



FOCS-N



2022 - 4822
450 - 1162 kW

Reversible unit, air source for outdoor installation



(The photo of the unit is indicative and may change depending on the model)

- High efficiency
- Compactness
- Extensive range of operation
- Hot water supply



SUMMARY

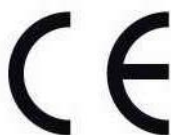
1. Product presentation
 - 1.2 High efficiency
 - 1.3 Compactness
 - 1.4 Extensive range of operation
 - 1.5 Hot water supply
2. Unit description
 - 2.2 Standard unit composition
 - 2.3 Certifications
 - 2.4 Units' tests
 - 2.5 Available configurations
 - 2.6 Available versions
 - 2.7 W3000SE Large electronic controller
 - 2.8 Accessories
 - 2.9 Group regulation device
 - 2.10 Supervisory device
3. Technical data
 - 3.1 General technical data
4. Selection limits
5. Hydraulic data
 - 5.1 Water flow and pressure drop
 - 5.2 Hydronic group
6. Electrical data
7. Full load sound level
8. Dimensional drawings
9. Variable flow hydronic group
 - 9.1 VPF Systems
 - 9.2 VPF.D Systems

FOCS-N 2022 - 4822

- pg. n° III
- pg. n° III
- pg. n° III
- pg. n° III
- pg. n° III
- pg. n° 1
- pg. n° 1
- pg. n° 2
- pg. n° 2
- pg. n° 2
- pg. n° 2
- pg. n° 2
- pg. n° 2
- pg. n° 3
- pg. n° 4
- pg. n° 5
- pg. n° 6
- pg. n° 6
- pg. n° 14
- pg. n° 17
- pg. n° 17
- pg. n° 19
- pg. n° 25
- pg. n° 29
- pg. n° 33
- pg. n° A1
- pg. n° A1
- pg. n° A4



This company participates in the Eurovent Certification Programme. The products are listed in the Directory of certified products. Eurovent certification applied to units with cooling capacity up to 1500 kW for air cooled water chillers and water cooled liquid chillers.



Company quality system
certified to UNI EN ISO 9001
and environmental certification
UNI EN ISO 14001

Liability disclaimer

This bulletin is not exhaustive about: installation, use, safety precautions, handling and transport. Refer to the "General Manual of Installation" for further information.

This bulletin refers to standard executions, particularly as regards dimensions, weight, electric, hydraulic, aerualic and refrigerant connections (where applicable). Contact Climaveneta Commercial Office for further drawings and schemes.

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1. PRODUCT PRESENTATION

Outdoor heat pump unit for the production of chilled/hot water with semi-hermetic screw compressors optimized for R134a, axial-flow fans, external coil with copper tubes and aluminium fins, shell and tubes heat exchanger designed by Climaveneta and electronic expansion valve. Base and supporting structure and panels are galvanized epoxy powder coated steel with increased thickness. These units are designed for two-pipes systems and are able to produce hot or cold water according to the selected operation mode; the precise thermoregulation guarantees an optimal response to load's changes, in every operating conditions.

1.2 High efficiency

Unit in Class A as per Eurovent. High efficiency for low energy consumption during the operating hours.

1.3 Compactness

Reduced dimensions, for easy installation even in sites with space' constraints.

1.4 Extensive range of operation

Unit's operation guaranteed with external air temperature down to -10°C during winter and up to 46°C during summer.

1.5 Hot water supply

Supply of hot water in use up to 55°C, offering maximum versatility with respect to different plant engineering solutions.

2. UNIT DESCRIPTION

2.1 Chiller, air source for outdoor installation

Outdoor heat pump unit for the production of chilled/hot water with semi-hermetic screw compressors optimized for R134a, axial-flow fans, external coil with copper tubes and aluminium fins, shell and tubes heat exchanger designed by Climaveneta and electronic expansion valve. Base and supporting structure and panels are galvanized epoxy powder coated steel with increased thickness. These units are designed for two-pipes systems and are able to produce hot or cold water according to the selected operation mode; the precise thermoregulation guarantees an optimal response to load's changes, in every operating conditions.

The unit is supplied fully refrigerant charged and factory tested. On site installation only requires power and hydraulic connection.

2.2 Standard unit composition

Structure

Base and frame in galvanized steel. The supporting frame are polyester-painted for the highest resistance to external factors: surfaces' hue and brightness are preserved. In silenced versions, pipes and compressors' box are covered with an acoustic layer to reduce global noise emissions.

Screw compressors

New semi-hermetic screw compressors designed for high efficiency both at full and partial load. Semi-hermetic screw compressors with 2 five- and six-lobe rotors: the five-lobe rotor is splined directly onto the motor (nominal speed 2950 rpm) without the use of interposed overgears.

The bearings provided along the rotor axis in a separate chamber isolated from the compression chamber are made in carbon steel.

Each compressor is provided with an inlet for refrigerant injection (for the extension of operating limits) and the use of the economiser (for the output capacity and efficiency's increase). Optimized lubrication guarantees oil's distribution between mechanical parts, without using an oil pump; the built-in oil separator has 3 stages of separation, and a 10 mm stainless steel mesh filter ensures the constant presence of oil inside. Cooling power is partialized by a slide valve, which depending on the position assumed, permits a stepless compression chamber reduction; each compressor can therefore continuously partialize from 50% to 100% of its capacity. The two pole motors are fitted as standard with electric devices to limit the absorbed current during compressor start-up, and with empty start-up. Each compressor is fitted with manual-reset motor thermal protection, delivery gas temperature and oil level controls and an electric resistance for the carter's heating while the compressor is stopped. A check valve fitted on the refrigerant delivery line prevents the rotors from reversing after stopping. On-off cocks on the delivery line of each compressor to isolate the refrigerant charge in the heat exchanger when required. Compressors star-delta start.

Plant side heat exchanger

Shell and tube heat exchanger; it acts as an evaporator or as a condenser depending to the unit's commutation; refrigerant flows inside the pipes and water flow on the shell side. The tubes have asymmetrical flows that maintain the correct speed of the refrigerant in the tubes during phase transition. The water flows on the shell side is fitted with baffles to increase turbulence and therefore the efficiency of exchange. The steel shell has

external foamed closed-cell elastomer insulating lining 10 mm thick and thermal conductivity of 0.033 W/mK at 0°C. The tube nest is manufactured using copper tubes with internal grooves for favouring heat exchange and mechanically expanded onto the tube plates. The heat exchanger is fitted with a differential pressure switch which controls the flow of water when the unit is working, in this way preventing anomalies and overheating. In other case, when the unit is off, an electrical heater prevents ice-formation. The heat exchanger is made in compliance with PED standard work pressure requisites.

Source side heat exchanger

Air-refrigerant heat exchanger, working as a condenser or an evaporator depending to the specific operating mode. Made with copper tubes and aluminium fins. The aluminium fins are spaced to guarantee the best heat exchange efficiency. The lower part of the exchanger works as a subcooling circuit increasing the cooling capacity, when it is working as a condenser.

Fan section source side

Axial electric fans, system of protection IP54 and "F" insulation class, with external rotor, profiled die-cast aluminium blades, housed in aerodynamic hoods complete with guard grille. 6-poles electric motor with built-in thermal protection. Variable Speed low-temperature Device (DVV) to control condensation adjusting the rotational speed with voltage steps (auto-transformer) is standard for all versions.

Refrigerant circuit

The unit has two completely independent cooling circuits in order to ensure continuous operation, limited pollution, and easy maintenance.

Each cooling circuit is fitted as standard with:

- economizers
- externally equalised electronic expansion valve
- reversing cycle valve
- high and low pressure safety valves
- high and low pressure transducers
- check valve on the compressor delivery line
- on-off cock on the compressor's suction and delivery line and on the refrigerant line
- solenoid valve on the refrigerant line
- dryer filter with replaceable cartridge
- refrigerant line sight glass with humidity indicator
- high-pressure safety pressure-switch
- liquid receivers
- liquid separators.

Electric power and control panel

Electric power and control panel compliant with EN 60204-1/IEC 204-1, complete with:

- electronic controller
- transformer for control circuit
- general door lock isolator
- power circuit with bar distribution system
- fuses and contactors for compressors and fans
- terminals for cumulative alarm block
- remote ON/OFF terminals
- spring-type control circuit terminal boards
- phases sequence and minimum/maximum voltage control
- electrical heaters on external coils (only on CA, LN-CA, SL-CA versions).

Power supply 400/3/50 with star/delta start.

2.3 Certifications

EUROVENT Certification program

CE - Product quality certificate for the European Union

GOST - Product quality certificate for Russian Federation

SAFETY QUALITY LICENCE - Product quality certificate for Popular Republic of China

M&I - Product quality certificate for Australia and New Zealand

Machine directive 2006/42/EC

PED directive 97/23/EC

Low Voltage directive 2006/95/EC

ElectroMagnetic compatibility directive 2004/108/EC

ISO 9001 - Company's Quality Management System certification

ISO 14001 - Company's Environmental Management System certification.

2.4 Units' tests

Tests carried out along the all productive process as imposed by ISO9001.

Possibility to have performance and acoustical witness tests, with the support of qualified technical operators.

Performance tests give the possibility to measure:

- electrical data
- heat exchangers' waterflow
- operating temperature
- absorbed and given power, both at full load and partial load condition, in each operating mode.

It's even possible to have a simulation of the most common alarms and the pressure drops (water side) measurements.

The acoustical tests allow to verify level of sound emissions of the unit according to ISO3744.

2.5 Available configurations

Basic model

Reversible standard unit for production of chilled/hot water according to the selected operation mode.

Model with partial heat recovery (D)

Reversible unit for production of chilled/hot water, complete of an auxiliary heat exchanger on the discharge section of the compressor to the superheat reclaim. The reclaim heat is approximately the 20% of the total cooling capacity. This function is used for application with domestic hot water production or other secondary uses, as support of the existing boiler.

2.6 Available versions

B (Base)

Base unit.

SL-CA (Super Low-noise version, Class A of efficiency as per Eurovent)

Super Low-noise version, Class A of efficiency as per Eurovent.

Acoustic insulation on the compressors box, on pipes and a low fans' rotational speed gives the minimization of sound emission.

CA (Class A of efficiency)

Class A of efficiency as per Eurovent.

LN-CA (Low-noise version, Class A of efficiency as per Eurovent)

Low-noise version, Class A of efficiency as per Eurovent.

Acoustic insulation on the compressors box and a low fans' rotational speed gives the minimization of sound emission.

2.7 W3000SE Large electronic controller

The W3000SE Large controller offers advanced functions and algorithms. The keypad features an easy-to-use interface and a complete LCD display, allowing to consult and intervene on the unit by means of a multi-level menu, with selectable language setting. The regulation features the continuous modulation of capacity, based on a dynamic dead band and referring to the leaving water temperature. As alternative, step-wise regulation is also available, referred to the return water temperature with selectable proportional- or proportional-integral logic. The diagnostics includes a complete alarm management, with the "black-box" and alarm logging functions for enhanced analysis of the unit operation. For multiple units' systems, the regulation of the resources, via optional proprietary devices, can be implemented. Energy metering, for both consumption and capacity, can also be developed. Supervision can be easily developed via proprietary devices or the integration in third party systems by means of the most common protocols as ModBus, Bacnet, Bacnet-over-IP, Echelon LonWorks. Compatibility with the remote keyboard managing up to 10 units. Availability of an internal real time clock for operation scheduling (4-day profiles with 10 hour belts). The defrost adopts a proprietary self-adaptive logic, which features the monitoring of numerous operational parameters. This allows to reduce the number and duration of the defrost cycles, with a benefit for the overall energy efficiency.

2.8 Accessories

ACCESSORIES	DESCRIPTION	BENEFIT
Cu/Cu condensing coils	Air-refrigerant heat exchanger with copper fins and tubes.	Recommended for applications in corrosive atmospheres.
Condensing coils with epoxy-coated fins	Painted air-refrigerant heat exchanger.	Recommended for applications in medium level pollution atmospheres.
Condensing coils with Fin Guard Silver treatment	Air-refrigerant heat exchanger with epoxidic treatment on coils and fins.	Recommended for marine exposure conditions, with an high level of pollution or other aggressive atmospheres.
Soft start	Electronic device adopted to manage the inrush current.	Break down of the inrush current as soon as the electrical motor is switch on, lower motor's mechanical wear, favourable sizing for the electrical system.
Hydronic group	(See dedicate section)	
Variable flow hydronic group	(See dedicate section)	
kit HWT	Kit for high hot primary heat exchanger leaving water temperature up to 60°C and for high outdoor temperature: up to 50°C at full load and up to 57°C at partial load. The accessory is required for applications with high water temperature requestes (higher then 55°C) or for installation in extremely hot areas.	
ModBUS connectivity	Interface module for ModBUS protocols.	Allows integration with BMS operating with ModBUS protocol.
BACnet connectivity	Interface module for BACnet protocols.	Allows integration with BMS operating with BACnet protocol.
Echelon connectivity	Interface module for Echelon systems.	Allows integration with BMS operating with LonWorks protocols.
AUXILIARY SIGNAL 4-20mA	4..20mA analogue input. Allows to change the operating set-point according to the value of current applied to the analogue input.	Enforce Energy Saving policies.
Automatic circuit breakers	Over-current switch on the major electrical loads.	It protects compressors and/or fans from possible current peaks.
Input remote demand limit	Digital input (voltage free).	It permits to limit the unit's power absorption for safety reasons or in temporary situation.
EC fans	Electronically commutated fans (EC fans); the brushless motor, governed by a special controller, continuously adjust fans' speed.	Reduced energy consumption, electromagnetic noises and current's absorption even during start-up phase. Noise reduces proportionally to unit's partialization.
Coil protection grill in peraluman		
Anti-intrusions grills		Avoid the intrusion of solid bodies into the unit's structure.
Numbered cables on electrical board		
Remote signal double SP	Allows to activate the Energy Saving set-point.	Enforce Energy Saving policy.
Flanged evaporator connection		
Evaporator flowswitch (water side)		
Container packing		
Coil s protection grill and nylon coverage		
Rubber anti vibration device		
Spring anti vibration device		
Relay for pump(s) managment	Relay for the pump(s) on/off.	It permits the pumps on/off. In case of 2 pumps, one in stand-by to the other, it's possible to balance the operating hours between them.
BACnet OVER IP connectivity	Interface module for BACnet OVER-IP protocols.	Allows to interconnect BACnet devices over Internet Protocol within wide-area networks.
Double antifreeze heater		
Double insulation on evaporator		
DEMETERA (see dedicated manual)	Software to monitor capacity and energy absorbed by the units.	Allows a dynamic monitoring of the installed units and therefore a data (hourly based) downloading to support the current needs of energy management.
Network analyzer per DEMETERA	Tools to measure the electricity absorbed by the unit.	They meter the electricity absorbed and are connected with RS485 bus to an external device for energy metering (DEMETERA - see dedicated manual).
Group regulation device	(See dedicate section)	
Supervisory device	(See dedicate section)	

2.9 Group regulation device MANAGER 3000

Manager3000 allows the regulation within a group of hydronic units. The controller features high-level algorithms and user interface. The controller is suitable for the management of 2- or 4-pipe systems, with regulation on one water circuit, for chiller- or heat pump units and relevant mode change-over, and also with regulation on two circuits, with independent set-points and parameters, thus exploiting the simultaneous supply of chilled- and hot water.

The controller manages up to 8 units, with activation logic focused at the balancing of operation times and at the achievement of the highest energy efficiency. It is possible to define conditions of dynamic stand-by and priority as regards the units' activation. It is also feasible the rotation among the system's units, also in cases of constant load.

The alarm management is featured, with plain text descriptions and possible notification to remote recipients. Two relay outputs are available, associated to unit- and device alarms.

The user interface allows a safe and easy use, thanks to its touch-screen display, back-lit 8.4" type.

The multi-level menu features the language selection and differentiated access profiles (user and maintenance). The circuit temperatures and the status of both system- and unit- operation are displayed, via one overview page plus detailed pages. The regulation can be based on proportional- or proportional+integral logics, or also on a dead-band algorithm with dynamic adjustment, with relevant temperature inputs managed by the device.

Features as set-point offset, also referred to the outdoor temperature, and demand limit are included, with relevant analog inputs.

The device is integrated in the best way with the units, preventing

simultaneous activations or resources and optimizing efficiency, overall inrush current values and also operation of water pumps possibly associated to the units.

The WebManager option allows the access to the device and its settings, via any computer, with direct- or LAN-based connection, therefore also via internet resources; this is associated to the availability of historical charts for the main operating variables.

The "Variable Primary Flow" option represents a unique regulation dedicated to hydronic systems with variable water flow.

This represents a crucial contribution to the reduction of the costs related to the hydraulic plant and its operation.

It is available as option the interface with the Demetra metering device: thus it is possible to acquire and log the values of the system units' electric consumption, together with their operating status; this allows therefore to analyze the system's operating performances throughout time, in terms of both absorbed energy and cooling / heating capacities, consistently with the implementation of enhanced energy management policies for the building.



2.10 Supervisory device

FWS 3000

Supervisory device for a system composed of Climaveneta units.

Supervision can be operated via any computer, with direct- or LAN-based connection. It is therefore achieved the internet-based management of the resources, thanks to the built-in web-server and to the availability of web pages specifically defined both for the overall system monitoring and the access to detailed information about each unit.

The supervision achieved by this way does not require the installation of any additional software on the computer and utilizes the most common browsers. This allows the use of any computer connected to the network or web. A RS-485 serial connection is available for the communication with the slave devices, up to 15 connected units. FWS3000 is particularly effective for the supervision of systems composed of packaged or WET units.

