

DL

Low dew point industrial dehumidifiers



R407C

**Dew point
- 5°C**

**100%
Fresh air**

The Low dew point industrial dehumidifiers DL series are designed to grant very high performances and energy efficiencies, able to guarantee the humidity control in all industrial processes in which the required dew point is constant and below 0°C (units are able to perform down to -5°C dew point). The peculiarity of such units is, infact, to guarantee a constant dew point air discharge temperature, without the air humidity fluctuations created by the inevitables defrost cycles performed by the units.

VERSIONS

- The series includes 8 models with air flows from 800 to 5000 m³/h.

ACCESSORIES

- Rubber vibration dampers
- Oversized condenser fan motors

Mod.		800	1000	1200	1800	2400	3000	4000	5000
Total air flow	m³/h	800	1000	1200	1800	2400	3300	4000	5000
Water chiller cooling capacity ⁽¹⁾	kW	6,8	7,1	10,1	17,5	21,2	22,8	37,2	46,2
Water flow ⁽¹⁾	l/h	1165	1230	1730	3000	3700	4000	6400	8000
Pressure drops ⁽¹⁾	kPa	9	8	9	10	7	9	10	11
Moisture removed ⁽¹⁾	l/h	6,1	7,7	9,2	13,8	18,4	25,3	30,7	38,4
Water chiller cooling capacity ⁽²⁾	kW	10,8	12,1	16,1	26,5	33,3	39,3	57,3	71,3
Water flow ⁽²⁾	l/h	1860	2100	2800	4600	5800	6800	9900	12500
Pressure drops ⁽²⁾	kPa	22,8	23,3	23	23	17,2	29,9	23,7	26,2
Moisture removed ⁽²⁾	l/h	10,8	13,4	16,1	24,2	32,3	44,4	53,8	67,2
Water chiller cooling capacity ⁽³⁾	kW	13,2	15,2	19,7	32	40,5	49,3	69,4	86,4
Water flow ⁽³⁾	l/h	2280	2600	3400	5500	7000	8500	12000	15000
Pressure drops ⁽³⁾	kPa	34,3	36	34	33,4	25,6	42,3	34,8	38,5
Moisture removed ⁽³⁾	l/h	12,2	15,2	18,3	27,4	36,6	50,3	61	76,2
Water chiller cooling capacity ⁽⁴⁾	kW	16	18,7	23,9	38,3	49	60,8	83,3	104
Water flow ⁽⁴⁾	l/h	2760	3200	4100	6600	8400	10500	14400	18000
Pressure drops ⁽⁴⁾	kPa	50	55	51	47,9	37,2	64,3	50,3	55,7
Moisture removed ⁽⁴⁾	l/h	15	19	22,5	33,7	44,9	61,8	74,9	93,6
Available static pressure	kPa	250	250	250	270	270	350	350	350
Compressors input power	kW	5,1	5,9	6,6	10,3	9,3	9,9	17,7	18,9
Fan input power	kW	0,78	1,2	1,2	1,5	2,4	2,4	2,9	3,5
Power supply	V/Ph/Hz	400/3~+N/50							
Sound pressure level ⁽⁵⁾	dB(A)	70	71	73	74	75	75	76	76
Refrigerant		R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C
Weight	Kg	310	330	360	450	480	510	580	610

Air outlet dew temperature -5°C.

⁽¹⁾ Ambient air temperature 20°C; relative humidity 60%.

⁽²⁾ Ambient air temperature 27°C; relative humidity 60%.

⁽³⁾ Ambient air temperature 32°C; relative humidity 50%.

