Operator Manual

Refrigerated Dryer

TG

No.: 901760 02 USE

Manufacturer:

KAESER KOMPRESSOREN SE

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KAESER KOMPRESSOREN

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1 Regarding this Document

1.1 Using this document

The operating manual is a component of the product. It describes the machine as it was at the time of first delivery after manufacture.

- ➢ Keep the operating manual in a safe place throughout the life of the machine.
- ➢ Supply any successive owner or user with this operating manual.
- ➢ Please insert any amendment or revision of the operating manual sent to you.
- ➢ Enter details from the machine nameplate and individual items of equipment in the table in chapter 2.

1.2 Further documents

Further documents included with this operating manual are:

- ■ Declaration of Conformity in accordance with applicable directives.

Missing documents can be requested from KAESER.

- ➢ Make sure all documents are complete and observe the instructions contained in them.
- ➢ Make sure you provide the data from the nameplate when ordering documents.

1.3 Copyright

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

1.4 Symbols and labels

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

1.4.1 Warnings

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

Warning notices indicate three levels of danger identified by the corresponding signal term:

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

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

Warning notices preceding a chapter apply to the entire chapter including all sub-sections.

Example:

⚠ DANGER

The type and source of the imminent danger is shown here!
The possible consequences of ignoring a warning are shown here.
The word "DANGER" indicates that death or severe injury can very likely result from ignoring the warning.

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

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

Example:

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

1.4.2 Potential damage warnings

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

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

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

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

Example:

NOTICE

The type and source of the imminent danger is shown here!
Potential effects when ignoring the warning are indicated here.

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

➢ Carefully read and fully comply with warnings against damages.

1.4.3 Other alert notes and their symbols

This symbol indicates particular important information.

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

Precondition — Here you will find conditional requirements necessary to carry out the task.

The conditional requirements relevant to safety shown here will help you to avoid dangerous situations.

Option H1 — ➢ This symbol is placed by lists of actions comprising one stage of a task.
Operating instructions with several steps are numbered in the sequence of the operating steps. Information relating to one option only are marked with an option code (e.g., H1 indicates that this section applies only to machines with bolt-down machine feet). Option codes used in this operating manual are explained in chapter 2.2.

Information referring to potential problems is identified by a question mark.

The cause is specified in the help text ...

➢ ... as is a solution.

This symbol identifies important information or measures regarding the protection of the environment.

Further information — Further subjects are introduced here.

2 Technical Data

2.1 Nameplate

Machine nameplate

The machine's nameplate provides the model designation and important technical information.
The nameplate is located on the outside of the machine.

Nameplates in various languages are provided with the machine.

➢ If required, attach a nameplate in the applicable language.

➢ Enter the data from the nameplate here as a reference.

Feature	Value
Refrigerated dryer	
Part No.	
Serial No.	
Year of manufacture	
Max. gauge working pressure	
Compressed air inlet temperature	
Ambient temperature	
Rated current	
Largest motor FLA	
Short circuit current	
Supply fuse (field provided)	
Power supply	
Wiring diagram	
Option	
Refrigerant system	
Refrigerant	
Refrigerant charge	
Global warming potential	
CO_2 equivalent	
Max. working pressure (refrigeration system), HP*	
Max. working pressure (refrigeration system), LP**	
Tested for pressure tightness	
* High pressure ** Low pressure	

Tab. 3 Machine nameplate

Heat exchanger nameplate

For important technical data, please see the nameplate of the heat exchanger.

The nameplate is attached directly at the heat exchanger within the machine.

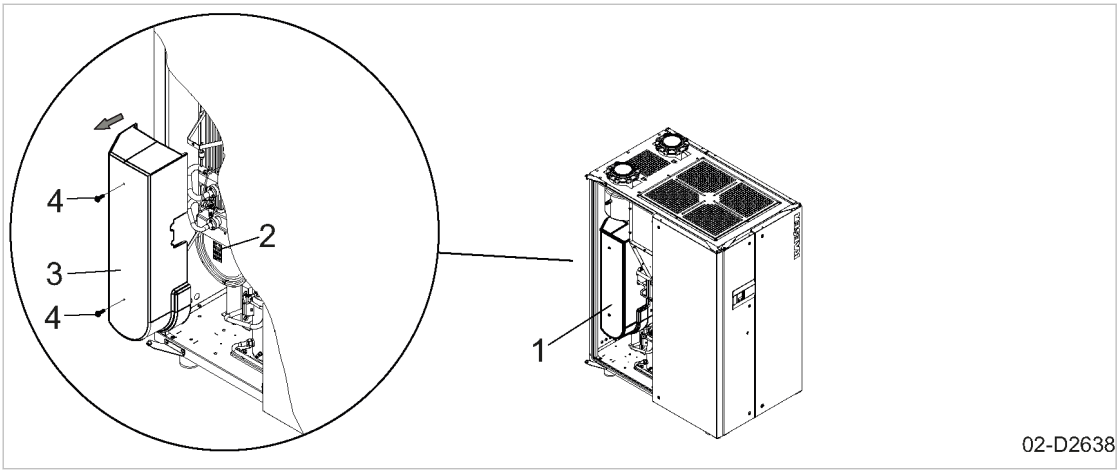


Fig. 1 Heat exchanger nameplate

[1]	Heat exchanger	[3]	Insulation
[2]	Nameplate	[4]	Screw

1. Undo the screws [4] and carefully remove the insulation [3].
2. Read the data on the nameplate [2].
3. Re-attach the insulation and secure with screws [4].

2.2 Options

The table contains a list of possible options.

➢ Enter options here as a reference:

Option	Option code	Available?
Floating contact: "Pressure dew point warning"	C36	✓
Floating contact: "Refrigerant compressor runs"	C37	✓
Communication module: Modbus TCP	C44	✓
Bolt-down machine mounts	H1	
Air-cooling	K1	✓
Water cooling: Plate-type heat exchanger	K2	
Electronic condensate drain, floating contact	K6	✓

Available: ✓
Not available: —

Tab. 4 Options

2.3 Weight

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

	TG 450	TG 520	TG 650	TG 780	TG 980
Weight [lb]	1405 / 1372[1)]	1450 / 1418[1)]	1555 / 1519[1)]	1545 / 1511[1)]	1685 / 1650[1)]
[1)] Option K2					

Tab. 5 Weight

2.4 Ambient conditions

	TG 450	TG 520	TG 650	TG 780	TG 980
Maximum elevation AMSL [1)] [ft]	3000	3000	3000	3000	3000
Permissible ambient temperature [°F]	38 – 120	38 – 120	38 – 120	38 – 120	38 – 120
[1)] Higher altitudes are permissible only after consultation with the manufacturer.					

Tab. 6 Ambient conditions

2.5 Compressed air system

	TG 450	TG 520	TG 650	TG 780	TG 980
Pressure drop[1)] [psig]	1.45	2.03	1.18	1.89	2.90
Flow rate[1)] [cfm]	1340	1550	1910	2330	3070
Flow rate[1)] [cfm] (Option K2)	1589	1836	2190	2684	3355
Cooling air flow rate [cfm] (Option K1 only)	2940	3880	4180	5000	7360
Heat exchanger volume [gal]	31.4	31.4	41.5	41.5	41.7
Pressure dew point[1)] [°F]	39	39	39	39	39
Max. working pressure [psig]	230	230	188	188	188
Min. compressed air inlet temperature [°F]	38	38	38	38	38
Max. compressed air inlet temperature [°F]	140	140	140	140	140

[1)] According to ISO 7183 Option A2:

- Reference point: 14.5 psi(a), 68°F, 0% relative humidity:
- Operating point: Gauge working pressure 100 psig, compressed air inlet temperature 100°F, 100% relative humidity, cooling air inlet temperature 100°F, cooling water inlet temperature 84°F

Tab. 7 Compressed air system

2.6 Refrigerant circuit

The refrigerated dryer contains a refrigerant that is classified as a fluorinated global warming gas. This refrigerant is required for the function of the machine.

	TG 450	TG 520	TG 650	TG 780	TG 980
Refrigerant	R-513A	R-513A	R-513A	R-513A	R-513A
Global warming potential (GWP)	631	631	631	631	631
Charge quantity[1] [lb]	9.48 9.04[2]	9.59 8.82[2]	14.11 13.45[2]	13.23 12.57[2]	17.42 17.20[2]
Charge quantity as CO_2 equivalent [t]	2.71 2.59[2]	2.74 2.52[2]	4.04 3.85[2]	3.79 3.60[2]	4.98 4.92[2]
Maximum working pressure [psig] (high pressure end)	348	348	348	348	348
Maximum working pressure [psig] (low pressure end)	305	305	305	305	305
Pressure monitor: Cut-out pressure [psig]	334	334	334	334	334

[1] Volume of fluorinated global warming gases for which the refrigerant system was designed

[2] Option K2

Tab. 8 Refrigerant circuit

2.7 MODBUS TCP communications module

Communication interface

Characteristic	Value
Communication bus	SIGMA NETWORK / MODBUS TCP server (slave)
SIGMA NETWORK cable CAT5, 2x2x0.64, color grey (meter goods)	Material number: 7.9679.0
Retrofit Kit SCS RJ45 connector plug (RJ45 plug, 90° offset, 4 displacement/clamping contacts, tool-free installation (Fast Connect))	Material number: 7.5250.02180
MODBUS TCP cable CAT5 shielded, copper, color green (meter goods)	Material number: 7.7629.0
Power supply [V DC]	24
Transfer rate [Mbit/s]	10/100
Properties 1	Auto crossing (Auto-MDI (X))
Properties 2	Auto negotiation

Characteristic	Value
Connections	1x RJ45 CAT5 shielded socket, 10/100 Base-TX
Max. cable length between 2 components [m]	100
Input data [byte]	1
Output data [byte]	89
Data content	“SIGMA CONTROL SMARTTechnical Description - Process Image”, Document number: 7_9200_PCM_PA

Tab. 9 Communication interface

2.8 Option K2 Water Cooling

Refrigeration may contaminate the cooling water if a leak occurs.

➢ A special heat exchanger must be used for heating drinking water.

The specific heat capacity and required volume flow rate of the cooling water changes if antifreeze is added.

➢ Consult an authorized KAESER service representative to ensure optimum cooling-system performance.

➢ Comply with the specified minimum requirements for the cooling water in order to avoid downtimes due to corrosion, calcification and contamination.

It is imperative that measures for cooling water treatment and filtration are implemented and performed.
KAESER can provide the names of companies specializing in cooling water analysis and the supply of suitable treatment devices.

The following design types are available:

- Option K2: Water cooling with plate heat exchanger: Chapter 2.8.1

Open cooling system

An open cooling system may be a cooling circuit with open cooling towers for cooling via evaporation. As a portion of the cooling water evaporates, it must be replenished regularly. During evaporation, the material content of the cooling water concentrates and the contact with ambient air can contaminate the cooling water. When replenishing cooling water, you must ensure the minimum requirements for the cooling water.

Closed cooling system

In a closed cooling system, the cooling water has not contact with the atmosphere. Thus, it cannot be contaminated by the atmosphere or enriched with oxygen, for example.

Continuous-flow cooling system

A continuous-flow cooling system is an open cooling system. Ground, surface or drinking water circulate once through the cooling system.

Further information The dimensional drawing in chapter 13.1 gives the flow direction, size and position of the connection ports.

2.8.1 Option K2 Water-cooling

The primary side of the heat exchanger is connected to the machine. The specifications refer to the secondary side of the heat exchanger.

2.8.1.1 Design data for the cooling system

	TG 450	TG 520	TG 650	TG 780	TG 980
Inlet temperature[1)] [°F]	84	84	84	84	84
Cooling water temperature rise[1)] [F]	17	18	14	12	17
Flow rate[1)] [gpm]	7.18	7.44	11.22	16.20	17.35
Pressure drop[1)] [psi]	6.5	7.1	4.5	8.7	10.2

[1)] ISO 7183 Option A2:

- Reference point: 14.5 psi(a), 68 °F, 0 % relative humidity:
- Operating point: Working pressure 100 psig, compressed air inlet temperature 100 °F, 100 % relative humidity

Tab. 10 Design data for the cooling system

2.8.1.2 Component specification:

Feature	Value
Material (Heat exchanger)	1.4401
Solder (Heat exchanger)	Copper (Cu)
Max. working pressure [psig]	145
Max. permissible pressure differential with closed valves [psi]	50
Minimum permissible inlet temperature [°F]	40
Max. permissible inlet temperature* [°F]	104
Unsuitable cooling media	Salt water Consult an authorized KAESER service representative on the suitability of cooling water solutions.

* Contact an authorized KAESER service representative regarding higher values.

Tab. 11 Component specifications (Option K2)

2.8.1.3 Cooling water quality

Characteristics/content	Closed cooling system	Open cooling system
pH value	7.5 – 9.0	7.5 – 9.0
General hardness [°dH]	0 – 20	0 – 20
Carbonate hardness* [°dH]	<20	<4
Chlorides (Cl) [mg/l]	<100	<100
Iron (Fe), dissolved [mg/l]	<0.5	<0.2
Sulphate (SO_4) [mg/l]	<300	<300
HCO_3/SO_4 ratio	>1	>1
Electrical conductivity [µS/cm]	10 – 800	10 – 1500
Ammonia (NH_4^+) [mg/l]	<1	<1
Manganese (Mn), dissolved [mg/l]	<0.1	<0.1
Glycol [%]	20 – 40	—
Solids (particle size) [mm]	<0.1	<0.1
Bacterial count [CFU*/ml]	10,000	10,000
Suspended solids [ppm] (portion of undissolved matter)	<20	<20
* CFU: colony-forming units		

Tab. 12 Cooling water quality

2.9 Sound pressure level

	TG 450	TG 520	TG 650	TG 780	TG 980
Sound pressure level [dB(A)]	<70 / <70[2)]	<70 / <70[2)]	<70 / <70[2)]	<70 / <70[2)]	<70 / <70[2)]
Sound pressure level as per EN ISO 11203 and basic standard ISO 9614-2 with d=1 m and Q2=17.2 / 16.4[2)] dB(A), uncertainty: ±3 dB(A)					
[2)] Option K2					

Tab. 13 Sound pressure level

2.10 Power Supply

Basic requirements

The machine is designed for an electrical supply according to National Electric Code (NEC) NEC-670, particulary NFPA 79, edition 2021, section 4.3. In the absence of any user-specified alternatives, the limits given in these standards must be adhered to. Consult manufacturer for any other specific power supply.

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

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

Three-phase

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

The machine requires a symmetrical three-phase power supply transformer with a WYE configuration output as shown in Figure 2 and Figure 3. In a symmetrical three-phase supply the phase angles and voltages are all the same.

Other power supplies are not suitable.

Fig. 2 Three-phase (wye system); 4 wire; center point solidly grounded

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

Further information Please contact an authorized KAESER service representative for power supply options.

The electrical diagram 13.3 contains further specifications for electrical connection.

2.11 Power supply specifications

The following multi-strand copper core wires are given according to 2020 NEC 310.14, 310.15, 310.16 and table 310.16 adjusted for 40°C ambient temperature.

If other local conditions prevail, like for example high temperature, the cross section should be checked and adjusted according to 2020 NEC 110.14(C), 220.3, 310.14, 310.15, 310.16, table 310.15(B)(1), table 310.15(C)(1), 430.6, 430.22, 430.24, 670.4(A) and other local codes.

Dual element time delay fuses should be selected according to 2020 NEC 240.6, 430.52 and tables 430.52, 430.248 and 430.250.

It is recommended to use a ground conductor the same size as the current carrying conductors, if local codes allow. Neither the minimum ground wire size as pointed out in 2020 NEC table 250.122 nor using conduit as the sole ground connection is recommended.

Option K1 Performance data

	TG 450	TG 520	TG 650	TG 780	TG 980
Power consumption [1] [hp]	6.8	8.0	9.6	12.1	20.0

[1] According to ISO 7183 Option A2:

- Reference point: 14.5 psia, 68°F, 0% relative humidity
- Operating point: Gauge working pressure 100 psig, compressed air inlet temperature 100°F, 100% relative humidity, cooling air inlet temperature 100°F

Tab. 14 Performance data (option K1)

Option K2 Performance data

	TG 450	TG 520	TG 650	TG 780	TG 980
Power consumption [1] [hp]	5.7	6.4	7.5	8.8	14.2

[1] According to ISO 7183 Option A2:

- Reference point: 14.5 psia, 68°F, 0% relative humidity
- Operating point: Gauge working pressure 100 psig, compressed air inlet temperature 100°F, 100% relative humidity, cooling air inlet temperature 100°F

Tab. 15 Performance data (option K2)

Rated voltage: 460V / 3 / 60Hz

	TG 450	TG 520	TG 650	TG 780	TG 980
Pre-fuse [A]	20 / 15[2)]	20	25 / 20[2)]	30 / 25[2)]	50 / 45[2)]
Supply per phase and ground (75°C)	14 AWG	12 AWG 14 AWG[2)]	12 AWG 14 AWG[2)]	10 AWG 12 AWG[2)]	8 AWG
Consumption [A]	13.3 / 10.4[2)]	15.2 / 12.1[2)]	16.9 / 13.9[2)]	20.6 / 16.8[2)]	33.8 / 27.3[2)]

[2)] Option K2

Tab. 16 Power supply details 460V / 3 / 60Hz

Further information The circuit diagram in chapter 13.3 contains further details of the electrical connection data.

3 Safety and Responsibility

3.1 Basic instructions

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

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

⚠ Disregard of warning or safety instructions can cause serious injuries!

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

➢ Immediately rectify (have rectified) any faults that could be detrimental to safety!

3.2 Specified use

The machine is intended solely to dry compressed air for industrial use. Any other use is considered incorrect. The manufacturer is not liable for any damages that may result from incorrect use. The user alone is liable for any risks incurred.

➢ Comply with the specifications shown in this service manual.

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

➢ Do not use compressed air for breathing purposes unless it is specifically treated.

➢ Do not use compressed air for any application that will bring it into direct contact with food products unless it is specifically treated.

3.3 Improper use

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

➢ Only use the machine as intended.

➢ Never direct compressed air at persons or animals.

➢ Do not use untreated compressed air for breathing purposes.

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

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

3.4 User's responsibilities

3.4.1 Observe statutory and universally accepted regulations

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

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

3.4.2 Qualified personnel

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

Authorized operators possess the following qualifications:

- are of legal age,
- are familiar with and adhere to the safety instructions and sections of the service manual relevant to operation,
- have received adequate training and authorization to operate electrical and compressed air devices.
- Additional qualifications for compressors with refrigerated dryers:
  - Adequate training and authorization on refrigeration devices.

Authorized installation and maintenance personnel have the following qualifications:

- are of legal age,
- must have read, are familiar with, and adhere to the safety instructions and sections of the service manual applicable to installation and maintenance,
- are completely familiar with the safety concepts and regulations of electrical, refrigeration, and compressed air engineering,
- are able to recognize the possible dangers of electrical, refrigeration, and compressed air devices and take appropriate measures to safeguard persons and property,
- have received adequate training in and authorization for the safe installation and maintenance of this machine.
- completely familiar with the safety concepts and regulations concerning refrigeration devices,
- must be able to recognize the possible dangers of refrigeration devices and take appropriate measures to safeguard persons and property.

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

3.5 Dangers

Basic information

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

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

Warning instructions are found before a potentially dangerous task.

3.5.1 Safely dealing with sources of danger

The following describes the various forms of danger that can occur during machine operation.

Electricity

Touching voltage-carrying components can result in electric shocks, burns, or death.

- ➢ Allow only qualified and authorized electricians or trained personnel under the supervision of a qualified and authorized electrician to carry out work on electrical equipment according to electrical engineering regulations.
- ➢ Before commissioning or re-commissioning the machine, the user must make sure there is adequate protection against electric shock from direct or indirect contact.
- ➢ Before starting any work on electrical equipment:
  Switch off and lock out the power supply disconnecting device and verify the absence of voltage.
- ➢ Switch off any external power sources.
  These may include devices connected to the floating relay contacts.
- ➢ Use fuses corresponding to machine power.
- ➢ Check regularly that all electrical connections are tight and in proper condition.

Forces of compression

Compressed air is contained energy. Uncontrolled release of this energy can cause serious injury or death. The following information concerns work on components that could be under pressure.

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

Rotating components

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

- ➢ Do not open the enclosure while the machine is switched on.
- ➢ Switch off and lock out the power supply disconnecting device and verify the absence of voltage.
- ➢ Wear close-fitting clothes and a hair net if necessary.
- ➢ Ensure that all covers and safety guards are in place and secured before restarting.

Temperature

High temperatures are generated during compression. Touching hot components may cause injuries.

- ➢ Avoid contact with hot components.
  These include, for example, the refrigerant condenser.
- ➢ Wear protective clothing.
- ➢ If welding is carried out on or near the machine take adequate measures to ensure that no parts of the machine can ignite because of sparks or heat.

Operating fluids/materials

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

- ➢ Strictly forbid fire, open flame and smoking.
- ➢ Follow safety regulations when dealing with refrigerant and chemical substances.
- ➢ Avoid contact with skin and eyes.

- ➢ Do not inhale refrigerant mist and vapours.
- ➢ Do not eat or drink while handling refrigerant.
- ➢ Keep suitable fire extinguishing agents ready for use.
- ➢ Allow only qualified specialists to work on refrigerant circuits.
- ➢ Use only KAESER approved operating materials.

Noise

The enclosure absorbs the machine noise to a tolerable level. This function will be effective only if the enclosure is closed.

- ➢ Operate the machine only with intact sound insulation.
- ➢ Wear hearing protection if necessary.

Unsuitable spare parts

Unsuitable spare parts compromise the safety of the machine.

- ➢ Use only spare parts approved by the manufacturer for use in this machine.
- ➢ Use only genuine KAESER replacement parts on pressure bearing parts.

Conversion or modification of the machine

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

- ➢ Do not convert or modify the machine!
- ➢ Obtain written approval by the manufacturer prior to any technical modification or expansion of the machine, the controller, or the control programs.

3.5.2 Safe machine operation

The following information will provide you with the necessary rules to ensure safe handling of the machine during individual product life phases.

Personal protective equipment

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

- ➢ Wear protective clothing as necessary.

Suitable protective clothing (examples):

- ■ Safety work wear
- ■ Protective gloves
- ■ Safety boots
- ■ Eye protection (protective glasses)
- ■ Ear protection

Transport

In order to prevent accidents, the weight and size of the machine require safety measures to be taken during its transport.

- ➢ Use suitable lifting gear that conform to local safety regulations.
- ➢ Allow transportation only by personnel trained in the safe movement of loads.

- ➢ Attach hoists only to suitable lifting points.
- ➢ Be aware of the center of gravity to avoid potential tipping.
- ➢ Make sure the danger zone is clear of personnel.
- ➢ Do not step onto machine components to climb up the machine.

Installation

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

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

Commissioning, operation and maintenance

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

- ➢ Allow maintenance work to be carried out only by authorized personnel.
- ➢ Switch off and lock out / tag out the power supply disconnecting device and verify the absence of voltage.
- ➢ Check that the floating relay contacts are voltage-free.
- ➢ Close shut-off valves or otherwise isolate the machine from the compressed air network to ensure that no compressed air can flow back into the machine.
- ➢ Depressurize all pressurized components and enclosures. Verify the vented state.
- ➢ Allow the machine to cool down.
- ➢ Do not open the cabinet while the machine is switched on.
- ➢ Do not open or dismantle any valves.
- ➢ Use only spare parts approved by KAESER for use in this machine.

De-commissioning, storage and disposal

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

- ➢ Drain all fluids from the machine, e.g. refrigerant, and dispose of in accordance with local environmental regulations.
- ➢ Do not damage the refrigerant circuit.
- ➢ Give refrigerant only to authorized bodies for disposal.
- ➢ Dispose of the machine in accordance with local environmental regulations.

3.5.3 Organizational Measures

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

3.5.4 Danger Areas

The table gives information on the areas dangerous to personnel.

Only authorized personnel may enter these areas.

Activity	Danger area	Authorised personnel
Transport	Within a 10 ft. radius of the machine.	Installation personnel for transport preparation. No personnel during transport.
	Beneath the lifted machine.	No personnel!
Installation	Within the machine. Within 3 ft. radius of the machine and its supply cables.	Installation personnel
Operation	Within a 3 ft. radius of the machine.	Operating personnel
Maintenance	Within the machine. Within a 3 ft. radius of the machine.	Maintenance personnel

Tab. 17 Danger Areas

3.6 Safety devices

Various safety devices ensure safe working with the machine.

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

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

3.7 Safety signs

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

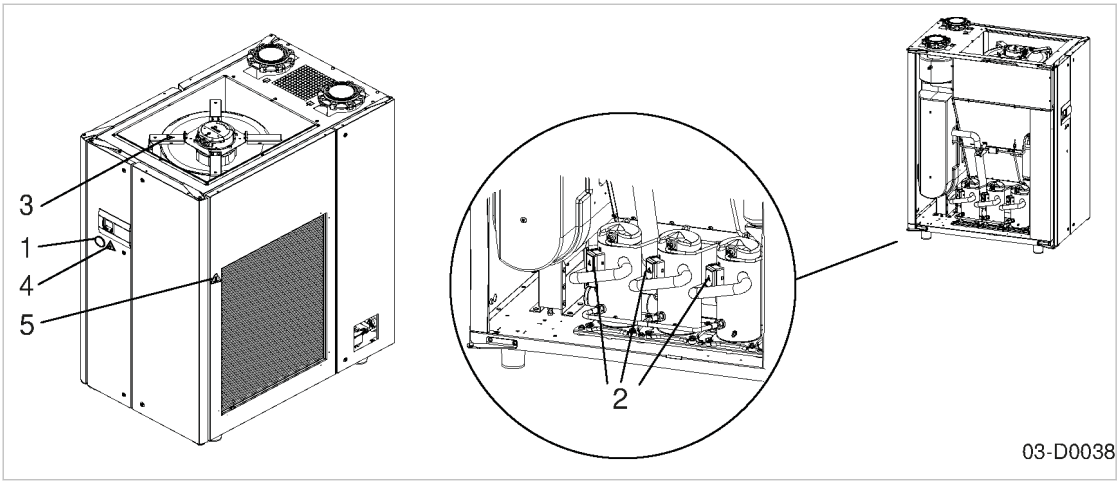


Fig. 4 Location of safety signs

Location	Symbol	Meaning
1		Injury and/or machine defects by improper use! ➢ Maintenance should be performed by properly trained personnel only. ➢ Read and understand manual and all safety labels before switching the machine on. ➢ Never remove or cover safety labels.
2		Danger of fatal injury from electric shock! ➢ Before starting any work on electrical equipment: Switch off and lock out/tag out the power supply disconnecting device and verify the absence of any voltage.
3		Danger of fatal injury from electrical voltage and charged capacitors! ➢ Before starting any work on electrical equipment: Switch off and lock out/tag out the power supply disconnecting device and verify the absence of any voltage. ➢ Following shutdown of the power supply disconnecting device, wait at least 5 minutes and check that no voltage is present, before opening the connector box.
4		Danger of fatal injury from electrical voltage and charged capacitors! ➢ Before starting any work on electrical equipment: Switch off and lock out/tag out the power supply disconnecting device and verify the absence of any voltage. ➢ Following shutdown of the power supply disconnecting device, wait at least 5 minutes and check that no voltage is present, before opening the control cabinet.
5		Hot surface! Risk of burns caused by contact with hot components. ➢ Do not touch the surface. ➢ Wear long-sleeved garments (no synthetics such as polyester) and protective gloves.

Tab. 18 Safety signs

3.8 Emergency situations

3.8.1 Correct fire fighting

Suitable measures

Calm and prudent action can safe lives in the event of a fire.

- ➢ Keep calm.
- ➢ Give the alarm.
- ➢ Shut off supply lines if possible.
  Power supply disconnecting device (all phases)
  Cooling water (if present)
- ➢ Warn and move endangered personnel to safety.
- ➢ Help incapacitated persons.
- ➢ Close the doors.
- ➢ When trained accordingly: Attempt to extinguish the fire.

Extinguishing substances

- ➢ Suitable extinguishing media:
  Foam
  Carbon dioxide
  Sand or soil
- ➢ Unsuitable extinguishing media:
  Strong jet of water

3.8.2 Treating injuries from handling refrigerant

Eye contact:

Severe eye irritation, watering, reddening, and swelling of the eyelids.
Risk of caustic burns and frostbite.

- ➢ Open eyelids wide to allow product to evaporate.
- ➢ Hold the eyelid wide and rinse the eye with running water.
- ➢ Consult an ophthalmologist if you experience lasting pains.

Skin contact:

Initially a sensation of chill, skin may redden subsequently.
Risk of frostbite.

- ➢ Allow the product to evaporate.
- ➢ Rinse with lukewarm water.
- ➢ Consult a physician if experiencing lasting pain or reddened skin.

Inhalation:

At high concentrations, risk of cardiac irregularity (arrhythmia).
At very high concentration, risk of asphyxia caused by oxygen deficiency.

- ➢ Remove victim to the fresh air.

➢ If necessary: respiration with respirator or administration of oxygen.
➢ Consult a physician if experiencing breathing or nerve complaints.

3.9 Warranty

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

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

In addition, we accept no warranty obligation for:

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

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

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

3.10 Environment protection

The operation of this machine may cause dangers for the environment.

➢ Do not allow refrigerants to escape into the environment or the sewage system.
➢ Store and dispose of operating materials and replaced parts in accordance with local environmental protection regulations.
➢ Observe national regulations.
This applies in particular to parts contaminated with refrigerant.

4 Design and Function

4.1 Enclosure

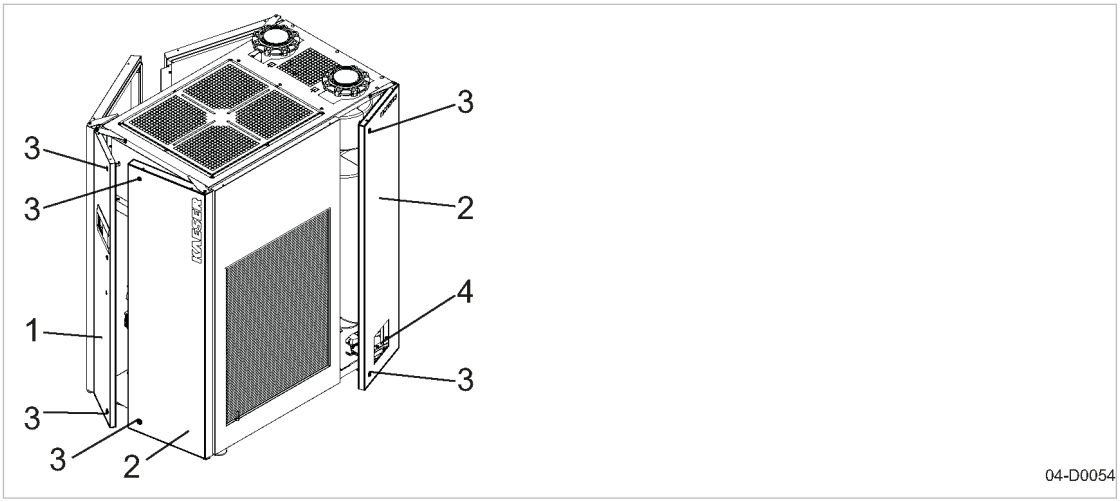


Fig. 5 Enclosure overview

1	Control cabinet door	3	Snap fastener
2	Access panel	4	Maintenance opening

When closed, the enclosure serves various functions:

- Sound insulation
- Protection against contact with components
- Cooling air flow:

The enclosure is not suitable for the following uses:

- Walking on, standing on, or sitting on
- Loads of any kind should not be placed or stored on the machine

Safe and reliable operation is only assured with the enclosure closed.

