LCP

MANUALE TECNICO

I

VERSIONE POLIVALENTE

Pompe di calore multifunzione condensate ad aria
Unità Aria - Acqua per condizionamento e produzione di acqua sanitaria

CE

eco R410A

Galletti
AIR CONDITIONING

Contents

CE

Declaration of conformity

The declaration of conformity is attached to each machine

1 General description

1.1 LCP product

LCP multifunction units are air conditioning and domestic hot water (DHW) production units, designed for both domestic and industrial use operating 24 hours a day. They cover the 50 to 370 kW thermal output range, guaranteeing high-level thermodynamic performance and a wide range of configuration possibilities, both in terms of accessories and of cooling circuits.

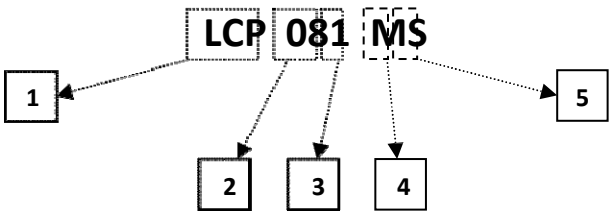
All versions are available in the sizes shown in the table below. LCP unit sizes are on the horizontal axis of the table in terms of nominal cooling capacity [kW]. They have been obtained with water cooled to 7°C and with an external air dry-bulb temperature of 35°C.

Table I - Table showing the range of LCP product sizes and Efficiency Packs:

Sizes:	041	051	061	071	081	094	104	124	144	164	194	214	244	274	294	324
Efficiency Pack 1	F1	F1	F2	F2	F2											
Efficiency Pack 4						F3+	F3+	F4	F4	F4	F4	F5	F5	F6	F6	F6

The first column of Table I shows the available ”Efficiency Packs”. These determine the configuration of the cooling circuit (for further details see the “Cooling circuit” paragraph). For example, the “LCP 081” size develops a 90 kW cooling output and is implemented with Efficiency Pack 1 (two compressors, two cooling circuits). The table cells show the machine “Frame” (metalwork) dimensions, using reference symbols F1 F2 F3 (of increasing dimensions). All information on machine weight and frame dimensions is available in the “Overall dimensions and weight” paragraph.
All sizes of the LCP series can be implemented in the standard “S” set-up or in the “L” soundproof set-up. In the latter the compressors and their compartments are covered with soundproof material and the machine is sized in relation to reduced fan speed.
All sizes of the LCP series can be combined with 2 or 4-pipe systems (see paragraph 1.1.1 for relevant information); “P” indicates a heat pump with full recovery for 4-pipe systems, “H” indicates multifunction heat pumps for 2-pipe systems.

The LCP units are identified with the following symbol:



- 1 - Identification symbol of Galletti Model (e.g.: “LCP” unit)
- 2 - Unit sizes expressed in nominal cooling capacity x10 [kW] (e.g.: 08 = 80 kW)
- 3 -Efficiency Pack: cooling circuit and compressor layout (e.g.: Efficiency Pack 1)
- 4 - Machine version (e.g.: “M” Multifunction)
- 5 - Machine execution (e.g.: “S” soundproofing not available)

1.1.1 Field of application

LCP units cool/heat water and glycol solutions (up to a maximum of 35% in weight) for civil, industrial and technological air conditioning.

The LCP series unit must be used within the functioning limits shown in this document, or the warranty required by the sales contract will be invalidated.

LCP multifunction machines have 4 water connections of two different water circuits, for 2 or 4-pipe systems:

- Circuit 1, production of cold water (or hot for reversible unit, such as LCP M);
- Circuit 2, hot water production by full heat recovery.

Diagram of the operating modes of a LCP M unit that interfaces with a 2-pipe conditioning system. It provides hot and cold water production to the primary system circuit and hot water production to the full recovery circuit (e.g. for sanitary purposes: DHW)

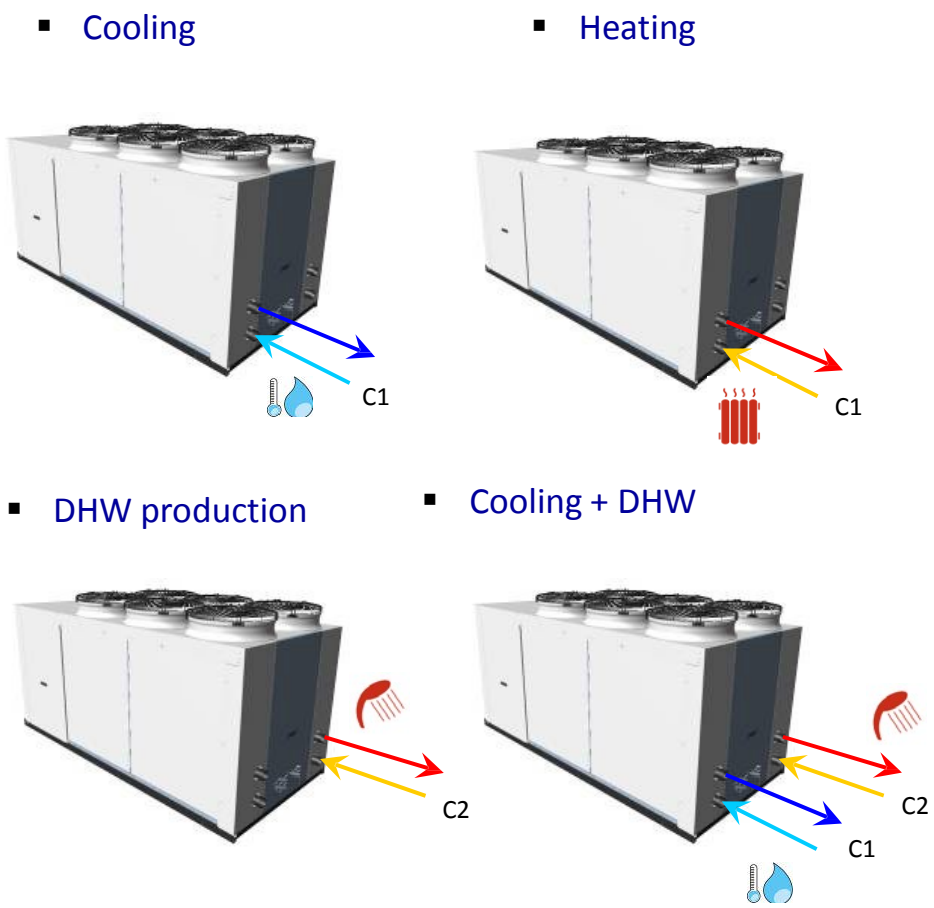
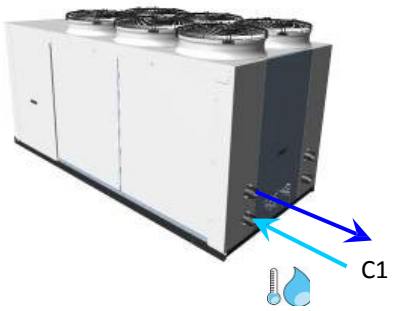


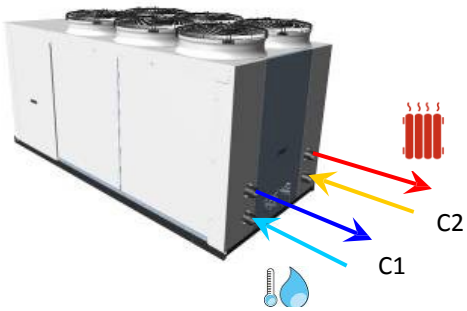
Diagram of the operating modes of a LCP P unit that interfaces with a 4-pipe conditioning system. It produces both hot and cold water.

- Cooling

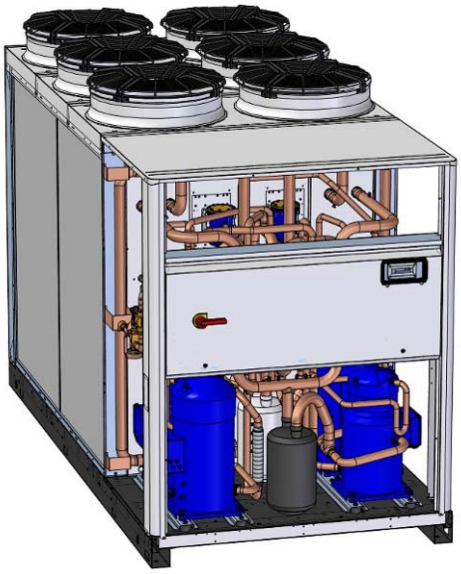


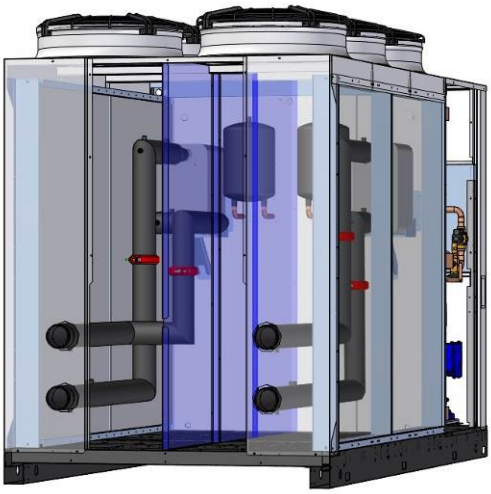
- Heating

- Cooling + Heating



Multifunction LCP machine: view of the water connections and of the thermodynamic circuit
For connection directions refer to the dimensional drawing attached to the documentation.

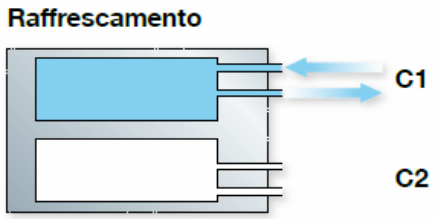




The following points list the operating modes of the LCP M multifunction unit:

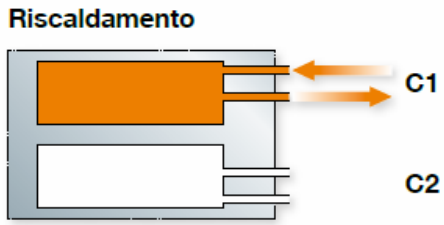
- Cooling

The LCP M multifunction unit in the “Chiller” mode cools water for room cooling on the utility circuit. It dissipates condensation heat into the air with a finned-pack condenser.



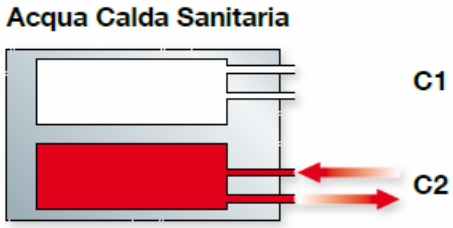
- Heating

The LCP M unit in the “Heat Pump” mode heats condenser water to heat the utility circuit, by absorbing the cooling capacity of air evaporation with a finned-pack condenser. In other words, heat is taken from the air (thermal source) which is then transferred to the utility when a certain temperature has been reached.



- Hot water production (DHW)

The LCP M multifunction unit in the “Hot water production for domestic use (DHW)” mode heats water in the second condenser. In fact, it absorbs the air evaporation cooling capacity with a finned-pack condenser.

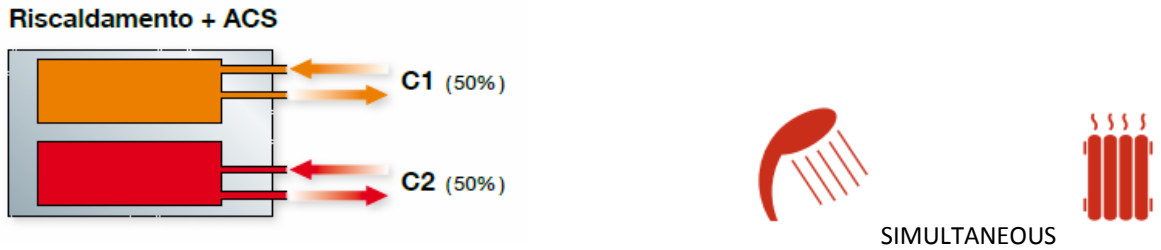


- Cooling and hot water production in full recovery

The LCP M multifunction unit, in “Chiller + DHW” mode, produces cooled water with high temperature hot water for domestic use, thanks to full heat recovery.

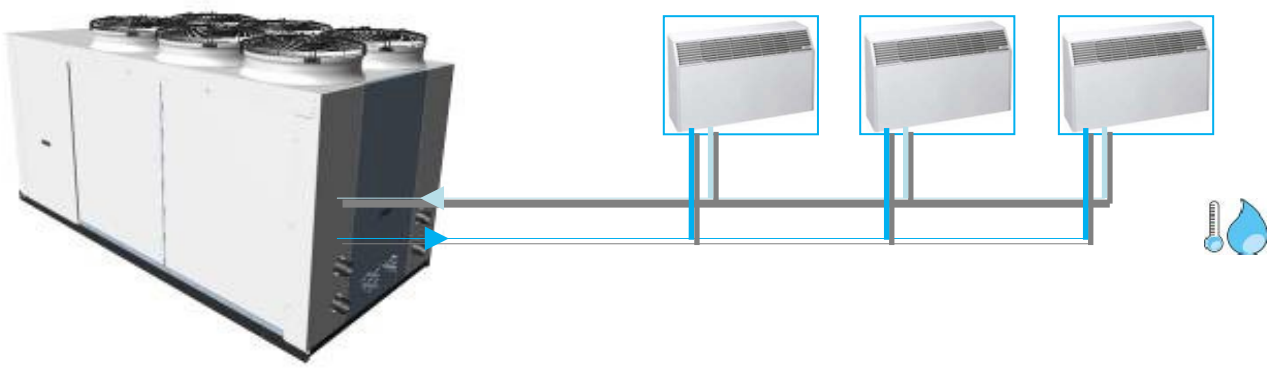
- Hot water production (for domestic use) along with heating

The LCP M multifunction unit in the “Production of DHW simultaneous with heating” mode also heats water, as the thermodynamic circuits are completely independent. The capacity is equally distributed between the two circuits.

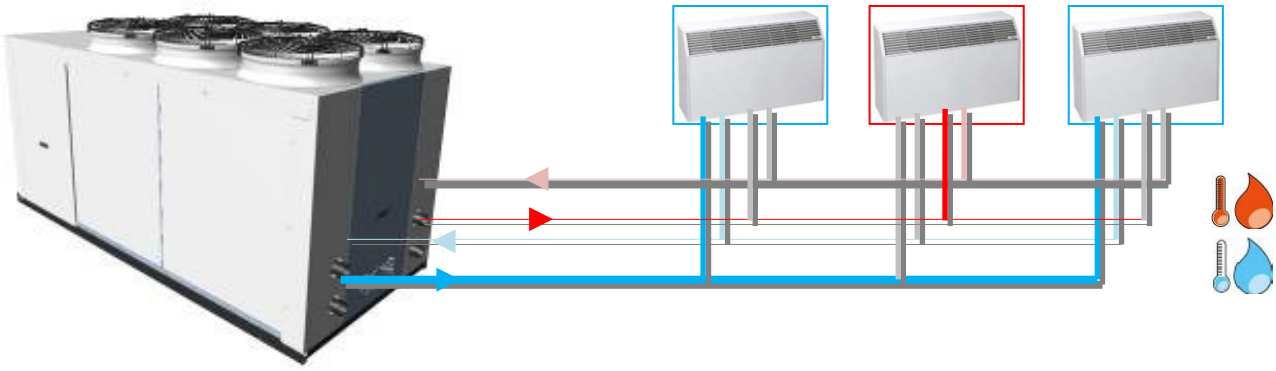


The LCP machines allow both 2 and 4-pipe air conditioning systems to be installed. The two or four pipe designation refers to the water distribution system that supplies all the conditioning equipment in a building. A 2-pipe system contains only one supply and one return line to the unit. The terminals supplied by a 2-pipe system have only one heat exchanger which acts, alternately, as a heating and cooling coil, depending on the operating mode. The 4-pipe system includes a distribution system which supplies both hot water (with return lines) and cold water (with return lines) simultaneously (for example cooling systems with dehumidification + post-heating).

- 2-pipe air conditioning system layout:

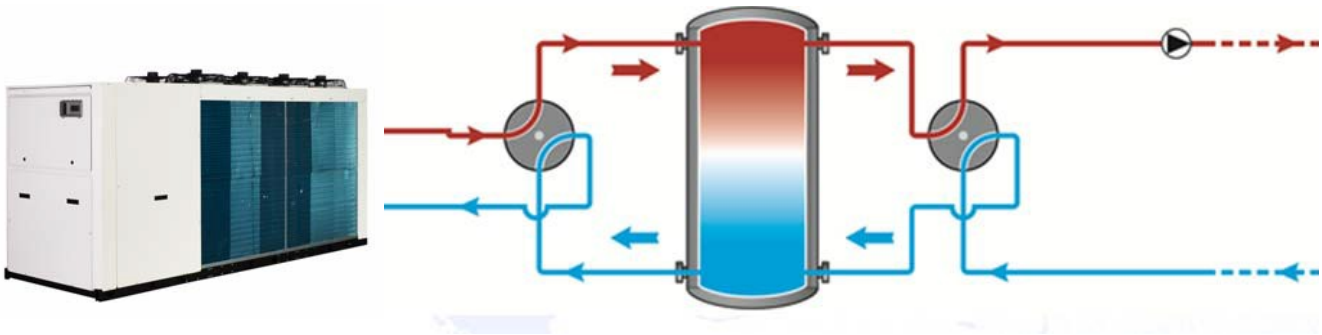


- 4-pipe air conditioning system layout:



The 2-pipe systems are not as flexible as the 4-pipe systems because the entire building is either heated or cooled, but they are much more convenient to install.
If the design requires a 4-pipe system, the LEP range, on demand, comes with the P units compatible with this configuration.

Below is shown an example of an inertial tank with double cycle inversion (optional) for winter and summer air conditioning, in combination with a 2-pipe heating system. The double cycle inversion valve (optional, automatically controlled by onboard microprocessor) provides the best performance as it favours tank stratification in both summer and winter modes.



1.1.2 Available operating modes in relation to thermal load:

The tables below list the operating modes of the LCP units with partial loads. The units are equipped with two thermodynamic circuits and two or four compressors. These work together to meet the variable heating system demands. For example, the LCP units in the winter mode can supply 50% of their power to domestic water and 50% to the heating utility.

- Unit with 2 Compressors 2 Cooling circuits:

Summer Mode:	***Winter Mode:***
o **100% Cold** o 50% Cold	o **100% Hot** o 50% Hot
o **100% Cold + 100% DHW** o 50% Cold + 50% DHW	
o 50% Cold + 100% DHW o 100% Cold + 50% DHW	o 50% Hot + 50% DHW
o 100% DHW o 50% DHW	o **100% DHW** o 50% DHW

- Unit with 4 Compressors 2 Cooling circuits:

Summer Mode:	***Winter Mode:***
o **100% Cold** o 75% Cold o 50% Cold o 25% Cold	o **100% Hot** o 75% Hot o 50% Hot o 25% Hot
o **100% Cold + 100% DHW** o 75% Cold + 75% DHW o 50% Cold + 50% DHW o 25% Cold + 25% DHW	
o 50% Cold + 100% DHW o 25% Cold + 100% DHW o 100% Cold + 50% DHW o 100% Cold + 25% DHW	o 50% Hot + 50% DHW o 50% Hot + 25% DHW o 25% Hot + 50% DHW o 25% Hot + 25% DHW
o 100% DHW o 75% DHW o 50% DHW o 25% DHW	o **100% DHW** o 75% DHW o 50% DHW o 25% DHW

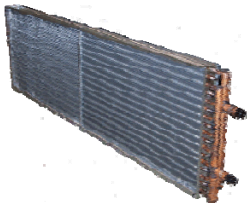
1.1.3 Product innovation: the solution to the defrosting problem

Thanks to constant research LCP machines provide excellent thermodynamic performance and the widest range of use: they can drive 2 or 4-pipe systems, produce DHW at the same time as cooled water, as well as cover a wide output range. The joint application of scroll compressors, advanced control systems and R410A refrigerant gas achieves compact circuits and high COPs.

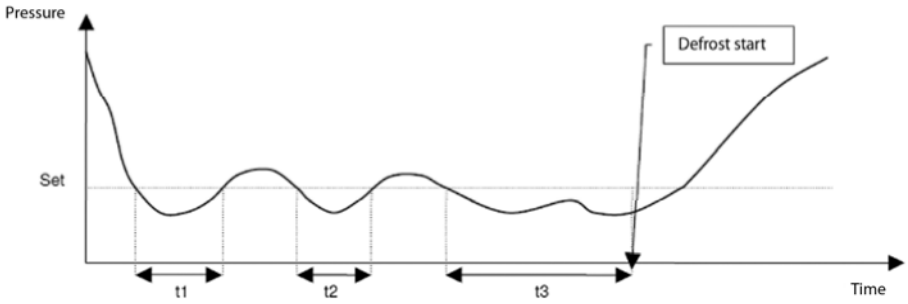
Two independent thermodynamic circuits make the LCP M stand out on the market. It produces hot water for heating, while it carries out a defrosting cycle or restores domestic hot water.
During winter, especially in the -3°C - +3°C range, the high relative air humidity condenses water around the coil fins. Since the coil is at a lower temperature than the air, any water that touches it solidifies and blocks the exchange of heat necessary for the system to correctly operate. The defrosting cycle, which is a temporary reversal of the thermodynamic cycle, places the machine in summer mode and melts the ice between the fins. This can be problematic as the cooling cycle heats the coil thus depriving the room of this heat. The defrosting circuit takes heat from the utility circuit (not the DHW circuit) for the LCP M machine, and heat from the heating utility circuit for the LCP P machine.

LCP minimises this problem with the following technical innovations:

- Hydrophilic coils are installed. These reduce the size of the water drops along with ice blockage between fins. Due to the lower surface tension, water tends to slide away due to gravity, thus preventing the formation of frost at low temperatures.

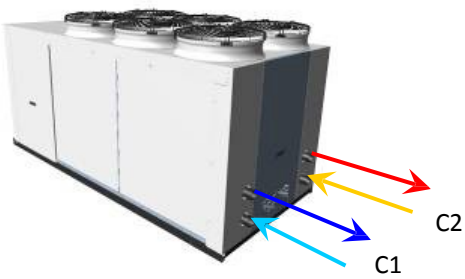


- Software management minimises defrosting cycle time, allowing cycle operation only when necessary. Fans operate at maximum power only when the ice is no longer attached to the fins. It can then be pushed out from the coil.



- The two thermal circuits in LCP M and LCP P are completely independent. While one defrosts, the other keeps the machine operating, with basically no thermal discomfort for the user.

- Separate defrosting



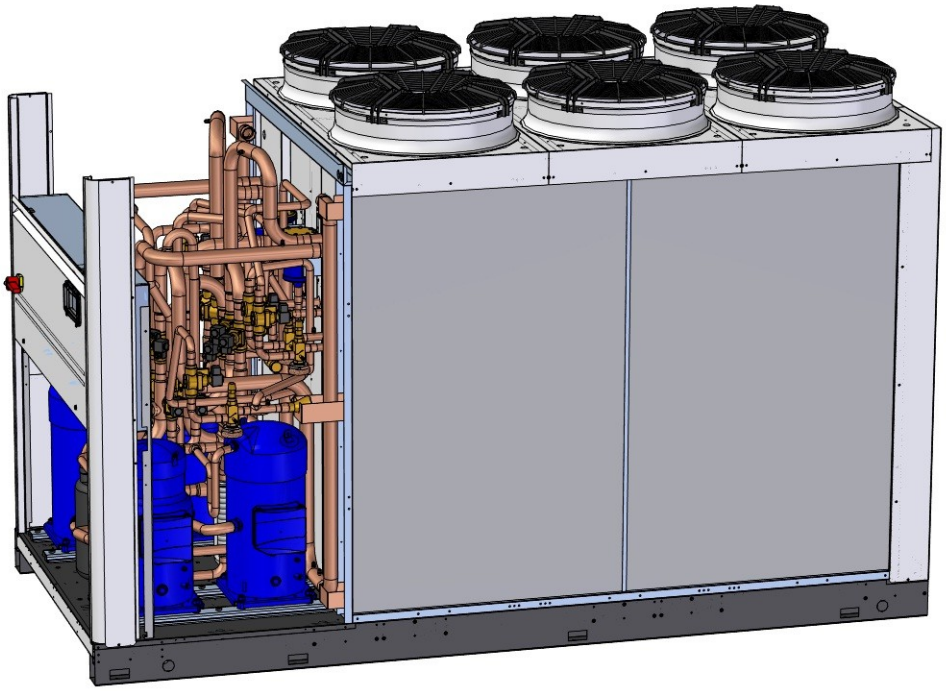
1.2 Structure

All LCP series units have the load bearing base and panelling in galvanised sheet metal painted with polyester powders and polymerised in the oven at 180°C. The unit is attractively designed and when closed all the components are inaccessible. This, along with the extensive use of soundproof material inside the compartment and around the compressors (available for the low-noise version), reduces sound to exceptionally low levels. The water/cooler connections are on the back (when looking at the electric panel) reducing the space required for installation. The unit is fully accessible as all the panels can be removed (except the one with the water connections). Routine maintenance however only requires access from the front.

1.3 Cooling circuit

The cooling circuit is manufactured in our factory, with top brand components and operators trained, according to Directive 97/23, on all the brazing operations.

LCP M cooling circuit



1.3.1 Compressors

Only top-quality Scroll compressors are used on LCP units. Scroll compressors, up to a power output of 200 kW for single circuit, are the best solution in terms of reliability and efficiency. They also provide the lowest amount of sound emissions. Process optimisation, along with a carefully selected intrinsic volumetric compression ratio (RVI), clearly improves the isentropic compression performance and reduces energy losses. The use of a scroll compressor allows low viscosity oils to be used. This, in comparison to higher viscosity oils, reduces thermal resistance at the evaporator. It also increases the evaporation temperature by over 1.5°C (EER increases by more than 5.5%) compared to other solutions.
Compressor motors are protected against overheating, overloads and high delivery gas temperatures. They are mounted on anti-vibration rubber, complete with oil charge and inserted in a soundproof compartment with sound-absorbing material. They are also equipped with an automatic oil heater that, when the compressor stops, prevents the oil from being diluted by the refrigerant.

NOTE: Scroll compressors, like all air-tight compressors, are classified as pressurised containers. The low pressure section, referred to by the PS on the data plate, complies with PED CE 97/23.

1.3.2 Heat exchangers

Only brazed plate heat exchangers are used, made of austenitic stainless steel AISI 316, with AISI 316L connections. These feature a reduced carbon content that favours brazing operations. The brazed plate heat exchanger represents the state-of-the-art in terms of thermal exchange efficiency and allows a strong reduction of the refrigerant load compared to standard solutions. The high degree of turbulence generated by internal plate corrugation, along with plate smoothness, makes it difficult for dirt to accumulate or for limestone to build up on the condenser circuit. These heat exchangers also make it possible to use R410A fluid which, thanks to the high-level thermal conductivity of its liquid phase and to its azeotropic behaviour, enhances thermal exchange during evaporation. The performances are improved over other methane-derivative fluids of the HFC group.

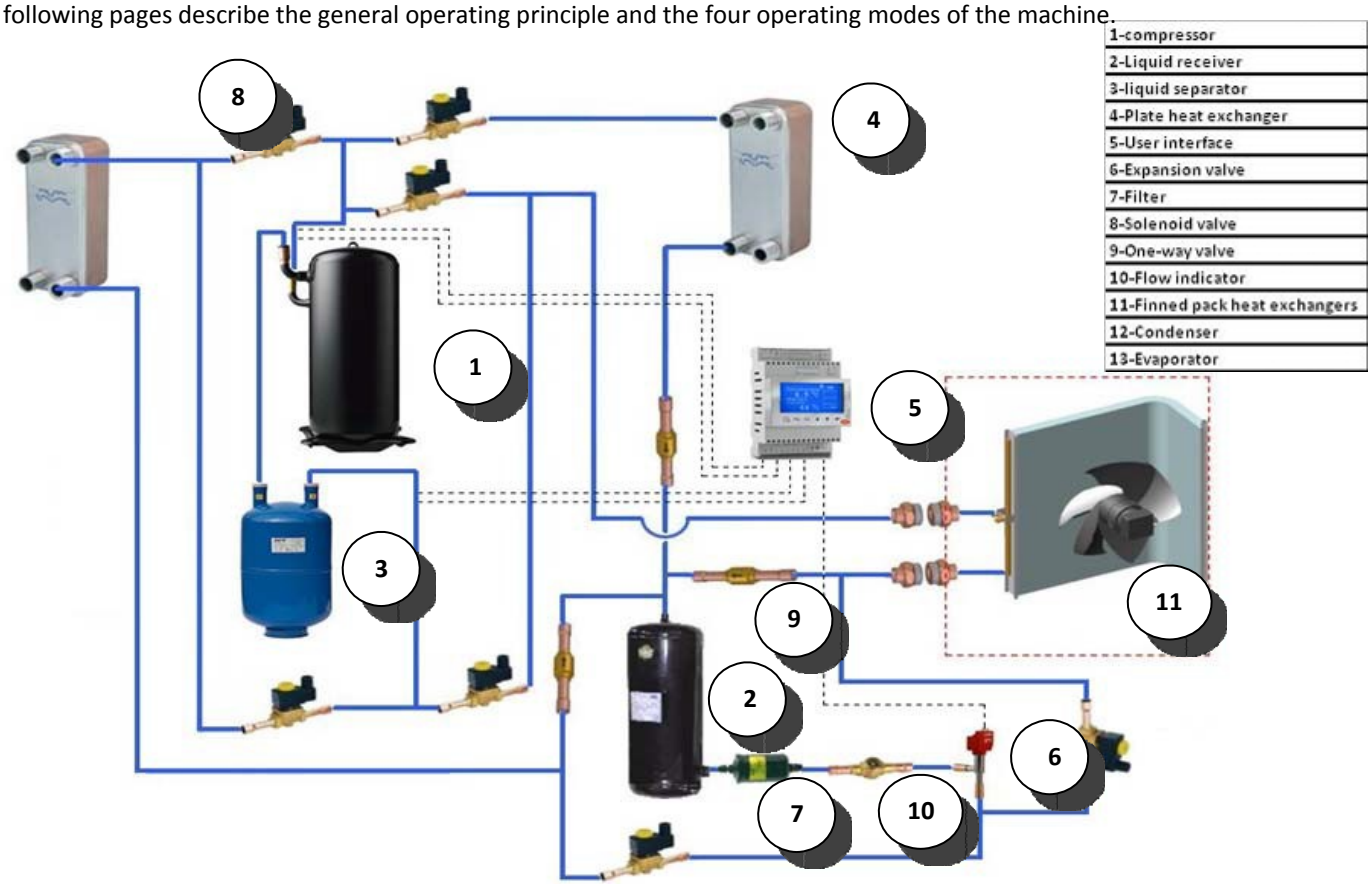
- *NOTE: due to thermal insulation the data plate (in compliance with PED CE 97/23) is not legible. However, the serial number of the heat exchanger and the declaration of conformity are both recorded during production and are an integral part of the company archive*.

1.3.3 Other cooling components

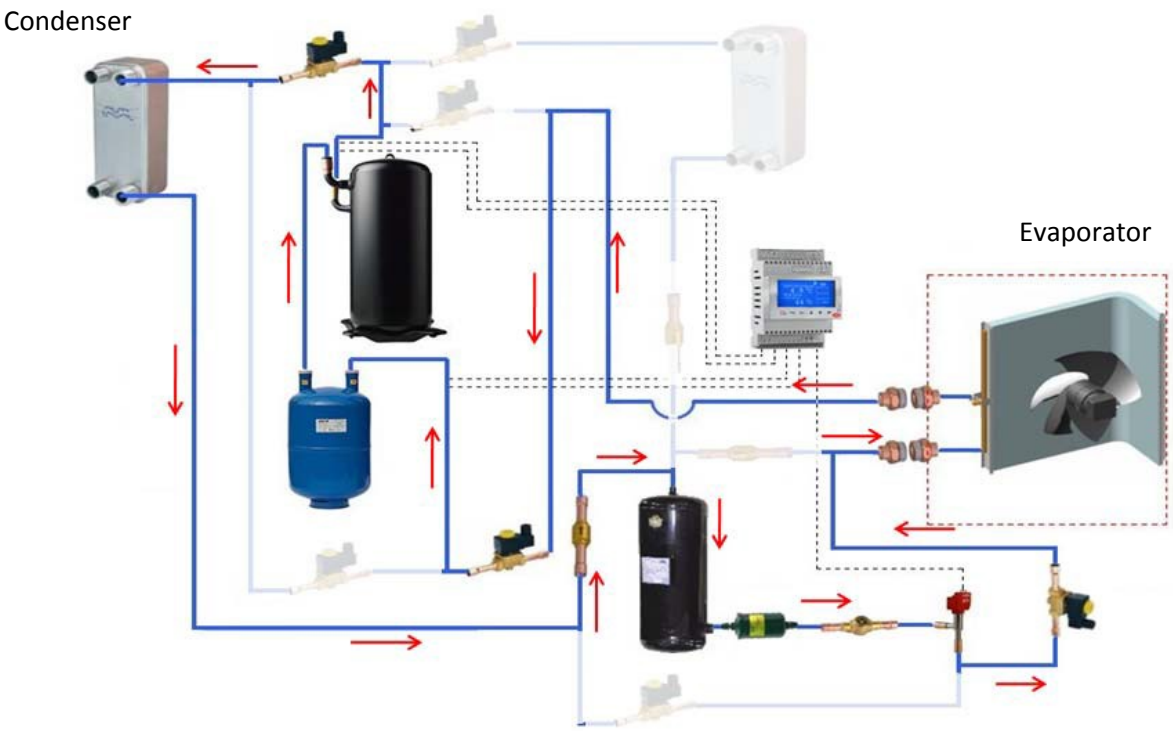
- Molecular sieve drying filter
- Sight glass with humidity indicator
- One-way valves
- Liquid receiver marked according to Directive EEC 97/23 PED
- High and low pressure switches
- Solenoid valves for management of the air conditioning and domestic hot water production modes
- Schrader valves for control and/or maintenance

1.3.4 General thermodynamic circuit layouts

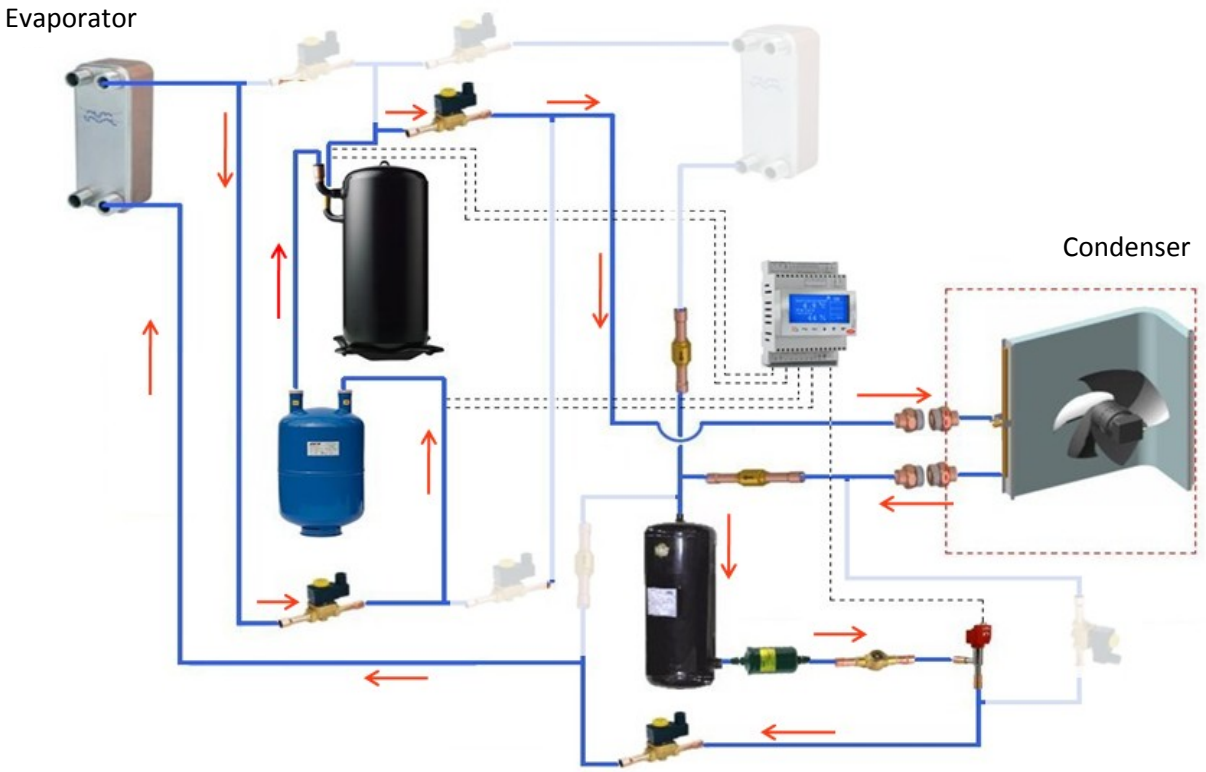
The following pages describe the general operating principle and the four operating modes of the machine.



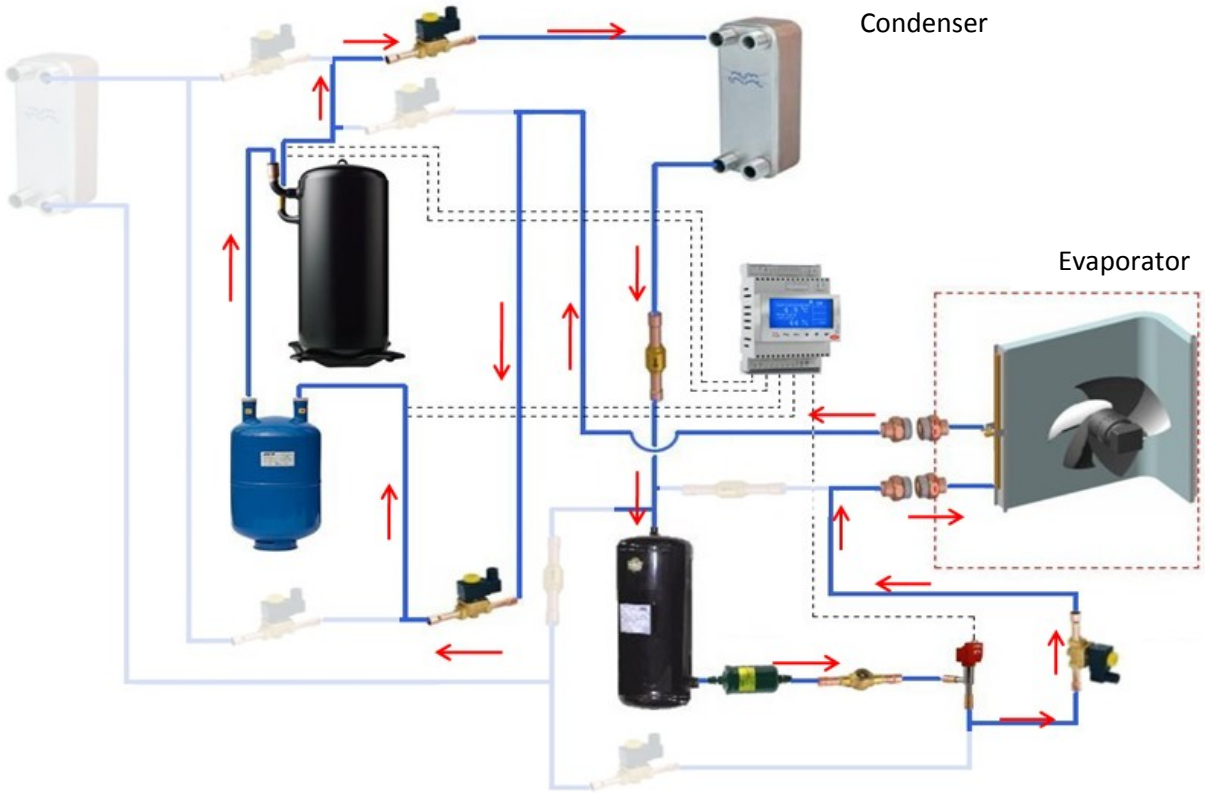
1. **HEATING phase on the UTILITY circuit (not available for LCP P)**



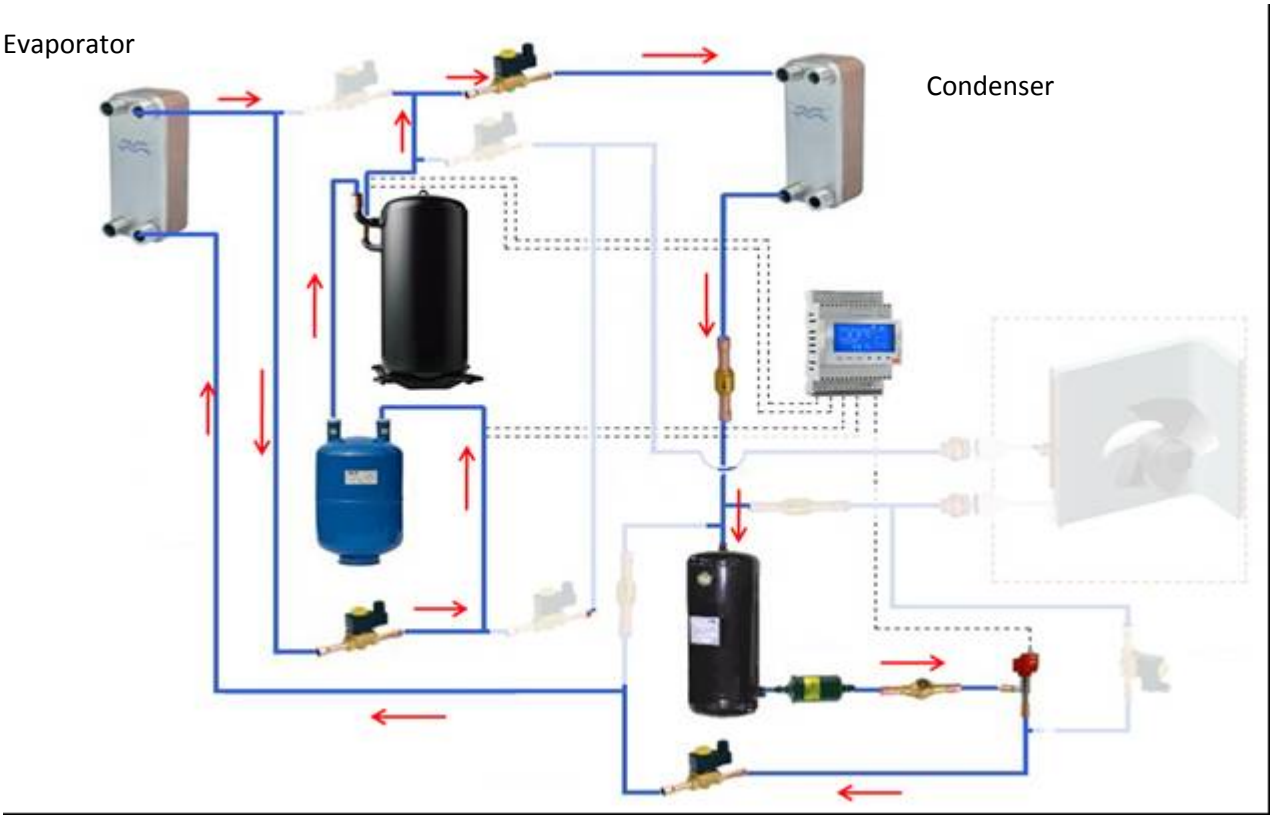
2. COOLING phase



3. DHW PRODUCTION phase



4. COOLING + DHW as FULL RECOVERY phase



A

1.4 Electric panel

The electric panel is built and wired in accordance with standard EN 60204-1. The electric panel is accessed from the front of the machine. Before it can be accessed, the unit must be disconnected from the power supply using the main switch, which functions as a door-lock. All the remote controls are implemented with low voltage 24 V signals, powered by an isolation transformer inside the electric panel. All the control boards have an air circulation system with auxiliary fans. The position of the main switch makes wiring operations in the work site easier. This avoids several difficult operations as well as having to twist the power cords. All the utilities are protected against surges and short circuits. The circuit breaker set-up can be configured for any load (optional). Thermal protection, however, is carried out by thermistor chains. These are set in the windings of each electric motor and are controlled by onboard electronics. All machines are standard-equipped with a phase sequence relay which inhibits compressor operation if the phase sequence is not carried out: only one direction of rotation is possible for scroll compressors, as well as for the screw and Rotary compressors. The unit is rated IP43 which makes it suitable for outdoor installation. The open panel control board maintains an IP20 rating.

