SERVICE MANUAL USE

Refrigerated Dryer

Model: TE 121

GL–Nr.: 1_8038_10030–00 01

Serial No.: .....

Table of Contents

KAESER COMPRESSORS

Chapter – Page

Table of Contents

KAESER COMPRESSORS

1 Technical Specification

1.1 Refrigerated Dryer

Model	TE 121	
Condensate volume under nominal conditions*	143	oz/h
Weight	1455	lbs
Cooling air volume	2118	cfm
Noise level to CAGI–Pneurop at 1 m distance (free sound field measurement)	< 70	dB(A)

*See chapter 1.2 for nominal conditions.

Drawings:

P & I flow chart (Pipework and instrument flow chart)	FKTTE121ST–00033.00
Electrical diagram	STE–U0910.00
Dimensional drawing	T 9156.2
By-pass piping	203990.0

1.2 Compressed Air System

Flow volume	460	scfm
Pressure drop	2.32	psid
Pressure dewpoint	35	˚F
at 100 ˚F air inlet, 100 psig and 100 ˚F ambient temperature.		
Maximum gauge working pressure	190	psig

1.3 Refrigerant System

Refrigerant	R 134a	
Maximum quantity	4.85	lbs
Permissible gauge working pressure	260	psig

1.4 Installation Requirements

Max. elevation above sea level of installation (for all elevations above please contact authorized KAESER distributor)	3000	ft.
Min. ambient temperature	40	˚F
Max. ambient temperature	110	˚F
Maximum compressed air inlet temperature	130	˚F

1.5 Connections

Compressed air outlet	2 NPT
Condensate drain connection (hose connection)	1/2
Service connection (Schrader valve)	7/16 UNF

1.6 Electrical Connection

Main voltage	575	V ± 10 % 3–phase
Full load current, FLA	3.3	A
Frequency	60	Hz
Recommended main disconnect fuses (Dual element or time–delay)	8	A
Recommended power supply cable (Cu multi–stranded) cross–section	14	AWG

Attention!

Maximum dual element time--delay fuses are selected according to 1996 N.E.C. Article 240--6, 430--52 and Tables 430--148 & 150.

Select multi--strand copper core wire at 40˚C ambient temperature according to 1996 N.E.C. 110--14(c), 220--3, 310--15, Table 310--16, 430--6, 430--22 and Tables 430--148 & 150.

1.7 Settings

Safety pressure switch (refrigerant)

switching point (fixed)

P_{OFF}	265	psi

Thermostat

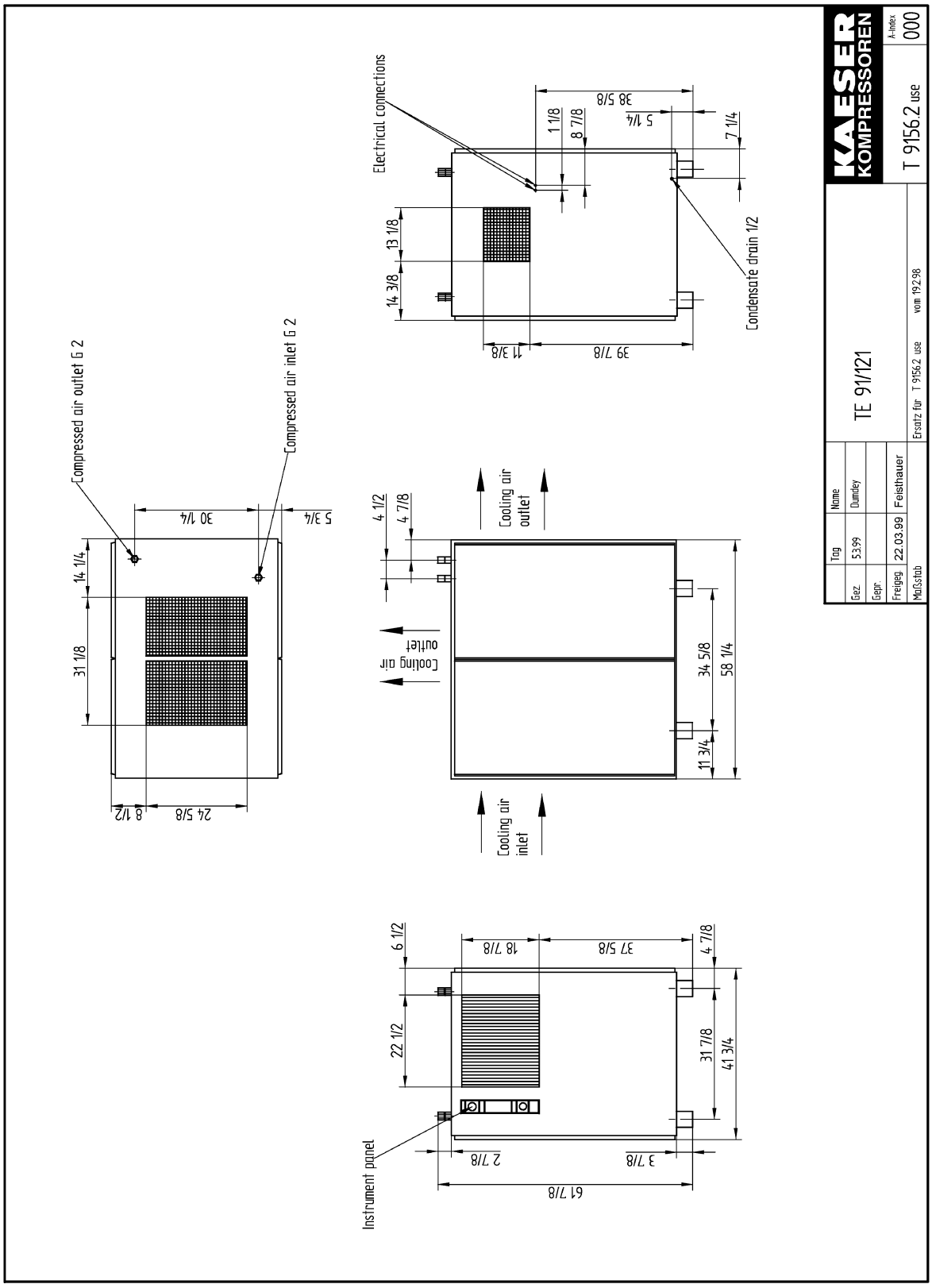
regulates pressure dewpoint to	ca. 35	˚F

1.8 Designation

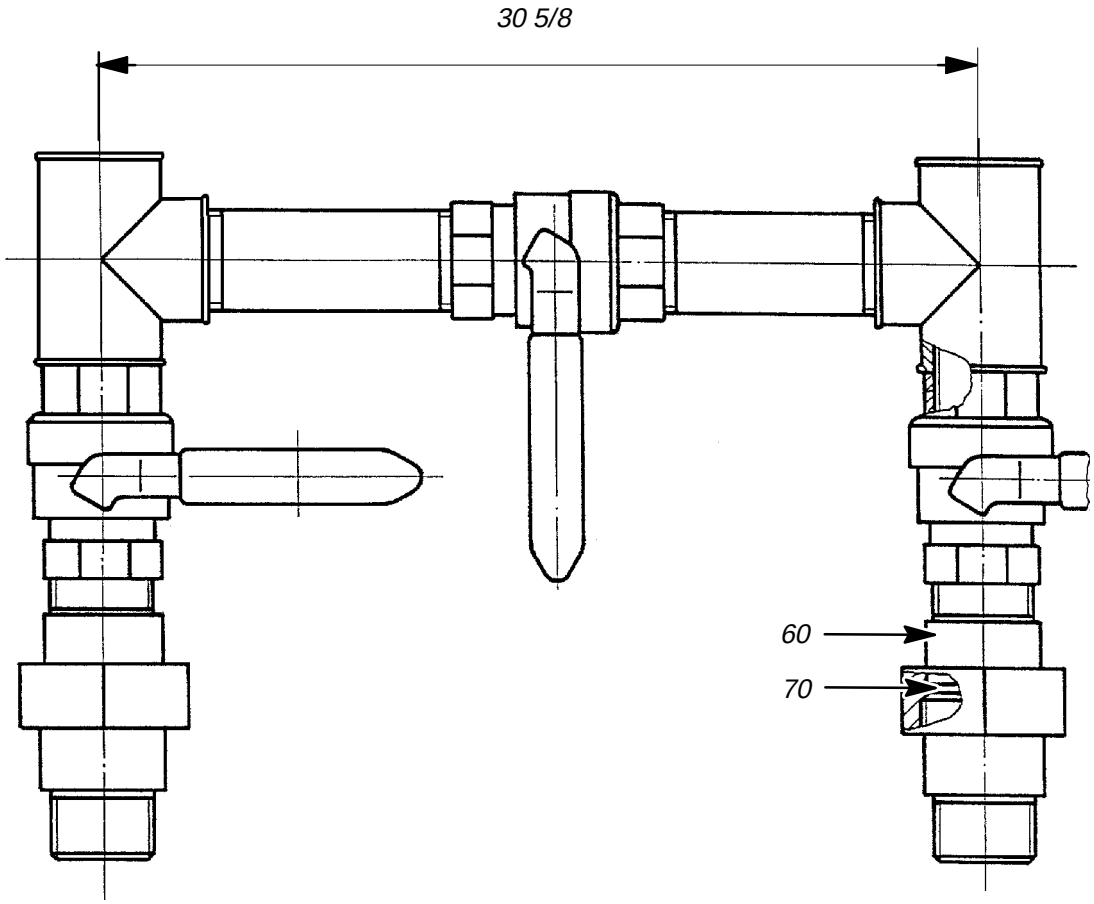
The nameplate of the refrigerated dryer is located on the front left below the cooling air inlet (see chapter 10 for an illustration of the nameplate).

1.9 Dimensional Diagram

(see next page)



1.10 Bypass 2 NPT



2 Safety Regulations

Read this service manual very carefully and observe all cautionary references before the initial start of this refrigerated dryer and before carrying out any maintenance on the unit.

2.1 Explanation of Symbols and References

This symbol is placed before all safety references where there is danger to life and limb. It is especially important that any associated instructions are followed explicitly and that extreme care is taken when performing the indicated task(s). For their own protection, inform all other users of these safety rules. Observe general safety and accident prevention regulations as well as the safety rules laid down in this service manual.

Attention! **This symbol is placed by text where considerable attention must be paid to recommendations, regulations, references and correct sequence so that damage and/or destruction of the compressor and/or other equipment is prevented.**

This symbol identifies environmental care measures.

☞ **This symbol indicates operations to be carried out by the operator or service technician.**

- **This bullet identifies listings.**

2.2 General Safety Instructions

Work on power driven systems may only be carried out by trained or instructed personnel or by specialized personnel.

Work on the electrical equipment of the refrigerated dryer may only be carried out by a qualified electrician or trained personnel under the supervision of a qualified electrician according to the NEC and any applicable local codes.

Work on the refrigeration system may only be carried out by a certified refrigeration technician (according to 40CFR Part 82).

Further points to be observed:

- No open flame or sparks at the point of installation.
- The maximum ambient temperature may not be exceeded (see chapter 1.4), otherwise special measures must be agreed between the manufacturer and the user.
- This unit is not explosion – protected and may not be operated in hazardous areas.

Attention! **The refrigerated dryer contains live electrical components.**

Prior to working on electrical systems of the compressor always perform the following steps in the sequence shown.

1. Lock the main disconnect in the ”off” position in accordance with applicable lock out/ tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

2. Ensure the package cannot be switched on again

3. Check that no voltage is present

4. Lock the isolation shut--off valve in the ”closed” position and vent all compressed air trapped between the compressor and the isolation shut--off valve in accordance with applicable lock out/ tag out procedures (example: OSHA CFR 29 § 1910.147).

The refrigerated dryer contains systems subject to high pressures. Before any maintenance work is carried out, vent and shut off all pipework under pressure.

Do not weld or braze on any pressurized components (e.g., pipes, tanks, fittings) or make any modifications that require heat treatment.

Attention! **Safety devices may not be modified or deactivated.**

Signs and labels of reference may not be removed or rendered unreadable.

Attention! **Any alterations or reconstruction carried out without consultation with and the previous consent of KAESER COMPRESSORS will invalidate the warranty.**

2.3 Refrigerant

Initial startup of and maintenance work on the refrigerant circuit may only be carried out by persons who have been trained in the safety concepts of refrigeration engineering.

Escaping compressed air and/or refrigerant can cause injury, frostbite, burns and lead to damage to the unit.
Safety data sheets explaining how to deal with refrigerant are available from KAESER COMPRESSORS Inc.

The refrigerant contained in the refrigerating system may not be vented to the open air. Always use a refrigerant recovery system when working on the refrigerant circulation.
Dispose of unusable refrigerant according to environmental regulations!

2.4 First Aid after Contact with Refrigerant

General: Remove damp clothing.

Inhalation:

☞ Remove victim to the fresh air.
Obtain medical attention in the case of breathing difficulties or nervous symptoms.

Skin:

☞ Rinse area with plenty of warm water.
Treat frostbite the same as burns. Obtain medical attention if pain persists or skin reddens.

Eyes:

☞ Open eyelids wide to allow product to evaporate.
Rinse immediately with open eyelids and plenty of running water for at least 10 minutes and seek medical advice if pain persists.

2.5 Spare Parts

The use of KAESER original parts guarantees safe and reliable operation of the refrigerated dryer.

2.6 Environmental Protection

Condensate drainage

The condensate accumulated during the drying of compressed air must be removed via a suitable drainage system, collected in special canisters and disposed of according to federal and local environmental regulations.

Maintenance materials/wear items/replacement parts

Ensure that all wear items, maintenance and replacement parts accumulated during operation of the refrigerated dryer are disposed of according to environmental regulations.

3 General

The service manual must always be available for use at the location of the refrigerated dryer.

3.1 Proper use

The refrigerated dryer is intended solely for drying compressed air.

Any other use outside of this purpose is considered improper. The manufacturer cannot accept liability for any damage caused by improper use; the user alone is liable for any risks incurred.

Proper use of the dryer includes compliance with the installation, removal, servicing, operation and maintenance instructions as specified by the manufacturer.

3.2 Improper use

Never direct compressed air toward persons. Compressed air is a concentrated form of energy and as such is dangerous to life.

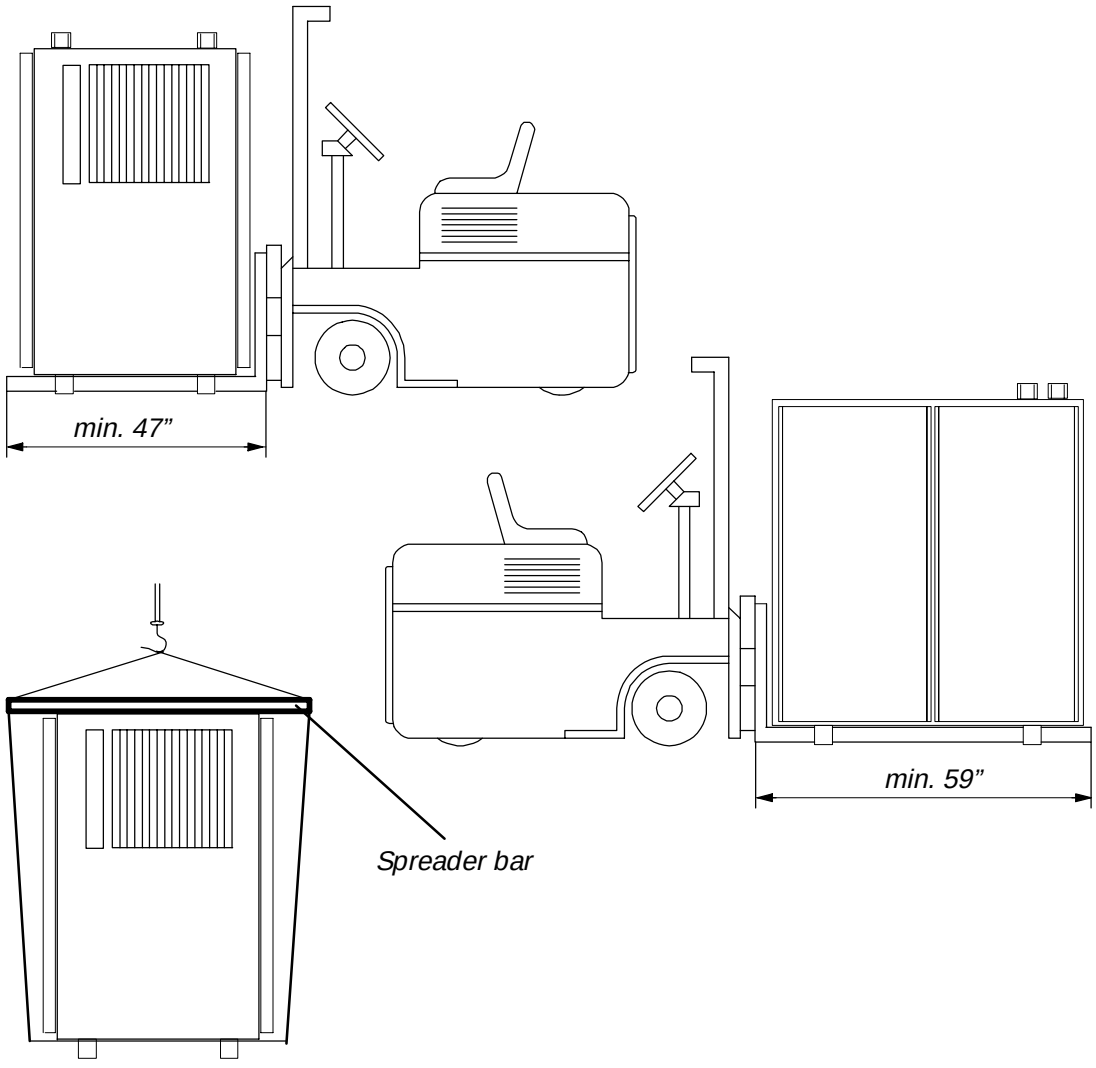
3.3 Copyright

4 Transport

4.1 Transport Instructions

Attention! **Under no circumstances lift the refrigerated dryer with the compressed air inlet and outlet connections or lay the refrigerated dryer on its side. Serious damage can result from such treatment of the refrigerated dryer.**
To prevent damage to the panelling of the refrigerated dryer always use a jack lift or a forklift truck for transport.

☞ Always mount the refrigerated dryer on a suitable transporting medium (pallet or wooden base) during transport.



Attention! **Do not exert any side forces on the refrigerated dryer with lifting equipment.**

4.2 Packaging

The packaging provided with this compressor as delivered is intended to safeguard the package against normal road transport damage. Please dispose of in an environmentally friendly way and arrange for it to be recycled if possible.

4.3 Temporary Storage

Store the refrigerated dryer in an enclosed space, regardless of whether it is packaged or not.

The storage temperature should not fall below –13°F and not rise above 140°F.

Attention! **Before initial start, wait until the temperature of the refrigerated dryer has adapted to the ambient temperature.**

5 Construction and Operation

Items referred to in ( ) correspond with the items in the Pipe and Instrument Flow Diagram (see chapter 5.5).

5.1 Construction

The main component of the refrigerated dryer comprises a combined heat exchanger (heat transmitter). It consists of the two following main groups:

1st. stage: air to air heat exchanger (1)

2nd. stage: air to refrigerant heat exchanger (2)

A condensate separating system (3) is fitted in series with the heat exchanger.

A safety pressure switch (9) is fitted in the refrigerant circulation system as a protection against excessive pressure.

A thermal overload switch protects the refrigerant compressor (11) against current overloads and high temperatures.

The refrigerant circulation is automatically regulated with a thermostat (13).

5.2 Functional Description

The dried compressed air is then rewarmed by flowing through the air to air heat exchanger (1) before leaving the refrigerated dryer.

The warm compressed air of high humidity entering the unit is initially cooled in the air to air heat exchanger (1) through heat exchange with the cooled compressed air leaving the unit.

The moisture precipitated in the air to air heat exchanger is drained via an automatic condensate drain (5).

Further cooling occurs in the air to refrigerant heat exchanger (2), connected in series with the air to air heat exchanger through the action of expanding, gassing refrigerant. This action causes the humid components of the compressed air to condense out when the pressure dewpoint is undercut.

The condensate separator, (3) connected in series, separates the condensed water and oil droplets, together with coarse dirt particles, from the compressed air. This condensate is removed from the system by an automatic condensate drain (5).

The cooling action of the refrigerated dryer causes the condensation and subsequent separation of the humid content of the compressed air.

The refrigerant compressor (11) is switched off by a thermostat if the refrigeration demand sinks and switched on again when the demand rises. Considerable savings in energy are possible with this principle of operation.

