technotrans

power to transform

Refrigerating set

omega.k 340L - 420L - 500L - 620L

Instruction Manual

ORIGINAL INSTRUCTION MANUAL

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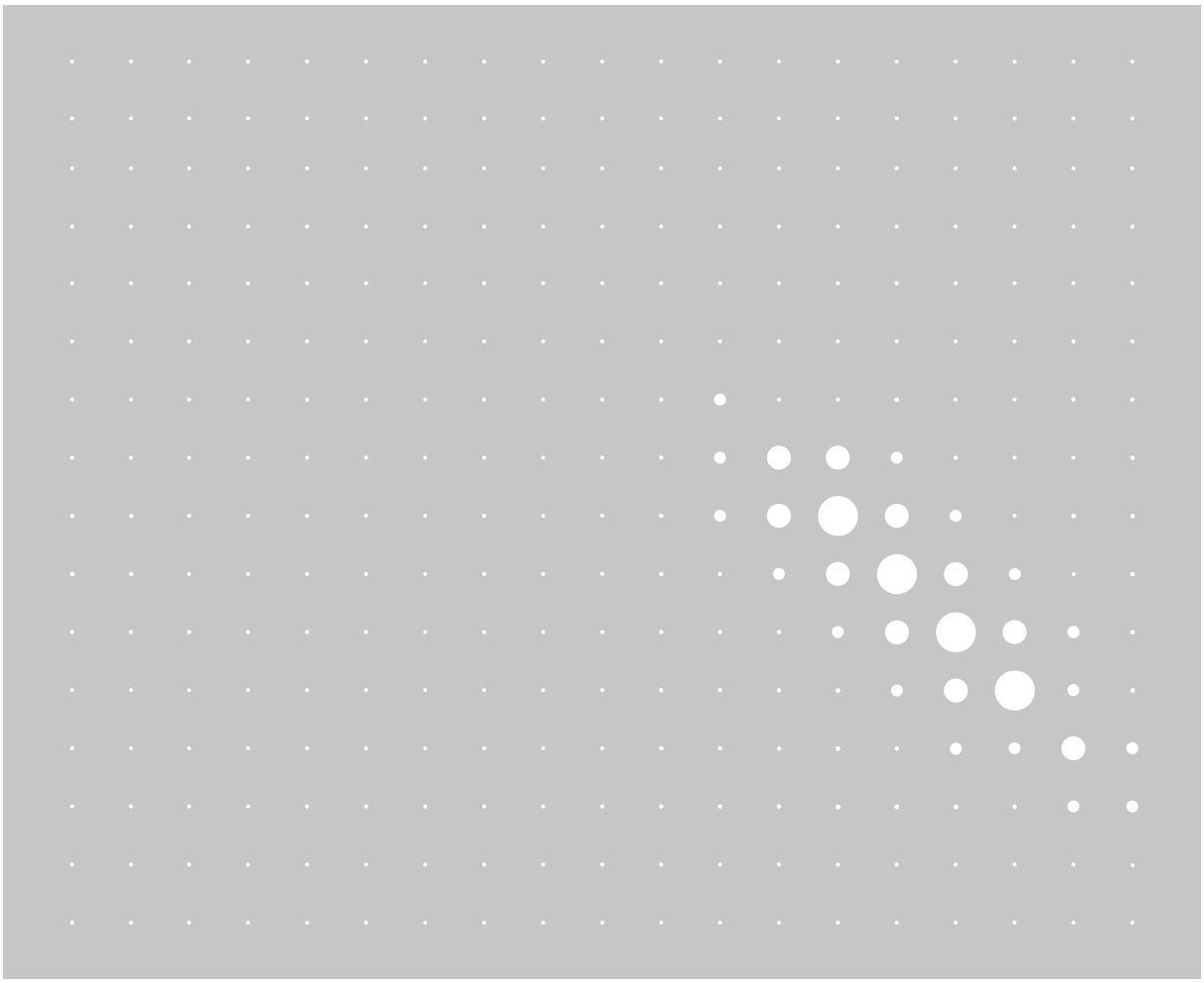

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gdsCert

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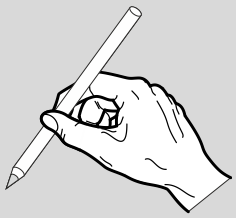
1.3 Making contact

Please keep the following details ready (see the type plate of the unit) when contacting us (e.g. for spare part orders, warranty claims, etc.):

- Product name
- Serial no.

NOTE

If necessary, enter the information, which is stated on the type plate of the unit, into the table.



Name of the unit: (Product Name)	.....
Serial number: (Serial No.)	.....
Part number: (Part No.)	.....
Year of manufacture: (Year of Manufacture)	.....

2 About this manual

2.1 Use and storage

NOTE

Prior to performing any work on the unit/system, read the instruction manual.

The following points must be noted:

- The instruction manual is an integral part of the unit/system and must be available to the operating personnel at the unit/system at all times.
- The instruction manual is indispensable for the safe start-up, operation and maintenance of the unit/system in line with its intended purpose.
- The instruction manual applies solely to the product that is stated on the cover sheet.
- We reserve the right to change the instruction manual due to further technical developments.
- This instruction manual is part of the scope of supply.
- The instruction manual shall apply from the transport phase up to the final disposal and must be absolutely observed.
- Keep the instruction manual in a place where it is readily accessible at all times. It must be complete, remain with the machine and must be available to all authorised persons.
- Maintain the instruction manual in a clearly legible state at all times.
- Hand over the instruction manual along with the device if it is resold.
- The unit/system may present unavoidable residual risks to persons and property. This is why the instruction manual must be read, understood and strictly complied with for all types of tasks by the personnel prior to commencing any work. In addition, any person who works on or with the unit/system in any way must be instructed and familiar with the potential hazards.
- This instruction manual is solely intended for trained and authorised personnel.
- It is the operator's responsibility to ensure that the manual is read and understood by all operating personnel before starting work.
- The illustrations in this manual are for providing a basic understanding and may differ from the actual unit/system.

2.2 Target audience

When working with the unit/system, the various tasks must be assigned to specific groups of persons.

Depending on the location of use, the necessary qualification of the personnel may be subject to varying statutory provisions. The operator must ensure compliance with the relevant laws. Unless regulated by law, the following list is used to define the permissible personnel and their minimum qualification.

The following points must be noted:

- Any work on the unit/system must be performed by qualified and instructed personnel.
- The personnel must have knowledge of the relevant standards, provisions, accident prevention regulations and operating conditions.
- The personnel must be instructed and trained for the tasks that need to be performed.
- The personnel must be able to identify and avoid any potential hazards.

Person	Task	Qualification	Lifcycle phase
Qualified personnel for transporting loads	Lifting/lowering and transport of the system	Proven experience in the handling of suspended loads and in the securing of loads	Transport, installation, disassembly and removal
Qualified personnel (mechanics)	Mechanical work during: start-up, elimination of faults and malfunctions, maintenance and shut-down	Training as an industrial mechanic or an equivalent professional qualification	Start-up, maintenance, elimination of faults and malfunctions, shut-down, disassembly and removal
Qualified personnel (trained electricians)	Electrical work	Specialised electrical training or an equivalent professional qualification	
Qualified personnel (refrigeration specialists)	Work on the refrigeration unit	Training as a refrigeration specialist or an equivalent professional qualification	
Qualified personnel (machine operators and fitters)	Operation and set-up of the system	Person who has been trained and instructed by the operator based on the instructions for use	Start-up, operation, maintenance, elimination of faults and malfunctions
Qualified personnel (disposal specialists)	Proper disposal of the system	Knowledge about the disposal regulations applicable on site	Shut-down, disassembly and removal, disposal
Qualified personnel (safety specialists)	Implementation of the applicable safety regulations	Knowledge about the safety regulations applicable on site	All phases
Others (e.g. visitors)	Site inspection	Person under the supervision of a safety specialist	-

2.3 Explanation of the various notes

The warning notes are preceded by signal words indicating the severity of the hazard.

Compliance with the warning notes is imperative in order to avoid accidents, injuries and damage to property.

Explanation of warning notices used in this manual:

⚠ DANGER

Short description of danger

The signal word **DANGER** identifies an immediately threatening danger.

Any non-adherence will result in severe injuries or death.

⚠ WARNING

Short description of danger

The signal word **WARNING** identifies a potential danger.

Any non-adherence may result in severe injuries or death.

⚠ CAUTION

Short description of danger

The signal word **CAUTION** identifies a potential danger.

Non-compliance may result in minor to medium injuries.

NOTICE

Short description

The signal word **NOTICE** identifies a potential risk of damage to property.

Non-compliance may cause damage to the unit or system.

NOTE

The signal word **NOTE** identifies further information on the unit or about its use.

Note concerning the protection of the environment

The keyword **Note concerning the protection of the environment** indicates information concerning the protection of the environment.

2.4 Seal of quality

The seal of quality "gdsCert" of gds GmbH (service provider for technical documentation) is a proof of quality for technical documentation.

With the "gdsCert" seal of quality, the manufacturer provides proof of the high standard of the technical documentation and of the compliance with the relevant standards and guidelines.

The seal of quality "ecoDoc" is used for the certification of instruction manuals under ecological points of view. It is listed under the "green safety instruction".

With the "ecoDoc" seal of quality, the manufacturer indicates that the product documentation includes notes concerning the potential ecological hazards resulting from operating errors or other tasks that are performed with or on the product. Companies thereby make a contribution to the protection of the environment.

The seal of quality "ecoDoc" provides a proof of compliance with the relevant standards and guidelines and/or of the ecological approach concerning the contents of the documents.

2.5 Further applicable documents

In addition to this instruction manual, there are further applicable documents that also need to be taken into consideration. These are usually the following documents:

- spare parts catalogues/lists
- electrical documentation
- safety data sheets
- project drawings
- documentation of third-party manufacturers

NOTE

Information concerning the actual documents that are part of the product-accompanying documents can be found in the specifications of the order confirmation.

3 Liability and warranty

3.1 General information

The unit/system has been manufactured in line with the state of the art as well as the recognised safety regulations and standards. Still, its use may jeopardise the health and safety of the user or third parties or cause damage to the unit/system or other property.

Warranty and liability claims for injuries to persons/damage to property are excluded if they are due to one or several of the following causes:

- Improper use of the unit/system not in line with its intended use
- Non-compliance with the instruction manual and its associated parts and annexes
- Unauthorised structural or technical modifications of the unit/system
- Use of untrained personnel
- Use of the unit/system with defective or improperly installed safety devices and guards
- Operating errors
- Failure to maintain the unit/system
- Non-elimination of faults/malfunctions
- Use of non-authorised spare parts
- Other misuse
- Catastrophic events caused by foreign objects or force majeure

The information in this instruction manual describes the characteristics of the product without guaranteeing them.

No claims for the modification of components that have already been supplied may be made on the basis of the information, illustrations and descriptions in this instruction manual. The information, data and notes included in this instruction manual were up to date at the time of printing.

3.2 Terms of warranty

The manufacturer cannot be held liable for damage resulting from improper use, non-compliance with this manual, the employment of insufficiently qualified personnel, or unauthorised modifications. In these cases the manufacturer's warranty is rendered void.

The correct operation of the unit will be impaired if incorrect spare parts are used!

The correct operation of the unit cannot be guaranteed if components are used which have not been approved. Only use spare parts approved by the after-sales service.

No warranty claim!

The use of media (e.g. washing agents, additives, cleaning agents, etc.) that are not approved may result in damage to the unit or system. The warranty will be rendered void. The same shall apply when different media are mixed.

Use only media that have been approved by the manufacturer.

NOTE

Removing type plates will make the warranty claim expire.

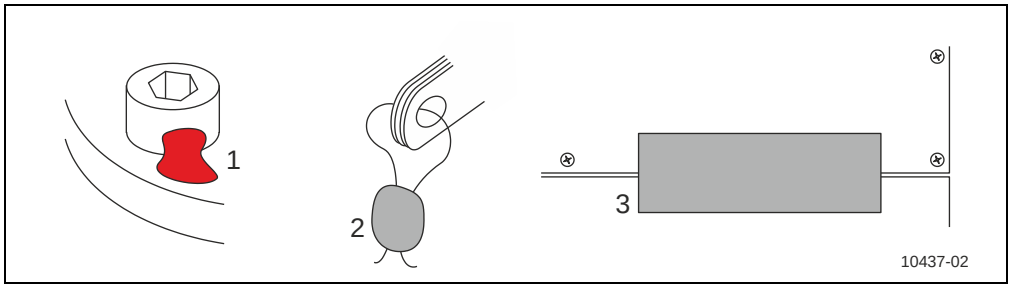


Fig. 1: Sealings

Sealings may exist at various different locations at the unit or plant:

1 Sealing wax (Application example)
2 Seals (Application example)
3 Seal stickers (Application example)

NOTE

The warranty will be rendered void if sealings are broken without authorisation.

4 Safety

4.1 General information

NOTE

Every person who is ordered to work on the unit/system must have read and understood these instructions and, in particular, the "Safety" chapter.

If necessary, in-house instruction should be provided, taking into account the technical qualifications of the personnel concerned.

The "Safety" chapter provides an overview of all of the important safety aspects for the optimum protection of the personnel and for the safe and trouble-free use of the unit/system from the transport up to the operation and disposal.

The unit/system has been designed and manufactured in line with the current state of the art and is in compliance with the recognised safety regulations and standards.

The unit/system is safe to operate.

Non-compliance with the instructions and safety notes in this instruction manual may lead to substantial hazards to persons and damage to the unit/system.

Only use specialised personnel who are familiar with the fundamental health and safety rules and regulations and who have been briefed about the handling of the unit/system.

Certain components have additional warning plates or labels to ensure safe operation. Plates or labels must not be covered or removed.

Compliance with the safety instructions is mandatory. The observation of these instructions is essential for ensuring safety.

The relevant accident prevention regulations as well as other generally recognised regulations concerning workplace health and safety must be observed.

4.2 Intended use

The unit or the system is intended solely for the application outlined in the “Description/Overview” section and only with the components supplied and approved.

Using the unit for purposes other than those mentioned above is considered contrary to the intended use. The manufacturer cannot be held liable for any damage resulting from such use. The risk of such misuse lies entirely with the user.

The product-specific documentation can only refer to the intended use of the unit/system on which the order is based.

The instructions cannot cover any specific situations arising from special local conditions or special applications that the manufacturer was not aware of. In this case, the operator must ensure the safe operation of the unit/system or shut the unit/system down until appropriate measures for the safe operation have been coordinated or implemented in consultation with the manufacturer or other competent authorities.

4.3 Safety of personnel

Knowledge of, and compliance with, the present content is a prerequisite for the protection of persons against danger and for the avoidance of errors and mistakes.

Tasks (e.g. maintenance and service tasks) should be performed only by suitably qualified persons who are familiar with these tasks and who have been informed concerning the potential danger.

Avoid any working practice that:

- puts the health and safety of the user or third parties at risk,
- is detrimental to the unit or system or other material assets,
- impairs the safety or functionality of the unit or system,
- does not comply with the safety instructions.

In addition:

- Always wear personal protective equipment when working on the unit/system.
- Comply with the relevant accident prevention regulations.
- Comply with the occupational health regulations.
- Comply with the generally recognised safety rules.

There is an increased risk of injury if the safety devices and guards are disabled. Never dismantle or disable any safety devices or guards.

- Check the safety devices and guards daily for correct operation.
- Report any faults and defects concerning the safety devices and guards to the customer service without delay.
- Keep covers (e.g. panels, shields, housings) closed during operation.
- Perform repairs of the pipe systems and tanks only when the system is depressurised.
- Observe the respective supplier's safety data sheets and disposal instructions as well as all of the local safety regulations when using chemicals.
- When handling process fluids (e.g. oils, greases and other chemical substances), comply with the supplier's specifications and safety information for the respective product.
- Wear personal protective equipment.

Failure to wear personal protective equipment may cause serious injuries or death.

- Wear the prescribed personal protective equipment, e.g. hearing protection, eye protection, safety shoes, helmet, protective clothing, safety gloves, and respiratory protective equipment.
- Long hair must be tied back. Do not wear any jewellery or loose-fitting clothes. There is a risk of injury if these items get caught in or are pulled into any moving parts of the machinery.
- Ensure that there are no unauthorised persons in the danger zone.

Any safety devices that have been removed for set-up, maintenance, or repair purposes must be reinstalled and checked for correct operation immediately upon the completion of the maintenance and repair work.

In the above case, particular attention must be paid to the general accident prevention and safety regulations.

There is a risk of damage to property if the unit/system is operated improperly.

- Comply with the description of any add-on parts or ancillary equipment (if included).
- See also the supplier documentation or the separate documentation provided by the third-party suppliers.

4.4 Installation site

When selecting an installation site, observe the following instructions:

- Keep the specified escape routes clear.
- Ensure firm support and a horizontal position of the unit.
- Comply with the data stated in the “Technical Data” section concerning the ambient temperature for operation, transport and storage when the unit is completely empty.
- Ensure sufficient space for operating, maintaining and cleaning.
- If provided, keep the vents for incoming and outgoing air clear.
- If installing the device in a building, select a room with dimensions that are in accordance with the specifications of DIN EN 378-1, taking into account the dependency on the refrigerant fill quantity (see “Technical data” section).

Observe relevant technical and building regulations.

Hoses and electrical cables must be laid such that there is no danger of tripping and that they are protected from damage.

When selecting an installation site, the applicable safety regulations and manufacturer’s instructions concerning substances used for or located near the machine must be observed.

When installing the units near traffic routes, separate the units from the traffic routes by suitable structures.

4.5 Transport and installation/start-up

There is an increased risk of injury for persons who perform tasks for which they are neither qualified nor trained.

Only persons who are familiar with the tasks, who have been informed about the associated hazards have the necessary qualifications are authorised to transport the unit.

- Never work or stand under suspended loads. There is a risk of fatal injuries from falling loads.
- Transport tasks may only be performed by qualified and authorised persons and in compliance with the safety instructions!
- The shipping company and the manufacturer must be informed immediately in writing about any damage that is noticed after the delivery. The start-up of the unit/system must be suspended, if necessary.
- Use only suitable lifting devices, transport equipment, load handling attachments and lifting accessories and ensure that they are in a perfect technical state and have a sufficient load-bearing capacity.
- Take the attachment points and centre of gravity of the load into consideration.
- Do not add any additional attachment points to the units/systems by welding, flame cutting or drilling. There is a risk of cracking due to the notch effect of the weld seam or flame-cutting spot or bore.
- When transporting the unit, observe the instruction labels on the unit (if provided).
- Transport the unit only when it is empty.
- If the unit/system needs to be replaced, fasten and secure it thoroughly on the lifting devices.
- The banksman must be within the range of vision of the operator or have voice contact with the operator.
- Block and mark the transport routes so that unauthorised persons cannot reach the hazard area!
- Always secure the transport route with the aid of a third person!

