

# DRY-COOLER



## DCS - DCVS Dry Coolers

Frigosystem, the patent holder for free cooling and dual free cooling in single frame, present the new generation line of DRY COOLERS, born to satisfy the request of cost saving.

Industrial processes require large amounts of cold water and often the temperature required are very close to highest ambient temperature. For this reason Frigosystem has projected the new Dry coolers DCS, that gives very important results in saving energy and costs. DCS is completely manufactured in aluminium Anticorodal, for long life, and projected with a new heat-exchanger design, that permit to work also with ambient temperature as  $-20^{\circ}\text{C}$  without having antifreeze inside the piping.

Frigosystem Dry coolers serie DCS, can work in closed circuit, without needing of fresh water, that eliminate all the trouble shooting of the cooling towers. Moreover the new range of DCS are very efficient in comparison to cooling tower.

DCS could be delivered with the new generation spray system, that give the possibility to work in very critical ambient temperature without any efficiency loosing.

DCS line could be connected with all previous and existing plants, they could be controlled by new generation microprocessor that give the possibility to save the maximum energy also thanking the use of a 3 way proportional valve. This amount of energy saving will be never possible with the usual standard On/Off systems.

## Main technical datas:

- Aluminium Anticorodal frame, with different thickness in various body parts.
- Stainless steel INOX support legs.
- Heat exchanger made by 12mm high efficiency copper tube, corrugated aluminium Anticorodal fins 1,8 pitch, very high efficiency.
- Counter-flow air/water heat exchanger, to improve the thermal efficiency.
- All DCS are individually tested in water with air pressure up to 17 bar.
- Low speed and low noise axial fans, compliance to Din 45635. Overload protection for any single fan.

- Last generation hydraulic design, allows to work without antifreeze. In case of emergency stop for electrical troubles the particular piping design give the possibility to drain completely and automatically (option) the DCS in a very short time. This means that there will be never breaking troubles given from ice.
- DCS could be installed in horizontal or vertical way, for any air flow reasons.
- Control board complete with microprocessor for automatic operations. The system could also be interfaced Frigosystem's chillers.
- GSM tele-service system available (optional).
- CE assembly, design and components conformity.

### **Heat exchanger**

Innovative heat exchanger gives excellent heat transfer with minimized fluid volume, thanks new fin corrugation, developed by Frigosystem, combined with smooth tubes. Heat exchanger manufactured from aluminum fins and copper tubes with nominal diameter 3/8", for series with 500 mm fan diameter, and nominal diameter 1/2" for series with 630, 800 and 910 mm fan diameter. The fin spacing is 2.1 mm.

### **Fan motors**

High efficiency fans with low power consumption are used. Four different fan diameters available: 500, 630, 800 and 910 mm with three-phase motors 400V-50Hz. The motors are with external rotor, made in accordance with VDE 0530/12.84. Protection class IP 54 according to DIN 40050. Integrated thermal protection by thermo contacts provides reliable protection against thermal overload. New bell mouths optimize the performance of the fan motors and minimize the noise level.

### **Frame and Casework**

Casework made of galvanized steel pre-painted sheets with epoxy finish, RAL 9002. New design frame provides high rigidity also for heavy applications. New system protects perfectly the heat exchanger tubes during transportation and operation against vibrations and thermal expansion. Supports manufactured of stainless steel AISI 304 or galvanized steel, with optimized length to permit a uniform air suction in the coil.

### **Optionals**

- Heat exchanger epoxy coating
- Heat exchanger with cataphoresis treatment
- Fan motors cabling
- Fan speed control
- Fan step control
- Safety switches
- Air filter for heat exchanger
- Motors 3ph/480V-60Hz
- Motors 1ph/400V-50Hz
- Explosion-proof fan motors
- Customized fin spacing

## **Spray water**

The spray water solution is used to increase the cooling capacity of the air cooler, by moistern the fins. When the ambient temperature is to high it's possible to acheve a temperature drop of 4-7°K. Spray cooling shall be restricted to a maximum of 400 hours per year concentrated during the high air temperature period.

## **Quality of the water**

PH: 6.5 - 9.0

Hardness as CaCO<sub>3</sub>: 30 - 500 ppm

Alkalinity as CaCO<sub>3</sub>: 500 ppm max

Chlorate: 125 ppm max

Solfate: 125 ppm max

Total solids melt: 1000 ppm max

## **Technical data:**

Max Operating Pressure: 2Bar

Water Flow Rate each nozzle: ~ 300 l/h

Type of nozzle: FULL CONE SPRAY

Not all the water sprayed on the coil will be evaporated. Any surplus water must therefore be drained.

## **Design**

The spray water kit is made of plastic pipes, hanged in sheet steel brackets.

The nozzles are placed with an angle, optimized as to moisten all of the finned area.

The spray water shall be delivered mounted on cooler or as KIT.

