/l]	< 2
Dissolved magnesium (Mn) [mg/l]	< 0,1
Dissolved aluminium (Al) [mg/l]	< 0,2
Nitrate (NO ₃), dissolved [mg/l]	< 100
Hydrogen sulphate (SO ₂) [mg/l]	< 0,05
Free aggressive carbon dioxide (CO ₂) [mg/l]	< 5
Glycol [%]	< 50
Solids (particle size) [mm]	< 0,1
Algae	not allowed

Tab. 24 Cooling Water Quality

2.11 Heat Recovery

2.11.1 Prepared for heat recovery (option W1)

Connections for an external heat recovery system are provided.

Heat capacity

	CSD 82	CSD 102	CSD 122
Max. heat capacity available [kW]	40.3	49.4	58.1
Max. heat capacity available [MJ/h]	145	178	209
Max. heat capacity available [kcal/h]	34669	42511	49940

Tab. 25 Heat capacity (option W1)

2.11.2 Internal Heat Recovery (option W2 / W3)

A plate heat exchanger is installed for heat recovery.

Generally water is used as the heat transfer medium. This must conform to the specification given below.



The water may not be used as drinking water.
If a leak occurs, oil can contaminate the cooling water.

The manufacturer should be consulted before another type of heat transfer medium is used.

Water Quality Specification

pH value	7.5 to 9
Hardness [° dH]	4.0–8.5
Chloride (Cl) [*] [mg/l]	< 150
Free chlorine gas (Cl ₂) [mg/l]	< 1
Sulphate (SO ₃) [mg/l]	< 1
Dissolved iron (Fe) [mg/l]	< 0.2

Hydrogen carbonate (HCO ₃) [mg/l]	70–300
Sulphate (SO ₄) [mg/l]	< 70
HCO ₃ / SO ₄	> 1
Electrical conductivity [μ S/cm]	10–500
Ammonia (NH ₃) [mg/l]	< 2
Dissolved magnesium (Mn) [mg/l]	< 0.1
Dissolved aluminium (Al) [mg/l]	< 0.2
Nitrate (NO ₃), dissolved [mg/l]	< 100
Hydrogen sulphate (SO ₂) [mg/l]	< 0.05
Free aggressive carbon dioxide (CO ₂) [mg/l]	< 5
Glycol [%]	< 50
Solids (particle size) [mm]	< 0.1
Algae	not allowed

Tab. 26 Water Quality Specification



If the heat transfer medium outlet temperature is to be kept constant, the user must install an appropriate regulating device.

Heat Exchanger Specification

	CSD 82	CSD 102	CSD 122
Maximum working pressure of the heat transfer medium [bar]	10	10	10
Pressure drop [bar]	< 0.1	< 0.1	< 0.1
Plate material	1.4401	1.4401	1.4401
Solder	Cu	Cu	Cu
Maximum permissible temperature of the heat transfer medium [°C]	100	100	100

Tab. 27 General specification of the heat exchanger

Flow rate and heat capacity by heating from 45° C to 70° C (equivalent to $\Delta T = 25$ K), (Option W2)

	CSD 82	CSD 102	CSD 122
Flow rate [m ³ /h]	1.39	1.70	2.00
Max. heat capacity available [kW]	40.3	49.4	58.1
Max. heat capacity available [MJ/h]	145	178	209
Max. heat capacity available [kcal/h]	34669	42511	49940

Tab. 28 Flow rate and heat available (option W2)

Flow rate and heat capacity by heating from 15° C to 70° C (equivalent to $\Delta T = 55$ K), (option W3)

	CSD 82	CSD 102	CSD 122
Flow rate [m ³ /h]	0.63	0.77	0.91
Max. heat capacity available [kW]	40.3	49.4	58.1
Max. heat capacity available [MJ/h]	145	178	209
Max. heat capacity available [kcal/h]	34669	42511	49940

Tab. 29 Flow rate and heat available (option W3)

3 Safety and Responsibility



Disregard of these instructions can result in serious injury.

DANGER

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

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

- Danger to life and limb of the operator or third parties
 - Detrimental to the machine and property.
- ☞ Use this machine only if it is in a technically perfect condition and only for the purpose for which it is intended, observing all safety measures and the instructions in the service manual.
 - ☞ In particular, immediately rectify (have rectified) any faults that could be detrimental to safety.

3.1 Specified Use

- The machine is intended solely for industrial use in generating compressed air. Any other use is considered incorrect. The manufacturer is not liable for any damages resulting from such unspecified use or application. The risk involved in such unspecified use is taken solely by the user.
 - Specified use also includes compliance with the instructions in this manual.
- ☞ Operate the machine only within its performance limits and under the permitted ambient conditions.

3.2 Unspecified Use

- ☞ Never direct compressed air at persons or animals.
- ☞ Do not use untreated compressed air for breathing purposes.
- ☞ Do not use untreated compressed for any application that will bring it into direct contact with foodstuffs.
- ☞ Cooling air, warmed after passing through the machine, may be used for heating purposes but only when it poses no health risk to humans or animals. If necessary, the warmed cooling air should be treated to render it harmless.
- ☞ Do not allow the machine to take in toxic, acidic, flammable or explosive gases or vapours.
- ☞ Do not operate the machine in areas in which specific requirements with regard to explosion protection are applied.

3.3 User's Responsibilities

Observe statutory and accepted regulations

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

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

3.3.1 **Qualified personnel**

Ensure that operating, installation and maintenance personnel are qualified and authorised for their tasks.

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

Operating personnel

Authorised operating personnel:

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

Installation and maintenance personnel

Authorised installation and maintenance personnel:

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

3.3.2 Adherence to inspection schedules and accident prevention regulations

The machine is subject to local inspection schedules.

Operation in Germany, for example:

- recurring inspections to BGR 500, chapter 2.11:

The user must ensure that the safety devices of the machine are subject to function checks as required but at least annually.

- Oil changes to BGR 500, chapter 2.11:

The user must have the compressor oil changed as required but at least annually and this must be documented. This requirement may be waived if analysis proves the oil to be further usable.

- Inspection schedule in accordance with operating safety regulations and with the strictest according to §15.

Inspection	Schedule	Inspecting authority
Installation and equipping	before initial start-up	approved supervisory board
Internal inspection	every 5 years after installation or the last inspection	approved supervisory board
Strength test	every 10 years after installation or the last inspection	approved supervisory board

Tab. 30 *Inspection schedule for Germany*

3.4 Safety Devices

Do not change, bypass or disable safety devices.

Do not remove or obliterate labels and notices.

Ensure that labels and notices are clearly legible.

More information on safety devices is contained in chapter 4 'Design and Function', section 4.4 'Safety Devices'.

3.5 Dangers

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

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

3.5.1 Awareness of danger sources

Here are to be found the various types of danger that can arise in connection with machine operation.

Electricity

- ☞ Allow only qualified electricians or trained personnel under the supervision of a qualified electrician to work on electrical equipment according to electrical engineering regulations.
- ☞ Before initial start-up, make sure that adequate protection against electric shock from direct or indirect contact with the machine is installed and checked.
- ☞ Isolate all phases of the main power supply.
- ☞ Check that there is no voltage present.
- ☞ Switch off any external power sources.
These can be, for example, power supplied through a volt-free (dry) contact or electrical machine heating.
- ☞ Use fuses corresponding to the machine power.
- ☞ Regularly check that all electrical connections are tight.

Pressure forces

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

Before all work on a pressure system:

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

Compressed air quality

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

Spring forces

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

Minimum pressure/check valves, pressure relief valves and inlet valves are powerfully spring-loaded.

- ✎ Do not open or dismantle valves.

Rotating components

Touching the fan wheel, the coupling or the belt drive while the machine is switched on can result in serious injury.

- ✎ Do not open the enclosure while the machine is switched on.
- ✎ Isolate all phases of the main power supply.
- ✎ Check that there is no voltage present.
- ✎ Wear close-fitting clothes and a hair net if necessary.
- ✎ Make sure all covers and safety guards are in place and secured before switching on.

Temperature

- ✎ Avoid contact with hot components.
These include, for example, compressor airends or blocks, oil and compressed air lines, coolers, oil separator tanks, motors and machine heaters.
- ✎ Wear protective clothing.
- ✎ When welding is taking place on or near the machine take adequate measures to ensure that no parts of the machine or any oil vapours can ignite because of sparks or heat.

Noise

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

Operating materials

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

Unsuitable spare parts

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

Conversion or modification of the machine

- ✎ Do not permit conversion or modification of the machine as this can compromise function and safe working.

Extension or modification of the compressed air station

- ✎ If a compressed air installation is to be extended or modified, check the blow-off capacity of the pressure relief valves on air receivers and pipelines before installing the new machines.
- ✎ Pressure relief valves of insufficient blowoff capacity must be replaced by valves with a higher capacity.

3.5.2 Safe machine operation

Here is found information to support safe conduct with the machine.

Transport

- ✎ Use suitable lifting gear that conforms to local safety regulations.
- ✎ Attach lifting gear only to the designated points on the machine.
- ✎ Make sure the centre of gravity is correctly positioned to avoid the machine tipping.
- ✎ Make sure the danger zone is clear.

Installation

- ✎ Make sure no power is applied when electrical connections are made.
- ✎ Only use only electrical cables that are suitable and approved for the the loads applied.
- ✎ Install or remove pressure lines only when they are in the depressurised condition.
- ✎ Only use pressure lines that are suitable and approved for the maximum working pressure and medium used.
- ✎ Do not allow connecting pipes to be under mechanical stress.
- ✎ Do not step onto machine components to climb up the machine.

Location

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

Operation

- ✎ Keep the machine enclosure closed for safety and correct cooling function.

- ✎ Carry out regular inspections:
 - for damage,
 - of the safety devices,
 - of the EMERGENCY STOP function,
 - of components needing to be monitored.
- ✎ Machines drawing in air from the surroundings should not be operate without an air filter.

Maintenance

- ✎ Make sure the machine is disconnected from electrical power, is voltage-free and de-pressurised before commencing any maintenance work.
- ✎ Wear close-fitting, flame-resistant clothing. Wear protective clothing as necessary.
- ✎ Do not leave any loose components, tools or cleaning rags on the machine.
- ✎ Components removed from the machine can still be dangerous.
Do not open or destroy removed components as some (inlet valves, for instance) are powerfully spring-loaded.

Decommissioning / disposal

- ✎ Drain all fluids from the machine, e.g. cooling oil and water, and dispose of in accordance with local environmental regulations.
- ✎ Give refrigerant only to authorised bodies for disposal.
- ✎ Dispose of the machine in accordance with local environmental regulations.

3.5.3 Organising

- ✎ 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.

3.5.4 Danger zones

The table gives information on the zones dangerous to personnel.

Only authorised personnel may enter these zones.

Activity	Danger zone	Authorised personnel
Transport	3 m radius from the machine	Installation or transport personnel. All personnel excluded during transport.
	Beneath the lifted machine.	All personnel excluded!
Installation	Within the machine. 1 m radius of the machine and power lines.	Installation personnel
Operation	1 m radius from the machine 2 m radius from the cooling air discharge.	Operating personnel
Maintenance	Within the machine. 1 m radius from the machine	Maintenance personnel

Tab. 31 Danger zones

3.6 Safety Devices

Do not change, bypass or disable safety devices.






Do not remove or obliterate labels and notices.






Ensure that labels and notices are clearly legible.

More information on safety devices is contained in chapter 4 'Design and Function', section 4.4 'Safety Devices'.

3.7 Safety Signs

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

Location	Sign	Meaning
1		Electric voltage There is danger of fatal injury caused by touching electrically live components. <ul style="list-style-type: none"> Isolate all phases of the main power supply. Ensure that the power supply cannot be switched on again (locked off). Check that no voltage is present.
2		Hot surface Danger of burns from touching hot components. <ul style="list-style-type: none"> Do not touch the surface Wear long-sleeved garments (not synthetics such as polyester) and protective gloves.
3		Rotating Components Danger of serious laceration or even severing, particularly of fingers. <ul style="list-style-type: none"> Operate the machine only with fully closed safety guards, access doors and panels. Isolate from the mains and lock off before opening any machine enclosure or guard.
4		Automatic starting Danger of injury from the machine starting automatically or by remote start command. <ul style="list-style-type: none"> Isolate from the mains and lock off before opening any machine enclosure or guard.
5		Danger of fatal injury from pressure and spring force if the valve is incorrectly opened. <ul style="list-style-type: none"> Do not open or dismantle the valve. Call for authorised service if a fault occurs.

Location	Sign	Meaning
6		Serious injury, particularly to the eyes, can result from foreign objects being thrown back from rotating components.  Do not allow foreign objects to fall through the ventilation grille  Do not work above the ventilation grille when the machine is running
7		Wrong cooling oil level Machine damage or excessive oil remaining the compressed air.  Check the oil level regularly and top up as necessary.

Tab. 32 Safety signs

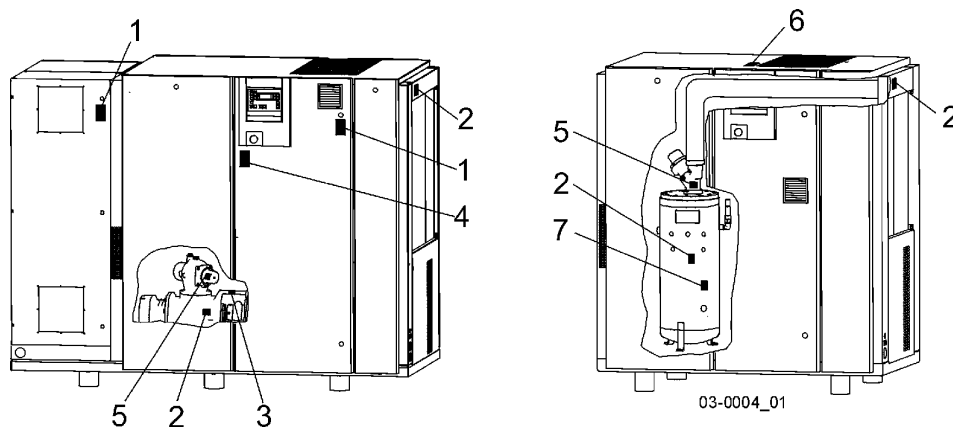


Fig. 1 Location of safety signs

3.8 In Emergency

3.8.1 Fire fighting

Suitable extinguishing agents:


- foam
- dry extinguishing agent
- carbon dioxide
- sand or earth.

Unsuitable or unsafe extinguishing agents:


- strong water jet.

3.8.2 Cooling oil

Skin contact:

-  wash off immediately

Eye contact:

-  rinse thoroughly with lukewarm water and seek medical assistance.

3.9 Environmental Protection

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

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

4 Design and Function

4.1 Machine Overview

4.1.1 Cabinet

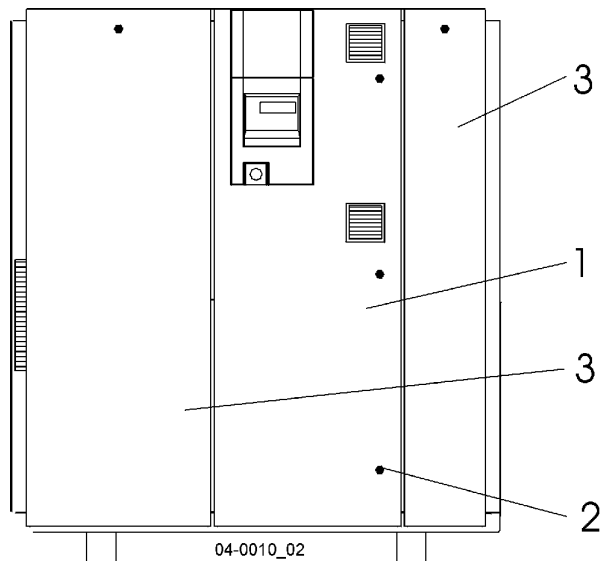


Fig. 2 Cabinet

- 1 Control cabinet door
- 2 Latch
- 3 Removable panel

The cabinet, when closed, serves various purposes:

- Sound damping
- Protection
- Cooling air flow control

Safe and reliable operation can only be ensured with the cabinet closed.

Latches are released by a key supplied with the machine.

Access doors are hinged to swing open, removable panels must be lifted off.

4.1.2 Function

An air-cooled machine serves to illustrate function.

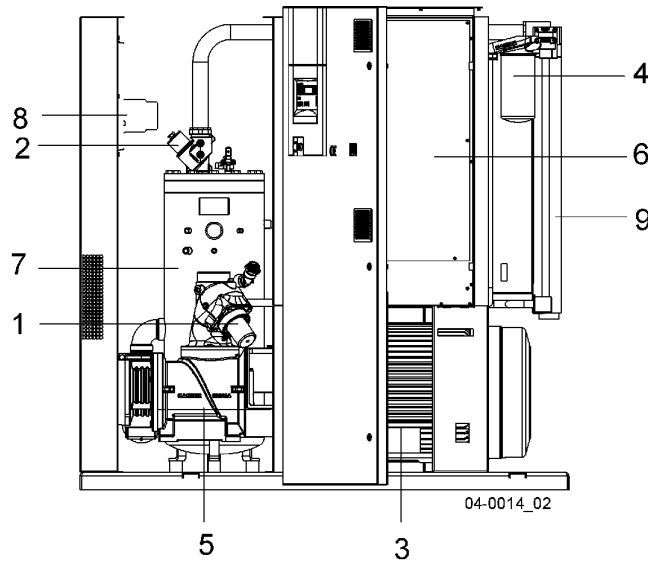


Fig. 3 Air-cooled machine

- | | |
|--------------------------------|----------------------|
| 1 Inlet valve | 6 Control cabinet |
| 2 Minimum pressure/check valve | 7 Oil separator tank |
| 3 Compressor motor | 8 Air filter |
| 4 Oil filter | 9 Oil / air cooler |
| 5 Airend | |

Machine

Ambient air is cleaned as it is drawn in through the filter (8).

The air is then compressed in the airend (5).

The airend is driven by an electric motor (3).

Cooling oil is injected into the airend. It lubricates moving parts and forms a seal between the rotors themselves and between them and the airend casing. The cooling effect directly within the compression chamber ensures a low airend discharge temperature.

Cooling oil recovered from the compressed air in the oil separator tank (7) gives up its heat in the oil cooler (9). The oil then flows through the filter (4) and back to the point of injection. Pressure within the machine keeps the oil circulating. A separate pump is not necessary. A thermostatic valve maintains optimum oil temperature.

Compressed air, freed of its oil content in the separator tank (7), flows through the minimum pressure/check valve (2) into the aftercooler (9). The minimum pressure/check valve ensures there is always sufficient internal pressure to maintain cooling oil circulation.

The aftercooler brings down the compressed air temperature to 5 to 10 K above ambient. Most of the moisture carried in the air is removed in the aftercooler.

4.1.3 Volt-free Contacts

Volt-free contacts are provided for passing messages.

Information on location, load and type of message is to be found in the electrical diagram.



If the volt-free contacts are connected to an external power source they may be under power even when the machine is isolated from the supply.

4.2 Options

4.2.1 Machine mountings (option H1)

The machine mountings enable the machine to be anchored to the floor.

4.2.2 Cooling air filter mats (option K3)

Mats filter the cooling air and keep the cooler surface clean.

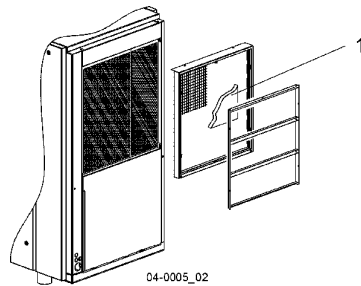


Fig. 4 Cooling air filter mats

1 Cooling air filter mat

4.2.3 Water cooling (option K2)

Plate heat exchangers in stainless steel are used for water-cooled machines.

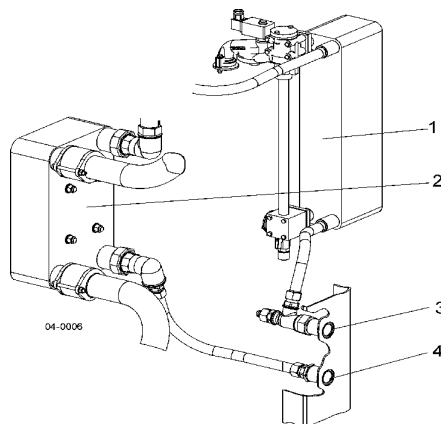


Fig. 5 Water cooling

1 Oil cooler

2 Compressed air aftercooler

3 Cooling water connection

4 Cooling water connection

4.2.4 Heat recovery

Prepared for external heat recovery (option W1)

Connections are provided and bridged.

An external heat recovery system can be retro-fitted at any time.

Internal heat recovery (option W2 / W3)

A plate heat exchanger (1) is installed for heat recovery.

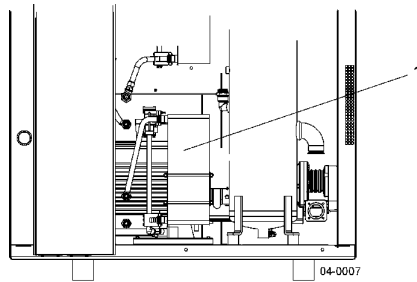


Fig. 6 Internal heat recovery

1 Plate heat exchanger

4.3 Operating States and Control Modes

4.3.1 Operating states

There are three operating states:

- **LOAD:** the inlet valve is open. The airend delivers compressed air to the system. The compressor motor runs under full load.
- **IDLING:** The inlet valve is closed. The minimum pressure/check valve shuts off the oil separator from the air system. The oil separator tank is vented. A small volume of air circulates through the bleed hole in the inlet valve, through the airend and back to the inlet valve via the venting valve. The compressor motor runs without load and draws little current.
- **STANDSTILL:** The inlet valve is closed. The minimum pressure/check valve shuts off the oil separator from the air system. The oil separator tank is vented. The compressor motor is stopped.
- **PARTIAL LOAD (option C1):** The proportional controller continuously varies the degree of opening of the inlet valve, and thereby the delivery rate of the compressor, in response and in proportion to the air demand. The airend delivers compressed air to the system. The load and power consumption of the drive motor rises and falls with the air demand. The regulating valve is factory set. Consult with KAESER Service before changing.

4.3.2 Tasks of the controller

Using the selected control mode, the controller switches the compressor between its various operational states in order to maintain system pressure between the set minimum and maximum values.

According to the individual compressed air demand one of the various control modes available will provide the optimum duty cycle for the machine.

4.3.3 Control Modes

The controller can operate in the following modes:

- DUAL
- VARIO
- QUADRO

DUAL

In the DUAL control mode, the compressor is switched back and forth between full load and idle to maintain system pressure between the set minimum and maximum values.

When the maximum pressure is reached the machine switches to idle running. When the preset *idling time* has elapsed the machine is STOPPED.

The shorter the *idling time* setting, the sooner and more frequently the motor is stopped.

VARIO

The VARIO control mode is an extension of DUAL control. The difference from DUAL being that under VARIO control the *idling time* is automatically increased or decreased corresponding to the increased or decreased switching frequency of the drive motor.

QUADRO

In QUADRO control mode the machine switches from LOAD to IDLE during periods of high air demand and directly from LOAD to STANDSTILL during periods of low air demand.

This mode of control requires two pre-set time periods: the *running time* and the *idle/standstill time*. The shorter these time settings, the sooner and more frequently the motor is stopped.

4.3.4 Modulating control (option C1)

The modulating control mode is an extension of DUAL control. The difference being that, in this mode, the delivery of the compressor is steplessly varied within the control range of the machine.

- Increasing air demand

The machine operates between PARTIAL LOAD and LOAD.

- Falling air demand

The machine operates between PARTIAL LOAD, IDLE RUNNING and STANDSTILL.

4.4 Safety Devices

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

- EMERGENCY STOP button
The EMERGENCY STOP button shuts down the compressor immediately. The motor remains still. The pressure system is vented.
- Pressure relief valve
The pressure relief valve protects the system from excessive pressure. This is factory set.
- Housing and covers for moving parts and electrical connections.
Protection from accidental contact.

4.5 SIGMA CONTROL Keys and Indicators

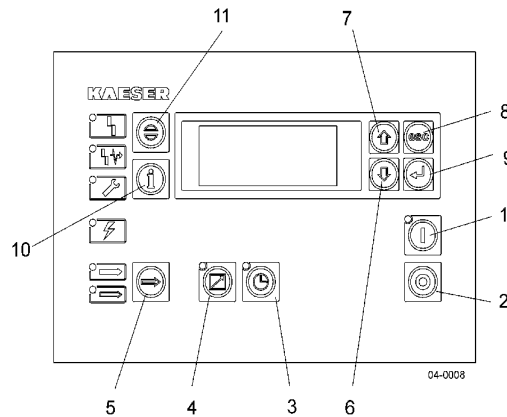


Fig. 7 SIGMA CONTROL keys

Symbol	Item	Description	Function
	1	ON (I)	Switch the machine on. Programmed operating mode is active.
	2	OFF (0)	Switch the machine off.
	3	Operating mode: Clock	Switching clock – control on and off. The LED lights when the machine is under clock control.
	4	Operating mode: Remote control	Switching remote control on and off. The LED illuminates when the machine is under remote control.
	5	Operating mode: LOAD / IDLE	Toggles the machine between LOAD and IDLE.
	6	Arrow key	Scrolls down menu. Reduces a parameter value.
	7	Arrow key	Scrolls menu up. Increases a parameter value.
	8	Escape	Returns to the next higher menu level. Exits the edit mode without saving. Returns to the main menu when held down at least 10 seconds.
	9	Return/enter/save key	Only affects the message in the third line of the display (12). Returns to the selected submenu. Saves and leaves the edit mode.

Symbol	Item	Description	Function
	10	Events and information key	Displays the event memory. Selection from every menu. Returns together with 'esc' key (8).
	11	Acknowledge (re-set) key	Acknowledges (re-sets) messages and resets the event memory (if permitted).

Tab. 33 SIGMA CONTROL keys

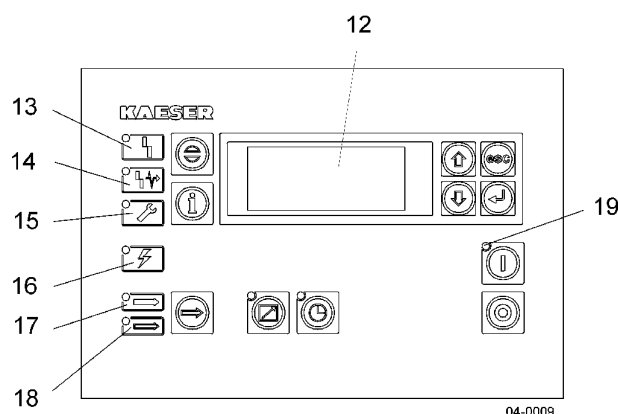


Fig. 8 SIGMA CONTROL indicators

Symbol	Item	Description	Function
	12	Display	Alphanumeric display with 4 lines.
	13	Alarm	Blinks red when an alarm occurs. Lights continuously when acknowledged.
	14	Communication	Lights red if communication via the Profibus is interrupted.
	15	Service/warning LED	Blinks yellow for: – maintenance work required – warning message
	16	Controller power ON	Lights green when the power supply to the controller is switched on.
	17	LOAD	Lights green when the machine is in the operating state LOAD
	18	Operating mode IDLE	Lights green when the machine is in the IDLE mode. Blinks green if the manualLOAD/IDLING changeover key (5) is used.
	19	Machine ON	The machine is switched on.

