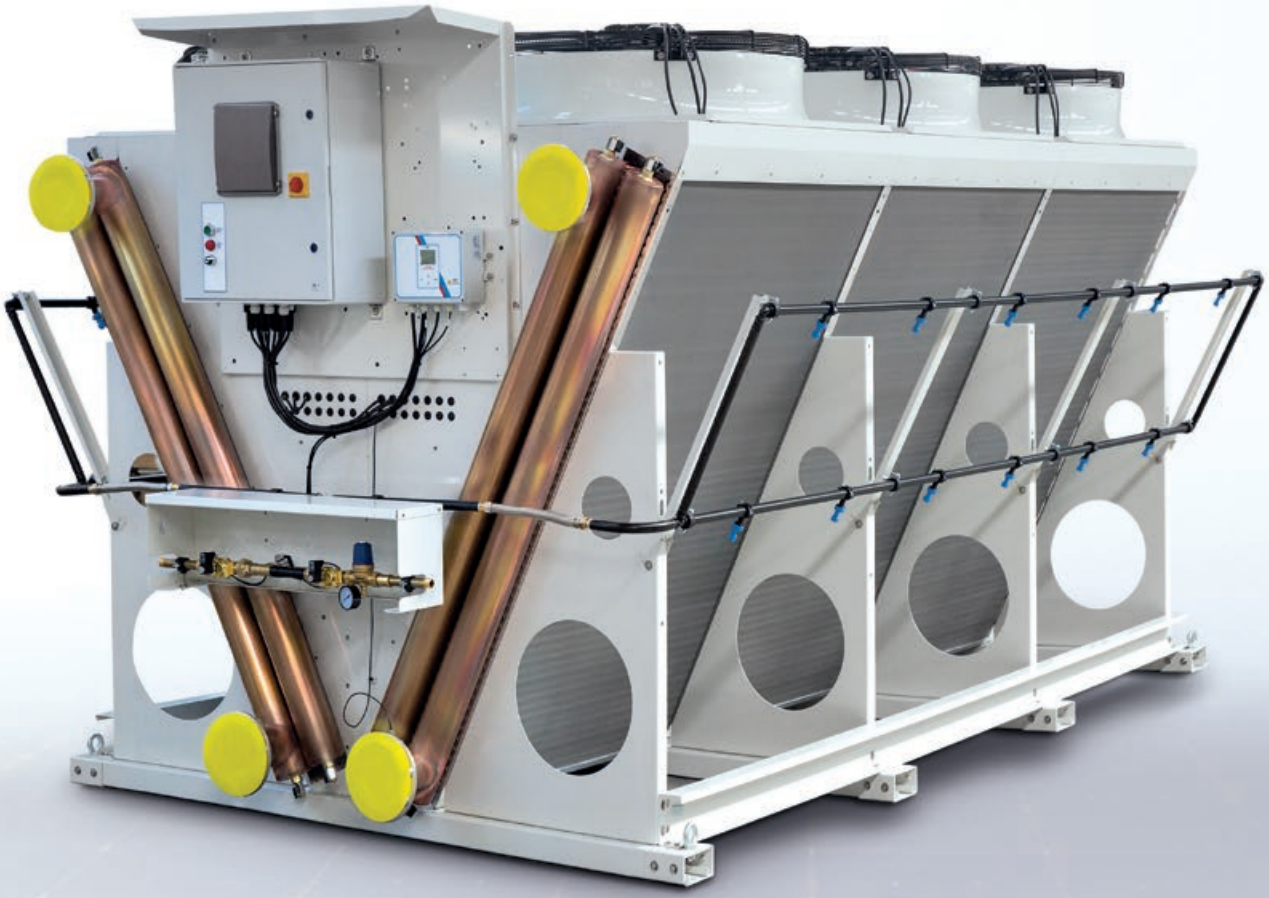


ADIABATIC SYSTEMS

REFRION
a better innovation

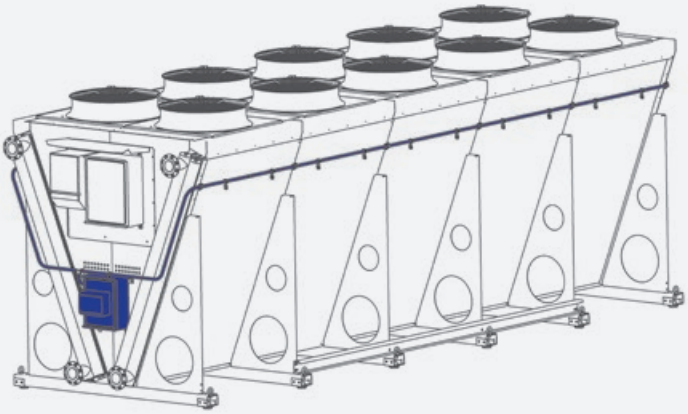
SPRAY ADIABATIC SYSTEM

HYGENIC CERTIFICATION
Compliant with VDI 2047 Part 2

RELATIVE HUMIDITY INCREASE
+30%

WATER CONSUMPTION
LOW

Inlet air humidification system through water atomisation. A very thin water mist generated by specific nozzles fills and humidifies the inlet air, thus making it colder, depending on the different working conditions.



AVAILABLE FOR THE FOLLOWING PRODUCT RANGE


SUPERJUMBO


COMBO


TOWER


WALL


HV

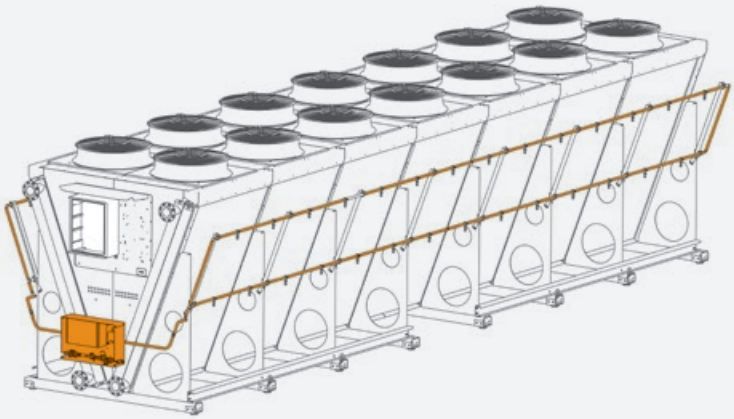
HYBRID SPRAY SYSTEM (H.S.S.) - OPEN CIRCUIT

HYGENIC CERTIFICATION
