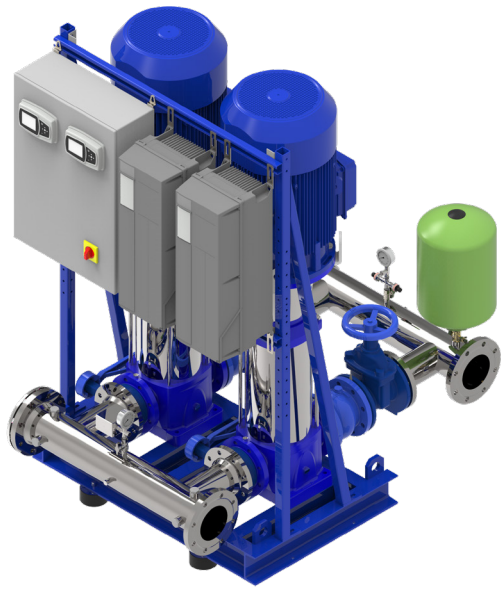
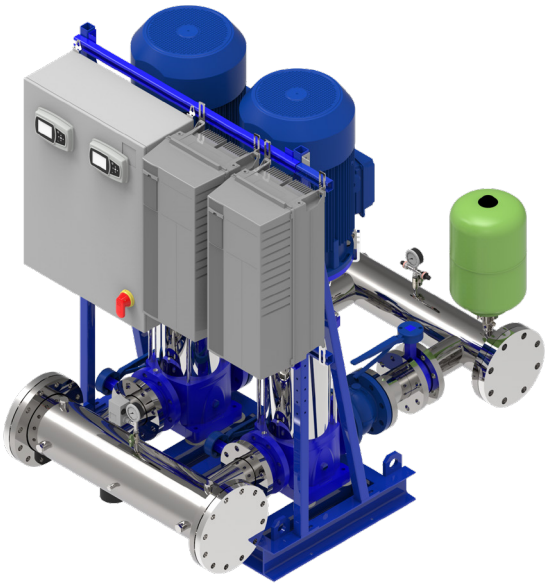
LOWARA xylem

Technical brochure
Cod. 191000721 Rev. C Ed.09/2026

50 Hz





Series GHV HVX+ Smart Controller

Variable speed booster sets
with e-SV vertical multistage electric pump series
and with hydrovar X+ Smart Controller

Sales region: DACH and Nordics

xylem

Directive 2009/125/EC of the European Union

The **Directive 2005/32/EC** on energy-using products (**EuP**) and the subsequent **Directive 2009/125/EC** on energy-related products (**ErP**) established the ecodesign requirements for products to reduce their energy consumption and consequently their environmental impact.

These requirements apply to products placed and used in the European Economic Area (European Union plus Iceland, Liechtenstein and Norway) as a stand-alone unit or as integrated parts in other products.

The following tables show the Regulations that define the requirements applicable to Lowara products.

- Some types of **pump** used for pumping clean water:

Regulations	From	Target
(EU) N. 547/2012 and subsequent updates	1 January 2015	**MEI** ≥ 0,4

- **Circulators** with a rated hydraulic output power of between 1 and 2500 W, designed for use in heating systems or in secondary circuits of cooling distribution systems:

Regulations	From	Target
(EC) N. 641/2009 and subsequent updates	1 August 2015	**EEI** < 0,23

- **Three-phase motors** with frequency 50 or 60 or 50/60 Hz and voltages between 50 and 1000 V (S1 and D.O.L.):

Regulations	From	Target
(EU) 2019/1781 and subsequent updates	1 July 2023	**IE2**: motors with a rated output ≥ 0,12 and < 0,75 kW **IE3**: motors with a rated output ≥ 0,75 and < 75 kW **IE4**: motors with a rated output ≥ 75 and < 201 kW **IE3**: motors with a rated output ≥ 201 and < 1000 kW

- **Single-phase motors** with frequency 50 or 60 or 50/60 Hz and voltages between 50 and 1000 V (S1 and D.O.L.):

Regulations	From	Target
(EU) 2019/1781and subsequent updates	1 July 2023	**IE2**: motors with a rated output ≥ 0,12

- **Variable speed drives** (VSD) with three-phase input and rated output power from 0,12 kW up to 1000 kW, rated for operating with motor included in the same regulations:

Regulations	From	Target
(EU) 2019/1781and subsequent updates	1 July 2021	**IE2**

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GHV SERIES
GENERAL INTRODUCTION – PRODUCT DESCRIPTION

Lowara GHV series booster sets are designed to transfer and increase the pressure of water, in the following applications:

- Hospitals
- Schools
- Public buildings
- Industries
- Hotels
- Condominiums
- Sports facilities
- Mains water systems

The GHV series booster sets are variable-speed pumping stations, consisting of two up to a maximum of four e-SV series vertical multistage pumps. Each pump is equipped with a frequency converter and is individually controlled by the hydrovar X+ Smart Controller system. This allows variable-speed operation across all pumps in the set, ensuring efficiency and adaptability to different operating conditions. Special versions with up to eight pumps are available on request.

These types of systems improve user comfort by reducing noise emissions and minimizing what is known as “water hammer,” thanks to the gradual shutdown of the pumps.

GHV2, GHV3, GHV4:
The pumps are mounted on a single base frame. Each pump is equipped with dedicated shut-off valves and check valves. The suction and discharge manifolds hydraulically connect all the pumps, forming an integrated system.
Depending on the number and power of the installed pumps, the control panel can be either: a box-type panel, fixed directly onto the base frame using a support system; or a cabinet-type panel, installed separately and placed on the floor.

GHV series booster sets have been defined with a wide range of pumps to satisfy the different needs of every system. However, Lowara can also offer the GHV series with customisation to satisfy particular working requirements.

Systems for regulating the speed of the electric motors, as in GHV series booster sets, are used in the following cases:

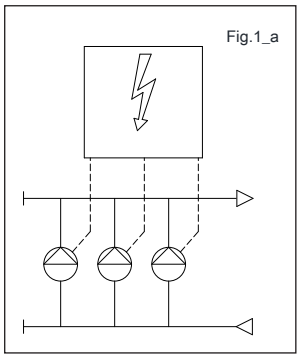
- In case of systems with many users, where the daily consumption varies frequently and in different periods.
- When it is necessary to obtain constant pressure.
- In case of systems with supervision it is possible to monitor and check the performances of the pump stations.

DESCRIPTION OF OPERATION

In Lowara GHV series booster sets, pump start-up is automatic, based on system demand.
Each pump is equipped with a pressure transmitter that ensures pressure reading, and the recorded data is transmitted to the hydrovar X+ Smart Controller.
This allows the speed of each pump to be modulated in real time according to system requirements.
Pump start-up alternation is automatically managed through a preset time interval (a parameter available in the hydrovar X+ Smart Controller).
Pump start and stop are determined based on the pressure values set as the target value in the hydrovar X+ Smart Controller menu.

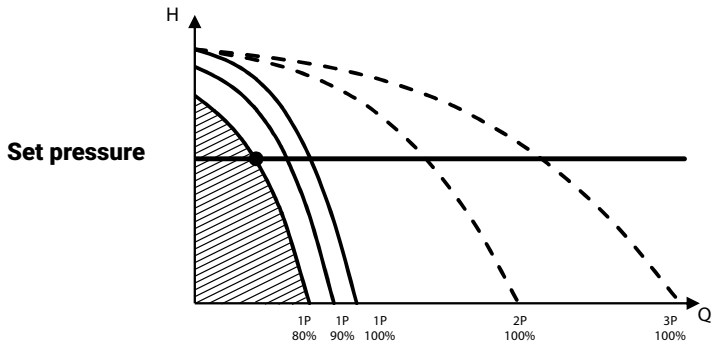
GHV SERIES
DESCRIPTION OF OPERATION

Example operation of a set of three GHV series pumps.

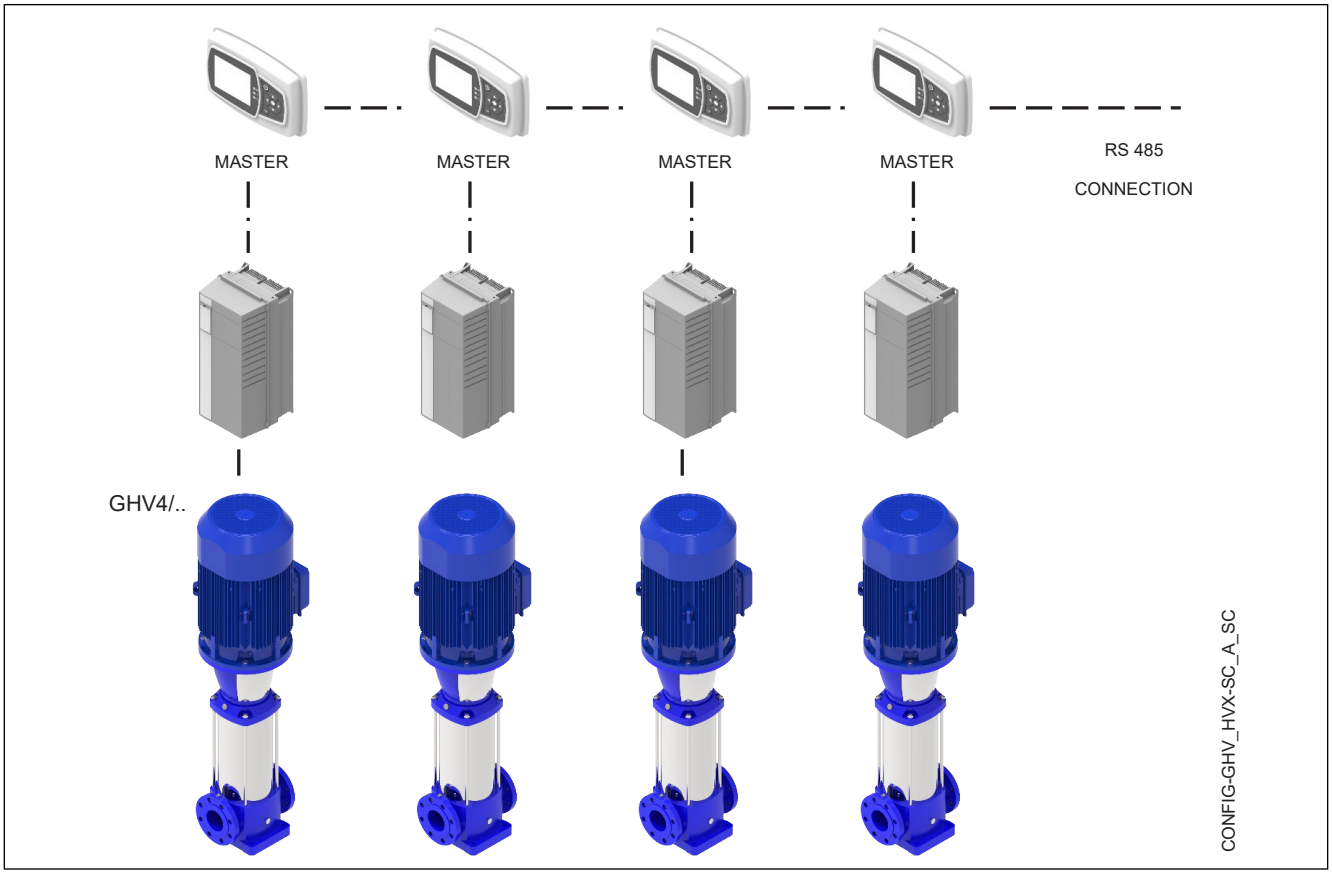


The pumps are controlled by frequency converters directly connected to their respective electric motors.
Each converter is managed by its own hydrovar X+ Smart Controller.
Pump start-up priority alternation occurs automatically, based on a time interval configurable via the controller.
All installed pumps operate at variable speed, adapting to system demand.
As water demand decreases, the pumps progressively shut down in cascade.
During operation, pressure is kept constant thanks to the modulation of the motor speed.
Both during start-up and shutdown, the pumps accelerate and decelerate smoothly, reducing water hammer and ensuring very quiet system operation.

Lowara GHV series booster sets guarantee constant pressure of the system as in the following example:

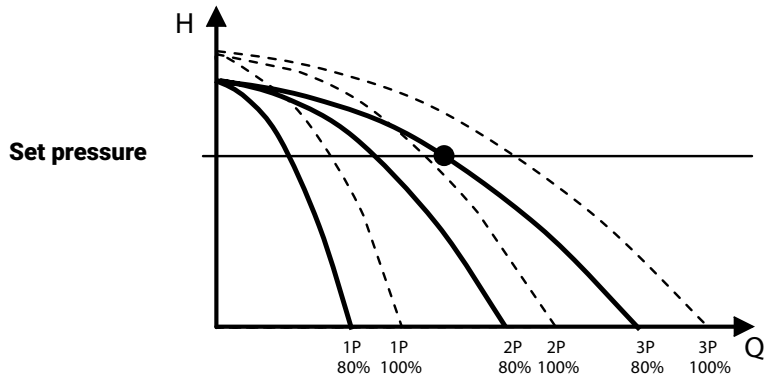


Example: multistage vertical electric pumps e-SV (8 units maximum)



GHV SERIES
DESCRIPTION OF OPERATION

When the pressure decreases, an electric pump starts, adjusting the motor speed so that the set pressure value can be guaranteed. When the demand for water increases, the other pumps also start in sequence, at variable speed, to keep the pressure at a constant level



When the demand for water decreases, the pumps switch off in succession. The number of revolutions of the first pump switched on decreases to a set minimum before switching off.

Regulating the constant pressure value

GHV series booster sets guarantee constant pressure of the system even during frequent variations in water consumption. The system pressure value is measured by the pressure transducers connected to the delivery manifold.
The value found is compared with the set value. The comparison between the measured pressure and the set pressure is performed through the hydrovar X+ Smart Controller, which manages the motor speed acceleration and deceleration ramps (frequency), changing the performance of the pump during the time.
In case of fault of one of the frequency converters, the others will remain active and will continue to guarantee the control of the other pumps and the constant pressure.

Type of control

GHV series booster sets use one or more sensors as a standard device to control pressure.
For each booster set, there are as many sensors as the number of pumps installed. In case of fault of one of the transducer, the converter connected to the pump stops working. It is also possible to change the unit of measure into bar, psi, m3/h, °C, °F, l/sec, l/min, %. In this case, different transducers may be used, depending on the selected measure, such as flow or temperature transducers.

Setpoint

It is possible to set up to two setpoints of different values. In this way, the same booster set can be used for systems that require different pressure values at the utility. For example, different setpoints can be used for an irrigation system on a hillside, or one setpoint value can be used for domestic water supply during the day and a second setpoint for irrigation at night.
The setpoints can be changed through an external consensus.

GHV SERIES
DESCRIPTION OF OPERATION

Cyclical exchange of pumps

In the GHV series with more than one pump, the pump's start is alternated according to a time set for each pump through a clock in the hydrovar X+ Smart Controller menu.

Protection against dry running

Protection against dry running activates when the water reserve falls below the minimum level guaranteed for suction. The level can be checked using a float switch, a minimum pressure switch, an external contact, or level probes. For the latter, the probes must be connected to the adjustable sensitivity electronic module. The control panel includes as standard the module for connecting the dry running protection device and as standard, the minimum pressure switch is installed on suction manifold (A1 sign in description of booster).

Minimum delivery pressure protection

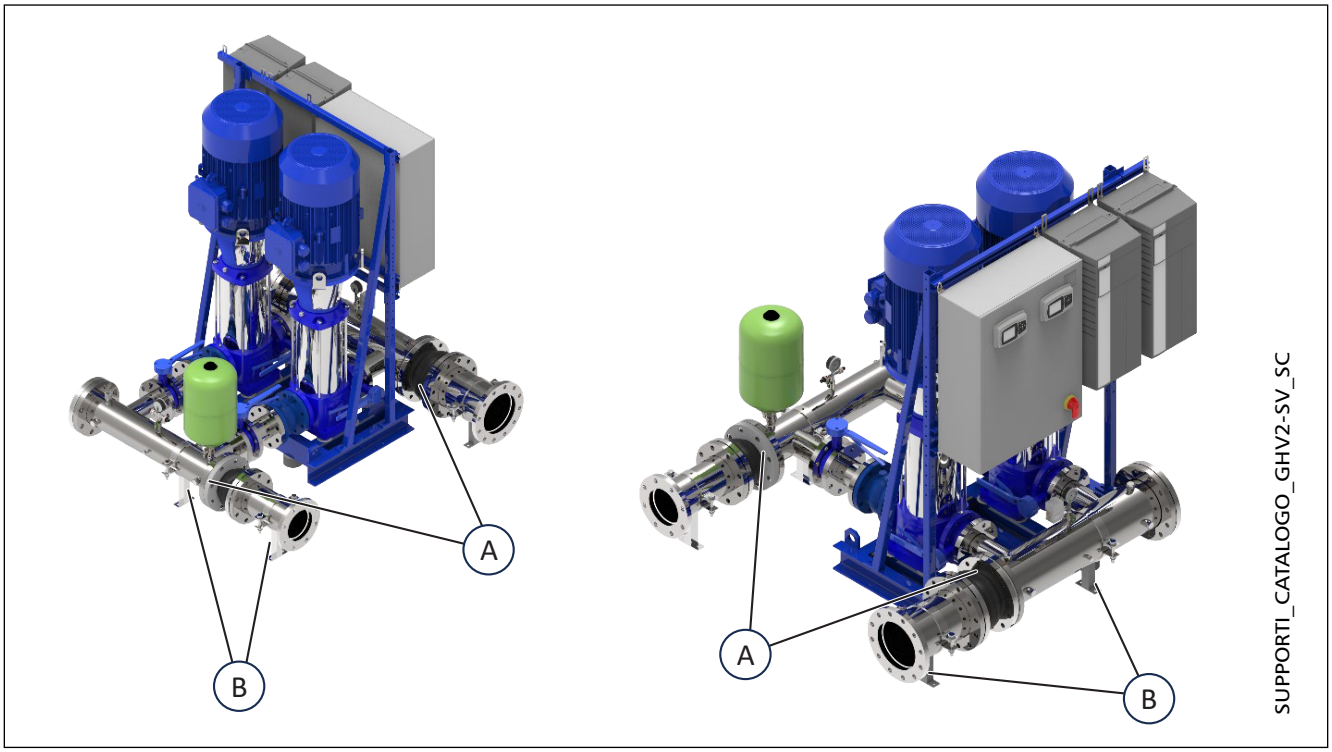
The minimum delivery pressure function can be managed by entering the pressure value in the menu of the hydrovar X+ Smart Controller, which will receive the signal through the pressure transducer at the delivery.

Filling mode function

The pipe filling function controls the filling of the hydraulic system when it is not pressurized, in order to prevent water hammer.
When this function is active, the unit operates at MINIMUM SPEED for the PIPE FILLING STEADY TIME, during which the pressure is constantly monitored.
If the pressure remains stable for the steady time, the speed is gradually increased according to the PIPE FILLING SPEED STEP, while continuously monitoring the pressure.
At the end of the function, the system automatically returns to the standard regulation mode.
The function is available in the hydrovar X+ Smart Controller menu.

GHV SERIES
INSTALLATION

The booster sets must be installed in areas protected against frost and with adequate ventilation to cool the motors. It is a good practice to connect the suction and delivery pipes with vibration-damping joints to limit vibrations and resonance in the whole system.



The booster sets must be connected to pressurized tanks with an adequate capacity for the system to operate correctly.

These tanks can avoid any problems due to water hammer that is created due to the sudden stopping of the pumps running at a fixed speed. For this type of system, it is possible to use expansion vessel that when installed in the delivery piping perform a pressure dampening function, as they are not intended to store water like autoclave systems. Due to their design, variable-speed booster sets can satisfy the user demand by moderating the pump speed.

Considering also that variable-pressure sets are very sensitive to swings of pressure in the system, the use of expansion vessel allows the pressure to stabilize when requests are low or inexistent and avoids the pumps remaining in operation at minimum speed without stopping.

GHV SERIES
CHOICE AND SELECTION

When selecting the booster set the consumption figure of the system must be considered, which is generally supplied by the person who designed the system.
For systems where consumption varies continuously and suddenly over time it is advisable to install GHV series booster sets with variable regulation of the pump speed.

The calculation of the size of the booster set (its performance and the number of pumps) is based on the take-off point and therefore on the consumption value which takes the following factors into account:

- The value of the peak in consumption
- Efficiency
- NPSH
- Standby pumps
- Jockey pumps
- Expansion vessel

By adjusting their operation over time, variable-speed booster sets give the end user energy savings which can be calculated directly on the control board with a metering module fitted in the electric control panel.
This allows checking of the system yield, especially in complex systems with many users and many ranges of consumption.
It is possible to install a standby pump if it is necessary to have some kind of additional safety in the pump station. This is typical in systems of a certain importance, such as hospitals or factories, or in the field of crop irrigation.
If small users have to be served in the same system, it is preferable to install what is commonly called a jockey pump, where instead of running the main pump, which usually has higher power, the service is guaranteed with a smaller pump and therefore lower energy consumption.

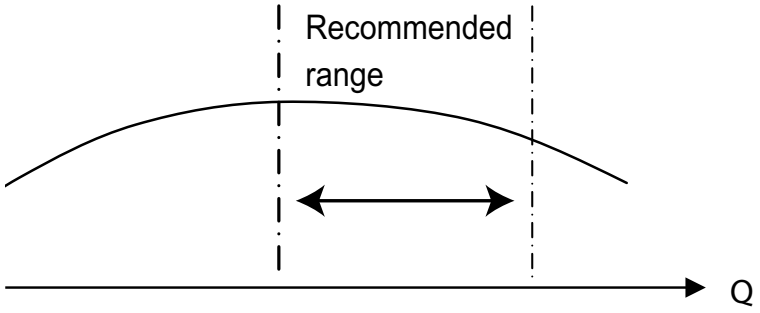
GHV series booster sets are equipped with an expansion vessel, with capacity 12lt PN16 or 24lt PN25.
For the sizes, see the specific chapter in this catalogue.
The expansion vessel avoids the risk of water hammer, which is harmful for both the system and the pumps.

Generally for systems with highly variable or sudden variations in consumption, it is recommended to install a booster set with variable pump speed, such as the GHV series, to guarantee constant pressure.

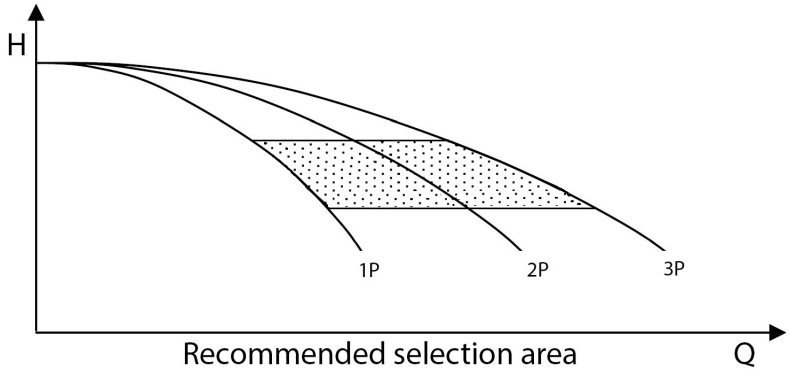
GHV SERIES
SELECTING THE PUMPS

What type of pump to choose?
Generally, the selection of pump is based on the maximum duty point of the system, which is usually the highest possible. The maximum request value is normally for short periods, so the pump must also be able to satisfy variable requests throughout its time in service.

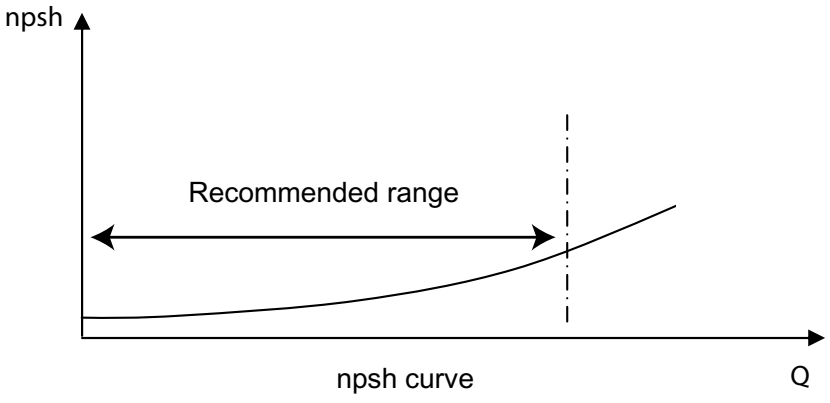
Generally the choice of the pump, based on the performance curve, should fall around the maximum efficiency point. The pump must ensure operation within its rated performance.
Since the unit is sized according to the maximum possible consumption, the maximum duty point of the pumps must be in the area on the right of the performance curve so that, if there is a fall in consumption, the efficiency remains high.



If we make a choice on the characteristic curve of the pump, we can see that the area where it is best to select the pump is represented by the following graph:



Another factor to be considered when choosing the pumps is its NPSH value. Never choose a pump where the maximum duty point is too far to the right of the NPSH curve.
This risks not having good pump suction, which may be aggravated by the type of installation (where negative suction is possible).
In these cases there is the risk of cavitation.
The NPSH of the pump must always be checked at the maximum flow rate requested.



GHV SERIES
HOW TO READ CURVES OF e-SV with hydrovar X+ Smart Controller

To exploit to the maximum potential of GHV BOOSTER SETS it's important to properly read working curves shown in the relevant charts.

(1) **Pump model**

Maximum speed curve (100%) for

(2) **1 pump** (3) **3 pumps**

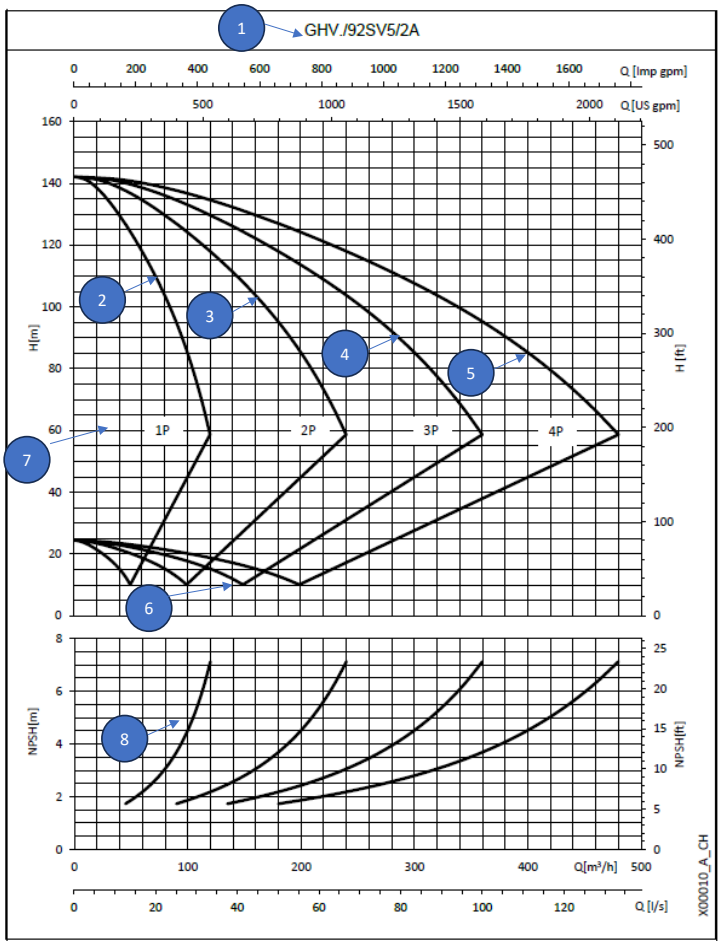
(4) **2 pumps** (5) **4 pumps**

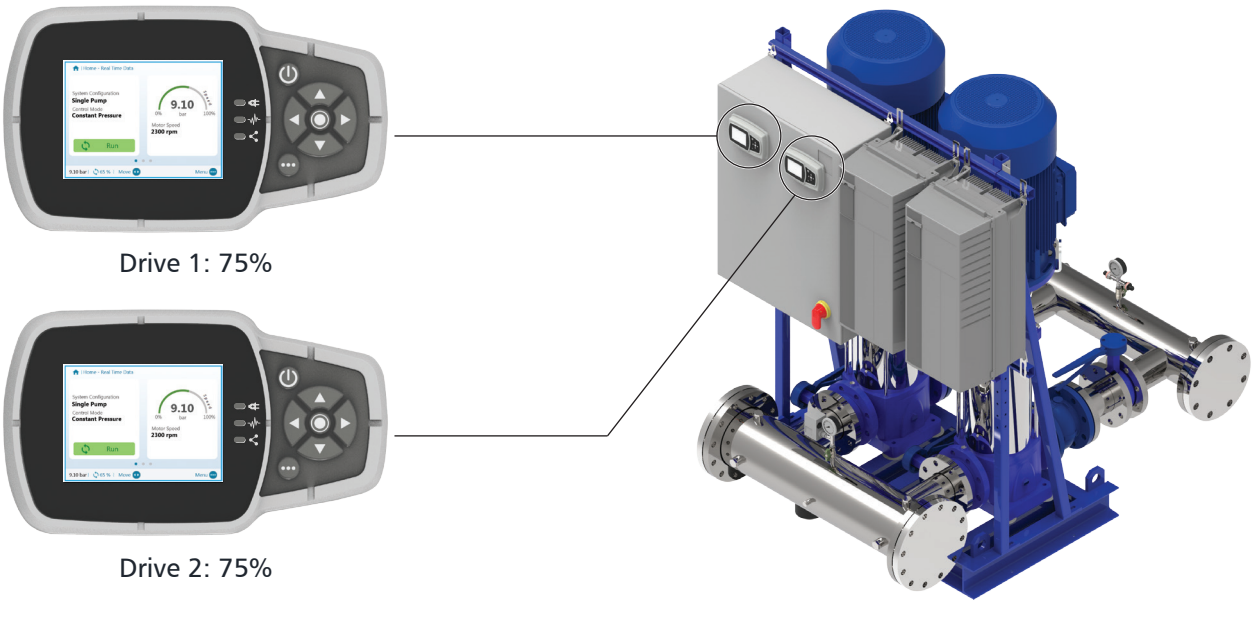
running equal to ~2900 rpm or pump running at nominal power.

(6) **Minimum speed curve (0%)**: it refers to the minimum rpm level the motor can work at, it's calculated depending on the model of pump maximizing the working area and allowing the highest system flexibility. Pumps run same speed.

(7) **The part load percentage** calculated depending on maximum speed (max, 100%) and minimum speed (min, equal to 0%, which coincides with the minimum load step under which the drive remains powered but cannot work). Pumps run same speed.

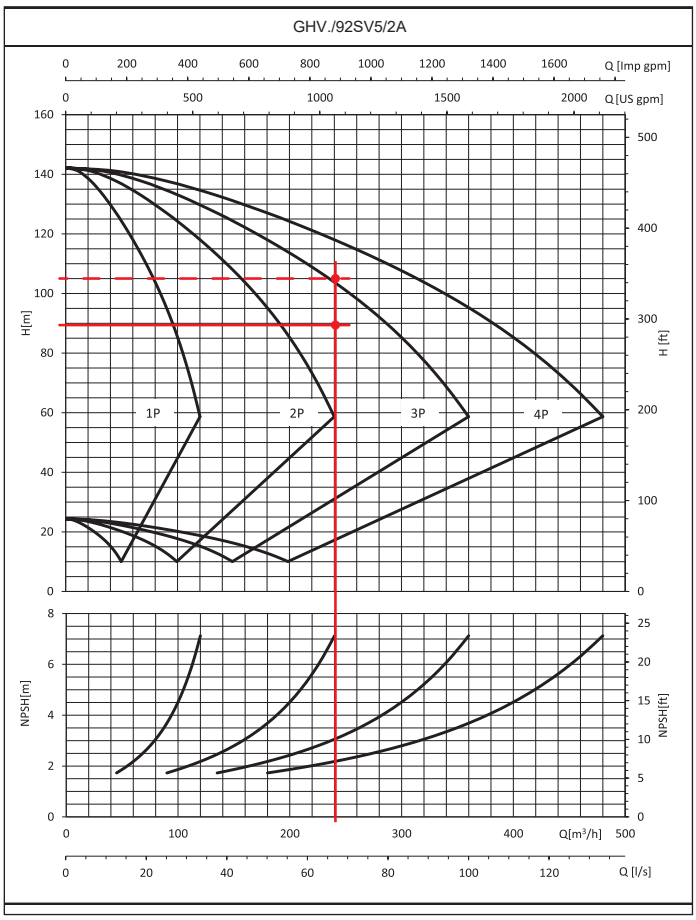
(8) **NPSH:** is the net positive suction head of pump+motor+drive system working at maximum speed.





GHV SERIES
SELECTING THE PUMPS

The choice of pump is therefore based on the characteristic curve of the pump depending on the flow rate and the pressure required for the system. Starting from the required flow rate, a vertical line is drawn until it meets the horizontal line of the required pressure. The point of intersection of the lines gives both the type and the number of pumps necessary for the system.



The example alongside refers to a required flow rate of 240 m³/h and a pressure of 90 m water column.

As shown in the operating curves on page 46, the selection requires three 92SV5/2A pumps.

Moreover the take-off point falls in the npsh area farthest to the left and therefore in an area with a low cavitation risk.

The values obtained are those for the performance of the pumps. A correct check of the net pressure value must be made due to the intrinsic load loss of the booster set and the conditions of installation. For this reason it is recommended to see the specific chapter in this catalogue.
The example considers all pumps in operation. For the selection of booster it is recommended that one pump is in stand by.

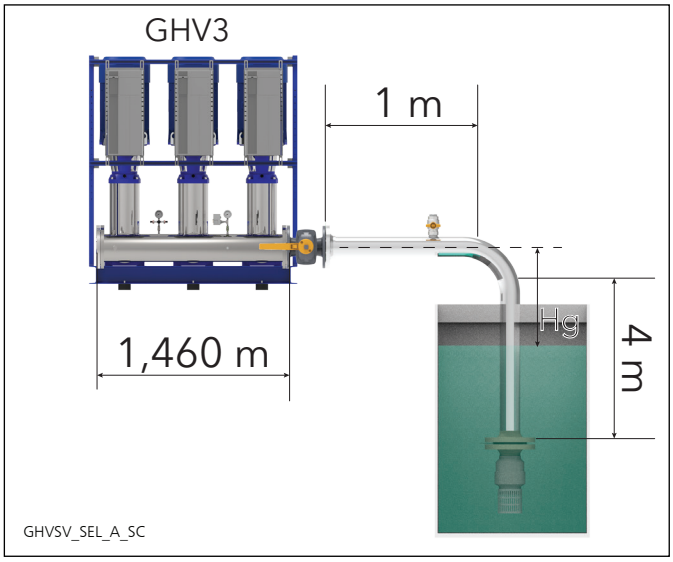
The inlet pressure of the booster or pump plus the pressure supply by pump must always be lower than the maximum operating pressure (PN) of the booster.

NPSH

The minimum operating values that can be reached by the pump suction are limited by the appearance of cavitation. Cavitation consists in the formation of steam pockets in the liquid when the local pressure reaches a critical value. A critical value is when the local pressure is equal or just below the pressure of the liquid steam.
Steam cavitation flows with the current. When it reaches a higher pressure area, condensation of the contained steam occurs. The pockets collide, causing pressure waves that are transmitted to the walls, which are therefore subjected to stress cycles that can cause deformation and then breaks due to fatigue.
This phenomena, characterized by a metallic noise due to the hammering of the walls, is called incipient cavitation. Cavitation damage can be made worse by electrochemical corrosion, and by local temperature increases due to the plastic deformation of the walls. The materials with the highest resistance to heat and corrosion are alloyed steels, and particularly austenitic steels. The conditions that cause cavitation can be predicted by calculating the total suction height, indicated in the technical literature with the acronym NPSH (Net Positive Suction Head).
The NPSH represents the total energy (in m) of the flow measured at the suction in incipient cavitation conditions, net of the steam pressure (in m) of the fluid at the input of the pump.

GHV SERIES
SUCTION CONDITIONS

Once the type and the number of pumps of the set have been identified, the suction conditions must also be assessment. Below is an example of the assessment of the suction lift installation conditions, in relation to the previously described case:



In suction lift installation, it is necessary to calculate the maximum Hg height - which must not be exceeded due to safety reasons -, to avoid cavitation, and therefore the unpriming of the pump itself.
The relation that must assessed, and which connects this value, is the following:

NPSH $_{available}$ ≥ NPSH $_{required}$, when the equality condition represents the limit condition.

NPSH $_{available}$ = Patm + Hg – ∑t – ∑a

Where:
Patm is the atmospheric pressure, equal to 10,33 m
Hg is the geodetic level difference
∑t are the pressure drops for suction components such as foot check valve, suction piping, curve, gate valve.
∑a are the pressure drops for suction set branch.

The NPSH requested is a parameter obtained from the performance curve; in our case, at the flow of each pump equal to 80 m³/h, it corresponds to 3.1 m (see page 46). Before calculating the NPSH $_{available}$, it is necessary to calculate the pressure drops at the suction, using the tables on pages 89-90 and taking into account the material, such as the type of stainless steel for the piping and cast iron for the valves.
The total sum of the pressure drops ∑t for suction components is made in the following way, considering that the diameter of the suction piping is DN200, equal to the diameter of the suction manifold of the set (page 35).

Calculation of suction drops ∑c for cast iron components
Equivalent piping length for DN200 foot check valve = 9.6 m
Equivalent piping length for DN200 gate valve = 0.9 m
Total equivalent length = 9.6 + 0.9 = 10.5 m
Pressure drops in the suction piping (cast iron) ∑c = 10.5 x 3.46/100 = 0,36 m

Calculation of suction drops ∑s for stainless steel components
Equivalent piping length for DN200 90° curve = 3.9 m
Total equivalent length = 3.9 m
Horizontal suction pipe length = 4 m
Vertical suction pipe length = 1 m
Pressure drops in the suction piping (stainless steel) ∑s = (3.9 + 4 + 1) x 3.46 x 0.54 / 100 = 0.16 m

Pressure drops for suction components ∑t = ∑c + ∑s = 0.36 + 0.16 = 0.52 m
The total sum of the pressure drops ∑t for suction components is made in the following way, considering that the diameter of the suction piping is DN200, equal to the diameter of the suction manifold of the set (page 35).
Hc pressure drops for suction set branch must be assessed on the B curve (page 70, scheme A0819_A_CH); at the flow value of each pump equal to 80 m³/h, a value of Hc = 0.25 m is obtained.
Calculation of suction drops ∑s for stainless steel components
Equivalent piping length for DN200 manifold T fitting = 7.5 m
Suction manifold length = 1.46 m
Pressure drops in the suction manifold (steel) ∑t = (7.5 + 1.46) x 3.46 x 0.54 / 100 = 0.17 m
Pressure drops ∑a = Hc + ∑s = 0.25 + 0.17 = 0.42 m

Remembering that NPSH $_{available}$ = Patm + Hg - ∑t – ∑a and that NPSH $_{available}$ ≥ NPSH $_{requested}$ we have that Patm + Hg - ∑t - ∑a must be ≥ NPSH $_{requested}$.
Substituting the values we get that 10.33 + Hg - 0.52 – 0.42 ≥ 3.1 m (NPSH $_{requested}$),
Hg = 3.1 + 0.52 + 0.42 – 10.33 = - 6.3 m, it represents the limit condition for which
NPSH $_{available}$ = NPSH $_{requested}$

Therefore, in order to guarantee the conditions for the correct operation of the system as far as cavitation risks, it will be necessary to position the pump above the water level, so that the Hg height is below the limit value of 6.3 m.

GHV SERIES
NET PRESSURE CALCULATION

When selecting GHV booster sets, the performance levels of the pump must be taken into account.
Performance levels are obtained from the characteristic curves of the pumps, and do not take into account any pressure drops due to system piping and valves. The following example helps the customer to obtain the correct delivery manifold pressure value: by knowing the system operating point Q = 240 m^3/h and H = 90 mca (P requested),and the installation height Hg (estimated to 5 m), in order to make the calculations easier we use the pressure drop curves for each single pump on pages 89-90. Assuming that a booster set GHV3/92SV5/2AG with non-return valves on the delivery has been selected, we proceed as follows:

P net available ≥ P requested, when the equality condition represents the limit condition.

P net available = H – (Hg + ∑t + ∑a + ∑m)
Where:
H head value of booster set
Hg is the geodetic level difference (estimated to 5 m)
∑t are the pressure drops for suction components such as foot check valve, suction piping, curve and gate valve.
∑a are the pressure drops for suction set branch
∑m are the pressure drops for delivery set branch

The total sum of the pressure drops ∑t for suction components is made in the following way, considering that the diameter of the suction piping is DN200, equal to the diameter of the suction manifold of the set (page 35).

