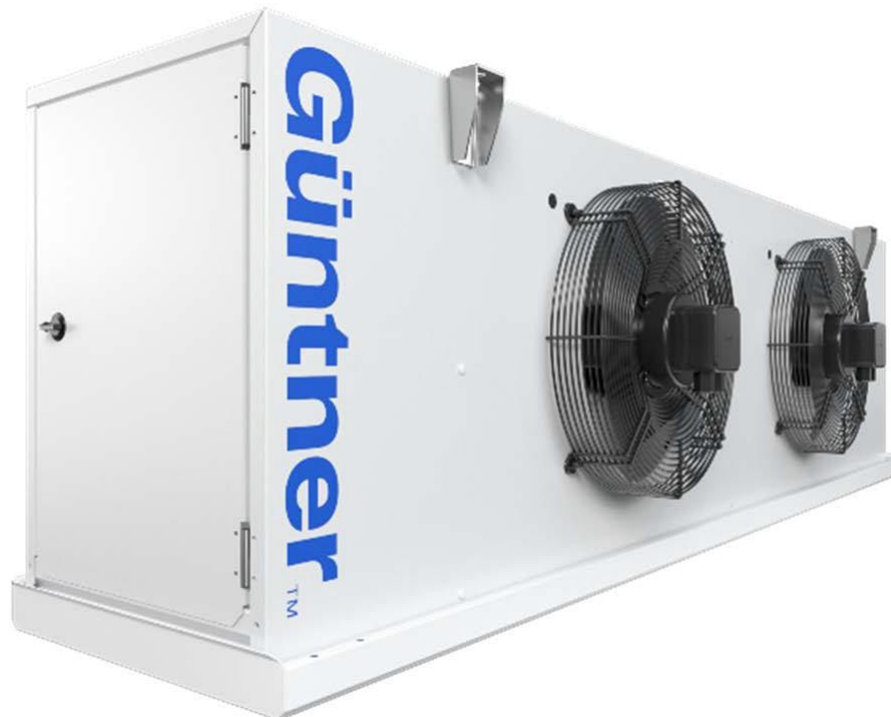


Installation instructions

Transportation | Installation | Operation | Maintenance



Cubic VARIO

Series: GHN, MHF



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:	Cubic VARIO
Version number:	2
Date of revision:	July 22, 2026

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1. Safety information

1.1 Safety symbols

⚠ WARNING
Dangerous situation that will definitely cause serious injury or death if it is not avoided.
⚠ WARNING
Dangerous situation that could cause serious injury or death if it is not avoided.
⚠ WARNING
Dangerous situation that could cause slight to moderate injury if it is not avoided.
NOTICE
Refers to possible damage to property.

1.2 Safety instructions

Installation and maintenance must only be carried out by qualified personnel who are familiar with this type of equipment.

Always wear safety glasses, gloves and head protection when working on the equipment.

Avoid contact with sharp edges and exposed finned surfaces as these can cause painful lacerations.

All units must be properly evacuated prior to charging the system.

Ensure all power sources are disconnected prior to any service work being done on the units.

Never apply heat to a sealed refrigeration system.

Keep hands away from fans when the unit is running.

Ensure all mounting bolts are tight and are the correct length for the specific application.

Maintain all safety labels on the unit in good condition. If required replace with new.

1.3 Refrigerant safety

⚠ WARNING
Although halocarbon refrigerants are classified as safe refrigerants, certain precautions must be observed when handling them. Refrigerant can be harmful if inhaled. When released to the atmosphere in the liquid state refrigerants evaporate rapidly, freezing anything, they contact. Refrigerants must be used and recovered responsibly.
Failure to follow this warning may result in personal injury or death.
⚠ WARNING
For A2L refrigerants , a suitable leak detection system should also be installed to comply with regulatory leak detection and mitigation requirements.
These systems are designed to activate automatically when a refrigerant leak is detected, which helps reduce refrigerant concentration levels in space.

Refrigerant charge limits must always be evaluated and respected.

Local regulations and F-Gas requirements must always be followed.

The safe use of **A2L refrigerants** requires effective leak detection, automatic mitigation measures such as shut-off valves, and careful system design that considers charge limits, ambient conditions, ventilation, and regulatory compliance.

WARNING

Anhydrous Ammonia (NH₃)

Specific precautions must be adhered to when people are working with or are exposed to Anhydrous Ammonia.

Ammonia is considered a high health hazard because it is corrosive to the skin, eyes, and lungs. Exposure to 300 parts per million (ppm) is immediately dangerous to life and health. Ammonia is also flammable at concentrations of approximately 15% to 28% by volume in air. When mixed with lubricating oils, its flammable concentration range is increased. It can explode if released in an enclosed space with a source of ignition present, or if a vessel containing anhydrous ammonia is exposed to fire. Personal protective equipment must be always worn when working with Ammonia. For systems that have an operating charge greater than 10,00lbs a process safety management program is mandatory. More information on this topic is available from OSHA.

Failure to follow this warning may result in personal injury or death.