Tab. 34 SIGMA CONTROL indicators

5 Installation and Operating Conditions

5.1 Surroundings

- ✎ Strictly forbid fire, open flame and smoking.
- ✎ When welding is taking place on or near the machine take adequate measures to ensure that no parts of the machine or any oil vapours can ignite because of sparks or heat.
- ✎ The machine is not explosion-proof.
Do not operate in areas in which specific requirements with regard to explosion protection are applied.
For instance, the requirements of the ATEX directive 94/9/EC "Equipment and Protective Systems for use in Explosive Atmospheres".
- ✎ Observe the required ambient conditions:
 - ambient temperature and humidity,
 - clean inlet air with no damaging contaminants,
 - inlet air free of explosive or chemically unstable gases or vapours,
 - inlet air free of acid-forming substances, particularly ammonia, chlorine or hydro-sulphide.
- ✎ suitable fire extinguishing material at hand.

5.2 Installation Conditions

5.2.1 Place of installation and space required

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



The spacings given are recommended and ensure unhindered access to all machine parts.
Please consult KAESER if they cannot be achieved.

- ✎ If installed outdoors, the equipment must be protected from frost, direct sunlight, dust and rain.
- ✎ Ensure accessibility so that all work on the machine can be carried out without danger or hindrance.

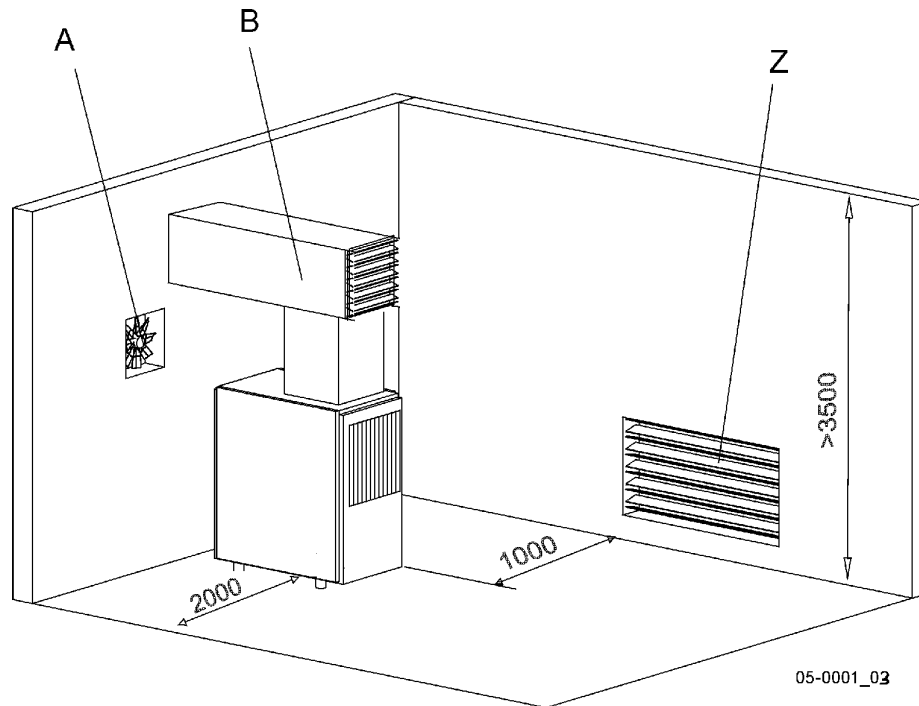


Fig. 9 Installation recommendation, dimensions [mm]

- A Exhaust fan
 B Exhaust air duct
 Z Inlet air opening

5.2.2 Ventilation

Values given are minimum guidelines.



If the inlet aperture is insufficient a dangerous vacuum can be created in the compressor room.

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

	CSD 82	CSD 102	CSD 122
Inlet opening [m ²] (option K1)	1.2	1.4	1.7
Extractor for forced ventilating: Flow rate [m ³ /h] at 100 Pa (option K1)	16500	20000	24000
Inlet opening [m ²] (option K2)	0.2	0.2	0.3
Extractor for forced ventilating: Flow rate [m ³ /h] at 100 Pa (option K2)	2500	3000	3500
Exhaust air duct: Dimensions [mm]	700 x 700	700 x 700	700 x 700

Tab. 35 Ventilation

Exhaust ducting

Consult the manufacturer on the design of the ducting, length, number of bends, etc.

Further information on exhaust air ducts can be found in chapter 13.1.3.

5.2.3 Operating in a compressed air network

When the machine is connected to an air network, the network operating pressure must not exceed 16 bar.

Initial filling of a fully vented air network generally creates very a high rate of flow through air treatment devices. These conditions are detrimental to correct air treatment. Air quality suffers.

To ensure maintenance of desired air quality when filling a vented air main we recommend the installation of an air main charging system.

KAESER is ready to offer good advice.

6 Installation

6.1 Safety



DANGER

Voltage!

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

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



WARNING

Uncontrolled pressure release!

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

- ✎ De-pressurize all pressurized components and enclosures.



WARNING

Minimum pressure/check valves, pressure relief valves and inlet valves are powerfully spring-loaded.

Fatal injury may occur from incorrect opening of spring-loaded components.

- ✎ Do not open or dismantle valves.



Installation work may only be carried out by authorised personnel!

All functioning parts are factory set.

Changes may not be made without the permission of the manufacturer.

6.2 Reporting Transport Damage

- ✎ Check the machine for visible and hidden transport damage.
- ✎ Inform the carrier and the manufacturer in writing of any damage.

6.3 Install the Compressed Air Connection

Pre-condition: air main completely vented.

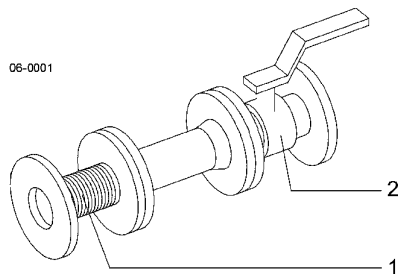


Fig. 10 Compressed Air Connection

- 1 Axial compensator or flexible hose
- 2 Shut-off valve

- ✎ Shut-off valve (2) to be installed by the user in the connection line.
- ✎ Make the compressed air connection with a flexible hose (1) or an axial compensator (1).

6.4 Electrical Connection

Have the electrical connection made only by a qualified and authorised electrician.

Carry out protection measures as stipulated in relevant regulations (IEC 364 or DIN VDE 0100, for example) and in national accident prevention regulations (BGV A2 in Germany). Also observe the regulations of the local power utility company.

Use wire conductor dimensions and fuse ratings in accordance with local regulations (DIN VDE 0100 parts 430 and 523 in Germany, for example).

Check the reaction time of overload protection devices (e.g. DIN VDE 0100 part 413). Guide values are given in chapter 2.9.

- ✎ The user must provide the machine with a lockable mains-disconnecting device. This could be, for example, a switch-disconnector with fuses. If a circuit breaker is used it must be suitable for the motor starting characteristics.

Before Initial Start-up

- ✎ The control transformer in the control cabinet has connections for various supply voltages. Check that the correct connections are made for the supply voltage provided for the machine. If necessary, re-connect the transformer to match the supply voltage using the $\pm 5\%$ taps. (see Fig. 11 and chapter 13.1.4)

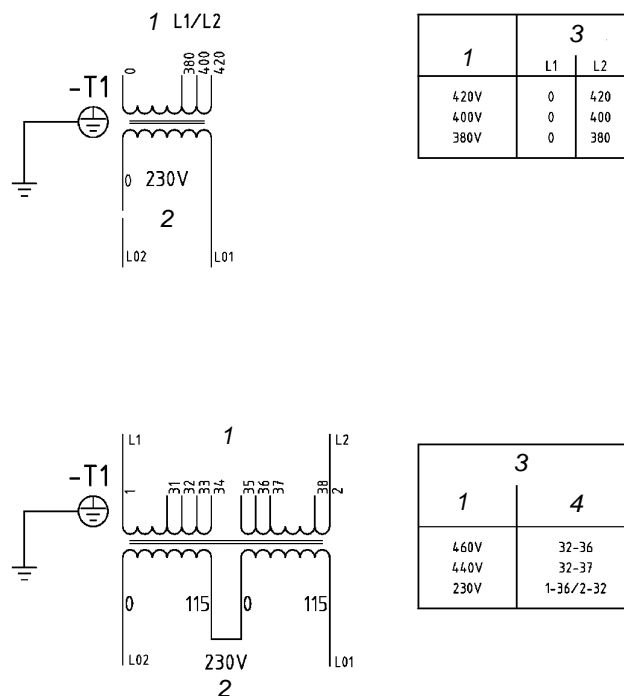


Fig. 11 Control Transformer Connection

- 1 Primary
- 2 Secondary
- 3 Mains supply
- 4 Bridge between terminals

- ✎ Connect the machine to the mains power supply in accordance with Fig. 12 and the electrical diagram in chapter 13.1.4.

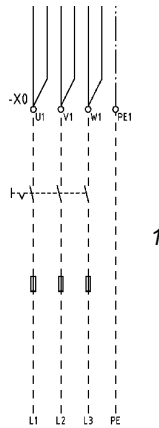


Fig. 12 Electrical Connection

1 User-provided main switch and fusing

6.5 Options

6.5.1 Machine fixing (option H1)

If the machine is supplied with mountings, these can be used to anchor it to the floor. Details of the fixing holes are contained in the dimensional drawing in chapter 13.1.3.

- ✎ Use appropriate bolts to anchor the machine.

6.5.2 Water cooling connection (option K2)

The dimensional drawing in chapter 13.1.3 gives the flow direction, size and position of the cooling water connection ports.

Use connecting lines made of the appropriate material for the water system. Take into account the effect of electro-chemical reaction.

Keep the effect of pressure surge on the cooler as low as possible.

Where pressure surges are unavoidable provide an expansion tank to damp pulsations.

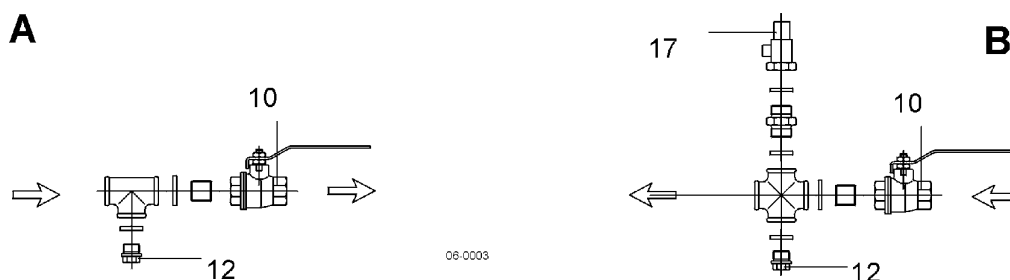


Fig. 13 Water cooling connection

- | | | | |
|---|----------------------|----|------------------------------|
| A | Cooling water outlet | 10 | Shut-off valve |
| B | Cooling water inlet | 12 | Connection port with stopper |
| | | 17 | Pressure relief valve |

The user is to provide the following fittings:

- Dirt trap with max. 0.1 mm strainer mesh.
- Shut-off valves (10) and connection ports (12) for maintenance and venting.
- Pressure relief valve (17) prevents build-up of excessive pressure.



Blowoff pressure and capacity are related to the user's installation design.
Keep to the cooler technical specification.

- ☞ Connect the cooling water line to the fitting.
- ☞ Open the shut-off valve on the cooling water outlet (A).
- ☞ Slowly open the cooling water inlet shut-off valve (B) to gradually fill the cooler with water.
- ☞ Vent the water lines.

6.5.3 Heat recovery system connection

6.5.3.1 Internal heat recovery (option W2, W3)

The dimensional drawing in chapter 13.1.3 gives the flow direction, size and position of the connection ports.

Use connecting lines of suitable material. Take into account the effect of electro-chemical reaction.

Keep the effect of pressure surge on the heat exchanger as low as possible.
Where pressure surges are unavoidable provide an expansion tank as a damper.

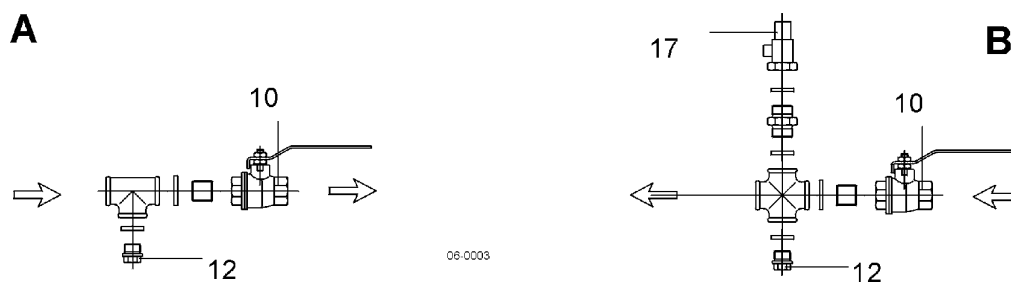


Fig. 14 Heat recovery

A Outlet
 B Inlet

10 Shut-off valve
 12 Connection port with stopper
 17 Pressure relief valve

The user is to provide the following fittings:

- Dirt trap with max. 0.1 mm strainer mesh.
- Shut-off valves (10) and connection ports (12) for maintenance and venting.
- Pressure relief valve (17) on the inlet (B) prevents build-up of excessive pressure.



Blowoff pressure and capacity are related to the user's installation design.
 Keep to the heat exchanger technical specification.

- ☞ Connect the water lines to the fittings.
- ☞ Open the shut-off valve on the outlet (A).
- ☞ Slowly open the inlet (B) shut-off tap to gradually fill the heat exchanger with water.
- ☞ Vent the lines.

6.5.3.2 External heat recovery system (option W1)

The dimensional drawing in chapter 13.1.3 gives the flow direction, size and position of the connection ports.

- ☞ Follow the manufacturer's instructions on connecting the external heat exchanger.

7 Initial Start–up

7.1 Safety



DANGER

Voltage!

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

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



WARNING

Uncontrolled pressure release!

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

- ☞ Close shut–off valves or otherwise isolate the machine from the air main to ensure that no compressed air can flow back into the machine.
- ☞ De–pressurize all pressurized components and enclosures.
- ☞ Check all machine hose connectors with a hand–held pressure gauge to ensure that all read zero .



Initial start–up may only be carried out by authorised personnel!

Before switching on ensure that:

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

7.2 To be Observed Before Every Initial Start–up

Initial start–up of the machine may only be carried out by trained and authorised installation or maintenance personnel.

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















Special measures on re–starting after storage

Storage period longer than...	Remedy
12 months	<ul style="list-style-type: none"> ☞ Change the oil filter. ☞ Change the oil separator cartridge. ☞ Change the cooling oil. ☞ Have the motor bearings checked by an authorised KAESER service agent.
36 months	<ul style="list-style-type: none"> ☞ Have the overall technical condition checked by an authorised KAESER service agent.

Tab. 36 Re–starting after storage

7.3 Checking Installation and Operating Conditions

Carry out all the items in the checklist before starting the machine.

	To be checked	Chapter	Done?
1	 Are all the conditions for installation fulfilled?	5	
2	 User's lockable supply disconnecting device installed?	6.4	
3	 Is the power supply as specified on the nameplate?	2	
4	 Supply cable section and fuse rating adequate?	2.9.2	
5	 All electrical connections checked for tightness?		
6	 Shut-off valve fitted to compressed air outlet?	6.3	
7	 Connection made to air main with hose or axial compensator?	6.3	
8	 Is there sufficient cooling oil in the separator tank? (cooling oil indicator outside the red zone?)		
9	 Required quantity of cooling oil poured into the airend?	7.6	
10	 Motor protection relay set correctly with regard to the power supply?	7.5	
11	 Are the operators fully conversant with safety regulations?		
12	 Supply of cooling water ensured? (option K2)	6.5.2	
13	 Machine anchored to the floor? (option H1)	6.5.1	
14	 Are all access doors closed and latched and all removable panels in place and secured?	4.1.1	

Tab. 37 Installation conditions checklist

7.4 Setting the overload protection cut-out

Compressor motor:

In the star-delta configuration the phase current is fed via the overload protection cut-out. This phase current is 0.58 times the rated machine current (see nameplate in the control cabinet).

To prevent the overload protection cutout from being triggered by voltage fluctuations, temperature influences or component tolerances, the setting can be higher than the arithmetical phase current.

7.5 Motor Protection Switch Setting

Fan motor

In direct on-line start the starting current is fed via the motor overload protection switch.

To prevent the overload protection switch from being triggered by voltage fluctuations, temperature influences or component tolerances, the setting can be higher than the motor rated current (see motor nameplate).

7.6 Pour cooling oil into the airend.

Material: 1 l cooling oil

The airend must be manually filled with cooling oil before initial start-up and after being out of use for more than 3 months.



Use the same type of oil.

A sticker giving the type of oil used is found near the oil separator tank filling port.

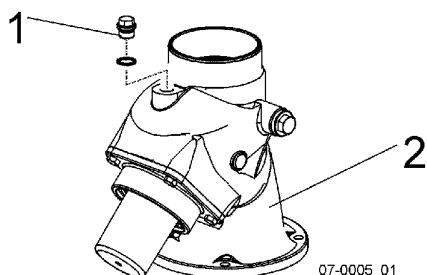


Fig. 15 *Inlet valve oil filling port*

- 1 Screw plug
- 2 Inlet valve

- ✚ Remove the plug (1) from the inlet valve (2).
- ✚ Pour cooling oil into the airend.

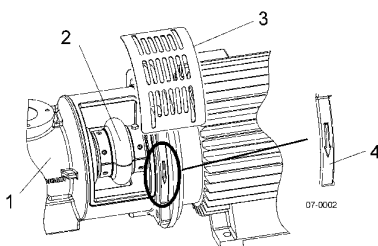


Fig. 16 *Coupling*

- 1 Airend
- 2 Coupling
- 3 Cover
- 4 Rotational direction arrow

- ✚ Remove the cover (3).
- ✚ Note the rotational direction arrow (4).
- ✚ Grasp the coupling (2) and turn it and the airend shaft (1).
- ✚ Replace the coupling cover (3).

7.7 Checking Direction of Rotation

The machine is designed for a clockwise field.

- ✚ Check the supply with a phase sequence indicator.
- ✚ If the compressor motor turns in the wrong direction, change the motor supply phases L1 and L2.



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

- ✚ Switch the machine off as soon as the direction of rotation is seen and compare it with the direction arrows on the motor and airend.

7.8 Initial Start–up

☞ Open the shut–off valve to the air network.

☞ Switch on at the main supply isolator.

The controller makes a self–test and the green LED 'Power ON' lights.

☞ Press the 'Operating state LOAD/IDLE' key.

☞ Press the 'ON' key.

The green LED 'Machine ON' lights.

☞ Allow the machine to idle for at least one minute.

This ensures good distribution of cooling oil.

☞ Press the 'Operating state LOAD/IDLE' key.

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



Watch for any faults occurring in the first hour of operation.

After the first 50 operating hours carry out the following:

☞ Check that all electrical connections are tight.

7.9 System pressure setting

The system pressure p1 is factory set to the highest possible value.

Adhustment is necessary for individual operating conditions.

☞ System pressure setting is described in the SIGMA CONTROL service manual.



The machine may toggle a maximum of twice per minute between LOAD and IDLE.

Reducing starting frequency:

☞ Increase the difference between cut–in and cut–out pressure.

☞ Add an air receiver downstream to increase buffer capacity.

8 Operation

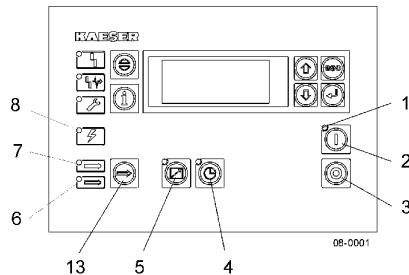


Fig. 17 Switching on and off

- | | | | |
|---|--------------------------|----|------------------------|
| 1 | 'Machine ON' LED (green) | 5 | 'Remote' key |
| 2 | 'ON' key ('I') | 6 | 'LOAD' LED |
| 3 | OFF key ('O') | 7 | 'IDLE' LED |
| 4 | 'Clock' key | 8 | 'Power ON' LED (green) |
| | | 13 | LOAD/IDLE toggle key |

8.1 Switching on and off



Compressed air!

WARNING

Serious injury is possible.

✎ Never direct compressed air at persons or animals.

Always switch the machine on and off with the 'ON' and 'OFF' keys.

The supply disconnecting device is installed by the user.

8.1.1 Switching on

✎ Ensure that:

- no one is working on the machine,
- all panels are in place,
- all access doors are closed,
- no parts of the machine are colder than + 3° C.

✎ Switch on the supply isolating device.

After the controller makes a self-test the green LED 'Power ON' (8) lights.

✎ Press the 'ON' key (2).

The green LED 'Machine ON' lights (1).

The compressor motor runs, assuming the network pressure is lower than the cut-out pressure.

8.1.2 Automatic restart

Pre-condition: Network pressure is lower than the compressor cut-out pressure.

Automatic restart is factory-set.

The machine restarts automatically when power is resumed after a power cut.

8.1.3 Switching off

- ✎ Press the 'LOAD/IDLE' toggle key (13).
The machine switches to IDLE and the LED (7) flashes.
- ✎ After running in idle for 20 seconds, press the OFF key (3).
The 'Machine ON' LED goes out (1).
- ✎ Switch off and lock out the supply disconnecting device.

8.2 Switching Off in an Emergency and Switching On Again

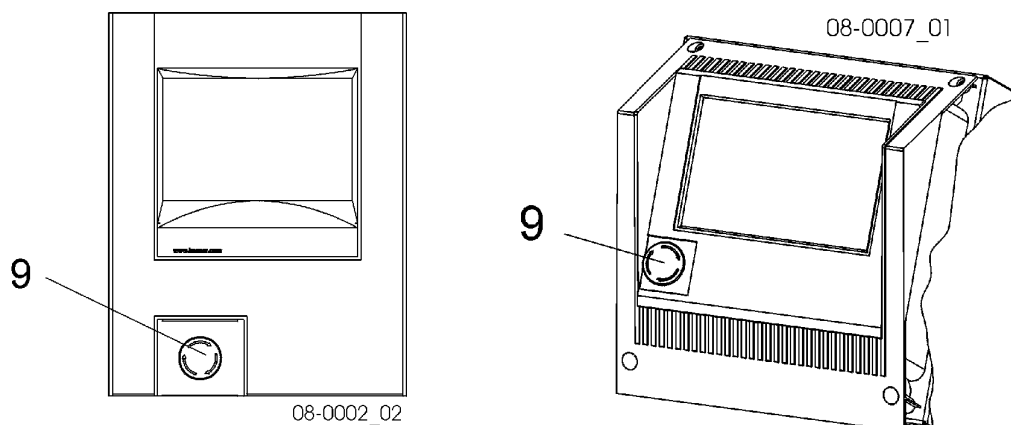


Fig. 18 Switching off in an emergency

9 EMERGENCYSTOP button

Switching off

- ✎ Press the 'EMERGENCY STOP' button (9).
The 'EMERGENCY STOP' button remains latched in.
- The compressor is vented and the machine is prevented from re-starting.

Starting again

Pre-condition: Fault rectified.

- ✎ Turn the 'EMERGENCY STOP' button in the direction of the arrow to unlatch it.
- ✎ Press the 'Reset' key to delete any existing alarm messages.
- ✎ Switch on the machine.

8.3 Remote On and Off Switching

Pre-condition: A remote control device is connected.



Apply the remote warning label to the machine where it is plainly visible.
BEWARE! This machine is remotely controlled and can start at any time.

Label the remote control device accordingly:

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



Press the 'Remote' key (5).

The LED lights. The remote control device has control of the machine.

The machine can still be switched on and off by the 'ON' and 'OFF' keys (2 and 3) if required.

8.4 Switching On and Off with the Clock

Pre-condition: The clock is programmed.



Apply the time-controlled warning label to the machine where it is plainly visible.

"BEWARE! This machine is clock-controlled and can start at any time."



Press the 'Clock' key (4).

The LED lights. The integrated clock has control of the machine.

8.5 Acknowledging and Resetting Warning and Alarm Messages

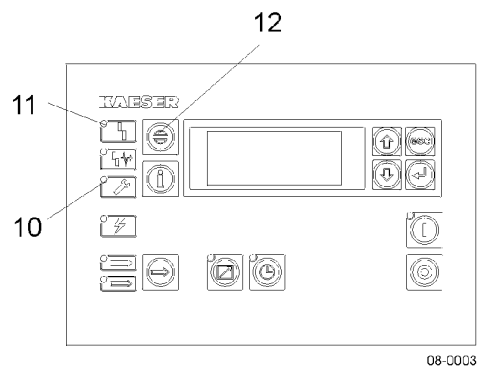


Fig. 19 Acknowledging and resetting warning and alarm messages

- 10 'Warning' LED (yellow)
- 11 'Alarm' LED (red)
- 12 'Acknowledge' (reset) key

Alarm message

An alarm shuts the machine down automatically. The red 'Alarm' LED blinks (11).

The display shows the latest acquired value

Alarm coming	LED flashes
Alarm acknowledged	LED illuminates
Alarm reset	LED out

or

Alarm coming	LED flashes
Alarm reset	LED flashes
Alarm acknowledged	LED out

Warning messages

The display shows a maintenance or warning message.

The yellow warning LED (10) flashes, for example, if a maintenance task is due.

The display shows the latest acquired value

Warning coming	LED flashes
Warning acknowledged	LED illuminates
Warning reset	LED out

or

Warning coming	LED flashes
Warning reset	LED flashes
Warning acknowledged	LED out

8.5.1 Resetting alarm messages

Pre-condition: Fault rectified.

- ☞ Press the 'Acknowledgement (reset)' key (12).
The 'Alarm' LED goes out (11).

The machine is now ready to start again.

8.5.2 Resetting warning messages

Pre-condition: The cause of the alarm is eliminated.
Maintenance task completed.

