



Multi-pipe units with scroll compressors

Model CMAB SE 050 - 525

Model CMAB HE 050 - 880

Cooling capacity: 45 - 779 kW

Heating capacity: 49 - 881 kW

BALANCETM



CG-PRC044A-GB

Table of Contents

Product presentation.....	4
Operating modes.....	8
Unit designation	10
Technical specifications.....	11
Options and accessories	15
Energy efficiency ratios.....	16
Technical data	17
Operating range.....	24
Scaling correction tables	26
Hydraulic data.....	27
Electrical data	48
Acoustic data	52
Installation sketch	58
Dimensions and weights	61



Product presentation

Multi-pipe systems

The units belonging to the CMAB range are high efficiency multifunctional units for 4-pipe systems with axial fans and scroll compressors.

CMAB multi-pipe units are the ideal solution for all buildings undergoing strong opposite variable loads during the whole year.

The main applications are:

- Buildings with a double and opposite sun exposure
- Airports
- Hotels
- Banks
- Discos, in which cooling for the dance floor zone and heating for those areas dedicated to conversation are simultaneously needed
- Wellness centers where areas with opposite loads requirements are present
- Datacenter, where the server zone needs to be cooled while the office area needs to both heating and cooling
- Hospital, in particular the operating theatre where the cooling or heating demand is independent from the season

The four-pipe technology is considered the best energy efficient solution able to satisfy the complex needs of buildings where it is necessary to neutralize simultaneous opposite thermal loads.

CMAB, operating in total or partial heat recovery mode, is able to satisfy the simultaneous demand of hot and cold water all over the year, simplifying the plant and reducing operating costs.



Hotels



Shopping malls



Hospitals



Wellness centers



Airports

Product presentation

50 % LESS DEFROST CYCLES

An innovative technology is implemented in the electronic control system in order to significantly decrease the number of defrosting cycles, reducing drastically the production of negative energy towards the plant, where a heat pump normally uses to switch the cycle in chiller mode producing cold water.

It is a digital self-adaptive defrosting system able to intervene only in case of a consistent thickness formation of ice on the coils' fins. In particular, the system reduces the number of defrosting cycles by monitoring the outdoor conditions and the unit evaporation and activates the defrost function only if necessary and if the coils are really iced.

Thanks to this technology the number of defrosting cycles decreases by 50%.

The reduction of mechanical stress, due to the cycle inversions during heating mode, implies an increase in the life cycle of the unit, as well as improving the comfort felt by the user.

DYNAMIC LOGIC CONTROL

The electronic controller can manage the differential of the inlet water temperature on the basis of the speed of its variation.

The function dLC works partially as a simulator of a water tank: in fact it allows to reduce the number of the compressor's starts. The main advantage of the function dLC is during the conditions of low load, that is:

- the compressor is switched off and the water temperature increases very slowly; in this situation the dLC is able to delay the start of the compressor by replacing itself to the thermal inertia that would be obtained from the water tank;
- the compressor is switched on and the water temperature decreases very quickly; in this situation the dLC is able to delay the compressor's switching off. In this way it is reached the same result that would be obtained from the water tank's thermal inertia.

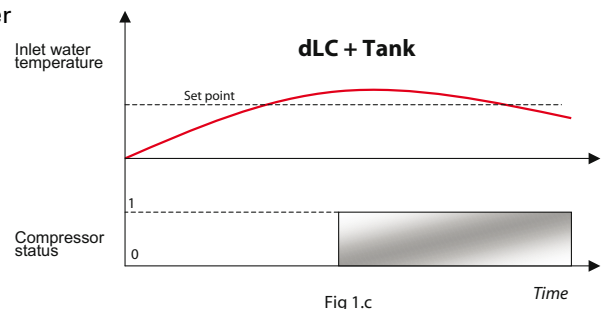
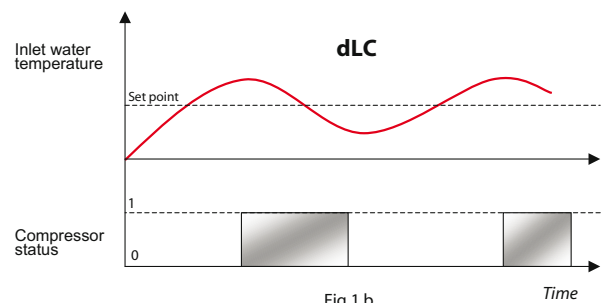
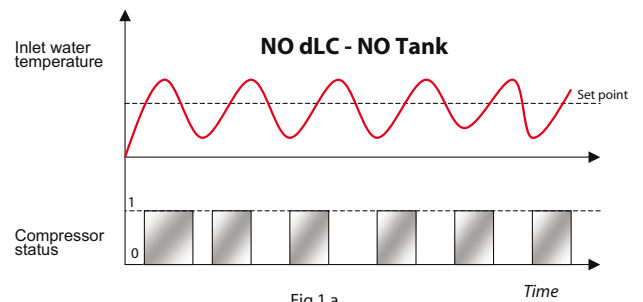
As result the function dLC makes possible to reduce the dimensions of the water tank, with huge advantages for the footprint of the unit .

Figure 1 shows how the compressor's startups decrease by passing from a system with no tank and without dLC (1.a) to a system with dLC (1.b) and to a system with dLC and a small water tank (1.c). It can be seen that this last solution is still the best, though the tank dimensions can be reduced.

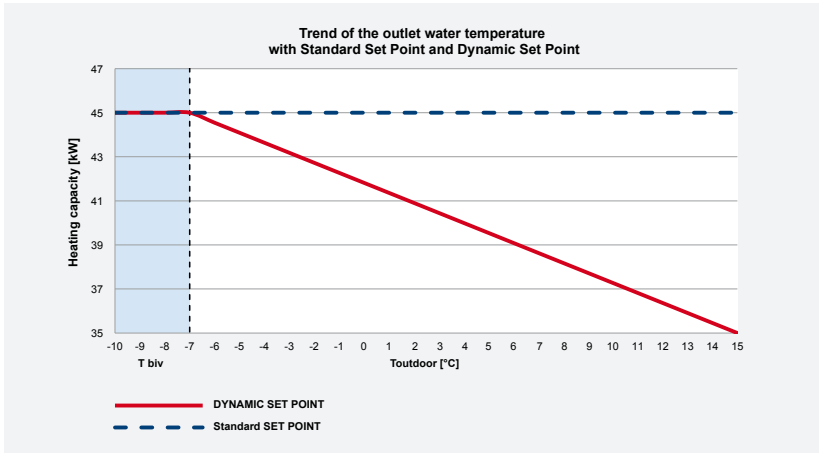
DYNAMIC SET POINT

During the heating season the outdoor temperature changes from the design temperature, and consequently the heating load of the plant changes too. It is therefore possible to adjust the outlet water temperature according to outdoor temperature by the use of a set point regulation following a climatic curve.

With a bivalent outdoor temperature of - 7°C with fan coils distribution (operating with an inlet water temperature of 45°C) it is possible to adjust the outlet water temperature as per a linear trend between the bivalent temperature and 15°C (temperature value to which the heating load is assumed to be zero).

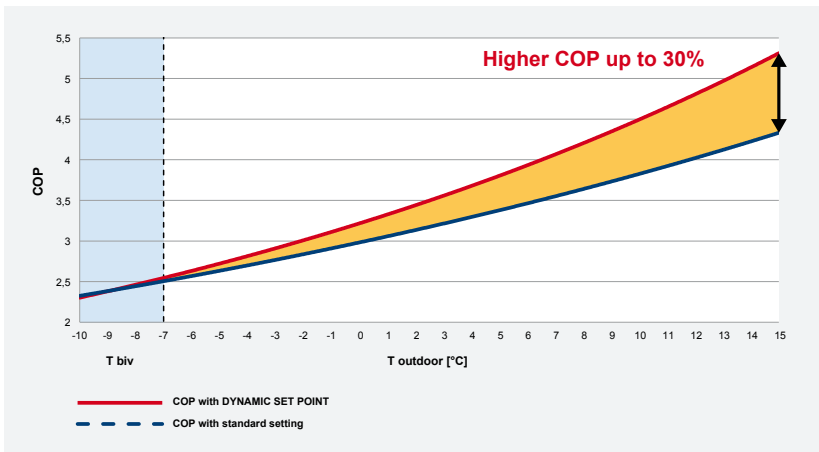


Product presentation

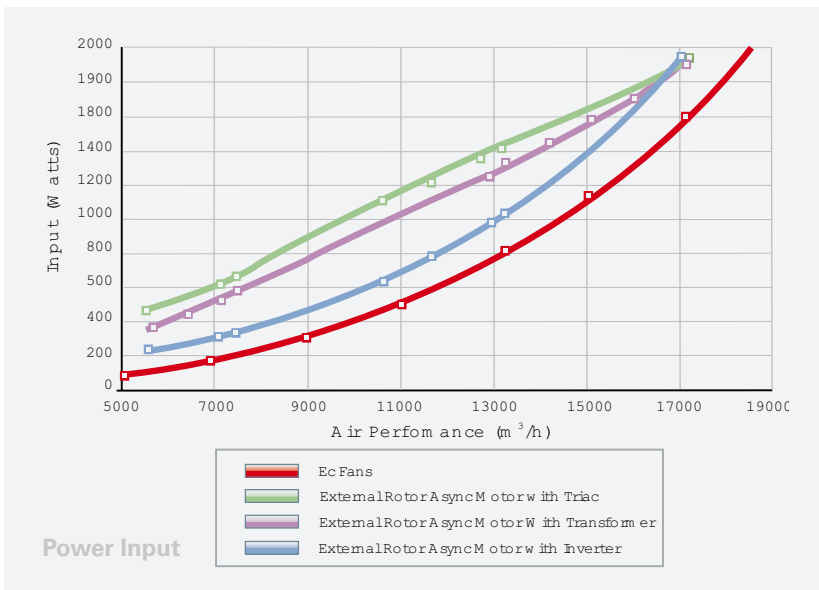


The curve shown is an example of possible regulation: the DYNAMIC SET POINT allows to set a regulation curve according to the design choices and to the requirements of each installation. This control allows to keep a high level of comfort and highlights the efficiency of the heat pump.

The efficiency increases with the decrease of the outlet water temperature thanks to a lowest condensing temperature of the refrigerant.



The diagram shows the COP trend for the standard set point and the Dynamic Set Point. The DYNAMIC SETPOINT allows to adjust the operating set point of the unit maximizing the comfort and the efficiency of the unit.



ELECTRONICALLY COMMUTATED BRUSHLESS FANS (OPTIONAL)

The new generation EC-BRUSHLESS fans ensure a higher efficiency thanks to lower energy consumption compared to traditional AC motors.

The EC motors allow lower sound emissions during the air flow modulation.

The blade profile has been studied to reduce noise and ensure high acoustic comfort levels.

Product presentation

NEW SUPERVISIONING CONTROL SYSTEM

The new generation and the most advanced control system entirely custom made able to manage and optimize the unit operation by coordinating the interaction between all the components:

compressors, fans, inverter pumps and electronic expansion valves, maximizing the efficiency of the multi-functional system. It allows the interface with the main BMS system, via RS485, BACnet™ TCP/IP or MS/TP, and LonTalk, the routing on the web of all the operating parameters of the unit, allowing a total remote control of the unit through the Ethernet port RJ45, and the interface with the expansion modules I/O, via CanBus.

ENERGY SAVING

The unit can be turned off according to time bands. An innovative **Energy Saving** function can be activated to regulate the on-off of the unit. By activating this function, at certain time bands, the controller will adjust the set point value to those required by the user.

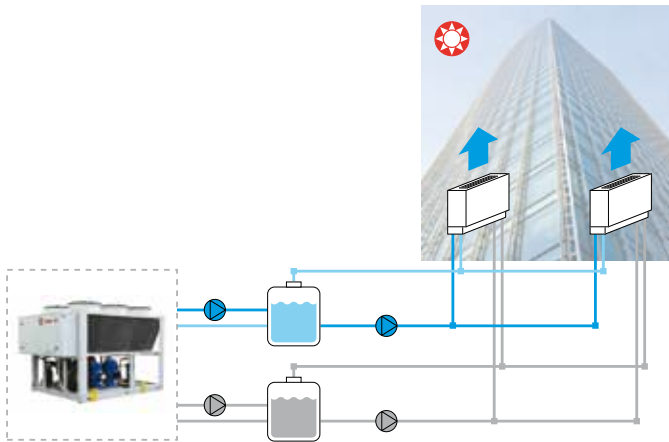
Thanks to the Energy saving function the unit will be "forced to work more" at times when the cost of electricity is lower or even to work less when there is a lower heating load.

The electronic control gives priority to the automatic shutdown, if the two functions should be active for the same daily time band.

Operating modes

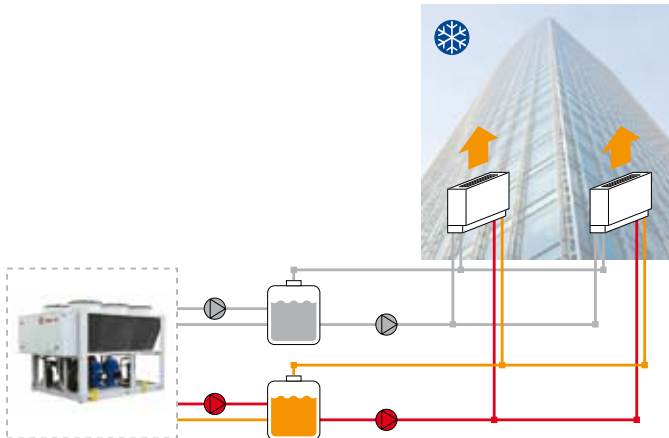
Multi-pipe units are made of 2 distinct sections, one for heating (condenser side) and one for cooling (evaporator side). The simultaneous production of hot and chilled water allows the unit to adapt its operation to any requirement of the HVAC system, in a totally autonomous and self-managed way.

Multi-pipe units automatically switch their operating cycle according to the load demands during the whole year, without doing the manual switch from summer to winter mode needed for traditional heat pumps. There are three basic operating modes which are automatically selected in order to minimize the power input and satisfy the thermal load of the plant.



ONLY CHILLER MODE

The unit works in chiller mode dissipating the condensation heat through a finned coil heat exchanger (condenser). The water is chilled in a water-refrigerant plate heat exchanger (evaporator).



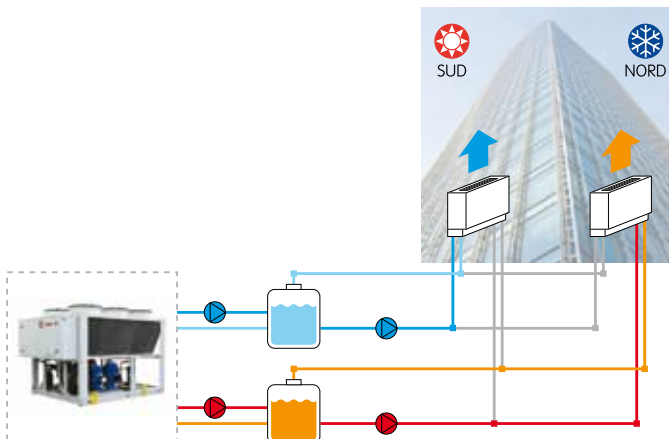
ONLY HEAT PUMP MODE

The unit works in heat pump mode only, exploiting the outdoor air energy to heat the water through a water-refrigerant plate heat exchanger (condenser).

Different from traditional reversible heat pumps the hot water is produced in a different heat exchanger from the one used to produce chilled water.

Therefore according to the operating mode, whether the unit works in heat pump mode or in chiller mode, there are dedicated heat exchangers for the chilled or hot water production (evaporator or condenser).

This is required in order to keep the cooling and heating side separated, as needed in a 4-pipe system.



CHILLER + TOTAL OR PARTIAL RECOVERY MODE

The unit works as a water-water heat pump in case there is simultaneous demand of hot and chilled water, by controlling the condensation and the evaporation through two different plate heat exchangers each for its own hydraulic circuit of the 4 pipe plant.

Operating modes

POSSIBLE OPERATING COMBINATIONS

COOLING LOAD (%)	HEATING LOAD (%)	CIRCUIT 1	CIRCUIT 2
0	25	OFF	H (50% PART LOAD)
0	50	OFF	H (100% FULL LOAD)
0	50	H (50% PART LOAD)	H (50% PART LOAD)
0	75	H (50% PART LOAD)	H (100% FULL LOAD)
0	100	H (100% PART LOAD)	H (100% FULL LOAD)
25	0	C (50% PART LOAD)	OFF
25	25	C+R (50% PART LOAD)	OFF
25	50	C+R (50% PART LOAD)	H (50% PART LOAD)
25	75	C+R (50% PART LOAD)	H (100% FULL LOAD)
50	0	C (100% FULL LOAD)	OFF
50	0	C (50% PART LOAD)	C (50% PART LOAD)
50	25	C+R (50% PART LOAD)	C (50% PART LOAD)
50	50	C+R (100% FULL LOAD)	OFF
50	50	C+R (50% PART LOAD)	C+R (50% PART LOAD)
50	75	C+R (100% FULL LOAD)	H (50% PART LOAD)
50	100	C+R (100% FULL LOAD)	H (100% FULL LOAD)
75	0	C (100% FULL LOAD)	C (50% PART LOAD)
75	25	C+R (50% PART LOAD)	C (100% FULL LOAD)
75	50	C+R (100% FULL LOAD)	C (50% PART LOAD)
75	75	C+R (100% FULL LOAD)	C+R (50% PART LOAD)
100	0	C (100% FULL LOAD)	C (100% FULL LOAD)
100	50	C+R (100% FULL LOAD)	C (100% FULL LOAD)
100	100	C+R (100% FULL LOAD)	C+R (100% FULL LOAD)

- H** HEAT PUMP MODE
- C** CHILLER MODE
- C+R** CHILLER + RECOVERY MODE

Note: The table shown refers only to units equipped with 2 refrigerant circuits and 4 compressors providing 4 unloading steps.



Unit designation

The encoding of CMAB is simple and follows the rules defined by Trane for all other units:

DIGIT																																							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
C	M	A	B	H	E	X	0	5	0	S	1	X	X	X	X	X	X	X	X	X	2	2	2	2	X	1	2	1	1	X	E	X	1	1	X	X	X	X	S

Digits 1-2-3-4: CMAB = Scroll compressor unit for Multi-pipe application

Digits 5-6-7: Unit version

- SEX Standard Efficiency
- HEX High Efficiency
- HSE High Seasonal Efficiency

Digits 8-9-10: Nominal heating capacity (heat pump mode)

Digit 11: Acoustics

- S Super Low Noise
- X Standard noise
- L Low noise

Digit 12: Pump package

- X Without (Standard)
- 1 2 pumps, Low Head pressure
- 2 2 pumps, medium Head pressure
- 3 2 pumps, High Head pressure
- 4 2+2 pumps, Low Head pressure
- 5 2+2 pumps, medium Head pressure
- 6 2+2 pumps, High Head pressure

Digit 13: Remote Control Display

- 1 With Remote Control Display
- X Without (Standard)

Digit 14: Power factor correction

- 1 Cos Phi = 0.91
- X Without (Standard)

Digit 15: Control panel electric heater with thermostat

- 1 With Control panel electric heater with thermostat
- X Without (Standard)

Digit 16: Phase failure protection relay

- 1 With (Standard)
- X Without

Digit 17: Communication card

- X RS485 (Standard)
- 1 Serial card with BACnet™ Protocol MS/TP
- 2 Serial card with BACnet™ Protocol TCP/IP
- 3 LonTalk™ gateway

Digit 18: Soft starter

- 1 With Soft starter
- X Without (Standard)

Digit 19: Automatic circuit breakers

- 1 With Automatic circuit breakers
- X Without (Standard)

Digit 20: Condensing control

- X Step condensing control
- 1 With variable fan speed modulation
- 2 EC fans

Digit 21: Numbered wires

- 1 With Numbered wires
- X Without (Standard)

Digit 22: Flow switch

- 1 With one flow switch
- 2 With two flow switches
- X Without (Standard)

Digit 23: Automatic water filling

- 1 With Automatic water filling
- 2 With two Automatic water filling
- X Without (Standard)

Digit 24: Water strainer

- 1 With Victaulic water strainer
- 2 With two Victaulic water strainers
- 3 With Threaded water strainer
- 4 With two Threaded water strainers
- X Without (Standard)

Digit 25: Water gauges

- 1 With water gauge
- 2 With two water gauges
- X Without (Standard)

Digit 26: Gas gauges

- 1 With Gas gauges
- X Without (Standard)

Digit 27: Protection grilles

- 1 Full Protection Grilles
- 2 Only Condensing Coils Protection Grilles
- X Without (Standard)

Digit 28: Isolators

- 1 Rubber anti vibration mounts
- 2 Spring anti vibration mounts
- X Without (Standard)

Digit 29: Sea container kit

- 1 With Sea container kit
- X Without (Standard)

Digit 30: Condenser coil

- 1 Aluminum (Standard)
- 2 Aluminum + Blygold condensing coils
- 3 Aluminum Epoxy coated condensing coils
- 4 Only epoxy pre-painted aluminum fins
- 5 Copper/Copper condensing coils
- 6 Tinned copper/copper condensing coils
- 7 Hydrophil coating of aluminum fins
- 8 Only external epoxy coated coils

Digit 31: High static pressure EC fans up to 100Pa

- 1 With High static pressure EC fans up to 100Pa
- X Without (Standard)

Digit 32: Literature language

- E English
- T Turkish
- D Dutch
- G German
- R Greek
- F French
- I Italian
- P Polish
- S Spanish

Digit 33: Victaulic Kit

- 2 With two Victaulic Kits
- X Without (Standard)
- 1 With Victaulic Kit

Digit 34: Electrical power supply

- X With neutral (Standard)
- 1 Without neutral

Digit 35: Water high pressure switch (for hydraulic versions)

- X Without (Standard)
- 1 With Water high pressure switch (for hydraulic versions)

Digit 36: Free for future option

- X

Digit 37: Free for future option

- X

Digit 38: Free for future option

- X

Digit 39: Free for future option

- X

Digit 40: Special

- S Special Request
- X Without (Standard)

Technical specifications

The units belonging to CMAB range are multi-functional air cooled units, for outdoor installation, equipped with scroll compressors, electronic expansion valves and high efficiency axial fans.

CMAB units are available in a wide capacity range in order to guarantee a high satisfaction level for different plant applications.

ACOUSTIC VERSIONS

- L** low noise unit, including condensing/evaporating control with air flow regulation and sound compressor jackets (not available for CMAB HE version).
- S** super low noise unit. The noise reduction is achieved by sound proofing box for compressors, fans controlled by a variable speed electronic control in accordance with the condensing/evaporating pressure, muffler on the compressors delivery lines.

HYDRAULIC VERSIONS (Built-in hydraulic kit)

1 pump for chilled water circuit + 1 pump for hot water circuit, low head pressure.

1 pump for chilled water circuit + 1 pump for hot water circuit, medium head pressure.

1 pump for chilled water circuit + 1 pump for hot water circuit, high head pressure.

2 pumps for chilled water circuit + 2 pumps for hot water circuit. Low head pressure.

2 pumps for chilled water circuit + 2 pumps for hot water circuit, medium head pressure.

2 pumps for chilled water circuit + 2 pumps for hot water circuit, high head pressure.

CASING

Casing made with heavy gauge structure in galvanized steel. The powder paint anti-corrosive treatment over the entire frame provides long lasting resistance for outdoor installation, even in aggressive environmental conditions. Its design allows these machines to be manufactured in modular units and, at same time, it ensures a constant air flow through the finned coils and makes for easy maintenance and service.

COMPRESSORS

Compressor of scroll hermetic type. These compressors are featured from high performance with low noise and vibration levels. The high values of COP are obtained:

- By means of high volumetric efficiency in the whole operating range obtained through the continuous contact between the fix and rotating spirals which avoids the bad space and the expansion of the refrigerant;
- By means of low pressure losses due to the absence of suction and discharge valves and to the continuous compression;
- By means of the reduction of the heat exchanging between the suction and discharge refrigerant, thanks to the complete separation of the refrigerant paths.

The acoustic features are obtained:

- For the absence of the suction and discharge valves;
- For the continuous and progressive compression process;
- For the absence of pistons which ensures the low vibrations level and pulsation of the refrigerant.

The electric motor is suction cooled and equipped with automatic reset thermal protection and electric heater to prevent the dilution of the refrigerant in the oil during the periods when the unit is stopped. The terminals are contained into a box IP 54 protected.

