

## Installation Instructions

[Transportation](#) | [Assembly](#) | [Operation](#) | [Maintenance](#)



|                     |                           |
|---------------------|---------------------------|
| Product line:       | W DryCooler               |
| Series description: | V-Shape Compact Drycooler |
| Series:             | GFW                       |

[guntner.com/us](https://guntner.com/us)

## Contents

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|                                                                              |           |
|------------------------------------------------------------------------------|-----------|
| <b>1. Warranty statement.....</b>                                            | <b>4</b>  |
| <b>2. Important basic information .....</b>                                  | <b>5</b>  |
| 2.1 Set-up and another applicable documents .....                            | 5         |
| 2.2 Warning signs and their meaning in this operation instructions .....     | 5         |
| 2.3 Prohibition signs and their meaning in this operation instructions ..... | 6         |
| 2.4 Mandatory signs and their meaning in this operation instructions .....   | 6         |
| <b>3. Safety .....</b>                                                       | <b>6</b>  |
| 3.1 How to act in an emergency .....                                         | 6         |
| 3.2 Personnel, care requirements .....                                       | 8         |
| 3.3 Proper intended use .....                                                | 8         |
| 3.4 Operation conditions.....                                                | 8         |
| 3.5 Improper use .....                                                       | 8         |
| <b>4. Technical data.....</b>                                                | <b>9</b>  |
| 4.1 Nomenclature .....                                                       | 9         |
| 4.2 Dimensions .....                                                         | 10        |
| <b>5. Set-up and function .....</b>                                          | <b>11</b> |
| <b>6. Fan motor .....</b>                                                    | <b>12</b> |
| <b>7. Transportation, rigging and storage .....</b>                          | <b>12</b> |
| 7.1 Safety .....                                                             | 12        |
| 7.2 Storage before installation .....                                        | 14        |
| <b>8. Set-up and start up.....</b>                                           | <b>14</b> |
| 8.1 System – side safety requirements .....                                  | 16        |
| 8.2 Customer – side safety requirements .....                                | 16        |
| 8.3 Requirements at the installation location .....                          | 17        |
| 8.4 Unpacking the unit .....                                                 | 17        |
| 8.5 Installation .....                                                       | 19        |
| 8.6 Unit electrical connections and protections.....                         | 20        |

## Contents

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|                                                                 |           |
|-----------------------------------------------------------------|-----------|
| 8.7 Perform acceptance test .....                               | 23        |
| 8.8 Test readiness for operation .....                          | 23        |
| 8.9 Putting the unit into operation for first time .....        | 24        |
| <b>9. Operation .....</b>                                       | <b>24</b> |
| 9.1 Putting the unit into operation .....                       | 24        |
| 9.2 Taking the unit out of operation .....                      | 25        |
| 9.3 Shutting down the unit .....                                | 25        |
| 9.4 Changing the unit over to another refrigerant (brine) ..... | 25        |
| 9.5 Water quality parameters for copper tubes .....             | 26        |
| <b>10. Service .....</b>                                        | <b>27</b> |
| <b>11. Inspection and maintenance plan .....</b>                | <b>27</b> |
| 11.1 Fans .....                                                 | 28        |
| 11.2 Unit heat exchanger .....                                  | 28        |
| 11.3 Care and maintenance plan .....                            | 29        |
| 11.4 Unit cleaning .....                                        | 29        |
| 11.5 Heat exchanger cleaning .....                              | 29        |
| 11.6 Cleaning with compressed air .....                         | 29        |
| 11.7 Hydraulic cleaning .....                                   | 30        |
| 11.8 Cleaning with brushes or brushed with compressed air ..... | 31        |
| 11.9 Cleaning pipe insides .....                                | 31        |
| 11.10 Fans cleaning .....                                       | 31        |
| <b>12. Spare parts .....</b>                                    | <b>32</b> |

## 1. Warranty statement

The supplier warrants the product to be free from defects in workmanship and materials under normal usage for the period outlined below. The supplier further warrants against defects in workmanship and materials of the product for a period of 24 months from the date of purchase (the "Warranty Period"), provided that the product is correctly installed and operated within the recommended limits of the manufacturer's technical documentation.

The supplier at its option shall repair or replace, free of charge to the purchaser, all components of the product which are or become defective during the Warranty Period as a result of defects in design, workmanship or materials, ordinary wear and tear excluded, provided, however, that:

- The product is applied correctly
- All operating and installation instructions for the product are complied with
- System component and piping design is in accordance with good refrigeration practice
- Nitrogen or an inert gas is introduced into the piping during the brazing of the piping installation

This warranty shall not include ordinary maintenance or cleaning of the product, or defects in the installation of the product.

This warranty also does not cover physical damage to the product during transit, after purchase of the product but before installation.

The purchaser must request repair or replacement of the defective component through a written notice to the supplier, and must provide the purchaser with the time and opportunity to make such repair or replacement. Otherwise, the supplier will be freed from liability for the defect.

Any transport and exchange costs for the repair or replacement shall be borne by the purchaser. The supplier shall also not be liable for costs incurred in dismantling or fitting replacement parts or for any independent inspection undertaken by the purchaser. The purchaser shall return any allegedly defective goods, postage or freight paid, to the supplier at the address below. Upon receipt of the goods and inspection thereof the supplier shall repair or replace, at the supplier's discretion, the defective components and shall return the same to the purchaser, return postage and freight paid. This shall constitute full compliance of the supplier's warranty obligations hereunder.

The seller accepts no liability for the direct or indirect consequences of any modifications of or repairs to the product made out by the purchaser or by a third party without the prior consent of the supplier.

This warranty applies only to the repair or replacement of components of the product and expressly excludes responsibility for damage and consequential damages not occurring to the product itself.

This warranty is the purchaser's exclusive remedy. The supplier expressly acknowledges that it shall not be liable to the purchaser or any client of the purchaser for any direct or indirect damages, injury to persons or property or any consequential damage or loss of profits arising from defective goods or workmanship or from any other cause whatsoever.

To obtain warranty service or to ask any questions regarding the foregoing, please contact our office:

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847- 781-0900 Tel  
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[dg-us-service@guentner.com](mailto:dg-us-service@guentner.com) or [sales.us@Guntner.com](mailto:sales.us@Guntner.com)  
Online support: <https://www.guntner-solutions.us/contact>

## 2. Important basic information

- 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 time.
- Ensure that the operating instructions are read and understood by all people that have anything at all to do with the unit.

### 2.1 Set-up and other applicable documents

The unit's operating instructions include the following parts:

- Installation & Operating Manual
- Submittal offer documents
- Submittal documents
- Submittal drawing/s, complete with technical data
- Electrical wiring diagram in terminal boxes

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

### 2.2 Warning signs and their meaning in this operation instructions

|  <b>WARNING</b> |                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <b>Warns against flammable substances</b><br>Use of ignition sources can cause fire at set-up point.                                              |
|                 | <b>Warns against harm to health</b><br>Contact with or inhaling harmful to health or irritant substances can cause injuries or damage the health. |
|                 | <b>Warns against potentially explosive substances</b><br>Use of ignition sources can cause explosions.                                            |
|                 | <b>Warns against toxic substances</b><br>Contact with or inhaling toxic substances can cause injuries or damage the health.                       |
|                 | <b>Warns against cold</b><br>If the temperature is below 32 °F (0 °C) frostbite can occur.                                                        |

## 2.3 Prohibition signs and their meaning in this operation instructions

| ⚠ WARNING                                                                         |                                                                                                                                     |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Flames / flammable substances prohibited</b><br/>Ignition sources must be prevented and ignition sources are not allowed.</p> |
|  | <p><b>Smoking prohibited</b><br/>Smoking is forbidden.</p>                                                                          |

## 2.4 Mandatory signs and their meaning in this operation instructions

| ⚠ WARNING                                                                           |                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Respiratory protection required</b><br/>Breathing apparatus must be suitable for the refrigerant used. Breathing apparatus must consist of:<br/>At least two independent breathing devices (self-contained breathing apparatus)</p> |

# 3. Safety

## 3.1 How to act in an emergency

| ⚠ WARNING                                                                           |                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Warns against hand injuries</b><br/>The unit is operated as standard with the brine, ethylene glycol (synonyms: ethane-1,2-diol, glycol). When using other brines, prior agreement with the manufacturer is an absolute must.</p> |

# **⚠ WARNING**



Ethylene glycol is a colorless, slightly viscous, not very fluid, water- mixable, deliquescent liquid with a sweet smell or taste.

Ethylene glycol is flammable and explosive at higher temperatures in a vapor/gaseous state.

With skin contact ethylene glycol causes slight irritation with the danger of skin absorption; with eye contact



Keep ethylene glycol away from ignition sources.