2. General information

Güntner evaporators and air coolers are designed to provide optimum efficiency and an extended life when properly installed, operated and maintained. It is therefore highly recommended that a comprehensive maintenance schedule be developed and undertaken on a regular pre-determined basis. This manual will assist the owner – operator in developing such a schedule. This equipment is relatively complicated and the installation, operation, maintenance and servicing should only be carried out by suitable individuals who are qualified to carry out these functions. These individuals shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the function/s.

The type of refrigerant and method of feed to the evaporator must comply with what is indicated on the submittal drawings and / or unit's nameplate.

Design operating pressures, as indicated on the nameplate, must never be exceeded!

Evaporators and all piping systems must be correctly evacuated prior to charging the system with refrigerant, to ensure the complete removal of moisture and non – condensables from the entire refrigerant circuit.

WARNING

Failure to comply with any of these requirements could result in serious damage to the equipment and / or the property where it is installed, as well as personal injury and / or death to themselves and / or people at the specific location.

3. Warranty statement

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

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

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

This warranty shall not include ordinary maintenance or cleaning of the product, or defects in the installation of the product. This warranty also does not cover physical damage to the product during transit, after purchase of the product but before installation.

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

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

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

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

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

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

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Online support: <https://www.guntner-solutions.us/contact>

3.1 Product lines

The product lines covered in this manual are as per Table 1. Please take note of the respective product families that the variations are incorporated into.

Aircoolers / Evaporators						Unit Type
Refrigerant / Fluid					Family	
HFC	NH3	CO2	Glycol	A2L		
GHN	AGHN	CP/XGHN	GGHN	GHN	GHN	Unit Cooler
MHF			MGF	MHF	MHF	Unit Cooler

4. Installation

4.1 Receiving & inspection

All units are factory tested to ensure safe operation and quality assembly. Units are packaged for easy handling and storage, if required, at the job site. Upon delivery inspect all components for possible shipping damage and / or shortages.

Torn or broken packaging, scratched or damaged panels should be recorded on the delivery receipt and reported to the carrier immediately. Any damage or shortages discovered after unpacking should also be reported to the carrier within the allotted time after delivery. The refrigerant circuit/s should also be inspected to confirm that no leaks have occurred during the shipment. If there is no holding charge within the unit it is possible that the coil might have been damaged during shipment.

The coil should therefore be pressure tested with dry nitrogen to confirm that it has no leaks.

Take photos of all damaged equipment if possible. Damaged equipment is the responsibility of the designated carrier and should not be returned to the manufacturer unless prior approval is given to do so. Confirm that all items listed on bill of lading are received; especially loose items such as air throw streamers, inlet hoods and fan guards.

NOTICE

Record any unit damage and shortages on the Bill of Lading and report to the carrier and Güntner factory immediately. Shipping and handling damages are not warranty items.

Compare the data on the nameplate of the unit with the ordering and shipping information to verify the correct unit is received. Model nomenclature and electrical data should also be verified with original order.

The unit can be transported with a forklift with the forks extended completely underneath the skid and generally in the center of the unit. Do not allow the forks to make contact with the unit. Refer to rigging instructions for greater detail.

The unit is intended for indoor use only. To protect the unit from damage due to the elements, the unit should be stored in a clean, dry location and away from areas with excessive traffic. The unit must remain on its skid as this should only be removed at the time of installation. The unit should be well ventilated at all times during storage.

4.2 Recommended air cooler location

Units should never be located directly above doorways and should be located as far away as possible from areas of high infiltration.

The location of the unit/s must allow for the air pattern to cover the entire room.

The air inlet side of the coil should be at least 0.8 x face height away from the wall to prevent obstructed airflow patterns. The positioning of the unit in relation to racks, aisles, lighting and / or product should be such that the leaving air from the unit is not obstructed.

The performance of the unit is realized by the specified air quantity flowing across the coil, and the inlet temperature of this air as per the submittal documentation. If either of these are compromised the performance of the unit will be adversely affected. The unit should not be connected to ducting on either the air inlet or air leaving side unless it has been specifically engineered and all external pressures have been accounted for.

Position the unit/s, in relation to the compressor room, to realize minimum pipe runs.
Position the unit/s to minimize condensate line runs.

The size and shape of the room will determine the number of units (and type thereof) that should be used and the specific location thereof.

Sufficient access at the sides, back, underneath and in front of the unit should be available for maintenance work to be undertaken. 3 foot (1m) minimum is generally sufficient at the sides and in front of the unit. The 0.8 x face height must be the minimum distance at the back of the unit – air inlet side. Bottom clearance for the removal of the pan should be the width of the unit, minimum.

Units with electric defrost will require an access area the length of the unit on the side of the unit where the electrical elements is required to be removed from, which is the refrigerant connection end of the unit.

Ensuring optimum performance of the unit with unobstructed air flow is the responsibility of the installing contractor.

NOTICE

Always ensure that there is no obstruction to the air intake or discharge for every unit

4.3 Air cooler mounting

Most units can be mounted with threaded rod or bolts suspended from the steel / ceiling structure above the unit. Care must be taken to ensure that the unit is mounted level so that condensate drains properly. The steel / ceiling structure from which the unit is supported must be strong enough to support the unit. All the mounting holes in the hangers on the unit must be used for supporting the unit. In some instances – e.g. seismic – the installing contractor might require additional bracing. Foot mount units should be mounted on the floor or steel structure and either bolted or welded to the support structure. Take care to ensure that the support structure is level.

