



GEA Searle Condensers and Dry cooler Installation and Maintenance Instructions

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Introduction

This installation and maintenance is intended to accompany GEA manufactured air cooled, fin-tube condensers. The condenser is made up of heat exchanger; commonly incorporating aluminium fin material and copper tube, galvanised steel casework and axial fanset. These components will vary with application, but the product function will remain common; to remove energy from a working fluid, generally as part of a refrigeration system. This document is not a replacement for formal training and should only be referenced by qualified personal (meeting relevant regional standards). Any installation or maintenance work carried out in relation to the supplied air cooled condenser should be in accordance to regional/ national law and legislation. Additional information and assistance can be provided by the equipment supplier or from the many GEA regional offices located worldwide.

1. Health and Safety instruction and signs

This concerns the following hazards, which may be encountered when installing and maintaining this equipment:



CAUTION

All work on the units must be carried out by qualified personnel. Installation and maintenance manual must be kept with unit at all times. Ensure that instruction manual is understood before installation. Ensure working environment is suitable..

Use suitable PPE (Personal Protection Equipment) as per site regulations and as appropriate for the task. It is the responsibility of the person performing the task and their employer to ensure that all suitable PPE is provided and worn at all times. Detailed below is some of the suggested PPE during installation and commissioning of the unit.



Head protection



Foot protection



Hand protection



High visibility clothing



Eye protection

Before installation



ELECTRICAL VOLTAGE

Ensure that

1. The power supply is isolated before any installation or maintenance work is carried out.
2. The voltage, working fluid and the maximum working pressure stated on the product nameplate is suitable for the working environment.



PROTECTIVE CLOTHING

Sharp edges on the casework of the units and coil fins are a possible cause of cuts to fingers and hands. Appropriate protective clothing /gloves should always be worn.

Ensure that:

- The proposed method of mounting is adequate to support the total operational weight of the unit. “Dry Weights” are given on the nameplate and the product sheet.
- Nameplate Data: When further pressure tests are carried out, the pressure applied shall not exceed 1.3 times the maximum operating pressure (PS) given on the nameplate.
- When ancillary pressure equipment, such as a receiver, is supplied on a frame with a unit, but not a pipe to it, the parts must be treated as separate components and data taken from individual nameplates.
- Rotating blades – dangling items of clothing, jewellery or any items that could be pulled into the fan set are a hazard . Keep safe working distance from the fan plate
- The fan guard should not be removed nor should the fanset be removed from the unit.

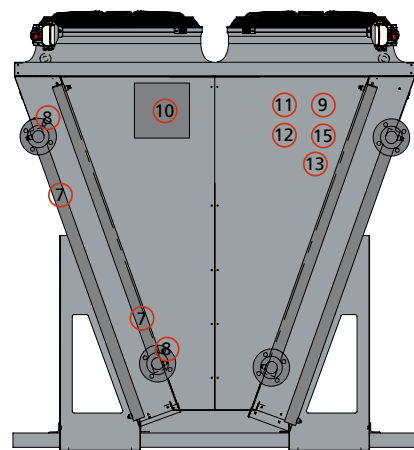
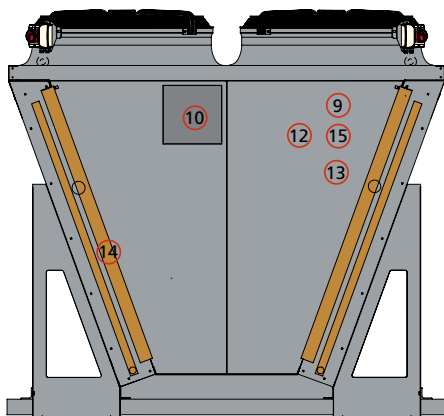
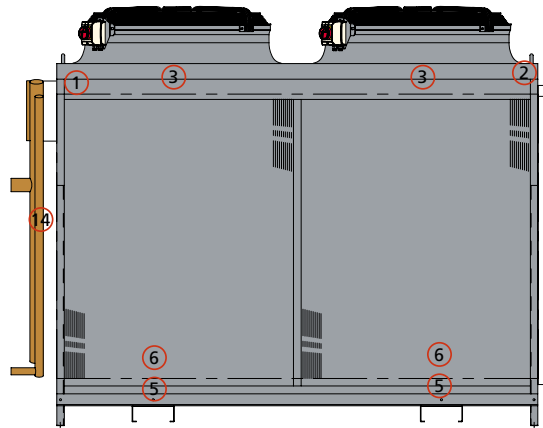
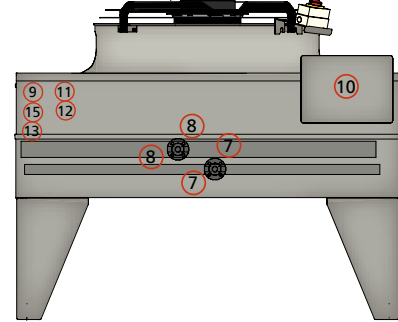
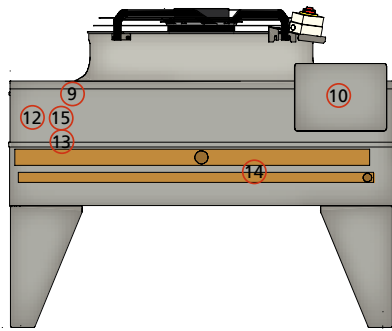
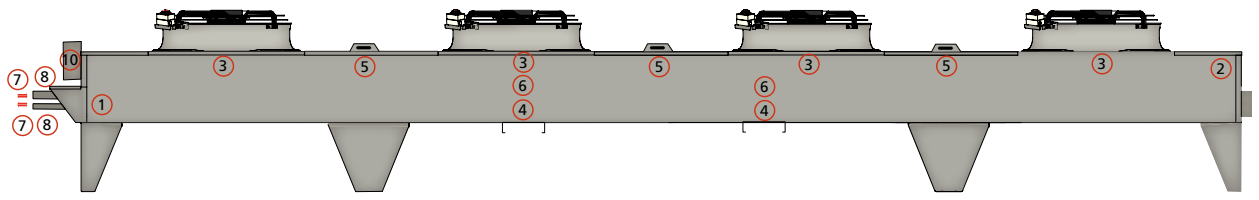
During installation and maintenance, ensure that:

- **The unit is installed and maintained by qualified personnel only.**
- When pressure testing is carried out, the pressure applied shall not exceed 1.3 times the maximum operating pressure given on the nameplate of the unit.
- The temperature of coils with vinyl-coated fins does not exceed 150°C (e.g. during brazing), as toxic fumes would be produced.

Be aware of burn hazard:**Burn hazards**

1. Burn hazards from pipes and pipeline components when the heat exchanger temperature exceeds 60°C.
2. Burn caused by refrigerant coming into contact with the skin or eyes.

2. Labelling on Condensers



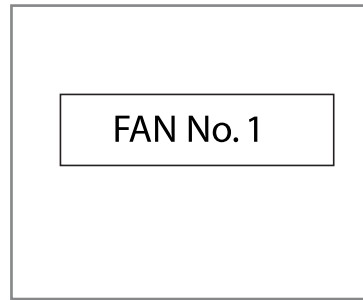
2. Labelling on Condensers



1. Searle logo



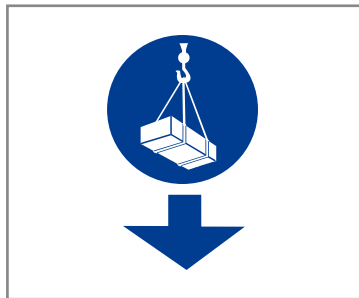
2. GEA logo



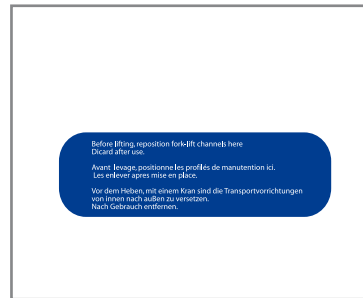
3. Fan numbering label



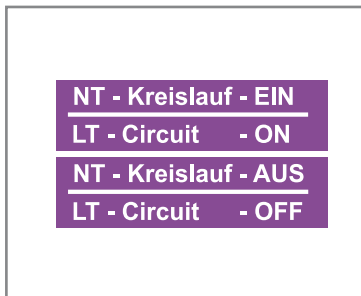
4. Forklift point



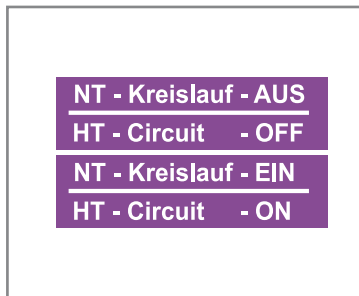
5. strop lifting



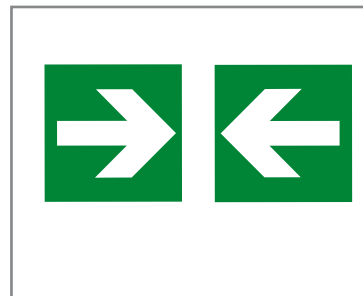
6. Lifting label



7. Low Temperature label



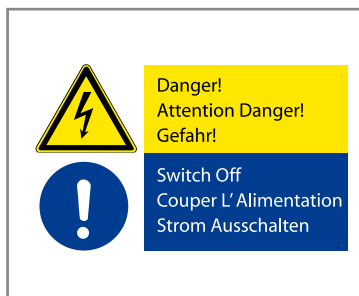
High Temperature label



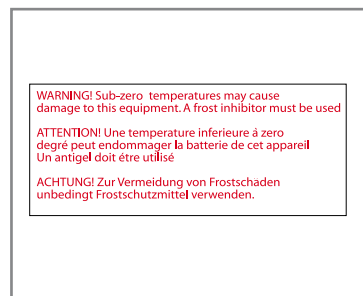
8. Inlet and Outlet labels



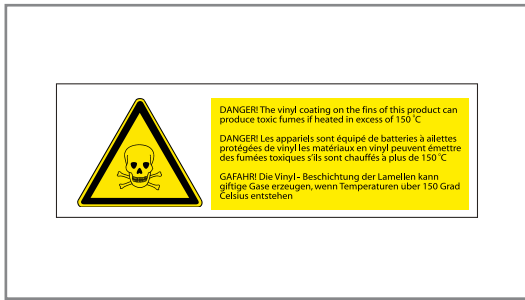
9. Plate label



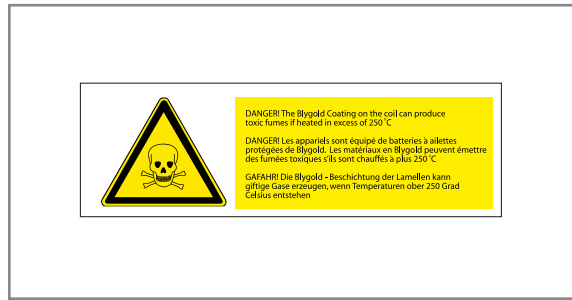
10. Danger and Caution labels



11. Warning label



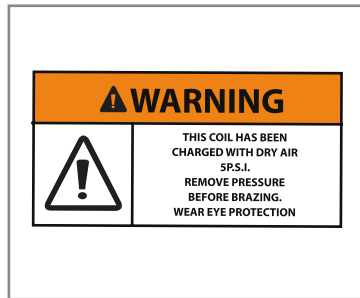
12. Danger label - used on units that have vinyl fins



12. Danger label - used on units that have Blygoldl fins



13. Passed label



14. Warning label for coils

Model	RF-MA101T4H	Serial Number	257173		
Medium (Group)	HCFC & HFC (2)	Date Code	DL		
Max Pressure	27 bar	Receiver Volume	itr		
Coil Volume	-	Net Weight	160kg		
Safety Device Settings	MOTOR SUPPLY				
		TOTAL AMPS/PHASE			
No. Off x Power	Conn -volt-Phase-Freq	1	2	3	
10 x 850 W	D 400V-3Ph-Hz	33.0			
	S 400V-3Ph-Hz	20.0	20.0	20.0	
DEFROST		TOTAL AMPS/PHASE			
Power	Voltage-Phase	1	2	3	
GEA Searle		MADE IN THE E.C.		CE	
Fareham, UK, PO14 1AR					

15. Name Plate

Maximum operating pressure suitable for this product.

