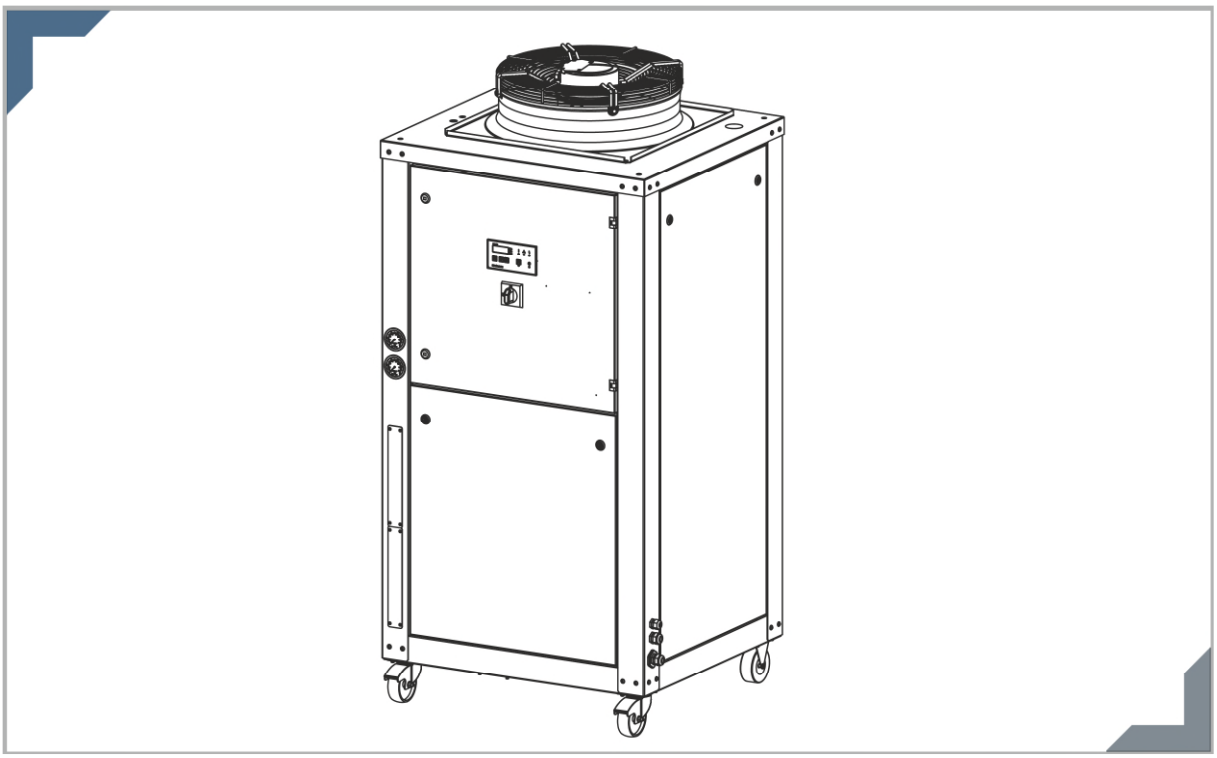

Instruction Manual

ORIGINAL INSTRUCTION MANUAL

coolset 250 L

90000463761-00 - EN
2016-09-22

Member of
the technotrans group

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1.3 Making contact

When ordering spare parts, making warranty claims, etc., please be ready to provide the following information (see type plate of device):

- Device type
- Serial number

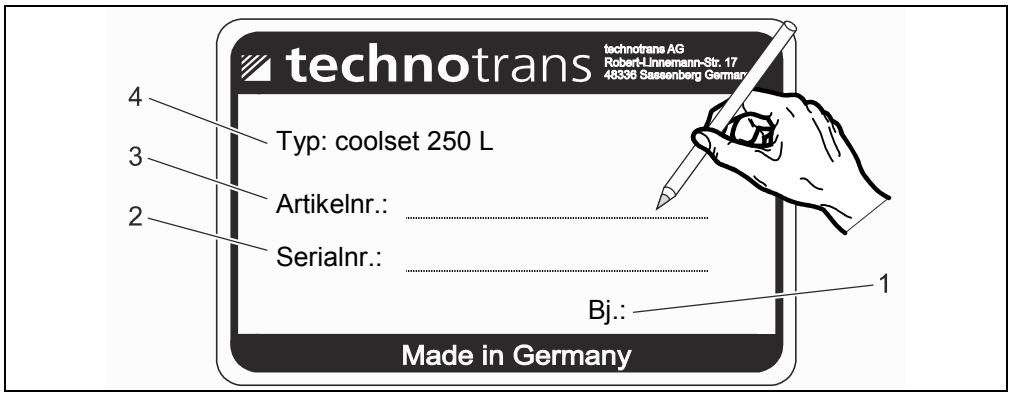


Fig. 1: Type plate (example)

1 Year of manufacture
2 Serial number
3 Part number
4 Unit name

▶ Note

If necessary, enter the details (serial number, etc.) from the type plate of the unit into the illustration above.

1.4 Ordering of spare parts

▶ Note

Only use genuine spare parts and filters, otherwise loss of warranty.

▶ Note

If you want to order spare parts, please refer to the CD-ROM included in the scope of supply.

▶ Note

In case the CD-ROM is lost, please contact the technotrans service department.

2 About this manual

2.1 Use and storage

Please observe the following:

- Only compliance with this manual ensures that the equipment/machine can be put into service properly, operated and maintained safely.
- These instructions comply only to the product that is mentioned on the cover page.
- We reserve the right to make changes to this manual based on engineering developments without notice.
- This manual is part of the scope of delivery.
- This manual shall be considered valid from the time of the transport to the customer until its final disposal.
- The manual must be stored so that it is easily available at any time. It must be complete, kept close to the machine and must be available to all authorized persons.
- The manual must always remain in a legible condition.
- If the equipment is sold, it must remain with the machine.
- This manual is only applicable for trained and authorised personnel.
- It is the owner's responsibility to ensure that the manual is read and understood by all operating personnel before starting work.
- The "Safety" chapter provides an overview of the most important safety aspects, highlights the optimum protection of personnel, and describes the safe and trouble-free operation of the system.
- The manufacturer cannot be held responsible for damage resulting from non-compliance with this manual.
- Reprints, translations, and duplications in any form, in parts all in its entirety require is the written approval of the publisher.
- The copyright remains with the manufacturer.

2.2 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.

2.3 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.

2.4 Explanation of the various notes

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.

3 Safety

3.1 General information regarding safety

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.

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.

Personnel in charge of carrying out work on the unit or system must have read and understood this manual and in particular the section on safety.

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

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

Observe all safety instructions. Observation of these instructions is in the interest of personal safety.

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

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.

3.2 Safety of personnel

Avoid any working practice that:

- endangers the health and safety of the user or third parties,
- presents a danger to the unit or system or other property,
- impairs the safety or functionality of the unit or system,
- does not comply with the safety instructions.

Maintenance and service should be performed only by suitably qualified persons who are familiar with the unit and who have been informed concerning the potential hazards.

⚠ WARNING

Warning – Danger to personnel!

There is an increased risk of injury if the safety devices are put out of operation. Do not remove or deactivate any safety devices.

- Check the safety devices according to maintenance plan for correct operation.
- Malfunctions and defects concerning the safety devices must be reported immediately to the after-sales service.
- The housing must be closed during the operation and may be opened only to rectify malfunctions or to perform maintenance tasks.
- Repairs to pipe systems and tanks may only be carried out when the system is depressurised.
- When handling chemicals, observe the applicable safety data sheets and disposal instructions that are provided by the suppliers, as well as any relevant local safety regulations. Wear protective clothing!

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.

3.3 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.

3.4 Terms of warranty

Warranty claims are limited to the contractual partner of the technotrans system.

Unless otherwise agreed, the warranty period concerning quality defects is twelve months from the date of shipment from the factory.

The warranty covers all of the material and labour costs for a repair at the factory. If the operator requests any defects to be remedied at the installation location of the unit/system by the technotrans customer service, any travel expenses must be borne by the operator.

Unless otherwise agreed, the shipment of spare parts under the warranty shall be subject to a fee if the defective component is not returned within a period of 6 weeks.

▶ Note

In case of defects during the warranty period, the contractual partner, via whom the unit/system has been purchased, must be contacted.

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.

! Notice

Damage to the unit or system!

The use of non-original spare parts or non-approved media (e.g. coolants, etc.) may result in damage to the unit or system. The warranty will be rendered void.

Non-compliance with the maintenance intervals may lead to damage to the unit or system, and to the partial or complete loss of warranty.

- Only use genuine spare parts by technotrans.
- Only use media that have been approved by technotrans and the machine manufacturer.
- Comply with the specified maintenance intervals.

▶ Note

Removing type plates will make the warranty claim expire.

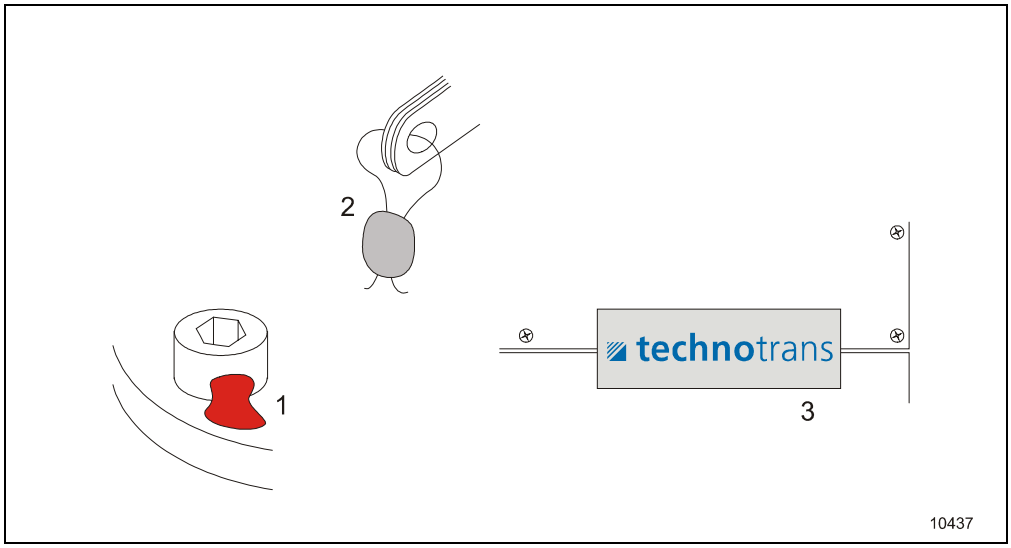


Fig. 2: Sealings

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.

3.5 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

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.

3.6 Safety instructions for transport

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.

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.

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.
- Transport on suitable and secured transporting pallet.
- Ensure that the side panels are installed for the transport.

Note

Comply with the general accident prevention and safety regulations.

Note

Compliance with the instructions given in the Chapter "Setting Up/Transport" is mandatory.

3.7 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.

Notice

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.

3.8 Use of chemicals

WARNING

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 Directive.

- Only use cleaning agents and solvents, additives, solvent-free washing agents, or coatings with a flash point of 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.

CAUTION

Health hazard!

The use of chemicals can present a health hazard.

- When handling chemicals, always wear protective gloves, eye protection and appropriate protective clothing.
- Comply with the material safety data sheets.

Notice

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.
- Comply with 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.
- Comply with the safety data sheets and also with the applicable national and local rules and regulations.

3.9 Use of refrigeration units

3.9.1 General information

If refrigeration units are used, please comply with the rules and regulations that are in force in the country where the system is set up.

Information concerning the refrigerant and the filling quantities can be found in the “Technical Data” section or on the type plate of the refrigeration unit.

Note the requirements regarding the installation site according to EN 378, "Refrigeration systems and heat pumps".

The refrigeration unit contains a fluorinated greenhouse gas (refrigerant). The refrigerants that are used are so-called partially halogenated fluorohydrocarbons (HFCs) without an ozone depletion potential (ODP=0). Information concerning the refrigerant filling quantity and greenhouse potential can be found in the "Technical Data" section.

Note concerning the protection of the environment

Refrigerants are harmful to the environment when they are released into the atmosphere.

- Work on the refrigeration unit should be performed only by specialist refrigeration companies.
- Do not damage the refrigerant pipes.

3.9.2 Obligation to maintain records

Refrigerant	annual leak test		semi-annual leak test
	Refrigeration unit	hermetically sealed refrigeration unit	Refrigeration units
R134a, R407C, R410A	as of a CO_2 equivalent (global warming potential) of		
	5,0 t	10,0 t	50,0 t

In accordance with the F-gases regulation (EU regulation 517/2014), the operators must maintain records about systems that are subject to statutory leak tests.

In addition, the documents must be preserved by the operator for a minimum of five years.