Calculation of suction drops ∑c for cast iron components
Equivalent piping length for DN200 foot check valve = 9.6 m
Equivalent piping length for DN200 gate valve = 0.9 m
Total equivalent length = 9.6 + 0.9 = 10.5 m
Pressure drops in the suction piping (cast iron)
Σc = 10.5 x 3.46 /100 = 0.36 m

Calculation of suction drops ∑s for stainless steel components
Equivalent piping length for DN200 90° curve = 3.9 m
Total equivalent length = 3.9 m
Horizontal suction pipe length = 4 m
Vertical suction pipe length = 1 m
Pressure drops in the suction piping (stainless steel) ∑s = (3.9 + 4 + 1) x 3.46 x 0.54 / 100 = 0.16 m

Pressure drops for suction components ∑t = ∑c + ∑s = 0.36 + 0.16 = 0.52 m
The total sum of the pressure drops ∑t for suction components is made in the following way, considering that the diameter of the suction piping is DN200, equal to the diameter of the suction manifold of the set (page 35).
Hc pressure drops for suction set branch must be assessed on the B curve (page 70, scheme A0819_A_CH); at the flow value of each pump equal to 80 m^3/h, a value of Hc = 0.25 m is obtained.

Calculation of suction drops ∑s for stainless steel components
Equivalent piping length for DN200 manifold T fitting = 7.5 m
Suction manifold length = 1.46 m
Pressure drops in the suction manifold (steel) ∑t = (7.5 + 1.46) x 3.46 x 0.54 / 100 = 0.17 m
Pressure drops ∑a = Hc + ∑s = 0.25 + 0.17 = 0.42
The total sum of the pressure drops ∑m for delivery branch is made in the following way, considering that the diameter of the delivery manifold is DN200, equal to the diameter of the delivery manifold of the set (page 35).
Hc pressure drops for delivery set branch must be assessed on the A curve (page 70, scheme A0819_A_CH); at the flow value of each pump equal to 80 m^3/h, a value of Hc = 0.65 m is obtained.

Calculation of delivery drops ∑s for stainless steel components
Equivalent piping length for DN200 manifold TEE fitting = 7.5 m
Delivery manifold length = 1.46 m
Pressure drops in the delivery manifold (steel) ∑s = (7.5 + 1.46) x 3.46 x 0.54 / 100 = 0.17 m

Pressure drops in delivery manifold ∑m = Hc + ∑s = 0.65 + 0.17 = 0.82 m
If we analyze the performance of the set at the flow value of 240 m^3/h, the head value H is 109.4 m.
The net pressure at the delivery manifold will be P net available= H – (Hg + ∑t + ∑a + ∑m)
Substituting the values we get that P net available = 109.4 – (5 + 0.52 + 0.42 + 0.82) = 102.6 m
When comparing this value with the design value (not taking into account the dynamic energy)
we see that 102.6 m > 90 m [P net available > P Required]

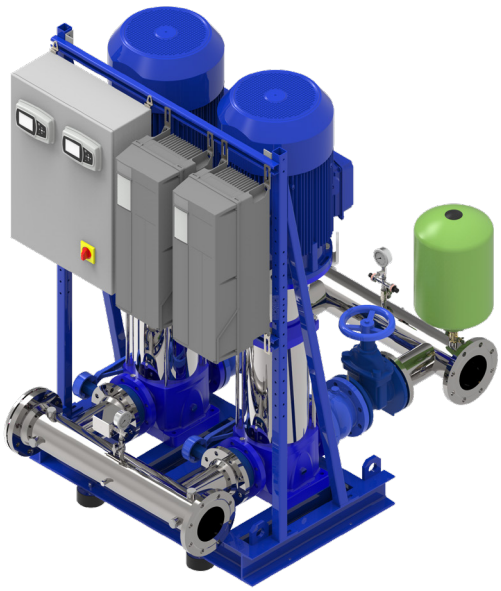
The set is therefore capable of meeting system requirements with three pumps run.

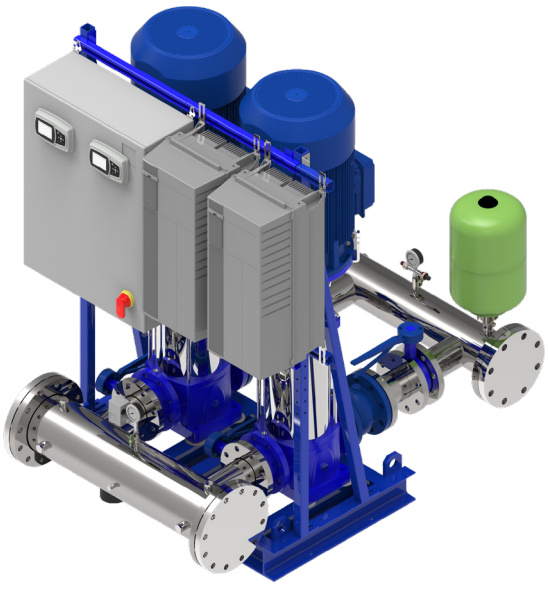
GHV.../SV Series

Variable speed booster sets
with e-SV™ series multistage vertical electric pumps
controlled by the hydrovar X+ Smart Controller system

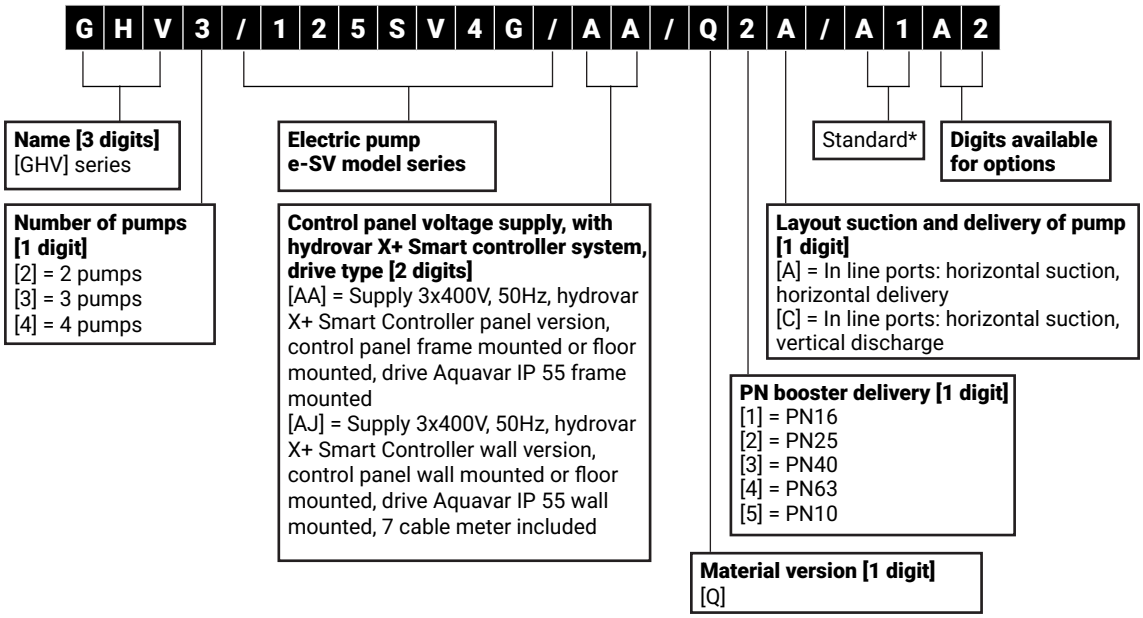
Flow rate up to 640 m^3/h and pressure up to 25 bar

50 Hz





GHV SERIES
IDENTIFICATION CODE



(*) A1 = minimum pressure switch and pressure gauge on suction manifold

MATERIAL VERSIONS

For material details see page 21.

OPTIONS

[A2] High pressure switch mounted on delivery manifold
[A5] Non return valves mounted on suction side
[A6] Without suction manifold (suction valves are mounted)
[C0] All electric pumps certified 1A (Factory test reports issued by the end of assembly line; it includes QH curve)
[C3] Booster set with only one electric pump certified 1B (Test report issued by Audit Test Lab; it includes QH curve, effiency and power)
[F5] Control panel with phase sequence, phase loss, over- and undervoltage and phase unbalance

GHV SERIES
with hydrovar X+ Smart Controller

Background and context

Xylem is a leading global water technology company committed to solving critical water and infrastructure challenges with innovation.
By providing smart and cutting-edge technology, we are reducing energy consumption to minimum possible levels and increasing sustainability.
There is one thing that Xylem shares with the greatest engineering innovators, that's the continuous investment into new products that reflects into outstanding solutions.
You can find all these features in hydrovar X+ Smart Controller, the answer to innovation, sustainability and easiness all-in-one.

hydrovar X+ Smart Controller combined with the frequency converter also offers the best efficiency performance. Xylem offers the highest control capabilities based on decades of experience and expertise in pumping solutions.
This is the perfect combination of motors, variable speed drive, and pump that guarantees excellent performance, maximum savings, and a rapid return on investment.

Ease of use and commissioning

The built-in application software makes it the easiest drive to commission, program and operate, enabling virtually any configuration of pumps. Backward compatibility assures the hydrovar X+ Smart Controller will work seamlessly with existing systems.

Pumping solution

Integrated pump functions provide protection for the pump solution and improve the quality of energy from the grid.
All of this means terrific energy savings from a compact, easy-to-use solution suited for nearly any application.

Application sectors

- Industrial installations
- Air conditioning
- Water supply systems in residential buildings
- Water treatment plants

hydrovar X+ Smart Controller

- Available in two installation types: control panel or wall-mounted.
- 24 V +/- 10% continuous power supply or Single-phase power supply from 115 to 240 V +/-10%, 50/60 Hz.
- IP 66 protection class, wall-mounted version
- IP 66 protection class, front panel control panel version
- Ambient temperature: -20°C to +50°C without performance penalty.
- Up to 8 hydrovar X+ Smart Controller units in parallel.
- As standard BacNet MS/TP, ModBus RTU, selectable

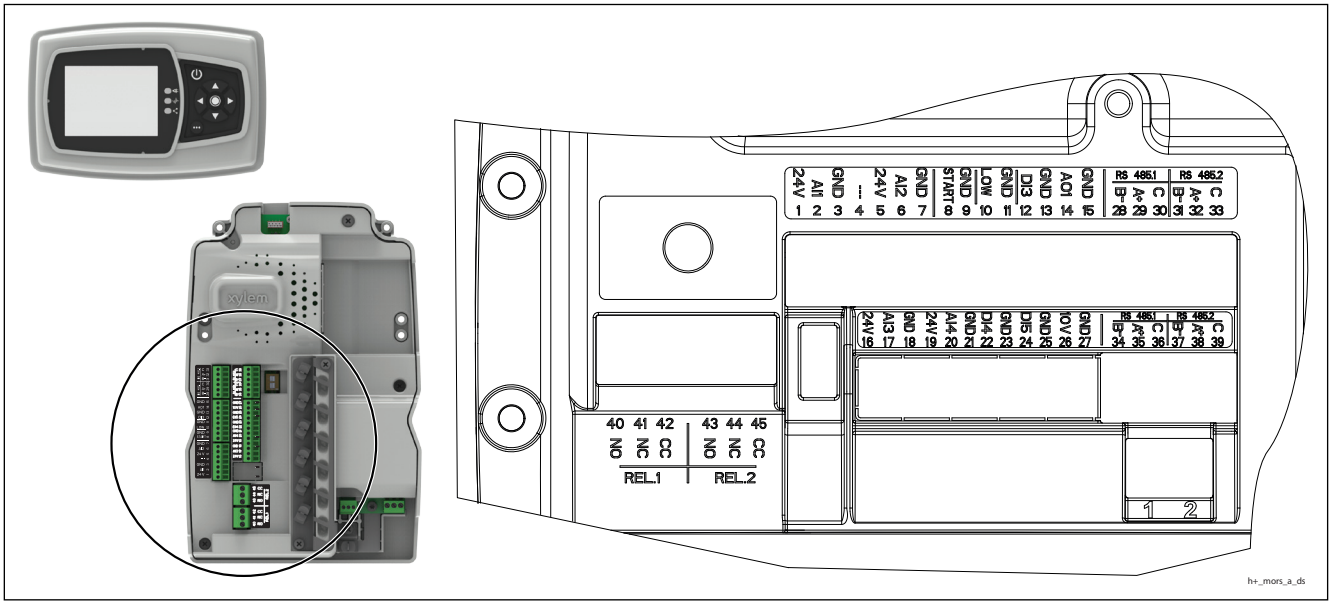
Control panel version, PM



Wall version, WM



TERMINAL BLOCK
hydrovar X+ Smart Controller



REF.	ITEM	DESCRIPTION	DEFAULT
1	Analog Input 1	Power supply +24 VDC, max. 60mA (total, terminals 1 + 5)	Pressure Sensor 1
2		Configurable Analog Input 1	
3		Electronic GND	
4	Not used	Internal use - Do not connect	
5	Analog Input 2	Power supply +24 VDC, max. 60mA (total, terminals 1 + 5)	Not used
6		Configurable Analog Input 2	
7		Electronic GND	
8	External Start/Stop	Start/Stop digital input, +24 VDC internal pull-up, 6mA contact current	-
9		Electronic GND	
10	External Lack of Water	Low water digital input, +24 VDC internal pull-up, 6mA contact current	-
11		Electronic GND	
12	Digital Input 3	Configurable Digital Input 3, +24 VDC internal pull-up, 6mA contact current	Solo Run
13		Electronic GND	
14	Analog Output	Configurable Analog Output	Motor Speed
15		Electronic GND	
16	Analog Input 3	Power supply +24 VDC, max. 60mA (total, terminals 16 and 19)	Not used
17		Configurable Analog Input 3	
18		Electronic GND	
19	Analog Input 4	Power supply +24 VDC, max. 60mA (total, terminals 16 and 19)	Not used
20		Configurable Analog Input 4	
21		Electronic GND	
22	Digital Input 4	Configurable Digital Input 4, +24 VDC internal pull-up, 6mA contact current	External VFD error
23		Electronic GND	
24	Digital Input 5	Configurable Digital Input 5, +24 VDC internal pull-up, 6mA contact current	Not used
25		Electronic GND	
26	10 VDC supply	Power supply +10 VDC, max. 3mA	-
27		Electronic GND	
28	Communication bus 1	RS485 port 1: RS485-1B N (-)	Multipump
29		RS485 port 1: RS485-1A P (+)	
30		RS485 port 1: RS485-COM	
31	Communication bus 2	RS485 port 2: RS485-2B N (-)	Modbus
32		RS485 port 2: RS485-2A P (+)	
33		RS485 port 2: RS485-COM	
34	Communication bus 1	RS485 port 1: RS485-1B N (-)	Multipump
35		RS485 port 1: RS485-1A P (+)	
36		RS485 port 1: RS485-COM	
37	Communication bus 2	RS485 port 2: RS485-2B N (-)	Modbus
38		RS485 port 2: RS485-2A P (+)	
39		RS485 port 2: RS485-COM	
40	Relay 1	Configurable relay 1: Normally Open	Running
41		Configurable relay 1: Normally Closed	
42		Configurable relay 1: Common Contact	
43	Relay 2	Configurable relay 2: Normally Open	Error
44		Configurable relay 2: Normally Closed	
45		Configurable relay 2: Common Contact	

h+_mors-en_a_sc

33, 46, 66, 92, 125SV SERIES GENERAL CHARACTERISTICS

- Version **G:** Multistage vertical centrifugal electric pump with impellers, diffusers and outer jacket fully made of stainless steel; superior cast iron pump body and head.
  Round flanges, in-line delivery and suction ports.
- Further choice possibilities among the following versions:
  - **N, P:** fully made of AISI 316 stainless steel.
- In pumps with higher heads, the axial load compensation system allows a reduction of axial thrusts, and therefore the use of **normalized standard motors**, easy to find on the market.
- **Balanced mechanical seal** according to EN 12756 (formerly DIN 24960) and ISO 3069, **easy to replace without removing the pump motor**.
- Seal housing designed to avoid air accumulation inside the critical area adjoining the mechanical seal.
- Pump body supplied with the necessary attachments for a pressure gauge on the flanges, both on the suction and the delivery side.
- Mechanical strength and easy maintenance. No special tools required for assembly or disassembly.

G and N pumps are certified for use with drinking water (WRAS, ACS and D.M.174).

For complete information see dedicated e-SV technical catalogue.

GHV2, GHV3, GHV4 SERIES MAIN COMPONENTS

- **Main shut-off valves** installed on the suction and discharge sides of each pump: ball-type valves up to and including 2”. For larger diameters, butterfly-type valves to be installed between flanges. Other types may be used depending on the booster set version.
- **Check valve** on the discharge side of each pump: spring-type up to and including 2”. Axial-guided type for larger sizes, from DN65 to DN125. Other types may be used depending on the booster set version.
- **Suction manifold** with threaded or flanged ends depending on the booster set type (see drawings). Threaded connection for water filling during booster priming. One minimum pressure switch is installed on suction manifold (A1 sign in description of booster as per standard).
- **Discharge manifold** with threaded or flanged ends depending on the booster set type (see drawings). Includes Rp3/4” threaded connections with caps for the possible installation of expansion vessel kits.
- **Pressure gauge and control transmitter** installed on the discharge manifold of the booster set.
- **Pressure tank** 12 l PN16 or 24l PN25 depending on the pump model, including a special isolation device or ball valve.
- **Electrical control panel.**
- **Various connection fittings.**
- **Support base** for the pump set and bracket for the control panel.
- **Anti-vibration feet** sized according to the booster set. In some models, installation is carried out by the customer.

Accessories on request:

- **Devices for protection against dry running** in one of the following versions:
  - float switch
  - pack of electronic module and probe electrodes
  - minimum pressure switch
- **Expansion vessel kit** includes: expansion vessel with membrane and isolation device for maintenance.
  Available models with device to prevent water stagnation:
  - Hydrotube kit 25 l 10 bar
  - Hydrotube kit 12 l 16 bar

  Available models with shut-off valve:
  - Hydrotube kit 24 l 16 bar
  - Hydrotube kit 24 l 25 bar
- **Expansion vessel**
  Membrane expansion vessel available in the following models:
  - 300 l, 25 bar hydro tube kit
  - 400 l, 25 bar hydro tube kit
  - 600 l, 25 bar hydro tube kit

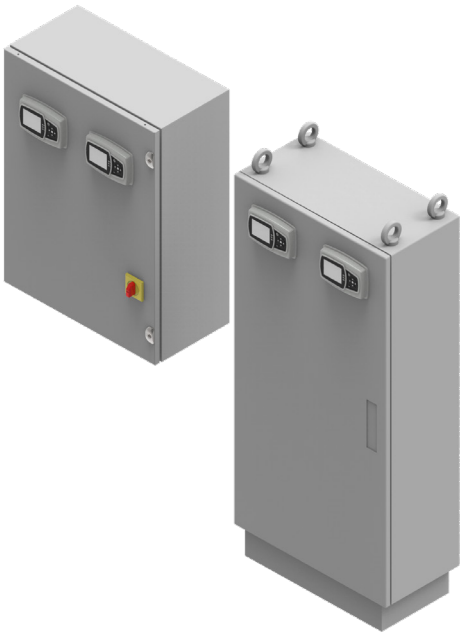
SPECIAL EQUIPMENT ON REQUEST (Contact the Sales and Technical Assistance Service)

- Sets with special valves.
- Sets with 5 to 8 electric pumps.
- Sets with jockey pump.

GHV...SERIES
CONTROL PANEL

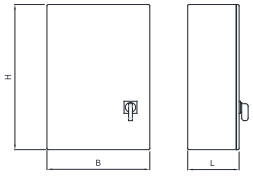
Electrical control and protection panel for Aquavar electric pumps with frequency converter and hydrovar X+ Smart Controller control system:

- Three-phase power supply 3x400 V +/-10%, 50/60 Hz. Metal enclosure with IP55 protection.
- Case or cabinet type depending on the number and power of electric pumps.

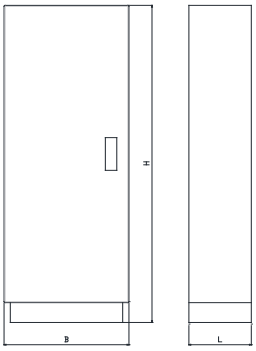


Main features:

- hydrovar X+ Smart Controller for each frequency converter.
- Automatic circuit breaker with thermal magnetic protection for each frequency converter.
- Standard with “dry” contacts for signaling: pump running or faulty.
- Standard with electronic relay module for dry-running protection, which intervenes when the water reserve drops below the minimum level guaranteed for suction.
  Level control can be performed via a float switch, minimum pressure switch, generic external contact, or three level probes.
- Ready for activation via external contact.
- Ready for installation of the Xylem CCD401 module.



TIPO 1



TIPO 2

MODEL	POWER N PUMPS X (kW)	SUPPLY	TYPE CASE	IP	DIMENSIONS (mm) B	H	L
QHV2	2 x 30	3x400	1	55	600	800	250
QHV2	2 x (37 ÷ 55)	3x400	1	55	600	800	250
QHV3	3 x 30	3x400	1	55	600	900	250
QHV3	3 x (37 ÷ 55)	3x400	2	55 *	600	1700	300
QHV4	4 x 30	3x400	2	55 *	800	1700	300
QHV4	4 x (37 ÷ 55)	3x400	2	55 *	800	1700	300

* Customer is responsible for ensuring IP rating

qhv_sc-en_b_td

GHV...SERIES
MATERIAL TABLE FOR SETS PUMPS, 33-46-66-92-125SV

DENOMINAZIONE	G... ../Q.. (STANDARD)
Pump flange	G
Manifolds	AISI 304
Slinding, blind, weld flange	AISI 304
On-off valves, threaded	AISI 316
On-off valves, flanged -Body -Disc PN16 -Disc PN25	 -Cast iron -Cast iron, EPDM -Cast iron, epoxy
Non-return valves - Body - Shutter PN16 -Shutter PN25	 -Cast iron -Bronze DN65, Cast iron Epoxy -Bronze
Pressure switches	Galvanized steel / AISI 304
Pressure transmitters	AISI 304
Pressure gauge -Water connection -Cover -Fluid	 -Brass -AISI 304 - Glycole
Vacuum pressure gauge -Water connection -Cover -Fluid	 -AISI 316 -AISI 304 - Glycole
Caps, plugs	AISI 316
Fittings	AISI 316
Bracket	Painted steel
Base	Painted steel
Miscellaneus	AISI 316

g_dach_ghv-sc_33-125sv-en_a_tm

GHV...SERIES
WORKING LIMITS

The input pressure of the pump, added to the pressure with the port shut off, must not exceed the maximum permitted operating pressure (PN) of the set.

Permitted liquids	Water without gases and corrosive and/or aggressive substances.
Fluid temperature	5°C to + 60 °C
Ambient temperature	5°C to + 40 °C
Maximum operating pressure*	Max 25 bar
Minimum input pressure	In line with the NPSH curve and the losses, with a margin of at least 0,5 m
Maximum input pressure	The input pressure added to the pump pressure without flow must be lower than the maximum operating pressure of the set.
Installation	Internal environment protected from atmospheric agents. Away from heat sources. Max altitude 1000 a.s.l. Max humidity 50%, without condensation.

* Higher PN available on request depending on pump type

ghv_sc_2p_cn-en_b_ti

e-SV SERIES
PUMPS (ErP 2009/125/EC)

With the **Regulation (EU) N. 547/2012**, the European Commission has established the requirements of ecodesign for some typologies of pumps used for pumping clean water, placed on the market and operated as stand-alone units or as parts of other products.

For vertical multi-stage pumps (MS-V for the Regulations), the requirements refers to:
• just the pump and not the pump and motor assembly (electric or combustion);
• pumps with:
- a nominal pressure PN not higher than 25 bar (2500 kPa);
- a speed of 2900 min^{-1} (for electric pumps this means 50 Hz 2-pole electric motors);
- a maximum flow of 100 m^3/h;

• use with clean water at a temperature ranging from -10°C to 120°C (the test is performed with cold water at a temperature not higher than 40°C).

This regulation states that water pumps shall have index MEI coming from a dedicated formula which considers hydraulic efficiency values at 'best efficiency point' (BEP), 75 % of the flow at BEP (Part load – PL) and 110 % of the flow at BEP (Over load – OL).

The Regulation also establishes the following deadline:

from	minimum efficiency index (MEI)
1st January 2015	MEI ≥ 0,4

Regulation (EU) n. 547/2012 – Annex II – point 2 (Product information requirements)

1) Minimum efficiency index: see the MEI column in the tables in the Hydraulic performance section.
2) The benchmark for most efficient water pumps is MEI ≥ 0,70.
3) Year of manufacture: see date on rating plate (≥ 2013).
4) Manufacturer: Xylem Service Italia Srl - Reg. No 07520560967 - Montecchio Maggiore, Vicenza, Italy.
5) Product type: see the PUMP TYPE column in the tables in the Hydraulic performance section.
6) Hydraulic pump efficiency with trimmed impeller: not applicable to these products.
7) Pump performance curves, including the performance curve: see the Operating Characteristics graphs in the following pages.
8) The efficiency of a pump with a trimmed impeller is usually lower than that of a pump with the full impeller diameter. The trimming of the impeller will adapt the pump to a fixed duty point, leading to reduced energy consumption. The minimum efficiency index (MEI) is based on the full impeller diameter.
9) The operation of this water pump with variable duty points may be more efficient and economic when controlled, for example, by the use of a variable speed drive that matches the pump duty to the system.
10) Information relevant for disassembly, recycling or disposal at end-of-life: observe the current laws and by-laws governing sorted waste disposal. Consult the product operating manual.
11) "Designed for use below – 10 °C only": note not applicable to these products.
12) "Designed for use above 120 °C only": note not applicable to these products.
13) Specific instructions for pumps as per points 11 and 12: not applicable to these products.
14) "Information on benchmark efficiency is available at": www.europump.org (Ecodesign section).
15) The benchmark efficiency graphs with MEI = 0.7 and MEI = 0.4 are available at www.europump.org, (Ecodesign, Efficiency charts). Refer to "Multistage Vertical 2900 rpm"

GHV2/33-125SV SERIES
TABLE OF HYDRAULIC PERFORMANCE

PUMP TYPE	RATED POWER	MEI ≥	Q = DELIVERY										
			l/min 0	200,0	400,0	600,0	800,0	1000,0	1200,0	1333,3	1533,3	1733,3	2000,0
			m3/h 0	12,0	24,0	36,0	48,0	60,0	72,0	80,0	92,0	104,0	120,0
	kW	(1)	H = TOTAL HEAD METRES COLUMN OF WATER										
33SV10	2 X 30	0,70	228,4	225,7	222,3	216,7	207,4	192,8	171,1	152,1			
46SV7	2 X 30	0,70	178,8	175,4	172,5	169,5	165,6	160,4	153,3	147,2	135,5	120,3	93,6
46SV8	2 X 30	0,70	202,8	199,1	196,0	192,7	188,4	182,6	174,5	167,5	154,1	136,7	105,8
46SV9	2 X 37	0,70	228,1	224,0	220,5	216,7	212,0	205,4	196,3	188,5	173,4	153,7	119,0

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A) 1p_33-46sv_sc-2p50-en_b_th

The table refers to performance with 2 pumps running.

(1) Value referred to the G and N versions with PN ≤ 16 bar (1600 kPa). P version is excluded.

PUMP TYPE	RATED POWER	MEI ≥	Q = DELIVERY										
			l/min 0	400,0	800,0	1200,0	1600,0	2000,0	2400,0	2833,3	3233,3	3633,3	4000,0
			m3/h 0	24,0	48,0	72,0	96,0	120,0	144,0	170,0	194,0	218,0	240,0
	kW	(1)	H = TOTAL HEAD METRES COLUMN OF WATER										
66SV5	2 X 30	0,70	144,51	141,6	137,2	131,5	124,1	114,5	101,8	83,3			
66SV6/1A	2 X 30	0,70	167,30	163,8	158,5	151,5	142,5	130,6	114,6	91,0			
66SV7/1A	2 X 37	0,70	196,20	192,1	185,9	177,8	167,3	153,5	135,0	107,6			
66SV8	2 X 45	0,70	231,22	226,5	219,5	210,3	198,5	183,1	162,8	133,2			
92SV4	2 X 30	0,60	127,03	126,1	122,1	116,4	109,8	102,8	95,7	87,6	79,2	69,2	57,6
92SV5/2A	2 X 37	0,60	142,20	140,9	137,2	131,8	125,3	118,0	109,9	99,7	88,5	74,6	58,6
92SV5	2 X 37	0,60	158,78	157,6	152,7	145,5	137,2	128,5	119,6	109,5	99,1	86,5	71,9
92SV6	2 X 45	0,60	190,97	188,8	182,6	174,0	164,2	153,8	143,1	130,9	118,2	103,1	85,7

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A) 2p_66sv-92_sc-2p50-en_b_th

The table refers to performance with 2 pumps running.

(1) Value referred to the G and N versions with PN ≤ 16 bar (1600 kPa). P version is excluded.

PUMP TYPE	RATED POWER	MEI ≥	Q = DELIVERY										
			l/min 0	533,3	1066,7	1600,0	2133,3	2666,7	3200,0	2833,3	3366,7	3900,0	5333,3
			m3/h 0	32,0	64,0	96,0	128,0	160,0	192,0	170,0	202,0	234,0	320,0
	kW	(1)	H = TOTAL HEAD METRES COLUMN OF WATER										
125SV4	2 X 30	-	107,6	101,9	96,9	92,2	87,5	82,4	76,6	80,7	74,6	67,3	39,2
125SV5	2 X 37	-	134,5	127,4	121,1	115,3	109,4	103,0	95,8	100,9	93,3	84,2	49,0
125SV6	2 X 45	-	153,4	145,1	137,9	131,2	124,4	116,9	108,4	114,4	105,4	94,4	51,3
125SV7	2 X 55	-	179,0	169,3	160,9	153,0	145,1	136,4	126,4	133,5	122,9	110,1	59,8
125SV8/2A	2 X 55	-	201,1	190,2	180,8	171,9	163,0	153,3	142,0	150,0	138,1	123,7	67,2

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A) 2p_125sv_sc-2p50-en_b_th

The table refers to performance with 2 pumps running.

(1) Value referred to the G and N versions with PN ≤ 16 bar (1600 kPa). P version is excluded.

GHV3/33-125SV SERIES
TABLE OF HYDRAULIC PERFORMANCE

PUMP TYPE	RATED POWER	MEI ≥	Q = DELIVERY										
			l/min 0	300,0	600,0	900,0	1200,0	1500,0	1800,0	2000,0	2300,0	2600,0	3000,0
			m3/h 0	18,0	36,0	54,0	72,0	90,0	108,0	120,0	138,0	156,0	180,0
	kW	(1)	H = TOTAL HEAD METRES COLUMN OF WATER										
33SV10	3 X 30	0,70	228,4	225,7	222,3	216,7	207,4	192,8	171,1	152,1			
46SV7	3 X 30	0,70	178,8	175,4	172,5	169,5	165,6	160,4	153,3	147,2	135,5	120,3	93,6
46SV8	3 X 30	0,70	202,8	199,1	196,0	192,7	188,4	182,6	174,5	167,5	154,1	136,7	105,8
46SV9	3 X 37	0,70	228,1	224,0	220,5	216,7	212,0	205,4	196,3	188,5	173,4	153,7	119,0

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A) 3p_33-46sv_sc-2p50-en_b_th

The table refers to performance with 3 pumps running.

(1) Value referred to the G and N versions with PN ≤ 16 bar (1600 kPa). P version is excluded.

PUMP TYPE	RATED POWER	MEI ≥	Q = DELIVERY										
			l/min 0	600,0	1200,0	1800,0	2400,0	3000,0	3600,0	4250,0	4850,0	5450,0	6000,0
			m3/h 0	36,0	72,0	108,0	144,0	180,0	216,0	255,0	291,0	327,0	360,0
	kW	(1)	H = TOTAL HEAD METRES COLUMN OF WATER										
66SV5	3 X 30	0,70	144,51	141,6	137,2	131,5	124,1	114,5	101,8	83,3			
66SV6/1A	3 X 30	0,70	167,30	163,8	158,5	151,5	142,5	130,6	114,6	91,0			
66SV7/1A	3 X 37	0,70	196,20	192,1	185,9	177,8	167,3	153,5	135,0	107,6			
66SV8	3 X 45	0,70	231,22	226,5	219,5	210,3	198,5	183,1	162,8	133,2			
92SV4	3 X 30	0,60	127,03	126,1	122,1	116,4	109,8	102,8	95,7	87,6	79,2	69,2	57,6
92SV5/2A	3 X 37	0,60	142,20	140,9	137,2	131,8	125,3	118,0	109,9	99,7	88,5	74,6	58,6
92SV5	3 X 37	0,60	158,78	157,6	152,7	145,5	137,2	128,5	119,6	109,5	99,1	86,5	71,9
92SV6	3 X 45	0,60	190,97	188,8	182,6	174,0	164,2	153,8	143,1	130,9	118,2	103,1	85,7

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A) 3p_66sv-92_sc-2p50-en_b_th

The table refers to performance with 3 pumpS running.

(1) Value referred to the G and N versions with PN ≤ 16 bar (1600 kPa). P version is excluded.

PUMP TYPE	RATED POWER	MEI ≥	Q = DELIVERY										
			l/min 0	800,0	1600,0	2400,0	3200,0	4000,0	4800,0	4250,0	5050,0	5850,0	8000,0
			m3/h 0	48,0	96,0	144,0	192,0	240,0	288,0	255,0	303,0	351,0	480,0
	kW	(1)	H = TOTAL HEAD METRES COLUMN OF WATER										
125SV4	3 X 30	-	107,6	101,9	96,9	92,2	87,5	82,4	76,6	80,7	74,6	67,3	39,2
125SV5	3 X 37	-	134,5	127,4	121,1	115,3	109,4	103,0	95,8	100,9	93,3	84,2	49,0
125SV6	3 X 45	-	153,4	145,1	137,9	131,2	124,4	116,9	108,4	114,4	105,4	94,4	51,3
125SV7	3 X 55	-	179,0	169,3	160,9	153,0	145,1	136,4	126,4	133,5	122,9	110,1	59,8
125SV8/2A	3 X 55	-	201,1	190,2	180,8	171,9	163,0	153,3	142,0	150,0	138,1	123,7	67,2

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A) 3p_125sv_sc-2p50-en_b_th

The table refers to performance with 3 pumps running.

(1) Value referred to the G and N versions with PN ≤ 16 bar (1600 kPa). P version is excluded.

GHV4/33-125SV SERIES
TABLE OF HYDRAULIC PERFORMANCE

PUMP TYPE	RATED POWER	MEI ≥	Q = DELIVERY										
			l/min 0	400,0	800,0	1200,0	1600,0	2000,0	2400,0	2666,7	3066,7	3466,7	4000,0
			m3/h 0	24,0	48,0	72,0	96,0	120,0	144,0	160,0	184,0	208,0	240,0
	kW	(1)	H = TOTAL HEAD METRES COLUMN OF WATER										
33SV10	4 X 30	0,70	228,4	225,7	222,3	216,7	207,4	192,8	171,1	152,1			
46SV7	4 X 30	0,70	178,8	175,4	172,5	169,5	165,6	160,4	153,3	147,2	135,5	120,3	93,6
46SV8	4 X 30	0,70	202,8	199,1	196,0	192,7	188,4	182,6	174,5	167,5	154,1	136,7	105,8
46SV9	4 X 37	0,70	228,1	224,0	220,5	216,7	212,0	205,4	196,3	188,5	173,4	153,7	119,0

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A) 4p_33-46sv_sc-2p50-en_b_th

The table refers to performance with 4 pumps running.

(1) Value referred to the G and N versions with PN ≤ 16 bar (1600 kPa). P version is excluded.

PUMP TYPE	RATED POWER	MEI ≥	Q = DELIVERY										
			l/min 0	800,0	1600,0	2400,0	3200,0	4000,0	4800,0	5666,7	6466,7	7266,7	8000,0
			m3/h 0	48,0	96,0	144,0	192,0	240,0	288,0	340,0	388,0	436,0	480,0
	kW	(1)	H = TOTAL HEAD METRES COLUMN OF WATER										
66SV5	4 X 30	0,70	144,51	141,6	137,2	131,5	124,1	114,5	101,8	83,3			
66SV6/1A	4 X 30	0,70	167,30	163,8	158,5	151,5	142,5	130,6	114,6	91,0			
66SV7/1A	4 X 37	0,70	196,20	192,1	185,9	177,8	167,3	153,5	135,0	107,6			
66SV8	4 X 45	0,70	231,22	226,5	219,5	210,3	198,5	183,1	162,8	133,2			
92SV4	4 X 30	0,60	127,03	126,1	122,1	116,4	109,8	102,8	95,7	87,6	79,2	69,2	57,6
92SV5/2A	4 X 37	0,60	142,20	140,9	137,2	131,8	125,3	118,0	109,9	99,7	88,5	74,6	58,6
92SV5	4 X 37	0,60	158,78	157,6	152,7	145,5	137,2	128,5	119,6	109,5	99,1	86,5	71,9
92SV6	4 X 45	0,60	190,97	188,8	182,6	174,0	164,2	153,8	143,1	130,9	118,2	103,1	85,7

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A) 4p_66sv-92_sc-2p50-en_b_th

The table refers to performance with 4 pumpS running.

(1) Value referred to the G and N versions with PN ≤ 16 bar (1600 kPa). P version is excluded.

PUMP TYPE	RATED POWER	MEI ≥	Q = DELIVERY										
			l/min 0	1066,7	2133,3	3200,0	4266,7	5333,3	6400,0	5666,7	6733,3	7800,0	10666,7
			m3/h 0	64,0	128,0	192,0	256,0	320,0	384,0	340,0	404,0	468,0	640,0
	kW	(1)	H = TOTAL HEAD METRES COLUMN OF WATER										
125SV4	4 X 30	-	107,6	101,9	96,9	92,2	87,5	82,4	76,6	80,7	74,6	67,3	39,2
125SV5	4 X 37	-	134,5	127,4	121,1	115,3	109,4	103,0	95,8	100,9	93,3	84,2	49,0
125SV6	4 X 45	-	153,4	145,1	137,9	131,2	124,4	116,9	108,4	114,4	105,4	94,4	51,3
125SV7	4 X 55	-	179,0	169,3	160,9	153,0	145,1	136,4	126,4	133,5	122,9	110,1	59,8
125SV8/2A	4 X 55	-	201,1	190,2	180,8	171,9	163,0	153,3	142,0	150,0	138,1	123,7	67,2

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A) 4p_125sv_sc-2p50-en_b_th

The table refers to performance with 4 pumps running.

(1) Value referred to the G and N versions with PN ≤ 16 bar (1600 kPa). P version is excluded.

e-SV SERIES
MOTORS (ErP 2009/125/EC)

- Short-circuit squirrel-cage motor, enclosed construction with external ventilation (TEFC).
- **IP55** protection degree.
- Insulation class **155 (F)**.
- Electrical performances according to EN 60034-1.
- Supplied **single-phase** surface motors with **IE2** efficiency level
- Supplied **three-phase** surface motors with **IE2** efficiency level (power < 0,75 kW) or **IE3** efficiency level (power ≥ 0,75 kW) as standard according to EN 60034-30:2009 and EN 60034-30-1:2014.
- Metric cable gland according to EN 50262.
- PTC included in motors from 30 to 55 kW (one per phase, 155°C).

- **Single-phase** version:
  0,37 to 1,5 kW (2-pole)
  220-240 V 50 Hz
  Built-in automatic reset overload protection
  Maximum ambient temperature: 45 °C.
- **Three-phase** version:
  0,37 to 55 kW (2-pole)
  220-240/380-415 V 50 Hz for power up to 3 kW.
  380-415/660-690 V 50 Hz for power above 3 kW.
  Overload protection to be provided by the user.
  Maximum ambient temperature: 50 °C,
  (40 °C for model with power of 0,37 kW)

From 1 July 2023 in accordance with the **Regulations (EU) 2019/1781 and 2021/341**, the three-phase 50 Hz, 60 Hz or 50/60 Hz **surface motors** with **power outputs ranging from 0,12 to 0,749 kW** must have a minimum level IE2 efficiency; the ones with power outputs ranging **from 0,75 and 74,9 kW** must have a minimum level of **IE3** efficiency. The single-phase **surface motors** with **power outputs ranging from 0,12 kW** must have a minimum level IE2 efficiency.