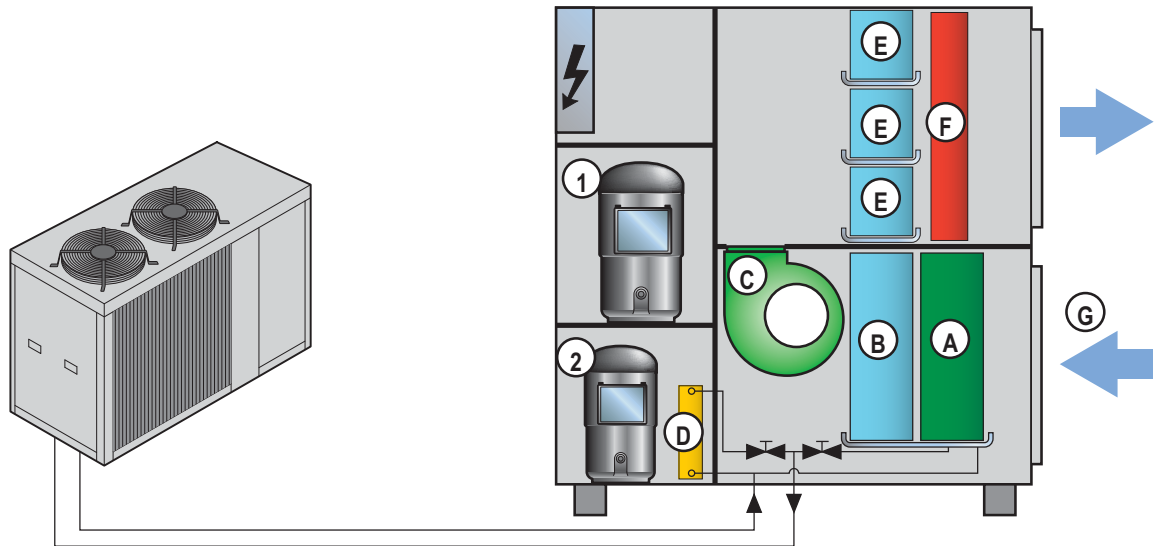
⁽⁴⁾ Ambient air temperature 35°C; relative humidity 50%.

⁽⁵⁾ Sound pressure level at 1 mt from the unit in free field conditions direction factor Q=2 according to ISO 3746.