NOTE

Comply with the general accident prevention and safety regulations.

4.6 Operation

- Operation is permissible only if all of the components are in a perfect technical state and proper operational condition and if they are used in line with the intended purpose.
- Avoid any operation that compromises the safety of the unit/system.
- The operator must ensure that unauthorised persons cannot work on the machine.
- Prior to switching the unit/system on, the operator must ensure that no persons are put at risk by starting the machine.
- During operation, the entire hazard area must be observed or closed off so that no one can enter this area without being noticed.
- Do not leave the unit/system unattended during operation.
- Use the unit/system only if all of the guards and safety devices are present and fully functional.
- The operator must ensure a clean and clearly arranged workplace at and around the unit/system by issuing corresponding instructions and performing checks.
- Observe the controls and indicators during operation.

4.7 Maintenance

The operator must ensure that the unit/system and its safety devices and guards are kept in a functional state. The control devices as well as the safety devices and guards must be checked in terms of their effectiveness.

Only specialised and trained personnel are authorised to perform maintenance, repairs and overhauls.

If safety devices or guards need to be removed for maintenance, overhauls and repairs, they must be reinstalled and checked for correct operation immediately after the completion of the tasks.

4.8 Operating faults

Malfunctions of the unit/system may be caused by a fault that can be localised and eliminated with the aid of the "Troubleshooting" section.

- Assign the associated tasks to the corresponding specialised personnel.
- If the fault cannot be eliminated, contact the service of the manufacturer.

NOTE

See the "Contacts" section.

4.9 Use of chemicals

Risk of explosion when handling flammable liquids!

The owner must inform the operating personnel as to the possible risk of explosion whilst using flammable liquids in accordance with the relevant explosion protection directive.

- Only use cleaning agents and solvents, additives, solvent-free washing agents, or coatings with a flash point of at least 60 °C (140 °F).
- Do not heat the substances to a point higher than their flash point.
- Ensure sufficient ventilation.
- No open flames or sources of ignition.
- Comply with the explosion protection measures.
- Immediately remove any leaked materials in a proper manner.
- Ensure that there are no open containers, spills or soaked rags.

Health hazard!

The use of chemicals can present a health hazard.

- When handling chemicals, always wear protective gloves, eyewear, and clothing.
- Observe the safety data sheets.

Damage due to aggressive chemicals!

Aggressive chemicals can damage the components.

- Do not use any chemicals (e.g. for cleaning) that are aggressive to the components.
- Observe the relevant material safety data sheets of the suppliers.

Note concerning the protection of the environment

The improper disposal of chemicals (e.g. additives) has a negative impact on the environment.

- Chemicals must not be disposed of as household waste and it must be ensured that they are not released into the sewage system or soil.
- Wear suitable protective equipment (gloves, eye protection) when performing disposal tasks.
- Chemicals must be disposed of separately (e.g. as special waste if applicable) and supplied separately to the recycling centres.
- Refrigerants are not allowed to enter the atmosphere. Used refrigerants must be returned to a certified company for reclamation.
- Only personnel qualified according to the Chemicals Climate Protection Ordinance is authorized to perform work on the refrigerant circuit.
- Comply with the safety data sheets and also with the applicable national and local rules and regulations.

4.10 Use of cleaning agents

No material, i.e. neither metals nor plastics, can be certified to be completely chemically resistant.

Due to the large number of available additives and cleaning agents, the recipes of which are subject to change, the manufacturer cannot assume any liability for damage attributable to the influence of such substances.

Damages through cleaning agents!

Cleaning agents can have an effect on devices and measuring equipment and can destroy materials and harm the environment.

Please observe the following points:

- Cleaning agents must not enter system circuits.
- Use cleaning agents economically and for specific objectives.
- Keep the application duration to a minimum, especially for plastic parts and seals.
- Excess cleaning agent has to be removed and parts have to be wiped dry or, if possible, rinsed with clear water.
- Do not use any flammable cleaning agents (unless explicitly specified by the manufacturer).
- Do not use any cleaning agents containing silicone or chlorine (unless explicitly specified by the manufacturer).

In case of doubt, the user should perform a test to see whether the detergents / chemicals are compatible with the materials used.

The materials used for this product have been selected on the basis of several years of field experience of these products worldwide. If the product is used as intended and if the information provided in the "Safety" chapter is observed, this product offers very good performance and a long service life.

Note concerning the protection of the environment

The excessive use of cleaning agents has a negative impact on the environment.

- Use environmentally friendly cleaning agents.
- Use cleaning agents economically and for specific objectives only.
- Do not spill any cleaning agents.
- Keep the containers tightly sealed. Empty containers or containers that are in use must also be sealed upon the completion of the task.
- Used cleaning agents and the associated containers, tanks, etc. must be disposed of in an environmentally sound manner and in compliance with the local and national rules and regulations.

4.11 Residual risks

Any unavoidable, design-based residual risks (if present) are mentioned and described in this instruction manual in the corresponding sections.

4.12 Safety labels

Notes and symbols on the equipment/system, e.g. safety labels and plates, must be absolutely complied with. Do not remove them and ensure that they are fully legible.

NOTE

Destroyed or illegible marks/symbols must be replaced immediately.

	**Warning – Electrical hazard.** Only specialised personnel is authorised to perform work on the electrical system. Negligence can lead to electric shock. • Comply with the information in the "Safety" section. • Wear protective clothing.
	**Danger of injury due to sharp cooling fins.** • Do not touch the sharp cooling fins. • Wear protective gloves.
	**Warning - Hot surface.** • Wear protective clothing (gloves). • Comply with the instructions given in the “Safety” section.

5 Description / Overview

5.1 General information

Device for cooling external components.

The device consists of the following main functional groups:

- Coolant circuit (KK) with integrated pump for transporting the cooling medium
- Refrigerant circuit (KM)
- Control unit with integrated microprocessor
- For water-cooled devices: Cooling water circuit (KW)

The cooling medium is cooled to a constant temperature via the refrigerant-circuit evaporator.

During operation, a constant flow of cooling medium is realised via the pump.

5.2 Safety devices

- Safety devices of the refrigeration unit as per EN378, part 2
- The refrigeration circuit is secured by a high-pressure switch.
  The high-pressure switch is triggered, if the refrigeration circuit is overloaded and the chilling medium is thus under high pressure.
- The unit can be disconnected from the power supply via the maintenance switch.

5.3 Foreseeable misuse

In general:

any incorrect use is classed as 'not for the intended purpose'. The manufacturer cannot be held liable for any damage resulting from such use. The risk of such misuse lies entirely with the user. Moreover, intended use of the unit also involves use in accordance with the applicable international and national safety instructions as well as the safety instructions in the manual.

Amongst others, the unit is **NOT** intended for the following applications:

- Use of the unit/system as a work platform.
- Use of the unit/system as a storage area.
- Stepping on the unit.
- Use of unsuitable media.
- Use of cooling medium with dirt particle size > 0.5 mm.
- Use of chilling media that are not specified and approved in "Technical Data".
- Operation of the unit without medium.
- Cooling of media and objects that are not intended for the operation of the unit/system.
- Attaching transport aids
- Transport with filled tank.
- Set-up in unsuitable locations
- Non-compliance with the permissible technical data. See the "Technical data" section.
- Operation with an incorrect phase sequence.
- Operation with missing or damaged sub-assemblies intended to protect the safety of persons and the device/system.
- Use of the unit in an explosive atmosphere.

5.4 Options

- **Outdoor installation with temperature control function (use only with antifreeze agent)**

The chiller contains the following extra equipment/substance:

- Control cabinet heater
- Tank heater
- Pump start-up controller
- Hot gas bypass
- EC-Fan (air-cooled system)
- Internal components with corrosion-resistant design
- Coolant circuit insulated
- Solenoid valve in refrigerant circuit

In case of falling ambient temperatures and system shutdown, the pumps and tank heater for controlling the temperature of the water are activated. The pumps and tank heater are activated at an coolant temperature of +6°C, and deactivated at an coolant temperature of +12°C.

- **Basement installation**

The chiller contains the following extra equipment/substance:

- Solenoid valve in return line of the coolant circuit
- Non-return valve in flow line of the coolant circuit

- **Installation in tropical climate**

In the case of the option concerning the installation in tropical climate, the unit can be used up to an ambient temperature of +50°C. The control cabinet is equipped with a cabinet fan. The pipes and hoses of the coolant circuit are insulated.

- **Temperature control**

In case of falling ambient temperatures and system shutdown, the pump and heater for controlling the temperature of the medium are activated.

When the unit is switched on, pump and heater are activated to keep the temperature of the medium close to the adjusted set point.

- **Increased outlet pressure**

Increased outlet pressure will be realized by a stronger pump.

- **Radial fan attachment**

To enable a connection to an exhaust-air duct, the chiller can be fitted with a radial fan attachment (axial fan not applicable).

- **Guide and fixed roller for heavy loads**

For easier change of installation position the device is equipped with guide and fixed roller for heavy loads.

- **Temperature sensor in coolant circuit**

This temperature sensor is used to monitor the temperature in the inlet of the coolant circuit.

- **EC-Fan**

For better energy efficiency a EC-Fan is installed.

- **Filling with Glycol**

A water-glycol-mixture will be delivered together with the refrigerating set.

- **Manometers**

The manometers are used to measure the pressure in the coolant circuit.

- **Dirt pan in coolant circuit**

The dirt pan is used to filter the water or water-glycol mixture of the coolant circuit.

- **Safety valve**

The safety valve ensures minimum throughput in the water circuit and limits the maximum flow pressure.

- **Ball valve**

The device can be equipped with the following ball valves:

  - Ball valve between tank and pump
  - Ball valve in the inlet and outlet of the coolant circuit
  - Ball valve in the inlet and outlet of the cooling water circuit (of water- / glycol-cooled devices).

- **Filter mat**

The filter mat reduces contamination of the device due to intaken dust particles.

- **Closed system**

The device is equipped with the following additional components:

  - closed tank
  - expansion tank
  - exhauster
  - pressure switch
  - safety valve.

6 System Layout

NOTE

The illustrations used in this chapter are examples. They can differ from the actual system layout depending on the specific unit and equipment variant.

6.1 Connections / electrical components

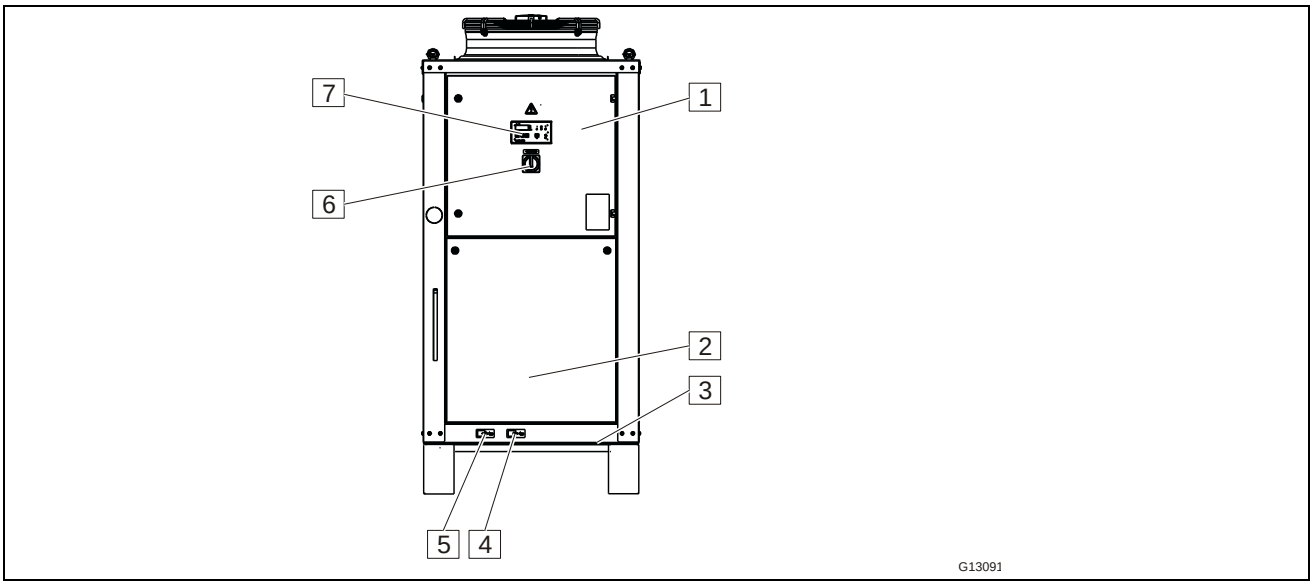


Fig. 2: Connection points / Electrical parts (340, 420, 500, 620)

1	Control cabinet	5	Cold water outlet (supply flow)
2	Tankdraining	6	Main switch (black) / Emergency stop switch (red / yellow)
3	Electrical connection	7	Device control unit
4	Cold water inlet (return flow)		

6.2 Symbols / labels on the unit

NOTE

Maintain symbols / signs on the unit so that they are easily legible and do not cover them.

Immediately replace damaged signs or stickers.

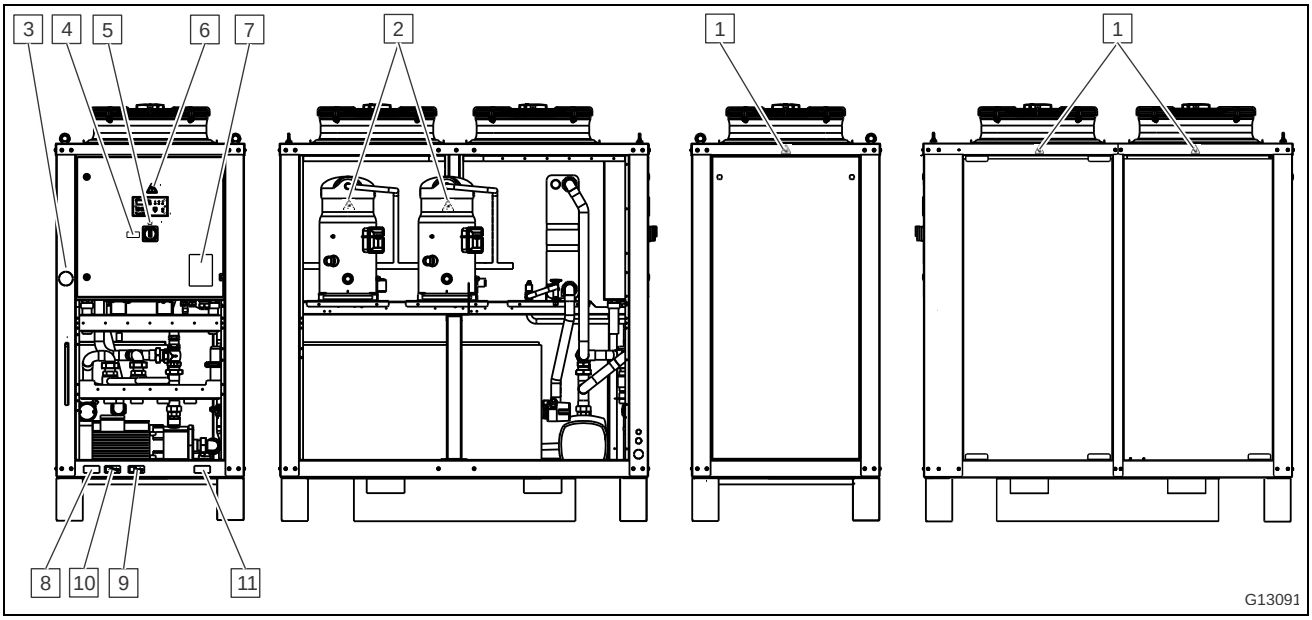


Fig. 3: Plates on device (340, 420, 500, 620)

Label 1	
	**Danger of injury due to sharp cooling fins.** • Do not touch the sharp cooling fins. • Wear protective gloves.

Label 2	
	**Warning - Hot surface.** • Wear protective clothing (gloves). • Comply with the instructions given in the “Safety” section.

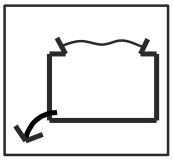
Label 3	
	**Pressure gauge**

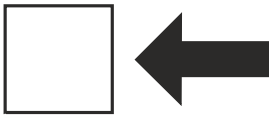
Label 4	
Dieses Gerät darf nur mit einem Wasser-Glykol-Gemisch von 65:35 betrieben werden. This equipment must run a water-glycol mixture of 65:35.	**Information concerning the filling of the system circuit with anti-corrosion and antifreeze agents (example).**

Label 5	
	Main switch / Maintenance switch for switching the device on and off.

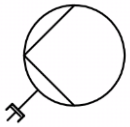
Label 6	
	**Warning – Electrical hazard.** Only specialised personnel is authorised to perform work on the electrical system. Negligence can lead to electric shock. • Comply with the information in the "Safety" section. • Wear protective clothing.

Label 7	
	**Type plate of the unit (example)**

Label 8	
	**Draining the unit.** • If necessary, keep a collecting vessel ready.

Label 9	
	**Cold water inlet**

Label 10	
	**Cold water outlet**

Label 11	
	**Pump draining the unit.** • If necessary, keep a collecting vessel ready.

6.3 Schematic system diagram

NOTE

The chiller can be equipped with various options dependent on the configuration.

