Operator Manual

Refrigerated Dryer

TF

No.: 901737 06 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 Copyright

1.3 Symbols and Identification

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

1.3.1 Warnings

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

Signal word	Meaning	Consequences of non-observance
DANGER	Warns of an imminent threat of danger	Death or serious injury may result
WARNING	Warns of possible danger	Death or serious injury are possible
CAUTION	Warns of a potentially dangerous situation	Light injuries or material damage are possible

Tab. 1 The levels of danger and their meaning

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

Example:

⚠ DANGER

These show the kind of danger and its source!
The possible consequences of ignoring a warning are shown here.
The word "Danger" indicates that death or severe injury can result from ignoring the instruction.

- ➢ *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 an action.

Example:

1. **⚠ WARNING** *These show the kind of danger and its source!*
   The possible consequences of ignoring a warning are shown here.
   The word "Danger" indicates that death or severe injury can result from ignoring the instruction.
   ➢ *The measures required to protect yourself from danger are shown here.*
2. Always read and comply with warning instructions.

1.3.2 Potential damage warnings

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

Warning notices for damages are identified by their signal word.

Signal word	Meaning	Consequences of non-observance
NOTE	Warns of a possibly dangerous situation	Damage to property is possible

Tab. 2 The levels of danger and their meaning

Example:

NOTICE
These show the kind of danger and its source!
The possible consequences of ignoring a warning are shown here.
➢ *The measures required to protect yourself from danger are shown here.*

➢ Always read and comply with warning instructions.

1.3.3 Other instructions and symbols

This symbol refers to particularly 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.
Here conditions relevant to safety are named that will help you to avoid dangerous situations.

Option H1 — ➢ This bullet is placed by lists of actions comprising one stage of a task.
In lists of actions with several stages the sequence of actions is numbered.
Information that refers to only one option is marked with an indicator (e.g., H1 means that this section is only valid for machines with adjustable machine mountings). Option indicators used in this service manual are explained in chapter 2.2.

Information referring to potential problems are identified by a question mark.
The cause is named in the help text ...
➢ ... and a remedy is given.

This symbol refers to important information or measures concerning environmental protection

Further information — Here, your attention is drawn to further topics.

2 Technical Data

2.1 Nameplate

Machine nameplate

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

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 for 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**	
Tightness checked	
* High pressure ** Low pressure	

Tab. 3 Machine nameplate

Heat exchanger nameplate

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

The heat exchanger's nameplate is attached directly at the heat exchanger within the machine.
TF 340: An additional nameplate with limited information is provided on the insulation.

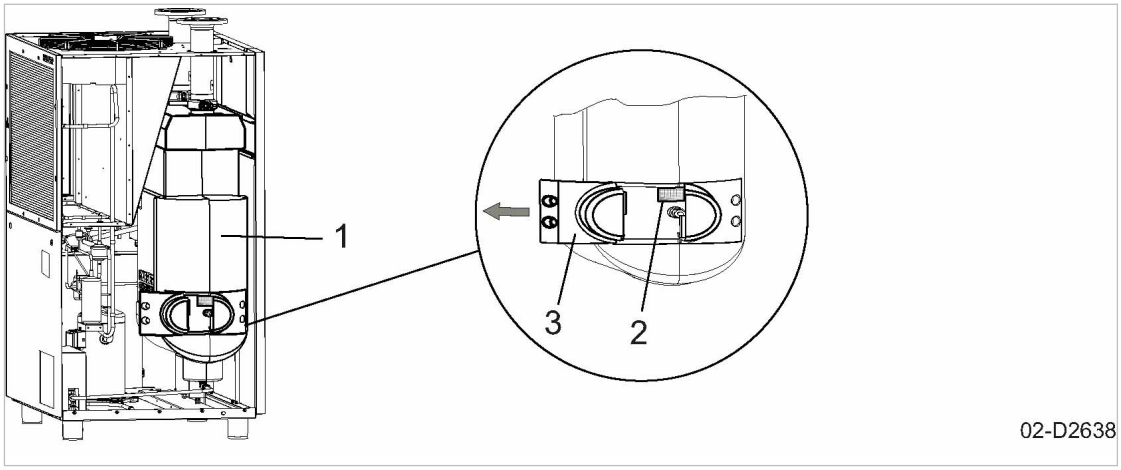


Fig. 1 Heat exchanger nameplate

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

1. Carefully pull out and remove the insulation [3].
2. Read the data on the nameplate.
3. Replace the insulation [3] and close carefully.

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: "Refrigeration compressor runs"	C37	✓
Communication module: Modbus TCP	C44	
Bolt-down machine feet	H1	
Air-cooling	K1	
Water cooling: Plate-type heat exchanger	K2	
Electronic condensate drain, floating contact	K6	✓
High ambient temperature.	K15	
Transformer power supply	T2	
Compressed air connection: left	T8	
Compressed air connection: compatible with TF 173/203/251	T9	

Tab. 4 Options

2.3 Weight

The values shown are maximum values. Actual weight of individual machines are dependent on equipment fitted.

	TF 174	TF 230	TF 280	TF 340
Weight [lb]	750 / 760[1)]	795 / 805[1)]	850 / 860[1)]	915 / 925[1)]

[1)] Option K2

Tab. 5 Weight

2.4 Ambient conditions

	TF 174	TF 230	TF 280	TF 340
Maximum elevation AMSL [1)] [ft]	3000	3000	3000	3000
Permissible ambient temperature [°F]	38 – 110 38 – 120[2)]	38 – 110 38 – 120[2)]	38 – 110 38 – 120[2)]	38 – 110 38 – 120[2)]

[1)] Higher elevations are permissible only after consultation with the manufacturer.

[2)] Option K2, Option K15

Tab. 6 Ambient conditions

2.5 Compressed air system

	TF 174	TF 230	TF 280	TF 340
Pressure drop [psi]	1.45	1.60	2.18	1.89
Compressed air flow rate[1)] [cfm]	520	670	900	1060
Cooling air flow rate* [cfm]	3100 / 4600[2)]	3100 / 4600[2)]	4600	4600
Max. working pressure [psig]	230	230	230	230
Pressure dew point[1)] [°F]	39	39	39	39
Min. compressed air inlet temperature [°F]	38	38	38	38
Max. compressed air inlet temperature [°F]	140	140	140	140

* Not applicable for Option K2

[1)] According to ISO 7183 Option A2
Reference point: 1.45 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

[2)] Option K15

Tab. 7 Compressed air system

2.6 Refrigerant circuit

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

	TF 174	TF 230	TF 280	TF 340
Refrigerant	R-134a	R-134a	R-134a	R-134a
Global warming potential (GWP)	1430	1430	1430	1430
Charge quantity[1] [lb]	4.85 / 4.96[2]	4.41 / 3.53[2]	5.73 / 3.97[2]	5.73 / 5.18[2]
Charge quantity as CO_2 equivalent [t]	3.1 / 3.2[2]	2.9 / 2.3[2]	3.7 / 2.6[2]	3.7 / 3.4[2]
Maximum working pressure [psig] (high pressure end)	335	335	335	335
Maximum working pressure [psig] (low pressure end)	290	290	290	290
Pressure monitor: Cut-out pressure [psig]	335	335	335	335

[1] Volume of fluoridized global warming gases for which the refrigerant system was designed.
[2] Option K2

Tab. 8 Refrigerant circuit

2.7 Option C44 MODBUS TCP communication module

Communication interface

Feature	Value
Communication bus	SIGMA NETWORK / MODBUS TCP server (slave)
SIGMA NETWORK cable CAT5, 2x2x0.64, grey color (metre goods)	Material number: 7.9679.0
RJ45 plug bus connection (RJ45 plug, 4 insulation displacement/clamping contacts, tool-free installation (fast connect))	Material number: 7.7628.1
Modbus TCP cable CAT5 shielded, copper, green color (meter goods)	Material number: 7.7629.0
Transfer rate [MBit/s]	10/100
Properties 1	Auto crossing (Auto-MDI(X),
Properties 2	Auto negotiation
Connections	1x socket RJ45 CAT5 shielded, 10/100 Base-TX

Feature	Value
Max. conduit length between two components [m]	100
Input data [byte]	1
Output data [byte]	89
Data content	“SIGMA CONTROL SMART Technical Description - Process Image”, Document number: 7_9200_PCM_PA

Tab. 9 Communication interface

Additional data, communication interface

Feature	Value
Power supply [V DC]	24

Tab. 10 Additional data, 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 (Plate-type heat exchanger)

Typical layout examples are provided here. Conditions for each individual installation may result in deviations from these standard values.

- ➢ If required, enter your individual values in the prepared table.
- ➢ If the design data differ, request that the settings are checked by an authorized KAESER service representative.

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

Individual design data

	My value
Cooling water temperature rise [°F]	
Flow rate [gpm]	
Pressure drop [psi]	

Tab. 11 Water cooling K2: Individual design data

2.8.1.1 Design data for the cooling system

Cooling water temperature rise 9°F

	TF 174	TF 230	TF 280	TF 340
Inlet temperature [°F]	85	85	85	85
Flow rate [gpm]	288	388	499	592
Pressure drop [psi]	2.9	4.5	6.5	8.6

According to ISO 7183 Option A2
Reference point: 1.45 psia, 68 °F, 0 % relative humidity
Operating point: Gauge working pressure 100 psig, compressed air inlet temperature 100°F, 100 % relative humidity

Tab. 12 Cooling water temperature (ΔT=9°F)

Cooling water temperature rise 18°F

	TF 174	TF 230	TF 280	TF 340
Inlet temperature [°F]	85	85	85	85
Flow rate [gpm]	148	188	251	304
Pressure drop [psi]	1.2	1.6	2.3	3.1
According to ISO 7183 Option A2 Reference point: 1.45 psia, 68°F, 0 % relative humidity Operating point: Gauge working pressure 100 psig, compressed air inlet temperature 100°F, 100 % relative humidity				

Tab. 13 Cooling water temperature (ΔT=18°F)

2.8.1.2 Component specification

Feature	Value
Material (Heat exchanger)	1.4401 stainless steel
Braze (Heat exchanger)	Copper (Cu)
Max. working pressure [psig]	145
Minimum permissible inlet temperature [°F]	40
Max. permissible inlet temperature* [°F]	105
Unsuitable cooling media	Seawater Consult KAESER on the suitability of water.
* Consult KAESER about higher values.	

Tab. 14 Component specification (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
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
* CFU: colony-forming units		

Characteristics/content	Closed cooling system	Open cooling system
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. 15 Cooling water quality (Plate-type heat exchanger)

2.9 Sound Pressure Level

	TF 174	TF 230	TF 280	TF 340
Sound pressure level [dB(A)]	<70 / 72[2)]	<70 / 72[2)]	72 / <70[3)]	72 / <70[3)]
Sound pressure level as per EN ISO 11203 and basic standard ISO 9614-2 with d=1 m and Q2= 16.4 dB(A), uncertainty: ±3 dB(A)				
[2)] Option K15 (only for air-cooled machines)				
[3)] Option K2				

Tab. 16 Sound pressure level [dB(A)]

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 2014 , 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 2014 NEC 310.15, Table 310.16 for 40 °C ambient temperature.

If other local conditions prevail, like for example high temperature, the cross section should be checked and adjusted according to 2014 NEC 110.14©, 220.3, 310.15, Table 310.16, 430.6, 430.22, 430.24 and other local codes.

Dual element time delay fuses are selected according to 2014 NEC 240.6, 430.52 and tables 430.52, 430.248 and 430.250.

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

Option K1 Performance data

	TF 174	TF 230	TF 280	TF 340
Power consumption [1] [hp]	2.9 / 3.4[3]	4.1 / 4.5[3]	5.0	5.7
Maximum power consumption [hp]	4.1 / 4.5[3]	6.1 / 6.5[3]	6.8	7.9

[1] According to ISO 7183 Option A2
Reference point: 1.45 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

[3] Option K15

Tab. 17 Performance data (Option K1)

Option K2 Performance data

	TF 174	TF 230	TF 280	TF 340
Power consumption [1] [hp]	1.9	2.7	3.4	3.9
Maximum power consumption [hp]	3.4	4.7	5.8	6.7

[1] According to ISO 7183 Option A2
Reference point: 1.45 psia, 68 °F, 0 % relative humidity
Operating point: Gauge working pressure 100 psig, compressed air inlet temperature 100 °F, 100 % relative humidity, cooling water inlet temperature 84 °F.

Tab. 18 Performance data (Option K2)

Rated voltage: 208V / 3ph / 60Hz

	TF 174	TF 230	TF 280	TF 340
Pre-fuse [A]	20	25	30	30
Supply [AWG]	4xAWG12	4xAWG10	4xAWG8	4xAWG8
Consumption [A]	12.4	16.9	20.8	20.6

[2] Option K2

Tab. 19 Power supply details 208V / 3ph / 60Hz

Rated voltage: 230V / 3ph / 60Hz

	TF 174	TF 230	TF 280	TF 340
Pre-fuse [A]	20	25	30	30
Supply [AWG]	4xAWG12	4xAWG10	4xAWG8	4xAWG8
Consumption [A]	11.3	15.3	18.8	18.6

[2] Option K2

Tab. 20 Power supply details 230V / 3ph / 60Hz

Rated voltage: 380V / 3ph / 60Hz

	TF 174	TF 230	TF 280	TF 340
Pre-fuse [A]	15	15	20	20
Supply [AWG]	4xAWG14	4xAWG14	4xAWG12	4xAWG12
Consumption [A]	6.8	9.3	11.4	11.2

[2] Option K2

Tab. 21 Power supply details 380V / 3ph / 60Hz

Rated voltage: 460V / 3ph / 60Hz

	TF 174	TF 230	TF 280	TF 340
Pre-fuse [A]	10	10	15	15
Supply [AWG]	4xAWG14	4xAWG14	4xAWG14	4xAWG14
Consumption [A]	5.4	7.3	8.9	8.9
[2)] Option K2				

Tab. 22 Power supply details 460V / 3ph / 60Hz

Rated voltage: 575V / 3ph / 60Hz

	TF 174	TF 230	TF 280	TF 340
Pre-fuse [A]	10	10	15	15
Supply [AWG]	4xAWG14	4xAWG14	4xAWG14	4xAWG14
Consumption [A]	4.5	6.1	7.5	7.4
[2)] Option K2				

Tab. 23 Power supply details 575V / 3ph / 60Hz

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 refrigeration 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.
- Additional qualifications for compressors with refrigeration dryers:
  - 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 operator 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

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

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 every start-up, 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 check that no voltage is present.
- ➢ Switch off any external power sources.
  These may include devices connected to the floating relay contact.
- ➢ Use fuses corresponding to machine power.
- ➢ Check regularly that all electrical connections are tight and in order.

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 compressed air system to ensure that no compressed air can flow back into the machine.
- ➢ Vent all pressurized components and chambers completely.
- ➢ 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 check that no voltage is present.
- ➢ Ensure that all covers and safety guards are in place and secured before starting.

Temperature

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 vapors.
- ➢ 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.

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 pressure components.

Conversion or modification of the machine

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

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

3.5.2 Safe machine operation

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

Transport

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

- ➢ Use suitable lifting gear that conforms to local safety regulations.
- ➢ Allow transportation only by personnel trained in the safe movement of goods.
- ➢ Attach lifting gear only to suitable lifting points.
- ➢ Note the center of gravity to avoid danger of the machine tipping over.
- ➢ 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 accidents and faults.

- ➢ Install the machine in a suitable compressor room.
- ➢ Ensure sufficient and suitable lighting so that the display can be read and work carried out comfortably and safely.
- ➢ Ensure accessibility so that all work on the machine can be carried out without danger or hindrance.
- ➢ If installed outdoors, the machine must be protected from frost, direct sunlight, dust, rain and splashing water.
- ➢ Do not operate in areas in which specific requirements with regard to explosion protection are in force.
- ➢ Ensure adequate ventilation.

- ➢ Place the machine in such a manner that the working conditions in its environment are not impaired.
- ➢ Comply with limit values for ambient temperature and humidity.
- ➢ Ensure clean compressed air without damaging components.
  Damaging contaminants are for instance: explosive or chemically instable gases and vapors, acid or base forming substances such as ammonia, chlorine or hydrogen sulfide.
- ➢ Do not position the machine in the warm exhaust air flow from other machines.
- ➢ Keep suitable fire extinguishing agents ready for use.

Commissioning, operation and maintenance

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

- ➢ Allow maintenance work to be carried out only by authorized personnel.
- ➢ Switch off and lock out the power supply disconnecting device and verify the absence of voltage.
- ➢ Check that there is no voltage on floating relay contacts.
- ➢ 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.
- ➢ 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 off fluids and dispose of them according to environmental regulations.
  These include, for example, refrigerant.
- ➢ 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. 24 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 figure shows the positions of the safety signs on the machine. The table lists the various safety signs used and their meanings.

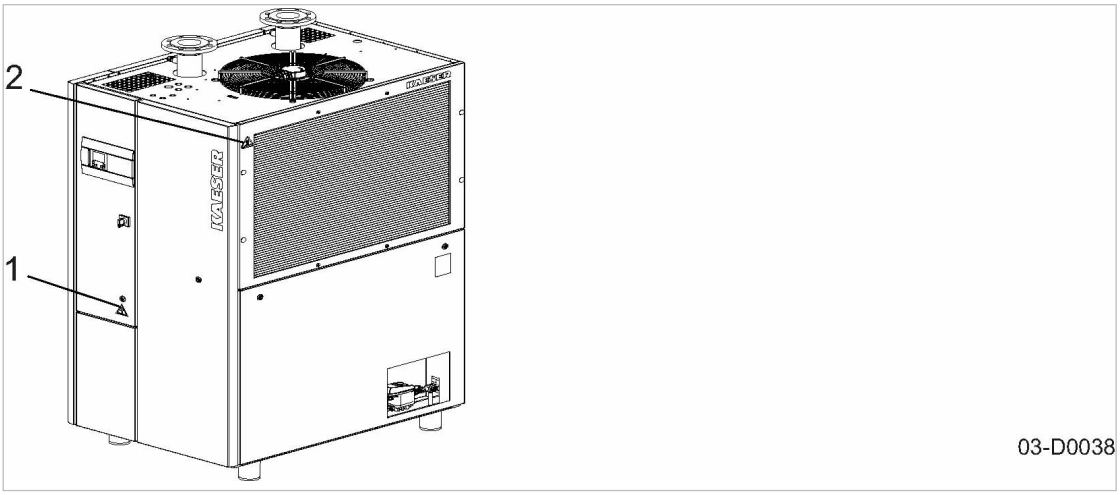


Fig. 4 Positions of safety signs

Item	Sign	Meaning
1		Danger of fatal injury from electric shock! ➢ Before starting any work on electrical equipment: Switch off and lock out the power supply disconnecting device and verify the absence of voltage.
2		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. 25 Safety signs

3.8 In emergency

3.8.1 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 disconnecting device, if possible.
  Power supply (all poles)
  Cooling water (if available)
- ➢ Warn persons in danger.
- ➢ Help incapacitated persons.
- ➢ Close the doors.
- ➢ Try to extinguish the fire if you have the skill to do so.

Suitable extinguishing agents

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

3.8.2 Injury from handling refrigerant

Eye contact

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

- ➢ Rinse thoroughly with lukewarm water and seek medical assistance.

Skin contact

Initially a sensation of chill, skin may redden subsequently.

Risk of frostbite.

➢ Wash off immediately.

➢ Treat burns and frostbite appropriately.

Inhalation

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

➢ Remove the affected person to fresh air and make him or her rest.

➢ If breathing stops, apply artificial respiration and call for medical assistance.

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

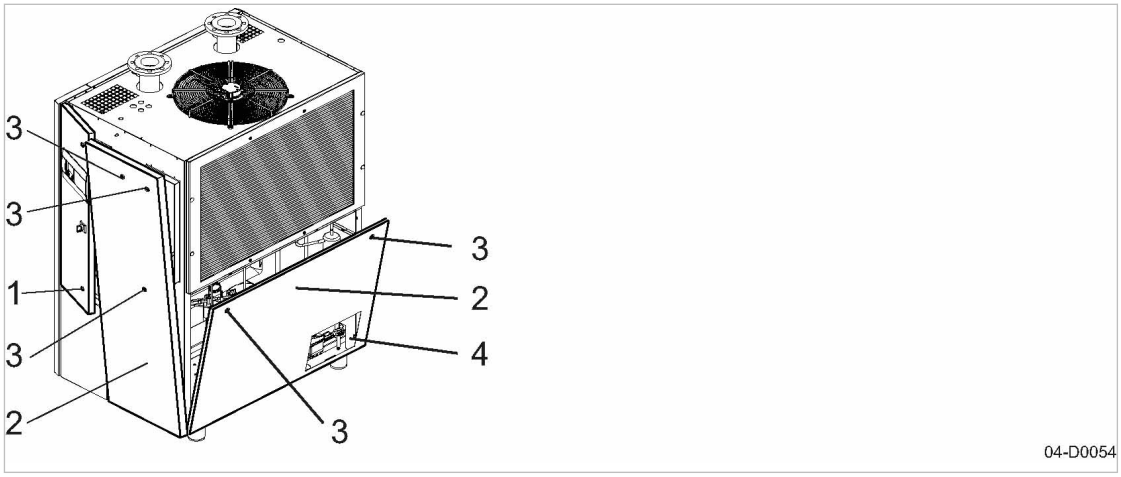


Fig. 5 Enclosure overview

1	Control cabinet door	3	Latch
2	Access panel	4	Maintenance opening

The enclosure, when closed, 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 or sitting on.
- As resting place or storage of any kind of load.

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

Latches are released by a key supplied with the machine.
Panels may then be lifted off.

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 drained off.

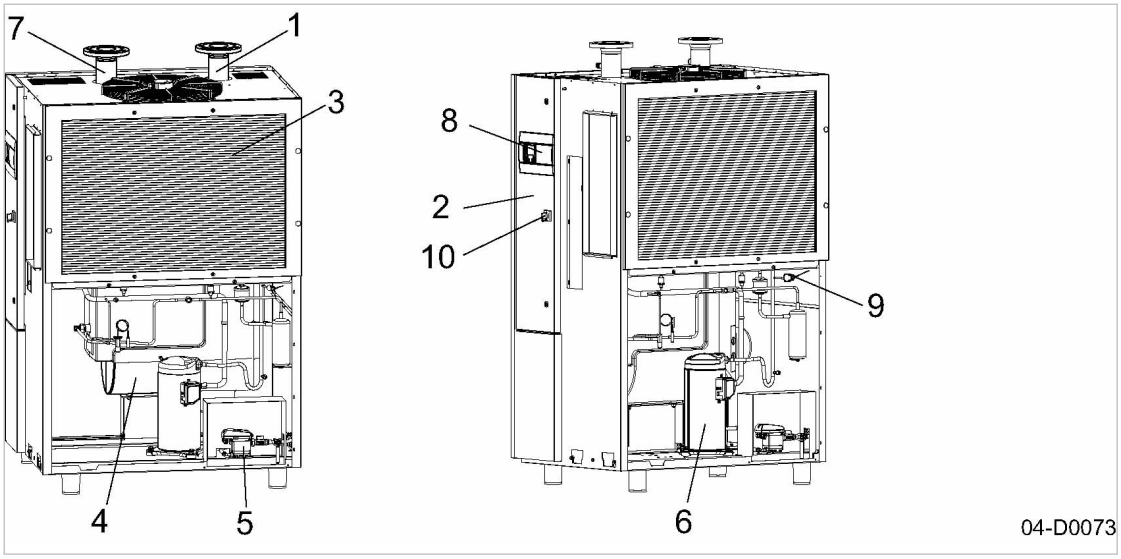


Fig. 6 Machine overview

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. Controller operator panel
9. Pressure monitor
10. Power supply disconnecting device (main switch)

1st 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 refrigerated dryer.

2nd 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 condenser.

Stage 3:

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

Stage 4:

The dry, cold 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 modes 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 compressor is switched off.

The refrigerant compressor starts as soon as the start conditions are met.

LOAD

The start conditions are met:

- The refrigerant compressor is running.
- The thermal mass is cooled.

4.4 SECOTEC CONTROL

The basic requirement for this type of control is a high capacity thermal mass: SECOPACK LS.

At the heart of the machine is a thermal mass with high specific heat capacity. It is cooled down to cut-out temperature by the refrigerant circuit and extracts the heat from the compressed air flowing through the dryer. When heat extraction raises its temperature to the cut-in point, the refrigerant compressors starts and reduces its temperature once more. The specific heat capacity of the thermal mass ensures that the pressure dew point remains stable long after the refrigerant compressor has stopped on reaching the cut-out temperature.