FANS

With blades statically and dynamically balanced, driven directly by the electric motors, closed type, external rotor and thermal protection for outdoor installation. Class F windings, internal protection according to VDE 0730. These fans are characterized by low speed and "owlet" profile to reduce the effect of vortices, thereby reducing the energy consumed for operation and noise, reducing it by an average of 6dB (A) compared with standard fans. All the units are equipped with condensing and evaporating pressotatic control by means of air flow regulation by step. In this way the unit is promptly adjusted in accordance to the outdoor conditions maximizing the efficiency of the refrigerant cycle.

Technical specifications

PLATE HEAT EXCHANGER – COLD SIDE

Direct expansion, stainless steel AISI 316 brazed plate type with double circuit, externally insulated with closed cell anti-condensation material and equipped with water differential pressure switch and antifreeze protection electric heater.

HIGH EFFICIENCY PLATE HEAT EXCHANGER – HOT SIDE

Direct expansion, stainless steel AISI 316 brazed plate type with double circuit, externally insulated with closed cell anti-condensation material and equipped with water differential pressure switch and antifreeze protection electric heater.

SOURCE HEAT EXCHANGER

The condensing / evaporating exchangers are made with finned coil and copper tubes, with corrugated aluminum fins. Thermostatic electrical heaters are installed on the base of the coils to prevent formation of ice on the coils, to reduce the defrost time and improve condensate drainage. The coils are also designed to ensure a proper speed inside the pipes and ensure the correct oil flow in each load condition.

REFRIGERANT CIRCUIT

The refrigerant circuit is specific and optimized for the use of a reduced number of solenoids valve and the cross exchange technology, which allows to avoid stops of the units during winter times in case of hot water demand only when cooling is satisfied. Consequently the water temperature of the cold tank doesn't reach the temperature of ice on the evaporator.

The refrigerant circuit is entirely made of copper tubes and includes:

- Refrigerant charge R410A
- Electronic expansion valve
- Filter drier with interchangeable cartridge suitable for the use of ecological fluids and polyesters oils
- Indicator lamp for liquid flow and humidity presence
- Shut off valve on the liquid line complete of balancing pressure system making easier the opening and closing operations
- High pressure switch
- Low pressure switch
- Safety valve on the discharge line
- Safety valve on the suction line
- High pressure transducers
- Low pressure transducers
- Liquid receiver
- Liquid accumulator on the suction line
- 4 way reverse valve
- Cycle configuration valve

ELECTRICAL PANEL

The electrical panel made in accordance with CEI-EN 60204-1 (CEI44-5; CEI EN 62061) standards, is housed in watertight box, the opening system of the box needs the use of a retractable handle or dedicated tools, in each case the opening is allowed only after disconnection of the power supply through the main switch with door lock handle lockable in OFF position.

The electrical panel includes:

- Protection fuses for the supply line of each compressor
- Protection fuses for the supply line of fans for each refrigerant circuit
- Protection fuses of auxiliary circuit
- Start up contactors for compressors dimensioned according to the maximum stress
- Start up contactors for fans
- Adjustable thermal magnetic circuit breaker for the protection of the pump (only in case of units equipped with hydraulic kit)
- Start up contactors for pump (only in case of units equipped with hydraulic kit)
- Single-phase transformer for the power supply of the auxiliary circuits
- Numbered wires (optional)
- Microprocessor control

Technical specifications

In case of phase failure an automatic system protects fans and compressors.

The wiring of the electric panel and the connection with the components of the units are made using cables appropriately calculated for operation at 55°C and according to the maximum electrical stress of the components.

All the cables and the terminals are univocally numbered according to the electrical scheme in order to avoid possible misinterpretation. The identification system of the cables connected to the components allow also an easy and intuitive recognition of the component.

Each component of the electrical panel is provided with an identification plate according to what is shown on the electrical scheme. All the connection to the electrical panel are made from the bottom and are equipped with cover preventing from break.

The electrical panel supply is 400V/3ph+n/50Hz and no additional power supply is necessary. The input of the power cables is provided on the bottom of the box where it is provided a dismountable flange suitable for the purpose.

MICROPROCESSOR CONTROL SYSTEM

The keypad allows a complete and intuitive display of all the main control variables of both circuits.

The programmable controller is based on a powerful platform with 256bit microprocessor, 4MB mass storage with a hardware and software configuration made with the most innovative technology in terms of processing speed and connectivity.

The diagnostics includes a complete alarm management, alarm history and data logger which stores an archive of about 4 days (further expandable by USB memory) where the main variables and the operating status of the unit are recorded. ModBus master and slave communication protocol. The temperature regulation is carried out by two hydraulic circuits (cooled water and hot water), with a continuous proportional logic according to the return water temperature.



The operating parameters of the machine are protected by 3 levels of passwords (user-maintainer-builder).

The user panel provides information LCD display with exhaustive descriptions in Italian and English (selectable).

- Ability to interface with the main BMS systems via RS485, BACnet™ MS/TP or TCP/IP and Lontalk.
- Ability to interface with I/O expansion modules via CanBus.
- Ability to control the unit by voltage free contacts.
- Input Ethernet RJ45, for routing on the web of all the parameters of the unit, providing a total remote control of unit.
- USB input to upload parameter files, system files, firmware and to download files of historical alarms, residing parameters files and default parameters files.
- User interface on the door of the panel, low-reflection LCD, equipped with 8 function keys, easy iconic display, easy sliding between the dynamic screens.
- Control of condensation / evaporation air through two speed fans directly managed by the electronic controller based on proportional logic (L version).
- Control of condensation / evaporation air through phase cutting system directly managed by the electronic controller based on proportional logic (S version).
- Management of electronic expansion valves through controller based on PID logic, with LOP control (low operating pressure), maintenance of the minimum operating pressure and of the MOP (maximum operating pressure) for the management of the maximum operating pressure.

The microprocessor manages:

- Starting of the compressors with the start-up and stop time control.
- Compressor rotation with FIFO logic.
- Fans start up and air flow variation according with condensation and evaporation pressure.
- Solenoid valves of liquid lines with pump-down management during stops through double control of suction pressure and maximum time of the procedure.
- Electric anti-freeze heater for user exchangers.
- Electric heater mounted on the base of coils to avoid ice formation.
- Hot and cold side water pumps management through voltage free contacts for standard versions; for hydraulic versions the pump management is automatically controlled.
- Alarm signal for each refrigerant circuit of the unit through voltage free contacts.

Technical specifications

The microprocessor will control and display by suitable measuring transducers the following variables:

- Inlet and outlet water temperature to the cold user exchanger.
- Inlet and outlet water temperature to the hot user exchanger.
- Outdoor temperature.
- Condensing pressure of each refrigerant circuit.
- Evaporating pressure of each refrigerant circuit.
- Total operating time of each compressor.
- Total operating time of the unit.

The microprocessor will protect the unit in the following cases, the resetting of any alarm will always be manual.

- Low evaporating pressure by analogical and digital input with possibility to edit the marking details.
- High condensing pressure by analogical and digital input.
- High temperature of the compressors windings.
- Reverse rotation of each compressor.
- Low pressure difference between discharge and suction (to allow a correct lubrication of the compressor) with the possibility to edit the start-up delay and the minimum requested value.
- High pressure difference on the oil filter.
- High temperature of fans motor windings.
- High temperature of pumps motor windings.
- Lack of water flow on evaporator and condenser.
- Low evaporator outlet water temperature.
- Low condenser outlet water temperature.

It is also possible to display and edit through the microprocessor the following value:

- Operating set point of the unit.
- Operating differential of the unit.
- Set point and anti-freeze block differential.
- Set point and differential of activation of the evaporator heater.
- Minimum operating time of each compressor.
- Minimum stop time of each compressor.
- Maximum number of starts per hour of each compressor.
- Set point and optimal condensation pressure differential (condensation and evaporation control).

Other functionalities ensured from the microprocessor are:

- Activating of preventive functions at extreme conditions of high pressure.
- Activating of preventive functions at extreme conditions of low pressure.
- Activation of preventive functions at limit conditions of high discharge temperature.
- Activating preventive functions at extreme conditions of low evaporator leaving water temperature.
- Activating preventive functions at extreme conditions of high evaporator inlet water temperature.
- Protection from unwanted changes of the parameters thanks of the use of password and systems to confirm the changed data.
- Indication of the unit status and the components status.
- Possibility to exclude each compressor for the maintenance.
- Possibility to change the set point by external analog signal.
- Possibility of ON/OFF remote signal through digital external signal.
- Communication with supervision systems (data and parameters exchange).
- Continuous adjustment of the set point according to the outdoor air temperature both with direct and reverse direction logic (DSP).
- Intelligent management of defrosts depending on the approach of the coil (Digital Defrost).
- Auto power on-off of the unit using time slots.
- Adjustment of the set point by time bands both with direct and reverse direction logic (Energy Saving).

Options and accessories

FACTORY-MOUNTED OPTIONS

- Power factor correction to cos phi 0.91.
- Control panel electric heater with thermostat.
- Serial card with BACnet™ Protocol MS/TP or TCP/IP.
- Gateway Modbus Lontalk.
- Soft - Start.
- Automatic circuit breakers.
- Condensing control with variable fan speed modulation.
- Electronically Commutated Motor fans (EC fans).
- EC fans with increased head pressure 100 Pa.
- Numbered wires.
- Gas gauges.
- Condensing coil protection grilles.
- Full protection grilles.
- Hydrophil coating of aluminum fins.
- BLYGOLD condensing coils.
- Aluminum Epoxy coated condensing coils.
- Only external epoxy coated coils.
- Only epoxy pre-painted aluminum fins.
- Copper/copper condensing coils.
- Tinned copper/copper condensing coils.
- Electrical power supply without neutral.
- Water high pressure switch (for hydraulic versions).

ACCESSORIES

- Remote control display.
- Flow switch.
- Automatic water filling.
- Threaded water strainers.
- Victaulic water strainers.
- Water gauges.
- Sea container kit.
- Victaulic kit.
- Rubber anti vibration mounts.
- Spring anti-vibration mounts.

Energy efficiency ratios

METHODOLOGY FOR CALCULATING SEASONAL ENERGY EFFICIENCY

Energy efficiency of the multi-pipe unit CMAB, in chiller operating mode, is calculated according the ESEER coefficient. Considering that all have recognized the IPLV lack of adaptability in front of needs in Europe, it is developed a new coefficient, called ESEER (European Seasonal Energy Efficiency Ratio).

The formula of the three coefficient is:

$$\text{Index} = \text{PE100\% EER100\%} + \text{PE75\% EER75\%} + \text{PE50\% EER50\%} + \text{PE25\% EER25\%}$$

as:

PE is energetic weight (energy produced divided by total energy) to the four loading conditions considered by the method (100% - 75% - 50% - 25%) and related in the following table:

FEATURES	INDEX	LOAD (100%)	LOAD (75%)	LOAD (50%)	LOAD (25%)
ENERGETIC WEIGHT	IPLV	1%	42%	45%	12%
	EMPE	10%	30%	40%	20%
	ESEER	3%	33%	41%	23%
T. IN AIR CONDENSER air-water unit	IPLV	35°C	26,7°C	18,3°C	12,8°C
	EMPE	35°C	31,3°C	27,5°C	23,8°C
	ESEER	35°C	30°C	25°C	20°C
T. IN WATER CONDENSER water-water unit	IPLV	29,5°C	23,9°C	18,3°C	18,3°C
	EMPE	29,5°C	26,9°C	24,4°C	21,9°C
	ESEER	30°C	25°C	20°C	20°C

TEC - TOTAL EFFICIENCY COEFFICIENT

The effective coefficient measuring the unit performance during the whole year is the TEC (Total Efficiency Coefficient), an index properly developed to measure the real efficiency of multi-pipe units.

The TEC indicator is an average year efficiency index considering the efficiency of each operating mode of the unit properly weighted (cooling, cooling + heating, heating), more completely than the standard full-load efficiency ratios (EER, COP) and seasonal one (ESEER).

Usually CMAB multi-pipe units have TEC value around 7,5. This means that for each kW of electrical power input there is a useful capacity of 7,5.

$$\text{TEC} = (\text{EER}_{\text{COOLING}} * \alpha + \text{TER}_{\text{COOLING+HEATING}} * \beta + \text{COP}_{\text{HEATING}} * \gamma)$$

where:

α = weight for only chiller mode operation (%)

β = weight for chiller + heating mode operation (%)

γ = weight for only heating mode operation (%)

TER = Total Efficiency Ratio

The TER index is the ratio between the sum of the heating and cooling capacity divided by compressors electrical power input, in chiller + recovery mode, and reaches the maximum value when the heating and cooling loads are fully balanced.

This index was defined to objectively measure the efficiency of a multi-functional unit according to simultaneous load requirement.

Technical data

GENERAL TECHNICAL DATA

CMAB HE

CMAB HE		50	60	70	90	120	130	145	165	180	220	260	320	355
Cooling EN 14511 VALUE (1)														
Total cooling capacity	kW	48.2	55.1	65.2	84.9	111	122	131	151	165	200	239	291	321
Total power input	kW	16.3	18.3	21.7	28.2	37.7	43.0	47.6	54.3	60.2	74.3	89.2	108	118
Total EER		2.95	3.01	3.00	3.01	2.93	2.84	2.76	2.78	2.74	2.69	2.68	2.70	2.73
ESEER		3.39	3.58	3.71	3.49	3.56	3.41	3.41	3.35	3.40	3.45	3.57	3.82	3.56
Water flow	m ³ /h	8.27	9.45	11.2	14.6	19.0	21.0	22.5	25.9	28.3	34.3	41.1	49.9	55.1
Water pressure drop	kPa	6.00	7.00	9.60	15.6	20.0	24.0	22.0	16.0	18.9	27.4	29.3	16.3	19.8
Cooling GROSS VALUE (1)														
Total cooling capacity	kW	48.3	55.1	65.4	85.1	111	123	131	151	165	200	240	291	322
Total power input	kW	16.2	18.2	21.6	28.0	37.5	42.7	47.2	54.0	59.8	73.7	88.5	107	117
Total EER		2.97	3.02	3.02	3.04	2.96	2.87	2.78	2.80	2.76	2.72	2.71	2.72	2.75
Heating EN 14511 VALUE (2)														
Total heating capacity	kW	50.6	57.9	69.2	90.6	119	132	144	162	178	217	260	320	355
Total power input	kW	16.7	18.7	21.9	29.4	38.1	43.4	46.0	53.5	58.8	70.8	83.5	102	112
Total COP		3.03	3.10	3.16	3.08	3.11	3.03	3.14	3.03	3.04	3.07	3.12	3.15	3.16
Water flow	m ³ /h	8.81	10.1	12.1	15.8	20.7	22.9	25.1	28.2	31.1	37.9	45.3	55.8	61.9
Water pressure drop	kPa	6.57	7.70	10.7	17.6	22.0	26.0	26.3	18.3	22.0	33.0	34.9	19.6	24.0
Heating GROSS VALUE (2)														
Total heating capacity	kW	50.5	57.8	69.1	90.4	118	131	144	162	178	217	259	320	354
Total power input	kW	16.6	18.6	21.8	29.2	37.8	43.0	45.6	53.2	58.3	70.1	82.6	101	112
Total COP		3.04	3.11	3.17	3.10	3.13	3.05	3.16	3.04	3.05	3.09	3.14	3.16	3.17
Heating + Cooling (3)														
Total cooling capacity	kW	46.0	52.8	62.9	79.9	108	118	131	150	165	200	242	298	322
Total heating capacity	kW	60.3	69.1	82.6	106	142	157	172	196	216	264	319	391	426
Total power input	kW	14.3	16.3	19.7	25.8	34.6	38.8	41.1	46.0	51.4	63.4	76.7	92.9	104
TER		7.45	7.48	7.38	7.19	7.21	7.09	7.37	7.54	7.42	7.32	7.32	7.43	7.19
Evaporator water flow	m ³ /h	7.91	9.09	10.8	13.7	18.5	20.3	22.5	25.8	28.4	34.5	41.7	51.3	55.4
Evaporator pressure drop	kPa	5.49	6.48	8.96	13.9	19.0	22.5	22.1	16.0	19.0	27.7	30.2	17.3	20.0
Condenser water flow	m ³ /h	10.5	12.0	14.4	18.4	24.8	27.3	30.0	34.2	37.7	46.0	55.6	67.3	74.2
Condenser pressure drop	kPa	9.35	11.0	15.3	24.1	31.7	37.2	37.8	27.0	32.5	49.0	52.8	29.4	34.7
SEASONAL EFFICIENCY IN HEATING ACCORDING TO EN14825 (4)														
P rated	kW	41.0	46.8	55.8	75.3	98	111	122	133	147	179	215	258	298
η _s	%	125	127	130	125	129	125	130	125	125	127	129	130	130
SCOP		3.19	3.24	3.32	3.20	3.29	3.20	3.32	3.19	3.19	3.24	3.31	3.33	3.33
Energy efficiency class		A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+
COMPRESSORS														
Compressors number	n	2	2	2	2	2	2	2	2	4	4	4	4	4
Refrigerant circuits	n	1	1	1	1	1	1	1	2	2	2	2	2	2
Type of regulation									Step					
Number of part load steps	n	3	3	2	2	2	3	2	3	2	7	7	8	4
Minimum capacity steps	%	45	39	50	50	50	45	50	45	50	8	14	23	25
Refrigerant charge (5)	kg	26.0	26.0	26.0	38.0	38.4	38.6	38.1	58.3	58.3	58.3	77.4	80.3	105.4
Oil charge	kg	6.6	6.6	6.6	7.2	13.4	13.4	13.4	13.4	13.4	26.8	26.8	26.8	26.8
FANS														
Fans number	n	2	2	2	3	3	4	4	6	6	6	6	8	8
Air flow	m ³ /h	35588	35588	35588	53380	53380	71808	71808	118168	118168	113416	107712	144628	144628
Power input for each fan	kW	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Absorbed current for each fan	A	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
SOUND LEVEL														
Sound power level (ISO 3744)	db(A)	82	82	82	84	88	88	88	89	89	90	91	91	92
Sound pressure level at 10 m (ISO 3744)	db(A)	50	50	50	52	56	56	56	57	57	58	59	59	59
Power supply		400V - 3ph+N - 50Hz												
DIMENSIONS AND WEIGHT														
Length	mm	2560	2560	2560	3559	3559	2617	2617	3565	3565	3565	3565	4535	4535
Depth	mm	1100	1100	1100	1100	1100	2201	2201	2260	2260	2260	2260	2260	2260
Height	mm	2131	2131	2131	2179	2179	2175	2175	2400	2400	2400	2400	2400	2400
Operating Weight	kg	1030	1034	1043	1289	1381	1466	1608	2202	2255	2401	2709	3144	3382
Shipping Weight	kg	1012	1016	1025	1271	1381	1466	1582	2166	2219	2365	2657	3088	3326

(1) Outdoor air temperature 35 °C – Outlet water temperature 12/7 °C.

(2) Outdoor air temperature 7 °C - 90% RH - Outlet water temperature 45 °C.

(3) Recovery water temperature 40/45 °C – Evaporator water temperature 12/7 °C.

(4) Ecodesign rating at low temperature conditions. Outdoor temperature: 7°C dry bulb/6°C wet bulb and hot water temperature in/out: 30°C/35°C.

(5) Refrigerant charge values are not binding, please check the effective quantity of refrigerant shown on the nameplate of the unit.

GENERAL TECHNICAL DATA

CMAB HE

CMAB HE		375	455	500	535	575	600	660	710	755	800	840	880
Cooling EN 14511 VALUE (1)													
Total cooling capacity	kW	341	406	451	474	513	533	582	643	678	713	746	779
Total power input	kW	126	148	165	177	194	203	231	235	253	271	289	308
Total EER		2.70	2.74	2.74	2.67	2.64	2.63	2.52	2.73	2.68	2.63	2.58	2.53
ESEER		3.58	3.98	3.47	3.42	3.51	3.48	3.67	3.56	3.54	3.48	3.40	3.66
Water flow	m ³ /h	58.5	69.7	77.3	81.3	88.0	91.4	99.8	110	116	122	128	134
Water pressure drop	kPa	22.1	31.0	47.3	59.7	48.6	41.0	49.6	19.8	21.9	24.1	26.2	28.5
Cooling GROSS VALUE (1)													
Total cooling capacity	kW	342	407	452	476	515	534	584	644	679	714	747	781
Total power input	kW	126	147	163	175	192	201	229	234	252	269	288	306
Total EER		2.72	2.77	2.78	2.72	2.68	2.66	2.55	2.75	2.70	2.65	2.60	2.55
Heating EN 14511 VALUE (2)													
Total heating capacity	kW	377	455	501	534	576	598	662	710	754	797	839	881
Total power input	kW	120	145	161	173	187	193	215	224	239	253	268	282
Total COP		3.15	3.14	3.10	3.09	3.08	3.09	3.07	3.17	3.16	3.15	3.14	3.13
Water flow	m ³ /h	65.6	79.2	87.2	93.1	100	104	115	124	131	139	146	154
Water pressure drop	kPa	27.0	38.4	57.4	74.4	60.2	51.0	63.2	24.0	26.9	29.9	32.9	36.1
Heating GROSS VALUE (2)													
Total heating capacity	kW	376	453	498	531	573	596	659	709	752	795	837	879
Total power input	kW	119	144	159	170	184	191	212	223	237	251	265	280
Total COP		3.17	3.16	3.13	3.12	3.11	3.12	3.10	3.18	3.17	3.16	3.15	3.14
Heating + Cooling (3)													
Total cooling capacity	kW	342	406	449	473	521	543	600	652	692	733	772	812
Total heating capacity	kW	454	540	596	631	694	723	804	860	916	971	1026	1080
Total power input	kW	112	134	146	158	173	181	204	208	223	238	253	268
TER		7.14	7.05	7.13	6.97	7.02	7.01	6.89	7.26	7.21	7.16	7.10	7.05
Evaporator water flow	m ³ /h	58.9	69.8	77.2	81.4	89.6	93.3	103	112	119	126	133	140
Evaporator pressure drop	kPa	22.4	31.1	47.2	59.8	50.4	42.7	53.1	20.4	23.0	25.6	28.2	31.1
Condenser water flow	m ³ /h	79.1	94.1	104	110	121	126	140	150	159	169	179	188
Condenser pressure drop	kPa	39.4	54.5	82.0	105.1	88.3	75.1	94.1	35.3	39.8	44.6	49.3	54.6
SEASONAL EFFICIENCY IN HEATING ACCORDING TO EN14825 (4)													
P rated	kW	316	371	-	-	-	-	-	-	-	-	-	-
η _s	%	130	130	-	-	-	-	-	-	-	-	-	-
SCOP		3.33	3.32	-	-	-	-	-	-	-	-	-	-
Energy efficiency class		A+	A+	-	-	-	-	-	-	-	-	-	-
COMPRESSORS													
Compressors number	n	4	4	6	6	6	6	6	8	8	8	8	8
Refrigerant circuits	n	2	2	3	3	3	3	3	4	4	4	4	4
Type of regulation		Step											
Number of part load steps	n	7	4	14	6	14	15	6	8	20	30	20	8
Minimum capacity steps	%	13	25	21	17	19	19	17	13	15	14	15	13
Refrigerant charge (5)	kg	105.4	131.1	164.6	164.6	165.9	166.3	166.3	210.8	210.8	210.8	210.8	210.8
Oil charge	kg	26.8	26.8	40.2	40.2	40.2	40.2	40.2	53.6	53.6	53.6	53.6	53.6
FANS													
Fans number	n	8	10	12	12	12	12	12	16	16	16	16	16
Air flow	m ³ /h	144628	181104	219608	219608	219608	219608	219608	289256	289256	289256	289256	289256
Power input for each fan	kW	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Absorbed current for each fan	A	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
SOUND LEVEL													
Sound power level (ISO 3744)	db(A)	94	97	93	94	96	97	98	95	97	98	99	100
Sound pressure level at 10 m (ISO 3744)	db(A)	61	64	61	61	63	64	66	62	64	65	66	67
Power supply		400V - 3ph+N - 50Hz											
DIMENSIONS AND WEIGHT													
Length	mm	4535	5505	7038	7038	7038	7038	7038	8155	8155	8155	8155	8155
Depth	mm	2260	2260	2170	2170	2170	2170	2170	2170	2170	2170	2170	2170
Height	mm	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400
Operating Weight	kg	3401	3836	4572	4678	4845	4882	4935	6157	6193	6228	6263	6298
Shipping Weight	kg	3345	3780	4506	4612	4769	4802	4855	6045	6081	6116	6151	6186

(1) Outdoor air temperature 35 °C – Outlet water temperature 12/7 °C.