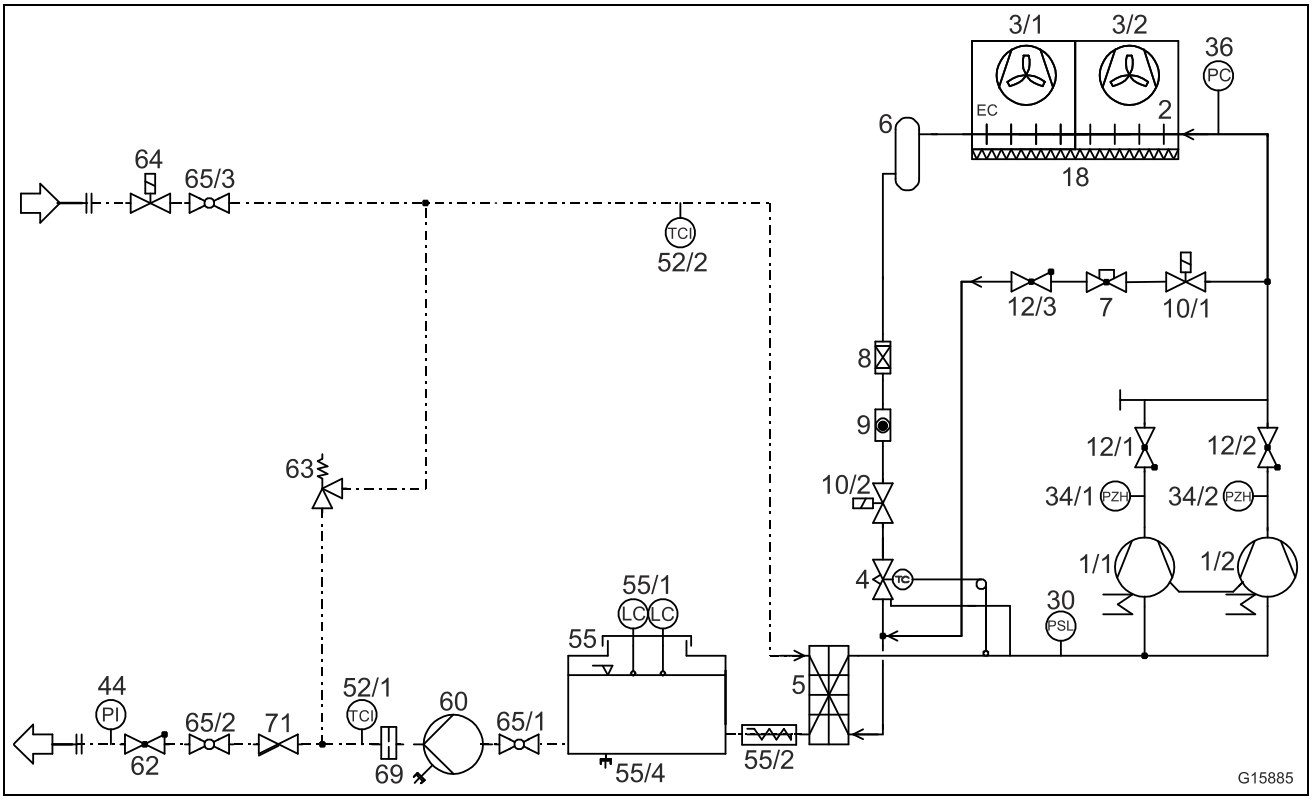


Fig. 4: Schematic system diagram (air-cooled system, open system)

Pos. no.:	
1/1	Compressor
1/1	Oil sump heater
1/2	Compressor *)
1/2	Oil sump heater *)
2	Condenser
3/1	Fan
3/2	Fan **)
4	Expansion valve
5	Evaporator
6	Tube expansion
7	Shut-off valve (optional)
8	Filter dryer
9	Refrigerant sight glass
10/1	Solenoid valve (optional)
10/2	Solenoid valve (optional)
12/1	Non return valve *)
12/2	Non return valve *)
12/3	Non return valve (optional)
18	Filter mat (optional)
30	Low-pressure switch

Pos. no.:	
34/1	High-pressure controller
34/2	High-pressure controller *)
36	High-pressure sensor
44	Pressure gauge (optional)
52/1	Temperature sensor
52/2	Temperature sensor (optional)
55	Tank
55/1	Float switch
55/2	Tank heater (optional)
55/4	Tank draining
60	Pump
62	Non return valve (optional)
63	Safety valve (optional)
64	Solenoid valve (optional)
65/1	Ball valve (optional)
65/2	Ball valve (optional)
65/3	Ball valve (optional)
69	Restrictor
71	Dirt trap (optional)

*) = only for omega.k 420, 500, 620
**) = only for omega.k 340, 420, 500, 620

7 Transport

The following must be observed in order to avoid injuries and damage to property:

- Only qualified personnel are authorised to perform these tasks.
- Comply with the information given in the "Safety" section.

DANGER

Suspended loads

Tipping or falling loads may lead to serious or even fatal injuries.

- Do not stand under suspended loads.
- Only use approved hoisting equipment and lifting accessories (slings, etc.) that are rated for the total weight of the attached load.
- Only use lifting accessories/load handling attachments that are in perfect technical condition.
- Take the attachment points and centre of gravity of the load into consideration.
- Secure the load by way of suitable devices.

WARNING

Danger for persons!

Increased risk of injuries through improper transport.

The transport of the unit should be carried out only by suitably qualified persons who are familiar with the unit and who have been informed as to potential hazards.

Risk of crushing between components during transport.

During the transport of components, limbs may be crushed. Serious injuries may result.

- Only use suitable means of transport.
- Secure the loads adequately.
- Wear personal protective equipment.

NOTICE

Damaging of unit!

Damage due to improper transport.

- Make sure to follow signs (if attached) at unit when transporting unit.
- Transport units with suitable lifting gear only.
- Transport the unit only when it is empty.
- When moving the unit, the respective transport vehicle (e.g., forklift, pallet truck) must be operated compliant with the local rules and regulations and according to relevant industrial accident prevention regulations.
- Compliance with the maximum lifting capacity of the transport equipment is mandatory. The weight of the unit is stated in the "Technical Data" section.
- Maintain a low lifting/lowering speed.

7.1 Device without eye bolts

7.1.1 Transport using a forklift / lifting truck

The provided openings on the wide side (A) in the subframe of the unit or in the supplied unit pallet must, if available, always be used when transporting the chiller with a forklift.

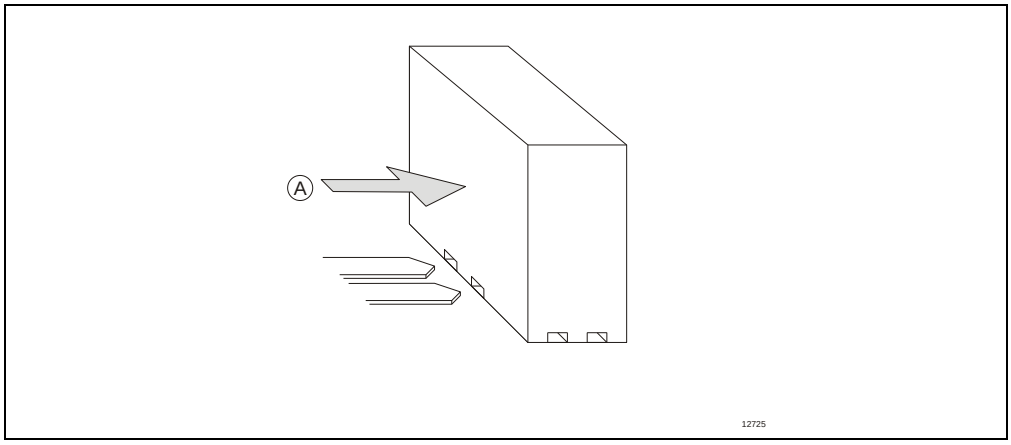


Fig. 5: Transport using a forklift / lifting truck (example)

- Push the forks of the forklift/pallet truck horizontally into the transport pockets of the unit.
- Ensure that the load is evenly distributed when using a forklift/pallet truck.
- Use a low lifting speed.

7.1.2 Transport by crane

When using a crane in order to transport the unit, there are attachment points on the frame in order to fix the lifting gear at 4 points.

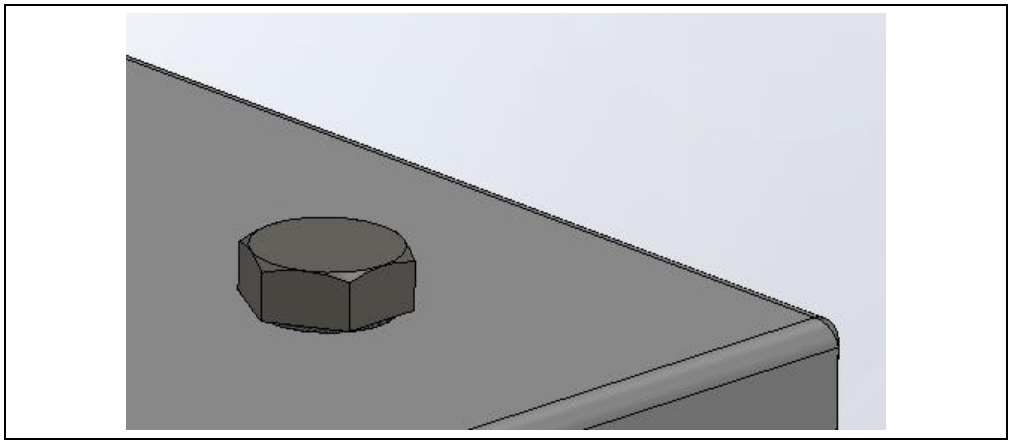


Fig. 6: attachment points on the unit (example)

- The eyebolts and the other transport equipment are not included in the scope of supply.
- Observe the markings (if available) identifying the location of the attachment points.
- Maintain a low lifting/lowering speed.
- Compliance with the generally applicable safety and accident prevention regulations is mandatory.

Load handling equipment:

The handling equipment (webbing sling, chain, rope, etc.) must be chosen to ensure that in the comply with local and legal requirements and guarantee the safe transport.

7.1.3 Transport using the spreader bar

When using a spreader bar in order to transport the unit, there are attachment points on the frame in order to fix the lifting gear at 4 points.

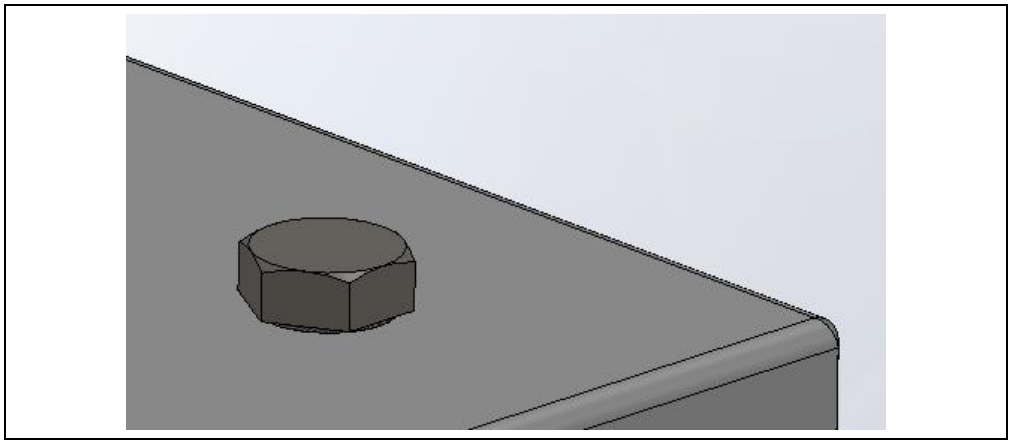


Fig. 7: attachment points on the unit (example)

- The eyebolts and the other transport equipment are not included in the scope of supply.
- Observe the markings (if available) identifying the location of the attachment points.
- Maintain a low lifting/lowering speed.
- Compliance with the generally applicable safety and accident prevention regulations is mandatory.

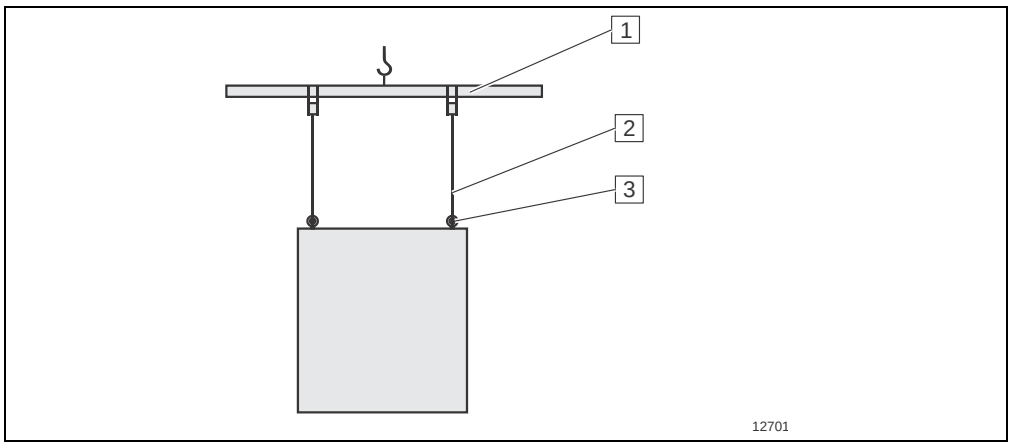


Fig. 8: Transport using the spreader bar (example)

1	Spreader bar	3	Load attachments
2	Sling		

Load handing equipment: use of a spreader bar in accordance with DIN 15401 and a webbing sling in accordance with EN 1492-1

7.2 Device with eye bolts tested according to DIN 1677-1 (pink)

7.2.1 Transport using a forklift / lifting truck

The provided openings on the wide side (A) in the subframe of the unit or in the supplied unit pallet must, if available, always be used when transporting the chiller with a forklift.

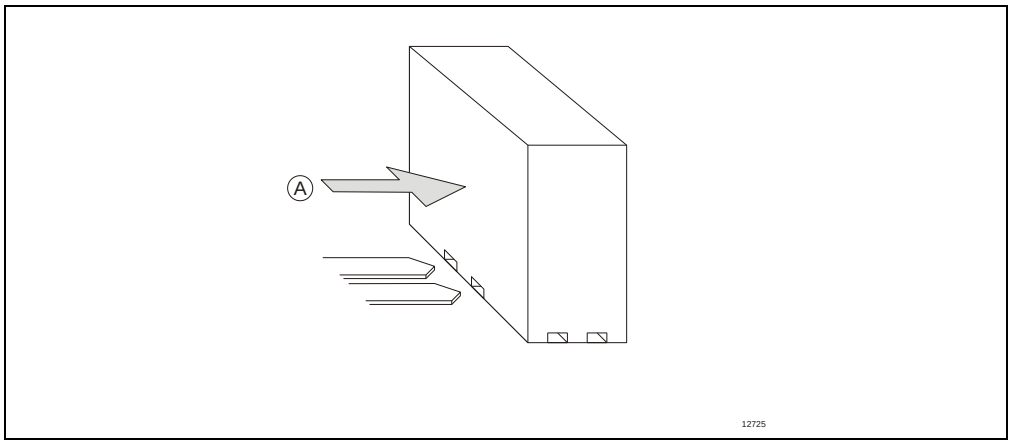


Fig. 9: Transport using a forklift / lifting truck (example)

- Push the forks of the forklift/pallet truck horizontally into the transport pockets of the unit.
- Ensure that the load is evenly distributed when using a forklift/pallet truck.
- Use a low lifting speed.

7.2.2 Transport by crane

If a crane is used in order to transport the equipment, there are 4 eye bolts located on the frame.

- After it has been screwed tightly into the frame, it must be possible to rotate the eyebolt through 360°.
- Maintain a low lifting/lowering speed.
- Compliance with the generally applicable safety and accident prevention regulations is mandatory.

Load handling equipment:

The handling equipment (webbing sling, chain, rope, etc.) must be chosen to ensure that in the comply with local and legal requirements and guarantee the safe transport.

Angle of inclination:
The inclination angle relative to the vertical must be ≤ 60°.

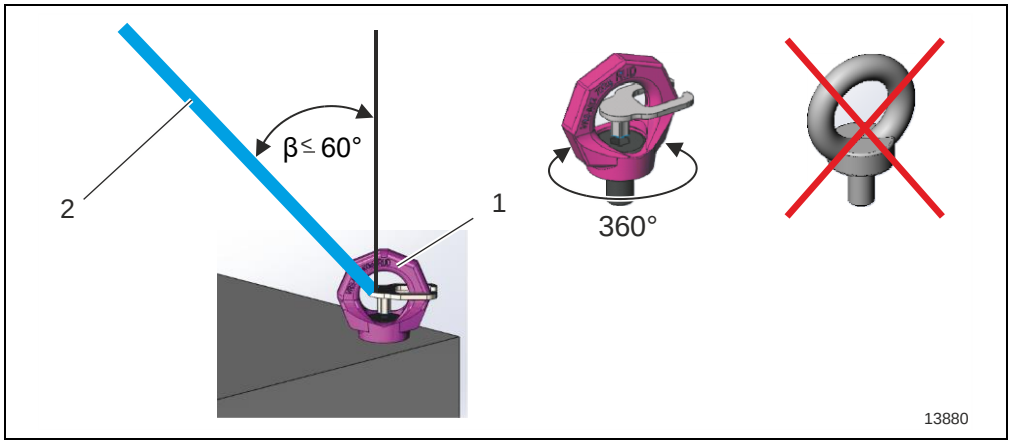


Fig. 10: Transport by crane with a rotating eyebolt (example)

1 Eyebolt
2 Webbing sling, chain, rope (slings)

7.2.3 Transport using the spreader bar

Load attachments mounted on the frame can be used to transport the chiller using a 4-point arrest system with a spreader bar.

- After it has been screwed tightly into the frame, it must be possible to rotate the eyebolt through 360°.
- Maintain a low lifting/lowering speed.
- Compliance with the generally applicable safety and accident prevention regulations is mandatory.

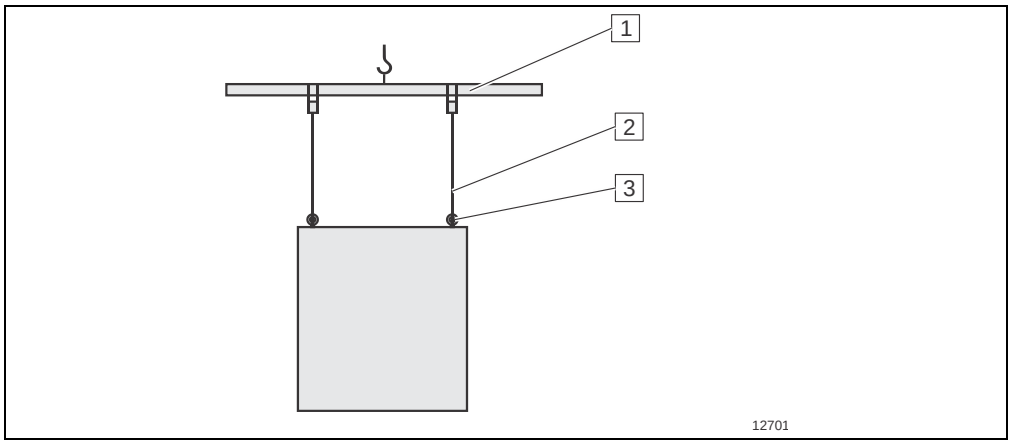


Fig. 11: Transport using the spreader bar (example)

1 Spreader bar
2 Sling
3 Load attachments

Load handing equipment: use of a spreader bar in accordance with DIN 15401 and a webbing sling in accordance with EN 1492-1

7.3 Device with eye bolts in accordance with DIN 580 (grey)

7.3.1 Transport using a forklift / lifting truck

The provided openings on the wide side (A) in the subframe of the unit or in the supplied unit pallet must, if available, always be used when transporting the chiller with a forklift.