Under approval

RELATIVE HUMIDITY INCREASE
Up to 100%

WATER CONSUMPTION
MEDIUM

Cooling system of the heat exchange surface of the equipment through a direct water atomisation. Special water diffusing nozzles atomise the water humidifying and cooling the inlet air; the finned-pack heat exchanger releases its sensible heat to the atomized water increasing the thermal heat exchange of the unit even further.



AVAILABLE FOR THE FOLLOWING PRODUCT RANGE


SUPERJUMBO


COMBO


TOWER


WALL


HV

OPTIONAL:
WATER RECIRCULATION SKID (CLOSE CIRCUIT)

WATER CONSUMPTION
VERY LOW

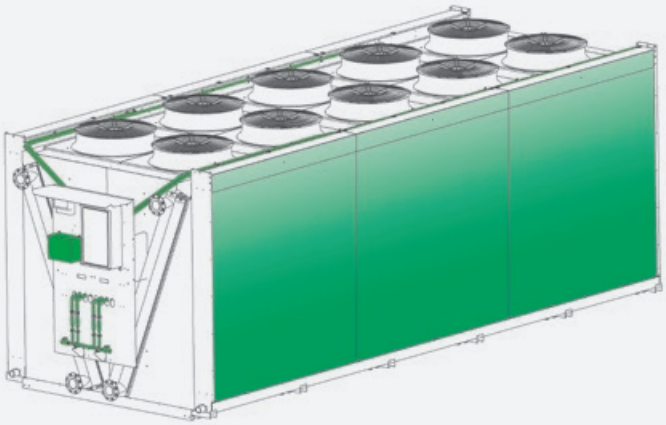
INDUSTRIAL ADIABATIC SYSTEM (PADS) - OPEN CIRCUIT