Consequence:
Low power consumption.

4.5 Electronic condensate drain

Condensate flows into the collecting tank.

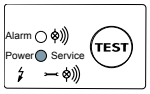
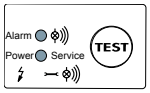
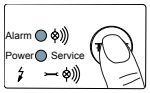
A sensor registers the level and signals this to the electronic control.

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 operational state

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

Indication	Operational state	Function
	*Ready to operate*	Power on
	*Fault/alarm*	Fault occurred Valve opens and closes repeatedly in an attempt to clear the fault.
	Test of the valve function	For manual draining, press and hold the button for about 2 seconds.
	Test the alarm function	To test the alarm function, press and hold the button for at least 1 minute.

Tab. 26 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 if the pressure of the refrigerant exceeds the permitted maximum. It is factory set.
- Enclosures and guards for moving parts and electrical connections:
  These protect against accidental contact.

4.7 SIGMA CONTROL SMART

4.7.1 Operating panel

Keys (mechanical)

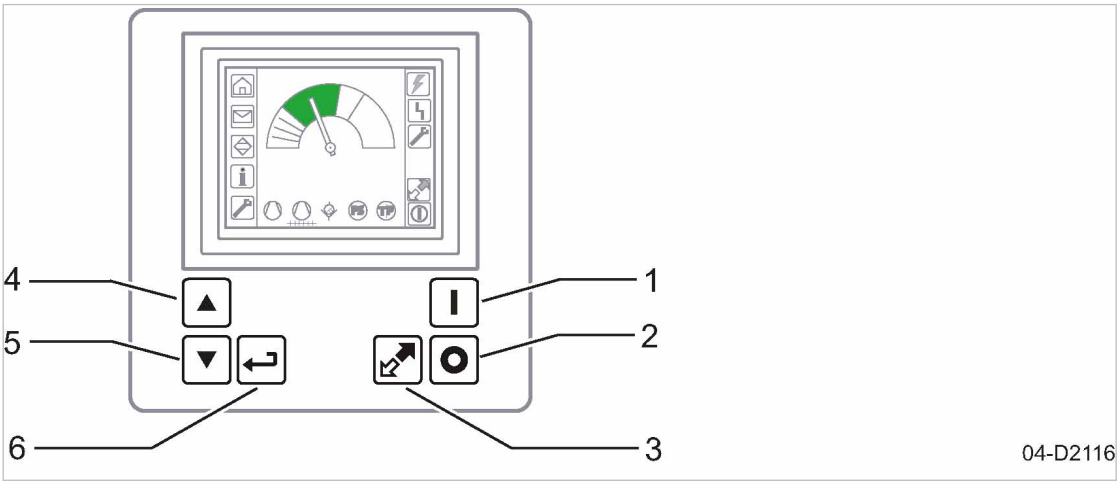


Fig. 7 Keys – overview

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. Acknowledges the message.

Tab. 27 Keys (mechanical)

Keys (soft key)

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

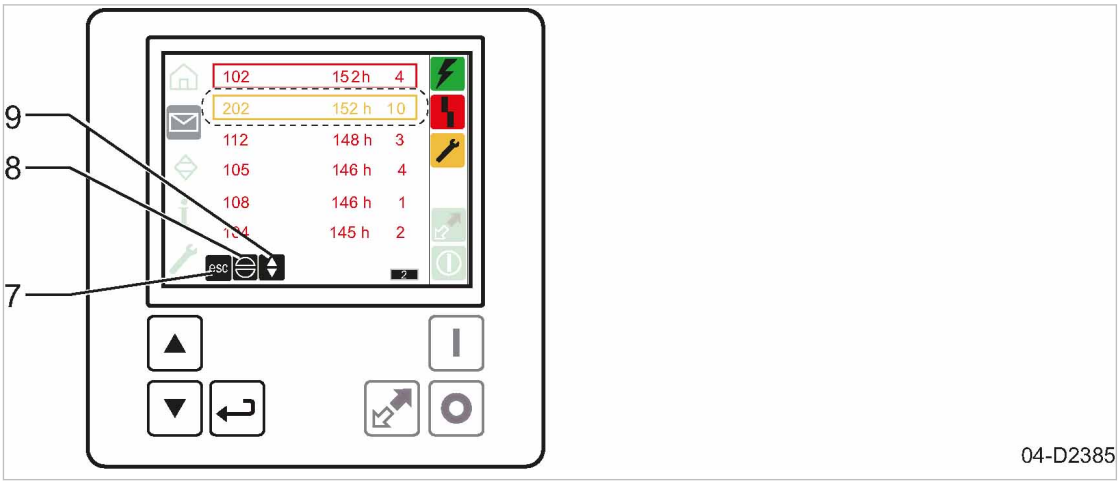


Fig. 8 Keys (soft key)

Item	Name	Function
7	Escape	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 Escape and Acknowledge ■ Changing images in sub-menus Gray: The «UP» and «DOWN» keys are inactive.

Tab. 28 Keys (soft key)

Indicators

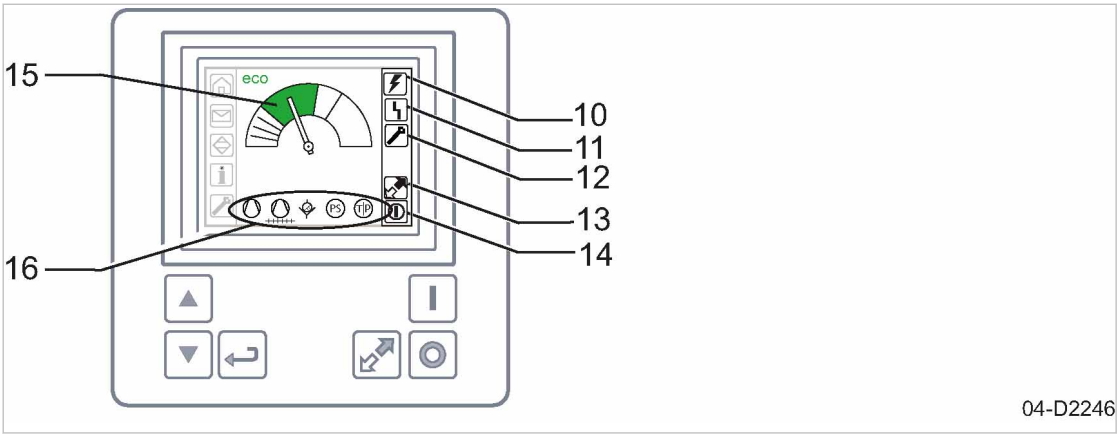


Fig. 9 Indicators

Item	Name	Function
10	*Controller Voltage*	Lights green when the power supply is switched on.
11	*Fault*	Flashes red when an alarm occurs. Lights continuously when acknowledged.
12	*Warning*	Flashes yellow for the following events: ■ Maintenance work due ■ Warning message Lights yellow continuously when acknowledged.
13	*Remote control*	The LED lights when the machine is in remote control.
14	*ON*	Lights green when the machine 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 ■ Analogue sensor

Tab. 29 Indicators

4.7.2 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. 30 Handling concept

Main menu

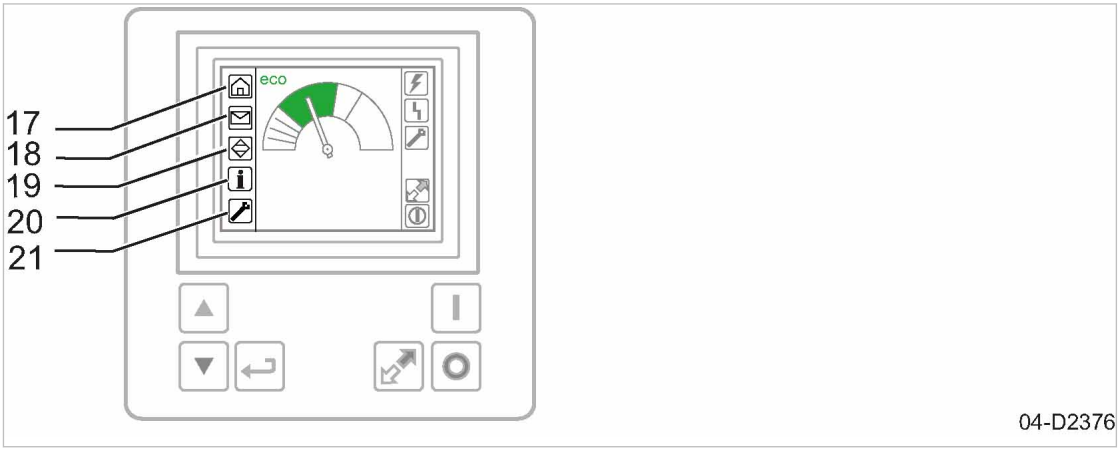


Fig. 10 Main menu

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.

Item	Designation	Description
21	*<Service>*	Displays maintenance tasks to be performed and the maintenance timer.

Tab. 31 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. 32 Color concept

4.7.3 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.

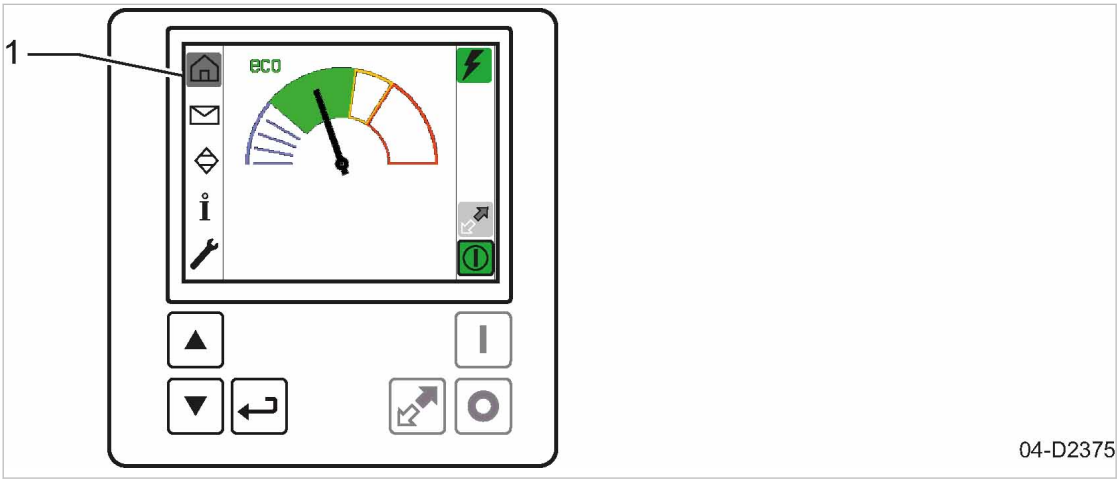


Fig. 11 Start screen

[1] Active start screen

4.7.4 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

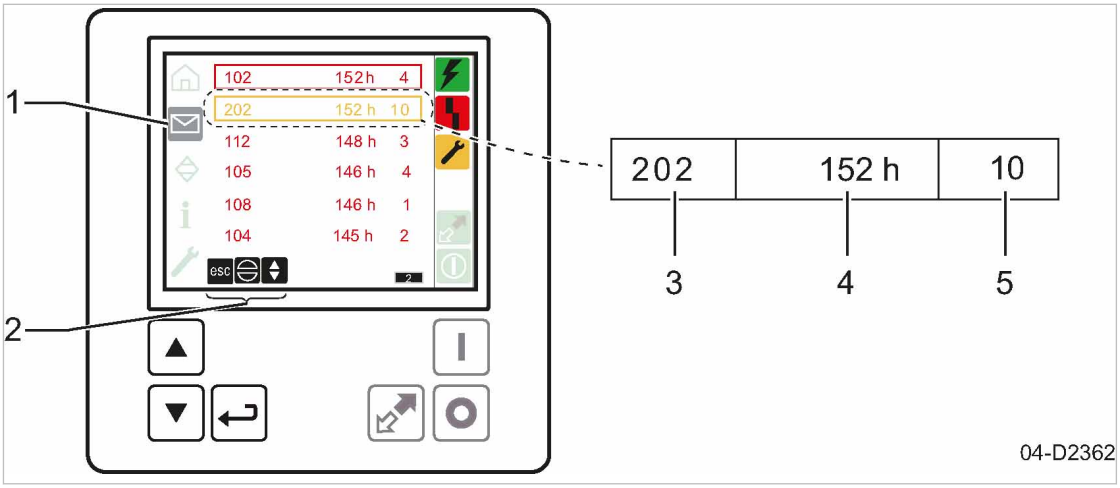


Fig. 12 Event history

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.

4.7.5 Flow diagram menu

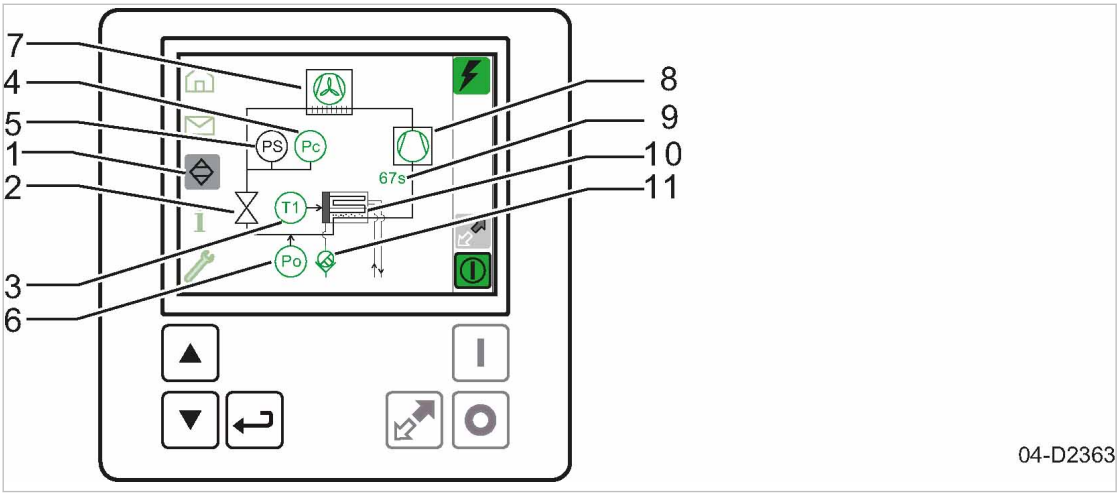


Fig. 13 Flow diagram

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
8. Refrigerant compressor
9. Run time of the refrigerant compressor in the current cycle (here: 67 s)
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 operating states are identified by the colors used to represent the components.

4.7.6 Information menu

Use the «UP» or «DOWN» keys to select the *<Message>* menu. This menu consists of several screens.

Press «Enter» to open the first screen.

4.7.6.1 Screen 1

The system displays the operating hours of the individual machine components. Settings cannot be modified in this screen.

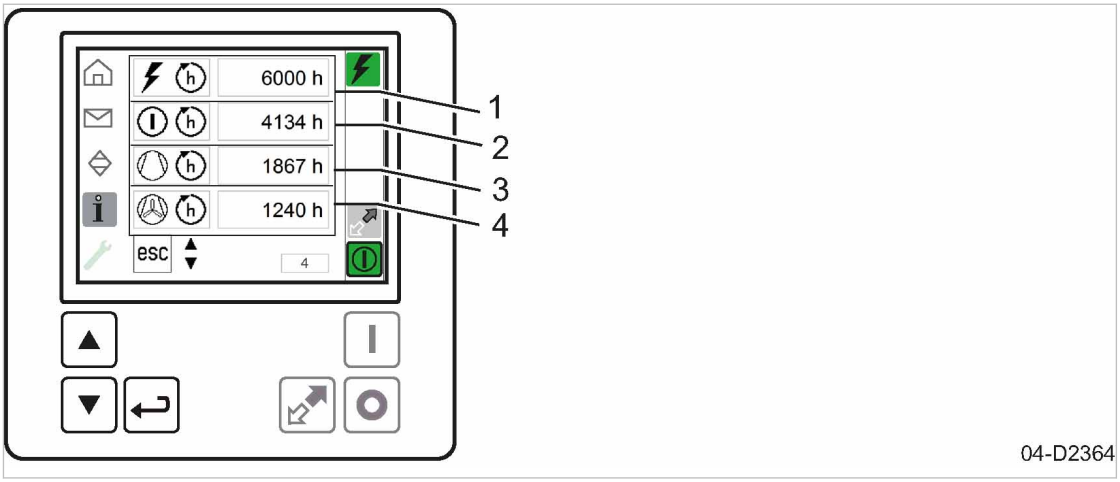


Fig. 14 Information: Screen 1

[1] Number of operating hours during which the controller is under power (example: 6000 hours)
[2] Number of operating hours during which the machine was switched on (example: 4134 hours)
[3] Number of operating hours of the refrigerant compressor (example: 1867 hours)
[4] Number of operating hours of the fan motor (example: 1240 hours)

4.7.6.2 Screen 2

Use «DOWN» to open the next screen.

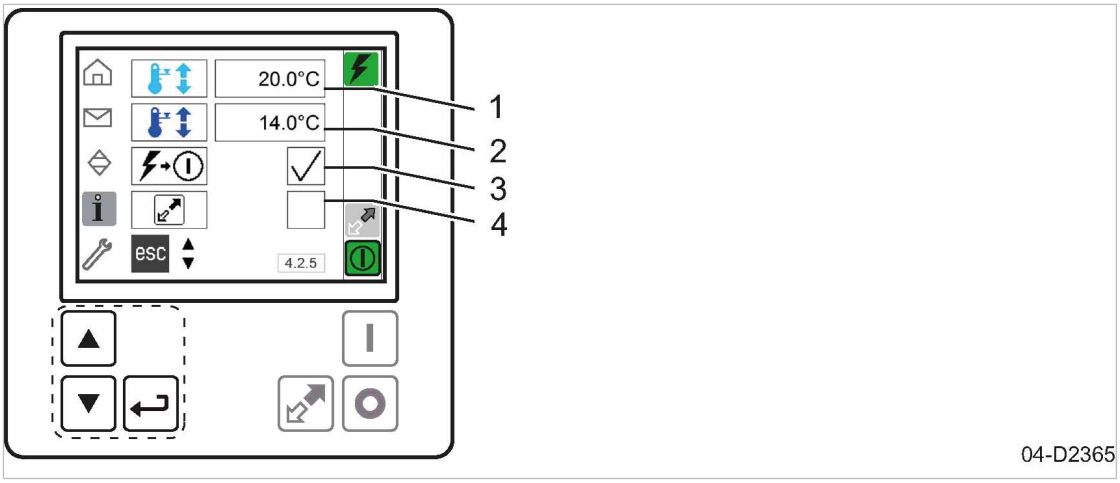


Fig. 15 Information: Screen 2

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

The following settings can be modified in this screen:

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

4.7.6.3 Screen 3

Use «DOWN» to open the next screen.

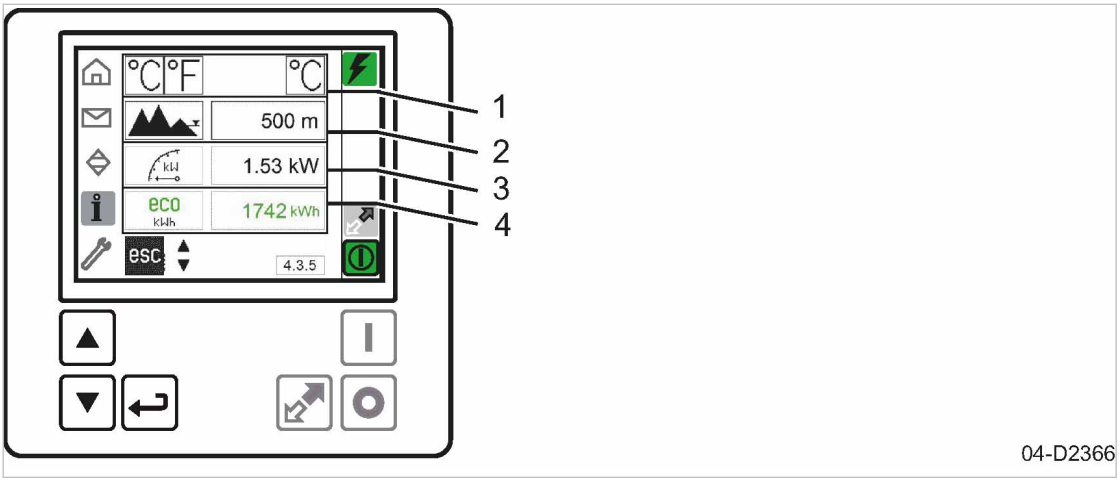


Fig. 16 Information: Screen 3

[1] Units of measure used (example: °C)
[2] Installation altitude (example: 500 m)
[3] Actual power consumption
[4] Electric energy saved with "eco" operation

The following settings can be modified in this screen:

- Setting the units of measure: °C or °F:
  - °C: Temperature in "°C", pressure in "bar" and length in "m".
  - °F: Temperature in "°F", pressure in "psi" and length in "feet".
- Installation altitude in a setting range between 0 m to 4000 m (13120 ft.) (default setting 500 m) (1640 ft.).

➢ From an installation altitude of 1000 m (3280 ft.) on, you must adjust the altitude value.
Installation altitudes below 1000 m (3280 ft.) do not necessarily require a correction of the altitude.

4.7.7 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.

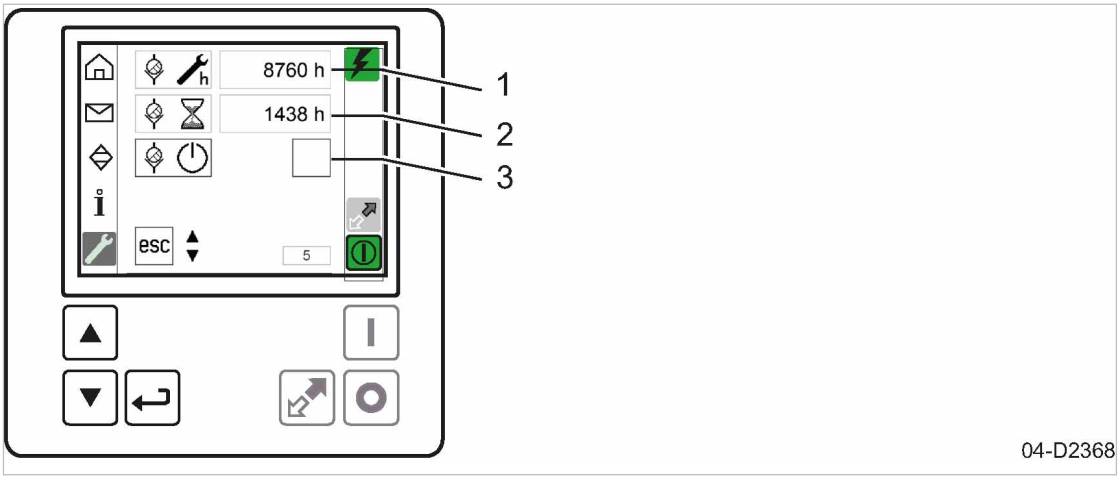


Fig. 17 Screen 1: Condensate drain

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.

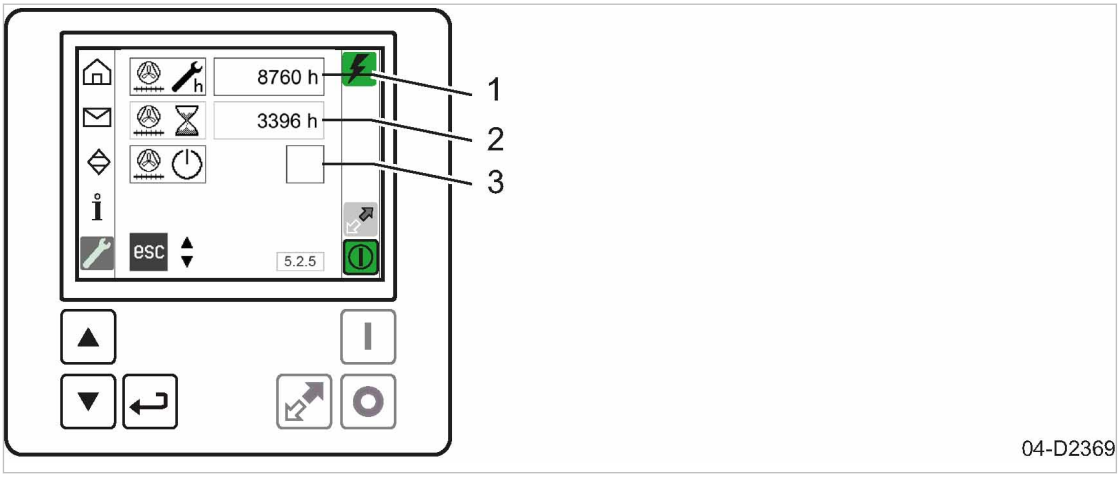


Fig. 18 Screen 2: Refrigerant condenser

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».