1.4.1 Control microprocessor

The LCP series machines come with Advanced – Carel, pCO series microprocessor control
The latter, in addition to the functions described below, can customise the software to meet all system requests. These include cascade management of the units with *step-control* or *cascade* logic. The microprocessor on board the unit controls the various operating parameters with an electric panel keypad;

- Compressor connection/disconnection to maintain the set-point of the chiller inlet water T;
- Alarm management
  - High / low pressure
  - Anti-freeze
  - Flow switch
  - Pump alarm
- Alarm signals
- Display of operating parameters
- Evaporator anti-freeze protection
- Control of maximum number of compressor starts
- RS232, RS485 serial output control (optional)
- Incorrect phase sequence (not viewed on display, prevents the compressor from starting)

As for remote communication, the controls can be connected to advanced BMS systems. The HSD (Galletti Software Department) structure is capable of assisting customers in integration operations. System interconnectivity capabilities are summarised below:

- Available serial ports
  - RS232
  - RS485
  - Ethernet (“Hiweb” board)
- GSM Modem: with prepaid card and relative antenna on board the machine for autonomous two-way control of alarms and/or set-point variations
- Protocols
  - Carel [Built-In]
  - Modbus® [Built-In]
  - LonWorks® [Dedicated serial board to be requested when ordering the machine]
  - BACnet™ [With external gateway]
  - TCP-IP [With external gateway]
  - TREND® [Dedicated serial board to be requested when ordering the machine]

(ref. Microprocessor control manual for further details)

1.5 Configurability, accessories and options

List of options

Version		
Full recovery heat pump for 4-pipe system	P	
Multifunction heat pump for 2-pipe system	M	
Execution		
standard	S	
low-noise	L	
1 - Electric power supply		
400/3/50 + N	0	
400/3/50 with transformer	1	
400/3/50 + Motor circuit breakers	2	
400/3/50 with transformer + Motor circuit breakers	3	
2 - control microprocessor and expansion device		
Advanced (pCO+pGD) + standard expansion valve	C	
3 - Utility circuit water pump		
absent	0	
single pump	1	
uprated single pump	2	
double pump for combined operation	3	Not available if Field 4 = S,R
uprated double pump for combined operation	4	Not available if Field 4 = S,R
double pump in stand-by rotation	5	Not available if Field 4 = S,R
uprated double pump in stand-by rotation	6	Not available if Field 4 = S,R
4 - Inertial storage tank		
absent	0	
inertial tank on utility circuit	S	
inertial tank on recovery circuit	R	
5 - Recovery circuit water pump		
absent	0	
single pump	1	
uprated single pump	2	
double pump for combined operation	3	Not available if Field 4 = S,R
uprated double pump for combined operation	4	Not available if Field 4 = S,R
double pump in stand-by rotation	5	Not available if Field 4 = S,R
uprated double pump in stand-by rotation	6	Not available if Field 4 = S,R
Field 6 - Condensation and fan control		
modulation of cut-off fan speed with variation of air flow rate	C	
modulation of electronically-controlled "EC" fan speed - (brushless)	E	
7 - Anti-freeze kit		
absent	0	
included, base machine (heater only on exchangers)	E	
included, machine with pump/s and vessel	P	
included, machine with pump/s, vessel and tank	S	
8 - Remote communication		
absent	0	
RS485 serial board (Carel or Modbus protocol)	1	
Serial board Lonworks	2	
GSM modem kit	3	
pCOWEB Ethernet board (SNMP or BACNET protocol)	4	
pCOWEB Ethernet board + “HIWEB” supervision software	5	
9 - Coil execution on request		
standard	0	
copper / copper coils	R	
cataphoresis	C	
pre-assembly and post-assembly epoxy coating	B	
10 - Package		
standard	0	
wooden cage	1	

wooden cage	2
11 - Vibration isolation	
absent	0
Rubber anti-vibration mounts at unit base	G
Spring anti-vibration mounts at unit base	M
12 - Remote control	
absent	0
Remote display for pCO	3

Standard list

R410A refrigerant
Scroll compressors
Galvanised and painted sheet-metal structure
Integrated flow switch
Brazed plate heat exchangers
Expansion vessel (if pumps present)
Programmable pCO advanced control
Clock board
Hydrophilic coils

List of accessories

Shunt condensers	A
Soft-starter kit	B
ON-OFF status of compressors	C
G - Four Vic-Taulic joints for quick water IN-OUT connection	D
Outdoor temperature sensor for set-point compensation	E
Pressure gauges	F
Filter cut-off kit (solenoid and cock on liquid line)	G
Reference standard other than 97/23/CE - PED	H
Unit lifting pipes	I
Condenser protection grill	L
Condenser coil protection metal filters	M
Supplied 4-way water flow inversion valve on utility circuit	N

Performance was calculated in countercurrent to the plate heat exchangers. Countercurrent can only be achieved for the LCP M unit in the utility circuit heat pump mode, by selecting the "Water circuit 4-way cycle inversion valve" or by modifying the system. If this can't be achieved, then calculate performances in the concurrent mode, referring to manual or selection software performances (all expressed in countercurrent), at a water temperature that is 3°C lower. For example, performances in countercurrent production of 45/50°C hot water approximates the concurrent performances of 42/47°C water

Table I – Technical data and performances of LCP M and LCP P models in standard execution S, from size LCP041 to size LCP124, during nominal operating conditions according to UNI 14511.

Summary of LCP S series technical data		041	051	061	071	081	094	104	124
Cooling @ 35°C air 12/7°C water									
Cooling Capacity	[kW]	51.7	56.4	67.6	74.18	82.82	102.3	111.46	134.64
Compressor Absorbed Power	[kW]	14.8	16.8	18.7	21.2	24.9	30.0	34.2	37.1
Compressor Absorbed Current	[A]	23.67	26,96	29,95	34.07	39.91	48.05	54.79	59.54
Fan Absorbed Power	[kW]	1.2	1.2	1.8	1.8	1.8	2.3	2.3	6.30
Fan Absorbed Current	[A]	4.40	4.40	6.60	6.60	6.60	8.80	8.80	15.00
EER	[-]	3.25	3.14	3.31	3.23	3.11	3.17	3.05	3.10
DISSIPATION Air Flow Rate	[m3/h]	21379	21379	30913	30913	30913	41340	41340	72700
UTILITY Water Flow Rate	[kg/h]	8866	9685	11615	12740	14223	17568	19141	23122
UTILITY Water Pressure Drops	[kPa]	29	34	34	41	32	37	43	45
Useful head - BP pumps	[kPa]	155	147	138	126	126	124	114	102
Useful head - BP pumps	[kPa]	190	182	198	189	195	183	173	182
Useful head - BP pumps [AND logic]	[kPa]	128	122	117	107	112	148	139	128
Useful head - HP pumps [AND logic]	[kPa]	178	171	164	154	158	182	173	188
DHW @ 40/45°C and 7°C ext air									
Thermal Output	[kW]	56.25	62.05	72.89	80.77	8938	111.45	123.08	123.08
Compressor Absorbed Power	[kW]	14.8	16.7	19	21.4	24.3	39.6	33.2	38.2
Compressor Absorbed Current	[A]	23.73	26.1	30.52	34.63	39	47.42	53.18	61.31
Fan Absorbed Power	[kW]	1.2	1.2	1.8	1.8	1.8	2.3	2.3	6.30
Fan Absorbed Current	[A]	4.40	4.40	6.60	6.60	6.60	8.80	8.80	15.00
COP	[-]	3.52	3.48	3.51	3.48	3.43	3.49	3.47	3.30
DISSIPATION Air Flow Rate	[m3/h]	21379	21379	30913	30913	30913	41340	41340	72700
DHW Flow Rate	[kg/h]	9779	10784	12668	14037	15534	19368	21389	25540
DHW Pressure Drops	[kPa]	33	41	41	50	39	45	54	55
Useful head - BP pumps	[kPa]	145	134	125	109	112	110	97	85
Cooling + DHW @ 40/45°C and 12/7°C									
Cooling Capacity	[kW]	50.86	56.10	66.11	73.18	83.97	101.90	112.13	131.01
Thermal Output	[kW]	65.22	72.20	84.47	93.76	107.15	130.64	144.33	167.86
Compressor Absorbed Power	[kW]	15.1	16.9	19.3	21.7	24.4	30.2	33.9	38.8
Compressor Absorbed Current	[A]	24.25	27.18	30.99	34.73	39.13	48.51	54.36	62.20
Fan Absorbed Power	[kW]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fan Absorbed Current	[A]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COP	[-]	4,32	4,27	4,38	4,32	4,39	4,33	4,26	4,33
UTILITY Water Flow Rate	[kg/h]	11335	12548	14680	16294	18621	22704	25082	29172
UTILITY Water Pressure Drops	[kPa]	22	25	25	30	25	28	33	33
Useful head - UTILITY BP pumps	[kPa]	167	161	155	145	142	137	129	123
Useful head - UTILITY HP pumps	[kPa]	201	195	210	203	205	196	188	203
Useful head - BP pumps AND UTILITY	[kPa]	137	132	129	122	123	161	153	148

Summary of LCP S series technical data		041	051	061	071	081	094	104	124
Useful head - HP pumps AND UTILITY	[kPa]	188	182	178	171	170	195	188	203
DHW Flow Rate	[kg/h]	8734	9635	11354	12568	14420	17500	19256	22499
DHW Pressure Drops	[kPa]	41	49	48	59	48	54	65	63
Useful head - DHW BP pumps	[kPa]	133	120	110	91	88	94	78	68
Heating @ 40/45°C and 7°C ext. air									
Thermal Output	[kW]	56.2	62.1	72.9	80.8	89.4	111.4	123.1	147.0
Compressor Absorbed Power	[kW]	14.8	16.7	19.0	21.4	24.3	29.6	33.2	38.3
Compressor Absorbed Current	[A]	23.73	26.71	30.52	34.36	39.0	47.42	53.18	61.4
Fan Absorbed Power	[kW]	1.2	1.2	1.8	1.8	1.8	2.3	2.3	6.30
Fan Absorbed Current	[A]	4.40	4.40	6.60	6.60	6.60	8.80	8.80	15.00
COP	[-]	3.52	3.48	3.51	3.48	3.43	3.49	3.47	3.30
DISSIPATION Air Flow Rate	[m3/h]	21379	21379	30913	30913	30913	41340	41340	72700
UTILITY Water Flow Rate	[kg/h]	9776	10784	12668	14037	15534	19368	21389	25543
UTILITY Water Pressure Drops	[kPa]	34	41	41	50	39	45	54	55
Useful head - BP pumps	[kPa]	145	134	125	109	112	110	97	85
Useful head - BP pumps	[kPa]	179	169	188	176	184	169	155	164
Useful head - BP pumps [AND logic]	[kPa]	119	111	107	95	102	135	122	111
Useful head - HP pumps [AND logic]	[kPa]	168	159	153	140	146	169	157	174
Maximum Current (FLA) [Without Options]	A	41	44	51	55	66	81	87	96
Booster current (LRA) [Without Options]	A	159	162	185	183	191	194	198	220
Booster current with Soft Starter kit [Without Options]	A	104	105	121	119	124	126	129	143
Lw sound output (base unit)	db(A)	80	80	81	81	81	82	82	84
Lp Sound Pressure (base unit) @10 m Q=2	db(A)	52	52	53	53	53	54	54	56
Air Flow Rate	m3/h	21379	21379	30913	30913	30913	41340	41340	72700
Number of Fans		4	4	6	6	6	8	8	6
Compressors/Circuits		2/2	2/2	2/2	2/2	2/2	4/2	4/2	4/2
Tank Capacity (optional)	l	200	200	220	220	220	340	340	600
Refrigerant - Electric Power Supply [V/n/Hz]		R410A - 400 / 3+N / 50							
ESEER		4.50	4.57	4.53	4.58	4.63	4.47	4.55	3.98
Dimensions [HxLxD]	mm	1735 x 2510 x 1183	1735x 2510 x 1183	1735 x 2862 x 1138	1735 x 2862 x 1138	1735 x 2862 x 1138	1720 x 3540 x 1185	1720 x 3540 x 1185	1830 x 3540 x 1654
Weight without accessories	kg	680	690	800	810	850	1190	1210	1530

Table II – Technical data and performances of LCP M and LCP P models in standard execution S, from size LCP144 to size LCP324, during nominal operating conditions.

Summary of LCP S series technical data		144	164	194	214	244	274	294	324
Cooling @ 35°C air 12/7°C water									
Cooling Capacity	[kW]	147.09	166.5	193.6	220.56	238.6	264.3	299	314
Compressor Absorbed Power	[kW]	42.1	48.5	59.9	68.3	76.8	83	93.6	106.8
Compressor Absorbed Current	[A]	67.56	77.85	96.05	109.5	123.24	133.12	150.04	171.27
Fan Absorbed Power	[kW]	6.30	6.30	6.30	6.30	6.30	8.40	8.40	8.40
Fan Absorbed Current	[A]	15.00	15.00	15.00	15.00	15.00	20.00	20.00	20.00
EER	[-]	3.05	3.04	2.93	2.96	2.87	2.89	2.93	2.73
DISSIPATION Air Flow Rate	[m3/h]	72700	67672	67672	75478	75478	103511	97902	97902
UTILITY Water Flow Rate	[kg/h]	25421	28597	33204	38249	42526	48275	53097	56165
UTILITY Water Pressure Drops	[kPa]	54	49	46	60	62	43	51	68
Useful head - BP pumps	[kPa]	145	140	138	134	165	170	151	127
Useful head - BP pumps	[kPa]	166	161	260	221	285	289	270	246
Useful head - BP pumps [AND logic]	[kPa]	113	110	134	113	170	178	162	140
Useful head - HP pumps [AND logic]	[kPa]	177	179	198	177	203	210	194	172

Summary of LCP S series technical data		144	164	194	214	244	274	294	324
DHW @ 50/55°C and 7°C ext air									
Thermal Output	[kW]	162.66	180.94	211.29	246.24	266.66	294.59	330.97	340.81
Compressor Absorbed Power	[kW]	43.2	49	57.5	67	72.3	78.9	89	100
Compressor Absorbed Current	[A]	69.33	78.62	92.17	107.38	115.97	126.61	142.75	160.37
Fan Absorbed Power	[kW]	6.30	6.30	6.30	6.30	6.30	8.40	8.40	8.40
Fan Absorbed Current	[A]	15.00	15.00	15.00	15.00	15.00	20.00	20.00	20.00
COP	[-]	3.28	3.27	3.31	3.36	3.39	3.37	3.40	3.14
DISSIPATION Air Flow Rate	[m3/h]	72700	67672	67672	75478	75478	103511	97902	97902
DHW Flow Rate	[kg/h]	28269	31445	36720	42793	46342	51196	57519	59230
DHW Pressure Drops	[kPa]	67	59	56	75	72	60	73	76
Useful head - BP pumps	[kPa]	122	119	109	92	140	139	111	83
Cooling + DHW @ 50/55°C and 12/7°C									
Cooling Capacity	[kW]	144.86	165.08	197.74	222.23	245.72	268.79	304.50	326.61
Thermal Output	[kW]	186.26	211.79	252.69	286.12	215.58	345.39	390.66	422.71
Compressor Absorbed Power	[kW]	43.6	49.2	57.8	67.3	73.5	80.6	90.7	101.2
Compressor Absorbed Current	[A]	68.89	78.84	92.76	107.85	117.93	129.32	145.46	162.23
Fan Absorbed Power	[kW]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fan Absorbed Current	[A]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COP	[-]	4,28	4,30	4,37	4,25	2,93	4,29	4,31	4,18
UTILITY Water Flow Rate	[kg/h]	32371	36806	43914	49724	54844	60025	67893	73463
UTILITY Water Pressure Drops	[kPa]	40	37	37	47	50	35	41	55
Useful head - UTILITY BP pumps	[kPa]	170	165	165	170	186	191	176	155
Useful head - UTILITY HP pumps	[kPa]	192	186	287	259	306	311	295	274
Useful head - BP pumps AND UTILITY	[kPa]	137	133	148	133	188	195	183	164
Useful head - HP pumps AND UTILITY	[kPa]	195	195	211	197	221	228	215	197
DHW Flow Rate	[kg/h]	24877	28350	33958	38164	42199	46159	52292	56090
DHW Pressure Drops	[kPa]	77	71	70	91	96	81	94	106
Useful head - DHW BP pumps	[kPa]	102	93	66	50	100	96	66	40
Heating @ 40/45°C and 7°C ext. air									
Thermal Output	[kW]	162.7	108.9	211.3	246.2	266.7	294.6	331	340.8
Compressor Absorbed Power	[kW]	43.2	49.0	57.5	67	72.3	78.9	89	100
Compressor Absorbed Current	[A]	69.1	78.8	92.1	107.1	115.97	126.61	142.75	160.37
Fan Absorbed Power	[kW]	6.30	6.30	6.30	6.30	6.30	8.40	8.40	8.40
Fan Absorbed Current	[A]	15.00	15.00	15.00	15.00	15.00	20.00	20.00	20.00
COP	[-]	3.28	3.27	3.31	3.36	3.39	3.37	3.40	3.14
DISSIPATION Air Flow Rate	[m3/h]	72700	67672	67672	75478	75478	103511	97902	97902
UTILITY Water Flow Rate	[kg/h]	28309	31450	36756	43271	48745	55379	59699	64597
UTILITY Water Pressure Drops	[kPa]	67	59	56	77	79	69	78	89
Useful head - BP pumps	[kPa]	122	119	109	91	133	126	106	81
Useful head - BP pumps	[kPa]	143	140	230	175	251	244	224	199
Useful head - BP pumps [AND logic]	[kPa]	92	91	118	89	141	139	121	100
Useful head - HP pumps [AND logic]	[kPa]	160	164	181	153	173	171	153	132

Summary of LCP S series technical data		144	164	194	214	244	274	294	324
Maximum current (FLA) [Without Options]	A	105	126	148	167	190	215	229	242
Booster current (LRA) [Without Options]	A	222	241	307	318	382	398	464	472
Booster current with Soft Starter kit [Without Options]	A	145	157	200	207	248	259	301	307
Lw sound output (base unit)	db(A)	84	85	85	86	86	86	87	87
Lp Sound Pressure (base unit) @10 m Q=2	db(A)	56	57	57	58	58	58	59	59
Air Flow Rate	m3/h	72700	67672	67672	75478	75478	103511	97902	97902
Number of Fans		6	6	6	6	6	8	8	8
Compressors/Circuits		4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2
Tank Capacity (optional)	l	600	600	600	600	600	765	765	765
Refrigerant - Electric Power Supply [V/n/Hz]		R410A - 400 / 3+N / 50							
ESEER		4.07	4.21	4.32	4.44	4.24	4.19	4.33	4.29
Dimensions [HxLxD]	mm	1830 x 3540 x 1654	1830 x 3540 x 1654	2174 x 3540 x 1654	2330 x 3540 x 1654	2330 x 3540 x 1654	2330 x 3540 x 1654	2330 x 3540 x 1654	2330 x 3540 x 1654
Weight without accessories	kg	1550	1690	1710	1890	1910	2260	2290	2320

Table III – Technical data and performances of LCP M and LCP P models in low-noise execution L, from size LCP041 to size LCP124, during nominal operating conditions according to UNI 14511.

Summary of LCP L series technical data		041	051	061	071	081	094	104	124
Cooling @ 35°C air 12/7°C water									
Cooling Capacity	[kW]	49.6	53.8	65	70.8	78.6	98	105.9	127.6
Compressor Absorbed Power	[kW]	15.7	18.0	19.8	22.7	26.9	32	36.7	40.4
Compressor Absorbed Current	[A]	25.1	28.9	31.8	36.5	43.2	51.2	59.0	64.7
Fan Absorbed Power	[kW]	0.54	0.54	0.81	0.81	0.81	1.08	1.08	4.02
Fan Absorbed Current	[A]	2.56	2.56	3.84	3.84	3.84	5.12	5.12	7.74
EER	[-]	3.06	2.90	3.15	3.01	2.84	2.97	2.80	2.88
DISSIPATION Air Flow Rate	[m3/h]	15398	15398	21955	21955	21955	29393	29393	43434
UTILITY Water Flow Rate	[kg/h]	8533	9225	11173	12171	13512	16849	18209	21906
UTILITY Water Pressure Drops	[kPa]	27	31	32	38	30	34	40	41
Useful head - BP pumps	[kPa]	158	152	142	132	133	128	120	109
Useful head - BP pumps	[kPa]	193	187	201	193	199	187	179	189
Useful head - BP pumps [AND logic]	[kPa]	131	125	120	112	117	152	144	135
Useful head - HP pumps [AND logic]	[kPa]	180	175	168	159	163	186	179	193
DHW @ 40/45°C and 7°C ext air									
Thermal Output	[kW]	55.72	61.47	71.56	79.29	88.54	109.89	120.76	140.36
Compressor Absorbed Power	[kW]	71.6	79.3	88.5	109.9	120.8	140.4	33.11	38.1
Compressor Absorbed Current	[A]	23.71	26.70	30.49	34.36	39.02	47.37	53.11	61.16
Fan Absorbed Power	[kW]	0.54	0.54	0.81	0.81	0.81	1.08	1.08	4.02
Fan Absorbed Current	[A]	2.56	2.56	3.84	3.84	3.84	5.12	5.12	7.74
COP	[-]	3.64	3.58	3.61	3.57	3.52	3.59	3.53	3.33
DISSIPATION Air Flow Rate	[m3/h]	15398	15398	21955	21955	21955	29393	29393	43434
DHW Flow Rate	[kg/h]	9684	10682	12436	13780	15388	19097	20984	24392
DHW Pressure Drops	[kPa]	34	40	40	46	38	44	52	50
Useful head - BP pumps	[kPa]	145	135	128	116	113	112	100	92

Summary of LCP L series technical data		041	051	061	071	081	094	104	124
Cooling + DHW @ 40/45°C and 12/7°C									
Cooling Capacity	[kW]	50.86	56.10	66.11	73.18	83.97	101.90	112.13	131.01
Thermal Output	[kW]	65.22	72.20	84.47	93.76	107.15	130.46	144.33	167.86
Compressor Absorbed Power	[kW]	15.1	16.9	19.3	21.7	24.4	30.2	33.9	38.8
Compressor Absorbed Current	[A]	24.25	27.18	30.99	34.73	39.13	48.51	54.36	62.20
Fan Absorbed Power	[kW]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fan Absorbed Current	[A]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COP	[-]	4,32	4,27	4,38	4,32	4,39	4,32	4,26	4,33
UTILITY Water Flow Rate	[kg/h]	11335	12548	14680	16294	18621	22704	25082	29172
UTILITY Water Pressure Drops	[kPa]	22	25	25	30	25	28	34	33
Useful head - UTILITY BP pumps	[kPa]	167	161	155	145	142	137	129	123
Useful head - UTILITY HP pumps	[kPa]	201	195	210	203	205	196	188	203
Useful head - BP pumps AND UTILITY	[kPa]	137	132	129	122	123	161	153	148
Useful head - HP pumps AND UTILITY	[kPa]	188	182	178	171	170	195	187	203
DHW Flow Rate	[kg/h]	8734	9635	11354	12568	14420	17500	19256	22499
DHW Pressure Drops	[kPa]	41	49	48	59	48	54	65	63
Useful head - DHW BP pumps	[kPa]	133	120	110	91	88	94	78	69
Heating @ 40/45°C and 7°C ext. air									
Thermal Output	[kW]	55.8	61.5	71.6	79.3	88.5	109.9	120.8	140.4
Compressor Absorbed Power	[kW]	14.8	16.6	19.0	21.4	24.3	29.5	33.1	38.1
Compressor Absorbed Current	[A]	23.7	26.6	30.5	34.4	39.0	47.3	53.2	61.1
Fan Absorbed Power	[kW]	0.54	0.54	0.81	0.81	0.81	1.08	1.08	4.02
Fan Absorbed Current	[A]	2.56	2.56	3.84	3.84	3.84	5.12	5.12	7.74
COP	[-]	3.64	3.58	3.61	3.57	3.52	3.60	3.53	3.33
DISSIPATION Air Flow Rate	[m3/h]	15398	15398	21955	21955	21955	29393	29393	43434
UTILITY Water Flow Rate	[kg/h]	9700	10650	12484	13852	15404	19115	21089	24532
UTILITY Water Pressure Drops	[kPa]	34	40	40	49	38	44	53	51
Useful head - BP pumps	[kPa]	145	135	127	111	113	112	99	91
Useful head - BP pumps	[kPa]	180	170	189	178	185	170	157	170
Useful head - BP pumps [AND logic]	[kPa]	120	112	108	96	103	136	124	117
Useful head - HP pumps [AND logic]	[kPa]	169	160	155	142	147	171	159	179
Maximum current (FLA) [Without Options]	A	41	44	51	55	66	81	87	96
Booster current (LRA) [Without Options]	A	159	162	185	183	191	194	198	220
Booster current with Soft Starter kit [Without Options]	A	104	105	121	119	124	126	129	143
Lw sound output (base unit)	db(A)	73	74	76	76	76	77	77	79
Lp Sound Pressure (base unit) @10 m Q=2	db(A)	45	46	48	48	48	49	49	51
Air Flow Rate	m3/h	15398	15398	21955	21955	21955	29393	29393	43434
Number of Fans		4	4	6	6	6	8	8	6
Compressors/Circuits		2/2	2/2	2/2	2/2	2/2	4/2	4/2	4/2
Tank Capacity (optional)	l	200	200	220	220	220	340	340	600
Refrigerant - Electric Power Supply [V/n/Hz]		R410A - 400 / 3+N / 50							
ESEER		4.67	4.68	4.79	4.76	4.72	4.63	4.63	4.16
Dimensions [HxLxD]	mm	1720 x 2010 x 1185	1720 x 2010 x 1185	1720 x 2360 x 1185	1720 x 2360 x 1185	1720 x 2360 x 1185	1720 x 3540 x 1185	1720 x 3540 x 1185	1830 x 3540 x 1654
Weight without accessories	kg	690	700	810	820	860	1210	1230	1550

Table IV – Technical data and performances of LCP M and LCP P models in low-noise execution L, from size LCP144 to LCP324, during nominal operating conditions.

Summary of LCP L series technical data		144	164	194	214	244	274	294	324
Cooling @ 35°C air 12/7°C water									
Cooling Capacity	[kW]	138.5	153.8	187.6	215.1	232.7	258.6	291.7	304.6
Compressor Absorbed Power	[kW]	46.5	54.6	62.6	71.1	80	85.6	97.3	111.2
Compressor Absorbed Current	[A]	74.56	87.50	100.35	114.04	128.30	137.29	156	178.37
Fan Absorbed Power	[kW]	4.02	4.02	4.02	4.02	4.02	6.10	6.10	6.10
Fan Absorbed Current	[A]	7.74	7.74	7.74	7.74	7.74	10.32	10.32	10.32
EER	[-]	2.74	2.62	2.82	2.86	2.77	2.82	2.82	2.60
DISSIPATION Air Flow Rate	[m3/h]	43434	40235	55808	63261	63261	87186	81687	81687
UTILITY Water Flow Rate	[kg/h]	23718	26480	32223	37283	41383	47185	51601	54392
UTILITY Water Pressure Drops	[kPa]	48	43	44	58	59	42	48	64
Useful head - BP pumps	[kPa]	156	153	145	141	171	174	157	135
Useful head - BP pumps	[kPa]	177	174	267	228	291	293	276	254
Useful head - BP pumps [AND logic]	[kPa]	124	122	137	117	174	181	167	147
Useful head - HP pumps [AND logic]	[kPa]	185	187	201	181	208	214	199	179
DHW @ 50/55°C and 7°C ext air									
Thermal Output	[kW]	155.52	177.55	210.31	245.36	266.66	293.25	330.97	340.81
Compressor Absorbed Power	[kW]	210.3	245.4	266.7	293.2	331	340.8	89	100
Compressor Absorbed Current	[A]	69.03	78.70	92.19	106.91	115.97	126.57	142.75	160.37
Fan Absorbed Power	[kW]	4.02	4.02	4.02	4.02	4.02	6.10	6.10	6.10
Fan Absorbed Current	[A]	7.74	7.74	7.74	7.74	7.74	10.32	10.32	10.32
COP	[-]	3.30	3.34	3.42	3.47	3.49	3.45	3.48	3.21
DISSIPATION Air Flow Rate	[m3/h]	43434	40235	55808	63261	63261	87186	81687	81687
DHW Flow Rate	[kg/h]	27027	30857	36549	42640	46432	50963	57519	56230
DHW Pressure Drops	[kPa]	62	57	56	75	72	59	73	76
Useful head - BP pumps	[kPa]	131	123	111	140	140	140	111	83
Cooling + DHW @ 50/55°C and 12/7°C									
Cooling Capacity	[kW]	144.86	165.08	197.74	222.23	245.72	268.79	304.50	326.61
Thermal Output	[kW]	186.26	211.79	252.69	286.12	315.58	345.39	390.66	422.71
Compressor Absorbed Power	[kW]	43.6	49.2	57.8	67.3	73.5	80.6	90.7	101.2
Compressor Absorbed Current	[A]	69.89	78.84	92.76	107.85	117.93	129.32	145.46	162.33
Fan Absorbed Power	[kW]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fan Absorbed Current	[A]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COP	[-]	4,27	4,30	4,37	4,25	4,29	4,29	4,31	4,18
UTILITY Water Flow Rate	[kg/h]	32371	36806	43914	49724	54844	60025	67893	73463
UTILITY Water Pressure Drops	[kPa]	40	37	37	47	50	35	41	55
Useful head - UTILITY BP pumps	[kPa]	170	165	165	170	186	191	176	155
Useful head - UTILITY HP pumps	[kPa]	192	186	287	259	306	311	295	274
Useful head - BP pumps AND UTILITY	[kPa]	137	133	148	133	188	195	183	164
Useful head - HP pumps AND UTILITY	[kPa]	195	195	211	197	221	228	215	197
DHW Flow Rate	[kg/h]	24877	28350	33958	38164	42199	46159	52292	56090
DHW Pressure Drops	[kPa]	77	71	70	91	96	81	94	106
Useful head - DHW BP pumps	[kPa]	102	93	66	50	100	96	66	40

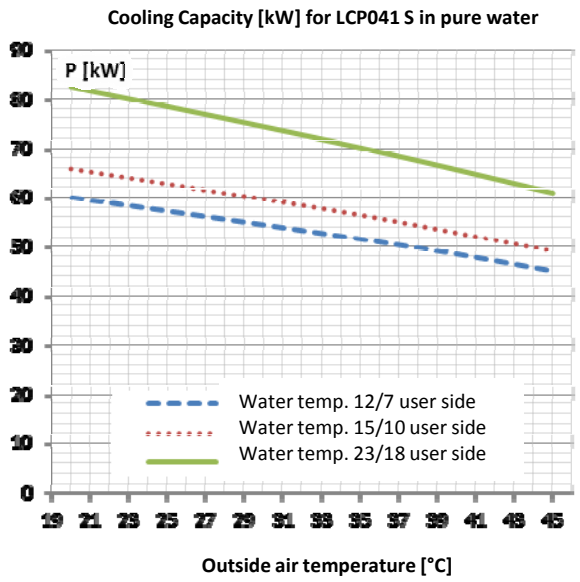
Summary of LCP L series technical data		144	164	194	214	244	274	294	324
Heating @ 40/45°C and 7°C ext. air									
Thermal Output	[kW]	155.5	177.6	210.3	245.4	266.7	293.2	331	340.8
Compressor Absorbed Power	[kW]	49	49.1	57.5	66.7	72.3	78.9	89	100
Compressor Absorbed Current	[A]	68.9	78.9	92.1	107.1	115.97	126.57	142.75	160.37
Fan Absorbed Power	[kW]	4.02	4.02	4.02	4.02	4.02	6.10	6.10	6.10
Fan Absorbed Current	[A]	7.74	7.74	7.74	7.74	7.74	10.32	10.32	10.32
COP	[-]	3.30	3.34	3.42	3.47	3.49	3.45	3.48	3.21
DISSIPATION Air Flow Rate	[m3/h]	43434	40235	55808	63261	63261	87186	81687	81687
UTILITY Water Flow Rate	[kg/h]	26935	30862	36413	42872	48519	55122	59409	64004
UTILITY Water Pressure Drops	[kPa]	62	57	55	75	79	68	77	88
Useful head - BP pumps	[kPa]	132	123	112	95	134	128	107	84
Useful head - BP pumps	[kPa]	153	144	233	178	252	246	225	202
Useful head - BP pumps [AND logic]	[kPa]	101	95	119	91	142	140	123	102
Useful head - HP pumps [AND logic]	[kPa]	167	167	183	155	174	172	155	135
Maximum current (FLA) [Without Options]	A	105	126	148	167	190	215	229	242
Booster current (LRA) [Without Options]	A	222	241	307	318	382	398	464	472
Booster current with Soft Starter kit [Without Options]	A	145	157	200	207	248	259	301	307
Lw sound output (base unit)	db(A)	79	80	81	82	82	83	83	83
Lp Sound Pressure (base unit) @10 m Q=2	db(A)	51	52	53	54	54	55	55	55
Air Flow Rate	m3/h	43434	40235	55808	63261	63261	87186	81687	81687
Number of Fans		6	6	6	6	6	8	8	8
Compressors/Circuits		4/2	4/2	4/2	4/2	4/2	4/2	4/2	4/2
Tank Capacity (optional)	l	600	600	600	600	600	765	765	765
Refrigerant - Electric Power Supply [V/n/Hz]		R410A - 400 / 3+N / 50							
ESEER		4.19	4.22	4.47	4.63	4.34	4.32	4.40	4.35
Dimensions [HxLxD]	mm	1830 x 3540 x 1654	1830 x 3540 x 1654	2170 x 3540 x 1654	2330 x 3540 x 1654	2330 x 3540 x 1654	2330 x 3540 x 1654	2330 x 3540 x 1654	2330 x 3540 x 1654
Weight without accessories	kg	1570	1710	1730	1920	1940	2290	2320	2350

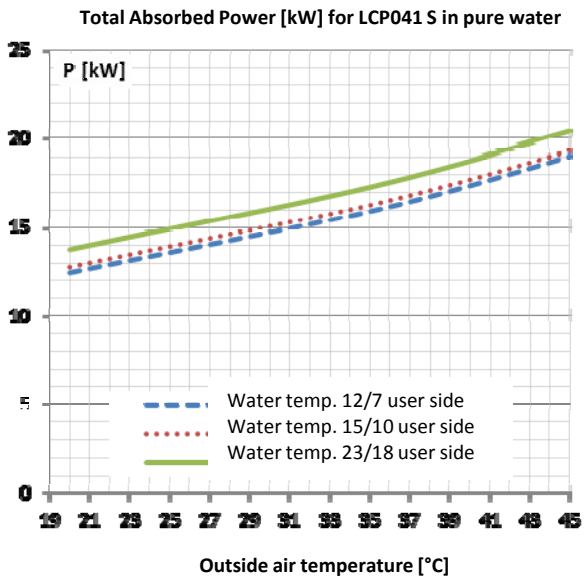
2.1 Performances of the LCP M and LCP P heat pump units

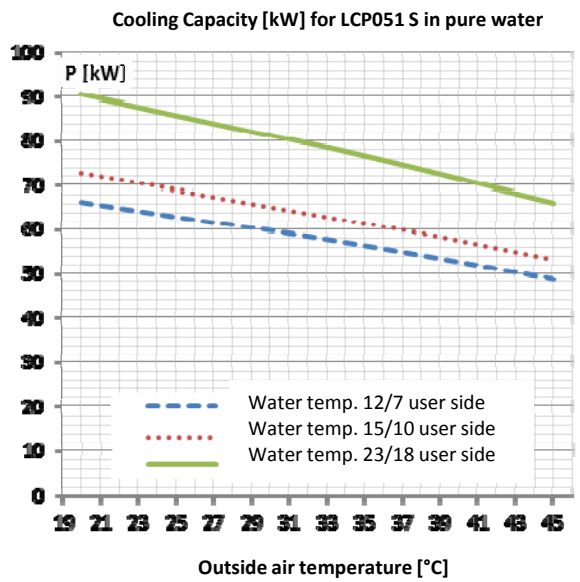
Paragraph data shows the power supplied by the units and the absorbed electric power (not including that absorbed by the accessories and pumps), with ΔT = 5°C on the utility circuit. To calculate the EER and COP thermodynamic factors divide the supplied power by the absorbed electric power. Refer to the "Use of glycol solutions" paragraph to obtain the performance corrective factors for applications with glycol solutions.

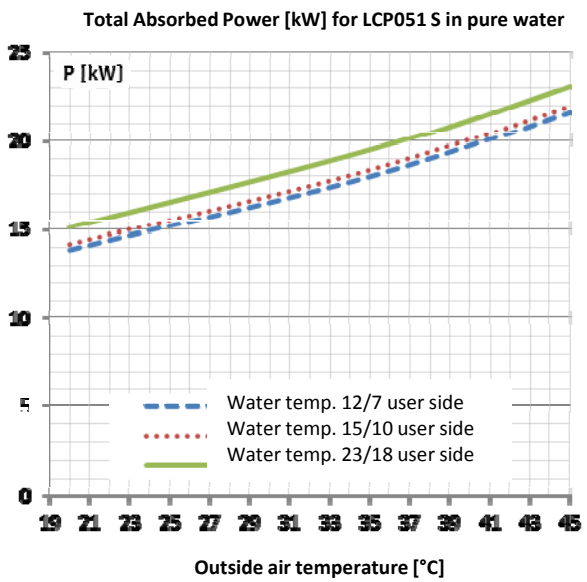
Performance was calculated in countercurrent to the plate heat exchangers. Countercurrent can only be achieved for the LCP M unit in the utility circuit heat pump mode, by selecting the "Water circuit 4-way cycle inversion valve" or by modifying the system. If this can't be achieved, then calculate performances in the concurrent mode, referring to manual or selection software performances (all expressed in countercurrent), at a water temperature that is 3°C lower. For example, performances in countercurrent production of 45/50°C hot water approximates the concurrent performances of 42/47°C water

Table I: performance of LCP MS and LCP PS machines in cold water production mode using water without glycol.

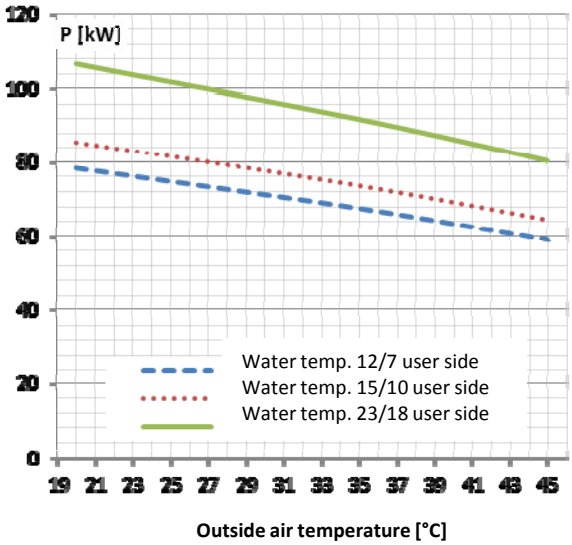




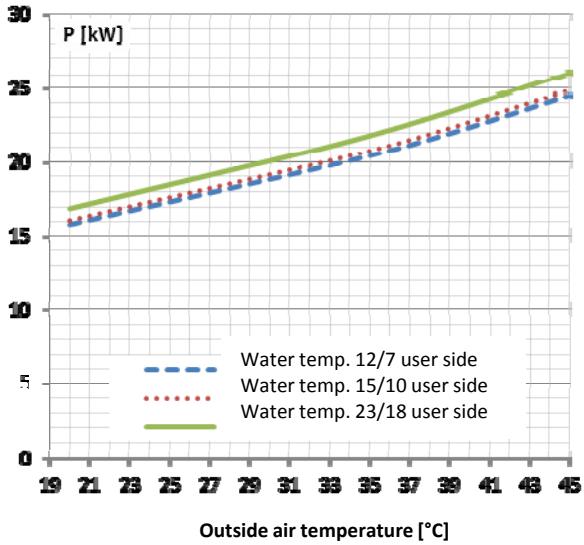




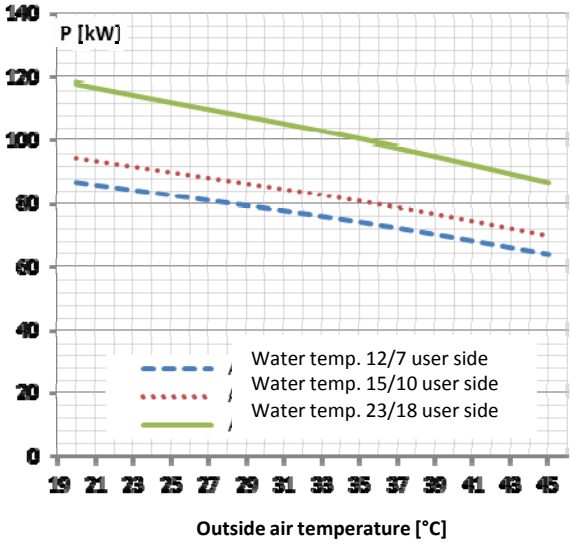
Cooling Capacity [kW] for LCP061 S in pure water



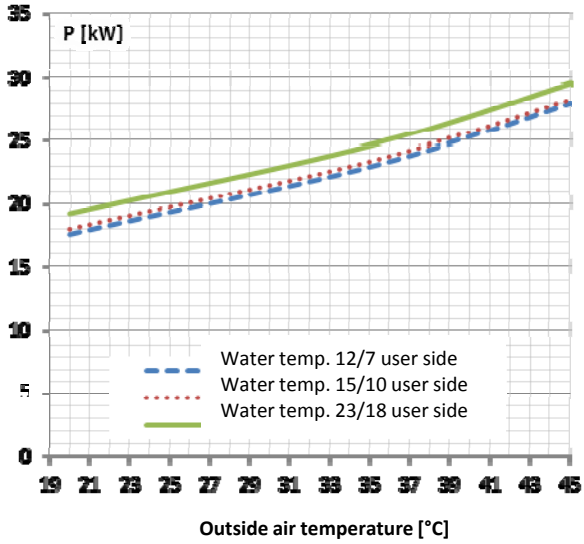
Total Absorbed Power [kW] for LCP061 S in pure water



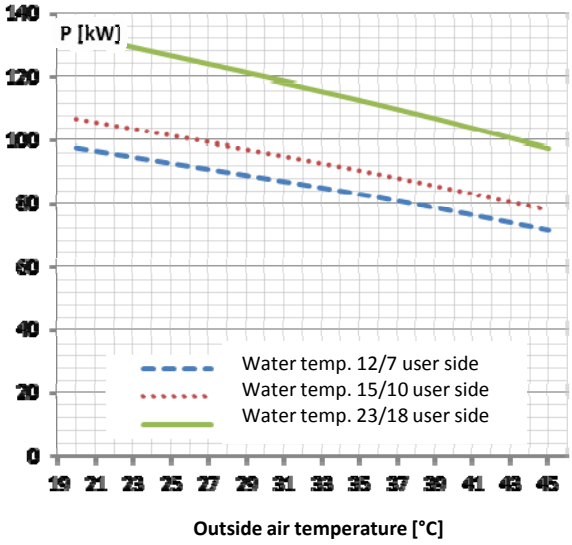
Cooling Capacity [kW] for LCP071 S in pure water



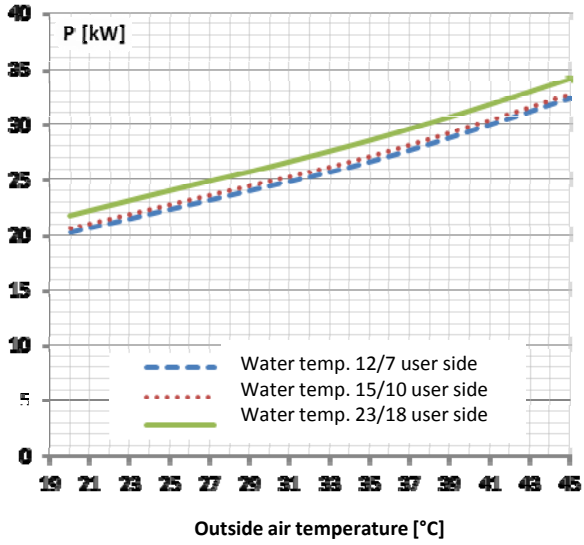
Total Absorbed Power [kW] for LCP071 S in pure water



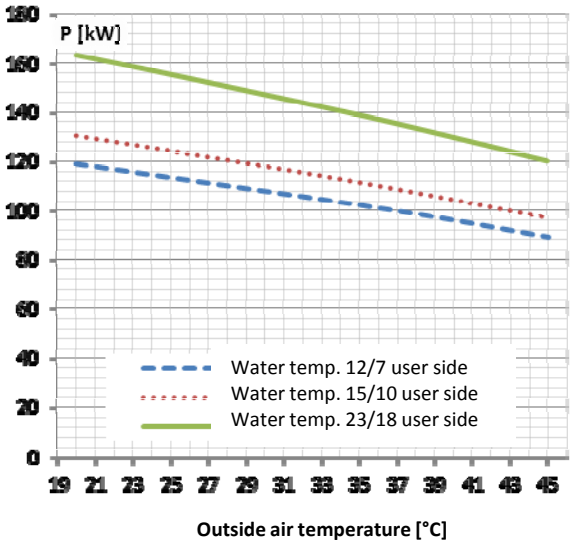
Cooling Capacity [kW] for LCP081 S in pure water



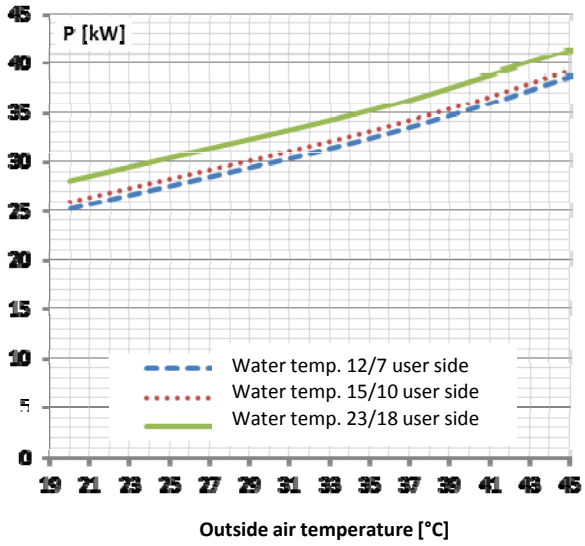
Total Absorbed Power [kW] for LCP081 S in pure water



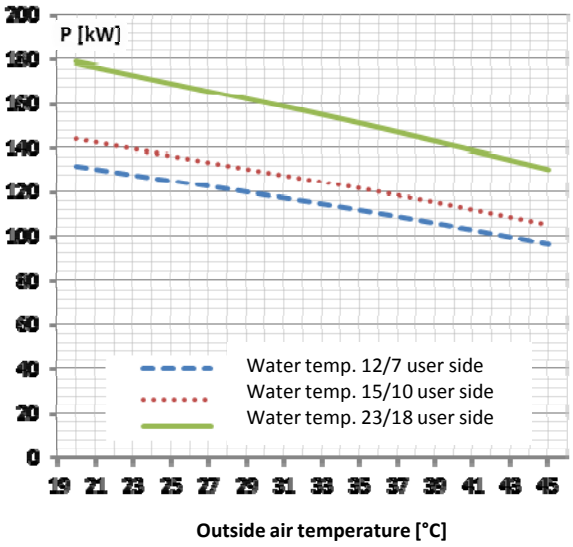
Cooling Capacity [kW] for LCP094 S in pure water



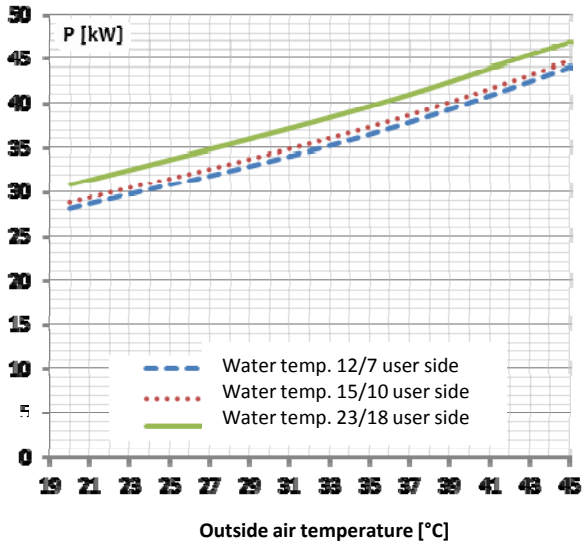
Total Absorbed Power [kW] for LCP094 S in pure water