HYGENIC CERTIFICATION
Compliant with VDI 2047 Part 2

RELATIVE HUMIDITY INCREASE
+60% (max 99%)

WATER CONSUMPTION
HIGH

Inlet air humidification system by means of special adiabatic panels.
The panels, placed in front of the heat exchangers on the air inlet side, are homogeneously soaked through a distribution system with no water recirculation. The air, by passing through the panels, increases its humidity and gets colder depending on the different working conditions.



AVAILABLE FOR THE FOLLOWING PRODUCT RANGE

SUPERJUMBO

COMBO

TOWER

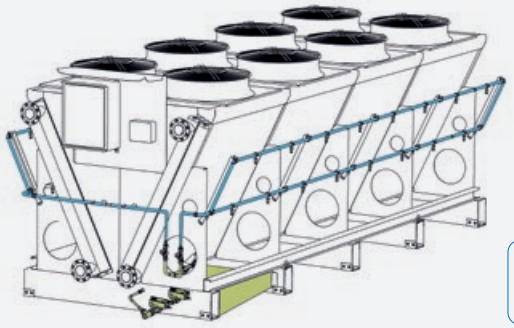
WALL

OPTIONAL:
WATER RECIRCULATION SKID (CLOSE CIRCUIT)

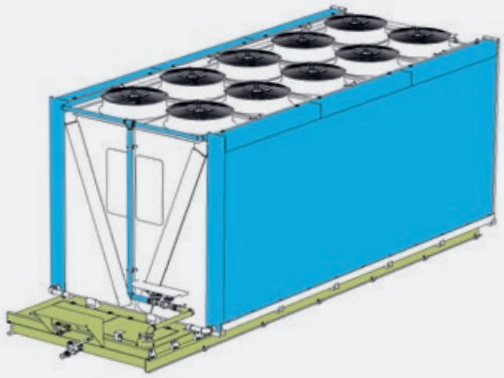
WATER CONSUMPTION
VERY LOW

WATER RECIRCULATION SKID

Designed to minimise water consumption in a closed circuit adiabatic system.
The water used to allow the adiabatic saturation of the air is directed into the basin and redirected into the circuit through the recirculation pump.
Water consumption is thus limited to the quantity evaporated during the adiabatic process.



H.S.S.



