Non-reversible heat pump, water cooled for indoor installation

ELFOEnergy Ground Medium^2 High temperature

WSHH-LEE1 19.2÷80.2 RANGE

TECHNICAL BULLETIN

ErP 2021 COMPLIANT

R-134a

SIZE	19.2	22.2	27.2	35.2	40.2	45.2	60.2	80.2
HEATING CAPACITY KW	73,4	83,0	96,8	122	144	184	224	278

Page

Clivet participates in the ECP Programme for “Liquid Chillers and Hydronic Heat Pumps”.
Check ongoing validity of certificate on www.eurovent-certification.com”

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Features and Benefits

ELFOEnergy Ground Medium²

Four solutions to satisfy different installation requirements.

WSH-XEE2 - Ground Medium² Cooling only or Heating only

- Liquid chiller with 3 operating modes: cooling only, heating only, reversibility on the hydraulic circuit
- Partial energy recovery

WSHN-XEE2 - Ground Medium² Heat pump

- Reversible-cycle heat pump
- Partial energy recovery

WSHN-XEE2 MF - Ground Medium² Multifunction

- Reverse cycle heat pump with total energy recovery
- Simultaneous production of hot and chilled water

WSHH-LEE1 - Ground Medium² High temperature

- Non-reversible heat pump
- Hot water production up to + 78°C

Compressor
Hermetic Scroll compressors with orbiting spiral, equipped with motor protective device for overtemperatures, overcurrents and excessive temperatures of the supply gas. They are mounted on rubber antivibration mounts and comes with a full oil charge. The compressors come with a thermal and acoustic insulation jacket. An automatic oil heater prevents the oil from being diluted by the refrigerant when the compressor stops. The compressors are connected in TANDEM on a single refrigerating circuit and have a biphasic oil equalisation.

Structure
Supporting structure made with zinc-magnesium sheet metal that ensures excellent mechanical features and high long-term resistance against corrosion.

Panelling
External panelling in zinc-magnesium sheet, prepainted RAL 9003, clad internally with heatproof and soundproof material. The panels are easy to remove when access to the internal components is required.

Source side exchanger
Direct expansion heat exchanger with braze welded stainless steel INOX AISI 316 plates and complete with external thermal/anti-condensation insulation.
The exchanger has Victaulic hydraulic connections.

User side exchanger
Direct expansion heat exchanger with braze welded stainless steel INOX AISI 316 plates and complete with external thermal/anti-condensation insulation.
The exchanger has Victaulic hydraulic connections.

Refrigeration circuit
Refrigeration circuit with:
- anti-acid dehydrator filter;
- liquid flow and moisture indicator;
- electronic expansion valve;
- safety high pressure switch;
- low pressure transducer;
- high pressure transducer;
- high pressure safety valve;
- low pressure safety valve;
- refrigerant charge.

Note: the unit can operate in heating only.

Water circuit
Source side
- Victaulic connection joints
- Differential pressure switch, water side
- Drain cock (only with hydronic units option)
- Minimum circuit charge pressure switch (only with hydronic units option)
- Safety valve (only with hydronic units option)

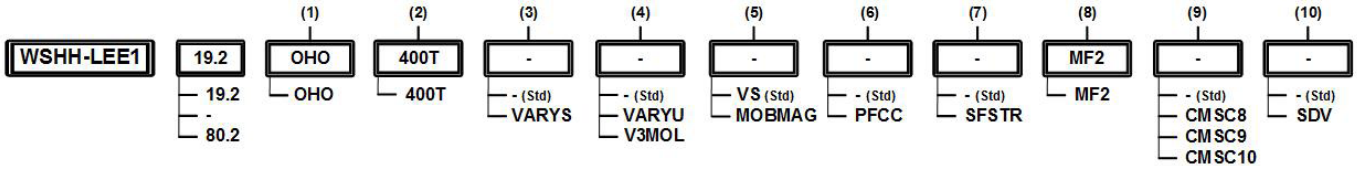
User side
- Victaulic connection joints
- Differential pressure switch, water side
- Drain cock (only with hydronic units option)
- Minimum circuit charge pressure switch (only with hydronic units option)
- Safety valve (only with hydronic units option)

Electrical panel
The capacity section includes:
- main door lock isolator switch;
- isolating transformer for auxiliary circuit power supply;
- compressor overload protection;
- compressor control contactor.

The control section includes:
- interface terminal with graphic display;
- display of the set values, the error codes and the parameter indexi;
- keys for ON/OFF control;
- proportional-integral water temperature control,
- daily, weekly programmer of temperature set-point and unit on/off;
- set-point compensation with 0-10 V signal;
- unit switching on management by local or remote (serial);
- antifreeze protection water side;
- compressor overload protection and timer;
- prealarm function for water antifreeze and high refrigerant gas pressure;
- self-diagnosis system with immediate display of the fault code;
- automatic rotation control for compressor starts;
- compressor operating hour display;
- Input for remote ON/OFF control;
- dry contacts to control the cumulative alarm signal remotely;
- inlet for demand limit (power input limitation according to a 0÷10V external signal);
- double setpoint enabling;
- potential-free contacts for compressor status;
- multi-function phase monitor;
- ECOSHARE function for the automatic management of a group of units;
- 0÷10V signal output and potential-free contact for auxiliary heater;
- enabling of DHW preparation in relation to remote consent;
- numeration of electrical panel cables;
- configuration for single on/off pump or user and source side modulating valve.

Accessories
- IFWX - Steel mesh strainer on the water side
- SPCX - Set-point compensation with outdoor air temperature probe
- RCTX - Remote control
- AVIBX - Anti-vibration mount supports
- BACX - BACnet serial communication module
- CMMBX - Serial communication module to supervisor (Modbus)
- CMSLWX - LonWorks serial communication module
- VACSUX - User side DHW switching valve
- V3MOLX - User side modulating 3-way for operational limits

Unit configuration



(1) Operation
OHO - Heating only (standard)

(2) Voltage
Supply voltage 400/3/50

(3) Source side hydronic unit
(-) not required (standard)
VARYS = Varyflow + (2 source side inverter pumps) (Available only with options: MOBMAG)

(4) User side hydronic unit
(-) not required (standard)
VARYU = Varyflow + (user side 2 inverter pumps) (Available only with options: MOBMAG)
V3MOL= User side modulating 3-way valve for operating limits (Available only with options: MOBMAG)

(5) Larger units
VS - Standard enclosure
MOBMAG - Larger units

(6) Power capacitors
(-) not required (standard)
PFCC - Power factor correction capacitors (cosfi > 0.95)

(7) Soft starter
(-) not required (standard)
SFSTR - Disposal for inrush current reduction

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

(9) Comunication modules
(-) not required (standard)
CMSC8 - Serial communication module to BACnet supervisor
CMSC9 - Serial communication module to Modbus supervisor
CMSC10 - Serial communication module to LonWorks supervisor

(10) Cutoff valve
(-) not required (standard)
SDV - Cutoff valve on compressor supply and return

MOBMAG — **Larger units**

The large cabinet configuration is selected automatically when any hydronic assembly (user or source side) or valve (3-way modulating valve) is selected.
To facilitate the handling, the Large cabinet structure has been revised, the position of components has been changed, and therefore the operations of disassembly are simplified, saving 50% of the time. The instructions for disassembly are reported in detail in the installation and operating manual.

SDV — **Cutoff valve on compressor supply and return**

This option makes it possible to be isolated and substituted without discharging the refrigerant from within the refrigeration circuit. This means that the extraordinary maintenance activities are facilitated.

CMSC9 — **Serial communication module for Modbus supervisor**

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

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

CMSC10 — **Serial communication module for LonWorks supervisor**

This enables the serial connection of the supervision system which uses the LonWorks communication protocol. It enables access to a list of operating variables, commands and alarms which comply with the Echelon® standard.
The device is installed and wired built-in the unit.

⚠ The configuration and management activities for the LonWorks networks are the responsibility of the client.
⚠ LonWorks technology uses the LonTalk® protocol for communicating between the network nodes. Contact the service supplier for further information.

CMSC8 — **Serial communication module for BACnet supervisor**

Allows the serial connection to supervision systems, by using BACnet as communication protocol. It allows the access to the entire list of operation variables, controls and alarms. With this accessory, every unit can communicate with the main supervision systems.
The device is installed and wired built-in the unit.

⚠ The configuration and management activities for the BACnet networks are the responsibility of the client.
⚠ The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)

SFSTR — **Disposal for inrush current reduction**

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

PFCC — **Power factor correction capacitors (cosfi > 0,95)**

The component is necessary to lower the phase difference between current and voltage in the electromagnetic components of the unit (e.g. asynchronous motors). The component allows to put the cosfi power factor to values on average higher than 0.95, reducing the network reactive power. This often leads to an economic benefit which the energy provider grants to the final user.

V3MOL — **User side modulating 3-way valve for operational limits**

Component required to ensure operation of the unit for applications where the source water temperature is greater than 25°C and the user side water temperature at start-up may be lower than the source water temperature. The valve is controlled by the unit so as to reduce the flow rate of water on the user side and increase the temperature differential at the exchanger. The valve intervenes when the outlet temperature is below 45°C.
With the modulating valve it is possible to obtain a temperature jump on the user side up to 20°C.
The device is installed and wired built-in the unit.

⚠ This option is not compatible with the VARYU - Varyflow + option (2 inverter pumps on the user side)

Accessories separately supplied

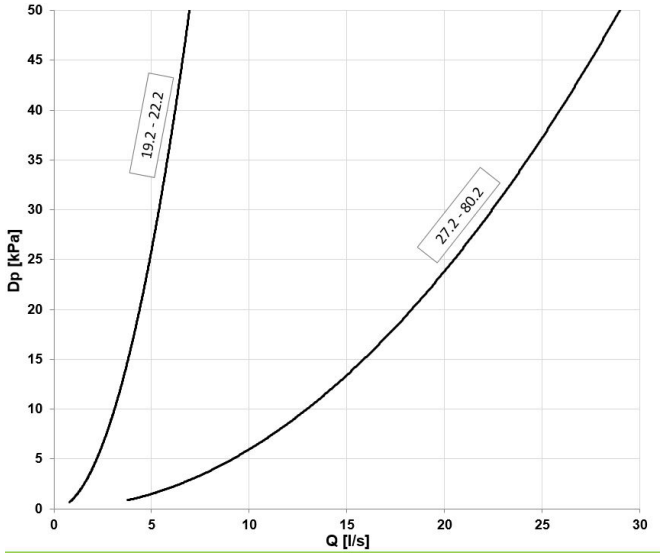
IFWX

Steel mesh strainer on the water side

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

⚠ Check for the presence of the required hydraulic shut-off valves in the system, in order to undertake periodical maintenance.

Pressure drops of steel mesh strainer water side



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

CMMBX

Serial communication module to supervisor (Modbus)

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

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

CMSLWX

LonWorks serial communication module

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

⚠ The configuration and management activities for the LonWorks networks are the responsibility of the client.
⚠ LonWorks technology uses the LonTalk® protocol for communicating between the network nodes. Contact the service supplier for further information.

BACX

BACnet serial communication module

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

⚠ The configuration and management activities for the BACnet networks are the responsibility of the client.
⚠ The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)

SPCX

Set-point compensation with outdoor air temperature probe

The setpoint compensation with air probe changes the calibration of the setpoint in relation to the temperature of the outside air and this reduces energy costs. The probe is connected to the unit's main control module and the maximum length of the connection cable is 20 meters. The sensor must not be influenced by factors that might affect its reading (for instance direct sunlight,contact with external heat sources, etc.) and therefore must be placed in a sheltered place.

RCTX **Remote control**

This option allows to have full control over all the unit functions from a remote position. It can be easily installed on the wall and has the same aspect and functions of the user interface on the unit.

- ⚠ All device functions can be repeated with a normal portable PC connected to the unit with an Ethernet cable and equipped with an internet navigation browser.
- ⚠ The device should be installed on the wall using suitable plugs, electrically hooked up and connected to the unit (installation and wiring are the responsibility of the Customer). Max. remote distance 350 m without auxiliary supply.
- ⚠ Data and power supply serial connection cable n.1 twisted and shielded pair. Diameter of the individual conductor 0.8 mm.