The following tables also contain the mandatory information pursuant to Annex I, section 2, of the aforementioned Regulations.

e-SV SERIES
THREE-PHASE MOTORS AT 50 Hz, 2-POLE (from 30 to 55 kW)

P_N kW	Manufacturer / Model	IEC SIZE	Construction Design	N. of Poles	f_N Hz	Data for 400 V / 50 Hz Voltage: cosφ	Is / I_N	T_N Nm	Ts/T_N	Tm/Tn
30	3MAS 200LA2 V1 30KW E3	200	V1	2	50	0,89	7,80	96,90	2,60	3,10
37	3MAS 200LB2 V1 37KW	200				0,90	8,00	119,4	2,90	3,20
45	3MAS 225M2 V1 45KW E3	225				0,91	8,20	144,4	2,70	3,30
55	3MGS 250M2 V1 55KW E3	250				0,90	7,60	176,4	2,50	3,00

Manufacturer: OMEGA MOTOR SANAYI A.S. Dudullu Organize Sanayi Bölgesi 2. Cadde No: 10 34775 Ümraniye ISTANBUL/TURKEY Reg. No. 913733

P_N kW	Voltage U_N V: Δ 380 V	Δ 400 V	Δ 415 V	Y 660 V	Y 690 V	n_N min^{-1}	Operating conditions **: Altitude Above Sea Level (m)	T. amb min/max °C	ATEX
	I_N (A)								
30	55,3	52,2	50,8	31,8	30,3	2965	≤ 1000	-20 / 50	No
37	66,6	63,9	61,5	38,4	37,0	2965			
45	80,6	75,9	73,7	46,4	44,0	2975			
55	98,2	92,7	89,7	56,5	53,7	2975			

P_N kW	Efficiency η_N % — Δ 380 V Y 660 V 4/4	3/4	2/4	Δ 400 V Y 690 V 4/4	3/4	2/4	Δ 415 V 4/4	3/4	2/4	IE
30	93,0	93,1	93,0	93,3	93,5	93,4	93,4	93,6	93,4	3
37	93,5	94,0	93,7	93,7	94,1	93,8	93,8	94,2	93,9	
45	93,8	94,0	93,5	94,0	94,2	93,6	94,2	94,4	93,8	
55	93,8	94,0	93,9	94,3	94,6	94,5	94,4	94,7	94,5	

** Operating conditions to be referred to motor only. About electric pump, refer to limits in user's manual.

sv-IE3-mott55-2p50-en_c_te

Note: Observe the regulations and codes locally in force regarding sorted waste disposal.

MOTOR NOISE, 2-POLE

POWER kW	MOTOR TYPE IEC SIZE*	NOISE LpA dB
0,37	71R	<70
0,55	71	<70
0,75	80-80R	<70
1,1	80	<70
1,5	90-90R	<70
2,2	90	<70
3	100R	<70
4	112R	<70
5,5	132R	<70
7,5	132	<70
11	160R	73
15	160	<70
18,5	160	<70
22	180R	70
30	200	71
37	200	71
45	225	73
55	250	75

*R = Reduced motor casing size with respect to shaft extension and related flange.

1-125sv_mott_2p50-en_f_tr

The table shows the mean sound pressure levels (Lp) measured at 1 meter distance in a free field according to EN ISO 11203. The noise values are measured on 50 Hz motors and have a tolerance of 3 dB (A) according to EN ISO 4871.

GHV SERIES
ELECTRICAL DATA TABLE

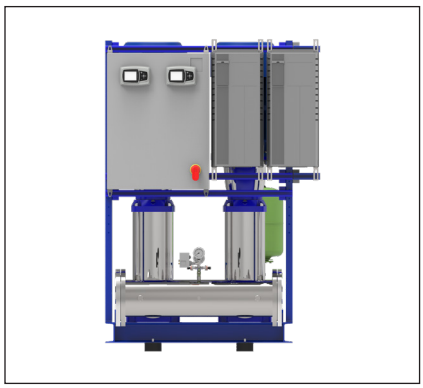
PUMP		CURRENT ABSORBED BY SET (A)		
		GHV2/.. AA	GHV3/.. AA	GHV4/.. AA
TIPO	kW	3~ 400V	3~ 400V	3~ 400V
33SV10	30	96,7	145,0	193,4
46SV7	30	96,7	145,0	193,4
46SV8	30	96,7	145,0	193,4
46SV9	37	118,7	178,1	237,5
66SV5	30	96,7	145,0	193,4
66SV6/1A	30	96,7	145,0	193,4
66SV7/1A	37	118,7	178,1	237,5
66SV8	45	144,0	215,9	287,9
92SV4	30	96,7	145,0	193,4
92SV5/2A	37	118,7	178,1	237,5
92SV5	37	118,7	178,1	237,5
92SV6	45	144,0	215,9	287,9
125SV4	30	96,7	145,0	193,4
125SV5	37	118,7	178,1	237,5
125SV6	45	144,0	215,9	287,9
125SV7	55	175,4	263,1	350,8
125SV8/2A	55	175,4	263,1	350,8

The current shown is the nominal current of the set.

GHV-33_125sv-sc-2p50-en_a_te

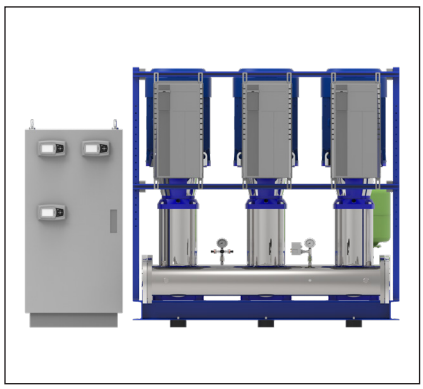
GHV SERIES
ELECTRIC PUMP RANGE AND CHARACTERISTICS

The standard range of GHV series variable-speed booster sets includes models with 2 to 4 e-SV pumps controlled by hydrovar X+ Smart Controller in different configurations, to adapt to the specific needs of each application. For other models refer to your usual sales representative.



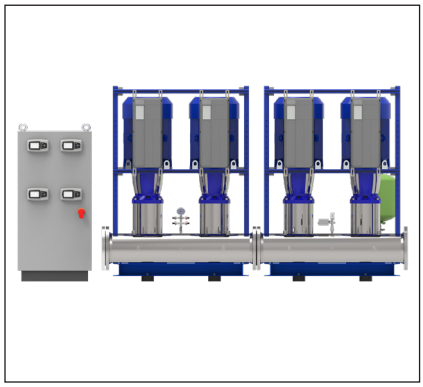
GHV2 SERIES
Variable speed sets with Aquavar frequency converter and two multistage vertical pump with power from 30 up to 55 kW.

Head up to 250 m.
Flow rate up to 320 m^3/h.



GHV3 SERIES
Variable speed sets with Aquavar frequency converter and three multistage vertical pump with power from 30 up to 55 kW.

Head up to 250 m.
Flow rate up to 480 m^3/h.



GHV4 SERIES
Variable speed sets with Aquavar frequency converter and four multistage vertical pump with power from 30 up to 55 kW.

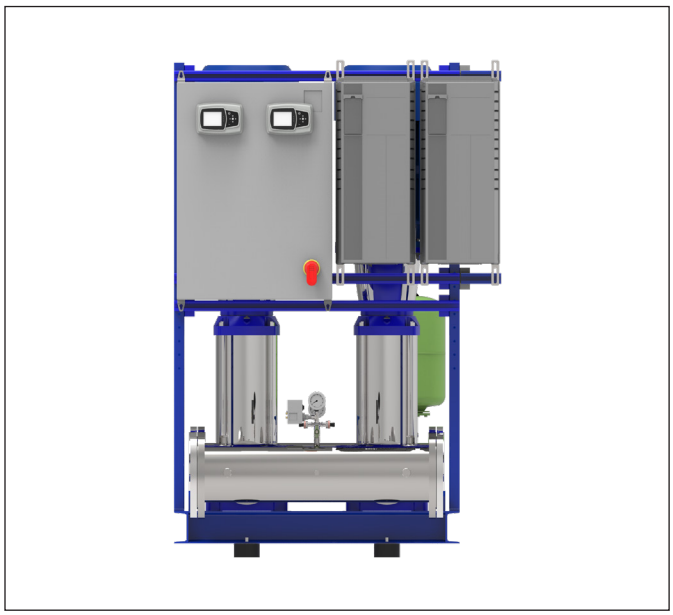
Head up to 250 m.
Flow rate up to 640 m^3/h.

Booster sets

MARKET SECTORS
RESIDENTIAL-CIVIL, INDUSTRIAL

APPLICATIONS
- Water network supply in housing complexes, offices, hotels, shopping centres, industrial plants.
- Supply of water networks for agricultural applications (e.g. irrigation).

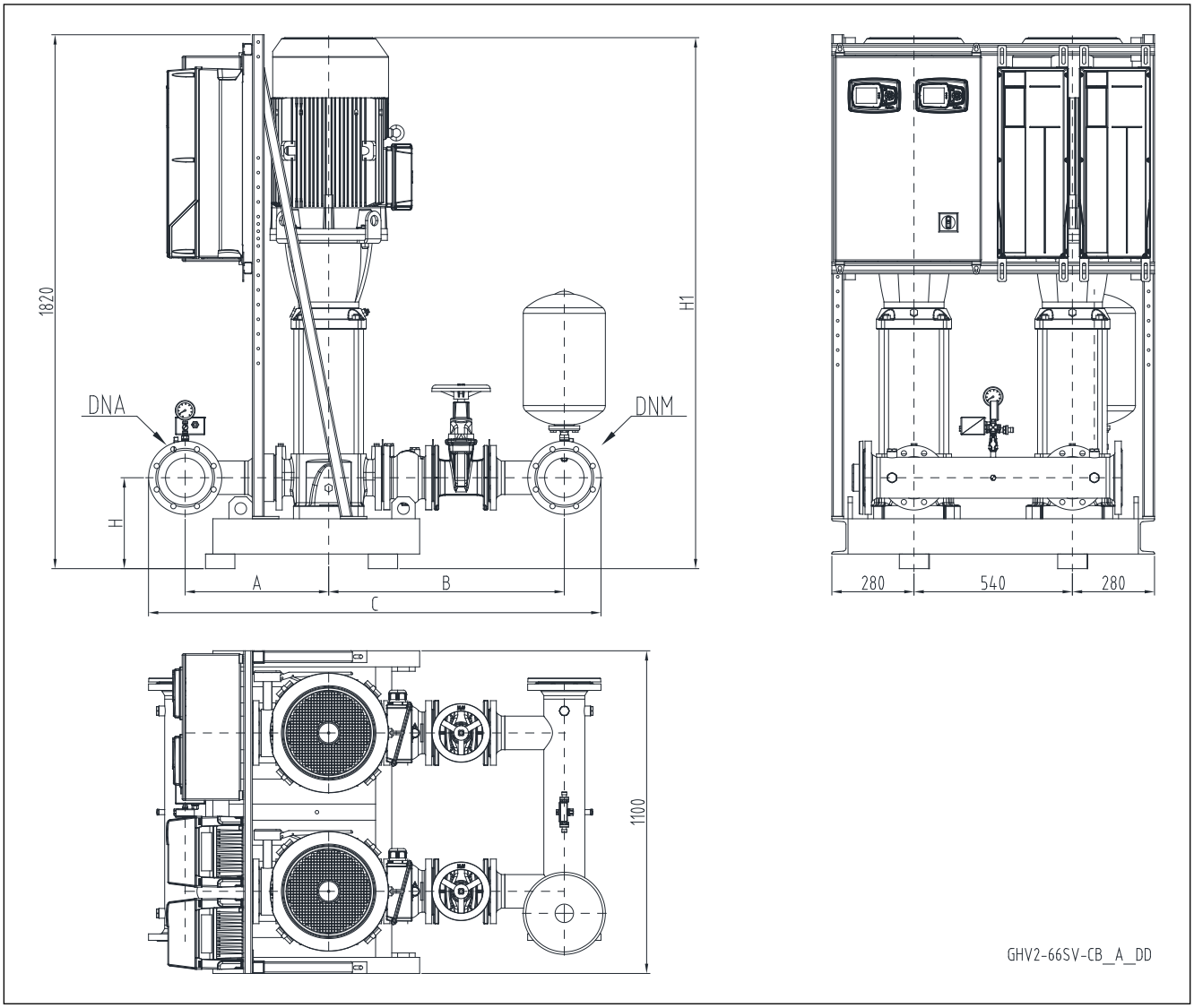
GHV2 Series



SPECIFICATIONS

- **Flow rate**
  up to 320 m^3/h.
- **Head**
  up to 250 m.
- **Frequency** 50Hz
- **e-SV** vertical axis electric pump
- **Aquavar** frequency converter controlled by **hydrovar X+ Smart Controller** and coupled with asynchronous motor
- **Protection class IP55** for:
  - e-SV electric pump
  - control panel
  - frequency converter
- Maximum operating **pressure**:
  25 bar.
- Maximum liquid **temperature**:
  max +60°C.
- Maximum electric pump **power**:
  2 x 55 kW.
- **Progressive** motor start.

GHV2 SERIES
DIMENSIONAL TABLES

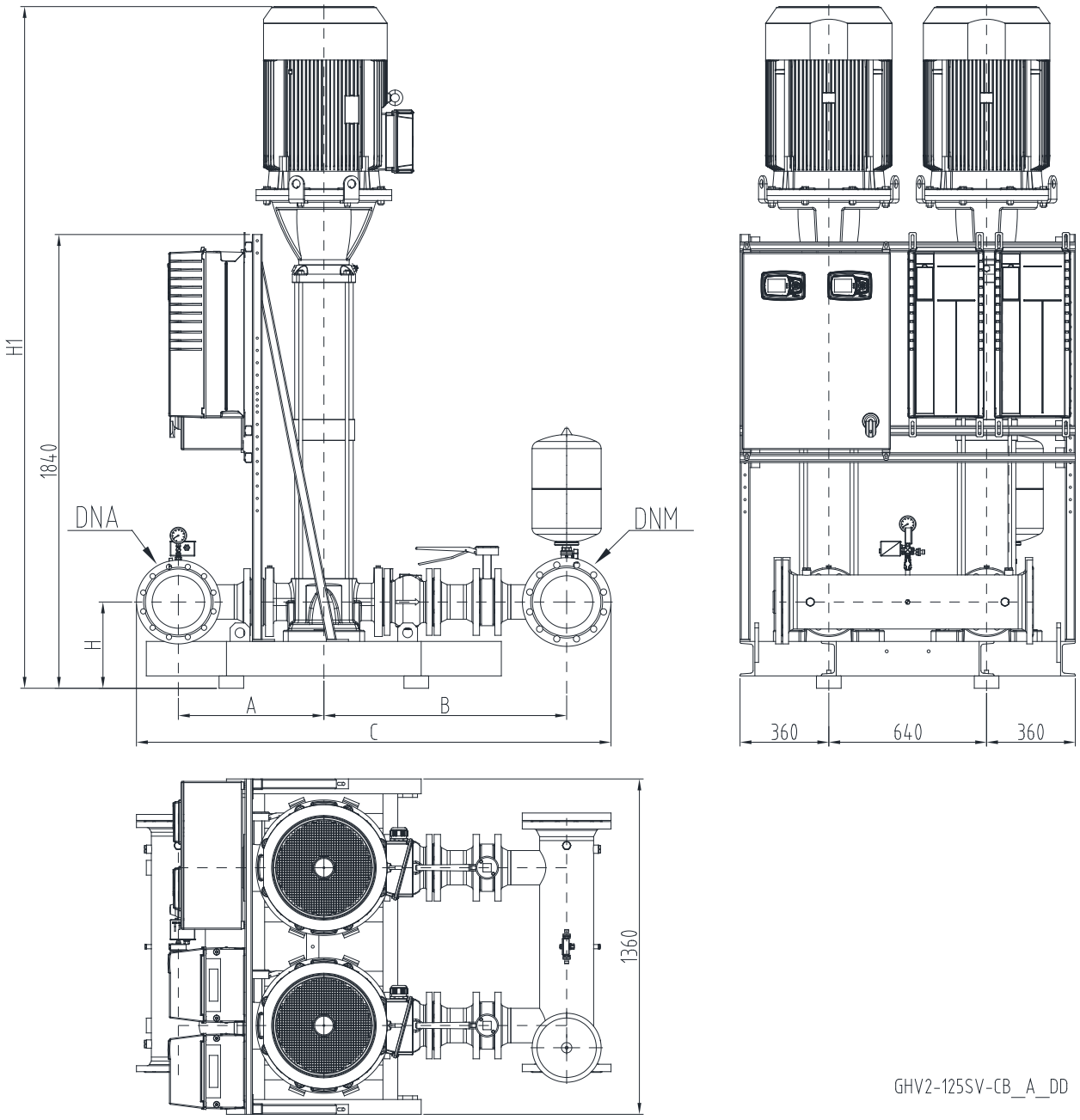


GHV 2	DNA	DNM	A	B	C	H	H1
33SV10G300T	DN80 / PN16	DN80 / PN25	435	719	1355	275	2060
46SV7G300T	DN100 / PN16	DN100 / PN25	471	785	1483	310	1875
46SV8G300T	DN100 / PN16	DN100 / PN25	471	785	1483	310	1950
46SV9G370T	DN100 / PN16	DN100 / PN25	471	785	1483	310	2025
66SV5G300T	DN125 / PN16	DN125 / PN16	489	803	1543	310	1820
66SV6/1AG300T	DN125 / PN16	DN125 / PN25	489	833	1583	310	1910
66SV7/1AG370T	DN125 / PN16	DN125 / PN25	489	833	1583	310	2000
66SV8G450T	DN125 / PN16	DN125 / PN25	489	833	1583	310	2110
92SV4G300T	DN150 / PN16	DN150 / PN16	504	818	1606	310	1720
92SV5/2AG370T	DN150 / PN16	DN150 / PN16	504	818	1606	310	1810
92SV5G370T	DN150 / PN25	DN150 / PN25	504	848	1644	310	1810
92SV6G450T	DN150 / PN25	DN150 / PN25	504	848	1644	310	1930

Dimensions in mm. Tolerance ± 10 mm.

ghv2-66sv-cb_a_td

GHV2 SERIES
DIMENSIONAL TABLES



GHV 2	DNA	DNM	A	B	C	H	H1
125SV4G300T	DN200 / PN16	DN200 / PN16	591	941	1871	350	2039
125SV5G370T	DN200 / PN16	DN200 / PN16	591	941	1871	350	2189
125SV6G450T	DN200 / PN16	DN200 / PN25	591	985	1925	350	2369
125SV7G550T	DN200 / PN16	DN200 / PN25	591	985	1925	350	2615
125SV8/2AG550T	DN200 / PN16	DN200 / PN25	591	985	1925	350	2765

Dimensions in mm. Tolerance ± 10 mm.

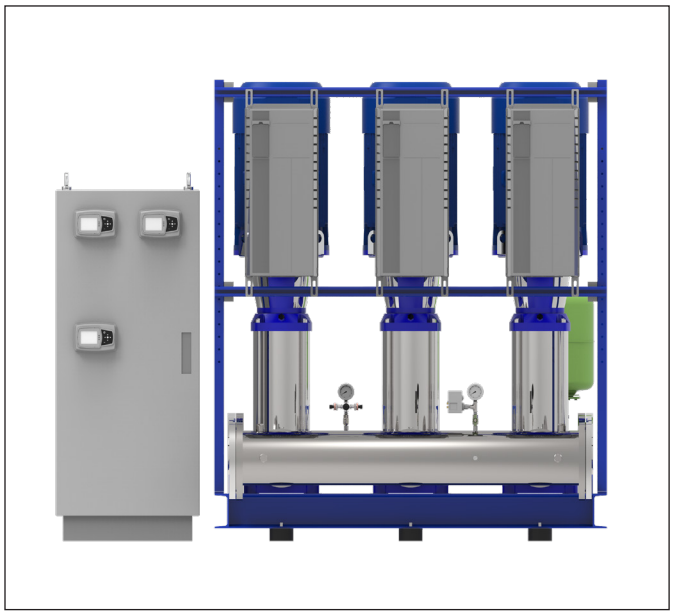
ghv2-125sv-cb_a_td

Booster sets

GHV3 Series

MARKET SECTORS
RESIDENTIAL-CIVIL, INDUSTRIAL

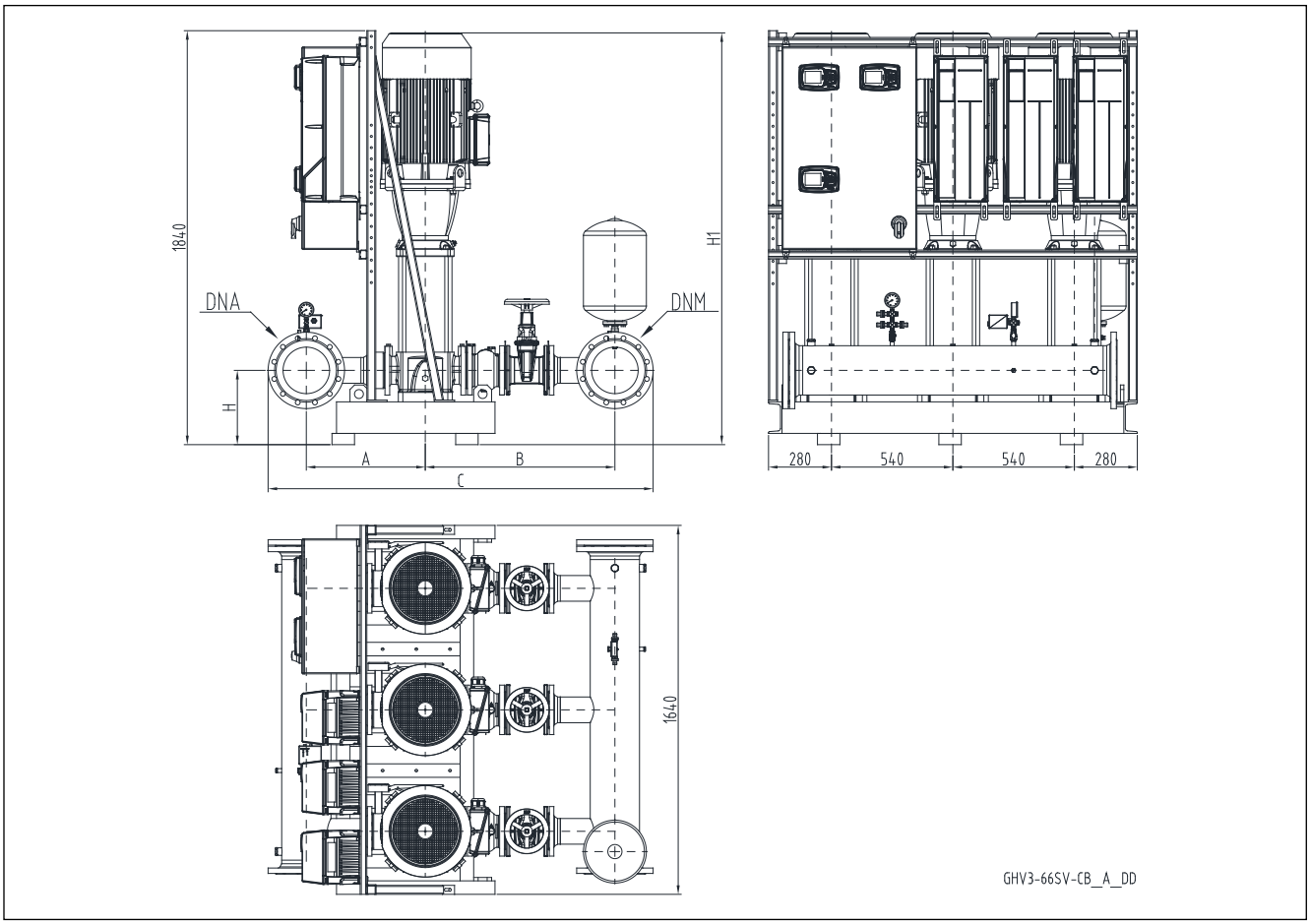
APPLICATIONS
- Water network supply in housing complexes, offices, hotels, shopping centres, industrial plants.
- Supply of water networks for agricultural applications (e.g. irrigation)



SPECIFICATIONS

- **Flow rate** up to 480 m^3/h.
- **Head** up to 250 m.
- **Frequency** 50Hz
- **e-SV** vertical axis electric pump
- **Aquavar** frequency converter controlled by **hydrovar X+ Smart Controller** and coupled with asynchronous motor
- **Protection class IP55** for:
  - e-SV electric pump
  - control panel
  - frequency converter
- Maximum operating **pressure**: 25 bar.
- Maximum liquid **temperature**: max +60°C.
- Maximum electric pump **power**: 3 x 55 kW.
- **Progressive** motor start.

GHV3 SERIES
DIMENSIONAL TABLES

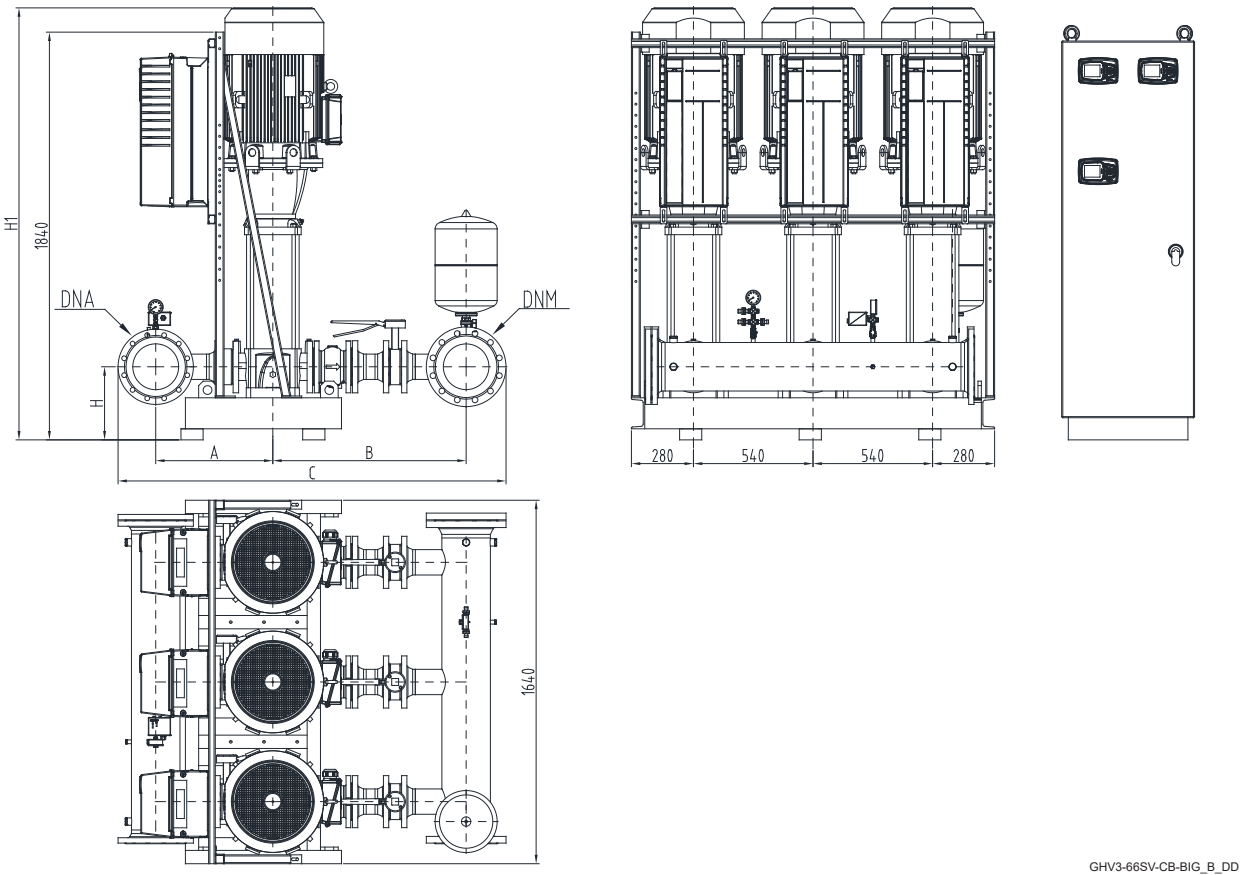


GHV 3	DNA	DNM	A	B	C	H	H1
33SV10G300T	DN125 / PN16	DN125 / PN25	461	745	1465	335	2120
46SV7G300T	DN150 / PN16	DN150 / PN25	498	812	1602	330	1895
46SV8G300T	DN150 / PN16	DN150 / PN25	498	812	1602	330	1970
66SV5G300T	DN200 / PN16	DN200 / PN16	529	843	1712	330	1840
66SV6/1AG300T	DN200 / PN16	DN200 / PN25	529	873	1752	330	1930
92SV4G300T	DN200 / PN16	DN200 / PN16	529	843	1712	330	1740

Dimensions in mm. Tolerance ± 10 mm.

ghv3-66sv-cb_a_td

GHV3 SERIES
DIMENSIONAL TABLES

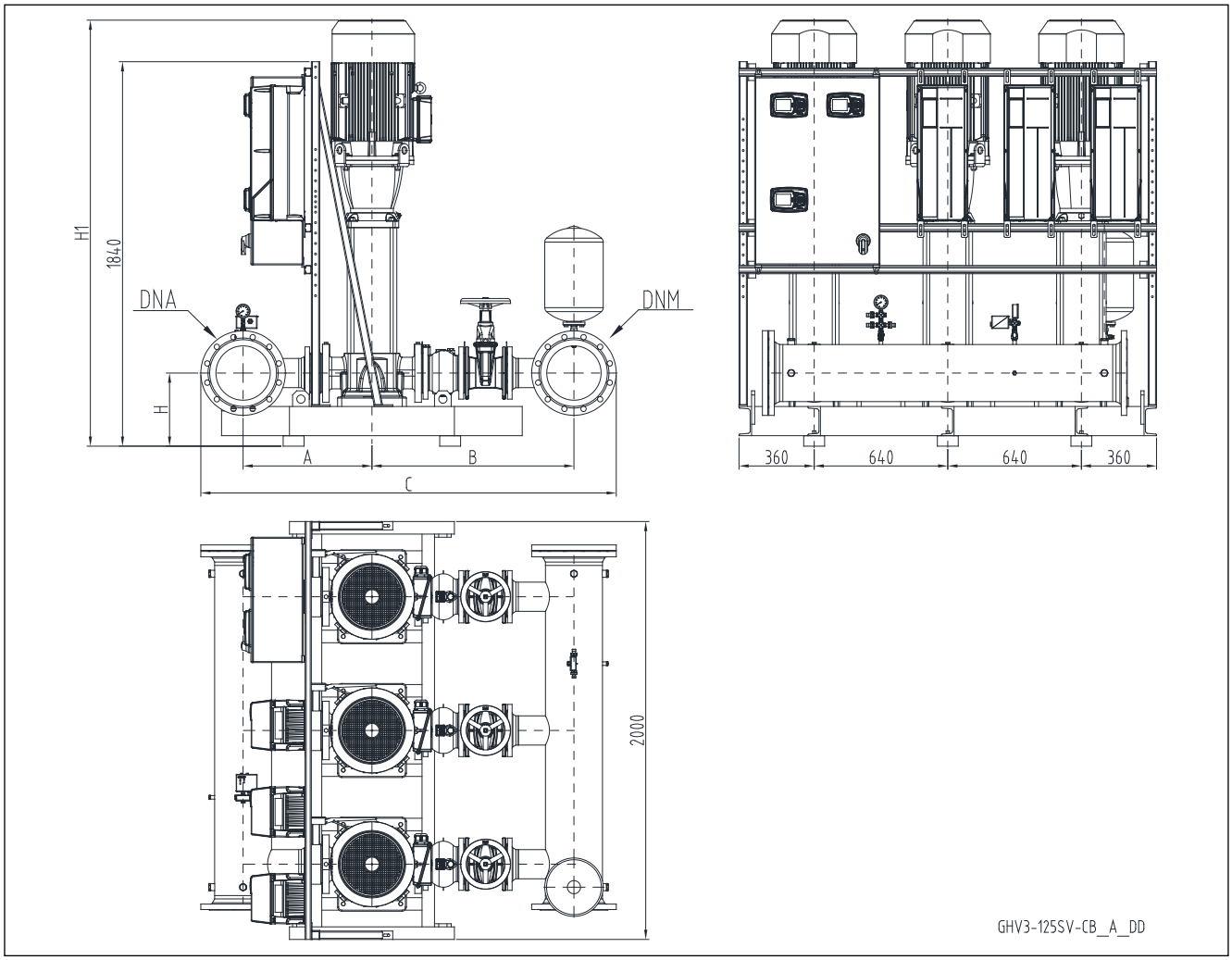


GHV 3	DNA	DNM	A	B	C	H	H1
46SV9G370T	DN150 / PN16	DN150 / PN25	498	812	1602	330	2045
66SV7/1AG370T	DN200 / PN16	DN200 / PN25	529	873	1752	330	2020
66SV8G450T	DN200 / PN16	DN200 / PN25	529	873	1752	330	2130
92SV5/2AG370T	DN200 / PN16	DN200 / PN16	529	843	1712	330	1830
92SV5G370T	DN200 / PN16	DN200 / PN25	529	873	1752	330	1830
92SV6G450T	DN200 / PN16	DN200 / PN25	529	873	1752	330	1950

Dimensions in mm. Tolerance ± 10 mm.

ghv3-66sv-cb-big_a_td

GHV3 SERIES
DIMENSIONAL TABLES

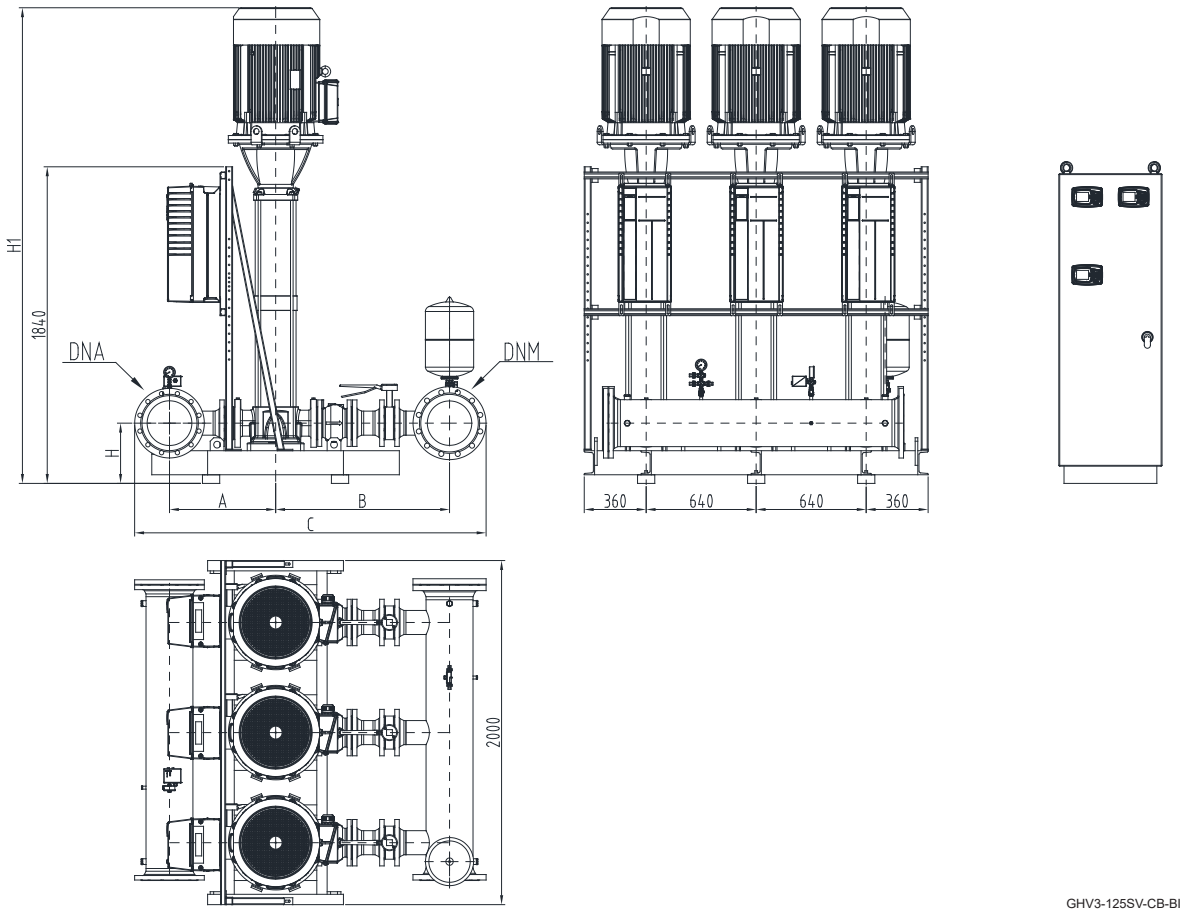


GHV 3	DNA	DNM	A	B	C	H	H1
125SV4G300T	DN250 / PN16	DN250 / PN16	618	968	1990	350	2039

Dimensions in mm. Tolerance ± 10 mm.

ghv3-125sv-cb_a_td

GHV3 SERIES
DIMENSIONAL TABLES



GHV 3	DNA	DNM	A	B	C	H	H1
125SV5G370T	DN250 / PN16	DN250 / PN16	618	968	1990	350	2189
125SV6G450T	DN250 / PN16	DN250 / PN25	618	1012	2044	350	2369
125SV7G550T	DN250 / PN16	DN250 / PN25	618	1012	2044	350	2615
125SV8/2AG550T	DN250 / PN16	DN250 / PN25	618	1012	2044	350	2765

Dimensions in mm. Tolerance ± 10 mm.

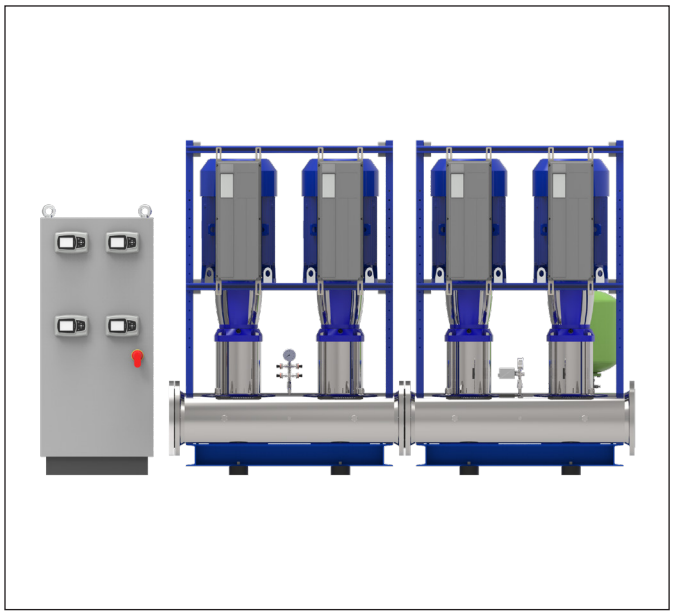
ghv3-125sv-cb-big_a_td

Booster sets

GHV4 Series

MARKET SECTORS
RESIDENTIAL-CIVIL, INDUSTRIAL

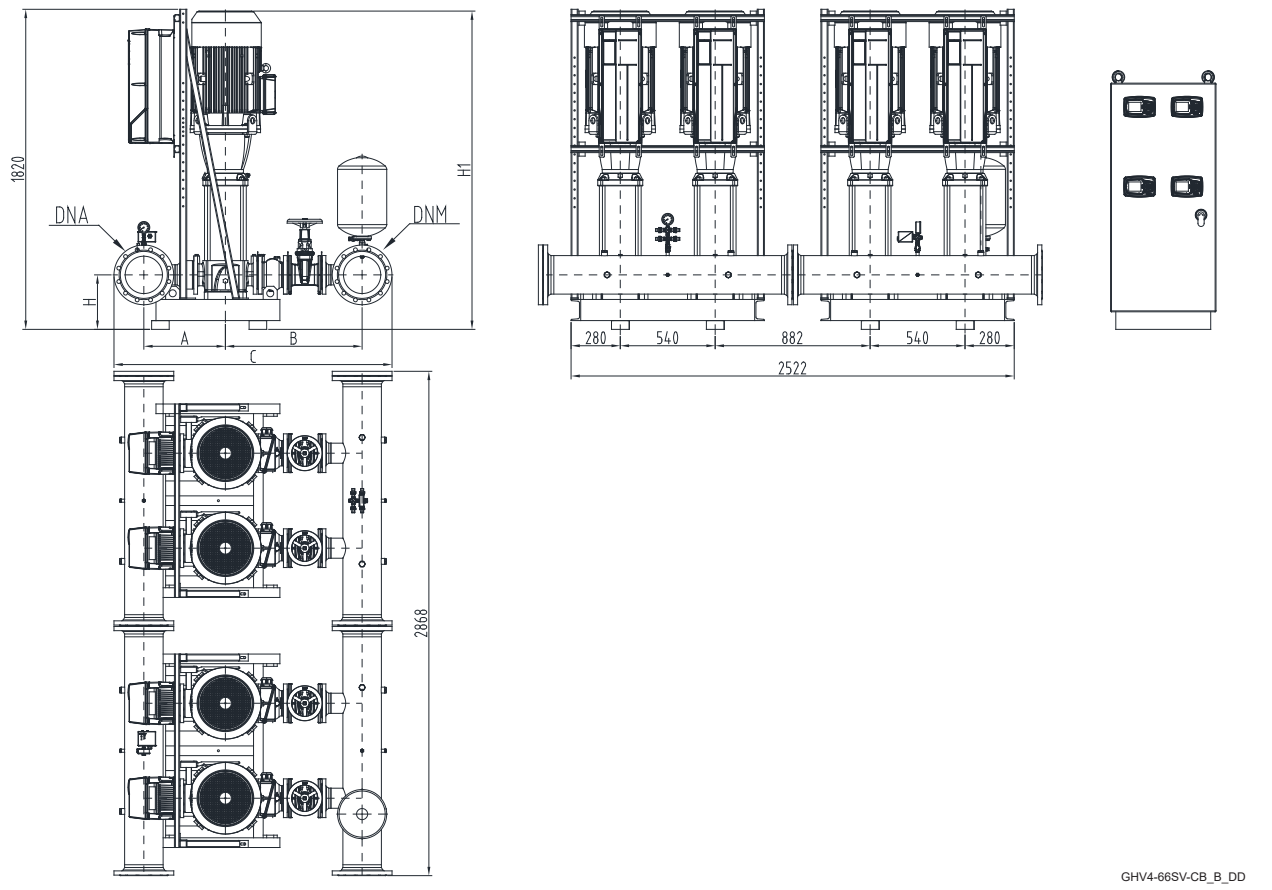
APPLICATIONS
- Water network supply in housing complexes, offices, hotels, shopping centres, industrial plants.
- Supply of water networks for agricultural applications (e.g. irrigation)



SPECIFICATIONS

- **Flow rate**
  up to 640 m^3/h.
- **Head**
  up to 250 m.
- **Frequency** 50Hz
- **e-SV** vertical axis electric pump
- **Aquavar** frequency converter controlled by **hydrovar X+ Smart Controller** and coupled with asynchronous motor
- **Protection class IP55** for:
  - e-SV electric pump
  - control panel
  - frequency converter
- Maximum operating **pressure**:
  25 bar.
- Maximum liquid **temperature**:
  max +60°C.
- Maximum electric pump **power**:
  4 x 55 kW.
- **Progressive** motor start.

