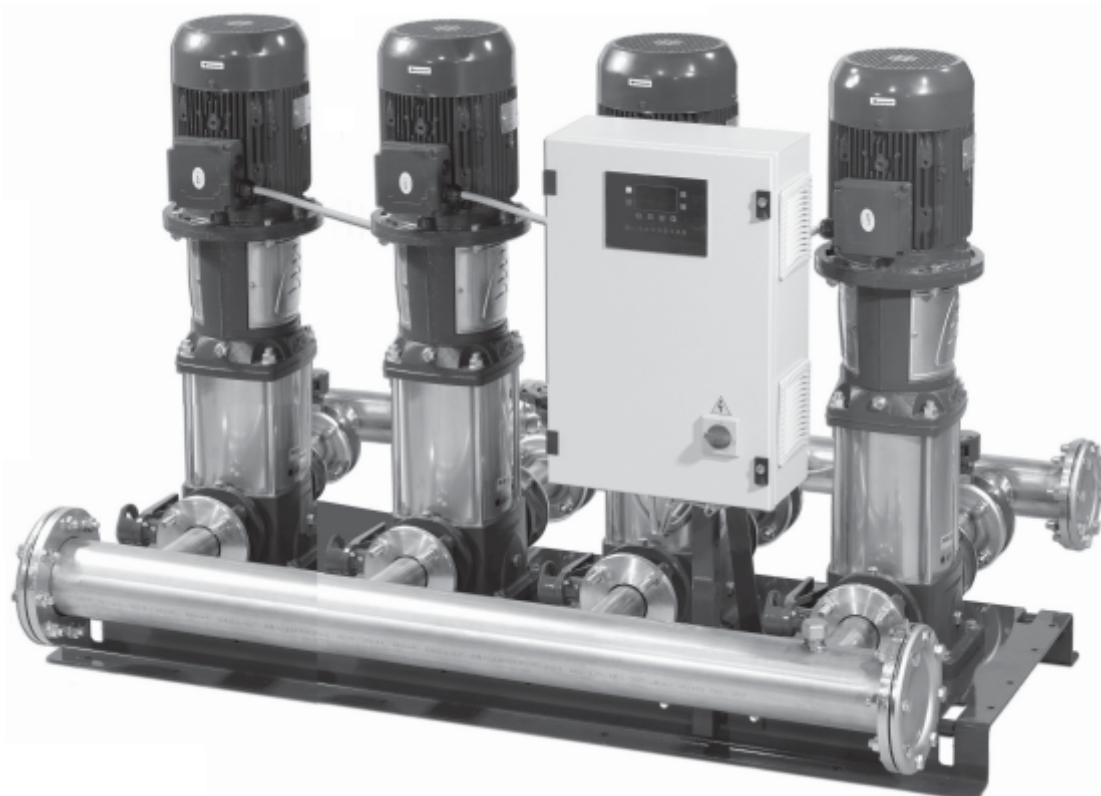


50 Hz



GVF11-GVF12-GVF13 Series

VARIABLE-SPEED BOOSTER SETS WITH
VERTICAL MULTISTAGE ELECTRIC PUMPS e-SV™ SERIES

Cod. 191000521 Rev.B Ed.06/2012

 **LOWARA**
a xylem brand

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BOOSTER SETS GV SERIES

GENERAL INTRODUCTION - PRODUCT DESCRIPTION

Lowara GV 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

GV series booster sets are pumping stations assembled with two up to a maximum of six vertical multistage pumps from the e-SV series.

The pumps are connected to one another by suction and delivery pipes, and fixed onto a single base. The pumps are connected to the manifolds by means of stop valves and check valves.

An electric protection and control panel is installed using a bracket on the base of the set. In the case of particularly large electric panels, they are installed on the floor.

GV series booster sets offer different regulating possibilities and are divided into the following versions:

GV series F

Pressure boosting sets with 2 to 6 e-SV series pumps and only one frequency converter inside the electric panel. Variable speed operation alternates between pumps in the booster set.

GV series E

Pressure boosting sets with 2 to 6 e-SV series pumps and only one frequency converter inside the electric panel. Variable speed operation remains fixed on the same pump.

GV 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 GV series with customisation to satisfy particular working requirements.

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

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

These systems improve comfort for the final user, reducing the noise emissions and, thanks to the gradual switching off of the pumps, they guarantee a significant reduction of water hammer in the system.

BOOSTER SETS GV SERIES DESCRIPTION OF OPERATION

In Lowara GV series booster sets only one electric pump operates at variable speed, while the others operate at fixed speed.

The pump is driven by a frequency converter directly inside the electric panel; the other pumps, up to a maximum of five, are started by contactors.

All the pumps are controlled by the SD60 control unit which is on the front of the electric panel door.

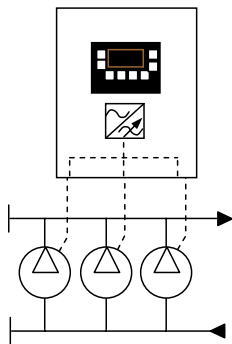
The pump driven by the inverter modulates its speed according to the system demand, while the other pumps run at maximum speed.

The first pump to start will always be the one connected to the frequency converter, the other pumps will start in sequence after the first. It is possible to have automatic alternation of the fixed-speed pumps to distribute wear and allow the pumps to operate for a uniform number of hours.

Starting and stopping of the pumps is determined according to the set value of pressure in the control board menu. The pressure value is read by a pressure transducer connected to the SD60 control unit.

Example operation of a set of three GV series pumps, version F.

Only example for GVF120...



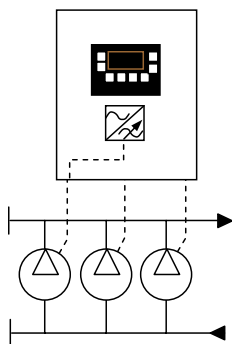
Only one pump is controlled by the converter inside the electric panel. At each new starting cycle of the pumps, the frequency converter moves on to the next pump, ensuring speed adjustment is alternated for all the pumps installed.

When the demand for water decreases, the pumps will stop in cascade and the last one to stop will be the one connected to the frequency converter.

The pump connected to the frequency converter keeps the pressure constant by modulating the number of motor revs.

Example operation of a set of three GV series pumps, version E.

Only example for GVE120...

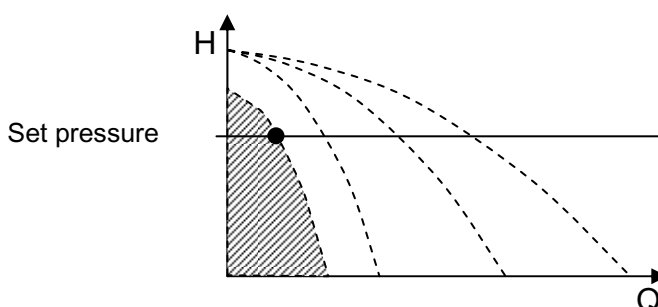


Only one pump is controlled by the converter inside the electric panel. At each new starting cycle of the pumps, the frequency converter always controls the same pump.

When the demand for water decreases, the pumps will stop in cascade and the last one to stop will be the one connected to the frequency converter.

The pump connected to the frequency converter keeps the pressure constant by modulating the number of motor revs.

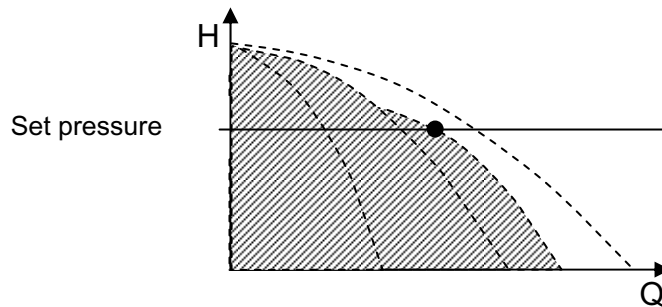
Lowara GV series booster sets guarantee constant pressure of the system as in the following example:



BOOSTER SETS GV SERIES

DESCRIPTION OF OPERATION

When there is a demand for water, the pump controlled by the converter will start, positioning its speed to guarantee the set pressure value. When the demand for water increases, the other pumps will start operating at maximum speed, while the first pump connected to the converter will start to modulate its speed to maintain constant pressure.



When the demand for water decreases, the pumps switch off in cascade, depending on the pressure value. The first pump (running at variable speed) decreases the number of revs to a set minimum before switching off.

Regulating the constant pressure value

GV series booster sets guarantee constant pressure of the system even during frequent variations in water consumption. When the booster set is connected to the system, the pressure value is read through the transducer fitted on the delivery of the system. The value found is compared with the set value. The check between the pressure value found and the set value is made by means of the PID regulator, which corrects the difference between the two values, acting on the frequency variation/number of motor revs, modifying the pump performance over time.

The PID regulator is in the SD60 control board.

In the event of breakdown of the frequency converter, the SD60 board automatically takes control of the booster set functions.

Type of control

GV series booster sets use a sensor as a standard device to control pressure. For each booster set there are two transducers (one standby) where, in the event of breakdown of the first, control automatically passes to the second. The SD60 control board allows the use of other control devices such as flow, temperature or level transducers, according to the needs of the system. It is possible to set the measuring unit directly from the control board menu. These control devices must be specifically requested, as they are not used as standard features on GV series pressure booster sets.

Setpoint

With the SD60 it is possible to set up to six setpoints with different values, as well as the original setpoint. In this way the booster set can be used for systems with a large extension and different levels. 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 may be changed by means of a timetable, set via the clock inside the SD60 control board or with an external consent (external device).

BOOSTER SETS GV SERIES

DESCRIPTION OF OPERATION

Timing the starting and stopping of the pumps

This function allows the improvement of the reaction time on starting or stopping of the pumps, in order to satisfy the demand of the system while optimising the number of stops and starts per hour.

Each time a pump starts or stops, if the correct delay time for that type of system has been set, the pump will stop or start only after a certain period of time. This allows the pump to remain operating without having to stop at the set pressure value. This prevents the pump restarting suddenly immediately after stopping due to a sudden lowering of the pressure due to the demand for water.

A good adjustment of the pump starting and stopping times will avoid an excessive number of starts per hour.

Standby pump

It is possible to use a standby pump on GV series booster sets, which will start up only if there is a breakdown in one of the pumps in the set. The standby pump will become like a regular pump, controlled in the same way as the others. If the cyclical exchange of pumps is activated, the standby pump will operate automatically.

The performance of the booster set is guaranteed with the standby pump, even if one of its pumps is out of service.

Cyclical exchange of pumps

If this function is activated, working hours will be equally shared among the installed pumps. At each restart the pumps are exchanged, even using those which are never activated because water demand is lower than the booster set performance.

It is also possible to force a cyclical exchange if the pumps have been running for long periods without stopping. The time at which the pumps will be exchanged can be set directly from the menu of the SD60 control board, rather than automatically.

Automatic auto-test

In GV series booster sets it is possible to activate the automatic auto-test function; this function is used when the pumps do not operate frequently.

The main purpose of the automatic auto-test is to start the pumps to avoid blocking of the mechanical seal due to impurities left by the pumped liquid, and to eliminate any air pockets left trapped in the pump.

The automatic auto-test can be activated from the menu of the SD60 control board and its day and duration are set using the clock.

It is possible to order GV series booster sets with the auto-test already set; in this case a water discharge circuit will be provided on the delivery manifold.

It is important to remember that a discharge circuit with a solenoid valve must be provided to avoid overheating the water inside the pump body during the auto-test.

Protection against dry running

The protection function against dry running intervenes if the water reserve to which the booster set is connected falls below the minimum level guaranteed for suction.

For GV series booster sets the level may be controlled by a float, level probes or minimum pressure switch.

It is also possible to manage the function directly by inputting a minimum pressure value in the SD60 control board menu, which will receive a signal from the pressure transducer.

BOOSTER SETS GV SERIES CHOICE AND SELECTION

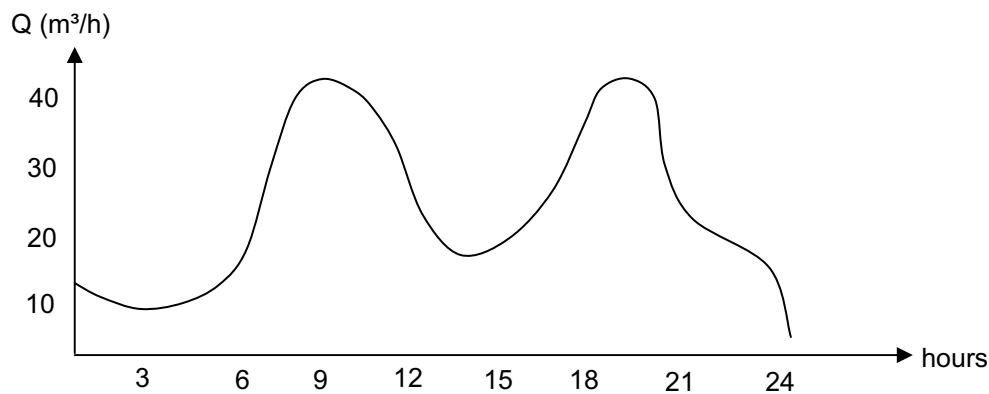
The following conditions should be considered when choosing a booster set:

- The system's requirements should be met regarding flow rate and pressure.
- The booster set must not be oversized, avoiding unnecessary installation and running costs.

Generally water distribution systems such as those for domestic water supply or for large agglomerates such as hospitals, hotels or similar, have "variable" water consumption i.e. in a 24-hour period there may be sudden variations in consumption that are difficult to foresee.

A pattern of consumption may occur in 24 hours, but the daily percentage of booster set operation may also occur at various flow rates.

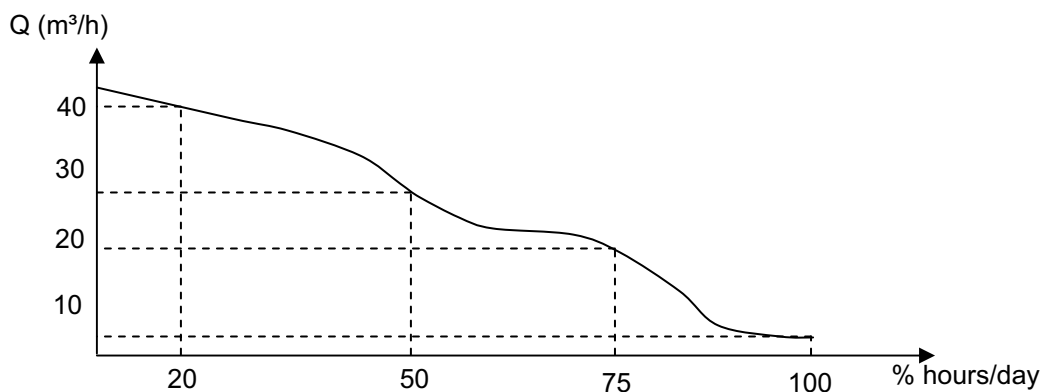
Generally the definition of flow rate for these types of systems is based on either the "probability calculation" which is a very complex system of calculation, or based on tables or diagrams in the national standards which provide guidelines for the sizing of the systems and therefore for calculating the maximum simultaneous flow rate.



Consumption over 24 h

The operating time of the booster set, still calculated over 24h, gives us a view of the daily percentage of operation at the various flow rates.

This means that there may be daily peaks where the maximum flow rate requested is concentrated in a short space of time. In the example given below, it can be seen that in 100% of the time there is a consumption of 4 m³/h, while in 20% of the operating time there is a consumption of 40 m³/h.



Operating time

BOOSTER SETS GV 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 GV 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
- Diaphragm tanks

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 panel.

This allows checking of the system efficiency, 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.

GV series booster sets must also be equipped with diaphragm tanks (for the size of the tank, see the specific chapter in this catalogue).

A single tank can be installed on the delivery side of the booster set, or smaller tanks, maintaining the same total volume.

Diaphragm tanks avoid 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 GV series, to guarantee constant pressure.

SELECTING THE PUMPS

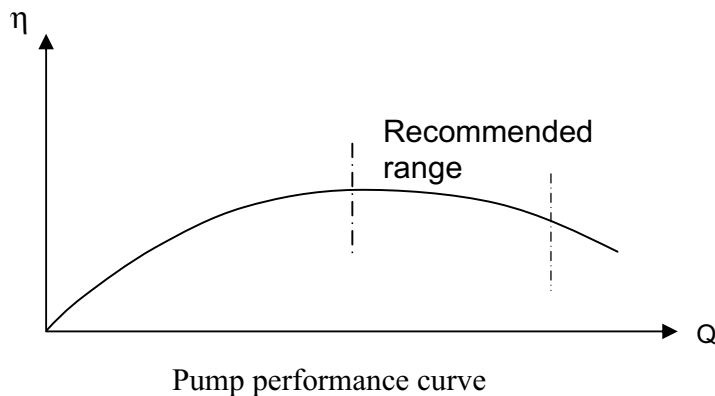
What type of pump to choose?

Generally, the choice of pump is based on the take-off 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.

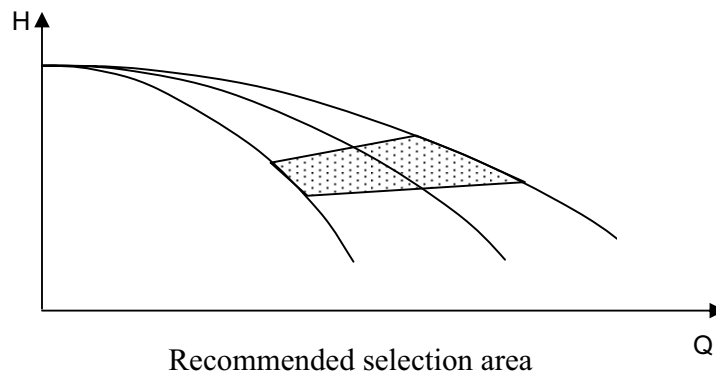
BOOSTER SETS GV SERIES SELECTING THE PUMPS

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 booster set is sized according to the maximum possible consumption, the take-off 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:

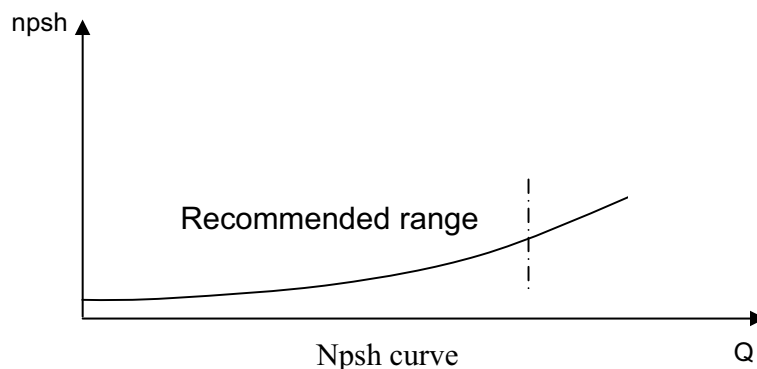


Another factor to be considered when choosing the pumps is its npsh value. Never choose a pump where the take-off point is too far to the right of the npsh curve.

This risks not having good pump suction, which may be aggravated by the type of installation (where negative suction is possible).

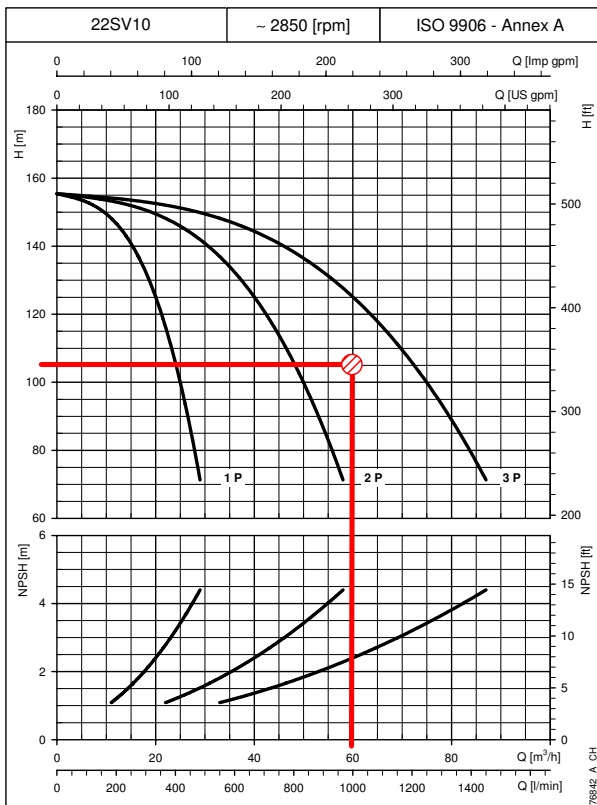
In these cases there is the risk of cavitation.

The npsh of the pump must always be checked at the maximum flow rate requested.



BOOSTER SETS GV 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 60 m³/h and a pressure of 110 water column.

As may be seen from the selection, the system requires three pumps of the type 22SV10 as indicated top left in the table.

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

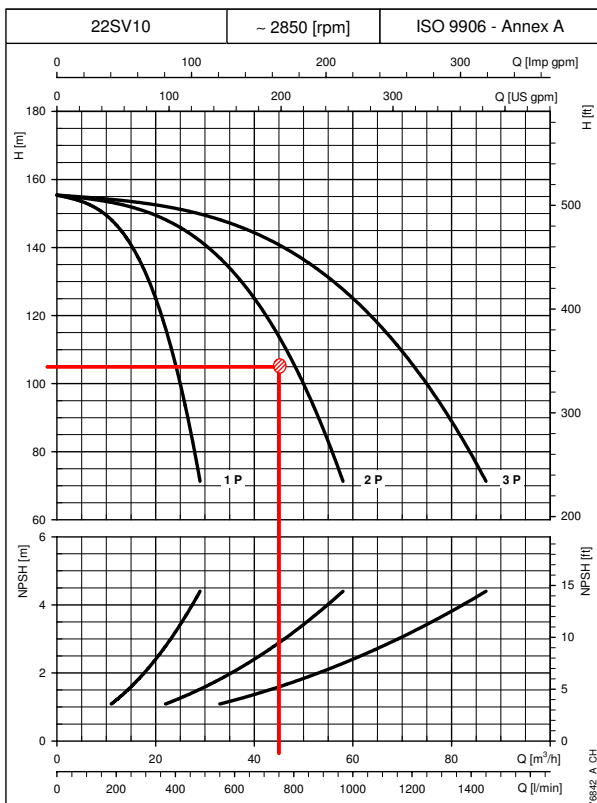
The values obtained are those for the performance of the pumps. A correct check of the net pressure value must be made due to the intrinsic load loss of the booster set and the conditions of installation.

For this reason it is recommended to see the specific chapter in this catalogue.

BOOSTER SETS GV SERIES CALCULATING NET PRESSURE

When selecting the GV series of pressure booster units, reference must be made to pump performance. Performance is calculated from the characteristic curves of the pumps and does not consider any pressure drops generated by pipes and valves as in the pressure booster units. To help choose the right pressure booster unit and calculate the correct pressure at the delivery manifold, the following example is shown:

given the duty point $Q = 42 \text{ m}^3/\text{h}$ $H = 105 \text{ mca}$ and with two pumps working, the pump with the most suitable characteristic curve is chosen, that is, the one with a curve that guarantees the required flow and head values.



From the example, we have chosen the 22SV10 series pump which guarantees system performance. The pump curve is slightly oversized, but this provides a safety margin to counter the pressure drops in the pressure booster unit pipes. To know the effective pressure at the delivery manifold outlet, the pressure drops in the suction and delivery lines of each pump are calculated.

To simplify calculations, the pressure drop curves for each pump, on page 115 of this catalogue, are used.

Assuming a pressure booster unit with check valves on the suction line (curve B of H_c pressure drops) has been selected, one proceeds as follows:

The H_c pressure drops on the pump suction line are to be evaluated on the "B" curve. At a flow rate of $21 \text{ m}^3/\text{h}$ the value of $H_c = 2,8 \text{ m}$.

Similarly, the H_c pressure drops on the delivery line of the pump, as evaluated on the "B" curve, are analysed. At a flow rate of $21 \text{ m}^3/\text{h}$, the value of H_c is $0,035 \text{ m}$.

The total pressure drop on the delivery and suction lines is therefore $2,84 \text{ m}$.

As regards the pressure drop in the suction and delivery manifolds, 5% with respect to the pressure drops in the pump suction and delivery can be considered.

In this case, therefore, the value is $0,142 \text{ m}$.

The total pressure drop is approximately: 3 m .

Analysing the performance of the unit at a flow rate of $42 \text{ m}^3/\text{h}$, the head H is 115 m .

The net pressure at the delivery manifold is $115 - 3 = 112 \text{ m}$.

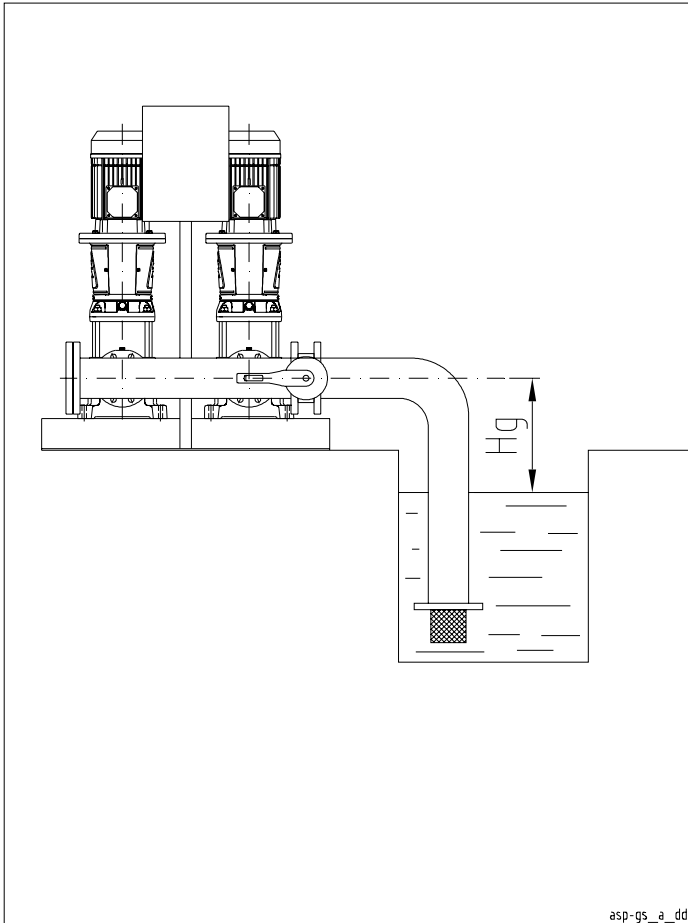
Comparing this value with the rated value, $112 \text{ m} > 105 \text{ m}$.

The unit can therefore satisfy the demand of the system.

BOOSTER SETS GV SERIES SUCTION CONDITIONS

The above example does not consider the suction conditions of the pressure booster unit which, similarly, affect final performance. It is therefore always best to check the suction line for leaks, especially as regards positive head installations.

An example of positive head installation relative to the above case is shown below:



In the positive head installation, the designer must calculate the minimum installation height H_g of the pump in safety conditions in order to avoid cavitation and, therefore, de-priming of the pump.

The relationship that must be checked and which connects this measurement is the following:

$NPSH_{available} \geq NPSH_{requested}$ where equality is the limit condition.

$NPSH_{available} = P_{atm} + H_g - \sum \text{pressure drops}$.

Where:

P_{atm} is the atmospheric pressure, equal to 10,33 m

H_g is the geodetic difference in level

The pressure drops are connected with to the suction piping and relative valves (foot and cut-off valves)

$NPSH_{requested}$ is a pump parameter taken from the performance curve of the pump which in our case, at a flow rate of 21 m³/h corresponds to 2,5 m. Before calculating the $NPSH_{available}$, the suction pressure drops are calculated using the tables on pages 135-136 in this catalogue, considering a material such as steel.

The chosen diameter of the suction piping is DN80.

90° curve DN80 = 2,11 m

Damper DN80 = 0,28 m

Drain valve DN80 = 0,3 m (calculated from supplier data)

Piping DN80 = 0,61 m (assuming a length of 2,5 m)

Piping DN80, intake manifold = 0,04 m (length of manifold 0,61 m)

Pressure drops on pump suction side (curve B) = 2,8 m

$\sum \text{pressure drops} = 6,1 \text{ m}$

Remembering that: $NPSH_{available} = 10,33 + H_g - 6,1$

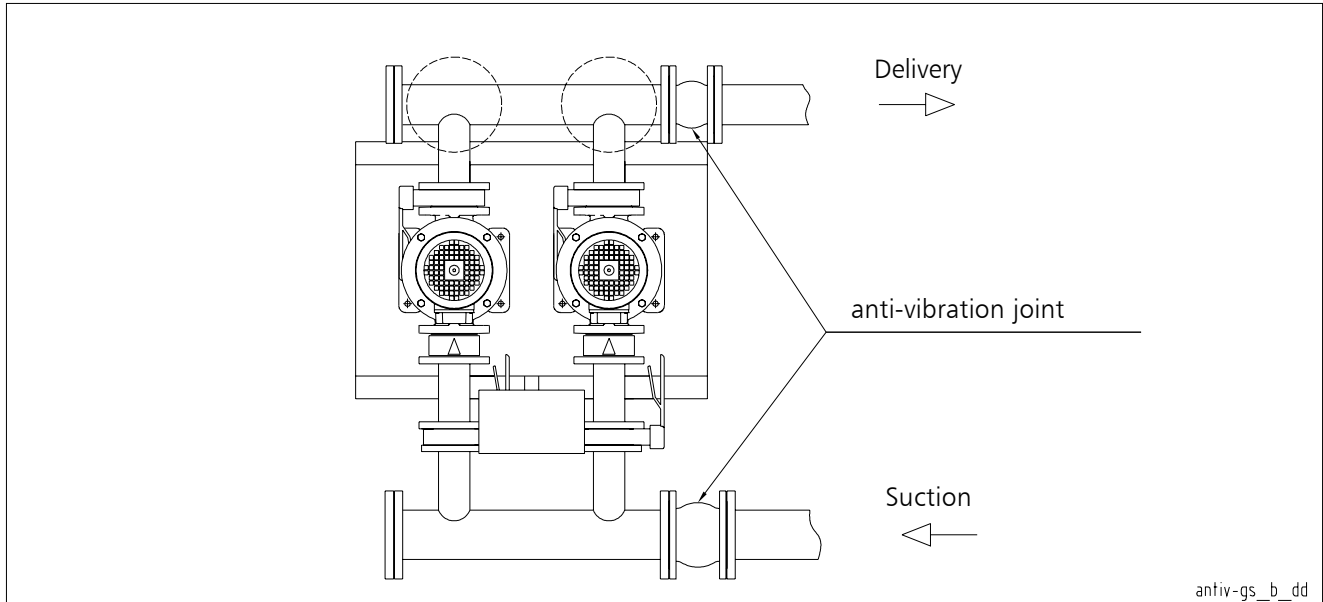
Replacing: $10,33 + H_g - 6,1 \geq 2,5$

$H_g = 2,5 + 6,1 - 10,33 = -1,73 \text{ m}$ representing the limit, for which reason: $NPSH_{available} = NPSH_{requested}$

Generally speaking, therefore, in order to assure correct operating conditions as regards the risk of cavitation, the pump must be positioned above the level of the tank so that the suction height is lower than the limit value of 1,73 m.

BOOSTER SETS GV SERIES INSTALLATION

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

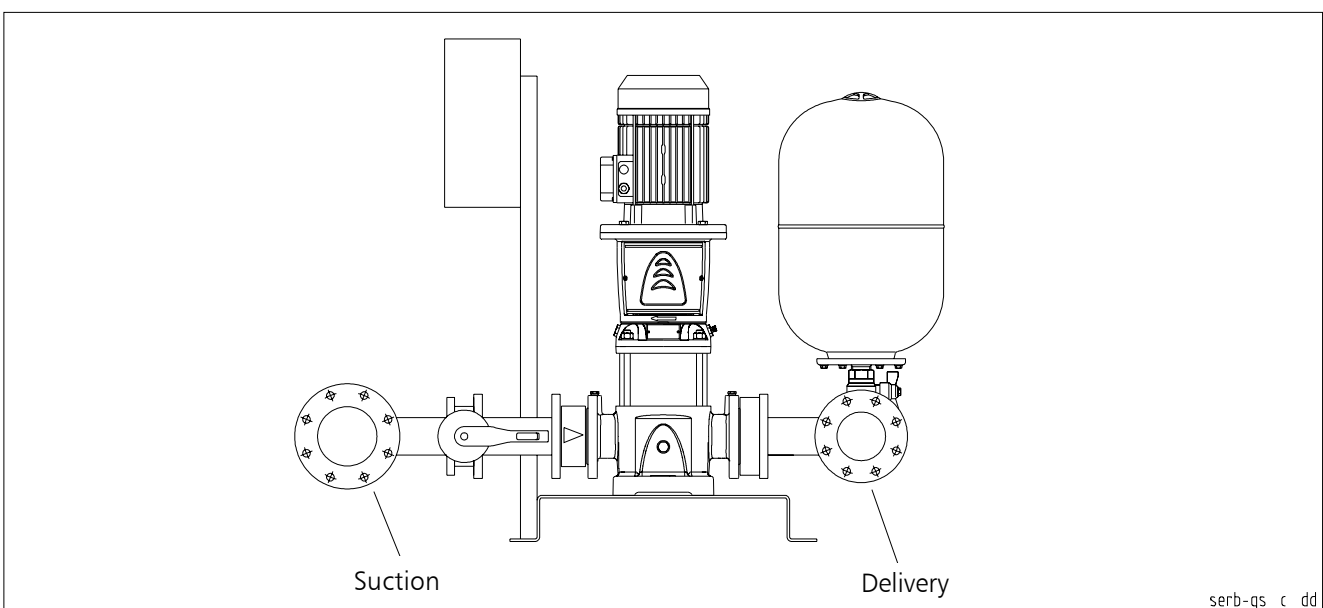


GV series booster sets must be connected to pressurised tanks with an adequate capacity for the system. These tanks can avoid any problems due to water hammer that is created due to the sudden stopping of the pumps running at a fixed speed. For this type of system, 24-litre diaphragm tanks can be used that perform a pressure dampening function, since they do not have to provide water storage like ordinary autoclave systems. Due to their design, variable-speed booster sets can satisfy users' demands by moderating the pump speed. It is always recommended to check the type of system to be made and choose the correct capacity of the diaphragm tank accordingly.

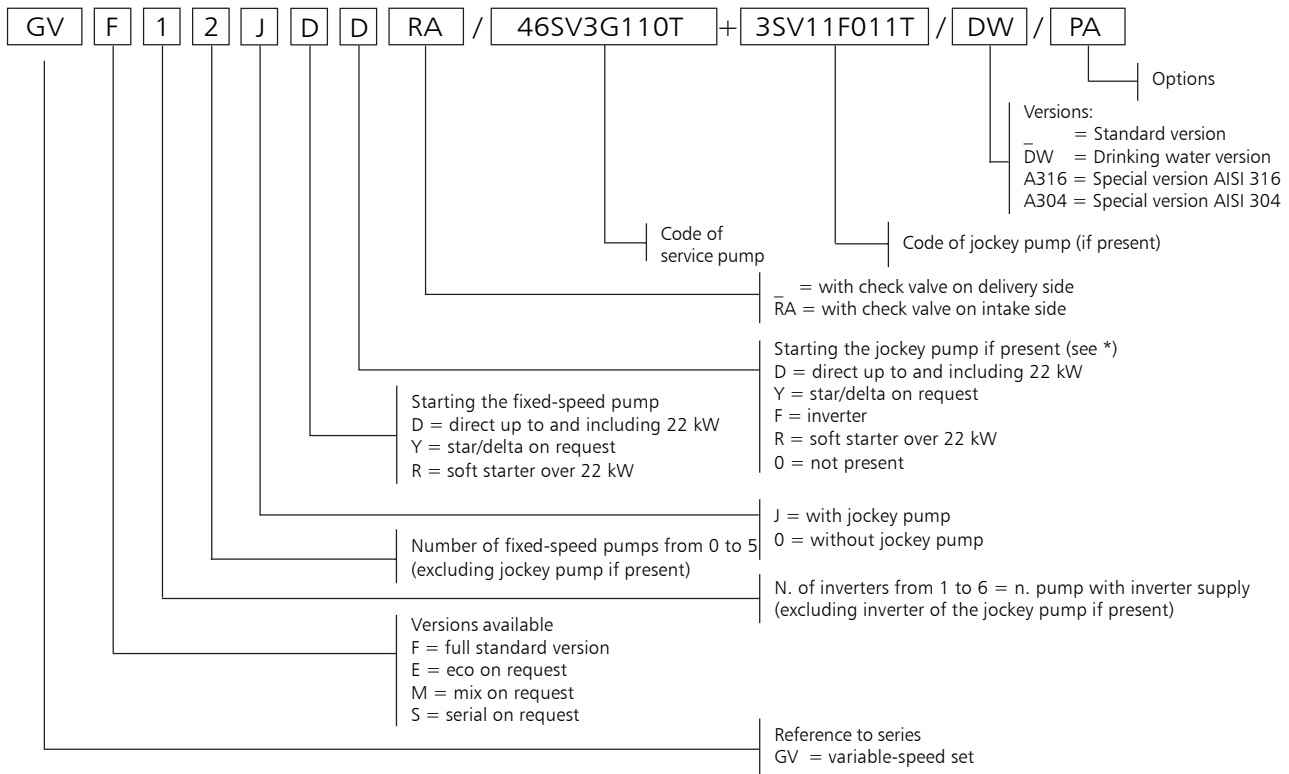
For the sizing of the diaphragm tanks, see the specific chapter in this catalogue.

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

It is good practice to check the value of the maximum pump pressure to match the set with a tank suitable for the pressure value.



SET IDENTIFICATION CODE



OPTIONS (ON DEMAND)

- 3A Booster set with electric pump certified 1A (Factory test reports issued by the end of assembly line; it includes QH curve).
- 3B Booster set with electric pump certified 1B (Test report issued by Audit Test Lab; it includes QH curve, efficiency and power).
- 60 Booster set with 60Hz supply voltage.
- BAP High pressure switch installed on the delivery manifold.
- C9 Delivery manifold at 90° with bend. The expansion vessels cannot be installed directly on the manifold.
- CM Suction or delivery manifold larger than standard size.
- CP Clean contacts version: converter faulty, start/stop for each pump.
- IP65 IP65 version control panel.
- KV Kit voltmeter.
- MA Pressure gauge installed on suction manifold.
- NL Dutch market version.
- PA Minimum pressure gauge installed on the suction manifold for dry-running protection.
- PQ Booster set with high suction pressure (pressure gauge/pressure switches/pressure transmitter increased of one range).
- RA Non return valves mounted on suction side (Es. GHV20RA/SV...).
- RE Heaters inside the control panel, with thermostat.
- SA No intake: no suction valves and suction manifold.
- SC Group with no control devices, such as pressure switches and transmitters; the pressure gauge is present.
- SCA No suction manifold (suction valves present).
- TS Booster set with pumps equipped with special mechanical seals.
- UK UK market version.
- VA Electric control panel fitted with analogue voltmeter and ammeter.
- WM Wall-mounted electrical panel with fixing tabs. Cables L= 5m.
- PP Control by pressure switches; in the event of malfunction of the transmitters the set runs at fixed speed (if enabled).

AVAILABLE VERSIONS

- A304 Main component in contact with liquid in stainless steel Aisi 304 or superior; gasket, sealing tape and thread sealing are suitable for drinking water. Bolts and screws galvanized. Flanges not in contact with the liquid in galvanized steel.
- B304 Main component in contact with liquid in stainless steel Aisi 304 or superior; gasket, sealing tape and thread sealing are suitable for drinking water. Bolts and screws in Aisi 304 or superior. Flanges not in contact with the liquid in Aisi 304 or superior.
- C304 Main component in contact with liquid in stainless steel Aisi 304 or superior; gasket, sealing tape and thread sealing are suitable for drinking water. Baseplate, frame, supports, bolts and screws in Aisi 304 or superior. Flanges not in contact with the liquid in Aisi 304 or superior. Valves and their components completely in Aisi 304 or superior (body, disc, plate).
- A316 Main component in contact with liquid in stainless steel Aisi 316; gasket, sealing tape and thread sealing are suitable for drinking water. Pumps in Aisi 316 material. Bolts and screws galvanized. Flanges not in contact with the liquid in galvanized steel.
- B316 Main component in contact with liquid in stainless steel Aisi 316; gasket, sealing tape and thread sealing are suitable for drinkingwater. Pumps in Aisi 316 material. Bolts and screws in Aisi 316. Flanges not in contact with the liquid in Aisi 316.
- C316 Main component in contact with liquid in stainless steel Aisi 316; gasket, sealing tape and thread sealing are suitable for drinking water. Pumps in Aisi 316 material. Baseplate, frame, supports, bolts and screws in Aisi 316. Flanges not in contact with the liquid in Aisi 316. Valves and their components completely in Aisi 316 (body, disc, plate).
- DW Main component in contact with fluid suitable for drinking water or in stainless steel AISI 304 or superior quality.

VERSIONS

- GVF System composed of 2 to 6 electric pumps and **only one** inverter. Auto-exchange of the inverter on the electric pumps. Exchange by means of a sequence of electrically interlocked contactors.
- GVE System composed of 2 to 6 electric pumps and **only one** inverter always connected to the same pump.
- GVM System composed of 2 to 6 electric pumps and more than one inverter (Available from 09-2012).
- GVS System composed of 2 to 6 electric pumps. Each pump is fed by an inverter (Available from 09-2012).
- * In versions GVF, GVE GVM the jockey pump is only fixed speed. In GVS versions the jockey pump may have fixed or variable speed.

SERIES GVS-GVM

SPECIAL VERSIONS WITH MULTI-INVERTER OPERATION (ON REQUEST)

The SD60 control board is able to run variable-speed booster sets even with several frequency converters. These systems must be chosen according to the type of installation and the type of service. For installations where it is necessary to supply water continuously for 24 hours, it is preferable to have a more balanced system, therefore using several inverters. In installations where the request is more variable, even in very limited spaces of time and in continuous duty, systems with variable-speed pumps are preferred.

In water supply installations such as water mains, where the power of the pumps installed is very high, a multi-inverter system may be provided, ensuring a saving in energy consumption.

N.B. : the following versions will be available on request.

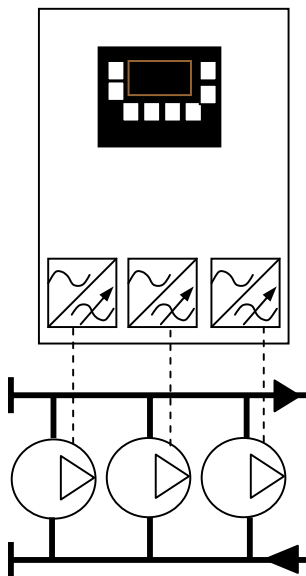
The control variations are listed below:

Systems with variable-speed pumps

Series **GVS** (Serial)

Each pump is controlled by a frequency converter.

Only example for GVS300...



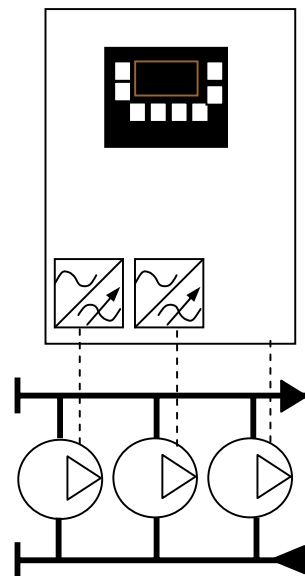
Constant pressure through continuous adjustment of the pump speed. The operating pumps can turn at the same speed (Synchro) or, by means of the programming menu, it is possible to choose serial control where the pumps which start up in cascade modulate the speed, letting the previous ones turn at max speed (50 Hz).

Systems with variable-speed and fixed-speed pumps

Series **GVM** (Mix)

Two pumps are each controlled by a frequency converter; the third pump runs at fixed speed. Operation at variable speed is provided only by the pumps controlled by an inverter.

Only example for GVM210...



Constant pressure through continuous adjustment of the speed of the pumps controlled by frequency converters. For this solution it is also possible to choose Synchro or Cascade Serial mode.

ELECTRIC CONTROL PANEL AND SD60 CONTROL UNIT

Electric panel or the supply, control and protection of, at most, six three-phase electric pumps, with sheet steel case (fig. 1) and protection rating IP55.

Main characteristics:

- Main door-blocking switch, fuse carrier and fuses, starting contactors and thermal protection.
- Standard supply voltage: 3x400Vac $\pm 10\%$, 50/60Hz. Non standard voltages on request, 1x230Vac $\pm 10\%$, 3x230Vca $\pm 10\%$, 50/60Hz.
- Transformer for low voltage auxiliary circuit; auxiliary voltage 24Vac.
- Inside, depending on the type of control variation, one or more frequency converters.

Lowara SD60 digital control unit, with microprocessors, with graphic display and programming keys (see fig. 2).

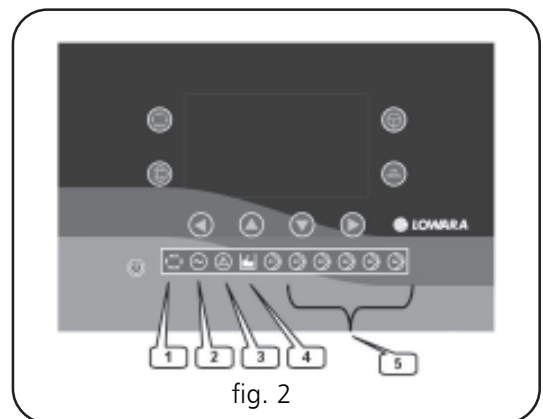
The SD60 is a programmable electronic controller with high connectivity and flexibility for regulating and monitoring variable-speed pressure boosting sets. The unit is based on a powerful platform that includes hardware able to satisfy the requests on the market and software which, thanks to the STRATON®, development environment, makes it possible to develop applications using standard programming languages, such as PLC. The controller offers the following characteristics and functions:

- Graphic display type o-led 2,7". The graphic display can show the state of the system, of the individual pump, the alarms log, one or more alarms in progress, the state of the digital inputs and outputs, the value of the analog inputs and outputs, the running hours of each pump installed or other elements depending on the menu. The system service technician can therefore obtain, at any time and with a few simple moves of the menu, a summary of the state of the applications, to decide what maintenance is needed.
- Multi-language.
- Indicating leds: automatic/manual operating mode (ref. 1), line presence (ref. 2), general fault (ref. 3), alarm level for water lack on suction side (ref. 4), pump running (ref. 5).
- Programming and menu browsing touch keys, type cap – sense back-lit.
- Manual adjustment of the output frequency, at the motor, of each inverter (jog mode).
- Manual starting of each fixed-speed pump.
- Management of a jockey pump and of a standby pump.
- Management of up to a maximum of six working set points.
- Management of frequency converter operation.
- Timing on starting and stopping of each installed pump.
- Cyclical exchange of starting of the variable-speed pump and of the fixed-speed pumps, to guarantee uniform wear of all the installed pumps.
- Four (4) analog inputs in current 0(4)-20mA for the connection of electronic sensors (pressure, flow rate, level, temperature, ...).
- One (1) analog input in current 0(4)-20mA and one (1) output in voltage 0(2)-10Vdc. The functions of the analog outputs are programmable.
- Dedicated inputs for the connection of the low level control device, low pressure on suction side of the pump set. The device may be chosen from: minimum pressure switch, float, three electric probes.
- Digital relay outputs for pump control.
- One (1) dedicated digital relay output, with two exchanging contacts, programmable type. Depending on the devices connected, there may be the following alarm signals: low level on suction side, motor overload, faulty sensor, faulty inverter, maximum and minimum pressure on pump set delivery side, fault due to general external device (excess voltage, insufficient voltage of power supply line, ...).

fig. 1



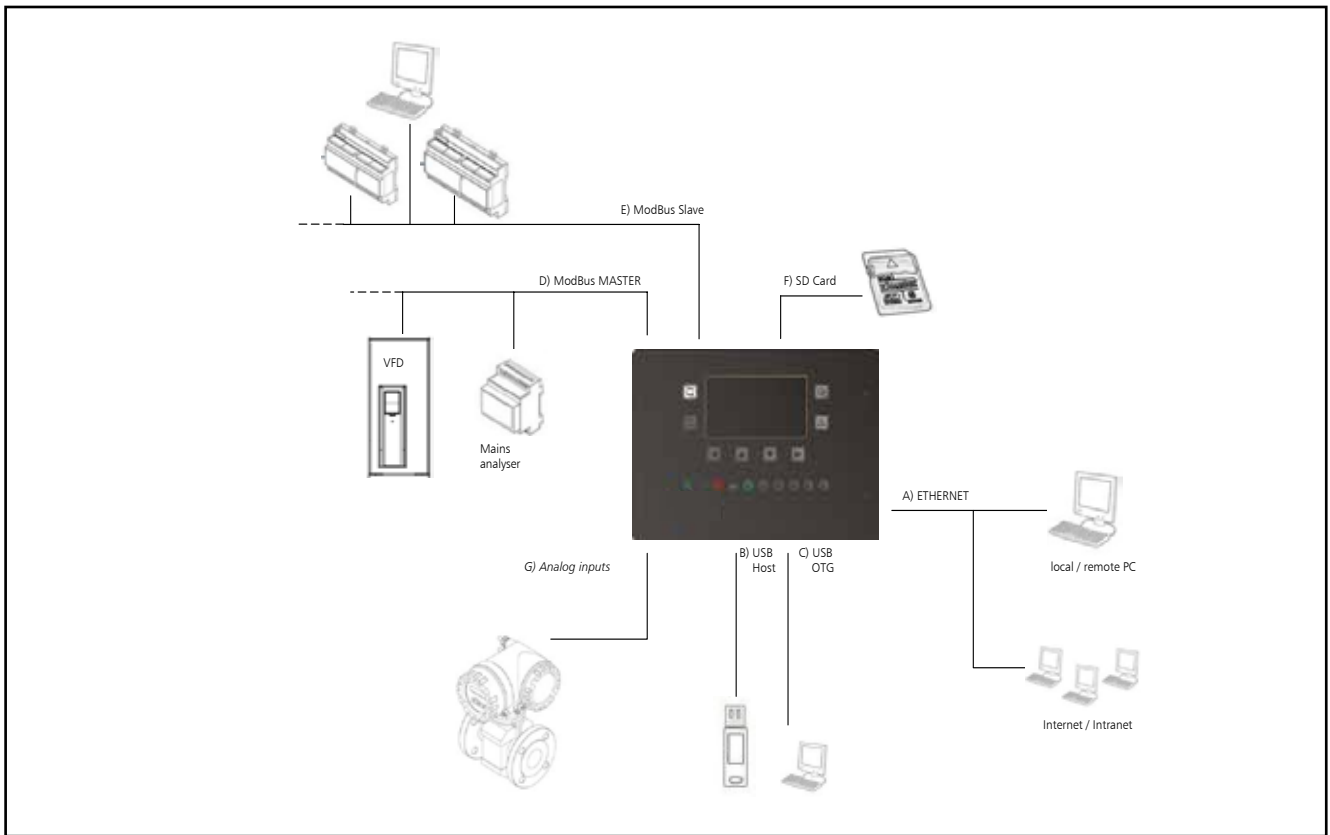
fig. 2



ELECTRIC CONTROL PANEL AND SD60 CONTROL UNIT

- One (1) dedicated digital relay output, with two exchanging contacts, programmable. Depending on the devices connected, there may be the following signals: set running, inverter running, autotest in progress.
- Dedicated optoinsulated digital inputs for the connection of the running pump contacts, thermal protection.
- Optoinsulated digital inputs, programmable according to the type of protection and control devices connected (PTC, maximum pressure switch, external alarm, faulty inverter, remote consent, change set point, ...).
- Thanks to the large capacity of the flash memory and to the clock with RCT buffer battery, it is possible to memorise all the alarms that occur, the value of the main physical characteristics regulated (pressure, flow rate, ...) and the state of the installed pumps. The data can be transferred to USB stick or to a PC, also by means of USB ports or ETHERNET. Two high-performance 16 bit microprocessors guarantee high speed of execution of the program and efficient interface management. All the important parameters are password-protected.
- Compatibility with supervision and control systems is becoming more and more important. For this reason the SD60 unit is equipped as standard with two (2) optoinsulated serial interfaces, for connection with the most widespread BMS supervision and control systems or with applications developed by third parties. Standard communication protocols are of the ModBus RTU.
It is also possible to interface with other supervision systems that use other communication protocols (BacNet™, Johnson Metasys®, TCP/IP, LonWorks®, Trend..) by means of optional external modules, available on request.
- Thanks to the web server and to the P_LAN gateway, it is possible to interface with intranet/internet networks.
- Slot for inserting memory card Micro SD card Max 2 Giga. Secure Digital (referred to briefly as SD) is the most widespread form of memory card, electronic devices used to store large quantities of information in digital format in flash memories. The user can therefore choose to save the event log data in the memory card (not included) instead of in the flash ram of the SD60 unit.
- One (1) USB port, Host type, for connecting devices such as a USB stick (also known as USB flash drive, USB pen, pendrive...): it is possible to transfer data such as the configuration files of the SD60 unit, the events log ("csv" format) or to import files such as software updates.
- One (1) USB OTG port for displaying, exporting (saving on PC) configuration files and the events log and for importing (saving on SD60) the configuration file, software updates.
- To guarantee greater safety and more simple maintenance of the pressure boosting systems, the SD60 unit can be provided with a serial connection to the electronic mains analysing module. This module allows monitoring of all the electric values of the pump set electric supply line, including energy consumed.
The data can be exported in a file.
- Provision for connection with an optional module with 5 digital outputs, each one programmable, each with final electric contact of the type NO normally open (on request, module with electric contact NC). Signals available: Automatic/Manual system mode, pump no. running, Thermal protection tripped pump no., low level/minimum pressure alarm on suction side of set, maximum and minimum pressure alarm on delivery side of set, external alarm, autotest failed, line presence, inverter running.