AVIBX **Anti-vibration mount support**

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

V3MOLX **User side modulating 3-way valve for operational limits**

Component required to ensure operation of the unit for applications where the source water temperature is greater than 25°C and the user side water temperature at start-up may be lower than the source water temperature.
The valve is controlled by the unit so as to reduce the flow rate of water on the user side and increase the temperature differential at the exchanger. The valve intervenes when the outlet temperature is below 45°C.
With the modulating valve it is possible to obtain a temperature jump on the user side up to 20°C.

- ⚠ This option is not compatible with the VACSUX accessory: DHW user side switching valve

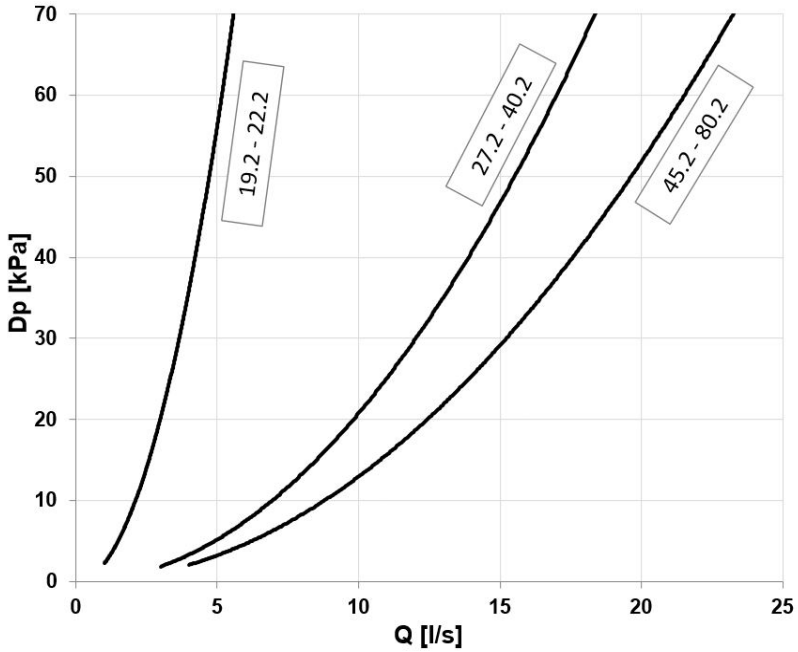
VACSUX **User side DHW switching valve**

The hot side DHW switching valve is also supplied as a separate accessory.
The DHW is called by the closure of the potential-free contact present in the unit electric panel.In heating, the control regulates the 3-way valve commutation because it deviates the flow-rate from installation to DHW storage tank, changes the installation set into the DHW one, thermoregulates and activates or deactivates the compressors depending on the distance from the DHW set. In cooling, the control switches off the compressors due to the mode changing, regulates the 3-way valve commutation and starts the compressors after the safety time owed to on/off.
For sizes from 19.2 to 22.2 the DHW switching valve is 2".
For sizes from 27.2 to 40.2 the DHW switching valve is 2"1/2.
For sizes from 45.2 to 80.2 the DHW switching valve is 3".

The hot side DHW switching valve has a IP 40 protection degree.

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

DHW switching valve pressure drops



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

General technical data

SIZE			19.2	22.2	27.2	35.2	40.2	45.2	60.2	80.2
Operation Heating-only (W40/45)										
Heating capacity (EN14511:2018)	1	kW	33,8	40,2	46,1	57,1	69,3	87,5	109	134
Total power input (EN14511:2018)	2	kW	8,13	9,07	10,2	13,0	16,2	21,1	26,4	31,8
COP (EN14511:2018)	3	-	4,16	4,43	4,52	4,40	4,28	4,16	4,13	4,23
Water flow-rate (user side)	1	l/s	1,63	1,94	2,22	2,76	3,35	4,23	5,27	6,48
Pressure drop (user side)	1	kPa	20,5	21,7	20,2	19,9	21,2	20,2	28,8	28,7
Water flow-rate (source side)	1	l/s	2,06	2,48	2,86	3,51	4,24	5,30	6,62	8,19
Pressure drop (source side)	1	kPa	47,6	45,1	28,1	31,9	35,9	39,4	46,4	42,7
Operation Heating-only (W50/55)										
Heating capacity (EN14511:2018)	4	kW	32,1	38,0	43,8	54,4	66,5	85,0	106	130
Total power input (EN14511:2018)	2	kW	10,0	11,0	12,3	16,1	19,8	25,5	32,1	38,6
COP (EN14511:2018)	3	-	3,21	3,47	3,55	3,38	3,36	3,33	3,30	3,38
Water flow-rate (user side)	4	l/s	1,56	1,84	2,12	2,63	3,22	4,12	5,14	6,31
Pressure drop (user side)	4	kPa	19,1	19,9	19,0	18,7	20,0	19,3	27,7	27,6
Water flow-rate (source side)	4	l/s	1,76	2,16	2,50	3,05	3,72	4,74	5,91	7,31
Pressure drop (source side)	4	kPa	37,3	36,1	22,6	25,3	29,1	32,8	38,6	35,5
ErP Classe Energetica - Clima MEDIO - W55	6	-	A+++	A+++	A+++	A+++	-	-	-	-
SCOP - Clima MEDIO - W55	7	-	4,48	4,65	4,65	4,61	4,57	4,45	4,45	4,52
Operation Heating-only (W70/78)										
Heating capacity	5	kW	73,4	83,0	96,8	122	144	184	224	278
Total power input (EN14511:2018)	2	kW	16,9	18,1	20,8	28,0	34,3	44,6	54,7	66,8
COP (EN14511:2018)	3	-	4,33	4,60	4,64	4,37	4,21	4,13	4,10	4,16
Water flow-rate (user side)	5	l/s	2,24	2,53	2,95	3,72	4,40	5,62	6,84	8,49
Pressure drop (user side)	5	kPa	33,1	33,9	29,2	30,4	33,1	32,0	44,0	44,0
Water flow-rate (source side)	5	l/s	2,75	3,16	3,69	4,57	5,34	6,78	8,25	10,3
Pressure drop (source side)	5	kPa	75,6	66,2	42,6	49,0	52,4	59,0	66,5	62,1
Compressor										
Type of compressors		-	Scroll							
Refrigerant		-	R-134a							
No. of compressors		Nr	2							
Capacity control steps		Nr	2	2	2	2	2	2	2	2
Oil charge		l	5,4	6,8	6,8	6,8	6,8	9,4	13,6	12,6
Refrigerant charge		kg	7,5	8,0	8,7	9,2	9,8	13,0	16,0	20,0
Refrigeration circuits		Nr	1							
User side exchanger										
Type of exchanger	8		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
No. of exchangers		Nr	1	1	1	1	1	1	1	1
Source side exchanger										
Type of exchanger	8		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
No. of exchangers		Nr	1	1	1	1	1	1	1	1
Connections										
Water fittings (Standard units)			1" 1/4	1" 1/4	2"1/2	2"1/2	2"1/2	2"1/2	2"1/2	2"1/2
Water fittings (Large units)			2"	2"	3"	3"	3"	3"	3"	3"
Water circuit										
Maximum water side pressure	9	MPa	1	1	1	1	1	1	1	1
Min. installation water contents (user side)		l	670	760	880	1110	1310	1670	2040	2530
Power supply										
Standard power supply		V	400/3/50							

The Product is compliant with the Erp (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 811/2013 (rate heat output ≤70 kW at specified reference conditions) and the Commission delegated Regulation (EU) No 813/2013 (rated heat output ≤400 kW at specified reference conditions).
«Contains fluorinated greenhouse gases» (GWP 1430)

1. Data referred to the following conditions: User side exchanger water temperature 40/45°C. Source side exchanger water temperature 10/7°C. Performance data calculated with reference to EN14511:2018
2. The total power draw is calculated by adding the compressor's power draw + the draw required to overcome the internal service and source side pressure drops + the control circuit power draw
3. COP (EN 14511:2018) heating performance coefficient. Ratio between delivered heating capacity and power input in compliance with EN 14511:2018
4. Data referred to the following conditions: User side exchanger water temperature 50/55°C. Source side exchanger water temperature 10/7°C. Performance data calculated with reference to EN14511:2018
5. Data referred to the following conditions: User side exchanger water temperature 70/78°C. Source side exchanger water temperature 45/40°C. Performance data calculated with reference to EN14511:2018
6. Seasonal energy efficiency class of ambient heating according to Commission Delegated Regulation (EU) No. 811/2013. W = Water outlet temperature (°C)
7. Data calculated according to the EN 14825:2018 Regulation
8. PHE = Plate exchanger
9. Conditions for the circuit on the utility side and the circuit on the source side. In configurations with hydronic units, the maximum pressure on the water side is 600 kPa.

Electrical data

Supply voltage 400/3/50

SIZE		19.2	22.2	27.2	35.2	40.2	45.2	60.2	80.2
F.L.A. - Full load current at max admissible conditions									
F.L.A. - Total	A	32,8	35,4	41,4	54,2	68,6	85,8	105,6	125,8
F.L.I. - Full load power input at max admissible conditions									
F.L.I. - Total	kW	18,3	19,4	22,6	30,0	36,6	47,8	59,6	69,6
M.I.C. Maximum inrush current									
M.I.C. - Value	A	111,4	128,2	138,7	167,1	208,3	267,9	324,8	372,9
M.I.C. with soft start accessory	A	63,9	73,2	79,7	97,1	121,3	155,4	188,8	217,9

Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations.
Power supply: 400/3/50 Hz. Voltage variation: max. +/-10%
Voltage unbalance between phases: max 2 %
For non standard voltage please contact Clivet technical office
Units are in compliance with the europeans law CEI EN 60204 and CEI EN 603355.

Sound levels

SIZE	Sound power level (dB)								Sound power level	Sound pressure level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
19.2	40	48	54	62	65	65	54	43	70	54
22.2	43	48	55	62	66	66	51	45	70	54
27.2	45	49	55	63	66	67	53	47	71	55
35.2	51	58	61	69	70	68	54	44	74	58
40.2	54	60	63	71	72	70	54	49	76	60
45.2	55	64	63	72	74	72	56	49	78	60
60.2	54	62	63	72	75	73	58	52	78	61
80.2	54	65	65	73	76	76	62	53	80	63

Sound levels refer to units with full load under nominal test conditions.
The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.
Measurements are carried out in compliance with UNI EN ISO 9614-1
The sound power data is not certified by Eurovent.
Data referred to the following conditions:
User side exchanger water temperature 70/78°C.
Source side exchanger water temperature 45/40°C.

General technical data

Admissible water flow rates

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

		19.2	22.2	27.2	35.2	40.2	45.2	60.2	80.2
User side	Min [l/s]	1,40	1,63	1,94	2,37	2,82	3,68	3,68	4,64
	Max [l/s]	4,66	4,83	7,66	8,76	8,76	11,4	11,4	14,4
Source side	Min [l/s]	1,10	1,39	2,13	2,44	2,73	3,21	3,59	4,69
	Max [l/s]	3,40	4,24	6,56	7,47	8,34	9,87	11,1	14,4

Correction factors for ethylene glycol use

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

Fouling Correction Factors

	EVAPORATOR		CONDENSER	
m² °C / W	F1	FK1	F2	FK2
0.44 x 10 (-4)	1	1	1	1
0.88 x 10 (-4)	0,97	0,99	0,97	1,08
1.76 x 10 (-4)	0,94	0,98	0,92	1,05

F1 = Cooling capacity correction factors
FK1 = Compressor power input correction factor

Overload and control device calibrations

		INTERVENTION	RESET	VALUE
High pressure switch (gas side)	[kPa]	2880	2110	-
Low pressure alarm (gas side)	[kPa]	150	170	-
Antifreeze protection	[°C]	4	6,0	-
High pressure safety valve (gas side)	[kPa]	3200	-	4500
Low pressure safety valve (gas side)	[kPa]	2000	-	2950
Max no. of compressor starts per hour (gas side)	[n°]	10	-	10
Differential pressure switch (water side)	[kPa]	2,7 (8*)	5 (10,5*)	-
Max. pressure without hydronic assembly (water side)	[kPa]	1000	-	1000
Max. pressure with hydronic assembly (water side)	[kPa]	600	-	600
Safety valve calibration (water side) (1)	[kPa]	600	-	600

(1) Available only with hydronic assembly option

Operating Range

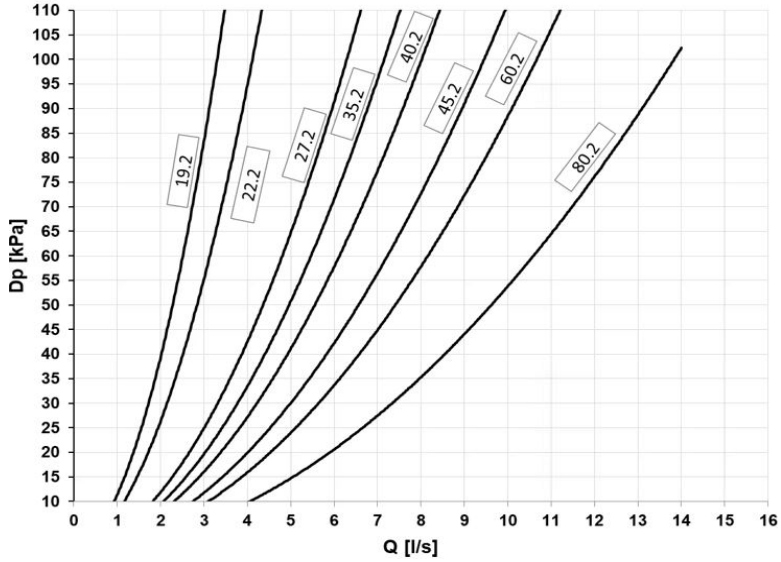
Twu [°C] = User side water outlet temperature
Tws [°C] = Source side water outlet temperature

Source side hydronic unit

Standard unit (-)

Configuration without source side hydronic assembly, equipped with components as described on the water diagram key.
All water fittings are Victaulic type. It is possible to control an external pump by an on/off or 0-10V signal.