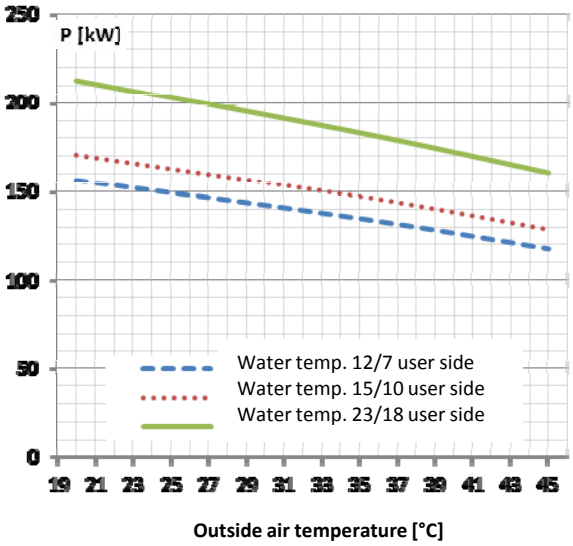
Cooling Capacity [kW] for LCP104 S in pure water



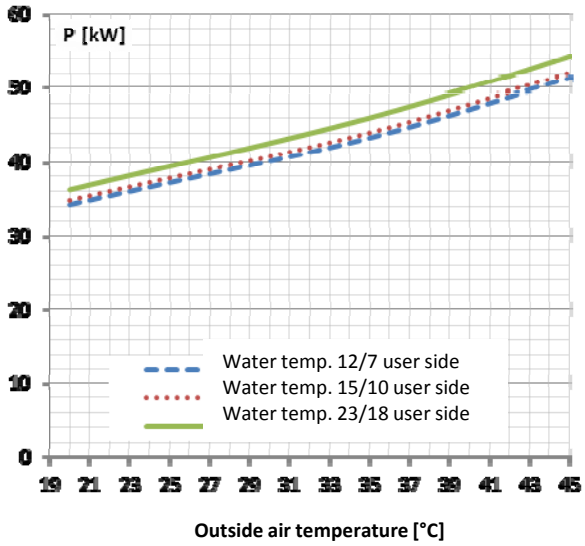
Total Absorbed Power [kW] for LCP104 S in pure water



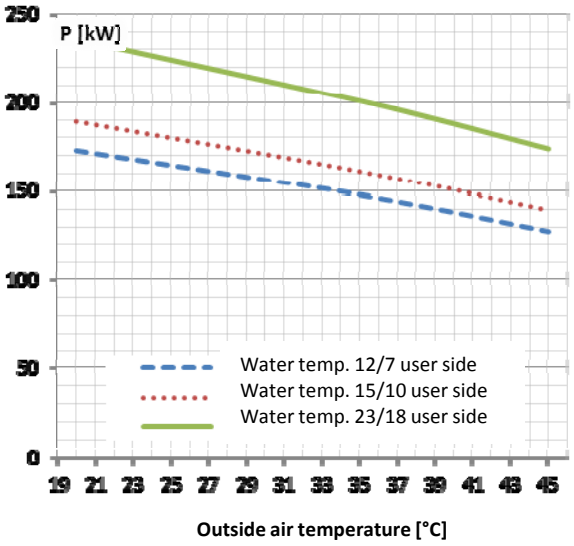
Cooling Capacity [kW] for LCP124 S in pure water



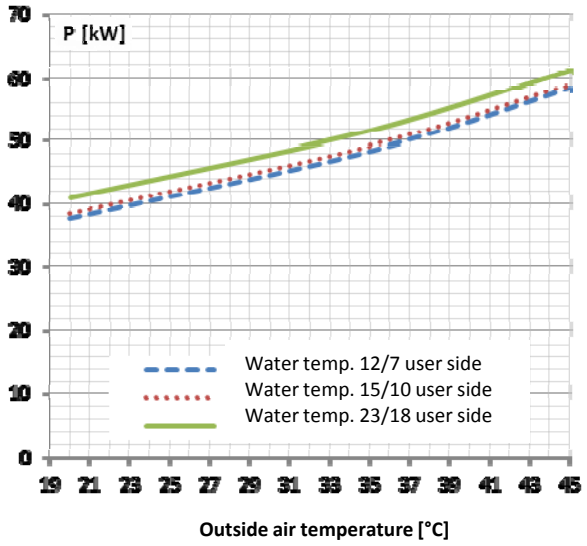
Total Absorbed Power [kW] for LCP124 S in pure water



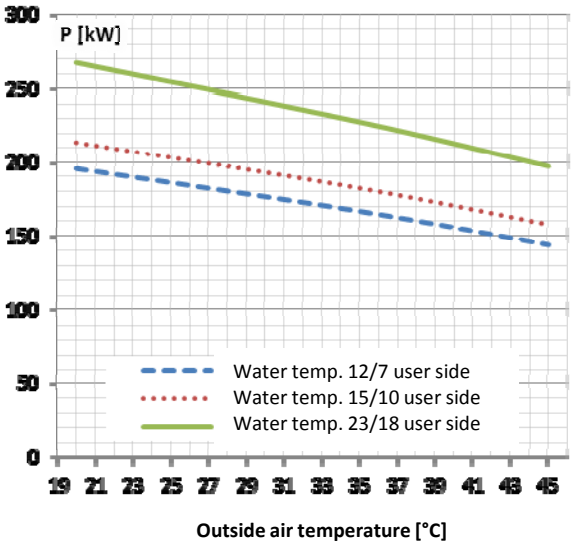
Cooling Capacity [kW] for LCP144 S in pure water



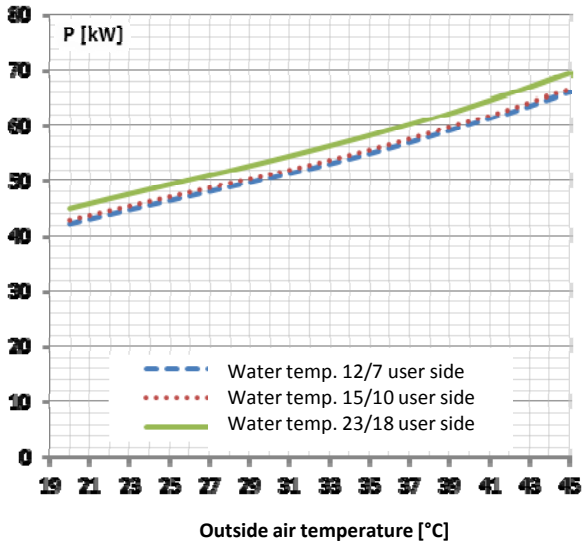
Total Absorbed Power [kW] for LCP144 S in pure water



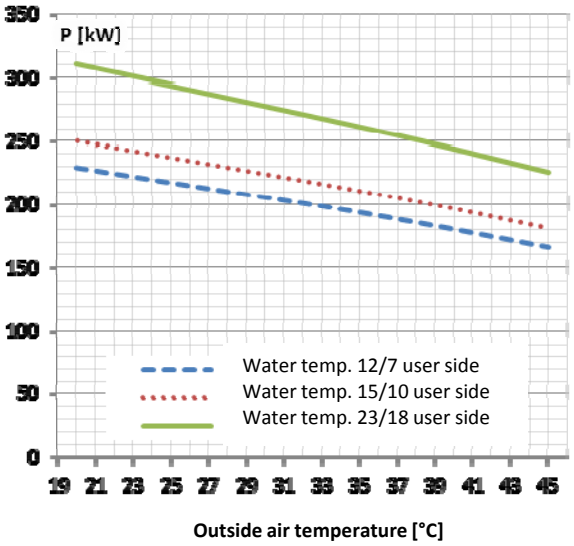
Cooling Capacity [kW] for LCP164 S in pure water



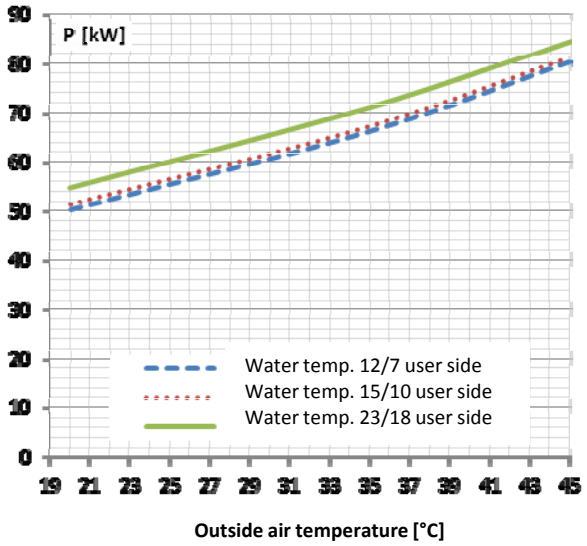
Total Absorbed Power [kW] for LCP164 S in pure water



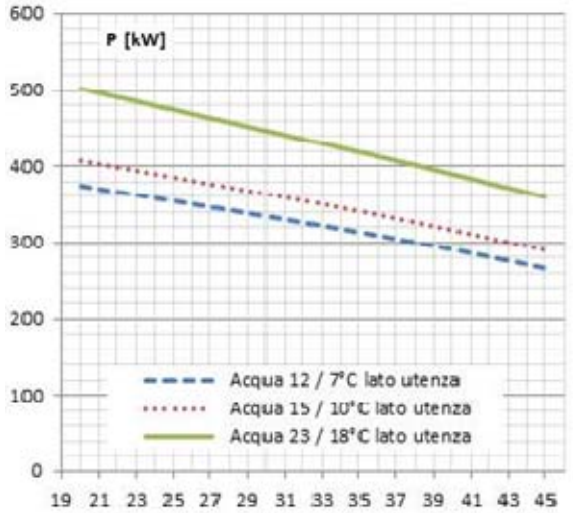
Cooling Capacity [kW] for LCP194 S in pure water



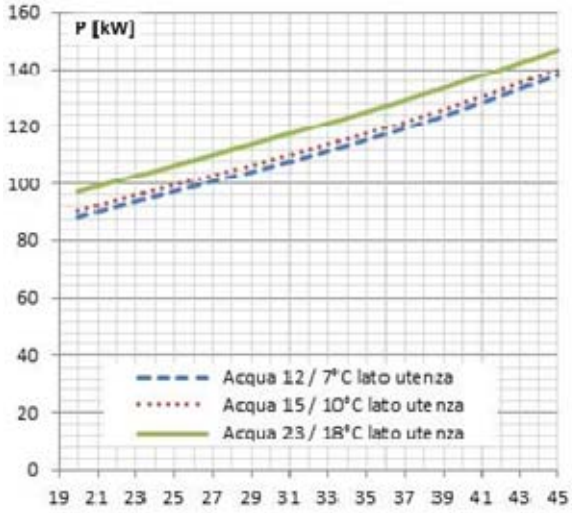
Total Absorbed Power [kW] for LCP194 S in pure water



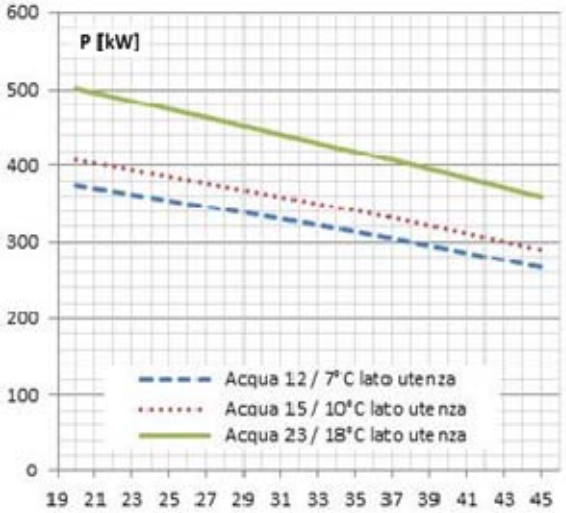
Cooling Capacity [kW] for LCP214 S in pure water



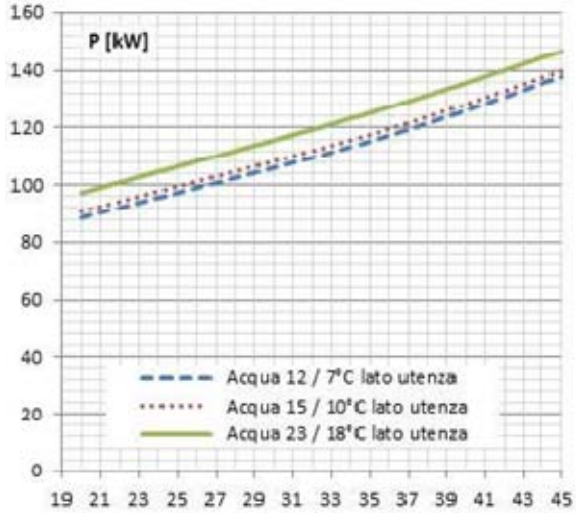
Total Absorbed Power [kW] for LCP214 S in pure water



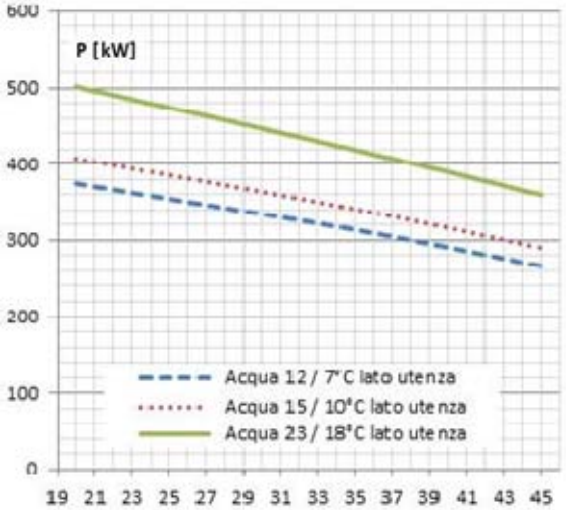
Cooling Capacity [kW] for LCP244 S in pure water



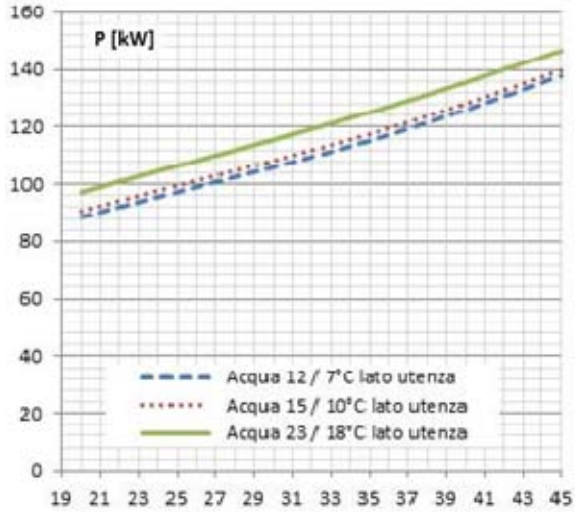
Total Absorbed Power [kW] for LCP244 S in pure water



Cooling Capacity [kW] for LCP274 S in pure water



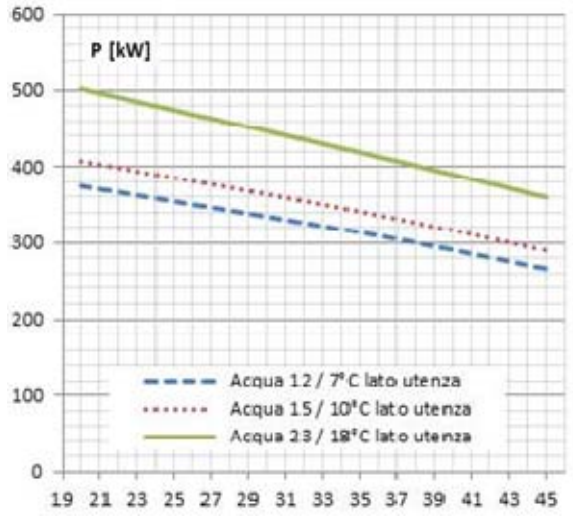
Total Absorbed Power [kW] for LCP274 S in pure water



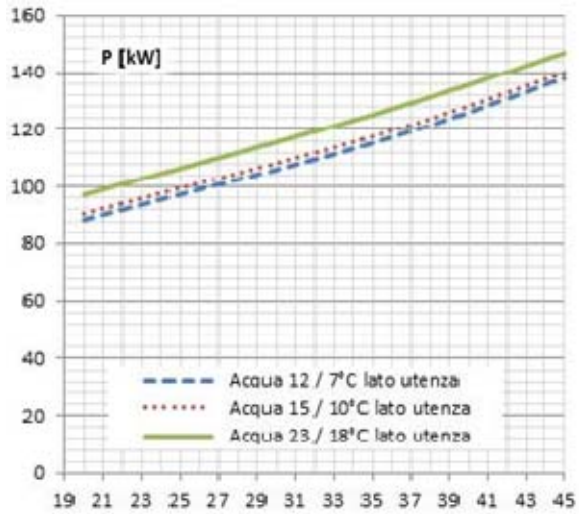
Outside air temperature [°C]

Outside air temperature [°C]

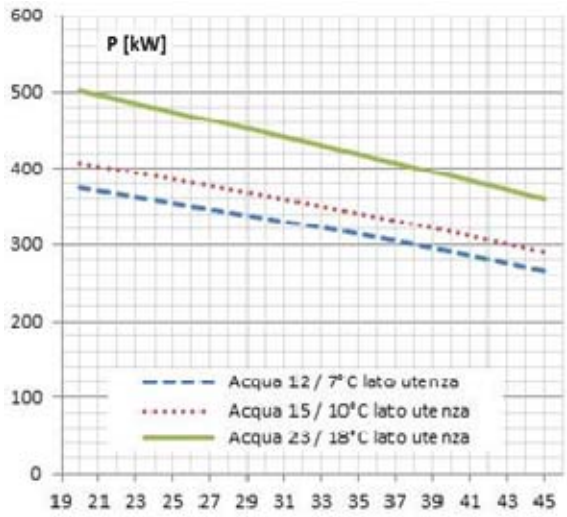
Cooling Capacity [kW] for LCP294 S in pure water



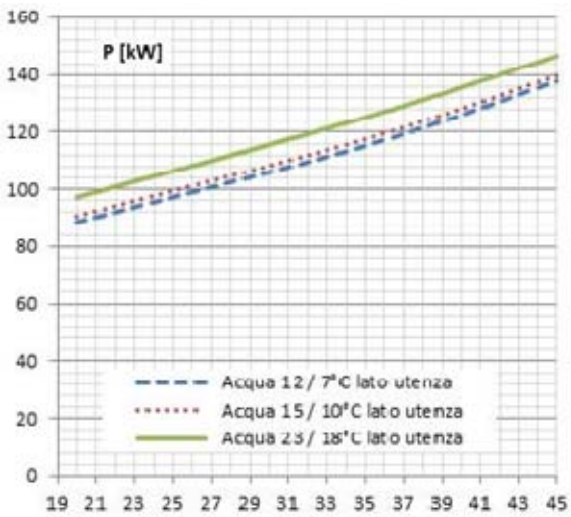
Total Absorbed Power [kW] for LCP294 S in pure water



Cooling Capacity [kW] for LCP324 S in pure water



Total Absorbed Power [kW] for LCP324 S in pure water

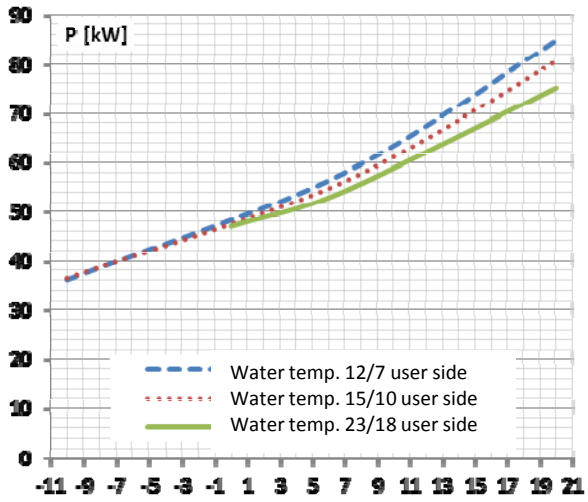


Outside air temperature [°C]

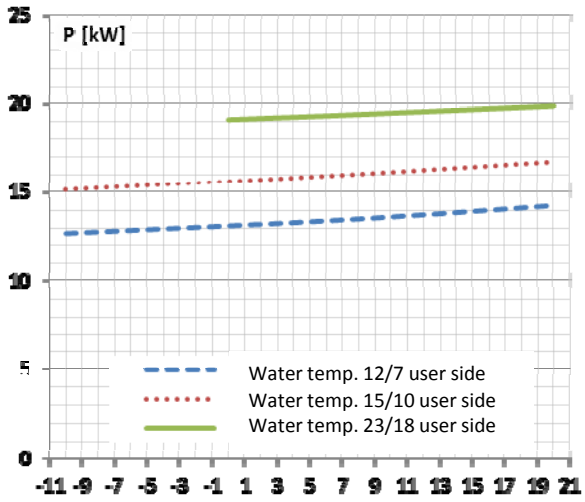
Outside air temperature [°C]

Table II: performance of LCP MS and LCP PS machines in hot water production mode using water without glycol.

Thermal Output [kW] for LCP041 S in pure water



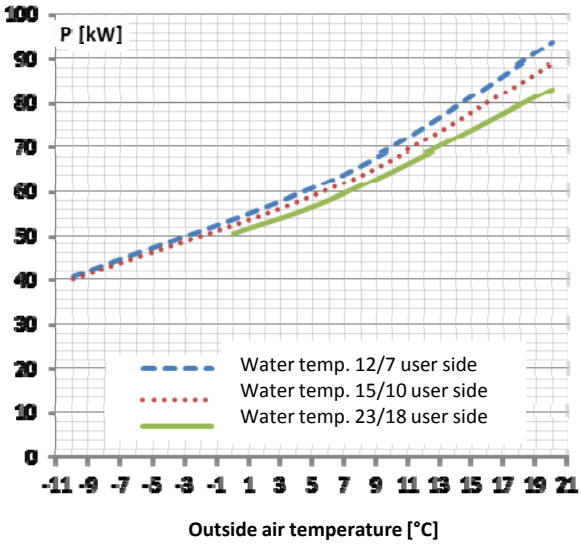
Total Absorbed Power [kW] for LCP041 S in pure water



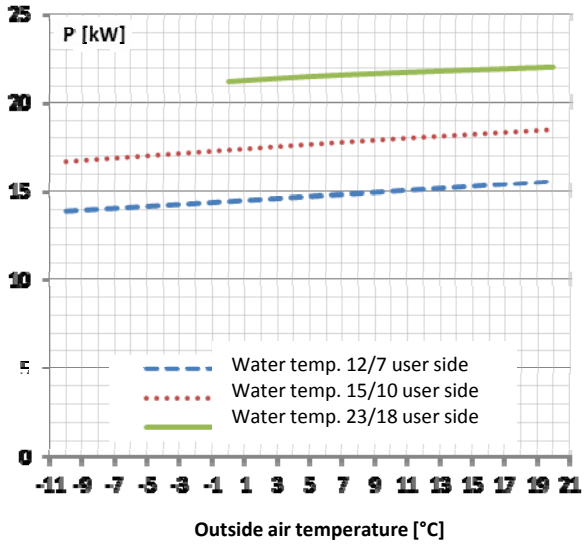
Outside air temperature [°C]

Outside air temperature [°C]

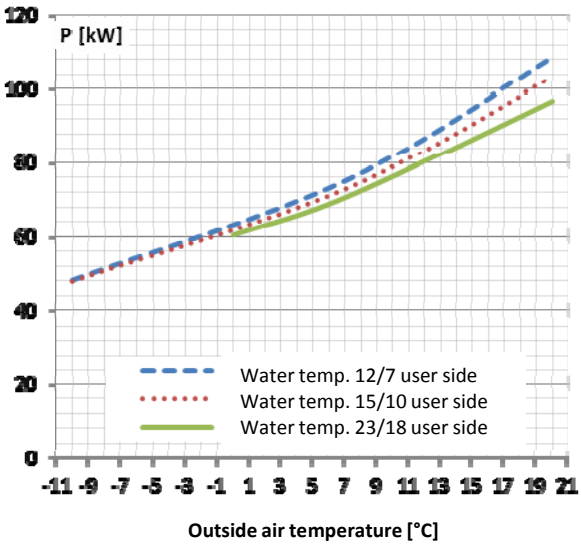
Thermal Output [kW] for LCP051 S in pure water



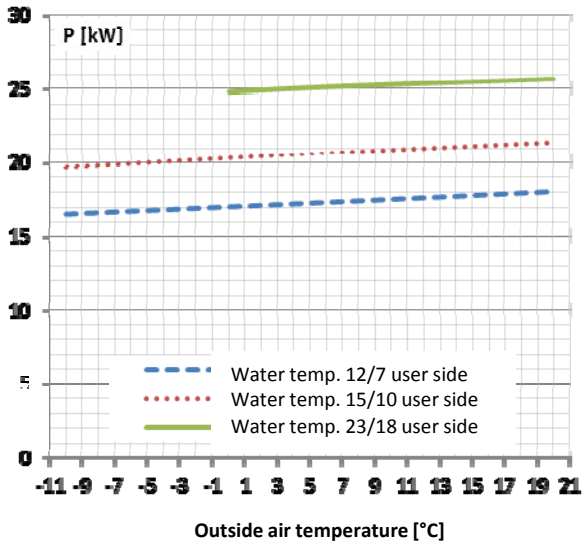
Total Absorbed Power [kW] for LCP051 S in pure water



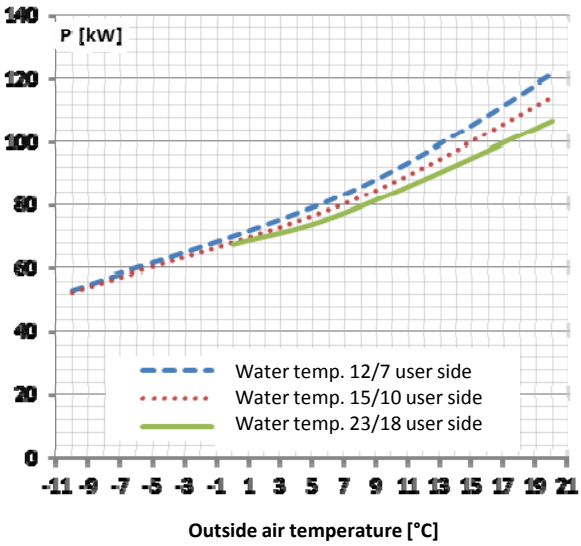
Thermal Output [kW] for LCP061 S in pure water



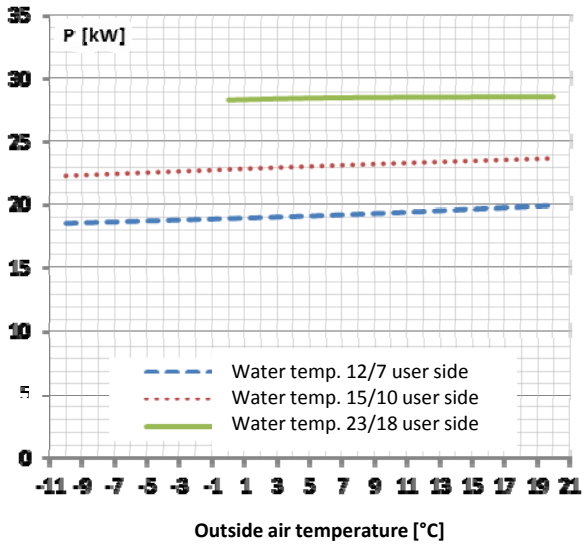
Total Absorbed Power [kW] for LCP061 S in pure water



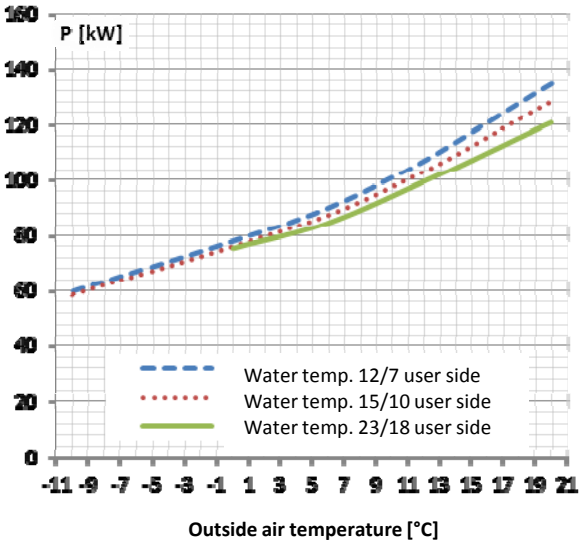
Thermal Output [kW] for LCP071 S in pure water



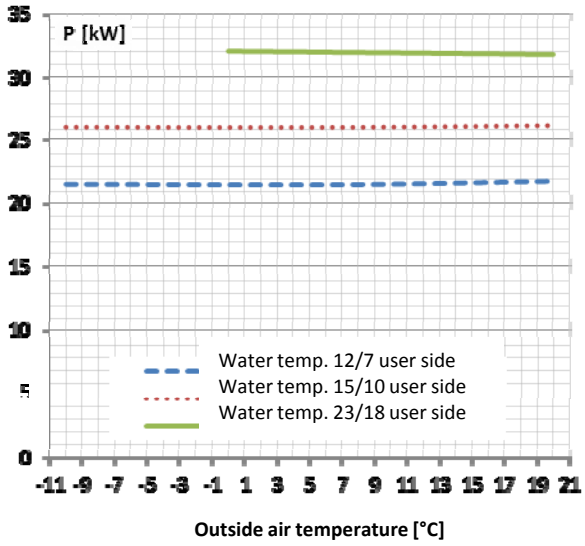
Total Absorbed Power [kW] for LCP071 S in pure water



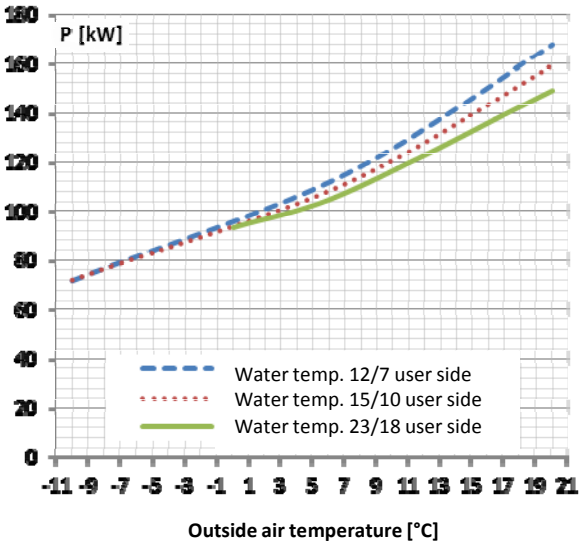
Thermal Output [kW] for LCP081 S in pure water



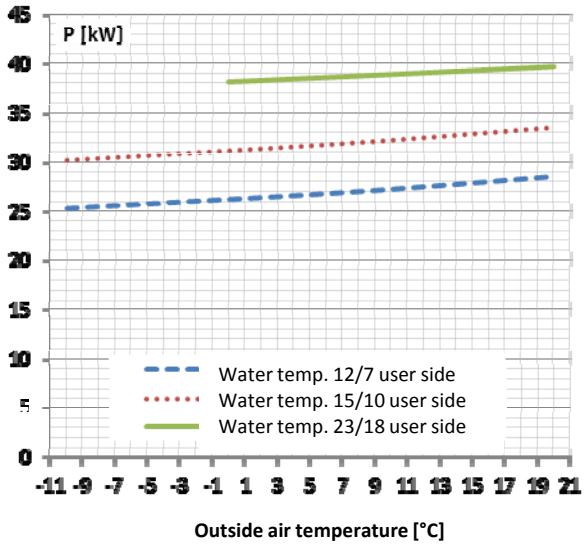
Total Absorbed Power [kW] for LCP081 S in pure water



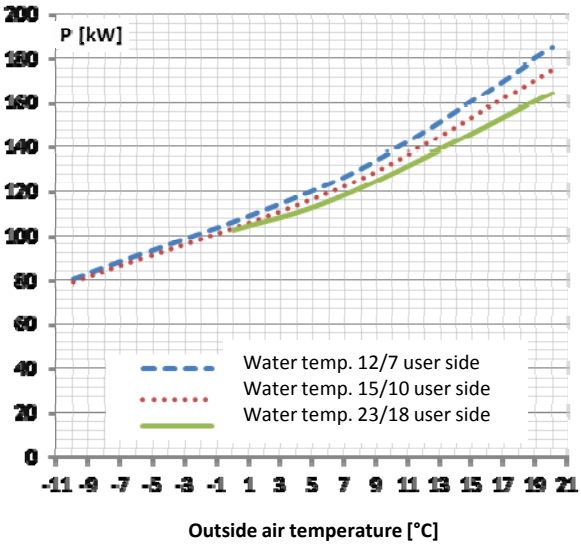
Thermal Output [kW] for LCP094 S in pure water



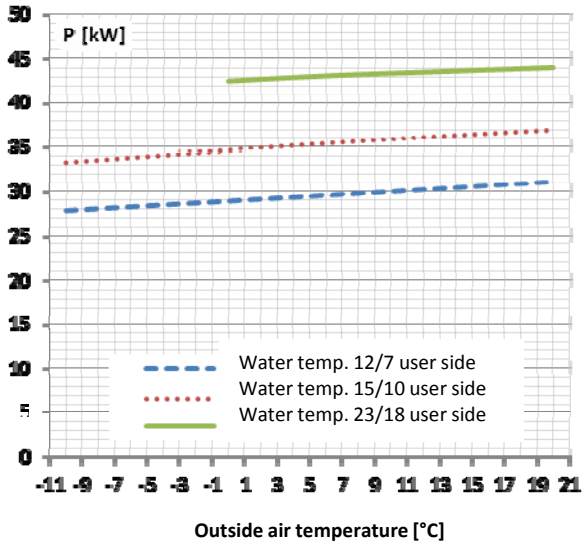
Total Absorbed Power [kW] for LCP094 S in pure water



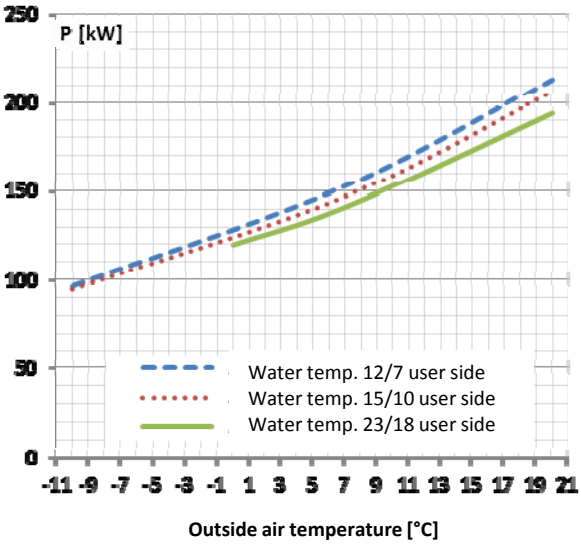
Thermal Output [kW] for LCP104 S in pure water



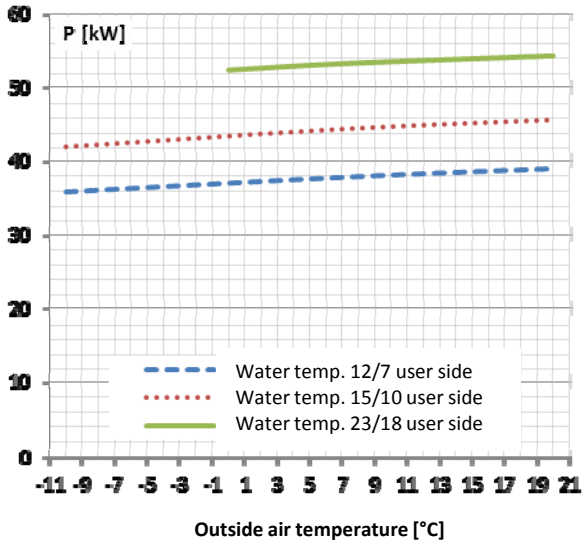
Total Absorbed Power [kW] for LCP104 S in pure water



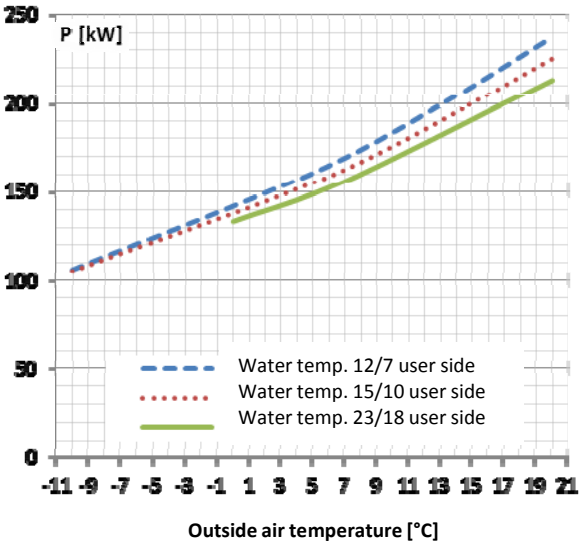
Thermal Output [kW] for LCP124 S in pure water



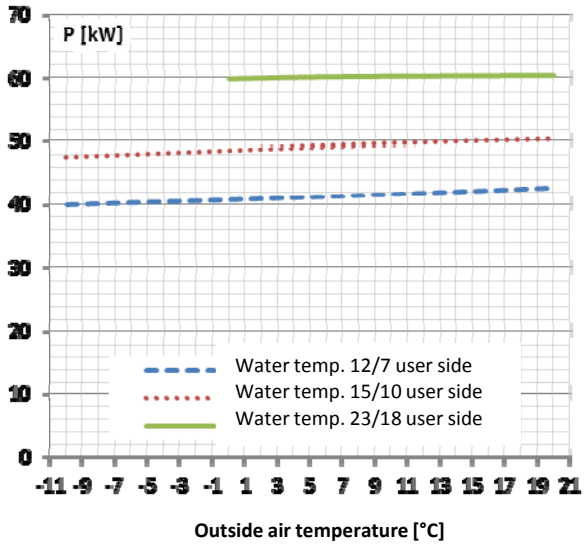
Total Absorbed Power [kW] for LCP124 S in pure water



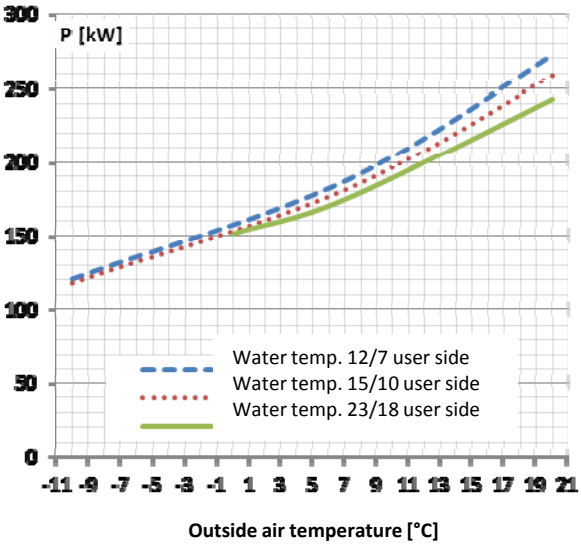
Thermal Output [kW] for LCP144 S in pure water



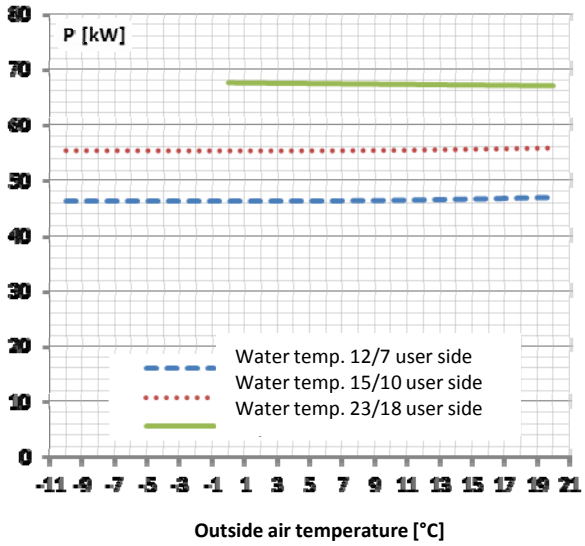
Total Absorbed Power [kW] for LCP144 S in pure water



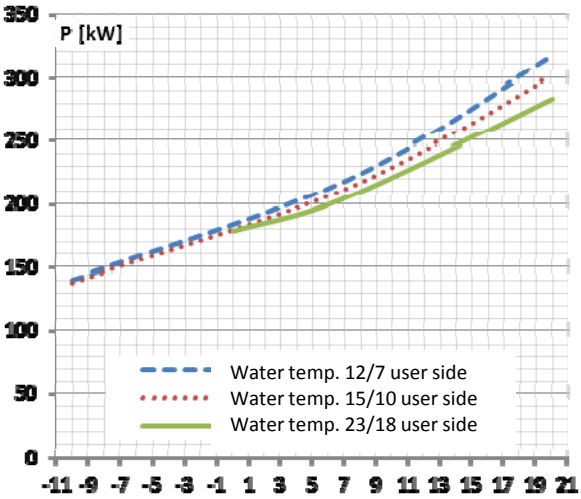
Thermal Output [kW] for LCP164 S in pure water



Total Absorbed Power [kW] for LCP164 S in pure water

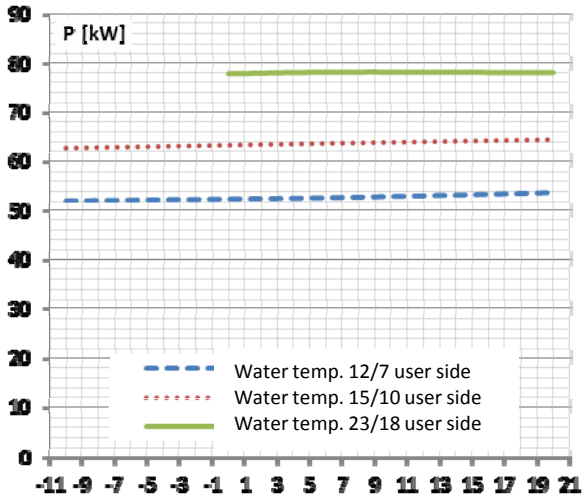


Thermal Output [kW] for LCP194 S in pure water



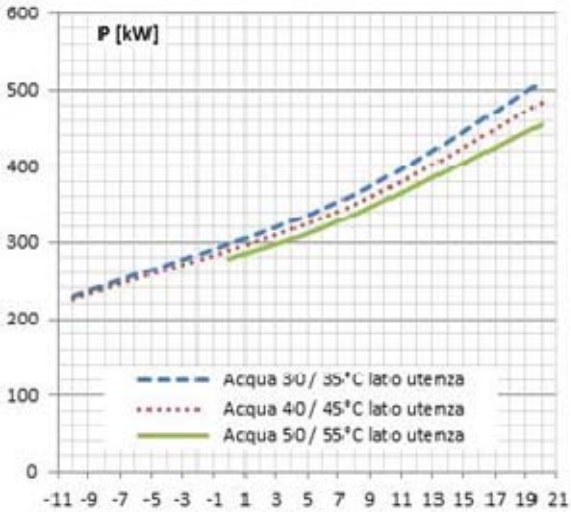
Outside air temperature [°C]

Total Absorbed Power [kW] for LCP194 S in pure water



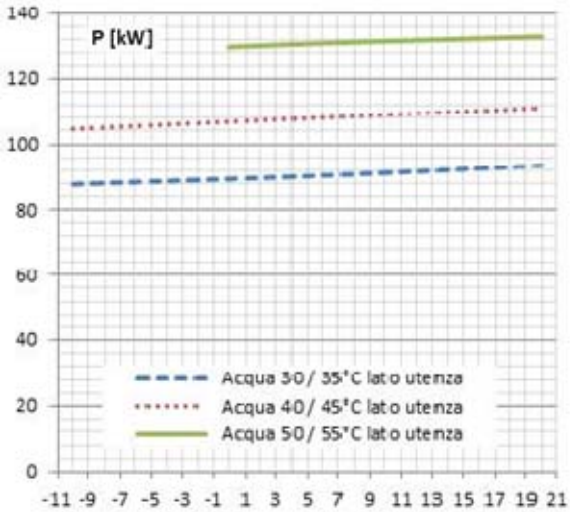
Outside air temperature [°C]

Thermal Output [kW] for LCP214 S in pure water



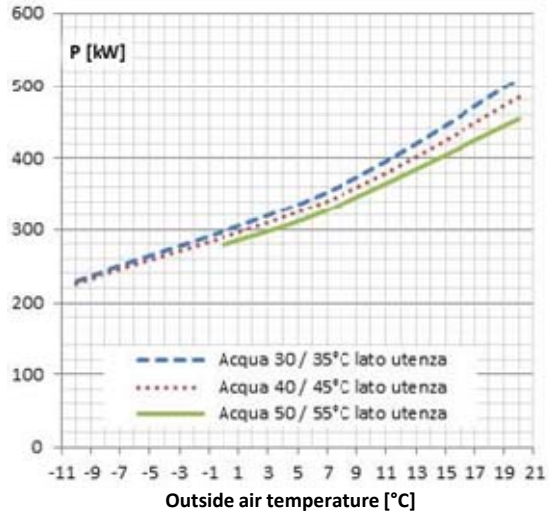
Outside air temperature [°C]

Total Absorbed Power [kW] for LCP214 S in pure water



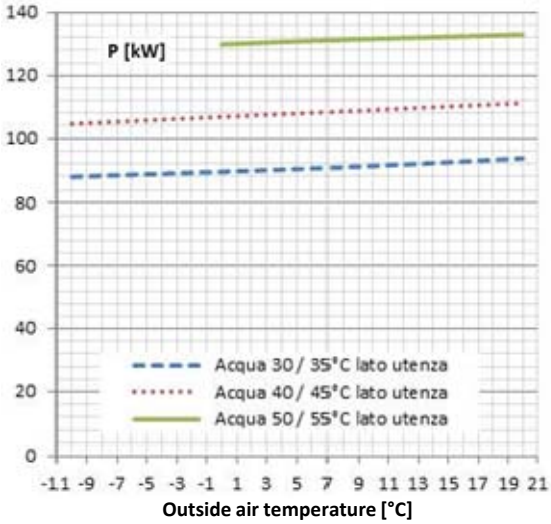
Outside air temperature [°C]