Doors can be opened and (removable access) panels may be lifted.
Open the snap fastener with the supplied key.

4.2 Machine function

The description uses an air-cooled machine as an example.

The refrigerated dryer cools the compressed air. As the compressed air cools, its capacity to retain moisture reduces and the surplus is precipitated out as condensate. This condensate is separated and automatically drained off.

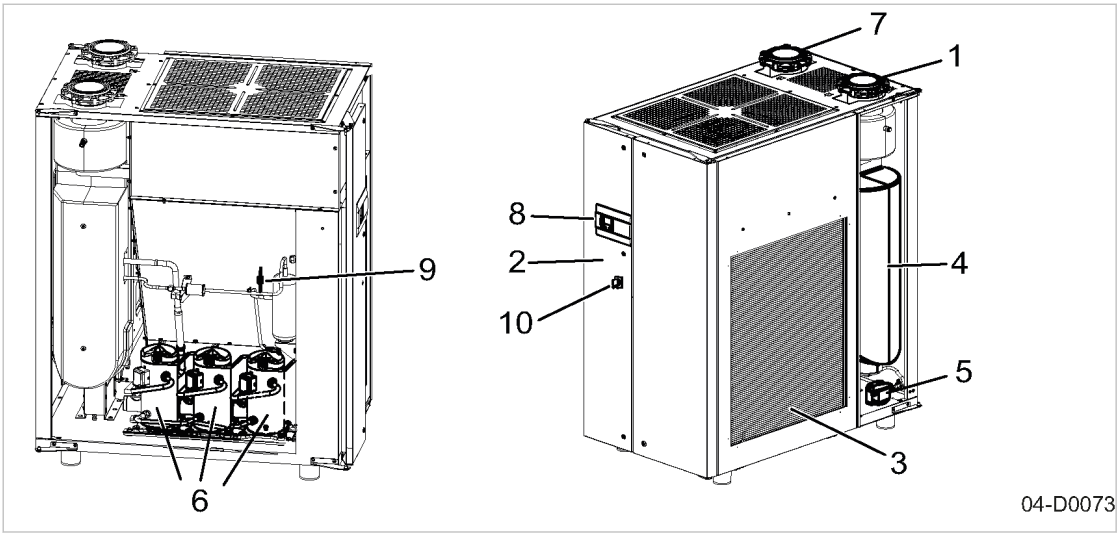


Fig. 6 Machine overview

1. Compressed air inlet
2. Control cabinet
3. Refrigerant condenser
4. Heat exchanger with condensate separator
5. Condensate drain
6. Refrigerant compressor
7. Compressed air outlet
8. Operator panel (controller)
9. Pressure monitor
10. Power supply disconnecting device (main switch)

First stage:

Warm compressed air entering the first section of the heat exchanger gives up some of its heat to the chilled and dried compressed air leaving the dryer.

Second stage:

Further air cooling takes place in the second part of the heat exchanger through which refrigerant flows. The refrigerant gives up its heat to the surroundings in the refrigerant condenser.

Third stage:

A separation system integrated in the heat exchanger removes the condensate precipitated out of the compressed air as it is chilled. The condensate drain reliably drains the condensate from the separator.

Fourth stage:

The dry, chilled air takes in some heat from the inflowing warm compressed air in the first part of the heat exchanger. The relative humidity of the compressed air drops.

4.3 Operating points and control modes

4.3.1 Machine operating modes

STOP

The machine is connected to the power supply:

- The *Controller Voltage* indicator lights green.
- The machine is switched off.
- The *ON* indicator is extinguished.

READY

The machine has been activated with «ON»:

- The *ON* indicator lights green.
- The refrigerant compressors are switched off.
- The refrigerant compressors start one after another, as soon as the start conditions are met.

LOAD

The start conditions are met:

- At least one refrigerant compressor is running.

4.4 SECOTEC CONTROL

The basic requirement for this type of control is a high capacity thermal mass: SECOPACK LS combined with several refrigerant compressors.

Depending on the load, the controller switches the necessary number of refrigerant compressors on one after another, thus ensuring even loading. As soon as the temperature in the thermal mass is sufficiently low, the controller switches one or several refrigerant compressors off, as required. Due to the high storage capacity the pressure dew point remains stable for a long time.
As soon as there is a new requirement for refrigeration, the controller switches on the required number of refrigerant compressors in order to cool down the thermal mass again.

Advantages:

- Low power consumption
- Low strain on refrigerant compressors
- Low switching frequency

4.5 Electronic condensate drain

Condensate flows into the collecting tank.

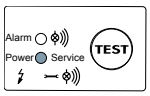
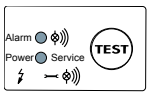
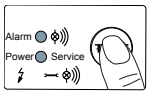
A sensor registers the level and signals this to the electronic control.

When the collecting tank is full, a valve opens automatically and drains the condensate.

The valve immediately closes when the condensate drain is empty. No compressed air is lost unnecessarily.

4.5.1 Condensate drain operating states

The operational state of the ECO-DRAIN condensate drain is indicated by three light-emitting diodes on the housing.

Display	Operating state	Function
	*Ready to operate*	Voltage is applied.
	*Fault/alarm*	Fault occurred. Valve opens and closes repeatedly in an attempt to clear the fault.
	Test the valve function	For manual draining, press and hold the key for at least 2 seconds.
	Test the alarm function	To test the alarm function, press and hold the key for at least 1 minute.

Tab. 19 Indication of the operational state of the condensate drain

4.6 Safety devices

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

- Main switch:
  The main switch also functions as a power supply disconnecting device. In the “0” position, the machine stops immediately.
- Safety pressure switch:
  The switch shuts down the machine as soon as the pressure of the refrigerant exceeds the permitted maximum. The switch is factory set.
- Enclosures and covers over moving parts and electrical connections:
  These protect against accidental contact.

4.7 Floating contacts

Floating contacts are provided for the transfer of signals/messages.

Information on location, loading capacity and type of message or signal can be found in the wiring diagram.

If the floating relay contacts are connected to an external power source, they may be under power even when the machine is disconnected from the supply.

4.8 SIGMA CONTROL SMART

4.8.1 Operating panel

Keys (mechanical)

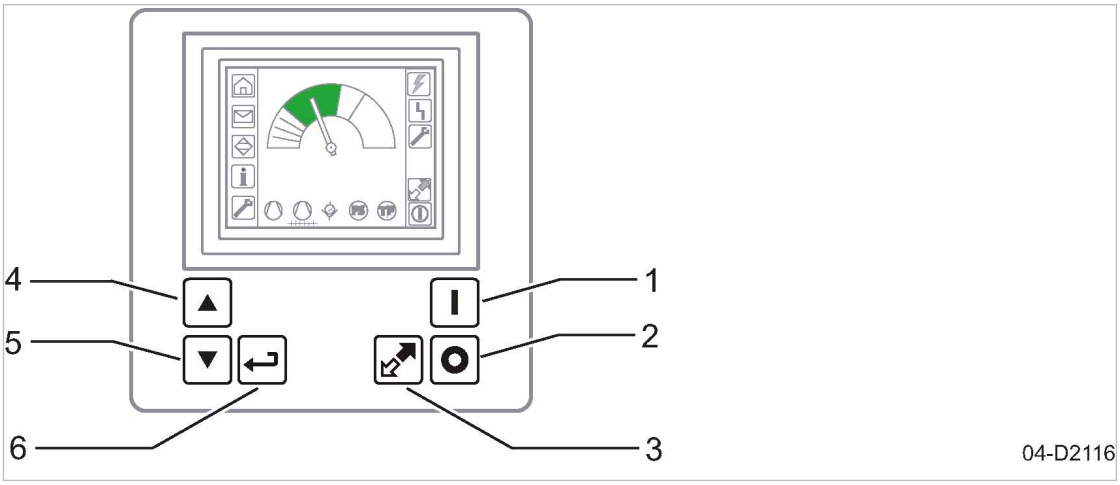


Fig. 7 Keys – overview

Item	Name	Function
1	«ON»	Switches the machine on.
2	«OFF»	Switches the machine off.
3	«Remote control»	Switches the remote control on and off.
4	«Up»	Scrolls up the menu options. Increases a parameter value.
5	«Down»	Scrolls down the menu options. Reduces a parameter value.
6	«Enter»	Jumps to the selected menu option. Switches to Edit mode. Exits the Edit mode and saves. Acknowledge the message.

Tab. 20 Keys (mechanical)

Keys (soft key)

The menu displays the following keys which can be controlled with the arrow keys.

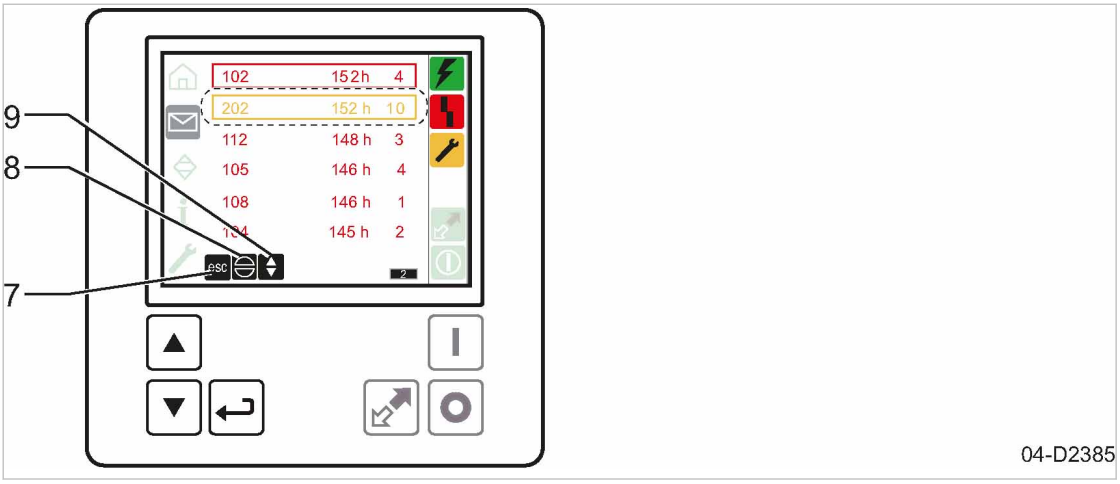


Fig. 8 Keys (soft key)

Item	Name	Function
7	esc	Returns to the next higher menu option level.
8	Acknowledgement	Acknowledges alarms and warning messages.
9		White: Use the «UP» and «DOWN» keys to navigate: ■ Press esc and Acknowledge ■ Changing images in submenus Gray: The «UP» and «DOWN» keys are inactive.

Tab. 21 Keys (soft key)

Indicators

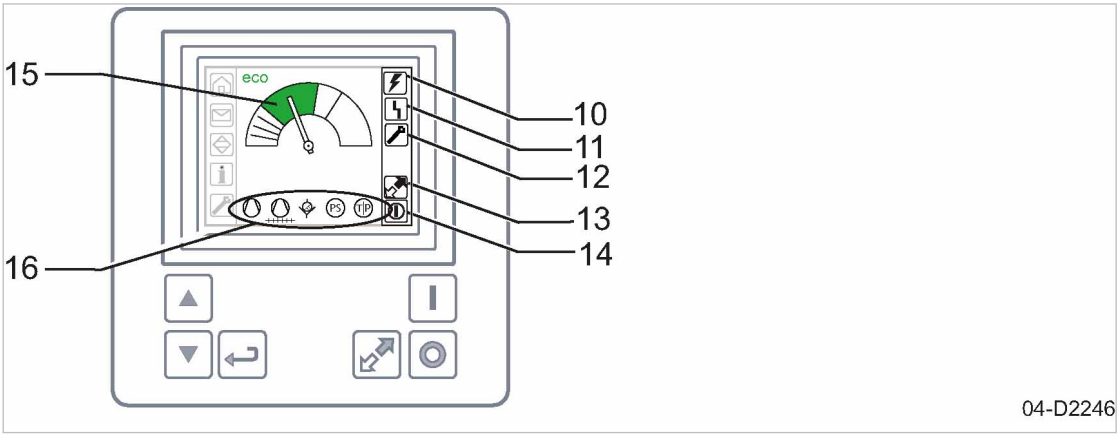


Fig. 9 Indicators

Item	Name	Function
10	*Controller voltage*	Lights green when the power supply is switched on.
11	*Alarm*	Flashes red when an alarm occurs. Lights continuously when acknowledged.

Item	Name	Function
12	*Warning/ Maintenance*	Continuous yellow light indicates a warning or maintenance message.
13	*Remote control*	Continuous yellow light when remote control is activated.
14	*ON*	Lights green when the machine is switched on.
15	*Dew point*	Indicates the dew point progress (trend display): ■ Blue: Pressure dew point too low ■ Green: Optimal pressure dew point ■ Yellow: Pressure dew point rising ■ Red: High pressure dew point (message contact switches)
	eco	Energy-saving operation
16	Indicates messages concerning individual components	From left to right: ■ Refrigerant compressor ■ Refrigerant condenser ■ Condensate drain ■ Safety pressure monitor ■ Machine sensors – Temperature transducer – Pressure transducer

Tab. 22 Indicators

4.8.2 User operation SIGMA CONTROL SMART

Handling concept

Task	Procedure
Navigating the menu	For navigating the menus, a cursor is provided to move the «UP» and «DOWN» keys The current cursor position is indicated by inverse coloring. Use the «Enter» key to switch, for example, from the main menu into a sub-menu. If a single menu is too large, the information is provided in several numbered screens (images). The corresponding symbol in the Main menu appears somewhat darker in this case.
Changing parameters	To change parameters, navigate to an entry and confirm with «Enter». This enables you to use the «UP» and «DOWN» keys to change values or activate/ deactivate check boxes: ■ Check box activated: ✓ ■ Check box deactivated: □ Confirm your selection with «Enter». The change is now active.

Tab. 23 Handling concept

Main menu

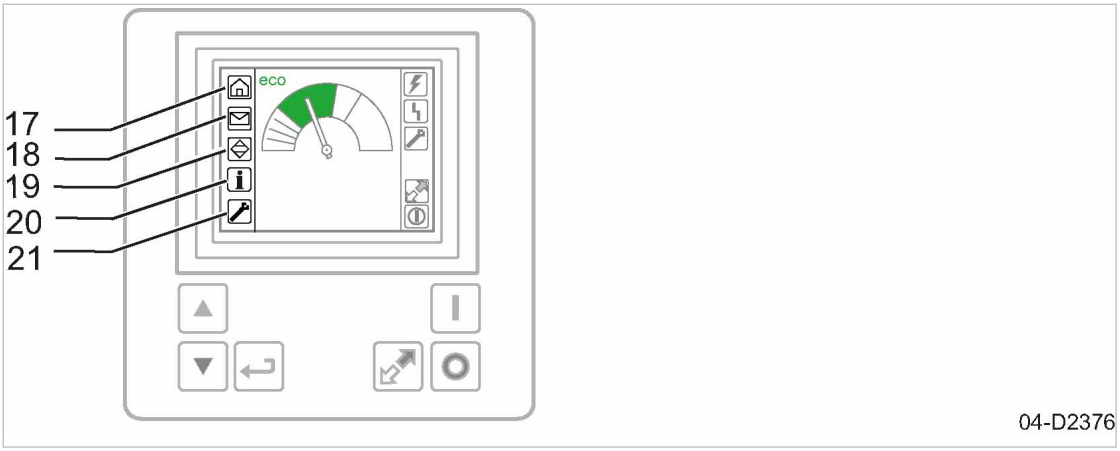


Fig. 10 Main menu

Item	Designation	Description
17	Opening page	Display: Pressure dew point
18	*<Messages>*	The following events (messages) are saved: ■ Faults ■ Warnings The machine shuts down when an alarm message is triggered.
19	*<Flow diagram>*	Displays all control-relevant sensors and actuators.
20	*<Information>*	Display: Operating hours Setting option for temperature limits and units.
21	*<Service>*	Displays maintenance tasks to be performed and the maintenance timer.

Tab. 24 Main menu

Color concept

Different colors indicate the various operating states.

Color	Meaning
White	Component is shut down. For sensors: The activation criteria is not met
Green	Component is switched on. For sensors: The activation criteria is met Measured value in normal range.
Yellow	Warning or maintenance message for a component Measured value in critical range.
Red	Fault in a component. Measured value in impermissible range. The machine will be shut down

Tab. 25 Color concept

4.8.3 Start screen

The start screen is displayed during normal operation. The controller automatically switches to this screen if you don't activate a key for three minutes.

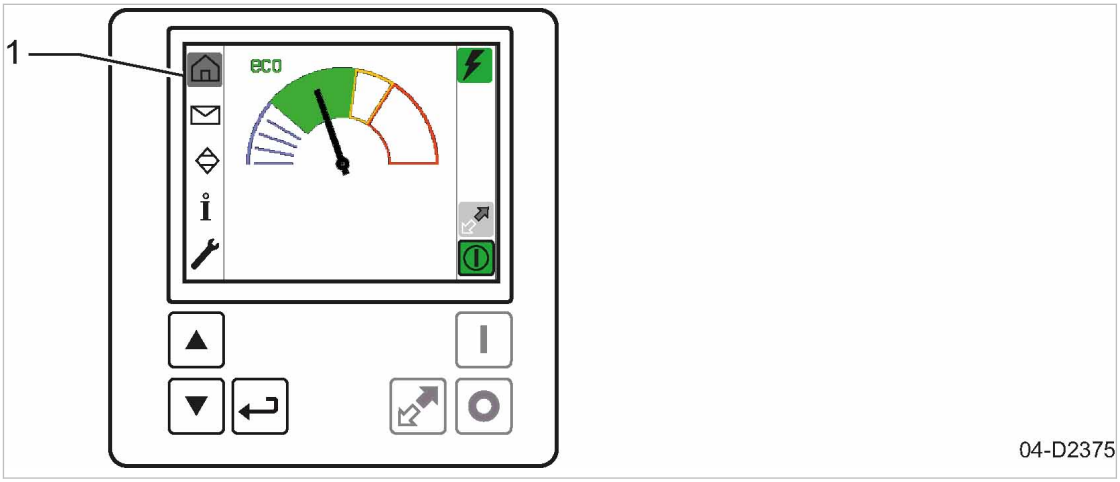


Fig. 11 Start screen

[1] Active start screen

4.8.4 Messages menu

All messages reported in the past are listed and displayed in the color of their classification:

- Warning/maintenance message: Yellow
- Alarm message: Red

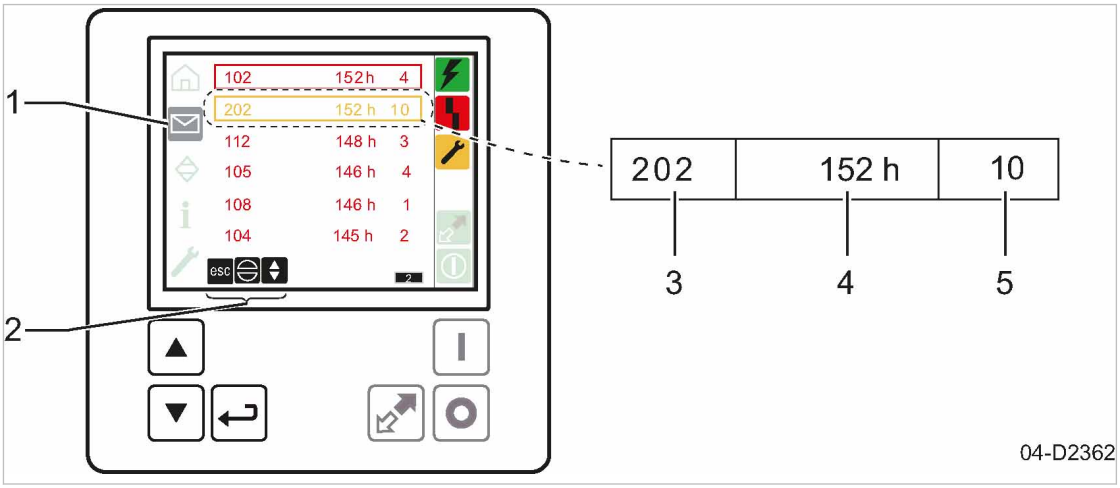


Fig. 12 Event history

[1] *<Messages>*
[2] Additional navigation options:
Escape
Acknowledgement
[3] Message number (example: 202)
[4] Operating hour during which the message had been issued the last time (example: 152 h)
[5] Frequency of occurrence (example: 10)

Use the «UP» or «DOWN» keys to select the *<Message>* menu.

Press «Enter» to open the corresponding screen.

Active faults or warnings which have not yet been acknowledged are indicated by a flashing frame.

Acknowledged messages are framed as long as the cause for the message is not resolved.

This frame disappears as soon as the message cause has been resolved. This is also the case if it is a message which does not require acknowledgement.

Further information — See chapter 9.2 for a list of all message codes.

4.8.5 "Flow diagram" menu

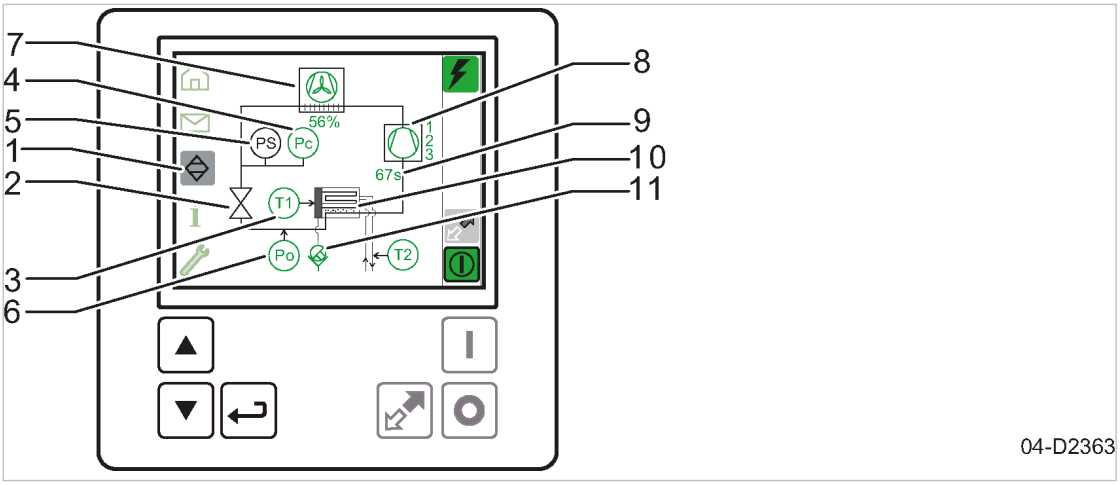


Fig. 13 Flow diagram

1. *<Flow diagram>*
2. Expansion valve: thermostatic
3. Temperature transducer
4. Pressure transducer: Condensation pressure
5. Pressure monitor
6. Pressure transducer: Evaporation pressure
7. Refrigerant condenser: Fan motor (speed in percentage of maximum speed)
8. Refrigerant compressor (displayed number indicates which refrigerant compressor is running)
9. Run time of the refrigerant compressor in the current cycle
10. Heat exchanger
11. Condensate drain

Use the «UP» or «DOWN» keys to select the *<Flow diagram>* menu.

The *<Flow diagram>* menu provides a simplified overview of the components with supplementary information.
For a complete *<flow diagram>*, see chapter 13.2.
The various colors used to display the components indicate their operating states.

4.8.6 "Information" menu

Use the «UP» or «DOWN» keys to select the *<Information>* menu. This menu comprises several screens.

Press «Enter» to open the first screen.

4.8.6.1 Screen 1

The system displays the operating hours of the individual machine components.
You cannot modify any settings.

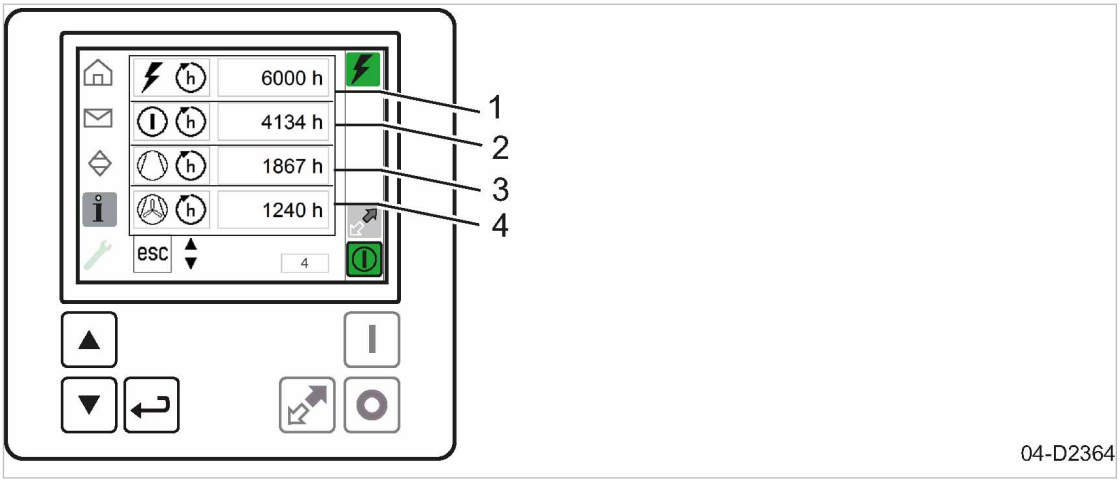


Fig. 14 Information: Screen 1

[1] Number of operating hours during which the controller is under power (here: 6000 h).
[2] Number of operating hours during which the machine was switched on (here: 4134 h).
[3] Number of operating hours of refrigerant compressor 1 (here: 1867 h). (Due to the even load of the refrigerant compressors the operating hours specified apply to all refrigerant compressors).
[4] Number of operating hours of the fan motor (here: 1240 h).

4.8.6.2 Screen 2

Use «DOWN» to open the next screen.

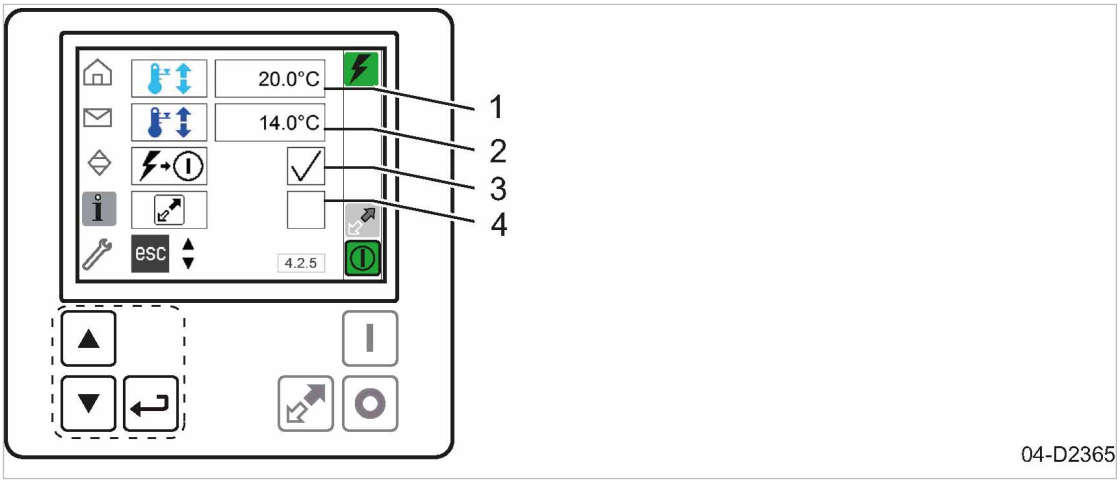


Fig. 15 Information: Screen 2

[1] Red warning range (here: 20.0 °C)
[2] Yellow warning range (here: 14.0 °C)
[3] Automatic restart (here: active)
[4] *Remote control* (here: inactive)

You can modify the following settings in this screen.

- Pressure dew point: Pressure dew point: Specify the lower temperature limit for the red warning range.
- Pressure dew point: Pressure dew point: Specify the lower temperature limit for the yellow warning range.

- Activate/deactivate automatic restart after a power failure:
- Activate/deactivate the «Remote control» key

4.8.6.3 Screen 3

Use «DOWN» to open the next screen.

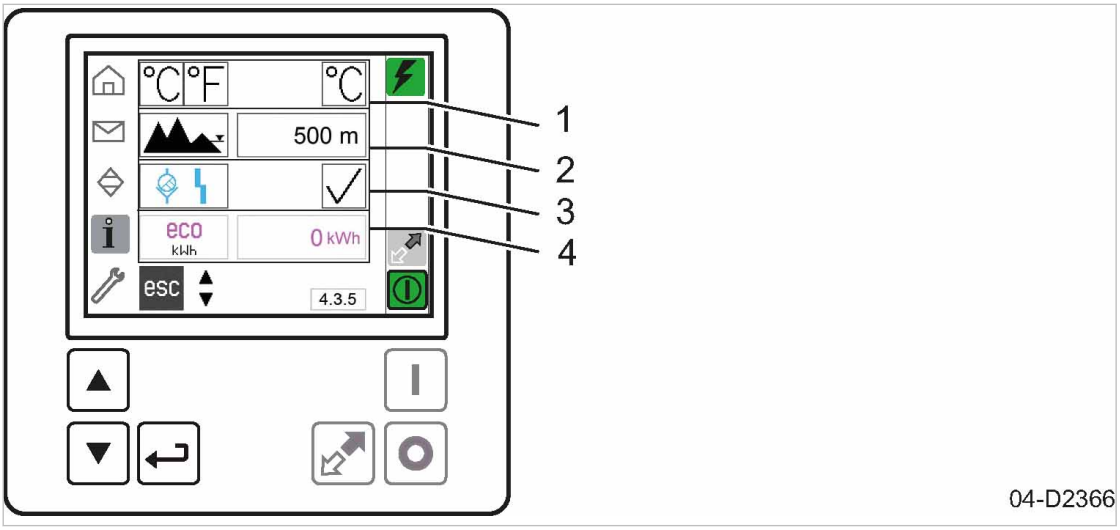


Fig. 16 Information: Screen 3

[1] Units of measure used (here: °C)
[2] Installation altitude (here: 500 m)
[3] Condensate drain: Activate fault message (here: Fault message activated)
[4] Electric energy saved with "eco" operation

You can change the following settings in this screen:

- Setting the unit of measurement:
  - Parameter °C: Temperature in “°C”, pressure in “bar” and length in “m”
  - Parameter °F: Temperature in “°F”, pressure in “psi” and length in “feet”
- Adjust installation altitude:
  - Adjustment range: 0 m to 4000 m (default setting 500 m)
  - Above 1000 m the altitude setting must always be adjusted.
- Activate or deactivate fault message:
  In the delivery condition a fault message is output at the condensate drain in the event of a fault. The refrigeration dryer continues running.

  If you activate the fault message, the control additionally reports a fault. This is only output if the condensate drain was malfunctioning for the duration of 10 min without interruption. The refrigerated dryer switches off.

4.8.7 Service menu

Use the «UP» or «DOWN» keys to select the *<Service>* menu. This menu may consist of several screens.