5.3 Refrigerant Circulation

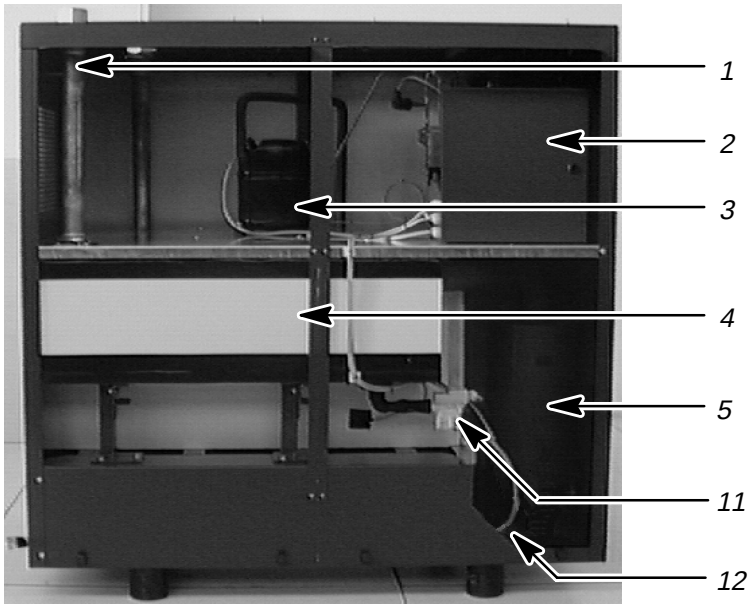
The dryer is able to cool the compressed air by using a refrigeration system not unlike a typical home refrigerator. Cooling is achieved by transferring heat from the compressed air to the refrigerant by vaporizing (boiling) the refrigerant, thereby turning the refrigerant into a gas. A more complete description of this process is given below:

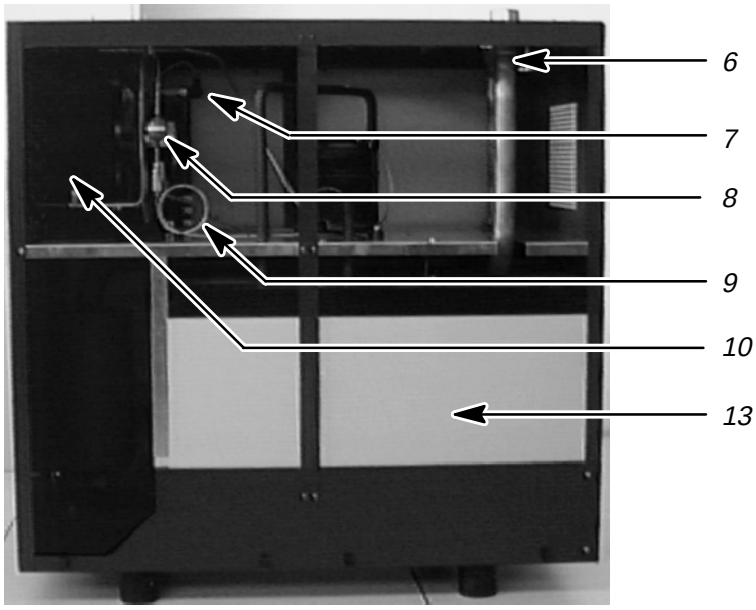
The refrigerant enters the hermetically sealed compressor (11) as a low pressure gas. The gas is compressed to a suitable pressure to ensure that the gas is nearly saturated. The high pressure refrigerant gas flows to the condenser (10) where heat is removed from the refrigerant. As the high pressure refrigerant gas is cooled, the refrigerant becomes a liquid.

The high pressure liquid is then forced through a capillary tube (7). By forcing the refrigerant through this restriction, the refrigerant becomes a low pressure liquid. The low pressure, liquid refrigerant enters the evaporator (2) where heat from the compressed air is transferred to the refrigerant. The added heat causes the refrigerant to boil and results in the refrigerant becoming a low pressure gas. This becomes an endless cycle which allows the refrigerant to simply remove heat from the compressed air and expel it to the ambient air.

5.4 Component Identification

Numbers in ( ) correspond to those in the Pipe and Instrument Flow Chart.
(P & I Flow Chart).

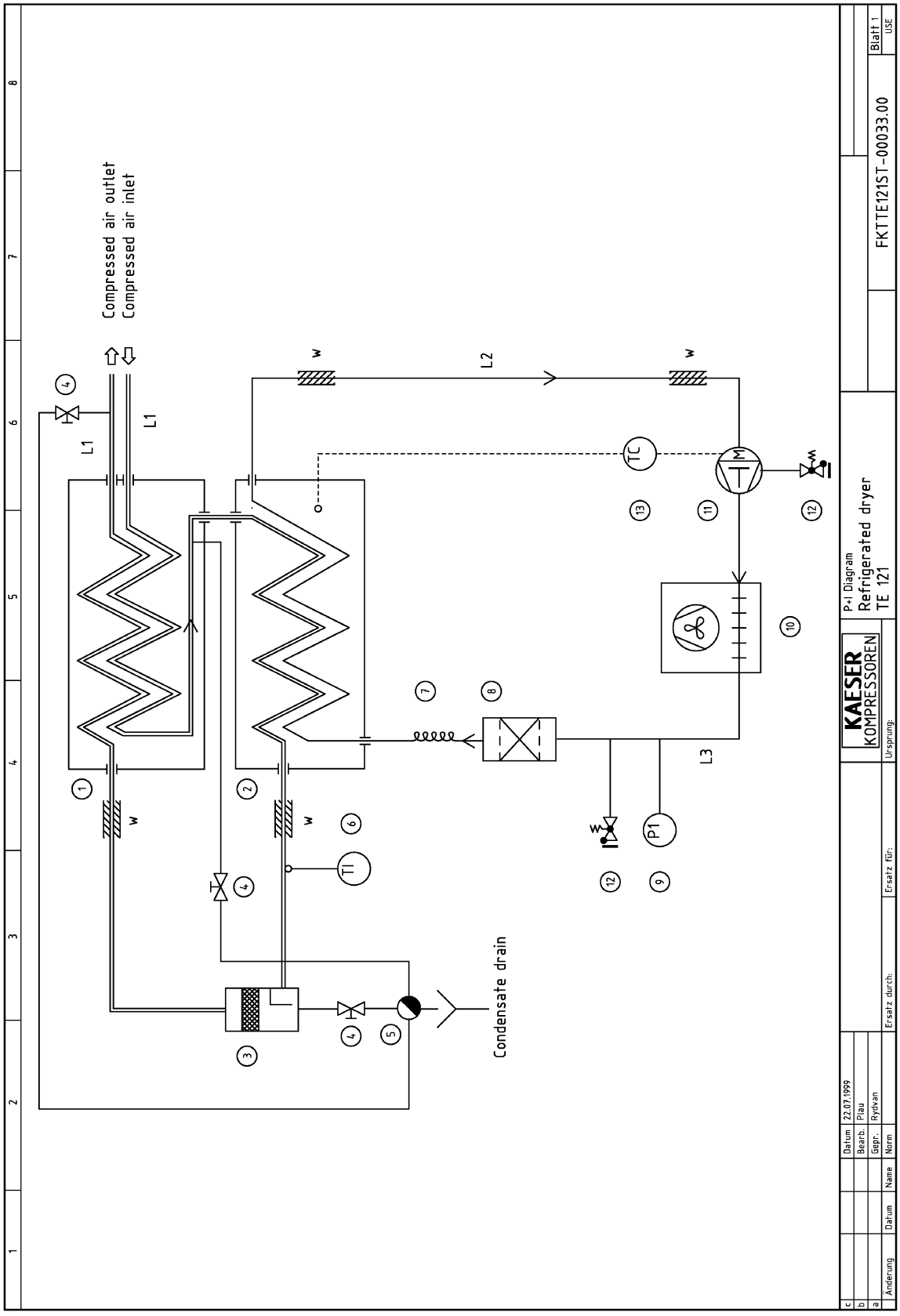




1 Compressed air outlet
2 Control cubicle
3 Refrigerant compressor (11)
4 Air to air heat exchanger (1)
5 Condensate separator (3)
6 Compressed air inlet
7 Safety pressure switch (9)
8 Filter dryer (8)
9 Capillary tube (7)
10 Refrigerant liquefier (10)
11 Condensate ECO–DRAIN (5)
12 Drain hose
13 Air to refrigerant heat exchanger (2)

5.5 Pipe and Instrument Flow Chart (P & I Flow Chart)

(see following pages)


Compressed air outlet
Compressed air inlet
L1
L2
L3
TC
TI
P1
Condensate drain
KAESER KOMPRESSOREN
P+I Diagram
Refrigerated dryer
TE 121
FKTTE121ST-00033.00
Blatt 1
Datum
Name
Änderung
Bearb.
Gepr.
Norm
Ersatz durch:
Ersatz für:
Ursprung:

1	2	3	4	5	6	7	8

1	Air/air heat exchanger	heat insulated
2	Air to refrigerant heat exchanger (Evaporator)	
3	Condensate separator	
4	Shut-off valve	
5	Condensate drain	
6	Pressure dew point indicator TI	
7	Capillary tube (Refrigerant injection)	
8	Filter dryer	
9	Safety pressure switch	
10	Refrigerant condenser (air cooled condenser)	
11	Refrigerant compressor (hermetic)	
12	Service connection (Schrader valve)	
13	Thermostat	

Piping:

L1	CU-Pipe 54 x 2,0 DIN 1708
L2	CU-Pipe 12 x 1,0 DIN 1708
L3	CU-Pipe 8 x 1,0 DIN 1708
w	heat insulated

c				Datum	22.07.1999		KAESER KOMPRESSOREN	P+I Diagram legend	
b				Bearb.	Plau			Refrigerated dryer	
a				Gepr.	Rydvan			TE 121	FKTTE121ST-00033.00 Blatt 2
	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung:		USE

6 Installation

6.1 Installation Requirements

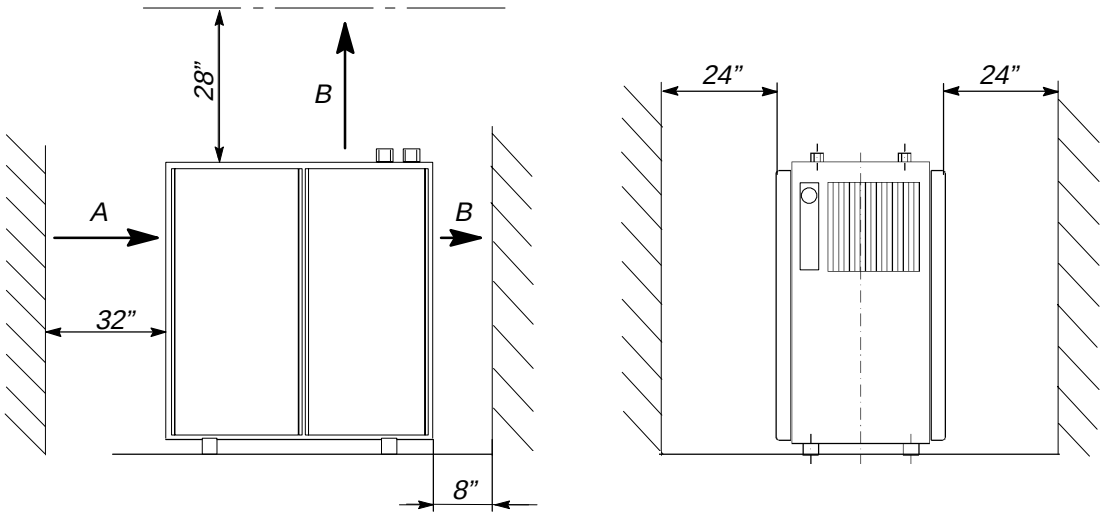
The refrigerated dryer must be installed in a dry and dust free space. To ensure adequate room for the maintenance of the refrigerated dryer, the minimum distances must be complied with (see following sketch).

Install the dryer on an even flat surface. Special foundations for the installation of the refrigerated dryer are not necessary.

See chapter 1.4 for the the ambient temperature and maximum height of the place of installation.

Attention! **To ensure adequate ventilation and air circulation, be sure to allow for the indicated minimum clearances at the cooling air inlet and exhaust.**

The refrigerated dryer must not be installed in the air inlet and/or cooling air outlet area of a compressor package.
The compressed air to be dried and the ambient air in the compressor space may not contain any acid--forming or other aggressive materials.



Measurements shown are minimum recommendations
A Cooling air inlet
B Cooling air outlet

Attention! **Installing of inlet and/or exhaust air ducting without prior written approval from of KAESER COMPRESSORS Inc. is not permitted.**

6.2 Compressed Air Connection

Attention! **Use flexible connecting pipes at the compressed air inlet and discharge to ensure vibration isolation, prevent strain on piping connections and allow easy installation.**
To avoid damage, do not overtighten the compressed air connections.

The refrigerated dryer is piped ready for operation.

Shut--off valves:

All power driven systems must be equipped with a main stop system for all forms of energy feed, the operation of which determines the start and stop of the energy supply to the system.

The compressed air inlet and outlet pipework must be provided with shut off arrangements (e.g. ball valves).

Bypass:

The compressed air inlet and outlet should be fitted with a bypass.

See diagram in chapter 1.10 for details of the bypass.

Installation notes:

Identification numbers in ( ) correspond to the diagram of the bypass in chapter 1.10.

☞ Screw the threaded part of the union fitting (60) (with sealing tape) into the corresponding connection for the compressed air inlet or outlet.

☞ Insert the flat gasket (70) and fit the bypass by screwing down and tightening the union nut of the fitting (60).

☞ Check the fittings for leakages.

See chapter 1.5 for the dimensions of the connector fittings.

6.3 Condensate Drain Connection

A hose connection is provided for drainage of the condensate. See chapter 1.5 for the dimensions.

Attention! **Use caution when attaching the condensation drain line to ensure that the condensate flow is not obstructed.**

The condensate must be drained and collected in a suitable container. It must be disposed of in accordance with federal and local environmental codes.

6.4 Electrical Connection

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

For fuse and wire recommendations, see chapter 1.6.

The refrigerated dryer is delivered completely wired, ready for connection to the power supply.This connection must be made as detailed in the electrical diagram (see chapter 11.1). See the dimensional diagram (see chapter 1.9) for the position and size of the cable entry into the refrigerated dryer.

Attention! **Maximum dual element time--delay fuses are selected according to 1996 N.E.C. Article 240--6, 430--52 and Tables 430--148 & 150.**

Select multi--strand copper core wire at 40˚C ambient temperature

according to 1996 N.E.C. 110--14(c), 220--3, 310--15, Table 310--16, 430--6, 430--22 and Tables 430--148 & 150.

Wire temperature rating:

1.25 x FLA (see chapter 1.6)	**wire temperature rating**	**correction factor for 40˚C**
≤ 100A	60˚C	0.82
> 100A	75˚C	0.88

6.5 Voltless Contacts

The refrigerated dryer is provided with the following volt–free alarm contacts for connection to an external alarm reporting system:

- Message: ”Control voltage ON”
- Message: ”High pressure dewpoint ”
- Message: “Malfunction condensate drain”

7 Preparation For Initial Start Up

7.1 Points to be Observed before Start Up

Every refrigerated dryer is tested in the factory and carefully checked before shipment. The test run confirms that the refrigerated dryer conforms to the manufacturer's specifications and operates as designed. However, independent of the checks made at the factory, the refrigerated dryer could be damaged during transport. For this reason, we recommend that the refrigerated dryer be examined for any damage. Inspect the refrigerated dryer carefully during the first hours of operation for any possible malfunction.

Attention! **The internal components of the refrigerated dryer are factory adjusted for correct operation. Adjustments may not be made to these components without prior written consultation with KAESER Compressors Inc.**

7.2 Points to be Observed before Switching On:

NON--OBSERVANCE OF THESE OR OTHER REFERENCES (WARNING; ATTENTION) CAN LEAD TO ACCIDENTS CAUSING INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

It is forbidden to operate the refrigeration dryer with the panelling removed removed because of the danger of injury to personnel.

☞ Remove all packaging materials, tools and transport securing devices on and in the refrigerated dryer.

- It is expected that the user employs safe working techniques when operating the refrigeration dryer and that all valid operating and safety provisions are followed.
- The operator of this refrigerated dryer unit is responsible for its safe working condition.
- The air in the compressor space and the compressed air to be dried may not contain any acid–forming or other aggressive matter.
- Do not connect the refrigerated dryer to a supply voltage different to that shown on the nameplate.
- Install the refrigerated dryer in a space that is not subject to freezing conditions. See chapter 1.4 for the minimum ambient temperature.
- Wait for the refrigerated dryer to warm up to the ambient temperature before putting into operation.

Carry out the following work only when the power supply is removed from the refrigerated dryer:

Check all screws on the electrical connections for tightness and tighten if necessary (carry out this check again after 50 operating hours).

7.3 Ready for Operation

Attention! **Do not start the refrigerated dryer until completing the following:**

- The refrigerated dryer is installed according to the conditions stated in chapter 6.
- All electrical connections, air piping and condensate lines are correctly connected and properly tightened.
- The shut–off valves in the compressed air inlet and outlet lines are closed.
- The condensate drainage line is free of obstructions.
- The refrigerated dryer is supplied with the correct voltage supply.
- The by-pass in the compressed air line between input and output lines is closed.

Attention! **Start the refrigerated dryer for approximately 15 minutes before opening the shut--off valves in the compressed air inlet and outlet lines.**

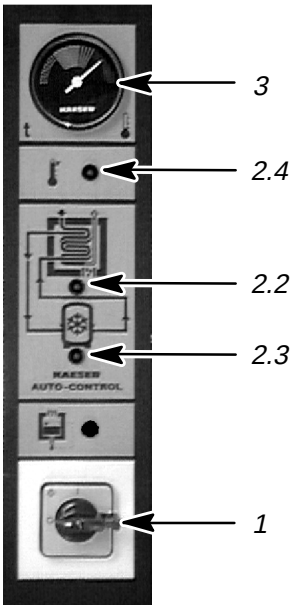
8 Operation

During operation of the refrigerated dryer, condensate is separated from the compressed air.

The condensate must be drained and collected in a suitable container. It must be disposed of according to Federal and local environmental codes.

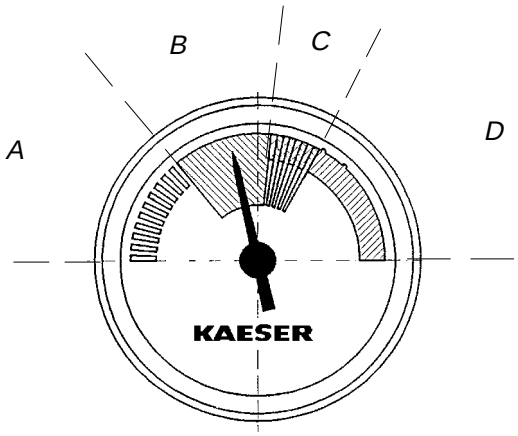
☞ Collect the accumulated condensate in a container and dispose of properly.

8.1 Instrument Panel



1 Main switch
2 KAESER–AUTO–CONTROL:
2.2 "Control Voltage ON" and thermal mass effective
2.3 "Refrigerant Compressor ON" indication
2.4 "High Dewpoint" alarm
3 Pressure dewpoint gauge

Explanation of the colored segment scale of the pressure dew point indication: (suction pressure gauge)



- ***A***

Blue--white range (low suction pressure) results in too low a pressure dewpoint due to:

– Evaporator temperature too low (evaporator freeze–up)

– Dryer too large or very low air demand. Refer to chapter 1.4

- ***B***

Green range (normal suction pressure) results in a normal pressure dew point.

- ***C***

Green--red range (elevated suction pressure) results in increased pressure dew point to:

– High ambient temperature

- ***D***

Red range (high suction pressure) results in too high a pressure dew point due to:

– Fault, see chapter 8.4.3 for help

8.2 Starting the Refrigerated Dryer

Attention! **Switch on the refrigerated dryer only if the conditions in chapter 7.3 ‘‘Ready for Operation’’ are fulfilled.**

☞ Check the refrigerated dryer according to chapter 7.3.

☞ Remove the padlock provided for protection against ‘‘inadvertent switch–on” of switch (1).

☞ Rotate the switch (1) to ‘‘I’’ (ON).

The refrigeration dryer is now in operation, the control lamp (3) illuminates indicating power on.

Depending on the temperature in the air to refrigerant heat exchanger, the refrigerant compressor switches on after the refrigeration dryer is switched on. Simultaneously the control lamp (2) ”Refrigerant Compressor ON ” illuminates.

If the control lamp (2) does not extinguish after approximately 15 minutes then a fault is apparent (see chapter 8.4.3).