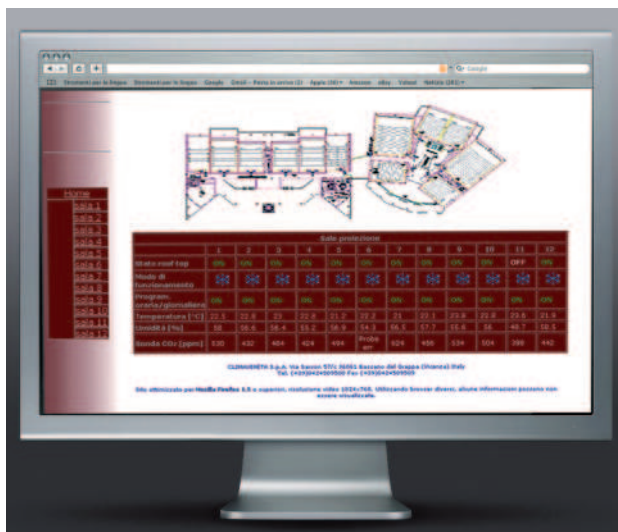
The access to the supervision is easy and safe, thanks to the use of password. It is possible to visualize a complete list of unit operational variables: temperatures, humidity, indoor air

quality, status of the unit. This is associated to the availability of historical charts for the main operating variables. It is also available the display of alarms, with plain text descriptions and possible notification to remote recipient.

The setting of the main operational parameters, for each unit, is also allowed: unit status, mode, set-point, time scheduling (based on 4 days, 10 time belts per day).

Various levels of customization are offered, for both the web pages and connectivity-related functions.

It is available as option the interface with the Demetra metering device: thus it is possible to acquire and log the values of the system units' electric consumption, together with their operating status; this allows therefore to analyze the system's operating performances throughout time, in terms of both absorbed energy and cooling / heating capacities, consistently with the implementation of enhanced energy management policies for the building.



3.1 GENERAL TECHNICAL DATA

FOCS-N / B

FOCS-N / B			2022	2222	2422	2622	2722	3222	3622	4222	4822
Power supply		V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
PERFORMANCE											
COOLING ONLY (GROSS VALUE)											
Cooling capacity	(1)	kW	450	494	531	572	663	791	916	1029	1146
Total power input	(1)	kW	163	177	187	208	229	272	299	343	389
EER	(1)		2,76	2,79	2,85	2,74	2,90	2,91	3,07	3,00	2,95
ESEER	(1)		3,71	3,75	3,81	3,81	3,99	3,89	3,90	4,02	3,94
COOLING ONLY (EN14511 VALUE)											
Cooling capacity	(1)(2)	kW	448	493	529	571	661	789	914	1026	1143
EER	(1)(2)		2,73	2,76	2,81	2,72	2,87	2,87	3,04	2,97	2,92
ESEER	(1)(2)		3,61	3,64	3,69	3,73	3,88	3,78	3,81	3,89	3,83
Cooling energy class			C	C	C	C	C	C	B	B	B
HEATING ONLY (GROSS VALUE)											
Heating capacity	(3)	kW	479	524	566	600	699	824	946	1073	1195
Total power input	(3)	kW	152	166	178	188	215	252	283	322	363
COP	(3)		3,14	3,15	3,18	3,19	3,25	3,27	3,34	3,34	3,29
HEATING ONLY (EN14511 VALUE)											
Heating capacity	(3)(2)	kW	480	525	568	601	701	826	948	1077	1199
COP	(3)(2)		3,12	3,13	3,16	3,18	3,23	3,25	3,32	3,31	3,27
Cooling energy class			B	B	B	B	A	A	A	A	A
COOLING WITH PARTIAL RECOVERY											
Cooling capacity	(4)	kW	467	513	551	593	688	821	951	1067	1189
Total power input	(4)	kW	158	172	181	202	222	264	290	332	377
Desuperheater heating capacity	(4)	kW	128	137	145	165	179	214	231	270	304
EXCHANGERS											
HEAT EXCHANGER USER SIDE IN REFRIGERATION											
Water flow	(1)	m³/h	77,4	85,0	91,4	98,5	114	136	158	177	197
Pressure drop	(1)	kPa	30,0	33,3	38,4	25,2	32,5	36,7	33,3	42,3	37,0
HEAT EXCHANGER USER SIDE IN HEATING											
Water flow	(3)	m³/h	83,2	91,0	98,4	104	121	143	164	186	208
Pressure drop	(3)	kPa	34,6	38,1	44,6	28,3	36,8	40,6	36,2	46,9	41,0
PARTIAL RECOVERY USER SIDE IN											
Water flow	(4)	m³/h	22,2	23,8	25,2	28,6	31,1	37,3	40,1	47,0	52,9
Pressure drop	(4)	kPa	36,8	42,2	47,6	28,7	33,9	33,5	22,2	30,4	29,9
COMPRESSORS											
N. of compressors		N°	2	2	2	2	2	2	2	2	2
Number of capacity		N°	0	0	0	0	0	0	0	0	0
No. of circuits		N°	2	2	2	2	2	2	2	2	2
Regulation			STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS
Min. capacity step		%	25	25	25	25	25	25	25	25	25
Refrigerant			R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a
Refrigerant charge		kg	159	176	185	196	233	256	294	355	355
Oil charge		kg	44,0	44,0	44,0	44,0	38,0	70,0	70,0	70,0	70,0
FANS											
Quantity		N°	10	12	12	12	14	16	20	20	24
Air flow		m³/s	52,8	68,5	63,6	63,6	75,5	86,3	106	101	127
Fans power		kW	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00
NOISE LEVEL											
Noise Pressure	(5)	dB(A)	67	69	69	69	68	69	69	71	71
Noise Power	(6)	dB(A)	99	101	101	101	101	102	102	104	104
SIZE AND WEIGHT											
A	(7)	mm	4900	5800	5800	5800	7000	7900	10000	10000	11800
B	(7)	mm	2260	2260	2260	2260	2260	2260	2260	2260	2260
H	(7)	mm	2430	2430	2430	2430	2430	2430	2430	2430	2430
Operating weight	(7)	kg	5900	6330	6420	6660	7290	9390	10400	10700	11310

Notes:

- 1 Plant (side) cooling exchanger water (in/out) 12°C/7°C; Source (side) heat exchanger air (in) 35°C
 - 2 Values in compliance with EN14511-3:2011
 - 3 Plant (side) heat exchanger water (in/out) 40°C/45°C; Source (side) heat exchanger air (in) 7°C - 87% R.H.
 - 4 Plant (side) cooling exchanger water (in/out) 12°C/7°C; Source (side) heat exchanger air (in) 35°C; Plant (side) heat exchanger recovery water (in/out) 40°C/45°C
 - 5 Average sound pressure level, at 10m distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level.
 - 6 Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units; in compliance with ISO 3744 for non-certified units.
 - 7 Unit in standard configuration/execution, without optional accessories.
- Unavailable

FOCS-N / CA			2022	2222	2422	2622	2722	3222	3622	4222	4822
Power supply		V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
PERFORMANCE											
COOLING ONLY (GROSS VALUE)											
Cooling capacity	(1)	kW	460	503	538	586	672	803	929	1041	1162
Total power input	(1)	kW	158	170	181	202	222	264	291	343	378
EER	(1)		2,91	2,96	2,97	2,91	3,03	3,04	3,19	3,04	3,08
ESEER	(1)		3,88	3,89	3,91	3,96	4,09	4,03	4,01	3,99	4,06
COOLING ONLY (EN14511 VALUE)											
Cooling capacity	(1)(2)	kW	458	501	536	585	670	801	926	1038	1159
EER	(1)(2)		2,88	2,93	2,93	2,88	2,99	3,01	3,16	3,00	3,04
ESEER	(1)(2)		3,77	3,79	3,79	3,86	3,96	3,91	3,91	3,87	3,94
Cooling energy class			C	B	B	C	B	B	A	B	B
HEATING ONLY (GROSS VALUE)											
Heating capacity	(3)	kW	470	520	553	590	682	804	923	1051	1166
Total power input	(3)	kW	143	156	167	177	202	238	265	309	341
COP	(3)		3,28	3,33	3,31	3,33	3,38	3,39	3,48	3,41	3,42
HEATING ONLY (EN14511 VALUE)											
Heating capacity	(3)(2)	kW	472	522	555	591	684	807	925	1054	1169
COP	(3)(2)		3,26	3,31	3,28	3,31	3,35	3,36	3,46	3,38	3,39
Cooling energy class			A	A	A	A	A	A	A	A	A
COOLING WITH PARTIAL RECOVERY											
Cooling capacity	(4)	kW	477	522	558	608	697	833	964	1080	1206
Total power input	(4)	kW	153	165	176	195	215	256	282	332	366
Desuperheater heating capacity	(4)	kW	123	130	140	159	173	207	224	263	294
EXCHANGERS											
HEAT EXCHANGER USER SIDE IN REFRIGERATION											
Water flow	(1)	m³/h	79,1	86,6	92,6	101	116	138	160	179	200
Pressure drop	(1)	kPa	31,3	34,5	39,4	26,5	33,4	37,8	34,3	43,3	38,0
HEAT EXCHANGER USER SIDE IN HEATING											
Water flow	(3)	m³/h	81,7	90,4	96,1	102	119	140	160	183	203
Pressure drop	(3)	kPa	33,4	37,6	42,5	27,3	35,2	38,7	34,5	45,0	39,0
PARTIAL RECOVERY USER SIDE IN											
Water flow	(4)	m³/h	21,4	22,6	24,4	27,6	30,1	36,0	38,9	45,7	51,1
Pressure drop	(4)	kPa	34,2	38,2	44,4	26,6	31,7	31,2	20,9	28,8	28,0
COMPRESSORS											
N. of compressors		N°	2	2	2	2	2	2	2	2	2
Number of capacity		N°	0	0	0	0	0	0	0	0	0
No. of circuits		N°	2	2	2	2	2	2	2	2	2
Regulation			STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS
Min. capacity step		%	25	25	25	25	25	25	25	25	25
Refrigerant			R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a
Refrigerant charge		kg	171	191	198	209	249	282	321	321	387
Oil charge		kg	44,0	44,0	44,0	44,0	38,0	70,0	70,0	70,0	70,0
FANS											
Quantity		N°	10	12	12	12	14	16	20	24	24
Air flow		m³/s	50,6	65,6	61,0	61,0	72,5	82,9	101	127	122
Fans power		kW	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00
NOISE LEVEL											
Noise Pressure	(5)	dB(A)	67	69	69	69	68	69	69	71	71
Noise Power	(6)	dB(A)	99	101	101	101	101	102	102	104	104
SIZE AND WEIGHT											
A	(7)	mm	4900	5800	5800	5800	7000	7900	10000	11800	11800
B	(7)	mm	2260	2260	2260	2260	2260	2260	2260	2260	2260
H	(7)	mm	2430	2430	2430	2430	2430	2430	2430	2430	2430
Operating weight	(7)	kg	6050	6630	6710	6950	7480	9620	10650	11260	11690

Notes:

1 Plant (side) cooling exchanger water (in/out) 12°C/7°C; Source (side) heat exchanger air (in) 35°C

2 Values in compliance with EN14511-3:2011

3 Plant (side) heat exchanger water (in/out) 40°C/45°C; Source (side) heat exchanger air (in) 7°C - 87% R.H.

4 Plant (side) cooling exchanger water (in/out) 12°C/7°C; Source (side) heat exchanger air (in) 35°C; Plant (side) heat exchanger recovery water (in/out) 40°C/45°C

5 Average sound pressure level, at 10m distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level.

6 Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units; in compliance with ISO 3744 for non-certified units.

7 Unit in standard configuration/execution, without optional accessories.

- Unavailable

FOCS-N / SL-CA			2022	2222	2422	2622	2722	3222	3622	4222	4822
Power supply		V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
PERFORMANCE											
COOLING ONLY (GROSS VALUE)											
Cooling capacity	(1)	kW	441	488	520	559	649	772	895	1004	1119
Total power input	(1)	kW	163	172	185	209	227	271	293	346	385
EER	(1)		2,71	2,84	2,81	2,68	2,86	2,85	3,05	2,90	2,91
ESEER	(1)		3,84	3,91	3,91	3,93	4,12	3,99	4,01	4,01	4,06
COOLING ONLY (EN14511 VALUE)											
Cooling capacity	(1)(2)	kW	440	487	518	557	647	769	893	1001	1116
EER	(1)(2)		2,69	2,81	2,78	2,66	2,83	2,82	3,02	2,87	2,88
ESEER	(1)(2)		3,74	3,81	3,79	3,84	4,01	3,88	3,91	3,89	3,94
Cooling energy class			D	C	C	D	C	C	B	C	C
HEATING ONLY (GROSS VALUE)											
Heating capacity	(3)	kW	461	514	546	578	674	794	911	1039	1151
Total power input	(3)	kW	142	154	166	175	200	235	262	305	338
COP	(3)		3,25	3,33	3,30	3,30	3,37	3,38	3,47	3,40	3,41
HEATING ONLY (EN14511 VALUE)											
Heating capacity	(3)(2)	kW	462	516	548	579	676	797	913	1042	1154
COP	(3)(2)		3,23	3,31	3,28	3,28	3,35	3,36	3,45	3,38	3,39
Cooling energy class			A	A	A	A	A	A	A	A	A
COOLING WITH PARTIAL RECOVERY											
Cooling capacity	(4)	kW	457	506	539	580	673	800	929	1042	1161
Total power input	(4)	kW	157	166	179	202	220	262	284	335	372
Desuperheater heating capacity	(4)	kW	135	141	153	175	189	226	242	285	320
EXCHANGERS											
HEAT EXCHANGER USER SIDE IN REFRIGERATION											
Water flow	(1)	m³/h	75,9	84,0	89,5	96,2	112	133	154	173	193
Pressure drop	(1)	kPa	28,8	32,5	36,8	24,0	31,2	34,9	31,8	40,3	35,3
HEAT EXCHANGER USER SIDE IN HEATING											
Water flow	(3)	m³/h	80,1	89,4	94,9	100	117	138	158	181	200
Pressure drop	(3)	kPa	32,1	36,8	41,5	26,2	34,3	37,7	33,6	44,0	38,0
PARTIAL RECOVERY USER SIDE IN											
Water flow	(4)	m³/h	23,5	24,6	26,6	30,3	32,8	39,3	42,1	49,5	55,6
Pressure drop	(4)	kPa	41,4	45,2	53,0	32,2	37,7	37,2	24,4	33,9	33,1
COMPRESSORS											
N. of compressors		N°	2	2	2	2	2	2	2	2	2
Number of capacity		N°	0	0	0	0	0	0	0	0	0
No. of circuits		N°	2	2	2	2	2	2	2	2	2
Regulation			STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS
Min. capacity step		%	25	25	25	25	25	25	25	25	25
Refrigerant			R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a
Refrigerant charge		kg	171	191	198	209	249	282	321	321	387
Oil charge		kg	44,0	44,0	44,0	44,0	38,0	70,0	70,0	70,0	70,0
FANS											
Quantity		N°	10	12	12	12	14	16	20	24	24
Air flow		m³/s	35,1	46,6	42,4	42,4	50,7	58,0	70,2	89,8	84,9
Fans power		kW	1,10	1,10	1,10	1,10	1,10	1,10	1,10	1,10	1,10
NOISE LEVEL											
Noise Pressure	(5)	dB(A)	57	59	59	59	58	59	59	61	61
Noise Power	(6)	dB(A)	89	91	91	91	91	92	92	94	94
SIZE AND WEIGHT											
A	(7)	mm	4900	5800	5800	5800	7000	7900	10000	11800	11800
B	(7)	mm	2260	2260	2260	2260	2260	2260	2260	2260	2260
H	(7)	mm	2430	2430	2430	2430	2430	2430	2430	2430	2430
Operating weight	(7)	kg	6190	6680	6770	7010	7650	9820	10890	11510	11950

Notes:

1 Plant (side) cooling exchanger water (in/out) 12°C/7°C; Source (side) heat exchanger air (in) 35°C

2 Values in compliance with EN14511-3:2011

3 Plant (side) heat exchanger water (in/out) 40°C/45°C; Source (side) heat exchanger air (in) 7°C - 87% R.H.

4 Plant (side) cooling exchanger water (in/out) 12°C/7°C; Source (side) heat exchanger air (in) 35°C; Plant (side) heat exchanger recovery water (in/out) 40°C/45°C

5 Average sound pressure level, at 10m distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level.

6 Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units; in compliance with ISO 3744 for non-certified units.