Press «Enter» to open the first screen.

Screen 1: Condensate drain

It is not possible to change the start value.

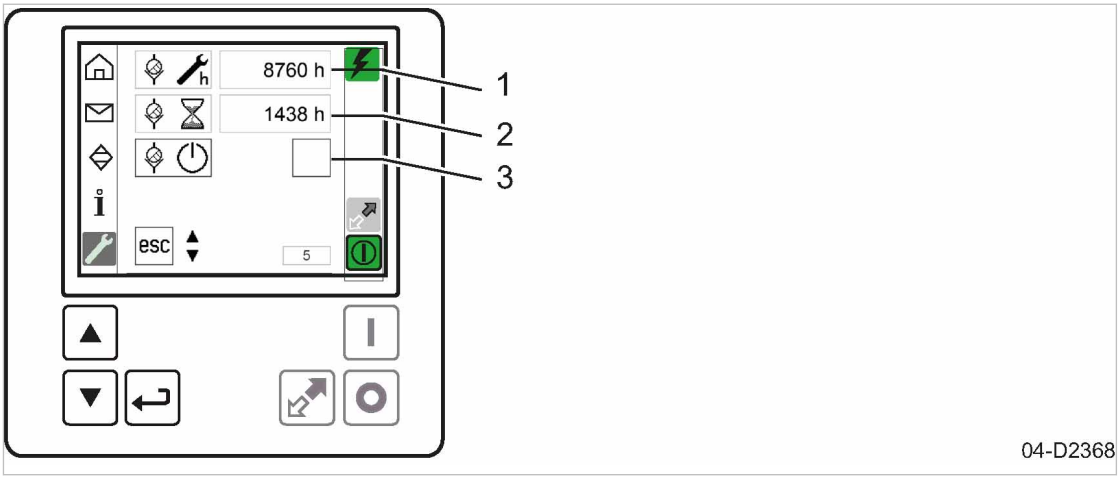


Fig. 17 Screen 1: Condensate drain

1 Start value of the maintenance counter (example: 8760 h)
2 Remaining operating hours to the next due maintenance (example: 1438 h)
3 Resetting the maintenance interval counters: activate/deactivate

To reset the maintenance hours counter to its start value, activate the check box and confirm with «Enter».

Option K1 Screen 2: Refrigerant condenser

It is possible to change the start value and adjust the maintenance interval for your individual operating conditions.

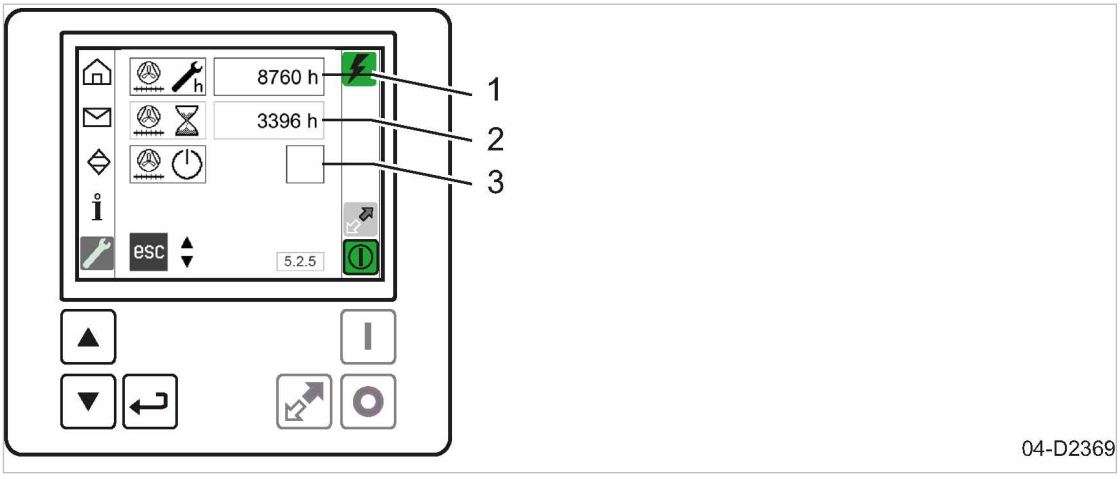


Fig. 18 Screen 2: Refrigerant condenser

1 Start value of the maintenance counter (example: 8760 h)
2 Remaining operating hours to the next due maintenance (example: 3396 h)
3 Resetting the maintenance interval counters: activate/deactivate

To reset the maintenance hours counter to its start value, activate the check box and confirm with «Enter».

4.9 MODBUS TCP communication module

The MODBUS TCP communication module is designed for the communication between SIGMA CONTROL SMART and SIGMA AIR MANAGER 4.0.
As an alternative to SIGMA AIR MANAGER 4.0, you can use MODBUS TCP to connect third-party controllers.
In this case, please contact an authorized KAESER service representative.

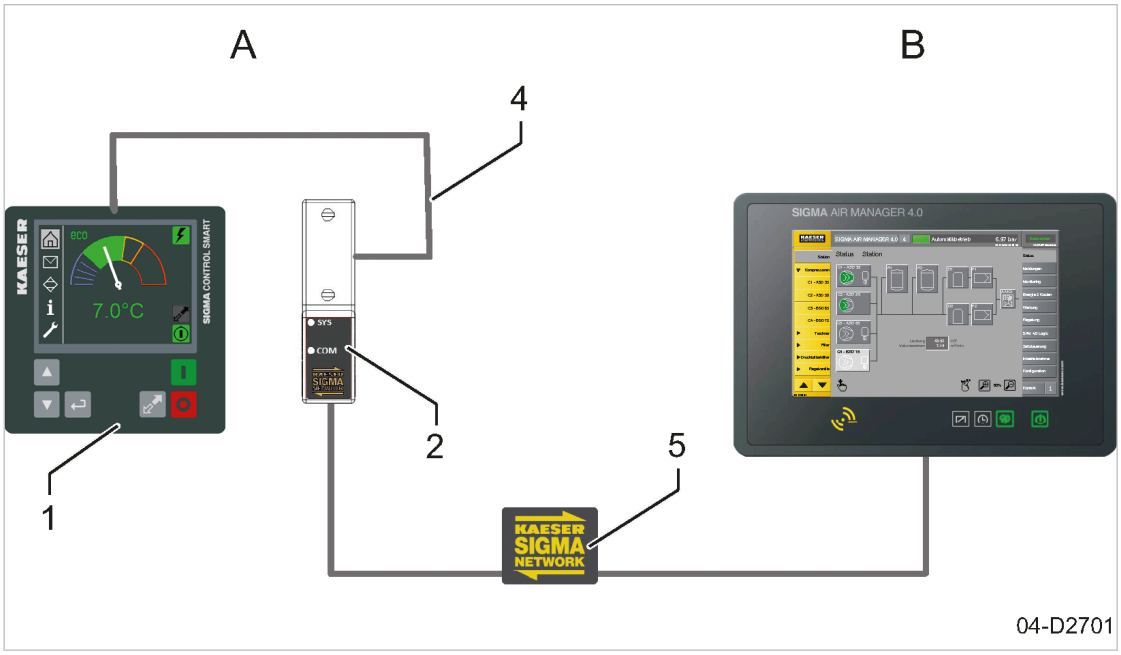


Fig. 19 Installation variant with SIGMA AIR MANAGER 4.0

A	Refrigerated dryer	B	SIGMA AIR MANAGER 4.0
1	SIGMA CONTROL SMART	4	CAN bus cable
2	MODBUS TCP communications module	5	SIGMA NETWORK cable

4.9.1 Display and operating elements of the communications module

The plug-in communications module communicates with SIGMA CONTROL SMART (SCS) via CAN bus (X2).

The plug-in communications module is equipped with these operating elements, displays and connections:

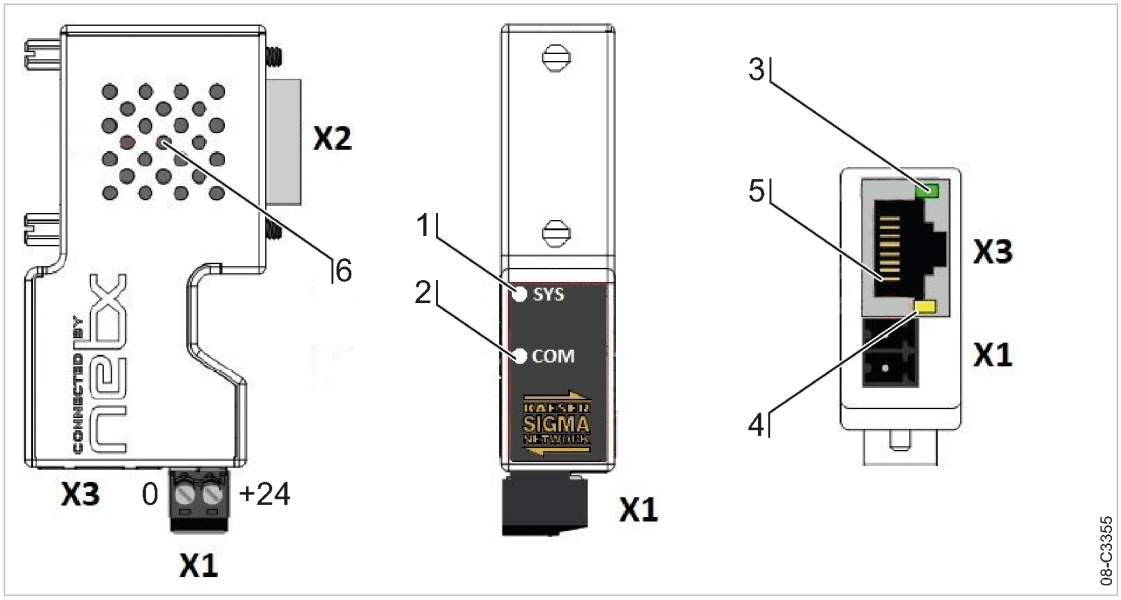


Fig. 20 Operating elements, displays and connections of the communications module

Item	Designation	Color	Status	Description
	X1	–	–	Supply voltage: 24 VDC
	X2	–	–	CAN, 9-pole sub D plug
	X3	–	–	Ethernet, RJ45 socket
1	SYS LED system status	Green	on	Standard operation, firmware started
		Yellow	on	Transition state
		Yellow/ green	flashes	Activating the communications module is in progress
		–	off	No supply voltage
2	COM LED communication	Green	on	Standard operation, CAN and Ethernet communication running
		–	off	RESET button pressed
		Red	flashes 1x/s	CAN communication malfunction / Ethernet communication running
		Red	flashes 2x/s	Ethernet communication malfunction / CAN communication running
3	Ethernet LINK LED	Green	off	No connection
			on	Connection established
4	Ethernet ACT LED	Yellow	off	No Ethernet communication
			flashes	Ethernet communication running
5	–	–	–	Pin 1
6	RESET key in housing underneath opening	–	–	Pressing the key with a suitable object for more than 3 s will reset the IP settings (IP address, SubNetMask, Gateway) to the factory setting

Tab. 26 Plug-in communications module – operating elements, displays and connections

These displays illuminate during operation:

- The SYS LED illuminates green during standard operation of the communications module
- The COM LED illuminates green during communication between SIGMA CONTROL SMART and the bus master (SAM 4.0 or Modbus TCP control system)
- The Ethernet LINK LED illuminates green if connection to the Ethernet network is established
- The Ethernet ACT LED flashes yellow during running Ethernet communication

4.10 Options

The options available for your machine are described below.

4.10.1 Option C37 Floating contact "Refrigerated compressor runs"

This floating contact switches as soon as at least one of the refrigerated compressor runs.

This contact can be used to switch an exhaust air flap.

4.10.2 Option C36 Pressure dew point warning

This floating relay contact switches as soon as the pressure dew point exceeds the permissible range. It is automatically reset when the pressure dew point drops back to an acceptable range.

4.10.3 Option H1 Machine Mountings

These mountings allow the machine to be anchored firmly to the floor.

Details of the fixing holes are contained in the dimensional drawing in chapter 13.1.

Fig. 21 Machine Mountings

[1] Machine mounting
[2] Holes for anchor bolts to fix the mounting to the floor.

4.10.4 Option K2 Water-cooling

Water-cooled machines are equipped with a plate-type heat exchanger in stainless steel as a condenser.

A cooling water regulating valve controls the flow depending on the supply temperature of the cooling water.

The cooling water regulating valve closes fully when the refrigerant compressor is shut down.

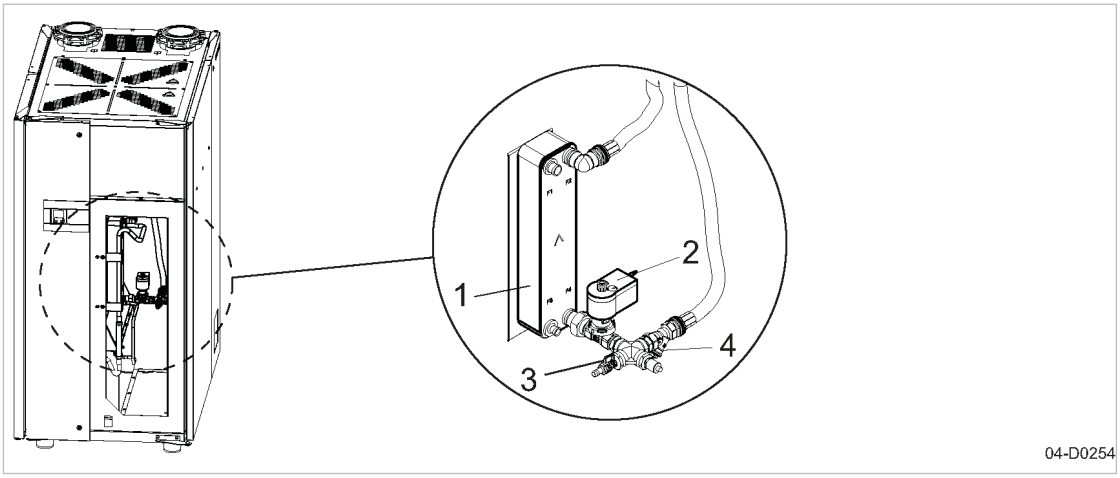


Fig. 22 Water-cooling

1 Refrigerant condenser
2 Cooling water regulating valve
3 Shut-off valve
4 Dirt trap

4.11 Accessories

4.11.1 Transformer

The transformer allows you to connect the machine to different main voltages.

5 Installation and Operating Conditions

5.1 Ensuring safety

The conditions in which the machine is installed and operated have a decisive effect on safety.

Warning instructions are located before a potentially dangerous task.

⚠ Disregard of warning instructions can cause serious injuries!

Complying with safety warnings

Disregard of safety warnings can cause unforeseeable dangers!

- ➢ Strictly forbid fire, open flame, and smoking.
- ➢ If welding is carried out on or near the machine take adequate measures to ensure that no parts of the machine can ignite because of sparks or heat.
- ➢ Do not store inflammable material in the vicinity of the machine.
- ➢ The machine is not explosion-proof!
  Do not operate in areas in which specific requirements with regard to explosion protection are in force.
- ➢ Ensure sufficient and suitable lighting such that the display can be read and work carried out comfortably and safely.
- ➢ Keep suitable fire extinguishing agents ready for use.
- ➢ Ensure that required ambient conditions are maintained.

Required ambient conditions may be:

- ■ Maintain ambient temperature and humidity
- ■ Ensure the appropriate composition of the air within the machine room:
  - – clean with no damaging contaminants (e.g., dust, fibers, fine sand)
  - – free of explosive or chemically unstable gases or vapors
  - – free of acid/alkaline forming substances, particularly ammonia, chlorine or hydrogen sulfide.

5.2 Installation conditions

5.2.1 Determining location and clearances

The machine is intended for installation in an appropriate machine room. Information on distances from walls and ventilation is given below.

Precondition The floor must be level, firm, and capable of bearing the weight of the machine.

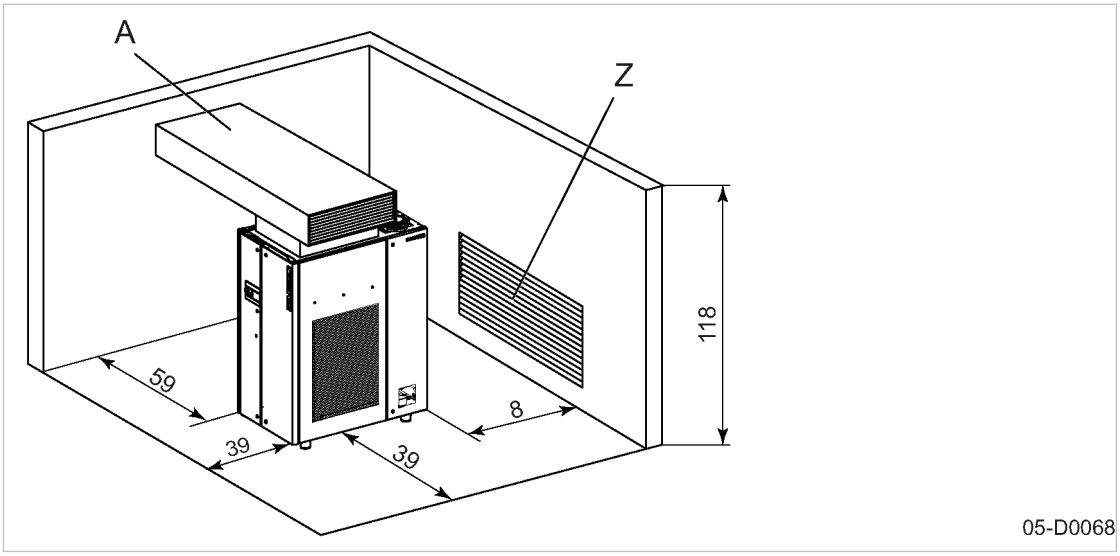


Fig. 23 Recommended machine placement and dimensions [in]

[A] Exhaust air duct
[Z] Air inlet aperture

1. **NOTICE** *Ambient temperature too low!*
   Frozen condensate can damage the machine when starting.
   ➢ *Switch the machine on only when the minimum switch-on temperature is reached.*
2. Consult KAESER for measures where there is a risk of frost.
3. Ensure that all intake and exhaust apertures of the enclosure remain opened.
4. Ensure accessibility and adequate lighting so that all work on the machine can be carried out without danger or hindrance.
5. Ensure that the displays can be read without glare and that the controller display is protected from damage by direct sunlight (UV radiation).
6. If installed outdoors, protect the machine against frost, direct sunlight, dust, and rain.

5.2.2 Ensuring the machine room ventilation

Adequate ventilation of the machine room fulfils several functions:

- It prevents a vacuum in the machine room.
- It evacuates the exhaust heat of the machine and thus ensures the required operating conditions.

➢ Consult KAESER if you cannot ensure the conditions for adequate ventilation of the machine room.

1. Ensure that the flow rate of fresh air is at least the same as the flow rate taken by the machine and exhaust fan from the machine room.
2. Keep the inlet and exhaust apertures free of obstructions so that the cooling air can flow freely through the room.
3. Do not install the machine in the exhaust air flow from other machines.
4. Ensure clean air in order to support the proper functioning of the machine.

5.2.3 Exhaust air duct design

At the cooling air inlet and exhaust, the machine can only overcome the air resistance by means of the corresponding the duct design. Any additional air resistance will reduce airflow and deteriorate machine cooling.

➢ Consult the KAESER SERVICE representative before deciding on:

- Design of the exhaust air duct
- Transition between the machine and the exhaust air duct
- Length of the ducting
- Number of duct bends
- Design of flaps or shutters

Further information

Further information on the design of exhaust air ducts can be found in chapter 13.1.

5.3 Operating the machine in a compressed air network

If the machine is integrated into a compressed air network, the specified maximum working pressure must not be exceeded.

When charging a fully vented air network there is generally a very high rate of airflow through the air treatment devices. These conditions are detrimental to correct air treatment. The compressed air quality drops.
To ensure the desired air quality when charging a vented air network, we recommend the installation of an air-main charging system.

➢ Consult KAESER for advice on this subject.

6 Installation

6.1 Ensuring safety

Follow the instructions below for safe installation.

Warning instructions are located prior to a potentially dangerous task.

⚠ Disregarding warning instructions can cause serious injuries!

Complying with safety instructions

Disregarding safety instructions can cause unforeseeable dangers.

- ➢ Follow the instructions in chapter 3 "Safety and Responsibility".
- ➢ Have the installation carried out only by personnel trained in refrigeration engineering.
- ➢ Make sure that no one is working on the machine.
- ➢ Ensure that all service doors and panels are locked.

Working on live components

Touching voltage carrying components can result in electric shocks, burns, or death.
Dangerous voltages persist at the terminals of the fan motor and intermediate circuit capacitors in the control cabinet for some time after power is switched off.

- ➢ Work on electrical equipment may be carried out only by authorized electricians.
- ➢ Switch off and lock out / tag out the power supply disconnecting device and verify the absence of voltage.
- ➢ Before starting work on the control cabinet or the fan, wait at least 5 minutes after the power supply disconnecting device has been switched off.
- ➢ Check that the floating relay contacts are voltage-free.

Working on the compressed air network

Compressed air is contained energy. Uncontrolled release of this energy can cause serious injury or death. The following safety instructions relate to any work on components that could be under pressure.

- ➢ Close shut-off valves or otherwise isolate the machine from the compressed air network to ensure that no compressed air can flow back into the machine.
- ➢ Fully vent all pressurized components and enclosures.
- ➢ Do not open or dismantle any valves.

Working on the drive system

Touching voltage carrying components can result in electric shocks, burns, or death.
Touching the fan while the machine is switched on can result in serious injury.

- ➢ Switch off and lock out / tag out the power supply disconnecting device and verify that no voltage is present.
- ➢ Do not open the cabinet while the machine is switched on.

Further information

Information regarding authorized personnel can be found in chapter 3.4.2.

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

6.2 Reporting Transport Damage

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

6.3 Creating the air connection

Condensate in the compressed air network can damage the piping:
- ➢ Install only corrosion-resistant piping.
- ➢ Use fluoroelastomers as the material for the seals.
- ➢ Observe the electrochemical voltage sequence.
- ➢ Consult with KAESER concerning suitable materials for the compressed air network.

Precondition The compressed air network is vented completely to atmospheric pressure.

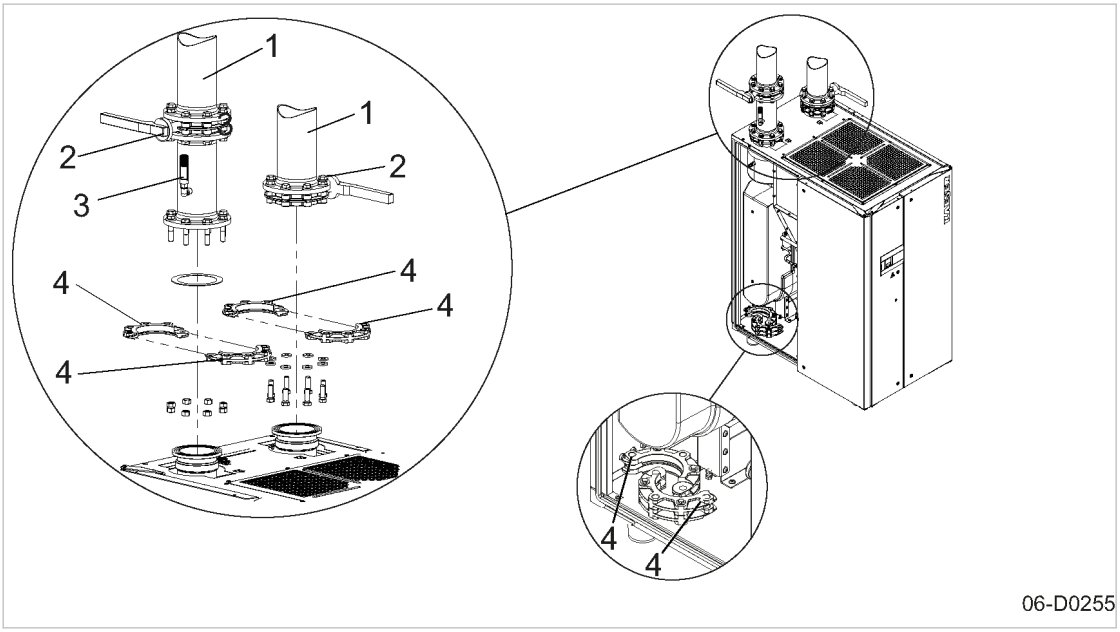


Fig. 24 Air connection

1 Compressed air line
2 Shut-off valve
3 Safety relief valve (user)
4 Loose flange (split)

1. **⚠ WARNING** *Serious injury or death can result from loosening or opening components under pressure!*
   - ➢ *Fully vent all pressurized components and enclosures.*
2. Remove loose flange from the bottom of the machine and install on the air connections.
3. Fit shut-off valves in the compressed air inlet and outlet.
4. **NOTICE** *The machine's compressed air system is internally not protected against any exceeding of the maximum working pressure.*
   - ➢ *The user must install a safety relief valve.*
5. Screw the air connections to the compressed air line.

Further information The dimensional drawing in chapter 13.1 gives the size and location of the connection ports.

6.4 Connecting the condensate drain

A threaded hose connection is provided to attach a condensate drain hose.

The condensate must be able to drain freely.

➢ Only machines with 232 psig maximum permissible working pressure may be connected to the condensate collecting line.

Fig. 25 illustrates the recommended installation.
Condensate flows downward into the condensate collecting line. This prevents condensate flowing back to the machine.

During summer operation and increased ambient temperatures, this can lead to dew formation and the formation of condensate on the condensate lines.

➢ The condensate lines must be insulated accordingly.

If condensate flows at several points into the condensate collecting line, you must install shut-off valves in the condensate lines to shut the condensate line off before commencing maintenance work.

Condensate line

Feature	Value
Max. length[1)] [ft]	49
Max. delivery head [ft]	16
Material (pressure-resistant, corrosion-proof)	Copper Stainless steel Plastics Hose line

[1)] For longer lengths, please contact an authorized KAESER service representative before installation.

Tab. 27 Condensate line

Condensate collecting line

Feature	Value
Gradient [%]	>1
Max. length[1)] [ft]	66
Material (pressure-resistant, corrosion-proof)	Copper Stainless steel Plastic Hose line

[1)] For longer lengths, please contact an authorized KAESER service representative before installation.

Tab. 28 Condensate collecting line

Compressed air flow rate[1] [cfm]	Line cross-section ["]
< 350	3/4
350 – 705	1
706 – 1410	1 1/2
> 1410	2

[1] Compressed air flow rate as guide for the condensate volume to be expected

Tab. 29 Condensate collecting line: Line diameter

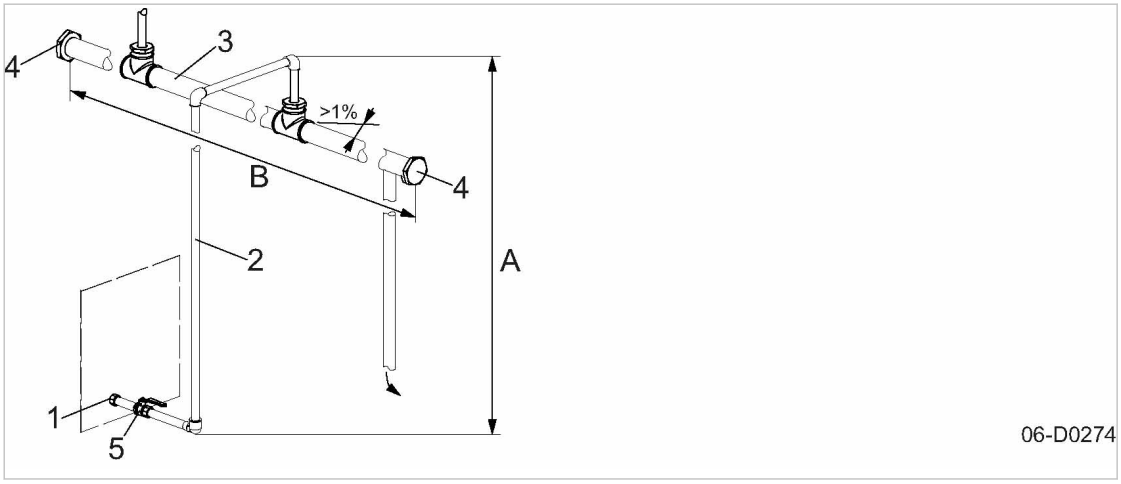


Fig. 25 Connecting the condensate drain

1 Threaded connection
2 Condensate line
3 Condensate collecting line
4 Screw plug
5 Shut-off valve
A Delivery head
B Length of the condensate collecting line

➢ Directly connect every condensate drain to the condensate collecting line.

➢ Collect the condensate in a suitable container and dispose of it in accordance with applicable environmental regulations.

Further information The dimensional drawing in chapter 13.1 provides the size and position of the connection port.

6.5 Connecting the machine to the power supply

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

1. The power supply must only be connected by authorized installation personnel or an authorized electrician.
2. Carry out safety measures as stipulated in relevant regulations and in national accident prevention regulations. In addition, observe the regulations of the local electricity supplier.
3. Test the overload protection cut-out to ensure that the time it takes to disconnect in response to a fault is within the permitted limit.

4. Select supply cable conductor cross-sections and fuse rating in accordance with local regulations.
5. **⚠ DANGER** *Danger of fatal injury from electric shock!*
   ➢ *Switch off and lock out / tag out the power supply disconnecting device and verify the absence of voltage.*
6. Connect the machine to the power supply.

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

6.6 Connecting the MODBUS TCP communications module with SIGMA AIR MANAGER 4.0

The MODBUS TCP communications module is installed at the factory.

6.6.1 Communication with SIGMA AIR MANAGER 4.0

➢ Use the KAESER SIGMA NETWORK to connect the communications module with SIGMA AIR MANAGER 4.0.
See the SIGMA AIR MANAGER 4.0 operating manual for more information about the connection options.

6.6.2 Communication with the user's (central) control system.

➢ Connect the communications module via MODBUS TCP with the user's (central) control system.
Contact an authorized KAESER service representative for more information regarding the connection options.

6.7 Options

6.7.1 Option H1 Anchoring the machine

➢ Use appropriate fixing bolts to anchor the machine.

Further information Details of the fixing holes are contained in the dimensional drawing in chapter 13.1.

6.7.2 Option K2 Connecting the water cooling

➢ Take the electrochemical series into consideration and choose suitable materials for water connections.
➢ Keep the effect of pressure surge on the cooler as low as possible.
➢ Install an expansion tank to act as a damper if pressure surges cannot be avoided.
➢ Avoid a low inlet temperature for the cooling water as it can cause condensation. If required, contact an authorized KAESER service representative for suitable insulation measures.

Temperature-controlled cooling water supply systems, to which numerous machines are connected, regulate water flow rate according to the difference in temperature between the supply and the return water. Individual machines may not receive an adequate cooling water flow rate with this system. Breakdowns are the result.

➢ KAESER can advise on how to ensure the cooling water supply via suitable control valves.