- ☞ Press the 'Acknowledgement (reset)' key (12).
The 'Warning' LED goes out (10).

9 Event Recognition and Fault Rectification

Inform KAESER service if the event cannot be rectified by the action suggested.

Do not attempt rectifications other than those given in this manual.

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

There are three types of event:

Description	Indicated by	see chapter
An event that triggers an alarm (with automatic shut-down)	Blinking red LED	9.1
An event that triggers a warning (no shut-down)	Blinking yellow LED	9.2
Miscellaneous events (faults)	No indication	9.3

9.1 Alarm messages to the controller (machine shut-down, red LED blinking)

Message	Possible cause	Remedy
access doors	Door open with the machine running.	Close the door(s).
ADT ↑	Maximum airend discharge temperature exceeded.	Ensure adequate ventilation. Ensure that the permissible room temperature is not exceeded. Clean the cooler. Cooling air outlet of the machine too near a wall. Check the cooling oil level.
ADT dT/dt	Maximum rise rate of airend discharge temperature (ADT) exceeded.	Check airend and piping to airend. Check the cooling oil level. Check oil circulation.
AI 3/AI 4 error	Line—break between the analog input and the sensor. Short circuit to earth.	Check transducer connections and wiring.
AI 7/AI 8 error	Line—break between the analog input and the sensor. Short circuit to earth.	Check transducer connections and wiring.
airend rotation	The drive motor is turning in the wrong direction.	Change over phase lines L1 and L2.
air filter dp ↑	Air filter clogged.	Clean or renew the filter element.
backpressure	Back pressure in the oil separator tank caused by poor venting.	Check venting line.
Buscontroller	Bus link via the Profibus DP interface	Check line and settings.

Message	Possible cause	Remedy
blowoff prot.	The activating pressure of the pressure relief valve on the oil separator tank has been exceeded.	Change the oil separator cartridge. Open the shut-off valve in the venting line.
Condensate drain	Fault in condensate drainage.	Check condensate drainage.
coolingwater low	Cooling water pressure too low.	Check cooling water supply. Check the cooling water stop valve position.
DO 0.6/DO 0.7	Short circuit in the line between DO 0.6 / DO 0.7 outputs and a consumer.	Check line and connections.
DO 1.6/DO 1.7	Short circuit in the line between DO 1.6 / DO 1.7 outputs and a consumer.	Check line and connections.
EMERGENCY-STOP	Emergency-stop-button pressed.	Unlatch the pushbutton.
ext. message 0	Customer specific: No data	
...		
ext. message 5		
fan M2 I ↑	Shutdown of 1st fan motor because of overload.	Investigate cause of shutdown. Reset overload trip.
fan M3 I ↑	Shutdown of 2nd fan motor because of overload.	Investigate cause of shutdown. Reset overload trip.
fan M4 I ↑	Shutdown of 3rd fan motor because of overload.	Investigate cause of shutdown. Reset overload trip.
HT cell	Fault in the high tension cell.	Contact KAESER service.
mains cont. on?	The mains contactor does not pull in despite ON command.	Check mains contactor and wiring.
mains cont. off?	The mains contactor does not drop out despite OFF command.	Check mains contactor and wiring.
mains monitor	Fault in mains power supply.	Have the mains power supply checked.
mains voltage ↓	2nd power failure	Check power supply voltage. Check door interlock.
Model	Machine model uncertain	Contact KAESER service.
motor I ↑	Drive motor has been shutdown because of overload.	Change the oil separator cartridge. Check minimum pressure/ check valve. Investigate cause of shutdown.

Message	Possible cause	Remedy
motor T ↑	Drive motor overheated.	Ensure adequate ventilation. Install an extractor. Clean the motor.
motor bearings	Drive motor bearings overheated.	Grease the motor bearings with the greasing device.
Neutral p –switch	Customer specific: No data	
Neutral T –switch	Customer specific: No data	
no press.buildup	Machine produces no compressed air. Working pressure stays below 3.5 bar within a preset period.	Check the machine for leaks. Check coupling / V–belts Contact KAESER service.
oil p ↓	No changeover to load as long as the minimum oil pressure is not reached.	Check oil circulation. Check pressure switch, line and connection.
PD temperature ↓	Package discharge temperature too low.	Contact KAESER service.
PD temperature ↑	Package discharge temperature too high.	Check the fan motor. Clean the cooler. Check the cooling oil level.
pRV ↑	The activating pressure of the pressure relief valve on the oil separator tank has been exceeded.	Replace the pressure relief valve.
RD compr. p ↑	Pressure switch for the refrigerant compressor has activated.	Ensure adequate ventilation. Clean the refrigerant condenser. Clean the cooler.
RD compr. T ↑	Temperature in the refrigerant dryer too high.	Clean the refrigerant condenser. Ensure adequate ventilation. Install an extractor fan. Clean the cooler
RD compr. T ↓	Temperature in refrigeration dryer too low.	Contact KAESER service.
separator dp ↑	Oil separator cartridge clogged.	Replace the oil separator cartridge.
separator T ↑	Maximum air temperature on oil separator tank outlet exceeded.	Check the line to the trip relay.
SFC	Frequency converter faulty.	Contact KAESER service.

Message	Possible cause	Remedy
SIGMA CONTROL T ↑	Maximum permissible temperature in SIGMA CONTROL housing exceeded.	Ensure adequate ventilation. Ensure that the permissible room temperature is not exceeded. Check control cabinet ventilator (filter mats).
sh.cct.AI 1/AI 2	The connection between the sensor and the analog input is shorted.	Check transducer connections and wiring.
sh.cct.AI 5/AI 6	The connection between the sensor and the analog input is shorted.	
soft start	Fault in the soft start equipment.	Contact KAESER service.
Start ↓	Airend discharge temperature (ADT) too low. Ambient temperature below + 3° C.	Heat the compressor room.
V-belts broken	The V-belts parted during operation.	Replace the belts.

Tab. 38 Alarm messages and actions

9.2 Warning messages on the controller (yellow LED flashes)

Message	Possible cause	Remedy
access doors	Doors opened with the machine shut down.	Close access doors.
ADT ↑	Maximum airend discharge temperature will soon be reached.	Ensure sufficient ventilation Clean the cooler. The machine's cooling air outlet is too near a wall. Check the cooling oil level. Replace the oil filter.
air filter dp ↑	The pressure drop across the air filter is too high. Air filter element clogged.	Clean/replace the air filter element.
air filter h ↑	The interval for the air filter element check has expired.	Clean/replace the air filter element.
annual maint.	The maintenance interval counter was not reset within a year.	Carry out necessary maintenance and reset one of the following maintenance interval counters: oil filter, oil separator, oil change or air filter.
bearing maint. h ↑	The maintenance interval for greasing the bearings has expired.	Grease the motor bearings.

Message	Possible cause	Remedy
blowoff prot.	Warning The blowoff pressure of the pressure relief valve will soon be reached.	Change the oil separator cartridge. Open the shut-off valve in the venting line.
blt.coup.insp.h ↑	The maintenance interval for V-belt tension / coupling inspection has expired.	Visually inspect and tension the V-belts.
blt.coup.chng. h ↑	V-belts / coupling worn.	Change belts / coupling.
Buffer battery	Battery for retention of data is discharged.	Replace the battery
bus alarm	Bus link via Profibus DP interface interrupted	Check bus highway and plug.
Condensate drain	Fault in condensate drainage.	Check condensate drain and lines.
elect. equip. h ↑	The service interval for checking electrical equipment and installation has expired.	Reset the service interval counter.
error: RS 485	Wrong configuration or transmission error.	Check the link/interface connections between the two controllers. Check maximum cable length and screening. 1 master and 1 slave configured.
ext.load signal?	Dubious external load signal Increased cut-out pressure exceeded. The external load control has not switched to idle (off load).	Check settings of the external controller. Take the pressure drops across filters and dryer into account.
ext. message 0	Customer specific: No data	
...		
ext. message 5		
flash memory	Internal controller memory error.	Contact KAESER service.
FC mains	Failure of power supply to the frequency converter.	Check power supply.
mains voltage ↓	1. power failure: Machine was re-started automatically.	Check power supply voltage. Check door interlock.
modem problem	SIGMA CONTROL does not recognise the modem.	Check the link between SIGMA control and the modem.
motor T ↑	Drive motor overheating.	Ensure adequate ventilation. Install an extractor. Clean the motor.

Message	Possible cause	Remedy
motorstarts /h ↑	The permissible number of motor starts was exceeded during the last 60 minutes.	Extend the idle period. Increase capacity of air receiver. Increase cross-section of piping between compressor and air receiver.
motorstarts /d ↑	The permissible number of motor starts was exceeded during the last 24 hours.	Extend the idle period. Increase capacity of air receiver. Increase cross-section of piping between compressor and air receiver.
motor bearings h ↑	The service interval for the motor bearing change has expired.	Have an authorized KAESER technician replace the motor bearings.
Neutral p-switch	Customer specific: No data	
Neutral T-switch	Customer specific: No data	
no press.buildup	The compressor cannot build-up to working pressure.	Check for air leaks. Check the value for internal pressure given in the "analog data" menu with the reading on the oil separator tank pressure gauge.
oil filter dp ↑	Oil filter clogged.	Oil filter replacement
oil filter h↑	The interval for the next oil filter check has expired.	Oil filter replacement
oil level ↓	Oil level too low.	Top up the cooling oil.
oil T ↓	Cooling oil temperature too low.	Increase room temperature. Check the oil circuit. Check temperature switch, line and connection.
oil change h ↑	The service interval for the oil change has expired.	Change the cooling oil.
oil content ↑	Warning The oil content limit for pure air will soon be reached.	Check the scavenge tube in the oil separator cartridge. Check the dirt trap strainer in the scavenge line. Check air treatment upstream of the measurement.
oil content ↑	The oil content limit for pure air has been exceeded.	Check the scavenge tube in the oil separator cartridge. Check the dirt trap strainer in the scavenge line. Check air treatment upstream of the measurement.

Message	Possible cause	Remedy
PD temperature ↓	Warning Compressor outlet (package discharge) temperature is low.	Contact KAESER service.
PD temperature ↑	Warning Compressor outlet (package discharge) temperature too high.	Clean the cooler. Check the cooling oil level.
RAM	Internal RAM defective.	Contact KAESER service.
set output	The 'set output' test function is activated.	Stop the "set output" mode.
separator dp ↑	Oil separator cartridge clogged.	Change the oil separator cartridge.
separator h ↑	The interval for the next oil separator cartridge check has expired.	Change the oil separator cartridge.
system press. ↓	System pressure has fallen below the "sys.press. low" value. Air consumption too high.	Check air demand. Check transducer connections and wiring. Check "sys.press. low" setting.
system press. ↑ (vacuum machines only)	System pressure is above the "sys.press. high" value.	Check for air leaks. Check "sys.press. high" setting. Check if the machine switches to LOAD.

Tab. 39 Warning messages and actions

9.3 Other Alarms

Fault	Possible cause	Remedy
Drive motor overload protection cutout has tripped.	Overload protection cutout is defective or incorrectly set.	Check setting.
	Oil separator cartridge clogged.	Check pressure drop across the separator cartridge. Change the oil separator cartridge if necessary.
	The pressure system does not vent.	Open the shut-off valve in the venting line.
	Motor defective; bearing damage or windings shorted.	
	Airend defective.	

Fault	Possible cause	Remedy
Machine runs but produces no compressed air.	Inlet valve not opening or only opening partially.	
	Venting valve not closing.	
	Leaks in the pressure system.	Check pipework and connections for leaks and tighten any loose fittings.
	Air consumption is greater than the capacity of the compressor.	Check compressed air network for leaks. Shut down the consumer(s).
	Hose coupling or maintenance hose still plugged into the quick-release coupling on the oil separator tank.	Remove coupling or maintenance hose.
Cooling oil runs out of the air filter.	Oil level in the oil separator tank too high.	Drain off oil until the correct level is reached.
	Inlet valve defective.	
Compressor switches between load and idle (off load) more than twice per minute.	Air receiver too small.	
	Flow into the compressed air network restricted.	Increase air pipe diameters. Check filter elements. Switching difference too small (e.g. p1 SD)
Cooling oil leaking into the floor pan.	Hose coupling or maintenance hose still plugged into the quick-release coupling on the oil separator tank.	Remove coupling or maintenance hose.
	Oil cooler leaking	
	Connections leaking.	Tighten connection fittings. Replace seals.
Cooling oil consumption too high.	Unsuitable oil is being used.	Use SIGMA FLUID cooling oil.
	Oil separator cartridge split.	Change the oil separator cartridge.
	Oil level in the oil separator tank too high.	Drain off oil until the correct level is reached.
	Oil return line clogged.	Check dirt trap in the oil return line.

Tab. 40 Other faults and actions

10 Maintenance

10.1 Safety

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



DANGER

Voltage!

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

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



Volt-free contacts may be under power from an external source even when the machine is isolated from the mains supply.



WARNING

Minimum pressure/check valves, pressure relief valves and inlet valves are powerfully spring-loaded.

Fatal injury may occur from incorrect opening of spring-loaded components.

- ✎ Do not open or dismantle valves.
- ✎ Call for authorised service if a fault occurs.



WARNING

Uncontrolled pressure release!

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

- ✎ Close shut-off valves or otherwise isolate the machine from the air main to ensure that no compressed air can flow back into the machine.
- ✎ De-pressurize all pressurized components and enclosures.
- ✎ Check all machine hose connectors with a hand-held pressure gauge to ensure that all read zero .



CAUTION

Leakage

Leaks result in loss of oil and reduced performance.
Damage or complete breakdown can result.

- ✎ Test run on completion of maintenance work.
- ✎ Carry out a visual check of the machine.



Maintenance work may only be carried out by authorised personnel!

Before switching on again ensure that:

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

10.2 Maintenance Schedule



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

According to the way a machine is equipped, sensors and/or maintenance interval counters monitor the operational state of important functional devices. Necessary maintenance tasks are signalled by the SIGMA controller.

📖 Keep a log of all service work.

This enables the frequency of individual maintenance tasks to be compared with KAESER's recommendations. A list is given in chapter 10.16.

10.2.1 Resetting maintenance interval counters

Maintenance interval counters indicate the operating hours between maintenance tasks.

When a maintenance task is completed, reset the corresponding counter to its original value.

See the SIGMA CONTROL service manual.

Pre-condition: Maintenance task completed.
Service message reset.
Activate password level 4.

📖 Select the appropriate entry from the maintenance menu.

📖 Select 'reset' and 'y' and confirm with the enter key.

10.2.2 Regular maintenance work



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

- Pay attention to the controller's service messages.
- Have KAESER Service adjust the maintenance interval counters to suit operating conditions.

Interval	Maintenance tasks	see chapter
weekly	Check cooling oil level.	10.12.1
	Clean or renew the filter mats.	10.3.2 / 10.6
Every 1000 hours	Oil and air cooler maintenance.	10.3
	Heat recovery system maintenance.	10.4
Indicated by SIGMA CONTROL	Air filter maintenance.	10.5
Indicated by SIGMA CONTROL but at least annually.	Change the oil filter.	10.14
Indicated by SIGMA CONTROL but at least every 3 years.	Change the oil separator cartridge.	10.15
Every 2000 h, but at least annually.	Grease the motor bearings.	10.7
Every 3000 hours	Check the coupling.	10.8
variable (see table) 42	Change the cooling oil.	10.13
annually	Check that all electrical connections are tight.	
	Check the pressure relief valve.	10.9
	Check the overheating safety shutdown function	10.10
	Check the oil and air coolers for leaks.	10.3

h. = operating hours

Tab. 41 Regular maintenance work

10.2.3 Cooling oil changing intervals

- Please observe national regulations regarding the use of cooling oil in oil-injected screw compressors.

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



KAESER Service will support you in determining appropriate intervals and provide information on the possibilities of oil analysis.

- Check operating conditions and adjust intervals as necessary; keep results in a table 42 for future reference.

Cooling oil	Maximum permissible oil change interval [operating hours / year]		
	Favourable operating conditions*	Unfavourable operating conditions	My operating conditions
SIGMA FLUID PLUS / S-460	6 000** / 2	3 000 / 1	
SIGMA FLUID MOL	3 000 / 1	2 000 / 1	
SIGMA FLUID FGL	3 000 / 1	2 000 / 1	
SIGMA FLUID FGH	3 000 / 1	2 000 / 1	

* Cool to moderate ambient temperatures, low humidity, high duty cycle

** Changing intervals > 6000 operating hours, permissible only with oil analysis.

Tab. 42 Cooling oil changing intervals

10.2.4 Regular service work



Only authorised KAESER service agents should carry out service work.

When operating conditions are unfavourable (e. g. dusty atmosphere) or when the equipment is heavily utilised, service work must be carried out more frequently.

Interval	Service tasks
up to 12000 hours	Check valves.
Up to 12000 hours, at the latest every 3 years	Change the fan motor bearings or the motor complete. (non re-greasable bearings)
Up to 36000 hours, at the latest every 8 years	Change the fan motor bearings (re-greasable bearings)
	Change the compressor drive motor bearings.
	Change the coupling.
	Change the hose lines.

h = operating hours

Tab. 43 Regular service intervals

10.3 Cooler Maintenance

10.3.1 Air cooling (option K1)

Material: brush
vacuum cleaner

Pre-condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

Check the cooler regularly for contamination. Frequency is mainly dependant on local operating conditions.



Contamination causes overheating and machine damage.

Avoid dust disturbance. Wear breathing apparatus if necessary.

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

A severely contaminated cooler should be cleaned by a KAESER service agent.

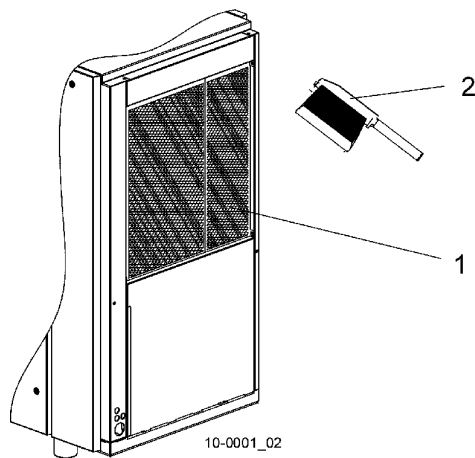



Fig. 20 Cleaning the cooler

- 1 Cooler
- 2 Brush

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

10.3.2 Filter mat maintenance (option K3)

Material: Warm water and household detergent
Spare parts (as required)

Pre-condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

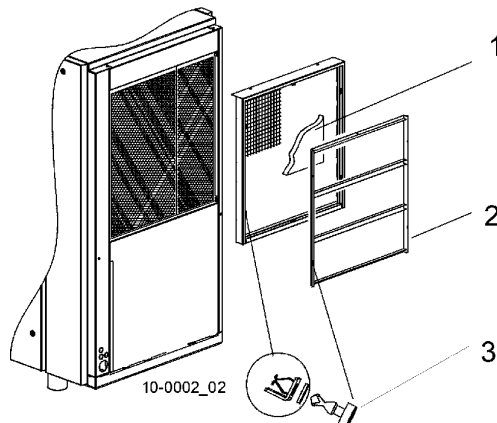


Fig. 21 Cooler filter mats

- 1 Filter mat
- 2 Retaining frame
- 3 Fixing

Removal

- ✎ Unlock the fixings (3).
Use a screwdriver to turn the fixing 90° anti-clockwise.
- ✎ Remove the frame (2).

Cleaning

- ✎ Beat the mat (1) or use a vacuum cleaner to remove loose dirt. If necessary, wash the mat in lukewarm water and household detergent then rinse thoroughly.
- Renew the mat if cleaning is not possible or has already been carried out five times.

Replacing

- ✎ Replace the frame and close the fixings.
Press and turn the fixings 90° clockwise until they latch.

10.3.3 Water cooling maintenance (option K2)

Pre-condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

Check the cooler regularly for leaks and contamination. Frequency of checking is dependent on the characteristics of the cooling water.



Contamination causes overheating and machine damage.

- ✎ Observe the airend discharge temperature to detect any tendency to rise.

Cleaning:

- ✎ An authorised KAESER service agent should clean the cooler when the airend discharge temperature is 10 °C above the annual average.

Leakage

Pressure in the cooling oil circuit is generally higher than that in the cooling water system. If a leak occurs, oil will run into the cooling water.

- ✎ Check the cooler visually for leaks.
- ✎ Have an authorised KAESER service agent check the cooler for internal leaks at least once a year.

10.4 Internal Heat Recovery Maintenance (option W2 / W3)

Pre-condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

Deposits in the heat exchanger in machines with heat recovery systems can adversely affect heat transfer.

Check the heat exchanger regularly for leaks and contamination. Frequency of checking is dependant on the characteristics of the heat transfer medium.

Contamination

- ☞ Have an authorised KAESER service agent clean the heat exchanger as soon as a pressure drop in the heat transfer medium is detected.

Leakage

If a leak occurs, cooling oil can flow into the heat transfer medium as pressure the cooling oil circuit is generally higher.

- ☞ Check the heat exchanger visually for leaks.
- ☞ Have an authorised KAESER service agent check the heat exchanger for internal leaks at least once a year.

10.5 Air Filter Maintenance.

Material: Compressed air for blowing out
Spare parts (as required)

Pre-condition: Machine is switched off
Mains disconnect is locked out
Machine is cooled down.

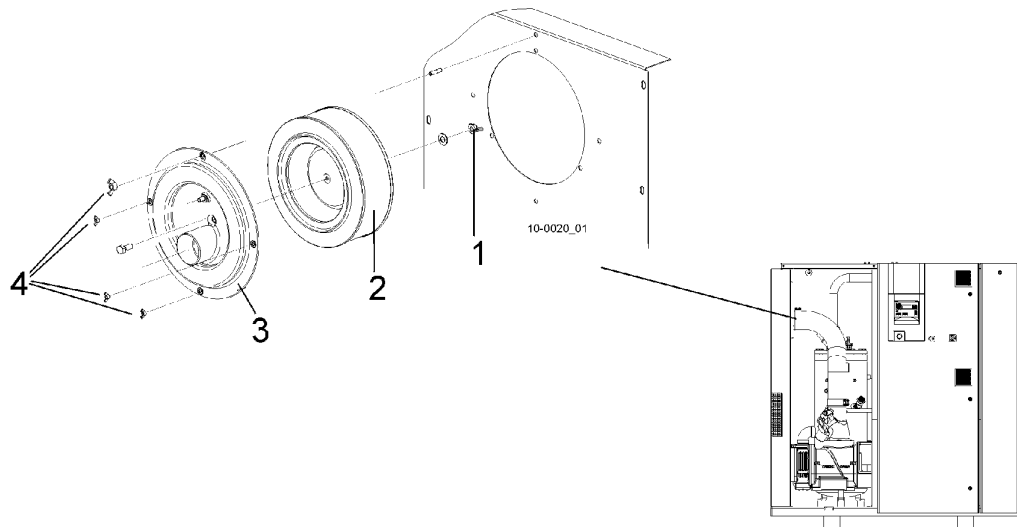


Fig. 22 Air filter maintenance.

- | | |
|------------------------|---------|
| 1 Nut | 3 Cover |
| 2 Air filter cartridge | 4 Nut |

Open the air filter housing:

- ✎ Unscrew the nuts (4) and lift out the cover (3) together with the air filter cartridge (2).
- ✎ Unscrew the nut (1) and remove the air filter cartridge.



Do not clean the air filter cartridge with liquids.

All sealing surfaces are matched to each other.

The use of unsuitable air filter cartridges can permit dirt to ingress into the pressure system and cause damage to the machine.

Clean the air filter cartridge by tapping

Renew the air filter cartridge after two years at the latest or after it has been cleaned five times.

- ✎ Tap the cartridge at the end a number of times with the palm of the hand.

Cleaning the air filter cartridge with compressed air:

- ✎ Use dry compressed air (< 5 bar!) to blow dirt from the air filter cartridge at a slant from the inside to the outside.

Close the air filter housing

- ✎ Clean all parts and sealing surfaces.
- ✎ Insert the air filter cartridge in the cover and affix with the nut (1).
- ✎ Affix the cover in the machine with the nuts (4).
- ✎ Close all access doors and replace all cover panels.
- ✎ Switch on the power supply and reset the maintenance interval counter.

10.6 Filter mat maintenance (control cabinet)

Material: Warm water and household detergent
Spare parts (as required)

Pre-condition: Machine switched off
Mains disconnect is locked out
Machine is cooled down.

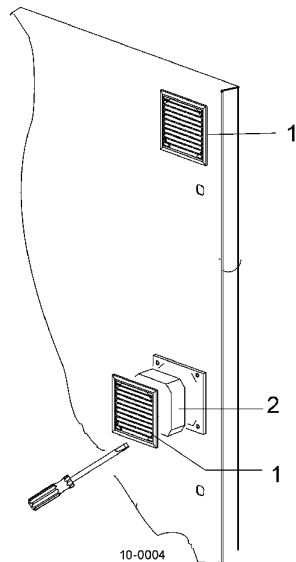


Fig. 23 Ventilator grill

- 1 Ventilator grill
- 2 Filter mat

Removal

- ✎ Remove the ventilator grill (1) and the filter mat (2).

Cleaning

- ✎ Beat the mat or use a vacuum cleaner to remove loose dirt. If necessary, wash the mat in lukewarm water (40 ° C) and household detergent then rinse thoroughly. Renew the mat if cleaning is not possible or has already been carried out five times.

Replacing

- ✎ Lay the filter mat in the frame and push on the grill to latch.

10.7 Electric Motor Maintenance

Material: Bearing grease
Cleaning rags

Pre-condition: Motor running.



Hot components – danger of burns

- ✎ Wear long-sleeved clothing and gloves.
- ✎ Work carefully.



High-temperature grease ESSO UNIREX N3 should be used for re-greasing the motor bearings. Bearing damages caused by the use of other brands of grease are excluded from the warranty.

Compressor motor

The motor bearings are fitted with grease nipples.

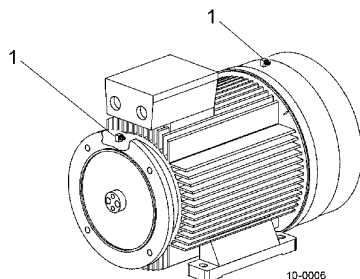


Fig. 24 Compressor motor maintenance

1 Grease nipple

- ✚ Clean the grease nipple (1) with a rag.
- Apply the quantity of grease as stated on the motor nameplate.
- ✚ Grease both bearings with a grease gun.
- ✚ Close all access doors; replace and secure all removable panels.
- ✚ Reset the maintenance interval counter.

Fan motor with grease nipple

The fan motor is equipped with grease nipples for re-greasing the bearings.

