



“**MORE**

- *More efficient*
- *More flexible*
- *More intelligent*

for **LESS**

- *Less energy*
- *Less time*
- *Less noise*

Capacity: up to 1100 kW



Free cooling



Water misting



USE

The **OPERA** range, available in drycooler or air-cooled condenser versions, is particularly suited to service sector, industrial and healthcare applications.

Drycoolers in the OPERA range are mainly designed for cooling water or glycol/water mix for:

- Condensers for water chillers,
- Generators,
- Free cooling,
- Processes and machines (presses, compressors, etc.).

Air-cooled condensers in the OPERA range are mainly designed for the condensation of refrigerants for water chillers, as a "split system".

These devices are designed to be installed outdoors.

RANGE

OPERA is a large modular range, which offers:

- 3 casing lengths (S, M or L module), allowing either the dimensions, the capacity or the power consumption to be optimised.
- A range of sizes, from 1 to 14 fans.
- 2 impeller diameters, 800 or 910 mm.
- Several rotation speeds, from 330 to 1 000 rpm.
- Several configurations: horizontal or vertical unit with forced or induced draught for high temperatures.

Various combinations of these elements, as well as the choice of a number of options, allow us to provide devices that are adapted to a large range of applications and environments.

DESCRIPTION

Excellent resistance to corrosion

The casing boasts category C3 protection against corrosion, in line with ISO standard 12944-2 – colour RAL 7035 (light grey)



- 1 **Coil**
Copper tubing and manifolds, high-performance aluminium fins, resistant to fouling.
Anti-shear system for tube bundles.
Pipings for drycooler: ISO PN16 type 02A rotating flanges in line with NFEN1092 in 304L stainless steel (1 or 2 input(s)/ outputs(s) depending on the flow rate) – The tubes are sealed with plastic caps to protect the bundle.
Tubes for condenser: copper (1 input/output per refrigerating circuit for units with 1 fan line, 2 inputs/outputs for units with 2 fan lines). Delivered pressurised with nitrogen.
- 2 **Fan motor assemblies**
Profiles collars with galvanised steel with polyester powder coating on the internal and external surfaces.
Aluminium and polypropylene impellers.
Class F motor - IP54 - 3PH400V +/-10% 50Hz+/-2% - Standard connection to the motor terminal boxes
Black protective grille compliant with standard BS ISO 12499.
Individual partitioning.
The motors are also available in a 60 Hz version or in other voltages.
- 3 **Casing**
Galvanised steel with polyester powder coating on the internal and external surfaces. Assembly using stainless rivets and LANTHANUM nuts and bolts for the feet.
- 4 **Feet**
Galvanised steel with polyester powder coating on the internal and external surfaces.
- 5 **Protective enclosures on the elbows and manifolds**

Each device is tested:

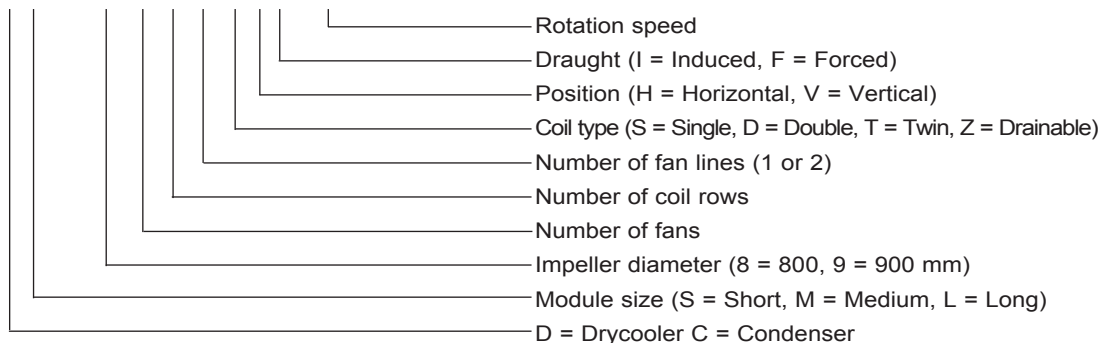
- The coil sealing is subjected to an underwater airtightness test.
- For devices with the terminal box or electrical cabinet option: rotation tests, dielectric tests, current measurement.

