

SIVIS

2 stage indirect adiabatic cooling system for large Data Center
Cooling Capacity: 80 ÷ 320 kW



pPUE<1,025
Variable air flow and cooling capacity
Fully aluminum structure
Totally recyclable
20 years warranty against corrosion

SIVIS: 2 stage indirect adiabatic cooling system for Large Data Center

Cooling Capacity: **80 ÷ 320 kW**

Air flow: **20000 ÷ 80000 m³/h**



pPUE 1,025

**20 YEARS
WARRANTY**

on cabinet

ADIABATIC
RC Hi-Tech **COOLING**

ALUMINUM
RC Hi-Tech

GO GREEN 
innovative solutions

SIVIS

MAIN FEATURES

- 2 stage indirect adiabatic cooling system for Large Data Center.
- 4 models available.
- EER up to 38,9 (London climatic profile)
- Fully recyclable. Fully aluminum structure.
- 3 operation conditions:
 - Total free-cooling
 - Free-cooling + adiabatic cooling
 - Free-cooling + adiabatic cooling + mechanical cooling
- Double stage indirect adiabatic cooling. Ambient air flow is divided from in-room air flow, protecting indoor from pollutants.
- Suitable for outdoor installation.

MAIN BENEFITS

- Industry leading level pPUE. SIVIS allows exceptional achieving pPUE score lower than 1,025.
- Allows high energy savings and low CO₂ emissions.
- 20 years warranty against corrosion on cabinet.
- Zero indoor footprint:
 - Installation on the external perimeter of the building.
 - Roof installation to reduce or eliminate the space occupied around the building.
- Availability of an auxiliary cooling source:
 - Direct expansion system
 - Chilled water system.
- No recycling water: The humidification system that does not recirculate the water
- All in one equipment for a quick installation and maintenance. Only electric, hydraulic and delivery/return canalization installation are required.
- Modular units. Side by side installation of the units.
- Ready to use. No extra components needed. Built in control system for ALL parts.

WORKING PRINCIPLE

SIVIS is a packaged Air Handling Unit (AHU) that uses ambient air as refrigerant fluid to cool the Data Center.

The machine is equipped with two cooling sections, each with filtering section, air/air heat exchanger and supply fans with variable air-flow. Each cooling section handle the 50% of the total air flow of the system.

The cooling effect is obtained inside the cross-flow air to air heat exchangers where the ambient air flow and Data Center airflow never come into direct contact ensuring treated air purity.

