



NASTEC

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4HS

4" variable speed submersible pumps



The electronic revolution



4HS is a range of 4" electric submersible pumps for well applications, featuring:

- Three-phase water-filled asynchronous motor with encapsulated resin stator, fully constructed of AISI 304 stainless steel.
- Built-in integrated inverter controlled by CM control module.
- Multistage pump made of AISI 304 stainless steel.

Inverter allows 4HS to:

- Change pump speed to maintain set-pressure re-

gardless of water demand. Thus, the pump is operated only when and as needed without wasting energy, and extending pump life.

- Starts and stops pump gently, thus reducing peak absorption, mechanical stress.
- Protects pump and drive from overload, surges, under/over-voltage, dry running, and any abnormal conditions.

Integrated onboard inverter avoids the use of expensive filters and shielded cables reducing to minimum electromagnetic emissions.

4HS product range matches applications in commercial and residential markets for water supply, water pressurization and irrigation.

Compared to conventional solutions 4HS offers:

- Energy-saving operation.
- Quick and simplified application.
- System reliability.

Construction characteristics and use of specific materials allow 4HS to be suitable for drinking water applications.

A ready to use product

The 4HS range submersible pumps are designed to provide customers a ready to-use product and so come packaged in a kit including:

- 4HS pump including 2,5 m / 8 ft flat cable lead (ACS-WRAS - KTM compliant)
- Surface control module (CM)
- Cable junction kit
- Pressure transducer 0-16 bar / 0-250 psi
- Operating Manual

In this way, installation becomes quicker and easier.

Nastec, upon request, can provide the communication and power cables of the desired length.



Inverter, motor, pump, all integrated



Pump

Pump stages, in AISI 304 stainless steel, are specifically designed to manage high water energy produced by higher pump speeds. The number of stages used is four times less than traditional 50 Hz pumps. Mono-block single shaft reduces imbalance and, as a consequence, vibration in the pump, to provide silent and smooth operation and extended motor life. Variable speed allows the pump to cover a wide range of hydraulic performance with a single pump, allowing a corresponding reduction in variants of pumps to stock.



Motor

The encapsulated stator, constructed entirely of AISI 304 stainless steel, is impregnated with a special resin with high thermal conductivity. Due to this design, 4HS submersibles are suitable for use in pumping high-temperature water.

The water-filled rotor maintains the radial alignment of the shaft and sustains the axial thrust via bushings and an up-thrust bearing with pads.



MINT: Built-in inverter module

Entirely made of AISI 304 stainless steel, it features an inverter power board immersed in a special resin with high thermal conductivity; this construction extends the life of electronic components and provides greater mechanical resistance to vibration and external pressure. The power plug allows simple and quick cable replacement.



CM: Above ground controller



CM control module, mounted above-ground, manages the pump operation by changing pump speed to maintain the desired pressure in the system regardless of water demand.

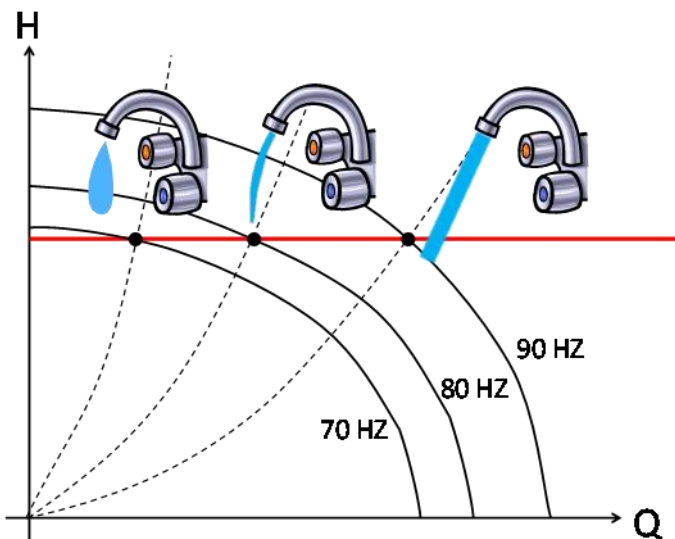
Simply connect the pressure transducer, supplied as standard, and perform a quick set-up of the sensor to configure the pressure range in relation to the system.

During operation, the CM control unit continuously monitors the electrical, hydraulic and thermal parameters providing complete protection against under/over-voltage, overload and dry-running.

Cable junction kit

The waterproof junction between the pump lead and drop cables is made using a provided kit consisting of:

- Polymer sheath containing the cable junctions
- Polyurethane resin
- Hardener
- Stick for mixing resin-hardener
- Insulated cable connectors
- Instruction manual



The control module receives the pressure signal from the pressure transducers and varies pump speed to maintain a constant set pressure regardless of water demand.

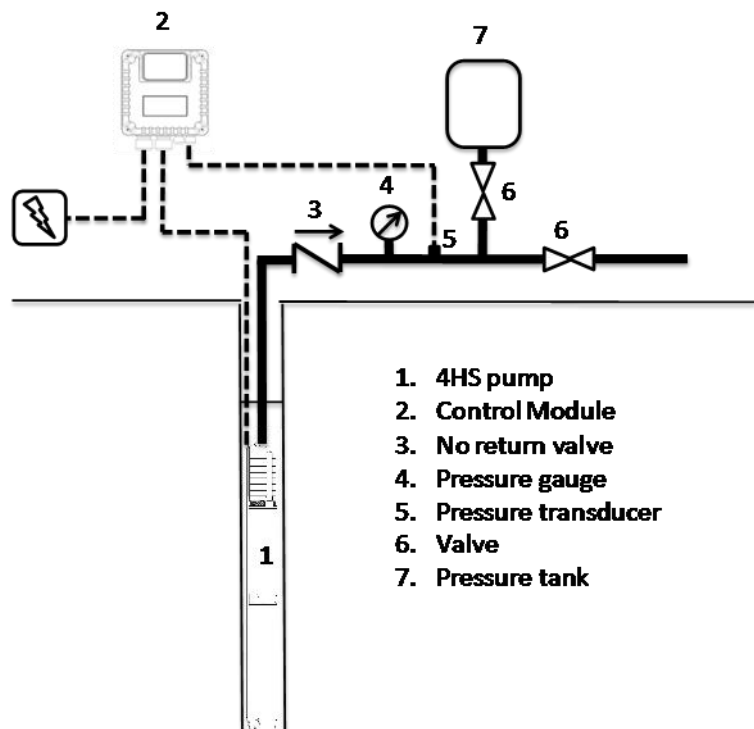
In addition to the constant pressure control, CM can also the following control modes:

- fixed frequency
- constant flow
- constant temperature

Constant pressure

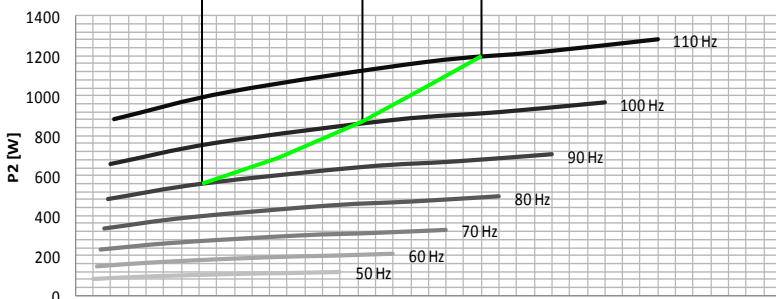
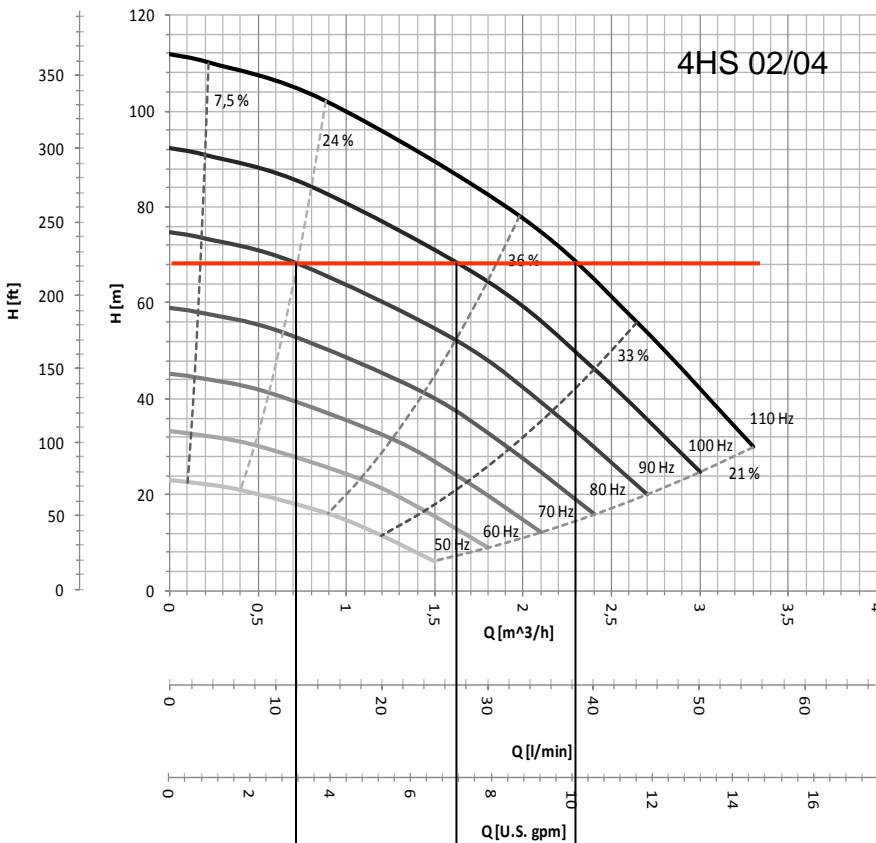
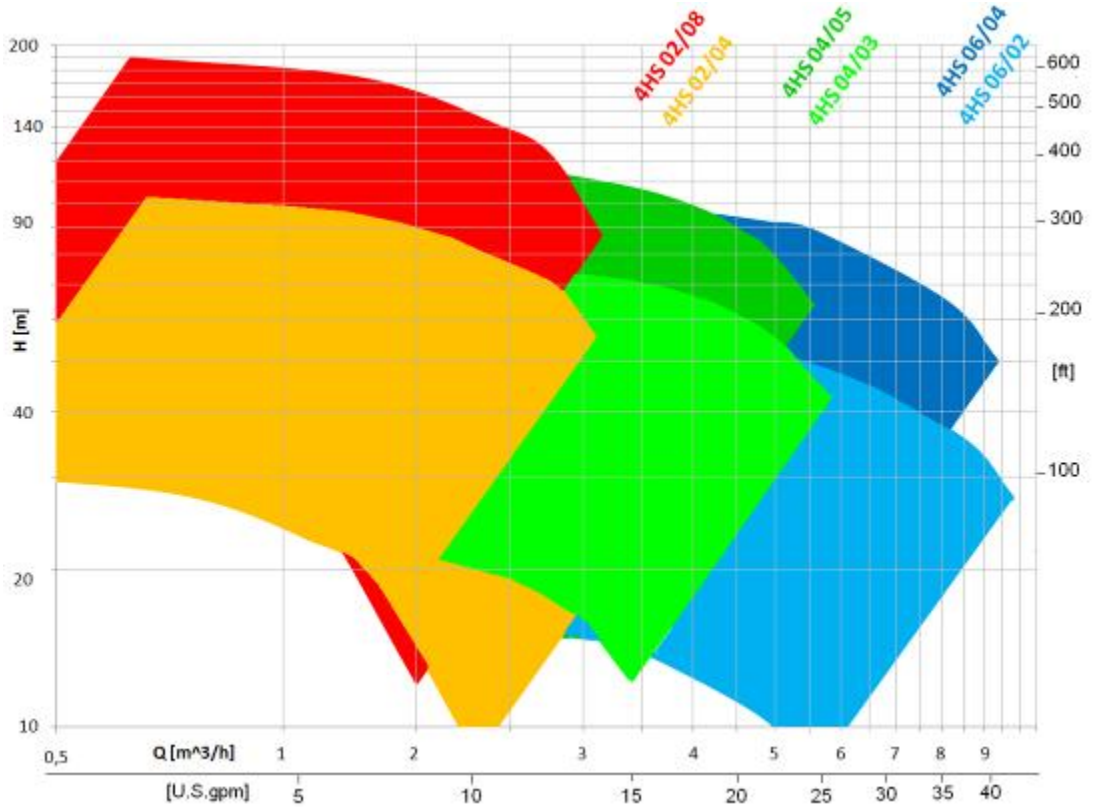
To set-up the system in a constant pressure application simply install the 4HS pump, connect the CM control module and wire the pressure sensor.

A small pressure tank is normally used to compensate for water losses while the pump is not running.



Pump selection chart

Variable speed allows 4HS to cover a wide range of water flow and heads with only few models; selecting the proper pump model for an application will help maximize the performance and overall efficiency of the application. Use the diagram below to select the most suitable 4HS pump model for your application.



Energy saving

If the water demand decreases, 4HS will reduce the speed (proportional to the frequency) to keep constant pressure.

As you can note from the chart, a speed reduction corresponds a significant decrease of the power consumption: for example, always keeping the 7 bar (230 psi), if frequency changes from 110 Hz down to 90 Hz, power drops from 1200W to less than 600 W.

4HS performs as "1000" pumps !

4HS can be used with fixed speed by setting the working frequency.

At any given frequency curve corresponds different hydraulic performances and consumption powers.

