

Ferrolli

RGW

WATER-WATER CHILLERS AND HEAT PUMPS
FOR INDOOR INSTALLATION



TECHNICAL MANUAL

SUMMARY

THIS MANUAL IS DIVIDED INTO SECTIONS. THEIR NAMES APPEAR IN THE HEADING OF EACH PAGE.

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GENERAL SPECIFICATIONS

Presentation of the unit

This new series of industrial chillers and heat pumps has been designed to meet the demands of global markets in the small medium power industrial and commercial plants. Units are compact and highly configurable, built to fit different types of plants so to meet the needs of highly qualified engineers. Units are water chillers (IR) and heat pumps (IW, IP) water cooled, suitable for indoor installation; if equipped with painted structure and panels (option) they are suitable for outdoor installation too. This series is composed of 11 models and two sizes with nominal cooling capacity from **70 to 240 kW** and thermal capacity from **78 to 268 kW**.

The heat pump units can be supplied for commutation between "COOL- HEAT" obtained by managing the hydraulic circuit (IW units) or reversible on refrigerant side (IP units): the IP unit, compared with the IW unit, allows a reduction of installation space, a simplification of the hydraulic circuit so achieving a cheaper and quicker installation. The units produce cold water from 5 to 20°C (in cooling mode) and hot water from 25 to 55°C (in heating mode).

The units can be supplied for brine production (BR, BW, BP) that allow brine production from -10 to 5°C.

The development of the unit has mainly based on the selection of heat exchanger to obtain high efficiency at full and partial load. To increase the seasonal efficiency index (ESEER) and so further containing power input and operation cost the units can be supplied with electronic expansion valve (as standard for IP and BP units).

These features allow a compressors working with low compression ratios so increasing the reliability level and the operation life. Great attention has been dedicated to achieve low sound levels in order to meet the increasingly restrictive laws in terms of noise: upon request, you can choose for a Standard Unit (AB) or Low noise unit (AS) or Extra low noise unit (AX). The basic unit (AB) is an essential structure made by sheet metal with anti-corrosion treatment (not painted) and without any closing panels so suitable ONLY for indoor installation, the low noise unit (AS) provides sound attenuation thanks to panels with sound absorbing insulation. The extra low noise unit (AX) provides a further sound attenuation thanks to panels with sound absorbing and acoustic jackets for compressors. All the units are equipped with 2 scroll compressors arranged in pairs (tandem) on 1 circuit operating with **environmental friendly R410A gas**, brazed plate heat exchangers (depending on unit type completely insulated and protected on water side with a differential pressure control), electrical panel complete with electronic controller and display, phase presence and sequence control device (as standard).

As option the unit can be selected with painted structure (epoxy powders RAL 7035). For low noise (AS) and extra low noise (AX) units, the painting is extended to all closing panels, so ensuring for the electrical panel a protection degree IP54 and the maximum protection against adverse weather conditions: with this features the unit is suitable for outdoor installation (to agree with sails support department).

A variety of other accessories are available to extend the capabilities of the units. Among various the unit can be equipped with Pumping Module (MP) with 1 or 2 pumps with Standard (STD), High (HP1) and very High (HP2) available head.

This module- full integrated inside the unit- can be asked for the water circulation on the plant exchanger, and/or for the water circulation on the source exchanger. So it is possible to order units equipped with maximum 4 pumps: max 2 for plant side, max 2 for source side.

The modules are equipped with all components necessary for a correct and easy installation so reducing the installation, space and cost for hydraulic connections.

Note that with this accessory the total length of the unit increases (see the section "dimensional data").

The electronic controller is able to manage different condensing control systems as modulating valves (2 or 3 way, available as accessory too) or pumps driven by inverter.

Note that IW/BW units can be equipped with pumping module complete of electrical panel, but the controller is not able to manage the pumps for the 2 operation modes (cooling and heating).

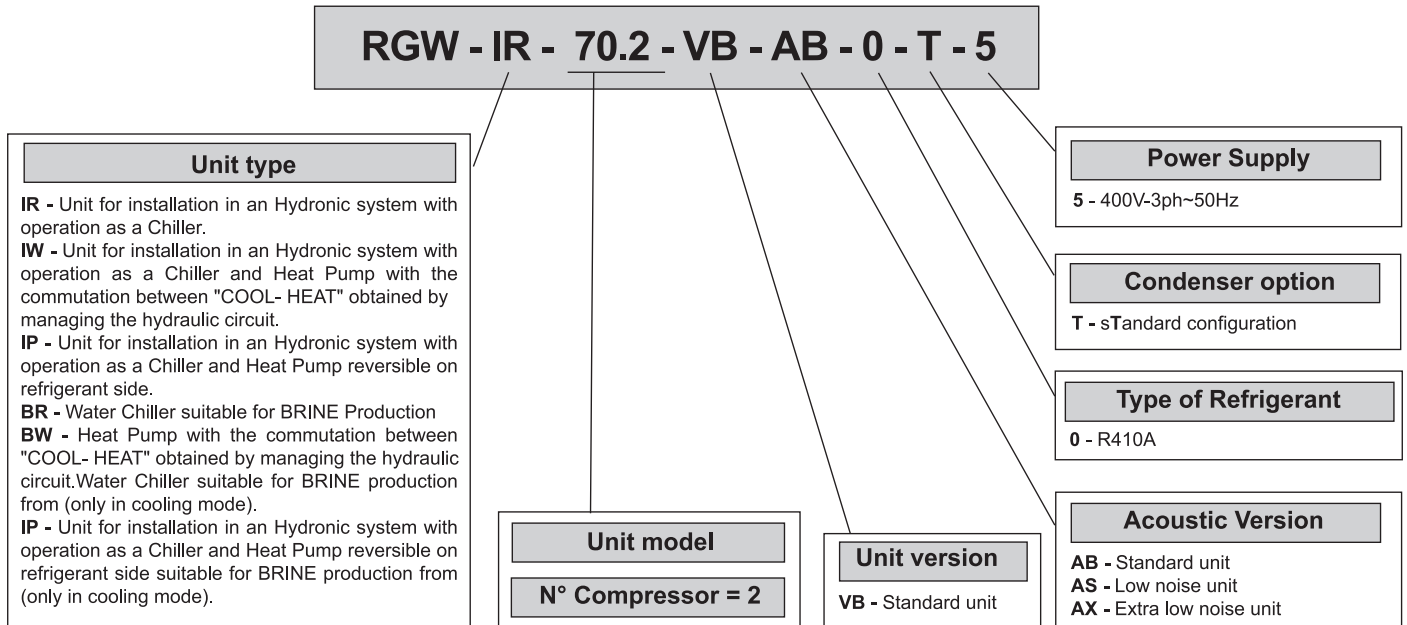
The units can be coupled with dry coolers, cooling towers, geothermal probes, or uses as cooling water city water, well-water, lake-water, etc.

All units are accurately build in compliance with the existing standards and are individually tested in factory. Only electrical and hydraulic connections are required for installation.

GENERAL SPECIFICATIONS

Identification code of the unit

The codes that identify the units are listed below and include the sequences of letters that determine the meanings for the various versions and set-ups.



The available special versions are described below:

AB Standard unit. The compressors are installed on rubber vibration dampers.

The unit has composed by basement and framework made by sheet metal with anticorrosion treatment without any closing panels.

AS Low noise unit. Allows a noise reduction of 4-5 dB.

The compressors are installed on rubber vibration dampers and the unit is closed with panels made by sheet metal with anticorrosion treatment and coated with sound absorbing insulation.

The AS unit reaches IP54 (protection degree) so it can be installed outdoor.

AX Extra low noise unit. Allows a noise reduction of 7-8 dB.

The compressors are installed on rubber vibration dampers and insulated with acoustic jackets; the unit is closed with panels made by sheet metal with anticorrosion treatment and coated with sound absorbing insulation.

The AX unit reaches IP54 (protection degree) so it can be installed outdoor.

Description of the components

Componenti principali:

1. Electric control and monitoring panel. This is housed in a metal casing in which the various electrical components are positioned on one metal plate.

1a. The power section includes:

- Main door-locking circuit-breaker.
- Fuse-holder that can be isolated with protection fuse triad for each compressor.
- Fuse-holder that can be isolated with protection fuse for compressor oil heaters and antifreeze (if installed).
- Control contactor for each compressor.
- Contactor and magnetothermic switch to protect the pump (if installed).
- Phase presence and sequence monitoring device on power supply

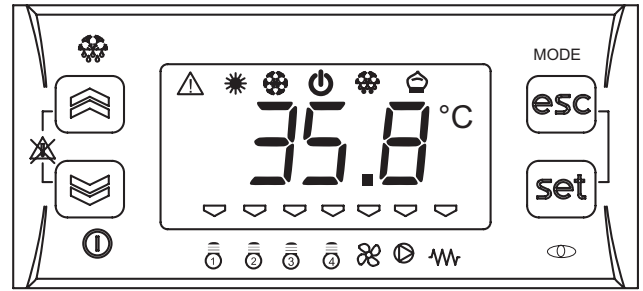
1b. The auxiliary section includes:

- Fuses on the auxiliary transformer.
- Electromagnetic noise filter
- Insulating and safety transformer to power the auxiliary circuit.

GENERAL SPECIFICATIONS

1c. The microprocessor monitoring section includes:

- User interfacing terminal with display.
- On-off key.
- Operating mode selector key.
- Compressor on-off display **LED**.
- Operational mode **LED**
- Antifreeze heaters activated indicator **LED**.
- Source Pump/s on-off display **LED**
- Plant Pumps on-off display **LED**
- Check-control with fault code display
- ON / Stand-by remote - Summer/Winter (E/I) remote selection (IW, IP, BW, BP units only).



Control system main functions:

temperature control of the water produced by the unit, compressor and pump operating hour counter, timing and cycling of start-ups, input parameters by keyboard, alarms management, operating mode change (IW, IP, BW, BP units only), dynamic set-point (climatic control), scheduling and integrative heaters control.

If installed the hydronic kit these functions are enabled: antifreeze with pump, start-up cycle after prolonged inactivity (antisticking), if the hydronic kit installed has 2 pumps there is a cycling between each pump to ensure an equivalent lifetime,

Digital input functions: low pressure, high pressure, high temperature on compressor supply, phase presence and sequence monitoring device on power supply, differential water pressure control, compressors thermal protection, pumps thermal protection, ON / Stand-by remote and remote operating mode change, demand limit and Economy function,

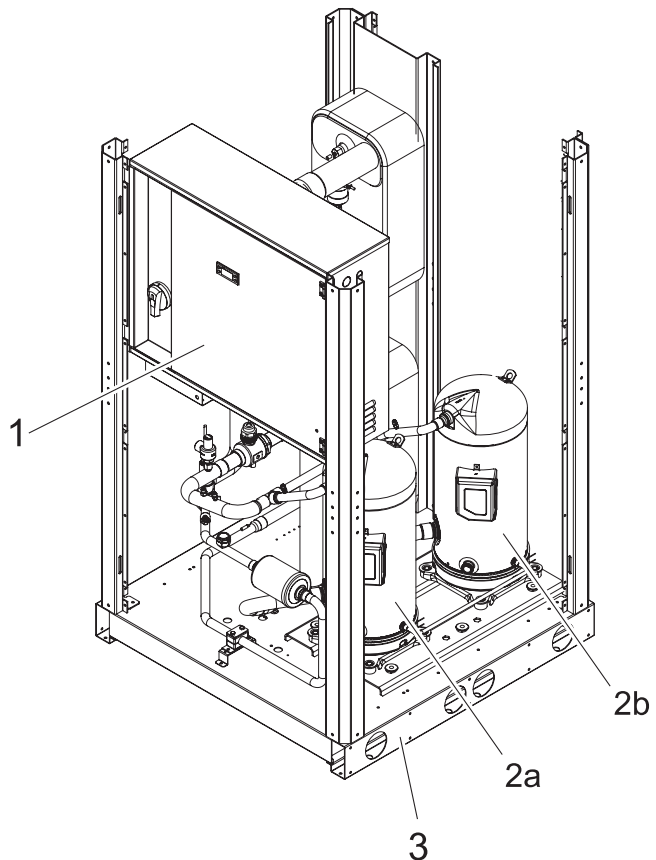
Digital output functions: compressor start-up, pump start-up, plate heat exchanger electrical heater, remote general alarm, 4-way valve (only IP, BP unit), integrative heaters.

Analogic input functions: in and out water temperature for plant and source sides, external air temperature probe (if present).

Analogic output functions: continuous control (0-10V) for 2 or 3 way valves (supplied as accessory too) or for inverter pumps for condensing control.

2. Compressors. They are the **SCROLL** type with orbiting coil equipped with built-in thermal protection. The AX unit includes: an acoustic jacket for the compressors. All units are equipped with two compressors connected in pairs (1 single refrigerant circuit) which can operate at the same time (**100% cooling capacity**) or individually (**50% of the cooling capacity**), thus adapting to the different thermal loads of the system.

3. Frame structure made of sheet metal with anticorrosion treatment and- as option- coated with epoxy powders (RAL 7035 to ensure maximum protection against adverse weather conditions).



The image refer to IR unit Mod. 90.2

GENERAL SPECIFICATIONS

4. Plant Exchanger made of brazed stainless steel plates (**AISI 316**). It is installed in a shell of heat-insulating material to prevent the formation of condensation and heat exchanges towards the outside. Standard supply also includes a differential pressure switch on the water circuit to avoid the risk of freezing if the water flow is shut off for some reason. It can be equipped with antifreeze heater.

5 Unit IR and BR Source Exchanger made of brazed stainless steel plates (**AISI 316**).

It can be equipped with antifreeze heater.

Unit IW and BW Source Exchanger made of brazed stainless steel plates (**AISI 316**). It is installed in a shell of heat-insulating material to prevent the formation of condensation and heat exchanges towards the outside.

It can be equipped with antifreeze heater.

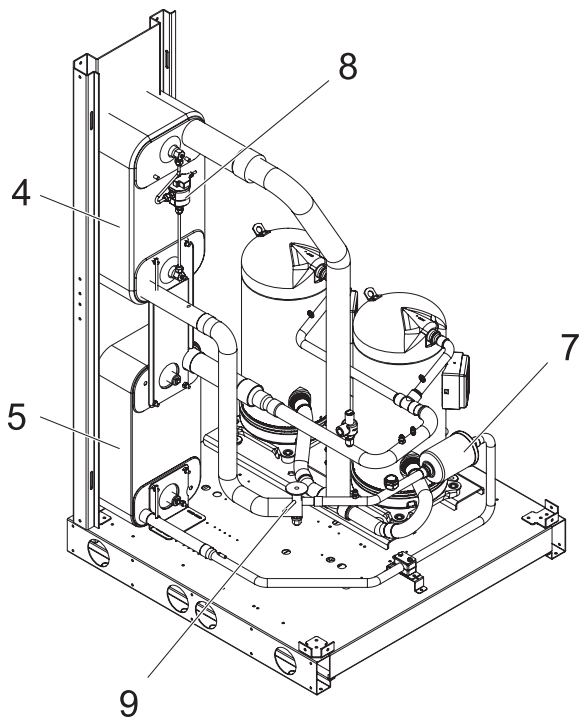
Unit IP and BP Source Exchanger made of brazed stainless steel plates (**AISI 316**). It is installed in a shell of heat-insulating material to prevent the formation of condensation and heat exchanges towards the outside. Standard supply also includes a differential pressure switch on the water circuit to avoid the risk of freezing if the water flow is shut off for some reason.

It can be equipped with antifreeze heater.

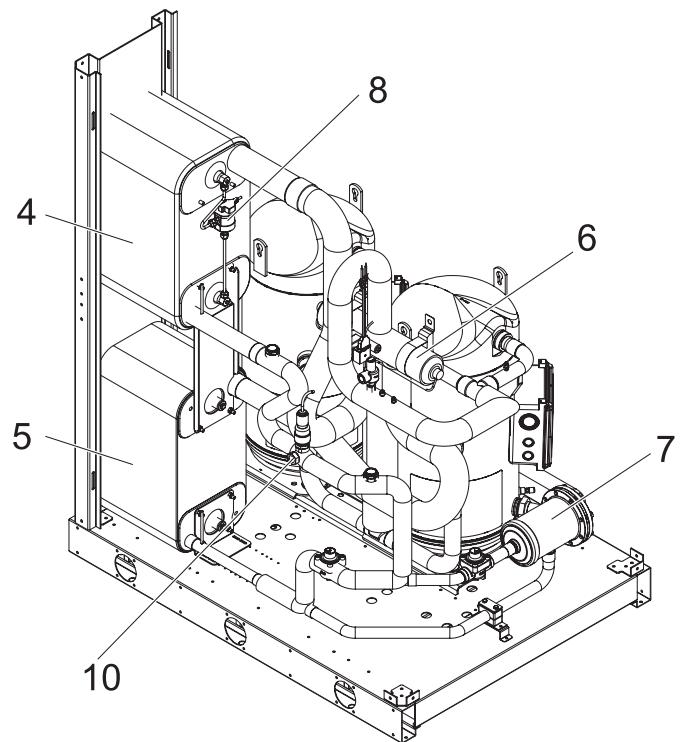
6. Four Way Reversing valve (IP and BP units), reverses the flow direction of the refrigerant depending on operation mode (cool/heat).

Covering panels (for AS and AX units, or as accessory for AB unit), made of galvanized sheet metal, if painting option (VER) is selected the panels are provided coated with epoxidic powder paint (RAL 7035) to ensure maximum protection against adverse weather conditions.

One-way valves (IP and BP units), allowing the refrigerant to pass into the appropriate exchangers, depending on the operation mode (cool/heat).



The image refer to IR unit Mod. 90.2



The image refer to IP unit Mod. 190.2

GENERAL SPECIFICATIONS

Hydraulic and chilling circuit components

7. Dehydrator filter. Mechanical type. Retains impurities and traces of moisture in the circuit. **Hermetic** type for models **70÷90**; **cartridge** type for models **105÷240**.

8. Water differential pressure switch. It is installed on the connections between the water inlet and outlet of the exchanger. It stops the unit if it activates.

9. Thermostatic expansion valve. With external equalizer, this feeds the evaporator correctly, keeping the selected superheat degree at a steady level.

10. Electronic Expansion valve (standard for IP and BP units), feeds the evaporator correctly, keeping the selected superheat degree at a steady level; it guarantees an effective and quick response to the load modifications so increasing the efficiency at partial load.

Refrigerant Safety valve. Installed on the discharge pipe of the compressors, this operates if extreme faults should occur in the system.

Liquid and moisture indicator. Signals if refrigerant is in liquid state so indicating that the refrigerant charge is correct. The indicator light also indicates the amount of moisture in the refrigerant by changing colour.

Low pressure switch. With fixed setting. It is installed on the suction pipe and blocks the compressors if the operating pressures drop below the tolerated values. Automatically resets as the pressure increases. If it activates frequently, the unit will block and can only be restarted by resetting via the user interface terminal.

High pressure switch (n°2). With fixed setting. Are installed on the discharge pipe and blocks the compressors if the operating pressure exceeds the tolerated values. If it activates, the unit will block and can only be restarted by resetting via the user interface terminal.

Pressure taps: 5/16 " SAE. Allow the operating pressure of the system to be measured: compressor discharge, expansion valve inlet, compressor suction.

Pressure taps: 1/4 " SAE (7/16" UNF) type with schraeder pin. Allow the charge/discharge of the refrigerant gas from the system.

ACCESSORIES AND OPTIONAL EQUIPMENT

PAN - Covering panels (M) (accessory only for AB unit), made of galvanized sheet metal, if painting option (VER) is selected the panels are provided coated with epoxidic powder paint (RAL 7035) to ensure maximum protection against adverse weather conditions.

AVG - Rubber vibration dampers (F). Consisting of 4 rubber vibration dampers to fit under the unit. Reduce the transmission of the mechanical vibrations generated by the compressors and pumps during normal operation to the basement of the unit. The insulating degree of the vibration dampers is about 85-90%.

GM - Pressure gauge unit (M). Consisting of 2 pressure gauges that display the pressure values of the refrigerant on the suction and discharge of the compressors.

AV – Victaulic Connections (F) Consisting of 2 Victaulic-brackets and 2 pipe Victaulic-Welding.

CV – Victaulic Elbows (F) Consisting of 2 brackets and 2 elbows Victaulic-Victaulic.

VA – Water valves (F) Consisting of 2 brackets and 2 water valves Victaulic to shut-off the unit from the plant or from the source.

F – Victaulic Water Filter Y (F). Consisting of 1 bracket and 1 Victaulic water filter of “Y” shape. Can be turned on and off and inspected. It prevents that machining residues (dust, swarf, etc.) in the water pipes can enter into the plate-type heat exchanger.

FLS - Flow switch (F). Paddle flow switch on the water circuit to avoid the risk of freezing if the water flow is shut off for any reason. For a quick connection to the unit the accessory is completed with grooved pipe (on which install the flow switch) and victaulic bracket.

VDV 2 way valve (F). Equipped with spring return actuator managed by the unit controller (0-10V) as condensing control device for units cooled by city-water or well-water.

VTV 3 way valve (F). Equipped with actuator managed by the unit controller (0-10V) as condensing control device for units cooled by dry-cooler or geothermal probe.

CR - Remote control (F). This can be used to select all the monitoring and display functions of the control unit on the machine at a maximum distance of 100 meters away. It must be installed by using a cable with three strands or three wires in **PVC** of the **N07-VK** type with a 1mm² section. The transmission line must be installed in a raceway separate from any electric powering wires (**230/400 V**). The control unit has the following buttons:



MODE key : used to select the operating mode

ON/OFF key : used to turn the unit ON/OFF and to reset the alarms

Mode + ON/OFF keys : used to access and quit the various menu levels

UP key: scrolls forwards through the menu items or increases the value of a parameter

Tasto DOWN: scrolls backwards through the menu items or decreases the value of a parameter.

KOP - Programmer clock (F). Allows the unit to be turned on and off depending on the programmed time setting (up to 14 switching actions can be programmed as required throughout the 7 days of the week).

TAT- High Temperature Thermostat (M). Two thermostats in series on compressors discharge pipes preserve operation not allowing temperature to rise up than a specified fixed value.

SND Outdoor Air Temperature Probe (F). It allows the climatic variation of setpoint depending on the outdoor air temperature.

INT - Serial interface (M/F). Allows serial communication on RS485 via MODBUS protocol

CSF - Voltage monitor and sequence meter (M). The device enables control of the correct sequence of power phases and the lack of any phase. It also ensures that the unit works within $\pm 10\%$ the rated voltage (MIN=360 V - RATED=400V - MAX=440V). It blocks the unit if the voltage is outside the limits provided for.

KBT – Low temperature Kit (M). Consisting of antifreeze electrical heaters for plate heat exchangers and oil crankcase heaters for compressors. It is particularly suggested for outdoor installation or indoor installation in rooms that during winter can reach very low ambient temperature

RAM – Compressors Suction and Discharge Ball Valves (M). (not available for IP and BP units) Consisting of 2 ball valves installed on suction and discharge of the compressors: they allow an easy and quick replacement of the compressors in case of fault.

NOTES: (M): only installed in the factory. **(F)**: supplied for installation by the customer.

ACCESSORIES AND OPTIONAL EQUIPMENT

MP - Pumping Module (M). Consists of minimum 1 pump up to maximum 4 pumps.

The water pumps are available on 3 levels for available pressure head: Standard (STD), High Pressure (HP1), very high pressure (HP2).

The MP is composed by:

1. Plant Side Pump: minimum 1 pump, maximum 2 pumps (the second pump is activated in case of failure of the first one). The pump/s is protected by magnetothermal switch installed on the unit electrical panel.

2. Source Side : minimum 1 pump, maximum 2 pumps (the second pump is activated in case of failure of the first one). The pump/s is protected by magnetothermal switch installed on the unit electrical panel.

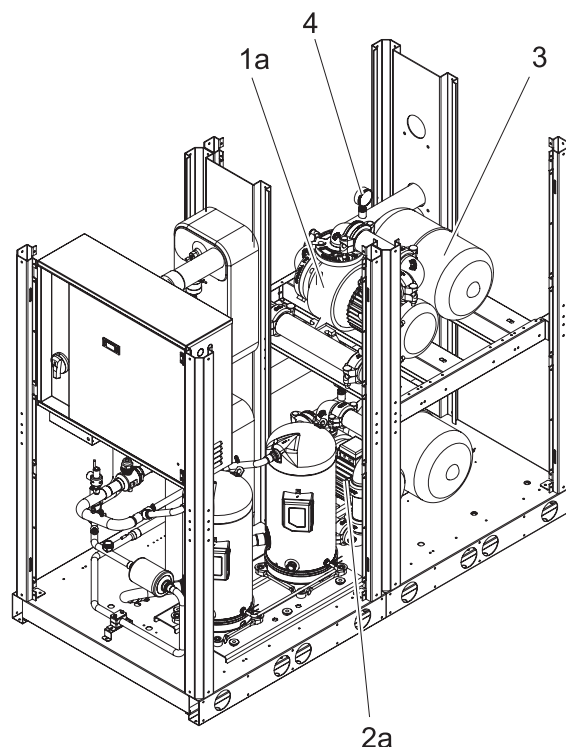
3. Expansion tank: This is a closed, diaphragm type chamber. It absorbs the variations in the volumes of water in the system caused by temperature variations.