The following information must be specified in the records:

- the quantity and type of fluorinated greenhouse gases installed;
- the quantities of fluorinated greenhouse gases added during installation, maintenance or servicing or due to leakage;
- whether the quantities of installed fluorinated greenhouse gases have been recycled or reclaimed, including the name and address of the recycling or reclamation facility and, where applicable, the certificate number;
- the quantity of fluorinated greenhouse gases recovered;
- the identity of the undertaking which installed, serviced, maintained and where applicable repaired or decommissioned the equipment, including, where applicable, the number of its certificate;
- the dates and results of the checks carried out;
- if the equipment was decommissioned, the measures taken to recover and dispose of the fluorinated greenhouse gases.

▶ Note

The classification of the refrigeration unit as an hermetically sealed system is stated on the type plate of the refrigeration unit.

▶ Note

Please refer to the "Technical data" section.

3.10 Safety instructions for set-up

⚠ WARNING

Danger through faulty commissioning!

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

- The commissioning of the system shall only be carried out by persons familiar with the system and instructed with respect to dangers and risks involved, also having the required qualifications.
- Fulfil all safety-relevant conditions before commissioning.
- The location of the unit or of the system must correspond to the regulations according to Chapter "Safety, Choice of Location".

! Notice

Damage to components!

Danger of damage due to improper operation. Observe the description of additional components, if included.

▶ Note

Check all hoses and hose connections for leaks when commissioning the unit.

▶ Note

Pressure tanks must undergo an approval test that is to be performed by the responsible technical control board before they are put into service or if they have been inoperative for more than two years. Comply with the local pressure tank regulations.

3.11 Safety instructions for maintenance

⚠ WARNING

Carry out instructed maintenance works only!

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

- Maintenance works should be carried out only by suitably qualified personnel who are familiar with the unit and who have been informed as to potential hazards.
- Repairs to pipe systems and tanks may only be carried out when the system is depressurised.

⚠ WARNING

Connections alive!

Negligence can lead to electric shock.
Observe the following points when carrying out maintenance work on the electrical system:

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 power and absolutely voltage-free
4. Earth and short-circuit the unit.
5. Cover any adjacent live parts and secure the danger area.

! Notice

Damage to electronic components!

Take suitable measures (ESD protection measures) to prevent the electronic components from being damaged due to electrostatic discharge.

4 Description / Overview

4.1 General information

Unit for the temperature control of process water for closed hydraulic systems:

- Process water cooling via an integrated compression-type refrigeration unit
- Process water pumping via an integrated pump
- System control via an integrated microprocessor
- Unit for indoor and outdoor use

The process medium is cooled to a constant temperature by the heat exchanger of the refrigeration circuit.

During operation, a constant quantity of the process medium is fed through the closed hydraulic systems.

4.2 Factory protective measures

- The unit can be disconnected from the power supply via the maintenance switch.
- Outer painting/coating/anodisation against corrosion.
- Warning labels (in accordance with the German regulation BGV A8) e.g.“Warning – hot surface” and “Warning – dangerous voltage”.
- In order to ensure proper electrostatic discharge, the protective earthing/potential equalisation must be attached to the unit frame.

4.3 Incorrect use

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 unsuitable media.
- Non-compliance with the permissible technical data. See the "Technical data" section.
- Transport with filled unit.
- Use of the unit as a work platform.
- Use of the unit as a storage area.
- Operation with an incorrect phase sequence.
- Operation of the unit without medium.

5 System Layout

5.1 General view

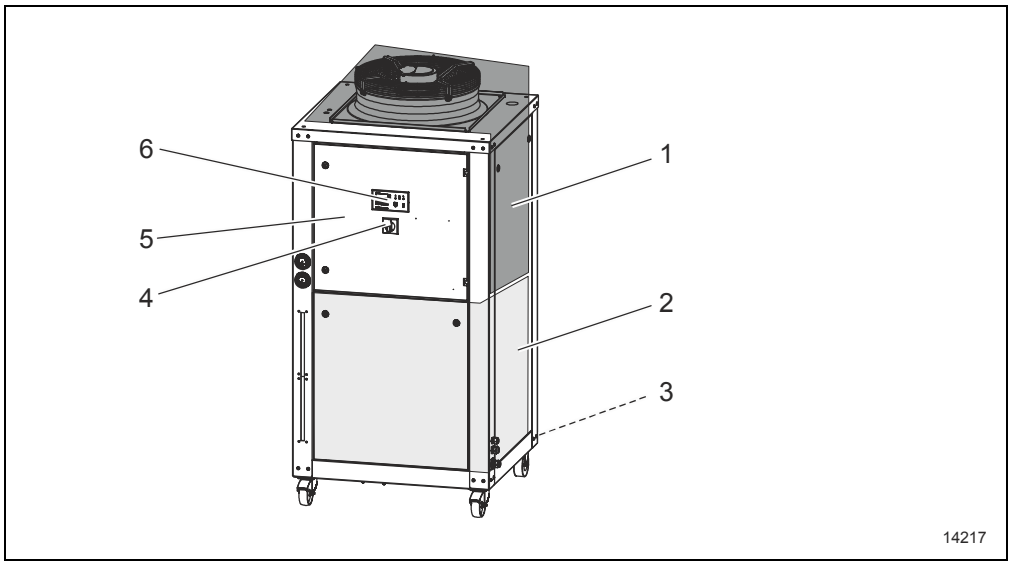


Fig. 3: coolset

1 Refrigeration circuit
2 Cooling/temperature-control circuit
3 Connection points
4 Maintenance switch
5 Control cabinet
6 Device control unit

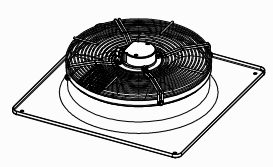
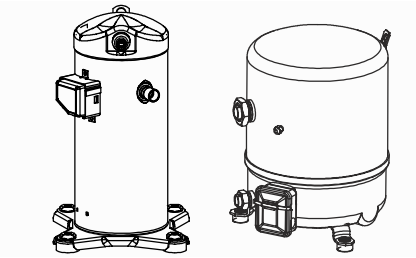
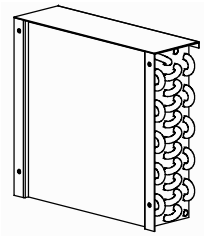
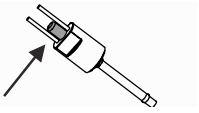
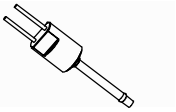
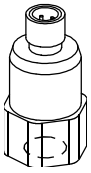
▶ Note

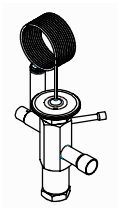
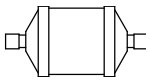
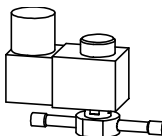
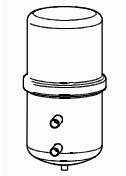
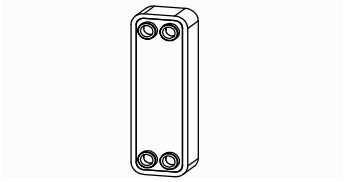
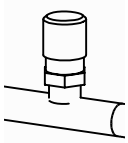
Electrical components are marked with reference designators. See also the circuit diagram.

5.2 Overview

5.2.1 Refrigerant circuit

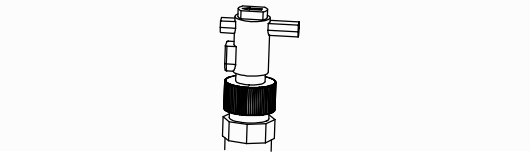
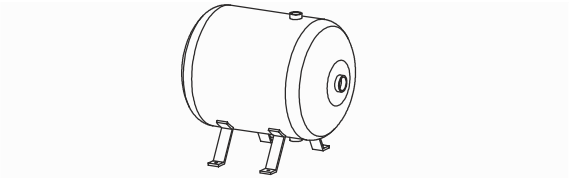
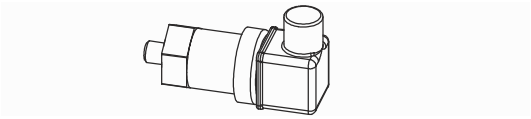
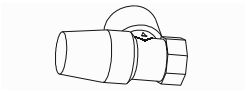
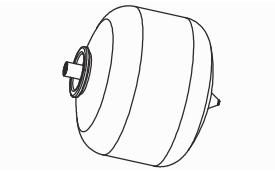
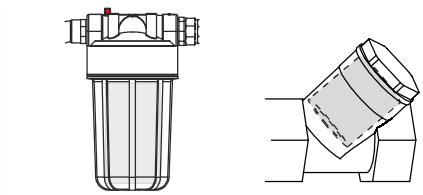
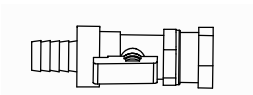
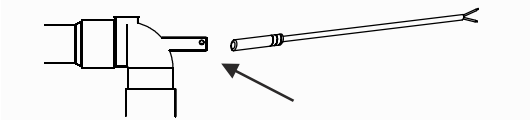
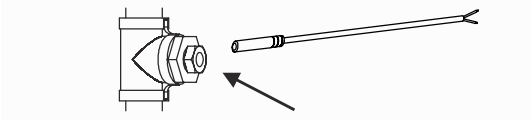
The following components are included in the unit (example).

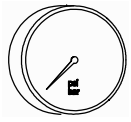
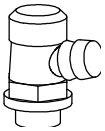
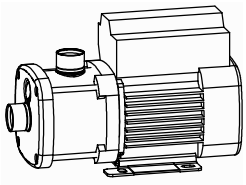
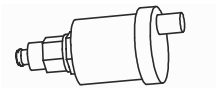
Component	Description
	Fan
	Compressor
	Condenser
	Air filter mat (at rear or side panel of device, depending on device version)
	High-pressure switch with reset button
	Low-pressure switch
	High-pressure sensor

Component	Description
	Expansion valve
	Filter dryer
	Refrigerant solenoid valve
	Refrigerant collector
	Refrigerant sight glass
	Heat exchanger
	Service connection

5.2.2 Cooling circuit

The following components are included in the unit (example).

Component	Description
	Flow monitor
	Buffer tank
	Low-water level switch
	Safety valve
	Expansion vessel
	Filter housing with filter
	Fill and drain valve
 	Temperatursensor befindet sich in der Verrohrung (siehe Pfeil)

Component	Description
	Pressure gauge
	Overflow valve
	Manual vent valve
	Pump
	Automatic vent valve

5.3 Connections / electrical components

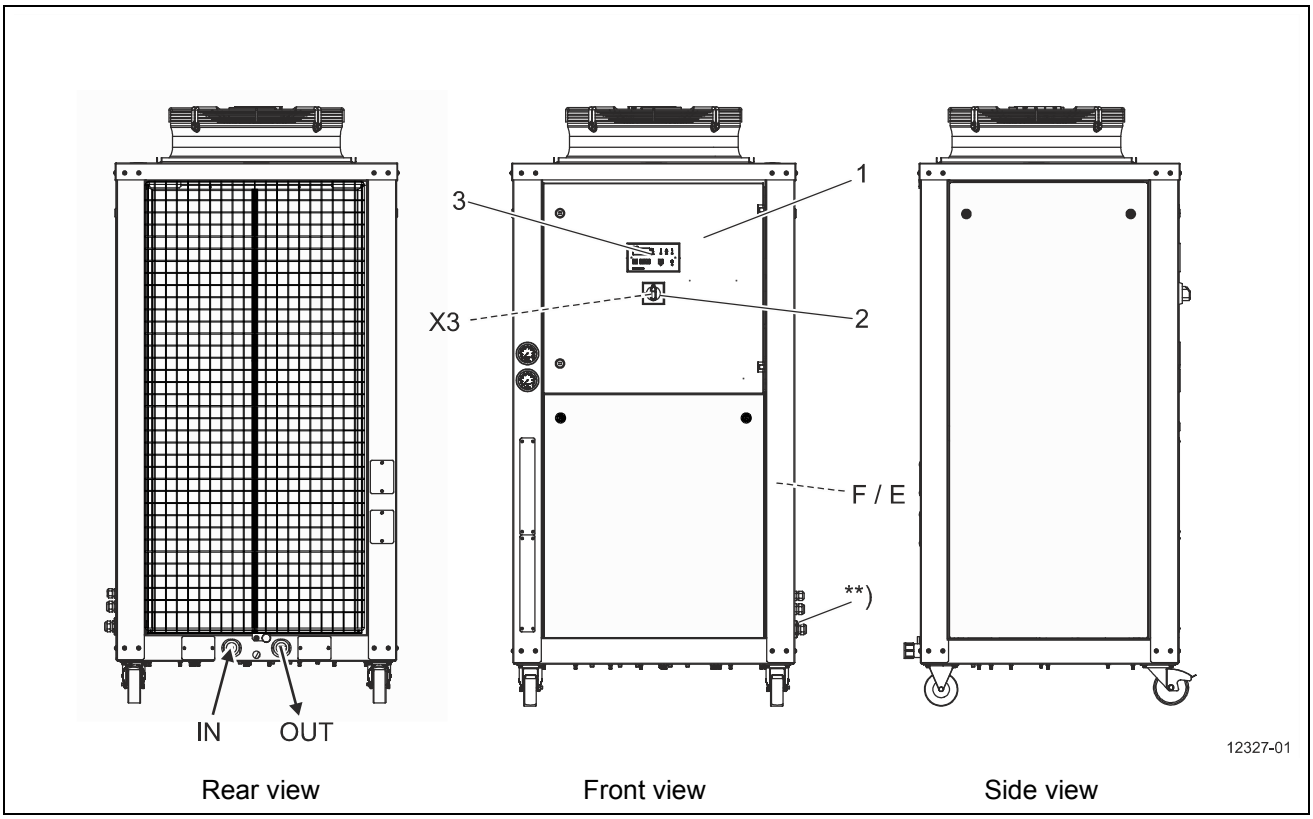


Fig. 4: coolset 250 L

1	Control cabinet
2	Maintenance switch
3	Control unit
X3	Power supply connector
**)	Opening for the connecting cable (X3)
IN	medium inlet (return flow)
OUT	medium outlet (feed flow)
F / E	Filling/draining connection