Ethylene glycol vapors are 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 suffocation due to reduced oxygen concentration, especially at ground level.



Avoid contact with skin, floor, and clothing. Remove contaminated, soaked clothing immediately.

Do allow contact with heavy oxidation agents (chromo-sulphuric acid, potassium permanganate, smoking sulphuric acid, or similar)! Danger of strong reactions.mucous membrane irritation; with ingestion agitation with disruption of the central nervous system; with prolonged endangering effect – fatigue, coordination disruption, unconsciousness, kidney damage.



Unauthorized people must not have access to the unit. When setting up it must be ensured that the brine 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 brine breaks, activate the emergency STOP switch set up in a safe place, e.g. with:
  - Visibly escaping brine from the heat exchanger or pipe components.
  - Sudden large release (release and evaporation of the greater part of the entire brine in a short time, e.g. in less than 5 minutes).
- 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 brine concentrations in the room air.
  - Divert released brine/liquid safely in accordance with OSHA requirements.
  - Ensure the set-up room is well ventilated.

### 3.2 Personnel, care requirements

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. 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, and daily monitoring of this system. These operating personnel may not make any adjustments to settings on the system including the brine circuit.

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:

Attention: Only qualified personnel familiar with AC motors and associated machinery should plan or implement the installation, start-up and subsequent maintenance of the system. Failure to comply may result in personnel injury and/or equipment damage.

### 3.3 Proper intended use

Dry coolers of the GFW series are intended for installation in the brine circuit of a refrigeration system and for outdoor installations. The dry coolers cool the brine by giving off heat to the air that is being moved by fans over the dry heat exchanger surface. The unit is delivered for operation with a specific operating point:

- Brine flow temperature
- Brine returns temperature or circulating brine volume
- Airflow volume
- Air inlet temperature

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

### 3.4 Operation conditions

The unit is a component of a refrigeration system including its brine/refrigerant 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 brine/refrigerant used in it to a minimum. These dangers are essentially connected with the physical and chemical properties of the brine/refrigerant and with the pressures and temperatures that occur in the brine/refrigerant-carrying components of the unit.

### 3.5 Improper use

Brine/fluids and their combinations with water or other substances in the system components have chemical and physical effects from the inside on the materials surrounding them. The unit must only charge with brine glycol. Charging the unit with another refrigerant results in:

- Material, wall thickness, tensile strength, corrosive resistance, shaping process and testing are not suitable for the refrigerant used and do not withstand the possible pressures and stresses that might occur.
- The unit not being resistant to the other refrigerant and the other refrigerant mixture.
- The unit not remaining leak tight during operation and when shut down.
- A possible sudden release of refrigerant could directly endanger people and/or property and the environment.

The maximum permissible operating pressure specified on the nameplate 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 leak tight during operation and when shut down.
- There may be a possible refrigerant release after a rupture or leakage on refrigerant-carrying components, which would result in the following dangers:
  - Danger of component rupturing
  - Suffocation hazard
  - Hazards caused by panic reactions
  - Environmental pollution

Dry cooler may not be used

- Where it is possible that short or prolonged effect caused by contact, inhalation or ingestion of the working fluid glycol might result in harmful hazards.
- Where the possibility exists of a sudden large release 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. Changes to the unit are:

- Changing the operating point (see chapter Unit)
- Changing the fan capacity (air volume)
- Changing the working fluid flow-through volume
- Changing over to another working fluid

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 immediately and must be removed immediately.

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

## 4. Technical data

### 4.1 Nomenclature

|     |     |    |   |   |   |   |     |   |     |   |    |      |    |
|-----|-----|----|---|---|---|---|-----|---|-----|---|----|------|----|
| GFW | 090 | .1 | / | 3 | - | M | (L) | - | F04 | / | 01 | /16P | .M |
| 1   | 2   | 3  |   | 4 |   | 5 | 6   |   | 7   |   | 8  | 9    | 10 |

1. GFW : Güntner V Dry cooler

2. Fan diameter: 080: 31.50" (800 mm) 090: 35.40" (900 mm)

3. Version : .1

4. Number of fans: 2 to 8

5. Fan noise level:

N: Normal

M: Medium

L: Low level

S: Very low level

6. Motor voltage:

U or V: 230V/3~/60Hz

L or K: 460V/3~/60Hz S or D: 400V/3~/50Hz

J or I: 400V/3~/60Hz

H: 575V/3~/60Hz

2: 380-460V/3~/50-60Hz

4: 220-240V/3~/50-60Hz

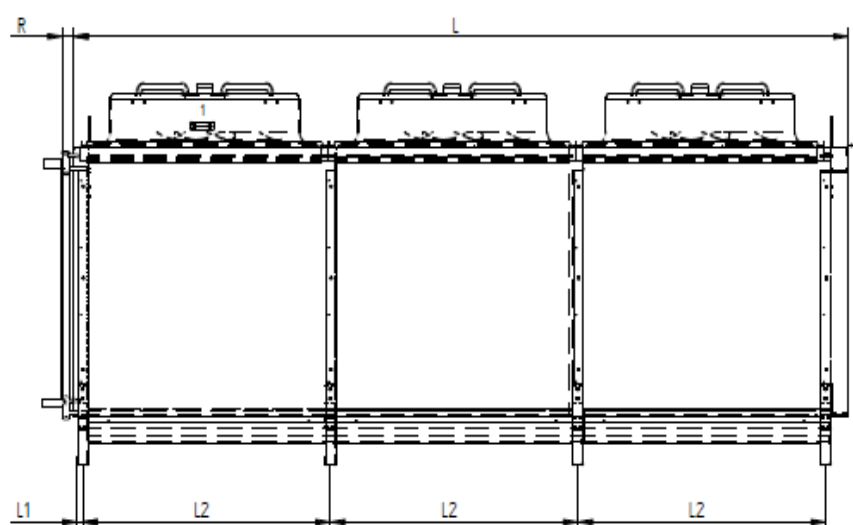
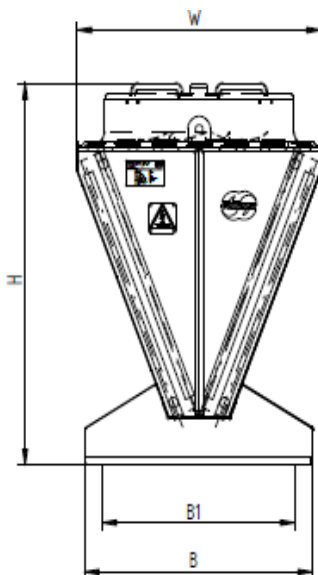
7. Fin type and rows depth: F04: F fin pattern (core tube  $\varnothing$  0.472" (12 mm)) and 4 rows in depth.

8. Core tube type: 01 is riffle core tube (0.013" (0.32 mm) thickness) and 12.7 fpi (2.0 mm) 02 is riffle core tube (0.013" (0.32 mm) thickness) and 10.6 fpi (2.4 mm) 03 is smooth core tube (0.012" (0.30 mm) thickness) and 12.7 fpi (2.0 mm) 04 is smooth core tube (0.012" (0.30 mm) thickness) and 10.6 fpi (2.4 mm)