CONNECTIONS OF SD60 CONTROL UNIT



Key:

- A) LAN port, Ethernet 10 100 integrated in the board, connector RJ45. It is possible to configure, display and control on a PC the state of operation of the pump set in a local Intranet network or even on the Internet, if accesses are enabled. The SD60 unit has as a standard feature (the Web server application) which allows a computer to be connected by Ethernet to the SD60 unit. It is therefore possible to export the user interface from the SD60 unit to a PC to allow external monitoring and control of the unit and, consequently, of the system.
- B) USB port, Host type. It is possible to connect only devices such as a USB stick (also called USB flash drive, USB PEN, pendrive) to this port. With this device it is possible to export files such as the configuration file of the SD60 unit, the events log ("csv" format) or to import files such as software updates.
- C) USB OTG port for connection to PC. With this device it is possible to display, export files (save on PC), such as the configuration file of the SD60 unit, the events log ("csv" format) or to import files such as software updates.
- D) ModBus Serial port, Master type on hardware RS485. The serial interface is for communication between the SD60 controller and the inverters of the pump set, the mains analyser and, if present, expansion modules such as the module for boosting dry digital contacts. Standard communication protocol type ModBus RTU with possibility of setting the following parameters by software: BAUD RATE, PARITY CONTROL, STOP BIT.
- E) ModBus Serial port, Slave type on hardware RS485. The serial interface is for communication between the SD60 controller and the supervision systems. Standard communication protocol type ModBus RTU with possibility of setting the following parameters by software: ADDRESS, BAUD RATE, PARITY CONTROL, STOP BIT.
- F) The SD60 unit is equipped, as hardware, with a slot for inserting the memory card Micro SD card Max 2 GB. Secure Digital (referred to briefly as SD) is the most widespread form of memory card, electronic devices used to store large quantities of information in digital format in flash memories. The user can therefore choose to save event log data in the memory card (not included) instead of in the flash ram of the SD60 unit.
- G) Standard features, four configurable analog inputs. Standard, two inputs exclusively for connection to pressure sensors, one active and one in standby with automatic activation in the event of malfunction of the main sensor. Devices may be connected to the remaining inputs such as a flow rate meter, thermal probes for temperature control, an additional pressure sensor.

ENERGY SAVING

The worldwide demand for energy is growing all the time and, while the demand is increasing, production is coming up against serious problems of an environmental nature and related to the supply of raw materials. In other words, energy is an asset that is becoming more precious every day, imposing choices to optimise consumption, especially with a view to safeguarding the environment.

A very important improvement role is played by new technologies which include, among the most desirable parameters, environmental protection and energy saving as well as best technical performance. Drives for electric motors fall into this category. As well as making a considerable contribution to the decrease in energy consumption and consequently to the improvement of the environment, in many applications they also produce a notable reduction in the overall costs of running the installations.

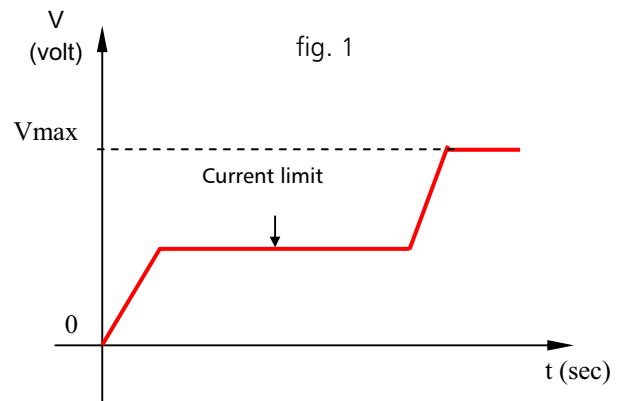
Drives for Electric Motors

The electronic drives that are most involved in the general improvement of the quality of systems and installations, are those for asynchronous alternating current motors, generally three-phase induction motors. They may be divided into two large categories:

- Drives with variable voltage
- Drives with variable frequency

The first, called "starters" or "soft starters", are appliances that operate at constant frequency (that of the power mains), dose the voltage supplied to the load and have limited current.

The following figure illustrates the typical operation of the "soft starter":



The second, called "Inverters" or "frequency converters" are most important from the point of view of energy saving and are able to supply the motor with a practically sinusoidal current (PMW) at a frequency that may vary from a value of practically 0 Hz to a rated frequency and beyond, with a constant flow (torque) or constant power.

The applicatory advantages of the two categories of drives will be described below.

Softstart

The direct starting of an asynchronous motor presents considerable difficulties due to the peak current in the start phase. Typically the value of the starting current is about 7/8 times the rated current of the motor.

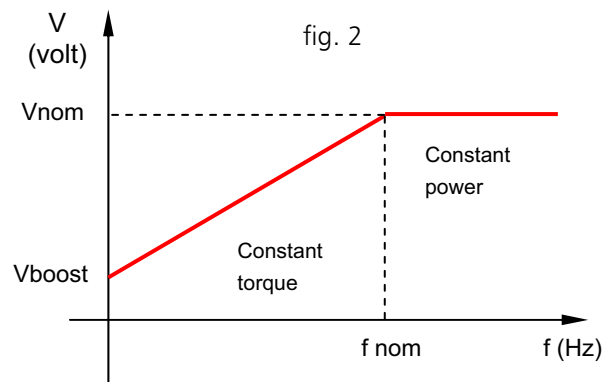
Direct start systems are therefore not generally convenient (except for small power); mainly because of the need to increase the size of the power supply mains (switches, fuses, etc. ...), and also problems of a mechanical nature, due to high stress in the start phase which in the medium/long term may prove to be destructive.

The electrical engineering industry has already found various practical solutions to the problems; the main ones are noted below:

- Special motors with double winding
- Starting with autotransformer
- Star/delta starting

These starting systems are certainly an improvement on direct starting, but they do not solve the problem.

The advent of electronic starters ("soft starters") made a decisive contribution to solving the question.



ENERGY SAVING

This type of drive is able to supply performance advantages:

- Progressive start with a voltage ramp having a duration adjustable within wide time limits.
- Limited current start with a value that can be set from 100% to 500% of the rated value.
- Descending voltage ramp having a duration adjustable within wide time limits.
- Voltage ramps at starting and stopping adaptable to particular operations (pumps).
- Low-speed operation, with reversible running direction, for specific applications.
- "Energy Saving" function with automatic reduction of the voltage/current in the case of a prolonged underload.
- Safety devices that can be calibrated to prevent overheating of the motor, over/under currents and over/under voltages.
- Safety devices that can be calibrated to prevent prolonged or too frequent starts.
- Possibility of by-pass operation after starting, keeping all the safety devices active.

All these features make the electronic starter the ideal tool for solving the problems we have mentioned. With the recently designed starters, with both analog and digital control, it is possible to obtain considerable softer and more efficient starts than any other electromechanical system was able to achieve. Moreover, thanks to the intrinsic control and protection systems of the starter, it is generally possible to eliminate other protection equipment that would otherwise be necessary in the system.

In conclusion, in many applications, one can SAVE on:

- Structure and auxiliary equipment of the power supply system.
- Protection of the mechanical system against excessive stress.

Speed Adjustment

The speed adjustment systems allow energy consumption in proportion to the use of the system based on user demand. This allows considerable savings in systems working on a daily basis (24h).

Alongside applications that require operation of the electric motors at a constant speed, with steady voltage and frequency, there are many in which the electric motor must be able to vary its speed of rotation (frequency); moreover, in many applications the process control obtained by varying the speed (adjustment of flow rate, pressure, etc...) is much more convenient than any other method of adjustment.

For these applications the most suitable drives are certainly frequency converters, referred to below as "Inverters", which can supply the motor with the desired torque from a few rpm up to the rated speed beyond which they are still able to operate at constant power with a decreasing torque. The advantage of using the Inverter lies in the greater efficiency of the performance that it is able to give in comparison with electromechanical controls.

A useful application of frequency converters may simply be that of obtaining a soft start for a load that is particularly heavy to start (pump) and variable over time (flow rate). In any case the advantage of a soft start is present in all inverter-controlled systems for starting a motor, even in cases where speed adjustment is not needed.

The advantage is due to the fact that the inverter is able to supply the rated torque (with possibility of 150% overload with respect to the rated current), right from frequency zero. This is possible because the voltage to the motor, generated by the inverter, is in phase with the number of revolutions right from the start (unless the motor is running). In this way the losses in the motor are considerably reduced.

The starting torque that can be obtained using the inverter is greater than that obtained with a soft starter, and the demand for current in the whole starting phase is much lower.

The yearly saving, for a lost power of 40000 Kwh, with electromechanical start, may be as much as 2000 Euro.

The reliability and efficiency of the pump speed control systems means optimising consumption and processes as well as savings. In the specific case of pumping appliances, the immediate consequence of the use of these systems is the realisation of pumps with greater operative flexibility, with much larger and optimal performance curves. There are many advantages – above all, a pump that always works, irrespective of variations in the installation, in optimal conditions with less wear and less malfunctions. So there are less problems from downtime and the pumps require less frequent maintenance. Moreover, an installation where the pumps are controlled by an inverter is more efficient and less subject to stress:

- absence of water hammer (which occurs when switching off pumps driven in a traditional way);
- lower working pressures than systems with an autoclave or piezometric tank;
- pressure and flow rate conditions always adequate for the demands, because the inverter is able to adjust the pump gradually in real time according to the pressure trend in the installation.

ENERGY SAVING

All this results in less stress on all the components in the distribution network, and therefore in less maintenance of the network, greater reliability of supply and lower running costs.

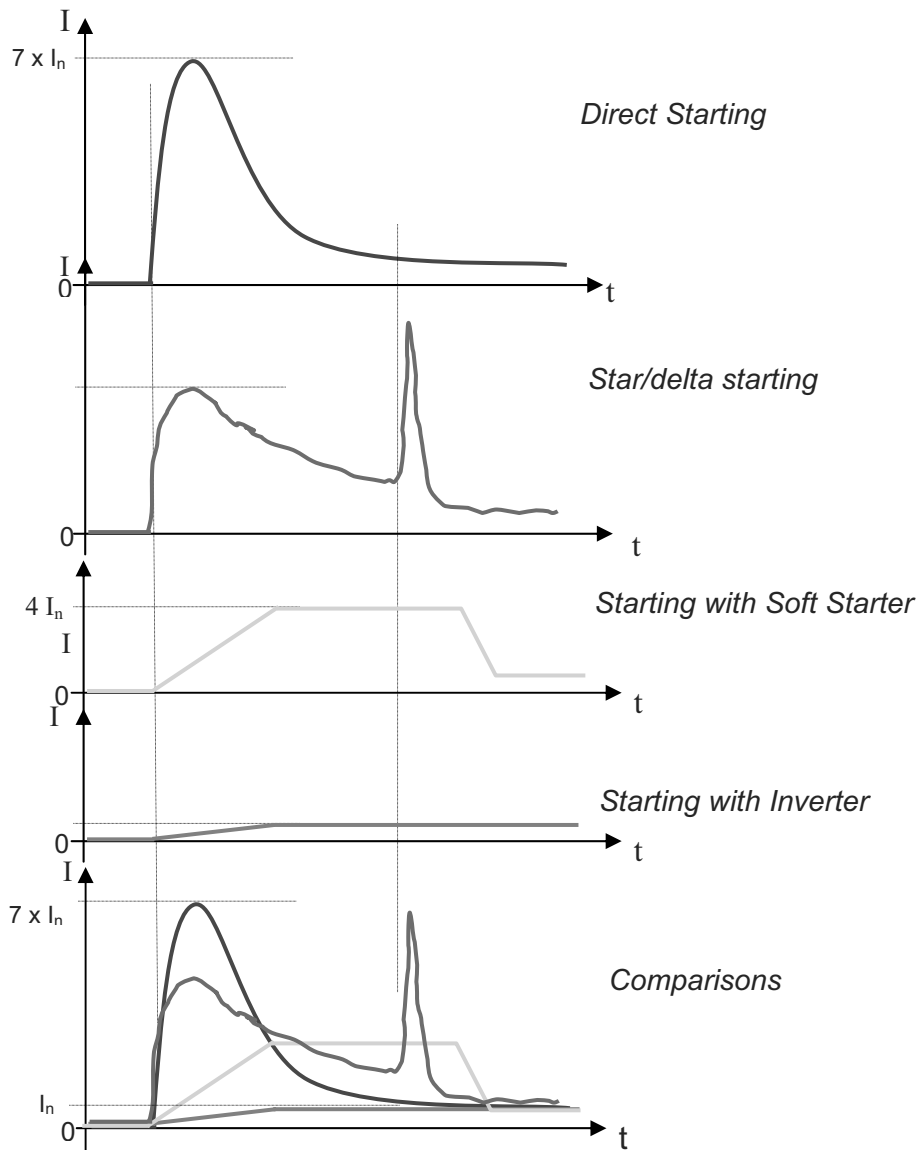
In short, using a pumping system with one or more variable-speed pumps means:

- ✓ Saving energy;
- ✓ Optimising resources and processes;
- ✓ Having the possibility of complete integration of the management, control and supervision systems;
- ✓ Prolonging the life of the installations;
- ✓ Reducing maintenance costs;

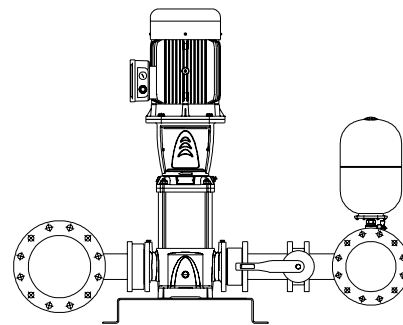
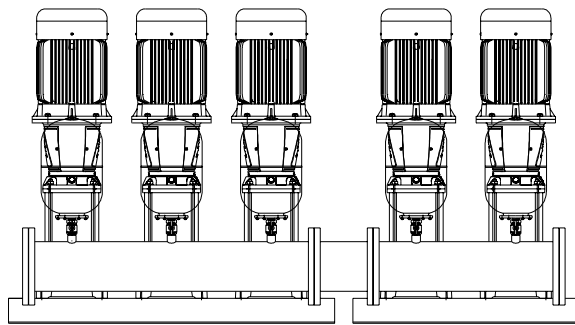
Increasing the productivity and efficiency of an installation.

Comparison of starting systems

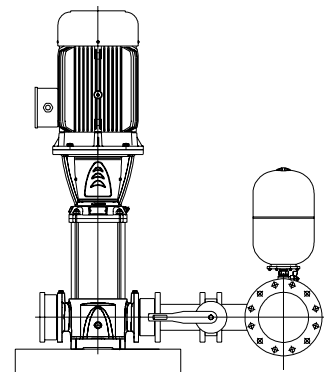
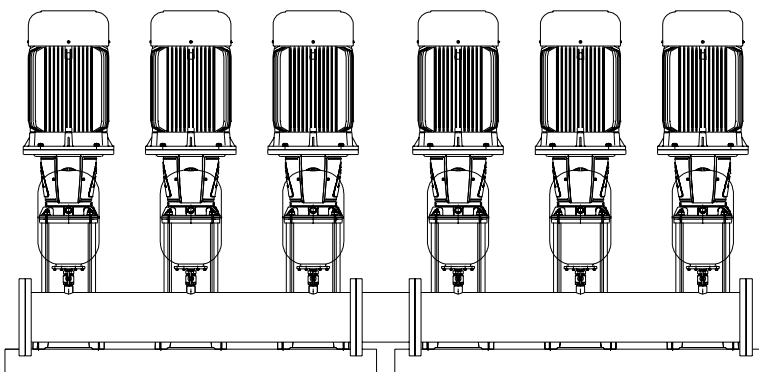
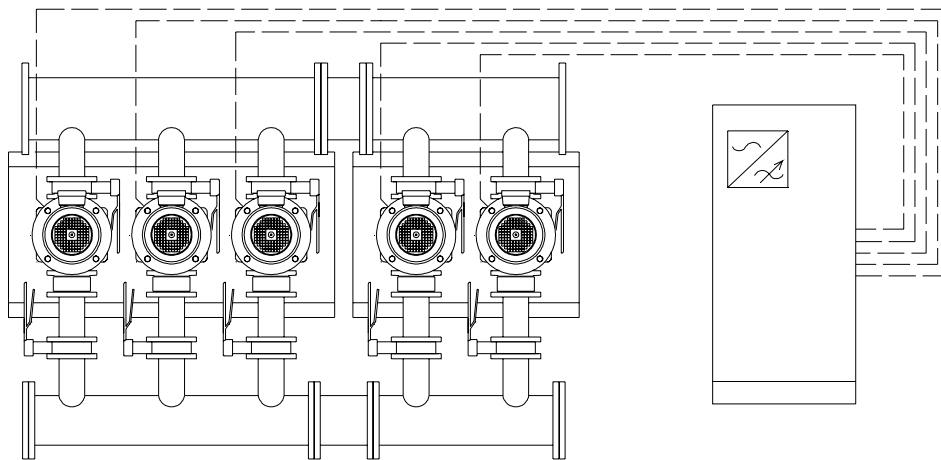
Having examined the various starting systems that can be realised for electric motors, direct start, star/delta, soft starter and inverter, they can be compared, analysing the absorbed currents and therefore the energy consumed (current = energy = kWh = MONEY)



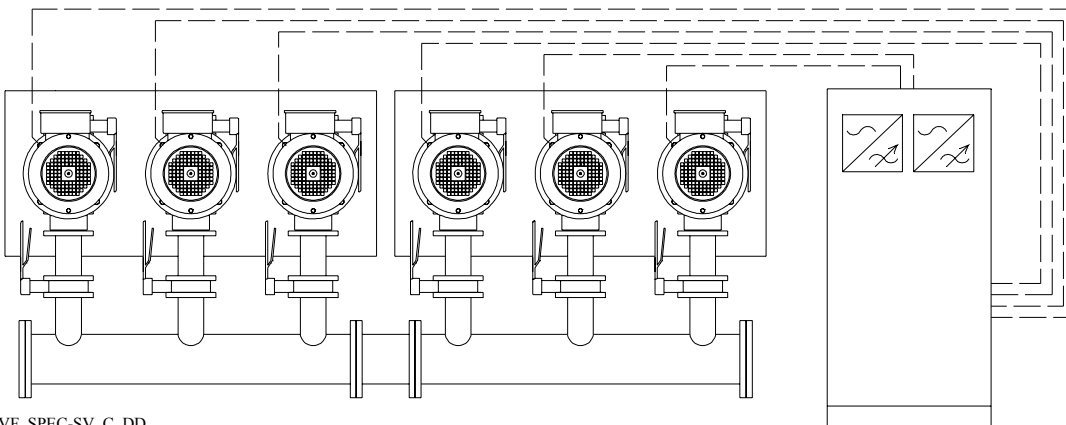
**GVF-GVM SERIES
SPECIAL VERSIONS WITH 5/6 PUMPS**



GVF140D0/92SV3G220T



GVM240Y0/92SV5/2AG70T/SCA



GVF_SPEC-SV_C_DD

N.B.: Please request other special versions with regard to materials used, working temperatures, electric panels with additional functions.

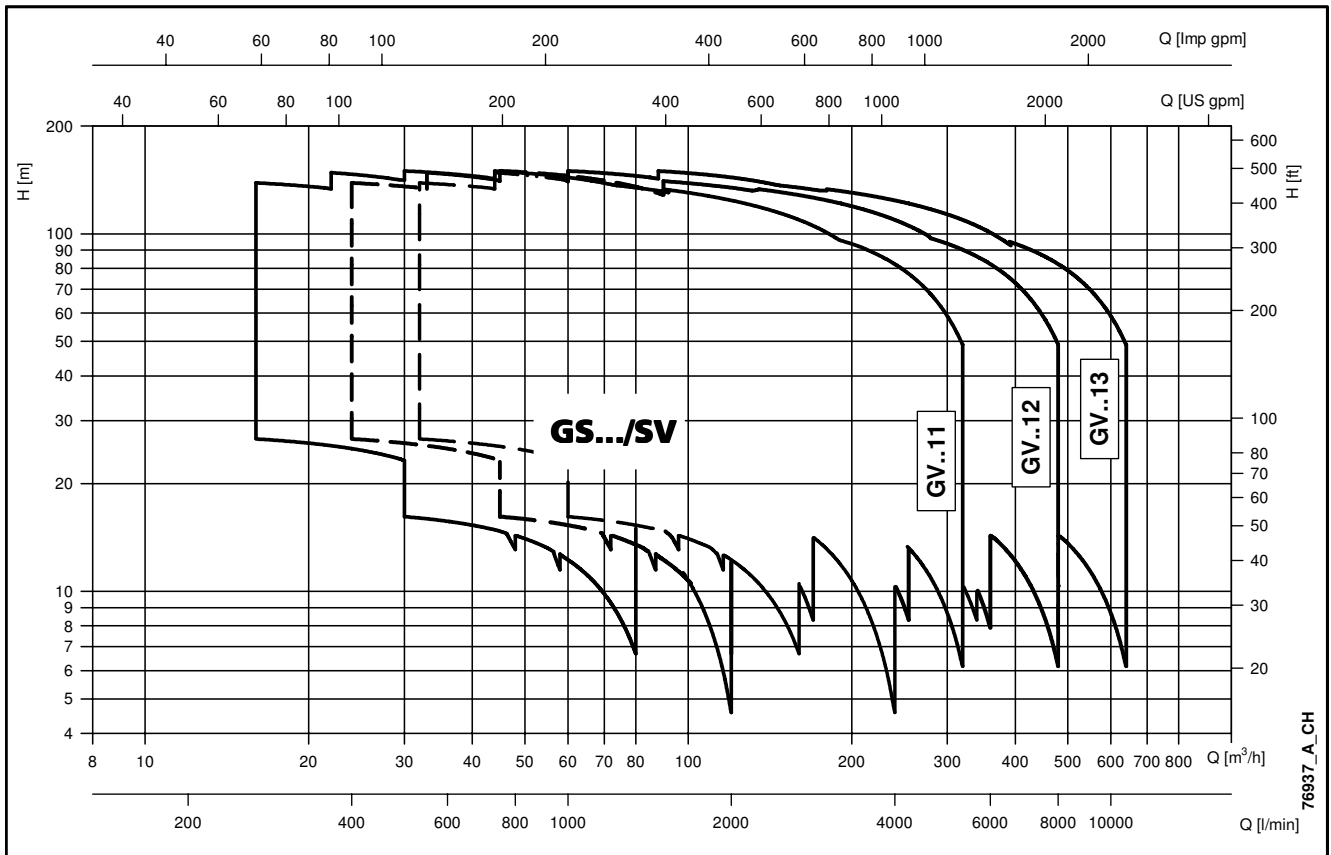
GVF.../SV Series

Variable-speed booster sets with e-SV™ series
Vertical Multistage Electric Pumps with
high-efficiency motors and
flow rates up to 640 m³/h

50 Hz

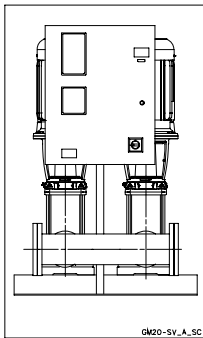
GV.../SV SERIES
HYDRAULIC PERFORMANCE RANGE AT 50 Hz

GVF.../SV



RANGE

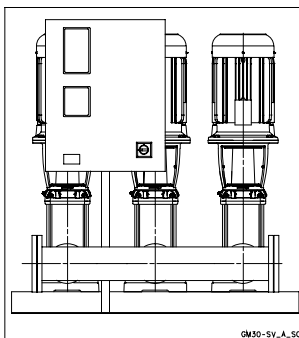
The range of GVF series variable-speed booster sets includes models with 2 to 4 electric duty pumps to adapt to the specific needs of each application.



GVF11 SETS

- Variable-speed sets with two multistage vertical service pumps, SV series, with power ratings up to 37 kW.

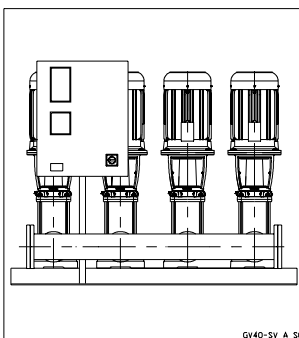
Head up to 160m.
Flow rate up to 320 m³/h.



GVF12 SETS

- Variable-speed sets with three multistage vertical service pumps, SV series, with power ratings up to 37 kW.

Head up to 160m.
Flow rate up to 480 m³/h.



GVF13 SETS

- Variable-speed sets with four multistage vertical service pumps, SV series, with power ratings up to 37 kW.

Head up to 160m.
Flow rate up to 640 m³/h.

REFERENCE STANDARDS

- The Lowara booster sets are CE-marked for conformity with the following directives:
 - Machinery Directive: 2006/42/EC.
 - Low Voltage Directive 2006/95/EC.
 - Electromagnetic Compatibility Directive 2004/108/EC
- Electric pump performance complies with the following standard: ISO 9906-A Rotodynamic pumps – hydraulic performance acceptance tests.

CHARACTERISTICS OF THE ELECTRIC PUMPS

GVF.../SV

The SV pump is a multistage vertical pump, not self-priming, combined with a normalised standard motor. The hydraulic part is kept in place between the upper cover and the pump body with tie-rods. The pump body is available in different configurations and connection typologies.



Technical Information:

Flow rates: up to 160 m³/h.
Heads: up to 160 m.

Temperature of pumped liquid:
- from -30°C to +120°C for 15, 22, 33, 46, 66, 92, 125SV standard version.

Tested to ISO 9906 annex A.
Clockwise direction of rotation looking at the pump from above (indicated with an arrow on the bracket and joint).

Motor

Short circuit squirrel cage motor, totally enclosed, fan-cooled. Standard supplied IE2/IE3 motors are compliant with Regulation (EC) no. 640/2009 and IEC 60034-30.

IP55 protection.

Class 155 (F) insulation.

Performance levels according to EN 60034-1.

Standard voltage:

Single-phase version: 220-240 V, 50 Hz.

Three-phase version: 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.

For electrical data of the motors used see Technical Appendix.

Materials

Suitable for pumping drinking water (WRAS certified).

CHARACTERISTICS OF THE ELECTRIC PUMPS USED IN GV SERIES BOOSTER SETS

CHARACTERISTICS OF 15, 22SV SERIES

- Vertical multistage centrifugal pump. All metal parts in contact with the pumped liquid are made of stainless steel.
- The following versions are available:
 - **F**: round flanges, in-line delivery and suction ports, AISI 304.
 - **T**: oval flanges, in-line delivery and suction ports, AISI 304.
 - **R**: round flanges, delivery port above the suction port, with four adjustable positions, AISI 304.
 - **N**: round flanges, in-line delivery and suction ports, AISI 316.
 - **V, P**: Victaulic® couplings, in-line delivery and suction ports, AISI 316.
 - **C**: Clamp couplings (DIN 32676), in-line delivery and suction ports, AISI 316.
 - **K**: threaded couplings, (DIN 11851), in-line delivery and suction ports, AISI 316.
- Reduced axial thrusts enable the use of **standard motors** that are easily found in the market. **Standard supplied IE2/IE3 three-phase surface motors $\geq 0,75$ kW are compliant with Regulation (EC) no. 640/2009.**
- Mechanical seal according to EN 12756 (ex DIN 24960) and ISO 3069 for 1, 3, 5SV and 10, 15, 22SV ($\leq$ of 4 kW) series.
- **Balanced mechanical seal** according to EN 12756 (ex DIN 24960) and ISO 3069, which **can be replaced without removing the motor from the pump** for 10, 15 and 22SV ($\geq$ of 5,5 kW) series.
- Seal housing chamber designed to prevent the accumulation of air in the critical area next to the mechanical seal.
- A second plug is available for 10, 15, 22SV series.
- Versions with round flanges that can be coupled to counter-flanges, according to EN 1092.
- Threaded, oval counter-flanges made of stainless steel are standard supply for the T versions.
- Round counter-flanges made of stainless steel are available on request for the F, R and N versions.
- Easy maintenance. No special tools required for assembly or disassembly.
- **The pumps for F, T, R, N versions are certified for drinking water use (WRAS and ACS certified).**
- Standard version for temperatures ranging from -30°C to $+120^{\circ}\text{C}$.

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

- The following versions are available:
 - **G**: vertical multistage centrifugal pump with impellers, diffusers and outer sleeve made entirely of stainless steel, and with pump casing and motor adaptor made of cast iron.
 - **N, P**: version made entirely of AISI 316 stainless steel.
- Innovative axial load compensation system on pumps with higher head. This ensures reduced axial thrusts and enables the use of **standard motors** that are easily found in the market. **Standard supplied IE2/IE3 three-phase surface motors are compliant with Regulation (EC) no. 640/2009.**
- **Balanced mechanical seal** according to EN 12756 (ex DIN 24960) and ISO 3069, which **can be replaced without removing the motor from the pump.**
- Seal housing chamber designed to prevent the accumulation of air in the critical area next to the mechanical seal.
- **The pumps for G, N versions are certified for drinking water use (WRAS and ACS certified).**
- Standard version for temperatures ranging from -30°C to $+120^{\circ}\text{C}$.
- Pump body fitted with couplings for installing pressure gauges on both suction and delivery flanges.
- In-line ports with round flanges that can be coupled to counter-flanges, in compliance with EN 1092.
- Mechanical sturdiness and easy maintenance. No special tools required for assembly or disassembly.

OPERATING CHARACTERISTICS AND LIMITS

Liquids handled	Water containing no gas or corrosive and/or aggressive substances.
Fluid temperature	Above -10°C a + 80 °C
Ambient temperature	Above 0°C a + 40 °C
Maximum operating pressure	Max 8 bar, 10 bar, 16 bar in function of pump type
Minimum inlet pressure	According to NPSH curve and losses, with a minimum margin of 0.5 m
Maximum inlet pressure	The inlet pressure added to the pressure of the pump at zero flow must be lower than the maximum operating pressure of the set.
Installation	Indoors, protected from the weather. Away from heat sources. Max elevation 1000 m ASL. Max humidity 50% without condensation.
Hourly starts (single pump)	0,37 kW ≤ Pn ≤ 3 kW max 60 starts per hour. Direct motor start; 4 kW ≤ Pn ≤ kW max 40 starts per hour. Direct motor start; 11 kW ≤ Pn ≤ kW max 30 starts per hour. Direct motor start; 18,5 kW ≤ Pn ≤ 22 kW max 24 starts per hour. Direct motor start; 30 kW ≤ Pn ≤ 37 kW max 16 starts per hour. Start/delta start; Pn = 45 kW max 8 starts per hour. Start/delta start;
Sound emission	See table

* On request, PN above in function of the pump

gfix_2p-en_c_ti

SOUND EMISSION LEVELS

50 Hz 2900 min -1		LpA (dB ±2)**		
P2 (kW)	IEC*	GVF11	GVF12	GVF13
2,2	90	< 70	< 70	< 70
3	100R	< 70	< 70	< 70
4	112R	< 70	< 70	< 70
5,5	132R	< 70	< 70	< 70
7,5	132	74	76	77
11	160R	76	78	79
15	160	74	76	77
18,5	160	76	78	79
22	180R	73	75	76
30	200	75	77	78
37	200	75	77	78

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

GVcom_2p-en_a_tr

** Noise value of the electric motor only.

MAIN COMPONENTS

- **Main On-off valves** on suction and discharge side of each pump, ball type with threaded coupling up to 2" size included. Butterfly type for installation between the flanges are used for larger diameters.
- **Check valve** on discharge side of each pump, spring-loaded type, with threaded coupling up to 1 1/2" size, as well as the double-swing type to fit between the flanges.
For applications with air-cushion surge tanks, they are mounted on the suction side and the set is equipped with a connector for G 1/2" threaded flexible air feeder pipe (GV..RA series).
- **Suction manifold** made of galvanized or AISI 304 stainless steel with threaded or flanged ends depending on the type of pump (see drawings). Threaded coupling for water charging.
- **Delivery manifold** made of galvanized or AISI 304 stainless steel depending on the version, with threaded or flanged ends depending on the type of pump (see drawings). Fitted with two R1" threaded couplings with caps to allow connection of 24 or 20-litre diaphragm pressure vessels.
- **Pressure gauge and 2 control transmitters** located on the delivery side of the unit.
- **Various couplings** in nickel-plated brass, galvanized steel or stainless steel depending on the version.
- **Mounting base**, for pumpset and panel mounting brackets:
- in painted steel for sets with electric pumps series 15-22-33-46-66-92-125SV;
- **Electric control panel**, IP55 protection class.

STANDARD VERSIONS AVAILABLE

See table of materials.

STANDARD VERSION

For general applications

Sets with 15-22SV pumps:

Nickel-plated brass valves, non-return valves with stainless steel flaps.

Sets with 33-46-66-92-125SV pumps:

Valves with polyamide butterfly, non-return valves with stainless steel flaps.

DW VERSION (GV../DW)

For drinking water applications.

The main components in contact with the liquid are certified suitable for drinking water or are made of AISI 304 or higher grade of stainless steel.

Sets with 15-22SV pumps:

Nickel-plated brass valves, non-return valves with stainless steel flaps.

Sets with 33-46-66-92-125SV pumps:

Valves with epoxy butterfly, non-return valves with stainless steel flaps.

AISI304 Version (GV../A304), AISI 316 (GS../A316)

For special applications

Manifolds, valves, non-return valves and main components with parts directly in contact with the pumped liquid are made of AISI 304 or AISI 316 stainless steel.

Accessories available on request:

- Devices **against dry running** in one of the following versions:
- float switch, for positive suction head;
- probe electrodes kit, for positive suction head;
- minimum pressure switch, for positive suction head.
- **Surge tank** in the following versions:
- Air-cushion surge tank with compressor and accessories for surge tank and compressor.
- Diaphragm vessel as an alternative to the air-cushion tank.
- **Kit featuring** a 24 or 20-litre **diaphragm expansion vessel** with ball valve (one for each pump), in the following versions, depending on the maximum head of the pumps:
- 24-litre 8 bar cylinder water vessel kit
- 24-litre 10 bar cylinder water vessel kit
- 24-litre 16 bar cylinder water vessel kit
- 20-litre 25 bar cylinder water vessel kit
- **Alarm kit;**
- **Air feeder** for **RA** version;
- **Air compressor** for **RA** version.

SPECIAL VERSIONS AVAILABLE ON REQUEST

(Contact the Sales and technical Assistance Service)

- Units with non-standard input voltages, such as three-phase 3x230V, 3x440V.
- Units with single-phase input voltages 1x230V.
- Support base in AISI 304, AISI 316 stainless steel.
- Units with stainless steel expansion vessels.
- Units with special valves.
- Sets with 5 electric pumps.
- Sets with 6 electric pumps.
- Sets with jockey pump.

TABLE OF MATERIALS FOR SETS WITH 15-22SV PUMPS

DENOMINATION	MATERIAL			
	(STANDARD)	DW	A304	A316
Manifolds	AISI304	AISI 304	AISI 304	AISI 316
On-off valves	Nickel-plated brass	Nickel-plated brass	AISI 316	AISI 316
Non-return valves	Painted cast iron with stainless steel flaps	Painted cast iron with stainless steel flaps	AISI 304	AISI 316
Pressure switches	Chrome plated zinc alloy	AISI 304	AISI 304	AISI 304
Pressure transmitters	AISI 316	AISI 316	AISI 316	AISI 316
Caps/plugs/flanges	Galvanized steel	AISI 304	AISI 304	AISI 316
Bracket	Painted steel (*)	Painted steel (*)	Painted steel (*)	Painted steel (*)
Base	Painted steel	Painted steel	Painted steel	Painted steel
Pump body	AISI 304	AISI 304	AISI 304	AISI 316
Outer sleeve	AISI 304	AISI 304	AISI 304	AISI 316

(*) of galvanized steel for two-pump sets up to 4kW

gfixvsv16_2p-en_b_tm

TABLE OF MATERIALS FOR SETS WITH 33-46-66-92-125SV PUMPS

DENOMINATION	MATERIAL			
	(STANDARD)	DW	A304	A316
Manifolds	AISI 304	AISI 304	AISI 304	AISI 316
On-off valves	Poliamide	Epoxy	AISI 316	AISI 316
Non-return valves	Painted cast iron with stainless steel flaps	Painted cast iron with stainless steel flaps	AISI 304	AISI 316
Pressure switches	Chrome plated zinc alloy	AISI 304	AISI 304	AISI 304
Pressure transmitters	AISI 316	AISI 316	AISI 316	AISI 316
Caps/plugs/flanges	Galvanized steel	AISI 316	AISI 316	AISI 316
Bracket	Painted steel	Painted steel	Painted steel	Painted steel
Base	Painted steel	Painted steel	Painted steel	Painted steel
Pump body	Cast iron	Cast iron	Cast iron	AISI 316
Outer sleeve	AISI 304	AISI 304	AISI 304	AISI 316

gfixvsv33_2p-en_b_tm

GV11/15SV SERIES BOOSTER SETS HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

SET TYPE GV11/..	NOMINAL POWER	Q = DELIVERY													
		l/min 0	167	200	267	340	367	467	540	660	700	800	600	700	800
		m³/h 0	10	12	16	20,4	22	28	32	39,6	42	48	36	42	48
	kW	H = TOTAL HEAD METRES COLUMN OF WATER													
15SV06F055T	2 x 5,5	88			81,5	79,4	78,4	74,1	69,9	60,3	56,3	44,2			
15SV07F055T	2 x 5,5	102			94,5	91,9	90,8	85,7	80,6	69,4	64,7	50,5			
15SV08F075T	2 x 7,5	117			110,9	108,0	106,8	100,8	94,9	82,0	76,7	60,6			
15SV09F075T	2 x 7,5	132			124,4	121,0	119,6	112,8	106,1	91,5	85,5	67,4			
15SV10F110T	2 x 11	148			138,8	135,3	133,8	126,7	119,6	103,9	97,4	77,5			

The tabel refers to performance with 2 pumps running

gv_2p15sv_2p50-en_a_th

GVF.. /SV

GV11/22SV SERIES BOOSTER SETS HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

SET TYPE GV11/..	NOMINAL POWER	Q = DELIVERY													
		l/min 0	167	200	267	340	367	467	540	660	700	800	860	920	967
	m³/h 0	10	12	16	20,4	22	28	32	39,6	42	48	52	55	58	
	kW	H = TOTAL HEAD METRES COLUMN OF WATER													
22SV05F055T	2 x 5,5	76					70,9	67,9	64,9	58,3	55,6	47,4	41,4	34,7	28,8
22SV06F075T	2 x 7,5	93					88,8	85,7	82,5	75,4	72,4	63,3	56,7	49,1	42,6
22SV07F075T	2 x 7,5	109					103,1	99,4	95,7	87,2	83,7	73,1	65,3	56,5	48,8
22SV08F110T	2 x 11	125					119,2	115,2	111,0	101,6	97,7	85,7	77,0	66,9	58,2
22SV09F110T	2 x 11	140					133,7	129,2	124,4	113,8	109,3	95,8	86,0	74,6	64,8
22SV10F110T	2 x 11	155					148,2	143,1	137,8	125,9	120,9	105,8	94,8	82,3	71,3

The tabel refers to performance with 2 pumps running

gv_2p22sv_2p50-en_a_th

GV11/33-46SV SERIES BOOSTER SETS

HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

GVF.../SV

SET TYPE GV11/..	NOMINAL POWER	Q = DELIVERY										
		l/min 0	500	600	733	833	1000	1167	1333	1500	1800	2000
	m³/h 0	30	36	44	50	60	70	80	90	108	120	
kW		H = TOTAL HEAD METRES COLUMN OF WATER										
33SV1/1AG022T	2 x 2,2	17,4	16,2	15,7	15,0	14,0	12,2	9,8	6,7			
33SV1G030T	2 x 3	23,8	21,7	21,2	20,3	20,0	17,8	15,5	12,7			
33SV2/2AG040T	2 x 4	35,1	34,1	33,3	32,0	30,0	27,0	22,4	16,6			
33SV2/1AG040T	2 x 4	40,8	38,8	37,9	36,0	35,0	32,0	27,5	22,3			
33SV2G055T	2 x 5,5	47,8	45,0	44,1	43,0	41,0	39,0	35,0	29,9			
33SV3/2AG055T	2 x 5,5	57,7	55,2	53,8	51,0	49,0	44,0	38,0	29,6			
33SV3/1AG075T	2 x 7,5	64,5	61,3	60,0	58,0	56,0	51,0	45,0	37,0			
33SV3G075T	2 x 7,5	71,5	67,4	66,0	64,0	62,0	58,0	52,0	44,6			
33SV4/2AG075T	2 x 7,5	82,0	78,8	77,0	74,0	72,0	66,0	58,0	47,2			
33SV4/1AG110T	2 x 11	88,9	85,0	83,0	81,0	78,0	73,0	65,0	55,1			
33SV4G110T	2 x 11	95,9	91,1	90,0	87,0	85,0	80,0	73,0	63,1			
33SV5/2AG110T	2 x 11	106,0	101,6	100,0	96,0	93,0	85,0	76,0	63,0			
33SV5/1AG110T	2 x 11	112,7	107,2	105,0	102,0	99,0	92,0	82,0	70,0			
33SV5G150T	2 x 15	120,4	114,9	113,0	110,0	107,0	101,0	92,0	80,5			
33SV6/2AG150T	2 x 15	131,2	126,9	125,0	120,0	116,0	108,0	96,0	81,2			
33SV6/1AG150T	2 x 15	139,1	133,5	131,0	128,0	124,0	116,0	105,0	90,4			
33SV6G150T	2 x 15	145,6	139,0	137,0	133,0	129,0	121,0	110,0	96,1			
33SV7/2AG150T	2 x 15	156,0	149,9	147,0	143,0	138,0	128,0	115,0	98,2			
46SV1/1AG030T	2 x 3	19,5			19,2	18,8	17,9	16,7	15,1	13,1	8,5	4,6
46SV1G040T	2 x 4	27,2			24,0	23,5	22,5	21,4	19,9	18,2	14,3	10,8
46SV2/2AG055T	2 x 5,5	38,8			39,8	39,2	37,8	35,7	32,9	29,4	21,1	13,9
46SV2G075T	2 x 7,5	52,6			48,5	47,7	46,1	44,2	41,7	38,7	31,4	25,1
46SV3/2AG110T	2 x 11	64,7			65,1	64,0	62,0	60,0	56,0	52,0	40,4	30,8
46SV3G110T	2 x 11	80,8			74,3	73,0	71,0	68,0	65,0	60,0	50,0	40,7
46SV4/2AG150T	2 x 15	92,4			90,7	90,0	87,0	83,0	79,0	73,0	58,0	45,6
46SV4G150T	2 x 15	107,3			99,8	98,0	96,0	92,0	87,0	82,0	68,0	55,9
46SV5/2AG185T	2 x 18,5	117,2			114,8	113,0	110,0	106,0	100,0	93,0	75,0	60,2
46SV5G185T	2 x 18,5	134,5			125,1	123,0	120,0	116,0	110,0	103,0	86,0	71,5
46SV6/2AG220T	2 x 22	143,7			139,3	138,0	134,0	129,0	122,0	113,0	92,0	73,4
46SV6G220T	2 x 22	161,0			149,9	148,0	144,0	139,0	132,0	124,0	104,0	86,0

The table refers to performance with 2 pumps running.

gv_2p33-46sv_2p50-en_a_th

GV11/66-92SV SERIES BOOSTER SETS

HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

SET TYPE GV11/..	NOMINAL POWER	Q = DELIVERY												
		l/min 0	1000	1200	1400	1500	1800	2000	2400	2600	2833,3	3200	3600	4000
	m³/h 0	60	72	84	90	108	120	144	156	170	192	216	240	
kW		H = TOTAL HEAD METRES COLUMN OF WATER												
66SV1/1AG040T	2 x 4	23,8	21,4	20,7	19,9	19,4	17,8	16,6	13,3	11,2	8,3			
66SV1G055T	2 x 5,5	29,2	25,8	24,8	23,8	23,3	21,8	20,7	17,9	16,1	13,5			
66SV2/2AG075T	2 x 7,5	47,5	42,6	41,2	39,5	38,6	35,5	32,9	26,4	22,2	16,4			
66SV2/1AG110T	2 x 11	54,2	49,6	48,2	46,7	45,8	42,9	40,6	34,8	31,2	26,2			
66SV2G110T	2 x 11	60,4	55,7	54,4	52,8	52,0	49,3	47,1	42,0	38,9	34,7			
66SV3/2AG150T	2 x 15	78,4	71,6	69,6	67,2	65,9	61,5	57,9	49,0	43,3	35,3			
66SV3/1AG150T	2 x 15	84,7	77,8	75,8	73,5	72,2	68,0	64,6	56,3	51,1	44,0			
66SV3G185T	2 x 18,5	91,4	84,7	82,7	80,5	79,3	75,2	72,0	64,4	59,8	53,5			
66SV4/2AG185T	2 x 18,5	108,9	99,6	96,9	93,8	92,1	86,3	81,6	70,1	62,8	52,8			
66SV4/1AG220T	2 x 22	115,2	105,9	103,1	100,1	98,5	92,9	88,6	77,8	71,1	61,8			
66SV4G220T	2 x 22	121,6	112,5	109,8	106,9	105,3	99,8	95,7	85,5	79,2	70,8			
66SV5/2AG300T	2 x 30	139,1	127,5	124,1	120,2	118,2	111,1	105,5	91,5	82,7	70,4			
66SV5/1AG300T	2 x 30	145,6	134,0	130,5	126,8	124,7	117,8	112,4	99,2	90,9	79,5			
66SV5G300T	2 x 30	152,0	140,4	137,0	133,3	131,3	124,6	119,4	106,8	99,1	88,5			
92SV1/1AG055T	2 x 5,5	24,5				22,2	21,5	20,9	19,4	18,5	17,3	15,0	11,8	7,9
92SV1G075T	2 x 7,5	33,5				28,7	27,2	26,2	24,3	23,3	22,2	20,2	17,6	14,3
92SV2/2AG110T	2 x 11	49,4				45,1	43,7	42,5	39,6	37,9	35,5	30,9	24,6	16,8
92SV2G150T	2 x 15	67,8				58,2	55,3	53,4	49,5	47,6	45,2	41,4	36,3	29,6
92SV3/2AG185T	2 x 18,5	82,4				74,4	71,6	69,6	64,8	62,1	58,6	52,2	43,6	32,9
92SV3G220T	2 x 22	102,2				88,2	84,0	81,2	75,5	72,6	69,2	63,4	55,9	46,3
92SV4/2AG300T	2 x 30	115,7				104,0	99,9	97,0	90,4	86,8	82,1	73,8	62,8	49,0
92SV4G300T	2 x 30	133,1				117,0	111,7	108,0	100,6	96,8	92,3	84,6	74,8	62,5
92SV5/2AG370T	2 x 37	149,0				133,2	127,8	124,0	115,6	111,0	105,2	94,9	81,4	64,6