Thermal Output [kW] for LCP244 S in pure water



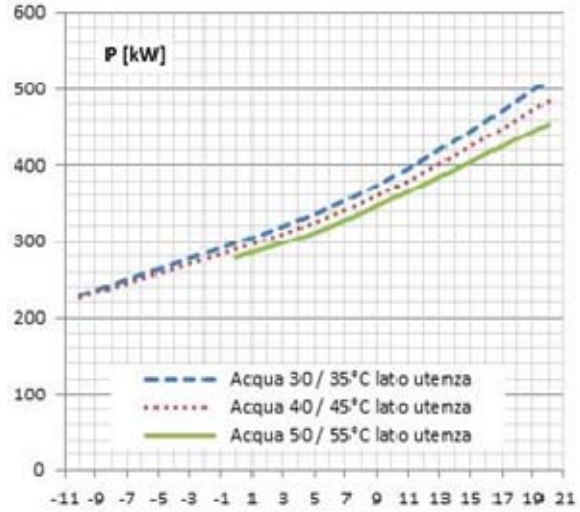
Outside air temperature [°C]

Total Absorbed Power [kW] for LCP244 S in pure water



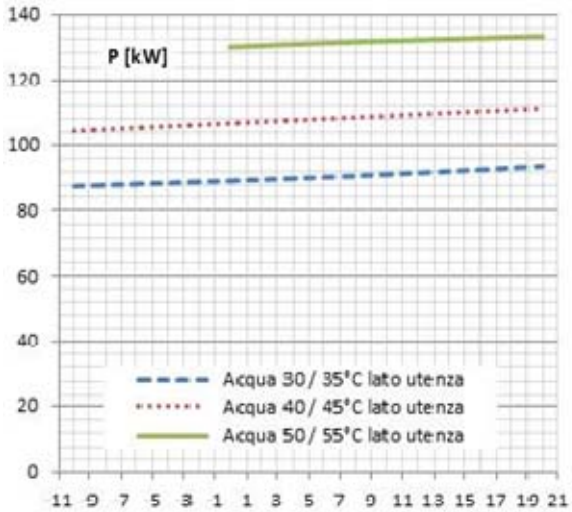
Outside air temperature [°C]

Thermal Output [kW] for LCP274 S in pure water



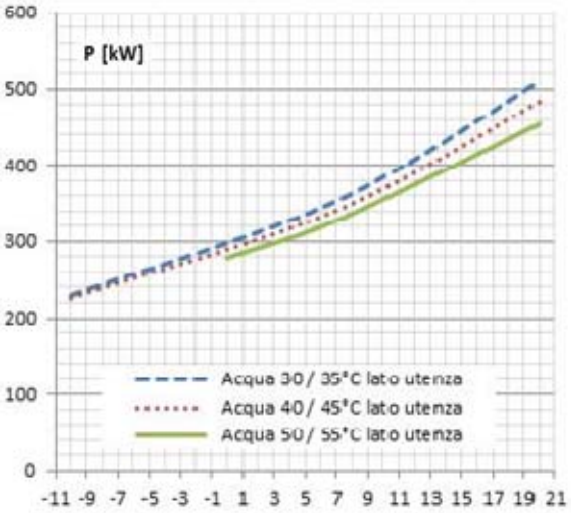
Outside air temperature [°C]

Total Absorbed Power [kW] for LCP274 S in pure water



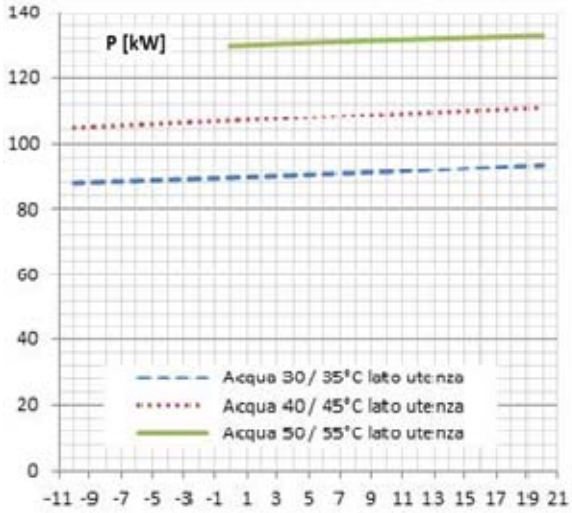
Outside air temperature [°C]

hermal Output [kW] for LCP294 S in pure water



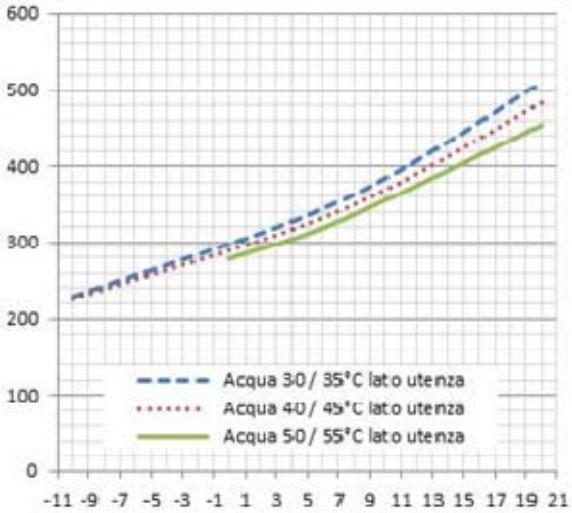
Outside air temperature [°C]

Total Absorbed Power [kW] for LCP294 S in pure water



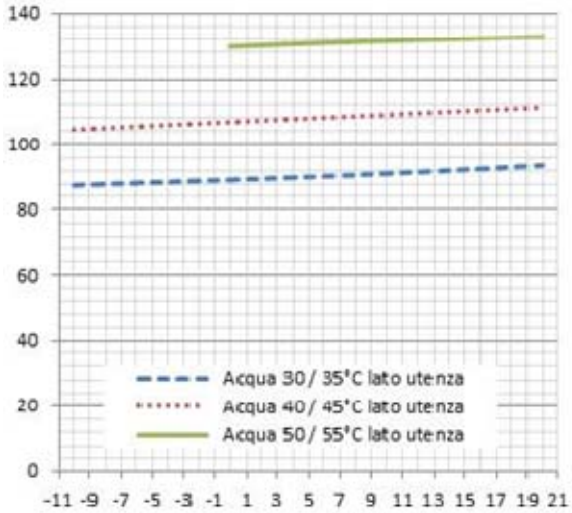
Outside air temperature [°C]

Thermal Output [kW] for LCP324 S in pure water



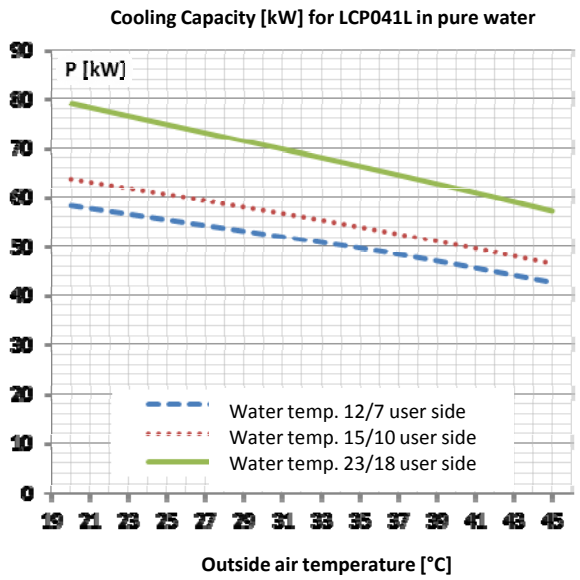
Outside air temperature [°C]

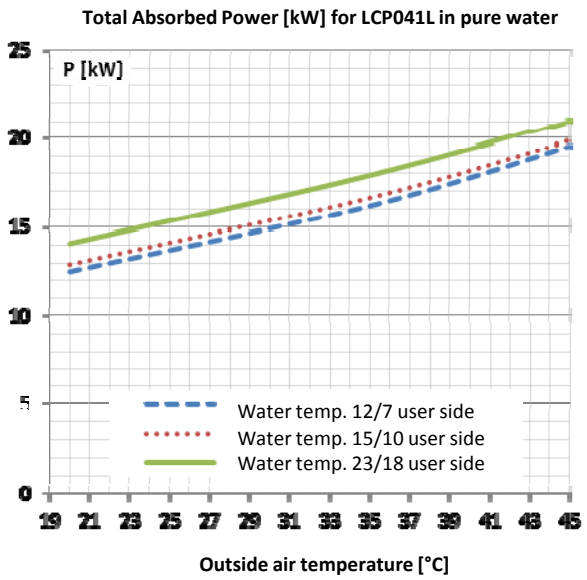
Total Absorbed Power [kW] for LCP324 S in pure water

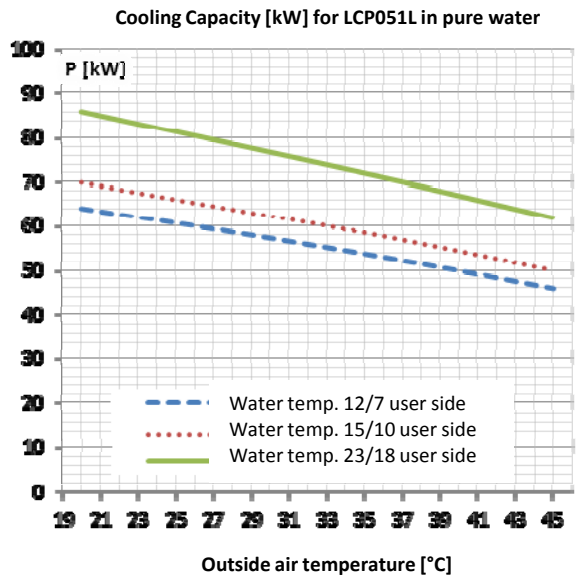


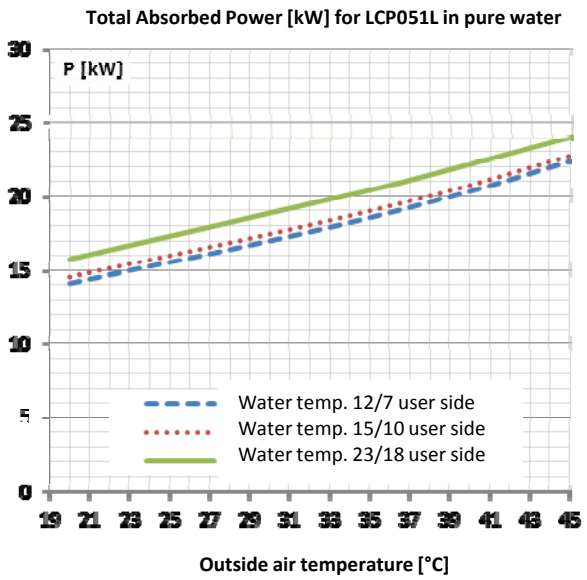
Outside air temperature [°C]

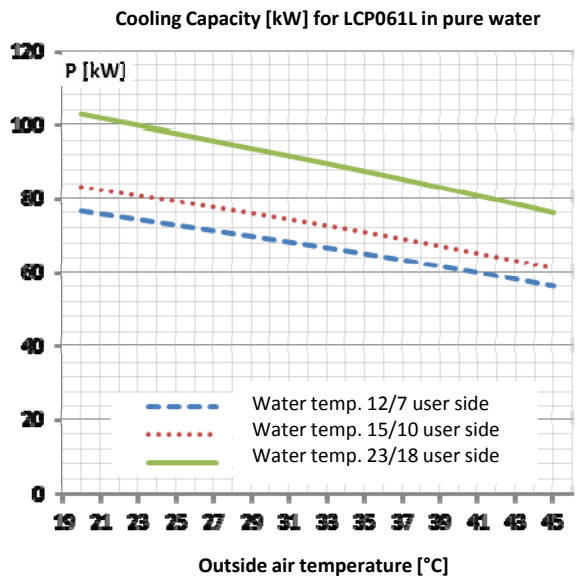
Table II: performance of LCP ML and LCP PL machines in cold water production mode using water without glycol.

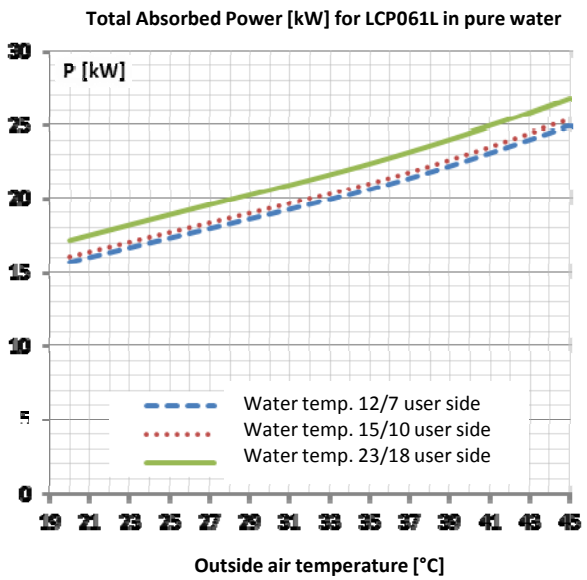




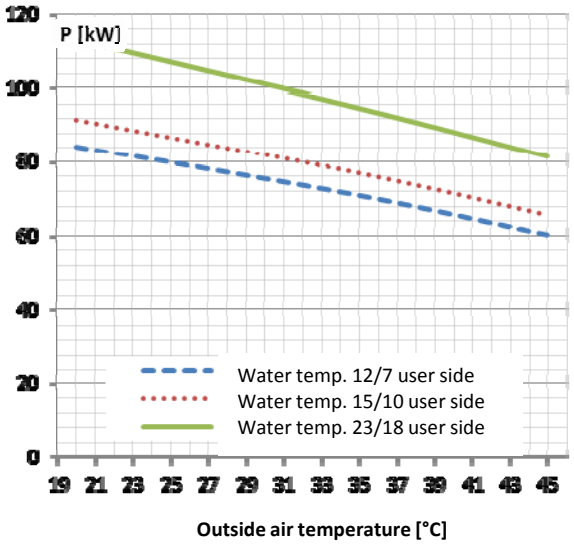




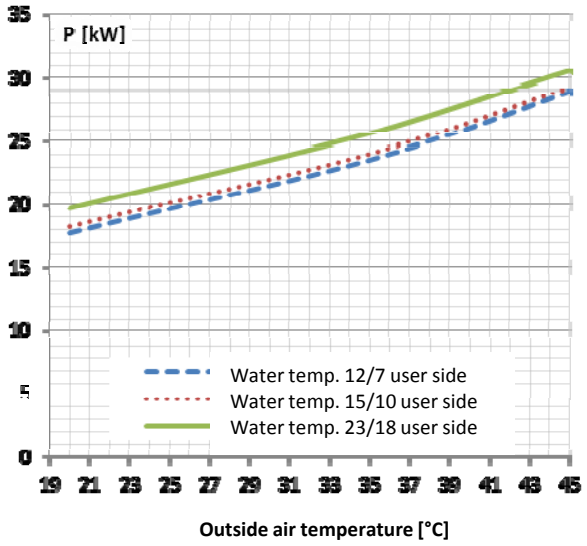




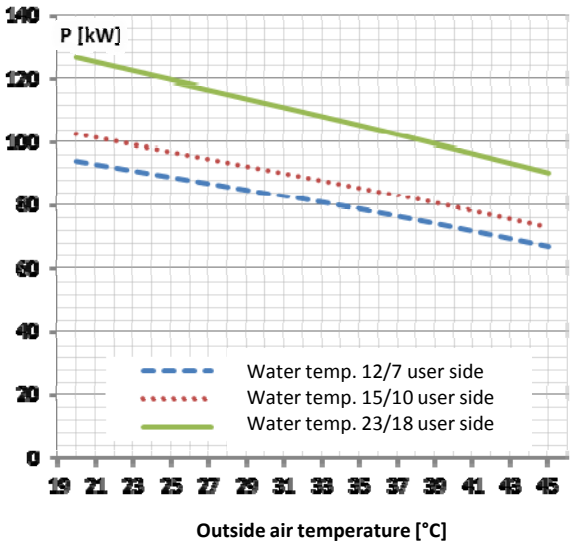
Cooling Capacity [kW] for LCP071L in pure water



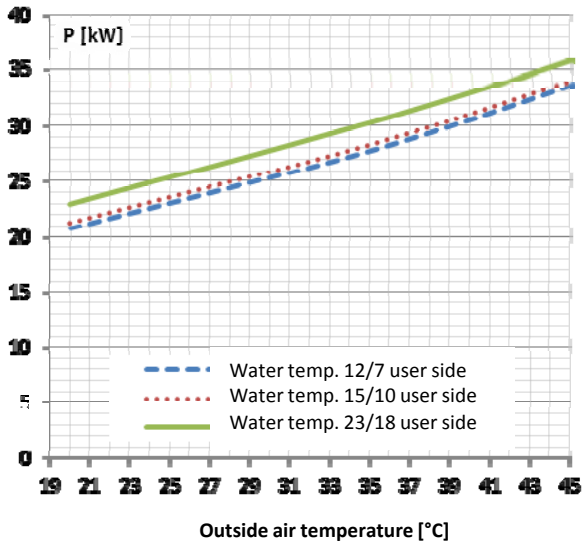
Total Absorbed Power [kW] for LCP071L in pure water



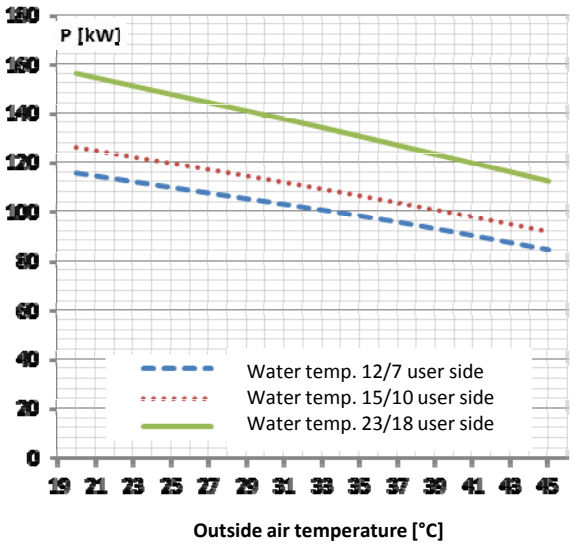
Cooling Capacity [kW] for LCP081L in pure water



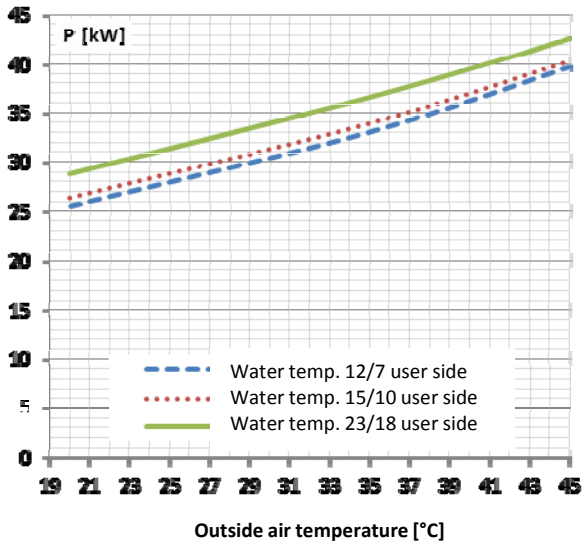
Total Absorbed Power [kW] for LCP081L in pure water



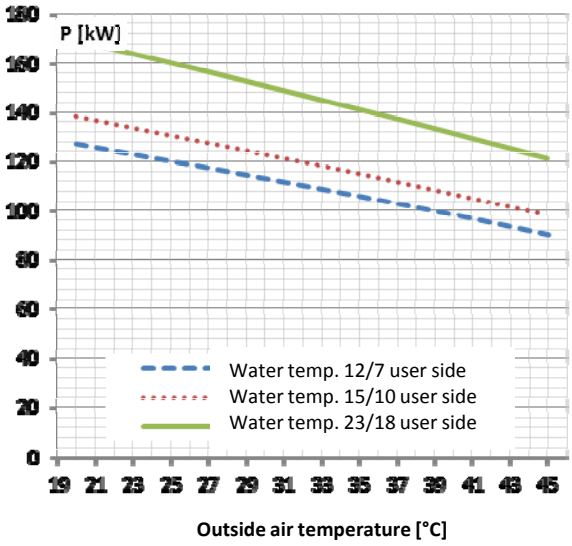
Cooling Capacity [kW] for LCP094L in pure water



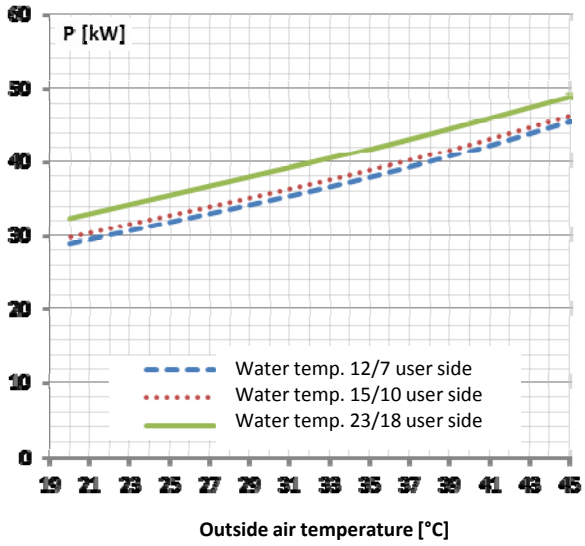
Total Absorbed Power [kW] for LCP094L in pure water



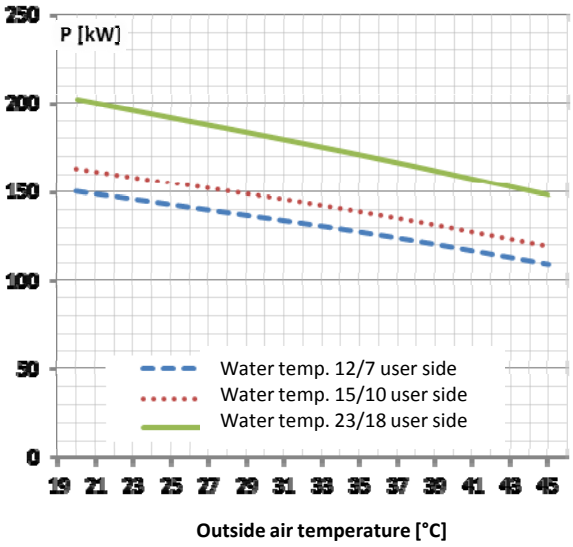
Cooling Capacity [kW] for LCP104L in pure water



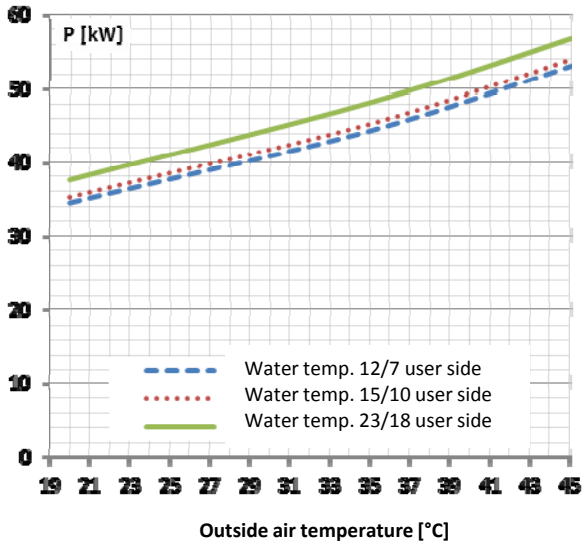
Total Absorbed Power [kW] for LCP104L in pure water



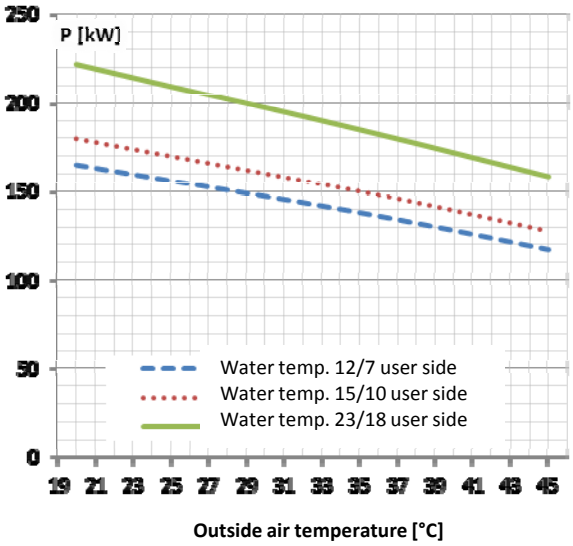
Cooling Capacity [kW] for LCP124L in pure water



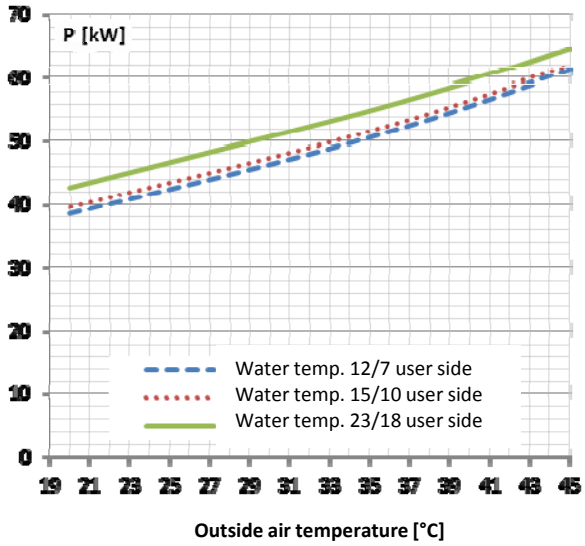
Total Absorbed Power [kW] for LCP124L in pure water



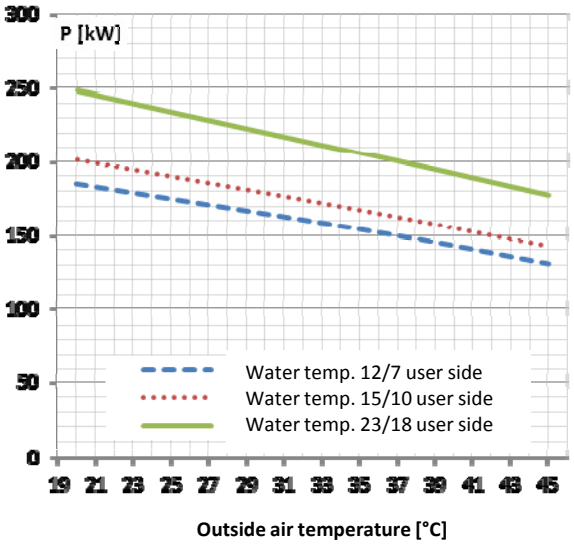
Cooling Capacity [kW] for LCP144L in pure water



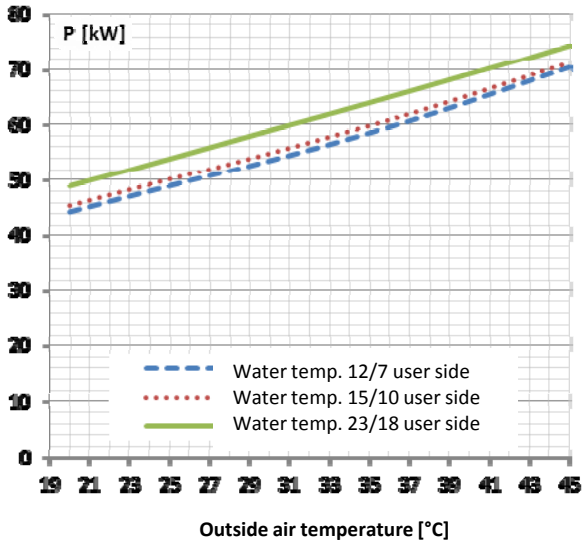
Total Absorbed Power [kW] for LCP144L in pure water



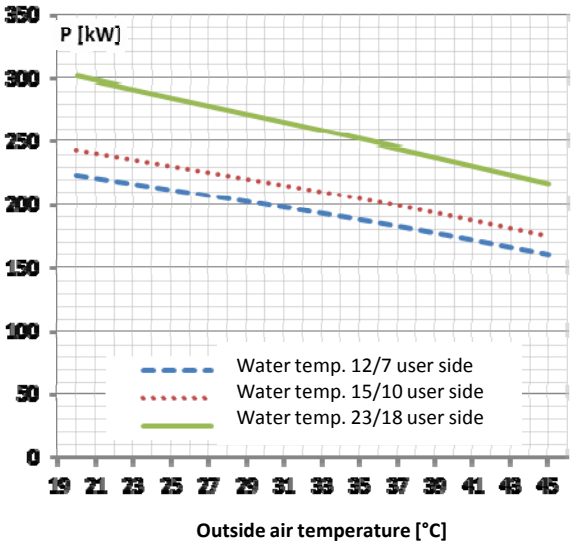
Cooling Capacity [kW] for LCP164L in pure water



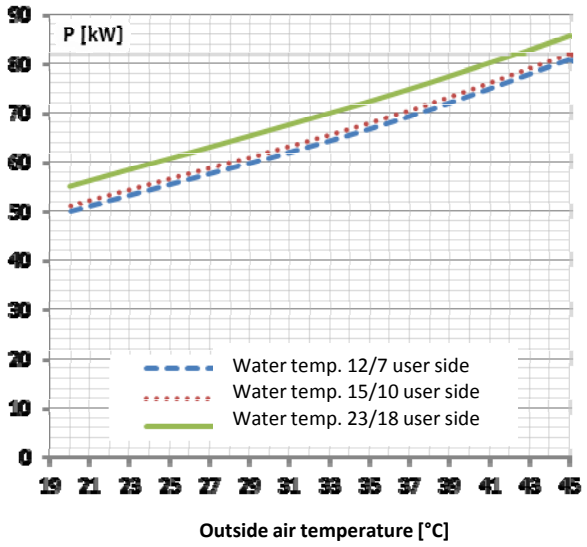
Total Absorbed Power [kW] for LCP164L in pure water



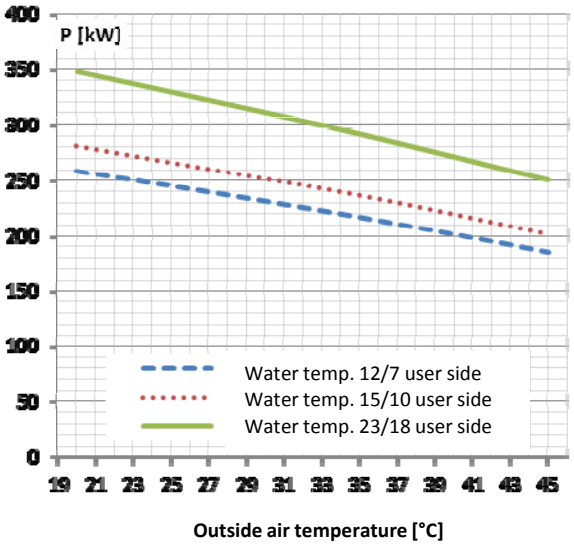
Cooling Capacity [kW] for LCP194L in pure water



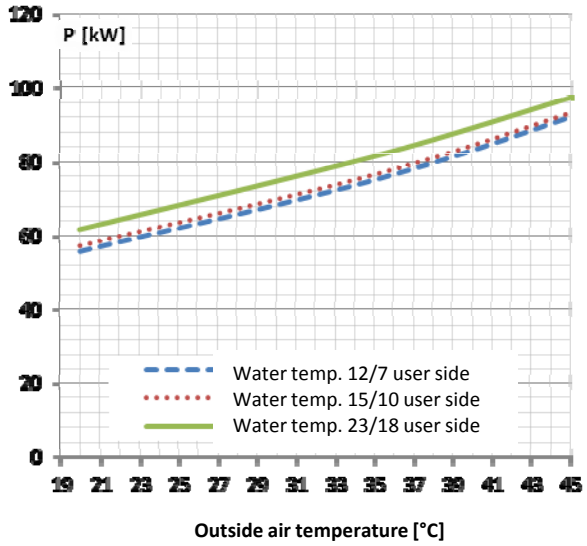
Total Absorbed Power [kW] for LCP194L in pure water



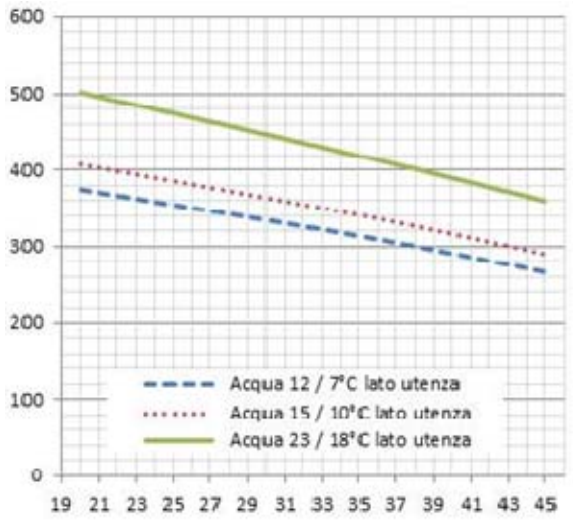
Cooling Capacity [kW] for LCP214L in pure water



Total Absorbed Power [kW] for LCP214L in pure water

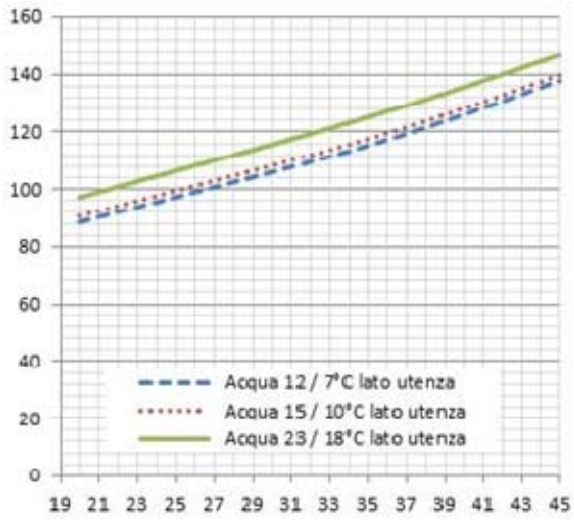


Cooling Capacity [kW] for LCP244L in pure water



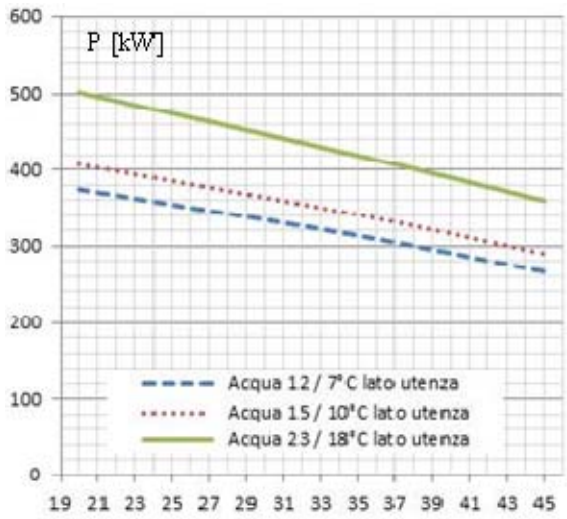
Outside air temperature [°C]

Total Absorbed Power [kW] for LCP244L in pure water



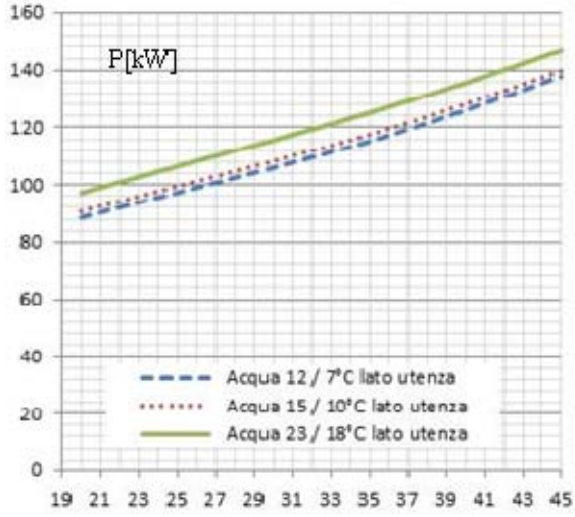
Outside air temperature [°C]

Cooling Capacity [kW] for LCP274L in pure water



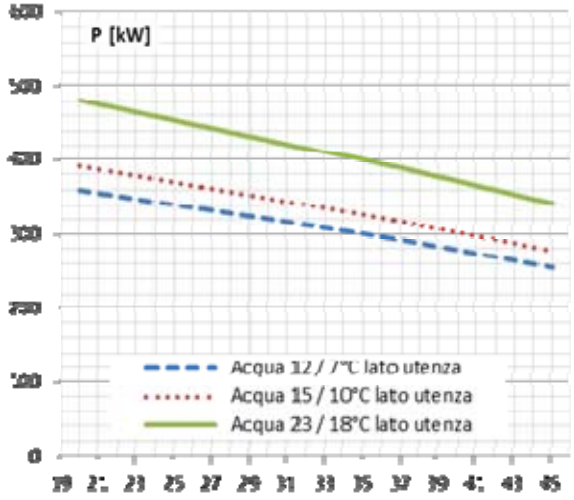
Outside air temperature [°C]

Total Absorbed Power [kW] for LCP274L in pure water



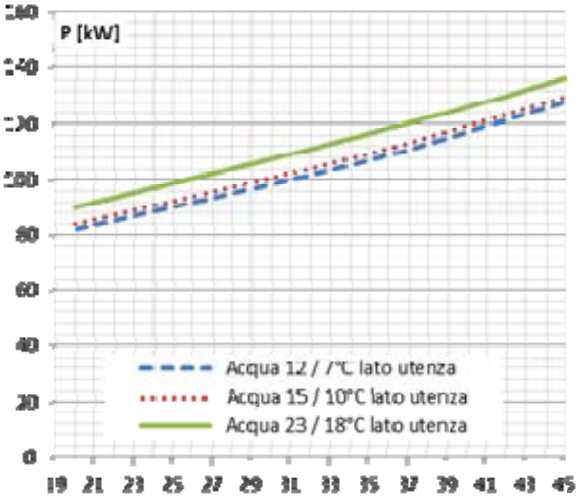
Outside air temperature [°C]

Cooling Capacity [kW] for LCP294L in pure water

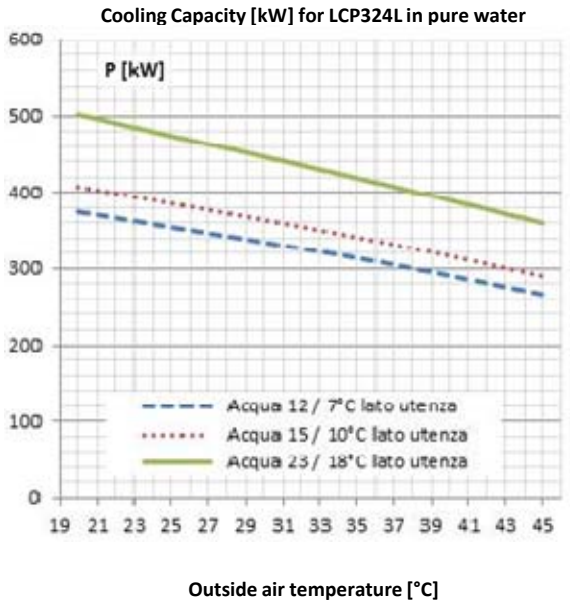


Outside air temperature [°C]

Total Absorbed Power [kW] for LCP294L in pure water



Outside air temperature [°C]



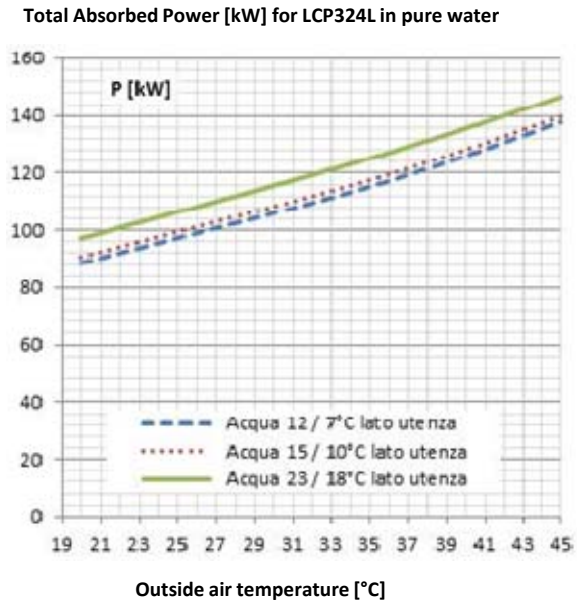
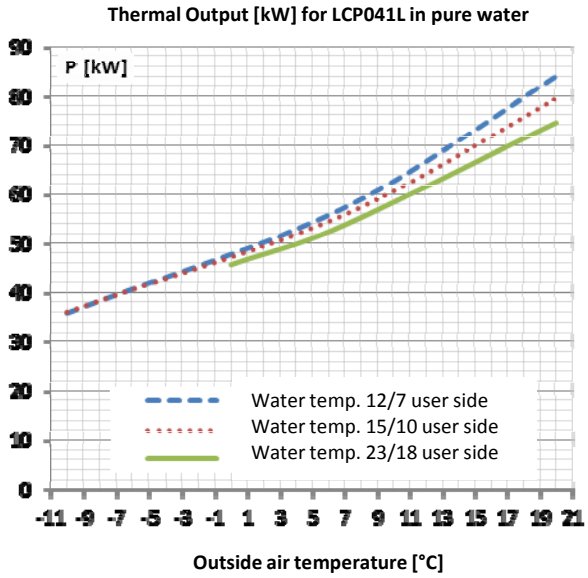
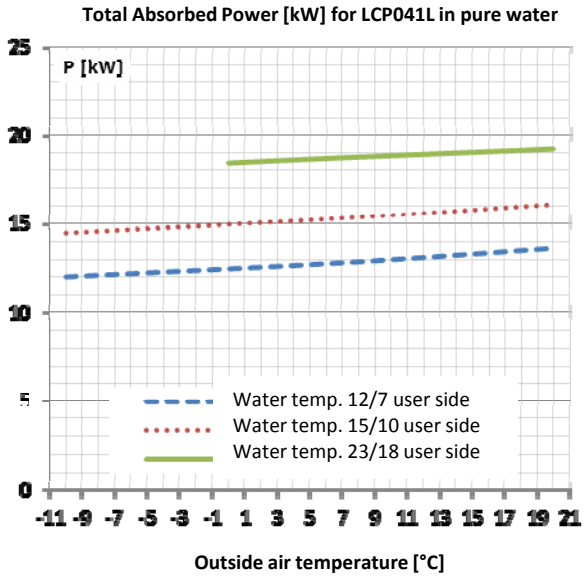
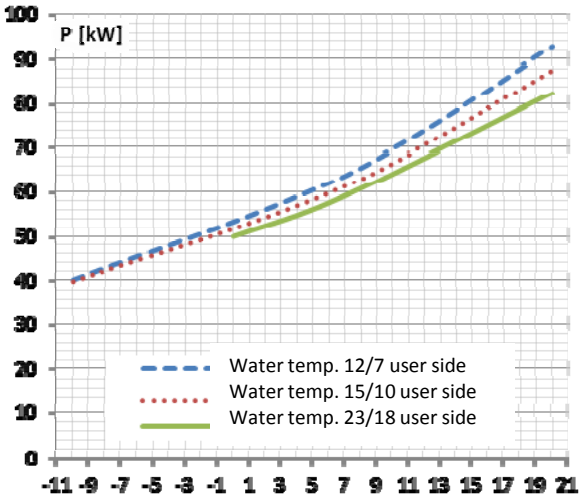


Table IV: performance of LCP ML and LCP PL machines in hot water production mode using water without glycol.