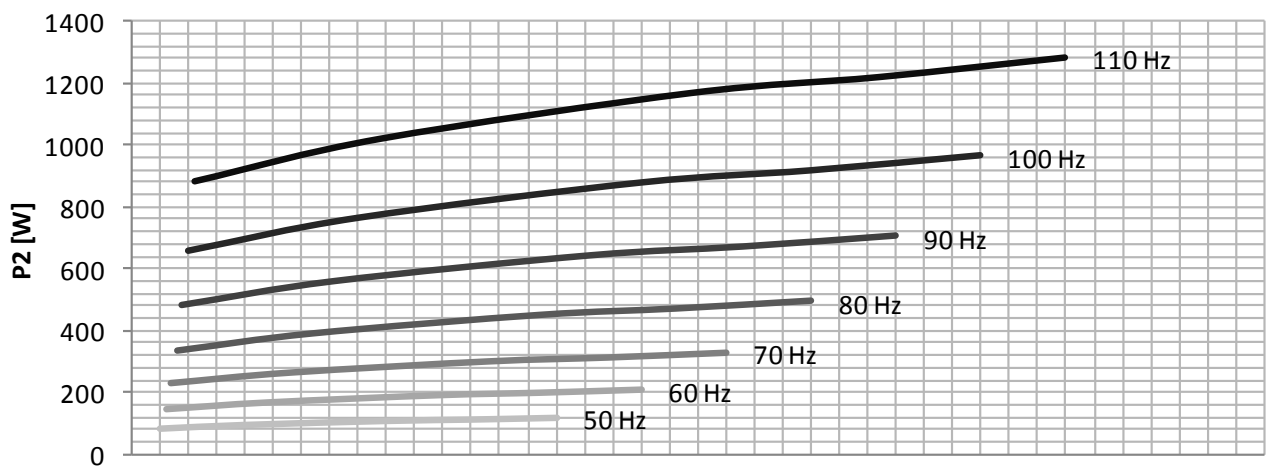
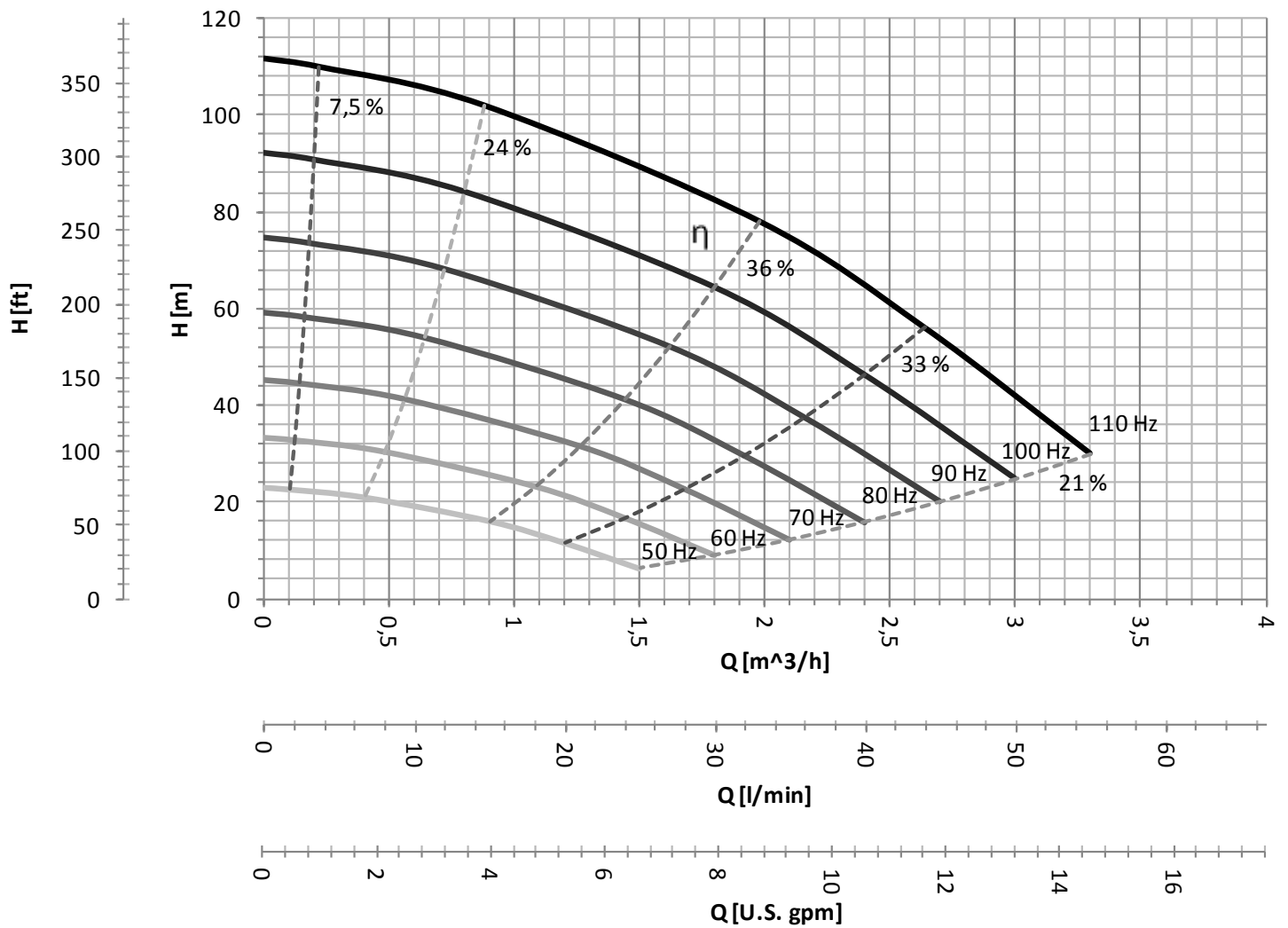
This means that each 4HS model covers the performances given by several standard pumps at fixed speed.

Automatic control of input max. current

Among the parameters to be set in the CM control module, is particularly useful the possibility of limiting the maximum current absorbed by the pump.

Exceeding this threshold, for example in case of drop of the input voltage, the control will reduce the 4HS pump speed to always ensure the operation.