4.8 Options

The options available for your machine are described below.

4.8.1 Option C37
Floating relay contact "compressor runs"

The "refrigeration compressor running" floating relay contact indicates that the refrigeration compressor is in operation.

4.8.2 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.

4.8.3 Option C44
MODBUS TCP communication module

The MODBUS TCP communication module is designed for the communication between SIGMA CONTROL SMART and SAM 2.
As an alternative to SAM 2, you can use MODBUS TCP to connect third-party controllers.
In this case, please contact an authorized KAESER service representative.

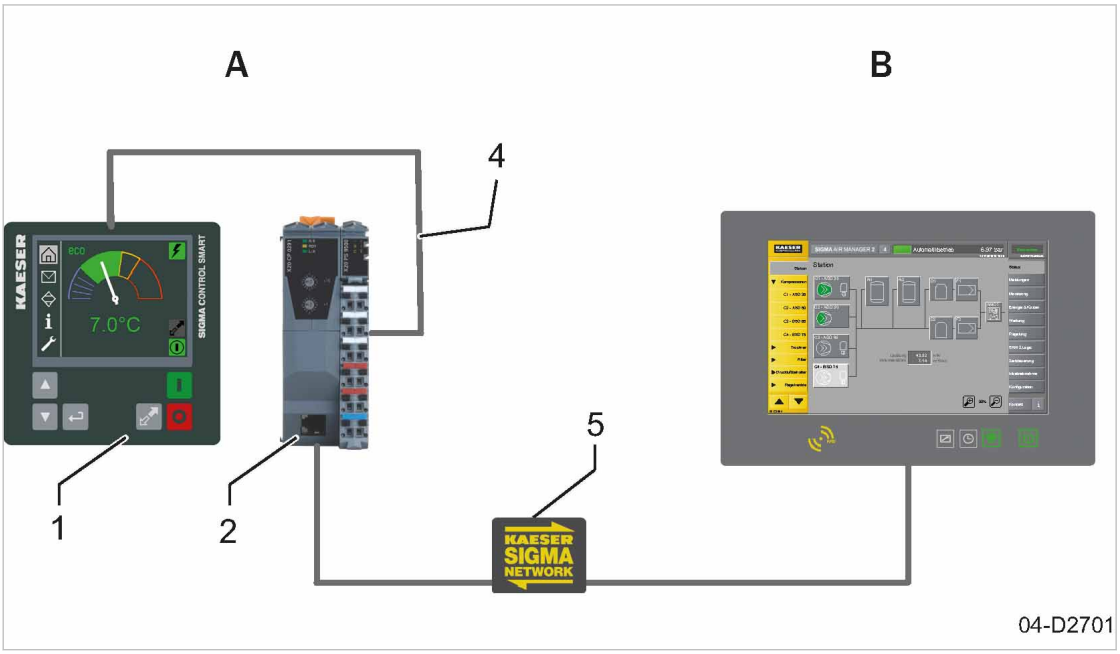


Fig. 19 Installation variant with SAM 2

A	Refrigerated dryer	B	SAM 2
1	SIGMA CONTROL SMART	4	CAN bus cable
2	MODBUS TCP communication module	5	SIGMA NETWORK cable

4.8.4 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. 20 Machine Mountings

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

4.8.5 Option T2
Transformer power supply

A transformer is provided to allow the machine to be connected to a variety of power supplies.

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

4.8.6 Option K15
High ambient temperature.

The machine is designed for ambient temperatures up to +122°F.

4.8.7 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 condensation pressure. It is factory set.

During commissioning, you must adjust the cooling water regulating valve. A description of this procedure is provided in chapter 7.6.

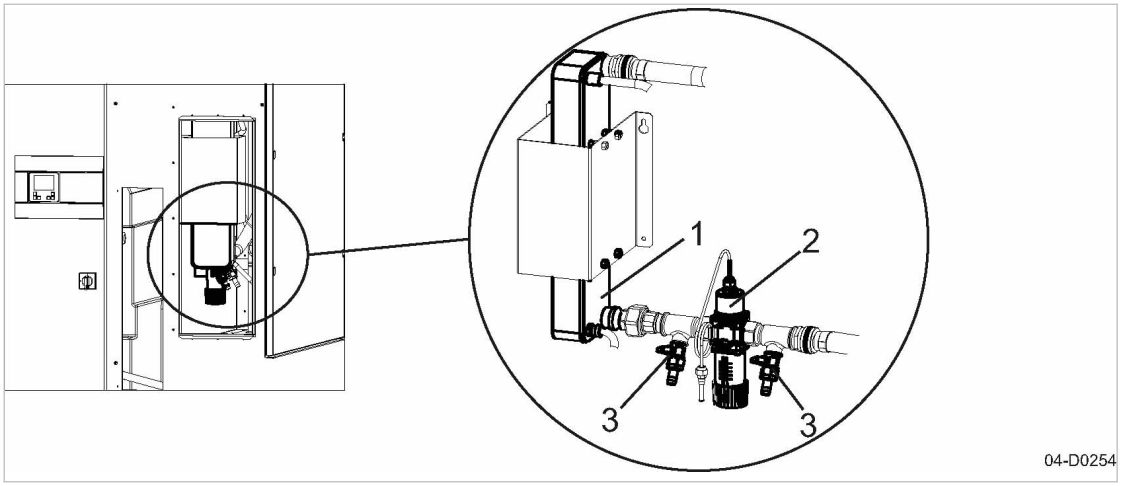


Fig. 21 Water cooling

[1] Refrigerant condenser
[2] Cooling water regulating valve
[3] Shut-off valve

4.8.8 Option T8
Compressed air connection: left

Compressed air inlet and outlet are integrated in the left enclosure side.

4.8.9 Option T9
Compressed air connection: compatible with TF 173/203/251

The position of the compressed air connections matches those of the predecessor types TF173, TF203 and TF251.

It is possible to integrate the refrigerant dryer into your air network without having to modify the pipe system.

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.

The distances quoted are recommended distances and ensure unhindered access to all machine parts.

- ➢ Please consult KAESER if they cannot be kept to.

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

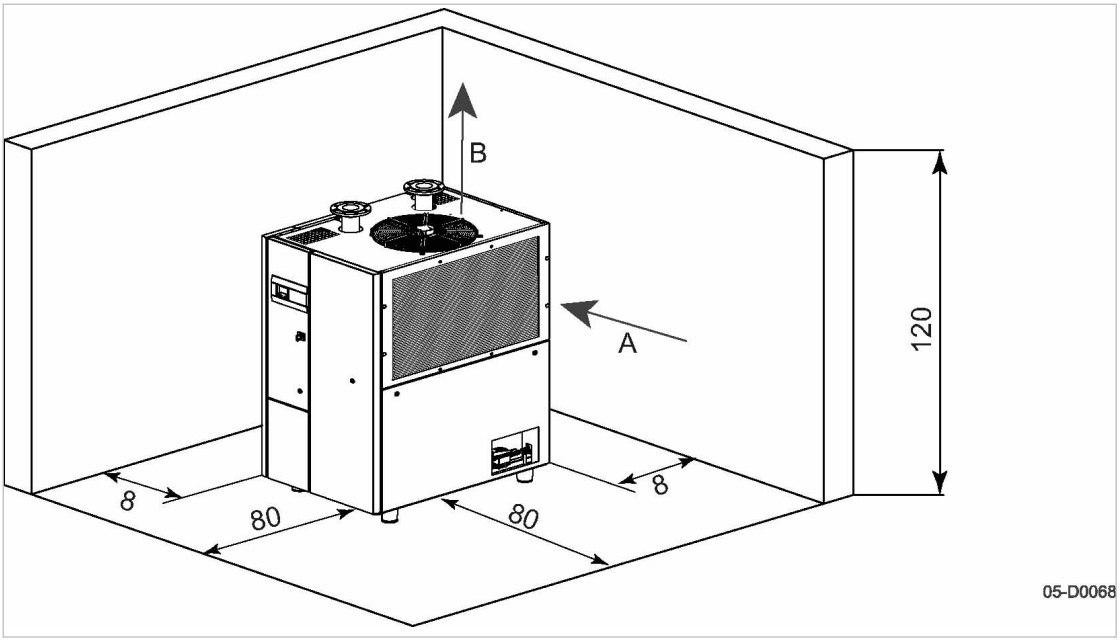


Fig. 22 Recommended machine placement and dimensions [inches]

[A] Cooling air inlet
[B] Cooling air outlet

1. **NOTICE** *Ambient temperature too low.*
   Frozen condensate can damage the machine.
   ➢ *Switch the machine on only when the switch-on temperature is reached.*
2. Consult KAESER for measures where there is danger of frost.
3. If installed outdoors, protect the machine against frost, direct sunlight, dust and rain.
4. Ensure that the indicators can be read without glare and that the controller display cannot be damaged by direct sunlight (UV radiation).
5. Ensure adequate lighting so that all work on the machine can be carried out without danger or hindrance.

5.2.2 Ensuring the machine room ventilation

The machine can only overcome the air resistance at the cooling air inlet and exhaust determined by the duct design. Any additional air resistance will reduce airflow and deteriorate machine cooling.

➢ Do not install the machine in the exhaust air flow from other machines.

➢ Keep the inlet and exhaust apertures free of obstructions so that the cooling air can flow freely through the room.

5.2.3 Exhaust duct design

The machine can only overcome the air resistance at the cooling air inlet and exhaust determined by 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 ducting
- Transition between the machine and the exhaust air duct
- Length of the ducting
- Number of duct bends
- Design of flaps or shutters

5.3 Operating the machine in a compressed air network

If the machine is supplying an air network, the system operating pressure may not exceed 232 psig.

Initial charging of a fully vented air system creates a very high rate of airflow through the air treatment devices. These conditions are detrimental to correct air treatment. Air quality suffers.
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 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!

- ➢ 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 personnel are working on the machine.
- ➢ Ensure that all access doors and panels are locked.

Working on live components

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

- ➢ Work on electrical equipment may only be carried out by authorized electricians.
- ➢ Switch off and lock out the power supply disconnecting device and verify the absence of voltage.
- ➢ Check that there is no voltage on floating relay contacts.

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 concerns 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.
- ➢ Depressurize 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 the power supply disconnecting device and verify the absence of voltage.
- ➢ Do not open the cabinet while the machine is switched on.

Further information

Details of authorized personnel are found in chapter 3.4.2.
Details of dangers and their avoidance are 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 Making the compressed air connection

Condensate in the compressed air network can damage the pipework:

- ➢ Install only corrosion-resistant pipes.
- ➢ Use fluoroelastomers as sealing material for seals.
- ➢ Note the electro-chemical voltage sequence.
- ➢ Consult with KAESER for suitable materials for the compressed air network.

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

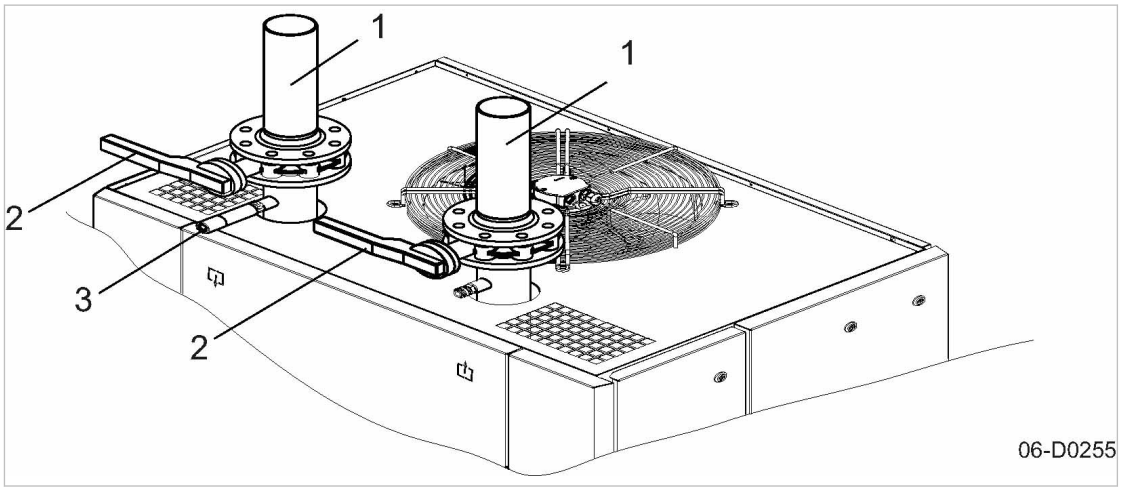


Fig. 23 Compressed air connection

1. Compressed air line
2. Shut-off valve
3. Safety relief valve (user)

1. **⚠ WARNING** *Serious injury or death can result from loosening or opening components under pressure.*
   - ➢ *Vent all pressurized components and enclosures.*
2. **NOTICE** *The machine is not protected against air pressure exceeding 232 psi!*
   - ➢ *The user must install a safety relief valve.*
3. **NOTICE** *An excessive tightening torque may cause the tearing of the connections.*
   - ➢ *Use a torque wrench to connect the machine to the compressed air network. Do not exceed a tightening torque of 65 Nm.*
4. Fit shut-off valves in the compressed air inlet and outlet lines.

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 psi maximum permissible working pressure may be connected to the condensate collecting line.

Fig. 24 shows an installation recommendation.
Condensate flows downward in the collecting line. This prevents condensate flowing back to the machine.

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]	50
Max. delivery head [ft]	16
Material (pressure-resistant, corrosion-proof)	Copper Stainless steel Plastics Hose line
[1)] For longer lengths, please contact the manufacturer before installation.	

Tab. 33 Condensate line

Condensate collecting line

Feature	Value
Gradient [%]	>1
Max. length[1)] [ft]	65
Material (pressure-resistant, corrosion-proof)	Copper Stainless steel Plastics Hose line
[1)] For longer lengths, please contact KAESER before installation.	

Tab. 34 Condensate collecting line

Compressed air flow rate[1)] [cfm]	Line cross-section ["]
<350	3/4
350 – 705	1
706 – 1410	1 1/2
[1)] Compressed air flow rate as guide for the condensate volume to be expected	

Compressed air flow rate[1] [cfm]	Line cross-section ["]
>1410	2

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

Tab. 35 Condensate collecting line: Line cross-section

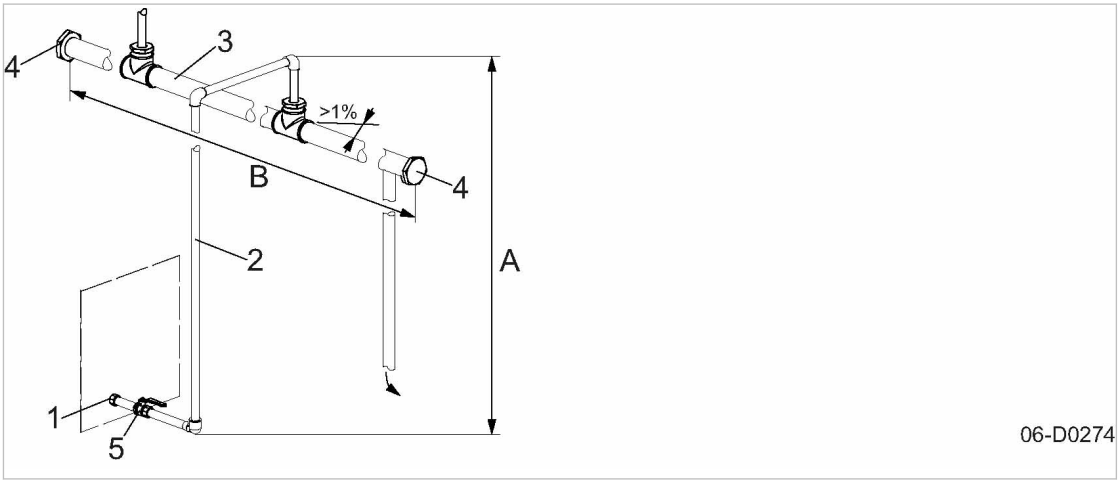


Fig. 24 Connecting the condensate drain

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 in accordance with environmental regulations.

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

6.5 Connecting the power supply

Precondition The power supply is switched off,
The device is locked off,
A check has been made to ensure no voltage is present.

1. Have the power supply connected by authorized installation personnel or an authorized electrician only.
2. Carry out protection measures as stipulated in relevant regulations (e.g IEC 364 or DIN VDE 0100) and in national accident prevention regulations (BGV A3 in Germany). In addition, the regulations of the local electricity supplier must be observed.
3. Check the permitted disconnect time for the overload protection cutout if a fault arises.
4. Select supply cable conductor cross-sections and fusing in accordance with local regulations.
5. If necessary, change the connections to the control transformer tappings (option T2) to suit the power supply.

6. **⚠ DANGER** *Danger of fatal injury from electric shock!*
   - ➢ *Switch off and lock out the power supply disconnecting device and check the absence of any voltage.*
7. Connect the machine to the power supply.

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

6.6 Options

6.6.1 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.

6.6.2 Option C44 Connecting the Modbus TCP communication module with SAM 2

The MODBUS TCP communication module is installed at the factory.

6.6.2.1 Communication with SAM 2:

- ➢ Use the SIGMA NETWORK to connect the communication module with SAM 2.

Further information See the SAM 2 operating manual for more information about the connection options.

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

- ➢ Connect the communication module via MODBUS TCP with the user's (central) control system.

Further information Contact authorized KAESER service representative for more information regarding the connection options.

6.6.3 Option K2 Connecting the cooling water

- ➢ 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 flow under this system. This can result in a breakdown.

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

Fig. 25 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 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 initial startup of the machine.
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!

- ➢ Follow the instructions in chapter 3 “Safety and Responsibility”.
- ➢ Commissioning tasks may only be carried out by authorized personnel!
- ➢ Make sure that no personnel 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.

- ➢ Work on electrical equipment may only be carried out by authorized electricians.
- ➢ Switch off and lock out the power supply disconnecting device and verify the absence of voltage.
- ➢ Check that there is no voltage on floating relay contacts.

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 concerns 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.
- ➢ Depressurize 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 the power supply disconnecting device and verify the absence of voltage.
- ➢ Do not open the cabinet while the machine is switched on.

Further information

Details of authorized personnel are found in chapter 3.4.2.
Details of dangers and their avoidance are 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. 36 Re-commissioning after storage

7.3 Checking installation and operating conditions

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

To be checked	See chapter	Confirmed?
➢ Are the operators completely familiar with safety regulations?	–	
➢ Have all the positioning conditions been fulfilled?	5	
➢ Are the tolerance limits of the power supply within the permissible tolerance limits of the rated machine voltage? (See nameplate)	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 installed by the user?	6.3	
➢ Has a shut-off valve been fitted to the compressed air connections?	6.3	
➢ Is the supply of cooling water ensured? (Option K2)	6.6.3	
➢ Has the cooling water regulating valve been correctly set? (Option K2)	7.6	
➢ Is the condensate drain connected?	6.4	
➢ Option H1: Is the machine firmly anchored to the floor?	6.6.1	

To be checked	See chapter	Confirmed?
➢ Installation altitude >3280 ft.: Has the manufacturer been consulted? Have the controller parameters been adjusted?	4.7.6.3	
➢ Are all access doors closed and latched and removable panels in place and secured?	–	

Tab. 37 Installation conditions checklist

7.4 Checking the direction of rotation

The machine is designed for a clockwise phase sequence.

The direction of phase rotation should be measured with a phase sequence meter.

Alternatively, start the machine very briefly and observe the direction of rotation of the motor cooling fan.

1. Check the direction of phase rotation with a phase sequence meter at the inlet lines of the fan motor.
2. If the direction is incorrect, reverse the machine supply phases L1 and L2.

You do not have a phase sequence meter?

➢ Switch the machine on and off again the moment the drive motor begins to turn.

➢ Compare the direction of rotation of the fan with the arrow on the motor casing.

7.5 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 valve to the compressed air system.
4. Watch for any faults occurring in the first hour of operation.

7.6 Adjusting the cooling water regulating valve

In order to ensure proper functioning of the machine, the required condensation temperature must be 18°F above the maximal possible cooling water inlet temperature but at least at 95°F.

If the condensation temperature differs by more than 5°F, you must adjust the cooling water regulating valve. This action ensures that the cooling water regulating valve will completely close during the standstill phases of the refrigeration compressor.

For example:
If the maximum possible cooling water inlet temperature is 90°F, you must set a condensation temperature of 108°F.

Precondition
The refrigeration compressor is running.

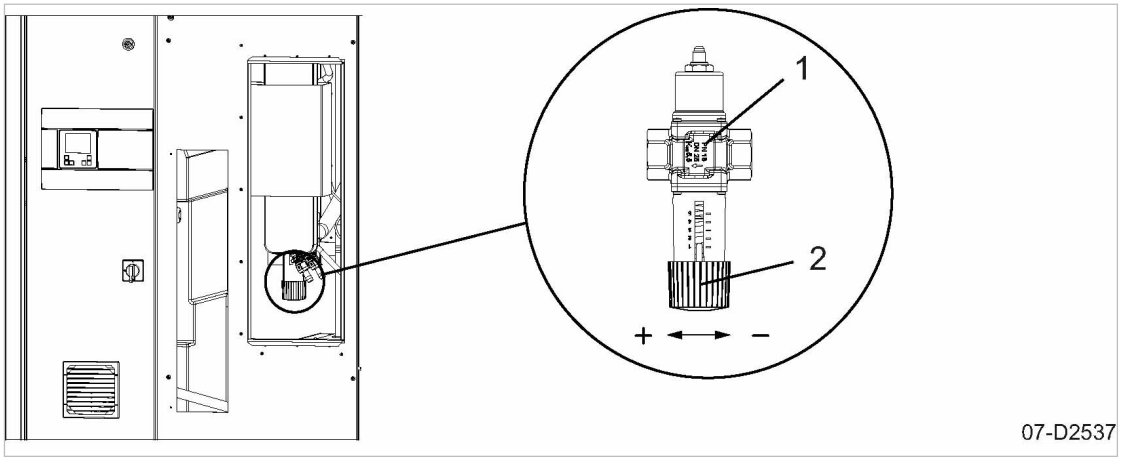


Fig. 26 Adjusting the cooling water regulating valve

[1] Cooling water regulating valve
[2] Hand wheel

1. Use the «Up» or «Down» keys at the controller to select the *<Flow diagram>* menu.
   The controller displays the current condensation temperature.
2. Using the hand wheel to adjust the condensation temperature:
   - Turn the hand wheel clockwise to lower the condensation temperature.
   - Turn the hand wheel counter-clockwise to increase the condensation temperature.

8 Operation

8.1 Switching on and off

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

The power supply disconnecting device connects or disconnects the machine and the electric system.

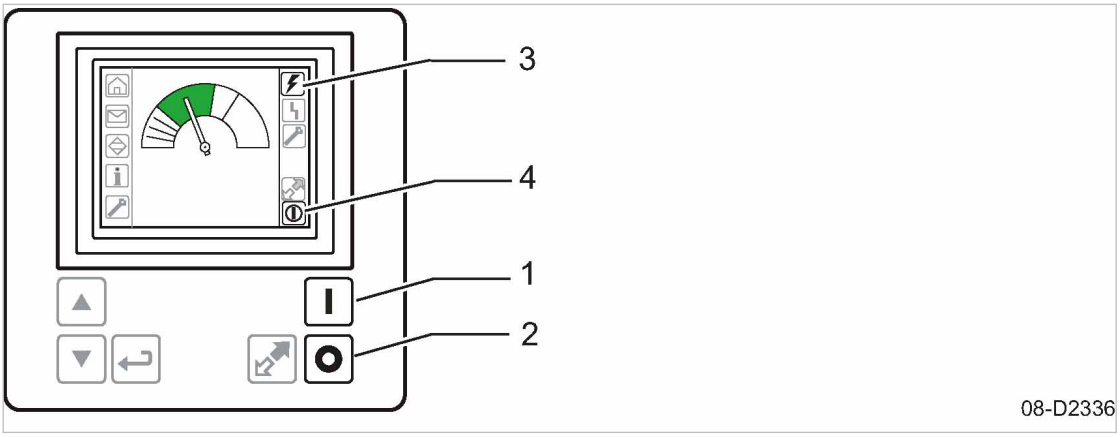


Fig. 27 Switching on and off

1 «ON» key
2 «OFF» key
3 *Voltage applied to controller* indicator
4 *ON* indicator

8.1.1 Switching on

Precondition No personnel are working on the machine.