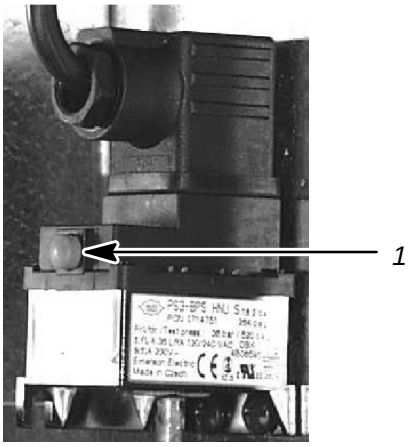
Attention! **Do not open the compressed air shut--off devices (inlet/outlet) until the control lamp (2) is extinguished.**

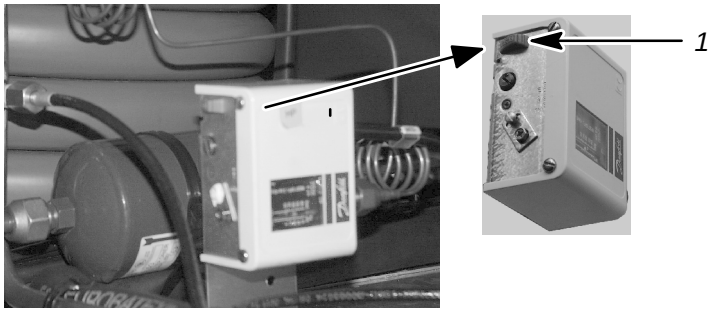
☞ Open the shut–off valve of the compressed air inlet slowly (admission of the compressed air).

☞ Open the shut–off valve of the compressed air outlet slowly.

The compressed air system is now connected to the refrigerated dryer.

Attention! **Press RESET if the safety pressure switch has shut down the refrigerated dryer.**





1 RESET

8.3 Stopping the Refrigerated Dryer

☞ Close the compressed air shut–off valves (inlet and outlet).

Attention! **The main switch (1) can be secured in the ” 0 ” position against inadvertent switch--on by a small padlock.**

☞ Turn switch (1) to ” 0 ” (OFF).

The refrigerated dryer is switched off and the control lamp is off.

8.4 Trouble shooting

The local safety regulations (see chapter 2) and the regulations detailed in the ”Safety” chapter must be complied with during trouble-shooting.

See chapter 7.3 and chapter 8.2. when starting the refrigerated dryer after the malfunction has been corrected.

8.4.1 Water in the compressed air system

Possible cause:	Remedy:
Moisture deposits in the compressed air pipe work that were formed before the dryer was started.	Blow out the compressed air pipe work with dry air until no more moisture condenses.
Bypass opened.	Close the bypass.
Compressed air inlet and outlet swapped.	Check the compressed air connections using the dimensional diagram.
The condensate is not drained out of the system.	Check the ECO–DRAIN (see chapter 9.2.4); Contact the authorized KAESER distributor.

8.4.2 High pressure losses via the refrigerated dryer

Possible cause:	Remedy:
Refrigerated dryer iced up on the air side.	Switch off the dryer until the air system has thawed. If the system ices up again after starting again, refer to authorized KAESER distributor.

8.4.3 Pressure dew point too high

Possible fault:	Remedy:
Ambient temperature too high.	Check the technical data, see chapter 1.2.
Compressed air inlet temperature is too high.	Check the technical data, see chapter 1.2.
Flow volume too high.	Check the technical data, see chapter 1.2.
Low refrigerant.	Refer to authorized KAESER distributor.
Defective refrigerant compressor.	Refer to authorized KAESER distributor.
Defective condenser fan motor.	Refer to authorized KAESER distributor.
High contamination component in the compressed air causing scale in the compressed air system.	Clean the compressed air system.
Condenser surface (refrigerant liquefier) contaminated.	See maintenance instructions chapter 9.2.2.

8.4.4 High compressed air losses

Possible fault:	Remedy:
Constant loss of pressure via the condensate drain.	Clean the ECO–DRAIN (see chapter 9.2.5).

8.4.5 Red LED on the ECO–DRAIN housing flashes

Possible cause:	Remedy:
Condensate not draining.	Check the ECO–DRAIN (see chapter 9.2.4); contact authorized KAESER distributor.

8.4.6 The safety pressure switch shuts down the refrigerated dryer

Possible fault:	Remedy:
Ambient temperature too high.	Check the technical data, see chapter 1.2.
Condenser surface (refrigerant liquefier) contaminated.	See maintenance instructions chapter 9.2.2.
Defective condenser fan motor.	Refer to authorized KAESER distributor.

9 Maintenance

9.1 Maintenance Instructions:

Before starting work, follow the procedure below to ensure the unit is not started or energized while maintenance work is being performed:

Work on the electrical equipment of the refrigerated dryer may only be carried out by a qualified electrician or trained personnel under the supervision of a qualified electrician according to local codes.

Lock the main disconnect in the ”off” position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the dryer does not restart.

Before starting work, carry out the following procedure to prevent inadvertent application of power to the refrigerated dryer:

☞ turn switch (1) to ‘‘ 0 ’’.

☞ lock out the switch (1) using a suitable padlock.

Before restarting the refrigerated dryer, ensure that:

- no maintenance personnel are working on the refrigerated dryer.
- all tools are removed from the refrigerated dryer.
- all guard and cover panels are properly installed and secured.

See chapter 7.3 and 8.2 for starting the refrigeration.

9.2 Regular Maintenance

Period	Work to be done	see chapter
Daily	Check the condensate outlet	9.2.3
50 hours after initial start	Clean the ECO–DRAIN	9.2.5
Every month	Check ECO–DRAIN for proper operation	9.2.4
	Clean the surface of the condenser	9.2.2
If necessary	Clean the ECO–DRAIN diaphragm valve	9.2.5
Every three month	General checks	9.2.1
Every year	Clean the ECO–DRAIN	9.2.5

The maintenance periods are recommended periods and may need to be adjusted based on installation and service conditions.

9.2.1 General checks

☞ Inspect the electrical components of the refrigerated dryer every two to three months. Correct any malfunctioning or worn components, such as loose connections or overheated cable immediately!

Escaping compressed air and/or refrigerant can cause injury to personnel and lead to damage to the dryer.

☞ Check all pipework, hoses and screwed fittings for leakage every two to three months and carry out a visual check for any external damage. Correct any faults immediately!

The refrigerant contained in the refrigerating system may not be vented to the open air. Always use a refrigerant recovery system when working on the refrigerant circulation.
Dispose of unusable refrigerant according to environmental regulations!

9.2.2 Cleaning the condenser

Clean the condenser every month.

☞ Stop the refrigerated dryer by turning the switch (1) to the “off” position.

☞ Lock the switch (1)with a suitable padlock to prevent unauthorized switch–on.

☞ Clean the cooling fins of the refrigerant liquefier by blowing compressed air from the outside to the inside.

See chapter 8.2 to start the refrigerated dryer.

9.2.3 Check the condensate outlet daily as follows:

Attention! **If neither condensate nor compressed air exits, clean the ECO--DRAIN. (See chapter 9.2.5)**

☞ Verify that condensate exits from the hose of the condensate drain outlet when the drain opens (the LED extinguishes for a short period).

9.2.4 Functional check of the ECO--DRAIN

Check monthly that the ECO–DRAIN functions correctly by pressing the TEST button on the cover. Observe the instructions in chapter 11.3 of the installation and operating manual for the ECO–DRAIN.

For possible malfunction cause, remedy and indication of operation status see service manual for ECO–DRAIN in chapter 11.3.

9.2.5 Cleaning the ECO--DRAIN

Clean the condensate drain monthly, or more frequently depending on the degree of contamination of the compressed air.

It is recommended that the ECO–DRAIN is cleaned after the first 50 hours of service.

Maintenance work on the ECO–DRAIN is only possible with the ECO–DRAIN removed.

Initial work:

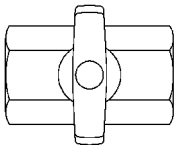
☞ Stop the refrigerated dryer by turning the switch (1) to the “off” position.

☞ Lock the switch (1)with a suitable padlock to prevent unauthorized switch–on.

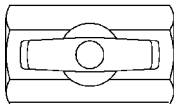
☞ Unscrew the two screws holding the left–hand side cover and remove the cover.

Before removing up the ECO--DRAIN it must be shut off from the compressed air.

☞ Close the shut–off valve in the air line to the ECO–DRAIN.



Shut–off valve closed



Shut–off valve opened

Removing the ECO--DRAIN:

☞ Depressurize the ECO–DRAIN by pressing the TEST pushbutton.

☞ Carefully remove the insulation on the ECO–DRAIN. Do not damage, the insulation will be needed again!).

☞ Unscrew all fittings for the feed lines on the ECO–DRAIN.

☞ Unscrew the venting line and condensate drain hose.

☞ Unscrew the fixing screws holding the ECO–DRAIN to the angle bracket.

☞ Take out the ECO–DRAIN.

Attention! **The ECO--DRAIN is still connected to the power supply cable.**

10 Spare Parts and After Sales Service

Provide the following details for all queries and spare parts orders: (see also the name plate)

Refrigerated dryer, model: . . . . . .

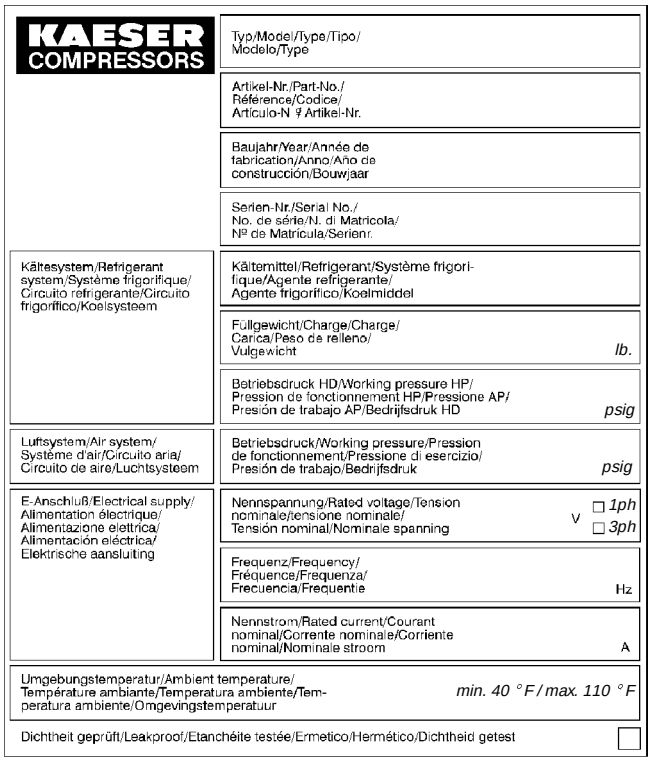
Serial number: . . . . . .

Part name: . . . . . .

Part order number: . . . . . .

Always provide the date of initial start up when making claims under warranty!

Name plate:



11 Appendix

11.1 Wiring Diagram

1	2	3	4	5	6	7	8

Wiring Diagram

air dryer TE 91/121/141

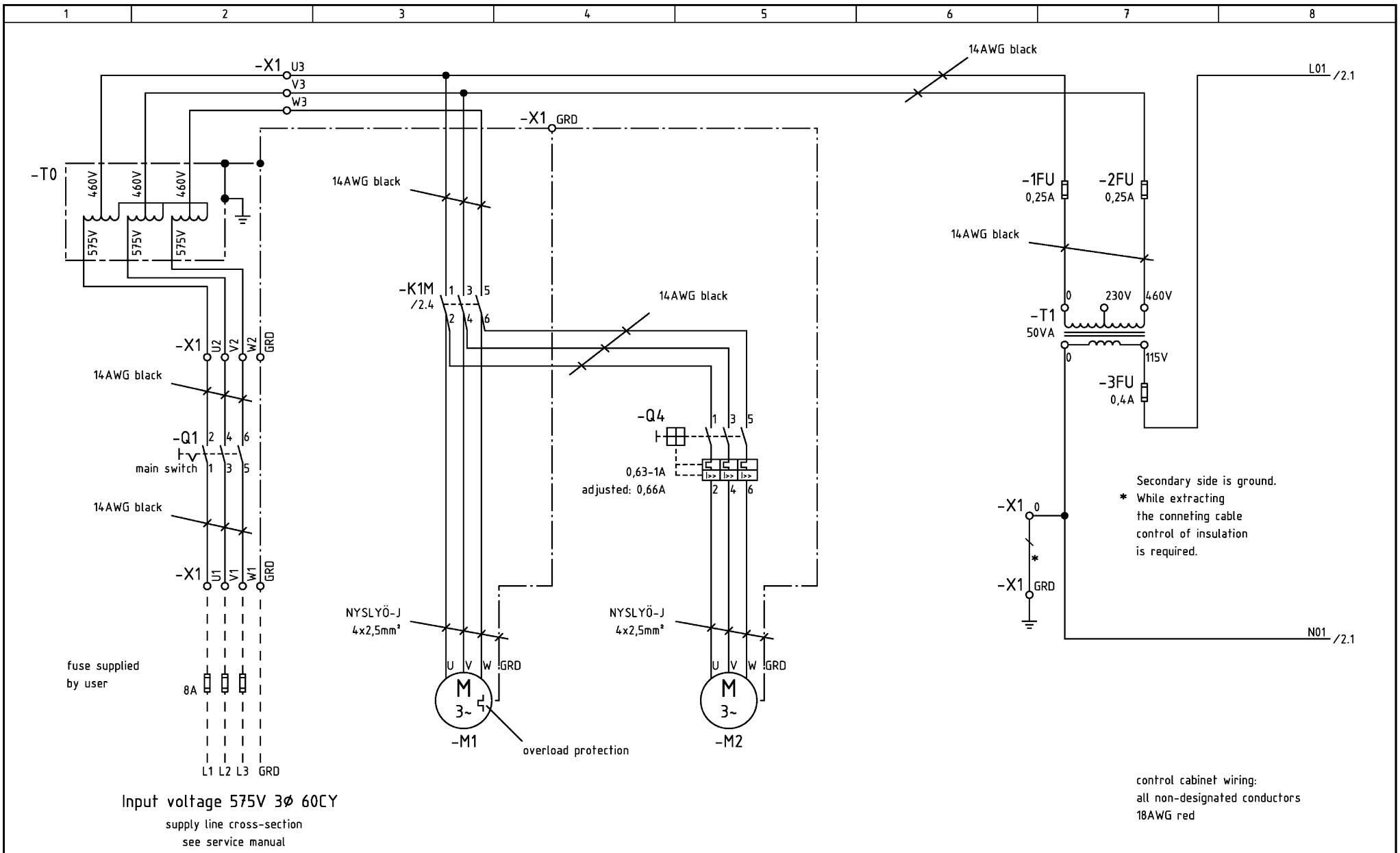
575V 3ø 60CY

manufacturer: KAESER COMPRESSORS
96450 COBURG
GERMANY

c				Datum	27.07.2001	USE		KAESER KOMPRESSOREN	cover page air dryer TE 91/121/141		=	
b				Bearb.	Sitter						+	
a				Gepr.	Gegner							
A	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: UTEU0909		DTE-U0910.00		Blatt 1 Bl.

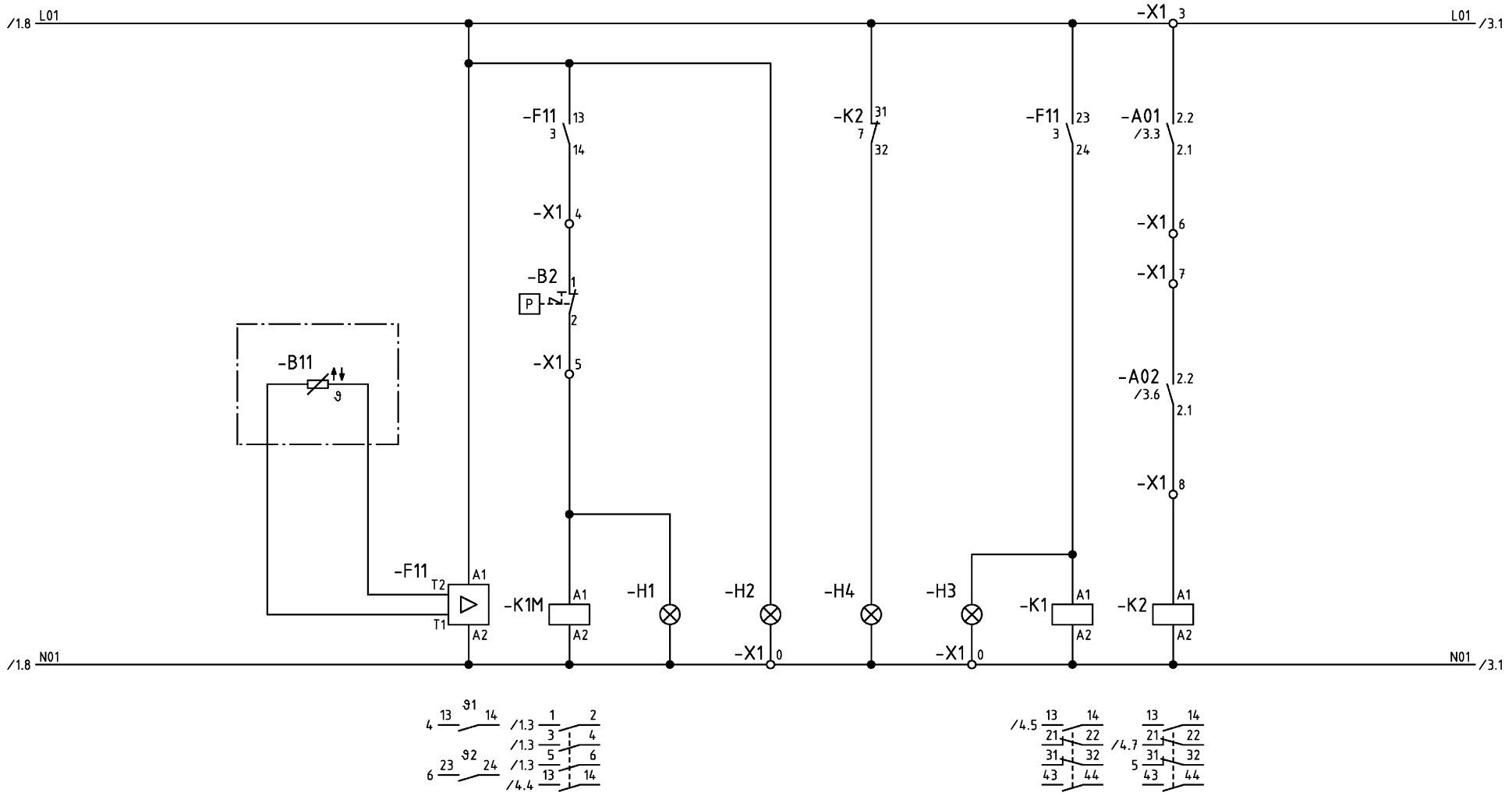
Lfd. Nr. No.	Benennung Name		Zeichnungsnummer (Kunde) Drawing No. (customer)	Zeichnungsnummer (Hersteller) Drawing No. (manufacturer)	Blatt Page	Anlagenkennzeichen Unit designation
1	cover page			DTE-U0910.00	1	
2	list of contents			ZTE-U0910.00	1	
3	wiring diagram	power unit/power supply		STE-U0910.00	1	
4	wiring diagram	control unit		STE-U0910.00	2	
5	wiring diagram	control unit		STE-U0910.00	3	
6	wiring diagram	Volt-free contacts		STE-U0910.00	4	
7	component legend			STE-U0910.00	5	
8	electrical component parts list	controller		GTE-U0910.00	1	
9	terminal connection	terminal strip -X1		KTE-U0910.00	1	
10	lay-out	control panel		ATE-U0910.00	1	

c				Datum	27.07.2001		KAESER KOMPRESSOREN	list of contents air dryer TE 91/121/141	=
b				Bearb.	Sitter				+
a				Gepr.	Gegner				ZTE-U0910.00 Blatt 1
B	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung:		Bl.

