MITSUBISHI ELECTRIC
HYDRONICS & IT COOLING SYSTEMS S.p.A.

IT COOLING

EVAPORATIVE COOLING SYSTEM

SIVIS

80 – 320 kW

2-Stage Indirect Adiabatic Cooling System for Data Center

ALUMINUM

ADIABATIC

The picture of the unit is indicative and may vary depending on the model

- **pPUE<1,025**
- VARIABLE AIR FLOW
- VARIABLE COOLING CAPACITY
- NO RECYCLING WATER
- ALL IN ONE UNIT
- TOTALLY RECYCLABLE UNIT
- 20 YEARS WARRANTY AGAINST CORROSION

INDEX

RC IT COOLING

MEHITS CERTIFICATIONS

SYSTEM CERTIFICATIONS

ISO 9001 CERTIFICATION – MEHITS S.p.A.
Quality Management System

ISO 14001 CERTIFICATION – MEHITS S.p.A.
Environmental Management System

BS OHSAS 18001 CERTIFICATION – MEHITS S.p.A.
Occupational Health and Safety Management System

PRODUCT CERTIFICATIONS BY COUNTRY

CE MARKING
MEHITS units are in compliance with the European Directives in force.

CCC – CQC CERTIFICATION
(People's Republic of China)

EAC CERTIFICATION
(Russian Federation, Belarus, Kazakhstan)

RC IT COOLING

A NEW APPROACH FOR THE COOLING OF LARGE DATA CENTER

The first air conditioner for computer rooms

MRE/A
The first air cooled chiller with built-in free-cooling system

SILVERBULLET
The prototype of air cooled chiller equipped with oil-free centrifugal compressor with magnetic levitation system

Google

4th July, 1963 RC was established with the mission of providing innovative and high quality air conditioning systems.
The commitment to research and use the latest technology available in the market has led the company to produce one of the first air conditioners for computer rooms for a leading Italian bank; to conceive the first chillers with free-cooling system built, the series MRE / A; to realize the first capillary pipes in plastic material for the refrigerant gas; to develop, jointly with the manufacturer, the two-stage centrifugal compressor with magnetic levitation of air-cooled chillers with the prototype Silverbullet.
In addition, the company has always been organized internally for the study and development of software applications for the management of its units and the plant where units are installed.

This philosophy, combined with continuous efforts in the search for energy saving, have led the company to design and develop a new concept of Precision Air Conditioning

SIVIS: an innovative indirect adiabatic cooling system with a revolutionary idea, structure and application, with the aim to reduce energy consumption, dramatically reduce maintenance costs, provide high reliability and continuous operation and to meet the requirements of the Data Center of last generation that provide for stringent operating conditions to obtain extremely high values in terms of performance and efficiency.

Here's what Google publishes on its website, as regards the efficiency of its Data Centers.
(http://www.google.com/about/datacenters/efficiency/index.html)

Efficiency
When you use Google products, the servers in our data centers do the work for you—around the clock and around the world. Our servers support many products at a time. That's "the cloud." By keeping our servers busy, we can do more with less—more searches, more Gmail, and more YouTube videos with fewer servers and less energy.

Measuring and improving our energy use
We're focused on reducing our energy use while serving the explosive growth of the Internet. We take detailed measurements to continually push toward doing more with less—serving more users while wasting less energy.

Building custom, highly-efficient servers
Google's servers are high-performance computers that run all the time. They're the core of our data centers, and we've designed them to use as little energy as possible.

We rise the thermostat to 26,67°C (80°F)
One of the simplest ways to save energy in a data center is to raise the temperature. It's a myth that data centers need to be kept chilly.

RC IT COOLING

MEASURING THE EFFICIENCY OF THE DATA CENTER

PUE
pPUE

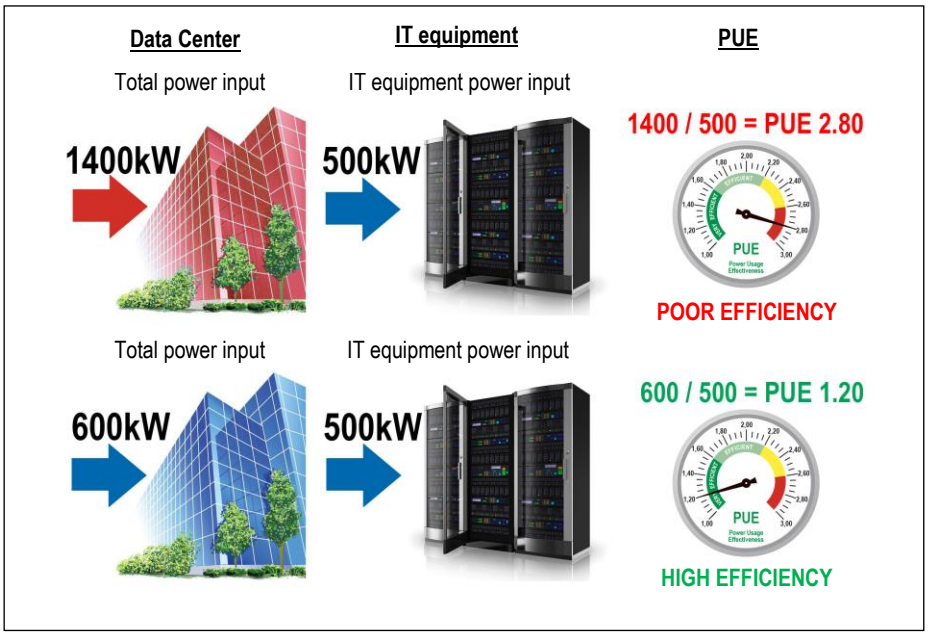
The main parameters for the evaluation of the Data Center can be summarized in:

PUE = **Energy efficiency** of the entire Data Center
pPUE = **Energy efficiency of a portion** of Data Center

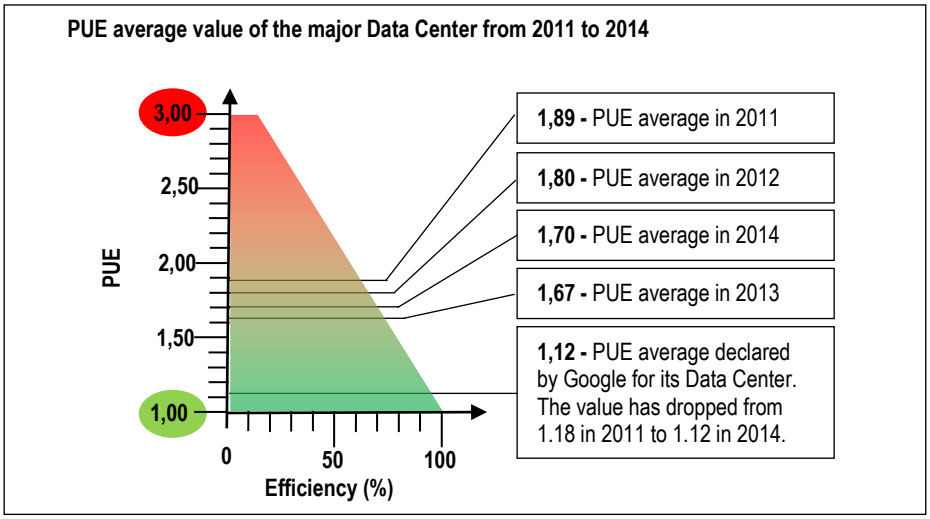
PUE

PUE (power usage effectiveness): **Effectiveness in energy use in the Data Center**
The energy efficiency of a Data Center is defined by the PUE, an index that compares the total installed power in the infrastructure (IT equipment * Cooling + Back-up + others) with one used only by IT equipment for data processing. To have an efficient Data Center, the result should be close to 1.

Sample calculation for a Data Center with IT equipment with a power consumption of 500 kW:



The chart below shows the PUE average values of the major Data Center in the world from 2011 to 2014. The average was calculated on the values provided by the respective Data Center (source Uptime Institute, Symposium in Santa Clara – California).



Uptime Institute is a consortium of companies that engage in education, publications, consulting, certifications, conferences and seminars for the data center industry.

RC IT COOLING

pPUE

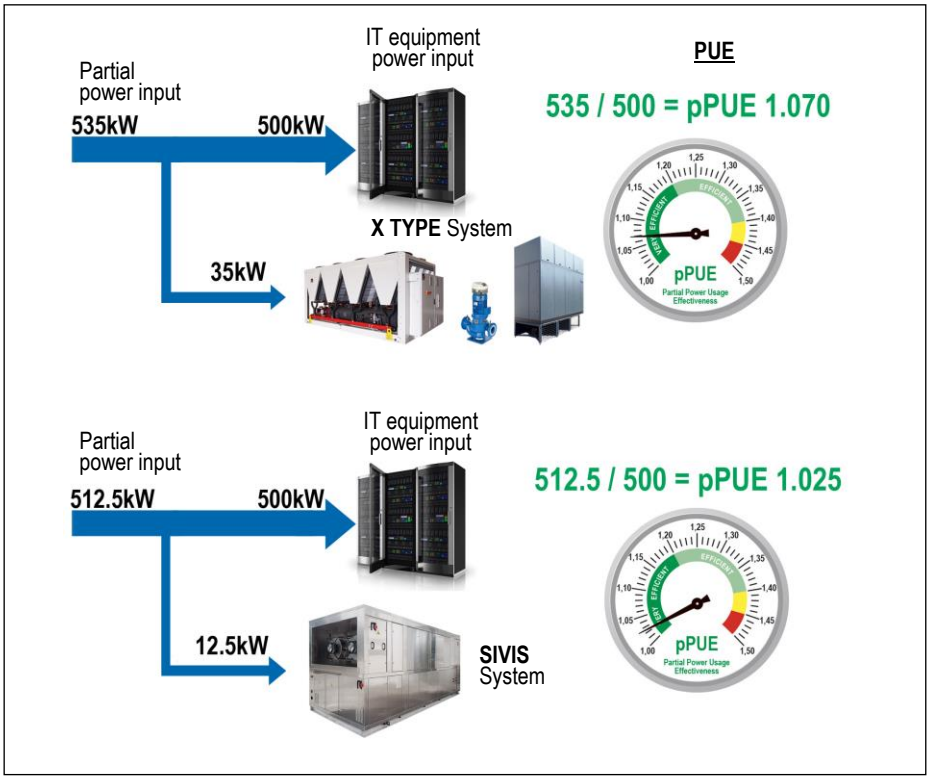
pPUE (partial power usage effectiveness):
Effectiveness in energy use in the Data Center portion.

The energy efficiency of a Data Center portion is defined by the pPUE that is referred to components within a boundary. The boundary can be physical or logical, for example:

- All cooling components;
- All power components;
- All departmental components;
- All baseline load components.

In IT COOLING field the reference value is pPUE calculated considering just the cooling components.

This pPUE is obtained comparing the installed power in the infrastructure (IT equipment * Cooling) with one used only by IT equipment for data processing. To have an efficient Data Center, the result should be close to 1.



RELIABILITY CLASSIFICATION OF THE DATA CENTER

TIER

TIER: Data Center reliability classification
The Uptime Institute has created the **TIER** classification to evaluate the data center infrastructure in terms of performance or guarantee of continued operation (uptime).
The **TIER** classification is recognized worldwide and is divided into four classes.
Classes are progressive; each **TIER** incorporates all levels of the previous one.

TIER I (basic – expected uptime levels of 99,671%)

- Susceptibility interruptions due to planned and unplanned activities;
- Lack of redundancies and with single power supply system and cooling;
- Presence or absence of UPS, generators and floating floor;
- Data center downtime: 28.8 hours/year;
- Total off during preventive maintenance.