7 Unit in standard configuration/execution, without optional accessories.

- Unavailable

FOCS-N / LN-CA			2022	2222	2422	2622	2722	3222	3622	4222	4822
Power supply		V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
PERFORMANCE											
COOLING ONLY (GROSS VALUE)											
Cooling capacity	(1)	kW	444	492	524	564	654	780	904	1013	1130
Total power input	(1)	kW	160	169	182	205	224	267	290	342	380
EER	(1)		2,78	2,91	2,87	2,75	2,92	2,92	3,11	2,96	2,97
ESEER	(1)		3,86	3,92	3,92	3,93	4,12	4,02	4,02	4,01	4,07
COOLING ONLY (EN14511 VALUE)											
Cooling capacity	(1)(2)	kW	443	491	523	563	653	777	901	1010	1127
EER	(1)(2)		2,75	2,88	2,84	2,72	2,89	2,89	3,08	2,93	2,94
ESEER	(1)(2)		3,76	3,81	3,80	3,85	4,00	3,91	3,92	3,89	3,96
Cooling energy class			C	C	C	C	C	C	B	B	B
HEATING ONLY (GROSS VALUE)											
Heating capacity	(3)	kW	467	520	553	586	682	804	923	1051	1166
Total power input	(3)	kW	143	156	167	177	202	238	265	309	341
COP	(3)		3,26	3,33	3,31	3,30	3,38	3,39	3,48	3,41	3,42
HEATING ONLY (EN14511 VALUE)											
Heating capacity	(3)(2)	kW	468	522	555	587	684	807	925	1054	1169
COP	(3)(2)		3,24	3,31	3,28	3,29	3,35	3,36	3,46	3,38	3,39
Cooling energy class			A	A	A	A	A	A	A	A	A
COOLING WITH PARTIAL RECOVERY											
Cooling capacity	(4)	kW	461	510	544	585	679	809	937	1051	1173
Total power input	(4)	kW	155	164	176	199	217	258	281	331	368
Desuperheater heating capacity	(4)	kW	132	138	150	171	185	221	238	280	314
EXCHANGERS											
HEAT EXCHANGER USER SIDE IN REFRIGERATION											
Water flow	(1)	m³/h	76,5	84,7	90,2	97,1	113	134	156	174	195
Pressure drop	(1)	kPa	29,3	33,0	37,5	24,5	31,7	35,7	32,4	41,1	36,0
HEAT EXCHANGER USER SIDE IN HEATING											
Water flow	(3)	m³/h	81,1	90,4	96,1	102	119	140	160	183	203
Pressure drop	(3)	kPa	32,9	37,6	42,5	26,9	35,2	38,7	34,5	45,0	39,0
PARTIAL RECOVERY USER SIDE IN											
Water flow	(4)	m³/h	23,0	24,0	26,1	29,6	32,1	38,5	41,3	48,6	54,5
Pressure drop	(4)	kPa	39,5	43,2	50,8	30,7	36,1	35,6	23,5	32,6	31,8
COMPRESSORS											
N. of compressors		N°	2	2	2	2	2	2	2	2	2
Number of capacity		N°	0	0	0	0	0	0	0	0	0
No. of circuits		N°	2	2	2	2	2	2	2	2	2
Regulation			STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS
Min. capacity step		%	25	25	25	25	25	25	25	25	25
Refrigerant			R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a
Refrigerant charge		kg	171	191	198	209	249	282	321	321	387
Oil charge		kg	44,0	44,0	44,0	44,0	38,0	70,0	70,0	70,0	70,0
FANS											
Quantity		N°	10	12	12	12	14	16	20	24	24
Air flow		m³/s	38,1	50,6	46,0	46,0	54,9	62,8	76,1	97,0	92,1
Fans power		kW	1,20	1,20	1,20	1,20	1,20	1,20	1,20	1,20	1,20
NOISE LEVEL											
Noise Pressure	(5)	dB(A)	61	63	63	63	62	63	63	65	65
Noise Power	(6)	dB(A)	93	95	95	95	95	96	96	98	98
SIZE AND WEIGHT											
A	(7)	mm	4900	5800	5800	5800	7000	7900	10000	11800	11800
B	(7)	mm	2260	2260	2260	2260	2260	2260	2260	2260	2260
H	(7)	mm	2430	2430	2430	2430	2430	2430	2430	2430	2430
Operating weight	(7)	kg	6120	6610	6700	6930	7580	9730	10800	11400	11860

Notes:

1 Plant (side) cooling exchanger water (in/out) 12°C/7°C; Source (side) heat exchanger air (in) 35°C

2 Values in compliance with EN14511-3:2011

3 Plant (side) heat exchanger water (in/out) 40°C/45°C; Source (side) heat exchanger air (in) 7°C - 87% R.H.

4 Plant (side) cooling exchanger water (in/out) 12°C/7°C; Source (side) heat exchanger air (in) 35°C; Plant (side) heat exchanger recovery water (in/out) 40°C/45°C

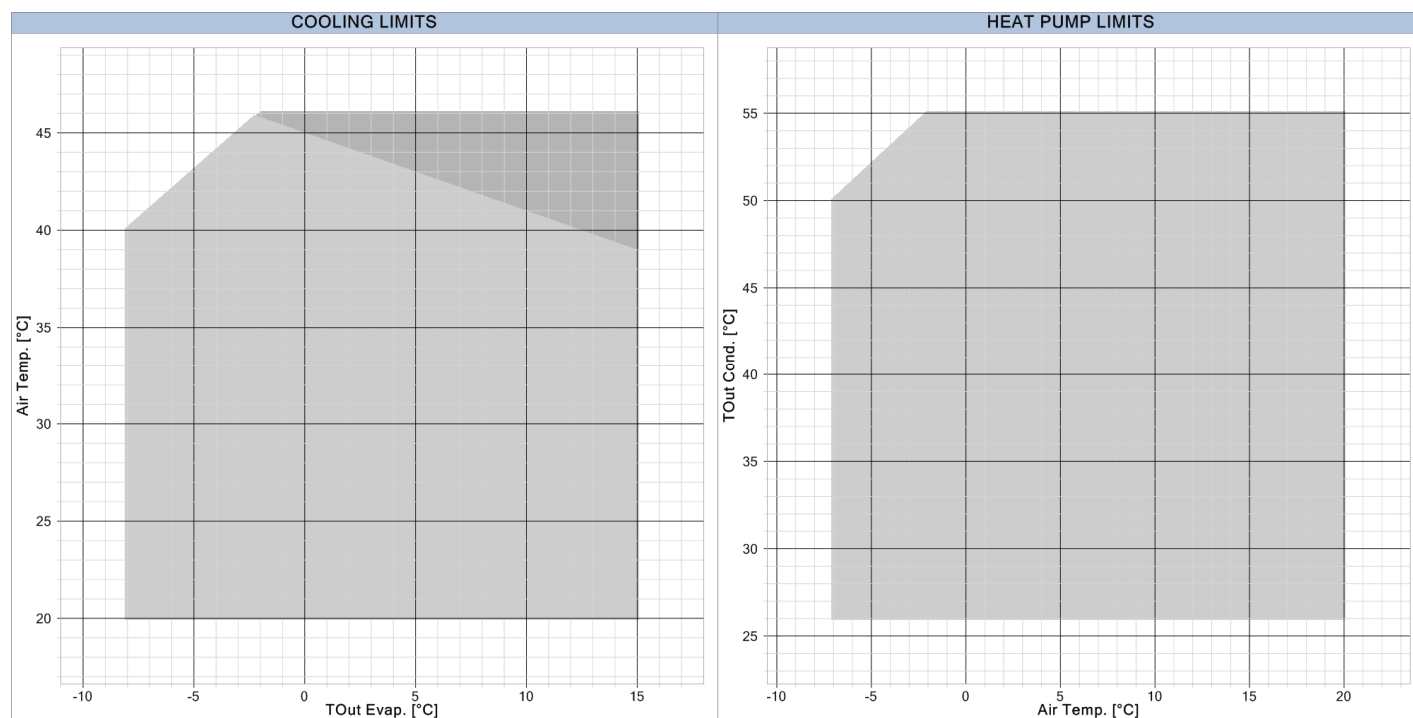
5 Average sound pressure level, at 10m distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level.

6 Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units; in compliance with ISO 3744 for non-certified units.

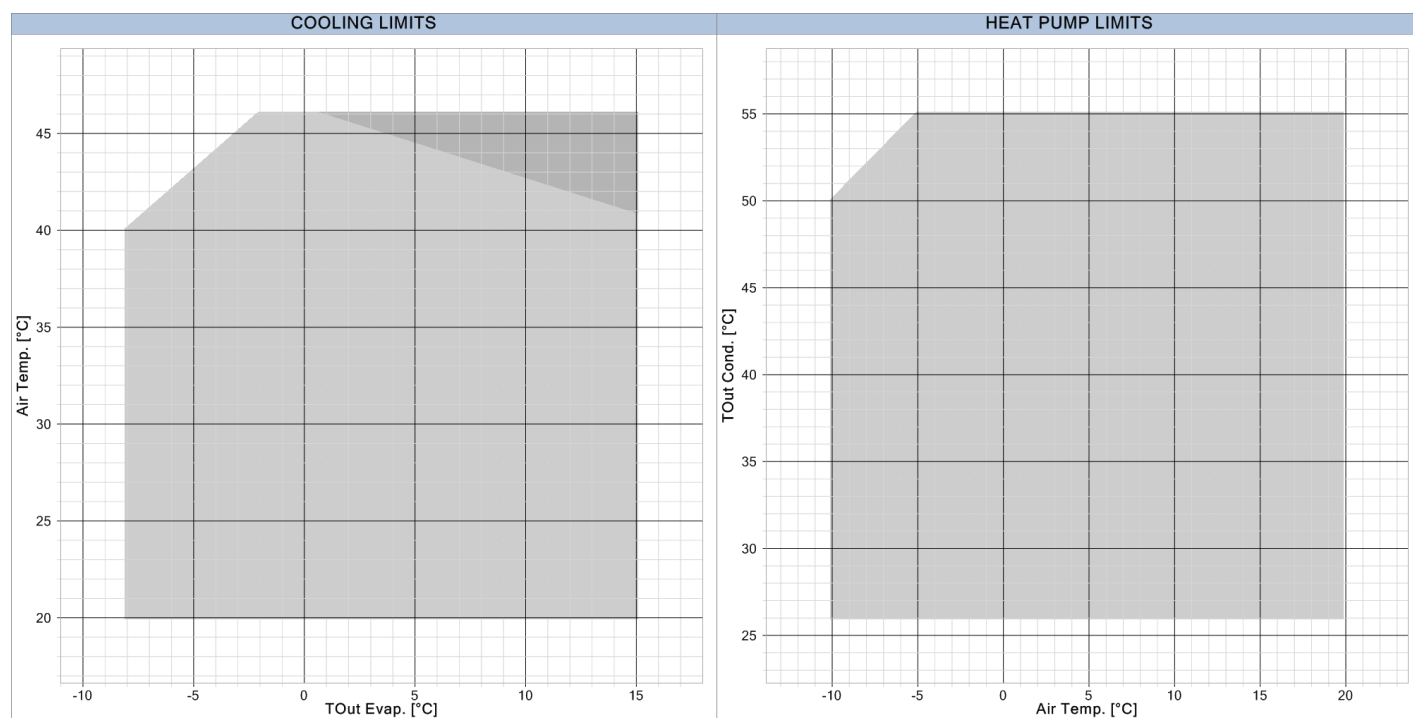
7 Unit in standard configuration/execution, without optional accessories.

- Unavailable

/B - 2022 ÷ 4822



/CA - 2022 ÷ 4822



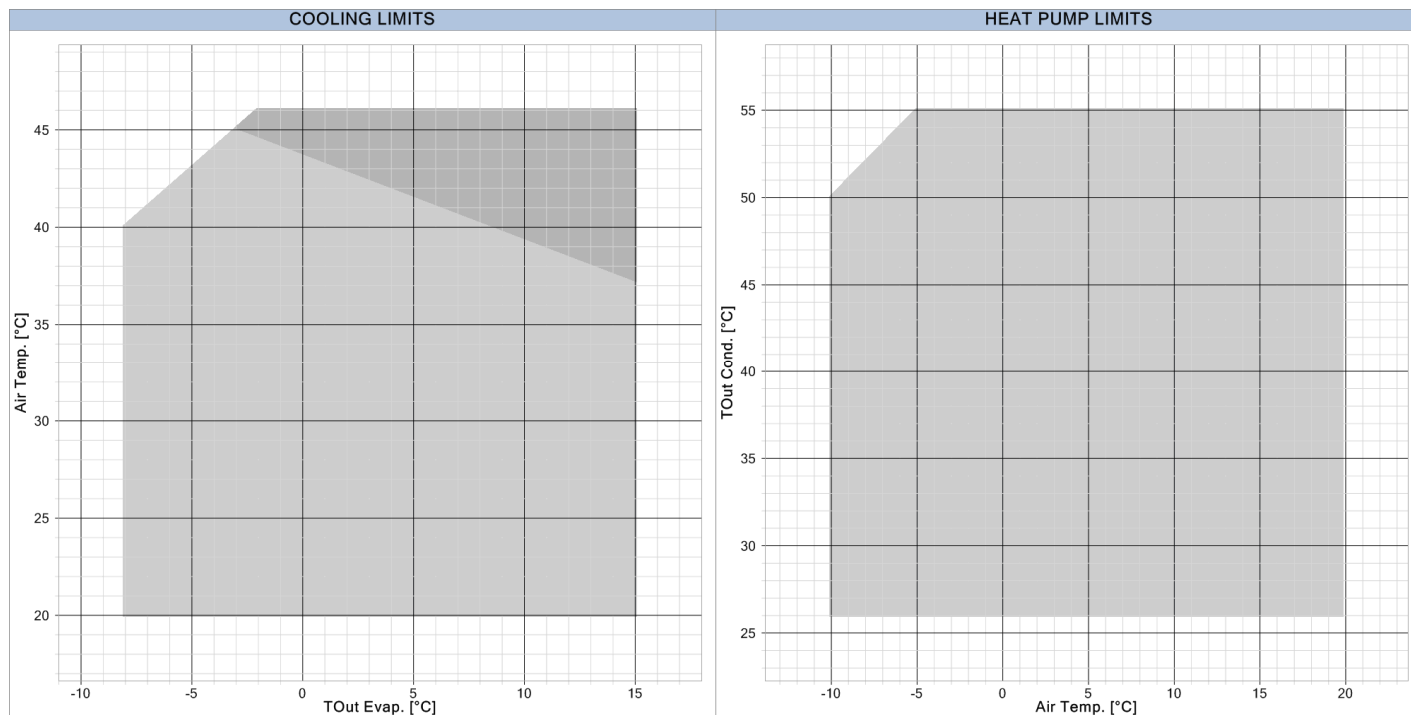
Selection limits

Economizers de-activated and unit in non silenced mode

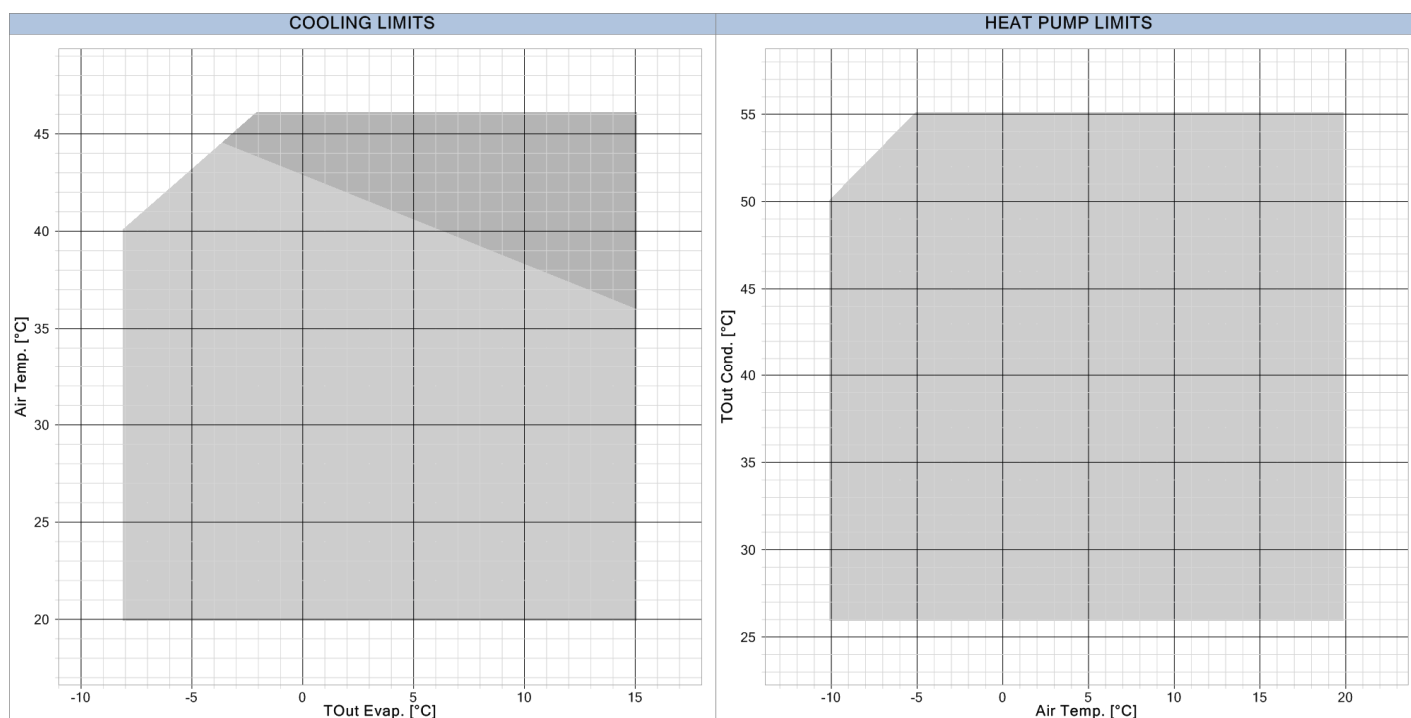
NOTE:

The represented operating limit refers to the standard unit's operation. Thanks to the condensation and evaporation control device adopted in FOCS-N line, the units can work in each of the possible operating mode from -10°C (chiller and heat pump operation) up to 46°C outdoor air temperature (only chiller operation).

/LN-CA - 2022 ÷ 4822



/SL-CA - 2022 ÷ 4822


 Selection limits

 Economizers de-activated and unit in non silenced mode
NOTE:

The represented operating limit refers to the standard unit's operation. Thanks to the condensation and evaporation control device adopted in FOCS-N line, the units can work in each of the possible operating mode from -10°C (chiller and heat pump operation) up to 46°C outdoor air temperature (only chiller operation).

4.2 ETHYLENE GLYCOL MIXTURE

Ethylene glycol and water mixture, used as a heat-conveying fluid, cause a variation in unit performance. For correct data, use the factors indicated in the following tabel.

	Freezing point (°C)							
	0	-5	-10	-15	-20	-25	-30	-35
	Ethylene glycol percentage by weight							
	0	12%	20%	30%	35%	40%	45%	50%
cPf	1	0,985	0,98	0,974	0,97	0,965	0,964	0,96
cQ	1	1,02	1,04	1,075	1,11	1,14	1,17	1,2
cdp	1	1,07	1,11	1,18	1,22	1,24	1,27	1,3

cPf: cooling power correction factor

cQ: flow correction factor

cdp: pressure drop correction factor

For data concerning other kind of anti-freeze solutions (e.g, propylene glycol) please contact our Sale Department.

4.3 FOULING FACTORS

Performances are based on clean condition of tubes (fouling factor = 1). For different fouling values, performance should be adjusted using the correction factors shown in the following table.