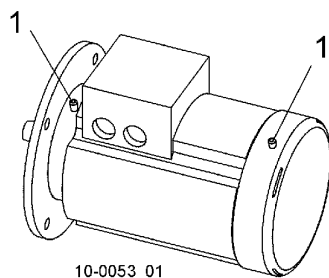


Fig. 25 Fan motor maintenance

1 Grease nipple

- ✚ Clean the grease nipple (1) with a rag.
- See chapter 2.7.2 for the required grease volume.
- ✚ Grease both bearings with a grease gun.
- ✚ Close all access doors; replace and secure all removable panels.

Fan motor without grease nipple

Fan motor bearings are permanently greased and need no further greasing.

10.8 Checking the Coupling



WARNING

Danger of injury from rotating coupling!

Severe injury could result from touching the coupling while it is rotating.

- ✚ Never switch the machine on without the guard in place over the coupling.

The coupling must be carefully inspected at regular intervals.

A defective coupling is recognisable by:

- noisy running,
- surface cracks,
- colour change.

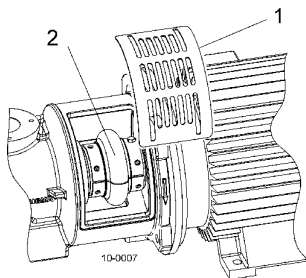


Fig. 26 Checking the Coupling

- 1 Safety screen
- 2 Coupling

Check for uneven or noisy running

- ☞ Switch the machine on.
- ☞ Check the coupling (2) for noisy or uneven running.

Check for damage

Pre-condition: Machine switched off.
Mains isolator locked off
Machine cooled down.

- ☞ Remove the fixing screws from the safety screen (1).
- ☞ Turn the coupling by hand and look for damage or colour change.
- ☞ Have a damaged coupling changed by an authorised KAESER Service agent.
- ☞ Refit the safety screen.
- ☞ Close all access doors and replace all cover panels.

10.9 Checking the pressure relief valve.

Pre-condition: Machine switched off.
Activate password level 4.

In order to check the pressure relief valve, the machine's working pressure is raised above the blowoff pressure of the valve.



WARNING

Pressure relief valve blows off.

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

- ☞ Close all access doors; replace and secure all removable panels.
- ☞ Wear ear and eye protection.
- ☞ Abort the test if the working pressure reaches 10% above the blowoff pressure of the valve.



Carry out the test exactly as described in the SIGMA CONTROL manual.

Blowoff protection and system pressure monitoring are switched off during the test.

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

- ✎ Close the user's shut-off valve between the machine and the air main.
- ✎ Read the blowoff pressure on the valve. (the blow-off pressure is usually to be found at the end of the part identification)
- ✎ Observe the pressure indicator on the SIGMA controller and call up the test function.
- ✎ Stop the test as soon as the pressure relief valve blows off or working pressure reaches 10% above the blowoff set point.
- ✎ If necessary, vent the machine and replace the pressure relief valve.
- ✎ Deactivate the test function.
- ✎ Open the user's shut-off valve between the machine and the air main.

10.10 Checking the Overheating Safety Shutdown Function

The machine should shut down if the airend discharge temperature reaches 110° C.

A detailed description of the checking procedure is to be found in the SIGMA CONTROL service manual.

10.11 Venting the Machine Manually

Pre-condition: Machine switched off.
Mains isolator locked off
Machine cooled down.



WARNING

Compressed air can cause injury or death.

Compressed air and devices under pressure can injure or cause death if the contained energy of the air is released suddenly or uncontrolled.

After shutting down the compressor and venting the oil separator tank there is still pressure on the check valve from the air main.

- ✎ Close the shut-off valve provided by the user to isolate the machine from the air main.
- ✎ Vent the oil separator tank.
- ✎ Vent the air aftercooler to completely depressurise the system between the user's shut-off valve and the minimum pressure/check valve.



CAUTION

Escaping oil mist is damaging to health.

- ✎ Do not direct the maintenance hose at a person while venting.
- ✎ Do not inhale oil mist or vapour.
- ✎ Avoid contact with skin and eyes.

Before undertaking any maintenance or service work on the pressure system the machine must be isolated from the air system and completely vented.

The machine is vented in three stages:

- the oil circuit vents automatically when the machine is switched off,
- air is vented manually from the oil separator tank,
- air is vented manually from the air cooler.

Venting

☞ Close the user's shut-off valve between the machine and the air main.



If no shut-off valve is provided, the complete air system must be vented.

The hose coupling, shut-off valve and maintenance hose lie beneath the oil separator tank.

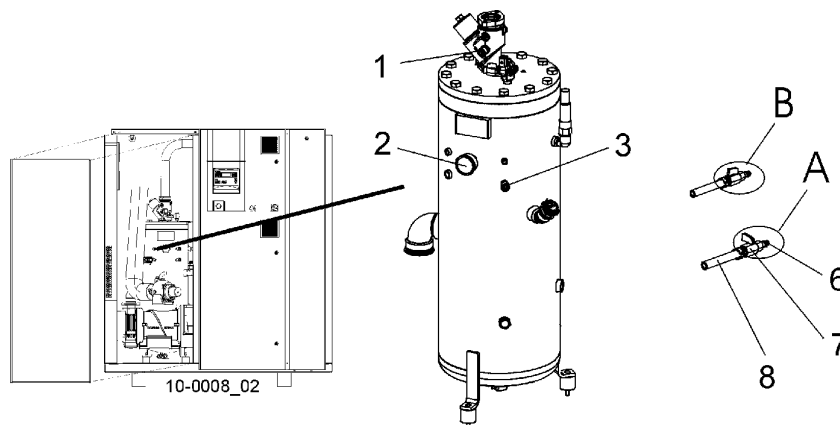


Fig. 27 Ventilate the machine.

- | | |
|----------------------------------------------|------------------------------|
| 1 Hose coupling (air cooler venting) | 6 Male hose coupling/fitting |
| 2 Pressure gauge | 7 Shut-off valve |
| | A: closed |
| | B: open |
| 3 Hose coupling (oil separator tank venting) | 8 Maintenance hose |

☞ Check that the oil separator tank pressure gauge reads zero.



After automatic venting the pressure gauge does not read zero?

☞ Make sure that the shut-off valve is closed.

☞ If manual venting does **not** bring the oil separator tank pressure gauge to zero, call KAESER service.

Manually venting the oil separator tank

- ☞ With the shut-off valve closed, insert the male hose fitting (6) into the hose coupling (3).
- ☞ Open the shut-off valve (7) slowly to release pressure.
- ☞ Withdraw the male hose fitting and close the shut-off valve.

Manually venting the compressed air cooler

- ✚ With the shut-off valve closed, insert the male hose fitting (6) into the hose coupling (1).
- ✚ Open the shut-off valve (7) slowly to release pressure.
- ✚ Withdraw the male hose fitting and close the shut-off valve.

10.12 Checking and Topping up the Cooling Oil
10.12.1 Check cooling oil level.

Pre-condition: Machine has been running at least five minutes under load.
 (minimum 50 Hz for machines under frequency control).


CAUTION
Danger of burning from hot surfaces!

Skin burns are possible.

- ✚ Wear long-arm garments and protective gloves.
- ✚ Work carefully.

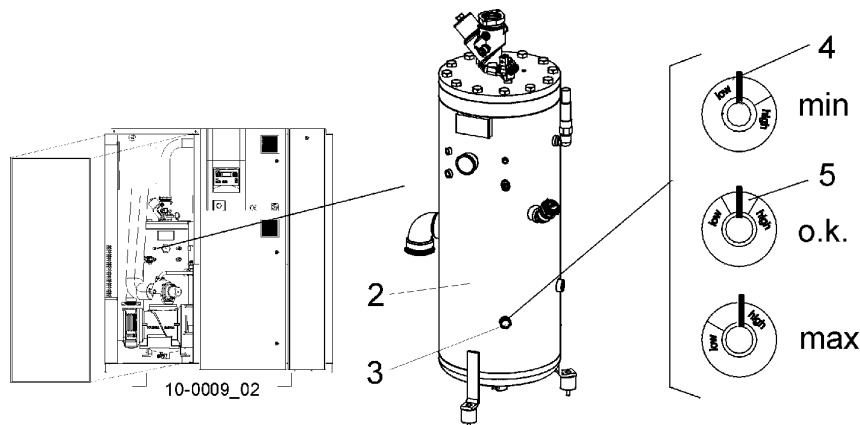


Fig. 28 Check cooling oil level.

- 2 Oil separator tank
- 3 Oil level indicator
- 4 Indicator markings
- 5 Green zone

- min Minimum oil level
- OK Oil level optimum
- max Oil level maximum

- ✚ Readout oil level.

When the indicator shows minimum level, top up the oil.

10.12.2 Topping up the cooling oil

Material: Cooling oil

Pre-condition: Machine switched off
 Mains isolator locked off
 Machine cooled down.


Danger of explosion from oils and lubricants!

Danger of explosion from oil mist and vapours.

- ☞ Fire, naked flame and smoking are forbidden!


Damage to the machine from unsuitable oil

- ☞ Never mix different types of oil.
- ☞ Top up only with the same type of oil as already in the machine.

Venting

- ☞ Close the user's shut-off valve between the machine and the air main.



If no shut-off valve is provided, the complete air system must be vented.

The hose coupling, shut-off valve and maintenance hose lie beneath the oil separator tank.

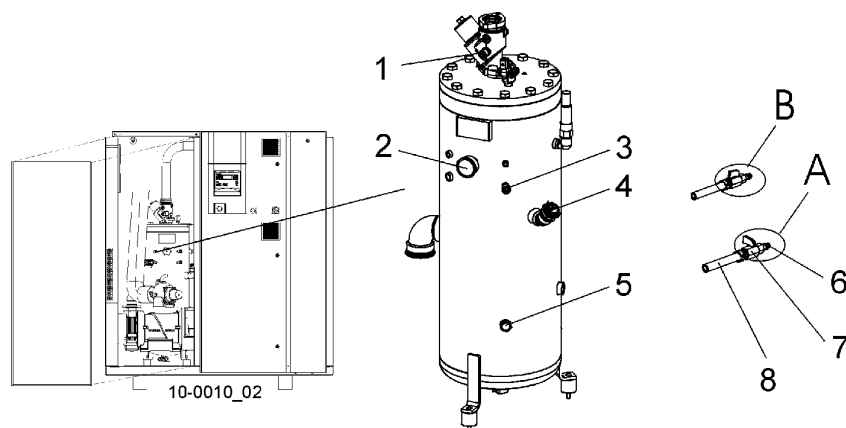


Fig. 29 *Topping up the cooling oil*

- | | |
|----------------------------------------------|------------------------------------------|
| 1 Hose coupling (air cooler venting) | 5 Oil level indicator |
| 2 Pressure gauge | 6 Male hose coupling/fitting |
| 3 Hose coupling (oil separator tank venting) | 7 Shut-off valve
A: closed
B: open |
| 4 Oil filling port with plug | 8 Maintenance hose |

- ☞ Check that the oil separator tank pressure gauge (2) reads zero.



After automatic venting the pressure gauge does not read zero?

- ☞ Make sure that the shut-off valve is closed.
- ☞ If manual venting does **not** bring the oil separator tank pressure gauge to zero, call KAESER service.

Manually venting the oil separator tank

- ☞ With the shut-off valve closed, insert the male hose fitting (6) into the hose coupling (3).
- ☞ Open the shut-off valve (7) slowly to release pressure.
- ☞ Withdraw the male hose fitting and close the shut-off valve.

Manually venting the compressed air cooler

- ✎ With the shut-off valve closed, insert the male hose fitting (6) into the hose coupling (1).
- ✎ Open the shut-off valve (7) slowly to release pressure.
- ✎ Withdraw the male hose fitting and close the shut-off valve.

Topping up the cooling oil

- ✎ Open the filler plug (4) slowly.
- ✎ Top up the cooling oil.
- ✎ Replace the plug gasket if necessary and re-insert the plug.

Start the machine and carry out a test run

- ✎ Close all access doors; replace and secure all removable panels.
- ✎ Open the user's shut-off valve between the machine and the air main.
- ✎ Start the machine and allow it to idle for at least one minute. Then switch to LOAD.
- ✎ After about five minutes, check the oil level and top up if necessary.
- ✎ Carry out a visual check for leaks.

10.13 Changing the Cooling Oil

Material: Cooling oil
Oil catchment container

**CAUTION****Danger of burns from hot components and oil.**

- ✎ Wear long-sleeved clothing and gloves.
- ✎ Work carefully.



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

Drain the oil thoroughly from:

- Oil separator tank
- Oil cooler
- Airend
- The heat recovery system (if installed).

Compressed air helps to expel the oil.

This pressure can be generated by the machine itself.

Alternatively, an external source of compressed air can be used.

External air is necessary if:

- the machine is not operational,
- the machine is to be restarted after a long standstill period.

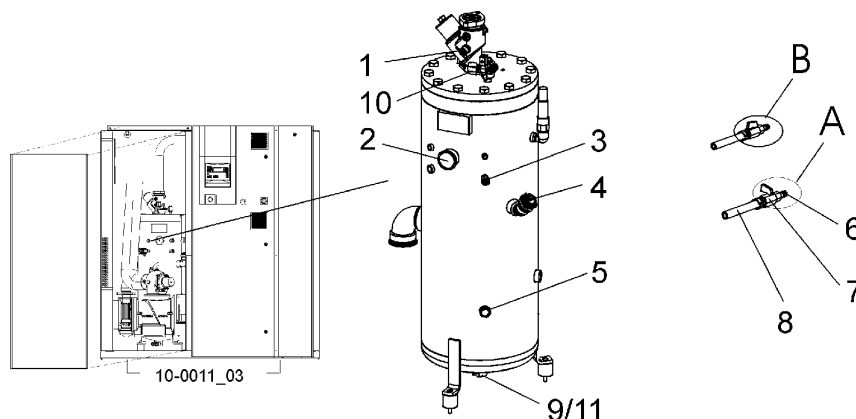


Fig. 30 Changing the cooling oil, oil separator tank

- | | |
|----------------------------------------------|------------------------------------------|
| 1 Hose coupling (air cooler venting) | 6 Male hose coupling/fitting |
| 2 Pressure gauge | 7 Shut-off valve
A: closed
B: open |
| 3 Hose coupling (oil separator tank venting) | 8 Maintenance hose |
| 4 Oil filling port with plug | 9 Hose coupling (oil drain) |
| 5 Oil level indicator | 10 Shut-off valve (venting line) |
| | 11 Shut-off valve (oil drain) |

Changing the oil with help from internal pressure

Pre-condition: The machine has been running at least five minutes under LOAD.
Machine is switched off.
Machine fully vented (no pressure).
Pressure gauge on the oil separator tank indicates zero.

- ☞ Close the shut-off valve (10) in the venting line.
- ☞ Start the machine in idle mode and watch the oil separator tank pressure gauge (2) until it reads 3–5 bar.
- ☞ Switch the machine off.
- ☞ Switch off and lock out the supply disconnecting device.
- ☞ Wait at least two minutes for oil to flow back to the separator tank.

Changing the oil with help from an external pressure source

Pre-condition: Machine switched off.
Supply disconnecting device switched off and locked out.
Machine fully vented (no pressure).
Pressure gauge on the oil separator tank indicates zero.
External source of compressed air available.

- ☞ Close the shut-off valve (10) in the venting line.
- ☞ With the shut-off valve closed, insert the male hose fitting (6) into the hose coupling (3).

- ✎ Connect the maintenance hose to an external air supply.
- ✎ Open the shut-off valve (7) until the pressure gauge on the oil separator tank reads 3–5 bar.
- ✎ Close the shut-off valve (7) and withdraw the hose fitting from the coupling.

10.13.1 Draining the oil from the separator tank



Contact KAESER Service if condensate is detected in the oil.
It is necessary to adjust the airend discharge temperature to suit operating conditions.

- ✎ Have an oil container ready.
- ✎ With the shut-off valve closed, insert the male hose fitting (6 in Fig. 30) into the hose coupling (9, Fig. 30).
- ✎ Place the end of the maintenance hose in the oil container and secure it in place.
- ✎ Open the shut-off valve (11, Fig. 30).
- ✎ Open the shut off valve (7, Fig. 30) in the maintenance hose slowly and close when air escapes.
- ✎ Close the shut-off valve (11, Fig. 30) and disconnect the hose.

10.13.2 Draining the oil from the cooler

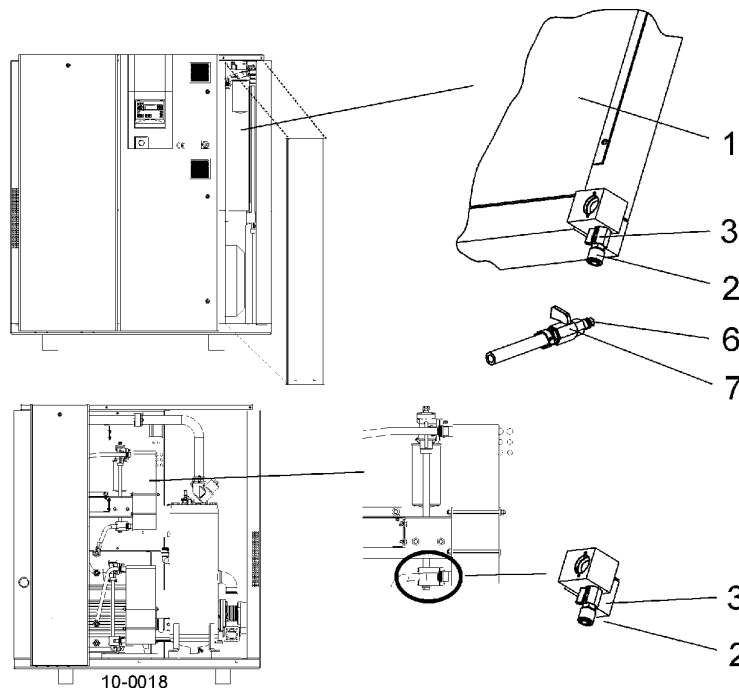


Fig. 31 Changing the cooling oil, oil cooler

- | | | | |
|---|---------------------------|---|----------------------------|
| 1 | Oil cooler | 6 | Male hose coupling/fitting |
| 2 | Hose coupling (oil drain) | 7 | Shut-off valve |
| 3 | Shut-off valve | | |

- ✎ Have an oil container ready.
- ✎ With the shut-off valve closed, insert the male hose fitting (6) into the hose coupling (2).
- ✎ Place the end of the maintenance hose in the oil container and secure it in place.
- ✎ Open the shut-off valve (3).
- ✎ Open the shut-off valve (7) slowly and allow oil and air to drain completely.
- ✎ Check that the oil separator tank pressure gauge reads zero.
- ✎ Close the shut-off valve (3) and unplug the hose.

10.13.3 Draining the oil from the airend:

Pre-condition: Machine fully vented (no pressure)

Pressure gauge on the oil separator tank indicates zero.

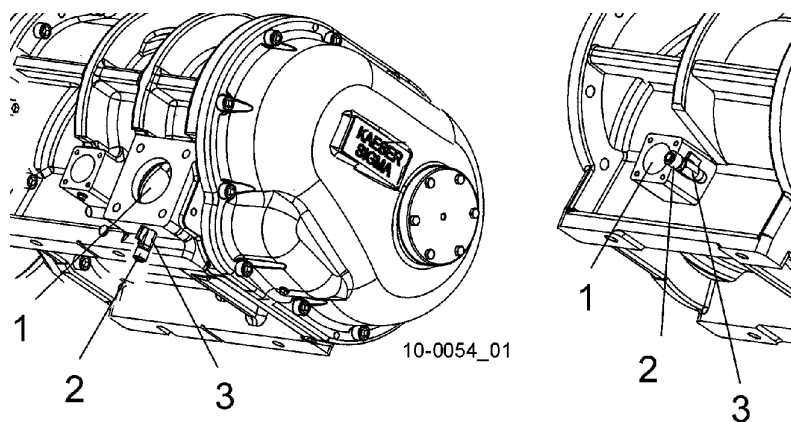


Fig. 32 Changing the cooling oil, airend

- 1 Airend discharge
- 2 Hose coupling (oil drain)
- 3 Shut-off valve

- ✎ Have an oil container ready.
- ✎ With the shut-off valve closed, insert the male hose fitting (6 in Fig. 31) into the hose coupling (2).
- ✎ Place the end of the maintenance hose in the oil container and secure it in place.
- ✎ Open the shut-off valve (3) and (7. Fig. 31).

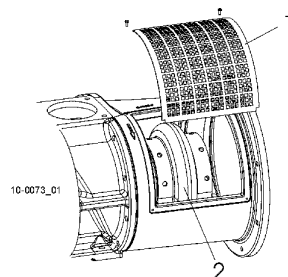


Fig. 33 Turning the coupling

- 1 Safety screen
- 2 Coupling

- ✎ Remove the protective screen (1, Fig. 33) and turn the coupling (2, Fig. 33) by hand at least five revolutions until all the oil has run out.

- ✎ Replace and secure the safety screen (1, Fig. 33).

- ✎ Close the shut-off valve (3) and unplug the hose.

Turning the coupling can cause a small amount of oil to flow back to the cooler and separator tank.

- ✎ Drain oil from the separator tank via the hose coupling (9, Fig. 30).

- ✎ Drain oil from the oil cooler via the hose coupling (2, Fig. 31).

10.13.4 Draining the oil from the heat recovery system (option W1/W2/W3)

Pre-condition: Machine fully vented (no pressure)

Pressure gauge on the oil separator tank indicates zero.

The procedure is dependent on the heat recovery system installed.

Internal heat recovery (option W2 / W3)

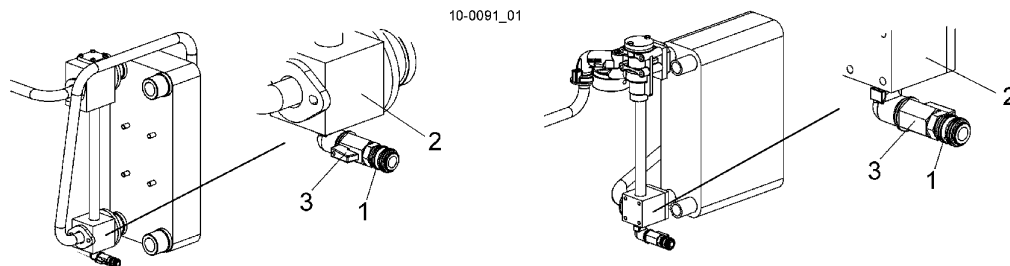


Fig. 34 Cooling oil changing, internal heat recovery

- 1 Hose coupling
- 2 Thermostatic valve
- 3 Shut-off valve

- ✎ Have an oil container ready.

- ✎ With the shut-off valve closed, insert the male hose fitting (6 in Fig. 31) into the hose coupling (1) on the thermostatic valve (2).

- ✎ Place the end of the maintenance hose in the oil container and secure it in place.

- ✎ Open the shut-off valve (3) and (7, Fig. 31) and wait for the cooling oil to drain out.

- ✎ Close the shut-off valve (3) and unplug the hose.

Prepared for heat recovery (option W1)

- ✎ Have an oil container ready.

- ✎ Use the maintenance hose to drain the oil from the drain point of the heat recovery system.

10.13.5 Filling with cooling oil

- ✎ Open the oil filler plug (4, Fig. 30) slowly.

- ✎ Fill with oil.

i Machines with heat recovery systems need correspondingly more oil.

- ✎ Check the plug and gasket for damage and re-insert the plug.

10.13.6 Start the machine and carry out a test run.

- ✚ Open the shut-off valve (10, Fig. 30) in the venting line.
- ✚ Close all access doors; replace and secure all removable panels.
- ✚ Open the user's shut-off valve between the machine and the air main.
- ✚ Switch on the power supply and reset the maintenance interval counter.
- ✚ Allow the machine to idle for at least one minute. Then switch to LOAD.
- ✚ After about ten minutes, check the oil level and top up again, if necessary.
- ✚ Carry out a visual check for leaks.

10.14 Oil filter maintenance

Material: Spare parts
Have the oil container ready.

Pre-condition: Machine switched off
Mains isolator locked off
Machine fully vented (no pressure).
Pressure gauge on the oil separator tank indicates zero.

**CAUTION**

Danger of burning from hot components and oil.

- ✚ Wear long-arm clothing and gloves.
- ✚ Work carefully.

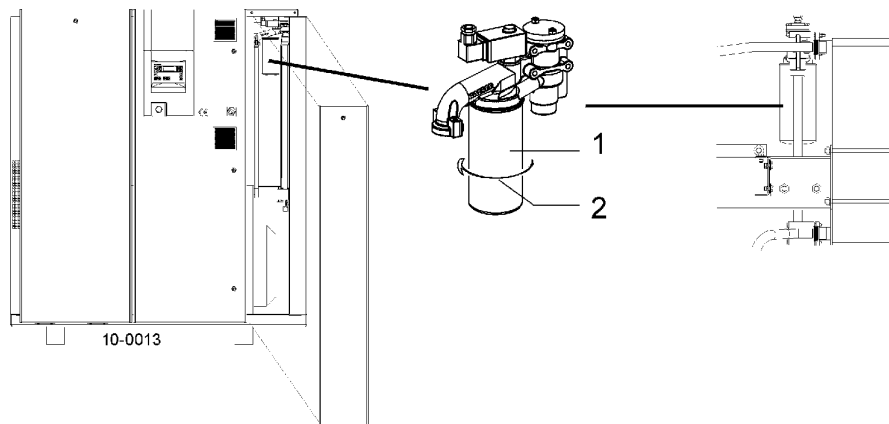


Fig. 35 Changing the Oil Filter

- 1 Oil filter
- 2 Direction to unscrew



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

- ✚ Unscrew the oil filter anti-clockwise, catch oil spillage and dispose of correctly.
- ✚ Lightly oil the new oil filter gasket.



Screw on the new filter using hand pressure only. Do not use any tool.

☞ The oil filter is turned clockwise to tighten.

Start the machine and carry out a test run

- ☞ Close all access doors; replace and secure all removable panels.
- ☞ Open the user's shut-off valve between the machine and the air main.
- ☞ Switch on the power supply and reset the maintenance interval counter.
- ☞ Allow the machine to idle for at least one minute. Then switch to LOAD.
- ☞ After about five minutes, check the oil level and top up if necessary.
- ☞ Carry out a visual check for leaks.

10.15 Changing the Oil Separator Cartridge

Material: Spare parts
Cleaning rags

Pre-condition: Machine switched off.
Mains isolator locked off
Machine fully vented (no pressure).
Pressure gauge on the oil separator tank indicates zero.
Machine cooled down.