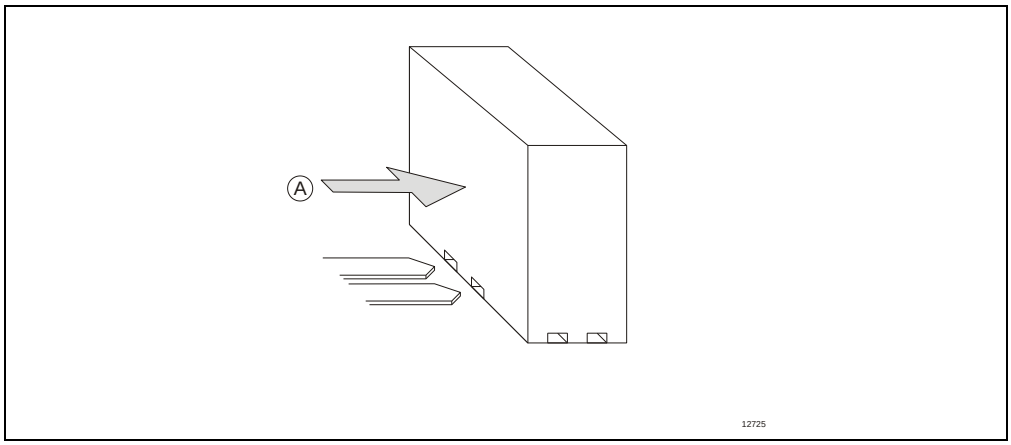


Fig. 12: Transport using a forklift / lifting truck (example)

- Push the forks of the forklift/pallet truck horizontally into the transport pockets of the unit.
- Ensure that the load is evenly distributed when using a forklift/pallet truck.
- Use a low lifting speed.

7.3.2 Transport to the installation location

For the first-time transport of the equipment to the installation location, there are 4 attachment points located on the frame.

- At the factory, the permissible eye bolts in accordance with DIN 580 are mounted and aligned in the direction of pull.
- Check the correct alignment of the eye bolts, before transporting the equipment. Do not use the eye bolts in the case of incorrect alignment or insufficient attachment.
- Do not skew the position of the eye bolt on the unit must.
- Maintain a low lifting/lowering speed.
- Compliance with the generally applicable safety and accident prevention regulations is mandatory.
- Replace and dispose the eye bolts after installation of the device.
- Reassembling of new or used eye bolts is prohibited.

Load handling equipment:

The handling equipment (webbing sling, chain, rope, spreader bar etc.) must be chosen to ensure that in the comply with local and legal requirements and guarantee the safe transport.

Angle of inclination:
The inclination angle relative to the vertical must be ≤ 45°.

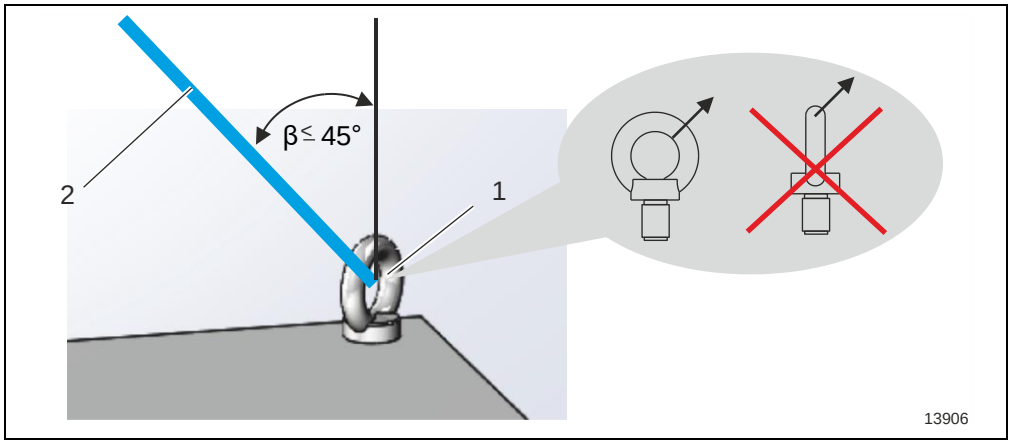


Fig. 13: Transport by crane with eye bolts in accordance with DIN 580 (example)

1 Eye bolt
2 Webbing sling, rope, chain (slings)

Alignment of the eye bolt:
The eye bolt must be aligned to the middle of the device.

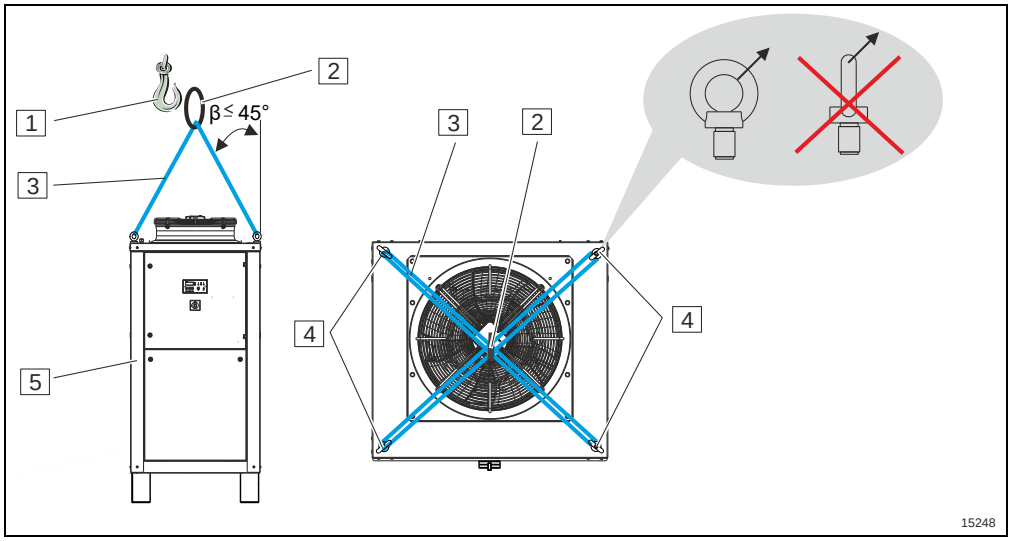


Abb. 14: Alignment of eye bolts in accordance with DIN 580 (example)

1 Crane hook
2 Crane lifting ring
3 Belt/lifting belts
4 Eye bolts
5 Device

Transport using the spreader bar

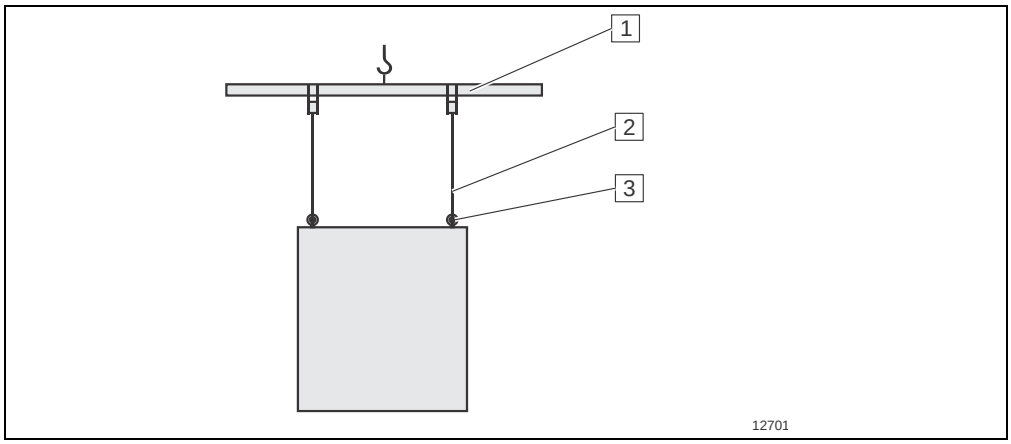


Fig. 15: Transport using the spreader bar (example)

1	Spreader bar	3	Load attachments
2	Sling		

Load handing equipment: use of a spreader bar in accordance with DIN 15401 and a webbing sling in accordance with EN 1492-1

7.4 Transport and packaging material

Check the packaging for transportation damage.

If transportation damage has occurred, observe the following points:

- Inform the forwarding agent and the supplier in written form.
- Keep the packaging material.
- Note down any external and internal damage.
- Document the damage (e.g. by means of photos).

Remove any transport material and packaging.

Note concerning the protection of the environment

The improper disposal of packaging materials has a negative impact on the environment.

- Packaging material that cannot be reused for transport purposes at a later point of time (e.g. packaging film) must be disposed of in an environmentally sound manner and in accordance with the applicable national and local rules and regulations.
- Ensure that the packaging material will be recycled.
- If applicable, assign the disposal to a specialist company.

NOTE

After unpacking, check the unit for signs of transport damage or other damage.

8 Setting Up

8.1 General information

⚠ WARNING

Health hazard!

The use of chemicals can present a health hazard.

- When handling chemicals, always wear protective gloves, eyewear, and clothing.
- Observe the safety data sheets.

NOTICE

Risk of damage to the unit due to overtightening of plastic glands!

Overtightening can damage the plastic glands.
To prevent damage to the unit, fasten plastic glands hand tight.

Risk of damage to the unit due to incorrect connections!

Risk of damage to the unit due to incorrect connections at the tank made of plastic! Check for leakage and hand tighten connections at the tank made of plastic, if necessary.

Damage to components!

- Damage to the pump due to dry operation. Never start the unit when it is not, or only insufficiently, filled.
- Damage of system components due to the use of the extra pure water. Do not use completely demineralized water (e.g. water obtained from an osmosis process).

NOTE

Use the unit only if the housing panels are installed.

For further information regarding connections, versions, pressure specifications, settings etc. please refer to the following chapters:

- Layout / System layout
- Maintenance
- Technical Data

as well as the instruction labels on the unit (if provided).

8.2 Transport and packaging material

Remove any transport material and packaging.

Note concerning the protection of the environment

The improper disposal of packaging materials has a negative impact on the environment.

- The packaging material must be disposed of in an environmentally sound manner and in compliance with the applicable national and local rules and regulations.
- Ensure that the packaging material will be recycled.
- If applicable, assign the disposal to a specialist company.

8.3 Installation

⚠ DANGER

Danger of death due to suffocation!

Escaping refrigerant is heavier than air. Escaping refrigerant displaces the air and, as a result, there is a danger of death due to suffocation.

If installing the device in a building, select a room with dimensions that are in accordance with the specifications of DIN EN 378-1, taking into account the dependency on the refrigerant fill quantity (see “Technical data” section). This will ensure that any leakage in the refrigerant circuit will not have an effect on human health!

⚠ CAUTION

Noise emission of the unit!

The effects of the noise emissions of the chiller onto the environment must be taken into consideration.

Use ear protection!

NOTICE

Risk of damage to device due to freezing!

For a minimum ambient temperature ta_{min} **<5 °C** or installation outdoors, the main switch is **generally** to be left in the “**ON**” position (standby mode, cooling function “OFF”)!

NOTE

- When installing the equipment, please consider minimum clearance (e.g. to wall, ceiling), see Chapter "Technical Data".
- If an installation over several levels is intended, the manufacturer must first be consulted.
- If intending to exceed the lengths, the manufacturer must first be consulted.

Set the unit and the consumer up on the same level.

Comply with the specifications for the maximum pressure and temperature values as stated in the "Technical Data" section.

Arrest the brakes on the castors (if available).

- If the specified setup requirements are met, unrestricted extracting and exhausting of cooling air will be ensured.
- Avoid extracting heated air that is discharged upwards (leading to short circuit of air).
- Ensure a sufficient exchange of air for heat dissipation purposes at the device setup location.

DANGER

Danger of death due to lightning!

If the device is operated outdoors, there is a danger of death due to lightning.

For outdoor installations, the customer must provide suitable lightning protection.

NOTICE

Risk of damage to device!

Use only a water/antifreeze mixture for the operation of the chiller, if installed outdoors!

For a minimum ambient temperature ta_{min} **<5 °C**, the main switch is **generally** to be left in the "**ON**" position (standby mode, cooling function "OFF")!

If chiller version is intended for indoor installation, do not use it outdoors!

Ensure unrestricted extracting and exhausting of the cooling air and a sufficient exchange of air for heat dissipation purposes at the setup location of the chiller!

Regarding alternative setup conditions, the manufacturer has to be consulted!

Use a weather-protection roof!

- Use only a water/antifreeze mixture for the operation of the chiller, if installed outdoors (option) (see the "Technical Data" section).
- Pre-heat the cooler for approx. 12 h before start-up.
- The main switch is **generally** to be left in the "**ON**" position (standby mode, cooling function "OFF").

Use a shelter for weather protection.

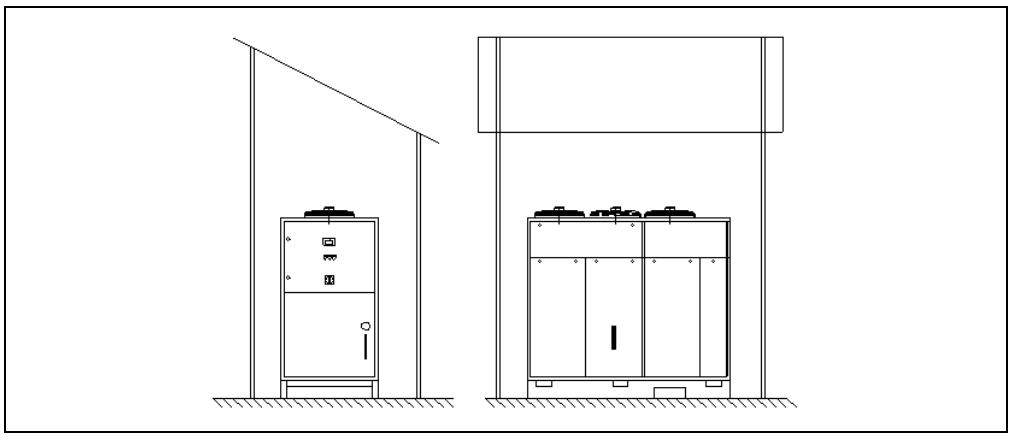


Fig. 16: Weather shelter (example)

8.4 Antifreeze and anti-corrosion agents

⚠ WARNING

Health hazard!

The use of chemicals can present a health hazard.

- When handling chemicals, always wear protective gloves, eyewear, and clothing.
- Observe the safety data sheets.

NOTICE

Risk of damage to components!

If the concentration of the anti-corrosion or anti-freeze agents in the system circuit is too high or too low, components may be damaged (e.g. the seals). If the concentration is too low, corrosion may be stimulated.

When using anti-corrosion or antifreeze agents, please comply with the information provided by the manufacturers concerning the area of application, compatibility with other materials, and minimum/maximum mixing ratios, etc.

NOTE

Possible causes of damage due to frost and corrosion:

- Impurities in coolant circuit
- Pump-related fault
- Air pockets in system (for devices with closed circuits only).

Note concerning the protection of the environment

The excessive use of antifreeze and corrosion inhibitors places a burden on the environment.

- Use environmentally friendly anti-freeze and corrosion inhibitors.
- Do not spill anti-freeze and corrosion inhibitors into the soil.
- Keep containers tightly closed. Ensure to close empty containers and those that are currently being used after the work is finished.
- Used antifreeze and corrosion inhibitors must be disposed of in an environmentally responsible way and compliant with local and national regulations.

To protect components from damage due to frost and corrosion, fill the coolant circuit with anti-corrosion and antifreeze agents.

The manufacturer recommends using monoethylene glycol that is available from Clariant under the brand name Antifrogen N© or Antifrogen L© (see unit data).

Part no. (technotrans)	Description
078403230	Clariant Antifrogen N
B64000000002	Clariant Antifrogen L

When using monoethylene glycol as the anti-corrosion and antifreeze agent, please observe the following points:

- Do not mix anti-corrosion and antifreeze agents of different manufacturers. Document the name and type of the anti-corrosion and antifreeze agent that is used.
- For filling the system circuit with anti-corrosion and antifreeze agents, we recommend mixing the liquids in advance in a separate tank (please refer to the "Technical data" section for information concerning the quantities).
- Concentration of frost/corrosion protection: see Technical Data.
- Regarding the usage of alternative anti-corrosion and anti-freeze agents, use only monoethylene glycol (1,2-ethanediol) from established manufacturers and comply with the information provided. Check the material compatibility and reliability with respect to the device and the higher-level machine.

Frost resistance of Antifrogen N/water mixtures of different concentrations (example):

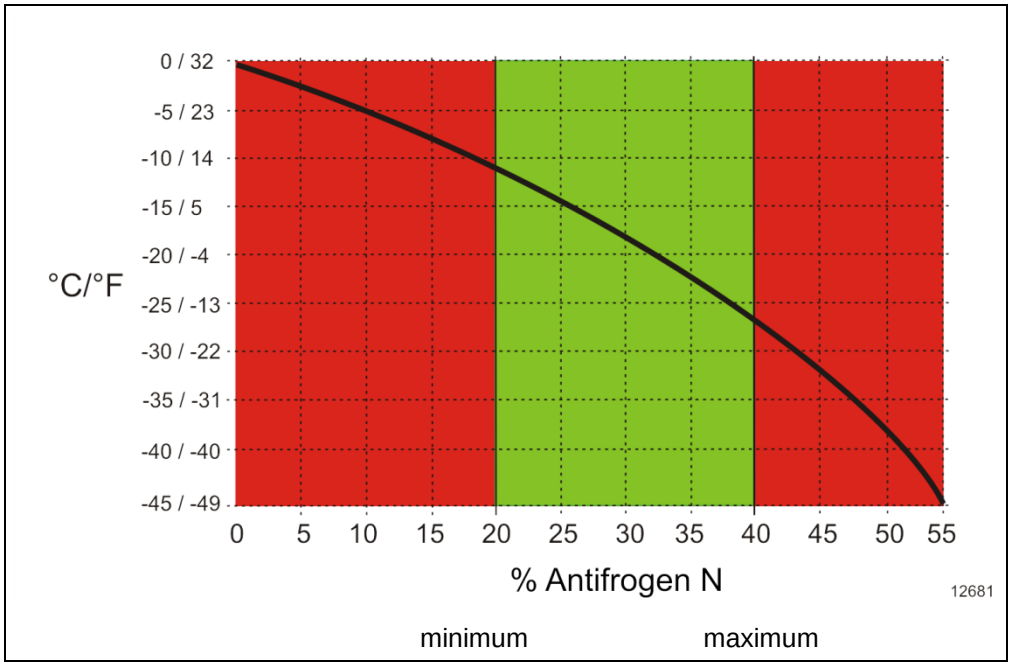


Fig. 17: Anti-freezing agent concentration

8.5 Radial fan attachment (optional)

⚠ WARNING

Danger to persons due to heavy objects!

When installing or removing components of the system (e.g., pumps, compressors, heat exchangers, ...), their entire weight must be taken into consideration.

- Perform the installation and removal with several persons or use suitable lifting devices.
- Install/remove the components individually one by one.
- Use personal protective equipment.