FOULING FACTORS	EVAPORATOR			CONDENSER/RECOVERY			DESUPERHEATER
ff (m ² °CW)	F1	FK1	KE [°C]	F2	FK2	KC [°C]	R3
0	1,000	1,000	0,0	1,000	1,000	0,0	1,000
1,80 x 10 ⁻⁵	1,000	1,000	0,0	1,000	1,000	0,0	1,000
4,40 x 10 ⁻⁵	1,000	1,000	0,0	0,990	1,030	1,0	0,990
8,80 x 10 ⁻⁵	0,960	0,990	0,7	0,980	1,040	1,5	0,980
13,20 x 10 ⁻⁵	0,944	0,985	1,0	0,964	1,050	2,3	0,964
17,20 x 10 ⁻⁵	0,930	0,980	1,5	0,950	1,060	3,0	0,950

ff: fouling factors

f1 - f2: potential correction factors

fk1 - fk2: compressor power input correction factors

r3: capacity correction factors

KE: minimum condenser outlet temperature increase

KC: maximum condenser outlet temperature decrease

Water flow and pressure drop

Water flow in the heat exchangers is given by: $Q = P \times 0,86 / \Delta t$

Q: water flow (m³/h)

Δt: difference between inlet and outlet water temp. (°C)

P: heat exchanger capacity (kW)

Pressure drop is given by: $\Delta p = K \times Q^2 / 1000$

Q: water flow (m³/h)

Δp: pressure drop (kPa)

K: unit size ratio

SIZE	PLANT SIDE COLD HEAT EXCHANGER (1)					PLANT SIDE HOT HEAT EXCHANGER (2)				AUXILIARY SIDE HEAT EXCHANGER			
	K	Q min m ³ /h	Q max m ³ /h	C.A.S. dm ³	C.a. min m ³	K	Q min m ³ /h	C.A.S. dm ³	Q max m ³ /h	K	Q min m ³ /h	C.A.S. dm ³	Q max m ³ /h
FOCS-N /B 2022	5	52,9	182	226	1,68	5	52,9	226	182	-	-	-	-
FOCS-N /B 2222	4,6	53,1	195,9	194	1,83	4,6	53,1	194	195,9	-	-	-	-
FOCS-N /B 2422	4,6	57,1	195,9	194	1,98	4,6	57,1	194	195,9	-	-	-	-
FOCS-N /B 2622	2,6	67,9	186,2	263	2,1	2,6	67,9	263	186,2	-	-	-	-
FOCS-N /B 2722	2,5	71,2	217,7	255	2,44	2,5	71,2	255	217,7	-	-	-	-
FOCS-N /B 3222	1,98	85	360	472	2,88	1,98	85	472	360	-	-	-	-
FOCS-N /B 3622	1,34	98,5	330	448	3,31	1,34	98,5	448	330	-	-	-	-
FOCS-N /B 4222	1,35	110,5	350	424	3,75	1,35	110,5	424	350	-	-	-	-
FOCS-N /B 4822	0,95	123,2	314	400	4,18	0,95	123,2	400	314	-	-	-	-
FOCS-N /CA 2022	5	52,9	182	226	1,68	5	52,9	226	182	-	-	-	-
FOCS-N /CA 2222	4,6	53,1	195,9	194	1,83	4,6	53,1	194	195,9	-	-	-	-
FOCS-N /CA 2422	4,6	57,1	195,9	194	1,98	4,6	57,1	194	195,9	-	-	-	-
FOCS-N /CA 2622	2,6	67,9	186,2	263	2,1	2,6	67,9	263	186,2	-	-	-	-
FOCS-N /CA 2722	2,5	71,2	217,7	255	2,44	2,5	71,2	255	217,7	-	-	-	-
FOCS-N /CA 3222	1,98	85	360	472	2,88	1,98	85	472	360	-	-	-	-
FOCS-N /CA 3622	1,34	98,5	330	448	3,31	1,34	98,5	448	330	-	-	-	-
FOCS-N /CA 4222	1,35	110,5	350	424	3,75	1,35	110,5	424	350	-	-	-	-
FOCS-N /CA 4822	0,95	123,2	314	400	4,18	0,95	123,2	400	314	-	-	-	-
FOCS-N /LN-CA 2022	5	52,9	182	226	1,68	5	52,9	226	182	-	-	-	-
FOCS-N /LN-CA 2222	4,6	53,1	195,9	194	1,83	4,6	53,1	194	195,9	-	-	-	-
FOCS-N /LN-CA 2422	4,6	57,1	195,9	194	1,98	4,6	57,1	194	195,9	-	-	-	-
FOCS-N /LN-CA 2622	2,6	67,9	186,2	263	2,1	2,6	67,9	263	186,2	-	-	-	-
FOCS-N /LN-CA 2722	2,5	71,2	217,7	255	2,44	2,5	71,2	255	217,7	-	-	-	-
FOCS-N /LN-CA 3222	1,98	85	360	472	2,88	1,98	85	472	360	-	-	-	-
FOCS-N /LN-CA 3622	1,34	98,5	330	448	3,31	1,34	98,5	448	330	-	-	-	-
FOCS-N /LN-CA 4222	1,35	110,5	350	424	3,75	1,35	110,5	424	350	-	-	-	-
FOCS-N /LN-CA 4822	0,95	123,2	314	400	4,18	0,95	123,2	400	314	-	-	-	-
FOCS-N /SL-CA 2022	5	52,9	182	226	1,68	5	52,9	226	182	-	-	-	-
FOCS-N /SL-CA 2222	4,6	53,1	195,9	194	1,83	4,6	53,1	194	195,9	-	-	-	-
FOCS-N /SL-CA 2422	4,6	57,1	195,9	194	1,98	4,6	57,1	194	195,9	-	-	-	-
FOCS-N /SL-CA 2622	2,6	67,9	186,2	263	2,1	2,6	67,9	263	186,2	-	-	-	-
FOCS-N /SL-CA 2722	2,5	71,2	217,7	255	2,44	2,5	71,2	255	217,7	-	-	-	-
FOCS-N /SL-CA 3222	1,98	85	360	472	2,88	1,98	85	472	360	-	-	-	-
FOCS-N /SL-CA 3622	1,34	98,5	330	448	3,31	1,34	98,5	448	330	-	-	-	-
FOCS-N /SL-CA 4222	1,35	110,5	350	424	3,75	1,35	110,5	424	350	-	-	-	-
FOCS-N /SL-CA 4822	0,95	123,2	314	400	4,18	0,95	123,2	400	314	-	-	-	-
FOCS-N /D /B 2022	5	52,9	182	226	1,68	5	52,9	226	182	74,8	-	2	27,8
FOCS-N /D /B 2222	4,6	53,1	195,9	194	1,83	4,6	53,1	194	195,9	74,8	-	2	29,8
FOCS-N /D /B 2422	4,6	57,1	195,9	194	1,98	4,6	57,1	194	195,9	74,8	-	2	31,6
FOCS-N /D /B 2622	2,6	67,9	186,2	263	2,1	2,6	67,9	263	186,2	35	-	3	35,9

Q min: minimum water flow admitted to the heat exchanger

Q max: maximum water flow admitted to the heat exchanger

C.a. min: minimum water content admitted in the plant, using traditional control logic

C.A.S.: heat exchanger water content

(1) Plant side heat exchanger referred to the unit working in chiller mode

(2) Plant side heat exchanger referred to the unit working in heat pump mode

SIZE	PLANT SIDE COLD HEAT EXCHANGER (1)					PLANT SIDE HOT HEAT EXCHANGER (2)				AUXILIARY SIDE HEAT EXCHANGER			
	K	Q min m ³ /h	Q max m ³ /h	C.A.S. dm ³	C.a. min m ³	K	Q min m ³ /h	C.A.S. dm ³	Q max m ³ /h	K	Q min m ³ /h	C.A.S. dm ³	Q max m ³ /h
FOCS-N /D /B 2722	2,5	71,2	217,7	255	2,44	2,5	71,2	255	217,7	35	-	3	39,1
FOCS-N /D /B 3222	1,98	85	360	472	2,88	1,98	85	472	360	24,1	-	3	46,7
FOCS-N /D /B 3622	1,34	98,5	330	448	3,31	1,34	98,5	448	330	13,8	-	9	50,3
FOCS-N /D /B 4222	1,35	110,5	350	424	3,75	1,35	110,5	424	350	13,8	-	9	58,9
FOCS-N /D /B 4822	0,95	123,2	314	400	4,18	0,95	123,2	400	314	10,7	-	10	66,3
FOCS-N /D /CA 2022	5	52,9	182	226	1,68	5	52,9	226	182	74,8	-	2	27,8
FOCS-N /D /CA 2222	4,6	53,1	195,9	194	1,83	4,6	53,1	194	195,9	74,8	-	2	29,8
FOCS-N /D /CA 2422	4,6	57,1	195,9	194	1,98	4,6	57,1	194	195,9	74,8	-	2	31,6
FOCS-N /D /CA 2622	2,6	67,9	186,2	263	2,1	2,6	67,9	263	186,2	35	-	3	35,9
FOCS-N /D /CA 2722	2,5	71,2	217,7	255	2,44	2,5	71,2	255	217,7	35	-	3	39,1
FOCS-N /D /CA 3222	1,98	85	360	472	2,88	1,98	85	472	360	24,1	-	3	46,7
FOCS-N /D /CA 3622	1,34	98,5	330	448	3,31	1,34	98,5	448	330	13,8	-	9	50,3
FOCS-N /D /CA 4222	1,35	110,5	350	424	3,75	1,35	110,5	424	350	13,8	-	9	58,9
FOCS-N /D /CA 4822	0,95	123,2	314	400	4,18	0,95	123,2	400	314	10,7	-	10	66,3
FOCS-N /D /LN-CA 2022	5	52,9	182	226	1,68	5	52,9	226	182	74,8	-	2	27,8
FOCS-N /D /LN-CA 2222	4,6	53,1	195,9	194	1,83	4,6	53,1	194	195,9	74,8	-	2	29,8
FOCS-N /D /LN-CA 2422	4,6	57,1	195,9	194	1,98	4,6	57,1	194	195,9	74,8	-	2	31,6
FOCS-N /D /LN-CA 2622	2,6	67,9	186,2	263	2,1	2,6	67,9	263	186,2	35	-	3	35,9
FOCS-N /D /LN-CA 2722	2,5	71,2	217,7	255	2,44	2,5	71,2	255	217,7	35	-	3	39,1
FOCS-N /D /LN-CA 3222	1,98	85	360	472	2,88	1,98	85	472	360	24,1	-	3	46,7
FOCS-N /D /LN-CA 3622	1,34	98,5	330	448	3,31	1,34	98,5	448	330	13,8	-	9	50,3
FOCS-N /D /LN-CA 4222	1,35	110,5	350	424	3,75	1,35	110,5	424	350	13,8	-	9	58,9
FOCS-N /D /LN-CA 4822	0,95	123,2	314	400	4,18	0,95	123,2	400	314	10,7	-	10	66,3
FOCS-N /D /SL-CA 2022	5	52,9	182	226	1,68	5	52,9	226	182	74,8	-	2	27,8
FOCS-N /D /SL-CA 2222	4,6	53,1	195,9	194	1,83	4,6	53,1	194	195,9	74,8	-	2	29,8
FOCS-N /D /SL-CA 2422	4,6	57,1	195,9	194	1,98	4,6	57,1	194	195,9	74,8	-	2	31,6
FOCS-N /D /SL-CA 2622	2,6	67,9	186,2	263	2,1	2,6	67,9	263	186,2	35	-	3	35,9
FOCS-N /D /SL-CA 2722	2,5	71,2	217,7	255	2,44	2,5	71,2	255	217,7	35	-	3	39,1
FOCS-N /D /SL-CA 3222	1,98	85	360	472	2,88	1,98	85	472	360	24,1	-	3	46,7
FOCS-N /D /SL-CA 3622	1,34	98,5	330	448	3,31	1,34	98,5	448	330	13,8	-	9	50,3
FOCS-N /D /SL-CA 4222	1,35	110,5	350	424	3,75	1,35	110,5	424	350	13,8	-	9	58,9
FOCS-N /D /SL-CA 4822	0,95	123,2	314	400	4,18	0,95	123,2	400	314	10,7	-	10	66,3

Q min: minimum water flow admitted to the heat exchanger

Q max: maximum water flow admitted to the heat exchanger

C.a. min: minimum water content admitted in the plant, using traditional control logic

C.A.S.: heat exchanger water content

(1) Plant side heat exchanger referred to the unit working in chiller mode

(2) Plant side heat exchanger referred to the unit working in heat pump mode

5.2 HYDRONIC GROUP (Optional)

Hydraulic group consisting of:

- 2 pumps, 2 or 4 pole
- differential pressure switch
- discharge valves
- pump inlet / outlet valves
- check valve
- purge valve
- drain valve

Each of the components of the hydraulic group has been designed to optimise hydraulic and electrical installation space, time and costs.

The second pump operates in stand-by to the first. The relative operating hours of the two pumps are balanced. In case the operating pump breaks down, the reserve pump is automatically enabled.

The electrical panel of the unit is protected with fuses and contactor with thermal cut-out.

IN-LINE PUMPS SPECIFICATION

2-pole low head pumps

Centrifugal pumps with in-line suction and delivery flanges, in single and twin versions. Pump body in cast iron and impeller in AISI 316L stainless steel or cast-iron, entirely laser technology welded. Mechanical seal with components in ceramics, carbon and EPDM elastomers. Three-phase electric motor protected to IP55, insulation class F, suitable for continuous service.

2-pole high-head pumps

All versions of the hydronic unit can be supplied with a high head pump. In these cases, the pump features a two-pole motor even in the silent-running versions.

4-pole low or high head pump

Horizontal one-piece centrifuge pump, normalised to EN 733, axial suction and radial delivery, cast iron body and AISI 316L stainless steel impeller. The section of the shaft in contact with the liquid is made from stainless steel. Mechanical seal with components in various materials depending on the size: ceramic/carbon/NBR or carbon/carburundum/silicon/EPDM.

Three-phase electric motor protected to IP55, insulation class F, suitable for continuous service.

N.B.: for the superlownoise version (SL), the addition of the hydraulic group with 2 pumps, increase noise output by about 1 dB(A).

SPECIAL PUMPS

For pumps with different configurations, please contact our sales department.

The supply does not include the following accessories though these are recommended to ensure correct system operation:

- Flow switch
- Pressure gauges upline and downline from the unit
- Flexible joints on piping
- On-off valves
- Outlet control thermometer
- Mains filter

Extra dimensions and Extra weight

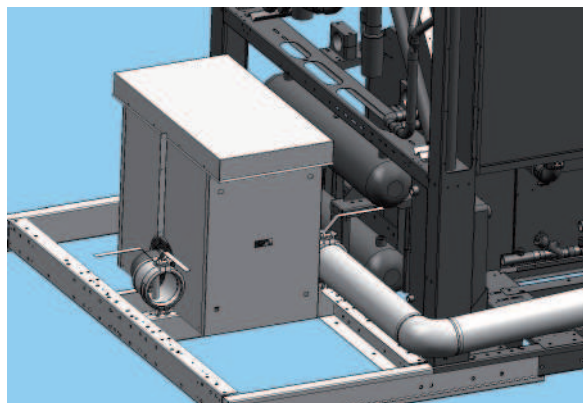
SIZE	2 Poli - AP		2 Poli - BP		4 Poli - AP		4 Poli - BP	
	extra mm.	extra kg.	extra mm.	extra kg.	extra mm.	extra kg.	extra mm.	extra kg.
2022	esterne +1000	405	esterne +1000	380	esterne +1300	760	esterne +1000	540
2222	esterne +1000	480	esterne +1000	390	esterne +1300	770	esterne +1000	550
2422	esterne +1000	480	esterne +1000	420	esterne +1300	800	esterne +1000	550
2622	esterne +1000	540	esterne +1000	580	esterne +1300	800	esterne +1000	580
2722	esterne +1000	560	esterne +1000	600	esterne +1300	840	esterne +1000	600
3222	esterne +1000	720	esterne +1000	580	esterne +1300	850	esterne +1300	820
3622	esterne +1000	760	esterne +1300	860	esterne +1300	890	esterne +1300	860
4222	esterne +1000	800	esterne +1300	900	esterne +1300	930	esterne +1300	900
4822	esterne +1300	920	esterne +1300	990	esterne +1300	930	esterne +1300	990

extra mm. extra dimensions (hydronic group + hydraulic connection)

extra kg. extra weight

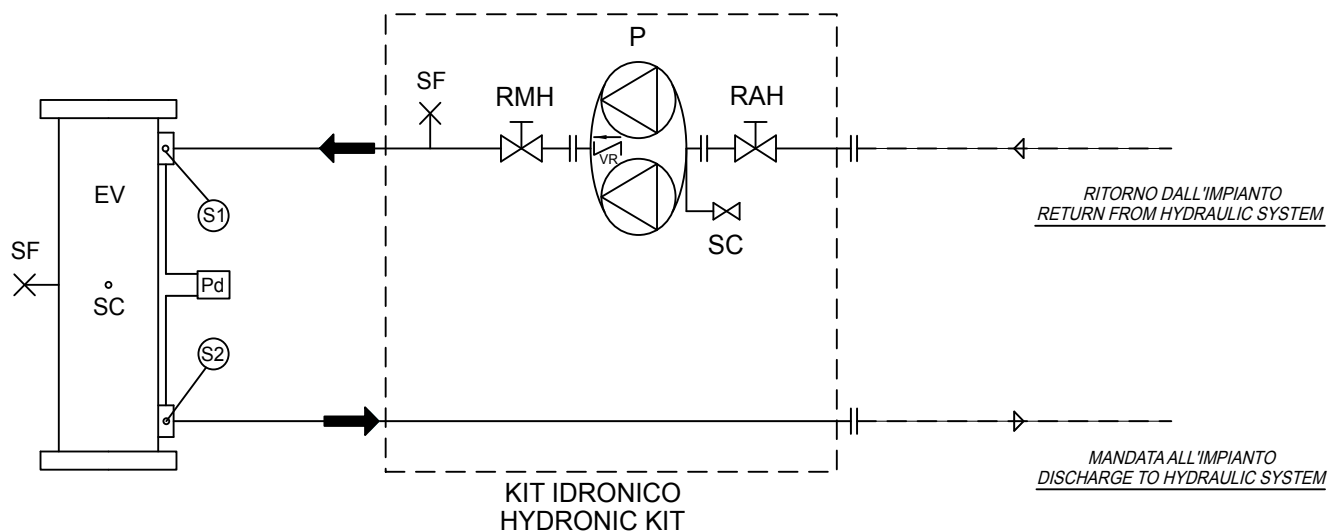
BP Low head pumps

AP High head pumps



HYDRONIC GROUP (Optional)

