

ELFOEnergy Magnum - Multifunction

Air-cooled heat pump with simultaneous production hot / cold for outdoor installation

WSAN-XEM MF 50.4 - 120.4 RANGE

Nominal heating capacity (**A7/W45**) from 157 kW to 381 kW

Nominal cooling capacity (**A35/W7**) from 139 kW to 324 kW



- ▶ **R-410A MODULAR SCROLL TECHNOLOGY**
- ▶ **TWO INDEPENDENT REFRIGERATION CIRCUITS**
- ▶ **AXITOP FAN (optional for size 70.4 - 120.4)**
Silent operation and reduced fan consumptions
- ▶ **ECOBREEZE FANS (optional for size 70.4 - 120.4)**
For a further increase in efficiency
- ▶ **VARYFLOW + (optional)**
Variable water flow-rate with inverter pumps



Clivet hydronic system

Designed to provide high energy efficiency and sustainability of the investment, the wide range of Clivet liquid chillers and heat pumps for high efficiency air conditioning of Residential and Commercial spaces and for Industrial applications it is available with air or water source.

HYDRONIC System - Air Source

Small and Medium Commercial			Large Commercial and Industry		
ELFOEnergy Extended Inverter ELFOEnergy Duct Inverter/Horus ELFOEnergy Vulcan 5 ÷ 50 kW			ELFOEnergy Medium / Large¹ ELFOEnergy Vulcan Medium ELFOEnergy Duct Medium 25 ÷ 220 kW		
ELFOEnergy Magnum 50 ÷ 375 kW			SPINchiller¹ / SPINchiller¹ Duct Multi Scroll Technology 120 ÷ 680 kW		
SCREWLine¹ 690 ÷ 1350 kW 460 ÷ 1530 kW					
Products:			Products:		
Chillers:			Chillers:		
High Temperature Chillers External Air			High Temperature Chillers External Air		
Chillers Systems in two sections			Chillers Systems in two sections		
Free Cooling Chillers			Free Cooling Chillers		
Heat pumps			Heat pumps		
High temperature water Heat pumps			High temperature water Heat pumps		
Multi function Heat pumps			Multi function Heat pumps		
Ducted units			Ducted units		

Specialization

Every intended use has specific requirements which determine the overall efficiency. For this, the Clivet hydronic system always offers the best solution in every project.

- Modular range with over 8000 kW of overall capacity
- Capacity control with Screw and modular Scroll technology
- Multifunction versions
- Outdoor or indoor (ductable type) installation

Centrality of the Air Renewal

From the Air Renewal depends the comfort in the spaces. Since it often represents the main building energetic load, it also determines the running costs of the entire system.



ZEPHIR3

Packaged Primary Air supply system with thermodynamic energy recovery

- Simplifies the system, reduces the heating and cooling generators
- Purifies the air with the standard electronic filters
- Increases the energy efficiency and it also allows a savings of 40% on the running costs
- From -40°C to +50°C of outdoor air temperature

Terminal and AHU complete system

The hydronic terminal units are very diffused for their versatility and reliability. The Clivet range includes many versions that simplify the application in different type of installation and building.



ELFOspace

High energy efficiency hydronic terminal units

AQX

Air-conditioning unit

- Cased and uncased terminal units, from 1 to 90 kW
- Horizontal and vertical installation
- Energy-saving DC fans
- Modular air conditioning units up to 160.000 m³/h
- EUROVENT certification

ELFOEnergy Magnum: modular scroll technology for every application

MAGNUM MULTIFUNCTION

WSAN-XEM MF:

- Air cooled heat/cool heat pump with simultaneous operating
- EXCELLENCE high efficiency version
- 4-pipe system
- 2-pipe system and total condensing heat recovery



MAGNUM HEAT PUMP

WSAN-XEM:

- Air cooled heat pump
- EXCELLENCE high efficiency version



MAGNUM COOL ONLY

WSAT-XEM:

- Air cooled water chiller
- EXCELLENCE high efficiency version
- PREMIUM compact version
- Total/partial recovery of the condensing heat



MAGNUM HEAT PUMP HIGH TEMPERATURE

WSAN-XEM HW:

- Air cooled heat pump
- EXCELLENCE high efficiency version
- Production of hot water up to 65°C
- Extended operating range



MAGNUM FREE-COOLING

WSAT-XEM FC:

- Air cooled water chiller with FREE-COOLING
- Direct FREE-COOLING
- Indirect FREE-COOLING (No Glycol)



Many applications require heating and cooling simultaneous production

Simultaneous opposite loads is a very frequent situation in many applications.

Large size buildings, aspect, variable insulation and different purpose ambient make recurring the request of heating and cooling simultaneously.

Many different technical solutions could be used at this purpose. Clivet believes since ever that solution differentiation is the key for success and consequently present diversified solutions for answering to only apparently similar demands.



Traditional way

The solution very common in the past is the independent production of heating and cooling thermal energy and transferring them to different ambient.

Thermal energy production thanks to one or many boilers and cooling power production with chillers is one possible solution.

Low efficiency of such kind system is well known, indeed during the periods where cooling and heating are simultaneously required, cooling energy production rejects a large quantity of thermal energy to a source and this is the working principle of a standard chiller, energy that could be used instead, supporting for example other thermal energy sources or as total replacement.



Enhanced hydronic system

Clivet, since ever pioneer of innovative solutions proposes Enhanced hydronic system as optimal solution for 90% of applications where simultaneous opposite loads are present.

Building blocks are:

- Magnum or SPINChiller heat pump;
- Primary Energy decentralized system Zephir;
- ELFOspace fancoils



Thanks to a proper primary air design and using Clivet products around 30% annual energy saving is achievable and with a more competitive capital investment*.

MULTIFUNCTION Option

Hydronic multifunction units, able to produce hot water and chilled water simultaneously and independently is the optimal solution for some industrial applications or where the four pipe air conditioning system is required.

Heat pump product family called MULTIFUNCTION (MF) is the Clivet answer.

*Dedicated documented.

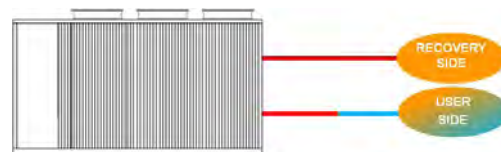
MULTIFUNCTION by CLIVET

ELFOEnergy MAGNUM and SPINChiller³ MF are the two air source heat pump families for simultaneous production of hot and chilled water.

Configuration available:

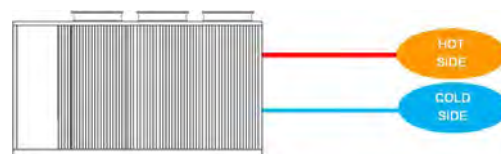
- **2T:** supply water for two pipe systems

- produce chilled water or hot water to the system;
- supply hot water using the total recovery device for domestic hot water tanks, pre or post heating simultaneously with chilled water production;



- **4T:** supply water for four pipe systems;

- produce chilled water and hot water to the system simultaneously and independently.



360° of efficiency

During a whole year and during the same day heating and cooling demand hugely vary with hot-cool combinations very unstable, function of many factors, among others: latitude and altitude of installation, building features and functionalities of different ambient.

Unit will mainly work in simultaneous heating-cooling mode with varying combinations over the time.

Clivet unit distinguishes for this working mode offering the best efficiency performance thanks to used solutions.

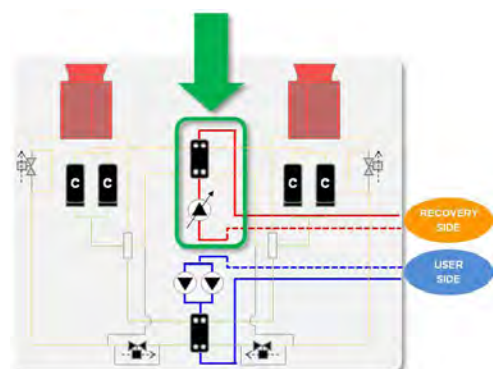
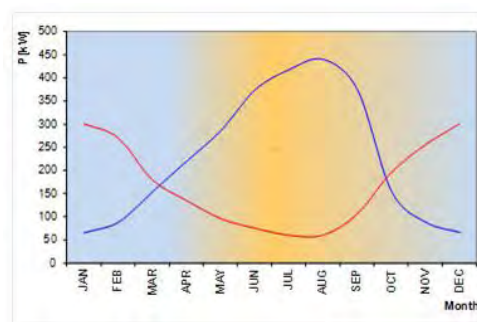
Refrigerant scheme allows both the partial and the total recovery mode for the MULTIFUNCTION heat exchanger according to thermal energy required.

Completely automatic set-up and system control logic adjusts the mode according the most efficient performance.

Completely automatic set-up and system control logic adjusts the mode according the most efficient performance. During a whole year more than half of energy provided is produced during unbalanced capacity demand where MULTIFUNCTION offer the best performances. Using the heat exchanger as a partial recovery device drives to an higher efficiency of 5% compared to solutions not using this working mode.

Real benefits in terms of efficiency and reliability:

- Few mode switches, reset where thermal capacity is less than 25% of cooling capacity;
- Improved reliability thanks to modulation and without on-off switches;
- Precise set-up thanks to modulation with less mode switches;
- Additional 3% savings on annual energy consumption comparing to standard multifunction units.

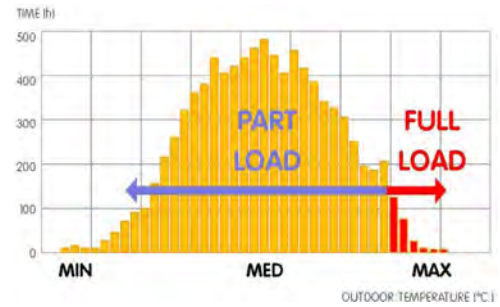


Maximum efficiency is necessary with a part load

The system is required to generate maximum capacity only for a short amount of time.

Therefore, it is essential to have the maximum efficiency under part-load conditions.

This is the only way to actually reduce overall yearly consumptions.



Magnum technology enhances part-load efficiency

Magnum uses high efficiency Scroll compressors.

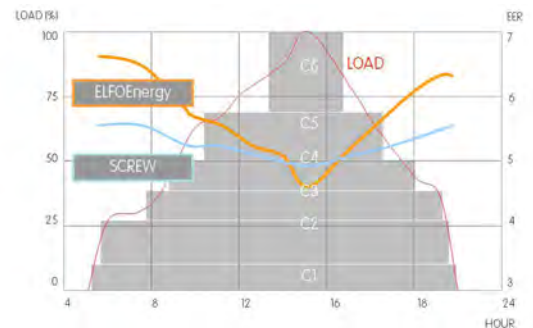
The advantages are:

- compressors manufactured in large ranges on an industrial scale with strict quality control inspections and maximum manufacturing reliability thanks to the high production volumes.
- every refrigeration circuit uses two or three Scroll compressors, depending on the different sizes of the unit. When two compressors are used, their sizes are different in order to obtain more control steps. This way, only the necessary energy is supplied

Efficient precision

Sequential activation of ELFOEnergy Magnum compressors allow:

- adapting to the load required for use, thereby ensuring added comfort
- reducing the number of compressor start-ups, i.e., the main cause of wear
- increasing the unit's useful life
- reducing repair times and costs, thanks to the modular components, their reduced dimensions and reduced cost compared to semi-hermetic compressors.



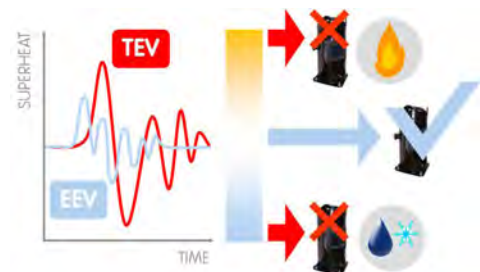
THE NUMBER OF START-UPS DECREASES THEREFORE THE LIFE CYCLE INCREASES

Control of the refrigerant flow

The load variability involves the continuous variation of the refrigerant volume moved by compressors.

The electronic expansion valve (EEV), standard on Clivet units, adapts rapidly and precisely to the actual load required for usage, allowing stable and reliable control in comparison with mechanical thermostatic valves (TEV). This results also in a further increase in efficiency and longer compressor life.

The overheating control allows preventing phenomena that are hazardous to the compressors, such as overtemperature and return fluids, thereby increasing even more efficiency and durability.



Doubled efficiency

The heat exchange surface is sized for full capacity operation. Under part load condition, some compressors are automatically deactivated. Under this condition, in fact, the compressors in operation make use of a much larger surface.

This entails a reduced condensation temperature and an increased evaporation temperature. This way, the compressor capacity consumption is reduced with respect to the yield thereby increasing the overall efficiency of the unit.



EERc = Energy efficiency referred to compressors

Efficient and silent ventilation technology (optional)

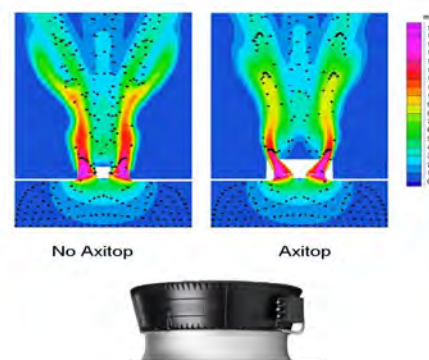
Available only for size 70.4 ÷ 120.4.

It is possible to further increase the seasonal efficiency with the innovative air handling system on the external exchangers.

The new AxiTop diffuser creates an ideal air distribution: it aerodynamically decelerates the flow and transforms a big part of its kinetic energy in static pressure.

All AXITOP components are aerodynamically optimized enhancing significantly the efficiency and reducing the impeller speed and consequently the noise. Obtaining:

- down to -3 dB of silence
- reduction of 3% of the absorbed energy



ECOBREEZE fans, electronically controlled (optional)

Available only for size 70.4 ÷ 120.4.

With ECOBREEZE, the electric motor with an external rotor is driven by the continuous magnetic switching of the stator, deriving from the integrated electronic control.

The advantages are:

- **70% increase in efficiency** thanks to the brushless technology and the special electricity supply;
- **increase in the working life**, thanks to the elimination of the brush wear;
- **Reduction in the electrical consumption by the system**, thanks to a drastic reduction of the inrush current for the fans obtained using the integrated 'Soft starter' function.

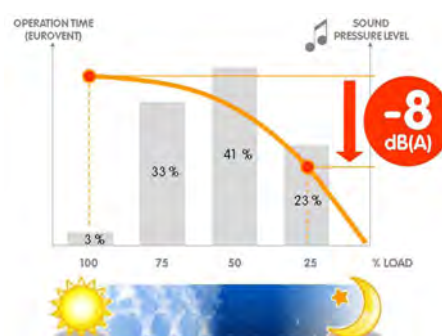


Fans at variable speed for minimal noise emission

All units are supplied with a **condensation electronic control**. It automatically reduces the fan speed as the heat load drops.

Since the fans are the unit's main noise source, the benefits are evident especially during the night hours, when the load is reduced but sensitivity to noise is enhanced.

All this translates into a **sound pressure reduced down to 8 dB(A)** compared to full load operation in 90% of operating time of the unit.



Water flow-rate continuous modulation (optional)

The energy used for the vector pumping is fundamental on the seasonal efficiency.

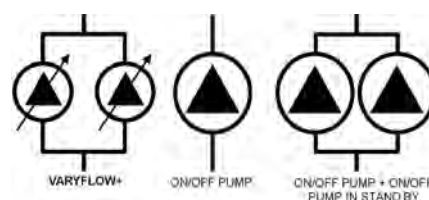
The **VARYFLOW + modulating pumping** unit made up of two pumps in parallel controlled by inverter, allows a precise water flow-rate modulation reducing notably the consumptions and at the same time it guarantees its functionality also in case of temporary unavailability of one of the two pumps, guaranteeing about the 80% of the nominal flow-rate.

The **water flow-rate** is modulated by keeping the supply/return water temperature differential constant

If the installation water temperature is in critical conditions, **VARYFLOW+** allows to extend the ELFOEnergy Magnum operating ranges guaranteeing the operating.

In case of particular installation needs, the hydronic assemblies are also available:

- **ON/OFF pump:** the traditional solution with high available pressure
- **ON/OFF pump + ON/OFF pump in stand-by:** the solution that favours reliability. The built-in control balances the operating hours of the two pump and in case of any failure it signals the damage and automatically activates the stand-by pump.



Built-in inertial accumulation available (optional)

In most Magnum systems it can be installed without inertial accumulation on the system. In fact, the unit quickly adapts to the load due to modular compressors, electronic thermostatic valve and low water content plate heat exchangers. However, in the event of hydraulic distribution networks with reduced dimensions, it is important to provide the system with a hydraulic flywheel. In such cases, inertial accumulation is available built-in, equipped with insulating coating and all the necessary safety devices. This allows eliminating installation times and costs and freeing space inside the building.

Advanced control

The control system combines in a single solution the operating efficiency and the user-friendliness.

Continuously monitoring all of the unit operating parameters, it ensures the maintenance of an optimal energy efficiency.

The control includes many safety functions and a complete alarm management.

It also includes advanced functions, such as daily and weekly programming and automatic maximum power consumption limitation (demand limit).

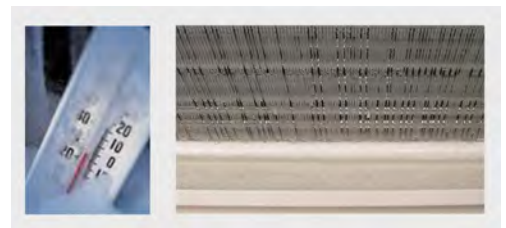
It allows the management of several units in cascade up to 1 master and 6 slave (Ecoshare)

The interface terminal is equipped with a backlit graphic display and a multifunction access keyboard. The multilevel menu is protected by different passwords according to the type of user.



Smart management of defrosts

The automatic defrost cycles on the remaining external exchanger surface are managed in **ALTERNATED mode for each refrigeration circuit**, guaranteeing the 50% of the delivered capacity. The built-in electronic control analyzes not only the external conditions but also the evaporating pressure variations in the exchanger.



Coils protected against the formation of ice

The particular technology of the heat pump developed by Clivet guarantees its continued and reliable operation.

The ICE PROTECTION SYSTEM device prevents icing on the base of the external exchanger during winter operation, thanks to a special subcooling circuit. This prevents damages caused by freezing.



Remote system management

Magnum is standard equipped with:

- potential-free contact for remote on-off control
- potential-free contacts for remote display of the compressor status
- setting from user interface: Off / local On / serial On
- potential-free contact to remote any possible alarm

The various communication protocols allow the unit to exchange information with the main supervision systems by means of serial connections.

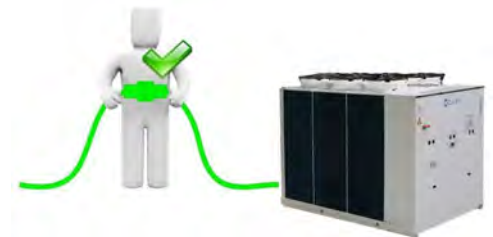


Controlled power supply

Proper power supply ensures optimal unit operation and protects its many electrical components.

The phase monitor, standard supplied.

- controls the presence and the exact sequence of the phases
- checks any voltage anomalies (-10%)
- automatically restarts the unit as soon as the proper power supply is restored.



Modularity

In the event of particularly large buildings requiring high capacities, it is advisable to use several units.

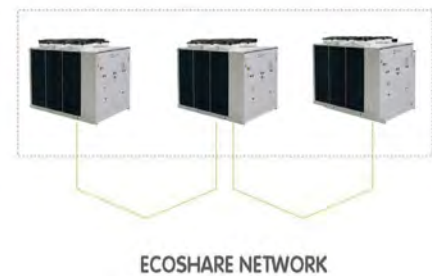
The Magnum units are designed to be connected in parallel in modular logic, thereby granting the following advantages:

Increased flexibility, enhanced by the control that can adapt to the load

Increased reliability, since the malfunction of one unit does not compromise the capacity supply of the other units.

Increased efficiency, since energy is produced where and when required, according to the served area.

The microprocessor control combined with ECOSHARE allows controlling up to 7 units in local network (1 Master unit and 6 Slave).



Standard unit technical specifications

Compressor

First circuit: Hermetic scroll compressors in tandem, equipped with a motor protection device for overheating, overcurrents and excessive temperatures of the supply gas. They are installed on anti-vibration mounts and equipped with oil charge. An oil heater, which starts automatically, keeps the oil from being diluted by the refrigerant when the compressor stops.

Second circuit: Hermetic scroll compressor in tandem equipped with a motor protection device for overheating, overcurrents and excessive temperatures of the supply gas. They are installed on anti-vibration mounts and equipped with oil charge. An oil heater, which starts automatically, keeps the oil from being diluted by the refrigerant when the compressor stops.

Structure

Supporting structure realised with steel frame with zinc-magnesium superficial treatment painted with polyester powder RAL 9001, that ensures excellent mechanical features and high long-term resilience against corrosion.

Panelling

External pre-painted zinc-magnesium panelling that ensures superior resistance to corrosion for outdoor installation and eliminates the need for periodical painting. The panels can be easily removed to fully access internal components and are lined with sound-proof material on the inside to contain the unit's sound levels.

Internal exchanger

Direct expansion heat exchanger, braze-welded AISI 316 stainless steel plates with large exchange surface and complete with external heat and anti-condensate insulation.

The exchanger is complete with:

- differential pressure switch, water side
- antifreeze heater to protect the water side exchanger, preventing the formation of frost if the water temperature falls below a set value.

Total recovery exchanger

Direct expansion heat exchanger, braze-welded AISI 316 stainless steel plates with large exchange surface and complete with external heat and anti-condensate insulation.

The exchanger comes complete with:

- differential pressure switch, water side
- antifreeze heater to protect the water side exchanger, preventing the formation of frost if the water temperature falls below a set value.

External exchanger

Direct expansion finned exchanger, made from copper pipes in staggered rows and mechanically expanded to the fin collars. The fins are made from aluminium with a corrugated surface and adequately distanced to ensure the maximum heat exchange efficiency.

Fan

Helical fans with shaped aluminium blades coupled directly to a three phase electric motor with thermal protection incorporated in version IP 54. Located in aerodynamically shaped nozzles to increase efficiency and minimise noise levels. They are fitted with protective safety guard grilles and supply with variable speed electronic control (phase cutting).

Refrigeration circuit

Double refrigeration circuit complete, for each circuit, with:

- replaceable anti-acid solid cartridge dehydrator filter
- high pressure safety pressure switch
- high pressure transducer
- low pressure transducer
- liquid receiver
- liquid separator
- refrigerant temperature probe
- double electronic thermostatic expansion valve
- inversion valve of the 4-way cycle
- non-return valve
- high pressure safety valve
- low pressure safety valve
- cutoff valve on compressor supply
- cutoff valve on liquid line

Electrical panel

The capacity section includes:

- main door lock isolator switch
- isolating transformer for auxiliary circuit power supply
- on-off "C1" and "C2" scroll compressor protection magnetothermic
- inverter scroll compressor protection fuses (size from 50.4 to 65.4)
- fan overload circuit breakers (size from 70.4 to 120.4)
- on-off "C1" and "C2" scroll compressor control contactor

The control section includes:

- interface terminal with graphic display
- display of the set values, the error codes and the parameter index
- keys for ON/OFF control, cool and heat operating modes, alarm reset
- proportional-integral water temperature control
- daily, weekly programmer of temperature set-point and unit on/off
- set point compensation in function of the outdoor air temperature
- set-point compensation with signal 0-10 V
- unit switching on management by local or remote (serial)
- antifreeze protection water side
- compressor overload protection and timer
- prealarm function for water antifreeze and high refrigerant gas pressure
- self-diagnosis system with immediate display of the fault code
- automatic rotation control for compressor starts
- compressor operating hour display
- Input for remote ON/OFF control
- relay for remote cumulative fault signal
- inlet for demand limit (power input limitation according to a 0÷10V external signal)
- digital input for double set-point enabling
- potential-free contacts for compressor status
- phase monitor
- ECOSHARE function for the automatic management of a group of units
- 0÷10V signal output and potential-free contact for auxiliary heater
- enabling of DHW preparation in relation to remote consent
- numeration of electrical panel cables

Unit equipment with low outdoor temperatures

Minimum outdoor air temperature	Operating unit		Unit in stand-by *** (fed unit)	Unit in storage (unit not fed)
	Freddo*	Caldo**		
+11°C	√ standard unit	√ standard unit	√ standard unit	√ standard unit
+2°C				
-5°C				
-7°C				
-10°C	√ standard unit	√ standard unit	√ standard unit	√ standard unit
Tra -10°C e -15°C	NOT POSSIBLE	√ glycol in an appropriate percentage (1)	√ glycol in an appropriate percentage (1)	NOT POSSIBLE

Data referred to the following conditions:

* Production of chilled water:
internal exchanger water = 12/7°C

** Production of hot water:
internal exchanger water = 30/35 °C

*** consider the unit powered electrically, with active control on pumping units. It is recommended to set a set-point value lower than standard (eco mode)

1. Operating range where the water pumping unit must be powered and always active, or with a periodical activation of the outdoor temperature operating pump to guarantee the correct unit operation

At the unit start-up the water temperature or water with glycol must be inside the operating range indicated in the "Operating range" graph.