(2) Outdoor air temperature 7 °C - 90% RH - Outlet water temperature 45 °C.

(3) Recovery water temperature 40/45 °C – Evaporator water temperature 12/7 °C.

(4) Ecodesign rating at low temperature conditions. Outdoor temperature: 7°C dry bulb/6°C wet bulb and hot water temperature in/out: 30°C/35°C.

(5) Refrigerant charge values are not binding, please check the effective quantity of refrigerant shown on the nameplate of the unit.

Technical data

GENERAL TECHNICAL DATA

CMAB HE

CMAB HE S		50	60	70	90	120	130	145	165	180	220	260	320	355
Cooling EN 14511 VALUE (1)														
Total cooling capacity	kW	47.3	53.6	63.1	82.6	106	118	126	147	160	192	226	279	308
Total power input	kW	15.9	18.0	21.8	27.8	38.5	43.2	48.1	53.5	59.8	75.4	91.7	110	120
Total EER		2.98	2.97	2.89	2.97	2.77	2.73	2.63	2.75	2.68	2.55	2.47	2.53	2.56
ESEER		3.42	3.58	3.70	3.49	3.55	3.41	3.40	3.35	3.40	3.45	3.56	3.82	3.56
Water flow	m ³ /h	8.11	9.20	10.8	14.2	18.3	20.3	21.7	25.3	27.5	33.0	38.8	47.8	52.9
Water pressure drop	kPa	5.77	6.64	8.96	14.8	18.5	22.4	20.5	15.2	17.9	25.3	26.2	15.0	18.2
Cooling GROSS VALUE (1)														
Total cooling capacity	kW	47.3	53.7	63.2	82.8	107	118	127	147	161	193	227	279	309
Total power input	kW	15.8	17.9	21.7	27.6	38.3	42.9	47.8	53.2	59.4	74.9	91.1	110	120
Total EER		2.99	2.99	2.91	3.00	2.79	2.76	2.65	2.77	2.70	2.57	2.49	2.54	2.57
Heating EN 14511 VALUE (2)														
Total heating capacity	kW	49.9	56.8	67.4	88.6	115	129	140	159	175	212	253	310	344
Total power input	kW	15.7	17.7	20.9	28.0	36.7	41.6	44.0	50.7	55.9	67.9	80.6	97.8	108
Total COP		3.17	3.21	3.22	3.16	3.14	3.09	3.18	3.13	3.13	3.12	3.13	3.17	3.17
Water flow	m ³ /h	8.69	9.90	11.7	15.4	20.1	22.4	24.4	27.7	30.4	36.9	44.0	54.0	59.9
Water pressure drop	kPa	6.39	7.42	10.2	16.8	20.8	24.8	24.8	17.6	21.1	31.3	32.9	18.4	22.5
Heating GROSS VALUE (2)														
Total heating capacity	kW	49.8	56.8	67.3	88.4	115	128	140	159	174	211	252	309	343
Total power input	kW	15.6	17.6	20.8	27.8	36.4	41.2	43.6	50.4	55.5	67.2	79.8	97.2	108
Total COP		3.18	3.22	3.23	3.18	3.16	3.11	3.20	3.15	3.14	3.14	3.16	3.18	3.18
Heating + Cooling (3)														
Total cooling capacity	kW	46.0	52.8	62.9	79.9	108	118	131	150	165	200	242	298	322
Total heating capacity	kW	60.3	69.1	82.6	106	142	157	172	196	216	264	319	391	426
Total power input	kW	14.3	16.3	19.7	25.8	34.6	38.8	41.1	46.0	51.4	63.4	76.7	92.9	104
TER		7.45	7.48	7.38	7.19	7.21	7.09	7.37	7.54	7.42	7.32	7.32	7.43	7.19
Evaporator water flow	m ³ /h	7.91	9.09	10.8	13.7	18.5	20.3	22.5	25.8	28.4	34.5	41.7	51.3	55.4
Evaporator pressure drop	kPa	5.49	6.48	8.96	13.9	19.0	22.5	22.1	16.0	19.0	27.7	30.2	17.3	20.0
Condenser water flow	m ³ /h	10.5	12.0	14.4	18.4	24.8	27.3	30.0	34.2	37.7	46.0	55.6	67.3	74.2
Condenser pressure drop	kPa	9.35	11.0	15.3	24.1	31.7	37.2	37.8	27.0	32.5	49.0	52.8	29.4	34.7
SEASONAL EFFICIENCY IN HEATING ACCORDING TO EN14825 (4)														
P rated	kW	41.0	46.8	55.8	75.3	98	111	122	133	147	179	215	258	298
η _s	%	125	127	130	125	129	125	130	125	125	127	129	130	130
SCOP		3.19	3.24	3.32	3.20	3.29	3.20	3.32	3.19	3.19	3.24	3.31	3.33	3.33
Energy efficiency class		A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+
COMPRESSORS														
Compressors number	n	2	2	2	2	2	2	2	2	4	4	4	4	4
Refrigerant circuits	n	1	1	1	1	1	1	1	2	2	2	2	2	2
Type of regulation									Step					
Number of part load steps	n	3	3	2	2	2	3	2	3	2	7	7	8	4
Minimum capacity steps	%	45	39	50	50	50	45	50	45	50	8	14	23	25
Refrigerant charge (5)	kg	26.0	26.0	26.0	38.0	38.4	38.6	38.1	58.3	58.3	58.3	77.4	80.3	105.4
Oil charge	kg	6.6	6.6	6.6	7.2	13.4	13.4	13.4	13.4	13.4	26.8	26.8	26.8	26.8
FANS														
Fans number	n	2	2	2	3	3	4	4	6	6	6	6	8	8
Air flow	m ³ /h	24912	24912	24912	37366	37366	50266	50266	82718	82718	79391	75398	101240	101240
Power input for each fan	kW	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Absorbed current for each fan	A	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
SOUND LEVEL														
Sound power level (ISO 3744)	db(A)	77	77	77	79	83	83	83	84	84	85	86	86	87
Sound pressure level at 10 m (ISO 3744)	db(A)	45	45	45	47	51	51	51	52	52	53	54	54	54
Power supply		400V - 3ph+N - 50Hz												
DIMENSIONS AND WEIGHT														
Length	mm	2560	2560	2560	3559	3559	2617	2617	3565	3565	3565	3565	4535	4535
Depth	mm	1100	1100	1100	1100	1100	2201	2201	2260	2260	2260	2260	2260	2260
Height	mm	2131	2131	2131	2179	2179	2175	2175	2400	2400	2400	2400	2400	2400
Operating Weight	kg	1107	1111	1120	1379	1471	1556	1698	2292	2436	2582	2890	3325	3563
Shipping Weight	kg	1089	1093	1102	1361	1471	1556	1672	2256	2400	2546	2838	3269	3507

(1) Outdoor air temperature 35 °C – Outlet water temperature 12/7 °C.

(2) Outdoor air temperature 7 °C - 90% RH - Outlet water temperature 45 °C.

(3) Recovery water temperature 40/45 °C – Evaporator water temperature 12/7 °C.

(4) Ecodesign rating at low temperature conditions. Outdoor temperature: 7°C dry bulb/6°C wet bulb and hot water temperature in/out: 30°C/35°C.

(5) Refrigerant charge values are not binding, please check the effective quantity of refrigerant shown on the nameplate of the unit.

GENERAL TECHNICAL DATA

CMAB HE

CMAB HE S		375	455	500	535	575	600	660	710	755	800	840	880
Cooling EN 14511 VALUE (1)													
Total cooling capacity	kW	325	389	432	453	491	508	551	615	647	678	708	737
Total power input	kW	131	152	168	181	201	211	242	242	262	282	303	323
Total EER		2.49	2.56	2.58	2.50	2.44	2.41	2.28	2.54	2.47	2.40	2.34	2.28
ESEER		3.58	3.98	3.47	3.41	3.51	3.47	3.66	3.56	3.54	3.47	3.39	3.65
Water flow	m ³ /h	55.8	66.8	74.2	77.8	84.2	87.1	94.5	106	111	116	121	126
Water pressure drop	kPa	20.1	28.4	43.5	54.6	44.4	37.2	44.5	18.1	19.9	21.8	23.6	25.5
Cooling GROSS VALUE (1)													
Total cooling capacity	kW	326	390	434	455	492	509	553	616	648	679	709	739
Total power input	kW	130	151	166	179	199	209	240	241	261	281	301	322
Total EER		2.51	2.58	2.61	2.54	2.47	2.43	2.31	2.56	2.48	2.42	2.35	2.30
Heating EN 14511 VALUE (2)													
Total heating capacity	kW	364	439	486	516	557	578	639	687	729	770	809	849
Total power input	kW	116	140	156	167	180	187	209	217	231	245	259	274
Total COP		3.15	3.14	3.12	3.09	3.09	3.09	3.06	3.17	3.16	3.14	3.12	3.10
Water flow	m ³ /h	63.5	76.5	84.7	89.9	97	101	111	120	127	134	141	148
Water pressure drop	kPa	25.3	35.8	54.1	69.5	56.4	47.7	58.8	22.5	25.1	27.9	30.6	33.5
Heating GROSS VALUE (2)													
Total heating capacity	kW	364	438	484	514	555	576	636	686	727	768	807	847
Total power input	kW	115	139	154	165	178	185	206	215	229	243	257	272
Total COP		3.17	3.16	3.15	3.12	3.12	3.12	3.09	3.18	3.17	3.16	3.14	3.12
Heating + Cooling (3)													
Total cooling capacity	kW	342	406	449	473	521	543	600	652	692	733	772	812
Total heating capacity	kW	454	540	596	631	694	723	804	860	916	971	1026	1080
Total power input	kW	112	134	146	158	173	181	204	208	223	238	253	268
TER		7.14	7.05	7.13	6.97	7.02	7.01	6.89	7.26	7.21	7.16	7.10	7.05
Evaporator water flow	m ³ /h	58.9	69.8	77.2	81.4	89.6	93.3	103	112	119	126	133	140
Evaporator pressure drop	kPa	22.4	31.1	47.2	59.8	50.4	42.7	53.1	20.4	23.0	25.6	28.2	31.1
Condenser water flow	m ³ /h	79.1	94.1	104	110	121	126	140	150	159	169	179	188
Condenser pressure drop	kPa	39.4	54.5	82.0	105.1	88.3	75.1	94.1	35.3	39.8	44.6	49.3	54.6
SEASONAL EFFICIENCY IN HEATING ACCORDING TO EN14825 (4)													
P rated	kW	316	371	-	-	-	-	-	-	-	-	-	-
η _s	%	130	130	-	-	-	-	-	-	-	-	-	-
SCOP		3.33	3.32	-	-	-	-	-	-	-	-	-	-
Energy efficiency class		A+	A+	-	-	-	-	-	-	-	-	-	-
COMPRESSORS													
Compressors number	n	4	4	6	6	6	6	6	8	8	8	8	8
Refrigerant circuits	n	2	2	3	3	3	3	3	4	4	4	4	4
Type of regulation		Step											
Number of part load steps	n	7	4	14	6	14	15	6	8	20	30	20	8
Minimum capacity steps	%	13	25	21	17	19	19	17	13	15	14	15	13
Refrigerant charge (5)	kg	105.4	131.1	164.6	164.6	165.9	166.3	166.3	210.8	210.8	210.8	210.8	210.8
Oil charge	kg	26.8	26.8	40.2	40.2	40.2	40.2	40.2	53.6	53.6	53.6	53.6	53.6
FANS													
Fans number	n	8	10	12	12	12	12	12	16	16	16	16	16
Air flow	m ³ /h	101240	126773	153726	153726	153726	153726	153726	202479	202479	202479	202479	202479
Power input for each fan	kW	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Absorbed current for each fan	A	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
SOUND LEVEL													
Sound power level (ISO 3744)	db(A)	89	92	88	89	91	92	93	90	92	93	94	95
Sound pressure level at 10 m (ISO 3744)	db(A)	56	59	56	56	58	59	61	57	59	60	61	62
Power supply		400V - 3ph+N - 50Hz											
DIMENSIONS AND WEIGHT													
Length	mm	4535	5505	7038	7038	7038	7038	7038	8155	8155	8155	8155	8155
Depth	mm	2260	2260	2170	2170	2170	2170	2170	2170	2170	2170	2170	2170
Height	mm	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400
Operating Weight	kg	3582	4017	4843	4949	5116	5153	5206	6519	6555	6590	6625	6660
Shipping Weight	kg	3526	3961	4777	4883	5040	5073	5126	6407	6443	6478	6513	6548

(1) Outdoor air temperature 35 °C – Outlet water temperature 12/7 °C.

(2) Outdoor air temperature 7 °C - 90% RH - Outlet water temperature 45 °C.

(3) Recovery water temperature 40/45 °C – Evaporator water temperature 12/7 °C.

(4) Ecodesign rating at low temperature conditions. Outdoor temperature: 7°C dry bulb/6°C wet bulb and hot water temperature in/out: 30°C/35°C.

(5) Refrigerant charge values are not binding, please check the effective quantity of refrigerant shown on the nameplate of the unit.

Operating range

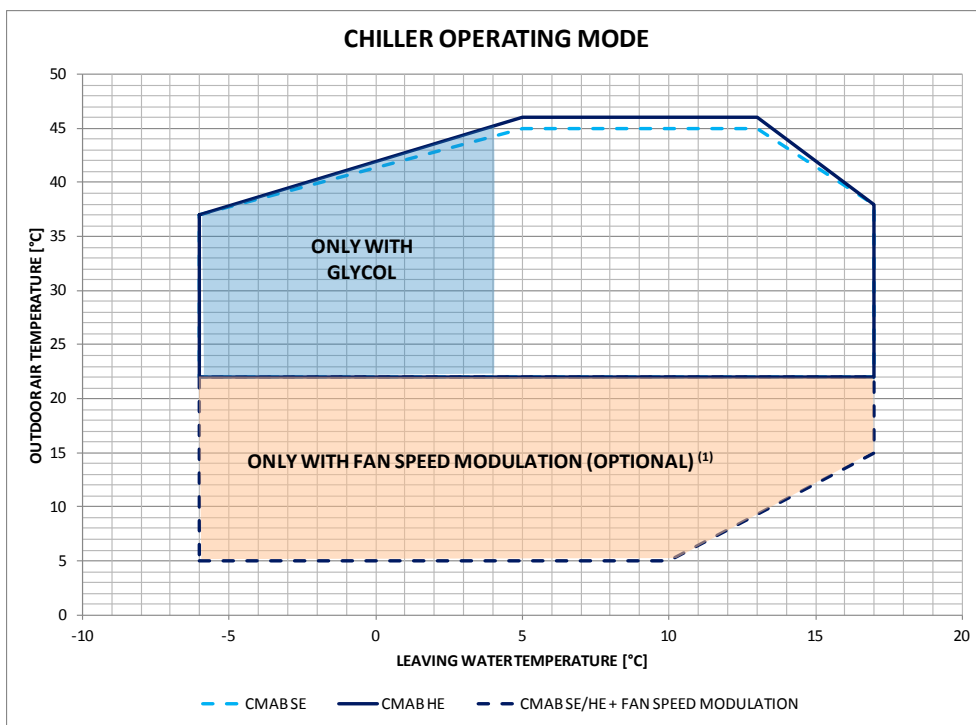
Version	Operating mode	Ta		Tw out	
		Min	Max	Min	Max
SE - SE LOW NOISE	Cooling only	22/5 ⁽¹⁾	45	-6 ⁽²⁾	17
SE SUPER LOW NOISE		5	45	-6 ⁽²⁾	17
SE - SE LOW NOISE	Heating only	-16	19,5/30 ⁽¹⁾	22	60
SE SUPER LOW NOISE		-16	30	22	60
HE	Cooling only	22/5 ⁽¹⁾	46	-6 ⁽²⁾	17
HE SUPER LOW NOISE	Cooling only	5	46	-6 ⁽²⁾	17
HE	Heating only	-18	19,5/30 ⁽¹⁾	22	60
HE SUPER LOW NOISE	Heating only	-18	30	22	60

Ta = Outdoor air temperature (°C)

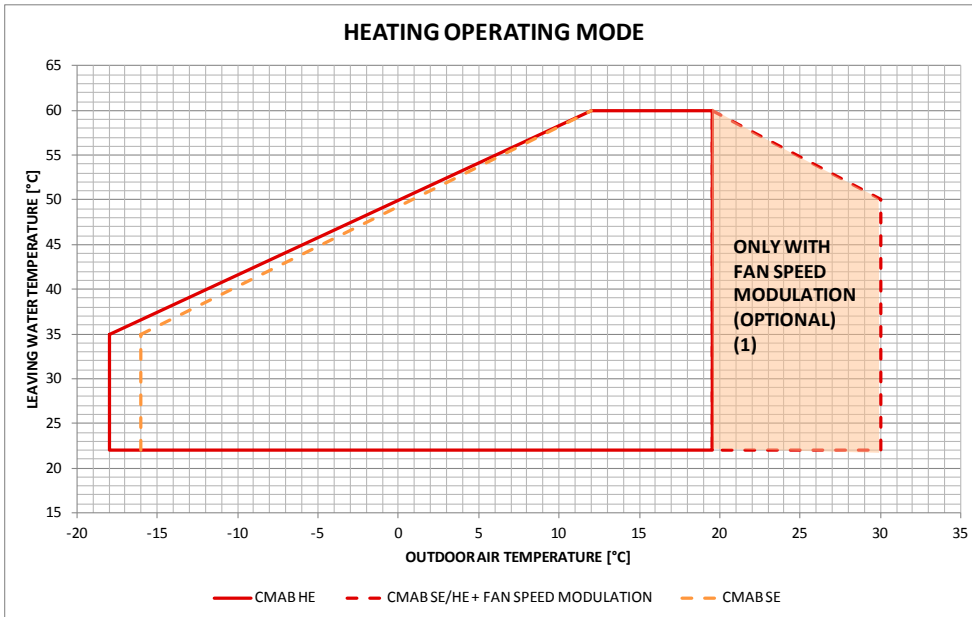
Tw out = Leaving water temperature from the heat exchanger (°C)

(1) Units equipped with fans speed modulation for continuous condensing/evaporating control (optional).

(2) Operation admitted only with glycol. Minimum required glycol percentage is provided in tables on next page.

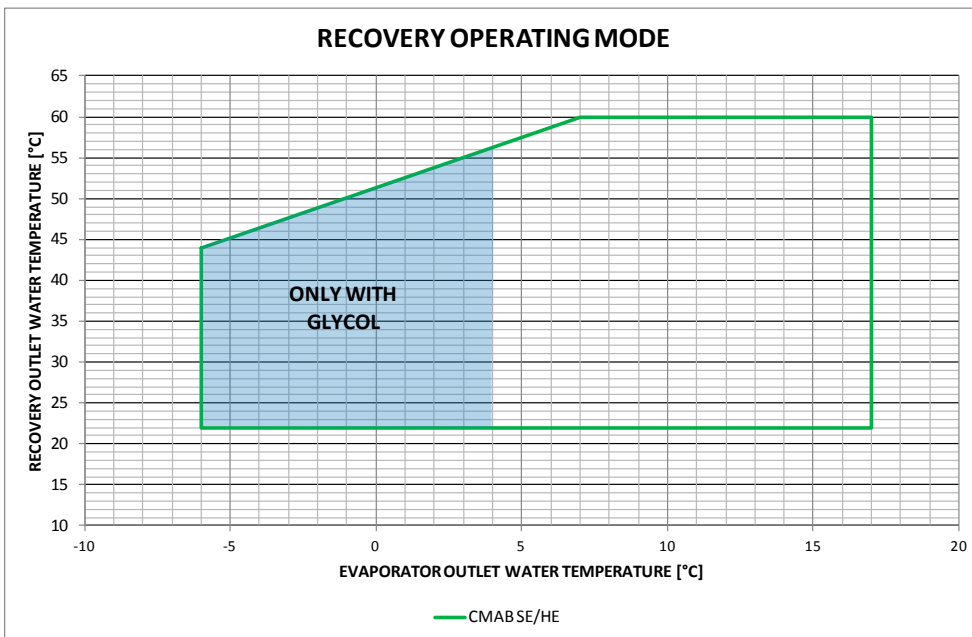


Operating range



The minimum outdoor air temperature is based on low wind speeds (wind not exceeding 15 km/h). Greater wind speeds may result in a drop in head pressure, therefore increasing the minimum starting and/or operating outdoor air temperature.

In case of higher wind speeds it may be necessary to install wind barriers to avoid the operating limitations.



(1) In this area the fans modulate in order to control the condensing/evaporating temperature. The performances may be different from the declared ones.

Scaling correction table

ETHYLENE GLYCOL CORRECTION TABLE

% Ethylene glycol weight		5%	10%	15%	20%	25%	30%	35%	40%
Freezing temperature	°C	-2	-3,9	-6,5	-8,9	-11,8	-15,6	-19	-23,4
Suggested security limit	°C	3	1	-1	-4	-6	-10	-14	-19
Cooling capacity coefficient	-	0,995	0,99	0,985	0,981	0,977	0,974	0,971	0,968
Power input coefficient	-	0,997	0,993	0,99	0,988	0,986	0,984	0,982	0,981
Flow rate coefficient	-	1,003	1,01	1,02	1,033	1,05	1,072	1,095	1,124
Pressure drop coefficient	-	1,029	1,06	1,09	1,118	1,149	1,182	1,211	1,243

In order to calculate performance with glycoled solutions multiply main sizes by respective coefficients.

ETHYLENE GLYCOL PERCENTAGE DEPENDING ON FREEZING TEMPERATURE

% glycol according to the freezing temperature						
Freezing temperature	0°C	-5°C	-10°C	-15°C	-20°C	-25°C
% Ethylene glycol	5%	12%	20%	28%	35%	40%
Flow rate coefficient	1,02	1,033	1,05	1,072	1,095	1,124

In order to calculate performance with glycoled solutions multiply main sizes by respective coefficients.