The OPERA range complies with the following European directives:

- Machinery Directive 2006/42/EC,
- EMC Directive 2004/108/EC,
- Pressure Equipment Directive (PED) 97/23 EC.

DESIGNATION (EXAMPLE)

OPERA DLN 9124-2 SHI 690A



OPTIONS FOR EACH APPLICATION

| | Options | Description/Advantages | DRYCOOLER | CONDENSER |
|---|---|---|-----------|-----------|
| Protection adapted for the environment | Pre-coated aluminium fins | Improves the resistance of the blades to corrosion. For low corrosion environments. | • | • |
| | High efficiency coating on the finned bundle: ALUCOAT®507 or HERESITE | Improves the resistance of the blades to corrosion. For corrosive environments. | • | • |
| | Stainless steel tube bundle | For corrosive fluids. | • | |
| | Corrosiveness resistance category C5M | Casing and fan motor assemblies for corrosive environments. | • | • |
| | ATEX II 2G/3G | For explosive atmospheres. | • | • |
| Quick, simple installation | Terminal box | Connection to the terminals of each motor on the front panel of unit. | • | • |
| | Protection cabinet | Protected by a thermal-magnetic circuit breaker on each motor. | • | |
| | Control cabinet with AeroCONNECT | Protection for motors and stage regulation provided by an electronic board according to temperature or pressure. | • | • |
| | Control cabinet with stages on terminals | Motor protection and stages controlled by the customer control. | • | |
| | Maintenance switch | For stopping individual motors. | • | • |
| | Companion flanges | In stainless steel, with gaskets and bolts. | • | |
| | Raised feet | To ensure a good flow of air depending on how the units are installed: against a wall, side by side, etc. | • | • |
| Installation surface constraints | Blade protective screen | Protection against hail, impacts, etc. For forced draught, vertical units. | • | • |
| | Vertical position | For narrow terraces. | • | • |
| Optimised, secure transport | Stacking of 2 identical devices | | • | • |
| | Skid for transport by container | Secure transport and easy loading/unloading. | • | • |
| Optimisation of electrical consumption and sound levels | EC motor (with electronic switching) | Variable speed control from 0 to 100% using a 0/10V signal. With the control cabinet via electronic board option, the device is self-regulating | • | • |
| High-temperature fluid application | Forced draught | Motors in the flow of fresh air. | • | |
| Generator application | Double circuit drycooler | Cooling of 2 water circuits (LT – HT) in series using air from just 1 unit. | • | |
| | Expansion vessel | Max permissible pressure: 0.5 bar eff. | • | |
| Application for water without glycol | Drainable coil | Device located on a slope to prevent frost - drainage by gravity | • | |
| Free cooling application | Free cooling valve kit | Valves with motor and sensor, controlled by the electronic board. Controlled according to the operation of the drycooler or chiller. | • | |
| Application with adiabatic cooling | AEROFRESH (water misting into the air flow) | Size of the unit reduced by cooling of the ambient air. Operates completely safely due to the antibacterial treatment applied to the water. | • | • |

ELECTRICAL SPECIFICATIONS

I: maximum input current

P: maximum power input

The currents and power actually absorbed depend on the operation point and will be indicated in detail when the unit is selected.