9. Number of passes

10. Manufacturing location: .M means manufactured in Mexico

## 4.2 Dimensions



| GFD Model        | W    |        | H    |        | B    |        | B1  |        | R  |       | L    |         | L1 |    | L2   |        |
|------------------|------|--------|------|--------|------|--------|-----|--------|----|-------|------|---------|----|----|------|--------|
|                  | mm   | in     | mm   | in     | mm   | in     | mm  | in     | mm | in    | mm   | in      | mm | in | mm   | in     |
| 080.1/2-() F4 /  | 1185 | 46 5/8 | 1660 | 65 3/8 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 2490 | 98      | 25 | 1  | 1200 | 47 1/4 |
| 080.1/3-() - F4/ | 1185 | 46 5/8 | 1660 | 65 3/8 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 3690 | 145 1/4 | 25 | 1  | 1200 | 47 1/4 |
| 080.1/4-() - F4/ | 1185 | 46 5/8 | 1660 | 65 3/8 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 4890 | 192 1/2 | 25 | 1  | 1200 | 47 1/4 |
| 080.1/5-() - F4/ | 1185 | 46 5/8 | 1660 | 65 3/8 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 6090 | 239 3/4 | 25 | 1  | 1200 | 47 1/4 |
| 080.1/6-() - F4/ | 1185 | 46 5/8 | 1660 | 65 3/8 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 7290 | 287     | 25 | 1  | 1200 | 47 1/4 |
| 080.1/7-() - F4/ | 1185 | 46 5/8 | 1660 | 65 3/8 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 8490 | 334 1/4 | 25 | 1  | 1200 | 47 1/4 |
| 080.1/8-() - F4/ | 1185 | 46 5/8 | 1660 | 65 3/8 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 9690 | 381 1/2 | 25 | 1  | 1200 | 47 1/4 |
| 090.1/2-() - F4/ | 1185 | 46 5/8 | 1720 | 67 3/4 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 2490 | 98      | 25 | 1  | 1200 | 47 1/4 |
| 090.1/3-() - F4/ | 1185 | 46 5/8 | 1720 | 67 3/4 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 3690 | 145 1/4 | 25 | 1  | 1200 | 47 1/4 |
| 090.1/4-() - F4/ | 1185 | 46 5/8 | 1720 | 67 3/4 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 4890 | 192 1/2 | 25 | 1  | 1200 | 47 1/4 |
| 090.1/5-() - F4/ | 1185 | 46 5/8 | 1720 | 67 3/4 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 6090 | 239 1/4 | 25 | 1  | 1200 | 47 1/4 |
| 090.1/6-() - F4/ | 1185 | 46 5/8 | 1720 | 67 3/4 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 7290 | 287     | 25 | 1  | 1200 | 47 1/4 |
| 090.1/7-() - F4/ | 1185 | 46 5/8 | 1720 | 67 3/4 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 8490 | 334 1/4 | 25 | 1  | 1200 | 47 1/4 |
| 090.1/8-() - F4/ | 1185 | 46 5/8 | 1720 | 67 3/4 | 1105 | 43 1/2 | 935 | 36 3/4 | 85 | 3 3/8 | 9690 | 381 1/2 | 25 | 1  | 1200 | 47 1/4 |

## 5. Set-up and function

The dry cooler consists of,

- Heat exchanger arranged as consisting of pipe coils fitted with fins (copper tube, aluminum fin), headers and header's outlets.
- Self-supporting enclosure structure of galvanized sheet steel, painted.
- Low noise axial fans, with maintenance –free motors.

The GFW series dry coolers are intended for installation in the brine circuit of a refrigeration system. 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 GFW dry coolers series feature a compact line design with low installation height and low width.

Approximately 50% more efficient relative to the base areas achieved: low brine charge is required and transport costs are saved (two units can be transported beside one another).

Several units can be placed space – saving in rows with high nominal capacity to cover high capacities.

The heat carrier is the working fluid that is used for the heat exchange, and which remains in the liquid phase during the heat absorption.

The brine is the working fluid that is used for the heat exchange, and which remains in the liquid phase during the heat absorption. The dry cooler cools the brine by giving off heat to the air (airside) that is being moved by fans over the dry heat exchanger surface.

## 6. Fan motor

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

In the case of fans with condensate holes, any sealed (plugged) 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 thermo-contact, the thermo-contact has to be wired in the switch cabinet in such a way that turning on the motor with triggered thermo-contact 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 (soft start 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 effective 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 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.

### Electronic technology

The fan motors avail of a separate electronic power circuit. This power circuit is controlled via Güntner Motor Management (GMM). The motors can be powered at single-phase (220V-277V, 1~, 50/60 Hz) and three-phase (480V-380V, 3~, 50/60 Hz) voltages. Please refer to the wiring diagrams or motor terminal box information for the electrical connection.

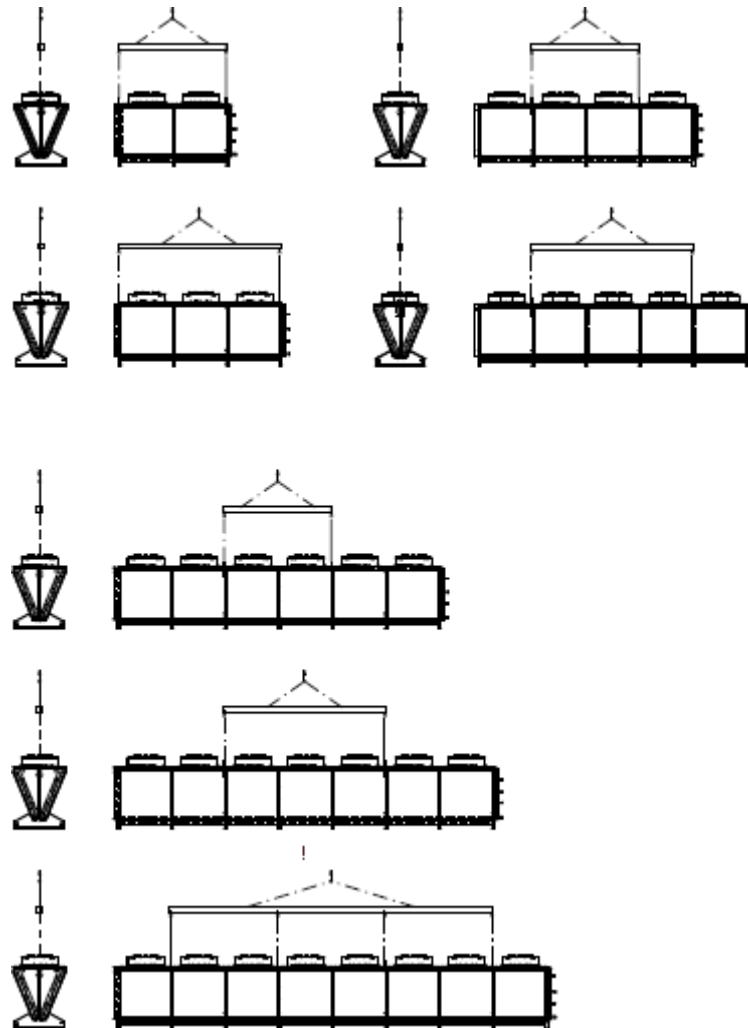
## 7. Transportation, rigging and storage

### 7.1 Safety

Read and observe all rigging 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.

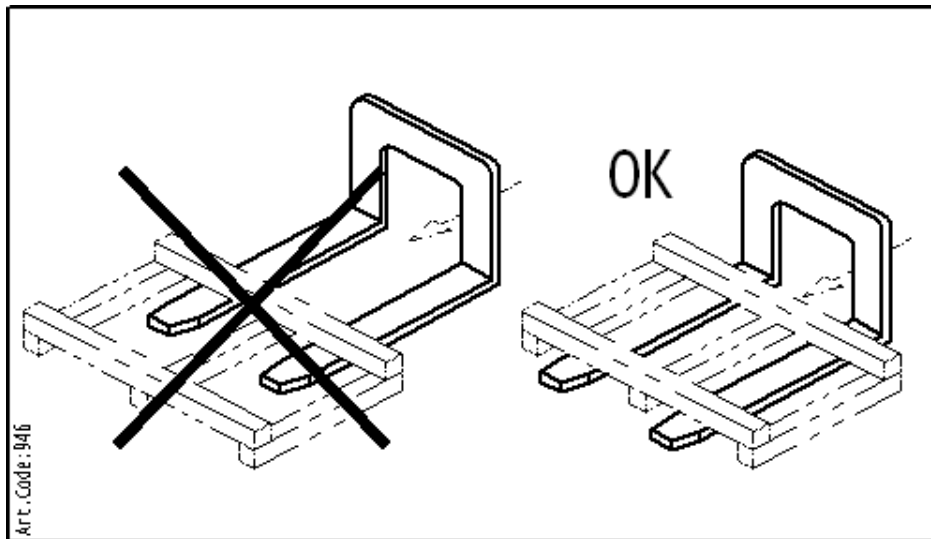
The units are rigged as complete system component. Ensure to use the correct lifting points when rig the unit with a crane:



- Rigging the unit at the job site
- Unloading the unit
- Rig and unload the crated unit with suitable transport equipment (e.g. forklift, crane) at the job site.

**⚠ WARNING**

When transporting with a forklift: Only lift the crated unit with a fork lengths extending beyond the outer reaches of the crated skid section.



## 7.2 Storage before installation

Moisture and dirt must be prevented from entering the unit.

- Protect the unit against dust, dirt, moisture and wetness, damage and other harmful effects.
- Do not store the unit for longer than necessary. Only store the units in their original packaging until installation.
- Store the unit at a protected place free of dust, dirt, moisture, and damage-free until it is installed (well-ventilated halls or roofed storage site).
- If the unit installation 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.

## 8. Set-up and start up

Incorrect installation can cause the danger of brine leaks when the unit is into operation, and injuries or damage to property can occur.

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

Foreign materials and contaminants in the refrigerant circuit can impair the effectiveness or damage components.

