Original version of operating instructions

Transportation | Assembly | Operation | Maintenance

Product line:	Evaporators R134a, R404A, ...
Series variant description:	Fruit and vegetable evaporators
Series:	GHFB

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Contents

1 Important basic information

1.1 Safety instructions

1.1.1 Observing operating instructions

⚠ CAUTION

- **Always keep the operating instructions in the unit's immediate vicinity at all times.**
- **Ensure that the operating instructions are accessible to all people that have anything at all to do with the unit at all times.**
- **Ensure that the operating instructions are read and understood by all people that have anything at all to do with the unit.**

1.2 Importance of the EN 378 series of standards – refrigeration systems and heat pumps – safety-related and environmental requirements

EN 378 deals with safety-related and environmental requirements for designing, constructing, producing, installing, operating, maintaining and disposing of refrigeration systems and cooling equipment.

EN 378 is oriented towards manufacturers, installers and operators of refrigeration systems and cooling equipment (see section 1.2. Responsibilities).

The objective of EN 378 is to restrict the possible hazards of refrigeration systems, cooling equipment and their working fluids (refrigerants and coolants) for people, property and the environment to a minimum.

Insufficient safety measures or non-compliance with safety-relevant regulations can result in:

- Breaks or ruptures on components with the danger of escaping materials (hazards caused by the influence of low temperatures, excess pressure, direct influence of the fluid phase, moving machine parts).
- Escaping working fluid after a break or leak because of defective design, improper operation, insufficient maintenance, repairs, filling and disposal (hazards caused by oxygen deficiency, flammability, frostbite, suffocation, panic)
- Fire from escaping coolants and refrigerator oil with subsequent fire risk.

1.3 Responsibilities

1.3.1 Manufacturer's responsibilities

The notes provided in these operating instructions on maintaining the unit's functional safety, preventing possible hazards when transporting, setting up and installing, start-up and operation, and with maintenance activities (cleaning, servicing and repairing) refer exclusively to the unit.

The manufacturer's responsibilities are documented in the unit's version in acc. with EN 378-2 (design, manufacture and testing).

The construction, soldering and welding materials are configured so that they withstand the foreseeable mechanical, thermal and chemical stresses, and are resistant to the working fluid and the working fluid/refrigerator oil mixture used.

The working fluid-carrying parts of the unit (core tubes, distributor tube and header outlet) are configured so that they remain tight with the foreseeable mechanical, thermal and chemical stresses, and withstand the maximum permissible operating pressure.

Material, wall thickness, tensile strength, corrosive resistance, shaping process and testing are suitable for the working fluid used and withstand the possible pressures and stresses that might occur.

All responsibilities regarding the equipment,, into which the unit is integrated, are the exclusive responsibility of the people involved in the individual workflows.

1.3.2 Responsibilities of the system's installer

The responsibilities of the system installer are documented in the system's version (design, manufacture and testing – cooling equipment and refrigeration system) in acc. with EN 378-2.

Component supplier-system installer interfaces :

- Inform Güntner AG & Co. KG if faults occur:
  Inform Güntner AG & Co. KG immediately if faults occur during the set-up, installation, start-up and operation.

The responsibilities of the system installer in particular include:

- Planning and preparing emergency measures:
  To avoid consequential damage caused by operational disruptions, a warning system which immediately signals all faults must be provided on-site. Prepare emergency measures that prevent consequential damage for people and property should faults occur.
- Install emergency STOP switches that can be actuated without danger.
- Specify checking and maintenance intervals:
  The system (complete system:must be configured and equipped with all required equipment for maintenance and sufficient servicing and testing in acc. with EN 378-4.

With the integration of the unit into the refrigeration system/ the working fluid and version must not deviate from the order-related information specified in the order-related offer documents.

The installer of the system must refer to the requirement for sufficient instruction of the operating and supervision staff when operating and maintaining the equipment .

It is recommended that the future customer staff – if possible – be present with the set-up and installation, with the tightness test and cleaning, with the filling with working fluid and with the setting of the equipment .

1.3.3 Owner or operator responsibilities

The owner or operator responsibilities are documented in the operation, maintenance, servicing and recovery of the system in acc. with EN 378-4.

The owner or operator must ensure that the proper people are sufficiently trained and qualified for operating, monitoring and servicing the system .

The operating personnel for the system must have sufficient knowledge and experience with regard to the mode of operation, operation and daily monitoring of this system .

Before the system start-up the owner or operator must ensure that the operating personnel are sufficiently instructed with the system's documentation (which is part of the operating instructions) on the set-up, monitoring, mode of operation and servicing of the system and the safety measures to be observed, and with regard to the properties and handling of the working fluid to be used.

The owner or operator must ensure that when operating, monitoring and maintaining the system the working fluid and version must not deviate from the details specified in the order-related offer documents.

Planning and preparing emergency measures: To avoid consequential damage caused by operational disruptions, a warning system must be installed on the customer's premises. Prepare emergency measures that prevent consequential damage for people and property should faults occur.

Responsibility remains with the owner or operator of the system , if the system are used by somebody else, unless there is an agreement on sharing responsibility.

1.4 Legal notes

Warranty claim expires as follows:

- With faults and damages that can be attributed to non-compliance with the specifications of these operating instructions.
- With complaints that can be attributed to use of spare parts other than the original spare parts specified in the order-related offer documents.
- With changes to the unit (working fluid, version, function, operating parameters) vis-a-vis the order-related information specified in the order-related offer documents without the manufacturer's prior consent.

The operating instructions may not be reproduced electronically or mechanically, circulated, changed passed on to third parties, translated or used otherwise, in full or in part, without Güntner AG & Co. KG's prior explicit written approval.

1.5 Operating instructions

1.5.1 Scope

These operating instructions apply for all evaporators of the GHFB series.

NOTICE

You will find the precise type of your unit in the attached order-related offer documents.

1.5.2 Set-up and other applicable documents

The unit's operating instructions include the following parts:

- These instructions
- Order-related offer documents
  The order-related offer documents are attached to these instructions and include the following information:
  - The order-related proper use as specified
  - The order-related scope of delivery
  - The order-related technical data
  - The order-related drawings specifying customer, project number and order number
- Motor connection wiring diagram in terminal boxes

These operating instructions are part of the operating instructions manual of the system, provided by the system's installer .

1.6 Conventions

1.6.1 Typographical conventions

The following text markups are used in these operating instructions:

Bold	Requires special attention!
Grey triangle	Instructions

1.6.2 List of abbreviations

Abbreviations	Meaning
CFC / HFC	Alkane group refrigerant, e.g. R134a, R404A, R407C, R507, ...
EN 378	European Norm 378: Refrigeration systems and heat pumps; safety-related and environmental requirements
EN	European Norm
DIN	German industrial standard (specification of a standard)
ISO	International Standardization Organization
Emergency STOP	Switch for immediately switching off the refrigeration system
°C	Degrees Celsius (Celsius scale temperature)
bar	Unit of pressure
l	Litre (liquid volume)
Vol %	Volume percent (concentration level relative to a volume)
IP	Insulation protection
Q 6.3	Balancing quality
ppm	parts per million, concentration figure, stands for "millionth"
Hz	Hertz (frequency)
D	Delta connection (rotating current: high speed)
S	Star connection (rotating current: low speed)
3~	3-phase rotating current
1~	1-phase alternating current
VDE	"Verband der Elektrotechnik, Elektronik und Informationstechnik" (Association for Electrical, Electronic & Information Technologies)
TCC	Technical Connection Conditions
EPC	Electric Power Company
VDI	"Verein Deutscher Ingenieure" (German engineers' association)

1.7 Conventions for safety signs and notices

1.7.1 General safety signs and their meaning in these operating instructions

⚠ DANGER

Dangerous situation that will definitely cause serious injury or death if it is not avoided.

⚠ WARNING

Dangerous situation that could cause serious injury or death if it is not avoided.

⚠ CAUTION

Dangerous situation that could cause slight to moderate injury if it is not avoided.

NOTICE

Refers you to possible damage to property.

1.7.2 Warning signs and their meaning in these operating instructions

Warns against hand injuries!

Hands or fingers can be crushed, pulled in or otherwise injured with non-compliance.

Warns against hot surfaces!

The temperature is over +45 °C (protein clotting) and can cause burns.

Warns against cold!

The temperature is below 0 °C and can cause frostbite.

Warns against dangerous electrical voltage!

Danger of an electric shock if voltage-carrying parts are touched.

Warns against fire-risk substances at set-up point.

Use of ignition sources can cause fire at set-up point.

Warns against harmful to health or irritant substances at set-up point

Contact with or inhaling harmful to health or irritant substances can cause injuries or damage the health.

1.7.3 Prohibitory signs and their meaning in these operating instructions

Feuer, offenes Licht und Rauchen verboten!

Ignition sources must be kept away and ignition sources must not develop!

No smoking!

Smoking is forbidden.

1.7.4 Mandatory signs and their meaning in these operating instructions.

Use eye protection!

Eye protection: Use protective cover, protective glasses or face protection.

Use hand protection!

Protective gloves must protect against mechanical and chemical dangers (see imprinted pictograms).

Use respiratory protection!

Breathing apparatus must be suitable for the working fluid used. Breathing apparatus must consist of:

- At least two independent breathing devices (self-contained breathing apparatus)

Use protective clothing!

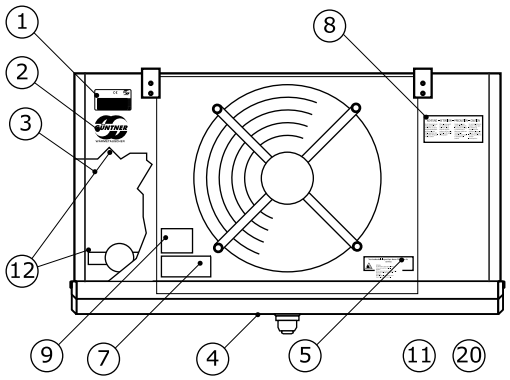
Personal protective clothing must be suitable for the working fluid used and for low temperatures, and must have good heat insulation properties.

Activate before work!

Activate the electrical system and secure against switching on again before starting installation, maintenance and repair work.

2 Safety

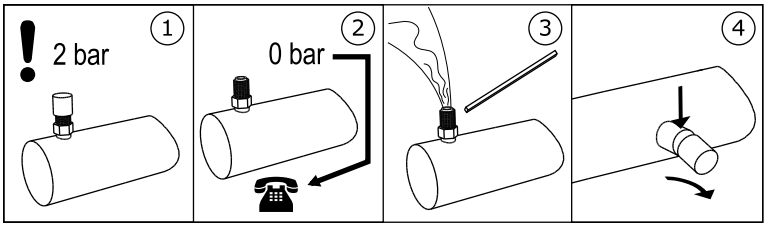
2.1 Labelling on the unit:



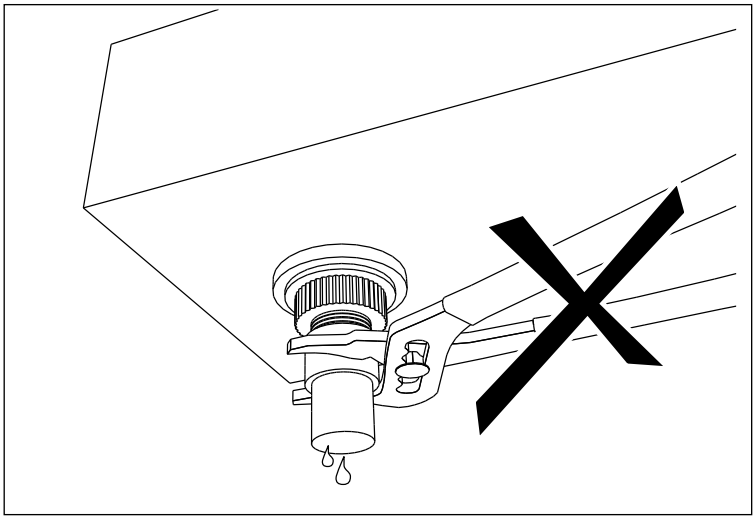
Placing labels on the unit

2.1.1 Safety signs on the unit

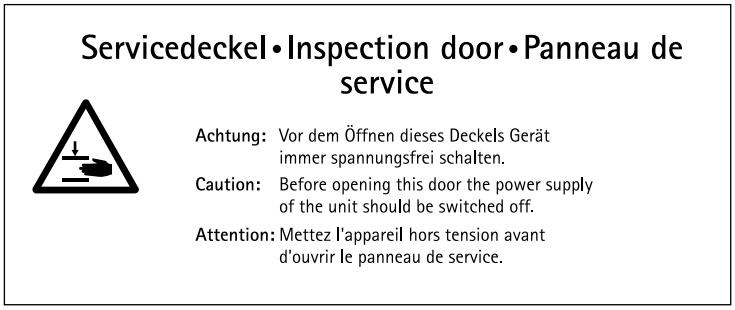
Safety signs on the unit individually:



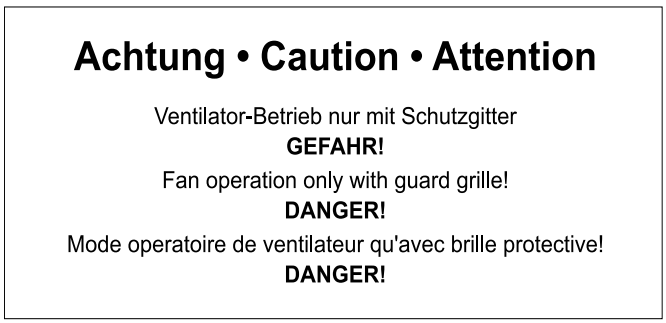
3 - "Transportation filling" warning sign next to Schrader valve



"Do not use wrench" warning sign beside tray drain

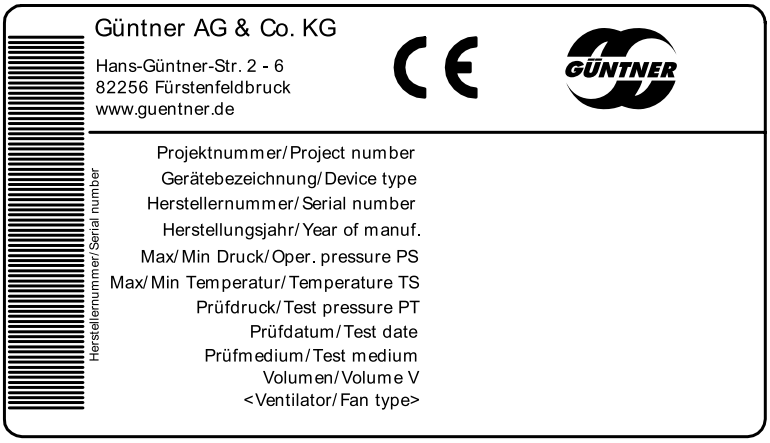


Note on inspection door (only with hinged fans)



7 - "Guard grille" warning sign (only used with separate removable guard grille)

2.1.2 Other signs and notes on the unit



1 - Unit type plate

2 – Güntner logo

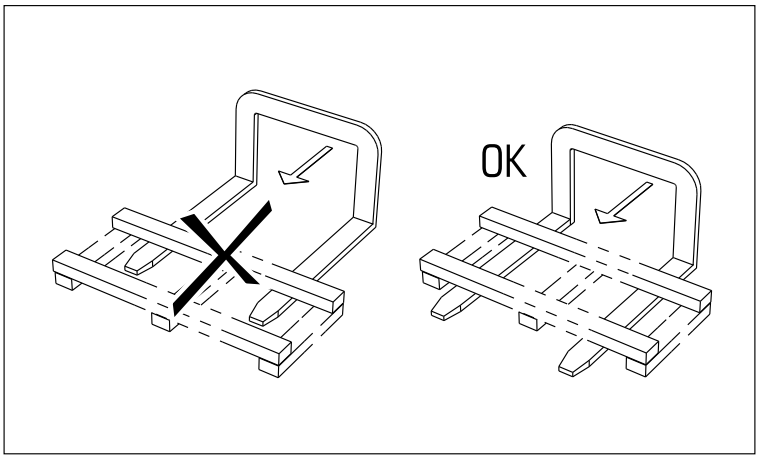
Hinweis: Güntner streamer haben Gleichrichter-funktion. Kein zusätzlicher Gleichrichter erforderlich.