1. Unscrew the lifting eyelets from the top face of the chiller.
2. Fit the lifting eyelets at the radial fan attachment.

⚠ DANGER

Suspended loads

Tipping or falling loads may lead to serious or even fatal injuries.

- Do not stand under suspended loads.
- Only use approved hoisting equipment and lifting accessories (slings, etc.) that are rated for the total weight of the attached load.
- Only use lifting accessories/load handling attachments that are in perfect technical condition.
- Take the attachment points and centre of gravity of the load into consideration.
- Secure the load by way of suitable devices.

3. Use suitable lifting gear to mount the radial fan attachment on the chiller.
4. Firmly screw on the radial fan attachment at the chiller.
5. Remove the cover plate from the radial fan attachment on the side the air ducts will be mounted.
6. Mount finger protection at the open side of the radial fan attachment (The finger protection is mounted on the top at delivery).
7. Mount the air ducts (provided by customer).
8. Make the electrical connections for the radial fan.

8.6 Connections

⚠ CAUTION

Risk of injury due to lines not being laid properly!

If lines used to connect the device are not laid properly, there is risk of tripping and being injured.

Ensure that lines used to connect the device are laid according to statutory regulations and guidelines.

8.6.1 Installation of pipes

NOTICE

Damage to the unit

If galvanised pipes are used, the correct operation of the unit cannot be guaranteed, since the zinc coating may be dissolved by antifreeze. Plate heat exchangers may be clogged by deposited zinc.

Do not use galvanised pipes.

NOTE

- When laying pipelines, comply with the relevant guidelines and information supplied by the manufacturer.
- Refer to the section entitled “Equipment layout”.
- Observe national and local regulations regarding liquids that are hazardous to water (e.g. German Federal Water Act (WHG)).
- The owner is responsible for ensuring that the system meets the requirements for quality and operation.
- See the "Technical data" section for information concerning the optimum water quality.
- Damage of system components due to the use of the extra pure water. Do not use completely demineralized water (e.g. water obtained from an osmosis process).
- It is the customer’s responsibility to ensure that, in accordance with the local regulations on water supply, water cannot flow back into the domestic water supply (e.g. by way of pipe isolators).

Fouled hose lines will contaminate the cooling system. Check the inside of the hose lines for cleanliness and clean them, if necessary, prior to installing them.

Determine the nominal widths of the pipes for the external water circuit, taking into account the available pump pressure and the pressure losses in the consumer circuit.

Make connections to the refrigeration unit using fixed or flexible pressure- and temperature-resistant hoses / lines.

If the connecting lines are laid on the ceiling, a non-return valve must be provided by the customer.

NOTE

In order to avoid damage, the corrosion behavior of the materials that are used by the consumer must be taken into consideration.

Connection sizes according to the "Technical Data" section.

Proper installation of the chilling medium (water/antifreeze) pipes is a prerequisite for the correct operation of the unit.

Please observe the following points:

- The pipes should preferably be made of copper pipes (DIN 1786 or type L (North America)), stainless steel pipes (North America: schedule 40) or black steel pipes (North America: schedule 40). In order to prevent corrosion, the pipes must be protected accordingly (e.g. by a double layer of anti-corrosive paint).
- It is possible to install plastic pipes (North America: schedule 80). However, their lower mechanical stability (pressure, temperature) and their resistance against antifreeze must be taken into consideration.
- The pipes must be resistant against pressure and high temperatures.
- Depending on the chilling medium temperature and in order to prevent the formation of condensation water, the pipes must be insulated.
- In order to prevent the transmission of vibrations, we recommend installing vibration dampers or hoses.
- Provide a sufficient number of fastening points in order to avoid vibrations.
- Use suitable hose couplers for the flexible connection of the various units.
- Use suitable shut-off devices, e.g. ball valves.
- In the case of units without a filter in the chilling medium inlet, install a suitable filter.
- Seal any unused branches by way of plugs.
- Only for closed systems: the cooler is equipped with an expansion tank. Depending on the length and volume of the tubes at customer site, an additional expansion tank could be necessary (designed and installed by the customer).

NOTE

Provide vents at the highest points in the pipework.

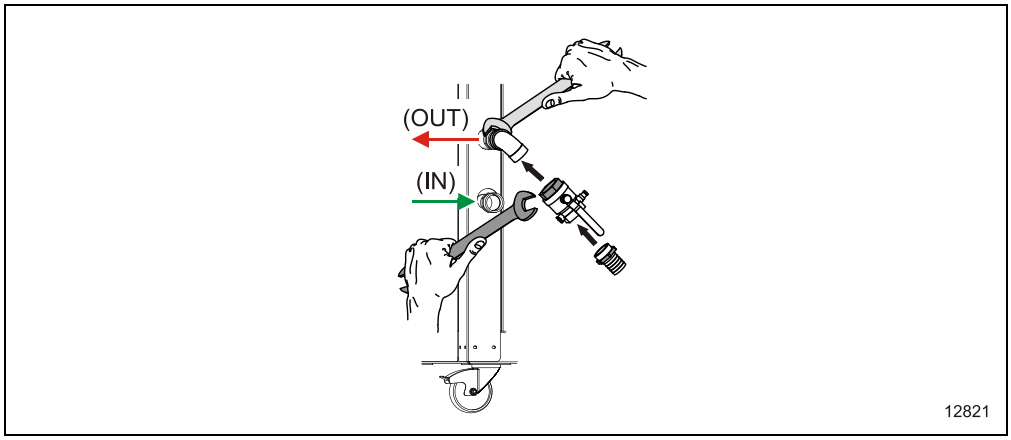


Fig. 18: Connections (example)

NOTE

Install the connections as shown in the illustration and hold the screw connections with a second open-end spanner.

1. Make the connection at the cold water inlet (KK-R).
2. Make the connection at the cold water outlet (KK-V).
3. Shut-off valves have to be provided by the customer.
4. Fill the coolant circuit with the required amount of water (according to the specifications) via the filling pipe / open tank (see “Technical data” section).

8.6.2 Electrical connection

⚠ DANGER

Warning – Danger to life due to electrical current!

Negligence can lead to electric shock. Observe the following points when working on the electrical system:

- Comply with the information that is given in the "Safety" chapter.
- Only suitably qualified persons are authorised to perform these tasks.

1. Disconnect the unit from the power supply in order to deenergise it.
2. Secure the unit so that it cannot be switched on again accidentally.
3. Check whether the unit is properly disconnected from the power supply and absolutely voltage-free.
4. Earth and short-circuit the unit.
5. Cover any adjacent live parts and secure the danger area.

NOTICE

Wrong connected voltage!

Incorrect supply voltages can lead to component damage.

Compare the supply voltage value with the voltage specification stated on the nameplate at the device. Set up the necessary fuse protection in accordance with the “Technical Data” section or the circuit diagram.

Loose bolts and terminal clamping points!

During transport and installation, screws and terminal clamping points might get loose.

Check all screws and terminal clamping points in the control cabinet for secure fitting prior to setting up the unit.

Damage to components!

EMC disturbance may affect the unit function negatively and/or damage components in case of insufficient equipotential bonding.

- If devices/machines are electrically coupled, additional local equipotential bonding should be provided between the devices/machines.

NOTE

IEC or NEC standard (see circuit diagram).

Do not put devices into operation that have been built in accordance with the IEC standard when compliance with the NEC standard is prescribed.

- Remove the housing panel on the service side.
- Insert the connecting cable through the cable gland that is provided for this purpose.
- Lay the cable in a professional manner inside the chiller and insert it into the control cabinet through the gland.
- Perform the electrical connection in accordance with the circuit diagram.

The manufacturer recommends using residual current devices (RCDs), if the chiller is to be powered via the customer's network (in-house network). Other devices (consumers, power sockets, ...) may not be set up behind the residual current device.

If the chiller is to be supplied with electricity from the consumer, the respective manufacturers' specifications must be observed.

Fuse protection to be provided by the customer	Residual-current-operated circuit breaker Nominal current (In)
10 / 16 / 20 / 25	25
35	40
50 / 63	63
80	80
100 / 125	125

Devices with frequency converters or phase-fired controllers may lead to faulty activations of the residual-current circuit breaker. In this case, a corresponding AC/DC-sensitive residual-current circuit breaker (alternating voltage, pulsating alternating voltage, direct current and pulsating direct current) must be used. For fire and plant protection, an AC/DC-sensitive residual-current circuit breaker (TYPE B+) must be used.

The chiller is prepared for the connection of a remote control (option). The corresponding terminals are jumpered in the as-supplied state of the chiller (see the circuit diagram).

8.7 Adjustment of the device for 50 Hz or 60 Hz operation

NOTICE

Risk of damage to the unit!

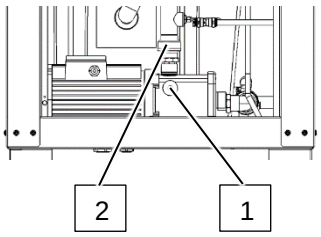
Risk of damage due to incorrect adjustment!

Incorrect adjustment can cause damage to the unit because of too high pressure.

Obey the following adjustment instrucions!

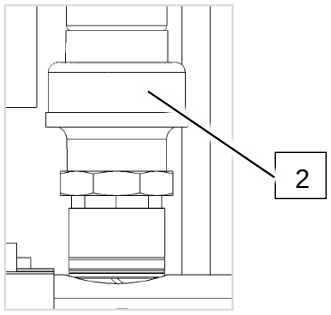
With delivery status the unit is adjusted for 50 Hz operation.

8.7.1 Adjustment for 60 Hz operation



Install the restrictor for 60 Hz operation before switching on the unit (see schematic system diagram position 69 in the chapter "System layout“).

The restrictor (1) for 60 Hz operation is fixed to the pump.



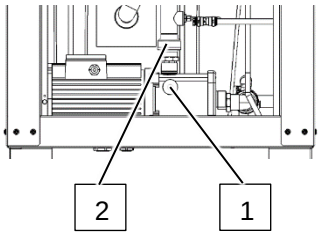
1. Loosen the fitting (2) above the pressure socket of the pump and open carefully.
2. Remove the seal.

Restrictor 50 Hz

Restrictor 60 Hz

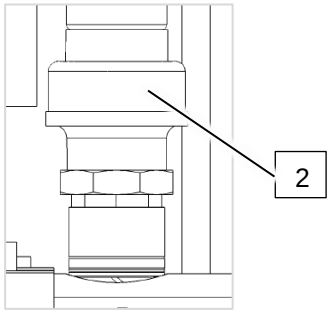
3. Remove restrictor for 50 Hz operation.
4. Insert restrictor for 60 Hz operation.
5. Refit the seal.
6. Retighten the fitting (2).
7. Fix the restrictor for 50 Hz operation to the pump.
8. Switch on the unit.
   The unit is ready for operation.

8.7.2 Adjustment for 50 Hz operation



Install the restrictor for 50 Hz operation before switching on the unit (see schematic system diagram position 69 in the chapter "System layout“).

The restrictor (1) for 50 Hz operation is fixed to the pump.



1. Loosen the fitting (2) above the pressure socket of the pump and open carefully.
2. Remove the seal.

Restrictor 50 Hz

Restrictor 60 Hz

3. Remove restrictor for 60 Hz operation.
4. Insert restrictor for 50 Hz operation.
5. Refit the seal.
6. Retighten the fitting (2).
7. Fix the restrictor for 60 Hz operation to the pump.
8. Switch on the unit.
   The unit is ready for operation.

8.8 Start-up

DANGER

Warning – Danger to life due to electrical current!

Negligence can lead to electric shock. Observe the following points when working on the electrical system:

- Comply with the information that is given in the "Safety" chapter.
- Only suitably qualified persons are authorised to perform these tasks.

1. Disconnect the unit from the power supply in order to deenergise it.
2. Secure the unit so that it cannot be switched on again accidentally.
3. Check whether the unit is properly disconnected from the power supply and absolutely voltage-free.
4. Earth and short-circuit the unit.
5. Cover any adjacent live parts and secure the danger area.

WARNING

Danger to persons!

Before setting up the unit, ensure that all safety-related conditions have been fulfilled.

- Initial start-up must only be carried out by qualified personnel.
- When selecting the installation site for the unit the relevant safety instructions stated in the “Safety / Installation Site” chapter must be observed.

Risk of injury due to 24-V control!

If the device is operated via the 24-V control (remote control), there is a risk of injury to persons at the device if certain other tasks (such as maintenance tasks) are performed at the same time.
Prior to carrying out **Setting Up**, deactivate the device via the 24-V control and secure it against inadvertent reactivation.

CAUTION

Danger due to detached housing panels!

With detached housing panels, there is a risk of sustaining burns from contact with hot device components.

Extra caution should be exercised until all of the housing panels have been fitted.

Risk of injury due to spilt liquids or parts lying around!

If spilt liquids/parts lying around are not wiped away/removed immediately, there is a risk of injury due to slipping or stumbling.

Wipe away any spilt liquids and remove any parts lying around.

NOTICE

Pre-heating of cooler prior to start-up!

For ambient temperatures below 5 °C, pre-heat the cooler for approx. **12 h**, if the main switch has been in the “off” position!

1. Main switch, control switch, motor protection switch and automatic circuit breakers in position - **0** -.
2. With open systems:
   - Take of the tank lid.
   - Fill the tank with water or a water/glycol mixture (see Technical Data) up to the -**MAX**- mark (fill level indicator).
3. With closed systems:
   - Fill the cooling circuit via the external connection.

NOTICE

Damage to components!

Damage to the pump due to dry operation. Never start the unit when it is not, or only insufficiently, filled.

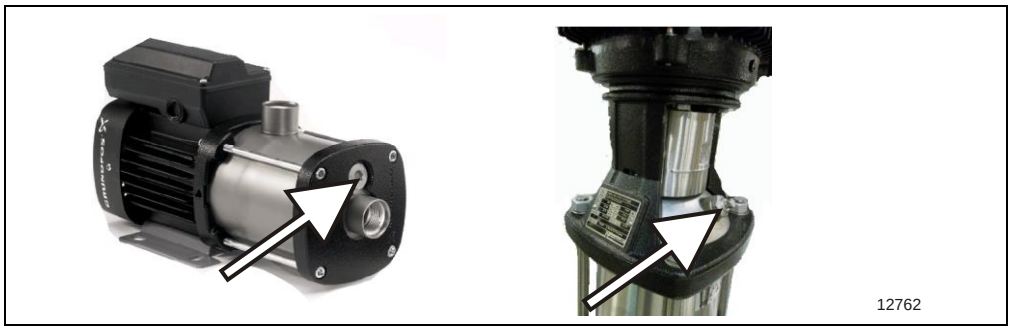


Fig. 19: Pump bleeding (examples)

4. If necessary, bleed the pump(s) via the vent plug on the pump housing (see figure).
5. If fitted, activate the additional (customer-provided) bleeding device.
6. Set the motor protection switches for pump(s), transformer, and circuit breakers to position - **1** - .

NOTICE

Danger of damage to unit components due to incorrect rotating field!

Even short-term operation of the unit with an incorrect rotating field can lead to considerable damage to the unit components, especially to the Scroll compressors (if installed).

Check the electrical rotating field of the power supply connection for correctness prior to setting up the unit.

There is no warranty for damages caused by operating the unit with an incorrect rotating field.

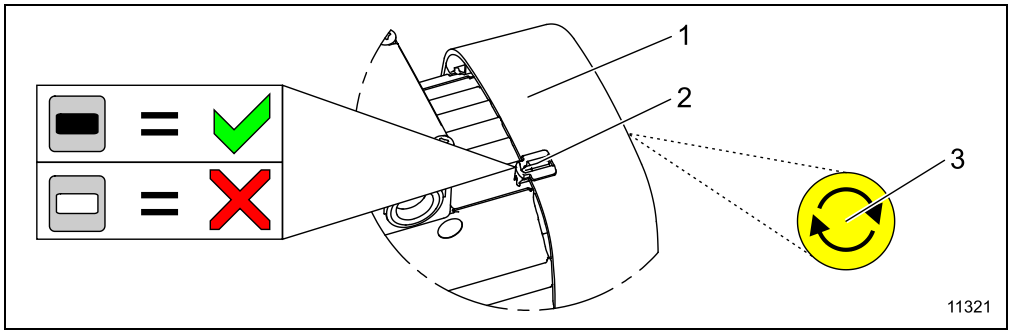


Fig. 20: Pump (example)

Black mark:	correct direction of rotation
Indicator white/reflecting:	incorrect direction of rotation

7. Set the main switch and control switch to position - **1** – (activation of the pump(s)).
8. Check the direction of rotation of the pump (see figure). The direction of rotation of the pump must match the direction indicated by the arrow (3) on the adhesive label attached to the pump. If a rotational direction indicator (2) is included, check the direction of rotation of the pump, while the pump (1) is running, at the indicator (2).
9. With open systems:
   - Activating the pump(s) or consumer causes the water level in the tank to drop.
   - Check the water fill level (using the fill level indicator) and add water (or a water/antifreeze mixture) if necessary; a low water level is indicated by a signal lamp.
10. Visually check the coolant circuit for leaks.
11. Check the volumetric flow rate of of the cooling medium with the aid of a manometer, if available (unsteady indicator).
12. Completely vent the entire system, by switching ON and OFF the pump(s) several times.
13. Main switch in position - **0** -.

NOTICE

Damage to the heater!

Air pockets in the system will damage the heater (if provided).

Do not activate the circuit breaker of the heater until the unit is completely filled and vented.

14. Set the remaining motor protection switches to position - **1** - .
15. Set the main switch to position - **1** – .
16. The (optional) green signal lamp for the pump lights up (the optional red indicator lamp for collective faults can also light up).
17. Fit the housing panels (if available).

9 Operation

9.1 Notes

The following must be observed in order to avoid injuries and damage to property:

- Only qualified personnel are authorised to perform these tasks.
- Comply with the information given in the "Safety" section.

⚠ WARNING

Risk of injury due to automatic restart!

For example, during a power failure fans or speed-controlled motors can switch on or off automatically. During the restart injuries can occur if reaching into the machine or when parts of clothing and long hair become entangled in the machine.

- Never reach into the danger zone.
- Wait for the fan/motors to come to a complete halt.
- Wearing a loose clothing is prohibited.
- Long hair must be tied in a knot and covered.

Danger to personnel!

There is a risk of injury due to liquid under pressure, rotating parts, and high electrical voltage in the unit.

- Do not use the unit when the side panels are removed.
- Open the side panels only in order to perform maintenance tasks and only in compliance with the safety instructions.

NOTICE

Risk of damage to device!

Use only a water/antifreeze mixture for the operation of the chiller, if installed outdoors!

For a minimum ambient temperature ta_{min} **<5 °C**, the main switch is **generally** to be left in the "**ON**" position (standby mode, cooling function "OFF")!

If chiller version is intended for indoor installation, do not use it outdoors!