FOULING FACTOR CORRECTION TABLE

Fouling Factor F.F. [m ² °C*W]	Plant side cold heat exchanger			Plant side hot heat exchanger		
	A1	B1	Tmin	A2	B2	Tmax
0	1	1	0	1	1	0
1,80E-05	1	1	0	1	1	0
4,40E-05	1	1	0	0,99	1,03	1
8,80E-05	0,96	0,99	0,7	0,98	1,04	1,5
1,32E-04	0,94	0,99	1	0,96	1,05	2,3
1,72E-04	0,93	0,98	1,5	0,95	1,06	3

A factor Capacity correction factor

B factor Compressor power input correction factor

Tmin Minimum evaporator outlet water temperature increase

T max Maximum condenser outlet water temperature decrease

Hydraulic data

MAXIMUM AND MINIMUM WATER FLOW AND RECOMMENDED WATER CONTENT

CMAB SE	Plant side cold water heat exchanger				Plant side hot water heat exchanger			
	V [m ³]	K	Q min [m ³ /h]	Q max [m ³ /h]	V [m ³]	K	Q min [m ³ /h]	Q max [m ³ /h]
50	0.39	221.6	4.8	12.9	1.2	189.9	5.3	14.3
55	0.44	217.9	5.5	14.6	1.4	186.4	6.1	16.2
65	0.51	212.4	6.4	17.1	1.6	181.0	7.2	19.1
85	0.67	204.5	8.3	22.2	2.1	145.3	9.4	25.0
110	0.89	76.5	11.1	29.5	2.7	68.4	11.9	31.9
140	1.08	74.3	13.6	36.2	3.4	67.3	15.1	40.1
155	1.19	52.8	14.9	39.7	3.8	48.8	16.5	44.0
175	1.36	52.7	17.0	45.4	4.3	47.7	19.0	50.6
210	1.60	23.4	20.0	53.3	5.3	21.0	23.1	61.6
260	1.95	23.1	24.3	64.8	6.4	20.7	28.1	75.1
305	2.30	13.3	28.8	76.7	7.6	12.2	33.3	88.7
350	2.69	11.1	33.6	89.6	8.7	10.2	38.2	101.8
370	2.84	11.1	35.5	94.7	9.2	10.2	40.4	107.7
435	3.27	10.2	40.9	109.1	10.8	9.4	47.3	126.0
495	3.70	7.7	46.2	123.3	12.3	6.6	53.6	143.0
525	3.90	7.5	48.7	129.9	13.0	6.5	57.0	152.1
50 L	0.38	221.6	4.7	12.7	1.2	190.0	5.2	14.0
55 L	0.43	217.8	5.4	14.3	1.4	186.4	5.9	15.9
65 L	0.50	212.4	6.2	16.6	1.6	181.0	7.0	18.7
85 L	0.65	204.4	8.1	21.7	2.1	145.3	9.2	24.5
110 L	0.85	76.5	10.6	28.4	2.7	68.4	11.7	31.1
140 L	1.05	74.3	13.1	34.8	3.4	67.3	14.7	39.1
155 L	1.14	52.8	14.3	38.1	3.7	48.8	16.1	43.0
175 L	1.31	52.7	16.4	43.8	4.3	47.7	18.6	49.7
210 L	1.57	23.4	19.6	52.2	5.1	21.0	22.5	60.0
260 L	1.87	23.1	23.4	62.4	6.3	20.7	27.4	73.0
305 L	2.20	13.3	27.5	73.4	7.4	12.2	32.3	86.2
350 L	2.58	11.1	32.3	86.0	8.5	10.2	37.2	99.2
370 L	2.71	11.1	33.9	90.4	9.0	10.2	39.4	105.0
435 L	3.09	10.2	38.6	103.0	10.4	9.4	45.6	121.7
495 L	3.57	7.7	44.7	119.1	12.0	6.6	52.4	139.6
525 L	3.76	7.5	46.9	125.2	12.7	6.5	55.6	148.2
50 S	0.38	221.6	4.7	12.6	1.2	190.0	5.2	13.9
55 S	0.43	217.8	5.3	14.2	1.4	186.4	5.9	15.8
65 S	0.49	212.3	6.2	16.4	1.6	181.0	6.9	18.5
85 S	0.65	204.4	8.1	21.6	2.1	145.3	9.1	24.3
110 S	0.85	76.5	10.6	28.2	2.6	68.5	11.6	30.9
140 S	1.04	74.3	12.9	34.5	3.3	67.3	14.6	38.9
155 S	1.13	52.8	14.2	37.7	3.7	48.8	16.0	42.6
175 S	1.31	52.7	16.4	43.8	4.2	47.7	18.6	49.5
210 S	1.55	23.4	19.4	51.6	5.1	21.0	22.4	59.7
260 S	1.86	23.1	23.2	61.9	6.2	20.7	27.2	72.5
305 S	2.17	13.3	27.1	72.4	7.3	12.2	32.1	85.6
350 S	2.56	11.1	32.0	85.2	8.4	10.2	36.9	98.4
370 S	2.68	11.1	33.6	89.5	8.9	10.2	39.1	104.1
435 S	3.05	10.2	38.1	101.6	10.4	9.4	45.4	121.1
495 S	3.55	7.7	44.3	118.2	11.9	6.6	52.1	138.8
525 S	3.72	7.5	46.5	124.1	12.6	6.5	55.2	147.3

LEGEND:

V: recommended water content of the plant (cold side and hot side) with dT 5°C on the heat exchanger

Q min: minimum water flow to the heat exchanger

Q max: maximum water flow to the heat exchanger

$$dpw = K \cdot Q^2 / 1000$$

$$Q = 0,86 P/\Delta T$$

P: heating or cooling capacity [kW]

ΔT at the heat exchanger (min = 3, max = 8) [°C]

dpw: pressure drop [kPa]

Hydraulic data

MAXIMUM AND MINIMUM WATER FLOW AND RECOMMENDED WATER CONTENT

CMAB HE	Plant side cold water heat exchanger				Plant side hot water heat exchanger			
	V [m ³]	K	Q min [m ³ /h]	Q max [m ³ /h]	V [m ³]	K	Q min [m ³ /h]	Q max [m ³ /h]
50	0.41	87.7	5.2	13.8	1.3	84.6	5.5	14.7
60	0.47	78.5	5.9	15.7	1.4	75.7	6.3	16.8
70	0.56	76.6	7.0	18.7	1.7	73.8	7.5	20.1
90	0.73	73.5	9.1	24.3	2.3	70.7	9.9	26.3
120	0.95	55.5	11.9	31.6	3.0	51.5	12.9	34.5
130	1.05	54.6	13.1	35.0	3.3	49.4	14.3	38.2
145	1.12	43.5	14.1	37.5	3.6	41.7	15.7	41.9
165	1.29	23.9	16.2	43.1	4.0	23.0	17.7	47.1
180	1.41	23.7	17.7	47.1	4.4	22.7	19.4	51.8
220	1.71	23.3	21.4	57.2	5.4	23.0	23.7	63.1
260	2.05	17.4	25.7	68.5	6.5	17.0	28.3	75.6
320	2.49	6.6	31.2	83.1	8.0	6.3	34.9	92.9
355	2.76	6.5	34.5	91.9	8.8	6.3	38.7	103.1
375	2.93	6.5	36.6	97.5	9.4	6.3	41.0	109.4
455	3.49	6.4	43.6	116.2	11.3	6.1	49.5	132.0
500	3.87	7.9	48.3	128.9	12.5	7.6	54.5	145.3
535	4.06	9.0	50.8	135.5	13.3	8.6	58.2	155.1
575	4.40	6.3	55.0	146.7	14.3	6.0	62.7	167.1
600	4.57	4.9	57.1	152.3	14.9	4.7	65.1	173.6
660	4.99	5.0	62.4	166.4	16.5	4.7	72.1	192.3
710	5.52	1.6	69.0	183.9	17.7	1.6	77.3	206.2
755	5.82	1.6	72.7	193.9	18.8	1.6	82.1	218.8
800	6.11	1.6	76.4	203.8	19.8	1.6	86.8	231.4
840	6.40	1.6	80.0	213.3	20.9	1.5	91.4	243.6
880	6.68	1.6	83.5	222.7	21.9	1.5	96.0	255.9
50 S	0.41	87.7	5.1	13.5	1.2	84.6	5.4	14.5
60 S	0.46	78.4	5.7	15.3	1.4	75.7	6.2	16.5
70 S	0.54	76.6	6.8	18.0	1.7	73.8	7.3	19.6
90 S	0.71	73.5	8.9	23.6	2.2	70.7	9.6	25.7
120 S	0.91	55.5	11.4	30.4	2.9	51.5	12.6	33.5
130 S	1.01	54.5	12.7	33.8	3.2	49.4	14.0	37.3
145 S	1.08	43.5	13.6	36.2	3.5	41.7	15.2	40.6
165 S	1.26	23.9	15.8	42.1	4.0	23.0	17.3	46.1
180 S	1.37	23.7	17.2	45.8	4.3	22.7	19.0	50.7
220 S	1.65	23.3	20.6	54.9	5.3	23.0	23.0	61.4
260 S	1.94	17.4	24.3	64.7	6.3	17.0	27.5	73.3
320 S	2.39	6.6	29.9	79.7	7.7	6.3	33.7	90.0
355 S	2.64	6.5	33.0	88.1	8.6	6.3	37.4	99.8
375 S	2.79	6.5	34.9	93.0	9.1	6.3	39.7	105.8
455 S	3.34	6.4	41.7	111.3	10.9	6.1	47.8	127.5
500 S	3.71	7.9	46.4	123.6	12.1	7.6	52.9	141.1
535 S	3.89	9.0	48.6	129.6	12.8	8.6	56.2	149.9
575 S	4.21	6.3	52.6	140.3	13.9	6.0	60.7	161.8
600 S	4.35	4.9	54.4	145.1	14.4	4.7	63.0	167.9
660 S	4.73	5.0	59.1	157.6	15.9	4.8	69.5	185.4
710 S	5.28	1.6	66.0	175.9	17.1	1.6	74.8	199.6
755 S	5.55	1.6	69.3	184.9	18.1	1.6	79.3	211.6
800 S	5.82	1.6	72.7	193.9	19.2	1.6	83.8	223.5
840 S	6.07	1.6	75.9	202.3	20.1	1.5	88.1	235.0
880 S	6.32	1.6	79.1	210.8	21.1	1.5	92.4	246.4

LEGEND:

V: recommended water content of the plant (cold side and hot side) with ΔT 5°C on the heat exchanger

Q min: minimum water flow to the heat exchanger

Q max: maximum water flow to the heat exchanger

$$dpw = K \cdot Q^2 / 1000$$

$$Q = 0,86 P / \Delta T$$

P: heating or cooling capacity [kW]

ΔT at the heat exchanger (min = 3, max = 8) [°C]

dpw: pressure drop [kPa]

Hydraulic data

The units of the CMAB family are also available in multiple hydraulic versions, characterized by complete kits of all major hydraulic components for an easier installation, with reduced time, cost and space.

The wide range of hydraulic versions available make the unit suitable for any type of installation.

HYDRAULIC VERSIONS

1 pump for chilled water circuit + 1 pump for hot water circuit, low head pressure.

1 pump for chilled water circuit + 1 pump for hot water circuit, medium head pressure.

1 pump for chilled water circuit + 1 pump for hot water circuit, high head pressure.

2 pumps for chilled water circuit + 2 pumps for hot water circuit, low head pressure.

2 pumps for chilled water circuit + 2 pumps for hot water circuit, medium head pressure.

2 pumps for chilled water circuit + 2 pumps for hot water circuit, high head pressure.

HYDRONIC KIT

Centrifugal pumps with 2 available in low, medium or high head pressure.

Pumps with cast iron body and impeller entirely welded using laser technology. Three phase electric motor with IP55 protection and insulation class F, suitable for continuous service.

Series motors with higher efficiency IE3 technology.

- Differential pressure switch on exchanger.
- Water discharge and shut-off valve.
- Taps on pumps suction / delivery which allow the replacement of a damaged pump eliminating the plant shutdown differently from other types of common use.
- Check valve (only for double pump versions).
- Relief valve.
- Safety valve (operating pressure 6 bars for low/ medium head pressure pump versions and 9 bars for high head pressure pump version).
- Water gauges.
- Expansion vessel.

The stand-by pump accessory is also available, including 2 additional pumps (one for the cold circuit and the other for the hot circuit) in stand-by mode to the first, equipped with the automatic changeover including also the pressure switch for the intervention of the second pump. The pumps operate with the balance of the related operating hours. In case of failure of one pump the controller in automatic switches on the additional pump. The control panel is equipped with fuses and contactor with thermal protection.

HYDRONIC ACCESORIES ON REQUEST

- "Y" water strainer (sold separately), consists of body and stainless steel mesh, with replaceable filter through the inspection cap.
- Automatic water filling (sold separately).

Hydraulic data

CMAB SE

LOW HEAD PRESSURE PUMP

COOLING MODE

Mod.	Pf	qw	dpw	Ref. curve	Expansion vessel	F.L.I.	F.L.A.	Hp	Hu
	[kW]	[m ³ /h]	[kPa]		[l]	[kW]	[A]	[kPa]	[kPa]
50	45	8	13	A	24	0.95	1.7	139	126
55	51	9	17	A	24	0.95	1.7	133	117
65	60	10	22	A	24	0.95	1.7	123	101
85	78	13	36	B	24	1.77	3.3	159	123
110	103	18	24	B	24	1.77	3.3	133	109
140	126	22	35	C	24	1.72	3.8	147	112
155	139	24	30	C	24	1.72	3.8	141	111
175	159	27	39	C	24	1.72	3.8	130	91
210	187	32	24	D	2 x 24	2.55	4.7	166	142
260	227	39	35	D	2 x 24	2.55	4.7	151	116
305	268	46	28	E	2 x 24	3.44	6.4	180	151
350	313	54	32	F	2 x 24	4.52	8.7	182	150
370	331	57	36	F	2 x 24	4.52	8.7	177	142
435	382	65	44	F	2 x 24	4.52	8.7	164	120
495	431	74	42	G	2 x 24	6.09	10.6	201	159
525	454	78	46	G	2 x 24	6.09	10.6	193	147

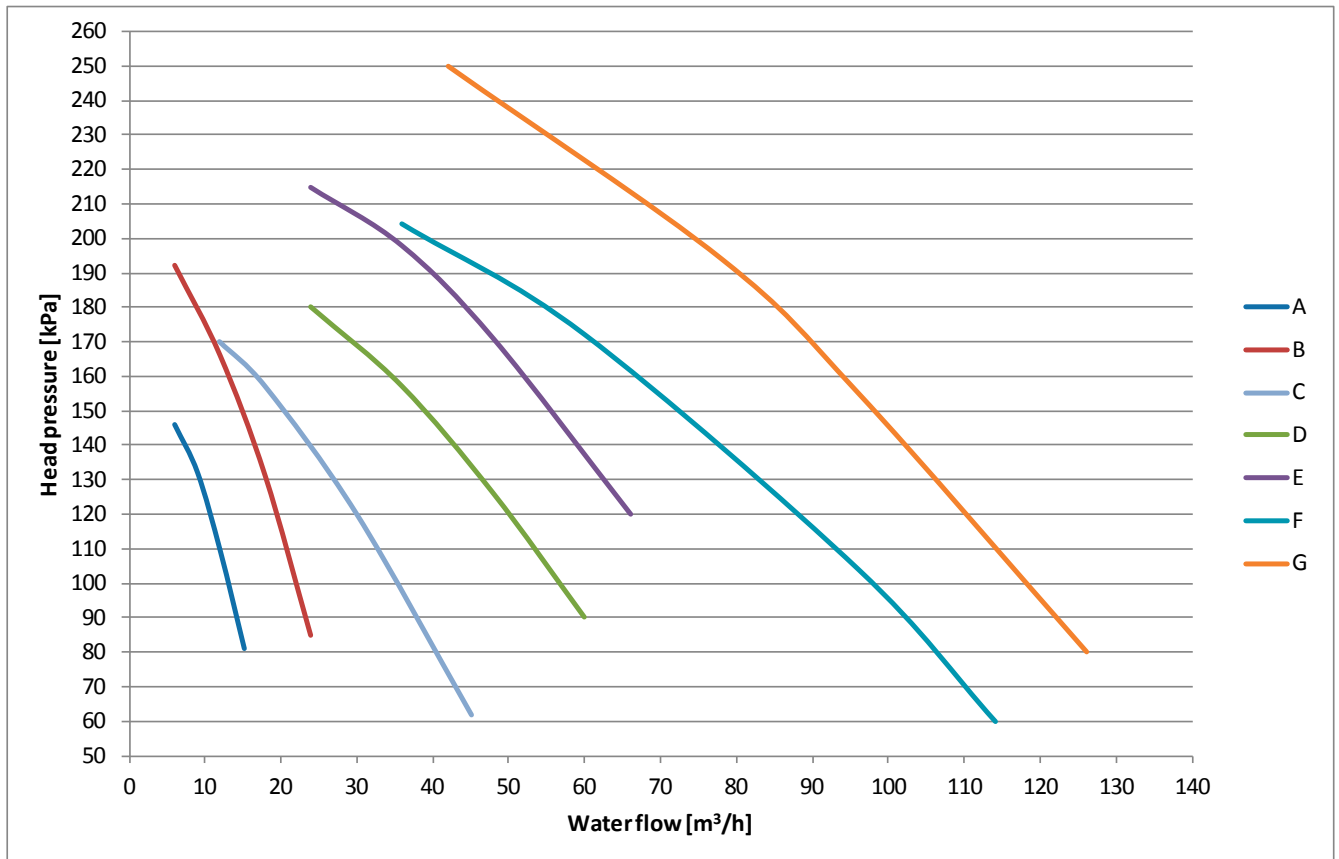
HEATING MODE

Mod.	Pt	qw	dpw	Ref. curve	Expansion vessel	F.L.I.	F.L.A.	Hp	Hu
	[kW]	[m ³ /h]	[kPa]		[l]	[kW]	[A]	[kPa]	[kPa]
50	49	8.6	13.9	A	24	0.95	1.7	135	121
55	56	9.7	17.6	A	24	0.95	1.7	127	109
65	66	11.4	23.7	A	24	0.95	1.7	114	90
85	86	15.0	32.8	B	24	1.77	3.3	150	117
110	110	19.1	25.0	B	24	1.77	3.3	124	99
140	138	24.1	39.0	C	24	1.72	3.8	140	101
155	152	26.4	34.0	C	24	1.72	3.8	133	99
175	174	30.4	44.0	C	24	1.72	3.8	120	76
210	212	36.9	28.7	D	2 x 24	2.55	4.7	155	127
260	259	45.0	41.9	D	2 x 24	2.55	4.7	135	93
305	306	53.2	34.5	E	2 x 24	3.44	6.4	163	128
350	351	61.1	38.1	F	2 x 24	4.52	8.7	171	133
370	371	64.6	42.5	F	2 x 24	4.52	8.7	166	123
435	434	75.6	53.9	F	2 x 24	4.52	8.7	147	93
495	493	85.8	48.7	G	2 x 24	6.09	10.6	176	128
525	524	91.2	54.1	G	2 x 24	6.09	10.6	164	110

Pf	Cooling capacity (kW)
Pt	Heating capacity (kW)
qw	Water flow (m ³ /h)
dpw	Pressure drop (kPa)
F.L.I.	Full load electrical power
F.L.A.	Full load operating current
Hp	Pump head pressure
Hu	Available pressure

CMAB SE

LOW HEAD PRESSURE PUMP



- A = Unit size 50-55-65
- B = Unit size 85-110
- C = Unit size 140-155-175
- D = Unit size 210-260
- E = Unit size 305
- F = Unit size 350-370-435
- G = Unit size 495-525

Hydraulic data

CMAB SE

MEDIUM HEAD PRESSURE PUMP

COOLING MODE

Mod.	Pf	qw	dpw	Ref. curve	Expansion vessel	F.L.I.	F.L.A.	Hp	Hu
	[kW]	[m ³ /h]	[kPa]			[kW]	[A]		
50	45	8	13	A	24	1.28	2.3	176	163
55	51	9	17	A	24	1.28	2.3	173	156
65	60	10	22	B	24	1.77	3.3	174	152
85	78	13	36	C	24	1.72	3.8	194	158
110	103	18	24	D	24	2.55	4.7	216	192
140	126	22	35	D	24	2.55	4.7	204	169
155	139	24	30	D	24	2.55	4.7	198	168
175	159	27	39	D	24	2.55	4.7	187	148
210	187	32	24	E	2 x 24	3.44	6.4	206	182
260	227	39	35	E	2 x 24	3.44	6.4	194	159
305	268	46	28	F	2 x 24	4.52	8.7	222	194
350	313	54	32	G	2 x 24	6.09	10.6	235	203
370	331	57	36	G	2 x 24	6.09	10.6	231	195
435	382	65	44	G	2 x 24	6.09	10.6	217	173
495	431	74	42	G	2 x 24	6.09	10.6	201	159
525	454	78	46	G	2 x 24	6.09	10.6	193	147

HEATING MODE

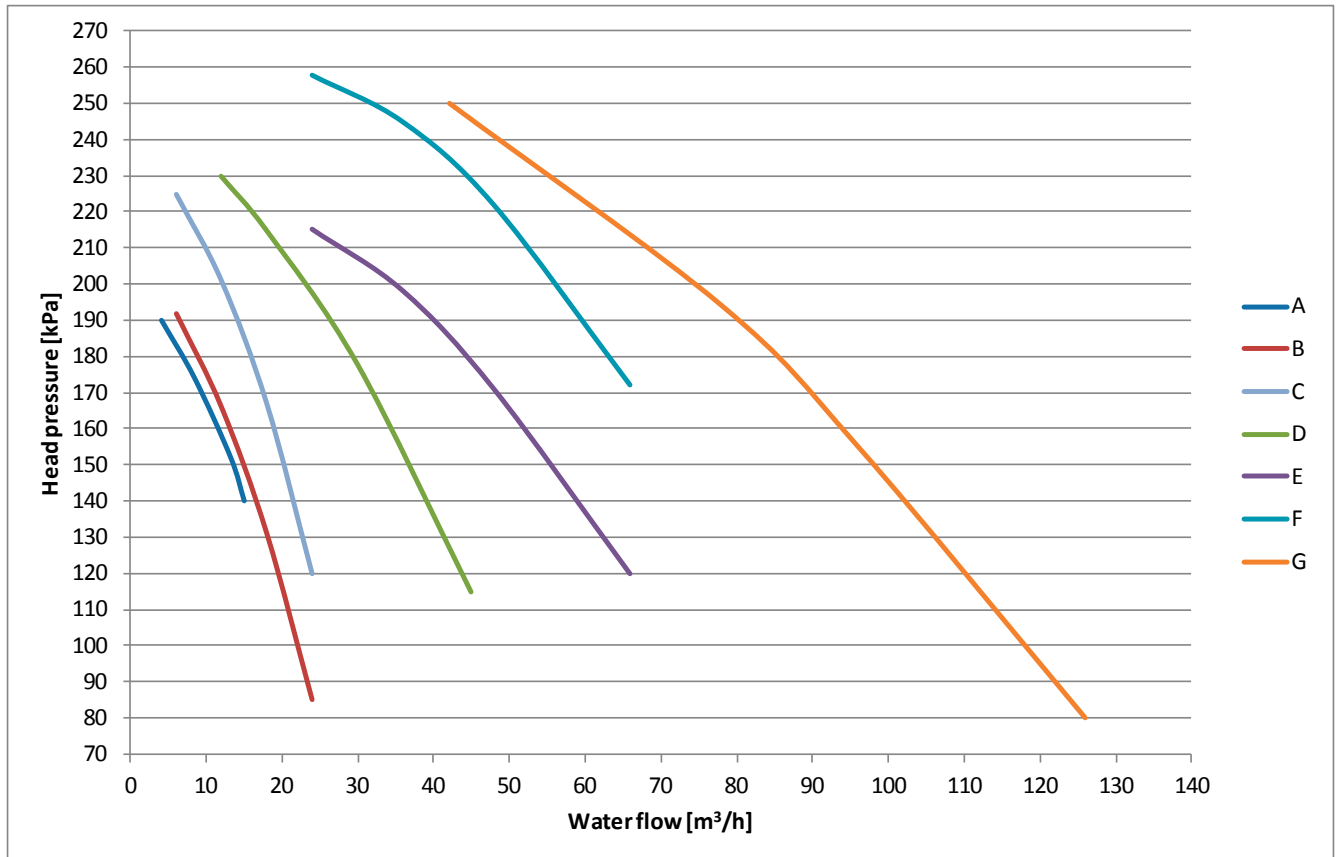
Mod.	Pt	qw	dpw	Ref. curve	Expansion vessel	F.L.I.	F.L.A.	Hp	Hu
	[kW]	[m ³ /h]	[kPa]			[kW]	[A]		
50	49	9	14	A	24	1.28	2.3	173	160
55	56	10	18	A	24	1.28	2.3	169	151
65	66	11	24	B	24	1.77	3.3	169	145
85	86	15	33	C	24	1.72	3.8	185	153
110	110	19	25	D	24	2.55	4.7	212	187
140	138	24	39	D	24	2.55	4.7	197	158
155	152	26	34	D	24	2.55	4.7	190	156
175	174	30	44	D	24	2.55	4.7	176	132
210	212	37	29	E	2 x 24	3.44	6.4	198	169
260	259	45	42	E	2 x 24	3.44	6.4	182	140
305	306	53	35	F	2 x 24	4.52	8.7	203	168
350	351	61	38	G	2 x 24	6.09	10.6	224	186
370	371	65	43	G	2 x 24	6.09	10.6	218	175
435	434	76	54	G	2 x 24	6.09	10.6	198	144
495	493	86	49	G	2 x 24	6.09	10.6	176	128
525	524	91	54	G	2 x 24	6.09	10.6	164	110

Pf	Cooling capacity (kW)
Pt	Heating capacity (kW)
qw	Water flow (m ³ /h)
dpw	Pressure drop (kPa)
F.L.I.	Full load electrical power
F.L.A.	Full load operating current
Hp	Pump head pressure
Hu	Available pressure