Note: The Güntner streamer has an air rectifying function. No additional air rectifyer needed.

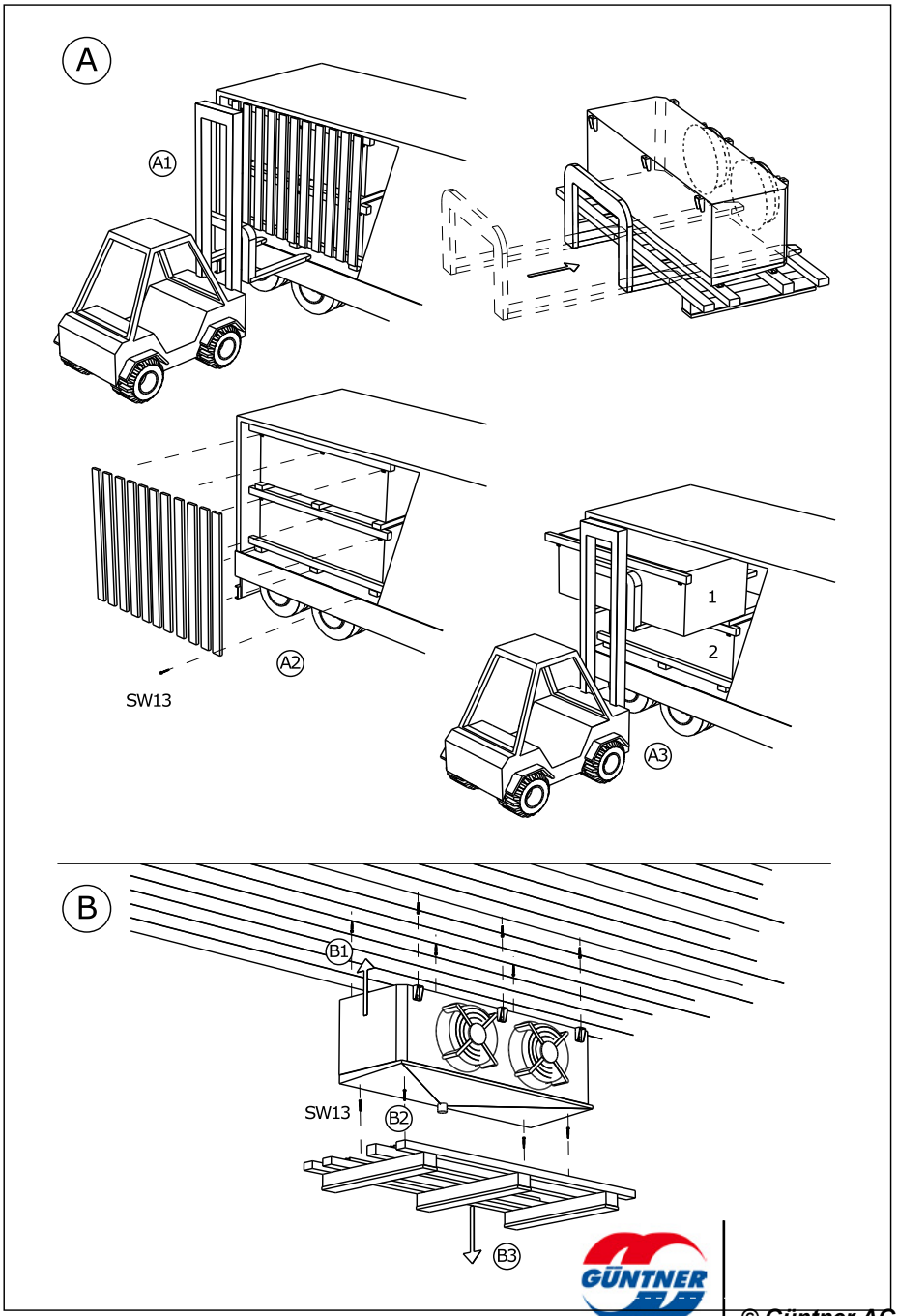
Remarque: La fonction du Güntner-streamer est le redressement du jet de l'air. Une grille supplémentaire n'est pas nécessaire.

Nota: Güntner-streamer tienen función de direccionar el aire, or lo tanto no se requiere rejilla adicional.

12 - Connections ON and OFF



15 - Forklift use (visible on packaging)



17 - Trailer loading – Ceiling-mounted air cooler

2.2 Basic safety notices

2.2.1 How to act in an emergency

⚠ WARNING

Danger of injuries!

The CFC/HFC refrigerants that are used (R134a, R404A, R407C, R507, R22 ...) are Group L1/A1 refrigerants in compliance with classification according to flammability (L) and toxicity (A) in compliance with EU Directive 97/23/EG for pressure equipment (Pressure Equipment Directive):

- **Refrigerants that, when gaseous, are non-flammable irrelevant of their concentration in air.**
- **Refrigerants with a time-weighted, averaged concentration that have no adverse effects on the majority of staff that are exposed every day during a normal 8 hour working day and a 40 hour working week to this concentration, which is greater than or equal to 400 ml/m^3 (400 ppm (V/V)).**

There is no imminent danger for the staff. However, refrigerants of the Group L1/A1 are generally heavier than air and may flow off to rooms on a lower level. In still air there may be an increase of the ground level concentration. With high concentrations there is a danger of suffering from disordered cardiac rhythm and suffocation due to a reduced oxygen concentration, especially at ground level.

Unauthorised people must not have access to the unit. Please ensure that the CFC/HFC refrigerant escaping from the unit cannot penetrate the interior of the building or put people at risk in any other way.

Safety measures and procedure:

- **With unexpected serious refrigerant escapes, leave the set-up room immediately and activate the emergency STOP switch set up in a safe place, e.g. with:**
  - **Visibly escaping refrigerant liquid or vapour from the heat exchanger or pipe components.**
  - **Sudden large release (release and evaporation of the greater part of the entire refrigerant filling in a short time, e.g. in less than 5 minutes).**
  - **Activation of the refrigerant detector (limit value in acc. with EN 378-1; Annex E):**
- **Have experienced, trained personnel with prescribed protective clothing perform all necessary protective and other measures:**
  - **Use respiratory protection.**
  - **Use a room air-independent breathing apparatus with maintenance work in high refrigerant concentrations in the room air.**
  - **Ensure the set-up room is well ventilated in acc. with EN378-3.**
  - **Divert escaped refrigerant vapour and escaped refrigerant liquid safely.**
  - **Ensure that no refrigerant enters water systems or sewage.**

2.2.2 Personnel, care requirements

⚠ CAUTION

The unit must only be put into operation, operated, maintained and repaired by trained, experienced and qualified personnel. People that are responsible for the operation, maintenance, repair and evaluation of systems and their components must have the required training and specialist knowledge for their work in acc. with EN 378-1 to be qualified. Qualified or expert means the ability to satisfactorily perform the activities required for the operation, maintenance, repair and evaluation of refrigeration systems and their components.

The unit may be operated by operating personnel that have no specific knowledge of refrigeration engineering, but have sufficient knowledge and experience with regard to the mode of operation, operation and daily monitoring of this system, . This operating personnel may not make any interventions or settings on the system .

Changes to the unit, which the manufacturer has first agreed to in writing, may only be made by the instructed and qualified personnel.

Electrical installation:
Work on the electrical equipment may only be performed by personnel that have the required expertise (e.g. an electrician or an electro-technically instructed person), and who are authorised by the operator, in compliance with the respective VDE regulations (and national and international provisions) and the TCCs of the EPCs.

2.3 Proper intended use

2.3.1 Proper intended use

CFC/HFC evaporators of the GHFB series are intended for installation in a refrigeration system and are used for cooling and circulating the room air in e.g. cold storage rooms up to medium construction size, cooling and cool storage of biological goods with low moisture loss.

The unit is delivered for operation with a specific operating point:

- Evaporation temperature
- Airflow volume
- Air inlet temperature
- Relative air humidity.

The specified operating point is provided in the order-related offer documents.

2.3.2 Operating conditions

The unit is a component a cooling system including its working fluid circuit. The purpose of these operating instructions, as part of the operating instructions manual (of which these operating instructions are a part), is to restrict the dangers to people and property and the environment from the unit and the working fluid used in it to a minimum. These dangers are essentially connected with the physical and chemical properties of the working fluid and with the pressures and temperatures that occur in the working fluid-carrying components of the unit see Residual hazards with CFC/HFC refrigerant/, page 21.

⚠ WARNING

Danger of injuries and damage to property!

The unit must only be used in acc. with the proper intended use. The operator must ensure that when operating, monitoring and maintaining the unit, the fluid and version do not deviate from the order-related information specified in the order-specific offer documents.

The operator must ensure that maintenance measures are performed in compliance with the system's operating instructions manual.

Filling the unit is only permitted following written approval by the manufacturer. You will find the order-related proper use as intended in the order-specific offer documents.

Do not exceed the max. operating pressure given on the unit's type plate.

2.3.3 Improper use

⚠ WARNING

Danger of injuries and damage to property!

Working fluids and their combinations with water or other substances in the working fluid-carrying components have chemical and physical effects from the inside on the materials surrounding them. The unit must only pressurised with CFC/HFC refrigerant. Pressurising the unit with another working fluid results in,

- **the structural, soldering and welding materials used do not withstand the foreseeable mechanical, thermal and chemical stresses, and the pressure that can occur during operation and when shut down is not withstood.**
- **material, wall thickness, tensile strength, corrosive resistance, shaping process and testing are not suitable for the working fluid used and do not withstand the possible pressures and stresses that might occur.**
- **the unit not being resistant to the other working fluid and the other working fluid mixture.**
- **the unit not remaining tight during operation and when shut down.**
- **a possible sudden escaping of working fluids could directly endanger people and/or property and the environment.**

The maximum permissible operating pressure specified on the type plate must not be exceeded! If the operating pressure is exceeded,

- **the structural and welding materials will not withstand the foreseeable mechanical, thermal and chemical stresses and the pressure that can occur during operation and when shut down.**
- **the unit will not remain tight during operation and when shut down.**
- **there may be a possible sudden escaping of working fluids after a break or leakage on working fluid-carrying components, which would result in the following dangers:**
  - **Danger of escaping materials**
  - **Dangers caused by oxygen displacement**
  - **Fire hazard (caused by refrigerator oil parts)**
  - **Frostbite hazard (caused by liquid coolant squirting/splashing)**
  - **Suffocation hazard**
  - **Hazards caused by panic reactions,**
  - **Environmental pollution**

⚠ WARNING

CFC/HFC Evaporatorsmay not be used

- **where it is possible that short or prolonged effect caused by contact, inhalation or ingestion of the working fluid might result in harmful hazards.**
- **where the possibility exists of a sudden large release (release and evaporation) of the greater part of the entire working fluid filling in a short time (e.g. in less than 5 minutes).**

The unit must not be changed without prior written consent by Güntner AG & Co. KG. Changes to the unit are:

- **Changing the operating point (see chapter Unit) (Function and performance of the heat exchanger coil, the special TEV and the IHE)**
- **Changing the fan capacity (air volume)**
- **Changing the working fluid flow-through volume**
- **Changing over to another working fluid (suitability and capacity of the evaporator; suitability, function and capacity of the special TEV and the IHE)**

The unit must not be operated if safety devices recommended by the manufacturer are not available, not properly installed or not fully functional.

The unit must not be operated if it is damaged or demonstrates faults. All damages and faults must be reported to Güntner AG & Co. KG immediately and must be removed immediately.

Work on the unit must not be performed without the personal protective equipment specified in these operating instructions.

2.4 Mechanical residual hazards

2.4.1 Fins, sharp unit corners and edges

⚠ WARNING

Warns against hand injuries!

Danger of cuts on hands and fingers on the fins and on sharp corners and edges of the unit.

Use reliable hand protection!

2.4.2 Fans

⚠ WARNING

Danger of cutting off, pulling in!

There is a danger of cutting off fingers on the rotating fan blades, injury hazard for the hands and pulling in danger for loose elements such as hair, necklaces or clothing parts.

Do not operate fans without guard grille. Pinch/trap point hazard!

With automatic fan start during maintenance work there is a danger of pinching/trapping for the hands and fingers.

Power off the unit before you begin maintenance work with which you must remove the guard grille. Secure the unit against unintentional switching on again by removing the electric fuses for the unit. Secure the unit with a suitable warning sign referring to unintentional switching on.

2.5 Electrical residual hazards

⚠ WARNING

Warns against dangerous electrical voltage!

Direct and indirect contact with voltage-carrying parts of motors and electrical lines can cause serious injuries or death.

Power off the unit before you begin maintenance work. See the refrigeration system's system documentation for this. Secure the unit against unintentional switching on again by removing the electric fuses for the unit. Secure the unit with a suitable warning sign referring to unintentional switching on.

Please note that the mains cables may also be carrying voltage, even if the unit is powered off.

Work on electrical equipment must only be performed by people that have the required expertise (e.g. an electrician or an electro-technically instructed person) and who are authorised to do so by the operator.

2.6 Thermal residual hazards

2.6.1 Danger of burns

⚠ WARNING

Warns against hot surfaces!

During electrical componentsthe heat exchanger coil (heat exchanger) of the unit, the tubes (hot gas defrosting) and heater rods have temperatures of over +45 °C. Contact can cause burns.