Source side exchanger pressure drop curves



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

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

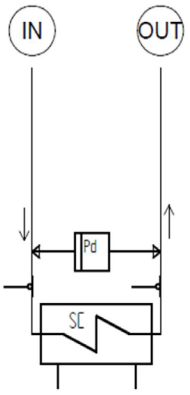
To the cold side exchanger pressure drops must be added the pressure drops of the steel mesh mechanical filter that must be placed on the water input line. It is a device compulsory for the correct unit operation, and it is available as accessory IFWX.

Admissible source side water flows

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

SIZE		19.2	22.2	27.2	35.2	40.2	45.2	60.2	80.2
Source side	Qmin	1,10	1,39	2,13	2,44	2,73	3,21	3,59	4,69
	Qmax	3,40	4,24	6,56	7,47	8,34	9,87	11,1	14,4

Water diagram



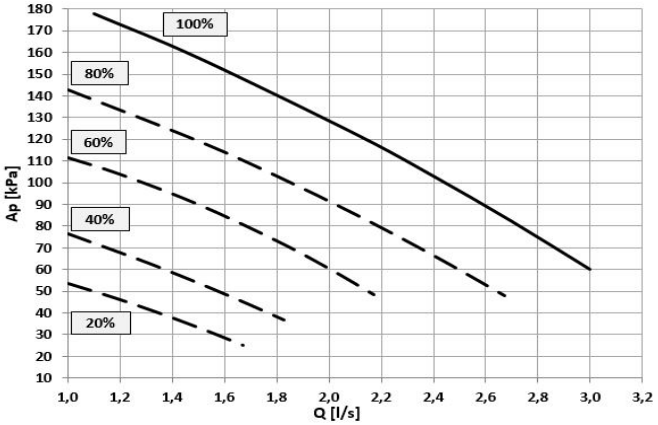
IN = Source side inlet
OUT = Source side outlet
Pd = Differential pressure switch
SC= Plate heat exchangers

Source side hydronic unit

Unit with VARYFLOW + (VARYS)

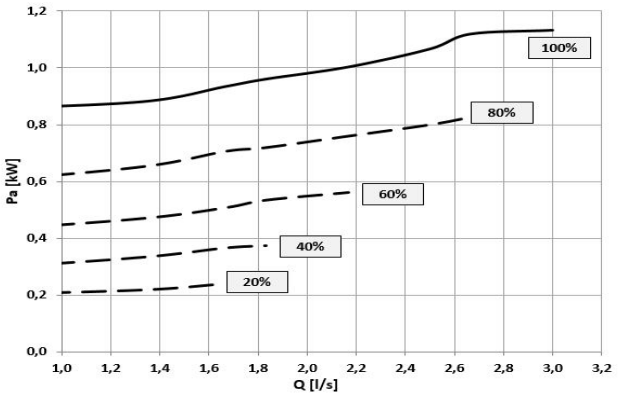
Configuration with 2 centrifugal electric pumps arranged in parallel and controlled by inverter, with housing and impeller made with AISI 304 stainless steel, and components as described on the water diagram key. All water fittings are Victaulic type.
The electric pumps are equipped with three-phase electric motor with IP55-protection and complete with thermoformed insulated casing.
The control, modulates the water flow-rate keeping constant the delta T. If the water temperature is in critical conditions, it allows to extend the unit operating ranges guaranteeing its operating, automatically reducing the water flow-rate. In the event of one of the two pumps is temporarily unavailable, it guarantees about the 80% of the nominal flow-rate.

Available pressure Size 19.2



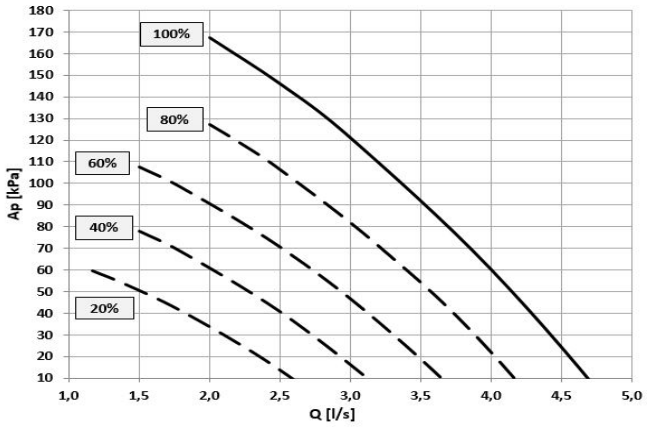
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 19.2



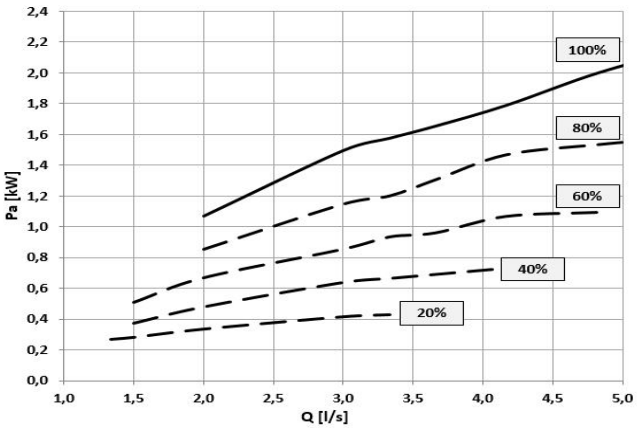
Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

Available pressure Size 22.2



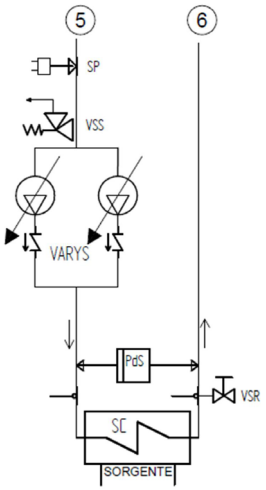
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 22.2



Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

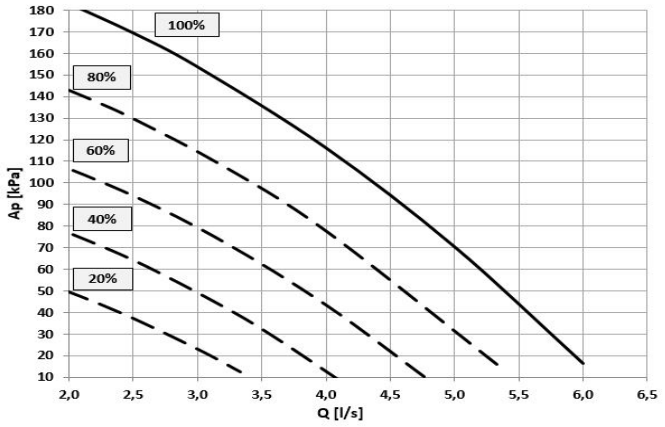
Source side water diagram



5 = Source side inlet
6 = Source side outlet
SP = Circuit charging pressure switch, calibrated to 0.7 bar
VS = Safety valve calibrated to 6 bar
VARYS = Hydronic unit VARYFLOW + source side
Pds = Source side differential pressure switch
VSR = Relief valve
SC = Plate heat exchangers

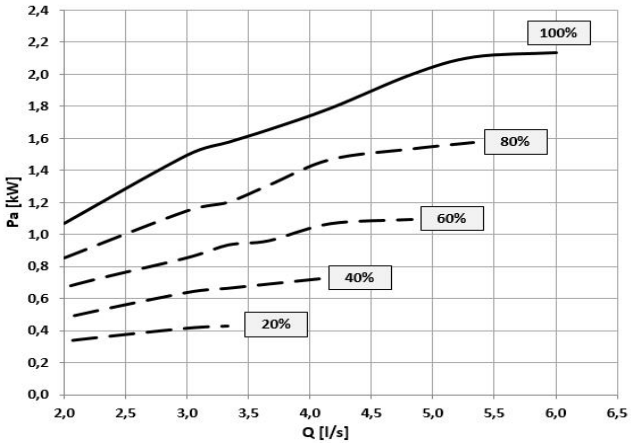
Unit with VARYFLOW + (VARYS)

Available pressure Size 27.2



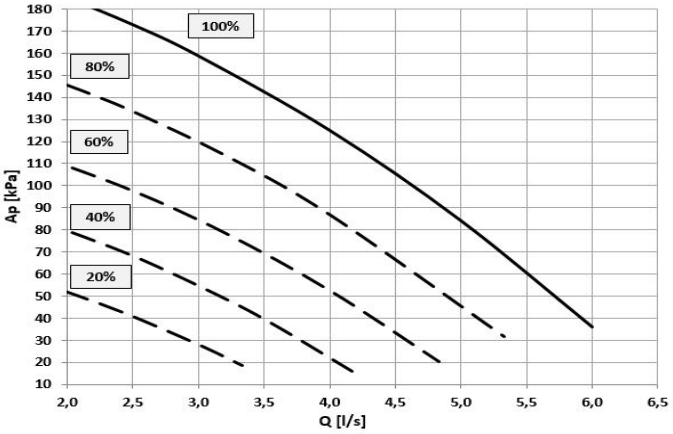
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 27.2



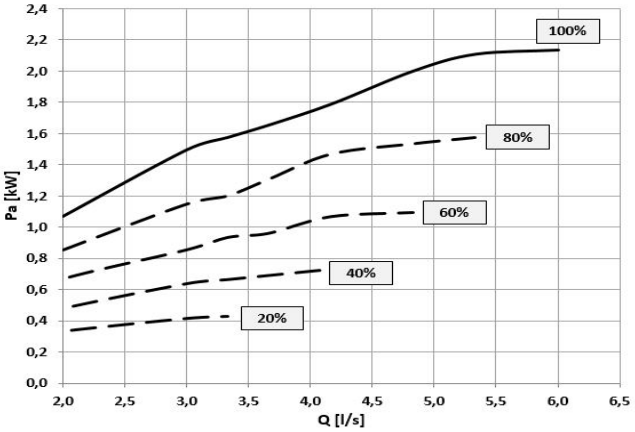
Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

Available pressure Size 35.2



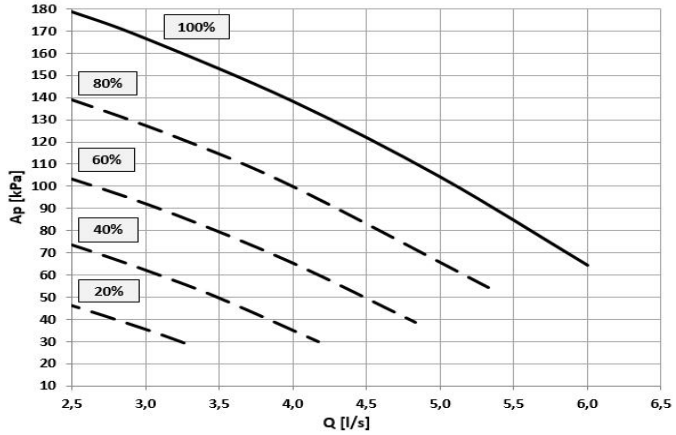
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 35.2