The life of the oil separator cartridge is influenced by:

- contamination in the air drawn into the compressor,
- adherence to the schedule of oil and air filter changes,

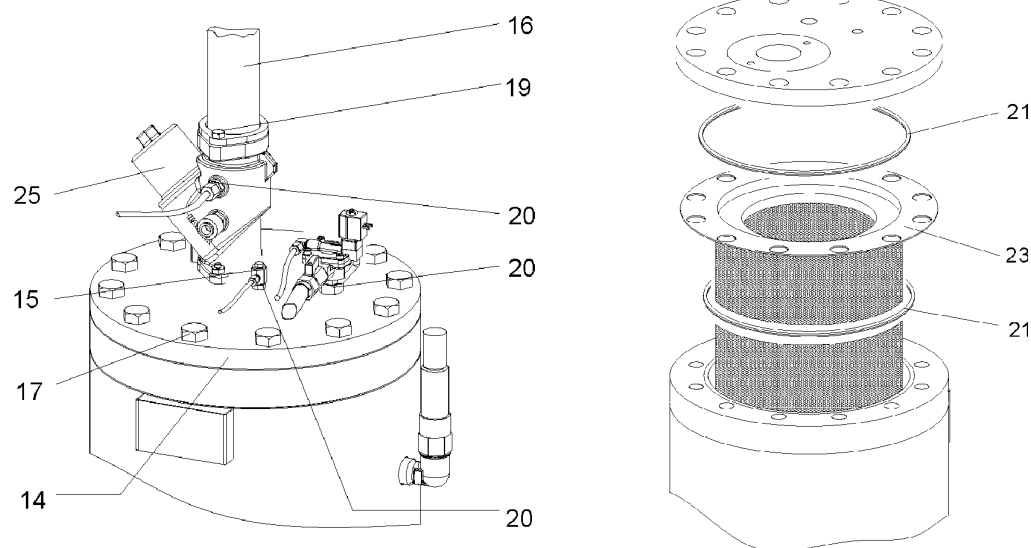


Fig. 36 Changing the Oil Separator Cartridge

- | | |
|--------------------|---------------------------------|
| 14 Cover | 19 Pipe fitting |
| 15 Dirt trap | 20 Fitting |
| 16 Air pipe | 21 Gasket |
| 17 Retaining screw | 23 Oil separator cartridge |
| | 25 Minimum pressure/check valve |

- ✎ Unscrew the fitting (20) and carefully put the parts to one side; pull out the copper pipe at item (15).
- ✎ Unscrew the fittings (19) from the ends of the air pipe (16).
- ✎ Withdraw the air pipe from the minimum pressure/check valve (25) and push carefully to one side.
- ✎ Remove the cover retaining screws (17) and carefully lift the cover (14).



The oil separator element cannot be cleaned.



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

- ✎ Take out the old oil separator element (23) together with the gaskets (21) and dispose of according to environmental regulations.
- ✎ Wipe all sealing faces with a cleaning rag.
- ✎ Insert the new oil separator cartridge with gaskets and re-fix the cover.
- ✎ Renew the dirt trap (15) strainer and O-ring.
- ✎ Connect the air pipe to the minimum pressure/check valve.
- ✎ Replace and tighten all fittings.

Start the machine and carry out a test run

- ✎ Close all access doors; replace and secure all removable panels.
- ✎ Open the user's shut-off valve between the machine and the air main.
- ✎ Switch on the power supply and reset the maintenance interval counter.
- ✎ Allow the machine to idle for at least one minute. Then switch to LOAD.
- ✎ Carry out a visual check for leaks.

Machine number:

[illegible]

Tab. 44	Maintenance log
---------	-----------------

11 Spares, Operating Materials, Service

11.1 Note the nameplate

Please quote the data on the nameplate for all enquiries and spare parts orders.

11.2 Ordering Maintenance Parts and Operating Materials



CAUTION

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

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

Damage to the machine can also result in personal injury.

☞ Use only genuine spare parts and authorised operating materials.

☞ Have an authorised KAESER service agent carry out regular maintenance.

KAESER maintenance parts and operating materials correspond to the original. These are correct for use in our machines.

Machine

Name	Quantity	Number
Air filter cartridge	1	1250
Filter mat (control cabinet ventilator)	2	1100
Filter mat (cooler)	1	1050
Oil filter	1	1200
Oil separator cartridge	1	1450
Cooling oil	1	1600
Bearing grease [g]	100	9.0915.0
	400	6.3234.0

Tab. 45 Machine maintenance parts

11.3 Maintenance Contract

☞ Sign a maintenance contract with an authorised KAESER service agent.

This ensures the utmost reliability and availability of your compressed air supply system.

11.4 Service Addresses

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

11.5 Spare Parts for Service and Repair



Any inspection, maintenance or repair tasks not described in this manual should be carried out by an authorised KAESER service agent.

With the help of this parts list you can obtain in advance the spares you need in accordance with your operating conditions.

Spare Parts List

Rotary Screw Compressor

without refrigeration dryer

without frequency converter

- K1 - air-cooled

- K2 - water-cooled

KAESER

<http://www.kaeser.com>

Dok.Nr. **SEL-1059_02E**

Model

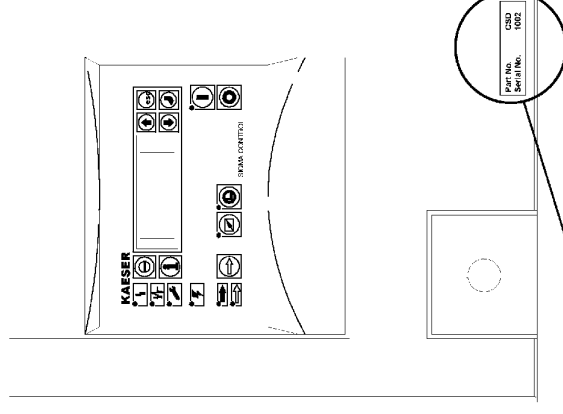
CSD

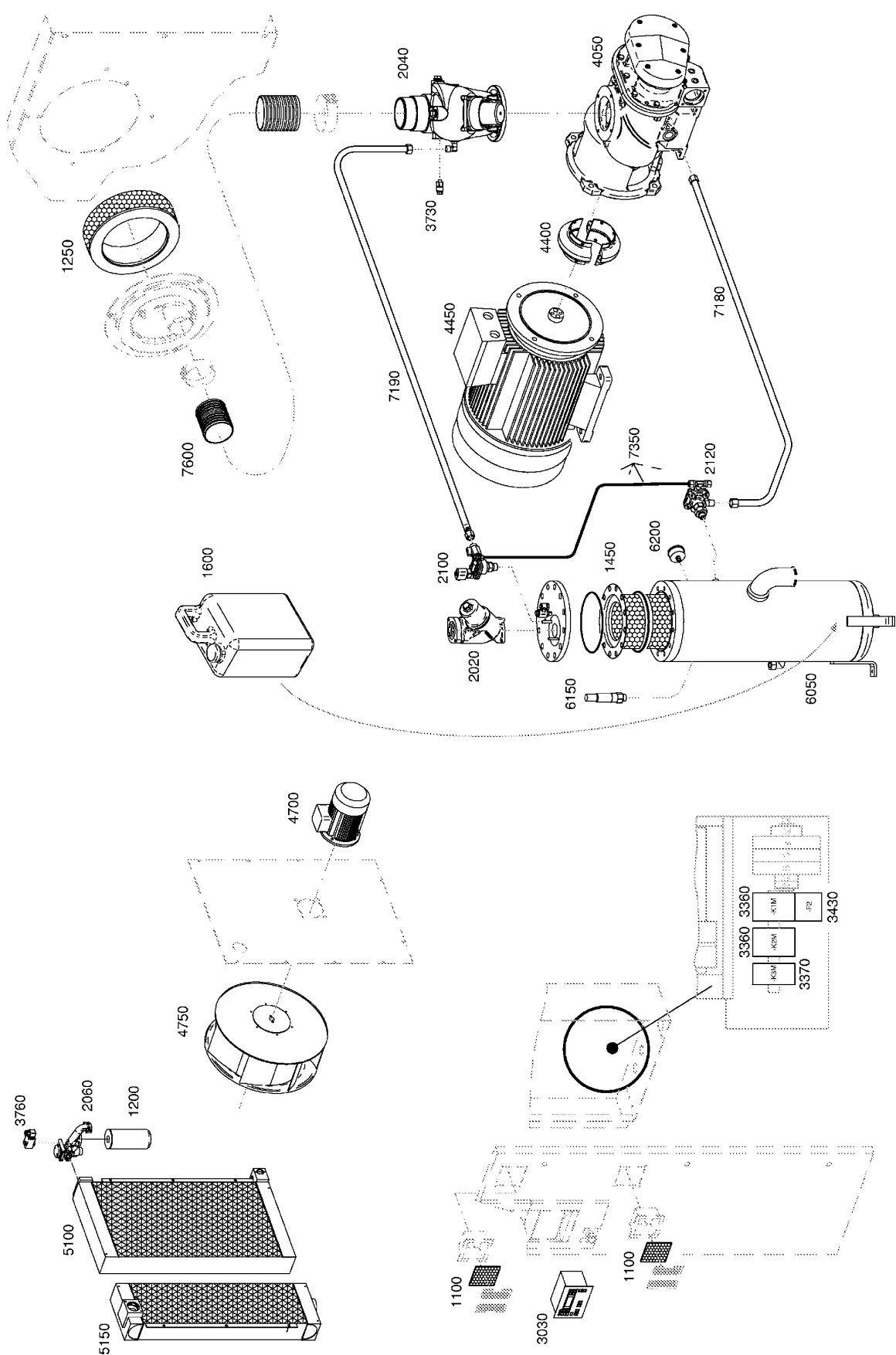
part number

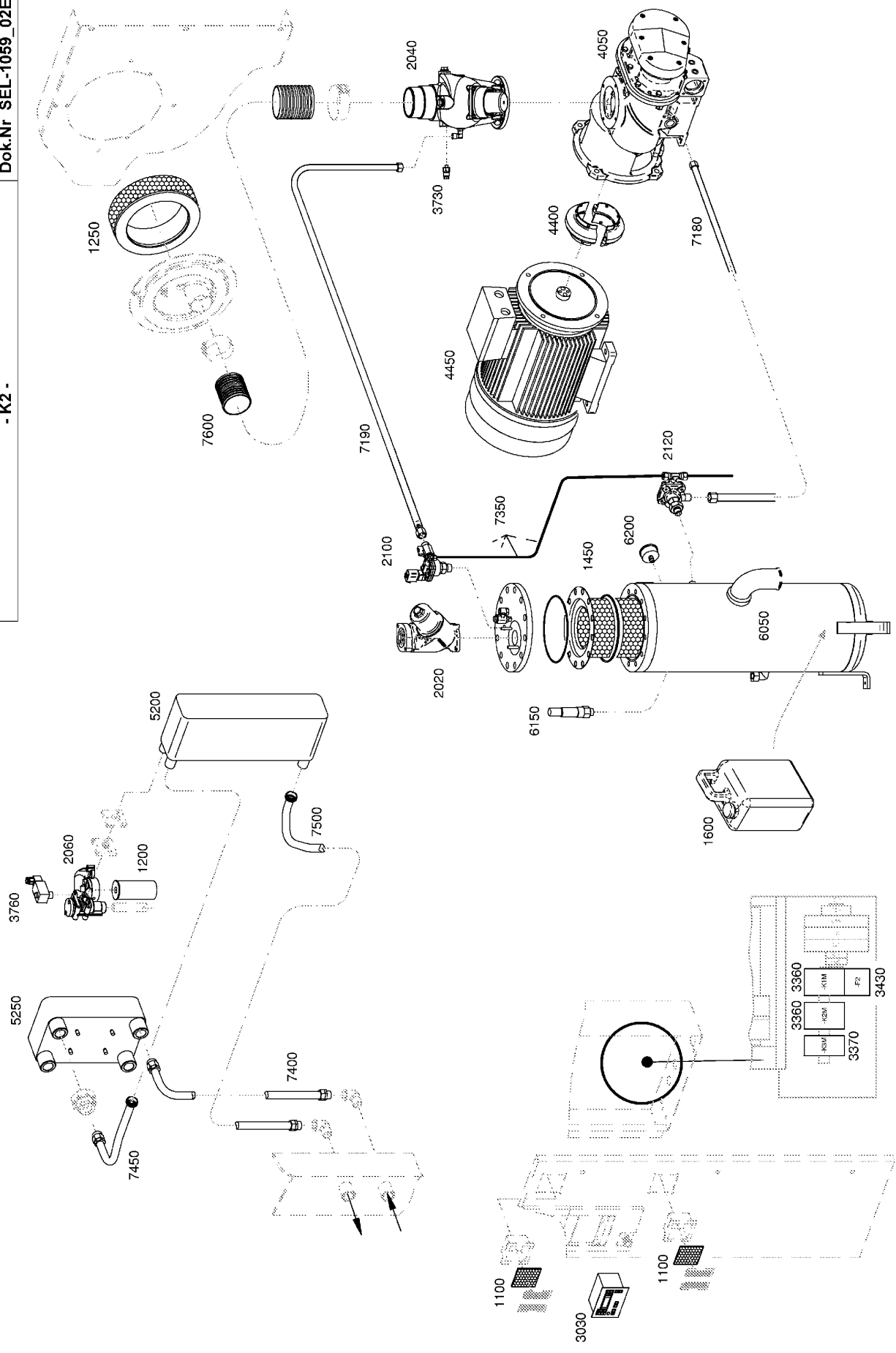
Serial number

ATTENTION!

Please quote the material number and serial number of the machine (see controller below right) when ordering spare parts together with the item number and the description of the spare part.







Legend	KAESER
	Dok.Nr. SEL-1059 02E

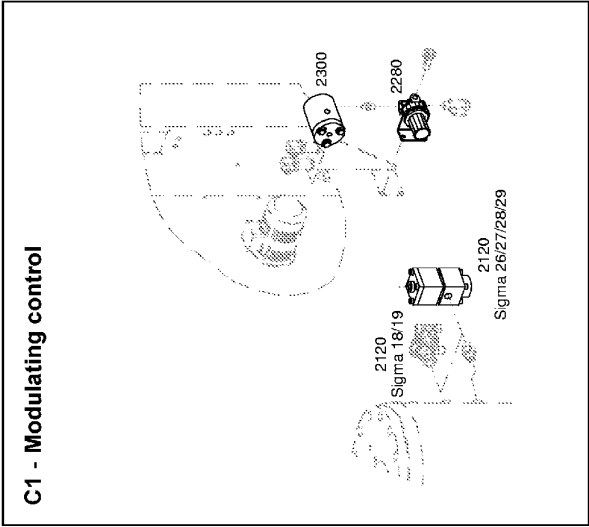
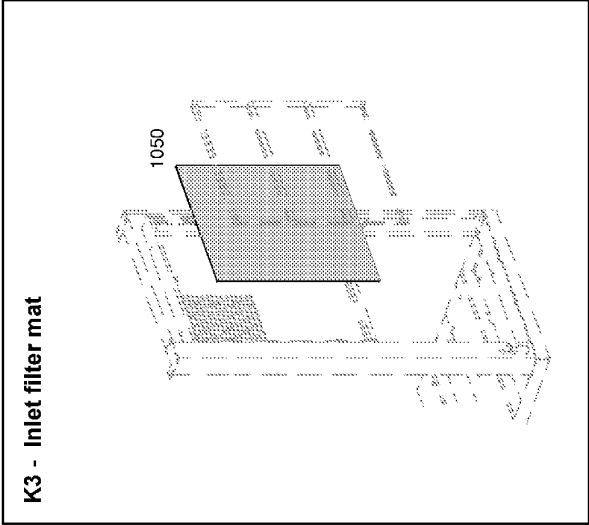
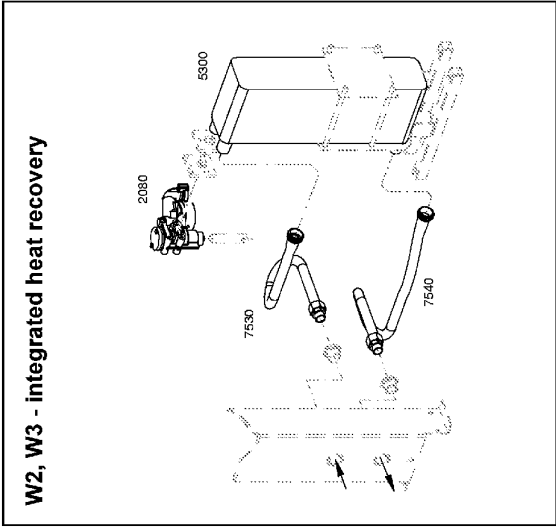
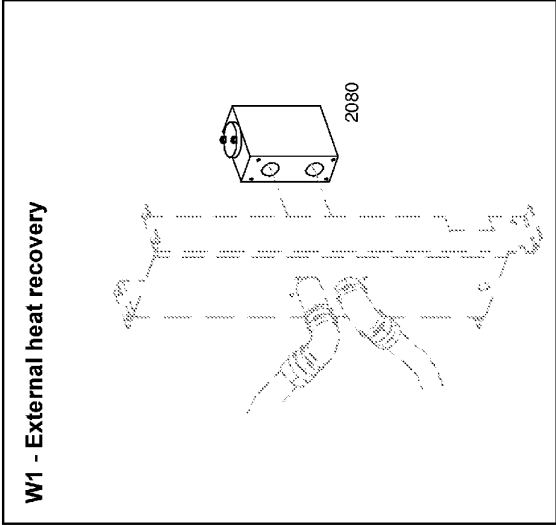
Rotary Screw Compressor CSD

Item	Quantity	Description
1100	2	Control cabinet filter mat
1200	1	Oil filter
1250	1	Air filter cartridge
1450	1	Oil separator cartridge, complete
1600	1	Coolant
2020	1	Minimum pressure / check valve cpl.
2022	1	Maintenance kit
2024	1	Repair kit
2040	1	Minimum pressure/check valve
2042	1	Inlet valve cpl.
2044	1	Maintenance kit
2060	1	Repair kit
2062	1	Inlet valve
2064	1	Inlet valve
2100	1	Combination valve cpl.
2102	1	Maintenance kit
2104	1	Repair kit
2120	1	Combined venting / auxiliary valve cpl.
2122	1	Maintenance kit
3030	1	Combined venting and auxiliary valve
3360	2	Combined venting and auxiliary valve
3370	1	Repair kit
3430	1	Venting valve cpl.
3730	1	Maintenance kit
3732	1	Sigma Control internal compressor controller
3760	1	Contact (K1M, -K2M)
4050	1	Drive motor overload protection cutout
4052	1	Safety pressure switch, complete
4100	1	Protective cap
4400	1	Differential pressure switch
4450	1	Exchange airend cpl.
447	1	Sliding ring seal cpl.
448	1	Exchange airend installation kit
4700	1	Coupling
472	1	Engine
473	1	Motor bearings D-end
4750	1	Motor bearings N-end
5100	1	Fan Motor
5150	1	Motor bearings D-end
5200	1	Motor bearings N-end
5250	1	Fan wheel
6050	1	Oil cooler cpl.
6150	1	Air cooler cpl.
6200	1	Oil cooler (water-cooled)
7180	1	Water-cooled air cooler
7190	1	Oil separator tank cpl.
	1	Pressure relief valve
	1	Pressure gauge
	1	Venting valve - airend
	1	Hose line
	1	Combined venting and auxiliary valve – inlet valve

Item	Quantity	Description
7350	1	Control air line kit
7400	1	Hose line
7450	1	Hose line
7500	1	Hose line
7600	1	Air inlet hose

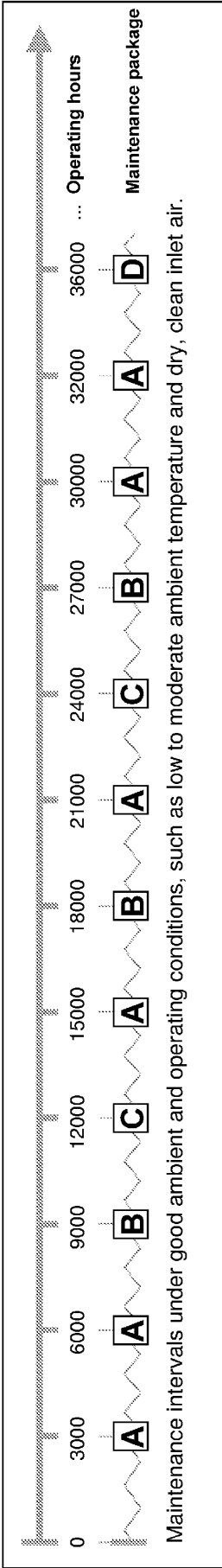
Cooling water inlet
Air cooler – oil cooler
Cooling water outlet

Options		KAESER
(see nameplate)		Dok.Nr. SEL-1059 02E



Item	Quantity	Description	
1050	1	Inlet filter mat	
2080	1	Thermostatic valve cpl.	Thermostatic valve
2082	1	Maintenance kit	Thermostatic valve
2084	1	Repair kit	
2280	1	Proportional controller	Proportional controller
2282	1	Maintenance kit	
2300	1	Pneumatic valve	
5300	1	Plate heat exchanger	
7530	1	Hose line	Heat recovery - inlet
7540	1	Hose line	Heat recovery - outlet

Maintenance kits		KAESER
		Dok.Nr. SEL-1059_02E



Maintenance intervals may decrease due to ambient and operating conditions.

Maintenance package		A
Item	Quantity	
1100	2	
1250	1	
1600*)	1	
1050 (Option K3)	1	

Maintenance package		B
Item	Quantity	
1100	2	
1200	1	
1250	1	
1450	1	
1600*)	1	
1050 (Option K3)	1	

Maintenance package		C
Item	Quantity	
1100	2	
1250	1	
1600*)	1	
2022	1	
2042	1	
2062	1	
2102	1	
2122	1	
472	1	
473	1	
1050 (Option K3)	1	
2082 (Option W1, W2, W3)	1	
2282 (Option C1)	1	

Maintenance package		D
Item	Quantity	
1100	2	
1200	1	
1250	1	
1450	1	
1600*)	1	
2024	1	
2044	1	
2064	1	
2104	1	
2122	1	
4400	1	
447	1	
448	1	
472	1	
473	1	
7180	1	
7190	1	
7400	1	
7450	1	
7500	1	
7600	1	
1050 (Option K3)	1	
2084 (Option W1, W2, W3)	1	
2282 (Option C1)	1	
7530 (Option W2, W3)	1	
7540 (Option W2, W3)	1	

*) see cooling fluid recommendations

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

For maximum safety and availability of the machine, we recommend that an authorised technician, regardless of the machine's operating hours, carry out a safety and function inspection annually.

12 Decommissioning, Storage and Transport

12.1 De – commissioning

Decommissioning is necessary when the machine:

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

Temporary decommissioning

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

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

Long – term decommissioning

Pre – condition: Before taking out of service the machine should be run under load for at least 30 minutes.

Machine switched off and fully vented.

The supply disconnecting device is switched off and locked out.

- ☞ The machine is cooled down completely.
- ☞ In water – cooled machines, disconnect the water supply and drain all water from the machine.
- ☞ All air and electrical connections are disconnected.

12.2 Packing

Material: Desiccant
Plastic sheeting
Wooden transport crate

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

- ☞ Place desiccant inside the machine cabinet.
- ☞ Wrap the machine in plastic sheeting.

Transport packaging

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

Consult an authorised KAESER service agent for advice on packaging for sea or air transport.

12.3 Storage

Pre-condition: The machine must be adequately packed.



Moisture and frost

Machine damage possible.

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



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

Moisture can lead to corrosion, particularly on the surfaces of the air end and oil separator tank.

Frozen moisture can damage components, diaphragms, valves and gaskets.

12.4 Transporting

12.4.1 Safety

Transport only by fork truck or lifting cradle and with personnel trained in the safe use of the transport equipment.



The water cooling system of water-cooled machines must be drained completely if there is danger of frost.

- ☞ Take weight and centre of gravity into consideration. The centre of gravity is shown in the drawing in chapter 13.1.3.
- ☞ Make sure the danger zone is clear of personnel during transporting.

12.4.2 Fork truck

Pre-condition: The fork truck complies with local safety regulations.
The whole machine is over the forks.

The diagram shows how the machine should be lifted by a fork truck.

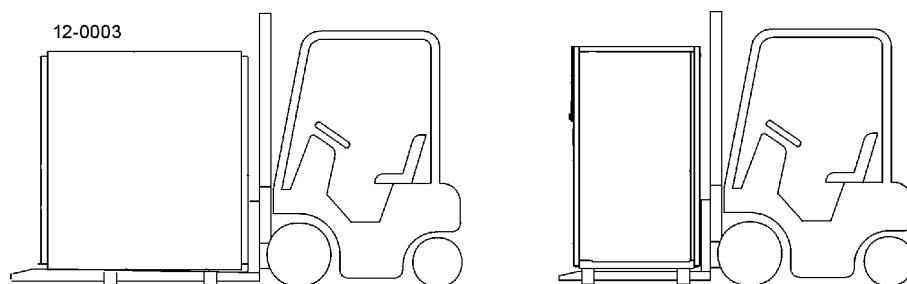


Fig. 37 Transport by fork truck

12.4.3 Transverse beams

Pre-condition: The lifting cradle complies with local safety regulations.
No pressure bears on the sides of the machine cabinet.



CAUTION

Incorrect application of the lifting cradle can damage the machine.

- ✎ Do not attach the lifting cradle to any of the machine components.
- ✎ The machine manufacturer can advise on application of a suitable lifting cradle.

Examples of unsuitable fixing points:

- pipe supports
- flanges
- attached components such as centrifugal separators, condensate drains or filters
- rain protection covers

The diagram shows how the machine should be lifted by a cradle.

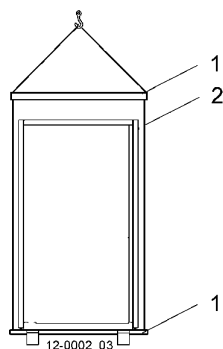


Fig. 38 Transport with lifting cradle

- 1 Transverse beams
- 2 Straps

12.5 Disposal

Pre-condition: Machine is de-commissioned.