To know the water freezing temperature at the glycol percentage changing refer to the specific "Correction factor for antifreeze solutions" table.



Air conditions which are at rest are defined as the absence of air flowing towards the unit. Weak winds can induce air to flow through the exchanger and air-levels which can cause a reduction in the operating range. In the presence of predominant winds it is necessary to use suitable windbreak barriers.

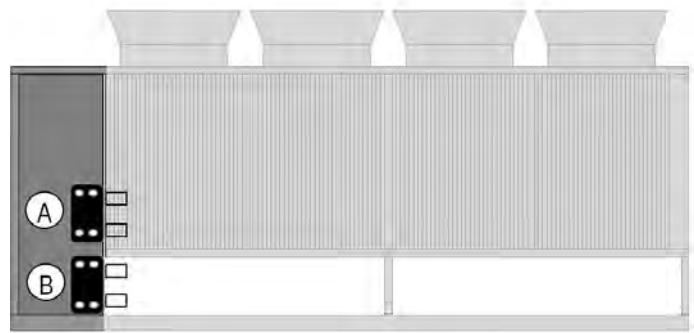
4T configuration - For 4-pipe systems

4T configuration supply air conditioning systems with 4 tubes and it is able to supply hot water and chilled water simultaneously and independently on season.

This configuration allows:

- Simultaneous hot water production to the hot user side with chilled water production to the cold user side;
- Hot water production to the hot user side with cooling capacity rejection to the external thermal source;
- Chilled water production to the cold user side with heating capacity rejection to the external thermal source.

Unit controller guarantees unit operation in mix mode conditions.



A: cold user side exchanger
B: hot user side exchanger

Considerations on the installation

Desuperheater mode

The standard unit control at part load changes the water flow-rate, hot side, maintaining the supply temperature at the target value. Through the flow modulation the standard unit can produce hot water even over the set-point, up to a settable limit temperature (default 65°C). Thanks to this setting the exchanger operation time, hot user side, is extended in desuperheater mode, improving the unit efficiency of 5% compared to the desuperheater mode not active.



The logic of control above described drives to a proper design of hydraulic components and safety devices, considering the upper limit of hot water. It is possible to decrease this temperature down to the set point, not having the energy efficiency benefits that desuperheater solution leads.

System water volume

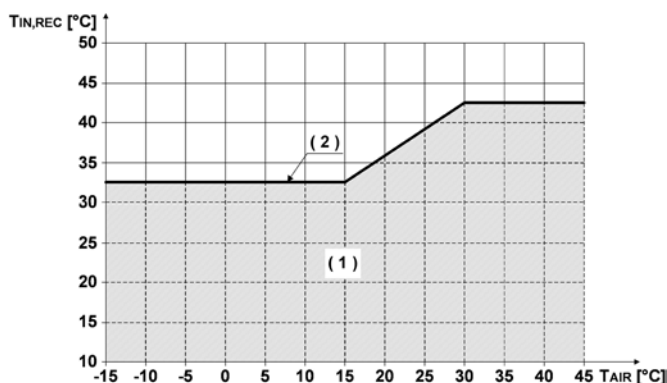
For a proper operation of MULTIFUNCTION 4T unit is necessary to contemplate a correct design of water tanks both on cold user side and hot user side.

Minimum system water volumes are described within 'General technical data' section and they have to be satisfied to avoid continuous compressor switching on and off.

We recommend to double minimum water volumes described for small deviations from set-point and a stable operation mode even in the most extreme conditions, such as simultaneously to an huge heating capacity demand there is a small cooling capacity demand.

Operation with water low temperatures on the exchanger, recovery side

When the hot water production function is enabled to the recovery but the water temperature is too low, the water produced to the recovery will have a temperature higher than the minimum level indicated in the graph. If this unit operating requirement is not acceptable, it is recommended to provide on the recovery side a primary - secondary where the secondary is maintained at the desired operating temperature while the primary will have a consistent operating temperatures within the limits shown in the graph



T_{IN,REC} [°C] = Entering water temperature to recovery
T_{AIR} [°C] = entering external exchanger air temperature (D.B.)

1. Transient operating range where unit operates forcing on the recovery set-point (if the recovery function is enabled)
2. Minimum system water temperature level, recovery side

Hot side water flow-rate

When pumps are not built-in it is necessary to contemplate hot user side water flow-rate modulation, managed by the unit with a 0-10V signal.

Cold side water flow-rate

For a correct unit operation in all the possible circuit switching, it is necessary to ensure the water flow-rate, cold side, even when usually chilled water is not requested. This results in maintaining in stand-by and available the pump at the primary circuit start-up in the cold season. If the pumping unit may not be installed built-in, the external pumps start signal must be managed by the unit taking it from the specific potential-free contact in the electrical panel.

4-pipe unit operating range

The unit is capable of producing chilled or hot water at the same time throughout the year. Chilled water is only produced on the cold side. Hot water is only produced on the hot side.

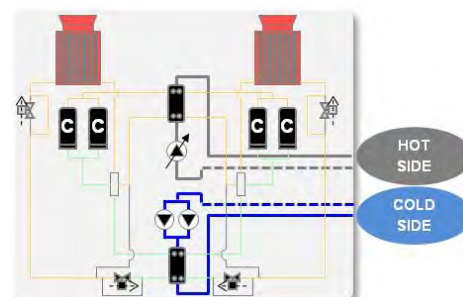
By providing the unit with an DHW switching valve (VACSRX) it is possible to prioritise domestic hot water production over system side heating requirements.

Example of how the unit operates:

Cooling requirement 100%, Heating requirement 0%:

In this condition all the cooling capacity is released to the cold side of the heat exchanger and maintenance of the cold side set point is ensured through the modulation of the capacity steps.

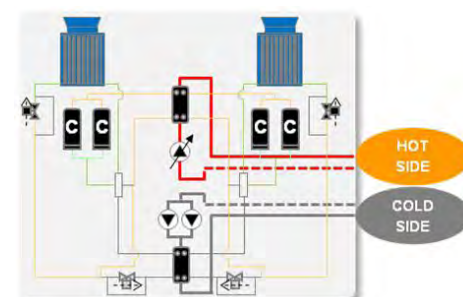
All the heating capacity is dispersed on the finned coil exchanger. The pump control on the hot side may be activated or deactivated based on a schedule to keep water temperature under control.



Cooling requirement 0%, Heating requirement 100%:

In this condition all the heating capacity is released to the hot side of the heat exchanger and maintenance of the hot side set point is ensured through the modulation of the capacity steps.

All the cooling capacity is dispersed on the finned coil exchanger. Cooling capacity is not released on the cold side: the cold side pump control may be kept activated at a minimum or it may be activated and deactivated based on a regular schedule to keep water temperature under control.

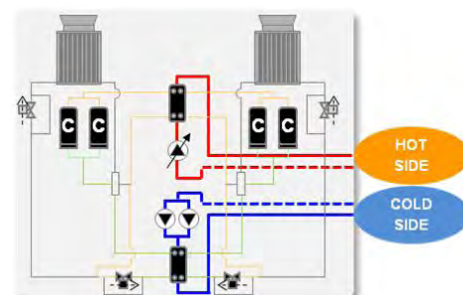


Cooling requirement 100%, Heating requirement 100%:

In this condition all the cooling capacity is released to the cold side of the heat exchanger while all the heating capacity is released to the hot side of the heat exchanger.

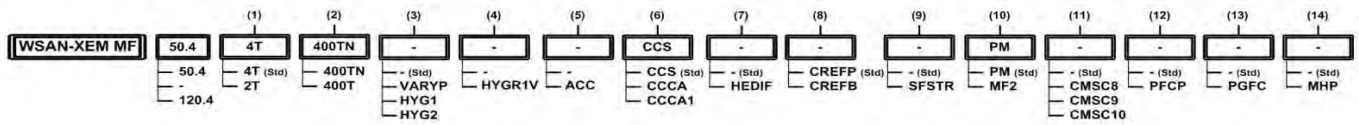
Maintenance of the hot side/cold side set point is ensured through the modulation of the capacity steps, according to the operation mode used (hot side in winter operation, cold side in summer operation).

In this condition, the overall efficiency of the unit, defined as (cooling capacity for use + heating capacity for recovery)/(total power input) is very high.



Configuration for 4-pipe system

Unit configurations



(1) Functionalities

4T - Unit for 4-pipe system (standard)
2T - Unit for reversible 2-pipe system

(2) Voltage

Supply voltage 400/3/50+N (only for size 50.4 ÷ 65.4)
Supply voltage 400/3/50 (only for size 70.4 ÷ 120.4)

(3) Cold side hydronic assemblies

Refer to the diagrams of the hydronic assembly reported

(4) Hot side hydronic assemblies

Refer to the diagrams of the hydronic assembly reported

(5) Storage tank

(-) Not required (standard)
ACC - Storage tank

(6) Condensing coil

CCS - Standard condenser coil (standard)
CCCA - Copper / aluminium condenser coil with acrylic lining
CCCA1 - Condenser coil with Energy Guard DCC Aluminum

(7) Diffuser for fans

(-) Not required (standard)
HEDIF - Diffuser for high efficiency axial fan (only for size 70.4 ÷ 120.4)

(8) Type of fans

CREFP - Device for consumption reduction of the external section at variable speed (phase-cutting) (standard)
CREFB - Device for consumption reduction of the external section ECOBREEZE fans (only for size 70.4 ÷ 120.4)

(9) Soft starter

(-) Not required (standard)
SFSTR - Disposal for inrush current reduction

(10) Phase monitor

PM - Phase monitor (standard)
MF2 - Multi-function phase monitor

(11) Serial communication module

(-) Not required (standard)
CMSC8 - Serial communication module to BACnet supervisor
CMSC9 - Serial communication module to Modbus supervisor
CMSC10 - Serial communication module to LonWorks supervisor

(12) Power capacitors

(-) Not required (standard)
PFCP - Power factor correction capacitors (cosφ>0.9)

(13) Protection grill

(-) Not required (standard)
PGFC - Finned coil protection grill

(14) High and low pressure gauges

(-) Not required (standard)
MHP - High and low pressure gauges

Funzionalità	Schemi gruppi idronici			
4 PIPE SYSTEM COLD SIDE	Standard unit (STD)	Unit with VARYFLOW + (VARYP)	Unit with 1 ON/OFF pump (HYG1)	Unit with 2 ON/OFF pumps (HYG2)
4 PIPE SYSTEM HOT SIDE	Standard unit (STD)		Unit with 1 inverter pump (HYGR1V)	

The unit may be configured by choosing one of the 4 cold side hydronic assembly combinations with one of the 2 hot side combinations depending on system requirements.

Accessories separately supplied			
RCTX - Remote control	BACX - BACnet serial communication module	PGFCX - Finned coil protection grill	AVIBX - Anti-vibration mount support
	CMMBX - Serial communication module to supervisor (MODBUS)	IFWX - Steel mesh strainer on the water side	MHPX - High and low pressure gauges
	CMSLWX - LonWorks serial communication module	VACSRX - Total recovery side DHW switching valve	

Configuration for 4-pipe system

General technical data - Performance

Size			50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
Cooling 100% - Heating 0%												
Cooling capacity	1	kW	139	149	160	170	184	209	236	275	297	324
Compressor power input	1	kW	43,3	48,2	52,8	58,2	60,4	69,4	85,2	86,7	98,3	114
Total power input	2	kW	48,2	53,1	57,7	63,1	66,8	75,8	91,6	96,4	108	124
EER	1		2,89	2,81	2,78	2,70	2,76	2,76	2,58	2,85	2,75	2,62
Water flow-rate	1	l/s	6,66	7,12	7,66	8,13	8,81	10,0	11,3	13,1	14,2	15,5
Cold side exchanger pressure drop factor	1	kPa	17,1	19,4	22,3	20,8	13,8	17,4	21,7	22,1	17,2	20,2
Cooling capacity (EN14511:2013)	3	kW	139	148	160	170	184	208	235	273	296	321
Total power input (EN14511:2013)	3	kW	48,7	53,6	58,4	63,7	67,6	77,0	92,7	98,1	110	126
EER (EN14511:2013)	3		2,85	2,76	2,73	2,66	2,72	2,70	2,54	2,79	2,69	2,55
Cooling 0% - Heating 100%												
Heating capacity	4	kW	157	169	185	197	213	243	278	318	345	381
Compressor power input	4	kW	41,5	45,6	49,7	53,2	56,6	65,3	75,9	84,0	91,6	104
Total power input	2	kW	46,4	50,5	54,6	58,1	63,0	71,7	82,1	93,7	101	113
COP	4		3,39	3,35	3,38	3,39	3,38	3,39	3,39	3,40	3,41	3,38
Water flow-rate	4	l/s	7,50	8,08	8,86	9,35	10,1	11,6	13,2	15,2	16,5	18,3
Hot side exchanger pressure drop factor	4	kPa	53,0	51,0	48,0	47,0	48,0	53,0	56,0	50,0	52,0	57,0
Heating capacity (EN14511:2013)	5	kW	157	170	186	196	213	243	278	321	346	387
Total power input (EN14511:2013)	5	kW	47,1	51,5	55,6	59,1	64,3	73,1	83,7	95,9	104	116
COP (EN14511:2013)	5		3,33	3,30	3,35	3,32	3,31	3,33	3,32	3,34	3,32	3,33
Cooling 100% - Heating 100%												
Cooling capacity	6	kW	140	151	162	172	187	212	239	278	300	328
Heating capacity	6	kW	182	196	214	228	246	281	322	367	397	442
Total power input	6	kW	40,3	44,3	48,1	52,5	54,8	63,2	76,0	80,3	89,2	102
Overall efficiency	7		7,99	7,84	7,81	7,62	7,89	7,80	7,39	8,04	7,81	7,53
Cold side exchanger water flow rate	6	l/s	6,69	7,21	7,74	8,22	8,93	10,1	11,4	13,3	14,3	15,7
Cold side exchanger pressure drop factor	6	kPa	17,0	20,0	23,0	21,0	14,0	18,0	22,0	23,0	17,0	21,0
Hot side exchanger water flow rate	6	l/s	8,70	9,36	10,2	10,9	11,8	13,4	15,4	17,5	19,0	21,1
Hot side exchanger pressure drop factor	6	kPa	68,0	65,0	62,0	64,0	64,0	69,0	75,0	65,0	65,0	75,0

The Product is compliant with the ErP (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 811/2013 (rated heat output ≤ 70 kW at specified reference conditions) and the Commission delegated Regulation (EU) No 813/2013 (rated heat output ≤ 400 kW at specified reference conditions)

1. Data referred to the following conditions: cold side exchanger water = 12/7 °C. Entering external exchanger air temperature 35°C. Evaporator fouling factor = $0.44 \times 10^{(-4)}$ m² K/W
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
3. Data compliant to Standard EN 14511:2013 referred to the following conditions: cold side exchanger water temperature = 12/7°C. Entering external exchanger air temperature 35°C
4. Data referred to the following conditions: hot side exchanger water = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B.
5. Data compliant to Standard EN 14511:2013 referred to the following conditions: hot side exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B.
6. Data referred to the following conditions: exchanger water cooling side = 12/7 °C. exchanger water heating side = 40/45°C
7. Global efficiency. calculated as (Cooling capacity + Heating capacity)/(Total power input).

Configuration for 4-pipe system

General technical data - Construction

Size			50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
Compressor												
Type of compressors			SCROLL									
Refrigerant			R-410A									
No. of compressors		Nr	4	4	4	4	4	4	4	4	4	4
Rated power (C1)		HP	25	25	30	30	35	40	45	50	55	60
Rated power (C2)		HP	25	30	30	35	35	40	45	50	55	60
Std Capacity control steps		Nr	6	5	4	5	6	6	6	6	6	4
Oil charge (C1)		l	7,00	7,00	7,00	7,00	8,00	10,0	10,0	11,0	13,0	13,0
Oil charge (C2)		l	7,00	7,00	7,00	8,00	8,00	10,0	10,0	11,0	13,0	13,0
Carica refrigerante (C1)	1	kg	20,0	26,0	24,0	28,0	29,0	34,0	43,0	46,0	48,0	52,0
Carica refrigerante (C2)	1	kg	20,0	26,0	24,0	28,0	29,0	34,0	43,0	46,0	48,0	52,0
Refrigeration circuits		Nr	2	2	2	2	2	2	2	2	2	2
Cold side exchanger												
Type of exchanger	2		PHE									
No. of exchangers		Nr	1	1	1	1	1	1	1	1	1	1
Water content		l	20	20	20	22	30	30	30	36	46	46
Minimum system water content cold side	3		1104	888	1240	1159	1314	1165	1503	1708	2562	2366
Hot side exchanger												
Type of exchanger	2		PHE									
No. of exchangers		Nr	2	2	2	2	2	2	2	2	2	2
Water content		l	54	55	56	57	58	60	62	108	110	111
Minimum system water content hot side	3		1056	1104	1317	1440	1531	1776	1869	2078	2593	2784
External Section Fans												
Type of fans	4		AX									
No. of fans		Nr	8	8	8	8	4	4	4	6	6	6
Type of motor	5		AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P
Standard airflow		l/s	20300	20300	20000	20000	25000	24200	24200	35000	35000	35000
Installed unit power		kW	0,60	0,60	0,60	0,60	1,60	1,60	1,60	1,60	1,60	1,60
Connections												
Water fittings user side			3"	3"	3"	3"	3"	3"	3"	4"	4"	4"
Water fittings recovery side			3"	3"	3"	3"	3"	3"	3"	4"	4"	4"
Water circuit												
Maximum water side pressure		kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Safety valve calibration		kPa	600	600	600	600	600	600	600	600	600	600
Power supply												
Standard power supply			400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50

1. Indicative values for standard units with possible +/-10% variation. The actual data are indicated on the label of the unit.

2. PHE = plate exchanger

3. The minimum system water content calculated value does not consider the internal exchanger water content. With outdoor air low temperature applications or low medium requested loads, the minimum installation water volume is obtained doubling the indicated value

4. AX = axial fan

5. AC/P = asynchronous three-phase external rotor motor with phase cutting speed automatic control

Configuration for 4-pipe system

Electrical data

Supply voltage 400/3/50+N

Size			50.4	55.4	60.4	65.4
F.L.A. - Full load current at max admissible conditions						
F.L.A. - Compressor 1		A	19,7	19,7	30,5	30,5
F.L.A. - Compressor 2		A	30,5	30,5	30,5	30,5
F.L.A. - Compressor 3		A	19,7	30,5	30,5	30,5
F.L.A. - Compressor 4		A	30,5	30,5	30,5	36,5
F.L.A. - Single External Fan		A	2,60	2,60	2,60	2,60
F.L.A. - Total		A	111	122	133	151
L.R.A. - Locked rotor amperes						
L.R.A. - Compressor 1		A	118	118	174	174
L.R.A. - Compressor 2		A	174	174	174	174
L.R.A. - Compressor 3		A	118	174	174	174
L.R.A. - Compressor 4		A	174	174	174	225
L.R.A. - Single External Fan		A	14,0	14,0	14,0	14,0
F.L.I. - Full load power input at max admissible conditions						
F.L.I. - Compressor 1		kW	11,9	11,9	17,0	17,0
F.L.I. - Compressor 2		kW	17,0	17,0	17,0	17,0
F.L.I. - Compressor 3		kW	11,9	17,0	17,0	17,0
F.L.I. - Compressor 4		kW	17,0	17,0	17,0	22,6
F.L.I. - Single External Fan		kW	0,60	0,60	0,60	0,60
F.L.I. - Total		kW	60,4	65,6	70,7	76,3
M.I.C. Maximum inrush current						
M.I.C. - Value		A	254	265	276	327
M.I.C. with soft start accessory		A	192	203	214	230

Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations.

Power supply: 400/3/50 Hz. Voltage variation: max. +/-10% Voltage unbalance between phases: max 2 %

For non standard voltage please contact Clivet technical office

The units are compliant with the provisions of European standards CEI EN 60204 and CEI EN 60335.

Supply voltage: 400/3/50

Size			70.4	80.4	90.4	100.4	110.4	120.4
F.L.A. - Full load current at max admissible conditions								
F.L.A. - Compressor 1		A	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 2		A	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Compressor 3		A	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 4		A	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Single External Fan		A	4,10	4,10	4,10	4,10	4,10	4,10
F.L.A. - Total		A	151	168	196	217	234	262
L.R.A. - Locked rotor amperes								
L.R.A. - Compressor 1		A	174	174	174	225	272	310
L.R.A. - Compressor 2		A	225	272	310	310	310	310
L.R.A. - Compressor 3		A	174	174	174	225	272	310
L.R.A. - Compressor 4		A	225	272	310	310	310	310
L.R.A. - Single External Fan		A	14,0	14,0	14,0	14,0	14,0	14,0
F.L.I. - Full load power input at max admissible conditions								
F.L.I. - Compressor 1		kW	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 2		kW	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Compressor 3		kW	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 4		kW	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Single External Fan		kW	1,90	1,90	1,90	1,90	1,90	1,90
F.L.I. - Total		kW	86,9	96,9	114	129	139	156
M.I.C. Maximum inrush current								
M.I.C. - Value		A	339	394	447	467	484	512
M.I.C. with soft start accessory		A	242	262	309	329	346	375

Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations.

Power supply: 400/3/50 Hz. Voltage variation: max. +/-10% Voltage unbalance between phases: max 2 %

For non standard voltage please contact Clivet technical office

The units are compliant with the provisions of European standards CEI EN 60204 and CEI EN 60335..

Configuration for 4-pipe system

Sound levels

Standard unit

Size	Sound power level (dB)								Sound power level	Sound pressure level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
50.4	88	95	84	84	83	81	68	61	88	69
55.4	88	95	84	84	83	81	68	61	88	69
60.4	88	95	84	84	83	81	68	61	88	69
65.4	88	95	84	84	83	81	68	61	88	69
70.4	91	88	88	85	83	82	67	60	88	68
80.4	91	88	88	85	83	82	67	60	88	68
90.4	91	88	88	85	83	82	67	60	88	68
100.4	93	90	90	88	88	85	71	62	92	72
110.4	93	90	90	88	88	85	71	62	92	72
120.4	93	90	90	88	88	85	71	62	92	72

Sound levels refer to units with full load under nominal test conditions.

The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field. Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

Data referred to the following conditions:

- internal exchanger water = 12/7 °C
- ambient temperature = 35 °C

Unit with HEDIF - “Diffuser for high efficiency axial fan” option

Size	Sound power level	Sound pressure level
	dB(A)	dB(A)
70.4	86	66
80.4	86	66
90.4	86	66
100.4	90	70
110.4	90	70
120.4	90	70

Sound levels refer to units with full load under nominal test conditions.