PADS

COMPARISON CHART

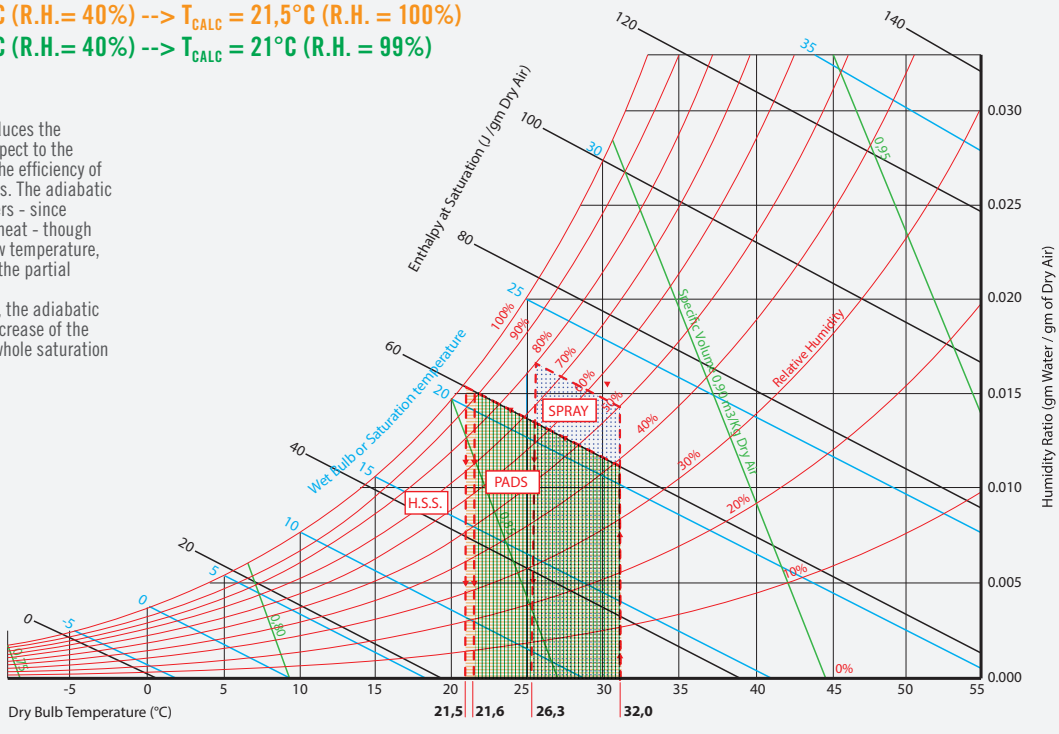
	ADIABATIC SYSTEMS		
	SPRAY	H.S.S.	PADS
SATURATION	80%	100%	99%
INCREASING R.H.	30%	100%	60%
AIR TEMP. REDUCTION	-5 K	-10 K	-8 K
VENTILATION ENERGY SAVING	2/10	5/10	4/10
DIRECT ENERGY CONSUMPTION	1/10	1/10	1/10
WATER CONSUMPTION	4/10	5/10 OPEN CIRC. 3/10 CLOSE CIRC.	9/10 OPEN CIRC. 3/10 CLOSE CIRC.
INVESTMENT	2/10	3/10 OPEN CIRC. 5/10 CLOSE CIRC.	6/10 OPEN CIRC. 5/10 CLOSE CIRC.
WATER QUALITY	6/10	8/10	3/10
HIGIENIC CERTIFICATION	OK	OK	OK

THEORY

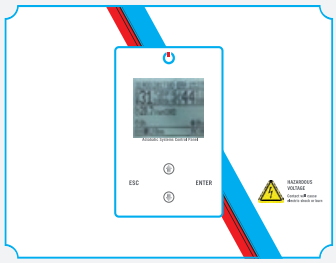
EXAMPLE:

SPRAY: T_{AMB} 32,0°C (R.H.= 50%) --> T_{CALC} = 26,3°C (R.H. = 80%)
H.S.S.: T_{AMB} 32,0°C (R.H.= 40%) --> T_{CALC} = 21,5°C (R.H. = 100%)
PADS: T_{AMB} 32,0°C (R.H.= 40%) --> T_{CALC} = 21°C (R.H. = 99%)

The adiabatic saturation reduces the suction air temperature (respect to the ambient air) and therefore the efficiency of the heat exchanger increases. The adiabatic saturation temperature lowers - since evaporating water removes heat - though it is still higher than the dew temperature, as evaporation itself raises the partial pressure of water vapour.
Thanks to Refrion's systems, the adiabatic saturation guarantees an increase of the relative humidity up to the whole saturation of the air (R.H.=100%).



A.S. MANAGER



Standard
Modbus®

A unique controller for the control and diagnostics of all Refrion adiabatic systems and related on-board equipment (pressure, temperature and humidity sensors, UV lamps, actuation valves).