Hydraulic data

CMAB SE

MEDIUM HEAD PRESSURE PUMP



A = Unit size 50-55

B = Unit size 65

C = Unit size 85

D = Unit size 110-140-155-175

E = Unit size 210-260

F = Unit size 305

G = Unit size 350-370-435-495-525

Hydraulic data

CMAB SE

HIGH HEAD PRESSURE PUMP

COOLING MODE

Mod.	Pf	qw	dpw	Ref. curve	Expansion vessel	F.L.I.	F.L.A.	Hp	Hu
	[kW]	[m ³ /h]	[kPa]		[l]	[kW]	[A]	[kPa]	[kPa]
50	45	8	13	A	24	1.73	3.2	215	201
55	51	9	17	B	24	2.2	4.3	275	258
65	60	10	22	B	24	2.2	4.3	266	244
85	78	13	36	B	24	2.2	4.3	244	208
110	103	18	24	C	24	3.44	6.4	238	214
140	126	22	35	C	24	3.44	6.4	227	192
155	139	24	30	C	24	3.44	6.4	221	191
175	159	27	39	D	24	3.44	6.4	247	208
210	187	32	24	D	2 x 24	3.44	6.4	229	205
260	227	39	35	E	2 x 24	4.52	8.7	238	203
305	268	46	28	F	2 x 24	6.09	10.6	284	255
350	313	54	32	F	2 x 24	6.09	10.6	263	230
370	331	57	36	F	2 x 24	6.09	10.6	253	218
435	382	65	44	G	2 x 24	8.26	13.6	265	221
495	431	74	42	H	2 x 24	10.12	17.2	304	261
525	454	78	46	H	2 x 24	10.12	17.2	298	252

HEATING MODE

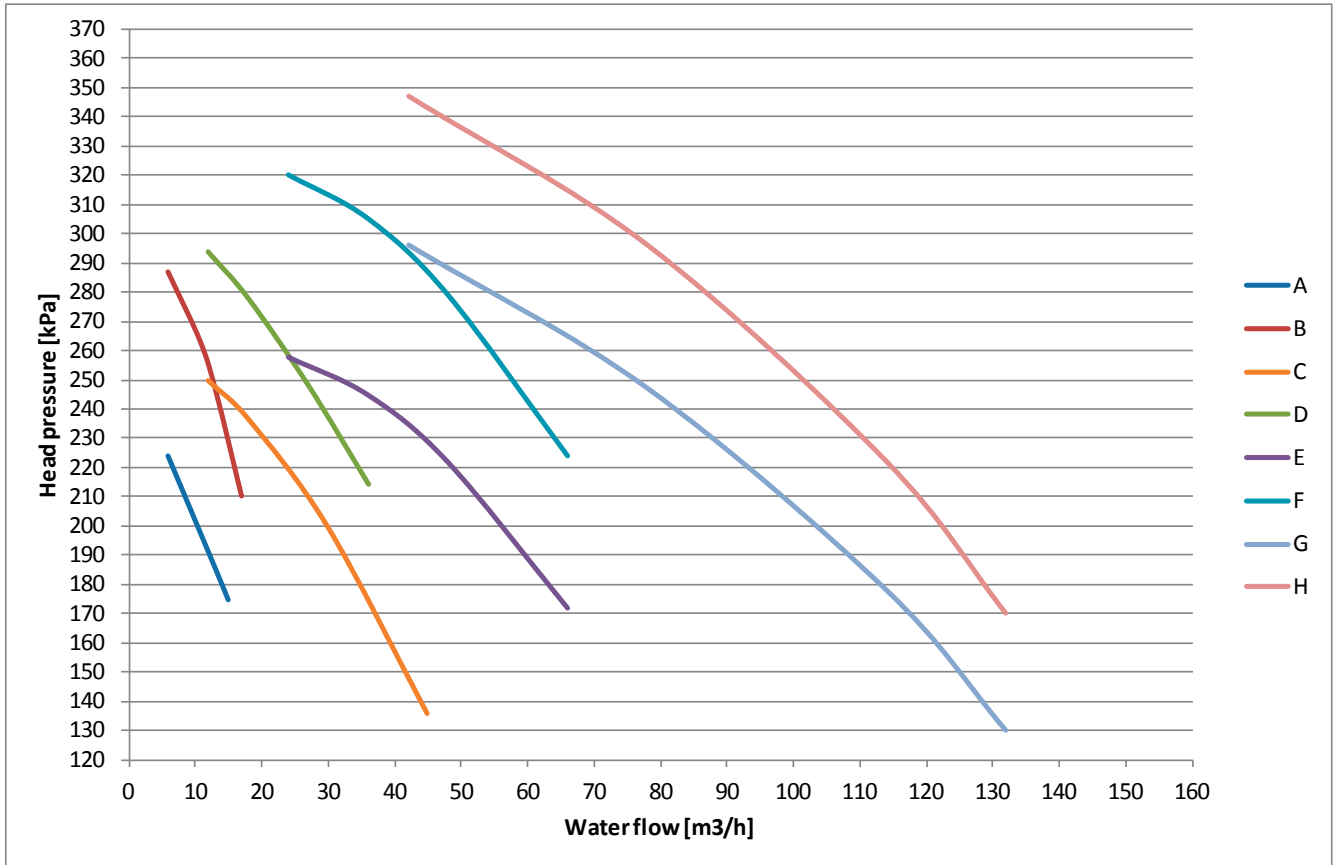
Mod.	Pt	qw	dpw	Ref. curve	Expansion vessel	F.L.I.	F.L.A.	Hp	Hu
	[kW]	[m ³ /h]	[kPa]		[l]	[kW]	[A]	[kPa]	[kPa]
50	49	9	14	A	24	1.73	3.2	210	196
55	56	10	18	B	24	2.2	4.3	270	252
65	66	11	24	B	24	2.2	4.3	259	235
85	86	15	33	B	24	2.2	4.3	229	196
110	110	19	25	C	24	3.44	6.4	234	209
140	138	24	39	C	24	3.44	6.4	220	181
155	152	26	34	C	24	3.44	6.4	212	178
175	174	30	44	D	24	3.44	6.4	235	191
210	212	37	29	D	2 x 24	3.44	6.4	209	180
260	259	45	42	E	2 x 24	4.52	8.7	225	183
305	306	53	35	F	2 x 24	6.09	10.6	264	230
350	351	61	38	F	2 x 24	6.09	10.6	240	202
370	371	65	43	F	2 x 24	6.09	10.6	228	185
435	434	76	54	G	2 x 24	8.26	13.6	250	196
495	493	86	49	H	2 x 24	10.12	17.2	285	236
525	524	91	54	H	2 x 24	10.12	17.2	275	221

Pf	Cooling capacity (kW)
Pt	Heating capacity (kW)
qw	Water flow (m ³ /h)
dpw	Pressure drop (kPa)
F.L.I.	Full load electrical power
F.L.A.	Full load operating current
Hp	Pump head pressure
Hu	Available pressure

Hydraulic data

CMAB SE

HIGH HEAD PRESSURE PUMP



- A = Unit size 50
- B = Unit size 55-65-85
- C = Unit size 110-140-155
- D = Unit size 175-210
- E = Unit size 260
- F = Unit size 305-350-370
- G = Unit size 435
- H = Unit size 495-525

Hydraulic data

CMAB HE

LOW HEAD PRESSURE PUMP

COOLING MODE

Mod.	Pf	qw	dpw	Ref. curve	Expansion vessel	F.L.I.	F.L.A.	Hp	Hu
	[kW]	[m ³ /h]	[kPa]		[l]	[kW]	[A]	[kPa]	[kPa]
50	48	8	6	A	24	0.95	1.7	136	130
60	55	9	7	A	24	0.95	1.7	129	122
70	65	11	10	A	24	0.95	1.7	116	106
90	85	15	16	B	24	1.77	3.3	152	137
120	111	19	20	B	24	1.77	3.3	125	105
130	122	21	24	C	24	1.72	3.8	149	125
145	131	22	22	C	24	1.72	3.8	145	123
165	151	26	16	C	24	1.72	3.8	135	119
180	165	28	19	C	2 x 24	1.72	3.8	127	108
220	200	34	27	D	2 x 24	2.55	4.7	161	134
260	239	41	29	D	2 x 24	2.55	4.7	145	116
320	291	50	16	E	2 x 24	3.44	6.4	171	154
355	321	55	20	F	2 x 24	4.52	8.7	180	160
375	341	59	22	F	2 x 24	4.52	8.7	175	153
455	406	70	31	F	2 x 24	4.52	8.7	157	126
500	451	77	47	G	2 x 24	6.09	10.6	194	147
535	474	81	60	G	2 x 24	6.09	10.6	186	126
575	513	88	49	G	2 x 24	6.09	10.6	171	123
600	533	91	41	G	2 x 24	6.09	10.6	164	123
660	582	100	50	H	2 x 24	8.26	13.6	207	157
710	643	110	20	I	2 x 24	12.27	19.9	203	183
755	678	116	22	I	2 x 24	12.27	19.9	198	176
800	713	122	24	L	2 x 24	16.33	26.8	239	215
840	746	128	26	L	2 x 24	16.33	26.8	233	207
880	779	134	29	L	2 x 24	16.33	26.8	226	198

Pf	Cooling capacity (kW)
Pt	Heating capacity (kW)
qw	Water flow (m ³ /h)
dpw	Pressure drop (kPa)
F.L.I.	Full load electrical power
F.L.A.	Full load operating current
Hp	Pump head pressure
Hu	Available pressure

Hydraulic data

CMAB HE

LOW HEAD PRESSURE PUMP

HEATING MODE

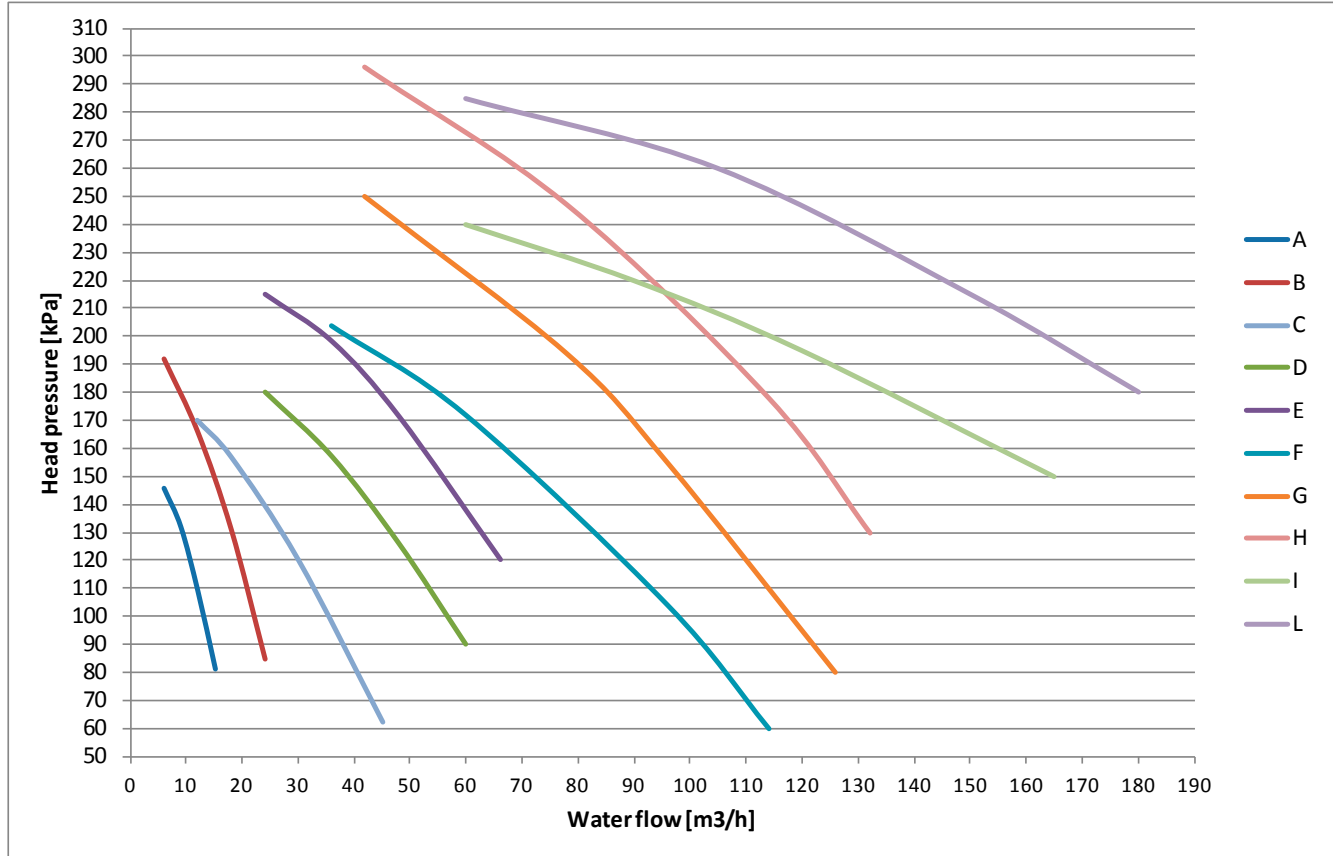
Mod.	Pt	qw	dpw	Ref. curve	Expansion vessel	F.L.I.	F.L.A.	Hp	Hu
	[kW]	[m ³ /h]	[kPa]		[l]	[kW]	[A]	[kPa]	[kPa]
50	51	9	7	A	24	0.95	1.7	133	127
60	58	10	8	A	24	0.95	1.7	124	117
70	69	12	11	A	24	0.95	1.7	108	98
90	91	16	18	B	24	1.77	3.3	145	128
120	119	21	22	B	24	1.77	3.3	112	90
130	132	23	26	C	24	1.72	3.8	144	118
145	144	25	26	C	24	1.72	3.8	137	111
165	162	28	18	C	24	1.72	3.8	127	109
180	178	31	22	C	2 x 24	1.72	3.8	117	95
220	217	38	33	D	2 x 24	2.55	4.7	153	120
260	260	45	35	D	2 x 24	2.55	4.7	134	100
320	320	56	20	E	2 x 24	3.44	6.4	156	137
355	355	62	24	F	2 x 24	4.52	8.7	170	146
375	377	66	27	F	2 x 24	4.52	8.7	164	137
455	455	79	38	F	2 x 24	4.52	8.7	141	102
500	501	87	57	G	2 x 24	6.09	10.6	173	116
535	534	93	74	G	2 x 24	6.09	10.6	160	85
575	576	100	60	G	2 x 24	6.09	10.6	142	82
600	598	104	51	G	2 x 24	6.09	10.6	133	82
660	662	115	63	H	2 x 24	8.26	13.6	172	109
710	710	124	24	I	2 x 24	12.27	19.9	191	167
755	754	131	27	I	2 x 24	12.27	19.9	184	157
800	797	139	30	L	2 x 24	16.33	26.8	220	190
840	839	146	33	L	2 x 24	16.33	26.8	210	177
880	881	154	36	L	2 x 24	16.33	26.8	201	165

Pf	Cooling capacity (kW)
Pt	Heating capacity (kW)
qw	Water flow (m ³ /h)
dpw	Pressure drop (kPa)
F.L.I.	Full load electrical power
F.L.A.	Full load operating current
Hp	Pump head pressure
Hu	Available pressure

Hydraulic data

CMAB HE

LOW HEAD PRESSURE PUMP



- A = Unit size 50-60-70
- B = Unit size 90-120
- C = Unit size 130-145-165
- D = Unit size 220-260
- E = Unit size 320
- F = Unit size 355-375-455
- G = Unit size 500-535-575-600
- H = Unit size 660
- I = Unit size 710-755
- L = Unit size 840-880

Hydraulic data

CMAB HE

MEDIUM HEAD PRESSURE PUMP

COOLING MODE

Mod.	Pf [kW]	qw [m ³ /h]	dpw [kPa]	Ref. curve	Expansion vessel [l]	F.L.I. [kW]	F.L.A. [A]	Hp [kPa]	Hu [kPa]
50	48	8	6	A	24	1.28	2.3	174	168
60	55	9	7	A	24	1.28	2.3	170	163
70	65	11	10	B	24	1.77	3.3	170	160
90	85	15	16	C	24	1.72	3.8	188	172
120	111	19	20	D	24	2.55	4.7	212	192
130	122	21	24	D	24	2.55	4.7	207	183
145	131	22	22	D	24	2.55	4.7	202	180
165	151	26	16	D	24	2.55	4.7	191	175
180	165	28	19	D	2 x 24	2.55	4.7	183	164
220	200	34	27	E	2 x 24	3.44	6.4	203	175
260	239	41	29	E	2 x 24	3.44	6.4	190	161
320	291	50	16	F	2 x 24	4.52	8.7	212	196
355	321	55	20	G	2 x 24	6.09	10.6	233	213
375	341	59	22	G	2 x 24	6.09	10.6	228	206
455	406	70	31	G	2 x 24	6.09	10.6	209	178
500	451	77	47	G	2 x 24	6.09	10.6	194	147
535	474	81	60	G	2 x 24	6.09	10.6	186	126
575	513	88	49	H	2 x 24	8.26	13.6	229	181
600	533	91	41	H	2 x 24	8.26	13.6	223	182
660	582	100	50	I	2 x 24	12.27	19.9	212	162
710	643	110	20	I	2 x 24	12.27	19.9	203	183
755	678	116	22	I	2 x 24	12.27	19.9	198	176
800	713	122	24	L	2 x 24	16.33	26.8	239	215
840	746	128	26	L	2 x 24	16.33	26.8	233	207
880	779	134	29	L	2 x 24	16.33	26.8	226	198

Pf	Cooling capacity (kW)
Pt	Heating capacity (kW)
qw	Water flow (m ³ /h)
dpw	Pressure drop (kPa)
F.L.I.	Full load electrical power
F.L.A.	Full load operating current
Hp	Pump head pressure
Hu	Available pressure

Hydraulic data

CMAB HE

MEDIUM HEAD PRESSURE PUMP

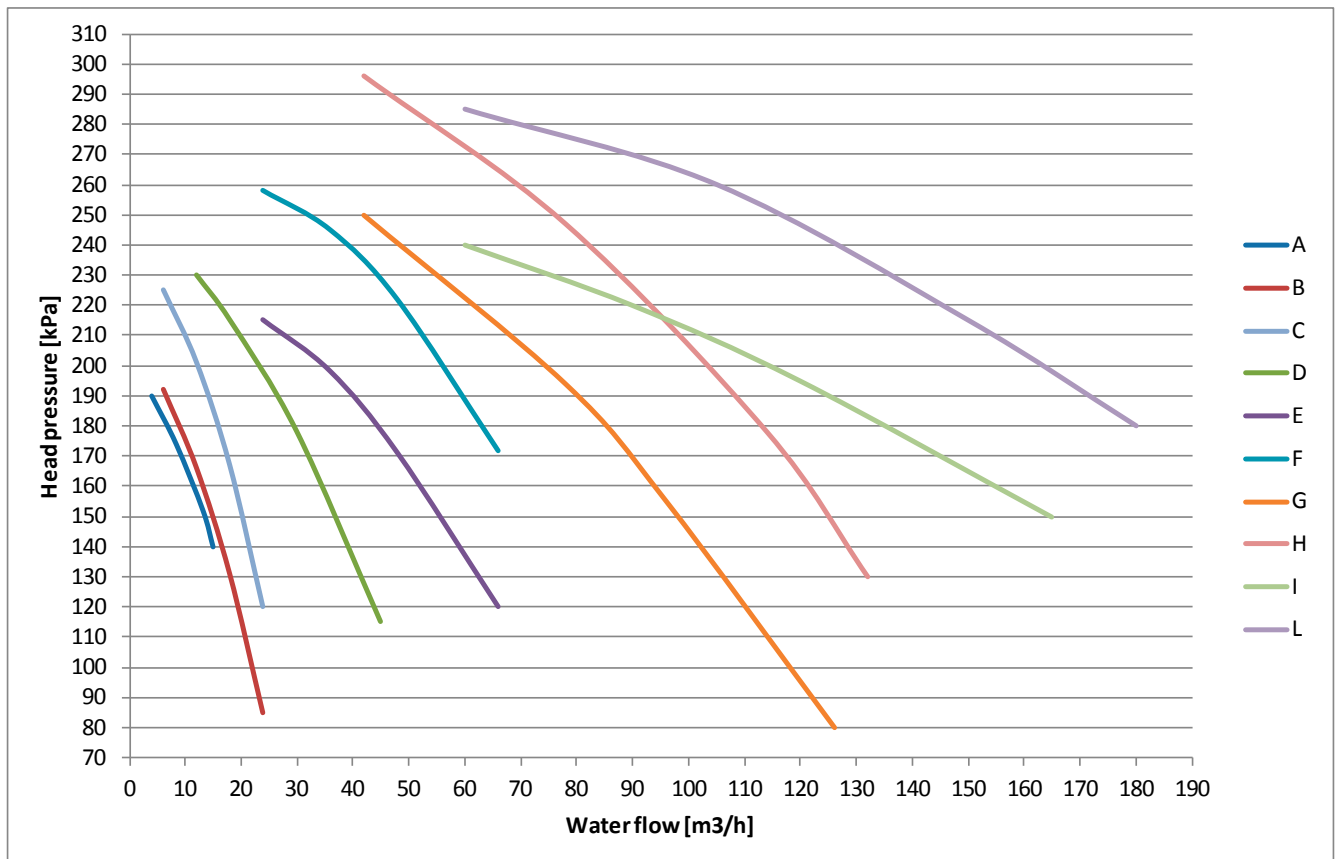
HEATING MODE

Mod.	Pt	qw	dpw	Ref. curve	Expansion vessel	F.L.I.	F.L.A.	Hp	Hu
	[kW]	[m ³ /h]	[kPa]		[l]	[kW]	[A]		
50	51	9	7	A	24	1.28	2.3	172	166
60	58	10	8	A	24	1.28	2.3	167	160
70	69	12	11	B	24	1.77	3.3	166	155
90	91	16	18	C	24	1.72	3.8	181	163
120	119	21	22	D	24	2.55	4.7	207	185
130	132	23	26	D	24	2.55	4.7	201	175
145	144	25	26	D	24	2.55	4.7	194	168
165	162	28	18	D	24	2.55	4.7	183	165
180	178	31	22	D	2 x 24	2.55	4.7	173	151
220	217	38	33	E	2 x 24	3.44	6.4	196	163
260	260	45	35	E	2 x 24	3.44	6.4	181	146
320	320	56	20	F	2 x 24	4.52	8.7	195	175
355	355	62	24	G	2 x 24	6.09	10.6	223	199
375	377	66	27	G	2 x 24	6.09	10.6	216	189
455	455	79	38	G	2 x 24	6.09	10.6	190	152
500	501	87	57	G	2 x 24	6.09	10.6	173	116
535	534	93	74	G	2 x 24	6.09	10.6	160	85
575	576	100	60	H	2 x 24	8.26	13.6	206	146
600	598	104	51	H	2 x 24	8.26	13.6	198	147
660	662	115	63	I	2 x 24	12.27	19.9	199	136
710	710	124	24	I	2 x 24	12.27	19.9	191	167
755	754	131	27	I	2 x 24	12.27	19.9	184	157
800	797	139	30	L	2 x 24	16.33	26.8	220	190
840	839	146	33	L	2 x 24	16.33	26.8	210	177
880	881	154	36	L	2 x 24	16.33	26.8	201	165

Pf	Cooling capacity (kW)
Pt	Heating capacity (kW)
qw	Water flow (m ³ /h)
dpw	Pressure drop (kPa)
F.L.I.	Full load electrical power
F.L.A.	Full load operating current
Hp	Pump head pressure
Hu	Available pressure

CMAB HE

MEDIUM HEAD PRESSURE PUMP



A = Unit size 50-60

B = Unit size 70

C = Unit size 90

D = Unit size 120-130-145-165-180

E = Unit size 220-260

F = Unit size 320

G = Unit size 355-375-455-500-535

H = Unit size 575-600

I = Unit size 710-755

L = Unit size 800-840-880

Hydraulic data

CMAB HE

HIGH HEAD PRESSURE PUMP

COOLING MODE

Mod.	Pf	qw	dpw	Ref. curve	Expansion vessel	F.L.I.	F.L.A.	Hp	Hu
	[kW]	[m ³ /h]	[kPa]		[l]	[kW]	[A]	[kPa]	[kPa]
50	48	8	6	A	24	1.73	3.2	212	206
60	55	9	7	B	24	2.2	4.3	271	264
70	65	11	10	B	24	2.2	4.3	260	251
90	85	15	16	B	24	2.2	4.3	233	218
120	111	19	20	C	24	3.44	6.4	234	214
130	122	21	24	C	24	3.44	6.4	229	205
145	131	22	22	C	24	3.44	6.4	225	203
165	151	26	16	D	24	3.44	6.4	252	236
180	165	28	19	D	2 x 24	3.44	6.4	243	224
220	200	34	27	D	2 x 24	3.44	6.4	220	192
260	239	41	29	E	2 x 24	4.52	8.7	233	204
320	291	50	16	F	2 x 24	6.09	10.6	274	257
355	321	55	20	F	2 x 24	6.09	10.6	259	239
375	341	59	22	F	2 x 24	6.09	10.6	248	226
455	406	70	31	G	2 x 24	8.26	13.6	259	228
500	451	77	47	H	2 x 24	10.12	17.2	299	251
535	474	81	60	H	2 x 24	10.12	17.2	292	233
575	513	88	49	H	2 x 24	10.12	17.2	281	232
600	533	91	41	I	2 x 24	16.33	26.8	268	227
660	582	100	50	I	2 x 24	16.33	26.8	261	212
710	643	110	20	I	2 x 24	16.33	26.8	252	232
755	678	116	22	I	2 x 24	16.33	26.8	245	224
800	713	122	24	L	2 x 24	16.33	26.8	302	277
840	746	128	26	L	2 x 24	16.33	26.8	296	270
880	779	134	29	L	2 x 24	16.33	26.8	290	262