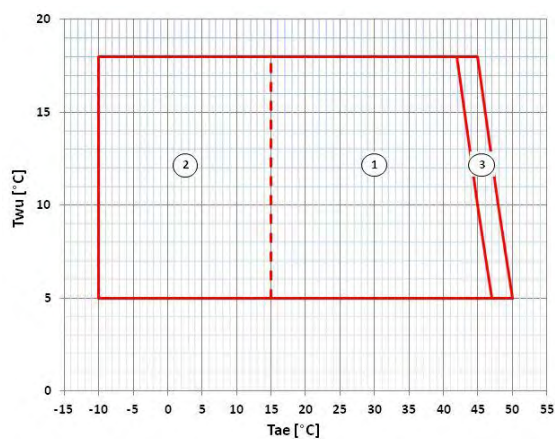
The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field. Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

Data referred to the following conditions:

- internal exchanger water = 12/7 °C
- ambient temperature = 35 °C

Configuration for 4-pipe system

Operating range - Cooling

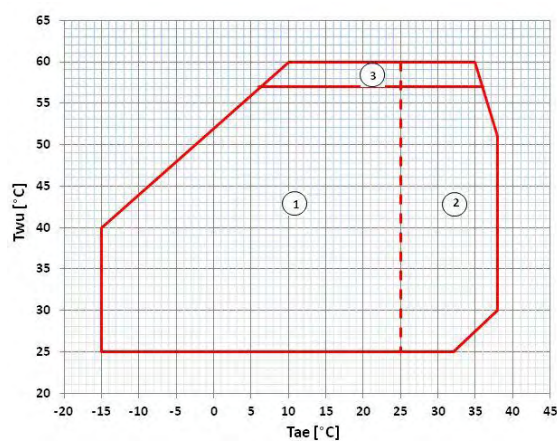


T_{wu} [°C] = Internal exchanger outlet water temperature

T_{ae} [°C] = External exchanger inlet air temperature

1. Standard unit operating range at full load
2. Standard unit operating range with air flow automatic modulation
3. Unit operating range with automatic staging of the compressor capacity

Operating range - Heating

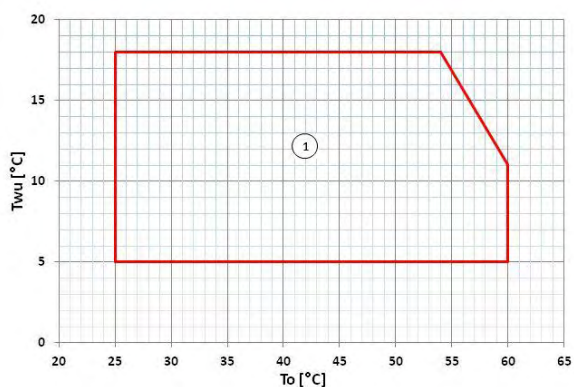


T_{wu} [°C] = Internal exchanger outlet water temperature

T_{ae} [°C] = External exchanger inlet air temperature

1. Standard unit operating range at full load
2. Standard unit operating range with air flow automatic modulation
3. Unit operating range with automatic staging of the compressor capacity

Operating range - Cooling 100% - Heating 100%



T_{wu} [°C] = Water outlet temperature from the user side of the heat exchanger (2-4 pipes)

T_o [°C] = Outlet water temperature at the heat exchanger recovery side (2-4 pipes)

1. Normal operating range

Configuration for 4-pipe system

Cooling performance - Size 50.4 ÷ 90.4

Size	To (°C)	Entering external exchanger air temperature (°C)											
		20		25		30		35		40		45	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
50.4	5	157	31,8	150	35,2	142	38,9	132	42,6	119	47,7	109	53,5
	7	166	32,3	158	35,9	150	39,5	139	43,3	126	48,3	116	54,2
	10	181	33,1	172	36,6	163	40,3	151	44,4	137	49,5	128	55,1
	12	191	33,7	183	37,3	172	41,1	159	45,1	145	49,9	-	-
	15	208	34,7	198	38,4	186	42,4	172	46,6	158	51,4	-	-
	18	223	35,8	213	39,5	200	43,5	185	47,6	170	52,7	-	-
55.4	5	167	36,0	160	39,7	152	43,5	142	47,4	128	52,9	117	59,4
	7	176	36,7	169	40,6	160	44,4	149	48,2	135	53,9	125	60,1
	10	191	37,7	183	41,7	173	45,5	161	49,6	146	55,3	136	61,8
	12	202	38,4	193	42,5	182	46,4	170	50,4	155	55,9	-	-
	15	218	39,7	209	43,8	196	48,0	183	52,2	168	57,7	-	-
	18	234	41,1	225	45,2	211	49,3	197	53,6	183	59,5	-	-
60.4	5	182	39,5	175	43,4	164	47,6	152	52,2	139	57,3	127	64,7
	7	192	40,1	184	44,3	173	48,4	160	52,8	147	58,2	136	65,4
	10	209	41,4	200	45,7	187	49,8	173	54,8	159	60,0	150	67,1
	12	220	42,1	211	46,6	197	50,9	183	55,3	167	61,0	-	-
	15	238	43,5	227	48,1	212	52,6	196	57,2	181	63,4	-	-
	18	257	44,6	244	49,2	228	53,8	211	59,2	197	65,3	-	-
65.4	5	195	43,1	186	47,5	175	52,1	162	57,1	147	63,1	138	71,2
	7	206	44,0	197	48,3	185	53,0	170	58,2	155	64,5	148	72,4
	10	224	45,4	214	49,9	200	54,8	184	59,9	169	66,4	162	74,9
	12	236	46,7	225	51,0	210	55,9	193	61,3	178	68,2	-	-
	15	255	48,3	243	52,7	226	57,8	209	63,3	195	70,5	-	-
	18	275	49,7	260	54,4	242	59,7	224	65,6	216	73,4	-	-
70.4	5	208	45,2	200	49,4	189	54,3	176	59,5	159	66,4	148	74,5
	7	219	46,1	210	50,3	198	55,5	184	60,4	167	67,0	156	75,9
	10	232	47,4	225	51,7	211	56,9	197	61,7	180	68,8	164	77,7
	12	249	48,4	239	52,9	225	58,2	209	63,5	191	70,9	-	-
	15	271	50,5	260	55,0	244	60,2	226	65,8	209	73,3	-	-
	18	290	51,9	277	56,5	262	61,7	243	67,3	226	75,0	-	-
80.4	5	235	52,0	226	57,4	215	62,6	199	68,7	182	75,9	168	83,7
	7	249	53,3	239	58,4	226	63,4	209	69,4	190	76,9	177	85,3
	10	267	54,5	257	59,7	242	65,4	225	71,2	206	78,4	194	86,6
	12	282	56,2	272	61,0	255	66,6	238	72,3	218	80,2	-	-
	15	308	57,8	293	62,9	277	68,7	258	74,7	237	82,9	-	-
	18	328	59,5	316	64,9	294	70,9	273	77,2	256	84,8	-	-
90.4	5	270	64,3	259	70,0	241	76,8	223	84,1	205	93,0	188	103
	7	287	65,8	272	71,9	255	77,9	236	85,2	216	94,4	203	106
	10	305	68,0	291	73,9	271	80,8	250	88,0	233	97,1	218	110
	12	321	69,5	305	75,6	286	82,0	265	89,7	247	98,7	-	-
	15	349	71,9	331	78,2	309	84,9	287	93,4	273	104	-	-
	18	373	75,2	352	80,9	330	87,8	308	96,0	287	111	-	-

kWf = Cooling capacity at the heat exchanger user side (2 pipes) or cold side (4 pipes) (kW)

kWe = Electrical power absorbed by compressors (kW)

To (°C) = Outlet water temperature at the heat exchanger user side (2 pipes) or cold side (4 pipes) (°C)

Performances in function of the inlet/outlet water temperature differential = 5°C

Configuration for 4-pipe system

Cooling performance - Size 100.4 ÷ 120.4

Size	To (°C)	Entering external exchanger air temperature (°C)											
		20		25		30		35		40		45	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
100.4	5	311	65,6	297	71,6	281	78,1	263	85,5	239	95,2	218	107
	7	325	66,8	310	73,0	292	80,0	275	86,7	248	96,5	229	108
	10	344	67,9	326	74,6	310	80,6	290	88,4	265	97,9	246	110
	12	364	70,0	349	76,3	331	82,7	309	90,8	281	102	-	-
	15	399	72,1	380	78,7	359	85,6	333	93,5	307	104	-	-
	18	423	75,2	404	81,4	380	87,8	352	96,6	328	106	-	-
110.4	5	342	74,8	328	81,0	309	88,3	287	96,7	261	108	242	120
	7	357	75,6	340	82,6	321	89,8	297	98,3	272	109	253	121
	10	376	77,0	361	83,6	338	91,8	315	99,8	289	111	272	123
	12	400	79,5	383	85,8	358	93,9	334	102	307	114	-	-
	15	437	82,1	415	89,2	388	97,1	362	105	336	116	-	-
	18	464	85,1	441	91,8	415	99,4	381	109	359	121	-	-
120.4	5	375	86,2	357	94,6	338	102	313	112	286	125	271	141
	7	389	88,0	373	95,2	350	104	324	114	295	128	278	141
	10	411	89,6	390	97,5	368	106	343	116	315	128	298	143
	12	435	92,2	414	99,9	386	110	362	119	335	132	-	-
	15	470	96,4	450	104	419	114	391	124	369	137	-	-
	18	502	99,1	475	108	447	117	417	127	395	142	-	-

kWf = Cooling capacity at the heat exchanger user side (2 pipes) or cold side (4 pipes) (kW)

kWe = Electrical power absorbed by compressors (kW)

To (°C) = Outlet water temperature at the heat exchanger user side (2 pipes) or cold side (4 pipes) (°C)

Performances in function of the inlet/outlet water temperature differential = 5°C

Configuration for 4-pipe system

Heating performance - Size 50.4 ÷ 90.4

Size	Tae (°C) DB/WB	Hot side heat exchanger outlet water temperature (°C)											
		25		35		40		45		55		60	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
50.4	-15 / -15.4	91,8	25,6	90,8	32,0	90,6	36,1	-	-	-	-	-	-
	10 / -10.5	106	26,0	104	32,3	104	36,3	-	-	-	-	-	-
	-7 / -8	113	26,2	112	32,5	111	36,4	110	40,8	-	-	-	-
	0 / -0.6	140	26,7	137	33,0	136	36,8	134	41,1	-	-	-	-
	7 / 6	166	27,0	163	33,6	160	37,2	157	41,5	149	52,1	144	61,0
	15 / 13	201	27,0	196	34,1	194	37,9	189	42,0	176	52,5	162	61,2
55.4	-15 / -15.4	97,6	28,1	96,8	34,9	98,1	39,4	-	-	-	-	-	-
	10 / -10.5	112	28,6	111	35,3	112	39,5	-	-	-	-	-	-
	-7 / -8	119	28,9	120	35,5	120	39,7	119	44,4	-	-	-	-
	0 / -0.6	147	29,6	147	36,2	146	40,3	145	44,9	-	-	-	-
	7 / 6	175	30,0	174	37,0	172	41,1	169	45,6	160	56,8	149	66,4
	15 / 13	211	30,1	210	37,8	207	41,9	204	46,5	190	57,5	172	66,9
60.4	-15 / -15.4	106	30,7	107	37,8	107	42,6	-	-	-	-	-	-
	10 / -10.5	122	31,4	122	38,3	123	41,9	-	-	-	-	-	-
	-7 / -8	131	31,8	131	38,6	132	43,0	131	48,1	-	-	-	-
	0 / -0.6	160	32,6	160	39,7	159	43,9	157	48,7	-	-	-	-
	7 / 6	192	33,1	190	40,7	189	45,0	185	49,7	174	61,8	167	72,0
	15 / 13	233	33,0	230	41,7	227	46,3	185	51,0	207	62,9	190	72,5
65.4	-15 / -15.4	112	32,6	112	39,0	113	45,6	-	-	-	-	-	-
	10 / -10.5	129	33,2	129	40,9	130	45,8	-	-	-	-	-	-
	-7 / -8	138	33,5	138	41,2	138	46,0	138	51,7	-	-	-	-
	0 / -0.6	169	34,4	168	42,0	168	46,7	166	52,3	-	-	-	-
	7 / 6	202	34,9	200	43,1	199	47,7	197	53,2	184	65,7	169	74,5
	15 / 13	245	35,1	243	44,1	240	48,9	235	54,4	218	66,6	198	74,5
70.4	-15 / -15.4	123	34,4	122	43,8	122	48,7	-	-	-	-	-	-
	10 / -10.5	142	35,0	141	44,3	141	49,1	-	-	-	-	-	-
	-7 / -8	152	35,3	150	44,6	150	49,2	149	55,0	-	-	-	-
	0 / -0.6	189	36,3	185	45,4	183	50,1	181	55,7	-	-	-	-
	7 / 6	224	36,8	219	46,6	217	51,1	213	56,6	203	71,1	194	84,2
	15 / 13	273	37,4	266	47,7	262	52,3	258	57,0	241	72,1	220	83,6
80.4	-15 / -15.4	143	40,6	143	50,3	142	56,1	-	-	-	-	-	-
	10 / -10.5	163	41,4	163	50,9	163	56,5	-	-	-	-	-	-
	-7 / -8	174	41,7	174	51,3	173	56,8	171	63,3	-	-	-	-
	0 / -0.6	213	42,8	212	52,4	210	57,9	207	64,2	-	-	-	-
	7 / 6	256	43,6	253	53,5	249	59,0	243	65,3	231	80,9	217	95,0
	15 / 13	310	44,4	303	54,7	298	60,4	290	66,5	274	82,2	261	96,2
90.4	-15 / -15.4	161	47,2	164	59,6	165	66,9	-	-	-	-	-	-
	10 / -10.5	186	47,9	186	59,9	187	66,9	-	-	-	-	-	-
	-7 / -8	198	48,3	198	60,0	198	66,8	198	74,6	-	-	-	-
	0 / -0.6	242	49,6	241	61,1	239	67,5	238	75,0	-	-	-	-
	7 / 6	290	50,8	287	62,2	282	68,5	278	75,9	266	95,1	235	110
	15 / 13	354	52,0	342	63,7	340	70,2	332	77,4	315	96,5	290	112

kWt = Heating capacity to the hot side exchanger (kW)

kWe = Electrical power absorbed by compressors (kW)

Tae [°C] = External exchanger inlet air temperature

Performances in function of the inlet/outlet water temperature differential = 5°C

Configuration for 4-pipe system

Heating performance - Size 100.4 ÷ 120.4

Size	T _{ae} (°C) DB/WB	Hot side heat exchanger outlet water temperature (°C)											
		25		35		40		45		55		60	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
100.4	-15 / -15.4	183	52,0	184	64,8	186	72,7	-	-	-	-	-	-
	-10 / -10.5	210	52,7	210	65,2	211	72,9	-	-	-	-	-	-
	-7 / -8	225	53,1	225	65,5	224	73,1	225	81,8	-	-	-	-
	0 / -0.6	277	54,5	274	66,6	272	73,9	269	82,5	-	-	-	-
	7 / 6	334	56,1	327	68,0	323	75,4	318	84,0	305	106	280	122
	15 / 13	406	58,2	398	70,1	388	77,3	380	86,1	360	108	338	124
110.4	-15 / -15.4	199	56,8	201	70,7	203	79,0	-	-	-	-	-	-
	-10 / -10.5	228	57,9	230	71,8	231	79,7	-	-	-	-	-	-
	-7 / -8	244	58,5	245	71,9	246	80,2	244	88,7	-	-	-	-
	0 / -0.6	301	60,5	298	73,8	297	81,4	292	90,0	-	-	-	-
	7 / 6	360	62,3	354	75,5	351	83,2	345	91,6	326	114	326	132
	15 / 13	438	64,8	424	77,7	418	85,6	411	93,7	385	116	368	135
120.4	-15 / -15.4	224	64,2	227	80,8	227	90,7	-	-	-	-	-	-
	-10 / -10.5	253	65,3	257	81,2	258	90,9	-	-	-	-	-	-
	-7 / -8	268	65,9	272	81,5	273	90,8	273	101	-	-	-	-
	0 / -0.6	329	67,9	332	83,4	329	91,9	326	102	-	-	-	-
	7 / 6	396	70,3	393	85,3	389	93,8	381	104	366	129	335	146
	15 / 13	480	73,1	474	88,0	465	96,3	453	106	429	131	409	153

kWt = Heating capacity to the hot side exchanger (kW)

kWe = Electrical power absorbed by compressors (kW)

T_{ae} [°C] = External exchanger inlet air temperature

Performances in function of the inlet/outlet water temperature differential = 5°C

Configuration for 4-pipe system

Cooling 100% - Heating 100% performance - Size 50.4 ÷ 90.4

Size	Tw (°C)	Recovery side (hot side) outlet water temperature																							
		20/25				30/35				35/40				40/45				45/50				50/55			
		kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE
50.4	5	163	26,8	190	13,2	150	32,7	183	10,2	141	36,1	178	8,85	130	40,0	172	7,55	120	44,6	166	6,42	111	49,9	163	5,49
	6	168	26,9	195	13,5	155	32,8	188	10,4	146	36,3	183	9,07	136	40,2	178	7,80	124	44,8	171	6,58	115	50,0	167	5,63
	7	173	26,9	201	13,9	160	33,0	194	10,7	151	36,4	189	9,35	140	40,3	182	7,99	128	44,9	174	6,73	118	50,1	170	5,74
	10	188	27,2	216	14,9	173	33,3	207	11,4	163	36,7	201	9,93	150	40,7	193	8,43	137	45,3	184	7,08	127	50,5	179	6,05
	15	210	27,5	238	16,3	194	33,9	228	12,4	185	37,4	223	10,9	172	41,4	215	9,34	157	46,1	205	7,86	-	-	-	-
	18	228	27,7	256	17,5	211	34,3	246	13,3	199	37,7	238	11,6	186	42,0	229	9,89	169	46,6	218	8,30	-	-	-	-
55.4	5	174	29,5	204	12,8	160	35,9	196	9,94	152	39,6	192	8,68	141	44,1	186	7,44	129	49,2	179	6,25	119	55,3	176	5,34
	6	181	29,8	211	13,2	167	36,0	203	10,3	157	39,7	198	8,94	146	44,2	191	7,65	133	49,5	184	6,40	124	55,4	180	5,49
	7	186	29,9	216	13,5	172	36,2	208	10,5	162	39,9	202	9,14	151	44,3	196	7,84	138	49,6	188	6,56	128	55,6	185	5,62
	10	204	30,3	234	14,4	186	36,6	223	11,2	176	40,3	217	9,75	163	44,7	208	8,30	147	50,0	199	6,92	138	55,9	195	5,94
	15	228	31,1	259	15,7	210	37,4	248	12,2	199	41,0	240	10,7	184	45,5	230	9,11	169	50,9	221	7,68	-	-	-	-
	18	246	31,5	277	16,6	227	37,9	264	13,0	216	41,5	257	11,4	201	46,2	248	9,71	183	51,5	235	8,13	-	-	-	-
60.4	5	187	32,2	222	12,7	172	39,0	215	9,94	164	43,0	211	8,70	151	47,7	203	7,40	139	53,2	196	6,29	128	59,6	191	5,35
	6	192	32,3	228	13,0	178	39,1	221	10,2	169	43,2	216	8,91	157	47,9	209	7,65	144	53,4	201	6,46	132	59,8	196	5,49
	7	199	32,5	235	13,4	184	39,2	227	10,5	174	43,4	222	9,14	162	48,1	214	7,81	148	53,5	206	6,61	137	59,9	200	5,62
	10	216	32,9	252	14,2	200	39,6	244	11,2	188	43,7	235	9,68	174	48,4	226	8,27	158	53,9	217	6,96	146	60,2	211	5,94
	15	242	33,6	280	15,5	225	40,4	269	12,2	212	44,4	261	10,6	198	49,2	252	9,13	182	54,7	241	7,75	-	-	-	-
	18	261	34,1	300	16,4	242	40,9	288	13,0	231	45,0	280	11,4	214	49,7	268	9,69	197	55,3	257	8,22	-	-	-	-
65.4	5	199	35,0	237	12,5	184	42,5	230	9,75	174	46,9	224	8,48	161	52,1	216	7,23	148	58,2	209	6,14	137	65,3	206	5,25
	6	206	35,2	244	12,8	191	42,6	237	10,0	179	47,1	230	8,68	167	52,3	222	7,44	153	58,4	215	6,30	142	65,4	210	5,37
	7	214	35,5	253	13,2	198	42,8	244	10,3	186	47,3	237	8,94	172	52,5	228	7,62	158	58,6	220	6,44	146	65,6	215	5,50
	10	231	36,0	271	14,0	212	43,2	259	10,9	200	47,7	251	9,47	185	52,9	242	8,06	171	59,4	233	6,79	156	65,9	225	5,77
	15	257	36,7	298	15,1	239	44,2	287	11,9	225	48,6	277	10,3	211	53,9	268	8,88	193	60,0	256	7,48	-	-	-	-
	18	278	37,2	320	16,1	258	44,7	307	12,6	245	49,2	298	11,0	228	54,6	287	9,42	208	60,7	272	7,90	-	-	-	-
70.4	5	213	36,9	255	12,7	197	44,6	247	10,0	188	49,1	242	8,74	175	54,4	234	7,52	161	60,5	227	6,41	147	67,3	219	5,43
	6	220	37,2	262	13,0	204	44,8	254	10,2	194	49,4	248	8,95	181	54,6	240	7,72	166	60,8	232	6,55	153	67,6	225	5,59
	7	228	37,6	271	13,3	212	45,1	262	10,5	200	49,6	255	9,18	187	54,8	246	7,89	170	60,9	236	6,67	157	67,8	229	5,70
	10	246	38,2	290	14,0	228	45,7	279	11,1	215	50,1	271	9,69	200	55,4	261	8,33	182	61,5	249	7,02	168	68,3	241	5,99
	15	274	39,2	319	15,1	255	46,8	307	12,0	242	51,0	299	10,6	227	56,5	289	9,13	209	62,7	277	7,77	-	-	-	-
	18	298	40,1	344	16,0	275	47,5	329	12,7	263	51,9	321	11,2	245	57,3	308	9,64	226	63,5	296	8,22	-	-	-	-
80.4	5	241	42,8	289	12,4	225	51,4	282	9,9	213	56,5	275	8,64	198	62,5	267	7,43	181	69,3	255	6,30	168	76,8	250	5,44
	6	251	43,2	300	12,8	232	51,8	290	10,1	221	56,9	284	8,86	205	62,8	273	7,61	187	69,6	262	6,44	174	77,2	256	5,57
	7	259	43,6	309	13,0	239	52,1	297	10,3	228	57,3	291	9,06	212	63,2	281	7,80	193	69,9	268	6,60	178	77,4	261	5,67
	10	278	44,4	329	13,7	257	52,9	317	10,8	243	57,9	307	9,49	225	63,8	295	8,15	207	70,9	284	6,93	190	78,0	273	5,93
	15	311	46,0	364	14,7	288	54,4	349	11,7	273	59,2	339	10,3	255	65,4	327	8,91	234	72,1	313	7,59	-	-	-	-
	18	333	47,2	388	15,3	312	55,5	376	12,4	296	60,4	364	10,9	276	66,5	350	9,42	253	73,1	333	8,01	-	-	-	-
90.4	5	274	50,8	336	12,0	256	61,6	326	9,45	243	68,0	319	8,25	226	75,7	308	7,05	206	84,7	296	5,93	188	95,2	288	5,00
	6	283	51,1	345	12,3	264	61,8	334	9,68	250	68,2	326	8,45	233	75,9	316	7,22	213	84,9	303	6,08	194	95,3	293	5,10
	7	292	51,3	354	12,6	272	62,0	343	9,93	257	68,4	334	8,64	239	76,0	322	7,39	218	85,0	308	6,19	198	95,4	298	5,20
	10	312	51,7	375	13,3	288	62,4	361	10,4	273	68,9	351	9,06	253	76,4	337	7,72	230	85,3	321	6,46	210	95,6	310	5,44
	15	347	52,6	413	14,5	326	63,5	401	11,4	309	69,9	390	10,0	288	77,5	375	8,55	267	86,4	362	7,28	-	-	-	-
	18	376	53,3	444	15,4	351	64,3	428	12,1	334	70,7	416	10,6	313	78,2	402	9,14	286	87,1	382	7,67	-	-	-	-

kWf = Cooling capacity (kW)

kWe = Total power input (kW)

kWt = Heating capacity (kW)

