

Installation instructions

Transportation | Installation | Operation | Maintenance | Disposal



V-shape VARIO

Series: GFD, GGFD



*This manual is to be considered part of the unit.
Read and follow this manual carefully before performing any work on the unit.
Always keep this manual accessible in the immediate vicinity of the unit
for future reference.*

guntner.com/us

About us

Product family and line:	V-shape VARIO
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Version history

The following table lists the respective changes compared to the old versions.

Attention! Minor changes to the instructions, such as the wording of the text or the layout, are not listed separately.

Version of the instructions	Changes/additions
1	Version of the instructions after which the version history was introduced

1 Key basic information

1.1 Importance of the instructions

These instructions apply for the units of the V-shape VARIO product family and line. The V-shape VARIO is a V-shape unit for heat dissipation for outdoor installation. The V-shape VARIO offers the possibility of operation with various working fluids and different operating principles (e.g., water/glycol: fluid cooler; CO₂: gas cooler). In addition, a variety of casings, variable equipment options, manifold combinations of materials and adjusted fan concepts are available.

Legal framework

These instructions have been written for the US Market. Design Product Safety Signs and Labels on the machine in accordance with ANSI Z535.

1.2 Applicable documents

The following documents are applicable:

- These instructions
- Documentation on selected accessories, if any
- Connection diagram (enclosed with the terminal box)
- For further technical data, see nameplate

These instructions are part of the system's operating instructions, which are provided by the system's manufacturer.

1.3 Responsibilities

1.3.1 Responsibilities of the installing contractor

The installing contractor is responsible for ensuring that this system is designed and installed in accordance with the local applicable codes, standards and safety regulations.

The installing contractor has the following obligations:

- Planning, design and calculation of the system in acc. with the statutory provisions, possibly also by an external planning consultancy (for required qualifications, see "Definition of the target group and requirements").
- Planning and preparing emergency measures:
 - To prevent consequential damage caused by malfunction, a warning system that immediately signals all faults must be provided on site.
 - Prepare emergency measures that prevent consequential damage to persons, property and the environment should faults occur.

- Specify inspection and maintenance intervals:
 - The system must be designed and equipped with all required equipment for maintenance, servicing and testing in acc. with the local applicable codes, standards and safety regulations.
- Point out the need for sufficient instruction of the operating and monitoring personnel for the operation and maintenance of the system.
- Inform Güntner U.S. LLC immediately if faults occur during unpacking, installation, start-up and operation.

1.3.2 Responsibilities of the owner

The owner must ensure that the employees entrusted with the operation, monitoring and maintenance of the system are adequately instructed and competent (see section "Definition of the target group and requirements", page 8).

Before commissioning the system, the owner must ensure that the operating personnel are sufficiently instructed about the system's documentation on the setup, monitoring, operating principles and maintenance of the system, as well as the safety measures to be observed and the properties and handling of the working fluid to be used.

The owner must ensure that, when operating, monitoring and maintaining the system, the working fluid and unit type do not deviate from the information specified in the order documents.

Planning and preparing emergency measures: To prevent consequential damage caused by malfunction, a warning system that immediately signals all faults must be provided on site. Prepare emergency measures that prevent consequential damage to persons, property and the environment should faults occur.

Responsibility remains with the owner of the system if the system is used by anybody else, unless there is an agreement on a different division of responsibilities.

1.4 Definition of the target group and requirements

General

Only persons who meet the requirements for the personnel may work in the area of the unit. This group of persons is defined below. To prevent damage to health and property, the owner must take measures to prevent unauthorized persons from gaining access to the unit.

In addition, the unit may only be installed, commissioned, operated, serviced, and repaired by trained, experienced, and qualified personnel. To be considered qualified, individuals responsible for the operation, maintenance, repair, and evaluation of the system and its components must have the necessary training and technical expertise as defined in ASHRAE Standard 15. Qualified personnel must be capable of satisfactorily performing all activities required for the safe and proper operation of refrigeration systems and their components.

Persons responsible for working on this unit in the various phases of its life cycle must have the necessary qualifications and competence for the respective tasks in acc. with the applicable local regulations.

Definition of the group of persons

Person	Qualification
Truck driver	Valid Class A CDL, additional training for heavy/permit loads if applicable
Crane/forklift operator	Valid driving and operator's license for crane/forklift truck
Warehouse worker	Specialized training as a warehouse worker or at least sufficient in-house qualification
Suitably qualified electrician	Certified training to become a qualified electrician
Pipefitter/welder	Certified training for the installation and welding of pipes and installation of heat exchangers and refrigeration piping
Refrigeration technician	A refrigeration technician should have comprehensive technical knowledge. This includes an understanding of how refrigeration systems work, the ability to install and repair equipment, knowledge of safety practices and the ability to read technical drawings and blueprints.
Mechanic	Training to become an industrial mechanic or comparable specialized training
Operator	Suitably qualified to monitor the safe operation of the system
Cleaning professional	Instruction in the use of cleaning methods and suitable cleaning agents
Installing contractor	Can be a person or a company that is responsible for the engineering and assembly and installation of the entire cooling system in the name of the owner and has a staff of trained engineers and technicians (see qualifications above)
Owner	The owner of the equipment can be a person or a company, who has the legal right to the machinery and to whom it belongs

Definition of tasks for the respective life cycle phases

Life cycle phase	Task	Group of persons
Transportation and storage	Transportation of the unit to the storage location or the place of installation	Truck driver
	Loading/unloading	Crane operator, warehouse worker
	Performing incoming goods inspection	Warehouse worker
	Performing intermediate storage	Crane operator, warehouse worker
Unpacking	Unpacking	Mechanic, warehouse worker
	Checking the holding pressure	Pipefitter/welder, refrigeration technician
	Performing maintenance runs of fans	Suitably qualified electrician
	Disposing of packaging material	Warehouse worker
Mounting/installation	Loading/unloading at the place of installation	Crane operator
	Mounting/installing and removing	Pipefitter/welder, refrigeration technician, mechanic
Connection	Connecting electrical components	Suitably qualified electrician
	Connecting hydraulic/refrigeration components	Pipefitter/welder, refrigeration technician
	Flushing the pipes	Pipefitter/welder, refrigeration technician
	Initial start-up (performing acceptance tests)	Refrigeration technician
Commissioning	Filling with working fluid	Pipefitter/welder, refrigeration technician
	Performing the commissioning and settings	Refrigeration technician
Operation	Performing functional checks	Operator
	Switching on/off	Operator
	Monitoring the cooling operation	Pipefitter/welder, refrigeration technician, operator
	Checking for damage	Skilled electrician, pipefitter/welder, refrigeration technician, operator
Troubleshooting	Performing a visual inspection	Skilled electrician, fitter/welder, mechanic, operator, cleaning professional
	Performing refrigeration tests	Refrigeration technician
	Performing electrical tests	Suitably qualified electrician, refrigeration technician

Life cycle phase	Task	Group of persons
Maintenance/repair	Performing a visual inspection	Operator
	Replacing wear parts	Suitably qualified electrician, pipefitter/welder, refrigeration technician, mechanic
	Performing weekly maintenance	Operator
	Performing annual maintenance	Suitably qualified electrician, pipefitter/welder, refrigeration technician, mechanic
	Replacing fans	Suitably qualified electrician, refrigeration technician, mechanic
	Replacing the control system	Suitably qualified electrician, refrigeration technician
	Fixing leaks	Pipefitter/welder, refrigeration technician
	Performing cleaning tasks	Pipefitter/welder, refrigeration technician, cleaning professional
Shutdown and taking out of operation	Shutting down	Pipefitter/welder, refrigeration technician
	Taking out of operation	Pipefitter/welder, refrigeration technician
	Draining propylene glycol	Refrigeration technician
	Draining (water)	Pipefitter/welder
Removal	Disconnecting the lines	Suitably qualified electrician, refrigeration technician
	Disassembling/dismantling/removing	Pipefitter/welder, refrigeration technician, mechanic
Disposal	Disposing of materials	Crane/forklift operator and truck driver, refrigeration technician, operator

1.5 Legal note

Please note that any warranty and/or liability claims require the presence of a proven defect of the unit supplied by us.

These installation instructions are an integral part of the supplied unit. It is essential that the contents of these installation instructions are fully observed. Any damage and/or malfunction resulting from failure to observe the contents of these installation instructions will not be covered by our warranty/liability. This applies in particular, but not exclusively, to the use of spare parts other than those specified (in case of doubt: use only original Güntner spare parts) and to unauthorized modifications to the unit compared to its original delivery condition, i.e. modifications without the express written consent of Güntner U.S. LLC. In particular, but not exclusively, modifications requiring our prior approval include the use of working fluids other than those specified, changes to the operating parameters and mechanical changes such as machining (e.g. drilling) without adequate protection of the unit from the resulting metal chips.

Warranty coverage does not apply to unauthorized modifications, improper installation, misuse, normal wear and tear, or damage caused during transport or handling. For complete warranty

terms and conditions, please contact Güntner U.S. LLC or refer to the applicable sales and delivery conditions.

1.6 Document conventions

Mark-up elements for special information

bold	Requires special attention!
⇒ —	Instructions Instructions (sub-item)
• ◦	Listing Listing (sub-item)

1.7 List of abbreviations

General list of abbreviations

Abbreviation	Meaning
A, Amps	Ampere (electrical current)
ANSI	American National Standards Institute
Emergency STOP	Switch for immediately switching off the refrigeration system
Hz	Hertz (frequency)
IP	Degree of protection against the penetration of solids/liquids
ppm	Parts per million, concentration figure, stands for "millionth part"
V	Volt (electrical voltage)
Ø	Diameter
1~	Single-phase alternating current
3~	Three-phase alternating current

List of abbreviations in metric system

Abbreviation	Meaning
°C	Celsius degrees (temperature unit)
l	Liter (volume)
mm	Millimeter (length)
kg	Kilogram (weight)

Abbreviation	Meaning
bar	Bar (pressure)

List of abbreviations in imperial system

Abbreviation	Meaning
°F	Fahrenheit degrees (temperature unit)
gal	Gallons (volume)
in	Inch (length)
lb	Pound (weight)
psi	Pounds per square inch (pressure indication)

1.8 Conventions for safety signs and instructions

1.8.1 General safety signs and their meaning in these instructions

⚠ DANGER
Addresses a hazardous situation which, if encountered, will result in death or serious injury.
⚠ WARNING
Addresses a hazardous situation which, if encountered, might result in death or serious injury.
⚠ CAUTION
Addresses a hazardous situation which, if encountered, could result in minor or moderate injury.
NOTICE
Indicates instructions that pertain to safe equipment operation. Failure to comply with these instructions could result in damage to the equipment.
SAFETY INSTRUCTIONS
Indicates specific safety-related instructions or procedures.

1.8.2 Warning signs and their meaning in these instructions



Warning of hand injury

Failure to observe the warnings can result in hands or fingers being crushed, drawn in or otherwise injured.



Warning of hot surface

The temperature is above +45 °C (the temperature at which protein clots) and can cause burns.



Warning of extreme cold

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



Warning of dangerous electrical voltage

Risk of an electric shock if live parts are touched.



Warning of heavy loads

Severe injuries can occur when lifting.



Warning of the risk of cutting

Sharp edges and corners.



Warning of risk of crushing

Transport, loading and unloading can result in life-threatening injury.



Warning of the risk of tripping

When entering this area, there is a risk of tripping over obstacles or uneven surfaces.



Warning of the risk of falling

Risk of falling when working high up.



Warning of the risk of slipping

After defrosting, after cleaning work or due to other circumstances, there is a risk of slipping.



Warning of explosive substances at the place of installation

Use of ignition sources can cause explosions at the place of installation.



Warning of flammable substances at the place of installation

Use of ignition sources can cause fire at the place of installation.



Warning of toxic substances at the place of installation

Contact with or inhaling toxic substances can cause injury or death.



Warning of suspended loads

Standing under suspended loads can cause injury or death.



Warning of risk of suffocation

Being in an atmosphere with oxygen deficiency or with hazardous substances, gases or vapors can cause suffocation and death.



Warning of high operating pressure

Breakage of pressurized components can cause injury or death.



Warning about general risks

General hazards to persons can cause injury or death.



Warning of automatic start-up
Automatic start-up of fans can result in hands and fingers being trapped.



Warning of the danger of pulling in
If body parts are being pulled into the unit, this can cause injury or death.

1.8.3 Prohibitory signs and their meaning in these instructions



No fire, no naked flames and no smoking!
Ignition sources must be kept away or at a safe distance, and ignition sources must not develop.



Do not enter!
Do not enter the marked area.

1.8.4 Mandatory signs and their meaning in these instructions



Use hearing protection!
Hearing protection must protect against loud noises.



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



Completely disconnect before working!
Completely disconnect the electrical system and secure it against restart before performing installation, maintenance and repair work.



Use eye protection!
Eye protection must protect against mechanical and chemical dangers and radiation.



Wear protective headgear!
Head protection must protect against hazards caused by impact with objects, swinging objects, falling objects or ejected objects.



Wear safety shoes!
Safety shoes must protect against external, damaging influences and offer protection against slipping.



Wear protective gloves!
Protective gloves must protect against mechanical and chemical dangers.



Observe manual!
Read the manual carefully and follow its instructions.



Use respiratory protection!
Breathing apparatuses must be suitable for the working fluid used. Breathing apparatuses must consist of:

- At least two self-contained breathing apparatuses (respiratory protective devices)



Lifting point/lifting hook

Marking of lifting points to ensure safe transport of loads.

2 Description

2.1 Types of V-shape VARIO

Fans

Fan types	Number of fans	Fan diameters
AC fans	from 2 x 2 up to 2 x 10	31-1/2", 35-7/16" (800 mm, 900 mm)
EC fans		

Available working fluids and their operating modes

Working fluid	Operating mode
Carbon dioxide (CO ₂)	Dry/hydroBLU™
Heat carriers (e.g. water/glycol)	Dry/hydroBLU™

Material combinations available as a standard

Material	Core tube	Fin	Casing	Header outlet/header inlet	Connections
Aluminum		X			
Copper	X*			X*	X*
High-strength Cu alloy					(X)
Aluminum, epoxy resin-coated		(X)			
Galvanized steel, powder-coated			X		
Stainless steel V2A/AISI 304	X**			X**	(X)**

X Standard design
(X) Optional
* Standard design for water/glycol
** Standard design for CO₂

Time limits

When used as intended, with maintenance carried out at the specified intervals and under the prescribed environmental conditions, the unit has a service life of 10 to 12 years.

Accessories and options available as a standard

- hydroBLU™ – adiabatic pad pre-cooling system
- Vibration dampers (supplied loose)
- Fall protection

2.1.1 Technical data of the unit

SAFETY INSTRUCTIONS

The specified typical values refer to standard types of this series. The following applies to special units in particular: Observe the specifications in the design (appendix) and on the nameplate.

Series	GGFD	GFD
Project number	See nameplate	
Unit name	See nameplate	
Serial number	See nameplate	
Year of manufacture	See nameplate	
Working fluid	CO ₂	Heat carriers (e.g. water/glycol)
Volume	See nameplate	
Max. permissible pressure (PS)	See order documents	
Test pressure	See nameplate	
Permissible humidity	0 – 100 %	
Airborne noise emitted	See order documents	
Weight	See order documents	

Legally binding values are indicated on the nameplate.

2.1.2 Technical data of the fans

SAFETY INSTRUCTIONS		
The capacity values of the fans depend on the ambient temperature and the air resistance at the place of installation. All electrical parts are designed in acc. with ASHRAE standards. The technical delivery conditions are in acc. with ASHRAE standards.		
Fan type	AC fan	EC fan
Degree of protection	At least IP54	IP55
Type of current	Three-phases current	
Voltage	3~230V, 460V, 575V, 50/60 Hz	
Permissible ambient temperature	-13°F to +140°F (-25°C to +60 °C)	
Protective devices	- Thermal: Overload protection - Mechanical: Protection guard	

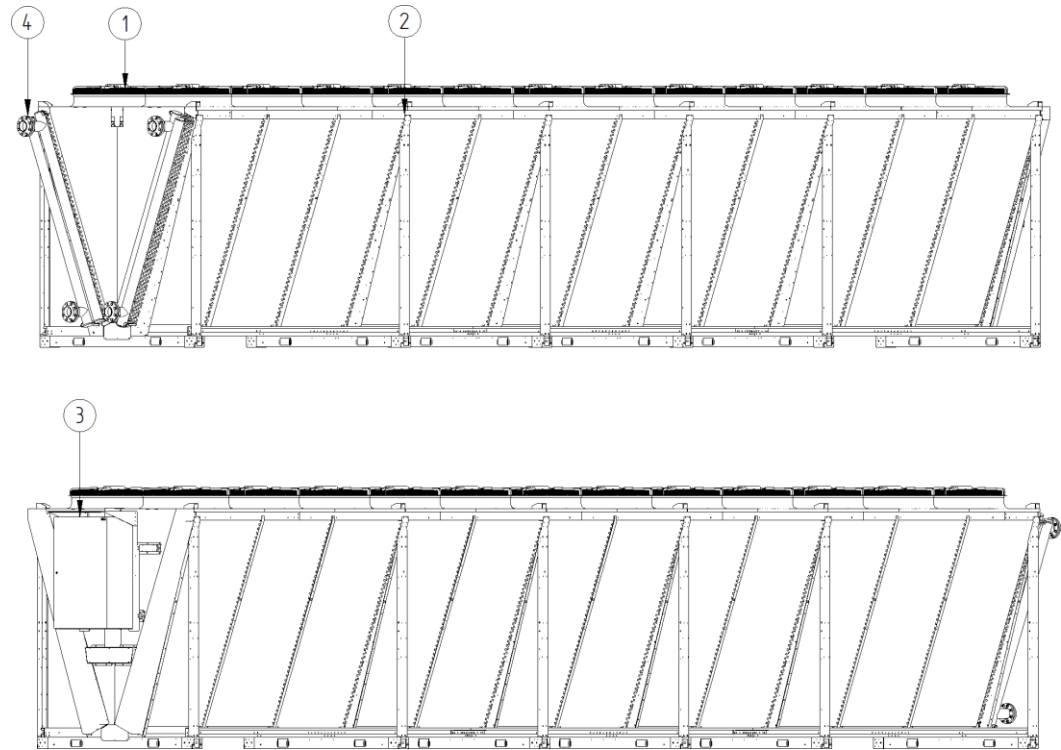
2.2 General information

Introduction

Units of the V-shape VARIO product family and line are intended for installation in a refrigerating plant (condensers/gas coolers) and in the heat carrier circuit of a cooling plant respectively (dry coolers). The refrigerating plant/cooling plant is a combination of interconnected refrigerant-carrying components and fittings that form a closed circuit in which the working fluid circulates.

Overview

The design and function are shown using the example of a standard unit of the V-shape VARIO.



Operation

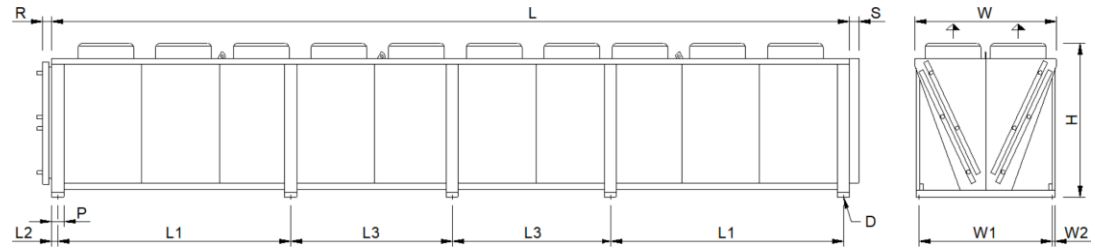
No.	Designation	Function
1	Fan	Dissipation of heat released by the working fluid into the atmosphere
2	Legs for floor mounting	Support the unit
3	Switch cabinet	Electrical connections
4	Unit connections	Connection of the pipes to the plant

2.3 Design and function

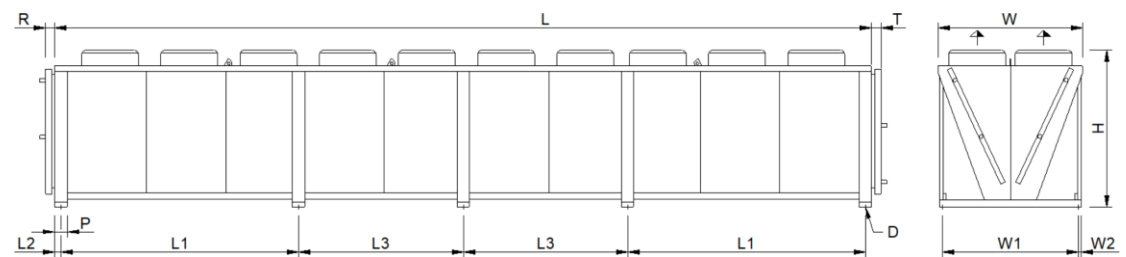
2.3.1 Designs

Overview

The unit is available with up to 20 (2 x 10) fans. The following figures are schematic representations of possible designs.



Dimensioning (one-sided connections)



Dimensioning (connections on both sides)

Refer to the order documents for the dimensioning of the units for the available sizes D, H, L, L1, L2, L3, P, R, T, W, W1 and W2.

2.3.2 Operating modes

Introduction

The unit can be operated in two different ways:

- **Dry**
- hydroBLU™ adiabatic pad pre-cooling system (**Pad**)

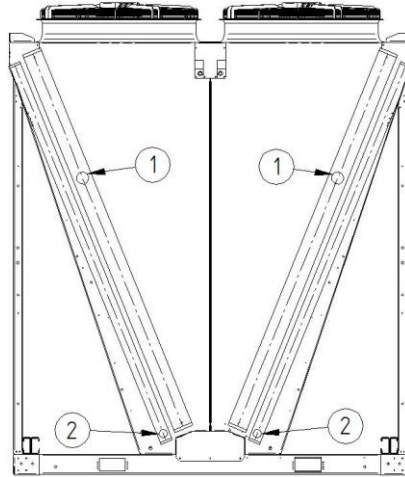
Dry operation

The heat exchanger coil is dry. The ambient air is taken in by the fans, then heated up while passing through the heat exchanger coil and finally discharged.

