OPERA™

Dry coolers
Air-cooled condensers

MORE

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

for LESS

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

Capacity: up to 1100 kW

Free cooling

HFC R-410A

HFC 407C

HFC R-134A

USE

The **OPERA** range, available in dry cooler or air-cooled condenser versions, is particularly suited to tertiary, industrial and healthcare applications.

Dry coolers 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.
- Adaptation of the rotation speed (EC motor).
- 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 range of applications and environments.

Description

Excellent resistance to corrosion

The casing offers 480 hours of resistance in salt spray tests in accordance with ISO 9227, C3 corrosion class Long durability in excess of 15 years or C4 Intermediate durability between 5 and 15 years, in line with ISO standard 12944-2

① **Coil**

Copper tubing and manifolds, high-performance aluminium fins, resistant to fouling.

Anti-shear system for bundle tubing.

Piping for dry coolers: ISO PN16 02A type rotating flanges as per DIN 2642 in 304L stainless steel (1 or 2 inlets/outlets depending on flow rate).

Piping 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**

Profiled collars in galvanised steel with RAL 7035 polyester powder paint or RAL 9005 composite depending on the motor reference.

Aluminium and polypropylene impeller.

Class F motor - IP54 - three-phase 400 V +/-10 % 50 Hz+/-2 %.

Black protective grille compliant with standard NF ISO 12499.

Individual partitioning.

EC motors can be used in 50 or 60 Hz and from 380 to 480V +/- 10%.

③ **Casing**

Galvanised steel with polyester powder paint RAL 7035 (light grey). Assembly using stainless rivets and LANTHANUM nuts and bolts for the feet.

④ **Feet**

Galvanised steel with polyester powder paint.

⑤ **Protective enclosures on the elbows and manifolds**

Each device is tested:

- The tightness of the coil 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 2014/30/EU,
- Pressure Equipment Directive (PED) 2014/68/EU.

Designation (example)

OPERA DLN 9124-2 SHI 690E9A

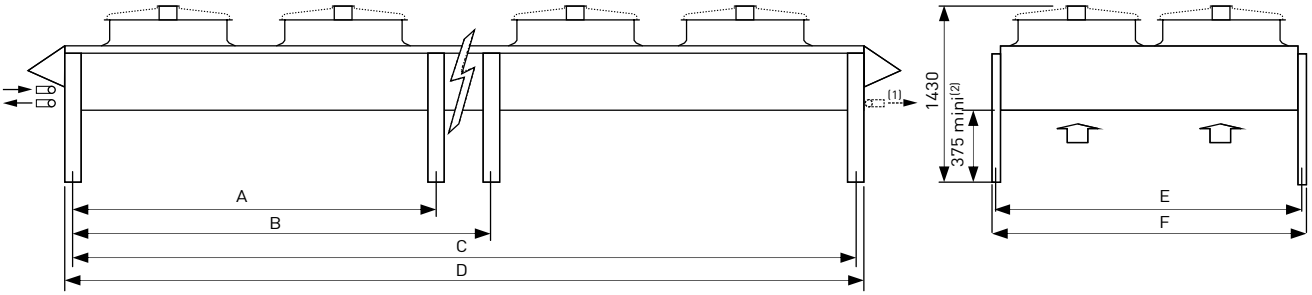
- Motor (A=AC, E=EC-3 ph 380 and 480 V +/- 10 %.50 or 60 Hz)
- Rotation speed
- Draught (I=Induced, F=Forced)
- Position (H = Horizontal, V = Vertical)
- Coil type (S=Single, D=Double, T=Twin, Z=Drainable)
- Number of fan lines (1 or 2)
- Number of coil rows
- Number of fans
- Impeller diameter (8 = 800, 9 = 910 mm)
- Module size (S=Short, M=Medium, L=Long)
- D = Dry cooler C = Condenser

Options for each application

	Options	Description/Advantages	DRY COOLER	CONDENSER
Protection adapted for the environment	Pre-coated aluminium fins	Improves the resistance of the fins to corrosion. For applications in coastal areas, industrial areas or highly populated areas.	●	●
	High efficiency coating on the fins : ALUCOAT®507 - HERESITE (on request)	Improves the resistance of the fins to corrosion. For corrosive environments.	●	●
	Corrosiveness resistance category C5M	Casing and fan motor assemblies for corrosive environments.	●	●
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	Motor and control protection, either by electronic board, depending on the temperature, or by the chiller if compatible.	●	●
	Maintenance switch	For stopping individual motors.	●	●
	Counter-flanges	In stainless steel, with gaskets, bolts and collar.	●	
	Raised feet	To ensure a good flow of air depending on how the units are installed: against a wall, side by side, etc.	●	●
	Blade protective screen	Protection against hail, impacts, etc. For forced draught, vertical units.	●	●
Installation surface constraints	Vertical position	For narrow terraces.	●	●
Optimised, secure transport	Stacking of 2 identical devices		●	●
	Skid for transport by container	Secure transport and easy loading/unloading.	●	●
High-temperature fluid application	Forced draught	Motors in the flow of fresh air.	●	
Generator application	Double circuit dry cooler	Cooling of 2 water circuits (LT – HT) in series using air from just 1 unit.	●	
	Expansion tank	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, controlled by the control cabinet. Controlled according to the operation of the dry cooler or chiller.	●	
Adiabatic cooling application	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.	●	●