Fluid working group. Reference to PED classification, i.e. group 1 or group 2

Model	RF-MA101T4H	Serial Number	257173		
Medium (Group)	HCFC & HFC (2)	Date Code	DL		
Max Pressure	27 bar	Receiver Volume	itr		
Coil Volume	-	Net Weight	160kg		
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DEFROST		TOTAL AMPS/PHASE			
Power	Voltage-Phase	1	2	3	
GEA Searle		MADE IN THE E.C.		CE	
Fareham, UK, PO14 1AR					

If no safety device setting are detailed, it is the installers' responsibility to ensure an appropriately sized safety device is installed to prevent the product going over its maximum pressure rating. Failure to do so may result in component / product failure.

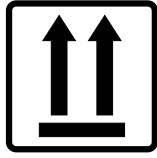
Electrical supply information

3. Packaging

Please pay attention to following symbols which can be identified on GEA Searle packing cartons.



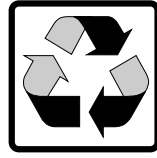
Keep dry



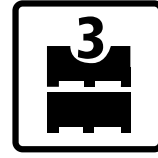
This way up



Fragile



Recycle



Stacking



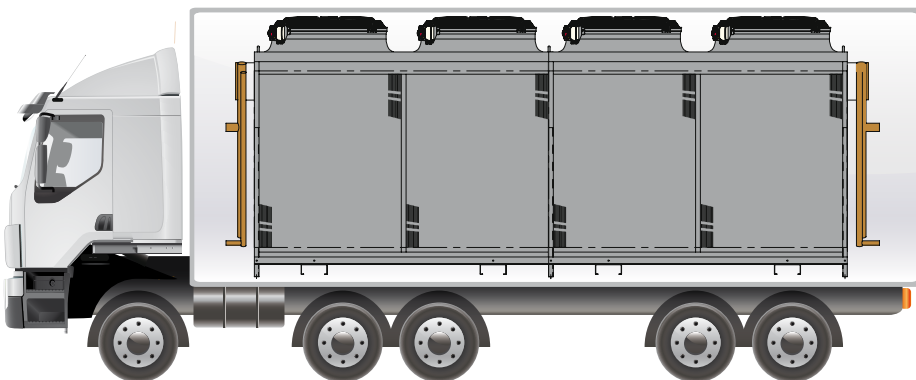
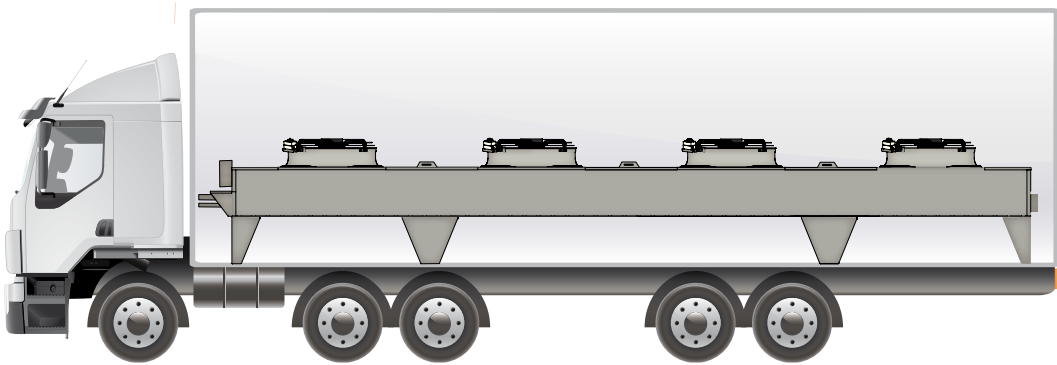
Wooden crate:

- GSL wooden crates incorporate heat treated timber as appropriate aligning with export requirements.
- Care should be taken when removing units from packing to ensure unit is not damaged

4. Legs and Loading

Appropriate equipment should be used to load, un-load and locate the unit in its operational location. Consideration of the products size and weight should be taken ensuring that any equipment (such as fork lifts or cranes) meets relevant national standards.

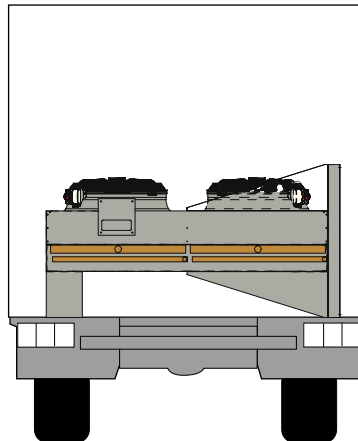
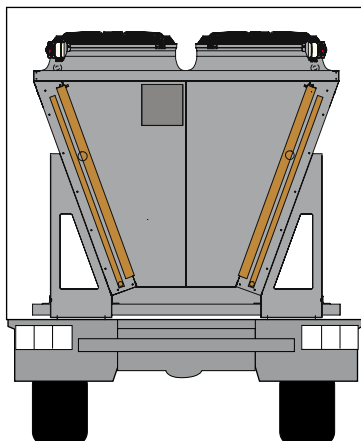
1. Units ordered with leg extensions are shipped with only the extension pieces fitted. The lower leg sections must be added on site.
2. The unit must be lifted horizontally when leg extensions are fitted.
3. On horizontal units supplied with channel legs, it may be necessary to move them from the transport position (legs extend above the unit body) to the operating position (leg top below casework).
4. Remove any stacking plates and mounting feet, carefully lift the unit, loosen the leg fixings and move the leg-down one set of key-slots. Re-tighten the fixings and fit feet if necessary.
5. **When loading or unloading unit over 7.2 metres, use only a strop, do not use forklift.**



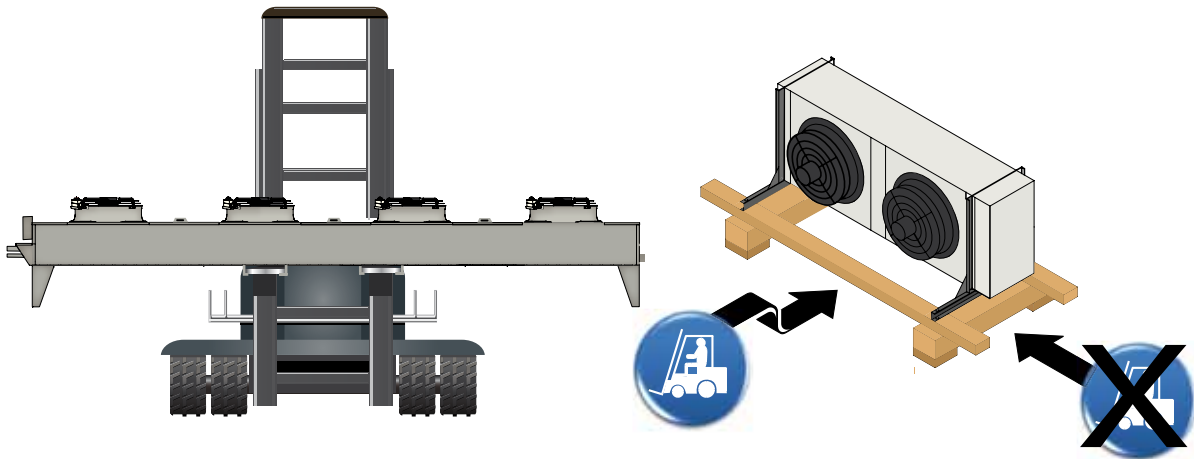
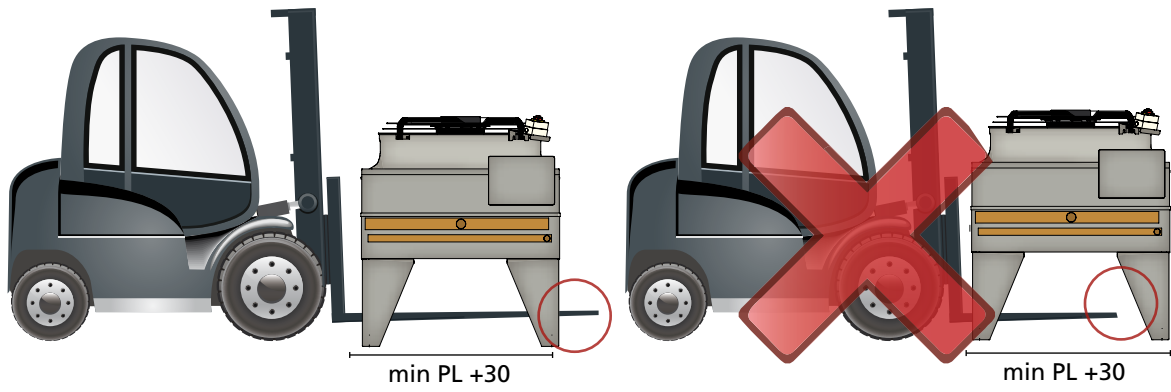
Strop lift