Pre-heating of cooler prior to start-up!

For ambient temperatures below 5 °C, pre-heat the cooler for approx. **12 h**, if the main switch has been in the "off" position!

NOTE

Usage of optional oil sump heater

If the optional oil sump heater is installed, a control switch is used, this being set to position - 1 - during operation. If the cooling function is deactivated (by setting the control switch to position - 0 -), the oil sump heater remains in operation.

9.2 Adjustments

Unit

- Check the shut-off valves and open them, if necessary.

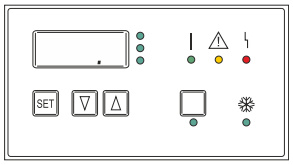
Cooling medium tank

- Check the filling level. Top it up, if necessary.

Switching the unit on:

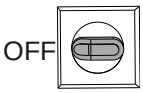
1. Use the maintenance switch to turn on the device.

Cooling circuit:



2. Check the desired parameters (e.g. the set temperature) via the control unit. Adjust them if necessary. Refer to the "Control unit" chapter.

Switching the unit off:



1. Switch the unit off via the maintenance switch.

9.3 Control unit

NOTICE

Damage to the unit!

The unit function cannot be ensured if the system configuration is tampered with.

The values set at delivery are basic settings and may only be changed after consultation with the customer service.

9.3.1 TEC 301

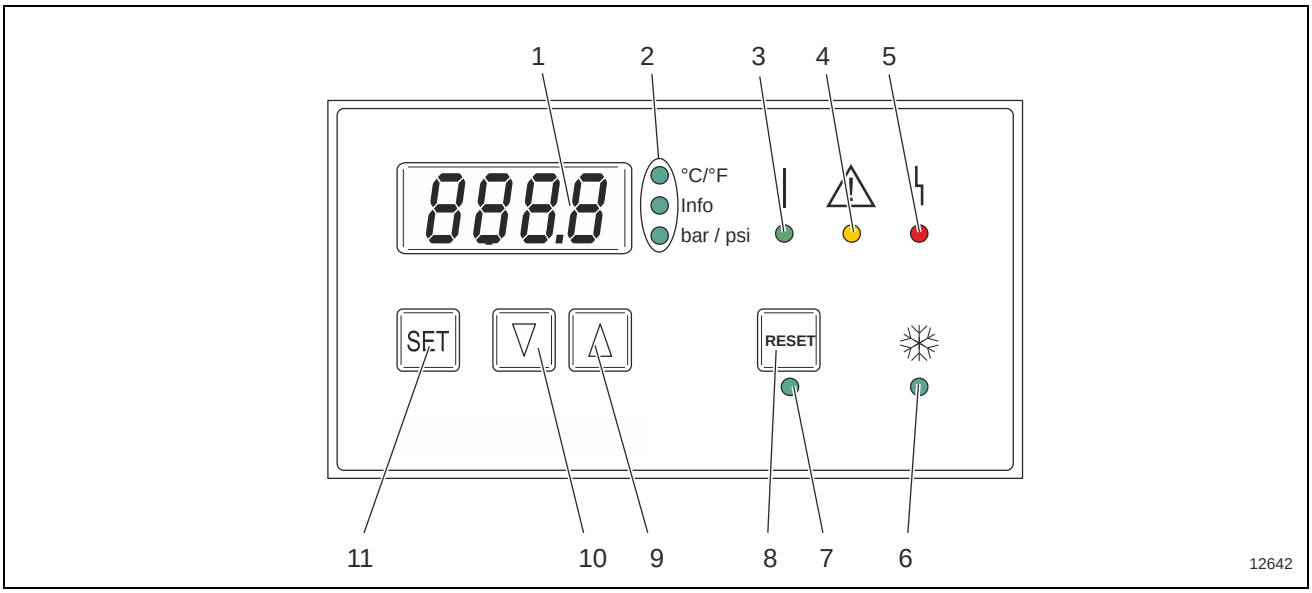


Fig. 21: Control unit TEC 301

1	Display	5	LED - Fault
2	LED	6	LED - Cooling ON
	- Temperature in °C / °F	7	LED (Reset button)
	- Information	8	Reset button
	- Pressure in bar / psi	9	Up key
3	LED - Unit ON	10	Down key
4	LED - Warning	11	SET key

9.3.2 Actual value display

1. Use the UP and DOWN button to select the applicable LED (°C/°F, Info, bar/psi). Depending on the selected LED (e.g., temperature, pressure) the actual value is indicated on the display.
2. Please refer also to the following chapters.

9.3.3 Setpoint adjustment

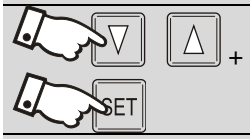
NOTE

At low setpoint temperatures and under certain ambient conditions (for example high humidity) condensation water can form in the unit. To prevent the formation of condensation water the manufacturer recommends an insulation of the pipes.

Please contact the manufacturer.

1. Select the corresponding LED by way of the up and down key.

2. Press and hold the SET key.

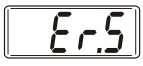


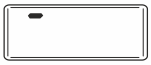
3. Adjust the setpoint with the up and down key while still holding the SET key.

4. Release the SET key after the value has been set.

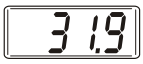
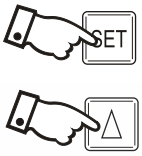
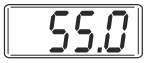
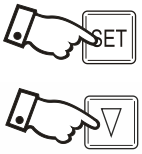
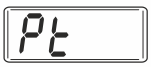
9.3.4 LED Display

☀ LED on ◐ LED flashes ○ LED off

Display	LED	Description
-		LED off: The unit is not in operation. The external request signal is not active.
		LED on: The unit is in operation. The external "enable" signal is activated.
-		The LED illuminates when a warning is pending. **Note** • Press the up and down keys to select the flashing display. • In the event of a warning, an error code will be displayed. See the "Troubleshooting" section.
-		The LED lights when an error/alarm is pending. **Note** In the event of a malfunction, an error code will be displayed. See the "Troubleshooting" section.
-		The LED illuminates when the cooling process is active.
		LED flashing: The refrigeration unit does not start because of the protective device of the compressor, although the target temperature has been exceeded (the minimum off-time or restart time has not yet elapsed).
-		The LED illuminates when faults can be reset. See the "Troubleshooting" section.
	-	The unit is switched off.
	☀ °C/°F ○ or ○ °C/°F	The LED(s) is/are lit and the temperature display blinks, alternating with the fault display. **Note** See the "Troubleshooting" section.
	☀ Info	

Display	LED	Description
	 °C/°F	Indication of the current temperature in the feed flow of the cooling/temperature control circuit. **Flashing display:** The temperature is out of the set temperature range. See the chapter "A parameters", parameters A4, A5.
	 °C/°F + 	When the SET key is pressed: Adjustment of the set temperature in the feed flow of the cooling/temperature control circuit.
	 °C/°F Info	Indication of the current temperature in the return flow from the cooling/temperature control circuit *).
	 bar/psi	Indication of the current high pressure in the refrigeration circuit.
	 Info	Service information concerning the refrigeration circuit. The following operating states are indicated:
		• The pump is switched off due to a fault. • The heater in the cooling medium tank and the refrigeration circuit are switched off (normal operation).
		The heater in the cooling medium tank is switched on.
		The solenoid valve (hot-gas bypass) is in operation.
		The lines on the display flash in alternation when the pump is in operation.
		A vertical line in the display indicates that one compressor is in operation. Two vertical lines in the display indicate that two compressors are in operation.
		Indication of the current refrigeration capacity in %.

*) option

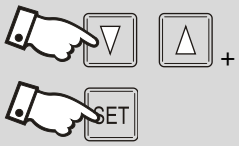
Display	LED		Description
		°C/°F + 	**Mode of operation: "No cooling" *)** Select the function as follows: • Press and hold the SET button and use the UP button to adjust the maximum set temperature. • Release the SET button. • Press the SET button again and then actuate the UP button.
			The display indicates the function: "No cooling". **NOTE** This function is selected during maintenance work/operating malfunctions (e.g. while filling the cooling/temperature control circuit).
		°C/°F + 	Deselect the function as follows: Press and hold the SET button and use the UP button to adjust the set temperature.
		Info	**NOTE** The "Pump start-up control" function is an option that monitors the temperature in the cooling/temperature control circuit if an external contact is used to switch off the device. The function is activated if: • the control unit is selected • an external contact is used to switch off the device and the "Device ON" LED is not illuminated.
			The "Pump start-up control" function is inactive and the pump in the cooling/temperature control circuit is switched off.
			**Mode of operation: "Pump start-up control"** The following operating states are indicated: The "Pump start-up control" function is active and the pump in the cooling/temperature control circuit is switched off.
			The "Pump start-up control" function is active and the pump in the cooling/temperature control circuit is switched on.
			The "Pump start-up control" function is active and the pump and heater (only omega.t) in the cooling/temperature control circuit is switched off.
			The "Pump start-up control" function is active and the pump and heater (only omega.t) in the cooling/temperature control circuit is switched on.

*) option

NOTE

If no button is pressed for more than 20 seconds, the system will automatically return to the actual value display (°C LED).

9.3.5 A-Parameters

	1.	Keep the up and down keys pressed simultaneously for approx. 5 seconds. The first parameter A0 will be displayed.
	2.	Select the parameter by way of the up and down key.
	3.	Press and hold the SET key.
	4.	Adjust the value with the up and down key while still holding the SET key.
	5.	Release the SET key.

NOTE

If no key is pressed for 20 seconds on the parameters level, the display will automatically return to its initial position.

Parameter	Description	Default value	Range
A0	Indication of the software version.	-	42. -- --
A1	Selection of the temperature and pressure unit.	°C / b	°C / b (bar) °F / b (bar) °C / p (psi) °F / p (psi)
A2	Indication of the software identification number. **Note** Pressing the SET button several times will display the software identification number 9000xxxxxx.	-	Indication only
A3	Information about the configuration of the unit.	-3 … 15	Indication only
A4	Cooling/temperature-control circuit Upper temperature difference with regard to the set value until a fault message will be displayed. Example: Set value = 15°C, upper temperature limit = 10.0 K. A fault message will be issued at a temperature > 25°C.	7,0	0,5 … 99,9 K
A5	Cooling/temperature-control circuit Lower temperature difference with regard to the set value until a fault message will be displayed. Example: Set value = 15°C, lower temperature limit = 10.0 K. A fault message will be issued at a temperature < 5°C.	7,0	0,5 … 99,9 K
A6 **)	Upper temperature difference with regard to the set value until a warning will be displayed. flashes for 0.6 seconds	1,0	0,0 … 20,0 K
A7 **)	Upper temperature difference with regard to the set value until a warning will be displayed. flashes for 1.0 seconds	1,0	0,0 … 20,0 K
A8 **)	Lower temperature difference with regard to the set value until a warning will be displayed. flashes for 0.6 seconds	1,0	0,0 … 20,0 K
A9 **)	Lower temperature difference with regard to the set value until a warning will be displayed. flashes for 1.0 seconds	1,0	0,0 … 20,0 K
A10	Mode of operation of the collective fault relay (see the table below).	1	0 normally open contact 1 normally closed contact
A11	A low cooling medium level leads to a collective fault message. The filling level in the cooling medium tank is below the "standard" filling level.	0	0 no 1 yes
A12	A value above or below the temperature limits **(A4, A5)** leads to a collective fault message.	2	0 no 1 yes 2 yes + flashing
A14	A high-pressure fault in the refrigeration circuit leads to a collective fault message.	1	0 no 1 yes
A15	A low-pressure fault in the refrigeration circuit leads to a collective fault message.	1	0 no 1 yes

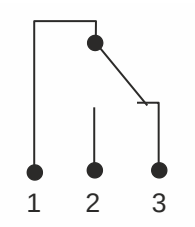
**) = See the following table. Active only if parameter A12 is set to 2.

Parameter	Description	Default value	Range
A16	Tripping of the compressor circuit breaker leads to a collective fault message.	1	0 no 1 yes
A17 *)	Tripping of the circuit breaker or safety temperature limiter of the fan leads to a collective fault message.	1	0 no 1 yes
A18 *)	Tripping of the heater circuit breaker or safety temperature limiter of the heater leads to a collective fault message.	0	0 no 1 yes
A19	Serial interface for data transfer at an interval of 0.5 seconds (service only).	0	0 = OFF 1 … 10 x 0.5 s
A99	No function. Press the "down" key to exit the parameter level.	0	-

*) = option

**) = See the following table. Active only if parameter A17 is set to 1.

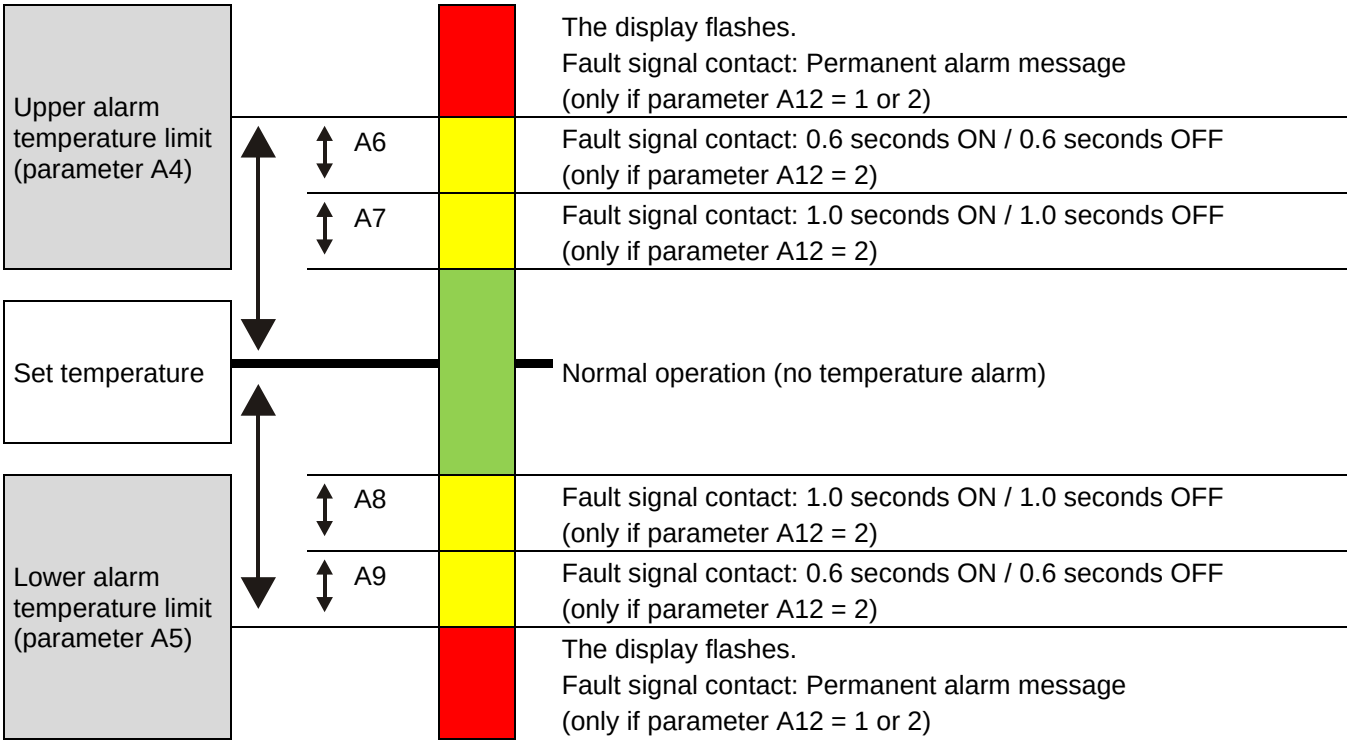
Description of parameter A 10



Fault relay

Collective fault message Fault contact (X12) connected	A10	In the event of a fault/warning of parameters A 11 - 18	Maintenance switch "OFF" (unit becomes voltage-free)
1 - 2	**0**	closed	open
1 - 2	**1**	open	open
1 - 3	**0**	open	closed
1 - 3	**1**	closed	closed

9.3.6 Temperature limits



10 Maintenance

10.1 General information

⚠ WARNING

Health hazard!

The use of chemicals can present a health hazard.

- When handling chemicals, always wear protective gloves, eyewear, and clothing.
- Observe the safety data sheets.

Danger through electric current!

Carelessness can lead to electrocution.

Disconnect the electricity supply before disconnecting the unit.

Warning - Danger of burns due to hot surface!

The surface and parts of the unit may become very hot during operation so that touching them may cause burns or injuries.

- Personal protective equipment (e.g., safety gloves) must be worn when working on the equipment.
- Wait until the temperature of all components has dropped below 40°C.

Risk of injury due to escaping refrigerant!

If tasks are not carried out properly at the refrigerant circuit, there is a risk of refrigerant escaping.
Maintenance work at the refrigerant circuit is to be performed by a specialist refrigeration company only.

Risk of injury due to 24-V control!

If the device is operated via the 24-V control (remote control), there is a risk of injury to persons at the device if certain other tasks (such as maintenance tasks) are performed at the same time.
Prior to carrying out **Maintenance**, deactivate the device via the 24-V control and secure it against inadvertent reactivation.

Air-cooled version:

Risk of injury due to rotating fans!

There is an increased risk of injury due to rotating fans when the unit is switched on.

- Keep housing closed during operation.
- Never reach into the device when it is switched on.
- Prior to opening the housing, ensure that the device is off and secured against reactivation.

⚠ CAUTION

Risk of injury due to spilt liquids or parts lying around!

If spilt liquids/parts lying around are not wiped away/removed immediately, there is a risk of injury due to slipping or stumbling.

Wipe away any spilt liquids and remove any parts lying around.

NOTICE

Risk of damage to the unit due to overtightening of plastic glands!

Overtightening can damage the plastic glands.
To prevent damage to the unit, fasten plastic glands hand tight.

Damage to the heater!

Air pockets in the system will damage the heater (if provided).

Do not activate the circuit breaker of the heater until the unit is completely filled and vented.

See the "Start-up" section.

NOTE

Keep the entire system clean.

Do not use any detergents containing solvents.

Note concerning the protection of the environment

The improper disposal of consumables (e.g. filters, filter mats) has a negative impact on the environment.

- Consumables must not be disposed of as household waste.
- The materials must be disposed of separately and supplied separately to the recycling centres.
- Depending on the contaminants that are filtered out, it may be necessary to dispose of the used filter materials as special waste.
- Comply with the applicable national and local rules and regulations.

The improper disposal of reusable materials (e.g. plastics, steel and aluminium parts, electronic modules) has a negative impact on the environment.

- Ensure that reusable materials are recovered for reuse. Recycling is an important contribution to the protection of the environment.
- Ensure that reusable materials are recycled.