Adiabatic operation

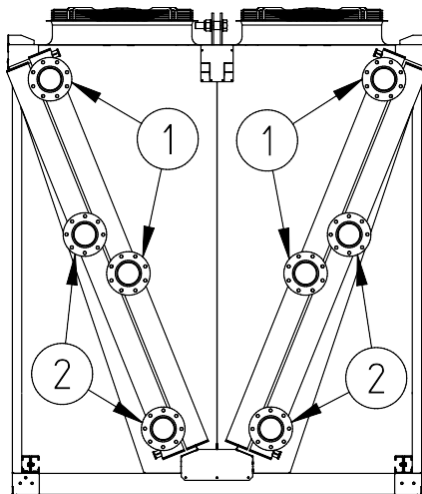
The heat exchanger coil is dry. The pad system is arranged in front of the heat exchanger coil. When the water wetting system is active, the pads are wetted. Now, the ambient air first passes through the wetted pads and cools down adiabatically. The pre-cooled ambient air then flows through the heat exchanger coil, heats up and is then discharged.

GGFD gas cooler



No.	Designation
1	Inlet of refrigerant
2	Outlet of refrigerant

Dry cooler GFD



No.	Designation
1	Heat carrier inlet
2	Heat carrier outlet

Operating principle

With CO₂:

CO₂ gas coolers operate in two distinct modes depending on the system operating conditions: transcritical mode and subcritical mode. In transcritical mode, the heat exchanger functions as a gas cooler, whereas in subcritical mode it operates as a condenser.

During transcritical operation, the incoming high-pressure CO₂ vapor is cooled through sensible heat rejection to the ambient air. Since the refrigerant remains above its critical pressure, no phase change occurs throughout the heat rejection process.

During subcritical operation, the incoming CO₂ vapor rejects heat to the ambient air, resulting in condensation of the refrigerant. Following condensation, the liquid CO₂ may undergo additional subcooling before leaving the heat exchanger. In this mode, the heat exchanger performs the function of a condenser by removing both sensible and latent heat from the refrigerant.

With the water/glycol working fluid:

Dry coolers (fluid coolers) cool the heat carrier by dissipating heat to the air (air side) that is guided over the heat transfer surface by the fans. There is no change of state.

2.4 Fan motor

Safety

SAFETY INSTRUCTIONS

Operate the unit once a month at full speed for at least three hours so that the bearings move and any penetrated condensate can evaporate.

SAFETY INSTRUCTIONS

For fans with an IP54 rating or higher, open the existing closed condensation water holes at least once a month.

AC technology

The AC motors are usually protected from superheating by a thermal contact (or PTC resistor).

With motors with thermal contact, wire the thermal contact in such a way that the motor cannot be started when the thermal contact is triggered. A locking device is recommended to prevent unintentional restart.

Motors with PTC resistor require an additional external trigger unit for the built-in thermistors. A locking device is recommended to prevent unintentional restart. The test voltage at the thermistors must not exceed 2.5 V or only current-limited measuring equipment may be used.

When using a star-delta connection, a corresponding time delay must be taken into account.

For motors with direct start and a connected load > 4.0 kW, a starting current limitation (soft start by means of thyristor) may be required.

If frequency converters are to be used for speed control, note the following regarding external rotor fans:

All-pole sinusoidal filters must be installed between the frequency converter and the fans (sinusoidal output voltage! Filter effect between phase to phase and phase to earth).

The frequency converters of the Güntner U.S. LLC company are equipped with this function as a standard. Three-phase standard motors are suitable for direct operation with frequency converters.

Three-phase fan motors can be operated by means of star-delta connection or with speed control. Check the direction of rotation. A change in the direction of rotation in the event of an incorrect direction of rotation is achieved by swapping two phases.

EC technology

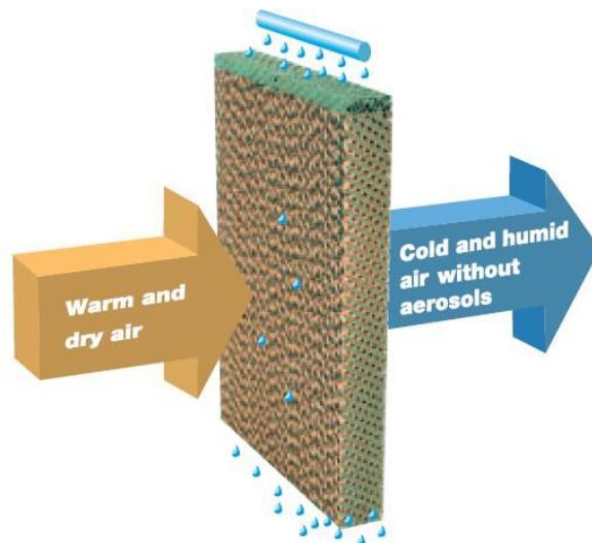
Please inform yourself about general differences between EC and AC technology.

The fan motors have their own electronic power unit. This power unit can be controlled via the Güntner Motor Management GMM / aicore™ air. Depending on the fan/motor type, the motors can be operated from three-phase supply (3~, 230, 460 and 575 V, 50/60 Hz) Operation without aicore™ air requires fan control with a voltage of 0 – 10 V. Available status and alarm relays: max. 230 V – 2 A / **at least 10 mA (2.3 W)**. For the connected loads, refer to the connection diagrams or the nameplate on the unit or the fan.

2.5 Pad pre-cooling system hydroBLU™ (accessory)

The units can be extended with the optional hydroBLU™ pad pre-cooling system. The hydroBLU™ pad pre-cooling system operates on the principle of adiabatic evaporative cooling and can be controlled with the Hydro Management function of the aicore™ air.

Adiabatic evaporative cooling is based on a physical principle: If water evaporates on a large surface such as the humid pads of the system, it extracts thermal energy from the air passing through. This energy is required for the water to change its state of matter from liquid to gaseous. The result is a noticeable cooling of the air.



Operating principle of the pad pre-cooling system

3 Safety

3.1 Intended/improper use

3.1.1 Intended use

Gas coolers/condensers or Fluid coolers of the V-shape VARIO product family and line are intended for installation in a refrigerating plant and a cooling plant respectively, and for outdoor installation. The gas cooler/condenser is intended for cooling CO₂ gas (transcritical summer operation) and for liquefying and subcooling CO₂ gas (subcritical winter operation) respectively with air for outdoor installation. The fluid cooler cools the heat carrier through heat dissipation into the air that is conveyed by the fans over the dry heat exchanger surface.

The operator of the system determines the operating point.

The nameplate indicates the state of matter of the fluid (liquid/gaseous), the fluid group (hazardous/non-hazardous), the permissible pressure and the temperature.

The machine must be operated in the professional sector.

3.1.2 Operating conditions

Safety measures

Observe the following to avoid personal injury, environmental damage and damage to property in acc. with the state of the art:

- The unit must be used only in acc. with the proper intended use.
- Maintain and clean the unit regularly (see section "Maintenance and cleaning").
- Ensure that the working fluid and unit type do not deviate from the information specified in the order documents when operating, monitoring and maintaining the system.
- Ensure that maintenance measures are performed in compliance with the system's operating instructions.
- Operate the unit only with the working fluids indicated on the nameplate (fluid group and state). Filling the unit with a different fluid is permitted only with the prior written consent of the manufacturer.
- The maximum permissible operating pressure stated on the nameplate must NOT be exceeded.
- Do not perform any work on the unit without using the personal protective equipment (PPE) specified in these instructions.

3.1.3 Improper use

General

The unit is being used improperly if:

- an unspecified working fluid, an unspecified pressure, an unspecified temperature and/or an unspecified connecting piping not prescribed in acc. with the instructions are used,
- the unit is not completely disconnected for cleaning/maintenance purposes,

- the main dimensions, weight, distances and recommended fixing sizes are not taken into account/adhered to during mounting,
- the supply line (electric) is fused or dimensioned incorrectly on site,
- the wrong fixing elements or not all of the fixing points provided were used for mounting,
- the unit is operated in an environment or for capacity requirements (e.g. aggressive/corrosive environment; capacity range) the unit with its material combination or capacity is not designed for, or which do not correspond to the intended use.

Improper modifications

The unit must not be modified without prior written consent of Guntner U.S. LLC. Modifications to the unit are:

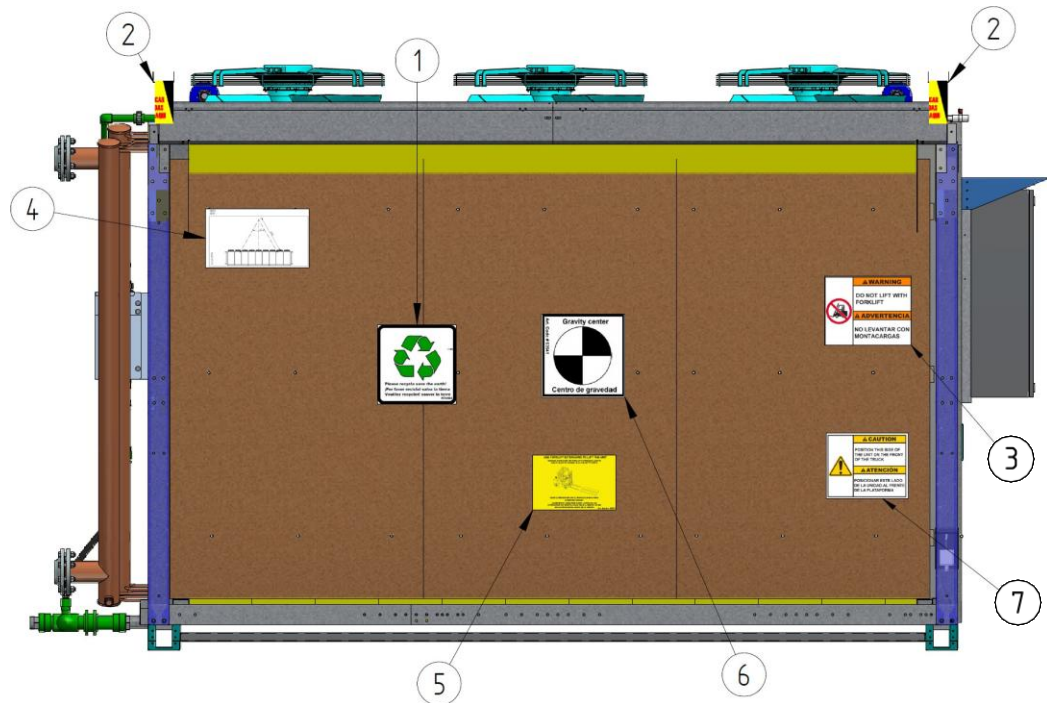
- Change of the operating point (the specified operating point is indicated in the order-related documents)
- Changing the fan capacity (air volume)
- Changing the volume of the working fluid passing through
- Changeover to a different working fluid
- Modification to load-bearing components or the casing (remodeling/changes)

Improper operation

The unit must not be operated if it is damaged or shows signs of faults. All damage and faults must be reported to Guntner U.S. LLC immediately and must be rectified without delay.

3.2 Labelling on the packaging/the unit

3.2.1 Packaging overview



Unit with 2×3 fans as example

3.2.2 Signs and notes on the packaging



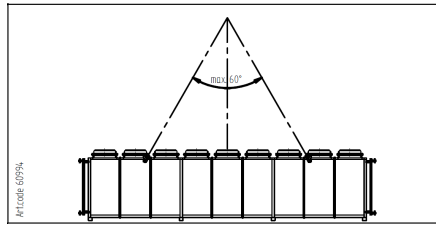
Label 1: 70488 / 70489 – Please recycle



Label 2: 60005 – Use strap only here



Label 3: 63050 – Do not lift the unit with forklift



Label 4: 60994 – Instruction for crane lift



Label 5: 66021 – Use forklift extensions



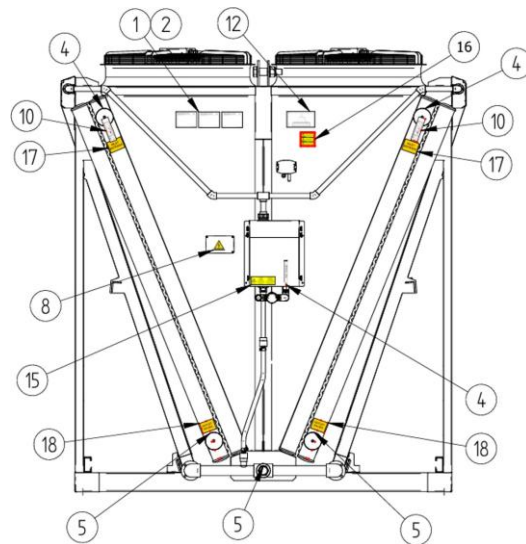
Label 6: 63541 – Gravity center



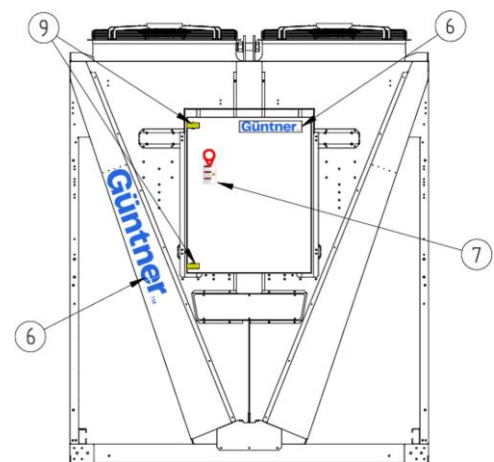
Label 7: 64489 – Side front sticker on the packaging

3.2.3 Unit overview

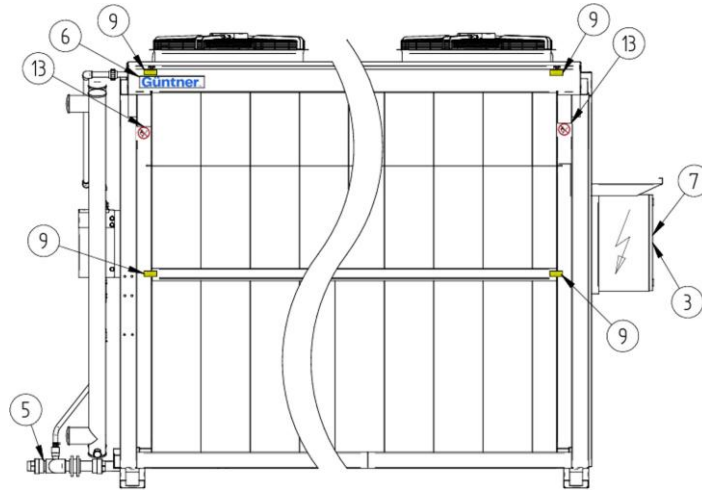
Side views



Markings on the unit (view from left)

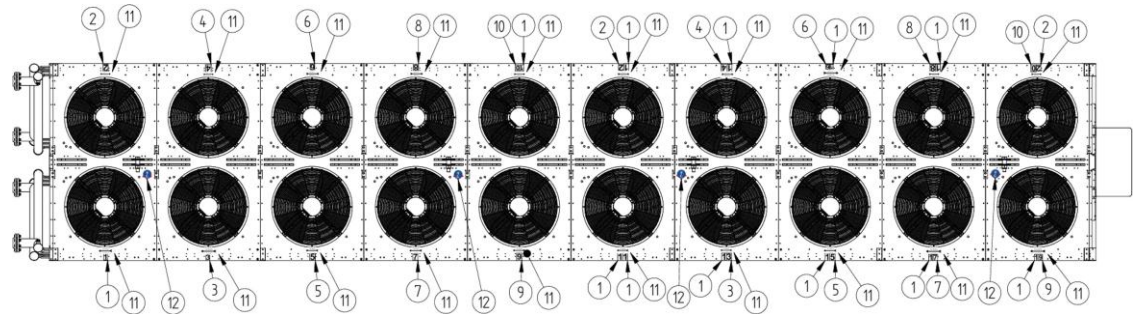


Markings on the unit (view from right)



Markings on the unit (front view)

Upper view



Markings on the unit (unit with 2×10 fans as example)

3.2.4 Signs and notes on the unit

Side views



Label 1: 64789 – Güntner US LLC nameplate

Label 2: 64788 – Güntner de México S.A. de C.V. nameplate

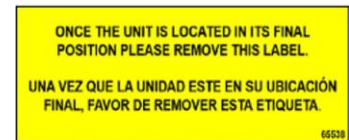
Label 3: 5477.1 – Motor Overload Sticker



Label 4: 5737 – Inlet connection

Label 5: 5738 – Outlet connection

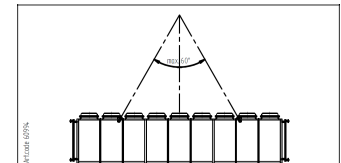
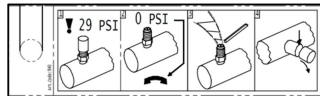
Label 6: 706** – Güntner logo



Label 7: 4628.1 – Danger electric shock

Label 8: 5607 – Warning of electric shock

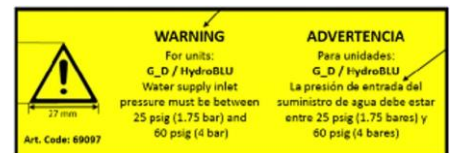
Label 9: 66538 – Installation sticker



Label 10: 940 – Transportation pressure

Label 11: 5608 – Fan rotation left

Label 12: 60994 – Instruction for crane lift



Label 13: 70300 – Flames prohibition

Label 14: 66932 – Entry prohibition

Label 15: 69067 – Water supply pressure



Label 16: 66327 – CO₂ pressure



Label 17: 70308 – hydroBLU water inlet



Label 18: 70309 – hydroBLU water outlet

Upper view



Label 1-10: 5750-5759 – Sticker numerals 0-9 (example shown: numeral 4)



Label 11: 5608 – Fan rotation left



Label 3: 64620 – Lifting point

3.3 Basic safety instructions

3.3.1 Please note

WARNING

Prior to all work on the unit and in case of danger respectively:

- Completely disconnect the unit and secure it against unintentional restart (lockable emergency stop switch is available or must be provided by the customer)
- Refer to the order documents for the permissible working fluid
- Observe the safety data sheets for the working fluid
- Wear personal protective equipment (PPE)

SAFETY INSTRUCTIONS

Only persons who meet the requirements for the personnel may work in the area of the unit (see section "Definition of the target group and requirements").
The operator must prevent persons under the age of 14 and unauthorized persons from gaining access to the unit.

3.3.2 Electrical hazard

⚠ DANGER



ELECTRICAL VOLTAGE!

A short-circuit on the electrical connections and direct or indirect contact with live parts of the unit (including accessories and supply lines) can cause severe injury or even death. In addition, overvoltage or overheating of the electrical parts installed in the unit can result in fires which in turn can cause smoke inhalation injuries among bystanders.

The risk of electric shocks and short circuits increases with the degradation of insulating material due to environmental influences or mechanical and/or deliberate damage.

- Completely disconnect the supply line before performing electrical work on the unit (see the documentation for the plant as a whole).
- Work on the unit and the connection and control configuration must be performed by specialist staff.
- Check electrical components regularly, including testing in acc. with ASHRAE standards and relevant national standards. Main switch/repair switch and similar to be provided by customer. Consider the information provided in the connection diagram.
- Properly connect the unit to the building's earthing system.
- Perform earthing checks and visual inspections of the earthing points regularly.
- Provide adequate lightning protection.
- The pipes of the hydroBLU™ system are connected to the protective conductor system by connecting the pipes provided by customer with the equipotential bonding of the building.



3.3.3 Hazard due to working fluids

Working fluids pose various residual risks such as irritation, suffocation, poisoning, burns, frostbite, fire hazard and/or explosion hazard. Observe the following safety measures:

- Observe the safety data sheet of the working fluid.
- Comply with the safety regulations for the system in acc. with the ASHRAE Standard 15 and ASHRAE Standard 34.
- Observe the pressure and temperature specified on the nameplate.
- Observe the type of fluid, the fluid charge and material selection in acc. with the technical data.
- Before performing any maintenance work, ensure that the unit is depressurized. Completely drain any working fluid from the unit if necessary.

⚠ WARNING		
	EXPLOSION HAZARD! FIRE HAZARD! RISK OF SUFFOCATION! RISK OF POISONING! RISK OF FROSTBITE! When working on the pipes of the heat exchanger (e.g. soldering or welding work), or if the flammable working fluid escapes through leaks and forms an explosive mixture over time, the working fluid catches fire or explodes and injures bystanders.	
	Bystanders may inhale the escaped working fluid. Inhaling the working fluid causes anything from breathing problems to suffocation or poisoning. Contact with the working fluid can cause frostbite and/or irritation.	
	Leakage of the working fluid can also lead to environmental damage.	
	• Drain the unit before commissioning or transporting. • Ensure that the operator provides appropriate firefighting equipment for soldering and welding work. • Ensure that the plant is designed in such a way that the unit can be filled/emptied safely. • Do not fill with a working fluid other than that specified in acc. with the order documents! • Take measures to prevent high working fluid concentrations on site. • Check the unit regularly for leaks and leakage (see section "Inspection/maintenance schedule"). Avoid leaks and leakage and, if necessary, have them fixed as quickly as possible by an expert. • Only put the unit back into operation when all leaks have been repaired. • Pay attention to the risk of ignition of oil residues carried over. • Avoid all sources of ignition when working! • Observe all applicable standards and directives with regard to waste disposal. • Wear personal protective equipment (PPE), including respiratory protection if necessary (see safety data sheet for the relevant working fluid).	
		

NOTICE

RISK OF MATERIAL DAMAGE AND LEAKAGE!

Using working fluids that differ from those specified on the nameplate can chemically or physically attack system materials, cause leaks, endanger personnel, property, and the environment.

- Only the designated working fluid may be used in the system.