All access doors and panels are closed and secure.

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.

If a power failure occurs, the machine is **not** prevented from re-starting automatically when power is resumed.
The machine can automatically restart when power 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 is carefully shut down. The *Machine ON* indicator flashes.
2. Press the «OFF» key again to immediately shut the machine down.
3. Switch off and lock out the power supply disconnecting device.
4. Close the shut-off valves to the compressed air system.

Result The *Voltage applied to controller* indicator extinguishes.

8.2 Switching off in an emergency

The power supply disconnecting device is located below the control panel.

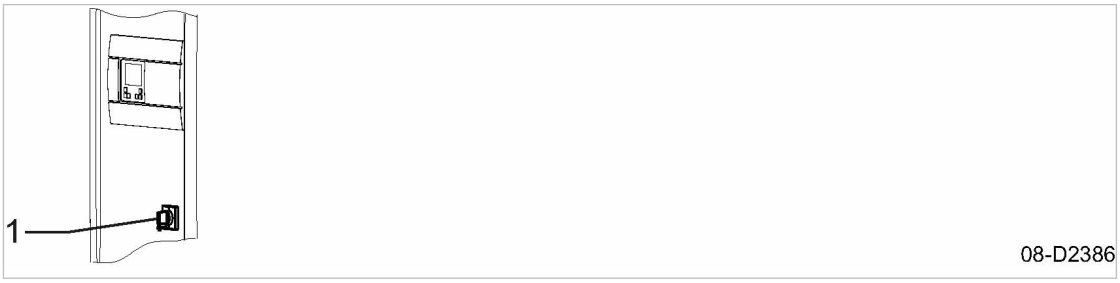


Fig. 28 Switching off in an emergency

[1] Power supply disconnecting device (main switch)

➢ Switch off the power supply disconnecting device.

Result Drive and controller are immediately disconnected from the power supply.

8.3 Using the remote control

The remote control feature must be activated prior to use. It is not possible to remotely start the switched off machine.

Precondition There is a link to the remote control center:
Contact closed: READY
Contact open: STOP

The «Remote control» key is activated.

The machine has been activated with «ON»:

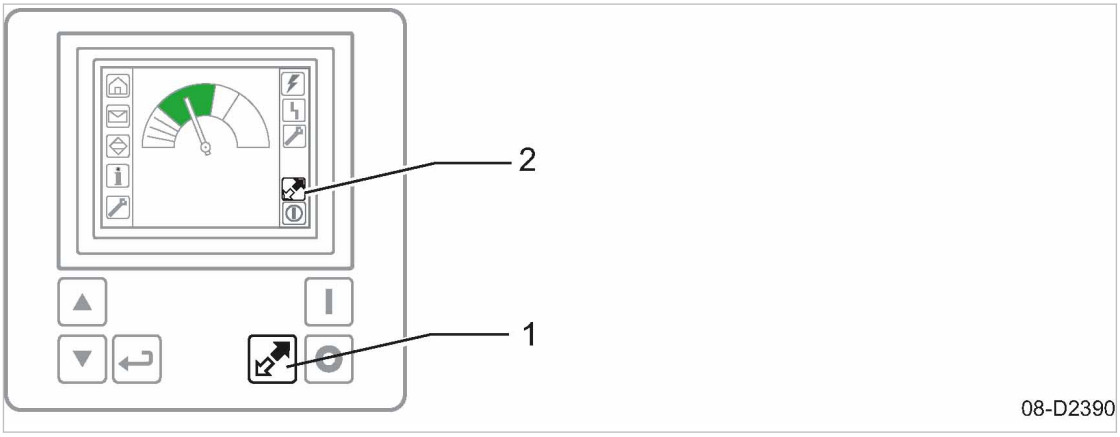


Fig. 29 Using the remote control for switching on and off

[1] «Remote control» key
[2] *Remote control*

➢ Press the «Remote control» key.

Remote control illuminates. The machine can be switched in the remote control center between the READY and STOP control modes.

8.4 Acknowledging and Resetting Warning and Alarm Messages

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

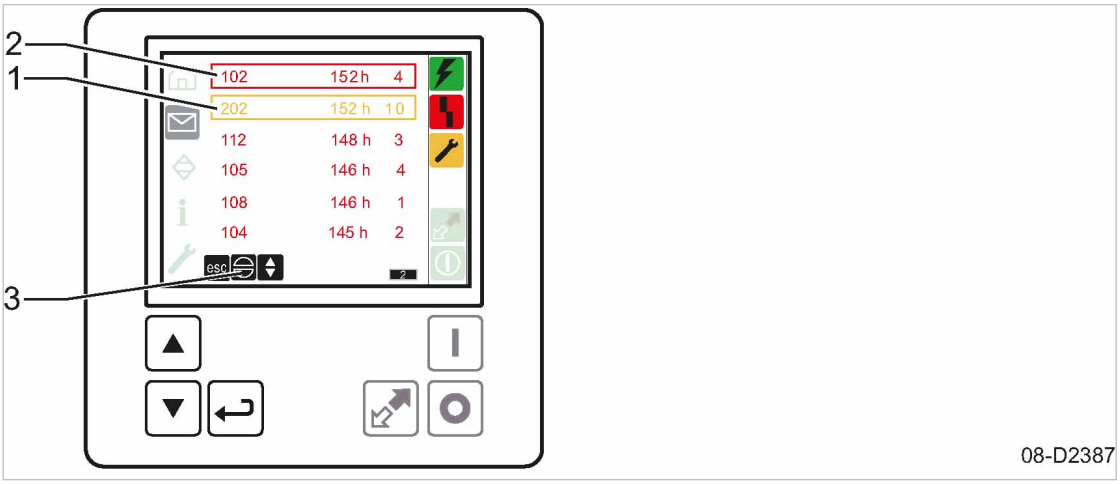


Fig. 30 Acknowledging messages

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 on the controller

There are three types of messages:

- Alarms (red)
  An alarm message causes the machine to shut down.
- Warning messages (yellow)
  A warning message does not cause the machine to shut down.
- Maintenance messages (yellow)

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

Alarm messages

Number	Meaning
101	Safety pressure switch PS has responded.
102	Motor protection switch for refrigerant compressor has responded.
103	Switching frequency of refrigerant compressor is too high.
104	Motor protection switch for refrigerant compressor has responded.
105	The temperature switch of the fan motor has activated.
106	Pressure sensor P0 for refrigerant pressure has an open circuit at the low-pressure end.
107	Pressure sensor P0 for refrigerant pressure has a short-circuit at the low-pressure end.
108	Pressure sensor Pc for refrigerant pressure has an open circuit at the high-pressure end.
109	Pressure sensor Pc for refrigerant pressure has a short-circuit at the high-pressure end.
110	Temperature sensor T1 for compressed air temperature has an open circuit.
111	Temperature sensor T1 for compressed air temperature has a short-circuit.
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.

Tab. 38 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 occurs when the yellow warning range has been reached. ■ An acknowledgement is not necessary.
204	Pressure dew point is too high. ■ This message occurs when the red warning range has been reached. ■ An acknowledgement is not necessary. ■ The "Pressure dew point high" message relay contact switches.

Tab. 39 Warning messages

Maintenance messages

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

Tab. 40 Maintenance messages

9.3 Other faults

Fault	Possible cause	Remedy
Water in the compressed pressure system	Compressed air inlet and outlet reversed.	Check the compressed air connection.
	The condensate is not draining out of the system.	Check and clean the condensate drain and line. Replace the condensate drain service unit.
	The pressure monitor has shut down the machine.	Check operating conditions. Check the machine.
High pressure drop.	Compressed air system frozen.	Switch off the machine and increase the ambient temperature.
	Continuous air loss from the condensate drain.	Maintain the condensate drain.
Pressure dew point too high.	Ambient or compressed air inlet temperature too high.	Check installation conditions are OK.
	Low refrigerant level.	Call authorized KAESER service representative.
	Dirt collecting in the compressed air system.	Call authorized KAESER service representative.

Fault	Possible cause	Remedy
The pressure monitor switches the machine off.	Ambient or compressed air inlet temperature too high.	Check installation conditions are OK.
	Refrigerant condenser dirty.	Clean the refrigerant condenser.
The motor protective switch responds.	Phase dropout.	Reset the motor protective switch.

Tab. 41 Other faults and remedies

10 Maintenance

10.1 Ensuring safety

Follow the instructions below for safe installation.
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!

- ➢ 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.

Working on live components

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

- ➢ Work on electrical equipment may only be carried out by authorized electricians.
- ➢ Switch off and lock out the power supply disconnecting device and verify the absence of voltage.
- ➢ Check that there is no voltage on floating relay contacts.

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 concerns 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.
- ➢ Depressurize 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 the power supply disconnecting device and verify the absence of voltage.
- ➢ Do not open the cabinet while the machine is switched on.

Further information
Details of authorized personnel are found in chapter 3.4.2.
Details of dangers and their avoidance are found in chapter 3.5.

10.2 Regular maintenance tasks

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

The table below lists maintenance tasks required.

➢ 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.	10.4
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	10.4.2
	Clean the refrigerant condenser.	10.3

Tab. 42 Regular maintenance tasks

10.3 Cleaning the refrigerant condenser

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

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

10.3.1 Option K1 Air-cooling maintenance

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

Precondition
The machine is switched off,
the switch is locked in the off position,
the absence of voltage has been verified.

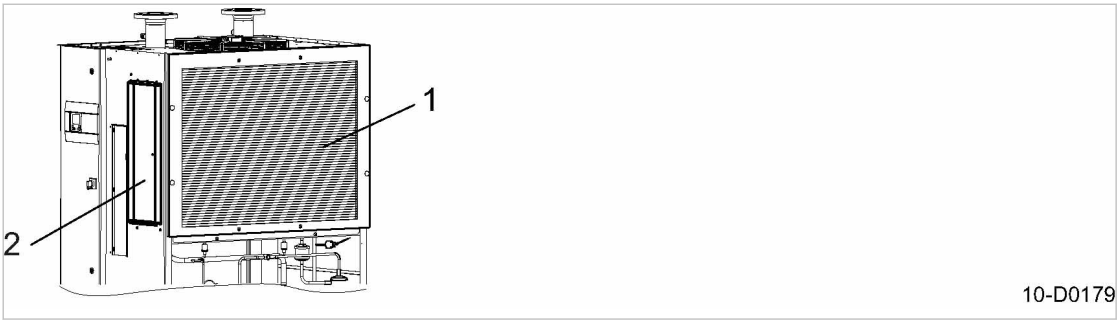


Fig. 31 Cleaning the refrigerant condenser

[1] Refrigerant condenser
[2] Maintenance opening

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

10.3.2 Option K2 Water-cooling maintenance

A clogged refrigerant condenser results in the condensation temperature rising.

➢ Monitor the condensation temperature to detect any tendency to rise.

Regularly check the condenser for leaks and contamination. Frequency of checking is dependent on the characteristics of the cooling water.

Precondition The power supply isolating device is switched off,
the device is locked off,
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

➢ An authorized KAESER service representative should clean the condenser when the machine's condensation temperature is 10 K above the annual average shown in chapter 7.6.

10.4 Condensate drain maintenance

10.4.1 Condensate drain check

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

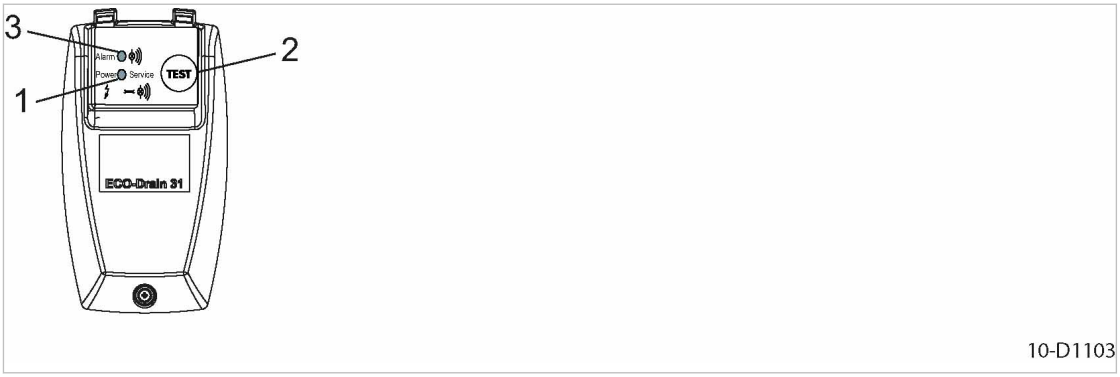


Fig. 32 Condensate drain check

1 *Power* LED
2 «TEST» key
3 *Alarm* LED

1. With one hand, lightly touch the condensate drain hose 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 drain hose.

Replace the service unit if you do **not** experience a burst during manual test.

10.4.2 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

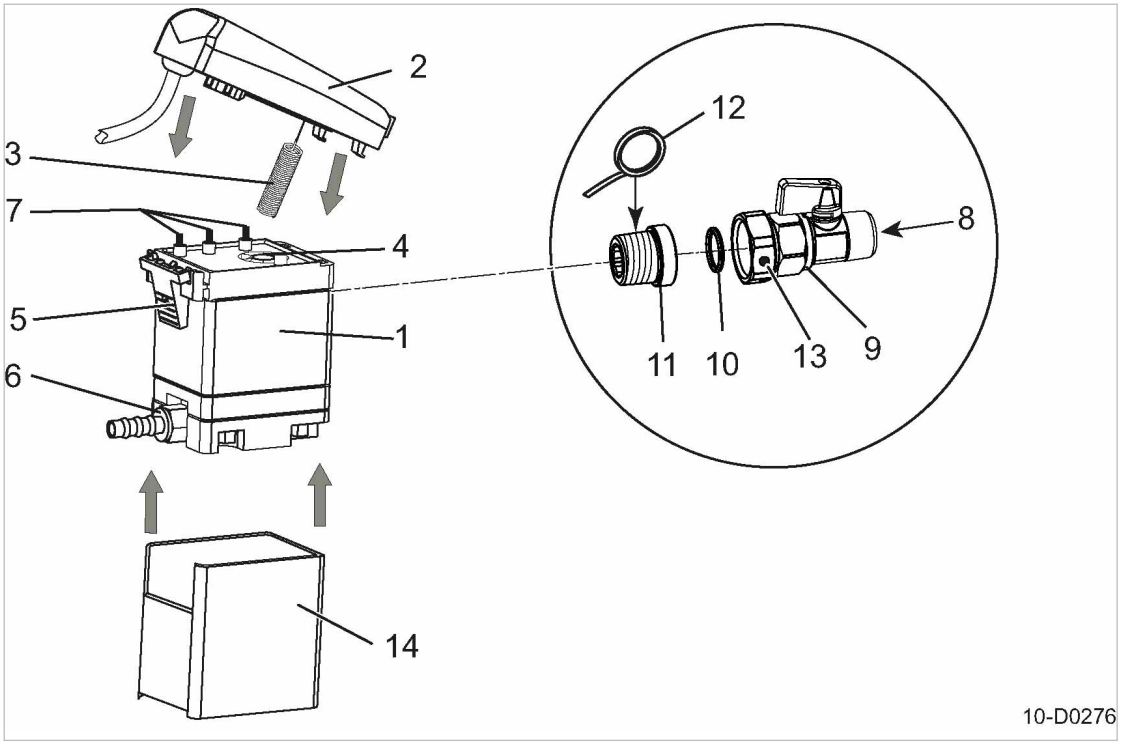


Fig. 33 Replacing the service unit

[1]	Service unit	[8]	Condensate inlet
[2]	Control unit	[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 spring	[14]	Insulation

Removing the service module

1. **⚠ WARNING** *Serious injury or death can result from loosening or opening components under pressure.*
   - ➢ *Vent all pressurized components and enclosures.*
2. Close the shut-off valve [9] upstream of the condensate drain.
3. Unscrew the condensate hose fitting [6].
4. Press the snap fastener and carefully remove the control unit [2] from the service unit [1].
5. Carefully loosen the union nut with vent holes [13] at the shut-off valve [9] until remaining residual air has escaped through the venting holes.
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 into the service unit eyes [1].
4. Press the control unit [2] to the service unit until the snap fastener audibly click 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 with vent holes [13] at the shut-off valve [9].
9. Install the condensate hose.
10. Open the shut-off valve [9] upstream of the condensate drain.

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 damage the machine or impair its proper function.
Damage to the machine can also result in personal injury.

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

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

Name	Number
Condensate drain: Service-Unit	9602

Tab. 43 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!

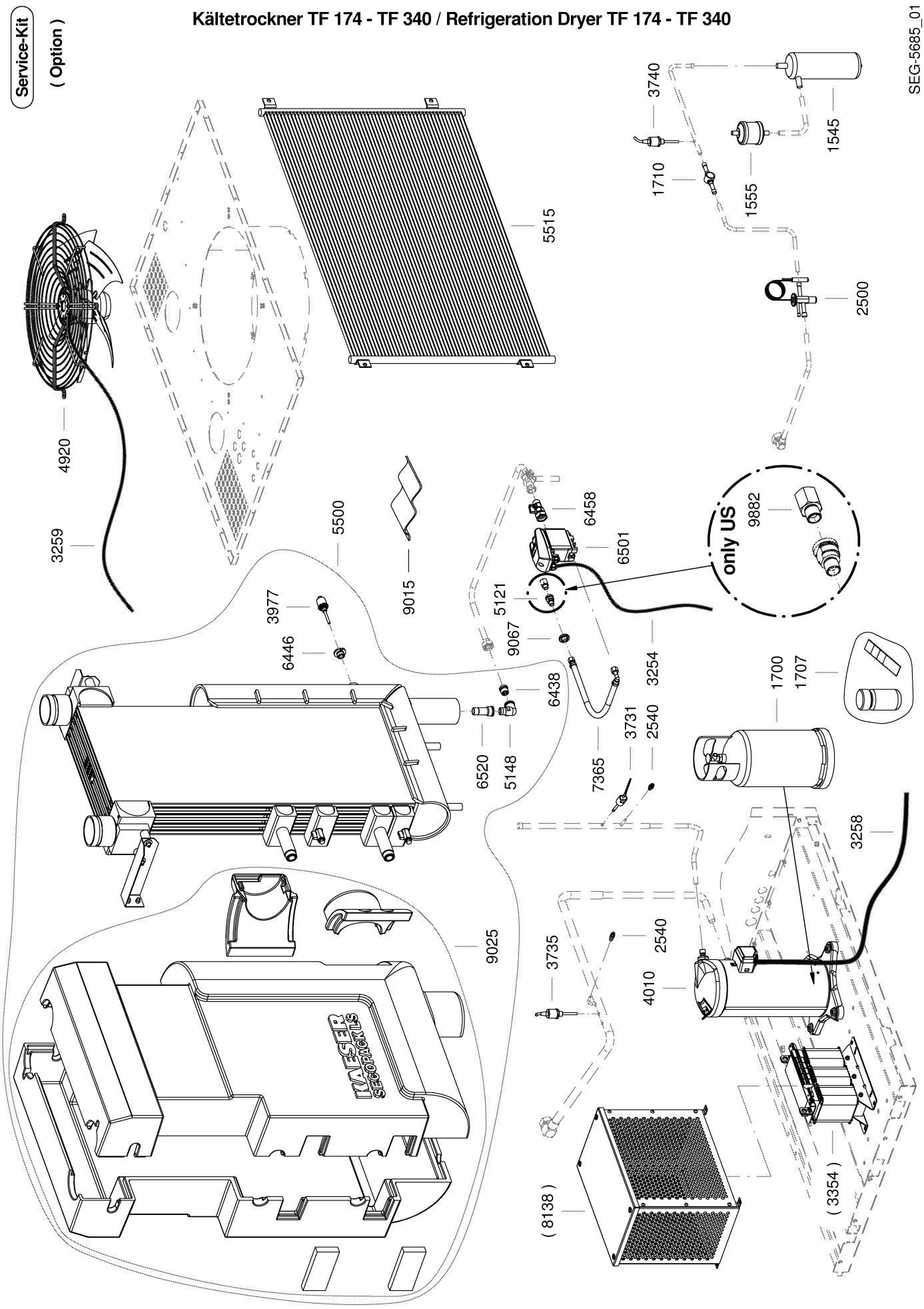
Result Your advantage:
lower costs and higher compressed air availability.

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.

Kältetrockner TF 174 - TF 340 / Refrigeration Dryer TF 174 - TF 340



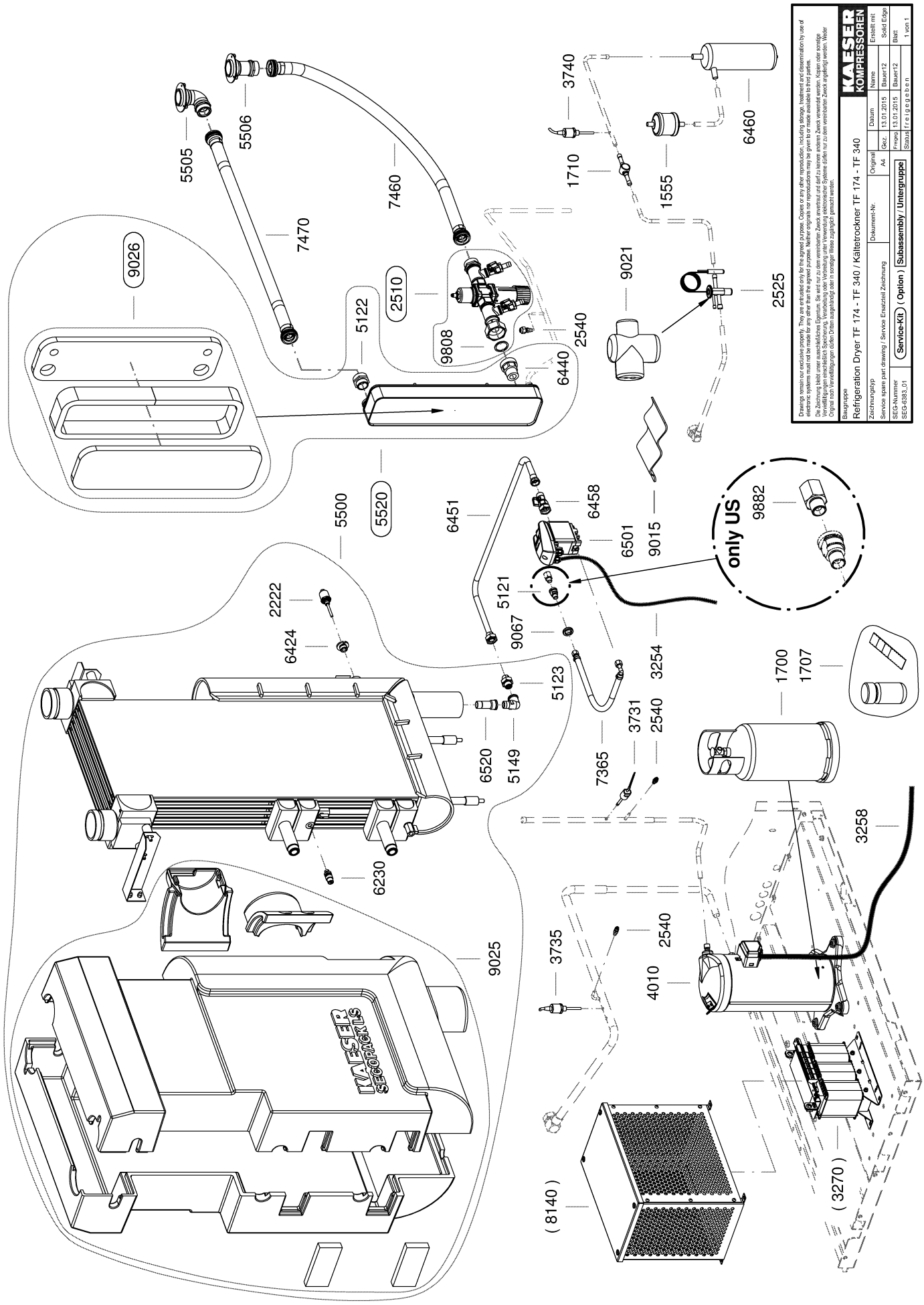
Legend	KAESER
Refrigeration Dryer TF 174 - TF 340	SEL-3950_01 E