In electric defrosting operation the unit's heat exchanger and the electric heater rods have temperatures of over +45 °C. Contact can cause burns.

Use hand protection!

2.6.2 Frostbite hazard

⚠ WARNING

Warns against cold!

In refrigerationoperation the heat exchanger and pipes have a temperature below ±0 °C. Contact can cause frostbite.

Use hand protection!

2.7 Residual hazards with CFC/HFC refrigerant/

The CFC/HFC refrigerants that are used (R134a, R404A, R407C, R507, R22 ...) are Group L1/A1 refrigerants in compliance with classification according to flammability (L) and toxicity (A) in compliance with EU Directive 97/23/EG for pressure equipment (Pressure Equipment Directive):

– Refrigerants that, when gaseous, are non-flammable irrelevant of their concentration in air.
– Refrigerants with a time-weighted, averaged concentration that have no adverse effects on the majority of staff that are exposed every day during a normal 8 hour working day and a 40 hour working week to this concentration, which is greater than or equal to 400 ml/m3 (400 ppm (V/V)).

There is no imminent danger for the staff. With good air ventilation and removal by suction, it will fall easily and clearly below the allowed limit values.

⚠ WARNING

Danger of harm to health and environmental damage!

Refrigerants of the Group L1/A1 are generally heavier than air and may flow off to rooms on a lower level. In still air there may be an increase of the ground level concentration. With high concentrations there is a danger of suffering from disordered cardiac rhythm and suffocation due to a reduced oxygen concentration, especially at ground level.

- **Unauthorised people must not have access to the unit.**
- **Ensure working rooms are well-ventilated in order to prevent inhalation of high vapour concentrations.**
- **Please ensure that the CFC/HFC refrigerant escaping from the unit cannot penetrate the interior of the building or put people at risk in any other way. CFC/HFC refrigerant vapour or gas**

must be kept from penetrating neighbouring rooms, staircases, yards, passages or drainage systems and must be discharged without risk.

- Monitor the CFC/HFC refrigerant concentration in the ambient air to ensure constant compliance with limit values.
- Test the tightness of the unit regularly, as specified in these operating instructions (see Inspection and maintenance plan, page 63).

Ignition and fire hazard!

- With work involving fire or sparks, e.g. grinding, welding, etc., ensure suitable fire fighting equipment is on-site.
- In particular be aware of the danger of ignition of unintentionally carried in oil residues or CFC/HFC refrigerant.
- Ensure that the provided fire fighting equipment is provided in sufficient quantities, that it functions properly and that the extinguishing agent does not react with the CFC/HFC refrigerant.
- Smoke during work is forbidden!

Frostbite hazard

Splashing CFC/HFC refrigerant under defervescence can cause frostbite on the eyes and skin.

- When removing faults after CFC/HFC refrigerant spills, you must be vigilant for remaining CFC/HFC refrigerant still under defervescence.

Danger of poisoning!

CFC/HFC refrigerant contact with fire can form toxic combustion products.

- Prevent CFC/HFC refrigerant contact with open fire.
- Welding and soldering must therefore only take place after completely draining the relevant section of the system of the CFC/HFC refrigerant. Ensure good ventilation here!

- With emergency work in high refrigerant concentrations in the room air wear a room air-independent breathing apparatus.

2.8 Residual hazards caused by vibrations

⚠ WARNING

Danger of injuries and damage to property caused by escaping materials

If fans are damaged during fan operation, flying parts of the fan blades can injure people or cause damage to property close to the fan.

Fans, components and cables in the system, must be designed, constructed and integrated so that dangers caused by vibrations that it or other parts of the system generate are reduced to an absolute minimum, while incorporating all available means for reducing vibrations, preferably at the source.

NOTICE

Damage to property caused by vibrations

Vibrations that are increased by imbalances, as created by dirt, frosting, icing or fan blade damage, are regularly caused with fan operation. The vibrations are transferred to the unit, where they can cause damage and damage the unit mounting or components connected to the unit.

Check the fan blades and guard grille regularly for dirt and frosting and/or icing and the fans' smooth running (see Fans, page 63).

2.9 Residual hazards caused by pressurised parts

⚠ WARNING

Injury and damage to property caused by pressurised parts that contain CFC/HFC refrigerant!

Breaks in pressurised pipes or pressurised components of the unit can cause injuries or damage to property caused by escaping materials. A sudden large release of the working fluid with its hazardous properties after a break or leak on pressurised components of the unit can cause the following hazards:

- **Oxygen displacement**
- **Flammability caused by refrigerator oil % present**
- **Frostbite (caused by liquid refrigerant squirting/splashing)**
- **Suffocation**
- **Panic,**
- **Environmental pollution**

Ensure that the unit in question is pressure-free before maintenance work begins or remove the working fluid from the unit in question.

Only perform maintenance work – especially soldering and welding work – on the unit in question after completely removing the working fluid from the unit.

2.10 Residual hazards caused by defective installation

⚠ WARNING

Injuries and damage to property caused by defective installation!

Defective installation results in hazards caused by:

- **Break or leak on liquid-carrying unit components and pipes**
- **Absence of release devices to prevent liquid escape: Observe the magnet valve/check valve sequence combination in the fluid line: In the flow direction the magnet valve must be installed first and then the check valve. If the sequence is reversed, liquid will be locked in between the check valve and the magnet valve when the magnet valve is closed; this will heat up during shutdown state and can cause pipes or connection flanges to break when it expands. This applies in particular to lines carrying cold liquids.**
- **Under-cooled liquid in system sections: If system sections are opened with repairs and the pressure is balanced with the atmosphere, there is a danger that liquid, under-cooled ammonia will still be in the opened area. Carbon dioxide has a very high evaporation heat, so that the heat penetration in the pipes, for example, which are laid with a "fluid sack", is not sufficient to evaporate the liquid refrigerant quickly – especially if this is an insulated line. This hazard is therefore referred to explicitly in BGR 500.**

- **Uneven load distribution on the fixtures with the danger of stresses within the unit or unit displacement (breaks or leaks on fluid-carrying components of the unit and pipes; danger of breaking off).**
- **Insufficient securing of working fluid-carrying lines against mechanical damage! On-site connections: loaded installation; effect of forces on the distribution and header pipes with the danger of breaks or leaks on fluid-carrying components of the unit and pipes; danger of breaking off!**
- **Break-off and fall danger of the unit with hazard of escaping working fluid and exposed electrical cables.**
- **Danger of damage caused by environment-conditional hazard sources (production, transport and other processes at the set-up point).**
- **Unit functional faults caused by air inlet/outlet obstructions.**
- **Obstruction of all-side inspection, checks and maintenance, i.e. no unobstructed accessibility to the working fluid-carrying and electrical components, connections and cables, no recognisable identifiers on the pipes and insufficient space for tests.**

Ensure that:

- **The units are to be installed on the fixing points corresponding with their weights and tightened with fixing bolts. The operator or installer is responsible for ensuring that the bolted connections are of an adequate strength.**
- **The diameters of the mounting holes have been statically determined by the manufacturer and the fixing bolts are adapted accordingly.**
- **The fixing bolts are secured against loosening by means of an appropriate locking device.**
- **The fixing bolts are not overtightened or stripped.**
- **All fixing bolts are tightened equally to achieve a load distribution on the connections that is as balanced as possible.**
- **All fixing points maintain the same spacing to the fixing level permanently and under load, so that no mechanical stress occurs in the unit structure. The units are anchored in their fixing position in order to prevent the equipment from moving.**
- **The functional safety of the fixing bolts is tested as part of the maintenance periods.** **see Maintenance, page 61****.**
- **The unit is fixed and set up so that it is not damaged by environment-conditional hazard sources (production, transport and other processes at the set-up point) or its functioning is not disturbed by the interventions of unauthorised persons.**
- **The units are fixed and set up with sufficient slopes for drip water flow.**
- **The units are fixed and set up so that unobstructed air inlet/outlet is constantly available without any air short circuiting.**
- **The units are fixed and set up so that unobstructed heater rod swap-out with electric defrosting is constantly available (option: accessory at customer's request).**
- **The units are fixed so that they can be inspected, checked and maintained from all sides at all times, i.e. there must be unobstructed access to the refrigerant-carrying and electrical components, connections and lines, the pipeline labelling must be identifiable and adequate space must be available for testing.**
- **The working fluid-carrying lines are protected against mechanical damage. On-site connections: when installing keep the unit free of load; force must not be exerted on the distribution and header pipes.**
- **The following must be observed without fail when installing the unit:**
  - **Imperative adherence to spacing from objects that could be endangered by an effect of the CFC/HFC refrigerant.**
  - **Provision of measures to safeguard protective objects from a CFC/HFC refrigerant concentration of more than that permissible in acc. with EN 378-3.**
  - **Easily flammable materials must not be placed below the unit.**

- Set up and fix units as follows: In areas that are used for inner-plant traffic, the pipelines to and from the unit must only be installed with connections and fittings that cannot be removed.
- Release devices to prevent liquid escapes must be provided and available.
- Under-cooled liquid must only be present in the lowest possible amount in system sections in shutdown state – minimized number of "fluid sacks".

2.11 Residual hazards with break during operation

⚠ WARNING

Injuries and damage to property caused by break during operation!

- **Residual hazards with break during operation (see Residual hazards caused by defective installation, page 23),**
- **Non-compliance with maximum permissible operating pressure (see Operating conditions, page 17),**
- **Disregarding pressurised line sections with maintenance (see Residual hazards caused by pressurised parts, page 23).**
- **Disregarding residual hazards caused by vibration (see Residual hazards caused by vibrations, page 22)**

result in ruptures during operation and maintenance. This results in dangers caused by

- **escaping materials (see Residual hazards caused by pressurised parts, page 23).**
- **released working fluid (see Residual hazards with CFC/HFC refrigerant/, page 21).**

Ensure that:

- **The installation is fault-free.**
- **The maximum permissible operating pressure is always adhered to.**
- **Pressurised line sections are de-pressurised before all maintenance and repair work.**
- **Vibrations from the refrigeration system (vibrations caused by refrigeration system compressors, components and lines) and from the fan (imbalances caused by frosting, icing or dirt build-up or damages) are reduced with all available means and brought down to an absolute minimum.**
- **Release devices to prevent liquid escapes are provided and available.**
- **Under-cooled liquid is only present in the lowest possible amount in system sections in shutdown state – minimized number of "fluid sacks".**
- **When switching over a duty pump to a reserve pump no liquid, cold refrigerant remains in the pump.**

2.12 Residual hazards caused by escaping objects or liquids

⚠ WARNING

Injuries and damage to property caused by escaping objects or liquids!

Residual hazards caused by escaping objects and liquids (see Residual hazards with break during operation, page 25).

2.13 Combined residual hazards

2.13.1 Removable drip plates/

⚠ WARNING

Danger of frostbite!
Danger of hand injuries!

With unauthorized access into the opened unit there is the danger of frostbite if heat exchangers or pipes are touched, and the danger of cuts on sharp edges.

The hinged drip plates, must only be opened by trained specialist staff with suitable tools and only for maintenance and repair purposes. Close the hinged drip plates, after the work is completed and secure them against unintentional or unauthorised opening!

The snap lock must not be secured at the manufacturer side. The operator must ensure the securing.

2.14 Residual hazards with disposal

⚠ WARNING

Danger of injuries and damage to property caused by CFC/HFC working fluid, , !

The following notes are recommendations for the proper professional disposal of the unit. Applicable waste disposal laws are binding for the country of operation:

- **Disposal must only be carried out by experts.**
- **All unit components, e.g. working fluids, refrigerator oil, heat exchangers, fans must be disposed of properly as specified.**
- **Used working fluid that is not determined for reuse, must be treated as waste and safely disposed of. There must be no emissions into the environment.**
- **The CFC/HFC refrigerant must be filled into a special refrigerant container in compliance with the respective safety measures. This special refrigerant container must be suitable for the refrigerant. It must be easy to identify and labelled for the refrigerant, e.g. "HFC R-4304A recovered".**
- **A disposable single-use container must not be used, as refrigerant vapour residues in the container escape during disposal.**
- **The working fluid container must not be overfilled. The maximum permissible pressure of the working fluid container must not be exceeded during the work process.**
- **The working fluid must not be filled in a liquid container that contains another or an unknown working fluid. This other or unknown working fluid must not be released into the atmosphere, but rather identified, treated again, or properly disposed of as specified.**
- **An officially authorised facility can be used for destroying the working fluid.**
- **Used refrigerator oil that has been recovered from the unit and cannot be treated again, must be kept in a separate, suitable container, treated as waste and safely disposed of.**
- **It must be ensured that all unit components containing working fluids and refrigerator oil, are disposed of properly as specified.**
- **The unit consists predominantly of the basic materials aluminium, coated steel (tube and tube coil (heat exchanger) and casing), steel, aluminium, copper, polyamide (motors), stainless steel, copper, insulating material, (heater rods for electrical defrost; option; accessory avail-**

able on request). These materials can be handled by the waste industry, including in paint-treated state, to recycling via mechanical and thermal separation.

- Before scrapping the working fluid-carrying unit components must be drained, whereby the pressure must be reduced to at least 0.6 bar absolute for a unit pipe volume up to and including 200 l, and to 0.3 bar absolute for a unit pipe volume over 200 l. The pressure reduction process is then ended when the pressure no longer increases and remains constant, and the unit is at ambient temperature.

⚠ WARNING

Danger of environmental pollution!

The facility for recovering or disposing of the refrigerant must be operated so that the danger of a refrigerant or refrigerator oil emission into the environment is kept as low as possible.

- **Ensure that no working fluid enters water systems or sewage.**
- **Operate the facility for recovering or disposing of working fluids so that the danger of a working fluid or refrigerator oil emission into the environment is kept as low as possible.**

Güntner AG & Co. KG's transportation packaging is made from environmentally compatible material and is suitable for recycling.

2.15 Residual hazard with special thermostatic expansion valve (special TEV) and internal heat exchanger (IHE)

⚠ WARNING

Residual hazard with special thermostatic expansion valve (special TEV) and internal heat exchanger (IHE)

All work on special TEVs (e.g. changing of superheating, changing of insert for injection nozzle used) may only be executed by trained and instructed specialised personnel! All work has to be documents!

A change of the nozzle insert may only by effected on unpressurised pipe sections!

After each change of nozzle insert, the sealing must be replaced!

If a special TEV is used, after each changing of the degree of superheating, the screw for changing the degree of superheating has to be secured against unauthorised manipulation!

The special TEV may only be replaced by the identical type of special TEV!

If the seal on the superheating position of the special TEV ist broken, there is no warranty for capacity and function of the special TEV!

The max. admissible operating pressure for the IHE type HE 0.5 bis HE 4.0 is 28 bar and for type HE 8.0 it is 21.5 bar!

The max. admissible operating temperature for the IHE ist -60/+120 °C!