Gas cooler mode

 WARNING		
 	DANGER OF INJURIES AND DAMAGE TO PROPERTY! The gas cooler units are operated as standard with carbon dioxide (CO₂, R744) as the heat rejection medium. CO₂ systems operate at very high pressures, especially under trans critical conditions. Prior agreement with the manufacturer is imperative when using other heat carriers. Carbon dioxide (CO₂) is a colorless, odorless, and nonflammable gas that is heavier than air. Under operating conditions in gas coolers, CO₂ may be present at very high pressure and temperature. CO₂ is non-flammable and non-explosive; however, rapid expansion of CO₂ from high pressure can cause: • Strong local cooling • Formation of dry ice • Cold burns or frostbite upon skin contact • Mechanical damage due to pressure release • Oxygen displacement CO₂ is Avoid contact with leaking CO₂. Escaping CO₂ gas or liquid can cause severe cold injuries. Remove affected persons immediately from the hazard area. CO₂ is heavier than air and may accumulate at floor level, in pits, shafts, or poorly ventilated spaces. In still air, dangerous concentrations may form quickly. There is a serious risk of suffocation, particularly at low levels due to oxygen displacement. Unauthorized people must not have access to the unit. When setting up it must be ensured that the heat carrier escaping from the unit cannot penetrate the interior of the building or put people at risk in any other way. Safety measures and procedure: • In the event of unexpected, serious leakage of heat carrier, activate the emergency procedures provided, e.g. if: ◦ There is a visible leak of heat carrier from the heat exchanger or pipeline components. ◦ There is a sudden large release (release of the greater part of the entire heat carrier filling 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 self-contained breathing apparatus for repair work in areas with high heat carrier concentrations in the ambient air. ◦ Ensure the set-up room is well ventilated. ◦ Divert escaped heat carrier fluid safely in accordance with local standards.	  

Dry Cooler mode

 WARNING		
  	DANGER OF INJURIES AND DAMAGE TO PROPERTY! The dry coolers units are operated as standard with the heat carrier ethylene glycol (synonyms: ethane-1,2-diol, glycol). Prior agreement with the manufacturer is imperative when using other heat carriers. 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 mucous membrane irritation; with ingestion agitation with disruption of the central nervous system; with prolonged endangering effect – fatigue, coordination disruption, unconsciousness, kidney damage. 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, floor, clothing! Remove contaminated, soaked clothing immediately! Do not allow 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 up it must be ensured that the heat carrier escaping from the unit cannot penetrate the interior of the building or put people at risk in any other way. Safety measures and procedure: • In the event of unexpected, serious leakage of heat carrier, activate the emergency procedures provided, e.g. if: ◦ There is a visible leak of heat carrier from the heat exchanger or pipeline components. ◦ There is a sudden large release (release of the greater part of the entire heat carrier filling 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 self-contained breathing apparatus for repair work in areas with high heat carrier concentrations in the ambient air. ◦ Ensure the installation is well ventilated. ◦ Divert escaped heat carrier fluid safely in accordance with local standards.	   

NOTICE

RISK OF FREEZING!

Units filled with a heat carrier can be damaged or destroyed in frost if adequate frost protection measures have not been taken. There is a risk of freezing during pressure testing, operation, standstill or after draining units that cannot be completely drained.

- Ensure that the antifreeze concentration is sufficient.
Caution! The operator must ensure that the antifreeze concentration is sufficient.
- When draining, the unit must be sufficiently ventilated!

3.3.4 Hazard due to vibrations

⚠ WARNING



EXPLOSION HAZARD, FIRE HAZARD, RISK OF PERSONAL INJURY AND DAMAGE TO PROPERTY CAUSED BY EJECTED OBJECTS!

A component, a chunk of ice or the complete fan unit loosens because of vibrations/oscillations/imbalance and

- injures bystanders or
- is thrown out of the unit by the fan's rotating movement and damages the heat exchanger whereby
 - the working fluid escapes and gets onto the skin of bystanders and/or is inhaled by bystanders (see section "Hazard due to working fluids"), or
 - the working fluid ignites (with flammable working fluids) and injures bystanders, or
 - a core tube that is under pressure explodes and the resulting pressure wave injures bystanders.



Take the following measures:

- Fans, components and pipes in the system must be designed, constructed and integrated in such a way that risks caused by vibrations are reduced to a minimum.
- Connect the fans in acc. with the motor connection diagram in the terminal box, check the connection and perform acceptance test of the fans.
- Check the fan unit regularly in acc. with the inspection and maintenance schedule.
- Keep the unit free of ice.
- Check the unit and especially the proper functioning of the fans after standstill periods (particularly in the event of snow and freezing rain).
- To further reduce the transmission of vibrations from the unit to its surroundings, additional vibration dampers can be installed by the customer between the unit and the ceiling.

⚠ WARNING

ADVERSE HEALTH EFFECTS AND DAMAGE TO PROPERTY CAUSED BY VIBRATIONS!

The operation of fans regularly causes vibrations that are increased by imbalances resulting from impurities or damage of fan blades. These vibrations are transmitted to the building and the unit and can result in damage to the building and the unit, and to the unit's suspension, the pressurized pipes/components and the system's components connected to the unit.

This can result in leakage of the working fluid and adverse health effects (see section "Hazard due to working fluids").

- Check the fan blades and protection guards regularly for impurities and snow accumulation, and make sure the fans run smoothly.
- To further reduce the transmission of vibrations from the unit to its surroundings, additional vibration dampers can be installed by the customer between the unit and the ceiling.

3.3.5 Hazard due to pressurized parts

⚠ WARNING

EXPLOSION HAZARD! PERSONAL INJURY AND DAMAGE TO PROPERTY DURING OPERATION OR MAINTENANCE!

The pressure in the heat exchanger exceeds the specified limit values (e.g. due to improper installation) and results in an explosion or breakage of pressurized pipes/components. This causes objects to be ejected and/or working fluid to be released, resulting in personal injury or damage to property.



- Comply with all regulations regarding installation, operation, maintenance and maximum permissible operating pressure.
- Drain the unit before commissioning or transporting.
- Ensure that the operator provides appropriate firefighting equipment for soldering and welding work.
- Ensure that the plant is designed in such a way that the unit can be filled/emptied safely.
- Ensure that relief devices against liquid expansion are in place (if applicable).
- Ensure that subcooled liquid is present only to a minimal extent in parts of the system when the refrigerating plant is at a standstill – by minimizing the number of "dead end traps".

3.3.6 Thermal hazard

⚠ WARNING	
 	RISK OF BURNS OR RISK OF FROSTBITE! Contact with the working fluid (e.g. during filling/draining) or with the unit surface or pipes can cause severe burns/frostbite. • Wear personal protective equipment (PPE). • Retrofit a thermal insulation to the pipes and the connection system as required. • If necessary, wait until the temperature has equalized to the ambient temperature before starting to work.
 	

⚠ WARNING	
	OVERHEATING AND OVERPRESSURE HAZARD! Operating the system above its allowable temperature range can cause a dangerous rise in internal pressure and lead to material fatigue, resulting in equipment failure, leaks, or serious injury to personnel. • Do not exceed the specified temperature limits.

3.3.7 Mechanical hazard

⚠ WARNING	
	RISK OF INJURY! Due to overloading or external influences such as extreme, impermissible ice loads on the unit, the unit loses its stability and tips over or falls down, or structural failure occurs and the unit breaks apart. Bystanders are seriously injured. • Install the units at the corresponding fixing points. The operator or installer is responsible for ensuring that the connecting elements (screw connections) are of an adequate strength. • Tighten the fixing bolts evenly to achieve an even load distribution on the unit's fastenings. • Anchor the unit in its fixing position to prevent it from moving. • Secure fixing bolts against loosening by means of appropriate locking devices. • Regularly check all fixing bolts and attachments, especially those of the lifting accessories (e.g. crane lug bolts), for corrosion damage, loading-bearing capacity and structural integrity, and replace them if necessary, especially before and after lifting the unit.

 WARNING		
  	RISK OF SLIPPING! RISK OF TRIPPING! RISK OF FALLING! A person slips when accessing the unit (e.g., on the unit surface), or trips over a protruding part and falls. • Arrange the unit's surroundings in such a way as to ensure safe access and safe working on the unit at all times – even in adverse weather conditions. • Check all fixing bolts and fixing devices regularly and especially before and after lifting the unit for corrosion damage, load-bearing capacity and structural integrity, and replace them if necessary. • Appropriate fall protection measures must be taken by the operator or operating personnel (separate installation instructions for the fall protection are provided or can be found in >myDocuments">https://myguntner.com/>>myDocuments with the filename "V-Shape_HANDRAIL_IOM..."). • Observe the maintenance schedule. • Wear personal protective equipment (work gloves and slip-resistant safety shoes or safety shoes with slip-resistant overshoes). • Please note the following before stepping onto the unit surface (e.g. for maintenance and servicing): ◦ Stepping onto the unit surface is permitted only if appropriate fall protection is in place. ◦ Check the unit surface for snow/ice and remove it if there is any. ◦ Climbing onto the unit is strictly prohibited during adverse weather conditions (e.g., water on the unit surface, ice, or strong wind gusts). Failure to comply may result in serious injury or death. ◦ Never step on the fans. ◦ Always maintain a safety distance from the edges when walking on the unit. ◦ The fall protection (railing and ladder construction) must be attached to the unit by specialist staff in acc. with the manufacturer's instructions. ◦ The fastening elements of the fall protection (railing and ladder construction) may be used only once, i.e. new fastening elements must be used for each assembly/disassembly. Tighten all setscrews applying a tightening torque of 40 Nm. ◦ It is the responsibility of the operator to ensure that the ladder is secured against unauthorized climbing. Access only for persons who have permission from the operator and are appropriately trained.	   

⚠ WARNING		
 	RISK OF CUTTING AND CRUSHING! Persons can cut or otherwise injure themselves on the packaging (e.g. wood) or on sharp edges of the unit (e.g. sheet metal edges/fins) or the accessories. There is a risk of crushing when the unit is open.	 
	• Wear personal protective equipment (PPE). • The hinged or removable components (e.g. side plates (if any)) may be opened only by trained specialist staff and only for the purpose of maintenance and repair. Once the work has been completed, the components must be closed and secured against unintentional or unauthorized opening.	
⚠ CAUTION		
	RISK OF SKIN INJURY! User comes into contact with insulating material or its fixing needles, which causes skin irritations.	 
	• Wear personal protective equipment (PPE).	

3.3.8 Hazard due to fans

⚠ WARNING		
  	DANGER OF PULLING IN, RISK OF CRUSHING AND DANGER OF CUTTING OFF! Limbs can be caught by the running fan or pulled into it and be injured (e.g. crushed) or severed. Hair and clothing can be pulled in the running fan and cut off. • Completely disconnect the unit and secure it against unintentional restart before performing any work. A lockable repair switch is available or to be provided by customer. Attach an appropriate warning label to the unit. • Ensure that the fans are connected in acc. with the motor connection diagram in the terminal box, then perform an acceptance test of the fans. • Operate the fans only with protection guards. • The protection guards must be opened by trained specialist staff and only for maintenance and repair purposes. • Check the fan unit regularly in acc. with the inspection and maintenance schedule. • Do not wear any loose clothing or jewelry. Secure long hair on the head. • Wear personal protective equipment (PPE). • Stop the unit immediately if a missing or ineffective safety device is detected. • Check the unit and especially the proper functioning of the fans after standstill periods. • Keep the unit free of ice. • Operate the unit only with safety devices.	  

3.3.9 Other hazards

⚠ WARNING		
	RISK OF HEARING DAMAGE! Persons who spend long periods in the vicinity of the unit can suffer hearing damage, discomfort and stress as the unit produces noise levels (sound pressure levels) of over 70 dB(A). • Wear personal protective equipment. • Observe the requirements of local authorities. • The manufacturer of the system is obliged to position the unit in such a way that noise pollution is minimized. In addition, further suitable measures must be taken to minimize noise.	

3.3.10 Hazards due to accessories

⚠ WARNING	
 	RISK OF FIRE AND BURNS! The humidification pads for the pre-cooling system are flammable if in contact with sparks, fire and high heat respectively, especially if they are dry. Burning pads can cause severe injuries and even death, and result in serious damage to property. • Remove the pads from the unit prior to grinding, welding and hot work. • Store the pads in a safe area for the duration of the work.
⚠ CAUTION	
	RISK OF INJURY DUE TO SLIPPING! Leakage in the piping and the humidification pad system causes persons to slip and fall. • Check the drain system and the fixing bolts regularly.

Safety instructions for hydroBLU™

⚠ WARNING	
 	RISK OF FIRE AND BURNS! The humidification pads for the pre-cooling system are flammable if in contact with sparks, fire and high heat respectively, especially if they are dry. Burning pads can cause severe injuries and even death, and result in serious damage to property. • Remove the pads from the unit prior to grinding, welding and hot work. • Store the pads in a safe area for the duration of the work.
⚠ CAUTION	
	RISK OF BIOFILM FORMATION DUE TO STANDING WATER! If the drains of the trays remain closed, standing water can occur, resulting in biofilm formation. This can cause adverse health effects. • Ensure that the drains are not closed. • Connect the drains to the drain line.

3.3.11 Legionella prevention

For all units in which water is evaporated, the operator is responsible for complying with locally applicable specifications.

The chain of events for the formation and spread of legionella is used to describe the measures to be taken to prevent legionella being discharged from the system.

4 Transportation and unpacking

4.1 Safety instructions for transportation and unpacking

⚠ WARNING		
    	RISK OF INJURY OWING TO STRONG IMPACTS! RISK OF CRUSHING AND SHEARING! The following hazards may occur: • During transporting or maneuvering the means of transport, bystanders are caught by the unit. This causes serious impact injuries, or limbs are sheared off/crushed. • Bystanders get under the unit or are caught by a falling component/unit and lose limbs or are crushed. • The unit loses its stability due to accelerations during transportation and falls over or falls from the goods vehicle. Bystanders are seriously injured. • Attempting to transport the unit by hand may result in injury (e.g. spinal injury) due to excessive load. Take the following measures: • Transportation including loading and unloading only by specialist staff. • Do not stand in the loading/danger zone under or in the vicinity of suspended loads. • Ensure that the unit is protected against slipping and mechanical damage. • Remove foreign material before lifting the unit, and sweep off snow. • Ensure that the unit is not filled during transportation. • Suspend or position the unit so that it has a stable center of gravity. • Use appropriate lifting or tie-down points. • Use suitable tools and working equipment. • Do not lift the unit in strong winds. • Observe maximum permissible total weight. • Wear personal protective equipment. • Not intended for carrying by hand.	   
NOTICE		
The lifting capacity of the means of transport must be at least 1.5 times the weight of the unit. Do not use connection pieces and outlet headers as attachment points for lifting, pulling, fixing and climbing. This can result in leakage.		

NOTICE

The finned heat exchangers must be protected against hard impacts and shocks during unloading and internal transport, and against slipping, mechanical damage as well as harmful effects of the atmosphere (packaging units)!

SAFETY INSTRUCTIONS

Observe all basic safety instructions (see section "Basic safety instructions").

4.2 Transportation and storage of the unit

4.2.1 Transporting the unit

General safety

SAFETY INSTRUCTIONS

Read and observe the transport signs on the unit packaging!

Permanent mechanical load caused by uneven road surfaces and potholes, and vibrations during ship transport, can result in transport damage.

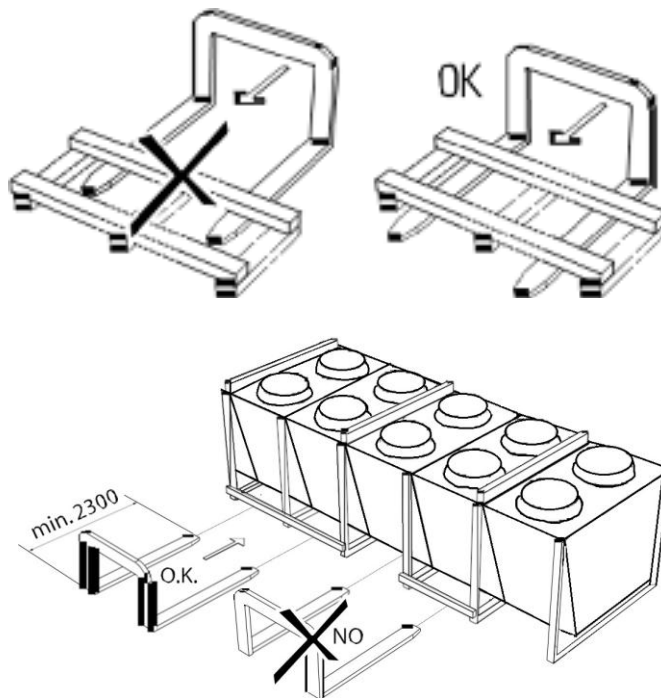
- Mounted parts that can be induced to vibrate – particularly fans and bases (if applicable) – must be removed prior to maritime transport or in countries with critical traffic routes.
- Supports of outlet headers and flanges must be added if required.
- After transport, check all bolted connections, especially on EC fan terminal boxes, and retighten them if necessary (for tightening torque values, see section "Fans").
- After transport and installation of the unit, check all parts of the unit for damage. Seal any damage properly with varnish to ensure corrosion protection. This applies in particular to crane lugs and cross struts on the unit frame for transport with industrial trucks.

Industrial truck with forks

NOTICE**RISK OF THE UNIT FALLING DURING TRANSPORT WITH AN INDUSTRIAL TRUCK WITH FORKS!**

When transporting the packaged unit with an industrial truck with forks, there is a risk that the unit may slip or fall, causing damage.

- Ensure that the forks are long enough for the pallet to rest completely and across its full width on the forks.
- Before lifting the pallet, slide the forks far enough underneath the open spaces of the pallet so that they reach to the end of the pallet.
- To prevent paint damage, prepare the forks accordingly, for example by applying rubberized pads.
- During transport, avoid impact loads caused by uneven surfaces as well as abrupt starting or braking.



Crane

NOTICE

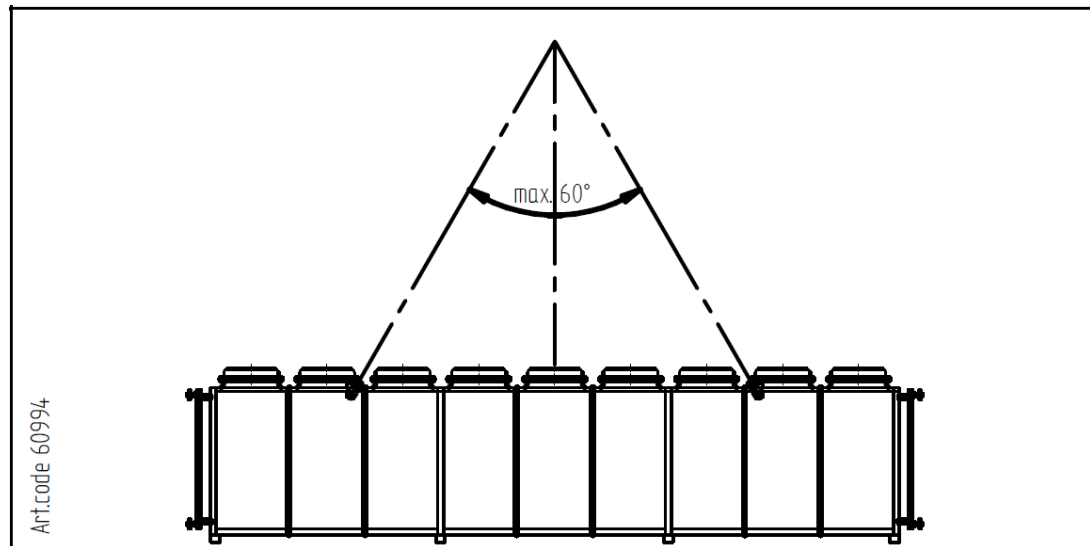
RISK OF UNIT FALLING DURING TRANSPORT BY CRANE!

If too great an angle is allowed between the cables, chains, or lifting loops when transporting with a crane, this can lead to excessive mechanical stress on the crane lugs, which can break in extreme cases, causing the unit to fall down.

- Ensure that the angle between the cables, chains, or lifting loops does not exceed 60 degrees during crane transport.

Observe the following regulations when transporting with a crane:

- ⇒ Use the drill holes for the eyes.
- ⇒ Ensure that the cables/chains/loops do not rub against the legs or other components.
- ⇒ The angle between the cables/chains/loops must not exceed 60°.
- ⇒ The cables/chains/loops must pull upwards as straight as possible when viewed from the front.
- ⇒ Prevent any vibration of the unit.



Procedure

- ⇒ Transport the packed unit with suitable transport equipment (e.g. industrial truck with forks, crane) to the final place of installation.
- ⇒ Unload the unit.

4.2.2 Storing the unit prior to installation

- ⇒ Protect the unit against dust, dirt, moisture and wetness, damage and other harmful influences until it is mounted.
- ⇒ For storage periods of more than one month: Operate the fans at least once a month at full speed for at least three hours so that the bearings move and any penetrated condensate can evaporate. Check, once a month and prior to installation, if the transportation pressure is still present to ensure that the unit is leak-tight. If the pressure is too low or if there is no transportation pressure at all, be sure to contact the service department of the manufacturer. Before moving the unit to the installation site, check the load capacity and structural integrity of the crane lugs and replace them if required. Store the unit only in its original packaging until installation.
- ⇒ If the unit installation is delayed beyond the initial deadline scheduled for installation: Protect the unit against weather and other harmful effects and dirt with an appropriate tarpaulin. In this context, ensure good ventilation of the unit.

4.3 Transport and storage of humidification pads

As standard, the humidification pads are supplied mounted on the unit.

If the humidification pads are delivered separately for subsequent mounting, the delivery consists of individual packages. If the delivery is not intended for direct mounting, store it in a dry place where it is protected from damage, moisture and the risk of fire until mounting.