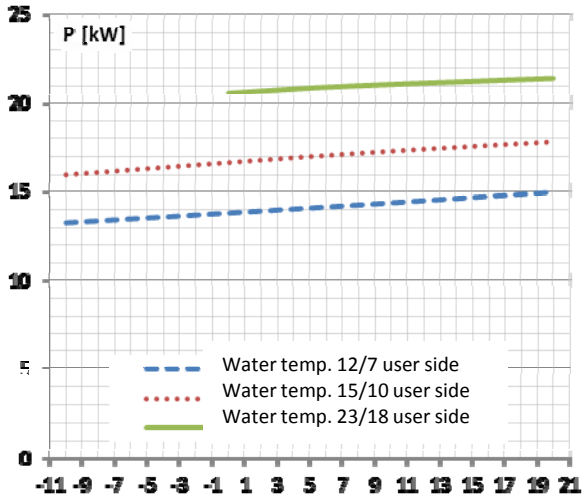




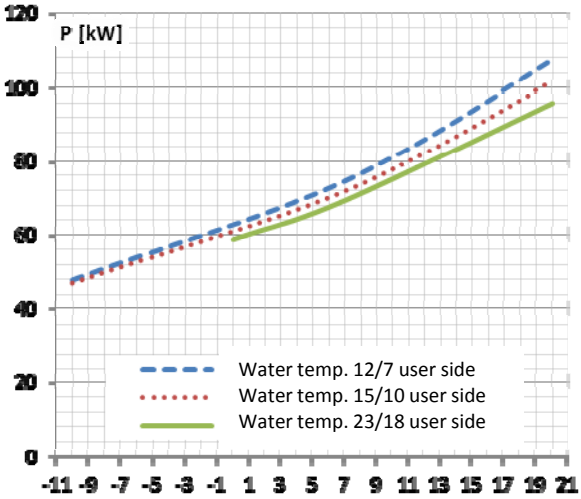
Thermal Output [kW] for LCP051L in pure water



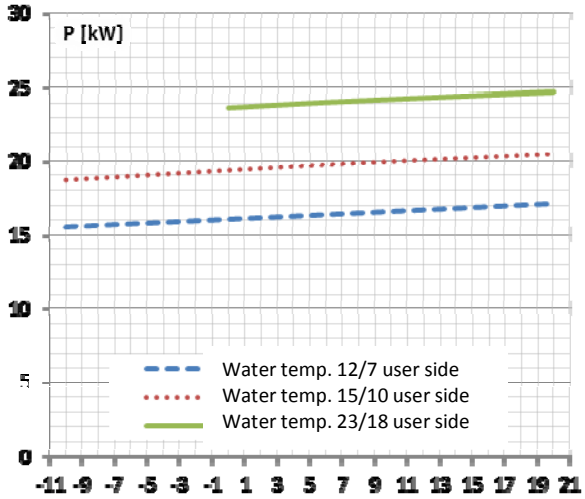
Total Absorbed Power [kW] for LCP051L in pure water



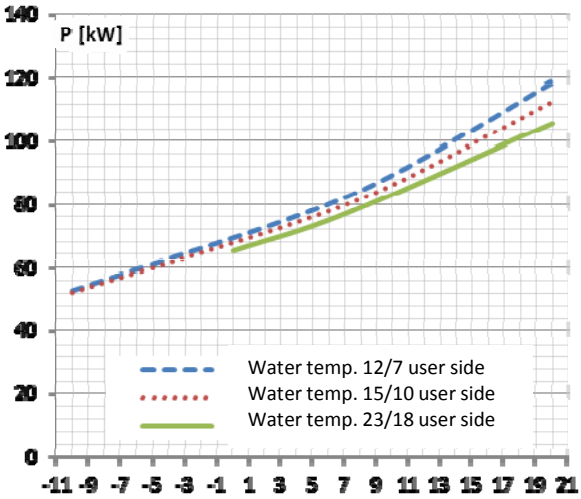
Thermal Output [kW] for LCP061L in pure water



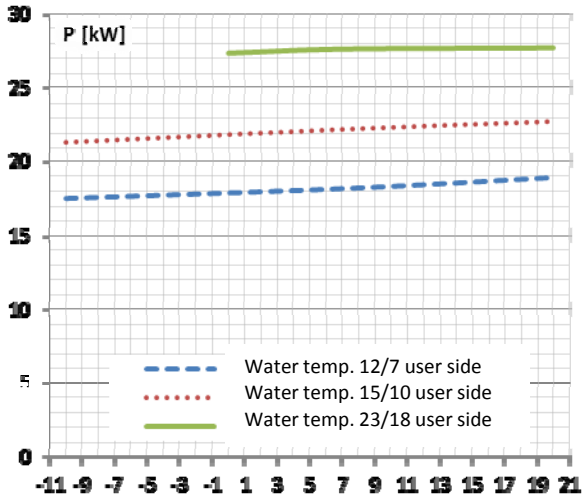
Total Absorbed Power [kW] for LCP061L in pure water



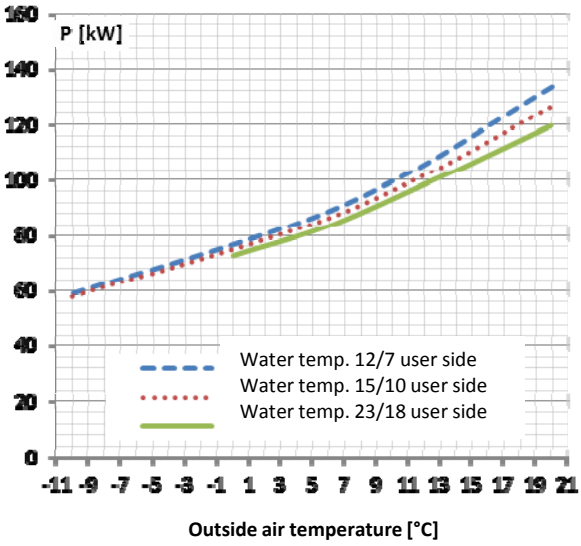
Thermal Output [kW] for LCP071L in pure water



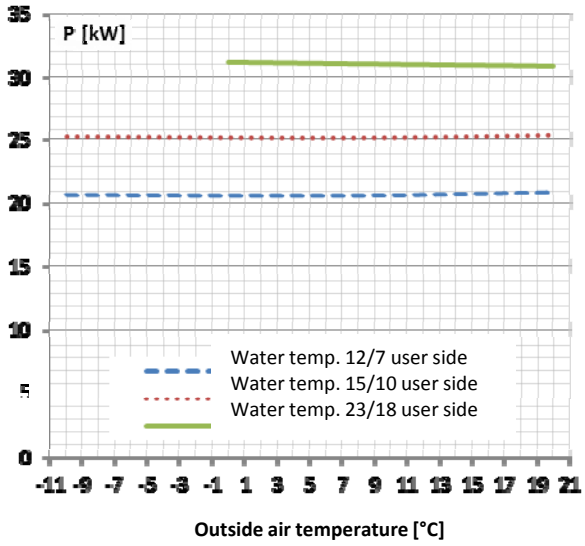
Total Absorbed Power [kW] for LCP071L in pure water



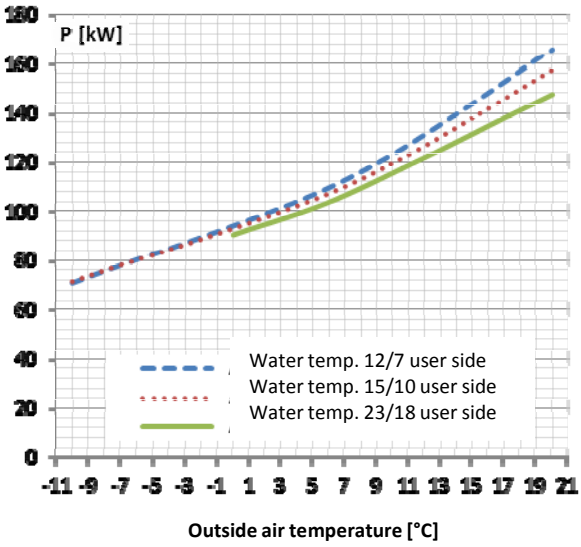
Thermal Output [kW] for LCP081L in pure water



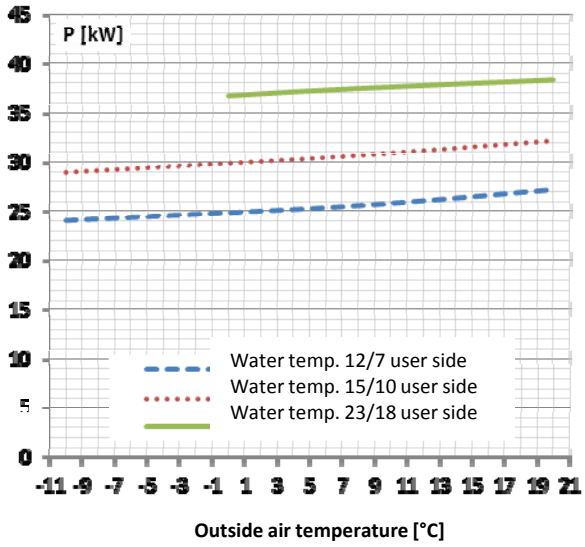
Total Absorbed Power [kW] for LCP081L in pure water



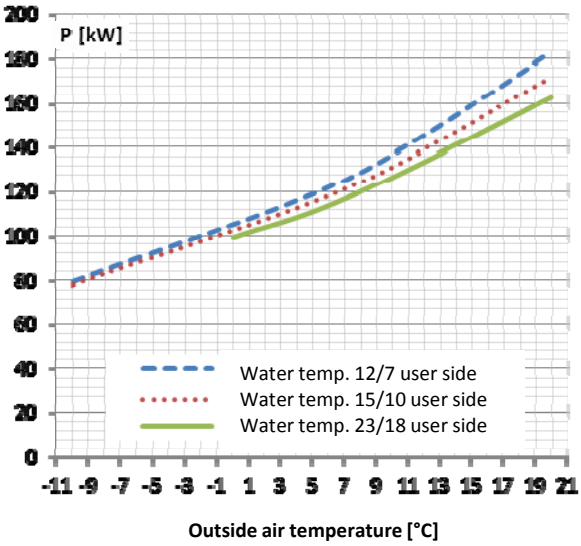
Thermal Output [kW] for LCP094L in pure water



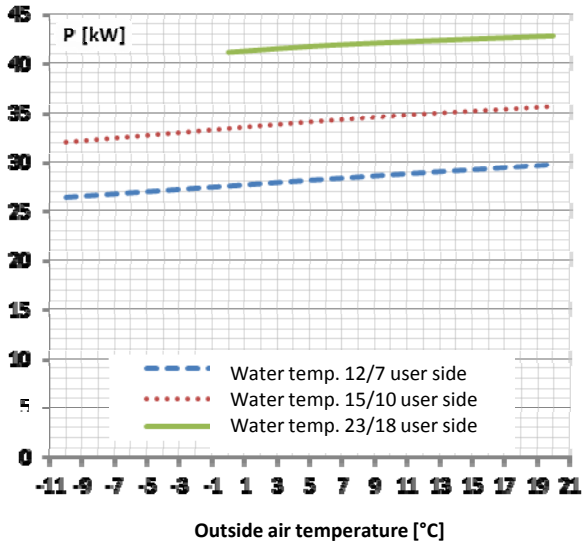
Total Absorbed Power [kW] for LCP094L in pure water



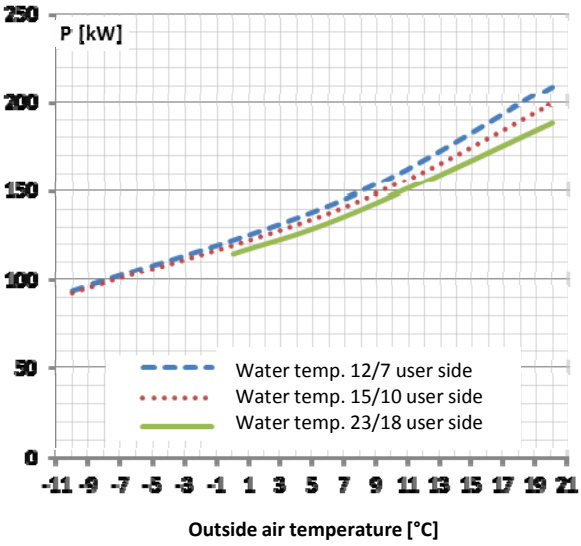
Thermal Output [kW] for LCP104L in pure water



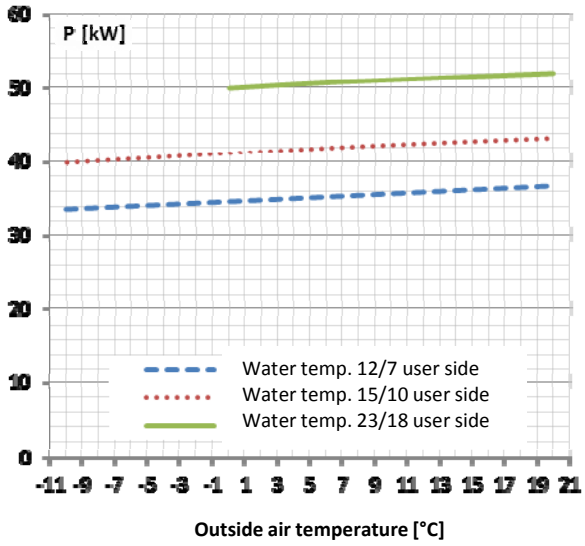
Total Absorbed Power [kW] for LCP104L in pure water



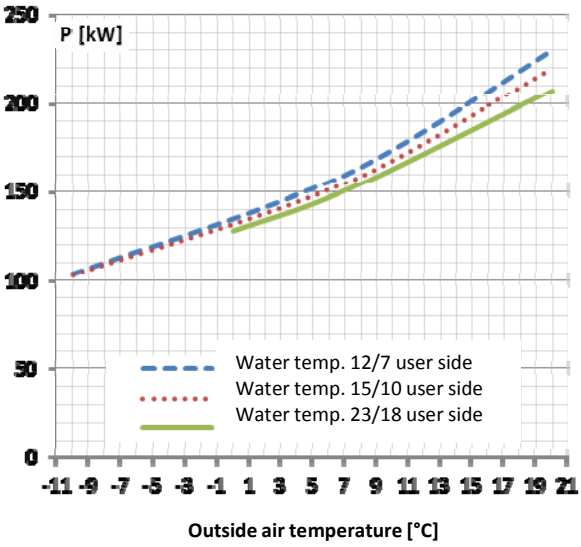
Thermal Output [kW] for LCP124L in pure water



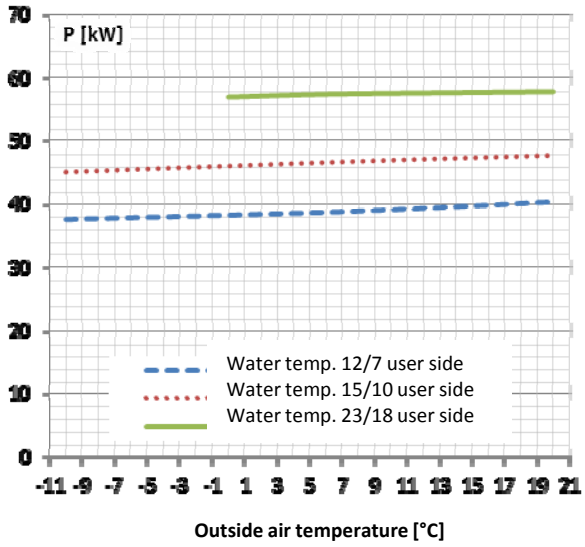
Total Absorbed Power [kW] for LCP124L in pure water



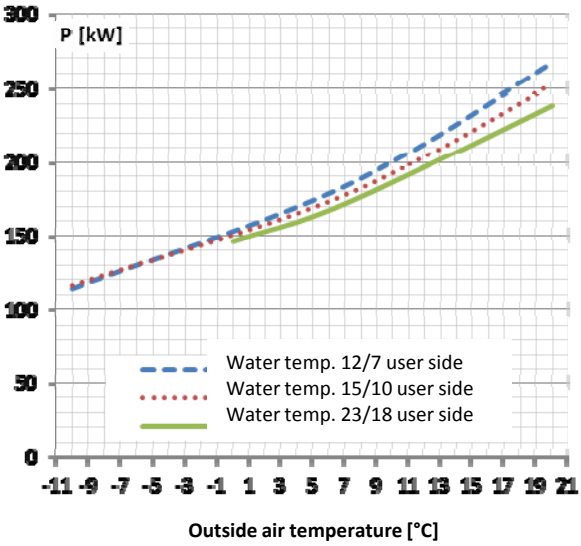
Thermal Output [kW] for LCP144L in pure water



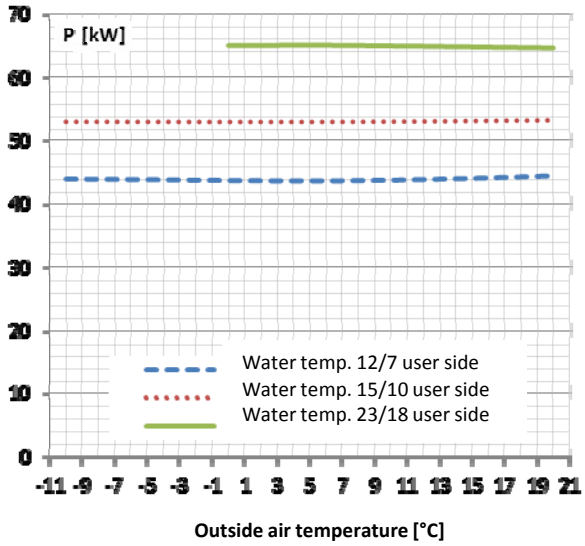
Total Absorbed Power [kW] for LCP144L in pure water



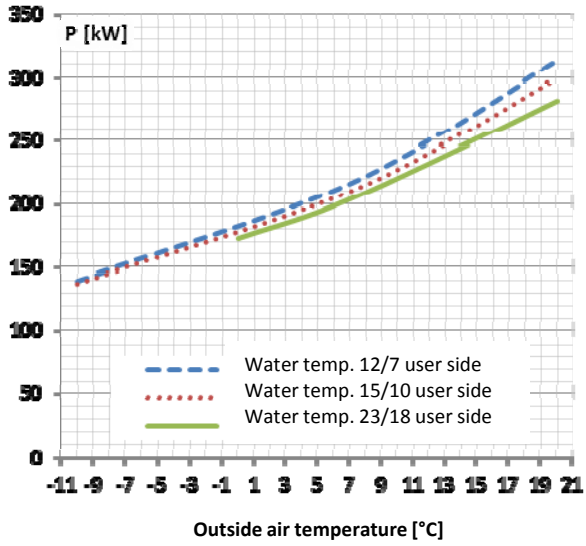
Thermal Output [kW] for LCP164L in pure water



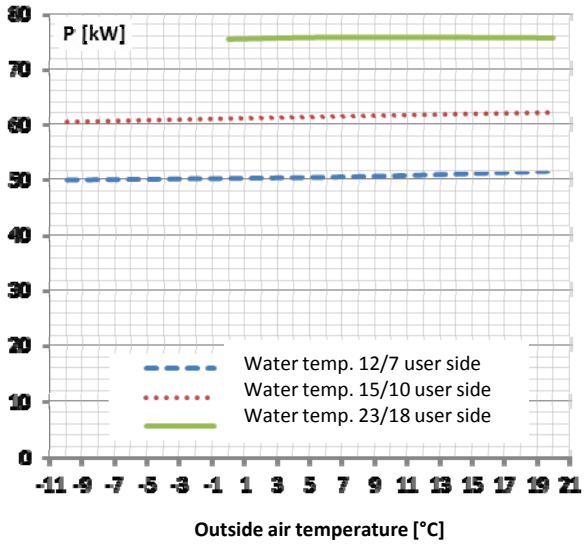
Total Absorbed Power [kW] for LCP164L in pure water



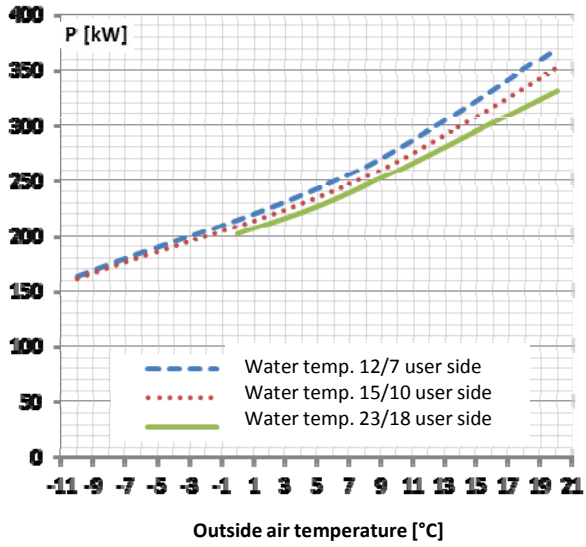
Thermal Output [kW] for LCP194L in pure water



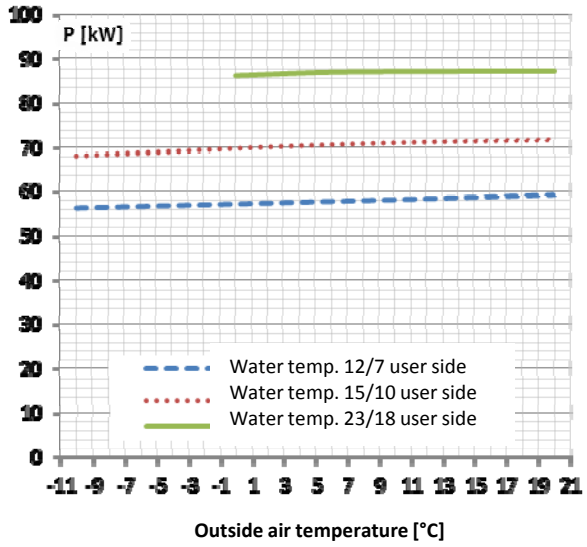
Total Absorbed Power [kW] for LCP194L in pure water



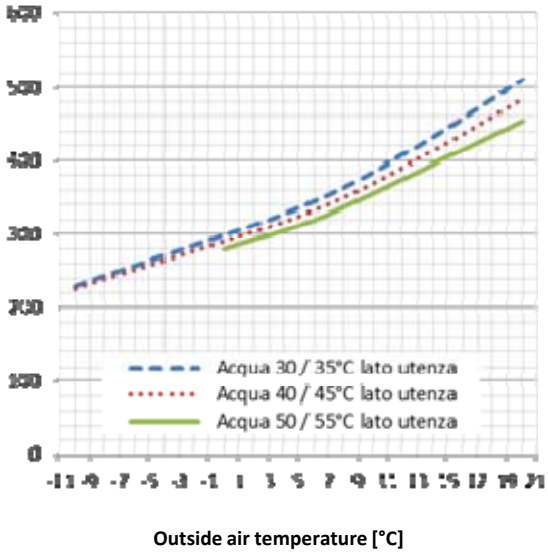
Thermal Output [kW] for LCP214L in pure water



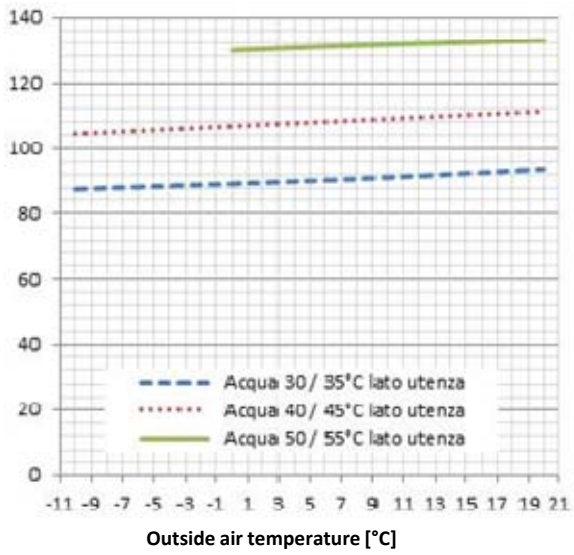
Total Absorbed Power [kW] for LCP214L in pure water



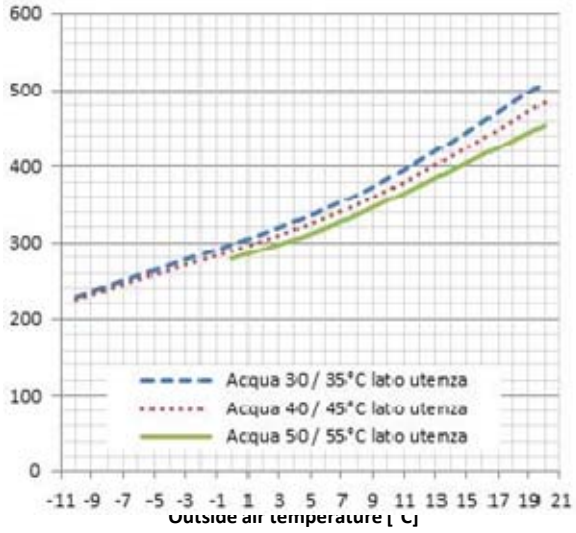
Thermal Output [kW] for LCP244L in pure water



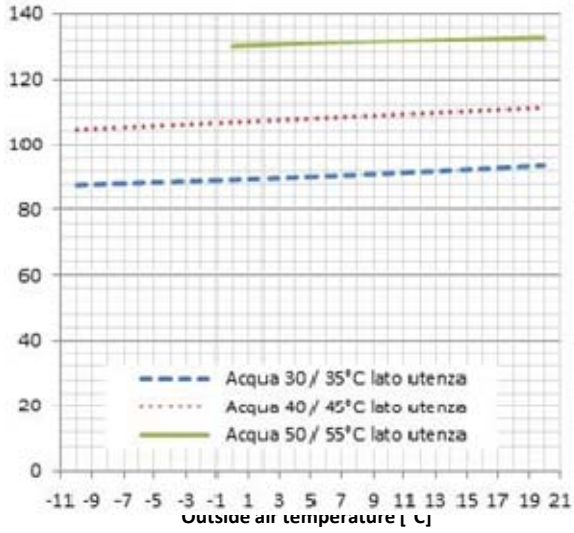
Total Absorbed Power [kW] for LCP244L in pure water



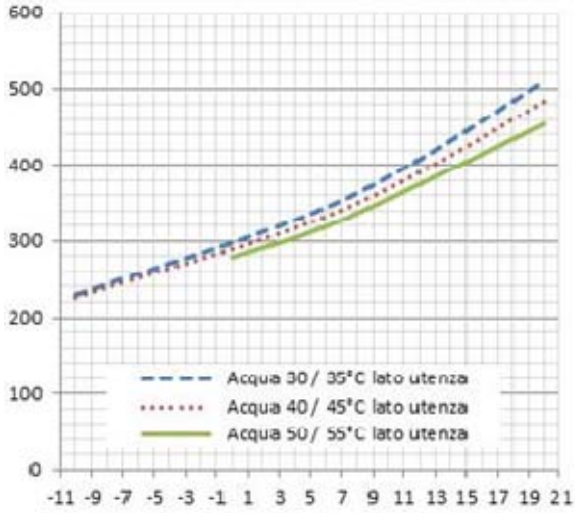
Thermal Output [kW] for LCP274L in pure water



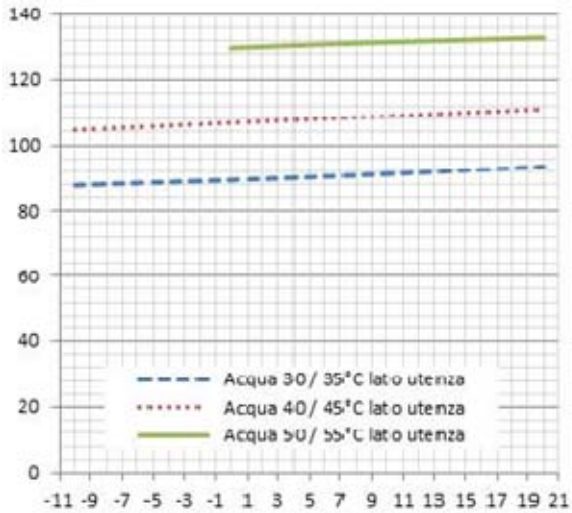
Total Absorbed Power [kW] for LCP274L in pure water



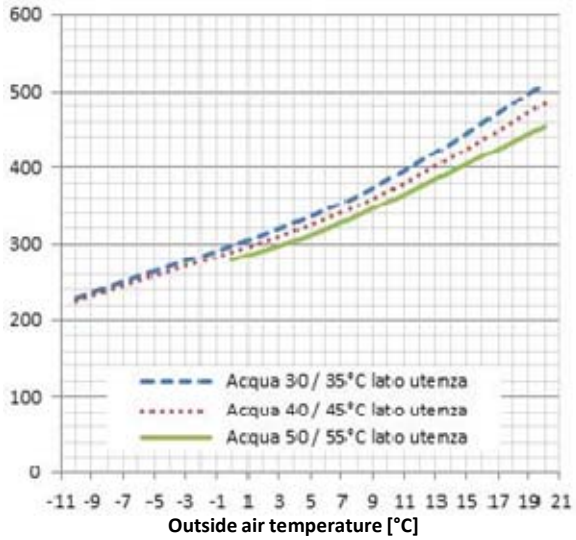
Thermal Output [kW] for LCP294L in pure water



Total Absorbed Power [kW] for LCP294L in pure water



Thermal Output [kW] for LCP324L in pure water



Total Absorbed Power [kW] for LCP324L in pure water

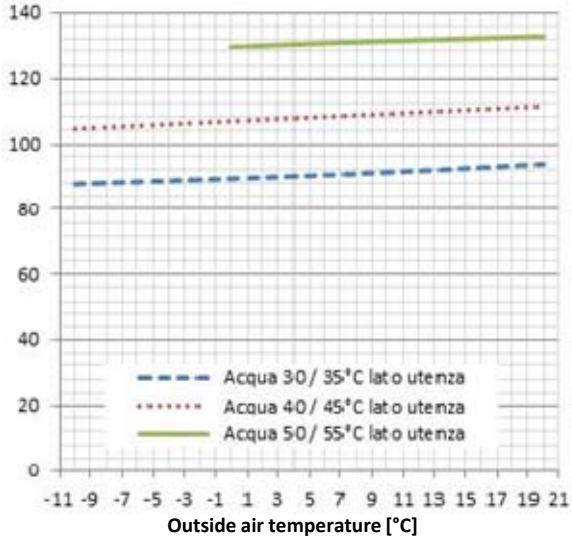
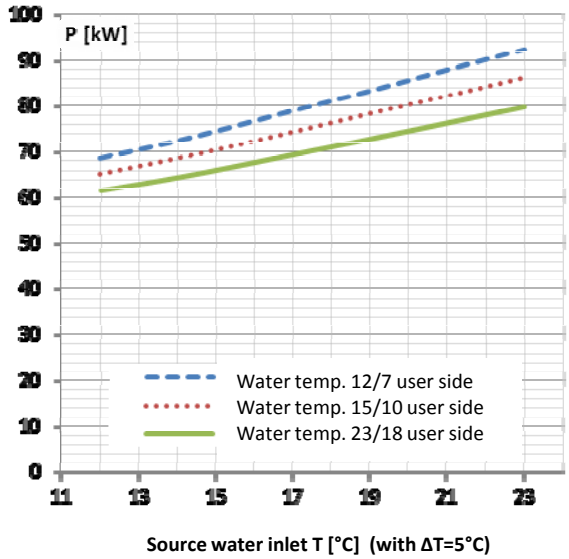
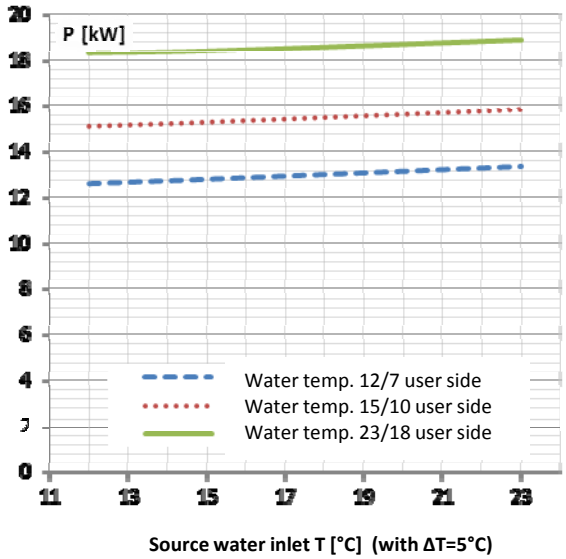


Table V: performance of LCP ML and LCP PL, LCP MS and LCP PS machines, in simultaneous hot and cold water production mode, by full heat recovery, using water without glycol.

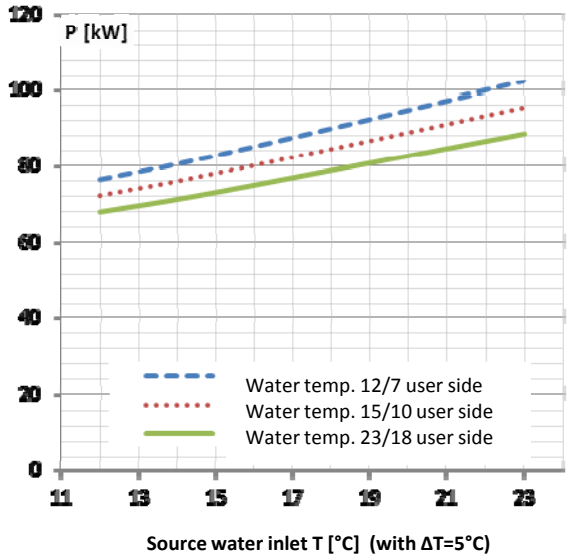
Thermal Output [kW] for LCP041 in pure water



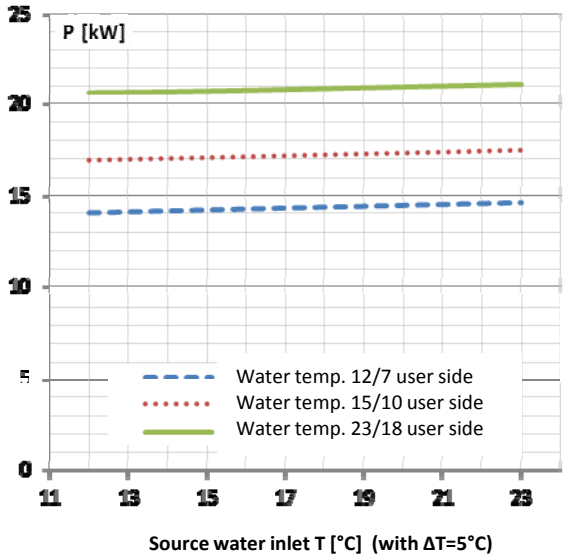
Compressor absorbed power [kW] for LCP041 in pure water



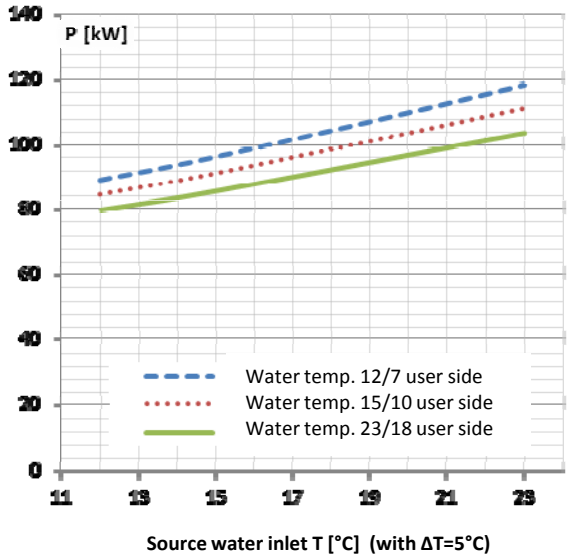
Thermal Output [kW] for LCP051 in pure water



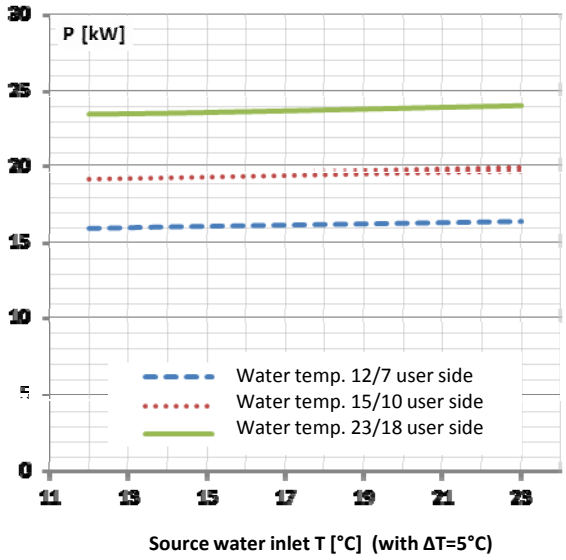
Compressor absorbed power [kW] for LCP051 in pure water



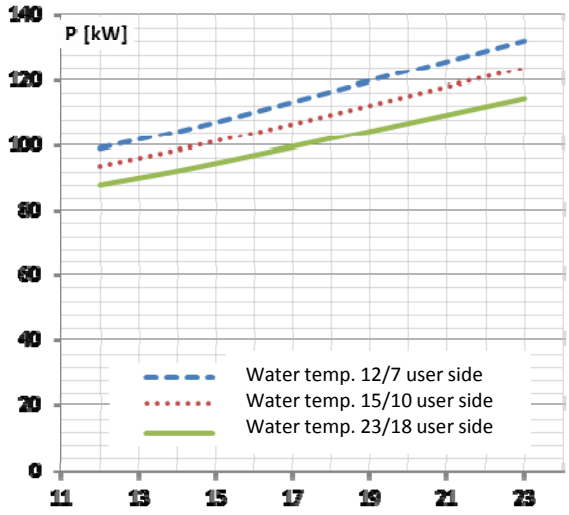
Thermal Output [kW] for LCP061 in pure water



Compressor absorbed power [kW] for LCP061 in pure water

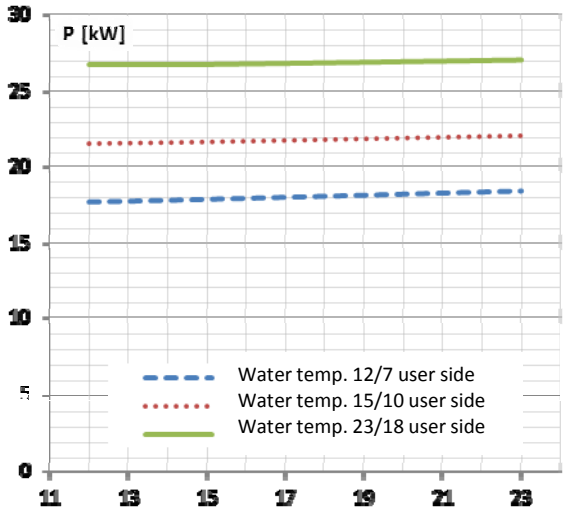


Thermal Output [kW] for LCP071 in pure water



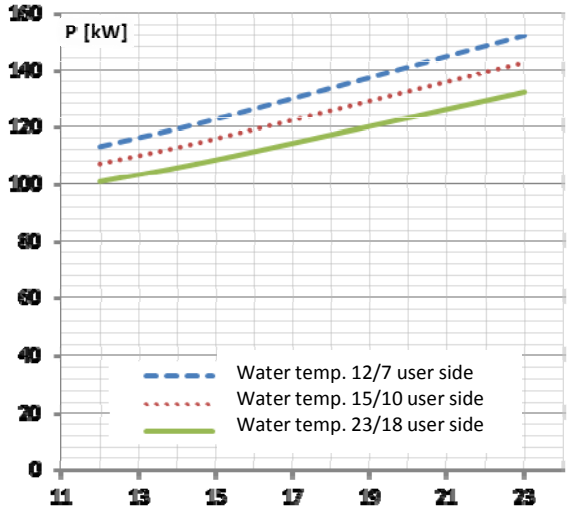
Source water inlet T [°C] (with ΔT=5°C)

Compressor absorbed power [kW] for LCP071 in pure water



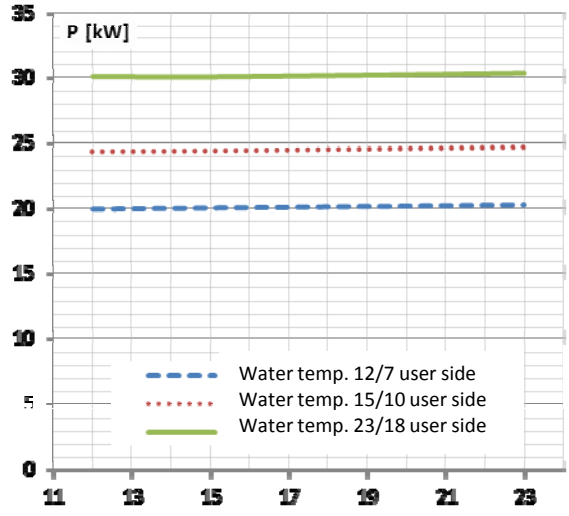
Source water inlet T [°C] (with ΔT=5°C)

Thermal Output [kW] for LCP081 in pure water



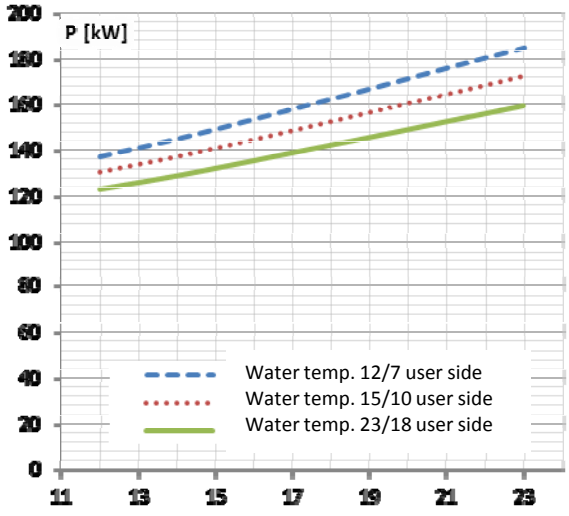
Source water inlet T [°C] (with ΔT=5°C)

Compressor absorbed power [kW] for LCP081 in pure water



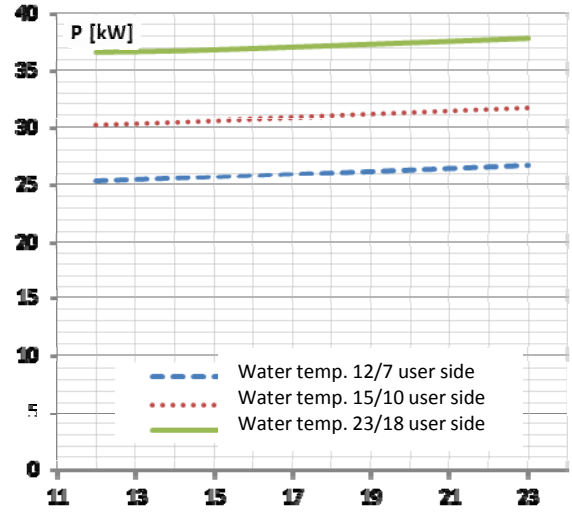
Source water inlet T [°C] (with ΔT=5°C)

Thermal Output [kW] for LCP094 in pure water



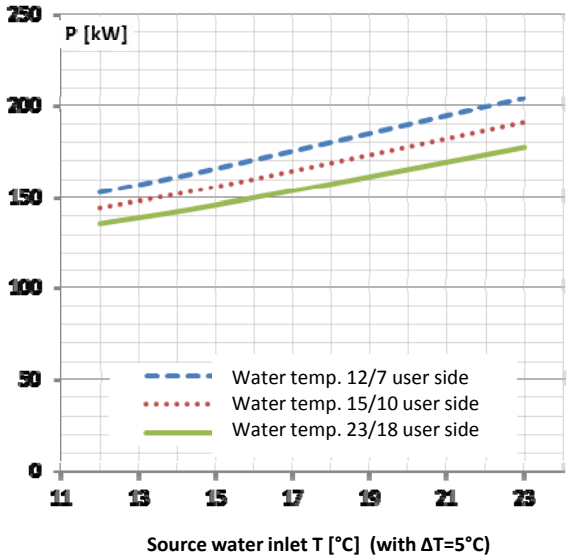
Source water inlet T [°C] (with ΔT=5°C)

Compressor absorbed power [kW] for LCP094 in pure water

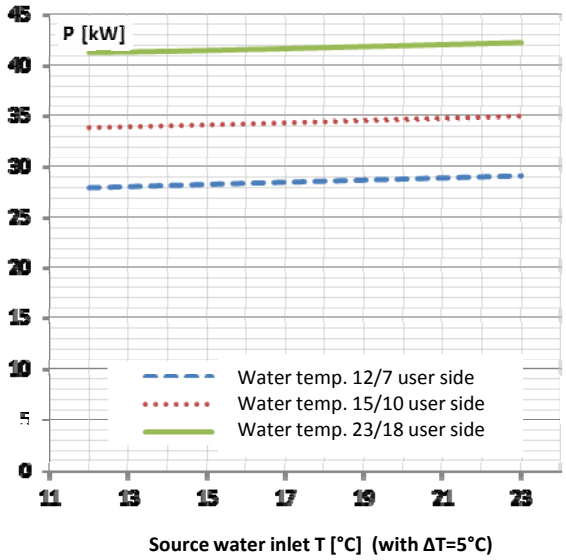


Source water inlet T [°C] (with ΔT=5°C)

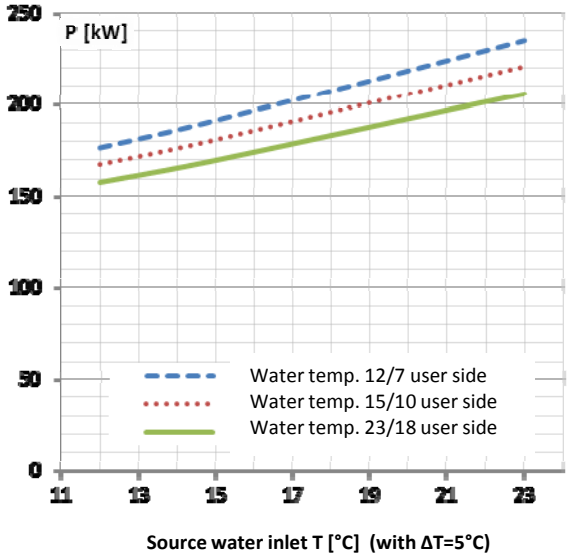
Thermal Output [kW] for LCP104 in pure water



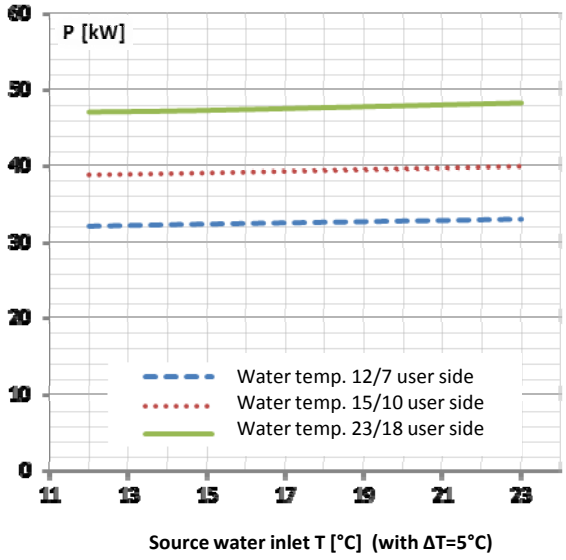
Compressor absorbed power [kW] for LCP104 in pure water



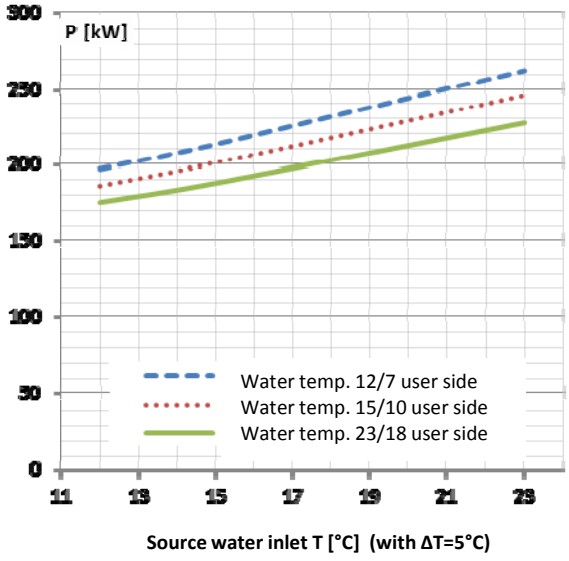
Thermal Output [kW] for LCP124 in pure water



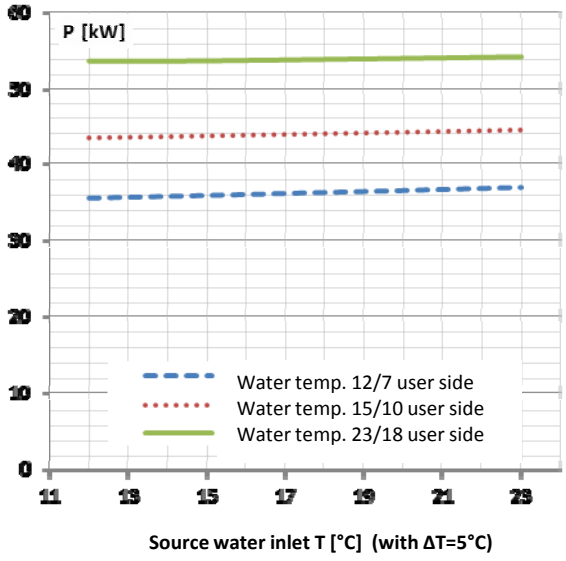
Compressor absorbed power [kW] for LCP124 in pure water