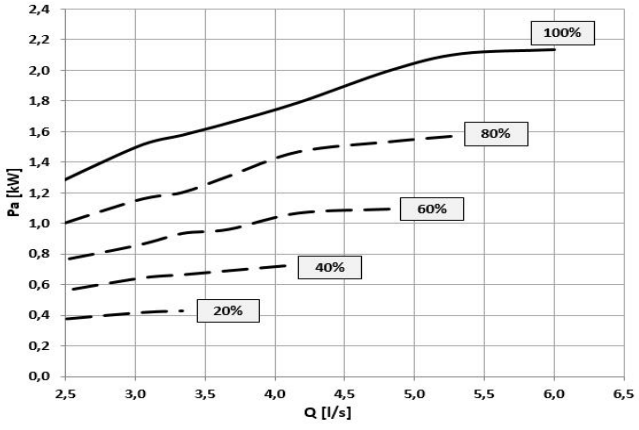
Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

Available pressure Size 40.2



Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

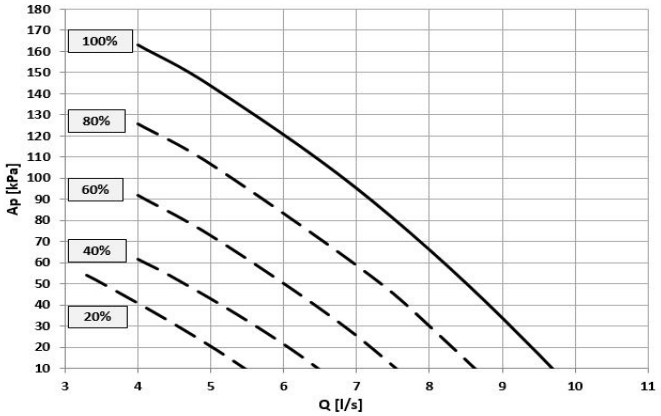
Absorption curves Size 40.2



Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

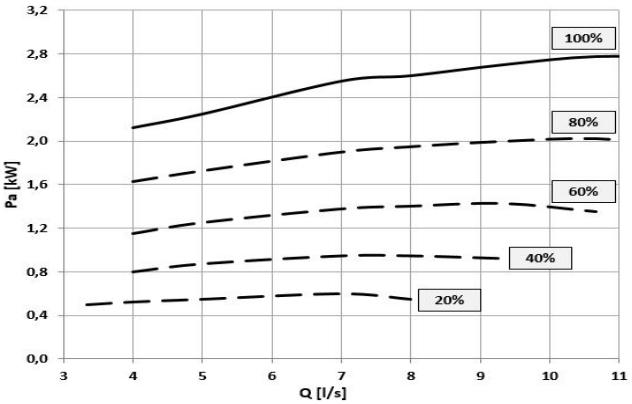
Unit with VARYFLOW + (VARYS)

Available pressure Size 45.2



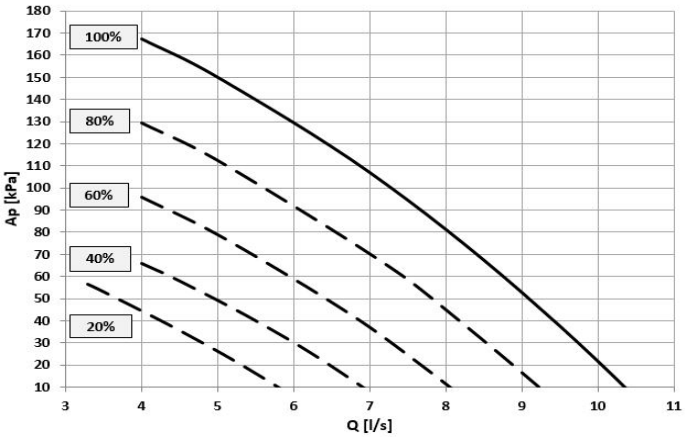
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 45.2



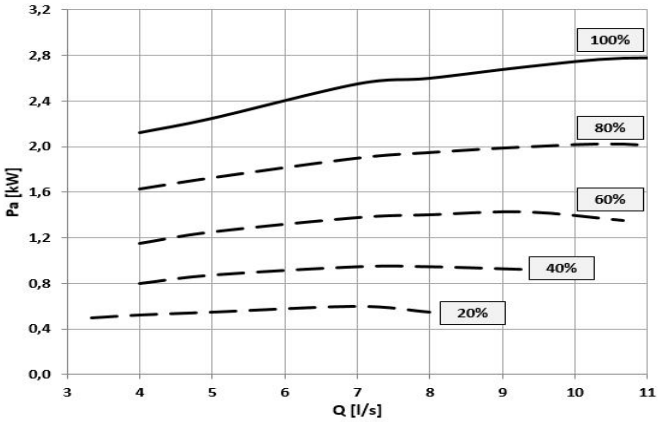
Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

Available pressure Size 60.2



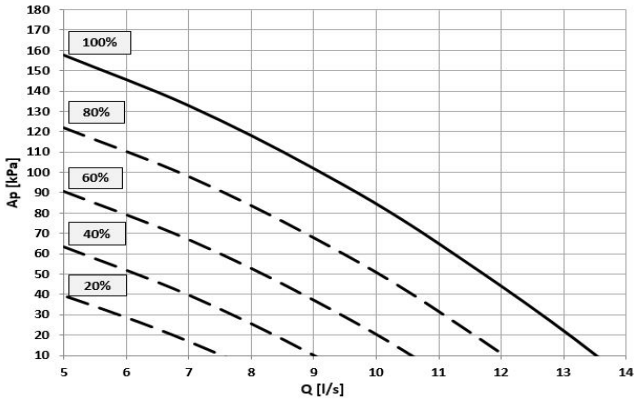
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 60.2



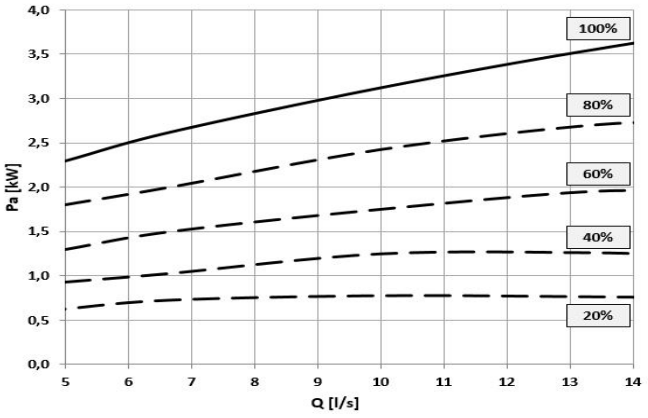
Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

Available pressure Size 80.2



Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 80.2



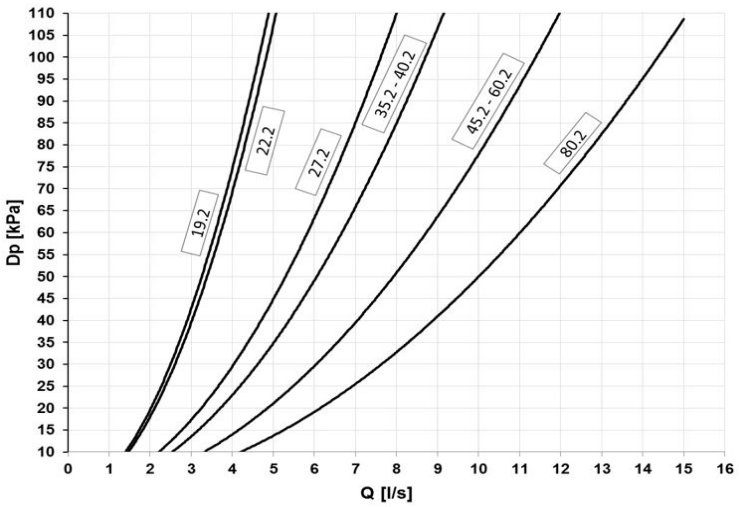
Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

User side hydronic unit

Standard unit (-)

Configuration without user side hydronic assembly, equipped with components as described on the water diagram key.
All water fittings are Victaulic type. It is possible to control an external pump by an on/off or 0-10V signal.

User side exchanger pressure drop curves



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

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

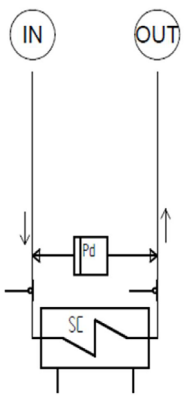
To the user side exchanger's pressure drop we must add the pressure drop of the steel mesh filter installed on the water intake line. This device is essential to the unit's proper operation, and is available as accessory IFWX.

Admissible user side water flows

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

SIZE		19.2	22.2	27.2	35.2	40.2	45.2	60.2	80.2
User side	Qmin	1,40	1,63	1,94	2,37	2,82	3,68	3,68	4,64
	Qmax	4,66	4,83	7,66	8,76	8,76	11,4	11,4	14,4

Water diagram



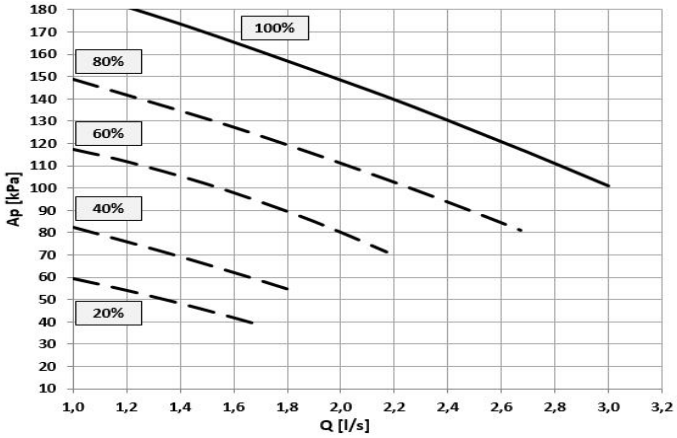
IN = User side inlet
OUT = User side outlet
Pd = Differential pressure switch
SC = Plate heat exchangers

User side hydronic unit

Unit with VARYFLOW + (VARYU)

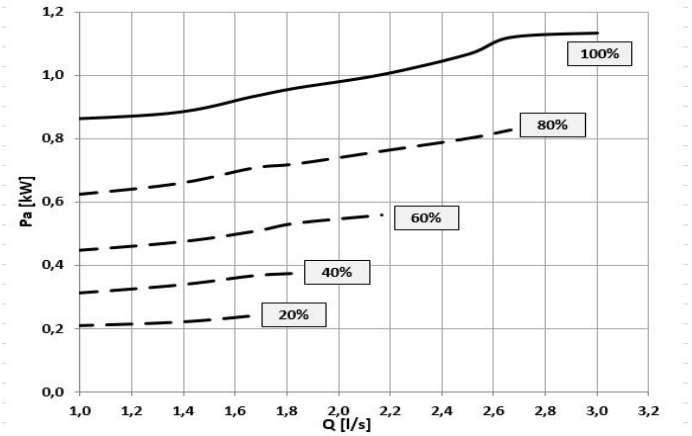
Configuration with 2 centrifugal electric pumps arranged in parallel and controlled by inverter, with housing and impeller made with AISI 304 stainless steel, and components as described on the water diagram key. All water fittings are Victaulic type.
The electric pumps are equipped with three-phase electric motor with IP55-protection and complete with thermoformed insulated casing.
The control, modulates the water flow-rate keeping constant the delta T. If the water temperature is in critical conditions, it allows to extend the unit operating ranges guaranteeing its operating, automatically reducing the water flow-rate. In the event of one of the two pumps is temporarily unavailable, it guarantees about the 80% of the nominal flow-rate.