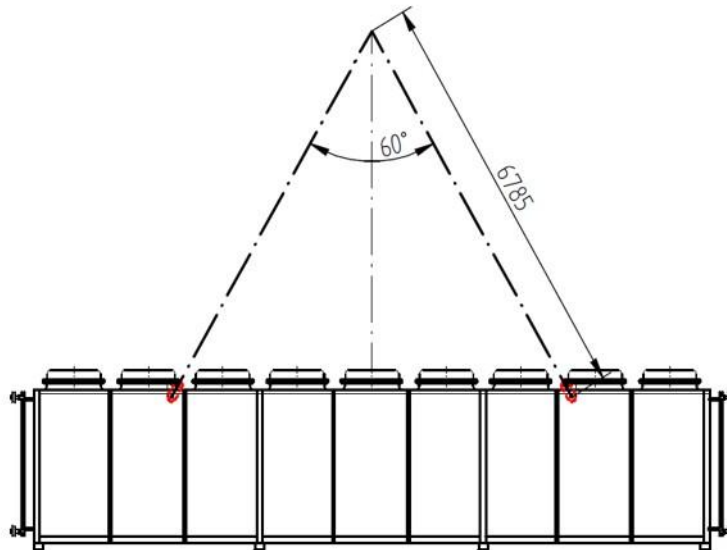
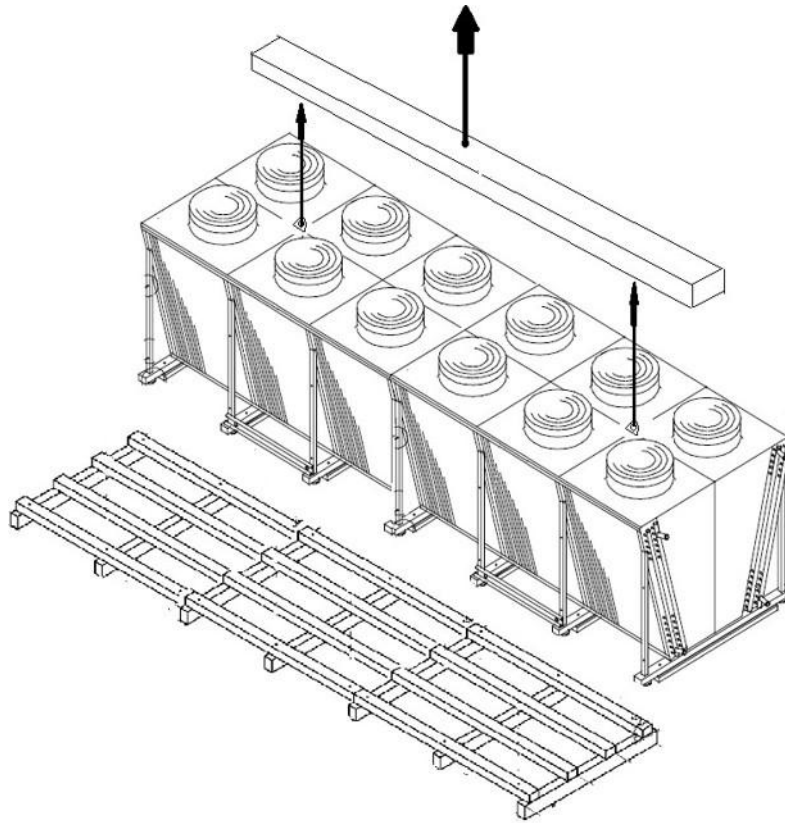
Depending on the size of the packages, provide a suitable means of transportation to the place of installation.

4.4 Rigging and unpacking the unit

Rigging instructions

An appropriate crane is required to unload the unit from the flat bed.

- ⇒ Determine unit weight from the offer-related documents. The crane capacity, hooks, chains, straps, and load bar must be determined accordingly.
- ⇒ Insert hooks, chains or straps in the rigging supports located at the top of the unit, between the fans (see drawing below).
- ⇒ Lift unit from the flat bed and move to a clear and completely horizontal area.



Unpacking instructions

Once the unit has been placed over a completely horizontal area:

- ⇒ Remove plastic
- ⇒ Remove cardboard from corners
- ⇒ Remove wooden screws from the basement of the unit, that attach it to the pallet
- ⇒ Use crane and load bar to lift the unit and remove from the pallet
- ⇒ Place unit in site of operation
- ⇒ Set up installation of inlet and outlet pipelines and remove flange supports
- ⇒ Unscrew the cap.

After unpacking

- ⇒ Dispose of packaging material.
- ⇒ Check scope of delivery for completeness. For the scope of delivery, refer to the order documents
- ⇒ State transport damages and/or missing parts on the delivery notes. Immediately notify the manufacturer in writing about the matter. Damaged fins can be repaired on site using a fin comb.
- ⇒ Check the transport pressure (see below).

SAFETY INSTRUCTIONS

Güntner U.S. LLC transport packaging is made from environmentally sound material and is suitable for recycling.

4.5 Checking the transportation pressure

Introduction

The section applies only to units supplied with transportation pressure.

All units are delivered by the manufacturer with approx. 29 psi (2 bar) of transportation pressure (cleaned and dehumidified air). The transportation pressure is used to check the leak tightness.

Specific hazards

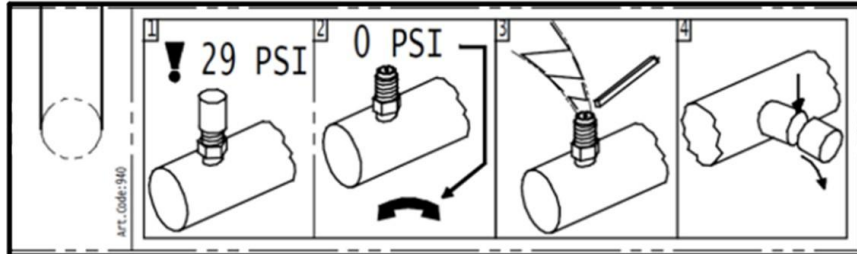
⚠ CAUTION



RISK OF DAMAGE TO PROPERTY!

The unit is pressurized! An unpressurized unit indicates a leak due to transport damage.

- Do not put the unit into operation!
- Immediately report any pressure drop of the unit to the manufacturer and note it on the delivery note.

Procedure immediately before the installation

In the case of factory-sealed pipe ends without flanges

- ⇒ Check the transportation pressure (attach a pressure gauge to the Schrader valve and read the pressure) and then release it.
 - ⇒ Cut off the sealed pipe ends without flanges from the pipes (e.g. with a suitable saw).
- Caution!** The sealed pipe ends must not be cut off more than 13/16 in (20 mm) from the end.

5 Installation and commissioning

5.1 Safety instructions for installation and commissioning

Please note

SAFETY INSTRUCTIONS

Observe the basic safety instructions and the safety instructions for transportation (see sections "Basic safety instructions" and "Safety instructions for transportation and unpacking").

SAFETY INSTRUCTIONS

As a lightning protection measure, conductor antennas next to the units are strongly recommended.
Several units can be placed space-saving in rows with high nominal capacity to cover high capacities. With double or multiple row set-ups a substructure is required to guarantee sufficient air-side pressurizing.

SAFETY INSTRUCTIONS

Observe the earthing marking on the unit.
Ensure professional equipotential bonding to protect any warranty claims.
After ensuring that the unit is earthed on site, all components of the earthing point must be repainted and sealed properly to ensure corrosion protection.

SAFETY INSTRUCTIONS

Install and commission the unit in accordance with ASHRAE Standard 15, only in the manufacturer approved configuration. Mounting/installation must be performed by competent persons. Comply with ASHRAE Standard 15 regarding refrigerants, filling quantities, and heat transfer systems.
Provide alarm and monitoring systems in accordance with ASHRAE Standard 15, where applicable.
The manufacturer's warranty does not cover damage resulting from improper installation.

SAFETY INSTRUCTIONS

During filling and after filling the system, properly vent the heat exchanger (e.g. for glycol/water). To do this, keep the vent connections open until no more air escapes from the unit!
Observe the safety data sheets of the working fluid used!

SAFETY INSTRUCTIONS

When performing chip-removing activities (e.g. drilling holes) on or near the unit, grinding with an angle grinder and during all cutting work, the unit must be protected from flying sparks and falling chips. It is necessary to cover the unit during processing and to clean it carefully afterwards. Remove all falling chips and repaint the unit in the reworked areas to ensure corrosion protection.

SAFETY INSTRUCTIONS

After commissioning, document the installation and settings and have them signed by the responsible persons.

Specific hazards**NOTICE****RISK OF DAMAGE TO PROPERTY!**

In order to avoid stray currents, heat exchanger tubes, casing parts and the like must not be used as return line when performing welding work as these load-bearing components and lifting accessories are not designed for high welding currents.

If not observed, unintended or improper current flow can damage heat exchanger pipes of the unit and lead to damage during operation.

- Securely connect the insulated welding return line to the workpiece to be welded directly at the welding point.

NOTICE**RISK OF DAMAGE TO PROPERTY!**

Deposits can result in reduced performance and, in the long term, to leaks.

- Ensure that the heat exchanger is leak-tight, clean and without damage and deposits before mounting the system.

NOTICE**RISK OF DAMAGE TO PROPERTY!**

To prevent damage to the heat exchangers, always connect them without force and torque. There must be no forces or moments acting on the heat exchanger at any time. Failure to observe this can result in leaks and further damage to the heat exchanger in the short and medium term.

- Ensure that the outlet headers and flanges (if any) are not used as a climbing aid. They are not designed for external forces.
- Ensure that no forces or moments act on the heat exchanger at any time by using suitable fixed bearings during pipe installation.

Safety instructions for hydroBLU™

⚠ WARNING



RISK OF FIRE AND BURNS!

The humidification pads for the pre-cooling system are flammable if in contact with sparks, fire and high heat respectively, especially if they are dry. Burning pads can cause severe injuries and even death, and result in serious damage to property.

- Remove the pads from the unit prior to grinding, welding and hot work.
- Store the pads in a safe area for the duration of the work.



NOTICE

RISK OF DAMAGE TO PROPERTY!

There is an increased risk of scale deposits in perforated pipes, microbial contamination and clogging in the pipes, which can result in malfunctions or damage to the unit.

- Ensure that the quality of the water used is at least equivalent to drinking water quality (see table below: "Water quality requirements for the pad pre-cooling system").
- Check (visual inspection) and clean the perforated pipes regularly in acc. with the maintenance schedule (see section "Humidification pads").

SAFETY INSTRUCTIONS

The owner or operator must ensure that there is a separate supply line including shut-off and drain valve per unit.

SAFETY INSTRUCTIONS

Exclusion of warranty in case non-permissible water quality is used! Pay attention to water quality (see below) to ensure optimal performance of the pad pre-cooling system and maximum service life of the humidification pads.

Parameters	Unit	Abbr.	Value
Material in contact with water			Stainless steel, aluminum, cellulose
Appearance		-	Clear, without sediment
Color		-	colorless
Smell		-	none
pH value (at 20 °C)		-	6.5 ... 8.5
Temperature	°C	T	< 20
Electrical conductivity (at 20 °C)	µS/cm	EC	< 1000

Water quality requirements for the pad pre-cooling system

Parameters	Unit	Abbr.	Value
Total water hardness	°d	GH	< 21
Ammonium	g/m ³	NH ₄ ⁺	< 0.5
Chloride	g/m ³	Cl ⁻	< 200
Sulphate	g/m ³	SO ₄ ²⁻	< 300
Gen. colony-forming units	CFU/ml	CFU gen.	< 10000
Pseudomonas aeruginosa	CFU/100 ml	Pseud. aer.	< 100
Legionella spp.	CFU/100 ml	Legionl.	< 100

Water quality requirements for the pad pre-cooling system

5.2 Requirements for the place of installation

Dimensions/weights

For dimensions and weights, refer to the order documents.

Environmental conditions

The material selection of all components must be suitable for the local conditions.

Installation conditions

- ⇒ Install the unit only outdoors, on a stable and level surface.
- ⇒ The floor of the place of installation must have sufficient load-bearing capacity.
- ⇒ The layout plan must be drawn up by the plant operator.
- ⇒ Position the unit in such a way that it is safe to reach and cannot be damaged by internal traffic or transport processes or by other environmental hazard sources (e.g. processes at the place of installation).
- ⇒ Position the units in such a way that the air flow is not impeded by obstacles.
- ⇒ Place the unit in such a way that that it can be monitored and checked from all sides at all times.
- ⇒ Ensure that sufficient space is available for maintenance.
- ⇒ Ensure that all working fluid-carrying components, connections, shut-off devices and pipes and all electrical connections and lines are easy to access.
- ⇒ Ensure that the labelling of the pipes is easily visible.
- ⇒ The unit must be securely fixed at all fixing points without vibration.

SAFETY INSTRUCTIONS

The operator or installer of the equipment is responsible for ensuring that the bolted connections are of an adequate strength.

SAFETY INSTRUCTIONS

Do not move the unit with contact to the floor. Instead, lift the unit completely. Otherwise, the base frame can be deformed.

SAFETY INSTRUCTIONS

Risk of corrosion of the vibration dampers and legs for floor mounting

Installation of the unit in standing water or on surfaces on which water can collect (such as glycol protectors) can result in rust on vibration dampers and legs for floor mounting. Rusting vibration dampers or legs for floor mounting result in instability of the unit.

Requirements for unobstructed air flow to the unit

For detailed requirements regarding unobstructed airflow, please refer to the document "V-Shapes Coolers and Condensers – Unit Layout Manual" available on the myGuntner platform:
<https://myguntner.com/#/internal-user/overview>

Should you require further assistance, please do not hesitate to get in touch with us:
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SAFETY INSTRUCTIONS

Consider additional obstacles at the place of installation that may impede the air flow! Examples of additional obstacles: Walls, beams, pipes, etc.

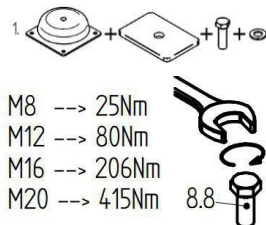
SAFETY INSTRUCTIONS

When installing several units side by side, it is recommended to cover the top between the units with a cover sheet.

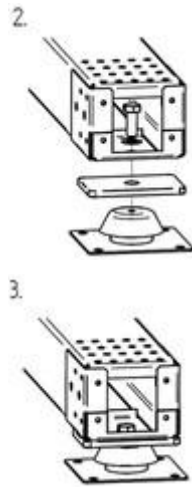
5.3 Installation of the unit

5.3.1 Mounting the vibration dampers (accessories)

The optional vibration dampers are supplied loose with the unit.



- ⇒ On delivery, check that the scope of delivery is complete.
- ⇒ Observe the torque specifications.



- ⇒ Assemble the individual parts in the order shown.
- ⇒ After mounting the vibration dampers, repaint all fixing elements properly to ensure corrosion protection.

Mounted vibration damper

5.3.2 Mounting the unit

Required staff

- At least 2 persons are required for mounting.

Auxiliary equipment/tools

- Lifting accessories and lifting gear
- Cables
- Climbing aids
- Fasteners (fixing bolts/nuts, washers and rawlplugs)
- Master gauge for holes (see section "Designs")
- Writing materials and instruments for measuring lengths and angles
- Drilling tool
- Wall plugs
- Spanner or appropriate assembly tools for screws and nuts

Provisions for fixing

- Prevent mechanical stress on the unit as follows:
 - Ensure that all fixing points are at the same distance from the fixing level and that this distance is maintained permanently even under load.
- At the place of installation, bolt the unit into place at the fixing points using fixing bolts with washers. The fixing points must support the weight of the respective unit. The operator or installer of the equipment is responsible for ensuring that the bolted connections are of an adequate strength.
- Observe the following instructions when fixing the unit:

- The diameters of the mounting holes have been statically determined by the manufacturer; use suitable fixing bolts and washers. When calculating the bearing strength, it is imperative to take into account the total weight of the unit (= structural weight of the unit + weight of tube volume + additional weight such as moisture, ice, snow, dirt or similar).
- Secure fixing bolts against loosening by means of appropriate locking devices.
- The fixing bolts must not be overtightened.
- All fixing bolts must be tightened equally.
- Fix the unit in position and secure it against moving.
- Use the fixing points provided to fix the unit.
- With the hydroBLU™ pad pre-cooling system, ensure that the unit is set up with a 3° incline to facilitate complete draining of the system. This prevents water accumulation in the system and reduces the risk of microbial contamination.

5.3.3 Mounting the fall protection system (accessories)

For detailed requirements regarding the fall protection system, please refer to the document "V-Shapes Coolers and Condensers – Handrail" available on the myGüntner platform:
<https://myguntner.com/#/internal-user/overview>

Should you require further assistance, please do not hesitate to get in touch with us:
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5.4 Connecting the unit

5.4.1 Connecting the unit to the plant

Safety

⚠ WARNING	
	RISK OF PERSONAL INJURY AND DAMAGE TO PROPERTY! Improper connection to the system will result in leaks that will lead to the escape of working fluid and corresponding risks (see section "Hazard due to working fluids"). • Follow the instructions for connecting the unit and pipes. • Refrigerant detectors and alarm systems for control purposes must be installed at the place of installation of the unit in acc. with ASHRAE Standard 15 and ASHRAE Standard 34.
NOTICE	
RISK OF DAMAGE TO PROPERTY DUE TO IMPROPER VENTILATION! Without proper ventilation, the unit can be damaged or destroyed by freezing liquid (in the case of water/glycol).	

SAFETY INSTRUCTIONS

The owner or operator of the plant is responsible for water quality, flushing the system and implementing long-term protective and treatment measures.
Damage resulting from failure to comply with these measures is not covered by the warranty.

SAFETY INSTRUCTIONS

Observe all safety instructions on the installation and commissioning (see section "Safety instructions for installation and commissioning").

Important notes on connecting the unit

- Regarding welding work: Observe the safety instructions on connecting the welding return line (see "Safety instructions for installation and commissioning").
- Perform soldering and welding work only on unpressurized units and with the humidification pads removed.
- Ensure that mechanical stresses and vibrations from the system are not transferred to the unit.
- Ensure that relief devices against liquid expansion are in place.
- With condensers and gas coolers/condensers: Ensure that the (subcooled) liquid can drain freely into the liquid receiver.
- It is imperative that working fluid connections are installed without tension and protected against linear thermal expansion and vibrations using horseshoe expansion joints or pipe compensators.
- Support the on-site piping with at least two fixed points before connecting to the unit.
- With the water/glycol working fluid: In addition, use a wrench/spanner to counter hold when connecting and disconnecting the threaded connections of pressurized pipes and components to prevent leaks.
- With the water/glycol working fluid: Use water of drinking water quality.

Important notes on preventing damage to the cooling circuit with water/glycol as working fluid

Prior to commissioning the cooling circuit, the person responsible for the plant must perform the following tasks:

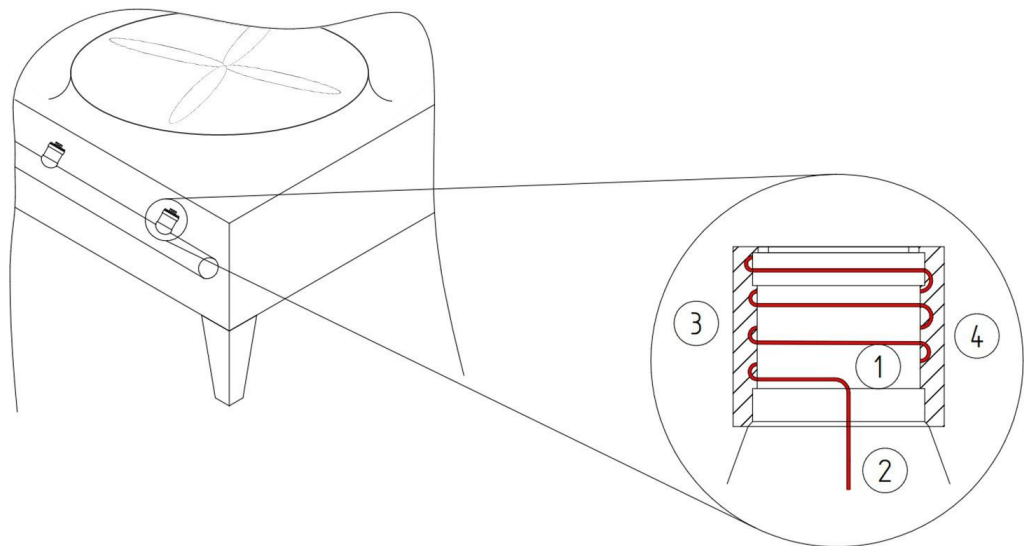
- Removal of particulate foreign material from the circulating water by flushing the entire system.
Such foreign material in the circulating water may include, for example:
 - Corrosion products
 - Dirt
 - Micro-organisms
 - Welding residues
 - Materials that were introduced during tool changes
 - Detached biofilm
- Installation of a permanent protection device to prevent dirt accumulation and corrosion (e.g. dirt trap/filter).
- Use of corrosion inhibitors when using water as the working fluid.
- Analysis of water quality and, based on this, implementation of appropriate water treatment and conditioning measures.

Installation notes on pipes

- Keep the installation of pipes as short as possible; use as few bends as possible, and only those with large radii, to minimize the pressure drop.
- External loads must not act on the pipes and unit connections.
- Lay pipes (liquid and discharge lines, supply and return lines) separately from each other and insulate on both sides.
- Ensure that pipes are secured against vibrations, mechanical stresses and force transmission due to linear expansion.
- The free space around the unit must be sufficiently large to allow for the following measures:
 - Regular maintenance of the components,
 - Checking of components, pipes and fittings,
 - Repairs.
- It must be possible to shut off the unit in the event of leakage.

Procedure

- ⇒ Install the pipes in acc. with ASHRAE Standard 15 and ASHRAE Standard 34. Please note:
 - With condensers/gas coolers: Ensure that the (subcooled) liquid can drain freely into the liquid receiver.
 - With water/glycol: Ensure that the unit is well ventilated: The venting mechanism must be installed and protected against freezing. To this end, we recommended to fit the bleed valves and bleed connections with heat tracing and to insulate them.



(1) Automatic bleed valve
(2) Bleed connection

(3) Heat tracing
(4) Insulation

- With water/glycol: After completion of the pipe installation and before connecting the units, carry out professional internal cleaning, pressure test and evacuation.
- Ensure that relief devices against liquid expansion (in the case of water/glycol) are in place.
- ⇒ With stainless steel, the connection to the system must be welded.
- ⇒ With copper, the connection to the system must be brazed.
- ⇒ With units with threaded connections/flanges, bolt the connections together.