Performances : 4HS 02/04

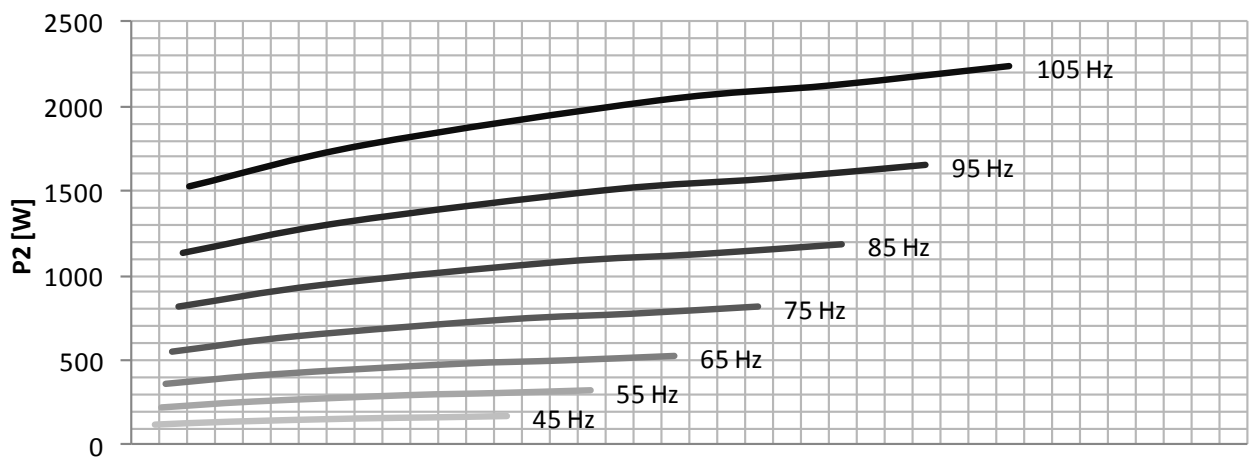
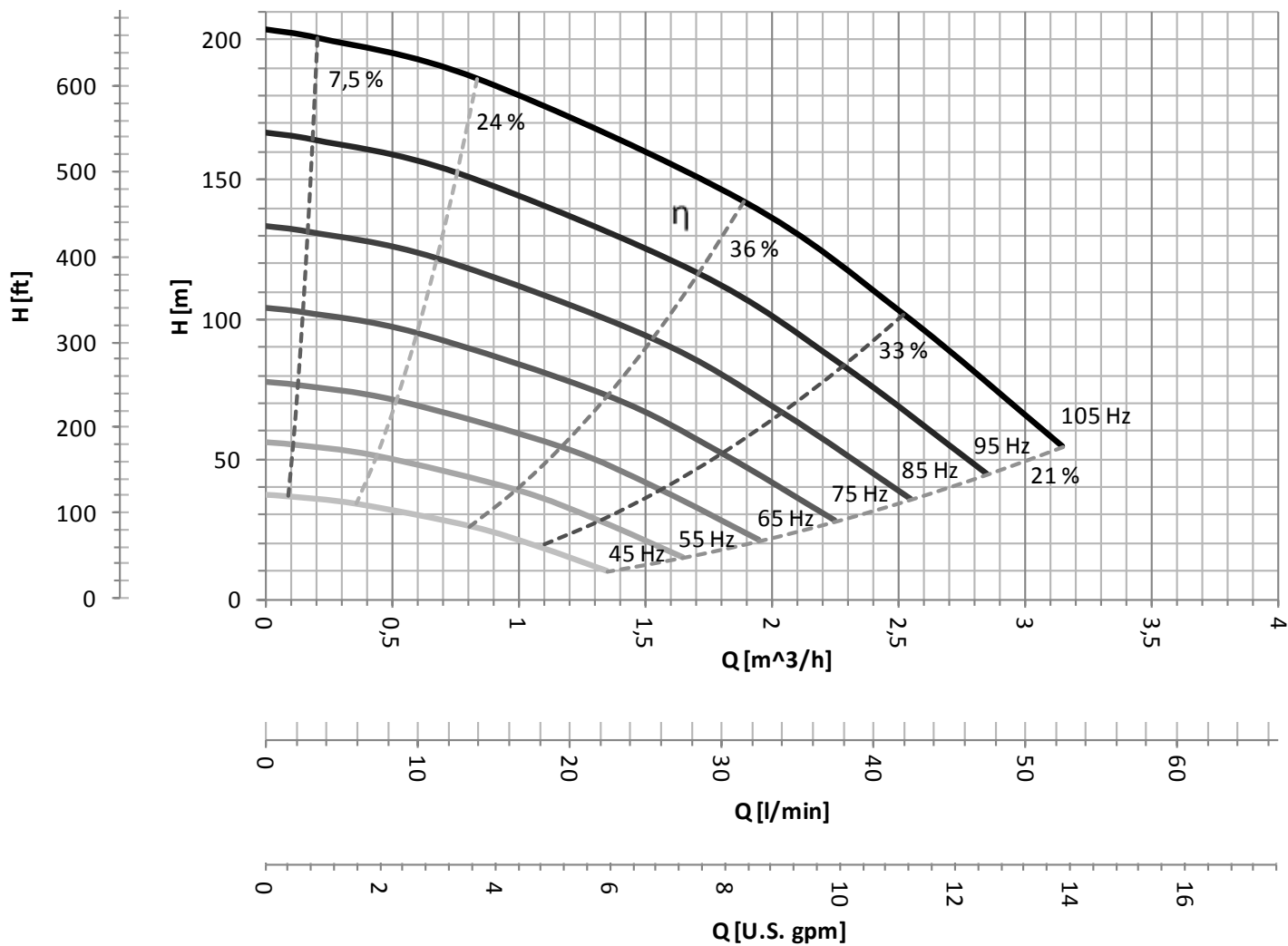


| Rated input voltage | Max. input current | Power factor | Max input power | Efficiency at full load | Lenght | Delivery | Pump weight | Max. diameter | Packing dimension | Packing weight |
|---------------------|--------------------|--------------|-----------------|-------------------------|--------|----------|-------------|---------------|-------------------|----------------|
| [VAC] | [A] | | [W] | | [mm] | | [kg] | [mm] | [cm] | [Kg] |
| 1 x 230 +/- 15% | 14 | 0,65 * | 2100 | 70 % | 936 | 1"1/4 | 19,5 | 101 ** | 120x20x29 | 22 |