The table refers to performance with 2 pumps running.

gv_2p66-92sv_2p50-en_a_th

GV11/125SV SERIES BOOSTER SETS

HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

PUMP TYPE	NOMINAL POWER kW	Q = DELIVERY									
		l/min 0	2000	2400	2833	3400	3800	4000	4300	4600	5333
		m ³ /h 0	120	144	170	204	228	240	258	276	320
H = TOTAL HEAD METRES COLUMN OF WATER											
125SV1G075T	2 x 7,5	27,6	20,8	19,8	18,6	16,8	15,3	14,4	12,9	11,3	6,2
125SV2G150T	2 x 15	53,8	44,4	42,5	40,4	37,1	34,4	32,9	30,4	27,7	19,6
125SV3G220T	2 x 22	80,7	66,5	63,8	60,6	55,7	51,6	49,4	45,7	41,5	29,4
125SV4G300T	2 x 30	107,6	88,7	85,0	80,7	74,2	68,8	65,8	60,9	55,4	39,2
125SV5G370T	2 x 37	134,5	110,9	106,3	100,9	92,8	86,0	82,3	76,1	69,2	49,0

The table refers to performance with 2 pumps running.

gv_2p125sv_2p50-en_b_th

GV12/15SV SERIES BOOSTER SETS HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

GVF.../SV

SET TYPE GV12/..	NOMINAL POWER	Q = DELIVERY													
		l/min 0	167	200	267	340	367	467	540	660	700	800	600	700	800
	m³/h 0	10	12	16	20,4	22	28	32	39,6	42	48	36	42	48	
	kW	H = TOTAL HEAD METRES COLUMN OF WATER													
15SV02F022T	3 x 2,2	29			26,7	25,9	25,5	23,9	22,4	18,9	17,4	13,1			
15SV03F030T	3 x 3	43			40,4	39,1	38,6	36,2	33,8	28,7	26,5	20,1			
15SV04F040T	3 x 4	58			54,7	53,1	52,5	49,4	46,3	39,7	36,9	28,7			
15SV05F040T	3 x 4	73			67,8	65,8	65,0	61,0	57,1	48,7	45,2	34,9			
15SV06F055T	3 x 5,5	88			81,5	79,4	78,4	74,1	69,9	60,3	56,3	44,2			
15SV07F055T	3 x 5,5	102			94,5	91,9	90,8	85,7	80,6	69,4	64,7	50,5			
15SV08F075T	3 x 7,5	117			110,9	108,0	106,8	100,8	94,9	82,0	76,7	60,6			
15SV09F075T	3 x 7,5	132			124,4	121,0	119,6	112,8	106,1	91,5	85,5	67,4			
15SV10F110T	3 x 11	148			138,8	135,3	133,8	126,7	119,6	103,9	97,4	77,5			

The table refers to performance with 3 pumps running.

gv_3p15sv_2p50-en_a_th

GV12/22SV SERIES BOOSTER SETS HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

SET TYPE GV12/..	NOMINAL POWER	Q = DELIVERY													
		l/min 0	250	300	400	510	550	700	810	990	1050	1200	1290	1380	1450
	m³/h 0	15	18	24	30,6	33	42	49	59,4	63	72	77	83	87	
	kW	H = TOTAL HEAD METRES COLUMN OF WATER													
22SV02F022T	3 x 2,2	30					28,4	27,2	26,0	23,3	22,2	18,9	16,6	13,8	11,5
22SV03F030T	3 x 3	45					42,2	40,4	38,5	34,5	32,8	27,8	24,2	20,2	16,6
22SV04F040T	3 x 4	61					56,8	54,4	51,9	46,6	44,4	37,9	33,1	27,7	23,0
22SV05F055T	3 x 5,5	76					70,9	67,9	64,9	58,3	55,6	47,4	41,4	34,7	28,8
22SV06F075T	3 x 7,5	93					88,8	85,7	82,5	75,4	72,4	63,3	56,7	49,1	42,6
22SV07F075T	3 x 7,5	109					103,1	99,4	95,7	87,2	83,7	73,1	65,3	56,5	48,8
22SV08F110T	3 x 11	125					119,2	115,2	111,0	101,6	97,7	85,7	77,0	66,9	58,2
22SV09F110T	3 x 11	140					133,7	129,2	124,4	113,8	109,3	95,8	86,0	74,6	64,8
22SV10F110T	3 x 11	155					148,2	143,1	137,8	125,9	120,9	105,8	94,8	82,3	71,3

The table refers to performance with 3 pumps running.

gv_3p22sv_2p50-en_a_th

GV12/33-46SV SERIES BOOSTER SETS

HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

SET TYPE GV12/..	NOMINAL POWER kW	Q = DELIVERY										
		l/min 0	750	900	1100	1250	1500	1750	2000	2250	2700	3000
		m³/h 0	45	54	66	75	90	105	120	135	162	180
H = TOTAL HEAD METRES COLUMN OF WATER												
33SV1/1AG022T	3 x 2,2	17,4	16,2	15,7	15	14	12,2	9,8	6,7			
33SV1G030T	3 x 3	23,8	21,7	21,2	20	20	17,8	15,5	12,7			
33SV2/2AG040T	3 x 4	35,1	34,1	33,3	32	30	27	22,4	16,6			
33SV2/1AG040T	3 x 4	40,8	38,8	37,9	36	35	32	27,5	22,3			
33SV2G055T	3 x 5,5	47,8	45	44,1	43	41	39	35	29,9			
33SV3/2AG055T	3 x 5,5	57,7	55,2	53,8	51	49	44	38	29,6			
33SV3/1AG075T	3 x 7,5	64,5	61,3	60	58	56	51	45	37			
33SV3G075T	3 x 7,5	71,5	67,4	66,0	64	62	58	52,0	44,6			
33SV4/2AG075T	3 x 7,5	82	78,8	77	74	72	66	58	47,2			
33SV4/1AG110T	3 x 11	88,9	85	83	81	78	73	65	55,1			
33SV4G110T	3 x 11	95,9	91,1	90	87	85	80	73	63,1			
33SV5/2AG110T	3 x 11	106	101,6	100	96	93	85	76	63			
33SV5/1AG110T	3 x 11	112,7	107,2	105	102	99	92	82	70			
33SV5G150T	3 x 15	120,4	114,9	113	110	107	101	92	80,5			
33SV6/2AG150T	3 x 15	131,2	126,9	125	120	116	108	96	81,2			
33SV6/1AG150T	3 x 15	139,1	133,5	131	128	124	116	105	90,4			
33SV6G150T	3 x 15	145,6	139	137	133	129	121	110	96,1			
33SV7/2AG150T	3 x 15	156	149,9	147	143	138	128	115	98,2			
46SV1/1AG030T	3 x 3	19,5			19,2	18,8	17,9	16,7	15,1	13,1	8,5	4,6
46SV1G040T	3 x 4	27,2			24	23,5	22,5	21,4	19,9	18,2	14,3	10,8
46SV2/2AG055T	3 x 5,5	38,8			39,8	39,2	37,8	35,7	32,9	29,4	21,1	13,9
46SV2G075T	3 x 7,5	52,6			48,5	47,7	46,1	44,2	41,7	38,7	31,4	25,1
46SV3/2AG110T	3 x 11	64,7			65,1	64	62	60	56	52	40,4	30,8
46SV3G110T	3 x 11	80,8			74,3	73	71	68	65	60	50	40,7
46SV4/2AG150T	3 x 15	92,4			90,7	90	87	83	79	73	58	45,6
46SV4G150T	3 x 15	107,3			99,8	98	96	92	87	82	68	55,9
46SV5/2AG185T	3 x 18,5	117,2			114,8	113	110	106	100	93	75	60,2
46SV5G185T	3 x 18,5	134,5			125,1	123	120	116	110	103	86	71,5
46SV6/2AG220T	3 x 22	143,7			139,3	138	134	129	122	113	92	73,4
46SV6G220T	3 x 22	161			149,9	148	144	139	132	124	104	86

The table refers to performance with 3 pumps running.

gv_3p33-46sv_2p50-en_a_th

GV12/66-92SV SERIES BOOSTER SETS

HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

GVF.../SV

SET TYPE GV12/..	NOMINAL POWER	Q = DELIVERY												
		l/min 0	1500	1800	2100	2250	2700	3000	3600	3900	4250	4800	5400	6000
	kW	m³/h 0	90	108	126	135	162	180	216	234	255	288	324	360
H = TOTAL HEAD METRES COLUMN OF WATER														
66SV1/1AG040T	3 x 4	23,8	21,4	20,7	19,9	19,4	17,8	16,6	13,3	11,2	8,3			
66SV1G055T	3 x 5,5	29,2	25,8	24,8	23,8	23,3	21,8	20,7	17,9	16,1	13,5			
66SV2/2AG075T	3 x 7,5	47,5	42,6	41,2	39,5	38,6	36	32,9	26,4	22,2	16,4			
66SV2/1AG110T	3 x 11	54,2	49,6	48,2	46,7	45,8	42,9	40,6	34,8	31,2	26,2			
66SV2G110T	3 x 11	60,4	55,7	54,4	52,8	52	49,3	47,1	42	38,9	34,7			
66SV3/2AG150T	3 x15	78,4	71,6	70	67	66	62	58	49	43,3	35,3			
66SV3/1AG150T	3 x 15	84,7	77,8	76	74	72	68	65	56	51	44,0			
66SV3G185T	3 x 18,5	91,4	84,7	83	81	79	75	72	64	60	53,5			
66SV4/2AG185T	3 x 18,5	108,9	99,6	97	94	92	86	82	70	63	52,8			
66SV4/1AG220T	3 x 22	115,2	105,9	103	100	99	93	89	78	71	61,8			
66SV4G220T	3 x 22	121,6	112,5	110	107	105	100	96	86	79	70,8			
66SV5/2AG300T	3 x 30	139,1	127,5	124	120	118	111	106	92	83	70,4			
66SV5/1AG300T	3 x 30	145,6	134	131	127	125	118	112	99	91	79,5			
66SV5G300T	3 x 30	152	140,4	137	133	131	125	119	107	99	88,5			
92SV1/1AG055T	3 x 5,5	24,5				22,2	21,5	20,9	19,4	18,5	17,3	15	11,8	7,9
92SV1G075T	3 x 7,5	33,5				28,7	27,2	26,2	24,3	23,3	22,2	20,2	17,6	14,3
92SV2/2AG110T	3 x 11	49,4				45,1	43,7	42,5	39,6	37,9	35,5	30,9	24,6	16,8
92SV2G150T	3 x 15	67,8				58,2	55	53	49,5	47,6	45,2	41,4	36,3	29,6
92SV3/2AG185T	3 x 18,5	82,4				74,4	72	70	65	62	59	52	43,6	32,9
92SV3G220T	3 x 22	102,2				88,2	84	81	76	73	69	63	56	46,3
92SV4/2AG300T	3 x 30	115,7				104	100	97	90	87	82	74	63	49
92SV4G300T	3 x 30	133,1				117	112	108	101	97	92	85	75	62,5
92SV5/2AG370T	3 x 37	149				133,2	128	124	116	111	105	95	81	64,6

The table refers to performance with 3 pumps running.

gv_3p66-92sv_2p50-en_a_th

GV12/125SV SERIES BOOSTER SETS

HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

PUMP TYPE	NOMINAL POWER	Q = DELIVERY									
		l/min 0	3000	3600	4250	5100	5700	6000	6450	6900	8000
		m3/h 0	180	216	255	306	342	360	387	414	480
	kW	H = TOTAL HEAD METRES COLUMN OF WATER									
125SV1G075T	3 x 7,5	27,6	20,8	19,8	18,6	16,8	15,3	14,4	12,9	11,3	6,2
125SV2G150T	3 x 15	53,8	44,4	42,5	40,4	37,1	34,4	32,9	30,4	27,7	19,6
125SV3G220T	3 x 22	80,7	66,5	63,8	60,6	55,7	51,6	49,4	45,7	41,5	29,4
125SV4G300T	3 x 30	107,6	88,7	85,0	80,7	74,2	68,8	65,8	60,9	55,4	39,2
125SV5G370T	3 x 37	134,5	110,9	106,3	100,9	92,8	86,0	82,3	76,1	69,2	49,0

The table refers to performance with 3 pumps running.

gv_3p125sv_2p50-en_b_th

GV13/15SV SERIES BOOSTER SETS HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

SET TYPE GV13/..	NOMINAL POWER	Q = DELIVERY													
		l/min 0	167	200	267	340	367	467	540	660	700	800	600	700	800
	m³/h 0	10	12	16	20,4	22	28	32	39,6	42	48	36	42	48	
	kW	H = TOTAL HEAD METRES COLUMN OF WATER													
15SV02F022T	4 x 2,2	29			26,7	25,9	25,5	23,9	22,4	18,9	17,4	13,1			
15SV03F030T	4 x 3	43			40,4	39,1	38,6	36,2	33,8	28,7	26,5	20,1			
15SV04F040T	4 x 4	58			54,7	53,1	52,5	49,4	46,3	39,7	36,9	28,7			
15SV05F040T	4 x 4	73			67,8	65,8	65,0	61,0	57,1	48,7	45,2	34,9			
15SV06F055T	4 x 5,5	88			81,5	79,4	78,4	74,1	69,9	60,3	56,3	44,2			
15SV07F055T	4 x 5,5	102			94,5	91,9	90,8	85,7	80,6	69,4	64,7	50,5			
15SV08F075T	4 x 7,5	117			110,9	108,0	106,8	100,8	94,9	82,0	76,7	60,6			
15SV09F075T	4 x 7,5	132			124,4	121,0	119,6	112,8	106,1	91,5	85,5	67,4			
15SV10F110T	4 x 11	148			138,8	135,3	133,8	126,7	119,6	103,9	97,4	77,5			

The table refers to performance with 4 pumps running.

gv_4p15sv_2p50-en_a_th

GV13/22SV SERIES BOOSTER SETS HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

SET TYPE GV13/..	NOMINAL POWER	Q = DELIVERY													
		l/min 0	333	400	533	680	733	933	1080	1320	1400	1600	1720	1840	1933
	m³/h 0	20	24	32	40,8	44	56	65	79,2	84	96	103	110	116	
	kW	H = TOTAL HEAD METRES COLUMN OF WATER													
22SV02F022T	4 x 2,2	30					28,4	27,2	26,0	23,3	22,2	18,9	16,6	13,8	11,5
22SV03F030T	4 x 3	45					42,2	40,4	38,5	34,5	32,8	27,8	24,2	20,2	16,6
22SV04F040T	4 x 4	61					56,8	54,4	51,9	46,6	44,4	37,9	33,1	27,7	23,0
22SV05F055T	4 x 5,5	76					70,9	67,9	64,9	58,3	55,6	47,4	41,4	34,7	28,8
22SV06F075T	4 x 7,5	93					88,8	85,7	82,5	75,4	72,4	63,3	56,7	49,1	42,6
22SV07F075T	4 x 7,5	109					103,1	99,4	95,7	87,2	83,7	73,1	65,3	56,5	48,8
22SV08F110T	4 x 11	125					119,2	115,2	111,0	101,6	97,7	85,7	77,0	66,9	58,2
22SV09F110T	4 x 11	140					133,7	129,2	124,4	113,8	109,3	95,8	86,0	74,6	64,8
22SV10F110T	4 x 11	155					148,2	143,1	137,8	125,9	120,9	105,8	94,8	82,3	71,3

The tabel refers to performance with 4 pumps running

gv_4p22sv_2p50-en_a_th

GV13/33-46SV SERIES BOOSTER SETS

HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

GVF../SV

SET TYPE GV13/..	NOMINAL POWER kW	Q = DELIVERY										
		l/min 0	1000	1200	1466,67	1666,67	2000	2333,33	2666,67	3000	3600	4000
		m³/h 0	60	72	88	100	120	140	160	180	216	240
H = TOTAL HEAD METRES COLUMN OF WATER												
33SV1/1AG022T	4 x 2,2	17,4	16,2	15,7	15	14	12,2	9,8	6,7			
33SV1G030T	4 x 3	23,8	21,7	21,2	20	20	17,8	15,5	12,7			
33SV2/2AG040T	4 x 4	35,1	34,1	33,3	32	30	27	22,4	16,6			
33SV2/1AG040T	4 x 4	40,8	38,8	37,9	36	35	32	27,5	22,3			
33SV2G055T	4 x 5,5	47,8	45	44,1	43	41	39	35	29,9			
33SV3/2AG055T	4 x 5,5	57,7	55,2	53,8	51	49	44	38	29,6			
33SV3/1AG075T	4 x 7,5	64,5	61,3	60	58	56	51	45	37			
33SV3G075T	4 x 7,5	71,5	67,4	66,0	64	62	58	52,0	44,6			
33SV4/2AG075T	4 x 7,5	82	78,8	77	74	72	66	58	47,2			
33SV4/1AG110T	4 x 11	88,9	85	83	81	78	73	65	55,1			
33SV4G110T	4 x 11	95,9	91,1	90	87	85	80	73	63,1			
33SV5/2AG110T	4 x 11	106	101,6	100	96	93	85	76	63			
33SV5/1AG110T	4 x 11	112,7	107,2	105	102	99	92	82	70			
33SV5G150T	4 x 15	120,4	114,9	113	110	107	101	92	80,5			
33SV6/2AG150T	4 x 15	131,2	126,9	125	120	116	108	96	81,2			
33SV6/1AG150T	4 x 15	139,1	133,5	131	128	124	116	105	90,4			
33SV6G150T	4 x 15	145,6	139	137	133	129	121	110	96,1			
33SV7/2AG150T	4 x 15	156	149,9	147	143	138	128	115	98,2			
46SV1/1AG030T	4 x 3	19,5			19,2	18,8	17,9	16,7	15,1	13,1	8,5	4,6
46SV1G040T	4 x 4	27,2			24	23,5	22,5	21,4	19,9	18,2	14,3	10,8
46SV2/2AG055T	4 x 5,5	38,8			39,8	39,2	37,8	35,7	32,9	29,4	21,1	13,9
46SV2G075T	4 x 7,5	52,6			48,5	47,7	46,1	44,2	41,7	38,7	31,4	25,1
46SV3/2AG110T	4 x 11	64,7			65,1	64	62	60	56	52	40,4	30,8
46SV3G110T	4 x 11	80,8			74,3	73	71	68	65	60	50	40,7
46SV4/2AG150T	4 x 15	92,4			90,7	90	87	83	79	73	58	45,6
46SV4G150T	4 x 15	107,3			99,8	98	96	92	87	82	68	55,9
46SV5/2AG185T	4 x 18,5	117,2			114,8	113	110	106	100	93	75	60,2
46SV5G185T	4 x 18,5	134,5			125,1	123	120	116	110	103	86	71,5
46SV6/2AG220T	4 x 22	143,7			139,3	138	134	129	122	113	92	73,4
46SV6G220T	4 x 22	161			149,9	148	144	139	132	124	104	86

The table refers to performance with 4 pumps running.

gv_4p33-46sv_2p50-en_a_th

GV13/66-92SV SERIES BOOSTER SETS

HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

SET TYPE GV13/..	NOMINAL POWER	Q = DELIVERY												
		l/min 0	2000	2400	2800	3000	3600	4000	4800	5200	5666,7	6400	7200	8000
	m³/h 0	120	144	168	180	216	240	288	312	340	384	432	480	
kW		H = TOTAL HEAD METRES COLUMN OF WATER												
66SV1/1AG040T	4 x 4	23,8	21,4	20,7	19,9	19,4	17,8	16,6	13,3	11,2	8,3			
66SV1G055T	4 x 5,5	29,2	25,8	24,8	23,8	23,3	21,8	20,7	17,9	16,1	13,5			
66SV2/2AG075T	4 x 7,5	47,5	42,6	41,2	39,5	38,6	36	32,9	26,4	22,2	16,4			
66SV2/1AG110T	4 x 11	54,2	49,6	48,2	46,7	45,8	42,9	40,6	34,8	31,2	26,2			
66SV2G110T	4 x 11	60,4	55,7	54,4	52,8	52	49,3	47,1	42	38,9	34,7			
66SV3/2AG150T	4 x15	78,4	71,6	70	67	66	62	58	49	43,3	35,3			
66SV3/1AG150T	4 x 15	84,7	77,8	76	74	72	68	65	56	51	44,0			
66SV3G185T	4 x 18,5	91,4	84,7	83	81	79	75	72	64	60	53,5			
66SV4/2AG185T	4 x 18,5	108,9	99,6	97	94	92	86	82	70	63	52,8			
66SV4/1AG220T	4 x 22	115,2	105,9	103	100	99	93	89	78	71	61,8			
66SV4G220T	4 x 22	121,6	112,5	110	107	105	100	96	86	79	70,8			
66SV5/2AG300T	4 x 30	139,1	127,5	124	120	118	111	106	92	83	70,4			
66SV5/1AG300T	4 x 30	145,6	134	131	127	125	118	112	99	91	79,5			
66SV5G300T	4 x 30	152	140,4	137	133	131	125	119	107	99	88,5			
92SV1/1AG055T	4 x 5,5	24,5				22,2	21,5	20,9	19,4	18,5	17,3	15	11,8	7,9
92SV1G075T	4 x 7,5	33,5				28,7	27,2	26,2	24,3	23,3	22,2	20,2	17,6	14,3
92SV2/2AG110T	4 x 11	49,4				45,1	43,7	42,5	39,6	37,9	35,5	30,9	24,6	16,8
92SV2G150T	4 x 15	67,8				58,2	55	53	49,5	47,6	45,2	41,4	36,3	29,6
92SV3/2AG185T	4 x 18,5	82,4				74,4	72	70	65	62	59	52	43,6	32,9
92SV3G220T	4 x 22	102,2				88,2	84	81	76	73	69	63	56	46,3
92SV4/2AG300T	4 x 30	115,7				104	100	97	90	87	82	74	63	49
92SV4G300T	4 x 30	133,1				117	112	108	101	97	92	85	75	62,5
92SV5/2AG370T	4 x 37	149				133,2	128	124	116	111	105	95	81	64,6

The table refers to performance with 4 pumps running.

gv_4p66-92sv_2p50-en_a_th

GV13/125SV SERIES BOOSTER SETS

HYDRAULIC PERFORMANCE TABLE AT 50 HZ (SERVICE PUMP)

PUMP TYPE	NOMINAL POWER	Q = DELIVERY									
		l/min 0	4000	4800	5667	6800	7600	8000	8600	9200	10667
	m3/h 0	240	288	340	408	456	480	516	552	640	
	kW	H = TOTAL HEAD METRES COLUMN OF WATER									
125SV1G075T	4 x 7,5	27,6	20,8	19,8	18,6	16,8	15,3	14,4	12,9	11,3	6,2
125SV2G150T	4 x 15	53,8	44,4	42,5	40,4	37,1	34,4	32,9	30,4	27,7	19,6
125SV3G220T	4 x 22	80,7	66,5	63,8	60,6	55,7	51,6	49,4	45,7	41,5	29,4
125SV4G300T	4 x 30	107,6	88,7	85,0	80,7	74,2	68,8	65,8	60,9	55,4	39,2
125SV5G370T	4 x 37	134,5	110,9	106,3	100,9	92,8	86,0	82,3	76,1	69,2	49,0

The table refers to performance with 4 pumps running.

gv_4p125sv_2p50-en_b_th

GVF11, GVF12, GVF13/15-22-33SV SERIES BOOSTER SETS ELECTRICAL DATA TABLE AT 50 Hz

GVF.../SV

SERVICE PUMP 3 X 400 V			CURRENT ABSORBED BY SET 3 X 400V		
TYPE	Pn kW	In A	GV11 A	GV12 A	GV13 A
15SV02	2,2	4,64	-	14,9	19,6
15SV03	3	6,14	-	19,4	25,6
15SV04	4	7,63	-	23,9	31,5
15SV05	4	7,63	-	23,9	31,5
15SV06	5,5	10,40	21,8	32,2	42,6
15SV07	5,5	10,40	21,8	32,2	42,6
15SV08	7,5	14,00	29,0	43,0	57,0
15SV09	7,5	14,00	29,0	43,0	57,0
15SV10	11	20,30	41,6	61,9	82,2
22SV02	2,2	4,64	-	14,9	19,6
22SV03	3	6,14	-	19,4	25,6
22SV04	4	7,63	-	23,9	31,5
22SV05	5,5	10,40	21,8	32,2	42,6
22SV06	7,5	14,00	29,0	43,0	57,0
22SV07	7,5	14,00	29,0	43,0	57,0
22SV08	11	20,30	41,6	61,9	82,2
22SV09	11	20,30	41,6	61,9	82,2
22SV10	11	20,30	41,6	61,9	82,2
33SV1/1A	2,2	4,64	10,3	14,9	19,6
33SV1	3	6,14	13,3	19,4	25,6
33SV2/2A	4	7,63	16,3	23,9	31,5
33SV2/1A	4	7,63	16,3	23,9	31,5
33SV2	5,5	10,40	21,8	32,2	42,6
33SV3/2A	5,5	10,40	21,8	32,2	42,6
33SV3/1A	7,5	14,00	29,0	43,0	57,0
33SV3	7,5	14,00	29,0	43,0	57,0
33SV4/2A	7,5	14,00	29,0	43,0	57,0
33SV4/1A	11	20,30	41,6	61,9	82,2
33SV4	11	20,30	41,6	61,9	82,2
33SV5/2A	11	20,30	41,6	61,9	82,2
33SV5/1A	11	20,30	41,6	61,9	82,2
33SV5	15	26,00	53,0	79,0	105,0
33SV6/2A	15	26,00	53,0	79,0	105,0
33SV6/1A	15	26,00	53,0	79,0	105,0
33SV6	15	26,00	53,0	79,0	105,0
33SV7/2A	15	26,00	53,0	79,0	105,0

The current shown is the nominal current of the set.

gv_15-33sv_2p50-en_c_te

GVF11, GVF12, GVF13/46-66-92-125SV SERIES BOOSTER SETS ELECTRICAL DATA TABLE AT 50 Hz

SERVICE PUMP 3 X 400 V			CURRENT ABSORBED BY SET 3 X 400V		
TYPE	Pn kW	In A	GV11 A	GV12 A	GV13 A
46SV1/1A	3	6,14	13,3	19,4	25,6
46SV1	4	7,63	16,3	23,9	31,5
46SV2/2A	5,5	10,40	21,8	32,2	42,6
46SV2	7,5	14,00	29,0	43,0	57,0
46SV3/2A	11	20,30	41,6	61,9	82,2
46SV3	11	20,30	41,6	61,9	82,2
46SV4/2A	15	26,00	53,0	79,0	105,0
46SV4	15	26,00	53,0	79,0	105,0
46SV5/2A	18,5	33,20	67,4	100,6	133,8
46SV5	18,5	33,20	67,4	100,6	133,8
46SV6/2A	22	38,60	78,2	116,8	155,4
46SV6	22	38,60	78,2	116,8	155,4
66SV1/1A	4	7,63	16,3	23,9	31,6
66SV1	5,5	10,40	21,8	32,2	42,6
66SV2/2A	7,5	14,00	29,0	43,0	57,0
66SV2/1A	11	20,30	41,6	61,9	82,2
66SV2	11	20,30	41,6	61,9	82,2
66SV3/2A	15	26,00	53,0	79,0	105,0
66SV3/1A	15	26,00	53,0	79,0	105,0
66SV3	18,5	33,20	67,4	100,6	133,8
66SV4/2A	18,5	33,20	67,4	100,6	133,8
66SV4/1A	22	38,60	78,2	116,8	155,4
66SV4	22	38,60	78,2	116,8	155,4
66SV5/2A	30	53,60	108,2	161,8	215,4
66SV5/1A	30	53,60	108,2	161,8	215,4
66SV5	30	53,60	108,2	161,8	215,4
92SV1/1A	5,5	10,40	21,8	32,2	42,6
92SV1	7,5	14,00	29,0	43,0	57,0
92SV2/2A	11	20,30	41,6	61,9	82,2
92SV2	15	26,00	53,0	79,0	105,0
92SV3/2A	18,5	33,20	67,4	100,6	133,8
92SV3	22	38,60	78,2	116,8	155,4
92SV4/2A	30	53,60	108,2	161,8	215,4
92SV4	30	53,60	108,2	161,8	215,4
92SV5/2A	37	65,80	132,6	198,4	264,2
125SV1	7,5	14,00	29,0	43,0	57,0
125SV2	15	26,00	53,0	79,0	105,0
125SV3	22	38,60	78,2	116,8	155,4
125SV4	30	53,60	108,2	161,8	215,4
125SV5	37	65,80	132,6	198,4	264,2

The current shown is the nominal current of the set.

gv_46-125sv_2p50-en_b_te

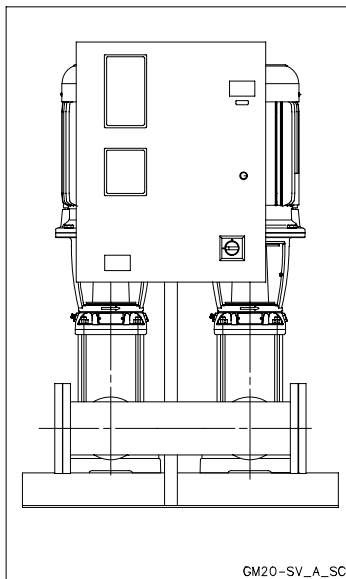
Booster sets

MARKET SECTORS CIVIL, INDUSTRIAL

APPLICATIONS

- Water network supply in condominiums, offices, hotels, shopping centres, factories.
- Water supply to agricultural water networks (e.g. irrigation).

GVF11..D GVF11..R Series



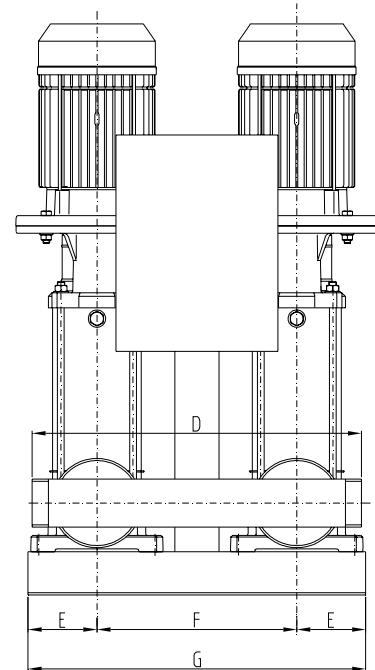
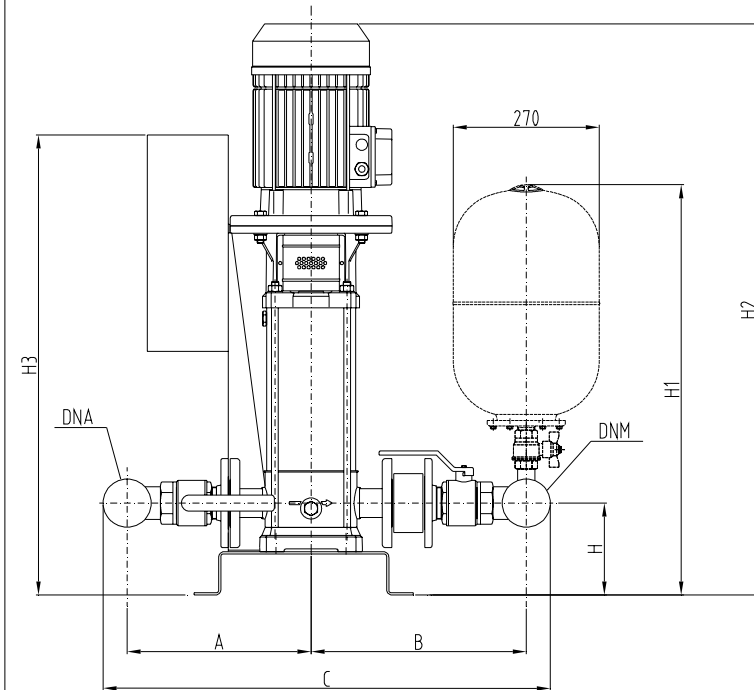
GVF11D
GVF11Y

SPECIFICATIONS

- **Flow rate** up to 320 m³/h.
- **Head** up to 160 m.
- Electrical panel supply voltage:
3 x 400V $\pm$ 10%.
- Frequency 50 Hz.
- Voltage for controls outside panel:
24 Vac.
- Electrical panel
protection class IP 55.
- Maximum service pump power:
2 x 37 kW.
- Starting fixed-speed motors:
 - Direct for powers up to 22 kW inclusive for pump (GVF..D).
 - Star/Delta on request (GVF..Y set).
 - Softstarter, for higher powers (GVF..R set).
- **Electric pumps with vertical axis:**
 - SV series (motor protection class IP55).
- Maximum operating pressure:
16 bar.
- Maximum temperature of pumped liquid : +80°C.

TWO-PUMP BOOSTER SETS, GVF11 SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE

**GVF11D
GVF11Y**



GS20-15SV_B_DD

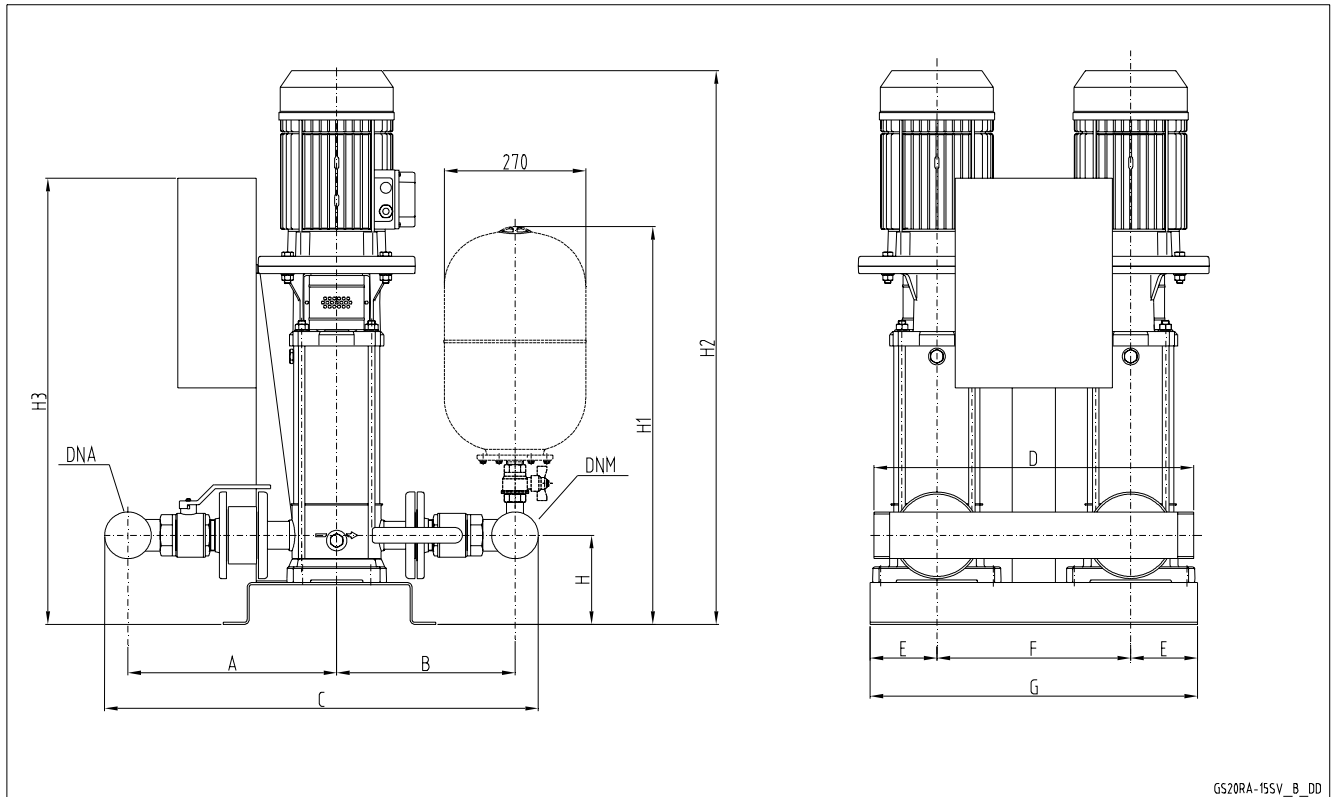
GVF11	DNA	DNM	A		B		C		D	E	F	G	H	H1	H2	H3
			STD/DW	AISI	STD/DW	AISI	STD/DW	AISI								
15SV06F055T	R 3"	R 3"	342	382	399	437	829	907	610	135	370	640	170	765	1133	1570
15SV07F055T	R 3"	R 3"	342	382	399	437	829	907	610	135	370	640	170	765	1181	1570
15SV08F075T	R 3"	R 3"	342	382	399	437	829	907	610	135	370	640	170	765	1221	1570
15SV09F075T	R 3"	R 3"	342	382	399	437	829	907	610	135	370	640	170	765	1269	1570
15SV10F110T	R 3"	R 3"	342	382	399	437	829	907	680	260	440	960	200	795	1438	1570
22SV05F055T	R 3"	R 3"	342	382	399	437	829	907	610	135	370	640	170	765	1085	1570
22SV06F075T	R 3"	R 3"	342	382	399	437	829	907	610	135	370	640	170	765	1125	1570
22SV07F075T	R 3"	R 3"	342	382	399	437	829	907	610	135	370	640	170	765	1173	1570
22SV08F110T	R 3"	R 3"	342	382	399	437	829	907	680	260	440	960	200	795	1342	1570
22SV09F110T	R 3"	R 3"	342	382	399	437	829	907	680	260	440	960	200	795	1390	1570
22SV10F110T	R 3"	R 3"	342	382	399	437	829	907	680	260	440	960	200	795	1438	1570

Dimensions in mm. Tolerance ± 10 mm.

gvf11_15sv-new-en_b_td

Note: for versions with vibration damping fit increase height by 30 mm.

TWO-PUMP BOOSTER SETS, GVF11 RA SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON SUCTION SIDE



**GVF11D
GVF11Y**

GVF11RA	DNA	DNM	A		B		C		D	E	F	G	H	H1	H2	H3
			STD/DW	AISI	STD/DW	AISI	STD/DW	AISI								
15SV06F055T	R 3"	R 3"	399	437	342	380	829	905	610	135	370	640	170	765	1133	1570
15SV07F055T	R 3"	R 3"	399	437	342	380	829	905	610	135	370	640	170	765	1181	1570
15SV08F075T	R 3"	R 3"	399	437	342	380	829	905	610	135	370	640	170	765	1221	1570
15SV09F075T	R 3"	R 3"	399	437	342	380	829	905	610	135	370	640	170	765	1269	1570
15SV10F110T	R 3"	R 3"	399	437	342	380	829	905	680	260	440	960	200	795	1438	1570
22SV05F055T	R 3"	R 3"	399	437	342	380	829	905	610	135	370	640	170	765	1085	1570
22SV06F075T	R 3"	R 3"	399	437	342	380	829	905	610	135	370	640	170	765	1125	1570
22SV07F075T	R 3"	R 3"	399	437	342	380	829	905	610	135	370	640	170	765	1173	1570
22SV08F110T	R 3"	R 3"	399	437	342	380	829	905	680	260	440	960	200	795	1342	1570
22SV09F110T	R 3"	R 3"	399	437	342	380	829	905	680	260	440	960	200	795	1390	1570
22SV10F110T	R 3"	R 3"	399	437	342	380	829	905	680	260	440	960	200	795	1438	1570

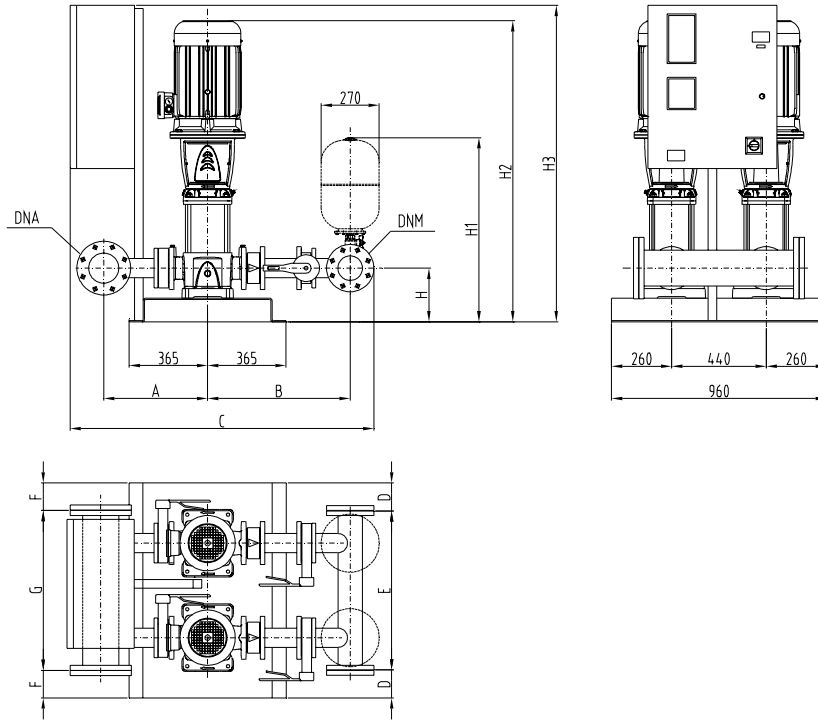
Dimensions in mm. Tolerance ± 10 mm.

gvf11ra_15sv-new-en_b_td

Note: for versions with vibration damping fit increase height by 30 mm.