4 Water pressure gauge. Connected to the water fill pipe. Displays the pressure of the water in the system.

- **Water safety valve,** It acts whenever faulty service leads to an operating pressure in the hydraulic (set =6 bar).

- **Water drain valves.**

- **Air vent.**



The image refer to IR unit Mod. 190.2 with MP 1P plant side and 1P source side.

VER Framework and panels (if present) made by sheet metal with anticorrosion treatment painted RAL7035 with epoxy powders to ensure the maximum resistance to adverse weather conditions.

EEV (M) Electronic Expansion valve (standard for IP and BP units), feeds the evaporator correctly, keeping the selected superheat degree at a steady level; it guarantees an effective and quick response to the load modifications so increasing the efficiency at partial load.

SS - Soft Starter (M). Soft starter for compressors, allows a reduction around 30/40% for the inrush current and of the vibrations transmitted to the refrigerant pipes during the start-up phase.

RIF - Capacitors for power factor corrections (M). Capacitors for power factor corrections increase power factor $\cos \phi$ (>0.91)

MTC - Magnetothermal switch (M). Magnetothermal switch on all loads in place of fuses.

Other power source voltage rating (contact our technical department).

GENERAL TECHNICAL SPECIFICATION

General technical specifications

MODELS	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM
Power supply	400-3-50											V-ph-Hz
Refrigerant type	R410A											-
Compressor specifications												
Type / capacity control	SCROLL (ON-OFF)											-
Starting	Direct											-
Quantity	2											N°
Plant Exchanger												
Type	stainless steel brazed plates											-
PS max. operating pressure	1000											kPa
Quantity	1											N°
Victaulic hydraulic connection	DN65	DN65	DN65	DN65	DN65	DN65	DN65	DN65	DN65	DN65	DN65	DN
Total water capacity	3.9	4.2	4.8	5.5	5.9	6.9	7.5	8.7	9.7	11.2	12.8	l
Source Exchanger												
Type	stainless steel brazed plates											-
PS max. operating pressure	1000											kPa
Quantity	1											N°
Victaulic hydraulic connection	DN65	DN65	DN65	DN65	DN65	DN65	DN65	DN65	DN65	DN65	DN65	DN
Total water capacity	3.9	4.2	4.8	5.5	5.9	6.9	7.5	8.7	9.7	11.2	12.8	l
Pumping module MP												
Safety valve setting	600											kPa
Volume source chamber	24											l
Default pressure source chamber	150											kPa
Max. operating pressure source chamber	800											kPa
Electrical specifications												
Units without pumping module												
MODELS	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM
Total maximum load current [FLA]	45	51	62	68	74	82	90	105	120	142	164	A
Total maximum power input [FLI]	26	29	34	40	45	50	55	63	72	83	93	kW
Total maximum starting current [MIC]	141	166	204	256	262	309	317	355	370	454	476	A

GENERAL TECHNICAL SPECIFICATION

NET NOMINAL performances - Standard plants - Data certified by EUROVENT

IR unit - Chiller

MODELS		70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	
IR	Cooling mode W30W7 (source: water in 30°C out 35°C / plant: water in 12°C out 7°C)													
	Cooling capacity		69.5	78.5	91.4	104.3	117.2	132.1	146.9	168.8	190.5	214.3	238.1	kW
	Total power input		16.4	18.1	21.9	25.2	28.6	32.3	36.3	41.3	46.4	53.0	59.7	kW
	EER		4.23	4.34	4.17	4.14	4.10	4.09	4.05	4.09	4.11	4.04	3.99	W/W
	Plant side	Water flow rate	3.3	3.8	4.4	5.0	5.6	6.4	7.1	8.1	9.2	10.3	11.5	l/s
		Water pressure drop	47	38	40	41	44	42	45	46	48	48	49	kPa
	Source side	Water flow rate	4.0	4.5	5.3	6.1	6.8	7.7	8.6	9.8	11.1	12.5	13.9	l/s
		Water pressure drop	68	55	59	60	65	62	66	67	70	71	72	kPa

Data declared according to **EN 14511**. The values are referred to units without options and accessories.

IW unit - Chiller and Heat Pump with the commutation between "COOL- HEAT"

MODELS		70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	
IR	Cooling mode W30W7 (source: water in 30°C out 35°C / plant: water in 12°C out 7°C)													
	Cooling capacity		69.5	78.5	91.4	104.3	117.2	132.1	146.9	168.8	190.5	214.3	238.1	kW
	Total power input		16.4	18.1	21.9	25.2	28.6	32.3	36.3	41.3	46.4	53.0	59.7	kW
	EER		4.23	4.34	4.17	4.14	4.10	4.09	4.05	4.09	4.11	4.04	3.99	W/W
	Plant side	Water flow rate	3.3	3.8	4.4	5.0	5.6	6.4	7.1	8.1	9.2	10.3	11.5	l/s
		Water pressure drop	47	38	40	41	44	42	45	46	48	48	49	kPa
	Source side	Water flow rate	4.0	4.5	5.3	6.1	6.8	7.7	8.6	9.8	11.1	12.5	13.9	l/s
		Water pressure drop	68	55	59	60	65	62	66	67	70	71	72	kPa
IP	Heating mode W10W45 (source: water in 10°C / plant: water in 40°C out 45°C)													
	Heating capacity		78.7	87.6	103.8	117.9	132.1	149.2	166.5	190.7	215.0	242.3	270.6	kW
	Total power input		20.6	22.5	27.1	30.9	34.8	39.2	44.1	50.2	56.5	63.8	71.4	kW
	COP		3.81	3.90	3.84	3.82	3.80	3.81	3.78	3.80	3.81	3.80	3.79	W/W
	Plant side	Water flow rate	3.7	4.2	4.9	5.6	6.3	7.1	7.9	9.0	10.2	11.5	12.8	l/s
		Water pressure drop	58	46	50	51	54	52	56	57	59	59	61	kPa
	Source side	Water flow rate	4.0	4.5	5.3	6.1	6.8	7.7	8.6	9.8	11.1	12.5	13.9	l/s
		Water pressure drop	68	55	59	60	65	62	66	67	70	71	72	kPa

Data declared according to **EN 14511**. The values are referred to units without options and accessories.

IP unit - Chiller and Heat Pump reversible on refrigerant side

MODELS		70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	
IR	Cooling mode W30W7 (source: water in 30°C out 35°C / plant: water in 12°C out 7°C)													
	Cooling capacity		68.1	77.0	89.6	102.3	114.9	129.5	144.0	165.4	186.8	210.1	233.4	kW
	Total power input		16.2	17.9	21.6	24.9	28.2	31.8	35.8	40.7	45.7	52.3	58.9	kW
	EER		4.20	4.31	4.14	4.11	4.07	4.07	4.03	4.07	4.09	4.02	3.96	W/W
	Plant side	Water flow rate	3.3	3.7	4.3	4.9	5.5	6.2	6.9	8.0	9.0	10.1	11.2	l/s
		Water pressure drop	45	36	38	39	42	40	43	44	46	46	47	kPa
	Source side	Water flow rate	4.0	4.5	5.2	6.0	6.7	7.6	8.4	9.7	10.9	12.3	13.7	l/s
		Water pressure drop	66	53	56	58	62	60	64	65	68	68	70	kPa
IP	Heating mode W10W45 (source: water in 10°C / plant: water in 40°C out 45°C)													
	Heating capacity		77.7	86.6	102.8	116.8	130.8	147.7	165.4	188.8	212.8	239.8	267.9	kW
	Total power input		20.7	22.5	27.1	31.0	34.9	39.3	44.2	50.3	56.4	64.0	71.6	kW
	COP		3.76	3.85	3.80	3.77	3.75	3.76	3.74	3.76	3.77	3.75	3.74	W/W
	Plant side	Water flow rate	3.7	4.1	4.9	5.5	6.2	7.0	7.8	8.9	10.1	11.4	12.7	l/s
		Water pressure drop	57	45	49	50	53	51	55	56	58	58	60	kPa
	Source side	Water flow rate	4.0	4.5	5.2	6.0	6.7	7.6	8.4	9.7	10.9	12.3	13.7	l/s
		Water pressure drop	66	53	56	58	62	60	64	65	68	68	70	kPa

Data declared according to **EN 14511**. The values are referred to units without options and accessories.

GENERAL TECHNICAL SPECIFICATION

GROSS NOMINAL performances - Standard plants - EUROVENT certified data

IR unit - Chiller

MODELS		70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	
Cooling mode W30W7 (source: water in 30°C out 35°C / plant: water in 12°C out 7°C)														
R	Cooling capacity	70	79	92	105	118	133	148	170	192	216	240	kW	
	Total power input	15.0	16.8	20.3	23.3	26.3	29.8	33.3	37.8	42.3	48.4	54.5	kW	
	EER	4.67	4.70	4.53	4.51	4.49	4.46	4.44	4.50	4.54	4.46	4.40	W/W	
	ESEER	6.07	6.16	6.00	5.87	5.94	5.81	5.86	5.95	5.90	5.91	5.74	-	
	Plant side	Water flow rate	3.3	3.8	4.4	5.0	5.6	6.4	7.1	8.1	9.2	10.3	11.5	l/s
		Water pressure drop	47	38	40	41	44	42	45	46	48	48	49	kPa
	Source side	Water flow rate	4.0	4.5	5.3	6.1	6.8	7.7	8.6	9.8	11.1	12.5	13.9	l/s
		Water pressure drop	68	55	59	60	65	62	66	67	70	71	72	kPa

IW unit - Chiller and Heat Pump with the commutation between "COOL- HEAT"

MODELS		70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	
Cooling mode W30W7 (source: water in 30°C out 35°C / plant: water in 12°C out 7°C)														
R	Cooling capacity	70	79	92	105	118	133	148	170	192	216	240	kW	
	Total power input	15.0	16.8	20.3	23.3	26.3	29.8	33.3	37.8	42.3	48.4	54.5	kW	
	EER	4.67	4.70	4.53	4.51	4.49	4.46	4.44	4.50	4.54	4.46	4.40	W/W	
	ESEER	6.07	6.16	6.00	5.87	5.94	5.81	5.86	5.95	5.90	5.91	5.74	-	
	Plant side	Water flow rate	3.3	3.8	4.4	5.0	5.6	6.4	7.1	8.1	9.2	10.3	11.5	l/s
		Water pressure drop	47	38	40	41	44	42	45	46	48	48	49	kPa
	Source side	Water flow rate	4.0	4.5	5.3	6.1	6.8	7.7	8.6	9.8	11.1	12.5	13.9	l/s
		Water pressure drop	68	55	59	60	65	62	66	67	70	71	72	kPa

Heating mode W10W45 (source: water in 10°C / plant: water in 40°C out 45°C)														
R	Heating capacity	78	87	103	117	131	148	165	189	213	240	268	kW	
	Total power input	19.0	21.0	25.2	28.7	32.2	36.4	40.7	46.3	51.9	58.6	65.4	kW	
	COP	4.11	4.14	4.09	4.08	4.07	4.07	4.05	4.08	4.10	4.10	4.10	W/W	
	Plant side	Water flow rate	3.7	4.2	4.9	5.6	6.3	7.1	7.9	9.0	10.2	11.5	12.8	l/s
		Water pressure drop	58	46	50	51	54	52	56	57	59	59	61	kPa
	Source side	Water flow rate	4.0	4.5	5.3	6.1	6.8	7.7	8.6	9.8	11.1	12.5	13.9	l/s
		Water pressure drop	68	55	59	60	65	62	66	67	70	71	72	kPa

IP unit - Chiller and Heat Pump reversible on refrigerant side

MODELS		70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	
Cooling mode W30W7 (source: water in 30°C out 35°C / plant: water in 12°C out 7°C)														
R	Cooling capacity	68.6	77.4	90.2	103	116	130	145	167	188	212	235	kW	
	Total power input	14.9	16.6	20.1	23.1	26.0	29.5	33.0	37.4	41.9	47.9	54.0	kW	
	EER	4.62	4.65	4.49	4.46	4.44	4.42	4.40	4.45	4.49	4.42	4.36	W/W	
	ESEER	6.01	6.10	5.94	5.81	5.88	5.75	5.80	5.89	5.84	5.85	5.68	-	
	Plant side	Water flow rate	3.3	3.7	4.3	4.9	5.5	6.2	6.9	8.0	9.0	10.1	11.2	l/s
		Water pressure drop	45	36	38	39	42	40	43	44	46	46	47	kPa
	Source side	Water flow rate	4.0	4.5	5.2	6.0	6.7	7.6	8.4	9.7	10.9	12.3	13.7	l/s
		Water pressure drop	66	53	56	58	62	60	64	65	68	68	70	kPa

Heating mode W10W45 (source: water in 10°C / plant: water in 40°C out 45°C)														
R	Heating capacity	77	86	102	116	130	147	164	187	211	238	265	kW	
	Total power input	19.1	21.1	25.3	28.9	32.4	36.6	41.0	46.5	52.0	59.0	65.9	kW	
	COP	4.03	4.08	4.03	4.01	4.00	4.00	4.00	4.02	4.06	4.03	4.03	W/W	
	Plant side	Water flow rate	3.7	4.1	4.9	5.5	6.2	7.0	7.8	8.9	10.1	11.4	12.7	l/s
		Water pressure drop	57	45	49	50	53	51	55	56	58	58	60	kPa
	Source side	Water flow rate	4.0	4.5	5.2	6.0	6.7	7.6	8.4	9.7	10.9	12.3	13.7	l/s
		Water pressure drop	66	53	56	58	62	60	64	65	68	68	70	kPa

GENERAL TECHNICAL SPECIFICATION

NET NOMINAL performances - Radiant plants

IW unit - Chiller and Heat Pump with the commutation between "COOL- HEAT"

MODELS		70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	
IR	Cooling mode W30W18 (source: water in 30°C out 35°C / plant: water in 23°C out 18°C)													
	Cooling capacity		94.0	105.2	121.2	140.0	158.7	178.4	197.6	227.0	257.2	288.8	321.4	kW
	Total power input		18.8	20.3	24.5	28.4	32.6	36.6	41.3	47.1	53.2	60.7	68.6	kW
	EER		5.01	5.19	4.95	4.94	4.86	4.88	4.79	4.82	4.83	4.76	4.69	W/W
	Plant side	Water flow rate	4.55	5.08	5.86	6.77	7.68	8.63	9.56	10.99	12.46	13.99	15.58	l/s
		Water pressure drop	87	69	71	75	82	78	82	84	89	88	90	kPa
	Source side	Water flow rate	5.25	5.87	6.80	7.86	8.92	10.03	11.13	12.77	14.45	16.27	18.14	l/s
		Water pressure drop	116	92	96	101	110	105	111	114	119	119	123	kPa
IP	Heating mode W10W35 (source: water in 10°C / plant: water in 30°C out 35°C)													
	Heating capacity		85.2	95.8	112.3	128.3	144.5	162.9	181.5	208.1	234.8	264.9	295.2	kW
	Total power input		17.9	19.4	23.5	27.2	31.0	34.9	39.3	44.9	50.6	57.8	65.3	kW
	COP		4.75	4.93	4.78	4.73	4.65	4.67	4.61	4.64	4.64	4.58	4.52	W/W
	Plant side	Water flow rate	4.03	4.54	5.32	6.07	6.83	7.71	8.58	9.84	11.09	12.52	13.94	l/s
		Water pressure drop	68	55	59	60	65	62	66	67	70	71	72	kPa
	Source side	Water flow rate	5.25	5.87	6.80	7.86	8.92	10.03	11.13	12.77	14.45	16.27	18.14	l/s
		Water pressure drop	116	92	96	101	110	105	111	114	119	119	123	kPa

Data declared according to **EN 14511**. The values are referred to units without options and accessories.

IP unit - Chiller and Heat Pump reversible on refrigerant side

MODELS		70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	
IR	Cooling mode W30W18 (source: water in 30°C out 35°C / plant: water in 23°C out 18°C)													
	Cooling capacity		90.8	101.0	117.0	135.0	153.0	172.0	190.6	218.6	247.5	278.4	309.5	kW
	Total power input		19.0	20.1	24.1	28.1	32.3	36.1	41.0	46.7	52.5	59.5	66.6	kW
	EER		4.79	5.01	4.85	4.80	4.74	4.77	4.65	4.69	4.72	4.68	4.65	W/W
	Plant side	Water flow rate	4.40	4.87	5.65	6.52	7.40	8.31	9.22	10.58	11.98	13.48	14.99	l/s
		Water pressure drop	81	63	66	69	76	72	77	78	82	82	84	kPa
	Source side	Water flow rate	5.12	5.67	6.60	7.62	8.64	9.72	10.81	12.37	13.98	15.75	17.52	l/s
		Water pressure drop	110	86	90	95	103	98	105	107	111	112	114	kPa
IP	Heating mode W10W35 (source: water in 10°C / plant: water in 30°C out 35°C)													
	Heating capacity		83.7	94.0	110.3	126.1	142.1	159.5	178.2	204.6	230.3	260.3	289.5	kW
	Total power input		17.6	19.0	23.1	26.7	30.4	34.2	38.6	43.9	49.5	56.6	63.9	kW
	COP		4.74	4.95	4.78	4.73	4.68	4.67	4.62	4.66	4.65	4.60	4.53	W/W
	Plant side	Water flow rate	3.96	4.45	5.22	5.97	6.72	7.55	8.43	9.68	10.88	12.30	13.68	l/s
		Water pressure drop	66	53	56	58	63	59	64	65	68	68	70	kPa
	Source side	Water flow rate	5.12	5.67	6.60	7.62	8.64	9.72	10.81	12.37	13.98	15.75	17.52	l/s
		Water pressure drop	110	86	90	95	103	98	105	107	111	112	114	kPa

Data declared according to **EN 14511**. The values are referred to units without options and accessories.

IR-IW UNIT PERFORMANCE

Mod. 70.2 ÷ 105.2

MOD.	TWE	TWc																		
		30			35			40			45			50			55			
		kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	
70.2	5	67.4	13.8	80.5	64.1	15.3	78.6	60.8	17.0	77.0	56.9	19.0	74.9	52.6	21.1	72.6	47.7	23.4	69.9	
	6	69.7	13.9	82.9	66.4	15.3	80.9	63.0	17.0	79.2	58.9	19.0	77.0	54.5	21.1	74.5	49.4	23.4	71.6	
	7	72.0	13.9	85.2	70.0	15.0	84.3	65.2	17.1	81.4	60.9	19.1	79.0	56.4	21.2	76.5	51.1	23.4	73.3	
	8	74.4	13.9	87.6	71.0	15.4	85.6	67.3	17.1	83.6	63.0	19.1	81.1	58.2	21.2	78.4	-	-	-	
	9	76.7	14.0	90.0	73.2	15.4	87.9	69.5	17.1	85.8	65.0	19.1	83.2	60.1	21.2	80.3	-	-	-	
	10	79.0	14.0	92.4	75.5	15.5	90.2	71.7	17.2	88.0	67.0	19.2	85.2	62.0	21.2	82.2	-	-	-	
	11	81.4	14.1	94.7	77.8	15.5	92.6	73.8	17.2	90.2	69.1	19.2	87.3	63.9	21.3	84.1	-	-	-	
	12	83.7	14.1	97.1	80.1	15.5	94.9	76.0	17.2	92.4	71.1	19.2	89.4	65.8	21.3	86.0	-	-	-	
	13	86.0	14.1	99.5	82.4	15.6	97.2	78.2	17.3	94.6	73.1	19.3	91.4	67.7	21.3	87.9	-	-	-	
	14	88.3	14.2	101.8	84.7	15.6	99.5	80.4	17.3	96.8	75.2	19.3	93.5	69.5	21.4	89.8	-	-	-	
	15	90.7	14.2	104.2	87.0	15.7	101.9	82.5	17.4	99.0	77.2	19.3	95.6	71.4	21.4	91.7	-	-	-	
	16	93.0	14.3	106.6	89.3	15.7	104.2	84.7	17.4	101.2	79.2	19.4	97.6	73.3	21.4	93.7	-	-	-	
	17	95.3	14.3	108.9	91.5	15.7	106.5	86.9	17.4	103.4	81.3	19.4	99.7	75.2	21.4	95.6	-	-	-	
	18	97.7	14.4	111.3	93.8	15.8	108.8	89.0	17.5	105.6	83.3	19.4	101.7	77.1	21.5	97.5	-	-	-	
	80.2	5	75.0	15.1	89.4	71.4	16.8	87.4	67.8	18.7	85.6	63.5	21.0	83.5	58.9	23.4	81.1	53.5	25.9	78.1
		6	77.5	15.2	91.9	73.9	16.8	89.9	70.3	18.8	88.1	65.9	21.0	85.8	61.1	23.4	83.3	55.6	26.0	80.2
		7	80.0	15.2	94.5	79.0	16.8	95.0	72.7	18.8	90.5	68.2	21.1	88.2	63.3	23.4	85.6	57.7	26.0	82.4
		8	82.5	15.3	97.0	78.9	16.9	95.0	75.1	18.9	93.0	70.5	21.1	90.5	65.5	23.5	87.8	-	-	-
9		85.0	15.3	99.6	81.4	17.0	97.5	77.5	18.9	95.4	72.8	21.1	92.9	67.7	23.5	90.0	-	-	-	
10		87.5	15.4	102.1	83.9	17.0	100.0	79.9	18.9	97.9	75.1	21.2	95.2	69.9	23.5	92.3	-	-	-	
11		90.0	15.4	104.6	86.4	17.1	102.6	82.3	19.0	100.3	77.4	21.2	97.6	72.1	23.6	94.5	-	-	-	
12		92.5	15.5	107.2	88.9	17.1	105.1	84.7	19.0	102.8	79.7	21.3	99.9	74.3	23.6	96.8	-	-	-	
13		95.0	15.5	109.7	91.3	17.1	107.6	87.1	19.1	105.2	82.0	21.3	102.3	76.5	23.7	99.0	-	-	-	
14		97.5	15.5	112.3	93.8	17.2	110.2	89.5	19.1	107.7	84.4	21.3	104.6	78.7	23.7	101.3	-	-	-	
15		100.0	15.6	114.8	96.3	17.2	112.7	91.9	19.1	110.1	86.7	21.4	107.0	81.0	23.7	103.5	-	-	-	
16		102.5	15.6	117.4	98.8	17.3	115.2	94.3	19.2	112.6	89.0	21.4	109.3	83.2	23.8	105.7	-	-	-	
17		105.0	15.7	119.9	101.3	17.3	117.8	96.8	19.2	115.0	91.3	21.5	111.7	85.4	23.8	108.0	-	-	-	
18		107.5	15.7	122.4	103.8	17.4	120.3	99.2	19.3	117.5	93.6	21.5	114.0	87.6	23.8	110.2	-	-	-	
90.2		5	87.9	18.0	105.0	83.9	20.0	102.9	79.8	22.4	101.1	75.0	25.1	98.9	69.8	28.0	96.4	63.7	31.1	93.3
		6	90.7	18.0	107.8	86.7	20.0	105.7	82.6	22.4	103.9	77.7	25.2	101.6	72.4	28.1	99.1	66.3	31.2	95.9
		7	93.4	18.1	110.6	92.0	20.3	111.3	85.4	22.5	106.7	80.4	25.2	104.4	75.1	28.1	101.8	68.9	31.2	98.6
		8	96.2	18.1	113.4	92.3	20.2	111.4	88.1	22.5	109.5	83.1	25.3	107.1	77.8	28.2	104.5	-	-	-
	9	98.9	18.2	116.2	95.0	20.2	114.2	90.9	22.6	112.3	85.9	25.3	109.9	80.4	28.2	107.2	-	-	-	
	10	101.7	18.3	119.0	97.8	20.3	117.1	93.6	22.6	115.1	88.6	25.4	112.7	83.1	28.3	109.9	-	-	-	
	11	104.5	18.3	121.9	100.6	20.3	119.9	96.4	22.7	117.9	91.3	25.4	115.4	85.8	28.3	112.6	-	-	-	
	12	107.2	18.4	124.7	103.4	20.4	122.8	99.1	22.7	120.7	94.0	25.5	118.2	88.4	28.3	115.4	-	-	-	
	13	110.0	18.4	127.5	106.2	20.4	125.6	101.9	22.8	123.5	96.7	25.5	121.0	91.1	28.4	118.1	-	-	-	
	14	112.7	18.5	130.3	109.0	20.5	128.5	104.6	22.8	126.3	99.4	25.6	123.7	93.8	28.4	120.8	-	-	-	
	15	115.5	18.5	133.1	111.8	20.5	131.3	107.4	22.9	129.1	102.1	25.6	126.5	96.4	28.5	123.5	-	-	-	
	16	118.3	18.6	135.9	114.6	20.6	134.1	110.2	22.9	131.9	104.8	25.7	129.2	99.1	28.5	126.2	-	-	-	
	17	121.0	18.6	138.7	117.4	20.6	137.0	112.9	23.0	134.8	107.6	25.7	132.0	101.8	28.6	128.9	-	-	-	
	18	123.8	18.7	141.5	120.2	20.7	139.8	115.7	23.0	137.6	110.3	25.8	134.8	104.4	28.6	131.6	-	-	-	
	105.2	5	99.9	20.9	119.7	95.2	23.0	117.1	90.5	25.6	114.8	84.8	28.6	112.0	78.7	31.8	108.9	71.7	35.2	105.1
		6	103.2	20.9	123.1	98.5	23.1	120.5	93.8	25.7	118.2	88.1	28.7	115.3	81.9	31.8	112.1	74.7	35.2	108.2
		7	106.5	21.0	126.5	105.0	23.3	127.1	97.1	25.8	121.5	91.3	28.8	118.6	85.0	31.9	115.3	77.8	35.3	111.3
		8	109.8	21.1	129.9	105.2	23.3	127.3	100.3	25.8	124.9	94.5	28.8	121.9	88.1	32.0	118.5	-	-	-
9		113.2	21.1	133.2	108.6	23.3	130.7	103.6	25.9	128.2	97.7	28.9	125.2	91.3	32.1	121.7	-	-	-	
10		116.5	21.2	136.6	111.9	23.4	134.1	106.9	26.0	131.6	100.9	29.0	128.4	94.4	32.1	125.0	-	-	-	
11		119.8	21.3	140.0	115.2	23.5	137.5	110.2	26.1	134.9	104.1	29.1	131.7	97.6	32.2	128.2	-	-	-	
12		123.1	21.4	143.4	118.6	23.6	140.9	113.5	26.1	138.3	107.3	29.1	135.0	100.7	32.3	131.4	-	-	-	
13		126.4	21.4	146.8	121.9	23.6	144.3	116.7	26.2	141.6	110.6	29.2	138.3	103.8	32.3	134.6	-	-	-	
14		129.7	21.5	150.1	125.2	23.7	147.8	120.0	26.3	145.0	113.8	29.3	141.6	107.0	32.4	137.8	-	-	-	
15		133.0	21.6	153.5	128.6	23.8	151.2	123.3	26.3	148.3	117.0	29.3	144.9	110.1	32.5	141.0	-	-	-	
16		136.3	21.7	156.9	131.9	23.8	154.6	126.6	26.4	151.7	120.2	29.4	148.1	113.3	32.6	144.2	-	-	-	
17		139.6	21.7	160.3	135.2	23.9	158.0	129.9	26.5	155.0	123.4	29.5	151.4	116.4	32.6	147.4	-	-	-	
18		142.9	21.8	163.6	138.6	24.0	161.4	133.1	26.6	158.4	126.6	29.6	154.7	119.6	32.7	150.6	-	-	-	

TWE= OUTLET PLANT water temperature (cooling mode). OUTLET SOURCE water temperature (heating mode) (°C)

TWc= OUTLET SOURCE water temperature (cooling mode). OUTLET PLANT water temperature (heating mode) (°C)

kWf = Cooling capacity (kW).

kWa = Compressor power input (kW).

kWt = Heating capacity (kW).