Particularly harmful contaminants are:

- Moisture
- Atmospheric air
- Welding or brazing residues
- Rust
- Soot/ash/cinders
- Metal cuttings
- Dust and dirt of all kinds

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

- Ageing and brine decay

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

- Brine oxidation
- Brine chemical reactions

Brine chemical reactions with the absence of moisture or atmospheric air with ageing and decay can have the following consequences:

- Formation of organic and inorganic acids
- Corrosion

Other contaminants can cause:

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

Ensure with installation (connecting the refrigerant-carrying components of the unit to the refrigerant-carrying system of the installation) that internal contamination is strictly avoided.

Perform the installation with extreme cleanliness.

Finish all on-site pipe installation work before releasing the holding charge.

Only release the holding charge at the Schrader valve immediately before final installation.

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

Humidity and dirt must not get into the unit's interior. If humidity or dirt gets 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 exposure to flammable gases
- Chemical: Damages caused by contaminated atmospheres (salt, acid, chlorine, sulphur-containing, or similar)
- Thermal: Damages caused by exposure to heat sources Start as soon as possible with installation.

Only qualified personnel familiar with AC motors or EC motors and associated machinery should plan or implement the installation in accordance with local and national applicable codes and regulations. Failure to comply may result in personal injury and/or equipment damage.

## 8.1 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:
- Electric: fans
- Refrigerant: valves and fittings
- An emergency STOP switch that can be actuated without danger must be installed.
- The brine-side and electrical connections must be available within the system. The connections must be specified in the submittal documents.
- The power supply of the fan motors must be provided in accordance with the specifications on the nameplate on the fan motors.
- A lock-out 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
- The fan motors' switch-on/off device must be secured (e.g. with a padlock) to prevent uncontrolled fan start-up.
- The electrical motor, disconnect switch, terminal box and electrical panel connections must be provided in accordance 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 released brine from a safe position.

## 8.2 Customer – side safety requirements



Danger of injuries

The unit contains brine.

The unit is operated as standard with the brine, ethylene glycol (synonyms: ethane-1,2-diol, glycol). Prior agreement with the manufacturer is imperative when using other brines.

Ethylene glycol is a colorless, slightly viscous, not very fluid, water-mixable, deliquescent liquid with a sweet smell or taste.



With skin contact ethylene glycol causes slight irritation with the danger of skin absorption; with eye contact mucous membrane irritation; with ingestion agitation with disruption of the central nervous system; with prolonged endangering effect – fatigue, coordination disruption, unconsciousness, kidney damage.

Ignition and fire hazard.

Ethylene glycol is flammable and explosive at higher temperatures in a vapor/gaseous state.

Keep ethylene glycol away from ignition sources. No smoking

Ethylene glycol vapors are 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 suffocation due to reduced oxygen concentration, especially at ground level.

Avoid contact with skin, eyes and clothing! Remove contaminated, soaked clothing immediately. There is no imminent danger for the staff. Ethylene glycol vapors are 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 suffocation due to reduced oxygen concentration, especially at ground level.

Do not bring into contact with heavy oxidation agents (chromo-sulphuric acid, potassium permanganate, smoking sulphuric acid, or similar)! Danger of strong reactions.

Unauthorized people must not have access to the unit. When setting the unit up it must be ensured that the coolant escaping from the unit cannot penetrate the interior of the building or put people at risk in any other way.



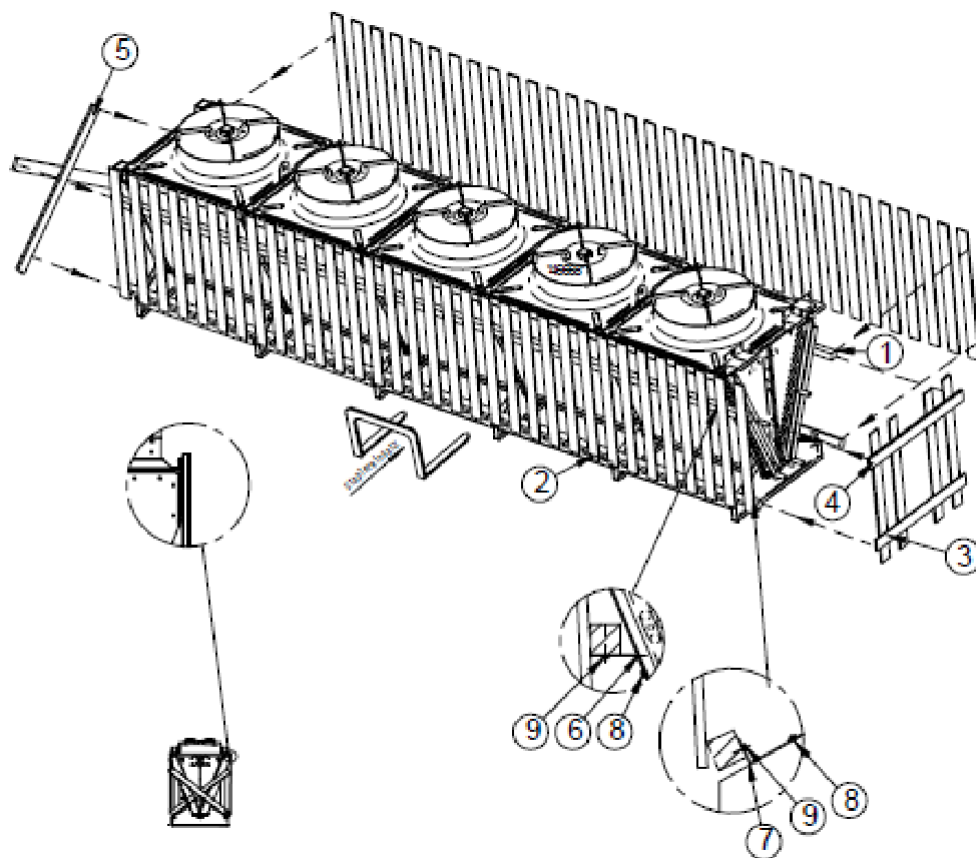
- Set up the unit so that brine, which can escape from the unit in the event of a fault, cannot enter water systems or sewage.
- Operate the facility for recovering or disposing of brine so that the danger of a brine emission into the environment is kept as low as possible.

### 8.3 Requirements at the installation location

You will find the dimensions and weights in the submittal documents.

- Ensure that the unit is installed so that is not damaged by environmental-conditional hazard sources (production, transport and other processes at the set-up point) and its functioning are not disturbed by the interventions of unauthorized persons.
- 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 it 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, connection lines, all electrical connections and lines are easy to access.
  - Ensure that the pipes' identification is clearly visible.

## 8.4 Unpacking the unit

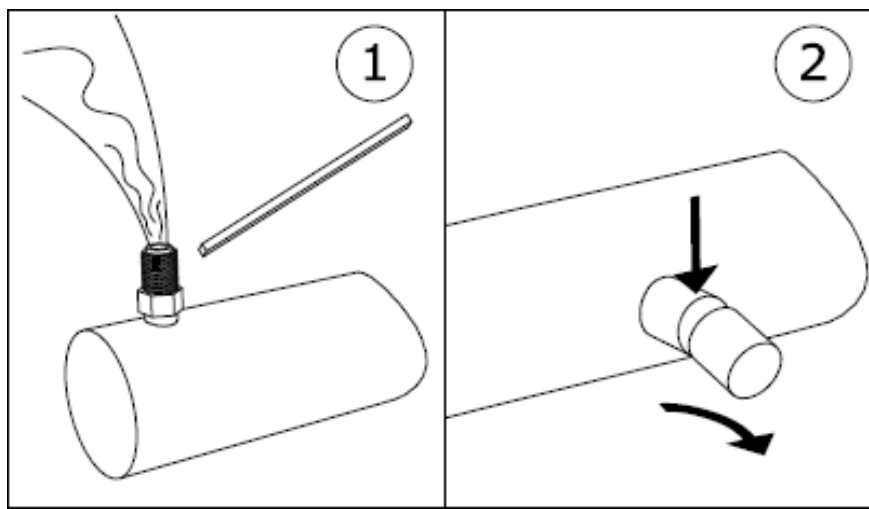


- Removes screws (1)
- Remove lining boards (2)
- Remove lateral lining boards (3, 4 and 5)
- Loose screws (8 and 9) and remove bearer plates (6 and 7)
- Check delivery scope on completeness. For complete delivery scope, refer to the submittal documents.
- Any transport damage and / or missing part must 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.
- Check transport excess pressure: The units are delivered by the manufacturer with approx. 30 psi (2 bar) holding pressure (clean dry air). Check transport pressure at the Schrader valve (pressure measurement). NOTE: 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 brine. A pressure-less unit indicates leaks on the unit due to transport damage. Leaking brine due to leaks on the unit can lead to injuries or even death. Do not take the unit into operation.