NOTICE

Air Coolers should never be positioned directly above doors and / or door openings.
Ensure that a space equal to 0.8 x unit height between the wall and air inlet side is maintained.
Always allow for a space equal to the unit height below the unit.
Do not stack product directly in front of the unit.

5. Operating instructions

5.1 Pre start-up

- Check all electrical and refrigerant connections
- Ensure unit voltage as indicated on nameplate matches supply voltage
- Confirm that the air cooler is wired in accordance with all local and national standards that are applicable
- Ensure unit is securely mounted and fastened at the hanger points and unit is level
- Confirm all fasteners for fans and motors are tight
- Ensure that all service valves for liquid supply, suction and hot gas feed lines are open
- Confirm proper drainage of condensate from drain pan
- Check operation of condensate drain heaters

5.2 Post start-up

- Confirm the correct rotation of all impellers
- High moisture load in new rooms can lead to rapid frost accumulation on the finned surface. It may be necessary to initiate a manual defrost(s).

- Confirm that the air unit has the correct refrigerant charge
- Pull down after start up may result in higher than normal suction pressure, which could cause nuisance tripping of compressor overloads
- Check drain pan for proper drainage
- Thermostatic expansion valves must be checked for proper superheat settings
- ALL adjustable controls and valves must be field adjusted to meet desired operating conditions

6. Electrical wiring

6.1 Field wiring

⚠ WARNING

All wiring must be undertaken by qualified personnel in accordance with national and local electrical codes and standards.

All wiring must be in accordance with all local and national codes.

Please refer to the submittal documentation and/or unit nameplate for voltage information.

Electrical drawings indicated nameplate “amps”. Operating motor amps can be found on submittal drawing.

Prior to any wiring of the equipment confirm that the electrical supply is in accordance with the electrical information on the unit nameplate and unit wiring schematics shipped with the unit. All electrical components such as circuit breakers, branch circuit protection, contactors, overload relays and wire sizing must be in accordance with national and local electrical codes and standards. The wiring schematics shipped with the unit provide the design motor amps and protection rating/s required for branch circuit protection, disconnects (fused or non-fused) and thermal overload relays.

Motor protection and supply wire sizing must be sufficiently sized to accommodate the increase in motor amp draw due to lower temperatures and increased air density. [See Table 2 below]

Room Temp °F	40	30	20	10	0	-10	-20	-30	-40
Amperage correction factor	1.06	1.09	1.11	1.13	1.15	1.18	1.21	1.24	1.27

Table 2

Before operating the unit(s) check all wiring connections, including factory terminals as these could vibrate loose during shipment.

Units are shipped with each of the motors wired to a terminal strip within a common junction box – unless otherwise requested. It is the installing contractor’s responsibility to provide the power supply wiring to the unit terminal block or disconnect switch option.

NOTICE

Use Copper conductors only

6.2 Motor wiring

All external rotor motors are shipped with internal thermal contacts. These contacts are not an internal overload protection device, but thermal contacts which when overheated will open. The thermal contacts can be incorporated into the control circuit wiring for added motor protection. MSP’s and thermal overload protection can be supplied upon request. NEMA motors are shipped without internal overload protection, except for the AGBF product line, but can be supplied upon request.

Branch circuit, feeder circuit, motor starters, overload relays and all wire sizes must be in accordance with all applicable local and national codes.

⚠ WARNING

Prior to performing any service work on the equipment, particularly in the vicinity of the fans or any other moving part, ensure that the correct electrical precautions are adhered to. ALL electrical switchgear for the fans must be disconnected, locked out and tagged out!

7. Refrigerant piping

All refrigerant piping and piping components should be installed in accordance with either the IIR Refrigeration Piping Handbook [Ammonia, Carbon Dioxide and A2L] or the relevant "Systems and Practices" chapters of the ASHRAE Handbook [Halocarbons or Brines].

Units are supplied with multiple refrigerant connections, factory sealed and pressurized to 30 psig (+/- 2 bar) and should remain sealed until ready to be piped into the refrigeration system. The connections on the units are not designed to support any field piping or piping components whatsoever. Field piping should be designed and supported independent of the unit, to minimize the transmission of vibration and allow for thermal expansion and contraction, and to inflict no load on the unit connections.

Units with stainless steel tubes and piping are supplied with black steel stubs at the end of each connection piece to facilitate field piping / welding. (These can be supplied as stainless steel if required.) The supplied connections should not be used as a reference for system piping. System piping dimensions should be based on industry accepted good engineering design principles.

8. Defrost piping

8.1 Condensate drain piping

Condensate drain lines should be kept as short as possible within the refrigerated space and should be individually trapped. All condensate drain lines should be pitched at a 3/8" inclination per linear foot (3 cm/m). Drain lines from each unit should be piped to an independent trap to prevent the migration of warm air through the condensate drain lines. This is critical when multiple units drain lines are piped to a common drain line header. The reverse flow (migration) will cause ice buildup in the drain pans if the room temperature is below 32°F (0°C). This ice buildup will block the drain outlet and trap the condensate within the drain pan. Traps should preferably be positioned outside of freezer spaces and in warm locations. When the trap is located in an area where the temperature never drops below freezing the trap should not be heated. If heated there is a possibility of the condensate within the trap boiling off and drying out the trap.