- ⇒ In the case of threaded connections, prevent the pipe from twisting by holding it in place.
- ⇒ When brazing, observe the following:
 - Braze all connections!
 - Avoid end-to-end joints; use copper pipe ends expanded on one side (capillary brazing)!
 - Avoid leaks, braze conscientiously and carefully!
 - Avoid overheating when brazing (risk of excessive scaling)!
 - Use shielding gas when brazing (to avoid scaling)!
- ⇒ When welding, observe the following:
 - Avoid leaks, weld conscientiously and carefully.
 - Prevent overheating when welding (risk of excessive scaling).
 - Use shielding gas when welding (to prevent scaling).

5.4.2 Commissioning the hydroBLU™ system

Safety

SAFETY INSTRUCTIONS

See "Basic safety instructions".

Procedure

- ⇒ Connect to the water supply.
- ⇒ Check the water pressure and adjust if necessary (at least 20 psi (1.4 bar), max. 60 psi (4 bar)).
- ⇒ Check the supply voltage.
- ⇒ Connect to the power supply.
- ⇒ Commission the hydroBLU™ controller (see controller manual, commissioning wizard).
- ⇒ Enter the default data (e.g. height above sea level at the place of installation; air volume flow through the heat exchanger at maximum speed of all fans; air velocity; etc. – for the required data, refer to your technical unit documentation).
- ⇒ Set the parameters for the application.

SAFETY INSTRUCTIONS

- In connection with a Güntner controller, the hydroBLU™ functionality must first be activated via the controller (see controller instructions).

The humidification controller aicore™ hydroBLU communicates with the speed controller of the fans via 0 – 10 V signal.

The humidification controller aicore™ hydroBLU must be set acc. to the design of the heat exchanger and the fans. When switching on, the humidification controller automatically detects whether commissioning has already taken place. If this is the case, normal controlled operation is continued. If the humidification controller aicore™ hydroBLU detects that commissioning has not yet taken place, a commissioning procedure starts. After the procedure, all set parameters are saved. All values set during commissioning can later be viewed and changed individually via the menus.

Communication takes place internally with the humidification controller aicore™ fusion. The humidification controller aicore™ fusion must be set acc. to the design of the heat exchanger. When switching on, the humidification controller automatically detects whether commissioning has already taken place. If this is the case, normal controlled operation is continued. If the aicore™ fusion detects that commissioning has not yet taken place, a commissioning procedure starts. After the procedure, all set parameters are saved. All values set during commissioning can later be viewed and changed individually via the menus.

- ⇒ If fine dirt particles are suspected to be present in the customer's water supply line, flush the water supply line:
 - Keep the local drain in the water supply line closed; open the drain valve of the hydroBLU™ system (via manual operation of the controller).
 - Open the control valve (via manual operation of the controller).
 - The water supply line is flushed; any dirt in the water supply line is flushed away or collects in the scale trap.
 - Close the control valve (via manual operation of the controller).
 - Depressurize the water supply line and clean the scale trap.
 - To flush the local water supply line, reset the following to the values required for normal automatic operation: Any previously made adjustments to external signals, adjustments to the draining in the local water supply line or on the controller (deactivate manual operation of the controller -> automatic operation is activated).
- ⇒ Check the function of the hydroBLU™:
 - Simulate the operating situation previously set in the controller (set the switch point for hydroBLU™ accordingly or simulate an increased ambient temperature; activate fan control signal -> e.g. for EC fans: 0 – 10 V and bus respectively with GMM / aicore™ air or external specification of the fan control signal; with AC fans: with external ON/OFF release).
 - Check the correct operation of the hydroBLU™ system.
 - Check the water supply and distribution and rework if necessary (e.g. tightness of the water and drain system, even water supply to the hydroBLU™ pads, water pressure).
 - Reset the adjustments made to external signals or to the controller for checking the system to the values necessary for normal automatic operation.
 - Ensure that the hydroBLU™ controller is in automatic operation and not in manual operation.

The hydroBLU™ is now ready for operation.

SAFETY INSTRUCTIONS

To save energy in dry operation, the pads can be removed (winter operation). This measure allows the air to flow freely to the heat exchanger coil, eliminating the pressure drop caused by the humidification pads and improving the energy efficiency of the fans. During this time, the pads must be stored in a dry place where they are protected from damage and moisture.

5.5 Electrically connecting and protecting the unit

Introduction

Each unit is designed for a specific fan speed in acc. with the data sheet and wired accordingly. Some fans provide the option of a second, reduced speed or a continuous control as a standard. For details, refer to the corresponding connection diagram. Changing the fan speed can have a negative impact on the thermodynamic configuration of the unit.

Interfaces

As interfaces to the electrical equipment, there are terminal boxes and switch cabinets for the electrical supply and signal exchange (see connection diagrams and manuals of the control systems).

Procedure

- ⇒ Connect the unit to the power supply in acc. with the connection diagram.
- ⇒ Use the prepared thermocontacts to protect the motors to safeguard any warranty claims.
- ⇒ Perform all electrical lines in acc. with the connection diagram, taking into consideration the ASHRAE Standard 15 and national regulations respectively.

5.6 Connection diagrams

Connection diagram for fan motor

See inside the motor terminal box at the fan or in the terminal box of the unit
See order documents

Connection diagram 0-10 V control

See inside the unit's terminal box
See order documents

5.7 Performing an acceptance test

Specific hazards

⚠ WARNING



RISK OF PERSONAL INJURY AND DAMAGE TO PROPERTY!

Escaping working fluid can cause personal injury (see safety instructions regarding working fluids in section "Basic safety instructions").

- Have the following acceptance test performed by a competent person before commissioning the unit, after making important changes to the unit and after replacing the unit.

Requirements

- The acceptance test must be performed by the manufacturer of the system!
- The temperature and humidity at the place of installation correspond to the permissible operating range (see section "Technical data of the unit").

When to perform an acceptance test

- Before commissioning the unit
- After making important changes to the unit
- After replacing the unit

Procedure

- ⇒ When operated with water, the unit must be put into operation quickly after initial filling (maximum two weeks) to prevent pitting corrosion caused by stagnant water.
- ⇒ Ensure that sufficient air can be sucked in and blown out.
- ⇒ Ensure the power supply is sufficiently dimensioned: Compare the connection diagram of the unit with the connection diagrams of the complete system.
- ⇒ Ensure that a professional equipotential bonding has been performed.
- ⇒ Check the unit for vibrations and movements that could be caused by the operation of the fans or the plant. Eliminate vibrations and external forces, following consultation with the manufacturer if required.
- ⇒ Perform a visual inspection of the structural design, the brackets and fastenings (materials, connections), the operability and the arrangement of the fittings.
- ⇒ Check all threaded connections on the fans and tighten them if necessary in acc. with the following table.

Screw/bolt	Type of bolt	Tightening torque
M6 (property class 8.8)	Cage nut/snap nut	88.5 lb-in (10 Nm)
M8 (property class 8.8)	Cage nut	204 lb-in (23 Nm)
M8 (property class 8.8)	Nut (steel)	239 lb-in (27 Nm)
M8 (property class 10.9)	Nut (steel, condenser and evaporator from Ø 710)	310 lb-in (35 Nm)

- ⇒ Check all other threaded connections and tighten if necessary.

- ⇒ Check the pipe connections.
- ⇒ Check that working fluid-carrying pipes are laid correctly.
- ⇒ Ensure that the unit is protected against mechanical damage.
- ⇒ Ensure the unit is protected against excessive heating up and cooling down.
- ⇒ Check the protection guards for damage.
- ⇒ Ensure that the unit can be inspected at any time and is always freely accessible:
 - Is the unit positioned so that it can be monitored and checked from all sides at all times?
 - Is sufficient space available for maintenance?
 - Are all working fluid-carrying components, connections and pipes and all electrical connections and lines easy to access?
 - Are the pipe identifications easily visible?
- ⇒ Check heat exchanger surfaces for dirt and clean if necessary (see section "Cleaning the coil").
- ⇒ Perform a function test on the fans (rotation direction, power consumption).
- ⇒ Check the wiring of the fans for damage.
- ⇒ Check the quality and execution of all connections (soldered connections, electrical connections and fixing connections).
- ⇒ Be sure to perform a pressure test in acc. with ASHRAE Standard 15.
- ⇒ Perform a system test in acc. with the locally applicable regulations, e.g. ASHRAE Standards.
- ⇒ Check the corrosion protection: Perform a visual inspection of all pipes, components and component holders that are not heat-insulated. Document and archive the test results.
- ⇒ Perform a test run. Observe and check the unit during the test run, in particular for:
 - Quiet running of the fans (bearing noises, contact noises, imbalances, among other things)
 - Current consumption of the fans
 - Leaks

Procedure in case of defects

- ⇒ Report all defects to the manufacturer immediately.
- ⇒ Rectify the defects only upon consultation with the manufacturer.

Check after 48 operating hours

- ⇒ Check the unit and the unit's interaction with the system (cooling equipment and refrigeration system) again after approx. 48 operating hours, especially at the connections and at the fans.
- ⇒ Document the test result.

6 Operation

6.1 Safety instructions for operation

Please note

SAFETY INSTRUCTIONS

Observe the basic safety instructions (see section "Basic safety instructions").

Specific hazards

⚠ WARNING



RISK OF PERSONAL INJURY AND DAMAGE TO PROPERTY!

Escaping working fluid can cause personal injury (see section "Hazard due to working fluids").

- Put the unit into operation only if all requirements are met (see section "Putting the unit into operation").
- Ensure that the maximum operating pressure is never exceeded (also after shutdown)!

NOTICE

DAMAGE TO PROPERTY CAUSED BY VIBRATIONS!

The vibrations caused by the unit make a building vibrate which, in turn, results in collapse of this building or in errors of other systems.

- In order to prevent overload during transport and resulting damage of the vibration dampers, the vibration dampers are supplied loose and can be mounted by the customer.
- Check the fans regularly and replace them if necessary (see section "Fans").

SAFETY INSTRUCTIONS

To prevent corrosion caused by stagnant water, units with water as working fluid must be put into operation within two weeks after filling.

6.2 Water quality parameters for copper tubes

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

Following these guidelines will help maximize the lifetime of the equipment and minimize the risk of failure during operation. All recommendations made in this manual 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 the recommendations or warnings listed in this manual may result in damage to the unit and subsequent failure. Güntner is not liable for failures induced by the operator ignoring the recommendations in this section.

Water quality parameters during operation for copper tubes:

Parameter	Value	Units (SI)
pH	7.5 - 9.0	
Specific conductance, 25 °C	337	µS
Alkalinity as CaCO ₃ — "M"	119	mg/l
Alkalinity as CaCO ₃ — "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 ₃	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 ₃	48.6	mg/l
Manganese as Mn	< 0.005	mg/l
Nitrate as NO ₃	0.6	mg/l
Oxygen	< 1	mg/l
Phosphate as PO ₄	< 0.05	mg/l
Potassium as K	ND	mg/l
Silica as SiO ₂	1.7	mg/l
Sodium as Na	11.0	mg/l
Strontium as Sr	ND	mg/l
Sulfur as SO ₄	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	< 534	ppm or mg/l of CaCO ₃

Parameter	Value	Units (SI)
Total bacteria	< 1000	CFU/ml

NOTE:

- 1 The airtightness of the circuit must be ensured at all times. Air ingress can cause significant pH fluctuations and lead to corrosion of the copper tubes.
- 2 When the circuit is opened, the inflow of air must be prevented using protective atmospheres.
- 3 It is recommended to constantly monitor the pH value of the circulating water.
- 4 It is highly recommended that the operation of the system be monitored by specialist staff (tightness of the system, control of the pH values, controls and calibration of measuring equipment, maintenance and repair).
- 5 The responsibility for compliance with the limit values lies with the system manufacturer or owner.

6.3 Putting the unit into operation

Requirements

Put the unit into operation only if the following requirements are met:

- A thorough and complete initial cleaning has been performed to remove dirt caused by transport and installation.
- Safe filling is ensured.
- The unit has been properly installed and connected (see section "Installation of the unit").
- A full acceptance test has been performed (see section "Performing an acceptance test").
- The operational readiness has been checked, and the operating point has been set (see below).
- All prescribed safety measures have been taken.

Checking the operational readiness

- ⇒ Ensure that all electrical protective measures are operational.
- ⇒ Ensure that all working fluid-side connections are securely established.
- ⇒ Ensure that all electrical connections (fans) are securely established.
- ⇒ Ensure that the protection guards are attached to the fans and that all foreign objects have been removed from the fans.
- ⇒ Ensure that all threaded connections on the fans, the fixing bolts on the unit and all other threaded connections are tight.

Setting the operating point

- ⇒ For the parameters for setting the operating point, refer to the order documents.
- ⇒ Ensure that the specified operating point is maintained. For this, secure the operating elements for setting the operating point against access by unauthorized persons (e.g. by sealing, screwing on caps, removing the handwheels).

Procedure

- ⇒ Switch on the system including the electrical system (see the system's operating instructions).
- ⇒ Switch on the unit.
- ⇒ Open the valves on the inlet and outlet side of the system.
- ⇒ Activate the fans.
- ⇒ Wait until the operating point is reached. Once the operating point is reached, the unit is ready to operate (see the system's operating instructions).
- ⇒ Check units with heat carrier regularly for correct bleeding after starting the pump.

6.4 Taking the unit out of operation

Introduction

The units are components of a system, including the heat exchanger circuit. The unit is taken out of operation by switching off the system in accordance with the system's operating instructions.

SAFETY INSTRUCTIONS

When shutting down the unit, observe the max. operating pressure! When required, take precautions to ensure that it cannot be exceeded.

Procedure

- ⇒ Switch off the fans
- ⇒ Switch off the working fluid feed pump (if any)
- ⇒ Switch off the electrical installation

6.5 Shutting down the unit

Safety**SAFETY INSTRUCTIONS**

All refrigerants must be removed from the unit by suction and disposed of by an approved specialist company in the field of refrigeration.

Procedure

- ⇒ Shut the unit down (see above).
- ⇒ Secure the unit as follows:
 - Secure the fan motor drives against restart.
 - Secure the working fluid-carrying pipes against supply with working fluid.
 - Protect against damaging effects at the place of installation or intermediate storage location so that the unit's components are kept in good condition and the intended use and usability of the unit are maintained. To this end, appropriate storage conditions (see section "Storing the unit prior to installation") must be provided, precautionary corrosion protection measures must be taken, regular checks of the functionality of the fans must be performed and the shutdown unit must be checked regularly.
- ⇒ With refrigerants (CO₂) prior to disassembly/removal: Completely remove the working fluid from the unit by suction into a suitable refrigerant container, and completely drain the lubricating oil for refrigerating compressors if necessary.
- ⇒ With coolants prior to disassembly/removal: Completely drain the working fluid from the unit.

If the system is shut down for a period of three weeks or longer, the following must be observed:

- ⇒ Completely disconnect the unit and indicate this accordingly.
- ⇒ Remove dirt and deposits from the outside and inside of the unit.
- ⇒ Store the unit in a place that is not exposed to sunlight. It is recommended to cover the air outlets of the fans to prevent dirt and deposits from entering.

SAFETY INSTRUCTIONS

Operate the fans for approx. 2 – 4 hours per month during idle times of one month or longer in order to maintain functionality.

SAFETY INSTRUCTIONS

When using the optional perforated pipes, drain and clean them if the unit is not operated for a week or longer. For information on draining, refer to the order documents.

6.6 Putting the unit back into operation after shutdown

Introduction

The unit must be put back into operation in acc. with the system-specific design as set out in the system's operating instructions.

Procedure

- ⇒ Test the unit's readiness for operation.
- ⇒ Perform a pressure test in acc. with ASHRAE Standard 15 and a visual inspection for corrosion protection.
- ⇒ Put the unit into operation (see section "Putting the unit into operation").

NOTICE

Water residues in a refrigerating plant operated with refrigerants can result in damage to property!

- Evacuate to ensure that a sufficient degree of dryness of the refrigeration circuit is achieved in acc. with the requirements of ASHRAE Standard 15 and local regulations.

6.7 Changeover to a different working fluid

Specific hazards

⚠ WARNING



RISK OF PERSONAL INJURY AND DAMAGE TO PROPERTY!

Operating the unit with a different working fluid without the prior consent of the manufacturer can result in significant dangers (see section "Hazard due to working fluids").

- The unit must not be changed over to a different working fluid without prior written consent from the manufacturer.

Requirements for the working fluid

- Ensure that the unit manufacturer has agreed to the changeover.
- Ensure that the unit is filled with the correct working fluid.
- Ensure that all materials used in the unit 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.

- Reset the safety device for the unit or replace it where necessary.
- Prevent mixtures with residues of working fluid and possibly oil.
- Change all information regarding the new working fluid accordingly.
- Change the complete documentation including these instructions and the system's operating instructions accordingly.

Procedure

- ⇒ Change the working fluid following written consent by Güntner U.S. LLC and in compliance with the requirements for the working fluid.
- ⇒ Perform an acceptance test (see section "Performing an acceptance test").

6.8 Troubleshooting

Safety

SAFETY INSTRUCTIONS

Observe all basic safety instructions and the safety instructions for operating the unit (see sections "Basic safety instructions" and "Safety instructions for operation").
Use suitable tools, protective clothing and safety devices.

Hotline

Phone +1 (847) 781-0900

E-mail: dg-us-service@guentner.com or serviceus@guntnerus.com

Troubleshooting table

The following table shows possible faults and the measures to correct them.

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	Replace the fan
Unit vibrating	Defective fan blades	Replace fan blades
	Fan bracket loose	Tighten the fixings and replace them if necessary
Unit capacity is not achieved	Coil is very dirty on the air side	Clean the coil
	Fans not running properly or fail to operate	Repair or replace fans
	Working fluid pressurizing defective (temperature and quantity insufficient)	Set the working fluid pressurizing values (temperature and quantity) according to the design data

Fault	Possible cause(s)	Remedy
	Humidification pads are very dirty	Clean or replace humidification pads
	Wrong mixing ratio (with the working fluid water/glycol)	Adjust mixing ratio (concentration, inhibition)
Working fluid escaping	Working fluid-carrying components of the unit are leaking	Switch off the working fluid supply and the fans, document the damage, rectify the leak (see section "Fixing leaks")
Humidification pad is not wetted with water	Water supply or power supply interrupted	Check the entire water supply line and installed equipment/valves for functionality or restore the power supply
Humidification pads insufficiently wetter with water	Scale traps/filters or distribution hoses/perforated pipes are dirty	Clean or replace scale traps/filters and distribution hoses/perforated pipes

Note: Faults not described in these instructions may only be rectified by Güntner U.S. LLC. Contact the hotline.

Rectify faults

- ⇒ Close the main lines of the working fluid supply
- ⇒ Wear personal protective equipment (PPE)
- ⇒ Determine and document the size of the leak
- ⇒ Shut off all working fluid supply lines
- ⇒ Sound the alarm at the slightest suspicion of injured persons in connection with working fluid. First get persons to safety, then eliminate leaks (see section "Fixing leaks").
- ⇒ Press the Emergency STOP switch. This switches off valves, motors and other components to prevent working fluid from escaping.
- ⇒ Close shut-off valves, especially on the liquid side, where possible section by section so that the working fluid volume in the leakage area is kept as low as possible.
- ⇒ If possible, siphon off or drain the system section concerned in a controlled manner, or move the working fluid to other parts of the system. Here too it must be ensured that no liquid working fluid is locked in by shutting off system sections.

7 Maintenance and cleaning

7.1 Safety instructions for maintenance and cleaning

Please note

SAFETY INSTRUCTIONS

Observe the basic safety instructions (see section "Basic safety instructions").

SAFETY INSTRUCTIONS

Non-compliance with the maintenance schedule can result in cracks and breakage in the pipes and leakage of the working fluid.

SAFETY INSTRUCTIONS

The operator is responsible for providing protective clothing for maintenance and cleaning.

SAFETY INSTRUCTIONS

The operator is responsible for selecting suitable cleaning agents, antifreeze agents und corrosion inhibitors, and for observing and complying with the manufacturers' instructions.

Specific hazards

⚠ DANGER		
	ELECTRICAL VOLTAGE! Cleaning using a jet of water or steam causes water to enter live components. This results in a short circuit at the electrical connections and/or a life-threatening electric shock. This, in turn, can cause severe injury or even death of bystanders. • Completely disconnect the supply line before performing electrical work on the unit. • Do not point the water jet at live components (e.g. terminal box). • Do not use steam cleaners or high-pressure cleaners on live components. • Ensure that live components are not hit by water or vapor jets (cover if necessary). • Observe the cleaning pressures and distances when cleaning. • Work on the unit and the connection and control configuration must be performed by specialist staff. • Check electrical components regularly. • Perform earthing checks and visual inspections of the earthing points regularly. • Connect the unit to the building's earthing system in the proper manner. • Provide adequate lightning protection.	
⚠ WARNING		
	RISK OF BURNS OR RISK OF FROSTBITE! Person suffers severe burns caused by contact with the unit's surface (surface temperature of the heat exchanger in operation up to 45 °C). • Wear personal protective equipment (PPE). • If necessary, wait until the temperature has equalized to the ambient temperature before starting to work.	

⚠ WARNING

RISK OF PERSONAL INJURY!

Risk of personal injury caused by escaping working fluid.

- See section "Hazard due to working fluids").

⚠ WARNING

RISK OF CRUSHING!

The unit is equipped with the hydroBLU™ system whose humidification pads must be removed for cleaning. During removal, a person crushes his or her fingers.

- Two people are required to lift the top rail and carry out maintenance.
- Wear personal protective equipment (PPE).


⚠ WARNING

RISK OF CRUSHING!

When working in the vicinity of moving components, fingers or other limbs can get caught between the components and be crushed.

- Completely disconnect the unit before performing maintenance work.
- Secure the unit against unintentional restart. A lockable repair switch is available or to be provided by customer. Attach an appropriate warning label to the unit.
- Wear personal protective equipment (PPE).


⚠ WARNING

RISK OF FALLING!

When replacing the fan, there is a risk that the operator or another person standing or walking on the unit surface falls into the open area of the fan and injures him or herself.

- During maintenance on the open fan, uninvolved persons are not allowed in the danger zone.
- Ensure that, during maintenance, the open area of the fan is clearly marked and secured to prevent accidental entry.

⚠ CAUTION		
	WARNING OF RISK OF CUTTING OR INJURY! Person can cut or injure him or herself on the cleaning flap or the exposed fins below. • Wear personal protective equipment (PPE).	