Item		Description	Option
1545	*)	Refrigerant collector	
1555	*)	Filter dryer	
1700	*)	Refrigerant	
1707	*)	Acid test, refrig. R134a/R404a	
1710	*)	Refrigerant indicator	
2500	*)	Hot gas bypass controller	
2540	*)	Refrigerant filling port	
3254		Condens. drain, connect. cable	
3258		Refr.compress.connecting cable	
3259		Fan motor connecting cable	
3354		Transformer	X
3731	*)	Safety pressure switch	
3735	*)	Leakage protection switch	
3740	*)	Fan pressure switch	
3977		Transducer	
4010	*)	Refrigerant compressor	
4920		Exhauster, dryer	
5121		Double nipple	
5148		Elbow fitting	
5500	*)	Heat exchanger	
5515	*)	Refrigerant condenser	
6438		Screw-in fitting	
6446		Reduction piece	
6458		Stop valve	
6501		Condensate drain, dryer	
9602		Condensate drain service-unit	
6520		Extension	
7365		Condensate drain line	
8138		Cover	X
9015		Insulating tape	
9025		Heat exchanger insulation	
9067		Counternut	
9882		Adapter	

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


Refrigeration Dryer TF 174 - TF 340 / Kältetrockner TF 174 - TF 340
Service spare part drawing / Service Ersatzteil Zeichnung
Service-Kit (Option) Subassembly / Untergruppe
only US
(8140)
(3270)
5505
5506
7470
7460
3740
1710
1555
6460
9026
5122
2510
9808
2540
6440
9021
2525
5500
5520
6451
6458
6501
9015
9882
2222
6424
5121
9067
5123
3254
1700
1707
6520
5149
7365
3731
2540
3258
6230
9025
3735
4010

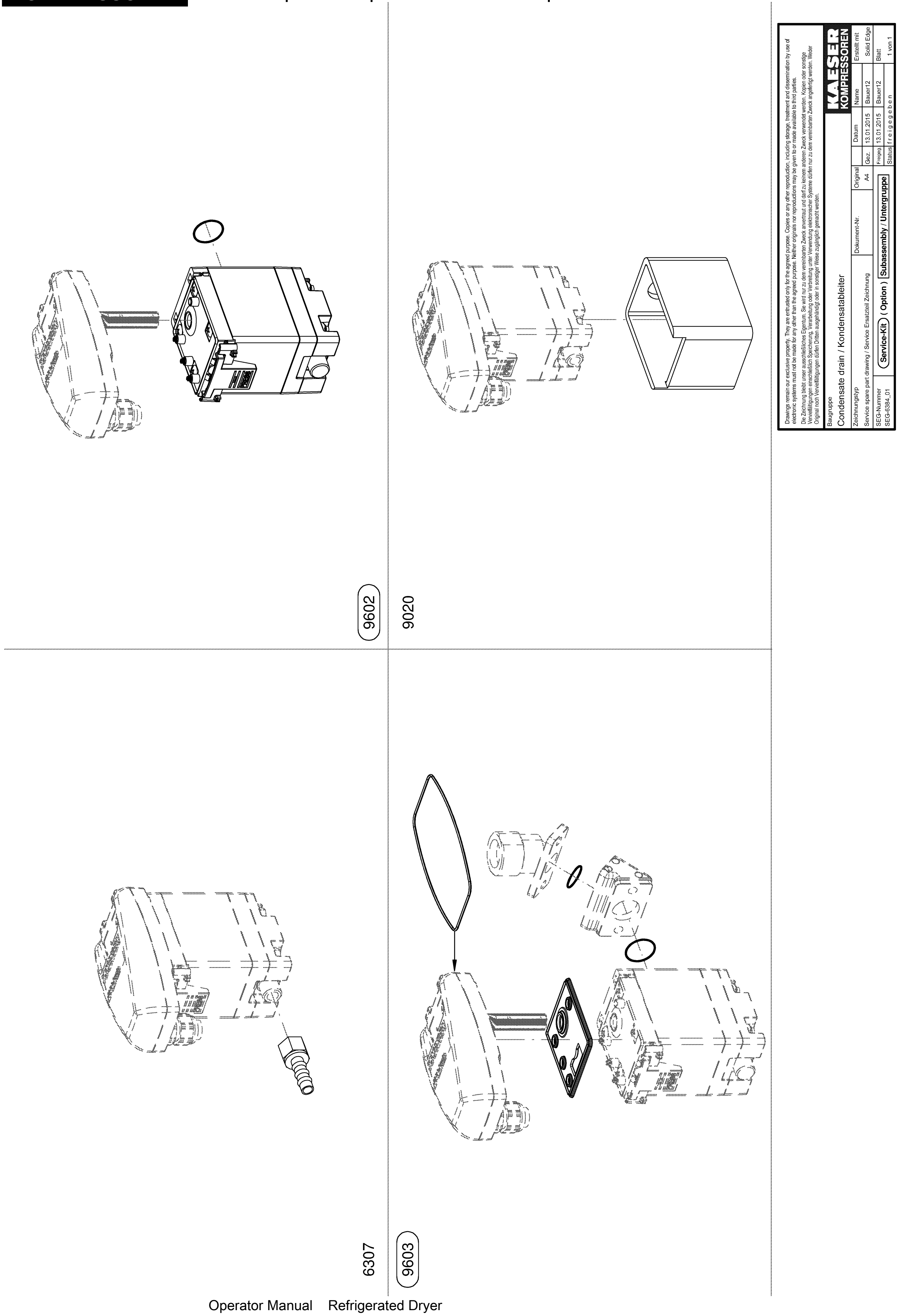
Legend		KAESER
	Refrigeration Dryer TF 174 - TF 340	SEL-4075_01 E

Item		Description	Option
1555	*)	Filter dryer	
1700	*)	Refrigerant	
1707	*)	Acid test, refrig. R134a/R404a	
1710	*)	Refrigerant indicator	
2222		Temperature sensor	
2510	*)	Cooling water regulator	
2525	*)	Injection valve	
2540	*)	Refrigerant filling port	
3254		Condens. drain, connect. cable	
3258		Refr.compress.connecting cable	
3270		Control transformer	X
3731	*)	Safety pressure switch	
3735	*)	Leakage protection switch	
3740	*)	Fan pressure switch	
4010	*)	Refrigerant compressor	
5121		Double nipple	
5122		Double nipple	
5123		Double nipple	
5149		Elbow fitting	
5500	*)	Heat exchanger	
5505		Fitting	
5506		Fitting	
5520	*)	Refrigerant condenser waterc.	
6230		Blowoff valve	
6424		Reduction piece	
6440		Pipe fitting	
6451		Condensate drain pipe	
6458		Stop valve	
6460	*)	Refrigerant separator	
6501		Condensate drain, dryer	
9602		Condensate drain service-unit	
6520		Extension	
7365		Condensate drain line	
7460		Hose line	
7470		Hose line	
8140		Enclosure	X
9015		Insulating tape	
9021		Insulating jacket	
9025		Heat exchanger insulation	
9026		Heat exchanger insulation	
9067		Counternut	
9808		Gasket	
9882		Adapter	

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
6307
9603
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Baugruppe
Condensate drain / Kondensatableiter
KAESER KOMPRESSOREN
Zeichnungstyp
Service spare part drawing / Service Ersatzteil Zeichnung
Dokument-Nr.
Original
A4
Datum
Name
Erstellt mit
Gez. 13.01.2015 Bauer12
Solid Edge
Freigeg. 13.01.2015 Bauer12
Blatt
1 von 1
SEG-Nummer
SEG-6384_01
Service-Kit (Option) Subassembly / Untergruppe
Status f r e i g e g e b e n

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

Decommissioning is necessary, for example, 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.

Temporary de-commissioning

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

Permanent de-commissioning

1. Switch the machine off and shut off all connecting lines.
2. Drain condensate from the condensate drain.
3. Machine fully vented (no pressure).
4. Switch off and lock out the power supply disconnecting device and check the absence of any voltage.
5. Allow the machine to completely cool down.
6. Drain cooling water from water-cooled machines (option K2).
7. 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 lifting gear only by personnel trained in the safe transportation of loads.

➢ Make sure the danger area is clear of personnel.

12.3.2 Transport with a forklift truck

Precondition The forks are fully under the machine.

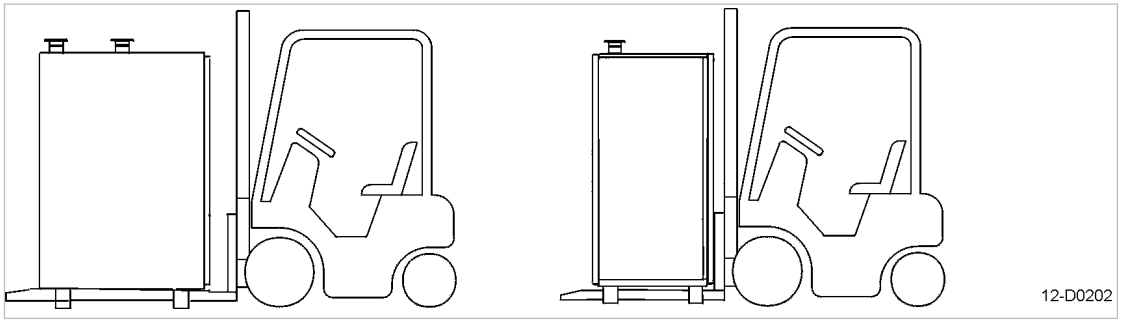


Fig. 34 Transport with a forklift truck

➢ Drive the forks completely under the machine or pallet and lift carefully.

12.3.3 Transport with a crane

Suitable lifting gear ensures correct transportation.
The lifting slings must be fed under the machine.
The slings may not bear on the side of the machine enclosure.

Examples of unsuitable fixing points:

- Pipe sockets
- Flanges
- Attached components such as cyclone separators, condensate drains, or filters.
- Bypass pipe

Precondition The lifting gear complies with local safety regulations.
No pressure should bear on the sides of the machine cabinet.

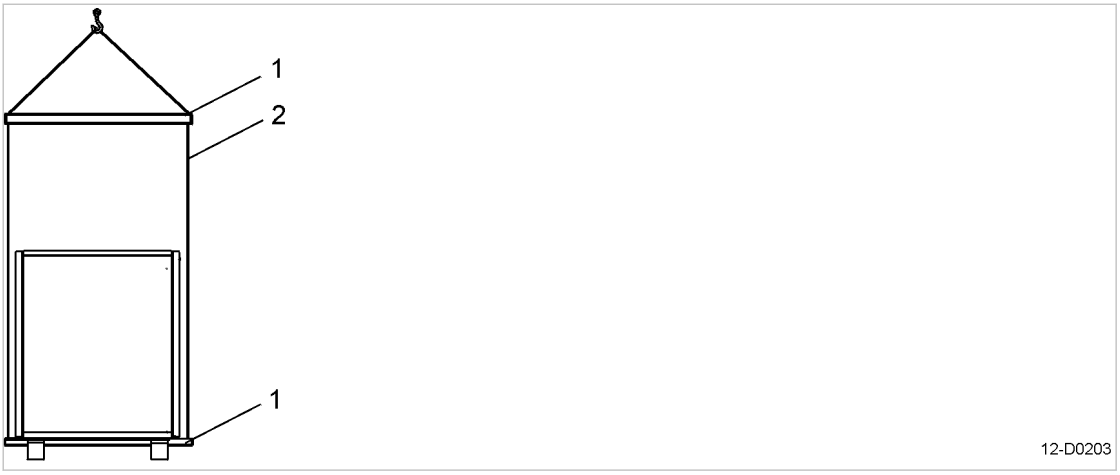


Fig. 35 Transport with a crane

[1] Lifting gear
[2] Slings

1. **⚠ CAUTION** *The machine can be damaged by incorrect attachment of the lifting gear!*
   - ➢ *Do not attach the lifting gear to any of the machine components.*
   - ➢ *The manufacturer can advise on the use of suitable lifting gear.*
2. Use the lifting gear correctly and lift the machine carefully.

12.4 Disposal

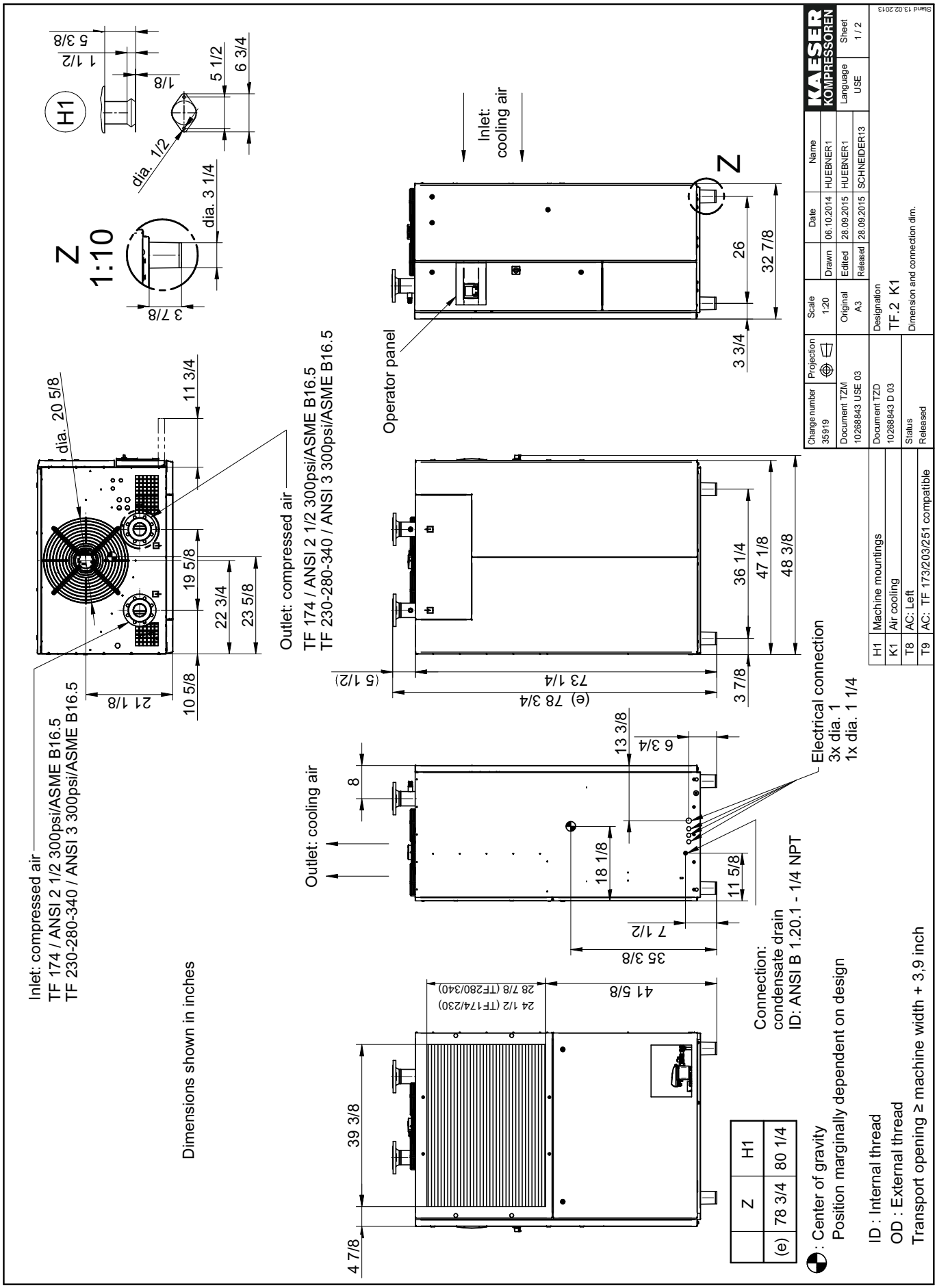
The sealed refrigerant circuit still contains both refrigerant and oil.

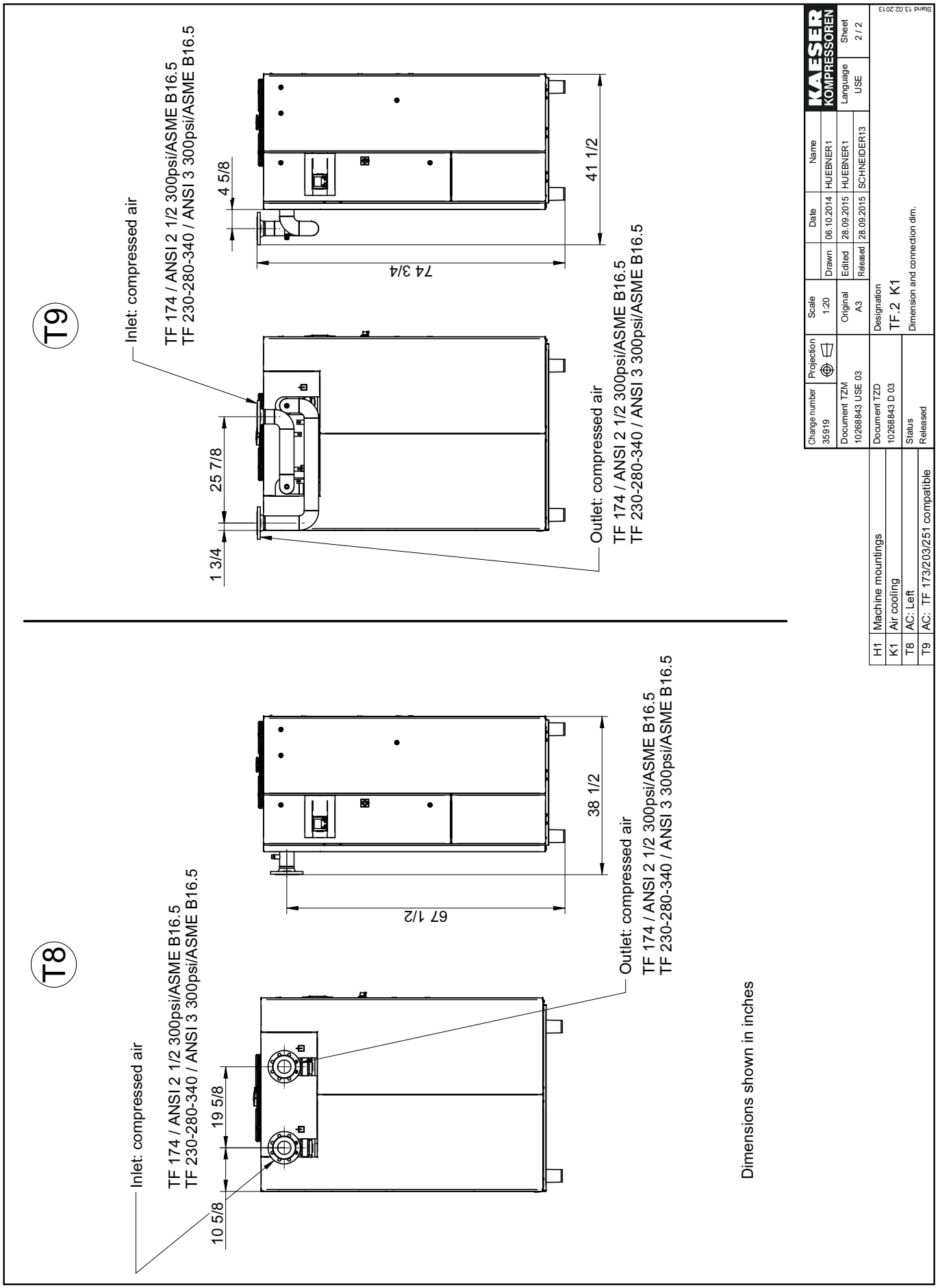
1. De-commission the machine.
2. Hand the machine over to an authorized disposal expert.

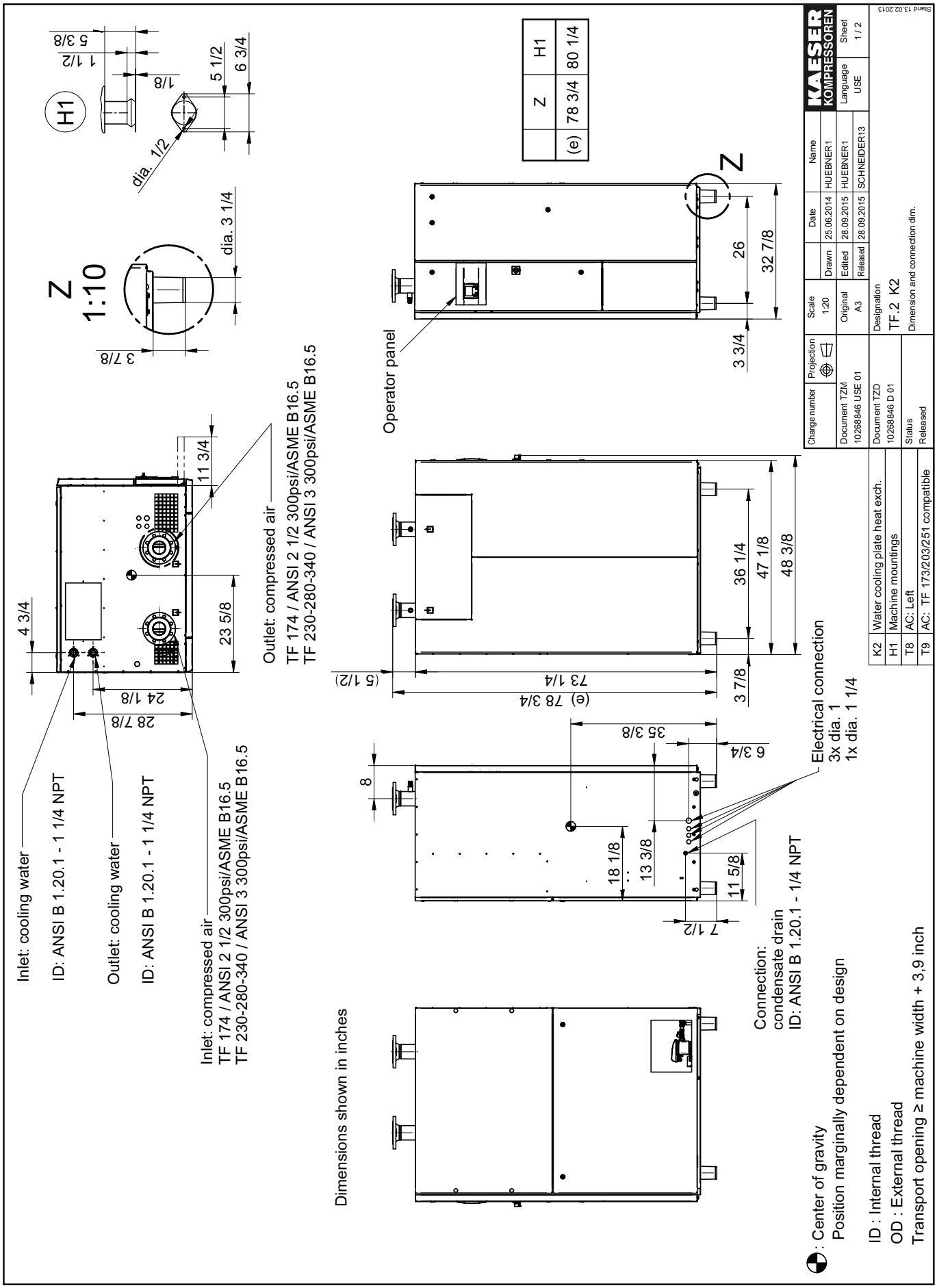
➢ Refrigerant and oil must be drained and disposed of by an authorized body.