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Working Principle

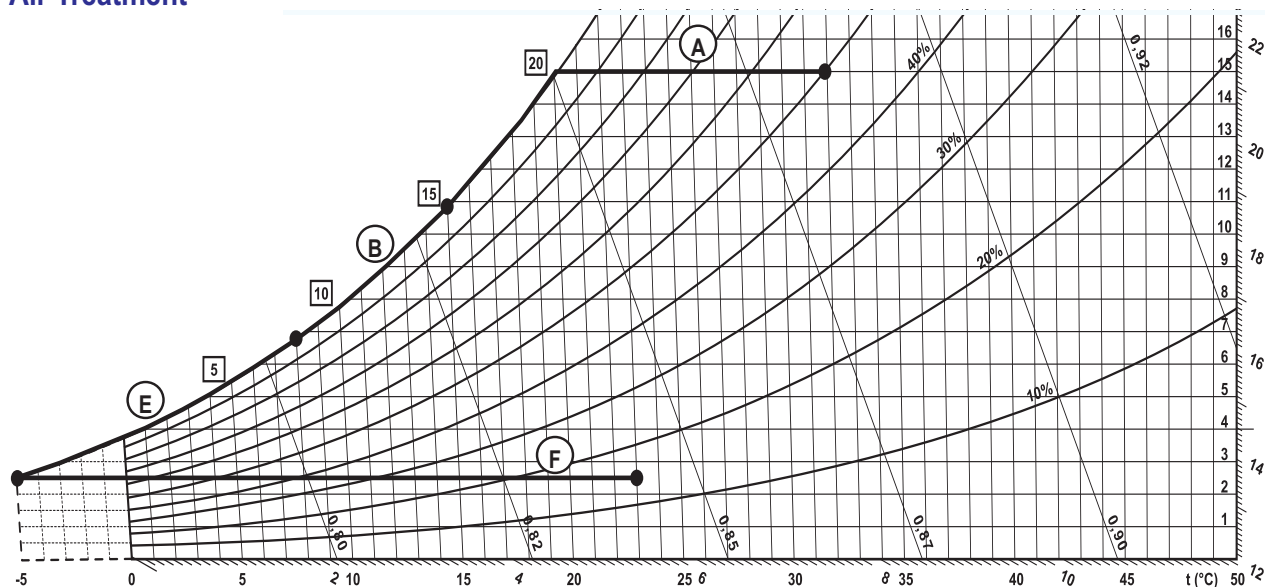


The DL units are equipped with 2 compressors, 2 independent circuits and a pre-cooling water circuit. The first refrigerant circuit is water cooled (by mean of cold water refrigerated by a water chiller always necessary for the correct operation of the DL units), the second refrigerant circuit is air cooled. The humid airflow, moved by the fan C, passes first through the suction filter G, then through the pre-cooling water coil A where it is cooled down (depending from the room and water conditions) down to its saturation dew point temperature. The saturated air passes then through the DX cooling coil B of the first refrigerant circuit (water cooled D), where the dehumidification

is done at a positive dewpoint temperature. Passing now through a second step of DX cooling coils E, the air is furtherly dried down to the required conditions. (minimum dew point obtainable -5°C). The DX cooling coils E (which are part of the second refrigerant circuit) are designed to guarantee a constant dew point air outlet temperature (caused by the inevitable defrost cycles). The second refrigerant circuit, is in fact, designed with 3 DX cooling coils placed in parallel one with the other. Each one is controlled by an independent thermostatic valve, and operates in order to have 2 DX coils always in operation and 1 DX coil always defrosting. The logic of the defrosts in the DX coils is

managed by a specific software installed in the microprocessor control. After all these treatments the air, that is extremely cold to be sent to the user, it is then heated up in the DX condensing coil F, where the temperature is increased up to approx. 23°C , suitable temperature for the user applications.

Air Treatment



In the enclosed diagram we notice the typical treatment of the airflow in the DL units in case of 100% fresh air (32°C, 50%). In the water pre-cooling coil (Part A) the air is cooled down to approx 15°C-100%, necessary inlet condition to the first DX cooling circuit (tratto B) where we have a dehumidification down to 7°C – 100% (in this first refrigerant circuit the defrost is never activated since the evaporation pressure is managed by an evaporation pressure control valve). After the first DX circuit, the air is furtherly cooled down in the second DX circuit (E) where, having a proper management the defrost cycles, the discharge dew point temperature of -5°C is

kept constant. The cold and dried air, then passes into the condensing coil F where it is increased up to 23°C with a relative humidity of 13%. The above described cycle shows the maximum obtainable performances from the unit that, clearly, with different waterflows in the pre-cooling coil, can have different performances and energy consumptions. In case of 100% recirculation airflow, for example, it is quite evident that keeping constant the -5°C dew point air outlet conditions, the cooling capacity of the water coil can be highly reduced and then consequently, the cooling capacity of the dedicated water chiller.

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FRAME

All DL units are made from hot-galvanised thick sheet metal, painted with polyurethane powder enamel at 180°C to ensure the best resistance against the atmospheric agents. The frame is self-supporting with removable panels. The drip tray is present standard in all DL units and it's in stainless steel. The colour of the units is RAL 7035.

REFRIGERANT CIRCUIT

The refrigerant gas used in these units is R407C. The refrigerant circuit is made by using international primary brands components and according to ISO 97/23 concerning welding procedures. The refrigerant circuit includes: sight glass, filter drier, thermal expansion valve with external equalizer, Evaporating control valve, Hot gas injection valve, Liquid line solenoid valve, Manometers, Schrader valves for maintenance and control, pressure safety device (according to PED regulation).

COMPRESSOR

The compressor is scroll type with crankcase heater and thermal overload protection by a klixon embedded in the motor winding. It's mounted on rubber vibration dampers and, by request, it can be supplied with some jackets to reduce the noise (accessory). The crankcase heater, when present, is always powered when the compressor is in stand-by. The inspection is possible through the frontal panel of the unit.

CONDENSERS AND EVAPORATORS

The condensers and evaporators are made of copper pipes and aluminium fins. The diameter of the copper pipes is 3/8" and the thickness of the aluminium fins is 0,1 mm. The tubes are mechanically expanded into the aluminium fins to improve the heat exchange factor. The geometry of these condensers guarantees a low air side pressure drop and then the use of low rotation (and low noise emission) fans. All the units have a stainless steel drip tray. Besides this, each evaporator is supplied of a temperature probe used as automatic antifreeze probe.