The performances refer to a 5°C temperature difference between the water entering and leaving the heat exchangers. Has also been considered A 0.44 x 10⁻⁴ m² K/W fouling factor.

The performances are declared no considering any correction due to water flow rate and water side pressure drop (gross performance).

IR-IW UNIT PERFORMANCE

Mod. 120.2 ÷ 170.2

MOD.	TWE	TWC																		
		30			35			40			45			50			55			
		kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	
120.2	5	112.0	23.7	134.5	106.6	26.1	131.4	101.3	28.9	128.7	94.8	32.1	125.3	87.9	35.5	121.6	79.9	39.2	117.1	
	6	115.8	23.8	138.4	110.5	26.1	135.3	105.1	28.9	132.5	98.5	32.2	129.1	91.5	35.6	125.3	83.3	39.3	120.6	
	7	119.7	23.9	142.4	118.0	26.3	143.0	108.8	29.0	136.4	102.2	32.3	132.9	95.0	35.7	128.9	86.7	39.4	124.1	
	8	123.6	23.9	146.3	118.2	26.3	143.2	112.6	29.1	140.3	105.9	32.4	136.6	98.6	35.8	132.6	-	-	-	
	9	127.4	24.0	150.2	122.1	26.4	147.2	116.4	29.2	144.2	109.6	32.5	140.4	102.2	35.9	136.2	-	-	-	
	10	131.3	24.1	154.2	126.0	26.5	151.2	120.2	29.3	148.0	113.3	32.5	144.2	105.7	36.0	139.9	-	-	-	
	11	135.2	24.2	158.1	129.9	26.6	155.1	124.0	29.4	151.9	116.9	32.6	147.9	109.3	36.1	143.6	-	-	-	
	12	139.0	24.3	162.1	133.8	26.6	159.1	127.8	29.5	155.8	120.6	32.7	151.7	112.9	36.2	147.2	-	-	-	
	13	142.9	24.3	166.0	137.6	26.7	163.0	131.6	29.5	159.6	124.3	32.8	155.5	116.4	36.3	150.9	-	-	-	
	14	146.8	24.4	170.0	141.5	26.8	167.0	135.4	29.6	163.5	128.0	32.9	159.2	120.0	36.3	154.5	-	-	-	
	15	150.6	24.5	173.9	145.4	26.9	170.9	139.2	29.7	167.4	131.7	33.0	163.0	123.6	36.4	158.2	-	-	-	
	16	154.5	24.6	177.8	149.3	27.0	174.9	142.9	29.8	171.3	135.4	33.1	166.8	127.1	36.5	161.8	-	-	-	
	17	158.4	24.7	181.8	153.1	27.1	178.9	146.7	29.9	175.1	139.0	33.2	170.6	130.7	36.6	165.5	-	-	-	
	18	162.2	24.7	185.7	157.0	27.1	182.8	150.5	30.0	179.0	142.7	33.3	174.3	134.3	36.7	169.2	-	-	-	
	135.2	5	126.3	26.8	151.8	120.4	29.5	148.4	114.5	32.6	145.5	107.3	36.3	141.8	99.6	40.1	137.7	90.7	44.2	132.7
		6	130.7	26.9	156.2	124.7	29.6	152.8	118.6	32.7	149.7	111.3	36.4	145.9	103.4	40.2	141.6	94.3	44.3	136.4
		7	135.0	27.0	160.7	133.0	29.8	161.3	122.8	32.8	154.0	115.3	36.4	150.0	107.3	40.3	145.5	97.9	44.4	140.1
		8	139.4	27.1	165.1	133.4	29.8	161.6	127.0	32.9	158.2	119.4	36.5	154.1	111.1	40.4	149.4	-	-	-
9		143.7	27.2	169.5	137.7	29.8	166.0	131.2	33.0	162.5	123.4	36.6	158.1	114.9	40.5	153.3	-	-	-	
10		148.0	27.3	173.9	142.0	29.9	170.4	135.3	33.1	166.8	127.4	36.7	162.2	118.7	40.5	157.2	-	-	-	
11		152.4	27.3	178.4	146.3	30.0	174.8	139.5	33.2	171.0	131.4	36.8	166.3	122.5	40.6	161.1	-	-	-	
12		156.7	27.4	182.8	150.6	30.1	179.2	143.7	33.2	175.3	135.4	36.9	170.4	126.3	40.7	165.0	-	-	-	
13		161.1	27.5	187.2	155.0	30.2	183.6	147.9	33.3	179.5	139.4	37.0	174.5	130.2	40.8	168.9	-	-	-	
14		165.4	27.6	191.7	159.3	30.3	188.0	152.0	33.4	183.8	143.4	37.1	178.6	134.0	40.9	172.8	-	-	-	
15		169.8	27.7	196.1	163.6	30.4	192.4	156.2	33.5	188.1	147.4	37.1	182.7	137.8	41.0	176.7	-	-	-	
16		174.1	27.8	200.5	167.9	30.5	196.8	160.4	33.6	192.3	151.4	37.2	186.8	141.6	41.1	180.6	-	-	-	
17		178.4	27.9	204.9	172.2	30.5	201.2	164.6	33.7	196.6	155.4	37.3	190.9	145.4	41.2	184.5	-	-	-	
18		182.8	28.0	209.4	176.6	30.6	205.7	168.8	33.8	200.8	159.4	37.4	194.9	149.3	41.2	188.4	-	-	-	
150.2		5	140.8	30.2	169.5	134.3	33.1	165.7	127.7	36.6	162.5	119.8	40.6	158.4	111.3	44.8	153.9	101.5	49.4	148.4
		6	145.6	30.3	174.4	139.0	33.2	170.6	132.3	36.7	167.1	124.2	40.7	162.8	115.4	44.9	158.1	105.3	49.4	152.3
		7	150.4	30.4	179.3	148.0	33.3	179.6	136.8	36.8	171.8	128.5	40.8	167.2	119.5	45.0	162.2	109.1	49.5	156.1
		8	155.2	30.5	184.2	148.5	33.4	180.2	141.3	36.9	176.4	132.8	40.9	171.6	123.6	45.1	166.4	-	-	-
	9	159.9	30.6	189.0	153.2	33.6	185.1	145.9	37.0	181.0	137.1	41.0	176.1	127.6	45.2	170.6	-	-	-	
	10	164.7	30.7	193.9	157.9	33.7	189.9	150.4	37.1	185.7	141.4	41.1	180.5	131.7	45.3	174.7	-	-	-	
	11	169.5	30.9	198.8	162.6	33.8	194.7	155.0	37.2	190.3	145.8	41.2	184.9	135.8	45.4	178.9	-	-	-	
	12	174.3	31.0	203.7	167.4	33.9	199.6	159.5	37.3	195.0	150.1	41.3	189.3	139.9	45.4	183.0	-	-	-	
	13	179.0	31.1	208.6	172.1	34.0	204.4	164.1	37.4	199.6	154.4	41.4	193.7	143.9	45.5	187.2	-	-	-	
	14	183.8	31.2	213.5	176.8	34.1	209.2	168.6	37.5	204.2	158.7	41.5	198.1	148.0	45.6	191.4	-	-	-	
	15	188.6	31.3	218.3	181.6	34.2	214.1	173.1	37.6	208.9	163.0	41.6	202.5	152.1	45.7	195.5	-	-	-	
	16	193.4	31.4	223.2	186.3	34.3	218.9	177.7	37.7	213.5	167.4	41.7	206.9	156.2	45.8	199.7	-	-	-	
	17	198.1	31.5	228.1	191.0	34.4	223.7	182.2	37.8	218.2	171.7	41.8	211.4	160.3	45.9	203.9	-	-	-	
	18	202.9	31.6	233.0	195.7	34.5	228.5	186.8	37.9	222.8	176.0	41.8	215.8	164.3	46.0	208.0	-	-	-	
	170.2	5	161.4	34.3	194.1	154.0	37.7	189.8	146.5	41.6	186.0	137.6	46.2	181.4	127.8	50.9	176.2	116.7	56.1	170.0
		6	167.0	34.5	199.7	159.4	37.8	195.3	151.8	41.7	191.4	142.6	46.3	186.5	132.6	51.1	181.1	121.1	56.2	174.5
		7	172.5	34.6	205.3	170.0	37.8	205.9	157.0	41.8	196.8	147.6	46.4	191.6	137.3	51.2	185.9	125.5	56.3	179.0
		8	178.0	34.7	210.9	170.4	38.0	206.5	162.3	41.9	202.1	152.6	46.5	196.7	142.0	51.3	190.8	-	-	-
9		183.5	34.8	216.6	175.8	38.1	212.1	167.5	42.1	207.5	157.6	46.6	201.9	146.8	51.4	195.6	-	-	-	
10		189.0	34.9	222.2	181.3	38.3	217.6	172.8	42.2	212.9	162.6	46.7	207.0	151.5	51.5	200.4	-	-	-	
11		194.5	35.1	227.8	186.8	38.4	223.2	178.0	42.3	218.2	167.6	46.8	212.1	156.2	51.6	205.3	-	-	-	
12		200.1	35.2	233.5	192.2	38.5	228.8	183.3	42.4	223.6	172.6	47.0	217.2	161.0	51.7	210.1	-	-	-	
13		205.6	35.3	239.1	197.7	38.6	234.4	188.5	42.5	229.0	177.6	47.1	222.3	165.7	51.9	215.0	-	-	-	
14		211.1	35.4	244.7	203.1	38.7	240.0	193.8	42.7	234.3	182.6	47.2	227.4	170.4	52.0	219.8	-	-	-	
15		216.6	35.5	250.4	208.6	38.9	245.5	199.1	42.8	239.7	187.6	47.3	232.5	175.2	52.1	224.6	-	-	-	
16		222.1	35.7	256.0	214.1	39.0	251.1	204.3	42.9	245.1	192.6	47.4	237.6	179.9	52.2	229.5	-	-	-	
17		227.6	35.8	261.6	219.5	39.1	256.7	209.6	43.0	250.4	197.6	47.5	242.8	184.6	52.3	234.3	-	-	-	
18		233.2	35.9	267.3	225.0	39.2	262.3	214.8	43.1	255.8	202.6	47.7	247.9	189.4	52.4	239.2	-	-	-	

TWE= OUTLET PLANT water temperature (cooling mode). OUTLET SOURCE water temperature (heating mode) (°C)

TWC= OUTLET SOURCE water temperature (cooling mode). OUTLET PLANT water temperature (heating mode) (°C)

kWf = Cooling capacity (kW).

kWa = Compressor power input (kW).

kWt = Heating capacity (kW).

The performances refer to a 5°C temperature difference between the water entering and leaving the heat exchangers. Has also been considered A 0.44 x 10⁻⁴ m² K/W fouling factor.

The performances are declared no considering any correction due to water flow rate and water side pressure drop (gross performance).

IR-IW UNIT PERFORMANCE

Mod. 190.2 ÷ 240.2

MOD.	TWE	TWC																		
		30			35			40			45			50			55			
		kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	
190.2	5	181.9	38.4	218.3	173.5	42.1	213.5	165.1	46.6	209.3	155.0	51.7	204.1	144.1	57.1	198.3	131.5	62.9	191.3	
	6	188.2	38.5	224.8	179.7	42.3	219.9	171.1	46.7	215.5	160.7	51.8	210.0	149.5	57.2	203.9	136.6	63.0	196.4	
	7	194.5	38.6	231.2	192.0	42.3	232.2	177.1	46.8	221.6	166.5	52.0	215.8	154.9	57.3	209.4	141.6	63.2	201.6	
	8	200.8	38.8	237.7	192.2	42.5	232.6	183.1	47.0	227.7	172.2	52.1	221.6	160.3	57.5	214.9	-	-	-	
	9	207.1	38.9	244.1	198.5	42.7	239.0	189.1	47.1	233.8	177.9	52.2	227.5	165.7	57.6	220.4	-	-	-	
	10	213.4	39.0	250.5	204.7	42.8	245.4	195.1	47.2	240.0	183.6	52.4	233.3	171.1	57.8	226.0	-	-	-	
	11	219.8	39.2	257.0	211.0	42.9	251.8	201.1	47.4	246.1	189.3	52.5	239.2	176.5	57.9	231.5	-	-	-	
	12	226.1	39.3	263.4	217.2	43.1	258.1	207.1	47.5	252.2	195.0	52.6	245.0	181.9	58.0	237.0	-	-	-	
	13	232.4	39.4	269.8	223.5	43.2	264.5	213.1	47.6	258.4	200.7	52.8	250.8	187.3	58.2	242.5	-	-	-	
	14	238.7	39.6	276.3	229.7	43.3	270.9	219.1	47.8	264.5	206.4	52.9	256.7	192.7	58.3	248.1	-	-	-	
	15	245.0	39.7	282.7	236.0	43.5	277.2	225.1	47.9	270.6	212.1	53.0	262.5	198.1	58.4	253.6	-	-	-	
	16	251.3	39.8	289.2	242.2	43.6	283.6	231.1	48.0	276.7	217.8	53.2	268.4	203.4	58.6	259.1	-	-	-	
	17	257.6	39.9	295.6	248.5	43.7	290.0	237.1	48.2	282.9	223.6	53.3	274.2	208.8	58.7	264.6	-	-	-	
	18	264.0	40.1	302.0	254.7	43.8	296.4	243.1	48.3	289.0	229.3	53.4	280.0	214.2	58.9	270.1	-	-	-	
	215.2	5	204.9	43.2	245.9	195.4	47.5	240.6	185.9	52.6	235.9	174.6	58.4	230.1	162.3	64.6	223.6	148.1	71.2	215.7
		6	211.9	43.4	253.1	202.4	47.7	247.7	192.7	52.7	242.7	181.0	58.6	236.6	168.3	64.7	229.8	153.7	71.3	221.5
		7	219.0	43.5	260.3	216.0	48.4	262.0	199.4	52.9	249.6	187.4	58.7	243.2	174.4	64.9	236.0	159.4	71.5	227.3
		8	226.0	43.7	267.5	216.4	48.0	261.9	206.1	53.0	256.5	193.8	58.9	249.7	180.4	65.0	242.2	-	-	-
9		233.1	43.8	274.7	223.3	48.1	269.1	212.8	53.2	263.3	200.2	59.0	256.2	186.4	65.2	248.4	-	-	-	
10		240.1	44.0	281.9	230.3	48.3	276.2	219.5	53.3	270.2	206.5	59.2	262.8	192.5	65.3	254.5	-	-	-	
11		247.2	44.2	289.1	237.3	48.4	283.3	226.2	53.5	277.0	212.9	59.3	269.3	198.5	65.5	260.7	-	-	-	
12		254.3	44.3	296.3	244.3	48.6	290.5	232.9	53.6	283.9	219.3	59.5	275.8	204.6	65.6	266.9	-	-	-	
13		261.3	44.5	303.5	251.3	48.7	297.6	239.7	53.8	290.7	225.7	59.6	282.4	210.6	65.8	273.1	-	-	-	
14		268.4	44.6	310.7	258.3	48.9	304.7	246.4	53.9	297.6	232.1	59.8	288.9	216.6	65.9	279.3	-	-	-	
15		275.4	44.8	317.9	265.3	49.0	311.8	253.1	54.1	304.5	238.5	59.9	295.4	222.7	66.1	285.5	-	-	-	
16		282.5	44.9	325.1	272.2	49.2	319.0	259.8	54.2	311.3	244.9	60.1	302.0	228.7	66.2	291.6	-	-	-	
17		289.5	45.1	332.3	279.2	49.3	326.1	266.5	54.4	318.2	251.3	60.2	308.5	234.8	66.4	297.8	-	-	-	
18		296.6	45.2	339.5	286.2	49.5	333.2	273.2	54.5	325.0	257.7	60.4	315.0	240.8	66.5	304.0	-	-	-	
240.2		5	228.5	48.0	274.2	218.1	52.9	268.3	207.6	58.6	263.2	195.0	65.2	256.9	181.4	72.1	249.9	165.6	79.6	241.3
		6	236.4	48.2	282.2	225.9	53.0	276.3	215.1	58.7	270.9	202.1	65.3	264.2	188.1	72.3	256.8	171.9	79.8	247.7
		7	244.3	48.4	290.3	240.0	54.5	291.8	222.6	58.9	278.5	209.3	65.5	271.5	194.8	72.5	263.7	178.2	80.0	254.2
		8	252.2	48.5	298.3	241.5	53.4	292.2	230.1	59.1	286.2	216.4	65.7	278.8	201.6	72.6	270.6	-	-	-
	9	260.1	48.7	306.4	249.3	53.6	300.2	237.6	59.2	293.9	223.5	65.9	286.1	208.3	72.8	277.5	-	-	-	
	10	268.0	48.9	314.4	257.1	53.7	308.1	245.1	59.4	301.5	230.7	66.0	293.4	215.1	73.0	284.4	-	-	-	
	11	275.9	49.0	322.5	264.9	53.9	316.1	252.6	59.6	309.2	237.8	66.2	300.7	221.8	73.2	291.3	-	-	-	
	12	283.8	49.2	330.5	272.7	54.1	324.1	260.1	59.8	316.9	245.0	66.4	308.0	228.5	73.4	298.2	-	-	-	
	13	291.7	49.4	338.6	280.5	54.2	332.1	267.6	59.9	324.5	252.1	66.6	315.3	235.3	73.5	305.1	-	-	-	
	14	299.6	49.6	346.6	288.3	54.4	340.0	275.1	60.1	332.2	259.2	66.7	322.6	242.0	73.7	312.0	-	-	-	
	15	307.5	49.7	354.7	296.1	54.6	348.0	282.6	60.3	339.9	266.4	66.9	329.9	248.8	73.9	319.0	-	-	-	
	16	315.4	49.9	362.7	304.0	54.7	356.0	290.1	60.5	347.5	273.5	67.1	337.2	255.5	74.1	325.9	-	-	-	
	17	323.2	50.1	370.8	311.8	54.9	363.9	297.6	60.6	355.2	280.6	67.3	344.5	262.2	74.2	332.8	-	-	-	
	18	331.1	50.2	378.8	319.6	55.1	371.9	305.1	60.8	362.9	287.8	67.4	351.8	269.0	74.4	339.7	-	-	-	

TWE= OUTLET PLANT water temperature (cooling mode). OUTLET SOURCE water temperature (heating mode) (°C)

TWC= OUTLET SOURCE water temperature (cooling mode). OUTLET PLANT water temperature (heating mode) (°C)

kWf = Cooling capacity (kW).

kWa = Compressor power input (kW).

kWt = Heating capacity (kW).

The performances refer to a 5°C temperature difference between the water entering and leaving the heat exchangers. Has also been considered A 0.44 x 10⁻⁴ m² K/W fouling factor.

The performances are declared no considering any correction due to water flow rate and water side pressure drop (gross performance).