TIER II (redundant component – expected uptime levels of 99,749%)

- Less susceptibility to interruptions due to planned and unplanned activities;
- Redundant components with single power supply and cooling;
- Presence of UPS, generators and floating floor;
- Data center downtime: 22 hours/year;
- Total off during maintenance of power and other parts of the infrastructure

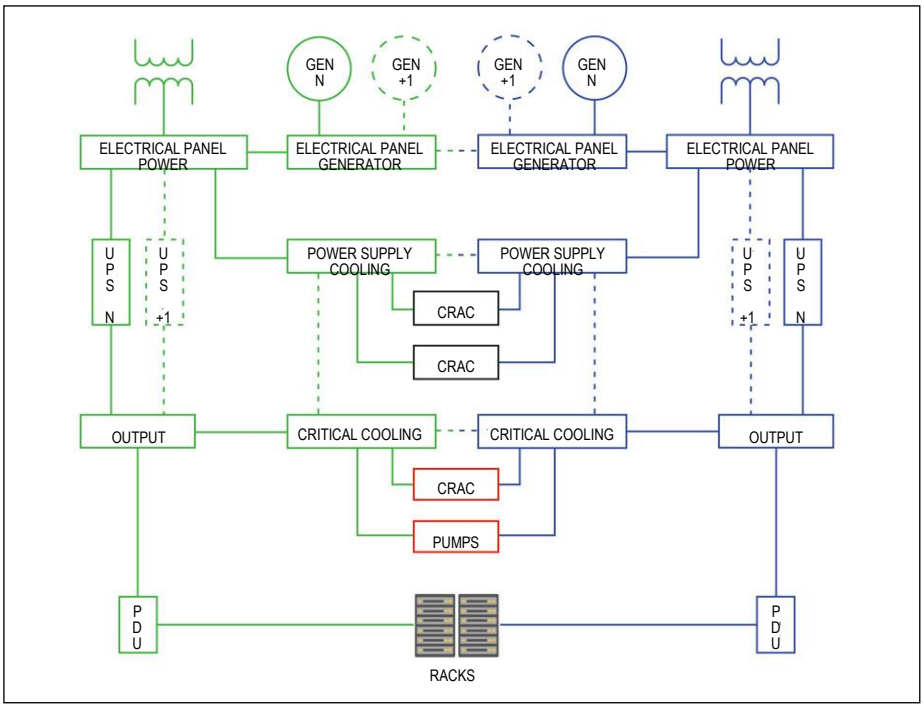
TIER III (concurrently maintainable – expected uptime levels of 99,982%)

- Ability to perform scheduled maintenance without interruption, but susceptibility to interruptions due to unplanned activities;
- Redundant components and connections to multiple power and cooling;
- Presence of UPS, generators and floating floor;
- Data center downtime: 1.6 hours/year;
- Do not need to turn off completely during maintenance, switch to other connections for power and infrastructure.

TIER IV (fault tolerant – expected uptime levels of 99,995%)

- Ability to perform scheduled and unscheduled maintenance, without any negative impact on the management of its functions;
- Redundant components and multiple links simultaneously active power and cooling;
- Availability of UPS, generators and floating floor;
- Data center downtime: 0.04 hours/year;
- Do not need to turn off completely during maintenance, switch to other connections for power and infrastructure.

DIAGRAM FOR ARCHITECTURE OF A DATA CENTER TIER IV



RC IT COOLING

GENERAL CHARACTERISTICS

SIVIS

SIVIS: High efficiency two stages indirect adiabatic free-cooling system for pPUE<1,025.

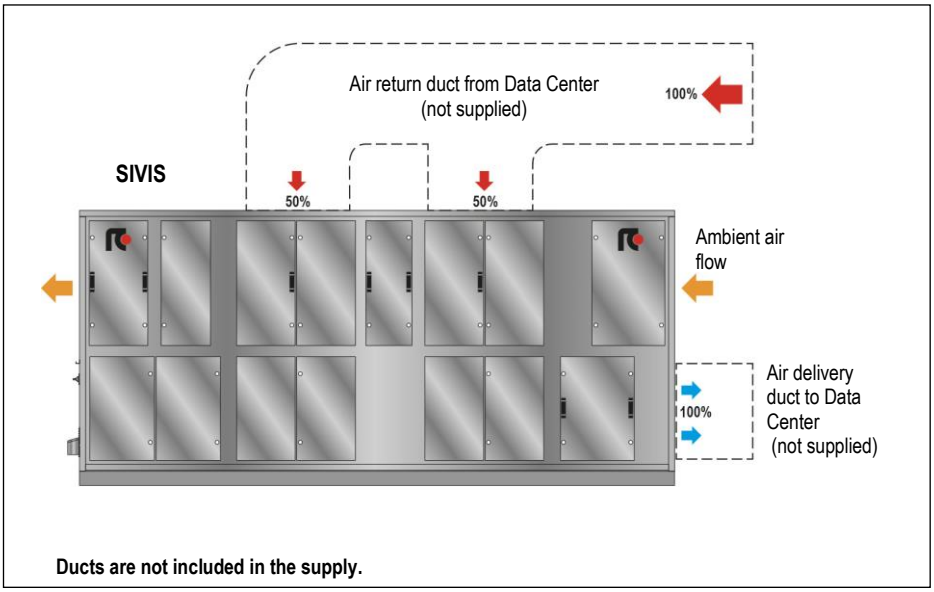
This series is offered in 4 models.
Cooling capacity: 80 - 320 kW
Air flow: 20.000 - 80.000 m^3/h

The machines are made for outdoor installation.

The constructive solutions and the internal lay-out allow high application flexibility and the frontal access to the main components for the inspection and routine maintenance.

Machines supply fully assembled with control systems. The installation requires electrical, hydraulic connections and air return and delivery canalization installation only, allowing high costs and time reduction. Return and delivery canalizations from/to the data center are not supplied.

Final assembly on all machines before shipment including running test, reading and monitoring of operating parameters, alarms simulation and visual check.



Ducts are not included in the supply.

HIGHLIGHTS

Full aluminium unit (basement, panelling and casing) for an excellent corrosion protection, 20-year anti-corrosion guarantee.

The choice of the materials used for units construction, the possibility to recycle them and the energy used for produce and recycle them are very important things to consider when referring to global energy saving, and CO_2 emissions reductions.

- Aluminum can be recycled for infinite times with low energy costs
- Aluminum doesn't need any special protective surface treatments
- No need for painting
- Higher corrosion resistance
- 2,8 times lighter then steel;

SIVIS structure is **guarantee against corrosion for 20 years**

The series is designed for easy deconstruction: **SIVIS units are 98% recyclable**.

RC IT COOLING

PRODUCT FEATURES AND BENEFITS

SIVIS represents the state of the art of the air conditioning for data centers with low energy consumption:

- Industry leading level pPUE. SIVIS allows exceptional achieving pPUE score **lower than 1,025**.
- Allows **high energy savings** and low CO_2 emissions.
- **EER up to 38,9** (London climatic profile)
- **Fully recyclable.** Fully aluminum structure.
- **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.
- **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.
- **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.
  Canalization not supplied.
- **Modular units.** Side by side installation of the units.
- **Ready to use.** No extra components needed. Built in control system for ALL parts.

pPUE: Partial Power Usage Effectiveness without UPS and lighting

MODEL IDENTIFICATION

SIVIS 30

SIVIS	**Series identification**
30	**Model – (Nominal air flow / 1000)**

WORKING LIMITS

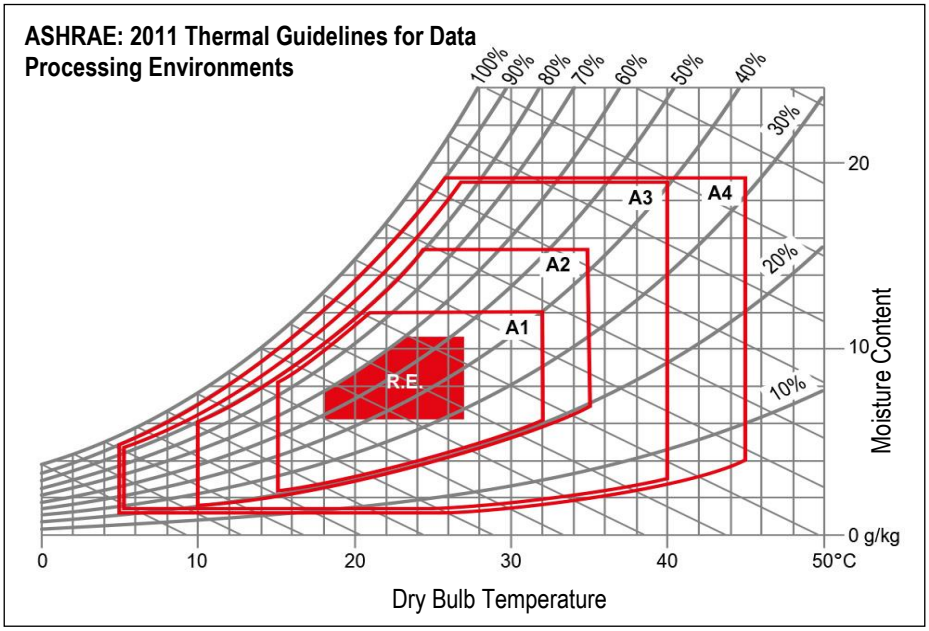
OUTDOOR AIR CONDITIONS
-5°C minimum temperature with dry bulb
40°C maximum temperature with dry bulb

-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-pont of air delivery to Data Center can vary between 20°C and 27°C
The temperature set-pont 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.

STORING TEMPERATURE

If the machine is not installed on receipt and is stored for a long time, store it in a protected place, at temperatures ranging between -30°C and 50°C in absence of superficial condensation and direct sun light.

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

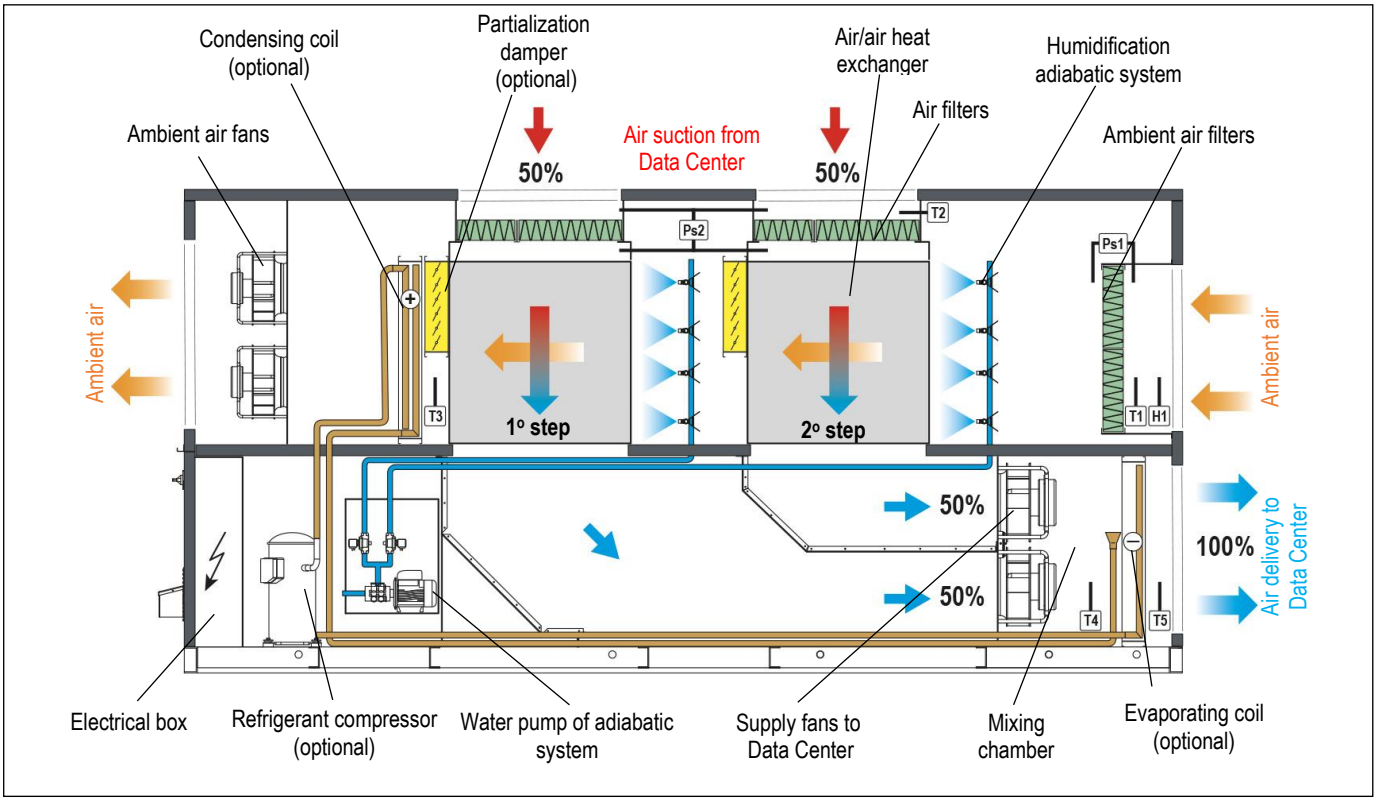
The cooling effect is obtained inside the cross-flow air to air heat exchangers where the ambient air flow and Data Center airflow never come into direct contact ensuring treated air purity.