| Speed | Wiring | AC MOTORS | | | | | | | | EC MOTOR | |
|--------|--------|-----------|-------|-------|-------|-------|-------|-------|-------|----------|-------|
| | | 900 | | 690 | | 890 | | 680 | | 1000 | |
| | | Δ | | Y | | Δ | | Y | | | |
| I (A) | P(kW) | I (A) | P(kW) | I (A) | P(kW) | I (A) | P(kW) | I (A) | P(kW) | | |
| 9010-1 | | 5.3 | 2.65 | 3 | 1.84 | 3.9 | 2.13 | 2.3 | 1.33 | 4.4 | 2.98 |
| 9020-1 | | 10.6 | 5.3 | 6 | 3.68 | 7.8 | 4.26 | 4.6 | 2.66 | 8.8 | 5.96 |
| 9030-1 | | 15.9 | 7.95 | 9 | 5.52 | 11.7 | 6.39 | 6.9 | 3.99 | 13.2 | 8.94 |
| 9040-1 | | 21.2 | 10.6 | 12 | 7.36 | 15.6 | 8.52 | 9.2 | 5.32 | 17.6 | 11.92 |
| 9050-1 | | 26.5 | 13.25 | 15 | 9.2 | 19.5 | 10.65 | 11.5 | 6.65 | 22 | 14.9 |
| 9040-2 | | 21.2 | 10.6 | 12 | 7.36 | 15.6 | 8.52 | 9.2 | 5.32 | 17.6 | 11.92 |
| 9060-2 | | 31.8 | 15.9 | 18 | 11.04 | 23.4 | 12.78 | 13.8 | 7.98 | 26.4 | 17.88 |
| 9080-2 | | 42.4 | 21.2 | 24 | 14.72 | 31.2 | 17.04 | 18.4 | 10.64 | 35.2 | 23.84 |
| 9100-2 | | 53 | 26.5 | 30 | 18.4 | 39 | 21.3 | 23 | 13.3 | 44 | 29.8 |
| 9120-2 | | 63.6 | 31.8 | 36 | 22.08 | 46.8 | 25.56 | 27.6 | 15.96 | 52.8 | 35.76 |
| 9140-2 | | 74.2 | 37.1 | 42 | 25.76 | 54.6 | 29.82 | 32.2 | 18.62 | 61.6 | 41.72 |

| Speed | Wiring | AC MOTORS | | | | | | | | | | | | EC MOTOR | | | |
|--------|--------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|------|--------|
| | | 900 | | 700 | | 690 | | 560 | | 425 | | 300 | | 510 | | 740 | |
| | | Δ | | Y | | Δ | | Y | | Δ | | Y | | | | | |
| I (A) | P(kW) | I (A) | P(kW) | I (A) | P(kW) | I (A) | P(kW) | I (A) | P(kW) | I (A) | P(kW) | I (A) | P(kW) | I (A) | P(kW) | | |
| 8010-1 | | 3.65 | 1.98 | 2.4 | 1.43 | 2.1 | 0.895 | 1.05 | 0.56 | 0.42 | 0.194 | 0.35 | 0.075 | 0.49 | 0.298 | 1.4 | 0.918 |
| 8020-1 | | 7.3 | 3.96 | 4.8 | 2.86 | 4.2 | 1.79 | 2.1 | 1.12 | 0.84 | 0.388 | 0.7 | 0.15 | 0.98 | 0.596 | 2.8 | 1.836 |
| 8030-1 | | 10.95 | 5.94 | 7.2 | 4.29 | 6.3 | 2.685 | 3.15 | 1.68 | 1.26 | 0.582 | 1.05 | 0.225 | 1.47 | 0.894 | 4.2 | 2.754 |
| 8040-1 | | 14.6 | 7.92 | 9.6 | 5.72 | 8.4 | 3.58 | 4.2 | 2.24 | 1.68 | 0.776 | 1.4 | 0.3 | 1.96 | 1.192 | 5.6 | 3.672 |
| 8050-1 | | 18.25 | 9.9 | 12 | 7.15 | 10.5 | 4.475 | 5.25 | 2.8 | 2.1 | 0.97 | 1.75 | 0.375 | 2.45 | 1.49 | 7 | 4.59 |
| 8060-1 | | 21.9 | 11.88 | 14.4 | 8.58 | 12.6 | 5.37 | 6.3 | 3.36 | 2.52 | 1.164 | 2.1 | 0.45 | 2.94 | 1.788 | 8.4 | 5.508 |
| 8040-2 | | 14.6 | 7.92 | 9.6 | 5.72 | 8.4 | 3.58 | 4.2 | 2.24 | 1.68 | 0.776 | 1.4 | 0.3 | 1.96 | 1.192 | 5.6 | 3.672 |
| 8060-2 | | 21.9 | 11.88 | 14.4 | 8.58 | 12.6 | 5.37 | 6.3 | 3.36 | 2.52 | 1.164 | 2.1 | 0.45 | 2.94 | 1.788 | 8.4 | 5.508 |
| 8080-2 | | 29.2 | 15.84 | 19.2 | 11.44 | 16.8 | 7.16 | 8.4 | 4.48 | 3.36 | 1.552 | 2.8 | 0.6 | 3.92 | 2.384 | 11.2 | 7.344 |
| 8100-2 | | 36.5 | 19.8 | 24 | 14.3 | 21 | 8.95 | 10.5 | 5.6 | 4.2 | 1.94 | 3.5 | 0.75 | 4.9 | 2.98 | 14 | 9.18 |
| 8120-2 | | 43.8 | 23.76 | 28.8 | 17.16 | 25.2 | 10.74 | 12.6 | 6.72 | 5.04 | 2.328 | 4.2 | 0.9 | 5.88 | 3.576 | 16.8 | 11.016 |
| 8140-2 | | 51.1 | 27.72 | 33.6 | 20.02 | 29.4 | 12.53 | 14.7 | 7.84 | 5.88 | 2.716 | 4.9 | 1.05 | 6.86 | 4.172 | 19.6 | 12.852 |