5.4 Schematic system diagram

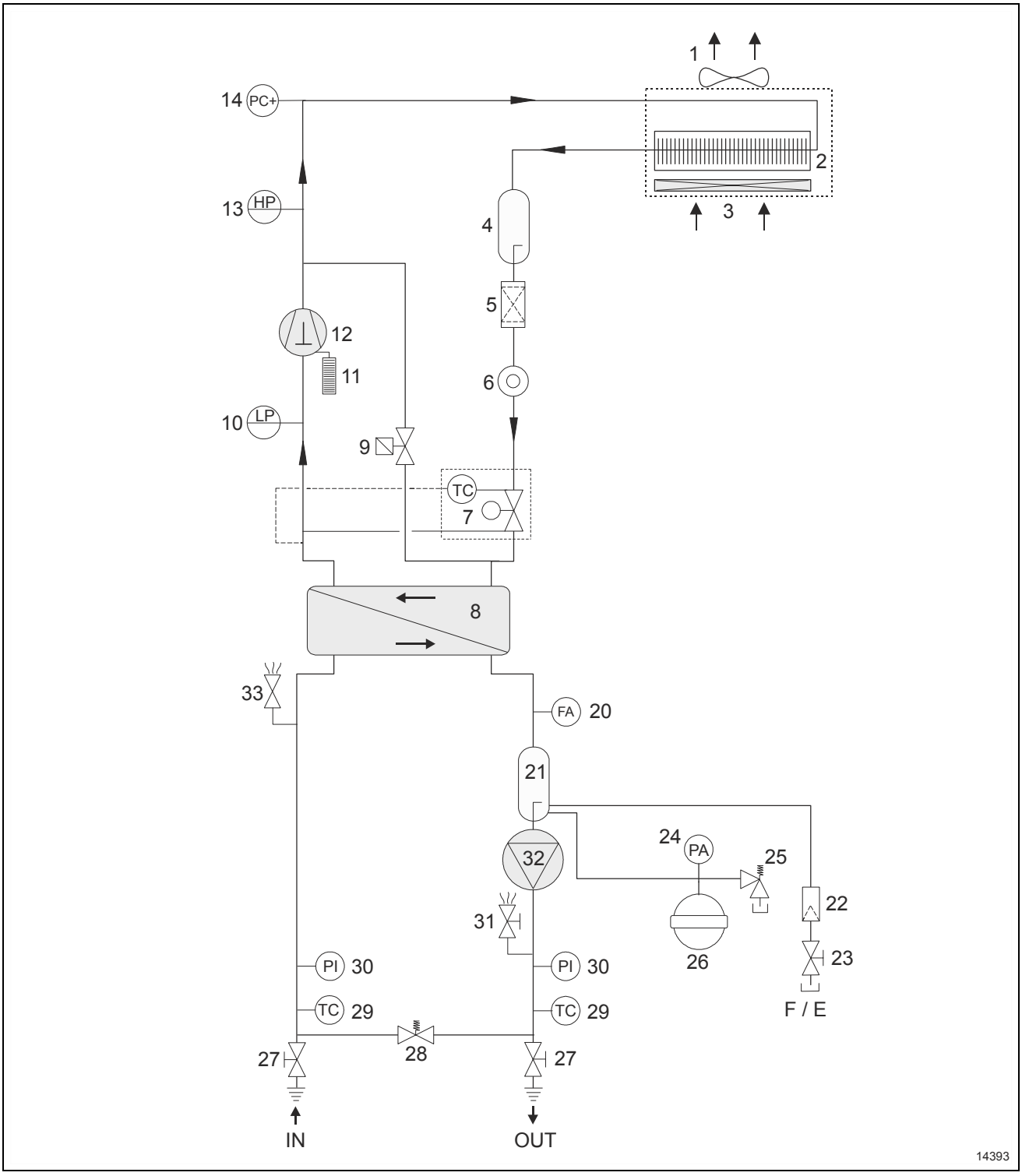


Fig. 5: Schematic diagram of system

Refrigeration circuit

1 Fan
2 Condenser
3 Air filter mat
4 Refrigerant collector
5 Filter dryer
6 Refrigerant sight glass
7 Expansion valve
8 Heat exchanger
9 Solenoid valve (hot gas bypass)
10 Low-pressure switch
11 Heater *)
12 Compressor
13 High-pressure switch
14 Pressure sensor

*) = option

Cooling circuit

20 Flow monitor
21 Buffer tank
22 Filter
23 Fill and drain valve
24 Low water level switch
25 Safety valve
26 Expansion vessel
27 Shut-off valve *)
28 Overflow valve
29 Temperature sensor
30 Pressure gauge
31 Manual vent valve
32 Pump
33 Automatic vent valve

Connections

IN medium inlet (return flow)
OUT medium outlet (feed flow)
F / E Filling/draining connection

5.5 Symbols / labels on the unit

▶ Note

Destroyed or illegible marks/symbols must be replaced immediately.

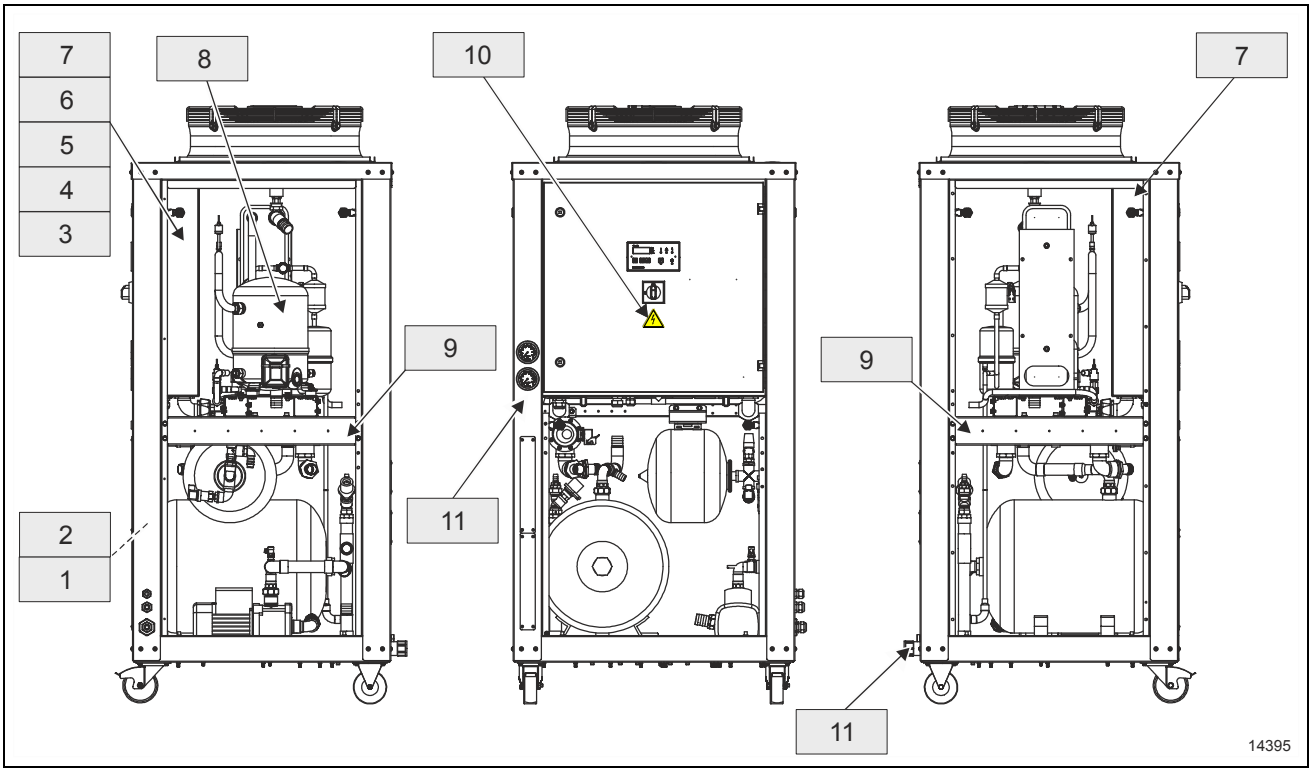
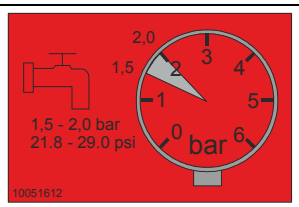
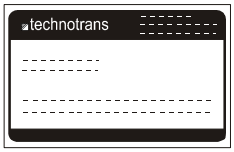


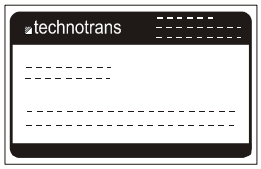
Fig. 6: Plates/labels on the device

Label 1	
	**Information concerning the filling of the system circuit with anti-corrosion and antifreeze agents.** • Comply with the information in the manual. • Refer to the "Start-up / ..." section.

Label 2	
	**Observe the filling pressure (static system pressure). The pressure must be in between 1.5 - 2.0 bar.**

Label 3	
	**Information concerning the refrigeration unit** The refrigeration circuit contains fluorinated greenhouse gas listed in the Kyoto Protocol!

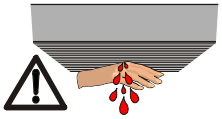
Label 4	
	**Type plate of the refrigeration unit**

Label 5	
	**Type plate of the unit**

Label 6	
CE	**CE marking of the device** The device satisfies the basic requirements set out by European directives.

Label 7	
	**Risk of injury due to rotating fans.** • Ensure housing is closed during operation. • Never reach into the unit while the unit is switched on. • Before opening the housing ensure that the unit is switched off and secured against being inadvertently switched on again.

Label 8	
	**Warning - Hot surface.** • Wear protective clothing (gloves). • Comply with the instructions given in the “Safety” section.

Label 9	
	**Danger of injury due to sharp cooling fins.** • Do not touch the sharp cooling fins. • Wear protective gloves.

Label 10	
	**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 11	
IN **OUT**	**Cooling-circuit connection points** IN Medium inlet OUT Medium outlet

6 Components

6.1 Refrigeration unit

6.1.1 General information

⚠ CAUTION

Improper handling of the refrigeration unit!

Danger due to improper handling of the refrigeration unit.

The unit should be serviced and repaired only by persons who have been trained in the use and maintenance of the unit and are informed about the potential hazards.

- Risk of burns. Do not touch the refrigerant hot-gas pipes.
- Risk of injuries. Do not touch the sharp cooling fins of the condenser used on air-cooled versions.

! Notice

Impairment of air circulation!

Impairment of air circulation leads to reduced refrigeration capacity of air-cooled versions.

- Provide sufficient space for unhindered air circulation.
- Do not place objects in front of or on top of the unit.

▶ Note

The pressure vessels of the refrigeration system are subject to periodic inspections depending on the device category and in accordance with the Pressure Equipment Directive.

- Pressure vessels of category 1 and 2 must be tested by a competent person.
- Pressure vessels of a higher category than category 2 must be tested by an approved inspection body (e.g. TÜV in Germany).
- The device category in accordance with the Pressure Equipment Directive is stated in the "Technical data" section.
- Comply with the applicable national and local regulations and laws (e.g. Pressure Equipment Directive).

Note concerning the protection of the environment

Refrigerants are harmful to the environment when they are released into the atmosphere.