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



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

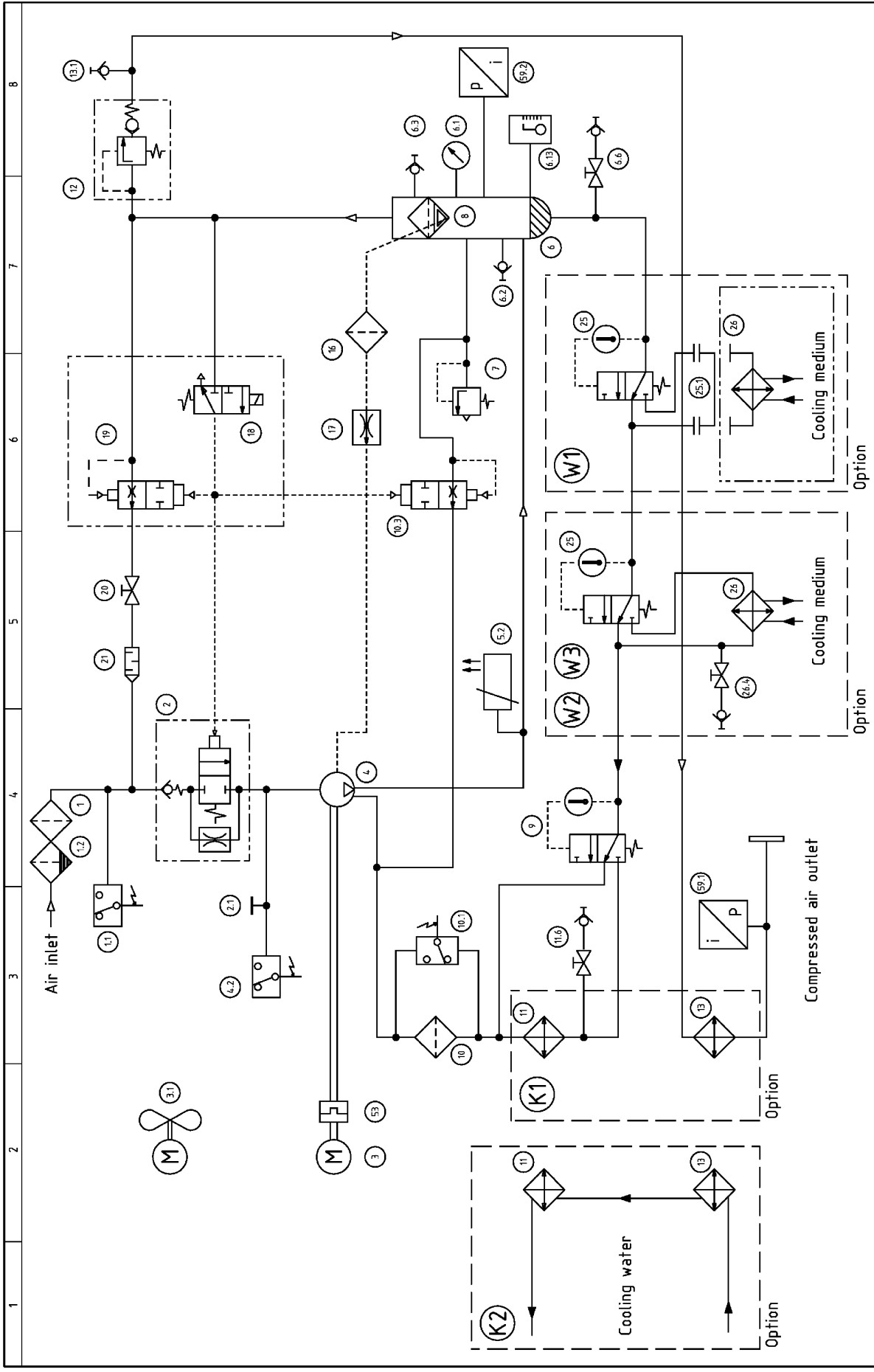
- ✎ Completely drain the cooling oil from the machine.
- ✎ Remove used oil filter and separator cartridge.
- ✎ Hand the machine over to an authorised disposal expert.

13 Annex

13.1 Diagrams and Drawings

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

1	2	3	4	5	6	7	8
<div> </div> <div> <div>1</div>Compressor <div>2</div>Centrifugal separator <div>3</div>Refrigeration dryer <div>4</div>Electronically controlled condensate drain ECO-DRAIN <div>5</div>Shut-off valve </div>							
c			Datum	02.06.2003	P&I Diagram / P&I Diagram legend Compressor Package		
b			Bearb.	Plau			
a			Gepr.	Hildenstein			
Änderung	Datum	Name	Norm	Ersatz durch:	Ersatz für:	FCSDST-0020.01	
						Blatt 1	
						E	



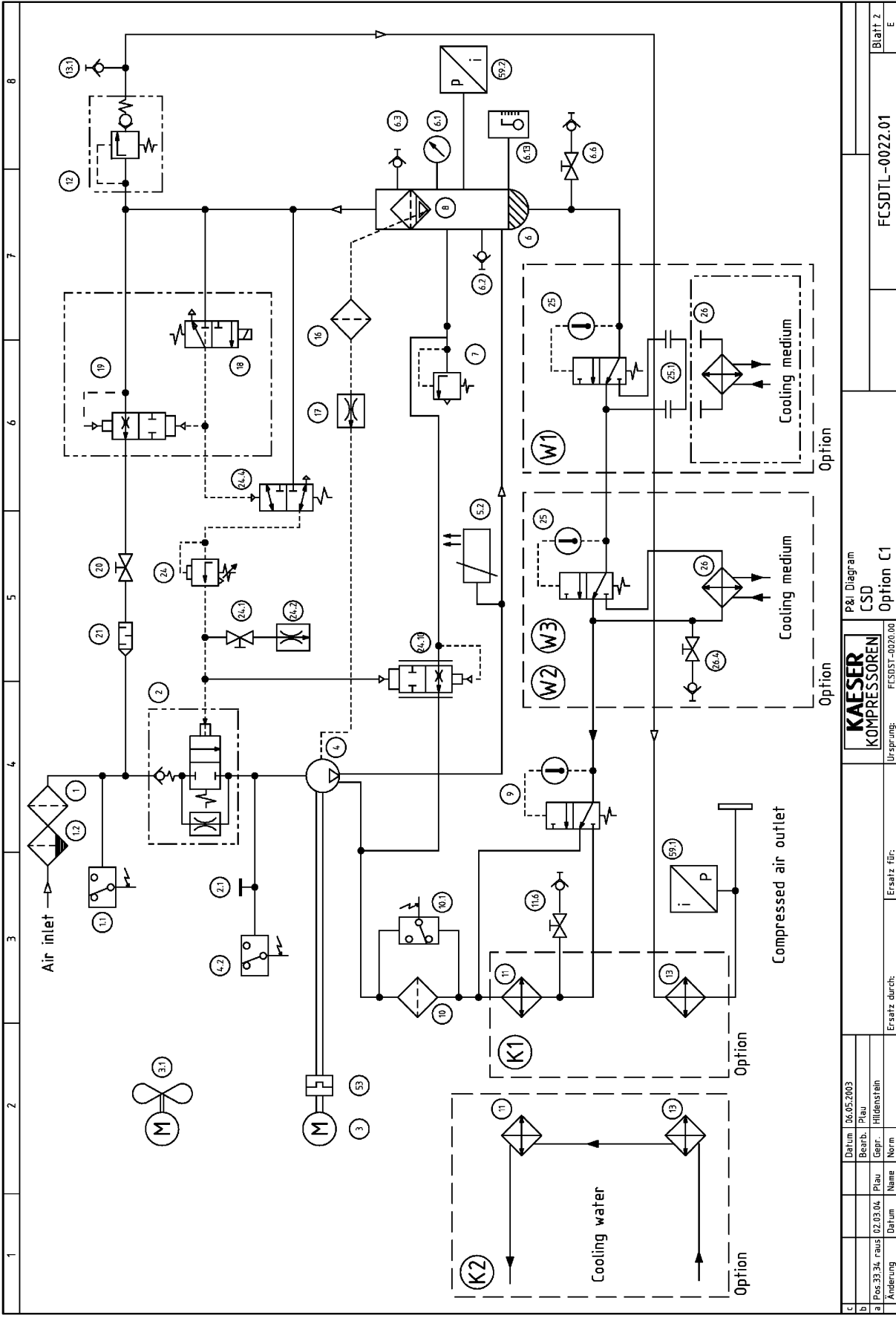
c		Datum	02.06.2003	P&ID Diagram		FLCSDST-0020.01		Blatt 2
b		Bearb.	Plau	CSD				E
a		Pos. 33.34. raus	02.03.04	KAESER KOMPRESSOREN				
Änderung		Datum	Name	Ersatz durch:		Ursprung		

1	2	3	4	5	6	7	8																								
1	Air filter			11.6	Shut-off valve with hose coupling – Oil drain																										
1.1	Vacuum switch – Air filter			12	Minimum pressure check valve																										
1.2	Dust collector			13	Air cooler																										
2	Inlet valve			13.1	Hose coupling																										
2.1	Oil filler with screw plug			16	Dirt trap																										
3	Drive motor			17	Nozzle																										
3.1	Fan motor			18/19	Combined control/venting valve																										
4	Airend			18	Control valve																										
4.2	Pressure switch – Wrong direction of rotation			19	Venting valve																										
5.2	PT100-sensor			20	Shut-off valve – Venting line																										
6	Oil separator tank			21	Silencer																										
6.1	Pressure gauge			25	Oil temperature thermostat for heat recovery system																										
6.2	Hose coupling (oil end)			25.1	Hose line																										
6.3	Hose coupling (air end)			26	Heat recovery system																										
6.6	Shut-off valve with hose coupling – Oil drain			26.4	Shut-off valve with hose coupling – Oil drain																										
6.13	Oil level indicator			53	Coupling																										
7	Pressure relief valve			59.1	Pressure transducer – System pressure																										
8	Oil separator cartridge			59.2	Pressure transducer – Internal pressure																										
9	Oil temperature controller			Option																											
10	Oil filter			K1	air-cooled																										
10.1	Differential pressure switch – Oil filter			K2	water-cooled																										
10.3	Oil flow reduction valve			W1	Heat recovery system, external																										
11	Oil cooler			W2/W3	Heat recovery system, internal																										
<table border="1"> <tr> <td colspan="2">P&I Diagram legend</td><td colspan="2">CSD</td><td colspan="4">FLSDST-0020.01</td></tr> <tr> <td colspan="2">KAESEKOMPRESSOREN</td><td colspan="2">Ursprung</td><td colspan="4">Blatt 3</td></tr> <tr> <td colspan="2">Ersatz durch:</td><td colspan="2">Ersatz file:</td><td colspan="4">E</td></tr> </table>								P&I Diagram legend		CSD		FLSDST-0020.01				KAESEKOMPRESSOREN		Ursprung		Blatt 3				Ersatz durch:		Ersatz file:		E			
P&I Diagram legend		CSD		FLSDST-0020.01																											
KAESEKOMPRESSOREN		Ursprung		Blatt 3																											
Ersatz durch:		Ersatz file:		E																											
c				Datum	02.06.2003																										
b				Bearb.	Plau																										
a	Pos.33.34. raus	02.03.04	Plau	Gepr.	Hildenstein																										
Änderung	Datum	Name	Norm																												

1	2	3	4	5	6	7	8
<div> <div> <div>1</div> <div>Air to air heat exchanger</div> </div> <div> <div>2</div> <div>Air to refrigerant heat exchanger (Vapouriser)</div> </div> <div> <div>3</div> <div>Condensate separator</div> </div> <div> <div>4</div> <div>Shut-off valve</div> </div> <div> <div>5</div> <div>Condensate drain</div> </div> <div> <div>7</div> <div>Capillary tube (Refrigerant injection)</div> </div> <div> <div>8</div> <div>Filter dryer</div> </div> <div> <div>9</div> <div>Safety pressure switch</div> </div> <div> <div>10</div> <div>Refrigerant condenser (air cooled condenser)</div> </div> <div> <div>11</div> <div>Refrigerant compressor (hermetic)</div> </div> <div> <div>12</div> <div>Service connection (Schrader valve)</div> </div> <div> <div>13</div> <div>Thermostat</div> </div> <div> <div>18</div> <div>Pressure switch - Refrigerant condenser</div> </div> <div> <div>19</div> <div>Hot gas bypass valve</div> </div> <div> <div>20</div> <div>Refrigerant separator</div> </div> <div> <div>27</div> <div>PT100-sensor</div> </div> <div> <div>heat insulated</div> </div> <div> <div>Piping:</div> <div> <div>L1</div> <div>Bypass line</div> </div> <div> <div>L2</div> <div>CU-Pipe</div> </div> <div> <div>L3</div> <div>CU-Pipe</div> </div> <div> <div>w</div> <div>heat insulated</div> </div> </div> </div>							
c							
b							
a							
Änderung	Datum	Name	Norm	Ersatz durch:	Ersatz für:	P&I Diagram legend Option Refrigeration dryer	
						KAESE KOMPRESSOREN	
						Ur-sprung	
						FCSDST-0020.01	
						Blatt 5	
						E	

13.1.2 Pipeline and instrument flow diagram (option C1)

1	2	3	4	5	6	7	8
<div data-bbox="394 831 760 1449"> </div> <div data-bbox="924 844 1122 1449"> <p>1 Compressor</p> <p>2 Centrifugal separator</p> <p>3 Refrigeration dryer</p> <p>4 Electronically controlled condensate drain ECO-DRAIN</p> <p>5 Shut-off valve</p> </div>							
c			Datum	06.05.2003	P&I Diagram / P&I Diagram legend		
b			Bearb.	Plau	Compressor Package		
a			Gepr.	Hildenstein	FCSDTL-0022.01		
Änderung			Datum	Name	Blatt 1		
			Ersatz durch:		E		
			Ersatz für:				
			Ursprung:				



c		Datum	06.05.2003	P&ID Diagram		FCSDTL-0022.01		Blatt 2	
b		Bearb.	Plau	CSD				E	
a		Pos. 33.34 raus	02.03.04	Option C1					
Änderung		Datum	Name	Ursprung:		FCSDTL-0020.00			
		Ersatz durch:		Ersatz fñc:					

	1	2	3	4	5	6	7	8
1	Air filter			17	Nozzle			
1.1	Vacuum switch – Air filter			18/19	Combined control/venting valve			
1.2	Dust collector				18 Control valve			
2	Inlet valve				19 Venting valve			
2.1	Oil filler with screw plug			20	Shut-off valve – Venting line			
3	Drive motor			21	Silencer			
3.1	Fan motor			24	Proportional controller			
4	Airend			24.1	Shut-off valve open: machine in modulating control Shut-off valve closed: package running in DUAL-/QUADRO or VARIO mode			
4.2	Pressure switch – Wrong direction of rotation							
5.2	PT100-sensor			24.2	Nozzle			
6	Oil separator tank			24.4	3/2-Directional control valve (amplifies volume of control air for the inlet valve)			
6.1	Pressure gauge							
6.2	Hose coupling (oil end)			24.10	Oil flow regulating valve (proportionally controlled)			
6.3	Hose coupling (air end)			25	Oil temperature thermostat for heat recovery system			
6.6	Shut-off valve with hose coupling – Oil drain			25.1	Hose line			
6.13	Oil level indicator			26	Heat recovery system			
7	Pressure relief valve			26.4	Shut-off valve with hose coupling – Oil drain			
8	Oil separator cartridge			53	Coupling			
9	Oil temperature controller			59.1	Pressure transducer – System pressure			
10	Oil filter			59.2	Pressure transducer – Internal pressure			
10.1	Differential pressure switch – Oil filter							
11	Oil cooler							
11.6	Shut-off valve with hose coupling – Oil drain			Option				
12	Minimum pressure check valve			K1	air-cooled			
13	Air cooler			K2	water-cooled			
13.1	Hose coupling			W1	Heat recovery system, external			
16	Dirt trap			W2/W3	Heat recovery system, internal			

1	2	3	4	5	6	7	8
1	Air to air heat exchanger			} heat insulated	13	Thermostat	
2	Air to refrigerant heat exchanger (Vapouriser)				18	Pressure switch – Refrigerant condenser	
3	Condensate separator				19	Hot gas bypass valve	
4	Shut-off valve				20	Refrigerant separator	
5	Condensate drain				27	PT100-sensor	
7	Capillary tube (Refrigerant injection)						
8	Filter dryer						
9	Safety pressure switch						
10	Refrigerant condenser (air cooled condenser)				L1	Bypass line	
11	Refrigerant compressor (hermetic)				L2	CU-Pipe	
12	Service connection (Schrader valve)				L3	CU-Pipe	
					w	heat insulated	
						</	

c

Datum

06.05.2003

b

Bearb. Plau

a

Gepr.

Hildenstein

Änderung

Datum

Name

Norm

Ersatz durch:

Ersatz für:

KAESER

KOMPRESSOREN

Ursprung:

FCSDT-0020.00

P&I Diagram legend

Option

Refrigeration dryer

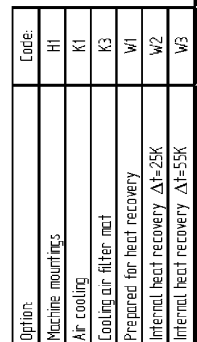
FCSDTL-0022.01

Blatt 5

E

13.1.3 Dimensional drawing

13.1.3.1 Air cooling (option K1)



CG : Centre of gravity position marginally dependent on design

ATTENTION!
Minimum width of door is total width of unit + 100 mm

	Imp	Name	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; border-radius: 50%; padding: 5px; margin-right: 10px;">K1</div> <div style="text-align: center;"> <div style="border-bottom: 1px solid black; width: 100px; margin: 0 auto;"></div> <div style="border-top: 1px solid black; width: 100px; margin: 0 auto;"></div> <div style="border: 1px solid black; border-radius: 50%; padding: 5px; margin: 0 auto;">K1</div> </div> </div>
Gez.	7.12.2004	Lumley	
Gegr.			
Freigeq.	11.01.2005	Schubert, P.	
Merkstabs			Erstzul. für

KAESER
KOMPRESSOREN

T10276.01 ^e	A-Index 01
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13.1.3.2 Water cooling (option K2)




CG : Centre of gravity position marginally dependent on design

ATTENTION!

Minimum width of door is total width of unit + 100 mm

Option	Code
Machine mountings	H1
Water cooling	K2
Prepared for heat recovery	W1
Internal heat recovery $\Delta t=25K$	W2
Internal heat recovery $\Delta t=55K$	W3

	Imj	Monp	 CSO	Einsatz für
Ges.	16.12.2003	Ilumpey		
Gepir.				
Frequenz.	11012005	Schubant, P.		
Marktstab				

13.1.4 Electrical diagram

Lfd. Nr.		Benennung Name	Zeichnungsnummer (Kunde) Drawing No. (customer)	Zeichnungsnummer (Hersteller) Drawing No. (manufacturer)	Blatt Page	Anlagenkennzeichen Unit designation
1		Cover page		DCSD-02000.01	1	
2		List of contents		ZCSD-02000.01	1	
3		Block diagram		UCSD-02000.01	1	
4		Block diagram		UCSD-02000.01	2	
5		Block diagram	performance-related components	UCSD-02000.01	3	
6		Block diagram	performance-related components	UCSD-02000.01	4	
7		Block diagram	performance-related components	UCSD-02000.01	5	
8		Block diagram		UCSD-02000.01	6	
9		Circuit diagram	Power switching	SCSD-02000.01	1	
10		Circuit diagram	Condensate drain/Fan	SCSD-02000.01	2	
11		Circuit diagram	Power supply unit	SCSD-02000.01	3	
12		Circuit diagram	mother board/inputs	SCSD-02000.01	4	
13		Circuit diagram	mother board/inputs	SCSD-02000.01	5	
14		Circuit diagram	mother board/inputs	SCSD-02000.01	6	
15		Circuit diagram	mother board/outputs	SCSD-02000.01	7	
16		Circuit diagram	mother board/outputs	SCSD-02000.01	8	
17		Circuit diagram	Volt-free contacts	SCSD-02000.01	9	
18		Circuit diagram	Transformer diagrams	SCSD-02000.01	10	
19		Terminal schedule	Terminal strip -X0	KCSD-02000.01	1	
20		Terminal schedule	Terminal strip -X2,-X11	KCSD-02000.01	2	
21		Terminal schedule	Terminal strip -X14,-X15	KCSD-02000.01	3	
22		Component layout	Mounting plate	ACSD-02000.01	1	

C		Datum	13.05.2004	List of contents		=
b		Bearb.	Sitter	Compressor series CSD		+
a		Gepr.	Büchner	ZCSD-02000.01		
B	Änderung	Datum	Name	Ersatz durch:	Ersatz für:	Blatt 1
						B

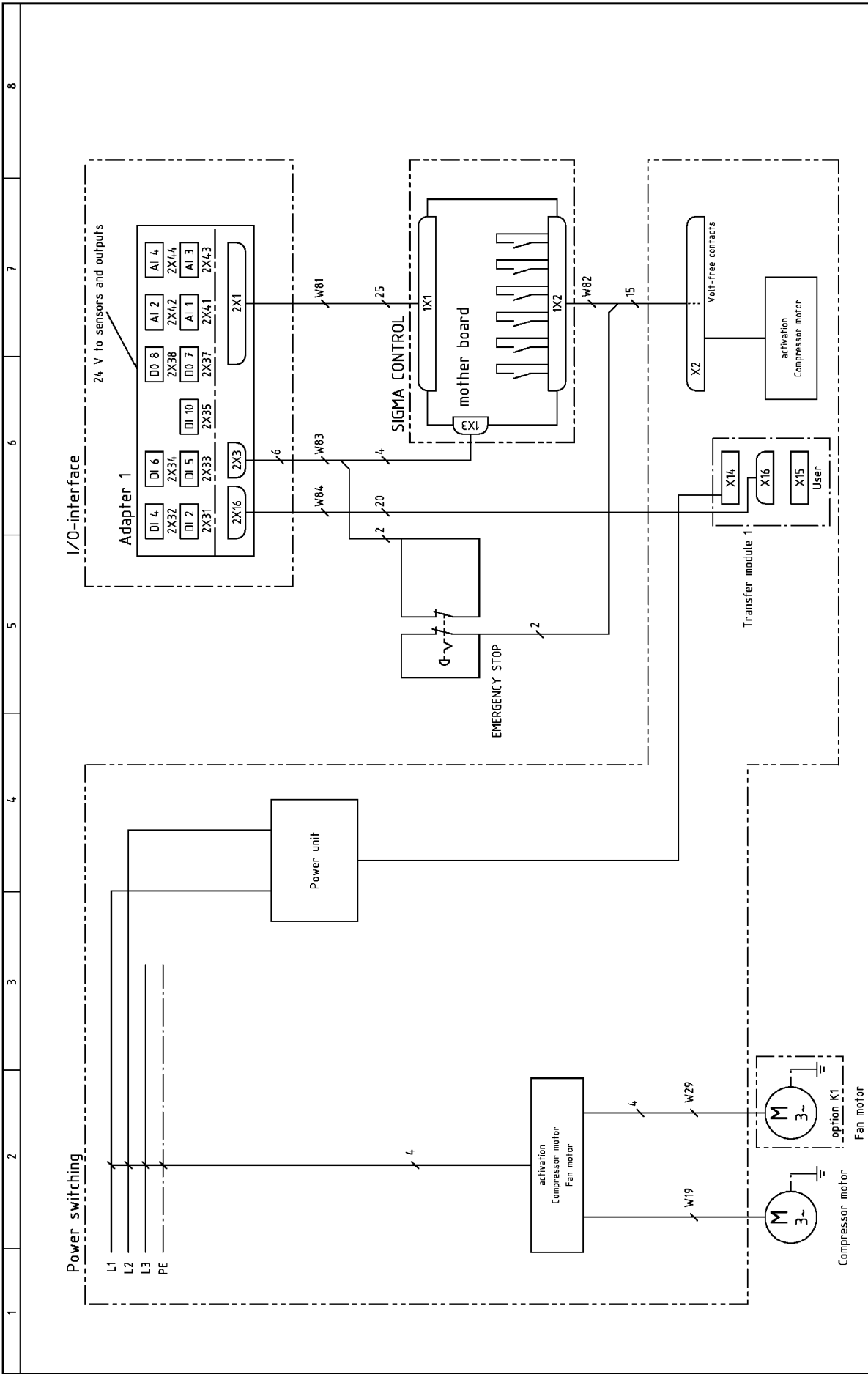
1	2	3	4	5	6	7	8
<div><div><div>general instructions</div><div>ATTENTION !!! Install supplies, grounding and shock protection to local safety regulations. Control circuits are single-end-earthed; operate with insulation monitoring only. Do not make or break live plug-in connectors.</div></div><div><div>control cabinet wiring for non-designated conductors</div><div>primary circuits: Control voltage AC: Control voltage DC: external voltage: measuring circuits: earth conductor:</div><div>black red 1mm² H05V-K blue 1mm² H05V-K orange 1,5mm² H07V-K violet 1mm² H05V-K green/yellow</div></div></div>							
<div><div>option K1 = air cooling</div><div>option K2 = water cooling</div></div>							
<div><div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div><div><div>Datum</div><div>13.05.2004</div></div><div><div>Beantw.</div><div>Stiller</div></div><div><div>Gepr.</div><div>Büchner</div></div></div><div><div>Änderung</div><div>Datum</div><div>Name</div><div>Norm</div></div><div><div>Ersatz durch:</div><div>Ersatz für:</div><div>Ursprung:</div></div></div> <div><div><div>KAESER</div><div>KOMPRESSOREN</div></div><div><div>Block diagram</div><div>Compressor series CSD</div></div><div><div>=</div><div>+</div></div><div><div>UCSD-02000.01</div><div>Blatt 1</div><div>Bl.</div></div></div>							

1	2	3	4	5	6	7	8
electrical equipment identification							
general components				terminal strips/plug-in connections		Fault indicator	
-A10 SIGMA CONTROL				SIGMA CONTROL		Shutdown function and Indicating function:	
-A10.1...-A10.5 mother board, inputs/outputs				connector strip, mother board		Direction of rotation pressure switch	
-G1 Power unit				Connector plug		Temperature probe	
-K1M Mains contactor						Air end discharge temperature	
-K2M Delta contactor						Overload protection	
-K3M Star contactor				Adapter		Compressor motor	
-M1 Compressor motor				connector strip, internal		Compressor unit fan-	
-M2 Fan motor				connector strip, internal		Overload protection	
-M5 Control cabinet ventilator				Connector plug, internal		Overload protection switch	
-Q0 Overload protection switch, Control transformer				connector strip, external		Fan motor	
-T1 Control transformer				Connector plug, external		EMERGENCY STOP pushbutton	
-Y1 Control valve				Transfer module			
				Terminal strip, digital inputs		Indicating function:	
				connector strip digital inputs		Pressure transducer,	
				Connector plug		Air main pressure	
						Oil filter differential pressure switch	
				Terminal strip, Power supply		Pressure transducer,	
				Terminal strip, Control		package internal pressure	
				Terminal strip, outputs,		Air filter vacuum switch	
				Volt-free contacts			
				Connector plug,			
				outputs/Volt-free contacts			