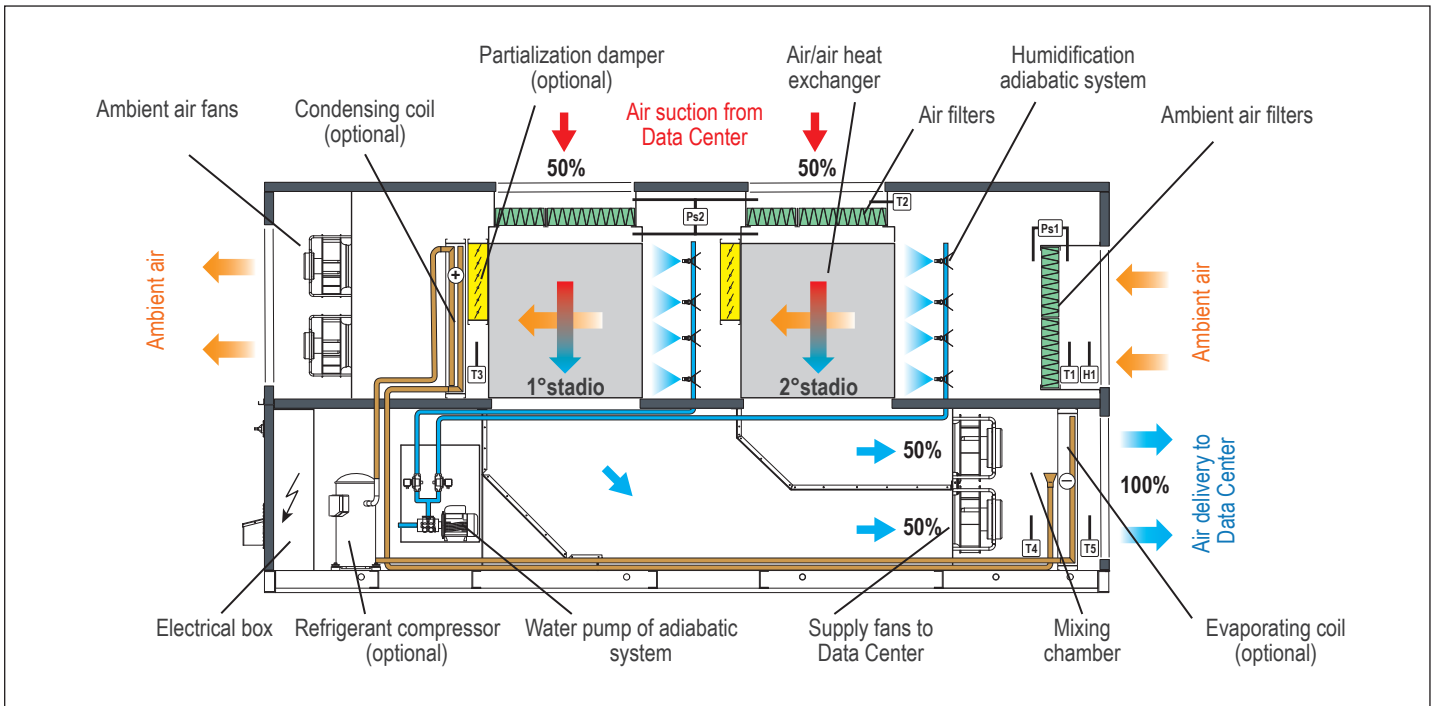
The ambient air flow is ensuring by dedicated fans with variable flow. A suction filters section guarantees the quality of ambient air flow.

In case the ambient air temperature is not sufficient to ensure free-cooling, the first stage of adiabatic humidification system starts. The cooling effect is achieved by evaporation of water in the ambient air flow by reducing, in this way, the temperature.

The adiabatic cooling system is provided with a high pressure water pump and nozzle atomizer system. In even more severe operating conditions, it also activates the second stage of the adiabatic system.

The two air flows, of the first and the second cooling stages, are combined in the mixing chamber downstream the supply fans, before sending to Data Center.

The feed water of the adiabatic system is disposable and is not recycled.



WORKING LIMITS

OUTDOOR AIR CONDITIONS

- 5°C minimum temperature with dry bulb
- 40°C maximum temperature with dry bulb
- 20°C minimum temperature with dry bulb with the aid of additional damper in the cooling system

HYDRAULIC CIRCUIT

3 Bar Maximum working pressure of the hydraulic circuit

POWER SUPPLY

± 10% Maximum tolerance of the supply voltage (V)

AIR DELIVERY TEMPERATURE

The operating temperatures of the SIVIS system reflect the ASHRAE conditions, as indicated in "2011 Thermal Guidelines for Data Processing Environments".

The guidelines define the ranges of temperature and humidity in which Information Technology Equipment (ITE) would have the highest reliability:

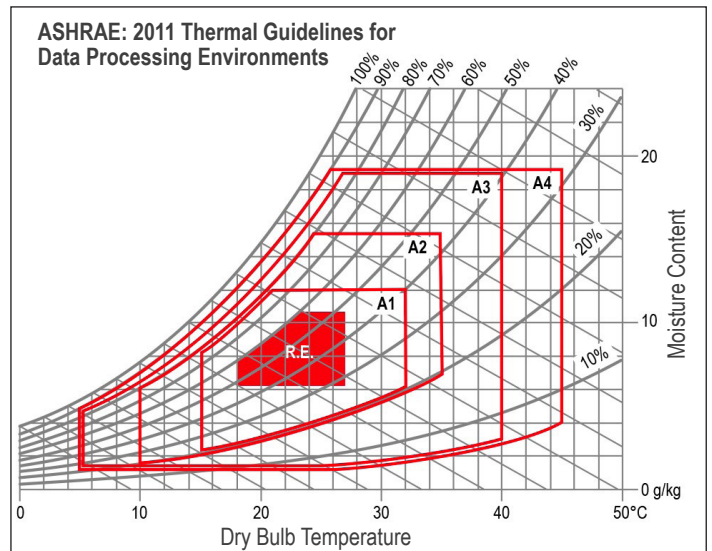
- R.E. Recommended envelope
- A1 – A2 Envelope for Data Center with restricted operating temperature/humidity
- A3 – A4 Envelope for modern Data Center with extended operating temperature/humidity

