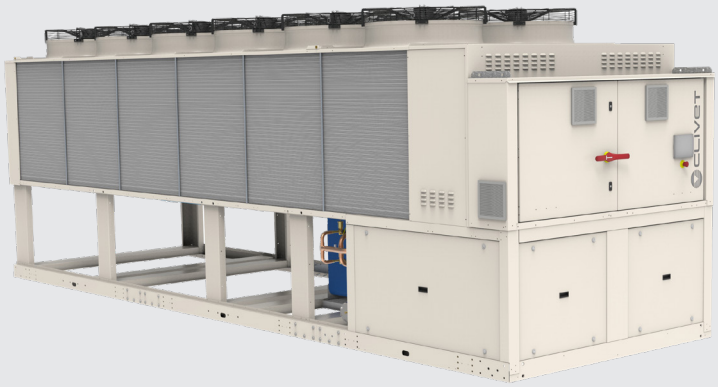
SPINCHILLER4 NA

WSAN-YSC4 NA 90.4 - 175.4 RANGE

Air cooled reversible heat pump for outdoor installation

TECHNICAL BULLETIN



SIZE	90.4	100.4	110.4	120.4	130.4	145.4	160.4	175.4
Cooling capacity [ton]	67.7	73.4	79.1	84.1	92.1	103	115	126
Heating capacity [MBH]	825	892	960	1,063	1,166	1,329	1,467	1,604

R-32

Sommario

Features and benefits

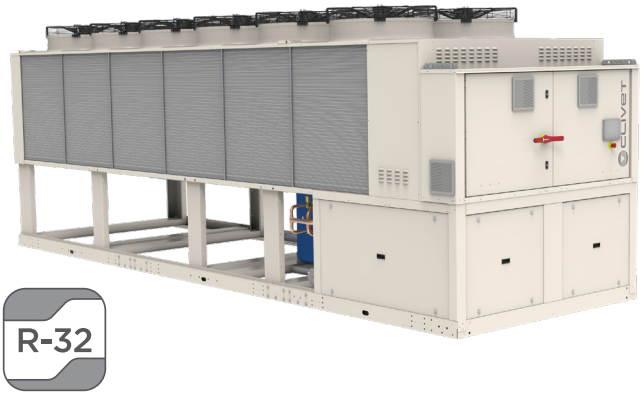
SPINCHILLER4: Modular scroll technology for every application

SPINCHILLER4 is the new generation of Clivet heat pumps with modular scroll technology.
Thanks to its high seasonal efficiency and the adoption of the R-32 refrigerant with reduced environmental impact, it represents the ideal solution for different types of installation.

WSAN-YSC4 NA 90.4 ÷ 175.4

Air cooled reversible heat pump with multiscroll technology

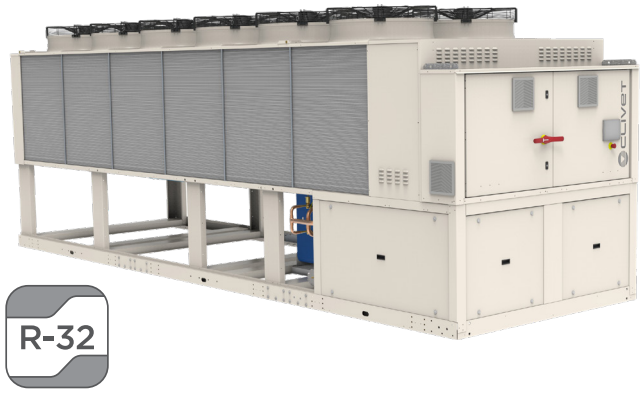
- Cooling range 67.7 ÷ 126 ton
- Heating range 825 ÷ 1,604 MBH
- Seasonal efficiency (IPLV) 17.4 Btu/Wh
- Operating with 118.4 °F of outdoor temperature in cooling
- Operating with 5 °F of outdoor air temperature in heating
- Copper/aluminum condensing coil
- Plate exchangers
- 2 refrigeration circuits



WSAN-YSC4 PL NA 90.4 ÷ 175.4

Air cooled polyvalent heat pump with multiscroll technology

- Cooling range 67.7 ÷ 126 ton
- Heating range 851 ÷ 1,653 MBH
- Seasonal efficiency (IPLV) 17.4 Btu/Wh
- Operation for 4-pipe system
- Operating with 118.4 °F of outdoor temperature in cooling
- Operating with 5 °Fof outdoor air temperature in heating
- Copper/aluminum condensing coil
- Plate exchangers
- 2 refrigeration circuits



Standard unit technical specifications

Compressor

High efficiency hermetic orbiting scroll compressor complete with oil charge, motor over-temperature and over-current devices and protection against excessive gas discharge temperature with oil heater, which starts automatically, keeps the oil from being diluted by the refrigerant when the compressor stops.
Compressors, fitted on rubber antivibration mounts to prevent transmission of noise and vibration, are connected in TANDEM or TRIO on a single refrigerating circuit with biphasic oil equalisation, it allows to reach high efficiency at partial load.
Uniform compression process with reduced number of moving parts which ensure very low levels of noise and vibration.

Structure

Structure and base made entirely of sturdy sheet steel, thickness of 30/10 or 40/10, with the surface treatment in Zinc–Magnesium painted , for the parts in view, with polyester powder RAL 9001 that guarantees excellent mechanical characteristics and high corrosion strength over time.

Internal exchanger

Direct expansion heat exchanger, braze-welded AISI 316 stainless steel plates, in pack without seals using copper as the brazing material, with low refrigerant charge and large exchange surface, complete with:

- external thermal insulation no-condensation, 3/8" thickness, in extruded elastomer foam with closed cells;
- differential pressure switch, water side;
- antifreeze heater to protect the water side exchanger, preventing the formation of frost if the water temperature falls below a set value.

Maximum operating pressure exchanger: 145 psi on the water side.

External exchanger

Finned exchanger, made from copper pipes arranged in staggered rows and mechanically expanded for better adherence to the collar of the fins. The exchangers are planned, designed and produced directly by CLIVET. The fins are made of aluminium and special corrugated surface, set a suitable distance apart to ensure maximum heat exchange efficiency. A proper liquid supply of the expansion valve is ensured by the subcooling circuit. Each finned heat exchanger is directly cooled by the air flow of its specific fans.
In Excellence version the fins are made of aluminium with hydrophilic treatment.

Fan

Axial fans with high performance and low-noise, balanced statically and dynamically, with blades in aluminum sheet coated in PP and sickle profile terminating with “Winglets”, Wall ring in sheet steel pre-galvanised, directly coupled to the three-phase electric motor with external rotor and IP54 protection and class F insulation. Fans are located in aerodynamically shaped structures, equipped with accident prevention steel guards.Supplied with variable speed control (ECOBREEZE).

Refrigeration circuit

Two independent refrigeration circuits made of copper, brazed and factory-assembled, complete with:

- anti-acid dehydrator filter with solid cartridge replaceable;
- liquid flow and humidity indicator;
- ricevitore di liquido;
- electronic expansion valve;
- non return valve;
- 4-way reverse cycle valve;
- high-pressure safety pressure switch;
- safety valve for high and low pressure;
- cut-off valve on liquid line.
- inlet liquid separator.

Suction pipes thermally insulated with highly flexible EPDM rubber closed-cell elastomer insulation. Each cooling circuit is tested under pressure for leaks and is supplied complete with load of refrigerant gas.

Electrical panel

Entirely manufactured and wired in conformity to the UL 508 A
The power section includes:
- door locking main circuit breaker;
- insulation transformer for powering the auxiliary circuit;
- magneto-thermal cut-out switches to protect compressors;
- magneto-thermal cut-out switches to protect fans;
- electrical panel ventilation.

The control section includes:
- interface terminal with graphic display;
- view of values set, failure codes and parameters index;
- anti-freeze protection water side;
- compressor overload protection and timer;
- potential-free contacts for compressor status;
- system with instant error code visualisation
- multifunction phase monitor;
- input for remote HEAT/COOL control;
- digital input for enabling double set point;
- relay for remoting cumulative alarm signalling.

All the features of the device can be replicated with a normal laptop connected to the unit with an Ethernet network cable and an internet browser. All electrical cables are coloured and numbered in conformity with the wiring diagram.
A web-based graphical interface is available, where operating states, parameters, alarms, and pre-alarms can be viewed at different access levels.

Test

Unit subjected to factory-tested in specific steps and test pressure of the piping of the refrigerant circuit (with nitrogen and hydrogen), before shipping them.

Standard unit technical specifications

Unit equipment with outdoor air low temperatures

<table>
<tr><th colspan="3" rowspan="2">MINIMUM OUTDOOR AIR TEMPERATURE</th><th colspan="2">OPERATING UNIT</th><th rowspan="2">UNIT IN STAND-BY (5) (FED UNIT)</th><th rowspan="2">UNIT IN STORAGE (UNIT NOT FED)</th></tr>
<tr><th>COOL*</th><th>HOT**</th></tr>
<tr><td>51.8 °F</td><td>+11 °C</td><td>1</td><td rowspan="4">✓ STANDARD UNIT</td><td rowspan="4">✓ STANDARD UNIT</td><td rowspan="4">✓ STANDARD UNIT</td><td rowspan="5">✓ STANDARD UNIT (6)</td></tr>
<tr><td>35.6 °F</td><td>+2 °C</td><td>2</td></tr>
<tr><td>19.4 °F</td><td>-7 °C</td><td rowspan="2">3</td></tr>
<tr><td>14 °F</td><td>-10 °C</td></tr>
<tr><td>Between 14 °F and 5 °F</td><td>Between -10 °C and -15 °C</td><td rowspan="3"></td><td>NOT POSSIBLE</td><td>✓ STANDARD UNIT
X NOT SUITABLE: BUILT-IN INVERTER PUMPS</td><td>✓ STANDARD UNIT
X NOT SUITABLE: BUILT-IN INVERTER PUMPS</td></tr>
<tr><td>Between 5 °F and -13 °F</td><td>Between -15 °C and -25 °C</td><td colspan="2">NOT POSSIBLE</td><td>✓ WATER EMPTY UNIT OR WITH AN APPROPRIATE GLYCOL PERCETAGE
✓ ELECTRICAL PANEL ANTIFREEZE PROTECTION (RE-25) OPTION
X NOT SUITABLE: BUILT-IN PUMPS. AND STORAGE TANK</td><td>NOT POSSIBLE</td></tr>
<tr><td>Between -13 °F and -38.2 °F</td><td>Between -25 °C and -39 °C</td><td colspan="2">NOT POSSIBLE</td><td>✓ WATER EMPTY UNIT OR WITH AN APPROPRIATE GLYCOL PERCETAGE
✓ ELECTRICAL PANEL ANTIFREEZE PROTECTION (RE-39) OPTION
X NOT SUITABLE: BUILT-IN PUMPS. AND STORAGE TANK</td><td>NOT POSSIBLE</td></tr>
</table>

Data referred to the following conditions:
*chilled water production:
cold side exchanger water = 53.6 / 44.6 °F
**hot water production:
hot side exchanger water = 104 / 113 °F

Notes referring to cooling operation:
1. Part load unit and air speed equal to 197 ft/min
2. Part load unit and air speed equal to 98 ft/min
3. Full load unit and outdoor air temperature at rest.

(5) The hydronic assembly must be fed and connected to the unit according to the manual.
(6) Unit without water or containing water with an appropriate quantity of glycol.
At the unit start-up the water temperature or water with glycol must be inside the operating range indicated in the "Operating range" graph.
To know the water freezing temperature on varying the glycol percentage refer to the specific 'Correction factors for glycol use' table.

⚠ Air conditions which are at rest are defined as the absence of air flowing towards the unit. Weak winds can induce air to flow through the exchanger and air-levels which can cause a reduction in the operating range. In the presence of predominant winds it is necessary to use suitable windbreak barriers.
⚠ The unit. with an outdoor air temperature on average lower than 14 °F. can remain stored for a maximum of 1 month.

Unit configuration

WSAN-YSC4 NA	90	.4	4606H	SC	CCHY	CREFB	=
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

(1) Range

WSAN = Air cooled heat pump
YSC4 = SPINCHILLER range with multiscroll compressors and R-32 refrigerant

(2) Size

90 = Nominal compressor capacity (HP)

(3) Compressors

.4 / = Compressor quantity

(4) Supply voltage

4606H = 460/3/60 supply voltage
5756H = 575/3/60 supply voltage

(5) Acoustic configuration

SC = Acoustic configuration with compressor soundproofing (standard)
EN = Super-silenced acoustic configuration

(6) Condensing coil

CCHY = Copper / aluminium condenser coil with hydrophilic treatment (Standard)
CCCA = Copper / aluminium condenser coil with acrylic lining
CCCA1 = Copper / aluminium condensing coils with Aluminium Energy Guard DCC treatment

(7) Fans

CREFB = Device for fan consumption reduction of the external section ECOBREEZE type (Standard)

(8) Hydronic assembly

(-) Not required (standard)
1PM = Hydropack with 1 on/off pump
1PMH = Hydropack with 1 high static pressure on/off pump
1PMV = Hydropack with 1 inverter pump
1PMVH = Hydropack with 1 high static pressure inverter pump
1P1SB = Hydropack with 1+1 on/off pump
1PAPS = Hydropack with 1+1 high static pressure on/off pump
1P1SBV = Hydropack with 1+1 inverter pump
1PAPSV = Hydropack with 1+1 high static pressure inverter pump

Built-in options

IVFCDT **Variable flow rate control cooling side by inverter according to the temperature differential**

Allows control of the water flow-rate to the unit under partial load conditions, keeping the temperature difference at the inlet to and outlet from the user side exchanger constant. Flow-rate control is managed by the on-board electronics via the water temperature probes built into the unit.
Designed to work on systems with a variable flow-rate primary circuit decoupled from the secondary circuit. If the building has no load, the unit switches the compressors off, and one of the following operating modes can be selected for the pumps:

- keep the pumping unit running at minimum flow-rate to allow continuous monitoring of load variations on the secondary circuit;
- switch off the pumping unit completely and start it periodically (with settable time) to bring the temperatures of the secondary circuit back to the primary one;
- switch off the pumping unit completely and wait for the customer's consent to restart (potential-free contact).

Device available with inverter pumps.

CMSC9 **Serial communication module for Modbus supervisor**

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

⚠ The total length of each serial line do not exceed 3,280 ft and the line must be connected in bus typology (in/out)

CMSC11 **Serial communication module for BACnet/IP supervisor**

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

⚠ The configuration and management activities for the BACnet networks are the responsibility of the client.
⚠ The total length of each serial line do not exceed 3,280 ft and the line must be connected in bus typology (in/out)

CMSC12 **Serial communication module for MSTP supervisor**

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

⚠ The configuration and management activities for the BACnet networks are the responsibility of the client.
⚠ The total length of each serial line do not exceed 3,280 ft and the line must be connected in bus typology (in/out)

SCP4 **Set-point compensation with 0-10 V signal**

This device enables the set-point to be varied which is pre-set using an external 0÷10 V signal.
The device is installed and wired built-in the unit.

SPC1 **Set-point compensation with 4-20 mA signal**

This device enables the set-point to be varied which is pre-set using an external 4-20 mA signal.
The device is installed and wired built-in the unit.

ECS ECOSHARE function for the automatic management of a group of units

The device allows automatic management of units that operate on the same hydraulic circuit, by creating a local communication network.

The device allows for rotation based on the criterion of minimum wear and management of units in stand-by. The Ecoshare network coordinates the thermoregulation of the system in such a way that all the Slaves receive from the Master, the on/off status command, and the offset for scaling the SetPoints of the individual Slaves (which will work with their own thermoregulator), according to wear, state of sleep in progress, and presence of alarms which would prevent the activation of the single Slave.
Units can be of different sizes. Each unit must be equipped with ECOSHARE functionality. The set of units is controlled by a Master unit.
The local network can be extended up to 7 units (1 Master and 6 Slave).
For units in ECOSHARE, the minimum water content of the system is equal to that of the largest unit increased by +25% for each additional unit connected.

- ⚠ The unit supplied with this device can also be equipped at the same time with the RCMRX option and one of the CMSC9 / CMSC11 / CMSC12 options.
- ⚠ It is necessary to provide a non-return valve for each unit installed in hydraulic parallel and equipped with an hydronic assembly (1PM, 1PMH, 1PMV, 1PMVH) installed on board (Installation by the Customer).

RE-25 Electrical panel antifreeze protection for min. outdoor temperature down to -25 °C

This option is necessary for very cold climates, where the external temperature can go down to 5 °F and -13 °F (-25 °C). It includes self-regulating temperature maintaining resistances which are able to protect the electrical panel against condensation and frost guaranteeing that it functions correctly. The choice of device should be carried out on the basis of the minimum temperatures reached at the unit installation site.
The device is built-in the unit.

- ⚠ This accessory does not lead to substantial variations in the electrical data for the unit which has been declared in the Electrical Data section.
- ⚠ This accessory operates even when the unit is switched off provided that the power supply is maintained active and the unit continues to be connected.
- ⚠ It is necessary to make precautions against build up of snow and ice in front of the exhaust and outdoor air inlet locations

RE-39 Electrical panel antifreeze protection for min. outdoor temperature down to -39 °C

This option is necessary for very cold climates, where the external temperature can go down to -38.2 °F (-39 °C). It includes self-regulating temperature maintaining resistances which are able to protect the electrical panel against condensation and frost guaranteeing that it functions correctly. It also includes additional resistances to protect key components in the refrigeration section The choice of device should be carried out on the basis of the minimum temperatures reached at the unit installation site.
The device is built-in the unit.

- ⚠ This accessory does not lead to substantial variations in the electrical data for the unit which has been declared in the Electrical Data section.
- ⚠ This accessory operates even when the unit is switched off provided that the power supply is maintained active and the unit continues to be connected.
- ⚠ It is necessary to make precautions against build up of snow and ice in front of the exhaust and outdoor air inlet locations

Built-in options

PGFC **Finned coil protection grilles**

Grilles made in drawn of electro-welded steel and coated to protect the external coil from accidental contact with people and things.
The protection grill has a height equal to the whole unit. Therefore, all areas under the coils are protected.
This accessory also protects the rear area of the unit opposite to the electric panel.
Ideal for installation in places where persons can pass from, such as car parks, terraces, etc.
The accessory is provided and installed built-in the unit. Grille slot 0.98 in.

⚠ This option is not suitable for application in sulphuric environments.

PGCCH **Anti-hail protection grilles**

Grilles made in drawn of electro-welded steel and coated suitable to protect the external coil from hail damage.
Accessories supplied and installed on the unit.

DLM0-10 **Demand limit with signal 0-10V**

The device allows to limit the absorption unit through an external signal type 0-10V.

DLM4-20 **Demand limit with signal 4-20mA**

The device allows to limit the absorption unit through an external signal type 4-20mA.

CCCA **Copper / aluminium condenser coil with acrylic lining**

Condensing coils with copper pipes and aluminum fins with acrylic lacquering. Can be used in settings with moderately aggressive low saline concentrations and other chemical agents. The acrylic coating is used as the most economical and effective method particularly in protecting aluminum surfaces exposed to the corrosive influence of the humid and salty air in regions with marine climates.
Attention!
- Cooling capacity variation -2.7%
- Variation in compressor power input +4.2%
- Operating range reduction -2.1°C

CCCA1 **Copper / aluminium condensing coils with Aluminium Energy Guard DCC treatment**

Condensing coils with copper pipes and aluminum fins with Aluminium Energy Guard DCC treatment. Complete treatment which offers an optimal thermal exchange and guarantees and protects the finned coil exchangers from corrosion over time and UV rays. Can be used in settings with very aggressive saline concentrations and other chemical agents in the air thus maintaining the performance of the coils over time and with negligible pressure drop.

PFGP **Soundproofing paneling of the pumping unit**

Configuration used to increase the hydronic assembly's silent operation.
It is made up of steel casings lined internally with high-density material with a soundproofing function. The casings are pre-painted with RAL 9001 color.

Option available for all pumping groups installed on the unit, in combination with the standard acoustic configuration with compressor soundproofing (SC)

Accessories separately supplied

RCMRX **Remote control via microprocessor control**

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

- All device functions can be repeated with a normal portable PC connected to the unit with an Ethernet cable and equipped with an internet navigation browser.
- The device must be installed on the wall with suitable plugs and connected to the unit (installation and wiring to be conducted by the Customer). Maximum remote control distance 1,150 ft without auxiliary power supply.
- For distances greater than 1,150 ft and in any case less than 2,300 ft it is necessary to install the 'PSX - Mains power unit' accessory.
- Data and power supply serial connection cable n.1 twisted and shielded pair. Diameter of the individual conductor 0.031 in.
- Installation is a responsibility of the Customer.