3 Technical data

3.1 Unit

NOTICE

The fans' capacity values depend on the ambient temperature and on the air resistance at the set-up point.

Güntner AG & Co. KG recommends electric fan ring heating with use in the temperature range.

Please consult the manufacturer when operating the unit below -40°C because of the special material requirements and selection.

All electrical parts must be installed in acc. with EN standards.

Project number	See order-related offer documents
Unit name	See order-related offer documents
Manufacturer number	See order-related offer documents
Production year	See order-related offer documents
Working fluid	See order-related offer documents
Volume	See order-related offer documents
Permissible operating pressure	32 bar *)
Test pressure	35.2 bar *)
Permissible operating temperature	-50 ... +100 °C
Permissible ambient temperature	-30 ... +40 °C
Permissible air humidity	100 %
Test date	See order-related offer documents
Test medium	Dry air
Airborne noise emitted	See order-related offer documents In acc. with standard procedure for calculating sound level in acc. with EN 13487; Annex C (normative). As cold storage rooms only have a very low absorption behaviour, we recommend calculation with only very low absorption of the sound level at big distances.
Weight	See order-related offer documents

*) When using an IHE (internal heat exchanger) or the following TEVs (thermostatic expansion valves), the max. permissible pressure and the applied test pressure change in acc. with the following tables. See order-related offer documents or manufacturer number on the TEV or IHE.

Internal heat exchanger	Danfoss manufacturer number	Max. permissible operating pressure [bar]	Max. test pressure [bar]
HE 0.5	015D0001	28	35.2
HE 1.0	015D0003	28	35.2
HE 1.5	015D0005	28	35.2
HE 4.0	015D0007	28	35.2
HE 8.0	015D0009	21.5	28

Expansion valve	Danfoss manufacturer number	Max. permissible operating pressure [bar]	Max. test pressure [bar]
TE12 therm. element (R134a)	067B3232	22	28
TE20 therm. element (R134a)	067B3292	22	28
TE5 therm. element (R134a)	067B3297	22	28
TE5 therm. element (R404a)	067B3342	22	28

Expansion valve	Danfoss manufacturer number	Max. permissible operating pressure [bar]	Max. test pressure [bar]
TE12 therm. element (R404a)	067B3347	22	28
TE20 therm. element (R404a)	067B3352	22	28
TE55 therm. element (R134a)	067G3222	22	28
TE55 therm. element (R404a)	067G3302	22	28

3.2 Fans

Fan type	See order-related offer documents
Protection rating	IP 44 acc. to DIN 40050
Current type	alternating current
Voltage	230 V 1~ 50 Hz
Balancing quality	Q 6.3 in acc. with VDI 2060
Permissible air temperature	Usage range: -30 C to +40 °C
Protective devices	• Thermal: Thermo contacts (break contact) • Mechanical: Protective contact grille in acc. with EN 294

Fan type	See order-related offer documents
Protective devices	• Thermal: Thermo contacts (break contact - protective device for preventing thermal overload). • Mechanical: Protective contact grille in acc. with EN 294

4 Set-up and function

The evaporator consists of,

- a heat exchanger arranged as consisting of pipe coils fitted with fins (copper pipe; aluminium fin) distribution and header pipes (copper)/ and pipe connections to the pipeline system,
- a casing with aluminium magnesium alloy, powder-coated;
- a thermally-decoupled and therefore condensation-free drip tray made of AlMg3, powder-coated. The drip tray is hinged and removable for easier cleaning. Fault-free condensation water drain with optimally arranged flow.Discharge nozzles mounted below 45° with G-thread flat sealing in acc. with DIN-ISO 228-1,
- a double drip plate (no condensation water formation). The drip tray has a drain slope for easier cleaning; dirt build-ups in the corners are prevented; removable from size 040. Big condensation water drain. Drain nozzles mounted below 45° from size 040.
- and – depending on the version – with one or more low noise axial fans with maintenance-free motors. Two fan versions are possible here: normal and reinforced (option). High throw distances can be achieved with Güntner streamers.
-
- and – depending on the version – with one or more low noise axial fans with external rotor motors wired on terminal socket.

The evaporator is a refrigeration system component. It provides a finned heat exchanger (straight and curved pipes – pipe coils – with fins, which are connected to form a heat exchanger), in which liquid refrigerant evaporates with heat absorption from the material to be cooled.

The refrigeration system is a combination of refrigerant-carrying components and fittings connected with one another, which form a closed circuit, in which the refrigerant circulates.

The refrigerant absorbs heat at a low temperature and low pressure and evaporates (evaporator-side), and at a higher temperature and higher pressure gives off the heat again and condenses itself (condenser-side).

The heat from the material to be cooled is dissipated with fans over the entire surface of the evaporator.

The GHFB series evaporators work as standard in acc. with the "dry evaporation" principle. The refrigerant liquid fed to the evaporator is completely evaporated in it, and overheated to protect the compressor from slugging.The CFC/HFC refrigerants used (R134a, R404A, R407C, R507, R22 ...) are Group L1/A1 refrigerants (see Residual hazards with CFC/HFC refrigerant/, page 21).

The GHFB type fruit and vegetable evaporators are equipped as standard with a factory-fitted, connection-ready complete system consisting of a factory-fitted special thermostatic expansion valve (special TEV, including completely mounted overheating sensor and pressure compensation line) and a factory-fitted internal heat exchanger (IHE). The corresponding notes on this are provided in these operating instructions/in the manufacturer's instructions and must be observed.

5 Fan motor

NOTICE

During longer storage or downtime periods, the fans must be operated for 2 to 4 hours each month.

NOTICE

In the case of fans with protection type IP55 or higher, any sealed condensate drain holes must be opened at least every six months.

AC technology

The AC motors are protected against overheating by a thermo-contact (or positor).

For motors with thermocontacts, the thermocontact has to be wired in the switch cabinet in such a way that turning on of the motor with triggered thermocontact is not possible. A locking device is recommended for preventing reactivation.

Motors with PTC resistors require an additional trigger device for the installed thermistors. Locking is recommended to prevent reactivation. Max. 2.5 V test voltage or current-limited meters may be used on thermistors.

When star-delta connection, corresponding time delays must be taken into consideration.

For motors with direct start and a connection value > 4.0 kW, a startup current limitation (softstart using thyristor) may be necessary.

If frequency converters for speed control are used, the following has to be observed for external rotor motors:

Between frequency converter and motor, an effective all-pole sine filter has to be installed (sinus-shaped output voltage! Filter effect between phase against phase, phase against earth).

Güntner frequency converters feature this function as standard. Güntner three-phase standard motors are suitable for direct operation on frequency converters.

The three-phase fan motors can be operated by means of star-delta connection with two speeds and/or with speed control. The direction of rotation must be checked. If the direction is wrong, it can be changed by interchanging two phases.

6 Transportation and storage

6.1 Safety

⚠ WARNING

Crushing danger with falling down!

The unit weighs between 20 kg and 235 kg. It can slip and fall off the means of transport, causing serious injuries or death. Heavy impacts or vibrations can damage the unit.

Observe the instructions on the transport labels on the packed units.

Ensure that the assigned staff is trained for proper unloading.

Use a transporting device appropriate for the unit's weight (see Transportation and storage, page 33). You will find the weight of the packed unit in the order-related offer documents.

Ensure that nobody is under the unit or near the loaded area during the transport.

Observe even distribution of unit weight for transport. Observe that the main unit weight is always on the fan side. Observe the instructions on the transport labels on the packed units (see Other signs and notes on the unit, page 13).

Secure the unit against slipping and mechanical damage.

When transporting by crane: The hooks and lifting gear of the load lifting equipment must be only attached at the points specified by the manufacturer. Ensure that the unit enclosure is not crushed by slings.

Use auxiliary transport equipment where required. Use a transporting device appropriate for the unit's weight . You will find the weight of the unit in the order-related offer documents (see Set-up and other applicable documents, page 7). Do not use connection pieces and header pipes as hooking points for lifting, pulling, fixing or mounting. This can cause leaks.

Transport the unit carefully. Avoid setting the unit down hard in particular.

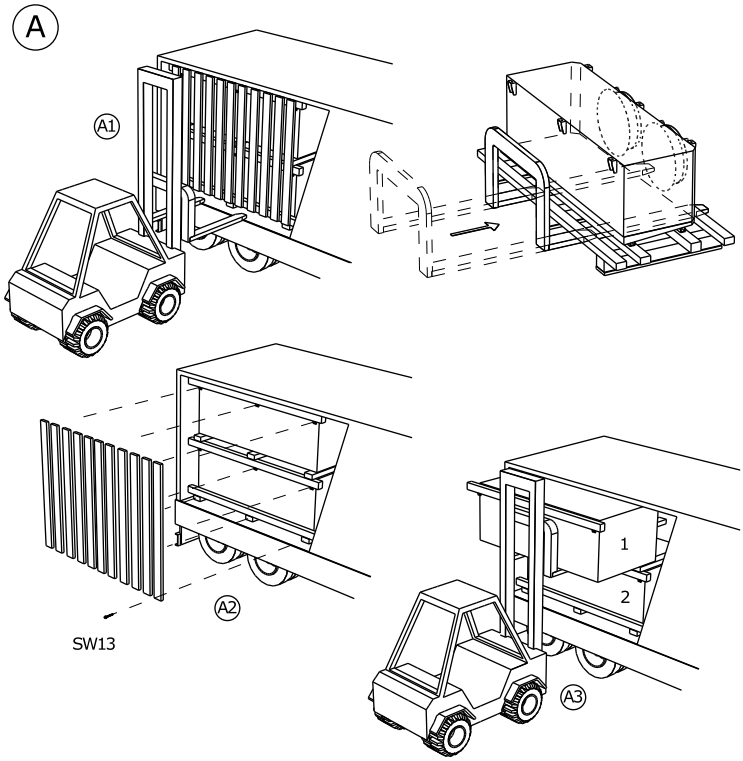
6.2 Transportation and storage

NOTICE

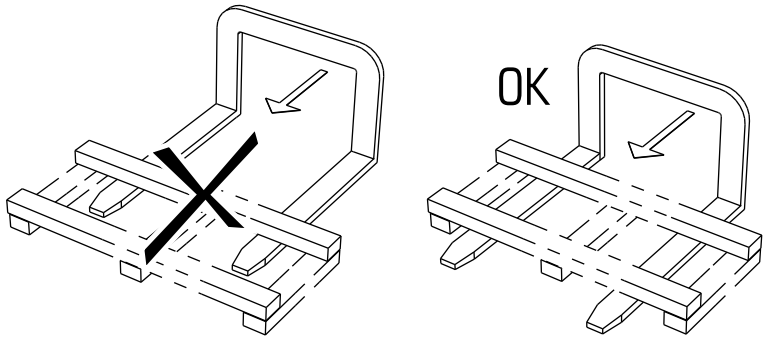
Read and observe all transport signs on the units' packaging!

Prolonged mechanical stresses caused by uneven road surfaces and potholes and vibrations during transport by ship can cause transportation damage. Before transportation by sea or in countries with difficult transport routes, attachment parts that are likely to vibrate – in particular fans and base stands – must be removed for transportation.

- Transporting the unit at the set-up point
- Unloading the unit



- Transport and unload the packed unit with suitable transport equipment (e.g. forklift, crane) at the set-up point.
  CAUTION: When transporting with a forklift: Only lift the packed unit with a forklift with full fork length.



6.3 Storage before installation

NOTICE

Danger of corrosion and dirt build-up!

Moisture and dirt must be prevented from entering the unit.

- **Protect the unit against dust, dirt, moisture and wetness, damage and other harmful effects. Harmful effects:** **see Safety instructions for set-up and start-up, page 36**
- **Do not store the unit for longer than necessary. Only store the units in their original packaging until installation. Always only place packaging units of the same size on top of one another.**

- Store the unit at a protected place free of dust, dirt, moisture and damage-free until its set-up (well-ventilated halls or roofed storage site).
- If the unit set-up is delayed with regard to the planned installation time: protect the unit against weather and other harmful effects and dirt and other contaminants with an appropriate cover. The unit must also be well-ventilated here.

7 Set-up and start-up

7.1 Safety

7.1.1 Safety instructions for set-up and start-up

⚠ WARNING

Danger of injuries and damage to property with escaping CFC/HFC refrigerant!

Incorrect installation causes the danger of working fluid escaping when the unit is operated and injuries or damage to property (see Residual hazards with CFC/HFC refrigerant/, page 21).

Follow the set-up instructions in this chapter precisely and apply extreme care!

NOTICE

Damage to the system's cooling equipment!

Foreign materials and contaminants in the working fluid circuit can impair the effectiveness or damage components. Particularly harmful contaminants are:

- **Moisture**
- **Atmospheric air**
- **Welding and soldering residues**
- **Rust**
- **Soot/ash/cinders**
- **Metal cuttings**
- **Unstable oils**
- **Dust and dirt of all kinds**

Moisture in the working fluid-carrying components of the unit can have the following consequences:

- **Water separation and ice formation cause faults in the switching and control fittings of the refrigeration system**
- **Acidification**
- **Ageing and refrigerator oil decay**
- **Corrosion**

Atmospheric air and other non-condensable gases can have the following consequences:

- **Refrigerator oil oxidation**
- **Chemical reactions between working fluid and refrigerator oil**
- **Increased condensing pressure in the system**

Chemical reactions between working fluid and refrigerator oil with the absence of moisture or atmospheric air with ageing and working fluid and refrigerator oil decay can have the following consequences:

- **Formation of organic and inorganic acids**
- **Increased compressed gas temperature in the system**
- **Corrosion**
- **Bad lubrication, increased wear and tear through to system or failure**

Other contaminants can cause:

- **Accelerated chemical processes (decomposition)**
- **Mechanical and electrical faults in the refrigeration system**

Ensure with installation (connecting the working fluid-carrying components of the unit to the working fluid-carrying system of the installation's that internal contamination is strictly avoided.

Perform the installation with extreme cleanliness.

Finish all on-site pipe installation work before releasing the transport pressure!

Only release the transport pressure on the Schrader valve immediately before installation.

Only remove the sealing caps on the distribution and header pipe immediately before installation.

NOTICE

Danger of corrosion and dirt build-up!

Humidity and dirt may not get into the unit's interior. If humidity or dirt get into the unit's interior, fittings and other components of the refrigeration installation can be damaged.

Protect the unit against dust, contamination, moisture and wetness, damage and other harmful influences. Harmful influences are, for example:

- **Mechanical: Damages caused by impacts, objects falling on or against, collisions with transport equipment, etc.**
- **Physical: Damages caused by close by concentrated flammable gases**
- **Chemical: Damages caused by contaminated atmospheres (salt, acid, chlorine, sulphur-containing, or similar)**
- **Thermal: Damages caused by close by heat sources**

Start as soon as possible with installation.