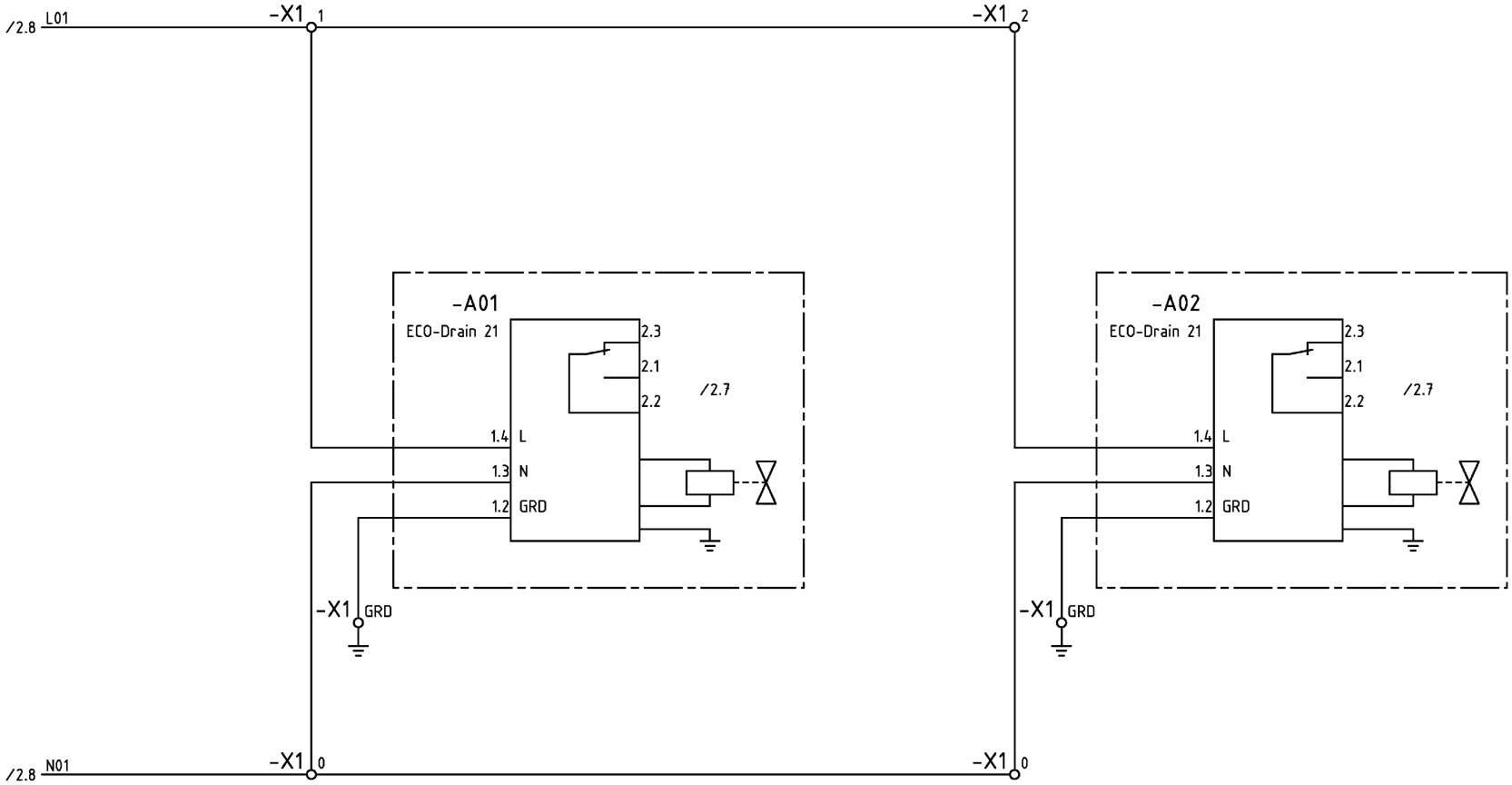


Function:	compressor motor with overload protection	vent motor	115V/1~/60CY
Group of function: Input voltage	power unit		control voltage tapping

c				Datum	27.07.2001		KAESER KOMPRESSOREN	wiring diagram air dryer TE 91/121/141 power unit/power supply	=
b				Bearb.	Sitter				+
a				Gepr.	Gegner				
D	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: UTEU0909	STE-U0910.00	Blatt 1 Bl.



Function:							control voltage ON		FAILURE - temperature		
Function:					NTC-temperature control		motor running		FAILURE - condensate drain		
Group of function:									control unit		
c				Datum	27.07.2001		KAESER KOMPRESSOREN	wiring diagram air dryer TE 91/121/141 control unit		=	
b				Bearb.	Sitter					+	
a				Gepr.	Gegner						
D	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: UTEU0909		STE-U0910.00	Blatt 2 Bl.

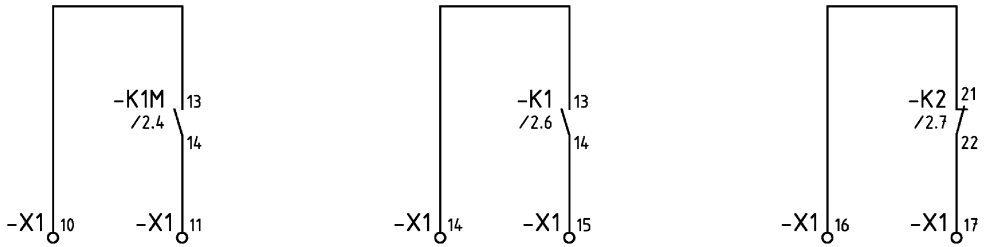


Function:	automatic condensate drain
Group of function:	

c				Datum	27.07.2001		KAESER KOMPRESSOREN	wiring diagram air dryer TE 91/121/141 control unit	=
b				Bearb.	Sitter				+
a				Gepr.	Gegner				
D	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: UTEU0909	STE-U0910.00	Blatt 3 Bl.

1	2	3	4	5	6	7	8

User's connection



all non-designated conductors,
16AWG yellow

Function:					motor running		high dew point		FAILURE condensate drain		
Group of function:					Volt-free contacts						
c				Datum	27.07.2001		KAESER KOMPRESSOREN	wiring diagram air dryer TE 91/121/141 Volt-free contacts		=	
b				Bearb.	Sitter					+	
a				Gepr.	Gegner						
D	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: UTEU0909		STE-U0910.00	Blatt 4 Bl.

-A01,-A02	automatic condensate drain
-B2	safety air pressure switch
-B11	NTC-temperature probe
-1FU,-2FU	primary control fuse
-3FU	secondary control fuse
-Q4	circuit breaker
-F11	NTC-thermostat
-H1,-H2,-H3,-H4	LED indicator
-K1,-K2	control relay
-K1M	motor starter
-M1	compressor motor with overload protection
-M2	vent motor
-Q1	main switch
-T0	auto-transformer
-T1	control transformer
-X1	terminal strip

c				Datum	27.07.2001		KAESER KOMPRESSOREN	component legend air dryer TE 91/121/141		=	
b				Bearb.	Sitter					+	
a				Gepr.	Gegner					STE-U0910.00	Blatt 5
E	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: UTEU0909				Bl.

1	2	3	4	5	6	7	8

A Stück-zahl Qty.	B Benennung und Verwendung Description and function	C Fabrikatsbezeichnung Typ; Bestell-Nr.; Unterlagen-Nr.; Normkurzbezeichnung notwendige techn. Daten, z.B. Steuerspannung, Frequenz, Einstellbereich Identification data Type; order No.; document No.; equipment code No.; basic technical data				D Lfd. Nr. Item	E Betriebsmittel-Kennz. nach DIN 40719, Teil 2 Identifying symbol of device	F Stromlaufplan Planabschnitt Circuit diagramm sheet No.; section No.	G Einbauort Location	Concerns only the manufacturer Wst.-Nr. H Schabl. Nr.	I BZ-Pos.	J VA Kz. *)	K Eingangs-vermerk
1	controller			7.4549.3	CKC								
1	control panel	336x366x2,5		203379.10010	CKC								
1	motor starter	A9-30-10-89	115V	7.5750.00010	ABB		-K1M						
1	circuit breaker	MS225-1	0,63-1A	7.4526.00010	ABB		-Q4						
2	control relay	K6-22Z	115V	7.2088.00010	ABB		-K1,-K2						
1	control transformer	50VA	230-460/115V	7.3902.00020	Block		-T1/-3FU						
1	secondary control fuse	5x20	0,4A	891336.0			-3FU						
1	fuse socket	USM 2	2-pole	7.3320.00020	Pump		-1FU,-2FU						
2	primary control fuse, 230V	ATQ 0,25	0,25A	7.3161.00150	Pump		-1FU,-2FU						
1	NTC-thermostat	TRN 122K-2-4	115V	7.4690.20050	Ziehl		-F11						
1	terminal strip			7.3165.10060	Wago		-X1						
6	series terminal	281-601		896168.0	Wago		-X1						
1	GRD terminal	281-607		896170.0	Wago		-X1						
	operating panel:												
1	Emergency Stop/main switch	KG20A	3-pole	890939.0	Solenoid		-Q1						
2	LED indicator	19511331	green	7.5720.0	EBT		-H1,-H2						
1	LED indicator	19511332	yellow	7.5720.00020	EBT		-H3						
1	LED indicator	19511330	red	7.5720.00010	EBT		-H4						
1	auto-transformer	575/460V		7.5452.00050	Block		-T0						

Bei Nachbestellung von Geräten und Maschinen sind alle in den stark umrandeten Spalten B und C angegebenen Daten aufzuführen. Die Daten in den Spalten D bis G sind zusätzlich unter Nennung dieser Gerätestücklisten-Nummer anzugeben, soweit sie die Beantwortung technischer Rückfragen erleichtern. Für Ersatzteilbestellung ist zusätzlich die Angabe der Fabriknummer erforderlich, falls diese auf dem Typenschild des Erzeugnisses genannt ist.

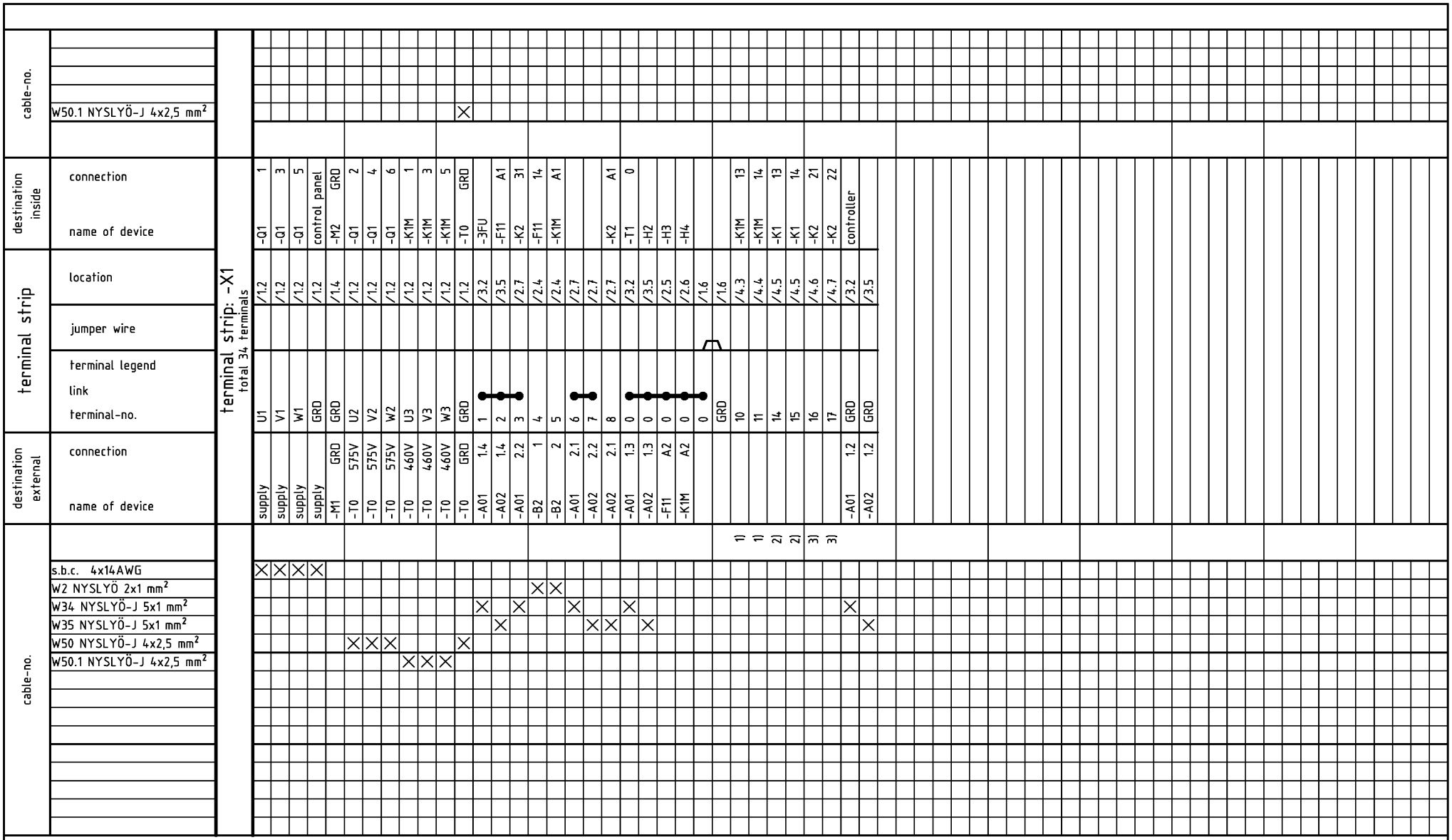
In Zweifelsfällen gilt die deutsche Fassung.

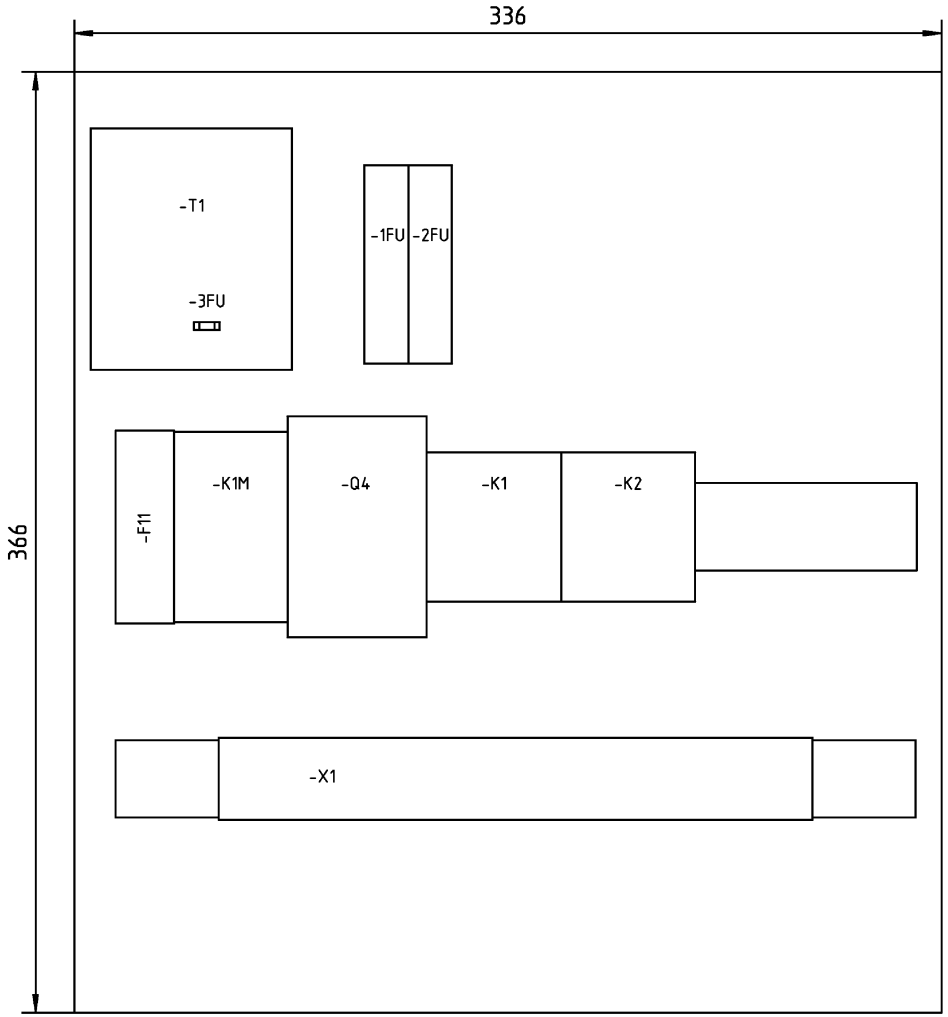
When reordering the equipment, all data enclosed by the heavy lines of columnes B and C should be stated. In addition, the data in columnes D to G should be given together with the No. of this list of equipment, insofar as they ar helpful in answering technical enquiries. When ordering spare parts, also quote the serial No. of the product if stated on the rating plate.

The German version applies in cases of doubt.

*) Versandanschrift - Kennzeichen

c				Datum	27.07.2001		KAESER KOMPRESSOREN	electrical component parts list		=	
b				Bearb.	Sitter			air dryer TE 91/121/141		+	
a				Gepr.	Gegner			controller		GTE-U0910.00	Blatt 1
F	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung: UTEU0909			Bl.


cable-no.
W50.1 NYSLYÖ-J 4x2,5 mm²
destination inside
connection
name of device
terminal strip
location
jumper wire
terminal legend
link
terminal-no.
destination external
connection
name of device
terminal strip: -X1
total 34 terminals
cable-no.
s.b.c. 4x14AWG
W2 NYSLYÖ 2x1 mm²
W34 NYSLYÖ-J 5x1 mm²
W35 NYSLYÖ-J 5x1 mm²
W50 NYSLYÖ-J 4x2,5 mm²
W50.1 NYSLYÖ-J 4x2,5 mm²
Volt-free contacts, User's connection
1) motor running
2) high dew point
3) FAILURE condensate drain
s.b.c. = supplied by customer
KAESER
KOMPRESSOREN
terminal connection
air dryer TE 91/121/141
terminal strip -X1
KTE-U0910.00
Blatt 1
Datum 27.07.2001
Bearb. Sitter
Gepr. Gegner
Anderung Datum Name Norm
Ersatz durch:
Ersatz für:
Ursprung:



c				Datum	27.07.2001		KAESER KOMPRESSOREN	lay-out air dryer TE 91/121/141 control panel	=
b				Bearb.	Sitter				+
a				Gepr.	Gegner				
l	Änderung	Datum	Name	Norm		Ersatz durch: / Ersatz für:	Ursprung: UTEU0909	ATE-U0910.00	Blatt 1 Bl.

11.2 Maintenance Schedule

Refrigerated dryer, model: **Serial number:**			
Date	Description of work	Operating hours	Signature

11.3 Installation and Service Manual for ECO – DRAIN

Installations- und Betriebsanleitung deutsch
Instructions for installation and operation english
Instructions de montage et de service français
Installatie- en Gebruiksaanwijzing nederlands

ECO-DRAIN 21
ECO-DRAIN 21PLUS

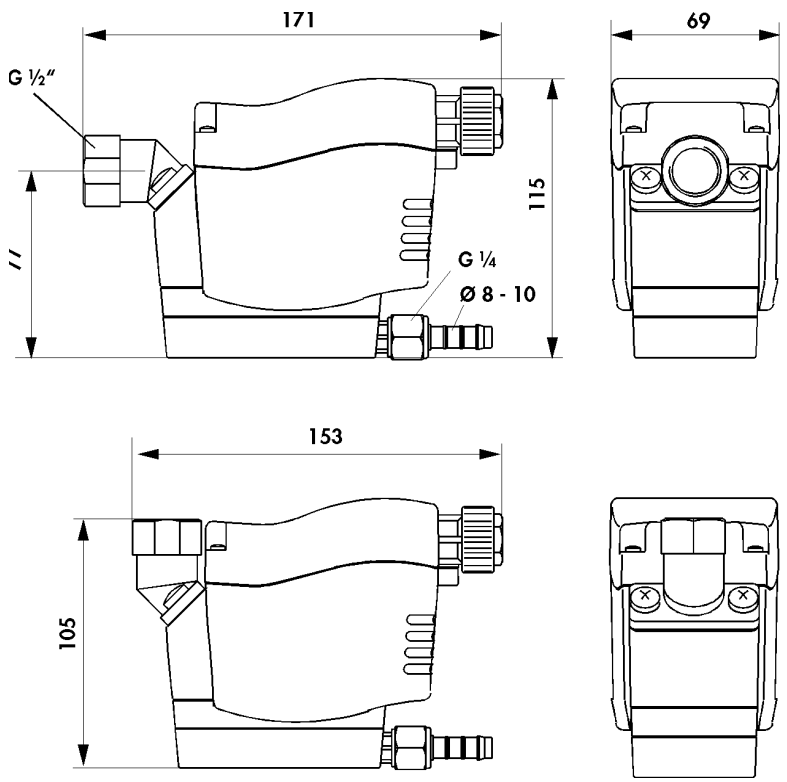
Sehr geehrter Kunde,
vielen Dank, daß Sie sich für den Kondensatableiter ECO-DRAIN entschieden haben. Bitte lesen Sie vor Montage und Inbetriebnahme des ECO-DRAIN diese Installations- und Betriebsanleitung aufmerksam und befolgen Sie unsere Hinweise. Nur bei genauer Beachtung der beschriebenen Vorschriften und Hinweise ist die einwandfreie Funktion des ECO-DRAIN und damit eine zuverlässige Kondensatableitung sichergestellt.

Dear Customer,
Thank you for deciding in favour of the condensate drain ECO-DRAIN. Please read the present instructions carefully before installing your ECO-DRAIN unit and putting it into service. The perfect functioning of the condensate drain ECO-DRAIN - and thus reliable condensate discharge - can only be guaranteed if the recommendations and conditions stated here are adhered to.

Cher client,
Vous venez d'acquérir un purgeur de condensat ECO-DRAIN et nous vous en félicitons. Nous vous recommandons de lire attentivement ces instructions avant le montage et la mise en service du ECO-DRAIN et de suivre nos conseils. Car, seul le respect scupuleux des prescriptions et consignes données, peut garantir le parfait fonctionnement du ECO-DRAIN et une purge fiable du condensat.