Available pressure Size 19.2



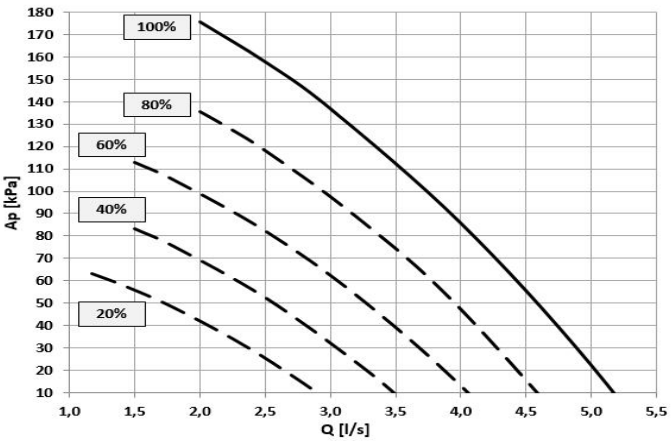
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size Gr. 19.2



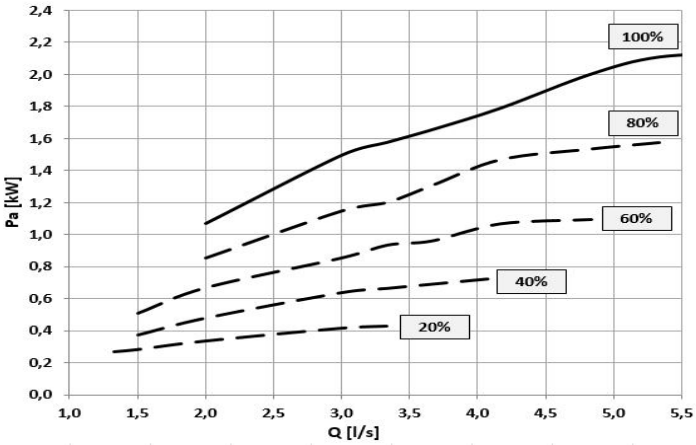
Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

Available pressure Size 22.2



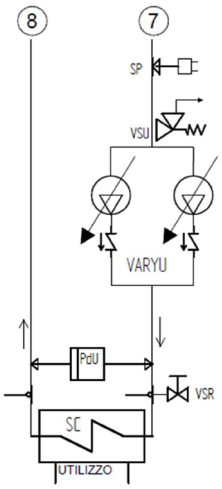
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size Gr. 22.2



Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

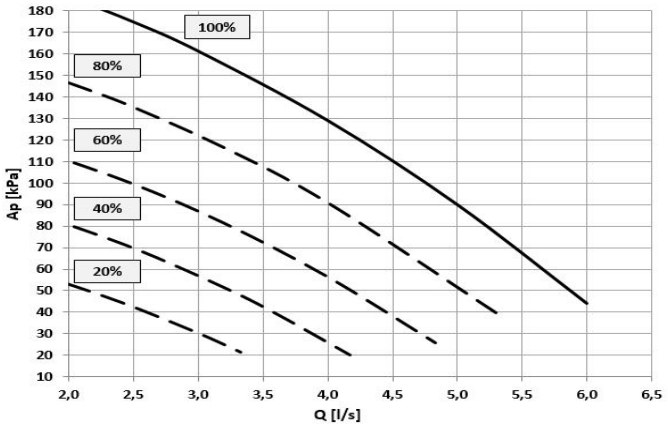
User side water diagram



7 = User side inlet
8 = User side outlet
SP = Circuit charging pressure switch, calibrated to 0.7 bar
VSU = Safety valve calibrated to 6 bar
VARYU = Hydronic unit VARYFLOW+ user side
PdU = User side differential pressure switch
VSR = Relief valve
SC = Plate heat exchangers

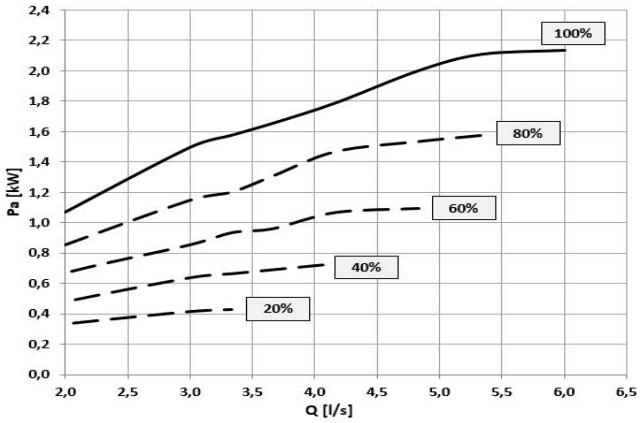
Unit with VARYFLOW + (VARYU)

Available pressure Size 27.2



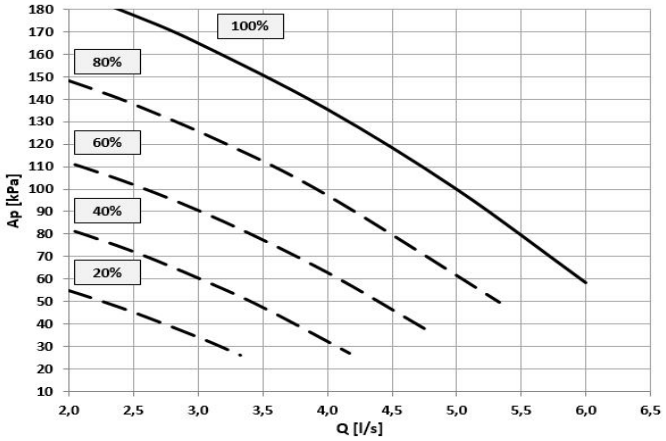
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 27.2



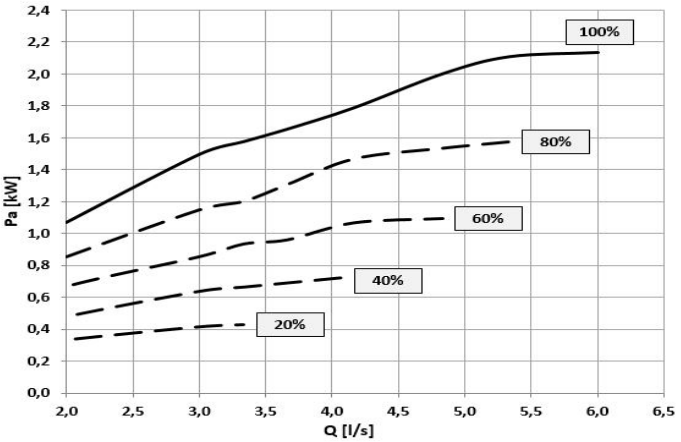
Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

Available pressure Size 35.2



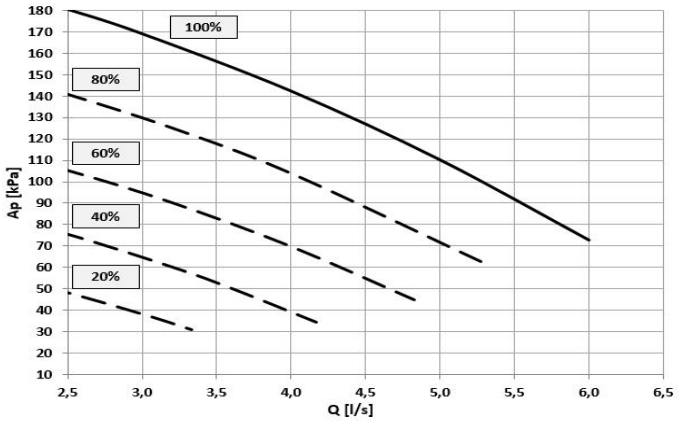
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 35.2



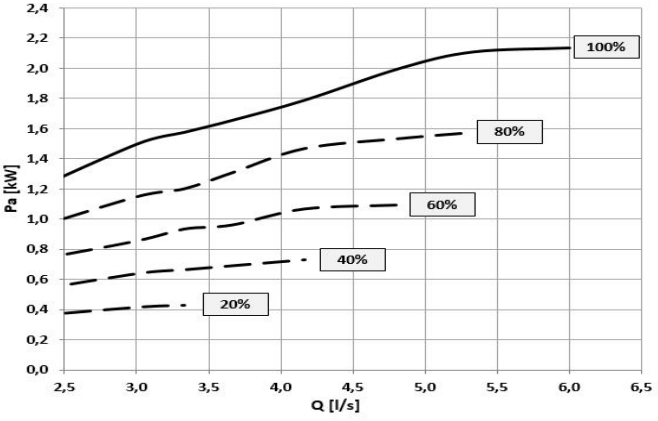
Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

Available pressure Size 40.2



Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

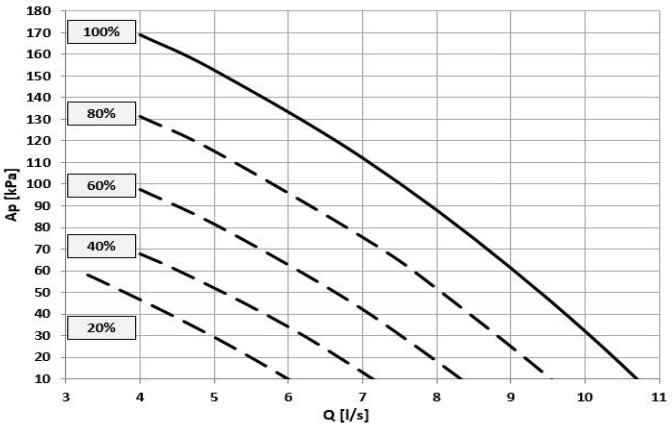
Absorption curves Size 40.2



Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

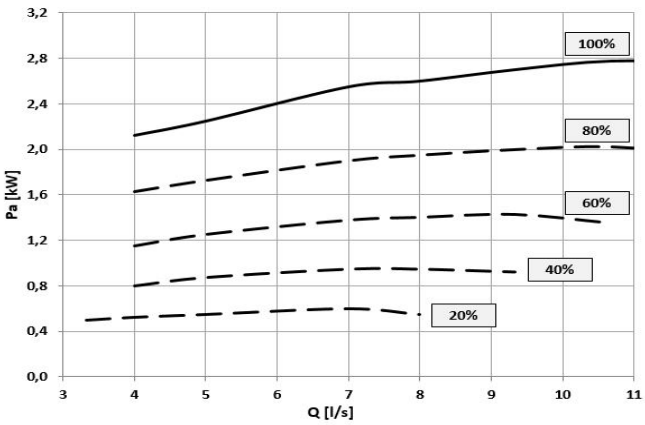
Unit with VARYFLOW + (VARYU)

Available pressure Size 45.2



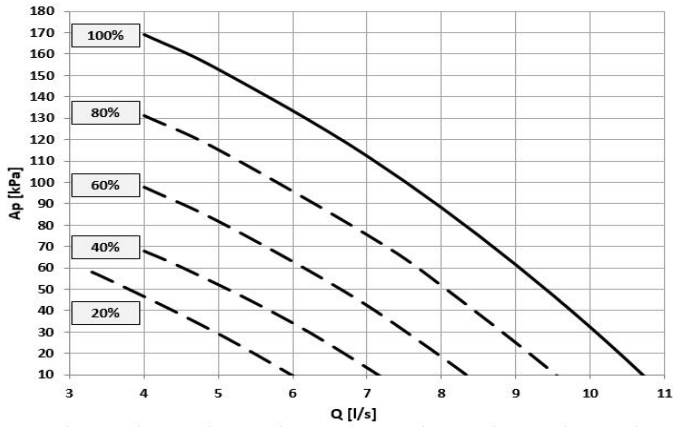
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 45.2



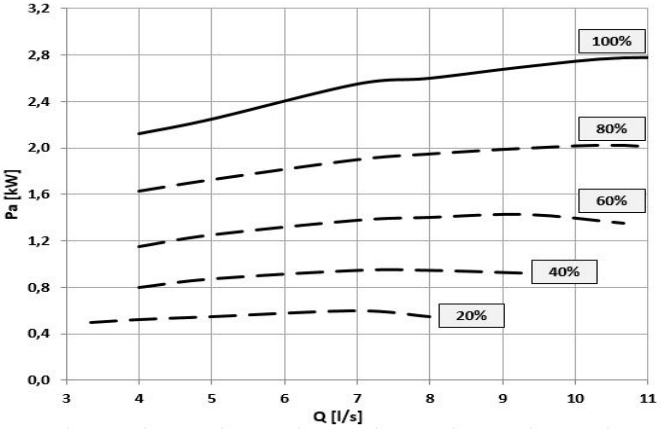
Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