- Check transport holding charge and release pressure (only prior to final installation).
- Remove sealing caps.



- Moisture and dirt must be prevented from entering the unit.
- Protect the unit against dust, dirt, moisture, wet conditions, damaging and other detrimental influences.
- Begin with the installation as soon as possible.

## 8.5 Installation

- Prevent stresses in the unit:
  - Ensure that all mounting points have the same spacing to the mounting level.
  - Ensure that all mounting points maintain the same spacing to the mounting level under load and when permanently positioned.
- Set up and mount units as follows: Airflow must not be impaired by obstructions.
- The units must be installed on mounting points that are appropriate for the unit's weight and then bolted with securing 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 mounting the units:
  - The diameter of the mounting holes has been statically determined by the manufacturer; the mounting bolts must be sized 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, snow, dirt or similar).
  - The mounting bolts must be secured to prevent against loosening with an appropriate locking device.
  - The mounting bolts must not be over tightened or stripped. All mounting bolts must be tightened equally.
- Prevent the unit from shifting in its position. Fix the unit in its position. Tighten the mounting bolts and secure then against loosening.
- Only fix the unit to the intended mounting points.

In case of improper installation, brine leaks can occur during operation of the installation, this can lead to injuries or damage to property.

- Only fix the unit to the mounting points intended for this.
- Prevent brine releases to environment
- Secure all refrigerant – 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 on site connections do not exercise any force upon the distributor and header points. This can cause leaks on the refrigerant connection points of the unit and on connection points of the piping layout on site.

Ensure that:

- Release devices to prevent brine releases are provided and available.
- That in shutdown state sub-cooled liquid is only present a minimum level in system sections.

Improper connection to heat carrier circuit of the system causes hazards:

- Leaks result in escaping brine.
- Soldering and welding work on pressurized parts can result in fires or explosions.
- Smoking or open light can cause fires or explosions.
- Ensure that stresses and vibrations from the system are not passed on to the unit.
- Only lay refrigerant-side connections stress-free! The on-site pipeline system must be braced before connecting to the unit.
- Evacuate the unit. Soldering and welding work is only permitted on unpressurised units!
- 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 local or national requirements.
- Ensure that refrigerant detectors and alarm systems for warning about explosion or fire dangers, about health-endangering concentrations and for control purposes at the unit working point

Install the pipes and ensure:

- Release devices to prevent liquid escapes must be provided and available.
- That the pipeline installation is kept as short as possible. Use as few bends as possible, and if bends are necessary, use big radius elbows.
- The free space around the unit 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.
- It must be possible to shut off the unit if a leak occurs. It must be possible to activate all devices used for diverting escaping working fluids from a safe position.
- Observe the following when soldering:
- All connections must be hard-soldered!
- 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)!
- After completing pipe installation and before connecting the units they must be professionally cleaned internally and evacuated.

## 8.6 Unit electrical connections and protections

Field wiring should comply with national and local standards, codes and regulations. The power supply voltage, phase and frequency must match what is shown on the unit data plate. Each motor was wired so that the fan rotation is counterclockwise.

The fan motor terminal blocks are located in the junction box on the opposite side of refrigerant connection. Below you will find standard fan motor terminal diagram for typical unit wiring with 230V - 460V/3~ /60Hz power. If a mounted control panel is provided, wiring to only one set of terminal blocks is required. Review the wiring diagram supplied with unit. Provide, when required, and adjust individual motor overload protection in accordance with local applicable codes and regulations.

## Customer Power Supply

### Incoming Power

1/230V/60Hz

FLA 2.04 Amp.

MCA 2.21Amp.

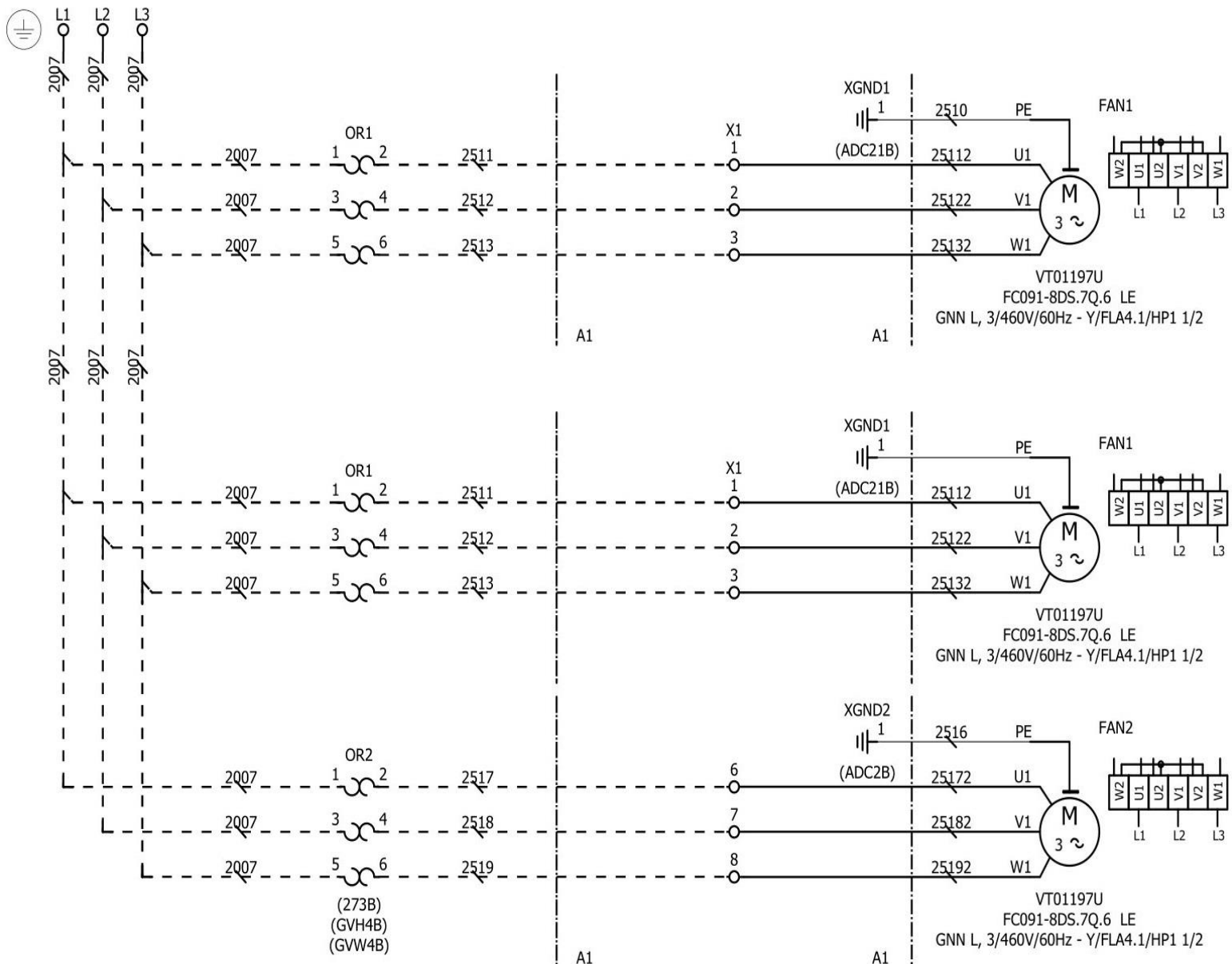
MOP 15 Amp.

Motor overload protective device  
is required and shall be rated according  
to applicable installation code!