Pf	Cooling capacity (kW)
Pt	Heating capacity (kW)
qw	Water flow (m ³ /h)
dpw	Pressure drop (kPa)
F.L.I.	Full load electrical power
F.L.A.	Full load operating current
Hp	Pump head pressure
Hu	Available pressure

Hydraulic data

CMAB HE

HIGH HEAD PRESSURE PUMP

HEATING MODE

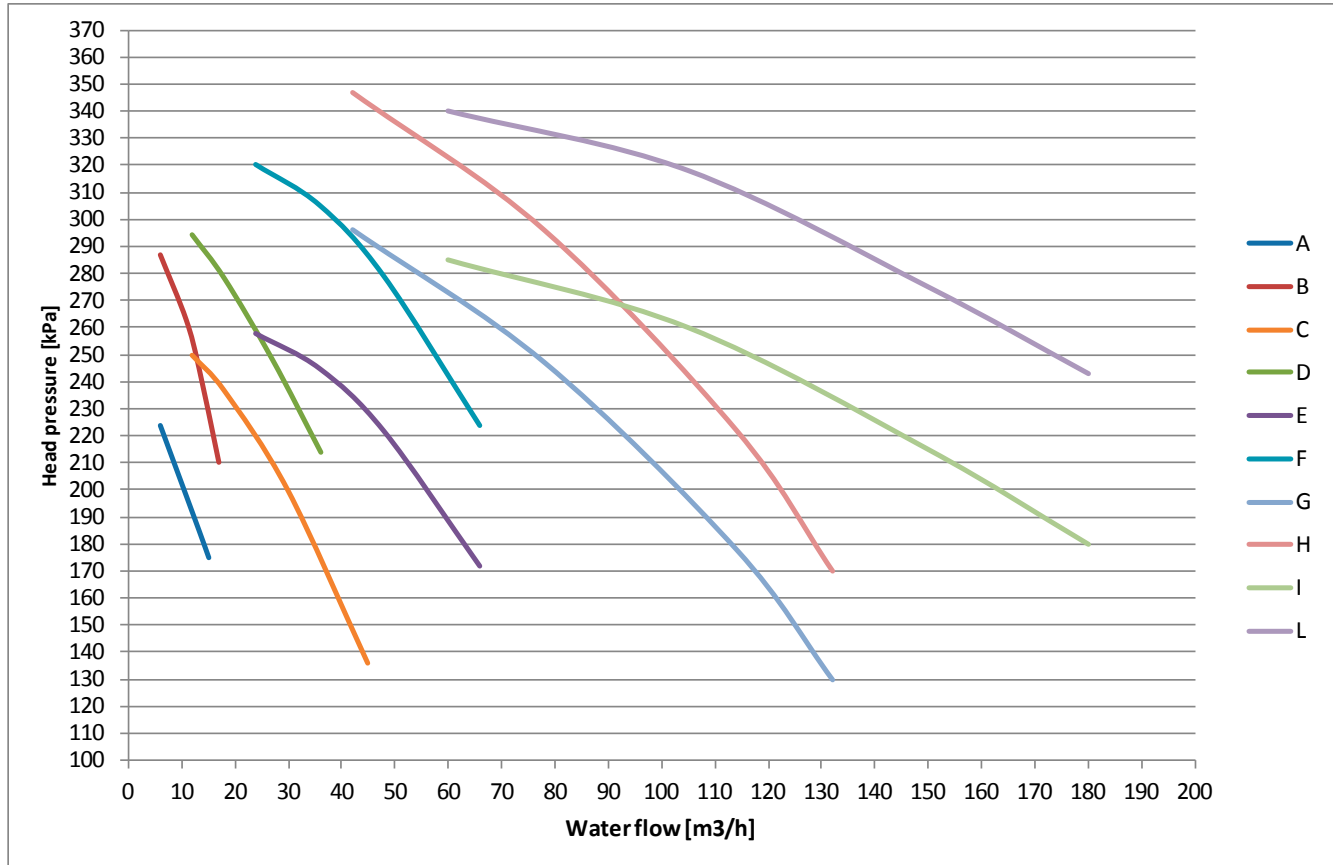
Mod.	Pt [kW]	qw [m ³ /h]	dpw [kPa]	Ref. curve	Expansion vessel [l]	F.L.I. [kW]	F.L.A. [A]	Hp [kPa]	Hu [kPa]
50	51	9	7	A	24	1.73	3.2	209	202
60	58	10	8	B	24	2.2	4.3	268	260
70	69	12	11	B	24	2.2	4.3	254	243
90	91	16	18	B	24	2.2	4.3	221	204
120	119	21	22	C	24	3.44	6.4	230	208
130	132	23	26	C	24	3.44	6.4	223	197
145	144	25	26	C	24	3.44	6.4	217	190
165	162	28	18	D	24	3.44	6.4	243	225
180	178	31	22	D	2 x 24	3.44	6.4	232	210
220	217	38	33	D	2 x 24	3.44	6.4	205	172
260	260	45	35	E	2 x 24	4.52	8.7	224	189
320	320	56	20	F	2 x 24	6.09	10.6	257	237
355	355	62	24	F	2 x 24	6.09	10.6	237	213
375	377	66	27	F	2 x 24	6.09	10.6	224	197
455	455	79	38	G	2 x 24	8.26	13.6	244	206
500	501	87	57	H	2 x 24	10.12	17.2	282	225
535	534	93	74	H	2 x 24	10.12	17.2	272	197
575	576	100	60	H	2 x 24	10.12	17.2	257	197
600	598	104	51	I	2 x 24	16.33	26.8	257	206
660	662	115	63	I	2 x 24	16.33	26.8	246	183
710	710	124	24	I	2 x 24	16.33	26.8	238	214
755	754	131	27	I	2 x 24	16.33	26.8	229	202
800	797	139	30	L	2 x 24	16.33	26.8	285	255
840	839	146	33	L	2 x 24	16.33	26.8	276	244
880	881	154	36	L	2 x 24	16.33	26.8	268	232

Pf	Cooling capacity (kW)
Pt	Heating capacity (kW)
qw	Water flow (m ³ /h)
dpw	Pressure drop (kPa)
F.L.I.	Full load electrical power
F.L.A.	Full load operating current
Hp	Pump head pressure
Hu	Available pressure

Hydraulic data

CMAB HE

HIGH HEAD PRESSURE PUMP



A = Unit size 50

B = Unit size 60-70-90

C = Unit size 120-130-145

D = Unit size 165-180-220

E = Unit size 260

F = Unit size 320-355-375

G = Unit size 455

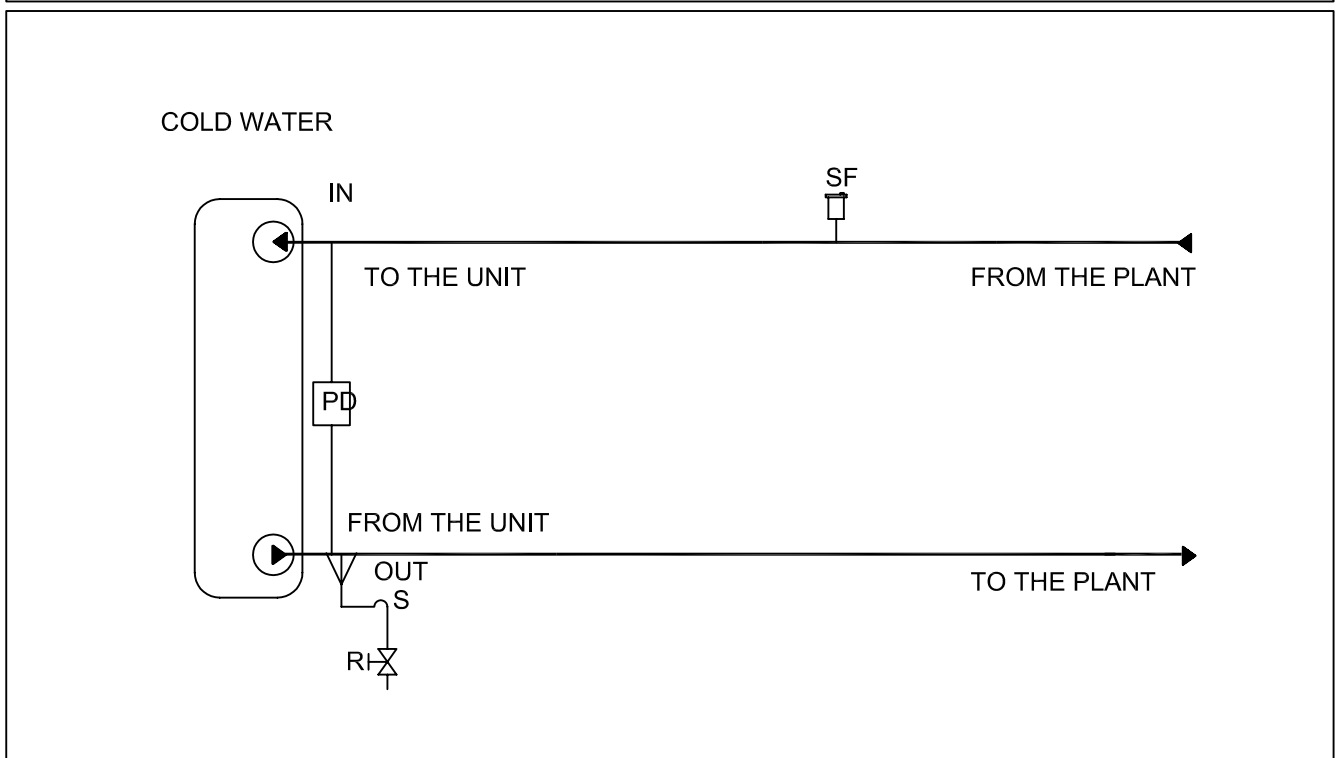
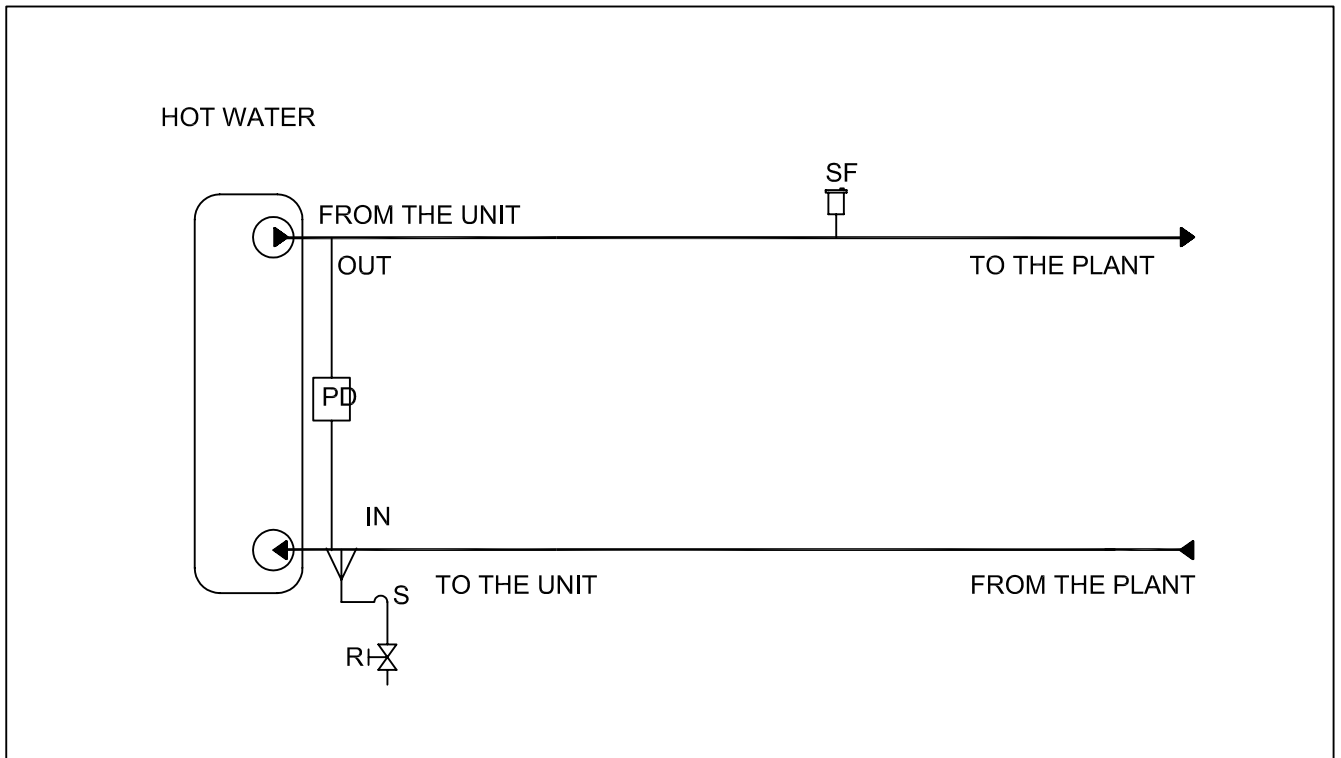
H = Unit size 500-535-575

I = Unit size 600-660-710-755

L = Unit size 800-840-880

Hydraulic data

UNIT HYDRAULIC CIRCUIT - NO PUMP VERSION

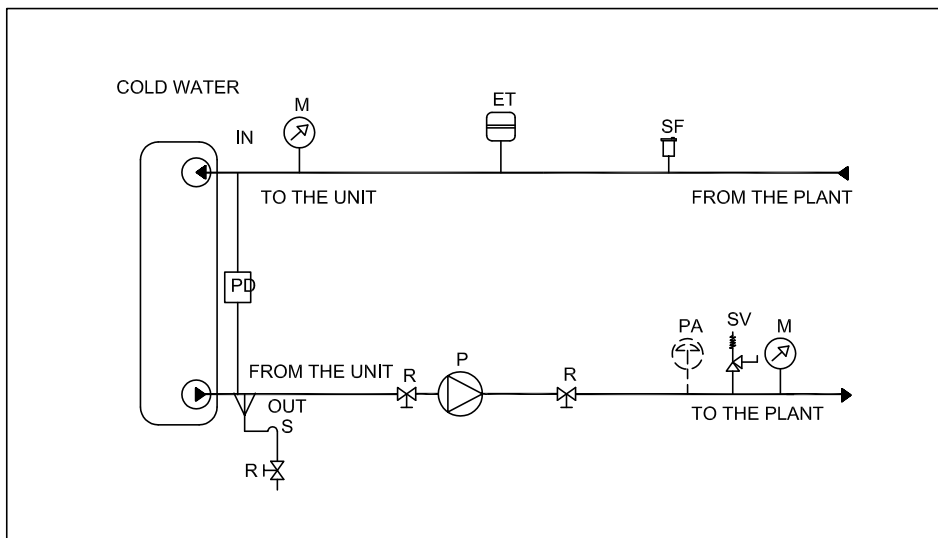
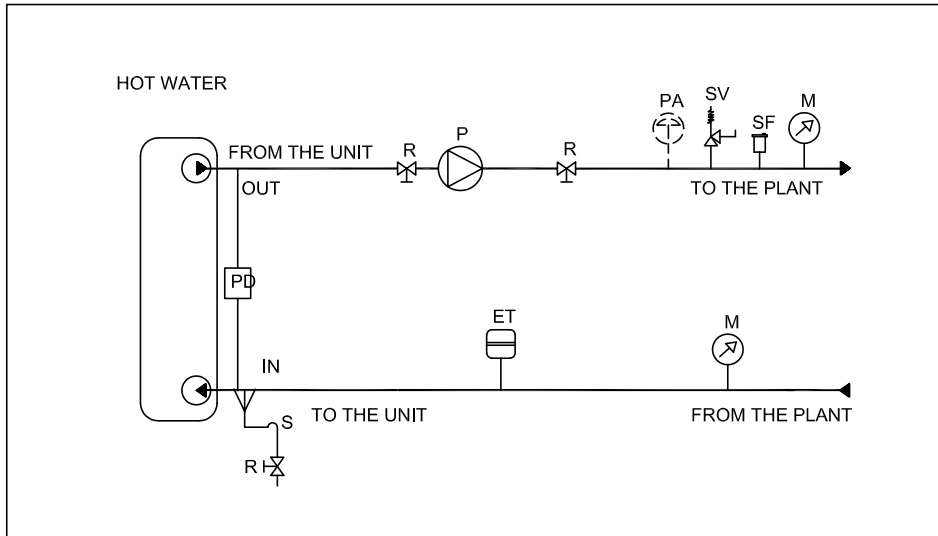


- S Water discharge
- SF Relief valve
- R Shut off valve
- PD Water differential pressure switch

Please see the installation sketches on pages 57-58-59 showing the mandatory hydraulic accessories to be installed on the HVAC system and which are the customer's responsibility.

Hydraulic data

UNIT HYDRAULIC CIRCUIT - 1 PUMP HOT WATER SIDE + 1 PUMP COLD WATER SIDE

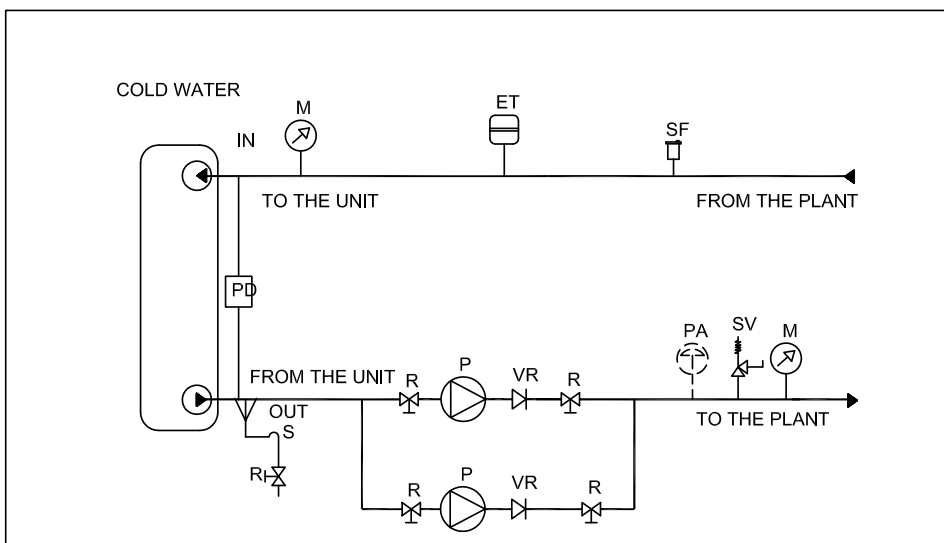
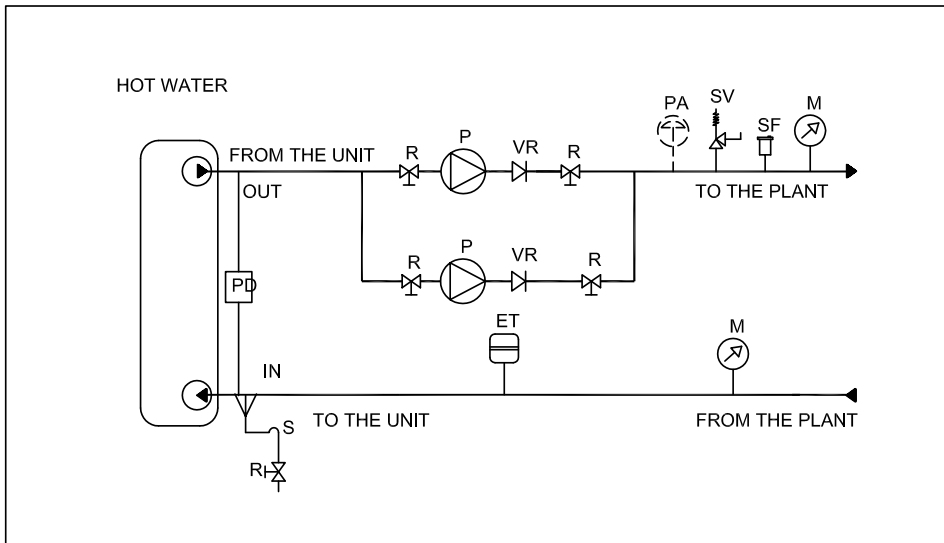


- M Gauges
- S Water discharge
- P Pump
- SV Safety valve
- SF Relief valve
- ET Expansion vessel
- PD Water differential pressure switch
- R Shut off valve
- PA High pressure switch (optional)*
 - * 4,6 bar - Low Head pressure
 - * 5,4 bar - Medium Head pressure
 - * 5,4 bar - High Head pressure

Please see the installation sketches on pages 57-58-59 showing the mandatory hydraulic accessories to be installed on the HVAC system and which are the customer's responsibility.

Hydraulic data

UNIT HYDRAULIC CIRCUIT - 2 PUMPS HOT WATER SIDE + 2 PUMPS COLD WATER SIDE



- M Gauges
 - S Water discharge
 - P Pump
 - SV Safety valve
 - SF Relief valve
 - ET Expansion vessel
 - PD Water differential pressure switch
 - R Shut off valve
 - VR Check valve
 - PA High pressure switch (optional)*
- * 4,6 bar - Low Head pressure
 * 5,4 bar - Medium Head pressure
 * 5,4 bar - High Head pressure

Please see the installation sketches on pages 57-58-59 showing the mandatory hydraulic accessories to be installed on the HVAC system and which are the customer's responsibility.