Available pressure Size 60.2



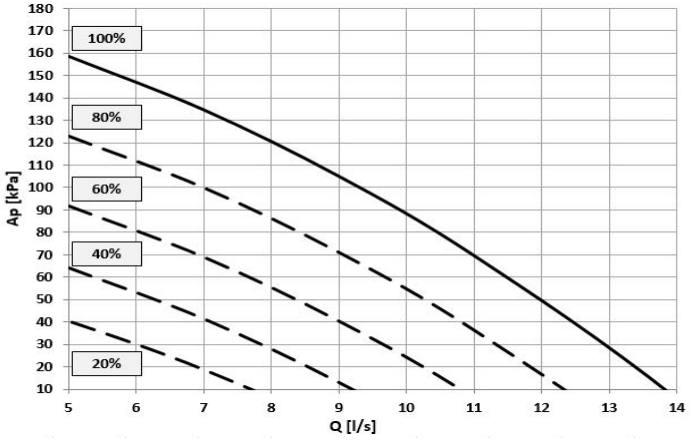
Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 60.2



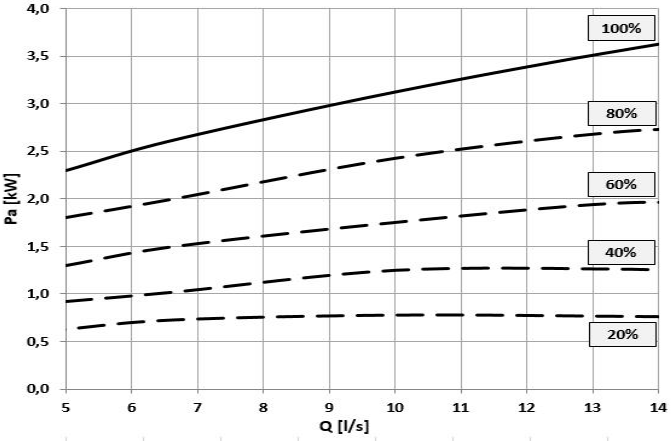
Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

Available pressure Size 80.2



Q = Water flow rate [l/s] Ap = Pressure head, available to the unit fittings [kPa]

Absorption curves Size 80.2



Q = Water flow rate [l/s] Pa = Electrical power draw [kW]

Heating - OHO

SIZE	To (°C)	Source side water outlet temperature [°C]											
		7		12		25		30		35		40	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
19.2	45	32,5	7,88	40,4	8,02	61,1	8,39	--	--	--	--	--	--
	55	30,1	9,84	37,9	9,97	58,4	10,3	66,3	10,5	74,2	10,6	--	--
	65	28,7	12,4	35,9	12,5	54,7	12,8	61,9	12,9	69,8	13,0	77,9	13,1
	70	--	--	--	--	52,8	14,3	60,3	14,4	67,9	14,5	75,7	14,6
	75	--	--	--	--	50,7	15,9	58,2	16,0	65,9	16,1	73,7	16,2
	78*	--	--	--	--	48,1	16,9	56,3	16,8	64,6	16,7	73,1	16,6
22.2	45	38,0	8,78	47,1	8,93	70,6	9,35	--	--	--	--	--	--
	55	35,5	10,8	44,3	11,0	67,4	11,3	76,3	11,5	85,1	11,6	--	--
	65	34,7	13,3	42,6	13,5	63,3	13,8	71,3	14,0	80,0	14,1	88,9	14,2
	70	--	--	--	--	61,3	15,3	69,5	15,4	77,9	15,6	86,5	15,7
	75	--	--	--	--	59,7	16,9	68,1	17,1	76,7	17,2	79,1	17,3
	78*	--	--	--	--	54,0	18,0	61,8	17,9	69,6	17,8	77,4	17,7
27.2	45	44,0	9,90	54,7	10,1	82,6	10,6	--	--	--	--	--	--
	55	40,9	12,1	51,5	12,3	78,8	12,8	89,4	13,0	99,9	13,2	--	--
	65	39,7	15,2	49,2	15,3	73,9	15,6	83,4	15,8	93,8	15,9	104	16,1
	70	--	--	--	--	71,4	17,3	81,3	17,5	91,2	17,6	101	17,7
	75	--	--	--	--	69,4	19,2	78,7	19,3	88,3	19,5	98,0	19,6
	78*	--	--	--	--	67,3	20,1	76,6	20,3	86,0	20,4	95,6	20,5
35.2	45	55,0	12,6	68,4	13,0	103	14,0	--	--	--	--	--	--
	55	51,2	15,7	64,3	16,1	98,6	17,0	112	17,3	125	17,7	--	--
	65	49,4	19,7	61,3	20,0	92,5	20,7	104	21,0	118	21,2	131	21,5
	70	--	--	--	--	89,4	22,9	102	23,2	114	23,4	127	23,6
	75	--	--	--	--	86,7	25,5	98,5	25,6	111	25,8	123	26,0
	78*	--	--	--	--	84,3	26,7	96,0	26,9	108	27,1	120	27,3
40.2	45	66,6	15,7	82,6	16,2	124	17,3	--	--	--	--	--	--
	55	62,4	19,4	78,1	19,8	119	20,9	135	21,3	150	21,8	--	--
	65	60,5	24,3	74,7	24,6	111	25,5	126	25,8	141	26,1	157	26,5
	70	--	--	--	--	108	28,1	122	28,4	137	28,8	152	29,1
	75	--	--	--	--	105	31,1	119	31,4	133	31,7	147	32,0
	78*	--	--	--	--	101	32,6	115	32,9	129	33,1	143	33,4
45.2	45	84,2	20,4	104	20,9	157	22,3	--	--	--	--	--	--
	55	80,0	25,1	100	25,6	150	26,9	170	27,4	189	27,9	--	--
	65	79,0	31,4	96,4	31,8	142	32,9	159	33,3	178	33,8	198	34,2
	70	--	--	--	--	137	36,5	155	37,0	174	37,4	192	37,8
	75	--	--	--	--	134	40,6	151	41,0	168	41,5	186	42,0
	78*	--	--	--	--	130	42,7	147	43,1	164	43,5	181	43,9
60.2	45	105	25,4	129	26,1	192	27,9	--	--	--	--	--	--
	55	100	31,4	123	31,9	184	33,5	208	34,1	231	34,7	--	--
	65	98	39,5	119	39,9	174	41,0	195	41,4	218	41,8	241	42,3
	70	--	--	--	--	169	45,6	190	46,0	212	46,4	235	46,7
	75	--	--	--	--	163	51,0	184	51,2	206	51,5	229	51,8
	78*	--	--	--	--	156	54,2	178	54,0	201	53,8	225	53,6
80.2	45	129	30,6	158	31,6	235	34,3	--	--	--	--	--	--
	55	122	37,6	151	38,6	225	41,2	254	42,1	282	43,1	--	--
	65	121	46,6	146	47,5	213	49,8	238	50,7	267	51,6	295	52,5
	70	--	--	--	--	207	54,9	233	55,8	260	56,7	288	57,6
	75	--	--	--	--	202	60,5	227	61,5	253	62,5	279	63,5
	78*	--	--	--	--	191	64,0	219	64,5	248	65,0	278	65,5

KWt = Heating capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit)(kW)
To = Water outlet temperature user side (°C)
The performances are referred to DeltaT=5 on both the user side and source side
* The performrces are referred to DeltaT=8 on the user side

Option compatibility

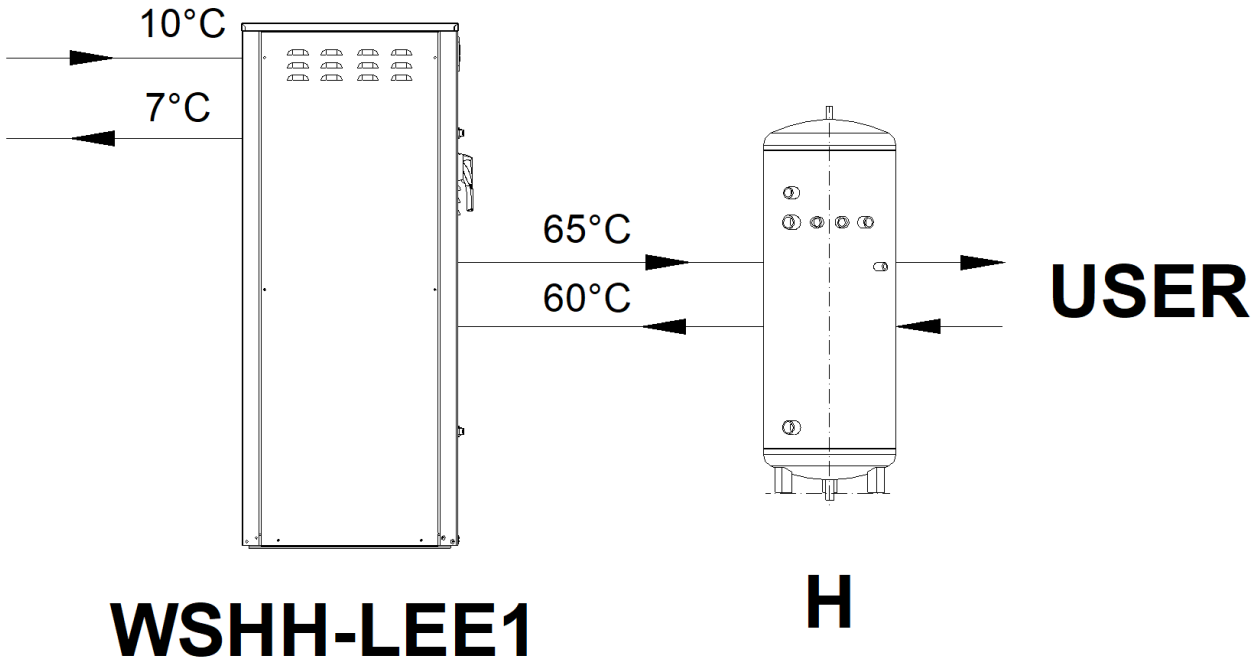
REF	DESCRIPTION	19.2	22.2	27.2	35.2	40.2	45.2	60.2	80.2
	Configurations and main accessories								
VARYU	Varyflow + (user side 2 inverter pumps)	o	o	o	o	o	o	o	o
V3MOL	User side modulating 3-way for operational limits	o	o	o	o	o	o	o	o
VARYS	Varyflow + (source side 2 inverter pumps)	o	o	o	o	o	o	o	o
SDV	Cutoff valve on compressor supply and returni	o	o	o	o	o	o	o	o
VS	Standard version	●	●	●	●	●	●	●	●
MOBMAG	Larger units	o	o	o	o	o	o	o	o
VACSUX	User side DHW switching valve (supplied separately)	o	o	o	o	o	o	o	o
V3MOLX	User side modulating 3-way valve for operational limits (supplied separately)	o	o	o	o	o	o	o	o
	VS - Configurazione standard								
VARYU	Varyflow + (user side 2 inverter pumps)	-	-	-	-	-	-	-	-
V3MOL	User side modulating 3-way for operational limits	-	-	-	-	-	-	-	-
VARYS	Varyflow + (source side 2 inverter pumps)	-	-	-	-	-	-	-	-
	Other accessories								
MF2	Multi-function phase monitor	●	●	●	●	●	●	●	●
SFSTR	Disposal for inrush current reduction	o	o	o	o	o	o	o	o
IFWX	Steel mesh strainer water side (supplied separately)	o	o	o	o	o	o	o	o
PFCC	Power factor correction capacitors (cosfi > 0.95)	o	o	o	o	o	o	o	o

o Option
● Standard
- Non disponibile

Simplified functional diagrams

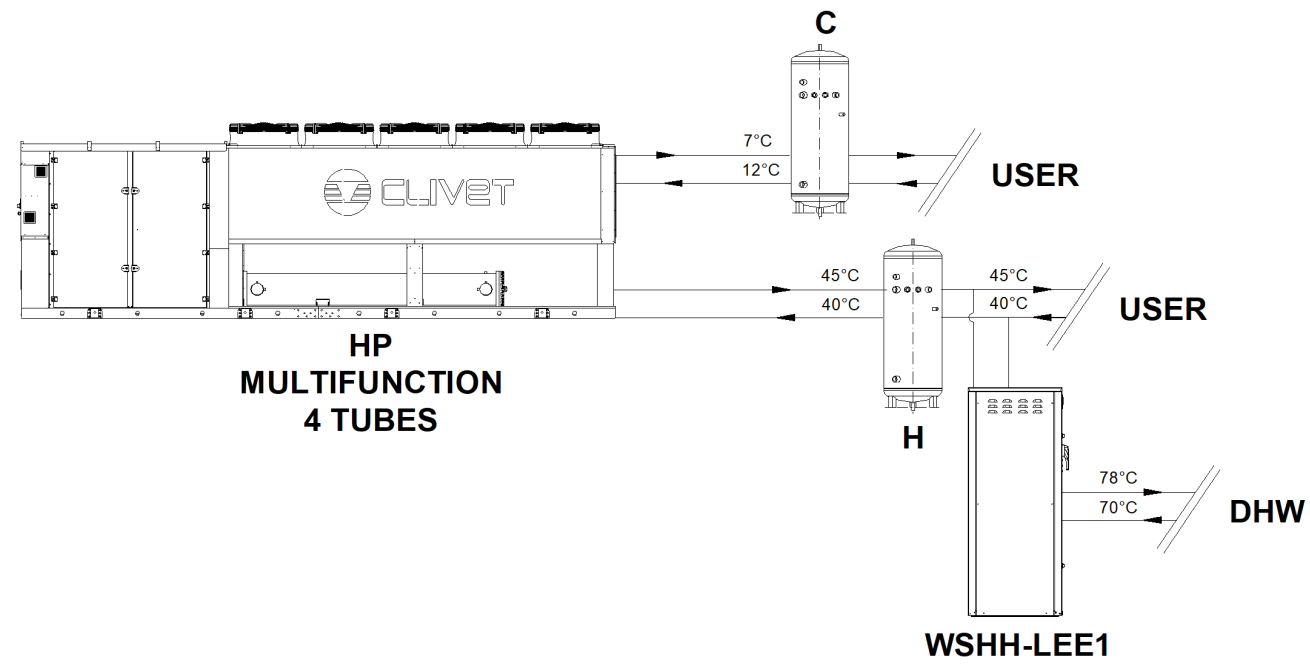
WSHH-LEE1 stand alone installation

For WSHH-LEE1 properly operation, it's necessary to respect the minimum water content on the user side.