Hydraulic diagram IN-LINE water pump



LEGENDA - LEGEND

COMPONENTI DEL KIT IDRONICO
COMPONENTS OF THE HYDRONIC KIT

EV	Scambiatore freddo lato utenza (scambiatore a fascio tubiero) Plant side cold heat exchanger (tube exchanger)
P	Pompa gemellare Twin rotor pump
Pd	Pressostato differenziale lato acqua Water Differential pressure switch
VR	Valvola di ritegno (interna alla pompa) Check valve (pump inside)
RAH	Rubinetto aspirazione Pump suction valve
RMH	Rubinetto mandata Pump discharge valve
SC	Valvola di scarico Drain valve
SF	Valvola di sfiato Purge valve
S1	Sonda ingresso acqua scambiatore Exchanger water inlet probe
S2	Sonda uscita acqua scambiatore Exchanger water outlet probe

HYDRONIC GROUP (Optional)

COLD CIRCUIT - 2 PUMPS - 2 Poli - HIGH HEAD PUMP

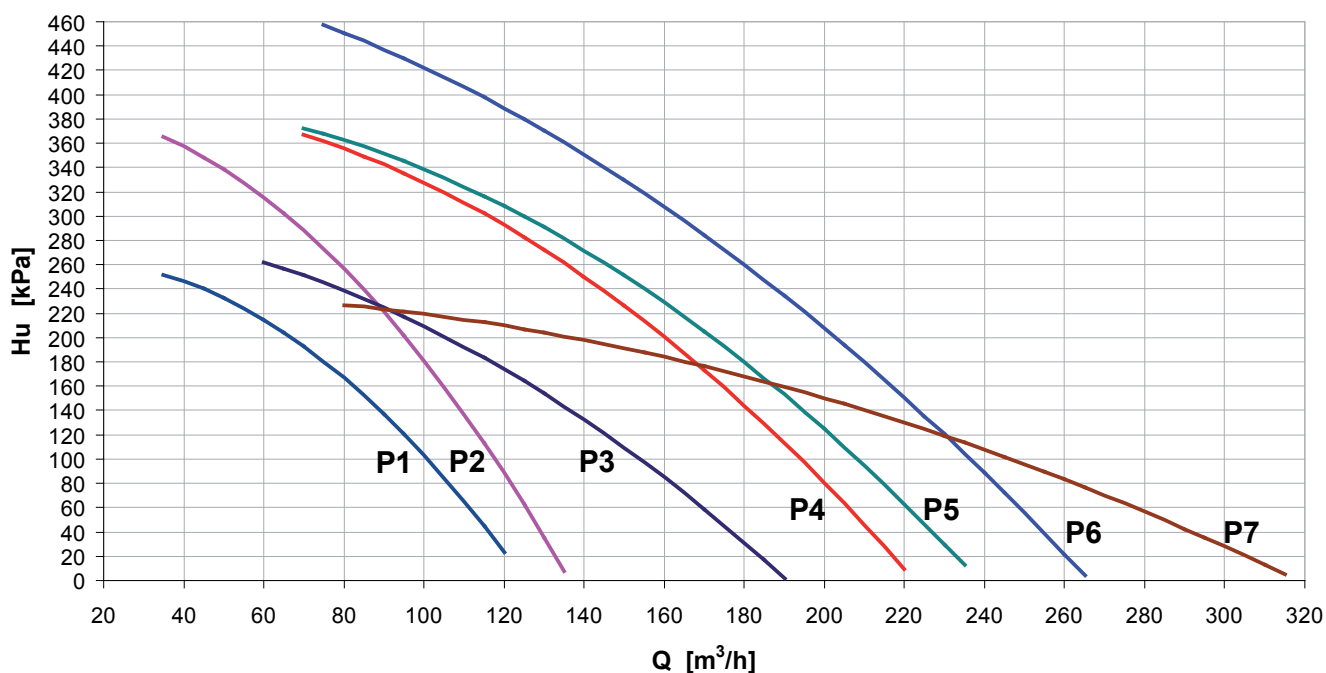
SIZE	Pf (1) [kW]	Q (1) [m ³ /h]	Rif. Pump	Pump		N. Poli	F.L.I. [kW]	F.L.A. [A]	Ks	Dps kPa	Hu kPa
2022	459	78,9	P1	FCTE 80-160/75	IN - LINE	2	7,5	13,7	8,2	50	172
2222	503	86,5	P2	FCTE 80-200/110	IN - LINE	2	11	20	7,8	57	236
2422	538	92,5	P2	FCTE 80-200/110	IN - LINE	2	11	20	7,8	66	213
2622	586	101	P3	FCTE 100-160/110	IN - LINE	2	11	20	3,7	37	197
2722	672	116	P3	FCTE 100-160/110	IN - LINE	2	11	20	3,6	48	168
3222	803	138	P4	FCTE 100-200/185	IN - LINE	2	18,5	32,8	3,1	58	249
3622	928	160	P5	FCTE 100-200/185	IN - LINE	2	18,5	32,8	2,1	52	223
4222	1041	179	P6	FCTE 100-200/220	IN - LINE	2	22	38,7	2,1	65	248
4822	1162	200	P7	FCTS4 150-250/185	IN - LINE	4	18,5	37	1,3	51	152

(1) Values refer to rated operating conditions
 Pf Cooling capacity of unit
 Q Flow of water to evaporator
 F.L.I. Power absorbed by pump
 F.L.A. Current absorbed by pump

Ks Total coefficient for the calculation of loss of power with double pump (one on stand-by)
 Dps Total pressure drop in water circuit (evaporator and pipes)
 Hu Residual head

WORKING HEAD CURVES

FOCS-N 2022 - 4822



HYDRONIC GROUP (Optional)

COLD CIRCUIT - 2 PUMPS - 2 Poli - LOW HEAD PUMP

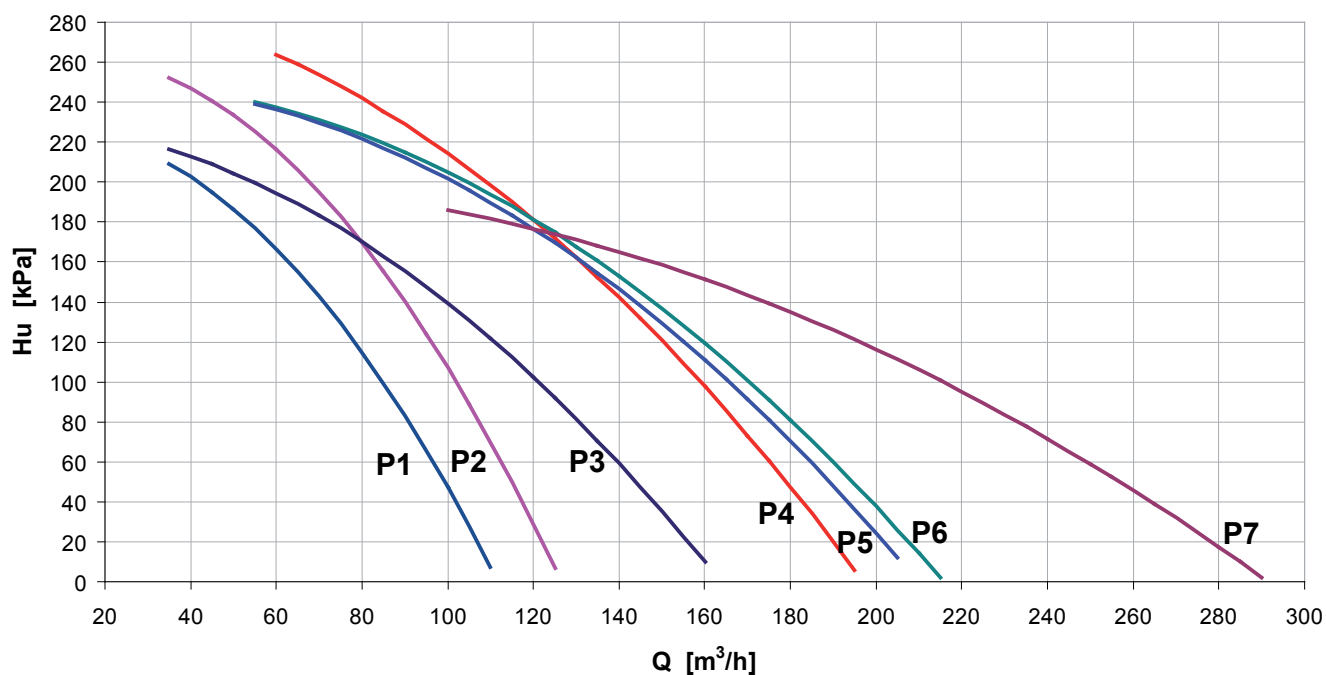
SIZE	Pf (1) [kW]	Q (1) [m ³ /h]	Rif. Pump	Pump		N. Poli	F.L.I. [kW]	F.L.A. [A]	Ks	Dps kPa	Hu kPa
2022	459	78,9	P1	FCTE 80-125/55	IN - LINE	2	5,5	10,1	8,2	50	120
2222	503	86,5	P1	FCTE 80-125/55	IN - LINE	2	5,5	10,1	7,8	57	99
2422	538	92,5	P2	FCTE 80-160/75	IN - LINE	2	7,5	13,7	7,8	66	135
2622	586	101	P3	FCTE4 100-250/75	IN - LINE	4	7,5	15,3	3,7	37	126
2722	672	116	P3	FCTE4 100-250/75	IN - LINE	4	7,5	15,3	3,6	48	99
3222	803	138	P4	FCTE 100-160/110	IN - LINE	2	11	22,5	3,1	58	124
3622	928	160	P5	FCTS4 125-250/110	IN - LINE	4	11	22,5	1,8	45	120
4222	1041	179	P6	FCTS4 125-250/110	IN - LINE	4	11	22,5	1,8	57	83
4822	1162	200	P7	FCTS4 150-250/150	IN - LINE	4	15	30	1,3	51	117

(1) Values refer to rated operating conditions
 Pf Cooling capacity of unit
 Q Flow of water to evaporator
 F.L.I. Power absorbed by pump
 F.L.A. Current absorbed by pump

Ks Total coefficient for the calculation of loss of power with double pump (one on stand-by)
 Dps Total pressure drop in water circuit (evaporator and pipes)
 Hu Residual head

WORKING HEAD CURVES

FOCS-N 2022 - 4822



HYDRONIC GROUP (Optional)

COLD CIRCUIT - 2 PUMPS - 4 Poli - HIGH HEAD PUMP

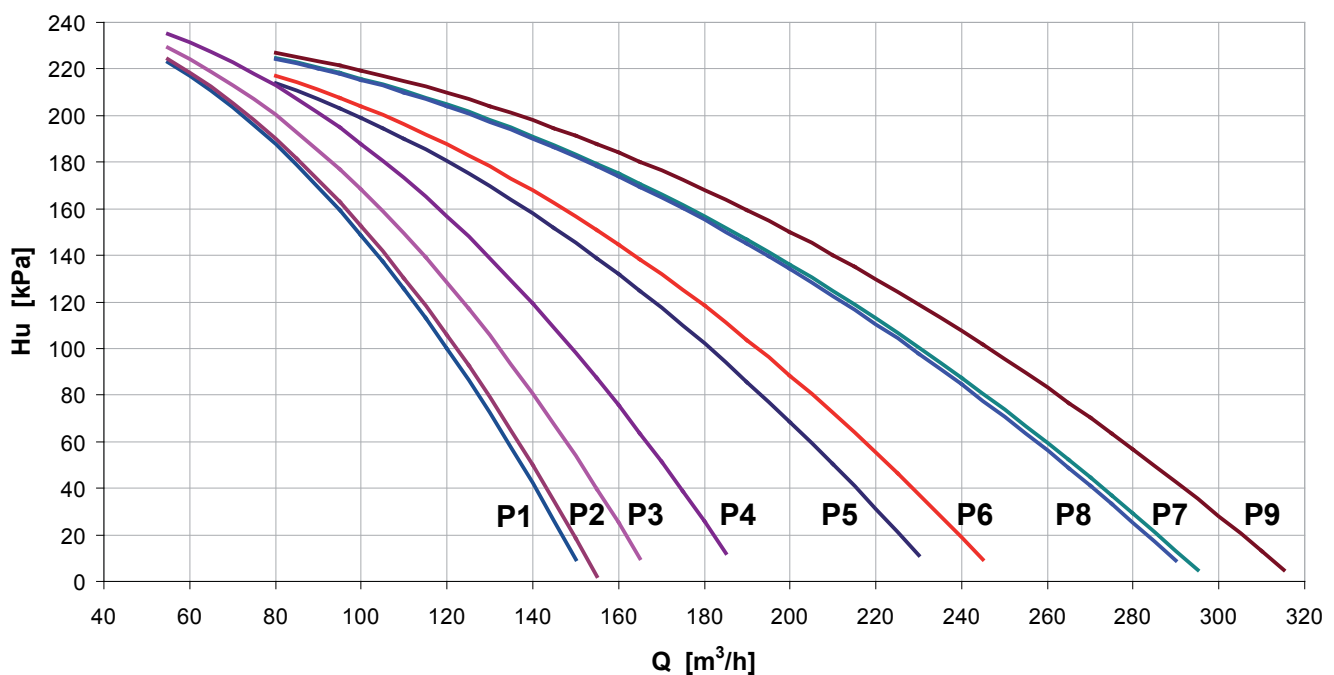
SIZE	Pf (1) [kW]	Q (1) [m ³ /h]	Rif. Pump	Pump		N. Poli	F.L.I. [kW]	F.L.A. [A]	Ks	Dps kPa	Hu kPa
2022	459	78,9	P1	FCTS4 125-250/110	IN - LINE	4	22,5	7,4	7,4	45	190
2222	503	86,5	P2	FCTS4 125-250/110	IN - LINE	4	22,5	7,0	7,0	51	179
2422	538	92,5	P3	FCTS4 125-250/110	IN - LINE	4	22,5	5,4	5,4	46	182
2622	586	101	P4	FCTS4 125-250/110	IN - LINE	4	22,5	3,5	3,5	34	187
2722	672	116	P5	FCTS4 150-250/185	IN - LINE	4	37	3,3	3,3	44	185
3222	803	138	P6	FCTS4 150-250/185	IN - LINE	4	37	2,8	2,8	53	171
3622	928	160	P7	FCTS4 150-250/185	IN - LINE	4	37	1,7	1,7	42	175
4222	1041	179	P8	FCTS4 150-250/185	IN - LINE	4	37	1,7	1,7	53	158
4822	1162	200	P9	FCTS4 150-250/185	IN - LINE	4	37	1,3	1,3	51	152

(1) Values refer to rated operating conditions
 Pf Cooling capacity of unit
 Q Flow of water to evaporator
 F.L.I. Power absorbed by pump
 F.L.A. Current absorbed by pump

Ks Total coefficient for the calculation of loss of power with double pump (one on stand-by)
 Dps Total pressure drop in water circuit (evaporator and pipes)
 Hu Residual head

WORKING HEAD CURVES

FOCS-N 2022 - 4822



HYDRONIC GROUP (Optional)

COLD CIRCUIT - 2 PUMPS - 2 Poli - LOW HEAD PUMP

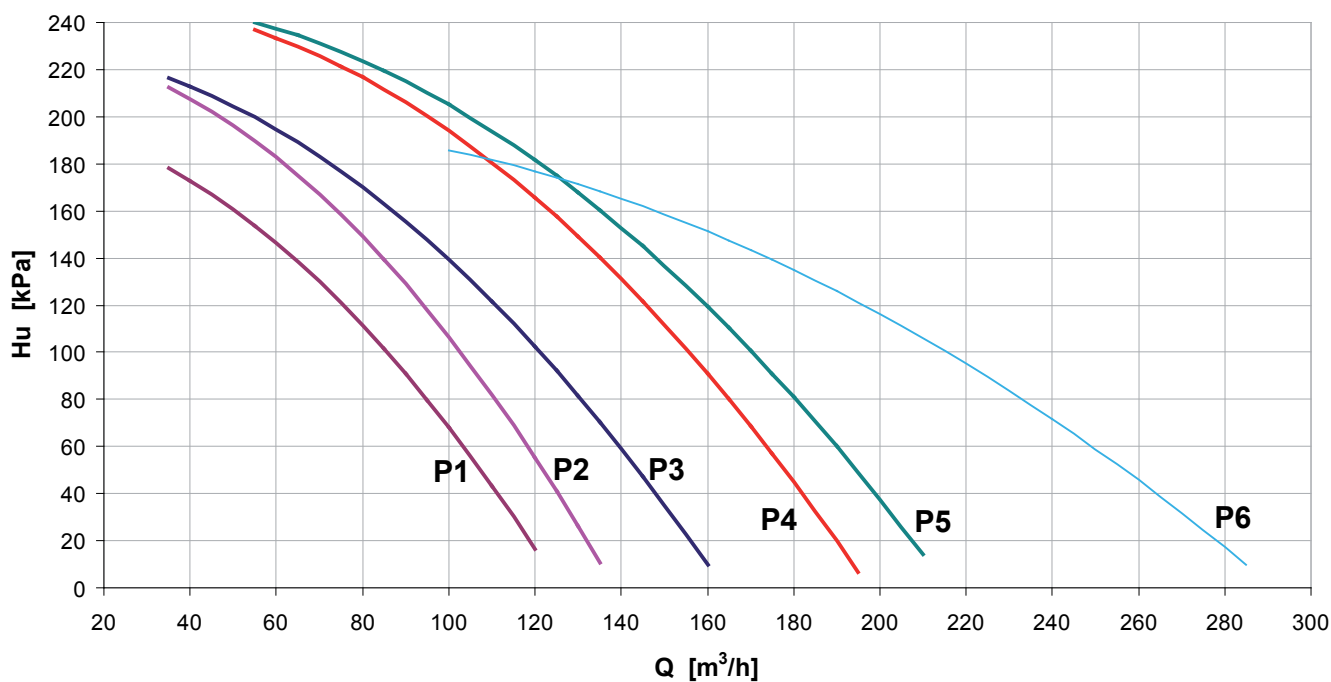
SIZE	Pf (1) [kW]	Q (1) [m ³ /h]	Rif. Pump	Pump		N. Poli	F.L.I. [kW]	F.L.A. [A]	Ks	Dps kPa	Hu kPa
2022	459	78,9	P1	FCTE4 100-250/55	IN - LINE	4	5,5	11,4	7,3	45	104
2222	503	86,5	P1	FCTE4 100-250/55	IN - LINE	4	5,5	11,4	6,9	51	92
2422	538	92,5	P2	FCTE4 100-250/75	IN - LINE	4	7,5	15,3	6,9	58	114
2622	586	101	P3	FCTE4 100-250/75	IN - LINE	4	7,5	15,3	3,7	37	126
2722	672	116	P3	FCTE4 100-250/75	IN - LINE	4	7,5	15,3	3,6	48	99
3222	803	138	P4	FCTS4 125-250/110	IN - LINE	4	11	22,5	2,8	53	136
3622	928	160	P5	FCTS4 125-250/110	IN - LINE	4	11	22,5	1,8	45	120
4222	1041	179	P5	FCTS4 125-250/110	IN - LINE	4	11	22,5	1,8	57	83
4822	1162	200	P6	FCTS4 150-250/150	IN - LINE	4	15	30	1,3	51	117