GLE = Overall efficiency

Tw [°C] = User side (cold side) outlet water temperature

Configuration for 4-pipe system

Cooling 100% - Heating 100% performance - Size 100.4 ÷ 120.4

Size	Tw (°C)	Recovery side (hot side) outlet water temperature																							
		20/25				30/35				35/40				40/45				45/50				50/55			
		kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE
100.4	5	318	54,0	380	12,9	296	65,1	370	10,2	281	71,9	362	8,94	261	79,8	349	7,65	239	89,0	336	6,46	219	99,7	326	5,47
	6	328	54,3	391	13,3	306	65,4	379	10,5	290	72,2	371	9,16	270	80,0	358	7,84	247	89,3	344	6,62	226	99,9	334	5,61
	7	338	54,6	402	13,6	315	65,7	390	10,7	299	72,5	381	9,38	278	80,3	367	8,04	253	89,4	350	6,74	232	100	340	5,71
	10	362	55,3	427	14,3	335	66,3	411	11,2	317	73,0	400	9,82	294	80,8	384	8,38	267	89,9	366	7,04	245	100	353	5,95
	15	402	56,5	469	15,4	373	67,6	451	12,2	354	74,2	438	10,7	331	82,1	423	9,18	308	91,3	409	7,84	-	-	-	-
	18	436	57,6	504	16,3	407	68,7	487	13,0	387	75,3	473	11,4	359	83,0	452	9,77	331	92,2	434	8,28	-	-	-	-
110.4	5	348	59,7	417	12,8	324	72,2	405	10,1	307	79,8	395	8,80	285	88,8	381	7,50	259	99,3	365	6,28	237	112	355	5,31
	6	359	60,0	428	13,1	334	72,5	415	10,3	317	80,1	405	9,01	294	89,0	390	7,68	266	99,5	372	6,41	243	112	361	5,4
	7	370	60,2	439	13,4	343	72,8	424	10,5	325	80,3	414	9,19	300	89,2	397	7,81	272	99,7	379	6,53	248	112	367	5,5
	10	389	60,7	459	14,0	360	73,4	442	10,9	341	80,8	431	9,55	315	89,6	412	8,11	286	100	393	6,78	262	112	381	5,72
	15	435	62,0	508	15,2	405	74,7	490	12,0	386	82,2	478	10,5	359	91,0	460	8,99	331	102	441	7,59	-	-	-	-
	18	471	63,0	545	16,1	440	75,8	527	12,7	417	83,1	510	11,1	388	91,9	490	9,56	356	103	468	8,03	-	-	-	-
120.4	5	376	68,1	458	12,3	353	82,7	449	9,69	335	91,5	439	8,46	311	102	423	7,20	283	114	406	6,03	258	129	394	5,07
	6	388	68,3	471	12,6	364	83,0	461	9,94	343	91,7	447	8,63	320	102	434	7,39	292	114	415	6,18	265	129	401	5,17
	7	400	68,5	484	12,9	373	83,3	471	10,1	354	92,0	459	8,84	328	102	442	7,53	298	115	422	6,29	271	129	408	5,27
	10	423	69,0	508	13,5	392	83,8	491	10,5	373	92,5	479	9,21	345	103	460	7,83	314	115	439	6,55	286	129	424	5,50
	15	468	70,0	557	14,7	438	84,9	539	11,5	415	93,5	523	10,0	387	104	505	8,59	360	116	488	7,31	-	-	-	-
	18	508	70,9	599	15,6	476	85,9	580	12,3	452	94,6	564	10,7	422	105	542	9,20	389	117	520	7,77	-	-	-	-

kWf = Cooling capacity (kW)

kWe = Total power input (kW)

kWt = Heating capacity (kW)

GLE = Overall efficiency

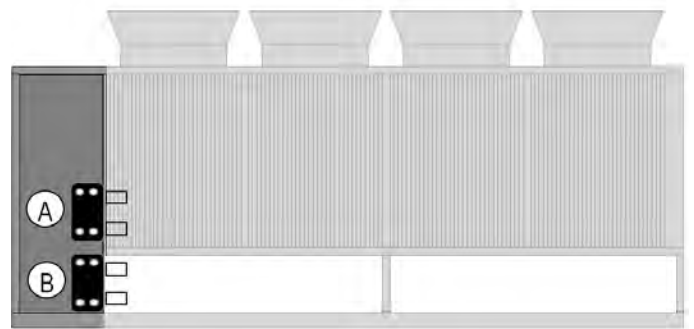
Tw [°C] = User side (cold side) outlet water temperature

2T configuration - For 2-pipe systems

2T configuration supply air conditioning systems with 2 tubes and it is able to supply hot water or chilled water dependently on season, with the total condensation heat recovery possibility. 2T configuration is designed for air conditioning systems, chilling and heating mode are not allowed.

This configuration allows:

- Simultaneous free hot water production to the recovery side with chilled water production to the user side.
- Hot water production to the recovery side with cooling capacity rejection to the external thermal source.
- Chilled water production to the user side with heating capacity rejection to the external thermal source.
- Hot water production to the user side with cooling capacity rejection to the external thermal source.
- Simultaneous hot water production to the user side and to the recovery side (total heating capacity is the heating capacity declared within 'General technical data' section).



A: user side exchanger
B: recovery exchanger

Unit controller guarantees unit operation in mix mode conditions.

It is possible a priority set on request of recovery hot water (priority DHW). The hot water unit production request can be performed by a proper potential-free contact.

Considerations on the installation

Desuperheater mode

The standard unit control at part load changes the water flow-rate, hot side, maintaining the supply temperature at the target value. Through the flow modulation the standard unit can produce hot water even over the set-point, up to a settable limit temperature (default 65°C). Thanks to this setting the exchanger operation time, hot user side, is extended in desuperheater mode, improving the unit efficiency of 5% compared to the desuperheater mode not active.



The logic of control above described drives to a proper design of hydraulic components and safety devices, considering the upper limit of hot water. It is possible to decrease this temperature down to the set point, not having the energy efficiency benefits that desuperheater solution leads.

The energy dimensioning from recovery has to consider that:

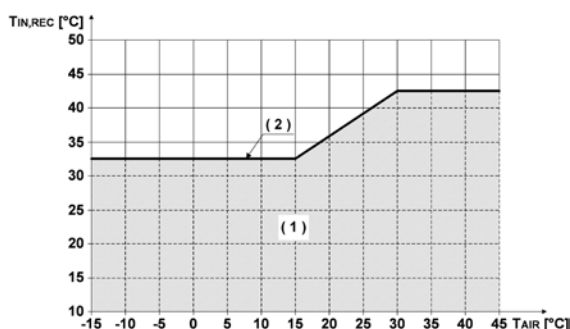
- in middle seasons the recovery heat production can be exclusive dissipating the cooling capacity on the external thermal source;
- in winter, the recovery heat production is obtained taking heat from the system use.

System water volume

For a proper operation of MULTIFUNCTION 2T unit is necessary to contemplate a correct design of water tanks both on user side and recovery side. Minimum system water volumes are described within 'General technical data' section and they have to be satisfied to avoid continuous compressor switching on and off. We recommend to increase minimum water volumes described to reduce compressor switching on and off in an hour and to limit drifting of water temperature during defrosting cycles.

Operation with water low temperatures on the exchanger, recovery side

When the hot water production function is enabled to the recovery but the water temperature is too low, the water produced to the recovery will have a temperature higher than the minimum level indicated in the graph. If this unit operating requirement is not acceptable, it is recommended to provide on the recovery side a primary - secondary where the secondary is maintained at the desired operating temperature while the primary will have a consistent operating temperatures within the limits shown in the graph



$T_{IN,REC}$ [°C] = Entering water temperature to recovery
 T_{AIR} [°C] = entering external exchanger air temperature (D.B.)

1. Transient operating range where unit operates forcing on the recovery set-point (if the recovery function is enabled)
2. Minimum system water temperature level, recovery side

Recovery side water flow-rate

When pumps are not built-in it is necessary to contemplate recovery side water flow-rate modulation, managed by the unit with a 0-10V signal.

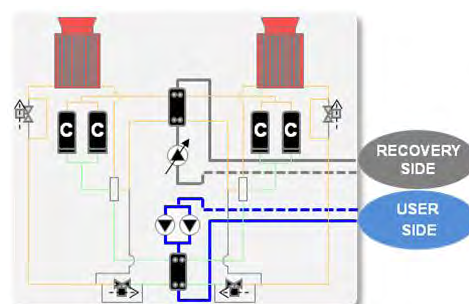
2-pipe unit operating range

The unit is capable of producing chilled water or domestic hot water on the user side. The total recovery heat exchanger allows for free domestic hot water production in summer operation mode and for the simultaneous production of chilled water and domestic hot water in winter operation mode.

Example of how the unit operates:

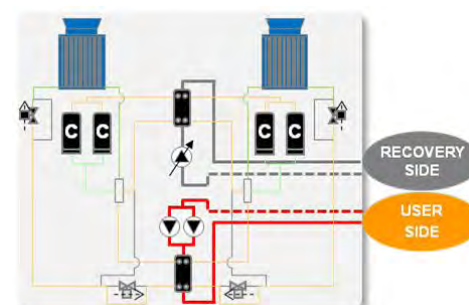
System cooling only:

In this condition all the cooling capacity is released to the user side of the heat exchanger and maintenance of the user side set point is ensured through the modulation of the capacity steps. All the heating capacity is dispersed on the finned coil exchanger.



System heating only:

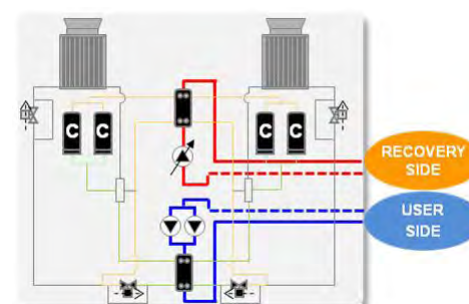
In this condition all the heating capacity is released to the recovery side of the heat exchanger and the load requirements are met through the modulation of the capacity steps. All the cooling capacity is dispersed on the finned coil exchanger.



System cooling requirements and free production of domestic hot water:

In this condition, all the cooling capacity is released to the user side of the heat exchanger while all the heating capacity is released to the recovery side of the heat exchanger.

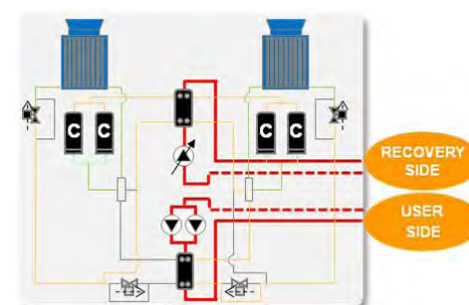
Maintenance of the user side set point is ensured through the modulation of the capacity steps. In this condition, the overall efficiency of the unit, defined as (chiller power for cold operation + heating capacity for recovery)/(total power input) is very high.



System heating requirements and production of domestic hot water:

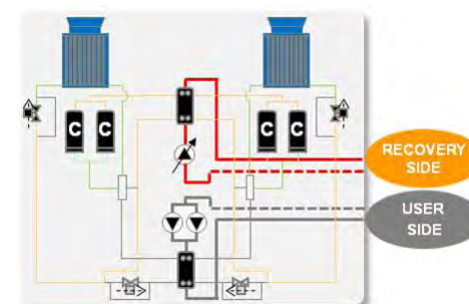
In this condition, the heat is released at the same time to the user side and the recovery side of the heat exchanger. The total heating capacity that can be provided to the two points of use cannot exceed 100% of the unit's nominal heating capacity.

The total heating capacity that can be provided to the two points of use cannot exceed 100% of the unit's nominal heating capacity. The unit will manage the capacity steps considering both loads, and through modulation of the flow it will initially serve the primary point of use, reserving the residual capacity for the secondary point of use. All the cooling capacity is dispersed on the finned coil exchanger.



Requirement for the production of domestic hot water only:

In this condition all the heating capacity is released to the recovery side of the heat exchanger and the load requirements are met through the modulation of the capacity steps. All the cooling capacity is dispersed on the finned coil exchanger.



Unit configurations - 2-pipe system

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
WSAN-XEM MF	50.4	2T	400TN	-	-	-	CCS	-	-	PM	-	-	-	-
50.4	2T (Std)	400TN	- (Std)	-	-	CCS (Std)	- (Std)	-	- (Std)	PM (Std)	- (Std)	- (Std)	- (Std)	- (Std)
-	4T	400T	VARYP	HYGR1V	ACC	CCCA	HEDIF	CREFP	SFSTR	MF2	CMSC8	PFCP	PGFC	MHP
120.4			HYG1			CCCA1		CREFB			CMSC9			
			HYG2								CMSC10			

(1) Functionalities

2T - Unit for reversible 2-pipe system (standard)
4T - Unit for 4-pipe system

(2) Voltage

Supply voltage 400/3/50+N (only for size 50.4 ÷ 65.4)
Supply voltage 400/3/50 (only for size 70.4 ÷ 120.4)

(3) User side hydronic assemblies

Refer to the diagrams of the hydronic assembly reported

(4) Recovery side hydronic assemblies

Refer to the diagrams of the hydronic assembly reported

(5) Storage tank

(-) Not required (standard)
ACC - Storage tank

(6) Condensing coil

CCS - Standard condenser coil (standard)
CCCA - Copper / aluminium condenser coil with acrylic lining
CCCA1 - Condenser coil with Energy Guard DCC Aluminum

(7) Diffuser for fans

(-) Not required (standard)
HEDIF - Diffuser for high efficiency axial fan (only for size 70.4 ÷ 120.4)

(8) Type of fans

CREFP - Device for consumption reduction of the external section at variable speed (phase-cutting) (standard)
CREFB - Device for consumption reduction of the external section ECOBREEZE fans (only for size 70.4 ÷ 120.4)

(9) Soft starter

(-) Not required (standard)
SFSTR - Disposal for inrush current reduction

(10) Phase monitor

PM - Phase monitor (standard)
MF2 - Multi-function phase monitor

(11) Serial communication module

(-) Not required (standard)
CMSC8 - Serial communication module to BACnet supervisor
CMSC9 - Serial communication module to Modbus supervisor
CMSC10 - Serial communication module to LonWorks supervisor

(12) Power capacitors

(-) Not required (standard)
PFCP - Power factor correction capacitors (cosφi>0.9)

(13) Protection grill

(-) Not required (standard)
PGFC - Finned coil protection grill

(14) High and low pressure gauges

(-) Not required (standard)
MHP - High and low pressure gauges

Functionalities	Diagram hydronic assemblies			
2 PIPE SYSTEM + TOTAL RECOVERY USER SIDE	Standard unit (STD)	Unit with VARYFLOW + (VARYP)	Unit with 1 ON/OFF pump (HYG1)	Unit with 2 ON/OFF pumps (HYG2)
2 PIPE SYSTEM + TOTAL RECOVERY RECOVERY SIDE	Standard unit (STD)		Unit with 1 inverter pump (HYGR1V)	

The unit may be configured by choosing one of the 4 user side hydronic assembly combinations with one of the 2 recovery side combinations depending on system requirements.

Accessories separately supplied			
RCTX - Remote control	BACX - BACnet serial communication module	PGFCX - Finned coil protection grill	AVIBX - Anti-vibration mount support MHPX - High and low pressure gauges
	CMMBX - Serial communication module to supervisor (MODBUS) CMLWX - LonWorks serial communication module	IFWX - Steel mesh strainer on the water side VACSX - Total recovery side DHW switching valve	

Configuration for 2-pipe system

General technical data - Performance

Size			50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
Cooling 100% - Heating 0%												
Cooling capacity	1	kW	139	149	160	170	184	209	236	275	297	324
Compressor power input	1	kW	43,3	48,2	52,8	58,2	60,4	69,4	85,2	86,7	98,3	114
Total power input	2	kW	48,2	53,1	57,7	63,1	66,8	75,8	91,6	96,4	108	124
EER	1		2,89	2,81	2,78	2,70	2,76	2,76	2,58	2,85	2,75	2,62
Water flow-rate	1	l/s	6,66	7,12	7,66	8,13	8,81	10,0	11,3	13,1	14,2	15,5
User side exchanger pressure drop	1	kPa	17,1	19,4	22,3	20,8	13,8	17,4	21,7	22,1	17,2	20,2
Cooling capacity (EN14511:2013)	3	kW	139	148	160	170	184	208	235	273	296	321
Total power input (EN14511:2013)	3	kW	48,7	53,6	58,4	63,7	67,6	77,0	92,7	98,1	110	126
EER (EN14511:2013)	3		2,85	2,76	2,73	2,66	2,72	2,70	2,54	2,79	2,69	2,55
Cooling 0% - Heating 100%												
Heating capacity	4	kW	154	166	181	193	209	238	273	312	338	374
Compressor power input	4	kW	42,3	46,5	50,7	54,3	57,8	66,6	77,4	85,7	93,5	106
Total power input	2	kW	47,2	51,4	55,6	59,2	64,2	73,0	83,6	95,4	103	115
COP	4		3,26	3,23	3,26	3,26	3,26	3,26	3,27	3,27	3,28	3,24
Water flow-rate	4	l/s	7,36	7,93	8,65	9,22	9,99	11,4	13,0	14,9	16,1	17,9
User side exchanger pressure drops	4	kPa	20,6	23,9	28,4	26,1	17,3	22,2	28,3	28,2	21,8	26,8
Heating capacity (EN14511:2013)	5	kW	155	167	183	194	210	239	274	313	340	378
Total power input (EN14511:2013)	5	kW	47,9	52,3	56,5	60,1	65,3	74,3	85,1	97,5	106	118
COP (EN14511:2013)	5		3,24	3,20	3,24	3,23	3,22	3,22	3,22	3,21	3,21	3,20
Cooling 100% - Heating 100%												
Cooling capacity	6	kW	140	151	162	172	187	212	239	278	300	328
Heating capacity	6	kW	182	196	214	228	246	281	322	367	397	442
Total power input	6	kW	40,3	44,3	48,1	52,5	54,8	63,2	76,0	80,3	89,2	102
Overall efficiency	7		7,99	7,84	7,81	7,62	7,89	7,80	7,39	8,04	7,81	7,53
Exchanger water flow rate utility side	6	l/s	6,69	7,21	7,74	8,22	8,93	10,1	11,4	13,3	14,3	15,7
User side exchanger pressure drops	6	kPa	17,0	20,0	23,0	21,0	14,0	18,0	22,0	23,0	17,0	21,0
Recovery side exchanger water flow-rate	6	l/s	8,70	9,36	10,2	10,9	11,8	13,4	15,4	17,5	19,0	21,1
Recovery side exchanger pressure drop	6	kPa	68,0	65,0	62,0	64,0	64,0	69,0	75,0	65,0	65,0	75,0

The Product is compliant with the ErP (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 811/2013 (rated heat output ≤ 70 kW at specified reference conditions) and the Commission delegated Regulation (EU) No 813/2013 (rated heat output ≤ 400 kW at specified reference conditions)

1. Data referred to the following conditions: User side exchanger water = 12/7 °C. Entering external exchanger air temperature 35°C.
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
3. Data compliant to Standard EN 14511:2013 referred to the following conditions: User side exchanger water = 12/7 °C. Entering external exchanger air temperature 35°C
4. Data referred to the following conditions: User side Exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B.
5. Data compliant to Standard EN 14511:2013 referred to the following conditions: User side Exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B
6. Data referred to the following conditions: user side exchanger water 12/7 °C. Source side exchanger water 40/45 °C.
7. Global efficiency, calculated as (Cooling capacity + Heating capacity)/(Total power input).

Configuration for 2-pipe system

General technical data - Construction

Size			50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
Compressor												
Type of compressors			SCROLL									
Refrigerant			R-410A									
No. of compressors		Nr	4	4	4	4	4	4	4	4	4	4
Rated power (C1)		HP	25	25	30	30	35	40	45	50	55	60
Rated power (C2)		HP	25	30	30	35	35	40	45	50	55	60
Std Capacity control steps		Nr	6	5	4	5	6	6	6	6	6	4
Oil charge (C1)		l	7,00	7,00	7,00	7,00	8,00	10,0	10,0	11,0	13,0	13,0
Oil charge (C2)		l	7,00	7,00	7,00	8,00	8,00	10,0	10,0	11,0	13,0	13,0
Carica refrigerante (C1)	1	kg	20,0	26,0	24,0	28,0	29,0	34,0	43,0	46,0	48,0	52,0
Carica refrigerante (C2)	1	kg	20,0	26,0	24,0	28,0	29,0	34,0	43,0	46,0	48,0	52,0
Refrigeration circuits		Nr	2	2	2	2	2	2	2	2	2	2
User side exchanger												
Type of exchanger	2		PHE									
No. of exchangers		Nr	1	1	1	1	1	1	1	1	1	1
Water content		l	20	20	20	22	30	30	30	36	46	46
Minimum system water content user side	3		1104	888	1240	1159	1314	1165	1503	1708	2562	2366
Recovery side exchanger												
Type of exchanger	2		PHE									
No. of exchangers		Nr	2	2	2	2	2	2	2	2	2	2
Water content		l	54	55	56	57	58	60	62	108	110	111
Minimum system water content recovery side	3		1056	1104	1317	1440	1531	1776	1869	2078	2593	2784
External Section Fans												
Type of fans	4		AX									
No. of fans		Nr	8	8	8	8	4	4	4	6	6	6
Type of motor	5		AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P
Standard airflow		l/s	20300	20300	20000	20000	25000	24200	24200	35000	35000	35000
Installed unit power		kW	0,60	0,60	0,60	0,60	1,60	1,60	1,60	1,60	1,60	1,60
Connections												
Water fittings user side			3"	3"	3"	3"	3"	3"	3"	4"	4"	4"
Water fittings recovery side			3"	3"	3"	3"	3"	3"	3"	4"	4"	4"
Water circuit												
Maximum water side pressure		kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Safety valve calibration		kPa	600	600	600	600	600	600	600	600	600	600
Power supply												
Standard power supply			400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50

1. indicative values for standard units with possible +/-10% variation. The actual data are indicated on the label of the unit.
2. PHE = plate exchanger
3. The minimum system water content calculated value does not consider the internal exchanger water content. With outdoor air low temperature applications or low medium requested loads, the minimum installation water volume is obtained doubling the indicated value
4. AX = axial fan
5. AC/P = asynchronous three-phase external rotor motor with phase cutting speed automatic control

Configuration for 2-pipe system

Electrical data

Supply voltage 400/3/50+N

Size			50.4	55.4	60.4	65.4
F.L.A. - Full load current at max admissible conditions						
F.L.A. - Compressor 1		A	19,7	19,7	30,5	30,5
F.L.A. - Compressor 2		A	30,5	30,5	30,5	30,5
F.L.A. - Compressor 3		A	19,7	30,5	30,5	30,5
F.L.A. - Compressor 4		A	30,5	30,5	30,5	36,5
F.L.A. - Single External Fan		A	2,60	2,60	2,60	2,60
F.L.A. - Total		A	111	122	133	151
L.R.A. - Locked rotor amperes						
L.R.A. - Compressor 1		A	118	118	174	174
L.R.A. - Compressor 2		A	174	174	174	174
L.R.A. - Compressor 3		A	118	174	174	174
L.R.A. - Compressor 4		A	174	174	174	225
L.R.A. - Single External Fan		A	14,0	14,0	14,0	14,0
F.L.I. - Full load power input at max admissible conditions						
F.L.I. - Compressor 1		kW	11,9	11,9	17,0	17,0
F.L.I. - Compressor 2		kW	17,0	17,0	17,0	17,0
F.L.I. - Compressor 3		kW	11,9	17,0	17,0	17,0
F.L.I. - Compressor 4		kW	17,0	17,0	17,0	22,6
F.L.I. - Single External Fan		kW	0,60	0,60	0,60	0,60
F.L.I. - Total		kW	60,4	65,6	70,7	76,3
M.I.C. Maximum inrush current						
M.I.C. - Value		A	254	265	276	327
M.I.C. with soft start accessory		A	192	203	214	230

Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations.

Power supply: 400/3/50 Hz. Voltage variation: max. +/-10% Voltage unbalance between phases: max 2 %

For non standard voltage please contact Clivet technical office

The units are compliant with the provisions of European standards CEI EN 60204 and CEI EN 60335.

Supply voltage: 400/3/50

Size			70.4	80.4	90.4	100.4	110.4	120.4
F.L.A. - Full load current at max admissible conditions								
F.L.A. - Compressor 1		A	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 2		A	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Compressor 3		A	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 4		A	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Single External Fan		A	4,10	4,10	4,10	4,10	4,10	4,10
F.L.A. - Total		A	151	168	196	217	234	262
L.R.A. - Locked rotor amperes								
L.R.A. - Compressor 1		A	174	174	174	225	272	310
L.R.A. - Compressor 2		A	225	272	310	310	310	310
L.R.A. - Compressor 3		A	174	174	174	225	272	310
L.R.A. - Compressor 4		A	225	272	310	310	310	310
L.R.A. - Single External Fan		A	14,0	14,0	14,0	14,0	14,0	14,0
F.L.I. - Full load power input at max admissible conditions								
F.L.I. - Compressor 1		kW	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 2		kW	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Compressor 3		kW	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 4		kW	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Single External Fan		kW	1,90	1,90	1,90	1,90	1,90	1,90
F.L.I. - Total		kW	86,9	96,9	114	129	139	156
M.I.C. Maximum inrush current								
M.I.C. - Value		A	339	394	447	467	484	512
M.I.C. with soft start accessory		A	242	262	309	329	346	375

Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations.