SOUND LEVELS

| | | SOUND PRESSURE LEVEL (Lp) * / SOUND POWER LEVEL (Lw)** - dB(A) | | | | | | | | | |
|--------|--|--|----|-----|----|-----|----|-----|----|----------|----|
| | | AC MOTORS | | | | | | | | EC MOTOR | |
| Speed | | 900 | | 690 | | 890 | | 680 | | 1000 | |
| Wiring | | Δ | | Y | | Δ | | Y | | | |
| | | Lp | Lw | Lp | Lw | Lp | Lw | Lp | Lw | Lp | Lw |
| 9010-1 | | 51 | 83 | 45 | 77 | 49 | 81 | 41 | 73 | 56 | 88 |
| 9020-1 | | 54 | 86 | 48 | 80 | 52 | 84 | 44 | 76 | 59 | 91 |
| 9030-1 | | 56 | 88 | 50 | 82 | 54 | 86 | 46 | 78 | 60 | 92 |
| 9040-1 | | 57 | 89 | 51 | 83 | 55 | 87 | 47 | 79 | 61 | 94 |
| 9050-1 | | 58 | 90 | 52 | 84 | 56 | 88 | 48 | 80 | 62 | 94 |
| 9040-2 | | 57 | 89 | 51 | 83 | 55 | 87 | 47 | 79 | 61 | 94 |
| 9060-2 | | 59 | 91 | 53 | 85 | 57 | 89 | 49 | 81 | 63 | 95 |
| 9080-2 | | 60 | 92 | 54 | 86 | 58 | 90 | 50 | 82 | 64 | 97 |
| 9100-2 | | 61 | 93 | 55 | 87 | 59 | 91 | 51 | 83 | 65 | 98 |
| 9120-2 | | 61 | 94 | 55 | 88 | 59 | 92 | 51 | 84 | 66 | 98 |
| 9140-2 | | 62 | 94 | 56 | 88 | 60 | 92 | 52 | 84 | 66 | 99 |