(1) Values refer to rated operating conditions
 Pf Cooling capacity of unit
 Q Flow of water to evaporator
 F.L.I. Power absorbed by pump
 F.L.A. Current absorbed by pump

Ks Total coefficient for the calculation of loss of power with double pump (one on stand-by)
 Dps Total pressure drop in water circuit (evaporator and pipes)
 Hu Residual head

WORKING HEAD CURVES

FOCS-N 2022 - 4822



SIZE	Maximum values								
	Compressor				Fans (1)		Total (1) (2)		
	n	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]	F.L.I. [kW]	F.L.A. [A]	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]
2022	2	2x85,4	2x137	2x246	2	3.8	191	312	377
2222	2	1x85,4 + 1x100,7	1x137 + 1x164,6	1x246 + 1x300	2	3.8	210	347	439
2422	2	2x100,7	2x164,6	2x300	2	3.8	225	375	449
2622	2	2x111,6	2x183,5	2x360	2	3.8	247	413	534
2722	2	2x127,3	2x208	2x404	2	3.8	283	469	589
3222	2	2x145,3	2x235	2x436	2	3.8	323	531	658
3622	2	2x170,7	2x272	2x465	2	3.8	381	620	706
4222	2	2x191,1	2x310	2x586	2	3.8	422	696	876
4822	2	2x217	2x351	2x650	2	3.8	482	793	957

F.L.I.: Full load power

F.L.A.: Full load current

L.R.A.: Locked rotor amperes for single compressor

S.A.: Inrush current

(1) Values calculated referring to the version with the maximum number of fans working at the max absorbed current

(1) (2) Safety values to be considered when cabling the unit for power supply and line-protections

Power supply: 400/3/50+N

Voltage tolerance: 10%

Maximum voltage unbalance: 3%

Give the typical operating conditions of units designed for outdoor installation, which can be associated (according to reference document IEC 60721) to the following classes:

- climatic conditions class 4K4H: air temperature range from -20 up to 55°C (*), relative humidity range from 4 up to 100%, with possible precipitations, at air pressure from 70 and 106 kPa and a maximum solar radiation of 1120 W/m²
- special climatic conditions negligible
- biological conditions class 4B1 and 4C2: locations in a generic urban area
- mechanically active substances class 4S2: locations in areas with sand or dust representative of urban areas
- mechanical conditions class 4M1: locations protected from significant vibrations or shocks

The required protection level for safe operation, according to reference document IEC 60529, is IP43XW (protection against access, to the most critical unit's parts, of external devices with diameter larger than 1 mm and rain).

The unit can be considered IP44XW protected, i.e. protected against access of external devices (with diameter larger than 1 mm) and water in general.

(*) for the unit's operating limits, see "selection limits" section

SIZE	Maximum values								
	Compressor				Fans (1)		Total (1) (2)		
	n	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]	F.L.I. [kW]	F.L.A. [A]	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]
2022	2	2x85,4	2x137	2x246	2	3.8	191	312	377
2222	2	1x85,4 + 1x100,7	1x137 + 1x164,6	1x246 + 1x300	2	3.8	210	347	439
2422	2	2x100,7	2x164,6	2x300	2	3.8	225	375	449
2622	2	2x111,6	2x183,5	2x360	2	3.8	247	413	534
2722	2	2x127,3	2x208	2x404	2	3.8	283	469	589
3222	2	2x145,3	2x235	2x436	2	3.8	323	531	658
3622	2	2x170,7	2x272	2x465	2	3.8	381	620	706
4222	2	2x191,1	2x310	2x586	2	3.8	430	711	891
4822	2	2x217	2x351	2x650	2	3.8	482	793	957

F.L.I.: Full load power

F.L.A.: Full load current

L.R.A.: Locked rotor amperes for single compressor

S.A.: Inrush current

(1) Values calculated referring to the version with the maximum number of fans working at the max absorbed current

(1) (2) Safety values to be considered when cabling the unit for power supply and line-protections

Power supply: 400/3/50+N

Voltage tolerance: 10%

Maximum voltage unbalance: 3%

Give the typical operating conditions of units designed for outdoor installation, which can be associated (according to reference document IEC 60721) to the following classes:

- climatic conditions class 4K4H: air temperature range from -20 up to 55°C (*), relative humidity range from 4 up to 100%, with possible precipitations, at air pressure from 70 and 106 kPa and a maximum solar radiation of 1120 W/m²
- special climatic conditions negligible
- biological conditions class 4B1 and 4C2: locations in a generic urban area
- mechanically active substances class 4S2: locations in areas with sand or dust representative of urban areas
- mechanical conditions class 4M1: locations protected from significant vibrations or shocks

The required protection level for safe operation, according to reference document IEC 60529, is IP43XW (protection against access, to the most critical unit's parts, of external devices with diameter larger than 1 mm and rain).

The unit can be considered IP44XW protected, i.e. protected against access of external devices (with diameter larger than 1 mm) and water in general.

(*) for the unit's operating limits, see "selection limits" section

SIZE	Maximum values								
	Compressor				Fans (1)		Total (1) (2)		
	n	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]	F.L.I. [kW]	F.L.A. [A]	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]
2022	2	2x85,4	2x137	2x246	2	3.8	191	312	377
2222	2	1x85,4 + 1x100,7	1x137 + 1x164,6	1x246 + 1x300	2	3.8	210	347	439
2422	2	2x100,7	2x164,6	2x300	2	3.8	225	375	449
2622	2	2x111,6	2x183,5	2x360	2	3.8	247	413	534
2722	2	2x127,3	2x208	2x404	2	3.8	283	469	589
3222	2	2x145,3	2x235	2x436	2	3.8	323	531	658
3622	2	2x170,7	2x272	2x465	2	3.8	381	620	706
4222	2	2x191,1	2x310	2x586	2	3.8	430	711	891
4822	2	2x217	2x351	2x650	2	3.8	482	793	957

F.L.I.: Full load power

F.L.A.: Full load current

L.R.A.: Locked rotor amperes for single compressor

S.A.: Inrush current

(1) Values calculated referring to the version with the maximum number of fans working at the max absorbed current

(1) (2) Safety values to be considered when cabling the unit for power supply and line-protections

Power supply: 400/3/50+N

Voltage tolerance: 10%

Maximum voltage unbalance: 3%

Give the typical operating conditions of units designed for outdoor installation, which can be associated (according to reference document IEC 60721) to the following classes:

- climatic conditions class 4K4H: air temperature range from -20 up to 55°C (*), relative humidity range from 4 up to 100%, with possible precipitations, at air pressure from 70 and 106 kPa and a maximum solar radiation of 1120 W/m²
- special climatic conditions negligible
- biological conditions class 4B1 and 4C2: locations in a generic urban area
- mechanically active substances class 4S2: locations in areas with sand or dust representative of urban areas
- mechanical conditions class 4M1: locations protected from significant vibrations or shocks

The required protection level for safe operation, according to reference document IEC 60529, is IP43XW (protection against access, to the most critical unit's parts, of external devices with diameter larger than 1 mm and rain).

The unit can be considered IP44XW protected, i.e. protected against access of external devices (with diameter larger than 1 mm) and water in general.

(*) for the unit's operating limits, see "selection limits" section

SIZE	Maximum values								
	Compressor				Fans (1)		Total (1) (2)		
	n	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]	F.L.I. [kW]	F.L.A. [A]	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]
2022	2	2x85,4	2x137	2x246	2	3.8	191	312	377
2222	2	1x85,4 + 1x100,7	1x137 + 1x164,6	1x246 + 1x300	2	3.8	210	347	439
2422	2	2x100,7	2x164,6	2x300	2	3.8	225	375	449
2622	2	2x111,6	2x183,5	2x360	2	3.8	247	413	534
2722	2	2x127,3	2x208	2x404	2	3.8	283	469	589
3222	2	2x145,3	2x235	2x436	2	3.8	323	531	658
3622	2	2x170,7	2x272	2x465	2	3.8	381	620	706
4222	2	2x191,1	2x310	2x586	2	3.8	430	711	891
4822	2	2x217	2x351	2x650	2	3.8	482	793	957

F.L.I.: Full load power

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L.R.A.: Locked rotor amperes for single compressor

S.A.: Inrush current

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The unit can be considered IP44XW protected, i.e. protected against access of external devices (with diameter larger than 1 mm) and water in general.

(*) for the unit's operating limits, see "selection limits" section

SOUND POWER									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound power level dB								
2022	90	97	98	97	95	89	82	72	99
2222	92	99	100	99	97	91	84	74	101
2422	92	99	100	99	97	91	84	74	101
2622	92	99	100	99	97	91	84	74	101
2722	92	99	100	99	97	91	84	74	101
3222	93	100	101	100	98	92	85	75	102
3622	93	100	101	100	98	92	85	75	102
4222	95	102	103	102	100	94	87	77	104
4822	95	102	103	102	100	94	87	77	104

Working conditions

Plant (side) cooling exchanger water (in/out) 12/7 °C

Heat exchanger air (in) 35 °C

Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units;

in compliance with ISO 3744 for non-certified units

Such certification refers specifically to the sound Power Level in dB(A). This is therefore the only acoustic data to be considered as binding.

SOUND PRESSURE LEVEL									
SIZE	Octave band [Hz] at 10 m								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound pressure level dB								
2022	58	65	66	65	63	57	50	40	67
2222	60	67	68	67	65	59	52	42	69
2422	60	67	68	67	65	59	52	42	69
2622	60	67	68	67	65	59	52	42	69
2722	59	66	67	66	64	58	51	41	68
3222	60	67	68	67	65	59	52	42	69
3622	60	67	68	67	65	59	52	42	69
4222	62	69	70	69	67	61	54	44	71
4822	62	69	70	69	67	61	54	44	71

Working conditions

Plant (side) cooling exchanger water (in/out) 12/7 °C

Heat exchanger air (in) 35 °C

Average sound pressure level, at 10 (m.) distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level

SOUND POWER									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound power level dB								
2022	90	97	98	97	95	89	82	72	99
2222	92	99	100	99	97	91	84	74	101
2422	92	99	100	99	97	91	84	74	101
2622	92	99	100	99	97	91	84	74	101
2722	92	99	100	99	97	91	84	74	101
3222	93	100	101	100	98	92	85	75	102
3622	93	100	101	100	98	92	85	75	102
4222	95	102	103	102	100	94	87	77	104
4822	95	102	103	102	100	94	87	77	104

Working conditions

Plant (side) cooling exchanger water (in/out) 12/7 °C

Heat exchanger air (in) 35 °C

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in compliance with ISO 3744 for non-certified units

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SOUND PRESSURE LEVEL									
SIZE	Octave band [Hz] at 10 m								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound pressure level dB								
2022	58	65	66	65	63	57	50	40	67
2222	60	67	68	67	65	59	52	42	69
2422	60	67	68	67	65	59	52	42	69
2622	60	67	68	67	65	59	52	42	69
2722	59	66	67	66	64	58	51	41	68
3222	60	67	68	67	65	59	52	42	69
3622	60	67	68	67	65	59	52	42	69
4222	62	69	70	69	67	61	54	44	71
4822	62	69	70	69	67	61	54	44	71

Working conditions

Plant (side) cooling exchanger water (in/out) 12/7 °C

Heat exchanger air (in) 35 °C

Average sound pressure level, at 10 (m.) distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level

SOUND POWER									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound power level dB								
2022	88	90	92	91	88	85	74	65	93
2222	91	93	95	92	91	86	76	67	95
2422	91	93	95	92	91	86	76	67	95
2622	91	93	95	92	91	86	76	67	95
2722	91	93	95	92	91	86	76	67	95
3222	92	94	96	93	92	87	77	68	96
3622	92	94	96	93	92	87	77	68	96
4222	94	96	98	95	94	89	79	70	98
4822	94	96	98	95	94	89	79	70	98

Working conditions

Plant (side) cooling exchanger water (in/out) 12/7 °C

Heat exchanger air (in) 35 °C

Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units;

in compliance with ISO 3744 for non-certified units

Such certification refers specifically to the sound Power Level in dB(A). This is therefore the only acoustic data to be considered as binding.

SOUND PRESSURE LEVEL									
SIZE	Octave band [Hz] at 10 m								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound pressure level dB								
2022	56	58	60	59	56	53	42	33	61
2222	59	61	63	60	59	54	44	35	63
2422	59	61	63	60	59	54	44	35	63
2622	59	61	63	60	59	54	44	35	63
2722	58	60	62	59	58	53	43	34	62
3222	59	61	63	60	59	54	44	35	63
3622	59	61	63	60	59	54	44	35	63
4222	61	63	65	62	61	56	46	37	65
4822	61	63	65	62	61	56	46	37	65

Working conditions

Plant (side) cooling exchanger water (in/out) 12/7 °C

Heat exchanger air (in) 35 °C

Average sound pressure level, at 10 (m.) distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level

SOUND POWER									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound power level dB								
2022	81	79	82	86	87	78	66	59	89
2222	83	82	86	88	89	77	66	58	91
2422	83	82	86	88	89	77	66	58	91
2622	83	82	86	88	89	77	66	58	91
2722	83	82	86	88	89	77	66	58	91
3222	84	83	87	89	90	78	67	59	92
3622	84	83	87	89	90	78	67	59	92
4222	86	85	89	91	92	80	69	61	94
4822	86	85	89	91	92	80	69	61	94

Working conditions

Plant (side) cooling exchanger water (in/out) 12/7 °C

Heat exchanger air (in) 35 °C

Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units;

in compliance with ISO 3744 for non-certified units

Such certification refers specifically to the sound Power Level in dB(A). This is therefore the only acoustic data to be considered as binding.

SOUND PRESSURE LEVEL									
SIZE	Octave band [Hz] at 10 m								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound pressure level dB								
2022	49	47	50	54	55	46	34	27	57
2222	51	50	54	56	57	45	34	26	59
2422	51	50	54	56	57	45	34	26	59
2622	51	50	54	56	57	45	34	26	59
2722	50	49	53	55	56	44	33	25	58
3222	51	50	54	56	57	45	34	26	59
3622	51	50	54	56	57	45	34	26	59
4222	53	52	56	58	59	47	36	28	61
4822	53	52	56	58	59	47	36	28	61

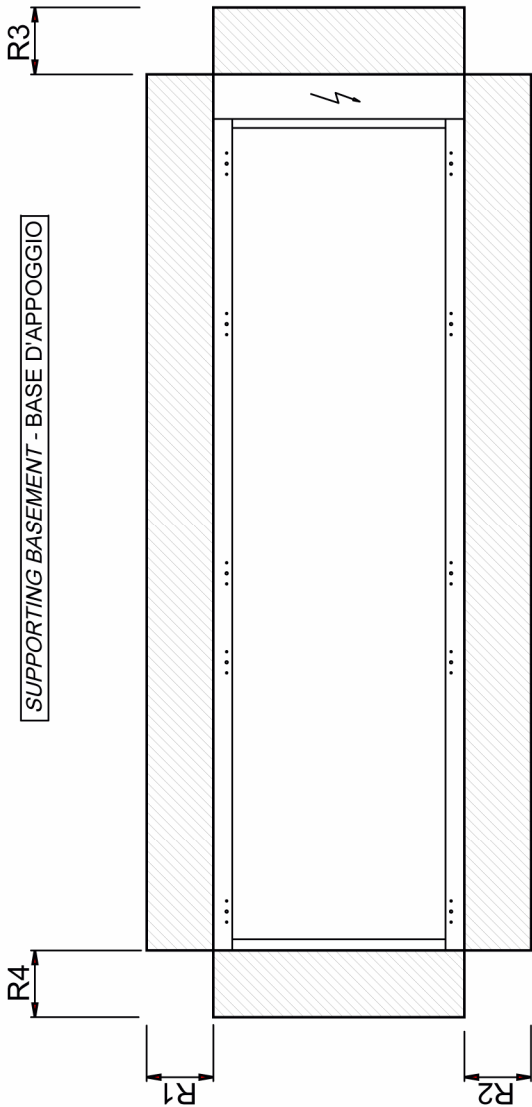
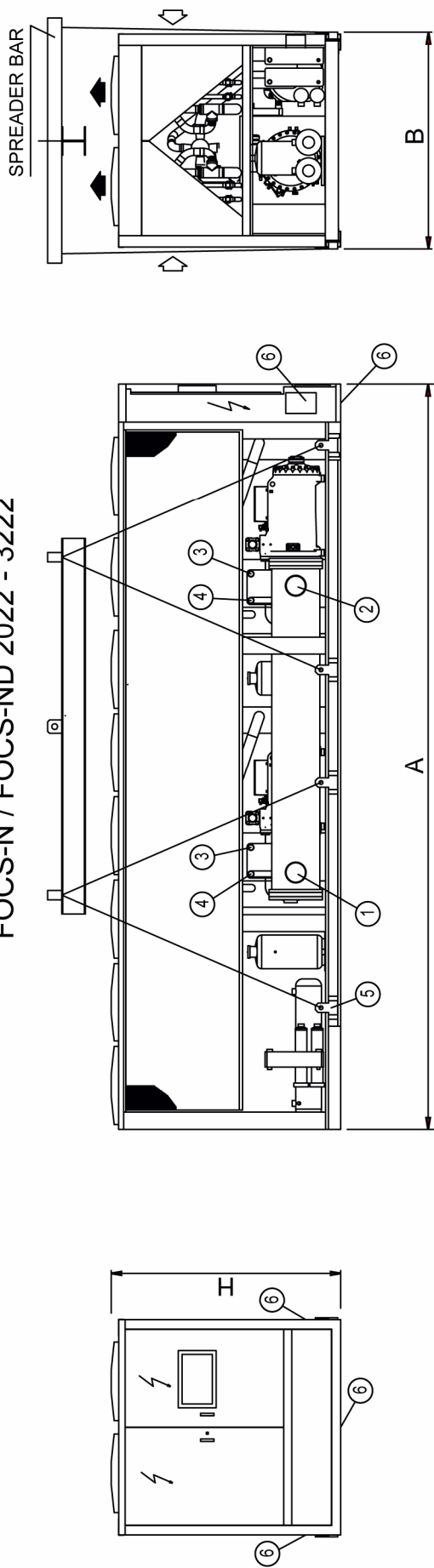
Working conditions