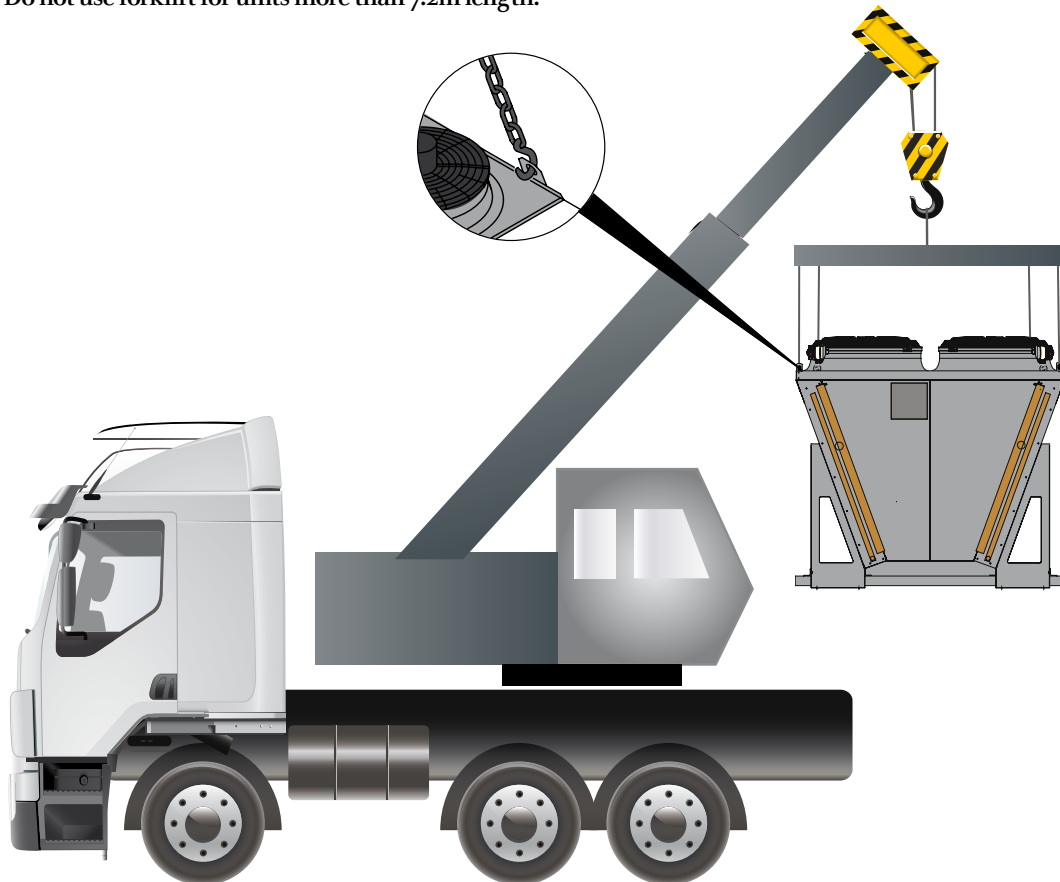
Forklift

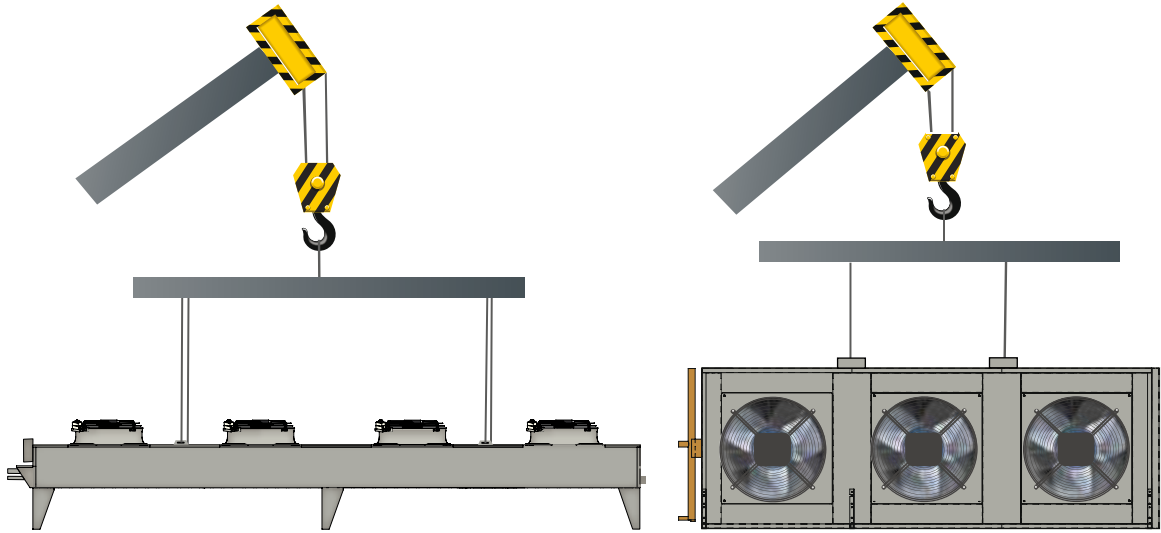


5. Handling

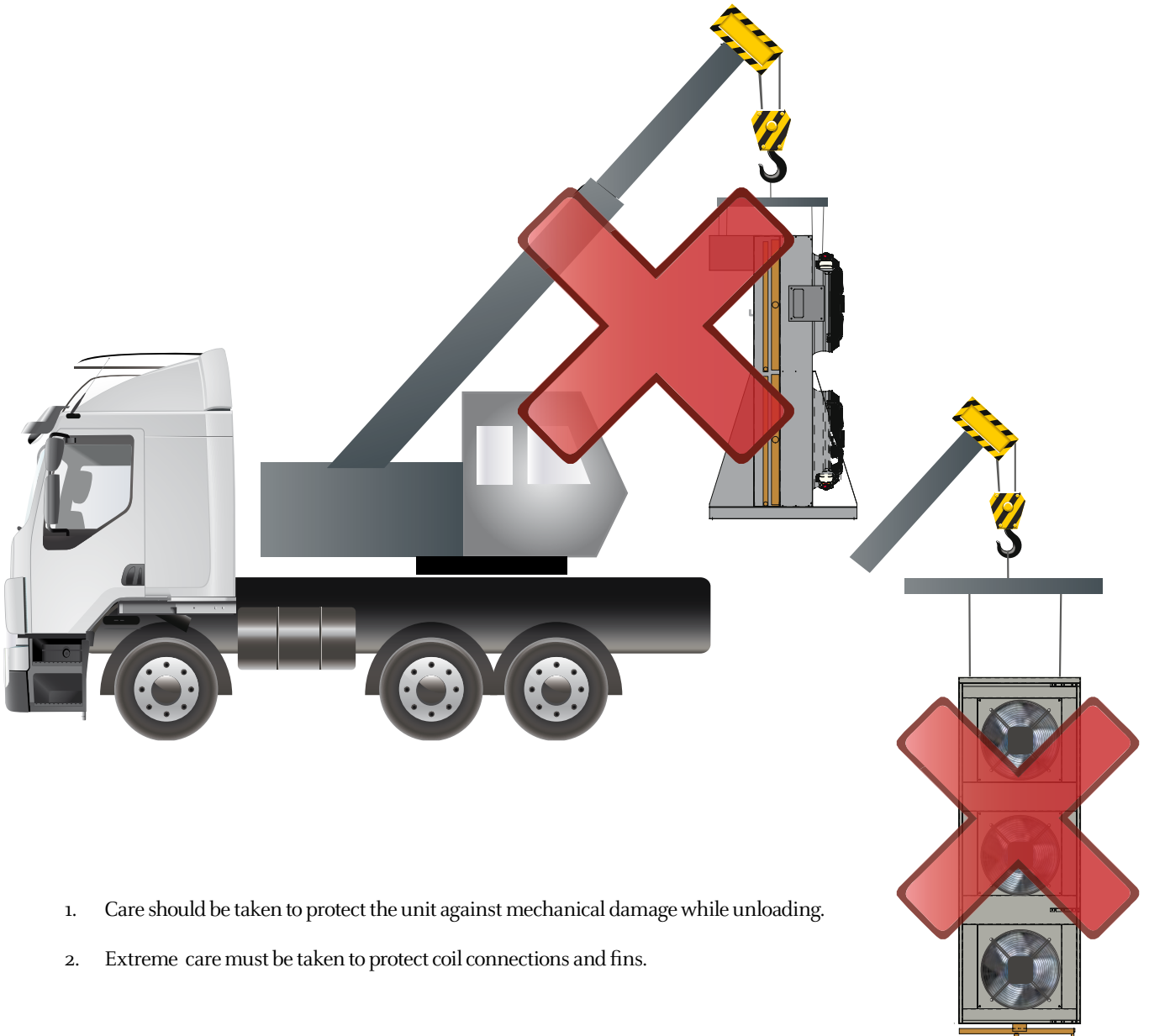


1. All large units have recommended points for use when fork or strop lifting, both are clearly marked.
2. Double bank models are fitted with lifting channels, which can be located according to requirements, and removed after installation.
3. Do not use forklift for units more than 7.2m length.





1. If the unit is not marked, the position of centre of gravity of the unit should be considered when lifting. Units should maintain a level attitude during off-loading.
2. If straps are used, spreader bars must be utilised to protect the casework.



1. Care should be taken to protect the unit against mechanical damage while unloading.
2. Extreme care must be taken to protect coil connections and fins.

6. Storage

1. To avoid contamination and corrosion, the units must be stored in dry and clean area.



2. Storing for long periods is not recommended, but where this cannot be avoided the fan motors must run for a **minimum of 2 hours per month**. Failure to do so will invalidate manufacturer's warranty.

General

Upon receipt, the units should be visually inspected, any transport damage and / or missing parts must be recorded on the delivery note and the manufacturer notified in writing within seven days . **Please ensure:**

- The pipework should shows no signs of damage
- The Fanset / motor terminals box lids are not cracked or show ing signs of obvious damage
- The Electrical screw terminals in control panels and motor mountings should be checked for security.

2. Units are not portable and are only for permanent installation.

The units are delivered with a 1 bar holding charge (N₂) which should be safely released through the schrader valve on the gas inlet header before removing the brazed header / manifold caps.

3. If the holding charge is not present the manufacturer should be contacted immediately.

Damage caused by incorrect installation / unit mis-handling will invalidate the the manufacturers warranty

7. Installation and Location guidance

Before locating the unit in its final location, appropriate load calculations should be completed, taking into consideration functional unit load. This is to ensure its operating platform will withstand the units distributed weight. It is the responsibility of the installer to ensure that the relevant national building legislations are met and the operating surface is suitable to withstand the supplied condenser.

For efficient operation, the unit needs airflow to be unrestricted and inlet air to be at ambient temperature.

Adjacent building styles, plant and prevailing winds can often cause air currents which, in turn can create down draughts, consequently forcing the discharge air back down into the air intake stream causing high air entering temperatures and subsequent loss of performance. Other adjacent plant, either requiring an air supply or dissipating air will affect the air flow onto the unit. To achieve unrestricted air at ambient temperature, it is necessary to avoid hazards such as:

- Local wind conditions causing warm outlet air to be mixed with the cool inlet.
- Inlet air entraining warm exhaust air from other equipment.
- Solar heat absorption from surrounding surfaces increasing the local ambient.
- Vertical coils should be shaded from the sun.

Adding effects together, it is not unusual for there to be a 5 K temperature increase in inlet air temperature over and above ambient. This obviously has a serious effect on the performance. Sound pressure levels away from the unit will be affected by its surrounding objects/obstructions such as solid walls resulting in higher than specified levels of sound pressure.

Vertical units with AC fan speeds <400 rpm are not available as wind can overcome the power of the motor, making it impossible to start. Detailed below are some guidelines for location and installation of the unit. These guidelines are applicable to flatbed and V bank units. It recommended to allow maximum distance wherever space is available.

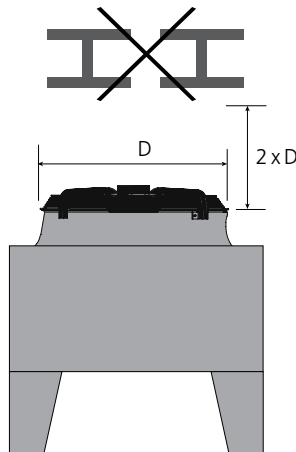


Fig 1

Avoid obstructions within 2 x diameter of the fan outlet

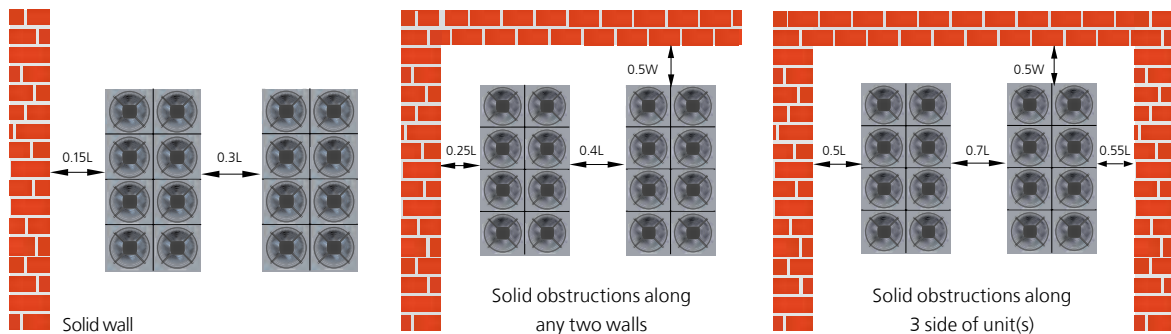


Fig 2

Recommended dimensions for location of units to avoid inlet or outlet restrictions objects such as walls. Extended legs offer a cost effective way to reduce warm air recirculation, reducing inlet flow velocities and increasing the average distance between warm and cool air.