⚠ WARNING

The electrical installation must only be performed by electricians in compliance with the relevant VDE rules (or applicable national and international regulations) and the TCCs of the EPCs!

7.1.2 System-side safety requirements

The unit is a component of an installation and can only be operated in conjunction with the installation

- All equipment required for operating the unit must be integrated into the switching and activation equipment :
  - Electrics: Fans , heater rods with electric defrosting where app. (selection option),
  - Working fluids: valves and fittings
  - Drip water: drip water drain line
- An emergency STOP switch that can be actuated without danger must be installed.
- The working fluid-side and electrical connections must be available on the system. The connections must be specified in the order-related offer documents.
- The working fluid-side and electrical connections must be available for the unit on the cooling unit. The connections must be specified in the order-related offer documents.
- The power supply of the fans must be provided in acc. with the specifications on the type plate on the fan motors.
- A switch-off device for preventing unexpected start-up (repairs switch), which separates all active conductors from the power supply (all-pole switch-off), must be provided for the fans in acc. with EN 60204-1.
- The fans' switch-on/off device must be secured (e.g. with a padlock) to prevent uncontrolled fan start-up.
- The electrical motor, repairs switch, terminal box and switching cabinet connections must be provided in acc. with the respective connection diagrams.

- It must be possible to shut off the unit if a leak occurs.
- People wearing ambient air-independent breathing apparatus in full protective clothing must also be able to activate all safety-relevant shut-off fittings.
- It must be possible to activate all devices meant for diverting escaping working fluids from a safe position.

7.1.3 Customer-side safety precautions

⚠ WARNING

Danger of injuries!

The unit contains CFC/HFC refrigerant (see Residual hazards with CFC/HFC refrigerant/, page 21).

The CFC/HFC refrigerants that are used (R134a, R404A, R407C, R507, R22 ...) are Group L1/A1 refrigerants in compliance with classification according to flammability (L) and toxicity (A) in compliance with EU Directive 97/23/EG for pressure equipment (Pressure Equipment Directive):

- **Refrigerants that, when gaseous, are non-flammable irrelevant of their concentration in air.**
- **Refrigerants with a time-weighted, averaged concentration that have no adverse effects on the majority of staff that are exposed every day during a normal 8 hour working day and a 40 hour working week to this concentration, which is greater than or equal to 400 ml/m3 (400 ppm (V/V)).**

There is no imminent danger for the staff. However, refrigerants of the Group L1/A1 are generally heavier than air and may flow off to rooms on a lower level. In still air there may be an increase of the ground level concentration. With high concentrations there is a danger of suffering from disordered cardiac rhythm and suffocation due to a reduced oxygen concentration, especially at ground level.

Unauthorised people must not have access to the unit. Please ensure that the CFC/HFC refrigerant escaping from the unit cannot penetrate the interior of the building or put people at risk in any other way.

Comply with the requirements of EN 378-3 for refrigerants, filling weight and cold transfer systems.

Only install the unit in acc. with EN 378-1 in the commissioned configuration and only in a set-up room that the unit manufacturer has configured the unit for.

Install the unit in acc. with EN 378-3, section 5 in a special machine room if an explosion or a CFC/HFC refrigerant concentration of more than that permissible in acc. with EN 378-3 could endanger the work environment. Take effective protective precautions if such a spatial separation were to be required, but is not possible.

Install the electrical equipment (for fan operation, for ventilation, for lighting and for the alarm system) in the set-up room while observing the condensing-out of moisture and drip water formation, as well as the risk level of CFC/HFC refrigerant in acc. with EN 378-3; section 6.

Arrange CFC/HFC refrigerant detectors and alarm systems for warning about explosion or fire dangers, about health endangering CFC/HFC refrigerant concen-

trations and for control purposes in the unit set-up room in acc. with EN 378-3; section 7.

Ensure that the unit in the set-up room is not exposed to any inadmissible high temperature effects. Effectively protect the unit against heat sources or temporary high temperatures.

⚠ WARNING

Danger of environmental pollution!

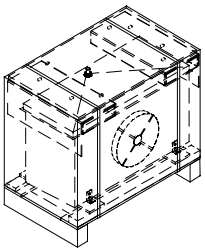
- **Ensure that no refrigerant enters water systems or sewage.**
- **Operate the facility for recovering or disposing of refrigerant so that the danger of a refrigerant or refrigerator oil emission into the environment is kept as low as possible.**

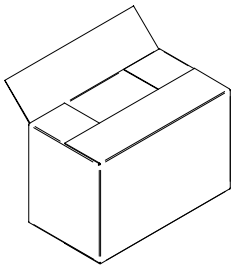
7.2 Requirements at the set-up point

You will find the dimensions and weights in the order-related offer documents.

- Position the unit so that it cannot be damaged by internal traffic or transport processes.
- Enable optimum unit control and accessibility:
  - Place the unit so that is can be monitored and controlled from all sides at all times.
  - Ensure that sufficient space is provided for maintenance.
  - Ensure that all liquid-carrying components, connections and lines and all electrical connections and lines are easy to access.
  - Ensure that there is free space for unobstructed swapping out heater rods with electric defrosting
  - Ensure that the pipes' identification is well visible.
  - Ensure that with units with electric block defrosting there is enough space for changing heater rods.

7.3 Unpacking the unit

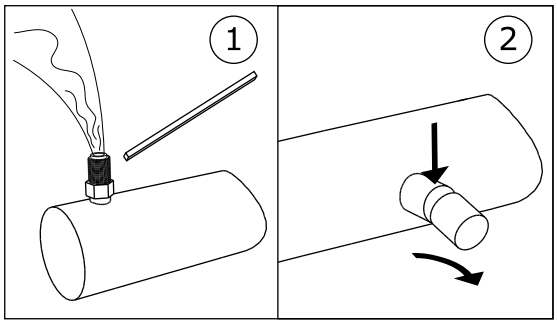




B Fasten streamer with cable tie

- Remove drip tray 3 .
- Remove frame for transport 2, 4.
- Frame for transport (4, 8, 10, 11) is intended for lifting the unit 5 (including drip tray heating (electrical or hotgas)) for mounting on building site see Mounting the unit, page 43.

- Check delivery scope on completeness. For complete delivery scope, refer to the order-specific offer documents.
- Any transport damage and/or missing parts must be recorded on the bill of delivery. The facts must be immediately reported to the manufacturer in writing. Damaged fins can be straightened on-site with a fin comb.
- The units are delivered packed in the installation position.
- Check transport excess pressure: The units are delivered by the manufacturer with approx. 1 bar transport excess pressure (cleaned and dried air). Check transport pressure at the Schrader valve (presure measurement). For pressure-less unit: Report immediately to manufacturer and note missing pressure on delivery note. A pressure-less unit indicates leaks on the unit.
  WARNING! Danger of injuries or damage to property caused by escaping working fluid!
  A pressure-less unit indicates leaks on the unit due to transport damage. Escaping working fluid due to leaks on the unit can lead to injuries (see Residual hazards with CFC/HFC refrigerant/, page 21**).Do not take the unit into operation!**
- Check transport excess pressure and discharge excess pressure (only immediately before installation).
- Remove sealing caps.



1: Check and discharge transport excess pressure 2: Remove sealing caps.

NOTICE

Danger of corrosion and dirt build-up!

Moisture and dirt must be prevented from entering the unit.

Protect the unit against dust, dirt, moisture, wet conditions, damaging and other detrimental influences. Detrimental influences:**see Safety instructions for set-up and start-up, page 36**

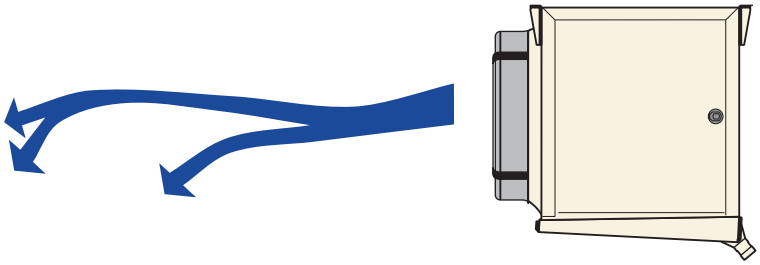
Begin with the installation as soon as possible.

7.4 Installation

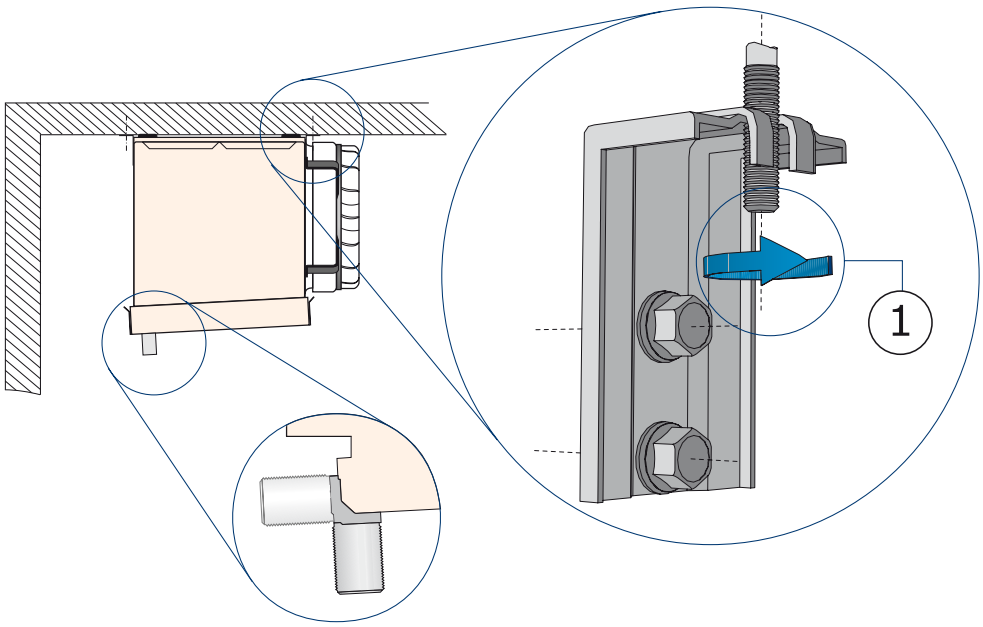
7.4.1 System-side requirements for stress-free installation

- Prevent stresses in the unit:
  - Ensure that all fixing points have the same spacing to the fixing level.
  - Ensure that all fixing points maintain the same spacing to the fixing level under load and permanently.

- Set up and fix units as follows: Airflow must not be impaired by obstructions.



- The units must be installed on fixing points that are appropriate for the unit's weight and then bolted with fixing bolts. The operator or installer of the equipment is responsible for ensuring that the bolted connections are of an adequate strength. The following instructions must be observed when fixing the units:
  - The diameter of the mounting holes have been statically determined by the manufacturer; the fixing bolts must be adapted accordingly. When calculating the transferring bearing strength it is imperative to take into account the total weight of the unit (= structural weight + weight of pipe content + additional weight, such as water, frost, ice, dirt or similar).
  - The fixing bolts must be secured against loosening with an appropriate locking device.
  - The fixing bolts must not be overtightened or stripped.
  - All fixing bolts must be tightened equally.
- Prevent the unit from shifting in its position. Fix the unit in its position. Tighten the fixing bolts and secure then against loosening.
- Ensure that the drip water drains correctly. Fix the unit horizontally with a sufficient slope for the drip water run-off.
- Only fix the unit to the intended fixing points.



Ceiling fixing (as standard on the brackets).

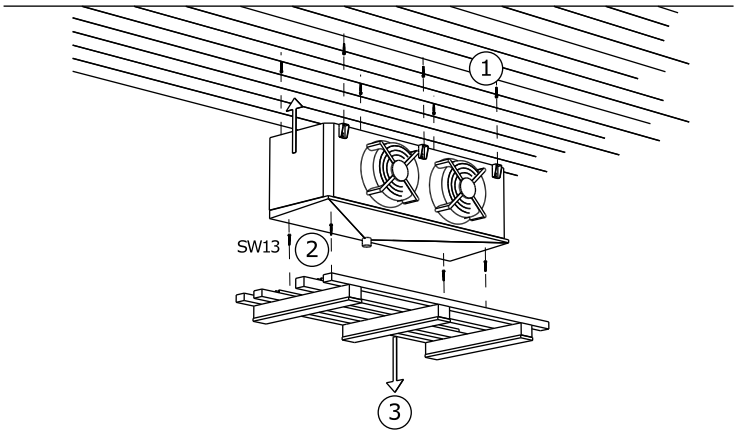
7.4.2 Mounting the unit

⚠ WARNING

Danger of injuries with escaping CFC/HFC refrigerant!

In case of improper installation, leak of working fluid can occur during operation of the installation, this can lead to injuries or damage to property (see Residual hazards with CFC/HFC refrigerant/, page 21)

- **Only fix the unit to the fixing points intended for this.**



The units are delivered in the installation position.

1 Fix the unit on the intended fixing points.
2 Remove bolts on transport frame.
3 Remove transport frame.

7.5 Notes on connecting the unit

⚠ WARNING

Danger of injuries and damage to property with escaping CFC/HFC refrigerant!

In case of improper installation, leak of working fluid can occur during operation of the installation, this can lead to injuries or damage to property (see Residual hazards with CFC/HFC refrigerant/, page 21).

Prevent working fluid from escaping from the unit into the environment.

- **Secure all working fluid-carrying lines against mechanical damage.**
- **In areas that are used for internal traffic, only lay the pipelines to and from the unit with connections and fittings that cannot be removed.**

Ensure that the on-site connections do not exercise any forces upon the distribution and header points. This can cause leaks on the working fluid connection points of the unit and on connection points of the on-site pipe-laying.

Ensure that:

- **Release devices to prevent liquid escapes are provided and available.**
- **With refrigeration system shutdown state, under-cooled liquid is only present in the lowest possible amount in system components – minimized number of "fluid sacks".**

7.5.1 Connecting the thermostatic expansion valve

The GHFB type fruit and vegetable evaporators are equipped as standard with a factory-fitted, connection-ready complete system consisting of a factory-fitted special thermostatic expansion valve (special TEV, including completely mounted overheating sensor and pressure compensation line) and a factory-fitted internal heat exchanger (IHE).

If type GFHB fruit and vegetable evaporators are delivered without factory-fitted connection-ready complete systems, the following shall apply:

The expansion valve and the heat carrier distributor are connected to the system as follows:

Connection

7.5.2 Connecting the drain line to the drip tray

NOTICE

Notes for mounting drain lines on the GHFB-V/H tray drains.

- **Drain vertical (V) as standard.**
- **From GHFB 040. ... (drain: G 1¼"); can also changed to horizontal (H).**

- **Connecting drain line seal with flat gasket pressed on pipe connectors.**
- **Cylindrical G-thread ¾" or 1 ¼" in acc. with DIN ISO 228-1:**

7.5.3 Connect the unit to the system

⚠ WARNING

Danger of injuries and damage to property!