- Work on the refrigeration unit should be performed only by specialist refrigeration companies.
- Do not damage the refrigerant pipes.

The refrigeration unit acts as a “compression refrigeration unit”. The filling volume of the refrigerant is noted on the type plate. The refrigerant is classified in safety group A1 in accordance with EN 378 ("Refrigeration systems and heat pumps"). Information concerning the type of refrigerant can be found in the “Technical Data” section.

The refrigeration unit contains a fluorinated greenhouse gas (refrigerant). The refrigerants that are used are so-called partially halogenated fluorohydrocarbons (HFCs) without an ozone depletion potential (ODP=0). Information concerning the refrigerant filling quantity and greenhouse potential can be found in the "Technical Data" section.

6.1.2 Refrigerant sight glass

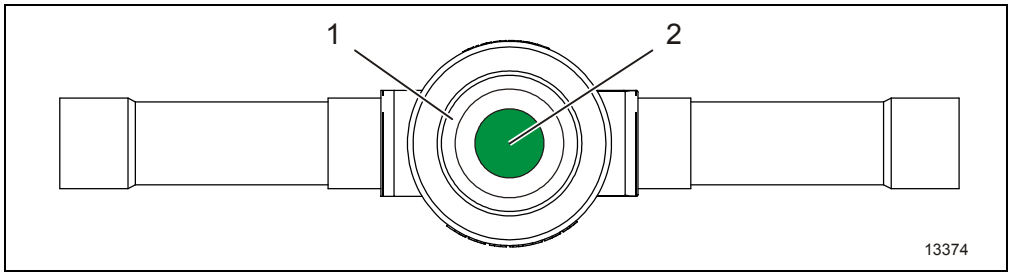


Fig. 7: Refrigerant sight glass (example)

1 Sight glass
2 Indicator

The colour of the indicator indicates the moisture content of the refrigerant.

- **Green**: No moisture in the refrigerant.
- **Yellow**: Moisture in the coolant. Replace the filter drier.

Symptoms of malfunctions:

- The indicator will turn from green to yellow when there is moisture in the refrigeration circuit.
- Continuous formation of bubbles while the compressors are running (can be seen in the sight glass).

▶ Note

In both cases, a refrigerant specialist should be consulted.

7 Setting Up

7.1 Notes

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

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

- See the "Technical data" section for information concerning the optimum water quality.
- 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).

Note

- 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.

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

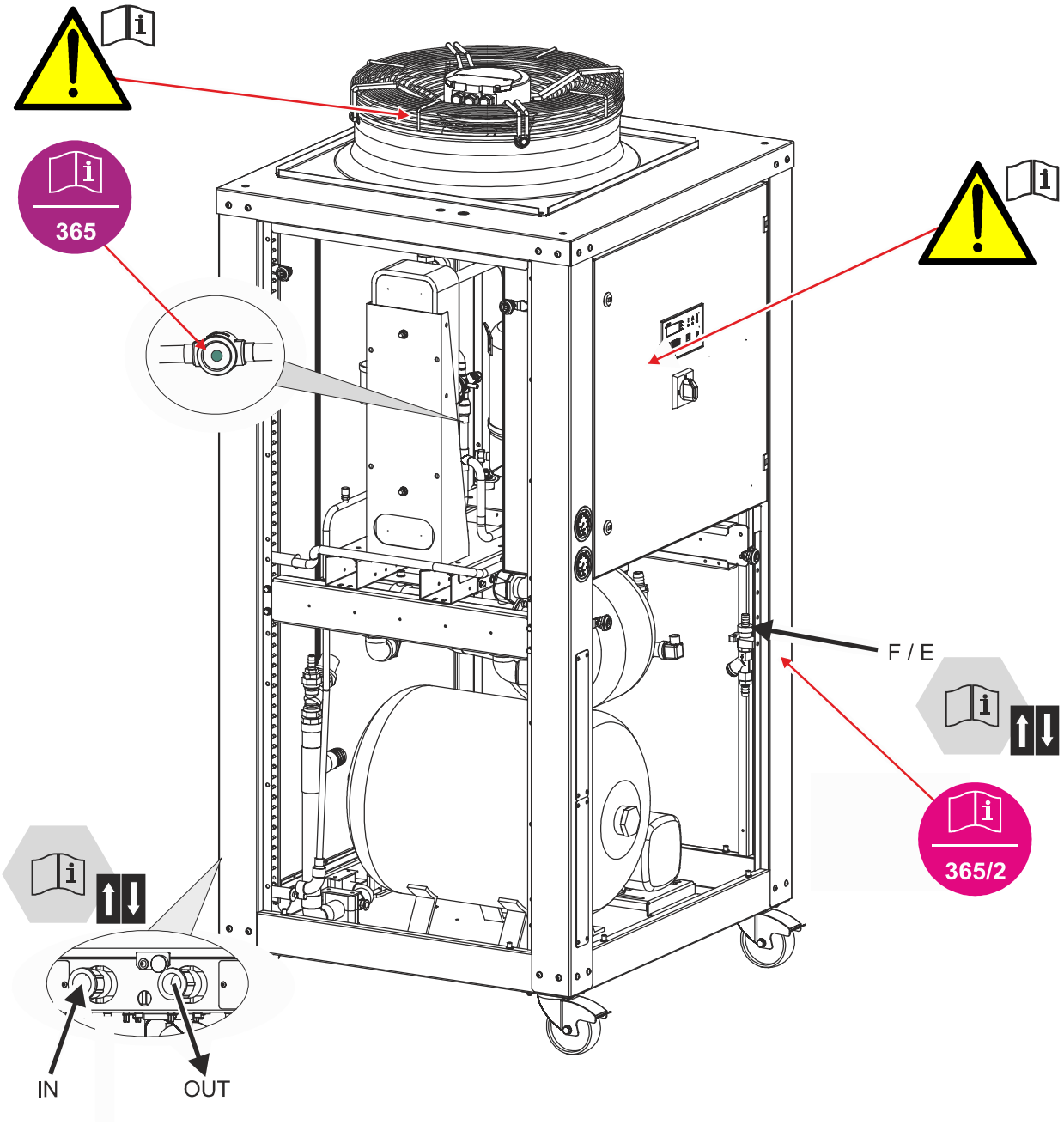
- Layout / System layout
- Components
- Maintenance
- Technical Data

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

7.2 Overview

Legend:

	Danger
	Please refer to the instruction manual!
	Maintenance point
	Adjustment, check
	Operating point, connection point
	Inlet/outlet
	Note
1	Every day
7	Weekly
365/12	Monthly
365/2	Every six months
365	Annually
!	Use original replacement parts and filters only –otherwise the warranty will be invalidated.



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7.3 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.

7.4 Transport to the installation location

7.4.1 General information

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.

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.
- Transport on suitable and secured transporting pallet.

- 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.
- 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.

7.4.2 Use of cranes

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.

Notice

Risk of damage to the unit when it is transported by crane!

Safe transport by crane cannot be guaranteed if unapproved eye bolts are used.

- Only use eye bolts that have been approved by the manufacturer.
- The eye bolts automatically adapt to the direction of pull.
- Transverse loads are avoided.
- Part no.:
  - 035101012 (eye bolt M12x18)
  - 10047272 (eye bolt M10x15)

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

- The eye bolts and the other transport equipment are not included in the scope of supply.
- After it has been screwed tightly into the frame, it must be possible to rotate the eye bolt through 360°.
- Observe the markings identifying the location of the attachment points. See the chapter "System layout/Plates/labels on the unit".
- 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°.

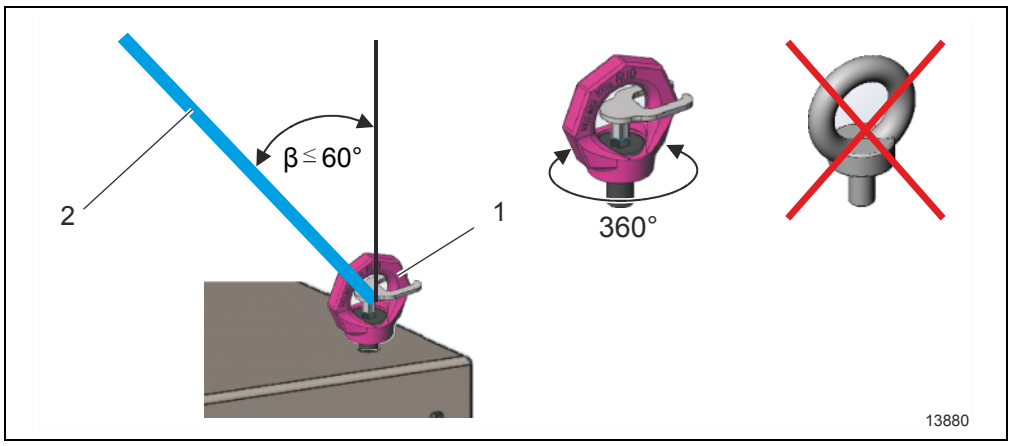


Fig. 8: Transport by crane with a rotating eye bolt (example)

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

7.5 Installation

7.5.1 General information

Install the unit and the printing press on the same level.

Comply with the maximum lengths (hoses, pipes, cables etc.) and pressure and temperature values as stated in the "Technical Data" section.

The connections to the unit must be flexible and sufficiently pressure- and temperature-proof.

If connecting lines are laid along the ceiling, a non-return valve must be proved at the customer end.

▶ Note

- Installation on different levels is permissible only after consultation with technotrans.
- Do not exceed the maximum lengths without prior consultation with technotrans.

- Ensure sufficient space for operating, maintaining, troubleshooting and cleaning.

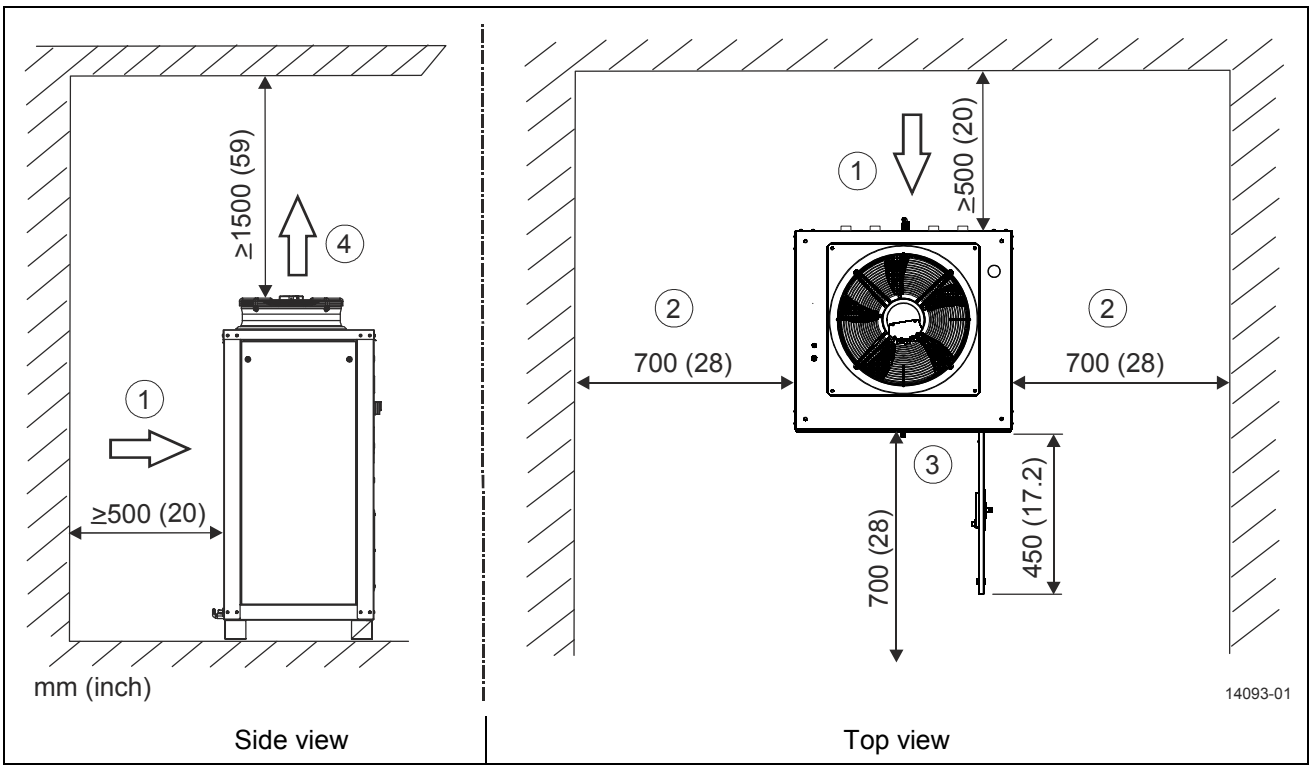


Fig. 9: Distances

1	Air inlet from unit	3	Operation of unit
2	Service area	4	Air outlet from unit

▶ Note

When installing the equipment, please consider minimum clearance (e.g. to wall, ceiling), see Chapter "Technical Data".