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.

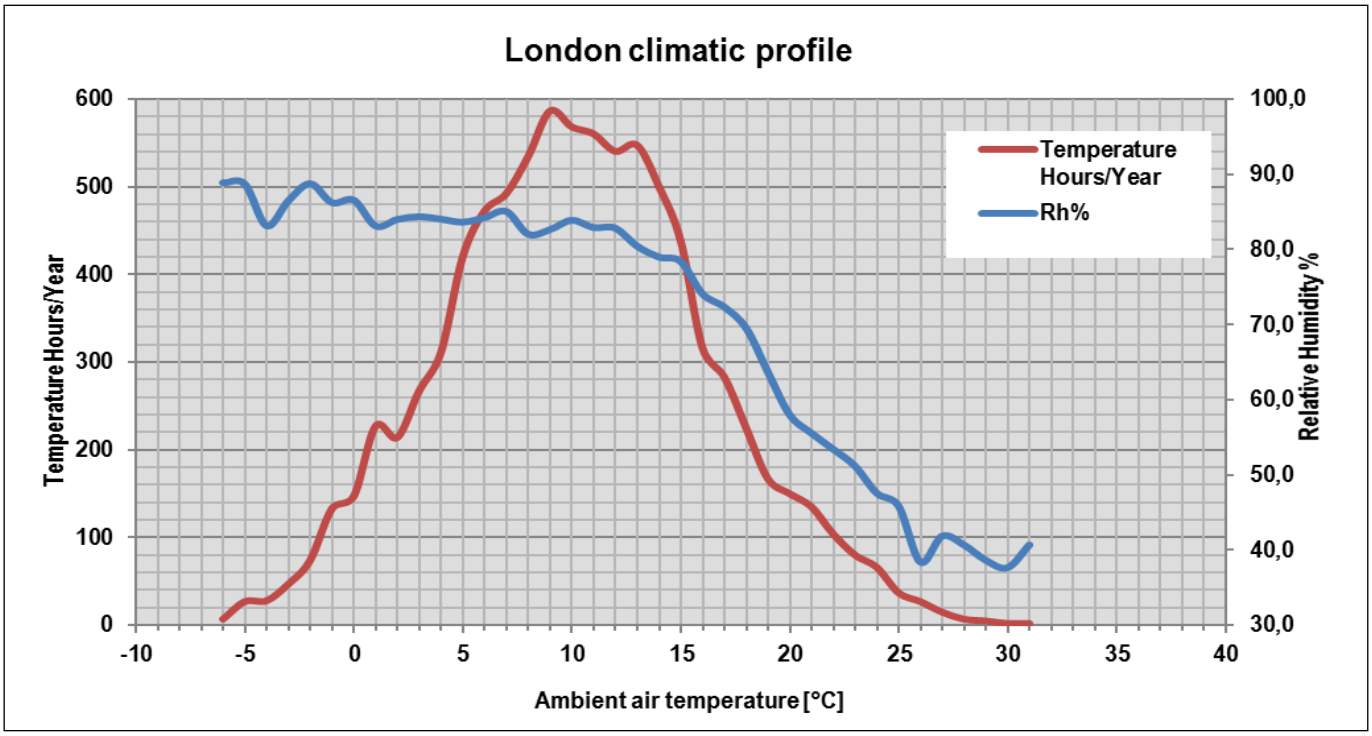
The feed water of the adiabatic system is disposable and is not recycled.

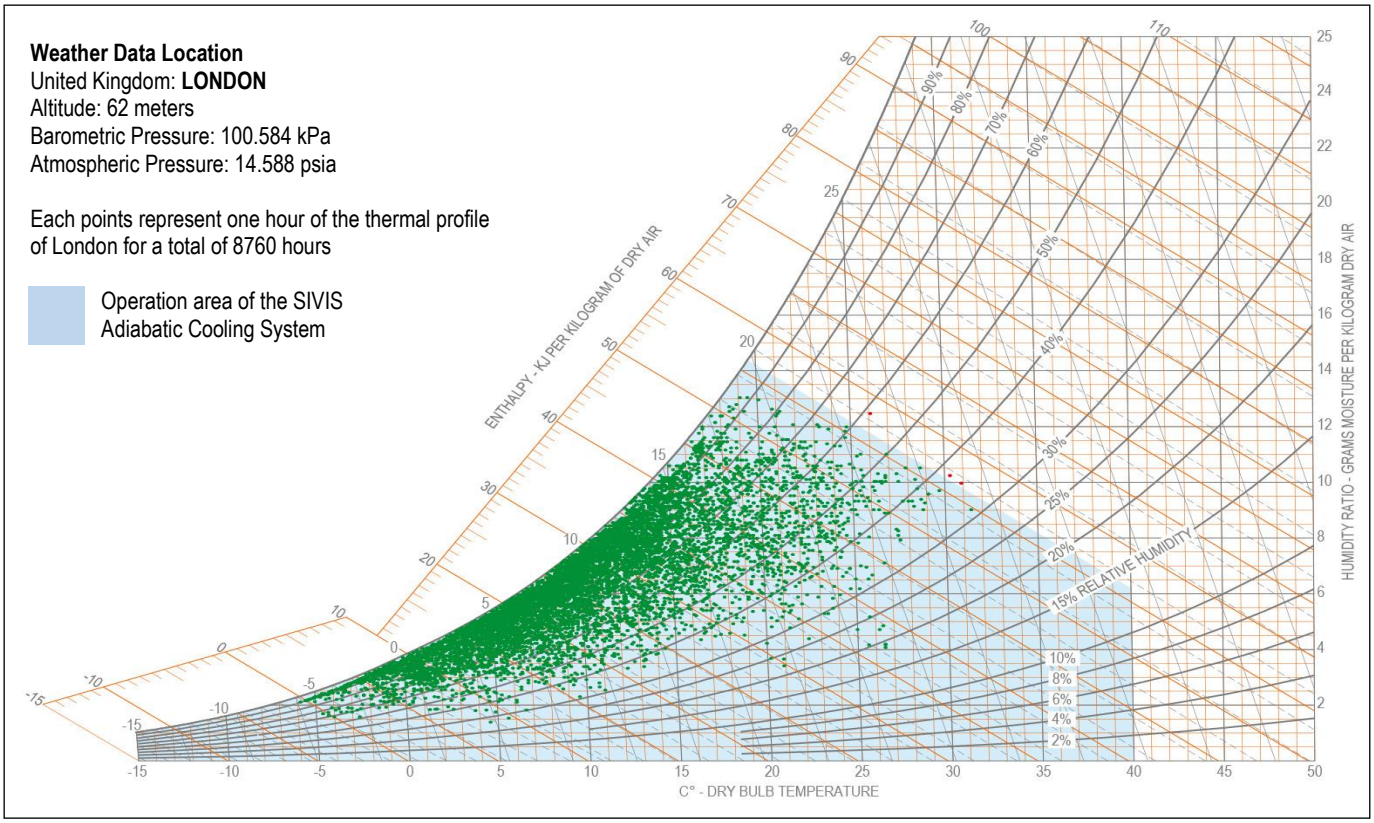


CLIMATE CONDITIONS

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.

CLIMATIC PROFILE OF LONDON



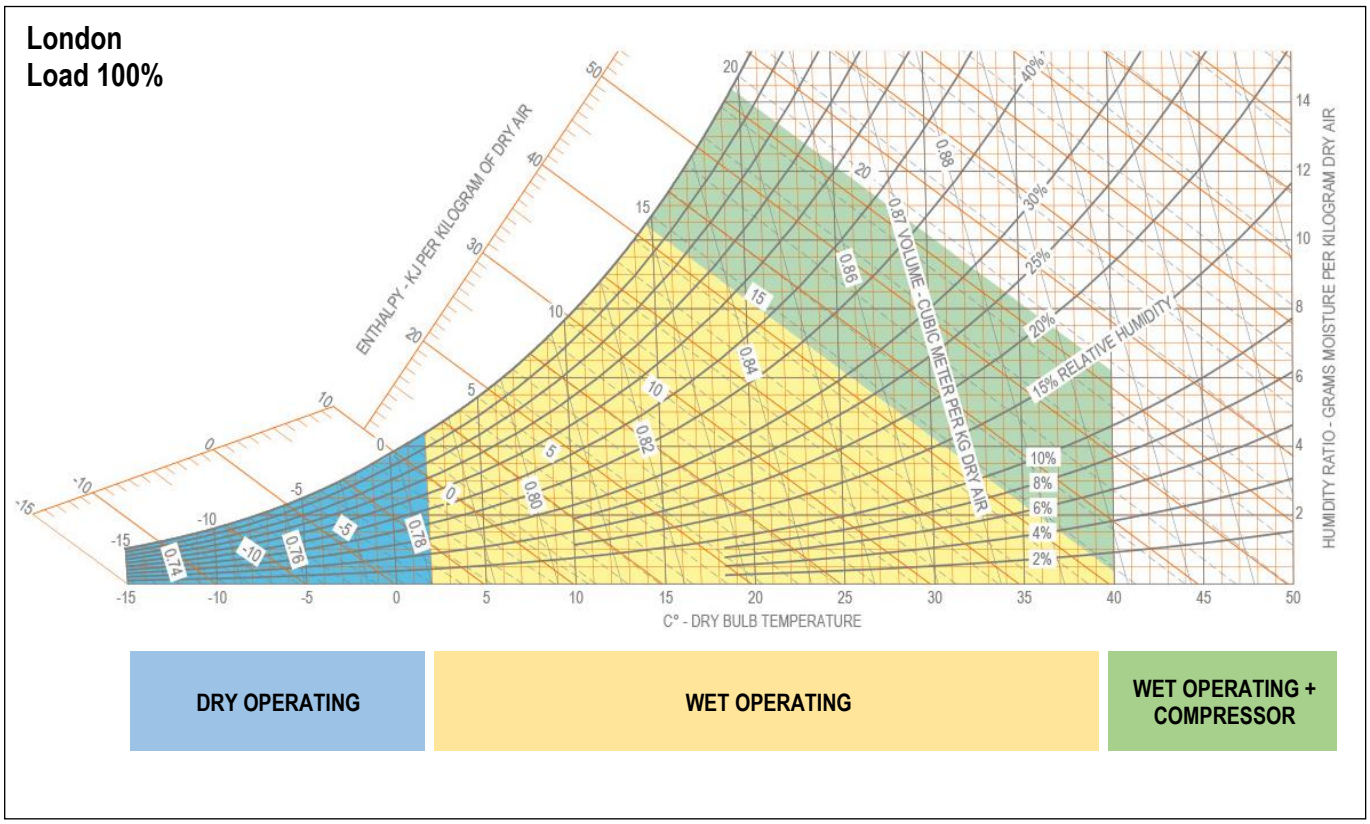


RC IT COOLING

WORKING EXAMPLE

THERMAL LOAD 100% - SITE LONDON

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



DRY OPERATION

FREE-COOLING
Up to ambient temperature of 2°C, the unit ensures the entire cooling capacity only using the ambient air as a coolant.

WET OPERATION

ADIABATIC COOLING
From ambient temperature of 3°C up to 18°C with 70% rH, the unit ensures the entire cooling capacity using the two stages adiabatic cooling system.