Fig. 26 Connecting the water cooling

[A] Cooling water outlet
[B] Cooling water inlet
[1] Shut-off valve
[2] Connection port with plug
[3] Safety relief valve

1. The user is to provide the following fittings:
   - Dirt trap with max. 0.004 in. strainer mesh
   - Shut-off valve [1] and connection port [2] for maintenance and venting.
   - Safety relief valve [3] to prevent build-up of excessive pressure.
     Actuating pressure and blow-off capacity of the safety relief valve are governed by the user's installation design. The technical specification of the cooler must be taken into consideration.
2. Connect the cooling water lines to the fittings.
3. Open the shut-off valve on the cooling water outlet [A].
4. Slowly open the cooling water inlet shut-off valve [B] to gradually fill the cooler with water.
5. Bleed air from the water lines.

Further information The dimensional drawing in chapter 13.1 gives the flow direction, size and position of the connection ports.

7 Initial Start-up

7.1 Ensuring safety

Here you will find instructions for a safe commissioning of the machine.
Warning instructions are displayed prior to a potentially dangerous task.

⚠ Disregarding warning instructions can cause serious injuries!

Complying with safety instructions

Ignoring safety instructions can cause unforeseeable dangers.

- ➢ Follow the instructions in chapter 3 "Safety and Responsibility".
- ➢ Commissioning tasks may only be carried out by authorized personnel!
- ➢ Make sure that no one is working on the machine.
- ➢ Ensure that all service doors and panels are locked.

Working on live components

Touching voltage carrying components can result in electric shocks, burns, or death.
Dangerous voltages persist at the terminals of the fan motor and intermediate circuit capacitors in the control cabinet for some time after power is switched off.

- ➢ Work on electrical equipment may be carried out only by authorized electricians.
- ➢ Switch off and lock out / tag out the power supply disconnecting device and verify the absence of voltage.
- ➢ Before starting work on the control cabinet or the fan, wait at least 5 minutes after the power supply disconnecting device has been switched off.
- ➢ Check that the floating relay contacts are voltage-free.

Working on the compressed air network

Compressed air is contained energy. Uncontrolled release of this energy can cause serious injury or death. The following safety instructions relate to any work on components that could be under pressure.

- ➢ Close shut-off valves or otherwise isolate the machine from the compressed air network to ensure that no compressed air can flow back into the machine.
- ➢ Fully vent all pressurized components and enclosures.
- ➢ Do not open or dismantle any valves.

Working on the drive system

Touching voltage carrying components can result in electric shocks, burns, or death.
Touching the fan while the machine is switched on can result in serious injury.

- ➢ Switch off and lock out / tag out the power supply disconnecting device and verify that no voltage is present.
- ➢ Do not open the cabinet while the machine is switched on.

Further information

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

7.2 Instructions to be observed before commissioning or re-commissioning

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

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

Special measures for re-commissioning after storage

Storage period or standstill longer than:	Remedy
12 months	➢ Check condensate drainage. ➢ Check the refrigerant condenser. ➢ Check the electrical equipment. ➢ Check all pipes, hoses and fittings for leaks and any visible damage. Correct any defects immediately.
36 months	➢ Have the overall technical condition checked by an authorized KAESER service representative.

Tab. 30 Re-commissioning after storage

7.3 Checking installation and operating conditions

➢ Check and confirm all the items of the checklist before commissioning the machine:

To be checked	See chapter	Confirmed?
➢ Are operating personnel completely familiar with the applicable safety regulations?	–	
➢ Have all of the installation conditions been fulfilled?	5	
➢ Are the tolerance limits of the power supply within the permissible tolerance limits of the rated machine voltage? (see electrical diagrams)	2.1	
➢ Are the power supply cable conductor cross-sections and fuse ratings adequate?	2.11	
➢ Have all electrical connections been checked for tightness?	–	
➢ Has a safety relief valve been installed by the user?	6.3	
➢ Shut-off valves fitted to the compressed air connections?	6.3	
➢ Supply of cooling water ensured? (Option K2)	6.7.2	
➢ Is the condensate drain connected?	6.4	
➢ Option H1: Is the machine firmly anchored to the floor?	6.7.1	
➢ Installation altitude >3000 ft: Has the manufacturer been consulted? Have the controller parameters been adjusted?	4.8.6.3	

To be checked	See chapter	Confirmed?
➢ Are all access doors closed and latched and removable panels in place and secured?	–	

Tab. 31 Installation conditions checklist

7.4 Starting the machine for the first time

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

1. Switch on the power supply disconnecting device.
2. Press the «ON »key.
3. Open the shut-off valves to the air network.
4. Watch for any faults occurring in the first few hours of operation.

7.4.1 Registering the machine at the bus

Precondition
The bus cabling has been completed and the RJ45 connectors are inserted at both ends of the network cable (see chapter 4.9).

The other network device (SIGMA AIR MANAGER 4.0, SBU, component on site) is running.

For connection to the user's Modbus TCP network: “SIGMA CONTROL SMART Technical Description - Process Image”, document number: 7_9200_PCM_PA is provided.

The bus address of the communication module depends on its IP address.

During registration, only one machine with SIGMA CONTROL SMART (SCS) can be simultaneously registered at SIGMA AIR MANAGER 4.0 or the Modbus TCP bus master. If you want to register multiple machines with SCS, you have to do this in sequence. Any machine not yet registered must remain deactivated.

1. Stick the adhesive label with the communications module's bus address (e.g. 11) onto the module front. Adhesive labels for the last digit of the IP address are included with the SIGMA AIR MANAGER 4.0.

Connection to a SIGMA NETWORK	Connection to the user's Modbus TCP network
1. Register the machine with SCS at SIGMA AIR MANAGER 4.0. The IP address is transmitted to SCS. For details, see chapter “Commissioning” in the SIGMA AIR MANAGER 4.0 Operating Manual. SCS communicates with the bus master using the network	1. Register the machine as a Modbus TCP device at the user's Modbus TCP bus master and set the parameters. The IP address set at the factory is 169.254.100.95. Use Modbus TCP to adjust the IP settings. For details, see ID x10 to x22 in "SIGMA CONTROL SMART Technical Description - Process Image”, document number: 7_9200_PCM_PA. SCS communicates with the bus master using the network

If the attempt to connect to the communication module fails, the IP address may have been set to an unknown address. Reset the IP address to the factory setting (169.254.100.95) as described below:

➢ Press the RESET key on the communications module (Fig. 2030 item 6) for more than 3 s.

8 Operation

8.1 Switching the machine on and off

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

The machine is connected to or disconnected from the power supply via the power supply disconnecting device.

The power supply disconnecting device is equipped with a protective function that switches off the machine in the event of a high current. In this case, the switch jumps to the TRIP position, indicating that the protective function has been triggered. To switch on again, first set the switch to position OFF to make the protective function ready again.

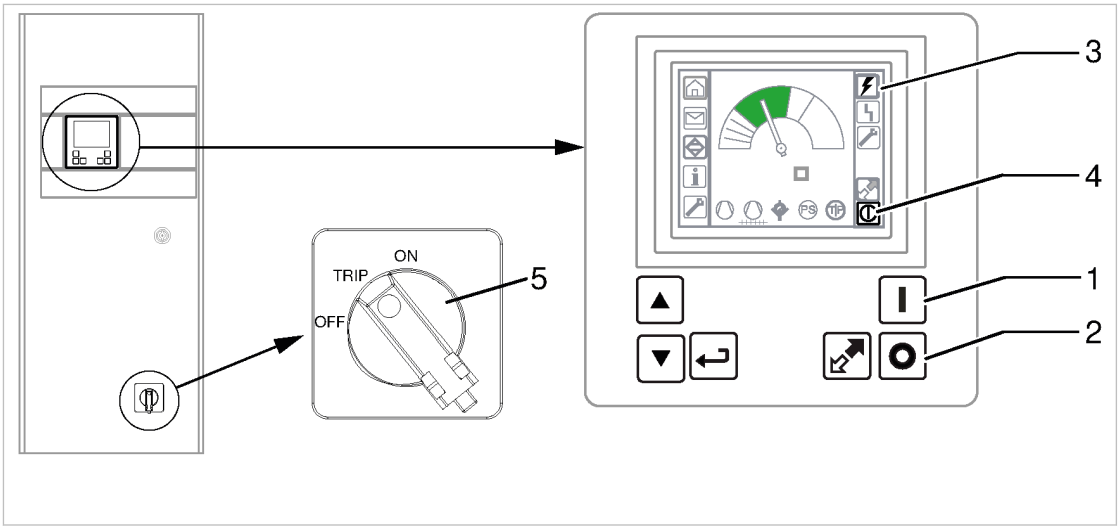


Fig. 27 Switching the machine on and off

1. «ON» key
2. «OFF» key
3. *Voltage applied to controller* indicator
4. *ON* indicator
5. Power supply disconnecting device (main switch)

8.1.1 Switching on

Precondition
- No personnel are working on the machine
- All access doors and panels are closed and secured

1. Switch on the power supply disconnecting device.
   The *Voltage applied to controller* indicator lights green.
2. Press the «ON» key.
   The green *ON* indicator lights continuously.
3. Wait 10–15 minutes, then open the shut-off valves to the compressed air system.

In the event of a power failure, the machine is **not** locked off against automatic restart when power returns.
The machine can automatically restart when the power supply is resumed and when the cut-in temperature is reached in the thermal mass.

8.1.2 Switching off

1. Press the «OFF» key.
   The machine gently shuts down. The *ON* indicator flashes.
2. Press the «OFF» key again to immediately shut the machine down.
3. Switch off and lock out / tag out the power supply disconnecting device.
4. Close the shut-off valves to the air network.

Result The *Voltage applied to controller* indicator extinguishes.

8.2 Using the remote control

The machine can be remotely controlled from a control center.
Various options are provided for creating a connection to the control center:

Connection via digital input

- Contact closed: READY
- Contact open: STOP

Connection via MODBUS TCP communication module (Option C44)

- This contact has a higher priority than the digital connection.

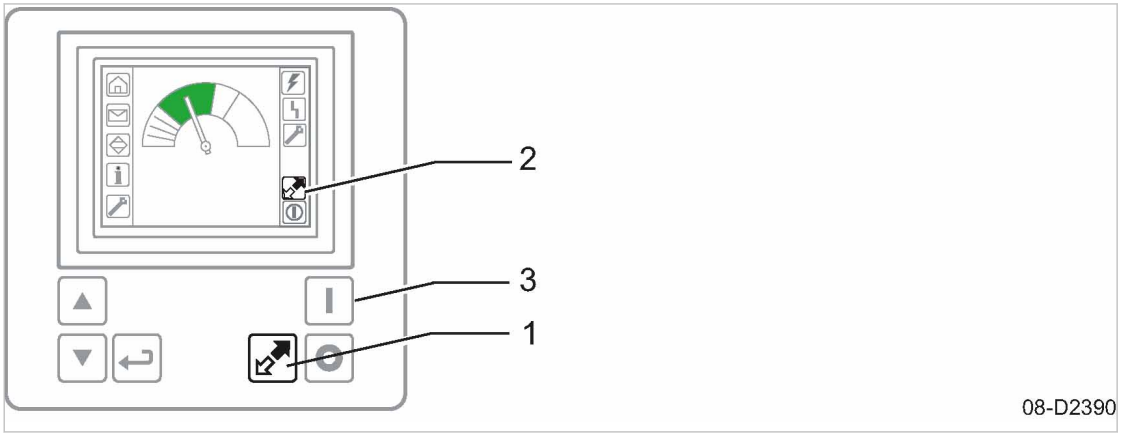


Fig. 28 Switching the remote control on and off

[1] «Remote control» key
[2] *Remote control*
[3] «ON» key
[4] «OFF» key

8.2.1 Switching the remote control on and off

Precondition The connection to a remote control center is established.
The «Remote control» key is activated.

1. Press «ON» to switch on the machine.
2. Press the «Remote control» key.
   You can switch the machine in the remote control centre between the READY and STOP control modes.
3. Press «Remote control» key again to switch the remote control off.

You want to prevent that the remote control is maladjusted?

➢ Deactivate the «remote control» key.

8.3 Acknowledging and Resetting Warning and Alarm Messages

The Acknowledge key affects only the top line on the display.

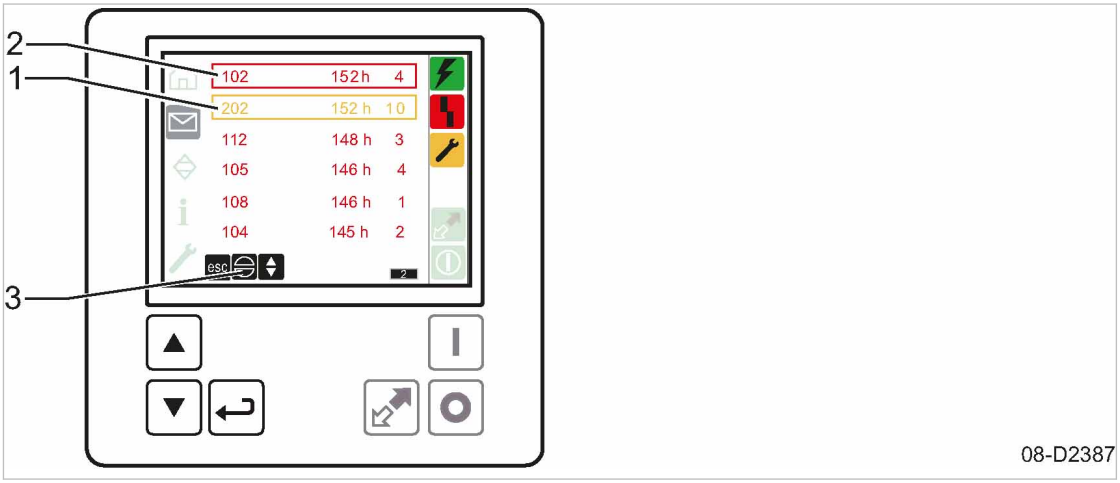


Fig. 29 Acknowledging messages

[1] Warning (yellow)
[2] Alarm (red)
[3] Acknowledge key

1. In the *<Message>* menu, use «UP» or «DOWN» to activate Acknowledge.
   Acknowledge is displayed inversely.
2. Press «Enter».
   The message in the top line is acknowledged and disappears and the next message is displayed in the top line.
3. Press esc to return to the start screen after all messages have been acknowledged.

9 Fault Recognition and Rectification

9.1 Basic instructions

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

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

9.2 Messages at the controller

There are three types of messages:

- Alarms (red)
  An alarm message causes the machine to shut down.
- Warning messages (yellow)
- Maintenance messages (yellow)

You must acknowledge the alarm message upon correction of the fault before you can re-start the machine.

Alarm messages

Number	Meaning
101	The pressure monitor has triggered.
102	Motor protective switch for refrigerant compressor has triggered.
103	Switching frequency of refrigerant compressor is very high.
104	Motor protective switch for fan motor has triggered.
105	The temperature switch of the fan motor has triggered.
106	Open circuit in pressure transducer (vaporization pressure).
107	Short-circuit in pressure transducer (vaporization pressure).
108	Open circuit in pressure transducer (condensation pressure).
109	Short-circuit in pressure transducer (condensation pressure).
110	Open circuit in temperature transducer (pressure dew point).
111	Short-circuit in temperature transducer (pressure dew point).
112	The phase sequence of the power supply line is incorrect.
113	CAN bus communication fault of the display unit.
114	CAN bus communication fault of the controller module.
115	Internal temperature of the display unit too high.
116	Internal temperature of the controller module too high.
117	Refrigerant pressure on the low-pressure end is too low.
119	Fault in the condensate drain.
120	Open circuit in temperature transducer (ambient temperature).

Number	Meaning
121	Short-circuit in temperature transducer (ambient temperature).
122	Fault in the fan

Tab. 32 Alarm messages

Warning messages

Number	Meaning
201	Switching frequency of refrigerant compressor is high.
202	Fault in the condensate drain.
203	Pressure dew point is high. ■ This message is output when the yellow warning range has been reached. ■ An acknowledgement is not necessary.
204	Pressure dew point is very high. ■ This message is output when the red warning range has been reached. ■ An acknowledgement is not necessary. ■ The "Pressure dew point high" message relay contact switches.
207	The dryer is controlled by means of the refrigerant pressure. ■ Call authorized KAESER service representative.
208	

Tab. 33 Warning messages

Maintenance messages

Number	Meaning
301	Maintain the refrigerant condenser.
302	Maintain the condensate drain.

Tab. 34 Maintenance messages

9.3 Communications module – Troubleshooting

Faults in the communications module or errors in the communication via interfaces are indicated by LEDs on the communications module.

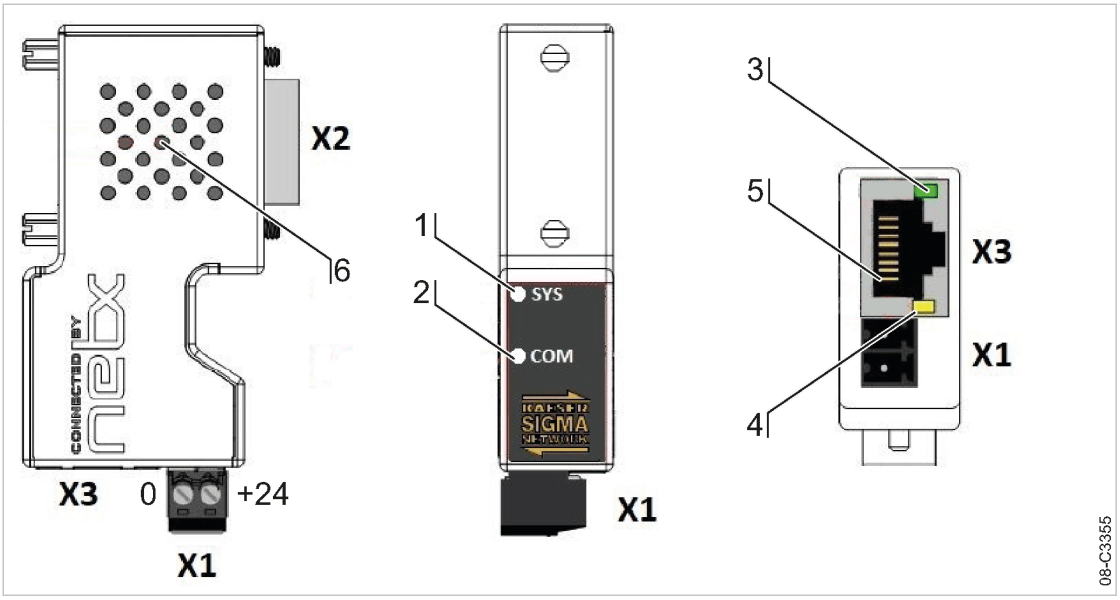


Fig. 30 Displays and connections of the communications module

Item	Display		Fault	Possible cause	Measure
2	COM LED	flashes red 1x/s	CAN communication faulty	SCS without voltage	Check the power supply
				Communications module loose	Plug in the communications module and tighten the fastening screws
		flashes red 2x/s	Ethernet communication faulty	See the following faults	
3	ETH LINK	off	No Ethernet connection	Network connection is interrupted	Check network cable and plug
4	ETH ACT	off		Communications module at the bus master incorrectly parametrized or not at all	Parametrize the module at the master, see chapter 7.4.1
				Incorrect IP address or communication settings	Reset to factory setting and re-register at the bus, see chapter 7.4.1
3	ETH LINK	on, green	No Ethernet communication	SIGMA AIR MANAGER 4.0 out of operation	Switch on SIGMA AIR MANAGER 4.0
4	ETH ACT	off		Ethernet network out of operation	Contact IT personnel

Tab. 35 Fault messages on the communications module

9.4 Faults

Fault	Possible cause	Action
Water in the compressed pressure system	Compressed air inlet and outlet reversed.	Check the compressed air connections.
	The condensate is not draining out of the system.	Check and clean the condensate drain. Replace the service unit at the condensate drain.
	The safety pressure switch has shut down the machine.	Check operating conditions. Check the machine. Reset the machine.
High pressure drop	Dryer frozen on the air side.	Switch off the machine and increase the ambient temperature.
	Continuous pressure loss at condensate drain.	Maintain the condensate drain.
Pressure dew point too high	Ambient or compressed air inlet temperature too high.	Check that installation conditions are OK.
	Low refrigerant level.	Contact an authorized KAESER service representative.
	Dirt collecting in the compressed air system.	Contact an authorized KAESER service representative.
The safety pressure switch shuts down the machine	Ambient or compressed air inlet temperature too high.	Check that installation conditions are OK.
	Refrigerant condenser dirty.	Clean the refrigerant condenser.
	Dirt trap clogged.	Clean the dirt trap.
	Back pressure in exhaust air duct too high.	Check that installation conditions are OK.

Tab. 36 Faults and troubleshooting

10 Maintenance

10.1 Ensuring safety

Follow these instructions for to ensure safe machine maintenance.
Warning instructions are given prior to a potentially dangerous task.

⚠ Disregarding warning instructions can result in life-threatening injuries!

Observe safety instructions

Ignoring safety instructions can cause unforeseeable dangers!

- ➢ Follow the instructions in chapter 3 "Safety and Responsibility".
- ➢ Allow maintenance work to be performed by authorized personnel only!
- ➢ Make sure that no personnel are working on the machine.
- ➢ Ensure that all service doors and panels are locked.

When working on live components

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

- ➢ Work on electrical equipment may only be carried out by authorized electricians.
- ➢ Switch off the power supply disconnecting device, lock out/tag out the device, verify the absence of any voltage.
- ➢ Check that there is no voltage on potential-free contacts.
- ➢ Before starting work on the control cabinet or the fan, wait at least 5 minutes after the power supply disconnecting device has been switched off.

Working on the compressed air system

Compressed air is contained energy. Uncontrolled release of this energy can cause serious injury or death. The following safety instructions relate to any work on components that could be under pressure.

- ➢ Close shut-off valves or otherwise isolate the machine from the compressed air system to ensure that no compressed air can flow back into the machine.
- ➢ Vent all pressurized components and enclosures.
- ➢ Do not open or dismantle any valves.

Working on the drive system

Touching live components can result in electric shocks, burns or death.
Touching the fan wheel whilst the machine is switched on can result in serious injury.

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

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

10.2 Regular maintenance tasks

The refrigeration circuit is maintenance-free. Repairs may only be carried out by certified personnel.

The table below lists the required maintenance tasks.

➢ Carry out maintenance tasks, or have them carried out, punctually as determined by ambient and operating conditions:

Interval	Maintenance task	See chapter
Weekly	Check the condensate drain.	10.5
Quarterly	Check that all electrical connections are tight.	–
	Check lines, hoses, and fittings for leaks.	–
Annually	Have the refrigerant circuit checked and documented by an authorized KAESER service representative.	–
	Have the pressure monitor checked by an authorized KAESER service representative.	–
Display: SIGMA CONTROL SMART	Condensate drain: Change the Service Unit.	10.5.2
	Clean the refrigerant condenser.	10.4

Tab. 37 Regular maintenance tasks

10.3 Regular maintenance tasks

The table below lists necessary maintenance tasks.

➢ Have an authorized KAESER service representative carry out maintenance tasks.

➢ Have maintenance tasks carried out in a timely manner, taking the ambient and operating conditions into account:

Interval	Maintenance task
Up to 36000 h, at least every six years	Have the plastic pipes and hose lines replaced.
h = operating hours	

Tab. 38 Regular maintenance tasks

10.4 Cleaning the refrigerant condenser

Regular cleaning of the refrigerant condenser ensures reliable cooling of the machine and the compressed air. The frequency is mainly dependent on local ambient conditions.

➢ Depending on the machine model, clean the refrigerant condenser as described below.

10.4.1 Option K1 Air-cooling maintenance

Material
Compressed air for blowing out
Cleaning cloths
Vacuum cleaner
Spare parts as required

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

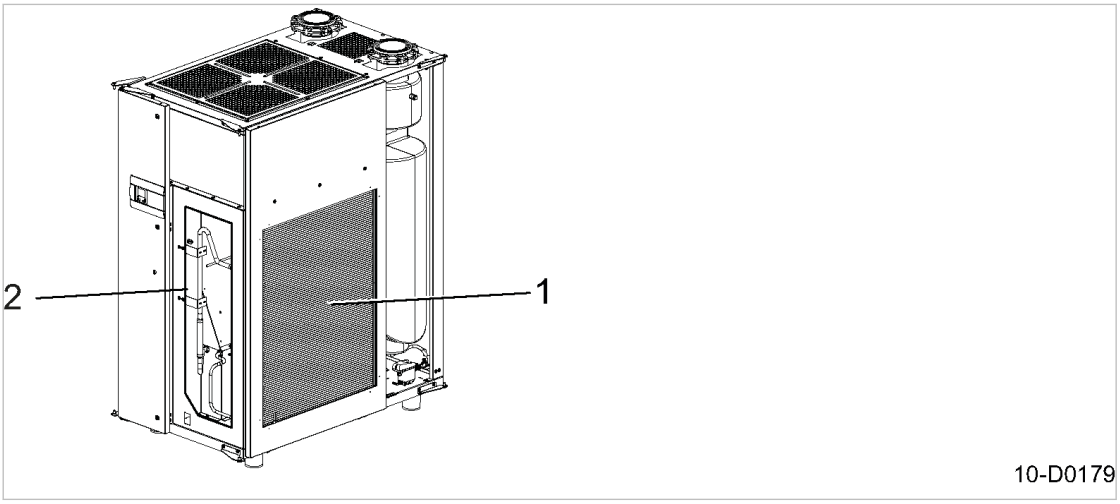


Fig. 31 Clean the refrigerant condenser
[1] Refrigerant condenser
[2] Maintenance opening

1. Use compressed air to blow the refrigerant condenser clean at regular intervals.
2. Have stubborn clogging removed by an authorized KAESER service representative.

10.4.2 Option K2 Water-cooling maintenance

A clogged refrigerant condenser and dirt trap cause the condensation temperature to rise.
➢ Monitor the condensation temperature to detect any tendency to rise.

Check the refrigerant condenser and dirt trap regularly for leaks and contamination. Frequency of checking is dependent on the characteristics of the cooling water.

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

Checking for leaks

1. Check the condenser for visible leaks.
2. Have an authorized KAESER service representative check the condenser for internal leaks at least once a year.

Cleaning

1. If necessary, have the refrigerant condenser cleaned by an authorized KAESER service representative.
2. Remove and clean the strainer of the dirt trap.

10.5 Maintaining the condensate drain

10.5.1 Checking the condensate drain

Precondition The user's power supply disconnecting device is switched on.
Machine is pressurized.
The *Power* LED lights.

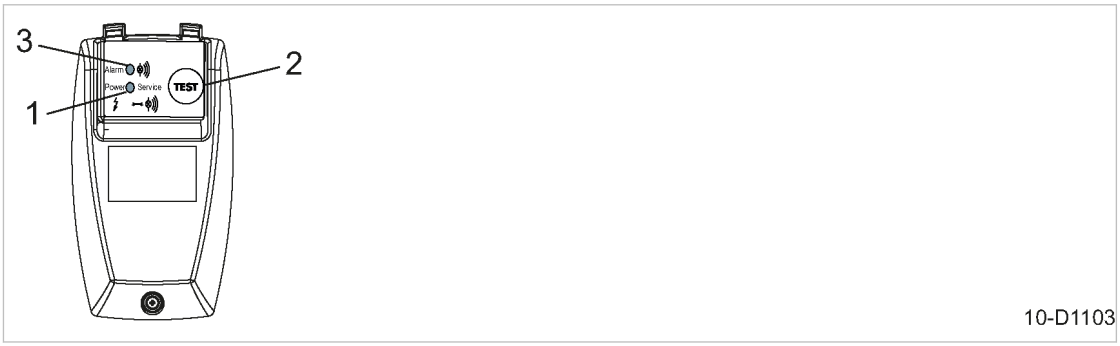


Fig. 32 Checking the condensate drain
1 *Power* LED
2 «TEST» key
3 *Alarm* LED

1. With one hand, lightly touch the condensate line at the condensate drain.
2. With your other hand, push and hold the «TEST» key at the condensate drain for at least 2 seconds.

Result As soon as the condensate drain opens, you will feel a short burst at the condensate line.
Replace the service unit if you do **not** experience a burst during manual test.

10.5.2 Replacing the service unit

The condensate drain cannot be cleaned. The service unit must be changed if condensate does not drain.

Material Sealing tape for sealing the screw-in part
O-ring 16x2 (5.1519.0), if required

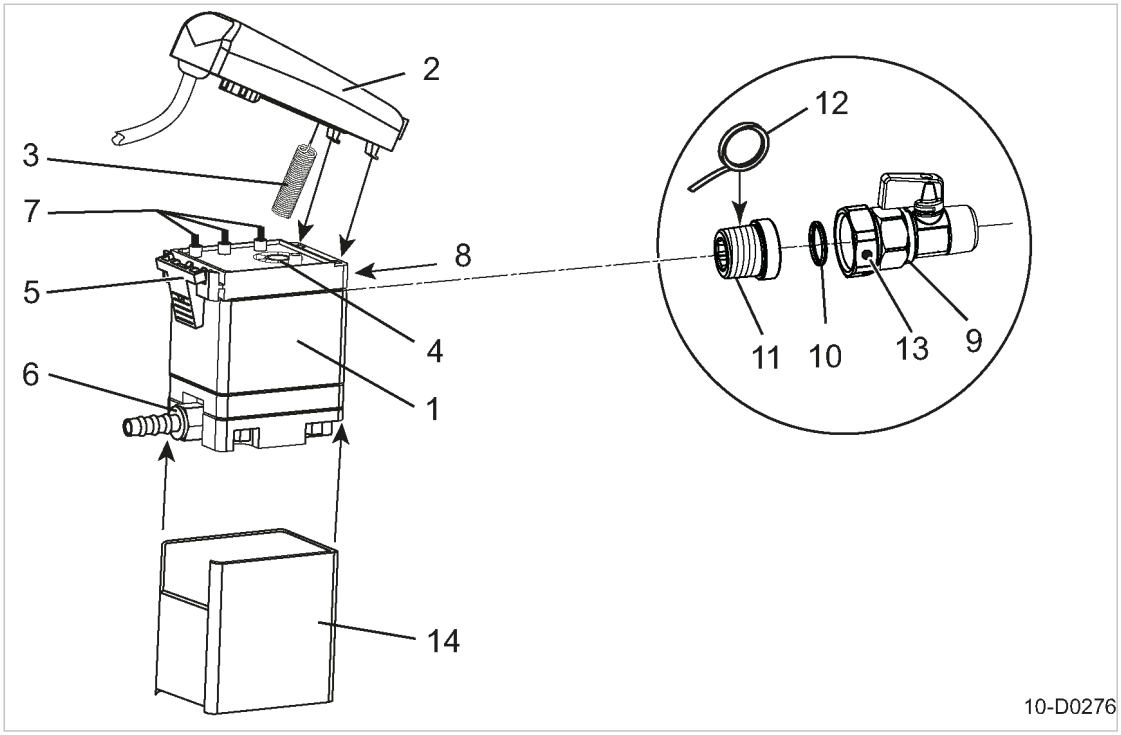


Fig. 33 Replacing the service unit

[1]	Service unit	[8]	Condensate inlet
[2]	Control module	[9]	Shut-off valve
[3]	Sensor	[10]	O-ring
[4]	Sensor opening	[11]	Screw-in part
[5]	Snap fastener	[12]	Sealing tape
[6]	Condensate drain hose fitting	[13]	Union nut with vent holes
[7]	Contact springs	[14]	Insulation

Removing the service unit

1. **⚠ WARNING** *Serious injury or death can result from loosening or opening components under pressure!*
   - ➢ *Fully vent all pressurized components and enclosures.*
2. Close the shut-off valve [9] upstream of the condensate drain.
3. Unscrew the fitting [6] at the condensate line.
4. Press the snap fastener and carefully remove the control module [2] from the service unit [1].
5. Carefully loosen the union nut [13] at the shut-off valve [9] until remaining residual air has escaped through the venting bores.
6. Unscrew the screw-in part [11] from the service unit [1] and place aside.
7. Remove the insulation [14] from the service unit [1].