IP UNIT PERFORMANCE

Mod. 70.2 ÷ 105.2

MOD.	TWE	TWc																		
		30			35			40			45			50			55			
		kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	
70.2	5	66.1	13.9	79.4	62.9	15.4	77.5	59.7	17.1	75.9	55.8	19.1	73.9	51.6	21.2	71.7	46.8	23.4	69.0	
	6	68.4	14.0	81.7	65.1	15.4	79.8	61.8	17.1	78.1	57.8	19.1	76.0	53.5	21.2	73.6	48.4	23.5	70.7	
	7	70.7	14.0	84.0	68.6	14.9	82.8	63.9	17.2	80.2	59.8	19.2	78.0	55.3	21.2	75.5	50.1	23.5	72.4	
	8	73.0	14.1	86.3	69.6	15.5	84.4	66.1	17.2	82.4	61.8	19.2	80.0	57.1	21.3	77.4	-	-	-	
	9	75.2	14.1	88.6	71.9	15.6	86.6	68.2	17.3	84.6	63.8	19.2	82.0	59.0	21.3	79.2	-	-	-	
	10	77.5	14.2	91.0	74.1	15.6	88.9	70.3	17.3	86.7	65.8	19.3	84.1	60.8	21.3	81.1	-	-	-	
	11	79.8	14.2	93.3	76.3	15.6	91.2	72.4	17.3	88.9	67.8	19.3	86.1	62.7	21.4	83.0	-	-	-	
	12	82.1	14.2	95.6	78.6	15.7	93.5	74.6	17.4	91.1	69.7	19.3	88.1	64.5	21.4	84.8	-	-	-	
	13	84.4	14.3	97.9	80.8	15.7	95.7	76.7	17.4	93.2	71.7	19.3	90.1	66.4	21.4	86.7	-	-	-	
	14	86.6	14.3	100.2	83.1	15.7	98.0	78.8	17.4	95.4	73.7	19.4	92.1	68.2	21.4	88.6	-	-	-	
	15	88.9	14.4	102.6	85.3	15.8	100.3	80.9	17.5	97.5	75.7	19.4	94.2	70.1	21.5	90.5	-	-	-	
	16	91.2	14.4	104.9	87.5	15.8	102.6	83.1	17.5	99.7	77.7	19.4	96.2	71.9	21.5	92.3	-	-	-	
	17	93.5	14.4	107.2	89.8	15.9	104.9	85.2	17.5	101.9	79.7	19.5	98.2	73.8	21.5	94.2	-	-	-	
	18	95.8	14.5	109.5	92.0	15.9	107.1	87.3	17.6	104.0	81.7	19.5	100.2	75.6	21.5	96.1	-	-	-	
	80.2	5	73.8	15.3	88.3	70.3	16.9	86.4	66.8	18.8	84.7	62.6	21.1	82.6	58.0	23.4	80.2	52.7	25.9	77.4
		6	76.3	15.3	90.8	72.7	17.0	88.8	69.1	18.9	87.1	64.8	21.1	84.9	60.2	23.5	82.4	54.8	26.0	79.5
		7	78.7	15.4	93.3	77.4	16.6	93.2	71.5	18.9	89.5	67.1	21.1	87.2	62.3	23.5	84.6	56.8	26.0	81.5
		8	81.2	15.4	95.8	77.6	17.0	93.8	73.9	19.0	91.9	69.4	21.2	89.5	64.5	23.5	86.8	-	-	-
9		83.6	15.5	98.3	80.1	17.1	96.3	76.2	19.0	94.3	71.6	21.2	91.8	66.6	23.6	89.0	-	-	-	
10		86.0	15.5	100.8	82.5	17.1	98.8	78.6	19.0	96.7	73.9	21.3	94.1	68.8	23.6	91.2	-	-	-	
11		88.5	15.6	103.3	84.9	17.2	101.2	80.9	19.1	99.1	76.2	21.3	96.4	71.0	23.6	93.4	-	-	-	
12		90.9	15.6	105.8	87.4	17.2	103.7	83.3	19.1	101.5	78.4	21.3	98.7	73.1	23.7	95.6	-	-	-	
13		93.4	15.6	108.3	89.8	17.3	106.2	85.7	19.2	103.9	80.7	21.4	101.0	75.3	23.7	97.8	-	-	-	
14		95.8	15.7	110.8	92.2	17.3	108.7	88.0	19.2	106.3	83.0	21.4	103.3	77.5	23.7	100.0	-	-	-	
15		98.3	15.7	113.2	94.7	17.4	111.2	90.4	19.3	108.7	85.2	21.5	105.6	79.6	23.8	102.2	-	-	-	
16		100.7	15.8	115.7	97.1	17.4	113.6	92.7	19.3	111.1	87.5	21.5	107.9	81.8	23.8	104.4	-	-	-	
17		103.2	15.8	118.2	99.6	17.4	116.1	95.1	19.3	113.5	89.7	21.5	110.2	84.0	23.8	106.6	-	-	-	
18		105.6	15.9	120.7	102.0	17.5	118.6	97.5	19.4	115.9	92.0	21.6	112.5	86.1	23.9	108.8	-	-	-	
90.2		5	86.6	18.2	103.8	82.6	20.2	101.8	78.6	22.5	100.1	73.9	25.3	97.9	68.8	28.1	95.5	62.8	31.2	92.5
		6	89.3	18.3	106.6	85.3	20.3	104.6	81.3	22.6	102.8	76.6	25.3	100.6	71.4	28.2	98.2	65.4	31.3	95.1
		7	92.0	18.3	109.4	90.2	20.1	109.3	84.0	22.6	105.6	79.2	25.4	103.3	74.0	28.2	100.8	68.0	31.3	97.7
		8	94.7	18.4	112.1	90.8	20.4	110.1	86.7	22.7	108.3	81.9	25.4	106.0	76.6	28.3	103.5	-	-	-
	9	97.4	18.4	114.9	93.5	20.4	112.9	89.5	22.8	111.1	84.5	25.5	108.7	79.2	28.3	106.1	-	-	-	
	10	100.1	18.5	117.6	96.3	20.5	115.7	92.2	22.8	113.8	87.2	25.5	111.4	81.8	28.4	108.8	-	-	-	
	11	102.8	18.5	120.4	99.0	20.5	118.5	94.9	22.9	116.6	89.9	25.6	114.1	84.4	28.4	111.4	-	-	-	
	12	105.5	18.6	123.1	101.8	20.6	121.3	97.6	22.9	119.3	92.5	25.6	116.9	87.1	28.5	114.1	-	-	-	
	13	108.2	18.6	125.9	104.5	20.6	124.1	100.3	23.0	122.1	95.2	25.7	119.6	89.7	28.5	116.8	-	-	-	
	14	110.9	18.7	128.7	107.2	20.7	126.9	103.0	23.0	124.8	97.8	25.7	122.3	92.3	28.6	119.4	-	-	-	
	15	113.6	18.8	131.4	110.0	20.7	129.7	105.7	23.1	127.6	100.5	25.8	125.0	94.9	28.6	122.1	-	-	-	
	16	116.3	18.8	134.2	112.7	20.8	132.4	108.4	23.1	130.3	103.2	25.8	127.7	97.5	28.7	124.7	-	-	-	
	17	119.0	18.9	136.9	115.4	20.8	135.2	111.1	23.2	133.1	105.8	25.9	130.4	100.1	28.7	127.4	-	-	-	
	18	121.7	18.9	139.7	118.2	20.9	138.0	113.8	23.2	135.8	108.5	25.9	133.1	102.7	28.8	130.1	-	-	-	
	105.2	5	98.5	21.1	118.5	93.9	23.2	116.0	89.3	25.8	113.8	83.7	28.8	111.1	77.7	31.9	108.0	70.8	35.3	104.3
		6	101.8	21.1	121.9	97.2	23.3	119.3	92.5	25.9	117.1	86.9	28.8	114.3	80.8	32.0	111.2	73.8	35.3	107.4
		7	105.0	21.2	125.2	103.0	23.1	124.9	95.7	25.9	120.4	90.0	28.9	117.5	83.9	32.0	114.3	76.8	35.4	110.4
		8	108.3	21.3	128.5	103.7	23.5	126.0	98.9	26.0	123.7	93.2	29.0	120.7	87.0	32.1	117.5	-	-	-
9		111.5	21.4	131.8	107.0	23.5	129.4	102.2	26.1	126.9	96.4	29.1	124.0	90.1	32.2	120.6	-	-	-	
10		114.8	21.4	135.1	110.3	23.6	132.7	105.4	26.2	130.2	99.5	29.1	127.2	93.1	32.2	123.8	-	-	-	
11		118.0	21.5	138.4	113.5	23.7	136.0	108.6	26.2	133.5	102.7	29.2	130.4	96.2	32.3	126.9	-	-	-	
12		121.2	21.6	141.7	116.8	23.7	139.4	111.8	26.3	136.8	105.8	29.3	133.6	99.3	32.4	130.1	-	-	-	
13		124.5	21.6	145.1	120.1	23.8	142.7	115.0	26.4	140.1	109.0	29.3	136.8	102.4	32.5	133.2	-	-	-	
14		127.7	21.7	148.4	123.4	23.9	146.1	118.3	26.4	143.4	112.1	29.4	140.1	105.5	32.5	136.4	-	-	-	
15		131.0	21.8	151.7	126.6	24.0	149.4	121.5	26.5	146.7	115.3	29.5	143.3	108.5	32.6	139.5	-	-	-	
16		134.2	21.9	155.0	129.9	24.0	152.7	124.7	26.6	149.9	118.4	29.6	146.5	111.6	32.7	142.7	-	-	-	
17		137.5	21.9	158.3	133.2	24.1	156.1	127.9	26.7	153.2	121.6	29.6	149.7	114.7	32.8	145.8	-	-	-	
18		140.7	22.0	161.6	136.5	24.2	159.4	131.1	26.7	156.5	124.7	29.7	152.9	117.8	32.8	149.0	-	-	-	

TWE= OUTLET PLANT water temperature (cooling mode). OUTLET SOURCE water temperature (heating mode) (°C)

TWc= OUTLET SOURCE water temperature (cooling mode). OUTLET PLANT water temperature (heating mode) (°C)

kWf = Cooling capacity (kW).

kWa = Compressor power input (kW).

kWt = Heating capacity (kW).

The performances refer to a 5°C temperature difference between the water entering and leaving the heat exchangers. Has also been considered A 0.44 x 10⁻⁴ m² K/W fouling factor.

The performances are declared no considering any correction due to water flow rate and water side pressure drop (gross performance).

IP UNIT PERFORMANCE

Mod. 120.2 ÷ 170.2

MOD.	TWE	TWC																		
		30			35			40			45			50			55			
		kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	
120.2	5	110.6	23.9	133.4	105.4	26.3	130.4	100.1	29.0	127.7	93.8	32.2	124.4	87.0	35.6	120.8	79.1	39.2	116.4	
	6	114.4	24.0	137.3	109.2	26.4	134.2	103.9	29.1	131.5	97.4	32.3	128.2	90.5	35.7	124.4	82.5	39.3	119.8	
	7	118.2	24.1	141.1	116.0	26.0	140.7	107.6	29.2	135.3	101.1	32.4	131.9	94.0	35.8	128.0	85.8	39.4	123.3	
	8	122.0	24.2	145.0	116.8	26.5	142.0	111.3	29.3	139.1	104.7	32.5	135.6	97.5	35.9	131.6	-	-	-	
	9	125.8	24.3	148.9	120.6	26.6	145.9	115.0	29.4	142.9	108.3	32.6	139.3	101.0	36.0	135.2	-	-	-	
	10	129.6	24.3	152.8	124.4	26.7	149.8	118.7	29.5	146.7	111.9	32.7	143.0	104.5	36.1	138.8	-	-	-	
	11	133.4	24.4	156.6	128.3	26.8	153.7	122.5	29.6	150.6	115.5	32.8	146.7	108.0	36.2	142.4	-	-	-	
	12	137.2	24.5	160.5	132.1	26.9	157.6	126.2	29.6	154.4	119.2	32.9	150.4	111.5	36.3	146.0	-	-	-	
	13	141.0	24.6	164.4	135.9	26.9	161.5	129.9	29.7	158.2	122.8	33.0	154.1	115.0	36.4	149.6	-	-	-	
	14	144.8	24.7	168.3	139.7	27.0	165.4	133.6	29.8	162.0	126.4	33.0	157.8	118.5	36.5	153.2	-	-	-	
	15	148.7	24.7	172.2	143.5	27.1	169.3	137.4	29.9	165.8	130.0	33.1	161.5	122.0	36.5	156.8	-	-	-	
	16	152.5	24.8	176.0	147.3	27.2	173.1	141.1	30.0	169.6	133.6	33.2	165.2	125.6	36.6	160.4	-	-	-	
	17	156.3	24.9	179.9	151.1	27.3	177.0	144.8	30.1	173.4	137.3	33.3	168.9	129.1	36.7	164.0	-	-	-	
	18	160.1	25.0	183.8	154.9	27.4	180.9	148.5	30.2	177.2	140.9	33.4	172.6	132.6	36.8	167.6	-	-	-	
	135.2	5	124.9	27.1	150.7	119.1	29.8	147.4	113.3	32.9	144.5	106.4	36.5	141.0	98.8	40.3	137.1	90.1	44.3	132.2
		6	129.2	27.2	155.0	123.3	29.8	151.7	117.4	32.9	148.7	110.3	36.6	145.0	102.5	40.3	140.9	93.6	44.4	135.8
		7	133.4	27.3	159.3	130.0	29.5	158.0	121.5	33.0	152.9	114.2	36.6	149.0	106.3	40.4	144.7	97.2	44.5	139.5
		8	137.7	27.4	163.7	131.8	30.0	160.3	125.6	33.1	157.0	118.1	36.7	153.0	110.0	40.5	148.5	-	-	-
9		141.9	27.5	168.0	136.0	30.1	164.6	129.7	33.2	161.2	122.0	36.8	157.0	113.7	40.6	152.3	-	-	-	
10		146.2	27.5	172.3	140.2	30.2	168.9	133.7	33.3	165.4	125.9	36.9	161.0	117.5	40.7	156.1	-	-	-	
11		150.4	27.6	176.6	144.5	30.3	173.2	137.8	33.4	169.5	129.8	37.0	165.0	121.2	40.8	160.0	-	-	-	
12		154.6	27.7	181.0	148.7	30.4	177.5	141.9	33.5	173.7	133.8	37.1	169.0	124.9	40.9	163.8	-	-	-	
13		158.9	27.8	185.3	152.9	30.4	181.8	146.0	33.6	177.9	137.7	37.2	173.0	128.7	41.0	167.6	-	-	-	
14		163.1	27.9	189.6	157.1	30.5	186.1	150.1	33.6	182.0	141.6	37.2	177.0	132.4	41.0	171.4	-	-	-	
15		167.4	28.0	194.0	161.3	30.6	190.4	154.1	33.7	186.2	145.5	37.3	181.0	136.1	41.1	175.2	-	-	-	
16		171.6	28.1	198.3	165.6	30.7	194.7	158.2	33.8	190.3	149.4	37.4	185.0	139.9	41.2	179.0	-	-	-	
17		175.9	28.2	202.6	169.8	30.8	199.0	162.3	33.9	194.5	153.3	37.5	189.0	143.6	41.3	182.8	-	-	-	
18		180.1	28.2	206.9	174.0	30.9	203.4	166.4	34.0	198.7	157.2	37.6	193.0	147.3	41.4	186.7	-	-	-	
150.2		5	139.2	30.6	168.3	132.8	33.5	164.6	126.4	36.9	161.4	118.7	40.9	157.5	110.3	45.1	153.1	100.7	49.6	147.8
		6	143.9	30.7	173.0	137.4	33.6	169.3	130.8	37.0	166.0	122.9	41.0	161.8	114.3	45.2	157.2	104.4	49.7	151.6
		7	148.6	30.8	177.8	145.0	33.0	176.4	135.3	37.1	170.5	127.1	41.1	166.1	118.3	45.3	161.3	108.1	49.7	155.4
		8	153.3	30.9	182.6	146.7	33.8	178.8	139.7	37.2	175.1	131.3	41.2	170.5	122.3	45.3	165.4	-	-	-
	9	157.9	31.0	187.4	151.3	33.9	183.5	144.2	37.3	179.6	135.6	41.3	174.8	126.3	45.4	169.4	-	-	-	
	10	162.6	31.1	192.2	156.0	34.0	188.3	148.6	37.4	184.2	139.8	41.4	179.1	130.3	45.5	173.5	-	-	-	
	11	167.3	31.2	197.0	160.6	34.1	193.0	153.1	37.5	188.7	144.0	41.5	183.4	134.3	45.6	177.6	-	-	-	
	12	172.0	31.4	201.8	165.2	34.2	197.7	157.5	37.6	193.3	148.3	41.6	187.8	138.3	45.7	181.7	-	-	-	
	13	176.6	31.5	206.5	169.8	34.3	202.5	162.0	37.7	197.8	152.5	41.7	192.1	142.3	45.8	185.8	-	-	-	
	14	181.3	31.6	211.3	174.5	34.4	207.2	166.4	37.8	202.4	156.7	41.7	196.4	146.3	45.9	189.8	-	-	-	
	15	186.0	31.7	216.1	179.1	34.6	211.9	170.9	37.9	206.9	161.0	41.8	200.7	150.3	46.0	193.9	-	-	-	
	16	190.7	31.8	220.9	183.7	34.7	216.7	175.3	38.0	211.4	165.2	41.9	205.1	154.3	46.1	198.0	-	-	-	
	17	195.4	31.9	225.7	188.4	34.8	221.4	179.8	38.1	216.0	169.4	42.0	209.4	158.2	46.1	202.1	-	-	-	
	18	200.0	32.0	230.5	193.0	34.9	226.1	184.2	38.2	220.5	173.7	42.1	213.7	162.2	46.2	206.2	-	-	-	
	170.2	5	158.9	34.6	191.8	151.6	37.9	187.6	144.3	41.8	184.0	135.5	46.3	179.5	125.9	51.1	174.5	114.9	56.2	168.3
		6	164.3	34.8	197.4	157.0	38.1	193.1	149.4	41.9	189.3	140.4	46.5	184.5	130.6	51.2	179.2	119.3	56.3	172.8
		7	169.8	34.9	202.9	167.0	37.4	202.5	154.6	42.1	194.5	145.3	46.6	189.5	135.2	51.3	184.0	123.6	56.4	177.2
		8	175.2	35.0	208.4	167.7	38.3	204.1	159.7	42.2	199.8	150.2	46.7	194.6	139.9	51.4	188.7	-	-	-
9		180.6	35.1	214.0	173.1	38.4	209.6	164.9	42.3	205.1	155.1	46.8	199.6	144.5	51.5	193.5	-	-	-	
10		186.0	35.2	219.5	178.4	38.5	215.0	170.1	42.4	210.4	160.0	46.9	204.6	149.2	51.6	198.2	-	-	-	
11		191.4	35.4	225.0	183.8	38.7	220.5	175.2	42.5	215.6	164.9	47.0	209.6	153.8	51.8	203.0	-	-	-	
12		196.9	35.5	230.6	189.2	38.8	226.0	180.4	42.6	220.9	169.9	47.1	214.6	158.5	51.9	207.7	-	-	-	
13		202.3	35.6	236.1	194.5	38.9	231.5	185.6	42.8	226.2	174.8	47.3	219.7	163.1	52.0	212.5	-	-	-	
14		207.7	35.7	241.6	199.9	39.0	237.0	190.7	42.9	231.4	179.7	47.4	224.7	167.8	52.1	217.2	-	-	-	
15		213.1	35.8	247.2	205.3	39.1	242.4	195.9	43.0	236.7	184.6	47.5	229.7	172.4	52.2	222.0	-	-	-	
16		218.5	36.0	252.7	210.6	39.2	247.9	201.0	43.1	242.0	189.5	47.6	234.7	177.1	52.3	226.8	-	-	-	
17		224.0	36.1	258.2	216.0	39.4	253.4	206.2	43.2	247.3	194.4	47.7	239.8	181.7	52.4	231.5	-	-	-	
18		229.4	36.2	263.8	221.4	39.5	258.9	211.4	43.3	252.5	199.4	47.8	244.8	186.3	52.5	236.3	-	-	-	

TWE= OUTLET PLANT water temperature (cooling mode). OUTLET SOURCE water temperature (heating mode) (°C)

TWC= OUTLET SOURCE water temperature (cooling mode). OUTLET PLANT water temperature (heating mode) (°C)

kWf = Cooling capacity (kW).

kWa = Compressor power input (kW).

kWt = Heating capacity (kW).

The performances refer to a 5°C temperature difference between the water entering and leaving the heat exchangers. Has also been considered A 0.44 x 10⁻⁴ m² K/W fouling factor.

The performances are declared no considering any correction due to water flow rate and water side pressure drop (gross performance).

IP UNIT PERFORMANCE

Mod. 190.2 ÷ 240.2

MOD.	TWE	TWC																	
		30			35			40			45			50			55		
		kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt	kWf	kWa	kWt
190.2	5	179.5	38.6	216.2	171.3	42.3	211.5	163.1	46.7	207.4	153.2	51.8	202.4	142.5	57.1	196.8	130.2	62.9	189.9
	6	185.7	38.7	222.5	177.4	42.5	217.7	168.9	46.8	213.4	158.8	51.9	208.1	147.8	57.3	202.2	135.1	63.0	195.0
	7	191.9	38.9	228.8	188.0	41.9	227.8	174.8	47.0	219.4	164.4	52.0	213.8	153.1	57.4	207.6	140.1	63.2	200.0
	8	198.0	39.0	235.1	189.6	42.7	230.2	180.7	47.1	225.4	170.0	52.2	219.6	158.4	57.5	213.0	-	-	-
	9	204.2	39.1	241.4	195.8	42.8	236.5	186.6	47.2	231.4	175.6	52.3	225.3	163.7	57.7	218.4	-	-	-
	10	210.4	39.3	247.7	201.9	43.0	242.7	192.5	47.4	237.4	181.2	52.4	231.0	168.9	57.8	223.8	-	-	-
	11	216.6	39.4	254.0	208.0	43.1	248.9	198.3	47.5	243.5	186.8	52.6	236.7	174.2	57.9	229.3	-	-	-
	12	222.8	39.5	260.3	214.1	43.2	255.2	204.2	47.6	249.5	192.3	52.7	242.4	179.5	58.1	234.7	-	-	-
	13	229.0	39.6	266.6	220.2	43.4	261.4	210.1	47.8	255.5	197.9	52.9	248.1	184.8	58.2	240.1	-	-	-
	14	235.1	39.8	272.9	226.3	43.5	267.7	216.0	47.9	261.5	203.5	53.0	253.9	190.1	58.3	245.5	-	-	-
	15	241.3	39.9	279.2	232.5	43.6	273.9	221.8	48.0	267.5	209.1	53.1	259.6	195.3	58.5	250.9	-	-	-
	16	247.5	40.0	285.5	238.6	43.8	280.1	227.7	48.2	273.5	214.7	53.3	265.3	200.6	58.6	256.3	-	-	-
	17	253.7	40.2	291.8	244.7	43.9	286.4	233.6	48.3	279.5	220.3	53.4	271.0	205.9	58.8	261.7	-	-	-
	18	259.9	40.3	298.1	250.8	44.0	292.6	239.5	48.4	285.5	225.9	53.5	276.7	211.2	58.9	267.1	-	-	-
215.2	5	202.2	43.8	243.8	193.0	48.0	238.6	183.7	53.0	234.0	172.5	58.8	228.4	160.5	64.9	222.1	146.5	71.5	214.4
	6	209.2	44.0	250.9	199.8	48.2	245.6	190.3	53.2	240.8	178.8	59.0	234.8	166.4	65.1	228.2	152.1	71.6	220.1
	7	216.1	44.1	258.0	212.0	47.9	257.5	196.8	53.3	247.5	185.1	59.1	241.2	172.3	65.2	234.3	157.6	71.8	225.8
	8	223.0	44.3	265.1	213.5	48.5	259.6	203.4	53.5	254.2	191.3	59.3	247.6	178.2	65.4	240.3	-	-	-
	9	229.9	44.4	272.1	220.4	48.6	266.6	210.0	53.6	261.0	197.6	59.4	254.1	184.2	65.5	246.4	-	-	-
	10	236.9	44.6	279.2	227.2	48.8	273.6	216.6	53.8	267.7	203.9	59.6	260.5	190.1	65.7	252.5	-	-	-
	11	243.8	44.7	286.3	234.1	48.9	280.6	223.2	53.9	274.4	210.2	59.7	266.9	196.0	65.8	258.5	-	-	-
	12	250.7	44.9	293.3	240.9	49.1	287.6	229.8	54.1	281.2	216.4	59.9	273.3	201.9	66.0	264.6	-	-	-
	13	257.6	45.0	300.4	247.8	49.2	294.6	236.4	54.2	287.9	222.7	60.0	279.7	207.9	66.1	270.7	-	-	-
	14	264.6	45.2	307.5	254.7	49.4	301.6	243.0	54.4	294.6	229.0	60.2	286.1	213.8	66.3	276.7	-	-	-
	15	271.5	45.3	314.5	261.5	49.5	308.6	249.6	54.5	301.4	235.2	60.3	292.5	219.7	66.4	282.8	-	-	-
	16	278.4	45.5	321.6	268.4	49.7	315.6	256.2	54.7	308.1	241.5	60.5	299.0	225.7	66.6	288.9	-	-	-
	17	285.3	45.6	328.7	275.2	49.8	322.6	262.8	54.8	314.8	247.8	60.6	305.4	231.6	66.7	294.9	-	-	-
	18	292.3	45.8	335.7	282.1	50.0	329.6	269.3	55.0	321.6	254.1	60.8	311.8	237.5	66.9	301.0	-	-	-
240.2	5	224.6	48.7	270.9	214.3	53.5	265.2	204.1	59.1	260.3	191.8	65.7	254.2	178.4	72.6	247.3	163.0	80.0	239.0
	6	232.3	48.9	278.8	222.0	53.7	273.0	211.4	59.3	267.8	198.7	65.9	261.3	185.0	72.7	254.1	169.2	80.2	245.3
	7	240.1	49.0	286.7	235.0	54.0	286.3	218.8	59.5	275.3	205.7	66.0	268.5	191.6	72.9	260.9	175.3	80.3	251.6
	8	247.8	49.2	294.5	237.3	54.0	288.6	226.1	59.6	282.8	212.7	66.2	275.6	198.2	73.1	267.6	-	-	-
	9	255.5	49.4	302.4	244.9	54.2	296.4	233.5	59.8	290.3	219.7	66.4	282.8	204.8	73.3	274.4	-	-	-
	10	263.2	49.5	310.3	252.6	54.3	304.2	240.8	60.0	297.8	226.7	66.5	289.9	211.4	73.4	281.2	-	-	-
	11	271.0	49.7	318.2	260.2	54.5	312.0	248.2	60.2	305.3	233.7	66.7	297.1	218.0	73.6	287.9	-	-	-
	12	278.7	49.9	326.1	267.9	54.7	319.8	255.5	60.3	312.8	240.7	66.9	304.2	224.6	73.8	294.7	-	-	-
	13	286.4	50.0	334.0	275.5	54.8	327.6	262.9	60.5	320.3	247.7	67.1	311.4	231.2	74.0	301.5	-	-	-
	14	294.2	50.2	341.9	283.2	55.0	335.4	270.2	60.7	327.8	254.6	67.2	318.5	237.8	74.1	308.2	-	-	-
	15	301.9	50.4	349.7	290.8	55.2	343.2	277.5	60.8	335.3	261.6	67.4	325.7	244.4	74.3	315.0	-	-	-
	16	309.6	50.5	357.6	298.4	55.4	351.0	284.9	61.0	342.8	268.6	67.6	332.8	251.0	74.5	321.8	-	-	-
	17	317.3	50.7	365.5	306.1	55.5	358.8	292.2	61.2	350.4	275.6	67.8	340.0	257.6	74.7	328.5	-	-	-
	18	325.1	50.9	373.4	313.7	55.7	366.6	299.6	61.3	357.9	282.6	67.9	347.1	264.2	74.8	335.3	-	-	-

TWE= OUTLET PLANT water temperature (cooling mode). OUTLET SOURCE water temperature (heating mode) (°C)

TWC= OUTLET SOURCE water temperature (cooling mode). OUTLET PLANT water temperature (heating mode) (°C)

kWf = Cooling capacity (kW).

kWa = Compressor power input (kW).

kWt = Heating capacity (kW).