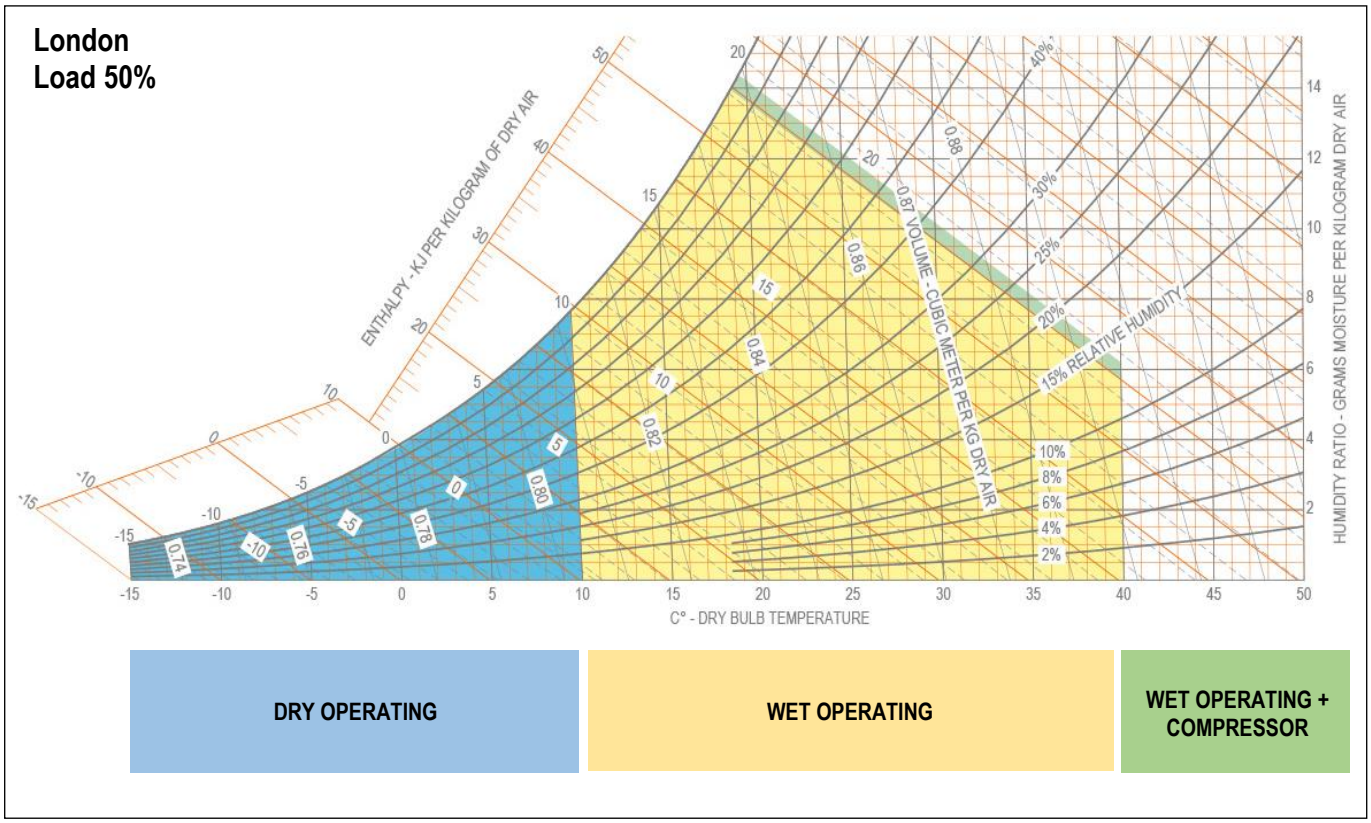
WET OPERATION + COMPRESSOR

ADIABATIC COOLING + MECHANICAL COOLING
From ambient temperature of 18°C with 70% rH up to 40°C, I the unit ensures the entire cooling capacity using the two stages adiabatic cooling system together with the mechanical cooling system (accessory).

RC IT COOLING

THERMAL LOAD 50% - SITE LONDON

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



DRY OPERATION

FREE-COOLING
Up to ambient temperature of 10°C, the unit ensures the entire cooling capacity only using the ambient air as a coolant.

WET OPERATION

ADIABATIC COOLING
From ambient temperature of 11°C up to 30°C with 37,7% rH, the unit ensures the entire cooling capacity using the two stages adiabatic cooling system.

WET OPERATION + COMPRESSOR

ADIABATIC COOLING + MECHANICAL COOLING
From ambient temperature of 30°C with 37,7% rH up to 40°C, I the unit ensures the entire cooling capacity using the two stages adiabatic cooling system together with the mechanical cooling system (accessory).

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;
- External air fans are protected by epoxy painting to allow operation in sea environment;

FILTER SECTIONS

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

- compact G4 efficiency, media in synthetic microfibers 98mm thickness;
  - Each filters stage is controlled by a pressure switch.

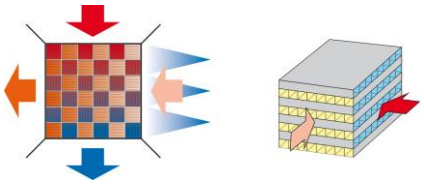
External air side: quick-remove green-designed filters:

- 95% ASHRAE gravimetric efficiency, G4, 98mm folded
  - 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;



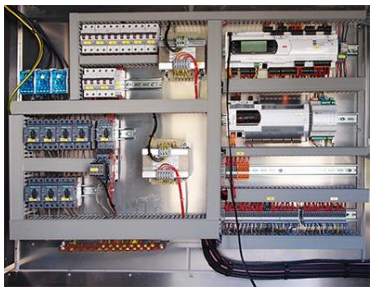
OPERATING LOGIC of THERMAL EXCHANGE
External Air side: series; the full external air flow crosses both exchangers in sequence;
Return Air side: parallel; half of the return air flow crosses the first exchanger, half the second.

ADIABATIC COOLING SYSTEM:
Nr. 2 x evaporative cooling and humidifying systems, one on each cross-flow exchanger, atomizing the water in fine droplets which, while spontaneously evaporating, remove heat from the humidified and cooled external air to indirectly cool the return air in the cross flow exchanger and increase the efficiency of the AHU. 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;
- Internal wiring numbered at both extremities using numbered ferrules;
- TT neutral system;
- Phase control relay;
- 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
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;
- Communication via MODBUS RC485 protocol.

RC IT COOLING

OPTIONAL ACCESSORIES

The descriptions of these additional components can be found in Chapter OPTIONAL ACCESSORIES.

- Mechanical cooling section. The system is included within the cabinet and includes one on/off scroll compressor, one BLDC inverter scroll compressor, an evaporator and a condensing coil.
- Partialization damper for low ambient temperature working mode. The damper is on 50% of the exchange surface to allow the most correct operation at low external air temperature.

OTHER ACCESSORIES

- Chilled water cooling section. The chilled water system is included within the cabinet and includes a chilled water coil and a 2-way valve for water flow regulation.
- System for the air pressure control in the under floor duct. The system controls the supply fans rotation speed in order to keep constant the air pressure in the under floor duct, or in general, the air delivery of the machine, via a differential pressure transmitter connected to the microprocessor control.
- Air delivery to the Data Center from the bottom of the unit. For roof installation.
- Air discharge on side or from the top of the unit.
- Non return motorized damper on Data Center air delivery to avoid air recirculation in case of machine's stops.
- Air filters. F7 efficiency.

WARNING

MEHITS reserves the right to accept the matching of the optional installed on the machine.

TECHNICAL DATA

MODEL		SIVIS 20	SIVIS 30	SIVIS 40	SIVIS 80
COOLING CAPACITY (1)					
Total	kW	**80**	**120**	**160**	**320**
Sensible	kW	**80**	**120**	**160**	**320**
SUPPLY AIR FANS	n.	4	4	4	8
Air flow	m³/h	20000	30000	40000	80000
Nominal external static pressure	Pa	100	100	100	100
Power input (2)	kW	7,9	9,0	9,4	18,8
Max power input	A	12,3	14,7	14,7	29,4
Operating current [OA] (2)	kW	13,0	21,5	18,8	37,6
Max operating current [FLA]	A	19,6	33,2	29,2	58,4
EXTERNAL AIR FANS	n.	2	2	3	6
Air flow	m³/h	15000	20000	27000	54000
Min Air flow	m³/h	5000	6670	9000	18000
Nominal external static pressure	Pa	0	0	0	0
Power input (2)	kW	4,5	5,5	8,8	17,7
Max power input	A	6,8	8,5	13,7	27,3
Operating current [OA] (2)	kW	7,0	9,4	14,1	28,2
Max operating current [FLA]	A	10,8	14,6	21,9	43,8
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
PLATE HEAT EXHANGERS					
Type		H2	H2	H2	H2
Dimension	mm	1000x1000	1400x1400	1700x1700	1700x1700
Length	mm	1800	2000	2000	2000
Plate spacing	mm	4	4	5	5
ADIABATIC SYSTEM					
Water flow - 1st stage	m³/h	0,10	0,15	0,202	0,404
Water flow - 2nd stage	m³/h	0,04	0,07	0,08	0,166
Electrical power input	kW	0,5	0,5	0,5	1,0
Absorbed current	kW	2,2	2,2	2,2	4,4
Max electric absorption [FLA]	A	3,6	3,6	3,6	7,2
Starting current [LRA]	A	5,9	5,9	5,9	11,8
ENERGY EFFICIENCY INDEXES					
SEER – load 100% (3)	m³/h	8,0	11,0	11,8	11,8
SEER – load 50% (3)	m³/h	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
DIMENSIONS					
Length	mm	5200	6500	7200	7200
Width	mm	2200	2350	2350	2 x 2350
Height	mm	2400	2800	3300	3300
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. Corresponding to the nominal external static pressure.
3. Referred to London Climatic conditions.

RC IT COOLING

ACOUSTIC DATA

Acoustic data of the standard machine at full load working conditions.

SIVIS

MODEL		SIVIS 20	SIVIS 30	SIVIS 40	SIVIS 80
SOUND LEVEL					
Indoor sound power level (in duct) [Lw] (1)	dB(A)	76,4	79,5	83,3	86,3
Outdoor sound power level [Lw] (1)	dB(A)	63,1	66,0	69,9	72,8

1. Sound power level Lw according to ISO EN 9614 – 2.

ELECTRICAL DATA

Maximum electric absorption (A) of the machine at maximum working conditions.
The values can be used for the calculation of the electrical cord section of main power supply.

SIVIS

MODEL		SIVIS 20	SIVIS 30	SIVIS 40	SIVIS 80
MAX ELECTRIC ABSORPTION					
Unit	A	35,7	54,0	57,4	114,9
Unit + mechanical cooling section	A	46,5	73,3	84,1	168,3

MICROPROCESSOR CONTROL SYSTEM

The microprocessor control system is equipped with 6 keys terminal and back lighted graphic display on which all information in different languages or easily identifiable symbols are displayed.
The system disposes of a "flash" memory that preserves the information even in absence of power supply. Part of memory is dedicated to the registration of intervened events - up to 100 events.

CHARACTERISTICS OF THE CONTROLLER

- CPU: 32 bit – 100 MHz
- 4 Mbyte FLASH memory that preserves the information even in absence of power supply
  - 2Mbyte dedicated to the recording of intervened events (records up to 100 events)
- Acoustic and optical signal of alarms
- On request BMS expansion cards

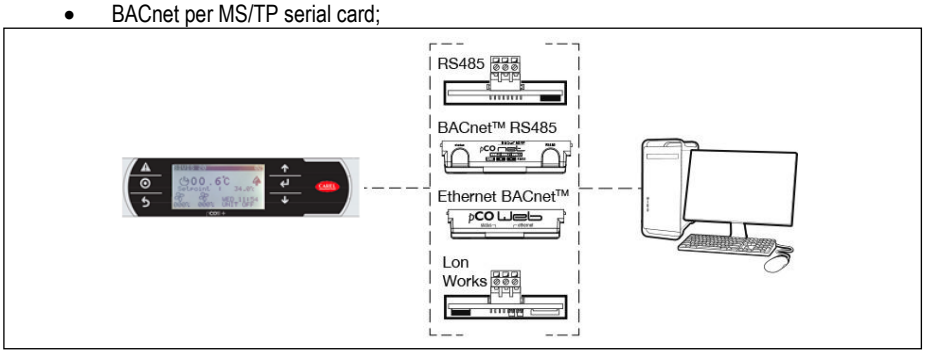
KEYBOARD FUNCTIONS

	ALARM	Press to access current alarms and faults. Press and hold to acknowledge alarms.
	PRG	Press once to access SETPOINTS. Press twice to access OPERATING SCHEDULE SETTINGS. Press three times to access CLOCK SETTINGS
	ESC	Go back to previous screen
	UP	Press to increase the selected value. From main screen: change display
	DOWN	Press to decrease the selected value. From main screen: change display
	ENTER	Press to confirm setting. Press and hold to start/stop the unit
	UP + DOWN	Press and hold together to access the Controller menu. (password protected).