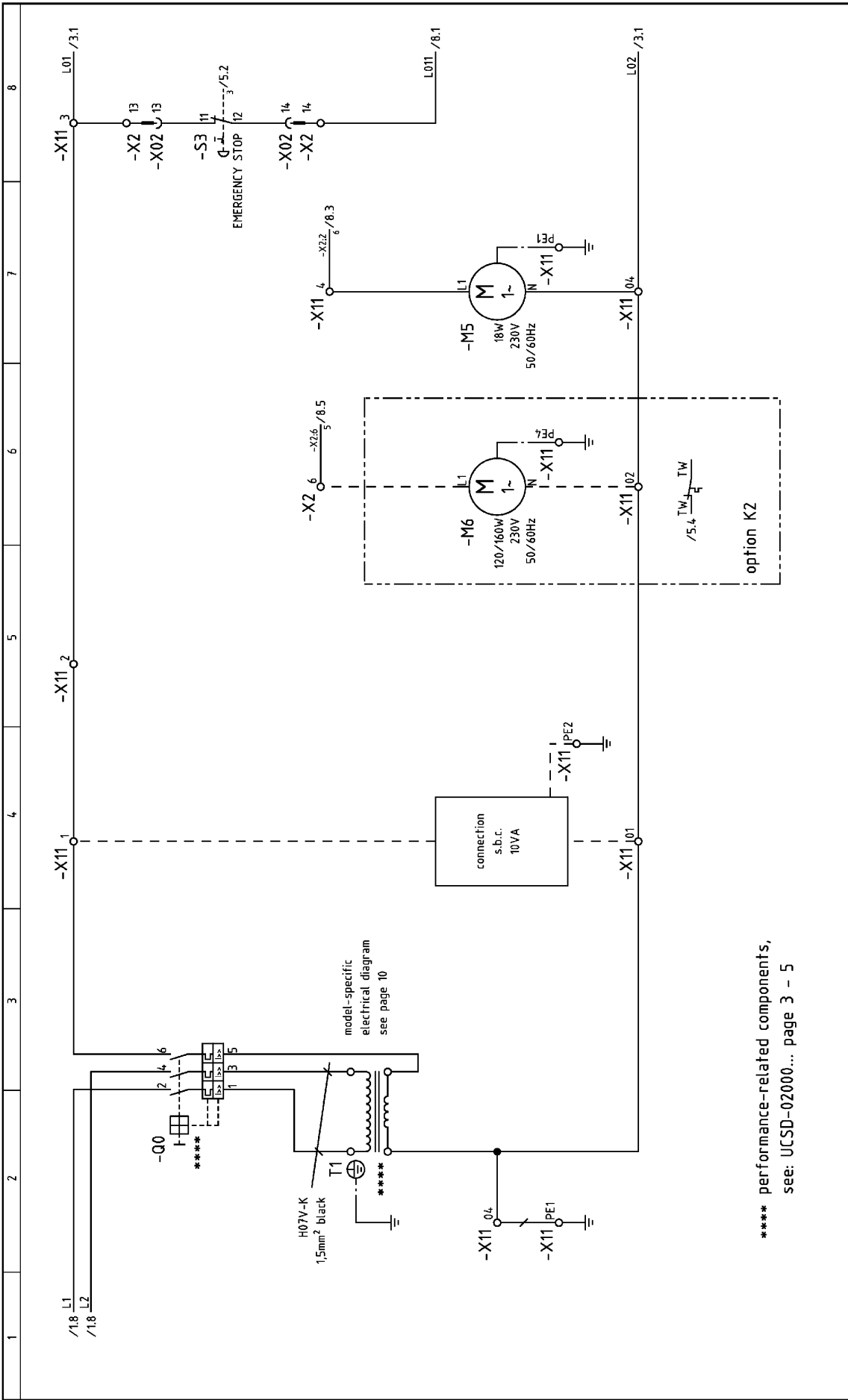
model	performance-related components CSD 82						Blatt 3	Bl.
machine power supply	200 V ±10% 50 Hz 200 V ±10% 60 Hz	230 V ±10% 50 Hz 230 V ±10% 60 Hz	380 V ±10% 60 Hz	400 V ±10% 50 Hz	440 V ±10% 60 Hz 460 V ±10% 60 Hz		UCSD-02000.01	
Motor -M1	45 kW	45 kW	45 kW	45 kW	45 kW	" +		
Motor -M2	1,1 kW	1,1 kW	1,1 kW	1,1 kW	1,1 kW		Compressor series CSD	
Terminal strip -X0	3x 7.3600.0 Wieland	7.3227.00010 Wieland	7.3227.0 Wieland	7.3227.0 Wieland	7.3227.0 Wieland			
Japanese type	---	7.3227.00020 Wieland	---	7.3227.00020 Wieland	7.3227.00020 Wieland			
Terminal strip -X2/X11	7.7113.00050 Wieland	7.7113.00050 Wieland	7.7113.00050 Wieland	7.7113.00050 Wieland	7.7113.00050 Wieland			
Transfer module -X14/X15/X16	7.7012.1 Wieland	7.7012.1 Wieland	7.7012.1 Wieland	7.7012.1 Wieland	7.7012.1 Wieland			
Adapter -2X...	7.7010.0 Wieland	7.7010.0 Wieland	7.7010.0 Wieland	7.7010.0 Wieland	7.7010.0 Wieland		Block diagram Compressor series CSD	
Contactor -K1M	7.3140.01480 3RT1055-6AP36	7.3140.01910 3RT1054-1AP36	7.6870.0 3RT1044-1AL20	7.6870.0 3RT1044-1AL20	7.6870.0 3RT1044-1AL20			
Auxiliary switch	---	---	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22			
Auxiliary switch	7.3140.01930 3RH1921-1JA11	7.3140.01930 3RH1921-1JA11	7.3140.01930 3RH1921-1JA11	7.3140.01930 3RH1921-1JA11	7.3140.01930 3RH1921-1JA11			
Interference suppressor	7.3140.01490 Siemens 3RT1956-1CD00	7.3140.01490 3RT1956-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00			
Contactor -K2M	7.3140.01480 3RT1055-6AP36	7.3140.01910 3RT1054-1AP36	7.6870.0 3RT1044-1AL20	7.6870.0 3RT1044-1AL20	7.6870.0 3RT1044-1AL20			
Auxiliary switch	---	---	7.3140.02030 3RH1921-1CA01	7.3140.02030 3RH1921-1CA01	7.3140.02030 3RH1921-1CA01			
Interference suppressor	7.3140.01490 Siemens 3RT1956-1CD00	7.3140.01490 3RT1956-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00			
Contactor -K3M	7.6871.0 3RT1045-1AL20	7.6870.0 3RT1044-1AL20	7.6868.0 3RT1035-1AL20	7.6867.0 3RT1034-1AL20	7.6867.0 3RT1034-1AL20			
Auxiliary switch	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22			
Interference suppressor	7.3140.00920 Siemens 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00		KAESER KOMPRESSOREN	
Overload protection	7.3140.02190 Siemens 3RB1056-1FG0	7.3140.02190 3RB1056-1FG0	7.6873.00050 3RB1046-1EB0	7.6873.00050 3RB1046-1EB0	7.6873.00050 3RB1046-1EB0			
Overload protection switch -Q0	7.6860.00120 3RV1011-1BA10 1,4-2 A Siemens setting: 1,8 A	7.6860.00120 3RV1011-1BA10 1,4-2 A Siemens setting: 1,5 A	7.6860.00120 3RV1011-1BA10 1,4-2 A Siemens setting: 1,5 A	7.6860.00120 3RV1011-1BA10 1,4-2 A Siemens setting: 1,5 A	7.6860.00120 3RV1011-1BA10 1,4-2 A Siemens setting: 1,5 A			
Overload protection switch -Q4	7.6860.00180 3RV1011-1HA10 5,5-8 A	7.6860.00180 3RV1011-1HA10 5,5-8 A	7.6860.00150 3RV1011-1EA10 2,8-4 A	7.6860.00150 3RV1011-1EA10 2,8-4 A	7.6860.00150 3RV1011-1EA10 2,8-4 A			
Auxiliary switch	7.3140.01890 Siemens 3RV1901-1E	7.3140.01890 3RV1901-1E	7.3140.01890 3RV1901-1E	7.3140.01890 3RV1901-1E	7.3140.01890 3RV1901-1E			
Transformer -T1	7.0776.10020 UTT 0,4 EMB 400 VA diagram 3, Sht. 10	7.2239.20070 USTE400 Block 400 VA diagram 2, Sht. 10	7.6349.0 B0110076 Block 320 VA diagram 1, Sht. 10	7.6349.0 B0110076 Block 320 VA diagram 1, Sht. 10	7.2239.20070 USTE400 Block 400 VA diagram 2, Sht. 10			
Power supply -G1	7.7025.1 Siemens 230VAC/24VDC 1,3A	7.7025.1 230VAC/24VDC 1,3A	7.7025.1 230VAC/24VDC 1,3A	7.7025.1 230VAC/24VDC 1,3A	7.7025.1 230VAC/24VDC 1,3A			
connection -W11 / W13	Silflex-SiF black 6x1x50 mm ²	Silflex-SiF black 6x1x35 mm ²	Silflex-SiF black 6x1x16 mm ²	Silflex-SiF black 6x1x16 mm ²	Silflex-SiF black 6x1x16 mm ²			
connection -W14	Silflex-SiF black 3x1x50 mm ²	Silflex-SiF black 3x1x35 mm ²	Silflex-SiF black 3x1x16 mm ²	Silflex-SiF black 3x1x16 mm ²	Silflex-SiF black 3x1x16 mm ²			
cables -W19.1./2	H07RN-F 7x1x50 mm ²	H07RN-F 7x1x35 mm ²	NYSLYÖ-J 2x4x25 mm ²	NYSLYÖ-J 2x4x16 mm ²	NYSLYÖ-J 2x4x16 mm ²			
Compressor control	7.7000.0	7.7000.0	7.7000.0	7.7000.0	7.7000.0		Ersatz für: Ersatz durch:	
Japanese type	7.7000.00010 Siemens SIGMA CONTROL TYP1	7.7000.00010 SIGMA CONTROL TYP1	---	7.7000.00010 SIGMA CONTROL TYP1	7.7000.00010 SIGMA CONTROL TYP1			
EMERGENCY STOP pushbutton -S3	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV			
Switching element	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00			
Control cabinet ventilator -M5	7.2751.00140 / LV200	7.2751.00140 / LV200	7.2751.00140 / LV200	7.2751.00140 / LV200	7.2751.00140 / LV200			
Sealing frame	7.3350.00020 / D200	7.3350.00020 / D200	7.3350.00020 / D200	7.3350.00020 / D200	7.3350.00020 / D200			
Outlet filter	7.2752.00060 / GV200	7.2752.00060 / GV200	7.2752.00060 / GV200	7.2752.00060 / GV200	7.2752.00060 / GV200			
Control cabinet	KAESER 7.7277.0	7.7277.0	7.7277.0	7.7277.0	7.7277.0			
Mounting plate	KAESER 206472.0	206472.0	206472.0	206472.0	206472.0			
							<div>13.05.2004</div> <div> <div>Datum</div> <div>Bearb.</div> <div>Gepr.</div> <div>Norm</div> </div> <div> <div>Blätter</div> <div>Büchler</div> </div>	

model	performance-related components CSD 102					Blatt 4		Bl.
machine power supply	200 V ±10% 50 Hz 200 V ±10% 60 Hz	230 V ±10% 50 Hz 230 V ±10% 60 Hz	380 V ±10% 60 Hz	400 V ±10% 50 Hz	440 V ±10% 60 Hz 460 V ±10% 60 Hz	UCSD-02000.01		
Motor -M1	55 kW	55 kW	55 kW	55 kW	55 kW	"		
Motor -M2	1,1 kW	1,1 kW	1,1 kW	1,1 kW	1,1 kW			
Terminal strip -X0	3x 7.3600.0 Wieland	3x 7.3600.0 Wieland	7.3227.0 Wieland	7.3227.0 Wieland	7.3227.0 Wieland			
Japanese type	---	---	---	7.3227.00020 Wieland	7.3227.00020 Wieland			
Terminal strip -X2/X11	7.7113.00050 Wieland	7.7113.00050 Wieland	7.7113.00050 Wieland	7.7113.00050 Wieland	7.7113.00050 Wieland			
Transfer module -X14/X15/X16	7.7012.1 Wieland	7.7012.1 Wieland	7.7012.1 Wieland	7.7012.1 Wieland	7.7012.1 Wieland			
Adapter -2X...	7.7010.0 Wieland	7.7010.0 Wieland	7.7010.0 Wieland	7.7010.0 Wieland	7.7010.0 Wieland			
Contactor -K1M	7.3140.01480 3RT1055-6AP36	7.3140.01480 3RT1055-6AP36	7.6871.0 3RT1045-1AL20	7.6871.0 3RT1045-1AL20	7.6871.0 3RT1045-1AL20			
Auxiliary switch	---	---	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22			
Auxiliary switch	7.3140.01930 3RH1921-1JA11	7.3140.01930 3RH1921-1JA11	7.3140.01930 3RH1921-1JA11	7.3140.01930 3RH1921-1JA11	7.3140.01930 3RH1921-1JA11			
Interference suppressor	7.3140.01490 3RT1956-1CD00	7.3140.01490 3RT1956-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00			
Contactor -K2M	7.3140.01480 3RT1055-6AP36	7.3140.01480 3RT1055-6AP36	7.6871.0 3RT1045-1AL20	7.6871.0 3RT1045-1AL20	7.6871.0 3RT1045-1AL20			
Auxiliary switch	---	---	7.3140.02030 3RH1921-1CA01	7.3140.02030 3RH1921-1CA01	7.3140.02030 3RH1921-1CA01			
Interference suppressor	7.3140.01490 3RT1956-1CD00	7.3140.01490 3RT1956-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00			
Contactor -K3M	7.6871.0 3RT1045-1AL20	7.6871.0 3RT1045-1AL20	7.6869.0 3RT1036-1AL20	7.6868.0 3RT1035-1AL20	7.6868.0 3RT1035-1AL20			
Auxiliary switch	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22			
Interference suppressor	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00			
Overload protection -F2	7.3140.02190 3RB1056-1FG0	7.3140.02190 3RB1056-1FG0	7.6873.00050 3RB1046-1EB0	7.6873.00050 3RB1046-1EB0	7.6873.00050 3RB1046-1EB0			
Overload protection switch -Q0	7.6860.00120 3RV1011-1BA10 1,4-2 A setting: 1,8 A	7.6860.00120 3RV1011-1BA10 1,4-2 A setting: 1,5 A	7.6860.00120 3RV1011-1BA10 1,4-2 A setting: 1,5 A	7.6860.00120 3RV1011-1BA10 1,4-2 A setting: 1,5 A	7.6860.00120 3RV1011-1BA10 1,4-2 A setting: 1,5 A			
Overload protection switch -Q4	7.6860.00180 3RV1011-1HA10 5,5-8 A	7.6860.00180 3RV1011-1HA10 5,5-8 A	7.6860.00150 3RV1011-1EA10 2,8-4 A	7.6860.00150 3RV1011-1EA10 2,8-4 A	7.6860.00150 3RV1011-1EA10 2,8-4 A			
Auxiliary switch	7.3140.01890 3RV1901-1E	7.3140.01890 3RV1901-1E	7.3140.01890 3RV1901-1E	7.3140.01890 3RV1901-1E	7.3140.01890 3RV1901-1E			
Transformer -T1	7.0776.10020 UTT 0,4 EMB 400 VA diagram 3, Sht. 10	7.2239.20070 USTE400 Block 400 VA diagram 2, Sht. 10	7.6349.0 B0110076 Block 320 VA diagram 1, Sht. 10	7.6349.0 B0110076 Block 320 VA diagram 1, Sht. 10	7.2239.20070 USTE400 Block 400 VA diagram 2, Sht. 10			
Power supply -G1	7.7025.1 230VAC/24VDC 1,3A	7.7025.1 230VAC/24VDC 1,3A	7.7025.1 230VAC/24VDC 1,3A	7.7025.1 230VAC/24VDC 1,3A	7.7025.1 230VAC/24VDC 1,3A			
connection -W11 / W13	Silflex-SiF black 6x1x50 mm ²	Silflex-SiF black 6x1x50 mm ²	Silflex-SiF black 6x1x25 mm ²	Silflex-SiF black 6x1x25 mm ²	Silflex-SiF black 6x1x25 mm ²			
connection -W14	Silflex-SiF black 3x1x50 mm ²	Silflex-SiF black 3x1x50 mm ²	Silflex-SiF black 3x1x25 mm ²	Silflex-SiF black 3x1x25 mm ²	Silflex-SiF black 3x1x25 mm ²			
cables -W19.1/.2	H07RN-F 7x1x50 mm ²	H07RN-F 7x1x35 mm ²	NYSLYÖ-J 2x4x25 mm ²	NYSLYÖ-J 2x4x25 mm ²	NYSLYÖ-J 2x4x25 mm ²			
Compressor control -A10	7.7000.0 7.7000.00010	7.7000.0 7.7000.00010	7.7000.0 ---	7.7000.0 7.7000.00010	7.7000.0 7.7000.00010			
Japanese type	SIGMA CONTROL TYP1	SIGMA CONTROL TYP1	SIGMA CONTROL TYP1	SIGMA CONTROL TYP1	SIGMA CONTROL TYP1			
EMERGENCY STOP pushbutton -S3	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV			
Switching element	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00			
Control cabinet ventilator -M5	7.2751.00140 / LV200	7.2751.00140 / LV200	7.2751.00140 / LV200	7.2751.00140 / LV200	7.2751.00140 / LV200			
Sealing frame	7.3350.00020 / D200	7.3350.00020 / D200	7.3350.00020 / D200	7.3350.00020 / D200	7.3350.00020 / D200			
Outlet filter RübSamen&Herr	7.2752.00060 / GV200	7.2752.00060 / GV200	7.2752.00060 / GV200	7.2752.00060 / GV200	7.2752.00060 / GV200			
Control cabinet	7.7277.0	7.7277.0	7.7277.0	7.7277.0	7.7277.0			
Mounting plate	206472.0	206472.0	206472.0	206472.0	206472.0			
						Block diagram Compressor series CSD		
						KAESER KOMPRESSOREN		
						Unsprung.		
						Ersatz für:		
						Ersatz durch:		
						Datum 13.05.2004		
						Bearb. Siffer		
						Gepr. Böhner		
						Datum Name		
						Änderung		

		performance-related components							Blatt 5	
model		CSD 122							UCSD-02000.01	
machine power supply		380 V ±10% 60 Hz	400 V ±10% 50 Hz	440 V ±10% 60 Hz 460 V ±10% 60 Hz						
Motor	-M1	75 kW	75 kW	75 kW						
Motor	-M2	1,1 kW	1,5 kW	1,1 kW						
Terminal strip	-X0	7.3227.00010 Wieland	7.3227.0 Wieland	7.3227.0 Wieland						
Japanese type		---	7.3227.00020 Wieland	7.3227.00020 Wieland						
Terminal strip	-X2/X11	7.7113.00050 Wieland	7.7113.00050 Wieland	7.7113.00050 Wieland						
Transfer module	-X14/X15/X16	7.7012.1 Wieland	7.7012.1 Wieland	7.7012.1 Wieland						
Adapter	-X2...	7.7010.0 Wieland	7.7010.0 Wieland	7.7010.0 Wieland						
Contactor	-K1M	7.3140.01910 3RT1054-1AP36	7.6872.0 3RT1046-1AL20	7.6871.0 3RT1045-1AL20						
Auxiliary switch		---	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22						
Auxiliary switch		7.3140.01930 3RH1921-1JA11	7.3140.01930 3RH1921-1JA11	7.3140.01930 3RH1921-1JA11						
Interference suppressor		7.3140.01490 3RT1956-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00						
	Siemens									
Contactor	-K2M	7.3140.01910 3RT1054-1AP36	7.6872.0 3RT1046-1AL20	7.6871.0 3RT1045-1AL20						
Auxiliary switch		---	7.3140.02030 3RH1921-1CA01	7.3140.02030 3RH1921-1CA01						
Interference suppressor		7.3140.01490 3RT1956-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00						
	Siemens									
Contactor	-K3M	7.6870.0 3RT1044-1AL20	7.6869.0 3RT1036-1AL20	7.6869.0 3RT1036-1AL20						
Auxiliary switch		7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22	7.3140.02220 3RH1921-1HA22						
Interference suppressor		7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00	7.3140.00920 3RT1936-1CD00						
	Siemens									
Overload protection	-F2	7.3140.02190 3RB1056-1FG0	7.6873.00050 3RB1046-1EB0	7.6873.00050 3RB1046-1EB0						
	Siemens	50-200 A	25-100 A	25-100 A						
Overload protection switch	-Q0	7.6860.00120 3RV1011-1BA10 1,4-2 A	7.6860.00120 3RV1011-1BA10 1,4-2 A	7.6860.00120 3RV1011-1BA10 1,4-2 A						
	Siemens	setting: 1,5 A	setting: 1,5 A	setting: 1,5 A						
Overload protection switch	-Q4	7.6860.00150 3RV1011-1EA10 2,8-4 A	7.6860.00160 3RV1011-1FA10 3,5-5 A	7.6860.00150 3RV1011-1EA10 2,8-4 A						
Auxiliary switch		7.3140.01890 3RV1901-1E	7.3140.01890 3RV1901-1E	7.3140.01890 3RV1901-1E						
	Siemens									
Transformer	-T1	7.6349.0 B0110076 Block 320 VA diagram 1, Sht. 10	7.6349.0 B0110076 Block 320 VA diagram 1, Sht. 10	7.2239.20070 USTE400 Block 400 VA diagram 2, Sht. 10						
Power supply	-G1	7.7025.1 230VAC/24VDC 1,3A	7.7025.1 230VAC/24VDC 1,3A	7.7025.1 230VAC/24VDC 1,3A						
	Siemens									
connection	-W11 / W13	Silflex-SiF black 6x1x35 mm ²	Silflex-SiF black 6x1x35 mm ²	Silflex-SiF black 6x1x35 mm ²						
connection	-W14	Silflex-SiF black 3x1x35 mm ²	Silflex-SiF black 3x1x35 mm ²	Silflex-SiF black 3x1x35 mm ²						
cables	-W19.1/2	H07RN-F 7x1x35 mm ²	H07RN-F 7x1x35 mm ²	H07RN-F 7x1x35 mm ²						
Compressor control	-A10	7.7000.0 ---	7.7000.0 7.7000.00010	7.7000.0 7.7000.00010						
Japanese type		SIGMA CONTROL TYP1	SIGMA CONTROL TYP1	SIGMA CONTROL TYP1						
	Siemens									
EMERGENCY STOP pushbutton	-S3	7.3217.0 / QRUV	7.3217.0 / QRUV	7.3217.0 / QRUV						
Switching element	Schlegel	7.3218.0 / MHT00	7.3218.0 / MHT00	7.3218.0 / MHT00						
Control cabinet ventilator	-M5	7.2751.00140 / LV200	7.2751.00140 / LV200	7.2751.00140 / LV200						
Sealing frame		7.3350.00020 / D200	7.3350.00020 / D200	7.3350.00020 / D200						
Outlet filter	Rübsamen&Herr	7.2752.00060 / GV200	7.2752.00060 / GV200	7.2752.00060 / GV200						
Control cabinet	KAESER	7.7277.0	7.7277.0	7.7277.0						
Mounting plate	KAESER	2064.72.0	2064.72.0	2064.72.0						