Power supply: 400/3/50 Hz. Voltage variation: max. +/-10% Voltage unbalance between phases: max 2 %

For non standard voltage please contact Clivet technical office

The units are compliant with the provisions of European standards CEI EN 60204 and CEI EN 60335..

Configuration for 2-pipe system

Sound levels

Standard unit

Size	Sound power level (dB)								Sound power level	Sound pressure level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
50.4	88	95	84	84	83	81	68	61	88	69
55.4	88	95	84	84	83	81	68	61	88	69
60.4	88	95	84	84	83	81	68	61	88	69
65.4	88	95	84	84	83	81	68	61	88	69
70.4	91	88	88	85	83	82	67	60	88	68
80.4	91	88	88	85	83	82	67	60	88	68
90.4	91	88	88	85	83	82	67	60	88	68
100.4	93	90	90	88	88	85	71	62	92	72
110.4	93	90	90	88	88	85	71	62	92	72
120.4	93	90	90	88	88	85	71	62	92	72

Sound levels refer to units with full load under nominal test conditions.

The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.

Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

Data referred to the following conditions:

- internal exchanger water = 12/7 °C

- ambient temperature = 35 °C

Unit with HEDIF - “Diffuser for high efficiency axial fan” option

Size	Sound power level	Sound pressure level
	dB(A)	dB(A)
70.4	86	66
80.4	86	66
90.4	86	66
100.4	90	70
110.4	90	70
120.4	90	70

Sound levels refer to units with full load under nominal test conditions.

The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.

Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

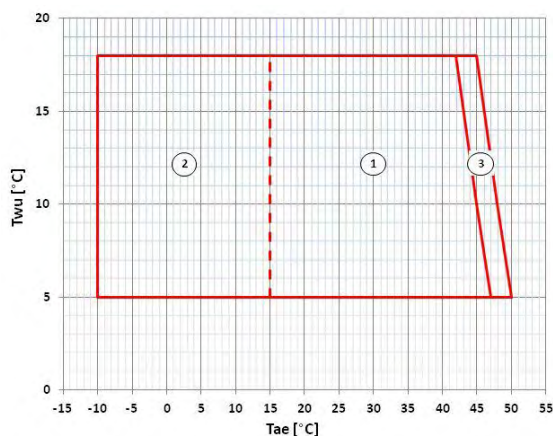
Data referred to the following conditions:

- internal exchanger water = 12/7 °C

- ambient temperature = 35 °C

Configuration for 2-pipe system

Operating range - Cooling



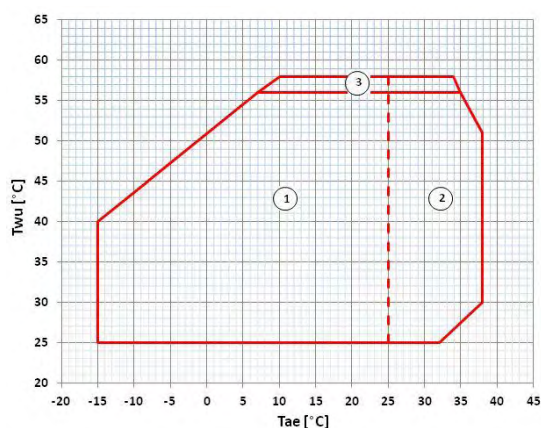
T_{wu} [°C] = Internal exchanger outlet water temperature

T_{ae} [°C] = External exchanger inlet air temperature

1. Standard unit operating range at full load
2. Standard unit operating range with air flow automatic modulation
3. Unit operating range with automatic staging of the compressor capacity

Operating range - Heating

User side

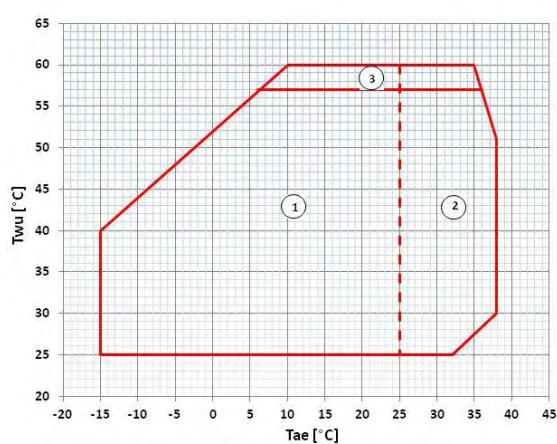


T_{wu} [°C] = Internal exchanger outlet water temperature

T_{ae} [°C] = External exchanger inlet air temperature

1. Standard unit operating range at full load
2. Standard unit operating range with air flow automatic modulation
3. Unit operating range with automatic staging of the compressor capacity

Recovery side (for production of DWH)

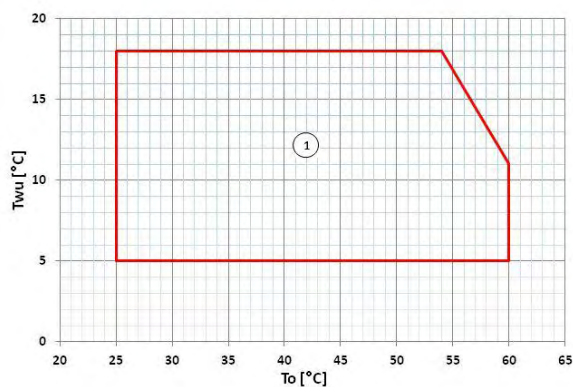


T_{wu} [°C] = Internal exchanger outlet water temperature

T_{ae} [°C] = External exchanger inlet air temperature

1. Standard unit operating range at full load
2. Standard unit operating range with air flow automatic modulation
3. Unit operating range with automatic staging of the compressor capacity

Operating range - Cooling 100% - Heating 100%



T_{wu} [°C] = Water outlet temperature from the user side of the heat exchanger (2-4 pipes)

T_o [°C] = Outlet water temperature at the heat exchanger recovery side (2-4 pipes)

1. Normal operating range

Configuration for 2-pipe system

Cooling performance - Size 50.4 ÷ 90.4

Size	To (°C)	Entering external exchanger air temperature (°C)											
		20		25		30		35		40		45	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
50.4	5	157	31,8	150	35,2	142	38,9	132	42,6	119	47,7	109	53,5
	7	166	32,3	158	35,9	150	39,5	139	43,3	126	48,3	116	54,2
	10	181	33,1	172	36,6	163	40,3	151	44,4	137	49,5	128	55,1
	12	191	33,7	183	37,3	172	41,1	159	45,1	145	49,9	-	-
	15	208	34,7	198	38,4	186	42,4	172	46,6	158	51,4	-	-
	18	223	35,8	213	39,5	200	43,5	185	47,6	170	52,7	-	-
55.4	5	167	36,0	160	39,7	152	43,5	142	47,4	128	52,9	117	59,4
	7	176	36,7	169	40,6	160	44,4	149	48,2	135	53,9	125	60,1
	10	191	37,7	183	41,7	173	45,5	161	49,6	146	55,3	136	61,8
	12	202	38,4	193	42,5	182	46,4	170	50,4	155	55,9	-	-
	15	218	39,7	209	43,8	196	48,0	183	52,2	168	57,7	-	-
	18	234	41,1	225	45,2	211	49,3	197	53,6	183	59,5	-	-
60.4	5	182	39,5	175	43,4	164	47,6	152	52,2	139	57,3	127	64,7
	7	192	40,1	184	44,3	173	48,4	160	52,8	147	58,2	136	65,4
	10	209	41,4	200	45,7	187	49,8	173	54,8	159	60,0	150	67,1
	12	220	42,1	211	46,6	197	50,9	183	55,3	167	61,0	-	-
	15	238	43,5	227	48,1	212	52,6	196	57,2	181	63,4	-	-
	18	257	44,6	244	49,2	228	53,8	211	59,2	197	65,3	-	-
65.4	5	195	43,1	186	47,5	175	52,1	162	57,1	147	63,1	138	71,2
	7	206	44,0	197	48,3	185	53,0	170	58,2	155	64,5	148	72,4
	10	224	45,4	214	49,9	200	54,8	184	59,9	169	66,4	162	74,9
	12	236	46,7	225	51,0	210	55,9	193	61,3	178	68,2	-	-
	15	255	48,3	243	52,7	226	57,8	209	63,3	195	70,5	-	-
	18	275	49,7	260	54,4	242	59,7	224	65,6	216	73,4	-	-
70.4	5	208	45,2	200	49,4	189	54,3	176	59,5	159	66,4	148	74,5
	7	219	46,1	210	50,3	198	55,5	184	60,4	167	67,0	156	75,9
	10	232	47,4	225	51,7	211	56,9	197	61,7	180	68,8	164	77,7
	12	249	48,4	239	52,9	225	58,2	209	63,5	191	70,9	-	-
	15	271	50,5	260	55,0	244	60,2	226	65,8	209	73,3	-	-
	18	290	51,9	277	56,5	262	61,7	243	67,3	226	75,0	-	-
80.4	5	235	52,0	226	57,4	215	62,6	199	68,7	182	75,9	168	83,7
	7	249	53,3	239	58,4	226	63,4	209	69,4	190	76,9	177	85,3
	10	267	54,5	257	59,7	242	65,4	225	71,2	206	78,4	194	86,6
	12	282	56,2	272	61,0	255	66,6	238	72,3	218	80,2	-	-
	15	308	57,8	293	62,9	277	68,7	258	74,7	237	82,9	-	-
	18	328	59,5	316	64,9	294	70,9	273	77,2	256	84,8	-	-
90.4	5	270	64,3	259	70,0	241	76,8	223	84,1	205	93,0	188	103
	7	287	65,8	272	71,9	255	77,9	236	85,2	216	94,4	203	106
	10	305	68,0	291	73,9	271	80,8	250	88,0	233	97,1	218	110
	12	321	69,5	305	75,6	286	82,0	265	89,7	247	98,7	-	-
	15	349	71,9	331	78,2	309	84,9	287	93,4	273	104	-	-
	18	373	75,2	352	80,9	330	87,8	308	96,0	287	111	-	-

kWf = Cooling capacity at the heat exchanger user side (2 pipes) or cold side (4 pipes) (kW)

kWe = Electrical power absorbed by compressors (kW)

To (°C) = Outlet water temperature at the heat exchanger user side (2 pipes) or cold side (4 pipes) (°C)

Performances in function of the inlet/outlet water temperature differential = 5°C

Configuration for 2-pipe system

Cooling performance - Size 100.4 ÷ 120.4

Size	To (°C)	Entering external exchanger air temperature (°C)											
		20		25		30		35		40		45	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
100.4	5	311	65,6	297	71,6	281	78,1	263	85,5	239	95,2	218	107
	7	325	66,8	310	73,0	292	80,0	275	86,7	248	96,5	229	108
	10	344	67,9	326	74,6	310	80,6	290	88,4	265	97,9	246	110
	12	364	70,0	349	76,3	331	82,7	309	90,8	281	102	-	-
	15	399	72,1	380	78,7	359	85,6	333	93,5	307	104	-	-
	18	423	75,2	404	81,4	380	87,8	352	96,6	328	106	-	-
110.4	5	342	74,8	328	81,0	309	88,3	287	96,7	261	108	242	120
	7	357	75,6	340	82,6	321	89,8	297	98,3	272	109	253	121
	10	376	77,0	361	83,6	338	91,8	315	99,8	289	111	272	123
	12	400	79,5	383	85,8	358	93,9	334	102	307	114	-	-
	15	437	82,1	415	89,2	388	97,1	362	105	336	116	-	-
	18	464	85,1	441	91,8	415	99,4	381	109	359	121	-	-
120.4	5	375	86,2	357	94,6	338	102	313	112	286	125	271	141
	7	389	88,0	373	95,2	350	104	324	114	295	128	278	141
	10	411	89,6	390	97,5	368	106	343	116	315	128	298	143
	12	435	92,2	414	99,9	386	110	362	119	335	132	-	-
	15	470	96,4	450	104	419	114	391	124	369	137	-	-
	18	502	99,1	475	108	447	117	417	127	395	142	-	-

kWf = Cooling capacity at the heat exchanger user side (2 pipes) or cold side (4 pipes) (kW)

kWe = Electrical power absorbed by compressors (kW)

To (°C) = Outlet water temperature at the heat exchanger user side (2 pipes) or cold side (4 pipes) (°C)

Performances in function of the inlet/outlet water temperature differential = 5°C

Configuration for 2-pipe system

Heating performance - Size 50.4 ÷ 90.4

Size	T _{ae} (°C) DB/WB	User side heat exchanger outlet water temperature (°C)											
		25		35		40		45		55		58	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
50.4	-15 / -15.4	90	26,1	89	32,7	88,8	36,8	-	-	-	-	-	-
	-10 / -10.5	104	26,5	102	33	102	37	-	-	-	-	-	-
	-7 / -8	111	26,7	110	33,2	109	37,1	108	41,6	-	-	-	-
	0 / -0.6	137	27,2	134	33,7	133	37,5	131	41,9	-	-	-	-
	7 / 6	163	27,5	160	34,3	157	38	154	42,3	146	53,2	142	59,8
	15 / 13	197	27,6	192	34,8	190	38,7	185	42,9	173	53,6	160	60
55.4	-15 / -15.4	95,7	28,7	94,9	35,6	96,2	40,2	-	-	-	-	-	-
	-10 / -10.5	110	29,2	109	36	110	40,3	-	-	-	-	-	-
	-7 / -8	117	29,5	118	36,2	118	40,5	117	45,3	-	-	-	-
	0 / -0.6	144	30,2	144	36,9	143	41,1	142	45,8	-	-	-	-
	7 / 6	172	30,6	171	37,8	169	41,9	166	46,5	157	58	147	65,1
	15 / 13	207	30,7	206	38,6	203	42,8	200	47,4	186	58,7	170	65,6
60.4	-15 / -15.4	104	31,3	105	38,6	105	43,5	-	-	-	-	-	-
	-10 / -10.5	120	32	120	39,1	121	42,8	-	-	-	-	-	-
	-7 / -8	128	32,4	128	39,4	129	43,9	128	49,1	-	-	-	-
	0 / -0.6	157	33,3	157	40,5	156	44,8	154	49,7	-	-	-	-
	7 / 6	188	33,8	186	41,5	185	45,9	181	50,7	171	63,1	165	70,6
	15 / 13	228	33,7	225	42,5	223	47,2	218	52	203	64,2	188	71,1
65.4	-15 / -15.4	110	33,3	110	39,8	111	46,5	-	-	-	-	-	-
	-10 / -10.5	126	33,9	126	41,7	127	46,7	-	-	-	-	-	-
	-7 / -8	135	34,2	135	42	135	46,9	135	52,8	-	-	-	-
	0 / -0.6	166	35,1	165	42,9	165	47,7	163	53,4	-	-	-	-
	7 / 6	198	35,6	196	44	195	48,7	193	54,3	180	67	167	73
	15 / 13	240	35,8	238	45	235	49,9	230	55,5	214	68	196	73
70.4	-15 / -15.4	121	35,1	120	44,7	120	49,7	-	-	-	-	-	-
	-10 / -10.5	139	35,7	138	45,2	138	50,1	-	-	-	-	-	-
	-7 / -8	149	36	147	45,5	147	50,2	146	56,1	-	-	-	-
	0 / -0.6	185	37	181	46,3	179	51,1	177	56,8	-	-	-	-
	7 / 6	220	37,6	215	47,5	213	52,1	209	57,8	199	72,5	192	82,5
	15 / 13	268	38,2	261	48,7	257	53,4	253	58,2	236	73,6	217	82
80.4	-15 / -15.4	140	41,4	140	51,3	139	57,2	-	-	-	-	-	-
	-10 / -10.5	160	42,2	160	51,9	160	57,7	-	-	-	-	-	-
	-7 / -8	171	42,6	171	52,3	170	58	168	64,6	-	-	-	-
	0 / -0.6	209	43,7	208	53,5	206	59,1	203	65,5	-	-	-	-
	7 / 6	251	44,5	248	54,6	244	60,2	238	66,6	226	82,6	214	93,1
	15 / 13	304	45,3	297	55,8	292	61,6	284	67,9	269	83,9	258	94,3
90.4	-15 / -15.4	158	48,2	161	60,8	162	68,3	-	-	-	-	-	-
	-10 / -10.5	182	48,9	182	61,1	183	68,3	-	-	-	-	-	-
	-7 / -8	194	49,3	194	61,2	194	68,2	194	76,1	-	-	-	-
	0 / -0.6	237	50,6	236	62,3	234	68,9	233	76,5	-	-	-	-
	7 / 6	284	51,8	281	63,5	276	69,9	273	77,4	261	97	232	108
	15 / 13	347	53,1	335	65	333	71,6	325	79	309	98,5	287	110

kWt = Heating capacity to the user side exchanger (kW)

kWe = Electrical power absorbed by compressors (kW)

T_{ae} [°C] = External exchanger inlet air temperature

Performances in function of the inlet/outlet water temperature differential = 5°C

Configuration for 2-pipe system

Heating performance - Size100.4 ÷ 120.4

Size	T _{ae} (°C) DB/WB	User side heat exchanger outlet water temperature (°C)											
		25		35		40		45		55		58	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
100.4	-15 / -15.4	179	53,1	180	66,1	182	74,2	-	-	-	-	-	-
	-10 / -10.5	206	53,8	206	66,5	207	74,4	-	-	-	-	-	-
	-7 / -8	221	54,2	221	66,8	220	74,6	221	83,5	-	-	-	-
	0 / -0.6	272	55,6	269	68,0	267	75,4	264	84,2	-	-	-	-
	7 / 6	327	57,2	321	69,4	317	76,9	312	85,7	299	108	277	120
	15 / 13	398	59,4	390	71,5	380	78,9	373	87,9	353	110	334	122
110.4	-15 / -15.4	195	58,0	197	72,1	199	80,6	-	-	-	-	-	-
	-10 / -10.5	224	59,1	225	73,3	226	81,3	-	-	-	-	-	-
	-7 / -8	239	59,7	240	73,4	241	81,8	239	90,5	-	-	-	-
	0 / -0.6	295	61,7	292	75,3	291	83,1	286	91,8	-	-	-	-
	7 / 6	353	63,6	347	77,0	344	84,9	338	93,5	320	116	322	129
	15 / 13	429	66,1	416	79,3	410	87,3	403	95,6	377	118	364	132
120.4	-15 / -15.4	220	65,5	223	82,4	223	92,5	-	-	-	-	-	-
	-10 / -10.5	248	66,6	252	82,9	253	92,8	-	-	-	-	-	-
	-7 / -8	263	67,2	267	83,2	268	92,7	268	103	-	-	-	-
	0 / -0.6	323	69,3	325	85,1	323	93,8	320	104	-	-	-	-
	7 / 6	388	71,7	385	87,0	381	95,7	374	106	359	132	331	143
	15 / 13	471	74,6	465	89,8	456	98,3	444	108	421	134	404	150

kWt = Heating capacity to the user side exchanger (kW)

kWe = Electrical power absorbed by compressors (kW)

T_{ae} [°C] = External exchanger inlet air temperature

Performances in function of the inlet/outlet water temperature differential = 5°C

Configuration for 2-pipe system

Cooling 100% - Heating 100% performance - Size 50.4 ÷ 90.4

Size	Tw (°C)	Recovery side (hot side) outlet water temperature																							
		20/25				30/35				35/40				40/45				45/50				50/55			
		kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE
50.4	5	163	26,8	190	13,2	150	32,7	183	10,2	141	36,1	178	8,85	130	40,0	172	7,55	120	44,6	166	6,42	111	49,9	163	5,49
	6	168	26,9	195	13,5	155	32,8	188	10,4	146	36,3	183	9,07	136	40,2	178	7,80	124	44,8	171	6,58	115	50,0	167	5,63
	7	173	26,9	201	13,9	160	33,0	194	10,7	151	36,4	189	9,35	140	40,3	182	7,99	128	44,9	174	6,73	118	50,1	170	5,74
	10	188	27,2	216	14,9	173	33,3	207	11,4	163	36,7	201	9,93	150	40,7	193	8,43	137	45,3	184	7,08	127	50,5	179	6,05
	15	210	27,5	238	16,3	194	33,9	228	12,4	185	37,4	223	10,9	172	41,4	215	9,34	157	46,1	205	7,86	-	-	-	-
	18	228	27,7	256	17,5	211	34,3	246	13,3	199	37,7	238	11,6	186	42,0	229	9,89	169	46,6	218	8,30	-	-	-	-
55.4	5	174	29,5	204	12,8	160	35,9	196	9,94	152	39,6	192	8,68	141	44,1	186	7,44	129	49,2	179	6,25	119	55,3	176	5,34
	6	181	29,8	211	13,2	167	36,0	203	10,3	157	39,7	198	8,94	146	44,2	191	7,65	133	49,5	184	6,40	124	55,4	180	5,49
	7	186	29,9	216	13,5	172	36,2	208	10,5	162	39,9	202	9,14	151	44,3	196	7,84	138	49,6	188	6,56	128	55,6	185	5,62
	10	204	30,3	234	14,4	186	36,6	223	11,2	176	40,3	217	9,75	163	44,7	208	8,30	147	50,0	199	6,92	138	55,9	195	5,94
	15	228	31,1	259	15,7	210	37,4	248	12,2	199	41,0	240	10,7	184	45,5	230	9,11	169	50,9	221	7,68	-	-	-	-
	18	246	31,5	277	16,6	227	37,9	264	13,0	216	41,5	257	11,4	201	46,2	248	9,71	183	51,5	235	8,13	-	-	-	-
60.4	5	187	32,2	222	12,7	172	39,0	215	9,94	164	43,0	211	8,70	151	47,7	203	7,40	139	53,2	196	6,29	128	59,6	191	5,35
	6	192	32,3	228	13,0	178	39,1	221	10,2	169	43,2	216	8,91	157	47,9	209	7,65	144	53,4	201	6,46	132	59,8	196	5,49
	7	199	32,5	235	13,4	184	39,2	227	10,5	174	43,4	222	9,14	162	48,1	214	7,81	148	53,5	206	6,61	137	59,9	200	5,62
	10	216	32,9	252	14,2	200	39,6	244	11,2	188	43,7	235	9,68	174	48,4	226	8,27	158	53,9	217	6,96	146	60,2	211	5,94
	15	242	33,6	280	15,5	225	40,4	269	12,2	212	44,4	261	10,6	198	49,2	252	9,13	182	54,7	241	7,75	-	-	-	-
	18	261	34,1	300	16,4	242	40,9	288	13,0	231	45,0	280	11,4	214	49,7	268	9,69	197	55,3	257	8,22	-	-	-	-
65.4	5	199	35,0	237	12,5	184	42,5	230	9,75	174	46,9	224	8,48	161	52,1	216	7,23	148	58,2	209	6,14	137	65,3	206	5,25
	6	206	35,2	244	12,8	191	42,6	237	10,0	179	47,1	230	8,68	167	52,3	222	7,44	153	58,4	215	6,30	142	65,4	210	5,37
	7	214	35,5	253	13,2	198	42,8	244	10,3	186	47,3	237	8,94	172	52,5	228	7,62	158	58,6	220	6,44	146	65,6	215	5,50
	10	231	36,0	271	14,0	212	43,2	259	10,9	200	47,7	251	9,47	185	52,9	242	8,06	171	59,4	233	6,79	156	65,9	225	5,77
	15	257	36,7	298	15,1	239	44,2	287	11,9	225	48,6	277	10,3	211	53,9	268	8,88	193	60,0	256	7,48	-	-	-	-
	18	278	37,2	320	16,1	258	44,7	307	12,6	245	49,2	298	11,0	228	54,6	287	9,42	208	60,7	272	7,90	-	-	-	-
70.4	5	213	36,9	255	12,7	197	44,6	247	10,0	188	49,1	242	8,74	175	54,4	234	7,52	161	60,5	227	6,41	147	67,3	219	5,43
	6	220	37,2	262	13,0	204	44,8	254	10,2	194	49,4	248	8,95	181	54,6	240	7,72	166	60,8	232	6,55	153	67,6	225	5,59
	7	228	37,6	271	13,3	212	45,1	262	10,5	200	49,6	255	9,18	187	54,8	246	7,89	170	60,9	236	6,67	157	67,8	229	5,70
	10	246	38,2	290	14,0	228	45,7	279	11,1	215	50,1	271	9,69	200	55,4	261	8,33	182	61,5	249	7,02	168	68,3	241	5,99
	15	274	39,2	319	15,1	255	46,8	307	12,0	242	51,0	299	10,6	227	56,5	289	9,13	209	62,7	277	7,77	-	-	-	-
	18	298	40,1	344	16,0	275	47,5	329	12,7	263	51,9	321	11,2	245	57,3	308	9,64	226	63,5	296	8,22	-	-	-	-
80.4	5	241	42,8	289	12,4	225	51,4	282	9,9	213	56,5	275	8,64	198	62,5	267	7,43	181	69,3	255	6,30	168	76,8	250	5,44
	6	251	43,2	300	12,8	232	51,8	290	10,1	221	56,9	284	8,86	205	62,8	273	7,61	187	69,6	262	6,44	174	77,2	256	5,57
	7	259	43,6	309	13,0	239	52,1	297	10,3	228	57,3	291	9,06	212	63,2	281	7,80	193	69,9	268	6,60	178	77,4	261	5,67
	10	278	44,4	329	13,7	257	52,9	317	10,8	243	57,9	307	9,49	225	63,8	295	8,15	207	70,9	284	6,93	190	78,0	273	5,93
	15	311	46,0	364	14,7	288	54,4	349	11,7	273	59,2	339	10,3	255	65,4	327	8,91	234	72,1	313	7,59	-	-	-	-
	18	333	47,2	388	15,3	312	55,5	376	12,4	296	60,4	364	10,9	276	66,5	350	9,42	253	73,1	333	8,01	-	-	-	-
90.4	5	274	50,8	336	12,0	256	61,6	326	9,45	243	68,0	319	8,25	226	75,7	308	7,05	206	84,7	296	5,93	188	95,2	288	5,00
	6	283	51,1	345	12,3	264	61,8	334	9,68	250	68,2	326	8,45	233	75,9	316	7,22	213	84,9	303	6,08	194	95,3	293	5,10
	7	292	51,3	354	12,6	272	62,0	343	9,93	257	68,4	334	8,64	239	76,0	322	7,39	218	85,0	308	6,19	198	95,4	298	5,20
	10	312	51,7	375	13,3	288	62,4	361	10,4	273	68,9	351	9,06	253	76,4	337	7,72	230	85,3	321	6,46	210	95,6	310	5,44
	15	347	52,6	413	14,5	326	63,5	401	11,4	309	69,9	390	10,0	288	77,5	375	8,55	267	86,4	362	7,28	-	-	-	-
	18	376	53,3	444	15,4	351	64,3	428	12,1	334	70,7	416	10,6	313	78,2	402	9,14	286	87,1	382	7,67	-	-	-	-

kWf = Cooling capacity (kW)

kWe = Total power input (kW)

kWt = Heating capacity (kW)