Operating temperature of SIVIS System:

Standard operating conditions:
 Air delivery to Data Center: 23°C – 50% rH
 Air return from Data Center: 35°C – 25% rH
 Operating ΔT: 12°C

Operating temperature range:

The temperature set-point of air delivery to Data Center can vary between 20°C and 27°C. The temperature set-point of air return from Data Center can vary between 32°C and 39°C. The operating ΔT is 12°C ± 2°C

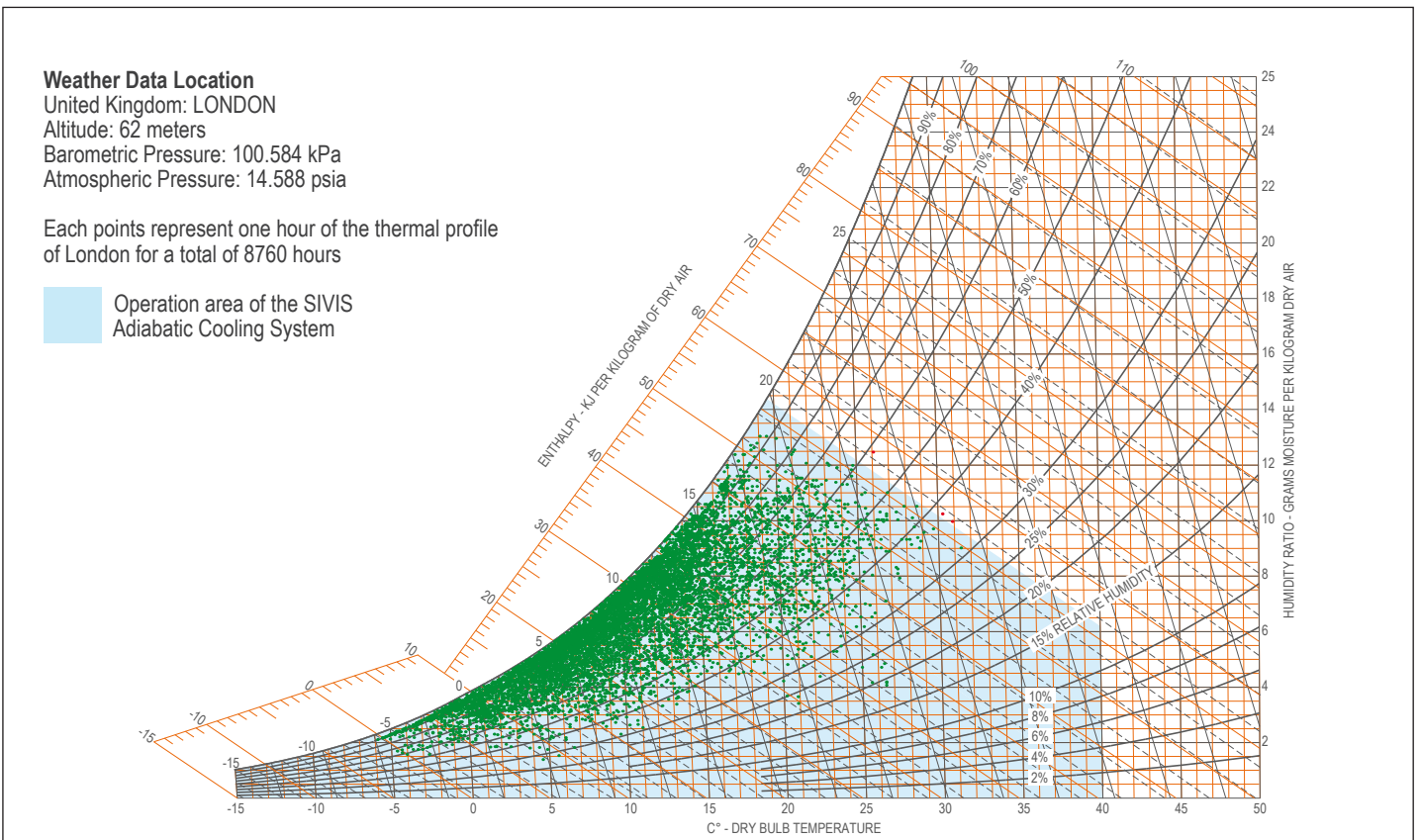
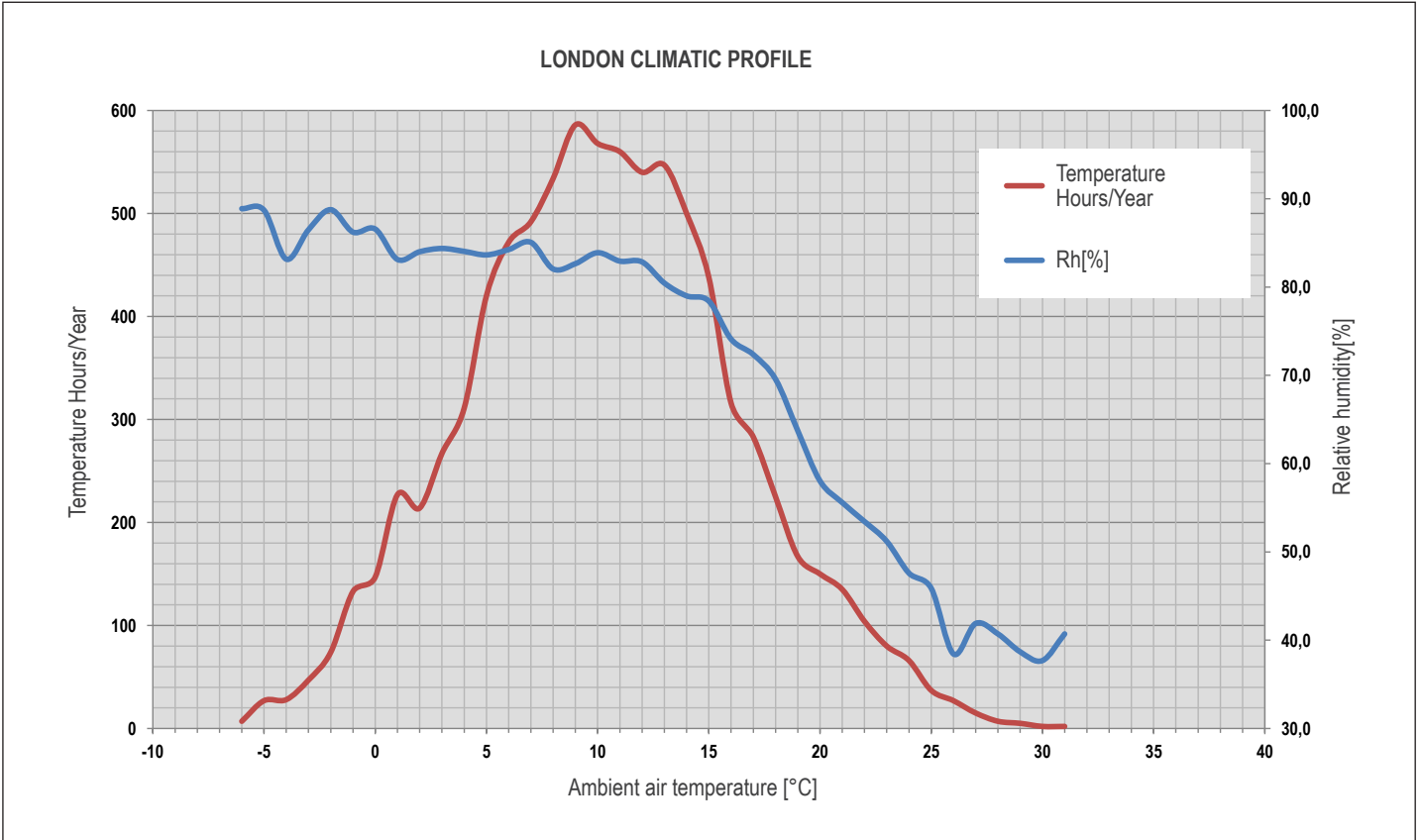


OPERATING CONDITIONS OTHER THAN STANDARD, IMPLY A DIFFERENT COOLING CAPACITY OF THE MACHINE.