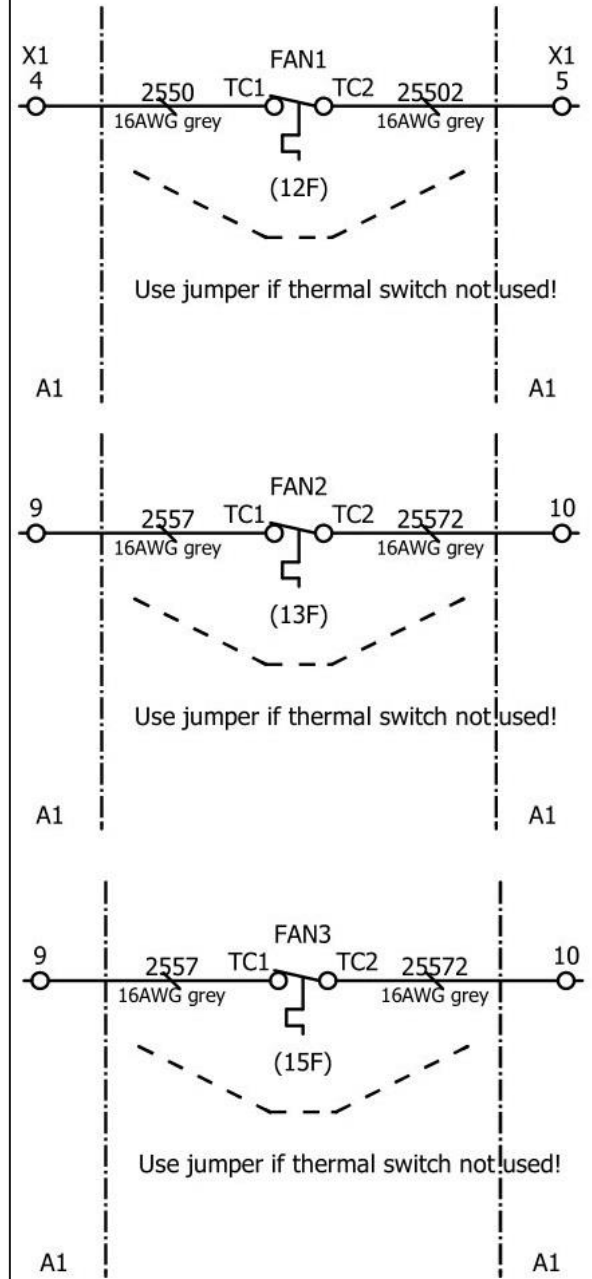
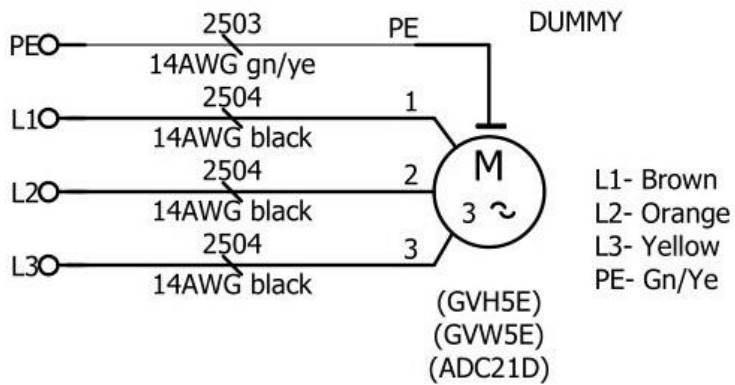
XGND1 Grounding Lug

XGND2 Grounding Lug

X1 Terminal Block 5 pole Terminal Block 5 pole



Unless otherwise indicated use for  
Motor Power Wiring:



## 8.7 Perform acceptance test

Ensure that the temperature at the set-up point corresponds with the technical data.

- Ensure that there are no restrictions to the air path/s.
- Ensure that the electrical supply feed is in accordance with nameplate data. Connect all control wiring where required.
- 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 for mounting.
- Check and re-tighten all bolts and threaded connections, especially on the fans.
- Check installation of pipe connections.
- Check bracing of refrigerant-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 fan guard protection is properly in place and securely fastened.
- Ensure that optimum unit control and accessibility are guaranteed.
  - Ensure that the unit is placed so that it can be monitored and controlled from all sides at all times
  - Ensure sufficient space for regular maintenance
  - Ensure all refrigerant-carrying components, connections and lines and all electrical connections and lines are easy to access
  - Ensure pipes are easy to identify
- Check heat exchanger surfaces for dirt and clean as required (see Unit cleaning, page 62).
- Perform function tests on the fans (rotation direction).
- Check electrical connections of the fan motors for damage.
- Check the quality of the bracing 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 within the system again after 48 operating hours, especially on the connections and at the fan terminals, and document the test results.

## 8.8 Test readiness for operation

- Ensure that all electrical protective measures are operational.
- Ensure that all refrigerant-carrying connections are securely fastened.
- Ensure that all electrical connections (fan panels and junction boxes) are effected securely fastened.
- Ensure the all threaded connections on the fans, the unit fixing bolts and all other threaded connections are firmly tightened.

## 8.9 Putting the unit into operation for the first time

Only put the unit into operation, when:

- The units has been properly mounted and connected.
- You have performed a complete acceptance test.
- You have performed a test for ensuring the system's readiness for operation.
- All safety precautions 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 submittal documents.

- Switch the system on.
- Activate the unit:
- Open the valves on the inlet and outlet-side system.
  - Activate fans
- Wait until the operating point is reached. After the operating point has been reached, the unit is ready to operate.

Parameters for setting the operating points see submittal documents. Operating point:

- Brine flow temperature
- Brine returns temperature or circulating brine volume
- Airflow volume
- Air inlet temperature

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

## 9. Operation

### 9.1 Putting the unit into operation

To operate the unit the system including the electrical system must be in operation. The unit must be started up by opening the respective valves on the entering and leaving sides of the unit and by activating to the electrical system as follows (see system operating instructions manual):

- Switch on electrical control system
- Open all shut off valves for refrigerant-carrying lines
- Switch on fan motors

## 9.2 Taking the unit out of operation

The unit/s is a system component of the refrigeration installation, including the brine circuit. The unit is taken out of operation by switching off the brine circuit of the system in accordance with the refrigeration system operating instructions manual for the entire installation. To do this, the refrigerant-carrying lines must be shut off from the electrical system (see refrigeration system operating instructions manual):

- Switch off fans
- Switch off electrical control system
- Close refrigerant-carrying line's shut off valves

### NOTICE

When shut down consider maximum operating pressure. If necessary, take precautions so that it cannot be exceeded.

## 9.3 Shutting down the unit

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

- Take the unit out of operation.
- Secure the unit:
  - When shutdown consider maximum operating pressure. If necessary, take precautions so that it cannot be exceeded.
  - Secure the fan motor drives against switching on again (lock-out procedure).
  - Secure refrigerant-carrying lines against pressurizing.
  - Secure unit against detrimental influences at the installation or storage location 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 and preventive measures for corrosion 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 brine.

## 9.4 Changing the unit over to another refrigerant (brine)

The unit must not be changed over to another refrigerant (brine) without prior written consent by Güntner

- Ensure that the unit manufacturer has agreed to the changeover.
- Ensure that the right refrigerant (brine) is re-filled. Ensure that all materials used in the unit are compatible with the new refrigerant (brine).
- Ensure that the permissible pressure is not exceeded.
- Check that the new refrigerant (brine) can be used without requiring a new test certificate for the unit.
- The safety device for the unit must be changed out or reset.
- Mixtures with residues of refrigerant (brine), for example, must be prevented.
- All information concerning the refrigerant (brine) must be changed accordingly.
- The complete documentation, including these operating instructions and the system operating instructions manual must be changed accordingly.
- Perform acceptance test.

## 9.5 Water quality parameters for copper tubes

The following water quality parameters are recommended to be used during the operation and inspection of the Güntner US, LLC (Güntner) family of finned copper tube heat exchange products designed and fabricated by Güntner.

Following these guidelines will help maximize the lifetime of the equipment and to minimize the risk of failure in service. All recommendations made in this guide are brand-independent, and it is up to each operator to select the most convenient chemical supplier, monitoring technology, etc. for their particular application and location.

Correct control of the water quality of the circulating fluid will help to prevent or mitigate a whole host of detrimental mechanisms that can lead to failure of the unit.

Failure to follow recommendations or warnings listed in the document may result in damage to the unit and subsequent loss of service. Güntner is not liable for failures induced by the operator choosing to ignore the recommendations in this section.