Arrest the brakes on the castors.

7.5.2 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 glycol. Plate heat exchangers may be clogged by deposited zinc.

Do not use galvanised pipes.

▶ Note

- Comply with the relevant guidelines and instructions of the manufacturer when installing the pipes.
- Refer to the section "System layout/Schematic system diagram".

Proper installation of the cooling medium (water/anti-corrosion and antifreeze agent, e.g. glycol) pipes is a prerequisite for the correct operation of the device.

The following points are to be noted:

- 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 a corrosion protection coating).
- The installation of plastic pipes (North America: schedule 80 pipes) is possible, but their reduced mechanical resistance (to pressure, temperature) as well as their resistance to the anti-corrosion and antifreeze agent used must be taken into consideration.
- The pipes must be pressure- and temperature-resistant.
- Only clean tools and auxiliary devices are to be used.
- Depending on the cooling medium temperature and whether the formation of condensation has to be avoided, the pipes may have to be insulated.
- The cooling/temperature control unit comes supplied with an expansion vessel. Depending on the length and volume of the pipes, it may be necessary to integrate an additional expansion vessel into the supply pipe (rating, supply and installation to be performed by the customer).
- In order to prevent the transmission of vibrations, we recommend installing vibration dampers or hoses.
- In order to avoid vibrations, there must be a sufficient number of fastening points.
- Suitable hose connectors for the flexible connection of the various devices are to be used.
- Suitable shut-off devices, such as ball valves, are to be used.
- In the case of units without a filter in the cooling medium inlet, a suitable filter is to be installed.
- Any unused branches are to be sealed off with plugs.
- As the formation of air cushions in the cooling medium pipework has negative effects on system operation and may even cause malfunctions in unfavourable cases, air separators must be installed at the highest points of the system in connection with either automatic or manual vent valves.

▶ Note

Install the vent valves at the highest points of the pipework system.

7.6 Connections

Notice

Damage to device at ambient temperatures ≤ 4.0 °C (39.2 °F)!

Risk of damage to the device through freezing.

The device must remain in an operationally ready state at temperatures ≤ 4°C (39.2°F). The power supply must not be interrupted and the enabling contact must be closed.

As an alternative, the device must be fully drained or filled with an anti-corrosion and antifreeze agent.

Carry out connection to unit via flexible, pressure-resistant hoses.

Note

Connection sizes according to the "Technical Data" section

- Medium inlet (IN, return flow)
- Medium outlet (OUT, feed flow)

- The customer must provide shut-off valves.

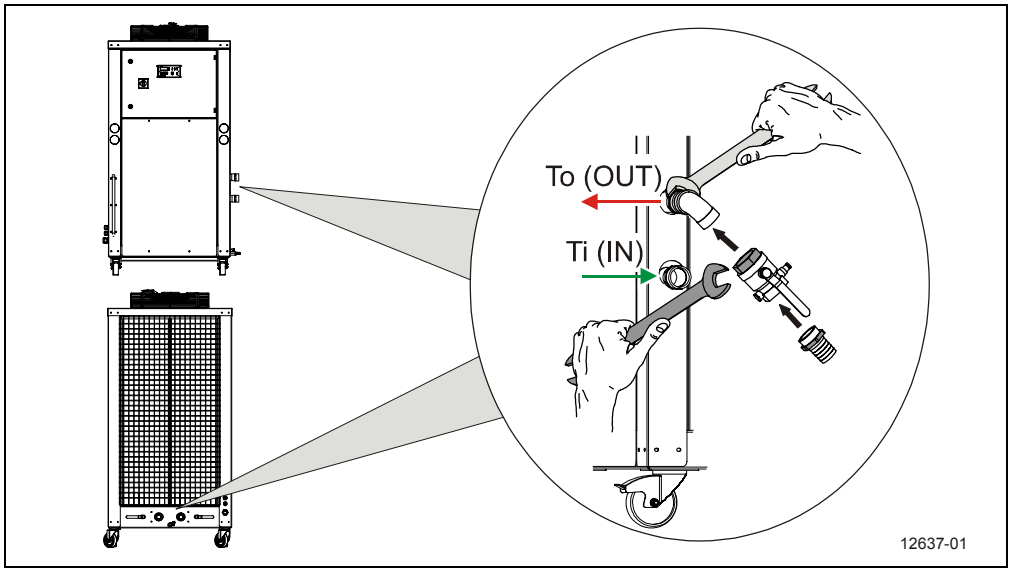


Fig. 10: Connections (example)

Note

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

7.7 Electrical connection

DANGER

Danger to life due to electric current!

Danger of life if live connections are touched.

Work must only be carried out by qualified electricians.

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.

Notice

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.

Notice

Damage to components

Electromagnetic incompatibilities can have a negative effect on the functionality of the unit or damage the components if no equipotential bonding is in place.

- If devices/machines are electrically coupled, additional local equipotential bonding must be provided between the devices/machines.
- Connect a suitable equipotential bonding cable (earthing strip, 16 mm² min.) to a marked spot on the higher-level machine.

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.

Note

Ensure clockwise phase rotation.

Set up the electrical connection according to the unit's circuit diagram. Observe local rules and regulations.

7.8 Glycerine-filled pressure gauge

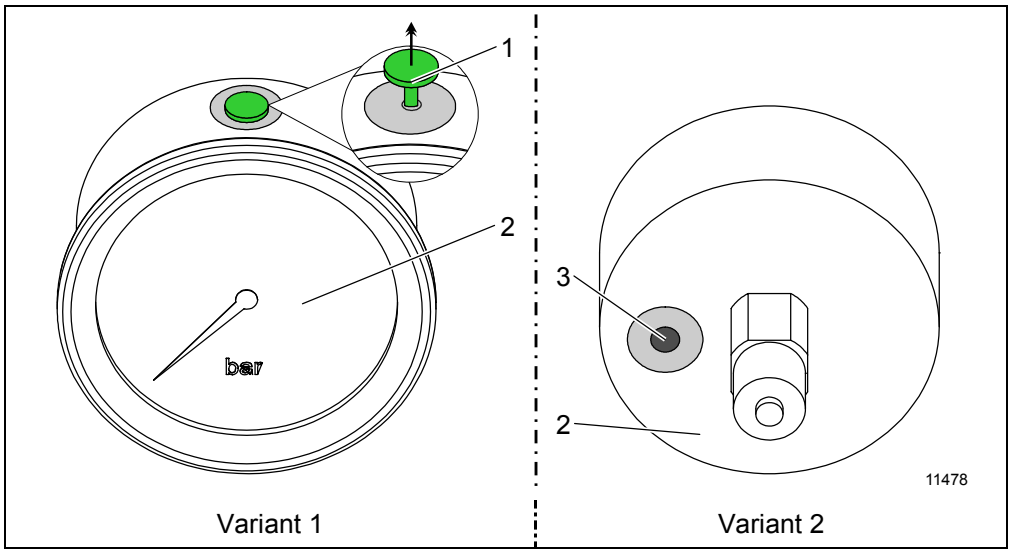


Fig. 11: Glycerine-filled pressure gauge

Depending on the variant, glycerine-filled pressure gauges (2) are equipped with a protective cap (1) or a rubber membrane (3) as a transport safeguard in order to prevent the glycerine from leaking.

In order to ensure that the pressure gauges display correct values, they must be vented when they are used for the first time.

Variant 1:

Pull the protective cap (1) out until you can feel a resistance.

Variant 2:

Puncture the pre-punched hole (3) in the rubber membrane with a sharp object (e.g. with a needle or pin).

7.9 Filling

7.9.1 Filling the cooling/temperature control circuit

For the initial start-up, fill the cooling/temperature control circuit with a water/glycol mixture in accordance with the information in the chapter "Anti-freeze and anti-corrosion protection".

Perform the following steps for filling:

1. Open the shut-off valves of the medium inlet/outlet (if included).
2. Take off the housing panel of the device.
3. Take the fill/drain valve out of the holder and connect it to the customer-provided filling unit.
4. Open the drain valve and fill the buffer tank.

▶ Note

Fill the cooling/temperature control circuit until the system is completely full and the filling pressure remains stable. During filling, switch the pumps repeatedly on and off every 10 to 20 seconds via the control unit in order to vent the system.

5. Continue filling the cooling/temperature control circuit until the system is completely full and no more air escapes from the automatic vent valve.

▶ Note

The filling pressure and water quality must comply with the values in the "Technical data" section.

Read the filling pressure off the pressure gauge.

7.9.2 Antifreeze and anticorrosion agents

In order to protect the components and prevent corrosion and frost damage, the system circuit must be filled with an anti-corrosion and anti-freezing agent.

▶ Note

Frost damage may be the result of one of the following factors:

- Dirt in the cooling/temperature control circuit
- pump fault
- Air pockets in the system (applies only to units with closed systems).

Part no. (technotrans)	Description
078403230	Clariant Antifrogen N
078403235	BP C 2230

! 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.

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.

▶ Note

- Refer to the specification of the manufacturer!
- See the "Technical data" section.
- The anti-freezing agent concentration must be adapted to the conditions on site (climate zone, ambient temperature).

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

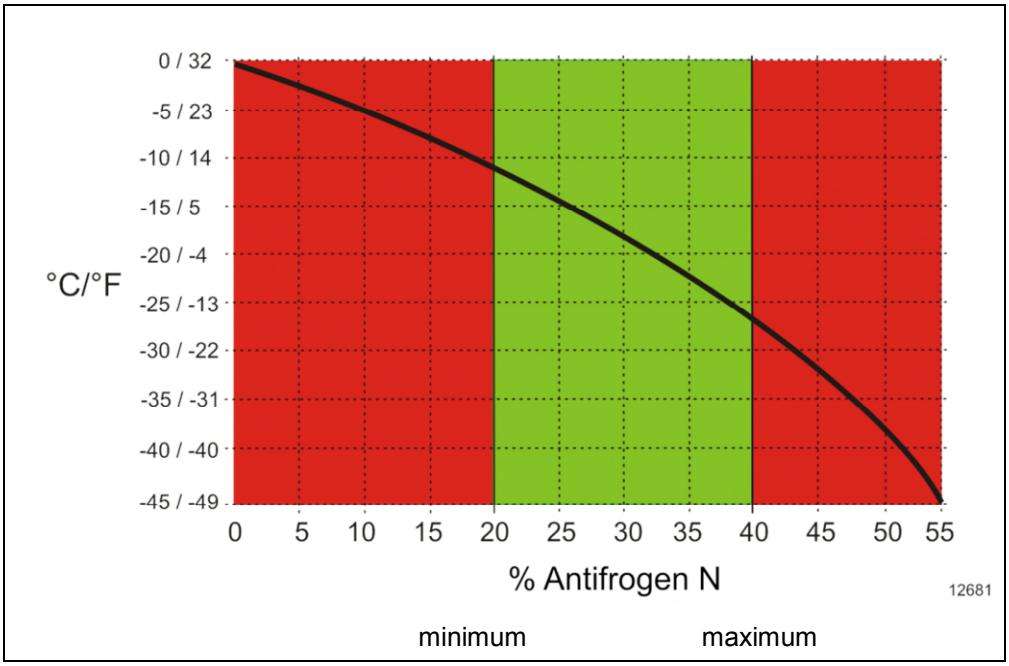


Fig. 12: Anti-freezing agent concentration

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.

7.10 Venting of closed circuits

In order to ensure the correct operation and operational safety of closed circuits, vent the entire system thoroughly at start-up.

! Notice

Damage to components!

Insufficient venting may damage the unit.

If venting at the highest point is not possible, there is a risk that some residual air remains entrapped in the system.

As a result, pumps (if installed) may run dry and heaters may burn through.

It is recommended to install a venting device (vent valve) at the highest point of the system.

The following steps must be performed:

1. Switch the unit off and on repeatedly and vent it while doing so.
2. Check the system pressure after each venting step. Top up the system if necessary (please refer to the "Technical Data" section).

▶ Note

Foam may form inside the system during start-up. This is due to additives (glycol, anti-corrosion agents etc.). This foam has a tendency to entrap air bubbles in the circuit, which subsequently cannot escape.

This is why venting must be repeated for a certain period of time (if necessary for several days) depending on the specific situation on site.

7.11 Adjustment of the overflow valve

The bypass for the volumetric flow rate and pressure reduction is adjusted as follows by way of the overflow valve:

▶ Note

- During the setting, the pump must be operating.
- In the factory setting is ~5 bar at ~1.5 bar static system pre-pressure.