⚠ CAUTION		
	RISK OF DAMAGE TO THE EYES! During cleaning work, there is a risk of injury from the water or air jet, dust or chemical cleaning agents. • Wear safety goggles!	

Safety instructions for hydroBLU™

⚠ WARNING	
	RISK OF FIRE AND BURNS! The humidification pads for the pre-cooling system are flammable if in contact with sparks, fire and high heat respectively, especially if they are dry. Burning pads can cause severe injuries and even death, and result in serious damage to property. • Remove the pads from the unit prior to grinding, welding and hot work. • Store the pads in a safe area for the duration of the work.
	

NOTICE
RISK OF DAMAGE TO PROPERTY! Mounting or replacing the humidification pads (see the separate instructions) when they are damp/wet can impair their function and damage the system. • Ensure that the humidification pads are mounted or replaced when completely dry.

NOTICE
RISK OF DAMAGE TO PROPERTY! There is an increased risk of scale deposits in perforated pipes, microbial contamination and clogging in the pipes, which can result in malfunctions or damage to the unit. • Ensure that the quality of the water used is at least equivalent to drinking water quality (see table below: "Water quality requirements for the pad pre-cooling system"). • Check (visual inspection) and clean the perforated pipes regularly in acc. with the maintenance schedule (see section "Humidification pads").

SAFETY INSTRUCTIONS

The dirt trap for the water supply line to the hydroBLU™ system, which protects the components against dirt and damage, must be cleaned regularly. Otherwise, the holes of the distribution pipe can become clogged, resulting in reduced water distribution and reduced performance. Also, the pads can become dirty more quickly, which may require earlier replacement.

7.2 Procedure prior to all maintenance work

Before performing any maintenance work, carry out the following safety measures:

- ⇒ Completely disconnect the unit and secure it against accidental switching on.
- ⇒ Drain or siphon off the coil (heat exchanger) of the unit.
- ⇒ Completely remove the working fluid from the leaky unit, especially prior to soldering and welding work.
- ⇒ Clean and blow out the coil (heat exchanger) of the unit.

7.3 Inspection/maintenance schedule

7.3.1 Unit

Measure	Means	Interval
Remove frost and perform partial cleaning	Mechanical	As required (visual inspection)
Perform complete cleaning	Warm water or environmentally safe cleaning agent that is compatible with the unit's materials	As required (visual inspection)
Testing in acc. with PED as prescribed by the accredited inspection bodies		Every 12 months
Inspection of the system (leak tightness tests, among other things) in acc. with ASHRAE standards		Every 12 months
Check for leaks		Every 6 months
Check corrosion protection		Every 6 months
Check frost protection		Every 6 months
Check grounding connections		Every 6 months (visual inspection) Every 12 months (measurement)

Measure	Means	Interval
Check that electrical connections, cables and components are not damaged (visual inspection)		Every 6 months
Check fastenings: Check all fasteners of the unit including any optional additions	Mechanical	Every 6 months
Check fixings and load-bearing elements (e.g. crane lug bolts) for corrosion and load-bearing capacity or structural integrity; replace them if necessary	Mechanical	Every 12 months
Check units with water/glycol working fluid for correct bleeding. Note: During the test, the pump must be running.		Every 6 months
For terminal boxes, check cable entries and their seals for damage and replace if necessary.		Every 6 months

7.3.2 Heat exchanger coil

External inspection

Have a competent person (recommendation: Güntner U.S. LLC) perform a regular external check (visual inspection) on the unit every 5 years.

Maintenance schedule

d = daily, w = weekly, m = monthly, y = yearly				
Work to be performed	d	w	m	y
Check the coil for dirt accumulation. • In the event of dirt accumulation: Clean the coil (see section "Cleaning the coil").	X			
Check the coil's general condition. • If damage is found: Rectify damage.		X		
Check the coil's operating point (see section "Installation and commissioning"). • If change in fan capacity is found: Restore required system-side conditions. • If change in surface temperatures is found: Restore required system-side conditions.			X	
Check the coil and connections for leak tightness. • Repair unit sections affected (see section "Fixing leaks")				X*

d = daily, w = weekly, m = monthly, y = yearly				
Work to be performed	d	w	m	y
Check the working fluid pressurizing of the coil. • Restore required system-side conditions.				X*
Check the coil for corrosion. • Corrosion or damage on core tubes, fins, support structures, pipe connections, fastenings: Repair unit sections affected.				X*

*) Recommended: every six months

7.3.3 Fans

Maintenance schedule

d = daily, w = weekly, m = monthly, y = yearly				
Work to be performed	d	w	m	y
Check fans for dirt accumulation • In the event of dirt accumulation: Clean the fans (see section "Cleaning the fans")	X			
Check the fan drive for quiet running • Vibrations on the unit: Eliminate imbalances • When required, tighten blade fixing devices and correct blade settings		X		
Check fan bearings (every six months by manually turning the rotor while the fan is switched off) • Running noise and smoothness of running changes: Replace the fan			X	
Impeller: Corrosion on bolts (with threaded blades) • Replace screws				X*
Fan blades: Corrosion or damage on blades • Replace the fan				X*
EC fan terminal boxes: Check threaded connections • Retighten all threaded connections				X*

*) Recommended: every six months

7.3.4 Humidification pads

Maintenance schedule

System part	Activity	Execution/intervals [every ... months]
Frame/modules	Check position and fixing; if necessary, correct the position and improve the fixing	6
Distribution hoses (standard)	Check position and leak tightness; correct position if necessary	6
	Replace distribution hoses	36

System part	Activity	Execution/intervals [every ... months]
Fittings	Check sensors and valves externally for dirt, damage, corrosion and correct fastening	6
	Check valves for proper operation (switching and control operations)	6
	Cleaning (external) to maintain reliable operation	If required
Scale traps	Clean scale traps	6
Humidification pads	Check for dirt deposits and clean if necessary	Daily
	Check for damage and wear and replace humidification pads if necessary	12 (6 recommended)
	Replace all humidification pads	36
Water supply and water supply line	Check for proper operation and restore water supply if necessary	Weekly
Trays, drains	Check for dirt and solids or clogging and, if necessary, clean trays and clear drains of solids	Weekly
Control	Functional test	12 & if required
	Check the automatic drain of the hydroBLU™ system when it is not in operation	6 & if required

7.4 Maintenance work

7.4.1 Fixing leaks

Procedure

- ⇒ Report any leaks on the unit to Güntner and have them fixed as quickly as possible by a competent person.
- ⇒ Perform all work including pressure, acceptance and functional test (see section "Performing an acceptance test").

7.4.2 Cleaning the unit

Introduction

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

Procedure

- ⇒ Ensure that the unit is free of voltage.
- ⇒ Remove accessories (if any).

- ⇒ Remove the humidification pads (see the separate instructions KAT959.2).
- ⇒ Fold down the cleaning flaps (see drawing) in the following order:



Cleaning flap

- Loosen the bolts (1).
- Hinge down the cleaning flaps (2).
- ⇒ Perform cleaning tasks in acc. with the indications on the drawings (see section "Hydraulic cleaning"). Make sure to maintain the required distance and angle. An upward inclination is not permissible to protect the fan from water ingress.
- ⇒ Clean the casing by rinsing with warm water (approx. +68 °F (+20 °C) recommended) and/or with environmentally friendly cleaning agents.
- ⇒ Rinse the casing thoroughly with warm water after using cleaning agents. The unit must be free of cleaning agents to prevent corrosion.
- ⇒ Allow the casing to dry completely.
- ⇒ Check the working fluid-side and electrical connections.
- ⇒ Fix the cleaning flaps (see drawing of inspection flap) in the following order:
 - Lift the cleaning flaps (3).
 - Tighten the bolts (4).
- ⇒ Put the pads back in place (see the separate instructions KAT959.2).

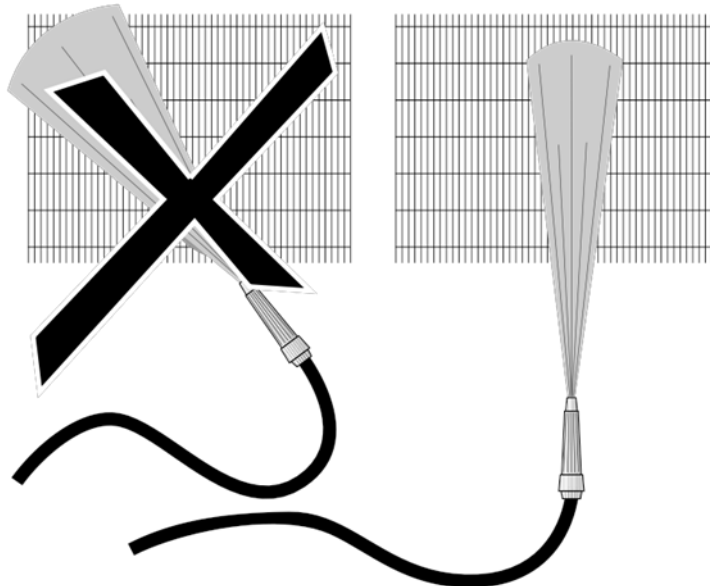
7.4.3 Cleaning the coil

Introduction

Removing the fans (see section "Dismantling and disposal") creates space with a few simple turns for better cleaning of the heat exchanger coil. The cleaning method depends on the type and degree of soiling and the place of installation. With loose and dry dirt, cleaning with compressed air is sufficient. With solid, damp and greasy dirt, we recommend hydraulic cleaning.

Specific hazards

⚠ CAUTION	
	RISK OF DAMAGE TO PROPERTY! If the pressure is too high, the distance is too small or the cleaning jet hits the fins at an angle, the fins can be damaged. Mechanical cleaning with hard objects (e.g. steel brushes, screwdrivers, etc.) will damage the heat exchanger. - Use a pressure of max. 435 psi (30 bar) for hydraulic cleaning and max. 116 psi (8 bar) for cleaning with compressed air! - Keep a minimum distance of 7-7/8 in (200 mm) from the fins! - Always direct the jet at right angles to the fins (max. deviation of ±5 degrees) to prevent the fins from bending! - Do not use hard objects for cleaning!



Preparation for cleaning

- ⇒ Prepare and shut off the unit in acc. with the system's operating instructions
- ⇒ Clean the coil (heat exchanger) with one of the following procedures:
 - Cleaning with compressed air (see section "Cleaning with compressed air")
 - Hydraulic cleaning (see section "Hydraulic cleaning")
 - Cleaning with brush or brush and compressed air (see section "Cleaning with brush or brush and compressed air")

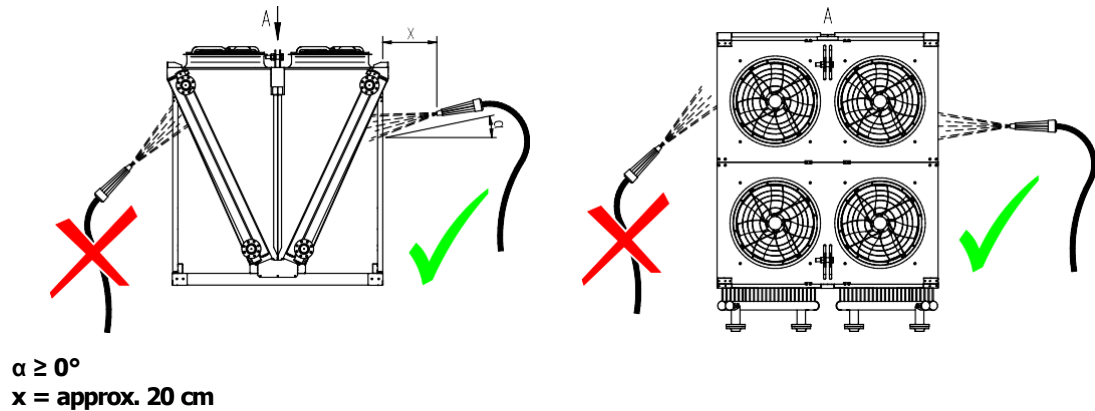
7.4.3.1 Cleaning with compressed air

Procedure

- ⇒ Blast the coil with compressed air (max. 116 psi (8 bar) pressure, distance to the fins at least 7-7/8 in (200 mm); against the air flow direction) to remove dirt and impurities. Please note:
 - Preferably clean from inside to outside and from top to bottom to prevent loosened dirt from settling on areas that have already been cleaned.
- ⇒ Clean until all dirt has been removed.

7.4.3.2 Hydraulic cleaning

Overview



Procedure

- ⇒ Always remove heavier damp or greasy dirt against the air flow direction, using a high-pressure water jet (max. 435 psi (30 bar) pressure) or a steam pressure jet (max. 435 psi (30 bar) pressure). In either case, use a flat spray nozzle (distance of at least 7-7/8 in (200 mm)) and, if required, neutral cleaning agents. Always direct the jet at right angles to the fins (max. deviation of ± 5 degrees). Please note:
 - With oily and greasy deposits, add a cleaning agent to the water.
 - When applying cleaning agents, change them from time to time to prevent resistance development in germs.
 - When using chemical cleaning agents, ensure that they do not attack the surfaces of the unit. After cleaning, the unit must be rinsed with warm water so that it is free of cleaning agents.
 - Clean against the air flow direction and from top to bottom (Güntner recommendation) so that dirt is not pushed even deeper into the heat exchanger or does not move to already cleaned areas.
- ⇒ Clean until all dirt has been removed.

7.4.3.3 Cleaning with brush or brush and compressed air

Procedure

- ⇒ Remove dry dust or dirt with a brush, a hand brush and – depending on the situation – compressed air (max. 116 psi (8 bar) pressure, minimum distance of 7-7/8 in (200 mm) to the fins; against the air flow direction) or with a powerful industrial vacuum cleaner. Please note:
 - Use soft brushes (no steel brushes or similar).
 - Preferably clean from inside to outside and from top to bottom to prevent loosened dirt from settling on areas that have already been cleaned.
- ⇒ Clean until all dirt has been removed.
- ⇒ Always brush in the longitudinal direction of the fins, never across.

7.4.4 Cleaning the pipe insides

Safety

⚠ WARNING		
	TOXIC HAZARD! Trichlorethylene is harmful to the health and highly narcotic: inhalation of air with 200 ppm causes tiredness. It has been classified by the MAC Commission as carcinogenic (category 2) and germ cell mutagenic (category 3B). It must be identified as "Toxic". Acute poisoning causes brain damage, blindness and destruction of the smell and taste senses. • Only use trichlorethylene 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.	

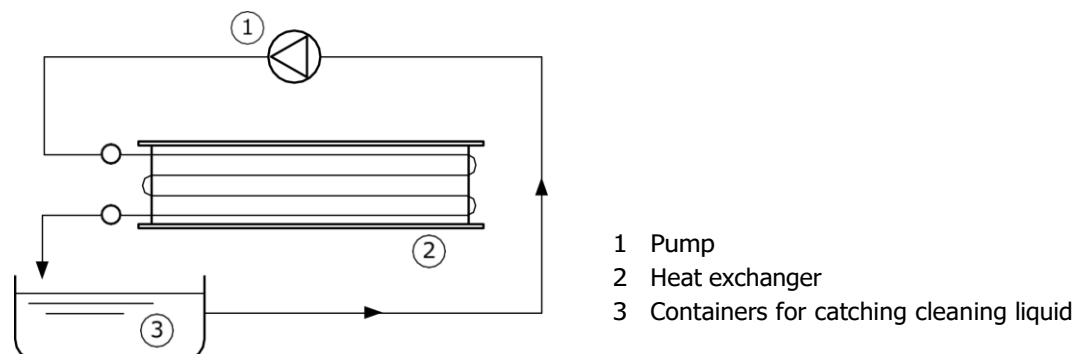
Procedure

Rinsing with solvents removes dirt build-ups formed by limescale, paint-type layers, oil residues, etc. A solvent appropriate to the deposits should always be selected. The following chemicals have been proved to be useful:

- 10%-content formic acid
- Trichlorethylene for organic layers

Generally speaking, the cleaning agent must be suitable for copper and/or non-ferrous metals. The information can be found in the product data sheet for the cleaning agent (request from the relevant manufacturer).

Cleaning principle:



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.

7.4.5 Cleaning the fans

Procedure

- ⇒ Completely disconnect the unit and secure it against accidental switching on.
- ⇒ Remove protection guard and accessories (if any).
- ⇒ Clean the fans in acc. with one of the following procedures:
 - Cleaning with compressed air: Blow the fans with compressed air (pressure max. 145 psi (10 bar), distance to the fins at least 7-7/8 in (200 mm)) to remove dirt and impurities. Clean until all dirt has been removed.
 - Cleaning with brush and compressed air: Remove dry dust or dirt with a brush or a hand brush, and then with compressed air (pressure max. 145 psi (10 bar), distance to the fins at least 7-7/8 in (200 mm)) or a powerful industrial vacuum cleaner. Clean until all dirt has been removed.
- ⇒ Switch on the unit.

7.4.6 Cleaning the humidification pads

Safety

⚠ WARNING		
	RISK OF PERSONAL INJURY! When handling the humidification pad, irritation of the eyes, skin and mucous membrane and, in individual cases, allergic skin reactions in persons cannot be ruled out. - Make sure to always wear protective equipment (PPE) when working on humidification pads. - Use suitable tools for the work.	 
⚠ CAUTION		
	RISK OF DAMAGE TO PROPERTY! Excessive water pressure can cause damage. Use a low-pressure water hose. - Ensure that the applied water pressure does not damage the humidification pads. - Do not clean the humidification pads with high-pressure cleaners.	

SAFETY INSTRUCTIONS

See "Basic safety instructions"

Procedure

Clean the humidification pads regularly. There are various methods of cleaning the humidification pads, depending on the type of soiling. In any case, a careful procedure is recommended.

- ⇒ Use a broom or a vacuum cleaner (against the direction of the air flow) to clean the humidification pads. In both cases, the pads must be dry.
- ⇒ If necessary, remove stubborn dirt with a water hose.

It may be necessary to replace the pads. In this case, please contact the Güntner Service Team.

After each cleaning and maintenance work:

- ⇒ Ensure that the wetting water fittings work.
- ⇒ Ensure that the humidification pads are correctly aligned and in perfect condition.

7.5 Procedure after all maintenance work

After completing all maintenance work, carry out the following safety measures:

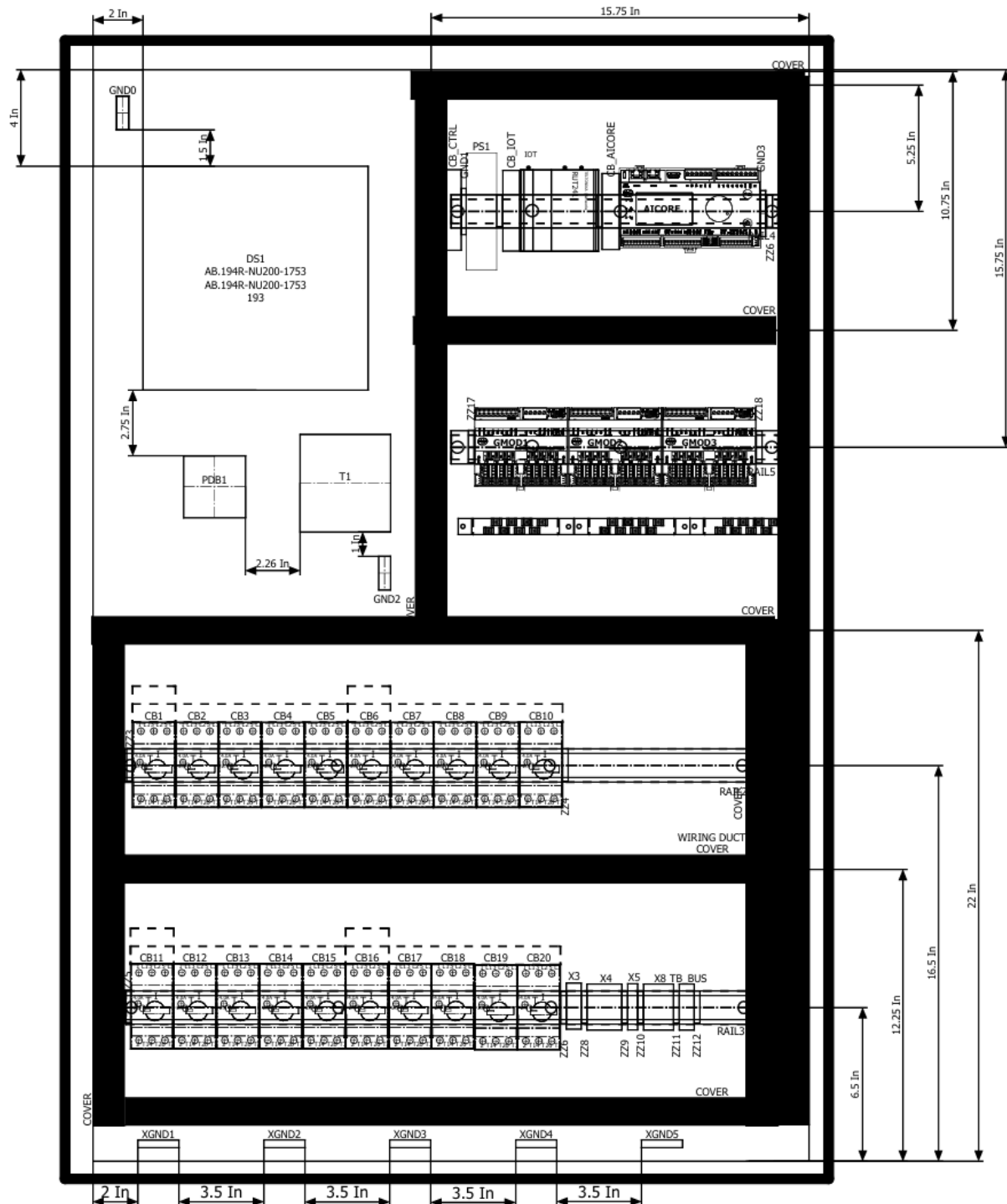
- ⇒ Ensure that the switching and activation devices, the measuring and display devices and the safety devices function properly.
- ⇒ Ensure that the working fluid fittings function properly.
- ⇒ Check the labelling of the pipes and ensure that the labels/tags are visible and legible.
- ⇒ Check the fastening and the corrosion protection of the components concerned.
- ⇒ Ensure that the electrical connections (e.g. fans) function properly.
- ⇒ Perform a pressure test in acc. with ASHRAE standards (or national relevant) and a leak test (see operating instructions of the plant).
- ⇒ Perform an acceptance test (see section "Performing an acceptance test").
- ⇒ Perform a functional test (see the system's operating instructions).
- ⇒ Document all tests performed and their results.