* Capacitive power factor

** Max. external diameter including cable and cable cover

Performances : 4HS 02/08

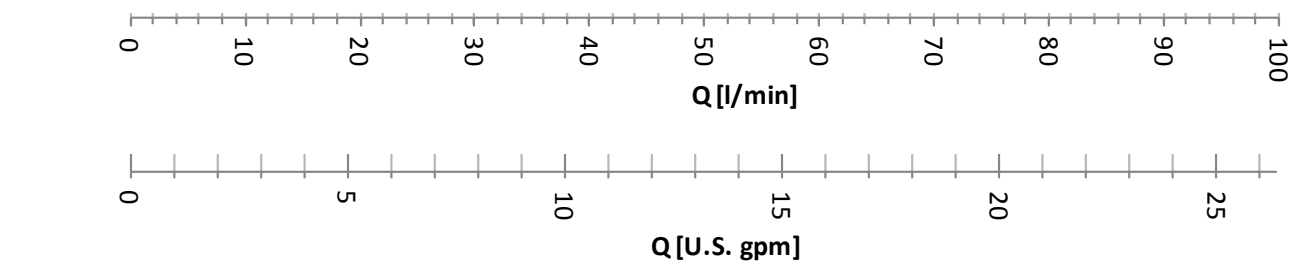
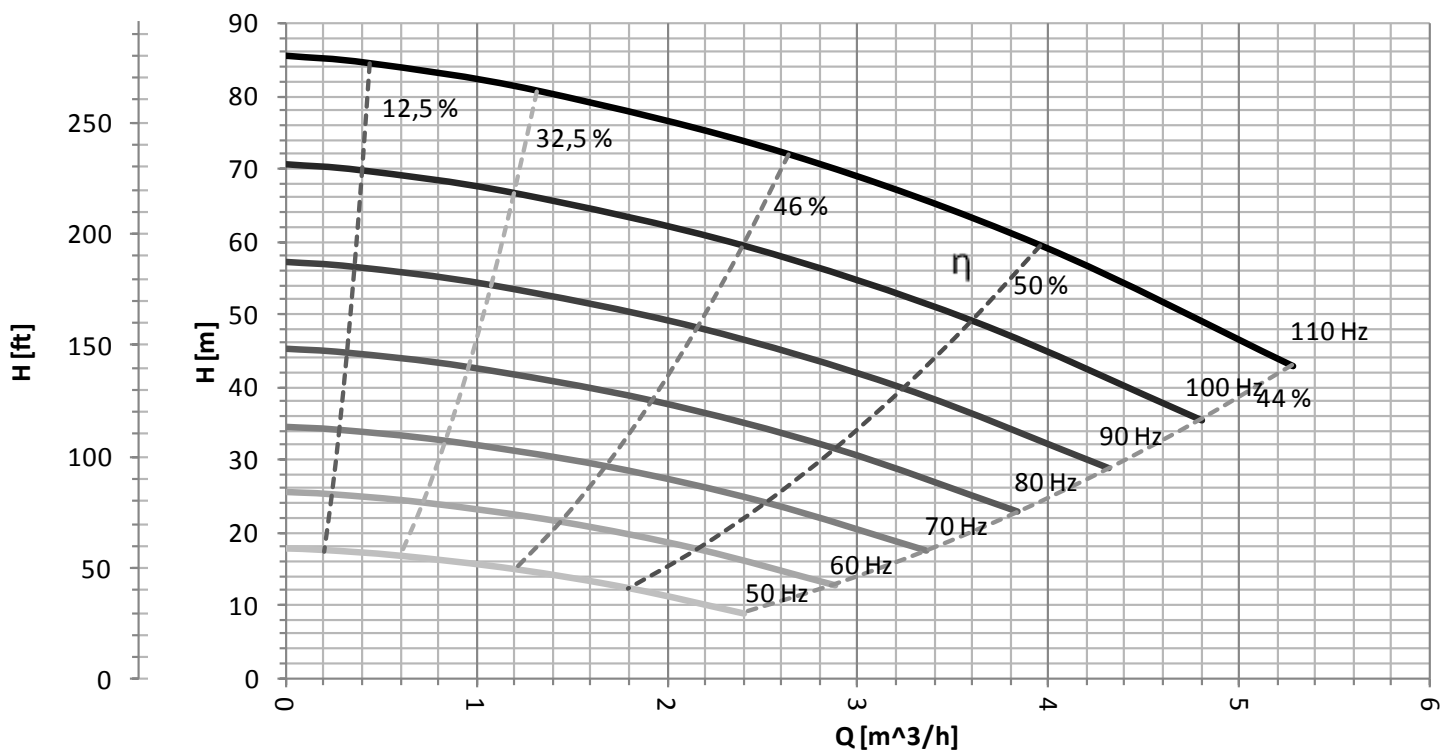


| Rated input voltage | Max. input current | Power factor | Max input power | Efficiency at full load | Lenght | Delivery | Pump weight | Max. diameter | Packing dimension | Packing weight |
|---------------------|--------------------|--------------|-----------------|-------------------------|--------|----------|-------------|---------------|-------------------|----------------|
| [VAC] | [A] | | [W] | | [mm] | | [kg] | [mm] | [cm] | [Kg] |
| 1 x 230 +/- 15% | 22 | 0,65 * | 3500 | 73 % | 1065 | 1"1/4 | 22 | 101 ** | 120x20x29 | 25 |

* Capacitive power factor

** Max. external diameter including cable and cable cover

Performances : 4HS 04/03

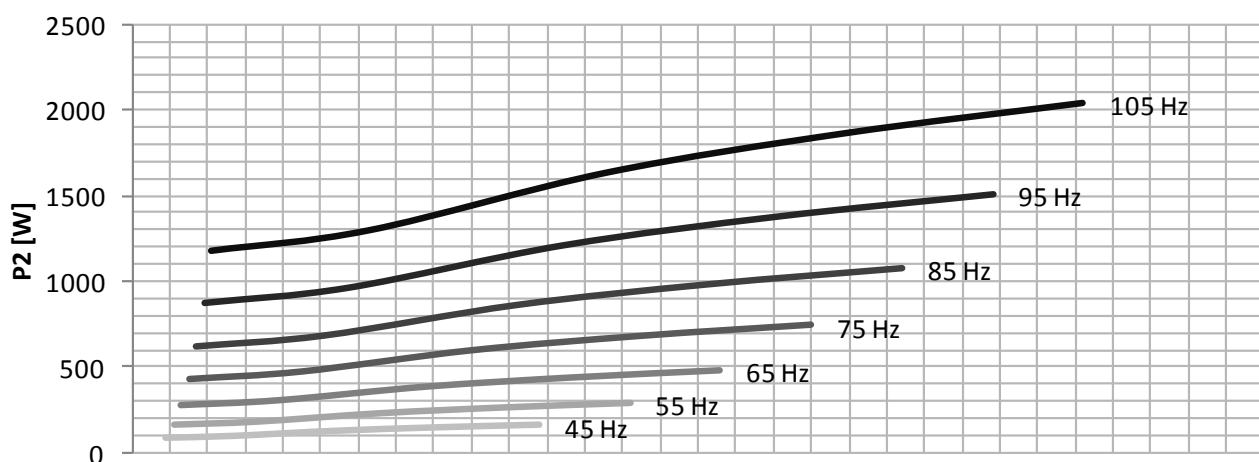
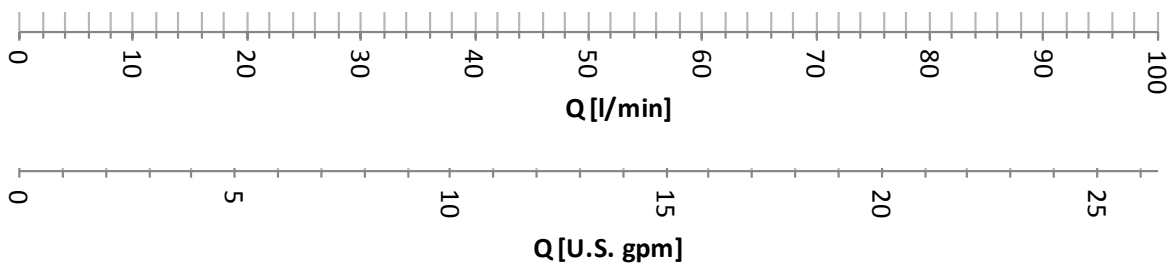
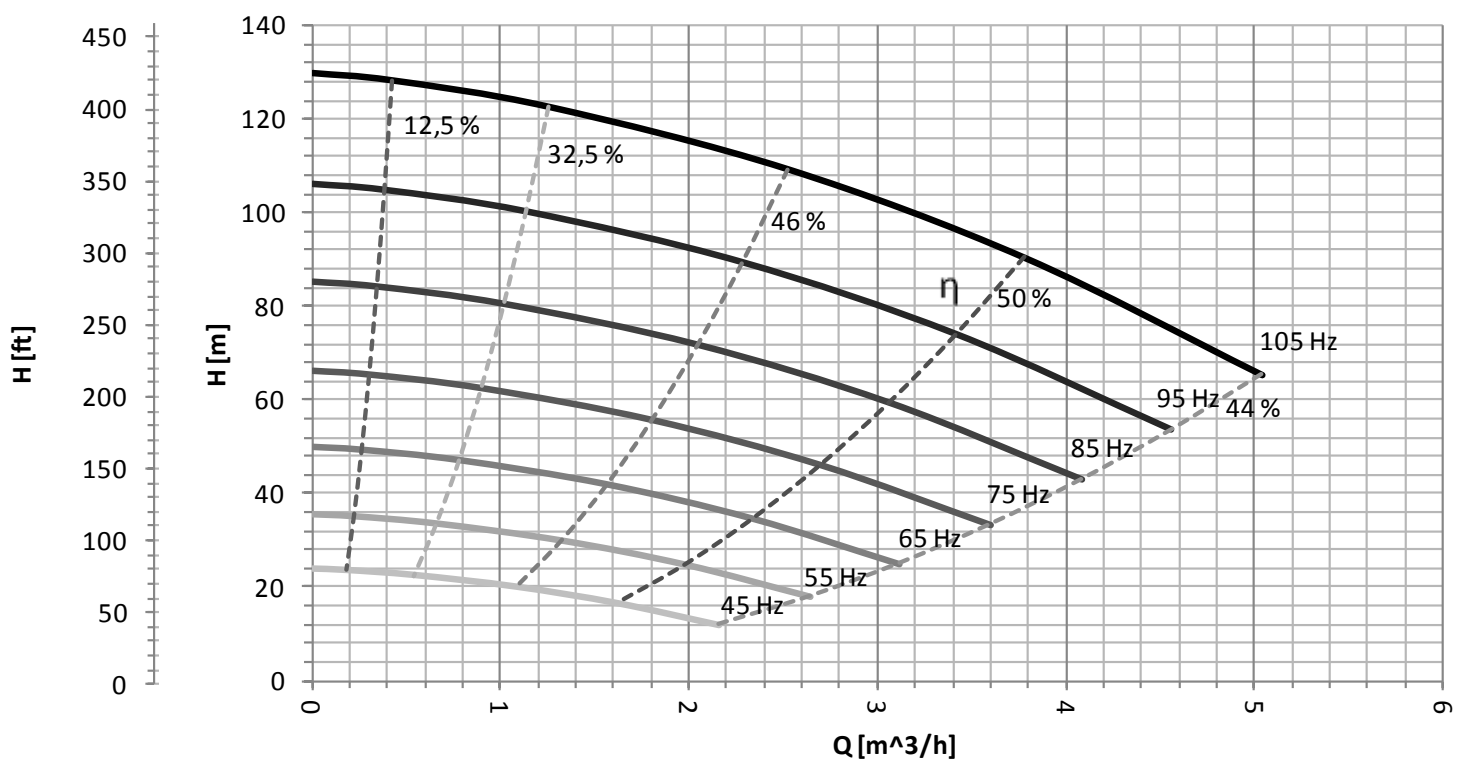