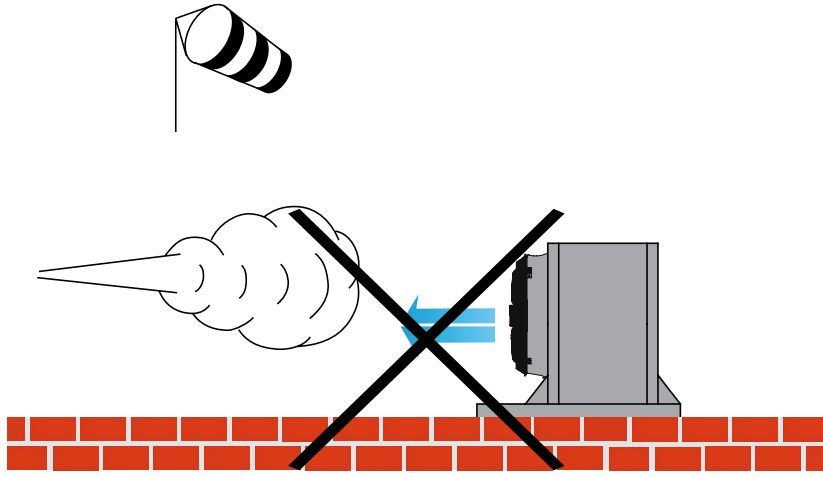


Fig 3

Avoid wind creating additional pressure for fans to work against, particularly at low speed - < 400 rpm.

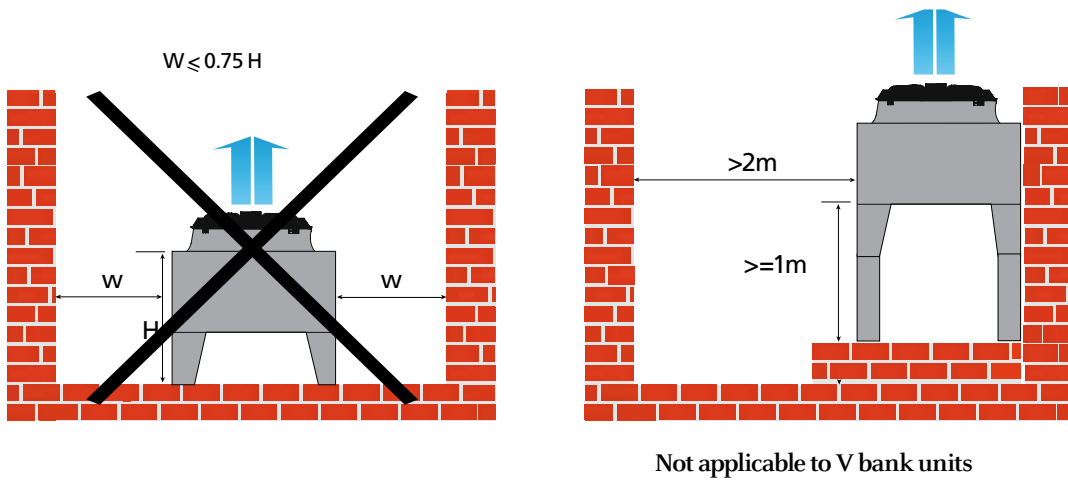


Fig 4

Avoid inlet air being drawn from above the height of the outlet.

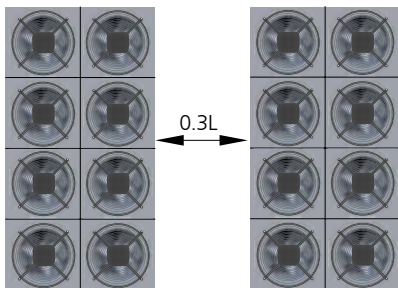


Fig 5

Avoid outlet air pulled down between adjacent units

8. Pipework

Pipework to and from the condenser should be suitable for:

- Working fluid (guidance can be provided by GEA representative or pipe supplier)
- Atmospheric conditions
- Maximum operating pressure including relevant safety factor



Damage caused by incorrect installation will invalidate the manufacturer's warranty obligations.

Pipework to and from the condenser should be selected to suit the application and not the connection size of the unit. Pipework sizes should be selected to ensure pressure drop does not exceed an equivalent of 2K at full load conditions. Pipework should be supported independently from the condenser unit in a way that prevents the transmission of vibration to the units. A qualified engineer should install the refrigerant pipework to a high standard of refrigeration practice. All pipework used must be clean and to refrigeration quality, all cuts should be made using a pipe cutter, never a hacksaw, and care must be taken to remove all burrs and swarf.

Braze using silver bearing brazing rod and ensure that all joints are cleaned before brazing. During brazing care should be taken to ensure that all components near joints should not be excessively overheated, a wet cloth should be applied where necessary. Dry nitrogen should be passed through the pipework during brazing to minimise oxidation.



WARNING!

Use appropriate PPE (personal protection equipment) during pipework, refrigerant charging and commissioning. During brazing ensure the temperature of coils with vinyl coated fins does not exceed 150°C as toxic fumes would be produced

When brazing and leak testing are complete the suction line should be insulated with 3/4" thick Class 'O' insulation. The unit has been thoroughly tested during manufacture however after on site brazing is complete all pipework should be pressure tested for leaks to maximum of 1.3 capacity pressure

Be aware of the below hazards during pipework and refrigerant charging:



Frost burns



Heat burns



Cuts or Wounds



Inhalation

In the event of injury, seek medical attention immediately.

It is the responsibility of the installer to ensure piping to and from the condenser is suitable for the application, although guidance from your GEA representative can be provided.

Unless otherwise specified, twin section units should be connected in parallel to each other, not in series; failure to do so will result in excessive fluid pressure drop and a corresponding loss in performance.

All pipework and fittings should be pressure tested upon installation completion in accordance with relevant regulations or legislations. Any pressure test should not exceed the units' maximum operating pressure or the pressure rating of any safety devices.

9. Evacuation

To avoid potential moisture related problems, it is necessary to evacuate the complete system to a minimum of 1 torr (1.33mbar). All parts of the system must be above freezing and ideally higher than +10°C during evacuation.

10. Refrigerant Sub-cooling

For a system fitted with a liquid receiver to operate correctly, the receiver should be installed between the condensing and the sub-cooling sections.

If no receiver is fitted, a liquid trap should be installed between the two sections.

NOTE: Without a liquid receiver, the degree of sub-cooling will vary with the refrigerant charge.

11. Refrigerants

The refrigerant should be selected appropriately for the application and coordinated with any relevant regional or national regulatory requirements. The refrigerant should be specified when selecting the condenser to ensure appropriate materials are used and that circuit loading is optimised for the application (completed within the GEA Searle Product Selector).

Only qualified personnel should be involved with any refrigerant handling, inappropriate installation or failure to adhere to commonly accepted refrigeration practices will invalidate unit warranty.

Safety precautions should be taken when working with refrigerant in accordance with the qualified personnel's training. Specific information on the composition and relevant safety precautions will be available from the refrigerant supplier. Detailed information about its incorporation within GEA Searle products can be obtained through contacting the product supplier; GEA Searle contact details found at the end of the Installation and Maintenance Instructions.

12. Fluid Cooler Applications - Fluid

- Ensure that the fluid to be used and any additives are compatible with the unit's construction.
- Fluid Cooler units are designed for use in closed systems, where the fluid is re-circulated.
- If the unit is to be used in an open system, extra care is required to prevent corrosion.

Fluid inhibitors may be required to prevent corrosion of system components. The fluid supplier should supply compatibility information with their fluid when incorporated with system components, including details of any required inhibitors. It is the responsibility of the installer to ensure the working fluid is compatible with any supplied products and that necessary precautions / preventative measures are taken to avoid product failure.

National legislation should be adhered to in relation to the supply, usage and eventual disposal of any working fluid.

13. Fluid Cooler Applications – Frost Protection

Fluid coolers using water or water-based solutions must be protected by adding anti-freeze in sufficient concentration, as it is not possible to drain the system completely.

Note: The heat transfer properties of a fluid vary with the concentration of additives.

ELECTRICAL VOLTAGE

Ensure that



1. The power supply is isolated before any installation or maintenance work is carried out.
2. The voltage, working fluid and the maximum working pressure stated on the product nameplate is suitable for the working environment.

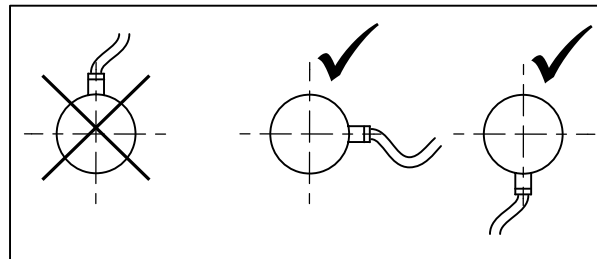
If residual current or earth leakage protection devices are to be used in the supply, appropriate sensitivity levels should be used. Up to 300 mA trip level may be required to avoid nuisance tripping, particularly with inverters. If greater protection is required then this can be provided for individual circuits.

Electrical connection is to individual motor terminal boxes, or a unit terminal box or control panel., Wiring instructions are provided within the terminal box. Generally 'cage clamp' type terminals are used. Pushing a correctly sized screwdriver into the square aperture adjacent to the conductor entry opens the terminal.

It is the installer's responsibility to ensure cable entry is fit for purpose and that where appropriate cable support is applied. Care should be taken to ensure the box IP rating is not compromised by the electrical supply cable entry.

Conductors between 1 and 2.5mm² are accommodated. Where wiring is to a motors individual terminal box the facility for additional casework earth points are provided. When motor wiring is routed within the unit side covers, earth studs are provided under these covers for additional earth points on the casework. All AC single-phase motors have automatic internal overload protection, and can be used in conjunction with a high quality 'triac' type speed controller. Some three phase AC motors are also fitted with internal thermostats, wired back to their terminal blocks (TK). Check that the fan rotation of 3 phase units is correct.

Reversing any two phases of the AC motor supply can change the rotation. Reversing two phases of the EC motors won't change the rotation. In optional AC fan Contactor boxes the fan contactors are energised through these auto-reset, normally closed, thermo-stats. When internal thermostats are not used three phase motors MUST be protected against overload and single phasing. Overloads must be set to cut out at FLC + 10% (FLC + 15% at -30°C) Failure to comply will render motor warranties void.



GEA Searle would recommend as general rule that each cable or group of cables will be supported at no greater than 500mm intervals; but if national legislation recommends otherwise this should be followed. Cable size is determined by the motor current, with the necessary deration for unit operating temperature. High Temperature cable is used where necessary. It is the responsibility of the installation contractor to ensure the complete installation is appropriately electrically tested according to national legislation.

Terminated Units

If no isolator specified on the unit it is the installers' responsibly to ensure appropriate isolation is incorporated within the system. With or without unit isolation; it is the installers' responsibility to provide over and short circuit protection for the installation.

Controls

Control options are supplied according to customer specification. Individual instructions are provided to guide the setting and use of control options. When a control option is specified, the unit will contain the necessary equipment to isolate and provide over current and short circuit protection for the unit.

Wiring Diagrams and Documentation

Wiring diagrams and other relevant documentation will either be supplied in the units' junction box or in a separately supplied documentation pack.