1. Setting of the required pressure valve volumetric flow on the higher-level machine.
2. Deactivating the refrigeration circuit (deactivating the circuit breaker 2F1).
3. Open the left side panel.
4. Use the hexagon head to set the overflow valve to the specified outlet pressure.

   The + / - symbol identifies the valve:

   \+ Pressure increase

   = Pressure reduction
5. Check the outlet pressure on the pressure gauge on the front panel of the device, adjusted the overflow valve if necessary.
6. Close the left side panel.
7. Re-activate the refrigeration circuit (activate the circuit breaker 2F1).

▶ Note

Observe the system diagram in the "System layout" section.

8 Operation

8.1 Adjustments

Switching the unit on:

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

▶ Note

Check the direction of rotation of the pump(s) only during the initial commissioning of the system.

2. Check the direction of rotation of the pump. The direction of rotation of the pump must match the direction that is indicated by the label (3) on the pump.
   If a rotational direction indicator (2) is included, use the direction indicator (2) to check the direction of rotation of the pump while the pump (1) is running.

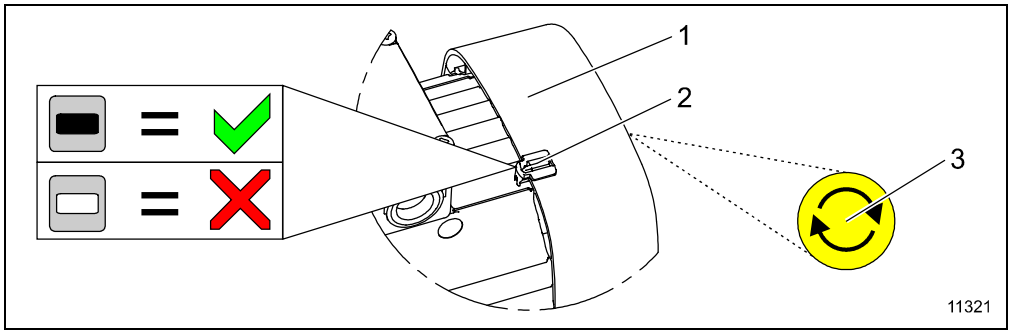
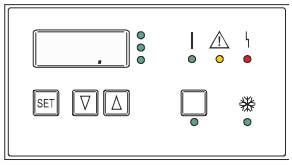


Fig. 13: Pump (example)

Black indicator:	correct direction of rotation
White/reflecting mark:	incorrect direction of rotation

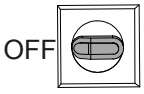
▶ Note

If the direction of rotation of the pump is incorrect, change the phase sequence of the power supply.



3. 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.

8.2 External signals

The unit can be controlled by the control unit of the printing press via an external floating contact.

- **Signal "ext. turn-on (external turn-on):** The unit can be switched on and off from the master point.

8.3 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 consulting technotrans.

8.3.1 TEC 301

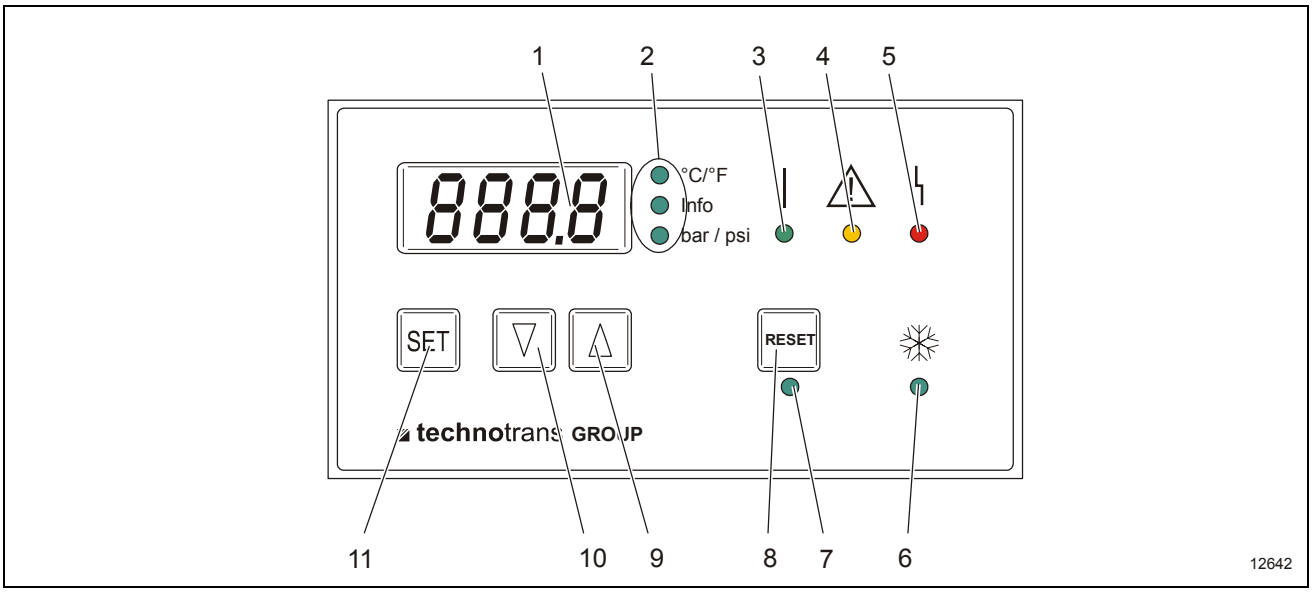


Fig. 14: Control unit TEC 301

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

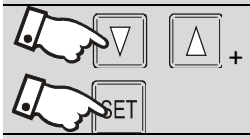
8.3.2 Actual value display

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.

8.3.3 Setpoint adjustment

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

2. Press and hold the SET key.



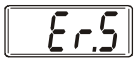
3. Adjust the setpoint with the up and down key while still holding the SET key.

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

8.3.4 LED Display

LED on LED flashes ○ LED is off

LED	Display	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 request signal is active.
		LED flashing: The request signal is active. There is a malfunction.
	-	The LED illuminates when a warning is pending.
	-	The LED illuminates when a fault 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.
	-	The LED illuminates when faults can be reset. See the "Troubleshooting" section.
-		The unit is switched off.

LED		Display	Description
			The LEDs and the display flash alternately if a fault (Er.1 - Er.10) is pending. See the "Troubleshooting" section.
			Indication of the current temperature in the feed flow
			Indication of the set temperature in the feed flow The external set temperature cannot be adjusted.
			Indication of the temperature in the return flow
			High pressure in the refrigeration circuit

▶ Note

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

8.3.5 A-Parameters

Parameter	Description	Default value	Range
A0	Indication of the software version	-	-
A1	Change of the temperature unit	°C	°C / °F
A2	Indication of the configured type of unit	11	Indication only
A3	Number of compressors 3 = one compressor 7 = two compressors	–	Indication only
A4	Maximum deviation of the temperature from the set value for a fault message Example: Target value = 15°C, upper alarm limit = 10.0 K. A fault message will be issued at a temperature > 25°C.	10,0	0 bis 99,9 K
A5	Minimum deviation of the temperature from the set value for a fault message Example: Target value = 15°C, lower alarm limit = 10.0 K. A fault message will be issued at a temperature < 5°C.	10,0	0 bis 99,9 K
A10	Mode of operation of the collective fault relay	0	0 Normally open contact 1 Normally closed contact
A11	A low water fault leads to a collective fault message.	0	0 no 1 yes
A12	A value above or below the temperature limits **(A4, A5)** leads to a collective fault message.	0	0 no 1 yes
A14	A high-pressure fault leads to a collective fault message.	0	0 no 1 yes
A15	A low-pressure fault leads to a collective fault message.	0	0 no 1 yes
A16	Tripping of the compressor circuit breaker leads to a collective fault message.	0	0 no 1 yes
A17	Tripping of the fan circuit breaker or a status message of the EC fan lead to a collective fault message.	0	0 no 1 yes
A99	No function. Press the "down" key to exit the parameter level.		

▶ Note

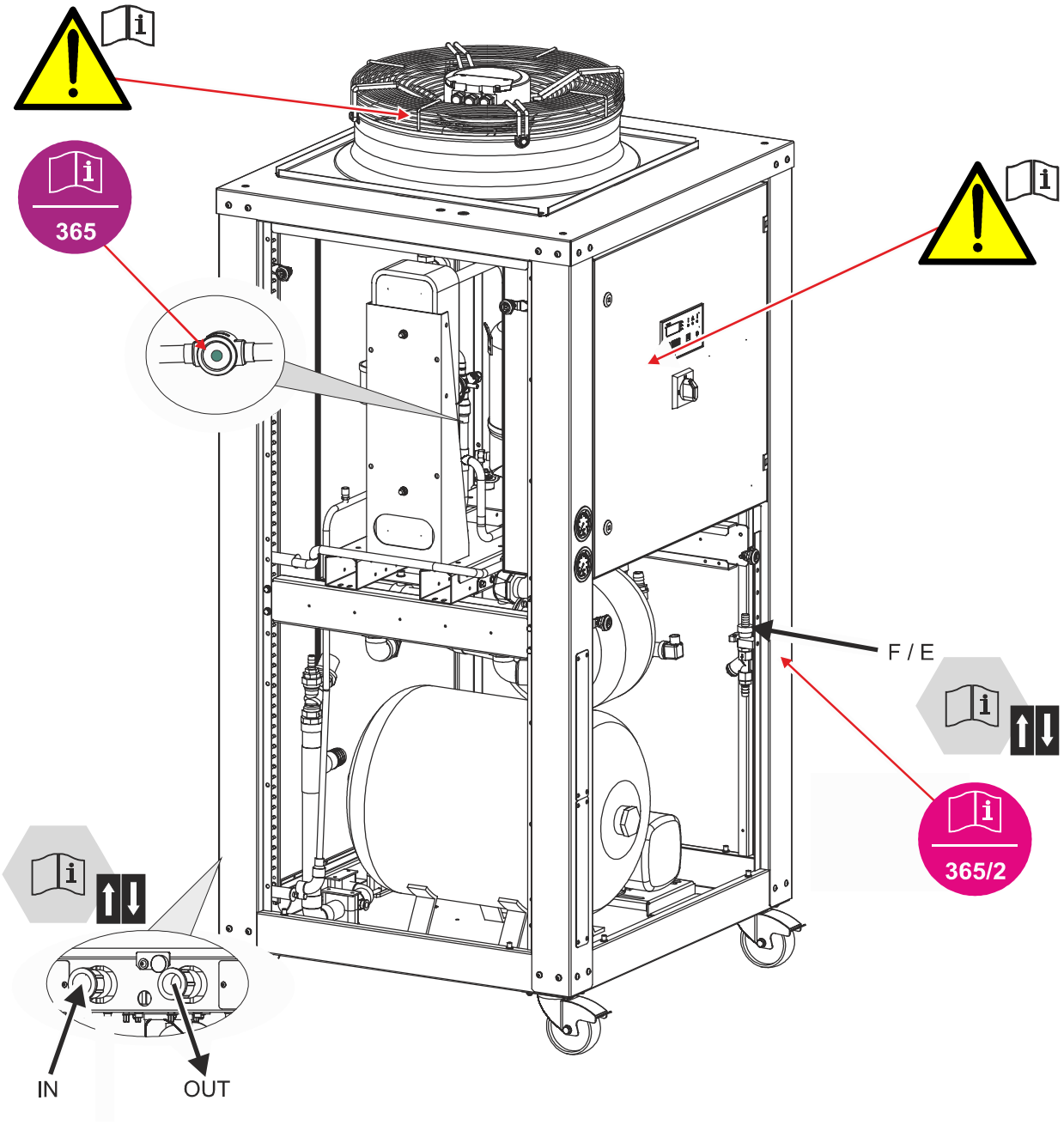
If no key is pressed for 20 seconds on the parameters level, the display will automatically return to its initial position.

9 Maintenance

9.1 Overview

Legend:

	Danger
	Please refer to the instruction manual!
	Maintenance point
	Adjustment, check
	Operating point, connection point
	Inlet/outlet
	Note
1	Every day
7	Weekly
365/12	Monthly
365/2	Every six months
365	Annually
!	Use original replacement parts and filters only –otherwise the warranty will be invalidated.



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9.2 Notes

⚠ WARNING

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.

⚠ 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.

⚠ CAUTION

Improper handling of the refrigeration unit!

Danger due to improper handling of the refrigeration unit.

The unit should be serviced and repaired only by persons who have been trained in the use and maintenance of the unit and are informed about the potential hazards.

- Risk of burns. Do not touch the refrigerant hot-gas pipes.
- Risk of injuries. Do not touch the sharp cooling fins of the condenser used on air-cooled versions.

Note concerning the protection of the environment

Refrigerants are harmful to the environment when they are released into the atmosphere.

- Work on the refrigeration unit should be performed only by specialist refrigeration companies.
- Do not damage the refrigerant pipes.