GHV4 SERIES
DIMENSIONAL TABLES

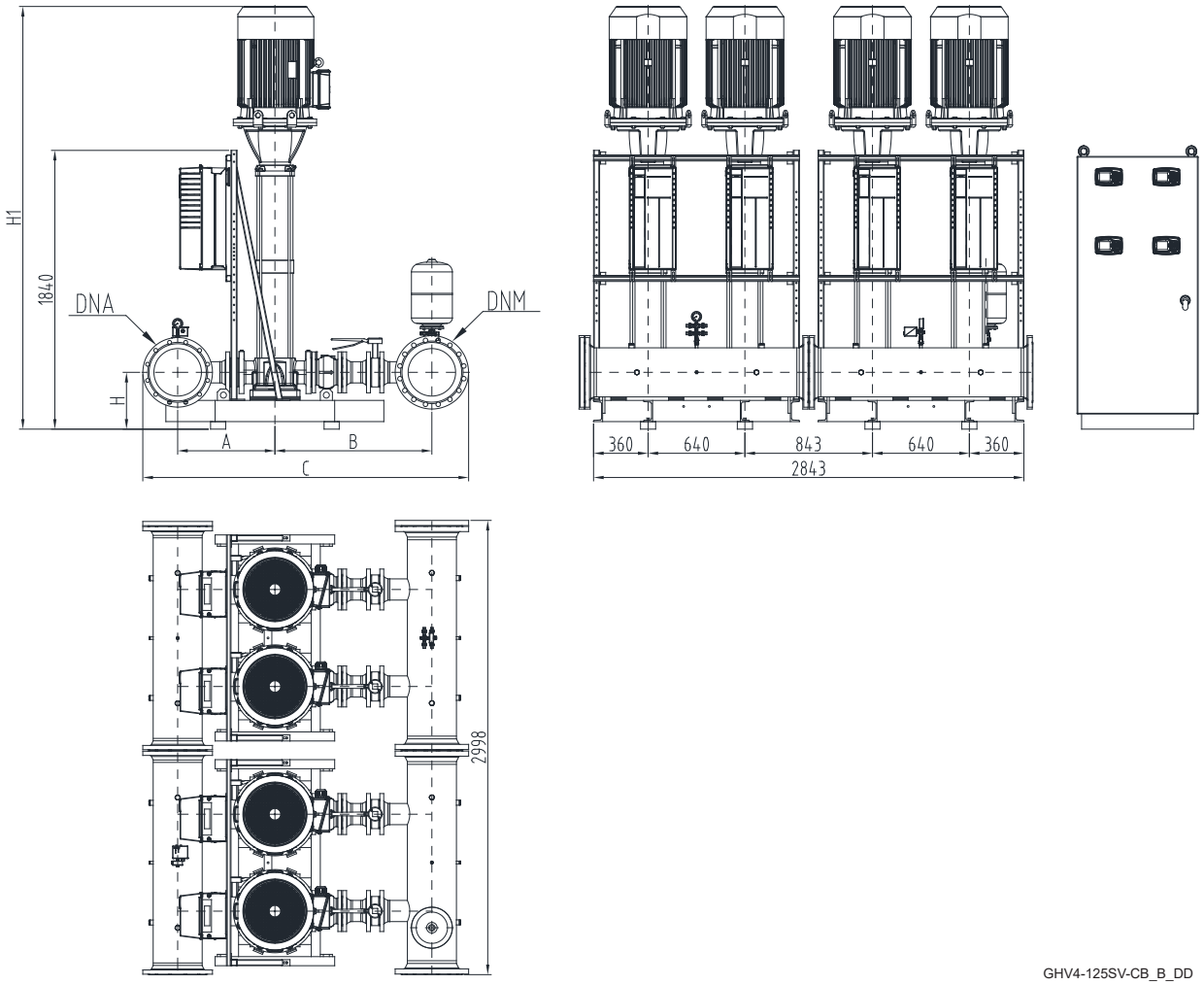


GHV 4	DNA	DNM	A	B	C	H	H1
33SV10G300T	DN150 / PN16	DN15 / PN25	475	759	1527	275	2060
46SV7G300T	DN200 / PN16	DN2000 / PN25	523	837	1710	310	1875
46SV8G300T	DN200 / PN16	DN2000 / PN25	523	837	1710	310	1950
46SV9G370T	DN200 / PN16	DN2000 / PN25	523	837	1710	310	2025
66SV5G300T	DN200 / PN16	DN200 / PN16	529	843	1712	310	1820
66SV6/1AG300T	DN200 / PN16	DN200 / PN25	529	873	1752	310	1910
66SV7/1AG370T	DN200 / PN16	DN200 / PN25	529	873	1752	310	2000
66SV8G450T	DN200 / PN16	DN200 / PN25	529	873	1752	310	2110
92SV4G300T	DN250 / PN16	DN250 / PN16	556	870	1831	310	1720
92SV5/2AG370T	DN250 / PN16	DN250 / PN16	556	870	1831	310	1810
92SV5G370T	DN250 / PN16	DN250 / PN25	556	900	1871	310	1810
92SV6G450T	DN250 / PN16	DN250 / PN25	556	900	1871	310	1930

Dimensions in mm. Tolerance ± 10 mm.

ghv4-66sv-cb_a_td

GHV4 SERIES
DIMENSIONAL TABLES



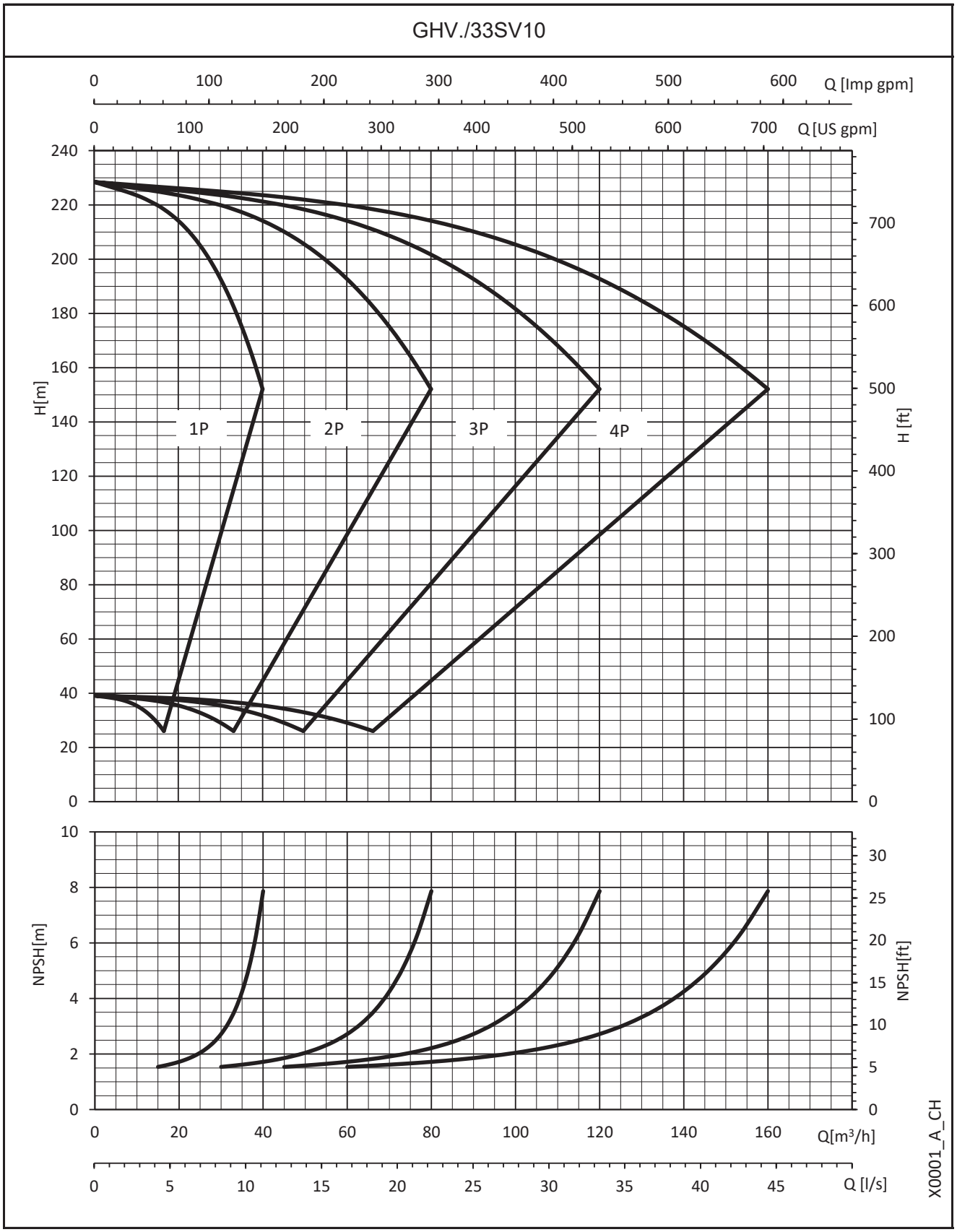
GHV 4	DNA	DNM	A	B	C	H	H1
125SV4G300T	DN3000 / PN16	DN300 / PN16	643	993	2096	375	2064
125SV5G370T	DN3000 / PN16	DN300 / PN16	643	993	2096	375	2214
125SV6G450T	DN3000 / PN16	DN300 / PN25	643	1037	2152	375	2394
125SV7G550T	DN3000 / PN16	DN300 / PN25	643	1037	2152	375	2640
125SV8/2AG550T	DN3000 / PN16	DN300 / PN25	643	1037	2152	375	2790

Dimensions in mm. Tolerance ± 10 mm.

ghv4-125sv-cb_a_td

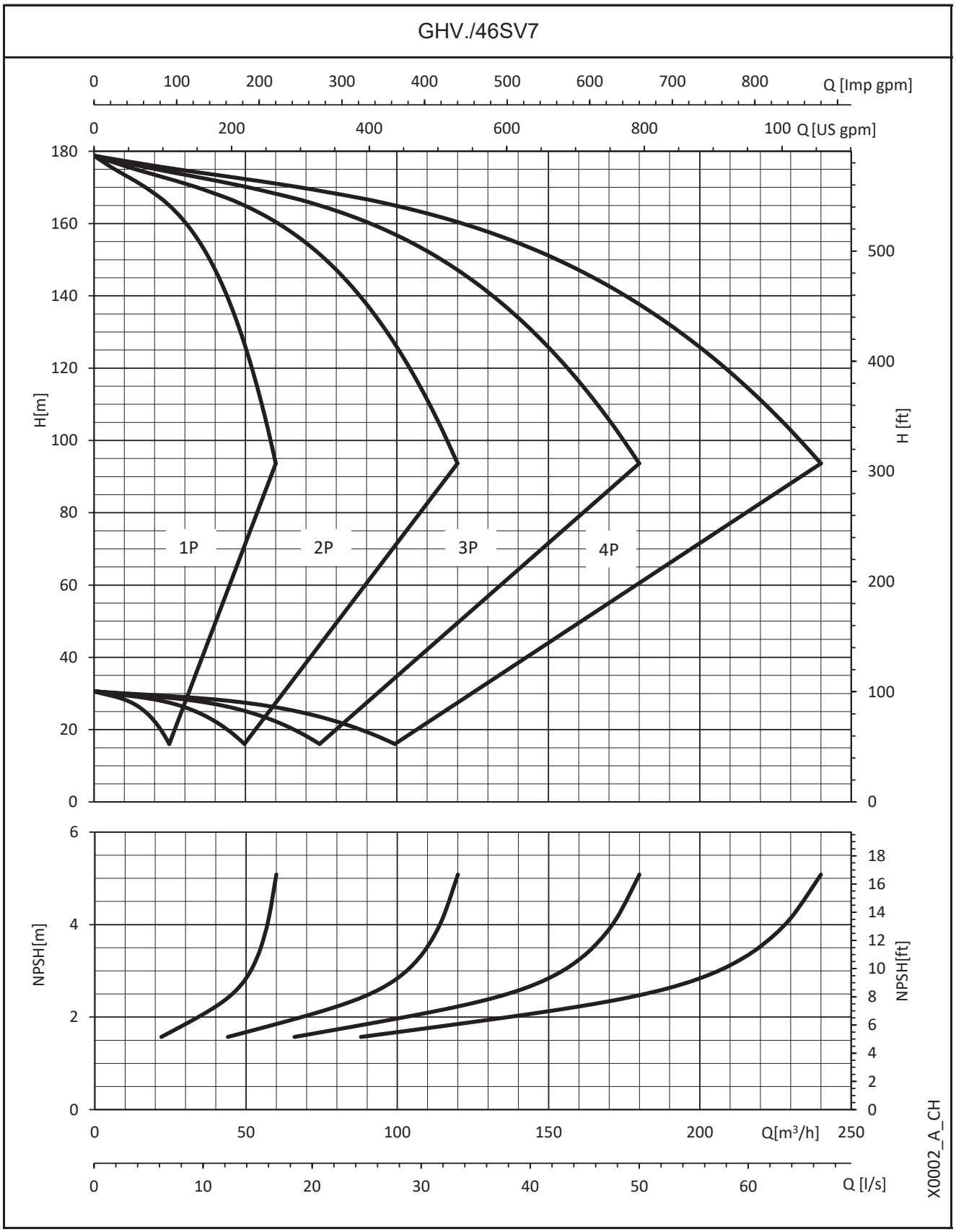
PERFORMANCE CURVES

GHV./..SV SERIES
OPERATING CHARACTERISTICS



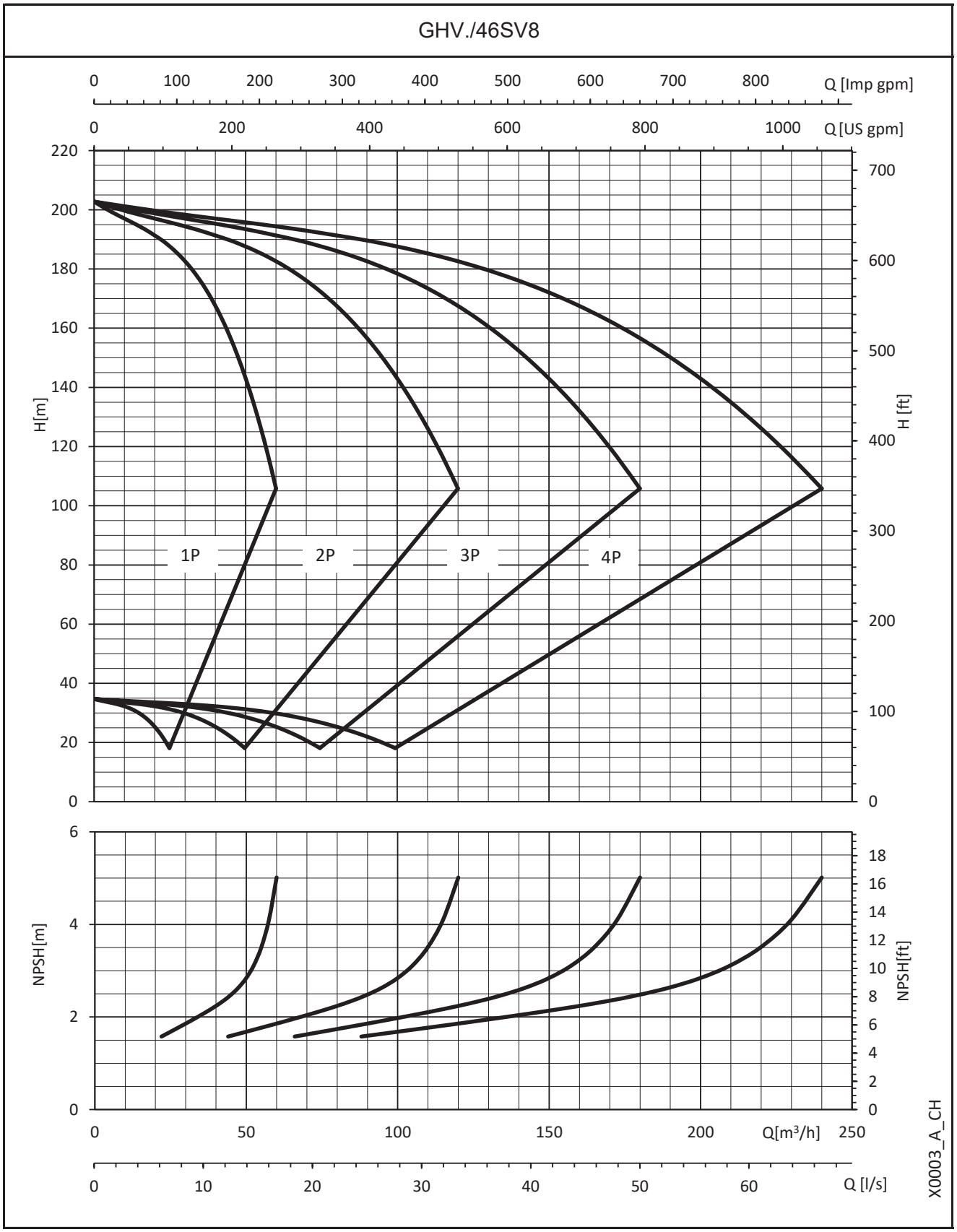
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These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity v = 1 mm²/sec.
The declared NPSH values are laboratory values; for practical use we recommend increasing these values by 0,5 m.

GHV./..SV SERIES
OPERATING CHARACTERISTICS



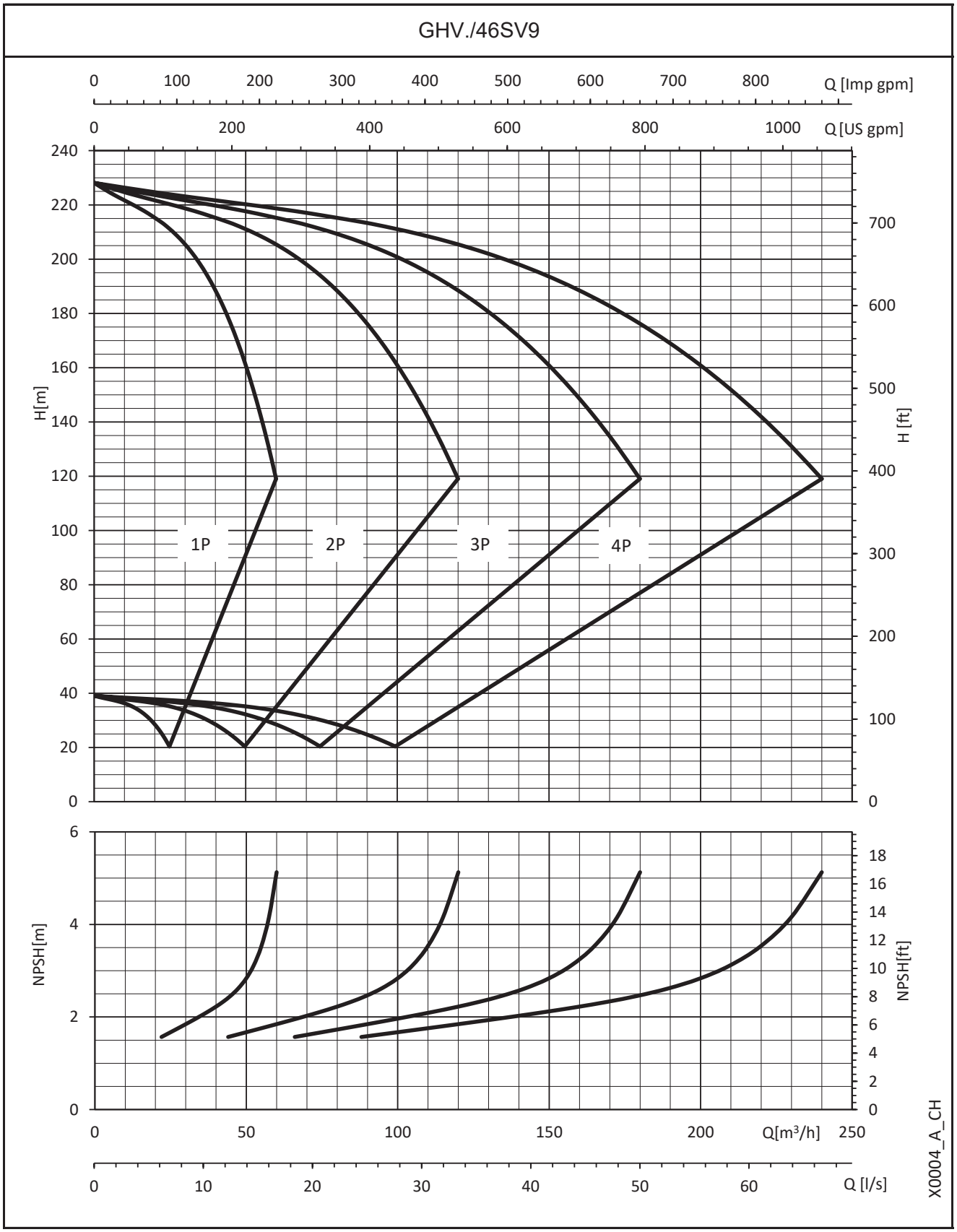
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GHV./..SV SERIES
OPERATING CHARACTERISTICS