GLE = Overall efficiency

Tw [°C] = User side (cold side) outlet water temperature

Configuration for 2-pipe system

Cooling 100% - Heating 100% performance - Size 100.4 ÷ 120.4

Size	Tw (°C)	Recovery side (hot side) outlet water temperature																							
		20/25				30/35				35/40				40/45				45/50				50/55			
		kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE	kWf	kWe	kWt	GLE
100.4	5	318	54,0	380	12,9	296	65,1	370	10,2	281	71,9	362	8,94	261	79,8	349	7,65	239	89,0	336	6,46	219	99,7	326	5,47
	6	328	54,3	391	13,3	306	65,4	379	10,5	290	72,2	371	9,16	270	80,0	358	7,84	247	89,3	344	6,62	226	99,9	334	5,61
	7	338	54,6	402	13,6	315	65,7	390	10,7	299	72,5	381	9,38	278	80,3	367	8,04	253	89,4	350	6,74	232	100	340	5,71
	10	362	55,3	427	14,3	335	66,3	411	11,2	317	73,0	400	9,82	294	80,8	384	8,38	267	89,9	366	7,04	245	100	353	5,95
	15	402	56,5	469	15,4	373	67,6	451	12,2	354	74,2	438	10,7	331	82,1	423	9,18	308	91,3	409	7,84	-	-	-	-
	18	436	57,6	504	16,3	407	68,7	487	13,0	387	75,3	473	11,4	359	83,0	452	9,77	331	92,2	434	8,28	-	-	-	-
110.4	5	348	59,7	417	12,8	324	72,2	405	10,1	307	79,8	395	8,80	285	88,8	381	7,50	259	99,3	365	6,28	237	112	355	5,31
	6	359	60,0	428	13,1	334	72,5	415	10,3	317	80,1	405	9,01	294	89,0	390	7,68	266	99,5	372	6,41	243	112	361	5,4
	7	370	60,2	439	13,4	343	72,8	424	10,5	325	80,3	414	9,19	300	89,2	397	7,81	272	99,7	379	6,53	248	112	367	5,5
	10	389	60,7	459	14,0	360	73,4	442	10,9	341	80,8	431	9,55	315	89,6	412	8,11	286	100	393	6,78	262	112	381	5,72
	15	435	62,0	508	15,2	405	74,7	490	12,0	386	82,2	478	10,5	359	91,0	460	8,99	331	102	441	7,59	-	-	-	-
	18	471	63,0	545	16,1	440	75,8	527	12,7	417	83,1	510	11,1	388	91,9	490	9,56	356	103	468	8,03	-	-	-	-
120.4	5	376	68,1	458	12,3	353	82,7	449	9,69	335	91,5	439	8,46	311	102	423	7,20	283	114	406	6,03	258	129	394	5,07
	6	388	68,3	471	12,6	364	83,0	461	9,94	343	91,7	447	8,63	320	102	434	7,39	292	114	415	6,18	265	129	401	5,17
	7	400	68,5	484	12,9	373	83,3	471	10,1	354	92,0	459	8,84	328	102	442	7,53	298	115	422	6,29	271	129	408	5,27
	10	423	69,0	508	13,5	392	83,8	491	10,5	373	92,5	479	9,21	345	103	460	7,83	314	115	439	6,55	286	129	424	5,50
	15	468	70,0	557	14,7	438	84,9	539	11,5	415	93,5	523	10,0	387	104	505	8,59	360	116	488	7,31	-	-	-	-
	18	508	70,9	599	15,6	476	85,9	580	12,3	452	94,6	564	10,7	422	105	542	9,20	389	117	520	7,77	-	-	-	-

kWf = Cooling capacity (kW)

kWe = Total power input (kW)

kWt = Heating capacity (kW)

GLE = Overall efficiency

Tw [°C] = User side (cold side) outlet water temperature

Correction factors for glycol use

% ethylene glycol by weight		5%	10%	15%	20%	25%	30%	35%	40%
Freezing temperature	°C	-2,0	-3,9	-6,5	-8,9	-11,8	-15,6	-19,0	-23,4
Safety temperature	°C	3	1	-1	-4	-6	-10	-14	-19
Cooling Capacity Factor	Nr	0,995	0,990	0,985	0,981	0,977	0,974	0,971	0,968
Compressor power input Factor	Nr	0,997	0,993	0,990	0,988	0,986	0,984	0,982	0,981
Internal exchanger glycol solution flow factor	Nr	1,003	1,010	1,020	1,033	1,050	1,072	1,095	1,124
Pressure drop Factor	Nr	1,029	1,060	1,090	1,118	1,149	1,182	1,211	1,243

The correction factors shown refer to water and glycol ethylene mixes used to prevent the formation of frost on the exchangers in the water circuit during inactivity in winter.

Fouling Correction Factors

m2 °C / W	Internal exchanger	
	F1	FK1
0.44 x 10 (-4)	1,0	1,0
0.88 x 10 (-4)	0,97	0,99
1.76 x 10 (-4)	0,94	0,98

The cooling performance values provided in the tables are based on the external exchanger having clean plates (fouling factor 1). For different fouling factor values, multiply the performance by the coefficients shown in the table.

F1 = Cooling capacity correction factors

FK1 = Compressor power input correction factor

Overload and control device calibrations

		open	closed	Value
High pressure switch (gas side)	[kPa]	4050	3300	-
Low pressure alarm (gas side)	[kPa]	450	600	-
Antifreeze protection	[°C]	4,0	6,0	-
High pressure safety valve (gas side)	[kPa]	-	-	4500
Low pressure safety valve (gas side)	[kPa]	-	-	3000
Max no. of compressor starts per hour (gas side)	[n°]	-	-	10
Differential pressure switch (water side)	[kPa]	3	5	-
Max. pressure without hydronic assembly (water side)	[kPa]	-	-	1000
Max. pressure with hydronic assembly (water side)	[kPa]	-	-	600
Safety valve calibration (water side) (1)	[kPa]	-	-	600

(1) Available only with hydronic assembly option

Integrated heating capacities

Air temperature external exchanger inlet °C (B.S. / B.U)	-10 / -10,5	-5 / -5,4	0 / 0,6	5 / 3,9	Altri
Heating capacity multiplication coefficient	0,90	0,89	0,88	0,91	1

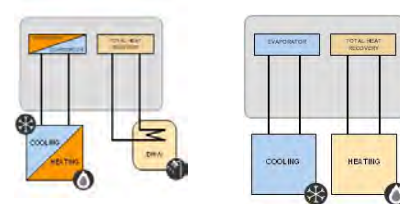
To obtain the integrated heating capacities (the real heating capacity considering the defrost cycles too), multiply the kWt value in the heating performance tables by the following coefficient.

User side (2/4 - pipes)

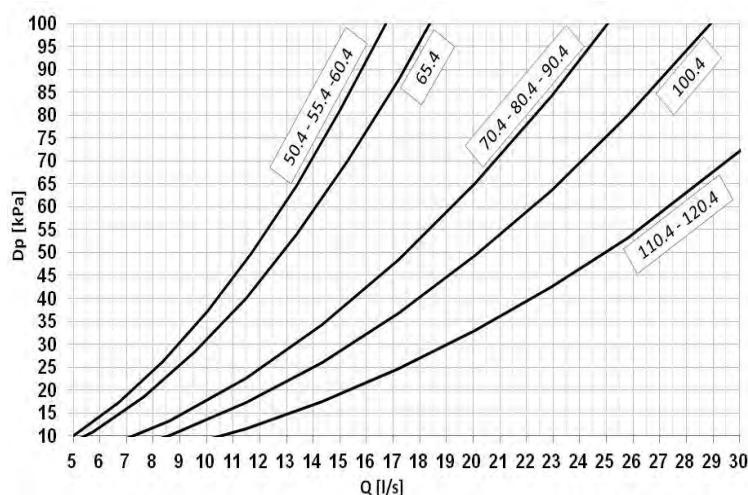
Standard unit (STD)

Configuration without hydronic assembly, equipped with components as described on the water diagram key.

All water fittings are Victaulic type. It is possible to control an external pump by an on/off or 0-10V signal.



Exchanger pressure drop curves



The pressure drops on the water side are calculated by considering an average water temperature at 7°C.

Q = Water flow rate [l/s]
DP = Pressure drops [kPa]

The water flow rate must be calculated with the following formula

$$Q \text{ [l/s]} = \text{kWf} / (4,186 \times \text{DT})$$

kWf = Cooling capacity in kW
DT = Temperature difference between entering / leaving water

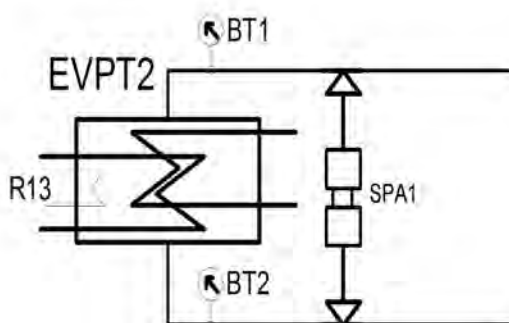
To the cold side exchanger pressure drops must be added the pressure drops of the steel mesh mechanical filter that must be placed on the water input line. It is a device compulsory for the correct unit operation, and it is available as accessory IFWX.

Admissible water flow rates

Min. (Qmin) and max. (Qmax) water flow-rates admissibles for the correct unit operation.

Size		50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
Qmin	[l/s]	5,0	5,0	5,0	5,5	7,2	7,2	7,2	8,5	10,5	10,5
Qmax	[l/s]	16,0	16,0	16,0	18,0	25,0	25,0	25,0	29,0	30,0	30,0

Water diagram



EVPT2 = Plate evaporator 2 circuits

R13 = Evaporator group heater

BT1 = Probes of entering water temperature

BT2 = Probes of leaving water temperature

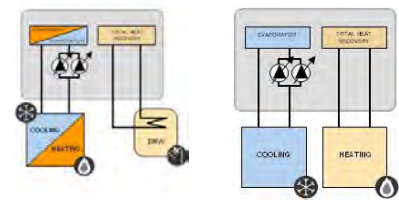
SPA1 = Differential pressure switch water

User side (2/4 - pipes) Unit with VARYFLOW+ (VARYP)

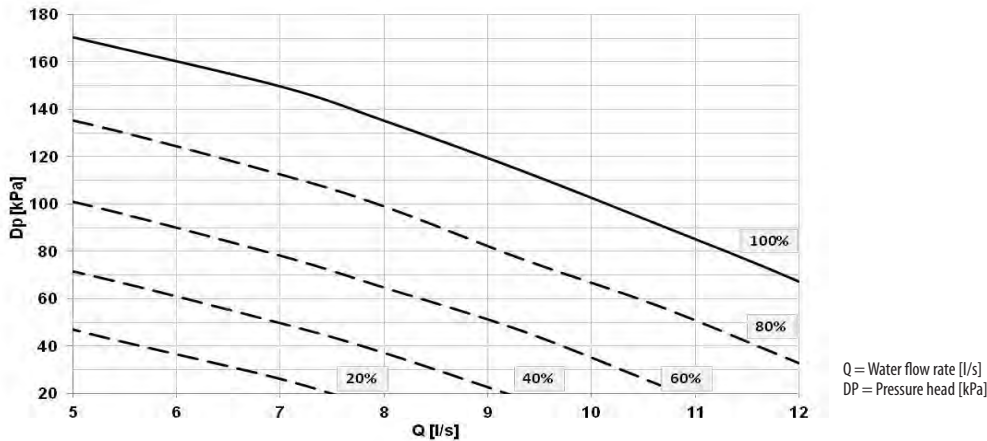
Configuration with 2 centrifugal electric pumps arranged in parallel and controlled by inverter, with housing and impeller made with AISI 304 stainless steel, and components as described on the water diagram key. All water fittings are Victaulic type.

The electric pumps are equipped with three-phase electric motor with IP55-protection and complete with thermoformed insulated casing.

The control, modulates the water flow-rate keeping constant the delta T. If the water temperature is in critical conditions, it allows to extend the unit operating ranges guaranteeing its operating, automatically reducing the water flow-rate. In the event of one of the two pumps is temporarily unavailable, it guarantees about the 80% of the nominal flow-rate.



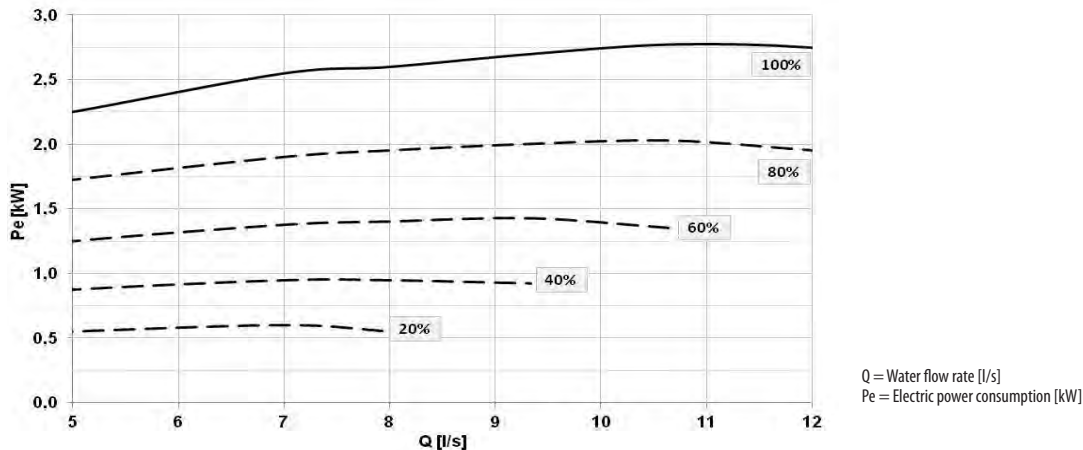
Pressure head VARYFLOW + (Size 50.4 - 65.4)



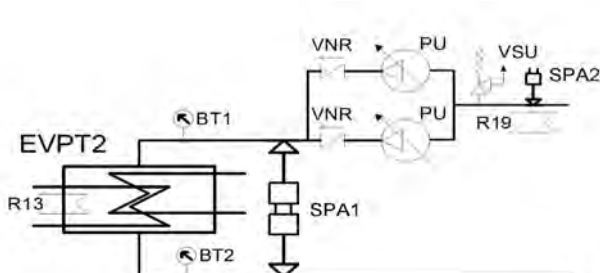
Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:

- User side exchanger pressure drops
- IFVX accessory - Steel mesh filter on the water side (where applicable)

Absorption curves VARYFLOW + (Size 50.4 - 65.4)

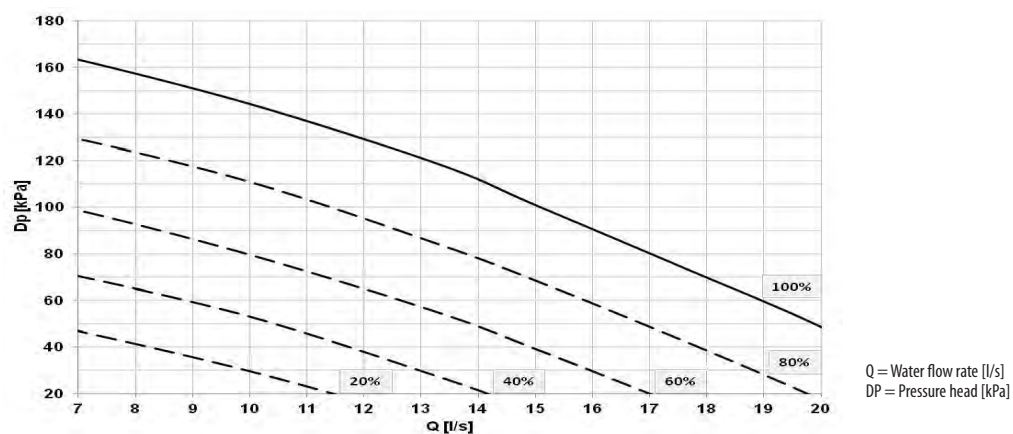


Water diagram

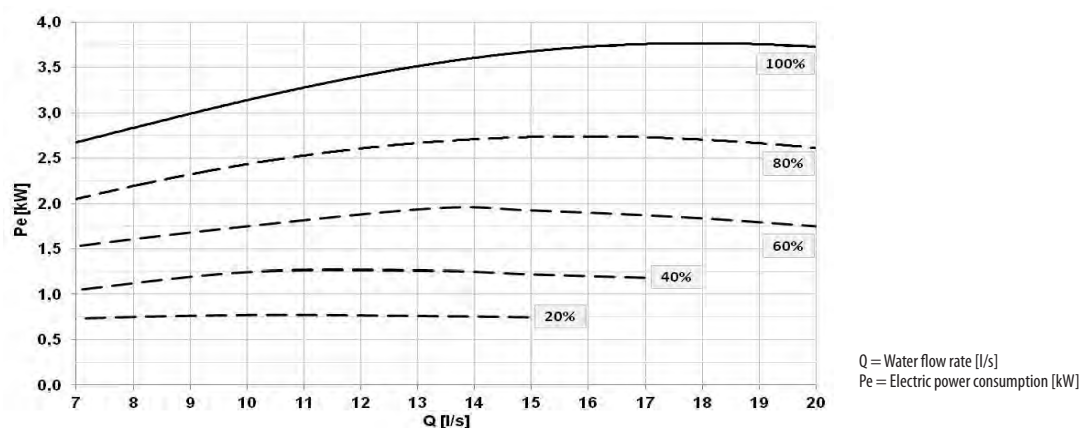


- EVPT2 = Plate evaporator 2 circuits
- R13 = Evaporator group heater
- BT1 = Probes of entering water temperature
- BT2 = Probes of leaving water temperature
- VNR = Non return valves
- SPA1 = Differential pressure switch water
- PU = Hydronic assembly VARYFLOW +
- VSU = Water safety valve
- R19 = Hydronic assembly heaters
- SPA2 = Installation load pressure switch

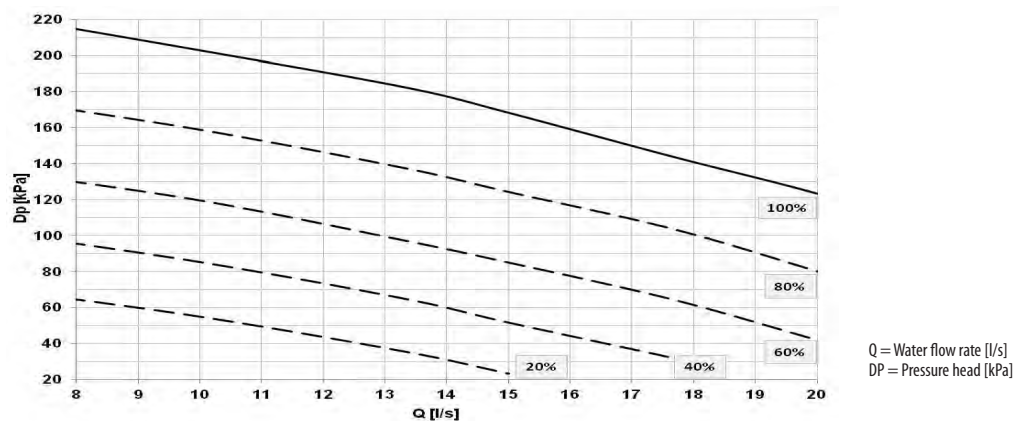
Pressure head VARYFLOW + (Size 70.4 - 90.4)



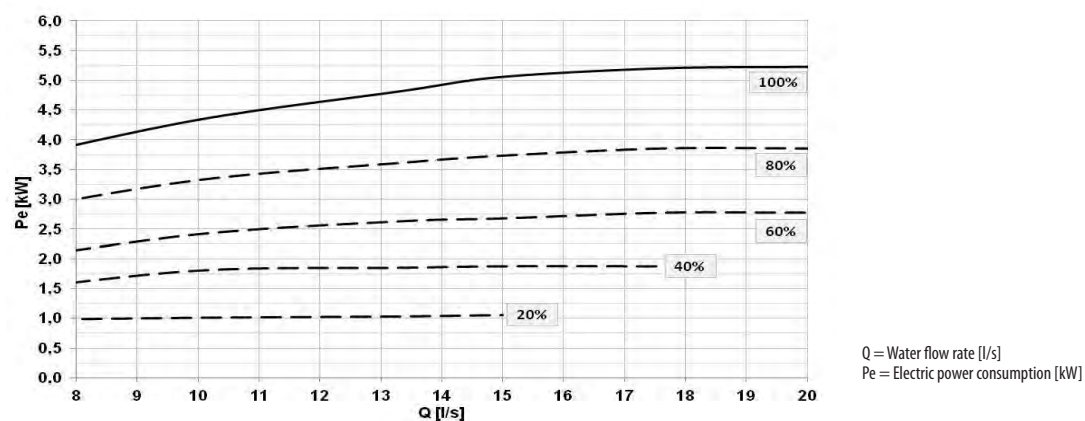
Absorption curves VARYFLOW + (Size 70.4 - 90.4)



Pressure head VARYFLOW + (Size 100.4 - 120.4)



Absorption curves VARYFLOW + (Size 100.4 - 120.4)

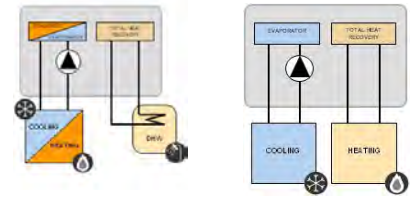


User side (2/4 - pipes)

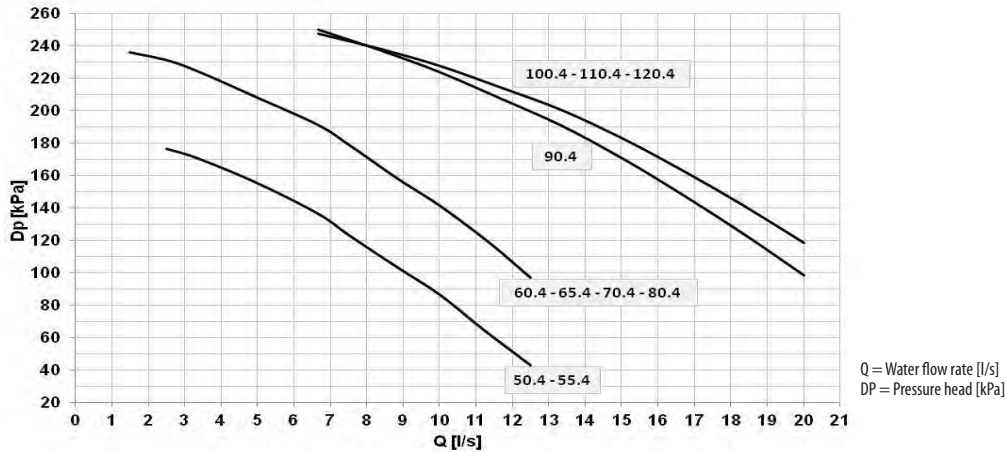
Unit with 1 ON/OFF pump (HYG1)

Configuration with 1 centrifugal electric pump, with housing and impeller made with AISI 304 stainless steel, and components as described on the water diagram key. All water fittings are Victaulic type.