SUPPLY FAN

The fan is centrifugal type. It's statically and dynamically balanced and supplied complete of the safety fan guard according

to EN 294. The electric motor is at 4 poles (about 1500 rpm). Connected to the fan by belts and pulleys and it's equipped of an integrated thermal overload protection. The protection class of the motors is IP 54.

AIR FILTER

It's made of filtering material in synthetic fibre without electrostatic charge. It can be removed for differential disposal, class G3, according to EN 779:2002.

MICROPROCESSOR

All DL units are supplied standard with microprocessor controls. The microprocessor controls the following functions: compressor timing, automatic defrost cycles, alarms. An appropriate LCD display shows the operation mode of the unit, set point and alarms. All DL units are supplied standard with an electronic probe for humidity indication which allows its indications in the display with a working range 0/90%.

ELECTRIC BOX

The electric switch board is made according to electromagnetic compatibility norms CEE 73/23 and 89/336. The accessibility to the board is possible after removing the front panel of the unit and the OFF positioning of the main switch. In all DL units are installed, standard, the compressors sequence relay which disables the operation of the compressor in case the power supply phase sequence is not the correct one (scroll compressors in fact, can be damaged if they rotate reverse wise). The following components are also standard installed: main switch, magnetic-thermal switches (as a protection of the fans), compressors fuses, control circuit automatic breakers, compressor contactors. The terminal board is also supplied with voltage free contacts for remote ON-OFF.

CONTROL AND PROTECTION DEVICES

All units are supplied with the following control and protection devices: defrost thermostat, which signals to the microprocessor control that a defrost cycle is needed and controls its termination, high pressure switch with manual reset, low pressure switch with automatic reset, high pressure safety valve, compressor thermal overload protection, fans thermal overload protection

TEST

All the units are fully assembled and wired at the factory, carefully evacuated and dried after leak tests under pressure and then charged with refrigerant R407C. They are all fully operational tested before shipment. They all conform to European Directives and are individually marked with the CE label and provided with Conformity Declaration.

HYDRAULIC CIRCUIT

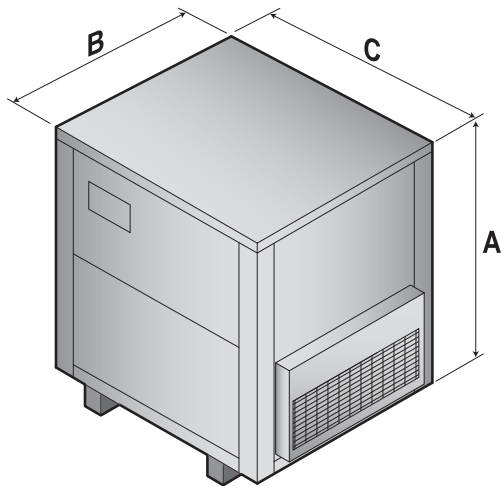
The hydraulic circuit is made by using international primary brands components. The hydraulic circuit includes: water flow manual valve, evaporator made of AISI 316 stainless steel braze-welded plates type.

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Mod.	800	1000	1200	1800	2400	3000	4000	5000
Main switch	●	●	●	●	●	●	●	●
Microprocessor control	●	●	●	●	●	●	●	●
Free contacts on/off	●	●	●	●	●	●	●	●
Compressors Magnetic-Thermal	●	●	●	●	●	●	●	●
Fans Magnetic-Thermal	●	●	●	●	●	●	●	●
Rubber vibration dampers	○	○	○	○	○	○	○	○
Oversized condenser fan motors	○	○	○	○	○	○	○	○

● Standard, ○ Optional, – Not available.



Mod.	A (mm)	B (mm)	C (mm)
800	1200	1000	1000
1000	1200	1000	1000
1200	1200	1000	1000
1800	1329	1300	1000
2400	1329	1300	1000
3000	1329	1300	1000
4000	1320	1600	1400
5000	1320	1600	1400