Installing the service unit

Use only KAESER service units to ensure the correct function of the condensate drain.

Precondition Ensure that the top of the service unit [1] and the contact springs are clean and dry.

1. Fit the insulation [14] to the service unit [1].

2. Carefully insert the control module sensor [3] in the opening [4] of the service unit [1].
3. Place the snap fastener [5] of the control module [1] into the service unit eyes.
4. Press the control module [2] against the service unit until the snap fastener audibly clicks into place.
5. At the screw-in part [11], replace old sealing material with new sealing tape.
6. Install the screw-in part [11] in the service unit [1].
7. If necessary, insert a new O-ring [10].
8. Tighten the union nut [13] at the shut-off valve [9].
9. Install the condensate line.
10. Open the shut-off valve [9] upstream of the condensate drain.
11. Close all access doors, replace and secure all removable panels.

11 Spares, Operating Materials, Service

11.1 Note the nameplate

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

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

11.2 Consumable Parts and Operating Materials

KAESER consumable parts and operating fluids/materials are all genuine KAESER parts. They are specifically selected for use in KAESER machines.

⚠ WARNING

There is risk of personal injury or damage to the machine resulting from the use of unsuitable spare parts or operating fluids/materials!
Unsuitable or poor quality consumable parts and operating fluids/materials may result in damage to the machine or significantly impair its proper function.
Personal injury may result from damage.

➢ *Use only original parts and operating fluids/materials.*

➢ *Have an authorized KAESER service representative carry out regular maintenance.*

Name	Number
Condensate drain: Service module	9602

Tab. 39 Consumable parts

11.3 KAESER AIR SERVICE

KAESER AIR SERVICE offers:

- authorized KAESER service representatives with KAESER factory training,
- increased operational reliability ensured by preventive maintenance,
- energy savings achieved by avoidance of pressure losses,
- optimum conditions for operation of the compressed air system,
- the security of genuine KAESER spare parts,
- increased legal certainty as all regulations are kept to.

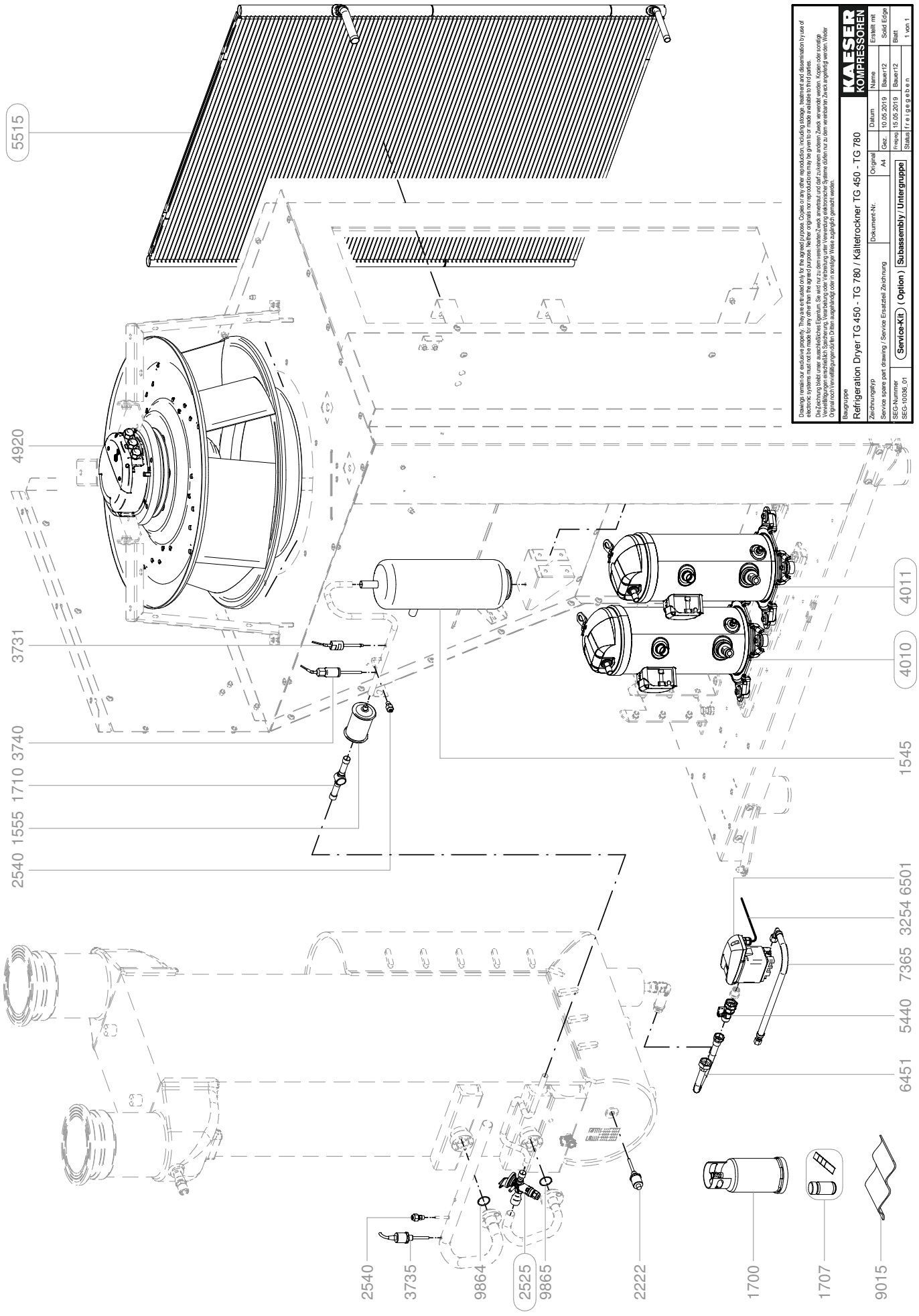
➢ Why not sign a KAESER AIR SERVICE maintenance agreement!

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

11.4 Replacement parts for service and repair

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

➢ Make sure that any service or repair tasks not described in this manual are carried out by an authorized KAESER service representative.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Baugruppe
Refrigeration Dryer TG 450 - TG 780 / Kältetrockner TG 450 - TG 780
Zeichnungstyp
Service spare part drawing / Service Ersatzteil Zeichnung
Dokument-Nr.
Original
A4
SEG-Nummer
SEG-I00086_01
Service-Kit (Option)
Subassembly / Untergruppe
Name
Datum
Gez.
10.05.2019
Bauer12
Bauer12
15.05.2019
freigegeben
Erstellt mit
SolidEdge
Blatt
1 von 1

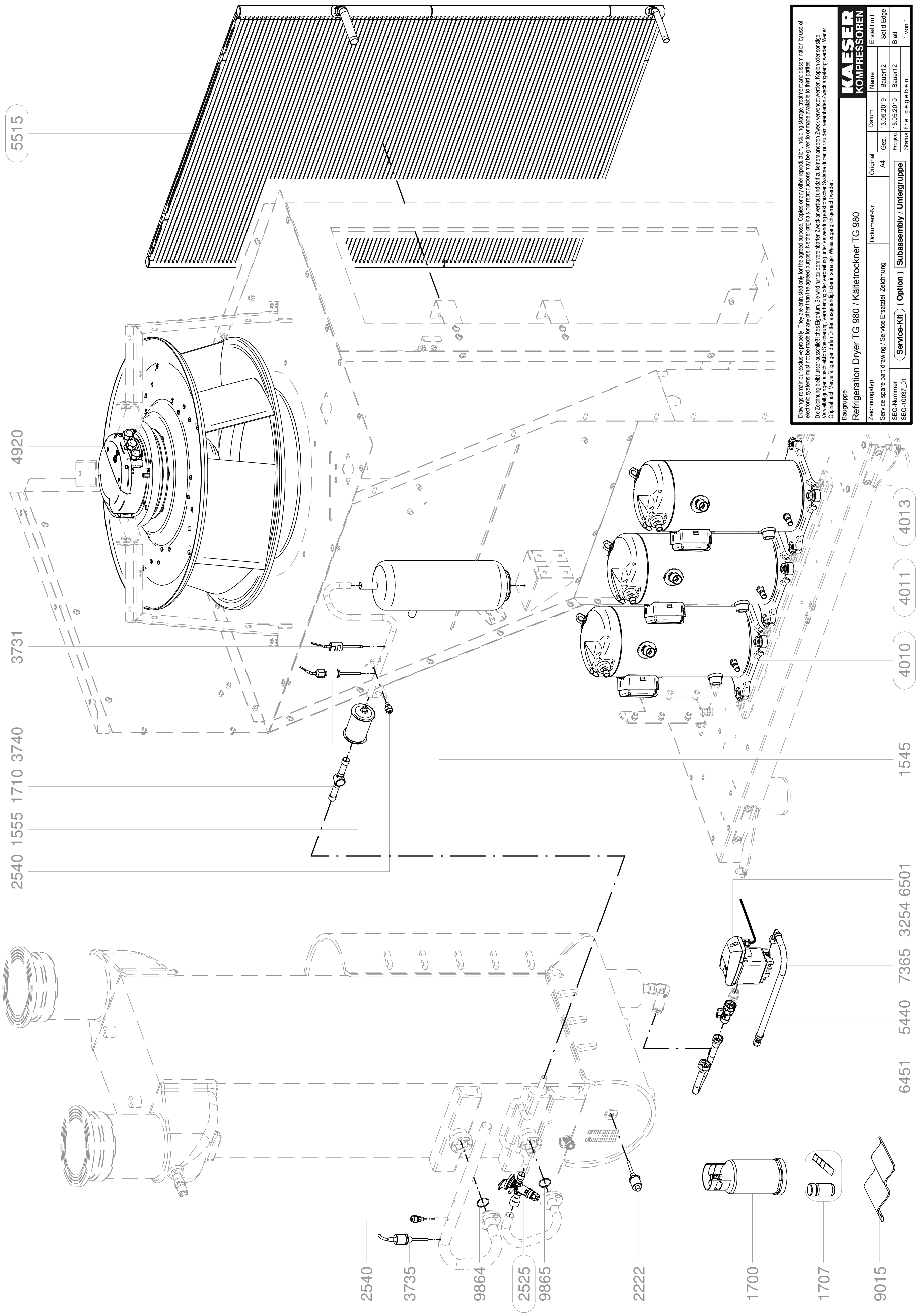
Legend		KAESER KOMPRESSOREN
	Refrigeration dryer TG	SEL-4388_01 E

Item		Description	Option
1555	*)	Filter dryer	
1545	*)	Refrigerant collector	
1700	*)	Refrigerant	
1707	*)	Acid test, refrigerant	
1710	*)	Refrigerant indicator	
2222		Temperature sensor	
2525	*)	Injection valve	
2540	*)	Refrigerant filling port	
3254		Condens. drain, connect. cable	
3731	*)	Pressure limiter	
3735	*)	Leakage protection switch	
3740	*)	Fan pressure switch	
4010	*)	Refrigerant compressor	
4011	*)	Refrigerant compressor	
4920		Exhauster, dryer	
5440		Ball valve	
5515	*)	Refrigerant condenser	
6451		Condensate drain pipe	
6501		Condensate drain, dryer	
7365		Condensate drain line	
9015		Insulating tape	
9864	*)	Gasket	
9865	*)	Gasket	

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

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

*) The replacement of the spare parts described requires an authorized and certified refrigerant technican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9864
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9015
Refrigeration Dryer TG 980 / Kältetrockner TG 980
SEG-10037_01

Legend		KAESER KOMPRESSOREN
	Refrigeration dryer TG	SEL-4389_01 E

Item		Description	Option
1555	*)	Filter dryer	
1545	*)	Refrigerant collector	
1700	*)	Refrigerant	
1707	*)	Acid test, refrigerant	
1710	*)	Refrigerant indicator	
2222		Temperature sensor	
2525	*)	Injection valve	
2540	*)	Refrigerant filling port	
3254		Condens. drain, connect. cable	
3731	*)	Pressure limiter	
3735	*)	Leakage protection switch	
3740	*)	Fan pressure switch	
4010	*)	Refrigerant compressor	
4011	*)	Refrigerant compressor	
4013	*)	Refrigerant compressor	
4920		Exhauster, dryer	
5440		Ball valve	
5515	*)	Refrigerant condenser	
6451		Condensate drain pipe	
6501		Condensate drain, dryer	
7365		Condensate drain line	
9015		Insulating tape	
9864	*)	Gasket	
9865	*)	Gasket	

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

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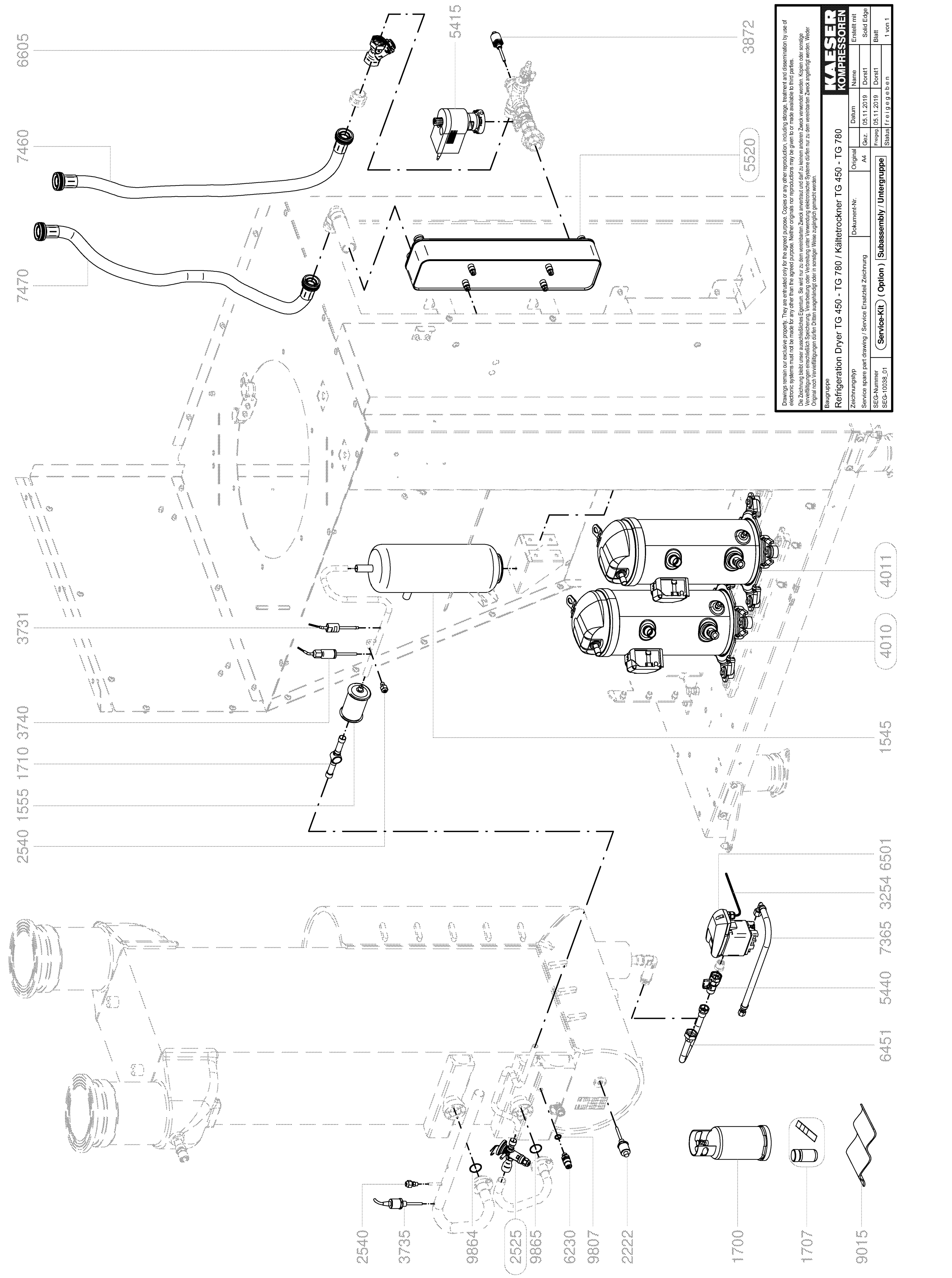
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9807
2222
1700
1707
9015
Refrigeration Dryer TG 450 - TG 780 / Kältetrockner TG 450 - TG 780
Service spare part drawing / Service Ersatzteil Zeichnung
SEG-10038_01
Service-Kit (Option) Subassembly / Untergruppe
05.11.2019 Dorst1
05.11.2019 Dorst1
Solid Edge
1 von 1

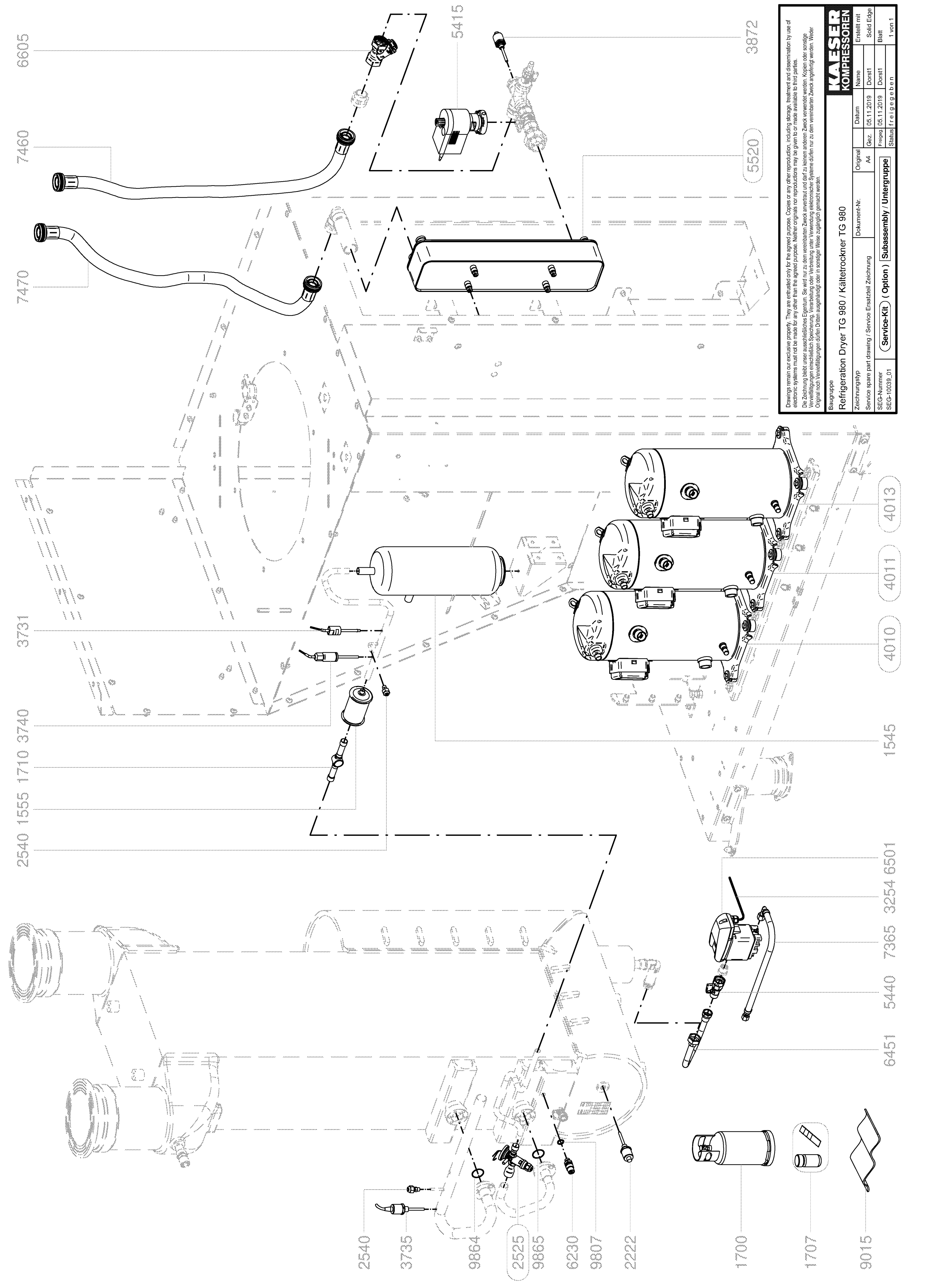
Legend		KAESER KOMPRESSOREN
	Refrigeration dryer TG	SEL-4390_01 E

Item		Description	Option
1555	*)	Filter dryer	
1545	*)	Refrigerant collector	
1700	*)	Refrigerant	
1707	*)	Acid test, refrigerant	
1710	*)	Refrigerant indicator	
2222		Temperature sensor	
2525	*)	Injection valve	
2540	*)	Refrigerant filling port	
3254		Condens. drain, connect. cable	
3731	*)	Pressure limiter	
3735	*)	Leakage protection switch	
3740	*)	Fan pressure switch	
3872		Temperature sensor	
4010	*)	Refrigerant compressor	
4011	*)	Refrigerant compressor	
5415		Actuator	
5440		Ball valve	
5520	*)	Refrigerant condenser waterc.	
6230		Blowoff valve	
6451		Condensate drain pipe	
6501		Condensate drain, dryer	
6605		Dirt trap	
7365		Condensate drain line	
7460		Hose line	
7470		Hose line	
9015		Insulating tape	
9807		Gasket	
9864	*)	Gasket	
9865	*)	Gasket	

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

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

*) The replacement of the spare parts described requires an authorized and certified refrigerant technican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9865
6230
9807
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1707
9015
Refrigeration Dryer TG 980 / Kältetrockner TG 980
Service-Kit (Option) Subassembly / Untergruppe
SEG-10039_01

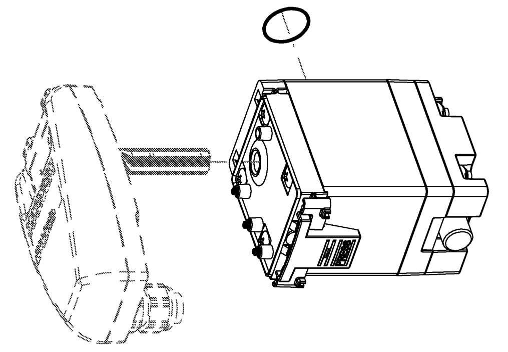
Legend		KAESER KOMPRESSOREN
	Refrigeration dryer TG	SEL-4391_01 E

Item		Description	Option
1555	*)	Filter dryer	
1545	*)	Refrigerant collector	
1700	*)	Refrigerant	
1707	*)	Acid test, refrigerant	
1710	*)	Refrigerant indicator	
2222		Temperature sensor	
2525	*)	Injection valve	
2540	*)	Refrigerant filling port	
3254		Condens. drain, connect. cable	
3731	*)	Pressure limiter	
3735	*)	Leakage protection switch	
3740	*)	Fan pressure switch	
3872		Temperature sensor	
4010	*)	Refrigerant compressor	
4011	*)	Refrigerant compressor	
4013	*)	Refrigerant compressor	
5415		Actuator	
5440		Ball valve	
5520	*)	Refrigerant condenser waterc.	
6230		Blowoff valve	
6451		Condensate drain pipe	
6501		Condensate drain, dryer	
6605		Dirt trap	
7365		Condensate drain line	
7460		Hose line	
7470		Hose line	
9015		Insulating tape	
9807		Gasket	
9864	*)	Gasket	
9865	*)	Gasket	

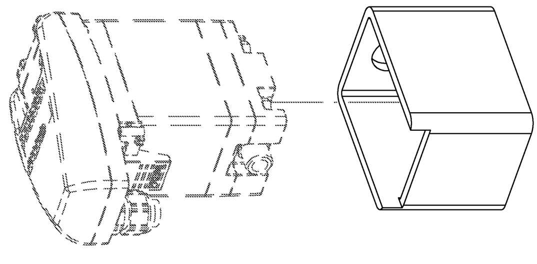
Please quote the part number and serial number of the machine together with the item number and the description of the part when ordering.

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

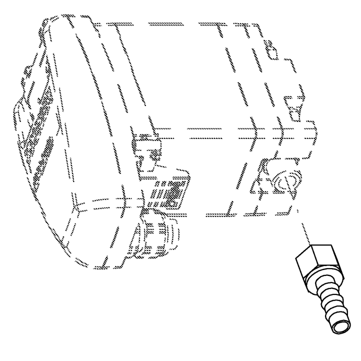
*) The replacement of the spare parts described requires an authorized and certified refrigerant technican



9602



9020



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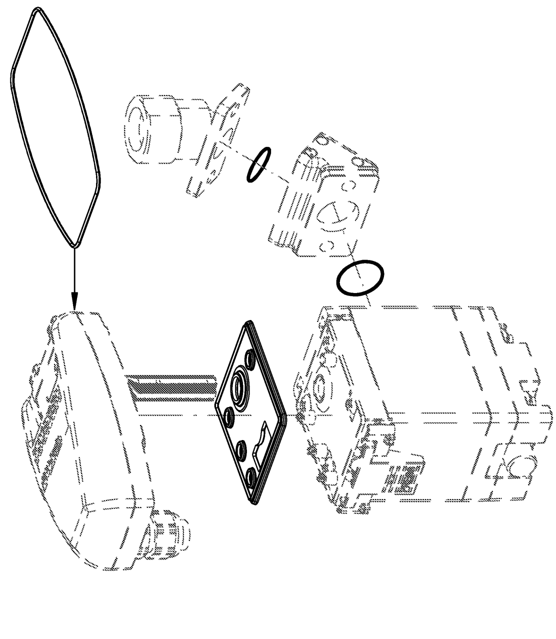

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Baugruppe
Condensate drain / Kondensatableiter

KAESER KOMPRESSOREN

Zeichnungstyp	Dokument-Nr.	Original		Datum	Name	Erstellt mit
Service spare part drawing / Service Ersatzteil Zeichnung		A4	Gez.	13.01.2015	Bauer12	Solid Edge
SEG-Nummer			Freigeg.	13.01.2015	Bauer12	Blatt
SEG-6384_01	Service-Kit (Option) Subassembly / Untergruppe		Status	freigegeben		1 von 1

Legend		KAESER
	Condensate drain	SEL-4076_01 E

Item	Description	Option
6307	Hose connection	
9020	Insulating jacket	
9602	Condensate drain service-unit	
9603	Condensate drain gasket kit	

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

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

12 Decommissioning, Storage and Transport

12.1 Decommissioning

This is necessary under the following circumstances:

- The machine is temporarily not needed.
- The machine is to be moved to another location.
- The machine is to be scrapped.

Temporarily decommissioning

1. Switch the machine off and is shut-off all connecting lines.
2. Drain condensate from the condensate drain.

Permanent decommissioning

Precondition the main disconnecting device is switched off,
the switch is locked in the off position,
a check has been made that no voltage is present.
Machine fully vented (no pressure).

1. Drain condensate from the condensate drain.
2. Allow the machine to cool down completely.
3. Drain cooling water from water-cooled machines (option K2).
4. Disconnect all supply lines.

12.2 Storage

Moisture can lead to corrosion, particularly on the surfaces of the machine.

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

Please consult with KAESER if you have questions about appropriate storage and commissioning.

Precondition Condensate drain and condensate lines are completely empty.

1. **NOTICE** *Moisture and frost can damage the machine!*
   - ➢ *Prevent ingress of moisture and formation of condensation.*
   - ➢ *Maintain a storage temperature of >32°F.*
2. Store the machine in a dry, frost-proof room.

12.3 Transport

12.3.1 Safety

Weight and center of gravity determine the most suitable method of transportation. The center of gravity is shown in the drawing in chapter 13.1.

➢ Please consult with KAESER if you intend to transport the machine in freezing temperatures.

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

➢ Ensure the danger area is clear of personnel.

12.3.2 Transport with a forklift truck

Precondition The forks are fully under the machine.

Fig. 34 Transporting with a forklift truck

1. Take note of the center of gravity.
2. Drive the forks completely under the machine or pallet and lift carefully.

12.3.3 Transport with a crane

Only suitable and approved load-carrying and attachment devices ensure proper transport of the machine with a crane. Suitable crossbeams ensure sufficient distance of the attachment resources from the machine housing to prevent damage.

The machine is not equipped with fixing points.

Examples of unsuitable fixing points:

- Pipe sockets
- Flanges
- Attached components such as condensate drains.

➢ Consult KAESER if you require suitable load-carrying and attachment devices or have questions regarding the correct use.

Precondition Load-carrying and attachment devices meet the local safety regulations.

The crane, load-carrying and attachment devices or the lifted machine do not endanger personnel.

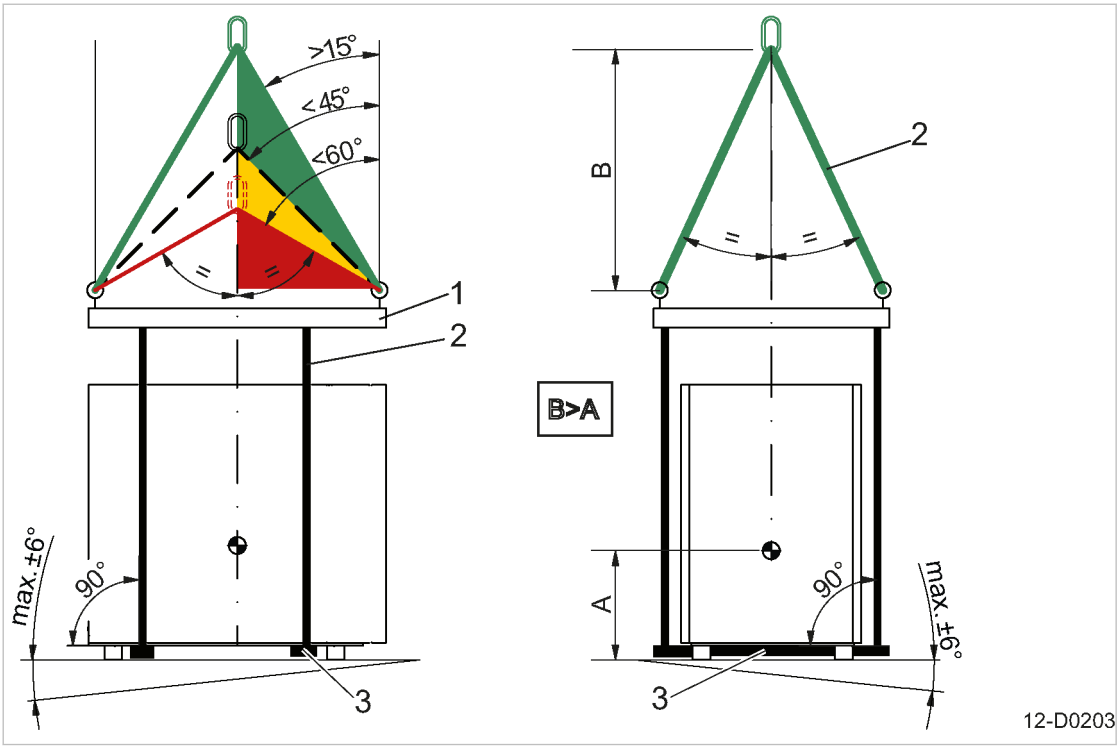


Fig. 35 Transport with a crane

1 Load carrying devices
2 Attachment resources

1. **⚠ WARNING** *Risk of accident caused by incorrect use of lifting gear and attachment devices!*
   - ➢ *Comply with permissible load limits.*
   - ➢ *Comply with specific safety information of used load-carrying and attachment devices.*
2. Properly use load-carrying and attachment devices:
   - Ensure proper distribution of the fastening points relative to the centre of gravity position (symmetrical load distribution).
   - Ensure equal slope angles of 15° to 45° for attachment devices with multiple strands.
     - – Slope angles between 45° and 60° may be unsuitable.
     - – Slope angles larger than 60° are prohibited.
   - Ensure the maximum incline of 6° of the machine to the horizontal.
   - Ensure sufficient distance of the attachment devices to the machine.
   - Ensure a positive stability height: Dimension B **>** Dimension A
   - Do not attach the attachment devices to any machine component.
3. Carry out a lifting test:
   Slightly lift the machine to check whether machine remains in horizontal position and does not teeter.
4. Transport the machine only after a successful lifting test.