All condensate drain piping and traps, if unavoidable, within space temperatures below 34°F (1°C) must be heated and insulated to prevent freezing. Heating elements must be energized continuously.

The values below are generally accepted within the industry for drain line heater wattages:

+20°F (-7°C)	>>> 10W / linear foot (33 W/m)
0°F (-18°C)	>>> 20W / linear foot (65 W/m)
-20°F (-29°C)	>>> 30W / linear foot (100 W/m)

Condensate drain line sizing should be the same dimension, at a minimum, as the outlet connection on the unit. A union piped into the outlet from the unit is recommended and will enable disconnecting the drain line for heater repair / replacement and / or maintenance.

NOTE: Always use two wrenches to fasten the condensate drain pipe union. DO NOT apply torque to the fitting on the drain pan.

NOTICE

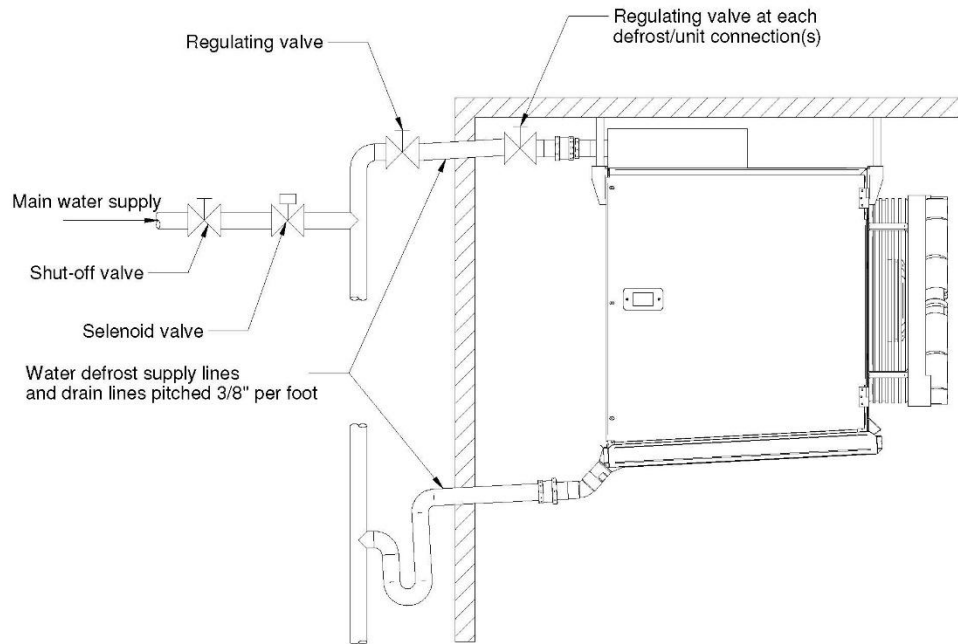
Always use two wrenches to fasten the condensate drain pipe union. DO NOT apply torque to the fitting on the drain pan.

8.2 Water defrost piping

All water lines within refrigerated spaces must be insulated and heat traced to prevent these lines freezing. Lines must also be pitched up to ½" per linear foot to allow the water to drain at the completion of the defrost period.

A solenoid valve should be installed in the water supply line to each unit, which will open under the control of an automated timer to allow water flow to the units. [See water defrost section for more details on pipe sizing and control requirements]

Drain line and water defrost piping.



9. Defrost

All air coolers operating with coil surface temperatures beneath freezing [32°F (0°C)] will experience some form of frost accumulation. In order to maintain the performance of the coil it is imperative that some form of defrost is incorporated into the system. Typically the defrosting of the coil will be accomplished by; air (for rooms above 36°F (2.2°C)), hot gas, electric or water. (See Table 3 below)

Recommended Defrost Types based on Room Temperature				
Temperature	Air Defros	Water Defrost	Electric Defrost	Hot Gas Defrost
HIGH Temperature > 40°F (4.4°C)	yes	no	no	no
MEDIUM Temperature > 20°F (-6.7°C) < 40°F(4.4°C)	no	yes	yes	yes
LOW Temperature < 20°F (-6.7°C)	no	yes	yes	yes
ULTRA LOW Temperature < -40°F (-40°C)	no	no	yes	yes
*** Insulated pans are recommended for any application with a room temperature below freezing.				

Table 3

9.1 Air defrost

For applications where the room temperature is above freezing, defrosting of the finned surface area is possible by closing the liquid feed to the coil and allowing the fans to continue running. The warmer air passing over the coil will melt the frost accumulation, but dependent on the frost formation and room temperature will determine the rate of frost melt. It is therefore recommended to only use air defrost when the room temperature is above 36°F (2.2°C).

9.2 Hot gas defrost

Most refrigeration systems incorporate a central compressor room. This is an ideal source for hot gas and only requires the piping to make it available for the evaporators. The latent heat content of the vapor makes this method of defrost very effective and is essentially a byproduct of the refrigeration system. It is essential that not more than 1/3 of the evaporators in the system are defrosted simultaneously.