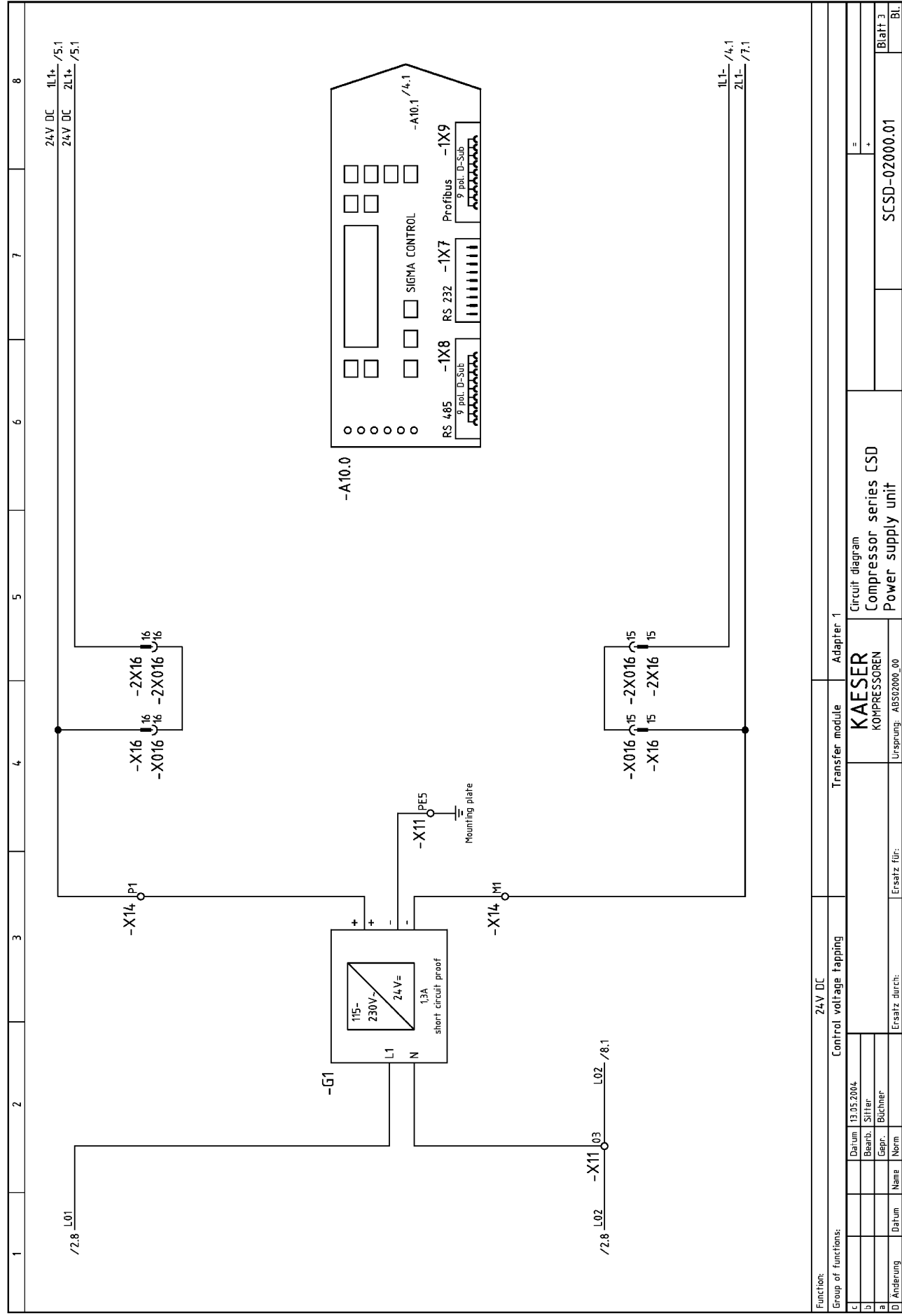


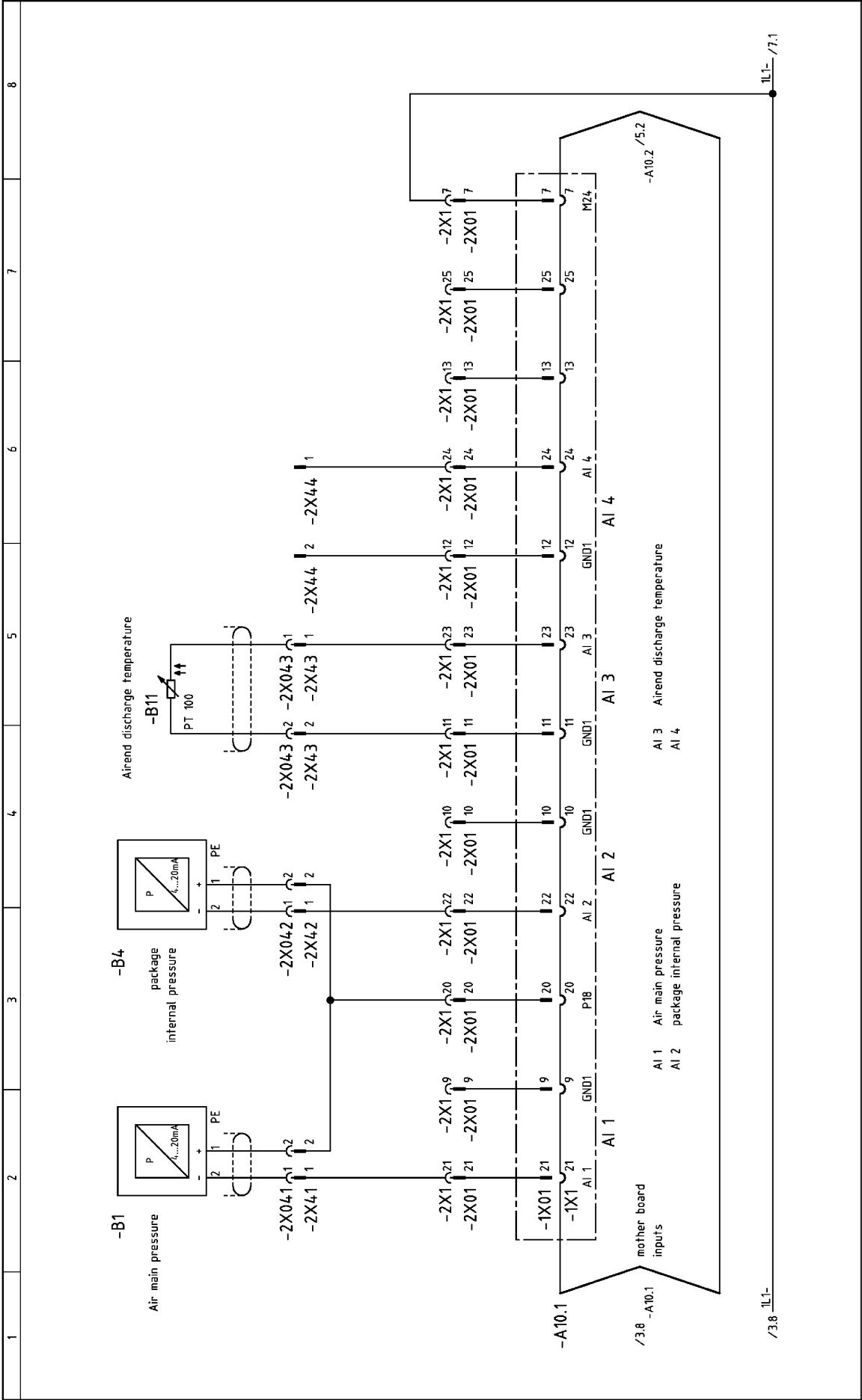
C		Datum	13.05.2004	Block diagram		Compressor series CSD		UCSD-02000.01		=	
b		Beauf.	Stiller	KAESER		KOMPRESSOREN		+		Blatt 6	
a		Gepr.	Büchner	Ursprung: ABS02000_00		Ersatz für:		Ersatz durch:		Bl.	
C		Änderung		Ersatz durch:		Ersatz für:		Bl.			



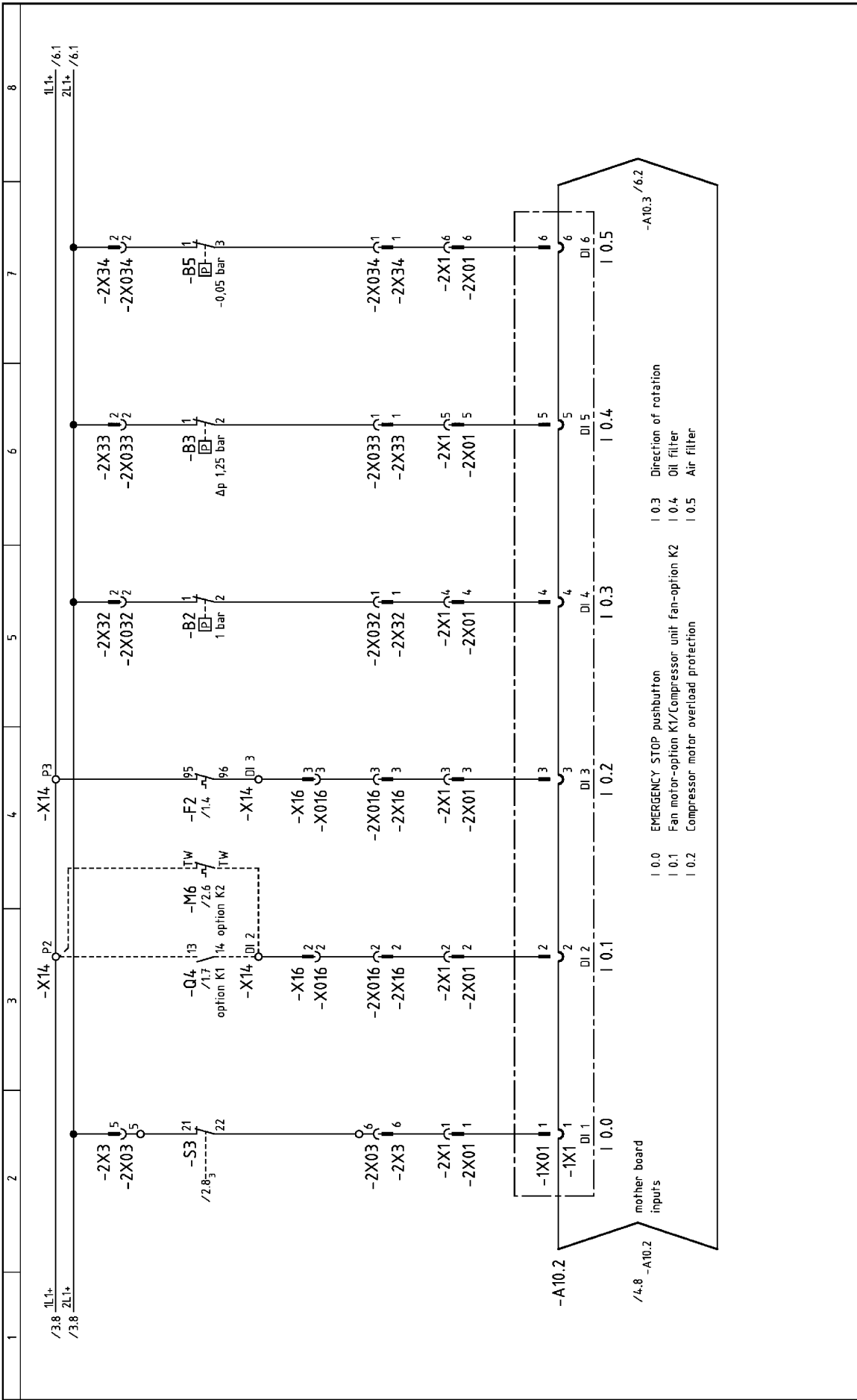
**** performance-related components,
see: UCSD-02000... page 3 - 5

Function:				230V/1-/50/60Hz				EMERGENCY STOP			
Group of functions:				Control voltage tapping				Safety chain			
c				Datum	13.05.2004			Control cabinet ventilator		=	
b				Beauf.	Stiller					+	
a				Gepr.	Büchner						
d	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Compressor unit fan		Compressor series CSD	
								Condensate drain/Fan		SCSD-02000.01	
								Circuit diagram		Blatt 2	
								Kompressor		Bl.	
								KOMPRESSOREN			
								Ursprung: ABS02000_00			

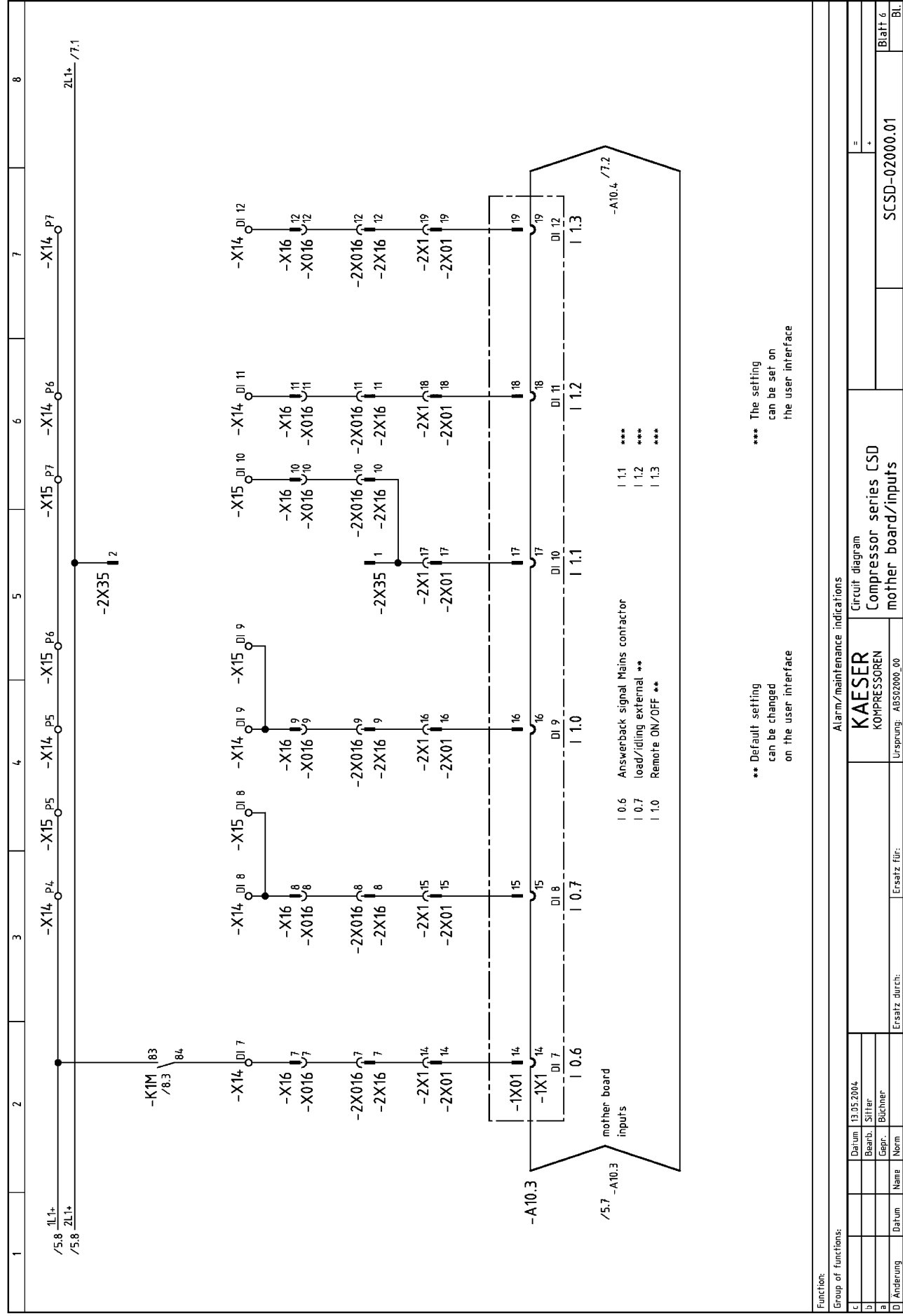


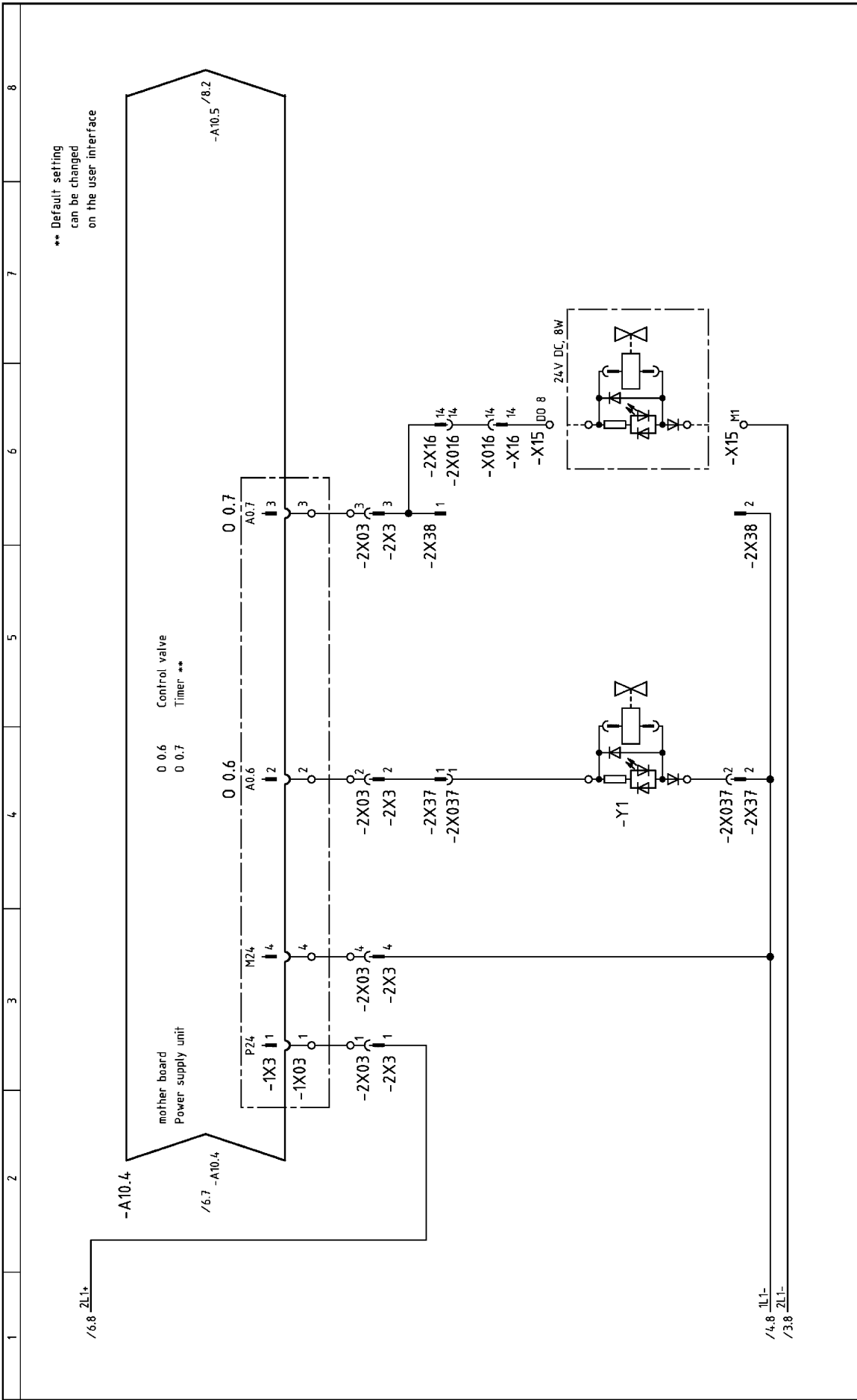


Function:				Pressure control			
Group of functions:				Circuit diagram			
c		Datum	13.05.2004	Compressor series CSD			
b		Bearb.	Stiller	mother board/inputs			
a		Gepr.	Büchner	=			
d	Änderung	Datum	Name	Ersatz für:			
				Ersatz durch:			
				Ursprung: ABS02000_00			
				KAESER			
				KOMPRESSOREN			
				SCSD-02000.01			
				Blatt 4			
				Bl.			

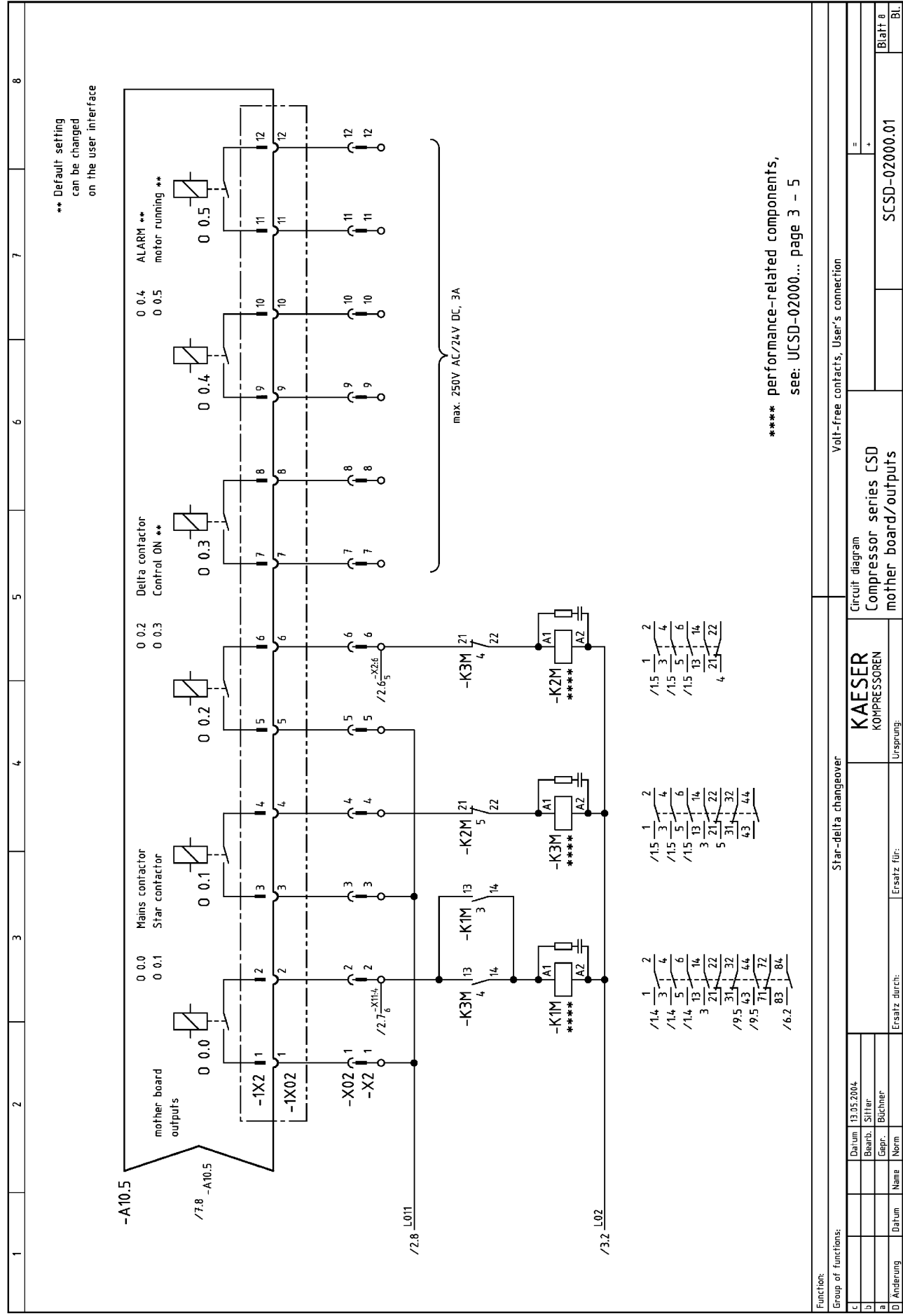


Function:				Alarm/maintenance indications			
Group of functions:				Circuit diagram			
				Compressor series CSD			
				mother board/inputs			
				SCSD-02000.01			
				Bl.			





Function:				Condensate drain, User's connection			
Group of functions:				mother board			
c		Datum	13.05.2004	Circuit diagram			
b		Bearb.	Stiller	Compressor series CSD			
a		Gepr.	Büchner	mother board/outputs			
D	Änderung	Datum	Name	Ersatz durch:	Ersatz für:	Ursprung:	ABS02000_00
				SCSD-02000.01			
				Blatt 7			
				Bl.			



1	2	3	4	5	6	7	8
<div>Volt-free contacts User's connection</div> <div><p>max. 250V AC/24V DC, 3A</p></div>							
<div>All non-designated conductors, 1,5mm² orange H07V-K</div>							
Function: motor running							
Group of functions: Volt-free contacts							
c		Datum		13.05.2004		Circuit diagram	
b		Bearb.		Siller		=	
a		Gepr.		Büchner		+	
D Änderung		Datum		Name		Norm	
Ersatz durch:		Ersatz für:		Ursprung:		SCSD-02000.01	
Blatt 9		Bl.		Bl.		Bl.	

[illegible]

**** See service manual for supply cable cross-section**

s.b.c. = supplied by customer

c			Datum	13.05.2004
b			Bearb.	Sittler
a			Gepr.	Büchner
H	Aenderung	Datum	Norm	

KAESER
KOMPRESSOREN

Ursprung:

Terminal schedule
Compressor series CSD
Terminal strip -X0

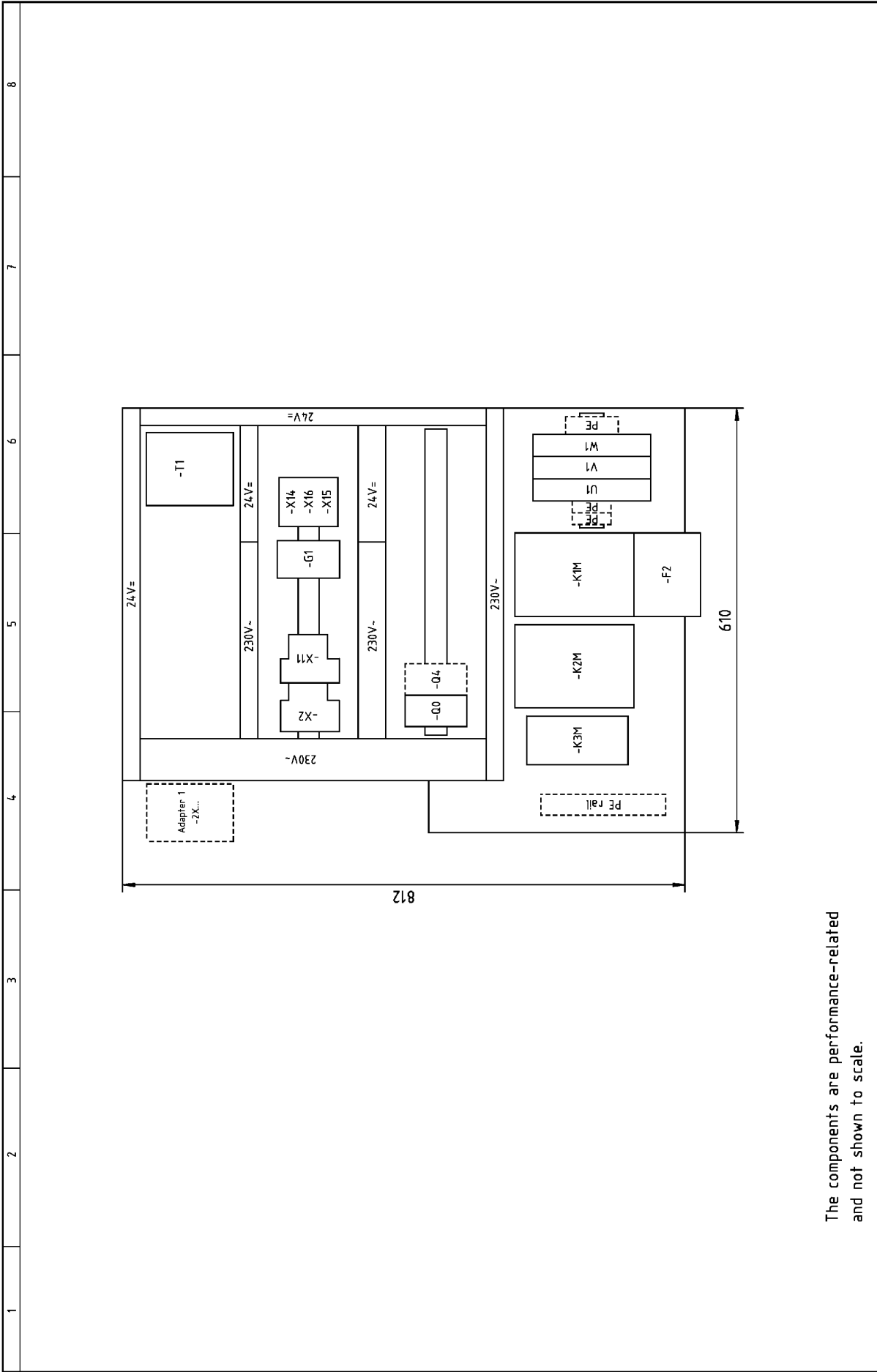
KCSD-02000.01

Blatt 1

19

Volt-free contacts, User's connection										2) Control ON **										** Default setting can be changed on the user interface										5) option K2									
1) motor running										3) ALARM **										4) motor running **																			

[illegible]



The components are performance-related
and not shown to scale.

c				Datum	13.05.2004	Component layout		=	
b				Beantw.	Stiller	Compressor series CSD		+	
a				Gepr.	Büchner	Mounting plate			
1	Änderung	Datum	Name	Ersatz durch:		Ersatz für:		ACSD-02000.01	Blatt 1
									Bl.