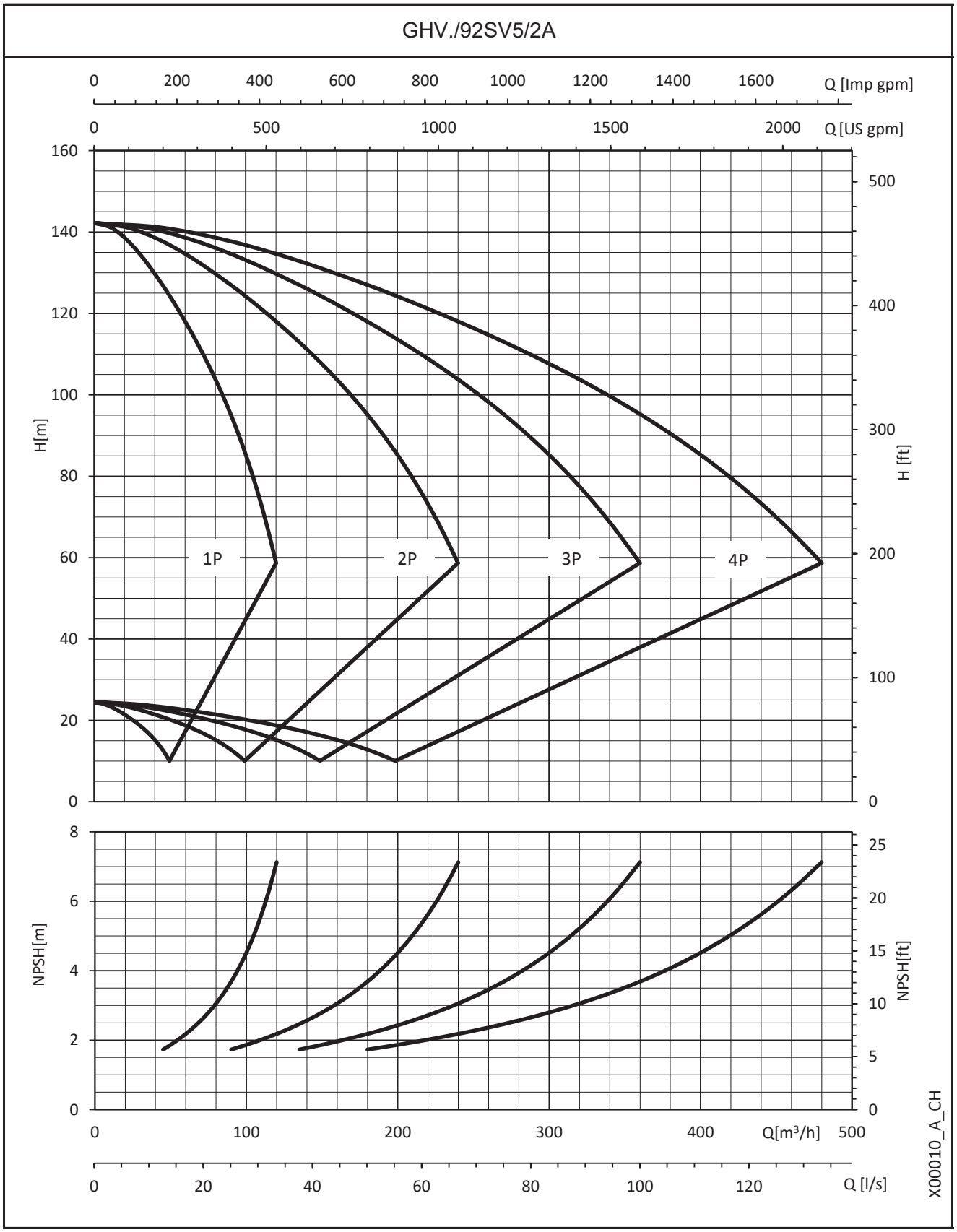
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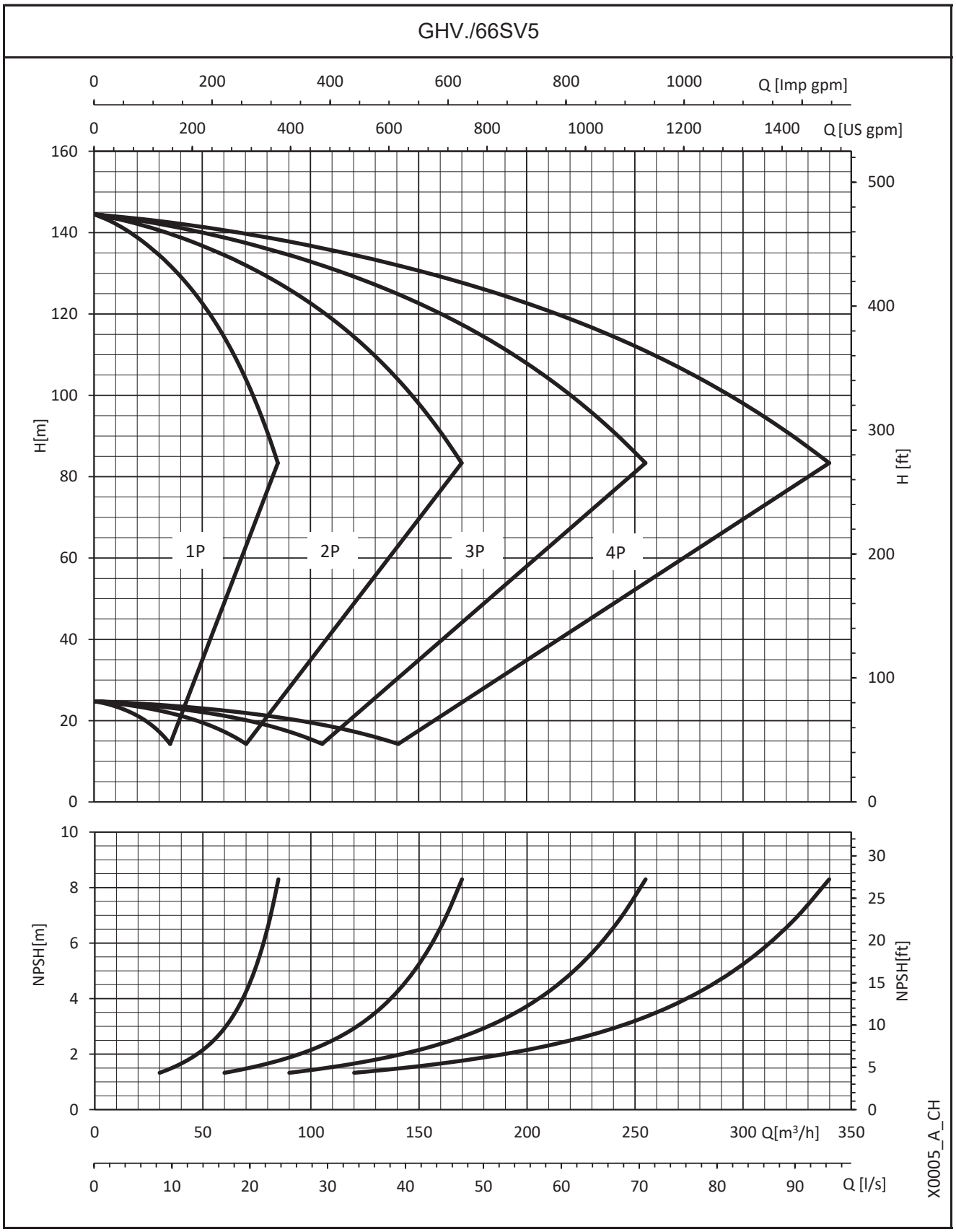
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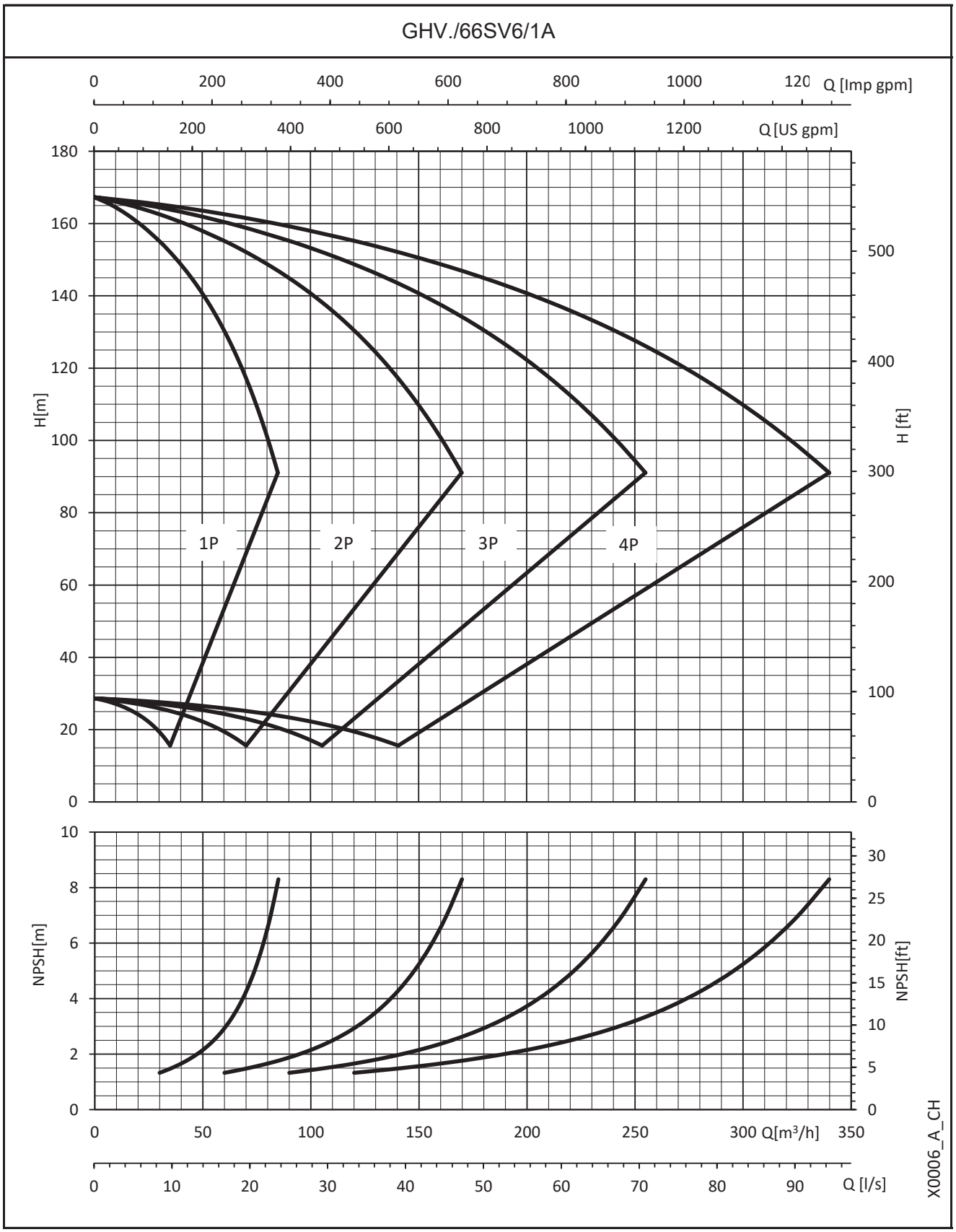
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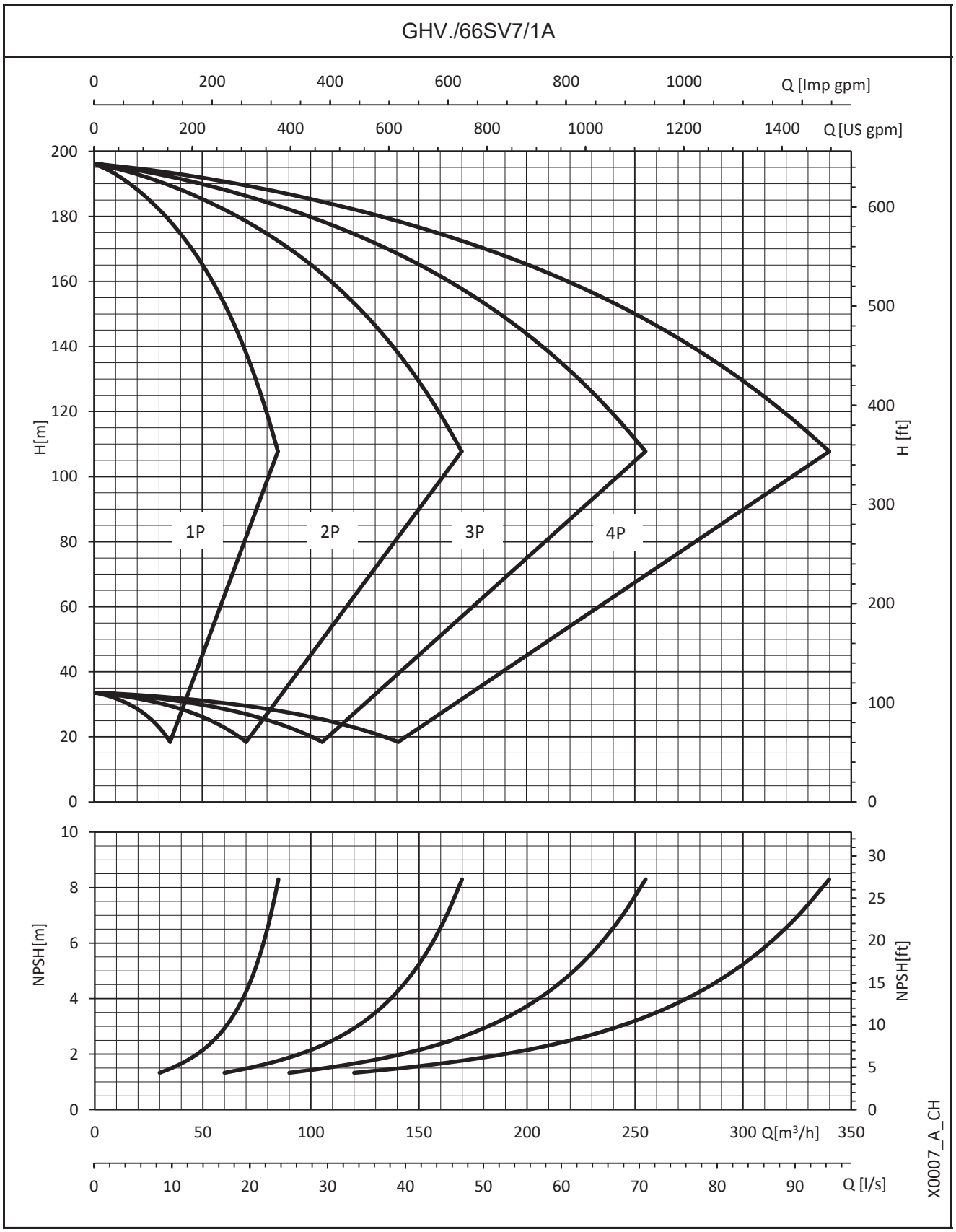
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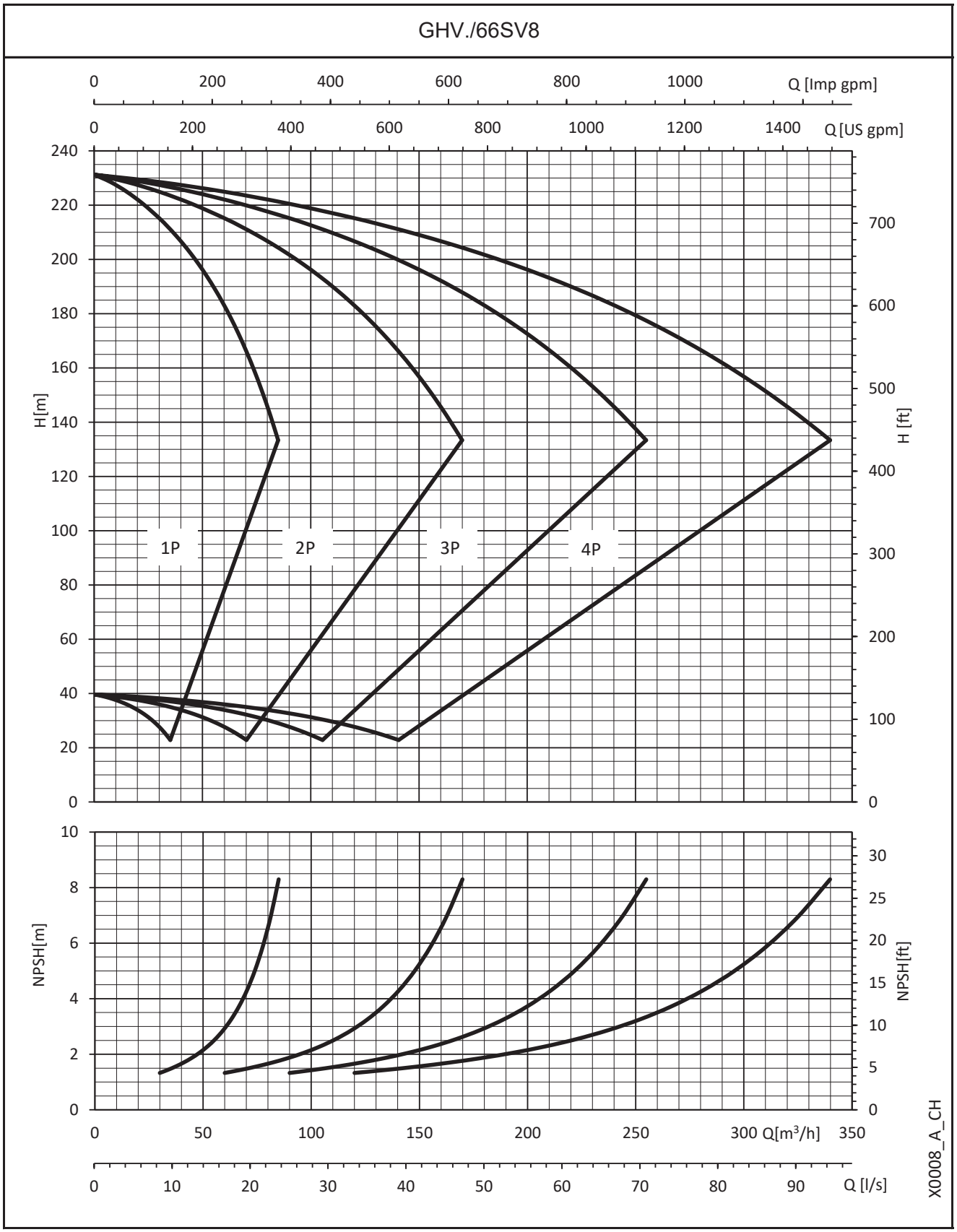
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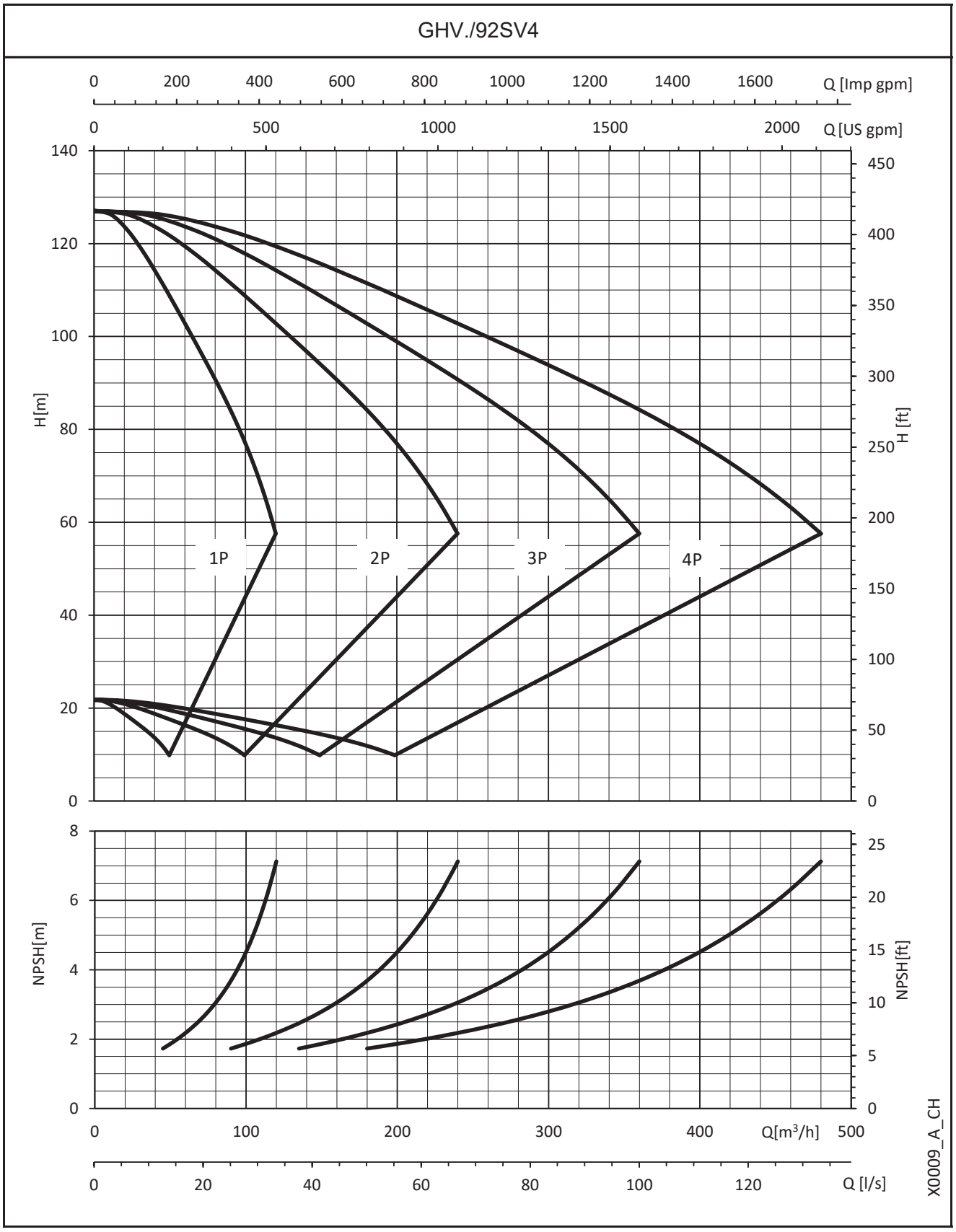
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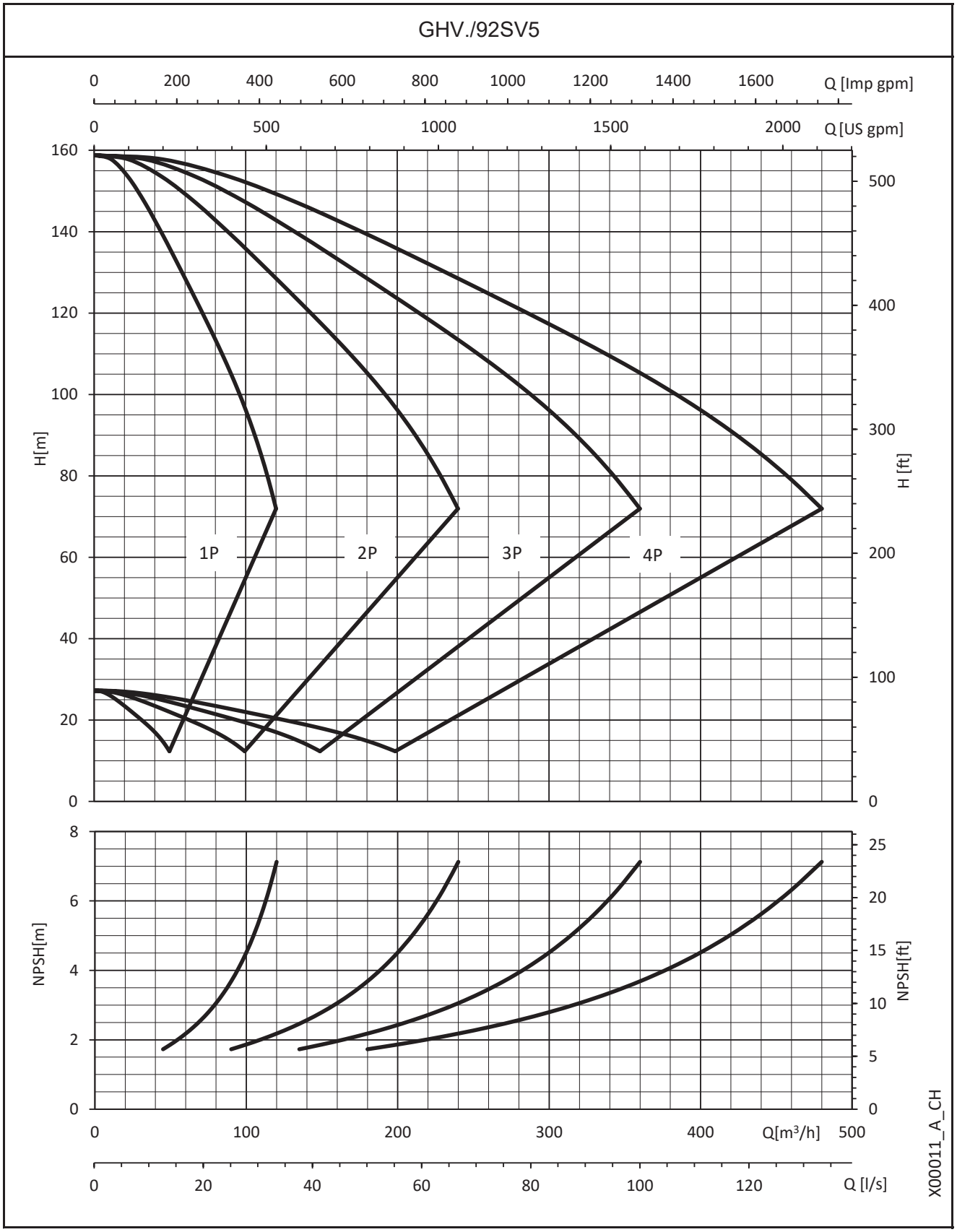
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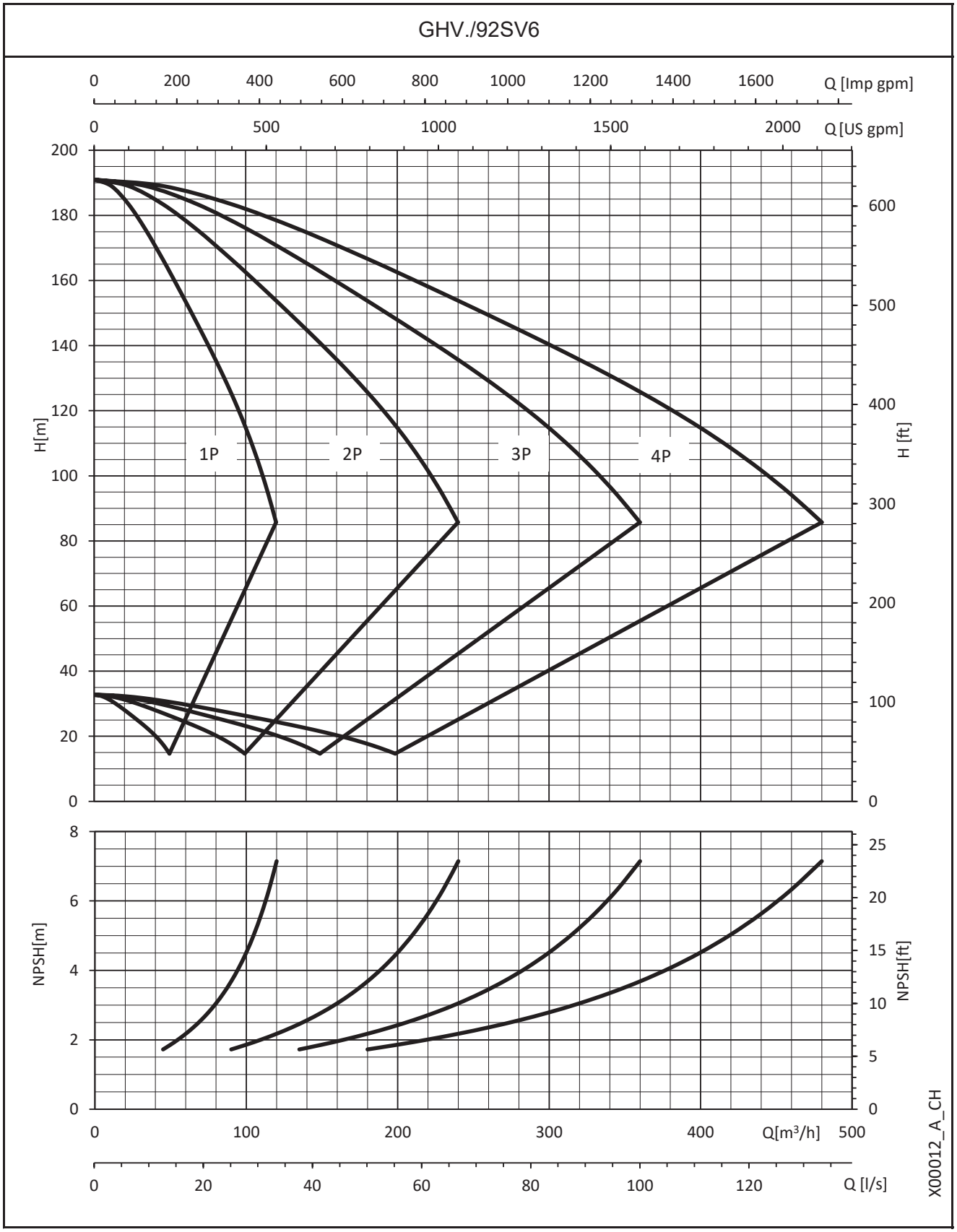
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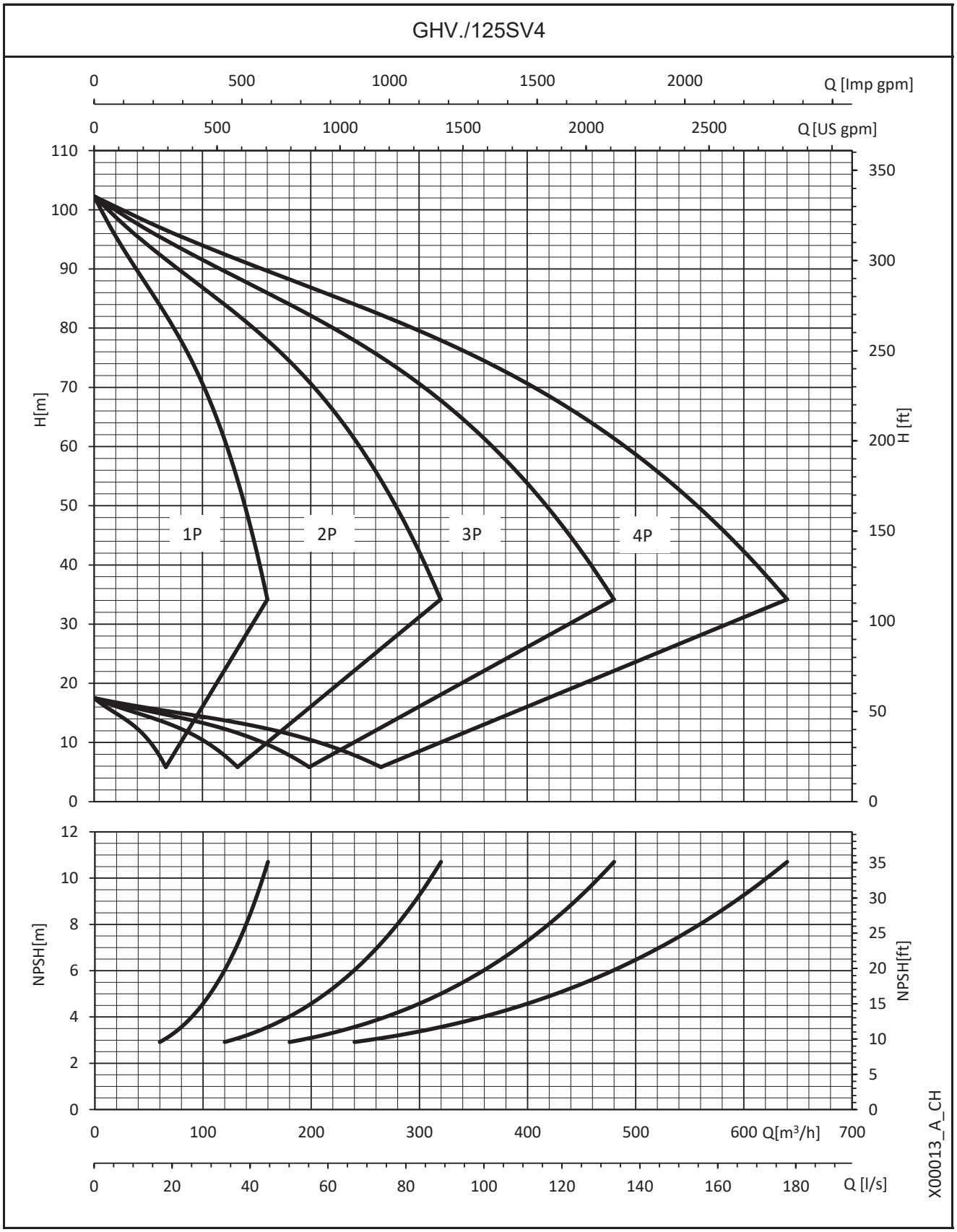
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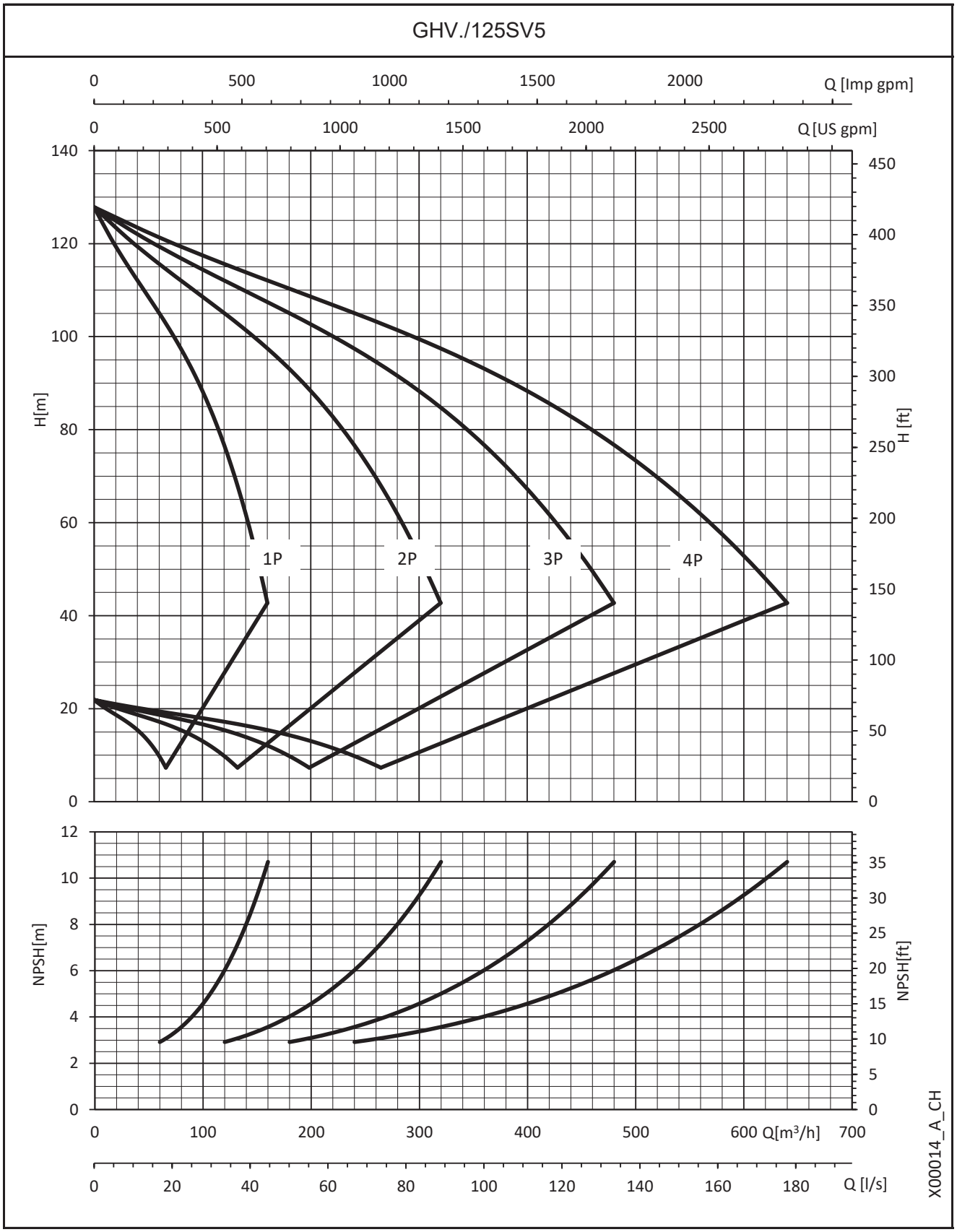
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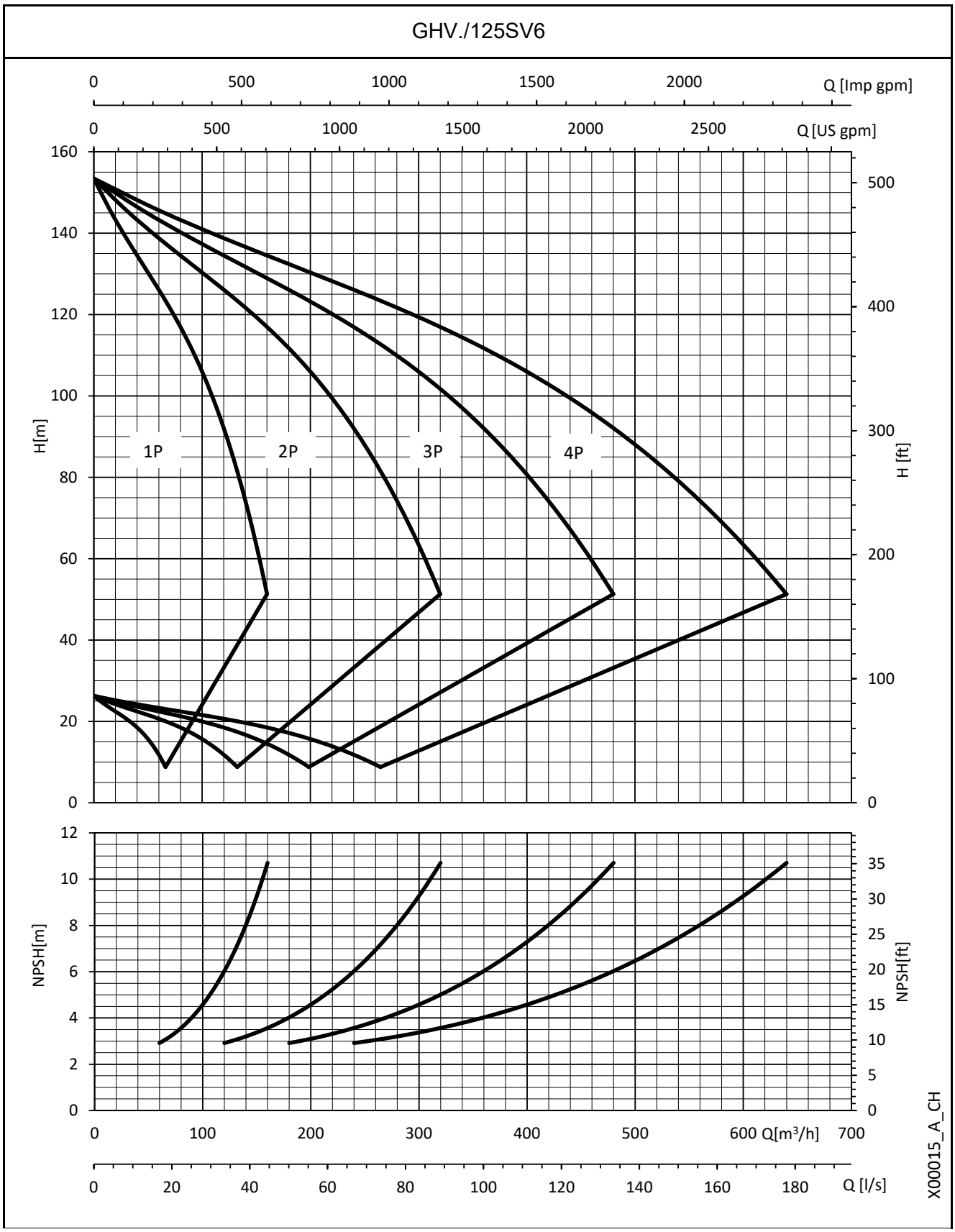
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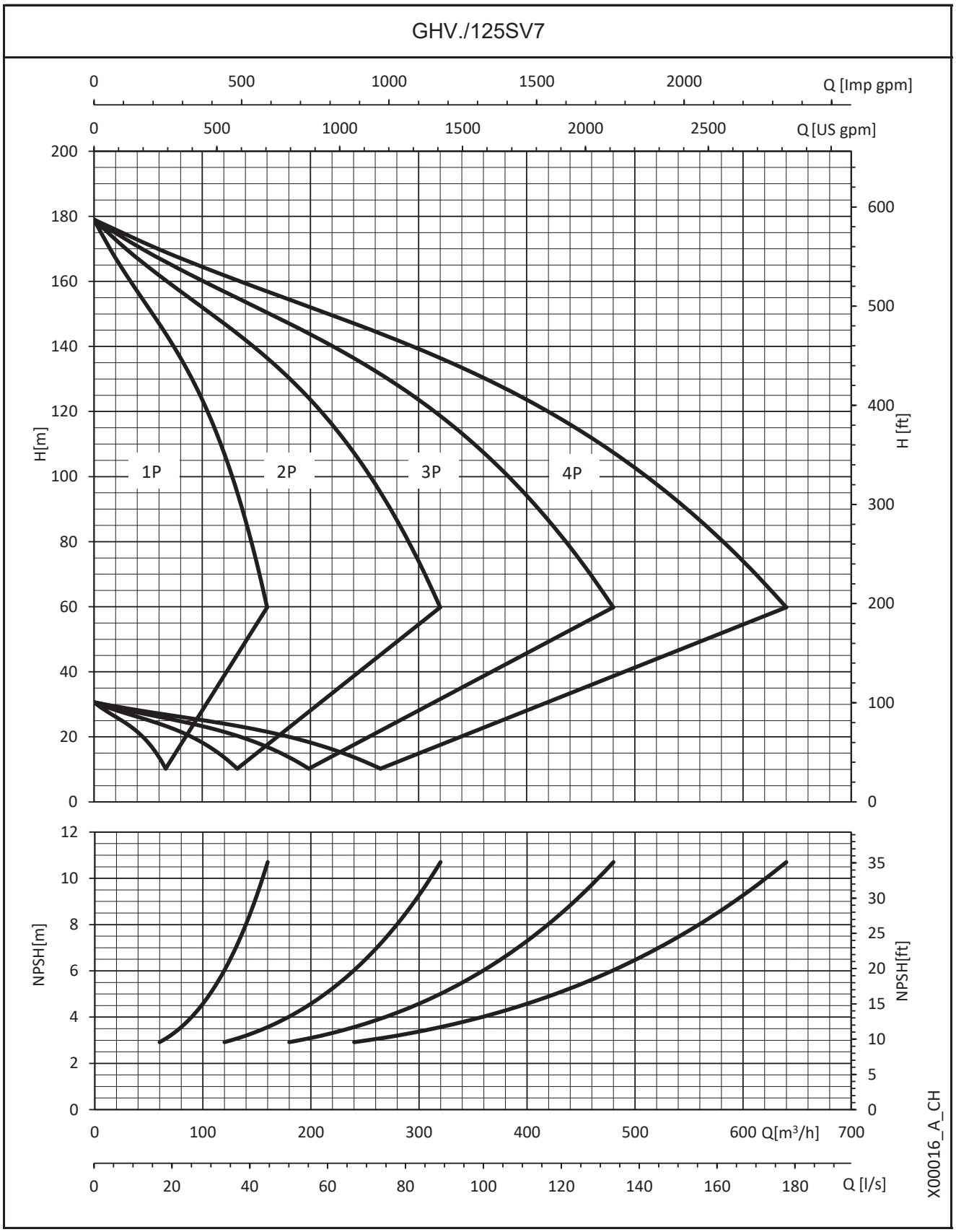
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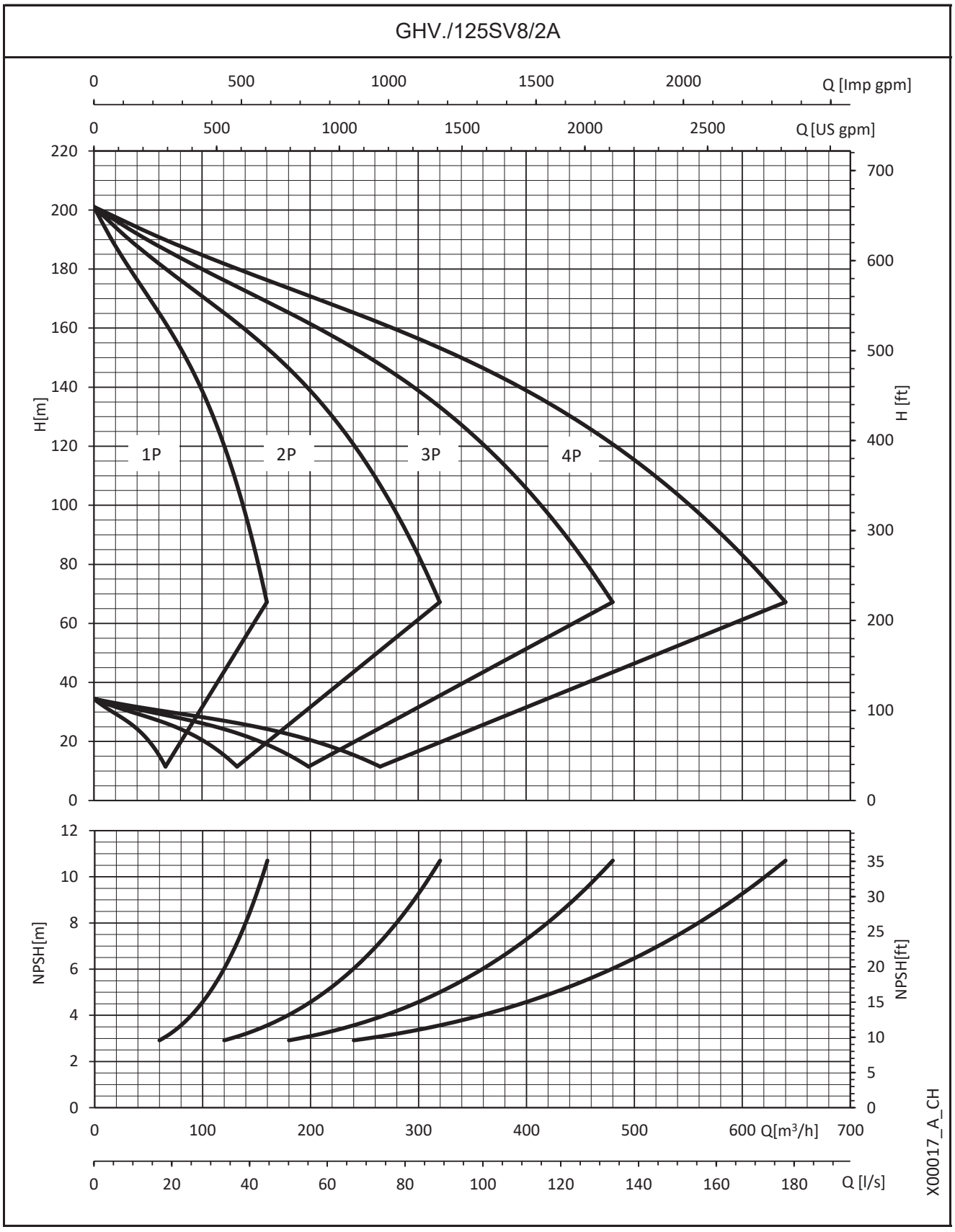
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OPERATING CHARACTERISTICS



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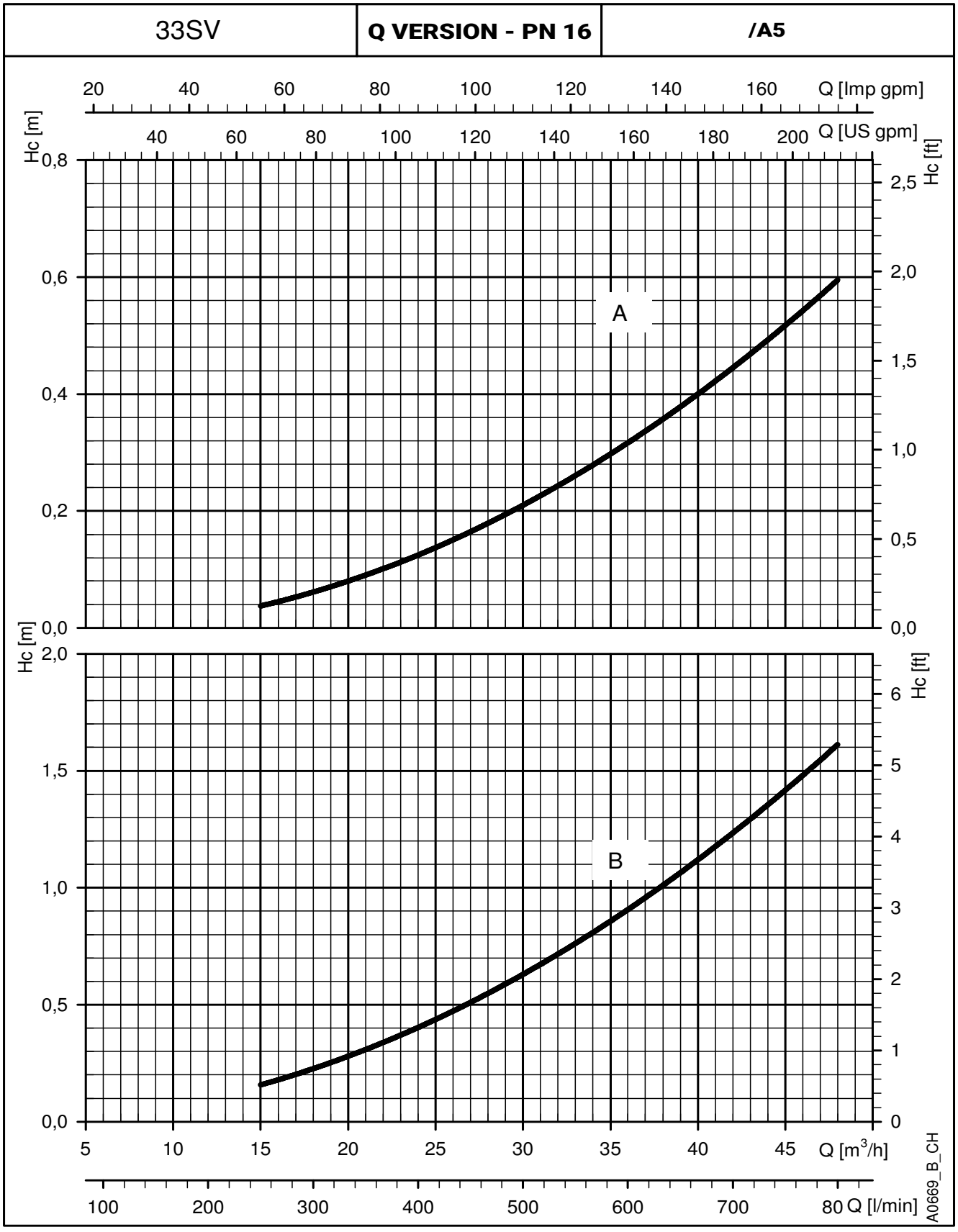
GHV./..SV SERIES
OPERATING CHARACTERISTICS



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GHV./..SV SERIES
HC PRESSURE DROP CURVE

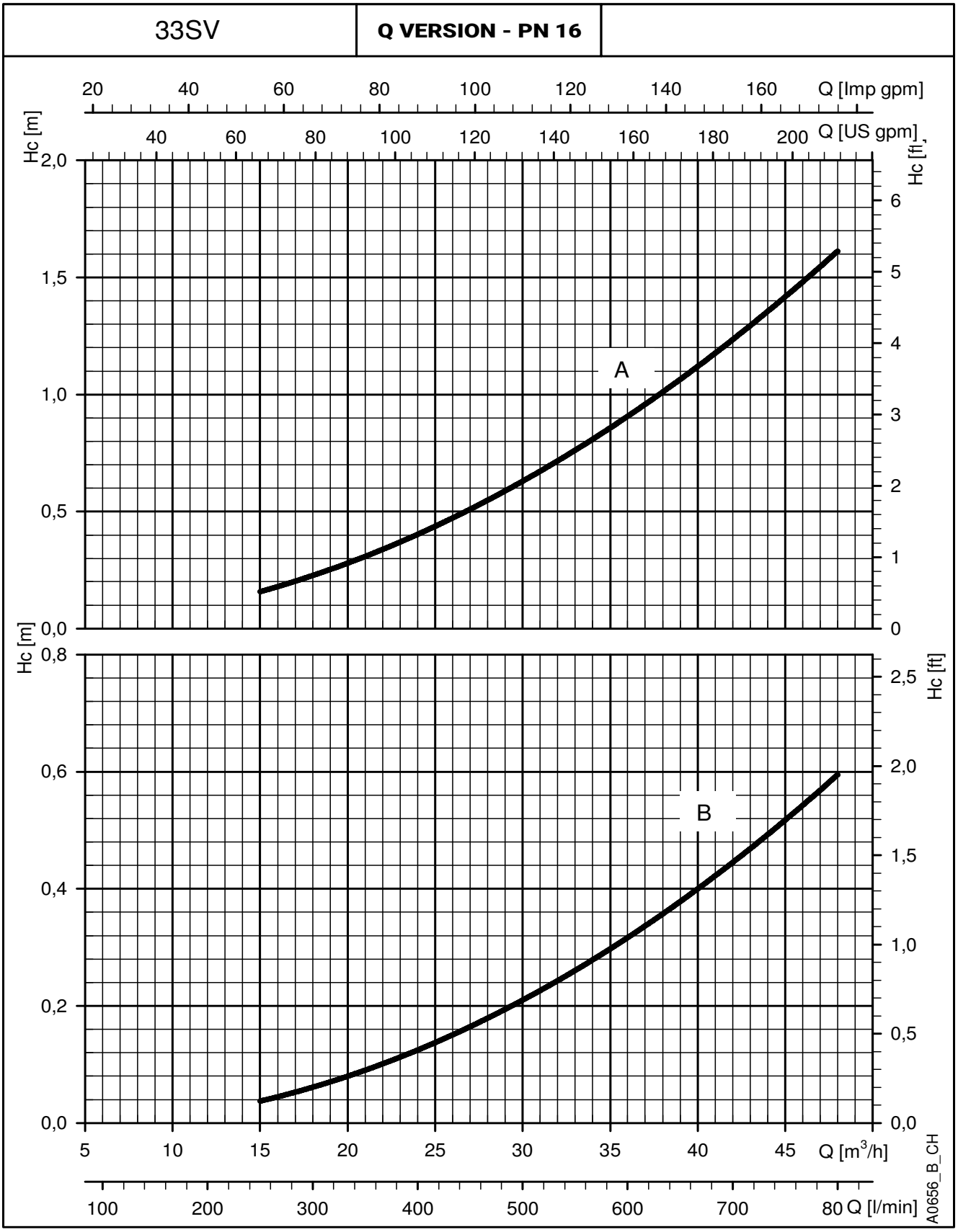
33SV	**Q VERSION - PN 16**	**/A5**



The declared curves are valid for liquids with density ρ = 1 Kg/dm³ and kinematic viscosity v = 1 mm²/sec.
Hc (A): Pressure drop curve on delivery side of the pump. Hc (B): Pressure drop curve on suction side of the pump.
RA: check valve on suction side. RM: check valve on delivery side.
The pressure drops do not consider the distributed pressure drops on the manifold.