**TWO-PUMP BOOSTER SETS, GVF11 SERIES
VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE
ON DISCHARGE SIDE**

**GVF11D
GVF11Y**



GM_GM20-SV46_B_DD

TWO-PUMP BOOSTER SETS, GVF11 SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE

GVF11	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2	H3
33SV1/1AG022T	100	80	448	701	1401	90	780	90	780	215	810	897	1321
33SV1G030T	100	80	448	701	1401	90	780	90	780	215	810	897	1321
33SV2/2AG040T	100	80	448	701	1401	90	780	90	780	215	810	993	1321
33SV2/1AG040T	100	80	448	701	1401	90	780	90	780	215	810	993	1321
33SV2G055T	100	80	448	701	1401	90	780	90	780	215	810	1069	1321
33SV3/2AG055T	100	80	448	701	1401	90	780	90	780	215	810	1144	1321
33SV3/1AG075T	100	80	448	701	1451	90	780	90	780	215	810	1136	1321
33SV3G075T	100	80	448	701	1451	90	780	90	780	215	810	1136	1321
33SV4/2AG075T	100	80	448	701	1451	90	780	90	780	215	810	1211	1321
33SV4/1AG110T	100	80	448	701	1451	90	780	90	780	215	810	1307	1571
33SV4G110T	100	80	448	701	1451	90	780	90	780	215	810	1307	1571
33SV5/2AG110T	100	80	448	701	1451	90	780	90	780	215	810	1382	1571
33SV5/1AG110T	100	80	448	701	1451	90	780	90	780	215	810	1382	1571
33SV5G150T	100	80	448	701	1451	90	780	90	780	215	810	1448	1571
33SV6/2AG150T	100	80	448	701	1451	90	780	90	780	215	810	1523	1571
33SV6/1AG150T	100	80	448	701	1451	90	780	90	780	215	810	1523	1571
33SV6G150T	100	80	448	701	1451	90	780	90	780	215	810	1523	1571
33SV7/2AG150T	100	80	448	701	1451	90	780	90	780	215	810	1598	1571
46SV1/1AG030T	125	100	484	739	1457	90	780	90	780	250	857	937	1321
46SV1G040T	125	100	484	739	1457	90	780	90	780	250	857	958	1321
46SV2/2AG055T	125	100	484	739	1457	90	780	90	780	250	857	1109	1321
46SV2G075T	125	100	484	739	1499	90	780	90	780	250	857	1101	1321
46SV3/2AG110T	125	100	484	739	1499	90	780	90	780	250	857	1272	1571
46SV3G110T	125	100	484	739	1499	90	780	90	780	250	857	1272	1571
46SV4/2AG150T	125	100	484	739	1499	90	780	90	780	250	857	1413	1571
46SV4G150T	125	100	484	739	1499	90	780	90	780	250	857	1413	1571
66SV1/1AG040T	150	125	504	780	1551	90	780	70	820	250	870	983	1321
66SV1G055T	150	125	504	780	1551	90	780	70	820	250	870	1059	1321
66SV2/2AG075T	150	125	504	780	1555	90	780	70	820	250	870	1141	1321
66SV2/1AG110T	150	125	504	780	1555	90	780	70	820	250	870	1237	1571
66SV2G110T	150	125	504	780	1555	90	780	70	820	250	870	1237	1571
66SV3/2AG150T	150	125	504	780	1555	90	780	70	820	250	870	1393	1571
66SV3/1AG150T	150	125	504	780	1555	90	780	70	820	250	870	1393	1571
92SV1/1AG055T	200	150	529	794	1635	70	820	70	820	250	884	1059	1321
92SV1G075T	200	150	529	794	1635	70	820	70	820	250	884	1051	1321
92SV2/2AG110T	200	150	529	794	1635	70	820	70	820	250	884	1237	1571
92SV2G150T	200	150	529	794	1635	70	820	70	820	250	884	1303	1571

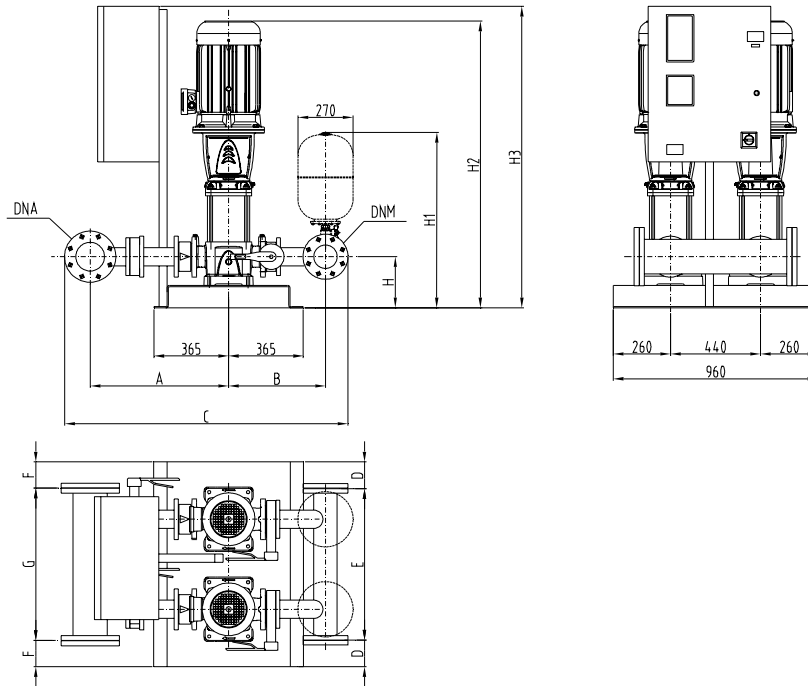
Note: for versions with vibration damping feet increase height by 50 mm.

gvf11_sv46-en_b_td

GVF11D
GVF11Y

**TWO-PUMP BOOSTER SETS, GVF11 RA SERIES
VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE
ON SUCTION SIDE**

**GVF11D
GVF11Y**



GM_CM20RA-SV46_B_DD

TWO-PUMP BOOSTER SETS, GVF11 RA SERIES

VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON SUCTION SIDE

GVF11RA	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2	H3
33SV1/1AG022T	100	80	713	436	1359	90	780	90	780	215	810	897	1321
33SV1G030T	100	80	713	436	1359	90	780	90	780	215	810	897	1321
33SV2/2AG040T	100	80	713	436	1359	90	780	90	780	215	810	993	1321
33SV2/1AG040T	100	80	713	436	1359	90	780	90	780	215	810	993	1321
33SV2G055T	100	80	713	436	1359	90	780	90	780	215	810	1069	1321
33SV3/2AG055T	100	80	713	436	1359	90	780	90	780	215	810	1144	1321
33SV3/1AG075T	100	80	713	436	1359	90	780	90	780	215	810	1136	1321
33SV3G075T	100	80	713	436	1359	90	780	90	780	215	810	1136	1321
33SV4/2AG075T	100	80	713	436	1359	90	780	90	780	215	810	1211	1321
33SV4/1AG110T	100	80	713	436	1359	90	780	90	780	215	810	1307	1571
33SV4G110T	100	80	713	436	1359	90	780	90	780	215	810	1307	1571
33SV5/2AG110T	100	80	713	436	1359	90	780	90	780	215	810	1382	1571
33SV5/1AG110T	100	80	713	436	1359	90	780	90	780	215	810	1382	1571
33SV5G150T	100	80	713	436	1359	90	780	90	780	215	810	1448	1571
33SV6/2AG150T	100	80	713	436	1359	90	780	90	780	215	810	1523	1571
33SV6/1AG150T	100	80	713	436	1359	90	780	90	780	215	810	1523	1571
33SV6G150T	100	80	713	436	1359	90	780	90	780	215	810	1523	1571
33SV7/2AG150T	100	80	713	436	1359	90	780	90	780	215	810	1598	1571
46SV1/1AG030T	125	100	752	471	1457	90	780	90	780	250	857	937	1321
46SV1G040T	125	100	752	471	1457	90	780	90	780	250	857	958	1321
46SV2/2AG055T	125	100	752	471	1457	90	780	90	780	250	857	1109	1321
46SV2G075T	125	100	752	471	1457	90	780	90	780	250	857	1101	1321
46SV3/2AG110T	125	100	752	471	1457	90	780	90	780	250	857	1272	1571
46SV3G110T	125	100	752	471	1457	90	780	90	780	250	857	1272	1571
46SV4/2AG150T	125	100	752	471	1457	90	780	90	780	250	857	1413	1571
46SV4G150T	125	100	752	471	1457	90	780	90	780	250	857	1413	1571
66SV1/1AG040T	150	125	794	490	1551	90	780	70	820	250	870	983	1321
66SV1G055T	150	125	794	490	1551	90	780	70	820	250	870	1059	1321
66SV2/2AG075T	150	125	794	490	1551	90	780	70	820	250	870	1141	1321
66SV2/1AG110T	150	125	794	490	1551	90	780	70	820	250	870	1237	1571
66SV2G110T	150	125	794	490	1551	90	780	70	820	250	870	1237	1571
66SV3/2AG150T	150	125	794	490	1551	90	780	70	820	250	870	1393	1571
66SV3/1AG150T	150	125	794	490	1551	90	780	70	820	250	870	1393	1571
92SV1/1AG055T	200	150	819	504	1635	70	820	70	820	250	884	1059	1321
92SV1G075T	200	150	819	504	1635	70	820	70	820	250	884	1051	1321
92SV2/2AG110T	200	150	819	504	1635	70	820	70	820	250	884	1237	1571
92SV2G150T	200	150	819	504	1635	70	820	70	820	250	884	1303	1571

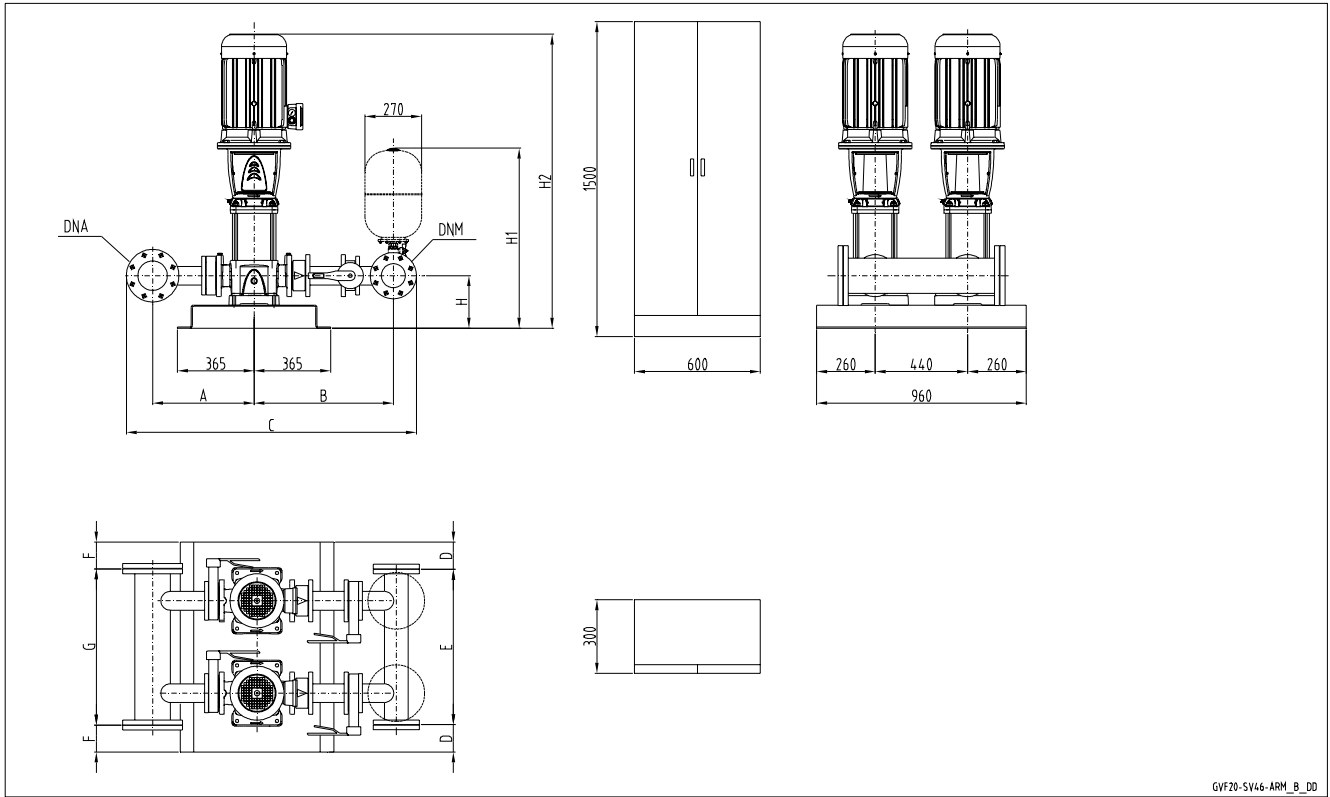
Note: for versions with vibration damping feet increase height by 50 mm.

gvf11ra_sv46-en_b_td

GVF11D
GVF11Y

TWO-PUMP BOOSTER SETS, GVF11 SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE

**GVF11D
GVF11Y**



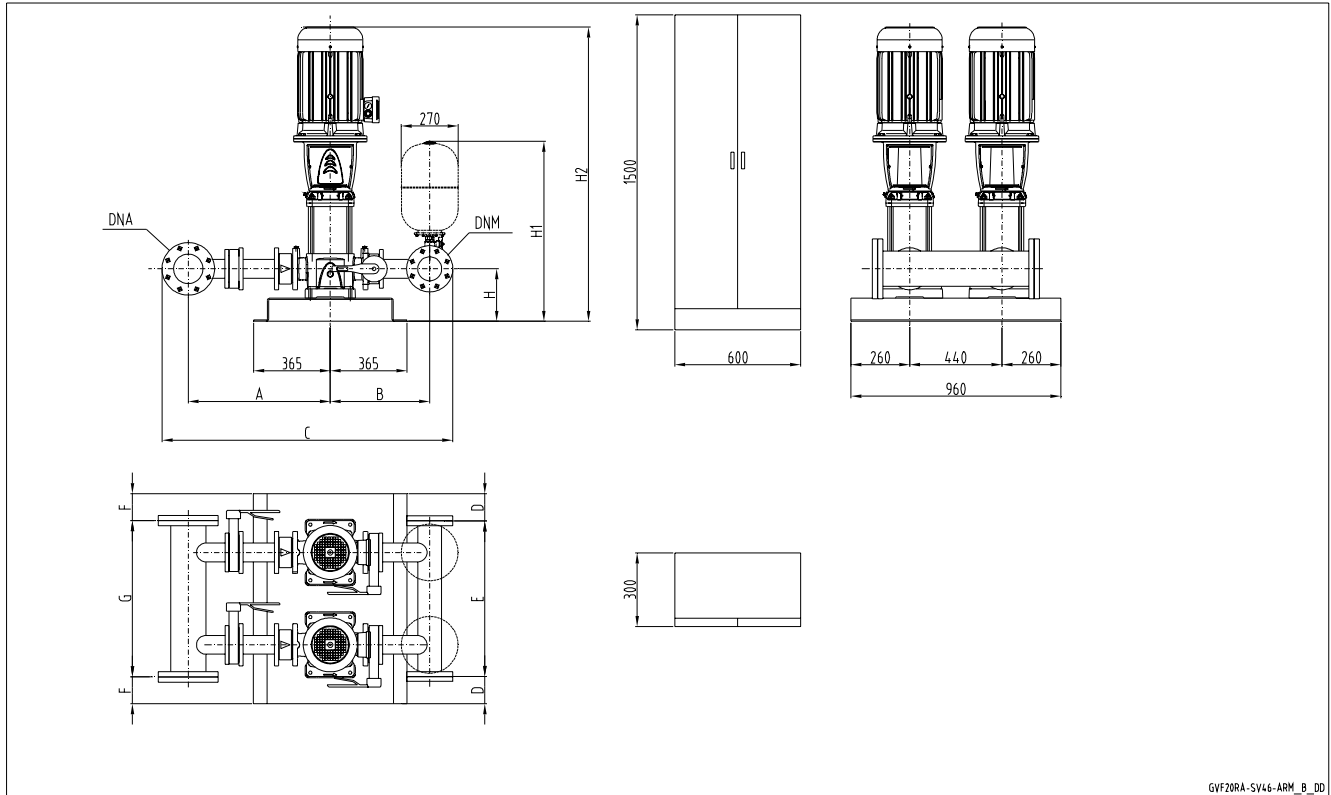
GVF20-SV46-ARM_B_DD

GVF11	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2
46SV5/2AG185T	125	100	484	739	1457	90	780	90	780	250	857	1488
46SV5G185T	125	100	484	739	1457	90	780	90	780	250	857	1488
46SV6/2AG220T	125	100	484	739	1457	90	780	90	780	250	857	1563
46SV6G220T	125	100	484	739	1457	90	780	90	780	250	857	1563
66SV3G185T	150	125	504	780	1551	90	780	70	820	250	870	1393
66SV4/2AG185T	150	125	504	780	1551	90	780	70	820	250	870	1483
66SV4/1AG220T	150	125	504	780	1551	90	780	70	820	250	870	1483
66SV4G220T	150	125	504	780	1551	90	780	70	820	250	870	1483
92SV3/2AG185T	200	150	529	794	1635	70	820	70	820	250	884	1393
92SV3G220T	200	150	529	794	1635	70	820	70	820	250	884	1393

Note: for versions with vibration damping fit increase height by 50 mm.

gvf11_sv46-arm-en_a_td

TWO-PUMP BOOSTER SETS, GVF11 RA SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON SUCTION SIDE



**GVF11D
GVF11Y**

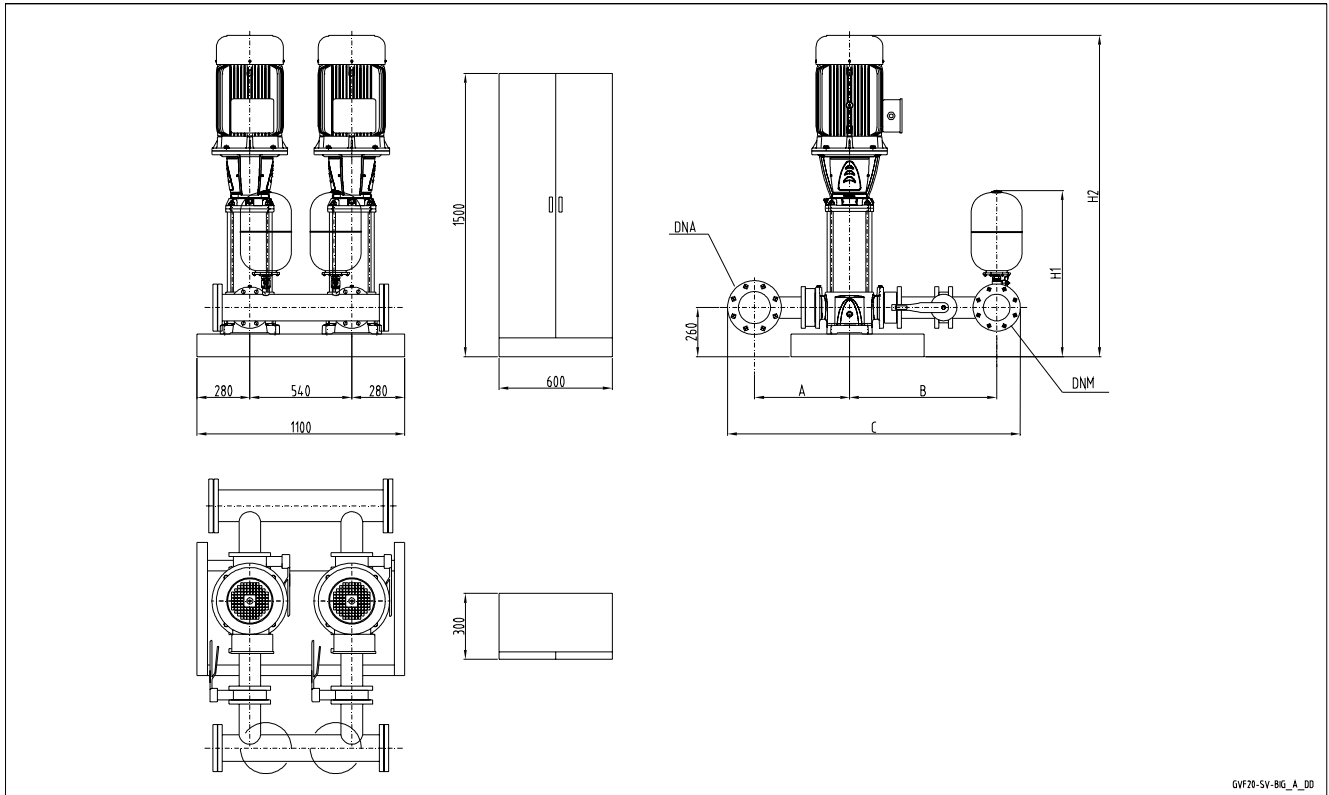
GVF11RA	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2
46SV5/2AG185T	125	100	752	471	1457	90	780	90	780	250	857	1488
46SV5G185T	125	100	752	471	1457	90	780	90	780	250	857	1488
46SV6/2AG220T	125	100	752	471	1457	90	780	90	780	250	857	1563
46SV6G220T	125	100	752	471	1457	90	780	90	780	250	857	1563
66SV3G185T	150	125	794	490	1551	90	780	70	820	250	870	1393
66SV4/2AG185T	150	125	794	490	1551	90	780	70	820	250	870	1483
66SV4/1AG220T	150	125	794	490	1551	90	780	70	820	250	870	1483
66SV4G220T	150	125	794	490	1551	90	780	70	820	250	870	1483
92SV3/2AG185T	200	150	819	504	1635	70	820	70	820	250	884	1393
92SV3G220T	200	150	819	504	1635	70	820	70	820	250	884	1393

Note: for versions with vibration damping fit increase height by 50 mm.

gvf11ra_sv46-arm-en_a_td

TWO-PUMP BOOSTER SETS, GVF11 SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE

GVF11D
GVF11Y



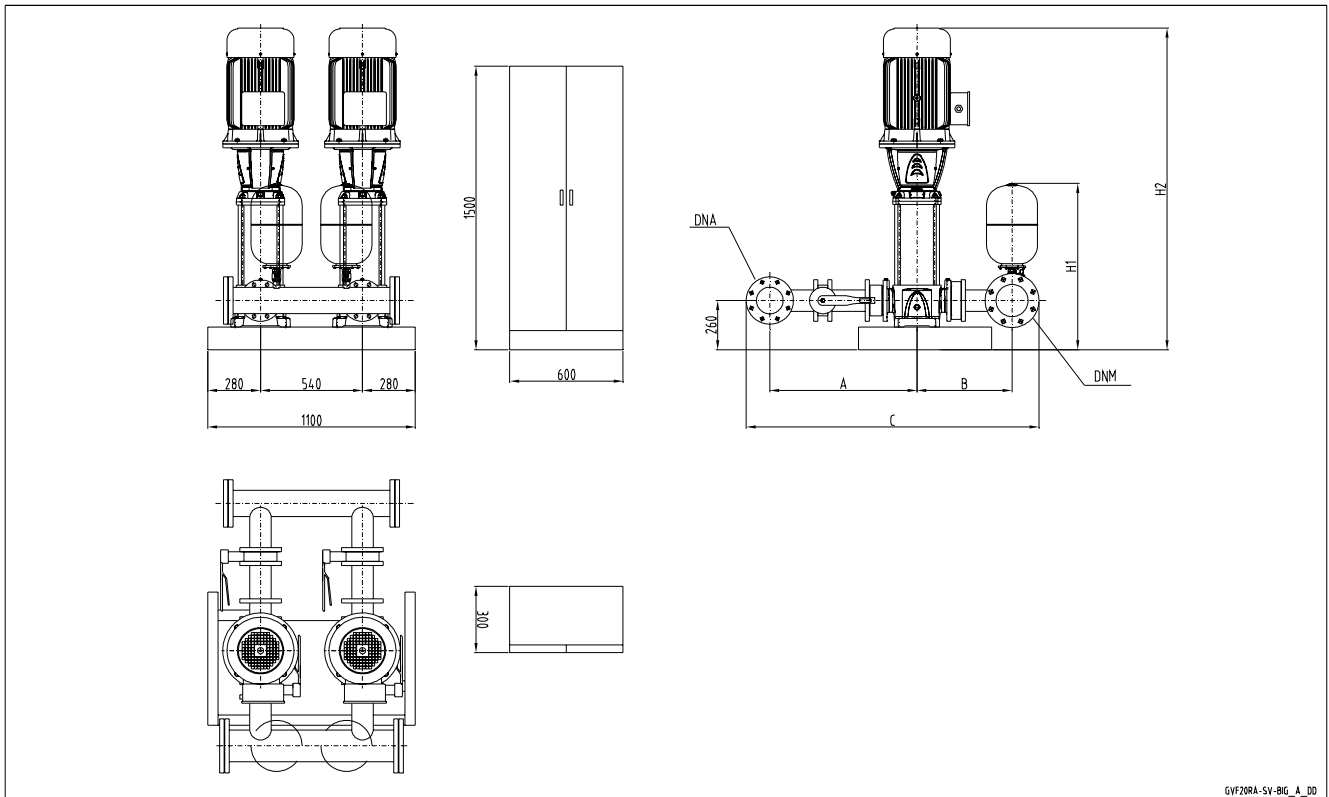
GVF11-SV-BIG_A_00

GVF11	DNA	DNM	A	B	C	H1	H2
66SV5/2AG300T	150	125	504	780	1552	880	1702
66SV5/1AG300T	150	125	504	780	1552	880	1702
66SV5G300T	150	125	504	780	1552	880	1702
92SV4/2AG300T	200	150	529	794	1635	894	1612
92SV4G300T	200	150	529	794	1635	894	1612
92SV5/2AG370T	200	150	529	794	1635	894	1702

Note: for versions with vibration damping fit increase height by 50 mm.

gvf11_sv-big-en_a_td

TWO-PUMP BOOSTER SETS, GVF11 RA SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON SUCTION SIDE



GVF20RA-SV-BIG_A_DD

**GVF11D
GVF11Y**

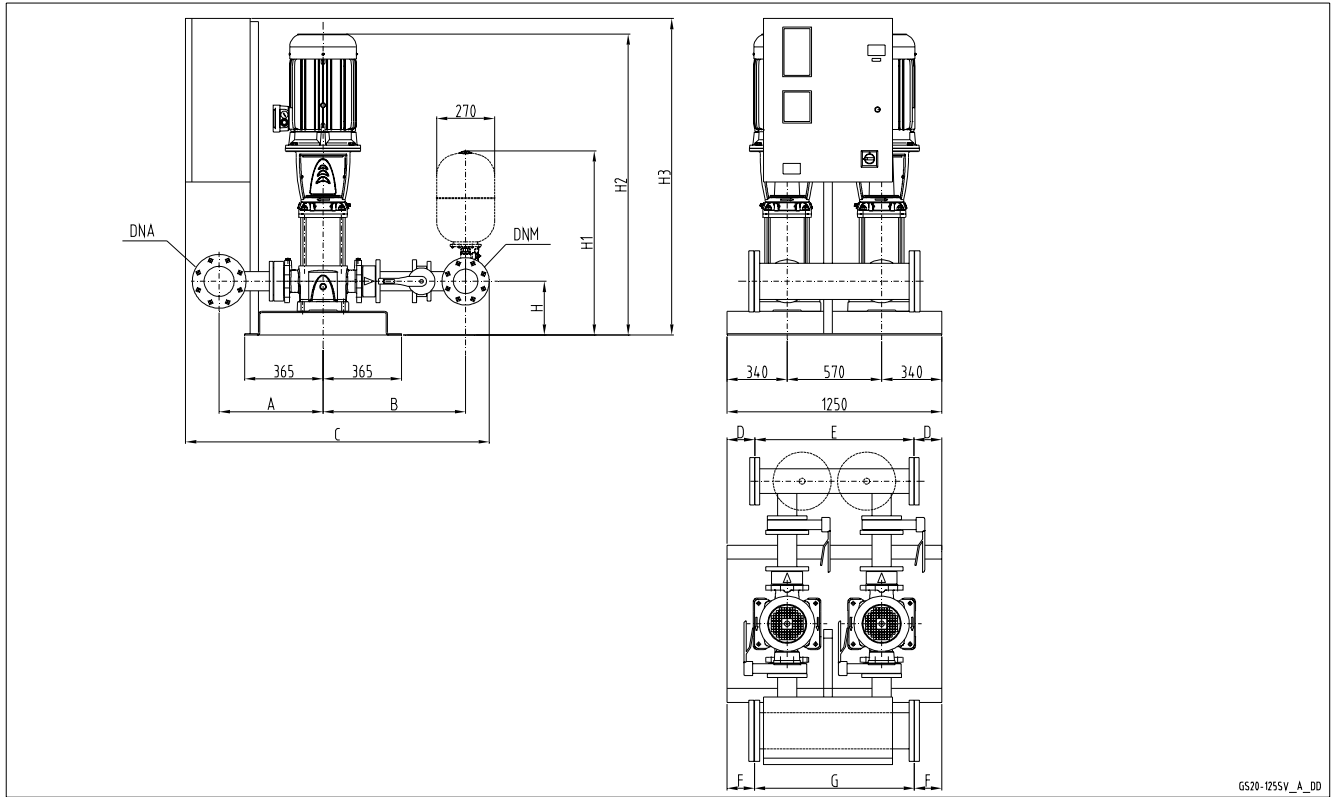
GVF11RA	DNA	DNM	A	B	C	H1	H2
66SV5/2AG300T	150	125	794	490	1552	880	1087
66SV5/1AG300T	150	125	794	490	1552	880	1087
66SV5G300T	150	125	794	490	1552	880	1087
92SV4/2AG300T	200	150	819	504	1635	894	1612
92SV4G300T	200	150	819	504	1635	894	1612
92SV5/2AG370T	200	150	819	504	1635	894	1702

Note: for versions with vibration damping fit increase height by 50 mm.

gvf11ra_sv-big-en_a_td

TWO-PUMP BOOSTER SETS, GVF11 SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE

**GVF11D
GVF11Y**



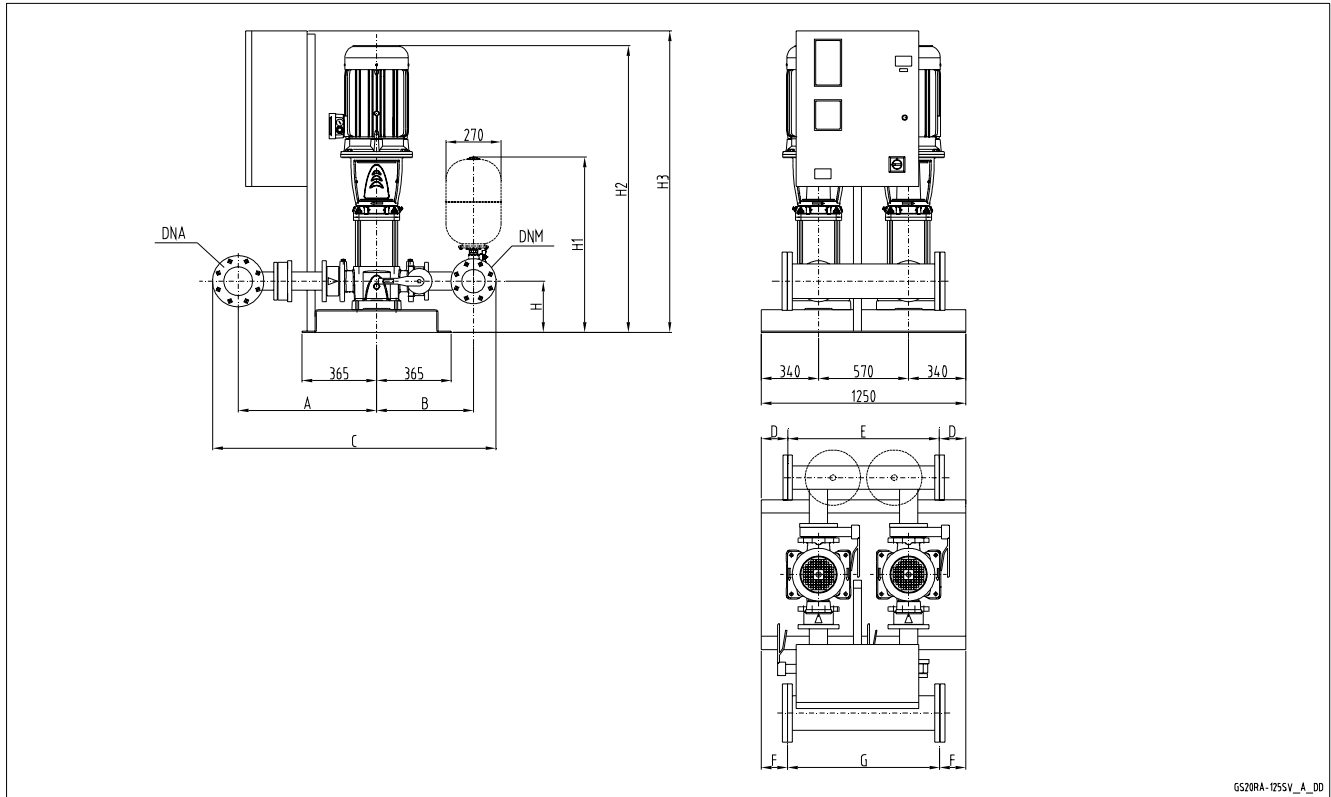
GS20-125SV_A_00

GVF11	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2	H3
125SV1G075T	200	200	591	927	1857	150	950	150	950	280	940	1180	1322
125SV2G150T	200	200	591	927	1857	150	950	150	950	280	940	1492	1572

Note: for versions with vibration damping fit increase height by 50 mm.

gvf11_125sv-en_a_td

TWO-PUMP BOOSTER SETS, GVF11 RA SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON SUCTION SIDE



GS20RA-125SV_A_DD

**GVF11D
GVF11Y**

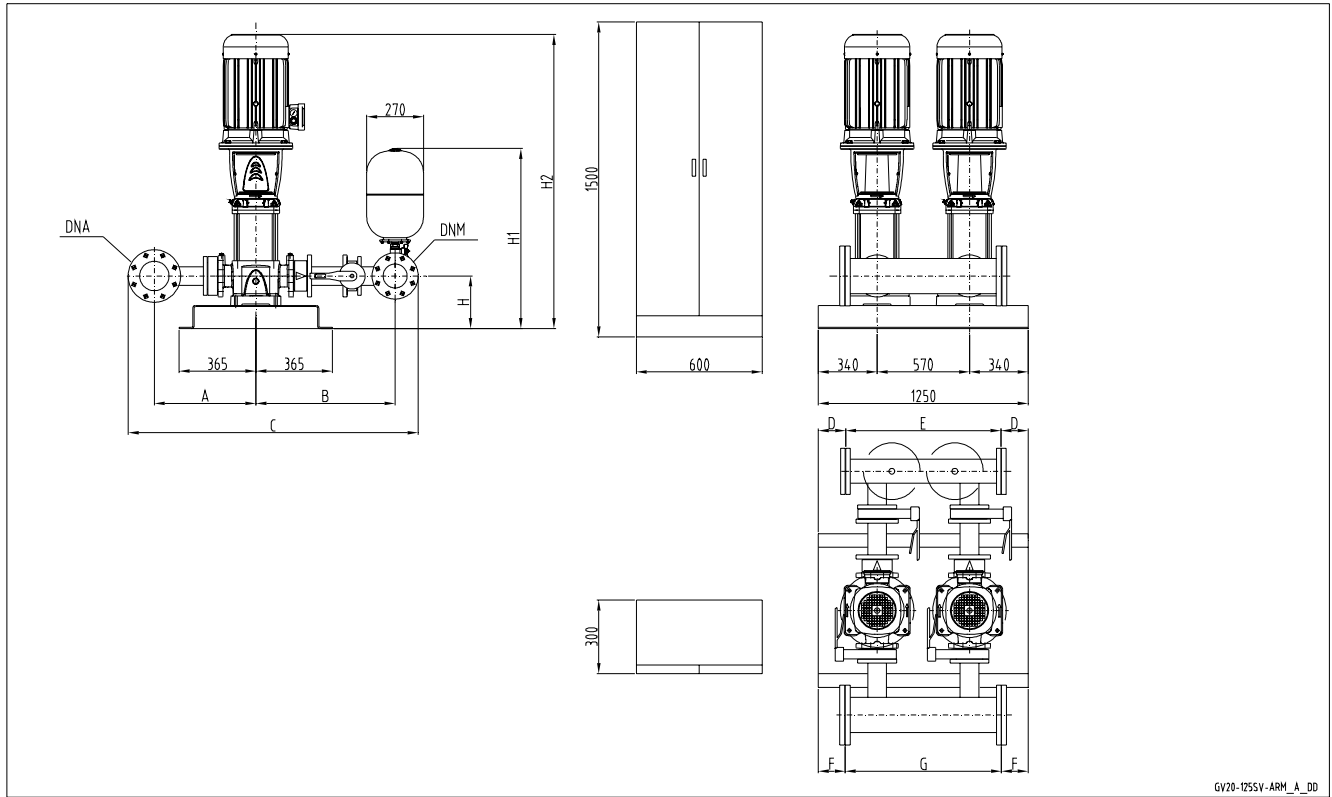
GVF11RA	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2	H3
125SV1G075T	200	200	927	591	1857	150	950	150	950	280	940	1180	1322
125SV2G150T	200	200	927	591	1857	150	950	150	950	280	940	1492	1572

Note: for versions with vibration damping fit increase height by 50 mm.

gvf11ra_125sv-en_a_td

TWO-PUMP BOOSTER SETS, GVF11 SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE

**GVF11D
GVF11Y**



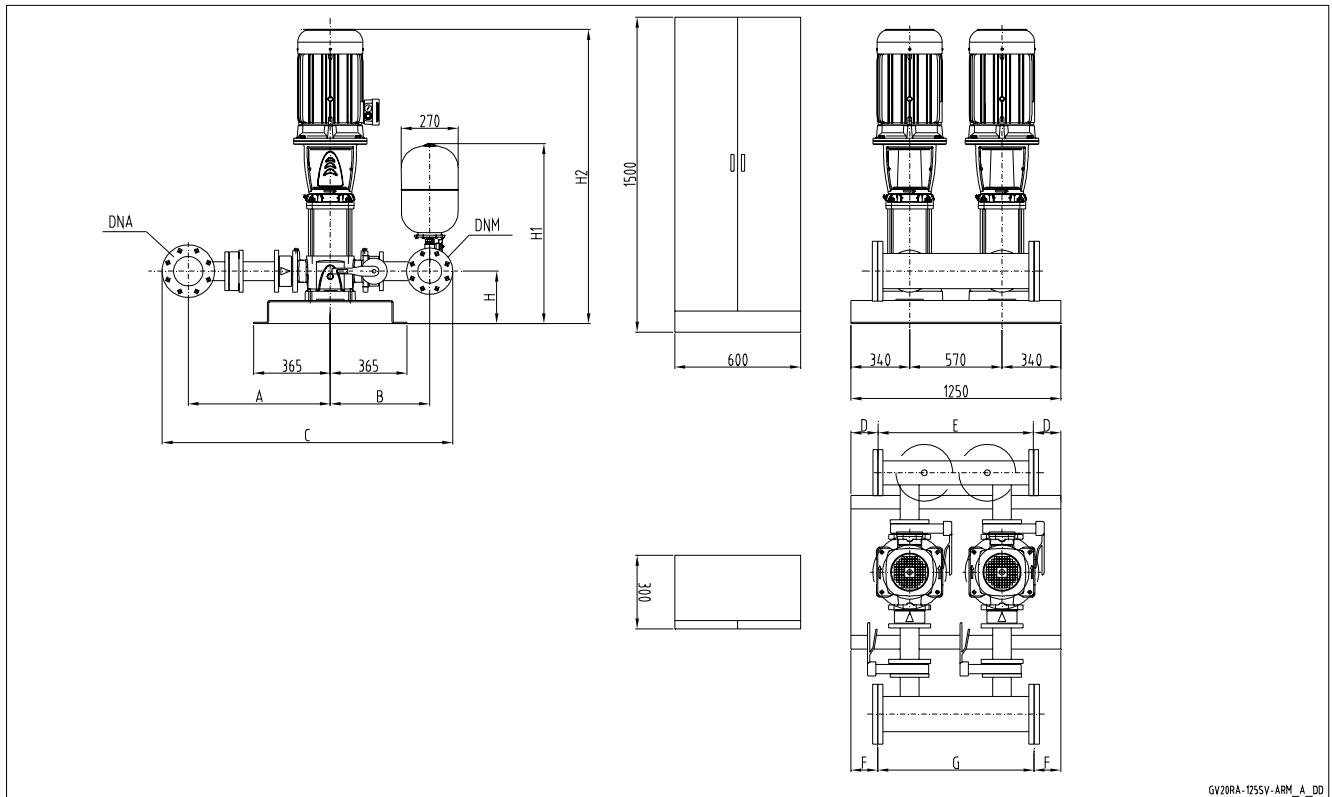
GV20-125SV-ARM_A_DD

GVF11	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2
125SV3G220T	200	200	591	927	1857	150	950	150	950	280	940	1642

Note: for versions with vibration damping fit increase height by 50 mm.

gvf11_125sv-arm-en_a_td

TWO-PUMP BOOSTER SETS, GVF11 RA SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON SUCTION SIDE



**GVF11D
GVF11Y**

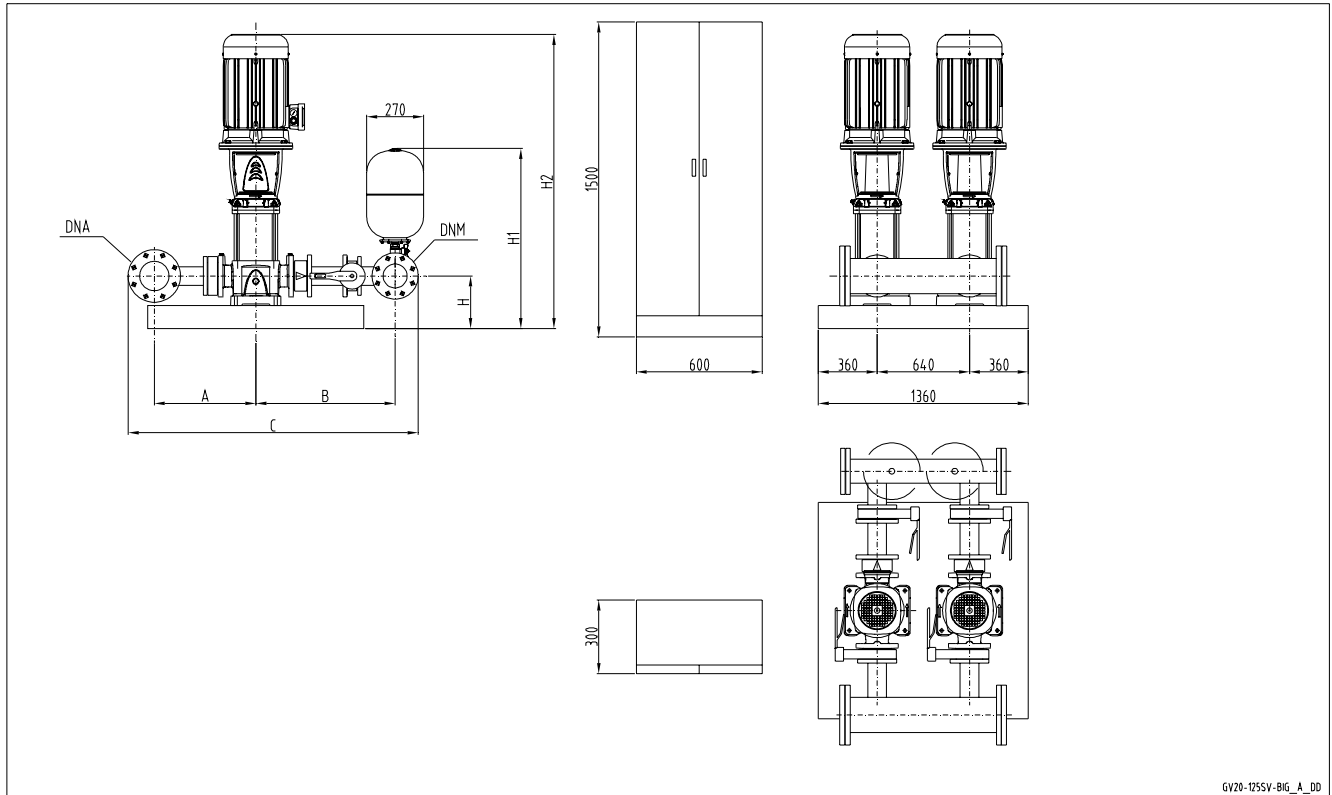
GVF11RA	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2
125SV3G220T	200	200	927	591	1857	150	950	150	950	280	940	1642

Note: for versions with vibration damping fit increase height by 50 mm.

gvf11ra_125sv-arm-en_a_td

TWO-PUMP BOOSTER SETS, GVF11 SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE

GVF11D
GVF11Y



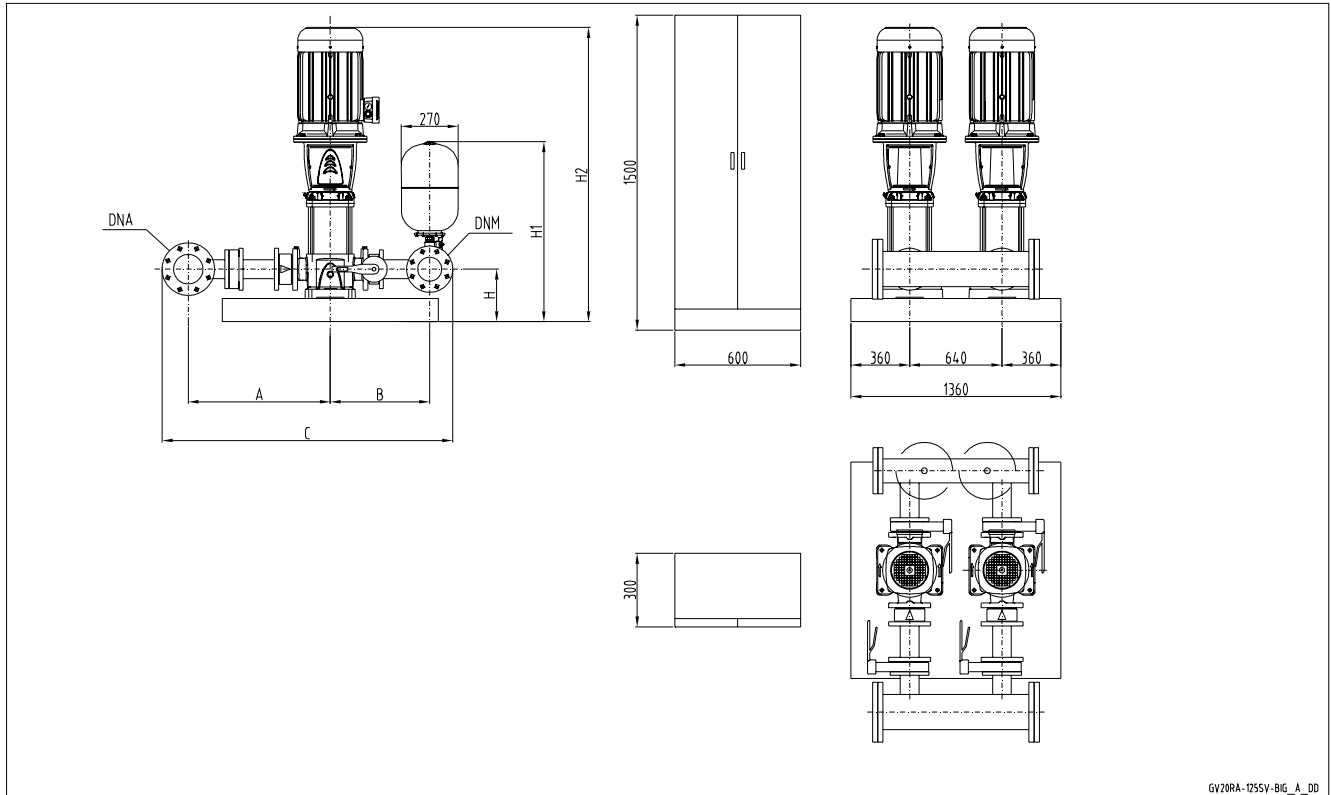
GV20-125SV-BIG_A_DD

GVF11	DNA	DNM	A	B	C	H	H1	H2
125SV4G300T	200	200	591	927	1857	300	960	1975
125SV5G370T	200	200	591	927	1857	300	960	2125

Note: for versions with vibration damping fit increase height by 50 mm.

gvf11_125sv-big-en_a_td

TWO-PUMP BOOSTER SETS, GVF11 RA SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON SUCTION SIDE



GVF11RA-125SV-BIG_A_DD

**GVF11D
GVF11Y**

GVF11RA	DNA	DNM	A	B	C	H	H1	H2
125SV4G300T	200	200	927	591	1857	300	960	1975
125SV5G370T	200	200	927	591	1857	300	960	2125

Note: for versions with vibration damping fit increase height by 50 mm.

gvf11ra_125sv-big-en_a_td

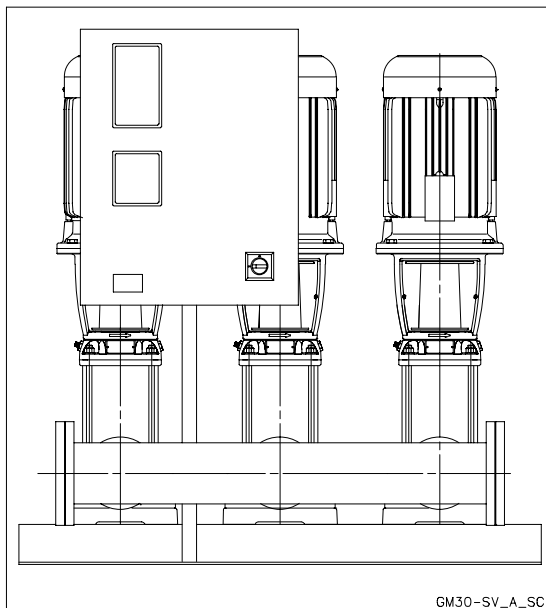
Booster sets

MARKET SECTORS CIVIL, INDUSTRIAL

APPLICATIONS

- Water network supply in condominiums, offices, hotels, shopping centres, factories.
- Water supply to agricultural water networks (e.g. irrigation).

GVF12..D GVF12..R Series



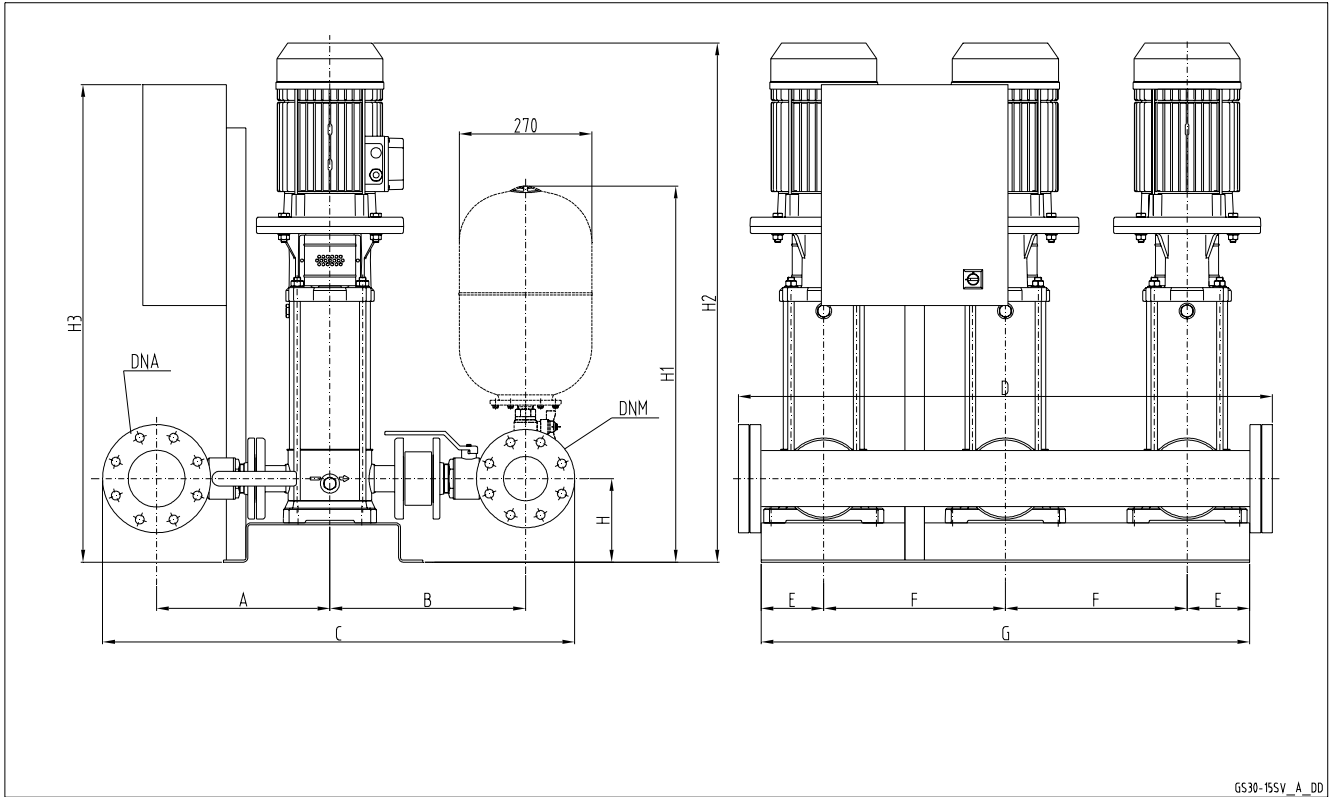
GVF12D
GVF12Y

SPECIFICATIONS

- **Flow rate** up to 480 m³/h.
- **Head** up to 160 m.
- Electrical panel supply voltage:
3 x 400V $\pm$ 10%.
- Frequency 50 Hz.
- Voltage for controls outside panel:
24 Vac.
- Electrical panel
protection class IP 55.
- Maximum service pump power:
3 x 37 kW.
- Starting fixed-speed motors:
 - Direct for powers up to 22 kW inclusive for pump (GVF..D).
 - Star/Delta on request (GVF..Y set).
 - Softstarter, for higher powers (GVF..R set).
- **Electric pumps with vertical axis:**
 - SV series (motor protection class IP55).
- Maximum operating pressure:
16 bar.
- Maximum temperature of pumped liquid : +80°C.