Water quality parameters during operation for copper tubes

| Parameter                             | Value                            | Units  |
|---------------------------------------|----------------------------------|--------|
| pH                                    | 7.5 - 9.0                        |        |
| Specific Conductance, 25° C           | 337                              | µS     |
| Alkalinity as CaCO <sub>3</sub> — "M" | 119                              | mg/l   |
| Alkalinity as CaCO <sub>3</sub> — "P" | 0                                | mg/l   |
| Aluminum as Al                        | 0.25                             | mg/l   |
| Arsenic as As                         | <0.003                           | mg/l   |
| Barium as Ba                          | 0.02                             | mg/l   |
| Cadmium                               | <0.005                           | mg/l   |
| Calcium as CaCO <sub>3</sub>          | 87.4                             | mg/l   |
| Chloride as Cl                        | 30.8                             | mg/l   |
| Chromium                              | <0.005                           | mg/l   |
| Copper as Cu                          | <0.005                           | mg/l   |
| Fluoride as F                         | 1.0                              | mg/l   |
| Iron as Fe                            | 0.1                              | mg/l   |
| Lead as Pb                            | <0.005                           | mg/l   |
| Magnesium as CaCO <sub>3</sub>        | 48.6                             | mg/l   |
| Manganese as Mn                       | <0.005                           | mg/l   |
| Nitrate as NO <sub>3</sub>            | 0.6                              | mg/l   |
| Oxygen                                | < 1                              | mg/l   |
| Phosphate as PO <sub>4</sub>          | <0.05                            | mg/l   |
| Potassium as K                        | ND                               | mg/l   |
| Silica as SiO <sub>2</sub>            | 1.7                              | mg/l   |
| Sodium as Na                          | 11.0                             | mg/l   |
| Strontium as Sr                       | ND                               | mg/l   |
| Sulfur as SO <sub>4</sub>             | 10.9                             | mg/l   |
| Zinc as Zn                            | 0.03                             | mg/l   |
| Color                                 | <5                               | CU     |
| Turbidity                             | 0.1                              | NTU    |
| Total Dissolved Solid                 | 188                              | mg/l   |
| Total hardness                        | ppm or mg/l of CaCO <sub>3</sub> | < 534  |
| Total bacteria                        | CFU/ml                           | < 1000 |

NOTE:

- 1) The airtightness of the circuit must be guaranteed at all times. Air access leads to sharp pH fluctuations and a corrosion damage to the copper tubes.
- 2) When the circuit is opened, the inflow of air must be prevented using protective atmospheres.
- 3) It is recommended a constant supervision of the pH of the circulating water.
- 4) It is highly recommended to keep a professionally competent surveillance of the operation of the system (tightness of the system, control of the pH values, controls and calibration of measuring equipment, maintenance and repairs).
- 5) The responsibility for compliance with the limit values lies with the system manufacturer or operator.

## 10. Service

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## 11. Inspection and maintenance plan

The regular safety – related checking of dry coolers in refrigeration system, is a prerequisite for meeting the local requirements and / or national requirements and these must be performed by a "qualified person". The operator must determine the test intervals for the complete system and the system components on the basis of a safety - related evaluation. Nevertheless, as with every technical installation, results, whereby it can generally be said the most frequent causes are not material errors , but operating errors, cannot be ruled out. The checks to be performed are listed in the following sections as time -scaled checklists.

### 11.1 Fans

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

| d = daily, w=weekly, m = monthly, y = yearly                                                                                                                     |   |   |   |   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|
| Work to be performed                                                                                                                                             | d | w | m | y |
| Check fans for dirt build-up<br>• With dirt build-up: Clean fans (see Unit cleaning, page 62)                                                                    | X |   |   |   |
| Check the fan drive for smooth running<br>• Vibrations on the unit: remove imbalances<br>• Where required, tighten and correct blade fixtures and blade settings |   | X |   |   |
| Fan motor bearing: Running sound and smoothness changes<br>• Change out fan motor                                                                                |   |   | X |   |
| Fan motor: Is a new bearing due?<br>• Change out fan motor                                                                                                       |   |   |   | X |
| Fan impeller: corrosion on bolts<br>• Change out fan                                                                                                             |   |   |   | X |
| Impeller blades: Corrosion or damage on blades<br>• Change out fan                                                                                               |   |   |   | X |

\*: Recommended every six months

### 11.2 Unit heat exchanger

Perform a regular external check (visual inspection) on the unit every 5 years. Güntner recommends you have the test performed by an expert.

| d = daily, w=weekly, m = monthly, y = yearly                                                                                                                                                                                      |   |   |   |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|
| Work to be performed                                                                                                                                                                                                              | d | w | m | y |
| Check heat exchanger for dirt build-up<br>• With dirt build-up: Clean heat exchanger (see Unit cleaning, page 62)                                                                                                                 |   |   |   |   |
| Check heat exchanger's general condition<br>• Damages found: remove damages                                                                                                                                                       |   |   |   |   |
| Check heat exchanger's operating point (see Operation, page 54)<br>• Change in fan capacity found: Restore required system – side conditions<br>• Change in surface temperatures found: restore required system – side conditions |   |   |   |   |
| Change heat exchanger setting found<br>• Restore required setting (concentration, inhibition)                                                                                                                                     |   |   |   |   |
| Check heat exchanger and connections for tightness<br>• Repair unit sections (see Remove leaks, page 62)                                                                                                                          |   |   |   |   |
| Check heat exchanger for brine pressure rating<br>• Restore required system – side conditions                                                                                                                                     |   |   |   |   |
| Check heat exchanger for corrosion<br>• Corrosion or damages on core tubes, fins, support structures, pipe connections, fixtures: repair unit sections affected                                                                   |   |   |   |   |

\*: Recommended every six months

### 11.3 Care and maintenance plan

| Measure                    | Cleaning agent                                    | Interval                        |
|----------------------------|---------------------------------------------------|---------------------------------|
| Component cleaning         | Mechanically                                      | As required (visual inspection) |
| Complete cleaning          | Warm water or environmentally safe cleaning agent | After 120 hours                 |
| Leak check                 |                                                   | After six months                |
| Setting check              |                                                   | After six months                |
| Corrosion protection check |                                                   | After six months                |

### 11.4 Unit 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.

- Clean casing by rinsing with warm water approx. 77 °F (25 °C) and/or with environmentally friendly cleaning agents.
- Rinse thoroughly with water after using cleaning agents.
- Allow casing to dry completely.
- Check working fluid-carrying and electrical connections (see Test readiness for operation, page 52).

### 11.5 Heat exchanger cleaning

- Drain the unit (see system).
- Shut off the unit (see system).
- Power off the fans (see system).
- Clean the heat exchanger with one of the following procedures:

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) can damage the heat exchanger surface.

- Use a pressure of maximum 725 psi (50 bar) with hydraulic cleaning and maximum 1160 psi (80 bar) with cleaning with compressed air.
- Maintain a minimum distance from the fins of 8 in (+/- 200 mm).
- Always aim the jet vertically (maximum ±5 degree deviation) at the fins.
- Do not use any hard objects when cleaning.
  - Switch fans on (see system).
  - Open drain side (see system).
  - Open inlet side (see system).

### 11.6 Cleaning with compressed air

Blast heat exchanger (maximum 1160 psi (80 bar) pressure) with compressed air to remove dirt and contaminants.

#### NOTICE

Hold the jet of the cleaner vertical to the fins (maximum deviation of ±5 degrees) to prevent fins from bending

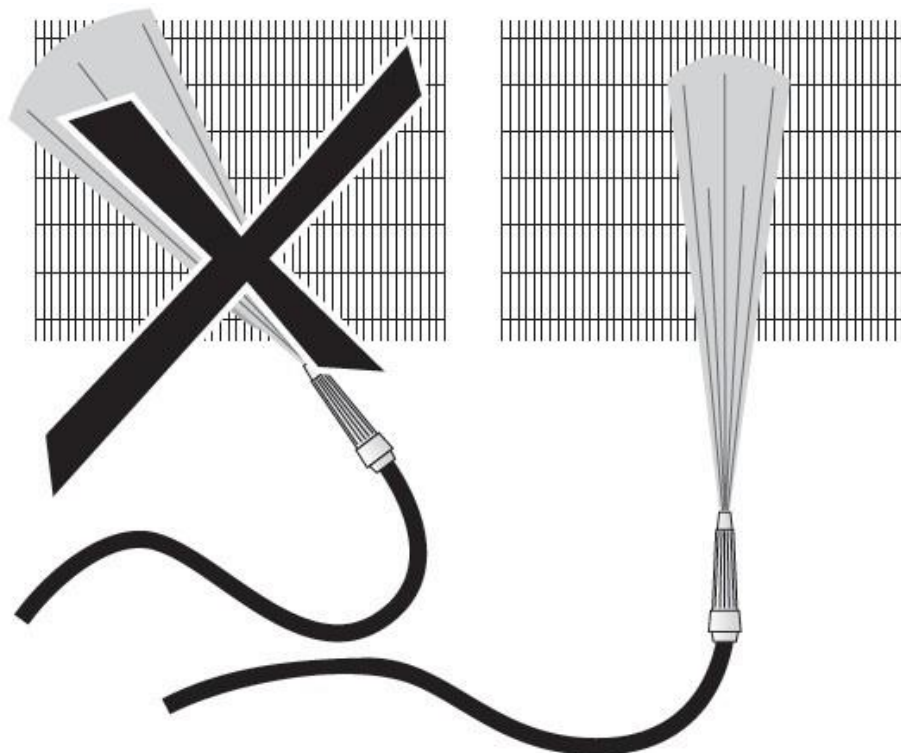
## 11.7 Hydraulic cleaning

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 when cleaning with water or pressurized steam. 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 in the working area are not in the path of water or steam jets. Cover these if required.