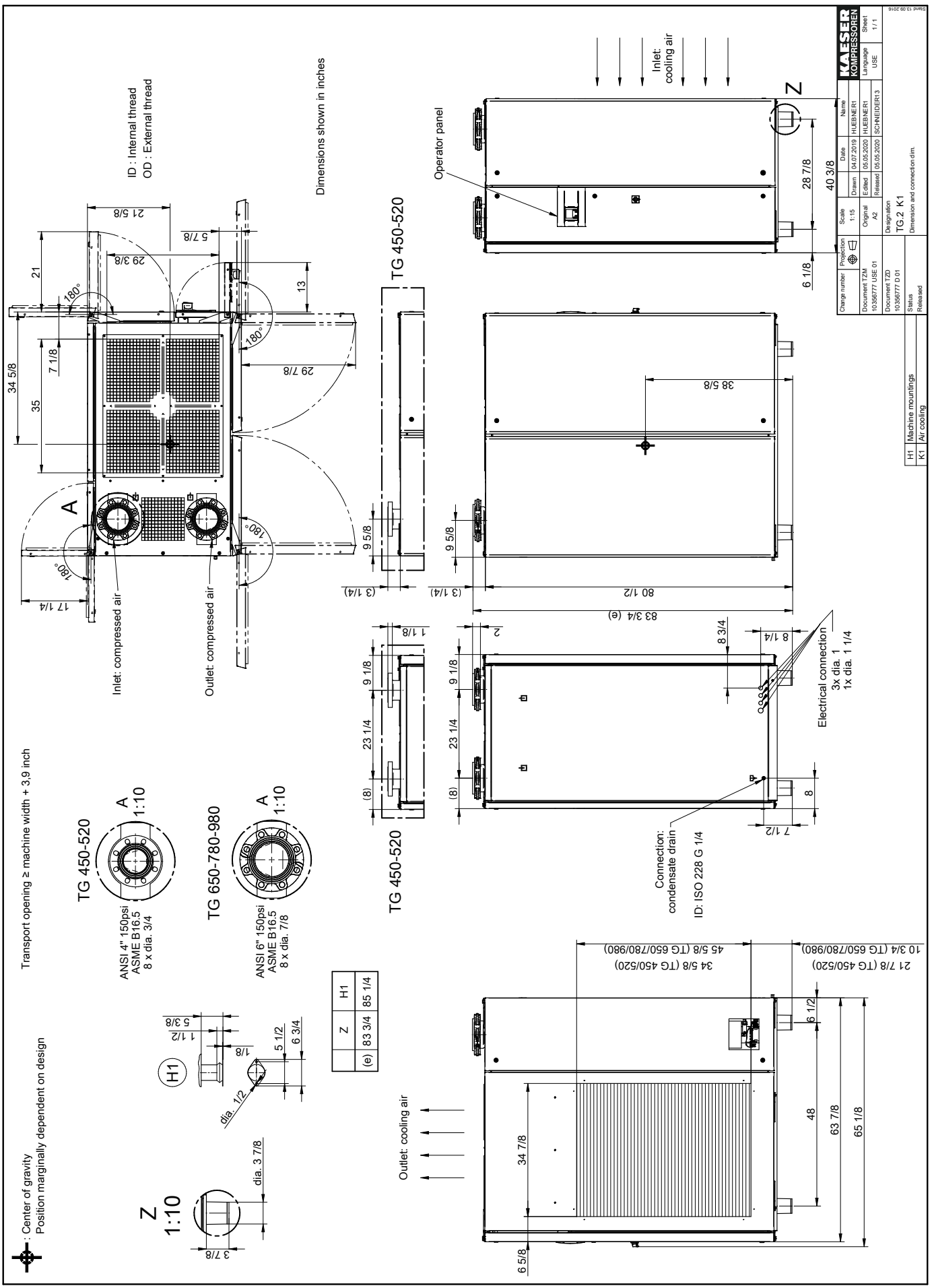
12.4 Disposal

The refrigerant circuit still contains both refrigerant and oil.

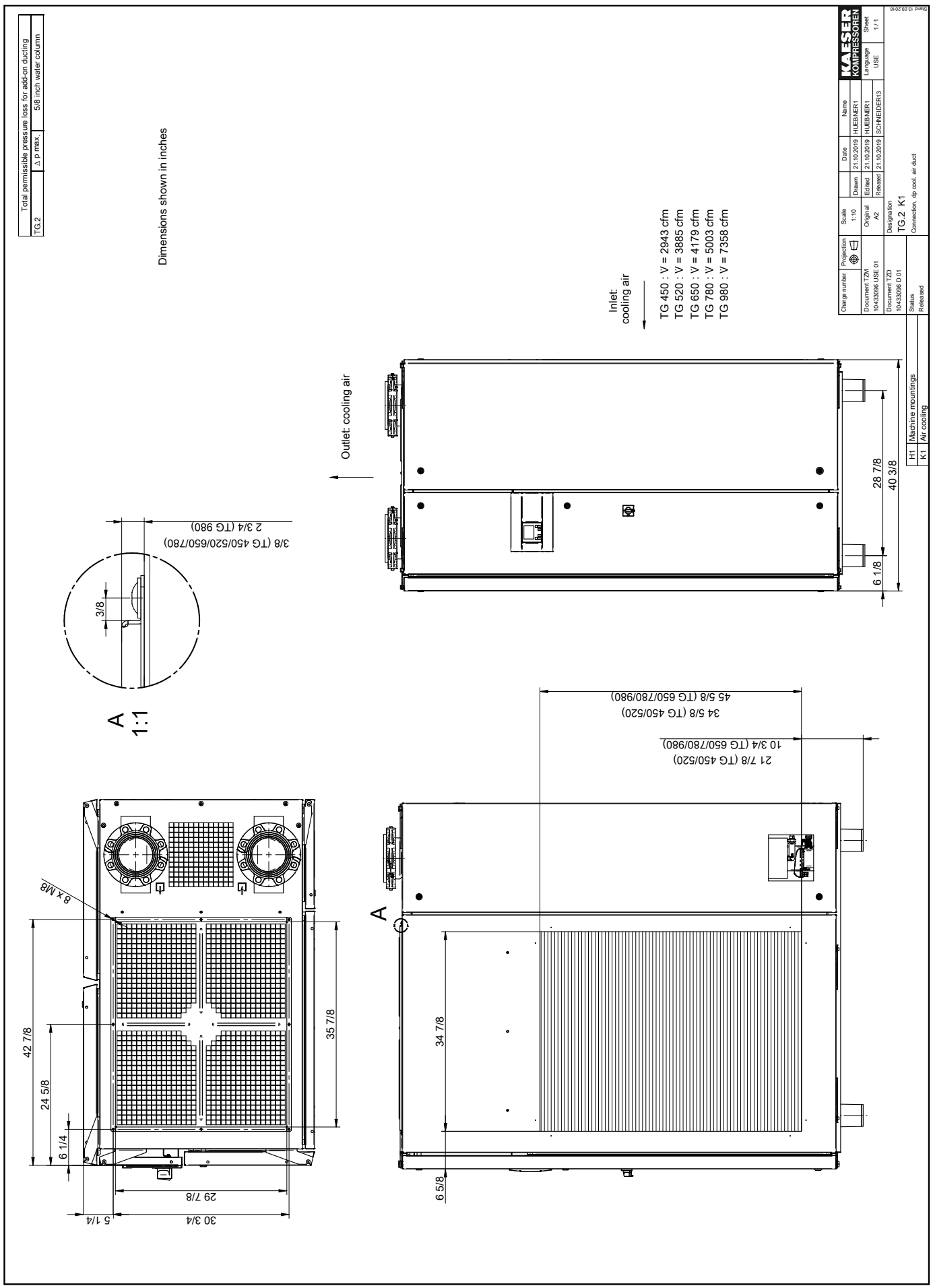
1. Decommission the machine.
2. Dispose of the machine through an authorized disposal expert.

13 Annex

13.1 Dimensional drawing



	Z	H1
	(e) 83 3/4	85 1/4



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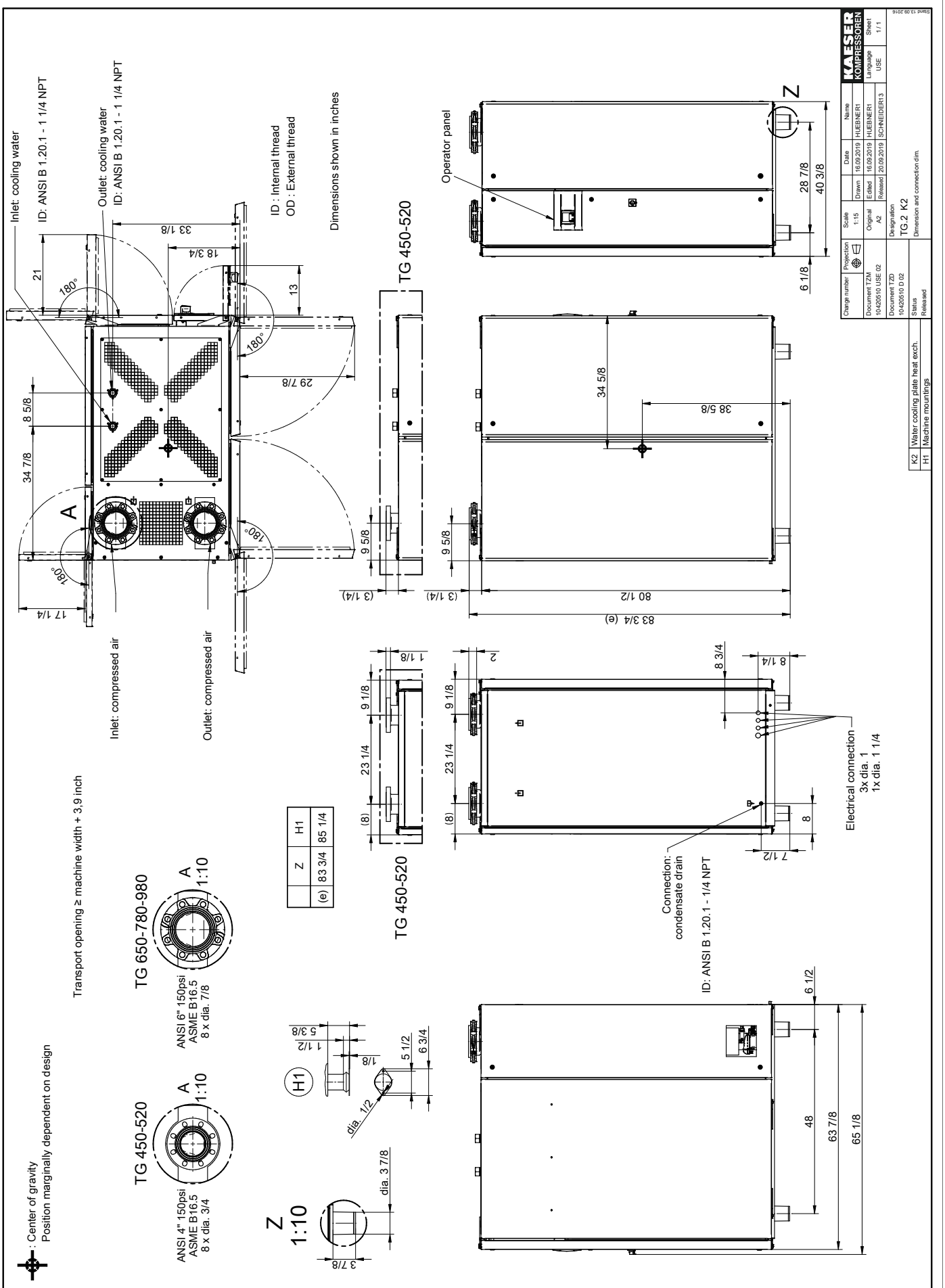
Subject to development-related changes.
Drawing may be altered only via CAD.



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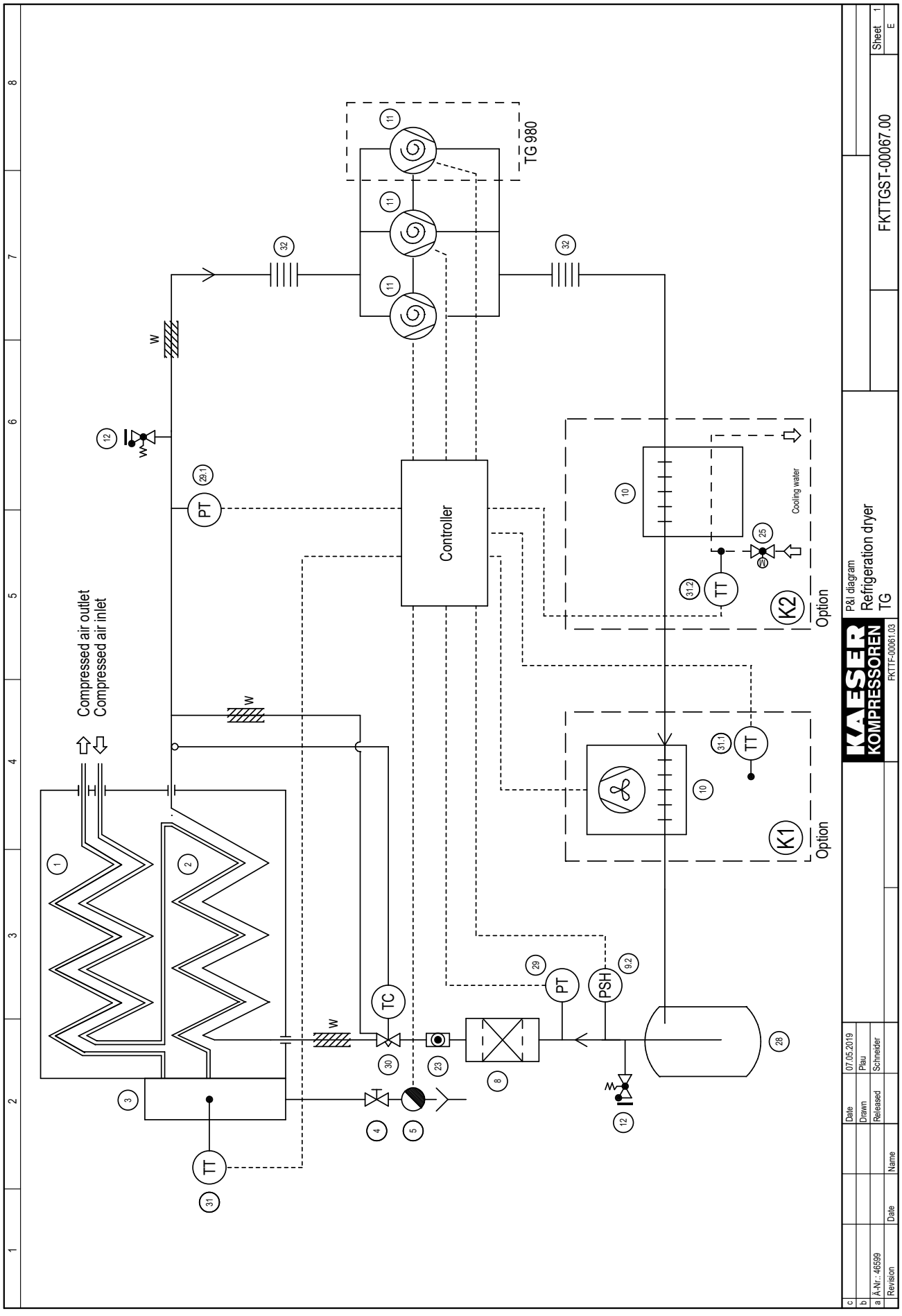
13.2 Pipeline and instrument flow diagram (P+I diagram)


TG 980
Controller
PT
TC
PSH
TT
Cooling water
Option
K1
K2
Compressed air outlet
Compressed air inlet
P&I diagram
Refrigeration dryer
TG
FKTTGST-00067.00
FKTTF-00061.03
Sheet 1
E
Date
Drawn
Released
Name
07.05.2019
Plau
Schneider
A-Nr.: 46599
Revision

1	2	3	4	5	6	7	8

1	Air/air heat exchanger (heat-insulated)
2	Air/refrigerant heat exchanger (Evaporator) (heat-insulated)
3	Condensate separator (heat-insulated)
4	Shut-off valve
5	Condensate drain
8	Filter dryer
9.2	Pressure limiter
10	Refrigerant condenser
11	Refrigerant compressor
12	Service connection (Schrader valve)
23	Inspection glass with humidity indicator
25	Cooling water regulating valve (motor-controlled)
28	Refrigerant collector
29	Pressure transducer - Condensation pressure
29.1	Pressure transducer - Evaporation pressure
30	Thermostatic expansion valve
31	Temperature transducer - Pressure dew point
31.1	Temperature transducer - Ambient temperature
31.2	Temperature transducer - Cooling water temperature
32	Compensator
w	heat-insulated
Option	
K1	Air-cooling
K2	Water-cooling

c				Date	07.05.2019	KAESER KOMPRESSOREN	P&I diagram legend		
b				Drawn	Plau		Refrigeration dryer		
a				Released	Schneider		TG		
	Revision	Date	Name			FKTTF-00061.03		FKTTGST-00067.00	Sheet 2 / E

13.3 Electrical Diagram

Wiring Diagram

refrigeration dryer series TG

460V±10% 3Ph 60Hz

Power supply:
WYE system with center point solidly grounded

ATTENTION !!!
The document gives collective information on
power supply voltages and frequencies for all machines.
The voltage and frequency and local conditions under
which any particular machine may be used
are given on the nameplate of the machine
and in the accompanying service manual.

manufacturer: KAESER COMPRESSORS
96450 Coburg
GERMANY

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forwarded or otherwise made accessible to third parties.

c				Date	21.05.2019 USE	KAESER KOMPRESSOREN	cover page	=	
b				Drawn	Sitter		refrigeration dryer series TG	+	
a				Released	Gegner				
A	Change	Date	Name					DTG-U3000.00	page 1 / 1 Sht.

Lfd. Nr. No.	Benennung Name		Zeichnungsnummer (Kunde) Drawing No. (customer)	Zeichnungsnummer (Hersteller) Drawing No. (manufacturer)	Blatt Page	Anlagenkennzeichen Unit designation
1	cover page			DTG-U3000.00	1	
2	list of contents			ZTG-U3000.00	1	
3	general instructions			UTG-U3000.00	1	
4	electrical component parts list			UTG-U3000.00	2	
5	electrical component parts list			UTG-U3000.00	3	
6	wiring diagram	power supply/power unit		STG-U3000.00	1	
7	wiring diagram			STG-U3000.00	2	
8	wiring diagram			STG-U3000.00	3	
9	wiring diagram			STG-U3000.00	4	
10	wiring diagram	option K1		STG-U3000.00	5	
11	wiring diagram	option K2		STG-U3000.00	6	
12	wiring diagram			STG-U3000.00	7	
13	wiring diagram			STG-U3000.00	8	
14	wiring diagram	Handling: Terminals / Feed line connection		STG-U3000.00	9	
15	terminal connection	terminal strip -X1,-X31,-X3		KTG-U3000.00	1	
16	terminal connection	terminal strip -X2		KTG-U3000.00	2	
17	terminal connection	terminal strip -X21		KTG-U3000.00	3	
18	lay-out	Switchboard		ATG-U3000.00	1	

c				Date	21.05.2019	KAESER KOMPRESSOREN	list of contents refrigeration dryer series TG	=	
b				Drawn	Sitter			+	
a				Released	Gegner			ZTG-U3000.00	page 1 1 Sht.
B	Change	Date	Name						

general instructions

ATTENTION !!!
Install supplies, grounding and shock protection
to local safety regulations.
Do not make or break
live plug-in connectors.

control cabinet wiring for non-designated conductors
with multi-standard stranded conductors

primary circuits:	black H07V-K, UL-Style 1015, CSA-TEW
control voltage DC ungrounded:	blue 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW
control voltage DC grounded:	white/blue 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW
CAN-Bus:	brown 1mm² H05V-K, 18AWG UL-Style 1015, CSA-TEW
ground conductor:	green/yellow H07V-K, UL-Style 1015, CSA-TEW

option K1 = air cooled

option K2 = water cooled

option C36 = warning pressure dew point

option C37 = Refrigerant compressor running

electrical equipment identification

-B30	safety air pressure switch (Pressure limiter)
-B32	pressure transducer (Liquefaction pressure)
-B33	pressure transducer (Gassing pressure)
-B34	Temperature measuring transducer (pressure dew point)
-B41	Temperature measuring transducer (Ambient temperature) - option K1
	Temperature measuring transducer (Cooling water temperature inlet) - option K2
-21FU	fuse, power supply
-F30,-F50,-F60	circuit breaker
-31FU	fuse - option K1
-K20	Display
-K21	control
-K33	condensate drain
-K31,-K50...-K53	coupling relay
-M20	control valve water cooling - option K2
-M30,-M50,-M60	Refrigerant compressor with overload protection
-M31	vent motor - option K1
-Q0	main disconnect
-Q30, -Q50,-Q60	motor starter Refrigerant compressor
-T21	power supply
-X1,-X31	terminal strip
-X2,-X21,-X22	transfer module
-X3	terminal - option K1
-X10	Rail system

c				Date	21.05.2019		KAESER KOMPRESSOREN	general instructions	=
b				Drawn	Sitter			refrigeration dryer series TG	+
a				Released	Gegner				
C	Change	Date	Name					UTG-U3000.00	page 1 / 3 Sht.

model		electrical component parts list TG 450	TG 520	TG 650	TG 780
machine power supply		**460 V ±10 %, 60 Hz**	**460 V ±10 %, 60 Hz**	**460 V ±10 %, 60 Hz**	**460 V ±10 %, 60 Hz**
supply	**connection**	fig. 10, Sht. 9	fig. 10, Sht. 9	fig. 10, Sht. 9	fig. 10, Sht. 9
GRD terminal	**-X1**	7.3149.01980	7.3149.01980	7.3149.01980	7.3149.01980
		WKFN 10 D1/2/SL/35	WKFN 10 D1/2/SL/35	WKFN 10 D1/2/SL/35	WKFN 10 D1/2/SL/35
	Stripped length	15 mm	15 mm	15 mm	15 mm
	Handling	fig. 2, Sht. 9	fig. 2, Sht. 9	fig. 2, Sht. 9	fig. 2, Sht. 9
GRD terminal		2x 7.3149.01830	2x 7.3149.01830	2x 7.3149.01830	2x 7.3149.01830
	Wieland	WKFN 4 SL/35	WKFN 4 SL/35	WKFN 4 SL/35	WKFN 4 SL/35
GRD terminal	**-X31**	7.3149.01830	7.3149.01830	7.3149.01830	7.3149.01830
	Wieland	WKFN 4 SL/35	WKFN 4 SL/35	WKFN 4 SL/35	WKFN 4 SL/35
Rail system	**-X10**	7.8237.00010	7.8237.00010	7.8237.00010	7.8237.00010
	Siemens	3RV2917-1E	3RV2917-1E	3RV2917-1E	3RV2917-1E
contactor	**-Q30/-Q50**	7.8237.00320	7.8237.00320	7.8237.00330	7.8237.00330
		3RT2017-2BB41	3RT2017-2BB41	3RT2018-2BB41	3RT2018-2BB41
	Siemens	24 VDC	24 VDC	24 VDC	24 VDC
circuit breaker	**-F30/-F50**	7.8237.00140	7.8237.00140	7.8237.00150	7.8237.00170
		3RV2011-1HA20	3RV2011-1HA20	3RV2011-1JA20	3RV2011-1KA20
		5.5-8 A	5.5-8 A	7-10 A	9-12.5 A
		setting: 6.0 A	setting: 7.5 A	setting: 9.0 A	setting: 10.5 A
auxiliary switch		7.8237.00250	7.8237.00250	7.8237.00250	7.8237.00250
	Siemens	3RV2901-2E	3RV2901-2E	3RV2901-2E	3RV2901-2E
fuse socket	**-21FU**	7.3320.00070	7.3320.00070	7.3320.00070	7.3320.00070
		Class CC 2-pol	Class CC 2-pol	Class CC 2-pol	Class CC 2-pol
	Wöhner	31296	31296	31296	31296
fuse socket	**-31FU**	7.3320.00060	7.3320.00060	7.3320.00060	7.3320.00060
	option K1	Class CC 3-pol	Class CC 3-pol	Class CC 3-pol	Class CC 3-pol
	Wöhner	31297	31297	31297	31297
fuse	**-21FU**	2x 7.3161.00340	2x 7.3161.00340	2x 7.3161.00340	2x 7.3161.00340
		ATDR 6	ATDR 6	ATDR 6	ATDR 6
	Ferraz	6 A, 600 V	6 A, 600 V	6 A, 600 V	6 A, 600 V
fuse	**-31FU**	3x 7.3161.00340	3x 7.3161.00340	3x 7.3161.00340	3x 7.3161.00340
option K1		ATDR 6	ATDR 6	ATDR 6	ATDR 6
	Ferraz	6 A, 600 V	6 A, 600 V	6 A, 600 V	6 A, 600 V
power supply	**-T21**	7.8726.0	7.8726.0	7.8726.0	7.8726.0
		PM-0224-038-0	PM-0224-038-0	PM-0224-038-0	PM-0224-038-0
	Block	200-500 VAC//24 VDC 3.8 A	200-500 VAC//24 VDC 3.8 A	200-500 VAC//24 VDC 3.8 A	200-500 VAC//24 VDC 3.8 A
coupling relay	**-K31**	7.3172.00310	7.3172.00310	7.3172.00310	7.3172.00310
option K1	**Phoenix**	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21
coupling relay	**-K50/-K51/-K52/-K53**	7.3172.00310	7.3172.00310	7.3172.00310	7.3172.00310
	Phoenix	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21
	Stripped length	8 mm	8 mm	8 mm	8 mm
	Handling	fig. 3, Sht. 9	fig. 3, Sht. 9	fig. 3, Sht. 9	fig. 3, Sht. 9
transfer module	**-X2/-X21/-X22**	7.8283.0	7.8283.0	7.8283.0	7.8283.0
	Wieland	99.808.5333.8	99.808.5333.8	99.808.5333.8	99.808.5333.8
	Stripped length	9 mm	9 mm	9 mm	9 mm
	Handling	fig. 1, Sht. 9	fig. 1, Sht. 9	fig. 1, Sht. 9	fig. 1, Sht. 9
terminal	**-X3**	7.8237.00850	7.8237.00850	7.8237.00850	7.8237.00850
option K1	**Wieland**	99.752.5333.8	99.752.5333.8	99.752.5333.8	99.752.5333.8
connection	**-W17/-W27**	7.8237.00030	7.8237.00030	7.8237.00030	7.8237.00030
	Siemens	3RV2917-5A	3RV2917-5A	3RV2917-5A	3RV2917-5A
connection	**-W18/-W28**	7.8237.00040	7.8237.00040	7.8237.00040	7.8237.00040
	Siemens	3RA2911-2A	3RA2911-2A	3RA2911-2A	3RA2911-2A
circuit breaker	**-Q0**	7.8237.00370	7.8237.00370	7.8237.00370	7.8237.00380
		3RV2721-4CD10	3RV2721-4CD10	3RV2721-4CD10	3RV2742-5FD10
		22 A / 460 V, 50kA	22 A / 460 V, 50kA	22 A / 460 V, 50kA	35 A / 460 V, 50kA
	Stripped length	10 mm	10 mm	10 mm	17 mm
	Torque	24 lb-in	24 lb-in	24 lb-in	46 lb-in
rotary actuator		7.8237.00270	7.8237.00270	7.8237.00270	7.8237.00480
	Siemens	3RV2926-2BA00	3RV2926-2BA00	3RV2926-2BA00	3RV2946-2B
control	**-K21**	7.9200.11000	7.9200.11000	7.9200.11000	7.9200.11000
	ifm	CR 9052	CR 9052	CR 9052	CR 9052
Operating panel and display	**-K20**	7.9200.11010	7.9200.11010	7.9200.11010	7.9200.11010
	ifm	CR 9047	CR 9047	CR 9047	CR 9047
communication module	**-K1**	7.9602.0	7.9602.0	7.9602.0	7.9602.0
Modbus TCP	**Hilscher**	SNW/CAN-Master	SNW/CAN-Master	SNW/CAN-Master	SNW/CAN-Master

page 2 3 Sht.