CONNECTIVITY

Through the optional serial port, the microprocessor control enables communication with the modern buildings BMS systems with the following protocols:

- RCcom MBUS/JBUS (RS485) serial card;
- LON Works serial card;
- BACnet per Ethernet – SNMP – TCP/IP serial card;
- BACnet per MS/TP serial card;



PASSWORD

Level 1: Ask to MEHITS Service. Allowing the changes of MAINENANCE, COMMUNICATION, ALARMS HISTORY, ENERGY METER, INPUTS-OUTPUTS, METER RESET.

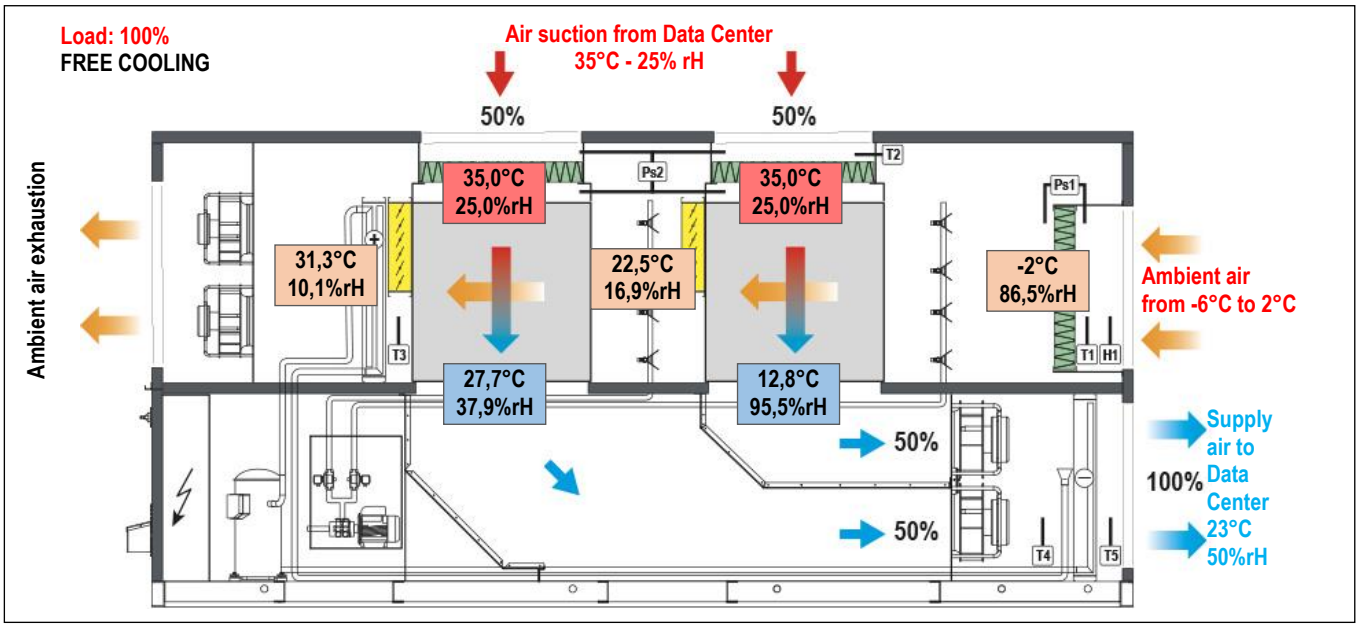
No passwords request to enter into: SETPOINT, OPERATING SCHEDULE, CLOCK SETTING

RC IT COOLING

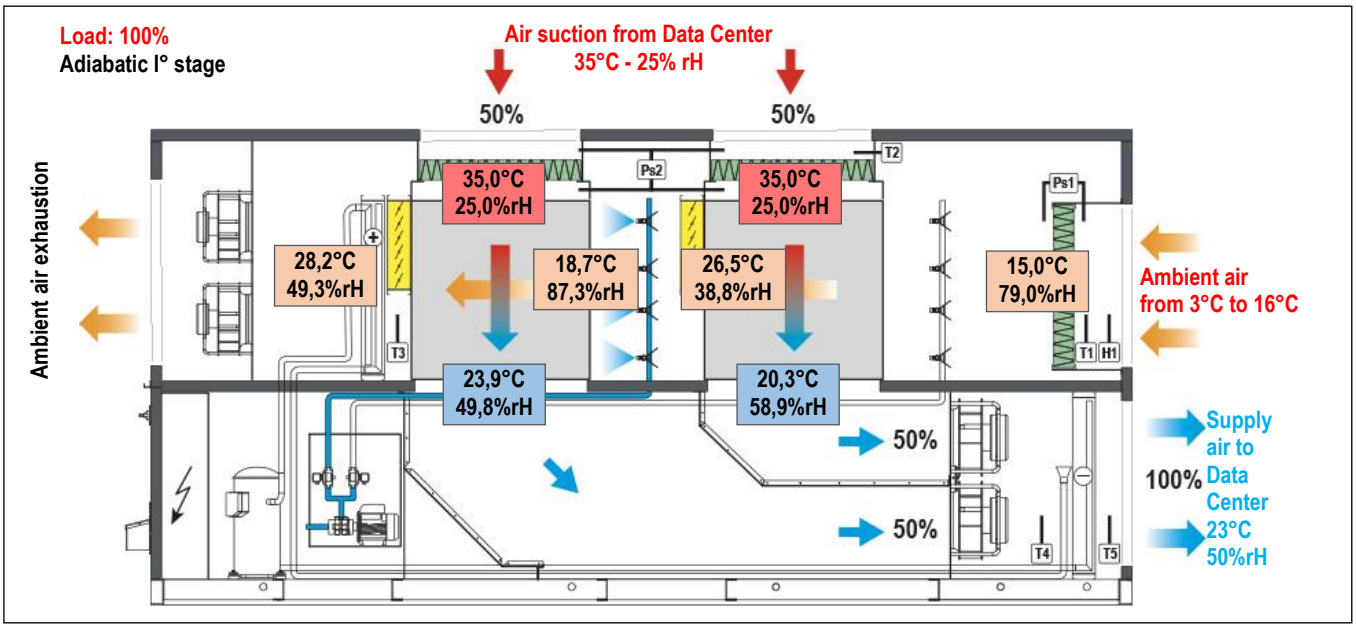
OPERATING MODE DIAGRAMS

EXAMPLE FOR LONDON

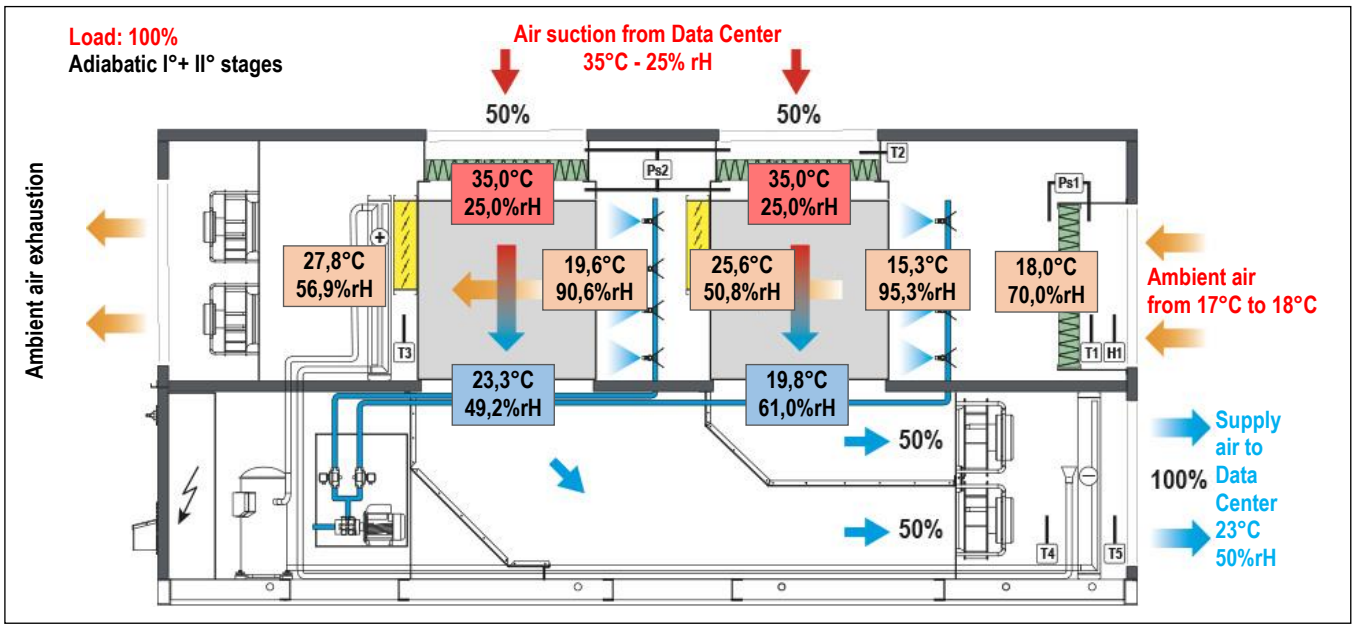
FREE COOLING: AIR FLOW CONTROL
Supply air temperature is maintained by adjusting exhaust air flow rate. At first, only half of the surface of the plate heat exchangers is used (with the installation of optional accessory partialization damper). The exhaust air flow rate progressively increases to the maximum according to the demand. Partialization dampers (optional accessory) progressively open as the exhaust air flow rate increases.



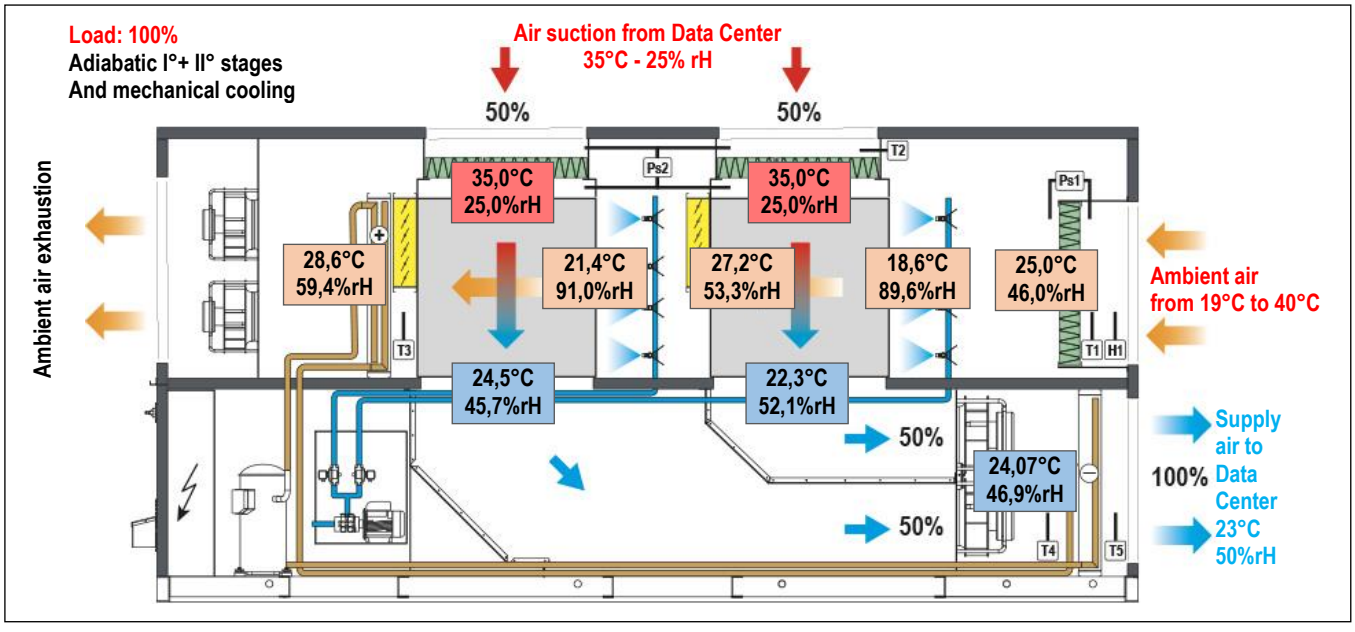
ADIABATIC FREE COOLING – FIRST STAGE OF ADIABATIC COOLING
Supply air temperature is maintained by adjusting water flow rate supplied to the atomisation rack.
Exhaust air flow rate is set to the maximum.