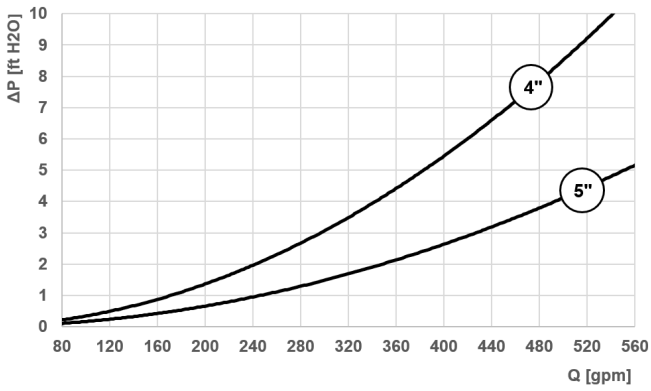
AMMX **Spring antivibration mounts**

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

- Installation is a responsibility of the Customer.

IFWX **Steel mesh strainer on the water side**

The device stops the exchanger from being clogged by any impurities which are in the hydraulic circuit. The mechanical steel mesh strainer must be placed on the water input line. It can be easily dismantled for periodical maintenance and cleaning. It also includes:
cast-iron shut-off butterfly valve with quick connections and activation lever with a mechanical calibration lock;
quick connections with insulated casing.



- Pressure drop referred to a clean filter.
- Installation is the responsibility of the Client, externally to the unit.
- Check for the presence of the required hydraulic shut-off valves in the system, in order to undertake periodical maintenance.

CSVX **Couple of manually operated shut-off valves**

The kit allows to isolated the input and output water circuit. It includes:
- no. 2 of cast-iron shut-off butterfly valves with fast fittings and activation lever with a mechanical setting lock
- no. 2 of victaulic connections

- Installation is the responsibility of the Client, externally to the unit.

PSX **Mains power supply**

The device allows the unit and the remote control to communicate with the user interface even when the serial line is longer than 1,150 ft.
It must be connected to the serial line at a distance of 1,150 ft from the unit and allows to extend the length to 2,300 ft maximum in total. The device requires an external power supply, 120 or 230 VAC

- Power supply at 120 or 230 VAC provided by Customer
- Installation is a responsibility of the Customer.

General technical data

Performance

Acoustic configuration Compressor soundproofing (SC)

SIZE			90.4	100.4	110.4	120.4	130.4	145.4	160.4	175.4
Cooling										
Cooling capacity	1	ton	67.7	73.4	79.1	84.1	92.1	103	115	126
Total power input	1	kW	77.3	87.1	95.8	104	114	125	139	157
EER	1	Btu/Wh	10.5	10.1	9.91	9.69	9.72	9.89	9.92	9.64
IPLV	1	Btu/Wh	17.4	17.2	16.9	16.6	16.7	17.1	17.0	16.6
Water flow-rate (User Side)	1	gpm	161	175	188	200	219	246	273	299
Internal exchanger pressure drops	1	ft H_2O	5.12	5.29	6.08	4.78	4.46	5.55	6.76	5.65
Heating										
Heating capacity	2	MBH	825	892	960	1,063	1,166	1,329	1,467	1,604
Total power input	2	kW	69.9	75.5	82.6	89.3	96.4	110	123	138
COP	2	kW/kW	3.46	3.46	3.40	3.49	3.54	3.53	3.50	3.40
Water flow (user side)	2	gpm	166	180	193	214	235	268	296	323
Internal exchanger pressure drops	2	ft H_2O	5.42	5.58	6.38	5.44	5.09	6.53	7.89	6.54
Heating										
Heating capacity	3	MBH	545	592	640	712	782	888	985	1,080
Total power input	3	kW	70.5	75.2	81.8	88.0	94.8	110	121	136
COP	3	kW/kW	2.27	2.31	2.29	2.37	2.42	2.37	2.38	2.33
Water flow (user side)	3	gpm	110	119	129	143	158	179	199	218
Internal exchanger pressure drops	3	ft H_2O	2.56	2.64	3.04	2.54	2.38	3.03	3.69	3.09
Heating										
Heating capacity	4	MBH	813	881	949	1,052	1,154	1,314	1,451	1,588
Total power input	4	kW	81.3	88.0	96.3	104	112	128	142	160
COP	4	kW/kW	2.93	2.94	2.89	2.97	3.03	3.01	2.99	2.91
Water flow (user side)	4	gpm	164	178	192	213	233	266	294	321
Internal exchanger pressure drops	4	ft H_2O	5.30	5.48	6.28	5.37	5.02	6.43	7.78	6.46

1. Data compliant to Standard AHRI 550/590 referred to the following conditions: Cold side exchanger water temperature = 54/44 °F. Entering external exchanger air temperature = 95 °F
2. Data compliant to Standard AHRI 550/590 referred to the following conditions: Hot side exchanger water temperature = 95/105 °F. Entering external exchanger air temperature = 47 °F d.b./43 °F w.b.
3. Data compliant to Standard AHRI 550/590 referred to the following conditions: Hot side exchanger water temperature = 95/105 °F. Entering external exchanger air temperature = 17 °F d.b./15 °F w.b.
4. Data compliant to Standard AHRI 550/590 referred to the following conditions: Hot side exchanger water temperature = 110/120 °F. Entering external exchanger air temperature = 47 °F d.b./43 °F w.b.

Performance

Super-silenced acoustic configuration (EN)

SIZE			90.4	100.4	110.4	120.4	130.4	145.4	160.4	175.4
Cooling										
Cooling capacity	1	ton	66.3	71.9	77.5	82.4	90.3	101	112	123
Total power input	1	kW	77.3	87.1	95.8	104.0	114	125	139	157
EER	1	Btu/Wh	10.3	9.91	9.71	9.50	9.53	9.69	9.72	9.45
IPLV	1	Btu/Wh	17.3	17.1	16.8	16.4	16.6	16.9	16.8	16.4
Water flow-rate (User Side)	1	gpm	158	171	185	196	215	241	267	293
Internal exchanger pressure drops	1	ft H_2O	4.93	5.10	5.85	4.60	4.29	5.34	6.50	5.44
Heating										
Heating capacity	2	MBH	825	892	960	1063	1166	1329	1467	1604
Total power input	2	kW	69.9	75.5	82.6	89.3	96.4	110	123	138
COP	2	kW/kW	3.46	3.46	3.40	3.49	3.54	3.53	3.50	3.40
Water flow (user side)	2	gpm	166	180	193	214	235	268	296	323
Internal exchanger pressure drops	2	ft H_2O	5.42	5.58	6.38	5.44	5.09	6.53	7.89	6.54
Heating										
Heating capacity	3	MBH	545	592	640	712	782	888	985	1080
Total power input	3	kW	70.5	75.2	81.8	88.0	94.8	110	121	136
COP	3	kW/kW	2.27	2.31	2.29	2.37	2.42	2.37	2.38	2.33
Water flow (user side)	3	gpm	110	119	129	143	158	179	199	218
Internal exchanger pressure drops	3	ft H_2O	2.56	2.64	3.04	2.54	2.38	3.03	3.69	3.09
Heating										
Heating capacity	4	MBH	813	881	949	1052	1154	1314	1451	1588
Total power input	4	kW	81.3	88.0	96.3	104	112	128	142	160
COP	4	kW/kW	2.93	2.94	2.89	2.97	3.03	3.01	2.99	2.91
Water flow (user side)	4	gpm	164	178	192	213	233	266	294	321
Internal exchanger pressure drops	4	ft H_2O	5.30	5.48	6.28	5.37	5.02	6.43	7.78	6.46

1. Data compliant to Standard AHRI 550/590 referred to the following conditions: Cold side exchanger water temperature = 54/44 °F. Entering external exchanger air temperature = 95 °F
2. Data compliant to Standard AHRI 550/590 referred to the following conditions: Hot side exchanger water temperature = 95/105 °F. Entering external exchanger air temperature = 47 °F d.b./43 °F w.b.
3. Data compliant to Standard AHRI 550/590 referred to the following conditions: Hot side exchanger water temperature = 95/105 °F. Entering external exchanger air temperature = 17 °F d.b./15 °F w.b.
4. Data compliant to Standard AHRI 550/590 referred to the following conditions: Hot side exchanger water temperature = 110/120 °F. Entering external exchanger air temperature = 47 °F d.b./43 °F w.b.

General technical data

Construction

SIZE			90.4	100.4	110.4	120.4	130.4	145.4	160.4	175.4
Compressor										
Type of compressors	1		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Refrigerant			R32	R32	R32	R32	R32	R32	R32	R32
No. of compressors		Nr	4	4	4	4	4	4	4	4
Rated power (C1)		HP	38	38	44	44	56	56	68	68
Rated power (C2)		HP	38	44	44	56	56	68	68	80
Std Capacity control steps		Nr	6	5	4	4	4	5	6	5
Oil charge (C1)		gal	2.48	2.48	3.22	3.22	3.22	3.22	3.22	3.22
Oil charge(C2)		gal	2.48	3.22	3.22	3.22	3.22	3.22	3.22	3.22
Refrigerant charge (C1)		lbs	68	69	69	70	96	93	119	122
Refrigerant charge (C2)		lbs	68	69	69	94	96	119	119	127
Refrigeration circuits		Nr	2	2	2	2	2	2	2	2
Internal exchanger										
Type of internal exchanger	2		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
N. of internal exchanger		Nr	1	1	1	1	1	1	1	1
Water content		gal	7.42	8.56	8.56	11.2	12.2	12.2	12.2	15.8
Minimum system water content		gal	555	555	581	687	687	977	1,004	1,030
External exchanger										
Type of external exchanger	3		CCHY	CCHY	CCHY	CCHY	CCHY	CCHY	CCHY	CCHY
Number of coils		Nr	4	4	4	4	4	4	4	4
External Section Fans										
Type of fans	4		AX	AX	AX	AX	AX	AX	AX	AX
Number of fans		Nr	6	6	6	6	6	8	8	8
Type of motor	5		EC	EC	EC	EC	EC	EC	EC	EC
Standard airflow in cooling (SC)		CFM	73,661	73,661	73,661	73,661	73,661	98,214	98,214	106,355
Standard airflow in cooling (EN)		CFM	56,778	56,778	56,778	56,778	56,778	75,703	75,703	83,950
Connections										
Water fittings			4"	4"	4"	4"	4"	5"	5"	5"
Power supply										
Standard power supply			460/3~/60	460/3~/60	460/3~/60	460/3~/60	460/3~/60	460/3~/60	460/3~/60	460/3~/60
Electrical data (460V)										
MCA	6	A	173	186	200	217	237	269	300	324
MOP	7	A	200	200	225	225	250	300	350	350
SCCR	8	kA	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Electrical data (575V)										
MCA	6	A	142	153	164	178	194	221	246	265
MOP	7	A	150	175	175	200	200	225	250	300
SCCR	8	kA	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

1. SCROLL = SCROLL compressor
2. PHE = Plate exchanger
3. CCHY = Copper / aluminium condenser coil with hydrophilic treatment
4. AX = Ventilatore assiale
5. EC = Asynchronous motor with permanent magnet commuted electronically.
6. MCA = Min. Circuit Amps. (For wire diameter selection)
7. MOP = Maximum overcurrent protector
8. SCCR = Short Circuit Current rating

Sound levels cooling

Acoustic configuration with compressor soundproofing (SC)

SIZE	Sound power level (dB) - Octave band (Hz)								Sound pressure level	Sound power level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
90.4	94	92	90	86	87	81	75	71	**70**	**90**
100.4	94	92	90	86	87	82	76	71	**71**	**91**
110.4	94	92	90	86	88	82	76	72	**71**	**91**
120.4	94	92	90	86	87	83	77	73	**71**	**91**
130.4	94	92	90	86	87	84	78	73	**71**	**91**
145.4	95	93	91	88	88	86	78	74	**72**	**92**
160.4	96	93	91	89	88	87	78	75	**73**	**93**
175.4	96	93	91	89	88	88	78	75	**73**	**93**

Sound levels refer to full load units, in test nominal conditions. The sound pressure level refers to 3.28 ft from the standard unit outer surface operating in open field. Measures according to UNI EN ISO 9614-2 regulations.

Data referred to the following conditions:
- internal exchanger water temperature = 53.6 / 44.6 °F
- ambient temperature = 95 °F

Sound levels heating

Acoustic configuration with compressor soundproofing (SC)

SIZE	Sound power level (dB) - Octave band (Hz)								Sound pressure level	Sound power level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
90.4	94	92	90	86	87	81	75	71	**70**	**90**
100.4	94	92	90	86	87	82	76	71	**71**	**91**
110.4	94	92	90	86	88	82	76	72	**71**	**91**
120.4	94	92	90	86	87	83	77	73	**71**	**91**
130.4	94	92	90	86	87	84	78	73	**71**	**91**
145.4	95	93	91	88	88	86	78	74	**72**	**92**
160.4	96	93	91	89	88	87	78	75	**73**	**93**
175.4	96	93	91	89	88	88	78	75	**73**	**93**

Sound levels refer to full load units, in test nominal conditions. The sound pressure level refers to 3.28 ft from the standard unit outer surface operating in open field. Measures according to UNI EN ISO 9614-2 regulations.

Data referred to the following conditions:
- internal exchanger water temperature = 104 / 113 °F
- ambient temperature = 44.6 °F d.b. / 42.8 °F w.b.

General technical data

Sound levels cooling

Super-silenced acoustic configuration (EN)

SIZE	Sound power level (dB) - Octave band (Hz)								Sound pressure level	Sound power level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
90.4	91	88	86	82	83	78	72	67	**67**	**87**
100.4	91	88	86	82	84	78	72	68	**67**	**87**
110.4	91	88	86	82	84	78	72	68	**67**	**87**
120.4	91	88	86	82	84	79	73	69	**67**	**87**
130.4	91	88	86	82	83	81	74	70	**68**	**88**
145.4	92	89	87	84	84	82	74	70	**68**	**89**
160.4	92	89	87	85	84	83	75	71	**69**	**89**
175.4	92	89	87	85	84	84	75	71	**69**	**90**

Sound levels refer to full load units, in test nominal conditions. The sound pressure level refers to 3.28 ft from the standard unit outer surface operating in open field. Measures according to UNI EN ISO 9614-2 regulations.

Data referred to the following conditions:
- internal exchanger water temperature = 53.6 / 44.6 °F
- ambient temperature = 95 °F

Sound levels heating

Super-silenced acoustic configuration (EN)

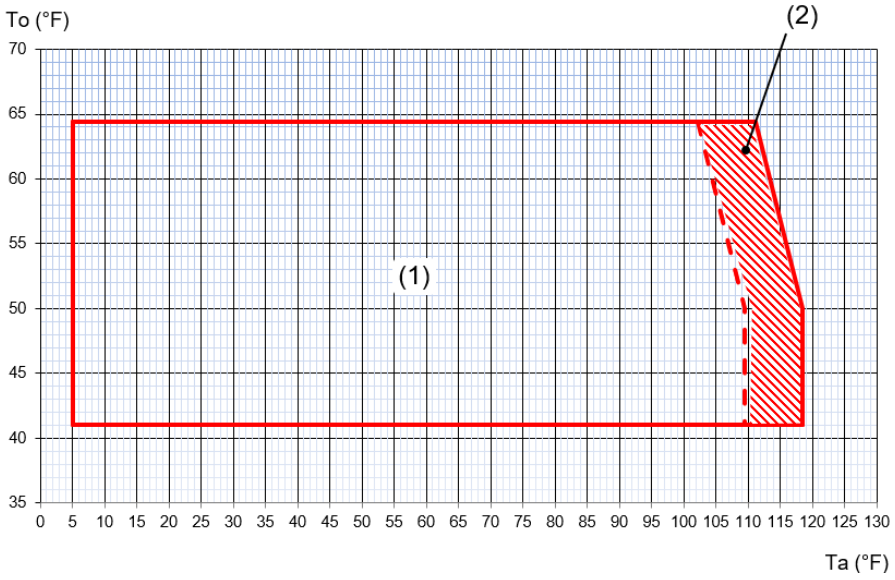
SIZE	Sound power level (dB) - Octave band (Hz)								Sound pressure level	Sound power level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
90.4	94	92	90	86	87	81	75	71	**70**	**90**
100.4	94	92	90	86	87	82	76	71	**71**	**91**
110.4	94	92	90	86	88	82	76	72	**71**	**91**
120.4	94	92	90	86	87	83	77	73	**71**	**91**
130.4	94	92	90	86	87	84	78	73	**71**	**91**
145.4	95	93	91	88	88	86	78	74	**72**	**92**
160.4	96	93	91	89	88	87	78	75	**73**	**93**
175.4	96	93	91	89	88	88	78	75	**73**	**93**

Sound levels refer to full load units, in test nominal conditions. The sound pressure level refers to 3.28 ft from the standard unit outer surface operating in open field. Measures according to UNI EN ISO 9614-2 regolations.

Data referred to the following conditions:
- internal exchanger water temperature = 104 / 113 °F
- ambient temperature = 44.6 °F d.b. / 42.8 °F w.b.

Operating range

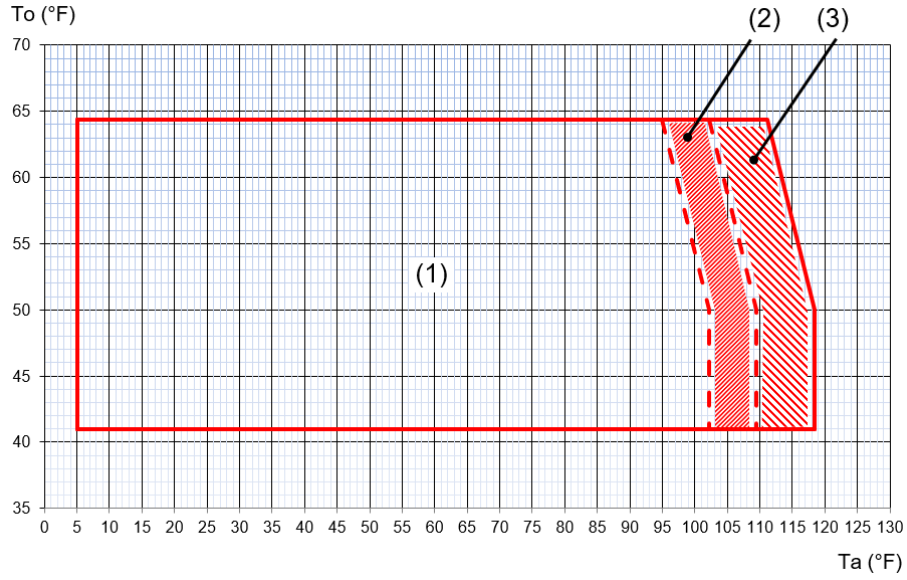
Cooling SC



Ta (°C) = External exchanger inlet air temperature (D.B.)
To (°C) = Internal exchanger outlet water temperature

1. Standard unit operating range at full load [SC]
2. Unit operating range with automatic staging of the compressor capacity

Cooling EN



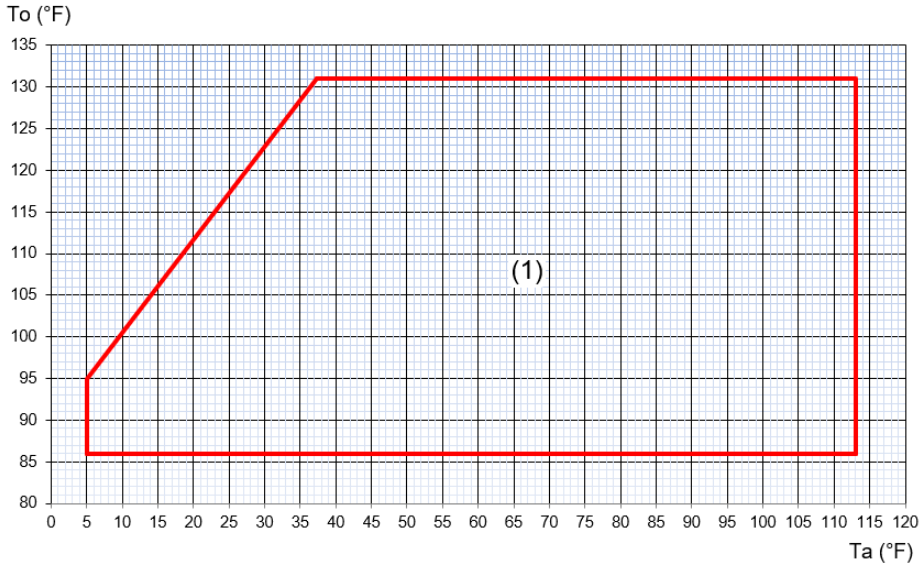
Ta (°C) = External exchanger inlet air temperature (D.B.)
To (°C) = Internal exchanger outlet water temperature