THREE-PUMP BOOSTER SETS, GVF12 SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON DISCHARGE SIDE**

GVF12D
GVF12Y



GS30-15SV_A_DD

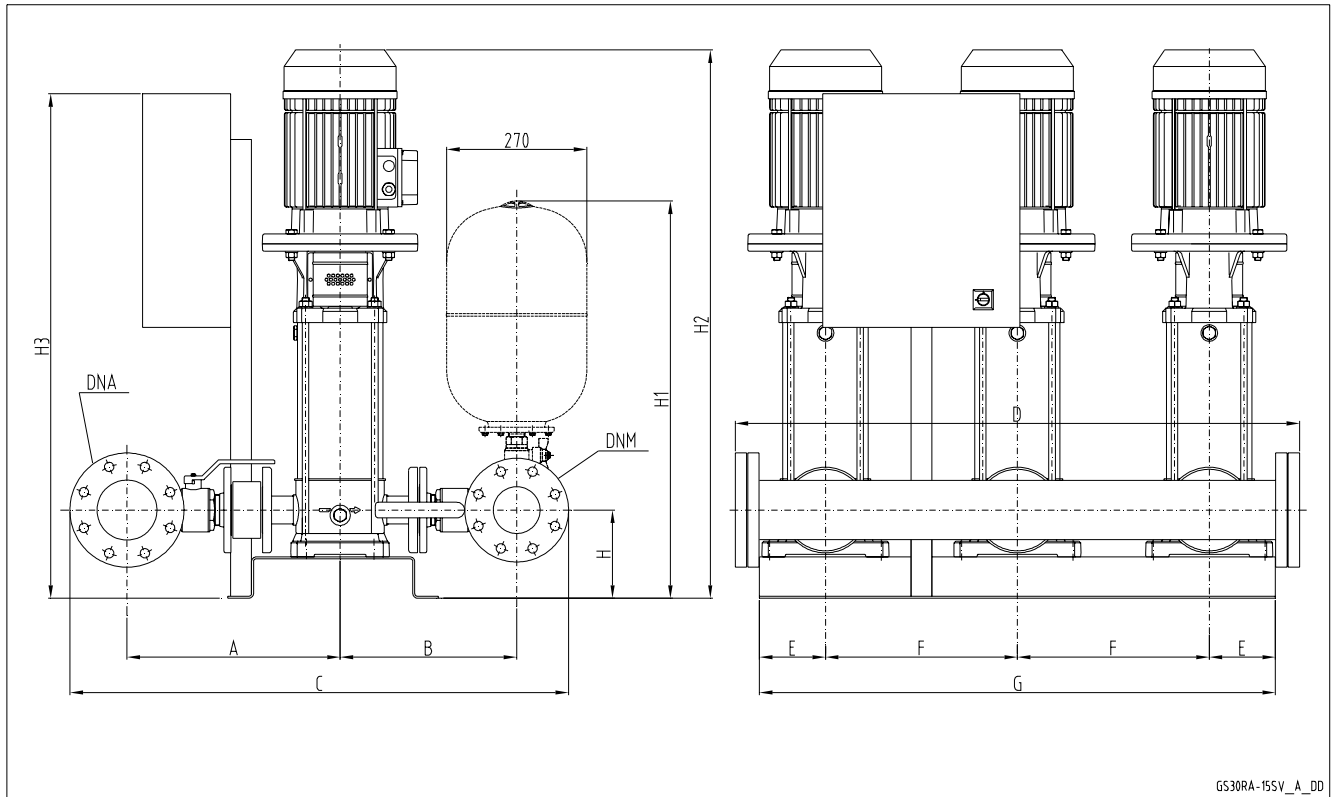
GVF12	DNA	DNM	A		B		C		D	E	F	G	H	H1	H2	H3
			STD/DW	AISI	STD/DW	AISI	STD/DW	AISI								
15SV02F022T	100	80	354	394	399	437	963	1041	1084	128	370	995	170	765	787	1570
15SV03F030T	100	80	354	394	399	437	963	1041	1084	128	370	995	170	765	845	1570
15SV04F040T	100	80	354	394	399	437	963	1041	1084	128	370	995	170	765	914	1570
15SV05F040T	100	80	354	394	399	437	963	1041	1084	128	370	995	170	765	962	1570
15SV06F055T	100	80	354	394	399	437	963	1041	1084	128	370	995	170	765	1133	1570
15SV07F055T	100	80	354	394	399	437	963	1041	1084	128	370	995	170	765	1181	1570
15SV08F075T	100	80	354	394	399	437	963	1041	1084	128	370	995	170	765	1221	1570
15SV09F075T	100	80	354	394	399	437	963	1041	1084	128	370	995	170	765	1269	1570
15SV10F110T	100	80	354	394	399	437	963	1041	1224	260	440	1400	200	795	1438	1570
22SV02F022T	100	100	354	394	411	449	985	1063	1084	128	370	995	170	777	787	1570
22SV03F030T	100	100	354	394	411	449	985	1063	1084	128	370	995	170	777	845	1570
22SV04F040T	100	100	354	394	411	449	985	1063	1084	128	370	995	170	777	914	1570
22SV05F055T	100	100	354	394	411	449	985	1063	1084	128	370	995	170	777	1085	1570
22SV06F075T	100	100	354	394	411	449	985	1063	1084	128	370	995	170	777	1125	1570
22SV07F075T	100	100	354	394	411	449	985	1063	1084	128	370	995	170	777	1173	1570
22SV08F110T	100	100	354	394	411	449	985	1063	1224	260	440	1400	200	807	1342	1570
22SV09F110T	100	100	354	394	411	449	985	1063	1224	260	440	1400	200	807	1390	1570
22SV10F110T	100	100	354	394	411	449	985	1063	1224	260	440	1400	200	807	1438	1570

Dimensions in mm. Tolerance ± 10 mm.

gvf12_15sv-new-en_c_dd

Note: for versions with vibration damping feet increase height by 30 mm.

THREE-PUMP BOOSTER SETS, GVF12 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



GS30RA-15SV_A_DD

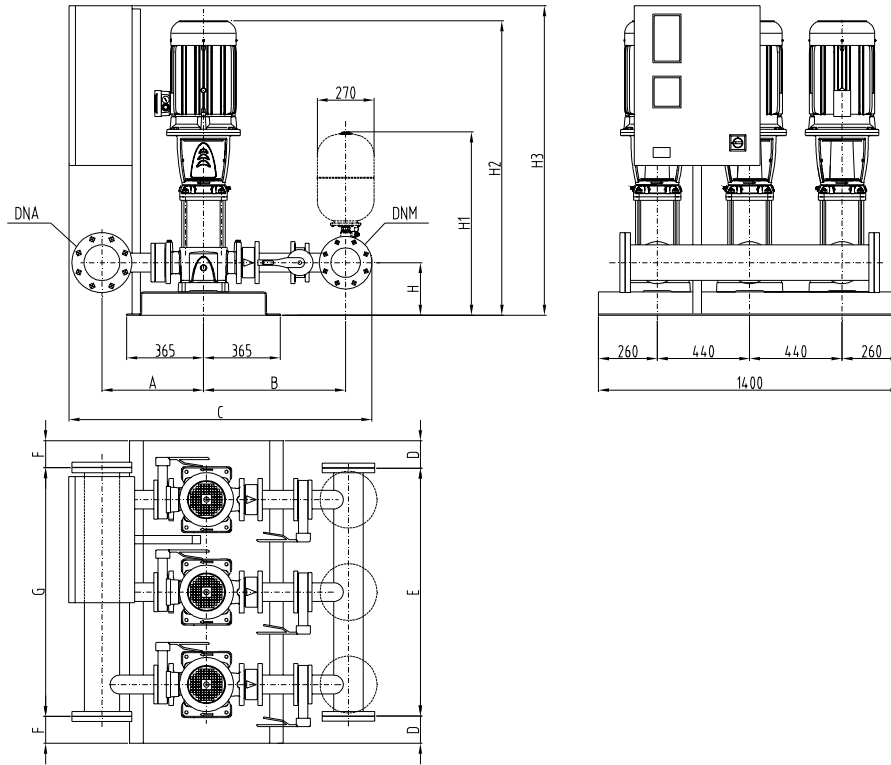
GVF12RA	DNA	DNM	A		B		C		D	E	F	G	H	H1	H2	H3
			STD/DW	AISI	STD/DW	AISI	STD/DW	AISI								
15SV02F022T	100	80	411	449	342	380	963	1039	1084	128	370	995	170	765	787	1570
15SV03F030T	100	80	411	449	342	380	963	1039	1084	128	370	995	170	765	845	1570
15SV04F040T	100	80	411	449	342	380	963	1039	1084	128	370	995	170	765	914	1570
15SV05F040T	100	80	411	449	342	380	963	1039	1084	128	370	995	170	765	962	1570
15SV06F055T	100	80	411	449	342	380	963	1039	1084	128	370	995	170	765	1133	1570
15SV07F055T	100	80	411	449	342	380	963	1039	1084	128	370	995	170	765	1181	1570
15SV08F075T	100	80	411	449	342	380	963	1039	1084	128	370	995	170	765	1221	1570
15SV09F075T	100	80	411	449	342	380	963	1039	1084	128	370	995	170	765	1269	1570
15SV10F110T	100	80	411	449	342	380	963	1039	1224	260	440	1400	200	795	1438	1570
22SV02F022T	100	100	411	449	354	392	985	1061	1084	128	370	995	170	777	787	1570
22SV03F030T	100	100	411	449	354	392	985	1061	1084	128	370	995	170	777	845	1570
22SV04F040T	100	100	411	449	354	392	985	1061	1084	128	370	995	170	777	914	1570
22SV05F055T	100	100	411	449	354	392	985	1061	1084	128	370	995	170	777	1085	1570
22SV06F075T	100	100	411	449	354	392	985	1061	1084	128	370	995	170	777	1125	1570
22SV07F075T	100	100	411	449	354	392	985	1061	1084	128	370	995	170	777	1173	1570
22SV08F110T	100	100	411	449	354	392	985	1061	1224	260	440	1400	200	807	1342	1570
22SV09F110T	100	100	411	449	354	392	985	1061	1224	260	440	1400	200	807	1390	1570
22SV10F110T	100	100	411	449	354	392	985	1061	1224	260	440	1400	200	807	1438	1570

Dimensions in mm. Tolerance ± 10 mm.

gvf12ra_15sv-new-en_c_dd

Note: for versions with vibration damping feet increase height by 30 mm.

THREE-PUMP BOOSTER SETS, GVF12 SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE



GM_GM30-SV46_B_DD

GVF12D
GVF12Y

THREE-PUMP BOOSTER SETS, GVF12 SERIES

VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE

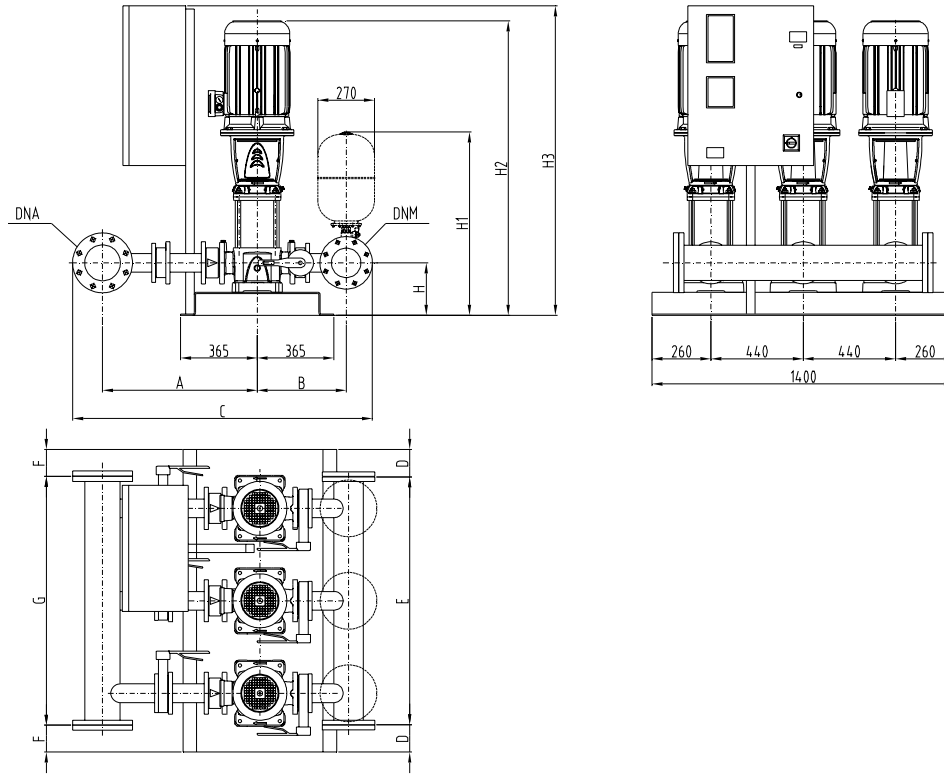
GVF12	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2	H3
33SV1/1AG022T	125	100	461	713	1423	90	1220	90	1220	215	822	897	1321
33SV1G030T	125	100	461	713	1423	90	1220	90	1220	215	822	897	1321
33SV2/2AG040T	125	100	461	713	1423	90	1220	90	1220	215	822	993	1321
33SV2/1AG040T	125	100	461	713	1423	90	1220	90	1220	215	822	993	1321
33SV2G055T	125	100	461	713	1423	90	1220	90	1220	215	822	1069	1321
33SV3/2AG055T	125	100	461	713	1423	90	1220	90	1220	215	822	1144	1321
33SV3/1AG075T	125	100	461	713	1423	90	1220	90	1220	215	822	1136	1571
33SV3G075T	125	100	461	713	1423	90	1220	90	1220	215	822	1136	1571
33SV4/2AG075T	125	100	461	713	1423	90	1220	90	1220	215	822	1211	1571
33SV4/1AG110T	125	100	461	713	1473	90	1220	90	1220	215	822	1307	1571
33SV4G110T	125	100	461	713	1473	90	1220	90	1220	215	822	1307	1571
33SV5/2AG110T	125	100	461	713	1473	90	1220	90	1220	215	822	1382	1571
33SV5/1AG110T	125	100	461	713	1473	90	1220	90	1220	215	822	1382	1571
33SV5G150T	125	100	461	713	1473	90	1220	90	1220	215	822	1448	1571
33SV6/2AG150T	125	100	461	713	1473	90	1220	90	1220	215	822	1523	1571
33SV6/1AG150T	125	100	461	713	1473	90	1220	90	1220	215	822	1523	1571
33SV6G150T	125	100	461	713	1473	90	1220	90	1220	215	822	1523	1571
33SV7/2AG150T	125	100	461	713	1473	90	1220	90	1220	215	822	1598	1571
46SV1/1AG030T	150	125	498	752	1517	90	1220	70	1260	250	870	937	1321
46SV1G040T	150	125	498	752	1517	90	1220	70	1260	250	870	958	1321
46SV2/2AG055T	150	125	498	752	1517	90	1220	70	1260	250	870	1109	1321
46SV2G075T	150	125	498	752	1517	90	1220	70	1260	250	870	1101	1571
46SV3/2AG110T	150	125	498	752	1527	90	1220	70	1260	250	870	1272	1571
46SV3G110T	150	125	498	752	1527	90	1220	70	1260	250	870	1272	1571
46SV4/2AG150T	150	125	498	752	1527	90	1220	70	1260	250	870	1413	1571
46SV4G150T	150	125	498	752	1527	90	1220	70	1260	250	870	1413	1571
66SV1/1AG040T	200	150	529	794	1635	70	1260	70	1260	250	884	983	1321
66SV1G055T	200	150	529	794	1635	70	1260	70	1260	250	884	1059	1321
66SV2/2AG075T	200	150	529	794	1635	70	1260	70	1260	250	884	1141	1571
66SV2/1AG110T	200	150	529	794	1635	70	1260	70	1260	250	884	1237	1571
66SV2G110T	200	150	529	794	1635	70	1260	70	1260	250	884	1237	1571
66SV3/2AG150T	200	150	529	794	1635	70	1260	70	1260	250	884	1393	1571
66SV3/1AG150T	200	150	529	794	1635	70	1260	70	1260	250	884	1393	1571
92SV1/1AG055T	200	200	529	819	1688	70	1260	70	1260	250	910	1059	1321
92SV1G075T	200	200	529	819	1688	70	1260	70	1260	250	910	1051	1571
92SV2/2AG110T	200	200	529	819	1688	70	1260	70	1260	250	910	1237	1571
92SV2G150T	200	200	529	819	1688	70	1260	70	1260	250	910	1303	1571

Note: for versions with vibration damping feet increase height by 50 mm.

gvf12_sv46-en_b_td

GVF12D
GVF12Y

THREE-PUMP BOOSTER SETS, GVF12 RA SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON SUCTION SIDE



GM_GM30RA-SV46_B_DD

GVF12D
GVF12Y

THREE-PUMP BOOSTER SETS, GVF12 RA SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON SUCTION SIDE

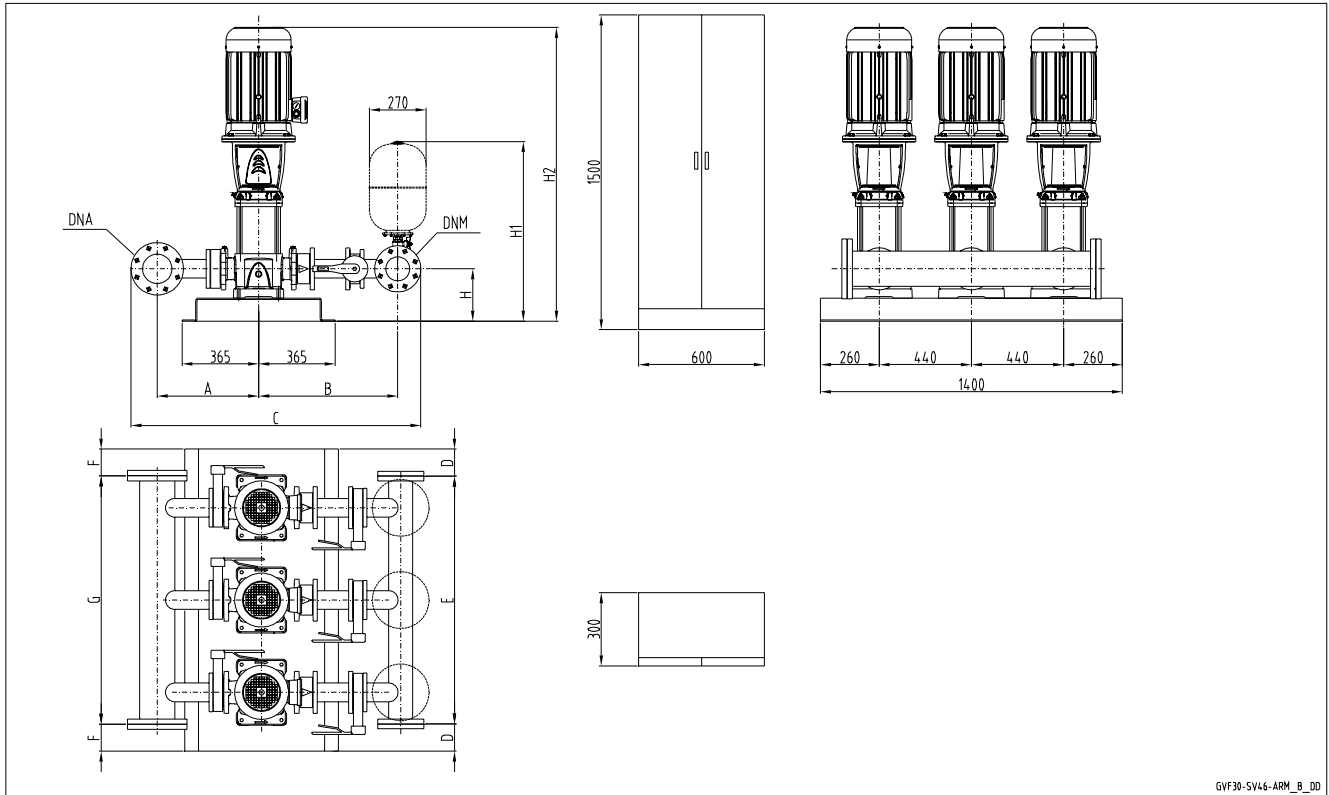
GVF12RA	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2	H3
33SV1/1AG022T	125	100	726	448	1409	90	1220	90	1220	215	822	897	1321
33SV1G030T	125	100	726	448	1409	90	1220	90	1220	215	822	897	1321
33SV2/2AG040T	125	100	726	448	1409	90	1220	90	1220	215	822	993	1321
33SV2/1AG040T	125	100	726	448	1409	90	1220	90	1220	215	822	993	1321
33SV2G055T	125	100	726	448	1409	90	1220	90	1220	215	822	1069	1321
33SV3/2AG055T	125	100	726	448	1409	90	1220	90	1220	215	822	1144	1321
33SV3/1AG075T	125	100	726	448	1409	90	1220	90	1220	215	822	1136	1571
33SV3G075T	125	100	726	448	1409	90	1220	90	1220	215	822	1136	1571
33SV4/2AG075T	125	100	726	448	1409	90	1220	90	1220	215	822	1211	1571
33SV4/1AG110T	125	100	726	448	1409	90	1220	90	1220	215	822	1307	1571
33SV4G110T	125	100	726	448	1409	90	1220	90	1220	215	822	1307	1571
33SV5/2AG110T	125	100	726	448	1409	90	1220	90	1220	215	822	1382	1571
33SV5/1AG110T	125	100	726	448	1409	90	1220	90	1220	215	822	1382	1571
33SV5G150T	125	100	726	448	1409	90	1220	90	1220	215	822	1448	1571
33SV6/2AG150T	125	100	726	448	1409	90	1220	90	1220	215	822	1523	1571
33SV6/1AG150T	125	100	726	448	1409	90	1220	90	1220	215	822	1523	1571
33SV6G150T	125	100	726	448	1409	90	1220	90	1220	215	822	1523	1571
33SV7/2AG150T	125	100	726	448	1409	90	1220	90	1220	215	822	1598	1571
46SV1/1AG030T	150	125	766	484	1517	90	1220	70	1260	250	870	937	1321
46SV1G040T	150	125	766	484	1517	90	1220	70	1260	250	870	958	1321
46SV2/2AG055T	150	125	766	484	1517	90	1220	70	1260	250	870	1109	1321
46SV2G075T	150	125	766	484	1517	90	1220	70	1260	250	870	1101	1571
46SV3/2AG110T	150	125	766	484	1517	90	1220	70	1260	250	870	1272	1571
46SV3G110T	150	125	766	484	1517	90	1220	70	1260	250	870	1272	1571
46SV4/2AG150T	150	125	766	484	1517	90	1220	70	1260	250	870	1413	1571
46SV4G150T	150	125	766	484	1517	90	1220	70	1260	250	870	1413	1571
66SV1/1AG040T	200	150	819	504	1635	70	1260	70	1260	250	884	983	1321
66SV1G055T	200	150	819	504	1635	70	1260	70	1260	250	884	1059	1321
66SV2/2AG075T	200	150	819	504	1635	70	1260	70	1260	250	884	1141	1571
66SV2/1AG110T	200	150	819	504	1635	70	1260	70	1260	250	884	1237	1571
66SV2G110T	200	150	819	504	1635	70	1260	70	1260	250	884	1237	1571
66SV3/2AG150T	200	150	819	504	1635	70	1260	70	1260	250	884	1393	1571
66SV3/1AG150T	200	150	819	504	1635	70	1260	70	1260	250	884	1393	1571
92SV1/1AG055T	200	200	819	529	1688	70	1260	70	1260	250	910	1059	1321
92SV1G075T	200	200	819	529	1688	70	1260	70	1260	250	910	1051	1571
92SV2/2AG110T	200	200	819	529	1688	70	1260	70	1260	250	910	1237	1571
92SV2G150T	200	200	819	529	1688	70	1260	70	1260	250	910	1303	1571

Note: for versions with vibration damping feet increase height by 50 mm.

gvf12ra_sv46-en_b_td

**GVF12D
GVF12Y**

THREE-PUMP BOOSTER SETS, GVF12 SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE

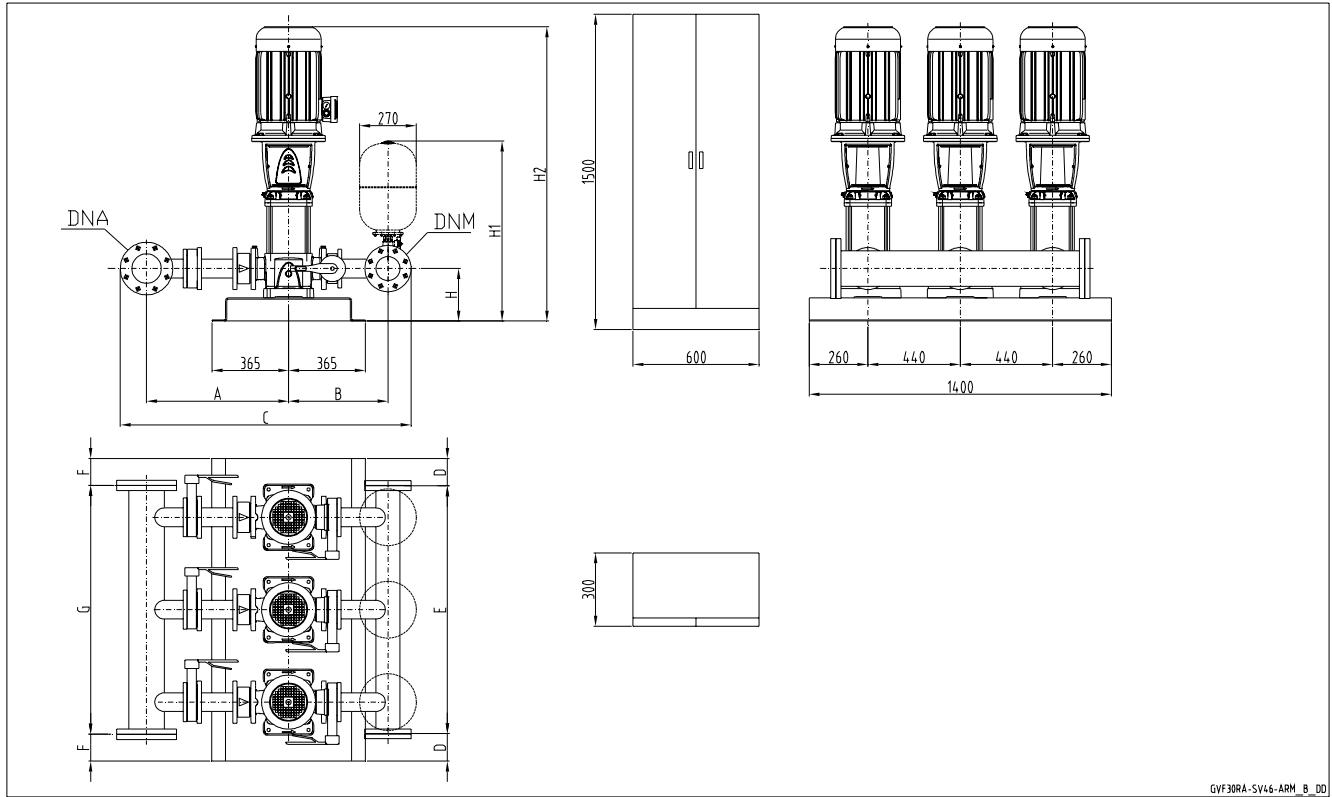


GVF12	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2
46SV5/2AG185T	150	125	498	752	1527	90	1220	70	1260	250	870	1488
46SV5G185T	150	125	498	752	1527	90	1220	70	1260	250	870	1488
46SV6/2AG220T	150	125	498	752	1527	90	1220	70	1260	250	870	1563
46SV6G220T	150	125	498	752	1527	90	1220	70	1260	250	870	1563
66SV3G185T	200	150	529	794	1635	70	1260	70	1260	250	884	1393
66SV4/2AG185T	200	150	529	794	1635	70	1260	70	1260	250	884	1483
66SV4/1AG220T	200	150	529	794	1635	70	1260	70	1260	250	884	1483
66SV4G220T	200	150	529	794	1635	70	1260	70	1260	250	884	1483
92SV3/2AG185T	200	200	529	819	1688	70	1260	70	1260	250	910	1393
92SV3G220T	200	200	529	819	1688	70	1260	70	1260	250	910	1393

Note: for versions with vibration damping fit increase height by 50 mm.

gvf12_sv46-arm-en_a_td

THREE-PUMP BOOSTER SETS, GVF12 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



GVF30RA-SV46-ARM_8_00

GVF12D
GVF12Y

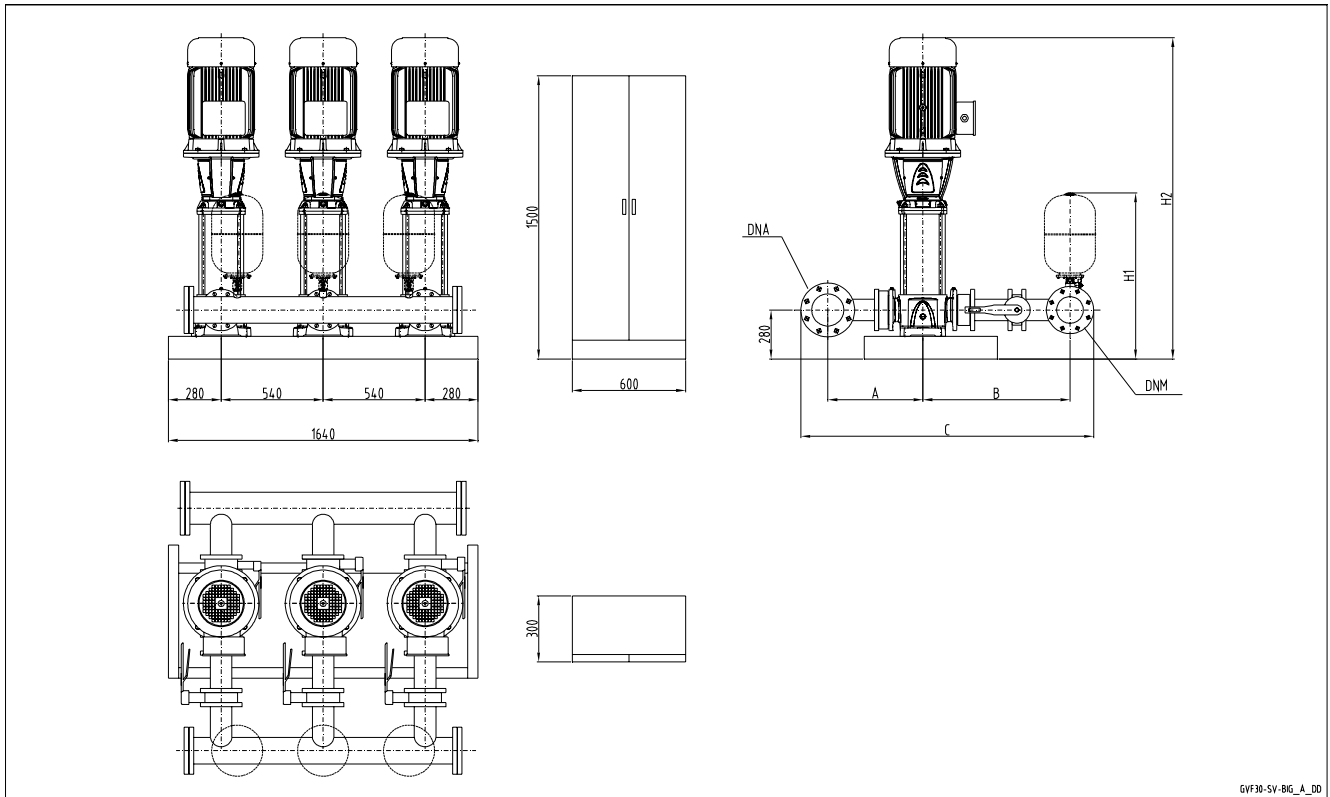
GVF12RA	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2
46SV5/2AG185T	150	125	766	484	1517	90	1220	70	1260	250	870	1488
46SV5G185T	150	125	766	484	1517	90	1220	70	1260	250	870	1488
46SV6/2AG220T	150	125	766	484	1517	90	1220	70	1260	250	870	1563
46SV6G220T	150	125	766	484	1517	90	1220	70	1260	250	870	1563
66SV3G185T	200	150	819	504	1635	70	1260	70	1260	250	884	1393
66SV4/2AG185T	200	150	819	504	1635	70	1260	70	1260	250	884	1483
66SV4/1AG220T	200	150	819	504	1635	70	1260	70	1260	250	884	1483
66SV4G220T	200	150	819	504	1635	70	1260	70	1260	250	884	1483
92SV3/2AG185T	200	200	819	529	1688	70	1260	70	1260	250	910	1393
92SV3G220T	200	200	819	529	1688	70	1260	70	1260	250	910	1393

Note: for versions with vibration damping fit increase height by 50 mm.

gvf12ra_sv46-arm-en_a_td

THREE-PUMP BOOSTER SETS, GVF12 SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON DISCHARGE SIDE**

GVF12D
GVF12Y



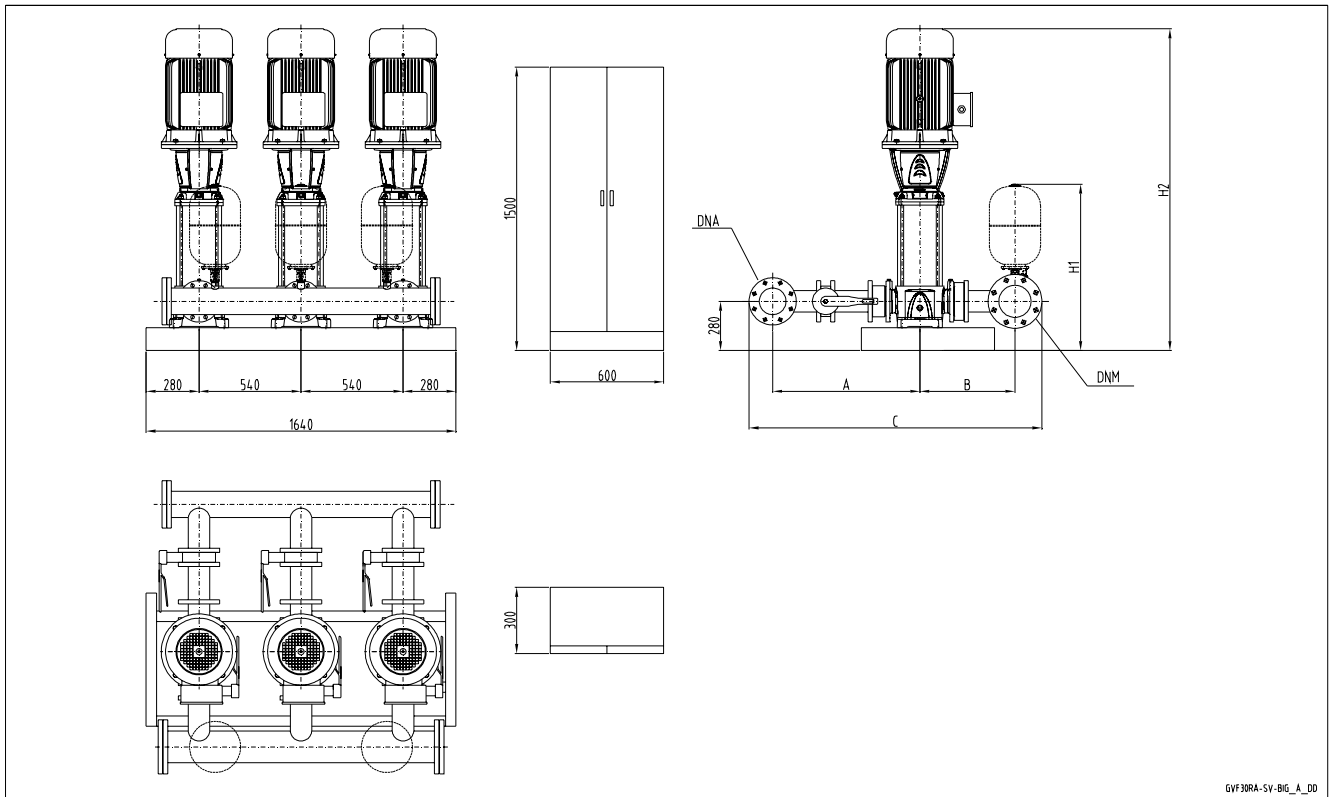
GVF30-SV-BIG_A_DD

GVF12	DNA	DNM	A	B	C	H1	H2
66SV5/2AG300T	200	150	529	794	1635	914	1766
66SV5/1AG300T	200	150	529	794	1635	914	1766
66SV5G300T	200	150	529	794	1635	914	1766
92SV4/2AG300T	200	200	529	819	1688	940	1676
92SV4G300T	200	200	529	819	1688	940	1676
92SV5/2AG370T	200	200	529	819	1688	940	1766

Note: for versions with vibration damping fit increase height by 50 mm.

gvf12_sv-big-en_b_td

THREE-PUMP BOOSTER SETS, GVF12 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



GVF30RA-SV-BIG_A_DD

GVF12D
GVF12Y

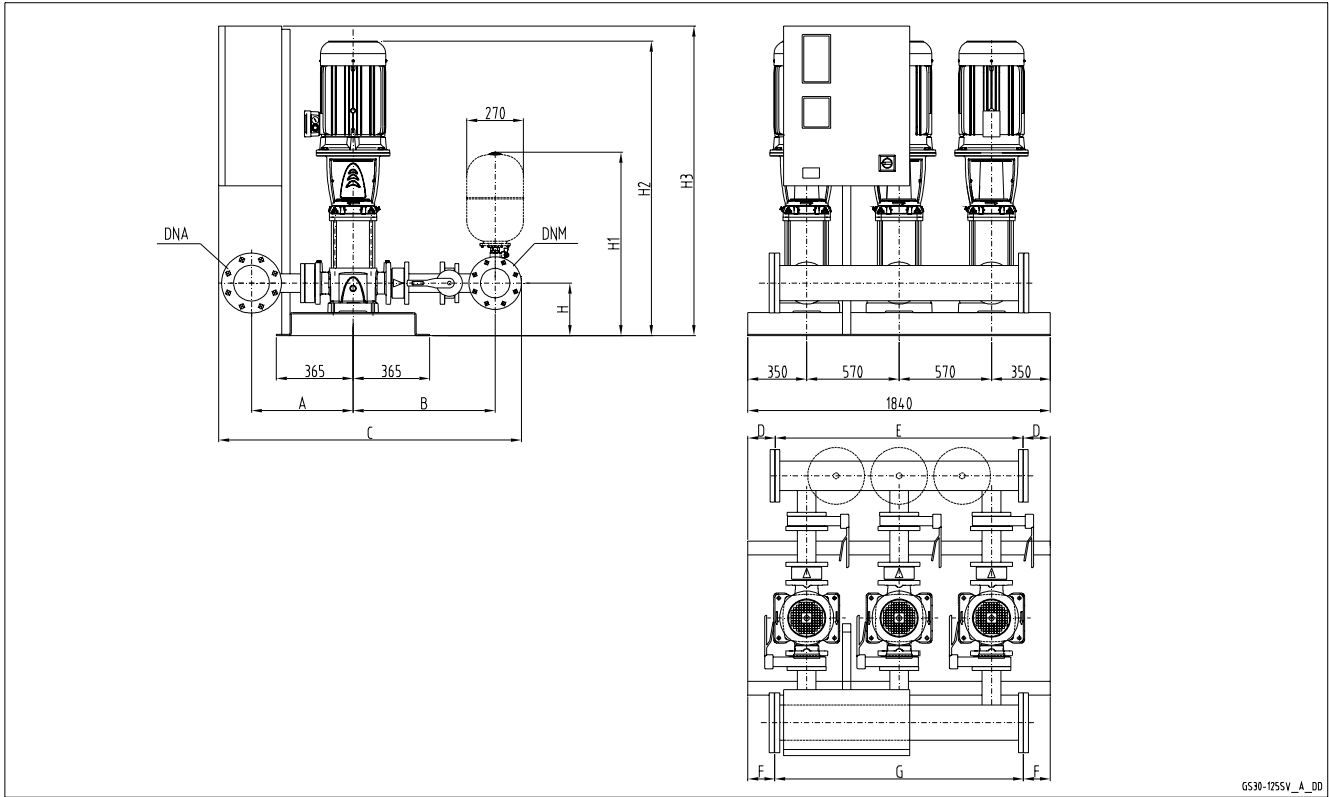
GVF12RA	DNA	DNM	A	B	C	H1	H2
66SV5/2AG300T	200	150	819	504	1635	914	1766
66SV5/1AG300T	200	150	819	504	1635	914	1766
66SV5G300T	200	150	819	504	1635	914	1766
92SV4/2AG300T	200	200	819	529	1688	940	1676
92SV4G300T	200	200	819	529	1688	940	1676
92SV5/2AG370T	200	200	819	529	1688	940	1766

Note: for versions with vibration damping fit increase height by 50 mm.

gvf12ra_sv-big-en_b_td

THREE-PUMP BOOSTER SETS, GVF12 SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON DISCHARGE SIDE**

GVF12D
GVF12Y



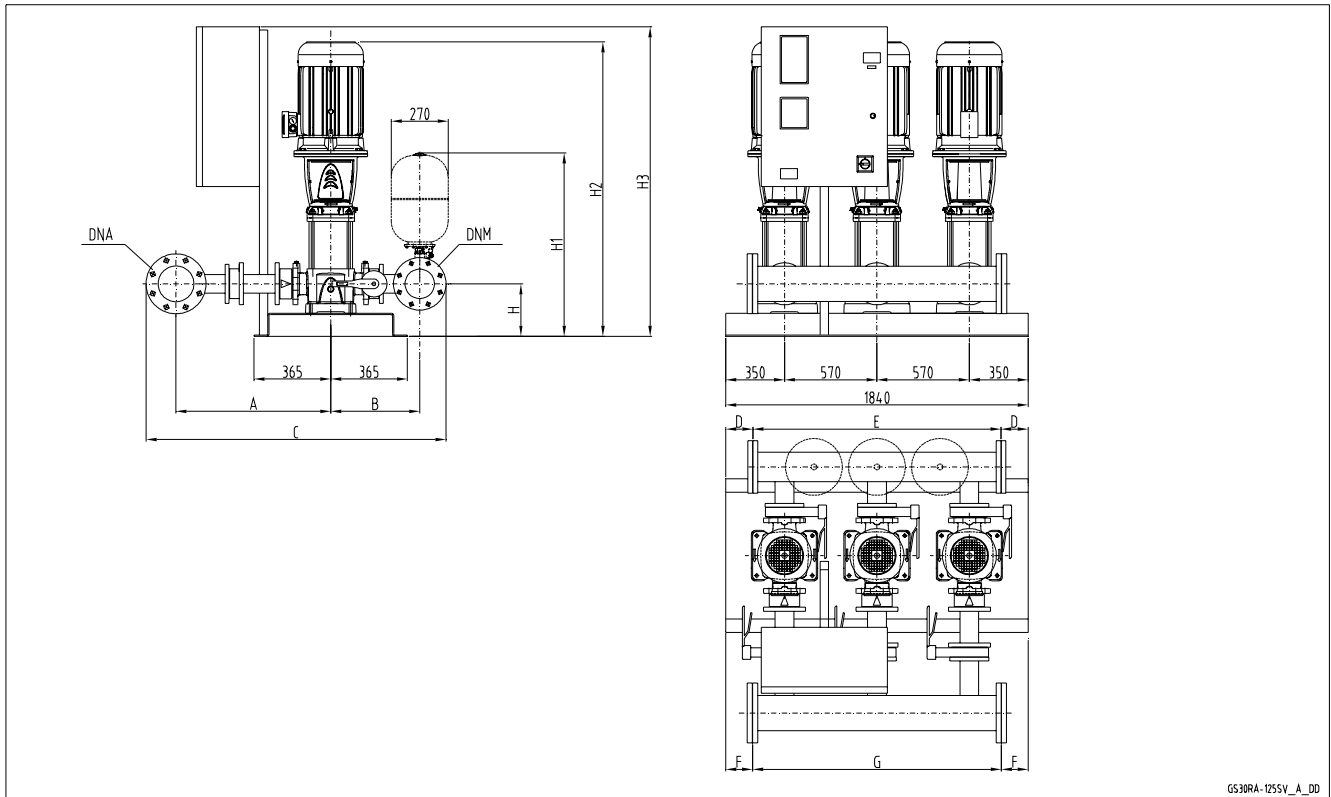
GS30-125SV_A_00

GVF12	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2	H3
125SV1G075T	250	200	618	927	1917	160	1520	130	1580	280	940	1180	1572
125SV2G150T	250	200	618	927	1917	160	1520	130	1580	280	940	1492	1572

Note: for versions with vibration damping fit increase height by 50 mm.

gvf12_125sv-en_a_td

THREE-PUMP BOOSTER SETS, GVF12 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



GS30RA-125SV_A_DD

GVF12D
GVF12Y

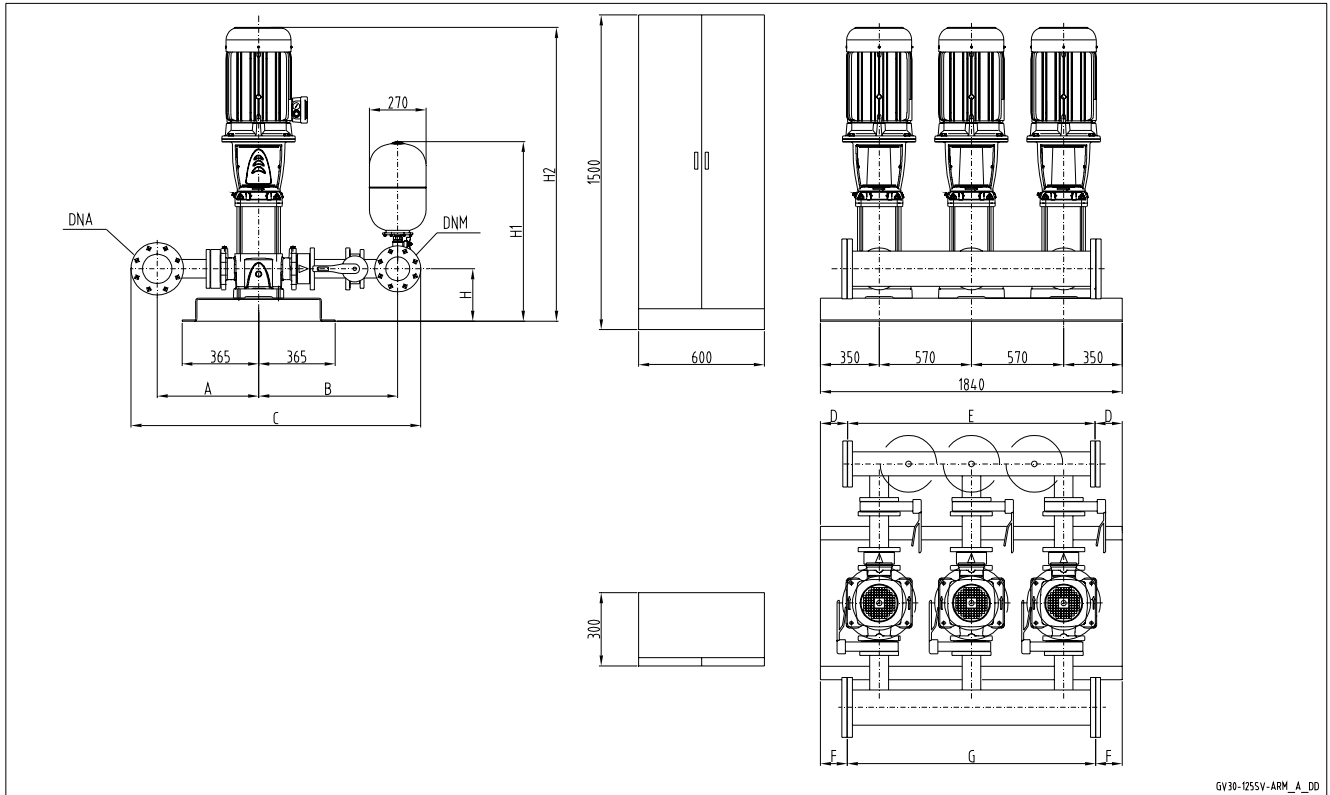
GVF12RA	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2	H3
125SV1G075T	250	200	954	591	1917	160	1520	130	1580	280	940	1180	1572
125SV2G150T	250	200	954	591	1917	160	1520	130	1580	280	940	1492	1572

Note: for versions with vibration damping fit increase height by 50 mm.

gvf12ra_125sv-en_a_td

THREE-PUMP BOOSTER SETS, GVF12 SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE

GVF12D
GVF12Y

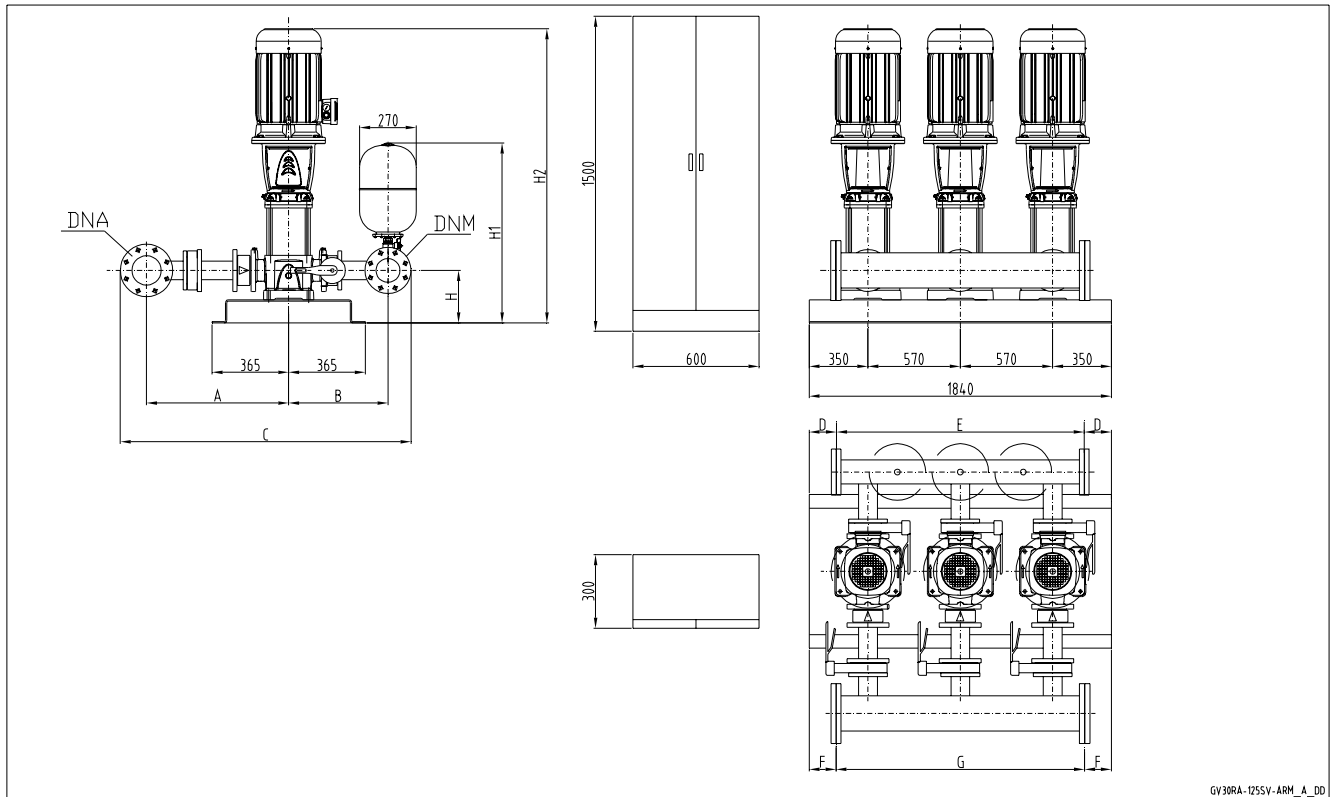


GVF12	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2
125SV3G220T	250	200	618	927	1917	160	1520	130	1580	280	940	1642