15. Condensers with Triac or Inverter Speed Control

Care should be taken to ensure that external control wiring to units fitted with triac speed control does not transfer electromagnetic interference to the unit.

This may require the fitting of a ferrite core or similar suppression components.

Phase cut / triac speed control can cause electromagnetic motor noises which can become dominant. This is likely to cause the actual sound pressure level to deviate from the claimed level or cause obtrusive peak frequencies within the sound spectrum.

If an inverter other than supplied by Searle, is to be used it must be set for a "Square Law" voltage to frequency relationship without any energy saving function.

- To prevent the generation of audible noise a switching frequency of up to 15kHz may be necessary.
- Mounting the inverter remotely from the unit may result in motor damage.
- A maximum of 5-metre cable length is recommended.

When using an inverter speed control, unless otherwise specified it is mandatory to incorporate a sinusoidal filter. Further details can be obtained through your GEA representative. Default controller set points can be programmed at the factory / to customer request. However, it is advisable the installer calibrate control requirements upon commissioning of the equipment.

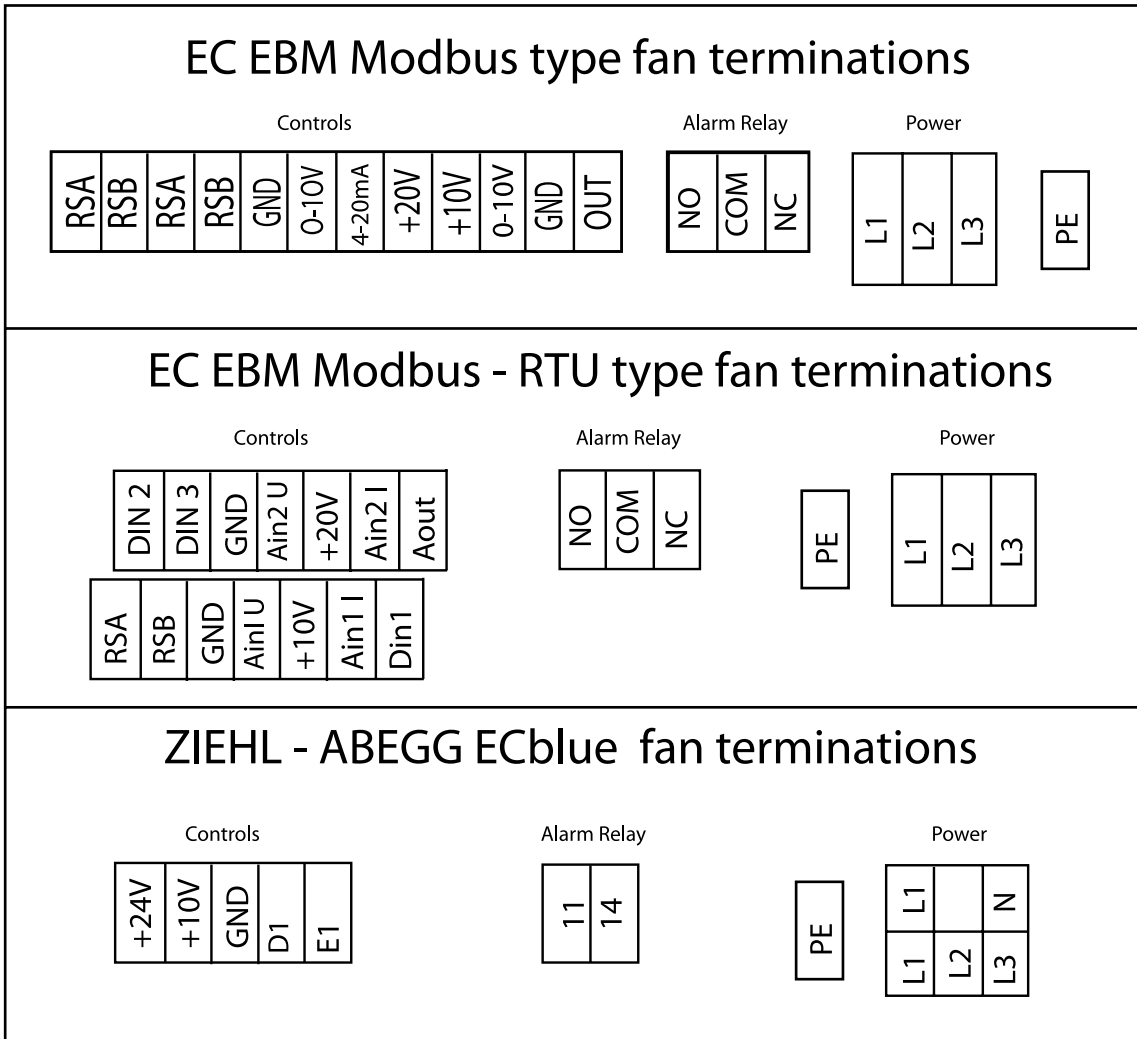
16 Dual Speed Motors

On units suitable for two-speed (Delta/Star) operation speed selection is achieved either by the arrangement of jumper bars or link wires in the motor terminal blocks, as indicated in the diagram on the terminal box lid.

- Automatic speed changeover can be achieved via an arrangement. Changeover contactors **MUST** be electrically and mechanically interlocked, with a changeover period greater than 50ms.
- Self-contained dual-speed control units are available.
- If motors are wired to a common terminal box then ensure that this is suitable for remote dual speed operation.

17. EC Motors

Fan sets are supplied with a 380-415 volt supply (50 or 60Hz) via a dedicated MCB, and are controlled by a 0-10Vdc signal provided by an external controller. If necessary the fan set can produce a 10Vdc supply for this purpose. If multiple fan sets are used, the 10V supply can be connected in the motors and can be used as a backup in the event of controller failure. Alarm Relay Contacts provide a normally open and/or normally closed volt free function. Terminals RSA & RSB provide a RS485 Network Connection for communication with the Fan sets. All links between RSA/RSB terminals should be removed if only one junction box on dual circuit unit is fitted.



	EC EBM MODBUS	EC EBM MODBUS-RTU	ZIEHL-ABEGG ECBlue
Gnd/0V/Return	GND	GND	GND
Control voltage supply	+20	+20	+20
10VDC supply	+10	+10	+10
0-10V speed control	0-10V PWM	Ain1U/Ain2U	E1
4-20mA speed control	4-20mA	Ain1I/Ain2I	
Communication port	RSA/RSB	RSA/RSB	
Alarm relay	NO/COM/NC	NO/COM/NC	11/14
Reverse rotation		Din2	D1
Main supply	L1/L2/L3	L1/L2/L3	L1/L2/L3, L1/N

18. Initial Starting

Before running the unit for the first time, check that all guards, motor mountings and electrical covers are secure, all unnecessary terminal block links are removed and fans rotate freely. Remove any lifting channels.

Check that the fan rotation of 3 phase units is correct. Reversing any two phases of the motor supply will change the rotation (AC fansets only).



WARNING!

The Unit must be Electrically Isolated before certain Maintenance Work is undertaken.

Appropriate PPE should be worn when performing maintenance procedures, adhering to specific site requirements as appropriate. Any repairs to the condensers or dry cooler should be undertaken by suitably qualified personal and relevant national regulations should be adhered to, specifically with regards to handling of working fluids and brazing. If any advice or guidance is required with regards to failure or repairs of GEA supplied product please contact your local representative. Regular attention should be paid to the system operating requirements to ensure that the operating parameters are within the products/system specifications.

Every month check:

- Fan motors must be operated for at least 2 hours every month to prevent possible fanset failure
- Coil condition, i.e clogging

Every 12 months check:

- Security of fixings especially fan motor mountings.
- Refrigerant fluid pipework for damage and leaks.
- Motor(s) rotate freely.
- Electrical connections for security of attachment. Check all external surfaces annually for any corrosion or peeling. Clean any affected area thoroughly with a wire brush, apply a coat of zinc primer and retouch with a suitable finishing paint.

When necessary:

Clean the fins, guards and general casework. Care must be taken when cleaning the fins to prevent damage. A soft brush and mild detergent solution is recommended.

The following routine annual maintenance is recommended:

- Check security of fixings especially fan motor mountings.
- Check refrigerant pipeline for damage and leaks.
- Check all motors rotate freely.
- Check electrical connections for security of attachment.
- Check heat exchanger coil for build up/build-up of debris or soiling.
- Check all external surfaces annually for any corrosion or peeling- cleaning any affected area thoroughly with a wire brush before applying a zinc primer to the area and complete with an appropriate finishing paint.
- Clean any affected area thoroughly with a wire brush, apply a coat of zinc primer and retouch with a suitable finishing paint.
- On belt drive units, every month check belt tension and wear.
- On completion of work ensure all objects are removed from the unit.
- Only original spare parts should be used if replacing failed components.

Component Replacement

- Pressure Transducer/ Pressure switches
- When removing the pressure devices safety goggles and gloves must be worn.

When starting the necessary maintenance routine please be aware of the following hazards



Explosion risk

Keep the risk area free from any ignition sources



Electrical voltage

The power supply is isolated before any installation or maintenance work is carried out.

20. Coil Cleaning

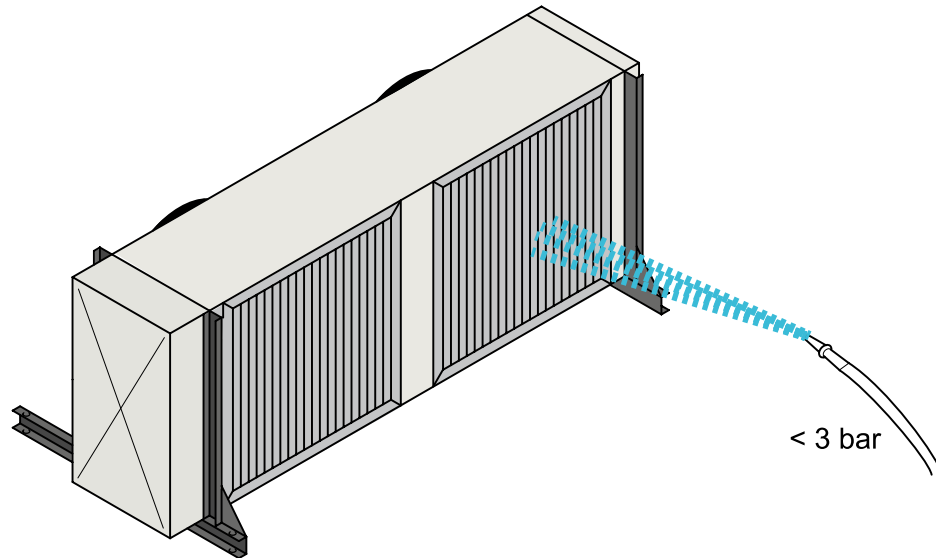
It is essential that the heat exchanger coil is kept clean to maintain the designed heat transfer rate. General debris such as leaves, paper, dust and pollen can be removed using a brush, with compressed air blowing against direction of airflow (Max pressure 3bar) or an industrial vacuum cleaner.

The fin should be brushed in the longitudinal direction of the fins with a soft brush.

Heavier greasy soiling must be removed using a high- pressure water/steam jet washer (Max pressure 3bar) against direction of airflow, at a distance of 300 to 400mm using a neutral cleaning agent if required.

The jet of the cleaner should be held vertical to the fin bank to avoid fin damage.

Any cleaning fluids should be suitable for use on both tube and fin materials, incorrect use of fluids could be corrosive towards heat exchanger materials.