Plant (side) cooling exchanger water (in/out) 12/7 °C

Heat exchanger air (in) 35 °C

Average sound pressure level, at 10 (m.) distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level

FOCS-N / FOCS-ND 2022 - 3222

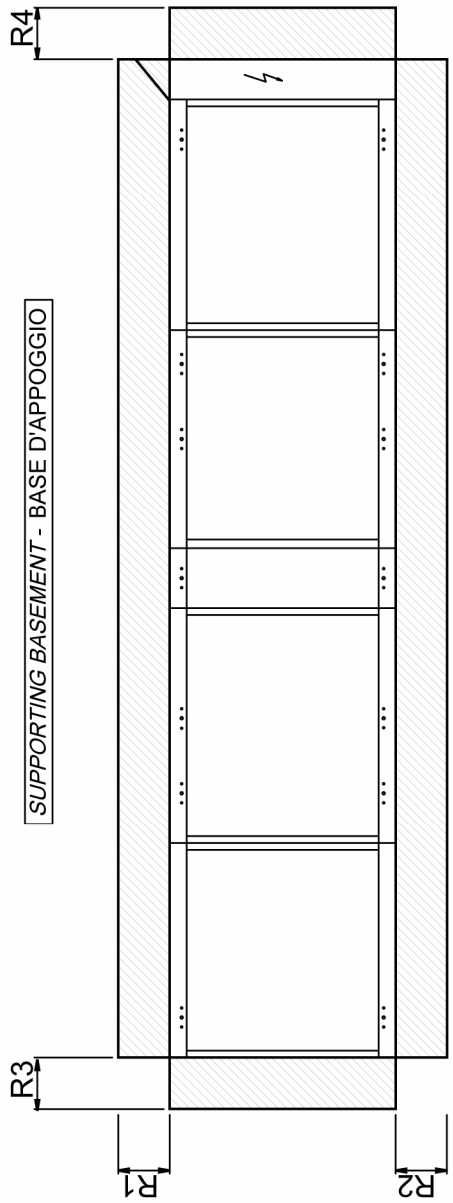
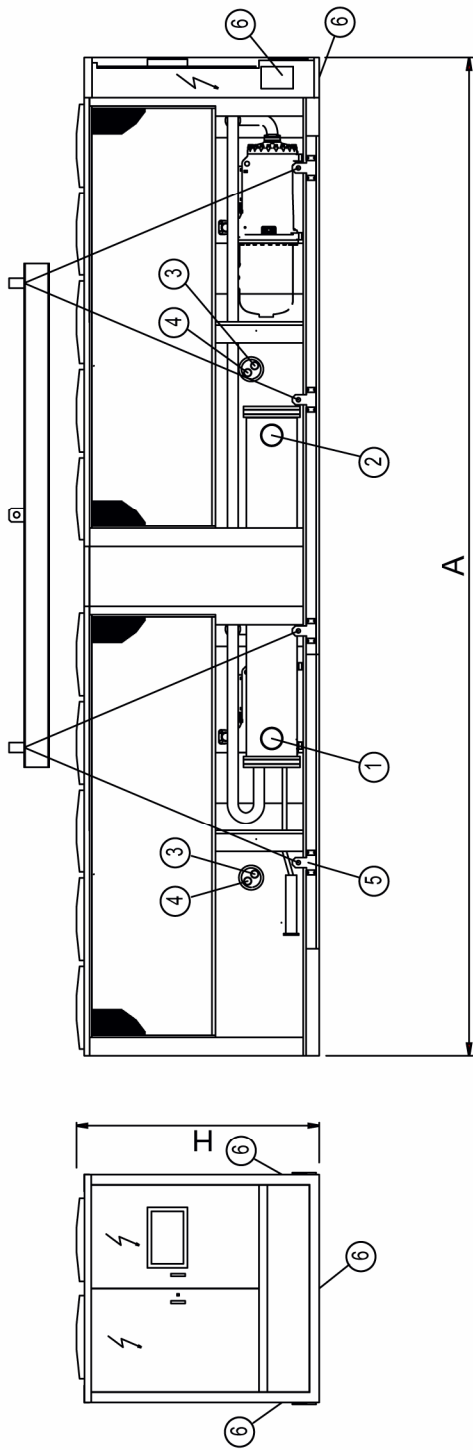
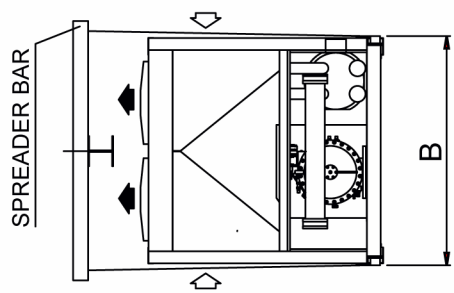


- ① EVAPORATOR WATER INLET
ENTRATA ACQUA EVAPORATORE
 - ② EVAPORATOR WATER OUTLET
USCITA ACQUA EVAPORATORE
 - ③ DESUPERHEATER WATER INLET
ENTRATA ACQUA DESURRISCALDATORE
 - ④ DESUPERHEATER WATER OUTLET
USCITA ACQUA DESURRISCALDATORE
 - ⑤ LIFTING POINTS
PUNTI DI SOLLEVAMENTO
 - ⑥ POWER INLET
INGRESSO LINEA ELETTRICA
- MINIMUM CLEARANCE
SPAZIO DI RISPETTO

"REMARKS:
For installation purposes, please refer to the documentation sent after the purchase-contract. This technical data should be considered as indicative. CLIMAVENETA may modify them at any moment."

SIZE	DIMENSIONS AND				CLEARANCE				PLANT SIDE COLD HEAT EXCHANGER		PLANT SIDE HOT HEAT EXCHANGER		AUXILIARY SIDE HEAT EXCHANGER	
	A	B	H	PESO	R1	R2	R3	R4	IN/OUT		IN/OUT		IN/OUT	
	[mm]	[mm]	[mm]	[kg]	[mm]	[mm]	[mm]	[mm]	TYPE	Ø	TYPE	Ø	TYPE	Ø
FOCS-N /B 2022	4900	2260	2430	5900	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /B 2222	5800	2260	2430	6330	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /B 2422	5800	2260	2430	6420	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /B 2622	5800	2260	2430	6660	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /B 2722	7000	2260	2430	7290	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /B 3222	7900	2260	2430	9390	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /CA 2022	4900	2260	2430	6050	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /CA 2222	5800	2260	2430	6630	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /CA 2422	5800	2260	2430	6710	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /CA 2622	5800	2260	2430	6950	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /CA 2722	7000	2260	2430	7480	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /CA 3222	7900	2260	2430	9620	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /LN-CA 2022	4900	2260	2430	6120	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /LN-CA 2222	5800	2260	2430	6610	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /LN-CA 2422	5800	2260	2430	6700	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /LN-CA 2622	5800	2260	2430	6930	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /LN-CA 2722	7000	2260	2430	7580	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /LN-CA 3222	7900	2260	2430	9730	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /SL-CA 2022	4900	2260	2430	6190	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /SL-CA 2222	5800	2260	2430	6680	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /SL-CA 2422	5800	2260	2430	6770	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	-	-
FOCS-N /SL-CA 2622	5800	2260	2430	7010	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /SL-CA 2722	7000	2260	2430	7650	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /SL-CA 3222	7900	2260	2430	9820	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /D /B 2022	4900	2260	2430	5960	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /B 2222	5800	2260	2430	6390	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /B 2422	5800	2260	2430	6480	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /B 2622	5800	2260	2430	6730	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"
FOCS-N /D /B 2722	7000	2260	2430	7360	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"
FOCS-N /D /B 3222	7900	2260	2430	9470	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"
FOCS-N /D /CA 2022	4900	2260	2430	6110	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /CA 2222	5800	2260	2430	6690	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /CA 2422	5800	2260	2430	6770	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /CA 2622	5800	2260	2430	7020	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"
FOCS-N /D /CA 2722	7000	2260	2430	7550	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"
FOCS-N /D /CA 3222	7900	2260	2430	9700	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"
FOCS-N /D /LN-CA 2022	4900	2260	2430	6180	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /LN-CA 2222	5800	2260	2430	6670	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /LN-CA 2422	5800	2260	2430	6760	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /LN-CA 2622	5800	2260	2430	7000	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"
FOCS-N /D /LN-CA 2722	7000	2260	2430	7650	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"
FOCS-N /D /LN-CA 3222	7900	2260	2430	9810	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"
FOCS-N /D /SL-CA 2022	4900	2260	2430	6250	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /SL-CA 2222	5800	2260	2430	6740	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /SL-CA 2422	5800	2260	2430	6830	2000	2000	1800	1500	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	6"	FLEXIBLE JOINT	2"
FOCS-N /D /SL-CA 2622	5800	2260	2430	7080	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"
FOCS-N /D /SL-CA 2722	7000	2260	2430	7720	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"
FOCS-N /D /SL-CA 3222	7900	2260	2430	9900	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	2"

FOCS-N / FOCS-ND 3622 - 4822



- ① EVAPORATOR WATER INLET
ENTRATA ACQUA EVAPORATORE
- ② EVAPORATOR WATER OUTLET
USCITA ACQUA EVAPORATORE
- ③ DESUPERHEATER WATER INLET
ENTRATA ACQUA DESURRISCALDATORE
- ④ DESUPERHEATER WATER OUTLET
USCITA ACQUA DESURRISCALDATORE
- ⑤ LIFTING POINTS
PUNTI DI SOLLEVAMENTO
- ⑥ POWER INLET
INGRESSO LINEA ELETTRICA
- MINIMUM CLEARANCE
SPAZIO DI RISPETTO

"REMARKS:
For installation purposes, please refer to the documentation sent after the purchase-contract. This technical data should be considered as indicative. CLIMAVENETA may modify them at any moment."

SIZE	DIMENSIONS AND				CLEARANCE				PLANT SIDE COLD HEAT EXCHANGER		PLANT SIDE HOT HEAT EXCHANGER		AUXILIARY SIDE HEAT EXCHANGER	
	A	B	H	PESO	R1	R2	R3	R4	IN/OUT		IN/OUT		IN/OUT	
	[mm]	[mm]	[mm]	[kg]	[mm]	[mm]	[mm]	[mm]	TYPE	Ø	TYPE	Ø	TYPE	Ø
FOCS-N /B 3622	1000	2260	2430	10400	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /B 4222	1000	2260	2430	10700	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /B 4822	1180	2260	2430	11310	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /CA 3622	1000	2260	2430	10650	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /CA 4222	1180	2260	2430	11260	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /CA 4822	1180	2260	2430	11690	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /LN-CA 3622	1000	2260	2430	10800	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /LN-CA 4222	1180	2260	2430	11400	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /LN-CA 4822	1180	2260	2430	11860	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /SL-CA 3622	1000	2260	2430	10890	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /SL-CA 4222	1180	2260	2430	11510	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /SL-CA 4822	1180	2260	2430	11950	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	-	-
FOCS-N /D /B 3622	1000	2260	2430	10700	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2
FOCS-N /D /B 4222	1000	2260	2430	11000	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2
FOCS-N /D /B 4822	1180	2260	2430	11630	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2
FOCS-N /D /CA 3622	1000	2260	2430	10950	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2
FOCS-N /D /CA 4222	1180	2260	2430	11560	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2
FOCS-N /D /CA 4822	1180	2260	2430	12010	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2
FOCS-N /D /LN-CA 3622	1000	2260	2430	11100	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2
FOCS-N /D /LN-CA 4222	1180	2260	2430	11700	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2
FOCS-N /D /LN-CA 4822	1180	2260	2430	12180	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2
FOCS-N /D /SL-CA 3622	1000	2260	2430	11190	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2
FOCS-N /D /SL-CA 4222	1180	2260	2430	11810	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2
FOCS-N /D /SL-CA 4822	1180	2260	2430	12270	2000	2000	1800	1500	FLEXIBLE JOINT	8"	FLEXIBLE JOINT	8"	GAS	2"1/2

LEGEND OF PIPE CONNECTIONS

UNI ISO 228/1

Pipe threads where pressure-tight joints are not made on the threads - Designation, dimensions and tolerances

Used terminology:

G: Pipe threads where pressure-tight joints are not made on the threads

A: Close tolerance class for external pipe threads where pressure-tight joints are not made on the threads

B: Wider tolerance class for external pipe threads where pressure-tight joints are not made on the threads

Internal threads: G letter followed by thread mark (only tolerance class)

External threads: G letter followed by thread mark and by A letter for A class external threads or by B letter for B class external threads.

UNI ISO 7/1

Pipe threads where pressure-tight joints are made on the threads - Designation, dimensions and tolerances

Used terminology:

Rp: Internal cylindrical threads where pressure-tight joints are made on the threads

Rc: Internal conical threads where pressure-tight joints are made on the threads

R: External conical threads where pressure-tight joints are made on the threads

Internal cylindrical threads: R letter followed by p letter

Internal conical threads: R letter followed by c letter

External conical threads: R letter

Designation	Description
UNI ISO 7/1 - Rp 1 1/2	Internal cylindrical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional $\varnothing$ 1 1/2"
UNI ISO 7/1 - Rp 2 1/2	Internal cylindrical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional $\varnothing$ 2 1/2"
UNI ISO 7/1 - Rp 3	Internal cylindrical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional $\varnothing$ 3"
UNI ISO 7/1 - R 3	External conical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional $\varnothing$ 3"
UNI ISO 228/1 - G 4 B	Internal cylindrical threads where pressure-tight joints are not made on the threads, defined by standard UNI ISO 228/1 Tolerance class B for external thread Conventional $\varnothing$ 4"
DN 80 PN 16	Flange Nominal Diameter: 80 mm Nominal Pressure: 16 bar

Notes:

Conventional diameter value [in inches] identifies short thread designation, based upon the relative standard.

All relative values are defined by standards.

As example, here below some values:

	UNI ISO 7/1	UNI ISO 228/1
Conventional $\varnothing$	1"	1"
Pitch	2.309 mm	2.309 mm
External $\varnothing$	33.249 mm	33.249 mm
Core $\varnothing$	30.291 mm	30.291 mm
Thread height	1.479 mm	1.479 mm

9. VARIABLE FLOW HYDRONIC GROUP (optional)

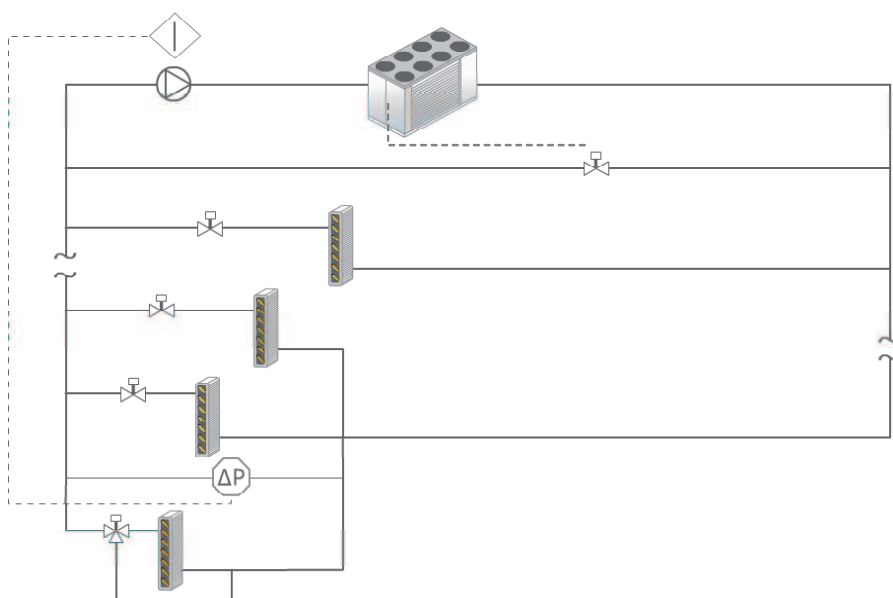
9.1 VPF systems: plants designed with a single variable flow hydraulic circuit

The energy consumption associated with fluid circulation weighs heavily on the total operating costs of a large installation, especially when the units work at part load, and even more, when they are in stand-by. Under these conditions, although the power absorbed by the compressors and fans is reduced, the power consumed for water circulation remains high.