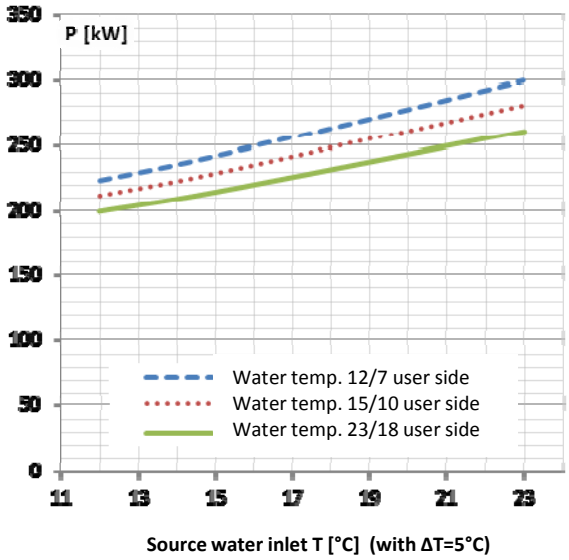
Thermal Output [kW] for LCP144 in pure water



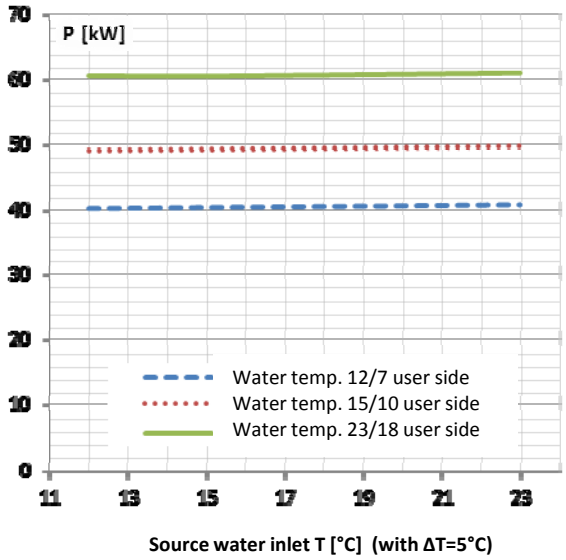
Compressor absorbed power [kW] for LCP144 in pure water



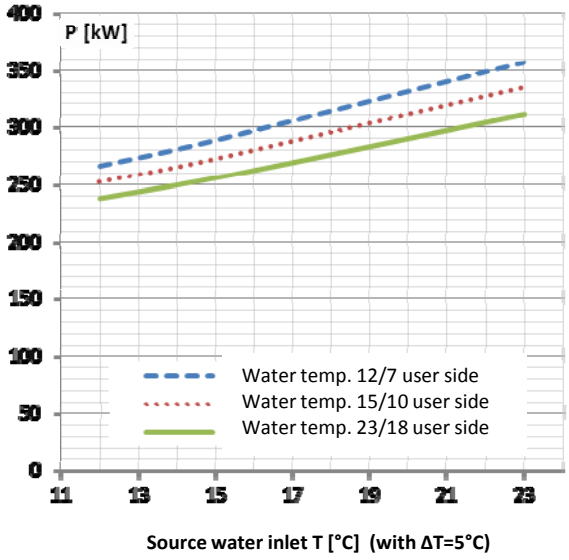
Thermal Output [kW] for LCP164 in pure water



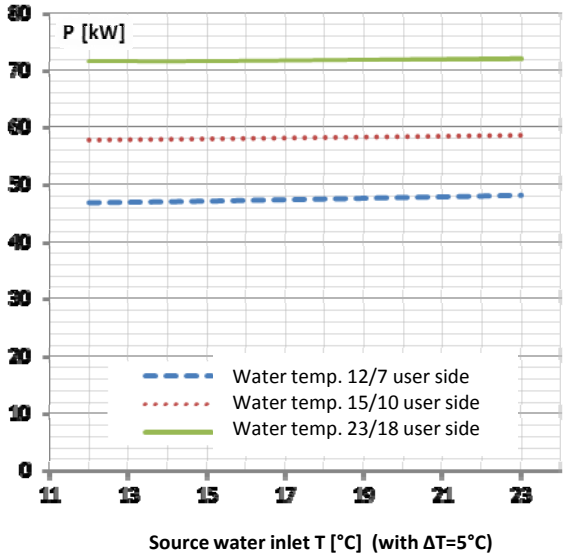
Compressor absorbed power [kW] for LCP164 in pure water



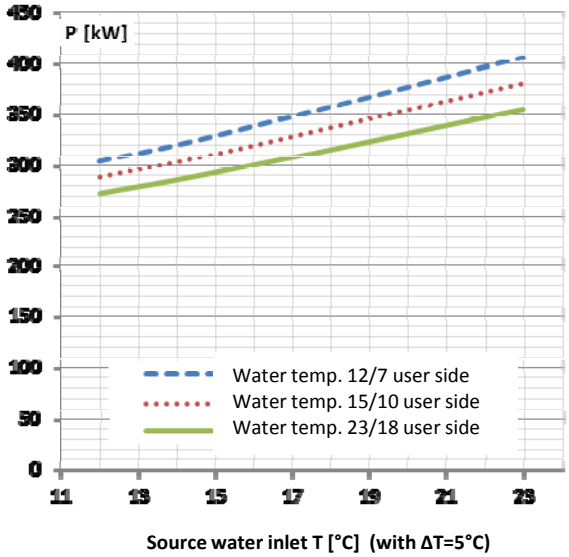
Thermal Output [kW] for LCP194 in pure water



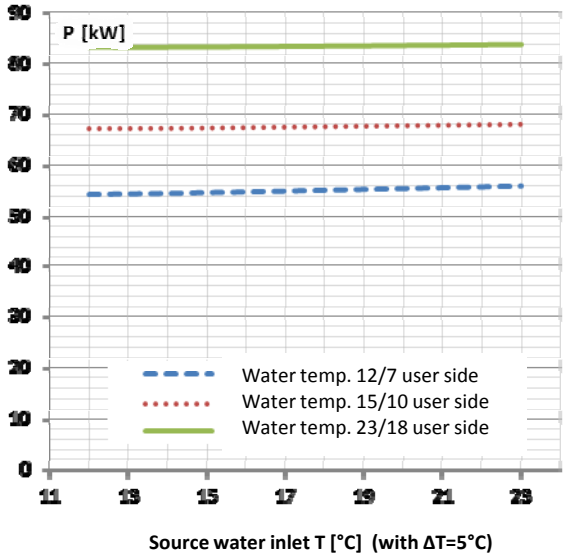
Compressor absorbed power [kW] for LCP194 in pure water



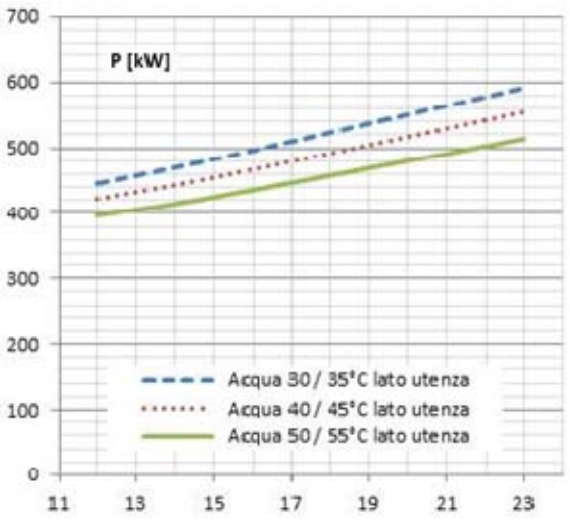
Thermal Output [kW] for LCP214 in pure water



Compressor absorbed power [kW] for LCP214 in pure water

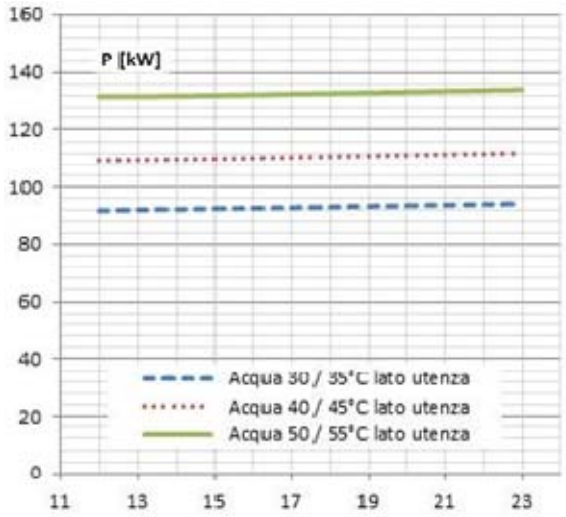


Thermal Output [kW] for LCP244 in pure water



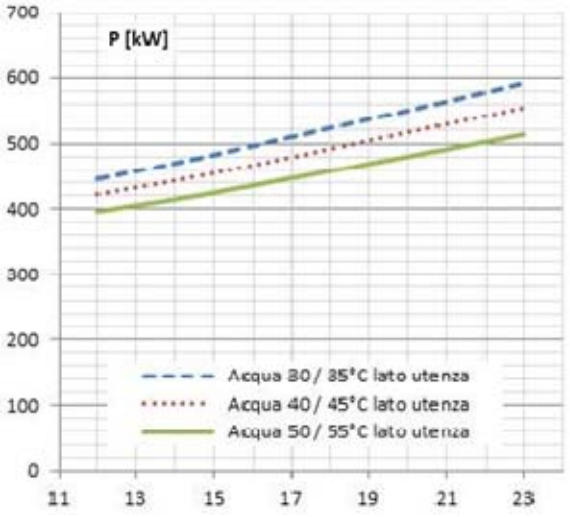
Source water inlet T [°C] (with ΔT=5°C)

Compressor absorbed power [kW] for LCP244 in pure water



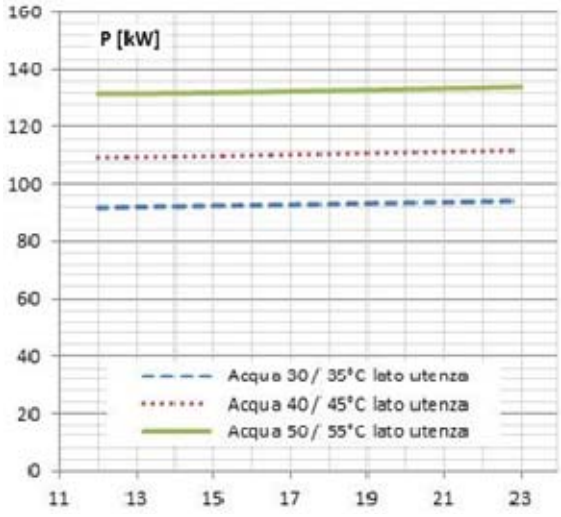
Source water inlet T [°C] (with ΔT=5°C)

Thermal Output [kW] for LCP274 in pure water



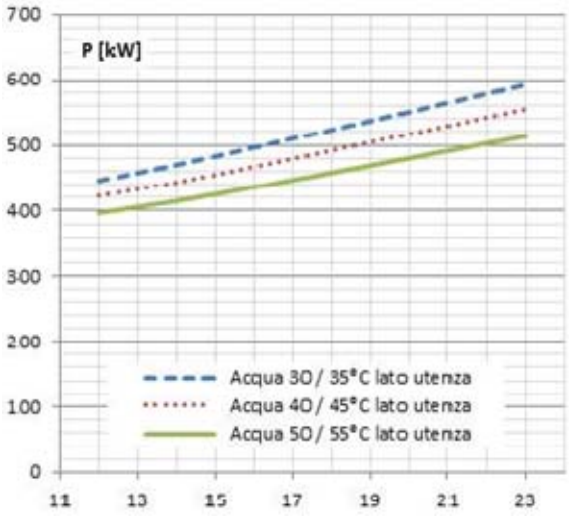
Source water inlet T [°C] (with ΔT=5°C)

Compressor absorbed power [kW] for LCP274 in pure water



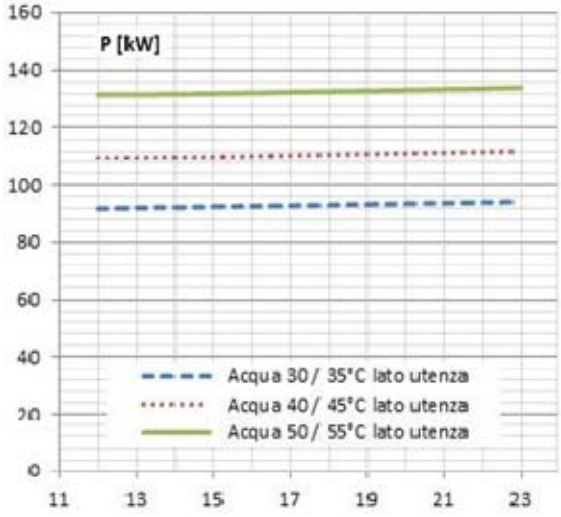
Source water inlet T [°C] (with ΔT=5°C)

Thermal Output [kW] for LCP294 in pure water



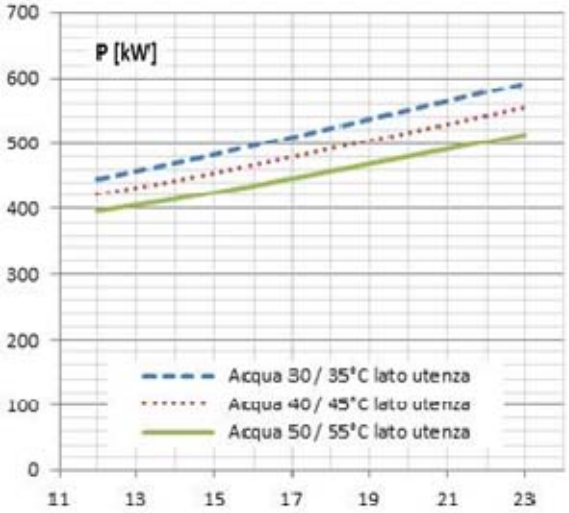
Source water inlet T [°C] (with ΔT=5°C)

Compressor absorbed power [kW] for LCP294 in pure water



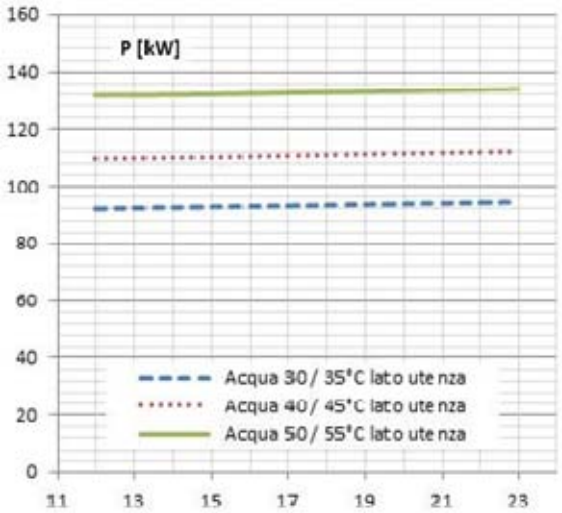
Source water inlet T [°C] (with ΔT=5°C)

Thermal Output [kW] for LCP324 in pure water



Source water inlet T [°C] (with ΔT=5°C)

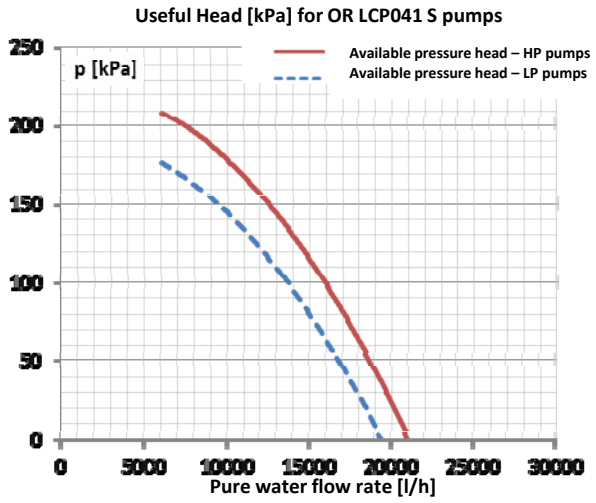
Compressor absorbed power [kW] for LCP324 in pure water



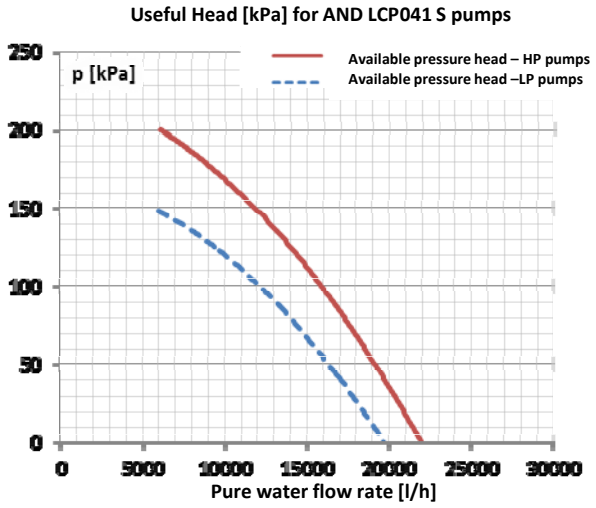
Source water inlet T [°C] (with ΔT=5°C)

2.2 Characteristic curves of the hydraulic pumps associated to the units

The graphs in these paragraphs express the useful head (net of the losses inside the units) of the high head (HP) and low head (LP) pumps available to the machine, both on the utility circuit and on the recovery circuit, in relation to water flow rate. Refer to the “Use of glycol solutions” paragraph to assess the effect of glycol on the useful head provided by the pumps. Below are the corrective coefficients to apply to the curves, calculated in pure water.

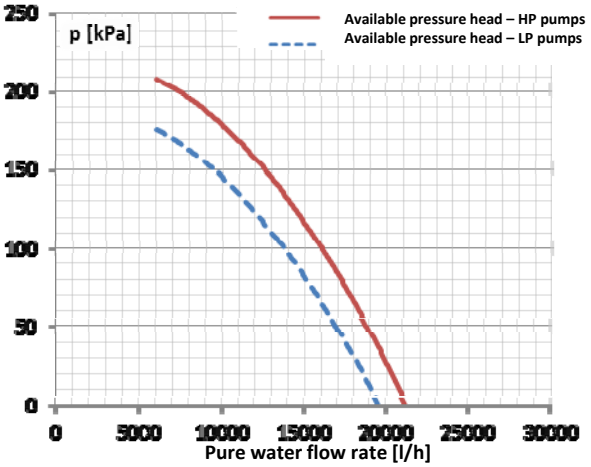


abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 1.5 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 3.2 [A]



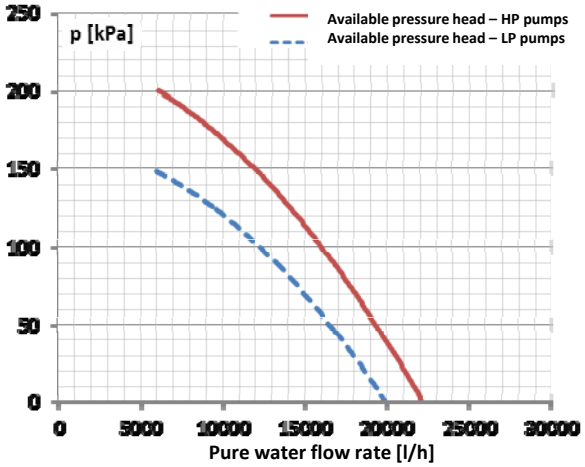
abs. nom. power LP: 0.9 [kW] abs. nom. power HP: 0.9 [kW]
abs. nom. current LP: 2.7 [A] abs. nom. current HP: 2.7 [A]

Useful Head [kPa] for OR LCP051 S pumps



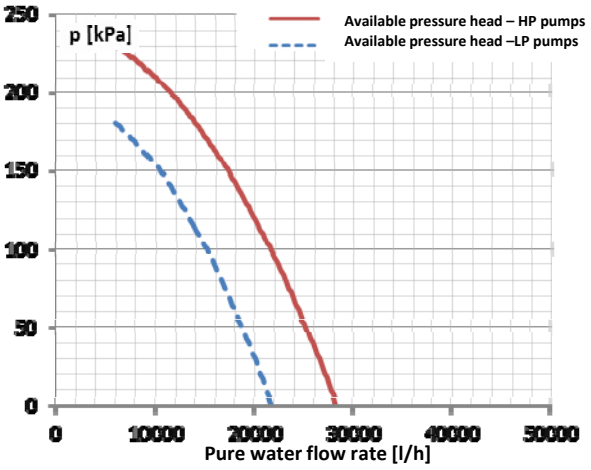
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 1.5 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 3.2 [A]

Useful Head [kPa] for AND LCP051 S pumps



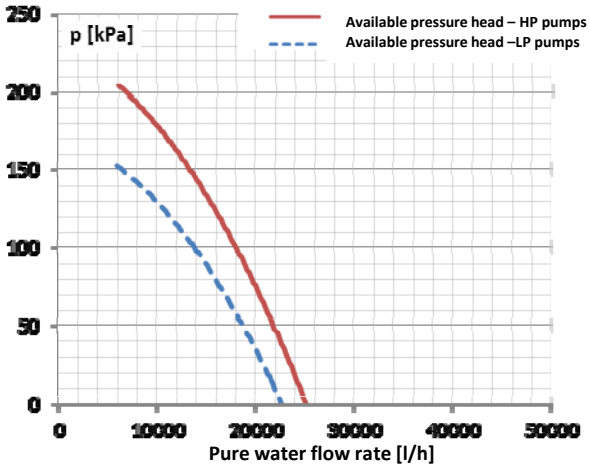
abs. nom. power LP: 0.9 [kW] abs. nom. power HP: 0.9 [kW]
abs. nom. current LP: 2.7 [A] abs. nom. current HP: 2.7 [A]

Useful Head [kPa] for OR LCP061 S pumps



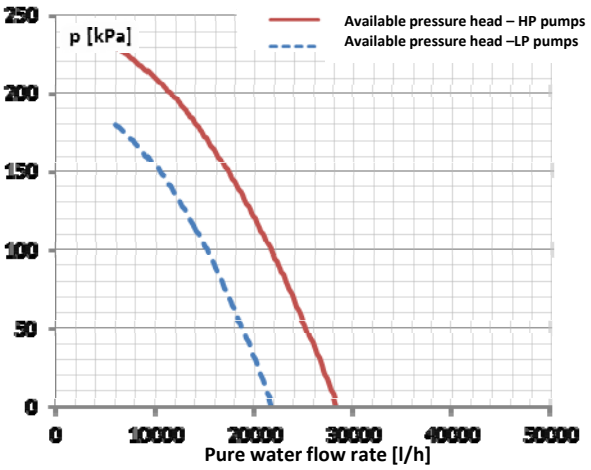
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for AND LCP061 S pumps



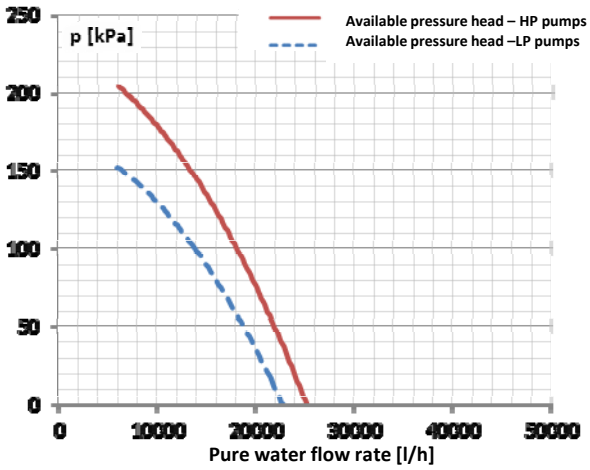
abs. nom. power LP: 0.9 [kW] abs. nom. power HP: 0.9 [kW]
abs. nom. current LP: 2.7 [A] abs. nom. current HP: 2.7 [A]

Useful Head [kPa] for OR LCP071 S pumps



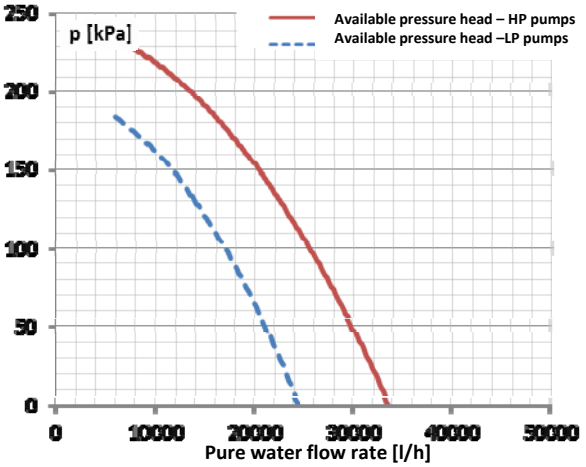
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for AND LCP071 S pumps



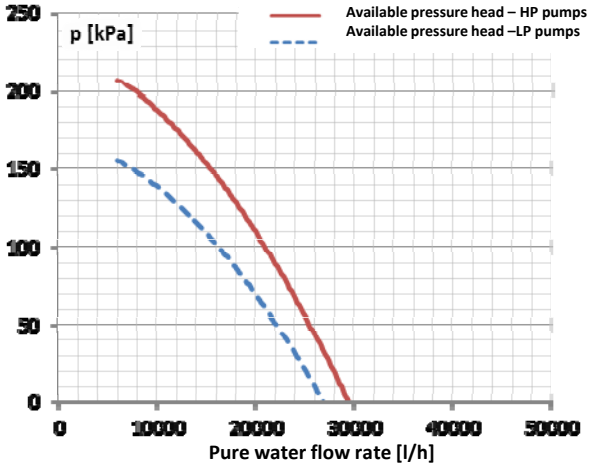
abs. nom. power LP: 0.9 [kW] abs. nom. power HP: 0.9 [kW]
abs. nom. current LP: 2.7 [A] abs. nom. current HP: 2.7 [A]

Useful Head [kPa] for OR LCP081 S pumps



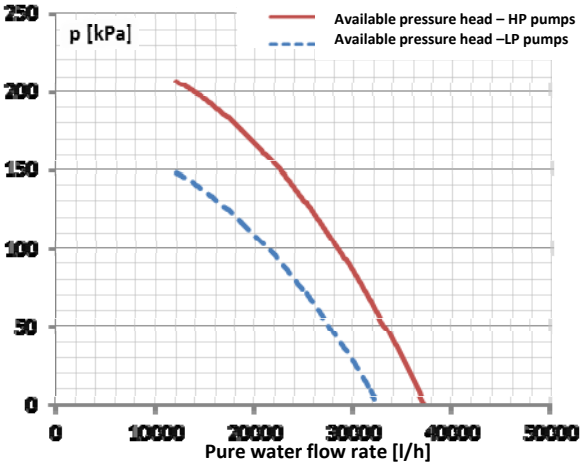
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for AND LCP081 S pumps



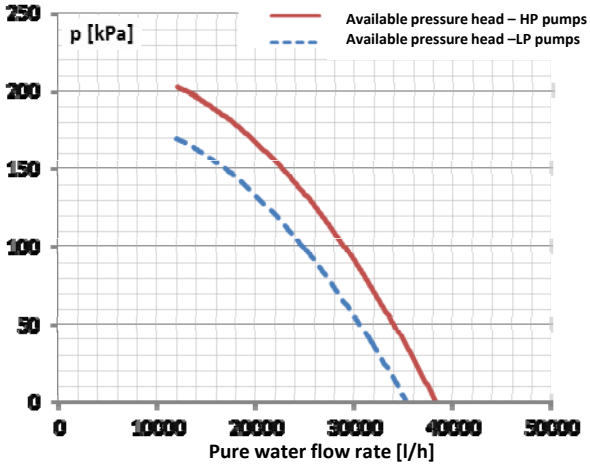
abs. nom. power LP: 0.9 [kW] abs. nom. power HP: 0.9 [kW]
abs. nom. current LP: 2.7 [A] abs. nom. current HP: 2.7 [A]

Useful Head [kPa] for OR LCP094 S pumps



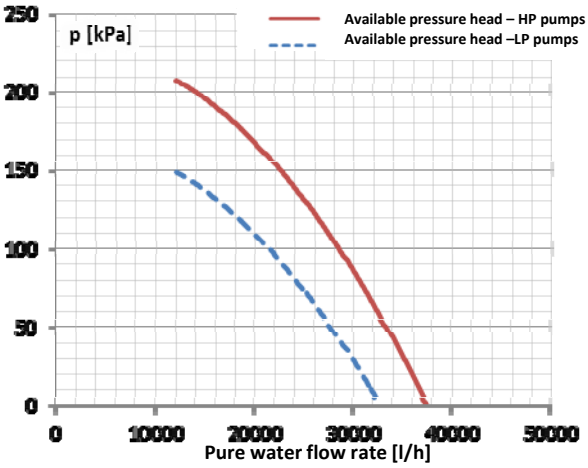
abs. nom. power LP: 1.5 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 3.4 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for AND LCP094 S pumps



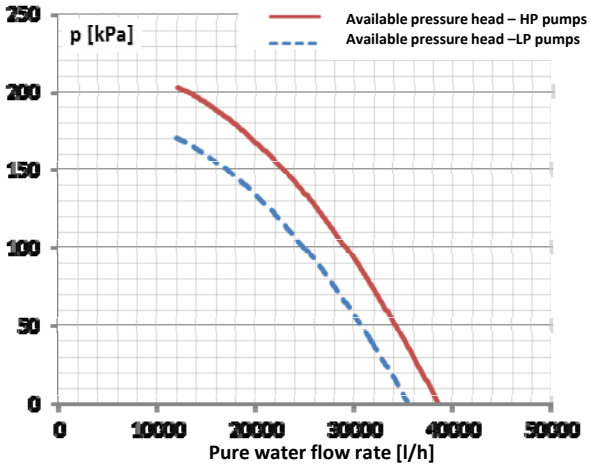
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 1.5 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 3.2 [A]

Useful Head [kPa] for OR LCP104 S pumps



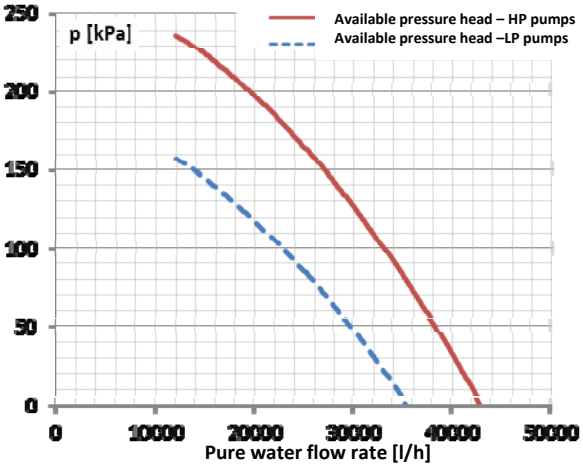
abs. nom. power LP: 1.5 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 3.4 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for AND LCP104 S pumps



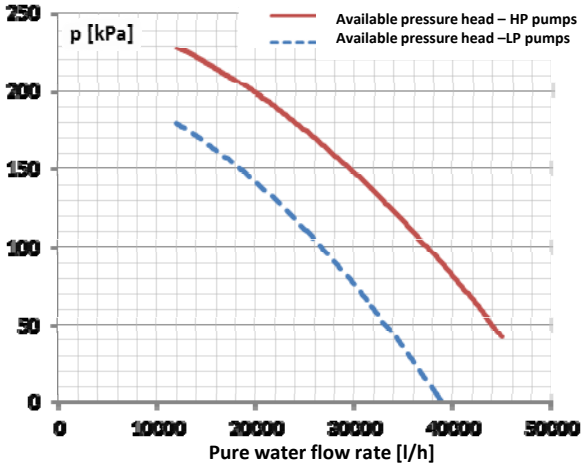
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 1.5 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 3.2 [A]

Useful Head [kPa] for OR LCP124 S pumps



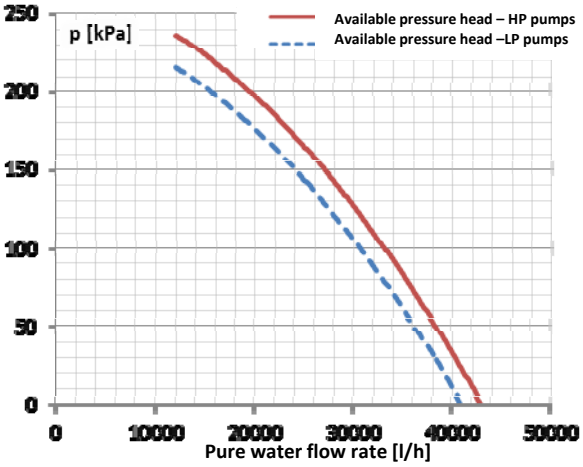
abs. nom. power LP: 1.5 [kW] abs. nom. power HP: 3 [kW]
abs. nom. current LP: 3.4 [A] abs. nom. current HP: 5.6 [A]

Useful Head [kPa] for AND LCP124 S pumps



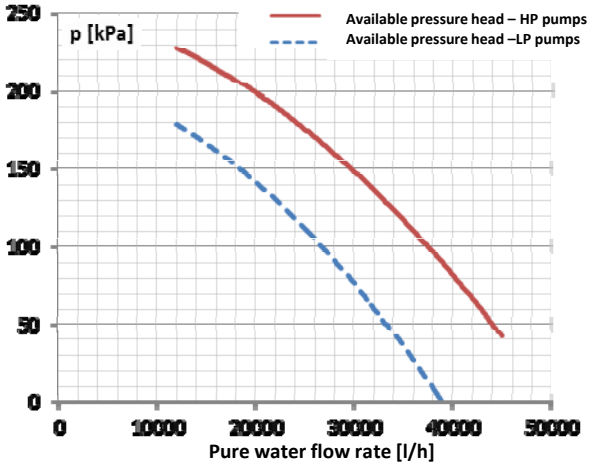
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for OR LCP144 S pumps



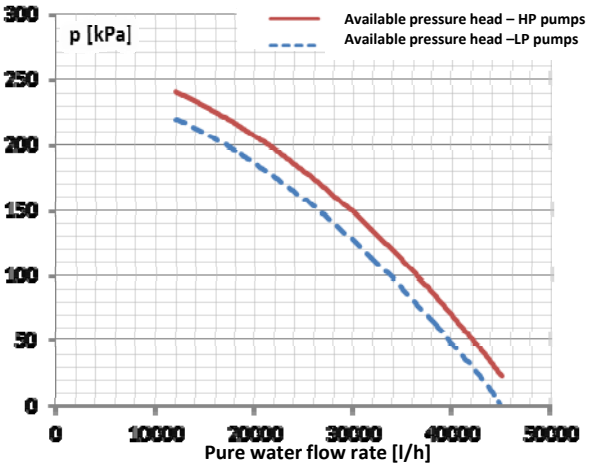
abs. nom. power LP: 2.2 [kW] abs. nom. power HP: 3 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 5.6 [A]

Useful Head [kPa] for AND LCP144 S pumps



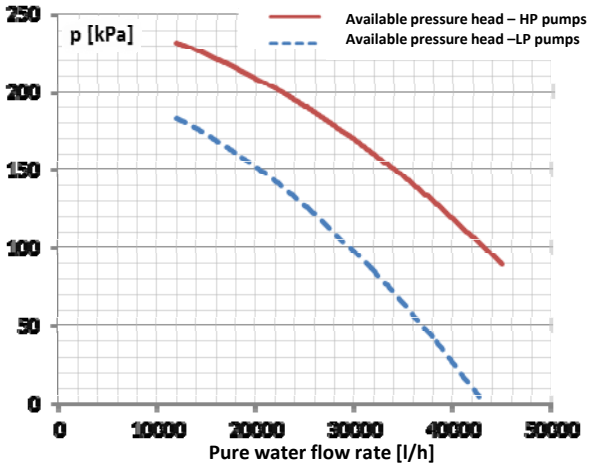
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for OR LCP164 S pumps



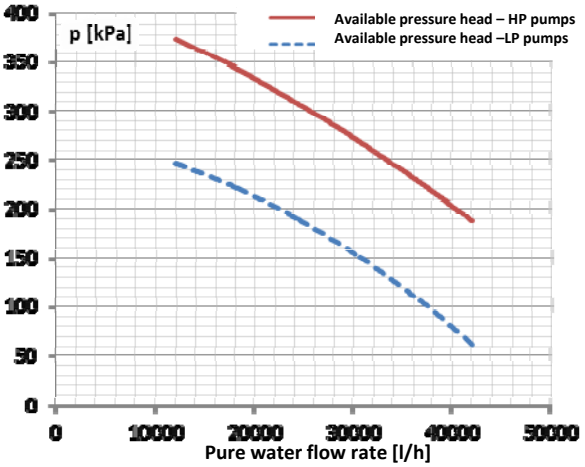
abs. nom. power LP: 2.2 [kW] abs. nom. power HP: 3 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 5.6 [A]

Useful Head [kPa] for AND LCP164 S pumps



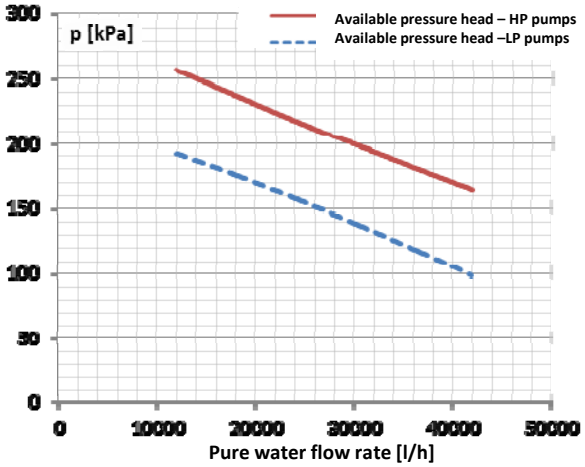
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for OR LCP194 S pumps



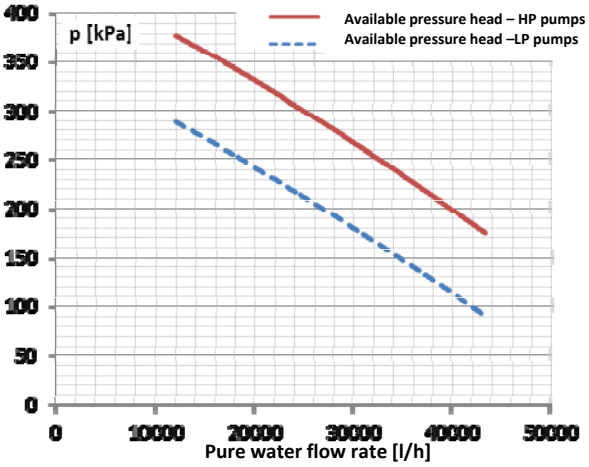
abs. nom. power LP: 2.8 [kW] abs. nom. power HP: 5.1 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 9.2 [A]

Useful Head [kPa] for AND LCP194 S pumps



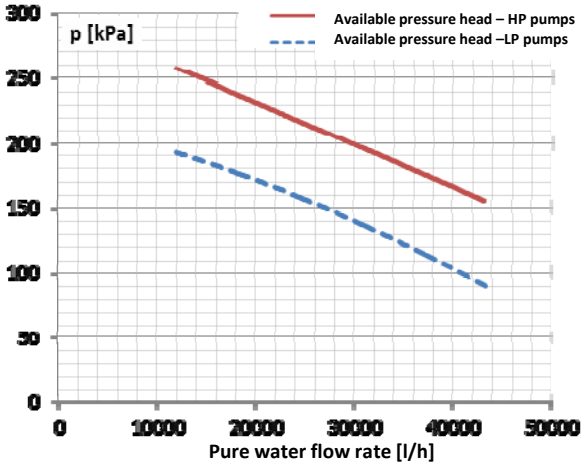
abs. nom. power LP: 2 [kW] abs. nom. power HP: 2.8 [kW]
abs. nom. current LP: 3.4 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for OR LCP214 S pumps



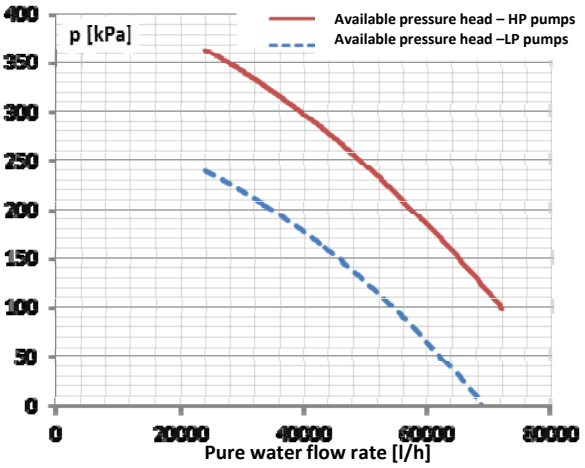
abs. nom. power LP: 3.7 [kW] abs. nom. power HP: 5.1 [kW]
abs. nom. current LP: 6.8 [A] abs. nom. current HP: 9.2 [A]

Useful Head [kPa] for AND LCP214 S pumps



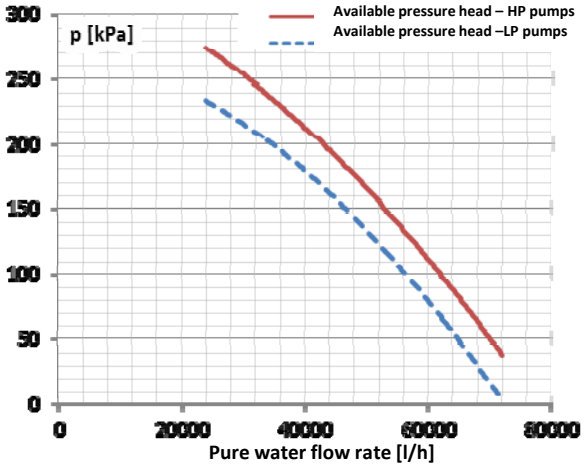
abs. nom. power LP: 2 [kW] abs. nom. power HP: 2.8 [kW]
abs. nom. current LP: 3.4 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for OR LCP244 S pumps



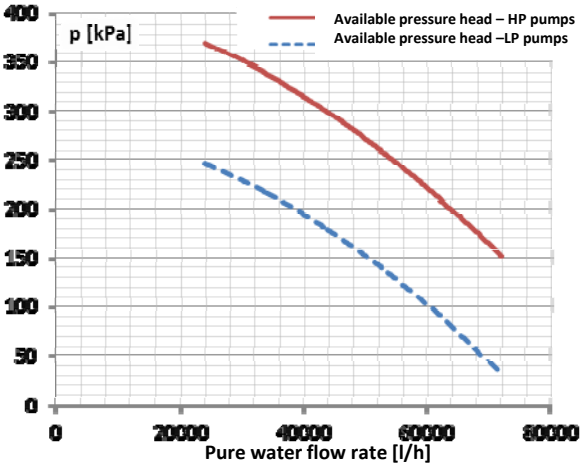
abs. nom. power LP: 4 [kW] abs. nom. power HP: 7.5 [kW]
abs. nom. current LP: 9.2 [A] abs. nom. current HP: 12.5 [A]

Useful Head [kPa] for AND LCP244 S pumps



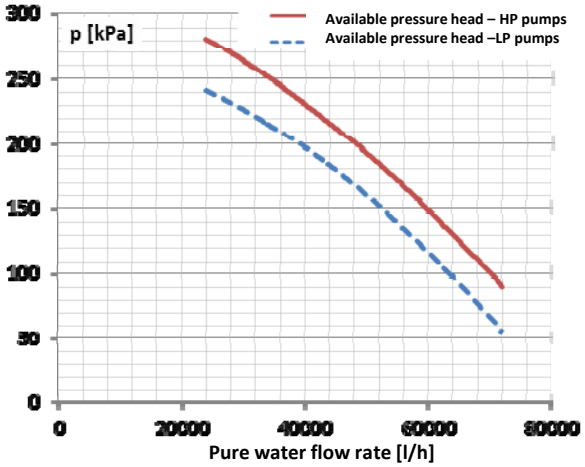
abs. nom. power LP: 2.8 [kW] abs. nom. power HP: 3.7 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 6.8 [A]

Useful Head [kPa] for OR LCP274 S pumps



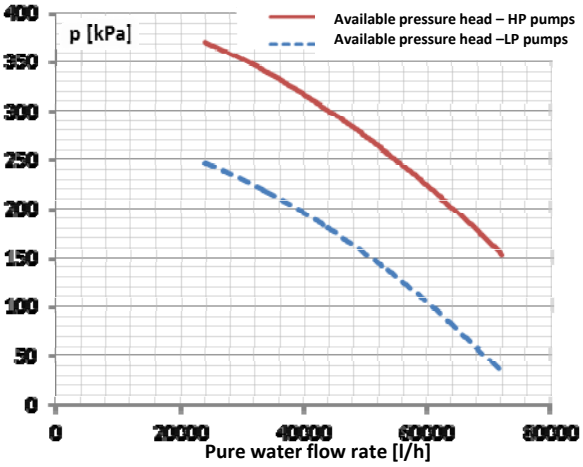
abs. nom. power LP: 4 [kW] abs. nom. power HP: 7.5 [kW]
abs. nom. current LP: 9.2 [A] abs. nom. current HP: 12.5 [A]

Useful Head [kPa] for AND LCP274 S pumps



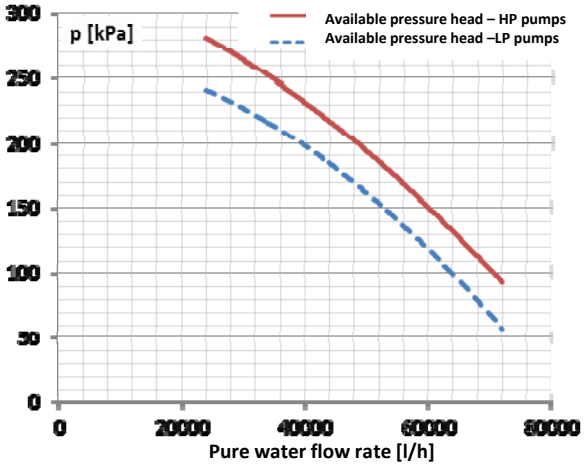
abs. nom. power LP: 2.8 [kW] abs. nom. power HP: 3.7 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 6.8 [A]