21. Standards

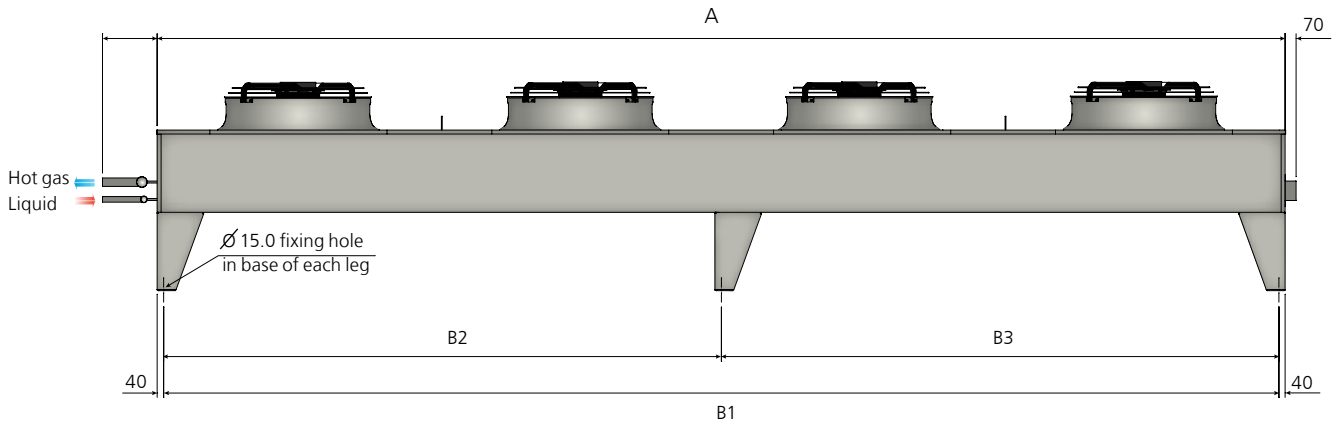
- 97/23/EG Pressure Equipment Directive
- 98/37/EG Machines Directive
- En 378; Parts 1 to 4; "Refrigeration systems and heat pumps, technical safety and environmental requirements"
- 73/23/EEC Low Voltage Directive
- EN60204-1: 1998 Safety of machinery-Electrical equipment of machines
- BS EN 61032: 1998 Protection of persons and equipment by enclosures, Probes for verification (propeller fan units)
- BS EN294: 1992 Safety of machinery- Safety distances to prevent danger zones being reached by the upper limbs: 1992 (axial fan units)

22. Invalidation of Guarantee

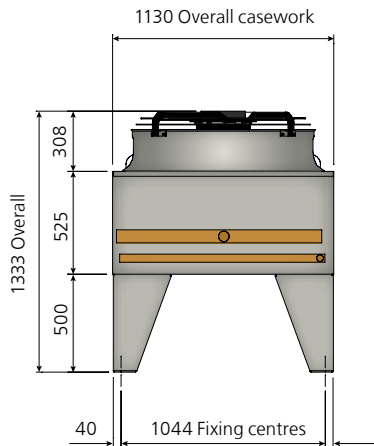
Searle accepts no liability according to Seale's terms and conditions of sale, or for loss or damage arising as a result of:

1. Failure to install set up or put to work any part of the equipment in the manner specified in the Installation and Maintenance Instructions
2. Failure to maintain the equipment in the manner specified in the Installation and Maintenance Instructions
3. Replacement parts, additional parts or accessories manufactured by persons other than Searle having been incorporated into, or attached to the equipment.
4. The equipment having been adapted for use, operated or used in such a way as does conform to Searle's recommendation.

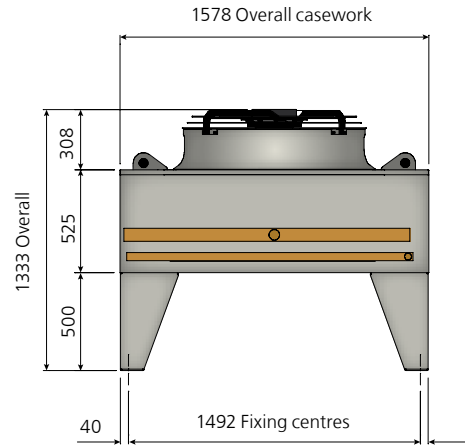
23. RF and NF Model drawings and Dimension table



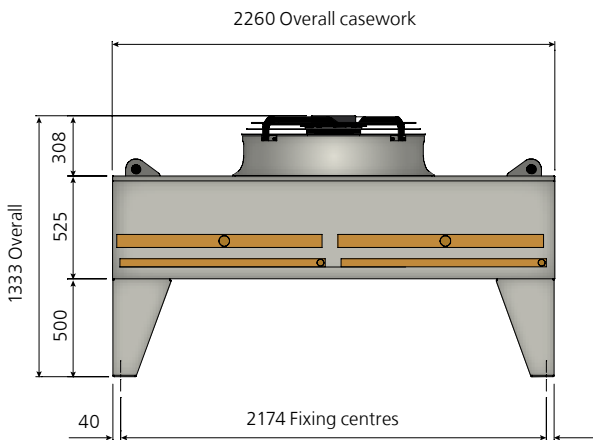
RF/NF-M



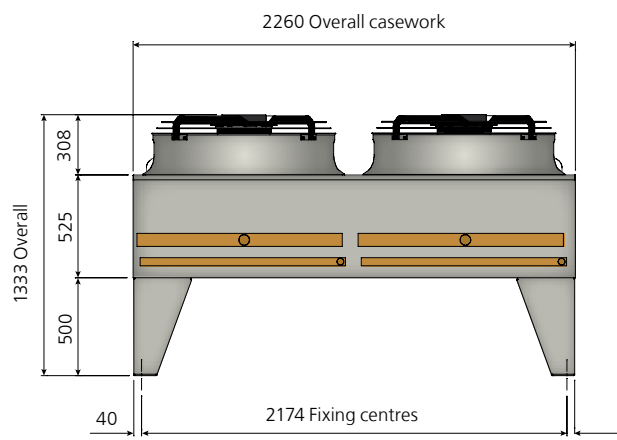
RF/NF-N



RF/NF-P1



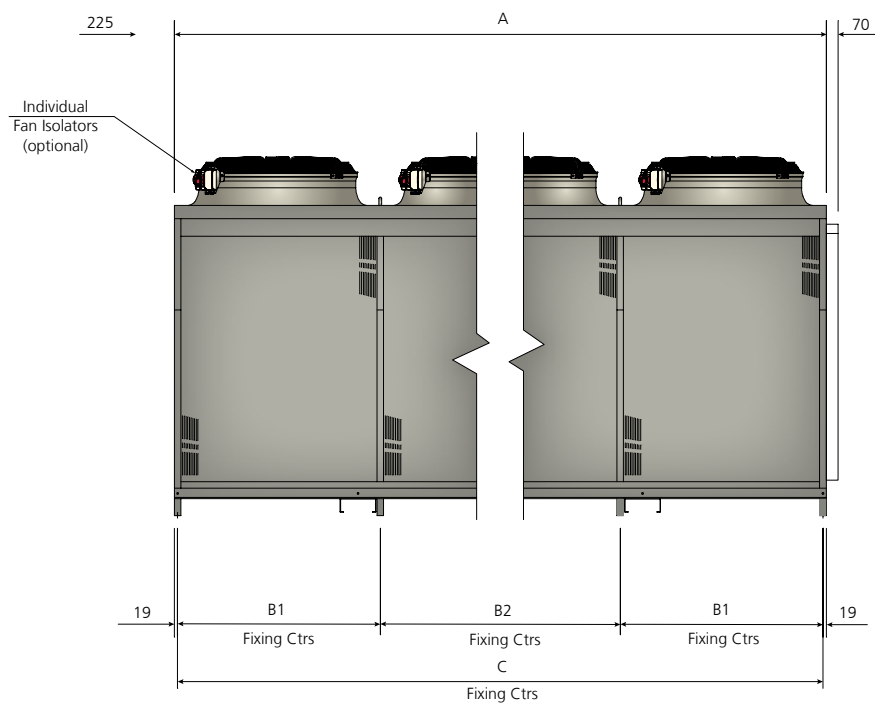
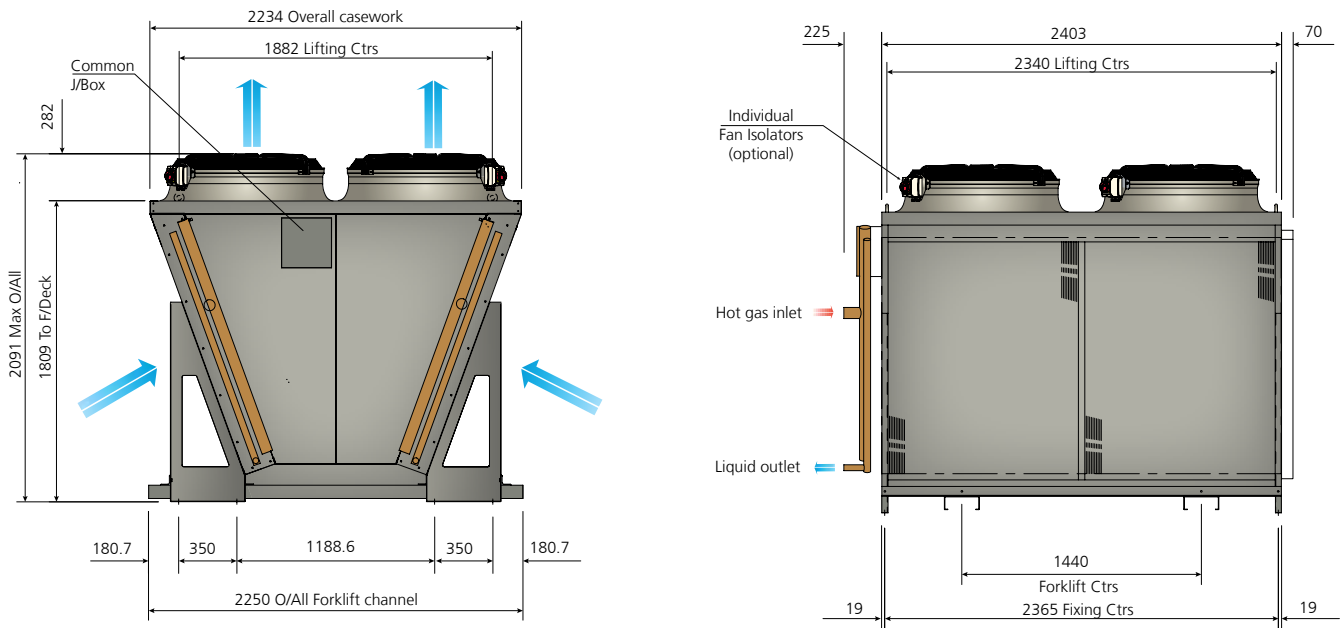
RF/NF-P2



Note: All dimensions in mm. Common junction box will vary in size and position depending on the control option required.