Note: for versions with vibration damping fit increase height by 50 mm.

gvf12_125sv-arm-en_a_td

THREE-PUMP BOOSTER SETS, GVF12 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



GV30RA-125SV-ARM_A_DD

GVF12D
GVF12Y

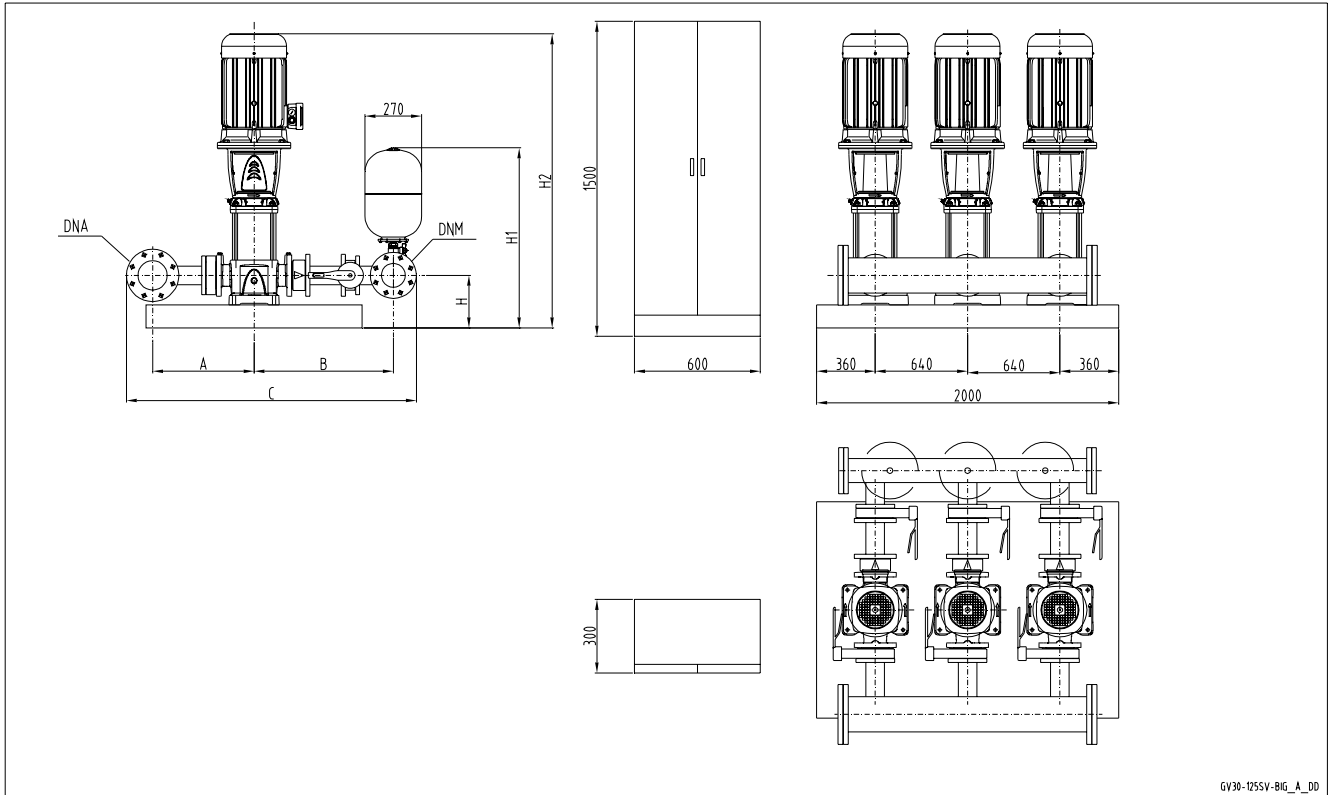
GVF12RA	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2
125SV3G220T	250	200	954	591	1917	160	1520	130	1580	280	940	1642

Note: for versions with vibration damping fit increase height by 50 mm.

gvf12ra_125sv-arm-en_a_td

THREE-PUMP BOOSTER SETS, GVF12 SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON DISCHARGE SIDE**

GVF12D
GVF12Y



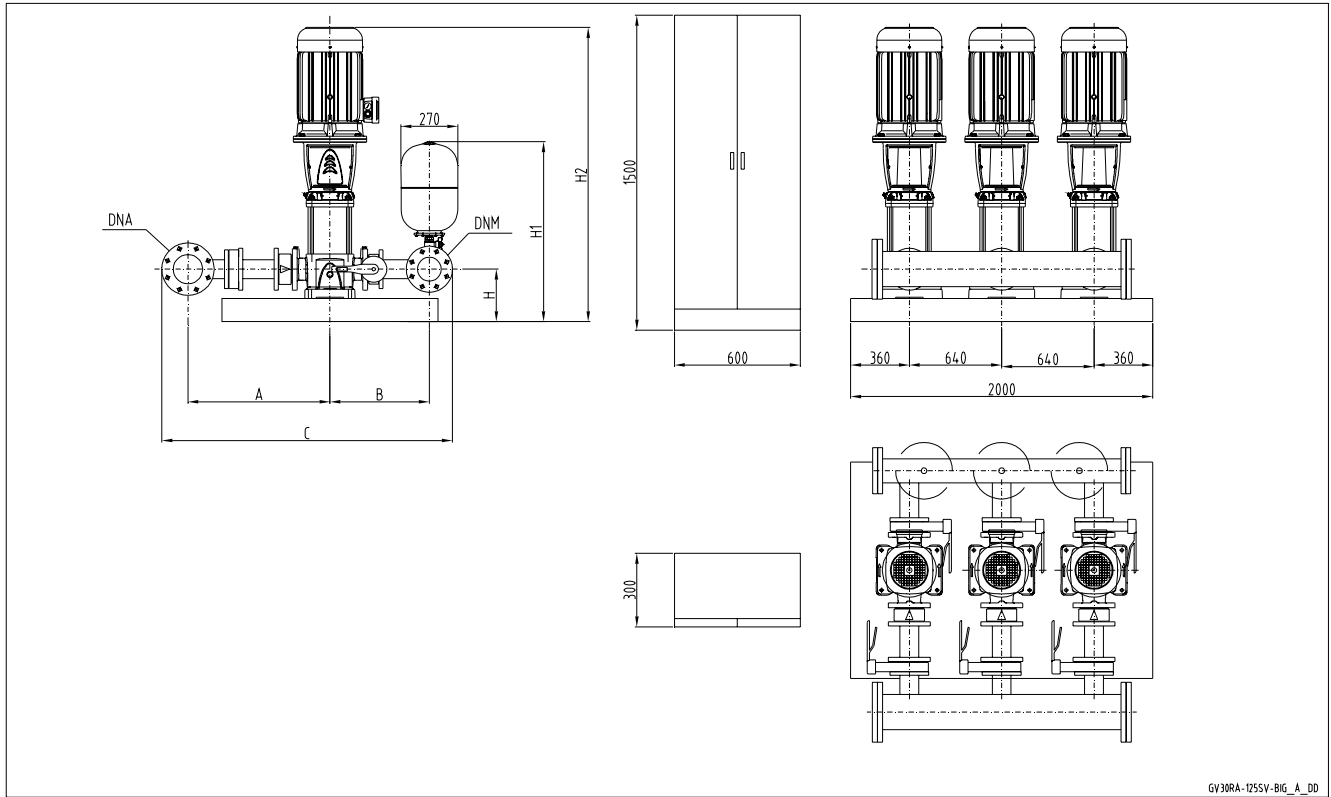
GV30-125SV-BIG_A_DD

GVF12	DNA	DNM	A	B	C	H	H1	H2
125SV4G300T	250	200	618	927	1917	300	960	1975
125SV5G370T	250	200	618	927	1917	300	960	2125

Note: for versions with vibration damping fit increase height by 50 mm.

gvf12_125sv-big-en_a_td

THREE-PUMP BOOSTER SETS, GVF12 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



GVF12D
GVF12Y

GVF12RA	DNA	DNM	A	B	C	H	H1	H2
125SV4G300T	250	200	954	591	1917	300	960	1975
125SV5G370T	250	200	954	591	1917	300	960	2125

Note: for versions with vibration damping fit increase height by 50 mm.

gvf12ra_125sv-big-en_a_td

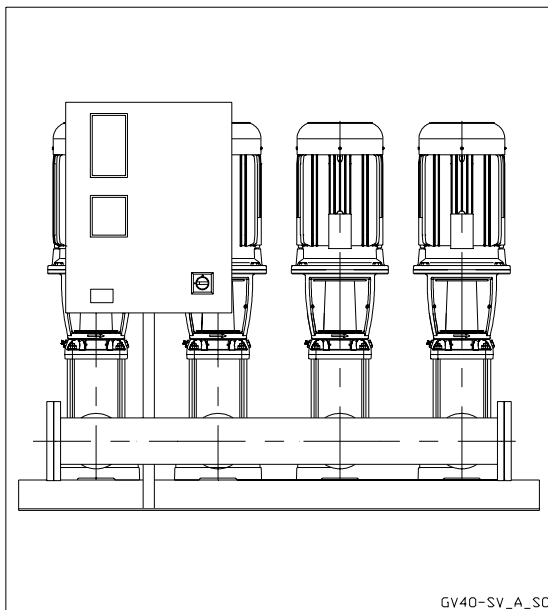
Booster sets

MARKET SECTORS CIVIL, INDUSTRIAL

APPLICATIONS

- Water network supply in condominiums, offices, hotels, shopping centres, factories.
- Water supply to agricultural water networks (e.g. irrigation).

GVF13..D GVF13..R Series

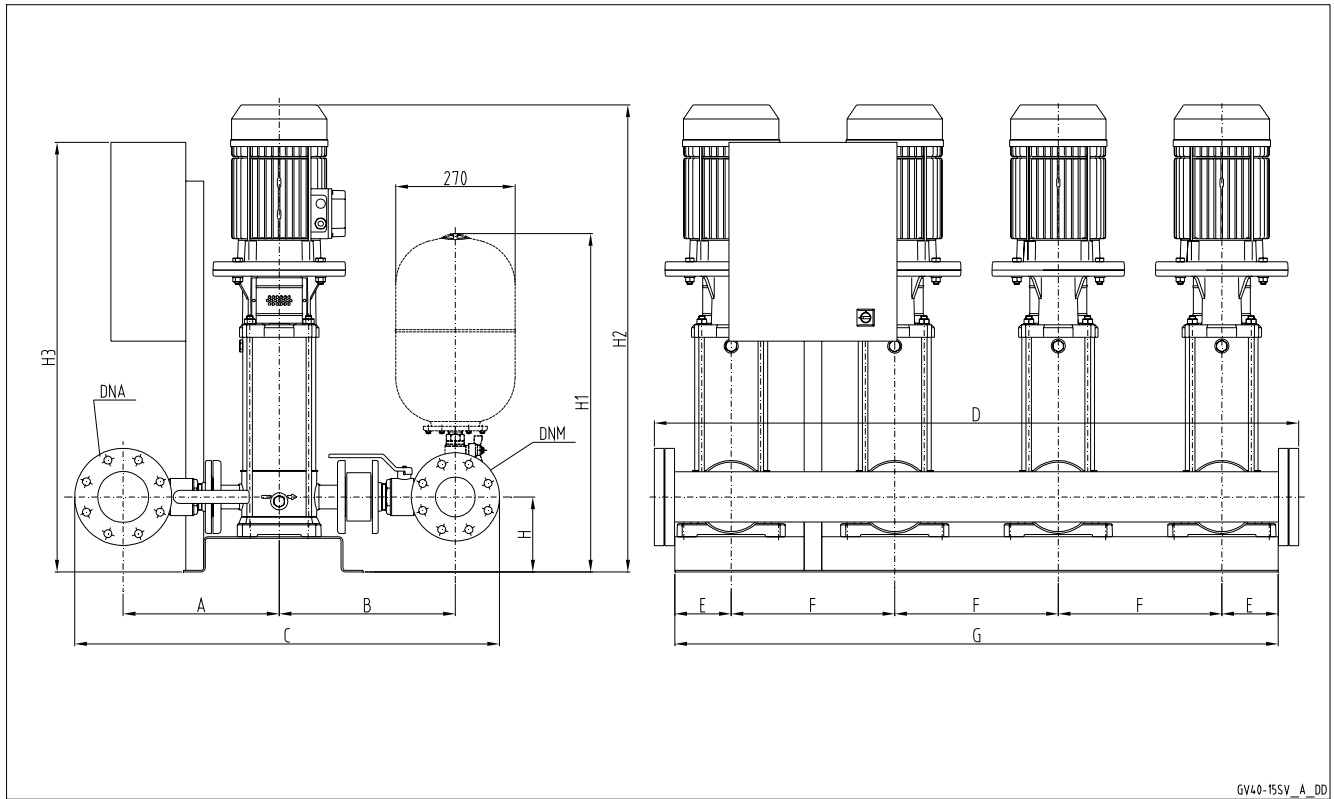


GVF13D
GVF13Y

SPECIFICATIONS

- **Flow rate** up to 640 m³/h.
- **Head** up to 160 m.
- Electrical panel supply voltage:
3 x 400V ± 10%.
- Frequency 50 Hz.
- Voltage for controls outside panel:
24 Vac.
- Electrical panel
protection class IP 55.
- Maximum service pump power:
4 x 37 kW.
- Starting fixed-speed motors:
 - Direct for powers up to 22 kW inclusive for pump (GVF..D).
 - Star/Delta on request (GVF..Y set).
 - Softstarter, for higher powers (GVF..R set).
- **Electric pumps with vertical axis:**
 - SV series (motor protection class IP55).
- Maximum operating pressure:
16 bar.
- Maximum temperature of pumped liquid : +80°C.

FOUR-PUMP BOOSTER SETS, GVF13 SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON DISCHARGE SIDE**



GVF13-15SV_A_DD

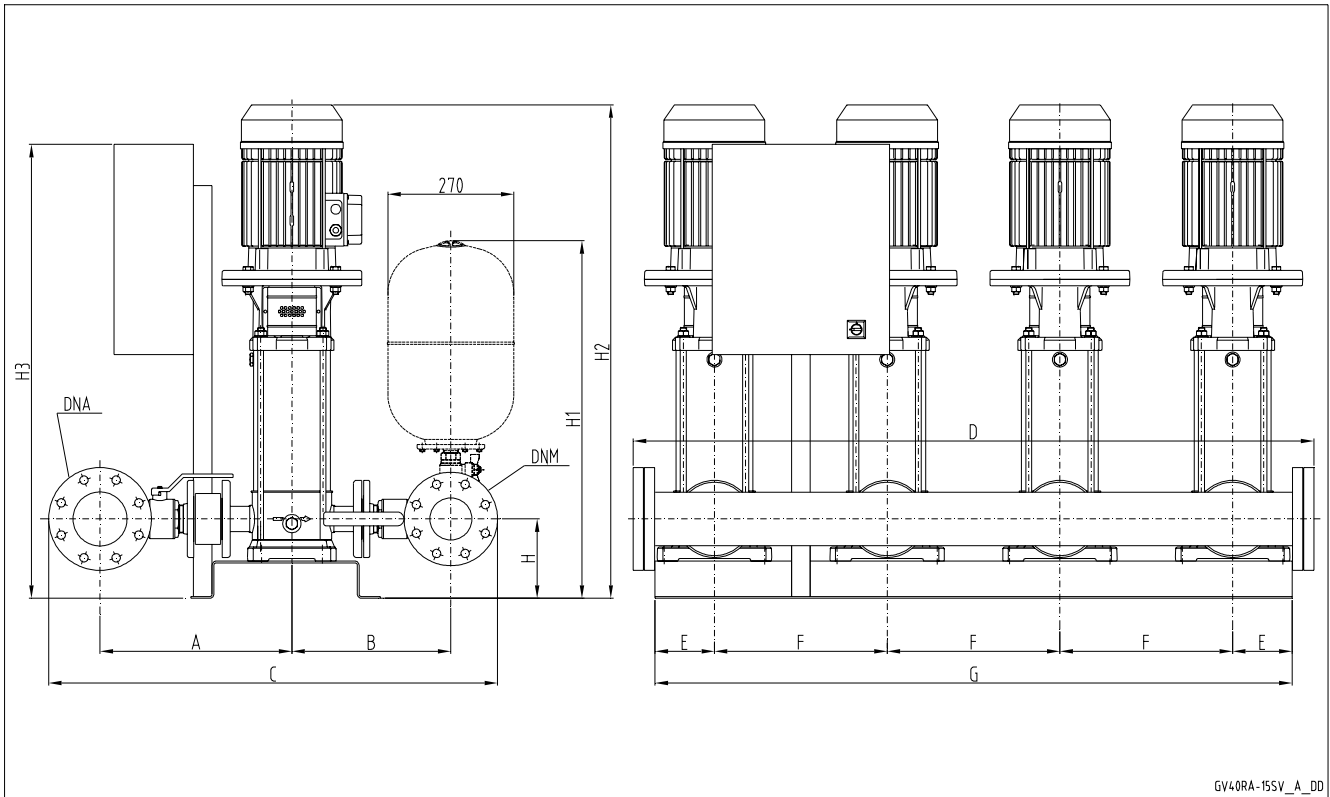
GVF13	DNA	DNM	A		B		C		D	E	F	G	H	H1	H2	H3
			STD/DW	AISI	STD/DW	AISI	STD/DW	AISI								
15SV02F022T	100	100	354	394	411	449	985	1063	1454	128	370	1365	170	777	787	1570
15SV03F030T	100	100	354	394	411	449	985	1063	1454	128	370	1365	170	777	845	1570
15SV04F040T	100	100	354	394	411	449	985	1063	1454	128	370	1365	170	777	914	1570
15SV05F040T	100	100	354	394	411	449	985	1063	1454	128	370	1365	170	777	962	1570
15SV06F055T	100	100	354	394	411	449	985	1063	1454	128	370	1365	170	777	1133	1570
15SV07F055T	100	100	354	394	411	449	985	1063	1454	128	370	1365	170	777	1181	1570
15SV08F075T	100	100	354	394	411	449	985	1063	1454	128	370	1365	170	777	1221	1820
15SV09F075T	100	100	354	394	411	449	985	1063	1454	128	370	1365	170	777	1269	1820
15SV10F110T	100	100	354	394	411	449	985	1063	1664	280	440	1880	200	807	1438	1820
22SV02F022T	125	100	367	407	411	449	1013	1091	1454	128	370	1365	170	777	787	1570
22SV03F030T	125	100	367	407	411	449	1013	1091	1454	128	370	1365	170	777	845	1570
22SV04F040T	125	100	367	407	411	449	1013	1091	1454	128	370	1365	170	777	914	1570
22SV05F055T	125	100	367	407	411	449	1013	1091	1454	128	370	1365	170	777	1085	1570
22SV06F075T	125	100	367	407	411	449	1013	1091	1454	128	370	1365	170	777	1125	1820
22SV07F075T	125	100	367	407	411	449	1013	1091	1454	128	370	1365	170	777	1173	1820
22SV08F110T	125	100	367	407	411	449	1013	1091	1664	280	440	1880	200	807	1342	1820
22SV09F110T	125	100	367	407	411	449	1013	1091	1664	280	440	1880	200	807	1390	1820
22SV10F110T	125	100	367	407	411	449	1013	1091	1664	280	440	1880	200	807	1438	1820

Dimensions in mm. Tolerance ± 10 mm.

gvf13_15sv-new-en_c_td

Note: for versions with vibration damping feet increase height by 30 mm.

FOUR-PUMP BOOSTER SETS, GVF13 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



GV40RA-15SV_A_DD

GVF13D
GVF13Y

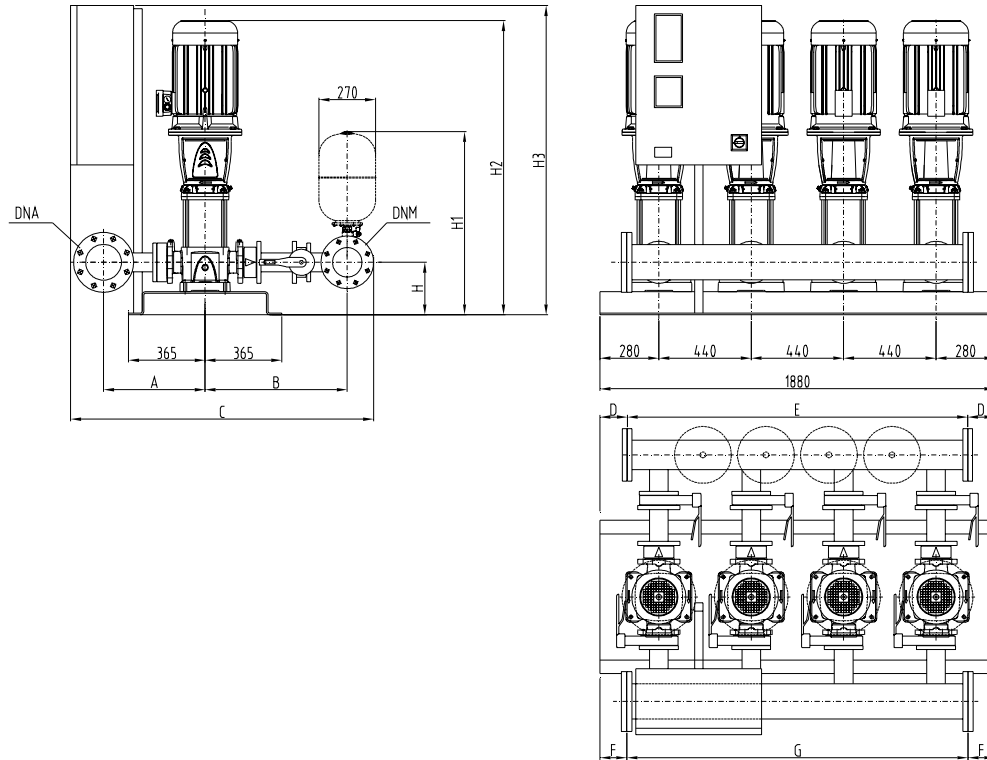
GVF13RA	DNA	DNM	A		B		C		D	E	F	G	H	H1	H2	H3
			STD/DW	AISI	STD/DW	AISI	STD/DW	AISI								
15SV02F022T	100	100	411	449	354	392	985	1061	1454	128	370	1365	170	777	787	1570
15SV03F030T	100	100	411	449	354	392	985	1061	1454	128	370	1365	170	777	845	1570
15SV04F040T	100	100	411	449	354	392	985	1061	1454	128	370	1365	170	777	914	1570
15SV05F040T	100	100	411	449	354	392	985	1061	1454	128	370	1365	170	777	962	1570
15SV06F055T	100	100	411	449	354	392	985	1061	1454	128	370	1365	170	777	1133	1570
15SV07F055T	100	100	411	449	354	392	985	1061	1454	128	370	1365	170	777	1181	1570
15SV08F075T	100	100	411	449	354	392	985	1061	1454	128	370	1365	170	777	1221	1820
15SV09F075T	100	100	411	449	354	392	985	1061	1454	128	370	1365	170	777	1269	1820
15SV10F110T	100	100	411	449	354	392	985	1061	1664	280	440	1880	200	807	1438	1820
22SV02F022T	125	100	424	462	354	392	1013	1089	1454	128	370	1365	170	777	787	1570
22SV03F030T	125	100	424	462	354	392	1013	1089	1454	128	370	1365	170	777	845	1570
22SV04F040T	125	100	424	462	354	392	1013	1089	1454	128	370	1365	170	777	914	1570
22SV05F055T	125	100	424	462	354	392	1013	1089	1454	128	370	1365	170	777	1085	1570
22SV06F075T	125	100	424	462	354	392	1013	1089	1454	128	370	1365	170	777	1125	1820
22SV07F075T	125	100	424	462	354	392	1013	1089	1454	128	370	1365	170	777	1173	1820
22SV08F110T	125	100	424	462	354	392	1013	1089	1664	280	440	1880	200	807	1342	1820
22SV09F110T	125	100	424	462	354	392	1013	1089	1664	280	440	1880	200	807	1390	1820
22SV10F110T	125	100	424	462	354	392	1013	1089	1664	280	440	1880	200	807	1438	1820

Dimensions in mm. Tolerance ± 10 mm.

gvf13ra_15sv-new-en_c_td

Note: for versions with vibration damping feet increase height by 30 mm.

**FOUR-PUMP BOOSTER SETS, GVF13 SERIES
VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE
ON DISCHARGE SIDE**



G5_G540-SV46_A_DD

**GVF13D
GVF13Y**

FOUR-PUMP BOOSTER SETS, GVF13 SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON DISCHARGE SIDE

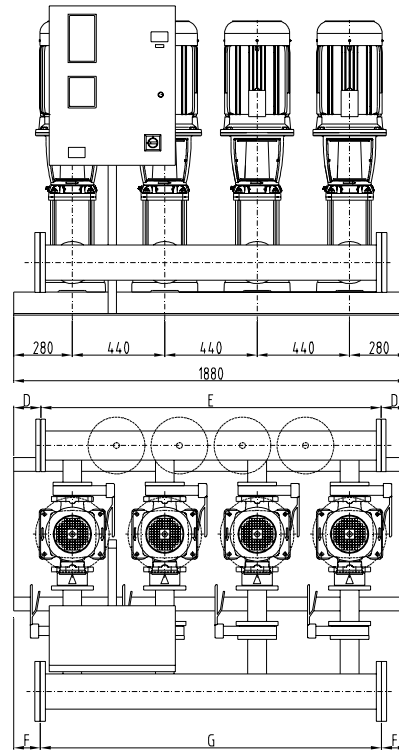
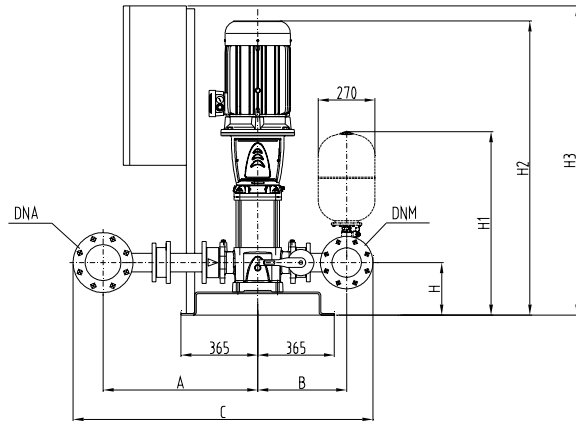
GVF13	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2	H3
33SV1/1AG022T	125	125	461	726	1451	110	1660	110	1660	215	835	897	1321
33SV1G030T	125	125	461	726	1451	110	1660	110	1660	215	835	897	1321
33SV2/2AG040T	125	125	461	726	1451	110	1660	110	1660	215	835	993	1321
33SV2/1AG040T	125	125	461	726	1451	110	1660	110	1660	215	835	993	1321
33SV2G055T	125	125	461	726	1451	110	1660	110	1660	215	835	1069	1321
33SV3/2AG055T	125	125	461	726	1451	110	1660	110	1660	215	835	1144	1321
33SV3/1AG075T	125	125	461	726	1451	110	1660	110	1660	215	835	1136	1821
33SV3G075T	125	125	461	726	1451	110	1660	110	1660	215	835	1136	1821
33SV4/2AG075T	125	125	461	726	1451	110	1660	110	1660	215	835	1211	1821
33SV4/1AG110T	125	125	461	726	1501	110	1660	110	1660	215	835	1307	1821
33SV4G110T	125	125	461	726	1501	110	1660	110	1660	215	835	1307	1821
33SV5/2AG110T	125	125	461	726	1501	110	1660	110	1660	215	835	1382	1821
33SV5/1AG110T	125	125	461	726	1501	110	1660	110	1660	215	835	1382	1821
33SV5G150T	125	125	461	726	1437	110	1660	110	1660	215	835	1448	1821
33SV6/2AG150T	125	125	461	726	1437	110	1660	110	1660	215	835	1523	1821
33SV6/1AG150T	125	125	461	726	1437	110	1660	110	1660	215	835	1523	1821
33SV6G150T	125	125	461	726	1437	110	1660	110	1660	215	835	1523	1821
33SV7/2AG150T	125	125	461	726	1437	110	1660	110	1660	215	835	1598	1821
46SV1/1AG030T	150	150	498	766	1548	90	1700	90	1700	250	884	937	1321
46SV1G040T	150	150	498	766	1548	90	1700	90	1700	250	884	958	1321
46SV2/2AG055T	150	150	498	766	1548	90	1700	90	1700	250	884	1109	1321
46SV2G075T	150	150	498	766	1548	90	1700	90	1700	250	884	1101	1821
46SV3/2AG110T	150	150	498	766	1558	90	1700	90	1700	250	884	1272	1821
46SV3G110T	150	150	498	766	1558	90	1700	90	1700	250	884	1272	1821
46SV4/2AG150T	150	150	498	766	1548	90	1700	90	1700	250	884	1413	1821
46SV4G150T	150	150	498	766	1548	90	1700	90	1700	250	884	1413	1821
66SV1/1AG040T	200	200	529	819	1688	90	1700	90	1700	250	910	983	1321
66SV1G055T	200	200	529	819	1688	90	1700	90	1700	250	910	1059	1321
66SV2/2AG075T	200	200	529	819	1688	90	1700	90	1700	250	910	1141	1821
66SV2/1AG110T	200	200	529	819	1688	90	1700	90	1700	250	910	1237	1821
66SV2G110T	200	200	529	819	1688	90	1700	90	1700	250	910	1237	1821
66SV3/2AG150T	200	200	529	819	1688	90	1700	90	1700	250	910	1393	1821
66SV3/1AG150T	200	200	529	819	1688	90	1700	90	1700	250	910	1393	1821
92SV1/1AG055T	250	200	556	819	1748	90	1700	60	1760	250	910	1059	1321
92SV1G075T	250	200	556	819	1748	90	1700	60	1760	250	910	1051	1821
92SV2/2AG110T	250	200	556	819	1748	90	1700	60	1760	250	910	1237	1821
92SV2G150T	250	200	556	819	1748	90	1700	60	1760	250	910	1303	1821

Note: for versions with vibration damping feet increase height by 50 mm.

gvf13_sv46-en_b_td

**GVF13D
GVF13Y**

FOUR-PUMP BOOSTER SETS, GVF13 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



G5_G540RA-SV46_A_DD

GVF13D
GVF13Y

FOUR-PUMP BOOSTER SETS, GVF13 RA SERIES VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE ON SUCTION SIDE

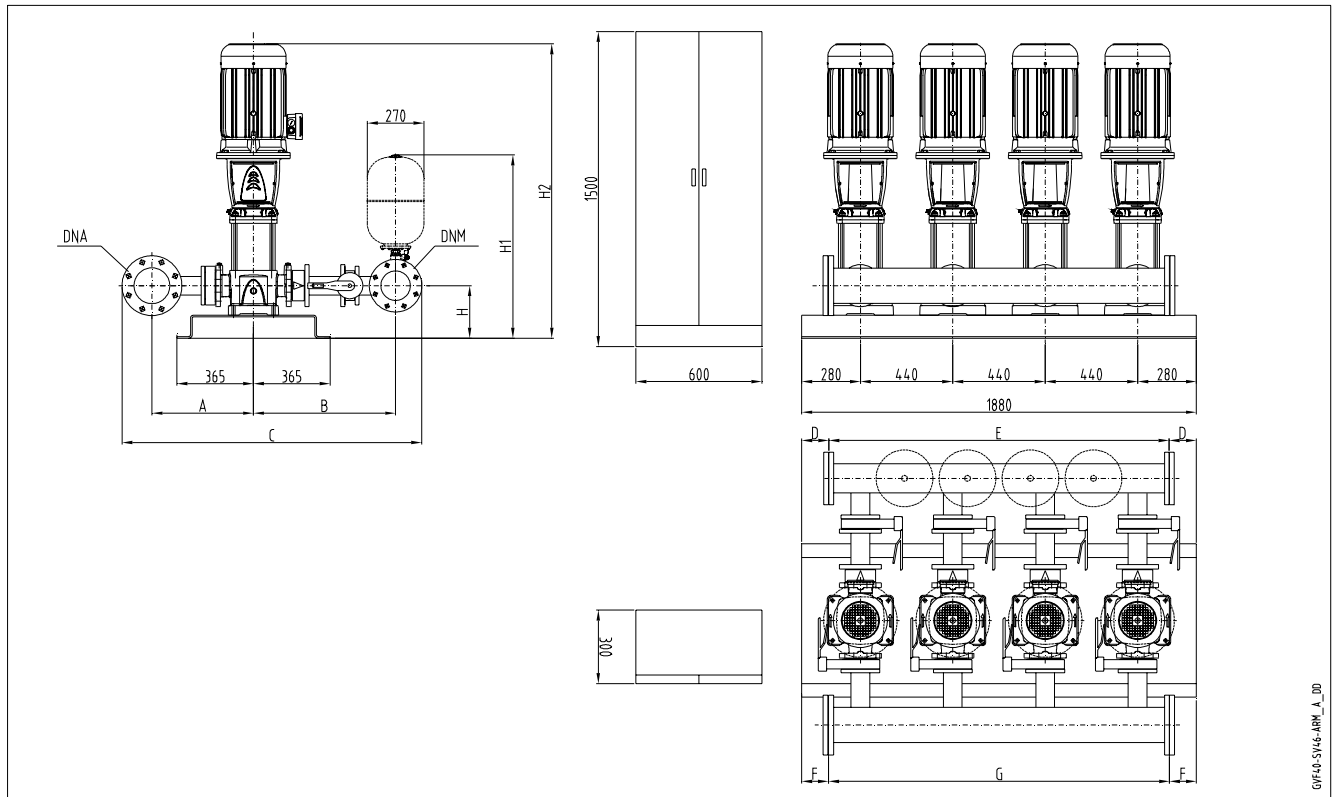
GVF13RA	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2	H3
33SV1/1AG022T	125	125	726	461	1437	110	1660	110	1660	215	835	897	1321
33SV1G030T	125	125	726	461	1437	110	1660	110	1660	215	835	897	1321
33SV2/2AG040T	125	125	726	461	1437	110	1660	110	1660	215	835	993	1321
33SV2/1AG040T	125	125	726	461	1437	110	1660	110	1660	215	835	993	1321
33SV2G055T	125	125	726	461	1437	110	1660	110	1660	215	835	1069	1321
33SV3/2AG055T	125	125	726	461	1437	110	1660	110	1660	215	835	1144	1321
33SV3/1AG075T	125	125	726	461	1437	110	1660	110	1660	215	835	1136	1821
33SV3G075T	125	125	726	461	1437	110	1660	110	1660	215	835	1136	1821
33SV4/2AG075T	125	125	726	461	1437	110	1660	110	1660	215	835	1211	1821
33SV4/1AG110T	125	125	726	461	1437	110	1660	110	1660	215	835	1307	1821
33SV4G110T	125	125	726	461	1437	110	1660	110	1660	215	835	1307	1821
33SV5/2AG110T	125	125	726	461	1437	110	1660	110	1660	215	835	1382	1821
33SV5/1AG110T	125	125	726	461	1437	110	1660	110	1660	215	835	1382	1821
33SV5G150T	125	125	726	461	1437	110	1660	110	1660	215	835	1448	1821
33SV6/2AG150T	125	125	726	461	1437	110	1660	110	1660	215	835	1523	1821
33SV6/1AG150T	125	125	726	461	1437	110	1660	110	1660	215	835	1523	1821
33SV6G150T	125	125	726	461	1437	110	1660	110	1660	215	835	1523	1821
33SV7/2AG150T	125	125	726	461	1437	110	1660	110	1660	215	835	1598	1821
46SV1/1AG030T	150	150	766	498	1548	90	1700	90	1700	250	884	937	1321
46SV1G040T	150	150	766	498	1548	90	1700	90	1700	250	884	958	1321
46SV2/2AG055T	150	150	766	498	1548	90	1700	90	1700	250	884	1109	1321
46SV2G075T	150	150	766	498	1548	90	1700	90	1700	250	884	1101	1821
46SV3/2AG110T	150	150	766	498	1548	90	1700	90	1700	250	884	1272	1821
46SV3G110T	150	150	766	498	1548	90	1700	90	1700	250	884	1272	1821
46SV4/2AG150T	150	150	766	498	1548	90	1700	90	1700	250	884	1413	1821
46SV4G150T	150	150	766	498	1548	90	1700	90	1700	250	884	1413	1821
66SV1/1AG040T	200	200	819	529	1688	90	1700	90	1700	250	910	983	1321
66SV1G055T	200	200	819	529	1688	90	1700	90	1700	250	910	1059	1321
66SV2/2AG075T	200	200	819	529	1688	90	1700	90	1700	250	910	1141	1821
66SV2/1AG110T	200	200	819	529	1688	90	1700	90	1700	250	910	1237	1821
66SV2G110T	200	200	819	529	1688	90	1700	90	1700	250	910	1237	1821
66SV3/2AG150T	200	200	819	529	1688	90	1700	90	1700	250	910	1393	1821
66SV3/1AG150T	200	200	819	529	1688	90	1700	90	1700	250	910	1393	1821
92SV1/1AG055T	250	200	846	529	1748	90	1700	60	1760	250	910	1059	1321
92SV1G075T	250	200	846	529	1748	90	1700	60	1760	250	910	1051	1821
92SV2/2AG110T	250	200	846	529	1748	90	1700	60	1760	250	910	1237	1821
92SV2G150T	250	200	846	529	1748	90	1700	60	1760	250	910	1303	1821

Note: for versions with vibration damping feet increase height by 50 mm.

gvf13ra_sv46-en_b_td

GVF13D
GVF13Y

FOUR-PUMP BOOSTER SETS, GVF13 SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON DISCHARGE SIDE**



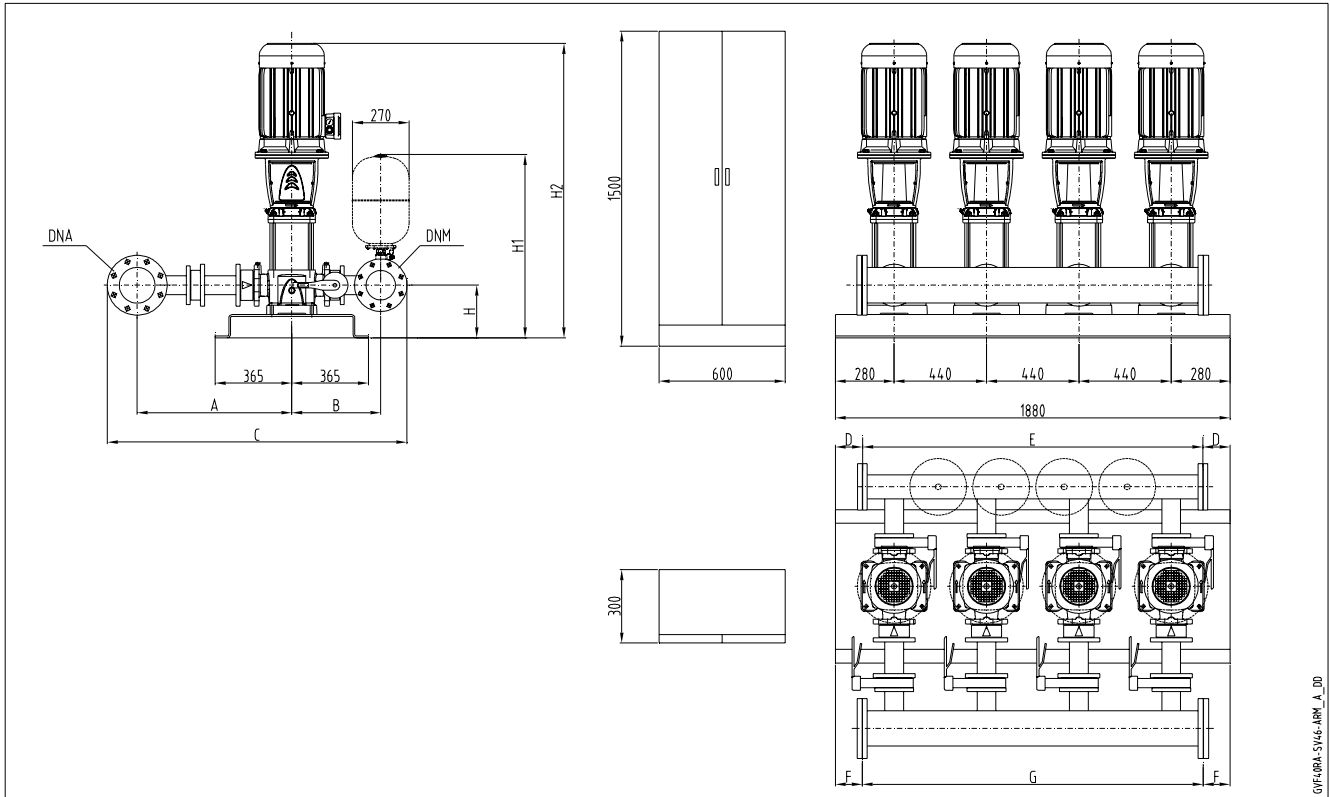
GVF13-SV46-ARM_A_3D

GVF13	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2
46SV5/2AG185T	150	150	498	766	1548	90	1700	90	1700	250	884	1488
46SV5G185T	150	150	498	766	1548	90	1700	90	1700	250	884	1488
46SV6/2AG220T	150	150	498	766	1548	90	1700	90	1700	250	884	1563
46SV6G220T	150	150	498	766	1548	90	1700	90	1700	250	884	1563
66SV3G185T	200	200	529	819	1688	90	1700	90	1700	250	910	1393
66SV4/2AG185T	200	200	529	819	1688	90	1700	90	1700	250	910	1483
66SV4/1AG220T	200	200	529	819	1688	90	1700	90	1700	250	910	1483
66SV4G220T	200	200	529	819	1688	90	1700	90	1700	250	910	1483
92SV3/2AG185T	250	200	556	819	1748	90	1700	60	1760	250	910	1393
92SV3G220T	250	200	556	819	1748	90	1700	60	1760	250	910	1393

Note: for versions with vibration damping fit increase height by 50 mm.

gvf13_sv46-arm-en_a_td

FOUR-PUMP BOOSTER SETS, GVF13 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



GVF13RA-SV46-ARM_A_00

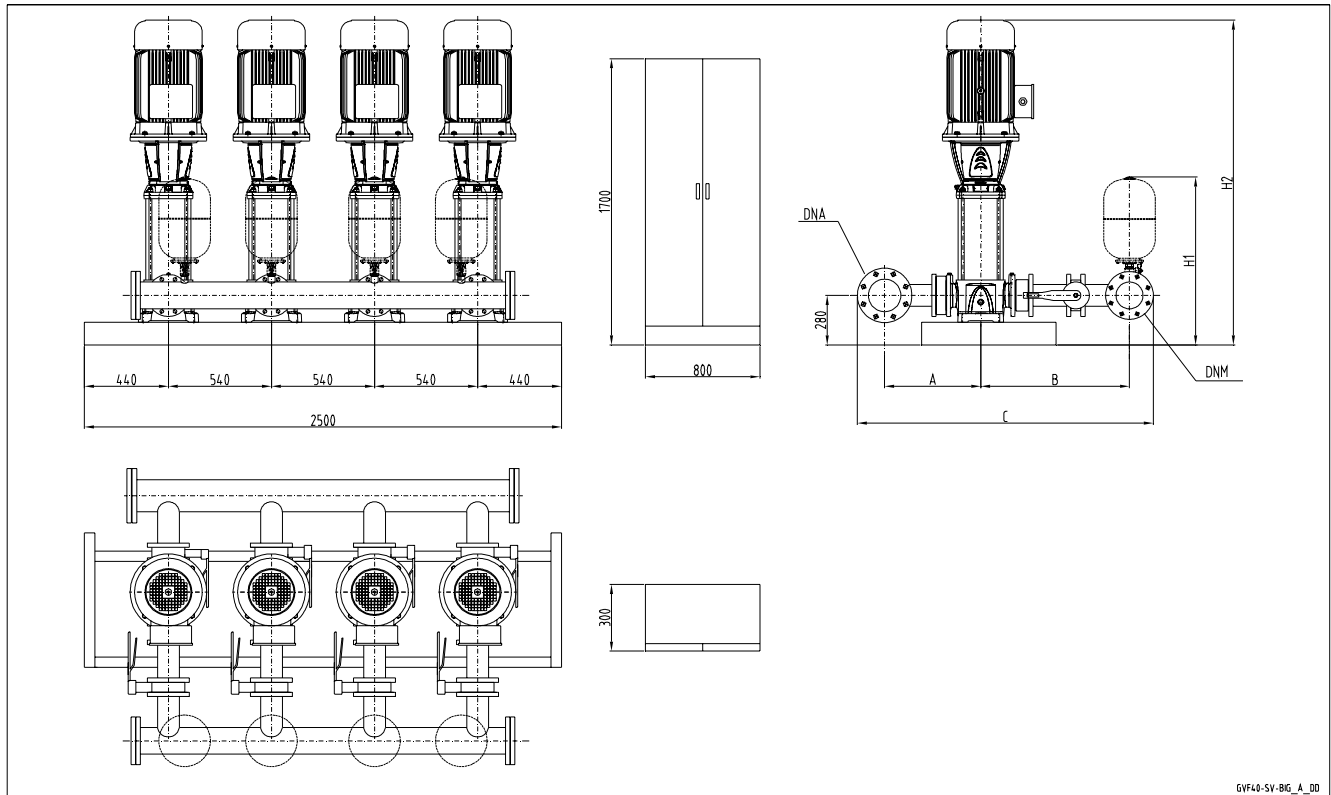
GVF13D
GVF13Y

GVF13RA	DNA	DNM	A	B	C	D	E	F	G	H	H1	H2
46SV5/2AG185T	150	150	766	498	1548	90	1700	90	1700	250	884	1488
46SV5G185T	150	150	766	498	1548	90	1700	90	1700	250	884	1488
46SV6/2AG220T	150	150	766	498	1548	90	1700	90	1700	250	884	1563
46SV6G220T	150	150	766	498	1548	90	1700	90	1700	250	884	1563
66SV3G185T	200	200	819	529	1688	90	1700	90	1700	250	910	1393
66SV4/2AG185T	200	200	819	529	1688	90	1700	90	1700	250	910	1483
66SV4/1AG220T	200	200	819	529	1688	90	1700	90	1700	250	910	1483
66SV4G220T	200	200	819	529	1688	90	1700	90	1700	250	910	1483
92SV3/2AG185T	250	200	846	529	1748	90	1700	60	1760	250	910	1393
92SV3G220T	250	200	846	529	1748	90	1700	60	1760	250	910	1393

Note: for versions with vibration damping fit increase height by 50 mm.

gvf13ra_sv46-arm-en_a_td

FOUR-PUMP BOOSTER SETS, GVF13 SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON DISCHARGE SIDE**



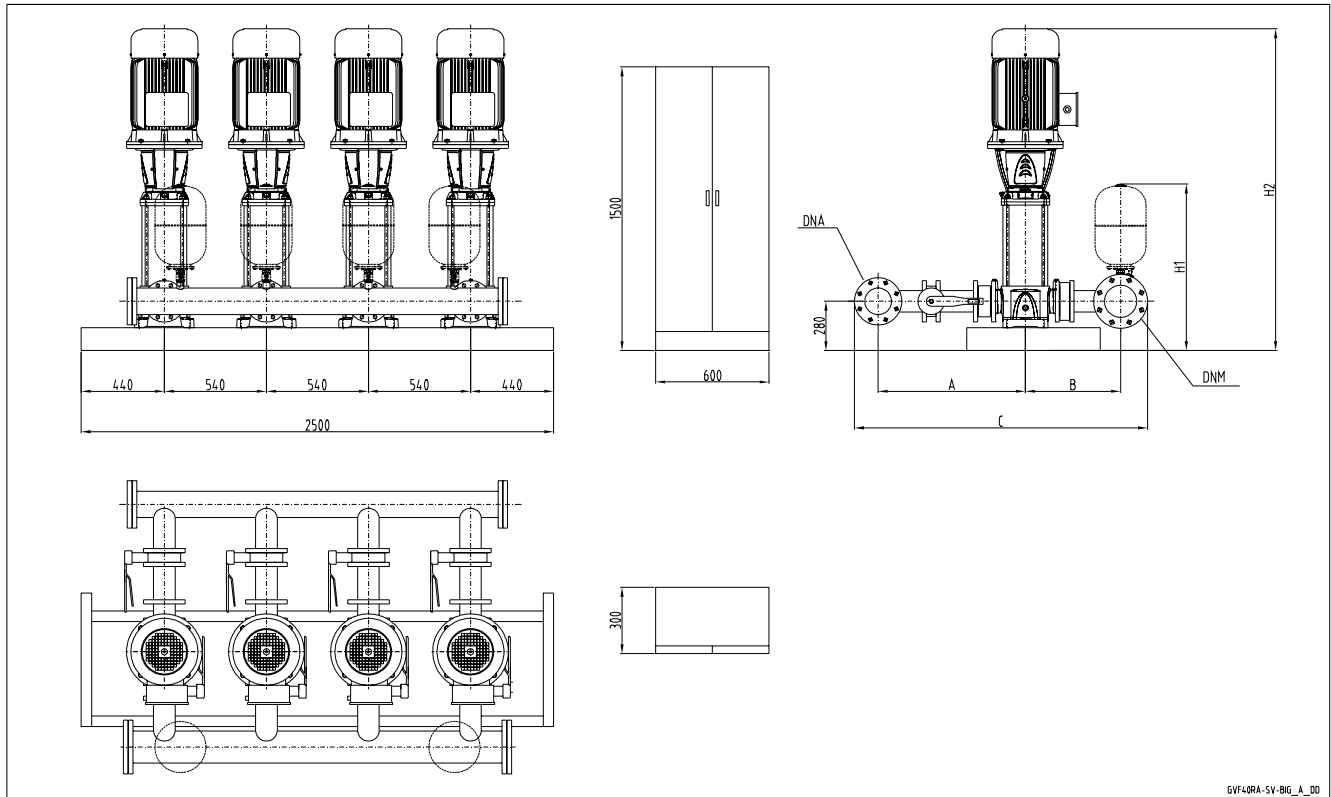
GVF13-SV-BG_A_00

GVF13	DNA	DNM	A	B	C	H1	H2
66SV5/2AG300T	200	200	529	819	1635	914	1766
66SV5/1AG300T	200	200	529	819	1635	914	1766
66SV5G300T	200	200	529	819	1635	914	1766
92SV4/2AG300T	250	200	556	819	1688	940	1676
92SV4G300T	250	200	556	819	1688	940	1676
92SV5/2AG370T	250	200	556	819	1688	940	1766