Reverse cycle defrost is not recommended for non – Industrial applications. Therefore forward cycle should always be used which requires a three pipe arrangement at the evaporator, the third pipe being the hot gas supply line. The hot gas flow through the unit should always be a series arrangement, first through the pan section and then into the coil from top to bottom. For DX applications where a distributor is used the hot gas feed into the coil should always be through the distributor, not reverse cycle.

Evaporators with capacities greater than 15 tons (52 kW) should incorporate a soft start hot gas solenoid valve in the valve station. This valve will allow the coil to ease up to the hot gas pressure and prevent problems such as check valve chatter, liquid hammer and piping vibrations.

The pump out phase is critical to optimum defrost performance. Additionally if liquid is still present in the tubes when the hot gas enters the coil, condensate induced hydraulic shock is possible which can have severe consequences, including the rupturing of the pipes!

Hot gas piping located within the refrigerated spaces and / or outdoors in cold climates must be insulated. It is also recommended to have liquid drainers installed in these lines to prevent liquid condensate entering the evaporator during the defrost phase.

The hot gas mass flow supplied to the evaporator is dependent on the capacity of the unit and the hot gas pressure entering the evaporator. More often than not there is insufficient volume flow to the evaporator than a hot gas pressure or temperature issue, that results in poor defrost performance.

Recommended hot gas pressures at the evaporator should be in accordance with Table 4:

Refrigerant	Required pressure at evaporator
R404a	115 - 140 psig [~8 - 9.5 bar]
R507A	115 - 140 psig [~8 - 9.5 bar]
R410a	155 - 185 psig [~10.5 - 12.5 bar]
NH3	80 - 100 psig [~5.5 - 7 bar]
R454C	80 - 100 psig [~5.5 - 7 bar]

Table 4

The sequence of hot gas defrost operation and recommended stage duration is indicated in Table 5:

Hot Gas Defrost - Sequence of Operation								
Defrost Stages	Time, in minutes (approx.)	Control Valves						
		Liquid solenoid (LSV)	Suction solenoid (SSV)	Delay	Soft hot gas solenoid valve (SHGSV)	Hot gas solenoid valve (HGSV)	Bleed solenoid valve (BSV)	Fan motor/motprs running
Refrigeration mode	xx							yes
Pump out period	10 - 30							yes
Delay	5-10 secs							no
Soft gas period	1 - 2							no
Hot gas period	5 - 30							no
Equalizing period	2 - 5							no
Fan delay period	1 - 3							no
Refrigeration mode	xx							yes
			=	Solenoid open				

9.3 Electric defrost

For DX applications the most common method of defrost is with electric heater rods or cable heaters. The rod heaters are placed in both the coil and the pan section. The heater rods are installed within support tubes in the coil bundle and held in place with "C" clips, which are positioned such that there is sufficient space for the rods to expand and contract due to the thermal changes.

All heater rods require a pull space for removal and / or replacement that is equal to 0.8 x the coil length.

Cable heaters elements do not require a support tube; due to the material and their direct contact with the fins, no clips are needed to held in place.

The heater rods for the drain pan section are attached to the underside of the heater sheet which is positioned below the coil and held in place with clips. All wiring for heater rods are terminated within a junction box located on the end tube sheet of the unit.

⚠ WARNING

Prior to performing any service work on the equipment, particularly in the vicinity of the fans or any other moving part, ensure that the correct electrical precautions are adhered to. ALL electrical switchgear for the fans must be disconnect, locked out and tagged out!

Wattages for heater elements will be dependent on the room temperature, and this should be carefully checked at the time of selection (see Table 6 below).

Recommended Wattages for Electric Defrost	
	Wattage per ft ² of coil surface area
MEDIUM Temperature > 20°F (-6.7°C) < 40°F(4.4°C)	6 to 8
LOW Temperature < 20°F (-6.7°C)	8 to 12
ULTRA LOW Temperature < -40°F (-40°C)	12 to 15

Table 6

9.4 Water defrost

For water defrost to function correctly it is essential that an adequate supply of suitably warm water [$> 55^{\circ}\text{F}$ (13°C)] is available at the job site. The defrost method consists of the water being evenly distributed over the coil from a water distribution pan positioned on top of the coil. Water flow is required until all frost has been melted off the finned surface.

The flow rate should be controlled by regulating a balancing valve located at the inlet to each unit. Refer to Table 7 below for water flow pipe sizing. The flow must be adjusted to ensure full coverage of the coil plan area and take care not to allow the water distribution pan to overflow. Flow rate requirements for each unit are indicated on the submittal drawings. During the set up and commissioning the defrost operation must be carefully observed to ensure that the entire coil is cleared of frost. The time required to clear the coil can vary from three to fifteen minutes – and should never exceed fifteen minutes. If this is the case typically inadequate water supply and / or inlet temperature is too low.

All water lines within refrigerated spaces must be insulated and heat traced to prevent these lines freezing. Lines must also be pitched up to $\frac{1}{2}$ " per linear foot to allow the water to drain at the completion of the defrost period.