Geachte klant,
Wij danken u voor het aanschaffen van de kondensaatafvoer ECO-DRAIN. Wij verzoeken u voor installatie en ingebruikname van de ECO-DRAIN eerst deze handleiding goed door te lezen. Alleen door het opvolgen van de voorschriften is een goede werking van de ECO-DRAIN en daardoor een ongestoorde kondensaatafvoer gegarandeerd.

Daten/Hinweise • Data/Notes
Characteristiques/Avis • Gegevens/Aanwijzingen



CE

IP 65

min./max. Temperatur min./max. temperature Température min/max Min./max. temperatuur	+1/+60 °C
Kondensatzulauf Condensate feed Entrée du condensat Kondensaatinvoer	G ½
Kondensatablauf (Schlauch) Condensate discharge (hose) Sortie du condensat (flexible) Kondensaatafvoer	G ¼ ø 8 - 10 mm

max. Kompressorleistung peak compressor performance Capacité maximale du compresseur Max. compressorcapaciteit	4 m³/min	**siehe Seite 20 / see page 20 voir page 20 / zie blz. 20**
max. Kältetrocknerleistung (nur mit Vorabscheidung) peak refrigeration dryer performance (only with preseparation) Capacité max. du sécheur frigo (uniquement avec pré-separation) Max. koeldrogercapaciteit (alleen met voorafscheiding)	8 m³/min	
max. Filterleistung (hinter Trockner) peak filter performance (downstream of dryer) Capacité maximale du filtre (en aval du sécheur) Max. filtercapaciteit (achter koeldroger)	40 m³/min	
min./max. Betriebsdruck operating pressure, min./max. Pression de service min/max Min./max. bedrijfsdruk	0,8 ... 16 bar	
Gewicht (leer) weight (empty) Poids (à vide) Gewicht (leeg)	0,7 kg	
Kondensat condensate Condensat Kondensaat	ölhaltig + ölfrei oil-contaminated + oil-free huileux + non huileux oliehoudend + olievrij	
Gehäuse housing Boîtier Behuizing	Kunststoff, glasfaserverstärkt plastic, glass fiber Matière plastique renforcée par fibres de verre Kunststof, glasvezel	

deutsch

SICHERHEITSHINWEISE

1. Max. Betriebsdruck nicht überschreiten (siehe Typenschild)!
ACHTUNG! Wartungsarbeiten nur im drucklosen Zustand durchführen!

2. Nur druckfestes Installationsmaterial verwenden!
Zulaufleitung (G½) fest verrohren. Ablaufleitung: kurzer Druckschlauch an druckfestes Rohr. Verhindern Sie, daß Personen oder Gegenstände von Kondensat getroffen werden können.

3. Werden am Zulauf konische Verschraubungen verwendet, übermäßige Anzugskräfte vermeiden.

4. Bei Montage Schlüsselfläche am Zulauf (SW27) zum Gegenhalten benutzen!

5. Bei elektrischer Installation alle geltenden Vorschriften einhalten (VDE 0100)!
ACHTUNG! Wartungsarbeiten nur im spannungsfreien Zustand durchführen! Alle elektrischen Arbeiten dürfen nur von befugtem Fachpersonal durchgeführt werden.

6. Gerät nicht bei Frostgefahr betreiben.

7. ECO-DRAIN ist nur bei anliegender Spannung funktionstüchtig.

8. Test-Taster **nicht** zur Dauerentwässerung nutzen!

9. ECO-DRAIN nicht in explosionsgefährdeten Bereichen einsetzen.

10. Nur Original-Ersatzteile verwenden! Andernfalls erlischt die Garantie.

english

SAFETY RULES

1. Do not exceed max. operating pressure (see type plate)!
NOTE: Maintenance work must only be carried out when the device is not under pressure!

2. Only use pressure-proof installation material!
The feed line (½") must be firmly fixed. Discharge line: short pressure hose to pressure-proof pipe. Please ensure that condensate cannot squirt onto persons or objects.

3. If conical connectors are used on the inlet side, avoid excessive tightening of the connectors.

4. For locking or holding in position **during installation, use spanner area** at inflow point (spanner size 27)!

5. The electrical installation must be carried out in compliance with the valid regulations!
NOTE: Maintenance work is only allowed when the device is in a de-energized condition! Electrical work must always be performed by a qualified electrician.

6. Do not operate the device when there is a danger of frost.

7. The ECO-DRAIN condensate drain will only function when voltage is being applied to the device.

8. Do not use the test button for continuous draining.

9. Do not use the ECO-DRAIN device in hazardous areas (with potentially explosive atmospheres).

10. Only employ original spare parts, otherwise the guarantee will no longer be valid.

français

CONSIGNES DE SÉCURITÉ

1. Ne pas dépasser la pression de service maximale (voir plaque signalétique) !
ATTENTION ! Dépressuriser le purgeur avant toute intervention d'entretien !

2. N'utiliser que du matériel d'installation résistant à la pression !
Conduite d'arrivée: toujours en tuyauterie rigide et fixe (½"). Conduite d'évacuation: flexible de faible longueur relié à un tube, tous deux résistant à la pression. Evitez que des personnes ou objets puissent être touchés par le condensat.

3. Ne pas utiliser de raccords à filetage conique !

4. Lors du montage, utiliser le méplat pour clé de 27mm situé à l'entrée du purgeur !

5. Lors de l'installation électrique, respecter toutes les prescriptions en vigueur (VDE 0 100)!
ATTENTION ! Avant toute intervention de maintenance, mettre l'installation hors tension ! Toute intervention électrique doit être réalisée exclusivement par un personnel qualifié et autorisé.

6. Utiliser l´appareil dans un local hors-gel ou équipé d´un chaffage.

7. Le ECO-DRAIN n'est opérationnel que s'il est sous tension.

8. Ne pas utiliser la touche Test pour une purge permanente.

9. Ne pas utiliser le ECO-DRAIN dans les atmosphères explosibles.

10. Utiliser exclusivement des pièces de rechange d'origine. Dans le cas contraire, la garantie est annulée.

nederlands

VEILIGHEIDSVOORSCHRIFTEN
1. Max. bedrijfsdruk niet overschrijden (zie typeplaatje)! PAS OP! Onderhoudswerkzaamheden uitsluitend uitvoeren in spanningsloze toestand.

2. Alleen drukbestendig installatiemateriaal gebruiken!
Voor de toevoerleiding een pijp (½"), voor de afvoerleiding een hogedrukslang of leiding ½" gebruiken. Pas op, dat personen en voorwerpen niet door het kondensaat geraakt kunnen worden.

3. Wanneer konische verbindingen worden gebruikt mogen deze niet te krachtig worden aangedraaid om beschadigingen te voorkomen aan de kondensaatinvoer.

4. Bij montage van de toevoerleiding het aansluitstuk vasthouden met sleutelmaat 27 (SW27)!

5. De elektrische installatie alleen uitvoeren volgens de geldende voorschriften!
PAS OP! Onderhoudswerkzaamheden alleen uitvoeren in spanningsloze toestand. Werkzaamheden mogen alleen worden uitgevoerd door daarvoor bevoegd personeel.

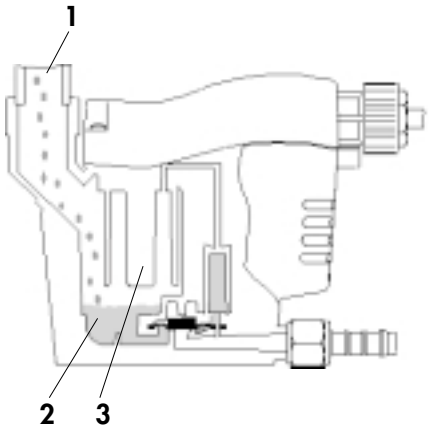
6. Bij vorstgevaar de ECO-DRAIN niet bedienen.

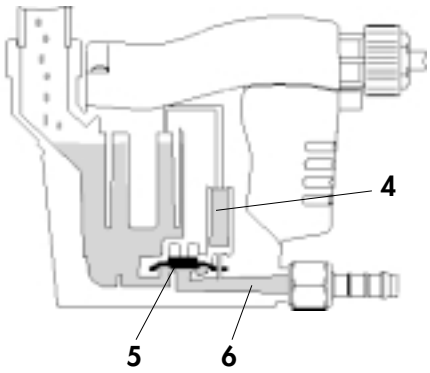
7. De ECO-DRAIN functioneert alleen bij ingeschakelde netspanning.

8. De testschakelaar niet voor continue-drainage gebruiken.

9. De ECO-DRAIN niet in explosiegevaarlijke ruimten gebruiken.

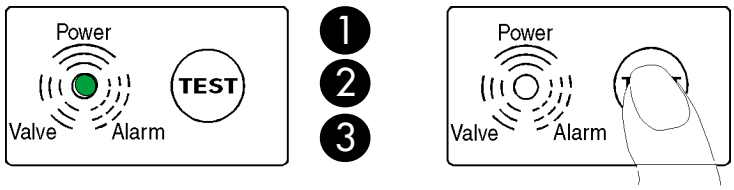
10. Gebruik bij onderhoud alleen originele onderdelen, daar anders de garantie op goede werking vervalt.





Das Kondensat strömt über die Zulaufleitung (**1**) in den ECO-DRAIN und sammelt sich im Gehäuse (**2**). Ein kapazitiv arbeitender Sensor (**3**) erfaßt permanent den Füllstand und gibt ein Signal an die elektronische Steuerung, sobald sich der Behälter gefüllt hat. Das Vorsteuerventil (**4**) wird betätigt und die Membrane (**5**) öffnet zur Kondensatausschleusung die Ablaufleitung (**6**).
Ist der ECO-DRAIN geleert, wird die Ablaufleitung rechtzeitig wieder dicht verschlossen, bevor unnötiger Druckluftverlust entstehen kann.

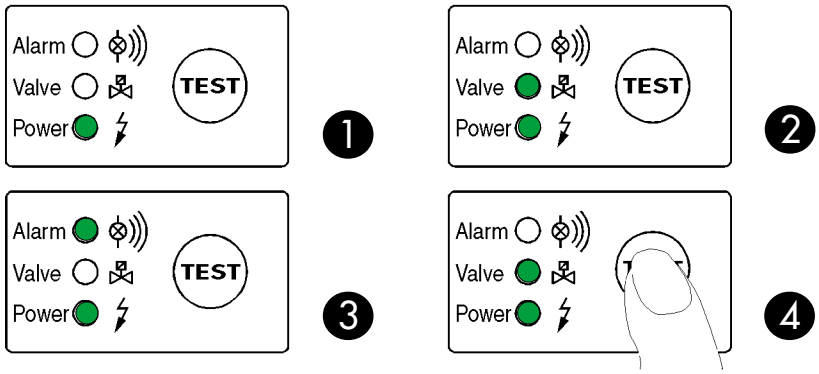
ECO-DRAIN 21



Bei dem ECO-DRAIN 21 zeigt **eine** LED die einzelnen Betriebszustände durch unterschiedliche Blinkfrequenz an.

1. Betriebsbereit
   Spannung liegt an
2. Ableitvorgang
   Ablaufleitung ist geöffnet

ECO-DRAIN 21 PLUS

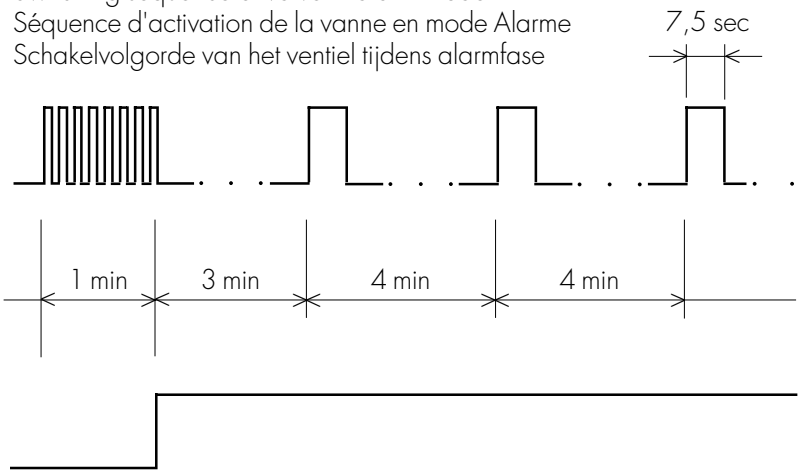


Ist der Kondensatablauf gestört, öffnet das Ventil taktweise (ca. alle3 Sek.), um die Störung selbsttätig zu beheben:

3. Störung /Alarm
4. Test der Ventilfunktion (manuelle Entwässerung): Taster ca. 2 Sekunden betätigen

Zusätzlich bei ECO-DRAIN 21 PLUS
Test der Alarmfunktion (s.u.): Taster mind. 1 Minute betätigen

Schaltfolge des Ventils im Alarmmodus
Switching sequence of valve in alarm mode
Séquence d'activation de la vanne en mode Alarme
Schakelvolgorde van het ventiel tijdens alarmfase



Alarmmeldung über potentialfreien Kontakt (nur ECO-DRAIN 21 PLUS)
Alarm signal via potential-free contact (only ECO-DRAIN 21 PLUS)
Signal d'alarme délivré sur le contact sans potentiel (uniqu. ECO-DRAIN 21 PLUS)
Alarmmelding via potentiaalvrij contact (allen ECO-DRAIN 21 PLUS)

Der ECO-DRAIN 21 PLUS besitzt zusätzlich eine Alarmmodus - Funktion:

Ist die Störung nach 1 Minute nicht behoben, wird eine Störmeldung ausgelöst:

- Die Alarm-LED blinkt
- Das Alarmrelais schaltet um (das Signal ist potentialfrei abgreifbar)
- Das Ventil öffnet alle 4 Minuten für 7,5 Sekunden

Ist die Störung behoben, schaltet der ECO-DRAIN 21 PLUS automatisch in den Normalmodus zurück.

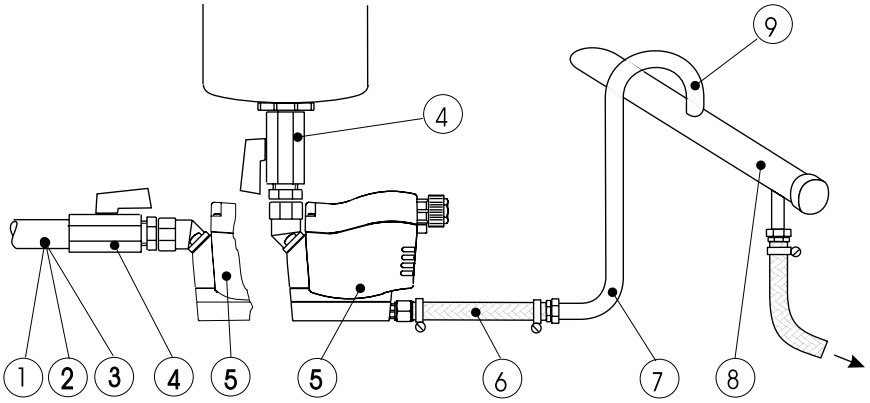
Mögliche Störungsursachen sind z.B.:

- Fehler in der Installation
- Unterschreiten des Minimaldruckes
- zu hoher Kondensatanfall (Überlast)
- verstopfte/gesperrte Ablaufleitung
- extreme Schmutzpartikelmenge
- eingefrorene Rohrleitungen

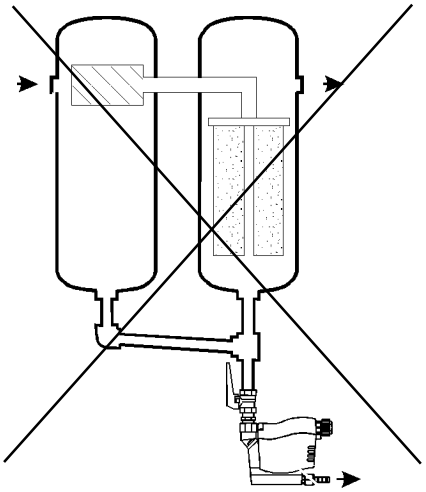
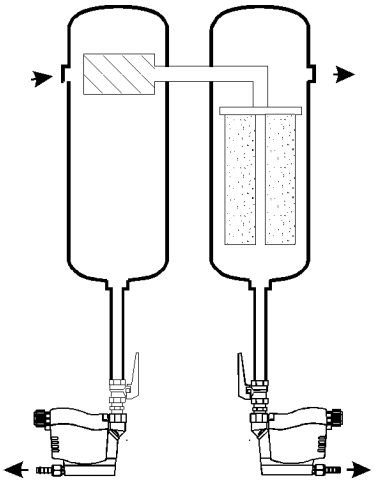
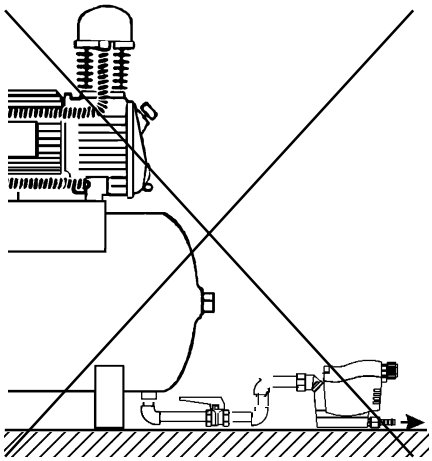
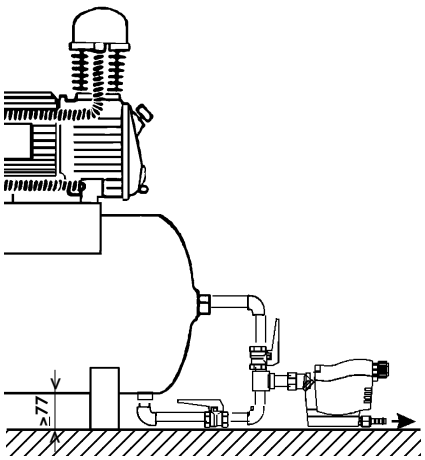
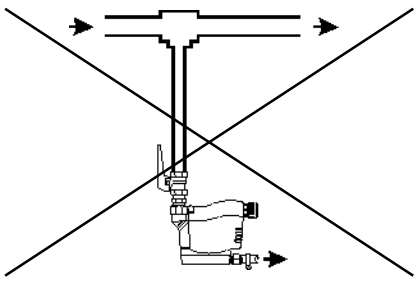
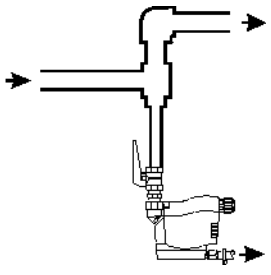
english	français	nederlands
The condensate flows through the feed line (1) into the ECO-DRAIN unit and accumulates in the container (2). A capacitive sensor (3) continuously registers the liquid level and passes a signal to the electronic control as soon as the container is filled. The pilot valve (4) is then activated and the diaphragm (5) opens the outlet line (6) for discharging the condensate. When the ECO-DRAIN unit has been emptied, the outlet line is closed again quickly and tightly without wasting compressed air.	Amené dans le ECO-DRAIN par la conduite d'arrivée (1), le condensat est collecté dans le réservoir (2). Une sonde capacitive (3) surveille en permanence le niveau de remplissage et envoie un signal à la commande électronique dès que le réservoir est rempli. L'électrovanne pilote (4) est activée et la membrane (5) ouvre la conduite d'évacuation (6) pour l'éclusage du condensat. Dès que le ECO-DRAIN est vide, la conduite d'évacuation est à nouveau refermée avec une parfaite étanchéité, avant même que l'air comprimé ne puisse s'échapper.	Het kondensaat stroomt door de toevoerleiding (1) in de ECO-DRAIN en verzamelt zich in het reservoir (2). De capacitieve sensor (3) registreert permanent het kondensaatniveau en geeft een signaal aan de elektronica, zodra het reservoir gevuld is. De ventieleenheid (4) treedt hierdoor in werking en het membraan (5) wordt omhoog gedrukt. Het kondensaat kan hierdoor in de afvoerleiding (6) stromen. Als het reservoir van de ECO-DRAIN geleegd is, wordt de afvoer weer gesloten, voordat er onnodig verlies van dure perslucht kan plaatsvinden.
The operating states of the ECO-DRAIN 21 are indicated by one LED with different flashing frequencies. 1 Ready for operation Power on 2 Discharge procedure Outlet line open If the condensate discharge is not functioning properly, the valve will keep opening (about every 3 seconds) so as to clear the fault automatically, if possible. 3 Malfunction / Alarm 4 Test of valve function and manual drainage: briefly press button. Additional feature of the ECO-DRAIN 21 PLUS: press button for > 1 minute to test the alarm function (s. below).	Sur le ECO-DRAIN 21, les états de fonctionnement sont affichés par **une** LED avec diverses fréq. de clignotement. 1 Prêt à fonctionner Tension d'alimentation présente 2 Phase de purge Conduite d'évacuation ouverte Si l'écoulement du condensat est pertubé, la vanne s'ouvre par intermittences (toutes les 3 s), afin de remédier automatiquement au défaut : 3 Dysfonctionnement / alarme 4 Test du fonctionnement de l'électrovanne et purge manuel le: actionner brièvement la touche. De plus, sur ECO-DRAIN 21PLUS: pour tester la fonction alarme (voir ci-dessous) actionner la touche > 1 minute	Bij de ECO-DRAIN 21 geeft een LED de desbetreffende werking aan. 1 Bedrijfsklaar, de ECO-DRAIN staat onder spanning 2 Afvoerproces De afvoerleiding is geopend Gaat de ECO-DRAIN in storing, dan schakelt het ventiel ritmisch (ca. elke 3 sec.) om de storing zelfstandig te verhelpen. 3 Storing/alarm 4 Test (handmatige afvoer): Schakelaar ca. 2 sec. indrukken Extra bij ECO-DRAIN 21 PLUS Test van de alarmfase (zie hieronder): Schakelaar > 1 minuut indrukken
The ECO-DRAIN 21 PLUS also has an alarm-mode function: If normal conditions have not been restored after 1 minute, a fault signal will be triggered: • Alarm LED flashes. • Alarm signal switches over (can be transmitted via potential-free contact). • Valve opens every 4 minutes for a period of 7.5 seconds. Once the fault is cleared, the ECO-DRAIN 21 PLUS will automatically switch back to the normal mode of operation. **Malfunctioning could be caused by, e.g.:** • Mistakes during installation • Dropping below the necessary minimum pressure • Excessive condensate quantities (overloading) • Blocked/shut off outlet line • Extreme amount of dirt particles • Frozen piping	**Le ECO-DRAIN 21 PLUS dispose en plus d'une fonction mode d'alarme :** Si un défaut n'est pas résolu au bout d'une minute, un signal de dysfonctionnement est émis: • La LED alarme clignote • Le relai d'alarme commute (le signal est délivré sur un contact sans potentiel) • La vanne s'ouvre toutes les 4 minutes, pendant 7,5 secondes Dès que le défaut est résolu, le ECO-DRAIN 21 PLUS revient automatiquement en mode normal. **Causes de dysfonctionnement possibles:** • Défaut au niveau de l'installation • Pression minimale non atteinte • Trop de condensat (surcharge) • Ecoulement bouché ou obturé • Importantes quantités d'impuretés • Conduites gelées	**De ECO-DRAIN 21 PLUS is in het bezit van een alarm-fase:** Indien de storing niet binnen een minuut is verholpen, wordt een storing gemeld: • De alarm-LED knippert • Het alarmrelais schakelt om (het potentiaalvrij signaal kan aan een centraal meldpunt worden doorgegeven) • Het ventiel opent alle 4 minuten voor 7,5 seconden Wanneer de storing verholpen is, schakelt de ECO-DRAIN 21 PLUS automatisch in de normale stand terug. **Mogelijke storingsoorzaken zijn b.v.:** • Een installatiefout • De werkdruk ligt onder de min. druk • Overbelasting (te veel kondensaat) • Verstopte/afgesloten afvoerleiding • Extreme hoeveelheden vuildeeltjes • Bevroren leidingens