10.2 Maintenance plan

NOTE

Service technicians of the technotrans group perform work concerning the refrigeration unit (e.g. leak checks, refrigeration checks). If necessary, contact the service technicians.

See the "Contacts" section.

The maintenance intervals that are stated apply to eight hours of operation per day. In the case of different hours of operation, the maintenance intervals must be adapted accordingly.

The maintenance intervals may depend on the fault message that is displayed by the control unit.

Carry out the described maintenance tasks at the intervals specified in the maintenance schedule.

Maintenance interval:	**every week**	
Component	**Maintenance task**	**Auxiliary devices**
Refrigeration unit	Visual inspection, e. g. for streaks, formation of ice, smell, noises.	
Condenser (air-cooled refrigeration circuit)	Check for contamination.	
	Clean the cooling fins and, if necessary, secure the surrounding area.	Safety goggles, respiratory equipment, compressed air
Filter mat (air-cooled refrigeration circuit)	Check and replace if necessary.	
Pressure gauge (optional)	Check the operating pressure.	

Maintenance interval:	**every month**	
Component	**Maintenance task**	**Auxiliary devices**
Tank	Check the filling level and top it up if necessary.	
	Check the water for contamination and change it, if necessary.	
Antifreeze and anti-corrosion agent	Check the concentration in the storage tank and adjust it, if necessary (only for units with antifreeze and anti-corrosion agents).	Densimeter or refractometer
Filter (optional)	Check, clean, and replace it, if necessary.	

Maintenance interval:	every year	
Component	**Maintenance task**	**Auxiliary devices**
System/unit	Check for soiling and clean it.	
	Check the pipe unions and hose connections for leaks. If necessary, tighten the pipe unions and hose clamps, or replace them.	
Screw fittings	Check for tight fit. Retighten if necessary.	Screw locking device
Refrigeration unit (refrigeration circuit)	Perform a leak test in accordance with the statutory and local rules and regulations (e.g. F-gases regulation). The following types of refrigeration units must be inspected for leaks: • Refrigeration units with a refrigerant filling quantity of more than five tonnes (5 t) of CO_2 equivalent. • Refrigeration units (hermetically sealed systems) with a refrigerant filling quantity of more than 10 tonnes (10 t) of CO_2 equivalent.	Certified and specialised personnel / Contact the technotrans service department
	Note • Information concerning the hermetically sealed system and the refrigerant filling quantity (CO_2 equivalent) can be found in the "Technical data" section or on the type plate of the unit. • Comply with the applicable national and local regulations and laws (e.g. Pressure Equipment Directive).	

10.3 Maintenance jobs

10.3.1 Visual inspection of device / machine

1. Carry out a visual inspection for obvious damage.
2. Carry out a visual inspection for impurities. If impurities are discovered, remove these.
3. Fasten or, if necessary, replace loose pipe fittings and hose clamps.
4. Check pipe fittings, hose connection points and lines for all circuits for leakage.
5. Carry out a visual inspection for corrosion. If corrosion is discovered, notify a specialist refrigeration company.
6. Check the availability of the operating manual.

10.3.2 Condenser (air-cooled device)

⚠ CAUTION

Danger when cleaning the condenser / heat exchanger!

There is a risk of injury when blowing out (air-cooled version) sharp-edged cooling fins or refrigerant hot-gas lines due to the formation of dust. Comply with the following precautions:

- Mark-off the dangerous area.
- Use personal protective equipment for blowing-out process.
- Do not touch sharp-edged cooling fins (air-cooled version).
- Do not touch the refrigerant hot-gas lines.

NOTE

In the event of any problems please consult a refrigeration specialist

1. Check the condenser fins for dirt and soiling.
2. Clean the condenser fins with compressed air (applying this in a direction perpendicular to the fin edges and at a maximum speed of 1 m/s) or using a vacuum cleaner.

10.3.3 Filter mat (air-cooled device)

1. Switch off the device via the main switch or the 24-V control.
2. Detach and take off the ventilation grating on the outside.
3. Remove the filter mat.
4. Clean the filter mat (by beating it or by using a vacuum cleaner).
5. Replace the filter mat if more than 50% of its surface can no longer be cleaned (see “Spare parts” section).
6. Insert the filter mat and refit the ventilation grating.
7. Switch on the device via the main switch or the 24-V control.

10.3.4 Operating pressure

1. Check the operating pressure (see “Technical data” section).
2. Clean the filter if required, replace it, if necessary.
3. Check ball valves if required, adjust if necessary.
4. Check safety valve (option) if required, adjust if necessary.
5. Check the pump if required.
6. Bleed the system if required.

10.3.5 Filter, coolant circuit

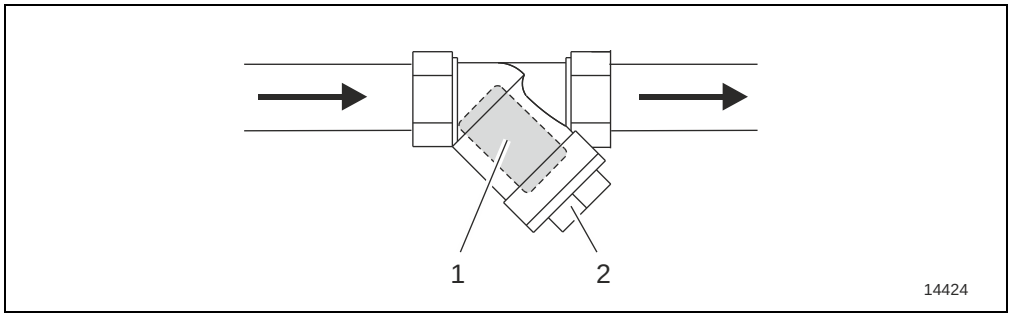


Fig. 22: Filter (example)

1. Prior to cleaning the filter, switch off the unit, depressurise the pipes and close the customer-provided shut-off valves.
2. Unscrew the screw fitting (2) and remove the filter (1).
3. Clean the filter (1) or replace it if necessary.
4. Refit the filter (1) and firmly tighten the screw fitting (2).
5. Open customer-provided shut-off valves as needed.
6. Check the screw fitting (2) for leaks after switching on the unit.

NOTE

Observe the filter position reference marks (if provided) when fitting a new filter.

10.3.6 Tank

1. Check tank and cooling medium for soiling/impurities.
2. In case of heavy soiling/high concentration of impurities, clean the tank and possibly treat the cooling medium.
3. Check fill level and fill up, is necessary.

NOTE

If the cooling medium is to be treated (a task for which the customer is responsible), deposits and corrosion must be avoided.

10.3.7 Antifreeze and anticorrosion agents

Note concerning the protection of the environment

The excessive use of antifreeze and corrosion inhibitors places a burden on the environment.

- Use environmentally friendly anti-freeze and corrosion inhibitors.
- Do not spill anti-freeze and corrosion inhibitors into the soil.
- Keep containers tightly closed. Ensure to close empty containers and those that are currently being used after the work is finished.
- Used antifreeze and corrosion inhibitors must be disposed of in an environmentally responsible way and compliant with local and national regulations.

To ensure sufficient concentration of the anti-freeze and corrosion protection agent, check the concentration according to the maintenance schedule.

This test is carried out using a conventional density measuring system or a refractometer. Observe the manufacturer' product information.

Check/top up an anti-freezing and anti-corrosion agent as follows:

1. Take a sample from the control circuit (e.g. at the filling and drain cock). Withdraw at least 0.5 l (0.1 gal) of the medium to achieve useful measuring results.
2. Measure the concentration with a suitable measuring device.
3. If the concentration is outside of the specified range, top up the anti-freezing and anti-corrosion agent.

NOTE

- Ensure a homogeneous mixture of the medium and anti-freezing and anti-corrosion agent (following refilling of the system control circuit or slow topping up of anti-freezing and anti-corrosion agent while the pumps are running).
- The use of a suitable filling pump is recommended for topping up.

10.4 Maintenance tasks of specialist refrigeration company

1. Following service or repair work at the refrigerant circuit (e.g. replacement of components, elimination of leaks) or a shutdown duration of over 2 years, tests have to be carried out by a specialist refrigeration company:
   - Pressure test
   - Check for leakage of refrigerant
   - Testing of high-pressure controller

2. Following service or repair work (e.g. replacement of components, elimination of leaks) or significant modifications to the refrigeration unit, tests have to be carried out by a specialist refrigeration company:
   - Check for leakage of refrigerant
   - Testing of high-pressure controller

3. In case of a suspected leak in the refrigerant circuit, a specialist refrigeration company has to carry out the refrigerant leakage check.

Note concerning the protection of the environment

Refrigerants are harmful to the environment if released into the atmosphere.

- Work on the refrigeration unit should be performed only by personnel qualified according to the Chemicals Climate Protection Ordinance.
- Do not damage the refrigerant pipes.
- Used refrigerants must be returned to a certified company for reclamation.

11 Troubleshooting

11.1 General information

The following must be observed in order to avoid injuries and damage to property:

- Only qualified personnel are authorised to perform these tasks.
- Comply with the information given in the "Safety" section.

⚠ WARNING

Carry out instructed work only!

There is an increased risk of injury to persons who perform tasks for which they are not suitably qualified or trained.

Troubleshooting shall only be carried out by qualified personnel. Contact the after-sales service particularly in the event of malfunctions in the electrical system or the refrigeration unit (if provided).

Risk of injury due to rotating fans!

There is an increased risk of injury due to rotating fans when the unit is switched on.

- Keep housing closed during operation.
- Never reach into the device when it is switched on.
- Prior to opening the housing, ensure that the device is off and secured against reactivation.

Danger to persons due to heavy objects!

When installing or removing components of the system (e.g., pumps, compressors, heat exchangers, ...), their entire weight must be taken into consideration.

- Perform the installation and removal with several persons or use suitable lifting devices.
- Install/remove the components individually one by one.
- Use personal protective equipment.

Risk of injury for personnel!

There is a risk of burns o freezing of limbs due to damaged refrigerant pipes.

Do not damage the refrigerant pipes.

⚠ CAUTION

Health hazard!

Health hazards when working on the refrigeration unit.

Wear eye protection and relevant protective clothing when working on the refrigeration unit.

11.1.1 Electrical connections

Fault	Cause	Note
Unit not working.	No power supply.	Switch the power supply system on.
		Check the external fuses.
		Check the power supply cable for signs of damage and ensure that it is properly connected.
		Check the electrical circuit.
		Check the fuses.
		Contact the technotrans service department.
Unit not working.	The circuit breaker has tripped.	Check the motor and motor connecting cable. Replace them if necessary.
		Check the setting of the circuit breaker and adjust it in accordance with the circuit diagram, if necessary.
		Reset the circuit breaker.
		Contact the technotrans service department if necessary.
	The external activation system is switched off or not connected.	Switch it on or connect it. Refer to the circuit diagram.
The rotating field of the motor is incorrect.	Motor not properly connected.	Check the rotating field. Check the connection. If necessary, change the phases. Refer to the circuit diagram.

11.1.2 Coolant circuit

Fault	Cause	Note
No/Insufficient flow of water.	Pump(s) not running.	Check pump(s) and replace as necessary.
		Switch the device on.
	Shut-off devices closed.	Open the devices.
	Insufficient pump pressure.	Set the pressure via the shut-off valve at the chilling medium outlet.
	Low water level.	Check the cooling circuit for leaks. Top up circuit with water.
	Filter is dirty	Check filter and replace if necessary.
Cooling medium too warm.	Fault concerning the refrigeration unit.	See "Refrigeration unit not working".
	Target temperature value too high.	Set the target value.
	The pump is not running.	Reset the circuit breaker.
		Check pump and replace if necessary.
		Check the pump motor and replace it if necessary.
		Switch the unit on.
	Control valve defective (if included).	Check the power supply and replace the valve if necessary.
Cooling medium too cold.	The target temperature value is too low.	Adjust the target value.
	The control valve is defective (if included).	Check the power supply and replace the valve if necessary. Following the replacement of the control valve, carry out a calibration procedure. (See the “Control valve” section.)
	(If heater present) The safety temperature limiter of the heater has been activated.	Check the heater and replace it, if necessary. Press the reset button of the safety temperature limiter (see diagram).
	The circuit breaker of the heater has been activated.	Reset the circuit breaker.

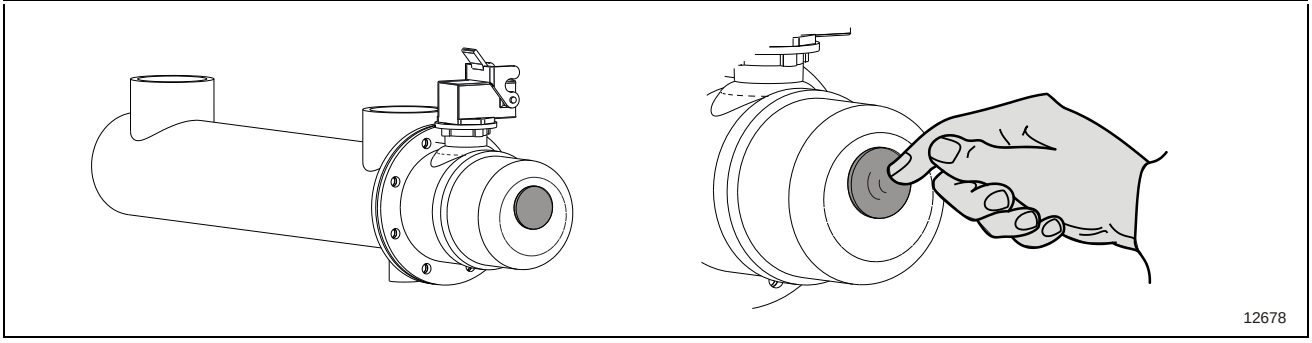


Fig. 23: Heater with safety temperature cut-out

Frequent lack of cooling medium.	System leaks.	Check for leaks and seal them if necessary.

11.1.3 Refrigerant circuit

Fault	Cause	Note
Refrigeration unit not running or reduced refrigeration capacity.	Compressor circuit breaker has tripped.	Reset circuit breaker.
	High pressure fault.	Clean the condenser (air-cooled version).
		Ensure sufficient cooling air (air-cooled version).
		Press the reset button on the pressure switch.
		The ambient temperature and / or coolant temperature is too high. Check the temperatures against the "Technical data" chapter. Adapt it, if necessary.
		Reinstall the housing panels after the fault has been eliminated.
	Air filter mat is dirty.	Replace respectively clean aluminium filter mat.
		Reinstall the housing panels after the fault has been eliminated.
	Low-pressure fault.	No or only insufficient flow in the cooling/temperature control circuit. • Check the flow monitor. • Check the filter. • Check the differential pressure.
		Check the refrigerant. Contact the technotrans service department.
	The thermal contact for the fan has been activated.	Allow the compressor to cool down (wait approx. 1 to 2 hours). The compressor re-starts automatically.
	Condenser cooling fins soiled.	Clean the fins.
	Condenser fan has failed (motor coil overheated).	Allow fan motor to cool down (allow 30 minutes approx.); replace it, if necessary.
	Entry /Exit of cooling air obstructed.	Remove any objects in front of or on top of the device.

11.2 Fault messages of the control unit

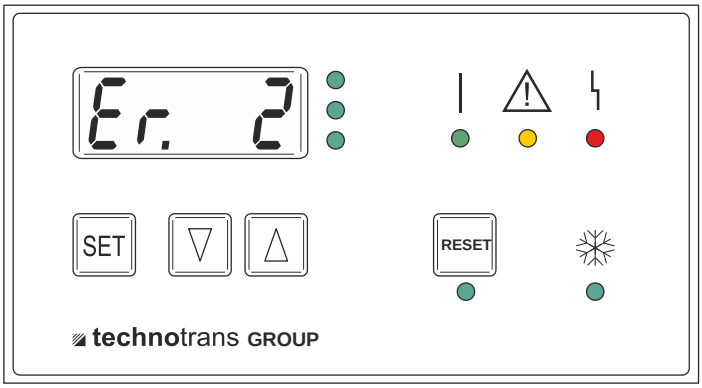


Fig. 24: Control unit TEC 301

Only one fault message will be displayed (the one with the lowest number) even though several fault messages are active at the same time.

A fault can be acknowledged if the LED below the Reset button is illuminated. Press and hold the Reset button for at least one second.

C - collective fault (fault LED, ON/OFF)

W - warning (orange LED) **F - fault (red LED)**

Warning / Fault	LED	Cause	Note	C
 Parameter error	**F**	Error in the internal parameter memory of the device control unit.	Reset the parameters according to the device version.	. / .
			If the error message appears repeatedly, inform the technotrans service department.	
 Undervoltage (24 V)	**F**	Control voltage too low (below 19 V).	Check the power supply.	. / .
 High pressure at compressor	**F**	The high-pressure switch or high-pressure sensor in the refrigeration circuit has tripped.	Press the reset button on the high-pressure switch. Set the maintenance switch at the device to the “off”/“on” position. If the fault occurs repeatedly, contact a refrigeration specialist company.	ON, if A14 = 1 **)
			LED of reset button lights up. Press the reset button to clear the fault.	
			The housing panels of the device are not installed. The device must be closed during operation (air-cooled version).	
		Insufficient air circulation through the condenser (applicable only to air-cooled refrigeration circuits/equipment).	Clean the condenser lamellae and check the intake and exhaust gratings for impurities.	
			The filter mat of the air filter is soiled. Remove the filter mat and clean it (wash it out) or replace it (air-cooled version).	
		Ambient temperature too high.	Check the maximum permissible ambient temperature specified in the “Technical data” section.	
		Insufficient supply of cooling medium (applicable only to glycol-cooled refrigeration circuits/equipment)	Check the supply of cooling medium.	

**) with “A” parameter set to “1”, for example

C - collective fault (fault LED, ON/OFF)

W - warning (orange LED) **F - fault (red LED)**

Warning / Fault	LED	Cause	Note	C
 Low pressure at compressor	**W**	Low pressure at compressor for < 60 seconds.	The ambient temperature is too low.	ON, if A15 = 1 **)
	F	The low-pressure switch in the refrigeration circuit continually trips or has tripped repeatedly.	Set the maintenance switch at the device to the “off”/“on” position. If the fault occurs repeatedly, contact the technotrans service department.	
		Insufficient flow through the heat exchanger.	Check the pump and heat exchanger for impurities and clean/flush as necessary.	
			The overflow valve *) is defective or its setting is not correct.	
		Loss of refrigerant	Contact the technotrans service department.	
		Defective expansion valve.	Contact the technotrans service department.	
 Circuit breaker protection for compressor	**F**	The circuit breaker for the compressor has been activated.	Allow the compressor to cool down, then check it and, if necessary, replace it. Reset the circuit breaker.	ON, if A16 = 1 **)
 Circuit breaker protection for pump	**F**	The circuit breaker for the pump has been activated.	Check the pump and replace it, if necessary. Reset the circuit breaker.	ON
 Safety temperature limiter/circuit breaker for fan (air-cooled refrigeration circuits/ equipment only)	**F**	Safety temperature limiter at fan has been activated.	Allow fan motor to cool down, check it, and replace it if necessary.	ON, if A17 = 1 **)
		The circuit breaker for the fan has been activated.	Check connecting line from fan. Reset the circuit breaker.	