Electrical data

CMAB SE

Model	NOMINAL VALUES									MAXIMUM VALUES (1)			
	Outdoor air temperature 35°C, evaporator water temperature in/out 12/7°C												
	Compressors (2)			Fans		TOTAL				TOTAL			
	F.L.I.	F.L.A.	L.R.A.	E.P.	O.C.	F.L.I.	F.L.A.	S.A.	S.A. with soft starter	F.L.I.	F.L.A.	S.A.	S.A. with soft starter
kW	A	A	kW	A	kW	A	A	A	kW	A	A	A	
50	14	24	142	3	6	17	30	159	60	30	53	170	71
55	16	29	147	3	6	19	35	164	61	33	58	175	72
65	20	35	147	3	6	23	41	171	68	37	66	183	80
85	25	43	197	5	9	30	52	228	90	46	81	242	104
110	37	61	215	5	9	41	70	255	104	63	111	275	125
140	44	69	260	6	12	50	81	307	125	77	136	334	152
155	51	80	320	6	12	57	92	368	144	87	153	394	170
175	54	83	320	9	18	63	101	379	155	99	176	417	193
210	69	115	215	9	18	78	133	318	167	118	209	373	223
260	82	132	320	9	18	91	150	428	204	142	250	491	267
305	106	159	320	9	18	115	177	453	229	170	300	541	317
350	109	169	320	12	24	121	193	471	247	193	340	581	357
370	118	182	413	12	24	130	206	565	276	199	351	674	385
435	148	223	413	12	24	160	247	605	316	218	384	707	418
495	150	232	320	18	36	168	268	546	322	269	476	717	493
525	163	251	320	18	36	181	287	565	341	289	510	751	527

CMAB SE L

Model	NOMINAL VALUES									MAXIMUM VALUES (1)			
	Outdoor air temperature 35°C, evaporator water temperature in/out 12/7°C												
	Compressors (2)			Fans		TOTAL				TOTAL			
	F.L.I.	F.L.A.	L.R.A.	E.P.	O.C.	F.L.I.	F.L.A.	S.A.	S.A. with soft starter	F.L.I.	F.L.A.	S.A.	S.A. with soft starter
kW	A	A	kW	A	kW	A	A	A	kW	A	A	A	
50	14	25	142	2	5	17	29	158	59	30	53	170	71
55	17	29	147	2	5	19	34	163	60	33	58	175	72
65	21	36	147	2	5	23	41	170	67	37	66	183	80
85	26	44	197	3	7	29	51	226	88	46	81	242	104
110	39	63	215	3	7	42	70	253	103	63	111	275	125
140	46	71	260	5	9	50	80	305	123	77	136	334	152
155	54	82	320	5	9	58	91	366	142	87	153	394	170
175	55	85	320	7	14	62	98	376	152	99	176	417	193
210	73	118	215	7	14	80	132	316	165	118	209	373	223
260	87	136	320	7	14	94	150	426	202	142	250	491	267
305	112	164	320	7	14	119	178	452	228	170	300	541	317
350	115	174	320	9	18	124	192	469	245	193	340	581	357
370	125	188	413	9	18	134	206	563	274	199	351	674	385
435	157	230	413	9	18	166	248	604	315	218	384	707	418
495	157	238	320	14	27	170	265	543	319	269	476	717	493
525	170	258	320	14	27	184	285	562	338	289	510	751	527

Electrical data

CMAB SE S

Model	NOMINAL VALUES									MAXIMUM VALUES (1)			
	Outdoor air temperature 35°C, evaporator water temperature in/out 12/7°C												
	Compressors (2)			Fans		TOTAL				TOTAL			
	F.L.I.	F.L.A.	L.R.A.	E.P.	O.C.	F.L.I.	F.L.A.	S.A.	S.A. with soft starter	F.L.I.	F.L.A.	S.A.	S.A. with soft starter
kW	A	A	kW	A	kW	A	A	A	kW	A	A	A	
50	15	24	142	2	4	17	29	157	58	30	53	170	71
55	17	29	147	2	4	19	33	163	60	33	58	175	72
65	21	36	147	2	4	23	40	169	66	37	66	183	80
85	26	44	197	3	6	29	50	225	87	46	81	242	104
110	39	62	215	3	6	42	68	252	102	63	111	275	125
140	46	70	260	4	8	50	78	303	121	77	136	334	152
155	54	80	320	4	8	58	89	364	140	87	153	394	170
175	56	83	320	6	13	62	96	374	150	99	176	417	193
210	73	116	215	6	13	80	128	313	162	118	209	373	223
260	88	134	320	6	13	94	146	423	199	142	250	491	267
305	113	161	320	6	13	119	173	449	225	170	300	541	317
350	116	171	320	8	17	124	187	465	241	193	340	581	357
370	126	184	413	8	17	134	201	559	270	199	351	674	385
435	158	225	413	8	17	166	242	599	310	218	384	707	418
495	157	233	320	13	25	170	259	537	313	269	476	717	493
525	171	253	320	13	25	184	278	556	332	289	510	751	527

Electrical data referred to 400V - 3PH+N-50Hz

Maximum operating admitted conditions: 10%

Maximum phase unbalance: 3%

F.L.I. full load electrical power

F.L.A. full load operating current

L.R.A. compressor motor locked rotor current (direct starting)

S.A. sum of LRA of the most powerful compressor, FLA of other compressor and fans current

E.P. electrical power

O.C. operating current

⁽¹⁾ maximum operating admitted conditions by the compressors manufacturer

⁽²⁾ data referred to the biggest compressor for units with different compressors

Electrical data

CMAB HE

Model	NOMINAL VALUES									MAXIMUM VALUES (1)			
	Outdoor air temperature 35°C, evaporator water temperature in/out 12/7°C												
	Compressors (2)			Fans		TOTAL				TOTAL			
	F.L.I.	F.L.A.	L.R.A.	E.P.	O.C.	F.L.I.	F.L.A.	S.A.	S.A. with soft starter	F.L.I.	F.L.A.	S.A.	S.A. with soft starter
kW	A	A	kW	A	kW	A	A	A	kW	A	A	A	
50	13	24	142	3	6	16	30	159	60	30	53	170	71
60	15	28	147	3	6	18	34	164	61	33	58	175	72
70	19	34	147	3	6	22	40	170	67	37	66	183	80
90	24	42	197	5	9	28	51	227	89	46	81	242	104
120	33	57	215	5	9	38	66	253	102	63	111	275	125
130	37	61	260	6	12	43	73	301	119	71	125	323	141
145	42	66	260	6	12	48	78	305	123	77	136	334	152
165	45	72	320	9	18	54	90	370	146	90	159	400	176
180	51	80	320	9	18	60	98	378	154	99	176	417	193
220	65	110	215	9	18	74	128	314	164	118	209	373	223
260	80	129	320	9	18	89	147	425	201	142	250	491	267
320	96	150	320	12	24	108	174	453	229	173	306	547	323
355	106	165	320	12	24	118	189	468	244	193	340	581	357
375	114	177	413	12	24	126	201	562	273	199	351	674	385
455	133	213	413	15	30	148	243	603	314	221	390	713	424
500	147	227	320	18	36	165	263	543	319	269	476	717	493
535	159	244	320	18	36	177	280	560	336	289	510	751	527
575	176	270	413	18	36	194	306	667	378	301	532	855	566
600	185	287	413	18	36	203	323	682	393	308	543	866	577
660	213	327	413	18	36	231	363	721	432	327	576	899	610
710	211	340	320	24	48	235	388	666	442	385	680	921	697
755	229	367	413	24	48	253	415	773	484	398	702	1025	736
800	247	394	413	24	48	271	442	800	511	410	724	1047	758
840	265	422	413	24	48	289	470	827	538	423	746	1069	780
880	284	450	413	24	48	308	498	855	566	435	768	1091	802

Electrical data

CMAB HE S

Model	NOMINAL VALUES									MAXIMUM VALUES (1)			
	Outdoor air temperature 35°C, evaporator water temperature in/out 12/7°C												
	Compressors (2)			Fans		TOTAL				TOTAL			
	F.L.I.	F.L.A.	L.R.A.	E.P.	O.C.	F.L.I.	F.L.A.	S.A.	S.A. with soft starter	F.L.I.	F.L.A.	S.A.	S.A. with soft starter
kW	A	A	kW	A	kW	A	A	A	kW	A	A	A	
50	14	24	142	2	4	16	28	157	58	30	53	170	71
60	16	28	147	2	4	18	32	162	59	33	58	175	72
70	20	34	147	2	4	22	39	168	65	37	66	183	80
90	25	43	197	3	6	28	49	225	87	46	81	242	104
120	35	57	215	3	6	39	64	250	100	63	111	275	125
130	39	62	260	4	8	43	70	297	115	71	125	323	141
145	44	67	260	4	8	48	75	302	120	77	136	334	152
165	47	72	320	6	13	53	85	365	141	90	159	400	176
180	53	81	320	6	13	60	93	373	149	99	176	417	193
220	69	111	215	6	13	75	124	310	159	118	209	373	223
260	85	130	320	6	13	92	142	421	197	142	250	491	267
320	102	151	320	8	17	110	168	446	222	173	306	547	323
355	112	166	320	8	17	120	183	461	237	193	340	581	357
375	122	179	413	8	17	131	196	556	267	199	351	674	385
455	142	215	413	11	21	152	236	595	306	221	390	713	424
500	155	229	320	13	25	168	254	533	309	269	476	717	493
535	168	246	320	13	25	181	271	550	326	289	510	751	527
575	188	272	413	13	25	201	298	658	369	301	532	855	566
600	198	289	413	13	25	211	314	673	384	308	543	866	577
660	229	329	413	13	25	242	354	713	424	327	576	899	610
710	225	343	320	17	34	242	376	654	430	385	680	921	697
755	245	370	413	17	34	262	403	762	472	398	702	1025	736
800	265	397	413	17	34	282	431	788	499	410	724	1047	758
840	286	425	413	17	34	303	459	816	527	423	746	1069	780
880	307	454	413	17	34	323	487	844	555	435	768	1091	802

Electrical data referred to 400V - 3PH+N-50Hz

Maximum operating admitted conditions: 10%

Maximum phase unbalance: 3%

F.L.I. full load electrical power

F.L.A. full load operating current

L.R.A. compressor motor locked rotor current (direct starting)

S.A. sum of LRA of the most powerful compressor, FLA of other compressor and fans current

E.P. electrical power

O.C. operating current

⁽¹⁾ maximum operating admitted conditions by the compressors manufacturer

⁽²⁾ data referred to the biggest compressor for units with different compressors

Acoustic data

CMAB SE

MODEL	Octave bands (Hz)								Lw eq dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Lw dB(A)								
50	59.5	55.5	50.9	46.7	44.3	59.5	42.0	31.0	81
55	59.6	55.6	51.0	46.8	44.4	59.6	42.1	31.1	81
65	59.9	55.9	51.3	47.1	44.7	59.9	42.4	31.4	81
85	61.8	57.8	53.2	49.0	46.6	61.8	44.3	33.3	83
110	65.2	61.2	56.6	52.4	50.0	65.2	47.7	36.7	87
140	65.7	61.7	57.1	52.9	50.5	65.7	48.2	37.2	87
155	66.0	62.0	57.4	53.2	50.8	66.0	48.5	37.5	87
175	67.0	63.0	58.4	54.2	51.8	67.0	49.5	38.5	88
210	68.0	64.0	59.4	55.2	52.8	68.0	50.5	39.5	89
260	68.4	64.4	59.8	55.6	53.2	68.4	50.9	39.9	90
305	68.6	64.6	60.0	55.8	53.4	68.6	51.1	40.1	90
350	69.3	65.3	60.7	56.5	54.1	69.3	51.8	40.8	91
370	71.1	67.1	62.5	58.3	55.9	71.1	53.6	42.6	93
435	74.1	70.1	65.5	61.3	58.9	74.1	56.6	45.6	96
495	70.9	66.9	62.3	58.1	55.7	70.9	53.4	42.4	92
525	71.1	67.1	62.5	58.3	55.9	71.1	53.6	42.6	93

CMAB SE L

MODEL	Octave bands (Hz)								Lw eq dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Lw dB(A)								
50	56.5	52.5	47.9	43.7	41.3	56.5	39.0	28.0	78
55	56.6	52.6	48.0	43.8	41.4	56.6	39.1	28.1	78
65	56.9	52.9	48.3	44.1	41.7	56.9	39.4	28.4	78
85	58.8	54.8	50.2	46.0	43.6	58.8	41.3	30.3	80
110	62.2	58.2	53.6	49.4	47.0	62.2	44.7	33.7	84
140	62.7	58.7	54.1	49.9	47.5	62.7	45.2	34.2	84
155	63.0	59.0	54.4	50.2	47.8	63.0	45.5	34.5	84
175	64.0	60.0	55.4	51.2	48.8	64.0	46.5	35.5	85
210	65.0	61.0	56.4	52.2	49.8	65.0	47.5	36.5	86
260	65.4	61.4	56.8	52.6	50.2	65.4	47.9	36.9	87
305	65.6	61.6	57.0	52.8	50.4	65.6	48.1	37.1	87
350	66.3	62.3	57.7	53.5	51.1	66.3	48.8	37.8	88
370	68.1	64.1	59.5	55.3	52.9	68.1	50.6	39.6	90
435	71.1	67.1	62.5	58.3	55.9	71.1	53.6	42.6	93
495	67.9	63.9	59.3	55.1	52.7	67.9	50.4	39.4	89
525	68.1	64.1	59.5	55.3	52.9	68.1	50.6	39.6	90

Acoustic data

CMAB SE S

MODEL	Octave bands (Hz)								Lw eq dB(A)
	63	125	250	500	1000	2000	4000	8000	
50	54.5	50.5	45.9	41.7	39.3	54.5	37.0	26.0	76
55	54.6	50.6	46.0	41.8	39.4	54.6	37.1	26.1	76
65	54.9	50.9	46.3	42.1	39.7	54.9	37.4	26.4	76
85	56.8	52.8	48.2	44.0	41.6	56.8	39.3	28.3	78
110	60.2	56.2	51.6	47.4	45.0	60.2	42.7	31.7	82
140	60.7	56.7	52.1	47.9	45.5	60.7	43.2	32.2	82
155	61.0	57.0	52.4	48.2	45.8	61.0	43.5	32.5	82
175	62.0	58.0	53.4	49.2	46.8	62.0	44.5	33.5	83
210	63.0	59.0	54.4	50.2	47.8	63.0	45.5	34.5	84
260	63.4	59.4	54.8	50.6	48.2	63.4	45.9	34.9	85
305	63.6	59.6	55.0	50.8	48.4	63.6	46.1	35.1	85
350	64.3	60.3	55.7	51.5	49.1	64.3	46.8	35.8	86
370	66.1	62.1	57.5	53.3	50.9	66.1	48.6	37.6	88
435	69.1	65.1	60.5	56.3	53.9	69.1	51.6	40.6	91
495	65.9	61.9	57.3	53.1	50.7	65.9	48.4	37.4	87
525	66.1	62.1	57.5	53.3	50.9	66.1	48.6	37.6	88

Acoustic data

CMAB HE

MODEL	Octave bands (Hz)								Lw eq dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Lw dB(A)								
50	59.4	55.4	50.8	46.6	44.2	59.4	41.9	30.9	82
60	59.6	55.6	51.0	46.8	44.4	59.6	42.1	31.1	82
70	59.8	55.8	51.2	47.0	44.6	59.8	42.3	31.3	82
90	61.6	57.6	53.0	48.8	46.4	61.6	44.1	33.1	84
120	65.0	61.0	56.4	52.2	49.8	65.0	47.5	36.5	88
130	65.5	61.5	56.9	52.7	50.3	65.5	48.0	37.0	88
145	65.5	61.5	56.9	52.7	50.3	65.5	48.0	37.0	88
165	66.3	62.3	57.7	53.5	51.1	66.3	48.8	37.8	89
180	66.6	62.6	58.0	53.8	51.4	66.6	49.1	38.1	89
220	67.6	63.6	59.0	54.8	52.4	67.6	50.1	39.1	90
260	68.0	64.0	59.4	55.2	52.8	68.0	50.5	39.5	91
320	68.5	64.5	59.9	55.7	53.3	68.5	51.0	40.0	91
355	68.8	64.8	60.2	56.0	53.6	68.8	51.3	40.3	92
375	70.6	66.6	62.0	57.8	55.4	70.6	53.1	42.1	94
455	73.6	69.6	65.0	60.8	58.4	73.6	56.1	45.1	97
500	70.1	66.1	61.5	57.3	54.9	70.1	52.6	41.6	93
535	70.3	66.3	61.7	57.5	55.1	70.3	52.8	41.8	94
575	72.5	68.5	63.9	59.7	57.3	72.5	55.0	44.0	96
600	73.3	69.3	64.7	60.5	58.1	73.3	55.8	44.8	97
660	75.0	71.0	66.4	62.2	59.8	75.0	57.5	46.5	98
710	71.4	67.4	62.8	58.6	56.2	71.4	53.9	42.9	95
755	73.2	69.2	64.6	60.4	58.0	73.2	55.7	44.7	97
800	74.4	70.4	65.8	61.6	59.2	74.4	56.9	45.9	98
840	75.4	71.4	66.8	62.6	60.2	75.4	57.9	46.9	99
880	76.2	72.2	67.6	63.4	61.0	76.2	58.7	47.7	100

CMAB HE SL

MODEL	Octave bands (Hz)								Lw eq dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Lw dB(A)								
50	54.4	50.4	45.8	41.6	39.2	54.4	36.9	25.9	77
60	54.6	50.6	46.0	41.8	39.4	54.6	37.1	26.1	77
70	54.8	50.8	46.2	42.0	39.6	54.8	37.3	26.3	77
90	56.6	52.6	48.0	43.8	41.4	56.6	39.1	28.1	79
120	60.0	56.0	51.4	47.2	44.8	60.0	42.5	31.5	83
130	60.5	56.5	51.9	47.7	45.3	60.5	43.0	32.0	83
145	60.5	56.5	51.9	47.7	45.3	60.5	43.0	32.0	83
165	61.3	57.3	52.7	48.5	46.1	61.3	43.8	32.8	84
180	61.6	57.6	53.0	48.8	46.4	61.6	44.1	33.1	84
220	62.6	58.6	54.0	49.8	47.4	62.6	45.1	34.1	85
260	63.0	59.0	54.4	50.2	47.8	63.0	45.5	34.5	86
320	63.5	59.5	54.9	50.7	48.3	63.5	46.0	35.0	86
355	63.8	59.8	55.2	51.0	48.6	63.8	46.3	35.3	87
375	65.6	61.6	57.0	52.8	50.4	65.6	48.1	37.1	89
455	68.6	64.6	60.0	55.8	53.4	68.6	51.1	40.1	92
500	65.1	61.1	56.5	52.3	49.9	65.1	47.6	36.6	88
535	65.3	61.3	56.7	52.5	50.1	65.3	47.8	36.8	89
575	67.5	63.5	58.9	54.7	52.3	67.5	50.0	39.0	91
600	68.3	64.3	59.7	55.5	53.1	68.3	50.8	39.8	92
660	70.0	66.0	61.4	57.2	54.8	70.0	52.5	41.5	93
710	66.4	62.4	57.8	53.6	51.2	66.4	48.9	37.9	90
755	68.2	64.2	59.6	55.4	53.0	68.2	50.7	39.7	92
800	69.4	65.4	60.8	56.6	54.2	69.4	51.9	40.9	93
840	70.4	66.4	61.8	57.6	55.2	70.4	52.9	41.9	94
880	71.2	67.2	62.6	58.4	56.0	71.2	53.7	42.7	95

Acoustic data

Operating conditions:

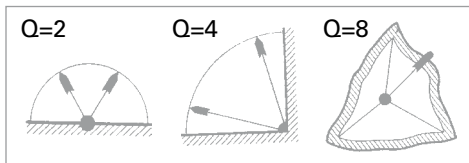
Chilled water temperature in/out 12°C/7°C – outdoor air temperature 35°C.

Testing point:

Average sound pressure levels calculated according to ISO 3744 at 10 m from unit.

Measurement conditions:

Free field on reflecting surface (Q factor Q=2).



- For units installed in the presence of 2 reflecting surfaces (Q factor Q=4) 3 dB have to be added at values above mentioned.
- For units installed in the presence of 3 reflecting surfaces (Q factor Q=8) 6 dB have to be added at values above mentioned.
- For units installed at a certain height from the ground, the sound energy coming out from the bottom of the unit leads an increase of the noise pressure level of around 3 dB.

Sound emission values in octave bands are shown just as an indication and they are not to be considered as a commitment. Sound pressure values, according to ISO 3744 standards and in observance of EUROVENT certification program, are the only ones to be used for every calculation to make a prevision of the sound pressure level at the operating conditions. The sound pressure level data are not binding. For a more precise value please refer to the sound power level.

Acoustic data

NOISE CORRECTION FACTORS FOR HYDRAULIC VERSION

Please consider the CMAB unit noise level slightly increases due to the addition of the hydraulic group.

CMAB SE

MODEL	Low head pressure		Medium head pressure		High head pressure	
	1 pump [dB(A)]	2 pump [dB(A)]	1 pump [dB(A)]	2 pump [dB(A)]	1 pump [dB(A)]	2 pump [dB(A)]
50	-	1	1	1	1	2
55	-	1	1	1	1	2
65	-	1	1	2	1	2
85	1	1	1	1	1	2
110	-	1	-	1	1	1
140	-	1	-	1	1	1
155	-	-	-	1	1	1
175	-	-	-	1	-	1
210	-	1	-	1	-	1
260	-	-	-	1	-	1
305	-	1	-	1	1	1
350	-	1	1	1	1	1
370	-	1	-	1	-	1
435	-	-	-	1	-	1
495	-	1	-	1	1	1
525	-	1	-	1	1	1

CMAB SE L

MODEL	Low head pressure		Medium head pressure		High head pressure	
	1 pump [dB(A)]	2 pump [dB(A)]	1 pump [dB(A)]	2 pump [dB(A)]	1 pump [dB(A)]	2 pump [dB(A)]
50	1	2	1	2	2	3
55	1	2	1	2	2	4
65	1	2	2	3	2	4
85	1	2	1	2	2	3
110	1	1	1	2	1	2
140	1	1	1	2	1	2
155	-	1	1	1	1	2
175	-	1	1	1	1	2
210	1	1	1	1	1	1
260	-	1	1	1	1	2
305	1	1	1	2	1	2
350	1	1	1	2	1	2
370	1	1	1	1	1	1
435	-	1	1	1	1	1
495	1	1	1	1	1	2
525	1	1	1	1	1	2

CMAB SE S

MODEL	Low head pressure		Medium head pressure		High head pressure	
	1 pump [dB(A)]	2 pump [dB(A)]	1 pump [dB(A)]	2 pump [dB(A)]	1 pump [dB(A)]	2 pump [dB(A)]
50	1	2	2	3	3	4
55	1	2	2	3	3	5
65	1	2	2	4	3	5
85	2	3	2	3	2	4
110	1	2	1	2	2	3
140	1	1	1	2	2	3
155	1	1	1	2	2	3
175	1	1	1	2	1	2
210	1	1	1	2	1	2
260	1	1	1	2	1	2
305	1	2	1	2	2	3
350	1	2	2	3	2	3
370	1	1	1	2	1	2
435	0	1	1	1	1	2
495	1	2	1	2	2	3
525	1	2	1	2	2	3

Acoustic data

CMAB HE

MODEL	Low head pressure		Medium head pressure		High head pressure	
	1 pump	2 pump	1 pump	2 pump	1 pump	2 pump
	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]
50	-	1	1	1	1	1
60	-	1	1	1	1	2
70	-	1	1	1	1	2
90	1	1	-	1	1	1
120	-	-	-	1	1	1
130	-	-	-	1	1	1
145	-	-	-	1	1	1
165	-	-	-	1	-	1
180	-	-	-	1	-	1
220	-	-	-	1	-	1
260	-	-	-	1	-	1
320	-	-	-	1	-	1
355	-	1	-	1	-	1
375	-	-	-	1	-	1
455	-	-	-	-	-	1
500	-	1	-	1	1	1
535	-	1	-	1	1	1
575	-	-	-	1	-	1
600	-	-	-	-	1	1
660	-	-	-	1	-	1
710	1	1	1	1	1	2
755	-	1	-	1	1	1
800	-	1	-	1	-	1
840	-	1	-	1	-	1
880	-	1	-	1	-	1

CMAB HE S

MODEL	Low head pressure		Medium head pressure		High head pressure	
	1 pump	2 pump	1 pump	2 pump	1 pump	2 pump
	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]
50	1	2	2	3	2	4
60	1	2	2	3	3	4
70	1	2	2	3	3	4
90	1	3	1	2	2	3
120	1	1	1	2	2	3
130	1	1	1	2	1	2
145	1	1	1	2	1	2
165	-	1	1	1	1	2
180	-	1	1	1	1	2
220	1	1	1	2	1	2
260	1	1	1	1	1	2
320	1	1	1	2	1	2
355	1	2	1	2	1	2
375	1	1	1	2	1	2
455	-	1	-	1	1	1
500	1	2	1	2	2	3
535	1	2	1	2	2	3
575	1	1	1	2	1	2
600	-	1	1	1	2	3
660	-	1	1	1	1	2
710	2	3	2	3	2	4
755	1	2	1	2	2	3
800	1	2	1	2	1	2
840	1	2	1	2	1	2
880	1	2	1	2	1	2

Installation sketch

Connection scheme - standard version

Flow switches and water strainers are separate mandatory accessories which must be installed by the contractor/ building owner close to the unit in both the hot and chilled inlet water pipes.

The flow switch signal prevails the build-in delta P switch signal to prevent unit failure in case of lack of water flow.