Installation • Installation
Installation • Installatie

deutsch



1. Zulaufrohr und Fitting mind. G½ !
2. Kein Filter oder Sieb im Zulauf!
3. Gefälle im Zulauf >1% !
4. Nur Kugelventile verwenden!
5. Betriebsdruck: min. 0,8 bar
   max. 16 bar
6. Kurzer Druckschlauch!
7. Pro Meter Steigung in der Ablaufleitung erhöht sich der erforderliche Mindestdruck um 0,1 bar!
   Ablaufleitung max. 5 m steigend!
8. Sammelleitung mind. G½ mit 1% Gefälle verlegen!
9. Ablaufleitung von oben in Sammelleitung führen.

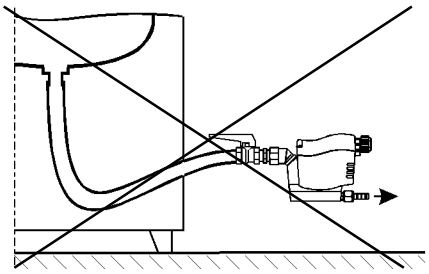
falsch • wrong **incorrect • onjuist**	**richtig • correct** **correct • juist**	
		**Beachte: Druckdifferenzen!** Jede Kondensatanfallstelle muß separat entwässert werden!
		**Beachte: Entlüftung!** Bei nicht ausreichendem Gefälle im Zulauf oder anderen Zulaufproblemen muß eine Luftausgleichsleitung verlegt werden!
		**Beachte: Prallfläche!** Soll aus der Leitung direkt entwässert werden, ist eine Umlenkung des Luftstromes sinnvoll!

english	français	nederlands
1. Feed pipe and fitting at least ½"! 2. No filters in feed line 3. Slope in feed line > 1%! 4. Only use ball valves! 5. Operating pressure: min. 0.8 bar max. 16 bar 6. Short pressure hose! 7. For each metre of rising slope in the outlet line, the required minimum pressure will increase by 0.1 bar. The rise of the outlet line must not exceed 5 metres! 8. Lay collecting line (min. ½") with 1% of slope. 9. Lead discharge pipe from the top into collecting line.	1. Tube d'amenée, au moins ½" ! 2. Pas de filtre sur l'amenée ! 3. Pente de l'amenée >1% ! 4. Utiliser uniquement des vannes à boisseau sphérique ! 5. Pression de service: min. 0,8 bar max. 16 bar (relever la pression sur la plaque) 6. Flexible pression de faible longueur! 7. Evacuation : longueur max. de la partie montante : 5 m ! 8. Conduite collectrice : au minimum ½" avec 1% de pente! 9. La conduite d'écoulement doit être raccordée par un col de cygne sur la conduite collectrice	1. Toevoerleiding en fittingen minstens ½" ! 2. Geen filter of vuilzeef in toevoerleiding monteren! 3. Toevoerleiding met verval monteren >1% ! 4. Alleen kogelafsluiters gebruiken! 5. Druk: minimaal 0,8 resp. 16 bar! (Druk is vermeld op typeplaatje) 6. Korte hogedrukslang! 7. Afvoerleiding max. 5 m omhoogvoeren! 8. Verzamelleiding minimaal ½" met 1% verval aanleggen! 9. Afvoerleiding van boven in de verzamelleiding voeren.
Note: Pressure differences! Each condensate source must be drained separately!	**Important: différences de pression !** Chaque point de soutirage de condensat doit être purgé individuellement !	**Belangrijk: Let op drukverschillen!** Ieder afvoerpunt apart draineren. Het drukverschil tussen de afvoerpunten zorgt in de kondensaatafvoerleiding voor een by-pass stroming.
Note: Venting! If the feed line cannot be laid with sufficient slope or if there are other inflow problems, it will be necessary to install a venting line!	**Important : équilibrage d'air !** Si la pente de l'amenée n'est pas suffisante, il faut poser une conduite d'équilibrage d'air !	**Belangrijk: Ontluchten!** Indien de toevoerleiding niet op afschot is gemonteerd of andere aanvoerproblemen, moet voor de toevoer een aparte ontluchtingsleiding worden geïnstalleerd.
Note: Deflector area! If drainage is to take place directly from a line, it is advisable to arrange the piping so that the air flow is diverted.	**Important : chicane !** Si la purge doit s'effectuer directement sur la tuyauterie, il faut prévoir une chicane pour que le condensat ne soit pas entrainé par le débit d'air comprimé !	**Belangrijk: Diepste punt!** Bij directe drainage in het leiding-systeem moet de ECO-DRAIN altijd op het diepste punt geïnstalleerd worden. Wij adviseren hiervoor een broekstuk te gebruiken.

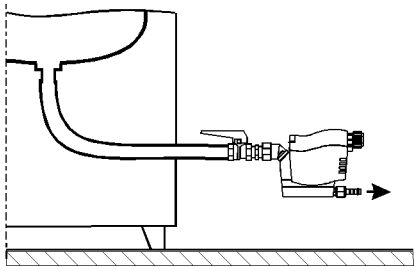
Installation • Installation
Installation • Installatie

deutsch

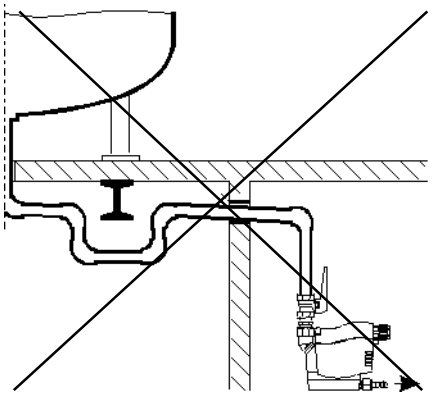
falsch • wrong
incorrect • onjuist

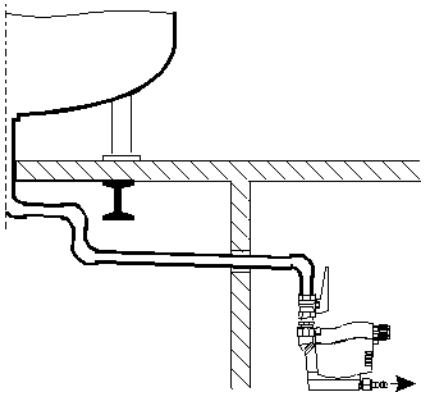


richtig • correct
correct • juist



Beachte: kontinuierliches Gefälle!
Wird ein Druckschlauch als Zulauf verwendet, kein Wassersack!

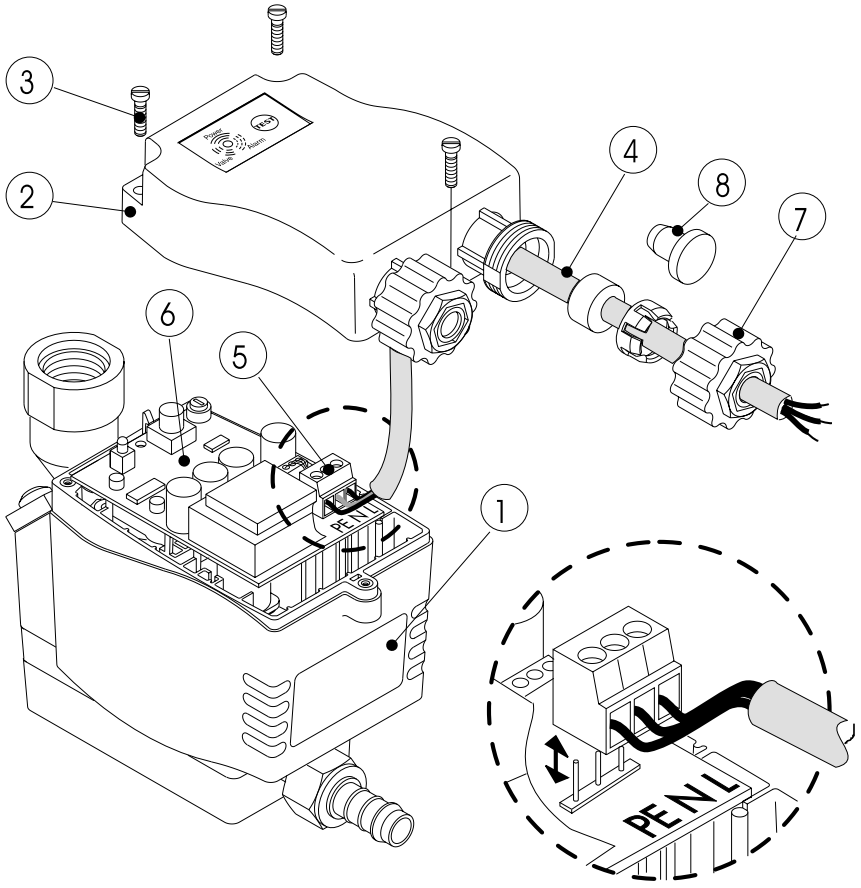




Beachte: kontinuierliches Gefälle!
Bei Verrohrung der Zulaufleitung kein Wassersack!

Elektrische Installation • Electrical installation
Installation électrique • Elektrische installatie

deutsch



ECO-DRAIN 21

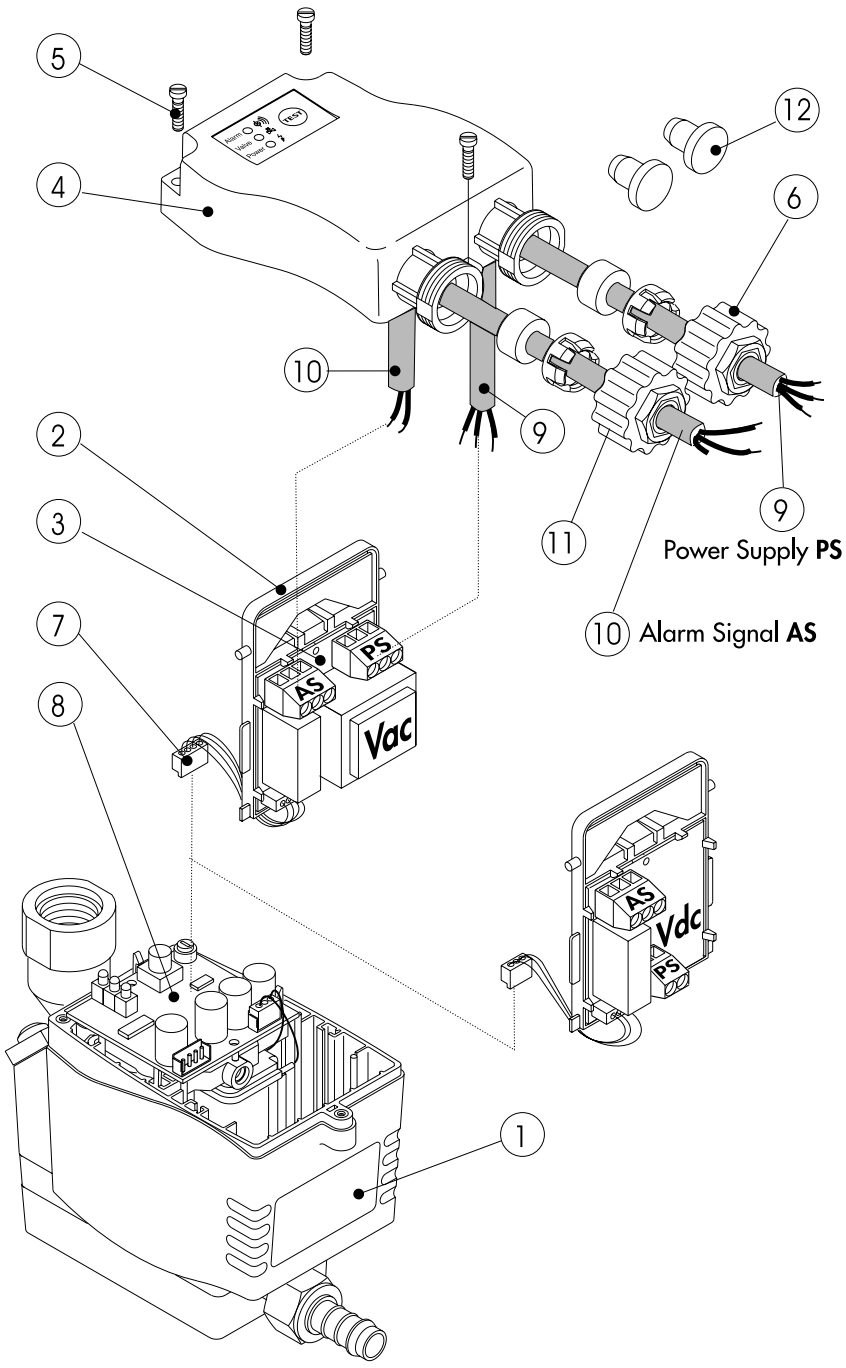
Vor Elektroinstallation beachten:
- **Zulässige Netzspannung auf Typenschild(1) ablesen und unbedingt einhalten!**
- **Installationsarbeiten gemäß VDE 0100 ausführen.**
- **Klemmenbelegung beachten!**

- Schrauben (**3**) lösen und Gehäusehaube (**2**) abnehmen
- Kabelverschraubung (**7**) lösen, Dichtstopfen (**8**) entfernen und 3-adriges Kabel für Spannungsversorgung (**4**) durchführen
- Kabel an Klemmenstecker (**5**) anschließen (Klemmenstecker ist abziehbar)

Klemmenbelegung
L = Außenleiter (schwarz), N = Neutralleiter (blau), PE = Schutzleiter (grüngelb)

- Klemmenstecker (**5**) auf Platine (**6**) aufstecken.
- Kabel (**4**) straffen und Kabelverschraubung (**7**) festschrauben
- Gehäusehaube mit Schrauben (**3**) befestigen

english	français	nederlands
Note: Continuous slope It is important to avoid water pockets when using a pressure hose as a feed line!	**Important: pente continue !** Si l'amenée est réalisée au moyen d'un flexible, il faut éviter toute "retenue d'eau" !	**Belangrijk: Op afschot monteren!** Wanneer een slang als toevoerleiding gebruikt wordt, mag er in geen geval een waterslot ontstaan!
Note: Continuous slope! Water pockets must also be avoided when laying a feed pipe.	**Important: pente continue !** Si l'amenée est réalisée au moyen d'une tuyauterie rigide, il faut aussi éviter toute "retenue d'eau" !	**Belangrijk: Continue verval!** Ook bij het aanleggen van de afvoerleiding een waterslot vermijden.
ECO-DRAIN 21 **Note before wiring:** • **Check type plate (1) for permissible mains voltage and ensure conformity!** • **Please ensure that the installation is carried out according to the valid regulations.** • **Please assign terminals as indicated!** • Remove screws (**3**) and lift off housing top (**2**) • Unscrew cable fitting(**7**), remove blanking disk(**8**) and guide 3-core cable for power supply(**4**) through cable fitting. • Join cable to terminal connector (**5**) (The terminal connector can be pulled off.) **Terminal assignment** L = phase conductor (black), N = neutral conductor (blue); PE = protective conductor (green & yellow) • Plug terminal connector (**5**) to control PCB (**6**) • Pull cable (**4**) tight and screw down cable fitting (**7**) • Put back housing top and tighten screws (**3**)	**ECO-DRAIN 21** **A noter avant l'installation électrique:** • **Respecter impérativement la tension secteur admissible mentionnée sur la plaque signalétique (1) !** • **Réaliser les travaux d'installation conformément à VDE 0100.** • **Respecter l'affectation des bornes !** • Desserrer les vis (**3**) et retirer le capot du boîtier (**2**) • Desserrer le presse-étoupe (**7**), retirer l'obturateur (**8**) et enfiler le câble à 3 conducteurs (**4**) assurant l'alimentation électrique • Raccorder le câble au bornier enfichable (**5**) **Affectation des bornes** L = phase (noir), N = neutre (bleu), PE = terre (vert/jaune) • Tendre le câble (**4**) et serrer le presse-étoupe (**7**) • Enficher le bornier (**5**) sur la carte électronique (**6**). • Fixer le capot du boîtier à l'aide des vis (**3**)	**ECO-DRAIN 21** **Elektrische Installatie:** • **Toelaatbare voeding op typeplaatje (1) aflezen en zeker nakomen!** • **Installatiewerkzaamheden altijd volgens de geldende voorschriften uitvoeren.** • **Let op de juiste elektrische aansluiting!** • Bovensdeksel (**2**) demonteren door lasdraaien van schroeven (**3**) • Voedingskabel (**4**) door wartels (**7**) en bestemde gaten doorvoeren • Kabel op stekker (fletcable) (**5**) aansluiten (stekker is afneembaar) **Elektrische aansluiting** L = zwart, N = blauw, PE = groengeel (aarde) • Stekker (**5**) op print (**6**) steken • Kabels (**4**) aantrekken en wartels (**7**) vastdraaien • Bovendeksel opzetten en met de schroeven (**3**) vastdraaien



Vac - voltages

L	N	PE				
phase	neutral	earth/ground		normally closed	common	normally open

fail safe

PS **AS**

Vdc - voltage

			±24V	±24V		
			+24 Vdc (0V)	0V (+24 Vdc)	normally closed	common	normally open

fail safe

PS **AS**

ECO-DRAIN 21 PLUS

Vor Elektroinstallation beachten:
- **Zulässige Netzspannung auf Typenschild (1) ablesen und unbedingt einhalten!**
- **Installationsarbeiten gemäß VDE 0100 ausführen.**
- **Klemmbelegung beachten!**

- Schrauben (**5)** lösen und Gehäusehaube (**4**) abnehmen (Kabel beachten)
- Versorgungsstecker (**7**) von Steuerplatine (**8**) abziehen.
- Platinenaufnahme (**2**) mit der Netzteilplatine in die Haube (**4**) einklappen **.**

Spannungsversorgung anschließen
- Überwurfmutter (**6**) lösen und Dichtstopfen (**12**) entfernen
- 3-adriges Kabel (**9**) für Spannungsversorgung durch Kabelverschraubung führen und an Platinenklemme **PS** anschließen

Klemmbelegung bei Vac-Geräten:
L = Außenleiter (schwarz), N = Neutralleiter (blau), PE = Schutzleiter (grüngelb)

Bei 24 Vdc-Geräten (Gleichspannung) ist die Polung beliebig: ± 24Vdc

Potentialfreier Störmeldekontakt
- 3-adriges Kabel (**10)** durch Kabelverschraubung (**11**) führen und an Platinenklemme **AS** anschließen (**Wechsler**)

  N.C.–COM:
  Kontakt geschlossen bei Störung oder Spannungsausfall (Failsafe-Prinzip)

  N.O.–COM:
  Kontakt geschlossen bei Normalbetrieb

Externer Test-Taster (optional)
Separate Anschlußanleitung beachten!