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.
- Comply with the safety data sheets and also with the applicable national and local rules and regulations.

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.
- Comply with the applicable national and local rules and regulations.

▶ Note

Do not use any detergents containing solvents.

▶ Note

Keep the entire system clean.

9.3 Maintenance plan

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

▶ Note

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.

▶ Note

- The technotrans service department performs work concerning the refrigeration unit (among others) (e.g. leak checks, refrigeration checks). If required, contact the technotrans service.
- See the “Contact addresses” section.

Maintenance interval:	**every week**	
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.	
Pressure gauge for the pump pressure side	Check the feed flow pressure of the pump(s).	

Maintenance interval:	**every month**	
Component	**Maintenance task**	**Auxiliary devices**
Labels and symbols	Check that the labels and symbols on the unit are complete and legible. Missing or illegible labels/symbols must be replaced.	
Air filter mat in refrigeration circuit	Check or remove the air filter mat in the refrigeration circuit and, if necessary, replace it or wash it out.	
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

Maintenance interval: every three months		
Component	**Maintenance task**	**Auxiliary devices**
Filter in the cooling/temperature control circuit	Check the filter in the cooling/temperature control circuit and replace it if necessary.	Special tool
Pump(s) (axial face seal)	Check the pump for leaks and replace it if necessary. **Note** Small leak rates < 15 ml per day are acceptable.	
Refrigerant sight glass	Check the moisture content of the refrigerant. The colour of the indicator reveals whether or not the refrigerant contains moisture. • Green: No moisture in the refrigerant. • Yellow: Moisture in the refrigerant.	
	Check the refrigerant quantity with active compressor(s). • A continuous formation of bubbles can indicate a lack of refrigerant. Contact the technotrans service department.	

Maintenance interval:	every year	
Component	**Maintenance task**	**Auxiliary devices**
Temperature sensor	Check whether the temperature sensor is properly installed in the sensor sheath. If necessary, lock the temperature sensor in place in the sensor sheath.	Cable ties (for example)
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
	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).	
Safety lock	Check safety lock on the housing and on the electrical cabinet for proper function.	Square spanner
Anti-freeze and anti-corrosion agent	Check the concentration in the system circuit and adjust it if necessary.	e.g., density measurement system
Insulation of medium pipes	Check the insulation for signs of damage (e.g. caused by weathering) and replace it if necessary.	

Maintenance interval:	3 years	
Component	**Maintenance task**	**Auxiliary devices**
Load contactor of compressor	Replace load contactor of compressor.	

9.4 Cooling circuit

9.4.1 Antifreeze and anticorrosion agents

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.

- If you use Clariant Antifrogen N or BP C 2230, the concentration must be between 20 % by volume minimum and 25 % by volume maximum.

Check the static system pressure:

- Information concerning the pressure can be found in the "Technical Data" section.
- If necessary fill up the system with water via the fill and drain valve.

9.4.2 Filter

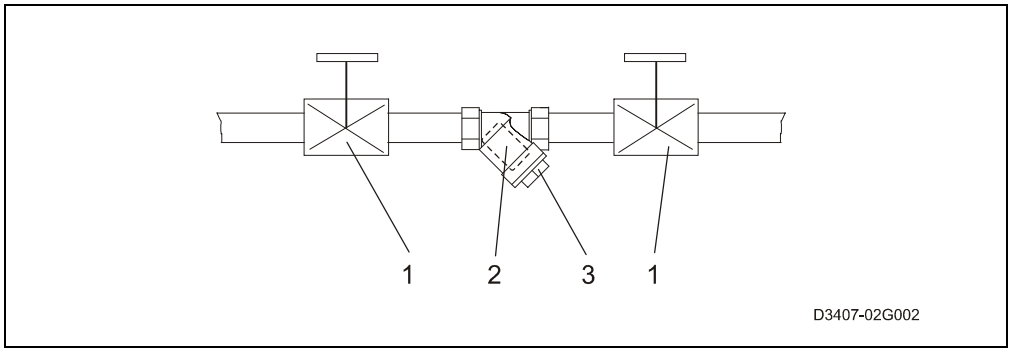


Fig. 15: Filter (example)

1. Switch off the device and close the shut-off valves (1).

▶ Note

The pipe is subject to pressure.

2. Unscrew the threaded fitting (3) and remove the filter (2). Collect any escaping liquid.
3. Clean or replace the filter (2), as necessary.
4. Refit the filter (2).
5. Refit the side cover (3).
6. Open the shut-off valves (1).
7. Check the screw fitting (3) for leaks after switching the unit on.
8. Check the system pressure and top the system up if necessary.

▶ Note

Use the position markings (if provided) when fitting new filters.

9.5 Refrigerant circuit

9.5.1 Cleaning

⚠ CAUTION

Risk of injury when cleaning condenser!

There is a risk of injury when blowing clean sharp-edged cooling fins or refrigerant hot-gas lines due to the formation of dust.

Comply with the following precautionary measures:

- Secure the hazard zone.
- Use personal protective equipment for the blowing process.
- Avoid contact with sharp-edged cooling fins.
- Avoid contact with refrigerant hot-gas lines.

1. In the case of an air-cooled condenser clean the cooling fins with the aid of compressed air or a vacuum cleaner.
2. In the event of any problems please consult a refrigeration specialist.

In the case of an air-cooled condenser, clean the cooling fins with the aid of compressed air or use a vacuum cleaner. Do not damage the cooling fins.

▶ Note

In case any problems arise, please contact the technotrans service department.

9.5.2 Refrigerant sight glass

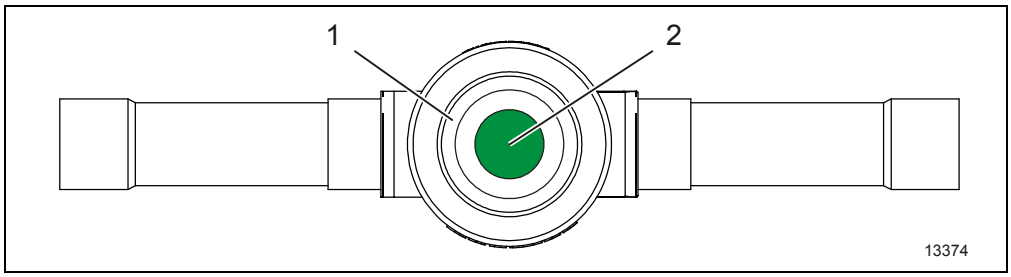


Fig. 16: Refrigerant sight glass (example)

1 Sight glass
2 Indicator

The colour of the indicator reveals whether or not the refrigerant contains moisture.

- **Green**: No moisture in the refrigerant.
- **Yellow**: Moisture in the refrigerant. Replace the filter drier.

Features indicating malfunctions:

- Change of indicator colour from green to yellow (indicating moisture in the refrigeration circuit).
- Continuous formation of bubbles while the compressors are running (can be viewed through the sight glass).

▶ Note

In either case, contact the technotrans service department.

10 Troubleshooting

10.1 Notes

DANGER

Warning – Risk of electrical shock!

The use of condensers bears the inherent risk of electrical shock when a person comes in contact with normally live components or those parts that have become live after a failure occurred. This may happen even after switching off the fans/speed-controlled motors.

- Only qualified personnel are authorised to proceed with this task.
- Mains feeds and all power supply lines must be disconnected.
- Prior to commencing your work wait three minutes.
- Comply with the information that is given in the "Safety" chapter.

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.

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).

WARNING

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.

⚠ 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.

⚠ CAUTION

Health hazard!

Health hazards when working on the refrigeration unit.

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

▶ Note

Re-activation is permitted only after a thorough inspection of the cause of the error and after the device has been tested.

10.2 Electrical connection

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.

10.3 Refrigerant circuit

Fault	Cause	Note
Refrigeration unit not running or reduced refrigeration capacity.	Compressor circuit breaker has tripped.	Reset circuit breaker.
	The flow controller in the connected circuit has tripped.	Check the flow.
	High pressure fault.	Clean the condenser (air-cooled version).
		Ensure sufficient cooling air (air-cooled version).
		Press the reset button on the pressure switch.
	Low-pressure fault.	Check the refrigerant (bubbles in the sight glass?). The compressor of the refrigeration unit is operating.
		Contact the technotrans service department.
	Air filter mat is dirty.	Replace.
• on air-cooled version	Condenser cooling fins dirty.	Clean.
	Condenser fan defective (motor coil overheated).	Allow fan motor to cool off (for approximately 30 minutes), replace if necessary.
	Entry /exit of cooling air obstructed.	Remove any objects from in front of or on top of the unit.
	Insufficient external suction.	Check.

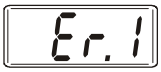
10.4 Cooling circuit

Fault	Cause	Note
No or only insufficient cooling medium flow.	Pump(s) not running.	Reset the circuit breaker.
		Check and replace if necessary.
		Switch the cooling circuit/unit on.
	Valves closed.	Open.
	Insufficient pump pressure.	Adjust the pressure via the shut-off valve in the cooling medium outlet.
	Low water level.	Check the cooling circuit for leaks. Top it up with water.
	The flow monitor in the cooling circuit has tripped.	Check the flow rate.
		Check the flow monitor.
Cooling medium too warm.	Fault on refrigeration unit.	See “Refrigeration unit not working”.
	Temperature setpoint too high.	Adjust the setpoint.
	Pump does not work.	Reset circuit breaker.
		Check pump motor.
		Check flow controller.
	Control valve defective (if included).	Check and replace the power supply if necessary.
Cooling medium too cold.	Temperature setpoint too low.	Adjust the setpoint.
	Control valve defective (if included).	Check and replace the power supply if necessary.
Frequent lack of cooling medium.	System leaks.	Check for leaks and seal them if necessary.
		Check the safety valve for leaks.
		Check the expansion vessel for leaks.

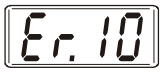
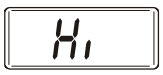
10.5 Fault messages of the control unit

▶ Note

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

Fault	Cause	Note
 Parameter error	Fault with the internal parameter memory of the control unit.	Readjust the parameters A1 - A23 in accordance with the equipment.
		If this fault occurs repeatedly, inform the technotrans service department.
 Undervoltage, 24 V	Supply control voltage too low (below 19 V).	Check the power supply.
 Compressor high pressure	The high pressure switch in the refrigeration circuit has tripped.	Press the reset button on the high pressure switch. Switch the maintenance switch of the unit off/on. If the fault occurs repeatedly, contact a refrigeration specialist.
		Function key F1 lights. Press the function key F1 in order to reset the fault.
	Insufficient air circulation through the condenser.	Clean the condenser lamellas and check the intake and exhaust grid for dirt.
	Ambient temperature too high.	Check the ambient temperature against the maximum permissible ambient temperature that is given in the "Technical Data" section.
 Low pressure of the compressor	The low pressure switch in the refrigeration circuit trips or has tripped repeatedly.	Switch the maintenance switch of the unit off/on. If the fault occurs repeatedly, contact a refrigeration specialist.
	Insufficient flow through the heat exchanger.	Check the pump and the heat exchanger for dirt. If necessary, clean/flush them.
	Loss of refrigerant	Check if bubbles appear in refrigerant sight glass. If necessary, contact a refrigeration specialist.
	Expansion valve defective.	Contact a specialist refrigeration company.

Fault	Cause	Note
 Compressor circuit breaker	The compressor circuit breaker has tripped.	Let the compressor cool down, check, and replace it if necessary. Reset the circuit breaker.
 Pump circuit breaker	The pump circuit breaker has tripped.	Check the pump and replace it if necessary. Reset the circuit breaker.
 Fan circuit breaker Safety temperature cut-out	The fan circuit breaker has tripped.	Let the fan cool down, check, and replace it if necessary. Reset the circuit breaker.
	The safety temperature cut-out of the fan has tripped.	Check the fan. Reset the safety temperature cut-out.
 Fan fault status	Fault concerning the fan motor.	Check the fan motor.
 Low water level	Low water level in the cooling circuit.	Top up with water.
	Water loss inside the device or printing press.	Locate and seal the leaks.
	Return flow pressure below 0.7 bar.	Add water and vent the system.
	Pressure drop in the cooling circuit following the venting of the system.	Top up with water.
 The flow controller signals that there is no flow although the pump is switched on.	Filter dirty.	Check the filter and clean it if necessary.
	Insufficient flow rate. The control valve is inoperative.	Check and replace it if necessary.
	Heat exchanger blocked.	Check. Clean/replace if necessary.
	Flow controller defective.	Check and replace if necessary.
	Incorrect direction of rotation of the pump.	Check.