ADIABATIC FREE COOLING – FIRST AND SECOND STAGE OF ADIABATIC COOLING
Supply air temperature is maintained by adjusting water flow rate supplied to the atomisation racks.
Exhaust air flow rate is set to the maximum.



ADIABATIC FREE COOLING + MECHANICAL COOLING SECTION (OPTIONAL ACCESSORY) – FIRST AND SECOND STAGE OF ADIABATIC COOLING + MECHANICAL COOLING SECTION
When the stages of adiabatic cooling aren't enough to grant the proper air delivery temperature, Compressor 1 first starts alone (scroll BLDC inverter compressor) and is controlled according to supply air temperature. If even at full capacity, the set point is not reached, compressor 2 (on/off scroll compressor) is triggered. Compressor 1 is set back to minimum capacity and still controlled according to supply air temperature



The operation of the AHU is influenced by the climate.
An analysis of the climate profile of the city of installation is necessary.
Not all climates are suitable to Adiabatic Cooling System.
Climate with high temperature and high humidity are not appropriate for Adiabatic Cooling.
Mechanical cooling section (optional accessory) expand the operating conditions of the cooling system.

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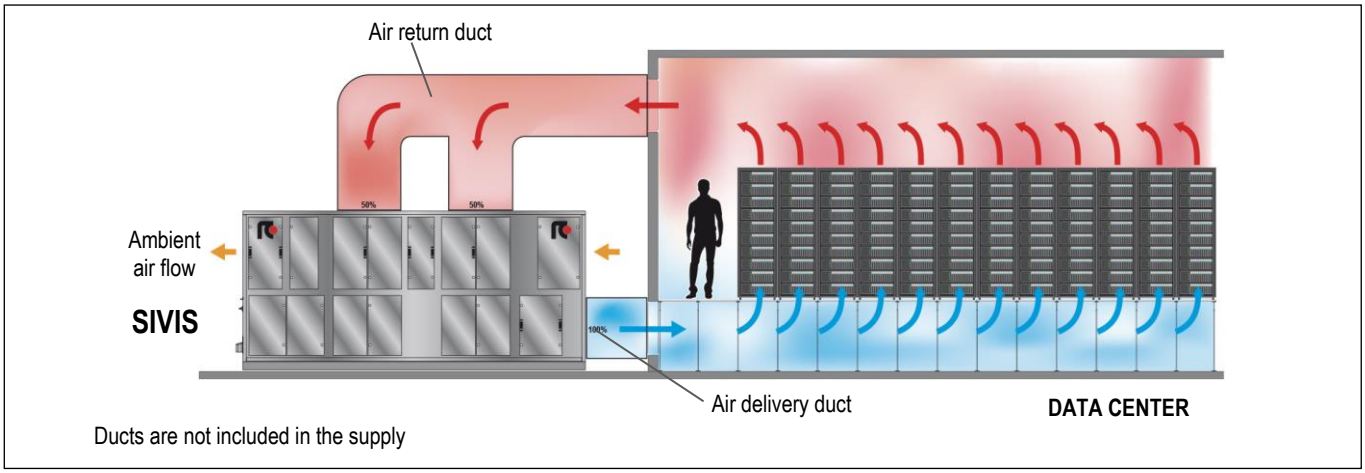
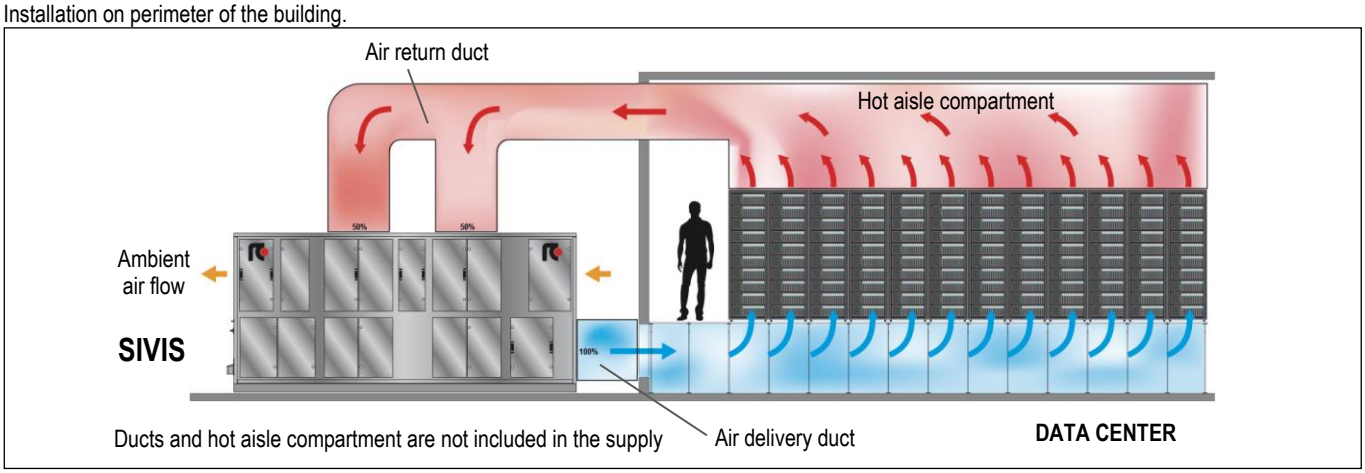
INSTALLATION DIAGRAMS

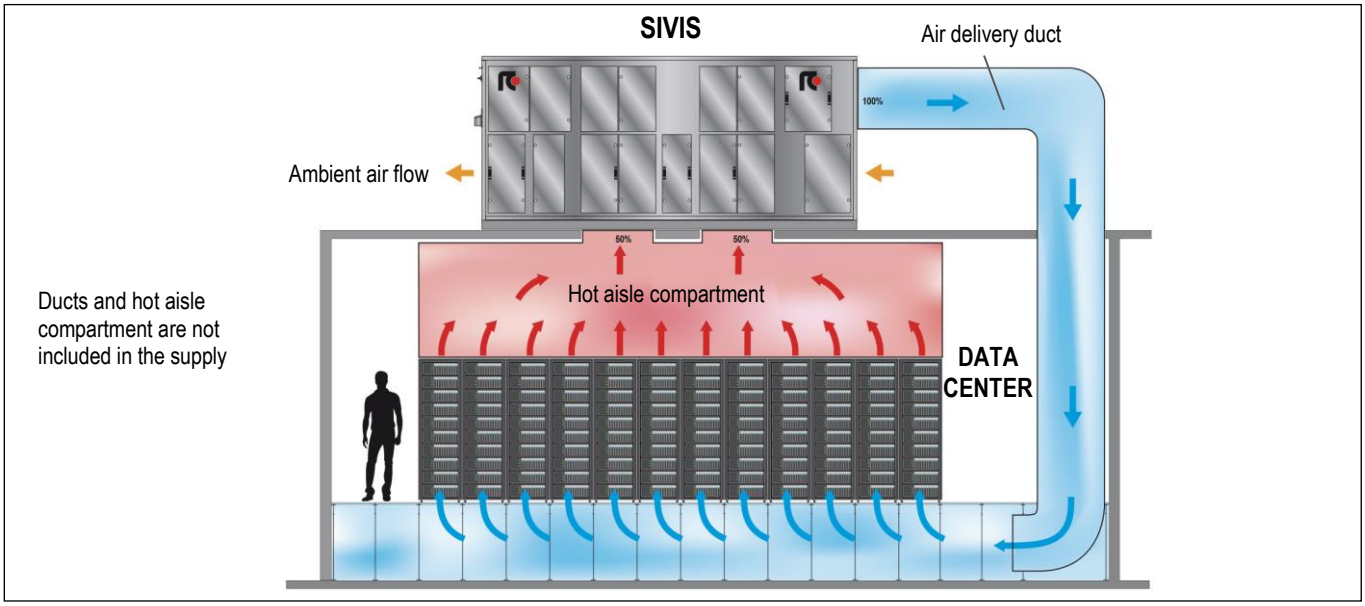
PERIMETER INSTALLATION:
Installation on perimeter of the building.



PERIMETER INSTALLATION WITH HOT AISLE COMPARTMENT:
Installation on perimeter of the building.



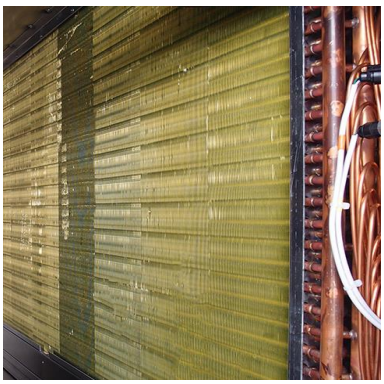
ROOF INSTALLATION WITH HOT AISLE COMPARTMENT:
Possibility of roof installation to reduce or eliminate the footprint around the Data Center building.



Equipment is modular in all configuration and can be installed side by side.

OPTIONAL ACCESSORIES - MECHANICAL COOLING SECTION

Mechanical cooling section is necessary when adiabatic system is not enough to grant the proper air delivery temperature to the data center in every working condition foreseen in the climate profile of the installation city.
Direct expansion mechanical cooling system DX can cover only a portion of the total cooling capacity of the equipment (60% approx.)
Mechanical cooling section is included within the equipment and includes one ON/OFF scroll compressor, one BLDC inverter scroll compressor, the evaporator and the condensing coil. BLDC inverter compressor maximizes the energy efficiency, furnishing only the strictly necessary cooling capacity to cover the plant load.
Condensing coil is always cooled by low temperature ambient air (cooled by adiabatic system). This features helps in reaching higher efficiencies.



COMPRESSORS

Nr. 2 x orbiting spiral (SCROLL) compressors parallel installation in single cooling circuit of which:

- Nr. 1 x orbiting spiral (SCROLL) hermetic compressors “BLDC inverter” type with spiral profile optimized for R410A refrigerant.
  - Inverter driven brushless type electric motor.
  - Modulating capacity control driver.
  - Reactance for the reduction of electromagnetic noise and interference.
  - Temperature sensor on compressor delivery for operating control, for the protection of all the machine compressors.
  - Crankcase heater.
  - Rubber supports.

- Nr. 1 x ON/OFF orbiting spiral (SCROLL) hermetic compressors with spiral profile optimized for R410A refrigerant.
  - 2-pole 3-phase electric motor with direct on line starting.
  - Crankcase heater.
  - Electric motor thermal protection via internal winding temperature sensors.
  - Terminal box with IP54 enclosure class.
  - Rubber supports.

EVAPORATOR

- Finned tubes type with copper pipe, aluminium fins and aluminium frame.
- Coils fins are protected with vinyl coating ensuring protection against corrosion in sea environment. The exchanger technology allows high COP and EER values at partial load operation and air flow modulation according to the requested capacity for an important reduction of fans power input.