Large volumes of water also require adequately sized condensate drain lines (see Table 8 below). Condensate drain lines must have a minimum inclination of $\frac{1}{2}$ " per linear foot and sufficient fall from the drain pan outlet is required prior to entering the trap in order for the static head to overcome the pressure drop of the water flow through the trap. Traps should always be situated outside the refrigerated space. Condensate lines must be heat traced and insulated.

Water Flow Rates for Different Pipe Diameters in gpm								
Pressure drop in psi / 100	Pipe Diameter in Inches							
	1	1 1/4	1 1/2	2	2 1/2	3	4	5
2	8	17	23	50	89	144	307	553
5	13	26	38	81	146	236	504	906
10	19	28	56	118	213	344	733	1318
15	24	49	69	147	265	428	912	1640
20	28	56	81	172	309	500	1065	1916
30	35	70	101	214	385	622	1326	2385
40	40	81	117	250	450	727	1549	2786

Table 7

Recommended Condensate Drain Line Diameters for Water Defrost							
Flow rate from drain pan in gpm	15	25	40	60	85	165	250
Pipe Diameter in Inches	2	2 1/2	3	3 1/2	4	5	6

Table 8

10. Transportation & rigging

10.1 Packing information

All Güntner air coolers are crated such that they can be removed from a truck with a forklift or a crane. When lifting any unit with a forklift it is essential that the forks extend the full span of the skid and must not make contact with any portion of the unit. Units are either plastic wrapped with a heavy duty plastic wrap and positioned on a skid or have wood crating around and on top of the unit, also placed on a skid.

When using a crane to lift the unit use only the designated lifting points as detailed on the rigging drawing attached to the unit at the time of shipping. Always ensure that the lifting points are balanced and evenly spread.

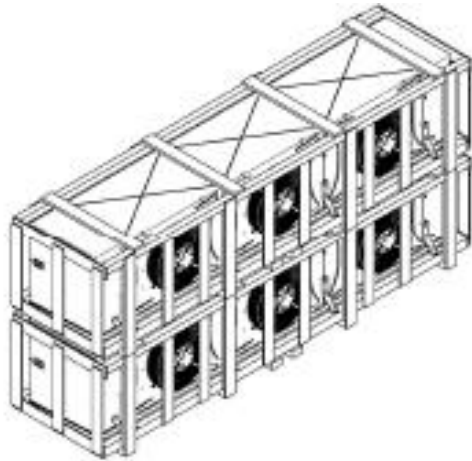
NOTICE

Never lift unit by placing forks in direct contact with the lower portion of the unit or the drain pan.

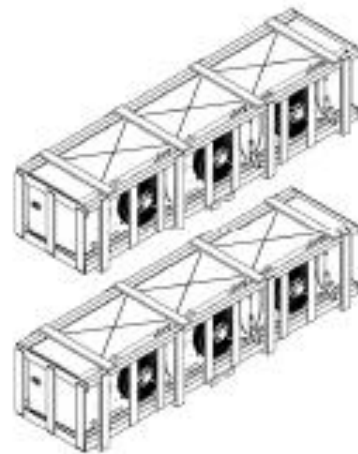
Leave the skid on the unit and use this to lift the unit with forklift. Only remove the skid once the unit is mounted to the ceiling supports. Ensure all support rods are adequately sized to support the load. [Refer to the submittal drawings for the unit weight]

10.2 Rigging

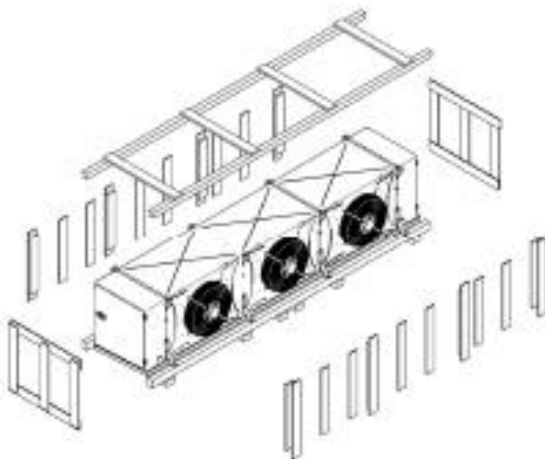
10.2.1 AGHN / GHN / GGHN / MHF (<071 Ø)



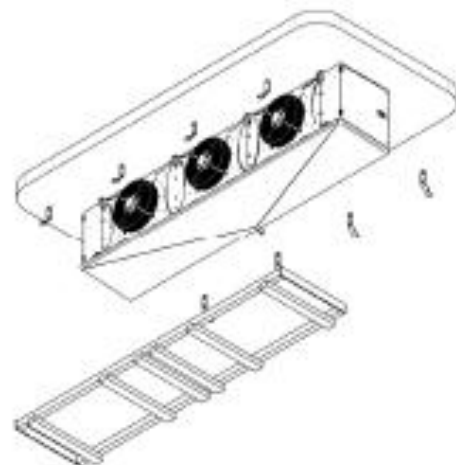
Step 1
As shipped, units are stacked, but individually skidded.



Step 2
Separate top unit from lower unit.