1. Standard unit operating range at full load [EN]
2. Extended operating range with air flow-rate automatic increasing. Inside this field the sound levels are the same of the 'compressor soundproofing (SC)' acoustic configuration
3. Unit operating range with automatic staging of the compressor capacity

General technical data

Operating range

Heating

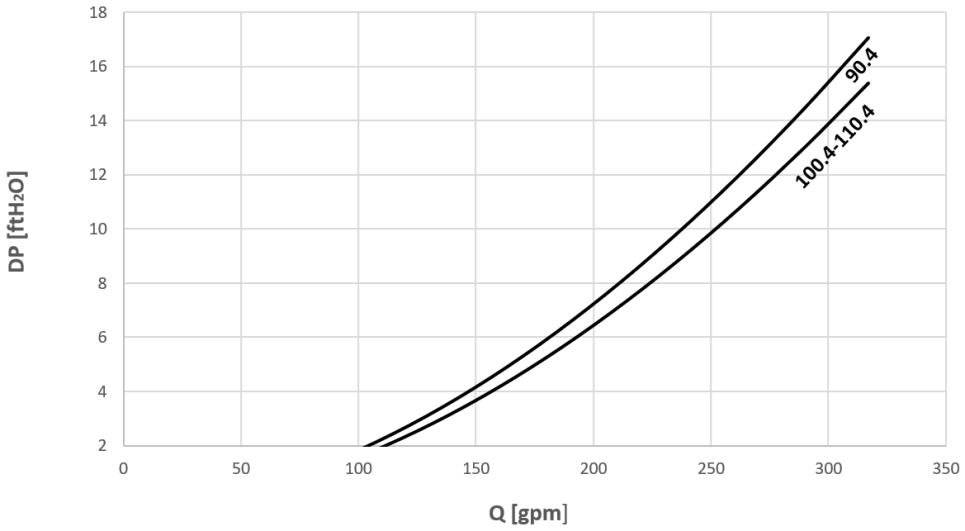


Ta (°C) = External exchanger inlet air temperature (D.B.)
To (°C) = Internal exchanger outlet water temperature

1. Standard unit operating range at full load

Pressure drops of user side plate exchanger

Size 90.4 ÷110.4



The pressure drops are calculated considering a water temperature of 44.6 °F

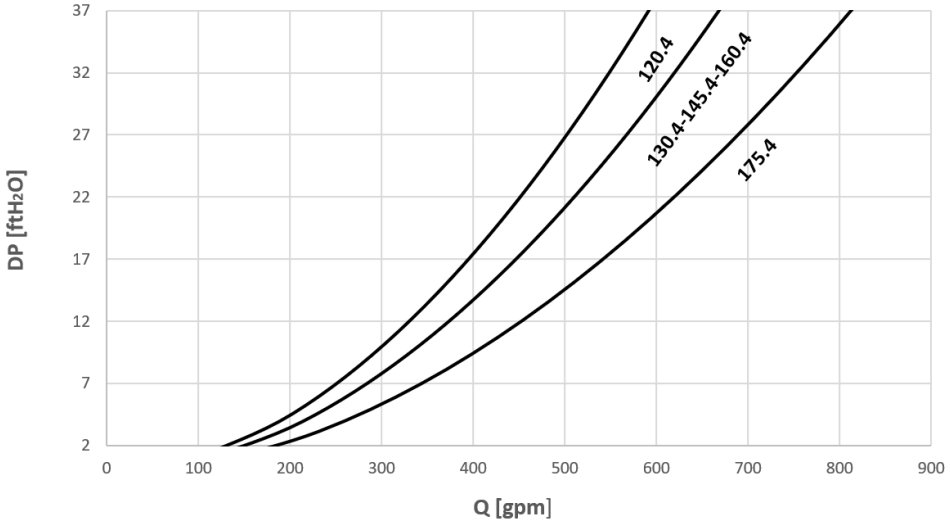
Q = Water flow-rate [gpm]
DP = Water side pressure drops [ft H_2O]

The water flow-rate must be calculated with the following formula

$$Q\ [gpm] = \frac{TR \times 24}{DT}$$

TR = Cooling capacity in ton
DT = Temperature difference between inlet / outlet water in °F

Size 120.4 ÷ 175.4



The pressure drops are calculated considering a water temperature of 44.6 °F

Q = Water flow-rate [gpm]
DP = Water side pressure drops [ft H_2O]

The water flow-rate must be calculated with the following formula

$$Q\ [gpm] = \frac{TR \times 24}{DT}$$

TR = Cooling capacity in ton
DT = Temperature difference between inlet / outlet water in °F

Admissible water flow-rates

Minimum (Qmin) and maximum (Qmax) admissible water flow for the unit to operate correctly

SIZE		90.4	100.4	110.4	120.4	130.4	145.4	160.4	175.4
Qmin	[gpm]	104.7	111.9	111.9	137.6	156.5	156.5	156.5	188.1
Qmax	[gpm]	317.0	317.0	317.0	558.2	631.1	631.1	631.1	766.4

General technical data

Correction factors for ethylene glycol use (user side exchanger)

% ETHYLENE GLYCOL BY WEIGHT		5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Freezing temperature	°F	28.4	25.0	20.3	16.0	10.8	3.9	-2.2	-10.1	-18.0	-26.9
Safety temperature	°F	37.4	33.8	30.2	24.8	21.2	14.0	6.8	-2.2	-10.8	-20.9
Cooling capacity factor	-	0.995	0.989	0.983	0.977	0.971	0.964	0.956	0.949	0.941	0.933
Compressor power input factor (cooling mode)	-	0.998	0.997	0.995	0.994	0.992	0.990	0.989	0.987	0.986	0.984
Pressure drop factor (cooling mode)	-	1.041	1.085	1.131	1.180	1.231	1.285	1.341	1.400	1.461	1.525
Heating capacity factor	-	0.999	0.998	0.997	0.996	0.995	0.994	0.993	0.992	0.991	0.990
Compressor power input factor (heating mode)	-	1.003	1.006	1.009	1.012	1.015	1.018	1.021	1.024	1.027	1.030
Pressure drop factor (heating mode)	-	1.037	1.077	1.118	1.162	1.208	1.257	1.307	1.360	1.415	1.473

Correction factors for propylene glycol use (user side exchanger)

% PROPYLENE GLYCOL BY WEIGHT		5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Freezing temperature	°F	28.4	25.0	20.3	16.0	10.8	3.9	-2.2	-10.1	-18.0	-26.9
Safety temperature	°F	37.4	33.8	30.2	24.8	21.2	14.0	6.8	-2.2	-10.8	-20.9
Cooling capacity factor	-	0.993	0.985	0.977	0.968	0.958	0.947	0.936	0.925	0.912	0.899
Compressor power input factor (cooling mode)	-	0.998	0.995	0.993	0.990	0.987	0.983	0.980	0.976	0.972	0.968
Pressure drop factor (cooling mode)	-	1.052	1.108	1.17	1.237	1.309	1.386	1.467	1.554	1.646	1.743
Heating capacity factor	-	0.998	0.996	0.994	0.991	0.988	0.984	0.980	0.976	0.971	0.966
Compressor power input factor (heating mode)	-	1.004	1.007	1.011	1.014	1.018	1.021	1.025	1.028	1.032	1.035
Pressure drop factor (heating mode)	-	1.047	1.098	1.153	1.213	1.278	1.347	1.421	1.499	1.581	1.669

Fouling Correction Factors

		cooling mode		heating mode	
[h ft2 F/Btu]	[m2 °C /W]	F1	FK1	F2	FK2
0.10 x 10 (-3)	0.18 x 10 (-4)	1.000	1.000	1.000	1.000
0.25 x 10 (-3)	0.44 x 10 (-4)	1.000	1.000	1.000	1.000
0.50 x 10 (-3)	0.88 x 10 (-4)	0.970	0.990	0.970	1.080
0.75 x 10 (-3)	1.32 x 10 (-4)	0.955	0.985	0.945	1.065
1.00 x 10 (-3)	1.76 x 10 (-4)	0.940	0.980	0.920	1.050

F1 = Cooling capacity correction factors
FK1 = Compressor power input correction factor (cooling mode)
F2 = Heating capacity correction factors
FK2 = Compressor power input correction factor (heating mode)

Exchanger operating range

DPR	DPW
587.4	145

DPr = Maximum allowable pressure on refrigerant side in psi
DPw = Maximum operating pressure on water side in psi

Overload and control device calibrations

		OPEN	CLOSE	VALUE
High pressure switch	psi	587.4	-	-
Antifreeze protection	°F	39.2	41.9	-
High pressure safety valve	psi	-	-	652.7
Low pressure safety valve	psi	-	-	435.7
Max no. of compressor starts per hour	n°	-	-	10

General technical data

Performance tables are based on sea level. Altitudes other than sea level affect the performance of the unit. Decreasing air density reduces condenser capacity and unit performance. The maximum altitude allowed is 1,800 metres.

$$D_Q = A_Q \cdot p^2 + B_Q \cdot p + C_Q$$

$$D_\eta = A_\eta \cdot p^2 + B_\eta \cdot p + C_\eta$$

$$(CF_Q)_{P=P_{test}} = 1 + \left(\frac{Q_{\%Load}}{Q_{100\%}}\right) \cdot (D_Q - 1) \cdot exp\{-0.35 \cdot [(D_\eta \cdot \eta_{test,100\%}) - 9.6]\}$$

$$(CF_\eta)_{P=P_{test}} = 1 + \left(\frac{Q_{\%Load}}{Q_{100\%}}\right) \cdot (D_\eta - 1) \cdot exp\{-0.35 \cdot [(D_\eta \cdot \eta_{test,100\%}) - 9.6]\}$$

$$Q_{corrected,application} = \frac{Q_{corrected,standard}}{(CF_Q)_{P=P_{rating}}}$$

$$\eta_{corrected,application} = \frac{\eta_{corrected,standard}}{(CF_\eta)_{P=P_{rating}}}$$

	Capacity DQ			Efficiency Dn			Atmospheric Pressure Corresponding to Altitude
Measurement unit for P	**AQ**	**BQ**	**CQ**	**An**	**Bn**	**Cn**	**P**
Value	0.001127	-0.04127	1.36304	0.002431	-0.09008	1.79872	According to the actual values; you can refer to the comparison table.

$Q_{standard}$	Capacity at sea level 0, unit: ton
$n_{standard}$	Efficiency at sea level 0, unit: Btu/W*h
$Q_{correct}$	Capacity at sea level P, unit: ton
$n_{correct}$	Efficiency at a height different than sea level, unit: Btu/W*h

Altitude and Atmospheric Pressure Comparison Table			
Altitude (meters)	Altitude (feet)	Atmospheric Pressure (mmHg)	Atmospheric Pressure (psi)
0	0	760	15
500	1640	716	14
1000	3281	674	13
1500	4921	633	12
2000	6562	593	11

$$p_{atm} = p_0 \cdot \left[\frac{T_0}{T_0 + \beta 1 \cdot (Z_H - Z_{H0})}\right]^{\left(\frac{g_0}{\beta 2} \cdot \frac{M_0}{R*}\right)}$$

Where:

β_1 = -0.00198 *K/ft*

β_2 = -0.0065 *K/m*

Z_{H0} = 0 *ft*

Z_H = *Installation height of the site in feet*

g_0 = *9.80665 m/s²*

M_0 = *28.96442 kg/kmol*

R^* = *8314.32 J/(K.kmol)*

p_0 = *14.696 psia*

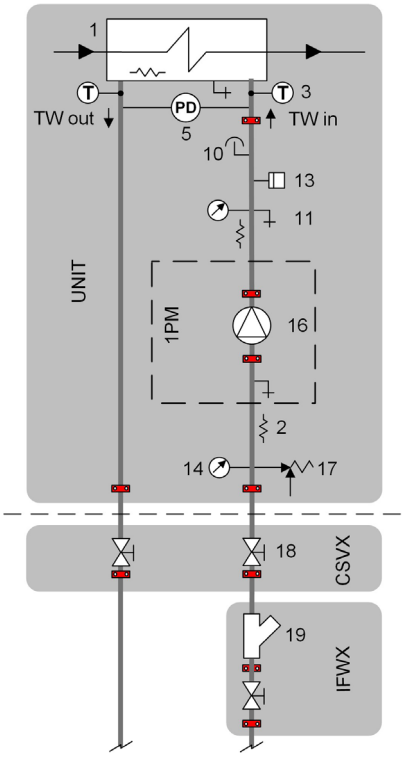
T_0 = *288.15 K*

Accessories - Hydronic assembly

1PM/1PMH - Hydropack with 1 on/off pump

Pumping unit made up of N°1 centrifugal electric pump, with the pump body and the impeller made of cast iron.
Mechanical seal using ceramic, carbon and EPDM elastomer components.
Three-phase electric motor with IP55-protection. Complete with thermoformed insulated casing, fast fittings with insulated casing, safety valve, pressure gauges, system load safety pressure switch, stainless steel anti-freeze immersion resistances located at the intake and at the supply point.
All water fittings are Victaulic with a short pipe stub already connected for welding the customer's pipe.
Option supplied built-in the unit.
1PM = Hydropack with 1 on/off pump
1PMH = Hydropack with 1 high static pressure on/off pump

CONNECTION DIAGRAM - GROUP WITH 1 ON/OFF PUMP



1 - Exchanger
2 - Antifreeze heater
3 - Water temperature probe
5 - Differential pressure switch
10 - Vent
11 - Drain
13 - System load safety pressure switch
14 - Pressure gauge
16 - Packaged electric pump with high efficiency impeller
17 - Safety valve
18- Shut-off valve
19 - Filter

T - Temperature probe
PD - Differential pressure switch

TW in chilled water inlet
TW out chilled water outlet

The grey area indicates further optional components.

⚠ Provide hydraulic interceptions outside the unit ('CSVX - Couple of manually operated shut-off valves' option) to facilitate any possible extraordinary maintenance interventions.
⚠ It is necessary to provide a non-return valve for each unit installed in hydraulic parallel and equipped with an hydronic assembly installed on board (Installation by the Customer).

Electrical data Hydropack

PUMP - 460 V	Rated power [kW]	Nominal Current [A]
1PM 90.4 ÷ 110.4	3.00	5.80
1PM 120.4	4.00	6.80
1PM 130.4 ÷ 175.4	5.50	9.37

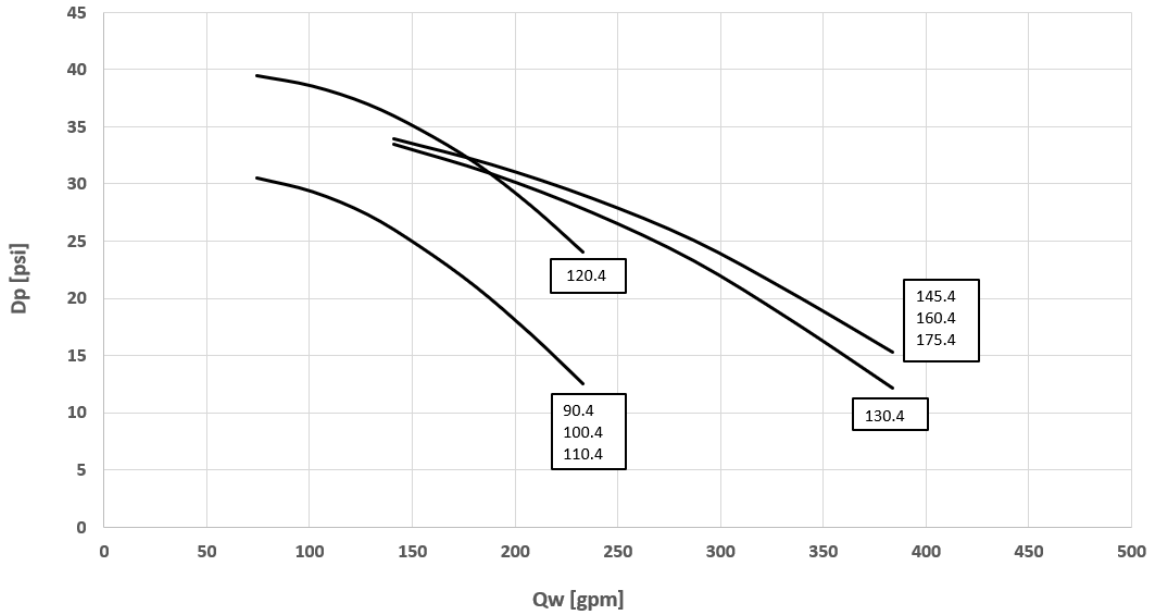
PUMP - 575 V	Rated power [kW]	Nominal Current [A]
1PM 90.4 ÷ 110.4	3.00	4.36
1PM 120.4	4.00	5.16
1PM 130.4 ÷ 175.4	5.50	7.20

PUMP - 460 V	Rated power [kW]	Nominal Current [A]
1PMH 90.4 ÷ 145.4	7.50	12.73
1PMH 160.4 ÷ 175.4	9.20	15.76

PUMP - 575 V	Rated power [kW]	Nominal Current [A]
1PMH 90.4 ÷ 145.4	7.50	10.00
1PMH 160.4 ÷ 175.4	9.20	12.10

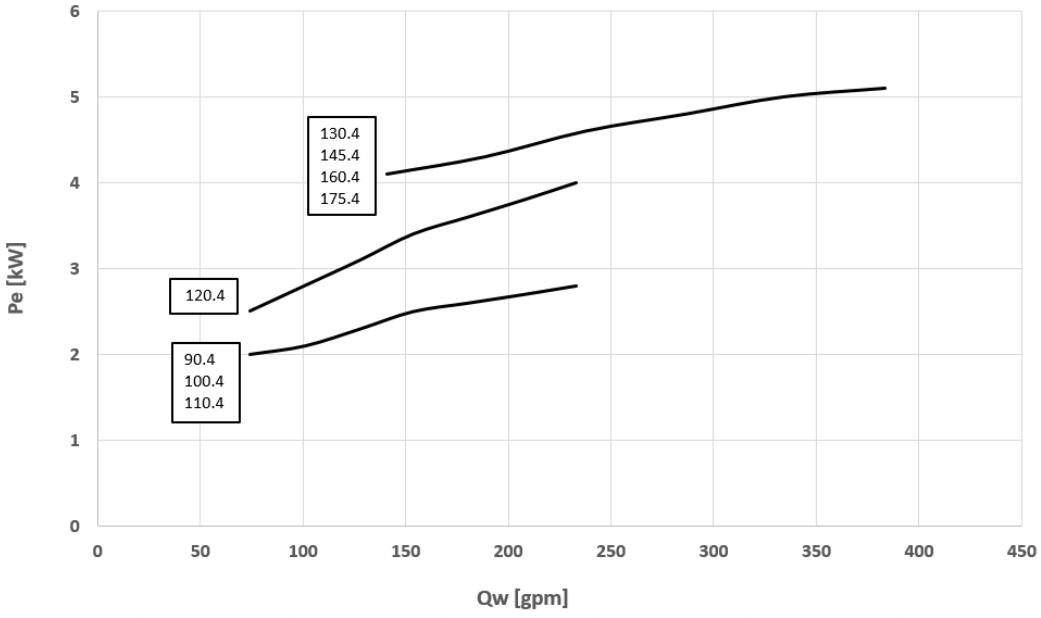
1PM - HYDROPACK WITH 1 ON/OFF PUMP

Head



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input



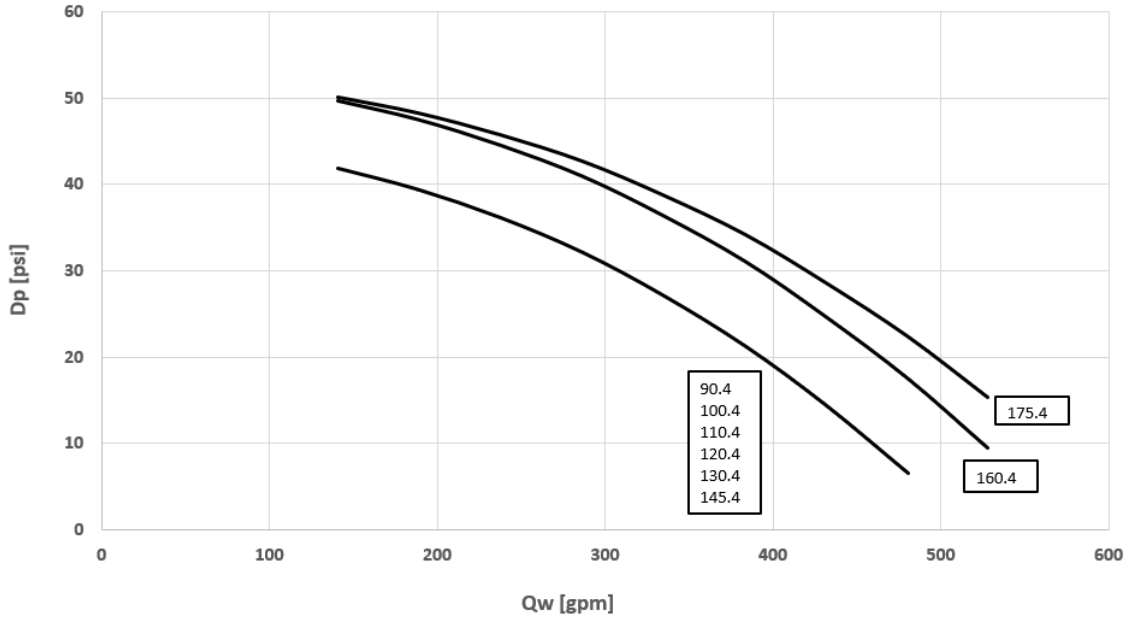
Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