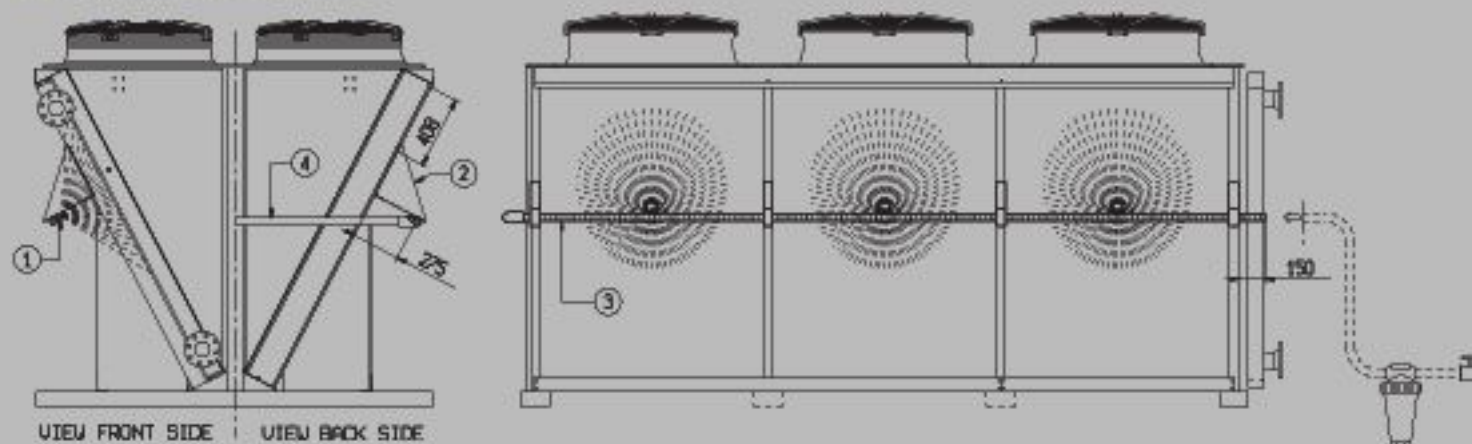
## **Material**

Water Pipe: Polyethylene Ø40 x 2mm

Nozzle: Stainless Steel 316

Steel Bracket: Galvanized Steel th 3mm

## spray water system DCUS



## DCUS technical details

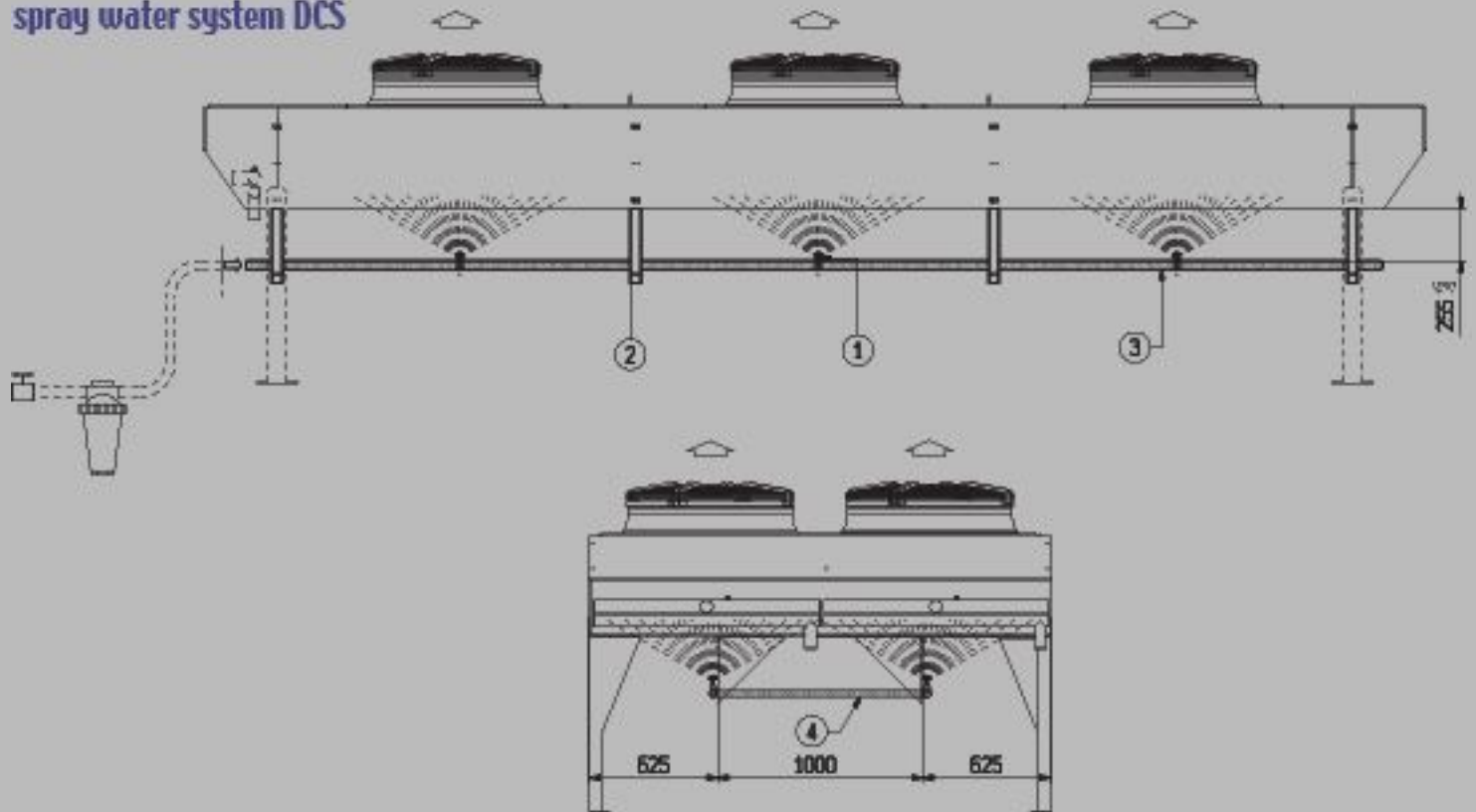
Modello Type	Capacità(*) Rating(*)	Capacità(*) Rating(*)	Portata fluido Fluid flow	Perdita di carico Pressure drop	Portata aria Air flow	n. Ventilatori n. Fans	Assorbimento nominale(*) Absorption power(*)	Dimensioni AxBxH Dimensions AxBxH	Peso Weight	Connessioni fluido Fluid connections	Spray System Kit OPTION
	kW	Kcal/h	mc/h	kPa	mc/h	N'	KW	mm	kg		
DCVS-200	200	172000	34,4	38,85	122500	4	14,4	2940x2230x2210	823	n.4 da DN80	Dispon./Avalab.
DCVS-300	300	258000	51,7	57,86	184000	6	21,6	4250x2230x2210	1167	n.4 da DN80	Dispon./Avalab.
DCVS-400	400	344000	68,9	56,98	245500	8	28,8	5560x2230x2210	1628	n.4 da DN100	Dispon./Avalab.
DCVS-500	500	430000	86,1	62,03	307000	10	36	6870x2230x2210	###	n.4 da DN100	Dispon./Avalab.
DCVS-600	600	516000	103,3	58,24	294500	10	36	6870x2230x2210	###	n.4 da DN100	Dispon./Avalab.
DCVS-700	700	602000	120,6	44,35	353500	12	43,2	8180x2230x2210	###	n.4 da DN100	Dispon./Avalab.
DCVS-800	800	688000	137,8	65,33	412600	14	50,4	9490x2230x2210	###	n.4 da DN100	Dispon./Avalab.