GHV./..SV SERIES
HC PRESSURE DROP CURVE

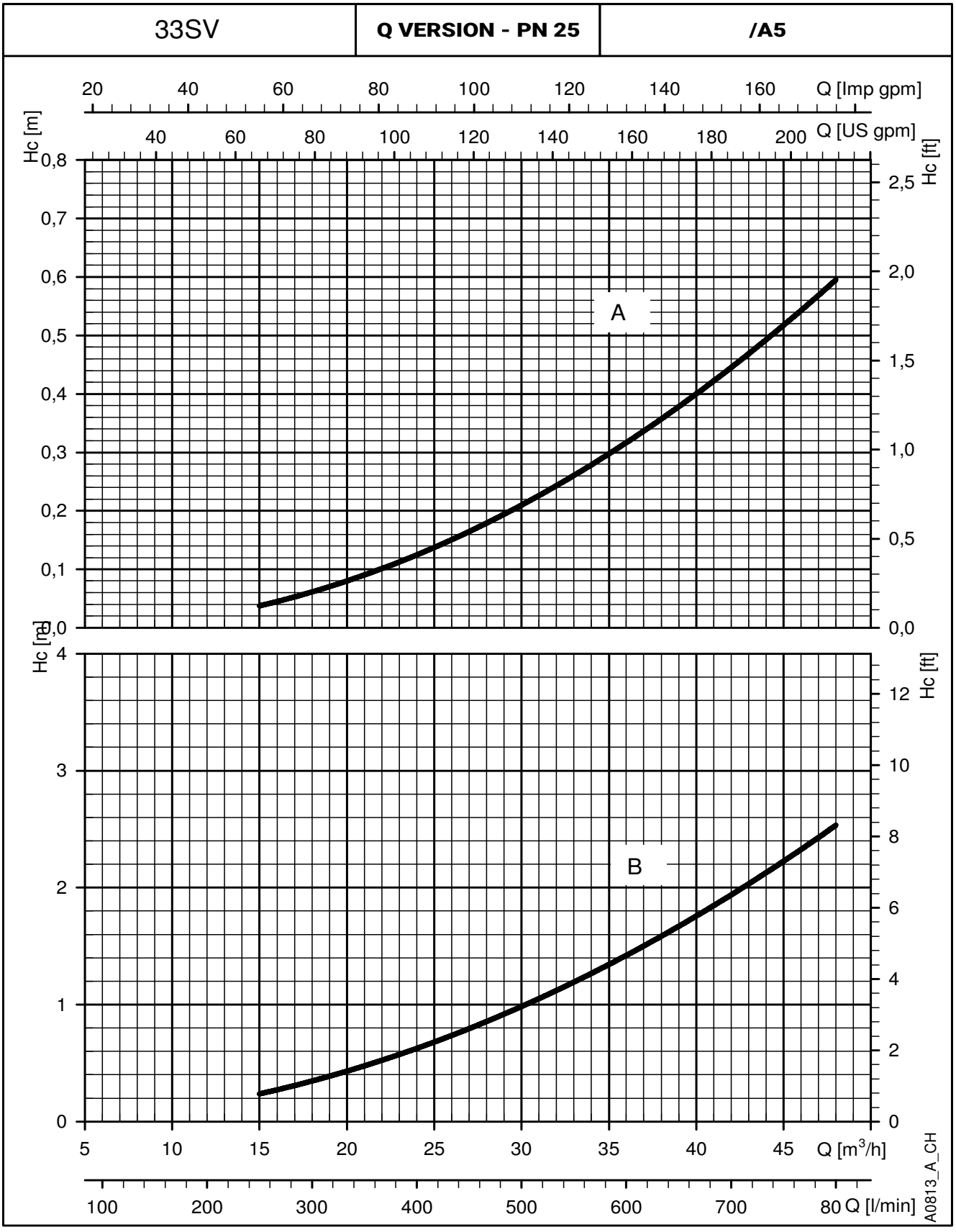
33SV	**Q VERSION - PN 16**	



The declared curves are valid for liquids with density ρ = 1 Kg/dm^3 and kinematic viscosity v = 1 mm^2/sec.
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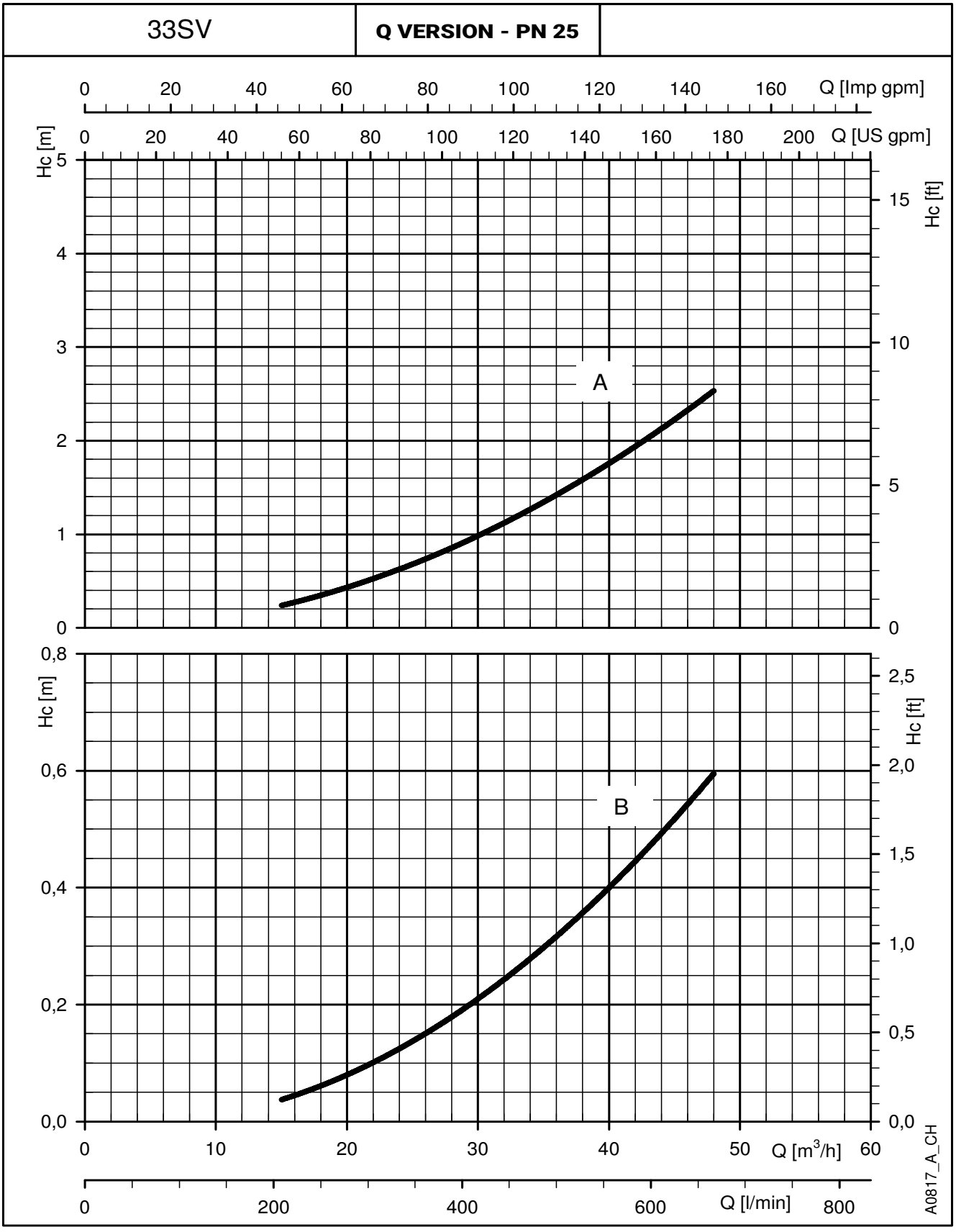
GHV./..SV SERIES
HC PRESSURE DROP CURVE

33SV	Q VERSION - PN 25	/A5



The declared curves are valid for liquids with density ρ = 1 Kg/dm³ and kinematic viscosity v = 1 mm²/sec.
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RA: check valve on suction side. RM: check valve on delivery side.
The pressure drops do not consider the distributed pressure drops on the manifold.

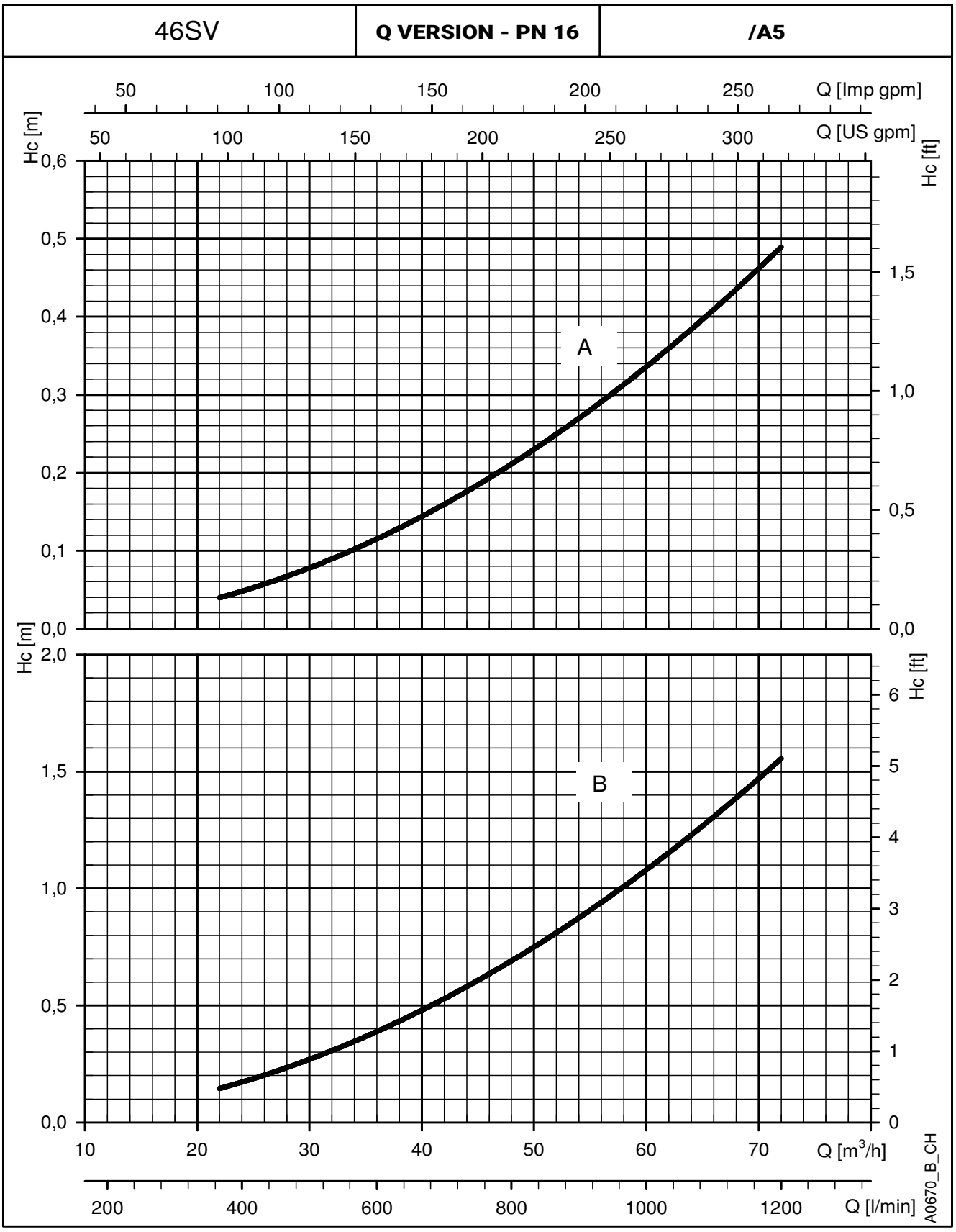
GHV./..SV SERIES
HC PRESSURE DROP CURVE



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GHV./..SV SERIES
HC PRESSURE DROP CURVE

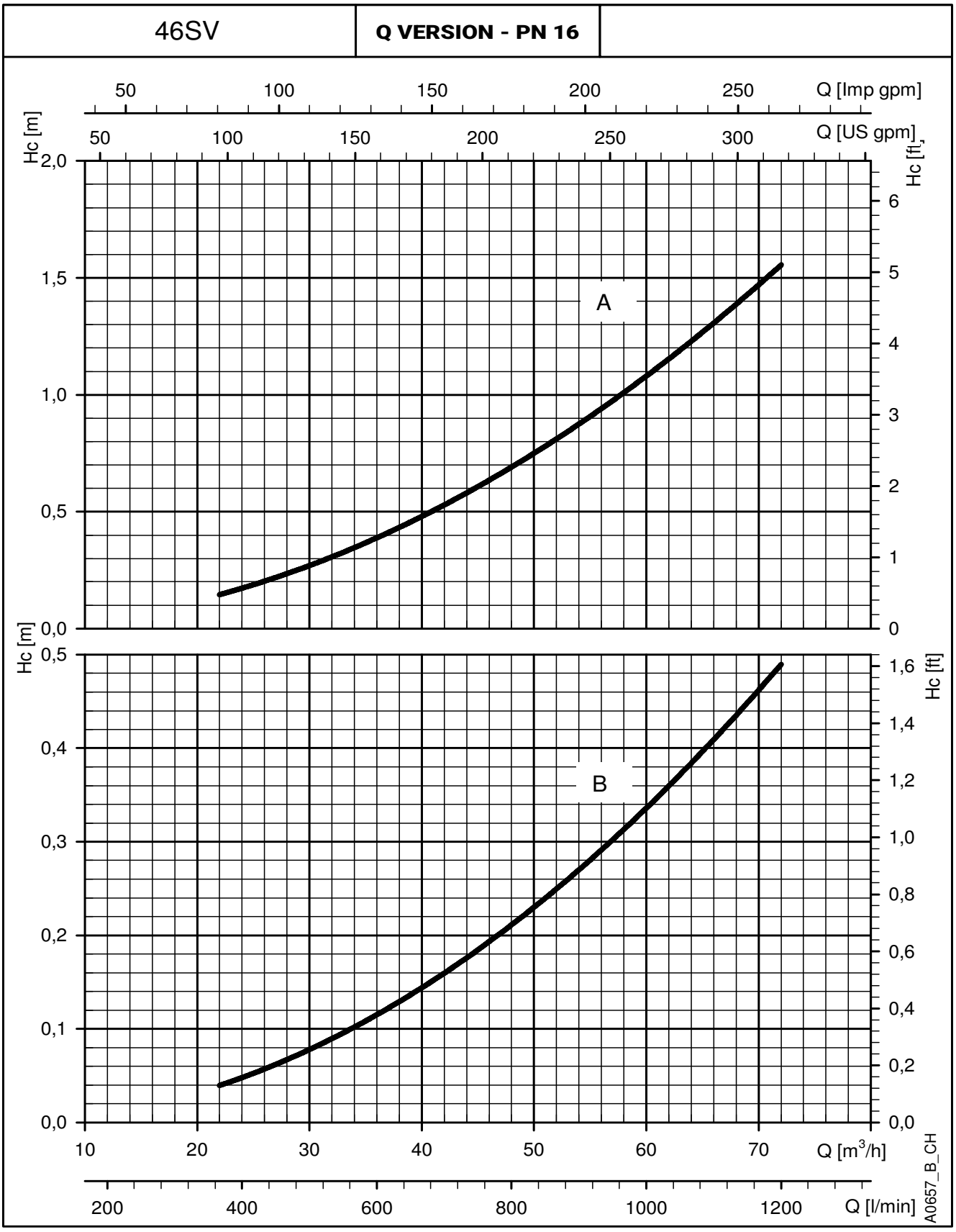
46SV	Q VERSION - PN 16	/A5



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GHV./..SV SERIES
HC PRESSURE DROP CURVE

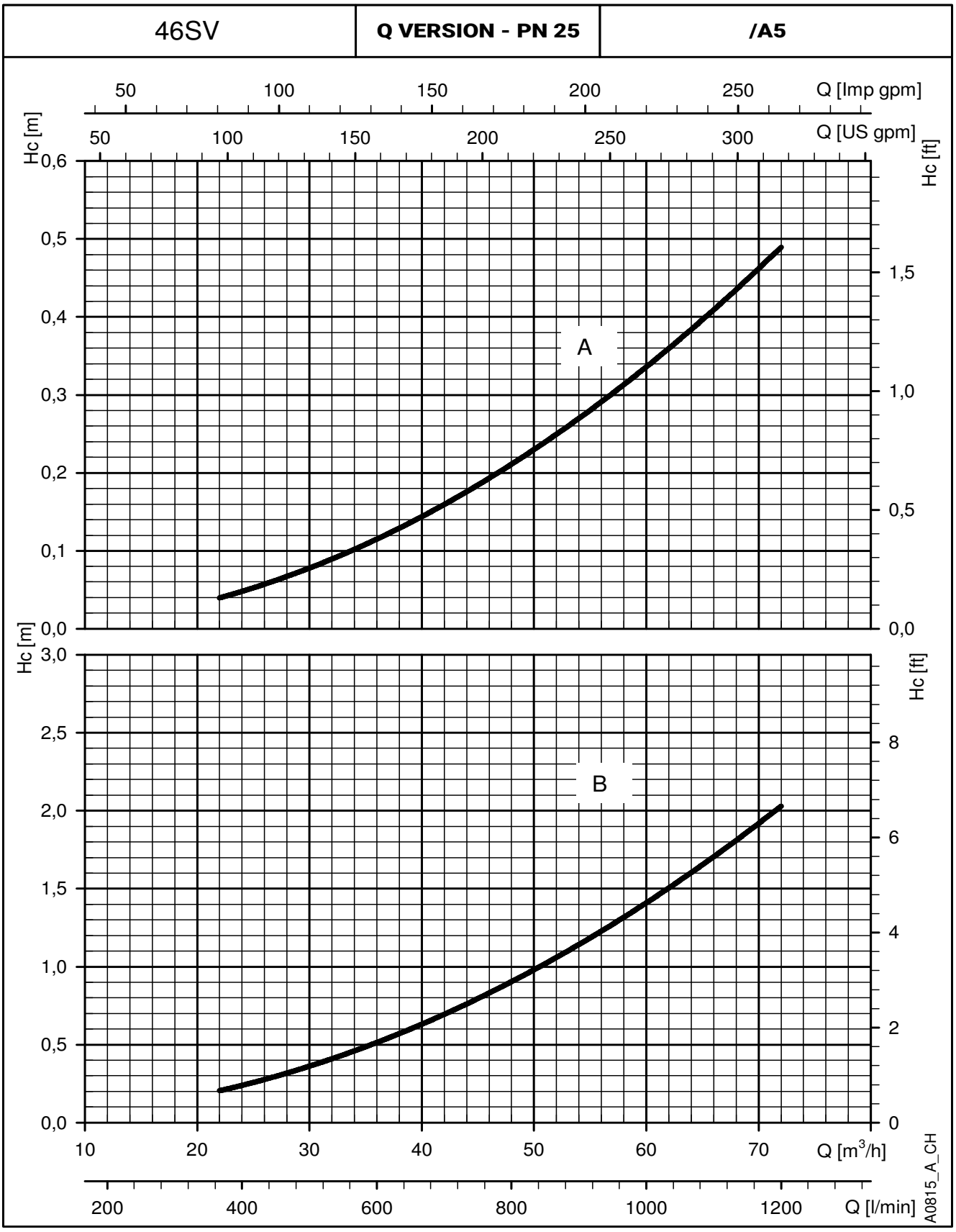
46SV	**Q VERSION - PN 16**	



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GHV./..SV SERIES
HC PRESSURE DROP CURVE

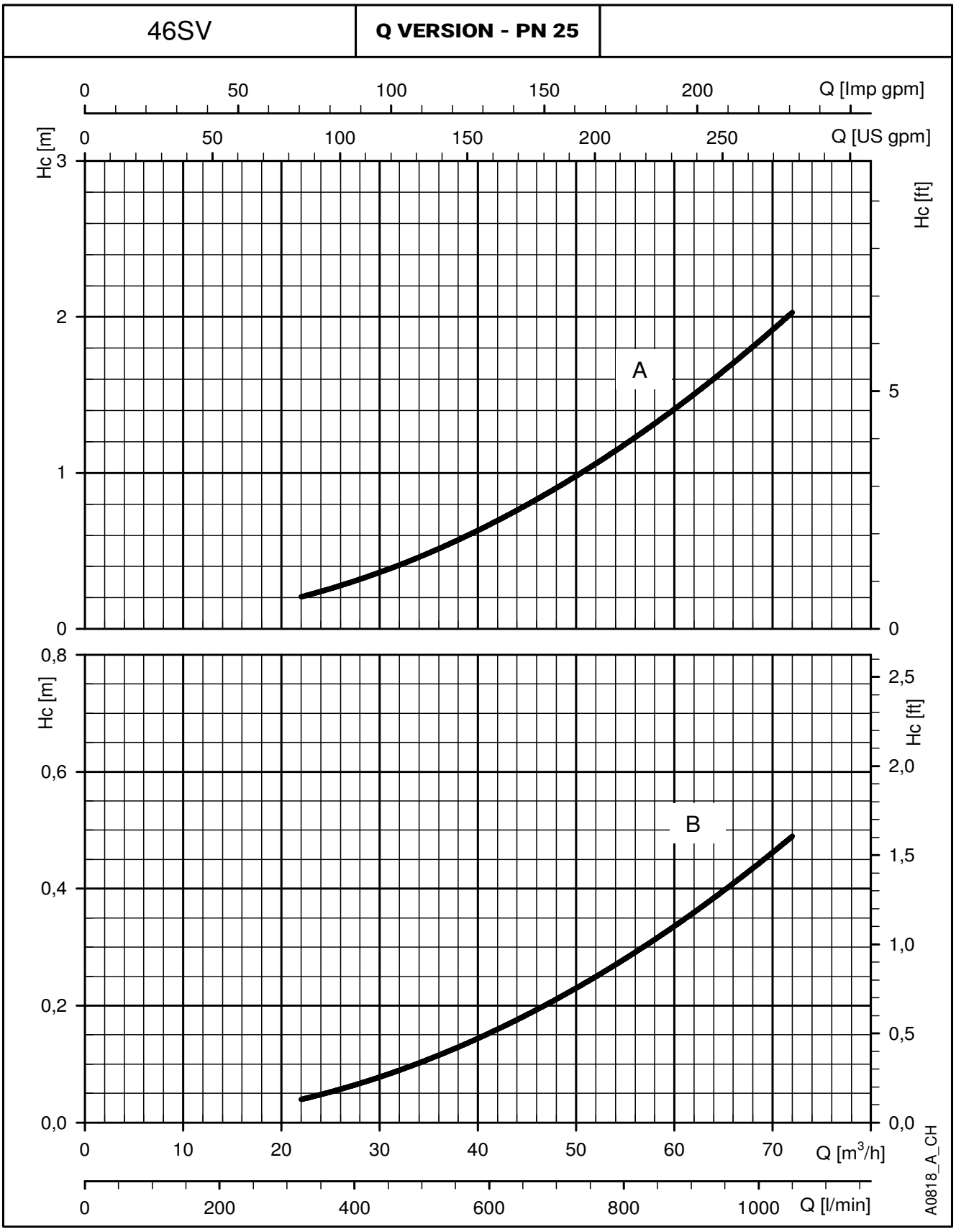
46SV	Q VERSION - PN 25	/A5



The declared curves are valid for liquids with density ρ = 1 Kg/dm^3 and kinematic viscosity v = 1 mm^2/sec.
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GHV./..SV SERIES
HC PRESSURE DROP CURVE

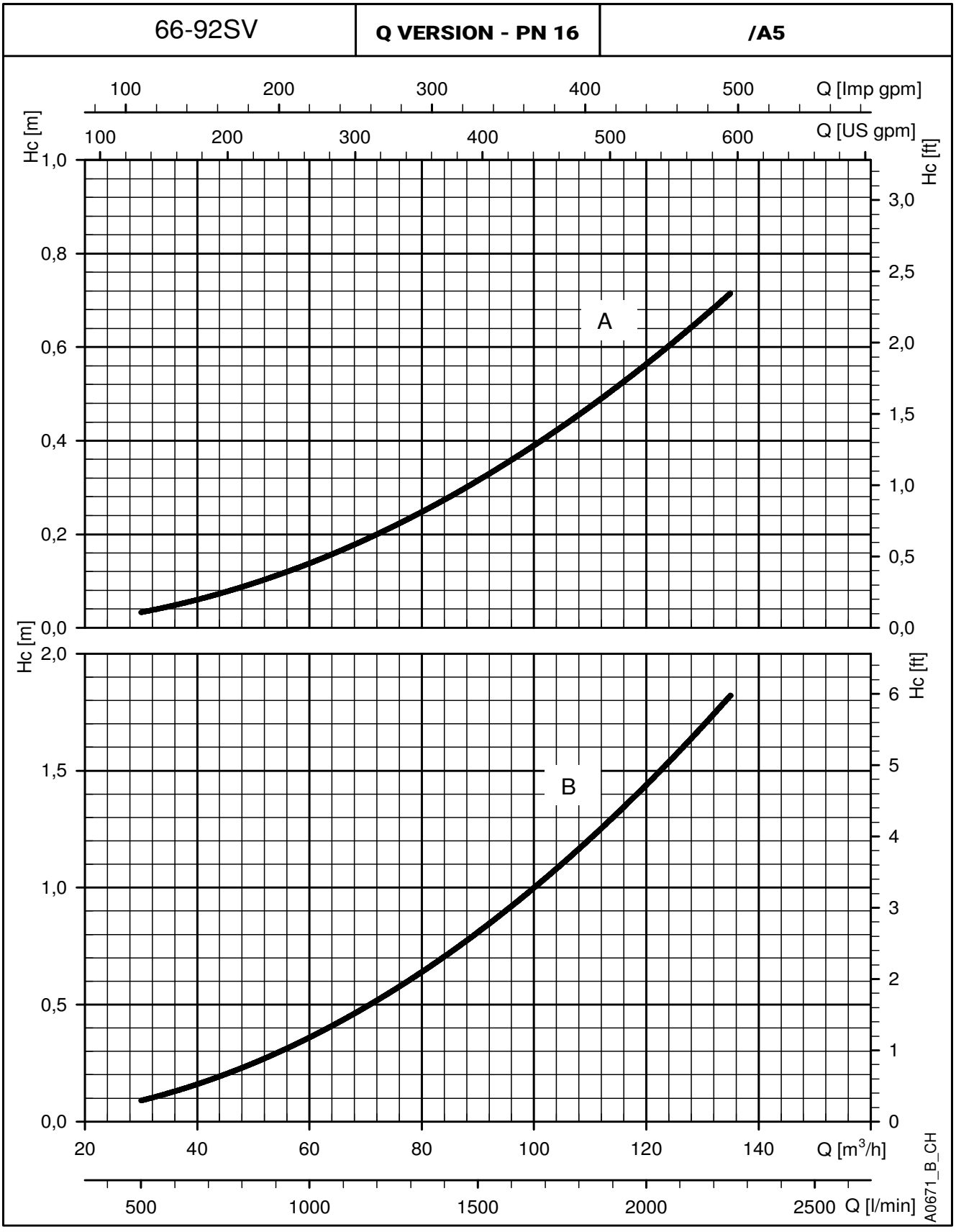
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GHV./..SV SERIES
HC PRESSURE DROP CURVE

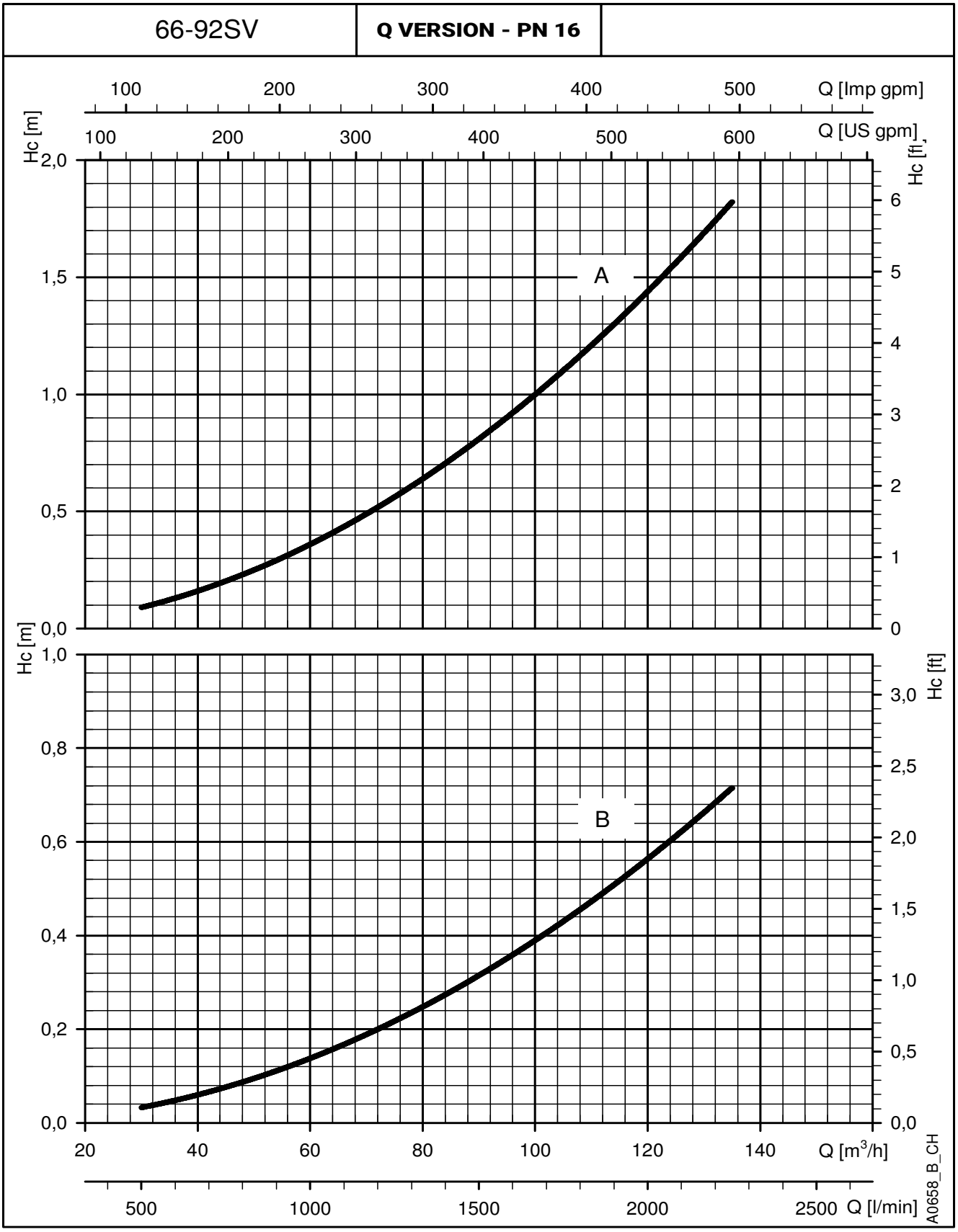
66-92SV	**Q VERSION - PN 16**	**/A5**



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The pressure drops do not consider the distributed pressure drops on the manifold.

GHV./..SV SERIES
HC PRESSURE DROP CURVE

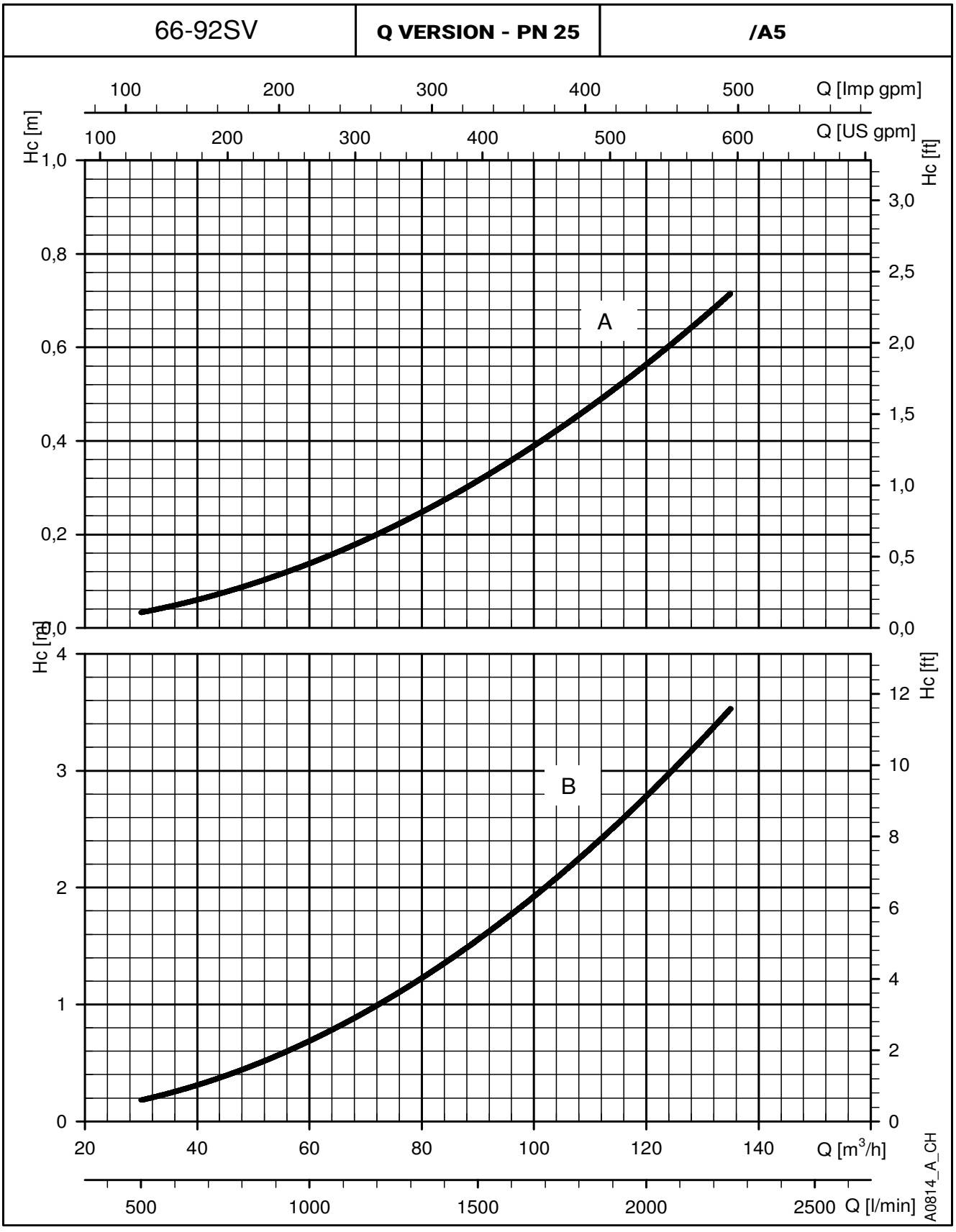
66-92SV	**Q VERSION - PN 16**	



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GHV./..SV SERIES
HC PRESSURE DROP CURVE

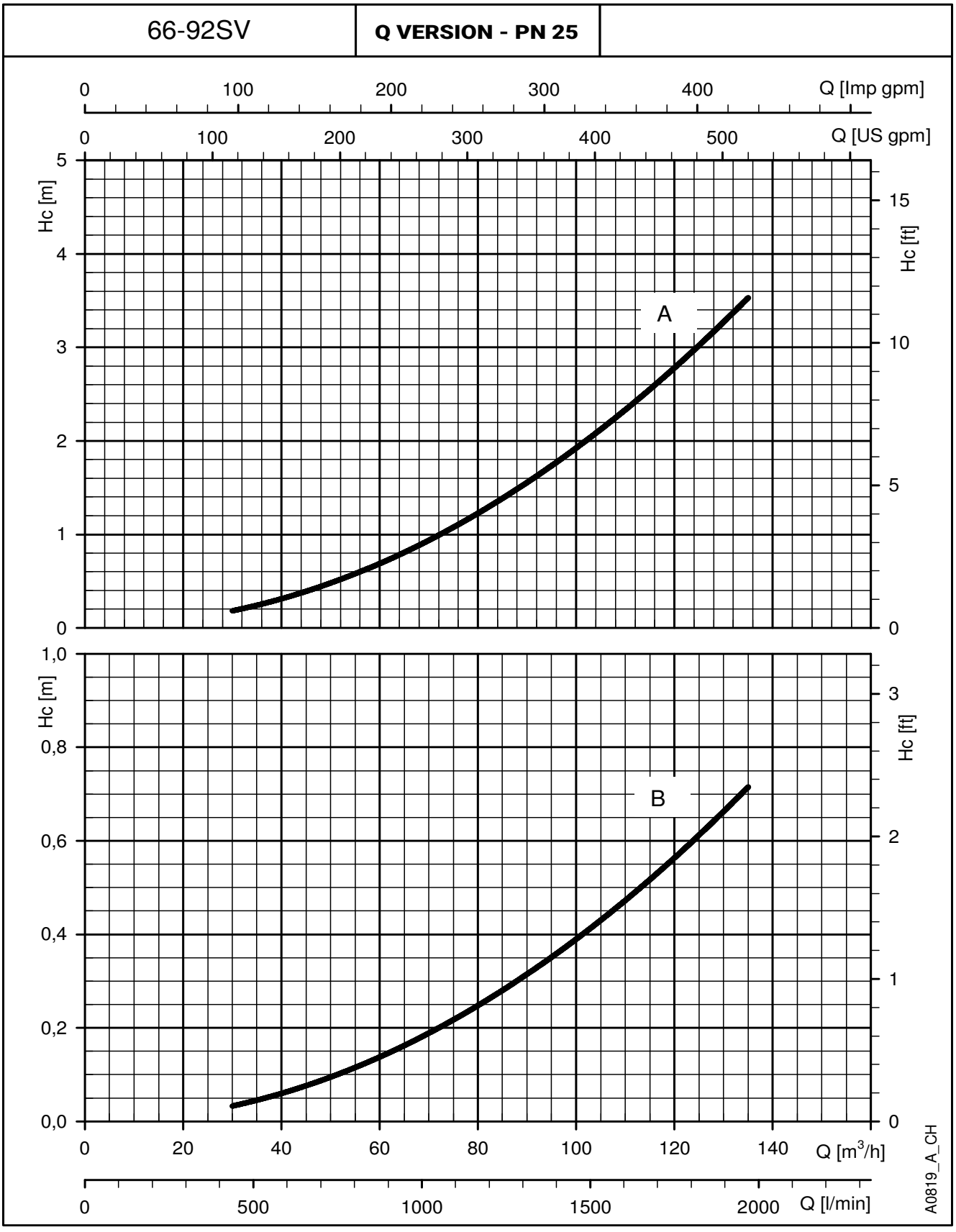
66-92SV	**Q VERSION - PN 25**	**/A5**



The declared curves are valid for liquids with density ρ = 1 Kg/dm³ and kinematic viscosity v = 1 mm²/sec.
Hc (A): Pressure drop curve on delivery side of the pump. Hc (B): Pressure drop curve on suction side of the pump.
RA: check valve on suction side. RM: check valve on delivery side.
The pressure drops do not consider the distributed pressure drops on the manifold.

GHV./..SV SERIES
HC PRESSURE DROP CURVE

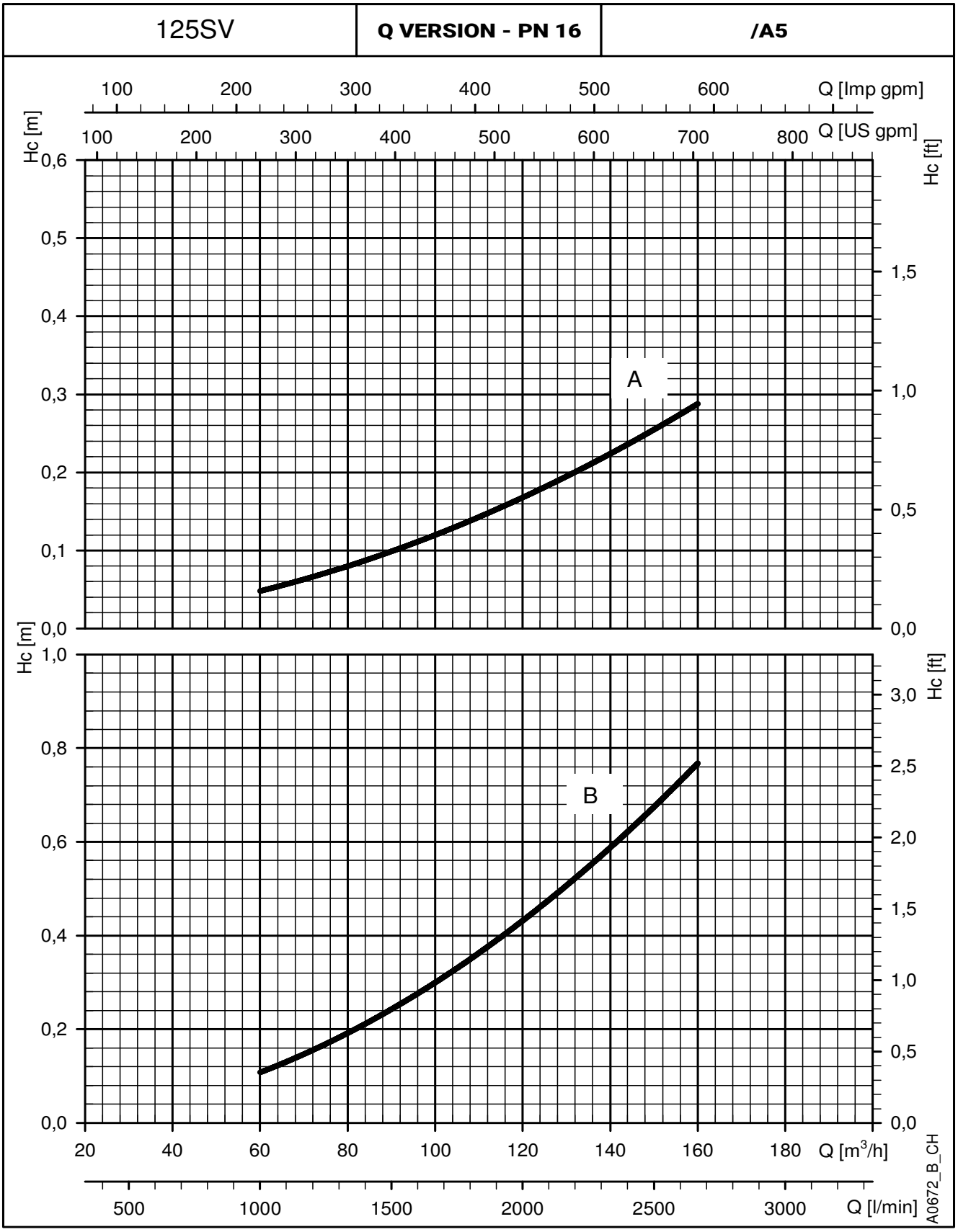
66-92SV	**Q VERSION - PN 25**	



The declared curves are valid for liquids with density ρ = 1 Kg/dm³ and kinematic viscosity v = 1 mm²/sec.
Hc (A): Pressure drop curve on delivery side of the pump. Hc (B): Pressure drop curve on suction side of the pump.
RA: check valve on suction side. RM: check valve on delivery side.
The pressure drops do not consider the distributed pressure drops on the manifold.