*) optional

**) with “A” parameter set to “1”, for example

C - collective fault (fault LED, ON/OFF)

W - warning (orange LED) **F - fault (red LED)**

Warning / Fault	LED	Cause	Note	C
 Safety temperature limiter/circuit breaker for heater *)	**F**	The safety temperature limiter of the heater has been activated.	Check the flow rate of the cooling medium. Reset the safety temperature limiter.	ON, if A18 = 1 **)
		The circuit breaker of the heater has been activated.	Check connecting line of heater. Reset the circuit breaker. Replace the heater, if necessary.	
 Fill level in cooling medium tank (low water level)	**W**	The fill level in the cooling medium tank is too low (below the standard filling level) during operation.	Top up the cooling medium tank. **Note** The device does not switch off.	ON, if A11 = 1 **)
		Loss of cooling medium in device or connected machine.	Find and seal off the leak(s).	
	F	The fill level in the cooling medium tank is too low (below the standard filling level) when the device is switched on.	Top up the cooling medium tank. **Note** The device cannot be switched on.	ON
	F	The fill level in the cooling medium tank is too low (below minimum filling level).	Top up the cooling medium tank. Check for leaks and seal off any that are found.	ON
 No flow in cooling/ temperature-control circuit, even though pump is active.	**F**	No flow.	Check the cooling/temperature-control circuit. **Note:** The compressor will automatically shut off after three seconds and the “warning” LED will light up. The “fault” LED will also light up after three minutes.	ON
		Low cooling-medium level in cooling/temperature-control circuit.	Find and seal off the leak(s) and top up círcuit with water.	
 Flow monitor signals a flow, even though pump is inactive *).	**W / F**	The flow monitor is defective.	Check and replace, if necessary. Check the connecting line.	ON

*) optional

**) with “A” parameter set to “1”, for example

C - collective fault (fault LED, ON/OFF)

W - warning (orange LED) **F - fault (red LED)**

Warning / Fault	LED	Cause	Note	C
 Circuit breaker Heater for compressor *)	**W**	The circuit breaker of the heater has been tripped.	Check connecting line of heater. Replace the heater on the compressor, if necessary.	OFF
 *) Filter mat soiled.	**W**	No sufficient air circulation through the filter mat in the refrigeration circuit. Soiled filter mat (air-cooled version).	Clean or replace the filter mat (air-cooled version).	OFF (ON: see circuit diagram)
 Lit if temperature display is selected.	**F**	Temperature > 99.9°C/211°F. Interruption at temperature sensor.	Check the cooling-medium temperature. Check the temperature sensor and connecting line.	ON
 Lit if temperature display is selected.	**F**	Temperature < -9.9°C/14°F. Short circuit at temperature sensor.	Check the cooling-medium temperature. Check the temperature sensor and connecting line.	ON
 The external floating "Stand-by" contact has not been actuated.	**. / .**	No request from the connected machine.	If this message is displayed although there is a request, check the signal against the circuit diagram. If the connected machine is for example switched off, the message is normal.	. / .

*) optional

**) with “A” parameter set to “1”, for example

C - collective fault (fault LED, ON/OFF)

W - warning (orange LED) **F - fault (red LED)**

Warning / Fault			LED	Cause	Note	C
					°bar/psi LED is lit.	
 High-pressure sensor		bar/psi	**W**	The high-pressure sensor or the connecting line is defective.	Check and replace, if necessary. Check the connecting line.	OFF
 High-pressure sensor			**W**	The high-pressure sensor has caused a short circuit.		
The actual temperature value flashes on the display.			**W**	The actual value does not lie between the warning limits that have been set at the parameter level.	Check the cooling-medium temperature. Check the parameter settings.	ON, if A12 = > 0

**) with “A” parameter set to “1”, for example

12 Disconnecting the device

12.1 Notes

The following must be observed in order to avoid injuries and damage to property:

- Only qualified personnel are authorised to perform these tasks.
- Comply with the information given in the "Safety" section.

⚠ DANGER

Warning – Danger to life due to electrical current!

Negligence can lead to electric shock. Observe the following points when working on the electrical system:

- Comply with the information that is given in the "Safety" chapter.
- Only suitably qualified persons are authorised to perform these tasks.

1. Disconnect the unit from the power supply in order to deenergise it.
2. Secure the unit so that it cannot be switched on again accidentally.
3. Check whether the unit is properly disconnected from the power supply and absolutely voltage-free.
4. Earth and short-circuit the unit.
5. Cover any adjacent live parts and secure the danger area.

⚠ WARNING

Danger of injury due to improper work practices!

Pressurised systems can be extremely dangerous.

- Wear suitable protective clothing.
- Depressurise all of the circuits prior to dismounting the system or device.

⚠ CAUTION

Danger due to improper work practices!

Danger due to improper handling of the refrigeration unit. Only specialised refrigeration companies are authorised to disconnect the refrigeration unit.

12.2 Transport and storage

NOTICE

Freezing hazard

The unit may be damaged if the medium freezes inside the unit.

Drain the unit completely prior to transporting it.

Devices with tank made of plastic:

Risk of damage to device!

Risk of damage to the tank made of plastic at low ambient temperature! Intense hits against the tank made of plastic can lead into cracks and leaks.

Avoid intense hit against the tank made of plastic!

Risk of damage to the tank made of plastic at high ambient temperature! High ambient temperature can lead into deformation of the tank made of plastic.

Drain the tank made of plastic completely, if the unit will be stored more than 2 days by expected ambient temperature more than 52 °C!

NOTE

Transport the unit carefully and in a shock-free and vibration-free manner.

Comply with the information given in the "Transport" section.

Please note the following:

- The unit must be completely drained before transport.
- The unit must be completely drained before storage.
- Ensure that the ambient conditions are in line with the "Technical data".
- Use suitable packaging material (e.g., shock-absorbing and vibration-absorbing material; preferably, use the original packaging material).
- Ensure that the packaging will protect the unit against dust and dirt.
- Pack the unit so that it is protected against shocks and falling down.
- Ship the unit on a pallet only with belts wrapped around.
- If the unit is shipped separately, use the original padding blocks and mark as follows:
  - "Protect against moisture"
  - "Transport and store in upright position"
  - "Fragile"

12.3 Dismantling

⚠ WARNING

Incorrect shut-down!

Pressurised systems (if installed) can present an increased danger source. Depressurise all of the circuits prior to dismounting the system or unit.

The following steps must be performed:

1. Switch off system or unit and wait until all components have a temperature of below 40°C.
2. Flush, depressurise and empty the systems and pipelines (if installed).
3. Remove all of the hose connections leading to the system or unit.
4. Remove all of the electrical connections leading to the system or unit.

Note concerning the protection of the environment

Refrigerants are harmful to the environment if released into the atmosphere.

- Work on the refrigeration unit should be performed only by personnel qualified according to the Chemicals Climate Protection Ordinance.
- Do not damage the refrigerant pipes.
- Used refrigerants must be returned to a certified company for reclamation.

12.4 Recycling

Note concerning the protection of the environment

The improper disposal of reusable materials (e.g. plastics, steel and aluminium parts, electronic modules) has a negative impact on the environment.

- Ensure that reusable materials are recovered for reuse. Recycling is an important contribution to the protection of the environment.
- Ensure that reusable materials are recycled.

The improper disposal of chemicals (e.g. additives) has a negative impact on the environment.

- Chemicals must not be disposed of as household waste and it must be ensured that they are not released into the sewage system or soil.
- Wear suitable protective equipment (gloves, eye protection) when performing disposal tasks.
- Chemicals must be disposed of separately (e.g. as special waste if applicable) and supplied separately to the recycling centres.
- Refrigerants are not allowed to enter the atmosphere. Used refrigerants must be returned to a certified company for reclamation.
- Only personnel qualified according to the Chemicals Climate Protection Ordinance is authorized to perform work on the refrigerant circuit.
- Comply with the safety data sheets and also with the applicable national and local rules and regulations.

The components of the system or unit are mainly made of the following materials:

- plastic
- non-ferrous metals
- stainless steel
- steel and aluminium components
- electronic modules

13 Technical Data

NOTE

The illustrations used in this chapter are examples. They can differ from the actual system layout depending on the specific unit and equipment variant.

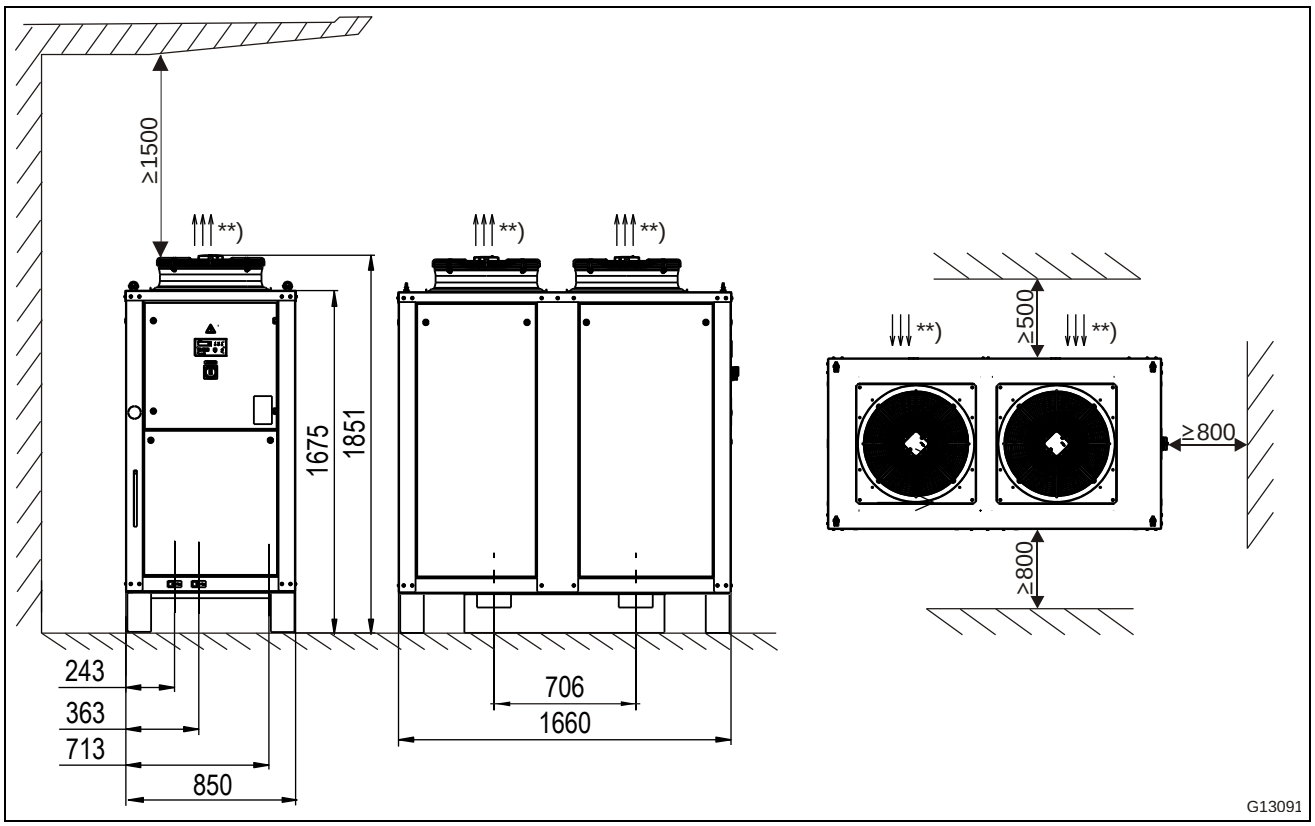


Fig. 25: Dimensions and clearances omega 340L, 420L, 500L, 620L

**) Direction of air flow

NOTE

- Unit must be accessible from at least three sides.
- The data listed are standard data. Depending on the unit variants deviations are possible; for technical specifications see electric circuit plan.

General data		
Ambient conditions		
- Temperature for transportation and storage when completely empty	°C	(- 25) ... + 60
- Temperature during operation	°C	+ 5 … + 43
		- 20 … + 43 *)
		+ 5 … + 50 **)
- Relative humidity (max.)	%	80
Maximum permissible nominal pressure PN		
- Open coolant circuit		Zero pressure
- Closed coolant circuit	bar	10
Water quality according to VDI pH value	pH	7.5 … 9.0
Hardness	°dH	< 20 (T < 40°C)
	mmol/l	< 3.5
Conductance	µS/cm	≥ 20 … < 2200
Chloride	mg/l	< 100
Sulphates	mg/l	< 100
Max. dirt particle size	µm	500
Noise emission (at a distance of 10 m)	dB (A)	< 65

*) option outdoor installation

**) option installation in tropical climate

Weight data	omega.k ... L	300	340	420	500	620
Net weight	kg	550	650	660	680	760
Operating weight	kg	848	853	963	984	1068

NOTE

Electrical data are default values!
Depending on equipment real data could be different (see circuit diagram).

Electrical connection data		**omega.k ... L**	**340**		**420**	
Connection voltage	50 Hz	V, Ph	400 ±10%, 3			
- Clockwise rotating field	60 Hz	V, Ph	460 ±10%, 3			
- Connection via maintenance switch			X3			
			3bar	5bar	3bar	5bar
Power consumption (max.)	50 Hz	kW	16.1	16.7	20.4	21.0
	60 Hz	kW	21.1	21.9	26.5	27.3
Current consumption (max.)	50 Hz	A	29.1	31.4	37.4	39.7
	60 Hz	A	32.2	34.9	40.7	43.4
Fuse protection (provided by the customer)	Indoor installation	A	35		50	
	Outdoor installation	A	50		63	
Frequency tolerance		%	±1,0			
Control voltage		VDC	24 ±10%			
Protection class of control cabinet			IP 54			

Electrical connection data		**omega.k ... L**	**500**		**620**	
Connection voltage	50 Hz	V, Ph	400 ±10%, 3			
- Clockwise rotating field	60 Hz	V, Ph	460 ±10%, 3			
- Connection via maintenance switch			X3			
			3bar	5bar	3bar	5bar
Power consumption (max.)	50 Hz	kW	24.8	25.4	29.0	29.6
	60 Hz	kW	31.5	32.3	36.3	37.1
Current consumption (max.)	50 Hz	A	44.8	47.1	50.2	52.5
	60 Hz	A	48.8	51.5	54.6	57.3
Fuse protection (provided by the customer)	Indoor installation	A	50		63	
	Outdoor installation	A	63		63	
Frequency tolerance		%	±1,0			
Control voltage		VDC	24 ±10%			
Protection class of control cabinet			IP 54			

Coolant circuit	omega.k ... L / W		340	420	500	620
Temperature control range (min./max. target value)		°C	13 … 25			
Control accuracy		K	± 2 (± 0.5; ± 1)*)			
Coolant	Indoor installation		Water			
	Outdoor installation	%	Water : Glycol 65 : 35			
Feed rate	50 Hz	m³/h	6.0	7.8	9.2	11.7
	60 Hz	m³/h	7.2	9.3	10.7	13.7
- for external differential pressure		bar	2.0			
- for external differential pressure and using reinforced pump *)		bar	4.0			
Filling pressure with open system		bar	Zero pressure			
Cold water inlet (internal thread)		∅ “	1 ½			2
Cold water outlet (internal thread)		∅ “	1 ½			2
Drain		∅ mm	12			
Tank volume (open system)		l	257.6			
Overall volume (open system)		l	273			

*) optional

NOTE

Performance data for following conditions:

- Ambient temperature: 32 °C / 89.6 °F

*) The GWP (global warming potential) of CO_2, based on a period of 100 years, is set to one.

**) Refrigerating capacity of compressor for a temperature difference (Δt) of 5 K between the cold water inlet and the cold water outlet.

For the actual refrigerant filling volume see the nameplate of the unit!

Refrigerant circuit	omega.k ... L			340	420	500	620
Refrigerating capacity of compressor **)	20 °C	50 Hz	kW	34.7	45.3	53.4	67.8
	14 °C	50 Hz	kW	27.2	35.7	40.4	54.0
	20 °C	60 Hz	kW	41.6	54.0	62.5	79.9
	14 °C	60 Hz	kW	32.7	43.2	50.1	64.0
Waste heat capacity		min 50 Hz	kW	22.2	29.7	36.6	45.3
		max 50 Hz	kW	45.6	59.4	70.8	90.6
		min 60 Hz	kW	26.8	36.0	44.5	55.2
		max 60 Hz	kW	54.6	71.7	86.0	108.6
Cooling-air flow rate		50 Hz	m³/h	16700	15500	18500	18400
		60 Hz	m³/h	19700	18600	21700	20400
Number of fans / Fan type				2 / Axial			
Refrigerant and Global warming potential (GWP) of refrigerant *)				R513A / 631			
Refrigerant fill quantity			kg	8.0	8.3	8.0	11.1
CO_2 equivalent			t	5.0	5.2	5.0	7.0
Number of compressors / Compressor type				1 / scroll	2 / scroll		

14 Spare Parts

NOTE

All of the components that are listed are standard components. Depending on the version that is used, deviations are possible.

When ordering spare parts, compare the component with the information given in the circuit diagram or on the respective type plate.

omega.k L/W 340				
Item *)	**Qty.**	**Component**	**Part no.**	
1	1	Compressors	10128739	
2	1	Condenser (air-cooled)	10087442	
2	1	Condenser (water-/ glycol-cooled)	10103380	
3	2	Fan (air-cooled)	10155140	
3	2	EC-Fan **) (air-cooled)	K11000000102	
4	1	Expansion valve	K41120000008	
5	1	Heat exchanger	K31100000815	
8	1	Filter dryer	***)	
9	1	Sight glass	T28043000018	
36	1	Pressure sensor	10051763	
52/1	1	Temperature sensor	10188035	
55	2	Float switch	R231000010GE	
60	1	Pump 3bar 4,0 – 4,5 m³/h	K52112001031	
60	1	Pump 3bar 4,6 – 5,5 m³/h	K52112001010	
60	1	Pump 3bar 5,6 – 12,0 m³/h	K52112001021	
60	1	Pump 5bar 3,8 – 4,6 m³/h	K52112001035	
60	1	Pump 5bar 5,0 – 9,8 m³/h	K52112001012	
60	1	Pump 5bar 9,9 – 12,7 m³/h	10061897	
	1	Control unit	10090037	

*) see schematic system diagram

**) only with option outdoor installation or EC-Fan

***) Contact technotrans service department with unit serial number.

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