Useful Head [kPa] for OR LCP294 S pumps



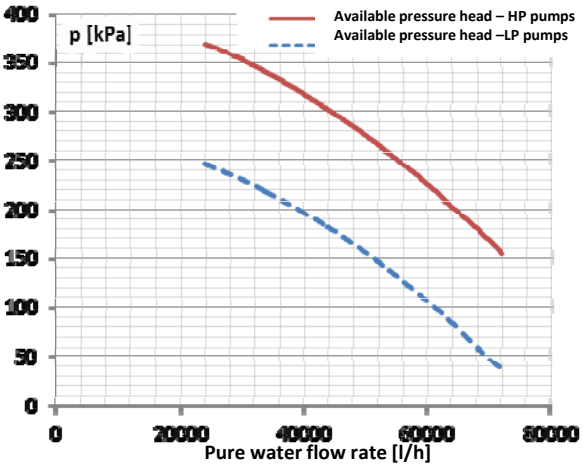
abs. nom. power LP: 4 [kW] abs. nom. power HP: 7.5 [kW]
abs. nom. current LP: 9.2 [A] abs. nom. current HP: 12.5 [A]

Useful Head [kPa] for AND LCP294 S pumps



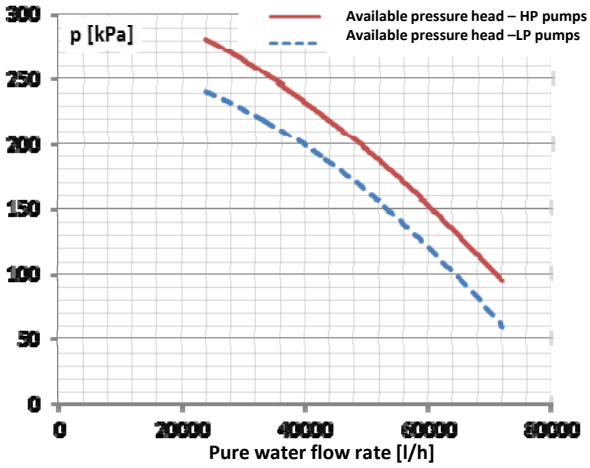
abs. nom. power LP: 2.8 [kW] abs. nom. power HP: 3.7 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 6.8 [A]

Useful Head [kPa] for OR LCP324 S pumps



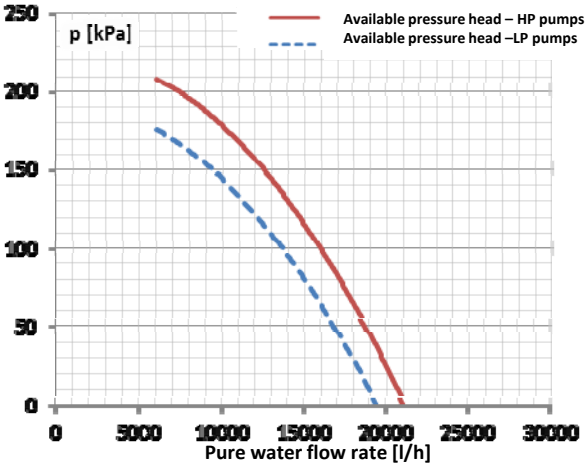
abs. nom. power LP: 4 [kW] abs. nom. power HP: 7.5 [kW]
abs. nom. current LP: 9.2 [A] abs. nom. current HP: 12.5 [A]

Useful Head [kPa] for AND LCP324 S pumps



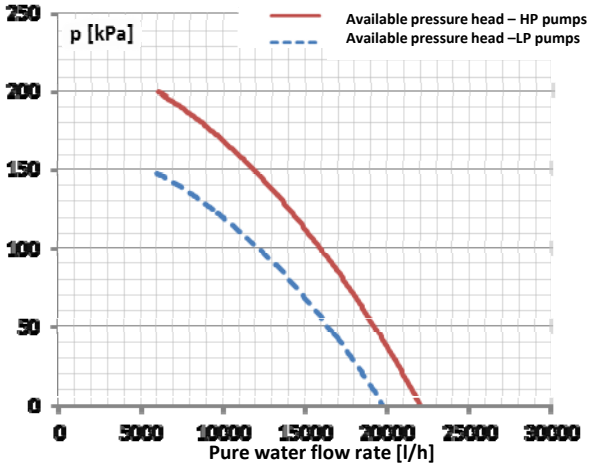
abs. nom. power LP: 2.8 [kW] abs. nom. power HP: 3.7 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 6.8 [A]

Useful Head [kPa] for OR LCP041L pumps



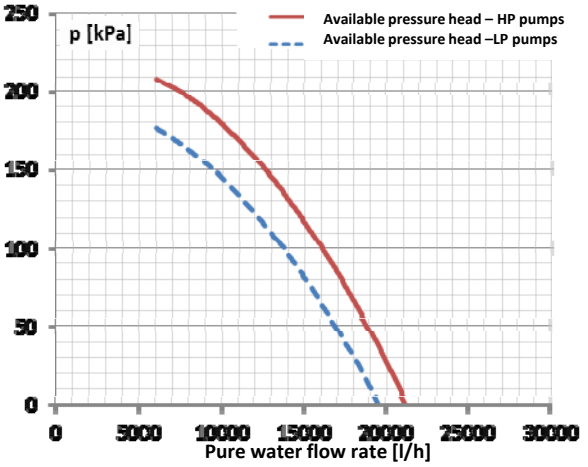
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 1.5 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 3.2 [A]

Useful Head [kPa] for AND LCP041L pumps



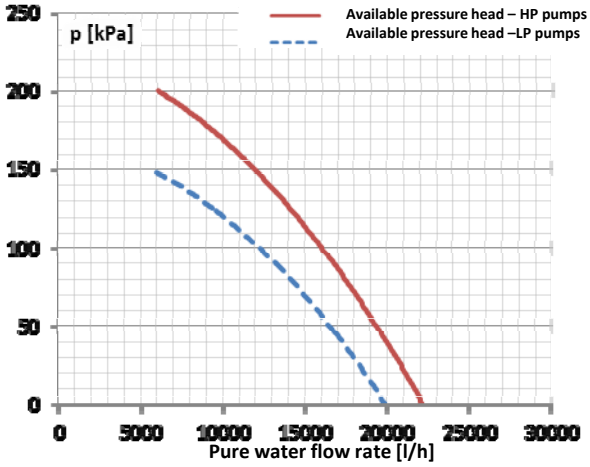
abs. nom. power LP: 0.9 [kW] abs. nom. power HP: 0.9 [kW]
abs. nom. current LP: 2.7 [A] abs. nom. current HP: 2.7 [A]

Useful Head [kPa] for OR LCP051L pumps



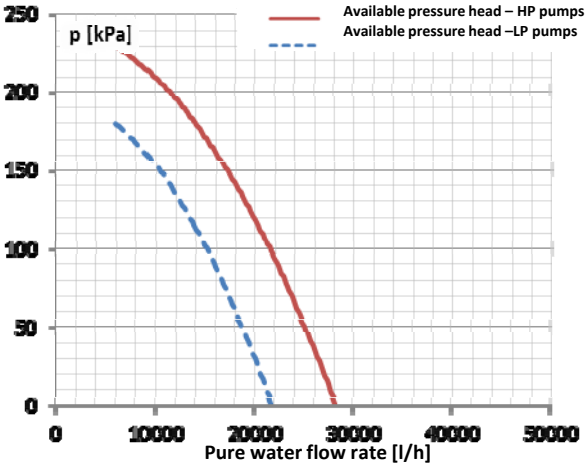
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 1.5 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 3.2 [A]

Useful Head [kPa] for AND LCP051L pumps



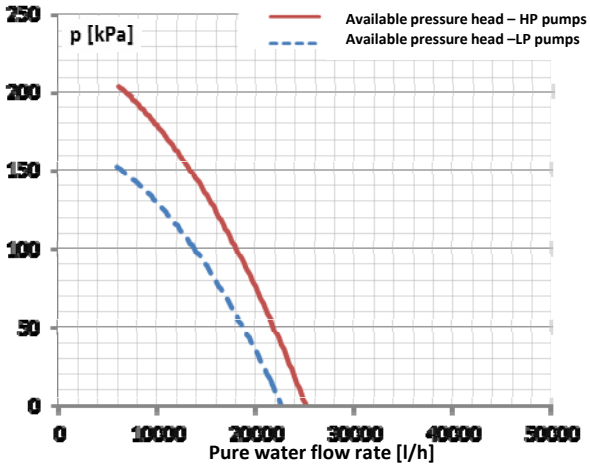
abs. nom. power LP: 0.9 [kW] abs. nom. power HP: 0.9 [kW]
abs. nom. current LP: 2.7 [A] abs. nom. current HP: 2.7 [A]

Useful Head [kPa] for OR LCP061L pumps



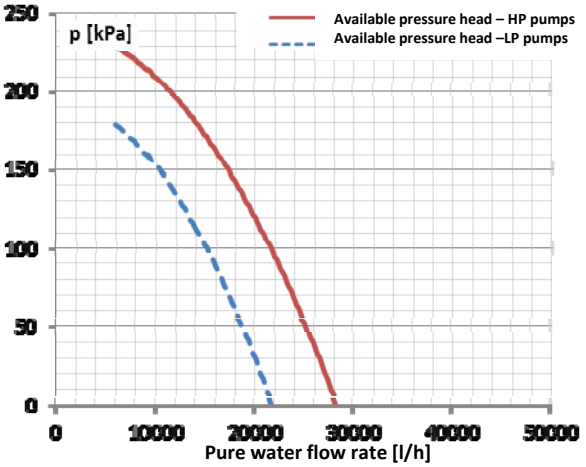
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for AND LCP061L pumps



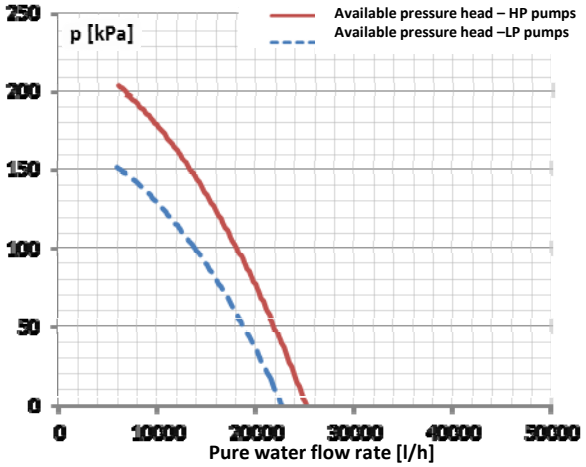
abs. nom. power LP: 0.9 [kW] abs. nom. power HP: 0.9 [kW]
abs. nom. current LP: 2.7 [A] abs. nom. current HP: 2.7 [A]

Useful Head [kPa] for OR LCP071L pumps



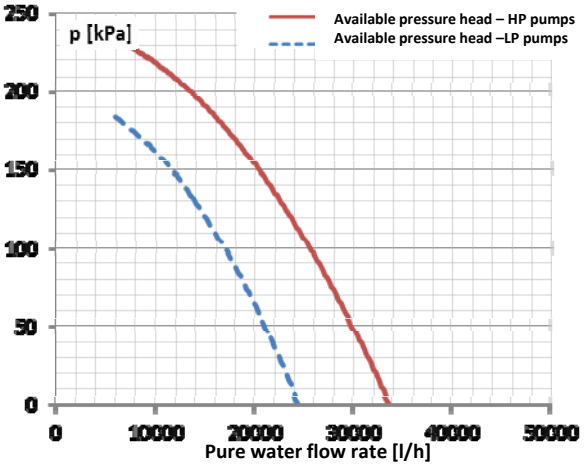
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for AND LCP071L pumps



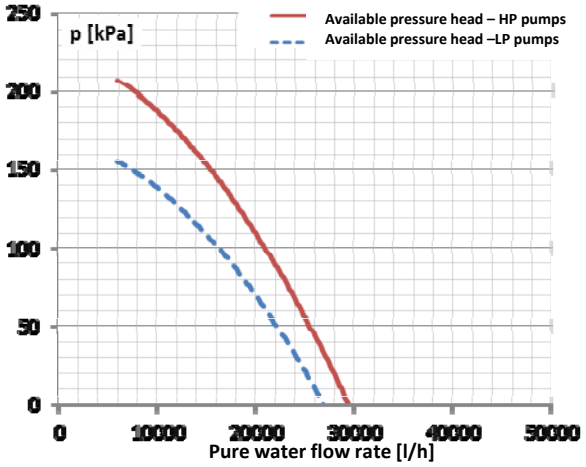
abs. nom. power LP: 0.9 [kW] abs. nom. power HP: 0.9 [kW]
abs. nom. current LP: 2.7 [A] abs. nom. current HP: 2.7 [A]

Useful Head [kPa] for OR LCP081L pumps



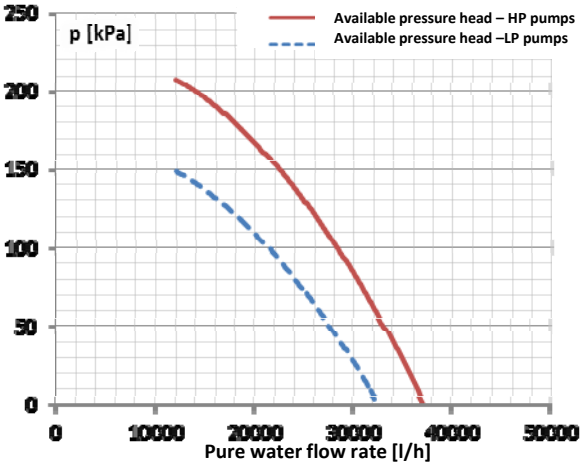
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for AND LCP081L pumps



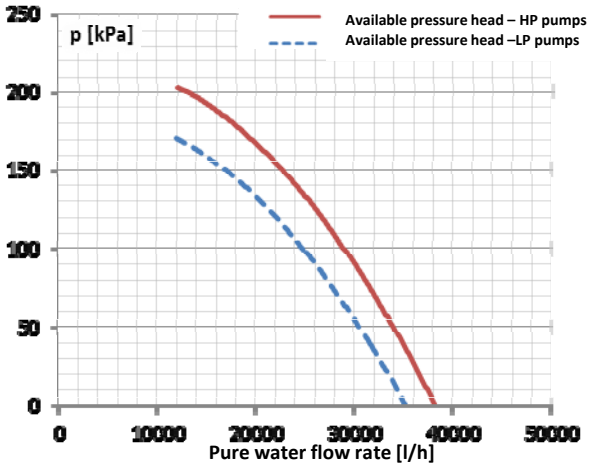
abs. nom. power LP: 0.9 [kW] abs. nom. power HP: 0.9 [kW]
abs. nom. current LP: 2.7 [A] abs. nom. current HP: 2.7 [A]

Useful Head [kPa] for OR LCP094L pumps



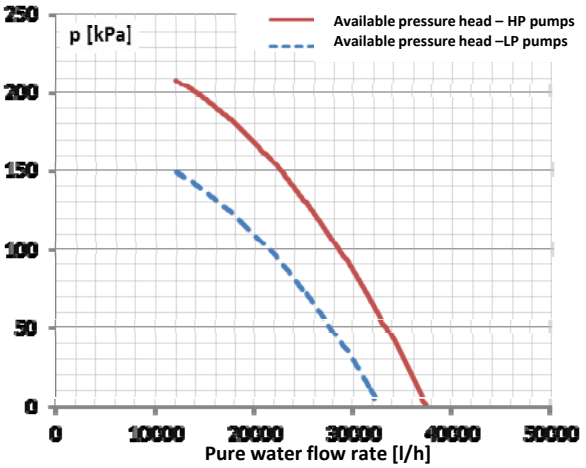
abs. nom. power LP: 1.5 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 3.4 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for AND LCP094L pumps



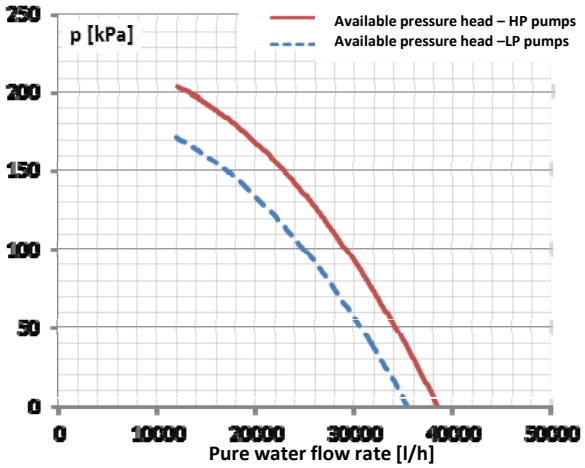
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 1.5 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 3.2 [A]

Useful Head [kPa] for OR LCP104L pumps



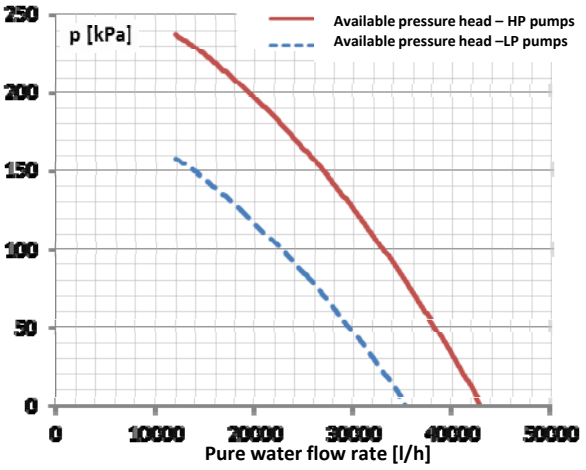
abs. nom. power LP: 1.5 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 3.4 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for AND LCP104L pumps



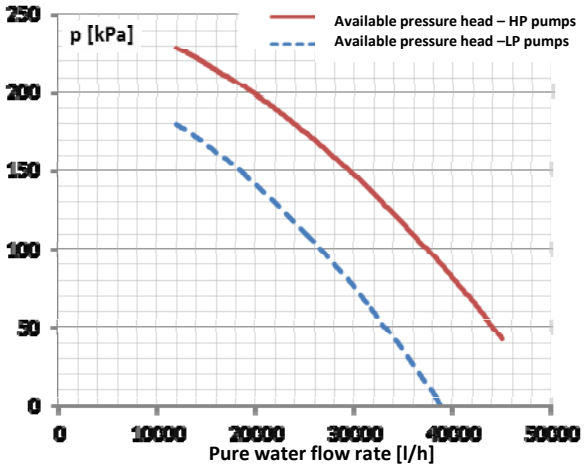
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 1.5 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 3.2 [A]

Useful Head [kPa] for OR LCP124L pumps



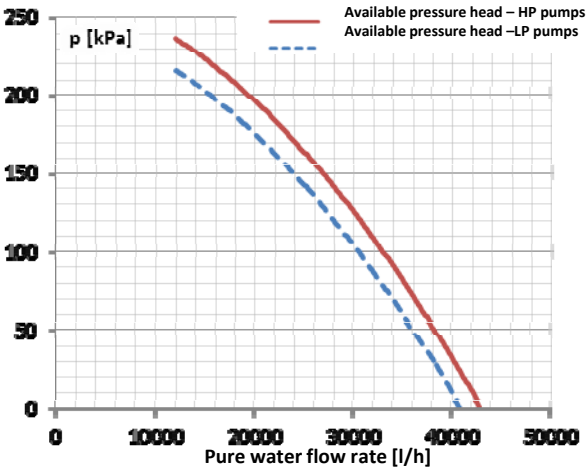
abs. nom. power LP: 1.5 [kW] abs. nom. power HP: 3 [kW]
abs. nom. current LP: 3.4 [A] abs. nom. current HP: 5.6 [A]

Useful Head [kPa] for AND LCP124L pumps



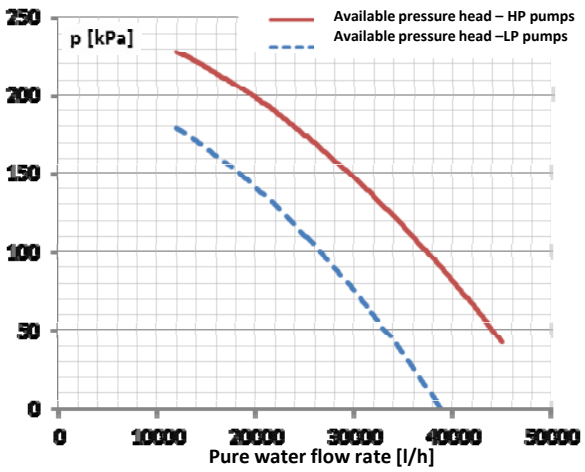
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for OR LCP144L pumps



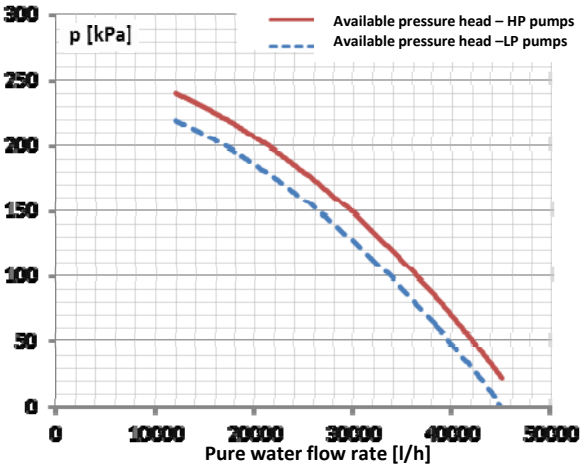
abs. nom. power LP: 2.2 [kW] abs. nom. power HP: 3 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 5.6 [A]

Useful Head [kPa] for AND LCP144L pumps



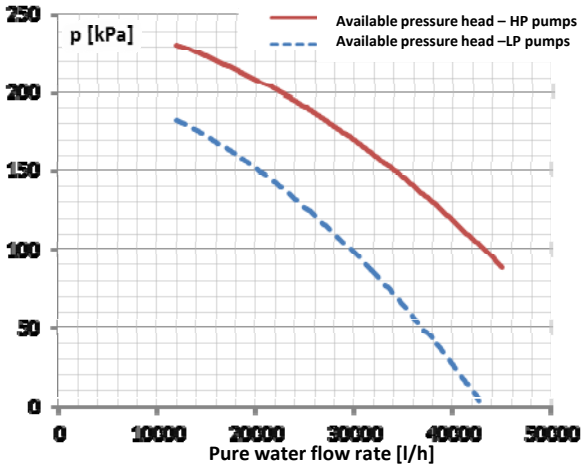
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for OR LCP164L pumps



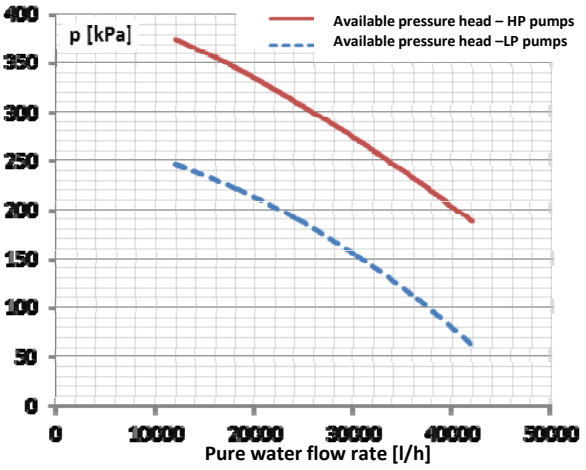
abs. nom. power LP: 2.2 [kW] abs. nom. power HP: 3 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 5.6 [A]

Useful Head [kPa] for AND LCP164L pumps



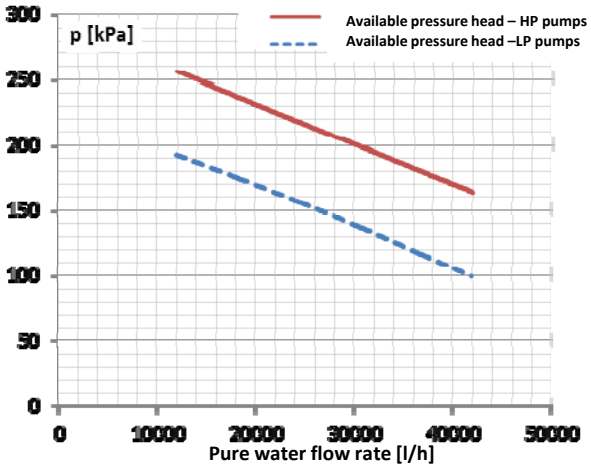
abs. nom. power LP: 1.1 [kW] abs. nom. power HP: 2.2 [kW]
abs. nom. current LP: 2.5 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for OR LCP194L pumps



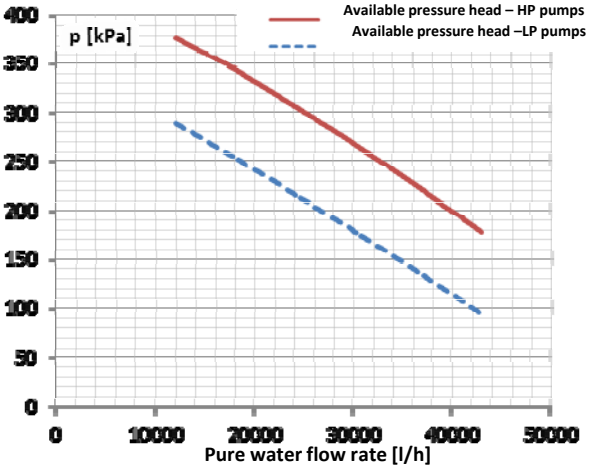
abs. nom. power LP: 2.8 [kW] abs. nom. power HP: 5.1 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 9.2 [A]

Useful Head [kPa] for AND LCP194L pumps



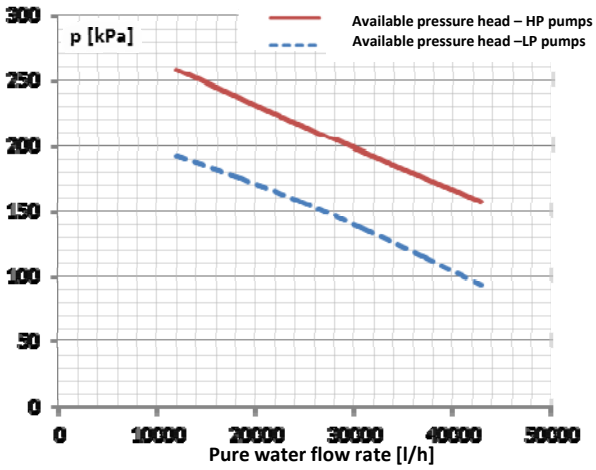
abs. nom. power LP: 2 [kW] abs. nom. power HP: 2.8 [kW]
abs. nom. current LP: 3.4 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for OR LCP214L pumps



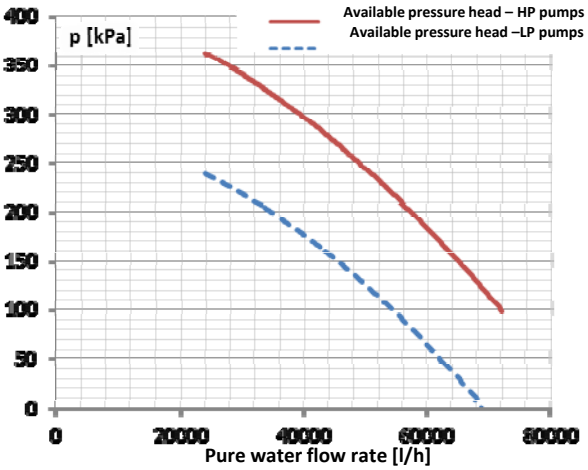
abs. nom. power LP: 3.7 [kW] abs. nom. power HP: 5.1 [kW]
abs. nom. current LP: 6.8 [A] abs. nom. current HP: 9.2 [A]

Useful Head [kPa] for AND LCP214L pumps



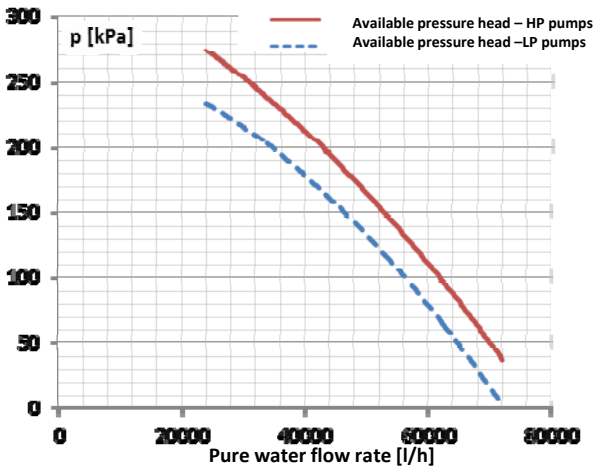
abs. nom. power LP: 2 [kW] abs. nom. power HP: 2.8 [kW]
abs. nom. current LP: 3.4 [A] abs. nom. current HP: 4.8 [A]

Useful Head [kPa] for OR LCP244L pumps



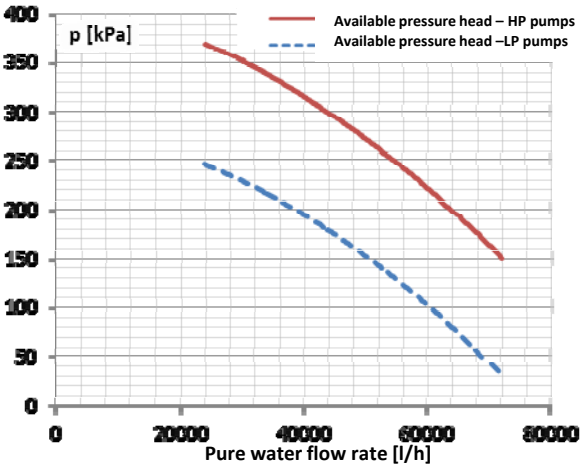
abs. nom. power LP: 4 [kW] abs. nom. power HP: 7.5 [kW]
abs. nom. current LP: 9.2 [A] abs. nom. current HP: 12.5 [A]

Useful Head [kPa] for AND LCP244L pumps



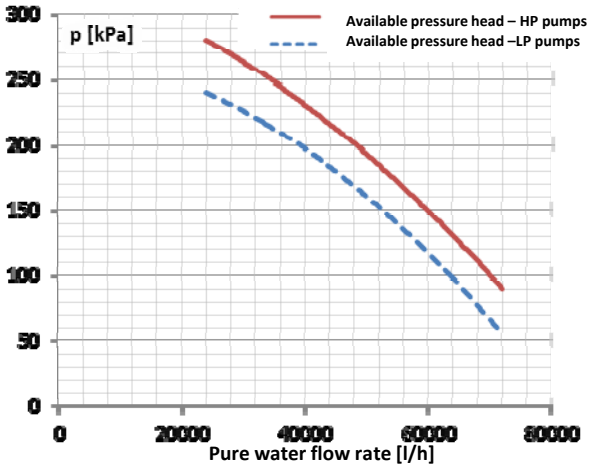
abs. nom. power LP: 2.8 [kW] abs. nom. power HP: 3.7 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 6.8 [A]

Useful Head [kPa] for OR LCP274L pumps



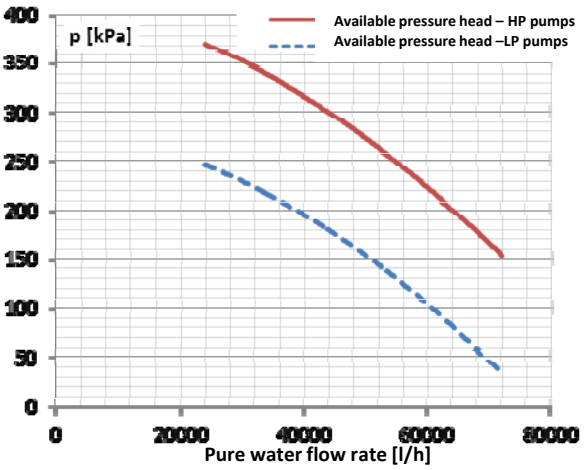
abs. nom. power LP: 4 [kW] abs. nom. power HP: 7.5 [kW]
abs. nom. current LP: 9.2 [A] abs. nom. current HP: 12.5 [A]

Useful Head [kPa] for AND LCP274L pumps



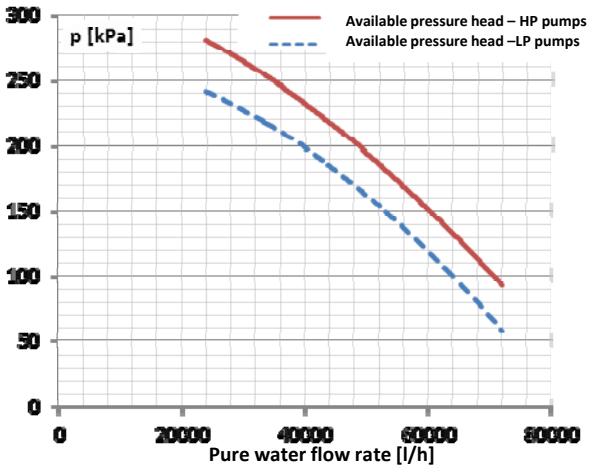
abs. nom. power LP: 2.8 [kW] abs. nom. power HP: 3.7 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 6.8 [A]

Useful Head [kPa] for OR LCP294L pumps

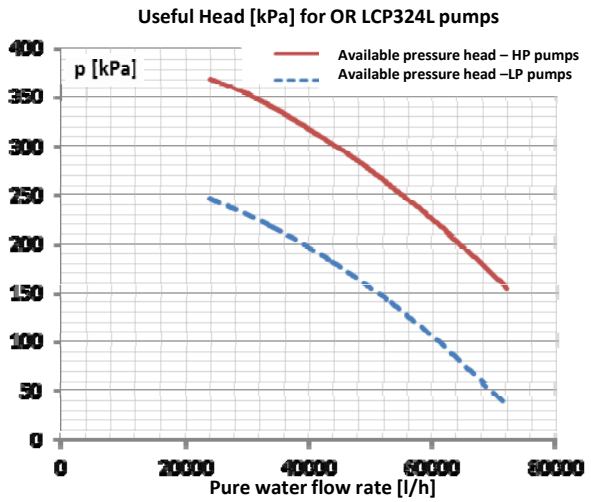


abs. nom. power LP: 4 [kW] abs. nom. power HP: 7.5 [kW]
abs. nom. current LP: 9.2 [A] abs. nom. current HP: 12.5 [A]

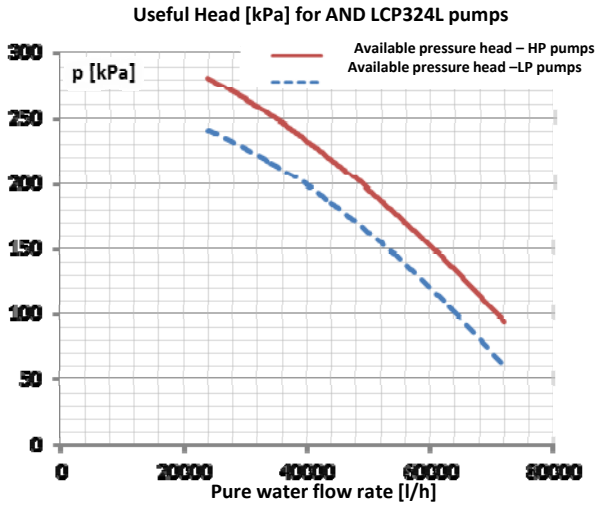
Useful Head [kPa] for AND LCP294L pumps



abs. nom. power LP: 2.8 [kW] abs. nom. power HP: 3.7 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 6.8 [A]



abs. nom. power LP: 4 [kW] abs. nom. power HP: 7.5 [kW]
abs. nom. current LP: 9.2 [A] abs. nom. current HP: 12.5 [A]



abs. nom. power LP: 2.8 [kW] abs. nom. power HP: 3.7 [kW]
abs. nom. current LP: 4.8 [A] abs. nom. current HP: 6.8 [A]

2.3 Sound spectra of LCP units

L_{PA} Pondered sound pressure global level A. calculated at a distance of 10 m with direction factor 2.
L_W Sound power level per octave band, not pondered.
L_{WA} Pondered global sound power level A.

Sound power level in dB for LCP S version L_W

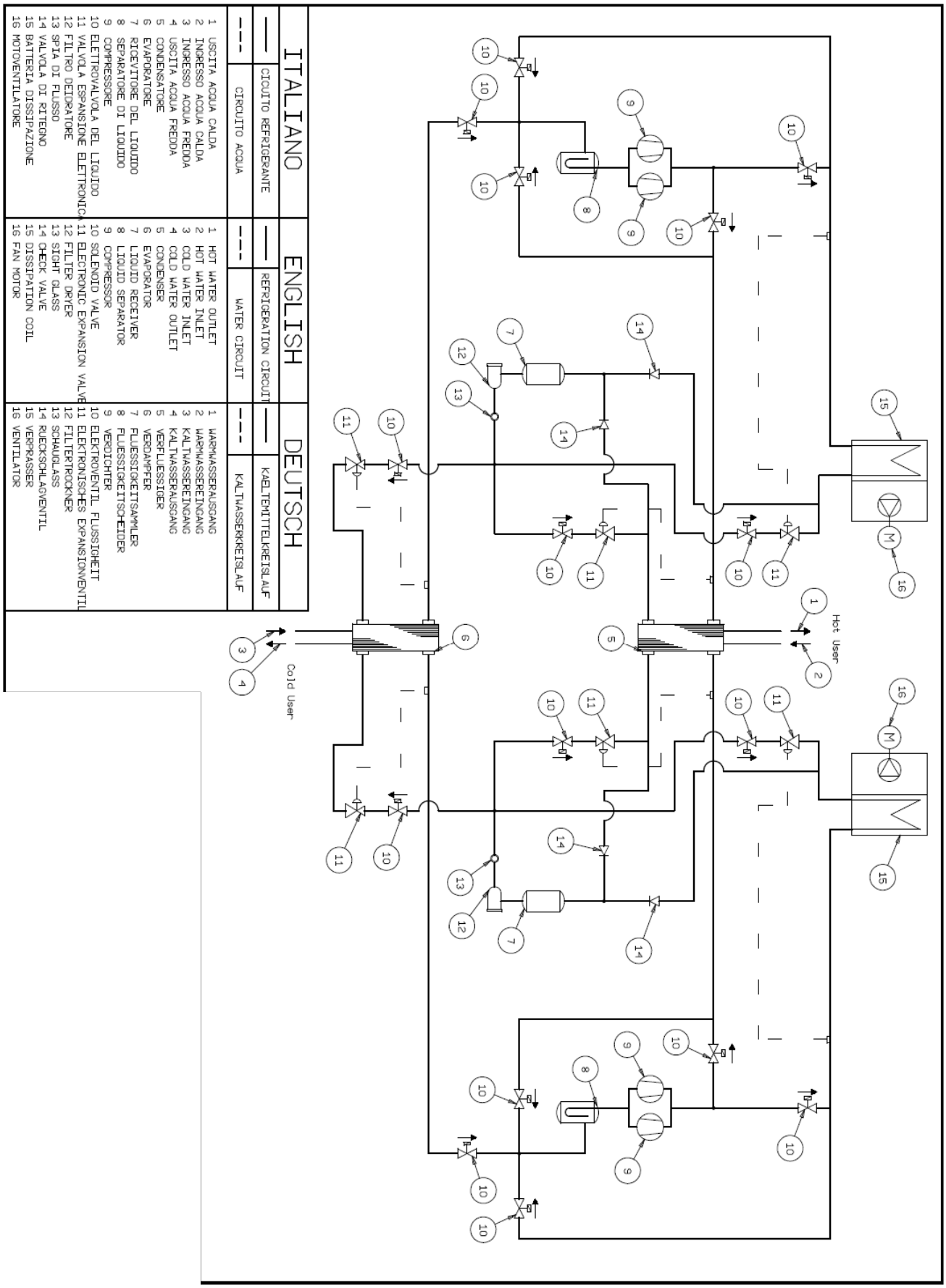
LCP S	125 Hz	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	L_{WA} dB(A)	L_{PA} dB(A)
041	78,7	82,5	76,5	75,9	69,0	62,7	61,2	80,0	52,0
051	78,7	82,5	76,5	75,9	69,0	62,7	61,2	80,0	52,0
061	79,7	83,5	77,5	76,9	70,0	63,7	62,2	81,0	53,0
071	79,7	83,5	77,5	76,9	70,0	63,7	62,2	81,0	53,0
081	79,7	83,5	77,5	76,9	70,0	63,7	62,2	81,0	53,0
094	80,2	84,0	78,0	77,4	70,5	64,2	62,7	81,5	53,5
104	80,2	84,0	78,0	77,4	70,5	64,2	62,7	81,5	53,5
124	82,7	86,5	80,5	79,9	73,0	66,7	65,2	84,0	56,0
144	82,7	86,5	80,5	79,9	73,0	66,7	65,2	84,0	56,0
164	83,7	87,5	81,5	80,9	74,0	67,7	66,2	85,0	57,0
194	83,5	87,3	81,3	80,7	73,8	67,5	66,0	84,8	56,8
214	84,5	88,3	82,3	81,7	74,8	68,5	67,0	85,8	57,8
244	84,5	88,3	82,3	81,7	74,8	68,5	67,0	85,8	57,8
274	84,7	88,5	82,5	81,9	75,0	68,7	67,2	86,0	58,0
294	85,7	89,5	83,5	82,9	76,0	69,7	68,2	87,0	59,0
324	85,7	89,5	83,5	82,9	76,0	69,7	68,2	87,0	59,0

Sound power level in dB for LCP L version L_W

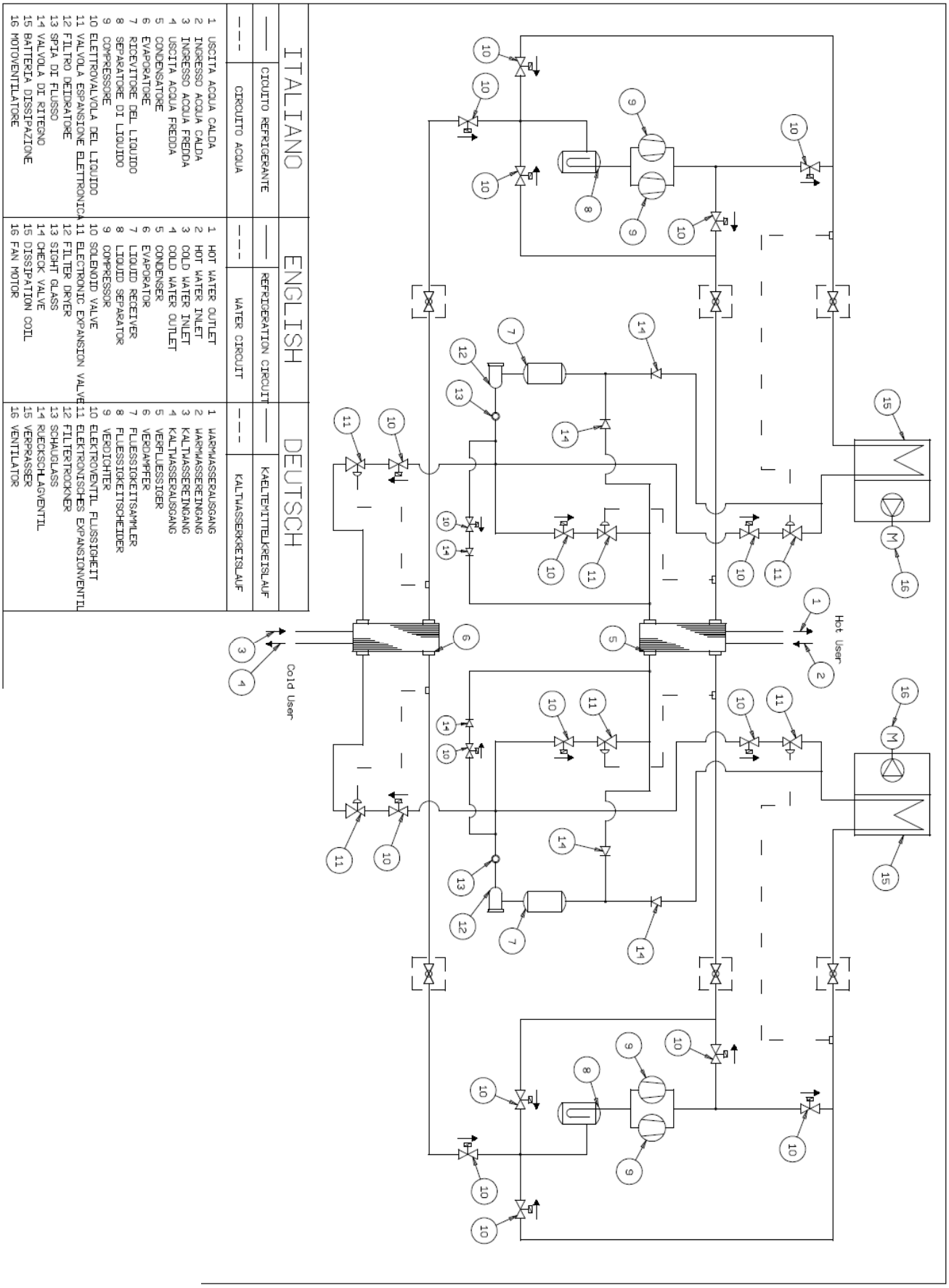
LCP L	125 Hz	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	L_{WA} dB(A)	L_{PA} dB(A)
041	71,0	76,6	71,0	67,0	59,7	56,6	55,6	73,0	45,0
051	72,0	77,6	72,0	68,0	60,7	57,6	56,6	74,0	46,0
061	74,0	79,6	74,0	70,0	62,7	59,6	58,6	76,0	48,0
071	74,0	79,6	74,0	70,0	62,7	59,6	58,6	76,0	48,0
081	74,0	79,6	74,0	70,0	62,7	59,6	58,6	76,0	48,0
094	75,0	80,6	75,0	71,0	63,7	60,6	59,6	77,0	49,0
104	75,0	80,6	75,0	71,0	63,7	60,6	59,6	77,0	49,0
124	77,0	82,6	77,0	73,0	65,7	62,6	61,6	79,0	51,0
144	77,0	82,6	77,0	73,0	65,7	62,6	61,6	79,0	51,0
164	78,0	83,6	78,0	74,0	66,7	63,6	62,6	80,0	52,0
194	79,0	84,6	79,0	75,0	67,7	64,6	63,6	81,0	53,0
214	80,0	85,6	80,0	75,0	68,7	65,6	64,6	81,0	54,0
244	80,0	85,6	80,0	75,0	68,7	65,6	64,6	81,0	54,0
274	81,0	86,6	81,0	77,0	69,7	66,6	65,6	83,0	55,0
294	81,0	86,6	81,0	77,0	69,7	66,6	65,6	83,0	55,0
324	81,0	86,6	81,0	77,0	69,7	66,6	65,6	83,0	55,0