UTG-U3000.00

electrical component parts list
refrigeration dryer series TG

KAESER KOMPRESSOREN

	Change	Date	Name
c			
b			
a			
	Date	21.05.2019	
	Drawn	Sitter	
	Released	Gegner	

model	electrical component parts list TG 980
machine power supply	**460 V ±10 %, 60 Hz**
supply **connection**	fig. 10, Sht. 9
GRD terminal **-X1**	7.3149.01980
	WKFN 10 D1/2/SL/35
Stripped length	15 mm
Handling	fig. 2, Sht. 9
	2x 7.3149.01830
Wieland	WKFN 4 SL/35
GRD terminal **-X31**	7.3149.01830
Wieland	WKFN 4 SL/35
connection **-F30/-F50/-F60**	7.6861.00020
	3RV1915-1BB
connectionklemme **-F50/-F60**	7.3140.05080
Siemens	3RV2925-5EB
circuit breaker **-F30/-F50/-F60**	7.8237.00360
	3RV2011-1KA10
	9-12.5 A
	setting: 10.5 A
auxiliary switch	7.8237.00250
Siemens	3RV2901-2E
contactor **-Q30/-Q50/-Q60**	7.8237.00330
	3RT2018-2BB41
Siemens	24 VDC
connection **-W18/-W28/-W38**	7.8237.00390
Siemens	3RA2911-2FA00
fuse socket **-21FU**	7.3320.00070
	Class CC 2-pol
Wöhner	31296
fuse socket **-31FU**	7.3320.00060
option K1	Class CC 3-pol
Wöhner	31297
fuse **-21FU**	2x 7.3161.00340
	ATDR 6
Ferraz	6 A, 600 V
fuse **-31FU**	3x 7.3161.00340
option K1	ATDR 6
Ferraz	6 A, 600 V
power supply **-T21**	7.8726.0
	PM-0224-038-0
Block	200-500 VAC//24 VDC 3.8 A
coupling relay **-K31**	7.3172.00310
option K1 **Phoenix**	RIF-0-RPT-24DC/21
coupling relay **-K50/-K51/-K52/-K53**	7.3172.00310
Phoenix	RIF-0-RPT-24DC/21
Stripped length	8 mm
Handling	fig. 3, Sht. 9
transfer module **-X2/-X21/-X22**	7.8283.0
Wieland	99.808.5333.8
Stripped length	9 mm
Handling	fig. 1, Sht. 9
terminal **-X3**	7.8237.00850
option K1 **Wieland**	99.752.5333.8
circuit breaker **-Q0**	7.8237.00380
	3RV2742-5FD10
	35 A / 460 V, 50kA
Stripped length	17 mm
Torque	46 lb-in
rotary actuator	7.8237.00480
Siemens	3RV2946-2B
control **-K21**	7.9200.11000
ifm	CR 9052
Operating panel and display **-K20**	7.9200.11010
ifm	CR 9047
communication module **-K1**	7.9602.0
Modbus TCP **Hilscher**	SNW/CAN-Master

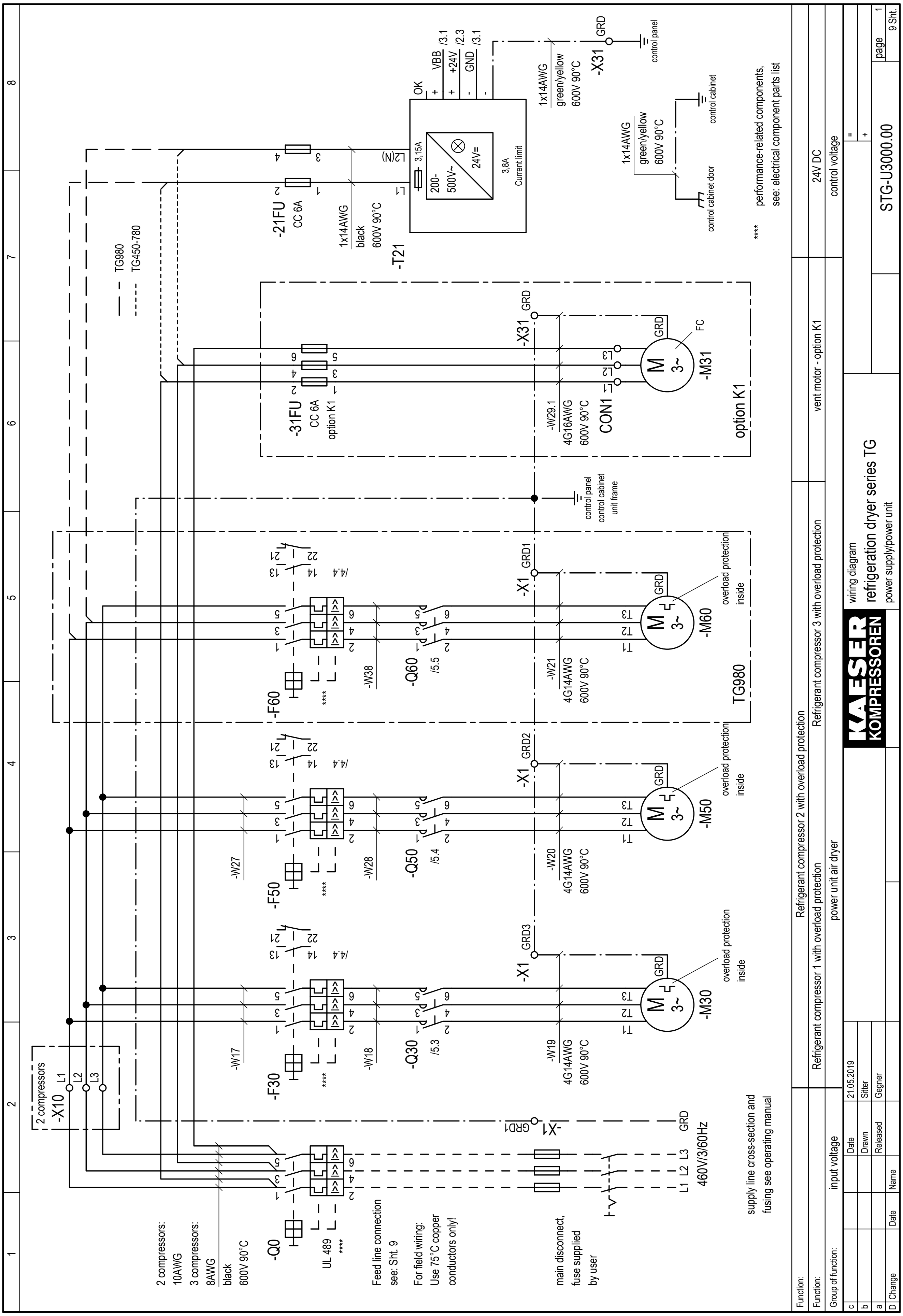
= + page 3 3 Sht.

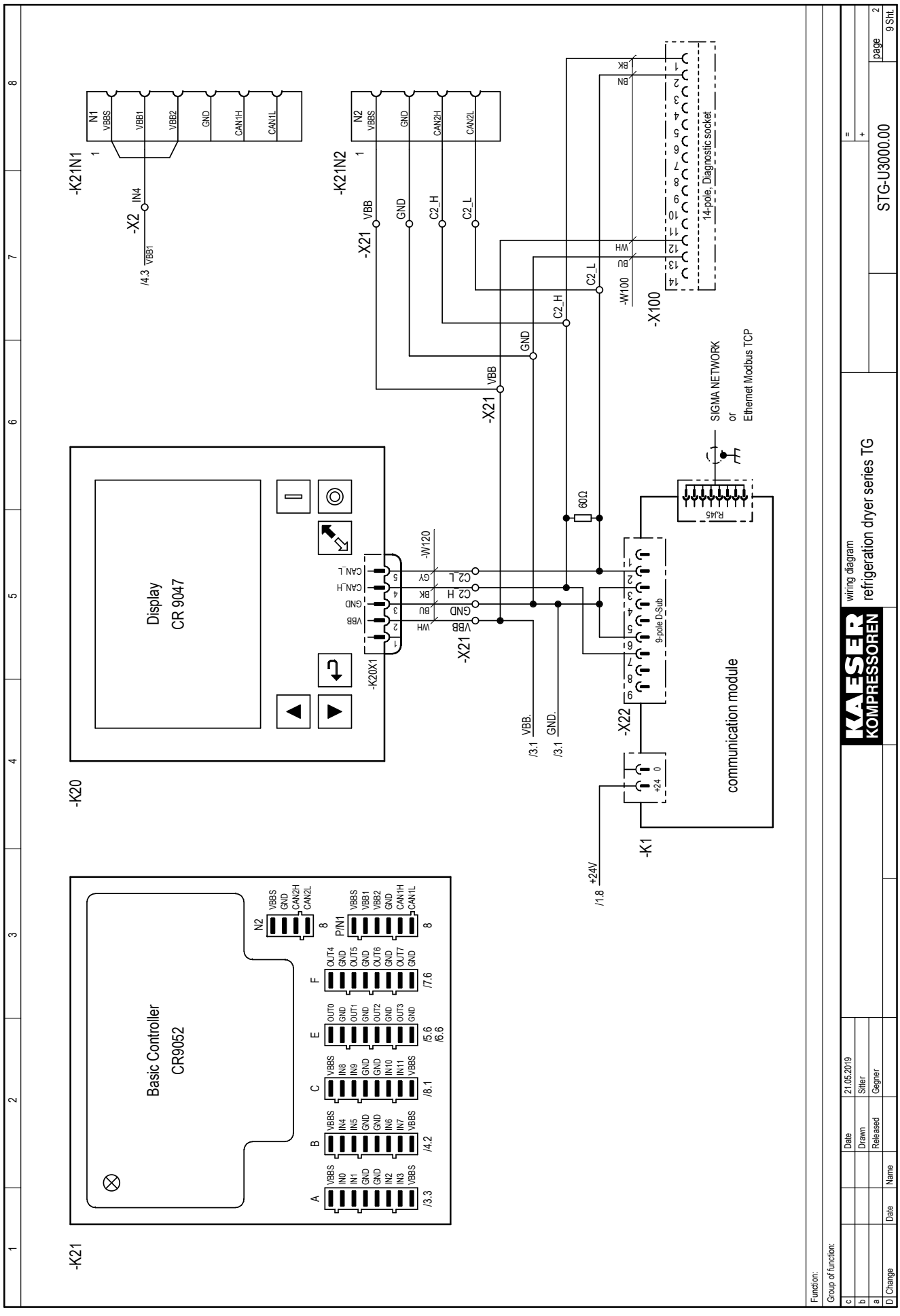
UTG-U3000.00

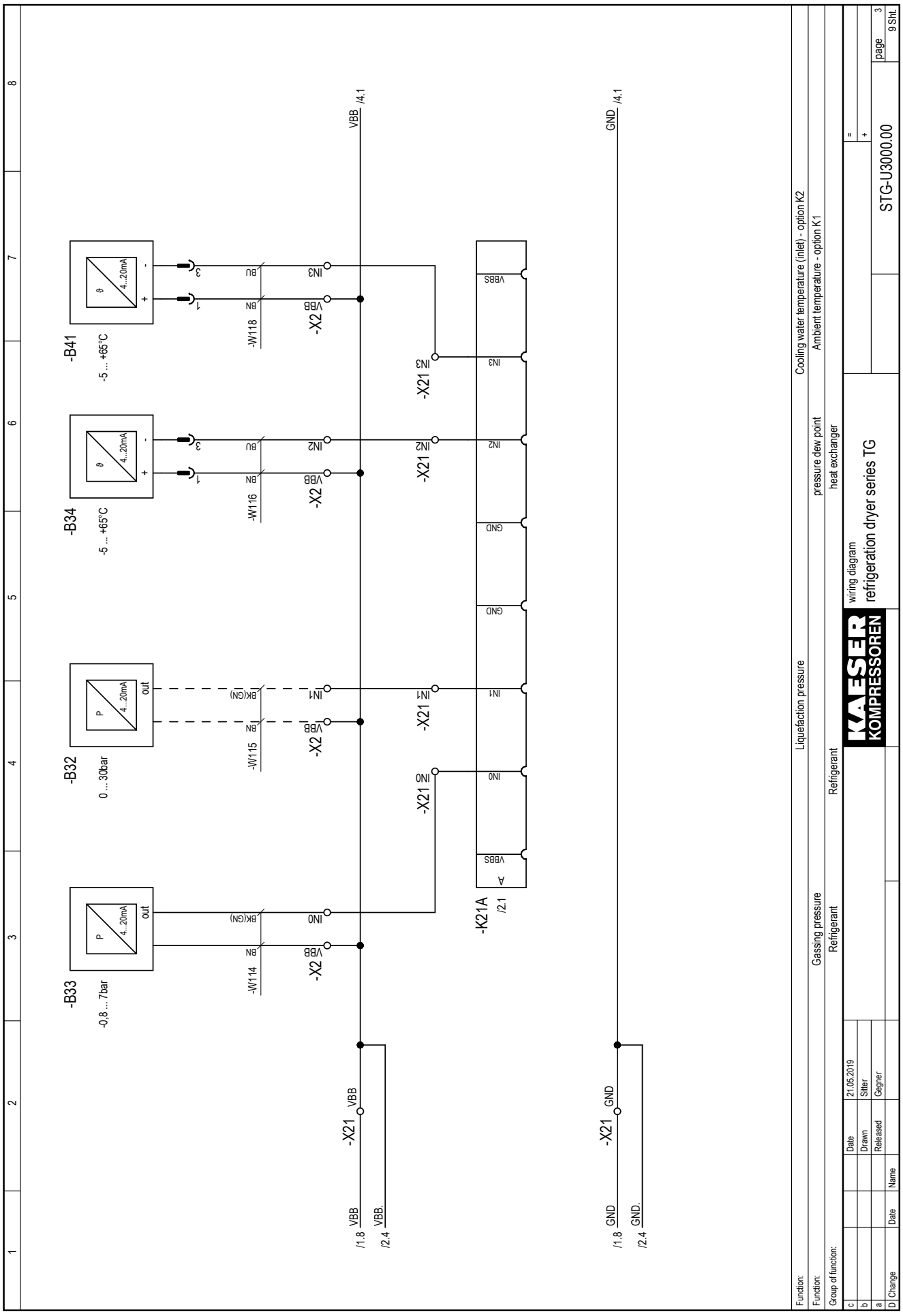
electrical component parts list
refrigeration dryer series TG

KAESER KOMPRESSOREN

	Date	Name
Drawn	21.05.2019	Sitter
Released		Gegner
Change	Date	Name
a		
b		
c		


wiring diagram
refrigeration dryer series TG
power supply/power unit
STG-U3000.00
page 1
9 Sht.
Function:
Refrigerant compressor 1 with overload protection
Refrigerant compressor 2 with overload protection
Refrigerant compressor 3 with overload protection
vent motor - option K1
24V DC
control voltage
input voltage
power unit air dryer
Group of function:
Date 21.05.2019
Drawn Sitter
Released Gegner
Change
Date
Name
2 compressors: 10AWG
3 compressors: 8AWG
black
600V 90°C
-Q0
UL 489
****
Feed line connection
see: Sht. 9
For field wiring:
Use 75°C copper conductors only!
main disconnect, fuse supplied by user
supply line cross-section and fusing see operating manual
L1 L2 L3
460V/3/60Hz
GRD
-X1 GRD1
2 compressors
-X10
-F30
-Q30
-M30
-F50
-Q50
-M50
-F60
-Q60
-M60
-W17
-W18
-W19
4G14AWG
600V 90°C
-W20
-W21
-W27
-W28
-W38
overload protection inside
TG980
TG450-780
control panel
control cabinet
unit frame
-31FU
CC 6A
option K1
-W29.1
4G16AWG
CON1
-X31
-M31
FC
-21FU
1x14AWG
-T21
200-500V~
24V=
3,15A
3.8A
Current limit
OK
VBB
+24V
GND
1x14AWG
green/yellow
600V 90°C
control cabinet door
performance-related components, see: electrical component parts list


-K21N1
-K21N2
-X2
-X21
-X100
-K20
-K21
-K1
-K20X1
-W120
-W100
-X22
Display
CR 9047
Basic Controller
CR9052
communication module
9-pole D-Sub
RJ45
SIGMA NETWORK
or
Ethernet Modbus TCP
14-pole, Diagnostic socket
60Ω
+24V
VBB.
GND.
C2_H
C2_L
GND
VBB
wiring diagram
refrigeration dryer series TG
STG-U3000.00
page 2
9 Sht.
Function:
Group of function:
Date
Drawn
Released
Name
21.05.2019
Sitter
Gegner
Change


-B41
-5 ... +65°C
-B34
-5 ... +65°C
-B32
0 ... 30bar
-B33
-0,8 ... 7bar
4...20mA
-W118
-W116
-W115
-W114
BU
BN
BK(GN)
-X2
VBB
-X21
IN3
IN2
IN1
IN0
GND
VBBS
-K21A
/2.1
/4.1
/1.8
/2.4
VBB.
GND.
Function:
Liquefaction pressure
Cooling water temperature (inlet) - option K2
Function:
Gassing pressure
pressure dew point
Ambient temperature - option K1
Group of function:
Refrigerant
Refrigerant
heat exchanger
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refrigeration dryer series TG
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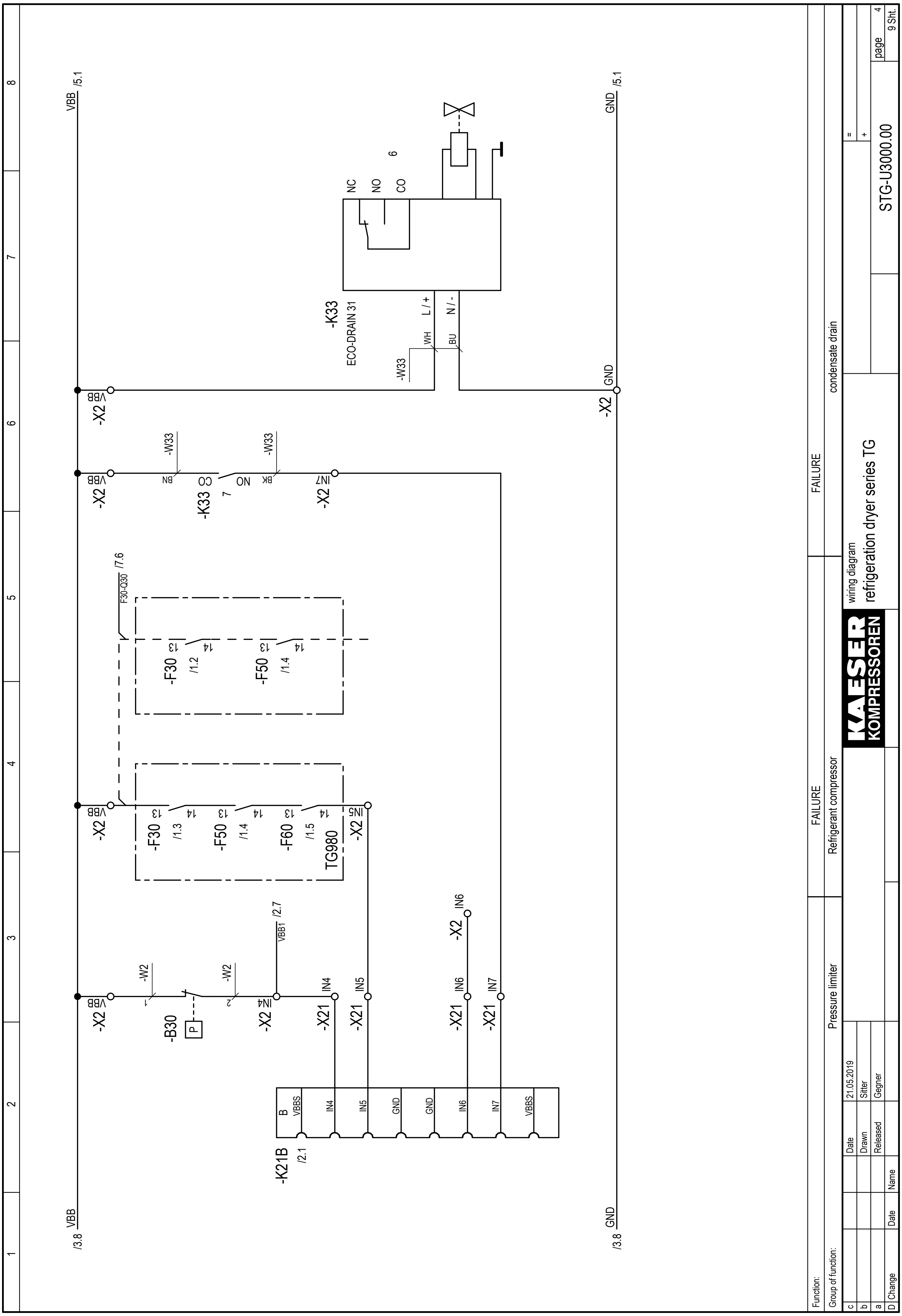
Date
Drawn
Released
Name
21.05.2019
Sitter
Gegner
Change


VBB
GND
-X2
-X21
-K33
ECO-DRAIN 31
NC
NO
CO
L / +
N / -
WH
BU
BN
BK
-W33
-W2
-B30
-K21B
-F30
-F50
-F60
TG980
F30-Q30
VBBS
IN4
IN5
IN6
IN7
Pressure limiter
Refrigerant compressor
FAILURE
condensate drain
Function:
Group of function:
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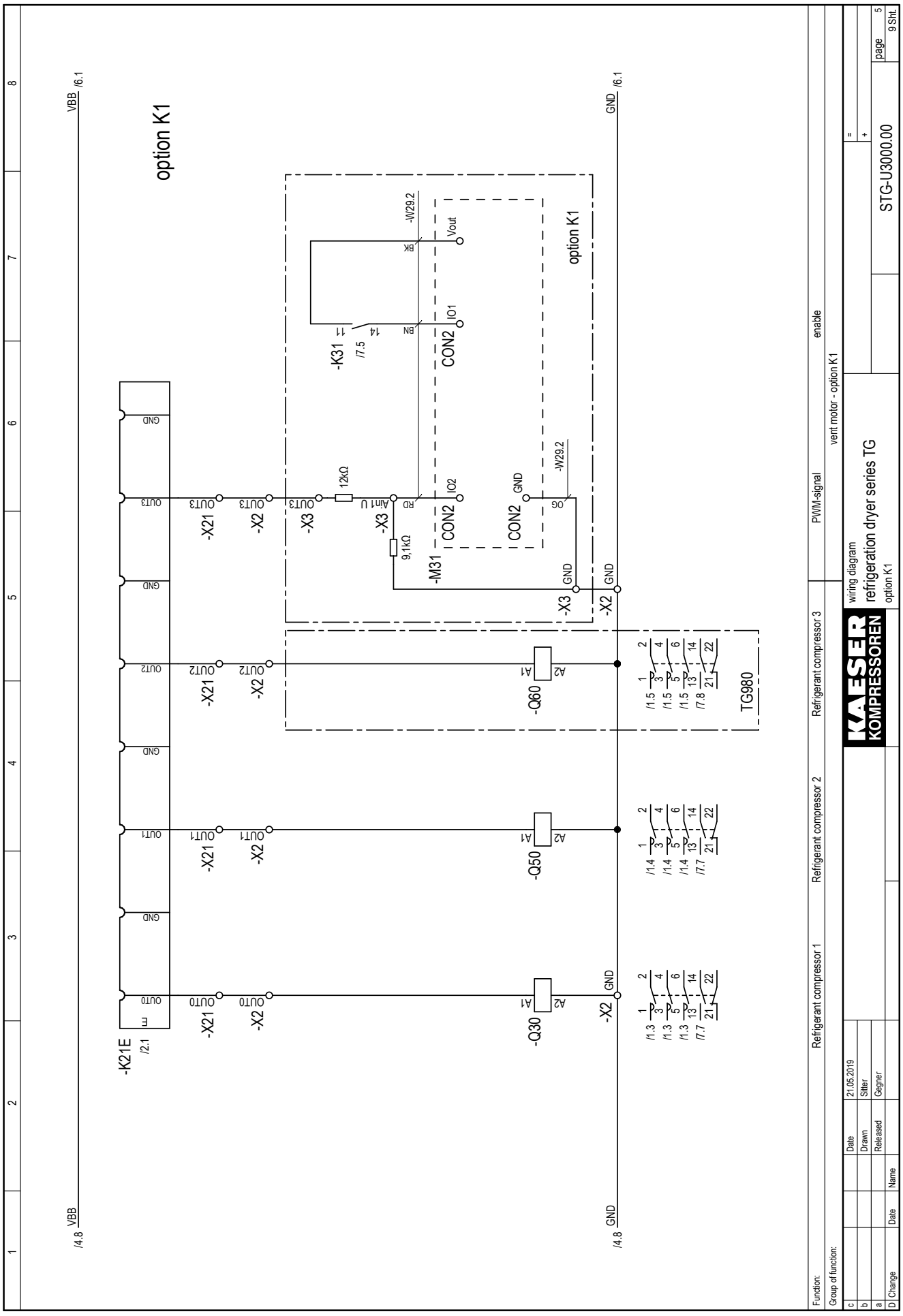
option K1
VBB /6.1
GND /6.1
-K21E /2.1
-X21
-X2
-X3
-M31
-K31 /7.5
-Q30
-Q50
-Q60
TG980
12kΩ
9,1kΩ
-W29.2
CON2
option K1
vent motor - option K1
PWM-signal
enable
Refrigerant compressor 1
Refrigerant compressor 2
Refrigerant compressor 3
wiring diagram
refrigeration dryer series TG
option K1
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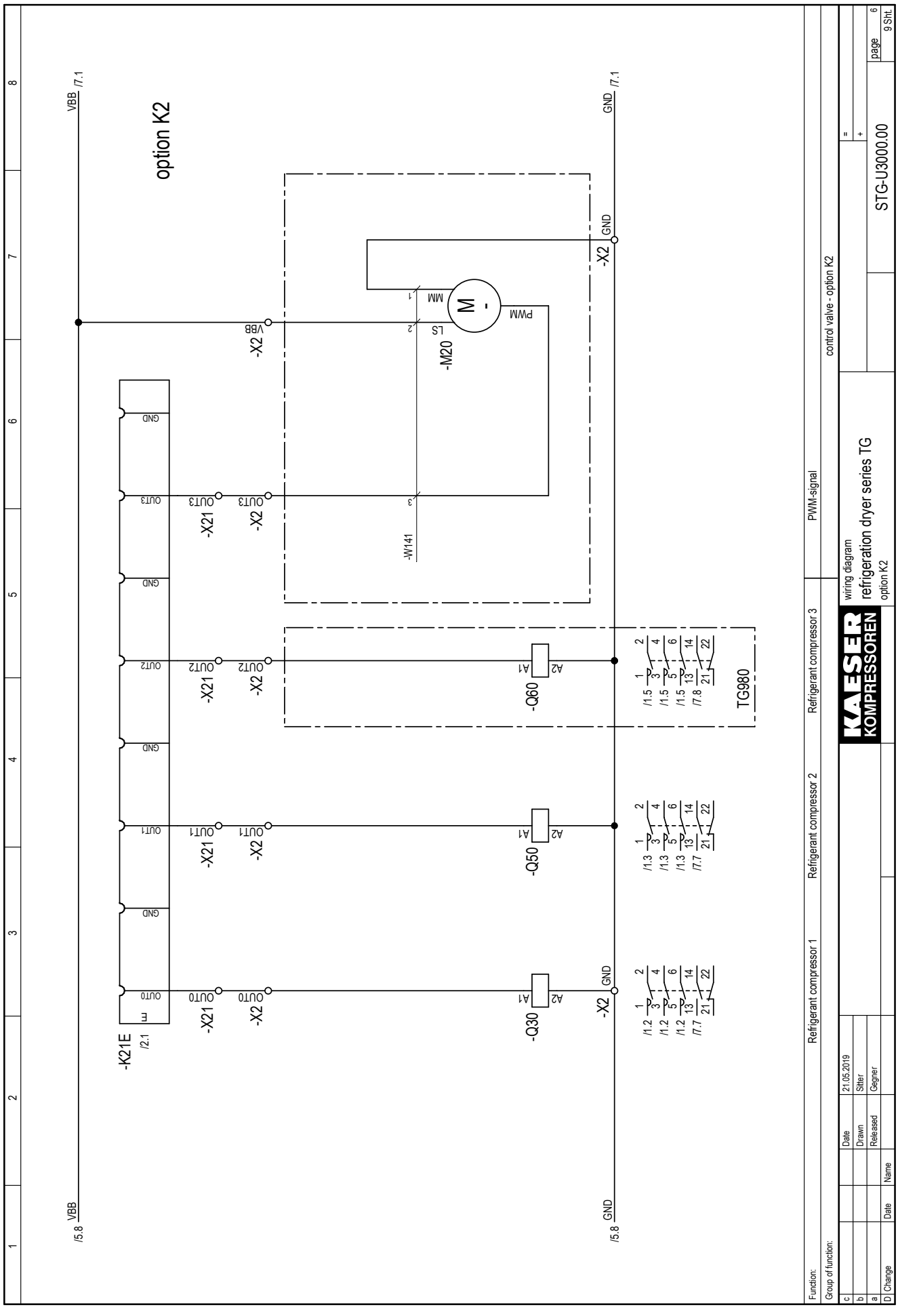
option K2
VBB /7.1
GND /7.1
-X2
VBB
GND
-M20
MM
LS
PWM
-W141
-K21E
/2.1
-X21
-Q60
-Q50
-Q30
TG980
/1.5
/1.3
/1.2
/7.8
/7.7
/5.8
Function:
Refrigerant compressor 1
Refrigerant compressor 2
Refrigerant compressor 3
PWM-signal
control valve - option K2
Group of function:
Date
Drawn
Released
Name
21.05.2019
Sitter
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wiring diagram
refrigeration dryer series TG
option K2
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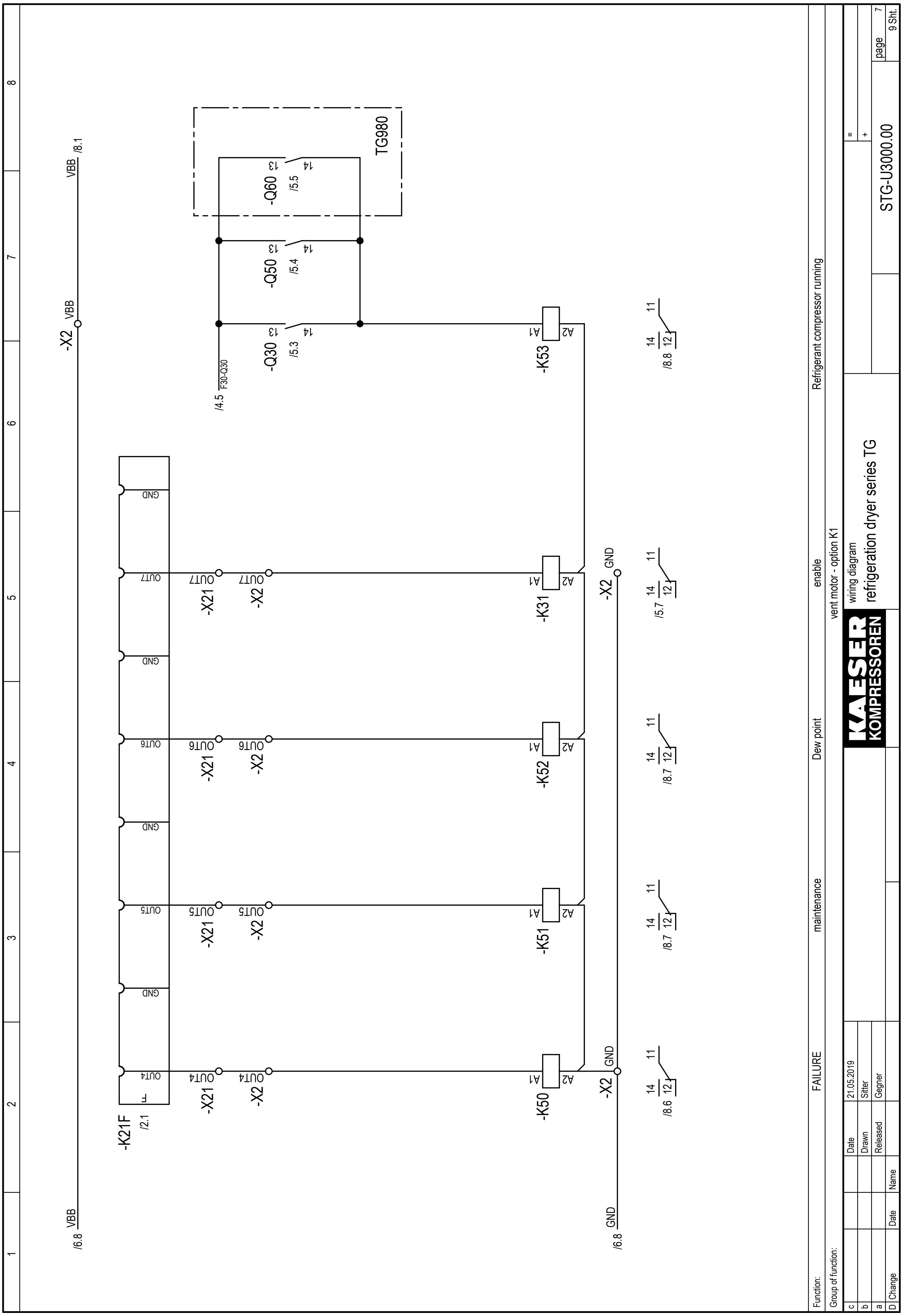
TG980
-Q60
-Q50
-Q30
F30-Q30
-K53
-K31
-K52
-K51
-K50
-K21F
-X21
-X2
VBB
GND
OUT4
OUT5
OUT6
OUT7
Function:
Group of function:
FAILURE
maintenance
Dew point
enable
vent motor - option K1
Refrigerant compressor running
Date 21.05.2019
Drawn Sitter
Released Gegner
Change Date Name
wiring diagram
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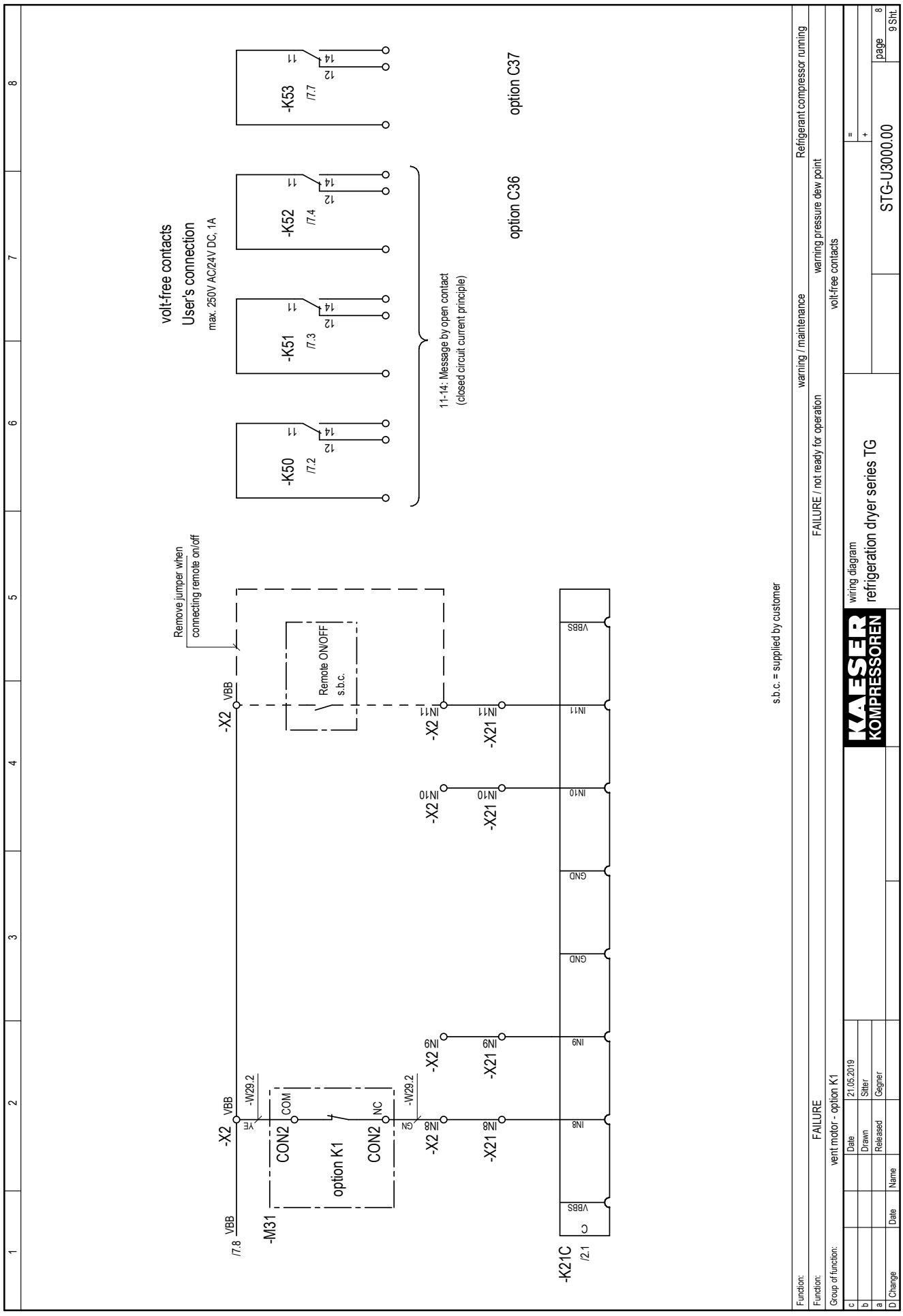
volt-free contacts
User's connection
max. 250V AC/24V DC, 1A
-K50 /7.2
-K51 /7.3
-K52 /7.4
-K53 /7.7
11-14: Message by open contact
(closed circuit current principle)
option C36
option C37
Remove jumper when
connecting remote on/off
Remote ON/OFF
s.b.c.
-X2 VBB
-X2 IN11
-X21 IN11
-X2 IN10
-X21 IN10
-X2 IN9
-X21 IN9
-X2 IN8
-X21 IN8
-X2 GND
-X21 GND
-X2 VBBS
-X21 VBBS
-W29.2
CON2 COM
CON2 NC
option K1
-M31 /7.8
-K21C /2.1
s.b.c. = supplied by customer
Function: warning / maintenance Refrigerant compressor running
Function: FAILURE FAILURE / not ready for operation warning pressure dew point
Group of function: vent motor - option K1 volt-free contacts
KAESER KOMPRESSOREN
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Released Gegner
Name
Change