CLIMATE CONDITIONS

The operation of the SIVIS system is influenced by the climate and not all climates are suitable to Adiabatic Cooling System. An analysis of the climate profile of the place of installation is necessary to verify the operation conditions of SIVIS system. Climate with high temperature and high humidity are not appropriate for Adiabatic Cooling.

LONDON CLIMATIC PROFILE

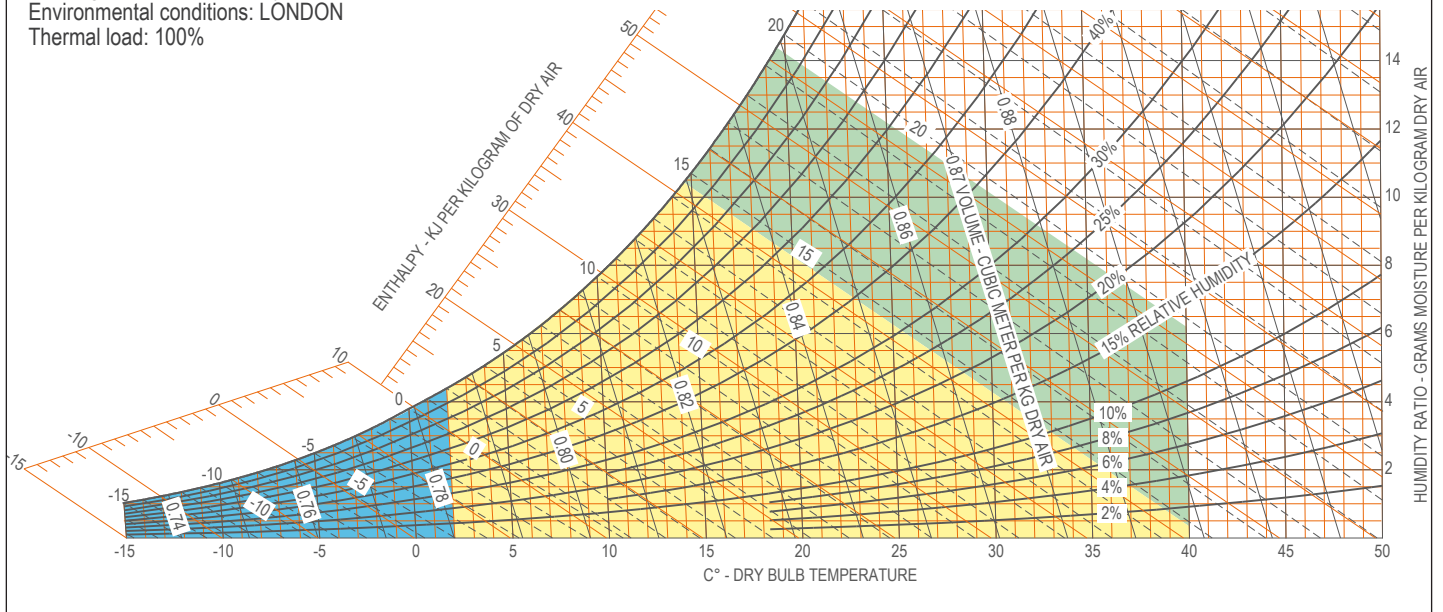


WORKING EXAMPLE

THERMAL LOAD 100% - SITE LONDON

London - Load 100%

Working example of SIVIS system.
Environmental conditions: LONDON
Thermal load: 100%