2.4 COOLING AND HYDRAULIC DIAGRAMS

Unit LCP P

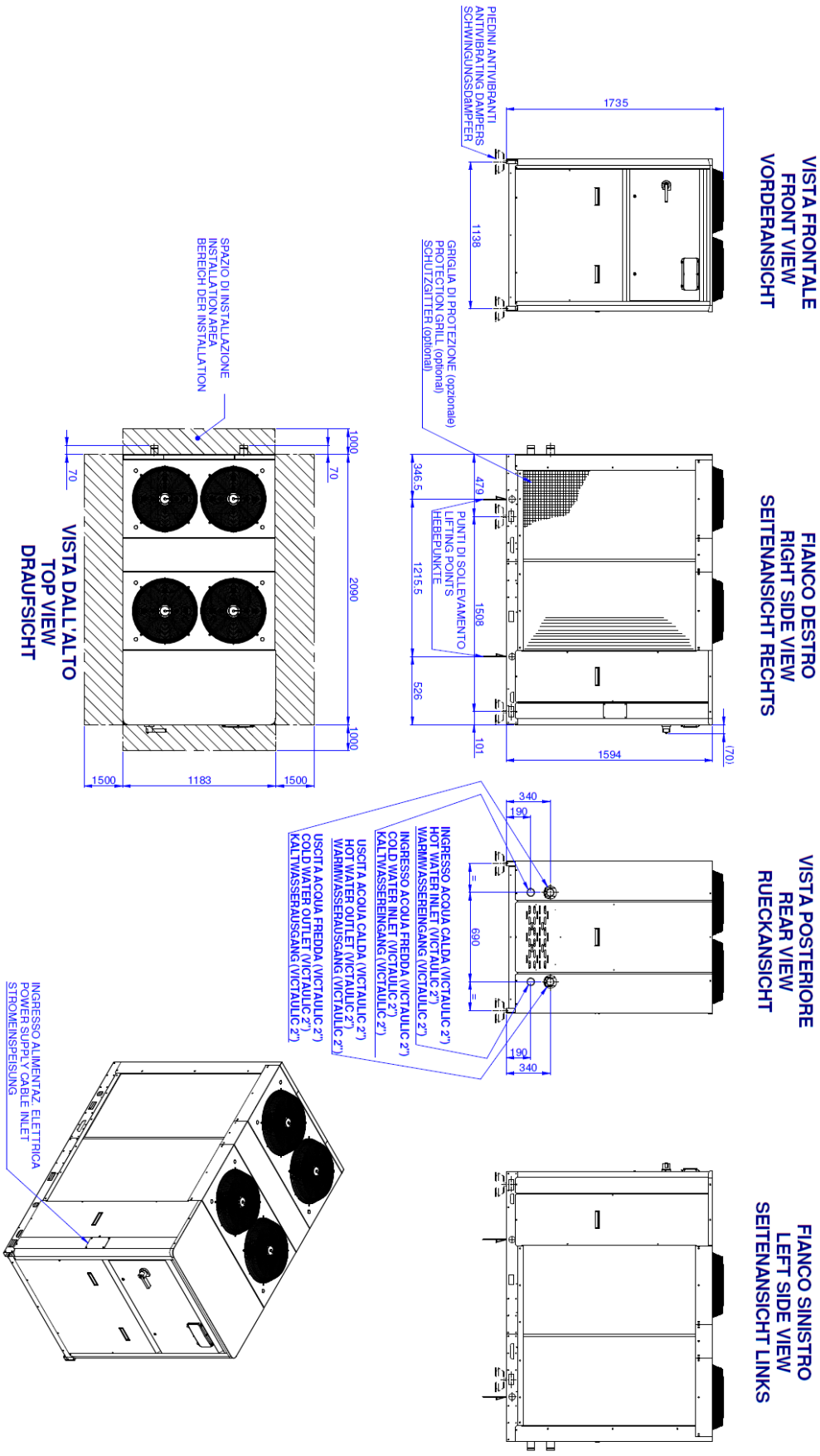


ITALIANO	ENGLISH	DEUTSCH
--- CIRCUITO REFRIGERANTE	--- REFRIGERATION CIRCUIT	--- KAELTEMITTELKREISLAUF
--- CIRCUITO ACQUA	--- WATER CIRCUIT	--- KALTWASSERKREISLAUF
1 USCITA ACQUA CALDA	1 HOT WATER OUTLET	1 WARMWASSERAUSGANG
2 INGRESSO ACQUA CALDA	2 HOT WATER INLET	2 WARMWASSEREINGANG
3 INGRESSO ACQUA FREDDA	3 COLD WATER INLET	3 KALTWASSEREINGANG
4 USCITA ACQUA FREDDA	4 COLD WATER OUTLET	4 KALTWASSERAUSGANG
5 CONDENSATORE	5 CONDENSER	5 VERFLUESSIGER
6 EVAPORATORE	6 EVAPORATOR	6 VERDAMPFER
7 RICEVITORE DEL LIQUIDO	7 LIQUID RECEIVER	7 FLUESSIGKEITSAMMLER
8 SEPARATORE DI LIQUIDO	8 LIQUID SEPARATOR	8 FLUESSIGKEITSSCHEIDER
9 COMPRESSORE	9 COMPRESSOR	9 VERDICHTER
10 ELETTROVALVOLA DEL LIQUIDO	10 SOLENOID VALVE	10 ELEKTROVENTIL FLUSSIGHEIT
11 VALVOLA ESPANSIONE ELETTRONICA	11 ELECTRONIC EXPANSION VALVE	11 ELEKTRONISCHES EXPANSIONVENTIL
12 FILTRO DEIDRATORE	12 FILTER DRYER	12 FILTERTROCKNER
13 SPIA DI FLUSSO	13 SIGHT GLASS	13 SCHAUGLASS
14 VALVOLA DI RITEGNO	14 CHECK VALVE	14 RUECKSCHLAGVENTIL
15 BATTERIA DISSIPAZIONE	15 DISSIPATION COIL	15 VERPRASSER
16 MOTOVENTILATORE	16 FAN MOTOR	16 VENTILATOR


Hot User
Cold User
ITALIANO
CIRCUITO REFRIGERANTE
CIRCUITO ACQUA
1 USCITA ACQUA CALDA
2 INGRESSO ACQUA CALDA
3 INGRESSO ACQUA FREDDA
4 USCITA ACQUA FREDDA
5 CONDENSATORE
6 EVAPORATORE
7 RICEVITORE DEL LIQUIDO
8 SEPARATORE DI LIQUIDO
9 COMPRESSORE
10 ELETTROVALVOLA DEL LIQUIDO
11 VALVOLA ESPANSIONE ELETTRONICA
12 FILTRO DEIDRATORE
13 SPIA DI FLUSSO
14 VALVOLA DI RITEGNO
15 BATTERIA DISSIPAZIONE
16 MOTOVENTILATORE
ENGLISH
REFRIGERATION CIRCUIT
WATER CIRCUIT
1 HOT WATER OUTLET
2 HOT WATER INLET
3 COLD WATER INLET
4 COLD WATER OUTLET
5 CONDENSER
6 EVAPORATOR
7 LIQUID RECEIVER
8 LIQUID SEPARATOR
9 COMPRESSOR
10 SOLENOID VALVE
11 ELECTRONIC EXPANSION VALVE
12 FILTER DRYER
13 SIGHT GLASS
14 CHECK VALVE
15 DISSIPATION COIL
16 FAN MOTOR
DEUTSCH
KAELTEMITTELKREISLAUF
KALTWASSERKREISLAUF
1 WARMWASSERAUSGANG
2 WARMWASSEREINGANG
3 KALTWASSEREINGANG
4 KALTWASSERAUSGANG
5 VERFLUESSIGER
6 VERDAMPFER
7 FLUESSIGKEITSAMMLER
8 FLUESSIGKEITSSCHEIDER
9 VERDICHTER
10 ELEKTROVENTIL FLUSSIGHEIT
11 ELEKTRONISCHES EXPANSIONVENTIL
12 FILTERTROCKNER
13 SCHAUGLASS
14 RUECKSCHLAGVENTIL
15 VERPRASSER
16 VENTILATOR

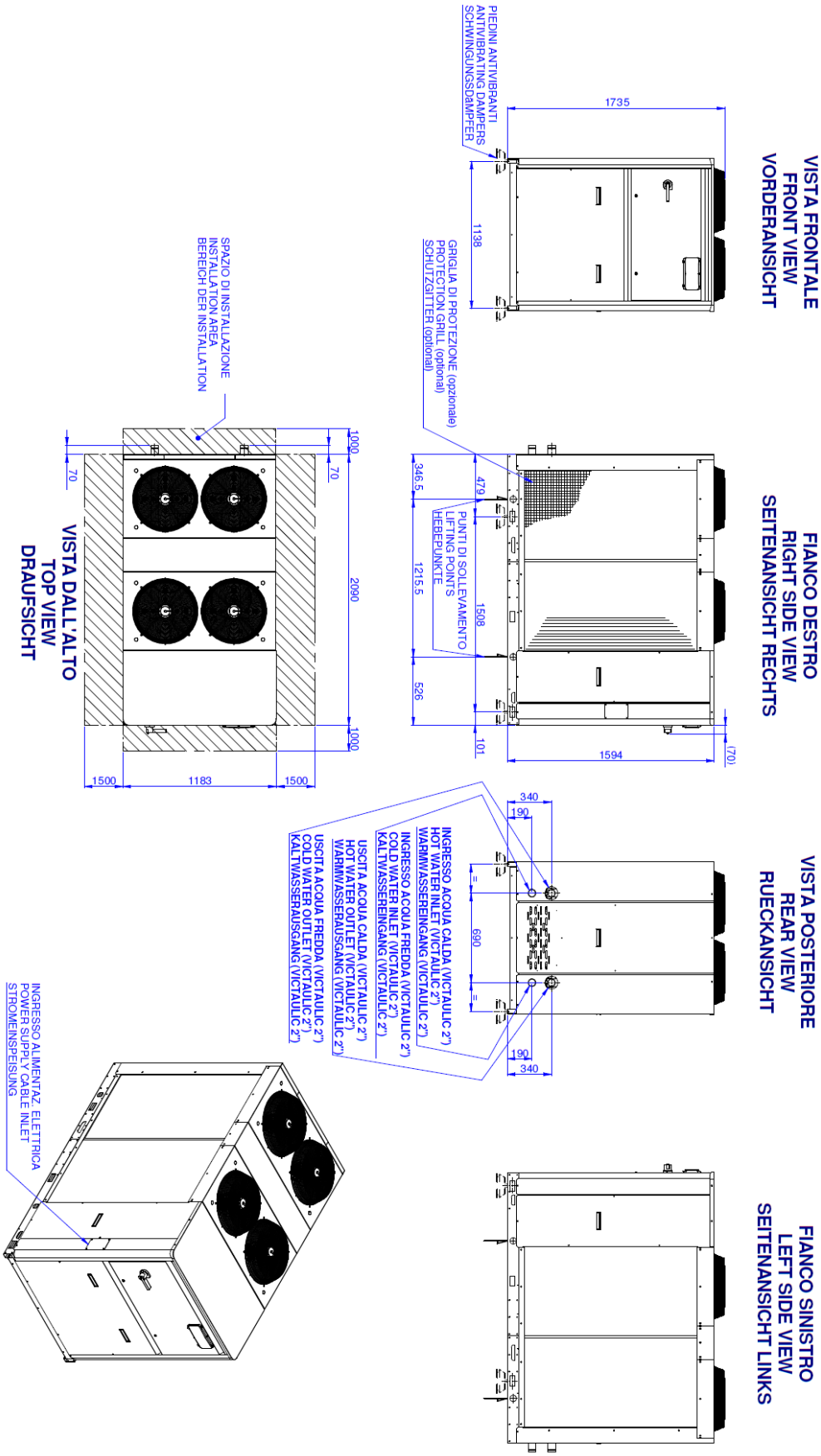
2.5 OVERALL DRAWINGS

LCP F1



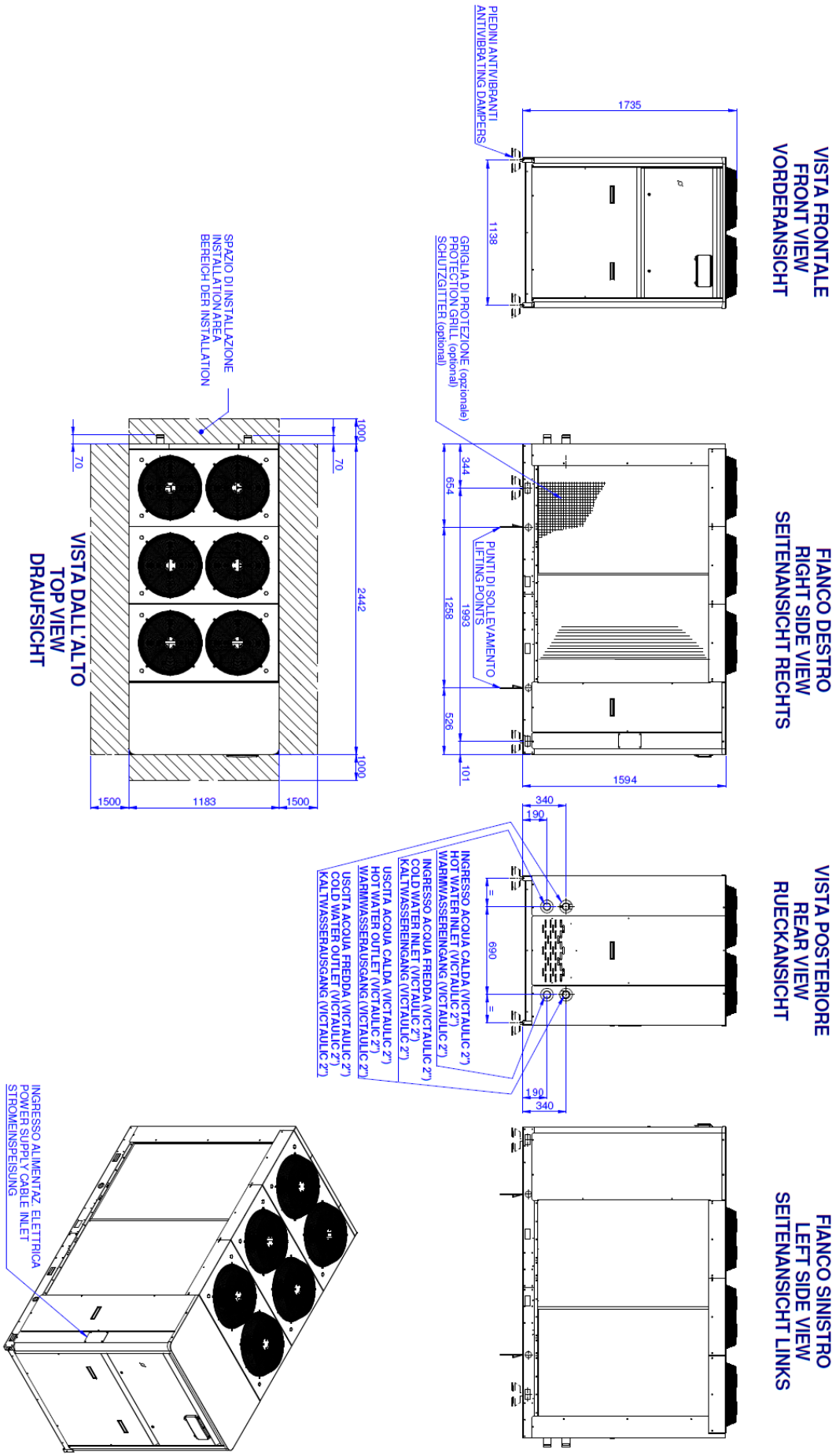
2.5 OVERALL DRAWINGS

LCP F2



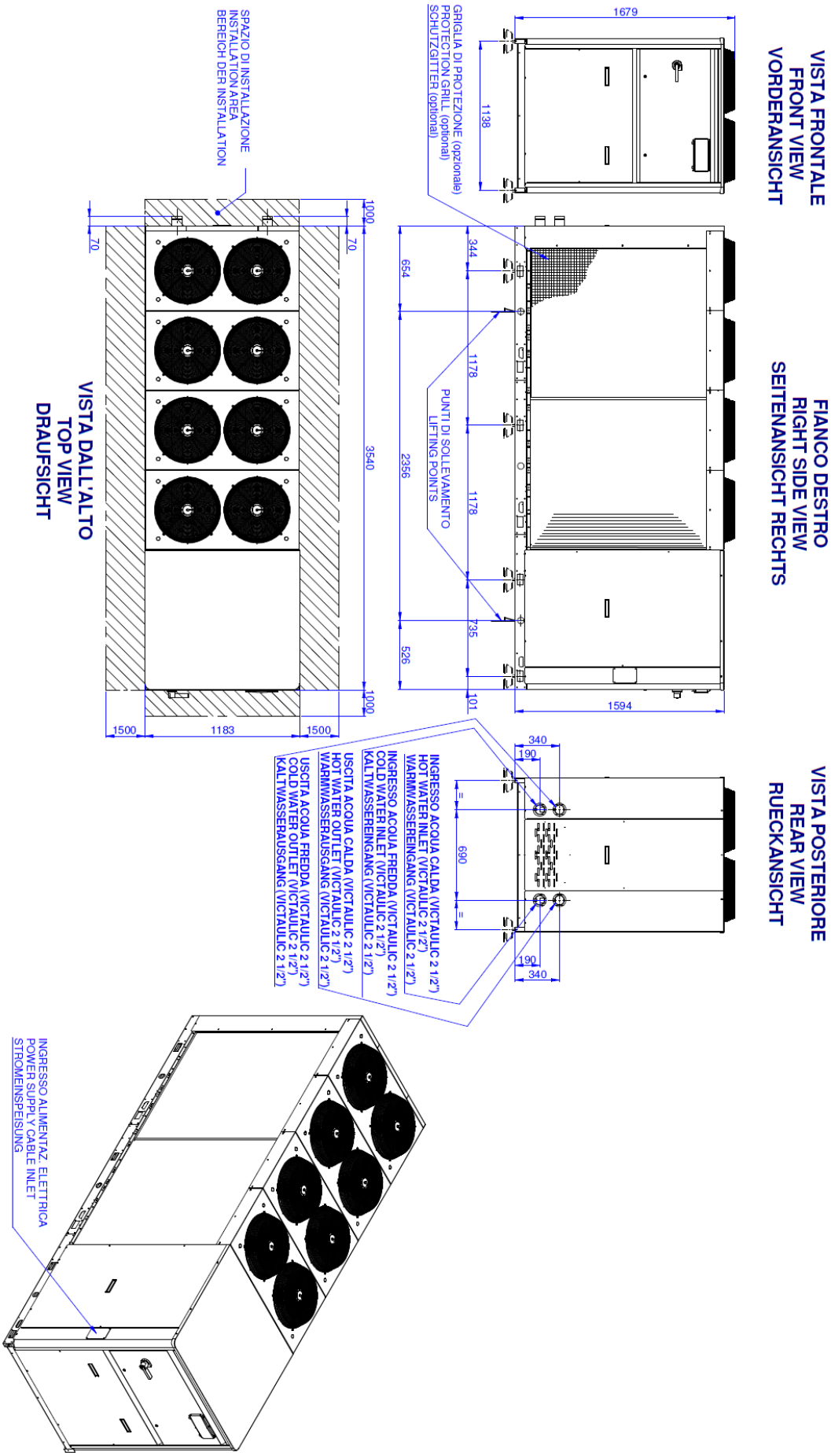
2.5 OVERALL DRAWINGS

LCP F3+



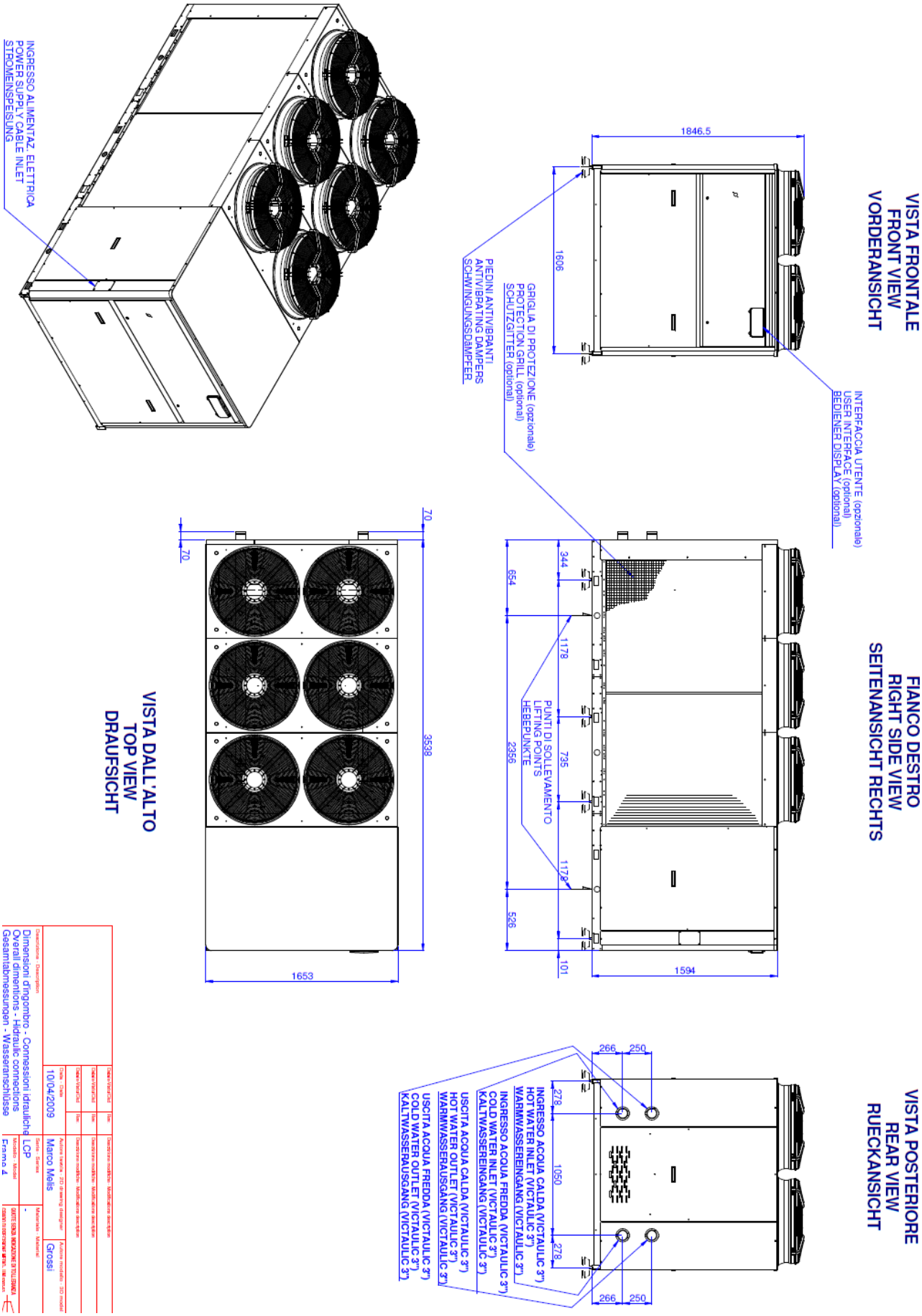
2.5 OVERALL DRAWINGS

LCP F4



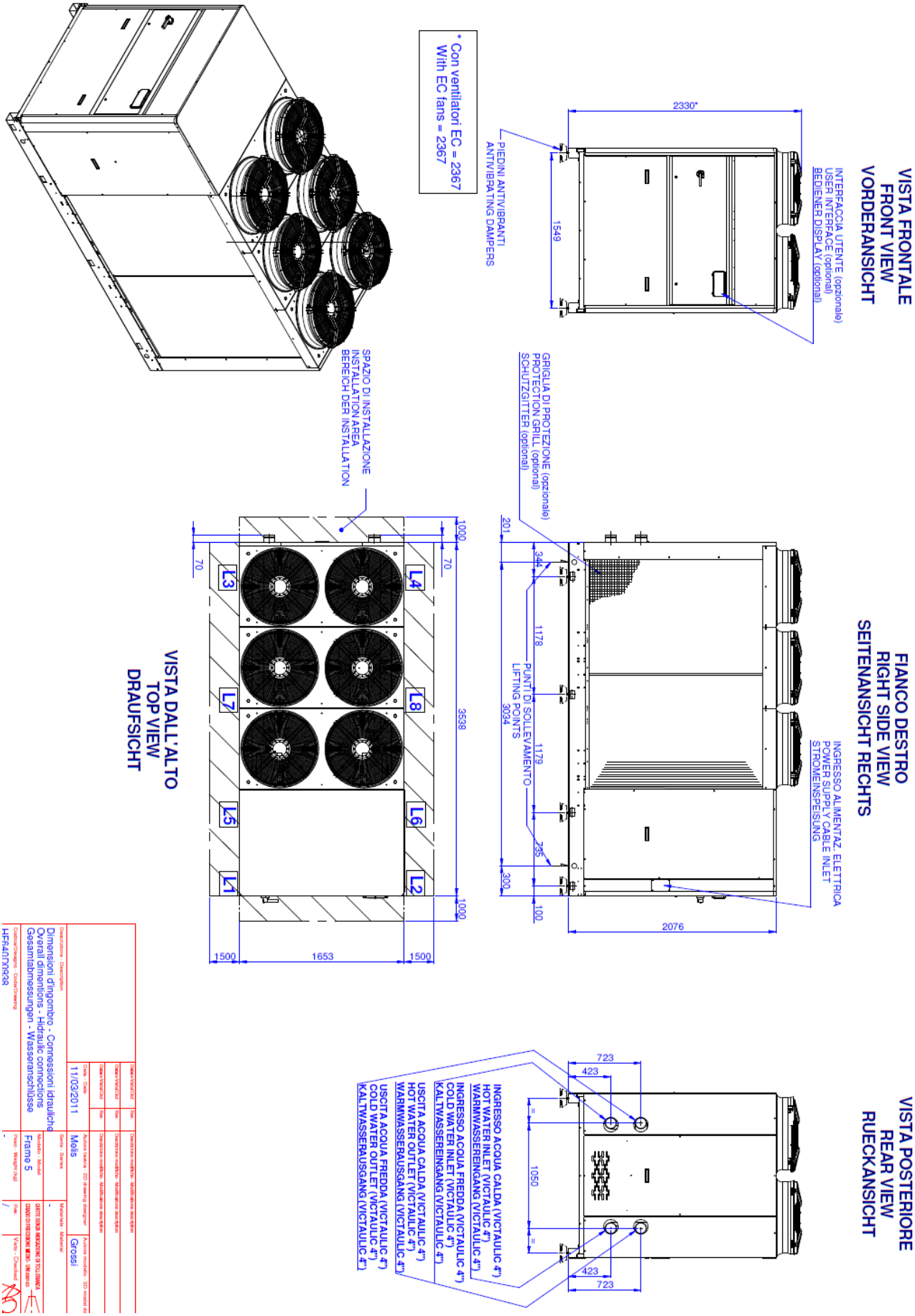
2.5 OVERALL DRAWINGS

F5



2.5 OVERALL DRAWINGS

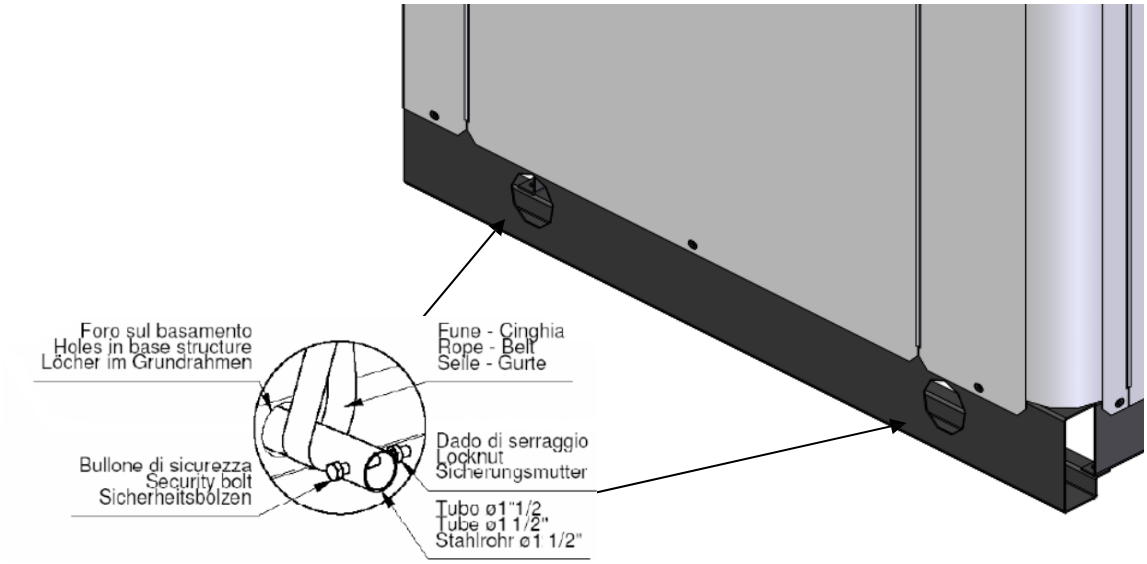
LCP F6



of equal length to the lifting hook (provide stops at the ends of the pipes to prevent the ropes from slipping off because of the weight).

Use ropes or belts long enough to extend beyond the height of the machine. Place spacer bars and boards on top of the unit to avoid damaging the sides and the top of the unit.

Warning: During all lifting operations make sure the unit is firmly anchored, to prevent it from tilting or falling.



3.1.2 Unpackaging

Carefully remove any packaging to avoid damaging the machine. Different packaging materials are used: wood, cardboard, nylon etc. Keep them separated and dispose of them at appropriate waste disposal or recycling facilities in order to minimise their environmental impact.

Once the machine is positioned, loosen the bolts to remove the pallet. Then push the unit from below and slide it to its proper position.

3.1.3 Siting

Bear in mind the following when choosing the best site for installing the unit and the connections:

- size and origin of water pipes;
- location of power supply;
- access for maintenance or repairs;

- stability of the supporting surface.

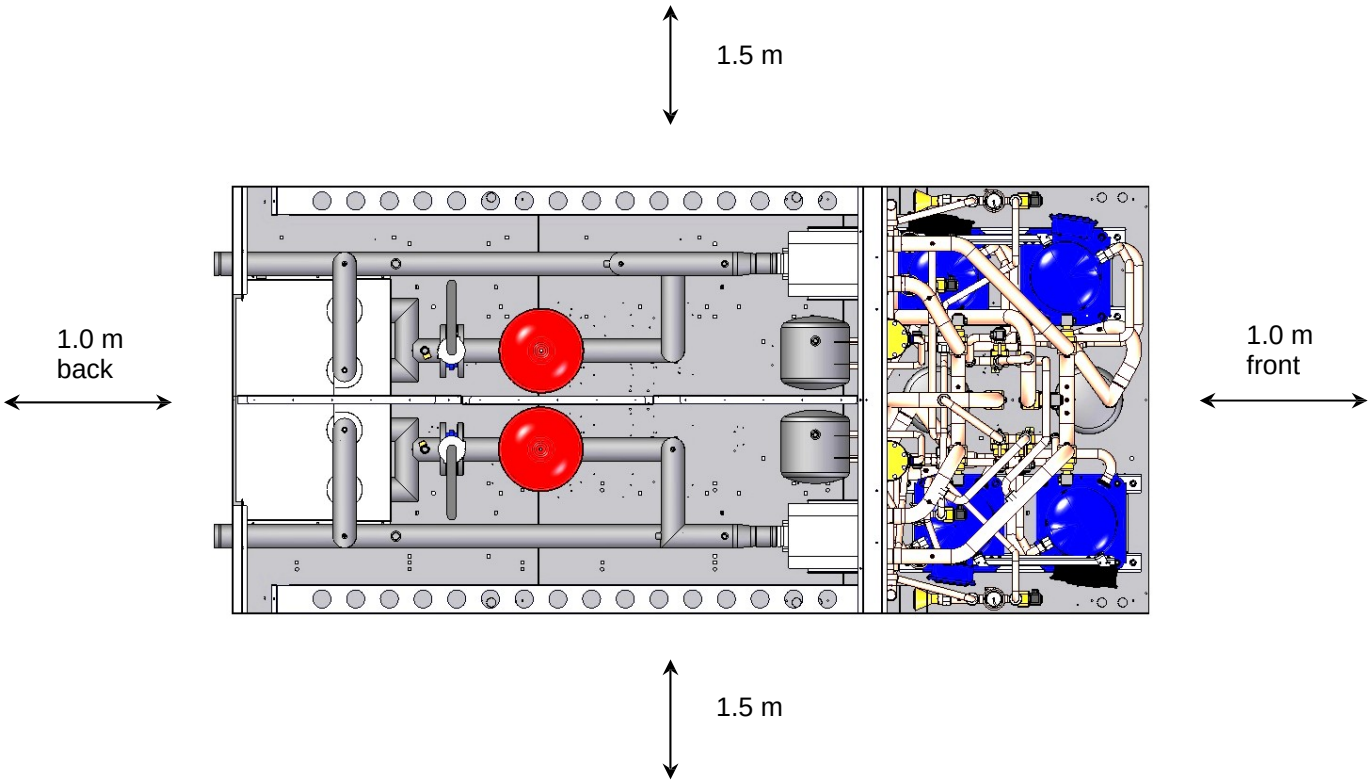
All the models of the LCP series have been designed and built for outdoor installations. Since soundproofing and protections of components and hot parts are specially designed, the LCP series models do not need to be kept inside rooms.
It is advisable to place a vibration damping system between the base frame and the supporting surface.

Should refrigerant leak in the vicinity of open flames or in a room without sufficient air exchange, it could catch fire and the combustion products could harm people.

3.1.4 Installation clearance requirements

It is important to provide an adequate volume of air on the intake and delivery sides of the condensing/evaporating finned coils. It is essential to prevent air recirculation between intake and delivery, as this may affect unit performance or interrupt normal operation. For this reason provide the following clearances (see figure on this page):

- hydraulic connections/back side: at least 1 metre to provide room for water connections and/or maintenance to the flow switch expansion vessel tank pump unit.
- electric panel side: at least 1 metre to guarantee access for inspections and/or for maintenance of cooling components
- finned-pack condenser side: at least 1.5 metres to ensure proper air circulation as well as access (even from the side) to the compressor compartment
- upper side: during expulsion there must be no obstacles.



Top view of the unit

When installing the unit, for safety purposes, make sure that the room temperature does not exceed 50°C (with unit on or off).

3.2 Water connections

When setting up the water circuit for the evaporator follow the instructions below and comply with national or local standards (use the diagrams attached to this document as reference). **Fit the piping to the cooler with flexible joints to**

dampen vibrations and to compensate thermal expansion. Refer to the technical data table for the type and dimensions of the hydraulic connections.
It is recommended to install the following components on the piping:

- temperature and pressure indicators for routine maintenance and inspections of the unit. Pressure control on the water side allows expansion vessel operation to be checked and any water leaks in the system to be detected in advance.
- sumps on inlet and outlet piping for measuring temperatures, and for directly viewing the operating temperatures. They can also be viewed on the display on board the unit (if pCO).
- shut-off valves (gate valves) to isolate the unit from the water circuit for maintenance.
- air vent valves, placed on the higher parts of the water circuit, that bleed the air. The internal pipes of the machine are fitted with manual air vent valves to bleed the unit: **this operation can only be carried out when the unit is disconnected from the power supply**
- discharge cock and, if necessary, drain tank to empty the system for maintenance or seasonal stops
- For process applications, it is recommended to install a decoupling heat exchanger, which avoids the fouling of the heat exchangers
- **It is mandatory to install a metal net filter (inlet pipe), with a mesh not above 1 mm, to protect the heat exchanger from slag or impurities inside the pipes. This is especially important during commissioning**.

3.2.1 Water connection to evaporator

It is extremely important that the water inlet is connected at the height of the “Water Inlet” sign.

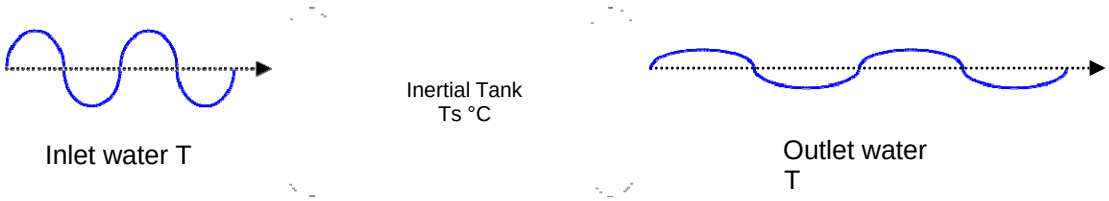
If not, the evaporator would be exposed to the risk of freezing, since the anti-freeze thermostat would not be able to perform its function. Furthermore, in the cooling mode, countercurrent circulation would not be activated. Additionally, this position does not enable consent of the water flow control device.
The dimensions and position of the water connections are provided in the dimensional tables and overall drawings.

The water circuit must guarantee a constant nominal flow rate of water (+/- 15%) to the evaporator in all operating conditions.

The ON/OFF-type compressors work intermittently, since the cooling power required by the utility is not generally the same as that supplied by the compressor. In systems containing little water, in which the thermal inertia is low, verify that the water content of the delivery section (to users) satisfies the equation below:

$$V = \frac{Cc \times \Delta\tau}{\rho \times Sh \times \Delta T \times Ns}$$

V	= water content in user section	[m3]
Sh	= specific heat of fluid	[J/(kg/°C)] e.g. 2090 [J/(kg/°C)] for water
ρ	= density of fluid	[kg/m3] e.g. 1000 [kg/m3] for water
Dτ	= minimum time between 2 compressor restarts	[s] e.g. 120 [s]
DT	= admissible differential on water T	[°C] e.g. 4 [°C]
Cc	= Cooling Capacity	[W]
Ns	= N° of capacity control steps	



The LCP units are supplied **standard** with a device that controls the water flow (paddle flow switch supplied on board the machine).
Any tampering with this device will immediately invalidate the warranty.
It is mandatory to install a metal net filter on the water inlet piping.

Warning: Never perform hydraulic connection operations with open flames near or inside the unit.

3.2.2 How to fill up the tank and/or the pumps *(if required by the system)*

The tank is not designed to withstand **vacuum pressures** greater than 0.15 bar. For this reason, make sure that the pressure on the pump intake side, where the expansion vessel is positioned, is always above 0.5 bar with pump running. This helps reduce the risk of cavitation.

It is extremely important that the installer follow and verify this procedure step-by-step to prevent the risk of tank implosion or pump cavitation:

- Drain the expansion vessel until the pressure reaches 0.5 bar
- Fill the system and pressurise it to approximately + 1 bar in pump suction (pump stopped)
- Bleed the system
- Check the pump suction pressure (approximately 1 bar) and start up the system
- Stop the pump after 15-30 minutes. Repeat the procedure from step 3 until no more air system noise can be heard.
-

3.3 Electrical connections

Before carrying out any operation on electrical parts, make sure that the power supply is disconnected.

Check that the mains electricity supply is compatible with the specifications (voltage, number of phases, frequency) shown on the unit rating plate.

The size of the cable and line protections must conform to the specifications provided in the wiring diagram.

The supply voltage must not fluctuate more than ±5% and the imbalance between phases must always be below 2%.

The machine must operate within the above values, or the warranty will be invalidated.

Cary out the electrical connections following the wiring diagram provided with the unit, as well as current regulations.
An earth connection is **mandatory**: The installer must connect the earthing wire with the earthing terminal on the electric panel (yellow and green wire).
The power supply to the control circuit is shunted from the power line through a electric panel transformer.
The control circuit is protected by fuses or automatic switches, depending on the size of the unit.

3.4 Electric connections of the circulation pump

All the units of the LER series are provided with a voltage-free contact on the electrical panel that powers the pump start consent.

The pump, when an integral part of the supply, must be started before the cooler starts and stopped after it stops (minimum recommended start delay: 60 seconds). If it is connected to the electric panel terminal, this function is already performed by the onboard microprocessor.

3.4.1 Remote Controls

To remotely switch on and switch off the unit, remove the jumper between the contacts and connect the remote control to the terminals (see attached wiring diagram). Enable the “REMOTE” function with the electric panel switch.

3.4.2 Remote Summer-Winter switching (LCP M Versions)

To remotely switch the unit from the summer to the winter modes, remove the jumper between the contacts and connect the remote control to the terminals (see attached wiring diagram). Enable the “REMOTE” function with the electric panel switch.

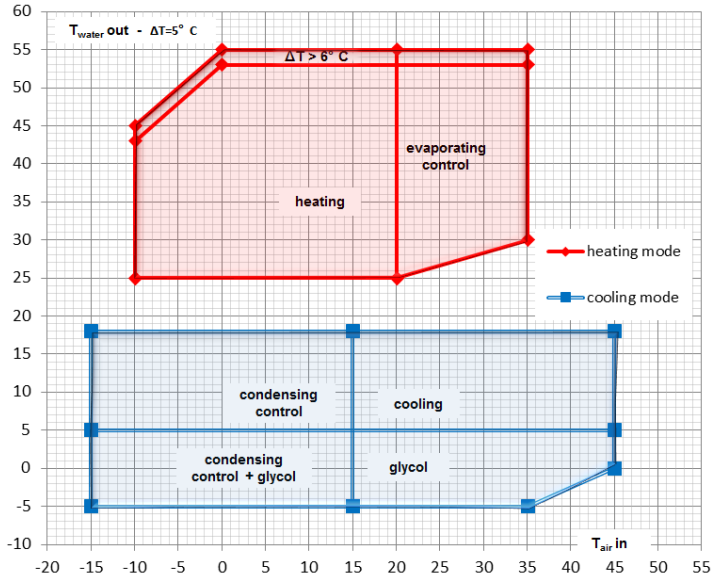
4 Operating limits

This paragraph lists the operating limits of the LCP M and LCP P heat pumps, in relation to utility circuit water outlet temperature and air temperature.

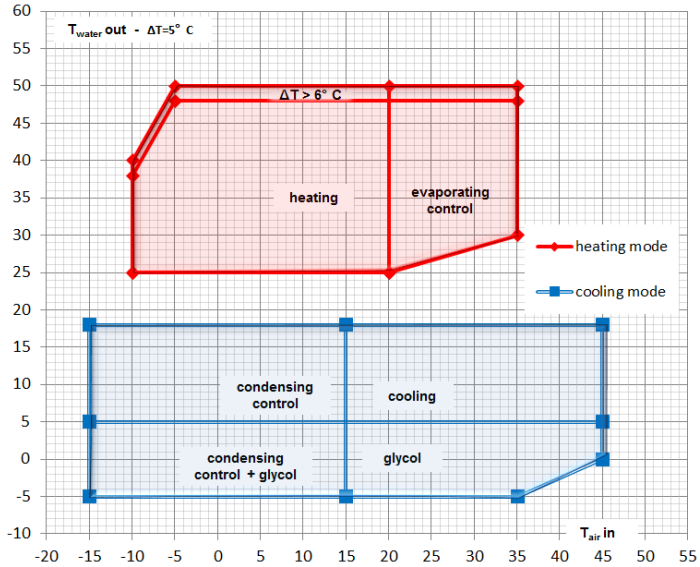
The nominal flow rate refers to a temperature differential of 5° C between inlet and outlet water, in relation to the cooling capacity provided at nominal water temperatures. The maximum allowable flow rate is associated with a temperature differential of 3 °C. Higher flow rates cause unacceptable drops in pressure. The minimum allowable flow rate is achieved with a temperature differential of 8 °C. Lower flow rates may result in low evaporation temperatures, which could trigger the safety devices and stop the unit. They may also cause an incorrect distribution or heat transfer in a non-turbulent or not fully turbulent flow. For temperature differentials outside these limits contact the company's technical department.

The LCP units are designed to exchange heat with water in countercurrent to the plate heat exchangers on the full recovery circuit. In cooling mode they are also in countercurrent on the heat exchanger (utility circuit). The LCP M unit can also generate heat on the utility circuit. In this case, select the supplied “water circuit cycle inversion valve” accessory to achieve countercurrent.

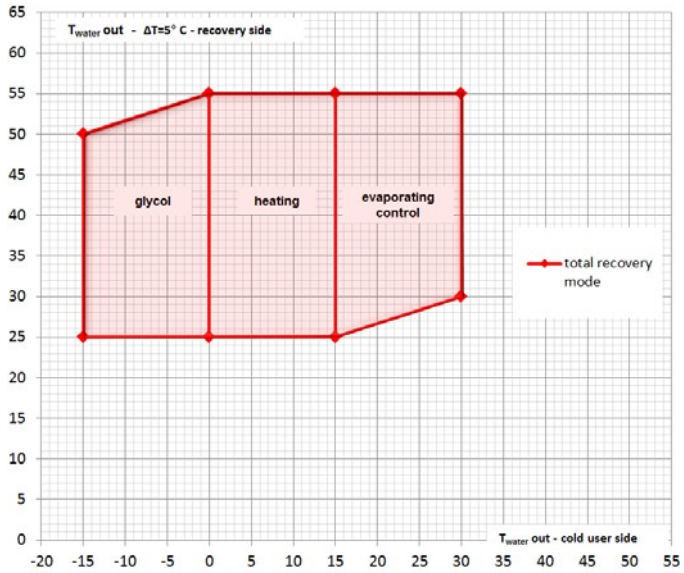
Operating range of the LCP units in cooling mode and with heat pump in countercurrent mode:



Operating range of the LCP units in cooling mode and with heat pump in concurrent mode:



Operating range of the LCP units in full recovery mode:



The diagrams were plotted with a temperature differential at the plate exchangers (water circuit) of 5°C

4.1 Use of glycol solutions

Water can be produced at temperatures below 5°C (up to -10°C) using glycol solutions. This lowers the freezing point as shown in the following table:

Minimum temperature of produced water	5 °C	2°C	-1 °C	-5°C	-10 °C
Percentage in weight of ethylene glycol	0 %	10 %	15%	25 %	30 %
Freezing temperature of mixture	0 °C	-4 °C	- 8 °C	-14 °C	-18 °C

For solution concentrations up to 30% in volume of glycol, the drop in thermodynamic circuit performance is minor. The LCP units are not guaranteed for applications in circuits with propylene glycol mixtures.

4.2 Operating and storage limits

- Heat transfer fluid: water or mixtures of water and ethylene glycol (max. 30% in volume)
- Maximum water side pressure: = 3 bar
- Maximum pressure on high pressure circuit R410A = 42 bar-r
- Maximum pressure on low pressure circuit R410A = 29 bar-r (*)
- Power supply voltage: = +/- 10% compared to plate voltage
- Maximum storage T = + 50 °C
- Minimum storage T = - 20 °C (limit set by on-board electronics)

(*) this value can only be reached during storage and determines the saturation pressure of 29 bar-r of the refrigerant on the low pressure side of the circuit (value which determines its limit