GHV./..SV SERIES
HC PRESSURE DROP CURVE

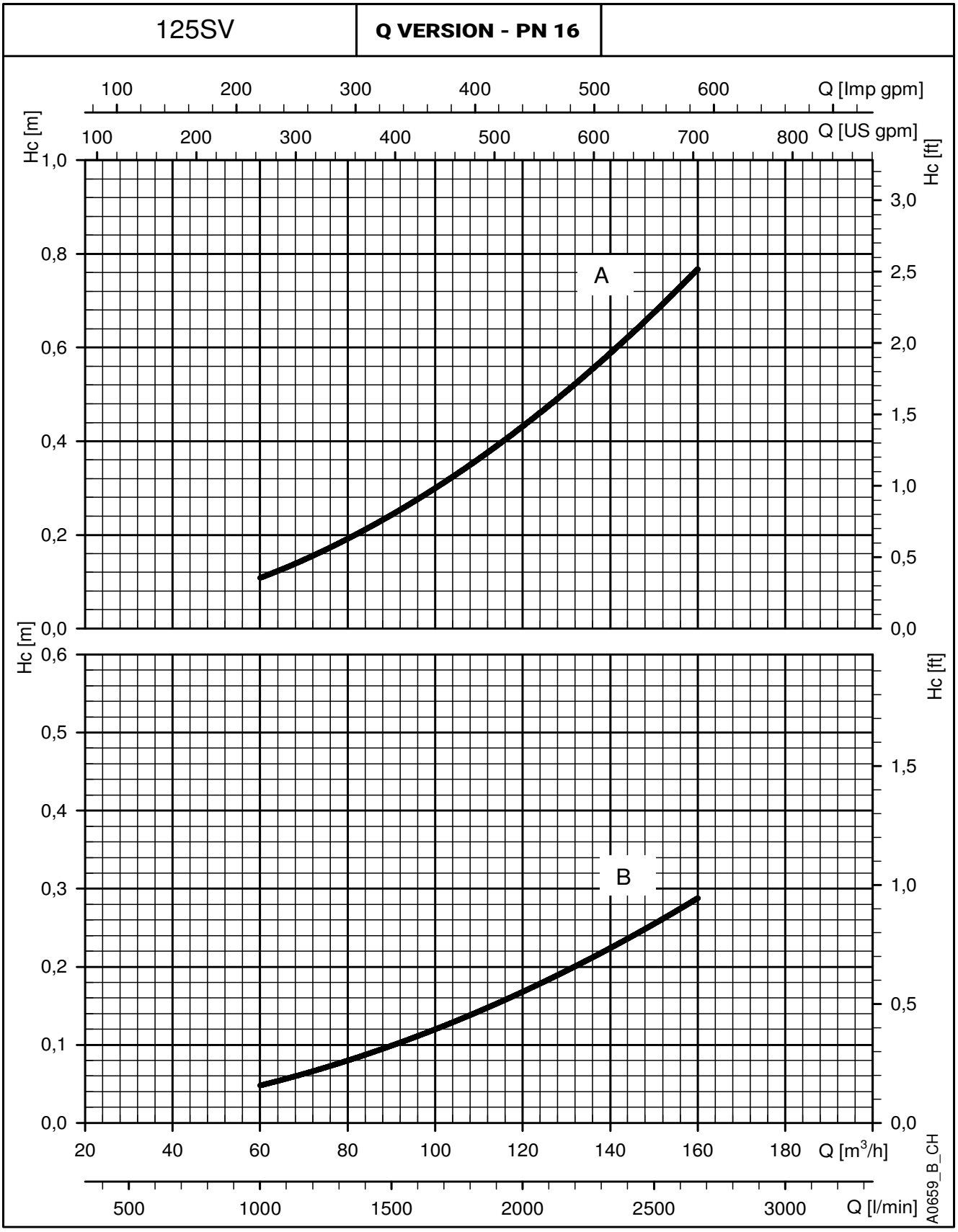
125SV	Q VERSION - PN 16	/A5



The declared curves are valid for liquids with density ρ = 1 Kg/dm^3 and kinematic viscosity v = 1 mm^2/sec.
Hc (A): Pressure drop curve on delivery side of the pump. Hc (B): Pressure drop curve on suction side of the pump.
RA: check valve on suction side. RM: check valve on delivery side.
The pressure drops do not consider the distributed pressure drops on the manifold.

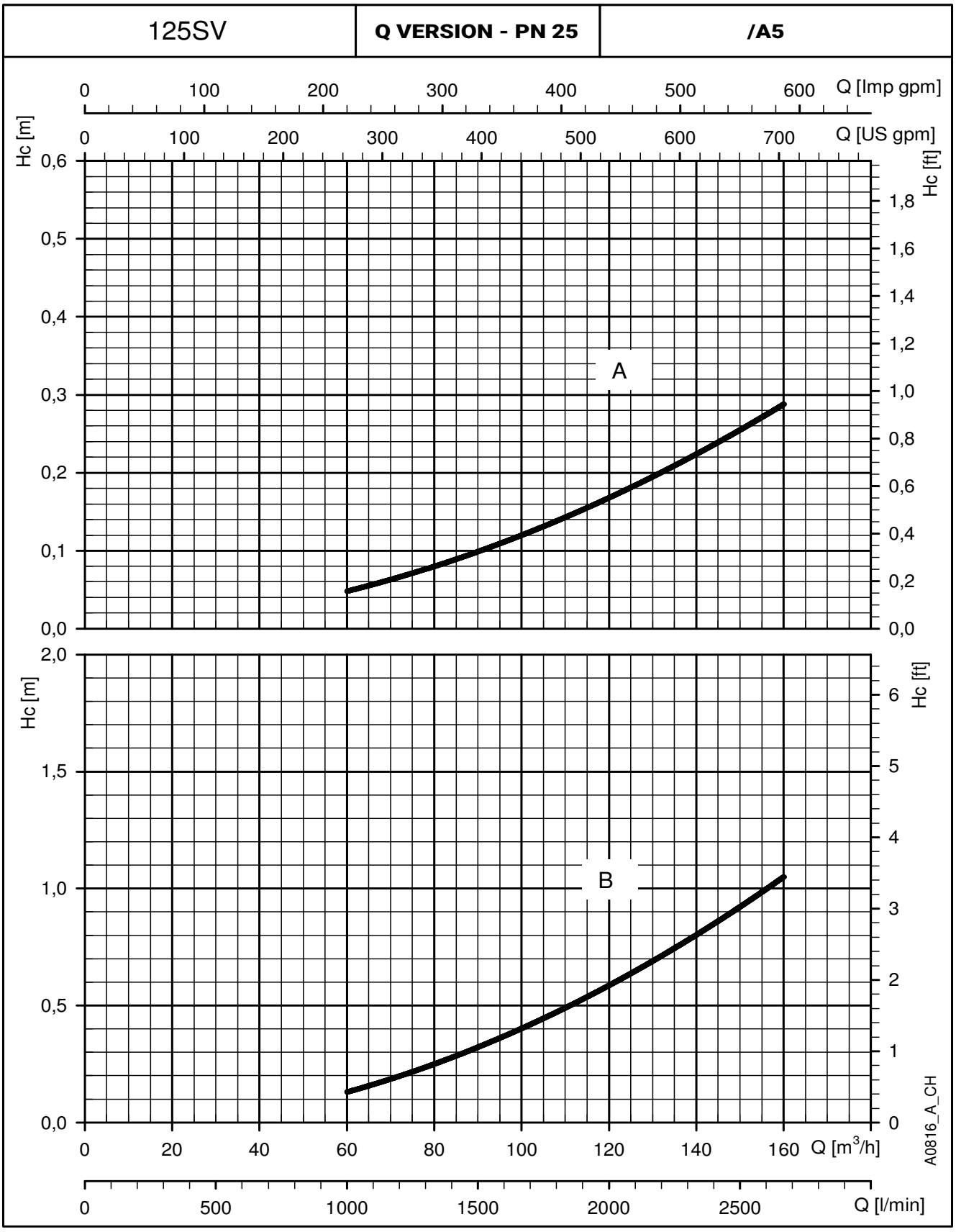
GHV./..SV SERIES
HC PRESSURE DROP CURVE

125SV	**Q VERSION - PN 16**	



The declared curves are valid for liquids with density ρ = 1 Kg/dm³ and kinematic viscosity v = 1 mm²/sec.
Hc (A): Pressure drop curve on delivery side of the pump. Hc (B): Pressure drop curve on suction side of the pump.
RA: check valve on suction side. RM: check valve on delivery side.
The pressure drops do not consider the distributed pressure drops on the manifold.

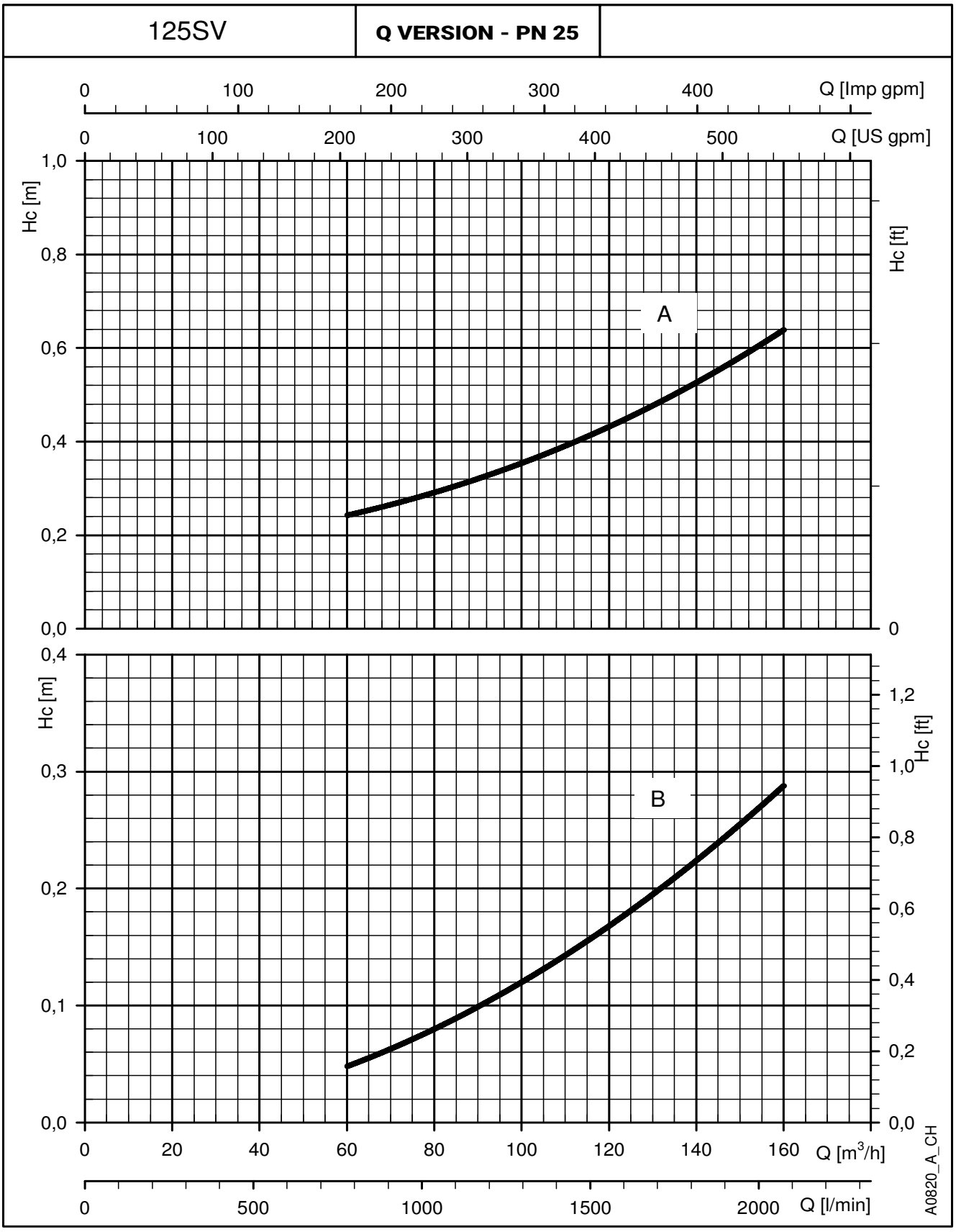
GHV./..SV SERIES
HC PRESSURE DROP CURVE



The declared curves are valid for liquids with density ρ = 1 Kg/dm^3 and kinematic viscosity v = 1 mm^2/sec.
Hc (A): Pressure drop curve on delivery side of the pump. Hc (B): Pressure drop curve on suction side of the pump.
RA: check valve on suction side. RM: check valve on delivery side.
The pressure drops do not consider the distributed pressure drops on the manifold.

GHV./..SV SERIES
HC PRESSURE DROP CURVE

125SV	**Q VERSION - PN 25**	



The declared curves are valid for liquids with density ρ = 1 Kg/dm^3 and kinematic viscosity v = 1 mm^2/sec.
Hc (A): Pressure drop curve on delivery side of the pump. Hc (B): Pressure drop curve on suction side of the pump.
RA: check valve on suction side. RM: check valve on delivery side.
The pressure drops do not consider the distributed pressure drops on the manifold.

ACCESSORIES

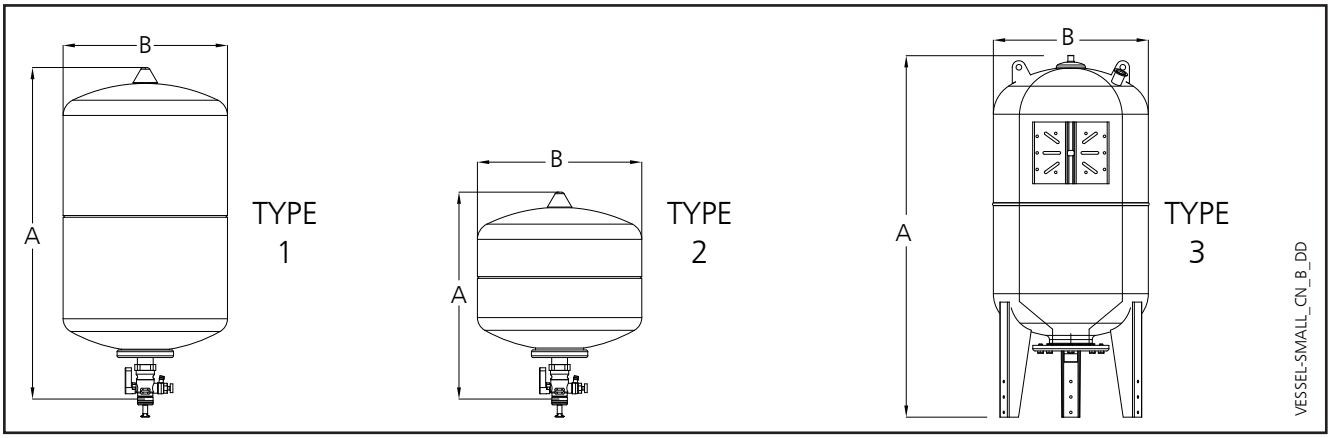
ACCESSORIES FOR BOOSTER SETS
EXPANSION VESSEL KITS

Any large size tanks can be connected to the unused end of the delivery manifold. For proper sizing of the tank, please refer to the technical appendix.
Kits including the following accessories **are available on request:**

- Expansion vessel
- Instructions sheet
- Packaging
- Special isolation device for tank that avoids water stagnation and allows servicing. Only for type 1 and type 2.

Volume	Type	PN	DIMENSIONS (mm)			Vessel material			Device material
Liters		bar	A	ø B	Connection	Bladder	Body	Connection	Connection
25	1	10	280	567	G 3/4"	BUTYL	Painted steel	AISI 304	Brass
12	2	16	280	354	G 3/4"	BUTYL	Painted steel	AISI 304	Brass
100	3	10	910	450	G 1"	BUTYL	Painted steel	AISI 304	-
100	3	16	910	450	G 1"	BUTYL	Painted steel	AISI 304	-
200	3	10	1235	550	G 1" 1/2	BUTYL	Painted steel	AISI 304	-
200	3	16	1235	550	G 1" 1/2	BUTYL	Painted steel	AISI 304	-
300	3	10	1365	630	G 1" 1/2	BUTYL	Painted steel	AISI 304	-
300	3	26	1365	630	G 1" 1/2	BUTYL	Painted steel	AISI 304	-

vessel-small-en_cn_b_td



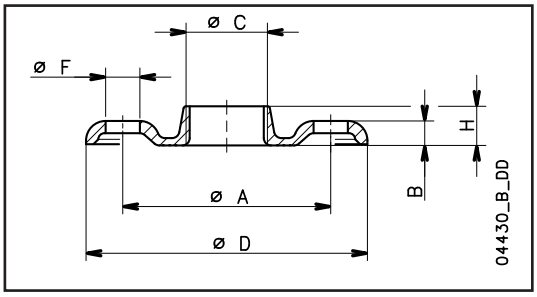
FLANGE KIT

Manifolds up to 3” are supplied with threaded attachments and caps for sealing the unused ends.
For these manifolds, stainless steel AISI 304 or 316 flanges for connection to the system are available on request.

THREADED COUNTERFLANGES

KIT		DIMENSIONS (mm)						HOLES		
TYPE	DN	MODEL	ø C	ø A	B	ø D	H	ø F	N°	PN
2"	50	A	Rp 2	125	16	165	24	18	4	25
2" ½	65	A	Rp 2 ½	145	16	185	23	18	4	16
3"	80	A	Rp 3	160	17	200	27	18	8	16
2" ½	65	B	Rp 2 ½	145	22	185	38	18	8	25
3"	80	B	Rp 3	160	24	200	40	18	8	25

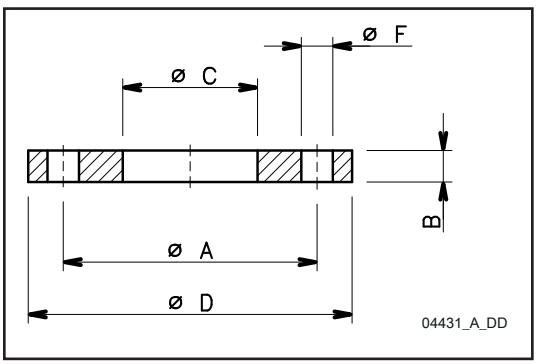
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WELD-ON COUNTERFLANGES

KIT		DIMENSIONS (mm)				HOLES		
TYPE	DN	ø C	ø A	B	ø D	ø F	N°	PN
2"	50	61,5	125	20	165	18	4	16
2"1/2	65	77,5	145	20	185	18	4	16
3"	80	90,5	160	20	200	18	8	16
4"	100	116	180	22	220	18	8	16
5"	125	141,5	210	22	250	18	8	16
6"	150	170,5	240	24	285	22	8	16
8"	200	221,5	295	26	340	22	12	16
10"	250	276,5	355	29	405	26	12	16
12"	300	327,5	410	32	460	26	12	16

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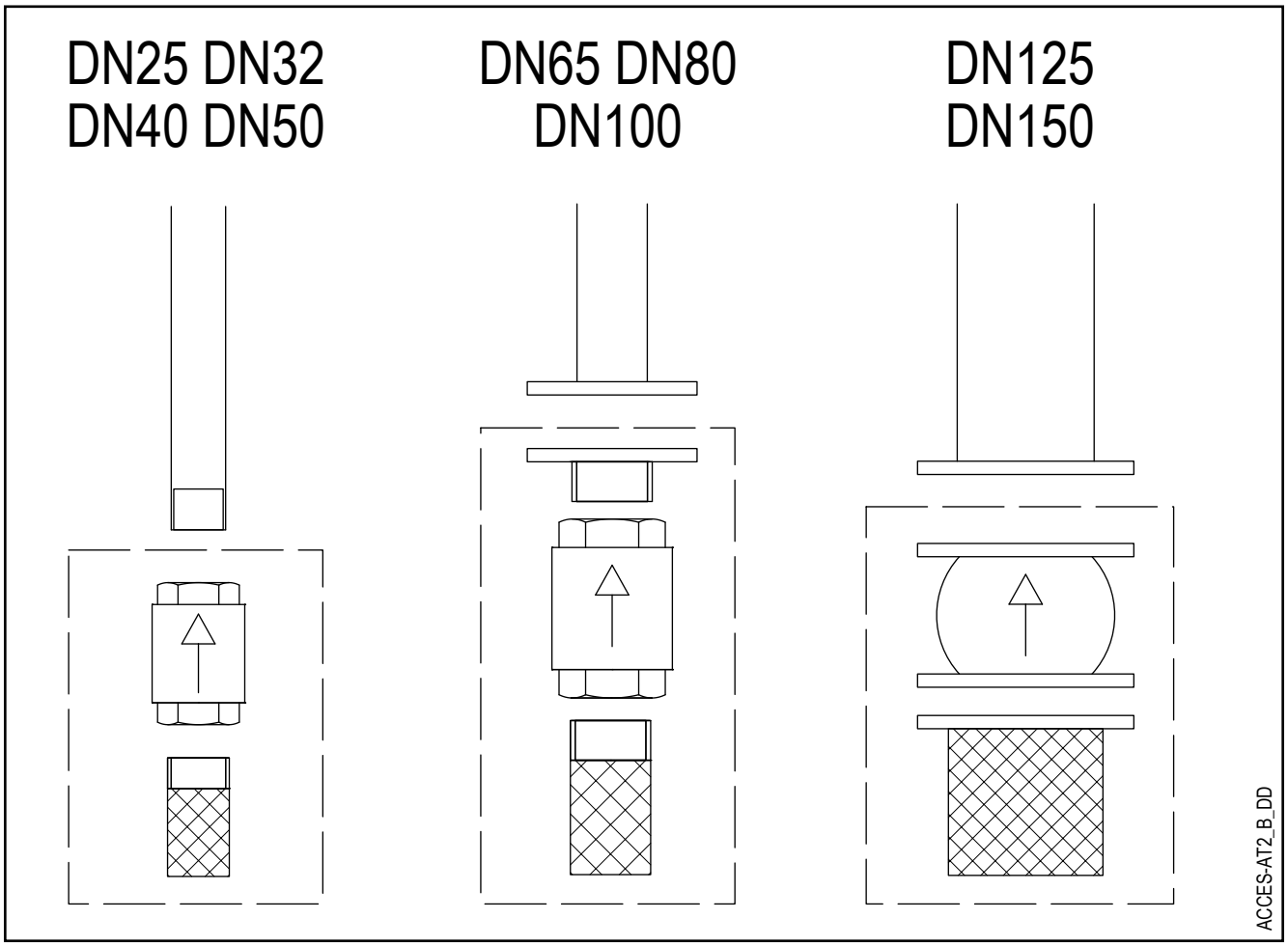


ACCESSORIES FOR BOOSTER SETS

SUCTION SIDE KIT

The GHV..SA booster sets are supplied without components on the suction side of the pumps and can be completed with piping, strainers and foot valves.

The following table summarizes the pump type and the components of the kit, such as strainer and foot valve. The pipe connection from foot valve and pump must be provided by the customers.



PUMP NAME	FOOT VALVE & STRAINER SIZE	FOOT VALVE & STRAINER MATERIAL
1SV	DN32	Aisi 304
3SV	DN32	Aisi 304
5SV	DN40	Aisi 304
10SV	DN50	Aisi 304
15SV	DN65	Aisi 304
22SV	DN65	Aisi 304
33SV	DN80	Aisi 304
46SV	DN100	Aisi 304
66SV	DN125	Aisi 304
92SV	DN125	Aisi 304
125SV	DN150	Aisi 304

acces-strainer_at2_mat-en_a_tm

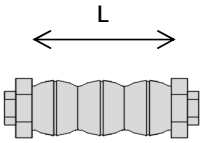
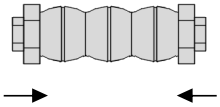
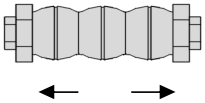
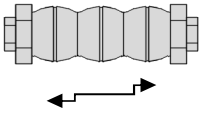
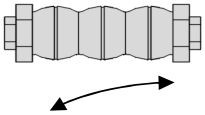
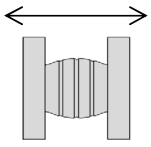
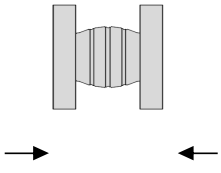
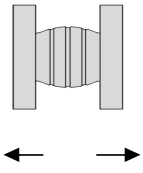
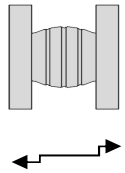
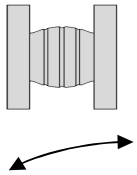
ANTI-VIBRATION JOINT KIT

Anti-vibration joints, or compensation joints, can be used to absorb deformations, expansions, pipe noise and reduce water hammering. They can also withstand a high level of vacuum, which enables the absorption of negative expansions due to depression.

Due to its elasticity, the material can deform or expand as necessary, making installation easier, simpler and quicker, even when the piping is not aligned.

The drinking water certificates are valid for the standard booster configuration. Please check with your Sales representative the drinking water certifications applicable for boosters equipped with fitted joints.
For more information, please contact the sales network.

RUBBER EXPANSION JOINT

EPDM RUBBER (*) DN	Pmax bar (**)	L  (mm)	A  (mm)	B  (mm)	C  (mm)	D  (°)
1"	10	203	22	6	22	25
1"1/4	10	203	22	6	22	25
1"1/2	10	203	22	6	22	20
2"	10	203	22	6	22	15
2"1/2	10	203	22	6	22	12
3	10	203	22	6	22	10
EPDM RUBBER (*) DN	Pmax bar (**)	L  (mm)	A  (mm)	B  (mm)	C  (mm)	D  (°)
32	16	152	13	9	13	15
40	16	152	13	9	13	15
50	16	152	13	9	13	15
65	16	152	13	9	13	15
80	16	152	13	9	13	15
100	16	152	19	13	13	15
125	16	152	19	13	13	15
150	16	152	19	13	13	15
200	16	152	19	13	19	15
250	16	203	25	16	19	15
300	10	203	25	16	19	15
350	10	203	25	16	19	15
400	9	203	25	16	19	15
450	9	203	25	16	19	15
500	9	203	25	16	19	15

* Metallic part in SS316

GD-316_JOINT-en_A_TD

** Maximum pressure permitted up to 80°C water

LEGEND

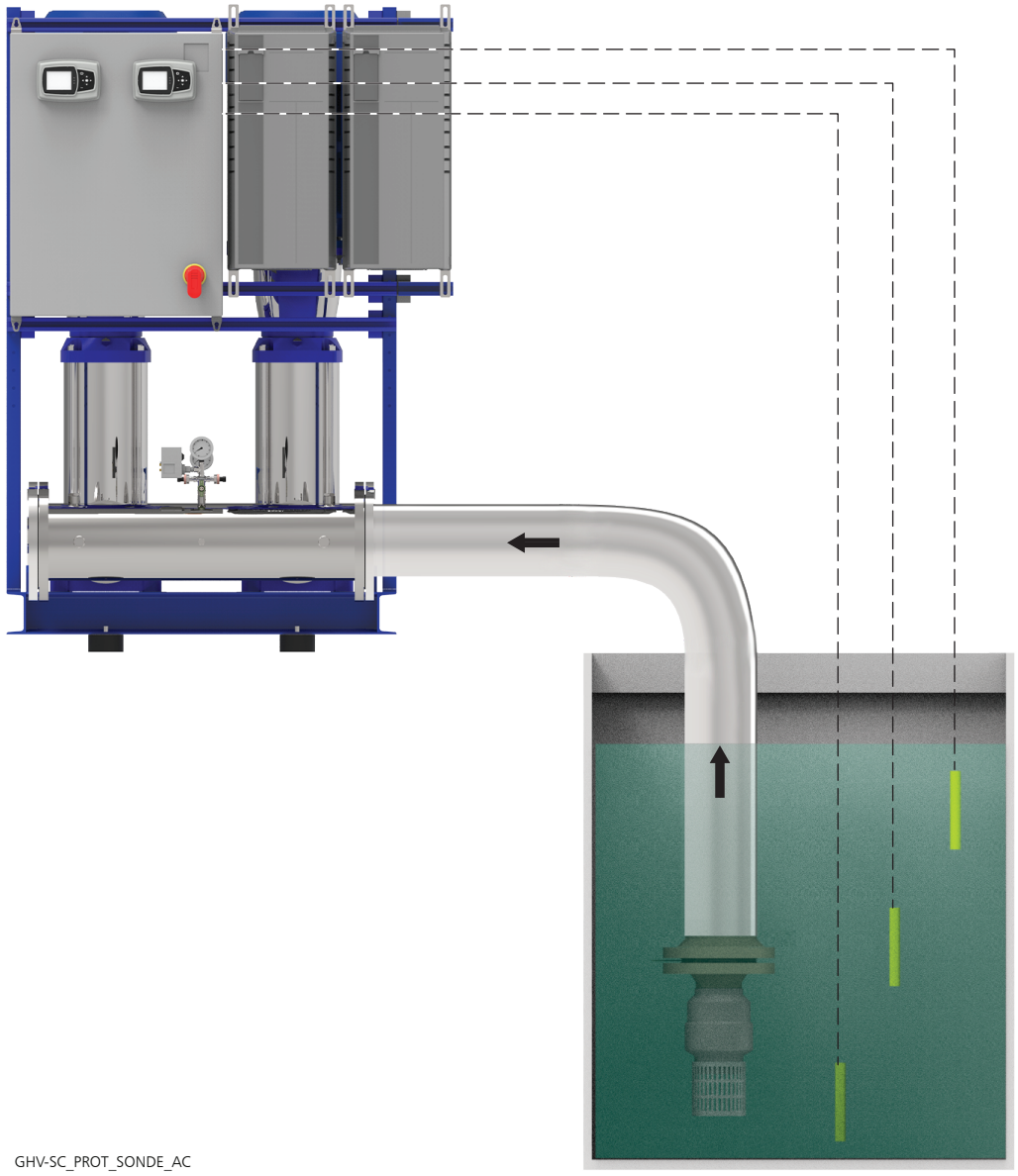
A = compression
B = extension
C = transverse
D = angular movement
NOTE. **A** - **B** - **C** - **D** can not be cumulative

PROTECTION SYSTEMS AGAINST DRY RUNNING

To avoid damaging the pumps, protection systems must be used to prevent it from dry running.

ELECTRODE PROBE PROTECTION

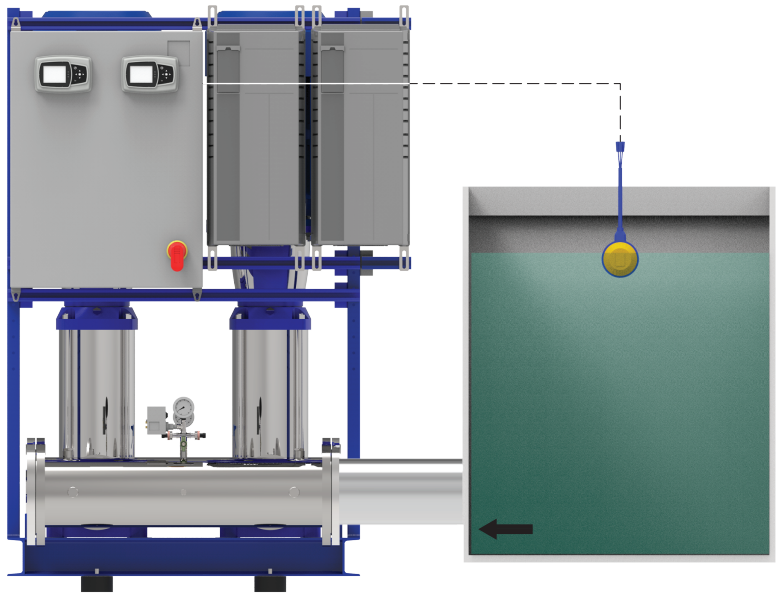
The system with electrode probes is used for supplies from open tanks or wells.
Three probes are directly connected to the electric module with adjustable sensitivity that can be installed in the control panel. If there is no water, the control circuit opens the electrical contact and the electric pumps stop.



GHV-SC_PROT_SONDE_AC

PROTECTION SYSTEMS AGAINST DRY RUNNING

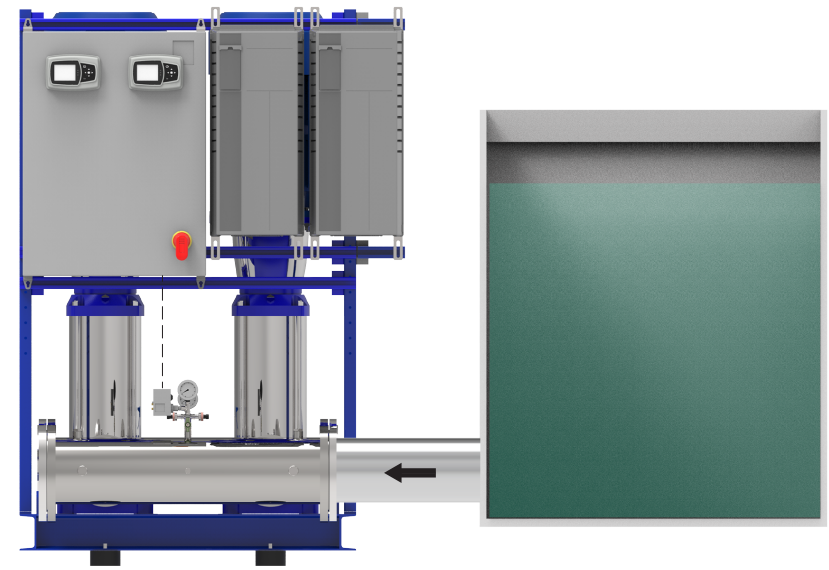
To avoid damaging the pumps, protection systems must be used to prevent it from dry running.



GHV_SC_PROT_LIVELLOST_A

FLOAT SWITCH PROTECTION

The float switch system is used for supplies from open tanks. The float switch immersed in the tank must be connected to the control panel. If there is no water, the float switch opens the electrical contact and the pumps stop.



GHV_SC_PROT_PRESSOST_A

MINIMUM PRESSURE SWITCH PROTECTION

The system with minimum pressure switch is used for water supplies from pressurized networks or tanks. The pressure switch is connected to the control panel. In case of water shortage, it opens the electric contact, causing the stop of the pumps.

PROTECTION SENSOR AGAINST DRY RUNNING



Sensor for detecting the presence of water based on the optoelectronic principle, therefore non-invasive and with no moving parts. The sensor features an electronic contact (on/off) which stops the pump if there is no water in the seal area.
The sensor opens the electric contact if there is no water after they factory-set delay (10 seconds) elapses. The sensor is supplied as a kit complete with 2 meters of cable, an EPDM O-ring gasket and a stainless steel adapter.

General operating features

- The sensor can be fitted directly on the filling cap of the e-SV series of pumps.
- Operation is independent of the hardness and conductivity of the water. The sensor cannot detect frozen liquids.

Available in two power versions depending on foreseen use:

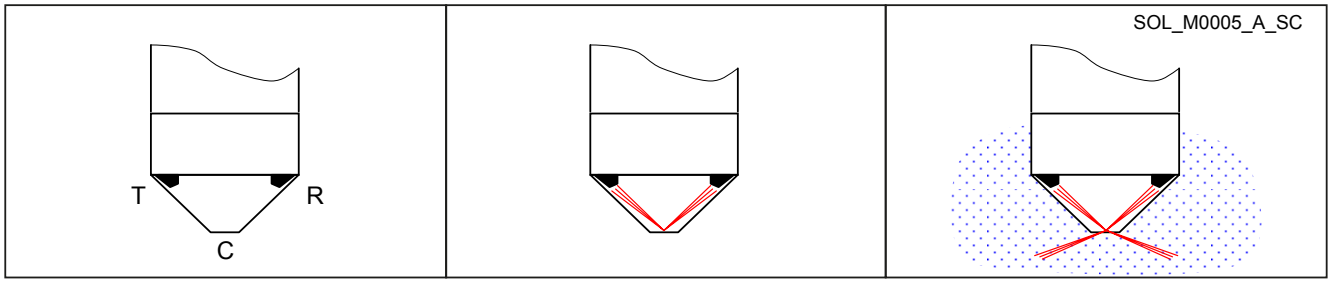
- 21÷27 Vac, universal solid state output for external relay at 24 Vac (21÷27 Vac, Max 50 mA).
- 15÷25 Vdc, NPN output at 25 V (10 mA) for HYDROVAR inverter.

Operating principle

Operation is based on the change in the refractive index on the surfaces. The optic sensor comprises a glass cap (C) containing a transmitter (T) and an infrared receiver (R).

If there is no liquid, all the infrared light emitted by the transmitter is internally reflected by the surface of the glass cap of the receiver.
The electronic contact will be open.

If liquid is present, the refractive index of the surface changes.
Most of the infrared light emitted by the transmitter is dispersed in the liquid.
The receiver receives less light and the electronic contact is closed.



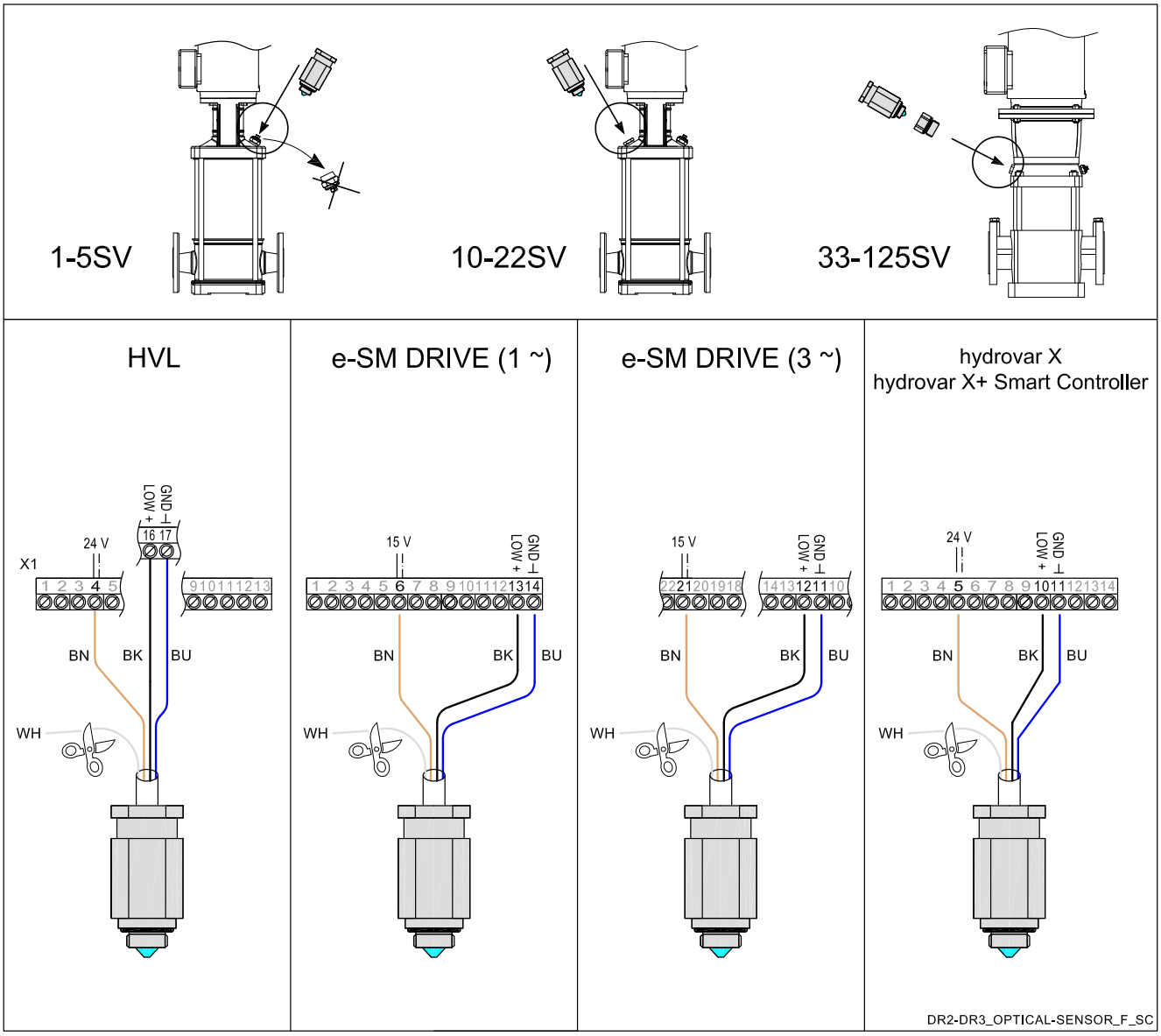
SPECIFICATIONS

- Materials:
  - Body in AISI 316L stainless steel
  - Glass optic cap
  - EPDM gasket
- Liquids: clean water, demi water. Operation is not affected by the hardness and conductivity of the liquid. To check the suitably of other liquids, contact the Lowara technical assistance service providing the characteristics of the liquid.
- Temperature of liquid: -20°C÷+120°C (cannot be used to detect frozen liquids).
- Ambient temperature: -5°C ÷+50°C
- Maximum pressure (PN): 25 bar
- Connector: 3/8 " (3/8" x 1/2" adapter plug included in the Kit)
- Dimensions: 27x 60 mm
- IP55 protection
- Electrical characteristics:
  - Input voltage: SENSOR KIT DRP-GP: 21÷27 Vac; SENSOR KIT DRP-HV: 15÷25 Vdc
  - Output: SENSOR KIT DRP-GP: universal solid state 21÷27 Vac (50 mA) for 24 Vac external relay; SENSOR KIT DRP-HV: NPN 25 V (10 mA) for HYDROVAR inverter
  - Alarm delay: 10 seconds (factory setting)
  - FROR cable 4 x 0,34 mm^2 (PVC-CEI 20-22) 2 meters long.