Accessories - Hydronic assembly

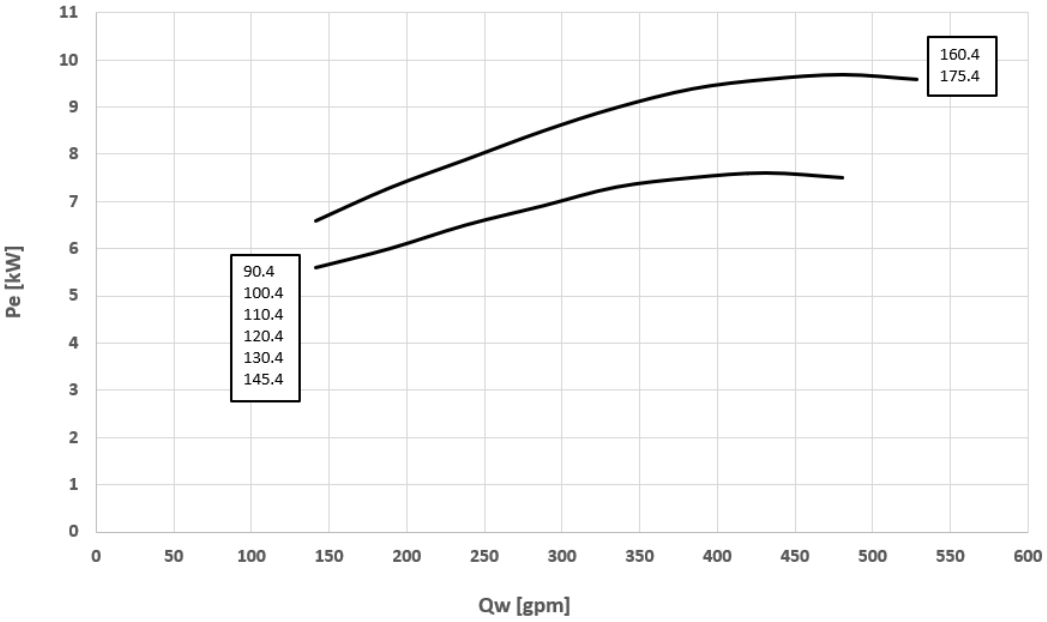
1PMH - HYDROPACK WITH 1 HIGH STATIC PRESSURE ON/OFF PUMP

Head



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input



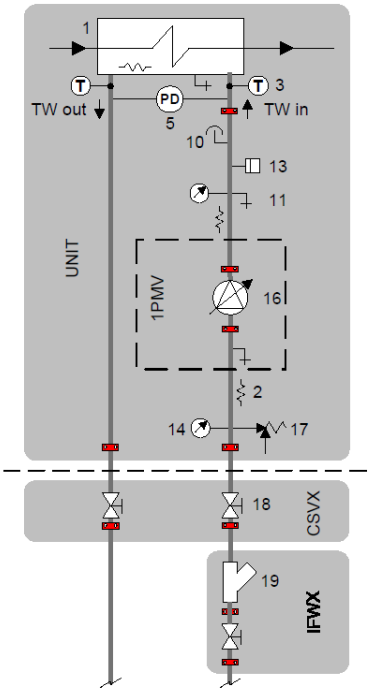
Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

1PMV/1PMVH - Hydropack with 1 inverter pump

Pumping unit made up of N°1 centrifugal electric pump, controlled by inverter to adapt to the different application conditions, with the pump body and the impeller made of cast iron. It enables the automatic reduction of the liquid flow rate in critical conditions, avoiding blocks due to overloading and consequential intervention work by specialised technical personnel.
Mechanical seal using ceramic, carbon and EPDM elastomer components.
Three-phase electric motor with IP55-protection. Complete with thermoformed insulated casing, fast fittings with insulated casing, safety valve, pressure gauges, system load safety pressure switch, stainless steel anti-freeze immersion resistances located at the intake and at the supply point.
In combination with the "IVFDT" - Variable flow-rate control option, it allows the water flow rate variation to the installation in part load operation to obtain the maximum unit efficiency and lower pumping unit consumption.
All water fittings are Victaulic with a short pipe stub already connected for welding the customer's pipe.
Option supplied built-in the unit.
1PMV = Hydropack with 1 inverter pump
1PMVH = Hydropack with 1 high static pressure inverter pump

CONNECTION DIAGRAM - GROUP WITH 1 INVERTER PUMP



1 - Exchanger
2 - Antifreeze heater
3 - Water temperature probe
5 - Differential pressure switch
10 - Vent
11 - Drain
13 - System load safety pressure switch
14 - Pressure gauge
16 - Packaged electric pump with high efficiency impeller
17 - Safety valve
18- Shut-off valve
19 - Filter

T - Temperature probe
PD - Differential pressure switch

TW in chilled water inlet
TW out chilled water outlet

The grey area indicates further optional components.

⚠ Provide hydraulic interceptions outside the unit ('CSVX - Couple of manually operated shut-off valves' option) to facilitate any possible extraordinary maintenance interventions.
⚠ It is necessary to provide a non-return valve for each unit installed in hydraulic parallel and equipped with an hydronic assembly installed on board (Installation by the Customer).

Electrical data Hydropack

PUMP - 460 V	Rated power [kW]	Nominal Current [A]
1PMVH 90.4 ÷ 145.4	7.50	12.73
1PMVH 160.4 ÷ 175.4	9.20	15.76

PUMP - 575 V	Rated power [kW]	Nominal Current [A]
1PMVH 90.4 ÷ 145.4	7.50	10.00
1PMVH 160.4 ÷ 175.4	9.20	12.10

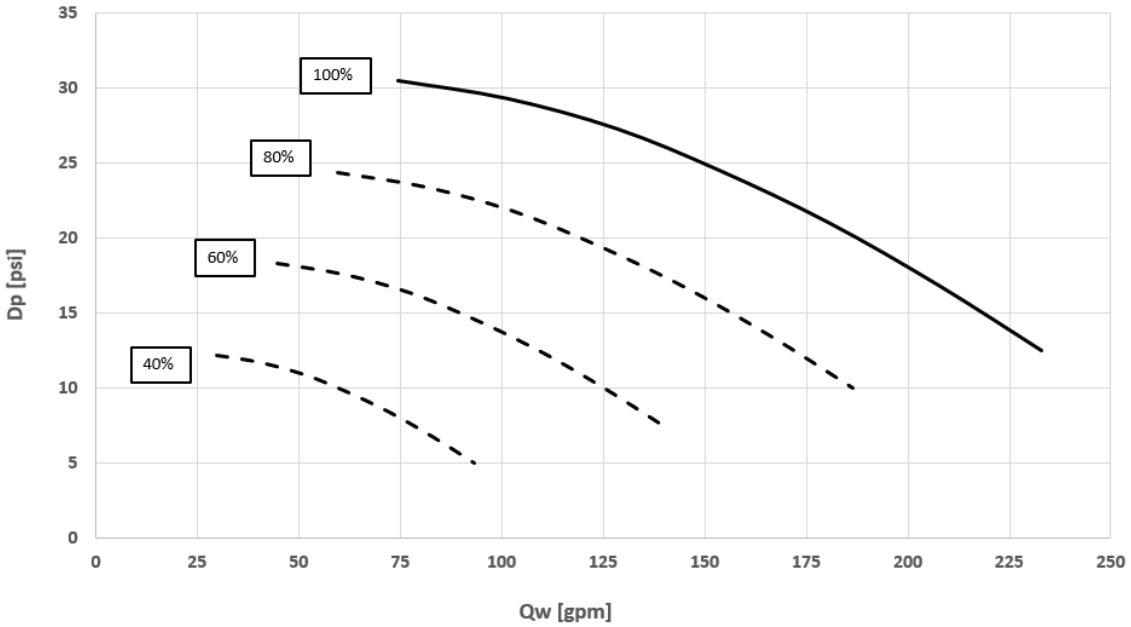
PUMP - 460 V	Rated power [kW]	Nominal Current [A]
1PMV 90.4 ÷ 110.4	3.00	5.80
1PMV 120.4	4.00	6.80
1PMV 130.4 ÷ 175.4	5.50	9.37

PUMP - 575 V	Rated power [kW]	Nominal Current [A]
1PMV 90.4 ÷ 110.4	3.00	4.36
1PMV 120.4	4.00	5.16
1PMV 130.4 ÷ 175.4	5.50	7.20

Accessories - Hydronic assembly

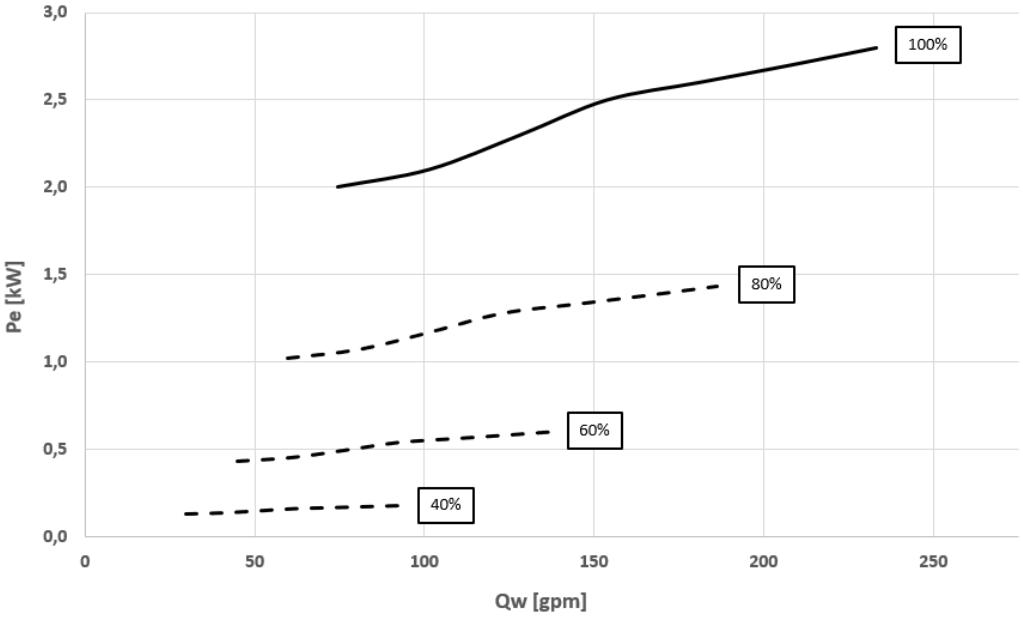
1PMV - HYDROPACK WITH 1 INVERTER PUMP

Head - Size 90.4 ÷ 110.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 90.4 ÷ 110.4

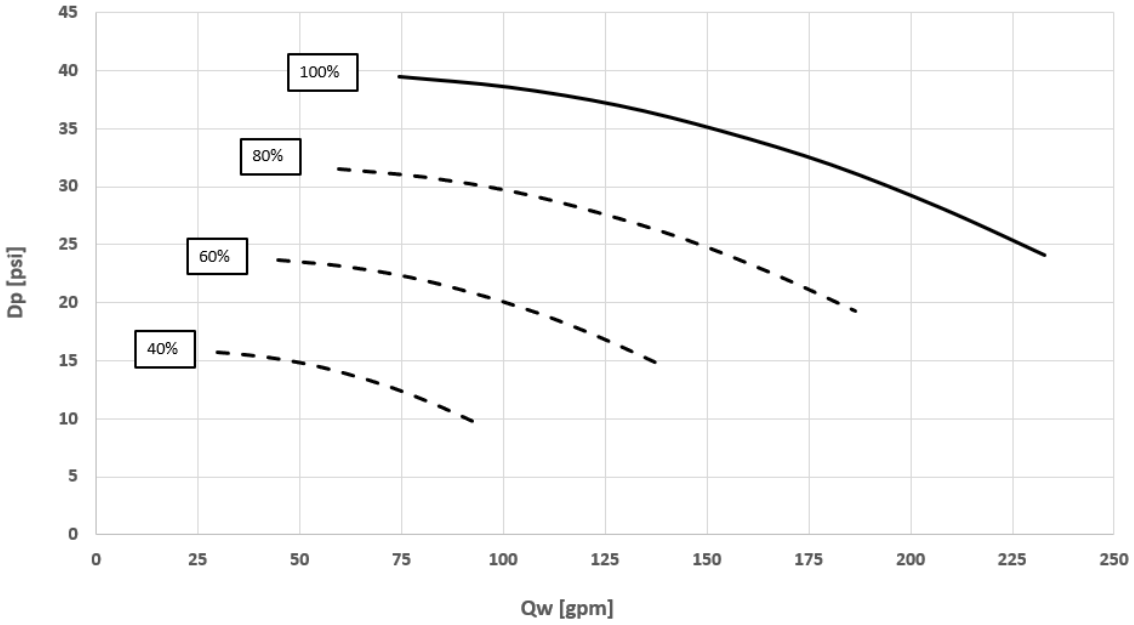


Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

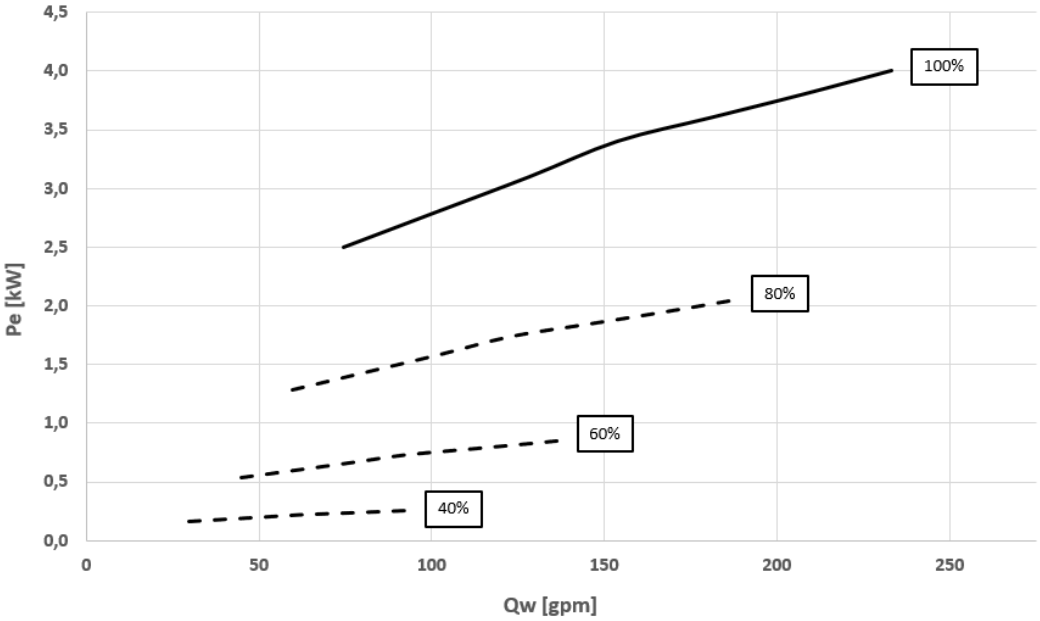
1PMV - HYDROPACK WITH 1 INVERTER PUMP

Head - Size 120.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 120.4



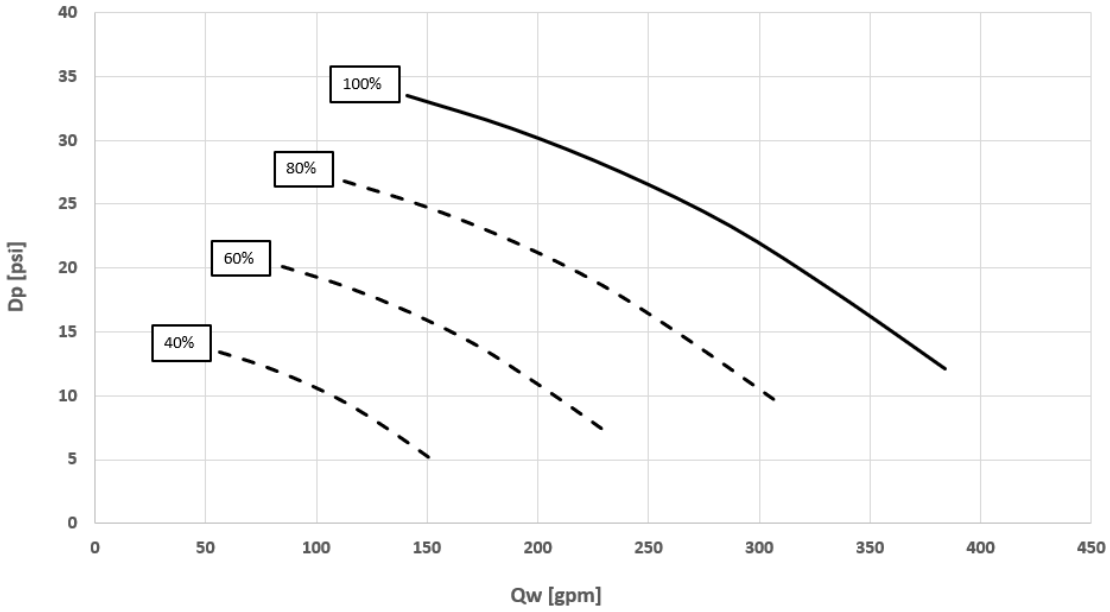
Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

Accessories - Hydronic assembly

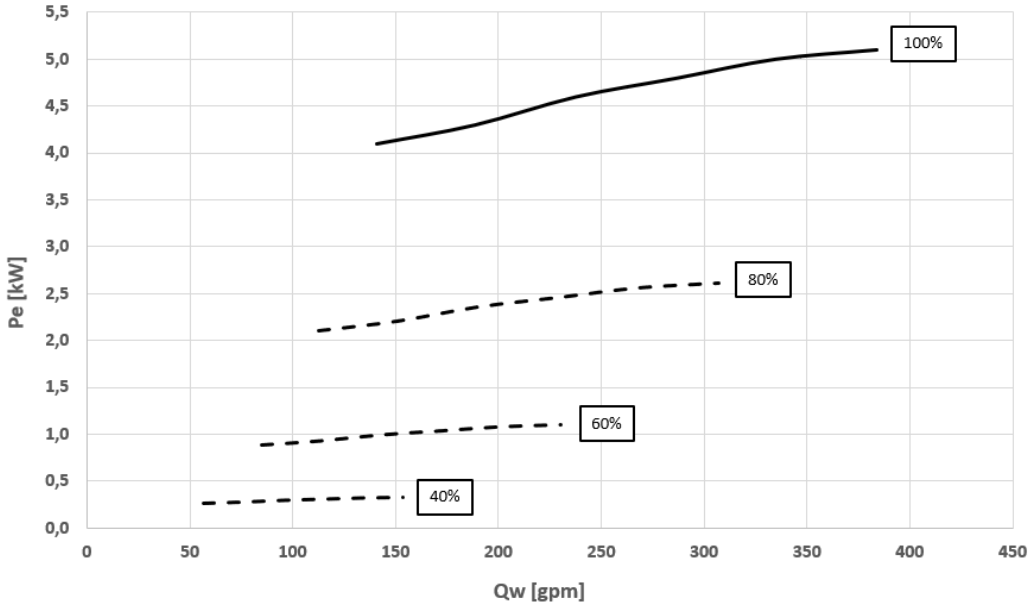
1PMV - HYDROPACK WITH 1 INVERTER PUMP

Head - Size 130.4 ÷ 145.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 130.4 ÷ 145.4