Improper connection to the system causes hazards:

- **Leaks result in escaping CFC/HFC refrigerant (see Residual hazards with CFC/HFC refrigerant/, page 21).**
- **Soldering and welding work on pressurised parts can result in fires or explosions.**
- **Smoking or open light can cause .**
- **Smoking or open light can cause fires due to the presence of refrigerator oil.**
- **Ensure that stresses and vibrations from the system are not passed on to the unit.**
- **Only lay working fluid-side connections stress-free! The on-site pipeline system must be braced before connecting to the unit!**
- **Soldering and welding work is only permitted on unpressurised units!**
- **Evacuate the unit professionally in acc. with EN 378-2.**

- **The use of open fire at the installation site is forbidden. Fire extinguishers and extinguishing agents used to protect the equipment and the operating staff must comply with the requirements of EN 378-3.**
- **Ensure that refrigerant detectors and alarm systems for warning about fire dangers, about health-endangering concentrations and for control purposes at the unit set-up point are arranged in acc. with EN 378-3; section 7.**

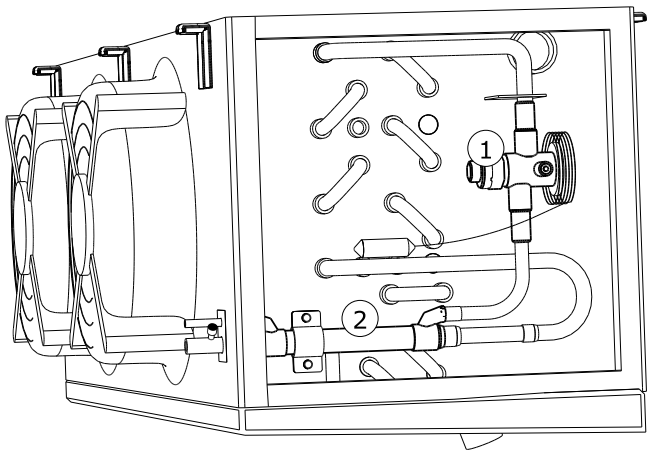
▶ Install the pipes in acc. with EN 378-1 and EN 378-3. Ensure here:

– Release devices to prevent liquid escapes must be provided and available.
– That in shutdown state under-cooled liquid is only present in the lowest possible amount in system sections – minimized number of "fluid sacks".
– That the pipeline installation is kept as short as possible. Use as few bends as possible, and if bends are necessary, use big radii!
– Pipes forliquid and suction lines must always run apart and must be insulated on both sides.
– The free space around the unit (e.g. the distance from the drip tray underside to any possibly existing pipe systems) must be big enough to ensure there is no danger to the unit; regular maintenance of the components must be possible, and it must also be possible to check and repair components, pipes and fittings.
– Observe the following when soldering:
  ° All connections must be hard-soldered!
  ° Caution! Use silver solder with TS < -40 °C! Ask manufacturer about solder specification if required!
  ° Avoid percussive soldering joints; use copper pipe ends that are widened on one side (capillary soldering)!
  ° Prevent leaks, solder precisely and carefully!
  ° Prevent overheating when soldering (danger of excessive scaling)!
  ° Use shielding gas when soldering (prevent excessive scaling)!

NOTICE

The GHFB type fruit and vegetable evaporators are equipped as standard with a factory-fitted connection-ready complete system consisting of a factory-fitted special thermostatic expansion valve (special TEV, including completely mounted overheating sensor and pressure compensation line) and a factory-fitted internal heat exchanger – IHE (see section 1.2 "Safety instructions – special TEV and IHE" and section 3.2. "Definitions".

All information necessary for the proper functioning of the special TEV and the IHE within the refrigeration system must be printed on the components of the special TEV and the IHE or the manufacturer's instructions and must be easy to read there.



1 Special TEV incl. pressure equalizing device and overheating sensor
2 IHE

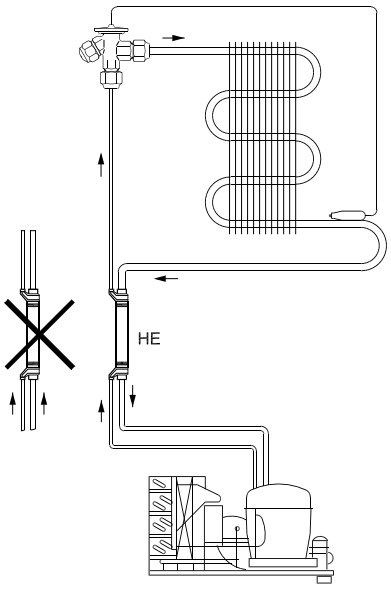
General notes on installing and operating an internal heat exchanger (IHE)

- **The max. permissible operating pressure for the IHE type HE 0.5 to HE 4.0 is 28 bar and for the type HE 8.0 it is 21.5 bar.**
- **The max. permissible operating temperature range for the IHE is -60/+120°C.**
- **The special TEV may only be replaced by a same type special TEV!**
- **If a seal is broken on the overheating setting of the special TEV the capacity and function warranty is invalid!**

Option: IHE enclosed, not fitted

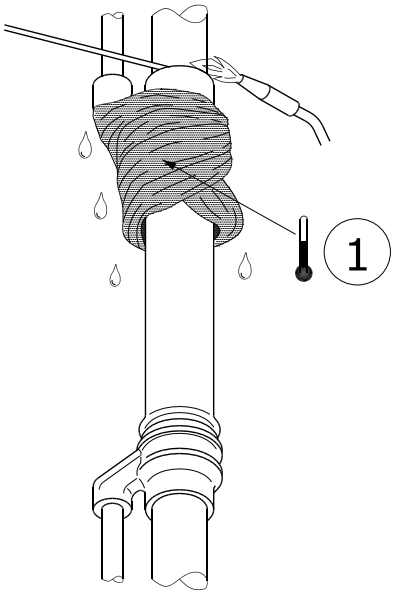
- **The IHE should be installed vertically in the refrigeration cycle. In special cases or if the IHE is installed in an evaporator casing, a horizontal or slightly downwards inclined installation is al-**

so admissible.

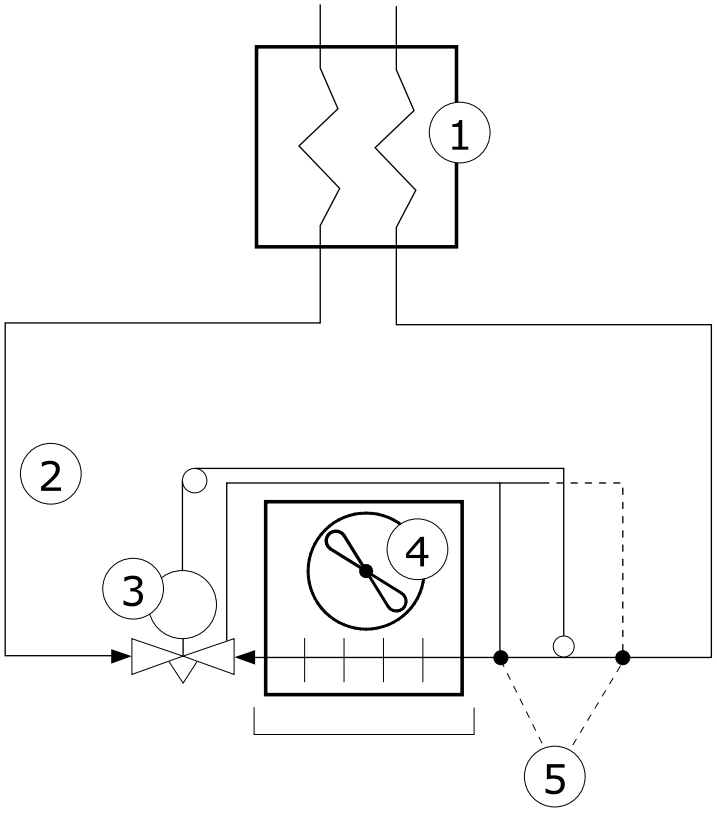


- **With external IHE installation a minimum distance of 1 m between the IHE and the evaporator must be observed.**
- **The liquid and suction line must be mounted in counterflow (see graphic above).**
- **Silver solder AG106 must be used.**

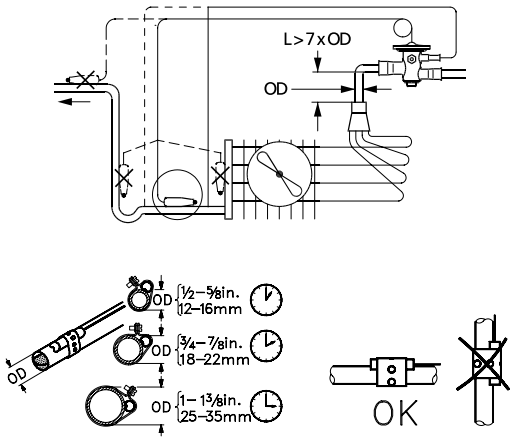
- **Before brazing the IHE has to wrapped in an moistened cloth, in order to avoid that the max. temperature of +660 °C defined by Danfoss is exceeded.**



- **The superhating sensor can be installation uostream or downstream of the pressure equalizing line.**



- **The installation of a overheating sensor has to be installed acc. to state of the art by specialised personnel.**



Mounting the overheating sensor

- **The overheating sensor must be suitably thermally insulated after mounting, e.g. Armaflex against ambient temperature.**

NOTICE

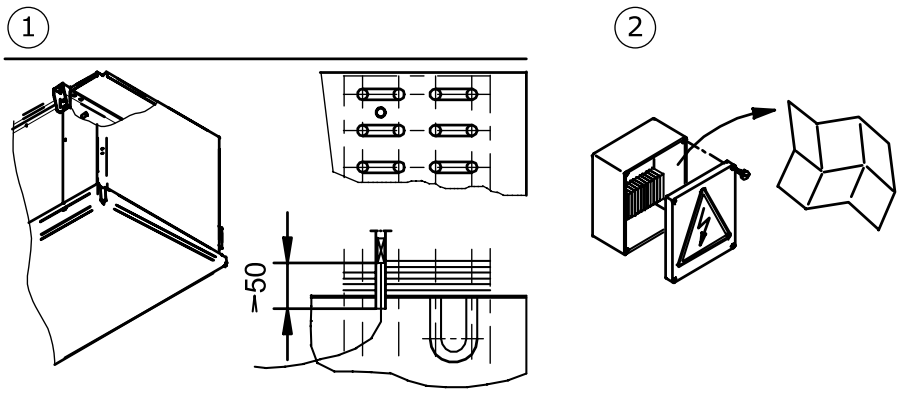
Changes to the factory-fitted ready-to-connect complete system are not permitted and must not be made (factory-side pre-set thermostatic special expansion valve, special TEV, including completely mounted overheating sensor and pressure compensation line and factory-fitted IHE)!

The correct thermal contact and sufficient insulation of the overheating sensor must be checked; with defects (e.g. possible transport damage) the manufacturer must be informed immediately! No self-authorised repair attempts!

With connection of the liquid and suction line the factory-fitted ready-to-connect complete system (special TEV, including completely mounted overheating sensor and pressure compensation line and IHE), must be protected against high heat stresses caused by the soldering process using suitable cooling measures!

7.5.4 Unit electrical connection and protection

- Connect fan motors in acc. with motor connection circuit and check connection.
- Provide power supply in acc. with the specifications on the fan motor's type plate:
  - The fan motors are operated in 1 ~ alternating current
- Connect thermo contacts for motor protection.
- Where required, connect electrical feeds for the heater rods with electric defrosting in acc. with electric connection diagram.



1 Defrost limit sensor position (if used)
2 Electrics (fan motor, stamp data, connection values)

- Seal all electrical lines to the connection boxes in acc. with their protection class. The connection class is specified in the order-related offer documents.
- **NOTE! Danger of damaging! If the fusing is too high there is the danger of injuries to people and damage to property. Max. fusing for the defrost heater rods feed: see order-related offer documents. The supply lines must always be fused in acc. with the smallest wire cross-section.**

7.6 Perform acceptance test

⚠ WARNING

Danger of injuries and damage to property!

Escaping CFC/HFC refrigerant can cause injuries or even death (see Residual hazards with CFC/HFC refrigerant/, page 21).

Perform the following acceptance test with an expert before starting up the unit after making important changes and after a unit swap-out.

- Ensure that the temperature and the air humidity at the set-up point correspond with the technical data (see Technical data, page 28).
- Ensure that sufficient air can be sucked in and released.
- Ensure that the supply feed is sufficient for the required energy. Compare the unit inside of the systemwith the plans of the systemand the electrical wiring diagrams.
- Test the unit for vibrations and movements that can be caused by the fans and operation of the system . Remove oscillations, vibrations and movements following consultation with the manufacturer or independently.
- Perform visual inspection of the structural design, the brackets and fixtures (materials, sequence, connections), the ability to operate and the arrangement of the fittings.
- Check and re-tighten all threaded connections, especially on the fans.
- Check installation of pipe connections.
- Check laying of working fluid-carrying connection pipes.
- Ensure that the unit is protected against mechanical damage.
- Ensure that the unit is protected against inadmissible heating up and cooling down.
- Check the fin blades protection.
- Ensure that optimum unit control and accessibility are guaranteed.
  - Is the unit placed so that it can be monitored and controlled from all sides at all times?
  - Is sufficient space provided for maintenance?
  - Are all liquid-carrying components, connections and lines and all electrical connections and lines easy to access?
  - Are the pipes easy to identify?
- Check heat exchanger surfaces for dirt and clean as required (see Clean unit, page 65).
- Perform function tests on the fans (rotation direction, power consumption, etc.).
- Check electrical connections of the fan motors and, where app., the heater rods with electric defrosting for damage.
- Check the soldering and welding connections, the electrical connections and the fixture connections.
- Perform pressure test with test gas and with a test pressure of 1.1-times the permissible operating pressure: check the connection seals and detect leaks, e.g. with foaming agent, or similar.
- Check corrosion protection: Perform a visual inspection on all bends, components and component holders that are not heat-insulated. Document and archive test results.
- Perform test run. Observe and check unit during test run, in particular for:
  - Fan smooth running (bearing noises, contact noises, imbalances, etc.).
  - Fan power consumption:

  - Leaks
- Report all defects to the manufacturer immediately. Remove defects following consultation with the manufacturer.
- Check the unit and the unit's interaction with of the system again after 48 operating hours, especially on the connections and on the fans, and document the test results.

7.7 Test readiness for operation

- Ensure that all electrical protective measures are ready to function.
- Ensure that all working fluid-carrying connections are securely in place.
- Ensure that all electrical connections (fans , if applicable heater rods for electrical defrost) are effected securely.
- The correct and proper installation of the factory-fitted ready-to-connect complete system (special TEV, including completely mounted overheating sensor and pressure compensation line and IHE) and the refrigerant distribution system (refrigerant distributor and distribution pipes) must be checked for correctness!
- Ensure the all connections of the unit to the condensation water drain pipe are correctly installed (see Connecting the drain line to the drip tray, page 44).