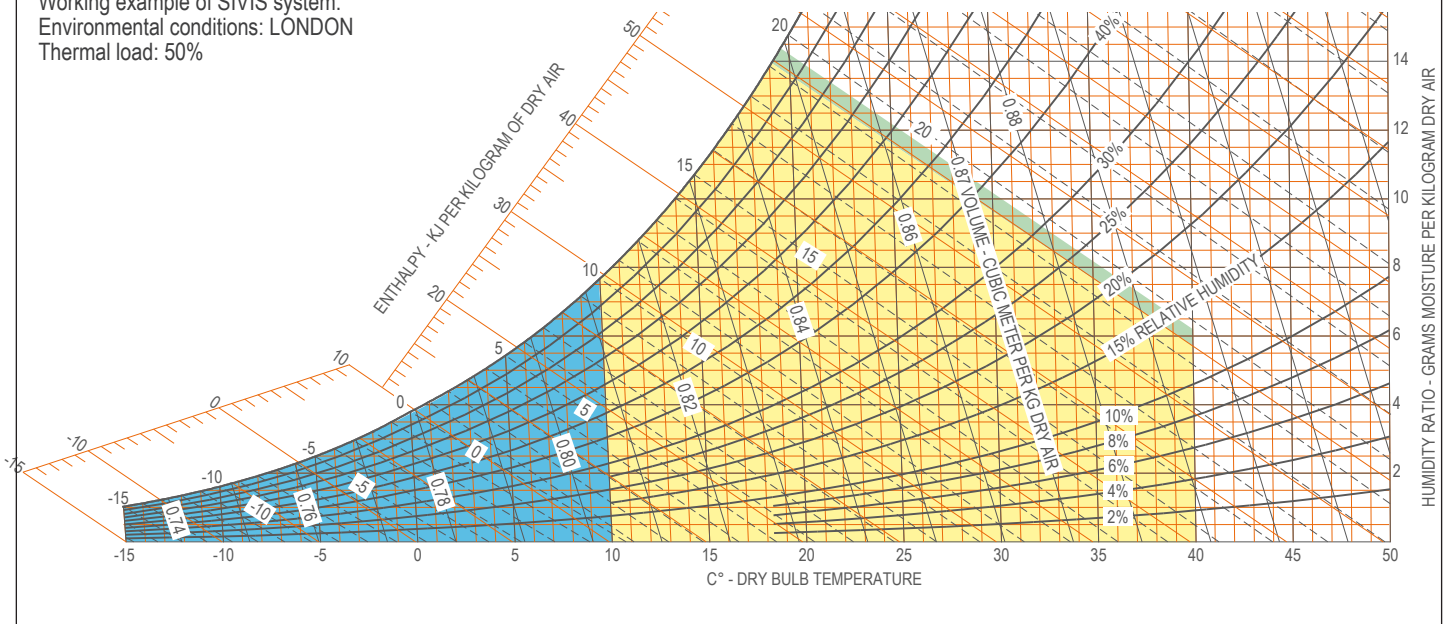


WORKING EXAMPLE

THERMAL LOAD 50% - SITE LONDON

London - Load 50%

Working example of SIVIS system.
Environmental conditions: LONDON
Thermal load: 50%



- DRY OPERATION**
Free-Cooling
- WET OPERATION**
Adiabatic cooling
- WET OPERATION + COMPRESSOR**
Adiabatic cooling + Mechanical cooling

MAIN COMPONENTS

FRAME AND PANELS

- Self-supporting frame made of aluminium;
- Watertight floor panel with drainage outlets located at the borders and rubber siphons;
- Vertical panels and roof made of AG3 aluminium (5754);
- Hinged doors and large removable panels with key locks (square). Tightness is granted by flexible gasket under compression, providing an ideal elasticity day after day;
- Inside sound and thermal insulation with 50mm thickness double skin glass wool (protected by a 13/10 aluminium sheet to ensure mechanical protection and an easy maintenance), classified M0/A1;
- Floor sound and thermal insulation made of double skin of rock wool, classified M0;
- Bird proof grid on external air sides.

FAN SECTION

Both supply air side and external air side fan sections are contained within the machine and include:

- Centrifugal fans with backward curved blades with wing profile, single suction and without scroll housings (Plug-fans), directly coupled to external rotor EC type electric motor;
- Supply and external air fans are protected by epoxy painting to allow operation in sea environment;

FILTER SECTIONS

Air threatment section: quick-remove green-designed filters:

- Washable air filters with G4 efficiency, with cells in synthetic fibre and metallic frame (EN 779-2012), recyclable.
 - Each filters stage is controlled by a pressure switch.