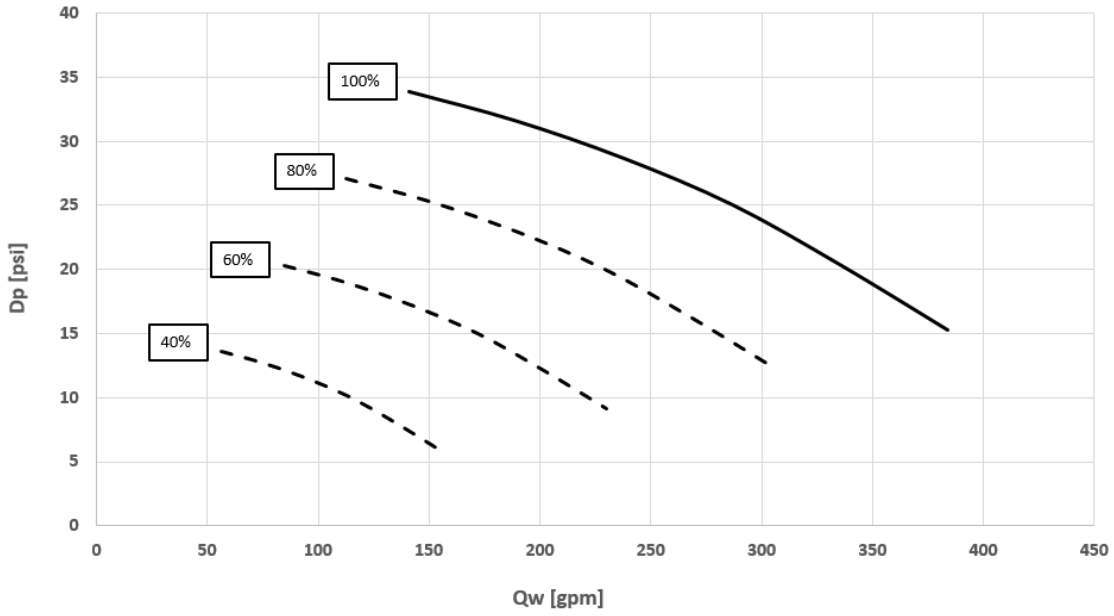


Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

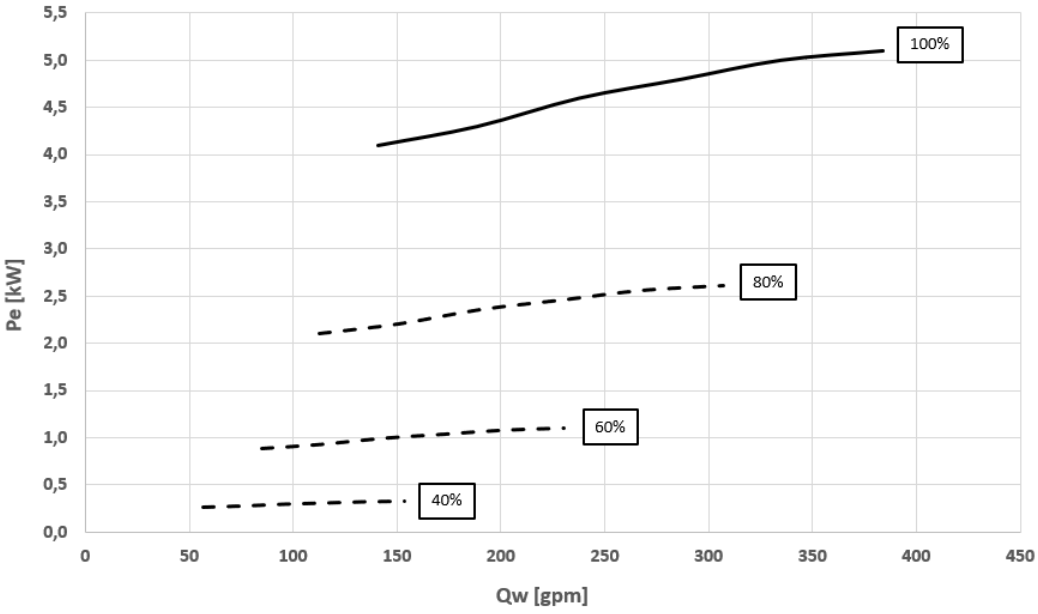
1PMV - HYDROPACK WITH 1 INVERTER PUMP

Head - Size 160.4 ÷ 175.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 160.4 ÷ 175.4



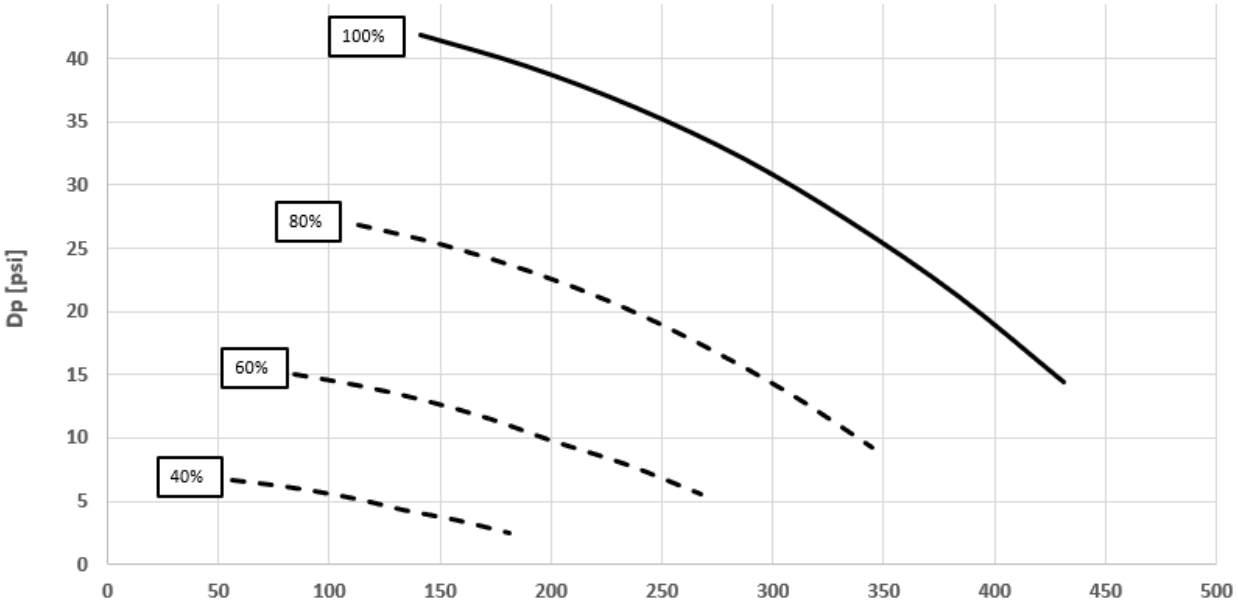
Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

Accessories - Hydronic assembly

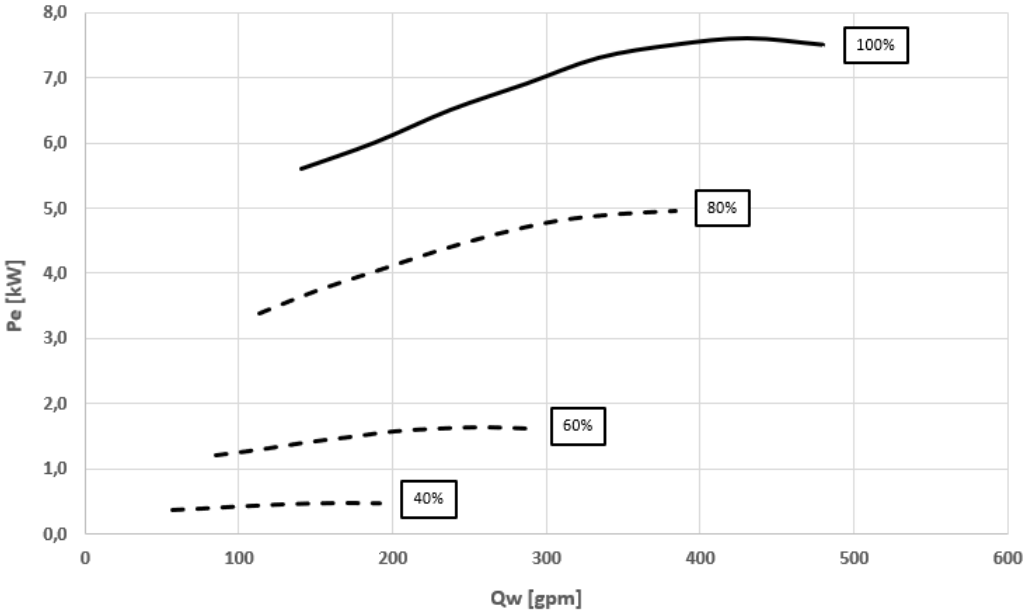
1PMVH - HYDROPACK WITH 1 HIGH STATIC PRESSURE INVERTER PUMP

Head - Size 90.4 ÷ 145.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 90.4 ÷ 145.4

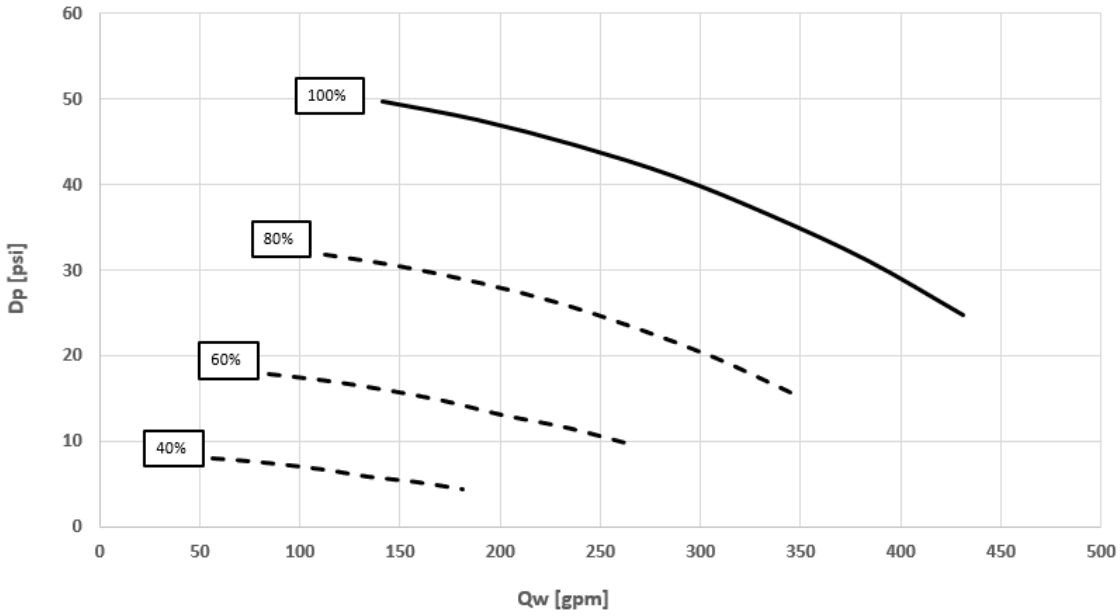


Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

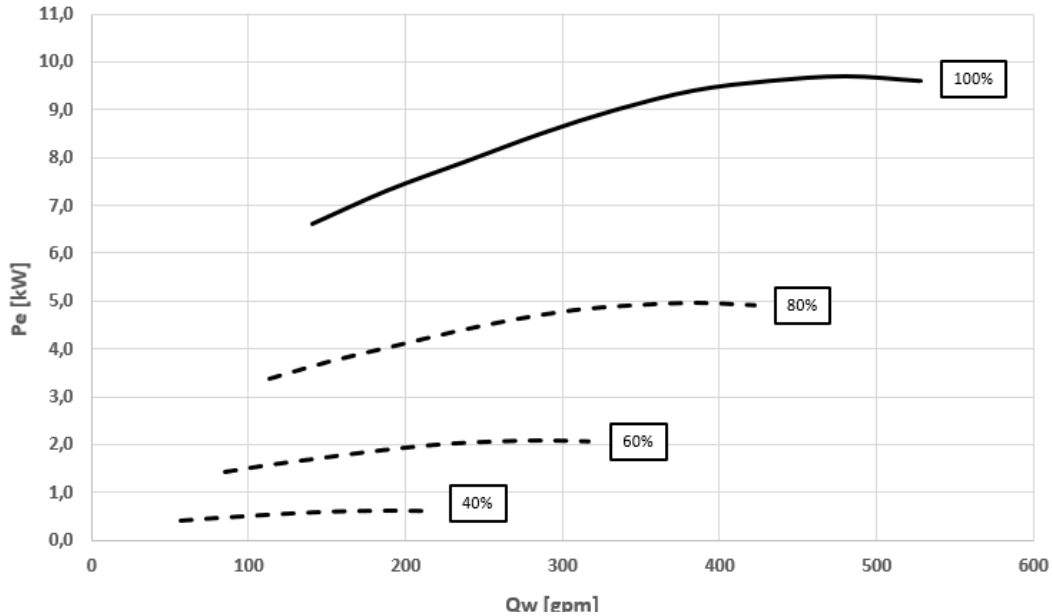
1PMVH - HYDROPACK WITH 1 HIGH STATIC PRESSURE INVERTER PUMP

Head - Size 160.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 160.4



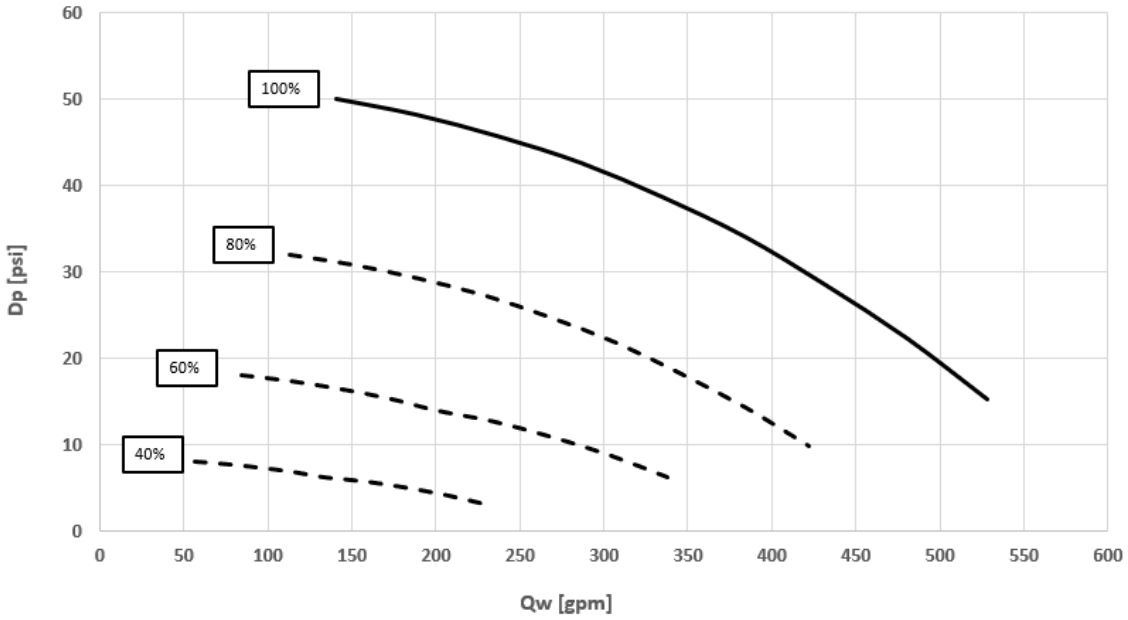
Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

Accessories - Hydronic assembly

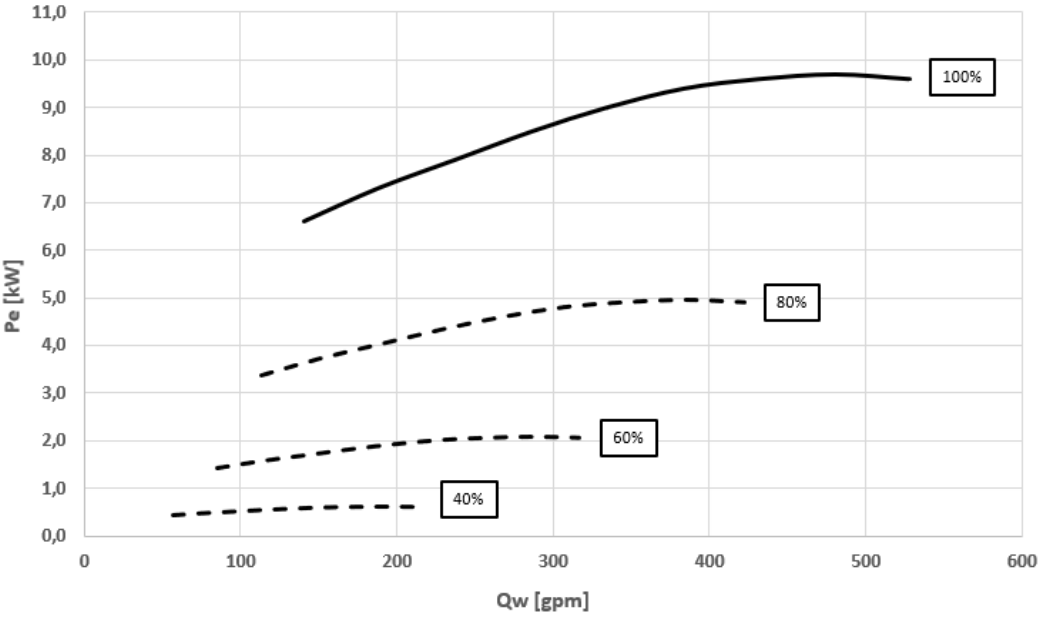
1PMVH - HYDROPACK WITH 1 HIGH STATIC PRESSURE INVERTER PUMP

Head - Size 175.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 175.4



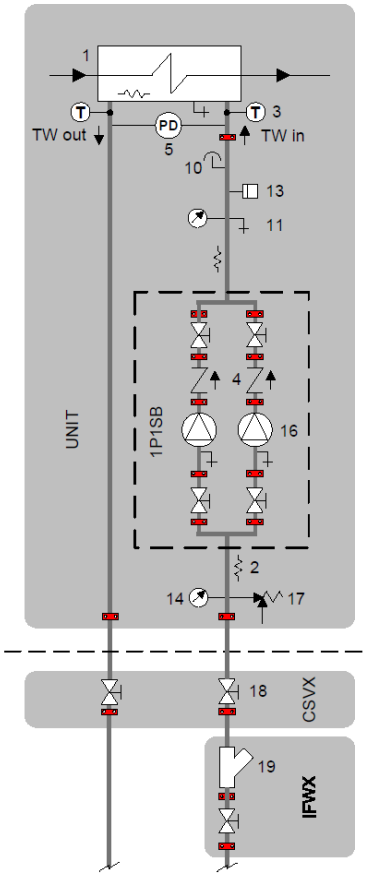
Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

1P1SB / 1PAPS - Hydropack with 1+1 on/off pump

Pumping unit made up of 1+1 centrifugal electric pump (1 stand-by) with the pump body and the impeller made of cast iron.
Mechanical seal using ceramic, carbon and EPDM elastomer components.
Three-phase electric motor with IP55-protection. Complete with thermoformed insulated casing, fast fittings with insulated casing, safety valve, pressure gauges, system load safety pressure switch, stainless steel anti-freeze immersion resistances located at the intake and at the supply point.
All water fittings are Victaulic with a short pipe stub already connected for welding the customer's pipe.
Option supplied built-in the unit.
1P1SB = Hydropack with 1+1 on/off pump
1PAPS = Hydropack with 1+1 hight static pressure on/off pump

CONNECTION DIAGRAM - GROUP WITH 1+1 ON/OFF PUMP



1. Exchanger
2. Antifreeze heater
3. Water temperature probe
4. Non-return valve
5. Differential pressure switch
10. Vent
11. Drain
13. System load safety pressure switch
14. Pressure gauge
16. Packaged electric pump with high efficiency impeller
17. Safety valve
18. Shut-off valve
19. Filter

T - Temperature probe
PD - Differential pressure switch

TW in chilled water inlet
TW out chilled water outlet

⚠ Provide hydraulic interceptions outside the unit ('CSVX - Couple of manually operated shut-off valves' option) to facilitate any possible extraordinary maintenance interventions.