The performances refer to a 5°C temperature difference between the water entering and leaving the heat exchangers. Has also been considered A 0.44 x 10⁻⁴ m² K/W fouling factor.

The performances are declared no considering any correction due to water flow rate and water side pressure drop (gross performance).

CORRECTION FACTOR

Correction factor for the use city water

For use of city water for condenser apply the correction factors reported on the following table.

Δt condenser water [°C]	5	10	15	20
Cooling capacity CCPF	1.000	1.025	1.030	1.035
Power input CCPA	1.000	0.960	0.955	0.950

Basing on design temperatures (TWE TWC) from the table “performances” extract Cooling Capacity (kWf) and Compressors Power Input (kW_a). Based on ΔT_{cond} equal to the difference outlet-inlet source side exchanger (condenser) water temperature you extract CCPF and CCPA so you can calculate

$$Pf = kWf \times CCPF$$

$$Pass_{CP} = kW_a \times CCPA$$

Then you calculate the thermal power to be cooled by the source side exchanger (condenser):

$$Pt = Pf + Pass_{CP}$$

Then you calculate the plant side exchanger (evaporator) and source side exchanger (condenser) water flow rate :

$$Q_{evap} [l/s] = (Pf [kW] \times 0.86 / \Delta T_{evap}) / 3.6:$$

$$Q_{cond} [l/s] = (Pt [kW] \times 0.86 / \Delta T_{cond}) / 3.6:$$

With Q_{evap} you can enter on abscissa on water pressure drop graph of the plant side exchanger (evaporator) and extract pressure drop.

With Q_{cond} you can enter on abscissa on water pressure drop graph of the source side exchanger (condenser) city water and extract pressure drop.

Fouling factors

The performances supplied with the tables are referred to a fouling factory = $0.44 \times 10^{-4} \text{ m}^2 \text{ K/W}$. For different values of the fouling factory, use the reduction coefficients reported in the following table.

Fouling factory		Evaporator	
		F.c. PF	F.c. PA
($\text{m}^2 \text{ K / W}$)	0.44×10^{-4}	1	1
($\text{m}^2 \text{ K / W}$)	0.86×10^{-4}	0.98	0.99
($\text{m}^2 \text{ K / W}$)	1.72×10^{-4}	0.93	0.98

F.c. PF: Correction Factor for Cooling capacity

F.c. PA: Correction Factor for compressor power Input

CORRECTION FACTOR

Correction factor for the use of glycol in heating mode

ETHYLENE GLYCOL with water produced between 30 ÷ 55 ° C.

Percentage Of glycol in mass / volume	0 / 0	10 / 8.9	20 / 18.1	30 / 27.7	40 / 37.5
Freezing point [°C]	0	-3.2	-8	-14	-22
CCPF - Thermal capacity correction factor	1.000	0.995	0.985	0.975	0.970
CCQA - Water flow rate correction factor	1.000	1.038	1.062	1.091	1.127
CCDP - Water pressure drop correction factor	1.000	1.026	1.051	1.077	1.103

PROPYLENE GLYCOL with water produced between 30 ÷ 55°C.

Percentage Of glycol in mass / volume	0 / 0	10 / 9.6	20 / 19.4	30 / 29.4	40 / 39.6
Freezing point [°C]	0	-3.3	-7	-13	-21
CCPF - Thermal capacity correction factor	1	0.99	0.975	0.965	0.955
CCQA - Water flow rate correction factor	1	1.018	1.032	1.053	1.082
CCDP - Water pressure drop correction factor	1	1.026	1.051	1.077	1.103

Basing on design temperatures (TWE TWC), from the performance tables extract the thermal capacity (kWt)

Based on type and percentage of glycol extract CCPT, CCQA, CCDP.

Then calculate.

$$P_{t_brine} = kWt \times CCPT$$

Then calculate brine flow rate to the heat exchanger:

$$Q_{brine} [l/s] = CCQA \times (P_{t_brine} [kW] \times 0.86 / \Delta T_{brine}) / 3.6$$

where ΔT_{brine} is the temperature difference outlet-intlet heat exchanger:

$$\Delta T_{brine} = T_{wout_brine} - T_{win_brine}$$

With this brine flow rate enter in abscissa on the water pressure drop of the heat exchanger then you have Dp_{app} .

Finally you can calculate the actual pressure drop of the brine on heat exchanger:

$$Dp_{brine} = CCDP \times Dp_{app}$$

Correction factor for the use of glycol in cooling mode

ETHYLENE GLYCOL with water produced between 5 ÷ 20 ° C.

Percentage Of glycol in mass / volume [%]	0 / 0	10 / 8.9	20 / 18.1	30 / 27.7	40 / 37.5
Freezing point [°C]	0	-3.2	-8	-14	-22
CCPF - Cooling capacity correction factor	1	0.99	0.98	0.97	0.95
CCPA - Power input correction factor	1	1	0.99	0.99	0.98
CCQA - Water flow rate correction factor	1	1.04	1.08	1.12	1.16
CCDP - Water pressure drop correction factor	1	1.08	1.16	1.25	1.35

PROPYLENE GLYCOL with water produced between 5 ÷ 20 ° C.

Percentage Of glycol in mass / volume [%]	0 / 0	10 / 9.6	20 / 19.4	30 / 29.4	40 / 39.6
Freezing point [°C]	0	-3.3	-7	-13	-21
CCPF - Cooling capacity correction factor	1	0.98	0.96	0.94	0.92
CCPA - Power input correction factor	1	0.99	0.98	0.95	0.93
CCQA - Water flow rate correction factor	1	1.01	1.03	1.06	1.09
CCDP - Water pressure drop correction factor	1	1.05	1.11	1.22	1.38

Basing on design temperatures (TWE TWc) and leaving water temperature of the evaporator (DESIGN CONDITIONS) from the table "performances" extract Cooling Capacity (kWf) and Compressors Power Input (kWa).

Based on type and percentage of glycol extract CCPF, CCPA, CCQA, CCDP.

Then calculate.

$$P_{f_brine} = kWf \times CCPF$$

$$P_{ass_CP_brine} = kWa \times CCPA$$

Then calculate brine flow rate of the evaporator:

$$Q_{brine} [l/s] = CCQA \times (P_{f_brine} [kW] \times 0.86 / \Delta T_{brine}) / 3.6$$

where ΔT_{brine} is the difference inlet-outlet heat exchanger water temperature:

$$\Delta T_{brine} = T_{win_brine} - T_{wout_brine}$$

With this brine flow rate enter in abscissa on the water pressure drop of the heat exchanger then you have Dp_{app} .

Finally you can calculate the actual pressure drop of the brine on heat exchanger side:

$$Dp_{brine} = CCDP \times Dp_{app}$$

BRINE UNIT BR - BP

Brine Unit (BR)

Correction factors to apply to the basic version data

ETHYLENE GLYCOL

Percentage Of glycol in mass / volume [%]	20 / 18.1						
Freezing point [°C]	-8						
Leaving water temperature	4	2	0	-2	-4	-6	-8
CCPF - Cooling capacity correction factor	0.912	0.855	0.798	0.738	0.683	-	-
CCPA - Compressor power input correction factor	0.967	0.957	0.947	0.927	0.897	-	-
CCQA - Water flow rate correction factor	1.071	1.072	1.073	1.075	1.076	-	-
CCDP - Water pressure drop correction factor	1.090	1.095	1.100	1.110	1.120	-	-

Percentage Of glycol in mass / volume [%]	30 / 27.7						
Freezing point [°C]	-14						
Leaving water temperature	4	2	0	-2	-4	-6	-8
CCPF - Cooling capacity correction factor	0.899	0.842	0.785	0.725	0.670	0.613	0.562
CCPA - Compressor power input correction factor	0.960	0.950	0.940	0.920	0.890	0.870	0.840
CCQA - Water flow rate correction factor	1.106	1.107	1.108	1.109	1.110	1.111	1.112
CCDP - Water pressure drop correction factor	1.140	1.145	1.150	1.155	1.160	1.175	1.190

Percentage Of glycol in mass / volume [%]	40 / 37.5						
Freezing point [°C]	-22						
Leaving water temperature	4	2	0	-2	-4	-6	-8
CCPF - Cooling capacity correction factor	0.884	0.827	0.770	0.710	0.655	0.598	0.547
CCPA - Compressor power input correction factor	0.880	0.870	0.860	0.840	0.810	0.790	0.760
CCQA - Water flow rate correction factor	1.150	1.151	1.153	1.154	1.155	1.157	1.158
CCDP - Water pressure drop correction factor	1.190	1.195	1.200	1.210	1.220	1.235	1.250

PROPYLENE GLYCOL

Percentage Of glycol in mass / volume [%]	20 / 19.4						
Freezing point [°C]	-8						
Leaving water temperature	4	2	0	-2	-4	-6	-8
CCPF - Cooling capacity correction factor	0.874	0.807	0.740	0.690	0.641	-	-
CCPA - Compressor power input correction factor	0.945	0.935	0.925	0.900	0.875	-	-
CCQA - Water flow rate correction factor	1.037	1.038	1.039	1.039	1.040	-	-
CCDP - Water pressure drop correction factor	1.110	1.115	1.120	1.130	1.140	-	-

Percentage Of glycol in mass / volume [%]	30 / 29.4						
Freezing point [°C]	-14						
Leaving water temperature	4	2	0	-2	-4	-6	-8
CCPF - Cooling capacity correction factor	0.869	0.799	0.729	0.680	0.630	0.583	0.536
CCPA - Compressor power input correction factor	0.935	0.923	0.910	0.888	0.865	0.838	0.810
CCQA - Water flow rate correction factor	1.072	1.071	1.070	1.069	1.069	1.068	1.067
CCDP - Water pressure drop correction factor	1.160	1.175	1.190	1.200	1.210	1.255	1.300

Percentage Of glycol in mass / volume [%]	40 / 39.6						
Freezing point [°C]	-22						
Leaving water temperature	4	2	0	-2	-4	-6	-8
CCPF - Cooling capacity correction factor	0.848	0.784	0.719	0.670	0.620	0.570	0.520
CCPA - Compressor power input correction factor	0.865	0.855	0.845	0.820	0.795	0.773	0.750
CCQA - Water flow rate correction factor	1.116	1.114	1.112	1.110	1.108	1.107	1.105
CCDP - Water pressure drop correction factor	1.230	1.275	1.320	1.375	1.430	1.500	1.570

Basing on design temperature TWC and TWE = 7°C from the table "performances" extract Cooling Capacity (kWf) and Compressors Power Input (kW_a).
Based on type and percentage of glycol extract CCPF, CCPA, CCQA, CCDP.

Then calculate.

$$Pf_{brine} = kWf \times CCPF$$

$$Pass_{CP_{brine}} = kW_a \times CCPA$$

Then calculate brine flow rate:

$$Q_{brine} [l/s] = CCQA \times (Pf_{brine} [kW] \times 0.86 / \Delta T_{brine}) / 3.6$$

where ΔT_{brine} is the difference between inlet-outlet heat exchanger water temperature:

$$\Delta T_{brine} = T_{win_{brine}} - T_{wout_{brine}}$$

With this brine flow rate enter in abscissa on the water pressure drop of the heat exchanger then you have Dp_{app} .

Finally you can calculate the actual pressure drop of the brine on heat exchanger side:

$$Dp_{brine} = CCDP \times Dp_{app}$$

TECHNICAL DATA - DESUPERHEATER VERSION (VD)

Heat exchanger specifications

MODEL	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM
Type of recovery exchanger	Braze plates											-
Quantity	1											N°
Max. operating pressure on wet side	600											kPa
Total water content of recovery exchangers	0,55	0,55	0,55	0,75	0,75	0,75	1,20	1,20	1,20	1,50	1,50	l

NET NOMINAL performances - Standard plants

IR / IW unit - Chiller

MODEL	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	
Cooling mode W30W7-45 (source: water in 30°C out 35°C / plant: water in 12°C out 7°C / recovery : water in 40°C out 45°C)													
Cooling capacity VD	70,8	80,1	93,2	106	119	135	150	172	194	219	243	kW	
Total power input VD	18,3	19,8	24,1	27,8	31,8	35,7	40,4	46,1	52,0	59,5	67,3	kW	
EER VD	3,86	4,05	3,87	3,83	3,76	3,77	3,71	3,74	3,74	3,67	3,61	W/W	
HRE VD	4,58	4,80	4,61	4,57	4,49	4,51	4,43	4,46	4,46	4,39	4,32	W/W	
Plant side	Water flow rate	3,41	3,85	4,48	5,12	5,75	6,48	7,21	8,28	9,36	10,53	11,70	l/s
	Water pressure drop	49	40	42	43	46	44	47	48	50	51	51	kPa
Source side	Water flow rate	4,08	4,60	5,39	6,15	6,92	7,81	8,69	9,97	11,24	12,68	14,12	l/s
	Water pressure drop	70	56	60	62	66	63	68	69	72	72	74	kPa
Recovered heating capacity	13,2	14,8	17,9	20,6	23,2	26,3	29,4	33,3	37,3	42,7	48,1	kW	
Recovered water flow rate	0,63	0,71	0,86	1,00	1,10	1,30	1,40	1,60	1,80	2,00	2,30	l/s	
Recovered water pressure drop	6	8	11	9	10	7	8	10	13	10	13	kPa	

IP unit - Chiller

MODEL	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	
Cooling mode W30W7-45 (source: water in 30°C out 35°C / plant: water in 12°C out 7°C / recovery : water in 40°C out 45°C)													
Cooling capacity VD	69,0	78,0	91,0	104	117	132	147	169	190	214	238	kW	
Total power input VD	18,0	19,4	23,7	27,3	31,2	35,1	39,7	45,3	51,1	58,4	66,1	kW	
EER VD	3,86	4,04	3,86	3,82	3,75	3,76	3,70	3,73	3,73	3,67	3,60	W/W	
HRE VD	4,58	4,79	4,60	4,56	4,49	4,50	4,43	4,46	4,45	4,39	4,32	W/W	
Plant side	Water flow rate	3,34	3,77	4,39	5,01	5,64	6,35	7,07	8,12	9,17	10,32	11,46	l/s
	Water pressure drop	47	38	40	41	44	42	45	46	48	48	49	kPa
Source side	Water flow rate	4,00	4,51	5,29	6,04	6,79	7,66	8,53	9,78	11,03	12,45	13,86	l/s
	Water pressure drop	67	54	58	59	64	61	66	67	69	70	72	kPa
Recovered heating capacity	13,1	14,7	17,7	20,3	23,0	26,0	29,1	33,0	36,9	42,3	47,6	kW	
Recovered water flow rate	0,63	0,70	0,85	0,97	1,10	1,24	1,39	1,58	1,76	2,02	2,27	l/s	
Recovered water pressure drop	6	7	11	8	10	6	8	10	12	10	13	kPa	

Data declared according to **EN 14511**. The values are referred to units without options and accessories.

 **NOTE : THE HEATING CAPACITY RECOVERED BY THE DESUPERHEATER EXCLUSIVELY REFERS TO UNITS OPERATING IN THE COOLING MODE.**

GROSS NOMINAL performances - Standard plants

IR / IW unit - Chiller

MODELLO	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM
Cooling mode W30W7-45 (source: water in 30°C out 35°C / plant: water in 12°C out 7°C / recovery : water in 40°C out 45°C)												
Cooling capacity VD	71,4	80,6	93,8	107	120	136	151	173	196	220	245	kW
Power input compressor VD VD	14,7	16,5	19,9	22,8	25,8	29,2	32,6	37,0	41,5	47,4	53,4	kW
Total power input VD	14,7	16,5	19,9	22,8	25,8	29,2	32,6	37,0	41,5	47,4	53,4	kW
EER VD	4,83	4,91	4,72	4,69	4,65	4,66	4,63	4,68	4,72	4,64	4,59	W/W
HRE VD	5,76	5,79	5,62	5,59	5,57	5,55	5,53	5,58	5,62	5,54	5,48	W/W

IP unit - Chiller

MODELLO	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM
Cooling mode W30W7-45 (source: water in 30°C out 35°C / plant: water in 12°C out 7°C / recovery : water in 40°C out 45°C)												
Cooling capacity VD	70,0	79,0	92,0	105	118	133	148	170	192	216	240	kW
Power input compressor VD VD	14,6	16,3	19,7	22,6	25,5	28,9	32,3	36,7	41,0	47,0	52,9	kW
Total power input VD	14,6	16,3	19,7	22,6	25,5	28,9	32,3	36,7	41,0	47,0	52,9	kW
EER VD	4,79	4,85	4,67	4,65	4,63	4,60	4,63	4,59	4,68	4,60	4,53	W/W
HRE VD	5,71	5,74	5,57	5,54	5,52	5,50	5,48	5,53	5,58	5,50	5,44	W/W

 **NOTE : THE HEATING CAPACITY RECOVERED BY THE DESUPERHEATER EXCLUSIVELY REFERS TO UNITS OPERATING IN THE COOLING MODE.**

NOISE LEVEL

The noise levels refer to units operating in the nominal conditions (water temperature: inlet: 12°C - outlet: 7°C, Condenser water temperature: inlet: 30°C - outlet: 35°C).
The acoustic pressure levels are measured 1/ 5 / 10 meters away from the outer surface of the unit operating in the free field and resting on a reflecting surface (directional factor of 2).

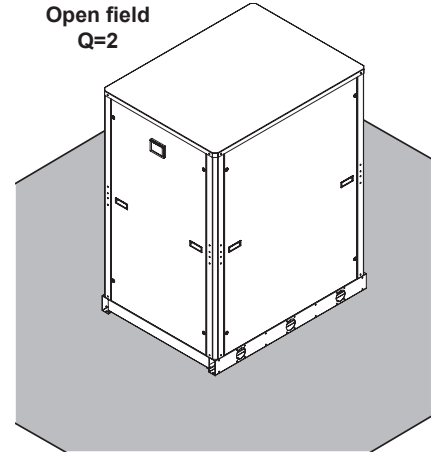
SWL = Sound power levels, with reference to 1×10^{-12} W.

The Total sound power level in dB(A) measured in compliance with ISO 9614 standards, which is therefore the only binding acoustic specification (the values of the Octave bands in the table are indicative).

SPL = Sound pressure levels, with reference to 2×10^{-5} Pa.

The sound pressure levels are values calculated by applying the **ISO-3744 relation (Eurovent 8/1)** and refer to a distance of 1 meter away from the external surface of units operating in the open field with directivity factor 2 (Q=2) and the units operating in nominal conditions in the cooling mode.

Open field
Q=2



AB Standard unit

MOD.	SWL (dB)									SPL [dB(A)]			
	Octave bands (Hz)								Total		1	5	10
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)			
70.2	76	74	71	72	72	65	61	55	80.6	75	59	49	44
80.2	76	74	75	74	70	68	64	53	81.5	76	60	50	45
90.2	77	75	76	75	71	69	65	54	82.5	77	61	51	46
105.2	77	75	76	75	71	69	65	54	82.5	77	61	51	46
120.2	77	75	76	75	71	69	65	54	82.5	77	61	51	46
135.2	78	76	77	76	72	70	66	55	83.5	78	62	52	47
150.2	78	76	77	76	72	70	66	55	83.5	78	62	52	47
170.2	79	77	78	77	73	71	67	56	84.5	79	63	53	48
190.2	79	77	78	77	73	71	67	56	84.5	79	63	53	48
215.2	80	78	79	78	74	72	68	57	85.5	80	64	54	49
240.2	80	78	79	78	74	72	68	57	85.5	80	64	54	49

AS Low noise unit

MOD.	SWL (dB)									SPL [dB(A)]			
	Octave bands (Hz)								Total		1	5	10
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)			
70.2	72	70	67	68	68	61	57	51	76.6	71	55	45	40
80.2	72	70	71	70	66	64	60	49	77.5	72	56	46	41
90.2	73	71	72	71	67	65	61	50	78.5	73	57	47	42
105.2	73	71	72	71	67	65	61	50	78.5	73	57	47	42
120.2	73	71	72	71	67	65	61	50	78.5	73	57	47	42
135.2	74	72	73	72	68	66	62	51	79.5	74	58	48	43
150.2	74	72	73	72	68	66	62	51	79.5	74	58	48	43
170.2	75	73	74	73	69	67	63	52	80.5	75	59	49	44
190.2	75	73	74	73	69	67	63	52	80.5	75	59	49	44
215.2	76	74	75	74	70	68	64	53	81.5	76	60	50	45
240.2	76	74	75	74	70	68	64	53	81.5	76	60	50	45

AX Extra low noise unit

MOD.	SWL (dB)									SPL [dB(A)]			
	Octave bands (Hz)								Total		1	5	10
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)			
70.2	68	66	63	64	64	57	53	47	72.6	67	51	41	36
80.2	68	66	67	66	62	60	56	45	73.5	68	52	42	37
90.2	69	67	68	67	63	61	57	46	74.5	69	53	43	38
105.2	69	67	68	67	63	61	57	46	74.5	69	53	43	38
120.2	69	67	68	67	63	61	57	46	74.5	69	53	43	38
135.2	70	68	69	68	64	62	58	47	75.5	70	54	44	39
150.2	70	68	69	68	64	62	58	47	75.5	70	54	44	39
170.2	71	69	70	69	65	63	59	48	76.5	71	55	45	40
190.2	71	69	70	69	65	63	59	48	76.5	71	55	45	40
215.2	72	70	71	70	66	64	60	49	77.5	72	56	46	41
240.2	72	70	71	70	66	64	60	49	77.5	72	56	46	41

(E): Dati dichiarati secondo il programma di certificazione **EUROVENT LCP**. I valori si riferiscono ad unità prive di opzioni ed accessori.

OPERATING RANGE

Operating range

The graph indicates the admissible working envelope of the unit.
 The use of the unit in conditions outside the envelope will avoid the warranty.
 Here under are reported the limits of water differential temperature for the heat exchangers of the unit.

Operating range standard unit AB

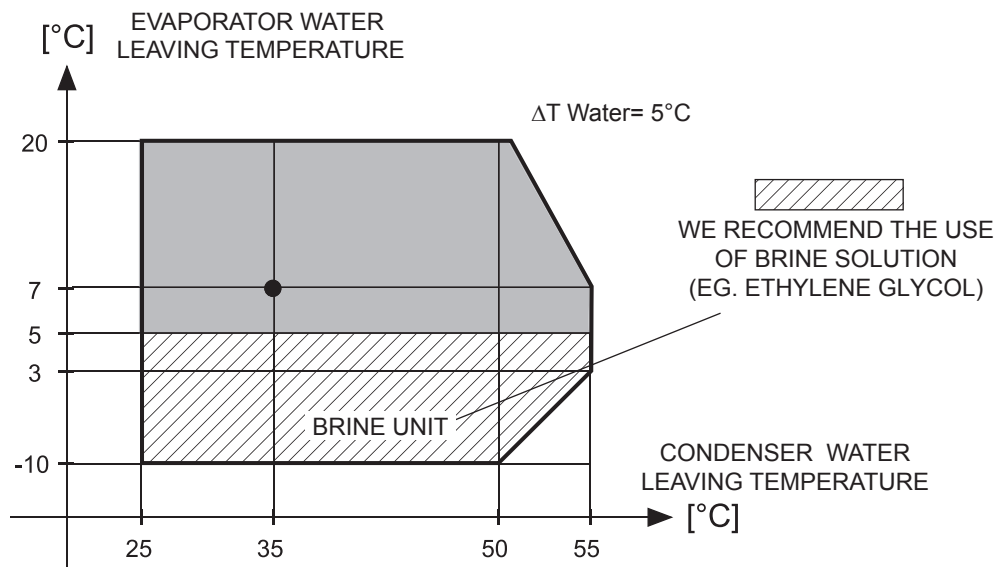
Water thermal gradient		Limit value		
		Plant exchanger	Source exchanger ⁽¹⁾	Source exchanger ⁽²⁾
Minimum	°C	3	3	10
Maximum	°C	10	10	20

Verify that water flow rate is inside the admissible limits.