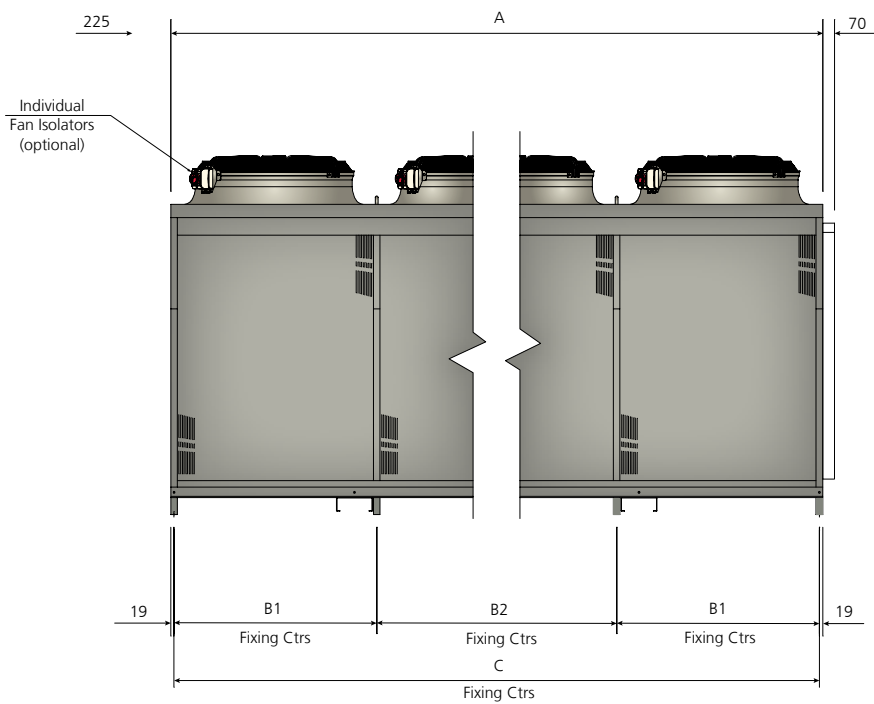
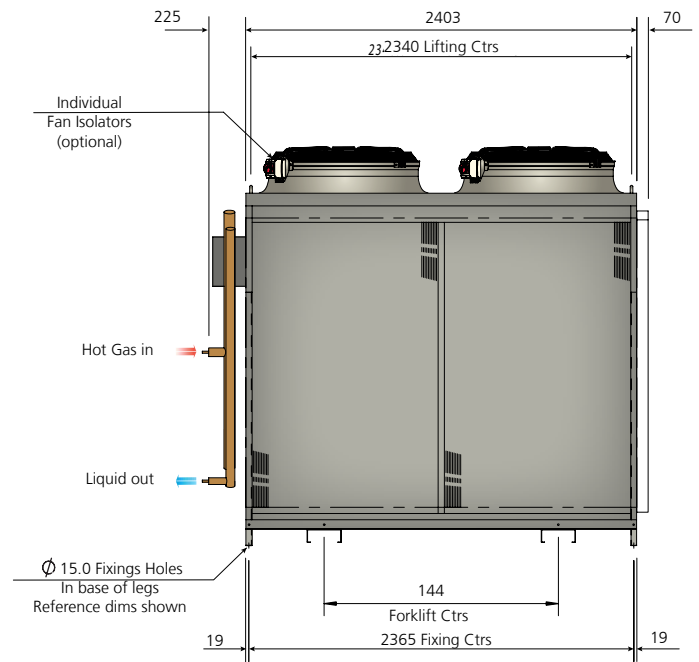
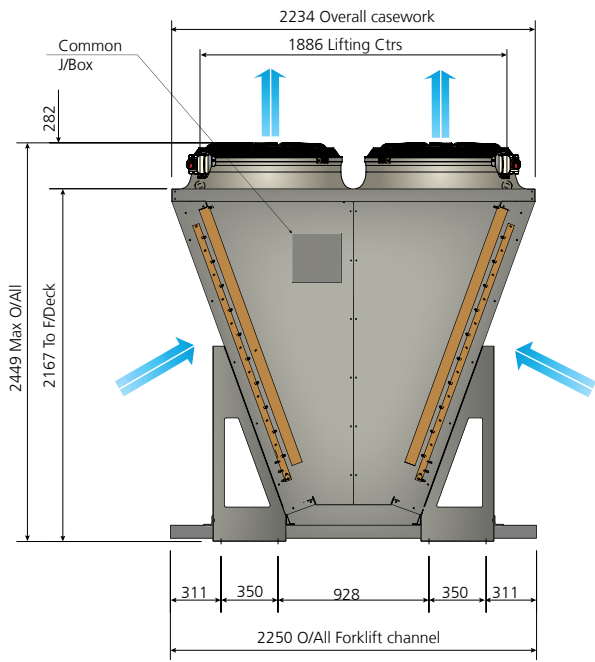
Unit	Module	Fan banks	Fan per banks	Dim A	Dim B1	Dim B2	Dim B3	Total Unit Dry Weight (Approx)							
								M		N		P1		P2	
								Al	Cu	Al	Cu	Al	Cu	Al	Cu
								kg	kg	kg	kg	kg	kg	kg	kg
_F_A_01T2	1200	1 or 2	1	1203	1123	-	-	214	239	258	294	315	366	365	416
_F_A_01T3	1200	1 or 2	1	1203	1123	-	-	226	265	276	330	340	416	390	466
_F_A_01T4	1200	1 or 2	1	1203	1123	-	-	239	290	293	366	365	467	415	517
_F_A_02T2	1200	1 or 2	2	2403	2323	-	-	369	421	454	526	552	655	649	752
_F_A_02T3	1200	1 or 2	2	2403	2323	-	-	394	471	489	597	685	756	699	853
_F_A_02T4	1200	1 or 2	2	2403	2323	-	-	419	522	524	669	652	857	749	954
_F_A_03T2	1200	1 or 2	3	3603	3523	-	-	525	602	650	758	790	944	934	1088
_F_A_03T3	1200	1 or 2	3	3603	3523	-	-	562	678	702	865	865	1095	1009	1239
_F_A_03T4	1200	1 or 2	3	3603	3523	-	-	600	753	755	972	939	1247	1083	1391
_F_A_04T2	1200	1 or 2	4	4803	4723	-	-	574	676	738	883	921	1126	1112	1316
_F_A_04T3	1200	1 or 2	4	4803	4723	-	-	624	777	808	1025	1020	1328	1211	1518
_F_A_04T4	1200	1 or 2	4	4803	4723	-	-	673	878	879	1168	1120	1529	1310	1720
_F_A_05T2	1200	1 or 2	5	6003	5923	-	-	695	823	900	1081	1124	1381	1362	1618
_F_A_05T3	1200	1 or 2	5	6003	5923	-	-	758	950	988	1259	1249	1633	1486	1871
_F_A_05T4	1200	1 or 2	5	6003	5923	-	-	820	1076	1075	1437	1373	1885	1611	2123
_F_A_06T2	1200	1 or 2	6	7203	7123	3562	3561	827	971	1061	1278	1328	1635	1613	1920
_F_A_06T3	1200	1 or 2	6	7203	7123	3562	3561	891	1122	1167	1492	1477	1938	1762	2223
_F_A_06T4	1200	1 or 2	6	7203	7123	3562	3561	966	1273	1272	1706	1626	2241	1911	2525
_F_A_07T2	1200	1 or 2	7	8403	8323	3562	4761	969	1149	1254	1507	1562	1921	1895	2254
_F_A_07T3	1200	1 or 2	7	8403	8323	3562	4761	1056	1325	1376	1756	1736	2274	2069	2607
_F_A_07T4	1200	1 or 2	7	8403	8323	3562	4761	1143	1502	1499	2005	1910	2627	2243	2960
_F_A_08T2	1200	1 or 2	8	9603	9523	4762	4761	1091	1296	1415	1705	1766	2176	2146	2555
_F_A_08T3	1200	1 or 2	8	9603	9523	4762	4761	1190	1497	1555	1989	1964	2579	2344	2959
_F_A_08T4	1200	1 or 2	8	9603	9523	4762	4761	1289	1699	1696	2274	2163	2982	2543	3362
_F_A_09T2	1200	1 or 2	9	10803	10723	4762	5961	1212	1443	1577	1902	1969	2430	2396	2857
_F_A_09T3	1200	1 or 2	9	10803	10723	4762	5961	1324	1670	1734	2223	2193	2884	2619	3311
_F_A_09T4	1200	1 or 2	9	10803	10723	4762	5961	1436	1897	1892	2543	2416	3338	2843	3765
_F_A_10T2	1200	1 or 2	10	12003	12003	5962	5961	1334	1590	1738	2100	2173	2685	2646	3159
_F_A_10T3	1200	1 or 2	10	12003	12003	5962	5961	1458	1842	1913	2456	2421	3189	2895	3663
_F_A_10T4	1200	1 or 2	10	12003	12003	5962	5961	1582	2094	2089	2812	2669	3694	3143	4167
_F_B_01T2	1500	1 or 2	1	1503	1423	-	-	233	265	281	327	353	417	405	469
_F_B_01T3	1500	1 or 2	1	1503	1423	-	-	248	296	303	371	384	480	436	532
_F_B_01T4	1500	1 or 2	1	1503	1423	-	-	264	328	326	416	415	543	467	595
_F_B_02T2	1500	1 or 2	2	3003	2923	-	-	408	472	500	591	629	757	729	857
_F_B_02T3	1500	1 or 2	2	3003	2923	-	-	439	535	544	680	691	883	791	983
_F_B_02T4	1500	1 or 2	2	3003	2923	-	-	470	598	588	769	753	1009	853	1110
_F_B_03T2	1500	1 or 2	3	4503	4503	-	-	454	550	591	727	776	968	925	1117
_F_B_03T3	1500	1 or 2	3	4503	4503	-	-	501	645	657	861	870	1158	1019	1307
_F_B_03T4	1500	1 or 2	3	4503	4503	-	-	547	740	723	994	963	1347	1112	1496
_F_B_04T2	1500	1 or 2	4	6003	6003	-	-	616	744	797	978	1039	1295	1237	1493
_F_B_04T3	1500	1 or 2	4	6003	6003	-	-	678	870	885	1156	1163	1548	1361	1745
_F_B_04T4	1500	1 or 2	4	6003	6003	-	-	740	997	973	1334	1288	1800	1485	1998
_F_B_05T2	1500	1 or 2	5	7503	7503	2962	4461	748	908	974	1200	1272	1592	1519	1839
_F_B_05T3	1500	1 or 2	5	7503	7503	2962	4461	826	1066	1083	1422	1428	1908	1674	2154
_F_B_05T4	1500	1 or 2	5	7503	7503	2962	4461	903	1224	1193	1645	1583	2223	1829	2469
_F_B_06T2	1500	1 or 2	6	9003	9003	4462	4461	880	1073	1150	1421	1505	1890	1800	2185
_F_B_06T3	1500	1 or 2	6	9003	9003	4462	4461	913	1262	1282	1688	1692	2268	1987	2563
_F_B_06T4	1500	1 or 2	6	9003	9003	4462	4461	1066	1451	1413	1956	1878	2646	2173	2941
_F_B_07T2	1500	1 or 2	7	10503	10503	4462	5961	1043	1267	1357	1674	1769	2218	2114	2562
_F_B_07T3	1500	1 or 2	7	10503	10503	4462	5961	1152	1488	15111	1985	1987	2659	2331	3004
_F_B_07T4	1500	1 or 2	7	10503	10503	4462	5961	1260	1709	1664	2297	2204	3100	2549	3445
_F_B_08T2	1500	1 or 2	8	12003	11923	5962	5961	1175	1431	1534	1895	2002	2515	2396	2908
_F_B_08T3	1500	1 or 2	8	12003	11923	5962	5961	1299	1684	1709	2251	2251	3019	2664	3413
_F_B_08T4	1500	1 or 2	8	12003	11923	5962	5961	1423	1936	1884	2607	2499	3524	3413	3917
_F_C_01T2	1800	1 or 2	1	1803	1723	-	-	252	290	305	359	357	433	410	487
_F_C_01T3	1800	1 or 2	1	1803	1723	-	-	271	328	331	413	394	509	447	562
_F_C_01T4	1800	1 or 2	1	1803	1723	-	-	289	366	358	466	431	585	485	638
_F_C_02T2	1800	1 or 2	2	3603	3523	-	-	446	523	547	656	636	790	740	893
_F_C_02T3	1800	1 or 2	2	3603	3523	-	-	483	599	600	763	711	941	814	1045
_F_C_02T4	1800	1 or 2	2	3603	3523	-	-	521	674	652	869	785	1093	889	1196
_F_C_03T2	1800	1 or 2	3	5403	5323	-	-	486	601	636	798	762	992	916	1146
_F_C_03T3	1800	1 or 2	3	5403	5323	-	-	542	715	715	959	874	1219	1027	1373
_F_C_03T4	1800	1 or 2	3	5403	5323	-	-	598	828	794	1119	985	1446	1139	1600
_F_C_04T2	1800	1 or 2	4	7203	7123	3562	3561	659	812	857	1074	1020	1327	1224	1531
_F_C_04T3	1800	1 or 2	4	7203	7123	3562	3561	733	964	962	1287	1169	1630	1373	1834
_F_C_04T4	1800	1 or 2	4	7203	7123	3562	3561	807	1115	1067	1501	1318	1933	1522	2137
_F_C_05T2	1800	1 or 2	5	9003	8923	3562	5361	801	993	1048	1319	1248	1633	1502	1887
_F_C_05T3	1800	1 or 2	5	9003	8923	3562	5361	894	1182	1179	1586	1435	2011	1689	2265
_F_C_05T4	1800	1 or 2	5	9003	8923	3562	5361	987	1372	1311	1853	1621	2389	1875	2643
_F_C_06T2	1800	1 or 2	6	10803	10723	5362	5361	974	1204	1269	1594	1507	1968	1811	2272
_F_C_06T3	1800	1 or 2	6	10803	10723	5362	5361	1085	1431	1426	1915	1730	2421	2034	2726
_F_C_06T4	1800	1 or 2	6	10803	10723	5362	5361	1197	1658	1584	2235	1953	2875	2258	3180
_F_D_01T2	2100	1 or 2	1	2103	2023	-	-	271	316	328	454	395	484	450	539
_F_D_01T3	2100	1 or 2	1	2103	2023	-	-	293	360	359	454	438	573	493	628
_F_D_01T4	2100	1 or 2	1	2103	2023	-	-	404	404	390	516	482	661	537	716
_F_D_02T2	2100	1 or 2	2	4203	4123	-	-	365	454	474	601	593	772	699	879
_F_D_02T3	2100	1 or 2	2	4203	4123	-	-	408	542	536	725	350	949	786	1055
_F_D_02T4	2100	1 or 2	2	4203	4123	-	-	631	631	597	850	767	1125	873	1232
_F_D_03T2	2100	1 or 2	3	6303	6223	-	-	577	712	740	930	910	1179	1069	1338
_F_D_03T3	2100	1 or 2	3	6303	6223	-	-	643	844	832	1117	1041	1444	1199	1602
_F_D_03T4	2100	1 or 2	3	6303	6223	-	-	977	977	924	10304	1171	1709	1330	1861
_F_D_04T2	2100	1 or 2	4	8403	8323	4162	4161	731	910	946	1199	1168	1527	1378	1737
_F_D_04T3	2100	1 or 2	4	8403	8323	4162	4161	818	1087	1068	1448	1342	1880	1552	2090
_F_D_04T4	2100	1 or 2	4	8403	8323	4162	4161	1263	1263	1191	1697	1516	2233	1726	2443
_F_D_05T2	2100	1 or 2	5	10503	10423	4162	6261	884	1108	1152	1468	1426	1874	1688	2136
_F_D_05T3</															