| | | SOUND PRESSURE LEVEL (Lp) * / SOUND POWER LEVEL (Lw)** - dB(A) | | | | | | | | | | | | | | | |
|--------|--|--|----|-----|----|-----|----|-----|----|-----|----|----------|----|-----|----|-----|----|
| | | AC MOTORS | | | | | | | | | | EC MOTOR | | | | | |
| Speed | | 900 | | 700 | | 690 | | 560 | | 425 | | 300 | | 510 | | 740 | |
| Wiring | | Δ | | Y | | Δ | | Y | | Δ | | Y | | | | | |
| | | Lp | Lw | Lp | Lw | Lp | Lw | Lp | Lw | Lp | Lw | Lp | Lw | Lp | Lw | Lp | Lw |
| 8010-1 | | 48 | 80 | 41 | 73 | 37 | 69 | 32 | 64 | 27 | 59 | 18 | 50 | 32 | 64 | 42 | 73 |
| 8020-1 | | 51 | 83 | 44 | 76 | 40 | 72 | 35 | 67 | 30 | 62 | 21 | 53 | 35 | 67 | 45 | 76 |
| 8030-1 | | 53 | 85 | 46 | 78 | 42 | 74 | 37 | 69 | 32 | 64 | 23 | 55 | 37 | 69 | 46 | 78 |
| 8040-1 | | 54 | 86 | 47 | 79 | 43 | 75 | 38 | 70 | 33 | 65 | 24 | 56 | 38 | 70 | 47 | 79 |
| 8050-1 | | 55 | 87 | 48 | 80 | 44 | 76 | 39 | 71 | 34 | 66 | 25 | 57 | 39 | 71 | 48 | 80 |
| 8060-1 | | 56 | 88 | 49 | 81 | 45 | 77 | 40 | 72 | 35 | 67 | 26 | 58 | 40 | 72 | 49 | 81 |
| 8040-2 | | 54 | 86 | 47 | 79 | 43 | 75 | 38 | 70 | 33 | 65 | 24 | 56 | 38 | 70 | 47 | 79 |
| 8060-2 | | 56 | 88 | 49 | 81 | 45 | 77 | 40 | 72 | 35 | 67 | 26 | 58 | 40 | 72 | 49 | 81 |
| 8080-2 | | 57 | 89 | 50 | 82 | 46 | 78 | 41 | 73 | 36 | 68 | 27 | 59 | 41 | 73 | 50 | 82 |
| 8100-2 | | 58 | 90 | 51 | 83 | 47 | 79 | 42 | 74 | 37 | 69 | 28 | 60 | 42 | 74 | 51 | 83 |
| 8120-2 | | 58 | 91 | 51 | 84 | 47 | 80 | 42 | 75 | 37 | 70 | 28 | 61 | 42 | 75 | 51 | 84 |
| 8140-2 | | 59 | 91 | 52 | 84 | 48 | 80 | 43 | 75 | 38 | 70 | 28 | 61 | 42 | 75 | 52 | 85 |

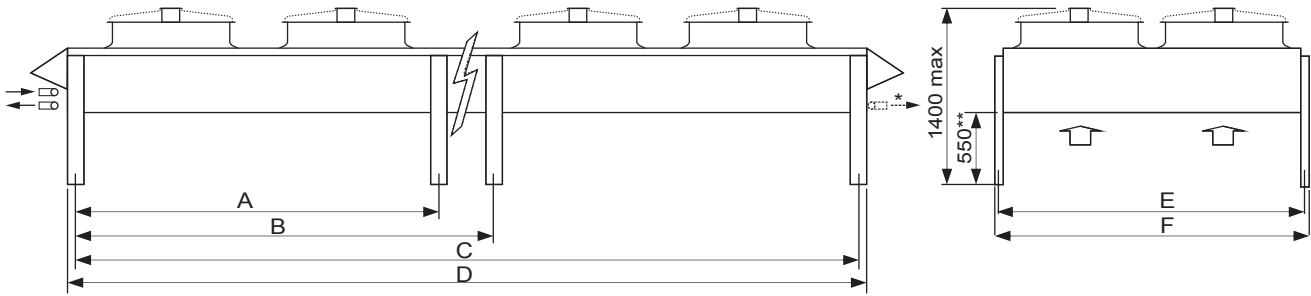
* Values measured at 10 m for horizontal units in free field, directivity 2, in line with the coil. Tolerance ±3dB.