7.8 Putting the unit into operation for the first time

⚠ WARNING

Danger of injuries and damage to property!

Escaping CFC/HFC refrigerant can cause injuries or even death (see Residual hazards with CFC/HFC refrigerant/, page 21).

Only put the unit into operation, when:

- **the units has been properly mounted and connected (see Installation, page 41),**
- **You have performed a complete acceptance test (see Perform acceptance test, page 53).**
- **You have performed a test for ensuring the system's readiness for operation (see Test readiness for operation, page 54) and**
- **all safety precautions (see Safety, page 36) have been taken.**

Follow the operating instructions manual of the system!

Contact the manufacturer immediately if you want to operate the unit under different operating conditions as those defined in the order-related offer documents.

- Switch on the system including of the electrical system (see system).
- Activate the unit:
  - Open the valves on the inlet and outlet-side system.
  - Activate fans
  - Put drip water waste line into operation
- Wait until the operating point is reached. After the operating point is reach the unit is ready to operate (see system).

Parameters for setting the operating point, see order-related offer documents. Operating point:

- Evaporation temperature
- Airflow volume

- Air inlet temperature
- Relative air humidity

To ensure the specified operating point is complied with the actuators for the operating point setting must be secured against unauthorized access (e.g. by sealing, screwing on caps, removing hand wheels, etc.).

8 Operation

8.1 Safety

⚠ WARNING

Danger of cutting off, pulling in!

There is a danger of cutting off fingers on the rotating fan blades, injury hazard for the hands and pulling in danger with loose elements such as hair, necklaces or clothing parts.

Do not operate fans without guard grille!

⚠ WARNING

Danger of frostbite/burning!

Danger of frostbite or burns if the parts are touched (see Thermal residual hazards, page 21).

Do not touch any parts of the unit without protective gloves when the unit is in operation or if it has not yet warmed up or cooled down after operation.

8.2 Putting the unit into operation

To operate the unit the systemincluding the electrical system must be in operation. The unit must be started up by opening the respective valves on the inlet and outlet-side of the plantby connecting to the electrical system and the drip water waste line as follows (see system operating instructions manual):

- Switch on electrical system
- Open working fluid-carrying lines
- Switch on fans
- Put drip water waste line into operation

8.3 Taking the unit out of operation

The units are system component parts of an refrigerationg installation . The unit is taken out of operation by switching off the system in acc. with the refrigeration system operating instructions manual for the entire installation. To do this, the working fluid-carrying lines must be shut off from system and the fans, and, if applicable, the heater rods for electrical defrost, must be disconnected from the electrical system (see operating instructions manual):

- Switch fans off
- Switch electrical system off
- Close working fluid-carrying lines
- **NOTE! When shut down consider max. operating pressure! If necessary, take precautions so that it cannot be exceeded.**

NOTICE

With shutdown times of a month or longer put the fans into operation for approx. 2-4 hours a month to maintain their functionality.

8.4 Shutting the unit down

⚠ WARNING

Danger of injuries and damage to property!

Escaping CFC/HFC refrigerant can cause injuries (see Residual hazards with CFC/HFC refrigerant/, page 21, and see Residual hazards caused by pressurised parts, page 23).

Ensure that the maximum operating pressure is not exceeded after the shutdown either!

NOTICE

Danger of corrosion and dirt build-up!

Moisture and dirt must be prevented from entering the unit.

Protect the unit against dust, dirt, moisture, wet conditions, damaging and other detrimental influences (see Safety instructions for set-up and start-up, page 36).

With shutdown times of a month or longer put the fans into operation for approx. 2-4 hours a month to maintain their functionality.

- Take the unit out of operation (see Taking the unit out of operation, page 57).
- Secure the unit:
  - When shutdown consider max. operating pressure (see Technical data, page 28)! If necessary, take precautions so that it cannot be exceeded.
  - Secure the fan motor drives and, where applicable, the heater rods with electric defrosting against switching on again.
  - Secure working fluid-carrying lines against pressurizing with working fluid.
  - Secure unit against detrimental influences at the installation or storage location (see Safety instructions for set-up and start-up, page 36) in order to keep all unit components in good state for proper use and to conserve the usability of the unit. For this purpose, special storage conditions (see Storage before installation, page 35) and preventive measures for corro-

sion protection have to be provided, regular testing of the functionality of the fans and of the unit taken out of operation have to be effected.

- Evacuate the unit: Completely release working fluid and, if applicable, refrigerator oil (see Residual hazards with disposal, page 26).

8.5 Putting the unit into operation after a shutdown

The unit must be put back into operation after a shutdown in acc. with the system-specific set-up in acc. with the operating instructions manual as follows:

- Test the unit's readiness for operation (see Test readiness for operation, page 54). Perform pressure test and visual inspection for corrosion protection.
  NOTE! The pressure test with recommissioning must only be carried out with appropriate media at appropriate test pressure.
- Put the unit into operation (see Putting the unit into operation, page 56).

8.6 Changing the unit over to another working fluid

⚠ WARNING

Danger of injuries and damage to property!

Considerable dangers can be caused with operation with another working fluid without prior manufacturer approval (Improper use).

The unit must not be changed over to another working fluid without prior written consent by Güntner AG & Co. KG.

- Ensure that the unit manufacturer has agreed to the changeover.
- Ensure that the right working fluid is re-filled. Ensure that all materials used in the unit and the factory-fitted ready-to-connect complete system (special TEV, including completely mounted overheating sensor and pressure compensation line and IHE) and the refrigerant distribution system (refrigerant distributor and distribution pipes) are compatible with the new working fluid.
- Ensure that the permissible pressure is not exceeded.
- Check that the new working fluid can be used without requiring a new test certificate for the unit. Ensure that classification is complied with.
- The safety device for the unit must be swapped out or reset.
- Mixtures with residues of working fluid and oil, for example, must be prevented.
- All information concerning the new working fluid must be changed accordingly.
- The complete documentation, including these operating instructions and the system operating instructions manual must be changed accordingly.
- Perform acceptance test (see Perform acceptance test, page 53).

9 Troubleshooting

9.1 Safety

⚠ WARNING

Danger of injuries and damage to property!

Faults that are not described in these operating instructions must only be removed by Güntner. Contact the Güntner hotline.

Faults that are described in these operating instructions must only be removed by appropriately trained personnel (see Personnel, care requirements, page 17).

With faults that occur during the operation, monitoring and maintenance of the complete system, inform Güntner AG & Co. KG immediately.

9.2 Service

Office hours

Tel. +49 8141 242-473
Fax. +49 8141 242-422

Email: service@guentner.de

Mon-Thurs: 7.30 am - 5 pm
Fri: 7.30 am - 1.30 pm

9.3 Troubleshooting table

Fault	Possible cause(s)	Remedy
Fan motor not running	Power supply interrupted	Restore power supply
	Fan blade stuck	Enable fan to rotate freely
Bearing noises	Defective fan motor	Renew bearing or fan motor
Unit vibrating	Defective fan blades	Change fan blades
	Loose fan fixture	Tighten fixtures
Unit capacity not achieved	Coil is strongly contaminated with dirt, frosted, iced up	Clean, defrost heat exchanger
	Fans not running properly or down	Repair, swap out fans
	Working fluid pressurising defective (temperature and quantity insufficient)	Set working fluid pressurising values (temperature and quantity) to reference values.
Working fluid escaping	Unit working fluid-carrying components leaking	Switch off working fluid feed and fans, close leak Caution! Observe notes on the special thermostatic expansion valve (special TEV) and internal heat exchanger (IHE)!

9.4 Dealing with faults

- Try to determine the size of the leak.
- If the room can be entered with a protective device for the respiratory system,
  - provide emergency ventilation before entering the room
  - shut off CFC/HFCrefrigerant / refrigerant feed
- With the tiniest suspicion of injured people in the set-up area, sound the alarm. First get people to safety, then remove leaks. Close all doors to the room in which the refrigerant/ is escaping.
- Activate Emergency STOP switch. Valves, motors and other components are therefore switched off to prevent /coolant/ from escaping.
- Close shut-off valves, especially to the liquid side, where possible in sections, so that the CFC/HFC refrigerant/quantity in the leakage area is kept as low as possible. If possible evacuate/drain the systemssection in question and to other systems sections. Here too it must be ensured that no liquid refrigerant is locked in by shutting off system sections.

10 Maintenance

10.1 Safety

10.1.1 Before starting all maintenance

⚠ WARNING

Danger of injuries and damage to property with escaping working fluid (see Residual hazards with CFC/HFC refrigerant/, page 21)!

Only perform maintenance work – especially welding work – on the leaking unit after completely removing the working fluid from the leaking unit!

Perform the following safety measures before beginning all maintenance work:

- **drain the unit's heat exchanger**
- **Clean and blow out the unit's heat exchanger.**

10.1.2 With all maintenance work

⚠ WARNING

Danger of injuries and damage to property with escaping CFC/HFC refrigerant!

Escaping refrigerant with leaks on the evaporator can cause the following hazard situations and injuries:

Warning against explosion-risk and fire-risk substances in the set-up room!

Unintentionally carried in oil residues can ignite.

- **Ensure that there is no unintentionally carried in oil in the set-up room .**
- **Keep the risk area free of direct and indirect ignition sources.**
- **Before releasing for maintenance obtain the required approvals for work for the unit that can involve ignition sources (e.g. grinding, welding, soldering, etc.).**
- **With all work involving ignition sources (e.g. grinding, welding, soldering, etc.) in the work area, keep suitable fire extinguishing equipment that meets the requirements of EN 378-3 at hand.**
- **Do no bring any open flames or hot gases (e.g. candles, matches, welding beads, welding sparks, glowing cinders or tobacco) into the set-up room.**
- **Ensure that there are no warmed up or hot surfaces (e.g. heaters, hotplates, bulbs, motor housings) in the set-up room.**
- **Ensure that no frictional heat develops in the set-up room (e.g. overheated stores).**

Warns against health-endangering irritants in the set-up room!

CFC/HFC refrigerant under defervescence still present can evaporate. Inhalation of refrigerant vapour causes harmful to health irritations and lack of oxygen.

- **Escaping refrigerant vapour and escaping refrigerant liquid must not reach adjacent rooms, staircases, yards, passages or drainage systems.**
- **Use respiratory protection.**

- Use a room air-independent breathing apparatus with maintenance work in high CFC/HFC refrigerant concentrations in the room air.
- Ensure the set-up room is well ventilated.
- Divert escaped refrigerant vapour and escaped refrigerant liquid safely.

Warns against cold!

Still present CFC/HFC refrigerant under defervescence has a temperature of 0 °C. Contact with refrigerant under defervescence caused by spraying causes frostbite.

- Use eye protection!

- Use hand protection!

- Ensure that the unit in question is pressure-free before maintenance work begins or the working fluid is sucked up from the unit in question.
- Power off the electrical system and secure it against unintentional switching on again.
- Separate the unit to be maintained from the refrigeration system and secure it.

NOTICE

Danger of damage to property!

With work in the inlet and outlet feeds of the fans and heat exchanger, objects can get into the fans and therefore cause faults and damage on the components.

- Power off the fans and, where applicable, the heater rods with electric defrosting before beginning maintenance work and secure them against switching on again.
- After the work has finished do not allow any objects to get back into the inlet and outlet feeds of the fans or the set-up room.

10.1.3 After all maintenance work

⚠ WARNING

Danger of injuries and damage to property with escaping CFC/HFC refrigerant!see Residual hazards with CFC/HFC refrigerant/, page 21)!

Perform the following safety measures after finishing all maintenance work:

- Ensure the switching and activation devices, the measuring and display devices and the safety devices function properly.
- Ensure the working fluid fittings are functioning.

- **Ensure that the swivel fan units (optional) and the hinged side covers are fixed in their original position and secured against unintentional or unauthorised opening.**
- **Check the identification of the pipelines and ensure this is visible and legible.**
- **Check the fixing and corrosion protection of the components in question.**
- **Ensure the electrical connections (fans and, where applicable, the heater rods with electric defrosting) are functioning.**
- **Ensure the temperature and air humidity at the set-up point are the same as that in the order-related offer documents.**
- **Perform a pressure test and a tightness test (see operating instructions manual annex).**
- **Perform an acceptance test (see Perform acceptance test, page 53).**
- **Perform a pressure test (see operating instructions manual annex).**

10.2 Inspection and maintenance plan

The regular checking of the safety-related important system part evaporator of an installation is a prerequisiste for meeting the requirements of the standard EN 378 . Repeated tests must be performed in acc. with § 2, section 7 of the German Ordinance on Industrial Safety and Health (BetrSichV) or either by a "qualified person" by a certified inspection agency. The operator must determine the test intervals for the complete installation and the installation and the system components on the basis of a safety-related evaluation. Nevertheless, as with every technical installation, results, whereby by it can generally be said the most frequent causes are not material causes, but operating errors, cannot be ruled out.

The checks to be performed are listed in the following sections as time-scaled checklists.

10.2.1 Fans

The manufacturer's operating specifications take priority for this component. Güntner AG & Co KG recommends proceeding in acc. with the following inspection and maintenance plan:

d = daily, w = weekly, m = monthly, y = yearly				
Work to be performed	d	w	m	y
Check the fan drive for smooth running. • Vibrations on the unit: remove imbalances • Where required, tighten and correct blade fixtures and blade settings		X		
Fan bearing: Running sound and smoothness changes • Swap out bearing			X	
Fan motor: Is a new bearing due? • Swap out bearing or motor; where applicable, clean and repair motor				X *
Fan wheel: corrosion on bolts (with threaded blades) • Swap out bolts				X *
Fan blades: Corrosion or damage on blades • Swap out blades or wheel				X *

d = daily, w = weekly, m = monthly, y = yearly				
Work to be performed	d	w	m	y
Fan guard grille Fixture loose • Tighten fixture				X *
Fan guard grille Corrosion on fixture • Renew fixture				X *

*) Recommended: every six months

10.2.2 Unit heat exchanger

⚠ WARNING

Danger of injuries or damage to property caused by escaping CFC/HFC refrigerant (see Residual hazards with CFC/HFC refrigerant/, page 21)!

d = daily, w = weekly, m = monthly, y = yearly				
Work to be performed	d	w	m	y
Check heat exchanger for dirt, frost and ice build-up. • With dirt build-ups: Clean heat exchanger (see Clean unit, page 65). • In case of frost or ice build-up: Defrost unit (see Defrosting the unit, page 69).	X			
Check heat exchanger's general condition. • Damages found: remove damages		X		
Check heat exchanger's operating point (see Operation, page 56). • Change in fan capacity found: restore required system-side conditions . • Change in surface temperatures found: restore required system-side conditions . • Caution! Observe notes on the special thermostatic expansion valve (special TEV) and internal heat exchanger (IHE)!			X	
Check heat exchanger and connections for tightness. • Repair affected unit part (see Remove leaks, page 65).				X *
Check heat exchanger for working fluid pressurising. • Restore required system-side conditions. • Caution! Observe notes on the special thermostatic expansion valve (special TEV) and internal heat exchanger (IHE)!				X
Check heat exchanger for corrosion. • Corrosion or damage on core tubes, fins, support structures, tube connections, fixtures: repair unit sections affected.				X *

*) recommended: every six months

Care and maintenance plan

Measure	Cleaning agent	Interval
Remove frost and clean component	Mechanically	As required (visual inspection)
Heat exchanger defrosting	Circulation air, electric, ; automatic defrosting device; defrost closure device (flap, Shut-Up)	According to local conditions (penetrating moisture (air or chilled oods); with an ice thickness of 1 mm at the latest
Complete cleaning	Warm water or environmentally safe cleaning agent	After 120 hours
Leak check		After 6 months
Corrosion protection check		After 6 months

10.3 Maintenance work

10.3.1 Remove leaks

⚠ WARNING

Danger of injuries and damage to property with CFC/HFC refrigerant (see Residual hazards with CFC/HFC refrigerant/, page 21)!