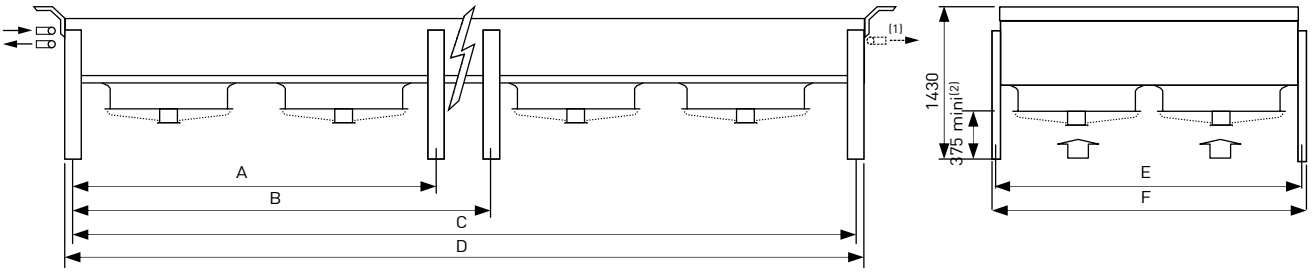
DIMENSIONS

Horizontal Position - Induced Draught



Unit shown has 2 fan lines - no. of motors between the feet is not contractually binding
(1) For units with input/output piping on the opposite side
(2) Standard feet

Horizontal Position - Forced Draught



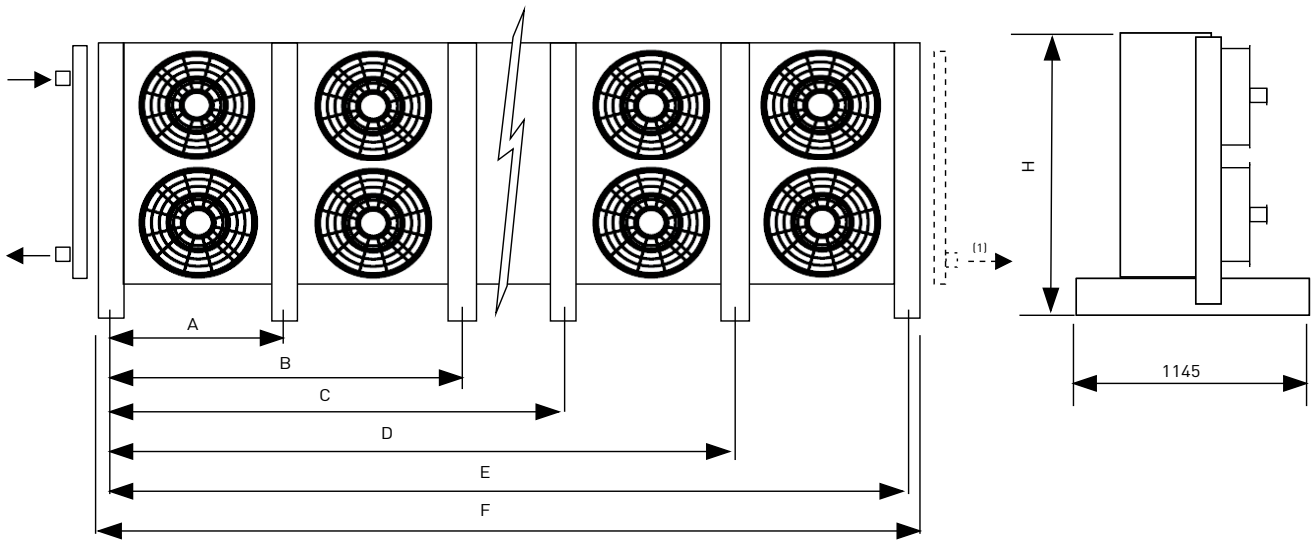
Unit shown has 2 fan lines - no. of motors between the feet is not contractually binding
(1) For units with input/output piping on the opposite side
(2) Standard feet

	No. of motors	1	2	3	4	5	6	4	6	8	10	12	14
DSN 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
	H	1388 max											
	Max empty weight without options +/-10% (kg)	233	369	503	666	809	928	638	875	1135	1393	1617	1874
DMN 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
	H	IMPELLER ø 800: 1388 max - IMPELLER ø 910: 1483 max											
	Max empty weight without options +/-10% (kg)	314	523	712	958	1183		918	1298	1645	2029	2388	2772
DLN 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	
	H	IMPELLER ø 800: 1388 max - IMPELLER ø 910: 1483 max											
	Max empty weight without options +/-10% (kg)	352	599	846	1110	1373		1036	1474	1929	2384	2806	
All	E	1240						2360					
	F	1280						2400					

Dimensions in mm, excluding options.

DIMENSIONS

Vertical position



Unit shown has 2 fan lines - no. of motors between the feet is not contractually binding
(1) For units with input/output piping 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	1370						2490					

Dimensions in mm, excluding options.

INSTALLATION RECOMMENDATIONS

- These units are designed to operate outside. When starting Bup, 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 clearance of 1.0m. 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).
- Avoid using **speed regulators** and prioritise EC motor solutions.
- 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, semihermetic 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.