⁽¹⁾: for applications with cooling tower, geothermal probe, dry cooler.

⁽²⁾: for applications with city water, well water.

NOTE: the admissible limits for water flow rate on heat exchangers are indicated under the related pressure drop graph (see section "water pressure drop"). If the unit is equipped with pumping module the admissible limits are indicated under the related working head graph (see section "working head").



WATER PRESSURE DROP

Applications with city water, well water

Note for the calculation of pressure drop for the Source heat exchanger using city water or well water

Unit IR

Cooling Mode

The water entering to the Source heat exchanger is at a temperature usually in the range 10.15°C. The water entering to the exchanger is controlled by a 2 way valve /ex accessory VDV) or a pump driven by inverter to have a leaving water temperature in the range 30:40°C (ΔT water in the range 15 : 20°C) : so the water flow rate is roughly 1/3 ¼ of the source water flow rate in nominal condition.

To get the pressure drop of the source heat exchanger use the diagram of this section (Source Heat Exchanger with well water)

Unità IW:

Cooling Mode

The water entering to the Source heat exchanger is at a temperature usually in the range 10.15°C. The water entering to the exchanger is controlled by a 2 way valve /ex accessory VDV) or a pump driven by inverter to have a leaving water temperature in the range 30:40°C (ΔT water in the range 15 : 20°C): so the water flow rate is roughly 1/3 ¼ of the source water flow rate in nominal condition.

To get the pressure drop of the source heat exchanger use the diagram of this section (Source Heat Exchanger with well water)

Heating Mode

The water entering to the Source heat exchanger is at a temperature usually in the range 8.15°C. In this case to achieve water leaving temperature between 4 and 10°C (not dangerous for exchanger freezing) the water flow rate has to ensure a DT between 4 and 8°C: so the water flow rate is roughly the same as in nominal condition.

To get the pressure drop of the source heat exchanger use the diagram Source Heat Exchanger with Tower Water

Unità IP:

Cooling Mode

The water entering to the Source heat exchanger is at a temperature usually in the range 10.15°C. The water entering to the exchanger is controlled by a 2 way valve /ex accessory VDV) or a pump driven by inverter to have a leaving water temperature in the range 30:40°C (ΔT water in the range 15 : 20°C): so the water flow rate is roughly 1/3 ¼ of the source water flow rate in nominal condition.

To get the pressure drop of the source heat exchanger use the diagram of this section (Source Heat Exchanger with well water)

Heating Mode

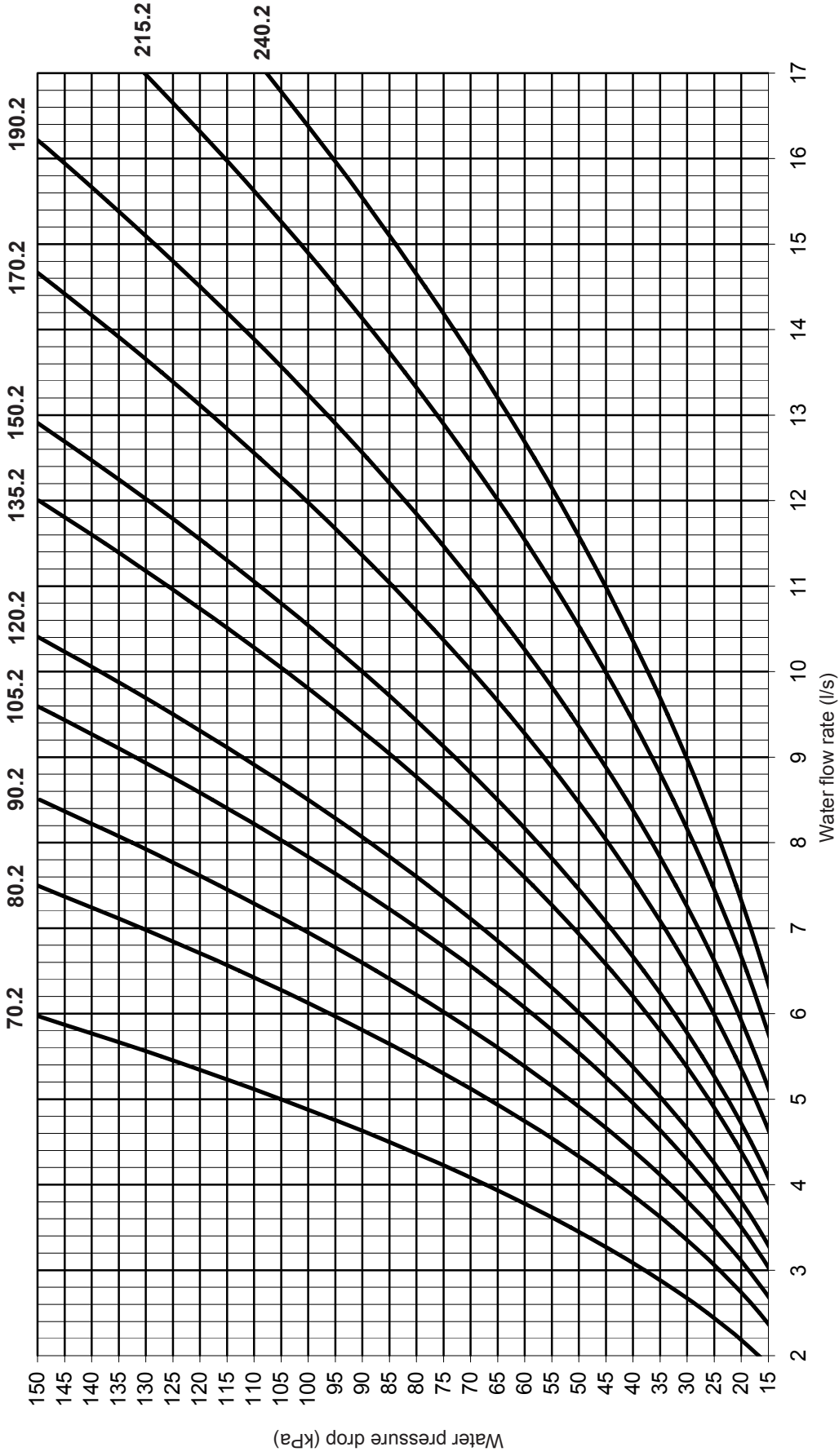
The water entering to the Source heat exchanger is at a temperature usually in the range 8.15°C. In this case to achieve water leaving temperature between 4 and 10°C (not dangerous for exchanger freezing) the water flow rate has to ensure a DT between 4 and 8°C: so the water flow rate is roughly the same as in nominal condition.

To get the pressure drop of the source heat exchanger use the diagram Source Heat Exchanger with Tower Water

WATER PRESSURE DROP

Plant exchanger

The graph below illustrates for the plant exchanger the water pressure drop values in kPa depending on the flow rate in liters/second. The operating range is delimited by the minimum and maximum values given in the next table.



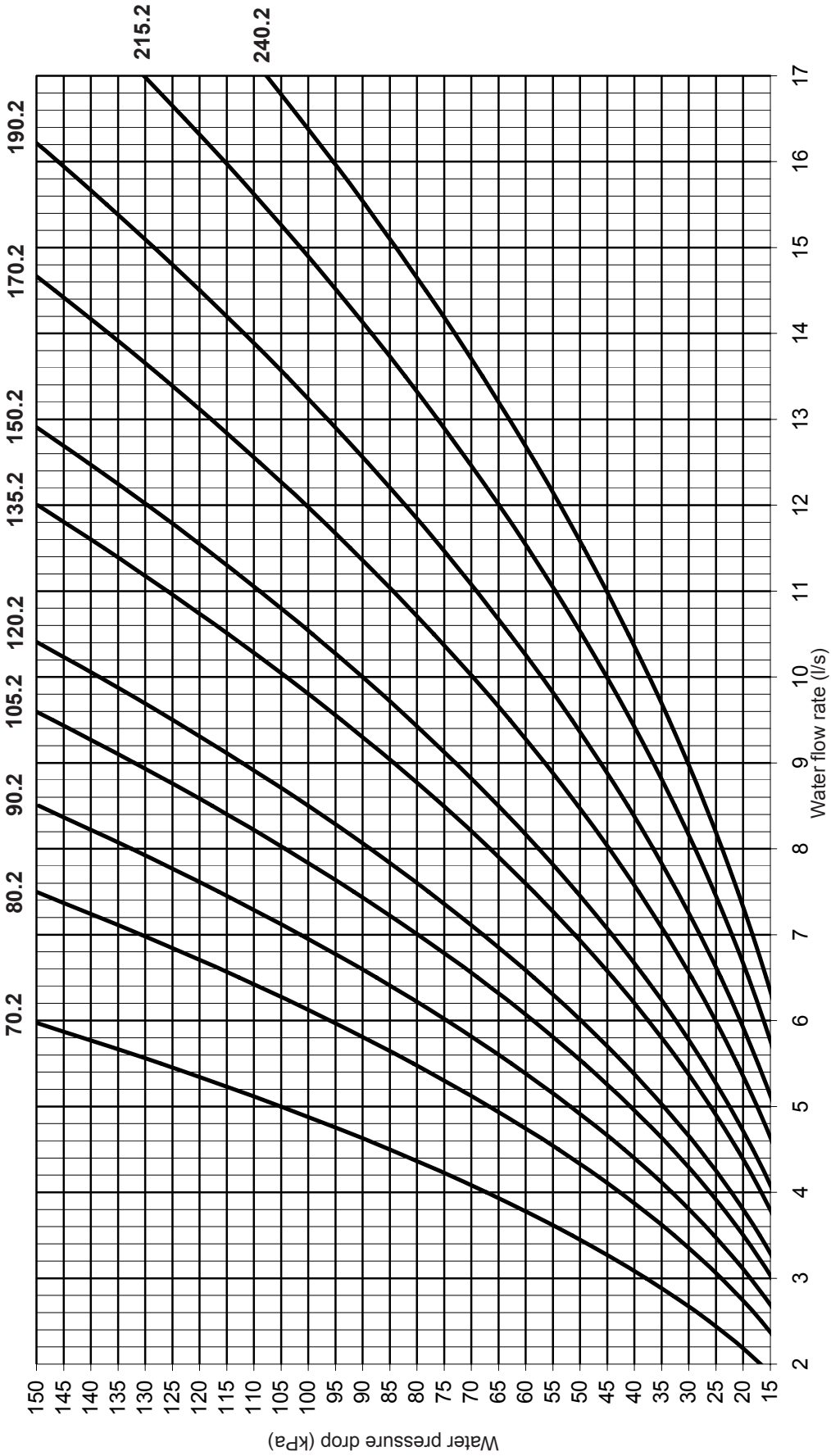
Operating range

MODELS		70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	NOTES
Lower limit value	Q	2.00	2.37	2.69	3.03	3.29	3.80	4.08	4.64	5.13	5.77	6.34	Q	Q=Water flow rate
Upper limit value	Q	5.97	7.50	8.51	9.60	10.41	12.01	12.91	14.67	16.22	17.00	17.00	Q	

WATER PRESSURE DROP

Source exchanger with cooling tower, geothermal probe, dry cooler

The graph below illustrates for the plant exchanger the water pressure drop values in kPa depending on the flow rate in liters/second. The operating range is delimited by the minimum and maximum values given in the next table.



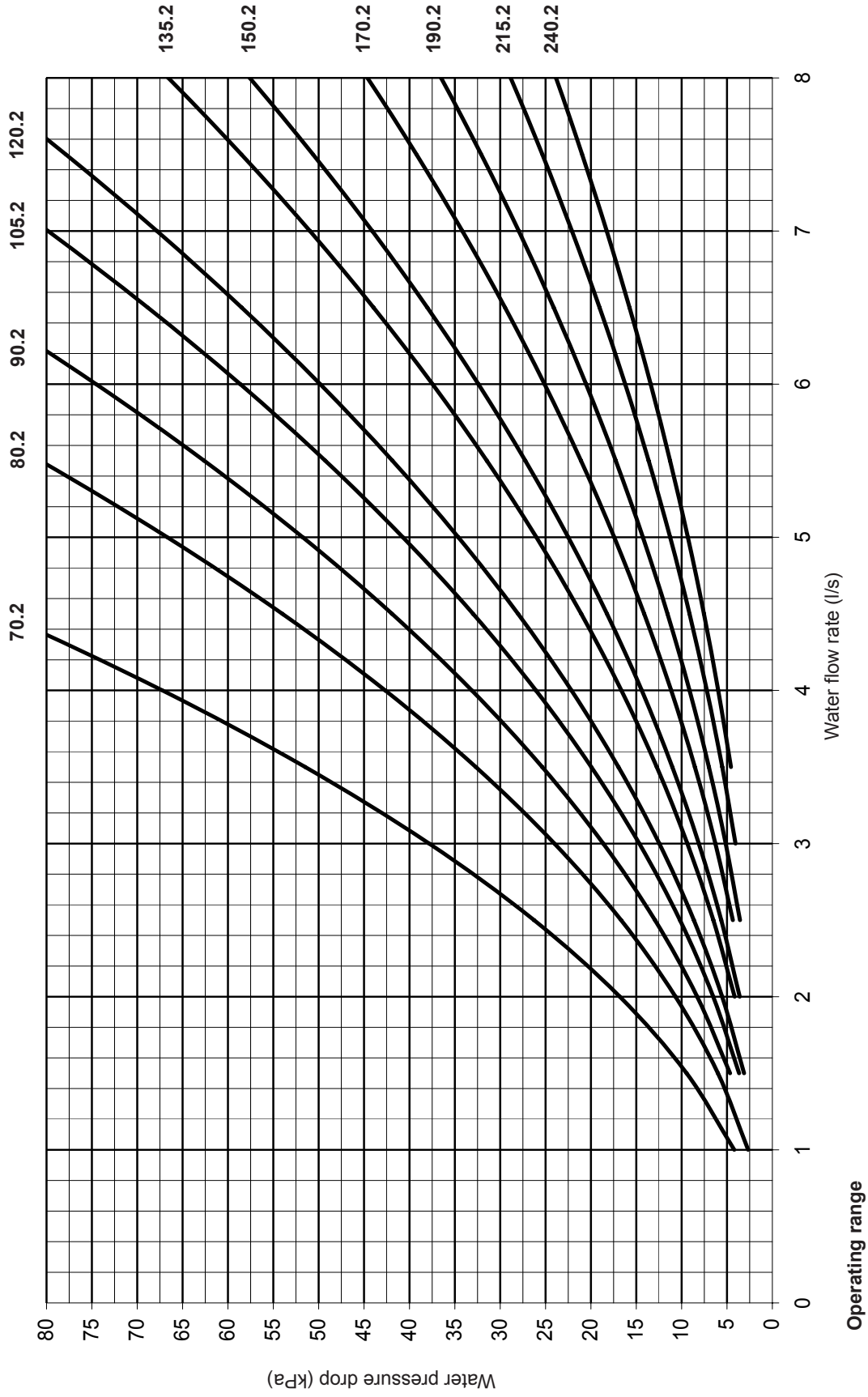
Operating range

MODELS		70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	NOTES
Lower limit value	Q	2.00	2.37	2.69	3.03	3.29	3.80	4.08	4.64	5.13	5.77	6.34	Q	Q
Upper limit value	Q	5.97	7.50	8.51	9.60	10.41	12.01	12.91	14.67	16.22	17.00	17.00	Q	Q=Water flow rate

WATER PRESSURE DROP

Source exchanger with city water and well water

The graph below illustrates for the plant exchanger the water pressure drop values in kPa depending on the flow rate in liters/second. The operating range is delimited by the minimum and maximum values given in the next table.



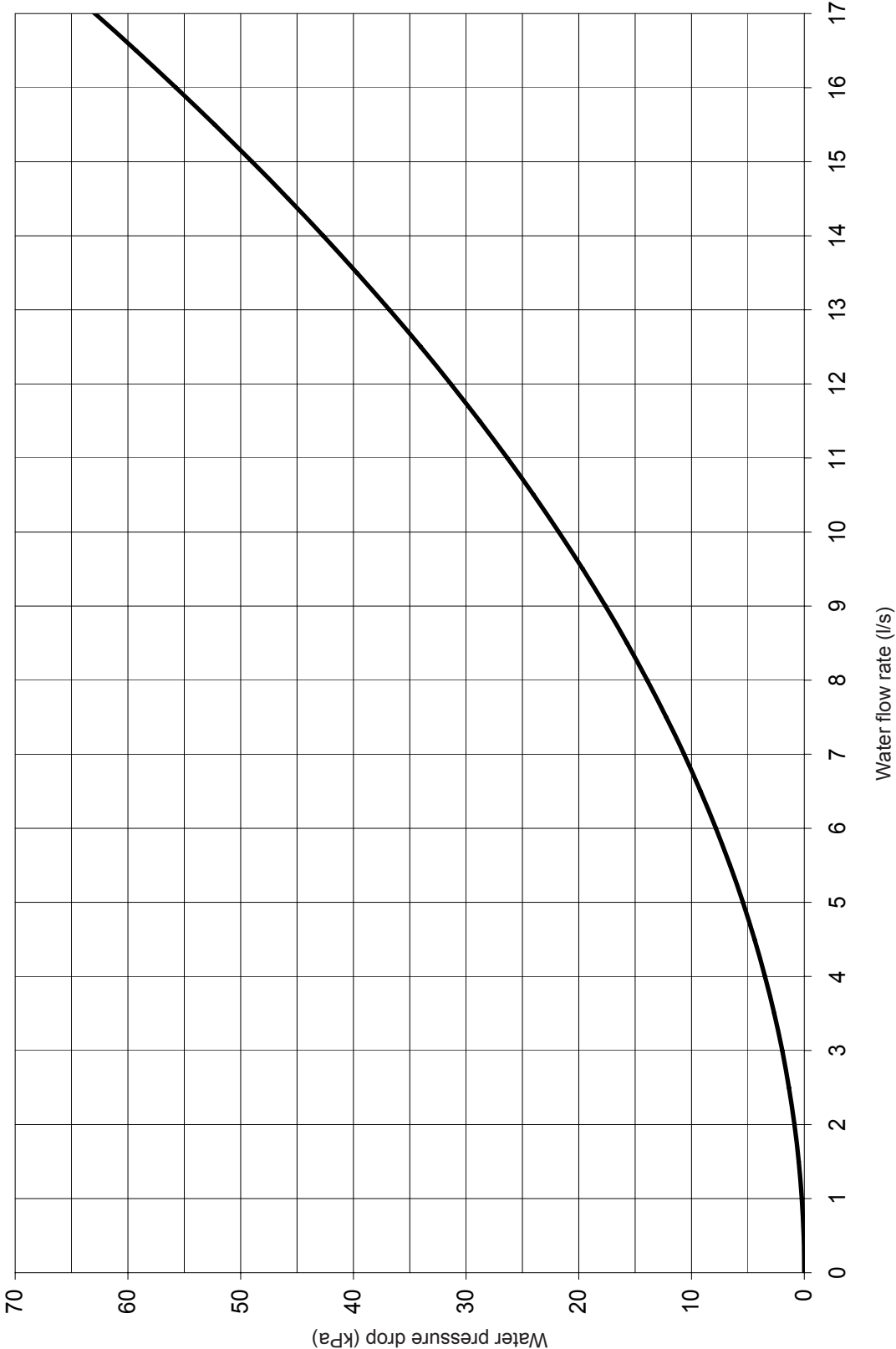
Operating range

MODELS		70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	NOTES
Lower limit value	Q	1.00	1.00	1.00	1.50	1.50	1.50	2.00	2.00	2.50	3.00	3.00	Q	Q=Water flow rate
Upper limit value	Q	5.97	7.50	8.51	9.60	10.41	12.01	12.91	14.67	16.22	17.00	17.00	Q	

WATER PRESSURE DROP

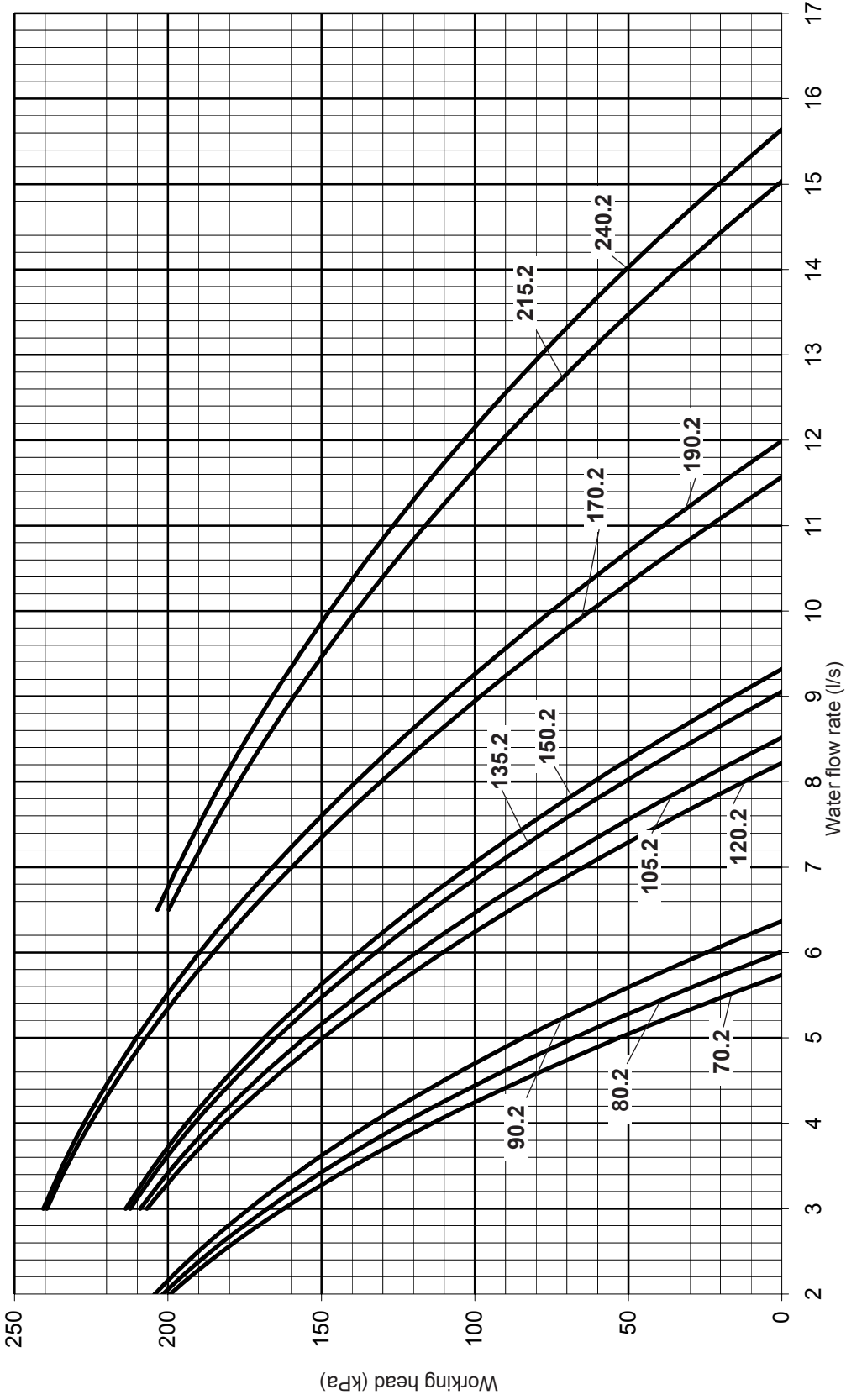
Water filter

The following graph shows the water filter pressure drop values in kPa as a function of flow rate in litres/second.



STD plant

Working head is that at the pumping module outlet reduced by all pressure losses inside the unit. The graph below illustrates for the evaporator the working head values in kPa depending on the flow rate in liters/second. The operating range is delimited by the minimum and maximum values given in the next table.