fig. 10: Feed line connection

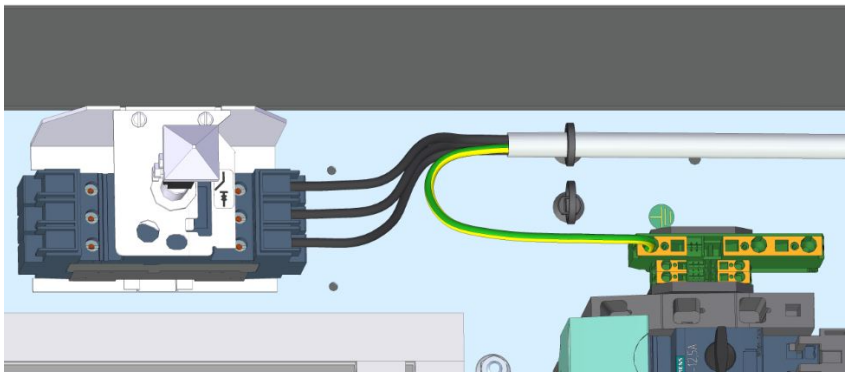


fig. 3: Handling: relay terminal

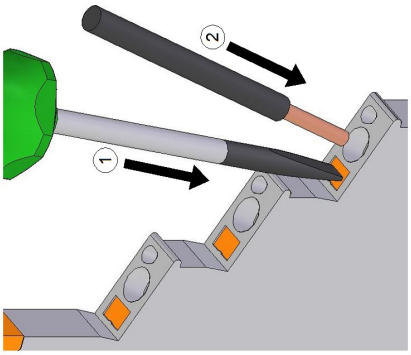


fig. 1: Handling: Control line terminal

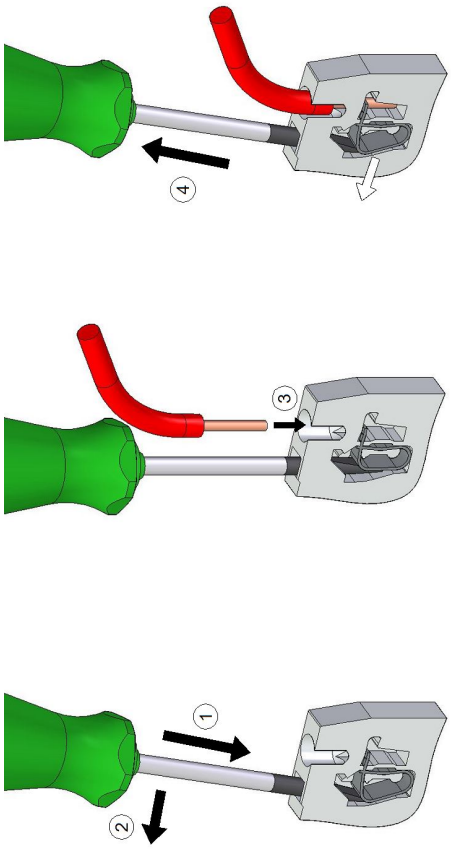
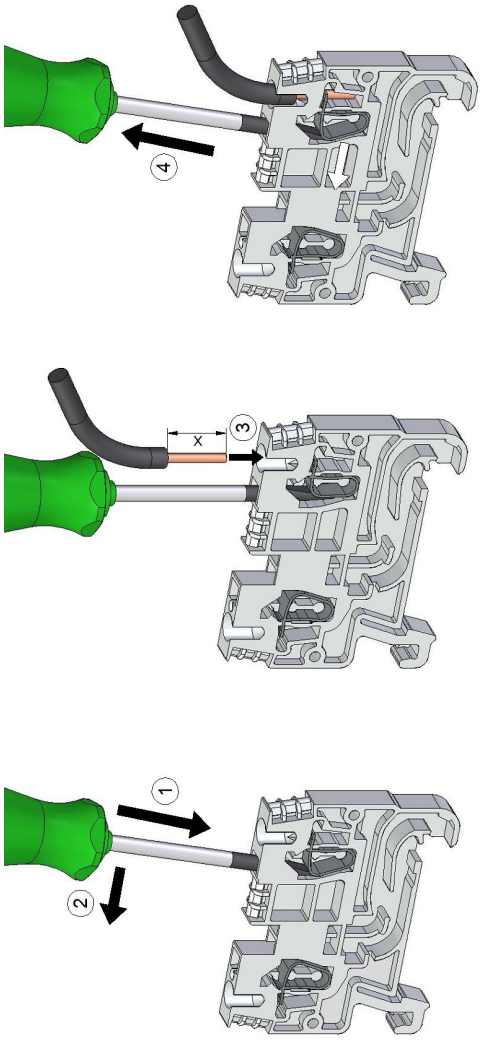


fig. 2: Handling: Supply terminal



c							
b				Date	21.05.2019		
a				Drawn	Sitter		
D	Change	Date	Name	Released	Gegner		

KAESER KOMPRESSOREN

wiring diagram
refrigeration dryer series TG
Handling: Terminals / Feed line connection

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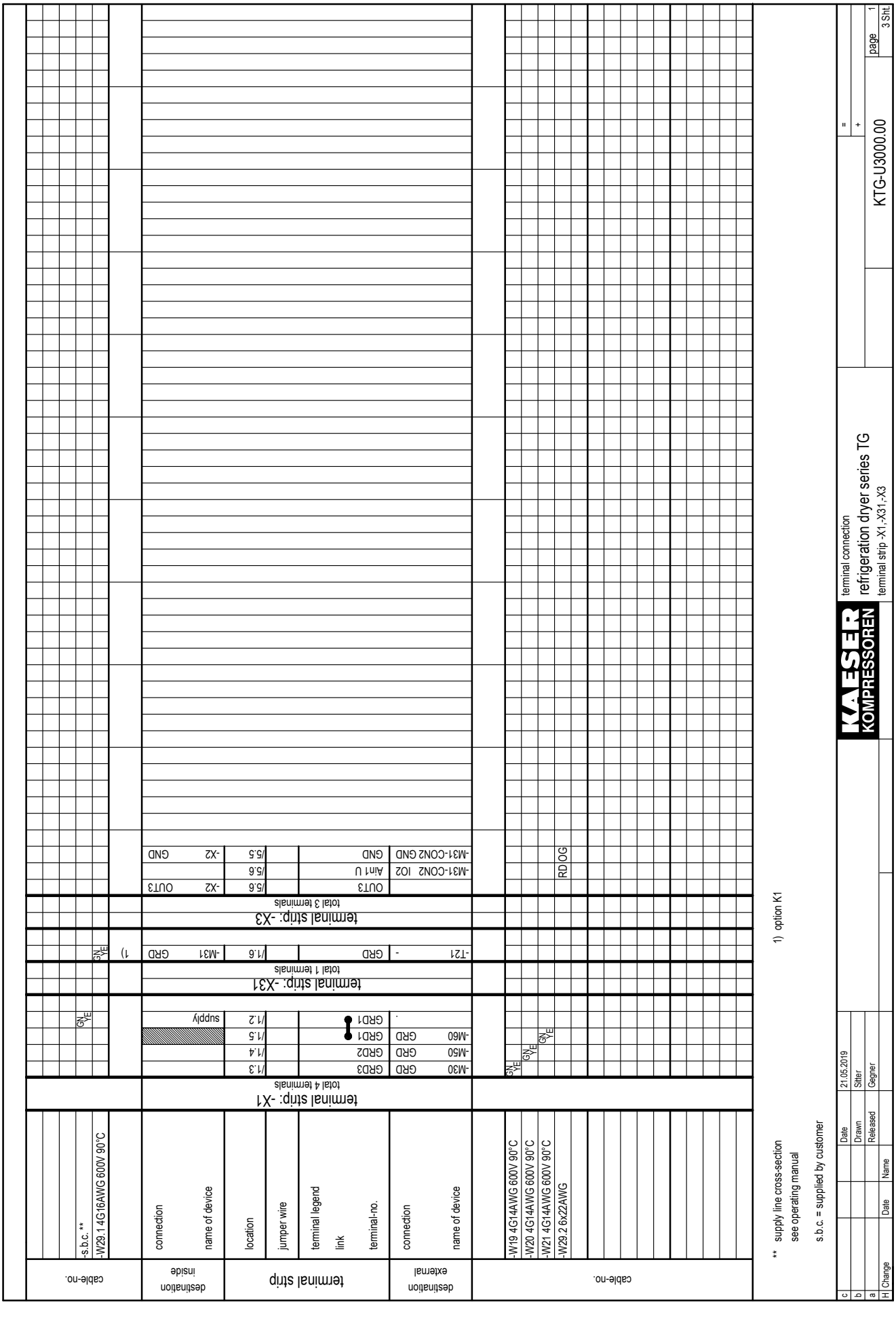
terminal strip: -X1
total 4 terminals
terminal strip: -X31
total 1 terminals
terminal strip: -X3
total 3 terminals
terminal strip
destination external
destination inside
cable-no.
connection
name of device
location
jumper wire
terminal legend
link
terminal-no.
-W19 4G14AWG 600V 90°C
-W20 4G14AWG 600V 90°C
-W21 4G14AWG 600V 90°C
-W29.2 6x22AWG
-W29.1 4G16AWG 600V 90°C
-s.b.c. **
-M30 GRD GRD3 /1.3
-M50 GRD GRD2 /1.4
-M60 GRD GRD1 /1.5
GRD1 /1.2 supply
-T21 - GRD /1.6 -M31 GRD 1)
OUT3 /5.6 -X2 OUT3
-M31-CON2 IO2 Ain1 U /5.6
-M31-CON2 GND GND /5.5 -X2 GND
RD OG
1) option K1
** supply line cross-section see operating manual
s.b.c. = supplied by customer
KAESER KOMPRESSOREN
terminal connection
refrigeration dryer series TG
terminal strip -X1,-X31,-X3
KTG-U3000.00
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Date Name
Change
Released Gegner
Drawn Sitter
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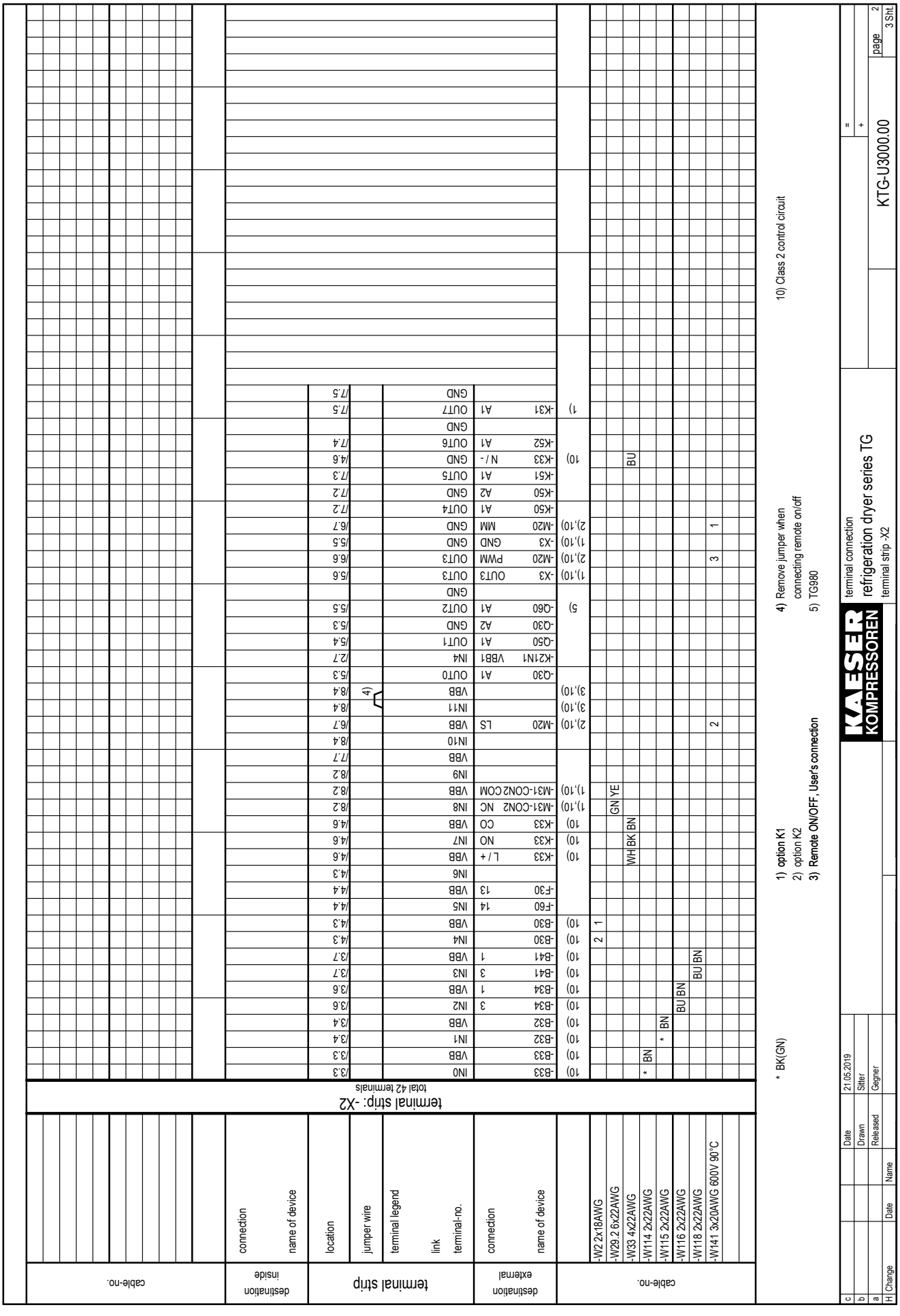
terminal strip: -X2
total 42 terminals
cable-no.
destination inside
terminal strip
destination external
cable-no.
connection
name of device
location
jumper wire
terminal legend
link
terminal-no.
connection
name of device
-W2 2x18AWG
-W29.2 6x22AWG
-W33 4x22AWG
-W114 2x22AWG
-W115 2x22AWG
-W116 2x22AWG
-W118 2x22AWG
-W141 3x20AWG 600V 90°C
-B33 10) VBB /3.3
-B33 10) IN0 /3.3
-B32 10) IN1 /3.4
-B32 10) VBB /3.4
-B34 10) IN2 /3.6
-B34 10) VBB /3.6
-B41 10) IN3 /3.7
-B41 10) VBB /3.7
-B30 10) IN4 /4.3
-B30 10) VBB /4.3
-F60 14 IN5 /4.4
-F30 13 VBB /4.4
IN6 /4.3
-K33 L / + VBB /4.6
-K33 NO IN7 /4.6
-K33 CO VBB /4.6
-M31-CONZ NC IN8 /8.2
-M31-CONZ COM VBB /8.2
IN9 /8.2
VBB /7.7
-M20 LS VBB /6.7
IN10 /8.4
IN11 /8.4
VBB /8.4
-Q30 A1 OUT0 /5.3
-K21N1 VBB1 IN4 /2.7
-Q50 A1 OUT1 /5.4
-Q30 A2 GND /5.3
-Q60 A1 OUT2 /5.5
GND
-X3 OUT3 OUT3 /5.6
-M20 PWM OUT3 /6.6
-X3 GND GND /5.5
-M20 MM GND /6.7
-K50 A1 OUT4 /7.2
-K50 A2 GND /7.2
-K51 A1 OUT5 /7.3
-K33 N / - GND /4.6
-K52 A1 OUT6 /7.4
GND
-K31 A1 OUT7 /7.5
GND /7.5
4) /8.4
* BK(GN)
1) option K1
2) option K2
3) Remote ON/OFF, User's connection
4) Remove jumper when connecting remote on/off
5) TG980
10) Class 2 control circuit
KAESER KOMPRESSOREN
terminal connection
refrigeration dryer series TG
terminal strip -X2
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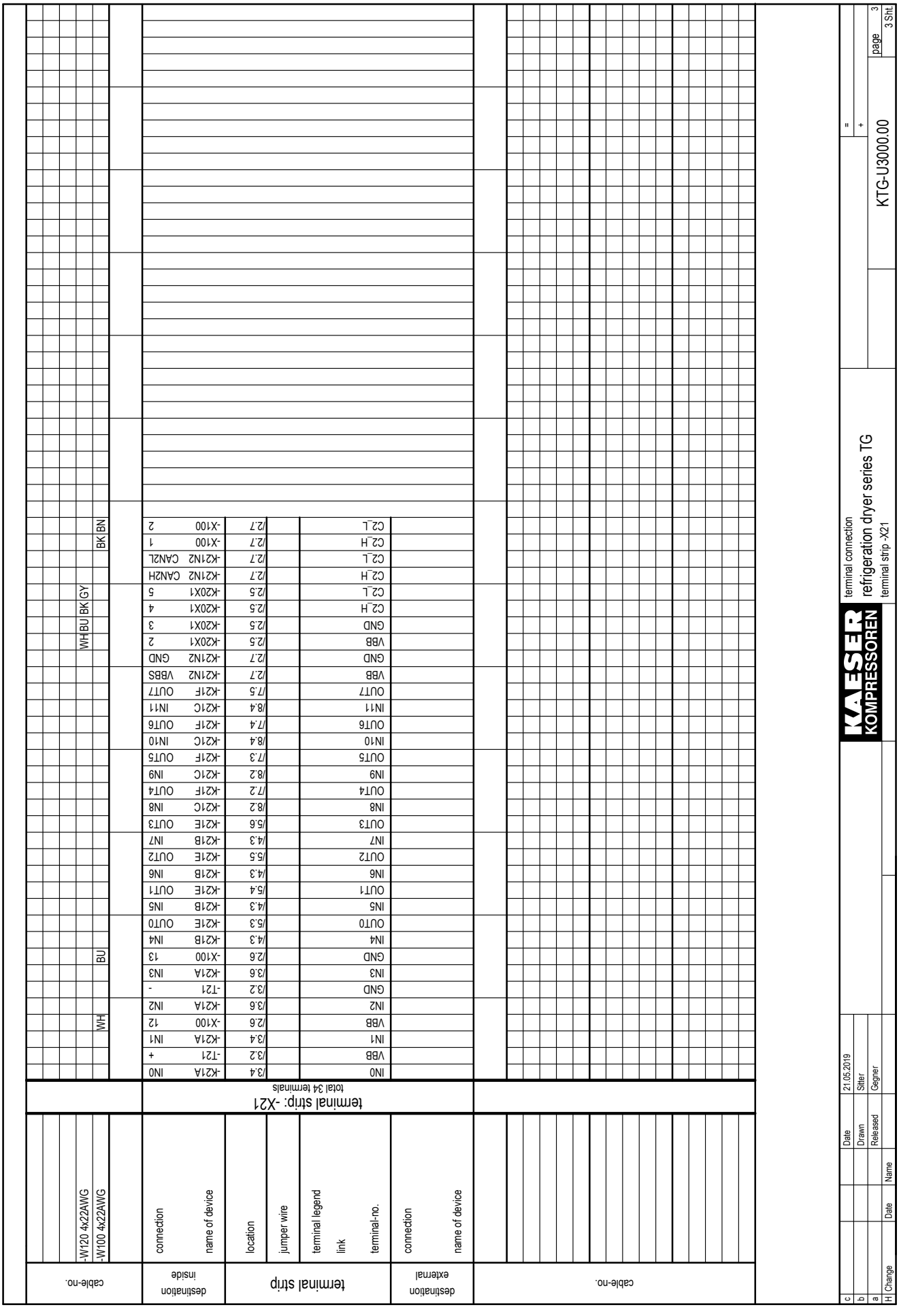
Date 21.05.2019
Drawn Sitter
Released Gegner
Name
Date
Change


terminal strip: -X21
total 34 terminals
cable-no.
destination inside
terminal strip
destination external
cable-no.
connection name of device
location
jumper wire
terminal legend link terminal-no.
connection name of device
-W120 4x22AWG
-W100 4x22AWG
IN0 /3.4 -K21A IN0
VBB /3.2 -T21 +
IN1 /3.4 -K21A IN1
VBB /2.6 -X100 12
IN2 /3.6 -K21A IN2
GND /3.2 -T21 -
IN3 /3.6 -K21A IN3
GND /2.6 -X100 13
IN4 /4.3 -K21B IN4
OUT0 /5.3 -K21E OUT0
IN5 /4.3 -K21B IN5
OUT1 /5.4 -K21E OUT1
IN6 /4.3 -K21B IN6
OUT2 /5.5 -K21E OUT2
IN7 /4.3 -K21B IN7
OUT3 /5.6 -K21E OUT3
IN8 /8.2 -K21C IN8
OUT4 /7.2 -K21F OUT4
IN9 /8.2 -K21C IN9
OUT5 /7.3 -K21F OUT5
IN10 /8.4 -K21C IN10
OUT6 /7.4 -K21F OUT6
IN11 /8.4 -K21C IN11
OUT7 /7.5 -K21F OUT7
VBB /2.7 -K21N2 VBBS
GND /2.7 -K21N2 GND
VBB /2.5 -K20X1 2
GND /2.5 -K20X1 3
C2_H /2.5 -K20X1 4
C2_L /2.5 -K20X1 5
C2_H /2.7 -K21N2 CANH
C2_L /2.7 -K21N2 CANL
C2_H /2.7 -X100 1
C2_L /2.7 -X100 2
WH
BU
BU BK GY
BK BN
terminal connection
refrigeration dryer series TG
terminal strip -X21
KAESER KOMPRESSOREN
Date 21.05.2019
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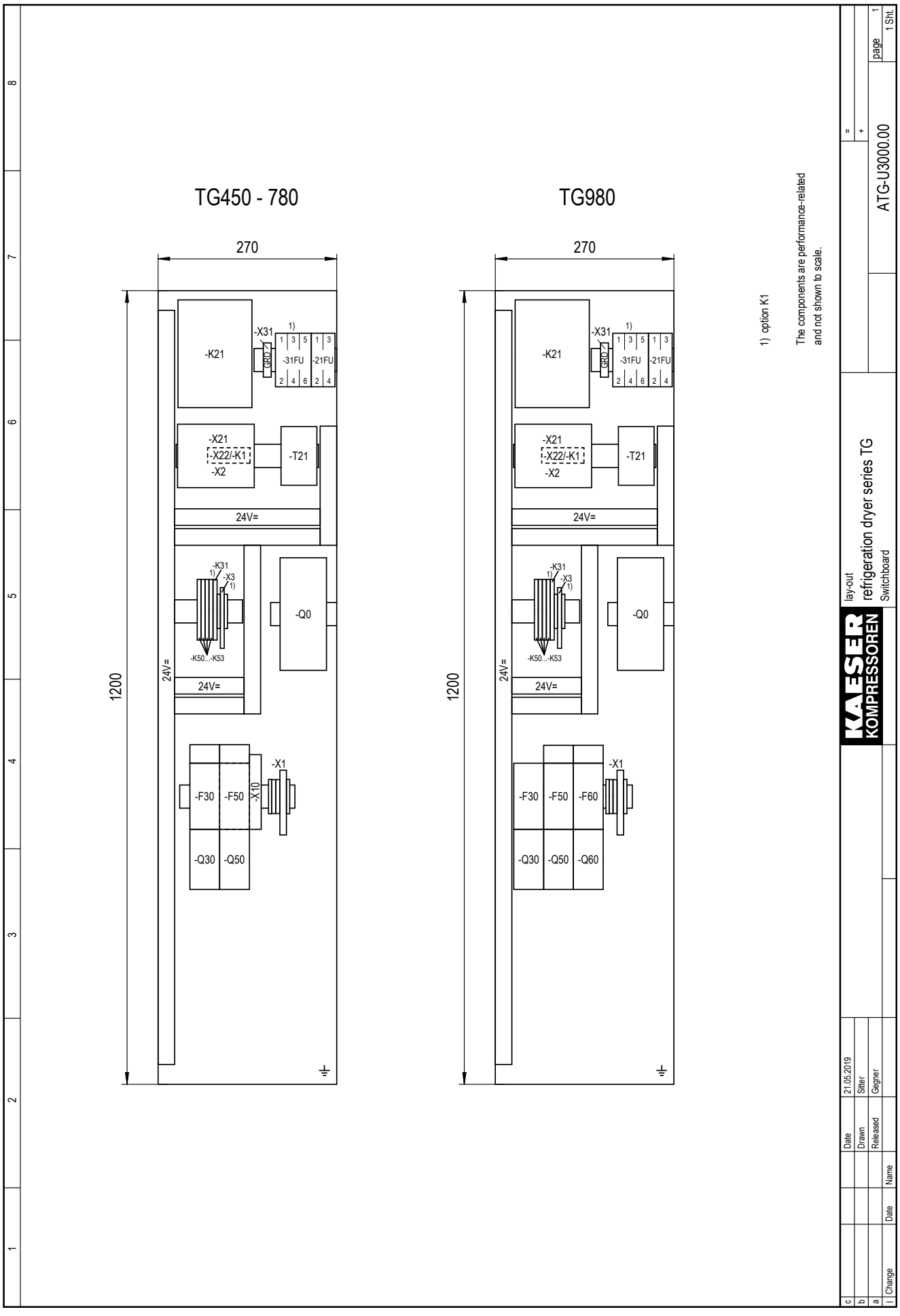
3 Sht.


TG450 - 780
TG980
270
270
1200
1200
-K21
-X31
1)
GRD
-31FU
-21FU
-X21
-X22/-K1
-X2
-T21
24V=
-K31
1)
-X3
1)
-K50...-K53
-Q0
24V=
24V=
-X1
-F30
-F50
-X10
-F60
-Q30
-Q50
-Q60
1) option K1
The components are performance-related and not shown to scale.
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lay-out
refrigeration dryer series TG
Switchboard
ATG-U3000.00
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Gegner
Name
Change