7.6 Spare Parts

EC FAN	Voltages
VT03200U.2	3~230V 50/60Hz
VT03147U.2	3~ 460V 50/60Hz
VT03084U.2	3~ 460V 50/60Hz
VT03240U.2	3~ 575V 50/60Hz

7.7 Electric Diagrams

Generic Electric Diagrams for a GGFD 090.2A2x10/6CA-E255U/XXP.M unit.
Should you require further information, please do not hesitate to get in touch with us.
Control Panel:



Power Supply 1/2

Incoming Power

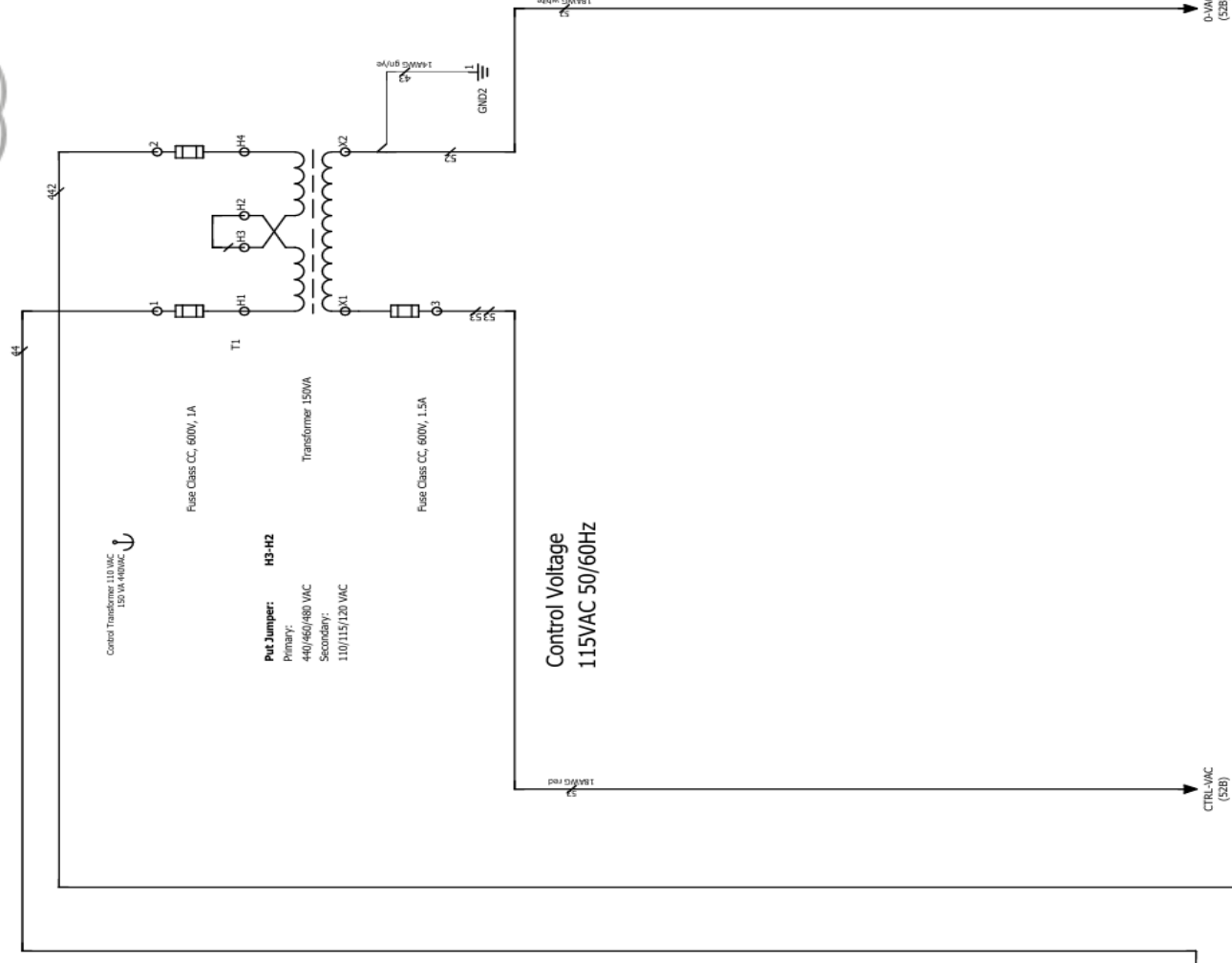
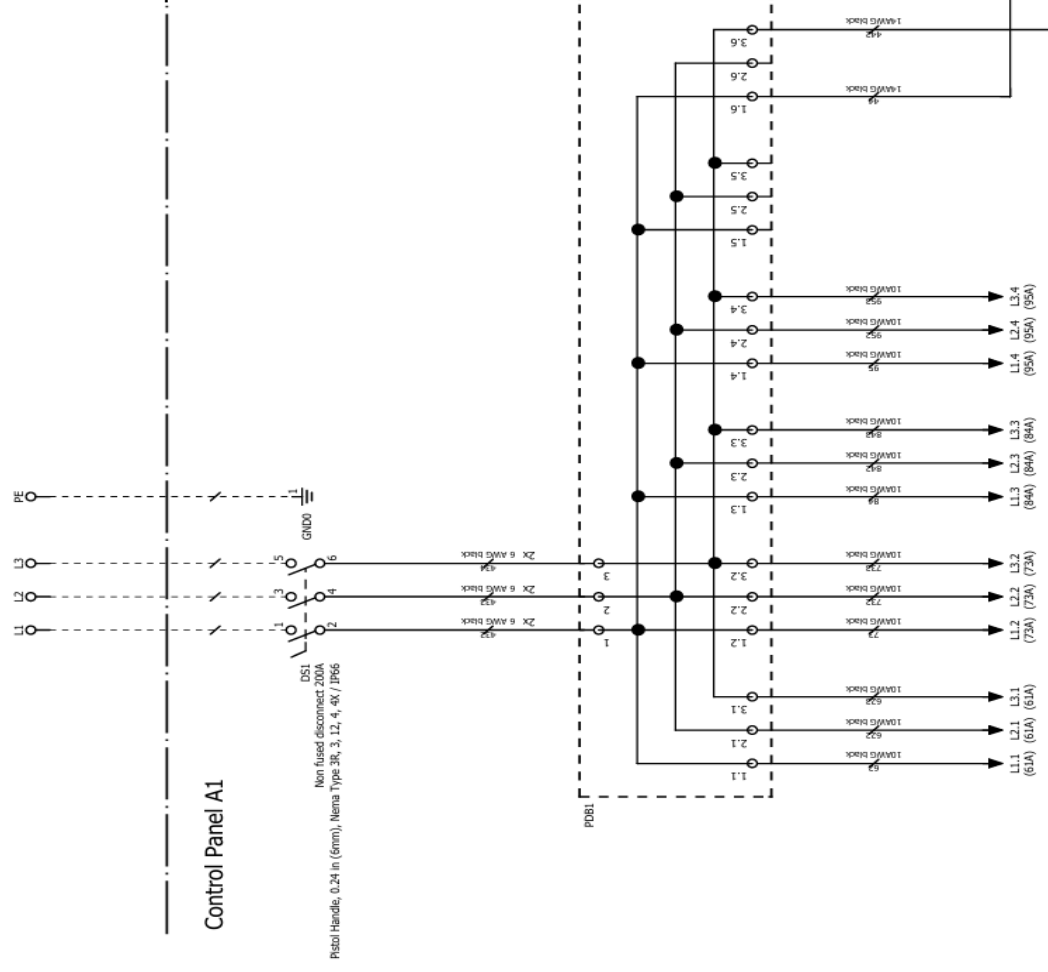
---V/---HZ

FLA --Amp.

MCA -- Amp.

MOP -- Amp. **Note

Wired to customer supplied (Listed) fuse disconnect or breaker supplying 460V, 3Ph, 60Hz power.
(Branch Circuit Protection provided by others)
Non fuse disconnect must use separately installed fuses (class J) for upstream short circuit protection



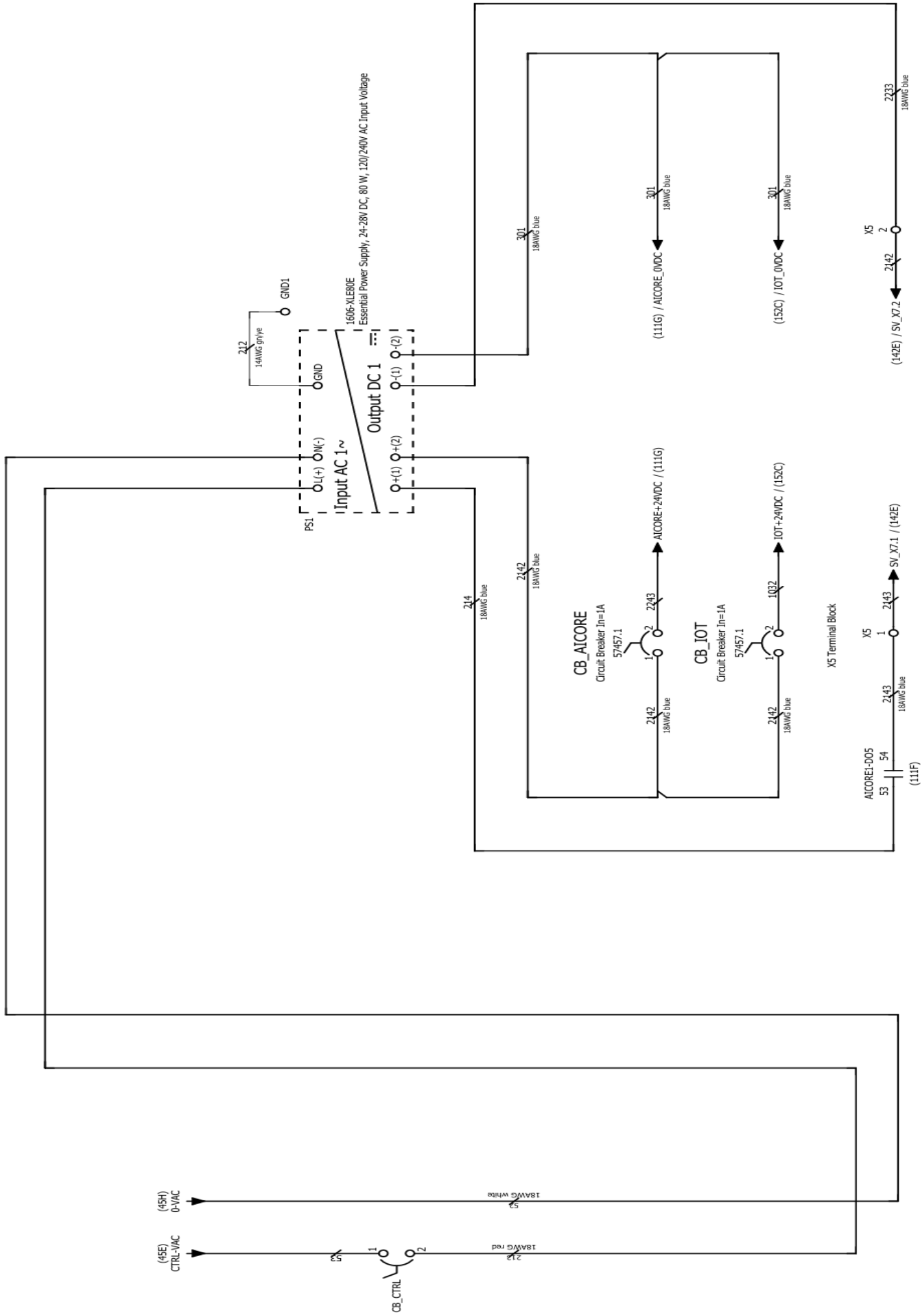
Factory wired

Field wired

Enclosure

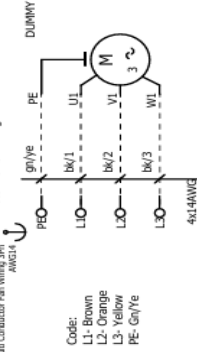


Power Supply 2/2

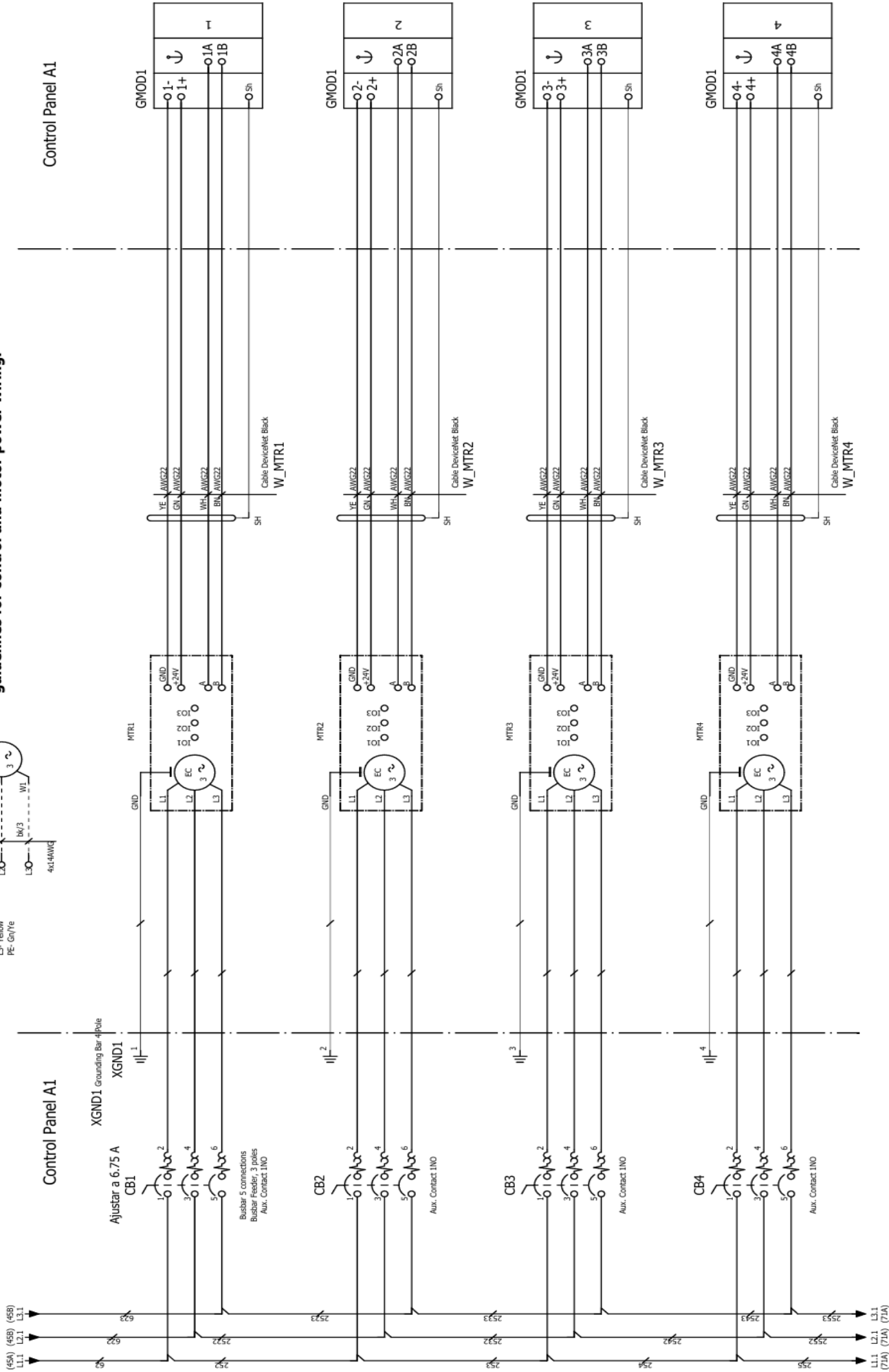


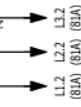


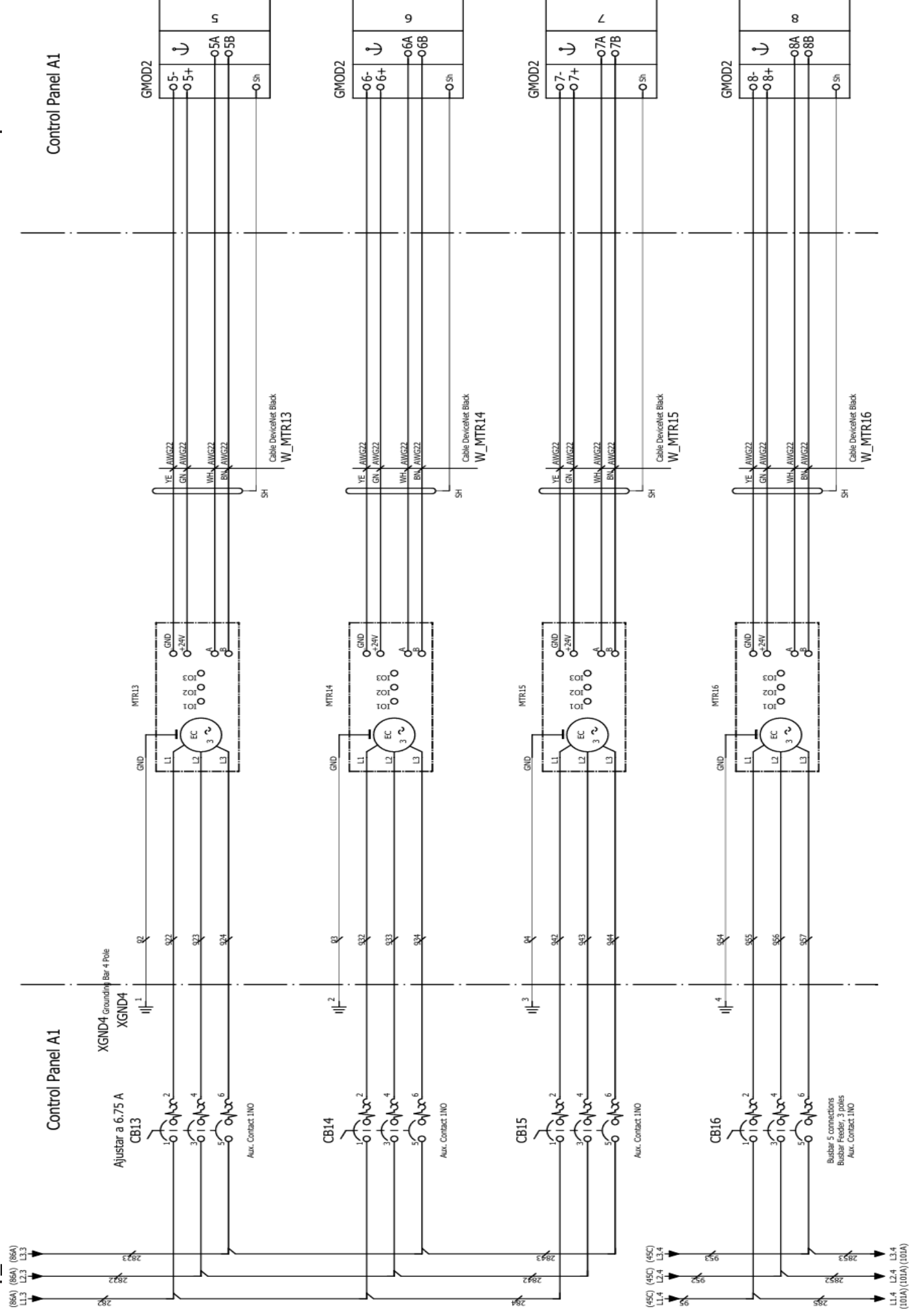
Unless otherwise indicated use for Motor Power Wiring:

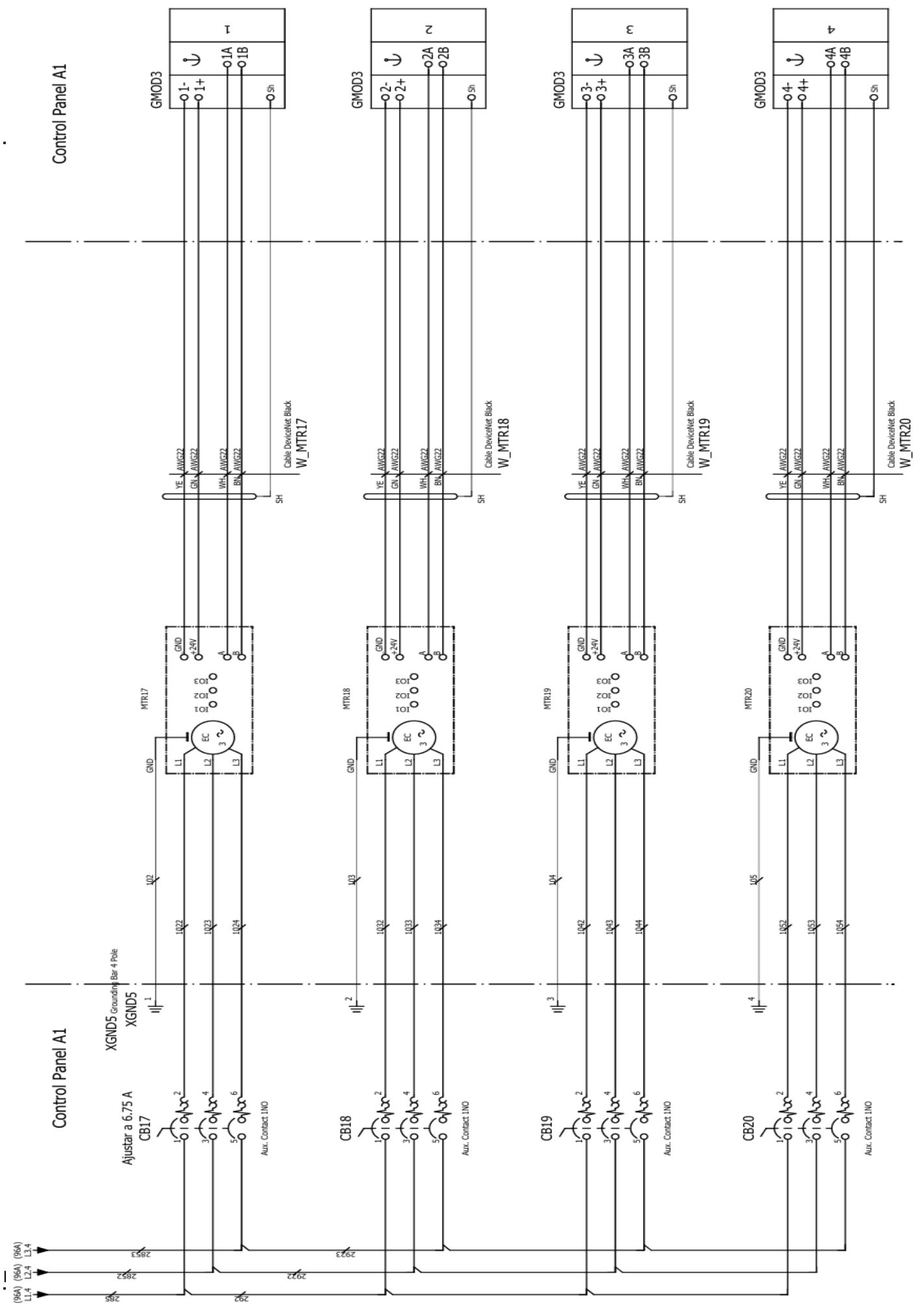


Unless otherwise required by manufacturer's installation guidelines, local codes, or national codes, use the following guidelines for control and motor power wiring.