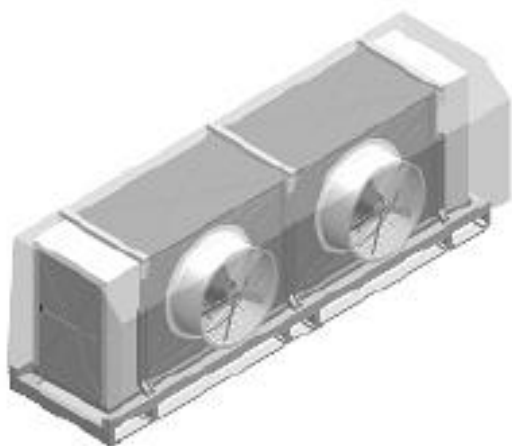


Step 3
Remove all crating from top and sides of skid.
Leave unit on skid

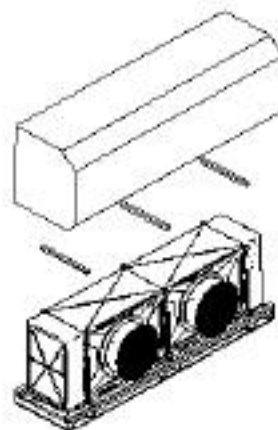


Step 4
Secure hangers to ceiling. Remove all shipping legs and skid from unit.

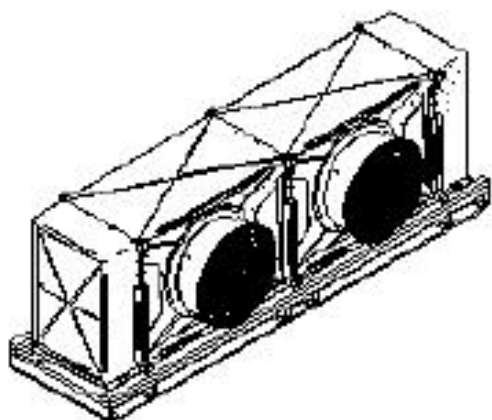
10.2.2 AGHN / GHN / GGHN / MHF (071 Ø and >)



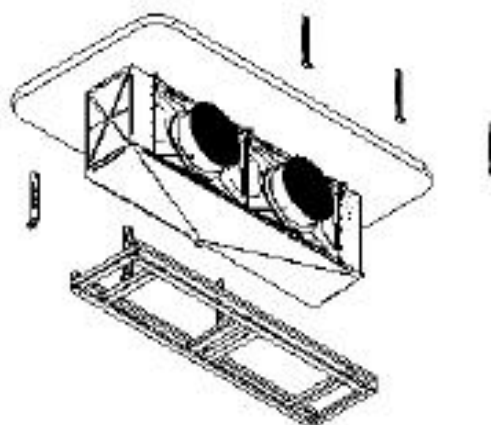
Step 1
As shipped with heavy duty plastic wrap on skid.



Step 2
Remove plastic wrap and support members from unit.



Step 3
Leave unit on skid and place forks under full span of skid.



Step 4
Secure hangers to ceiling / support rods. Remove all shipping legs and skid from unit.

11. Maintenance

Routine maintenance:

⚠ WARNING

Prior to any maintenance being carried out, ALL power must be disconnected, locked out and tagged in accordance with the respective Lockout / Tag Out policy.

Monthly:

- Inspect coil by opening the drain pan – clean if required.

⚠ WARNING

Failure to having proper support for the drain pan could result in serious injury or equipment damage.

- Confirm defrost operation and effectiveness.

NOTICE

Seasonal adjustments are often required for effective defrost performance [Space temperature, product loading rate, moisture content of ambient air, excessive traffic all contribute to variations in the quantity and pattern of frost accumulation on the finned surface]

Six Monthly:

- Confirm correct operation of all safety components
- Clean finned surface area of coil
- Inspect drain pan – clean if necessary
- Confirm drainage from pan is unobstructed
- Check all strainers – replace / clean if required
- Tighten all electrical connections
- Check all wiring
- Confirm motor integrity – check / grease bearings
- Check operation of all heaters (coil, pan and drain lines)
- Check piping insulation – repair / replace if damaged
- Leak detectors should be calibrated for the specific refrigerant used and set to alarm at 20% of the refrigerant's Lower Flammability Limit (LFL).

⚠ WARNING

All power must be disconnected and locked out prior to any cleaning. The drain pan also serves as cover of hazardous moving parts. Operation of unit without drain pan constitutes a hazard.

Coils should be kept clean to maintain optimum performance. During periods of high cooling demand or when dirty conditions prevail the coil should be cleaned more regularly. Always remove large debris from the coil and straighten fins prior to cleaning.

When using a high-pressure washer to clean the coil, the spray pressure must not exceed 1,100 psig (75 bar) and the spray head must be at least 12 inches (300mm) away from the finned surface area. The spray angle should not be wider than 15 degrees and must be directed perpendicular to the coil face area.

⚠ WARNING

Do not use acidic chemical coil cleaners. Do not use alkaline chemical coil cleaners that, after mixing, have a pH value greater than 8.5 without also using an aluminum corrosion inhibitor in the cleaning solution. Failure to follow these instructions could result in severe corrosion to the finned surface area. Cleaning and / or sanitizing solutions must be compatible with the materials of construction of the unit.

⚠ WARNING

Some chemical coil – cleaning compounds are caustic, as well as toxic. Use these substances only in accordance with the manufacturer's instructions. Failure to do so could result in serious injury, death or equipment damage.

Coil cleaning and sanitizing agents are available from the following companies – dependent on materials of construction of the air unit; Zep Inc., DuChem, Nalco and Hydro Balance.

12. Troubleshooting

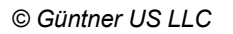
Symptoms	Possible Cause	Corrective Action
1. Fan motor(s) not running.	1.1 Main switch open.	1.1.1 Close switch.
	1.2 Blown fuse(s).	1.2.1 "Replace fuse(s) Check for short circuits and / or overload conditions".
	1.3 Faulty motor(s).	1.3.1 Replace motor(s).
	1.4 Unit currently in defrost mode.	1.4.1 Wait for completion of defrost cycle.
2. Elevated Room Temperature.	2.1 Incorrect thermostat setting (too high).	2.1.1 Adjust thermostat setting.
	2.2 Low refrigerant charge.	2.2.1 Add refrigerant.
	2.3 Superheat setting too high.	2.3.1 Adjust thermal / electronic expansion valve.
	2.4 Evaporators are undersized for room / load.	2.4.1 If design load has increased operating conditions might require change, or add more evaporators to the space.
	2.5 Coil iced up.	2.5.1 Manually defrost coil and adjust defrost settings.
	2.6 High infiltration load.	2.6.1 Ensure all openings in space are properly sealed.
	2.7 Low refrigerant flow into evaporator.	2.7.1 "Check fans / motors for correct operation (rotation).
3. Ice accumulation on ceiling around evaporator and / or around fans, motors and fan nozzles.	3.1 Defrost duration too long	3.1.1 Adjust defrost settings
	3.2 Too many defrosts	3.2.1 Decrease defrost frequency
	3.3 Defective defrost timer / thermostat / defrost relief regulating valve	3.3.1 Repair or replace defective components
	3.4 Fan delay not set correctly	3.4.1 Adjust setting for fan delay duration
4. Coil not clearing of frost during defrost cycle.	4.1 Insufficient defrost cycles in 24 hour period.	4.1.1 Increase defrost frequency.
	4.2 Defrost cycle too short.	4.2.1 Adjust defrost setting for increased duration.
	4.3 Hot gas volume insufficient.	4.3.1 Increase flow to evaporator.
	4.4 Hot gas temperature / pressure too low.	4.4.1 Increase hot gas temperature / pressure.
	4.5 Defective timer or relief regulating valve.	4.5.1 Replace timer or regulating valve.
	4.6 Fans continue to run when in defrost mode.	4.6.1 Adjust settings to prevent fans running.
	4.7 Excessive infiltration load.	4.7.1 Ensure all openings in space are properly sealed.
5. Uneven coil frosting.	5.1 Defective heater element(s)	5.1.1 Replace element(s)
	5.2 Unit located too close to a door or opening	5.2.1 Relocate evaporator

Symptoms	Possible Cause	Corrective Action
5. Uneven coil frosting.	5.3 Refrigerant feed insufficient to properly feed evaporator.	5.3.1 Check and clean strainers.
	5.4 Defrost duration too short.	5.4.1 Adjust defrost settings.
	5.5 TXV too small.	5.5.1 Replace with correct TXV.
	5.6 Fans not functioning correctly.	5.6.1 Check fans and motors for correct operation, replace if defective.
6. Ice accumulation in drain pan.	6.1 Defective heater element(s).	6.1.1 Replace element(s).
	6.2 Unit incorrectly pitched.	6.2.1 Check and adjust accordingly.
	6.3 Condensate drain line plugged.	6.3.1 Clean drain line.
	6.4 Defective drain line heater.	6.4.1 Replace heater.
	6.5 Insufficient hot gas flow to unit.	6.5.1 Increase hot gas flow to unit.
	6.6 Defective defrost timer / thermostat / defrost relief regulating valve.	6.6.1 Repair or replace defective components.
7. Low Airflow.	7.1 Coil iced up.	7.1.1 See symptoms 3, 4 and 5 above.
	7.2 Unit mounted too close to a wall.	7.2.1 Reposition unit for unobstructed airflow.
	7.3 VFD output too low.	7.3.1 Adjust VFD settings.
	7.4 Fans not functioning correctly.	7.4.1 Check fans and motors for correct operation, replace if defective.
8. Insufficient Air throw.	8.1 Air discharge area obstructed.	8.1.1 Remove / replace any items causing an obstruction to the discharge air.
		8.2.1 Fit streamers on air unit.

NOTICE

Ice has a much higher density than frost and will require more time to melt than the normal frost formation on a coil. Ice is typically formed from melted frost which is not drained from the unit during the defrost cycle. Over time this accumulation can become significant and can lead to other problems at the evaporator. It is essential that air coolers are regularly inspected to ensure effective defrost performance. Manual ice removal may be required in some instances to remove this ice accumulation.

Prior to any inspection involving frost or ice accumulation, the coil and all sheet metal components must be thoroughly cleaned of all ice accumulation!



This image shows a full page of white paper with horizontal black lines, resembling notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.