PROTECTION SENSOR AGAINST DRY RUNNING
WIRING DIAGRAM

The sensor can be directly mounted on the filling plug of the e-SV pumps.
For the 33, 46, 66, 92, 125SV series, the 3/8” x 1/2” adapter ring included in the Kit must also be mounted.

KIT SENSOR DRP-HV (code 109394600)
GHV10../DR1, GHV20../DR2, GHV30../DR3



OPTIMYZE™
CONDITION MONITORING TO OPTIMIZE YOUR BOTTOM LINE

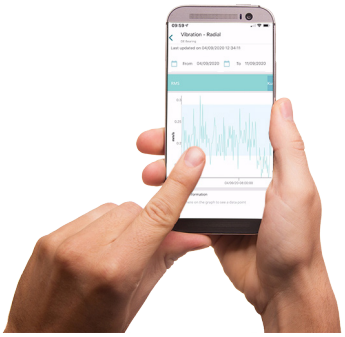
The optimyze™ modular condition monitoring solution provides health guidance and predictive maintenance advice for rotating and fixed assets such as pumps, motors, heat exchangers and steam traps. It periodically monitors system vibration and temperature and allows everyday users to access simple-to-use monitoring tools from iOS or Android mobile devices.



Using predictive analysis, optimyze identifies potential problems with your equipment before they occur, to help you manage system reliability and maintenance. Information is monitored, collected, stored and analyzed in the optimyze sensor. This allows you to understand the current health and historical trends of your assets, create maintenance reminders and generate detailed reports. As a result, you can perform preventative maintenance before issues become critical to uptime.

BENEFITS:

- Predictive maintenance to monitor the health of mechanical and electrical assets
- Asset management including asset location, size and manufacturing date
- System transparency to optimize reliability
- Optimized reporting that helps to simplify documentation, manage system maintenance and inform purchasing
- The ability to automatically share data with multiple local users
- Conveniently monitor system conditions on our simple-to-use mobile application



INDUSTRIES:

- Commercial Building Services
- Manufacturing
- Agriculture
- Water Utilities

APPLICATIONS:

- Monitoring the vibration of pumps and motors
- Monitoring the temperature of pump bearings
- Monitoring the temperature of motors to prevent overheating and winding damage
- Monitoring the performance of heat exchangers
- And more

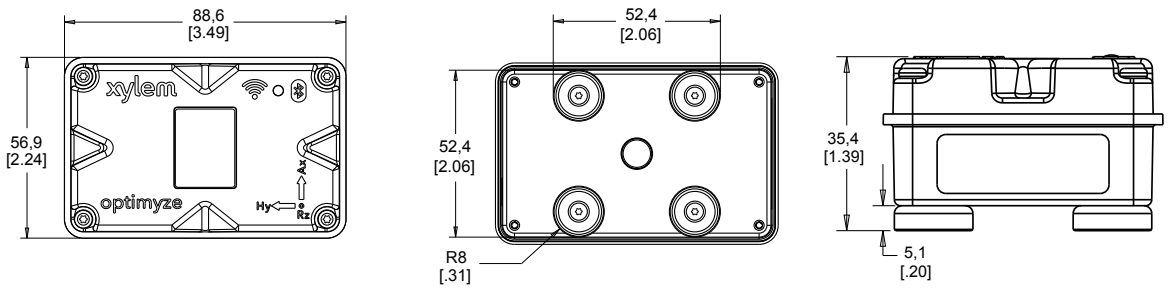
OPTIMYZE™
CONDITION MONITORING AND OPTIMIZATION SPECIFICATIONS

Surface Temperature Measurement	
Measurement range	-20°C to +135°C (-4°F to +275°F)
Measurement method	Non-contact infrared laser
Minor gradient accuracy (0°C to 25°C gradient)	+/- 1°C
Moderate gradient accuracy (25°C to 50°C gradient)	+/- 2°C
Large gradient accuracy (50°C to 100°C gradient)	+/- 4°C
Vibration Measurement	
Frequency range	5Hz to 1,100Hz
Measurement method	Independent 3-axis
Primary output (per axis)	Single value RMS
Other outputs	Kurtosis and FFT
Vibration limit (max acceleration)	16g
Threshold standard (Global)	ISO 10816-7
Threshold standard (North America)	ANSI/HI 9.6.4
Power	
Batteries (replaceable)	(2) 3.6V AA, 2400mAh, Lithium
Battery life (using default sampling rate at 25°C)	3 to 5 years
Default sampling rate	1 sample per 30 minutes
Available sampling rates (one sample per unit of time)	10 seconds to 12 hours
Wireless Communication	
Network type	Bluetooth® Low Energy 5.01
Connection range (without interference)	30 meters (100 feet)
Environmental	
Ambient operating range	-20°C to +50°C (-4°F to +122°F)
Storage temperature (5 to 95% humidity non-condensing)	-25°C to +65°C (-13°F to +149°F)
Protection rating	IP56, NEMA 4
Physical Properties	
Weight	145g (0.32 lbs.)
Status	LED
Mounting method (standard)	Magnetic (16mm potted magnets)
Mounting method (optional)	Drill and tap with plate
Certifications	
Certifications	CE, FCC, UL
Intended use (environments)	Non-hazardous, non-corrosive
Part Numbers	
optimyze (standard sensor)	P2007000
optimyze battery replacement kit	P2007030
optimyze optional flat plate mounting kit	P2007031

[1]Backwards compatible up to Bluetooth® Low Energy 4.2

opt-en_a_sc

DIMENSIONS: mm [in]



TECHNICAL APPENDIX

VAPOUR PRESSURE
VAPOUR PRESSURE ps AND ρ DENSITY OF WATER TABLE

t	T	ps	ρ
°C	K	bar	kg/dm³
0	273,15	0,00611	0,9998
1	274,15	0,00657	0,9999
2	275,15	0,00706	0,9999
3	276,15	0,00758	0,9999
4	277,15	0,00813	1,0000
5	278,15	0,00872	1,0000
6	279,15	0,00935	1,0000
7	280,15	0,01001	0,9999
8	281,15	0,01072	0,9999
9	282,15	0,01147	0,9998
10	283,15	0,01227	0,9997
11	284,15	0,01312	0,9997
12	285,15	0,01401	0,9996
13	286,15	0,01497	0,9994
14	287,15	0,01597	0,9993
15	288,15	0,01704	0,9992
16	289,15	0,01817	0,9990
17	290,15	0,01936	0,9988
18	291,15	0,02062	0,9987
19	292,15	0,02196	0,9985
20	293,15	0,02337	0,9983
21	294,15	0,24850	0,9981
22	295,15	0,02642	0,9978
23	296,15	0,02808	0,9976
24	297,15	0,02982	0,9974
25	298,15	0,03166	0,9971
26	299,15	0,03360	0,9968
27	300,15	0,03564	0,9966
28	301,15	0,03778	0,9963
29	302,15	0,04004	0,9960
30	303,15	0,04241	0,9957
31	304,15	0,04491	0,9954
32	305,15	0,04753	0,9951
33	306,15	0,05029	0,9947
34	307,15	0,05318	0,9944
35	308,15	0,05622	0,9940
36	309,15	0,05940	0,9937
37	310,15	0,06274	0,9933
38	311,15	0,06624	0,9930
39	312,15	0,06991	0,9927
40	313,15	0,07375	0,9923
41	314,15	0,07777	0,9919
42	315,15	0,08198	0,9915
43	316,15	0,09639	0,9911
44	317,15	0,09100	0,9907
45	318,15	0,09582	0,9902
46	319,15	0,10086	0,9898
47	320,15	0,10612	0,9894
48	321,15	0,11162	0,9889
49	322,15	0,11736	0,9884
50	323,15	0,12335	0,9880
51	324,15	0,12961	0,9876
52	325,15	0,13613	0,9871
53	326,15	0,14293	0,9862
54	327,15	0,15002	0,9862

t	T	ps	ρ
°C	K	bar	kg/dm³
55	328,15	0,15741	0,9857
56	329,15	0,16511	0,9852
57	330,15	0,17313	0,9846
58	331,15	0,18147	0,9842
59	332,15	0,19016	0,9837
60	333,15	0,1992	0,9832
61	334,15	0,2086	0,9826
62	335,15	0,2184	0,9821
63	336,15	0,2286	0,9816
64	337,15	0,2391	0,9811
65	338,15	0,2501	0,9805
66	339,15	0,2615	0,9799
67	340,15	0,2733	0,9793
68	341,15	0,2856	0,9788
69	342,15	0,2984	0,9782
70	343,15	0,3116	0,9777
71	344,15	0,3253	0,9770
72	345,15	0,3396	0,9765
73	346,15	0,3543	0,9760
74	347,15	0,3696	0,9753
75	348,15	0,3855	0,9748
76	349,15	0,4019	0,9741
77	350,15	0,4189	0,9735
78	351,15	0,4365	0,9729
79	352,15	0,4547	0,9723
80	353,15	0,4736	0,9716
81	354,15	0,4931	0,9710
82	355,15	0,5133	0,9704
83	356,15	0,5342	0,9697
84	357,15	0,5557	0,9691
85	358,15	0,5780	0,9684
86	359,15	0,6011	0,9678
87	360,15	0,6249	0,9671
88	361,15	0,6495	0,9665
89	362,15	0,6749	0,9658
90	363,15	0,7011	0,9652
91	364,15	0,7281	0,9644
92	365,15	0,7561	0,9638
93	366,15	0,7849	0,9630
94	367,15	0,8146	0,9624
95	368,15	0,8453	0,9616
96	369,15	0,8769	0,9610
97	370,15	0,9094	0,9602
98	371,15	0,9430	0,9596
99	372,15	0,9776	0,9586
100	373,15	1,0133	0,9581
102	375,15	1,0878	0,9567
104	377,15	1,1668	0,9552
106	379,15	1,2504	0,9537
108	381,15	1,3390	0,9522
110	383,15	1,4327	0,9507
112	385,15	1,5316	0,9491
114	387,15	1,6362	0,9476
116	389,15	1,7465	0,9460
118	391,15	1,8628	0,9445

t	T	ps	ρ
°C	K	bar	kg/dm³
120	393,15	1,9854	0,9429
122	395,15	2,1145	0,9412
124	397,15	2,2504	0,9396
126	399,15	2,3933	0,9379
128	401,15	2,5435	0,9362
130	403,15	2,7013	0,9346
132	405,15	2,867	0,9328
134	407,15	3,041	0,9311
136	409,15	3,223	0,9294
138	411,15	3,414	0,9276
140	413,15	3,614	0,9258
145	418,15	4,155	0,9214
155	428,15	5,433	0,9121
160	433,15	6,181	0,9073
165	438,15	7,008	0,9024
170	433,15	7,920	0,8973
175	448,15	8,924	0,8921
180	453,15	10,027	0,8869
185	458,15	11,233	0,8815
190	463,15	12,551	0,8760
195	468,15	13,987	0,8704
200	473,15	15,550	0,8647
205	478,15	17,243	0,8588
210	483,15	19,077	0,8528
215	488,15	21,060	0,8467
220	493,15	23,198	0,8403
225	498,15	25,501	0,8339
230	503,15	27,976	0,8273
235	508,15	30,632	0,8205
240	513,15	33,478	0,8136
245	518,15	36,523	0,8065
250	523,15	39,776	0,7992
255	528,15	43,246	0,7916
260	533,15	46,943	0,7839
265	538,15	50,877	0,7759
270	543,15	55,058	0,7678
275	548,15	59,496	0,7593
280	553,15	64,202	0,7505
285	558,15	69,186	0,7415
290	563,15	74,461	0,7321
295	568,15	80,037	0,7223
300	573,15	85,927	0,7122
305	578,15	92,144	0,7017
310	583,15	98,70	0,6906
315	588,15	105,61	0,6791
320	593,15	112,89	0,6669
325	598,15	120,56	0,6541
330	603,15	128,63	0,6404
340	613,15	146,05	0,6102
350	623,15	165,35	0,5743
360	633,15	186,75	0,5275
370	643,15	210,54	0,4518
374,15	647,30	221,20	0,3154

G-at_npsh_b_sc

TANK
CHOOSING AND SIZING THE SURGE TANK

The purpose of the surge tank is to limit the number of hourly starts of the pumps, placing part of its stock of water, which is maintained under pressure by the air above it, at the disposal of the system.
The surge tank can be of the air cushion or expansion vessel type.
In the air cushion version there is no clear separation between air and water.
Since part of the air tends to mix with water, it is necessary to restore it by means of air supply units or a compressor.
In the expansion vessel version, neither air supply units nor compressor are needed, as contact between air and water is prevented by a flexible expansion vessel inside the tank.
The following method, which is used to determine the volume of a surge tank, is valid both for horizontal and vertical surge tanks.
When calculating the volume of the surge tank, it is generally sufficient to consider the first pump only.

EXPANSION VESSEL

If you decide to use an expansion vessel, the volume will be lower than that of the air-cushion tank. It can be calculated with the following formula:

$$V_m = \frac{Qp}{4 \times Z} \times \frac{1}{1 - \frac{(Pmin - 2)}{Pmax}}$$

where:
Vm = Total volume of the air-cushion surge tank in m^3
Qp = Average pump flow rate in m^3/h
Pmax = Maximum pressure setting (wcm)
Pmin = Minimum pressure setting (wcm)
Z = Maximum number of starts per hour allowed by the motor
Example:
22SV10F110T electric pump
Pmax = 23 wcm
Pmin = 15 wcm
Qp = 20 m^3/h
Z =25

$$V_m = \frac{Qp}{4 \times Z} \times \frac{1}{1 - \frac{(Pmin - 2)}{Pmax}} = 0{,}46\ m^3$$

A 500-litre surge tank is therefore required.

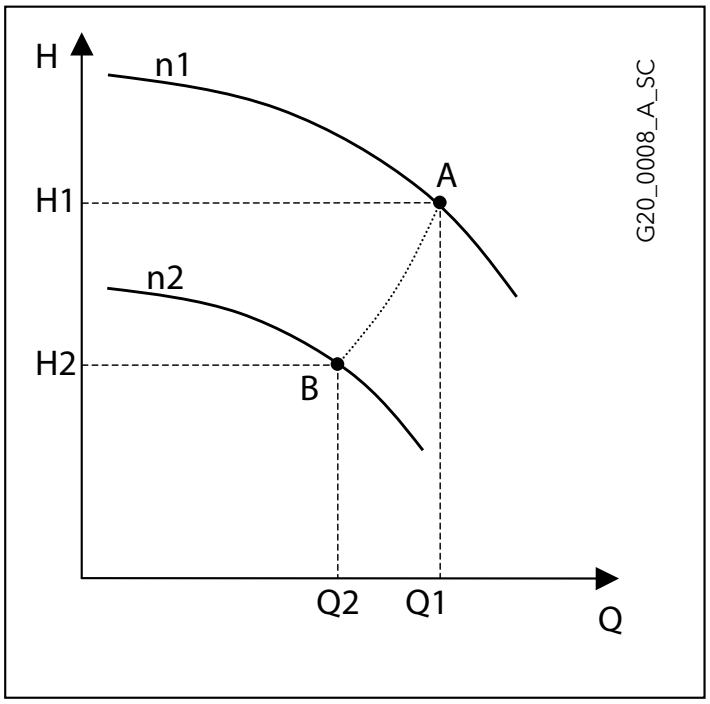
TANK
PERFORMANCE WITH VARYING SPEED: EQUIVALENCE RELATIONS

Fitting the electric pump with a frequency converter makes it possible to vary the pump rotation speed, normally according to the system pressure parameter. **Variations in electric pump speed** result in **modified performances** according to the equivalence relations.

Flow rate $\frac{Q1}{Q2} = \left[\frac{n1}{n2}\right]$

Head $\frac{H1}{H2} = \left[\frac{n1}{n2}\right]^2$

Power $\frac{P1}{P2} = \left[\frac{n1}{n2}\right]^3$



n1 = initial speed; n2= speed required.
Q1 = initial flow rate; Q2= flow rate required.
H1 = initial head; H2= head required.
P1 = initial power; P2= power required

Frequency ratios can be used instead of speed in practical applications, keeping 30 Hz as the bottom limit.

Example : 2-pole 50 Hz electric pump n1 =2900 rpm (point A)
Flow rate (A) = 100 l/min; Head (A) = 50 m
By reducing the frequency to 30 Hz the speed is reduced to approx. n2 = 1740 rpm (point B)
Flow rate (B) = 60 l/min; Head (B) = 18 m
The power of the new work point B is cut to about 22% of the initial power.

SIZING THE EXPANSION VESSEL IN SYSTEMS WITH SPEED VARIATION

Variable speed booster sets need **smaller expansion vessel** compared to traditional systems. Generally speaking, the vessel with a liter capacity of just 10% of the nominal capacity of a single pump, expressed in liters per minute, is needed.
The **gradual starting** of the pumps controlled by the frequency converters reduces the need to limit the number of hourly starts; the main purpose of the vessel is to compensate for small system losses, stabilize the pressure and make up for pressure variations caused by sudden demand.

Make the following calculation:
Set made up of three electric pumps, each with a maximum flow rate of 400 l/min, for a total capacity of 1200 l/min.
The **volume** required for the vessel is 40 liters. This size can be obtained by using two 24-litre vessels mounted directly onto the set's manifold.
The calculation establishes the minimum value needed for proper operation.

TABLE OF FLOW RESISTANCE IN 100 m OF STRAIGHT CAST IRON PIPELINE (HAZEN-WILLIAMS FORMULA C=100)

FLOW RATE			NOMINAL DIAMETER in mm and inches																
m^3/h	l/min		15	20	25	32	40	50	65	80	100	125	150	175	200	250	300	350	400
			1/2"	3/4"	1"	1 1/4"	1 1/2"	2	2 1/2"	3"	4"	5"	6"	7"	8"	10"	12"	14"	16"
0,6	10	v	0,94	0,53	0,34	0,21	0,13												
		hr	16	3,94	1,33	0,40	0,13												
0,9	15	v	1,42	0,80	0,51	0,31	0,20												
		hr	33,9	8,35	2,82	0,85	0,29												
1,2	20	v	1,89	1,06	0,68	0,41	0,27	0,17											
		hr	57,7	14,21	4,79	1,44	0,49	0,16											
1,5	25	v	2,36	1,33	0,85	0,52	0,33	0,21											
		hr	87,2	21,5	7,24	2,18	0,73	0,25											
1,8	30	v	2,83	1,59	1,02	0,62	0,40	0,25											
		hr	122	30,1	10,1	3,05	1,03	0,35											
2,1	35	v	3,30	1,86	1,19	0,73	0,46	0,30											
		hr	162	40,0	13,5	4,06	1,37	0,46											
2,4	40	v		2,12	1,36	0,83	0,53	0,34	0,20										
		hr		51,2	17,3	5,19	1,75	0,59	0,16										
3	50	v		2,65	1,70	1,04	0,66	0,42	0,25										
		hr		77,4	26,1	7,85	2,65	0,89	0,25										
3,6	60	v		3,18	2,04	1,24	0,80	0,51	0,30										
		hr		108	36,6	11,0	3,71	1,25	0,35										
4,2	70	v		3,72	2,38	1,45	0,93	0,59	0,35										
		hr		144	48,7	14,6	4,93	1,66	0,46										
4,8	80	v		4,25	2,72	1,66	1,06	0,68	0,40										
		hr		185	62,3	18,7	6,32	2,13	0,59										
5,4	90	v			3,06	1,87	1,19	0,76	0,45	0,30									
		hr			77,5	23,3	7,85	2,65	0,74	0,27									
6	100	v			3,40	2,07	1,33	0,85	0,50	0,33									
		hr			94,1	28,3	9,54	3,22	0,90	0,33									
7,5	125	v			4,25	2,59	1,66	1,06	0,63	0,41									
		hr			142	42,8	14,4	4,86	1,36	0,49									
9	150	v				3,11	1,99	1,27	0,75	0,50	0,32								
		hr				59,9	20,2	6,82	1,90	0,69	0,23								
10,5	175	v				3,63	2,32	1,49	0,88	0,58	0,37								
		hr				79,7	26,9	9,07	2,53	0,92	0,31								
12	200	v				4,15	2,65	1,70	1,01	0,66	0,42								
		hr				102	34,4	11,6	3,23	1,18	0,40								
15	250	v				5,18	3,32	2,12	1,26	0,83	0,53	0,34							
		hr				154	52,0	17,5	4,89	1,78	0,60	0,20							
18	300	v					3,98	2,55	1,51	1,00	0,64	0,41							
		hr					72,8	24,6	6,85	2,49	0,84	0,28							
24	400	v					5,31	3,40	2,01	1,33	0,85	0,54	0,38						
		hr					124	41,8	11,66	4,24	1,43	0,48	0,20						
30	500	v					6,63	4,25	2,51	1,66	1,06	0,68	0,47						
		hr					187	63,2	17,6	6,41	2,16	0,73	0,30						
36	600	v						5,10	3,02	1,99	1,27	0,82	0,57	0,42					
		hr						88,6	24,7	8,98	3,03	1,02	0,42	0,20					
42	700	v						5,94	3,52	2,32	1,49	0,95	0,66	0,49					
		hr						118	32,8	11,9	4,03	1,36	0,56	0,26					
48	800	v						6,79	4,02	2,65	1,70	1,09	0,75	0,55					
		hr						151	42,0	15,3	5,16	1,74	0,72	0,34					
54	900	v						7,64	4,52	2,99	1,91	1,22	0,85	0,62					
		hr						188	52,3	19,0	6,41	2,16	0,89	0,42					
60	1000	v							5,03	3,32	2,12	1,36	0,94	0,69	0,53				
		hr							63,5	23,1	7,79	2,63	1,08	0,51	0,27				
75	1250	v							6,28	4,15	2,65	1,70	1,18	0,87	0,66				
		hr							96,0	34,9	11,8	3,97	1,63	0,77	0,40				
90	1500	v							7,54	4,98	3,18	2,04	1,42	1,04	0,80				
		hr							134	48,9	16,5	5,57	2,29	1,08	0,56				
105	1750	v							8,79	5,81	3,72	2,38	1,65	1,21	0,93				
		hr							179	65,1	21,9	7,40	3,05	1,44	0,75				
120	2000	v								6,63	4,25	2,72	1,89	1,39	1,06	0,68			
		hr								83,3	28,1	9,48	3,90	1,84	0,96	0,32			
150	2500	v								8,29	5,31	3,40	2,36	1,73	1,33	0,85			
		hr								126	42,5	14,3	5,89	2,78	1,45	0,49			
180	3000	v									6,37	4,08	2,83	2,08	1,59	1,02	0,71		
		hr									59,5	20,1	8,26	3,90	2,03	0,69	0,28		
210	3500	v									7,43	4,76	3,30	2,43	1,86	1,19	0,83		
		hr									79,1	26,7	11,0	5,18	2,71	0,91	0,38		
240	4000	v									8,49	5,44	3,77	2,77	2,12	1,36	0,94		
		hr									101	34,2	14,1	6,64	3,46	1,17	0,48		
300	5000	v										6,79	4,72	3,47	2,65	1,70	1,18		
		hr										51,6	21,2	10,0	5,23	1,77	0,73		
360	6000	v										8,15	5,66	4,16	3,18	2,04	1,42		
		hr										72,3	29,8	14,1	7,33	2,47	1,02		
420	7000	v											6,61	4,85	3,72	2,38	1,65	1,21	
		hr											39,6	18,7	9,75	3,29	1,35	0,64	
480	8000	v											7,55	5,55	4,25	2,72	1,89	1,39	
		hr											50,7	23,9	12,49	4,21	1,73	0,82	
540	9000	v											8,49	6,24	4,78	3,06	2,12	1,56	1,19
		hr											63,0	29,8	15,5	5,24	2,16	1,02	0,53
600	10000	v												6,93	5,31	3,40	2,36	1,73	1,33
		hr												36,2	18,9	6,36	2,62	1,24	0,65

The hr values must be multiplied by:

0,71 for galvanized or painted steel pipes

0,54 for stainless steel or copper pipes

0,47 for PVC or PE pipes

hr = flow resistance for 100 m of straight pipeline (m)

V = water speed (m/s)

G-at-pct-en_b_th

FLOW RESISTANCE
TABLE OF FLOW RESISTANCE IN BENDS, VALVES AND GATES

The flow resistance is calculated using the equivalent pipeline length method according to the table below:

ACCESSORY TYPE	DN											
	25	32	40	50	65	80	100	125	150	200	250	300
	Equivalent pipeline length (m)											
45° bend	0,2	0,2	0,4	0,4	0,6	0,6	0,9	1,1	1,5	1,9	2,4	2,8
90° bend	0,4	0,6	0,9	1,1	1,3	1,5	2,1	2,6	3,0	3,9	4,7	5,8
90° smooth bend	0,4	0,4	0,4	0,6	0,9	1,1	1,3	1,7	1,9	2,8	3,4	3,9
Union tee or cross	1,1	1,3	1,7	2,1	2,6	3,2	4,3	5,3	6,4	7,5	10,7	12,8
Gate valve	-	-	-	0,2	0,2	0,2	0,4	0,4	0,6	0,9	1,1	1,3
Foot check valve	1,1	1,5	1,9	2,4	3,0	3,4	4,7	5,9	7,4	9,6	11,8	13,9
Non return valve	1,1	1,5	1,9	2,4	3,0	3,4	4,7	5,9	7,4	9,6	11,8	13,9

G-a-pcv-en_b_th

The table is valid for the Hazen Williams coefficient C=100 (cast iron pipework)
for galvanized steel or painted steel multiply the values by 0,71;
for stainless steel and copper multiply the values by 0,54;
for Pvc and PE multiply the values by 0,47.

When the **equivalent pipeline length** has been determined, the flow resistance is obtained from the table in the previous page.
The values given are guideline values which are bound to vary slightly according to the model, especially for gate valves and non-return valves, for which it is a good idea to check the values supplied by manufacturers.

VOLUMETRIC CAPACITY

Litres per minute l/min	Cubic metres per hour m^3/h	Cubic feet per hour ft^3/h	Cubic feet per minute ft^3/min	Imperial gallon per minute Imp. gal/min	U.S. gallon per minute US gal/min
1,0000	0,0600	2,1189	0,0353	0,2200	0,2642
16,6667	**1,0000**	35,3147	0,5886	3,6662	4,4029
0,4719	0,0283	**1,0000**	0,0167	0,1038	0,1247
28,3168	1,6990	60,0000	**1,0000**	6,2288	7,4805
4,5461	0,2728	9,6326	0,1605	**1,0000**	1,2009
3,7854	0,2271	8,0208	0,1337	0,8327	**1,0000**

PRESSURE AND HEAD

Newton per square metre N/m^2	kilo Pascal kPa	bar bar	Pound force per square inch psi	Metre of water m H_2O	Millimetre of mercury mm Hg
1,0000	0,0010	1×10^{-5}	$1,45 \times 10^{-4}$	$1,02 \times 10^{-4}$	0,0075
1 000,0000	**1,0000**	0,0100	0,1450	0,1020	7,5006
1×10^5	100,0000	**1,0000**	14,5038	10,1972	750,0638
6 894,7570	6,8948	0,0689	**1,0000**	0,7031	51,7151
9 806,6500	9,8067	0,0981	1,4223	**1,0000**	73,5561
133,3220	0,1333	0,0013	0,0193	0,0136	**1,0000**

LENGTH

Millimetre mm	Centimetre cm	Metre m	Inch in	Foot ft	Yard yd
1,0000	0,1000	0,0010	0,0394	0,0033	0,0011
10,0000	**1,0000**	0,0100	0,3937	0,0328	0,0109
1 000,0000	100,0000	**1,0000**	39,3701	3,2808	1,0936
25,4000	2,5400	0,0254	**1,0000**	0,0833	0,0278
304,8000	30,4800	0,3048	12,0000	**1,0000**	0,3333
914,4000	91,4400	0,9144	36,0000	3,0000	**1,0000**

VOLUME

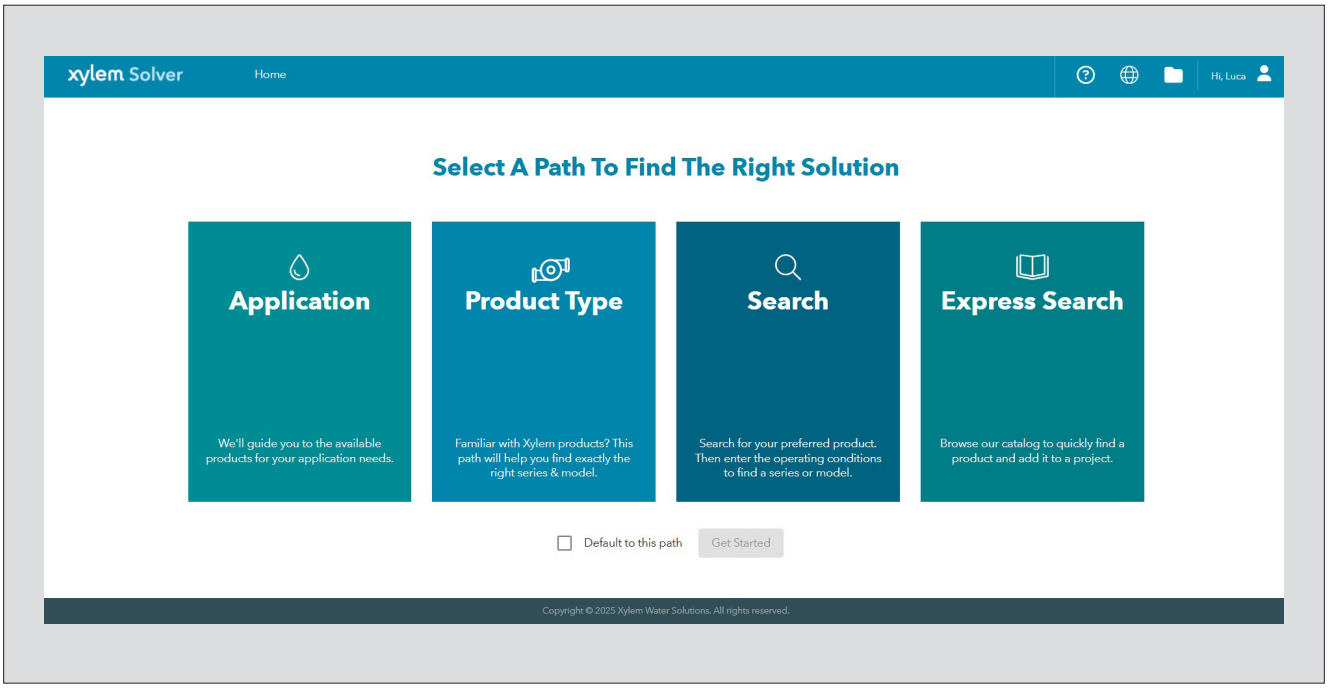
Cubic metre m^3	Litre L	Millilitre ml	Imperial gallon imp. gal.	U.S. gallon US gal.	Cubic foot ft^3
1,0000	1 000,0000	1×10^6	219,9694	264,1720	35,3147
0,0010	**1,0000**	1 000,0000	0,2200	0,2642	0,0353
1×10^{-6}	0,0010	**1,0000**	$2,2 \times 10^{-4}$	$2,642 \times 10^{-4}$	$3,53 \times 10^{-5}$
0,0045	4,5461	4 546,0870	**1,0000**	1,2009	0,1605
0,0038	3,7854	3 785,4120	0,8327	**1,0000**	0,1337
0,0283	28,3168	28 316,8466	6,2288	7,4805	**1,0000**

TEMPERATURE

Water	Kelvin K	Celsius °C	Fahrenheit °F	$°F = °C \times \frac{9}{5} + 32$ $°C = (°F - 32) \times \frac{5}{9}$
icing	273,1500	0,0000	32,0000	
boiling	373,1500	100,0000	212,0000	

G-at_pp-en_b_sc

FURTHER PRODUCT SELECTION AND DOCUMENTATION
Xylem Solver



Xylem Solver is pump solution selection software with an extensive online database of product information across the entire Xylem range of pumps and related products, with multiple search options and helpful project management facilities. The system holds up-to-date product information on thousands of products and accessories.

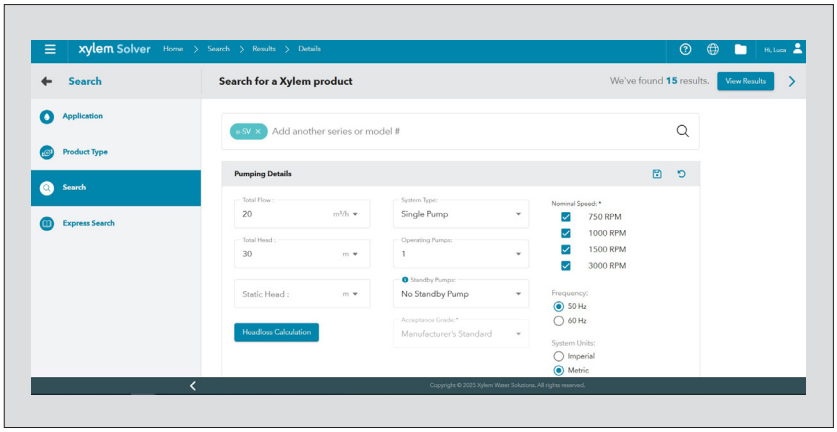
The possibility to search by applications and the detailed information output given makes it easy to make the optimal selection without having detailed knowledge about the Xylem products.

The search can be made by:

- Application
- Product type
- Duty point

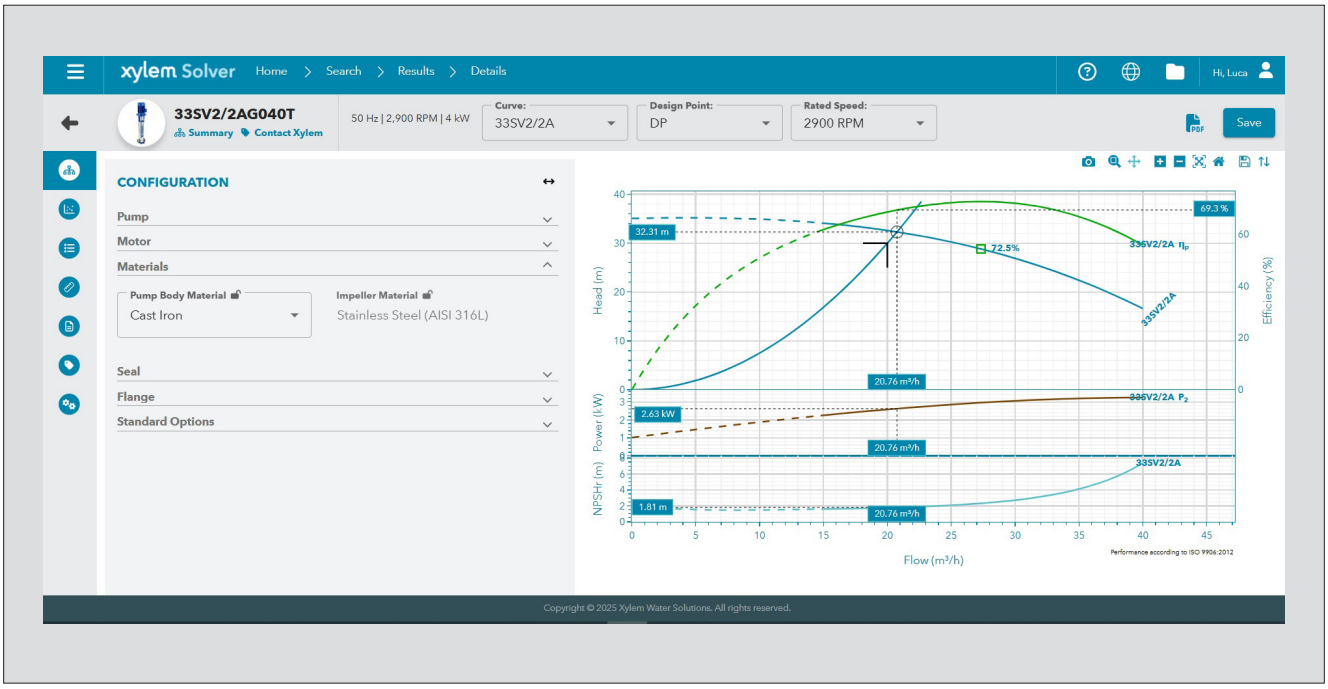
Xylem Solver gives a detailed output:

- List with search results in which you can compare up to four products
- Performance curves (flow, head, power, efficiency, NPSH)
- Motor data
- Dimensional drawings
- Options
- Data sheet printouts
- Document downloads incl dxf, stp and BIM files



Once a product series has been selected, input design criteria to select pumps that meet the design requirements.

FURTHER PRODUCT SELECTION AND DOCUMENTATION
Xylem Solver



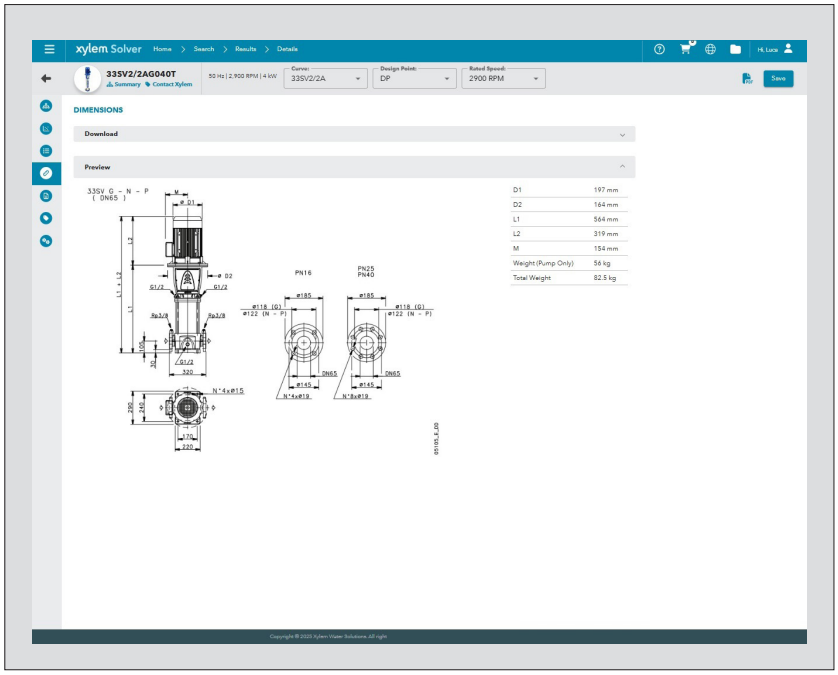
The detailed output makes it easy to select the optimal pump from the given alternatives.

The best way to work with Xylem Solver is to create a personal account. This makes it possible to:

- Set own standard units
- Create and save projects

Every registered user has a proper space, where all projects are saved.

For more information about Xylem Solver please contact our sales network or visit https://solver.xylem.com.



The dimensions tab shows technical drawings, dimensions, and CAD files when available.

Xylem |'zīləm|

1) the tissue in plants that brings water and nutrients upward from the roots.

2) a leading global water solutions company.

Xylem is the connective tissue and system in plants which cleanses and transports water from the root to where it is needed most to sustain life.

And this is the essence of Xylem as a company. We are committed to driving sustainable impact by ensuring our connected technologies and solutions support our customers and the communities they serve, to tackle the water challenges that matter most to them.

For more information on how Xylem can help you, visit xylem.com.

Xylem Service Italia Srl
Via Dottor Vittorio Lombardi 14
36075 - Montecchio Maggiore (VI)
Italy

Tel. (+39) 0444 707111
Fax (+39) 0444 491043
www.xylem.com/it-it

Xylem Water Solutions Italia Srl si riserva il diritto di apportare modifiche senza l'obbligo di preavviso

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