13 Annex

13.1 Dimensional drawing






Inlet: cooling water
ID: ANSI B 1.20.1 - 1 1/4 NPT
Outlet: cooling water
ID: ANSI B 1.20.1 - 1 1/4 NPT
Inlet: compressed air
TF 174 / ANSI 2 1/2 300psi/ASME B16.5
TF 230-280-340 / ANSI 3 300psi/ASME B16.5
Outlet: compressed air
TF 174 / ANSI 2 1/2 300psi/ASME B16.5
TF 230-280-340 / ANSI 3 300psi/ASME B16.5
Operator panel
Electrical connection
3x dia. 1
1x dia. 1 1/4
Connection:
condensate drain
ID: ANSI B 1.20.1 - 1/4 NPT
Dimensions shown in inches
: Center of gravity
Position marginally dependent on design
ID : Internal thread
OD : External thread
Transport opening ≥ machine width + 3,9 inch
H1
Z
1:10
dia. 1/2
dia. 3 1/4
(e) 78 3/4
(5 1/2)
73 1/4
36 1/4
47 1/8
48 3/8
3 7/8
3 3/4
26
32 7/8
35 3/8
6 3/4
18 1/8
13 3/8
11 5/8
7 1/2
8
28 7/8
24 1/8
23 5/8
4 3/4
11 3/4
5 3/8
1 1/2
1/8
5 1/2
6 3/4
3 7/8
Z | H1
(e) 78 3/4 | 80 1/4
K2 Water cooling plate heat exch.
H1 Machine mountings
T8 AC: Left
T9 AC: TF 173/203/251 compatible
Change number
Projection
Scale 1:20
Original A3
Drawn 25.06.2014 HUEBNER1
Edited 28.09.2015 HUEBNER1
Released 28.09.2015 SCHNEIDER13
Language USE
Sheet 1 / 2
Document TZM 10268846 USE 01
Document TZD 10268846 D 01
Status Released
Designation TF.2 K2
Dimension and connection dim.
Stand 13.02.2013
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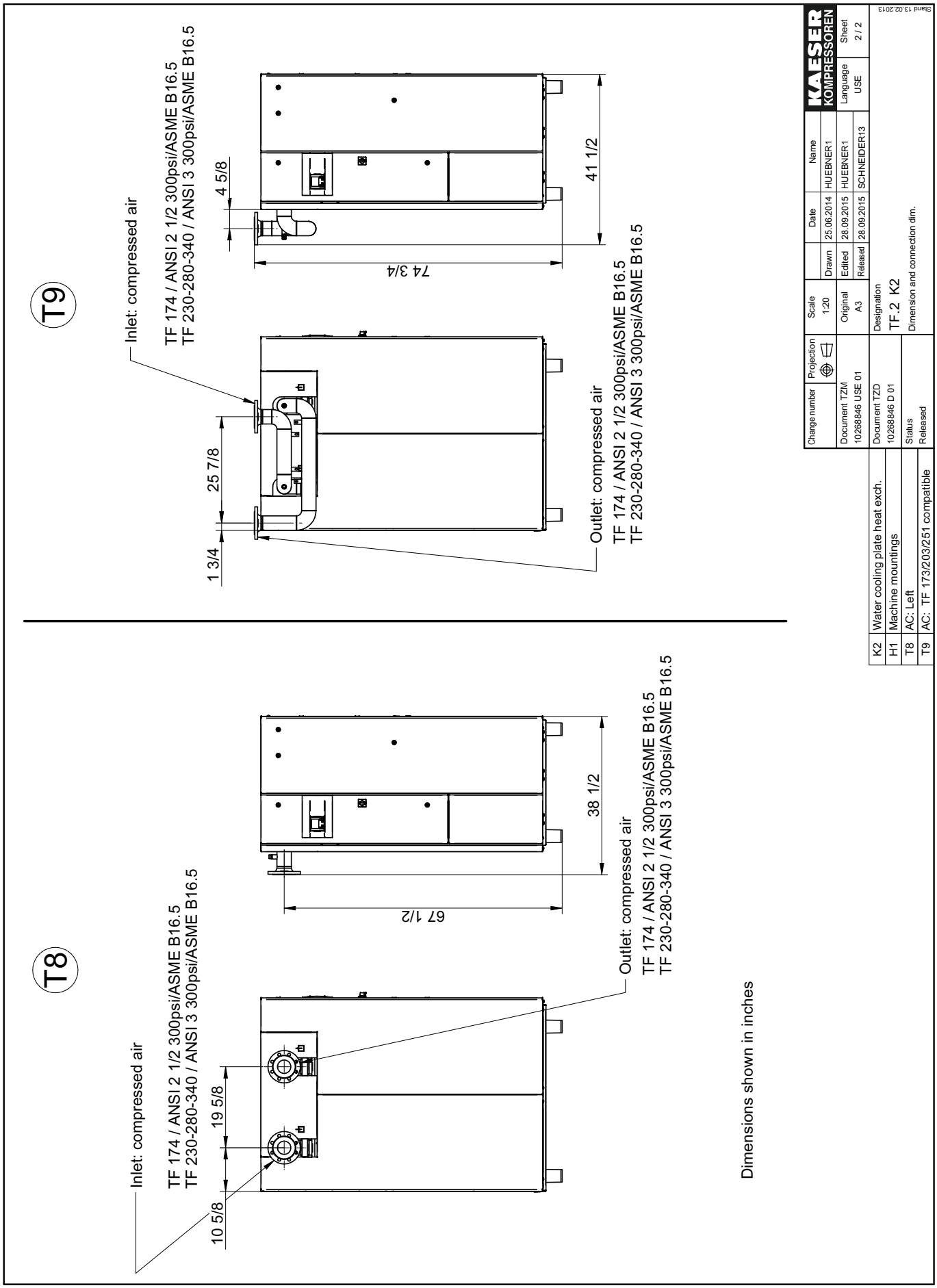
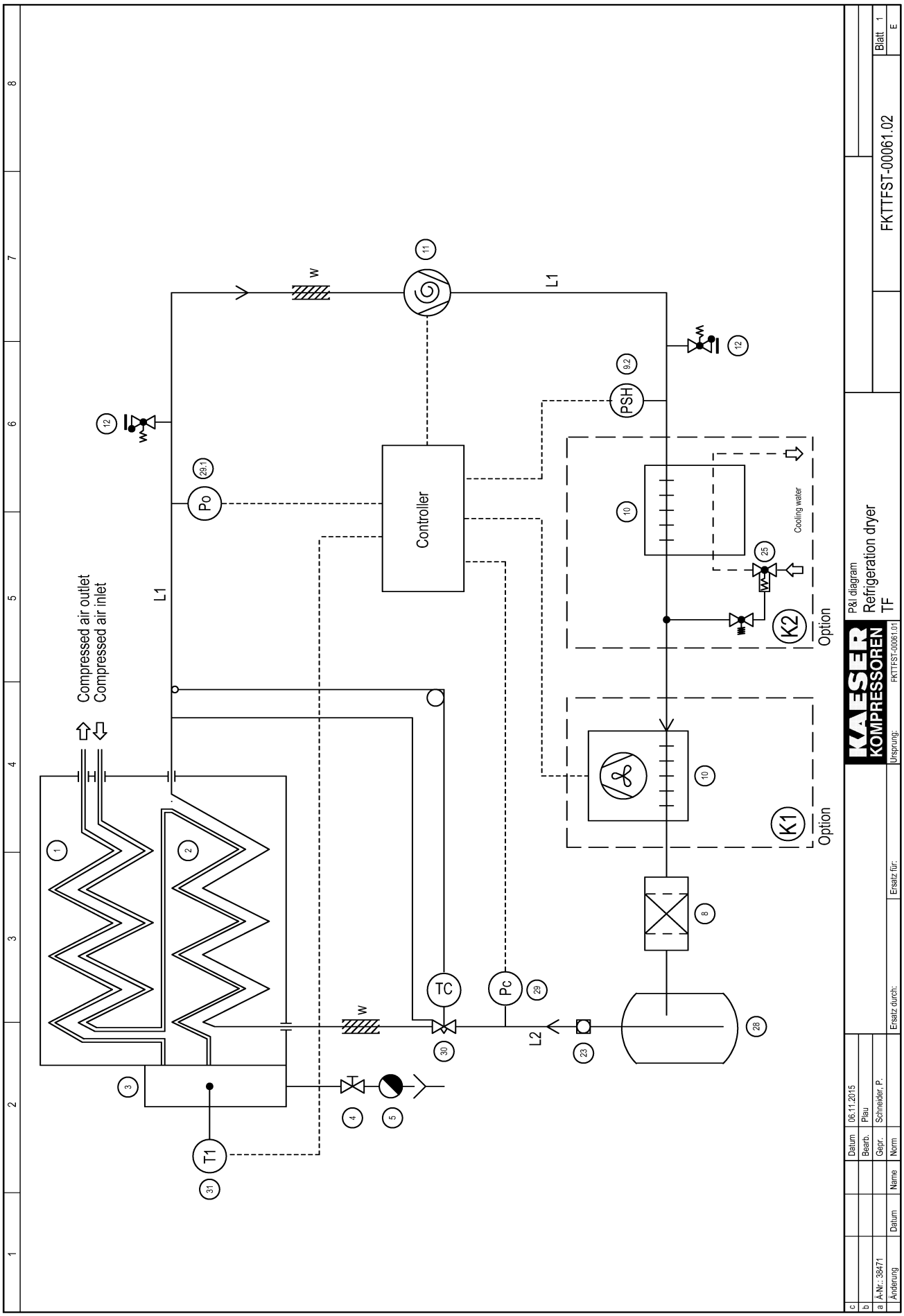


13.2 Pipeline and instrument flow diagram (P+I diagram)


Compressed air outlet
Compressed air inlet
L1
L1
L2
W
W
Controller
Po
PSH
TC
Pc
T1
K1
K2
Option
Option
Cooling water
P&I diagram
Refrigeration dryer
TF
FKTTFST-00061.02
KAESER KOMPRESSOREN

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 dryers
9.2	Pressure limiter
10	Refrigerant condenser
11	Refrigerant compressor (hermetic)
12	Service connection (Schrader valve)
23	Inspection glass with humidity indicator
25	Cooling water regulating valve
28	Collection chamber
29	Pressure transducer - Condensation pressure
29.1	Pressure transducer - Gassing pressure
30	Thermostatic expansion valve
31	Temperature transducer

Conduits:	
L1, L2, L3	CU-Pipe
w	heat-insulated
Option	
K1	Air-cooling
K2	Water-cooling

c				Datum	06.11.2015		KAESER KOMPRESSOREN	P&I diagram legend	
b				Bearb.	Plau			Refrigeration dryer	
a				Gepr.	Schneider, P.			TF	
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: FKTTFST-00061.01	FKTTFST-00061.02 Blatt 2 E

13.3 Electrical Diagram

Wiring Diagram

refrigeration dryer series TF

208V±10% 3Ph 60Hz
230V±10% 3Ph 60Hz
380V±10% 3Ph 60Hz
460V±10% 3Ph 60Hz
575V±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

c				Datum	25.06.2015 USE		KAESER KOMPRESSOREN	cover page		=
b				Bearbeiter	Sitter			refrigeration dryer series TF		+
a	ÄAF 20151127	15.12.15	Ge/Si	Geprüft	Gegner					
A	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	DTF-U3010.01	page 1 / 1 Bl.

Lfd. Nr. No.	Benennung Name		Zeichnungsnummer (Kunde) Drawing No. (customer)	Zeichnungsnummer (Hersteller) Drawing No. (manufacturer)	Blatt Page	Anlagenkennzeichen Unit designation
1	cover page			DTF-U3010.01	1	
2	list of contents			ZTF-U3010.01	1	
3	general instructions			UTF-U3010.01	1	
4	electrical component parts list			UTF-U3010.01	2	
5	wiring diagram	power supply/power unit		STF-U3010.01	1	
6	wiring diagram			STF-U3010.01	2	
7	wiring diagram	communication module - option C44		STF-U3010.01	3	
8	wiring diagram			STF-U3010.01	4	
9	wiring diagram			STF-U3010.01	5	
10	wiring diagram			STF-U3010.01	6	
11	wiring diagram			STF-U3010.01	7	
12	wiring diagram			STF-U3010.01	8	
13	terminal connection	terminal strip -X1		KTF-U3010.01	1	
14	terminal connection	terminal strip -X2		KTF-U3010.01	2	
15	terminal connection	terminal strip -X21		KTF-U3010.01	3	
16	lay-out	control panel		ATF-U3010.01	1	

c				Datum	25.06.2015		KAESER KOMPRESSOREN	list of contents	=
b				Bearbeiter	Sitter			refrigeration dryer series TF	+
a				Geprüft	Gegner				
B	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	ZTF-U3010.01	page 1 1 Bl.

1	2	3	4	5	6	7	8

general instructions

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

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

primary circuits:	black 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 T2 = transformer power supply for refrigeration dryer

option K1 = air cooled

option K15 = Ambient temperature 50°C

option C36 = warning pressure dew point

option C37 = Refrigerant compressor running

option C44 = Communication module: MODBUS TCP

electrical equipment identification

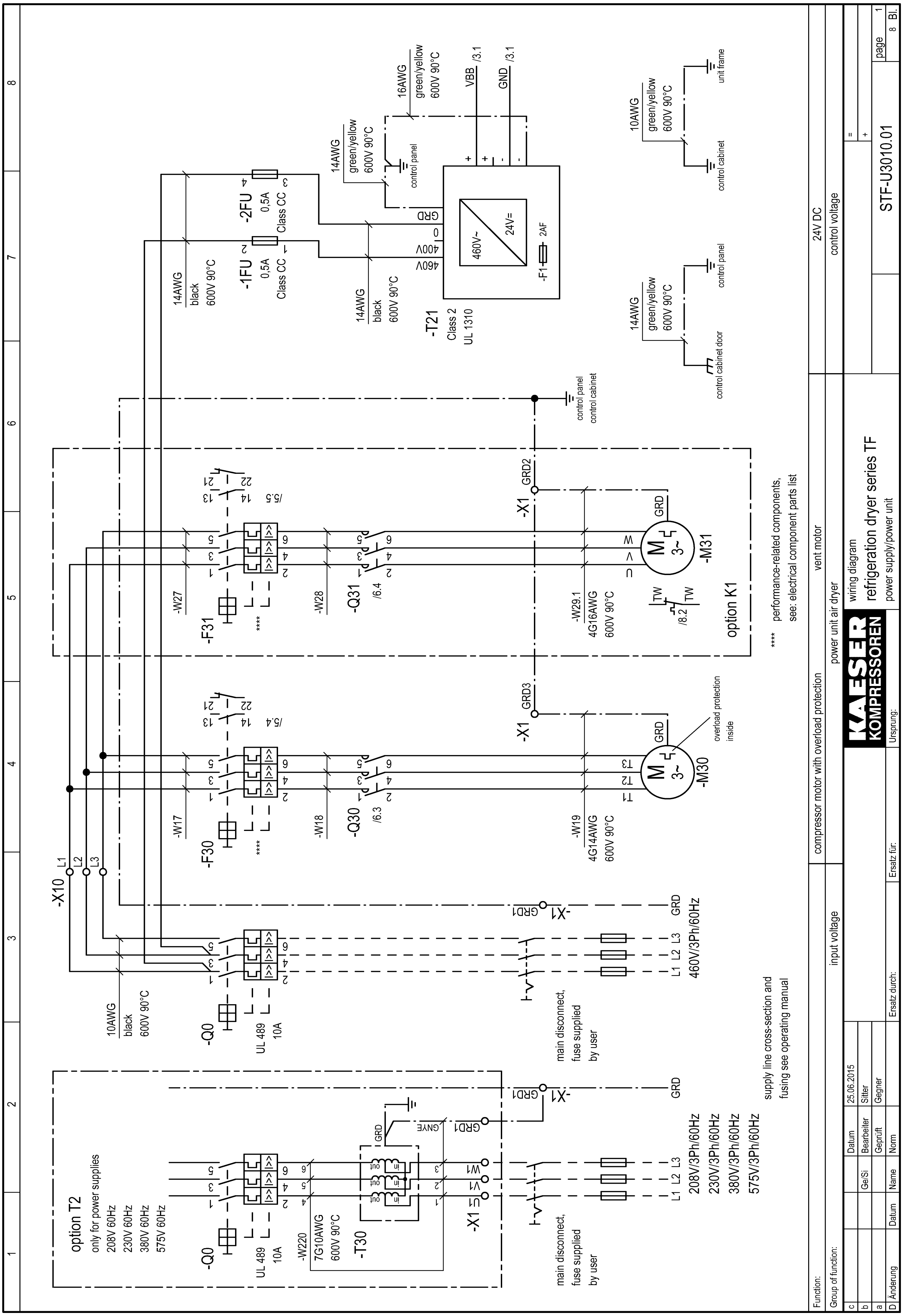
-B30	safety pressure controller
-B32	pressure transducer Condensation pressure
-B33	pressure transducer Inlet pressure
-B34	Temperature measuring transducer heat exchanger
-1FU,-2FU	fuse, power unit
-F1	fuse 24V=
-F30	circuit breaker
-F31	circuit breaker (option K1)
-K1	communication module (option C44)
-K20	Display
-K21	control
-K33	condensate drain
-K50...-K53	coupling relay
-M7	controller ventilator (option K15)
-M30	compressor motor with overload protection
-M31	vent motor (option K1)
-Q0	Power switch
-Q30	motor starter compressor motor
-Q31	motor starter vent motor (option K1)
-T21	power supply
-T30	transformer (option T2)
-X1	terminal strip
-X2,-X21,-X22	transfer module

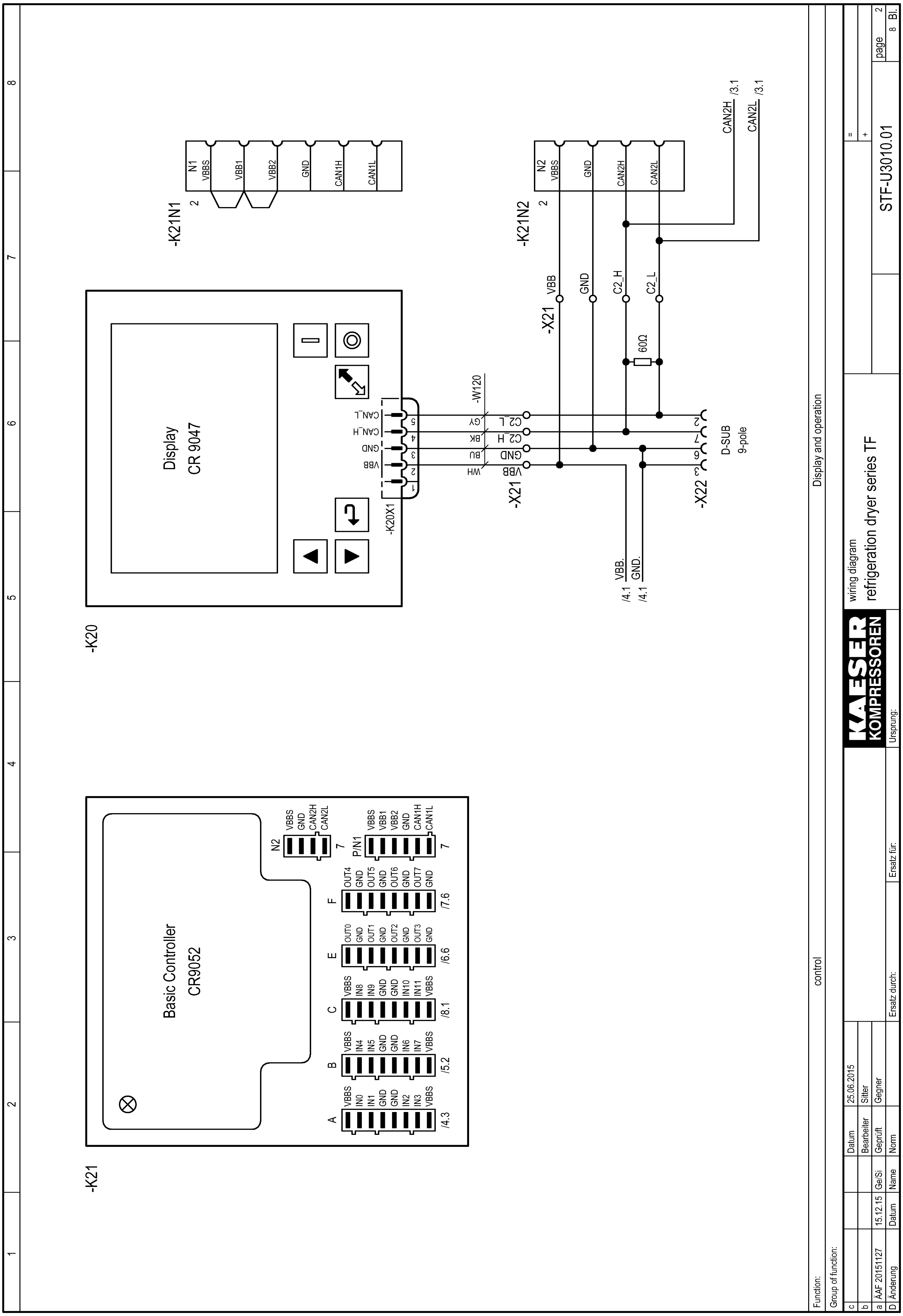
c				Datum	25.06.2015		KAESER KOMPRESSOREN	general instructions	=
b				Bearbeiter	Sitter			refrigeration dryer series TF	+
a				Geprüft	Gegner				
C	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	UTF-U3010.01	page 1 / 2 Bl.