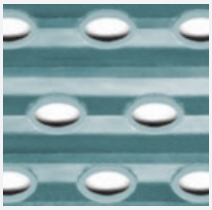
Overview:
- Enclosure in UV resistant plastic, protection rating IP54 (IEC Standard 60529).
- Operating temperature -25°C +50°C
- Multifunction LCD Display (resolution 128x64), remote control distance 600m
- 4 control buttons
- Multilanguage menu

Features:
- Non-volatile memory to retain parameters and event logs
- RTC (Time/Date) with battery backup
- Humidity/temperature sensor
- Input: remote start/stop (clean contact or Modbus)
- Output: operating state (clean contact)
- Output: alarm state (clean contact)
- Output: room thermostat state (clean contact)
- 2 password levels: user/manufacturer

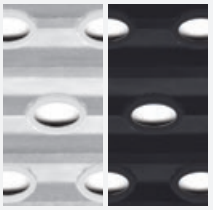
Connectivity:
- RS485 Modbus RTU Slave communication interface

Technical data:
- Single-phase supply, voltage 100-240V, frequency 50/60Hz.
- Power supply overcurrent protection using fuse
- USB Host Interface allows flash drive connection to upgrade software and download data logs
- RS485 interface
- Signal buzzer
- Electromagnetic system for reducing limescale build-up
- Complies with European Directive 2014/30/EU EMC
- Complies with European Directive 2014/35/EU LVD

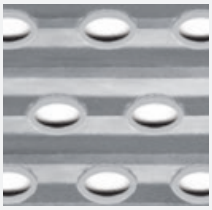
PROTECTION COATINGS



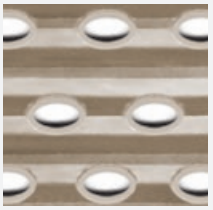
PRE-PAINTED HYDROPHILIC COATING
- High surface tension: it gives the drops of water wetting the fin a flattened shape (contact angle>15°).
- It favours circulation and the adiabatic saturation of the air.
- Corrosion resistance (ASTM B117): 250 hours.



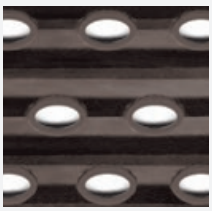
PRE-PAINTED HYDROPHOBIC COATING
- It gives the drops of water wetting the fin a spheroid shape (contact angle>50°) for easier draining.
- Corrosion resistance (ASTM B117): *single layer **1000 hours** (colour grey), double layer **1500 hours** (colour black).*



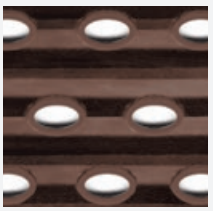
THERMOGUARD®
- Polyurethane based coating.
- High flexible properties.
- Heat conduction and UV resistant properties.
- Prevents chemical and galvanic corrosion.
- Corrosion resistance (ASTM B117): 3000 hours.



BLYGOLD®
- Heat conductive pigmentation.
- Very high chemical resistance at a low layer thickness.
- Corrosion resistance (ASTM B117): 4000 hours.



ELECTROFIN®
- Water-based, flexible cationic epoxy polymer using an electro-coat process.
- It guarantees complete heat exchanger coverage.
- Corrosion resistance (ASTM B117): 6000 hours.
- C5M & C5I High Durability (ISO 12944).