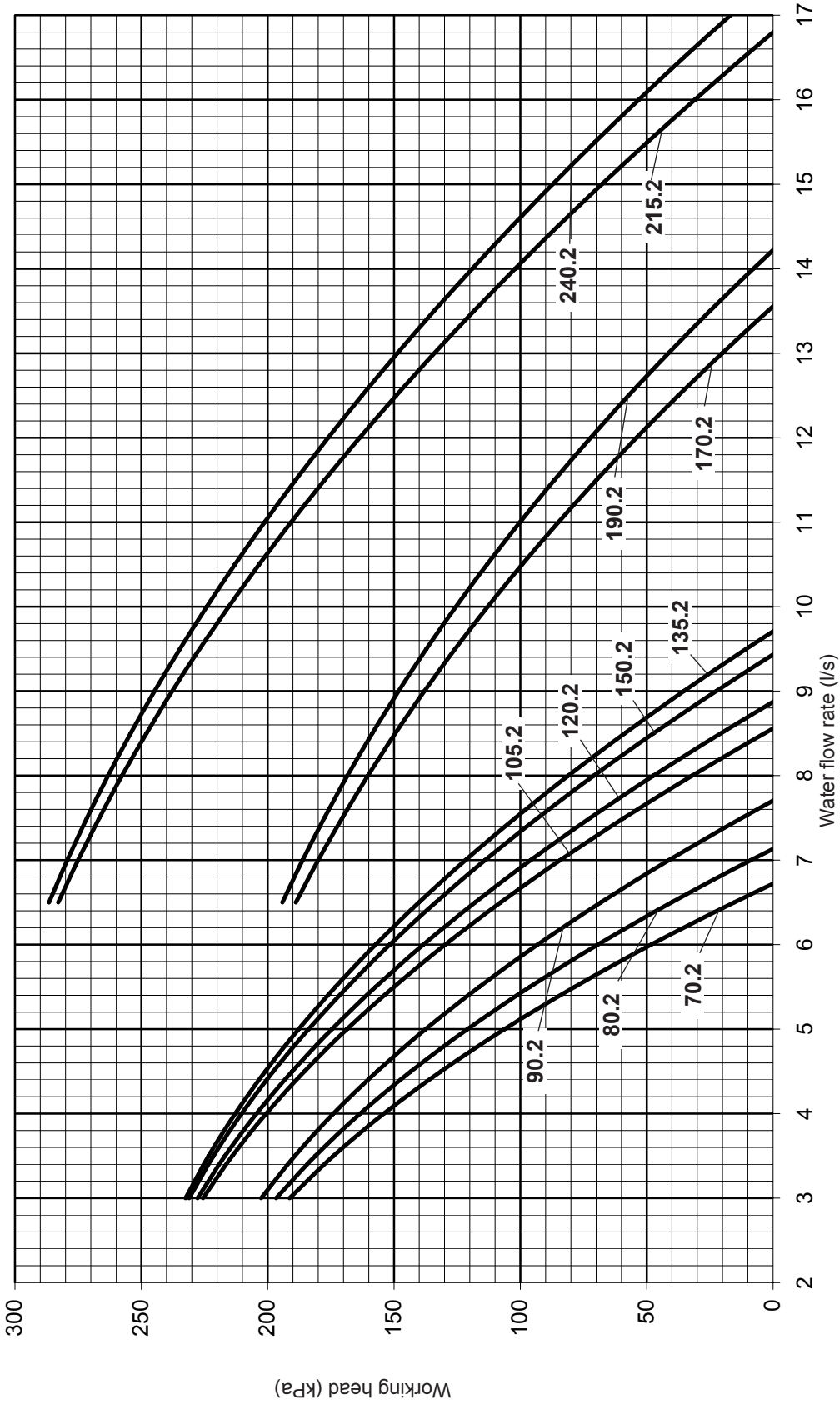


Operating range

MODELS	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	NOTES
Lower limit value	Q	1.5			3					6.5			Q=Water flow rate
Upper limit value	Q	5.75	6.0	6.4	8.2	8.5	9.0	9.3	11.6	15.0	15.6		

HP1 plant

Working head is that at the pumping module outlet reduced by all pressure losses inside the unit. The graph below illustrates for the evaporator the working head values in kPa depending on the flow rate in liters/second. The operating range is delimited by the minimum and maximum values given in the next table.



Operating range

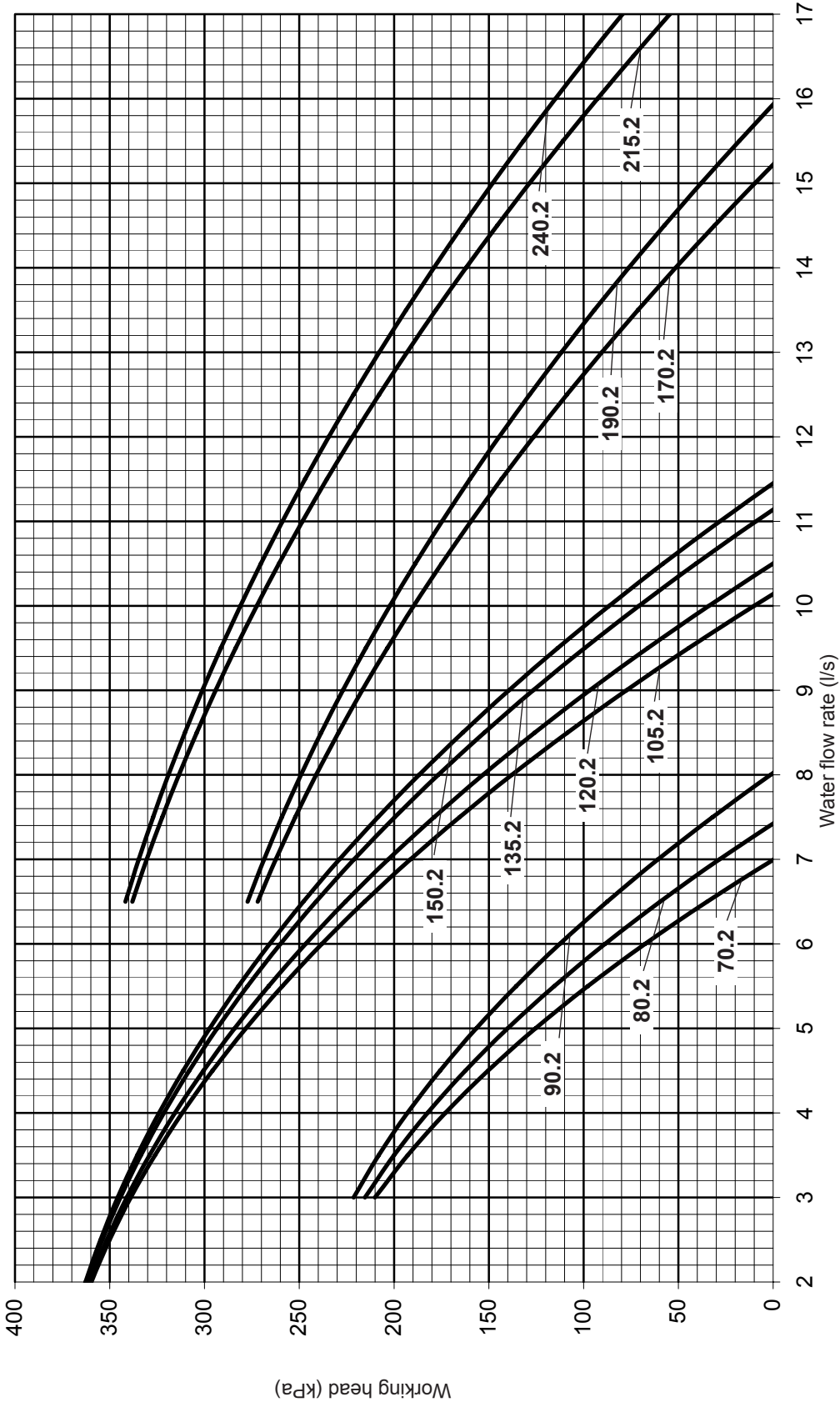
MODELS	70.2	80.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	NOTES
Lower limit value	Q				3					6.5			l/s	Q=Water flow rate
Upper limit value	Q	6.7	7.1	7.7	8.6	8.9	9.4	9.7	13.6	14.2	16.8	17.0	kPa	

WORKING HEAD

WORKING HEAD

HP2 plant

Working head is that at the pumping module outlet reduced by all pressure losses inside the unit. The graph below illustrates for the evaporator the working head values in kPa depending on the flow rate in liters/second. The operating range is delimited by the minimum and maximum values given in the next table.



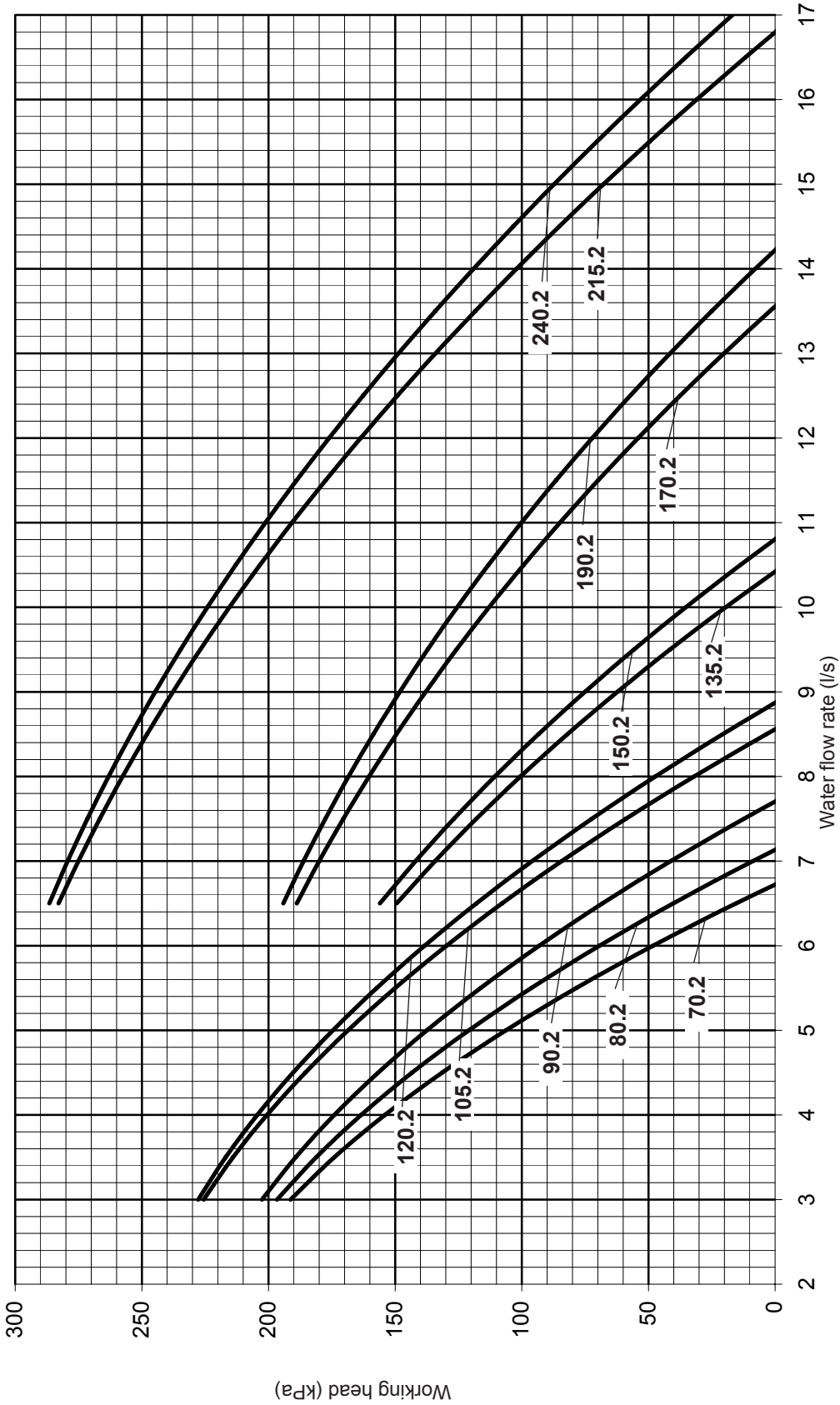
Operating range

MODELS	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	NOTES
Lower limit value	Q			3	0	6.5							Q=Water flow rate
Upper limit value	Q	7.0	7.4	8.0	10.2	10.5	11.2	11.4	15.2	16.0	17.0	17.0	

WORKING HEAD

STD source

Working head is that at the pumping module outlet reduced by all pressure losses inside the unit. The graph below illustrates for the evaporator the working head values in kPa depending on the flow rate in liters/second. The operating range is delimited by the minimum and maximum values given in the next table.



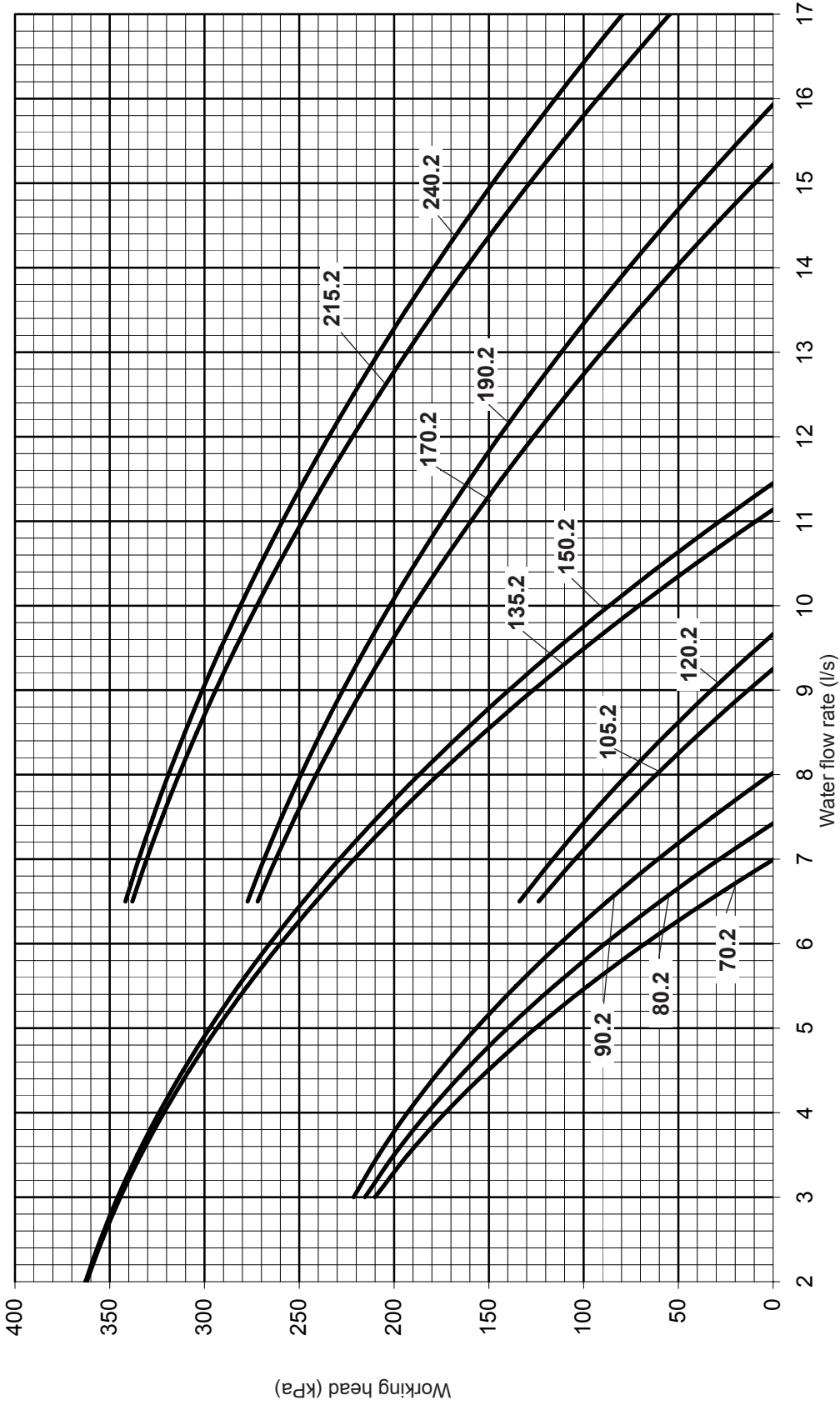
Operating range

MODELS	UM														NOTES		
	70.2	80.2	80.2	90.2	90.2	105.2	120.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2		240.2	
Lower limit value	3														Q	I/s	
Upper limit value	6.7	7.2	7.2	7.8	8.6	8.6	8.9	10.4	10.8	13.6	14.2	16.8	17.0	17.0	17.0	Q=Water flow rate	kPa

WORKING HEAD

HP1 source

Working head is that at the pumping module outlet reduced by all pressure losses inside the unit. The graph below illustrates for the evaporator the working head values in kPa depending on the flow rate in liters/second. The operating range is delimited by the minimum and maximum values given in the next table.



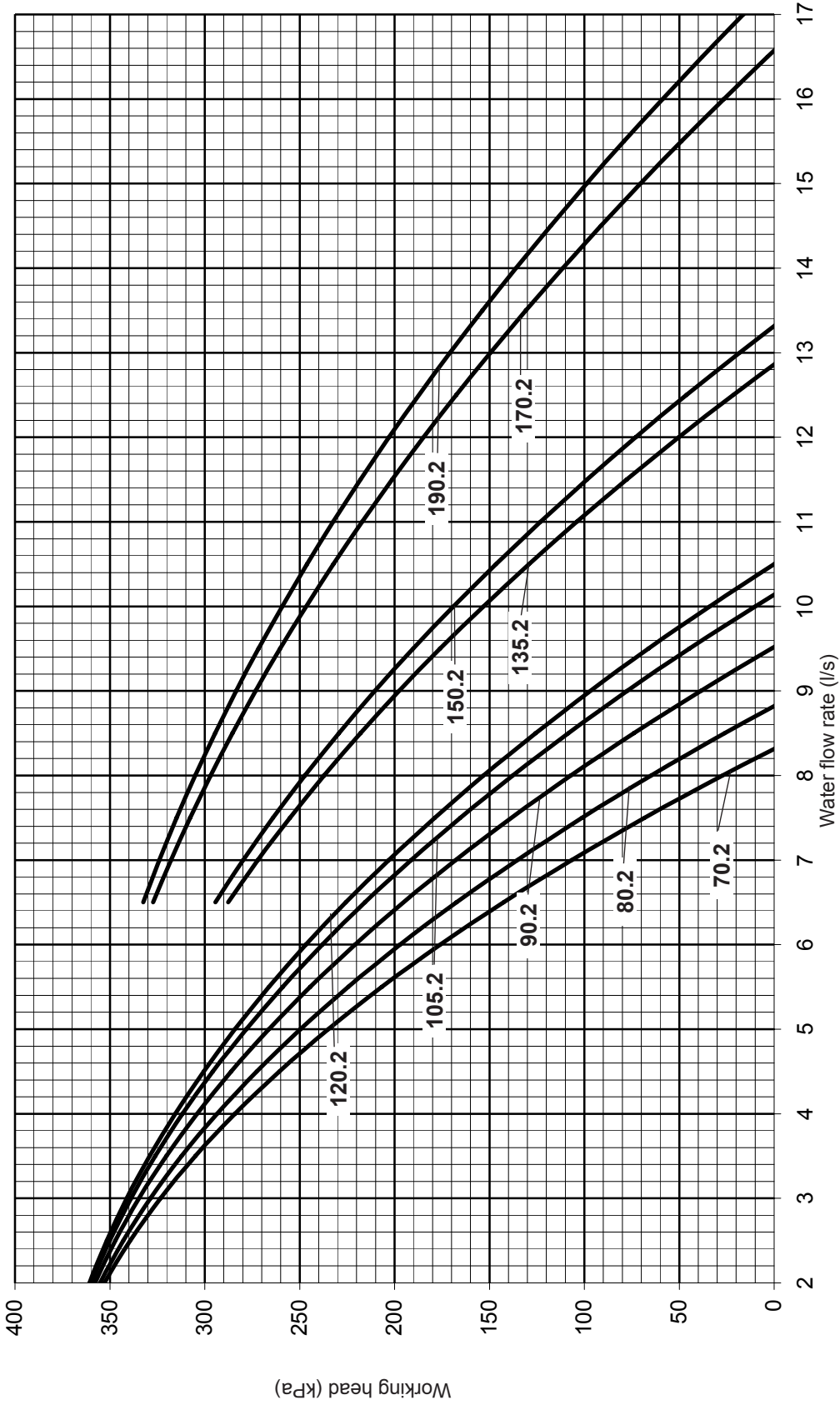
Operating range

MODELS	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM	NOTES		
Lower limit value	Q	3	3	6.5	6.5	0	6.5	6.5	6.5	6.5	6.5	l/s	Q=Water flow rate		
Upper limit value	Q	7.0	7.4	8.0	9.2	9.7	9.7	11.2	11.2	11.4	15.2	15.9		17.0	17.0

WORKING HEAD

HP2 source

Working head is that at the pumping module outlet reduced by all pressure losses inside the unit. The graph below illustrates for the evaporator the working head values in kPa depending on the flow rate in liters/second. The operating range is delimited by the minimum and maximum values given in the next table.

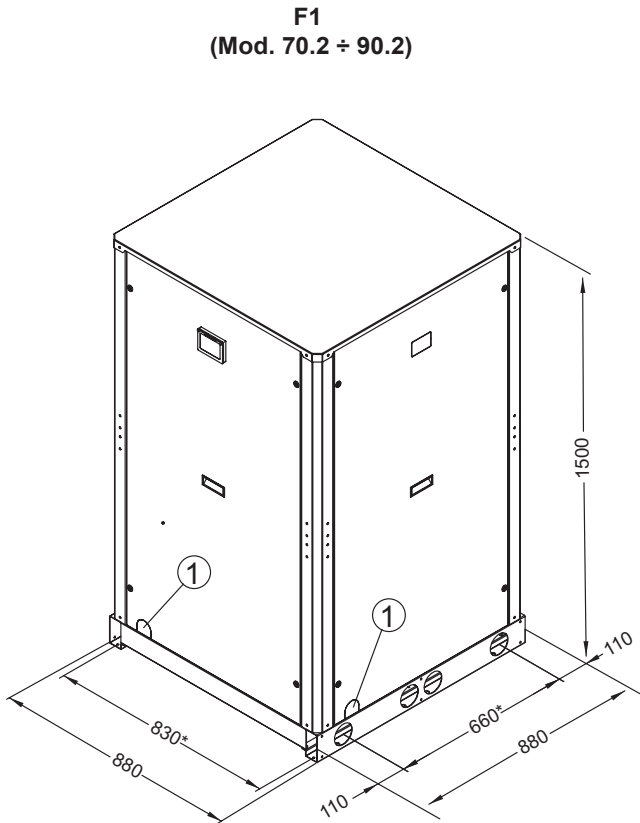


Operating range

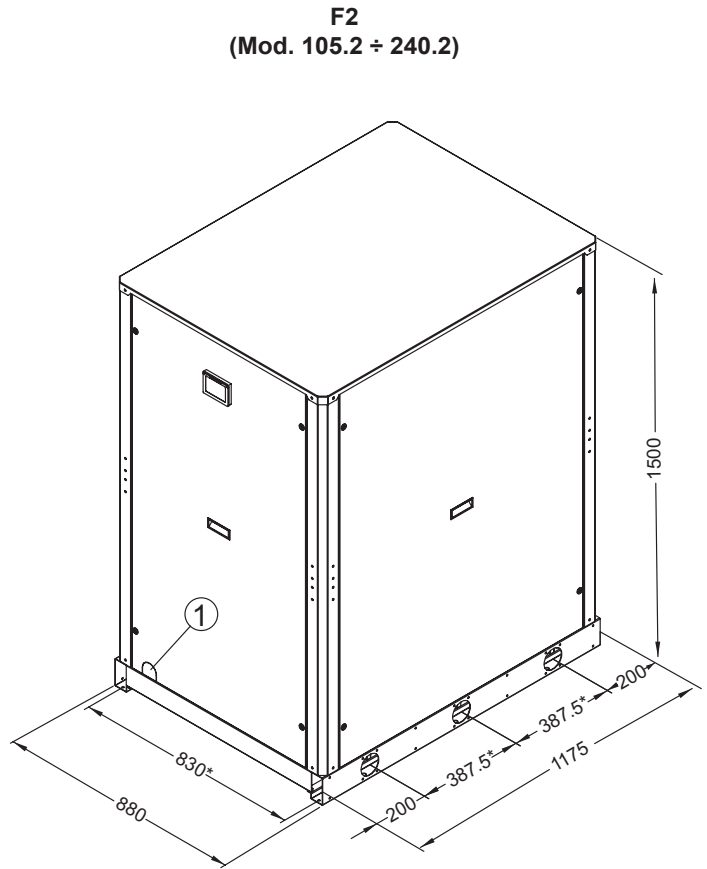
MODELS	UM																	NOTES					
	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		I/s	kPa			
Lower limit value	70.2	80.2	80.2	90.2	90.2	105.2	120.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	240.2	240.2	240.2	6.5	ND	ND	ND	ND	Q=Water flow rate
Upper limit value	8.3	8.8	8.8	9.5	9.5	10.2	10.5	10.5	12.9	13.3	16.6	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0