Heavier deposit or greasy dirt must be removed with a high-pressure water jet (maximum 725 psi (50 bar) pressure), steam pressure jet (maximum 725 psi (50 bar) pressure), min. 8 in (+/- 200 mm) distance with flat jet nozzle, or using neutral cleaning agent where applicable, against the coil. 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. The use of chemical substances is always under the full responsibility of the enduser and/or customer.
- Cleaning should be done from one side of coil preferably from outside to the inside, that is enough if done frequently. When the coil is too dirty and/or it has been reduced significantly its capacity, it must be cleaned from both sides.
- Hold the jet of the cleaner vertical to the fins (heat exchanger – maximum deviation of  $\pm 5$  degrees) to prevent fins from bending.



- Continue cleaning until all dirt has been removed.

## 11.8 Cleaning with brushes or brushed with compressed air

Remove dry dust or dirt with a brush, a hand brush or with compressed air (maximum 1160 psi (80 bar) pressure, minimum distance of 8 in (+/- 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.

## 11.9 Cleaning pipe insides

Rinsing with solvents removes dirt build-ups formed by lime scale, paint-type layers, oil residues, etc. The following are suitable as solvents:

10%-content formic acid

Trichloroethylene for organic layers

Cleaning principle:

1 Pump

2 Heat exchanger

3 Containers for catching cleaning liquid

Chemical cleaning is applied where the dirt is stubborn or with heat exchangers with lime scaled pipes and collectors.

Select the pump's supply rate so that a speed that is adjusted to the cleaning effect is achieved (2.5 to 5 m/s).

Neutralize and rinse the heat exchanger well after cleaning.

### Toxic hazard



Trichloroethylene is harmful to the health and highly narcotic: inhalation of air with 200 ppm causes tiredness. It has been classified as carcinogenic and germ cell mutagenic. It must be identified as "Toxic".

Acute poisoning cause brain damage, blindness and destruction of the smell and taste senses.

- Only use trichloroethylene in closed systems with complete recovery.
- Exclude all open flames or spark sources.
- Smoking is forbidden.
- Protect the skin and eyes with suitable protective materials

## 11.10 Cleaning fans

There is a danger of fingers being cut off from the rotating fan blades, injury hazard for the hands and the danger of being pulled in due to lose element such as hair, necklaces or clothing parts.

- Power off the unit before you begins 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 (Lock-out procedure).
- Put fans and guards that were removed or opened for maintenance back into their original position before 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.

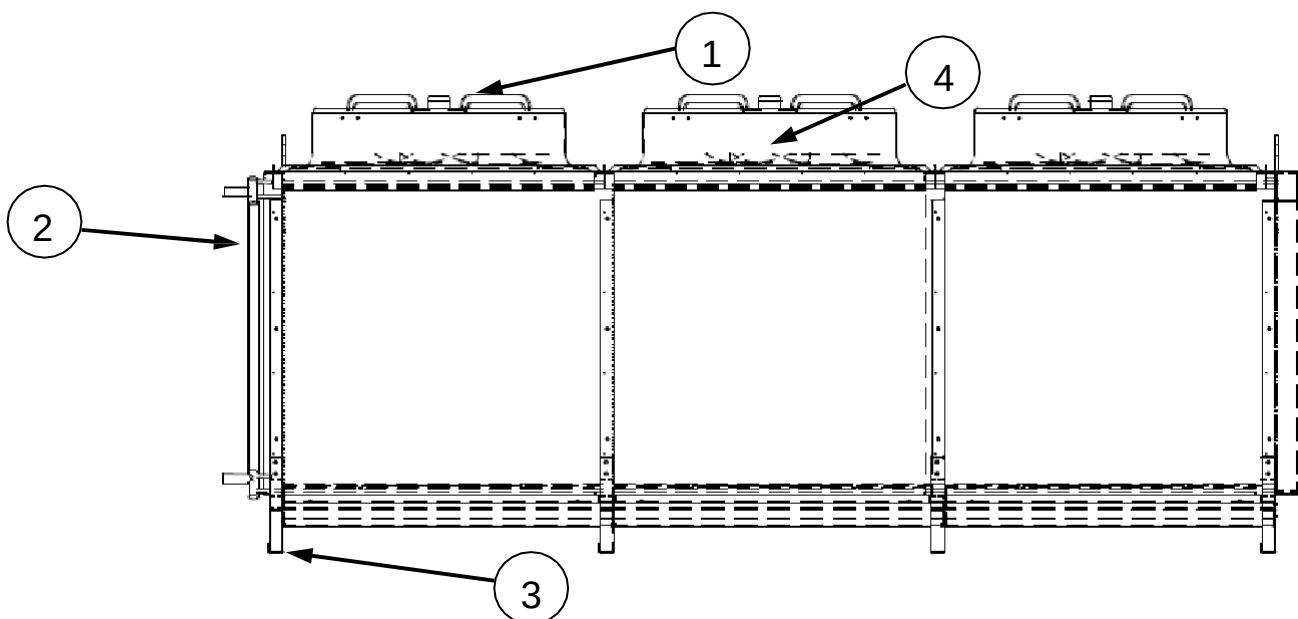
- Power off the unit and secure it against unintentional switching on.
- Clean fans with one of the following procedures:

#### ⚠ WARNING

Danger of damage to property. Mechanical cleaning with hard objects (e.g. steel brushes, screw drivers, or similar) damages the fan. Forbidden

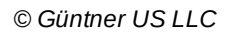
- Cleaning with compressed air: Blow fans with compressed air (maximum 145 psi (10 bar) pressure; minimum distance 8 in (+/- 200 mm)) to remove dirt and contaminants. Continue cleaning until all dirt has been removed.
- Cleaning with compressed air and brushes: Remove dry dust or dirt with a brush, a hand brush or with compressed air (maximum 145 psi (10 bar) pressure, minimum distance of 8 in (+/- 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 fan guard/s.
- Switch unit on.

## 12. Spare parts



Listed below are the major replacement parts of the GFW series. The standard motor is external rotor type.

| Item | Part                               | GFW 080  | GFW 090  |
|------|------------------------------------|----------|----------|
| 1    | Motor sound level N @ 230V/3~/60Hz | VT01224U | VT01196U |
|      | Motor sound level N @ 460V/3~/60Hz | VT01224U | VT01196U |
|      | Motor sound level N @ 400V/3~/60Hz | VT01224U | VT01196U |
|      | Motor sound level N @ 400V/3~/50Hz | VT01224U | VT01196U |
|      | Motor sound level N @ 575V/3~/60Hz | VT01328U | VT01331U |
|      | Motor sound level M @ 230V/3~/60Hz | VT01225U | VT01201U |
|      | Motor sound level M @ 460V/3~/60Hz | VT01225U | VT01201U |
|      | Motor sound level M @ 400V/3~/60Hz | VT01225U | VT01201U |
|      | Motor sound level M @ 400V/3~/50Hz | VT01225U | VT01201U |
|      | Motor sound level M @ 575V/3~/60Hz | VT01323U | VT01333U |
|      | Motor sound level L @ 230V/3~/60Hz | VT01226U | VT01197U |
|      | Motor sound level L @ 460V/3~/60Hz | VT01226U | VT01197U |
|      | Motor sound level L @ 400V/3~/60Hz | VT01226U | VT01197U |
|      | Motor sound level L @ 400V/3~/50Hz | VT01226U | VT01197U |
|      | Motor sound level L @ 575V/3~/60Hz | VT01329U | VT01330U |
|      | Motor sound level S @ 230V/3~/60Hz | VT01227U | VT01202U |
|      | Motor sound level S @ 460V/3~/60Hz | VT01227U | VT01202U |
|      | Motor sound level S @ 400V/3~/60Hz | VT01227U | VT01202U |
|      | Motor sound level S @ 400V/3~/50Hz | VT01227U | VT01202U |
|      | Motor sound level S @ 575V/3~/60Hz | VT01324U | VT01334U |
| 2    | Motor @ 380-460V/3~/50-60Hz        | VT03025U | VT03030U |
|      | Motor @ 220-240V/3~/50-60Hz        | VT03054U | n/a      |
|      | Junction box for 1 fan             | 4514     |          |
|      | Junction box for 2 fans            | 4608     |          |
|      | Junction box for 3 fans            | 4515     |          |
|      | Junction box for 4 fans            | 4515     |          |
|      | Junction box for 5 fans            | 4609     |          |
|      | Junction box for 6 fans            |          |          |
|      | Junction box for 7 fans            |          |          |
|      | Junction box for 8 fans            |          |          |
| 3    | Vibration damper                   | 4906     |          |
| 4    | Repair switch                      | 1407     |          |

[illegible]