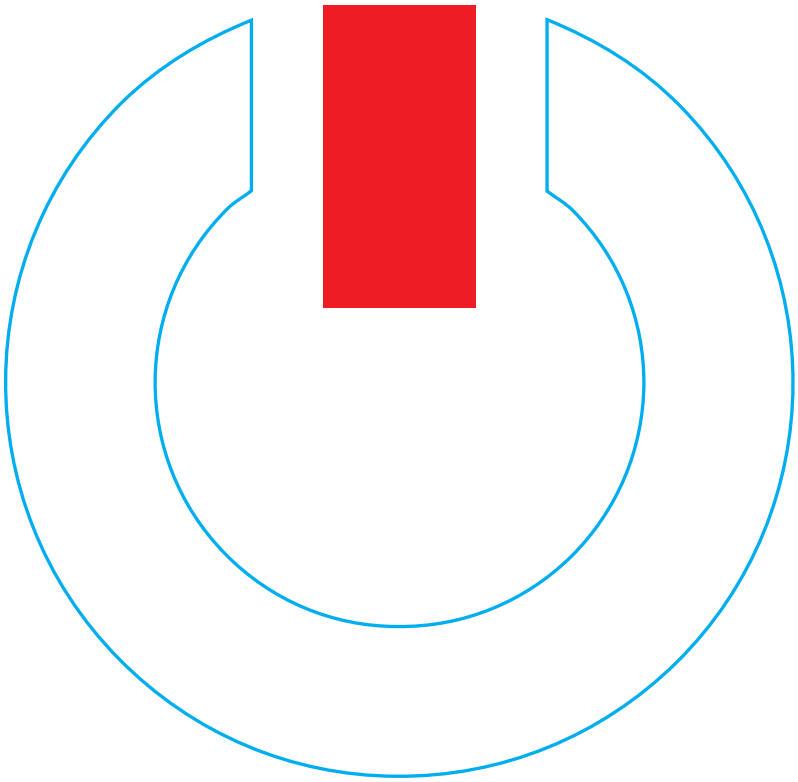


HERESITE®
- Suitable for marine and salt air environments.
- Withstand exposure to an extensive variety of corrosive and chemical fumes.
- Corrosion resistance (ASTM B117): 6000 hours.

USAGE LIMITATIONS

		LIMIT OF USE [HOURS/YEAR]						
	SPRAY ADIABATIC SYSTEM HYBRID SPRAY SYSTEM	**PRE-PAINTED HYDROPHILIC (single layer)**	**PRE-PAINTED HYDROPHOBIC (single layer)**	**PRE-PAINTED HYDROPHOBIC (double layer)**	**THERMOGUARD®**	**BLYGOLD®**	**HERESITE®**	**ELECTROFIN®**
WATER QUALITY	To prevent corrosion: • 6 < pH < 8 • Conductivity <1500 µS/cm • Chlorides < 100 ppm To prevent formation of scale: • Hardness 2-4 °f = Max. 1.1-2.2 °dH = Max. 20-40 ppm of $CaCO_3$	150	300	400	800	1000	1500	1500
WATER QUALITY	To prevent corrosion: • 6 < pH < 8 • Conductivity <500 µS/cm • Chlorides < 50 ppm • Sulphate < 50 ppm To prevent formation of scale: • Hardness 2-4 °f = Max. 1.1-2.2 °dH = Max. 20-40 ppm of $CaCO_3$	300	1000	1200	2400	3000	4000	4000
	INDUSTRIAL ADIABATIC SYSTEM							
WATER QUALITY	To prevent corrosion: • 6 < pH < 8 • Conductivity <1500 µS/cm • Chlorides < 200 ppm To prevent formation of scale: • Hardness <25 °f = 14 °dH = Max. 250 ppm of $CaCO_3$	/	MANDATORY FOR CLOSE CIRCUIT (ZP)	OPTION	OPTION	OPTION	OPTION	OPTION

PUBBLIMARKET 99990037-04 EN



ITALY
Refrion S.r.l.
Vicolo Malvis, 1
33030 Flumignano di Talmassons (UD)
Ph.: +39 0432 765533

SWITZERLAND
Refrion Schweiz GmbH
Tannackerstrasse, 7
3073 Gümligen BE
Ph.: +41 (0) 31 952 66 58

RUSSIA
Xchange RUS
Borisovskie prudy, 10-5
115211 Moscow
Ph.: +7 (495) 585-11-89

GERMANY
Refrion Deutschland GmbH
An der Bahn, 51
23867 Sülfeld
Ph.: +49 (0) 4537 7066055

The data in this leaflet are indicative. Refrion reserves the right to modify the data at any time.

© OCT 2018 All rights reserved.

REFRION
a better innovation

refrion.com