** Only the sound power level is characteristic of the unit. These values are obtained in compliance with the ISO 3744 standard.

The difference between the sound power level and pressure level varies according to the site. To determine the unit's sound pressure level, recalculate it using the sound power level of the unit and the site conditions (you may need to consult an acoustical engineer). As the sound emitted by the unit is not uniform in all directions, for a point 10 m away in line with the fans, the recalculated pressure value must be increased by approximately 4 dB.

DIMENSIONS

Horizontal Position - Induced Draught

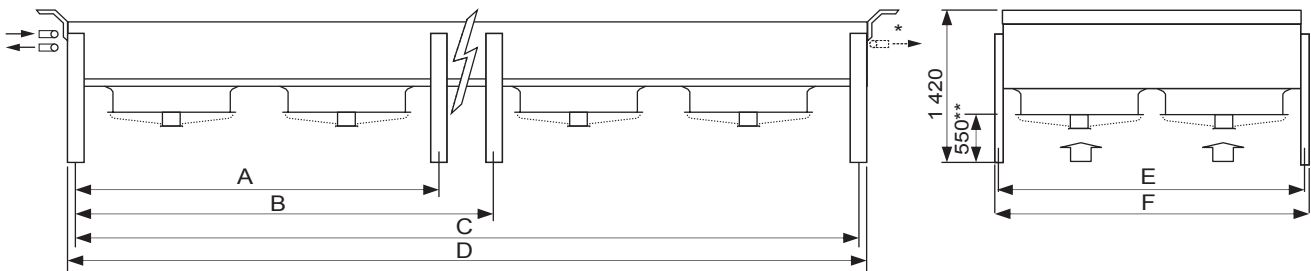


Unit shown has 2 fan lines - no. of motors between the feet is not contractually binding

* for units with input/output tubes on the opposite side

** standard feet

Horizontal Position - Forced Draught



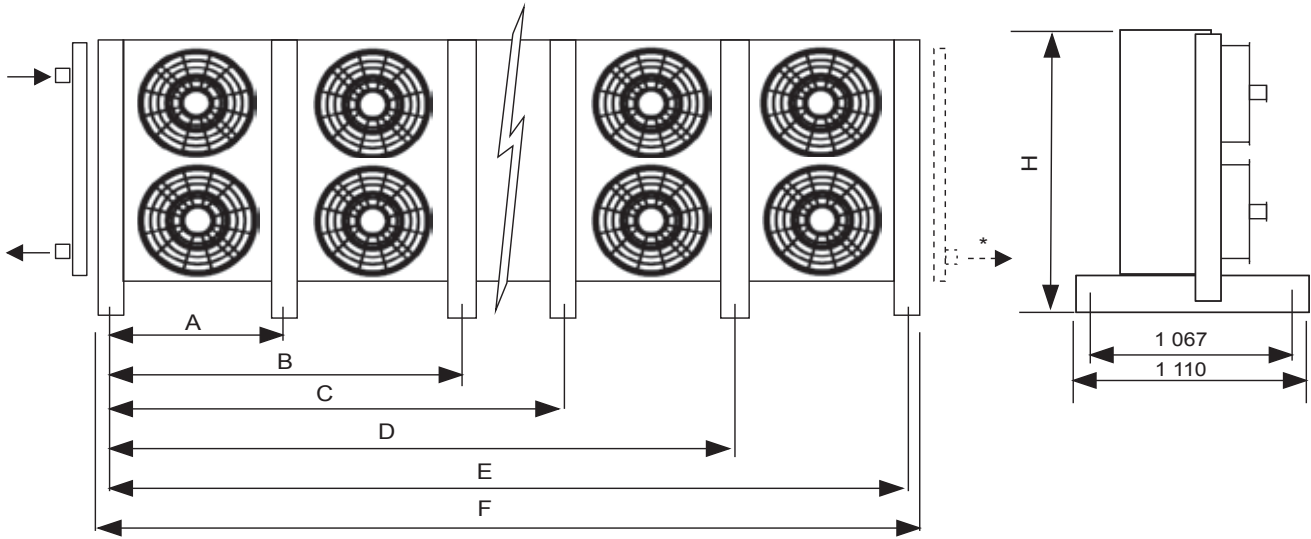
Unit shown has 2 fan lines - no. of motors between the feet is not contractually binding