External air side: quick-remove green-designed filters:

- Folded type, G4 efficiency, in polyester, fully recyclable, non-reusable.
 - Each filters stage is controlled by a pressure switch.

TWO STAGE ADIABATIC FREE-COOLING SECTION HEAT EXCHANGERS

Nr. 2 x cross flow technology return air to external air aluminum plate heat exchangers;

- Epoxy coating for operation in sea environment;
- High exchange efficiency from 65 to 80%;
- NO energy consumption for the heat exchange;
- NO mixing between return air and external air;

ADIABATIC COOLING SYSTEM:

Each system includes:

- Water filter;
- Automatic drain down and purge;
- Inverter driven modulating rotary vane pump to pressurize the water between 4 and 15 Bar;
- Distribution pipe with special nozzles for water atomization;

Each nozzle is equipped with a baffle plate to increase the turbulence of the air flow and improve the water evaporation;

- Electronic control system for high pressure water flow modulation;
- Water characteristics: softened water;
- Humidification capacity: 200 kg/h.

LEGIONELLA CONTROL

The system is designed to prevent mainly the Legionella bacteria growth but it is efficient against any other forms of aerosol dispersed bacteria thanks to:

- a micro-organism filter upstream the high pressure pump
- built-in automatic drain down and purge flushing the unused or stagnant water collected during cooling period when the system is stopped.

ELECTRICAL PANEL

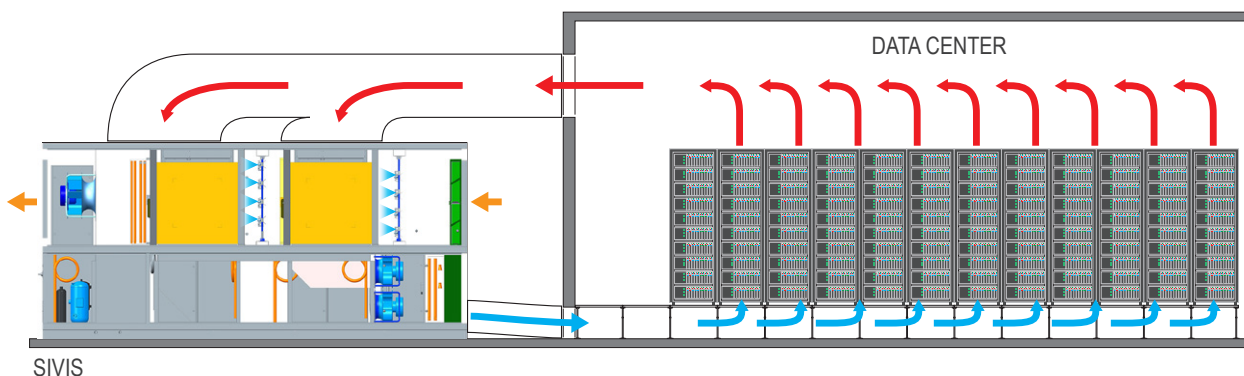
In accordance with EN 15-100 and EN 60204-1 norms complete with:

- Main switch with door lock safety;
- Voltage free contact for general alarm;
- Numbered terminal blocks with disconnecting terminals for remote controls and transfers;
- Terminal block for compressors load shedding;
- Internal wiring numbered at both extremities using numbered ferrules;
- TT neutral system;
- Phase control relay;
- Ik3 breaking capacity: 10 kA;
- Circuit breakers on main components;
- Transformer for auxiliary circuit and microprocessor supply;
- Panel with machine controls;
- Plexiglas protection;
- Power supply: 400/3/50.

CONTROL SYSTEM

MP.COM microprocessor system with graphic display for control and monitor of operating and alarms status. The system includes:

- Control on return and supply air temperature;
- Control on external air temperature;
- Main components hour-meter;
- Compressor operation management for the highest efficiency;
- Energy consumption management to limit the mechanical cooling operation – floating set point;
- Alarm list;
- Non-volatile “Flash” memory for data storage;
- Menu with protection password;
- LAN connection;
- Communication via MODBUS RC485 protocol.