- **Have leaks removed as quickly as possible by an expert.**
- **Do not fill with a working fluid other than that specified in acc. with the order-related offer documents!**
- **Only put the unit back into operation when all leaks have been repaired.**

▶ Perform all work including pressure, acceptance and functional test (see Perform acceptance test, page 53, and see Test readiness for operation, page 54).

10.4 Clean unit

10.4.1 General

The drip tray is hinged for easier cleaning.

The following applies for cleaning: The operator must ensure that the cleaning agent is environmental friendly. Harmful to the environment substances, e.g. acid-forming, are forbidden.

ACHTUNG - ATTENTION - ATTENTION - ATENCIÓN			
Bei der Verwendung von Reinigungsmitteln in Kühlräumen, ist auf die Korrosionsbeständigkeit der Materialien des Kühlers gegenüber dem verwendeten Reinigungs-mittel zu achten!	When cleaning agents are used inside the cold room, the corrosion resistance of the cooler materials to the applied cleaning agent has to be observed!	Lors de l'utilisation des détergents dans les chambres froides, il faut observer à la résistance à la corrosion des matériaux de l'appareil qui entrent en contact direct avec les détergents.	Cuando se apliquen agentes limpiadores en los productos instalados en cámaras frías, se debe tener cuidado que no corroen los materiales usados para la construcción del producto!

- Clean casing by rinsing with warm water (approx. +25°C) and/or with environmentally friendly cleaning agents.
- Rinse thoroughly with water after using cleaning agents.
- Allow casing to dry completely.
- Fix the hinged drip plate in its original position and secure against unintentional or unauthorised opening.
- Check working fluid-carrying and electrical connections (see Test readiness for operation, page 54).

10.4.2 Clean heat exchanger

The provide the best conditions for better cleaning the heat exchanger coil.

- Drain the unit (see system).
- Shut off the unit (see system).
- Power off the fans (see system).
- Perform defrosting (see system).
- Clean the heat exchanger with one of the following procedures:
  - Cleaning with compressed air (see Cleaning with compressed air, page 67).
  - Hydraulic cleaning (see Hydraulic cleaning, page 67)
  - Cleaning with brushes or brushes and compressed air (see Cleaning with brushes or brushes and compressed air, page 68).

NOTICE

Danger of damage to property!

The fins can be damaged with too high a pressure, too small a distance or a cleaning jet that hits the fins at an angle. Mechanical cleaning with hard objects (e.g. steel brushes, screw drivers, or similar) damages the heat exchanger.

- **Use a pressure of max. 50 bar with hydraulic cleaning and max. 80 bar with cleaning with compressed air!**
- **Maintain a minimum distance from the fins of 200 mm!**
- **Always aim the jet vertically (max. ±5 degree deviation) at the fins!**
- **Do not use any hard objects when cleaning!**

- Fix the hinged drip plates in their original position and secure against unintentional or unauthorised opening.
- Switch fans on (see system).
- Open suction side (see system).
- Open working fluid feed (see system).

10.4.2.1 Cleaning with compressed air

- Blast heat exchanger (max. 80 bar pressure) with compressed air to remove dirt and contaminants.
  NOTE! Hold the jet of the cleaner vertical to the fins (max. deviation of ±5 degrees) to prevent fins from bending.

10.4.2.2 Hydraulic cleaning

⚠ WARNING

Warns against dangerous electrical voltage!

Direct and indirect contact with voltage-carrying parts of motors and electrical lines can cause serious injuries or death. Water and cleaning agents conduct electricity.

- **Power off the fans for cleaning with water or steam jet and where applicable the heater rods for electrical defrost and ensure them against switching on again.**

NOTICE

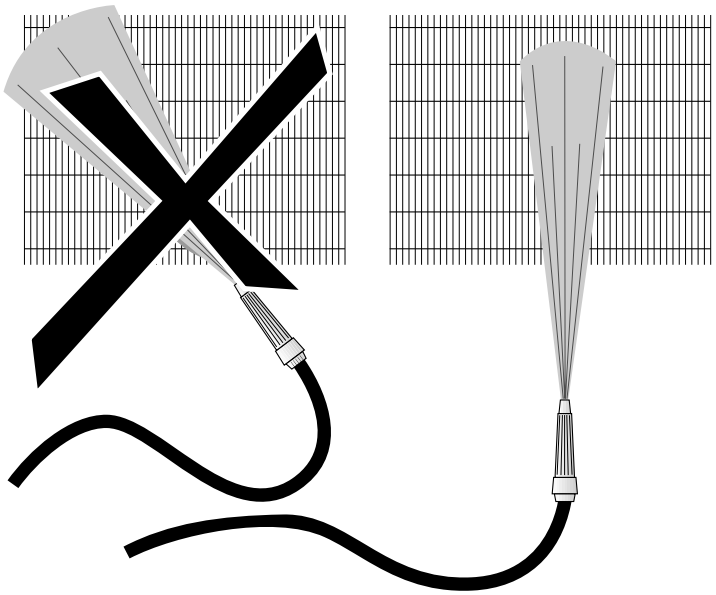
Danger of damage to property!

Water or steam jets can damage fans, electrical lines or other components.

- **Ensure that electrical connections and motors, as well as components and stored goods at the set-up point are not touched by water or steam jets. Cover these if required.**

- Heavier moisture or greasy dirt must be removed with a high-pressure water jet (max. 50 bar pressure), steam pressure jet (max. 50 bar pressure), min. 200 mm distance with flat jet nozzle, or using neutral cleaning agent where applicable, always against the airflow direction. Ensure here:
  - With oily and greasy dirt it helps to add a cleaning agent to the water.
  - When applying chemical agents ensure that they are not aggressive towards the unit's materials. Rinse the unit off after the treatment.
  - Cleaning should be done from inside to the outside (but always opposing the dirt onset) and from top to bottom, so that the dirt can be removed without returning.

– Hold the jet of the cleaner vertical to the fins (heat exchanger – max. deviation of ±5 degrees) to prevent fins from bending.



▶ Continue cleaning until all dirt has been removed.

10.4.2.3 Cleaning with brushes or brushes and compressed air

▶ Remove dry dust or dirt with a brush, a hand brush or with compressed air (max. 80 bar pressure, min. distance of 200 mm to the fins; against the airflow direction) or with a powerful industrial vacuum cleaner. Ensure here:

– Use soft brushes (no steel brushes or similar)!
– Where possible, cleaning should be from the top down. Where possible, cleaning should be from top to bottom, so that the dirt can be removed without the possibility of returning to cleaned parts. Continue cleaning until all dirt has been removed.
– Always brush the fins lengthways – never across!

10.4.3 Cleaning fans

⚠ WARNING

Danger of cutting off, pulling in!

There is a danger of cutting off fingers on the rotating fan blades, injury hazard for the hands and pulling in danger for loose elements such as hair, necklaces or clothing parts.

- **Power off the unit before you begin maintenance work. Secure the unit against unintentional switching on again by removing the electric fuses for the unit. Secure the unit with a suitable warning sign referring to unintentional switching on.**
- **Put fansthe hinged drip plates and guard grilles that were removed or opened for maintenance back into their original status without fail before you put the unit back into operation!**

Dirt build-ups and frost and/or icing on the fans and the fan guard grilles must be removed regularly, otherwise they will cause imbalances or destruction and power losses. The fan motors themselves are maintenance-free.

- Power off the unit and secure it against unintentional switching on.
- Clean fans with one of the following procedures:
  NOTE! Danger of damage to property! Mechanical cleaning with hard objects (e.g. steel brushes, screw drivers, or similar) damages the fan. Forbidden!
  - Cleaning with compressed air: Blow fans with compressed air (max. 10 bar pressure; min. distance 200 mm) to remove dirt and contaminants. Continue cleaning until all dirt has been removed.
  - Cleaning with compressed air and brushes: Remove dry dust or dirt with a brush, a hand brush or with compressed air (max. 10 bar pressure, min. distance of 200 mm) or with a powerful industrial vacuum cleaner. Ensure here: use soft brushes (no steel brushes or similar)! Continue cleaning until all dirt has been removed.
- Mount guard grille
- Switch unit on

Note for hinged drip plates

With units with hinged drip plates these should be opened or removed for better cleaning. The motors must, however, also be protected here from being sprayed.

After cleaning the hinged drip plates must be put back to their original position and fixed and secured here against unintentional or unauthorised opening.

10.5 Defrosting the unit

10.5.1 Notes on defrosting

Defrosting the unit at the correct times guarantees continuous operational reliability and the prevention of inaccessibilities that could result in a shutdown and disruptions. As the local conditions have a very big influence of the unit's performance and the need for defrosting, the operation must be checked regularly and specifically for frost and/or icing on the heat exchanger. The following notes apply for defrosting the unit:

- Regular checks for frost and/or icing. With a frost thickness of max. 1 mm per fin side the unit must be defrosted to be able to guarantee fault-free operation.
- Defrosting process must start in good time.

The frequency of defrosting depends on the amount of entering (e.g. through door of cold room) or inserted (e.g. chilled goods) humidity. In this regard, it has to be observed that the temperature difference between working fluid and air inlet temperature determines the frequency of defrosting:

- Unit with greater temperature difference: Frequent defrosting
- Unit with lesser temperature difference: Less defrosting

Also changing operating states such as e.g. changes of use at the installation site have to be observed. The defrost frequency can also be influenced by effects on the air side: Insufficient distance between wall and unit, insufficient distance between two units, supporting architectural elements close to air outlet, improper storage of goods (too close to ceiling or wall, crosswise to airflow direction) can leed to increased defrost frequency.

Defrosting completeness

When finishing the defrosting process you must ensure that the defrosting is absolutely complete. Selecting the right defrosting temperature is an important requirement in this respect.

- If the defrosting temperature is set too low this impairs the unit's effectiveness from one defrosting to another with the removal of "ice-spots".
- If the defrosting temperature is set too high this causes extreme water vapour formation, which causes frost and ice to form around the unit.

Settling time

A period (approx. 5 to 8 minutes) between when the defrosting finishes and when the unit is activated has been proven to be necessary, as the unit's heat exchanger can drip off completely and the defrosting water can flow away through the drip water tray drain during this period.

Delayed fan start

If the fans' activation is delayed by a further period (approx. 3 to 5 minutes), then the defrosting heat from the heat exchanger is absorbed and it is not given off into the room as warm-moist air.

10.5.2 Defrost control

- The defrosting process is started at pre-set intervals or as required.
- The process completion must be ensured twice (time/temperature and temperature/temperature),
- For defrost operation (air, electrical), the correct installation by customer of the defrost sensor has to be observed. See defrost procedures listed below.
- Recommendation – perform the defrosting process at the following times:

Electrical defrost

Cold operation	X					
Suction operation		5 min.				
Defrost operation			Approx. 50 min.			
Drip phase				5 min.		
Freeze on phase					5 min.	
Cold operation						X
Fans	Operation	Operation	Off	Off	Off	Operation

10.5.3 Circulation air defrosting

When operating units at room temperature in the positive range (cooling rooms above freezing point) and evaporating temperatures t_0 = 0 up to -5°C, the air circulation defrost is sufficient in most cases: With locked working fluid-carrying lines the required defrost heat is generated by the fan heat and the air temperature in the positive range. But also here the following applies: Only after having entirely completed the defrosting procedure, the refrigerating operation, as described, can be started again.

Recommended defrosting sensor positioning

10.5.4 Electric defrosting

With several units per room with electric defrosting alternating defrosting should be avoided, as otherwise reciprocal influences can have a negative effect here. These influences result on one hand from the extraction of the heat from the units to be defrosted and therefore in a defrost delay, and on the other hand in an additional stress with heat and moist air on the units in refrigerating operation. Group defrosting is recommended instead of alternating. Several units are grouped here into a defrosting group. If a group is now defrosted, the other groups must be switched off. This means that with a temperature increase in the room, which is not above the alternating defrosting one, the reciprocal influencing of the units is limited to a minimum, as described above.

The following must be ensured here: With alternating defrosting within a room (group defrosting), use defrost closure devices (defrost flaps, textile closure devices)! An on-site monitoring with a safety device (temperature limiter; to be planned for in creating the annex) must be provided in acc. with EN 60519-2; VDE 0721; T. 411 to rule out the danger of the units overheating. Operation without a temperature monitor is forbidden! The max. permissible fuse for the electric heating groups with 20 A must be complied with without fail. The min. fusing is provided in the order-related connection diagrams. To prevent the permissible pressure in the unit from being exceeded with electric defrosting systems, in acc. with EN 378-2 either working fluid displacement must be enabled or a suction circuit must be provided.

Recommended defrosting sensor positioning

10.5.5 Further notes on defrosting

The drains of the drip trays must be heated (apart from plus-cold storage rooms), so that ice formation is prevented here.

Available defrost closure devices (defrost flaps, textile closure devices must always be used here so that water vapour formation and therefore frost and ice formation do not occur outside the unit coil. For this see "Operating and installation instructions – defrost flap".

Fabric closure devices may only be used with use of fan ring heaters with reduced heating power and corresponding installation accessories.

NOTICE

The use of textile closure devices (e.g. Shut-Up) results with refrigeration operation in additional pressure losses on the air side. This fact must always be considered with the configuration.

11 Plans/diagrams

11.1 Electrics documentation

11.1.1 Fan motor connection diagram

See motor terminal box cover inside on the fan.

11.1.2 Connection diagram electrical defrost

See order-related offer documents

11.2 Working fluidconnection diagram

See order-related offer documents