Note: for versions with vibration damping fit increase height by 50 mm.

gvf13_sv-big-en_b_td

FOUR-PUMP BOOSTER SETS, GVF13 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



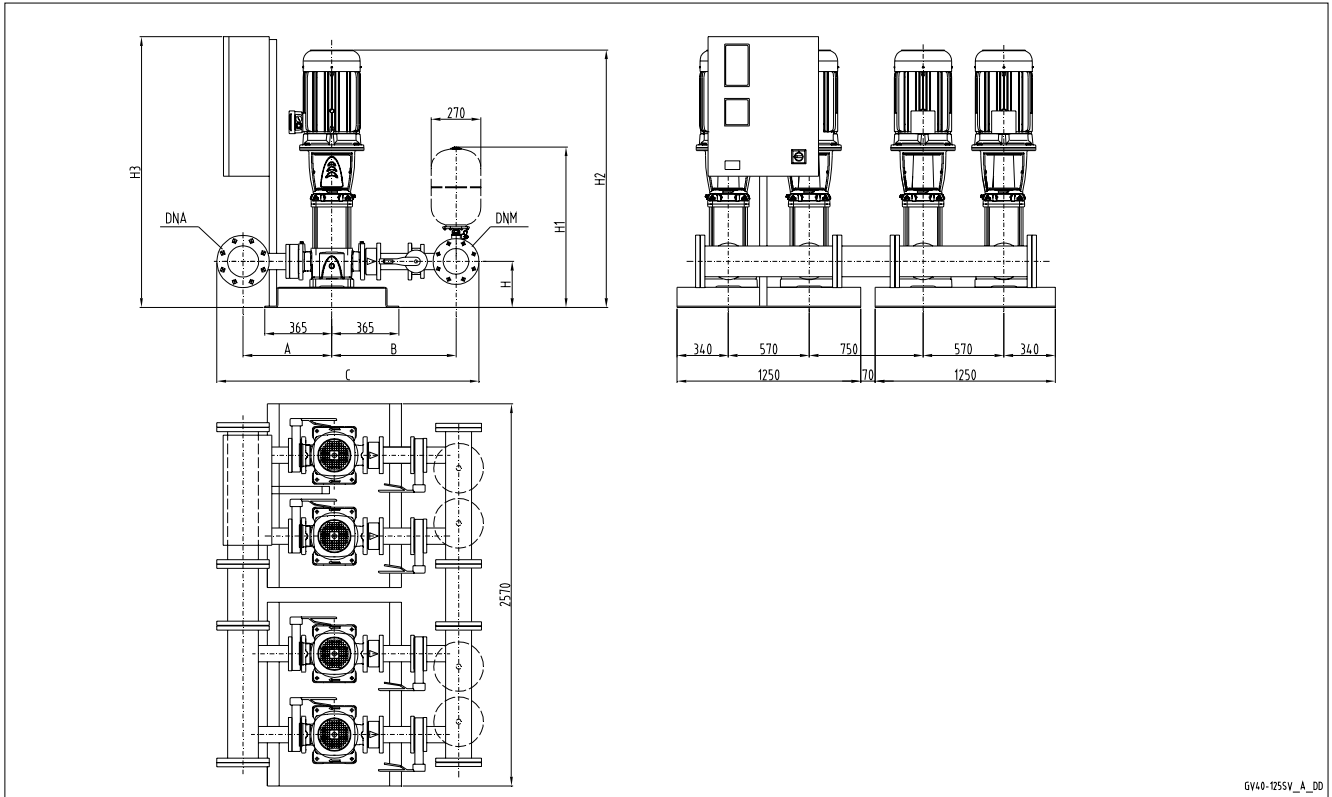
GVF13D
GVF13Y

GVF13RA	DNA	DNM	A	B	C	H1	H2
66SV5/2AG300T	200	200	819	529	1688	914	1766
66SV5/1AG300T	200	200	819	529	1688	914	1766
66SV5G300T	200	200	819	529	1688	914	1766
92SV4/2AG300T	250	200	846	529	1748	940	1676
92SV4G300T	250	200	846	529	1748	940	1676
92SV5/2AG370T	250	200	846	529	1748	940	1766

Note: for versions with vibration damping fit increase height by 50 mm.

gvf13ra_sv-big-en_b_td

FOUR-PUMP BOOSTER SETS, GVF13 SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON DISCHARGE SIDE**



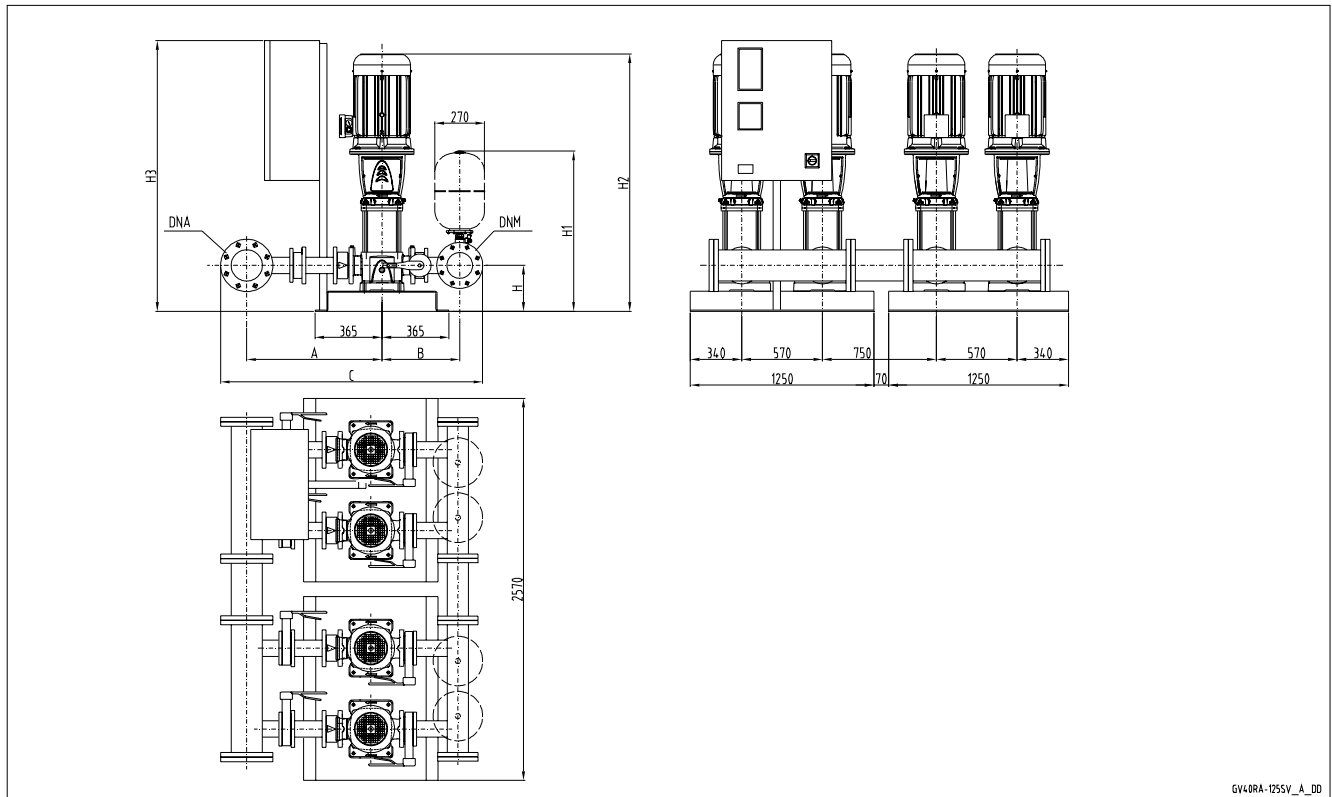
GVF13-125SV_A_DD

GVF13	DNA	DNM	A	B	C	H	H1	H2	H3
125SV1G075T	300	250	643	954	2029	280	967	1180	1822
125SV2G150T	300	250	643	954	2029	280	967	1492	1822

Note: for versions with vibration damping fit increase height by 50 mm.

gvf13_125sv-en_a_dd

FOUR-PUMP BOOSTER SETS, GVF13 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



GV40RA-125SV_A_DD

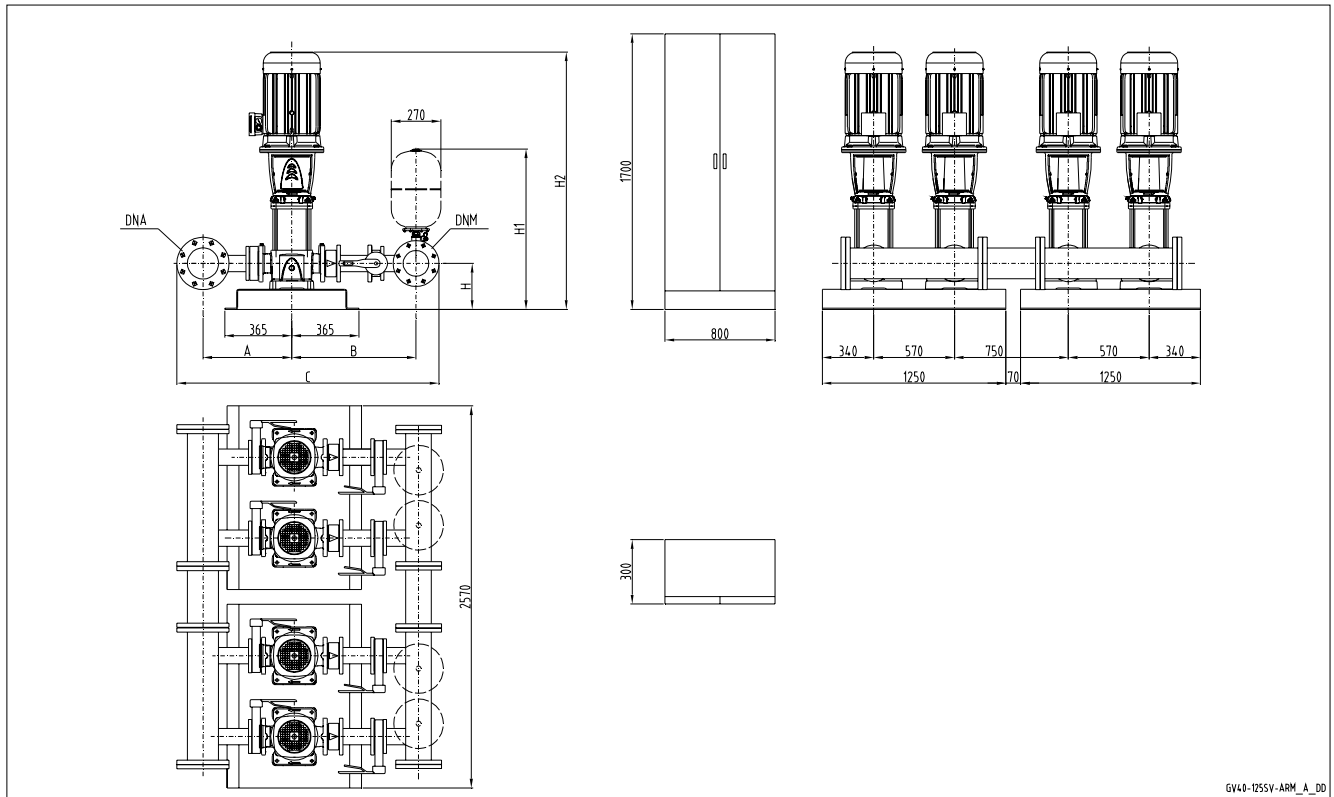
GVF13D
GVF13Y

GVF13RA	DNA	DNM	A	B	C	H	H1	H2	H3
125SV1G075T	300	250	979	618	2029	280	967	1180	1822
125SV2G150T	300	250	979	618	2029	280	967	1492	1822

Note: for versions with vibration damping fit increase height by 50 mm.

gvf13ra_125sv-en_a_td

FOUR-PUMP BOOSTER SETS, GVF13 SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON DISCHARGE SIDE**

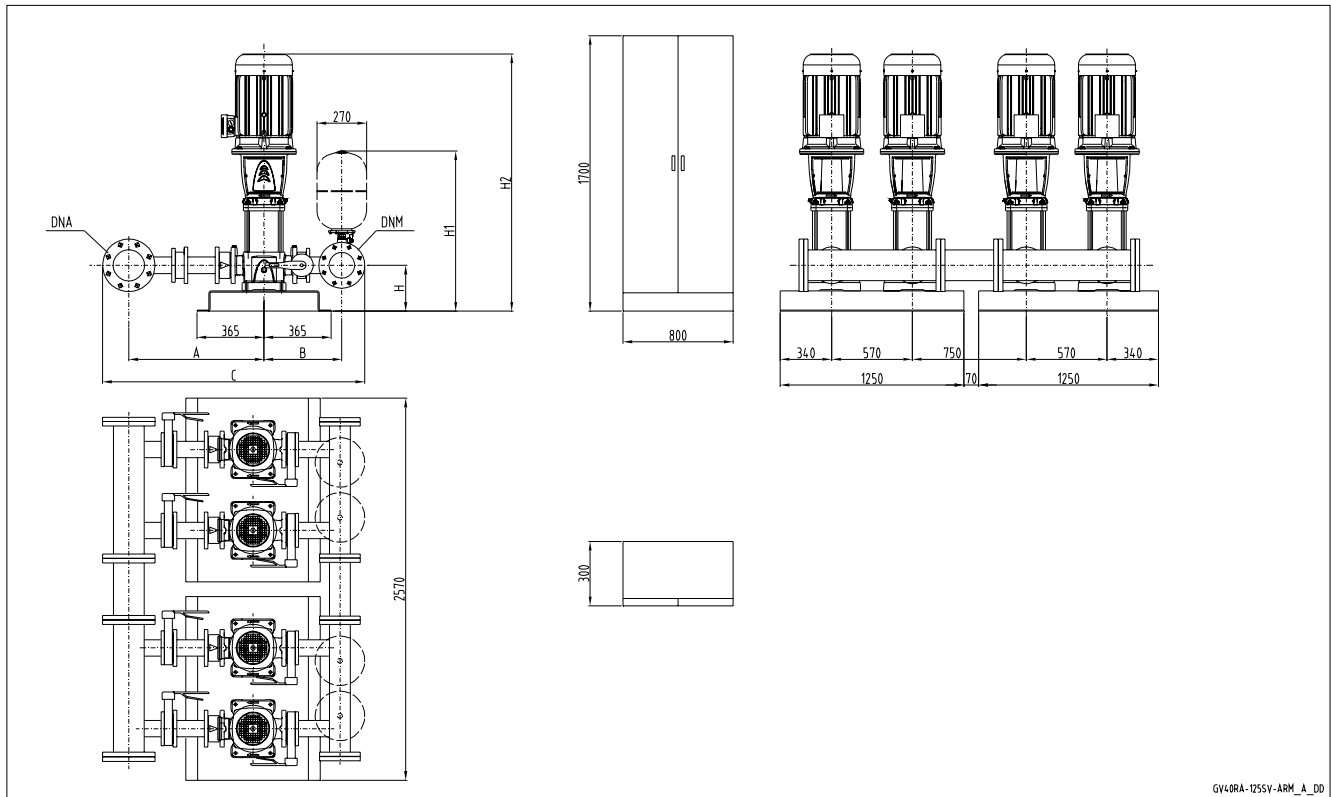


GVF13	DNA	DNM	A	B	C	H	H1	H2
125SV3G220T	300	250	643	954	2029	280	967	1642

Note: for versions with vibration damping fit increase height by 50 mm.

gvf13_125sv-arm-en_a_td

FOUR-PUMP BOOSTER SETS, GVF13 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



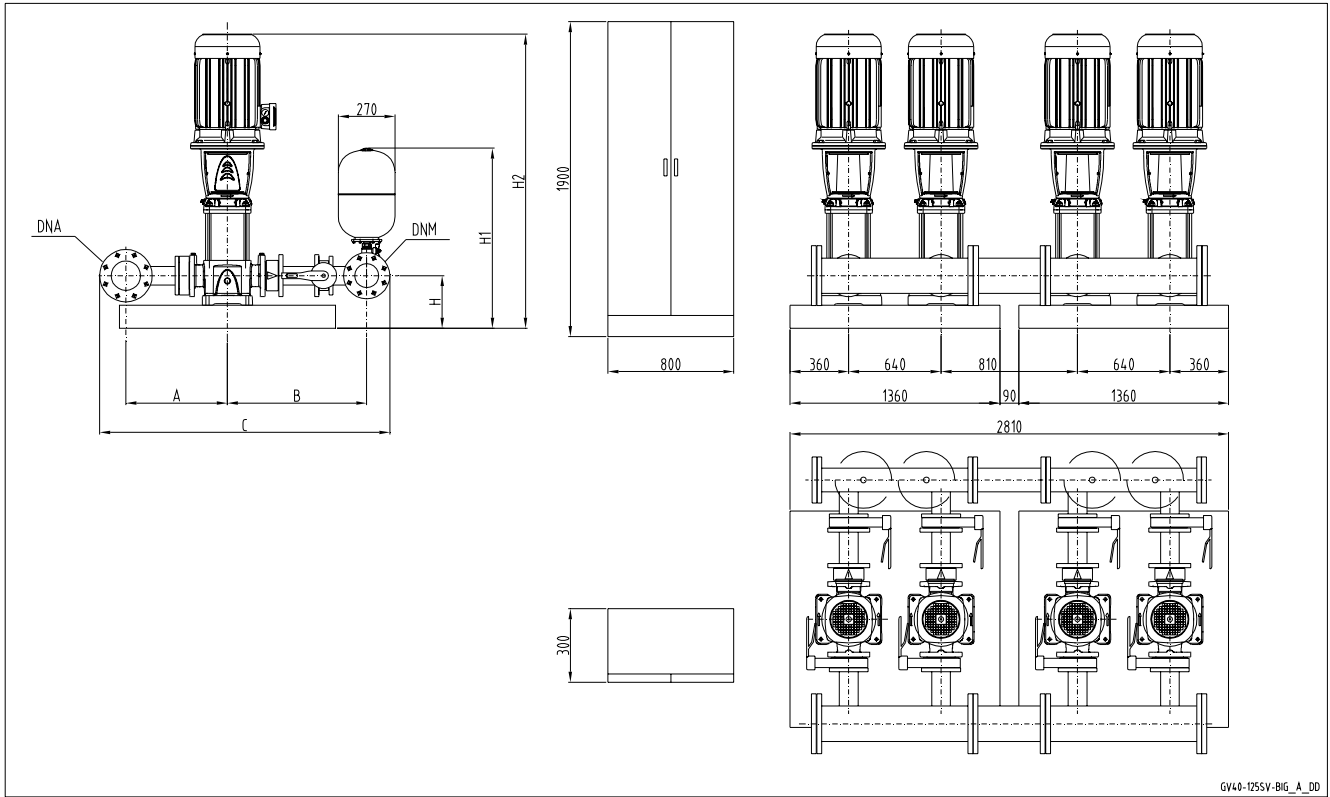
GVF13D
GVF13Y

GVF13RA	DNA	DNM	A	B	C	H	H1	H2
125SV3G220T	300	250	979	618	2029	280	967	1642

Note: for versions with vibration damping fit increase height by 50 mm.

gvf13ra_125sv-arm-en_a_td

FOUR-PUMP BOOSTER SETS, GVF13 SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON DISCHARGE SIDE**

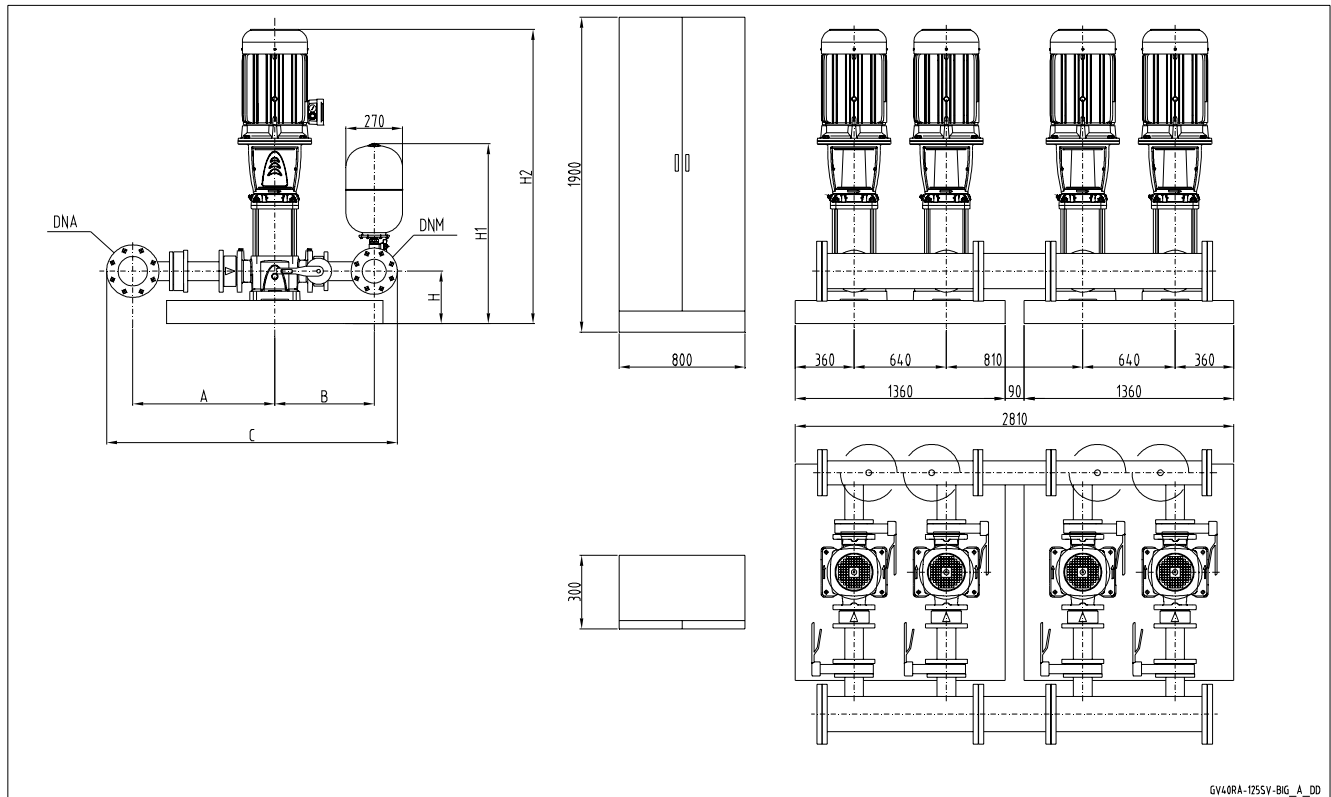


GVF13	DNA	DNM	A	B	C	H	H1	H2
125SV4G300T	300	250	643	954	2029	300	987	1975
125SV5G370T	300	250	643	954	2029	300	987	2125

Note: for versions with vibration damping fit increase height by 50 mm.

gvf13_125sv-big-en_a_td

FOUR-PUMP BOOSTER SETS, GVF13 RA SERIES **VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE** **ON SUCTION SIDE**



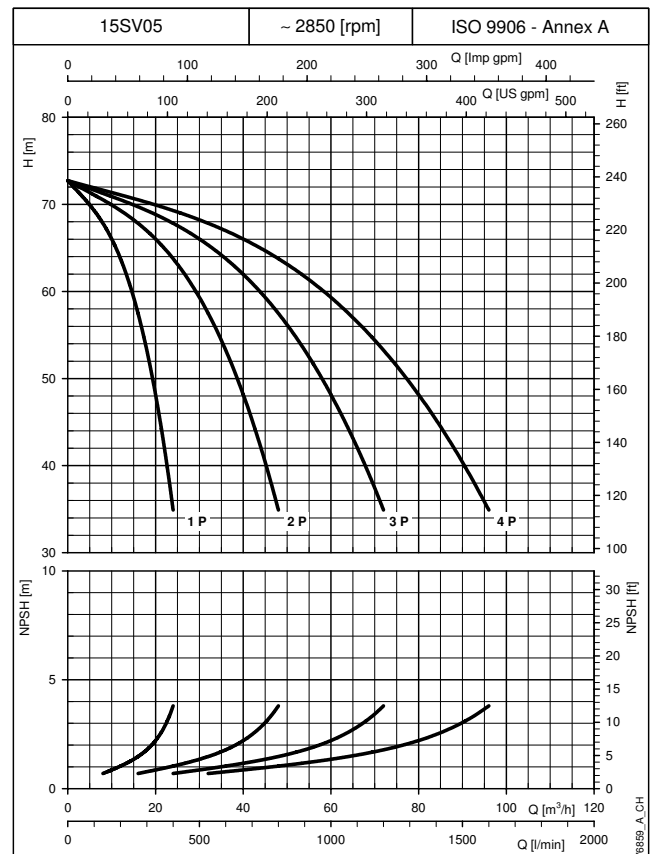
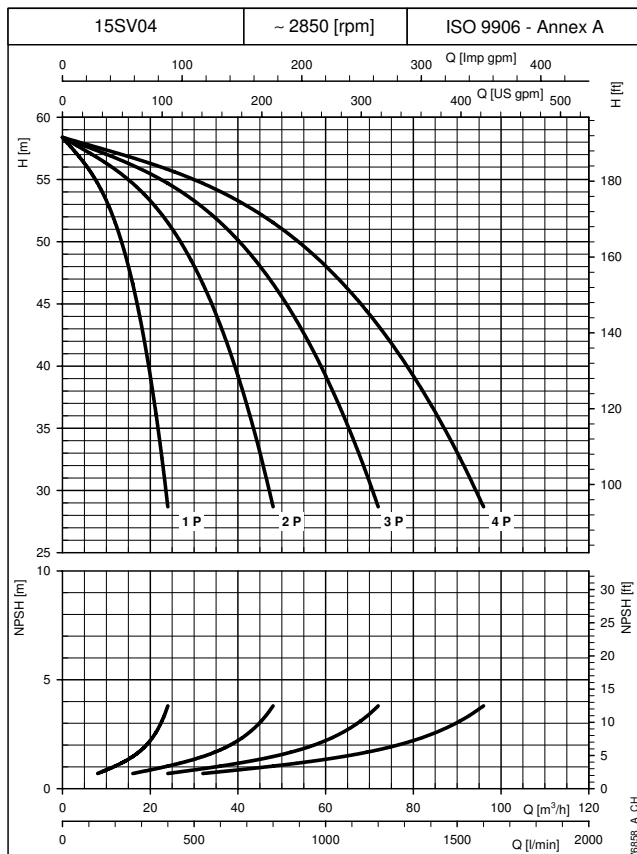
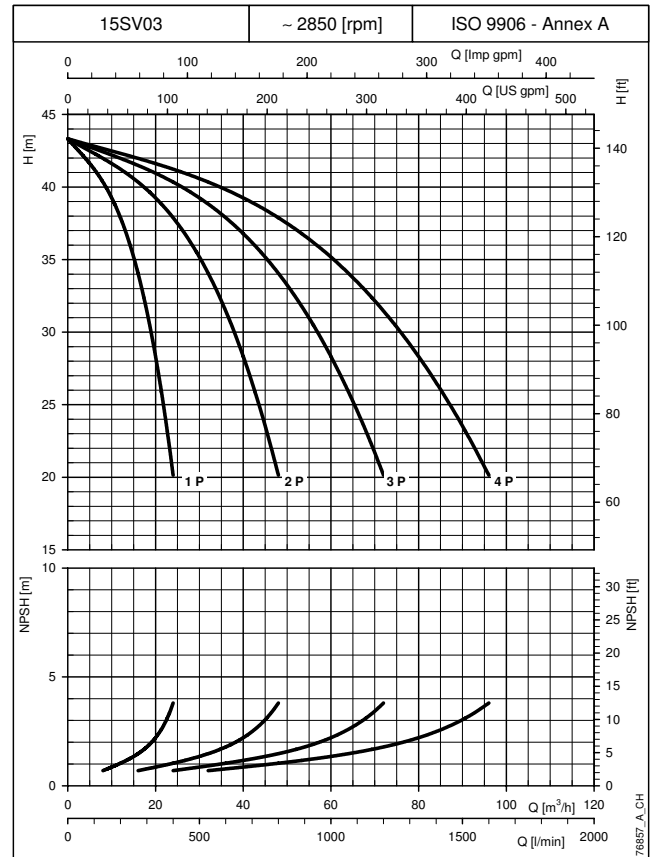
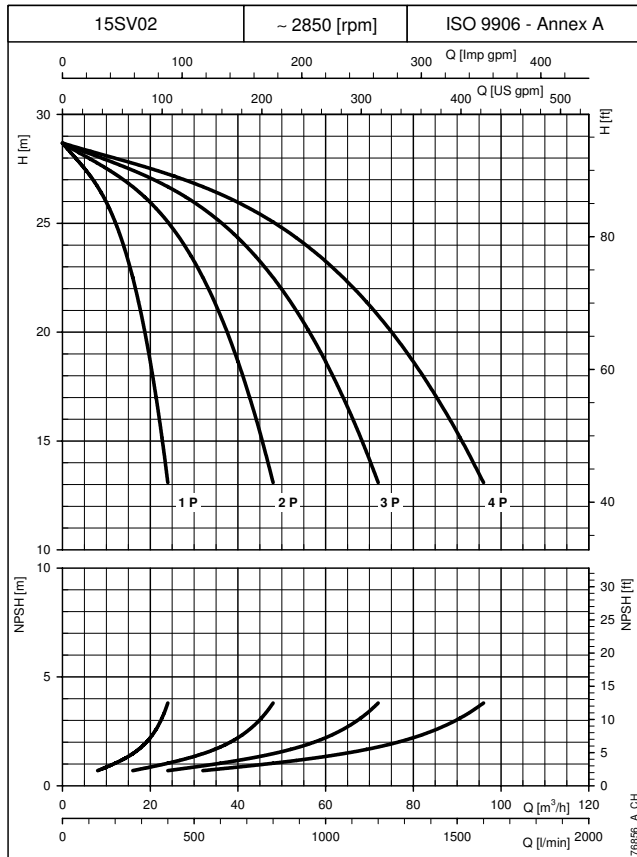
GVF13D
GVF13Y

GVF13RA	DNA	DNM	A	B	C	H	H1	H2
125SV4G300T	300	250	979	618	2029	300	987	1975
125SV5G370T	300	250	979	618	2029	300	987	2125

Note: for versions with vibration damping fit increase height by 50 mm.

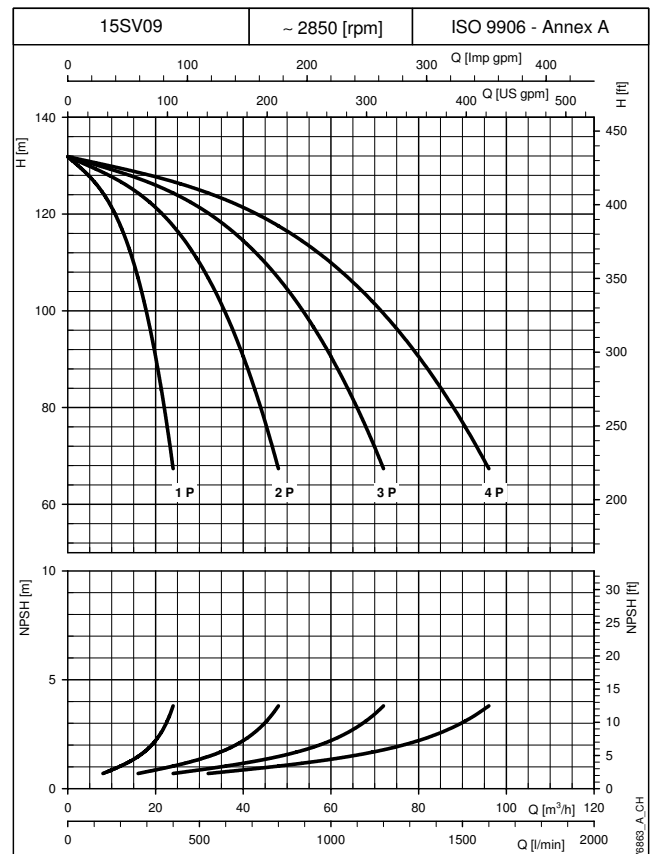
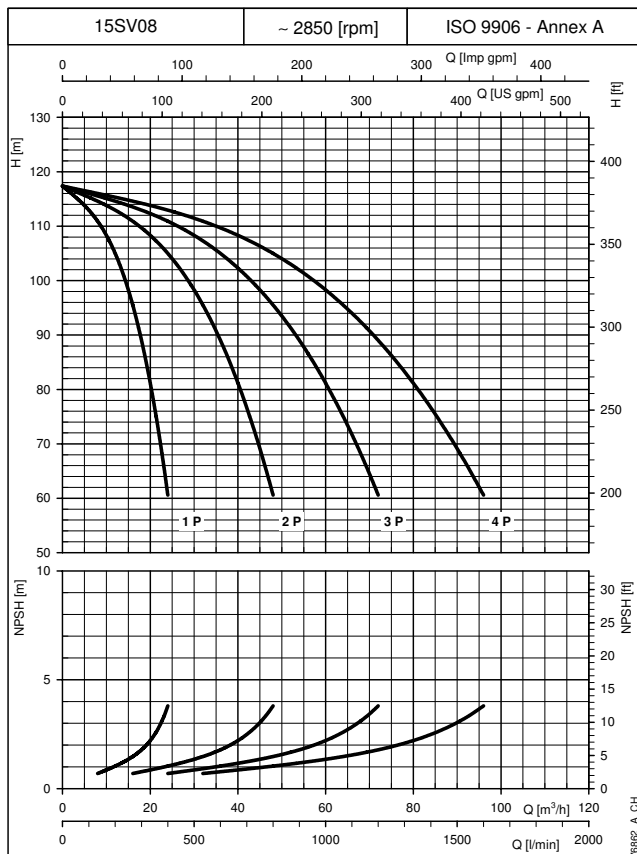
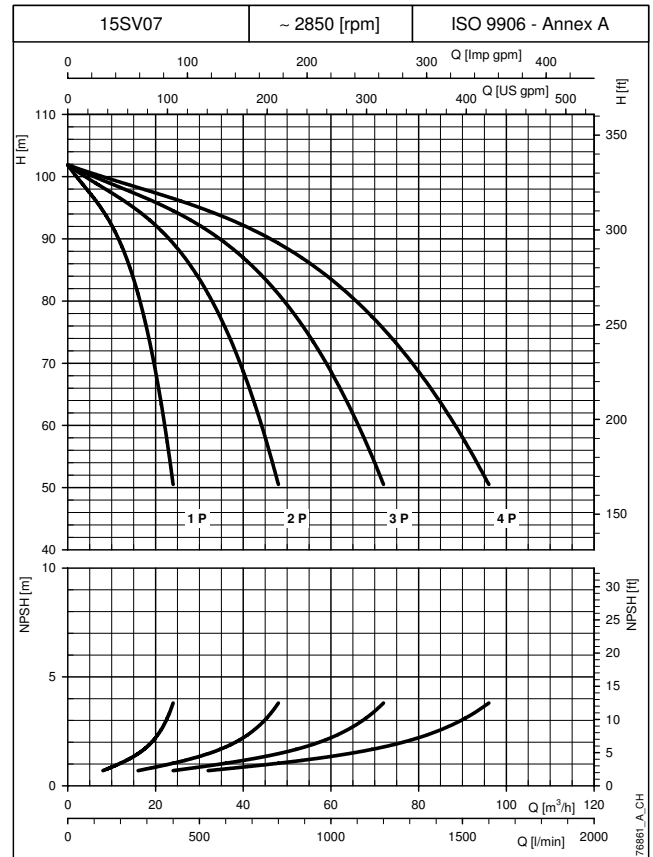
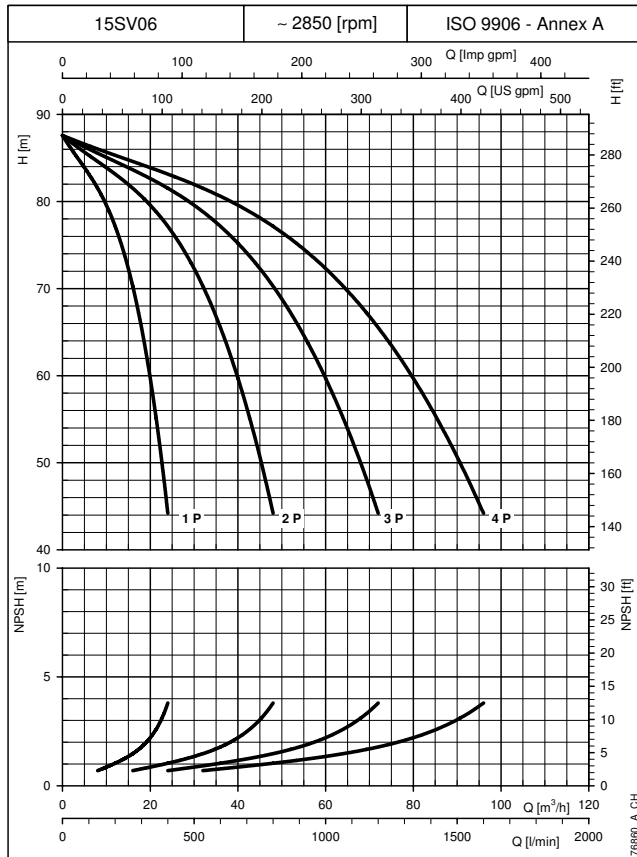
gvf13ra_125sv-big-en_a_td

BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



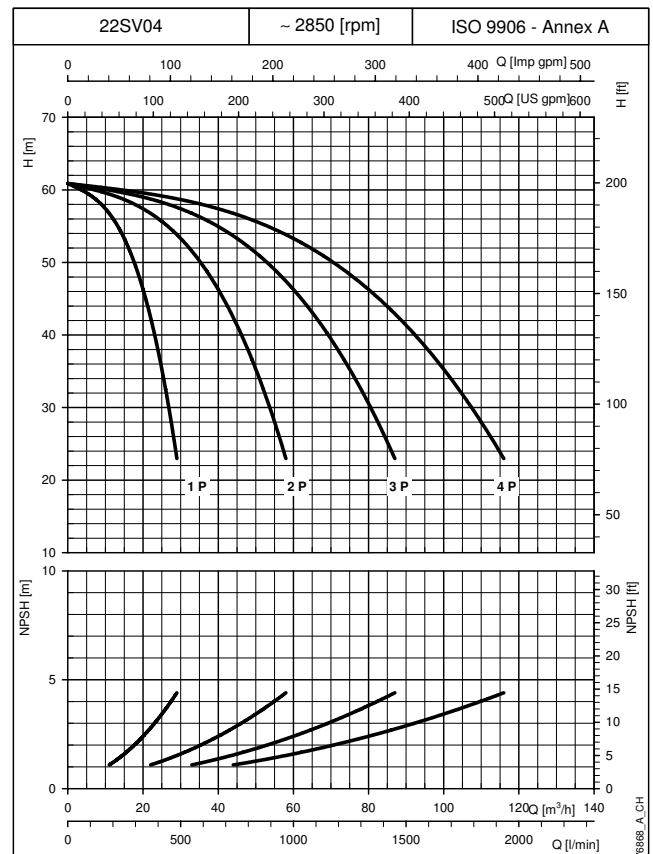
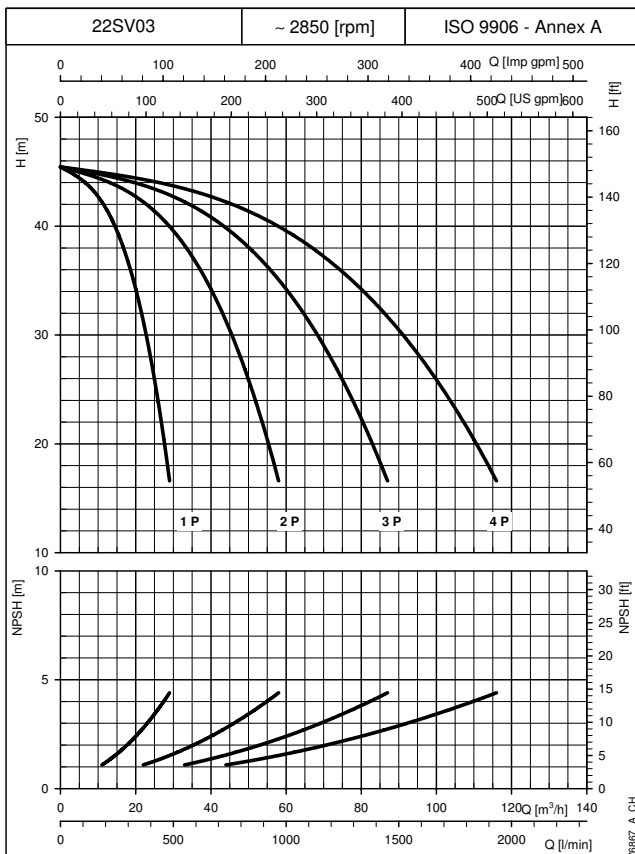
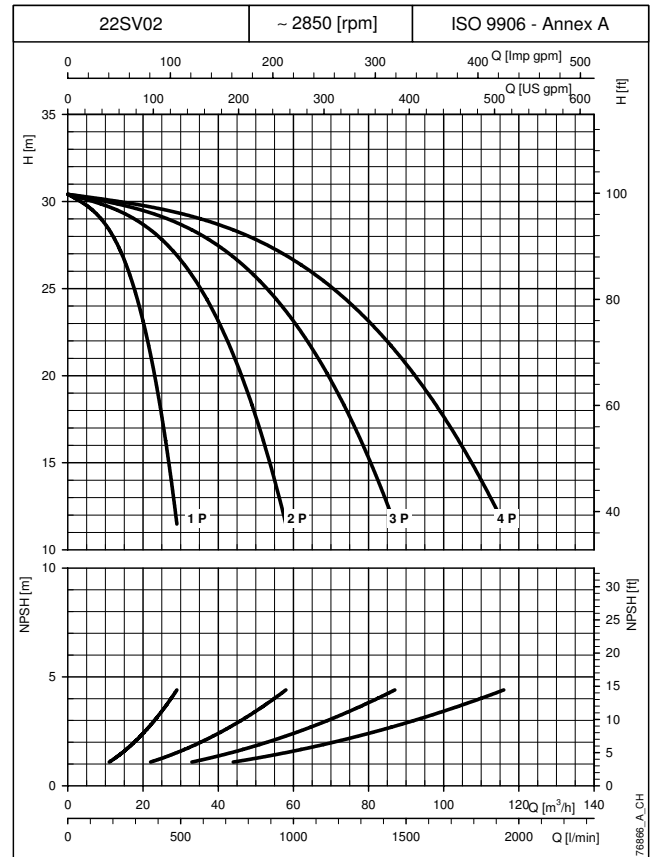
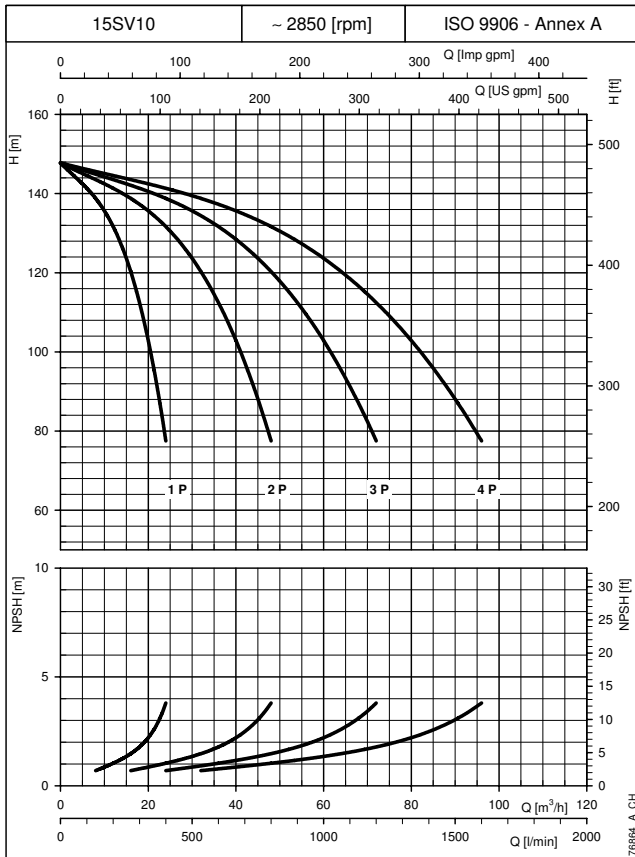
The performance curves do not take into account flow resistance in the valves and piping.
The curves show the performance with one, two, three and four pumps running.
These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.
The declared NPSH values are laboratory values: for practical use we recommend increasing these values by 0.5 m.

BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



The performance curves do not take into account flow resistance in the valves and piping.
The curves show the performance with one, two, three and four pumps running.
These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.
The declared NPSH values are laboratory values: for practical use we recommend increasing these values by 0.5 m.