| Rated input voltage | Max. input current | Power factor | Max input power | Efficiency at full load | Lenght | Delivery | Pump weight | Max. diameter | Packing dimension | Packing weight |
|---------------------|--------------------|--------------|-----------------|-------------------------|--------|----------|-------------|---------------|-------------------|----------------|
| [VAC] | [A] | | [W] | | [mm] | | [kg] | [mm] | [cm] | [Kg] |
| 1 x 230 +/- 15% | 16 | 0,65 * | 2400 | 70 % | 915 | 1"1/4 | 19,4 | 101 ** | 120x20x29 | 22 |

* Capacitive power factor

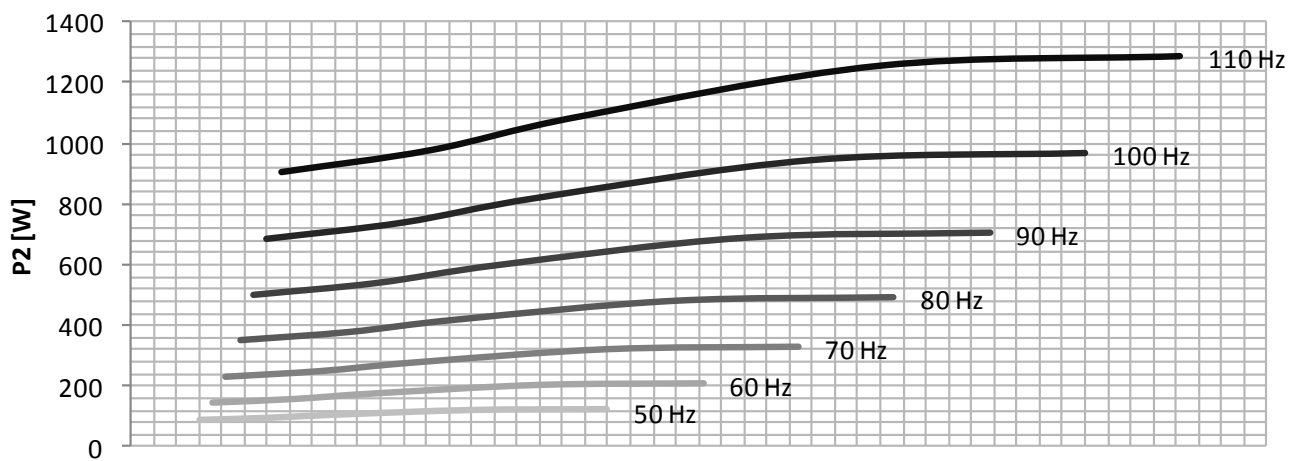
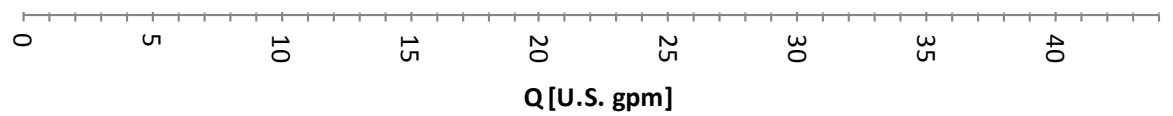
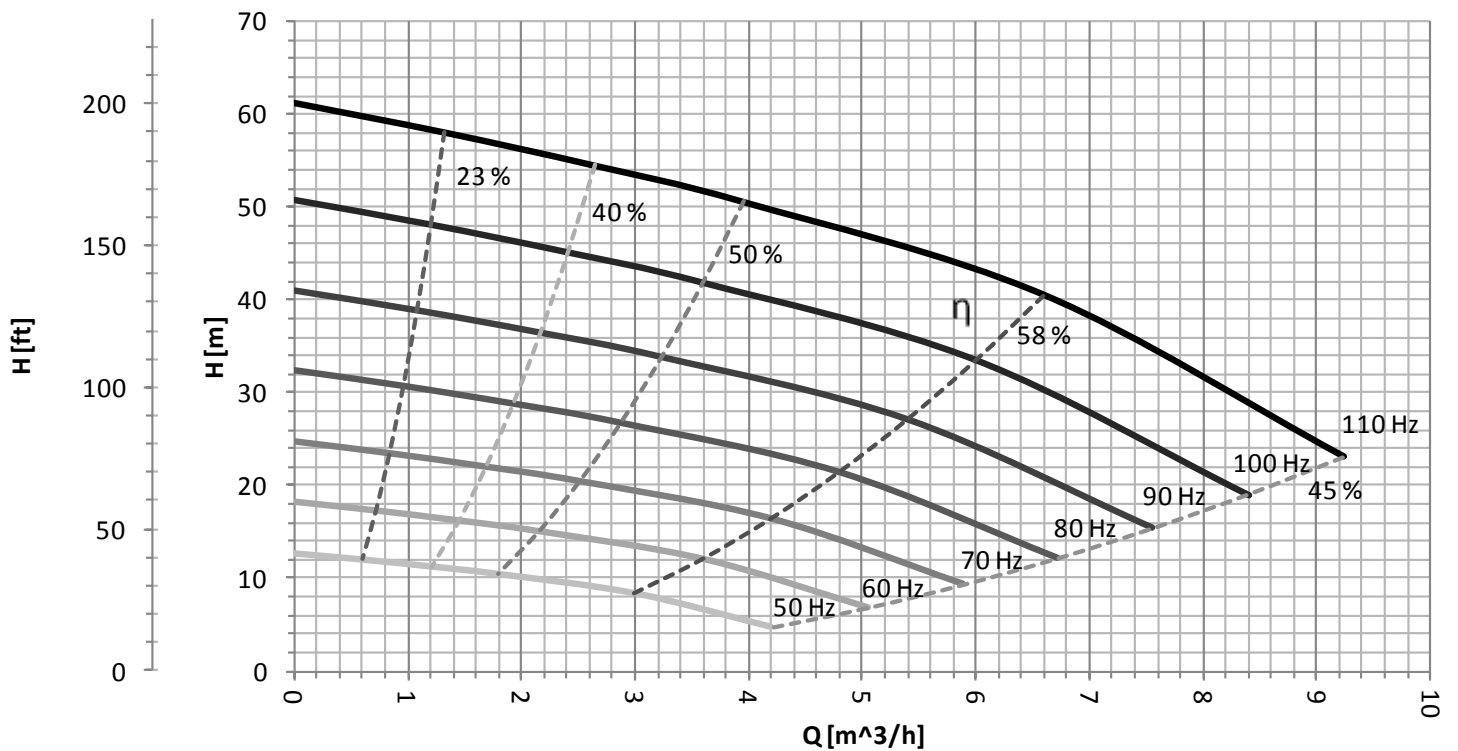
** Max. external diameter including cable and cable cover