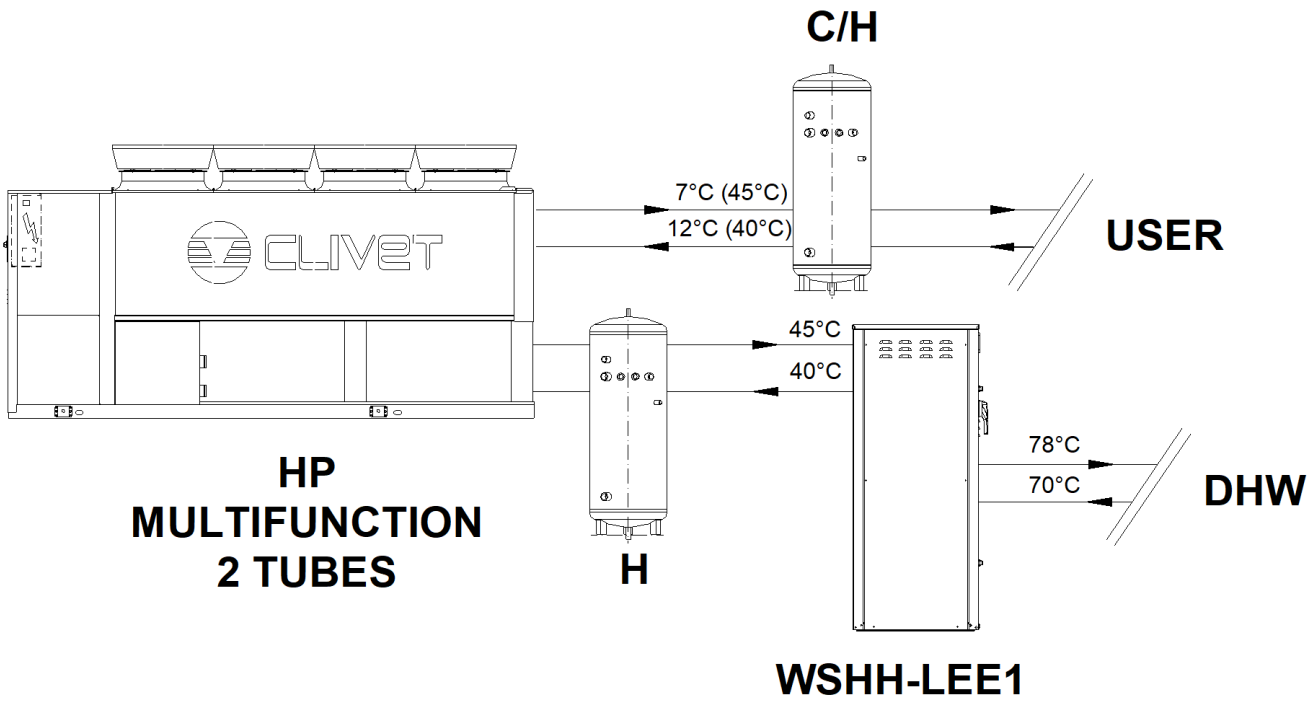
WSHH-LEE1 installation downstream of a multifunction unit (4 pipes)

For System properly operation, it's necessary to size the hot tank (H) and the cold tank (C) according to the minimum water content requested by the Multifunction unit (4-pipe).
It's also necessary to respect the minimum water content on the user side of the WSHH-LEE1.



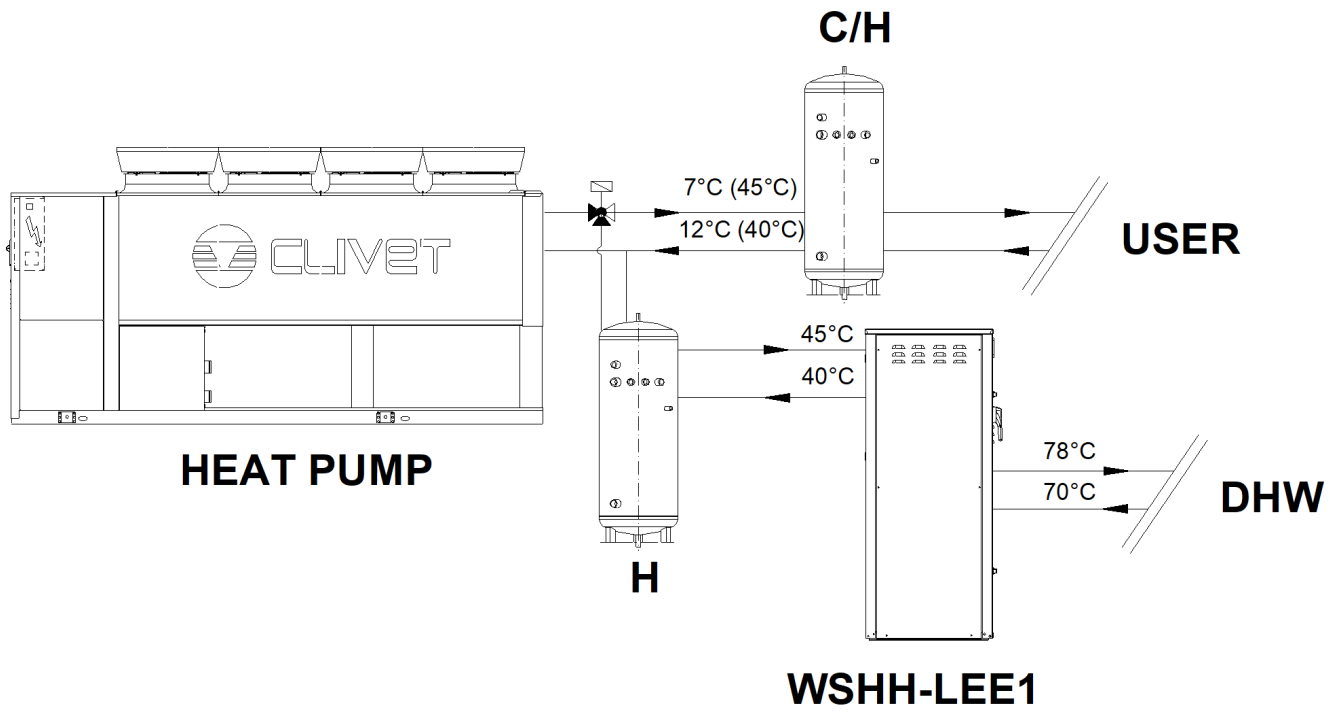
WSHH-LEE1 installation downstream of a multifunction unit (2-pipe + recovery)

For System properly operation, it's necessary to size the cold/hot tank (C/H) and the hot tank (H) according to the minimum water content requested by the Multifunction unit (2-pipe + recovery).
It's also necessary to respect the minimum water content on the user side of the WSHH-LEE1.



WSHH-LEE1 installation downstream of a heat pump unit

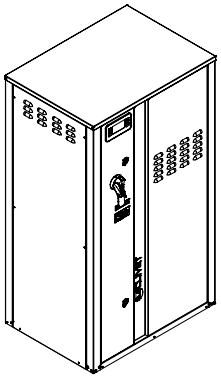
For System properly operation, it's necessary to size the cold/hot tank (C/H) and the hot tank (H) according to the minimum water content requested by the Heat pump unit.
It's also necessary to respect the minimum water content on the user side of the WSHH-LEE1.

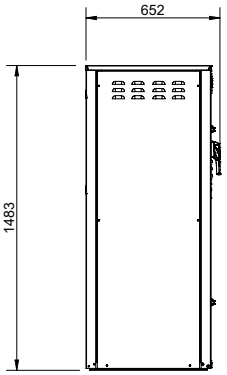


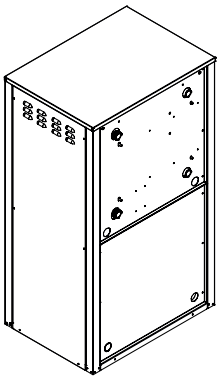
Dimensional drawings

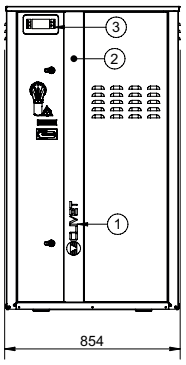
Size 19.2 - 22.2 standard unit without hydronic assemblies

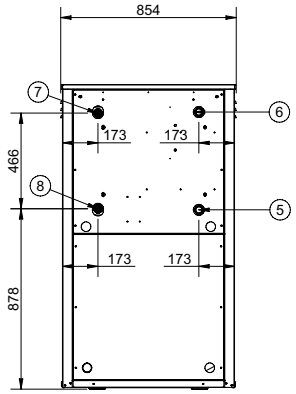
DAAHT0002_00 REV00
DATA/DTE 30/03/2021

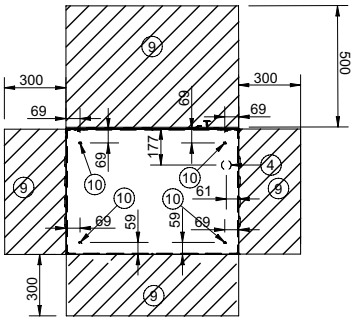












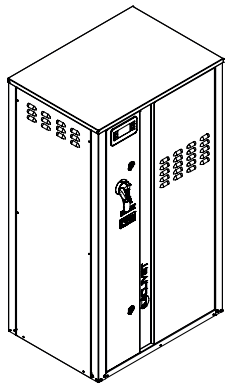
1. Compressor compartment
2. Electrical control box
3. Control keypad
4. Power input
5. User side water return
6. User side water supply
7. Source side water return
8. Source side water supply
9. Functional spaces
10. Vibration damper mounts

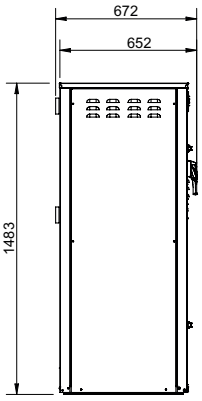
SIZE		19.2	22.2
Length	mm	854	854
Height	mm	1483	1483
Depth	mm	652	652
Operating weight	Kg	347	367
Shipping weight	Kg	349	367

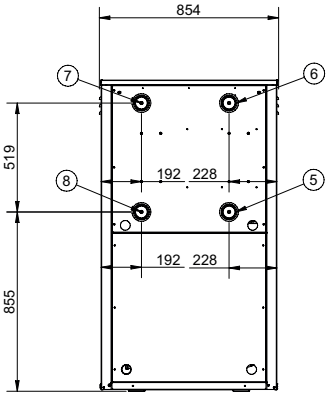
The presence of optional accessories may result in a substantial variation of the weights shown in the table.