(\*) Le rese termiche e le potenze elettriche assorbite si intendono con temperatura aria inferiore di almeno 5° rispetto alla temperatura desiderata in uscita per il fluido da raffreddare, differenza temperatura In/Out fluido da raffreddare 5°C, Altitudine s.l.m. 0,000 m, miscela fluido acqua/glycol al 25%

(\*) Thermal capacity, absorption power refer to ambient air temperature lower at least 5° in compare to the wished outlet water temperature, Cooled fluid In/Out differential temperature 5°C, Altitude above sea level 0,000 m, considered fluid mixture water/glycol at 25%

(Any Specification FRIGOSYSTEM may be subject to change without notice)

## spray water system DCS



## DCS technical details

Modello Type	Capacità(*) Rating(*)	Capacità(*) Rating(*)	Portata fluido Fluid flow	Perdita di carico Pressure drop	Portata aria Air flow	n. Ventilatori n. Fans	Assorbimento nominale(*) Absorption power(*)	Dimensioni AxBxH Dimensions AxBxH	Peso Weight	Connessioni fluido Fluid connections	Spray System Kit OPTION
	kW	Kcal/h	m <sup>3</sup> /h	kPa	m <sup>3</sup> /h	N°	KW	mm	kg		
DCS-50	50	43000	8,6	62,72	52850	3	7,8	3705x850x1255	392	n.2 da 1 1/2"	N/D N/A
DCS-100	100	86000	17,2	62,72	48890	3	7,8	3705x850x1255	451	n.2 da 2"	N/D N/A
DCS-150	150	129000	25,8	63,11	62460	4	10,4	4795x850x1255	642	n.2 da 2 1/2"	N/D N/A
DCS-200	200	172000	34,4	69,24	92620	3	10,8	6735x850x1495	906	n.2 da 3"	N/D N/A
DCS-250	250	215000	43,1	43,97	123400	4	14,4	8835x850x1495	1208	n.2 da 4"	N/D N/A
DCS-300	300	258000	51,7	40,92	119900	4	14,4	8835x850x1495	1308	n.2 da 4"	N/D N/A
DCS-350	350	301000	60,3	56,4	166000	6	21,6	6750x790x2290	1471	n.4 da DN100	Dispon./Avalab.
DCS-400	400	344000	68,9	46,21	231800	8	28,8	8850x790x2290	1826	n.4 da DN100	Dispon./Avalab.
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# DRY-COOLER



ITALIA  
8 unit DCVS  
capacity: 10000 kW

ITALIA  
8 unit DCS  
capacity: 10000 kW



# DRY-COOLER



**ITALIA**  
3 unit DCVS  
capacity: 2800 kW



**AUSTRIA**  
10 unit DCS  
capacity: 4800 kW