The electric pump is equipped with three-phase electric motor with IP55-protection and complete with thermoformed insulated casing.



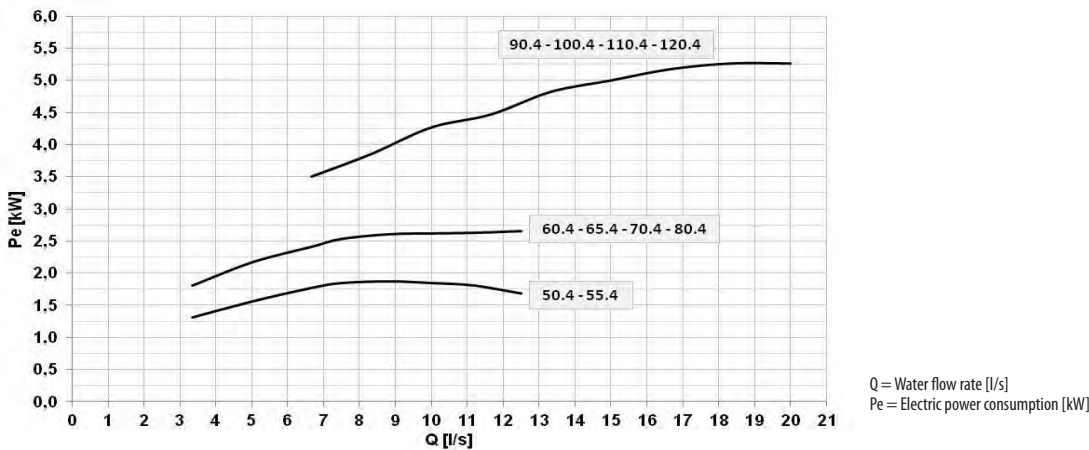
ON/OFF pump pressure head (Size 50.4 - 120.4)



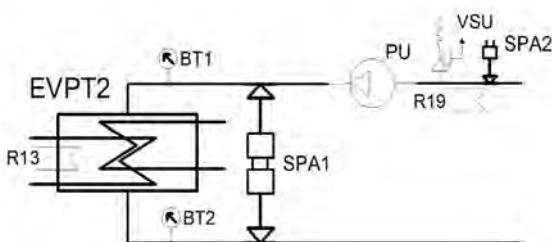
Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:

- User side exchanger pressure drops
- IFVX accessory –Steel mesh filter on the water side (where applicable)

ON/OFF pump absorption curves (Size 50.4 - 120.4)



Water diagram



- EVPT2 = Plate evaporator 2 circuits
- R13 = Evaporator group heater
- BT1 = Probes of entering water temperature
- BT2 = Probes of leaving water temperature
- SPA1 = Differential pressure switch water
- PU = Hydronic assembly 1 ON/OFF pump
- VSU = Water safety valve
- R19 = Hydronic assembly heaters
- SPA2 = Installation load pressure switch

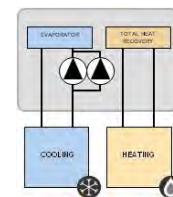
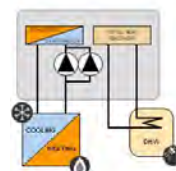
User side (2/4 - pipes)

Unit with 2 ON/OFF pumps (HYG2)

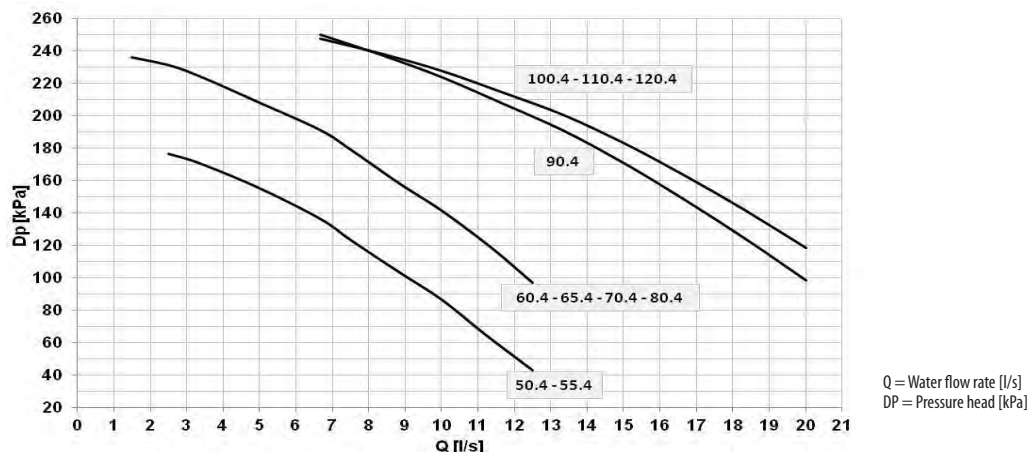
Configuration with 2 centrifugal electric pumps arranged in parallel and controlled by inverter, with housing and impeller made with AISI 304 stainless steel, and components as described on the water diagram key. All water fittings are Victaulic type.

The electric pumps are equipped with three-phase electric motor with IP55-protection and complete with thermoformed insulated casing.

The control balances the operating hours and in case of failure it is signaled and the stand-by pump is automatically activated.



ON/OFF pump pressure head (Size 50.4 - 120.4)

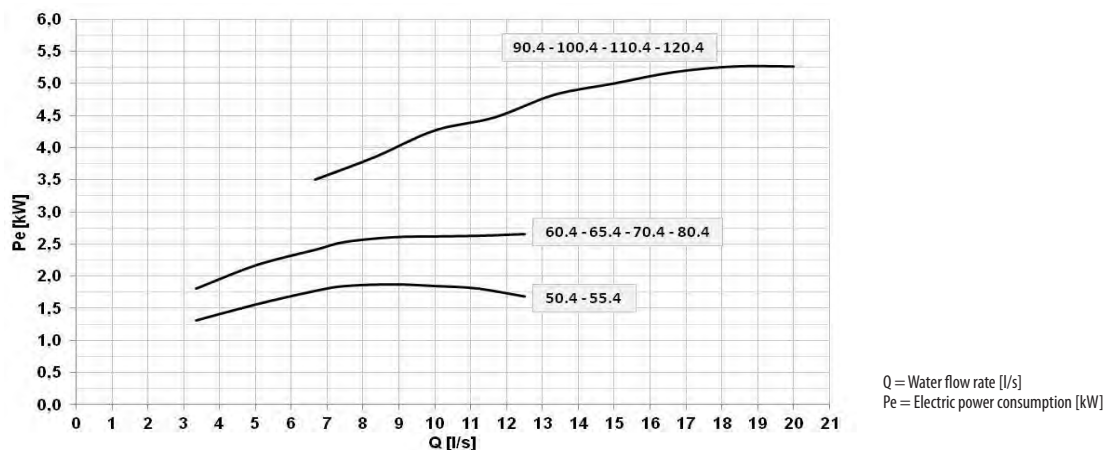


Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:

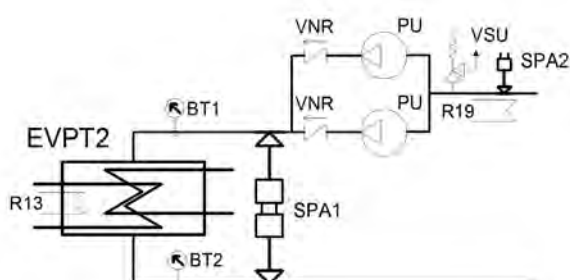


- User side exchanger pressure drops
- IFVX accessory – Steel mesh filter on the water side (where applicable)

ON/OFF pump absorption curves (Size 50.4 - 120.4)



Water diagram



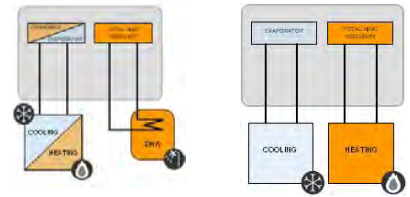
- EVPT2 = Plate evaporator 2 circuits
- R13 = Evaporator group heater
- BT1 = Probes of entering water temperature
- BT2 = Probes of leaving water temperature
- VNR = Non return valves
- SPA1 = Differential pressure switch water
- PU = Hydronic assembly 2 ON/OFF pumps
- VSU = Water safety valve
- R19 = Hydronic assembly heaters
- SPA2 = Installation load pressure switch

Recovery side (2/4 - pipes)

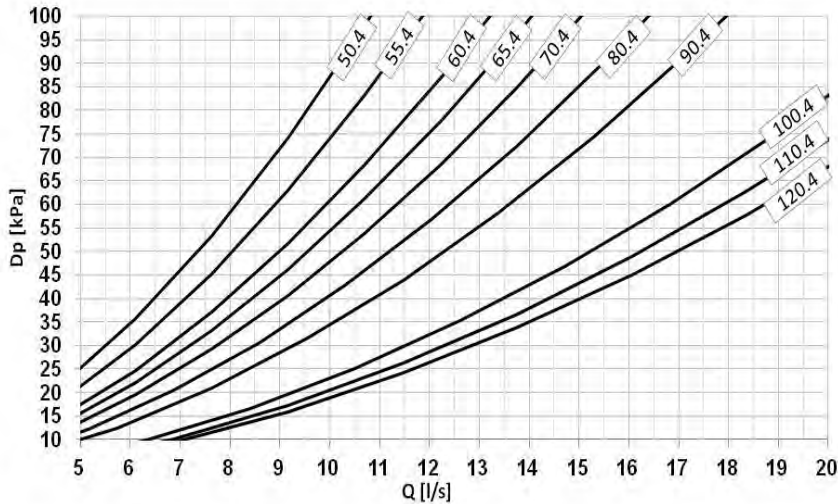
Standard unit (STD)

Configuration without hydronic assembly, equipped with components as described on the water diagram key.

All water fittings are Victaulic type. It is possible to control an external pump by an on/off or 0-10V signal.



Exchanger pressure drop curves

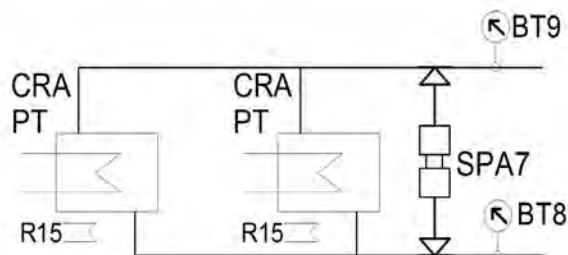


The pressure drops on the water side are calculated by considering an average water temperature at 7°C.

Q = Water flow rate [l/s]
DP = Pressure drops [kPa]

To the pressure drop at the heat exchanger recovery side (2 pipes) and hot side (4 pipes) we must also add the pressure drop at the steel mesh filter installed on the water intake line. This device is essential to the unit's proper operation, and is available as accessory IFWX.

Water diagram



CRA PT = Water cooled plate condenser
R15 = Condenser unit heaters
BT9 = Water outlet temperature probes
SPA7 = Water differential pressure switch
BT8 = Water inlet temperature probes

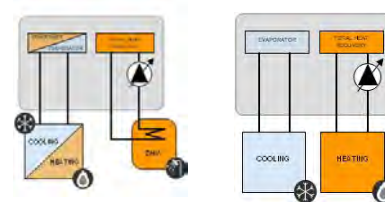
Recovery side (2/4 - pipes)

Configuration: Unit with 1 inverter pump (HYGR1V)

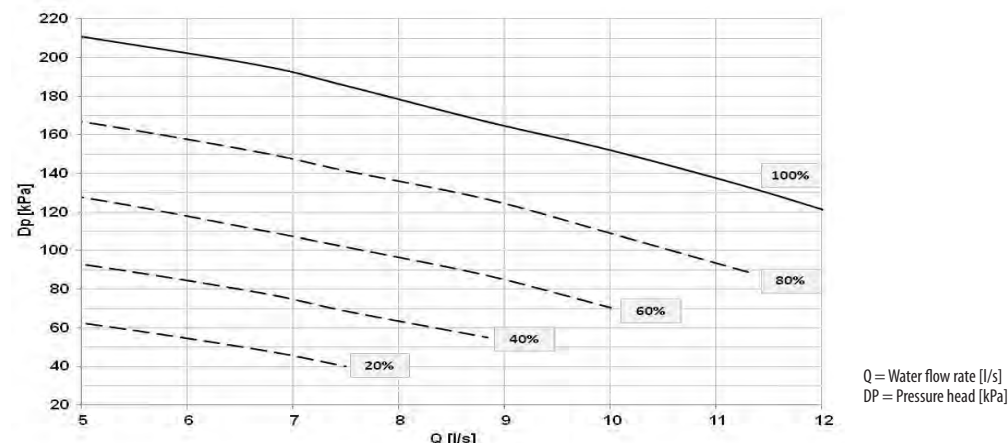
This configuration provides for one inverter-controlled electric centrifugal pump with body and impeller in AISI 304 steel and components listed in the key of the included water diagram. All water fittings are Victaulic.

The electric pump is equipped with three-phase electric motor with IP55-protection and complete with thermoformed insulated casing.

Adjustment enables the optimised load distribution according to the system requirements.



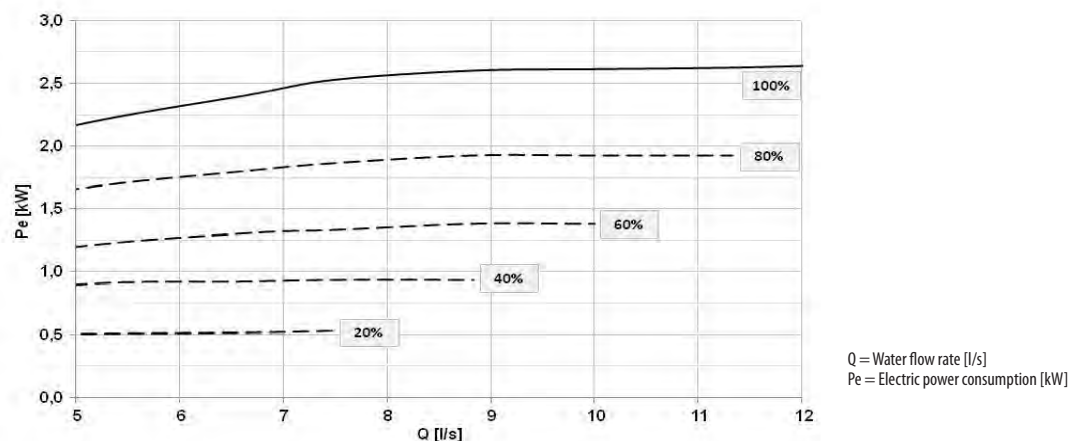
Inverter pump pressure head (Size 50.4 - 60.4)



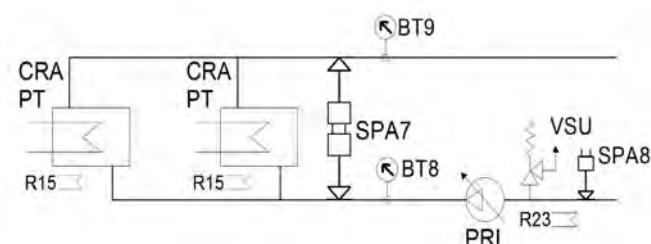
Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:

- User side exchanger pressure drops
- IFVX accessory - Steel mesh filter on the water side (where applicable)

Inverter pump absorption curves (Size 50.4 - 60.4)

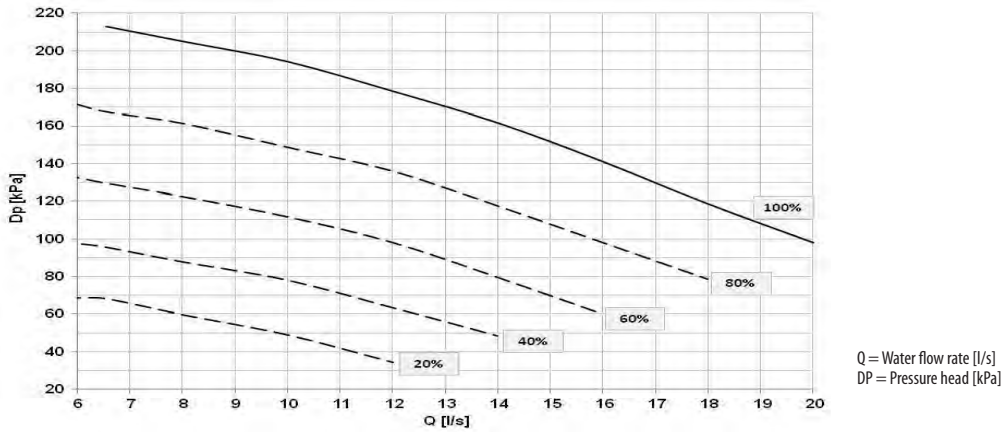


Water diagram

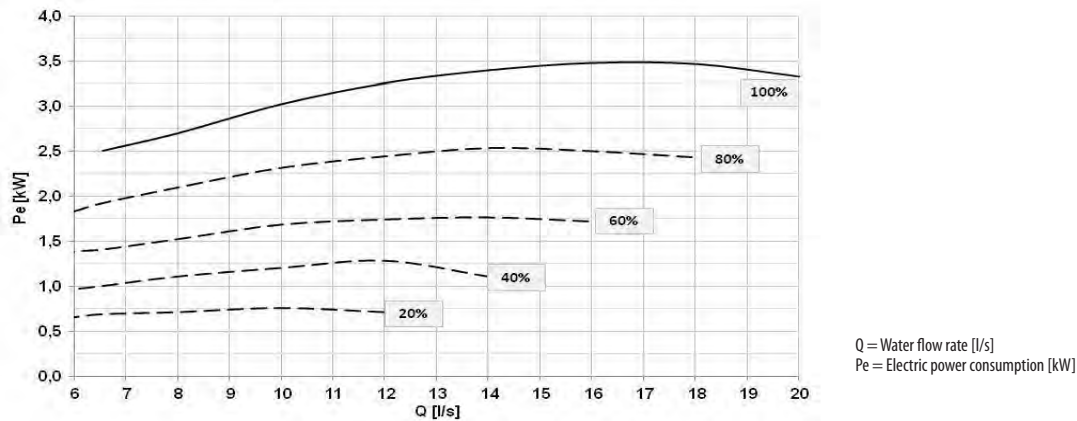


CRA PT = Water cooled plate condenser
R15 = Condenser unit heaters
BT9 = Temperature probes water outlet
SPA7 = Water differential pressure switch
BT8 = Water inlet temperature probes
PRI = Hydronic assembly 1 inverter pump
VSU = Water safety valve
R19 = Hydronic assembly heaters
SPA8 = Pressostato di carico impianto

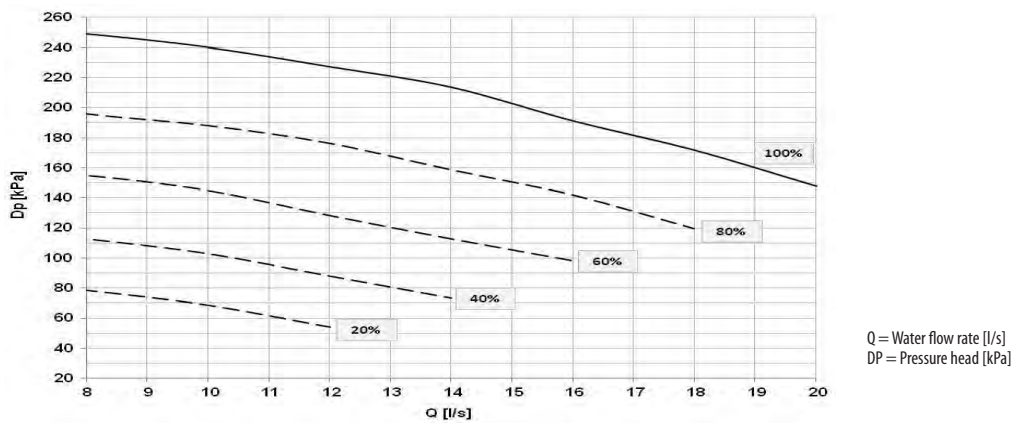
Inverter pump pressure head (Size 65.4 - 80.4)



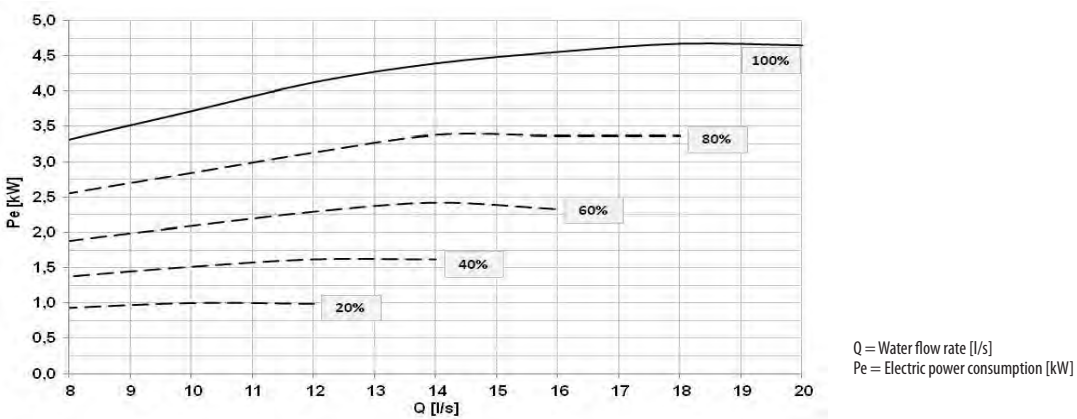
Inverter pump absorption curves (Size 65.4 - 80.4)



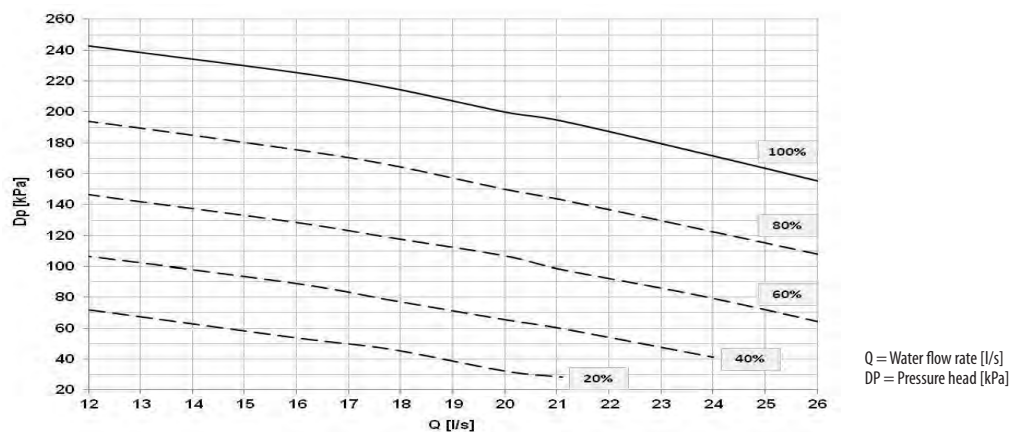
Inverter pump pressure head (Size 90.4 - 100.4)



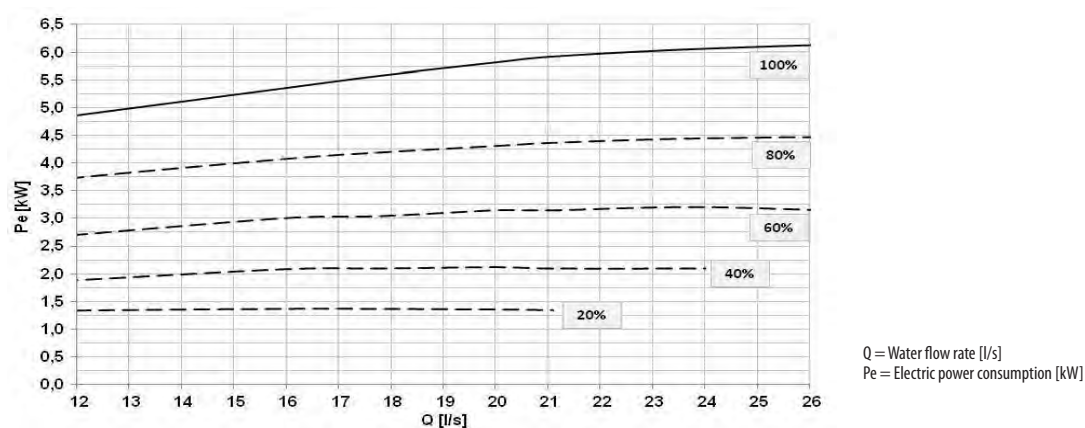
Inverter pump absorption curves (Size 90.4 - 100.4)



Inverter pump pressure head (Gr.110.4 - 120.4)



Inverter pump absorption curves (Gr. 110.4 - 120.4)



Built-in configuration options

ACC - Storage tank

Option supplied built-in the unit. Steel storage tank complete with double layer covering with closed-cell insulation, stainless steel anti-freeze immersion resistance, bleed valve, draw off cock, cast-iron shut-off butterfly valve with quick connections and activation lever with a mechanical calibration lock at the evaporator output, quick connections with insulated casing.