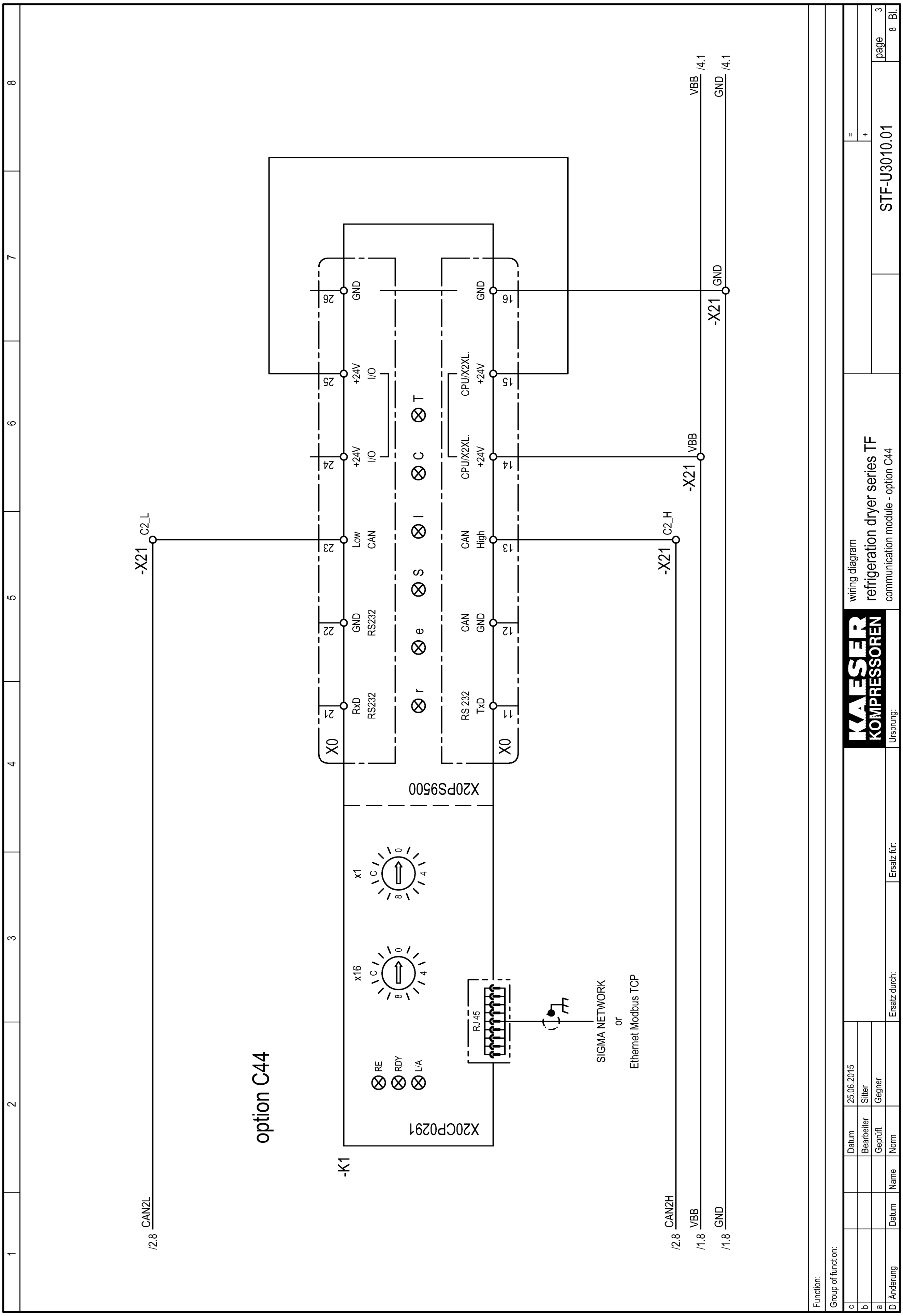
electrical component parts list

model	TF 174	TF 230	TF 280	TF 340
machine power supply	460 V ±10 %, 60 Hz	460 V ±10 %, 60 Hz	460 V ±10 %, 60 Hz	460 V ±10 %, 60 Hz
(option T2) 1)	208 V ±10 %, 60 Hz	208 V ±10 %, 60 Hz	208 V ±10 %, 60 Hz	208 V ±10 %, 60 Hz
(option T2) 2)	230 V ±10 %, 60 Hz	230 V ±10 %, 60 Hz	230 V ±10 %, 60 Hz	230 V ±10 %, 60 Hz
(option T2) 3)	380 V ±10 %, 60 Hz	380 V ±10 %, 60 Hz	380 V ±10 %, 60 Hz	380 V ±10 %, 60 Hz
(option T2) 4)	575 V ±10 %, 60 Hz	575 V ±10 %, 60 Hz	575 V ±10 %, 60 Hz	575 V ±10 %, 60 Hz
GRD terminal -X1	7.3149.01980	7.3149.01980	7.3149.01980	7.3149.01980
	WKFN 10D1/2/SL/35	WKFN 10D1/2/SL/35	WKFN 10D1/2/SL/35	WKFN 10D1/2/SL/35
	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
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	7.8237.00320	7.8237.00320	7.8237.00320	7.8237.00330
	3RT2017-2BB41	3RT2017-2BB41	3RT2017-2BB41	3RT2018-2BB41
Siemens	24 VDC	24 VDC	24 VDC	24 VDC
contactor -Q31	7.8237.00300	7.8237.00300	7.8237.00300	7.8237.00300
(option K1)	3RT2015-2BB41	3RT2015-2BB41	3RT2015-2BB41	3RT2015-2BB41
Siemens	24 VDC	24 VDC	24 VDC	24 VDC
circuit breaker -F30	7.8237.00130	7.8237.00140	7.8237.00150	7.8237.00170
	3RV2011-1GA20	3RV2011-1HA20	3RV2011-1JA20	3RV2011-1KA20
	4.5-6.3 A	5.5-8 A	7-10 A	9-12.5 A
	setting: 5.0 A	setting: 7.0 A	setting: 9.5 A	setting: 9.5 A
auxiliary switch	7.8237.00250	7.8237.00250	7.8237.00250	7.8237.00250
Siemens	3RV2901-2E	3RV2901-2E	3RV2901-2E	3RV2901-2E
circuit breaker -F31	7.8237.00110	7.8237.00110	7.8237.00120	7.8237.00120
(option K1)	3RV2011-0GA20	3RV2011-0GA20	3RV2011-0KA20	3RV2011-0KA20
	0.45-0.63 A	0.45-0.63 A	0.9-1.25 A	0.9-1.25 A
	setting: 0.57 A	setting: 0.57 A	setting: 1.1 A	setting: 1.1 A
(option K15)	7.8237.00120	7.8237.00120	7.8237.00120	7.8237.00120
	3RV2011-0KA20	3RV2011-0KA20	3RV2011-0KA20	3RV2011-0KA20
	0.9-1.25 A	0.9-1.25 A	0.9-1.25 A	0.9-1.25 A
	setting: 1.1 A	setting: 1.1 A	setting: 1.1 A	setting: 1.1 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 -1FU/-2FU	7.3320.00070	7.3320.00070	7.3320.00070	7.3320.00070
Wöhner	Class CC 2-pol 31296	Class CC 2-pol 31296	Class CC 2-pol 31296	Class CC 2-pol 31296
fuse -1FU/-2FU	7.33310.1	7.33310.1	7.33310.1	7.33310.1
Gould	ATQR 1/2 0.5 A, 600 V	ATQR 1/2 0.5 A, 600 V	ATQR 1/2 0.5 A, 600 V	ATQR 1/2 0.5 A, 600 V
power supply -T21	7.8208.0	7.8208.0	7.8208.0	7.8208.0
	B 1204078	B 1204078	B 1204078	B 1204078
Block	400/460 VAC//24 VDC 2 A	400/460 VAC//24 VDC 2 A	400/460 VAC//24 VDC 2 A	400/460 VAC//24 VDC 2 A
fuse -F1	7.0809.00030	7.0809.00030	7.0809.00030	7.0809.00030
	2AF 5x 20 mm	2AF 5x 20 mm	2AF 5x 20 mm	2AF 5x 20 mm
coupling relay -K50/-K51/-K52/-K53	7.3172.00310	7.3172.00310	7.3172.00310	7.3172.00310
Phönix	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21	RIF-0-RPT-24DC/21
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
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
Power switch -Q0	7.8237.00160	7.8237.00160	7.8237.00160	7.8237.00160
	3RV2711-1JD10	3RV2711-1JD10	3RV2711-1JD10	3RV2711-1JD10
	10 A/460 V, 65kA	10 A/460 V, 65kA	10 A/460 V, 65kA	10 A/460 V, 65kA
rotary actuator	7.8237.00270	7.8237.00270	7.8237.00270	7.8237.00270
Siemens	3RV2926-2BA00	3RV2926-2BA00	3RV2926-2BA00	3RV2926-2BA00
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
transformer -T30 1) 2) 3)	7.5452.00221	7.5452.00221	7.5452.00221	7.5452.00221
(option T2)	B 1311034	B 1311034	B 1311034	B 1311034
Block	200-440//400/460 V	200-440//400/460 V	200-440//400/460 V	200-440//400/460 V
transformer -T30 4)	7.5452.00330	7.5452.00330	7.5452.00330	7.5452.00330
(option T2)	B 1311007	B 1311007	B 1311007	B 1311007
Block	575/460 V	575/460 V	575/460 V	575/460 V
series terminal -X1	3x 7.3149.01940	3x 7.3149.01940	3x 7.3149.01940	3x 7.3149.01940
(option T2) Wieland	WKFN 10/35	WKFN 10/35	WKFN 10/35	WKFN 10/35
controller ventilator -M7	7.2751.00530	7.2751.00530	7.2751.00530	7.2751.00530
(option K15) Rübsamen&Herr	LV200	LV200	LV200	LV200
communication module -K1	7.9601.0	7.9601.0	7.9601.0	7.9601.0
Modbus TCP	SNW/CAN-Master	SNW/CAN-Master	SNW/CAN-Master	SNW/CAN-Master
(option C44) B&R				

UTF-U3010.01
page 2 Bl. 2
electrical component parts list
refrigeration dryer series TF
KAESER KOMPRESSOREN
Ursprung:
Ersatz für:
Ersatz durch:
Datum 25.06.2015
Bearbeiter Sitter
Geprüft Gegner
Norm
Name
Datum
Änderung


wiring diagram
refrigeration dryer series TF
power supply/power unit
STF-U3010.01
25.06.2015
input voltage
compressor motor with overload protection
power unit air dryer
vent motor
24V DC
control voltage
option T2
option K1
-M30
-M31
-T21
-T30
-Q0
-F30
-F31
-Q30
-Q31
-X10
-X1
460V/3Ph/60Hz
208V/3Ph/60Hz
230V/3Ph/60Hz
380V/3Ph/60Hz
575V/3Ph/60Hz
main disconnect, fuse supplied by user
supply line cross-section and fusing see operating manual
**** performance-related components, see: electrical component parts list


-K21
Basic Controller
CR9052
A
VBBS
IN0
IN1
GND
GND
IN2
IN3
VBBS
/4.3
B
VBBS
IN4
IN5
GND
GND
IN6
IN7
VBBS
/5.2
C
VBBS
IN8
IN9
GND
GND
IN10
IN11
VBBS
/8.1
E
OUT0
GND
OUT1
GND
OUT2
GND
OUT3
GND
/6.6
F
OUT4
GND
OUT5
GND
OUT6
GND
OUT7
GND
/7.6
P/N1
VBBS
VBB1
VBB2
GND
CAN1H
CAN1L
7
N2
VBBS
GND
CAN2H
CAN2L
7
-K20
Display
CR 9047
-K20X1
VBB
GND
CAN_H
CAN_L
-W120
WH
BU
BK
GY
-X21
VBB
GND
C2_H
C2_L
-X22
D-SUB
9-pole
60Ω
VBB.
GND.
/4.1
/4.1
-K21N1
N1
VBBS
VBB1
VBB2
GND
CAN1H
CAN1L
-K21N2
N2
VBBS
GND
CAN2H
CAN2L
CAN2H
CAN2L
/3.1
/3.1
Function:
Group of function:
control
Display and operation
Datum 25.06.2015
Bearbeiter Sitter
Geprüft Gegner
Norm
a AAF 20151127 15.12.15 Ge/Si
D Änderung Datum Name
Ersatz durch:
Ersatz für:
Ursprung:
KAESER KOMPRESSOREN
wiring diagram
refrigeration dryer series TF
STF-U3010.01
page 2
8 Bl.


option C44
-K1
X20CP0291
X20PS9500
RJ 45
SIGMA NETWORK
or
Ethernet Modbus TCP
RE
RDY
L/A
x16
x1
X0
RxD
RS232
GND
RS232
Low
CAN
+24V
I/O
GND
RS 232
TxD
CAN
GND
CAN
High
CPU/X2XL.
+24V
r
e
S
I
C
T
21
22
23
24
25
26
11
12
13
14
15
16
-X21
C2_L
C2_H
VBB
GND
CAN2L
CAN2H
/2.8
/1.8
/4.1
Function:
Group of function:
Datum
25.06.2015
Bearbeiter
Sitter
Geprüft
Gegner
Norm
Änderung
Name
Ersatz durch:
Ersatz für:
Ursprung:
wiring diagram
refrigeration dryer series TF
communication module - option C44
STF-U3010.01
page
3
8
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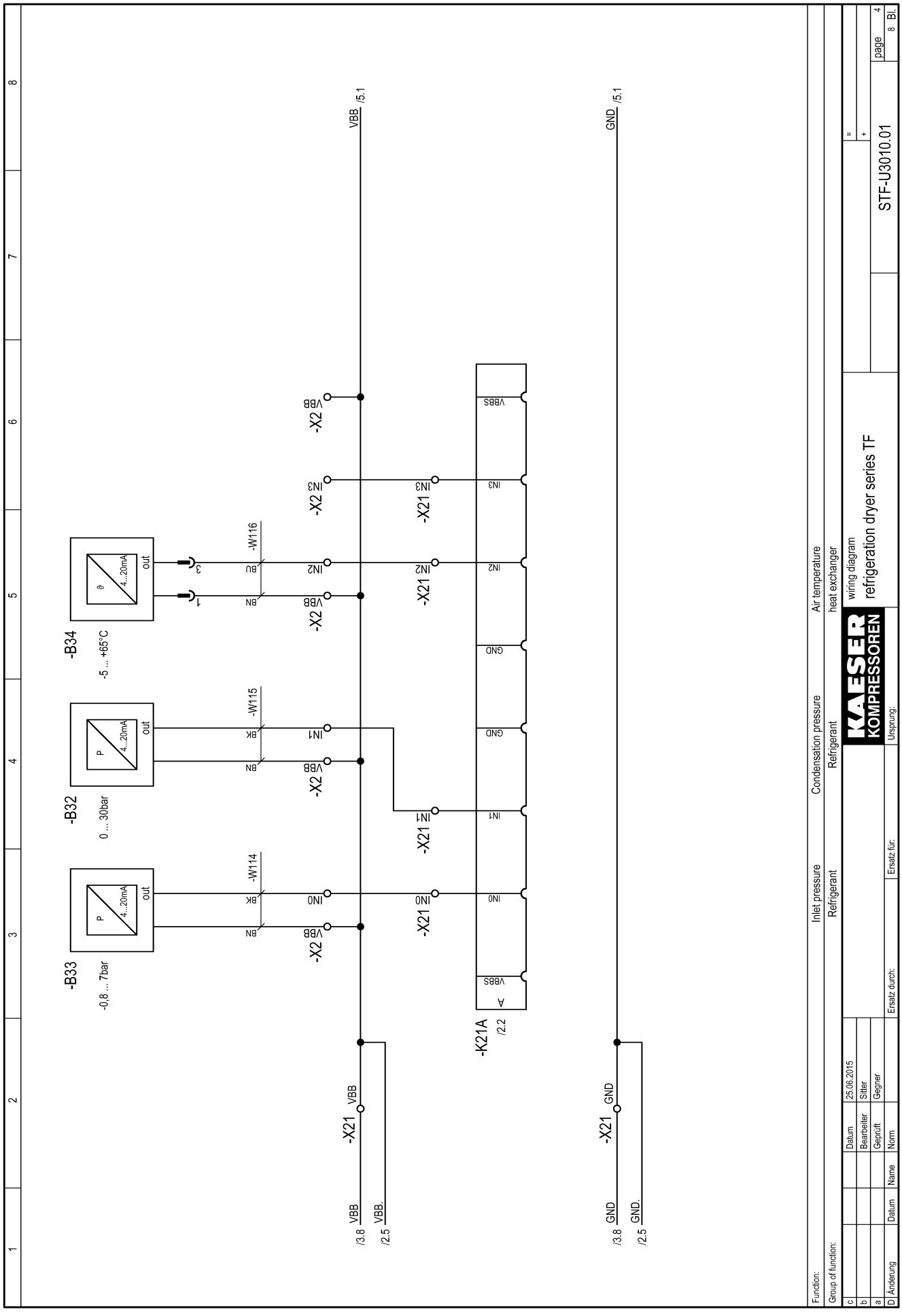
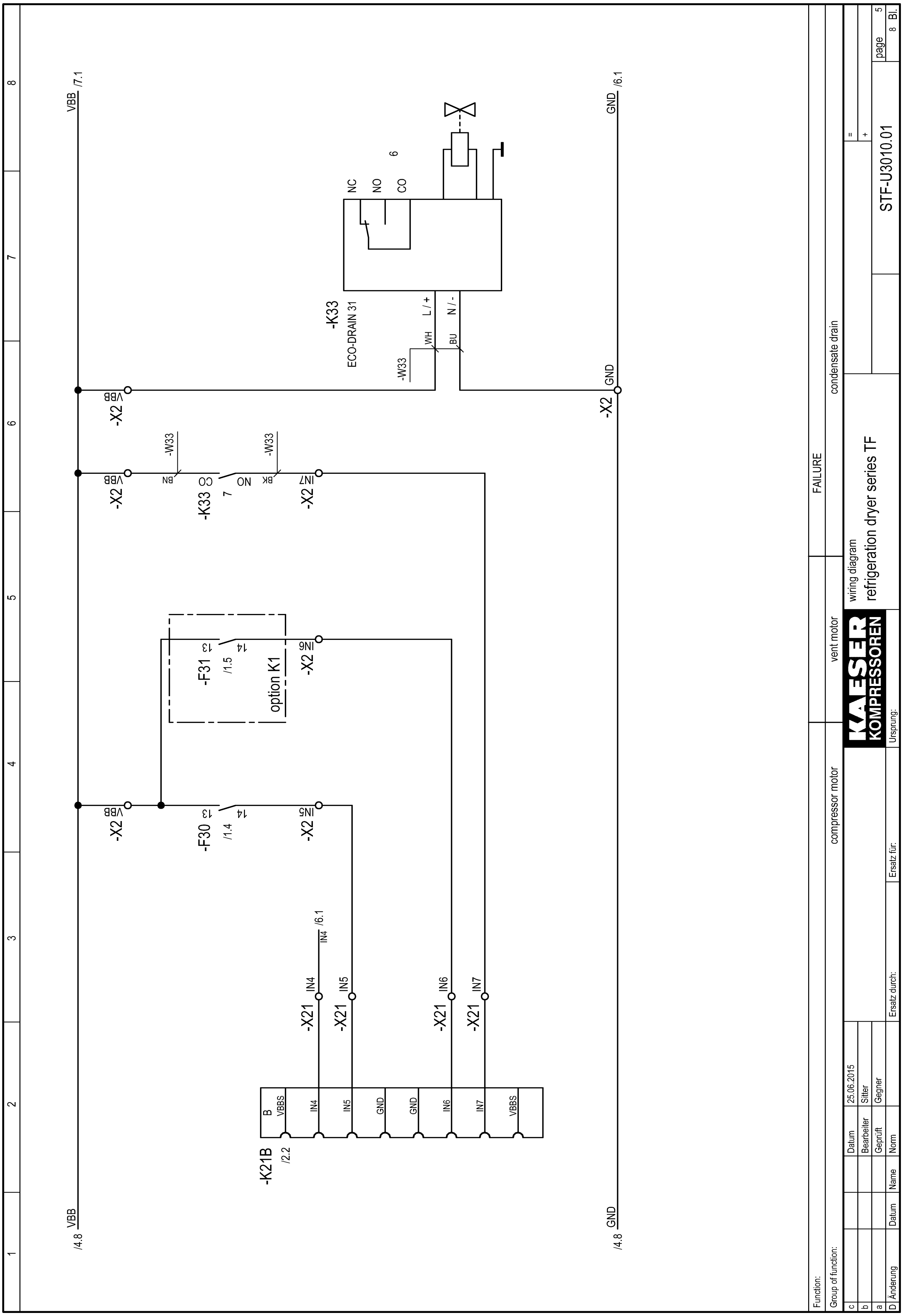
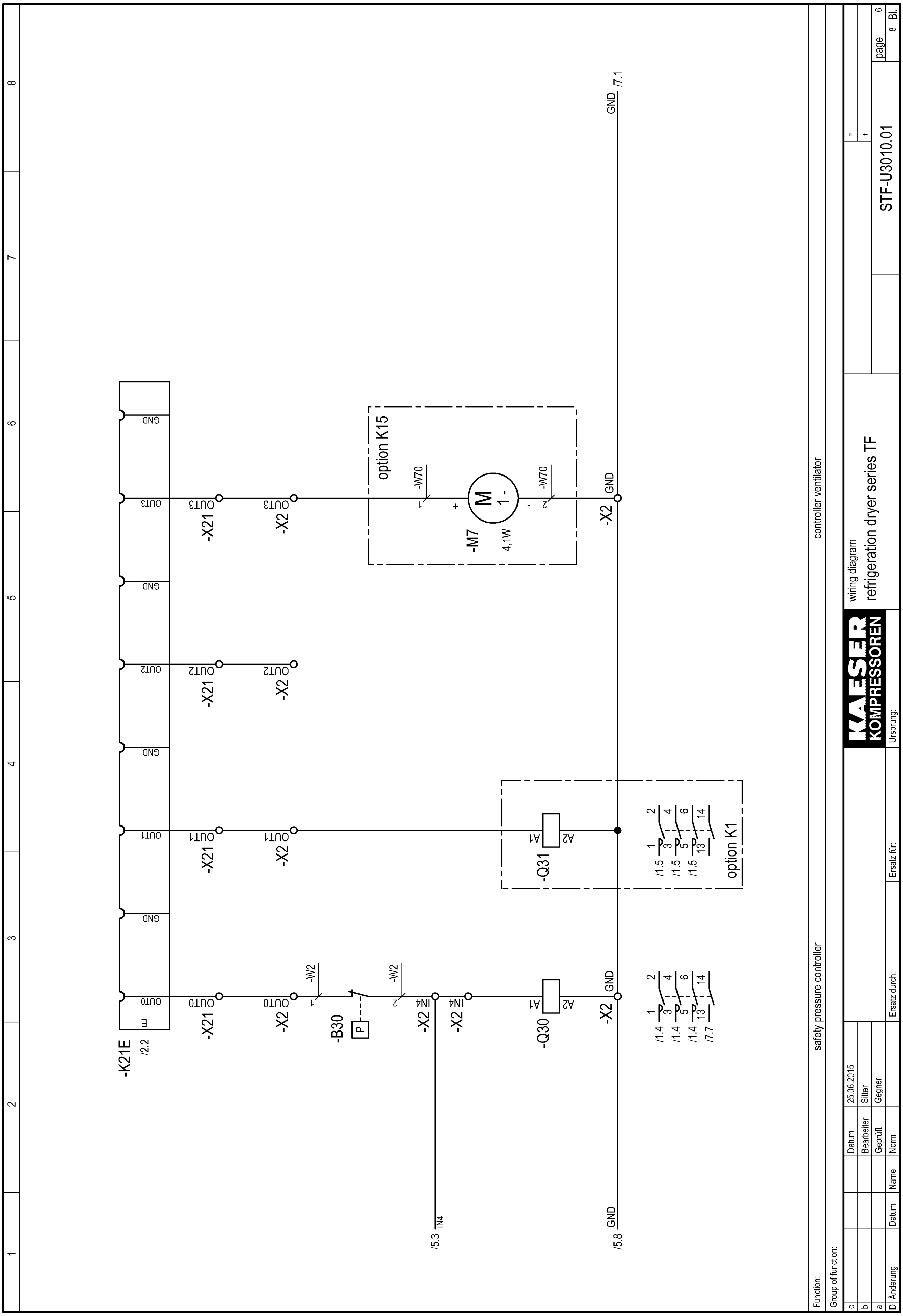
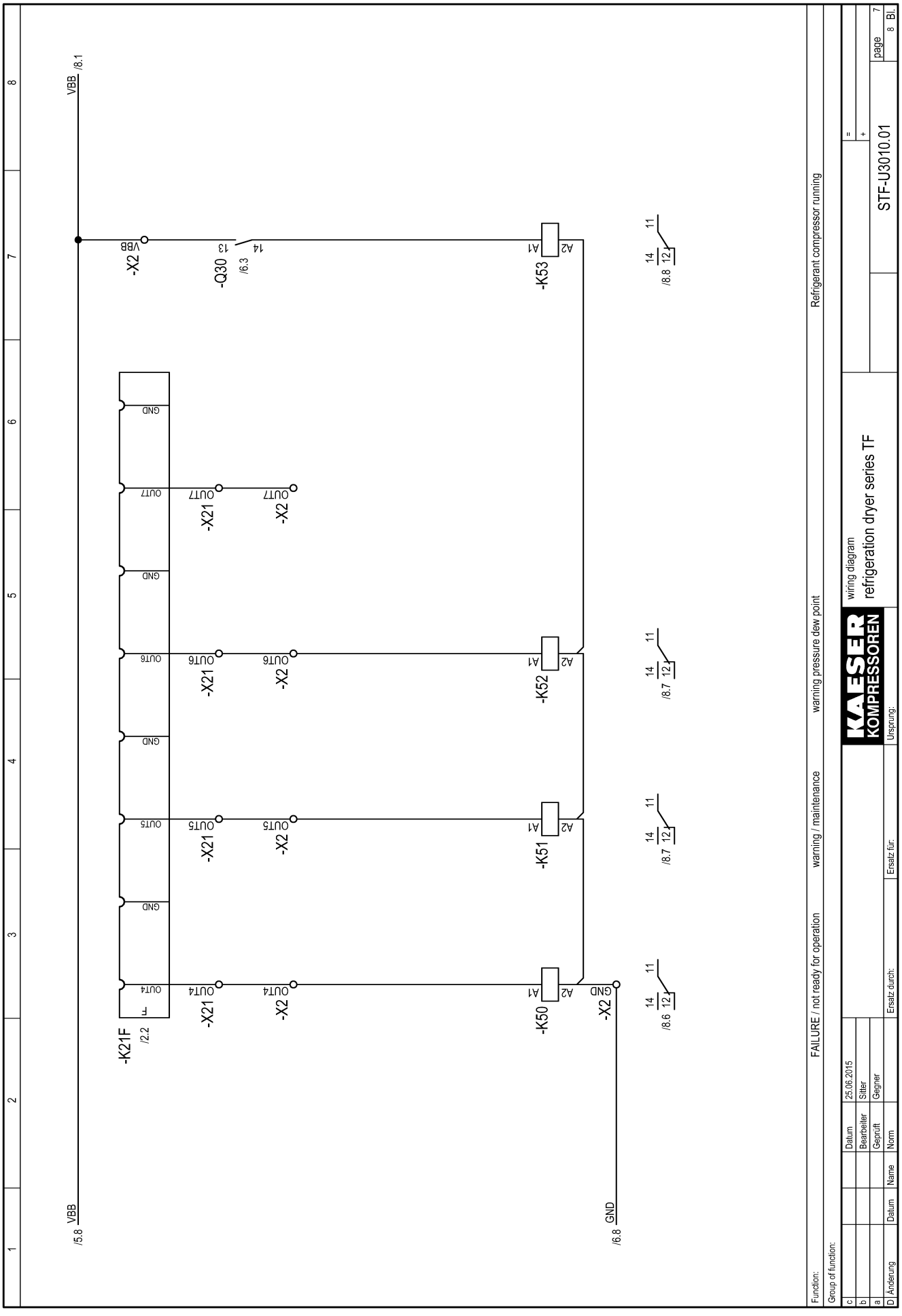
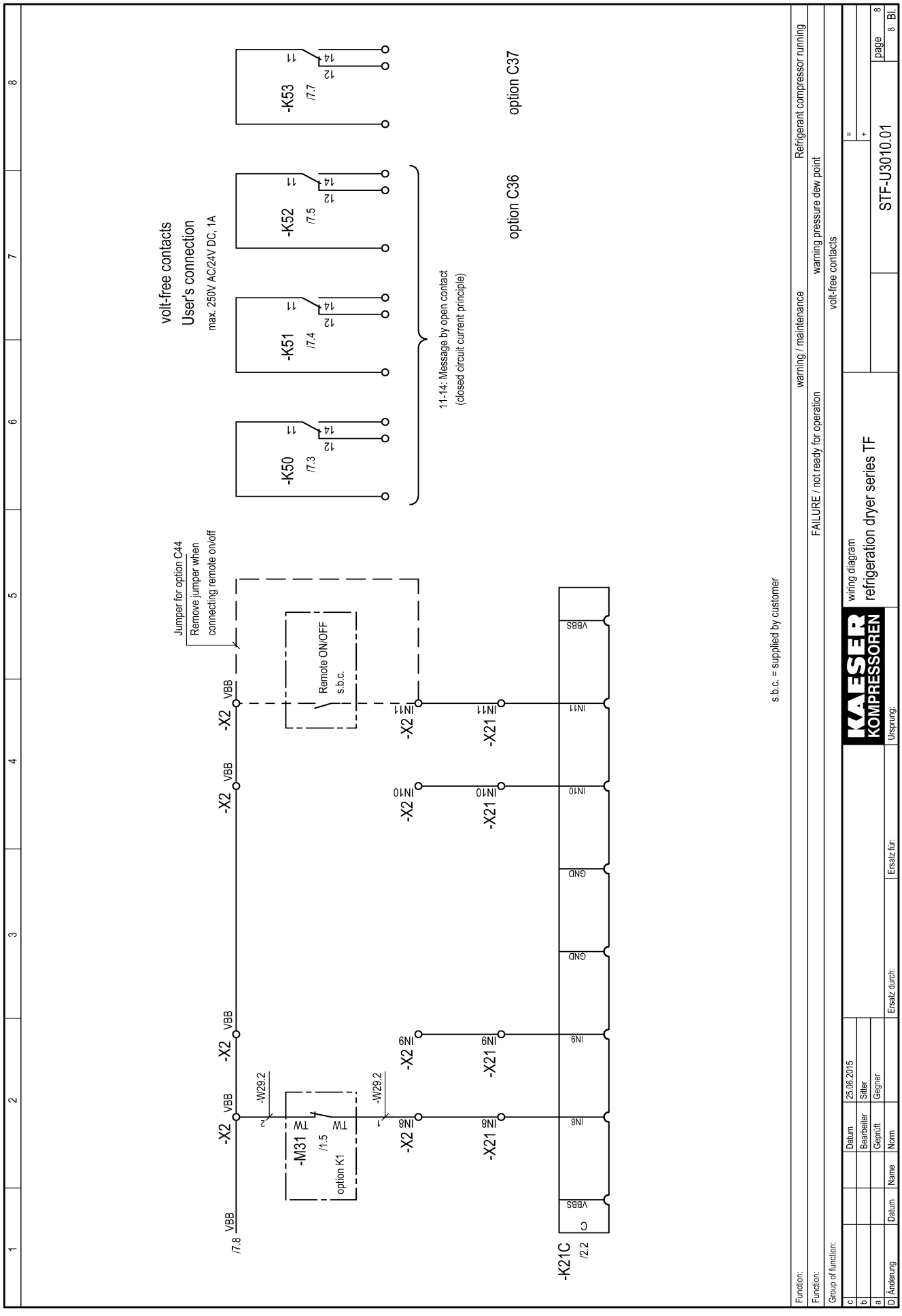
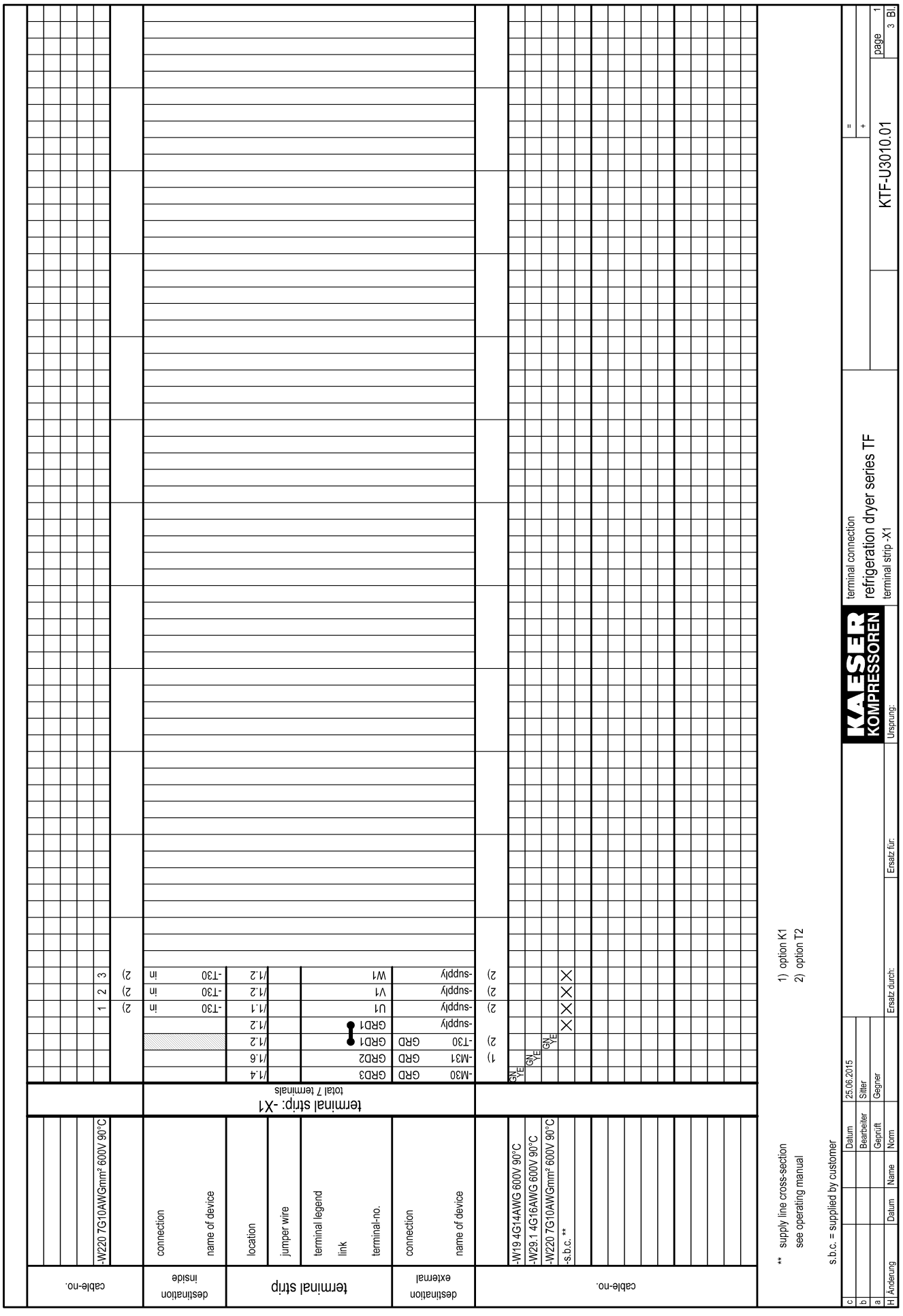