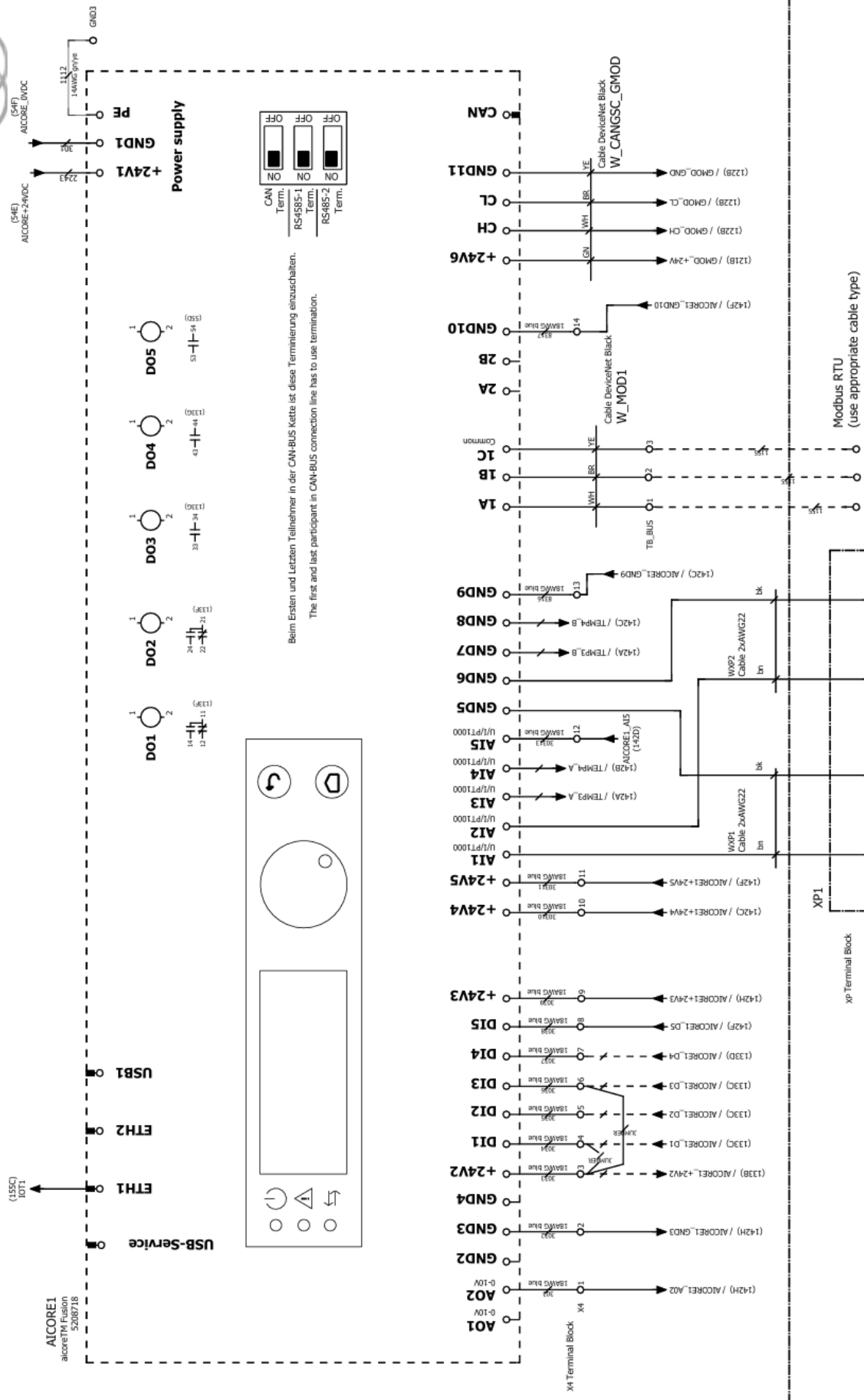








AIcore + Wiring + 2 Temp Sensor



Modbus RTU
(use appropriate cable type)

XP Terminal Block

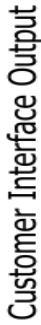
TEMPERATURE 2

TEMPERATURE 1

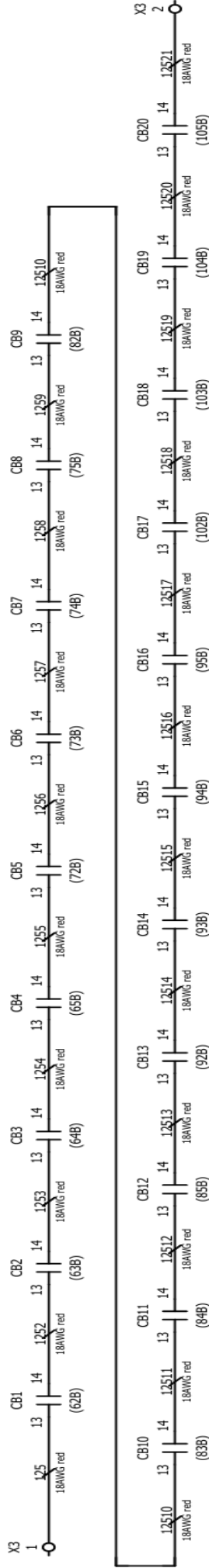
GN.P1000/B
Temperature Sensor, K8TF200501-4.0695w
4-wire cable with 1m length
(Shipped loose when the unit has more than 1 outlet header, please refer to unit selection or 10M for headers quantity.)

Note:
DI1 Jumper is the enable for the fans.
DI3 Jumper is the enable for adiabatic water.

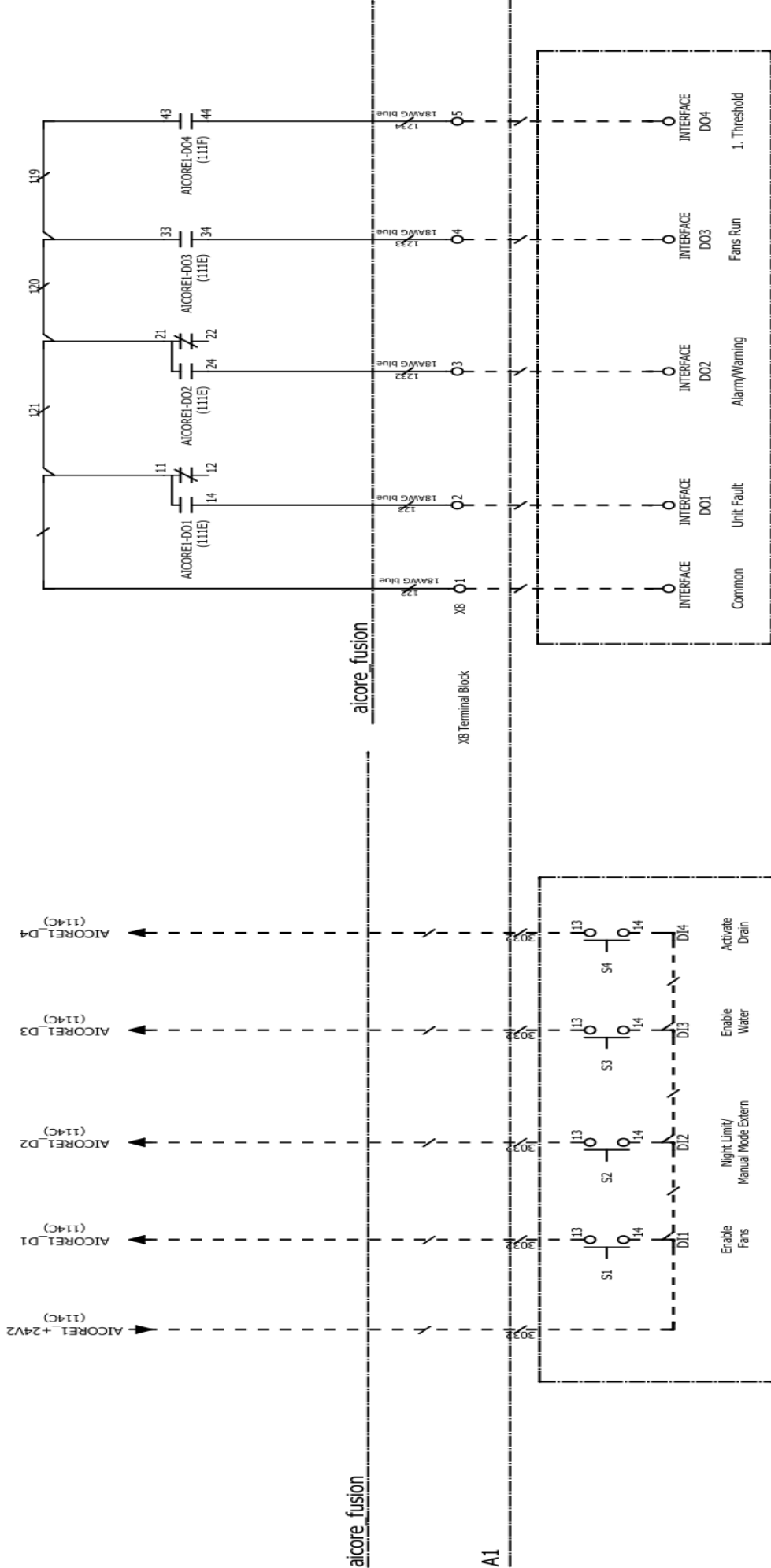
Control Panel A1



X3 Terminal Block



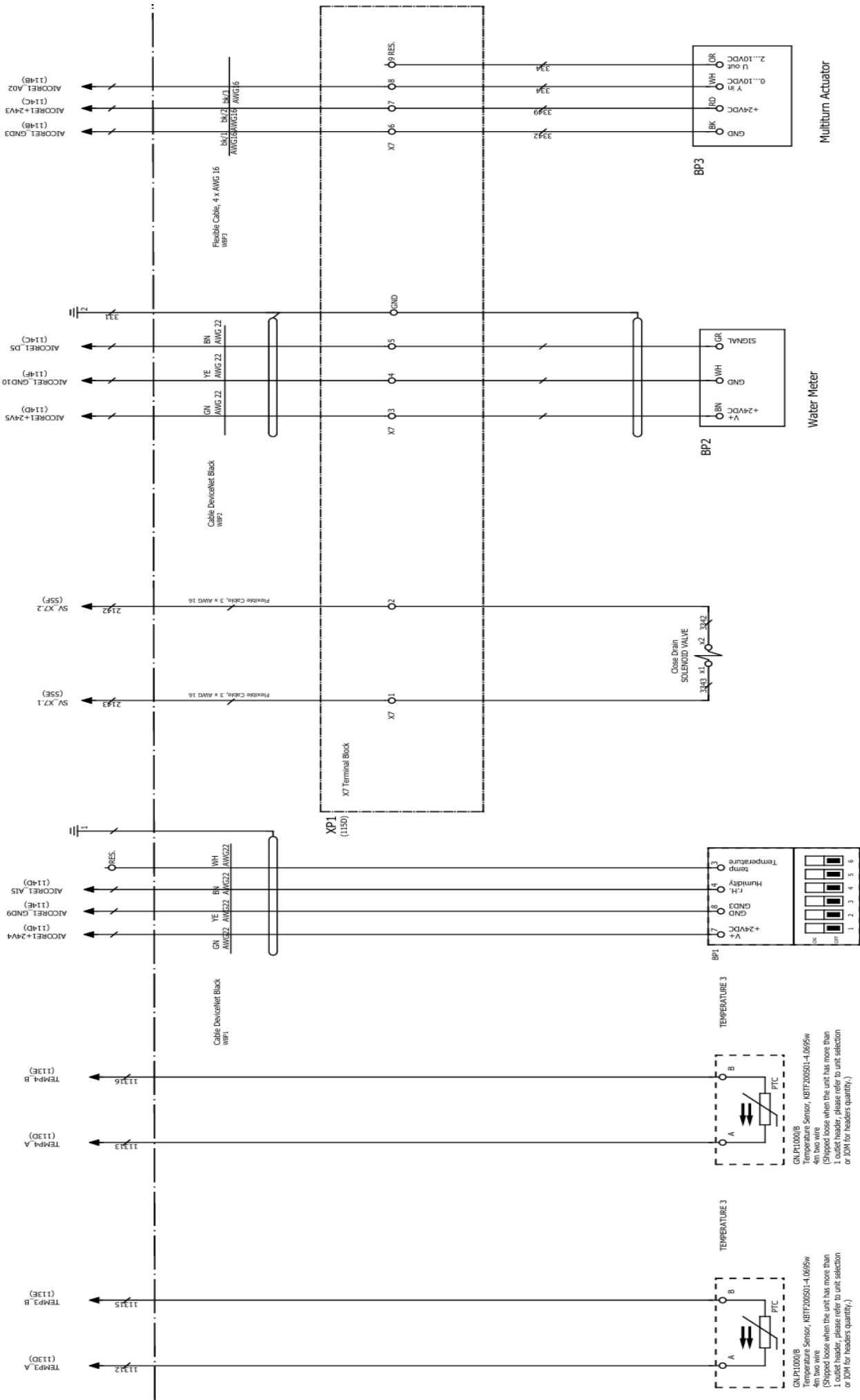
AICore Digital Input/Output + User Interface



D01 Unit Fault- Signals complete failure and standstill of the heat exchanger.
 D02 Alarm/Warning - Signals warnings that do not result in the complete failure of the heat exchanger.
 D03 Fans Run - Signals when the fans are operating.
 D04 Water Run - Signals when the water flow exists.
 D05 Drain Valve - Signals when draining is active.

DI1 Enable GMM - Change to Enable Fans.
 DI2 Night Limit - Used to limit the speed of the fans.
 DI3 Enable Water.
 DI4 Activate Drain.
 DI5 Spare.

Control Panel A1



Ambient Temperature Sensor

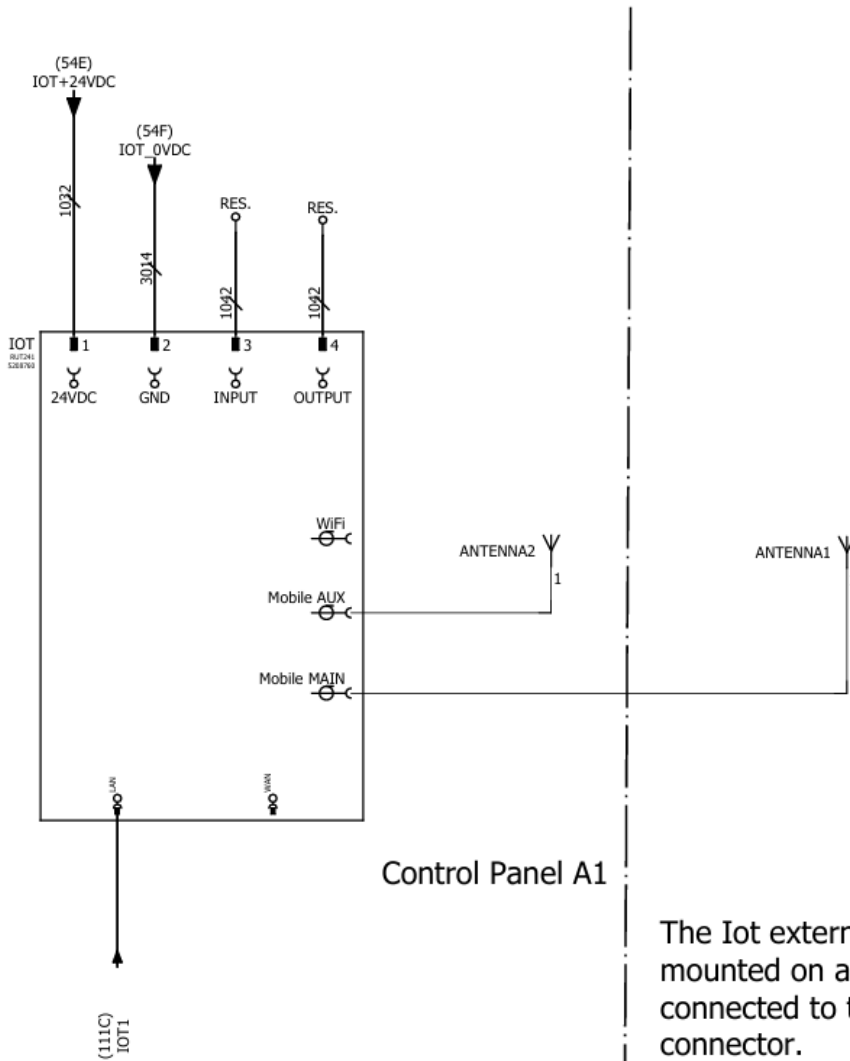
Air Inlet Temperature Sensor

Humidity and Temperature Sensor

Water Meter

Multiturn Actuator

Power supply IoT



The Iot external antenna will be mounted on an external bracket and connected to the panel through a gland connector.

8 Dismantling and disposal

8.1 Safety instructions on dismantling and disposal

Please note

SAFETY INSTRUCTIONS

Observe all basic safety instructions (see section "Basic safety instructions"), all safety instructions for transport (see section "Safety instructions for transportation and unpacking"), all safety instructions for installation (see section **commissioning**) and all safety instructions for maintenance (see section "Safety instructions for maintenance and cleaning")!

Specific hazards

⚠ CAUTION



RISK OF INJURY CAUSED BY CORROSION!

The unit is exposed to corrosive environment for a long time. Due to the onset of corrosion, the unit loses stability and is no longer suitable for lifting by crane or industrial truck with forks and endangers bystanders.

- Check the fan unit in acc. with the maintenance schedule.
- Check all fixing bolts and fixing devices, especially of the lifting accessories (e.g. crane lug bolts), load-bearing components, lifting elements, fixing elements and fans of the unit regularly and especially before and after lifting the unit for corrosion damage, lifting capacity and structural integrity, and replace them if necessary. In case of doubt, hire a specialized company.
- Prior to dismantling and disposal of the unit, ensure that there are no loose or slack parts on the unit.

NOTICE

RISK OF ENVIRONMENTAL DAMAGE!

Recovering or disposing of working fluid can result in working fluid or refrigerator oil emissions being released into the environment, causing pollution.

- All working fluids must be removed from the unit by suction and disposed of by an approved specialist company in the field of refrigeration.
- Ensure that no working fluid enters the groundwater.
- Operate the facility for recovering or disposing of working fluids in such a way that the risk of working fluids being released into the environment is kept as low as possible.
- Ensure that all applicable standards and guidelines are complied with.
- Observe local regulations.

NOTICE**RISK OF POLLUTION!**

If the materials are not disposed of correctly, this could result in environmental damage.

- Only dispose of materials in compliance with the waste disposal laws that are binding for the country of operation.

8.2 Dismantling the unit

Required staff

- Dismantling must be performed by at least two people (specialist staff).

Auxiliary equipment/tools

- Lifting accessories and lifting gear
- Climbing aids

Procedure

- ⇒ Completely disconnect all systems.
- ⇒ Shut down and drain the unit (see section "Shutting down the unit").
- ⇒ Make sure that there are no loose parts on the unit.
- ⇒ Follow the installation steps for humidification pads in reverse order (see the separate instructions KAT959.2)
- ⇒ Follow the removal sequence:
 - Remove the protection guard (if any)
 - Remove the fan(s)
 - Remove the fall protection (if any)
 - Remove the tray (if any)
- ⇒ Follow the installation steps in reverse order (siehe Abschnitt "Installation of the unit").

8.3 Disposing of the unit

Introduction

At the end of its life cycle, the unit requires proper and professional disposal of the materials and substances used.

Procedure

- ⇒ Disposal must be performed by competent persons.
- ⇒ All unit components, e.g. working fluids, lubricating oil for refrigerating compressors, coil (heat exchanger), fans and optional accessories must be disposed of properly.
- ⇒ Treat used working fluid that is not intended for reuse as waste and dispose of it safely. There must be no emissions into the environment.

- ⇒ Do not use a disposable single-use container as working fluid vapor residues in the container could escape during disposal.
- ⇒ Do not overfill the working fluid container. The maximum permissible pressure of the working fluid container must not be exceeded during the entire work process.
- ⇒ Do not pour the working fluid into a fluid container that contains a different or an unknown working fluid. Do not release this other or unknown working fluid into the atmosphere but rather identify it, reclaim it or properly dispose of as specified.
- ⇒ Instruct an officially authorized facility to destroy the working fluid.
- ⇒ All applicable laws, regulations, directives and standards must be complied with when disposing of materials and substances. The pads can be disposed of in the residual waste.