Performances : 4HS 04/05



| Rated input voltage | Max. input current | Power factor | Max input power | Efficiency at full load | Lenght | Delivery | Pump weight | Max. diameter | Packing dimension | Packing weight |
|---------------------|--------------------|--------------|-----------------|-------------------------|--------|----------|-------------|---------------|-------------------|----------------|
| [VAC] | [A] | | [W] | | [mm] | | [kg] | [mm] | [cm] | [Kg] |
| 1 x 230 +/- 15% | 22 | 0,65 * | 3500 | 73 % | 1002 | 1"1/4 | 21,5 | 101 ** | 120x20x29 | 24 |

Performances : 4HS 06/02

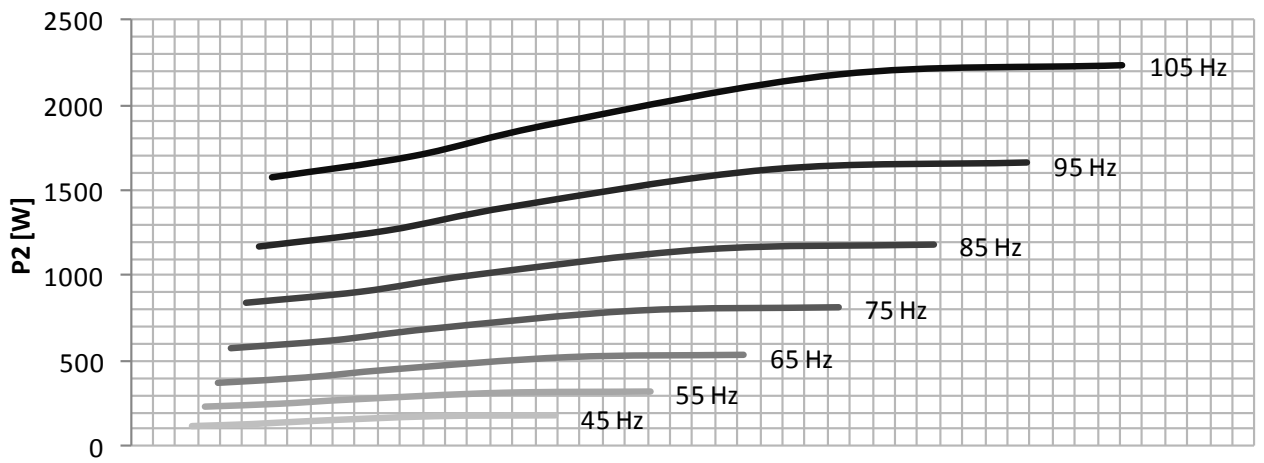
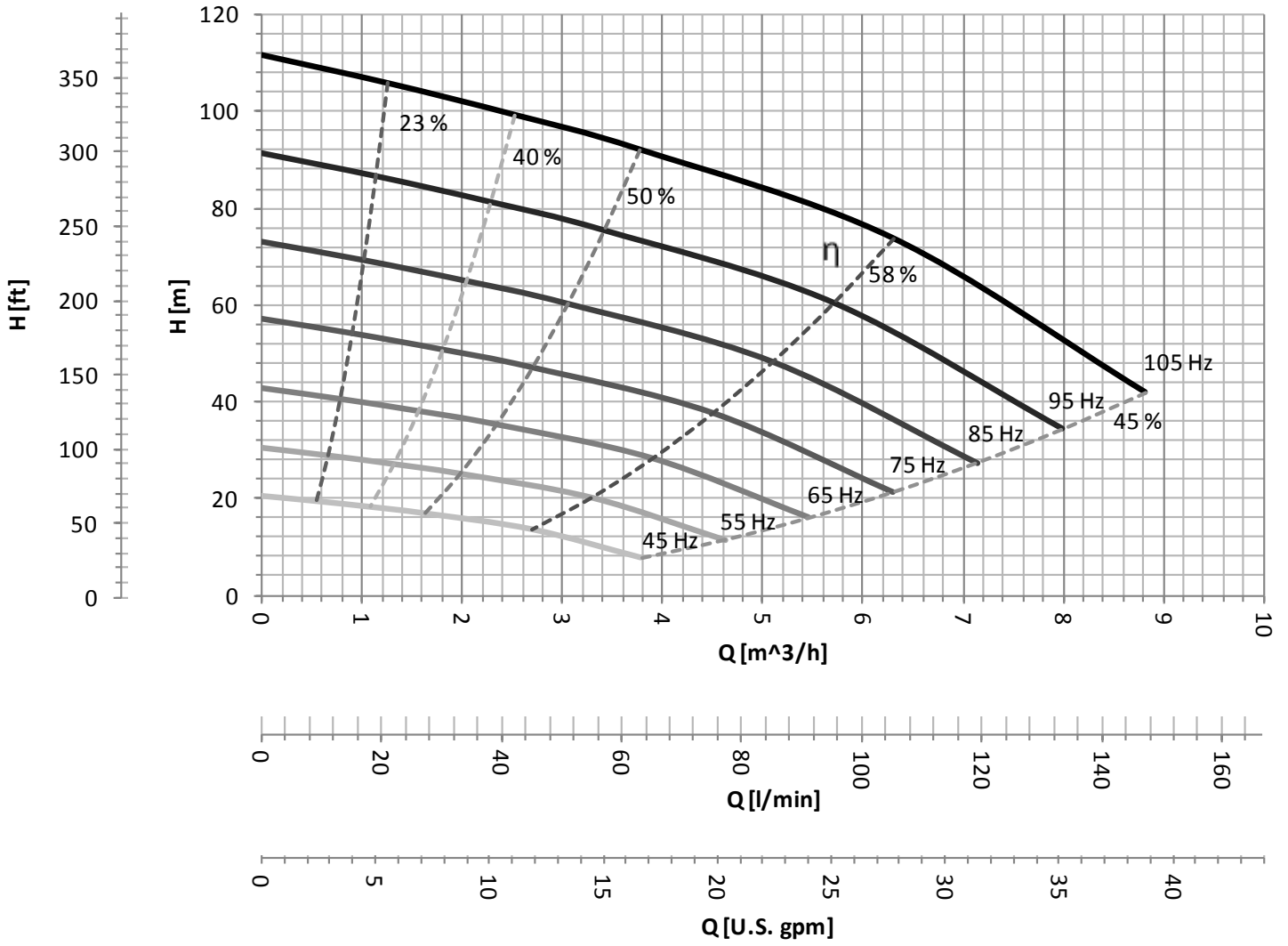