CONDENSER

- Finned tubes type with copper pipe, aluminium fins and aluminium frame.
- Coils fins are protected with vinyl coating ensuring protection against corrosion in sea environment.

REFRIGERANT CIRCUIT

- Electronic expansion valves, for a more precise overheating control and so, energy consumptions reduction.
- Anti-acid filter drier.
- HP/LP switches.
- Refrigerant: R410A

CONTROL SYSTEM

- SRV system (variable cooling system) which permits a precise control of room conditions, limits compressors starting cycles and reduces electrical consumptions up to 30%.

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TECHNICAL DATA – MECHANICAL COOLING SECTION – SCROLL BLDC INVERTER COMPRESSOR

MODEL		SIVIS 20	SIVIS 30	SIVIS 40	SIVIS 80
BLDC COMPRESSOR					
Quantity	n.	1	1	1	2
Compressors power input (1)	kW	7,1	11,2	15,8	31,6
Compressors operating current [OA] (1)	A	10,3	18,39	25,43	50,86
Starting current [LRA]	A	5,21	10,48	14,7	29,4
TOTAL UNIT POWER INPUT					
At full load (1)	kW	19,2	23,3	30,4	60,8
Mechanical cooling ratio (1)	%	48,2	41,6	40,0	40,0
At full load (2)	kW	20,2	24,7	32,3	64,6
Mechanical cooling ratio (2)	%	55,1	48,7	47,3	47,3
ENERGY EFFICIENCY INDEXES					
EER (1)	kW/kW	4,2	5,2	5,3	5,3
EER (2)	kW/kW	4,0	4,9	5,0	5,0
REFRIGERANT		R410A	R410A	R410A	R410A
Total refrigerant charge	kg	34,5	44,6	51,1	102,2
Gas Circuits (*)	n.	1 or 2	1 or 2	1 or 2	1 or 2
HFC R410A - F Gas - CO_2 equivalent	t	72,03	93,12	106,69	213,39

(1) Referred to ambient air temperature 35°C - 35%RH
(2) Referred to ambient air temperature 40°C - 25%RH
(*) Available with single or double refrigerant circuit

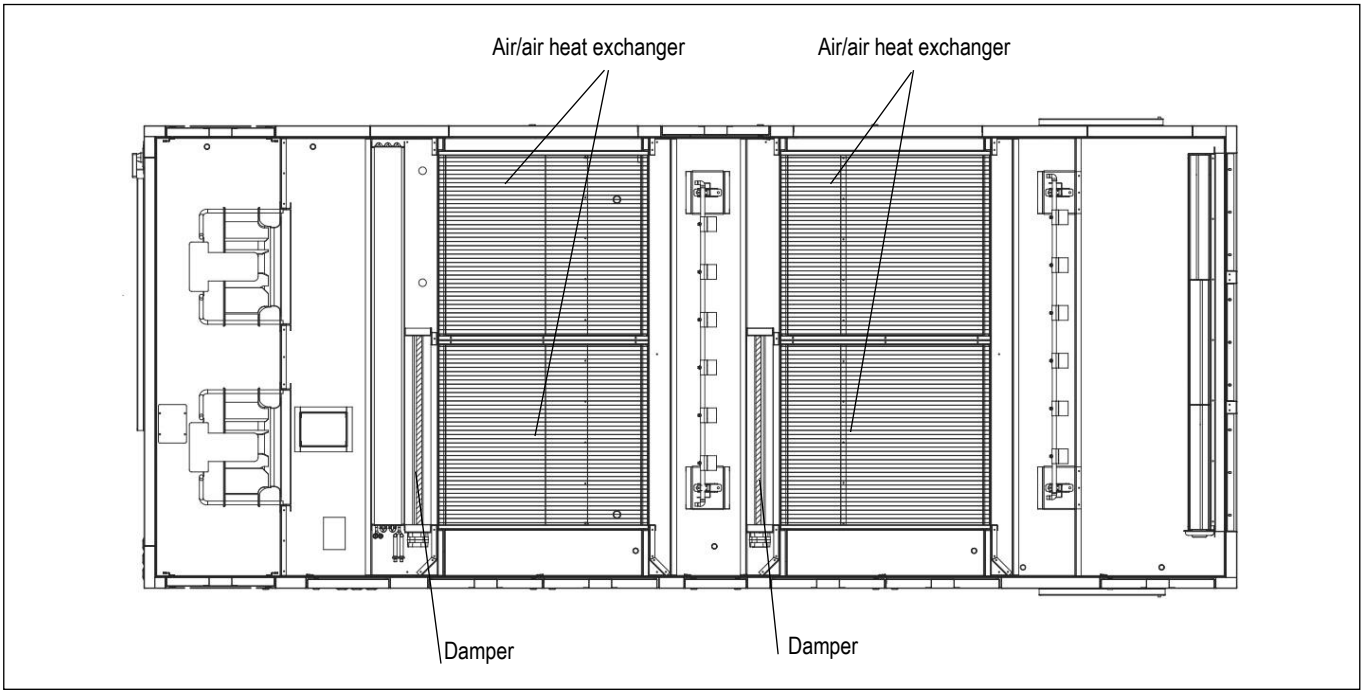
The units highlighted in this publication contain <HFC R410A [GWP_{100} 2088]> fluorinated greenhouse gas

OPTIONAL ACCESSORIES – PARTIALIZATION DAMPER FOR LOW AMBIENT TEMPERATURE WORKING MODE.

Each of heat exchange section is formed by two air/air heat exchangers placed side by side.
For operation with ambient air temperatures lower than -5°C, a damper as shown in picture is provided.

The damper is positioned downstream of the air / air heat exchanger and is controlled by a dedicated servo motor.

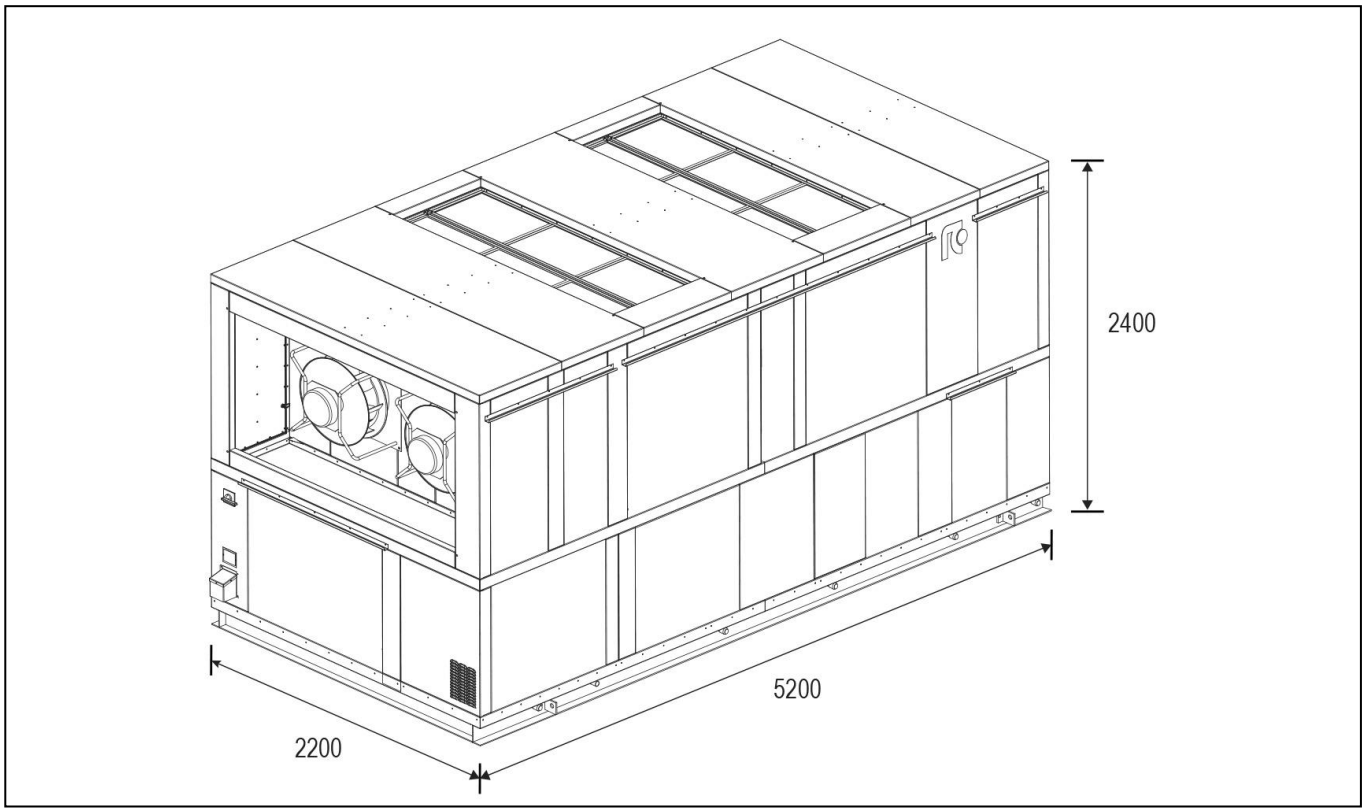
Supply air temperature is maintained by adjusting exhaust air flow rate. At first, only half of the surface of the plate heat exchangers is used (with the installation of optional accessory partialization damper). The exhaust air flow rate progressively increases to the maximum according to the demand. Partialization dampers (optional accessory) progressively open as the exhaust air flow rate increases.