MV/DV...M Model drawings



Note: All dimensions in mm. Common junction box will vary in size and position depending on the control option required.

MV/DV...L Model drawings



M/DV...M Dimensions

Model	Size	No of fans	A	B1	B2	C	Approx dry weight		
			Casework overall				AL/AV	CU/ET	
			mm	mm	mm	mm	kg	kg	
M/DVA	222	M	4	2403	N/A	N/A	2365	652	798
M/DVA	223	M	4	2403	N/A	N/A	2365	720	939
M/DVA	224	M	4	2403	N/A	N/A	2365	788	1081
M/DVA	232	M	6	3603	1183	1200	3565	986	1206
M/DVA	233	M	6	3603	1183	1200	3565	1089	1418
M/DVA	234	M	6	3603	1183	1200	3565	1191	1530
M/DVA	242	M	8	4803	1183	2400	4765	1316	1609
M/DVA	243	M	8	4803	1183	2400	4765	1453	1892
M/DVA	244	M	8	4803	1183	2400	4765	1589	2175
M/DVA	252	M	10	6003	2383	1200	5965	1646	2012
M/DVA	253	M	10	6003	2383	1200	5965	1817	2366
M/DVA	254	M	10	6003	2383	1200	5965	1987	2719
M/DVA	262	M	12	7203	2383	2400	7165	1976	2415
M/DVA	263	M	12	7203	2383	2400	7165	2181	2840
M/DVA	264	M	12	7203	2383	1200	7165	2385	3264
M/DVA	272	M	14	8403	3583	1200	8365	2307	2819
M/DVA	273	M	14	8403	3583	1200	8365	2545	3314
M/DVA	274	M	14	8403	3583	1200	8365	2784	3809
M/DVA	282	M	16	9603	3583	2400	9565	2637	3223
M/DVA	283	M	16	9603	3583	2400	9565	2910	3788
M/DVA	284	M	16	9603	3583	2400	9565	3183	4354
M/DVB	222	M	4	2883	N/A	N/A	2845	761	937
M/DVB	223	M	4	2883	N/A	N/A	2845	844	1107
M/DVB	224	M	4	2883	N/A	N/A	2845	926	1277
M/DVB	232	M	6	4323	1423	1440	4285	1144	1407
M/DVB	233	M	6	4323	1423	1440	4285	1267	1662
M/DVB	234	M	6	4323	1423	1440	4285	1390	1917
M/DVB	242	M	8	5763	1423	2880	5725	1527	1878
M/DVB	243	M	8	5763	1423	2880	5725	1690	2217
M/DVB	244	M	8	5763	1423	2880	5725	1854	2557
M/DVB	252	M	10	7203	2863	1440	7165	1908	2347
M/DVB	253	M	10	7203	2863	1440	7165	2113	2772
M/DVB	254	M	10	7203	2863	1440	7165	2317	3196
M/DVB	262	M	12	8643	2863	2880	8602	2291	2818
M/DVB	263	M	12	8643	2863	2880	8602	2536	3327
M/DVB	264	M	12	8643	2863	2880	8602	2782	3836
M/DVC	222	M	4	3603	1783	N/A	3565	918	1138
M/DVC	223	M	4	3603	1783	N/A	3565	1021	1350
M/DVC	224	M	4	3603	1783	N/A	3565	1123	1562
M/DVC	232	M	6	5403	1783	1800	5365	1379	1709
M/DVC	233	M	6	5403	1783	1800	5365	1533	2027
M/DVC	234	M	6	5403	1783	1800	5365	1686	2345
M/DVC	242	M	8	7203	1783	3600	7165	1840	2279
M/DVC	243	M	8	7203	1783	3600	7165	2045	2704
M/DVC	244	M	8	7203	1783	3600	7165	2249	3128
M/DVC	252	M	10	9003	3583	1800	8965	2301	2850
M/DVC	253	M	10	9003	3583	1800	8965	2557	3380
M/DVC	254	M	10	9003	3583	1800	8965	2813	3910

Note: For 12 metre units please refer to the selection software or call your GEA representative. Total unit dry weight is dependent upon the coil material used (AL = Copper tubes with Aluminium or Vinyl coated aluminium fins, CU = Copper tubes with Copper fins or Copper fins electro-tinned).

M/DV...L Dimensions

Model	Size	No of fans	A	B1	B2	C	Approx dry weight		
			Casework overall	mm	mm	mm	mm	AL/AV	CU/ET
			mm	mm	mm	mm	kg	kg	
M/DVA	222	L	4	2403	N/A	N/A	2365	781	964
M/DVA	223	L	4	2403	N/A	N/A	2365	867	1141
M/DVA	224	L	4	2403	N/A	N/A	2365	953	1319
M/DVA	232	L	6	3603	1183	1200	3565	1182	1456
M/DVA	233	L	6	3603	1183	1200	3565	1310	1721
M/DVA	234	L	6	3603	1183	1200	3565	1438	1987
M/DVA	242	L	8	4803	1183	2400	4765	1576	1942
M/DVA	243	L	8	4803	1183	2400	4765	1747	2296
M/DVA	244	L	8	4803	1183	2400	4765	1918	2649
M/DVA	252	L	10	6003	2383	1200	5965	1972	2429
M/DVA	253	L	10	6003	2383	1200	5965	2185	2871
M/DVA	254	L	10	6003	2383	1200	5965	2398	3313
M/DVA	262	L	12	7203	2383	2400	7165	2367	2916
M/DVA	263	L	12	7203	2383	2400	7165	2623	3446
M/DVA	264	L	12	7203	2383	2400	7165	2878	3976
M/DVA	272	L	14	8403	3583	1200	8365	2762	3413
M/DVA	273	L	14	8403	3583	1200	8365	3061	4021
M/DVA	274	L	14	8403	3583	1200	8365	3359	4639
M/DVA	282	L	16	9603	3583	2400	9565	3158	3890
M/DVA	283	L	16	9603	3583	2400	9565	3499	4598
M/DVA	284	L	16	9603	3583	2400	9565	3839	5303
M/DVB	222	L	4	2883	N/A	N/A	2845	918	1138
M/DVB	223	L	4	2883	N/A	N/A	2845	1021	1350
M/DVB	224	L	4	2883	N/A	N/A	2845	1124	1563
M/DVB	232	L	6	4323	1423	1440	4285	1379	1709
M/DVB	233	L	6	4323	1423	1440	4285	1533	2027
M/DVB	234	L	6	4323	1423	1440	4285	1687	2345
M/DVB	242	L	8	5763	1423	2880	5725	1841	2280
M/DVB	243	L	8	5763	1423	2880	5725	2045	2704
M/DVB	244	L	8	5763	1423	2880	5725	2250	3128
M/DVB	252	L	10	7203	2863	1440	7165	2299	2848
M/DVB	253	L	10	7203	2863	1440	7165	2554	3378
M/DVB	254	L	10	7203	2863	1440	7165	2810	3908
M/DVB	262	L	12	8643	2863	2880	8602	2760	3419
M/DVB	263	L	12	8643	2863	2880	8602	3067	4055
M/DVB	264	L	12	8643	2863	2880	8602	3374	4691
M/DVC	222	L	4	3603	1783	N/A	3565	1114	1388
M/DVC	223	L	4	3603	1783	N/A	3565	1242	1653
M/DVC	224	L	4	3603	1783	N/A	3565	1370	1919
M/DVC	232	L	6	5403	1783	1800	5365	1672	2084
M/DVC	233	L	6	5403	1783	1800	5365	1864	2481
M/DVC	234	L	6	5403	1783	1800	5365	2056	2879
M/DVC	242	L	8	7203	1783	3600	7165	2195	2744
M/DVC	243	L	8	7203	1783	3600	7165	2486	3310
M/DVC	244	L	8	7203	1783	3600	7165	2742	3840
M/DVC	252	L	10	9003	3583	1840	8965	2753	3439
M/DVC	253	L	10	9003	3583	1840	8965	3109	4138
M/DVC	254	L	10	9003	3583	1840	8965	3428	4800

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GEA Heat Exchangers

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