* for units with input/output tubes on the opposite side

** standard feet

| No. of motors | | 1 | 2 | 3 | 4 | 5 | 6 | 4 | 6 | 8 | 10 | 12 | 14 |
|------------------------|--|------|------|------|------|------|------|------|------|------|------|-------|-------|
| DSN or CSN S module | A | - | - | - | - | 1840 | 1840 | - | - | - | 1840 | 1840 | 1840 |
| | B | - | - | - | - | 2790 | 3740 | - | - | - | 2790 | 3740 | 4690 |
| | C | 830 | 1780 | 2730 | 3680 | 4630 | 5580 | 1780 | 2730 | 3680 | 4630 | 5580 | 6530 |
| | D | 950 | 1900 | 2850 | 3800 | 4750 | 5700 | 1900 | 2850 | 3800 | 4750 | 5700 | 6650 |
| | Max empty weight without options +/-10% (kg) | 233 | 369 | 503 | 666 | 809 | 928 | 638 | 875 | 1135 | 1393 | 1617 | 1874 |
| DMN or CMN M module | A | - | - | - | 3140 | 3140 | - | - | 3140 | 3140 | 4740 | 3140 | |
| | B | - | - | - | - | 4740 | - | - | - | 4740 | - | 7940 | |
| | C | 1480 | 3080 | 4680 | 6280 | 7880 | - | 3080 | 4680 | 6280 | 7880 | 9480 | 11080 |
| | D | 1600 | 3200 | 4800 | 6400 | 8000 | - | 3200 | 4800 | 6400 | 8000 | 9600 | 11200 |
| | Max empty weight without options +/-10% (kg) | 314 | 523 | 712 | 958 | 1183 | - | 918 | 1298 | 1645 | 2029 | 2388 | 2772 |
| DLN or CLN L module | A | - | - | - | 3740 | 3740 | - | - | 3740 | 3740 | 5640 | | |
| | B | - | - | - | - | 5640 | - | - | - | 5640 | - | | |
| | C | 1780 | 3680 | 5580 | 7480 | 9380 | - | 3680 | 5580 | 7480 | 9380 | 11280 | |
| | D | 1900 | 3800 | 5700 | 7600 | 9500 | - | 3800 | 5700 | 7600 | 9500 | 11400 | |
| | Max empty weight without options +/-10% (kg) | 352 | 599 | 846 | 1110 | 1373 | - | 1036 | 1474 | 1929 | 2384 | 2806 | |
| All | E | 1240 | | | | | | 2360 | | | | | |
| | F | 1280 | | | | | | 2400 | | | | | |

Vertical position



Unit shown has 2 fan lines - no. of motors between the feet is not contractually binding