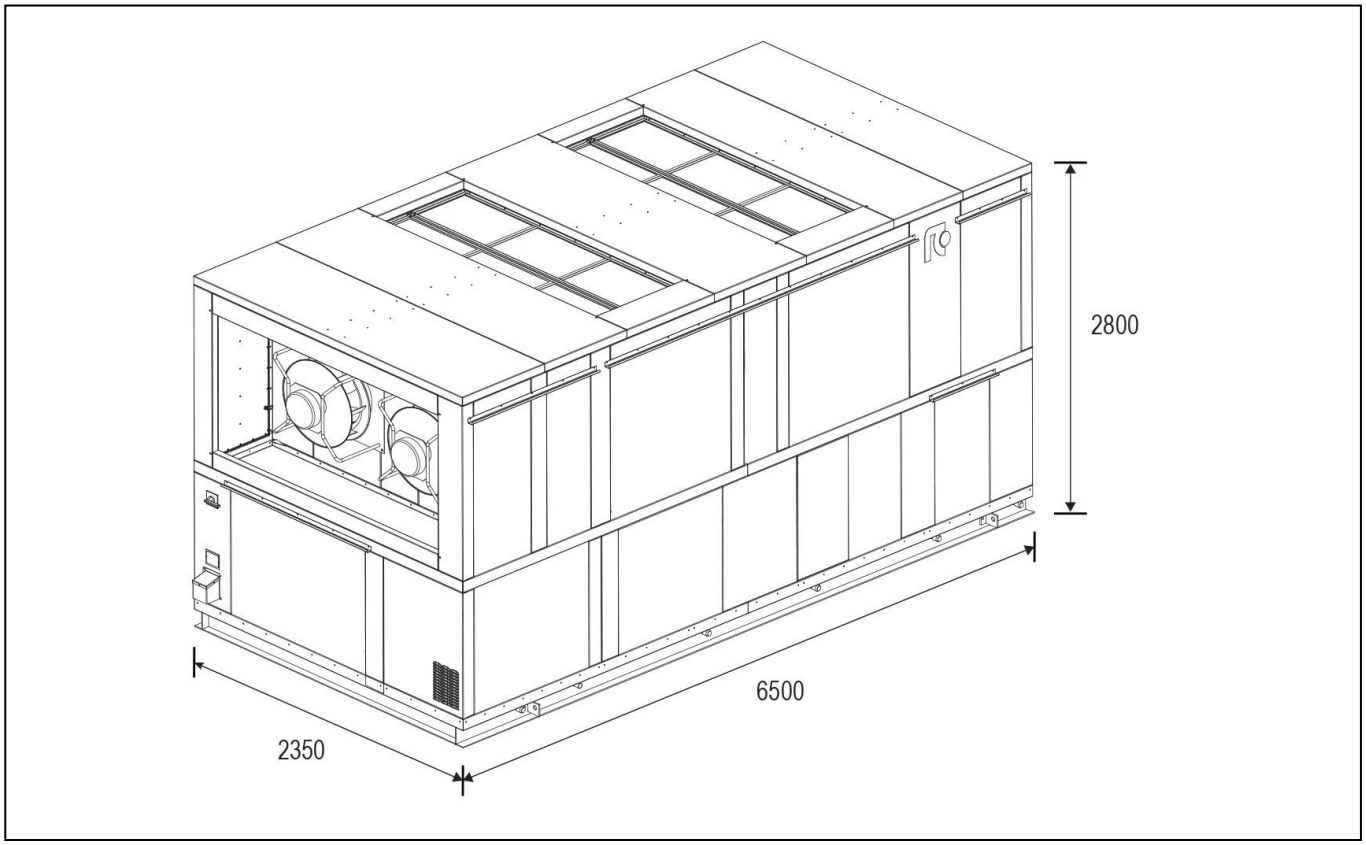
MACHINE DRAWINGS

Dimensions in mm

SIVIS 20

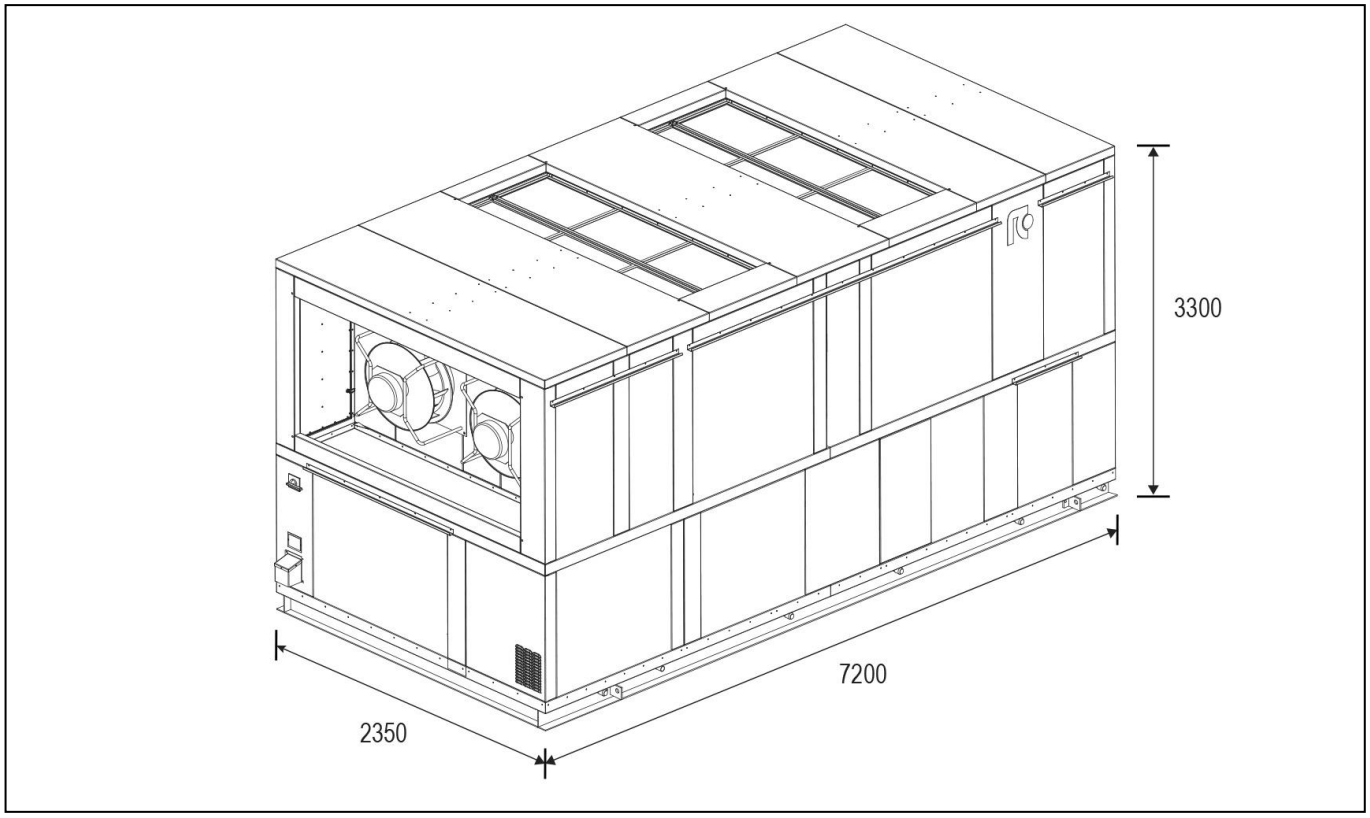


SIVIS 30

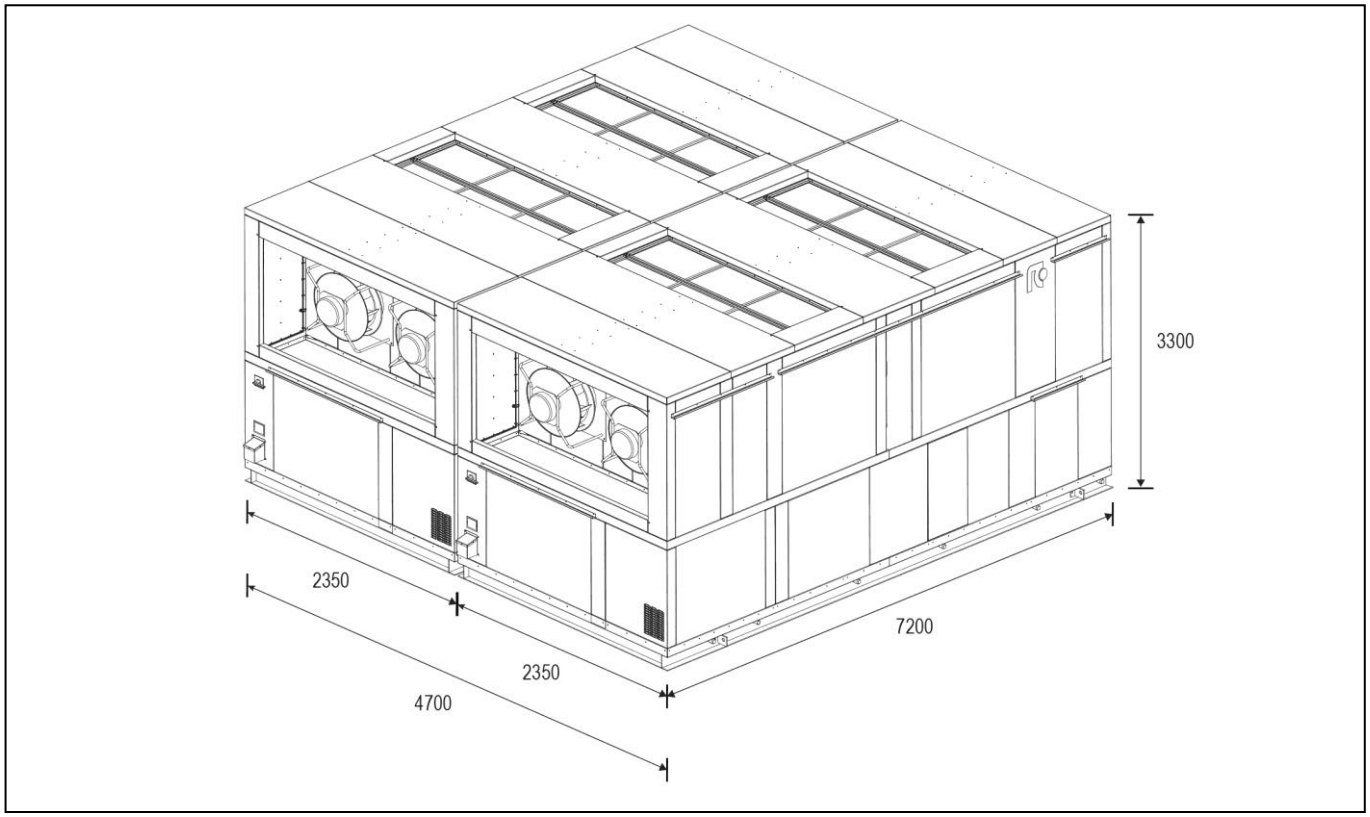


MACHINE DRAWINGS
Dimensions in mm

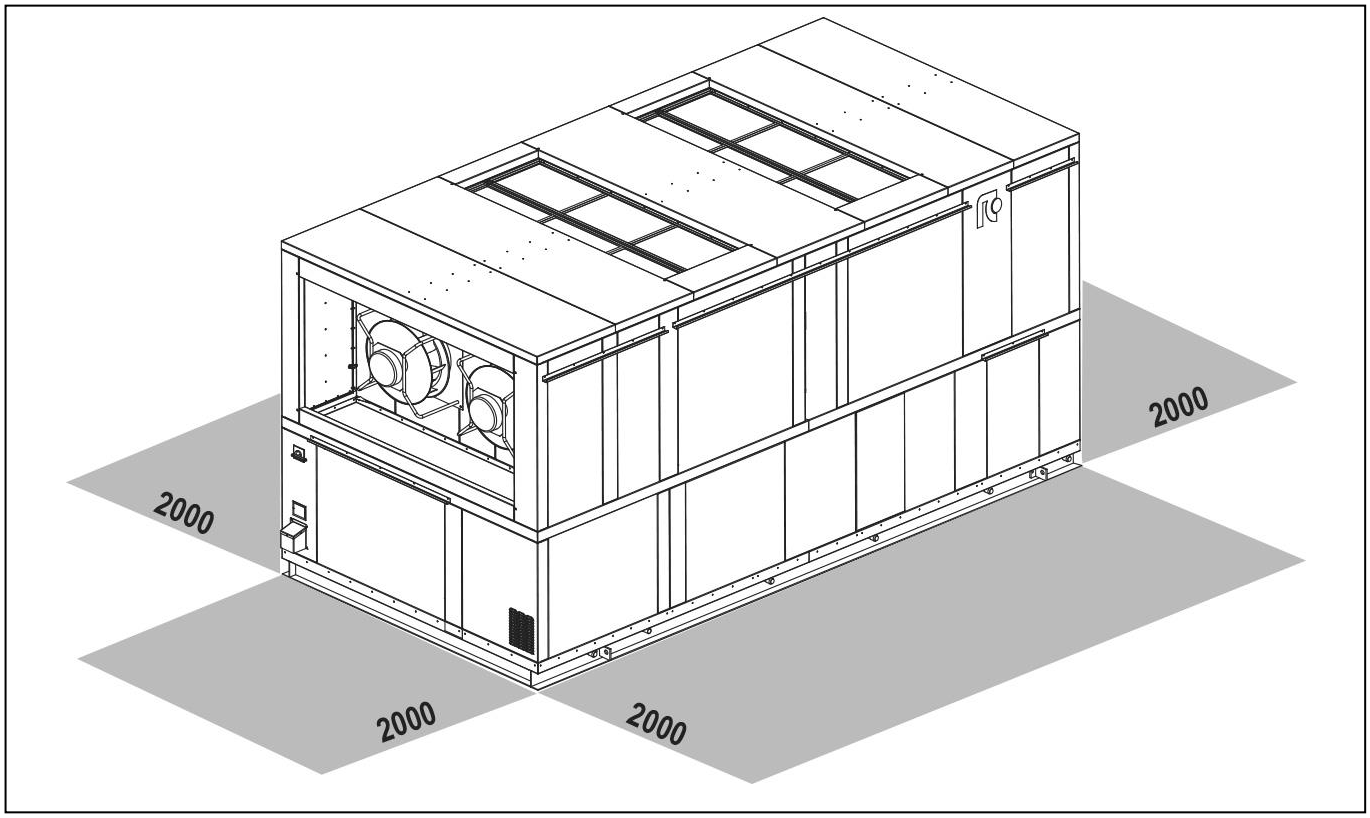
SIVIS 40



SIVIS 80



FREE SPACE FOR SERVICE



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