Montage
- Kabel (**9+10**) straffen und Kabelverschraubungen (**6+11**) festschrauben
- Platinenaufnahme (**2**) mit Netzteilplatine hochklappen (muß einrasten)
- Versorgungsstecker (**7**) auf Steuerplatine (**8**) aufstecken.
- Gehäusehaube (**4**) mit Platinenaufnahme (**2**) in Führungsnuten schieben
- Schrauben (**5**) anziehen.

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ECO-DRAIN 21 PLUS

Note before wiring:
- **The mains voltage must correspond to the permissible voltage on the type plate (1)!**
- **Please ensure that the installation is carried out according to the valid regulations.**
- **Please assign terminals as indicated!**

- Remove screws (**5**) and lift off housing top (**4**) paying attention to the cable.
- Unplug connector (**7**) from terminal on control PCB (**8**).
- Fit board holder (**2**) with power supply board into the housing top (**4**).

Connect power supply
- Unscrew union nut (**6**) and remove blanking disk (**12**)
- Guide a 3-core cable (**9**) for power supply through screwed cable fitting and connect to board terminal **PS**.

Terminal assignment in the case of Vac devices:
L = phase conductor (black), N = neutral conductor (blue); PE = protective earth conductor (green & yellow)

In the case of Vdc devices (direct current) the poling can be chosen as desired: ± 24 Vdc

Potential-free alarm contact
- Guide 3-core cable (**10**) through cable fitting (**11**) and connect to board terminal **AS** (**changeover contact**).

  N.C.–COM:
  Contact closed during malfunction or power failure (fail-safe principle).

  N.O.–COM:
  Contact closed during normal operation.

External test button (optional)
Use separate connecting lead!

Assembly
- Pull cables (**9+10**) tight and screw down cable fittings (**6+11**)
- Move board holder (**2**) with power supply board upwards (must click into place).
- Plug connector (**7**) to terminal on control PCB (**8**).
- Slide housing top (**4**) with board holder (**2**) into the guiding grooves.
- Tighten the screws (**5**).

français

ECO-DRAIN 21 PLUS

A noter avant l'installation électrique:
- **Seule la tension secteur mentionnée sur la plaque signalétique (1) est admissible !**
- **Réaliser les travaux d'installation conformément à VDE 0100.**
- **Respecter l'affectation des bornes !**

- Desserrer les vis (**5**) et retirer le capot du boîtier (**4**) (attention au câble)
- Débrancher le connecteur d'alimentation (**7**) sur la carte de commande (**8**).
- Pour accéder aux borniers, faire pivoter sur le capot (**4**) la carte d'alimentation secteur (**2**).

Brancher l'alimentation secteur
- Desserrer l'écrou (**6**) du presse-étoupe et retirer l'obturateur (**12**)
- Enfiler le câble à 3 conducteurs (**9**) assurant l'alimentation électrique, à travers le presse-étoupe, et le raccorder au bornier **PS** de la carte.

Affectation des bornes sur les appareils Vac (alimentés en alternatif)
L= phase (noir), N= neutre (bleu),
PE= terre (vert/jaune)

Sur les appareils 24 Vdc (alimentés en continu) la polarité n'a pas d'importance:
± 24Vdc

Contact d'alarme, sans potentiel
- Enfiler un câble à 3 fils (**10**), (**à 5 fils** en cas d'utilisation d'un „bouton TEST externe"), à travers le presse-étoupe (**11**) et le raccorder au bornier **AS** de la carte (**inverseur**)

  N.C.–COMMON:
  Contact fermé en cas de dysfonctionnement ou de coupure de courant (sécurité positive)

  N.O.–COMMON:
  Contact fermé en fonctionnement normal

Bouton Test externe (en option)
Suivre les instructions de branchement séparées !

Montage
- Tendre les câbles (**9+10**) et serrer les presse-étoupes (**6+11**)
- Pivoter la carte d'alimentation (**2**) (jusqu'à l'encliquetage)
- Enficher le connecteur d'alimentation (**7**) sur la carte de commande (**8**).
- Monter le capot du boîtier (**4**) en engageant la carte (**2**) dans les rails de guidage.
- Serrer les vis (**5**)

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Elektrische installatie:
- **Toelaatbare voeding op typeplaatje (1) aflezen en zeker nakomen!**
- **Installatiewerkzaamheden altijd volgens de geldende voorschriften uitvoeren.**
- **Let op de juiste elektrische aansluiting!**

- Bovensdeksel (**4**) demonteren door lasdraaien van schroeven (**5**) (op kabel letten)
- Stekker (fletcable) (**7**) van print (**8**) halen
- Printmoduul (**2**) met de voedingsprint in het huis monteren**.**

Spanning aansluiten
- Wartels (**6**) losdraaien en afdichtingen (**12**) verwijderen
- Kabel (**9**) door wartels en bestemde gaten doorvoeren en op contact **PS** ansluiten

Elektrische aansluiting
L = zwart, N = blauw, PE = groengeel (aarde)

Bij 24 Vdc-apparaten (gelijkspanning) is het volgende gewenst: ± 24Vdc

Potentiaalvrij contact
- Kabel (**10**) door wartels (**11**) en bestemde gaten doorvoeren en op contact **AS** aansluiten (**wisselaar**)

  N.C.–COM:
  Contact gesloten bij storing of stroomstoring (failsafe-modus)

  N.O.–COM:
  Contact gesloten bij normale funktie

Externe test-schakelaar (optie)
Separate aansluithandleiding raadplegen!

Montage
- Kabels (**9+10**) aantrekken en wartels (**6+11**) vastdraaien
- Printmoduul (**2**) met voedingsprint vast zetten tot hij klikt
- Stekker (fletcable) (**7**) op print (**8**) steken
- Bovendeksel (**4**) met printmoduul (**2**) in huis schuiven
- Schroeven (**5**) vastdraaien

Elektrische Daten • Electrical data
Caractéristiques électriques • Elektrische gegevens

	230/110/24/... Vac	24 Vdc
max. Leistungsaufnahme und Absicherung Max. power input and fuse protection Consommation maximale et fusibles Max. opgenomen vermogen en zekering	P < 2,0 VA 0,5 A *)	P < 2,0 W 100 mA *)
Netzspannung (siehe Typenschild) Supply voltage (see type plate) Alimentation électrique (voir plaque sign.) Voeding (zie typeplaatje)	Uac = ... ±10% 50 – 60 Hz	U_0 = 24Vdc -10/+25%
Kabelquerschnitt und Absicherung Cable cross-section Section des fils Kabeldoorsnede	max. ø 10 mm 3 x 0,75 mm² / 5 x 0,25 mm²	
Kontaktbelastung Relais bzw. OUT1 Contact loading relay or OUT1 Pouvoir de coupure Relais ou OUT1 Contactbelasting relais resp. OUT1	< 250 Vac / < 1,0 A > 5 Vdc / > 10 mA	

*) mittelträge/...../...../.....

deutsch

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POTENTIALFREIER KONTAKT

Über den potentialfreien Kontakt kann das Alarmsignal weitergeleitet werden (z.B. an einen Leitstand).
Der Umschaltkontakt kann z.B. im **Fail-safe-Modus** betrieben werden:

Liegt Betriebsspannung an und arbeitet der ECO-DRAIN störungsfrei ist das Alarmrelais angezogen. Der Arbeitskontakt (N.O.– COM) ist geschlossen.

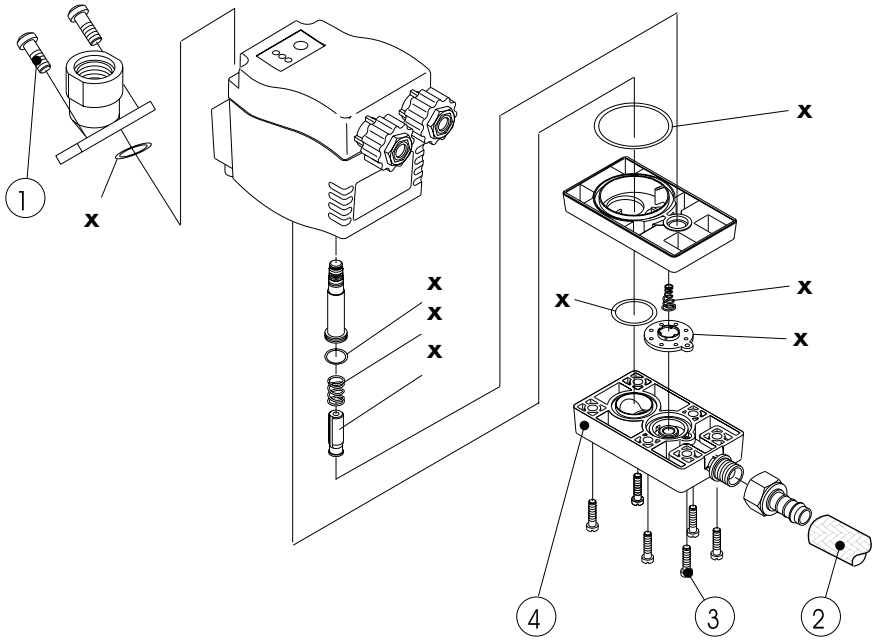
Liegt keine Betriebsspannung an oder erfolgt eine Störmeldung fällt das Alarmrelais ab. Der Arbeitskontakt ist offen (Alarm).

EXTERNER TEST-TASTER (optional)

Damit kann ferngesteuert vorhandenes Kondensat gezielt abgeleitet werden. Die normale Test-Taster-Funktion ist hier zusätzlich aus dem ECO-DRAIN herausgeführt. Wird der externe Kontakt geschlossen, öffnet das Ventil.

Wartung • Maintenance • Entretien • Onderhoud

deutsch



Vor jeder Wartung:

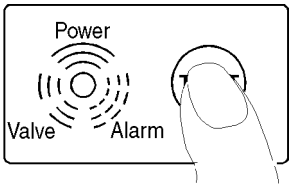
- **ECO-DRAIN drucklos schalten!**
- **ECO-DRAIN spannungsfrei schalten!**

Wartungs-Empfehlung:

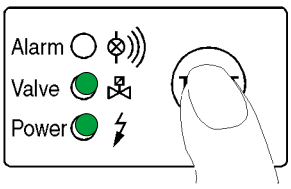
- 2 Zylinderschrauben (**1**) lösen und ECO-DRAIN abnehmen, der Winkeladapter verbleibt am System.
- Ablaufschlauch (**2**) entfernen
- 6 Zylinderschrauben (**3**) lösen (bis Kopf bündig zur Außenkante ist), Membranaufnahme (**4**) abnehmen
- Verschleißteile (**x**) austauschen
- ECO-DRAIN ordnungsgemäß montieren

Zugehöriger Verschleißteilsatz: (**x**)
ECO-DRAIN 21/21 PLUS 8.2520.0

ECO-DRAIN 21



ECO-DRAIN 21 PLUS



Funktionstest des ECO-DRAIN:

- Test-Taster ca. 2 Sekunden betätigen
  ➜ Ventil öffnet zur Kondensatableitung

ECO-DRAIN 21 PLUS

Überprüfen der Störmeldung

- Kondensatzulauf absperren
- Test-Taster mind. 1 Minute betätigen:
  ➜ rote LED blinkt
  ➜ Alarmsignal schaltet durch

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POTENTIAL-FREE CONTACT
The alarm signal can be relayed via a potential-free contact. The changeover contact can be operated, e.g., in the fail-safe mode.

When operating voltage is being applied and the ECO-DRAIN device is functioning correctly, the alarm relay is energized. The contact element (N.O.–COM).

When there is no operating voltage or in the case of a fault signal, the alarm relay drops out. The contact element is open (alarm).

EXTERNERNAL TEST BUTTON (optional)
Here, the normal test button function has been extended for additional use outside the ECO-DRAIN unit. This makes it possible to discharge any condensate in the unit by remote control, if required. When the external contact closes, the valve will open.

Before maintenance work always ensure that the device is:
- **pressureless and**
- **de-energized.**

Maintenance recommendation:
- Remove 2 pan head screws (**1**) and lift off ECO-DRAIN. The elbow adaptor stays in place.
- Disconnect discharge hose (**2**).
- Turn the 6 pan head screws (**3**) until heads are level with the outer edge and take off diaphragm seat (**4**).
- Replace wearing parts
- Reassemble ECO-DRAIN unit in reverse order.

Set of wearing parts **(x)**
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Functional test of ECO-DRAIN device:
- Briefly press test button 2 sec.
  ➜ Valve opens for condensate discharge.

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Checking of alarm signal:
- Shut off condensate inflow.
- Press test button for at least 1 minute.
  ➜ Red LED flashes
  ➜ Alarm signal is being relayed

français

ECO-DRAIN 21 PLUS

CONTACT SANS POTENTIEL
Un contact sans potentiel permet le report de l'alarme.
Le contact inverseur peut être exploité par exemple en mode fail-safe :

Si la tension de service est présente et si le ECO-DRAIN fonctionne normalement, le relais d'alarme est excité. Le contact de travail (N.O.–COM) est fermé.

Si la tension d'alimentation n'est pas présente ou si un signal d'alarme est émis, le relais d'alarme est désexcité. Le contact de travail est ouvert (Alarme).

BOUTON TEST EXTERNE (en option)
Celui-ci permet d'effectuer une commande à distance de la purge. La fonction normale de la touche Test est ainsi reportée sur un contact externe. Lorsque ce contact est fermé, la vanne s'ouvre.

Avant chaque entretien:
- **Dépressuriser le ECO-DRAIN !**
- **Débrancher l'alimentation électrique du ECO-DRAIN !**

Recommandations pour l'entretien :
- Desserrer les 2 vis à tête cylindrique (**1**) et retirer le ECO-DRAIN; l'adaptateur orientable reste sur la tuyauterie.
- Retirer le flexible d'écoulement (**2**)
- Desserrer les 6 vis à tête cylindrique (**3**) (jusqu'à ce que la tête affleure l'arête extérieure) et retirer le siège de la membrane (**4**)
- Remplacer les pièces d'usure **(x)**
- Remonter correctement le ECO-DRAIN

Kit de pièces d'usure correspondant (**x**)
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Test de fonctionnement du ECO-DRAIN:
- Presser la touche Test pendant 2 s
  ➜ la soupape s'ouvre pour la purge

ECO-DRAIN 21 PLUS

Vérification du signal d'alarme :
- Obturer l'arrivée de condensat
- Presser la touche Test pendant 1 minute au moins
  ➜ la LED rouge clignote
  ➜ le signal d'alarme est activé

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POTENTIAALVRIJ CONTACT
Via het potentiaalvrij contact kan het alarmsignaal aan een centraal meldpunt worden doorgegeven. Het contact kan b.v. werken volgens de fail-safe-modus.

Staat er spanning op de ECO-DRAIN en werkt hij storingsvrij, dan is het alarmrelais verbonden. Het werkcontact (0.7–0.8) is gesloten.

Indien de ECO-DRAIN spanningsloos is of een storingsmelding geeft, wordt het alarmrelais onderbroken. Het werkcontact is open (alarm).

EXTERNE TEST-SCHAKELAAR(optie)
Hiermee kan op afstand de ECO-DRAIN bediend worden. De normale testschakelaar-funktie is hiermee extern te bedienen. Wanneer het externe contact wordt gesloten, opent het ventiel.

Advies voor onderhoud:
- **ECO-DRAIN drukloos maken**
- **ECO-DRAIN spanningsvrij maken**

Advies voor onderhoud:
- 2 schroeven (**1**) losdraaien en de ECO-DRAIN afnemen. De montagebeugel blijft aan het systeem.
- Afvoerslang (**2**) verwijderen
- 6 schroeven (**3**) aan de onderkant losdraaien
- Serviceset **(x)** vervangen
- ECO-DRAIN monteren

Onderdeelset (**x**)
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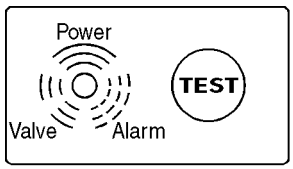
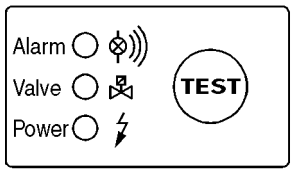
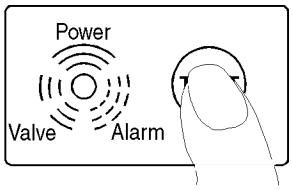
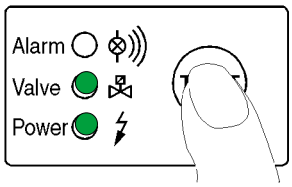
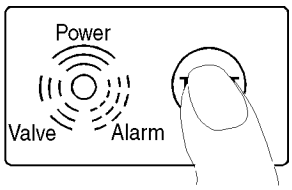
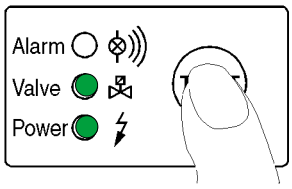
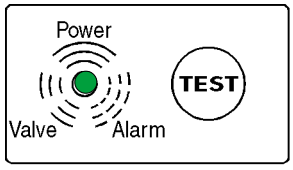
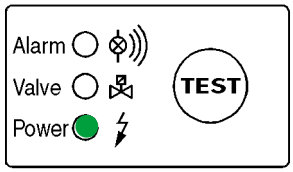
Functietest van de ECO-DRAIN:
- Testschakelaar 2 seconden indrukken
- Ventiel opent voor kondensaatafvoer

ECO-DRAIN 21 PLUS

Controle van storingsmelder:
- Kondensaattoevoer afsluiten
- Testschakelaar > 1 minuut indrukken
  ➜ Rode LED knippert
  ➜ Alarmsignaal wordt doorgescha keld

Fehlersuche • Trouble shooting Recherche de panne • Storingsoorzaken	deutsch
  **Keine LED leuchtet** **No LED lighting up** **Aucune LED n'est allumée** **Geen enkele LED brandt**	**Mögliche Ursachen:** • Spannungsversorgung fehlerhaft • Netzteil-Platine defekt • Steuer-Platine defekt ➜ Spannung auf Typenschild überprüfen ➜ Externe und interne Verdrahtung überprüfen ➜ Steckerverbindungen überprüfen ➜ Platinen auf mögliche Beschädigungen überprüfen
  **Test-Taster ist betätigt, aber keine Kondensatableitung** **Pressing of test button, but no condensate discharge** **La touche Test est actionnée, mais sans purge du condensat** **De testknop is ingedrukt, maar er is geen kondensaatafvoer**	**Mögliche Ursachen:** • Zu- und/oder Ablaufleitung abgesperrt oder verstopft • Verschleiß (Dichtungen, Ventilkern, Membrane) • Steuer-Platine defekt • Magnetventil defekt • Mindestdruck unterschritten ➜ Zu- und Ablaufleitung kontrollieren ➜ Verschleißteile austauschen ➜ Prüfen, ob Ventil hörbar öffnet (Test-Taster mehrmals betätigen) ➜ Platinen auf mögliche Beschädigungen überprüfen ➜ Betriebsdruck überprüfen, ggfs. Low Pressure- oder Vakuumableiter einsetzen
  **Kondensatableitung nur wenn Test-Taster betätigt ist** **Condensate discharge only when test button is being pressed** **Purge du condensat uniquement si la touche Test est actionnée** **Kondensaat wordt alleen afgevoerd als de testknop is ingedrukt**	**Mögliche Ursachen:** • Zulaufleitung ohne ausreichendes Gefälle, Querschnitt zu gering • zu hoher Kondensatanfall • Fühlerrohr sehr stark verschmutzt ➜ Zulaufleitung mit Gefälle verlegen ➜ Luftausgleichsleitung installieren ➜ Fühlerrohr reinigen
  **Gerät bläst permanent ab** **Device keeps blowing off air** **L'appareil refoule de l'air en permanence** **De BEKOMAT blaast continue af**	**Mögliche Ursachen:** • Steuerluftleitung verstopft • Verschleiß (Dichtungen, Ventilkern, Membrane) ➜ Ventileinheit komplett reinigen ➜ Verschleißteile austauschen ➜ Fühlerrohr reinigen