| Rated input voltage | Max. input current | Power factor | Max input power | Efficiency at full load | Lenght | Delivery | Pump weight | Max. diameter | Packing dimension | Packing weight |
|---------------------|--------------------|--------------|-----------------|-------------------------|--------|----------|-------------|---------------|-------------------|----------------|
| [VAC] | [A] | | [W] | | [mm] | | [kg] | [mm] | [cm] | [Kg] |
| 1 x 230 +/- 15% | 14,5 | 0,65 * | 2200 | 70 % | 894 | 1"1/2 | 19,2 | 101 ** | 120x20x29 | 22 |

* Capacitive power factor

** Max. external diameter including cable and cable cover

Performances: 4HS 06/04



| Rated input voltage | Max. input current | Power factor | Max input power | Efficiency at full load | Lenght | Delivery | Pump weight | Max. diameter | Packing dimension | Packing weight |
|---------------------|--------------------|--------------|-----------------|-------------------------|--------|----------|-------------|---------------|-------------------|----------------|
| [VAC] | [A] | | [W] | | [mm] | | [kg] | [mm] | [cm] | [Kg] |
| 1 x 230 +/- 15% | 25 | 0,65 * | 3800 | 73 % | 981 | 1"1/4 | 21,4 | 101 ** | 120x20x29 | 24 |

General characteristics

| 4HS PUMP | |
|----------------------------------|---|
| Max. temperature of the liquid | 35 °C (92 °F) |
| Min. cooling speed of the liquid | 0.2 m/s |
| Characteristics of pumped liquid | Clean , chemically not-aggressive, not explosive, without solids and fibers content, with max. 50 g/m3 sand content |
| Protection grade | IP68 |
| Max . Immersion depth | 150 m |
| Materials | Motor, impeller and diffuser in AISI 304 stainless steel |
| Cavo | Flat cable ACS - WRAS - KTM approved |

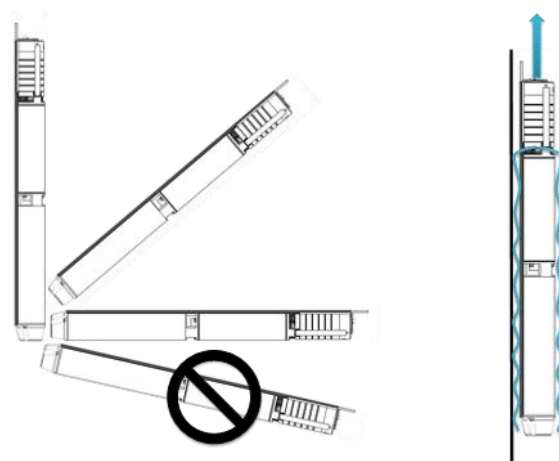
| CM CONTROL MODULE | |
|--------------------------|--|
| Max. ambient temperature | 50 °C (122 °F) |
| Protection Class | IP55 (Nema 4) |
| Materials | Alluminium enclosure, , PVC labels, cables gland in polyamide (PA) , display membrane in polyester (PE). |
| Analog input | 2 inputs 4-20 mA + 2 input 4-20 mA or 0-10 V settable by the user |
| Digital input | 4 input N.O or N.C settable by the user |
| Digital output | 2 relays output 5 A , 250 VAC, N.O. or N.C settable by the user |
| Auxiliary power supply | 24 Vdc (300 mA), 10 Vdc (5 mA) |
| User display | display LCD backlit, 16 characters x 2 rows, 5 buttons, buzzer for acoustic indication |
| Shortcircuit protection | By fuse |

| CERTIFICATION | |
|---------------|--|
| CE | |

| 4HS model | Cable type | Total cable length | | | |
|-------------------------------------|--------------|--------------------|---------------|------------------|----------------|
| | | 10 – 50 m | 50 – 100 m | 100 – 150 m | 150 – 200 m |
| 4HS 02/04 4HS 04/03 4HS 06/02 | power cable | 2,5 mm2 (AWG 13) | 4mm2 (AWG 11) | 6 mm2 (AWG 9) | 10 mm2 (AWG 7) |
| | signal cable | 1 mm2 (AWG 17) | | 1,5 mm2 (AWG 15) | |
| 4HS 02/08 4HS 04/05 4HS 06/04 | power cable | 4 mm2 (AWG 11) | 6mm2 (AWG 9) | 10 mm2 (AWG 7) | 16 mm2 (AWG 5) |
| | signal cable | 1 mm2 (AWG 17) | | 1,5 mm2 (AWG 15) | |

4HS pumps can be installed both vertically and horizontally with the outlet never be lower the horizontal axis

To ensure a proper cooling if 4HS is not installed in a well, it is necessary to use a cooling sleeve to grant the minimum cooling speed of the liquid.



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