OPTIONAL ACCESSORIES

SIVIS	SIVIS 20	SIVIS 30	SIVIS 40	SIVIS 80
Mechanical auxiliary cooling section	•	•	•	•
Partialization damper	•	•	•	•
Built in chilled water cooling section	•	•	•	•
Differential pressure air control in the floor duct	•	•	•	•
Air delivery from the bottom of the unit	•	•	•	•
Air discharge on side	•	•	•	•
Air discharge on the top	•	•	•	•
Non return motorized damper on air delivery	•	•	•	•
Air filters, F7 efficiency	•	•	•	•

• available accessory; - not available accessory

TECHNICAL DATA - SIVIS

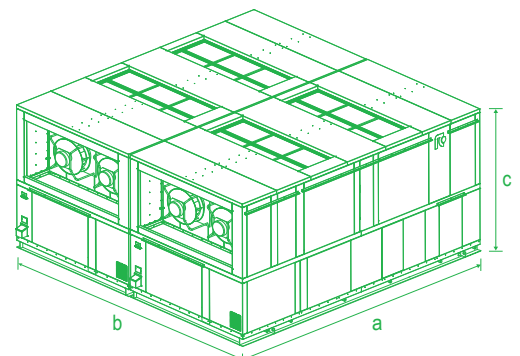
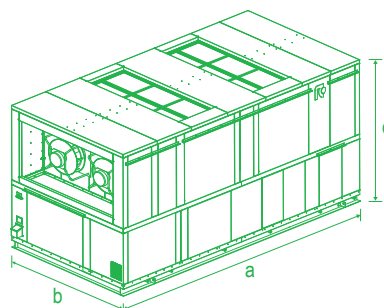
MODEL		SIVIS 20	SIVIS 30	SIVIS 40	SIVIS 80
COOLING CAPACITY (1)					
Total	kW	80	120	160	320
Sensible	kW	80	120	160	320
SHR		1,00	1,00	1,00	1,00
SUPPLY AIR FANS					
	n.	4	4	4	8
Air flow	m ³ /h	20000	30000	40000	80000
Nominal external static pressure	Pa	100	100	100	100
EXTERNAL AIR FANS					
	n.	2	2	3	6
Air flow	m ³ /h	15000	20000	27000	54000
Min Air flow	m ³ /h	5000	6670	9000	18000
Nominal external static pressure	Pa	0	0	0	0
RETURN AIR FILTERS					
	n.	12	17	24	48
Efficiency		G4	G4	G4	G4
EXTERNAL AIR FILTERS					
	n.	6	8	12	24
Efficiency		G4	G4	G4	G4
ADIABATIC SYSTEM					
Water flow - 1st stage	m ³ /h	0,1	0,15	0,20	0,40
Water flow - 2nd stage	m ³ /h	0,04	0,07	0,08	0,16
ENERGY EFFICIENCY INDEXES					
SEER – load 100% (2)		8,0	11,0	11,8	11,8
SEER – load 50% (2)		28,0	30,8	38,9	38,9
POWER SUPPLY					
	V/Ph/Hz	400-3-50+N	400-3-50+N	400-3-50+N	400-3-50+N
Max operating current (FLA)	A	35,7	54,0	57,4	114,9
SOUND LEVEL					
Indoor sound power level (in duct) [Lw] (3)	dB(A)	76,4	79,5	83,3	86,3
Outdoor sound power level [Lw] (3)	dB(A)	63,1	66,0	69,9	72,8
NET WEIGHT	kg	2600	4050	4760	9520
HYDRAULIC CONNECTIONS					
Water feeding	F Ø	1/2"	1/2"	1/2"	2 x 1/2"
Water drainage	Ø ext	14	14	14	2 x 14

THE COOLING CAPACITY DOES NOT CONSIDER THE SUPPLY FAN MOTOR THERMAL LOAD

1. Characteristics referred to supply air at 23°C-50%RH and return air at 35°C-25%RH.
2. Referred to London Climatic conditions.
3. Sound power level Lw according to ISO EN 9614 – 2.

DIMENSIONS (mm)

SIZE	a	b	c
SIVIS 20	5200	2200	2400
SIVIS 30	6500	2350	2800
SIVIS 40	7200	2350	3300
SIVIS 80	7200	4700	3300





for a greener tomorrow

Eco-Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.



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