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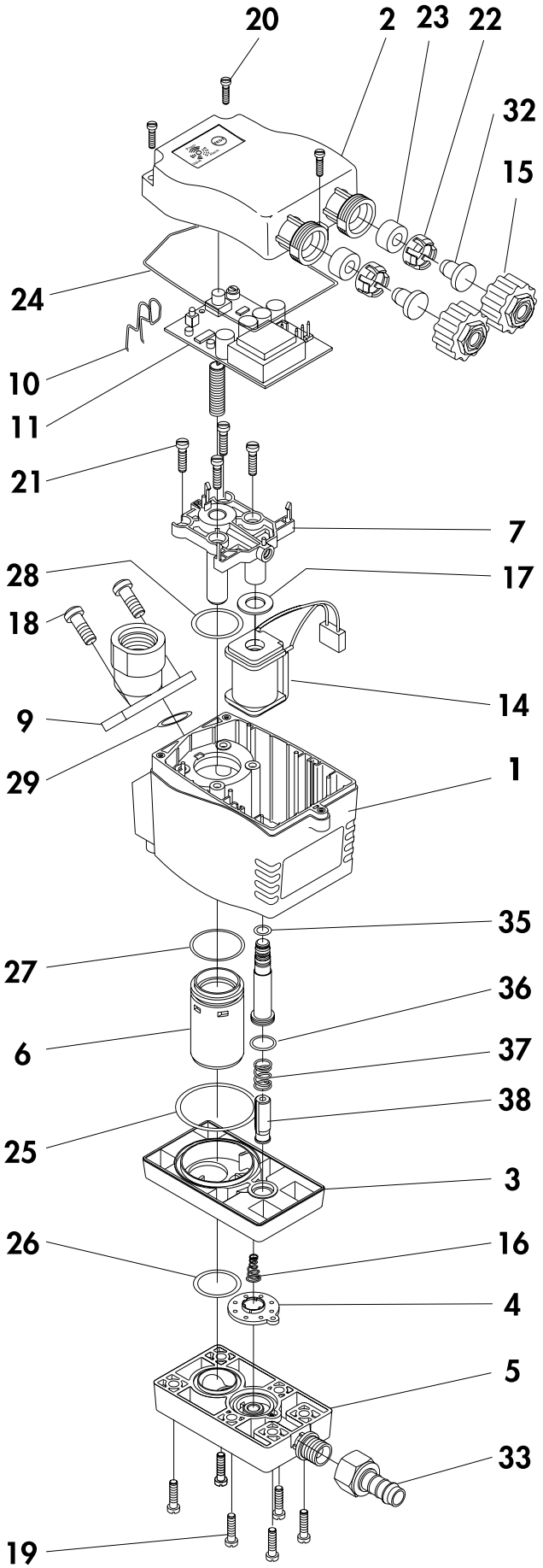
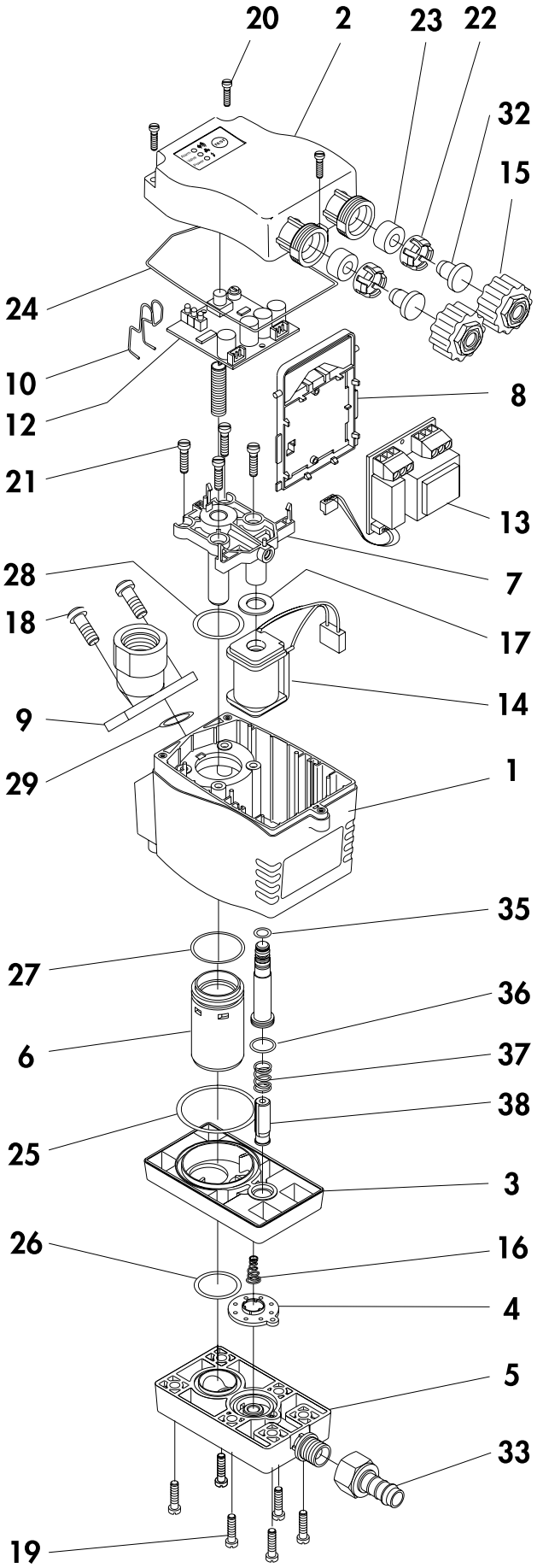
Possible causes: • Power supply faulty • Power supply board defective • Control PCB defective ➜ Check voltage on type plate. ➜ Check wiring (external and internal) ➜ Check plug connections ➜ Check printed circuit boards for possible damage	**Origines possibles :** • Défaut d'alimentation électrique • Carte d'alimentation défectueuse • Carte de commande défectueuse ➜ Vérifier la tension sur la plaque ➜ Vérifier le câblage interne et externe ➜ Vérifier les connexions enfichables ➜ Vérifier si les cartes ne présentent pas d'endommagements	**Mogelijke oorzaken:** • Spanning onjuist aangesloten • Voedingsprint defect • Besturingsprint defect ➜ Spanning op typeplaatje aflezen ➜ Controleer bedrading (intern/extern) ➜ Stekkerverbinding controleren ➜ Printen op mogelijke beschadigingen controleren
Possible causes: • Feed and/or outlet line shut off or blocked • Worn parts (seals, valve core, diaphragm) • Control PCB defective • Solenoid valve defective • Dropping below necessary minimum pressure ➜ Check feed line and outlet line ➜ Replace worn parts ➜ Check if valve opens audibly (press test button several times) ➜ Check printed circuit boards for possible damage ➜ Check operating pressure; where neessary, install pressure or vacuum drains.	**Origines possibles :** • Conduites d'arrivée et/ou d'évacuation obturées ou bouchées • Usure (joints, noyau de l'électro-vanne, membrane) • Carte de commande défectueuse • Electrovanne défectueuse • Pression minimale non atteinte • Pression maximale dépassée ➜ Contrôler l'arrivée et l'évacuation ➜ Remplacer les pièces d'usure ➜ Vérifier si l'ouverture de la soupape est perceptible (Presser plusieurs fois la touche Test) ➜ Vérifier si la carte ne présente pas d'endommagements ➜ Vérifier la pression de service. Au besoin, installer un purgeur "basse-pression", "systèmes sous vide" ou "haute-pression"	**Mogelijke oorzaken:** • Toe- en afvoerleiding afgesloten of verstopt • Onderdelen • Besturingsprint defect • Magneetventiel defect • Minimale druk te laag • Maximale druk te hoog ➜ Toe- en afvoerleiding controleren ➜ Onderdelen vervangen ➜ Testen, of het ventiel hoorbaar opent (testknop meerdere malen indrukken) ➜ Print op mogelijke beschadingen controleren ➜ Bedrijfsdruk controleren d.m.v. typeplaatje
Possible causes: • Feed line with insufficient slope; cross-section too small. • Excessive condensate quantities • Sensor tube extremely dirty ➜ Lay feed line with adequate slope ➜ Install venting line ➜ Clean sensor tube	**Origines possibles :** • Conduite d'arrivée avec pente insuffisante, section insuffisante • Trop de condensat produit • Tube de sonde fortement encrassé ➜ Réaliser l'arrivée avec une pente ➜ Installer une conduite d'équilibrage d'air ➜ Nettoyer le tube de sonde	**Mogelijke oorzaken:** • Toevoerleiding heeft onvoldoende verval • Te grote hoeveelheid kondensaat • Voeler zeer sterk vervuild ➜ Toevoerleiding onder afschot monteren ➜ Ontluchtingsleiding installeren ➜ Voeler reinigen
Possible causes: • Control air line blocked • Worn parts (seals, valve core, diaphragm) ➜ Clean entire valve unit ➜ Replace worn parts ➜ Clean sensor tube	**Origines possibles :** • Conduite d'équilibrage d'air bouchée • Usure (joints, noyau de l'électro-vanne, membrane) ➜ Effectuer un nettoyage complet de l'ensemble électrovanne ➜ Remplacer les pièces d'usure ➜ Nettoyer le tube sonde	**Mogelijke oorzaken:** • Stuurluchtleiding verstopt • Onderdelen ➜ Ventieleenheid compleet reinigen ➜ Onderdelen vervangen ➜ Voeler reinigen

ECO-DRAIN 21



ECO-DRAIN 21 PLUS



deutsch	english	français	nederlands
1 Gehäuse	1 Housing	1 Boîtier	1 Behuizing
2 Gehäusehaube	2 Housing top	2 Partie sup. boîtier	2 Kunststof bovenkap
3 Membrandeckel	3 Diaphragm cap	3 Couvercle de membrane	3 Membraandeksel
4 Membrane	4 Diaphragm	4 Membrane	4 Membraan
5 Membranaufnahme	5 Diaphragm seat	5 Siège membrane	5 Membraanhouder
6 Masserohr	6 Earthing tube	6 Tupe de masse	6 Massavoeler
7 Fühlerrohr	7 Sensor tube	7 Tube de sonde	7 Voeler
8 Platinen-Aufnahme	8 Board holder	8 Support de carte	8 Printmoduul
9 Winkeladapter	9 Elbow adaptor	9 Adaptateur orientable	9 Beugelhouder
10 Kontaktfeder	10 Contact spring	10 Ressort de contact	10 Kontakt-veer
11 Elektronik-Platine	11 Electronic PCB	11 Carte électronique	11 Elektronische print
12 Steuer-Platine	12 Control PCB	12 Carte de commande	12 Besturingsprint
13 Netzteil-Platine	13 Power supply board	13 Carte d'alimentation	13 Voedingsprint
14 Magnetventil	14 Solenoid valve	14 Electrovanne	14 Magneetventiel
15 Überwurfmutter	15 Union nut	15 Ecrou presse-étoupe	15 Wartel
16 Druckfeder f. Membrane	16 Spring for diaphragm	16 Ecrou presse-étoupe	16 Drukveer voor membraan
17 Wellscheibe	17 Washer	17 Rondelle	17 Ring
18 Linsenschraube M6 x 16	18 Pan head srew M6 x 16	18 Vis à tête cyl. M6x16	18 Schroef M6 x 16
19 Linsenschraube M5 x 16	19 Pan head srew M5 x 16	19 Vis à tête cyl. M5x16	19 Schroef M5 x 16
20 Linsenschraube M3 x 10	20 Pan head srew M3 x 10	20 Vis à tête cyl. M3x10	20 Schroef M3 x 10
21 Schneidschraube Ø 4 x 16	21 Self-tappingscrew Ø 4 x 16	21 Vis autotaraudeuse Ø 4 x 16	21 Schroefje Ø 4 x 16
22 Klemmkäfig für PG11	22 Clamping fixture f. PG11	22 Cage serre-câble PG11	22 Klemring voor PG11
23 Dichtring für PG11 di = 7,5	23 Sealing ring for PG11 di = 7,5	23 Bague d'étanchéité PG11 di = 7,5	23 Rubber dichtring PG11 di = 7,5
24 Haubendichtung	24 Sealing of cover	24 Joint deboîtier	24 Bovenkapafdichting
25 O-Ring 38 x 2	25 O-ring 38 x 2	25 Joint torique 38 x 2	25 O-Ring 38 x 2
26 O-Ring 20,35 x 1,78	26 O-ring 20,35 x 1,78	26 Joint torique 20,35 x 1,78	26 O-Ring 20,35 x 1,78
27 O-Ring 24 x 2	27 O-ring 24 x 2	27 Joint torique 24 x 2	27 O-Ring 24 x 2
28 O-Ring 19 x 2	28 O-ring 19 x 2	28 Joint torique 19 x 2	28 O-Ring 19 x 2
29 O-Ring 14 x 1,78	29 O-ring 14 x 1,78	29 Joint torique 14 x 1,78	29 O-Ring 14 x 1,78
32 Dichtstopfen für PG16	32 Vent plug for PG16	32 Bague d'étanchéité PG16	32 Afdichting voor PG16
33 Schlauchtülle komplett Ø 8 x 23	33 Hose connector complete Ø 8 x 23	33 Embout flexible complet Ø 8 x 23	33 Slangtule compleet Ø 8 x 23
35 O-Ring 4,5 x 1,5	35 O-ring 4,5 x 1,5	35 Joint torique 10 x 1	35 O-Ring 4,5 x 1,5
36 O-Ring 10 x 1	36 O-ring 10 x 1	36 Joint torique	36 O-Ring 10 x 1
37 Druckfeder für Ventilkern	37 Pressure spring for valve core	37 Ressort noyau de vanne	37 Drukveer voor ventielkern
38 Ventilkern	38 Valve core	38 Noyau de vanne	38 Ventielkern

Ersatzteil-Set • Spare part kits Kits de pièces de rechange • Onderdeelsets	deutsch

ECO-DRAIN 21

Bestell-Nr. • order ref. N° de com. • Bestelnr.	Inhalt • content • contente • inhoud	Lieferbare Ersatzteil-Sets
8.2520.0	4, 16, 25, 26, 29, 36, 37, 38	Verschleißteilsatz
8.2521.0	24, 25, 26, 27, 28, 29, 35, 36	Dichtungssatz
8.2522.0	3, 4, 5, 16, 19, 25, 26, 33	Membranaufnahme, komplett
8.2523.0	10, 12	Elektronik-Platine (230 Vac)
8.2524.0	10, 12	Elektronik-Platine (110 Vac)

ECO-DRAIN 21 PLUS

Bestell-Nr. • order ref. N° de com. • Bestelnr.	Inhalt • content • contente • inhoud	Lieferbare Ersatzteil-Sets
8.2520.0	4, 16, 25, 26, 29, 36, 37, 38	Verschleißteilsatz
8.2521.0	24, 25, 26, 27, 28, 29, 35, 36	Dichtungssatz
8.2522.0	3, 4, 5, 16, 19, 25, 26, 33	Membranaufnahme, komplett
8.2525.0	10,12	Platine "Steuerung"
8.2526.0	8, 13	Platine "Netzteil" (230 Vac)
8.2527.0	8, 13	Platine "Netzteil" (110 Vac)
XE KA21 206	8, 13	Platine "Netzteil" (24 Vac)
XE KA21 207	8, 13	Platine "Netzteil" (24 Vdc)
XE KA21 214	8, 13	Platine "Netzteil" (230 Vac) mit externem Test-Anschluß
XE KA21 215	8, 13	Platine "Netzteil" (110 Vac) mit externem Test-Anschluß
XE KA21 216	8, 13	Platine "Netzteil" (24 Vac) mit externem Test-Anschluß
XE KA21 217	8, 13	Platine "Netzteil" (24 Vdc) mit externem Test-Anschluß

english	français	nederlands
Available sets of spare parts	**Kits de pièces de rechange disponibles**	**Verkrijgbare onderdeelsets**
Set of wearing parts	Kit de pièces d'usure	Serviceset
Set of seals	Jeu de joints d'étanchéité	Afdichtingsset
Diaphragm seat	Siége de la membrane	Membraanhouder
Electronic PCB (230 Vac)	Carte électronique (230 Vac)	Electronic print (230 Vac)
Electronic PCB (110 Vac)	Carte électronique (110 Vac)	Electronic print (110 Vac)
Available sets of spare parts	**Kits de pièces de rechange disponibles**	**Verkrijgbare onderdeelsets**
Set of wearing parts	Kit de pièces d'usure	Serviceset
Set of seals	Jeu de joints d'étanchéité	Afdichtingsset
Diaphragm seats	Siège de la membrane	Membraanhouder
PCB „control"	Carte "Commande"	Besturingsprint
PCB „power supply" (230 Vac)	Carte "Alim." (230 Vac)	Voedingsprint (230 Vac)
PCB „power supply" (110 Vac)	Carte "Alim." (110 Vac)	Voedingsprint (110 Vac)
PCB „power supply" (24 Vac)	Carte "Alim." (24 Vac)	Voedingsprint (24 Vac)
PCB „power supply" (24 Vdc)	Carte "Alim." (24 Vdc)	Voedingsprint (24 Vdc)
PCB „power supply" (230 Vac) incl. external test connection	Carte "Alim." (230 Vac) avec raccord bouton test externe	Voedingsprint (230 Vac)
PCB „power supply" (110 Vac) incl. external test connection	Carte "Alim." (110 Vac) avec raccord bouton test externe	Voedingsprint (110 Vac)
PCB „power supply" (24 Vac) incl. external test connection	Carte "Alim." (24 Vac) avec raccord bouton test externe	Voedingsprint (24 Vac)
PCB „power supply" (24 Vdc) incl. external test connection	Carte "Alim." (24 Vdc) avec raccord bouton test externe	Voedingsprint (24 Vdc)

Klimazonen • Climatic zone • Zone climatique • Klimaatzone

	Klimazone Climatic zone Zone climatique Klimaatzone	Max. Kompressorleistung Peak compressor performance Capacité max. du compresseur Max. compressorcapaciteit **m³/min.**	Max. Trocknerleistung Peak dryer performance Capacité max. du sécheur Max. koeldrogercapaciteit **m³/min.**	Max. Filterleistung Peak filter performance Capacité max. du filtre Max. filtercapaciteit **m³/min.**
ECO-DRAIN 21 **ECO-DRAIN 21 PLUS**	grün/green/vert/groen	5,0	10,0	50,0
	blau/blue/bleu/blauw	4,0	8,0	40,0
	rot/red/rouge/rood	2,5	5,0	25,0

Die angebenen Leistungsdaten beziehen sich auf gemäßigtes Klima mit Gültigkeit für Europa, weite Teile Süd-Ost-Asiens, Nord- und Südafrika, Teile Nord- und Südamerikas (Klimazone: **blau**).

Für trockenes und/oder kühles Klima (Klimazone: **grün**) gilt folgender Faktor: Leistung in Klimazone "blau" ca. x 1,2

Für warmes und/oder feuchtes Klima (Tropen; Klimazone: **rot**) gilt folgender Faktor: Leistung in Klimazone "blau" ca. x 0,7

The compressor capacity figures relate to mild climate valid for Europe , large parts of South-East Asia, Nothern Africa, parts of North- and South America (climate zone: **blue**)

For dry and/or cold climate (climate zone: **green**), multiply the Blue zone figure with the following correction factor: approx. 1.2

For warm and/or wet climate (climate zone: **red**), multiply the Blue zone figure with the following correction factor: approx.

Les capacités indiquées se rapportent à un climat tempéré, valable pour l'Europe, certaines parties du Sud-Est asiatique, l'Afrique du Nord et du Sud, certaines parties de l'Amérique du Nord et du Sud (zone climatique: **bleu**).

Pour un climat sec et/ou frais (zone climatique: **vert**, il convient d'appliquer le facteur suivant :
Capacité en zone climatique "bleu" environ x 1,2

Pour un climat chaud et/ou humide (zones tropicales; zone climatique: **rouge**), il convient d'appliquer le facteur suivant:
Capacité en zone climatique "bleu" environ x 0,7

Door wereldwijd langdurige praktijkervaring met de ECO-DRAIN in verschillende klimaatzones, kunnen we nu nog nauwkeuriger het juiste type, ECO-DRAIN selecteren. Een correct type ECO-DRAIN kiest u door eerst de klimaatzone te selecteren waar de installatie wordt opgesteld.

Groen is een droog en koel klimaat b.v. Noord Europa, Canada, Noord Amerika, centraal Azië.

Blauw is een gematigd klimaat b.v. midden en zuid Europa, midden Amerika.

Rood is een tropenklimaat b.v. Zuid Oost Aziatische kustgebieden, Amazone en de Kongo.

XN KA21 001 Stand/Edition/Edition/Stand: 06.00

KAESER KOMPRESSOREN

KAESER KOMPRESSOREN GmbH
Postfach 2143 • 96410 Coburg • Tel. (09561) 640-0 • Fax (09561) 640-130