The storage tank is installed on user side in the 2-pipe configuration (2T), and on cold side in the 4-pipe configuration (4T).

For sizes 50.4 ÷ 65.4 the storage tank capacity is 300L.

For sizes 70.4 ÷ 120.4 the storage tank capacity is 500L.

CCCA - Copper / aluminium condenser coil with acrylic lining

Coils with copper pipes and aluminium fins with acrylic lacquering. Can be used in settings with moderately aggressive saline concentrations and other chemical agents.

Attention!

- Cooling capacity variation -2.7%
- variation in compressor power input +4.2%
- operating range reduction -2.1°C

CCCA1 - Condenser coil with Energy Guard DCC Aluminum

A treatment which offers an optimal thermal exchange and guarantees and protects the finned coil exchangers from corrosion over time. Can be used in settings with very aggressive saline concentrations and other chemical agents in the air thus maintaining the performance of the coils over time.

HEDIF - Diffuser for high efficiency axial fan

The new AxiTop diffuser creates an ideal air distribution: it aerodynamically decelerates the flow and transforms a big part of its kinetic energy in static pressure:

- down to -3 dB of silence
- reduction of 3% of the absorbed energy.

Since the fans are the unit's main noise source, the benefits are evident especially during the night hours, when the load is reduced but sensitivity to noise is enhanced.

Available only for size 70.4 ÷ 120.4.

CREFB - Device for consumption reduction of the external section ECOBREEZE fans

Axial fans with sickle profile blades terminating with "Winglets", directly coupled to the electronic controlled motor (IP54), driven by the magnetic switching of the stator. The brushless technology and the special supply increase both the life expectancy and the efficiency. As a result the electric consumption is reduced up to 50%. Fans are located in aerodynamically shaped structures to increase efficiency and reduce noise level.

The assembly is protected by accident prevention guards.

Available only for size 70.4 ÷ 120.4.

SFSTR - Disposal for inrush current reduction

Electronic device that automatically and gradually starts the compressors, thereby reducing the current peak generated in star-triangle start-ups and therefore reduces the mechanical stress on the motor and the electrodynamic stress on the power cables and on the mains.

MF2 - Multi-function phase monitor

The multifunction phase monitor controls all phases and their sequence, checks for voltage anomalies (+/-10%), and automatically restores operation of the unit as soon as the power supply returns to normal.

This control allows to:

- protect the internal components of the unit, which are powered by an abnormal voltage, may operate incorrectly or break;
- quickly identify, among the alarms of the unit's components, the real cause of the malfunction due to the sudden change in voltage.

CMSC8 - Serial communication module to BACnet supervisor

This enables the serial connection of the supervision system, using Modbus as the communication protocol. It enables access to the complete list of operational variables, commands and alarms. Using this accessory every unit can dialogue with the main supervision systems.

The device is installed and wired built-in the unit.



The configuration and management activities for the BACnet networks are the responsibility of the client.



The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)

CMSC9 - Serial communication module to Modbus supervisor

This enables the serial connection of the supervision system, using Modbus as the communication protocol. It enables access to the complete list of operational variables, commands and alarms. Using this accessory every unit can dialogue with the main supervision systems.

The device is installed and wired built-in the unit.



The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)

CMSC10 - Serial communication module to LonWorks supervisor

This enables the serial connection of the supervision system which uses the LonWorks communication protocol. It enables access to a list of operating variables, commands and alarms which comply with the Echelon® standard.

The device is installed and wired built-in the unit.



The configuration and management activities for the LonWorks networks are the responsibility of the client



LonWorks technology uses the LonTalk® protocol for communicating between the network nodes. Contact the service supplier for further information.

PFCP - Power factor correction capacitors (cosfi >0,9)

The component is necessary to lower the phase difference between current and voltage in the electromagnetic components of the unit (e.g. asynchronous motors). The component allows to put the cosfi power factor to values on average higher than 0.9, reducing the network reactive power. This often leads to an economic benefit which the energy provider grants to the final user.

PGFC - Finned coil protection grill

This accessory is used to protect the external coil from the accidental contact with external things or people.

Ideal for installation in places where persons can pass from, such as car parks, terraces, etc.

MHP - High and low pressure gauges

Despite the unit already enabling a series of digital displays on the operating pressure of the refrigeration circuit, this option enables analogical measuring of refrigerant pressures at compressor intake and supply thus easing the checking of these parameters for the technicians who are managing the unit. The two liquid pressure gauges and related pressure sensors are attached built-in in easily accessible positions.

Accessories separately supplied

RCTX - Remote control

This option allows to have full control over all the unit functions from a remote position.

It can be easily installed on the wall and has the same aspect and functions of the user interface on the unit.



All device functions can be repeated with a normal portable PC connected to the unit with an Ethernet cable and equipped with an internet navigation browser



The device should be installed on the wall using suitable plugs, electrically hooked up and connected to the unit (installation and wiring are the responsibility of the Customer). Max. remote distance 350 m without auxiliary supply.



Data and power supply serial connection cable n.1 twisted and shielded pair. Diameter of the individual conductor 0.8 mm.



BACX - BACnet serial communication module

Allows the serial connection to supervision systems by using BACnet-IP as a communication protocol. It allows the access to the entire list of operating variables, controls and alarms. With this accessory every unit can communicate with the main supervision systems.



The configuration and management activities for the BACnet networks are the responsibility of the client.



The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)

CMMBX - Serial communication module to supervisor (Modbus)

This enables the serial connection of the supervision system, using Modbus as the communication protocol. It enables access to the complete list of operational variables, commands and alarms. Using this accessory every unit can dialogue with the main supervision systems.



The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)

CMSLWX - LonWorks serial communication module

This enables the serial connection of the supervision system which uses the LonWorks communication protocol. It enables access to a list of operating variables, commands and alarms which comply with the Echelon® standard.



The configuration and management activities for the LonWorks networks are the responsibility of the client



LonWorks technology uses the LonTalk® protocol for communicating between the network nodes. Contact the service supplier for further information.

PGFCX - Finned coil protection grill

This accessory is used to protect the external coil from the accidental contact with external things or people.

Ideal for installation in places where persons can pass from, such as car parks, terraces, etc.



This option is not suitable for application in sulphuric environments

MHPX - High and low pressure gauges

Despite the unit already enabling a series of digital displays on the operating pressure of the refrigeration circuit, this option enables analogical measuring of refrigerant pressures at compressor intake and supply thus easing the checking of these parameters for the technicians who are managing the unit. The two liquid pressure gauges and related pressure sensors are attached built-in in easily accessible positions.



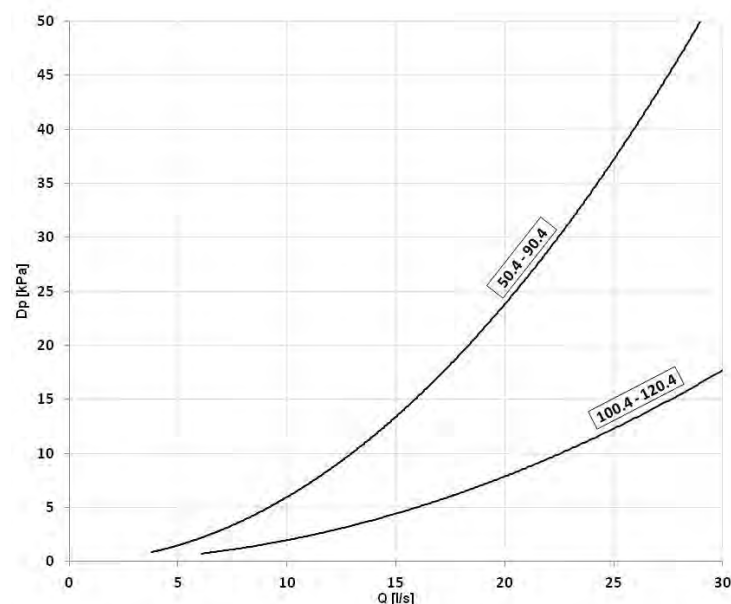
IFWX - Steel mesh strainer on the water side

The device prevents any impurity in the hydraulic circuit from soiling the exchanger. The stainless steel mesh mechanical filter must be placed on the water inlet line. It needs to be easy to remove for periodical maintenance and cleaning operations.

Moreover, it consists of:

- cast-iron shut-off butterfly valve with quick coupling and throttle drive and mechanical calibration stop
- quick couplings with an insulated casing

Steel mesh strainer pressure drops



Q = Water flow rate [l/s]
DP = Water side pressure drops [kPa]

AVIBX - Anti-vibration mount supports

The spring antivibration mounts are attached in special housing on the support frame and serve to smooth the vibrations produced by the unit thus reducing the noise transmitted to the support structure.

VACSRX - Total recovery side DHW switching valve

The utility side DHW switching valve is also supplied as a separate accessory.

The unit controller closes a digital output to control the DHW switching valve from the installation to the storage tank up to the DHW set point reaching.

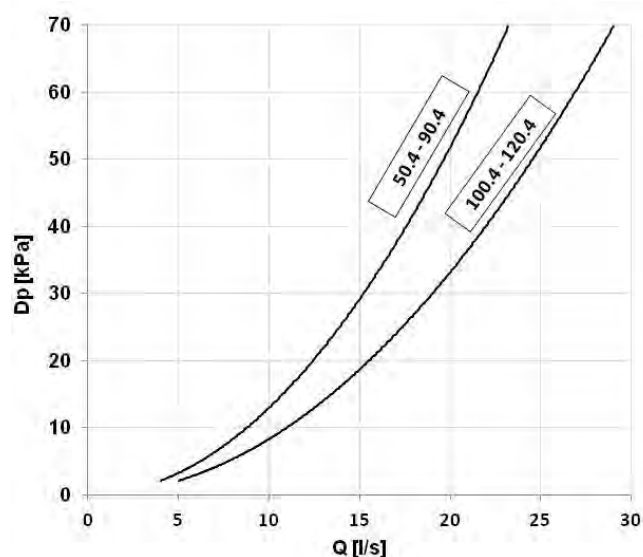
For sizes from 50.4 to 90.4 the DHW switching valve is 3".

For sizes from 100.4 to 120.4 the DHW switching valve is 4".

The DHW switching valve has a IP 40 protection degree.

It is therefore compulsory that client provides a protection for the external liquid valve.

DHW switching valve pressure drops

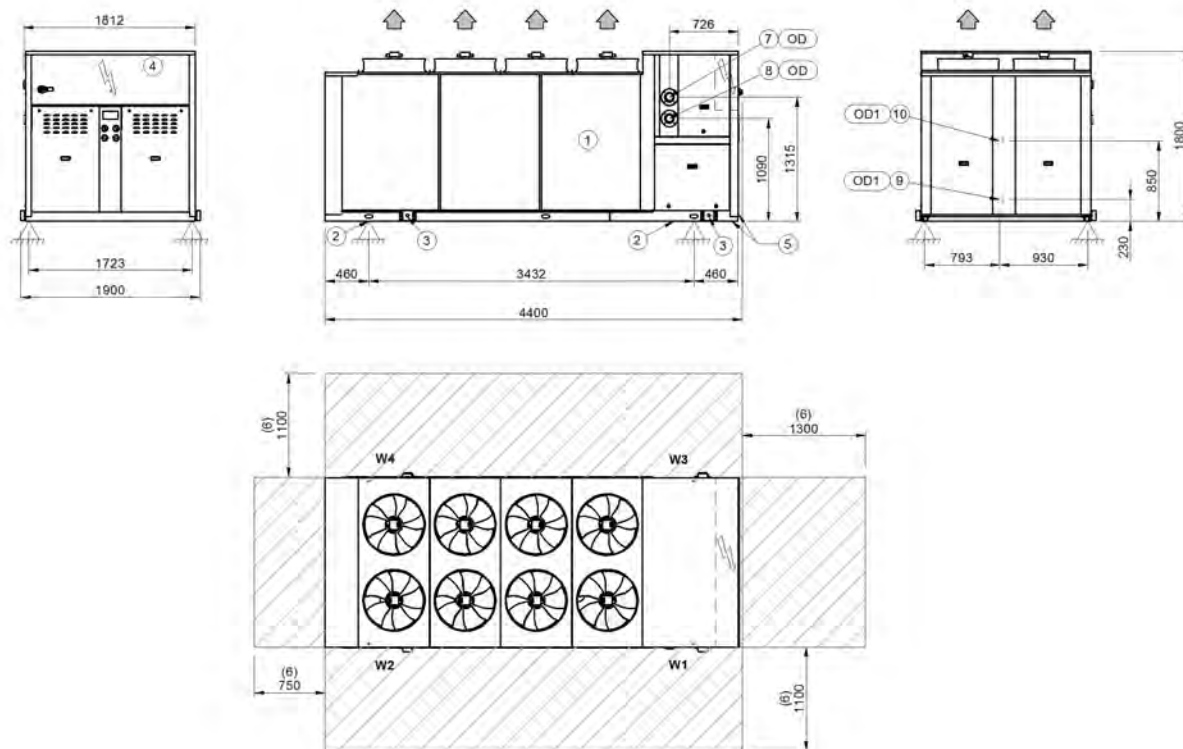


Q = Water flow rate [l/s]
DP = Water side pressure drops [kPa]

Dimensional

Size 50.4 - 55.4 - 60.4 - 65.4

DAAL 450.4_65.4 EXC_0 REV01
Data/Date 23/07/2015



- 1) External exchanger
- 2) Unit fixing holes Ø 25
- 3) Lifting brackets (Removable)
- 4) Electrical panel
- 5) Power input
- 6) Clearance access recommended
- 7) Water inlet user side of no pumps unit / Water outlet user side of unit with pumps (optional)
- 8) Water outlet user side of no pumps unit / Water inlet user side of unit with pumps (optional)
- 9) Recovery side exchanger water inlet (optional)
- 10) Recovery side exchanger water outlet (optional)

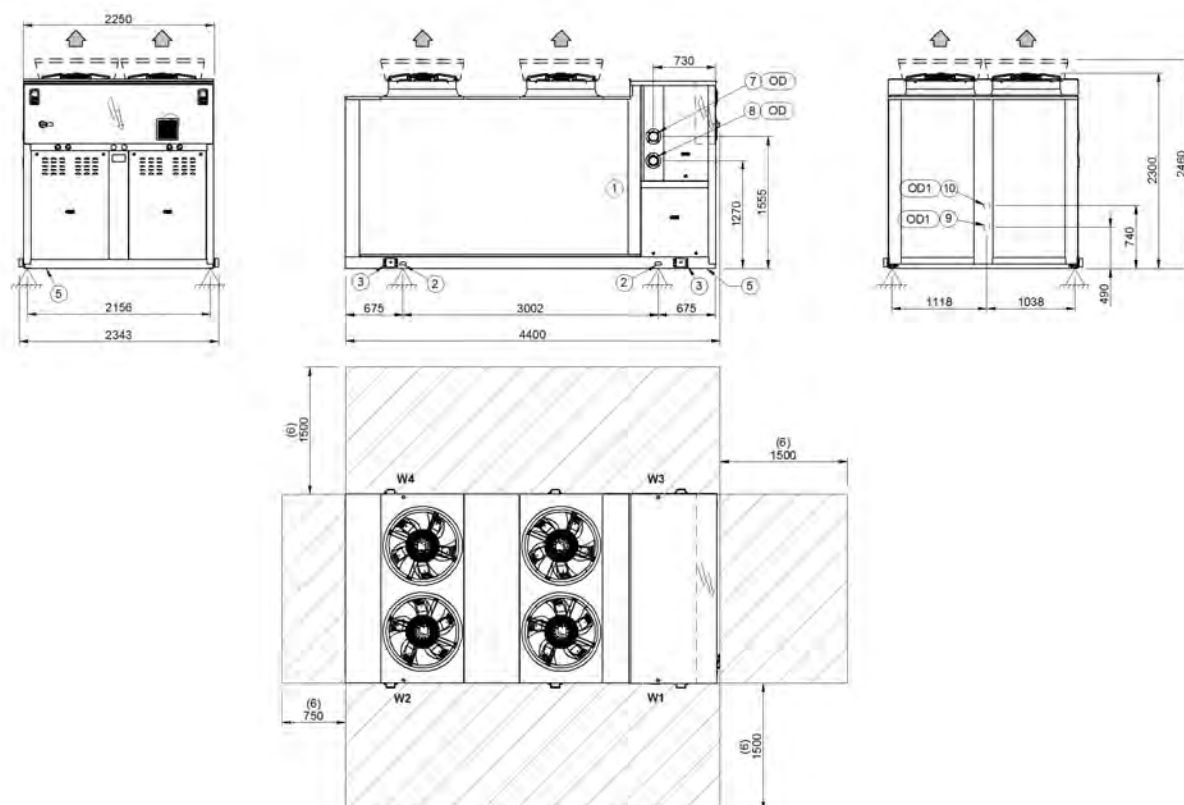
Size		50.4	55.4	60.4	65.4
Length	mm	4450	4450	4450	4450
Height	mm	1800	1800	1800	1800
Depth	mm	1812	1812	1812	1812
W1 Support point	kg	540	545	567	614
W2 Support point	kg	352	352	373	392
W3 Support point	kg	550	550	581	645
W4 Support point	kg	361	367	687	423
Operation weight	kg	1803	1825	1908	2073
Shipping weight	kg	1710	1730	1810	1970

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

Dimensional

Size 70.4 - 80.4 - 90.4

DAAL 470.4_90.4 EXC_0 REV01
Data/Date 23/07/2015



- 1) External exchanger
- 2) Unit fixing holes Ø 25
- 3) Lifting brackets (Removable)
- 4) Electrical panel
- 5) Power input
- 6) Clearance access recommended
- 7) Water inlet user side of no pumps unit / Water outlet user side of unit with pumps (optional)
- 8) Water outlet user side of no pumps unit / Water inlet user side of unit with pumps (optional)
- 9) Recovery side exchanger water inlet (optional)
- 10) Recovery side exchanger water outlet (optional)

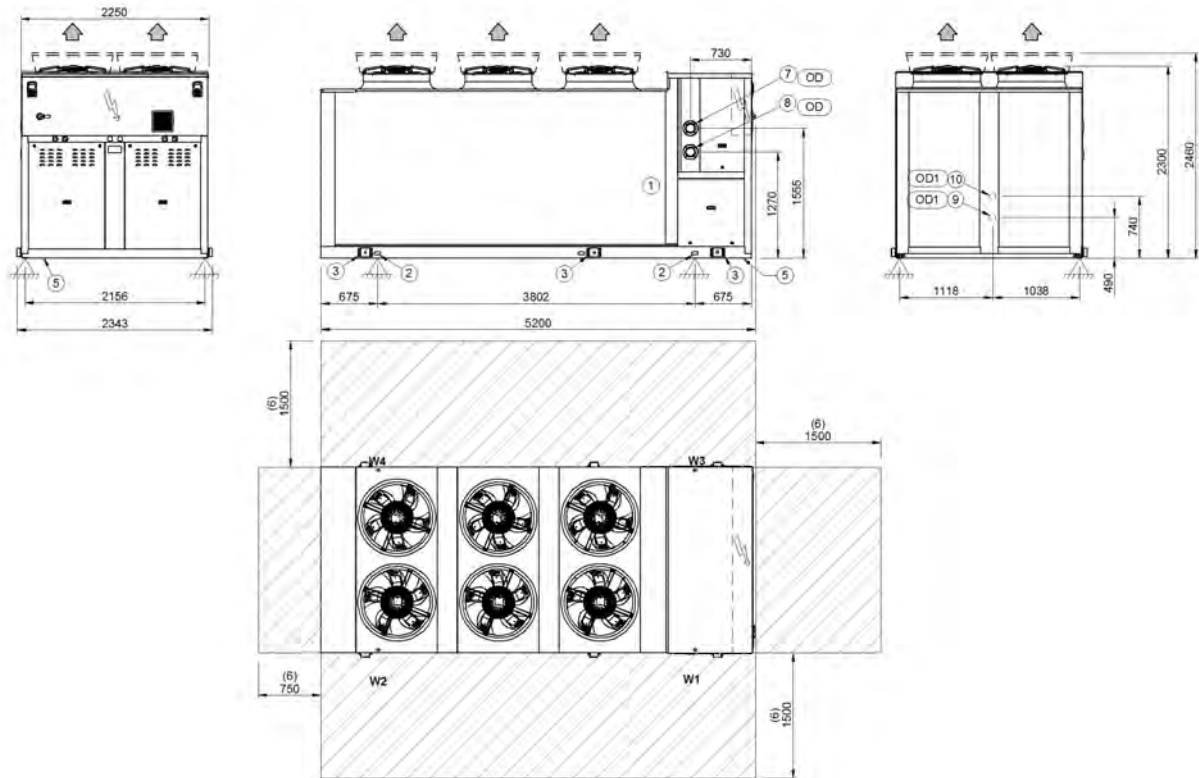
Size		70.4	80.4	90.4
Length	mm	4450	4450	4450
Height standard unit	mm	2300	2300	2300
Height with AXITOP	mm	2460	2460	2460
Depth	mm	2250	2250	2250
W1 Support point	kg	803	838	885
W2 Support point	kg	484	507	535
W3 Support point	kg	831	868	919
W4 Support point	kg	512	537	570
Operation weight	kg	2630	2750	2908
Shipping weight	kg	2520	2640	2800

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

Dimensional

Size 100.4 - 110.4 - 120.4

DAAL 4100.4_120.4 EXC_0 REV00
Data/Date 23/07/2015



- 1) External exchanger
- 2) Unit fixing holes Ø 25
- 3) Lifting brackets (Removable)
- 4) Electrical panel
- 5) Power input
- 6) Clearance access recommended
- 7) Water inlet user side of no pumps unit / Water outlet user side of unit with pumps (optional)
- 8) Water outlet user side of no pumps unit / Water inlet user side of unit with pumps (optional)
- 9) Recovery side exchanger water inlet (optional)
- 10) Recovery side exchanger water outlet (optional)

Size		100.4	110.4	120.4
Length	mm	5250	5250	5250
Height standard unit	mm	2300	2300	2300
Height with AXITOP	mm	2460	2460	2460
Depth	mm	2250	2250	2250
W1 Support point	kg	1060	1092	1136
W2 Support point	kg	648	657	687
W3 Support point	kg	1086	1119	1160
W4 Support point	kg	674	684	711
Operation weight	kg	3467	3553	3694
Shipping weight	kg	3320	3400	3540

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

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