The FOCS-N permits reduction in system power consumption using pumps with continuous flow control by inverter. Energy savings are considerable and immediately evident, to the extent that an Δx reduction of the flow of water to be delivered to the system amounts to a proportional reduction of $(\Delta x)^3$ in the power absorbed.

These pumps can be selected as high or low head accessory pumps controlled by inverter. In the most advanced systems (see the simplified model shown in the diagram below), these become the pumps for the entire hydraulic circuit, and this eliminates the need to detach the primary from the secondary circuit for the purpose of water circulation throughout the entire

system. Previously this was the only choice possible in traditional systems, and imposed primarily by the need for the chiller to work with constant water flows through the evaporator. Now, thanks to the FOCS-N units, designers need no longer worry about this limitation. The unit has been designed to work at maximum efficiency even with variable flows to the evaporator and managing the resources independently adjust itself in order to keep the outlet water temperature constantly at the set-point entered by the user. This simplifies the design and realisation of variable flow systems and offers advantages in terms of both reductions in consumption and hydraulic circuit sizing. The integration of pumps + inverters in the unit permits significant savings in space, circuit components, and system start-up times. In short, in addition to energy saving and consequently lower running costs, this innovative solution enables simplification in design that ensures substantial savings in initial investment costs.

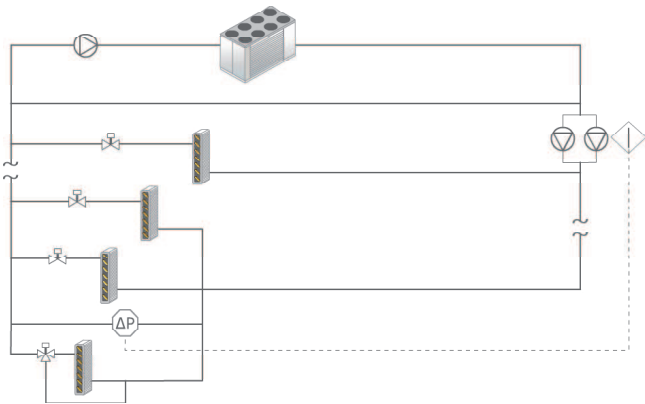


Typical scheme of a variable primary flow system
(differential pressure transducer and by-pass valve at customer charge)

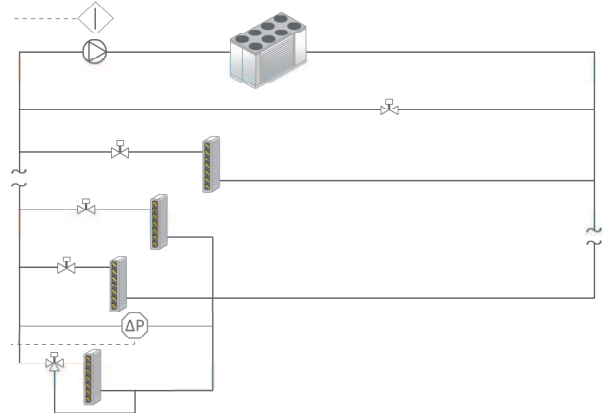
VARIABLE FLOW HYDRONIC GROUP (optional)

Working logic of “smart” plant with an only one variable primary flow circuit

Traditional plant



“Smart” plant

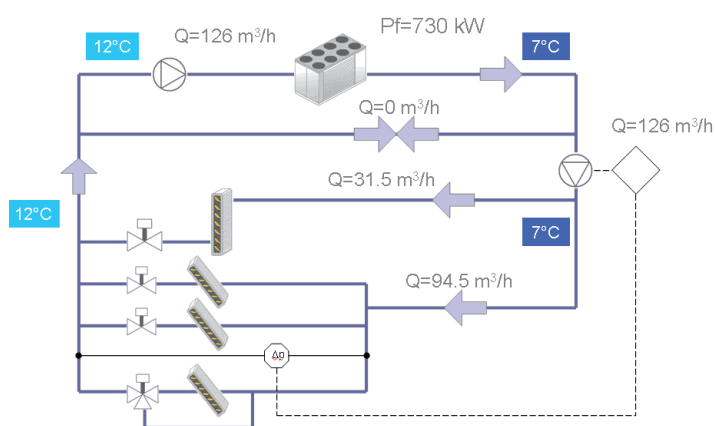


It is necessary to have a “decouple” system, which uses constant water flow through each chiller evaporator and variable water flow through each cooling coil to satisfy space loads. As each two-way valve adjusts the flow of chilled water through the coil to satisfy the existing load, the distribution pump responds by regulating the amount of chilled water delivered. Water flows through the bypass in either direction as needed to balance the system.

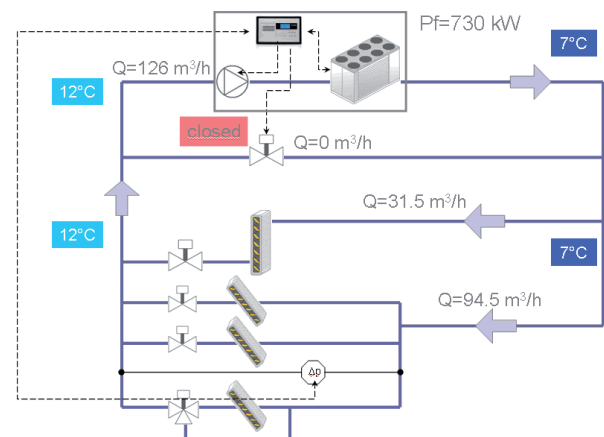
There is an only one variable primary flow circuit, which varies water flow throughout the entire system – that is, through the evaporator of the operating chiller as well as through the cooling coils. Two-way control valves and a bypass valve are required; the bypass valve ensures that the amount of the flow that returns to the operating chiller(s) never falls below the minimum limit.

Situation 1. 100% cooling capacity

Traditional plant



“Smart” plant

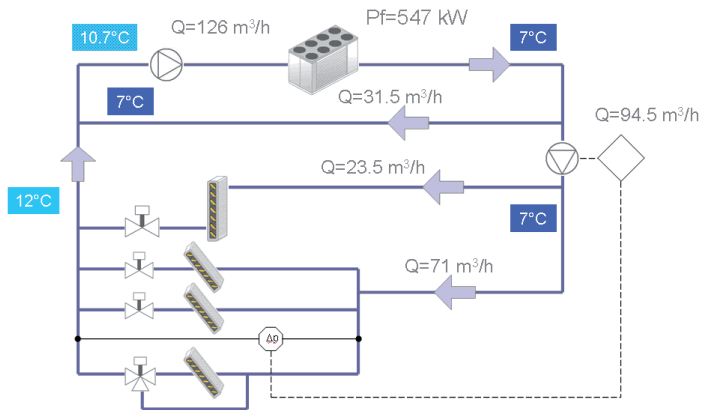


NOTE: the operating temperatures on the scheme referred to the unit working in chiller mode.

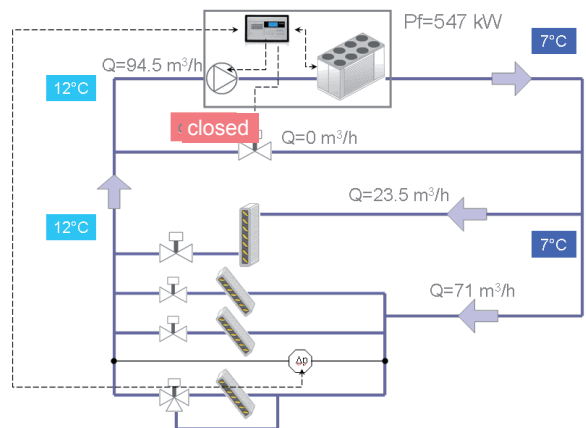
VARIABLE FLOW HYDRONIC GROUP (optional)

Situation 2. 75% cooling capacity

Traditional plant



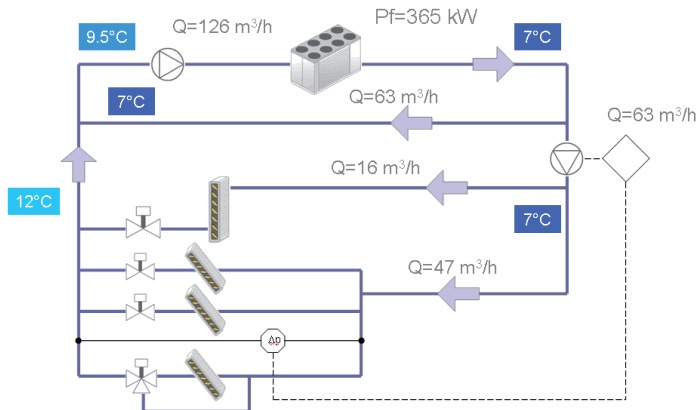
"Smart" plant



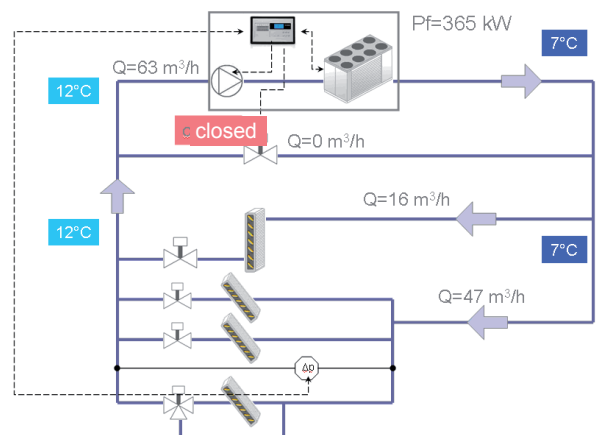
NOTE: the operating temperatures on the scheme referred to the unit working in chiller mode.

Situation 3. 50% cooling capacity

Traditional plant



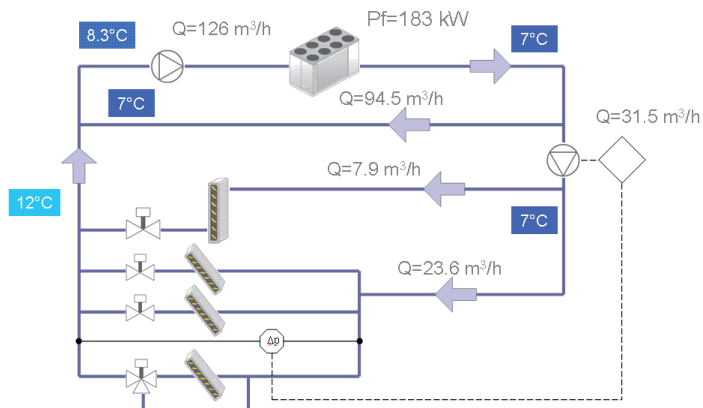
"Smart" plant



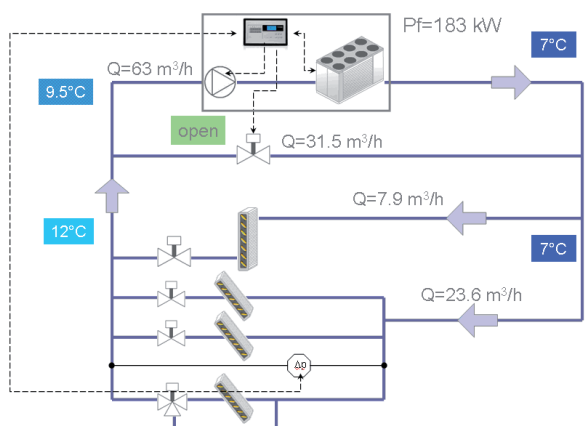
NOTE: the operating temperatures on the scheme referred to the unit working in chiller mode.

Situation 4. 25% cooling capacity

Traditional plant



"Smart" plant



NOTE: the operating temperatures on the scheme referred to the unit working in chiller mode.

VARIABLE FLOW HYDRONIC GROUP (optional)

9.2 VPF.D systems: plants designed for variable flow, decoupled, primary and secondary circuits

Even in that cases in which is not possible to work with a single variable primary flow circuit, or in that situations in which is preferable to maintain decoupled the primary circuit (to the units) and the secondary circuit (to the plants), it's possible the primary flow on pumps controlled by the unit.

The energy savings are lower than the solution with a unique VPF system, but still important especially when the units are in stand-by where it's possible to reduce the waterflow through the unit up to 50%.

The VPF.D systems can be easily adopted in retrofit application, where the chiller is supposed to be replaced but the plant isn't.

The regulation is up to the unit's controller, detecting the delta temperature at the primary heat exchanger: when the building's load decreases, waterflow is reduced in order to maintain a fixed delta T between the exchanger's inlet and outlet.

The VPF.D system by Climaveneta assures even the waterflow balancing between primary and secondary circuit, in order to avoid the flow inversion in the decoupling pipe.

Variable flow hydraulic group consisting of:

- 2 pumps, 2 or 4 poles
- discharge valves
- pump inlet / outlet valves
- check valve
- air vent
- inverter with 25-50 Hz frequency modulation capability
- extensions to the controller for to receive analogue inputs (4-20 mA) from the differential pressure transducer on the plant (VPF) or from the temperature probes on the decoupling pipe (VPF.D), and to manage toward 0-10 V signal, pumps and (if present) the by-pass valve. [For "VPF" solution, pressure transducer and by-pass valve are at customer charge]
- additional pressure transducer for increased safety controlling the minimum flow of water to the evaporator

Each of the components of the hydraulic group has been designed to optimise hydraulic and electrical installation space, time and costs. The following solutions are available on request:

Low or high head pump

Horizontal one-piece centrifuge pump, normalised to EN 733, axial suction and radial delivery, cast iron body and AISI 316L stainless steel impeller. The section of the shaft in contact with the liquid is made of stainless steel. Mechanical seal with components in various materials depending on the size: ceramic/carbon/NBR or carbon/carburundum/silicon/EPDM. Three-phase electric motor protected to IP55, insulation class F, suitable for continuous service.

The pump is combined with a frequency converter with 25-50 Hz modulation capability. The inverter is a feeding device, which when connected to the pump motor permits intelligent management as required by system conditions and the loads required. Pump motor-inverter assembly and connection are performed by Climaveneta.

The second pump operates in stand-by to the first. The relative operating hours of the two pumps are balanced. In case the operating pump breaks down, the reserve pump is automatically enabled.

Special pumps

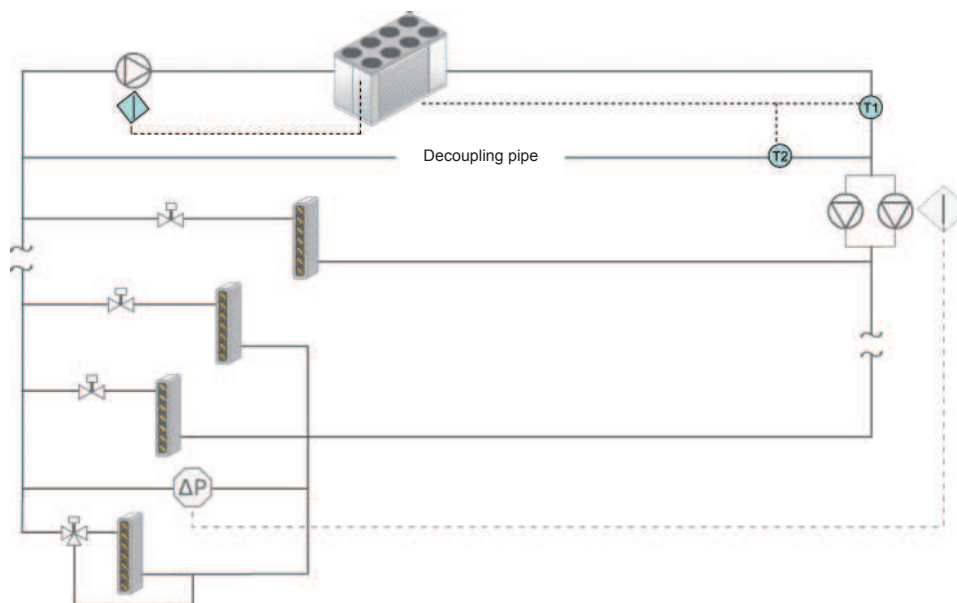
For pumps with different configurations, please contact our sales department.

Integration of pumps in each size

For the integration of the pumps and the circuit's hydraulic diagram, see Enclosure B to this bulletin.

Pump characteristics

For the technical specifications of the pumps installed and the respective curve characteristics, see Enclosure B to this bulletin.



Typical scheme of a system with decoupled variable flow primary and secondary circuits
[Temperature probes separately supplied]

VARIABLE FLOW HYDRONIC GROUP (optional)

9.3 For VPF system: indications for the bypass pipe sizing

Differential pressure transducer on the farthest pipe of the plant and by-pass valve are at customer charge.

Climaveneta provides only some indications for the plants design, as a function of the minimum waterflow on the primary heat exchanger.

Minimum waterflow to technical bulletin [m3/h]	Kvs	Recommended valve	Ø Valve	Valve motor	Ø ByPass
Da 19 a 30	40	VVG41.50	DN50	SKB60	DN50 (2")
fino a 37	49	VVF31.65	DN65	SKB60	DN65 (2"½)
fino a 60	78	VVF31.80	DN80	SKB60	DN80 (3")
fino a 95	124	VVF31.90	DN100	SKC60	DN100 (4")
fino a 150	200	VVF31.91	DN125	SKC60	DN125 (5")
fino a 230	300	VVF31.92	DN150	SKC60	DN150 (6")

2-way valve and minimum recommended bypass pipe diameter as a function of the minimum waterflow.

9.4 For VPF.D system: indications for the decoupling pipe sizing

Climaveneta provides in the table below some indications for the plants design, as a function of the nominal waterflow on the primary heat exchanger.

NOTE: temperature probes are separately supplied

Minimum waterflow to technical bulletin [m3/h]	Ø Decoupling pipe
Da 25 a 40	2"½
fino a 60	3"
fino a 100	4"
fino a 150	5"
fino a 225	6"
fino a 375	8"

Minimum decoupling pipe diameter as a function of the minimum waterflow

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