⚠ The head and consumption graphs of the pumping group refer to operation with pure water. If there is a water-glycol mix, please contact Clivet's office to check the correct operating point of the pumping group.

Electrical data Hydropack

PUMP - 460 V	Rated power [kW]	Nominal Current [A]
1P1SB 90.4 ÷ 110.4	3.00	5.80
1P1SB 120.4	4.00	6.80
1P1SB 130.4 ÷ 175.4	5.50	9.37

PUMP - 460 V	Rated power [kW]	Nominal Current [A]
1PAPS 90.4 ÷ 145.4	7.50	12.73
1PAPS 160.4 ÷ 175.4	9.20	15.76

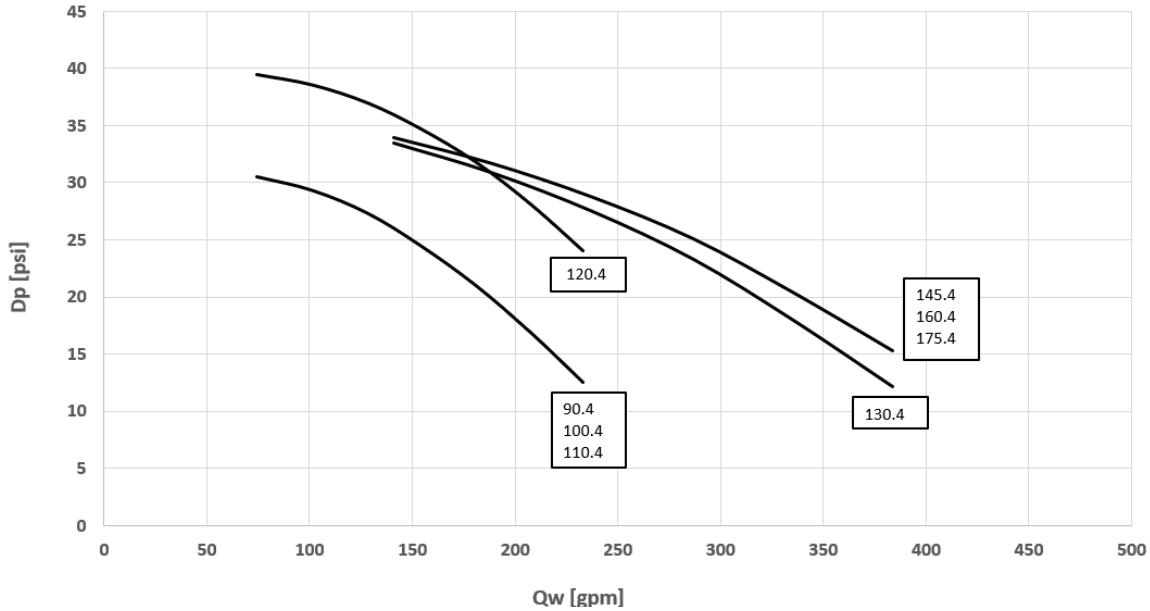
PUMP - 575 V	Rated power [kW]	Nominal Current [A]
1P1SB 90.4 ÷ 110.4	3.00	4.36
1P1SB 120.4	4.00	5.16
1P1SB 130.4 ÷ 175.4	5.50	7.20

PUMP - 460 V	Rated power [kW]	Nominal Current [A]
1PAPS 90.4 ÷ 145.4	7.50	10.00
1PAPS 160.4 ÷ 175.4	9.20	12.10

Accessories - Hydronic assembly

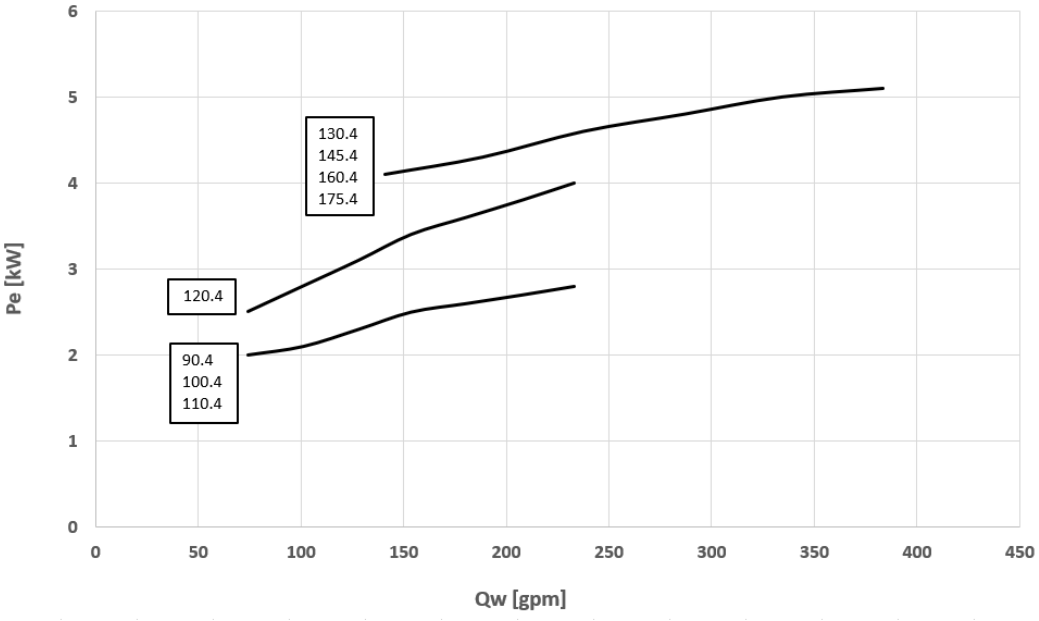
1P1SB - HYDROPACK WITH 1+1 ON/OFF PUMP

Head



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input

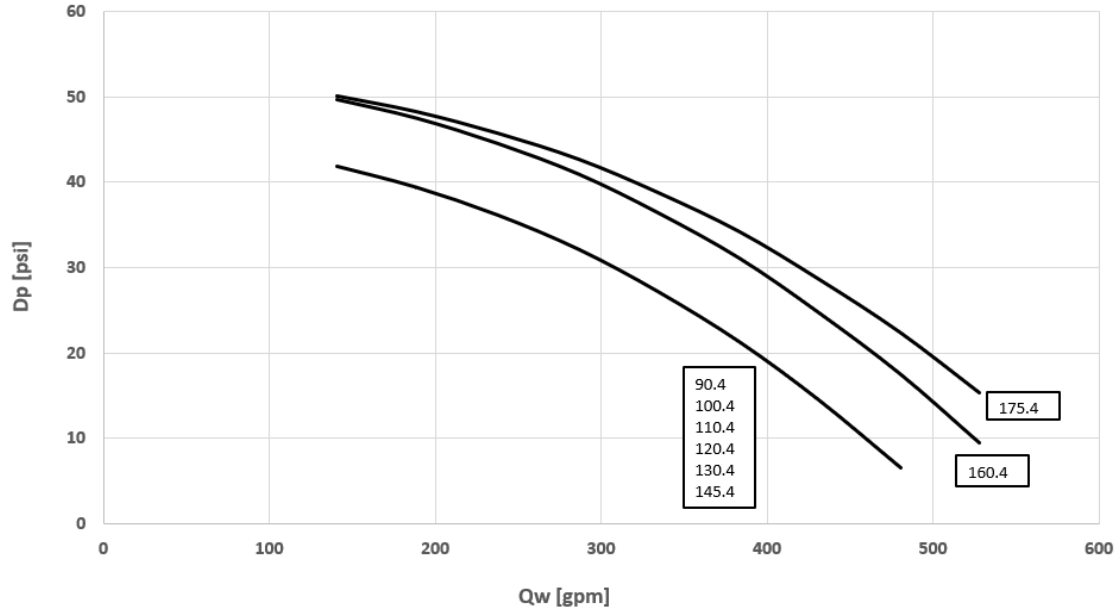


Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

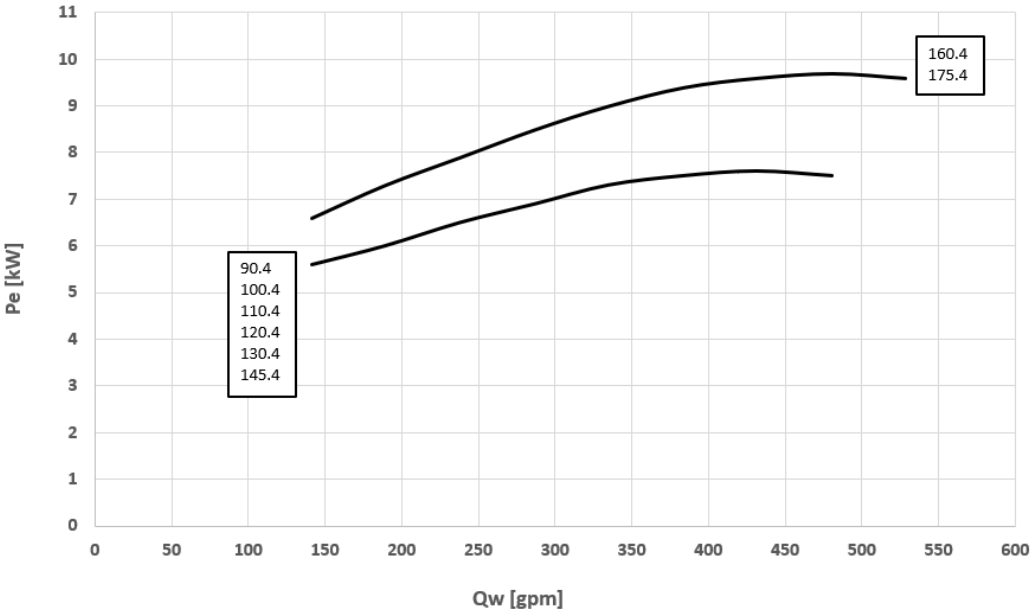
1PAPS - HYDROPACK WITH 1+1 HIGHT STATIC PRESSURE ON/OFF PUMP

Head



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input



Pe = Power input [kW]
Qw = Water flow-rate [gpm]

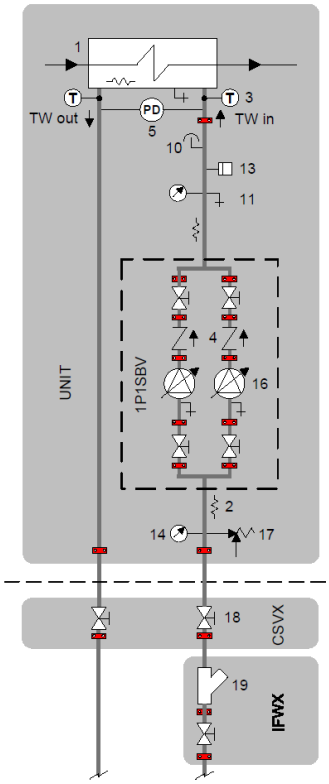
⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

Accessories - Hydronic assembly

1P1SBV / 1PAPSV - Hydropack with 1+1 inverter pump

Pumping unit made up of 1+1 centrifugal electric pump (1 stand-by) controlled by inverter to adapt to the different application conditions, with the pump body and the impeller made of cast iron.
It enables the automatic reduction of the liquid flow rate in critical conditions, avoiding blocks due to overloading and consequential intervention work by specialised technical personnel.
Mechanical seal using ceramic, carbon and EPDM elastomer components.
Three-phase electric motor with IP55-protection. Complete with thermoformed insulated casing, fast fittings with insulated casing, safety valve, pressure gauges, system load safety pressure switch, stainless steel anti-freeze immersion resistances located at the intake and at the supply point.
In combination with the "IVFDT" - Variable flow-rate control option, it allows the water flow rate variation to the installation in part load operation to obtain the maximum unit efficiency and lower pumping unit consumption.
All water fittings are Victaulic with a short pipe stub already connected for welding the customer's pipe.
Option supplied built-in the unit.
1P1SBV = Hydropack with 1+1 inverter pump
1PAPSV = Hydropack with 1+1 hight static pressure inverter pump

CONNECTION DIAGRAM - GROUP WITH 1+1 INVERTER PUMP



1. Exchanger
2. Antifreeze heater
3. Water temperature probe
4. Non-return valve
5. Differential pressure switch
10. Vent
11. Drain
13. System load safety pressure switch
14. Pressure gauge
16. Packaged electric pump with high efficiency impeller
17. Safety valve
18. Shut-off valve
19. Filter

T - Temperature probe
PD - Differential pressure switch

TW in chilled water inlet
TW out chilled water outlet

⚠ Provide hydraulic interceptions outside the unit ('CSVX - Couple of manually operated shut-off valves' option) to facilitate any possible extraordinary maintenance interventions.

⚠ The head and absorption graphs of the hydronic assembly refer to operation with pure water. In the presence of a mixture of water and glycol, please contact Clivet office to check the correct operating point of the hydronic assembly.

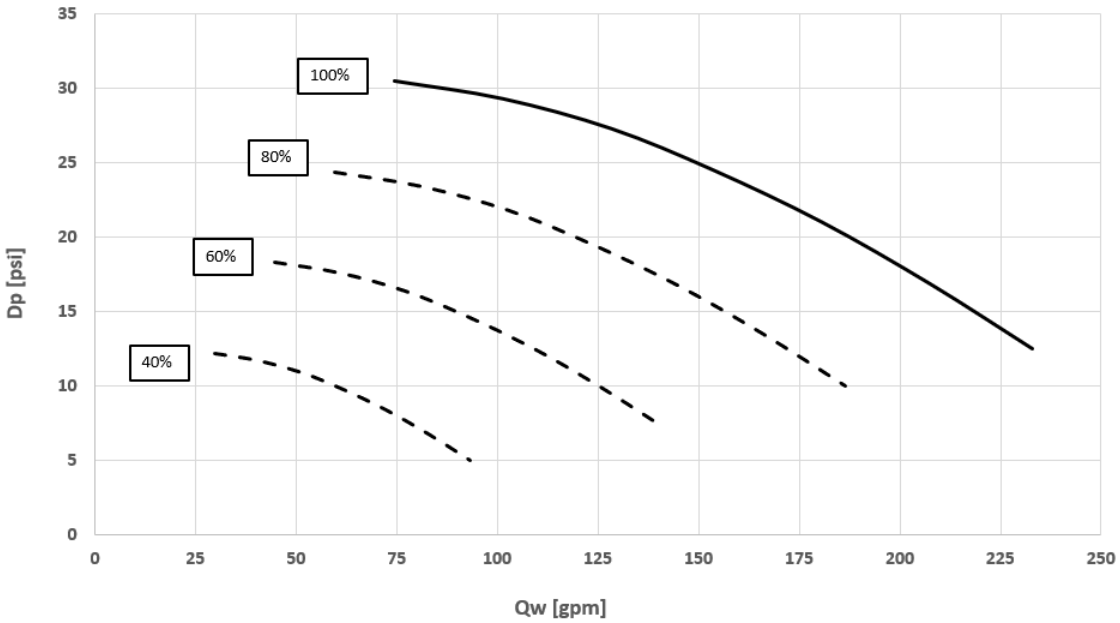
Electrical data Hydropack

PUMP - 460 V	Rated power [kW]	Nominal Current [A]	PUMP - 575 V	Rated power [kW]	Nominal Current [A]
1P1SBV 90.4 ÷ 110.4	3.00	5.80	1P1SBV 90.4 ÷ 110.4	3.00	4.36
1P1SBV 120.4	4.00	6.80	1P1SBV 120.4	4.00	5.16
1P1SBV 130.4 ÷ 175.4	5.50	9.37	1P1SBV 130.4 ÷ 175.4	5.50	7.20

PUMP - 460 V	Rated power [kW]	Nominal Current [A]	PUMP - 575 V	Rated power [kW]	Nominal Current [A]
1PAPSV 90.4 ÷ 145.4	7.50	12.73	1PAPSV 90.4 ÷ 145.4	7.50	10.00
1PAPSV 160.4 ÷ 175.4	9.20	15.76	1PAPSV 160.4 ÷ 175.4	9.20	12.10

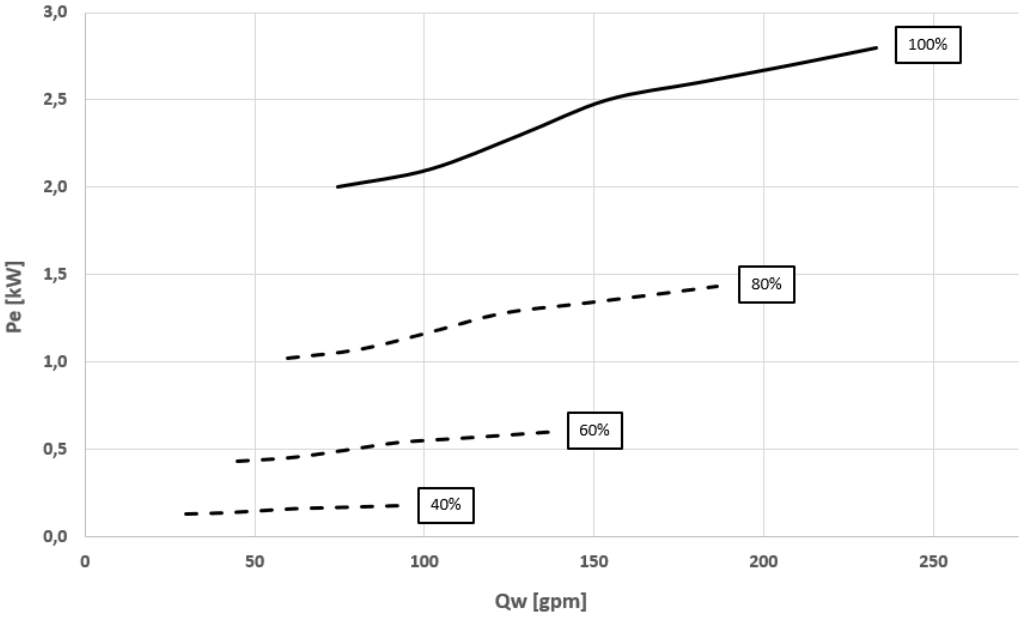
1P1SBV - HYDROPACK WITH 1+1 INVERTER PUMP

Head - Size 90.4 ÷ 110.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 90.4 ÷ 110.4



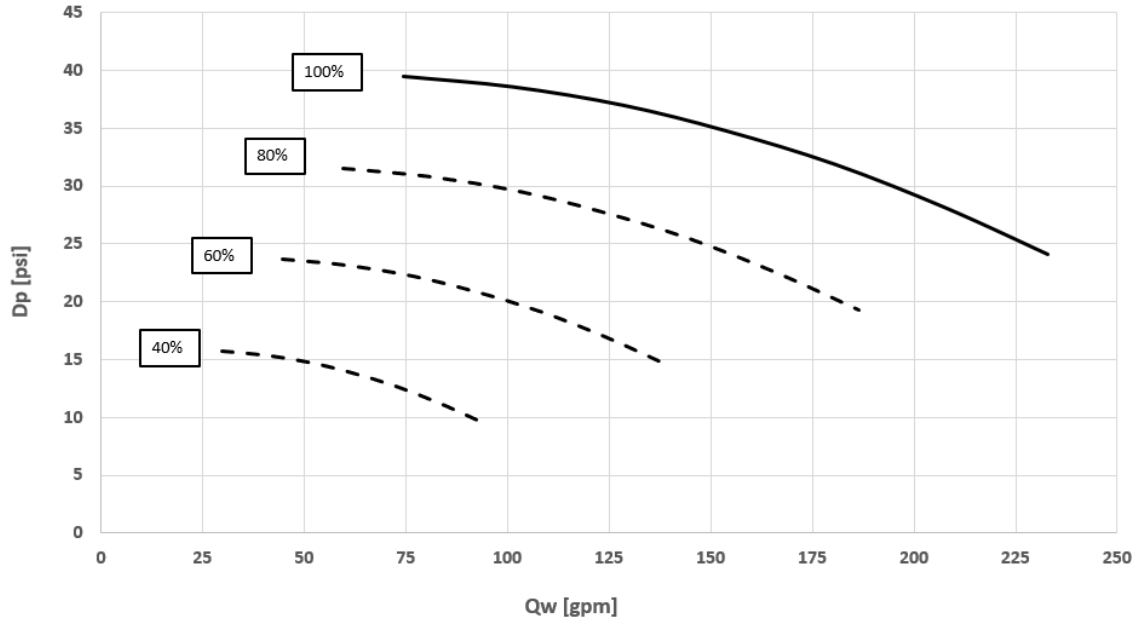
Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