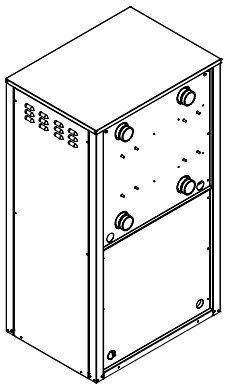
Size 27.2 ÷ 40.2 standard unit without hydronic assemblies

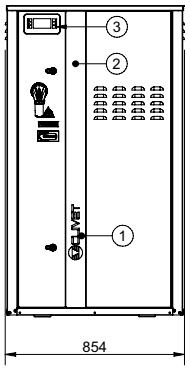
DAAHT0003_00 REV00
DATA/DTE 30/03/2021

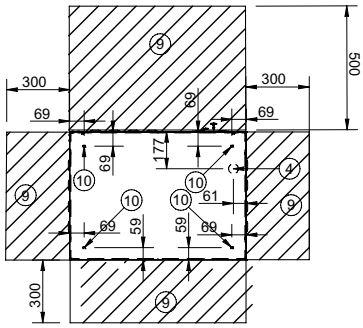












1. Compressor compartment
2. Electrical control box
3. Control keypad
4. Power input
5. User side water return
6. User side water supply
7. Source side water return
8. Source side water supply
9. Functional spaces
10. Vibration damper mounts

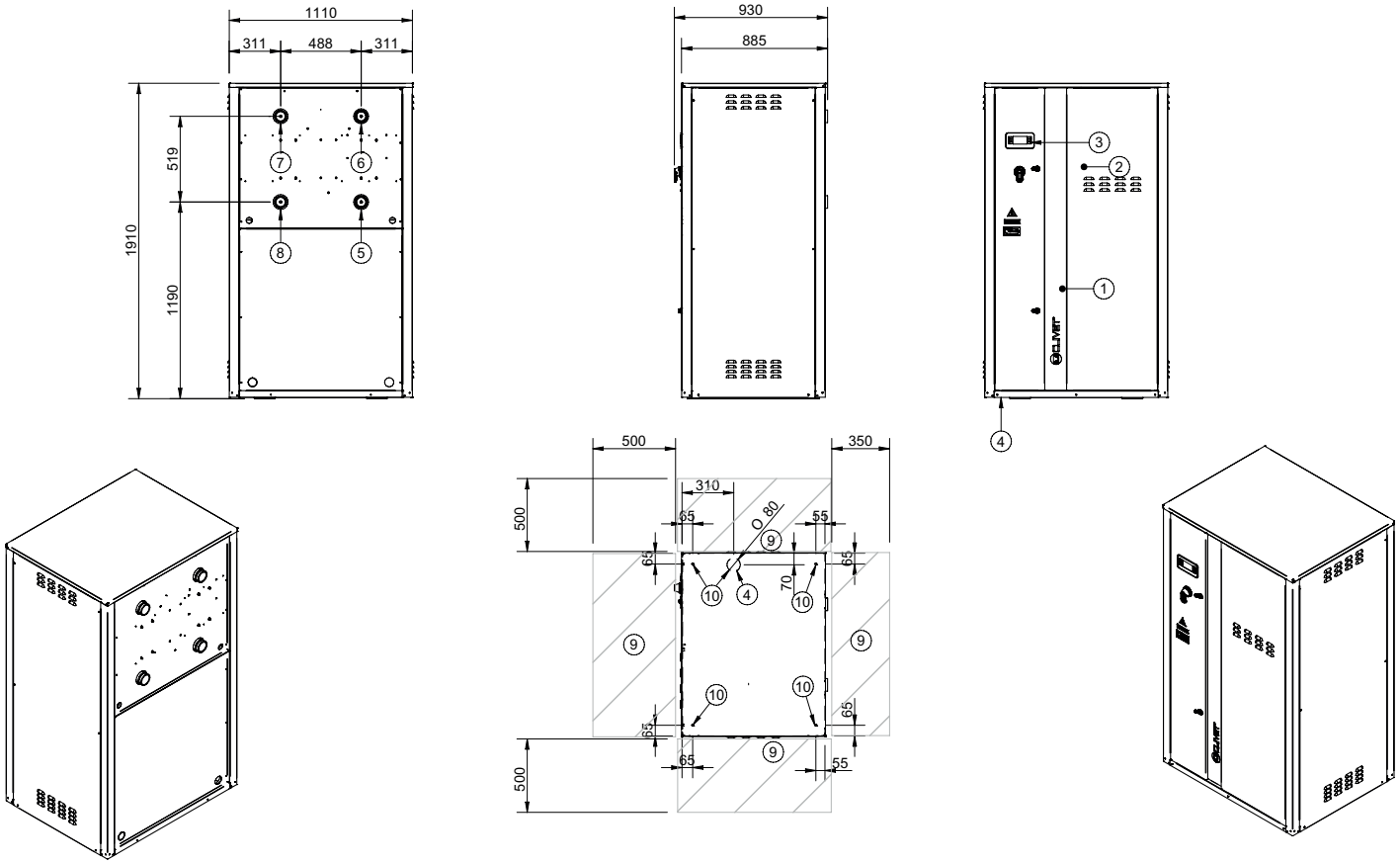
SIZE		27.0	35.2	40.2
Length	mm	854	854	854
Height	mm	1483	1483	1483
Depth	mm	672	672	672
Operating weight	Kg	398	417	420
Shipping weight	Kg	394	412	415

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

Dimensional drawings

Size 45.2 ÷ 80.2 standard unit without hydronic assemblies

DAAHT0005_00 REV00
DATA/DTE 04/04/2022



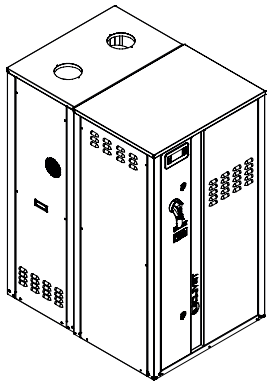
1. Compressor compartment
2. Electrical control box
3. Control keypad
4. Power input
5. User side water return
6. User side water supply
7. Source side water return
8. Source side water supply
9. Functional spaces
10. Vibration damper mounts

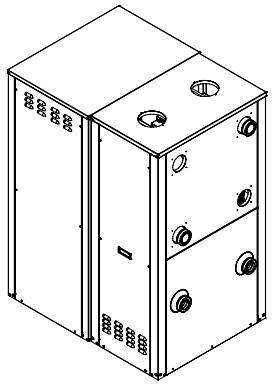
SIZE		45.2	60.2	80.2
Length	mm	1110	1110	1110
Height	mm	1910	1910	1910
Depth	mm	930	930	930
Operating weight	Kg	702	754	831
Shipping weight	Kg	702	755	824

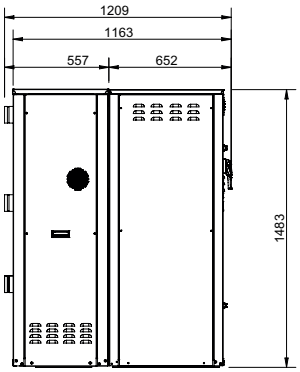
The presence of optional accessories may result in a substantial variation of the weights shown in the table.

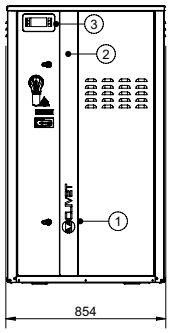
Size 19.2 ÷ 40.2 unit with hydronic assemblies option and oversize enclosure (MOBMAG)

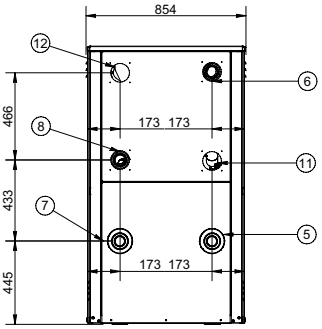
DAAHT0001_00 REV00
DATA/DTE 30/03/2021

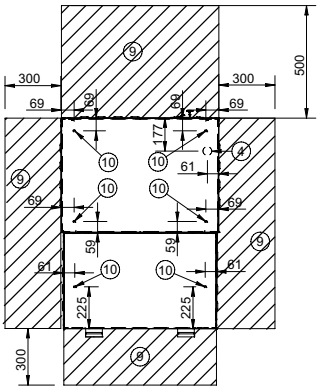












1. Compressor compartment
2. Electrical control box
3. Control keypad
4. Power input
5. User side water return
6. User side water supply
7. Source side water return
8. Source side water supply
9. Functional spaces
10. Vibration damper mounts
11. User side water return without pumps
12. Source side water return without pumps

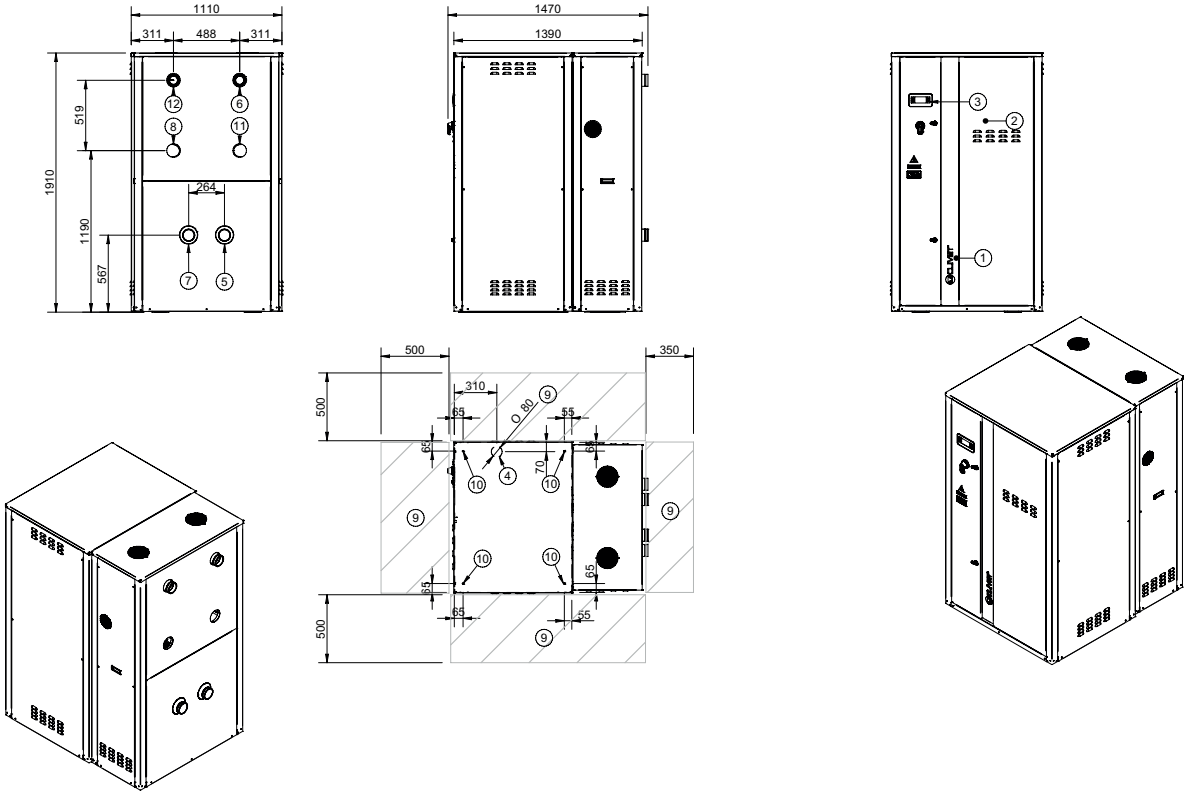
SIZE		19.2	22.2	27.2	35.2	40.2
Length	mm	854	854	854	854	854
Height	mm	1483	1483	1483	1483	1483
Depth	mm	1209	1209	1209	1209	1209
Operating weight	Kg	516	543	589	608	611
Shipping weight	Kg	478	503	535	553	556

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

Dimensional drawings

Size 45.2 ÷ 80.2 unit with hydronic assemblies option and oversize enclosure (MOBMAG)

DAAHT0004_00 REV00
DATA/DTE 30/03/2021



1. Compressor compartment
2. Electrical control box
3. Control keypad
4. Power input
5. User side water return
6. User side water supply
7. Source side water return
8. Source side water supply
9. Functional spaces
10. Vibration damper mounts
11. User side water return without pumps
12. Source side water return without pumps

SIZE		45.2	60.2	80.2
Length	mm	1110	1110	1110
Height	mm	1910	1910	1910
Depth	mm	1470	1470	1470
Operating weight	Kg	989	1042	1152
Shipping weight	Kg	917	970	1058

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

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