DIMENSIONAL DATA

Standard unit overall dimension



* : Center distance of vibration damper holes and lifting holes
 ø 14 mm Vibration damper fixing holes
 ø 75 mm lifting holes
 1- Power supply



* : Center distance of vibration damper holes and lifting holes
 ø 14 mm Vibration damper fixing holes
 ø 75 mm lifting holes
 1- Power supply

Standard unit shipping weight

IR / BR / IW / BW Cooling mode

Mod.	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM
AB Standard unit ⁽¹⁾	315	327	336	437	518	549	576	618	647	684	713	kg
AB Standard unit ⁽²⁾	365	377	386	499	580	611	638	680	709	746	775	kg
AS Low noise unit ⁽²⁾	365	377	386	499	580	611	638	680	709	746	775	kg
AX Extra low noise unit ⁽²⁾	389	401	410	529	610	641	668	710	739	776	805	kg

IP / BP Heating mode

Mod.	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM
AB Standard unit ⁽¹⁾	322	334	343	445	531	562	589	631	660	697	727	kg
AB Standard unit ⁽²⁾	372	384	393	507	593	624	651	693	722	759	789	kg
AS Low noise unit ⁽²⁾	372	384	393	507	593	624	651	693	722	759	789	kg
AX Extra low noise unit ⁽²⁾	396	408	417	537	623	654	681	723	752	789	819	kg

1) Unit without cover panels

2) Unit with cover panels

Standard unit operation weight

IR / BR / IW / BW Cooling mode

Mod.	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM
AB Standard unit ⁽¹⁾	323	335	346	447	530	563	591	636	666	706	739	kg
AB Standard unit ⁽²⁾	373	385	396	510	592	625	653	698	728	768	801	kg
AS Low noise unit ⁽²⁾	373	385	396	510	592	625	653	698	728	768	801	kg
AX Extra low noise unit ⁽²⁾	397	409	420	540	622	655	683	728	758	798	831	kg

IP / BP Heating mode

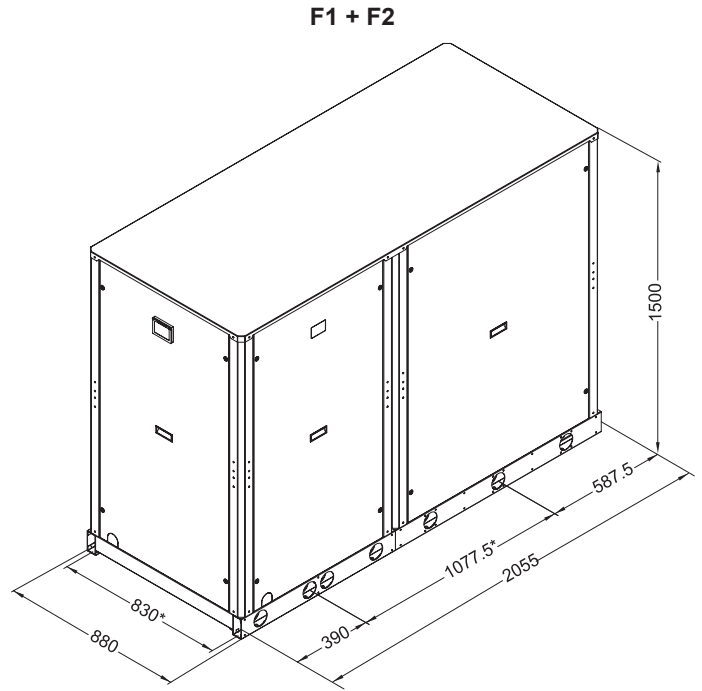
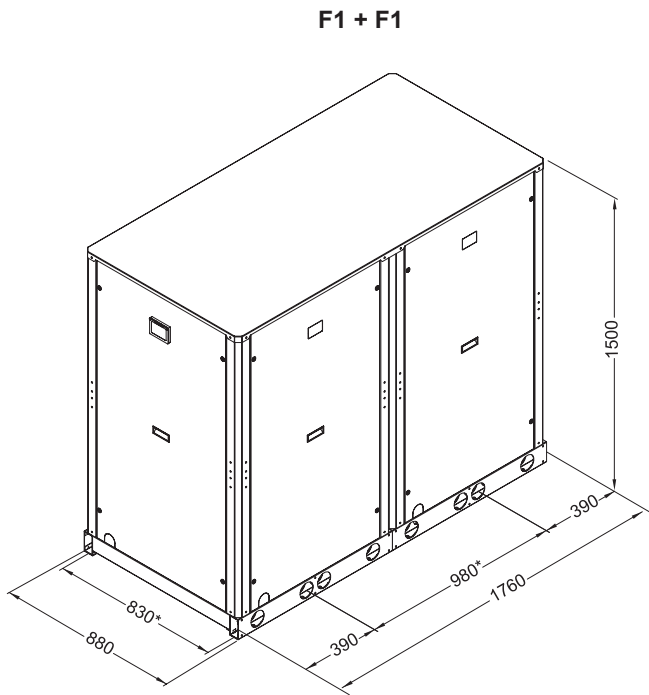
Mod.	70.2	80.2	90.2	105.2	120.2	135.2	150.2	170.2	190.2	215.2	240.2	UM
AB Standard unit ⁽¹⁾	330	342	353	455	543	575	604	648	679	719	752	kg
AB Standard unit ⁽²⁾	380	392	403	518	605	638	666	711	741	782	814	kg
AS Low noise unit ⁽²⁾	380	392	403	518	605	638	666	711	741	782	814	kg
AX Extra low noise unit ⁽²⁾	404	416	427	548	635	668	696	741	771	812	844	kg

1) Unit without cover panels

2) Unit with cover panels

DIMENSIONAL DATA

Overall dimension Standard unit + Pumping module MP

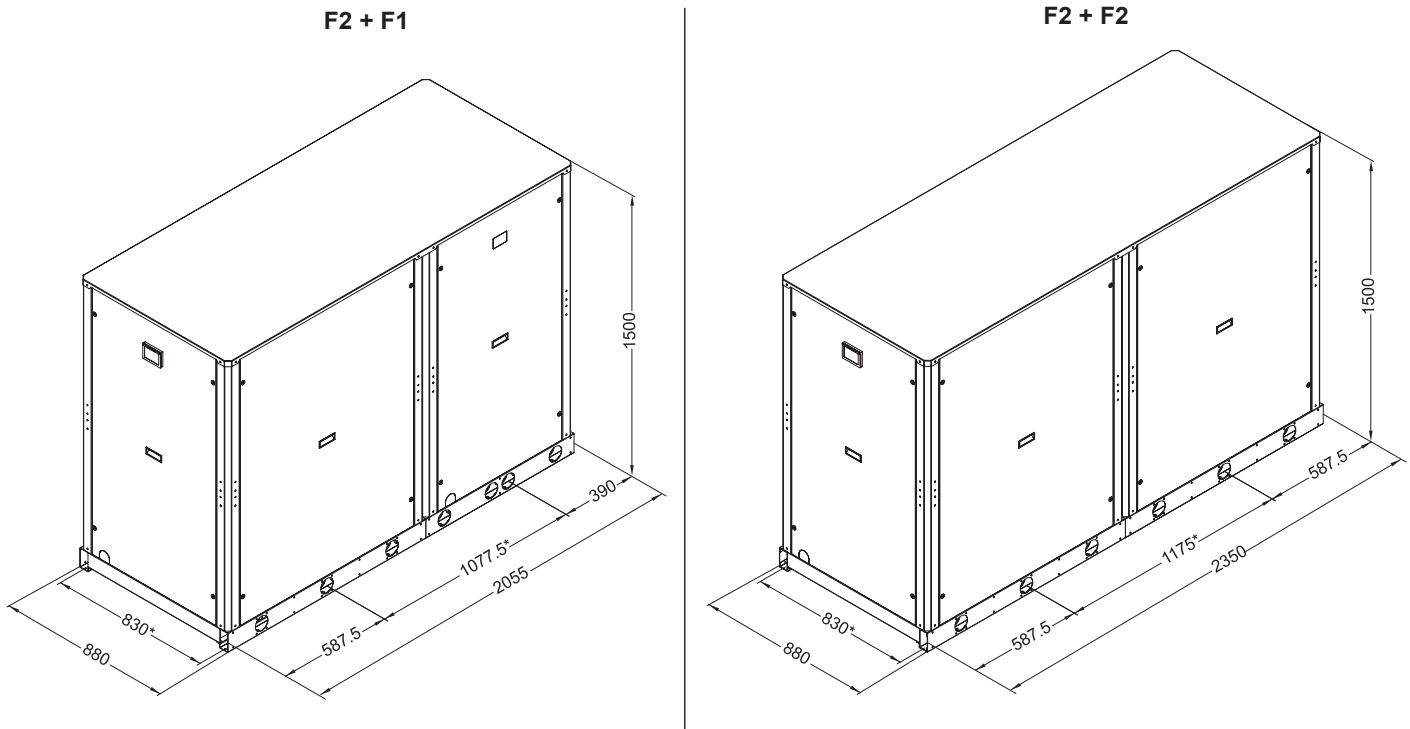


* : Center distance of vibration damper holes and lifting holes
 ø 14 mm Vibration damper fixing holes
 ø 75 mm lifting holes

Mod. 70.2 - 80.2 - 90.2

			PLANT						
PUMPS			0	STD		HP1		HP2	
	TYPE	N°	0	1	2	1	2	1	2
SOURCE	0	0	Standard unit	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1
	STD	1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1
		2	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1
	HP1	1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1
		2	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1
	HP2	1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1	F1 + F1
		2	F1 + F2	F1 + F2	F1 + F2	F1 + F2	F1 + F2	F1 + F2	F1 + F2

DIMENSIONAL DATA



* : Center distance of vibration damper holes and lifting holes
 ø 14 mm Vibration damper fixing holes
 ø 75 mm lifting holes

Mod. 105.2 - 120.2

PUMPS		PLANT							
		0	STD		HP1		HP2		
TYPE	N°	0	1	2	1	2	1	2	
SOURCE	0	0	Standard unit	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2
	STD	1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2
		2	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2
	HP1	1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2
		2	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2
	HP2	1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2
		2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2

Mod. 135.2 - 150.2

SOURCE	0	0	Standard unit	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2
	STD	1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2
		2	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2
	HP1	1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2
		2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2
	HP2	1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2
		2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2

Mod. 170.2 - 190.2

SOURCE	0	0	Standard unit	F2 + F1	F2 + F1	F2 + F1	F2 + F2	F2 + F1	F2 + F2
	STD	1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2	F2 + F1	F2 + F2
		2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2
	HP1	1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2	F2 + F1	F2 + F2
		2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2
	HP2	1	F2 + F1	F2 + F1	F2 + F1	F2 + F1	F2 + F2	F2 + F1	F2 + F2
		2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2

Mod. 215.2 - 240.2

SOURCE	0	0	Standard unit	F2 + F1	F2 + F2	F2 + F1	F2 + F2	F2 + F1	F2 + F2
	STD	1	F2 + F1	F2 + F1	F2 + F2	F2 + F1	F2 + F2	F2 + F1	F2 + F2
		2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2
	HP1	1	F2 + F1	F2 + F1	F2 + F2	F2 + F1	F2 + F2	F2 + F1	F2 + F2
		2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2
	HP2	1	F2 + F1	F2 + F1	F2 + F2	F2 + F1	F2 + F2	F2 + F1	F2 + F2
		2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2	F2 + F2

DIMENSIONAL DATA

MP Pumping module shipping weight

The pumping module is fully integrated with the basic unit in a single frame. For the calculation of the weight of the unit + pumping module the weights reported have to be added to the weight of the basic unit.

Esempio:

RGW IP 150.2 VB AX 0M5 + n°2 pumps HP1 Plant + n°1 pump HP2 Source

Unit weight 681 kg + pumping module weight 320 kg = **total 1001 kg**

Mod. 70.2 - 80.2 - 90.2			PLANT						
SOURCE	PUMPS		0	STD		HP1		HP2	
	TYPE	N°		1	2	1	2	1	2
SOURCE	0	0	Unità Base	153	195	156	200	158	206
	STD	1	156	196	238	199	244	202	249
		2	200	241	283	244	288	246	294
	HP1	1	158	199	241	202	246	205	252
		2	206	246	288	249	294	252	300
	HP2	1	203	243	285	246	291	249	297
		2	301	336	368	339	374	342	379

Mod. 105.2 - 120.2			PLANT						
SOURCE	PUMPS		0	STD		HP1		HP2	
	TYPE	N°		1	2	1	2	1	2
SOURCE	0	0	Unità Base	156	200	158	206	203	301
	STD	1	158	202	246	205	252	249	348
		2	206	249	294	252	300	297	395
	HP1	1	199	243	287	246	293	290	389
		2	295	332	367	335	373	379	468
	HP2	1	203	246	291	249	297	293	392
		2	301	339	374	342	379	386	475

Mod. 135.2 - 150.2			PLANT						
SOURCE	PUMPS		0	STD		HP1		HP2	
	TYPE	N°		1	2	1	2	1	2
SOURCE	0	0	Unità Base	156	200	158	206	203	301
	STD	1	199	243	287	246	293	290	389
		2	295	332	367	335	373	379	468
	HP1	1	203	246	291	249	297	293	392
		2	301	339	374	342	379	386	475
	HP2	1	226	269	314	272	320	316	415
		2	347	385	420	388	425	432	521

Mod. 170.2 - 190.2			PLANT						
SOURCE	PUMPS		0	STD		HP1		HP2	
	TYPE	N°		1	2	1	2	1	2
SOURCE	0	0	Unità Base	158	206	199	295	214	324
	STD	1	199	246	293	287	382	301	412
		2	295	335	373	376	461	391	491
	HP1	1	214	260	308	301	397	316	426
		2	324	365	402	406	491	421	521
	HP2	1	226	272	320	313	408	328	438
		2	347	388	425	429	514	444	544

Mod. 215.2 - 240.2			PLANT						
SOURCE	PUMPS		0	STD		HP1		HP2	
	TYPE	N°		1	2	1	2	1	2
SOURCE	0	0	Unità Base	199	295	214	324	226	347
	STD	1	214	301	397	316	426	328	449
		2	324	406	491	421	521	432	544
	HP1	1	226	313	408	328	438	339	461
		2	347	429	514	444	544	455	567
	HP2	1	#N/D	#N/D	#N/D	#N/D	#N/D	#N/D	#N/D
		2	#N/D	#N/D	#N/D	#N/D	#N/D	#N/D	#N/D

DIMENSIONAL DATA

MP Pumping module operating weight

The pumping module is fully integrated with the basic unit in a single frame. For the calculation of the weight of the unit + pumping module the weights reported have to be added to the weight of the basic unit.

Esempio:

RGW IP 150.2 VB AX 0M5 + n°2 pumps HP1 Plant + n°1 pump HP2 Source

Unit weight 696 kg + pumping module weight 341 kg = **total 1037 kg**

Mod. 70.2 - 80.2 - 90.2			PLANT							
SOURCE	PUMPS		0	STD			HP1		HP2	
	TYPE	N°	0	1	2	1	2	1	2	
SOURCE	0	0	Unità Base	164	210	167	215	169	221	
	STD	1	167	208	254	211	260	214	265	
		2	215	257	303	260	308	262	314	
	HP1	1	169	211	257	214	262	217	268	
		2	221	262	308	265	314	268	320	
	HP2	1	219	261	307	264	312	266	318	
		2	326	358	394	361	400	364	405	

Mod. 105.2 - 120.2

SOURCE	PUMPS		0	STD			HP1		HP2	
	TYPE	N°	0	1	2	1	2	1	2	
SOURCE	0	0	Unità Base	167	215	169	221	219	326	
	STD	1	169	214	262	217	268	266	374	
		2	221	265	314	268	320	318	425	
	HP1	1	216	260	309	263	315	313	420	
		2	320	354	393	357	399	407	504	
	HP2	1	219	264	312	266	318	316	423	
		2	326	361	400	364	405	414	511	

Mod. 135.2 - 150.2

SOURCE	PUMPS		0	STD			HP1		HP2	
	TYPE	N°	0	1	2	1	2	1	2	
SOURCE	0	0	Unità Base	167	215	169	221	219	326	
	STD	1	216	260	309	263	315	313	420	
		2	320	354	393	357	399	407	504	
	HP1	1	219	264	312	266	318	316	423	
		2	326	361	400	364	405	414	511	
	HP2	1	242	287	335	289	341	339	446	
		2	372	407	446	410	451	460	557	

Mod. 170.2 - 190.2

SOURCE	PUMPS		0	STD			HP1		HP2	
	TYPE	N°	0	1	2	1	2	1	2	
SOURCE	0	0	Unità Base	169	221	216	320	231	349	
	STD	1	216	263	315	310	413	324	443	
		2	320	357	399	403	497	418	527	
	HP1	1	231	278	330	324	428	339	458	
		2	349	387	428	433	527	448	557	
	HP2	1	242	289	341	336	440	351	469	
		2	372	410	451	456	550	471	580	

Mod. 215.2 - 240.2

SOURCE	PUMPS		0	STD			HP1		HP2	
	TYPE	N°	0	1	2	1	2	1	2	
SOURCE	0	0	Unità Base	216	320	231	349	242	372	
	STD	1	231	324	428	339	458	351	481	
		2	349	433	527	448	557	460	580	
	HP1	1	242	336	440	351	469	362	492	
		2	372	456	550	471	580	483	603	
	HP2	1	#N/D	#N/D	#N/D	#N/D	#N/D	#N/D	#N/D	
		2	#N/D	#N/D	#N/D	#N/D	#N/D	#N/D	#N/D	

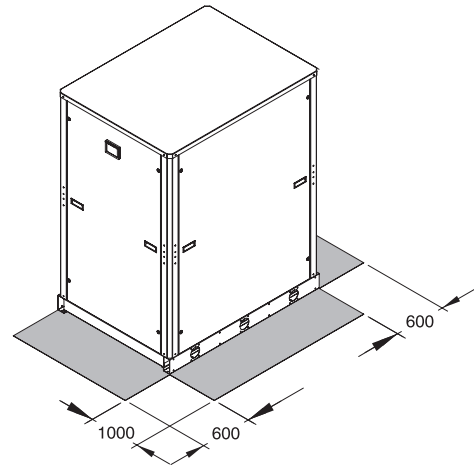
DIMENSIONAL DATA

Minimum space for operation

Refer to the figure alongside for the dimensions of the unit.
To correctly install the unit, comply with the measurements for the free area that must be left around the machine, as shown in the figure. The distances must be doubled if the unit is to be installed in a pit.

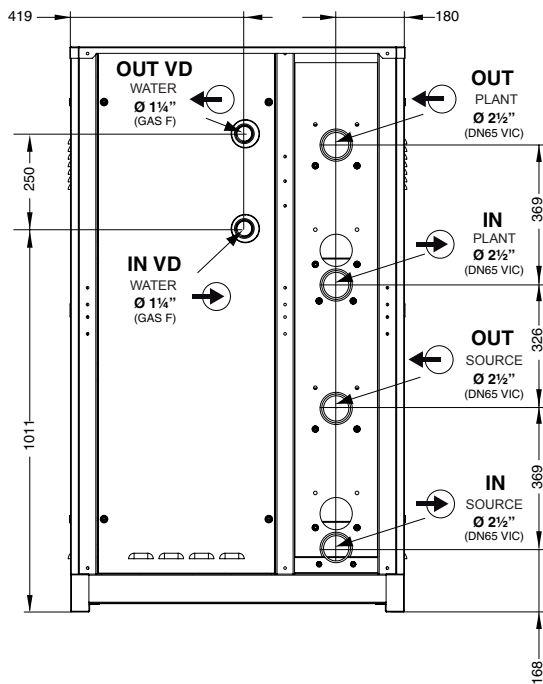
NOTE: Allow for a clear area of not less than 0.5 meters above unit.

The areas installation must be doubled if multiple units are installed.

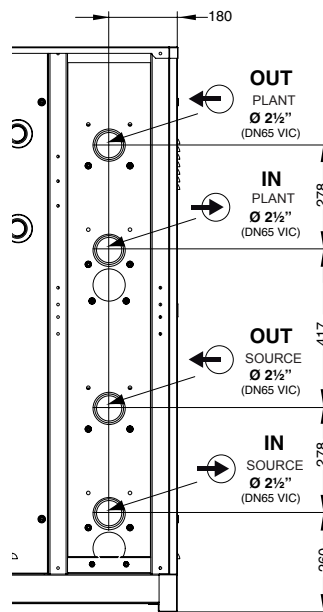


Hydraulic connections

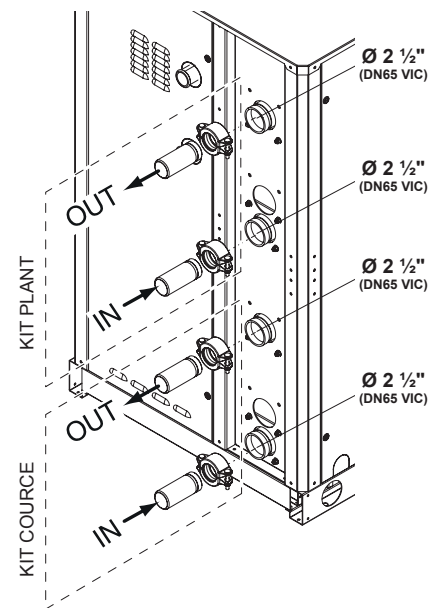
STANDARD UNIT VB + DESUPERHEATER VD



STANDARD UNIT VB + PUMPING MODULE MP

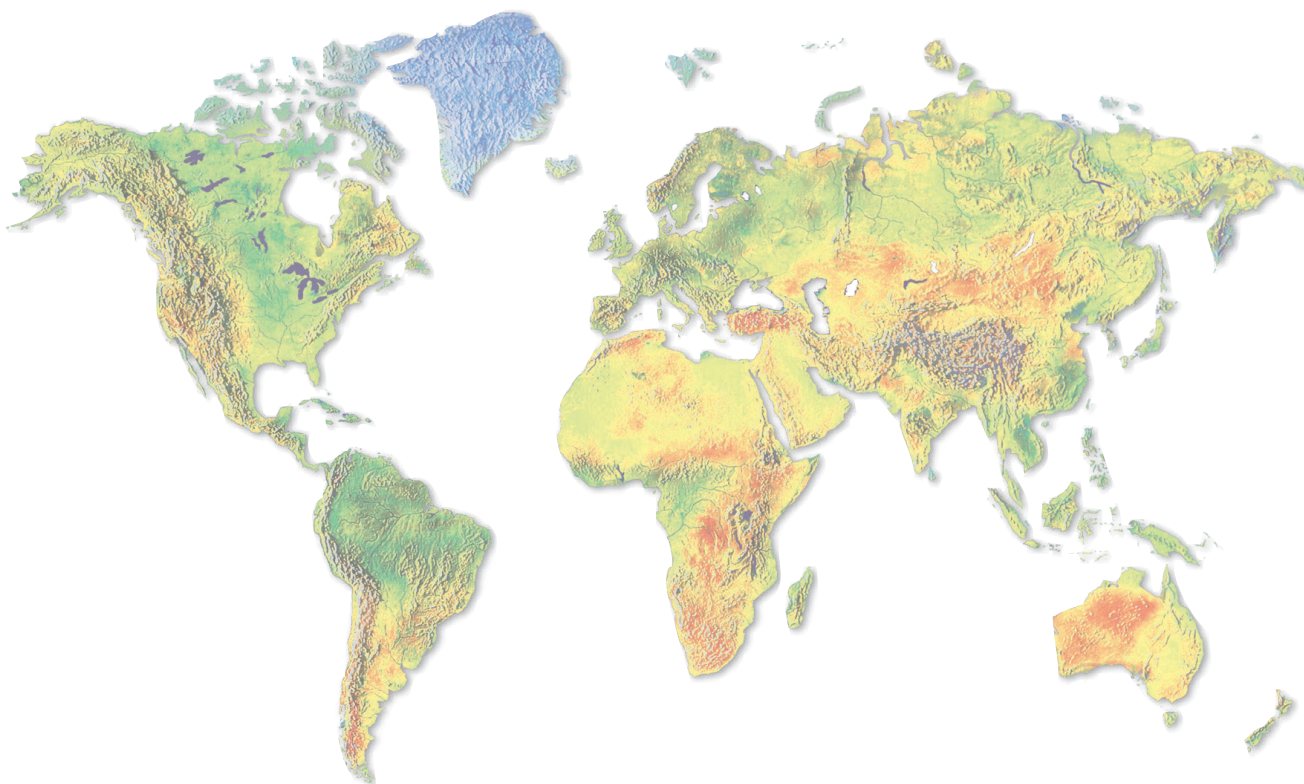


UNIT WITH N°2 ACCESSORIES VICTAULIC CONNECTION



NB.: The measures are in mm.

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