-B34
-5 ... +65°C
-B32
0 ... 30bar
-B33
-0,8 ... 7bar
-W116
-W115
-W114
-X2
-X21
-K21A
/2.2
VBB /5.1
GND /5.1
Inlet pressure
Condensation pressure
Air temperature
Refrigerant
Refrigerant
heat exchanger
wiring diagram
refrigeration dryer series TF
STF-U3010.01
page 4
8 Bl.


VBB
GND
-X2
-K33
ECO-DRAIN 31
-W33
NC
NO
CO
L / +
N / -
WH
BU
BN
BK
IN4
IN5
IN6
IN7
-F30
-F31
option K1
-X21
-K21B
VBBS
condensate drain
FAILURE
vent motor
compressor motor
wiring diagram
refrigeration dryer series TF
STF-U3010.01
25.06.2015
Sitter
Gegner
Datum
Bearbeiter
Geprüft
Norm
Name
Änderung
Ersatz durch:
Ersatz für:
Ursprung:
Function:
Group of function:
page
Bl.


-K21E
/2.2
-X21
-X2
-B30
-Q30
-Q31
-M7
4,1W
option K15
option K1
GND
/7.1
/5.3
/5.8
IN4
safety pressure controller
controller ventilator
wiring diagram
refrigeration dryer series TF
STF-U3010.01
Datum 25.06.2015
Bearbeiter Sitter
Geprüft Gegner
page 6
8 Bl.


VBB /8.1
-X2
-Q30
/6.3
-K53
/8.8
-K21F
/2.2
-X21
-X2
-K52
/8.7
-K51
/8.7
-K50
/8.6
GND
/6.8
VBB
/5.8
FAILURE / not ready for operation
warning / maintenance
warning pressure dew point
Refrigerant compressor running
Function:
Group of function:
wiring diagram
refrigeration dryer series TF
KAESER KOMPRESSOREN
STF-U3010.01
page 7
8 Bl.
Datum 25.06.2015
Bearbeiter Sitter
Geprüft Gegner
Norm
Name
Datum
Änderung
Ersatz durch:
Ersatz für:
Ursprung:


volt-free contacts
User's connection
max. 250V AC/24V DC, 1A
-K50 /7.3
-K51 /7.4
-K52 /7.5
-K53 /7.7
11-14: Message by open contact
(closed circuit current principle)
option C36
option C37
Jumper for option C44
Remove jumper when
connecting remote on/off
Remote ON/OFF
s.b.c.
-M31 /1.5
option K1
-W29.2
-X2 VBB
-X21 IN11
-X21 IN10
-X21 IN9
-X21 IN8
-K21C /2.2
VBBS
GND
/7.8
s.b.c. = supplied by customer
warning / maintenance
Refrigerant compressor running
FAILURE / not ready for operation
warning pressure dew point
volt-free contacts
wiring diagram
refrigeration dryer series TF
STF-U3010.01
page 8
8 BI.


terminal strip: -X1
total 7 terminals
cable-no.
destination inside
terminal strip
destination external
connection
name of device
location
jumper wire
terminal legend
link
terminal-no.
-W220 7G10AWGmm² 600V 90°C
-W19 4G14AWG 600V 90°C
-W29.1 4G16AWG 600V 90°C
-s.b.c. **
-M30 GRD GRD3 /1.4
-M31 GRD GRD2 /1.6
-T30 GRD GRD1 /1.2
-supply GRD1 /1.2
-supply U1 /1.1 -T30 in 2)
-supply V1 /1.2 -T30 in 2)
-supply W1 /1.2 -T30 in 2)
1) option K1
2) option T2
** supply line cross-section see operating manual
s.b.c. = supplied by customer
KAESER KOMPRESSOREN
terminal connection
refrigeration dryer series TF
terminal strip -X1
KTF-U3010.01
page 1
3 Bl.
Datum 25.06.2015
Bearbeiter Sitter
Geprüft Gegner
Name Norm
Änderung Datum
Ersatz durch:
Ersatz für:
Ursprung:

terminal strip: -X2
total 40 terminals

terminal-no. (terminal legend)	location	jumper wire	destination external: connection	destination external: name of device	note	cable-no.
IN0	/4.3			-B33		-W114 2x22AWG: BK
VBB	/4.3			-B33		-W114 2x22AWG: BN
IN1	/4.4			-B32		-W115 2x22AWG: BK
VBB	/4.4			-B32		-W115 2x22AWG: BN
IN2	/4.5		3	-B34		-W116 2x22AWG: BU
VBB	/4.5		1	-B34		-W116 2x22AWG: BN
IN3	/4.6					
VBB	/4.6					
IN4	/6.3		A1	-Q30		
VBB	/7.7		13	-Q30		
IN5	/5.4		14	-F30		
VBB	/5.4		13	-F30		
IN6	/5.5		14	-F31	1)	
VBB	/5.6		L / +	-K33		-W33 4x22AWG: WH
IN7	/5.6		NO	-K33		-W33 4x22AWG: BK
VBB	/5.6		CO	-K33		-W33 4x22AWG: BN
IN8	/8.2		TW	-M31	1)	-W29.2 2x20AWG: 1
VBB	/8.2		TW	-M31	1)	-W29.2 2x20AWG: 2
IN9	/8.2					
VBB	/8.2					
IN10	/8.4					
VBB	/8.4					
IN11	/8.4	4)			3)	
VBB	/8.4	4)			3)	
OUT0	/6.3			-B30		-W2 2x18AWG: 1
IN4	/6.3			-B30		-W2 2x18AWG: 2
OUT1	/6.4		A1	-Q31	1)	
GND	/6.3		A2	-Q30		
OUT2	/6.5					
GND						
OUT3	/6.6		+	-M7	2)	-W70 2x20AWG: 1
GND	/6.6		-	-M7	2)	-W70 2x20AWG: 2
OUT4	/7.3		A1	-K50		
GND	/7.3		A2	-K50		
OUT5	/7.4		A1	-K51		
GND	/5.6		N / -	-K33		-W33 4x22AWG: BU
OUT6	/7.5		A1	-K52		
GND						
OUT7	/7.6					
GND						

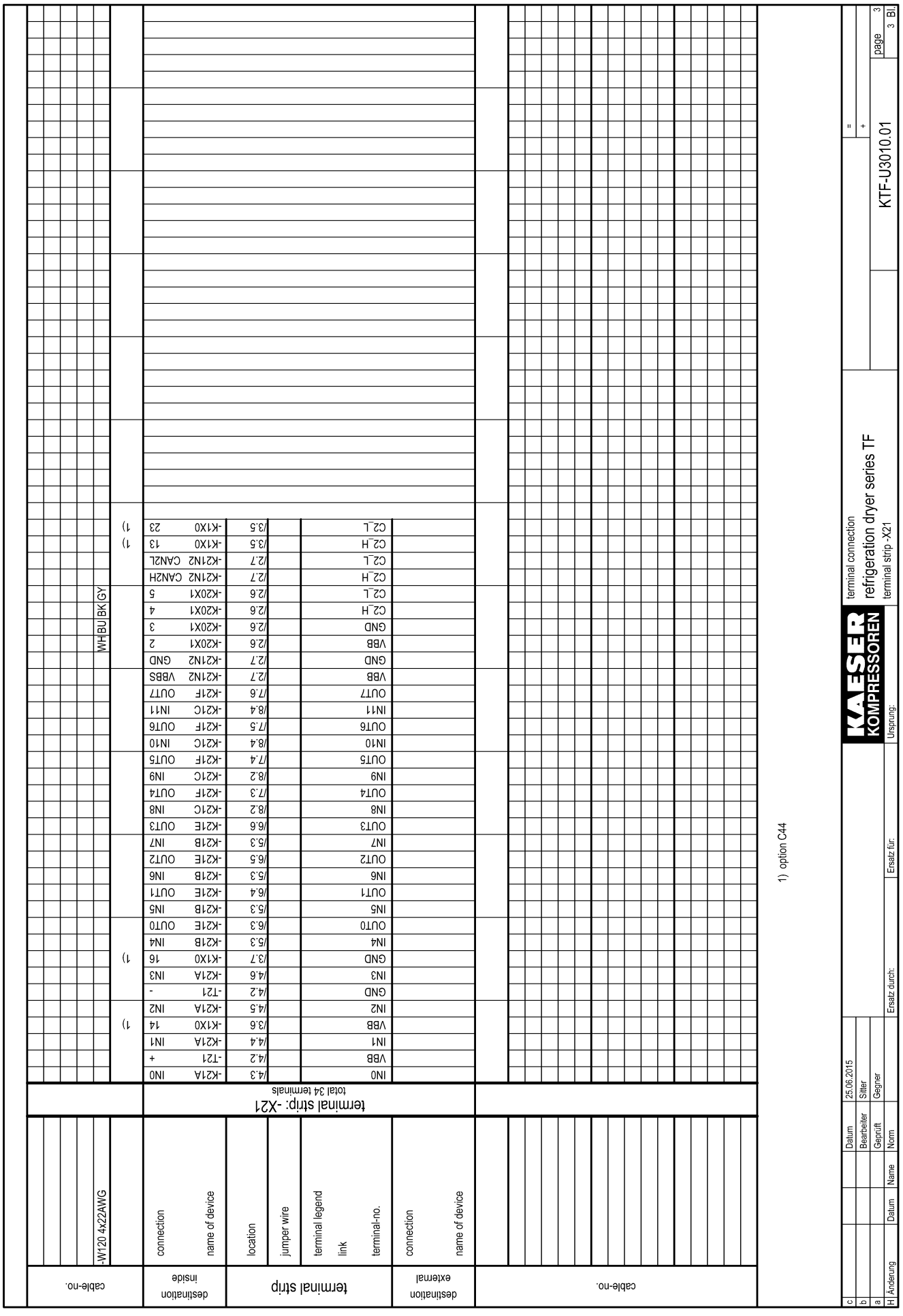
Cables: -W2 2x18AWG, -W29.2 2x20AWG, -W33 4x22AWG, -W70 2x20AWG, -W114 2x22AWG, -W115 2x22AWG, -W116 2x22AWG

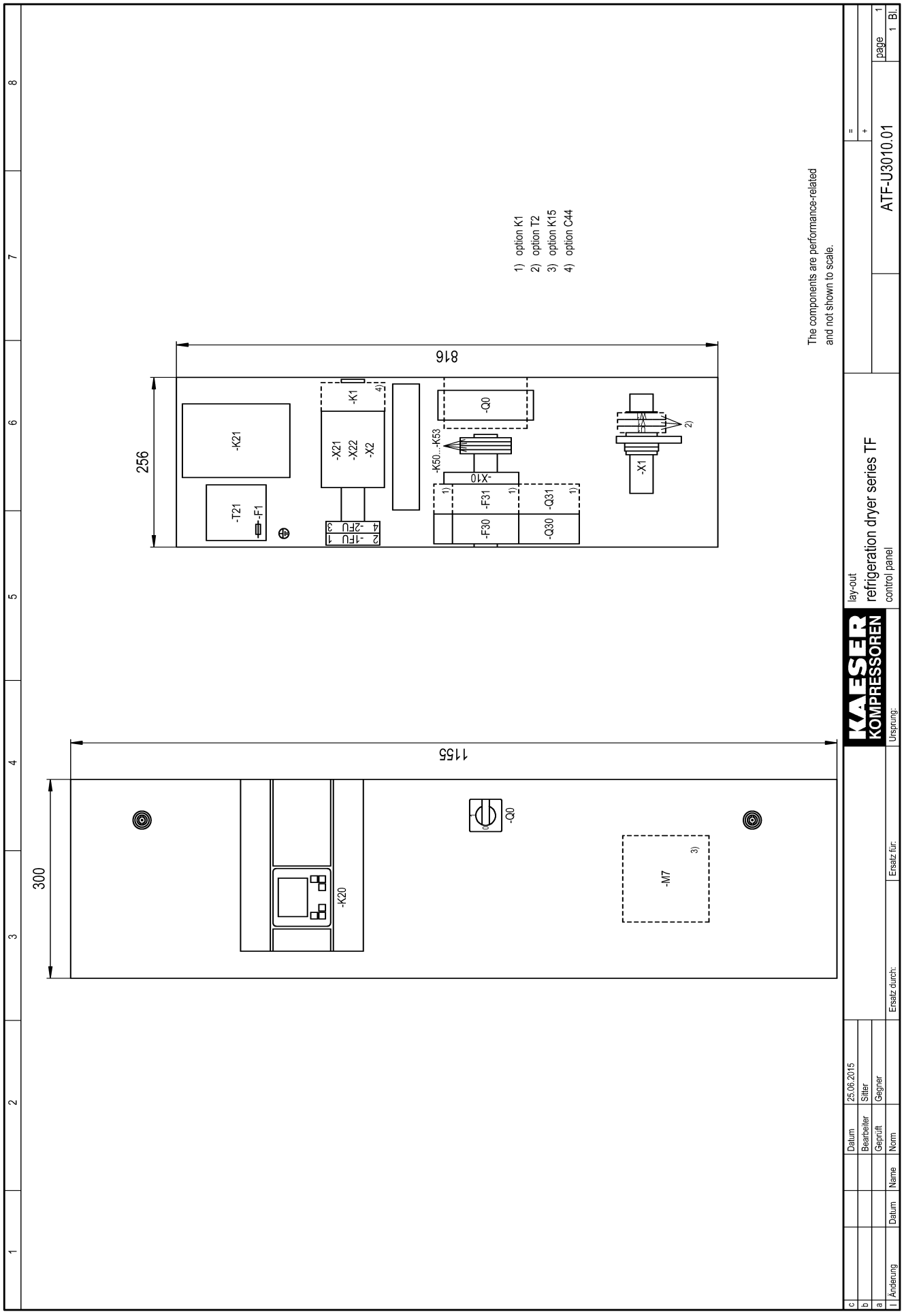
1) option K1
2) option K15
3) Remote ON/OFF, User's connection
4) Jumper for option C44
Remove jumper when
connecting remote on/off

c			Datum	25.06.2015	
b			Bearbeiter	Sitter	
a			Geprüft	Gegner	
H Änderung	Datum	Name	Norm		

Ersatz durch: | Ersatz für: | Ursprung:

KAESER KOMPRESSOREN
terminal connection
refrigeration dryer series TF
terminal strip -X2
=
+
KTF-U3010.01
page 2
3 Bl.


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.
-W120 4x22AWG
WH BU BK GY
IN0 /4.3 -K21A IN0
VBB /4.2 -T21 +
IN1 /4.4 -K21A IN1
VBB /3.6 -K1X0 14 1)
IN2 /4.5 -K21A IN2
GND /4.2 -T21 -
IN3 /4.6 -K21A IN3
GND /3.7 -K1X0 16 1)
IN4 /5.3 -K21B IN4
OUT0 /6.3 -K21E OUT0
IN5 /5.3 -K21B IN5
OUT1 /6.4 -K21E OUT1
IN6 /5.3 -K21B IN6
OUT2 /6.5 -K21E OUT2
IN7 /5.3 -K21B IN7
OUT3 /6.6 -K21E OUT3
IN8 /8.2 -K21C IN8
OUT4 /7.3 -K21F OUT4
IN9 /8.2 -K21C IN9
OUT5 /7.4 -K21F OUT5
IN10 /8.4 -K21C IN10
OUT6 /7.5 -K21F OUT6
IN11 /8.4 -K21C IN11
OUT7 /7.6 -K21F OUT7
VBB /2.7 -K21N2 VBBS
GND /2.7 -K21N2 GND
VBB /2.6 -K20X1 2
GND /2.6 -K20X1 3
C2_H /2.6 -K20X1 4
C2_L /2.6 -K20X1 5
C2_H /2.7 -K21N2 CANH
C2_L /2.7 -K21N2 CANL
C2_H /3.5 -K1X0 13 1)
C2_L /3.5 -K1X0 23 1)
1) option C44
c
b
a
H Änderung
Datum
Name
Norm
Geprüft
Gegner
Bearbeiter
Sitter
25.06.2015
Ersatz durch:
Ersatz für:
Ursprung:
KAESER KOMPRESSOREN
terminal connection
refrigeration dryer series TF
terminal strip -X21
KTF-U3010.01
page 3
3 Bl.


1) option K1
2) option T2
3) option K15
4) option C44
The components are performance-related and not shown to scale.
816
256
-K21
-T21
-F1
-K1
-X21
-X22
-X2
-K50...-K53
-X10
-F31
-F30
-Q31
-Q30
-Q0
-X1
1155
300
-K20
-M7
KAESER KOMPRESSOREN
lay-out
refrigeration dryer series TF
control panel
ATF-U3010.01
page 1
Bl. 1
Datum 25.06.2015
Bearbeiter Sitter
Geprüft Gegner
Name Norm
Änderung Datum
Ersatz durch:
Ersatz für:
Ursprung: