EN7536633-09

02 - 2024

VEXTRA TM

Instruction manual

CIAT

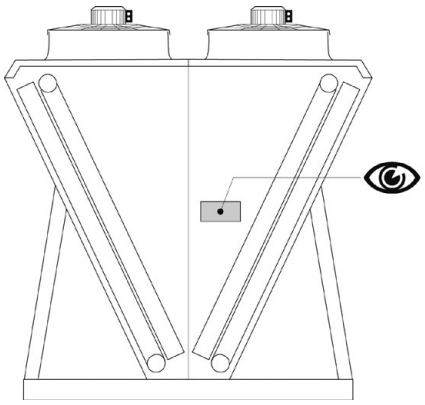
CONTENTS

Translation of the original document

1 - RECEIVING THE UNIT

1.1 - General checks

- Each unit has a data plate bearing an identification number. This number must be included in all correspondence. Ensure that it is the correct unit by checking the purchase order.
- After unpacking the unit, please inspect it for any damage.
- If any items are missing or in case of damage, specify this on the delivery slip and inform the carrier by registered letter within 3 days of delivery of the unit.



1.2 - Unloading

- The recipient shall be responsible for unloading the equipment and providing the necessary handling equipment (see the section entitled "LIFTING INSTRUCTIONS").

2 - SAFETY INSTRUCTIONS

- Any operation must be carried out by qualified personnel using the appropriate Personal Protective Equipment (PPE).
- Before any operation, read this guide carefully and keep it in a safe place. Safety information must be adhered to.
- The units must not be run under operating conditions which are more restrictive than those it was designed for (pressure, temperature, type and circulation of fluids).
- For units installed in European Community countries, ensure that the entire installation complies with the directives and legislation in force.
- Respect the instructions for using slings (see the labels on the unit).
- To prevent any risk of accident, prohibit public access by clearly marking the work area.
- Technicians who install, commission, operate and service the unit must understand the instructions given in this manual and be familiar with the specific technical characteristics of the installation site.

2.1 - In an emergency

- Switch off the electrical supply.
- The process should not be jeopardised if the emergency stop devices are activated.
- Switch off the fans.

2.2 - The 4 main risks

- Lifting or positioning = Accident
- Contact with the piping = Burns
- Opening the electrics box = Electrocution
- Removing the grilles = Injury

3 - GENERAL INFORMATION

3.1 - Unit functions

- **Dry cooler**: Device in which a fluid in liquid state is cooled by heat exchange with the ambient air, without direct contact between the ambient air and the fluid.
- Misting option: System for cooling air by misting of water droplets under high pressure.
- These devices must only be used for the purpose for which they are intended. In particular, it is formally prohibited to use any fluid other than that specified in the order documents.

3.2 - Regulation

CE

Declaration of Conformity UE

This unit complies with the provisions of European Directives :
2006/42/EC (Machinery)
2014/30/EU (EMC)
2011/65/EU (RoHS)
REGULATION (EC) No 1907/2006 (REACH)

UKCA

UK Declaration of Conformity

This unit complies with the requirements of:
Supply of Machinery (Safety) Regulations 2008
Electromagnetic Compatibility Regulations 2016
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
UK REACH Regulations 2019

UK Importer:
Toshiba Carrier UK Ltd, Porsham Close, Roborough, Plymouth, PL6 7DB

Specific case of directive 2014/68/EU.

The coils selected to equip these dry coolers work using a non-hazardous liquid type fluid. Their characteristics are less than or equal to the limits set out in paragraph 1, point a), of article 4 of the directive. They comply with article 4.3.

Therefore, in accordance with article 1.2 point f), the directive 2014/68/EU does not apply to these dry cooler assemblies equipped with these coils covered by directive 2006/42/EC.

3.3 - Warranty

- See general terms and conditions of sale.
- Check the compatibility of the fluid with the equipment being used.
- To find out the limits of use, refer to the name plate.

4 - NAME PLATE

- **Désignation\Description:** See "Description".
- **An (Year):** Year of manufacture.
- **N° série/Serial Nbr:** number to be quoted in all correspondence.
- **DIR 2014/68/EU (DN):** Category and determining value (DN for "PIPES", Capacity for "CONTAINERS").
- **Fluid CIRC. 1:** nature of fluid in circuit 1.
- **Fluid CIRC. 2:** nature of fluid in circuit 2.
- **Voltage:** Power supply.
- **Volume:** Capacity of the circuit.
- **P.Abs/P.Input**: Power input.
- **P.serv.\ Working P (PS):** Operating pressure. (Maximum allowable pressure set out in European Directive 2014/68/EU).
- **Current (+/-10%):** Maximum current.
- **Max. temperature:** Maximum permitted temperature.
- **Poids/Weight:** Maximum empty weight including options and accessories.

Ref. produit\Item Ref.		Designation/Description	
7225488.362873		1104 UI 740E8A 12A1	
An(Year)	N. Serie/Serial Nbr	PED 2014/68/UE (DN)	
2015	022777238/0001	ART4.3-LIQ-GR2 (DN: 100)	
Fluid CIRC. 1	Fluid CIRC. 2	Voltage	
EAU	EAU	TRI 400 50HZ	
Volume		P. abs \ P. input	
311 L	311 L	47600 W	
P.serv.\ working P (PS)		Courant (+/-10%)	
1.00 (13.0) BARS	1.00 (13.0) BARS	70.4 A	
Max. temperature		Poids-Weight	
110 °C	110 °C	3930 KG	

4.1 - Designation

E.g.: **1 10 4 UI 740 E 8A 12A1**

10: Number of fans:

4: Number of rows of finned tubes: 3 or 4

740: Rotation speed (rpm)

E: Motor type:

A = AC motors (3-ph/400 V/50 Hz),
B = AC motors (other voltages),
E = EC motors,
X = ATEX motors,
M = 1 stage with EC motors.

8A: Motor impeller: 9A/9B/9C/9D = impeller Ø 910 mm,
8A/8B/8C/8D = impeller Ø 800 mm,

12A1: Type of fins: 12A1 = Tube Ø 12.7 mm,
16B2 = Tube Ø 16/15.87 mm.

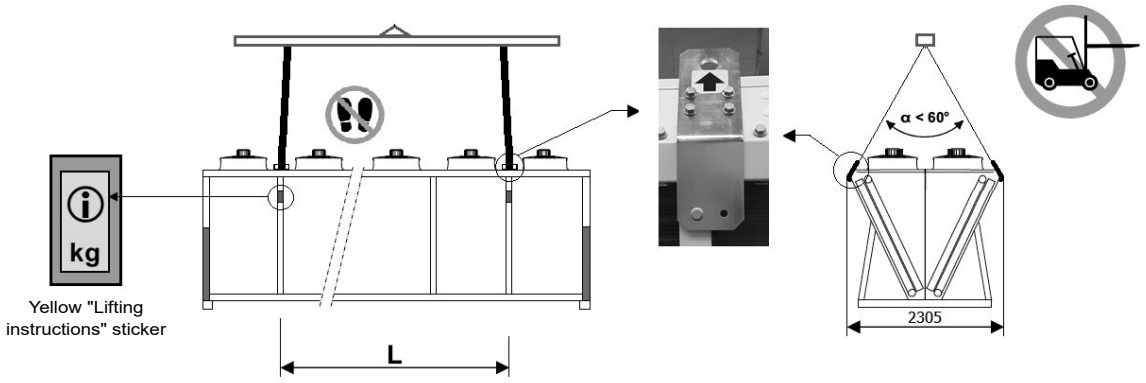
5 - INSTRUCTIONS FOR LIFTING AND TRANSPORTATION

- The weights are given on the data plates.
- To lift the units, it is essential to refer to the yellow lifting labels affixed to the unit and fix the slings to the slinging points shown on these

The lifting mode is shown on the dimensional drawing supplied with the order.

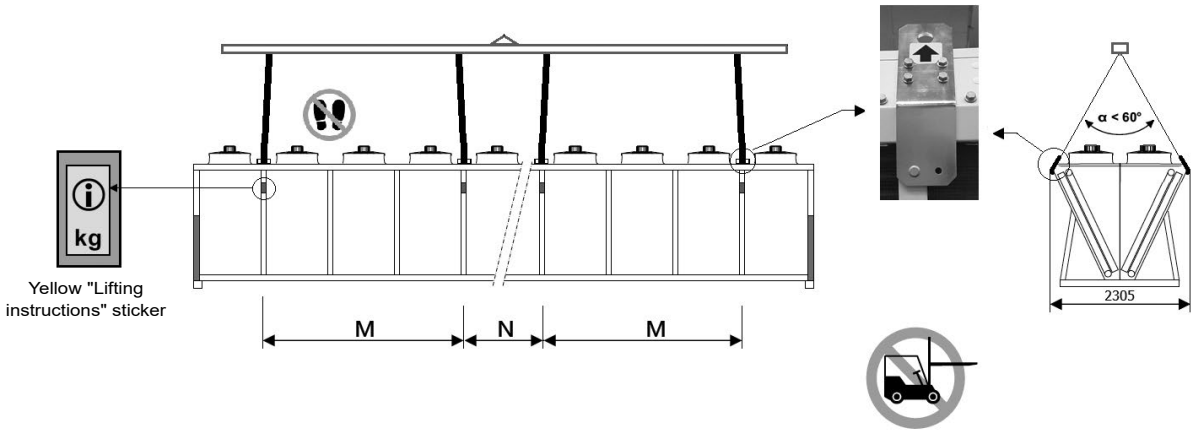
5.1 - Handling units using rings fixed to the roof: standard units

Standard units from 6 to 16 Fans



		x6	x8	x10	x12	x14	x16
W	mm	3450	2300	3450	2300	3450	4600

Standard units from 18 to 20 Fans

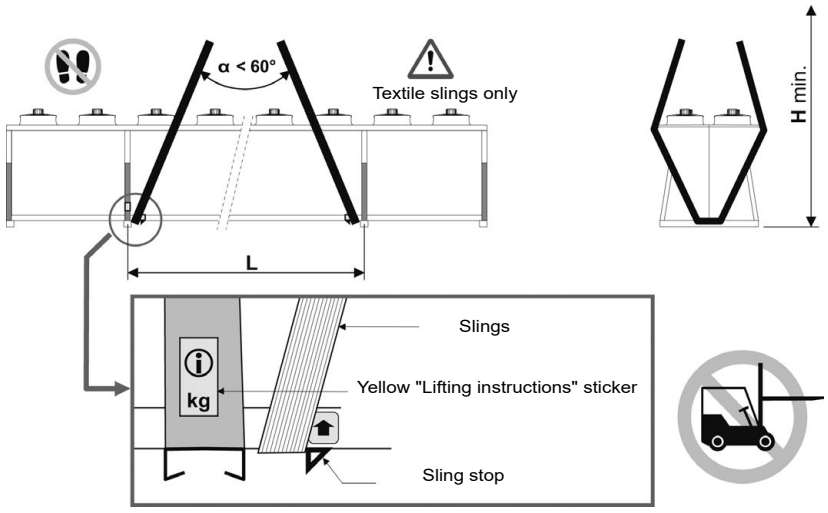


		x18	x20
M	mm	2300	2300
N	mm	1150	2300

5 - INSTRUCTIONS FOR LIFTING AND TRANSPORTATION

5.2 - Handling units using sling stops fixed underneath: special units

e.g.: copper fins, STAINLESS STEEL pipe wiring bundles, ATEX, STAINLESS STEEL casing.



		x6	x8	x10	x12	x14	x16	x18	x20
W	mm	3390	4540	5690	6840	4600	4600	6900	6900
H	mm	4100	4100	5000	6000	4100	4000	6100	6100

As the lifting mode is related to the weight of the unit, it is essential to refer to the dimensional drawing for the unit ordered.

5.3 - Transport

- Do not allow any disruption to the flow
- Follow the handling instructions affixed to the packages
- Follow the lashing instructions in the document provided
- Do not stand on the packages
- Do not place anything on top of the packages
- Strap the packages onto the deck of the truck
- Only textile straps are authorised (lifting and coupling)
- Use the dedicated option for container transport

6 - STORAGE

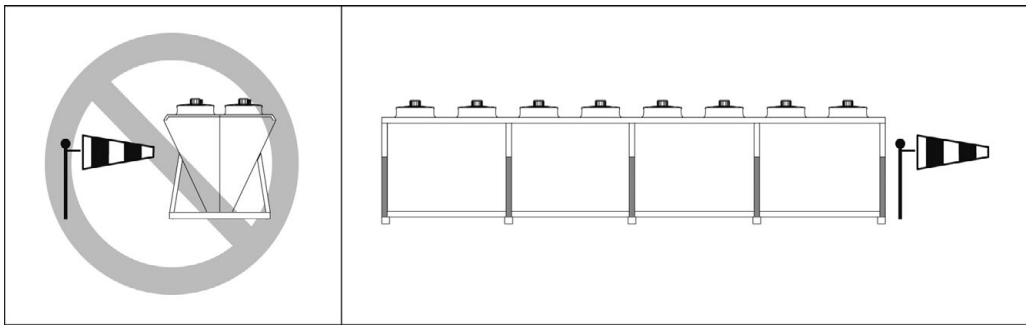
- Store the units at a temperature of between -40 and +60°C (temperature range for standard units). For options, see the relevant description.
- Protect the units against impacts and ensure that they only support their own weight.
- Place the units on firm, flat and level ground. For storage in very windy areas, affix the unit to the ground using straps or cables.
- Leave the blanking trim for the pipes in place before connecting the unit.
- For long-term storage (over 3 months), fill the exchanger with an inert gas and seal the pipes using caps. This is necessary to prevent the formation of condensation and oxidation. Warning: do not exceed the maximum operating pressure indicated on the data plate.
- For long-term storage, it is recommended to place the units in an area protected from adverse weather conditions.

7 - LOCATION

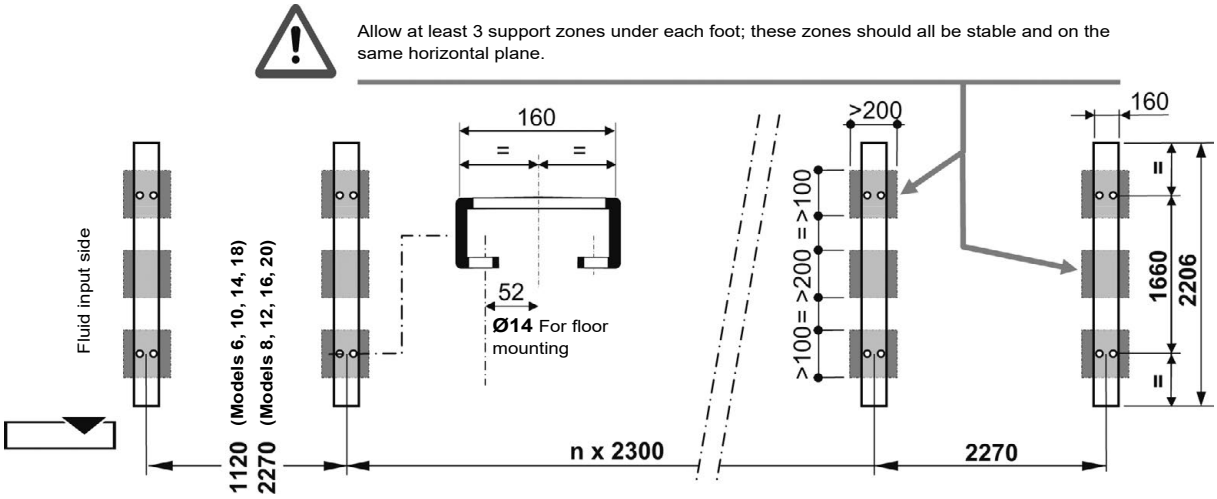
- For structures with a "special" seismic risk, please consult us.
- Before setting up the unit in its intended location, the installer must check the following points:
- The unit must be installed outdoors in an area protected from flooding. Ensure that all conditions have been taken into account (negative outdoor temperatures, corrosive atmosphere, altitude, etc.)
- The ground surface or structure must be level and strong enough to bear the unit's weight.
- Raise the unit if it is installed in a snowy area, in order to ensure a sufficient air intake height.
- At the design stage, check that the installation location is compatible with the unit's sound level.
- Protect the unit from sandstorms using the appropriate infrastructure.
- Waste from vegetation is a major factor contributing to the clogging of the coil; avoid installing the unit close to deciduous trees.
- Do not install the unit near hot air extraction duct outlets.
- The installer must take all necessary precautions to limit the recycling of hot air and ensure a good air supply to the unit.

7.1 - Maximum permitted wind speed

- Maximum permitted speed once the unit is secured to the floor: 100 Km/h
- For speeds > 100 Km/h, contact us.



7.2 - Floor mounting

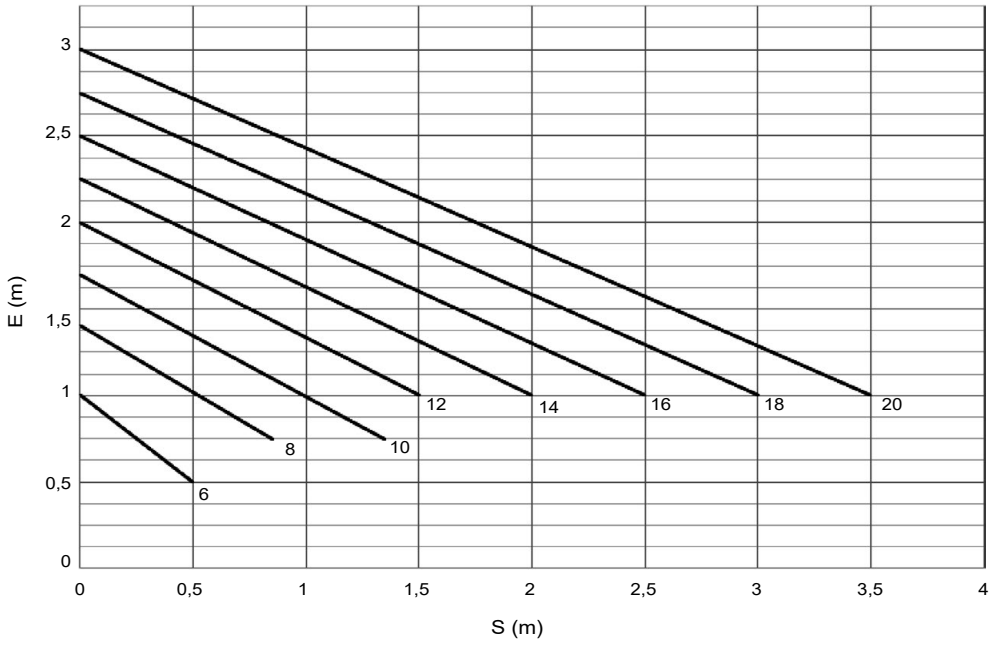


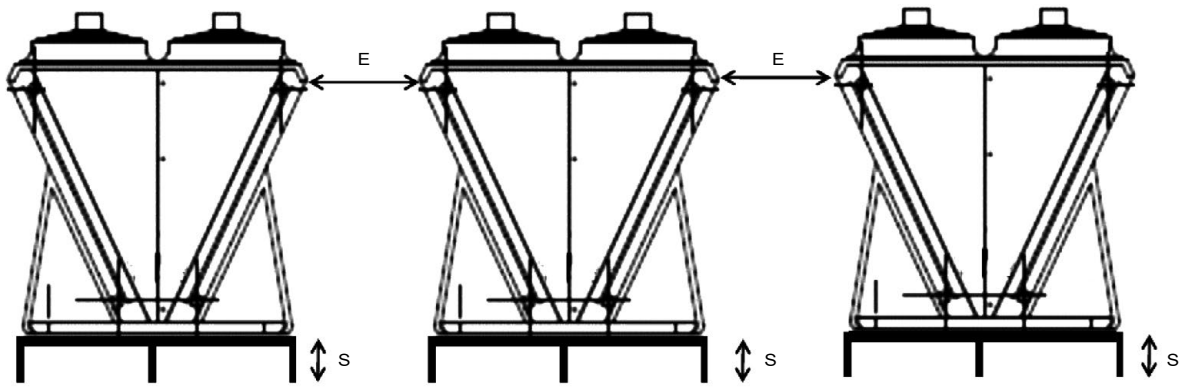
7.3 - Machine spacing and high-level installation

- Determining the minimum space between dry coolers (E) according to the height at which they are installed (S) and the number of fans.

Graphic valid for rated rotation speed > 400 rpm

Recirculation rates considered < 10%





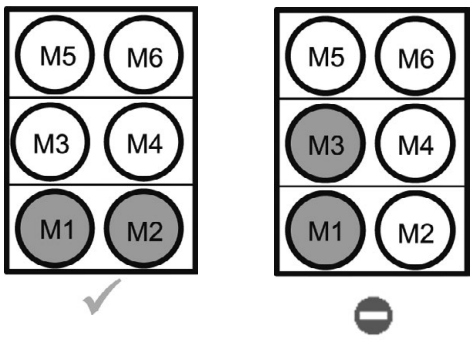
8 - INSTALLATION RECOMMENDATIONS

- Ensure sufficient devices are provided to guarantee the protection of persons and property, and to enable maintenance operations to be carried out in complete safety.
- If a malfunction would have significant human, environmental or financial consequences, take appropriate steps to limit the effects.
- Ensure that the installation complies with the legal texts and codes in force in the country of operation, and that it complies with the safety rules applicable to the site where it is being used (explosive atmosphere, for example).
- If necessary, affix to the machine the hazard symbol corresponding to the fluid in accordance with current standards.
- Install burn hazard signs wherever the internal temperature of pipes exceeds 65°C.
- Fit safety devices to prevent the fluid temperature or pressure from exceeding the values indicated in the order. Approval for operation at higher conditions must be obtained from us.
- The unit must be fitted with an immediately accessible emergency stop device; this visible device must allow the electrical supply to the unit and its accessories to be cut completely.
- Ensure that cutting off the electrical supply, whether intentionally or accidentally, does not jeopardise the process.
- Use the mounting holes and, if necessary, reinforce the anchoring system according to the wind conditions.
- If the unit needs to be installed on a framework, this structure must be calculated based on the weight of the unit during operation (full), equipped with all its accessories.
- If using rubber mounts, use a rigid frame which locks the feet together.
- The finned components may be damaged if the unit suffers impacts or is hit by falling objects. Take appropriate steps to protect it, by adding a protective screen, for example.
- If there is a risk of freezing while the system is operating, use a device designed to prevent this.
- Install venting and draining devices and shut-off valves.
- Connect the piping to earth in accordance with an overall study of the installation.
- For any accessories, refer to the specific guides.

9 - CONNECTIONS

9.1 - Electrical connection

- All wiring must be connected in accordance with the regulations that apply to the installation site (e.g. NF C 15100 in France).
- In all cases, refer to the "ELECTRICAL CONNECTION" document or wiring diagram attached to the unit.
- Follow the electrical supply specifications indicated on the data plate.
- The phase unbalance must not exceed ±2% for voltage.
- For units without wiring or with an electrics box option, the motors are partitioned in pairs: M1+M2 – M3+M4 - … The motors must be controlled by stage in a single partition.



If any of the above requirements are not met, immediately contact your energy supplier and make sure the unit is not switched on until the necessary corrective actions have been taken. Failure to do so will automatically void the warranty.

It is your responsibility to protect the unit from mains voltage spikes and voltage spikes caused by lightning. Depending on the geographic location and the type of mains network (buried or overhead), local regulations may require that a lightning rod be installed. Failure to comply with the requirements of standards in force in the country of installation (e.g. NF C 15100 in France) will void the warranty.

- Before connecting, make sure that the power supply cable is disconnected.

The terminal boxes on the motors for units without the terminal box or electrical cabinet option must be directly connected taking all the necessary precautions in order to avoid:

- electrical connection errors which can damage the motors or impair performance
- water ingress in the terminal boxes (e.g. if the cover is not closed properly) which damages the motors
- people falling from a height when making electrical connections for units installed high up

9.2 - Fluid connection

- Never introduce foreign bodies into the circuit.
- The connection pipes and the regulation or insulation equipment must be set up and supported so as to ensure they do not exert any force on the coil piping (pressure, torsion or flexion). It is recommended to use flexible connectors on the connections to prevent water hammer.
- Positioning of pipes: connect all piping on the unit (see dimensional drawing)
- If brazed/welded connections are used, take appropriate precautions to ensure that welding residues do not enter the circuit.

9.3 - Connecting a speed regulator

- A regulator must be commissioned by a specialist, as an incorrect choice/configuration could cause electromagnetic interference and damage to the motors. Minimum precautions:

- Use a shielded cable upstream and downstream of the regulator.
- The frequency must be between 25 and 50 Hz.
- Fit a DU/DT filter between the speed regulator and the fans.
- Fit an efficient sine-wave filter between the speed regulator and the fans between phases and between live and earth. These filters are sold by the fan manufacturers.

10 - OPERATION

10.1 - First commissioning

- Read the guides for commissioning any accessories very carefully and follow all advice.
- Check that the supply voltage corresponds to that given on the data plate.
- Retighten the connections of the electrics box.
- Switch the unit on and check that all the fans are turning in the correct direction (direction of rotation shown on the labels). In the event of abnormal noise coming from the fan motor assemblies, immediately switch off the power supply and contact us.
- Ensure that the hydraulic circuit(s) are clean.
- Start charging by bleeding the air remaining in the circuit using the vents provided in the top section.
- Start increasing the pressure, then check that the pipe connections are fully sealed.

10.2 - If anomalies occur..

Please contact us if you require any help. Before contacting your CIAT agency, please check the following points:
- Are all fans turning in the correct direction? (check this against the labels)
- Is the supply voltage correct?
- Are the motors running at the correct speed? (check the input current)
- Has the fluid direction been reversed during connection of the coil?
- Are the fins of the coil clogged?
- Are there any issues relating to air recycling or a poor air supply?

10.3 - Recommendations for use

Scaling and corrosion have a very negative effect on the operation and service life of the units. Therefore, only use treated water or authorised fluids (check the compatibility of any additives with the dry cooler's materials).

11 - AC FAN MOTOR ASSEMBLIES

11.1 - AC motor protection

- All the motors are equipped with a thermal cut-out, which is available in the motor terminal box. Wiring for the thermal cut-out is optional

11.2 - Fan with AC motor (3-ph 230 V/400 V 50 Hz)

- On a 3-ph/400 V/50 Hz network, the motors have 2 rotation speeds, via star (Y) or delta connection (Δ).
- Low speed with Y connection
- High speed with Δ connection
- On a 3-ph/230 V/50 Hz electrical network, the motors have 1 rotation speed via delta connection (Δ):
- Low speed with Δ connection

Impeller diameter	mm	910								800					
Motor type		A9A		A9B		A9C		A9D		A8A		A8B		A8C	
3-PH/230 V supply		Δ	-	Δ	-	Δ	-	Δ	-	Δ	-	Δ	-	Δ	-
3-PH/400 V supply		Y	Δ	Y	Δ	Y	Δ	Y	Δ	Y	Δ	Y	Δ	Y	Δ
Speed(s)	rpm	690	900	980	1280	680	890	700	900	700	900	560	690	300	440
Weight of impeller + motor	kg	23		-		28		-		28		19		-	
Weight of fan motor assembly	kg	70		59		66		59		52		48		38	
Min. room temperature for storage	°C	-40													
Min. operating temperature	°C	-40													
Insulation class		F													
Sealing class		IP 54													
Number of starts		Max. 50 / hour													

11.3 - Fan with AC motor 3-ph 208 V and 3-ph/400 V to 480 V 60 Hz

- On a 3-ph 208 V/60 Hz and 230 V/50 Hz electrical network, the motors have 1 rotation speed via delta connection (Δ).
- On a 3-ph/400 to 480 V/60 Hz electrical network, the motors have 1 rotation speed via star connection (Y):

Impeller diameter	mm	910			800			
Motor type		B9A	B9B	B9C	B8A	B8B	B8C	B8D
3-ph 208 V/60 Hz supply		Δ	Δ	Δ	-	-	Δ	Δ
3-ph/400 to 480 V/60 Hz supply		Y	Y	Y	Y	Y	Y	Y
Speed(s)	rpm	1100	1000	800	1100	1050	840	520
Weight of impeller + motor	kg	28	25	25	23	23	19	19
Weight of fan motor assembly	kg	69	66	66	51	51	47	47
Min. room temperature for storage	°C	-40						
Min. operating temperature	°C	-40						
Insulation class		F						
Sealing class		IP 54						
Number of starts		Max. 50 / hour						

12 - EC FAN MOTOR ASSEMBLIES

12.1 - EC motor protection

- These motors feature integrated protection and monitoring devices. They are protected against thermal overload of the electronic components and motors, and against any failure of the Hall effect sensors to analyse the position of the rotor.
- These faults are indicated by a change of state in the KL2 fault relay (terminals COM-NO-NC). This is a potential-free changeover relay, with a breaking capacity of 2 A/250 VAC cos phi = 1.
- List of faults:

- In the event of a thermal overload on the motor/electronic controls, or a Hall effect sensor fault: The fan stops and cannot be restarted. The fault is indicated by a change of state on the KL2 relay. The fan can only be restarted by powering off for 20 seconds then powering back on again (after the source of the fault has disappeared, otherwise the cycle restarts).
- Rotor blockage:
  In the event of accidental rotor blockage, the fault is indicated by a change of state on the KL2 relay. When the blockage is cleared, the fan automatically restarts.
- Under voltage:
  The motor accepts a nominal voltage/frequency range of 380 to 480 V/50 to 60 Hz with no notable modification to a handling performance. Between 380 and 290 V, the fan continues to operate with degraded performance. If the voltage drops below 290 V for 5 seconds, the motor stops. The fault is indicated by a change of state on the KL2 relay. The motor will restart when the voltage returns to its nominal value.
- Absence of phase:
  If one of the 3 phases is absent for more than 5 seconds, the motor stops. The fault is indicated by a change of state on the KL2 relay. The motor will automatically restart 10 - 40 seconds after the 3 phases return. Phase inversion has no effect on the direction of rotation of the motor.

12.2 - Fan with EC motor (3-ph 380 V to 480 V 50/60 Hz)

- On a 3-ph/380-400 V/50/60 Hz network, EC motors will have different rotation speeds depending on the control signal.

Impeller diameter	(mm)	910		800		
Supply voltage		3-PH/380 - 480 V/50/60 Hz supply				
Control signal		0/10 V or 4/20 mA				
Motor type		E9A	E9B	E8A	E8B	E8C
Max. speed(s)	rpm	1000	1100	740	510	700
Weight of impeller + motor	kg	25	-	20	9	-
Weight of fan motor assembly	kg	65	45	40	38	26
Min. room temperature for storage	°C	-40				
Min. operating temperature	°C	-25	-35	-25	-40	-35
Insulation class		F				
Sealing class		IP 54				
Number of starts		Max. 50 / hour				

13.1 - Recommendations for maintenance

- Make sure power to the unit has been disconnected before servicing.
- Reduce the temperature and pressure before carrying out any work on the bundle.
- Do not make any modifications without our agreement.
- Do not walk directly on the unit.
- Depending on the type of fluid (e.g. water without anti-freeze), take precautions to prevent the risk of freezing, which would destroy the coil. As standard units cannot be completely drained by gravity, protect from freezing as follows:
  1. Drain the circuit using the bleed nozzles and the vent located on the manifolds or pipes.
  2. Circulate compressed air through the circuit until all water has been removed.
  3. Fill the circuit with anti-freeze and close the circuit.
- For regulated units, do not forget the mandatory inspections.
- In winter, do not allow snow to accumulate around and on top of the unit.
- Periodically check the condition of the coatings and apply touch-ups as needed.

13.2 - Maintenance frequency

ACTION	FREQUENCY
Retighten nuts and bolts on fan motor assemblies (grille, motor).	6 months
Check and, if necessary, retighten the packing boxes and the terminal box mounting bolts	6 months
Clean the coil.	1 year (1)
Retighten the electrical connections.	1 month after system start-up then 1 year
Retighten all visible nuts and bolts.	1 year
Check for corrosion to the panelling and that the safety labels and name plate label are present.	1 year (1)
Clean the louvres on the electrical cabinet (optional)	1 year
Check the electrical cables.	5 years

(1) Frequency to be adapted to the environmental conditions.

13.3 - Cleaning the coils

- Switch off the unit.
- If the unit is fitted with a "protective screen" option, remove this to access the coils.
- If the fins are damaged, straighten them using a comb.
- In the event of minor fouling (non-clogging dry residue or dust, leaves, wires, etc.):

- Counter-flow supply air: dry air up to 30 bar.
- Where possible, periodically reversing the flow of air generated by the fans can prevent this. This operation is not possible if the unit is equipped with EC motors.

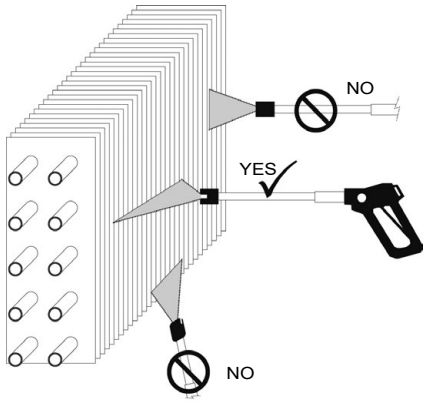
- In the event of moderate fouling (moderate clogging due to dry residues, damp dust or grass, insects, etc.):

- Use a high-pressure (HP) steam cleaner with a flat jet nozzle (25°).
- Max. pressure 100 bar
- Steam: max. 140°C
- Min. distance between the nozzle and the fins = 200 mm
- Cleaning fluid: municipal water with pH neutral detergent (pH 7). Avoid alkaline detergents.
- Flushing with clean water using the same adjustment parameters.

- **IMPORTANT**: the use of detergent is prohibited for cleaning fins with a BLYGOLD®, ALTENA® or HERESITE® coating.

Recommendations to follow when using a HP cleaner

1. Wait for the HP cleaner to fully warm up. Check that the fluid exiting the nozzle is steam rather than liquid.
2. Hold the high-pressure cleaner's lance at a distance greater than that recommended, then move forward into the working position.
3. Direct the flat jet created by the nozzle onto the surface of the fins and perpendicular to them. An angled position risks pushing the fins together and a parallel position risks pushing them apart.
4. To prevent residue from being pushed inside the finned block, it is often useful to perform an initial wash against the air flow direction (at the discretion of the operator and depending on the fouling level).
5. Some detergents may damage the unit's paintwork.



13.4 - Removing and refitting a fan

- The removal of a fan is a simple operation, however special care must be taken during handling, in particular:
- Do not pull on the blades.
- Place the fan motor assembly on a safe surface away from areas of activity.
- If the unit is to be shipped, provide the necessary protection and packing materials.
- Do not remove the panel.
- The fan must be repaired if any of the blades are bent.

Operating procedure for motor types A9A, A9C, A8A, A8B,E9A, E8A, E8B, M9, M8, B9A, B9B, B9C, B8A, B8B, B8C and B8D:

Switch off the power supply using the mains switch or maintenance switch (optional).

- Disassembly:

1. Remove the cover from the motor's terminal box.
2. Disconnect the wires, marking the terminals to facilitate rewiring.
3. Loosen the cable gland(s) on the terminal box and pull out the cable. Remove the clamps connecting it to the fan support arm.
4. Remove the 4 M8 bolts mounting the fan on the collar (T40 torx type spanner).

WARNING: do not unscrew the motor mounting bolts.

5. Remove the fan using the lifting lugs.

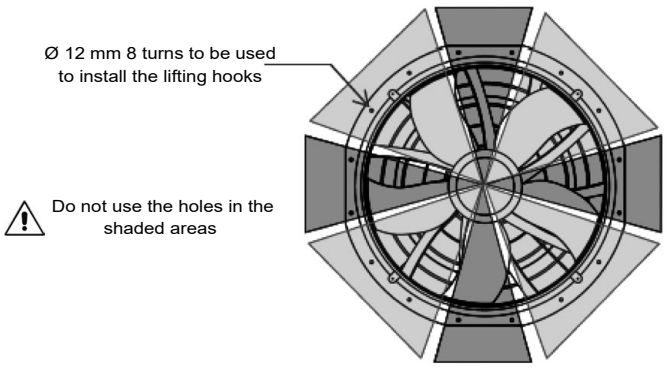
- When refitting, position the fan on the 4 collar inserts then carry out the operations in the reverse order to removal, ensuring only the M8 bolts provided are used (tightening torque 16 Nm).
- Before turning the unit back on, make sure:
- the ends of the blades do not touch the collar (centring of the blades in their collar): rotate the impeller by hand.
- the wiring is correct and the terminals are properly tightened.
- the motor terminal box seal is correctly in place and that the bolts keeping it closed are torque tightened to 1.5 ± 0.2 Nm (risk of rainwater ingress).
- the packing boxes are properly tightened

Operating procedure for motor types A9B, A9D, A8C, E9B and E8C:

Switch off the power supply using the mains switch or maintenance switch (optional).

- Disassembly:

1. Remove the fan protective grille
2. Remove the cover from the motor's terminal box.
3. Disconnect the wires, marking the terminals to facilitate rewiring.
4. Loosen the cable gland(s) on the terminal box and pull out the cable. Remove the clamps connecting it to the fan support arm.
5. Remove the 12 bolts mounting the fan on the unit.
6. Remove the fan using lifting hooks in the ø12 mm holes

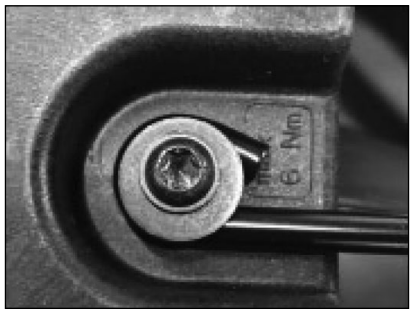


IMPORTANT: the handling hooks must be positioned diametrically opposite the widest parts of the fan's collar edge.

■ To refit, position the fan on the 12 unit inserts and carry out the operations in the reverse order to removal, using only the bolts provided:
- M8x25 bolts and flat washer for V units (tightening torque 12 Nm).
- M10x25 bolts for flatbed units (tightening torque 24 Nm).

M8x25 bolts and flat washer

M10x25 bolts



Torx bolts for protective grille
(tightening torque 6 Nm).

■ Before turning the unit back on, make sure:
- the ends of the blades do not touch the collar (centring of the blades in their collar): rotate the impeller by hand.
- the wiring is correct and the terminals are properly tightened.
- the motor electrics box seal is correctly in place and that the bolts keeping it closed are tightened to 2.5 Nm for ECs and 1.3 Nm for ACs. (risk of rainwater ingress).
- the cable glands are properly tightened.

14 - PROTECTION CABINET OPTION

Purpose

- Protects the motors

Power supply

- See connection sheet or wiring diagram supplied with the cabinet.

Limits of use

- Ambient air:
- Storage temperature: -40/+60°C
- Operating temperature: -25/+55°C

Components

- Packing boxes are provided for the installer on the base of the cabinet.
- A padlockable front disconnect switch, with auxiliary contact, fitted with a device requiring the power supply to be switched off before the door is opened. This works as an emergency stop.
- One thermal-magnetic circuit breaker for each motor, padlockable with normally open auxiliary contact.
- 1 x 3-stage terminal (1, 2, PE) for each fan line for 0/10 V signal (EC FMA option).
- A single common value of 0/10 V must be connected on the two terminal strips provided for this purpose

Electrical connection

- The motors are connected to the front of the mounted cabinet on the inlet manifold side.
- For electrical connection, refer to the connection sheet or wiring diagram supplied with the cabinet.
- The cables to use for the power connection must be made from copper. If cables made from other materials, such as aluminium, are used, bimetallic terminals and connectors or intermediate terminals must be used.
- Make the electrical connections as follows:
- Connection of the power circuit to the main switch.
- Connection of the protective conductor to the earth terminal.
- Connection of 0/10 V signal (EC fan motor assembly option) on 3-stage terminals (1, 2, PE) 1 terminal available for each fan line.

► Information available

- See connection sheet or wiring diagram supplied with the cabinet.
- On dry contacts:
- Switch position feedback
- Fault summary (failsafe)

15 - CONTROL CABINET WITH ELECTRONIC BOARD OPTION

Purpose

- Protects and controls the motors. The control electronic board makes it possible to control the temperature or pressure, monitor the operating parameters, communicate with certain chillers, diagnose and store faults and communicate with the remote control console, additional boards or a BMS.

Power supply

- See connection sheet or wiring diagram supplied with the cabinet.

Limits of use

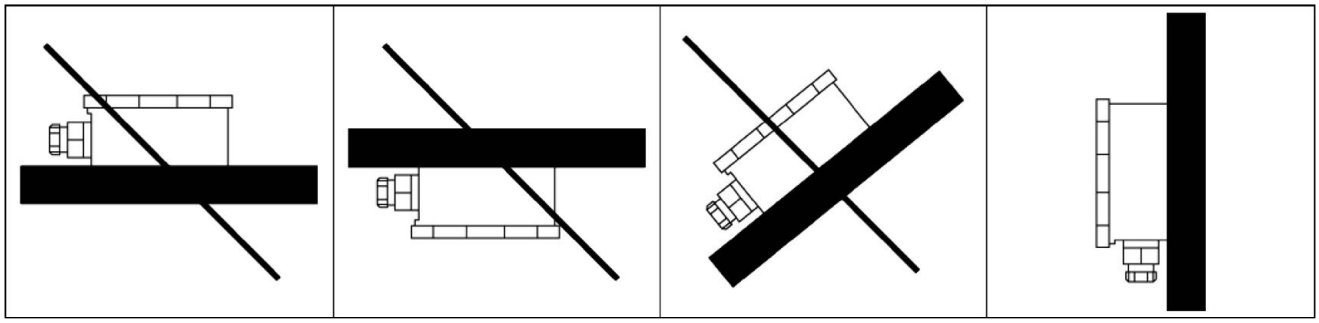
- Ambient air:
- Storage temperature: -40/+60°C
- Operating temperature: -25/+55°C

Components

- Packing boxes are provided for the installer on the base of the cabinet.
- A lockable isolator switch is used as an emergency stop.
- Protection against short circuit provided by 1 or 2 three-pole circuit breakers (ICC = 10 KA)
- Protection against overload: thermal cut-out wiring on electronic board.
- 1 x 230 V switch per stage.
- 1 Electronic board.
- 1 x console with LCD screen optional for condenser.
- Fluid temperature sensor (dry cooler): mounted on the outlet piping (control sensor).

Electrical connection

- Before connecting, make sure that the machine's disconnect switch is open
- The cabinet is connected to the motors and mounted on the front of the unit, on the inlet manifold side.
- For electrical connection, refer to the connection sheet or wiring diagram supplied with the cabinet.
- The cables to use for the power connection must be made from copper. If cables made from other materials, such as aluminium, are used, bimetallic terminals and connectors or intermediate terminals must be used.
- The electrical connections are to be made as follows:
- Connection of the power circuit to the disconnect switch after checking that the power supply cable is disconnected.
- Connection of the protective conductor to the earth terminal.
- Connection for automatic operation control
- Connection for changing the setpoint.
- Connection for fan forced operation
- Outdoor temperature sensor (dry cooler):
- The machine should be positioned so as to enable the outdoor sensor to be installed on the building's closest northern side. If necessary, the sensor must be positioned on the northern side of the unit, away from moving air (fan, etc.). If none of these conditions can be met, the customer must install a weather mast. (Not supplied)
- The sensor cable must be protected against external harmful elements.
- Make sure the outdoor sensoris not exposed to direct sunlight, and place it in a vertical position:



15 - CONTROL CABINET WITH ELECTRONIC BOARD OPTION

Electronic board functions.

- See the user manual for the electronic board.

► Options

- 400/230 V transformer for the control circuit, for 400 V 3-phase supplies without neutral.
- Water loop temperature sensor (dry cooler) to be installed with freecooling upstream of the valve: Fluid 90 °C max. – 6 m cable – G 1/2" sensor pocket.
- Pressure sensor (condenser): 35 bar max. (optional 50 bar max.) – mounted on the "flare" union on the inlet piping.
- Remote control console: max. distance: 1000 m. To be installed locally.
  Dimensions (L x H x D): 102 x 235 x 55 mm.
- Relay board: this has potential-free (dry) contacts for remotely displaying the following parameters: unit operation, sensor faults and fan stage faults. The boards must be installed in a cabinet.
- Electrical power measurement.

Ventilation

- Louvres with filters are fitted on the sides of the cabinet. As an option, a fan may be added for use from 45 to 55°C.

Heating

- As an option, a heater connected to a temperature sensor may be added for use from -20 to -40°C.

Humidity

- As an option, a heater connected to a humidity sensor may be added for use above 60% humidity.

► Information available

- See connection sheet or wiring diagram supplied with the cabinet.
- On dry contacts:

- Switch position feedback
- Operating information
- Fault summary (failsafe)

16 - CONTROL CABINET CONTROLLED BY THE CHILLER OPTION (AUX1)

Purpose

■ Protects and controls the motors. The electronic board enables communication with certain chillers that have the board embedded, allowing the temperature or pressure to be used for control.

Power supply

■ See connection sheet or wiring diagram supplied with the cabinet.

Limits of use

■ Ambient air:
- Storage temperature: -40/+60°C
- Operating temperature: -25/+55°C

Components

■ Packing boxes are provided for the installer on the base of the cabinet.
■ A lockable isolator switch is used as an emergency stop.
■ Protection against short circuit provided by 1 or 2 three-pole circuit breakers (ICC = 10 KA)
■ Protection against overload: thermal cut-out wiring on electronic board.
■ 1 230 V switch per stage, except variable speed fans (EC) which do not have a switch.
■ 1 Electronic board.
■ Temperature sensor (dry cooler): mounted on the outlet piping (control sensor).

Electrical connection

■ **Before connecting, make sure that the machine's disconnect switch is open.**
■ The cabinet is connected to the motors and mounted on the front of the unit, on the inlet manifold side.
■ For electrical connection, refer to the connection sheet or wiring diagram supplied with the cabinet.
■ The cables to use for the power connection must be made from copper. If cables made from other materials, such as aluminium, are used, bimetallic terminals and connectors or intermediate terminals must be used.
■ The electrical connections are to be made as follows:
- Connection of the protective conductor to the earth terminal.
- Connection of the power circuit to the disconnect switch after checking that the power supply cable is disconnected.
■ Outdoor temperature sensor: 25 m cable
- The machine should be positioned so as to enable the outdoor sensor to be installed on the building's closest northern side. If necessary, the sensor must be positioned on the northern side of the unit, away from moving air (fan, etc.). If none of these conditions can be met, the customer must install a weather mast. (Not supplied)
- The sensor cable must be protected against external harmful elements.
- Do not expose the outdoor sensor to direct sunlight.

Electronic board functions.

■ Refer to the chiller manual.

► Options

■ 400/230 V transformer for the control circuit, for 400 V 3-phase supplies without neutral.
■ Water loop temperature sensor (dry cooler) to be installed with freecooling upstream of the valve: 25 m cable G 1/2" sensor pocket.

Ventilation

■ Louvres with filters are fitted on the sides of the cabinet. As an option, a fan may be added for use from 45 to 55°C.

Heating

■ As an option, a heater connected to a temperature sensor may be added for use from -20 to -40°C.

Humidity

■ As an option, a heater connected to a humidity sensor may be added for use above 60 % humidity.

17 - ELECTRICS BOX OPTION

Purpose

- The electrics box centralises the wiring and fans on the front of the unit.

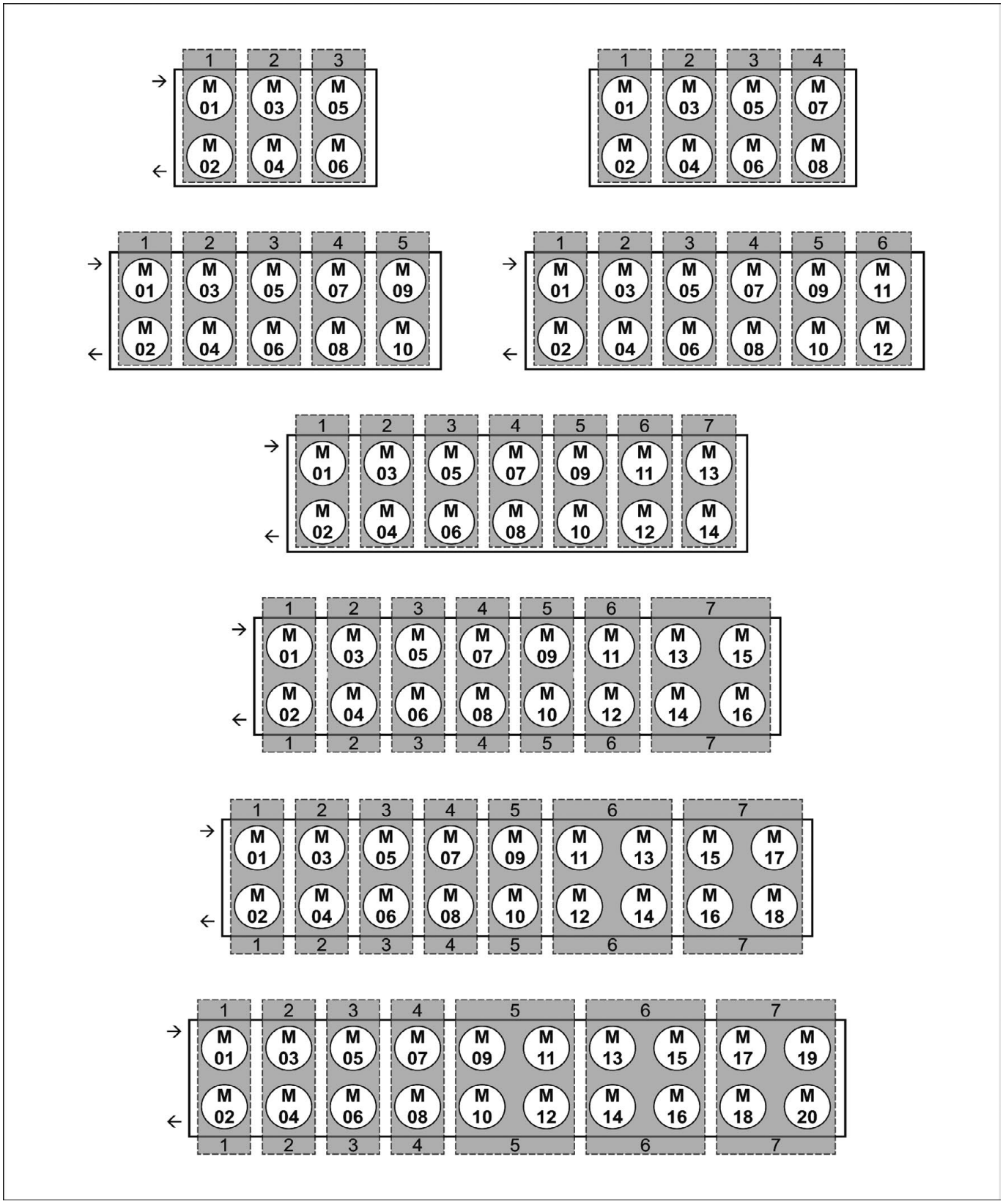
Specifications

- Ambient air:
- Storage temperature: -40/+60°C
- Operating temperature: -25/+60°C
- Sealing: IP55
- Cable routing diameter: M20

Components

- Packing boxes are provided for the installer on the base of the box.
- 1 x 3-stage terminal (U1, V1, W1) for each fan for phase connection.
- 1 x 3-stage terminal (1, 2, PE) for each fan for thermal cut-out connection.
- 1 x 3-stage terminal (1, 2, PE) for each fan line for 0/10 V signal (EC FMA option).
- A single common value of 0/10 V must be connected on the two terminal strips provided for this purpose

18 - STAGING FOR CONTROL CABINET AND CONTROL CABINET CONTROLLED BY THE CHILLER OPTIONS (AUX1)



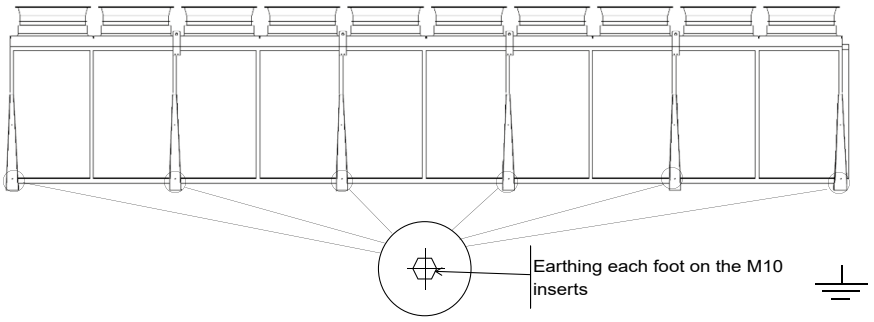
Key:

Number of motors

Number of stages

19 - OPTION C5M GUIDELINES FOR INSTALLATION AND MAINTENANCE

- During installation, avoid water retention areas; check the machine slopes to eliminate any retention area.
- It is essential to earth the machine casing; to do this, the side members of the frame have mounting holes for bolting on the earthing brackets.

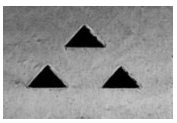


- Periodic removal of contaminants and dust is an essential condition to extend the longevity of the equipment. To do this, it is recommended to carry out the following operations:

- Vacuum any dust on the heat exchange coils and all retention areas (e.g. frame, roofs) as indicated in paragraph §13.3
- Clean the finned surfaces of the coils with fresh water, taking care not to damage the fins, as indicated in paragraph §13.3
- Clean and rinse the external surfaces comprising the frames and platforms.
  Do not use abrasive cloths when cleaning

20 - SKID OPTION FOR TRANSPORT BY CONTAINER

The SKID option enables the machine to be safely transported in a container, making it easy to load and unload.



The parts of the skid must be dismantled on site before any installation. Recognisable in the past by their red colour, these are now either painted RAL 7035 or unpainted, and stamped with 3 triangles (positioned as shown below):

Containerisation should take place at the port of shipment or at a service provider's premises.

You will need a 40' Highcube container, ensuring that the door is at least 2.36 m wide, as container dimensions vary depending on the year of construction, location, serial number etc.

Loading and unloading must be carried out on level ground to avoid any stress on the units.

A minimum of 2 forklift trucks + 1 lifting beam are required for the loading or unloading operation.

The unit must be handled using a lifting beam and the machine must be slung using 4 lifting rings (2 per side). The position of the lifting rings is indicated by yellow arrows.

Warning:

The colour of the skid parts in the views below is not contractually binding, as these parts (which used to be red) are now marked with 3 triangles (positioned as indicated above).

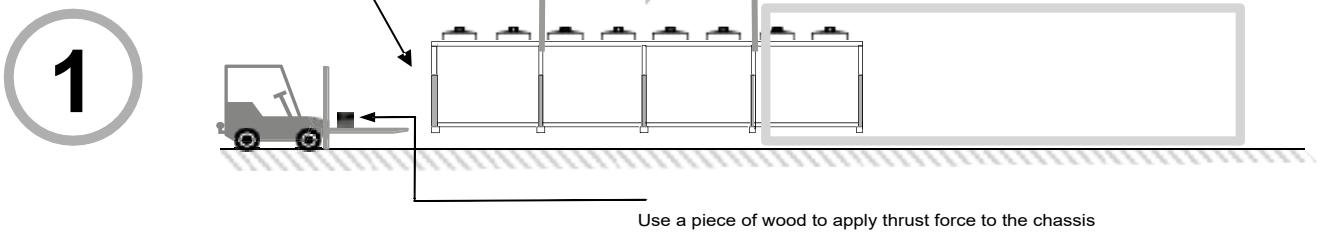
The diagrams below are schematics for the lifting instructions; refer to paragraph 5.1 of the user manual:

20 - SKID OPTION FOR TRANSPORT BY CONTAINER

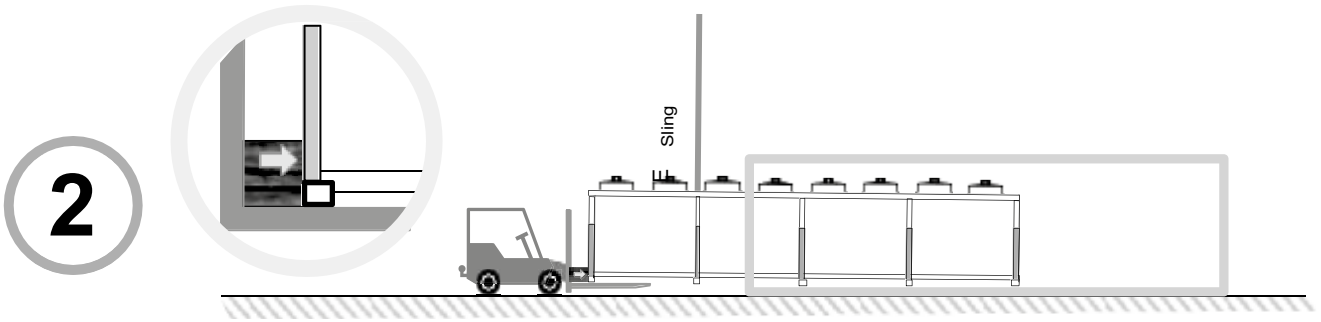
Loading a container

A dry cooler is loaded into a container as described below :

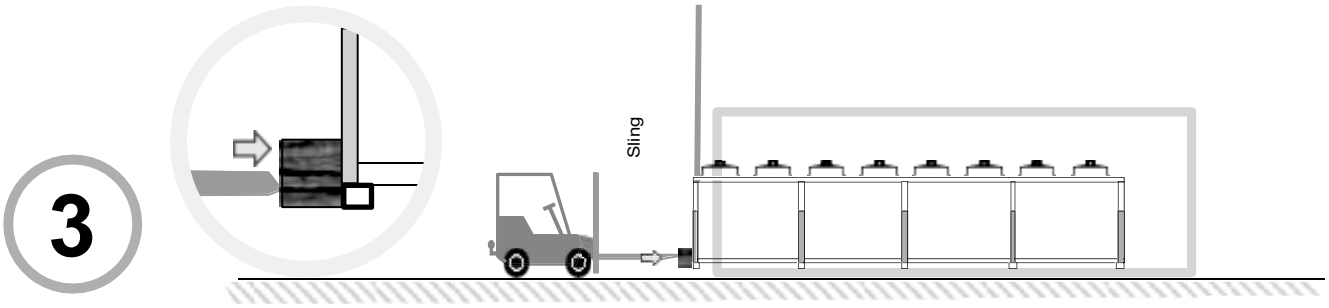
The electrical cabinet side of the machine must be on the container door side



This piece of wood pushes into the axis of the chassis.



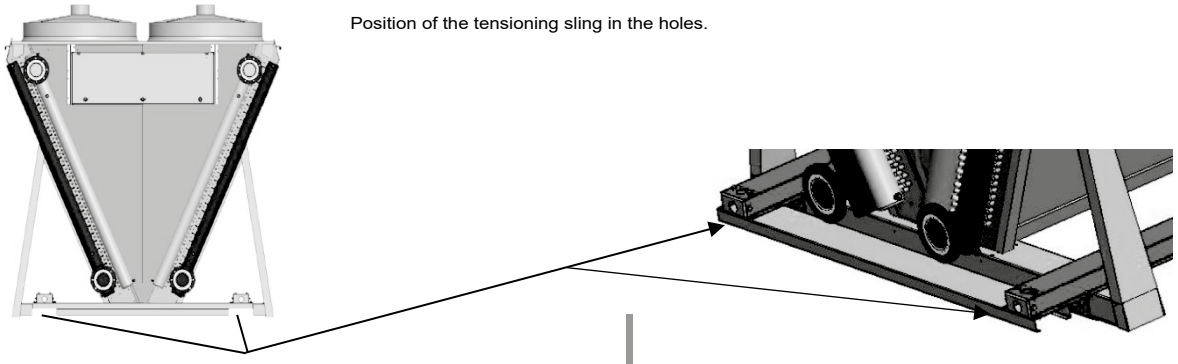
Insert the piece of wood between the forks and the chassis.

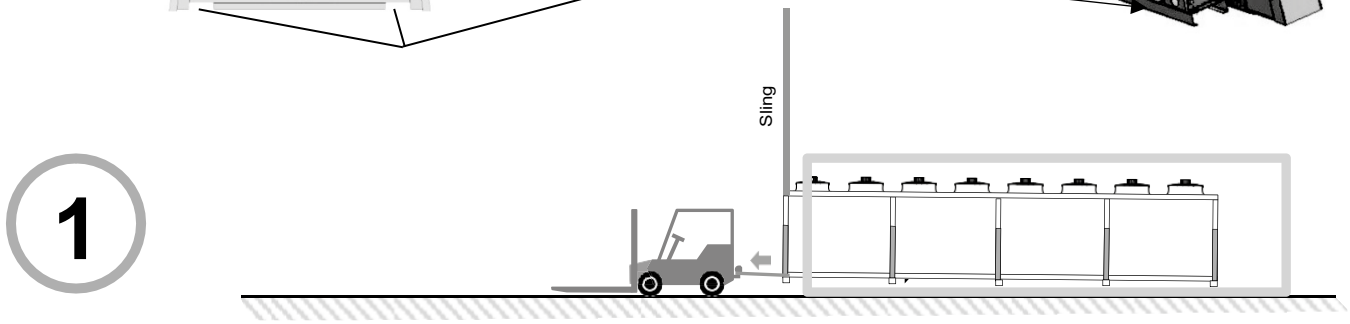


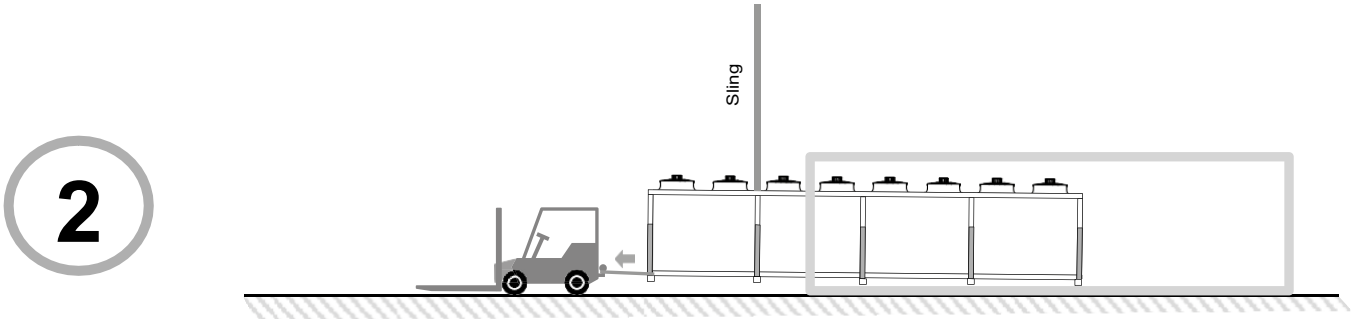
20 - SKID OPTION FOR TRANSPORT BY CONTAINER

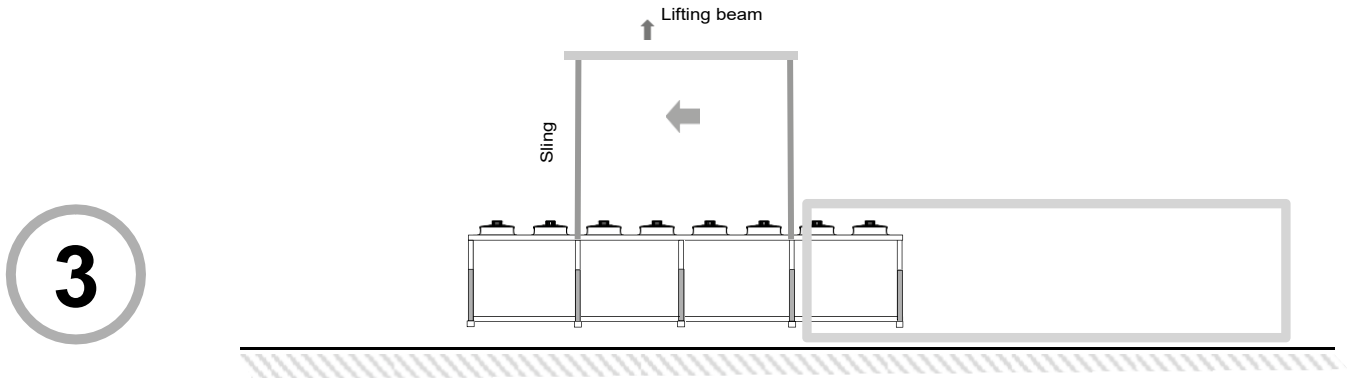
Unloading a container

A dry cooler is unloaded from a container as described below :









Refer to paragraphs 7 and 8 of the IOM for installation at the customer's site.

21 - MAINTENANCE SWITCH OPTION

Purpose

- The maintenance switch can be used to work on a fan motor assembly without interrupting the operation of the device. A switch cuts the power to 2 motors, while the other motors remain powered up and operate normally.
- The switches are located under the electrical cabinet and numbered from the cabinet onwards.
- The maintenance switch is not a safety device; the installer is still obliged to fit an emergency stop on the installation.

Precautions

- The operator must padlock the locking device to prevent the unit being switched back on by another person.
- Warning: pressing a switch only has an effect on the 2 associated motors. Bear in mind that, even if the unit appears to have stopped completely, it may restart at any time, and all the other components are still powered on.

Specifications

- Sealing: IP65
- Minimum storage temperature: -25°C
- Cable routing diameter: M20

Electrical connection

- See connection sheet

22 - DESTRUCTION OF THE UNIT

Shutting down

- Separate the units from their energy sources, allow them to cool then drain them completely.

Recommendations for disassembly

- Handling operations must be carried out by qualified personnel using PPE. The PPE must comply with the safety rules.
- Use the original lifting equipment.
- If the signs relating to lifting have been removed (anchoring points, slinging instructions, weight) you must find out this information.
- Sort the components according to their material for recycling or disposal, in accordance with regulations in force.
- Check whether any part of the unit can be recycled for another purpose.

Materials to be recovered for recycling

- Galvanised carbon steel
- Stainless steel
- Copper
- Aluminium
- Plastics
- Polyurethane foam (insulation)
- Electrical equipment.
- The electronic board can be recycled by a recovery company (gold, silver).

Fluids to be recovered for recycling

- Dry coolers: MEG, MPG. Thermal fluid
- Refrigerant fluid: R404, R407A, R407C, R410A, R134a, R22 depending on the condenser designation
- Compressor oil

Waste Electrical and Electronic Equipment (WEEE)

- At the end of its life, this equipment must be disassembled and contaminated fluids removed by professionals and processed via approved channels for electrical and electronic equipment (WEEE).
- In France, a partnership has been established with companies for the collection and recovery of professional waste governed by European Directive WEEE 2012/19/EU. This partnership simplifies the mandatory administrative procedures and ensures that old equipment is recovered via an official, structured channel. In terms of renovation work in France (mainland and overseas), for every new unit installed, our partner will collect and dismantle your existing equipment. Contact us for details of our partners.
- For other countries, please refer to the legislation in force and the specific solutions available to ensure your waste is processed legally.

The quality management system of this product's assembly site has been certified in accordance with the requirements of the ISO 9001 standard (latest current version) after an assessment conducted by an authorized independent third party.
The environmental management system of this product's assembly site has been certified in accordance with the requirements of the ISO 14001 standard (latest current version) after an assessment conducted by an authorized independent third party.
The occupational health and safety management system of this product's assembly site has been certified in accordance with the requirements of the ISO 45001 standard (latest current version) after an assessment conducted by an authorized independent third party.
Please contact your sales representative for more information

Carrier, Rte de Thil - 01120 Montluel, France.
Printed in the European Union.