Accessories - Hydronic assembly

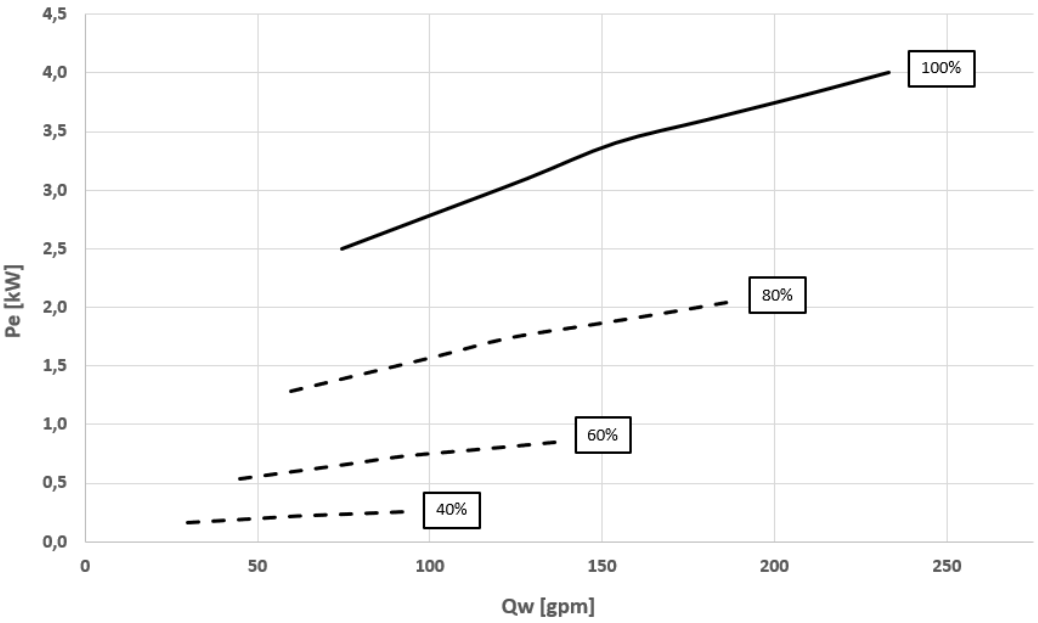
1P1SBV - HYDROPACK WITH 1+1 INVERTER PUMP

Head - Size 120.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 120.4

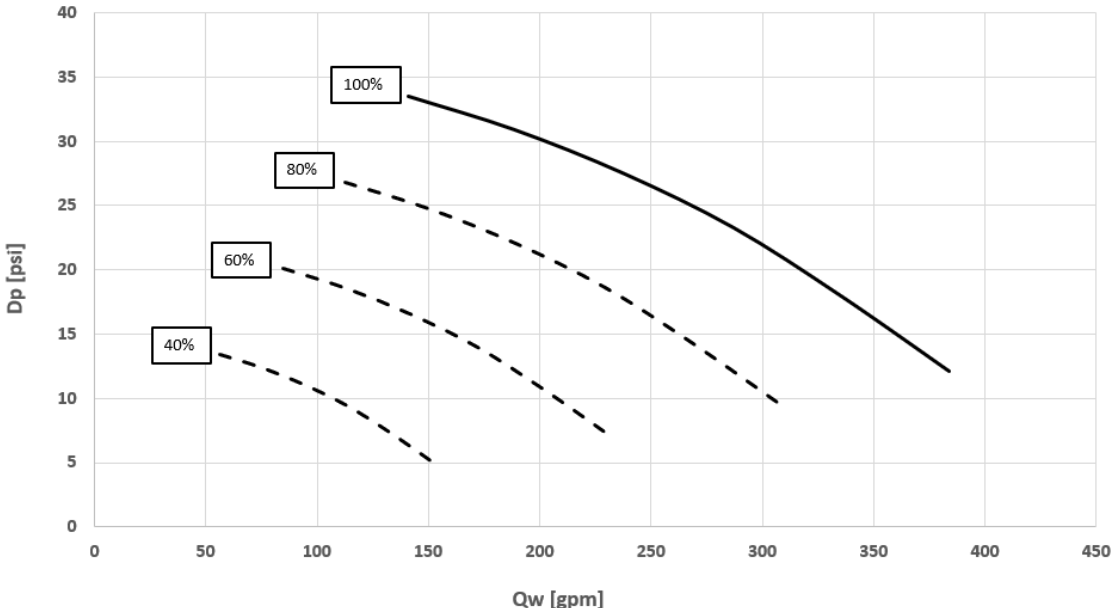


Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

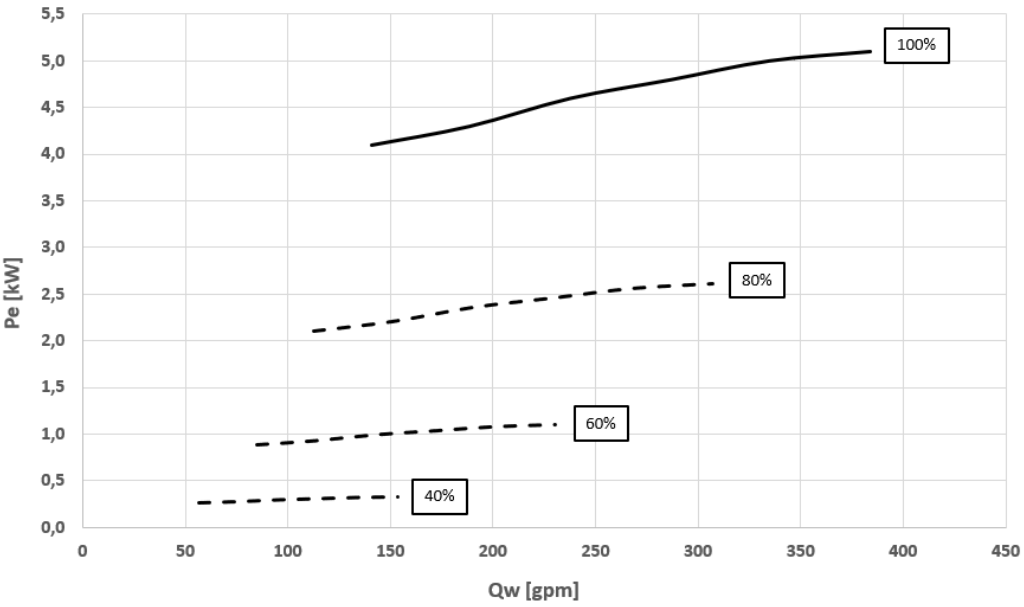
1P1SBV - HYDROPACK WITH 1+1 INVERTER PUMP

Head - Size 130 ÷ 145.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 130 ÷ 145.4



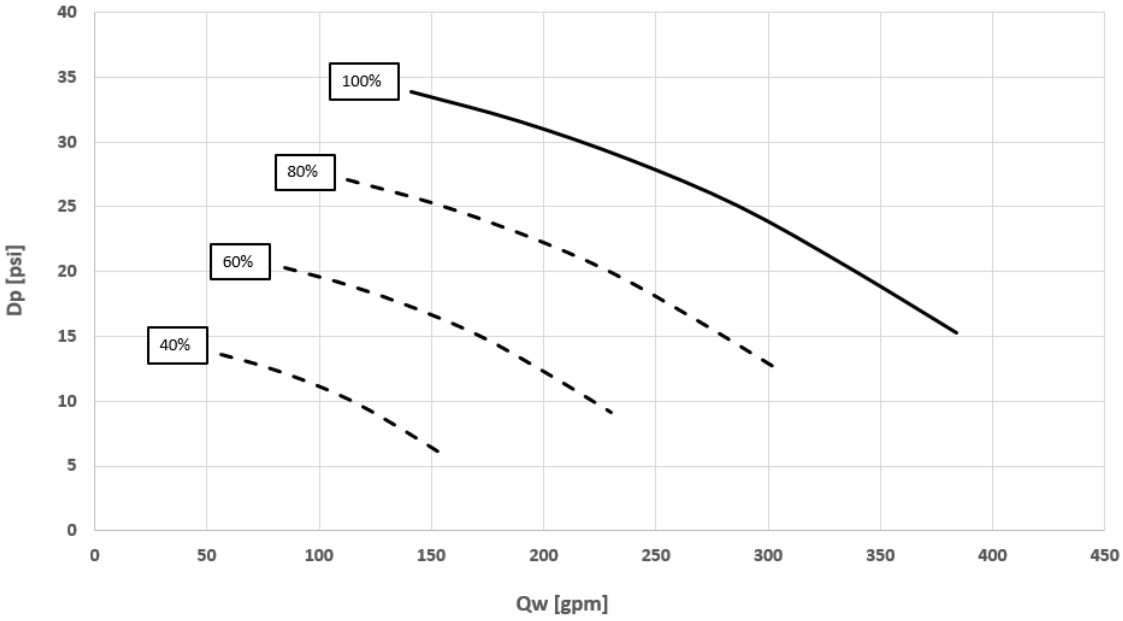
Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

Accessories - Hydronic assembly

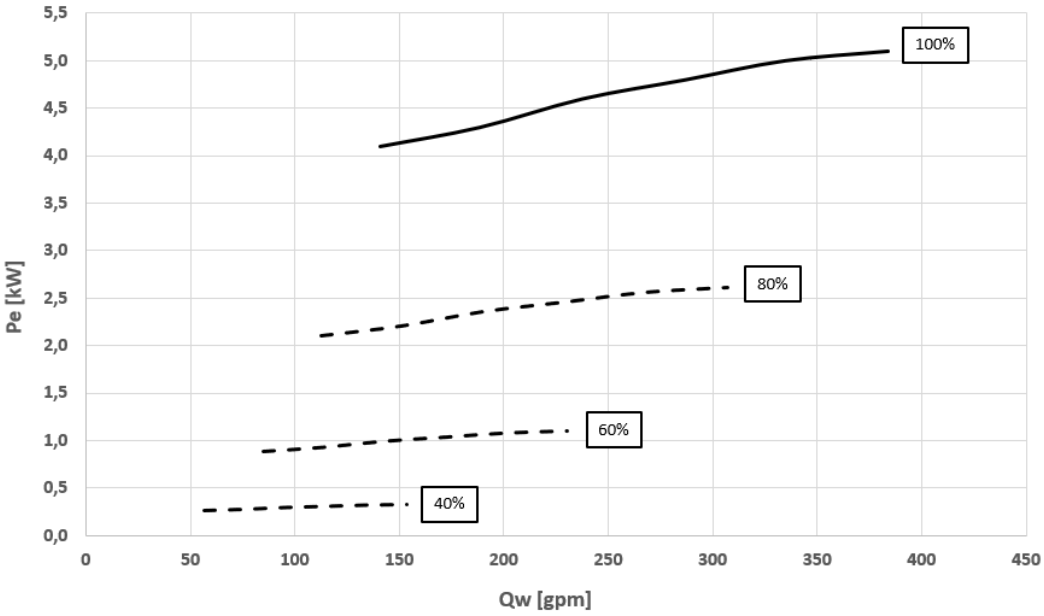
1P1SBV - HYDROPACK WITH 1+1 INVERTER PUMP

Head - Size 160.4 ÷ 175.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 160.4 ÷ 175.4

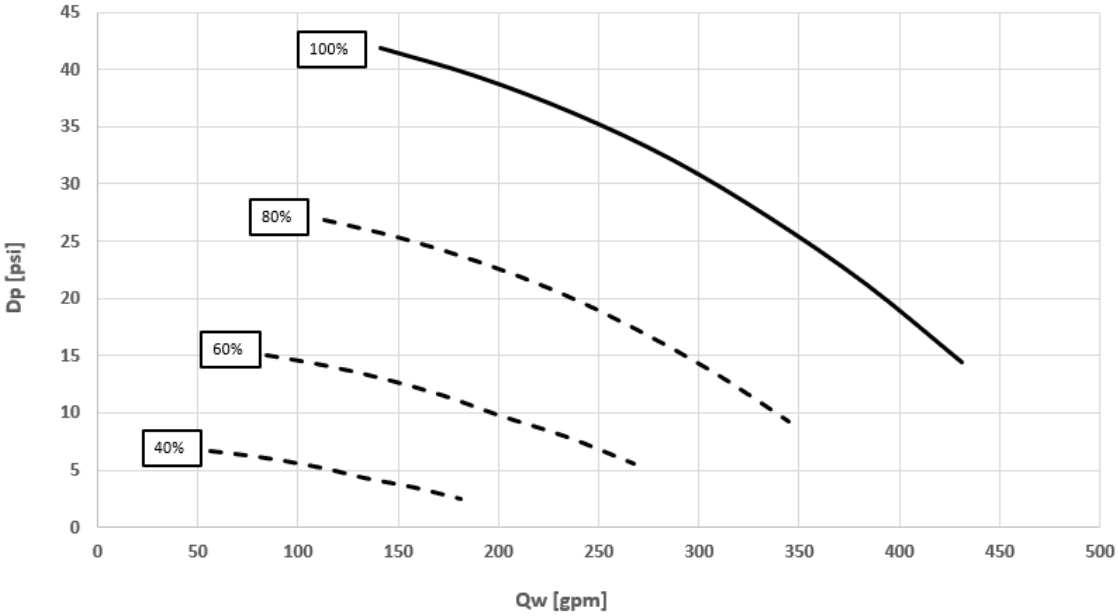


Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

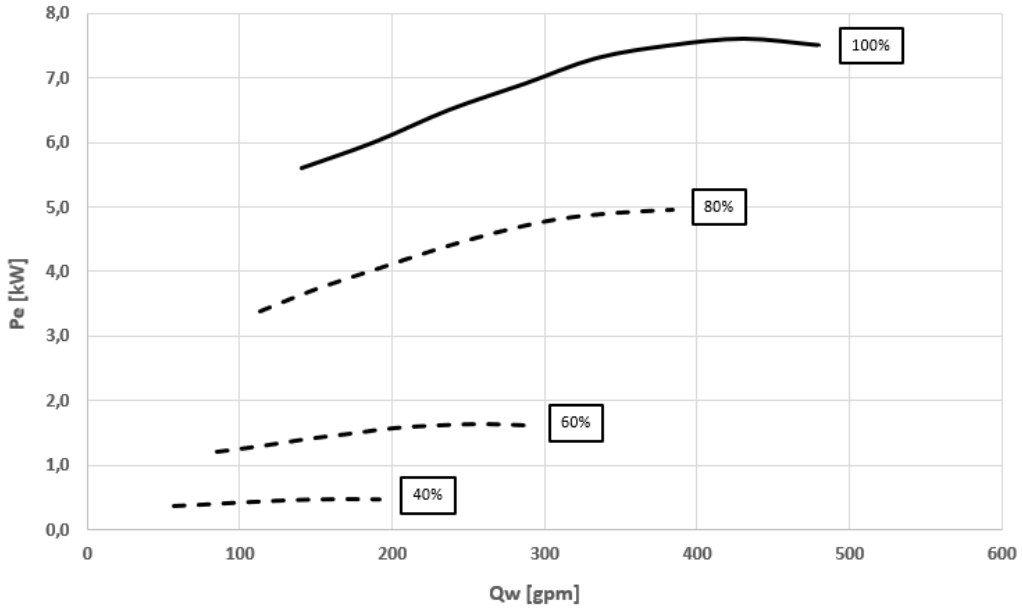
1PAPSV - HYDROPACK WITH 1+1 HIGHT STATIC PRESSURE INVERTER PUMP

Head - Size 90.4 ÷ 145.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 90.4 ÷ 145.4



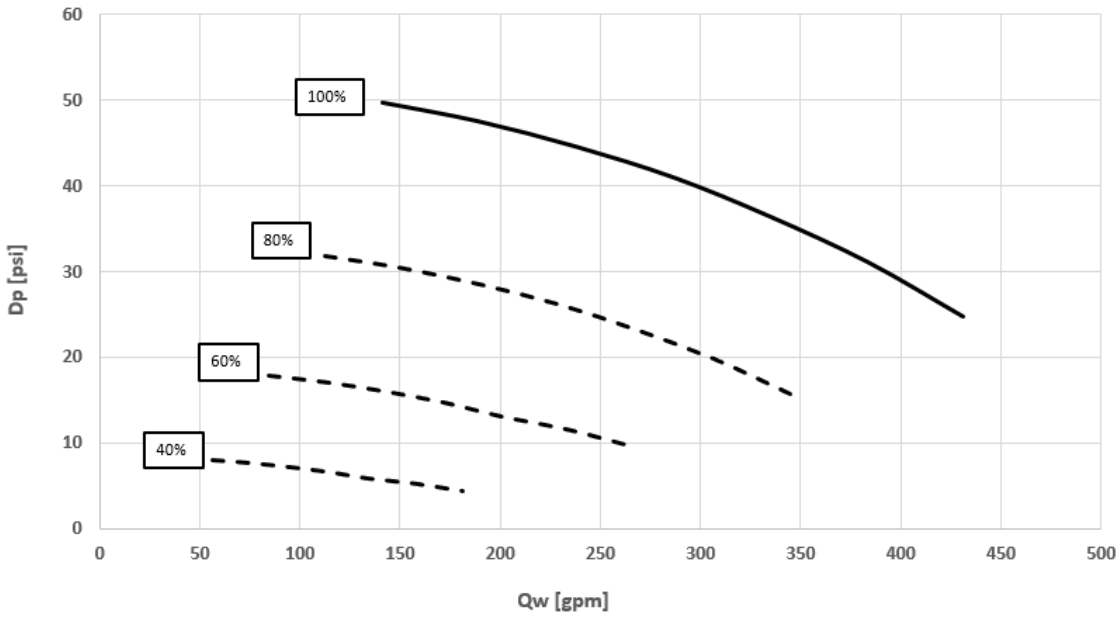
Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