* for units with input/output tubes on the opposite side

| No. of motors | | 1 | 2 | 3 | 4 | 5 | 6 | 4 | 6 | 8 | 10 | 12 | 14 |
|---------------------|--|------|------|------|------|------|------|------|------|------|------|-------|-------|
| DSN/CSN S module | A | - | - | - | 1840 | 1840 | 1840 | - | - | 1840 | 1840 | 1840 | 1840 |
| | B | - | - | - | - | 2790 | 3740 | - | - | - | 2790 | 3740 | 4690 |
| | C | - | - | - | - | - | - | - | - | - | - | - | - |
| | D | - | - | - | - | - | - | - | - | - | - | - | - |
| | E | 830 | 1780 | 2730 | 3680 | 4630 | 5580 | 1780 | 2730 | 3680 | 4630 | 5580 | 6530 |
| | F | 950 | 1900 | 2850 | 3800 | 4750 | 5700 | 1900 | 2850 | 3800 | 4750 | 5700 | 6650 |
| | Max empty weight without options +/-10% (kg) | 282 | 419 | 554 | 705 | 915 | 1039 | 684 | 922 | 1181 | 1497 | 1727 | 1983 |
| DMN/CMN M module | A | - | - | 1540 | 1540 | 1540 | - | 1540 | 1540 | 1540 | 3140 | 3140 | |
| | B | - | - | 3140 | 4740 | 3140 | - | 3140 | 4740 | 3140 | 6340 | 4740 | |
| | C | - | - | - | - | 4740 | - | - | - | 4740 | - | 6340 | |
| | D | - | - | - | - | 6340 | - | - | - | 6340 | - | 7940 | |
| | E | 1480 | 3080 | 4680 | 6280 | 7880 | - | 3080 | 4680 | 6280 | 7880 | 9480 | 11080 |
| | F | 1600 | 3200 | 4800 | 6400 | 8000 | - | 3200 | 4800 | 6400 | 8000 | 9600 | 11200 |
| | Max empty weight without options +/-10% (kg) | 356 | 558 | 835 | 1046 | 1339 | - | 927 | 1383 | 1734 | 2187 | 2464 | 2920 |
| DLN/CLN L module | A | - | - | 1840 | 1840 | 1840 | - | 1840 | 1840 | 1840 | 3740 | | |
| | B | - | - | 3740 | 5640 | 3740 | - | 3740 | 5640 | 3740 | 7540 | | |
| | C | - | - | - | - | 5640 | - | - | - | 5640 | - | | |
| | D | - | - | - | - | 7540 | - | - | - | 7540 | - | | |
| | E | 1780 | 3680 | 5580 | 7480 | 9380 | - | 3680 | 5580 | 7480 | 9380 | 11280 | |
| | F | 1900 | 3800 | 5700 | 7600 | 9500 | - | 3800 | 5700 | 7600 | 9500 | 11400 | |
| | Max empty weight without options +/-10% (kg) | 399 | 639 | 972 | 1204 | 1537 | - | 1053 | 1572 | 1986 | 2501 | 2842 | |
| All | H | 1375 | | | | | | 2495 | | | | | |

Dimensions (mm)

INSTALLATION RECOMMENDATIONS

- These units are designed to operate outside.
When starting up, frost and snow could adversely affect the operation of horizontal units.
As a general measure, all steps should be taken to avoid the risk of air recycling. This is especially important when the installation comprises several units.
It is not recommended to install units near the hot air extraction duct outlet or close to deciduous plants (this could cause fouling).
- **A horizontal unit** must have a surrounding free area of 1.5 m. Where the use of anti-vibration mounts is required, use a rigid frame which locks the feet together.
- **A vertical unit** should preferably be placed parallel to the direction of the wind. It is not recommended for use with low fan rotation speeds. In addition, we recommend that these units be stabilised using braces connecting their two upper ends to fixed supports (wall or framework).
- If **speed regulators** other than those recommended by the manufacturer are used, check that these are compatible with the electric motors..
- For air-cooled condensers, the **calculation of the evacuation capacity** of the air-cooled condenser must be carried out in accordance with professional best practice and particularly in accordance with:
 - the type of compressor in the installation (hermetic, semi-hermetic or open),
 - the horizontal and vertical lengths of the connection pipes and their diameter.
- **Commissioning and maintenance:** refer to the instruction manual.
- These units **comply with the European directives**. The installer is responsible for ensuring the compliance of the installation. The installer must ensure safety and protective devices (emergency stop, shut-off valves, lightning protection, etc.) are put in place and are accessible.

This document is non-contractual. As part of its policy of continual product improvement, CIAT reserves the right to make any technical modification it feels appropriate without prior notification.

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