Fault	Cause	Note
 The flow controller signals a flow although the pump is switched off.	Flow controller defective.	Check and replace if necessary. Check the connecting line.
 The circuit breaker of the crankcase heater has tripped.	The circuit breaker of the crankcase heater has tripped.	Check the connecting line. Replace the crankcase heater if necessary.
 The external floating contact "standby" has not been actuated.	No request from the printing press.	If this message is displayed although there is a request, check the signal against the circuit diagram. If the printing press is off, it is normal that the message is displayed.
	There is no "standby" signal.	Check the signal in accordance with the circuit diagram.
 Pressure sensor	Pressure sensor or connecting line defective.	Check and replace if necessary. Check the connecting line.
 Pressure sensor	The pressure sensor has cause a short-circuit.	
 Flashes when the temperature display is selected.	Temperature > 99.9°C / 211°F Interruption at the temperature sensor.	Check the cooling medium temperature. Check the temperature sensor and the connecting cable.
 Flashes when the temperature display is selected.	Temperature < -9.9°C / 14°F Short-circuit at the temperature sensor.	Check the cooling medium temperature. Check the temperature sensor and the connecting cable.
The actual temperature value flashes on the display.	The actual value is above or below the alarm limits that were set on the parameter level.	Check the cooling medium temperature. Check the parameter settings.

11 Disconnecting the device

11.1 Notes

⚠ 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.

⚠ WARNING

Danger through electric current!

Carelessness can lead to electrocution.

Disconnect the electricity supply before disconnecting the unit.

⚠ CAUTION

Danger due to improper work practices!

Danger due to improper handling of the refrigeration unit. The refrigeration unit may only be disconnected by specialist refrigeration companies.

11.2 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 when they are released into the atmosphere.

- Work on the refrigeration unit should be performed only by specialist refrigeration companies.
- Do not damage the refrigerant pipes.

11.3 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.

▶ Note

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

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"

11.4 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.

Note concerning the protection of the environment

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

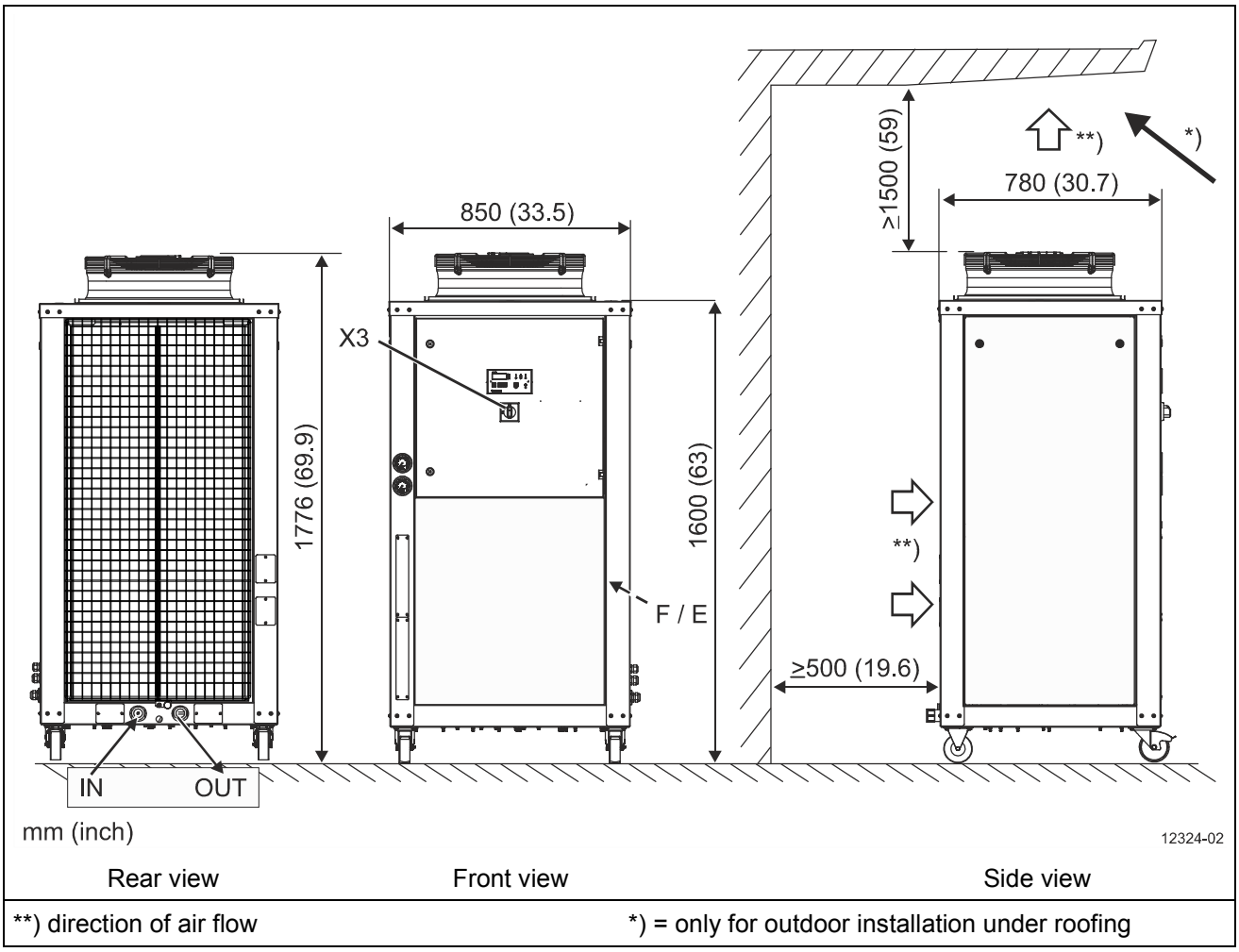
- Chemicals must not be disposed of as household waste and it must be ensured that they are not released into the sewage system or soil.
- Wear suitable protective equipment (gloves, eye protection) when performing disposal tasks.
- Chemicals must be disposed of separately (e.g. as special waste if applicable) and supplied separately to the recycling centres.
- 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

12 Technical Data

12.1 Dimensions, connections



**) direction of air flow

*) = only for outdoor installation under roofing

Fig. 17: coolset 250 L

IN	Medium inlet	X3	Power supply connector
OUT	Medium outlet	F / E	Filling/draining connection

▶ Note

The values that are stated are standard values.

Depending on the specific variant, deviations are possible; unit-specific information concerning the electrical system can be found in the circuit diagram.

12.2 General data

Ambient conditions		
- Temperature for transport and storage when completely drained	°C	(-25) ... 60
	°F	(-13) … 140
- Temperature during operation (after adding monoethylene glycol to the cooling circuit!)	°C	(-15) … 45
	°F	5 … 113
- Relative humidity (max., not condensing)	%	90
maximum permissible nominal system pressure PN (cooling circuit)	bar	10
	psi	145
Recommended max. length for connection hoses, tubes and cables between the chiller and the machine connections	m	20
	ft	66
Water quality according to VDI pH value	pH	6,5 … 7,5
Hardness	°dH	7 … 15
	mmol/l	1,5 … 2,5
Conductivity	µS/cm	15 … 500
Chloride	mg/l	< 100
Sulphates	mg/l	< 25
Max. dirt particle size	µm	150
Drinking water quality and pollution-free	-	-
Noise emissions at a distance of 10 metres	dB (A)	≤ 73
Certificates, external licences, test marks and trademarks	CE	

12.3 Weights

Net weight	kg	≈ 100
	lb	≈ 221
Operating weight	kg	≈ 170
	lb	≈ 375

12.4 Electrical connection

▶ Note

Follow the instructions given in the circuit diagram.

Connection voltage	50 Hz	V, Ph	400 ± 10%, 3
	60 Hz		460 ± 10%, 3
Frequency tolerance	permanent	%	±1,0
	temporary	%	±2,0
Control voltage		V	24 DC ± 10%

Power consumption	50 Hz	kW	10,3
	60 Hz		12,3
Current consumption	50 Hz	A	18,9
	60 Hz		20,7
Fuse rating (fuse provided by customer)	50 Hz	A	25
	60 Hz		25

technotrans recommends using residual-current-operated circuit breakers if the technotrans unit is connected to the customer's power supply system. It is not permissible to connect other devices (consumers, power sockets, etc.) downstream of the residual-current-operated circuit breaker.

If the technotrans unit is supplied with power via the customer-provided machine, the specifications of the manufacturer, which must be provided by the customer, must be complied with.

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

12.5 Cooling circuit

Note

- Fill the cooling circuit with antifreeze and anti-corrosion agents (30% ethylene glycol concentration).
- The outlet pressure of the device is limited to ~5.0 bar at the factory.

Temperature control range (min./max. target value)		°C	26 … 29
		°F	78.8 … 84.2
Control accuracy for constant load		K	± 1
Feed rate		m³/h	1,3
		US gal/h	343
- after the maximum differential pressure	50 Hz	bar	4,5
		psi	65.3
	60 Hz	bar	6,5
		psi	94.3
Static system pressure in closed system		bar	1,0 … 1,8
		psi	14.5 … 26.1
Medium inlet (internal thread)	**IN**	∅ "	Rp 1
Medium outlet (internal thread)	**OUT**	∅ "	Rp 1
Filling/drain connection (nozzle)	**F / E**	∅ mm	13
		∅ inch	½
System content in cooling circuit		l	~70
		US gal	15.4

12.6 Refrigerant circuit

▶ Note

The actual filling volume is stated on the nameplate of the unit.

▶ Note

Performance data applicable under the following conditions:

- Ambient temperature: 25°C / 77°F
- Medium temperature (OUT): 28°C / 82.4°F

Refrigerating capacity 50 Hz		kW	24
		BTU/h	81964
Maximum waste heat capacity		kW	≈ 37
		BTU/h	≈ 126362

Safety group according to EN 378	-	A1
Device category according to Pressure Equipment Directive	-	II
Conformity assessment procedure	-	Modul A2
Fluid group according to Pressure Equipment Directive	-	2

Refrigerant		-	R 407 C
Global warming potential (GWP) of refrigerant *)		-	1774
Refrigerant fill quantity	- Weight	kg	5,1
		lb	11.2
	- CO_2 equivalent	t	9,05
		lb	20272
Refrigeration unit oil			160SZ
Refrigeration unit oil fill quantity		l	3,25
		gal	0.72
Number of compressors (scroll type)			1
Cooling air flow rate		m³/h	≈ 8000
		cu ft/h	≈ 282517
Number/type of fans			1/axial

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

13 Declaration of conformity

In accordance with the EC Machinery Directive (2006/42/EC), annex II 1.

The manufacturer hereby declares that the machine (name of the machine, serial number as stated on the name plate) that is described in this manual is intended for the use described in the section “Description/Overview”, that it must be operated in accordance with the relevant safety regulations and that it complies with the following directives.

Document no.	Title
2006/42/EG	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive (does not apply to mechanical components)
2014/68/EU	Pressure Equipment Directive
EN 378	Refrigeration Units and Heat Pumps (applies only to units with refrigeration units or heat pumps)
2009/125/EG	Ecological design directive
2011/65/EU	Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS2)
1907/2006/EG	Regulation concerning the registration, evaluation, authorisation and restriction of chemicals (REACH).
453/2010/EU	Regulation amending regulation 1907/2006/EC (REACH).

The ecological design directive is adhered to by following EU Implementation Regulations which regulate the requirement for special product groups (e.g. electric motors, pumps, fans, etc.). These implementation regulations became or will become valid at different times.

The implementation regulation that was valid at the time of production were adhered to for components built into units or systems.

As far as the electrical hazards are concerned, the protection requirements of the Low Voltage Directive 2014/35/EU were fulfilled in accordance with annex I, section 1.5.1 of the Machinery Directive 2006/42/EC.

Other directives, harmonising standards or technical specifications that are not listed here were applied as required.

All components related to the pressure equipment directive are described in the spare parts list. The components (if installed) comply with the conformity assessment procedures as stated in the table:

Component	Conformity assessment procedure
Compressors	Module D1
Refrigerant collectors < 8 l	Module A2
Refrigerant collectors > 8 l	Module D1
Pressure switches	Module B + D
Plate heat exchangers	Module B + D
Pressure tanks	Module B + C1
Filter housings	Module G
Diaphragm expansion vessel	Module B + D
Safety valve	Module B + D

Assemblies containing components of category 1 (in accordance with the pressure equipment directive) are assessed on the basis of module A.

Assemblies containing components of category 2 (in accordance with the pressure equipment directive) are assessed on the basis of module A2.

The distinction is based on the fact that assemblies corresponding to module A are marked with the CE mark whereas assemblies corresponding to module A2 are marked with the CE mark and the mark of the notified body.

Notified body: TÜV Nord, ID no. CE 0045

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The undersigned person is authorised to compile the technical documentation and commits himself/herself to present the technical documentation in a suitable form at the request of the authorities in charge of this matter.

Sassenberg, 2016-09-22

14 Index