Accessories - Hydronic assembly

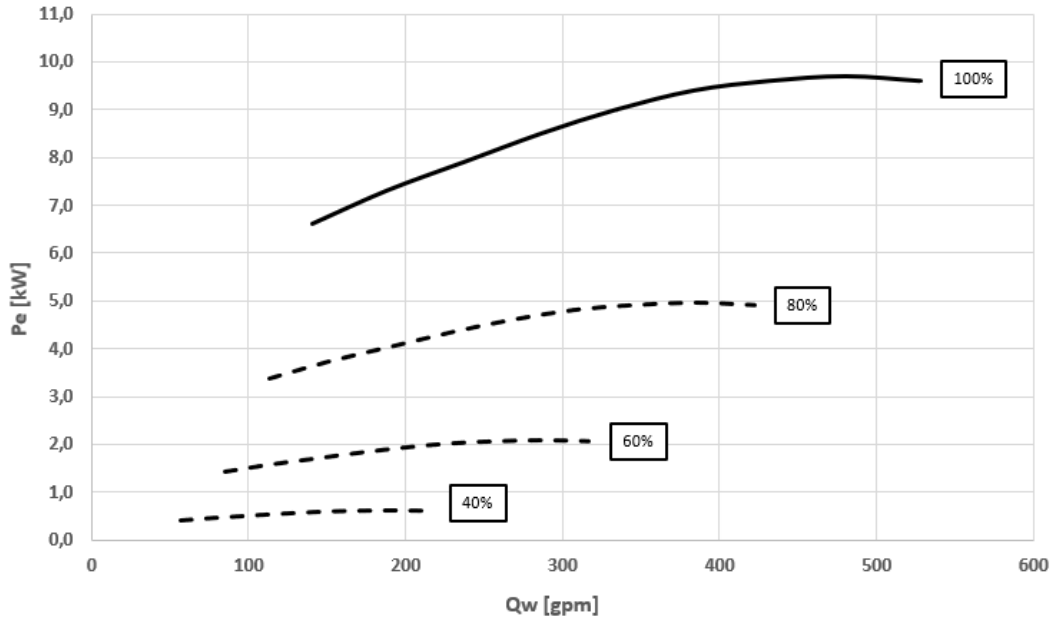
1PAPSV - HYDROPACK WITH 1+1 HIGHT STATIC PRESSURE INVERTER PUMP

Head - Size 160.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 160.4

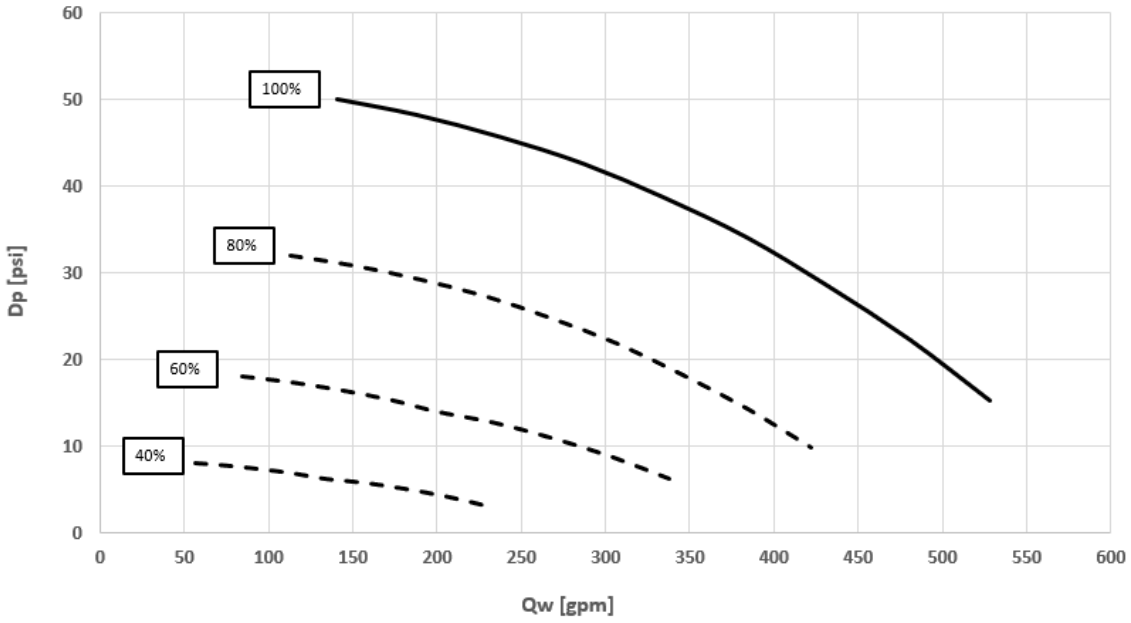


Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

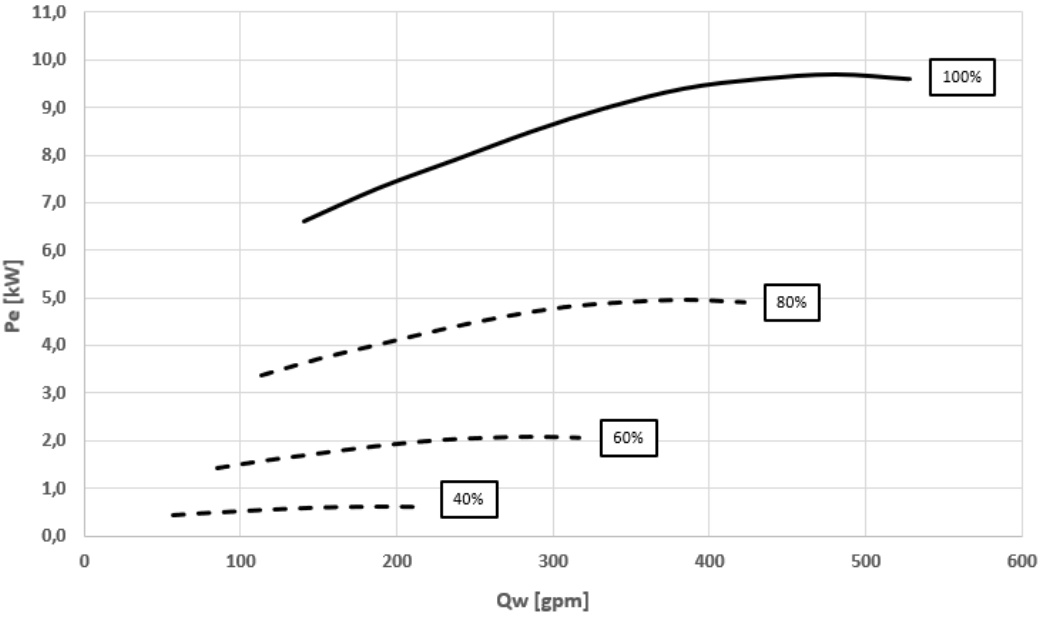
1PAPSV - HYDROPACK WITH 1+1 HIGHT STATIC PRESSURE INVERTER PUMP

Head - Size 175.4



Dp = Pump differential pressure [psi]
Qw = Water flow-rate [gpm]

Power input - Size 175.4



Pe = Power input [kW]
Qw = Water flow-rate [gpm]

⚠ Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:
Internal exchanger pressure drop
IFVX accessory –Steel mesh filter on the water side (where applicable)

Option compatibility

REF	DESCRIPTION	90.4	100.4	110.4	120.4	130.4	145.4	160.4	175.4
	Configurations and main accessories								
SC	Acoustic configuration with compressor soundproofing	●	●	●	●	●	●	●	●
EN	Super-silenced acoustic configuration	o	o	o	o	o	o	o	o
1PM	Hydropack user side with 1 on/off pump	o	o	o	o	o	o	o	o
1PMV	Hydropack with 1 inverter pump	o	o	o	o	o	o	o	o
1PMH	Hydropack user side with n°1 high static pressure on/off pump	o	o	o	o	o	o	o	o
1PMVH	Hydropack with 1 HSP inverter pump	o	o	o	o	o	o	o	o
1P1SB	Hydropack with 1+1 on-off pumps	o	o	o	o	o	o	o	o
1P1SBV	Hydropack with 1+1 inverter pumps	o	o	o	o	o	o	o	o
1PAPS	Hydropack with 1+1 HSP on-off pumps	o	o	o	o	o	o	o	o
1PAPSV	Hydropack with 1+1 HSP inverter pumps	o	o	o	o	o	o	o	o
	PFGP - Soundproofing paneling of the pumping unit								
+ SC	Acoustic configuration with compressor soundproofing	o	o	o	o	o	o	o	o
+ EN	Super-silenced acoustic configuration	●	●	●	●	●	●	●	●
	IVFDT - Inverter driven variable flow-rate user side control depending on the temperature differential								
1PM	Hydropack user side with 1 on/off pump	-	-	-	-	-	-	-	-
1PMV	Hydropack with 1 inverter pump	o	o	o	o	o	o	o	o
1PMH	Hydropack user side with n°1 high static pressure on/off pump	-	-	-	-	-	-	-	-
1PMVH	Hydropack with 1 HSP inverter pump	o	o	o	o	o	o	o	o
1P1SB	Hydropack with 1+1 on-off pumps	-	-	-	-	-	-	-	-
1P1SBV	Hydropack with 1+1 inverter pumps	o	o	o	o	o	o	o	o
1PAPS	Hydropack with 1+1 HSP on-off pumps	-	-	-	-	-	-	-	-
1PAPSV	Hydropack with 1+1 HSP inverter pumps	o	o	o	o	o	o	o	o

● Standard
o Option
- Not available

Dimensional drawings

SIZE 90.4 ÷ 110.4

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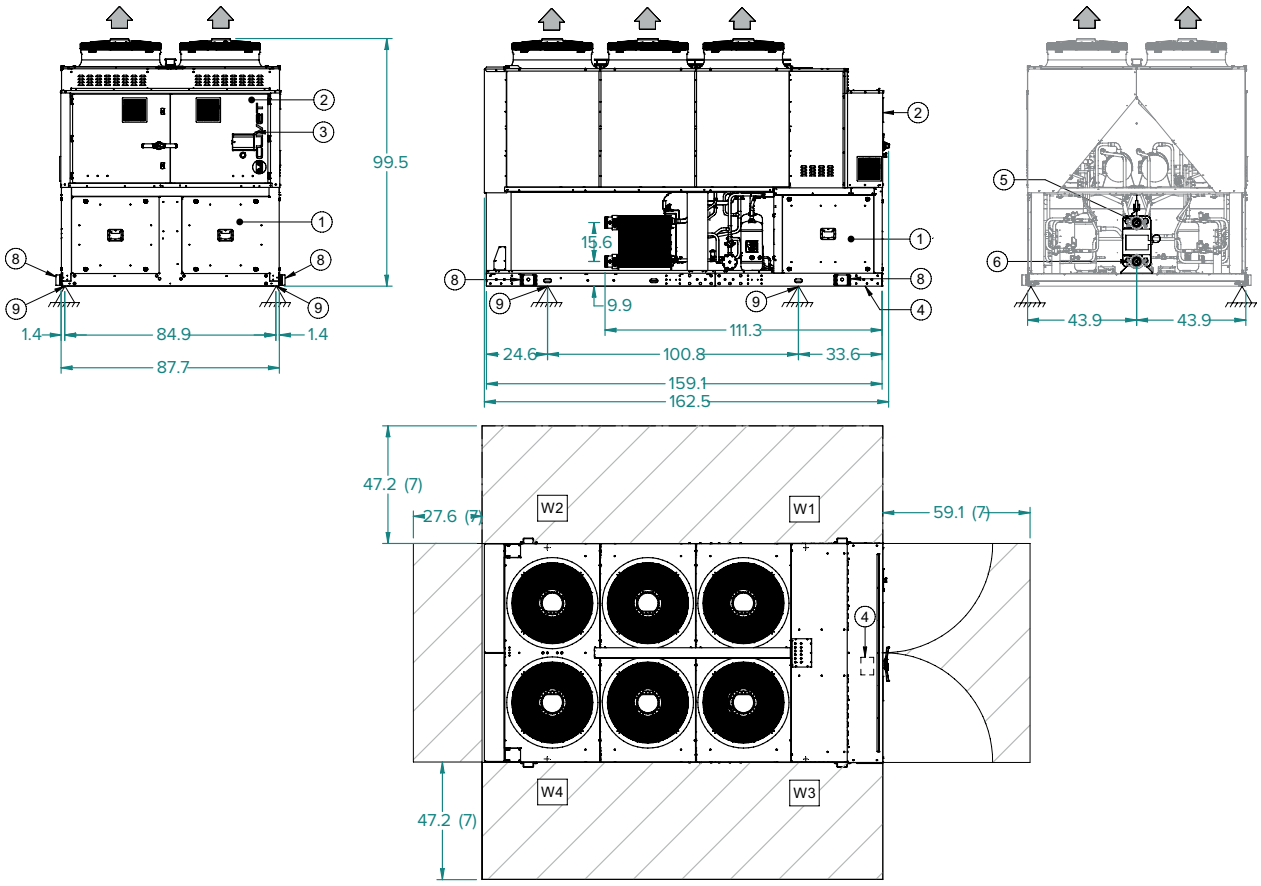

1. Compressor enclosure
2. Electrical panel
3. Control keypad
4. Power input
5. Water inlet 4" Victaulic
6. Water outlet 4" Victaulic
7. Functional spaces
8. Lifting bracket (removed)
9. Support points
10. Pump option
11. Water pump inlet 4" Victaulic
12. Water pump outlet 4" Victaulic

SIZE		90.4	100.4	110.4
Length	inch	162.5	162.5	162.5
Depth	inch	99.5	99.5	99.5
Height	inch	87.7	87.7	87.7
W1 Supporting point	lb	1818	1846	1876
W2 Supporting point	lb	1285	1299	1314
W3 Supporting point	lb	1818	1852	1876
W4 Supporting point	lb	1285	1306	1314
Operating weight	lb	6206	6303	6380
Shipping weight	lb	6144	6230	6307

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

Dimensional drawings

SIZE 120.4 ÷ 130.4

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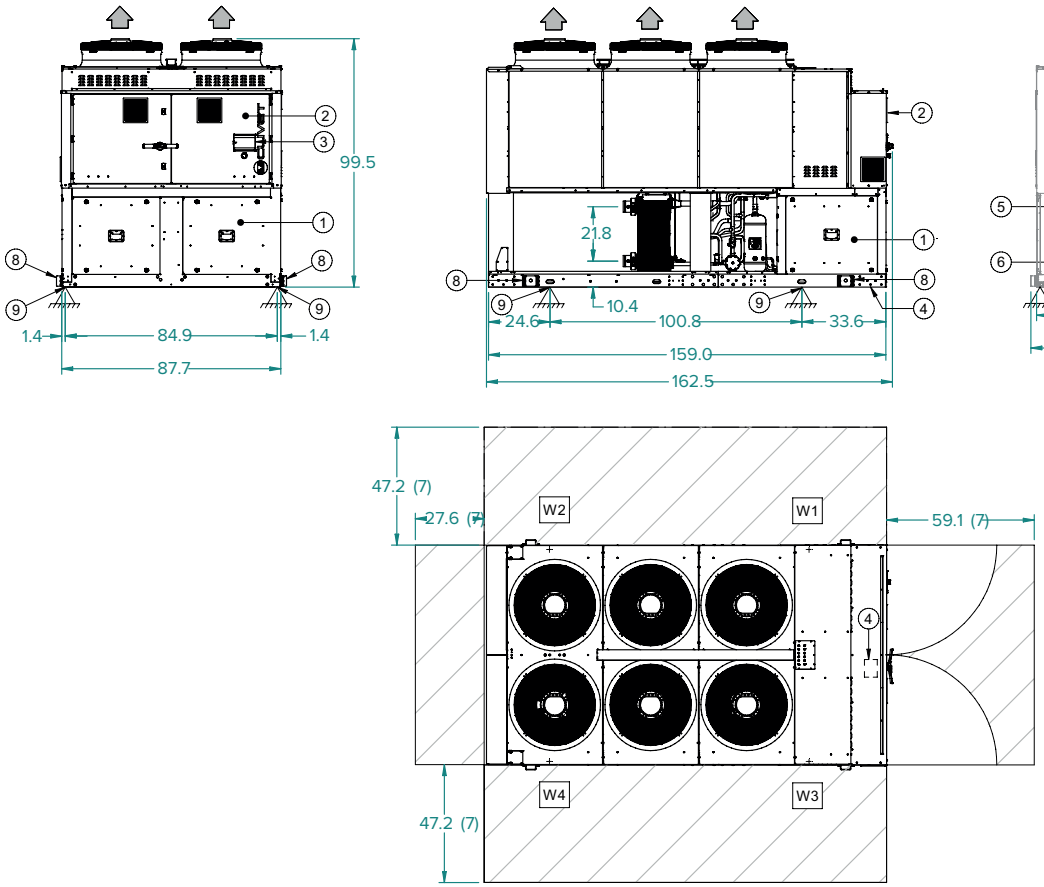
DATA/DATE 14/10/2024



1. Compressor enclosure
2. Electrical panel
3. Control keypad
4. Power input
5. Water inlet 4" Victaulic
6. Water outlet 4" Victaulic
7. Functional spaces
8. Lifting bracket (removed)
9. Support points
10. Pump option
11. Water pump inlet 4" Victaulic
12. Water pump outlet 4" Victaulic

SIZE		120.4	130.4
Length	inch	162.5	162.5
Depth	inch	99.5	99.5
Height	inch	87.7	87.7
W1 Supporting point	lb	1956	2019
W2 Supporting point	lb	1392	1449
W3 Supporting point	lb	1958	2019
W4 Supporting point	lb	1394	1449
Operating weight	lb	6700	6936
Shipping weight	lb	6605	6828

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

SIZE 145.4 ÷ 175.4

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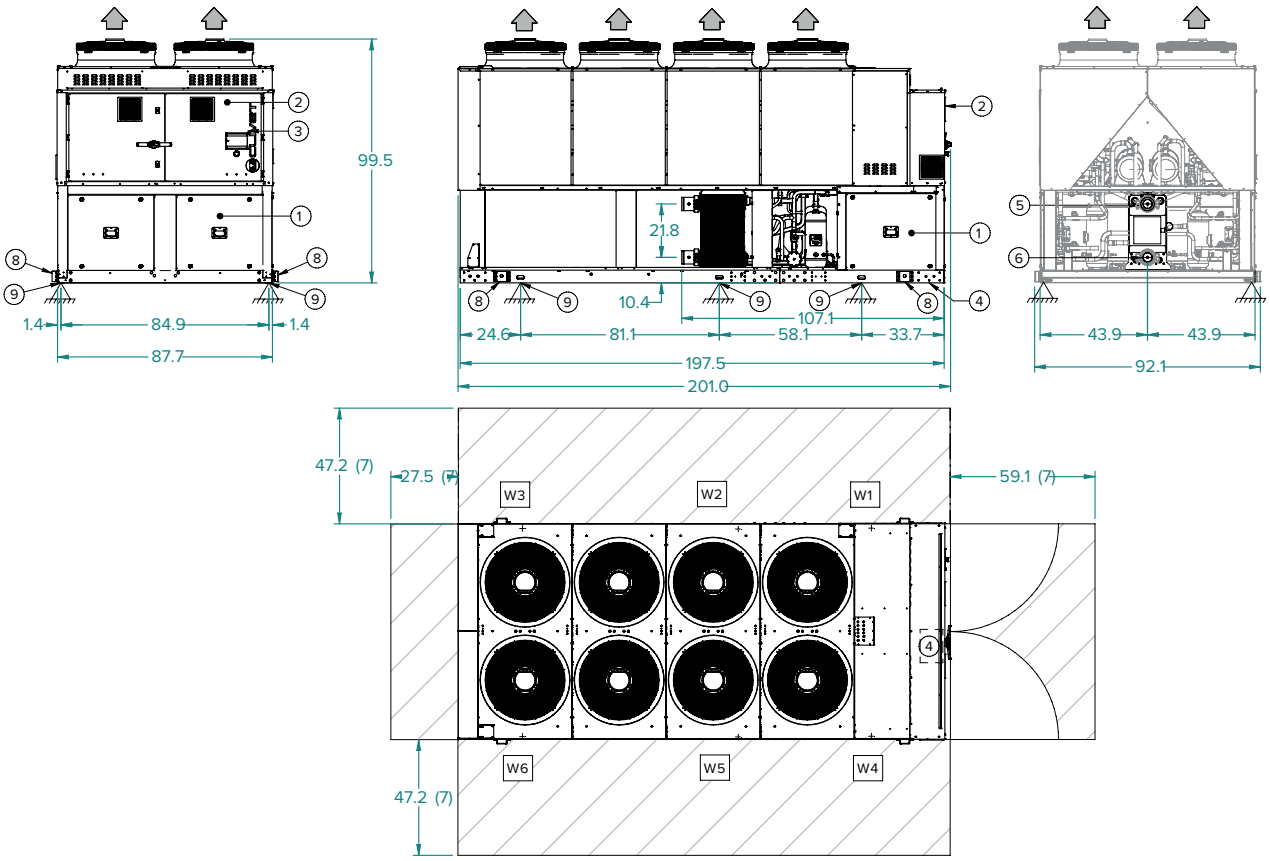

1. Compressor enclosure
2. Electrical panel
3. Control keypad
4. Power input
5. Water inlet 5" Victaulic
6. Water outlet 5" Victaulic
7. Functional spaces
8. Lifting bracket (removed)
9. Support points
10. Pump option
11. Water pump inlet 5" Victaulic
12. Water pump outlet 5" Victaulic

SIZE		145.4	160.4	175.4
Length	inch	201.0	201.0	201.0
Depth	inch	99.5	99.5	99.5
Height	inch	87.7	87.7	87.7
W1 Supporting point	lb	2156	2210	2370
W2 Supporting point	lb	1043	1077	1097
W3 Supporting point	lb	753	778	784
W4 Supporting point	lb	2036	2211	2248
W5 Supporting point	lb	1067	1077	1124
W6 Supporting point	lb	750	778	781
Operating weight	lb	7805	8131	8405
Shipping weight	lb	7697	8023	8270

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

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For over 35 years we have been offering solutions to ensure sustainable comfort and the well-being of people and the environment

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