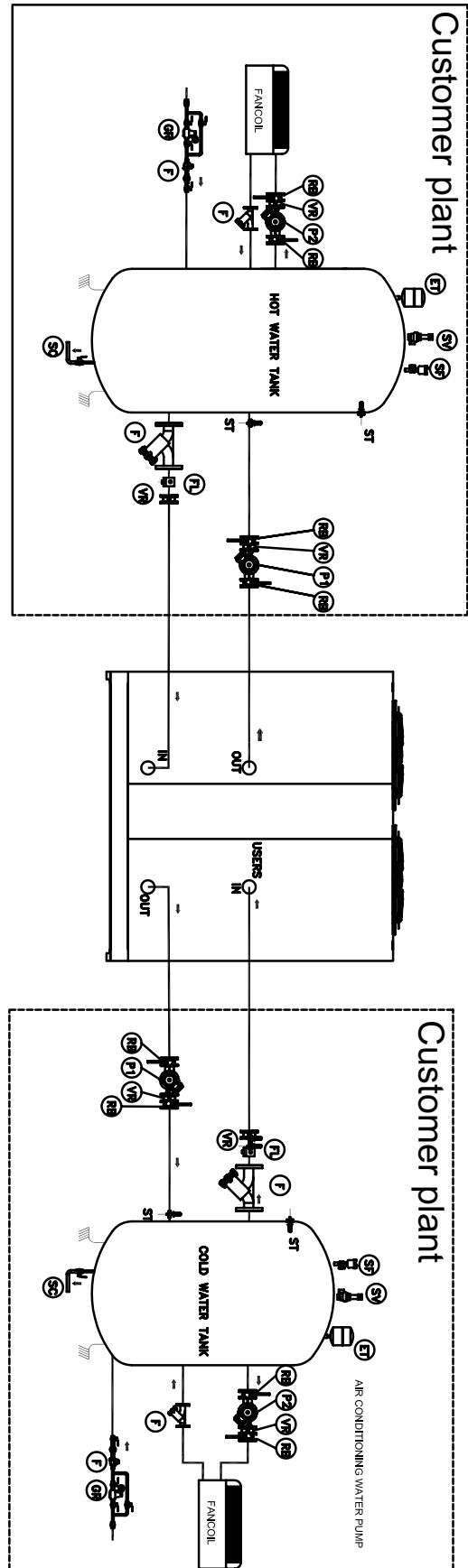
Important for flow switches:

Install the flow switch upright, with a minimum of 5 pipe diameters of straight horizontal run on each side.

Do not install close to elbows, orifices, or other valves.

Important for water strainers:

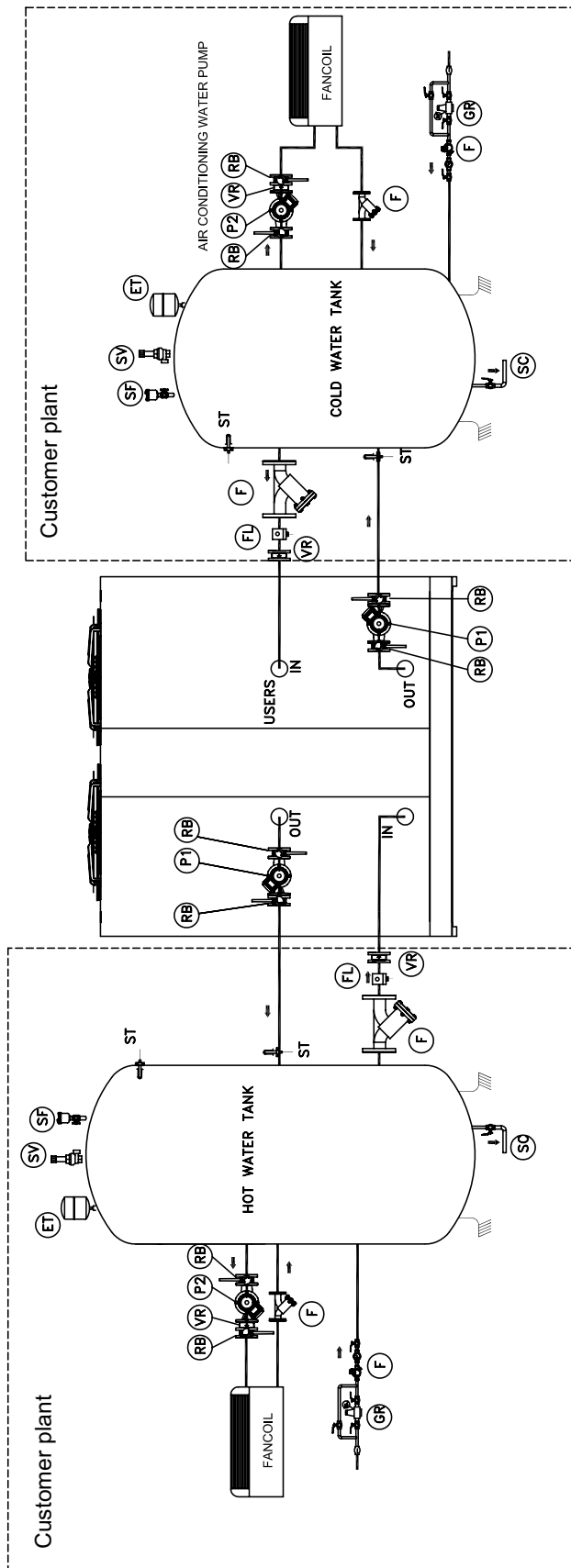
Install the water strainer in the water inlet piping. Failure to do so can result in heat exchanger tube damage.



- | | |
|----|---------------------|
| P1 | Primary pump |
| P2 | Secondary pump |
| ST | Temperature probe |
| FL | Flow switch |
| SC | Drainage |
| SF | Vent valve |
| ET | Expansion vessel |
| GR | Filling group |
| F | Steel mesh strainer |
| VR | Check valve |
| SV | Safety valve |
| RB | Interception valve |

Installation sketch

Connection scheme - single pump version



Flow switches and water strainers are separate mandatory accessories which must be installed by the contractor/ building owner close to the unit in both the hot and chilled inlet water pipes.

The flow switch signal prevails the build-in delta P switch signal to prevent unit failure in case of lack of water flow.

Important for flow switches:

Install the flow switch upright, with a minimum of 5 pipe diameters of straight horizontal run on each side.

Do not install close to elbows, orifices, or other valves.

Important for water strainers:

Install the water strainer in the water inlet piping. Failure to do so can result in heat exchanger tube damage.

P1	Primary pump
P2	Secondary pump
ST	Temperature probe
FL	Flow switch
SC	Drainage
SF	Vent valve
ET	Expansion vessel
GR	Filling group
F	Steel mesh strainer
VR	Check valve
SV	Safety valve
RB	Interception valve

Installation sketch

Connection scheme - double pump version

Flow switches and water strainers are separate mandatory accessories which must be installed by the contractor/building owner close to the unit in both the hot and chilled inlet water pipes.

The flow switch signal prevails the build-in delta P switch signal to prevent unit failure in case of lack of water flow.

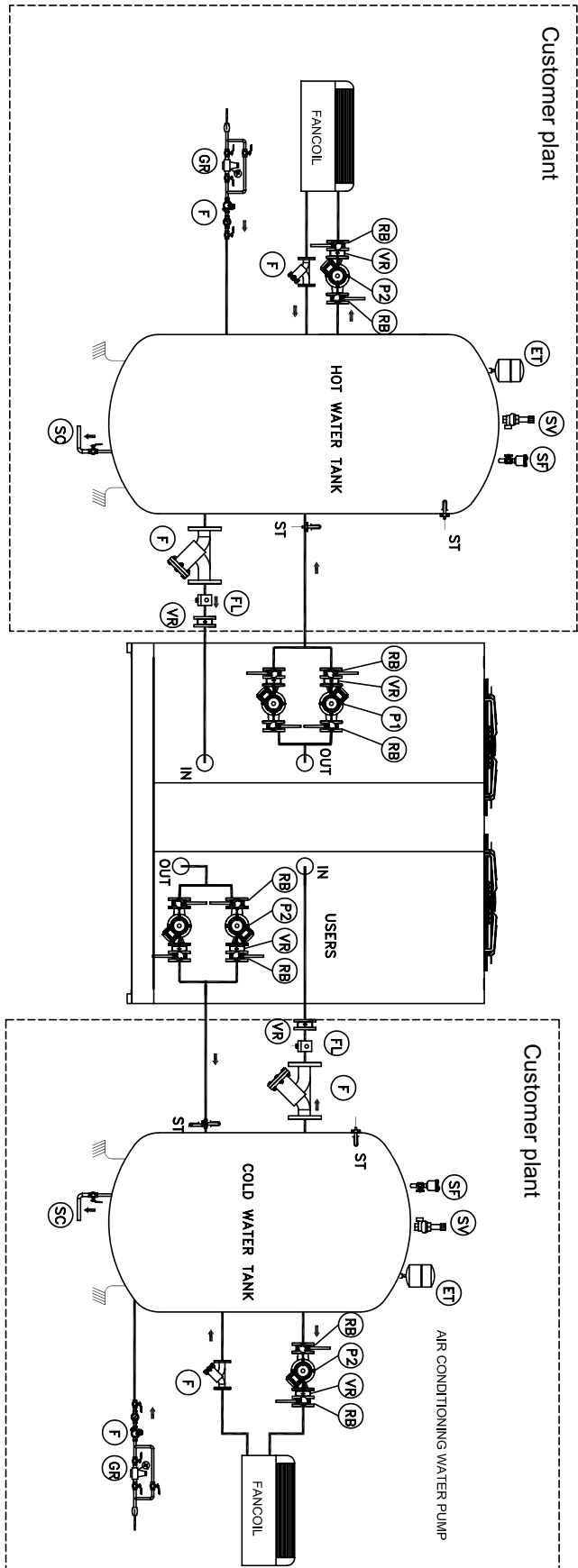
Important for flow switches:

Install the flow switch upright, with a minimum of 5 pipe diameters of straight horizontal run on each side.

Do not install close to elbows, orifices, or other valves.

Important for water strainers:

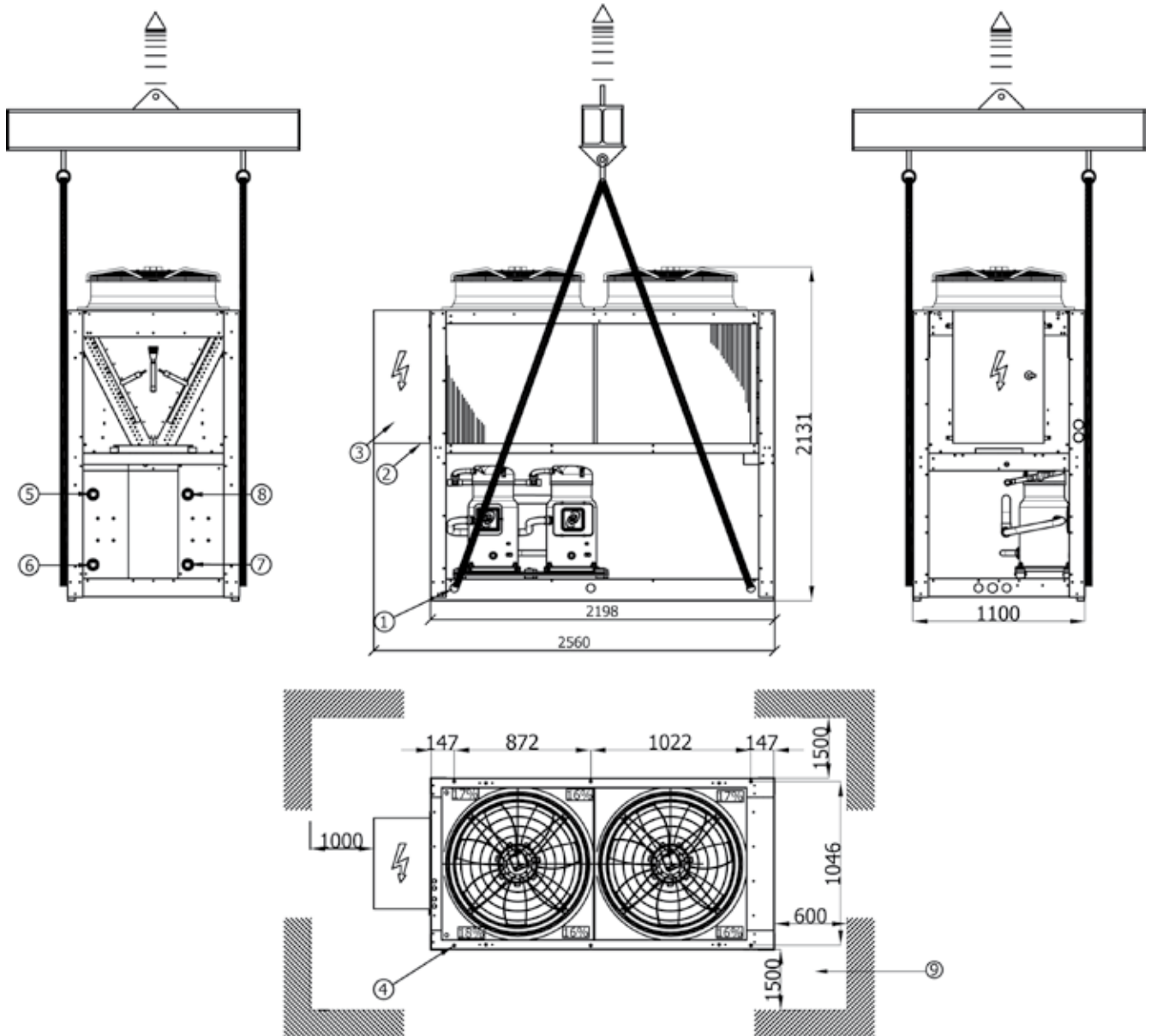
Install the water strainer in the water inlet piping. Failure to do so can result in heat exchanger tube damage.



P1	Primary pump
P2	Secondary pump
ST	Temperature probe
FL	Flow switch
SC	Drainage
SF	Vent valve
ET	Expansion vessel
GR	Filling group
F	Steel mesh strainer
VR	Check valve
SV	Safety valve
RB	Interception valve

Dimensions and weights

The drawing below represents an example of a schematic for lifting and installing a unit. For specific drawings and clearances, contact your local Trane sales office.



- 1 = Lifting holes
- 2 = Electric power supply
- 3 = Electric box
- 4 = A/V mounting position
- 5 = Chilled water inlet
- 6 = Chilled water outlet
- 7 = Hot water inlet
- 8 = Hot water outlet
- 9 = Minimum distance/clearance



Dimensions and weights

Weights

CMAB SE																	
Operating Weights		50	55	65	85	110	140	155	175	210	260	305	350	370	435	495	525
Standard Version	kg	909	913	922	1117	1199	1470	1563	2038	2241	2415	2556	3136	3153	3227	4357	4379
Low Noise	kg	933	937	946	1141	1223	1494	1587	2062	2289	2463	2604	3184	3201	3275	4429	4451
Super low Noise	kg	986	990	999	1207	1289	1560	1653	2128	2421	2595	2736	3316	3333	3407	4628	4650
Additional weight for Hydraulic version																	
1 pump for chilled water circuit + 1 pump for hot water circuit, Low head pressure	kg	74	74	74	42	42	48	48	48	98	98	104	138	138	170	170	170
1 pump for chilled water circuit + 1 pump for hot water circuit, Medium head pressure	kg	78	78	84	44	54	54	54	54	104	104	126	170	170	170	170	170
1 pump for chilled water circuit + 1 pump for hot water circuit, High head pressure	kg	96	102	102	60	58	58	58	102	102	126	158	158	158	190	222	222
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Low head pressure	kg	106	106	106	84	84	96	96	96	196	196	208	276	276	340	340	340
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Medium head pressure	kg	114	114	126	88	108	108	108	108	208	208	252	340	340	340	340	340
2 pumps for chilled water circuit + 2 pumps for hot water circuit, High head pressure	kg	150	162	162	120	116	116	116	204	204	252	316	316	316	380	444	444
Shipping Weights																	
Standard Version	kg	899	903	912	1107	1191	1462	1553	2028	2205	2379	2504	3076	3093	3163	4299	4321
Low Noise	kg	923	927	936	1131	1215	1486	1577	2052	2253	2427	2552	3124	3141	3211	4371	4393
Super low Noise	kg	976	980	989	1197	1281	1552	1643	2118	2385	2559	2684	3256	3273	3343	4570	4592
Additional weight for Hydraulic version																	
1 pump for chilled water circuit + 1 pump for hot water circuit, Low head pressure	kg	74	74	74	42	42	48	48	48	98	98	104	138	138	170	170	170
1 pump for chilled water circuit + 1 pump for hot water circuit, Medium head pressure	kg	78	78	84	44	54	54	54	54	104	104	126	170	170	170	170	170
1 pump for chilled water circuit + 1 pump for hot water circuit, High head pressure	kg	96	102	102	60	58	58	58	102	102	126	158	158	158	190	222	222
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Low head pressure	kg	106	106	106	84	84	96	96	96	196	196	208	276	276	340	340	340
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Medium head pressure	kg	114	114	126	88	108	108	108	108	208	208	252	340	340	340	340	340
2 pumps for chilled water circuit + 2 pumps for hot water circuit, High head pressure	kg	150	162	162	120	116	116	116	204	204	252	316	316	316	380	444	444
Tubes diameter																	
Standard Version		50	55	65	85	110	140	155	175	210	260	305	350	370	435	495	525
⑤ - ⑥	Ø	2"½	2"½	2"½	2"½	2"½	2"½	2"½	3"	3"	3"	3"	3"	3"	3"	5"	5"
		GM															VICTAULIC
⑦ - ⑧	Ø	2"½	2"½	2"½	2"½	2"½	2"½	2"½	3"	3"	3"	3"	3"	3"	3"	5"	5"
		GM															VICTAULIC
Hydraulic version																	
⑤ - ⑥	Ø	2"	2"	2"	2"½	2"½	2"½	2"½	3"	3"	3"	4"	4"	4"	4"	5"	5"
		VICTAULIC															
⑦ - ⑧	Ø	2"	2"	2"	2"½	2"½	2"½	2"½	3"	3"	3"	4"	4"	4"	4"	5"	5"
		VICTAULIC															

Dimensions and weights

Weights

CMAB HE														
Operating Weights		50	60	70	90	120	130	145	165	180	220	260	320	355
Standard Version	kg	1030	1034	1043	1289	1381	1466	1608	2202	2255	2401	2709	3144	3382
Low Noise	kg	1054	1058	1067	1313	1405	1490	1632	2226	2279	2449	2757	3192	3430
Super low Noise	kg	1107	1111	1120	1379	1471	1556	1698	2292	2435	2581	2889	3324	3562
Additional weight for Hydraulic version														
1 pump for chilled water circuit + 1 pump for hot water circuit, Low head pressure	kg	74	74	74	42	42	48	48	48	48	98	98	104	138
1 pump for chilled water circuit + 1 pump for hot water circuit, Medium head pressure	kg	78	78	84	44	54	54	54	54	54	104	104	126	170
1 pump for chilled water circuit + 1 pump for hot water circuit, High head pressure	kg	96	102	102	60	58	58	58	102	102	102	126	158	158
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Low head pressure	kg	106	106	106	84	84	96	96	96	96	196	196	208	276
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Medium head pressure	kg	114	114	126	88	108	108	108	108	108	208	208	252	340
2 pumps for chilled water circuit + 2 pumps for hot water circuit, High head pressure	kg	150	162	162	120	116	116	116	204	204	204	252	316	316
Shipping Weights														
Standard Version	kg	1012	1016	1025	1271	1381	1466	1582	2166	2219	2365	2657	3088	3326
Low Noise	kg	1036	1040	1049	1295	1405	1490	1606	2190	2243	2413	2705	3136	3374
Super low Noise	kg	1089	1093	1102	1361	1471	1556	1672	2256	2399	2545	2837	3268	3506
Additional weight for Hydraulic version														
1 pump for chilled water circuit + 1 pump for hot water circuit, Low head pressure	kg	74	74	74	42	42	48	48	48	48	98	98	104	138
1 pump for chilled water circuit + 1 pump for hot water circuit, Medium head pressure	kg	78	78	84	44	54	54	54	54	54	104	104	126	170
1 pump for chilled water circuit + 1 pump for hot water circuit, High head pressure	kg	96	102	102	60	58	58	58	102	102	102	126	158	158
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Low head pressure	kg	106	106	106	84	84	96	96	96	96	196	196	208	276
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Medium head pressure	kg	114	114	126	88	108	108	108	108	108	208	208	252	340
2 pumps for chilled water circuit + 2 pumps for hot water circuit, High head pressure	kg	150	162	162	120	116	116	116	204	204	204	252	316	316
Tubes diameter														
Standard Version														
⑤ - ⑥	∅	2"½	2"½	2"½	2"½	2"½	2"½	3"	3"	3"	3"	3"	4"	4"
							GM						VICTAULIC	
⑦ - ⑧	∅	2"½	2"½	2"½	2"½	2"½	2"½	3"	3"	3"	3"	3"	4"	4"
							GM						VICTAULIC	
Hydraulic version														
⑤ - ⑥	∅	2"	2"	2"	2"½	2"½	2"½	2"½	3"	3"	3"	3"	4"	4"
							VICTAULIC							
⑦ - ⑧	∅	2"	2"	2"	2"½	2"½	2"½	2"½	3"	3"	3"	3"	4"	4"
							VICTAULIC							



Dimensions and weights

Weights

CMAB HE														
Operating Weights			375	455	500	535	575	600	660	710	755	800	840	880
Standard Version	kg	3401	3836	4572	4678	4845	4882	4935	6157	6193	6228	6263	6298	
Low Noise	kg	3449	3884	4644	4750	4917	4954	5007	6253	6289	6324	6359	6394	
Super low Noise	kg	3581	4016	4843	4949	5116	5153	5206	6518	6554	6589	6624	6659	
Additional weight for Hydraulic version														
1 pump for chilled water circuit + 1 pump for hot water circuit, Low head pressure	kg	138	138	170	170	170	170	190	228	228	236	236	236	
1 pump for chilled water circuit + 1 pump for hot water circuit, Medium head pressure	kg	170	170	170	170	190	190	228	228	228	236	236	236	
1 pump for chilled water circuit + 1 pump for hot water circuit, High head pressure	kg	158	190	222	222	222	236	236	236	236	236	236	236	
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Low head pressure	kg	276	276	340	340	340	340	380	456	456	472	472	472	
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Medium head pressure	kg	340	340	340	340	380	380	456	456	456	472	472	472	
2 pumps for chilled water circuit + 2 pumps for hot water circuit, High head pressure	kg	316	380	444	444	444	472	472	472	472	472	472	472	
Shipping Weights														
Standard Version	kg	3345	3780	4506	4612	4769	4802	4855	6045	6081	6116	6151	6186	
Low Noise	kg	3393	3828	4578	4684	4841	4874	4927	6141	6177	6212	6247	6282	
Super low Noise	kg	3525	3960	4777	4883	5040	5073	5126	6406	6442	6477	6512	6547	
Additional weight for Hydraulic version														
1 pump for chilled water circuit + 1 pump for hot water circuit, Low head pressure	kg	138	138	170	170	170	170	190	228	228	236	236	236	
1 pump for chilled water circuit + 1 pump for hot water circuit, Medium head pressure	kg	170	170	170	170	190	190	228	228	228	236	236	236	
1 pump for chilled water circuit + 1 pump for hot water circuit, High head pressure	kg	158	190	222	222	222	236	236	236	236	236	236	236	
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Low head pressure	kg	276	276	340	340	340	340	380	456	456	472	472	472	
2 pumps for chilled water circuit + 2 pumps for hot water circuit, Medium head pressure	kg	340	340	340	340	380	380	456	456	456	472	472	472	
2 pumps for chilled water circuit + 2 pumps for hot water circuit, High head pressure	kg	316	380	444	444	444	472	472	472	472	472	472	472	
Tubes diameter														
Standard Version			375	455	500	535	575	600	660	710	755	800	840	880
⑤ - ⑥	∅	4"	4"	5"	5"	5"	5"	5"	5"	6"	6"	6"	6"	6"
									VICTAULIC					
⑦ - ⑧	∅	4"	4"	5"	5"	5"	5"	5"	5"	6"	6"	6"	6"	6"
										VICTAULIC				
Hydraulic version			375	455	500	535	575	600	660	710	755	800	840	880
⑤ - ⑥	∅	4"	4"	5"	5"	5"	5"	5"	5"	6"	6"	6"	6"	6"
										VICTAULIC				
⑦ - ⑧	∅	4"	4"	5"	5"	5"	5"	5"	5"	6"	6"	6"	6"	6"
										VICTAULIC				



Notes



Notes



Notes



Trane optimizes the performance of homes and buildings around the world. A business of Ingersoll Rand, the leader in creating and sustaining safe, comfortable and energy efficient environments, Trane offers a broad portfolio of advanced controls and HVAC systems, comprehensive building services and parts. For more information visit www.Trane.com

Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice.

© 2016 Trane All rights reserved
CG-PRC044A-GB October 2016
New

We are committed to using environmentally
conscious print practices that reduce waste.