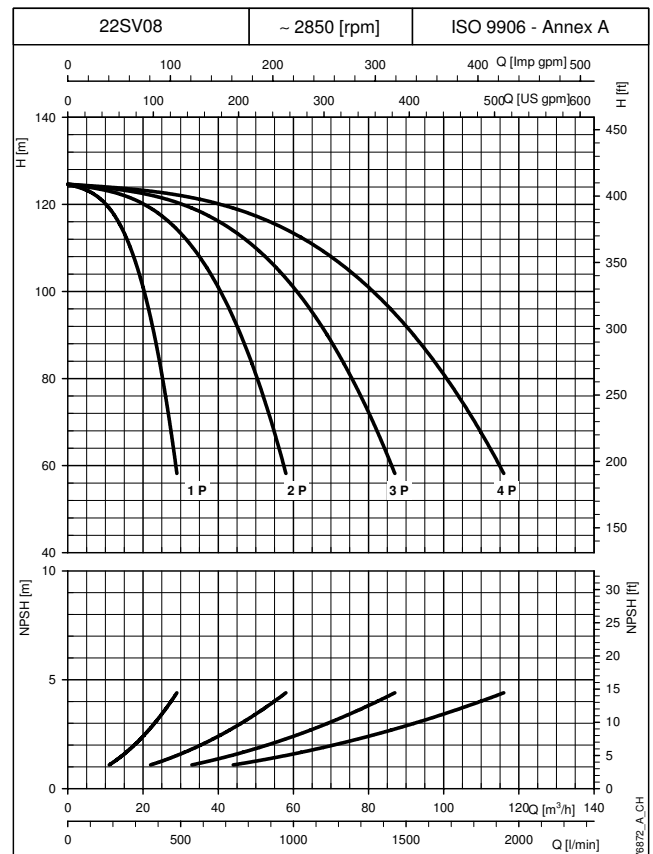
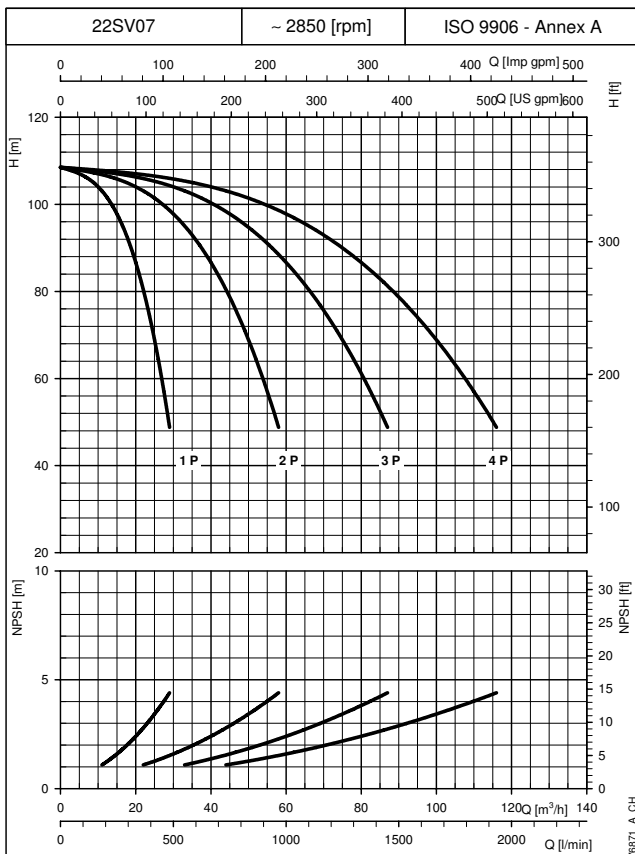
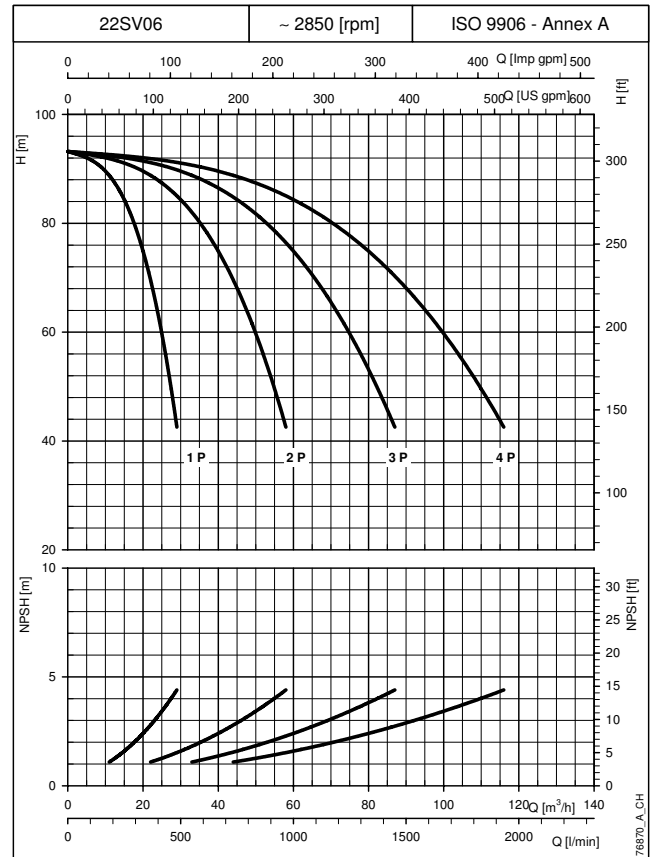
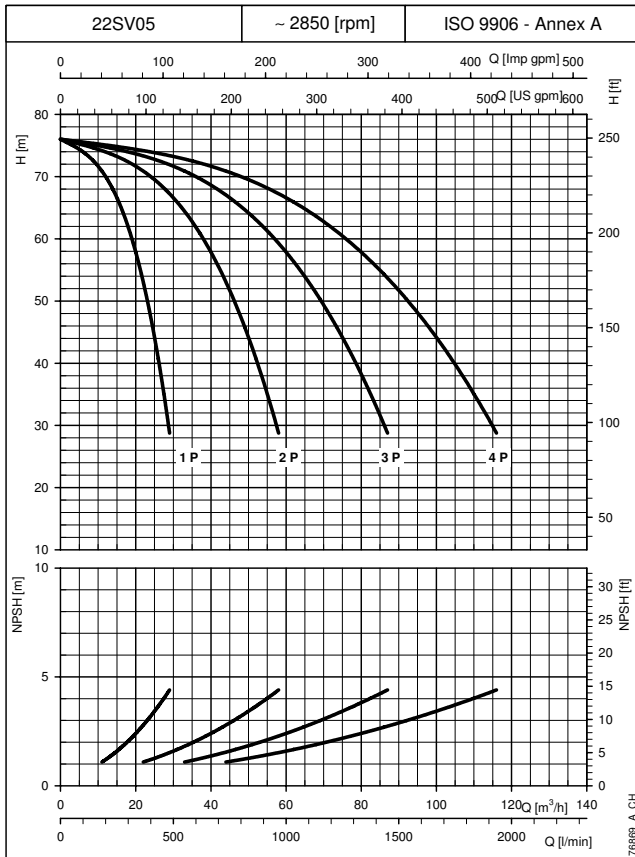
BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



CURVES

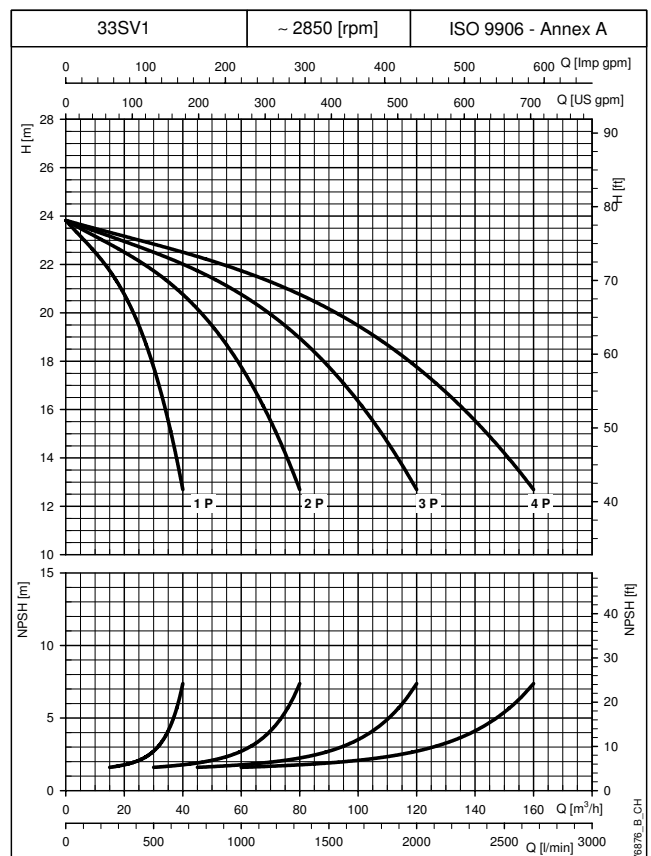
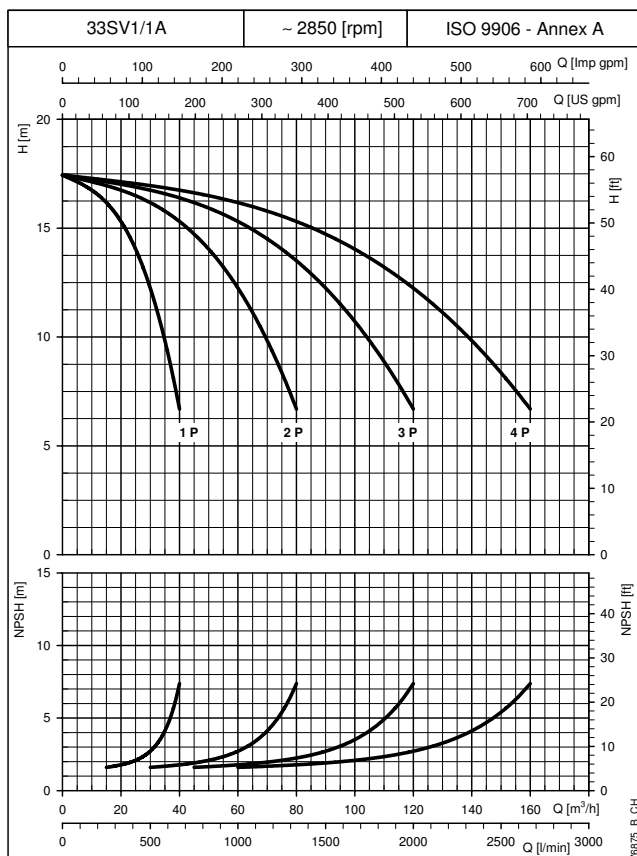
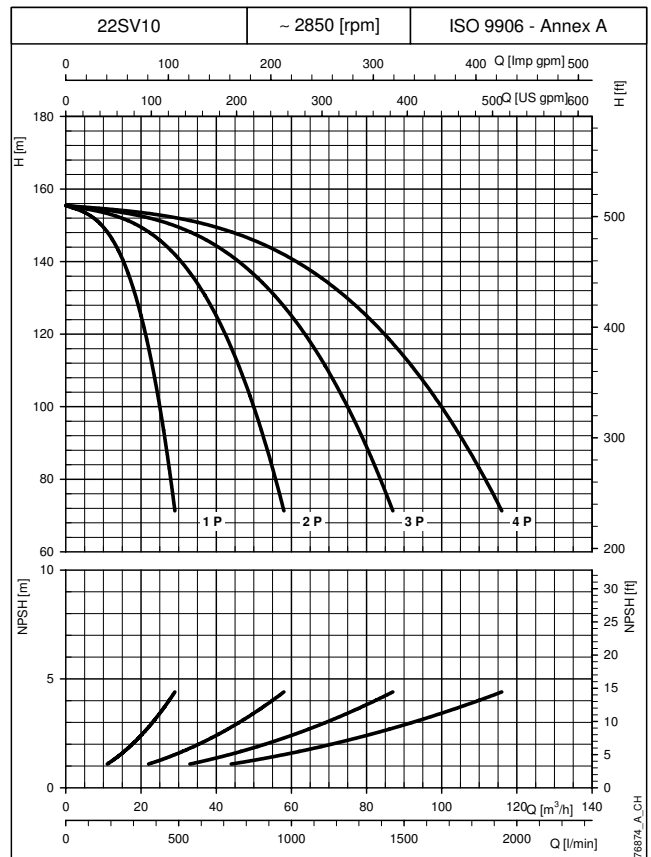
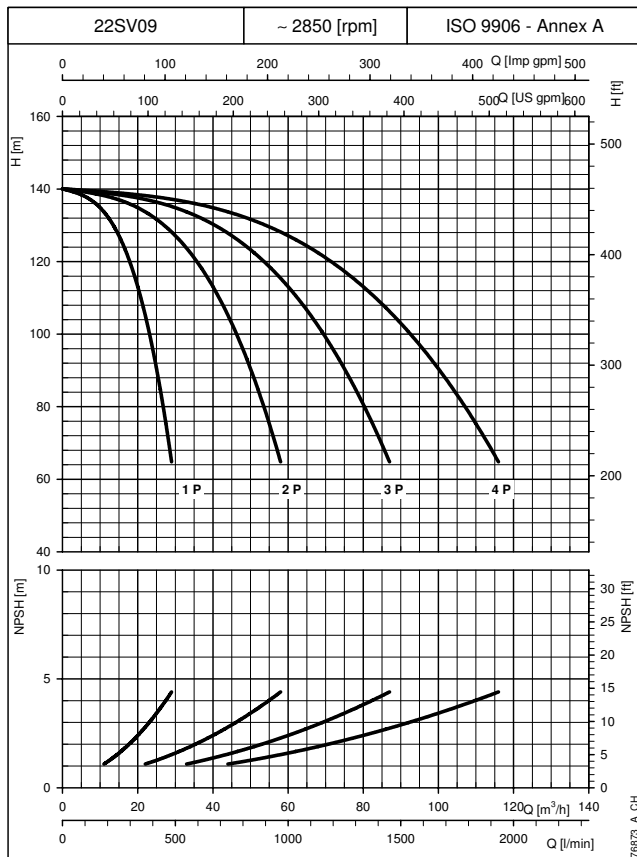
The performance curves do not take into account flow resistance in the valves and piping.
The curves show the performance with one, two, three and four pumps running.
These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.
The declared NPSH values are laboratory values: for practical use we recommend increasing these values by 0.5 m.

BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



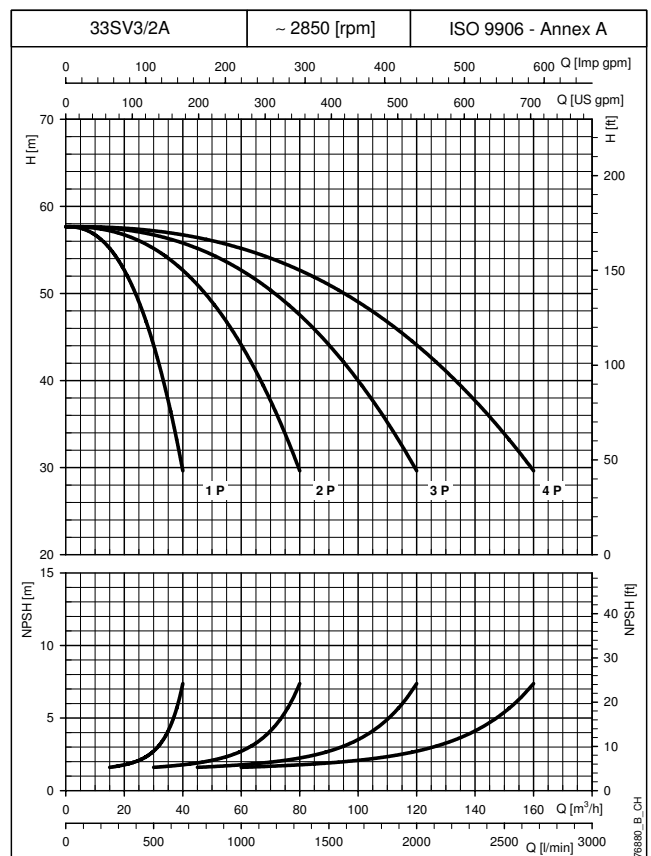
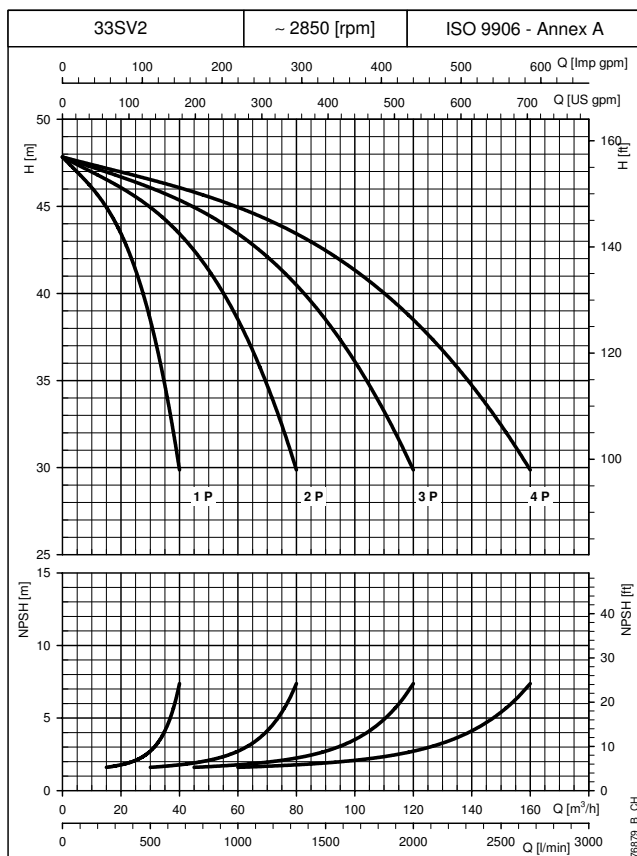
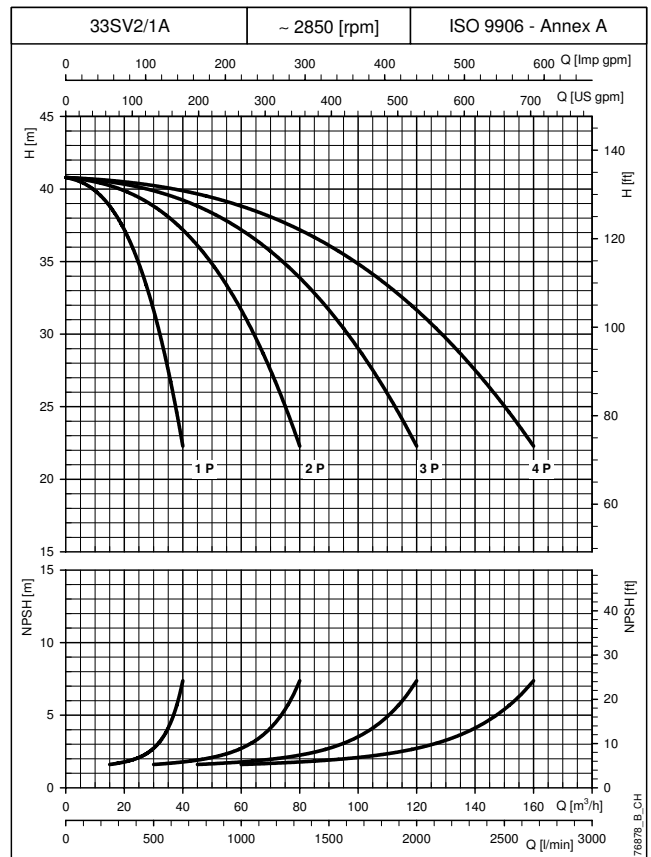
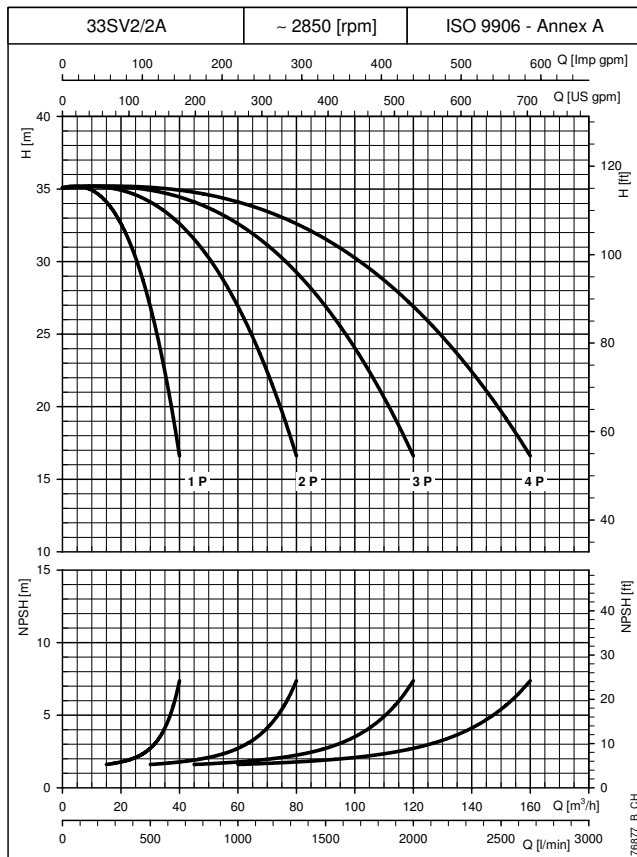
The performance curves do not take into account flow resistance in the valves and piping.
The curves show the performance with one, two, three and four pumps running.
These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.
The declared NPSH values are laboratory values: for practical use we recommend increasing these values by 0.5 m.

BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



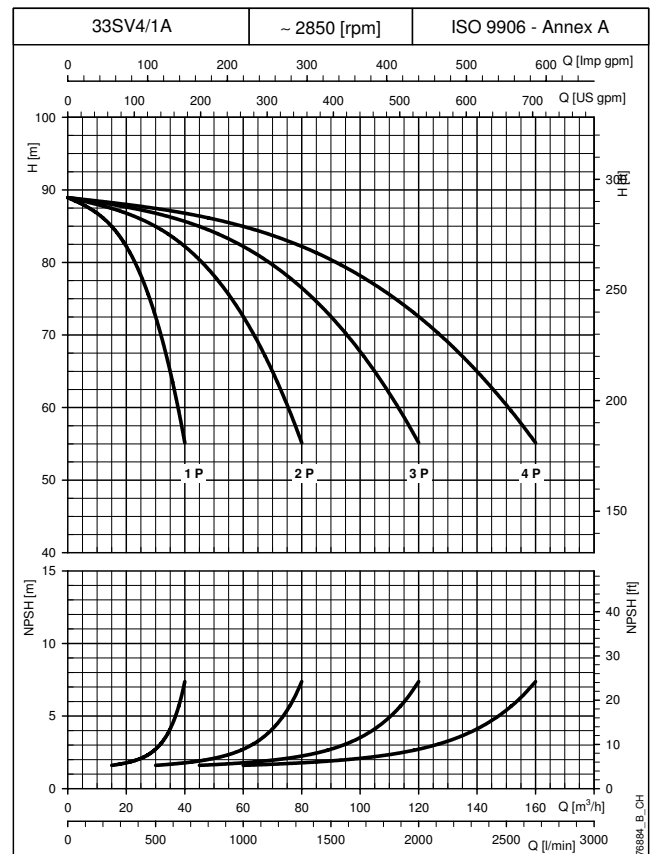
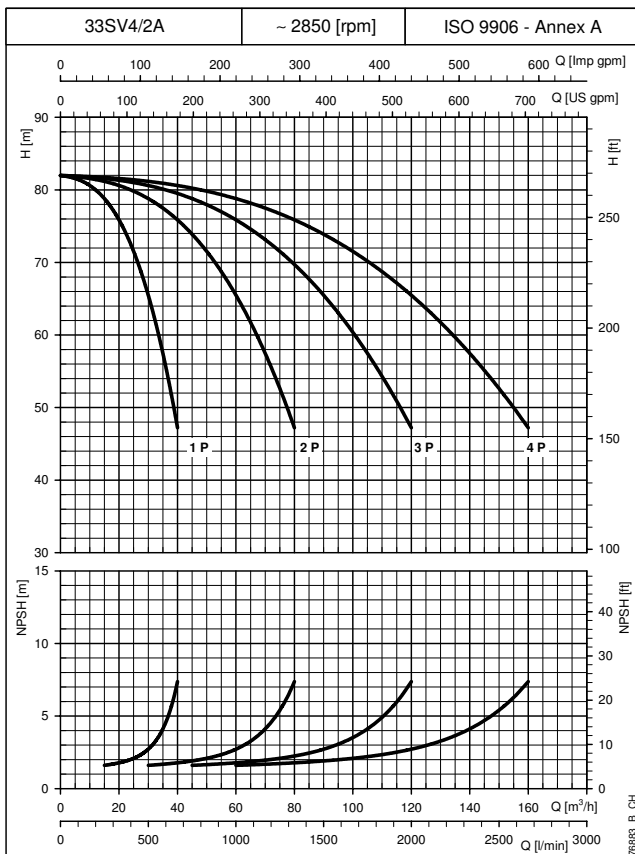
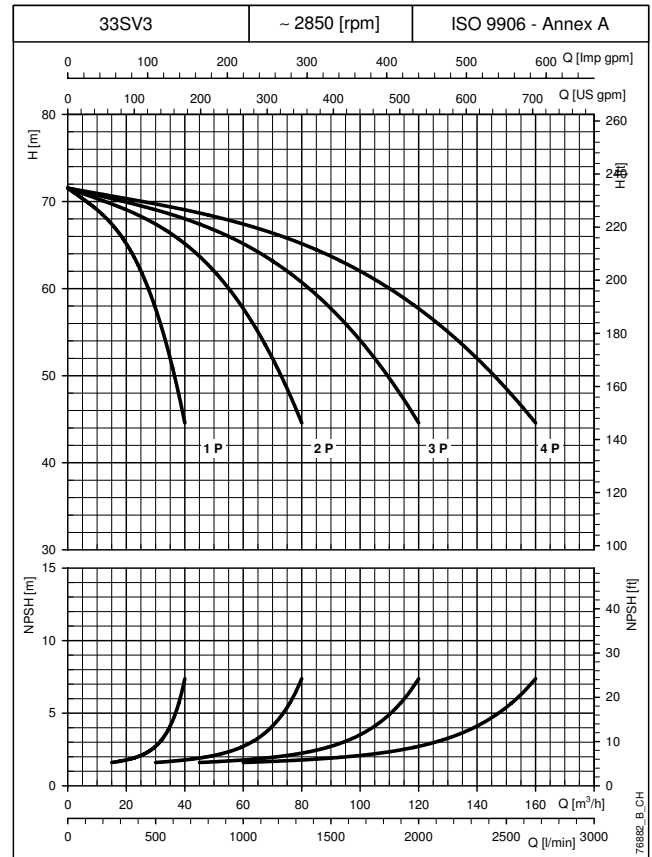
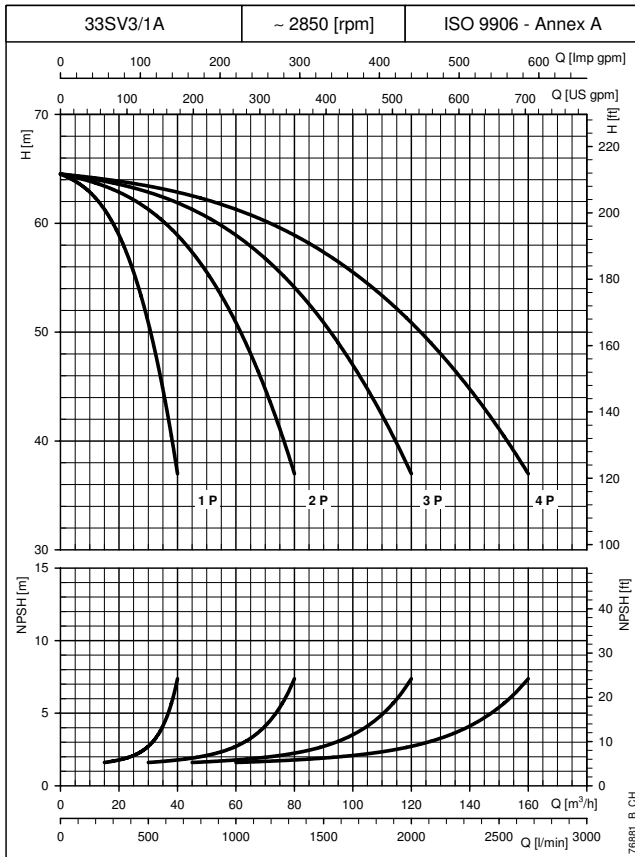
The performance curves do not take into account flow resistance in the valves and piping.
The curves show the performance with one, two, three and four pumps running.
These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.
The declared NPSH values are laboratory values: for practical use we recommend increasing these values by 0.5 m.

BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



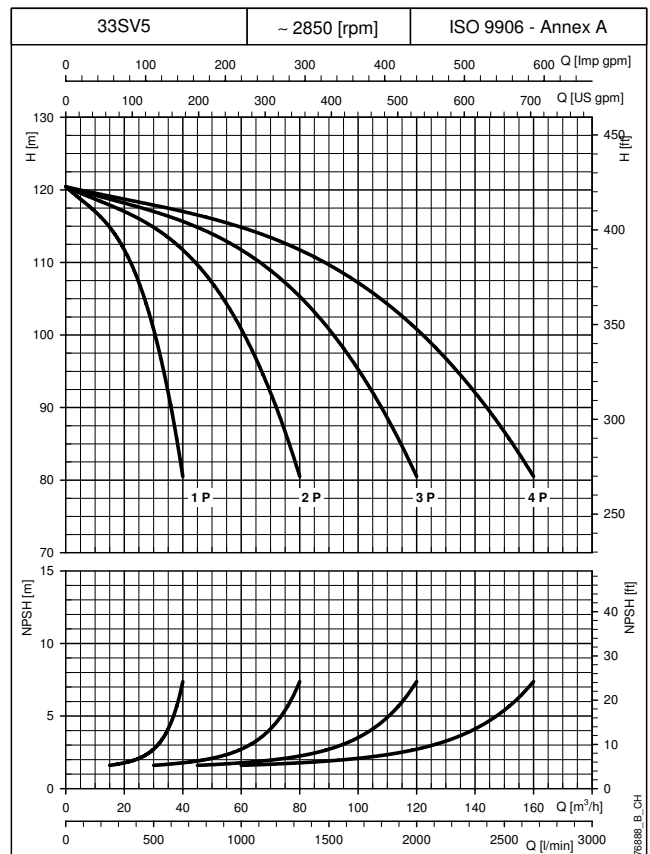
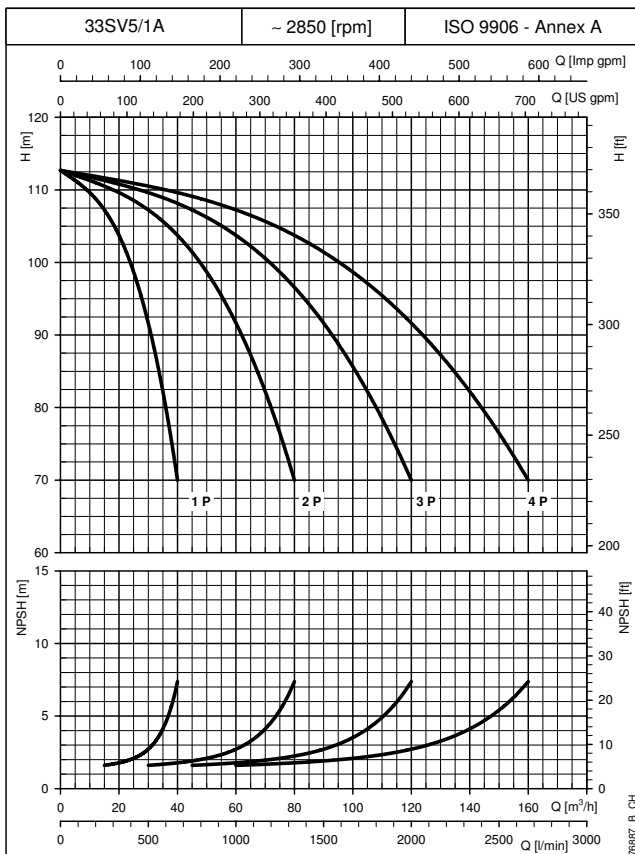
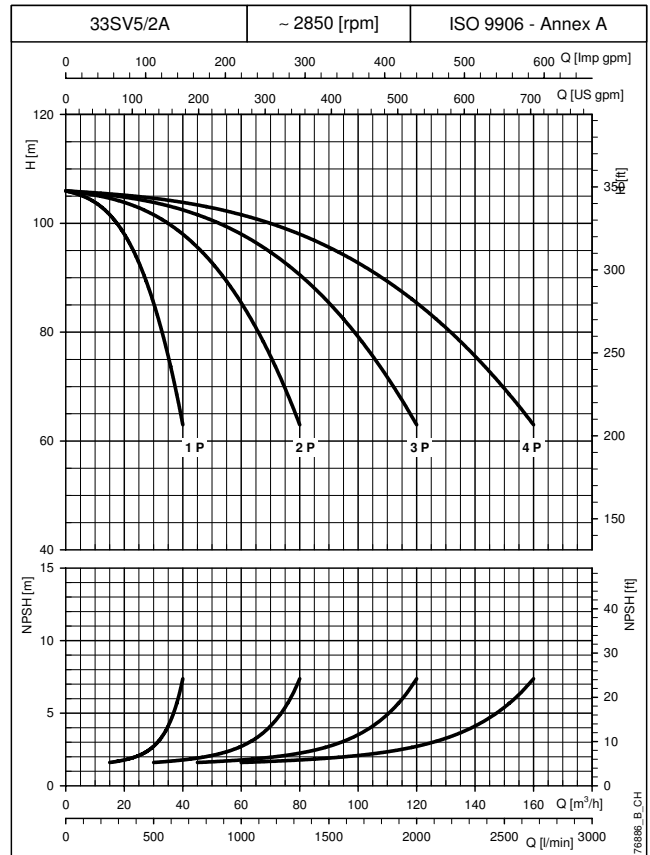
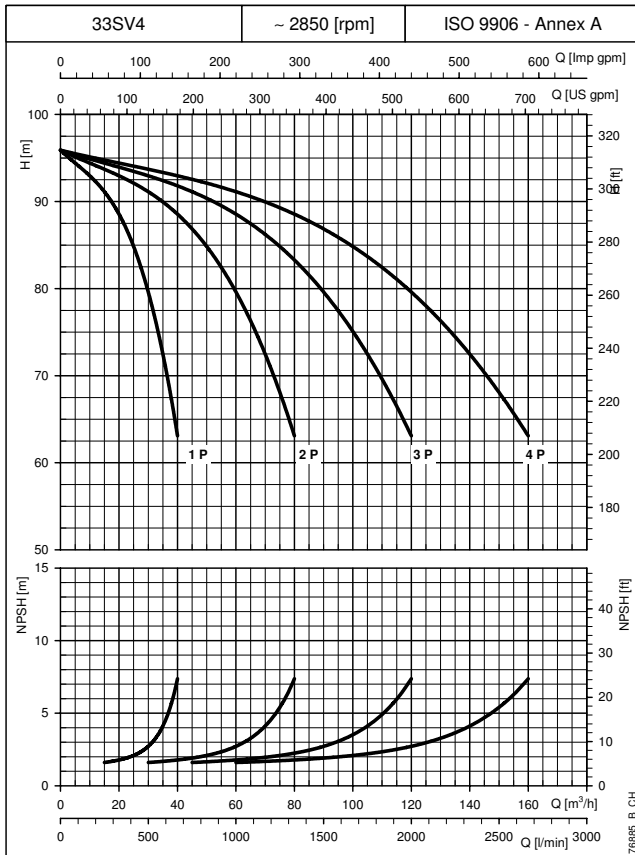
The performance curves do not take into account flow resistance in the valves and piping.
The curves show the performance with one, two, three and four pumps running.
These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.
The declared NPSH values are laboratory values: for practical use we recommend increasing these values by 0.5 m.

BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



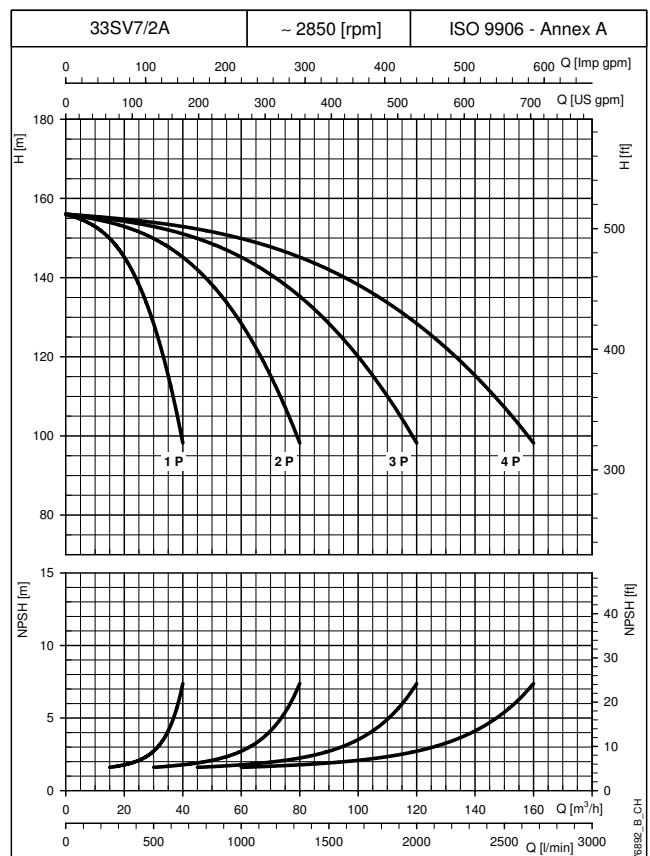
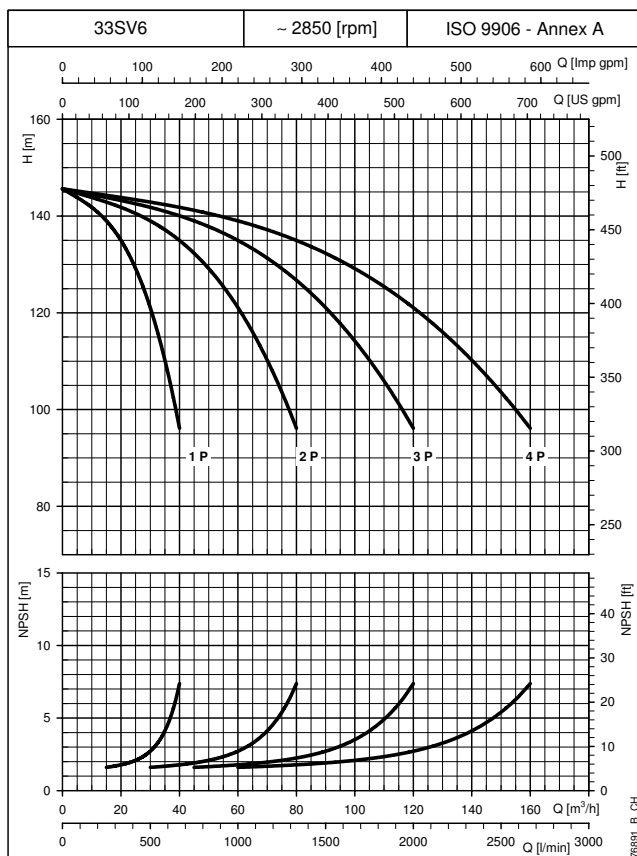
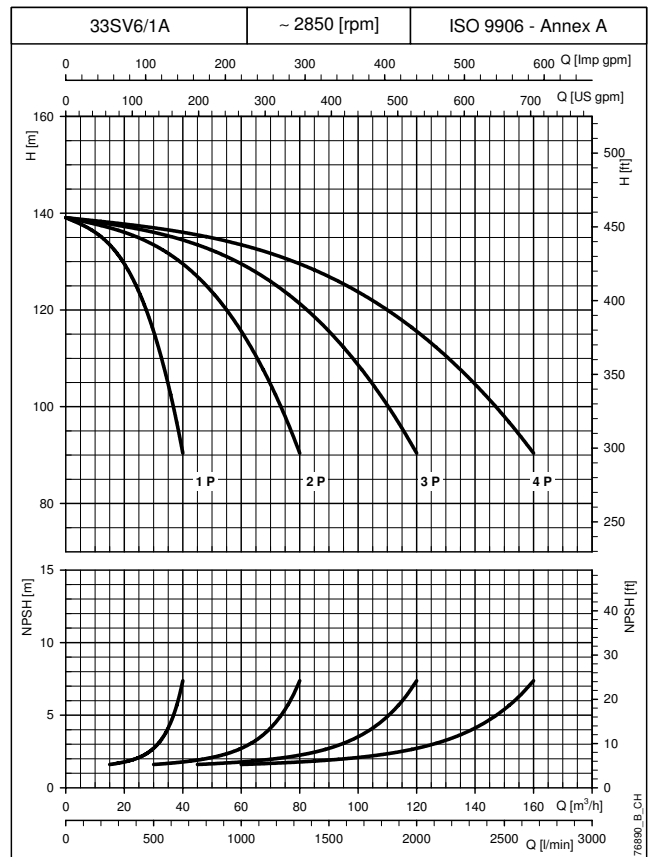
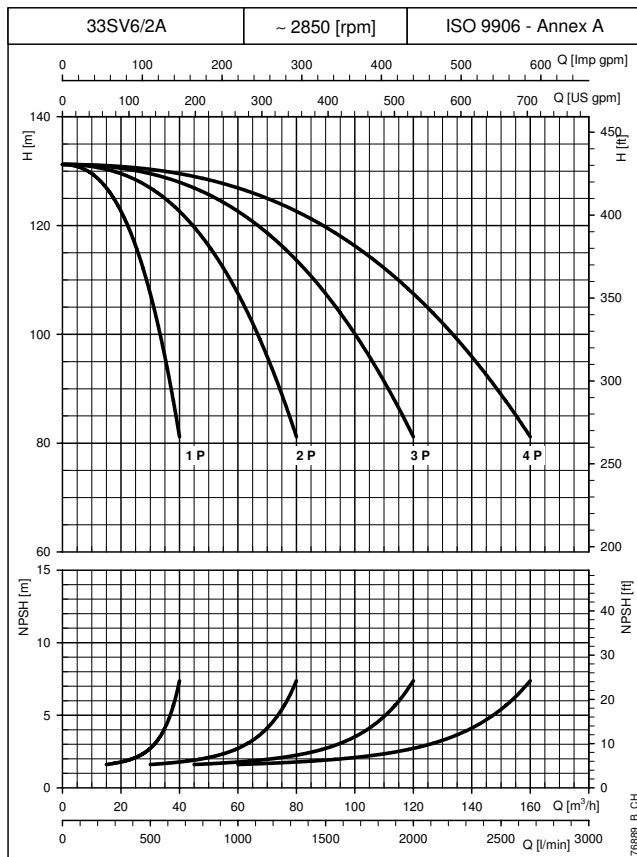
The performance curves do not take into account flow resistance in the valves and piping.
The curves show the performance with one, two, three and four pumps running.
These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.
The declared NPSH values are laboratory values: for practical use we recommend increasing these values by 0.5 m.

BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



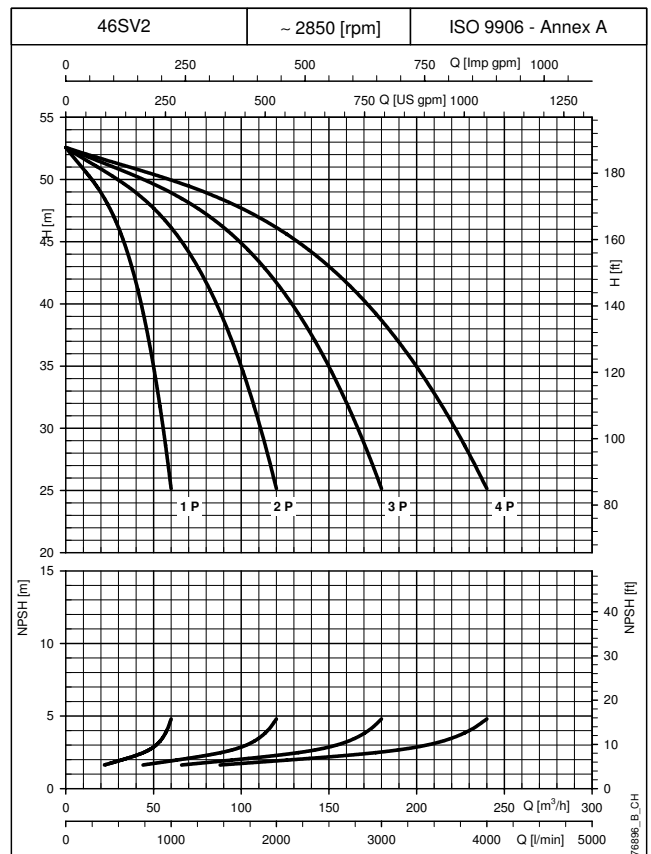
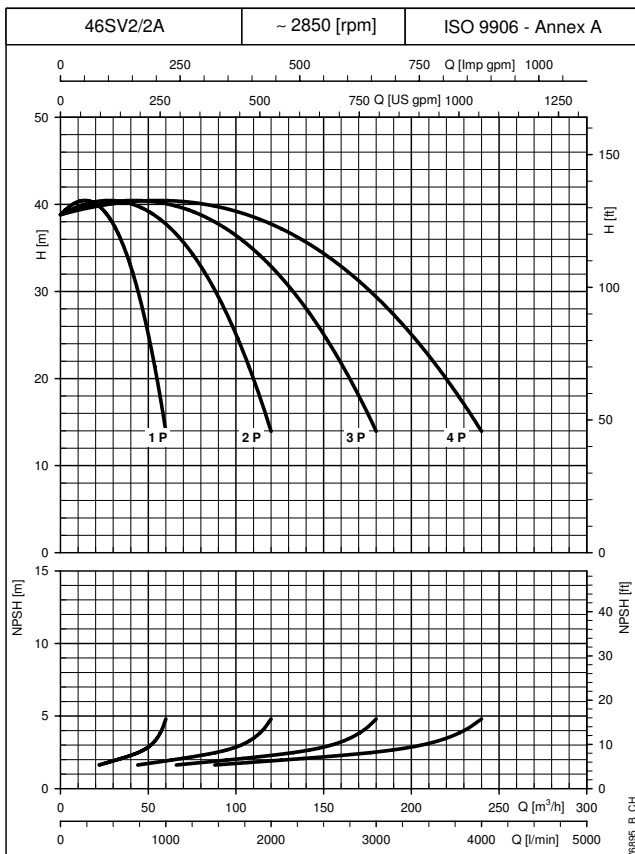
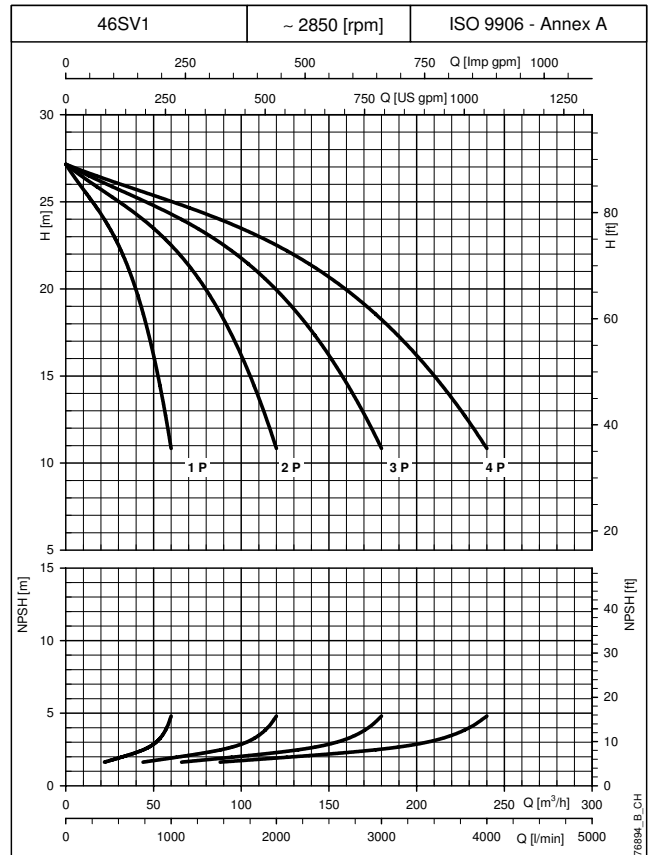
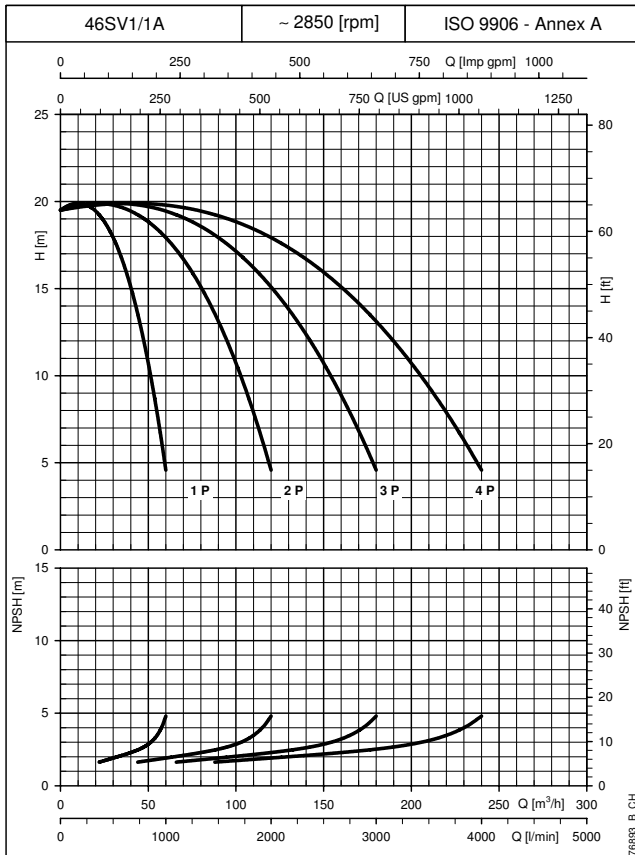
The performance curves do not take into account flow resistance in the valves and piping.
The curves show the performance with one, two, three and four pumps running.
These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.
The declared NPSH values are laboratory values: for practical use we recommend increasing these values by 0.5 m.

BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



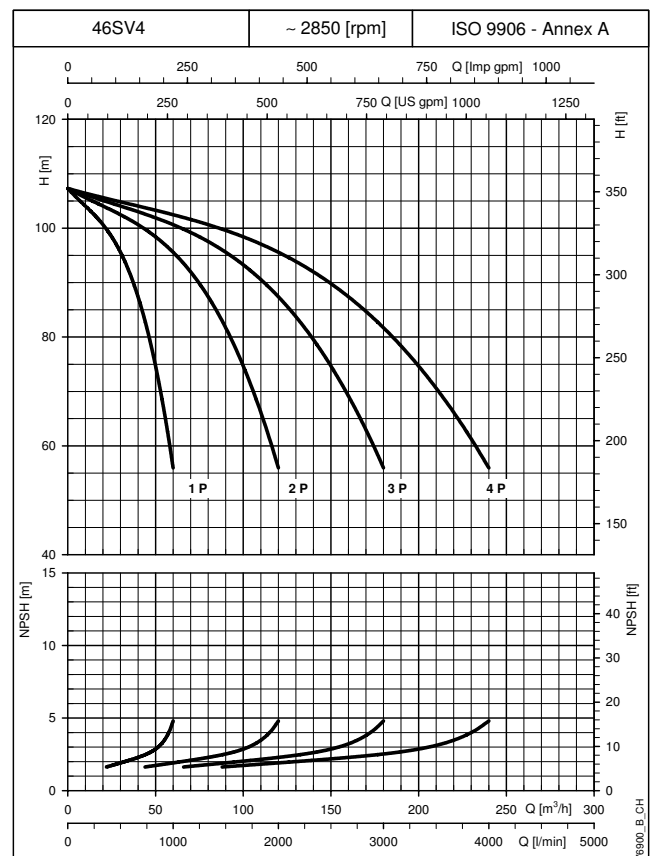
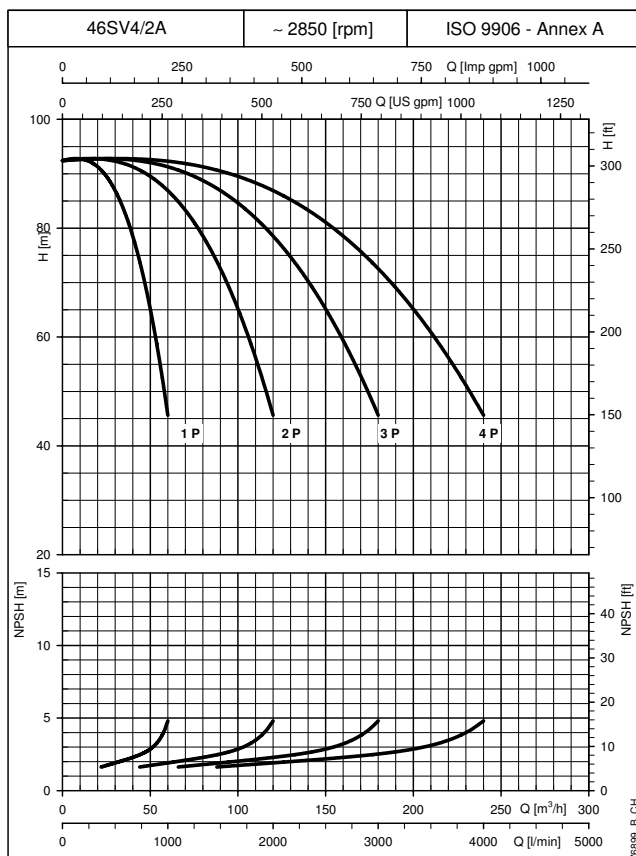
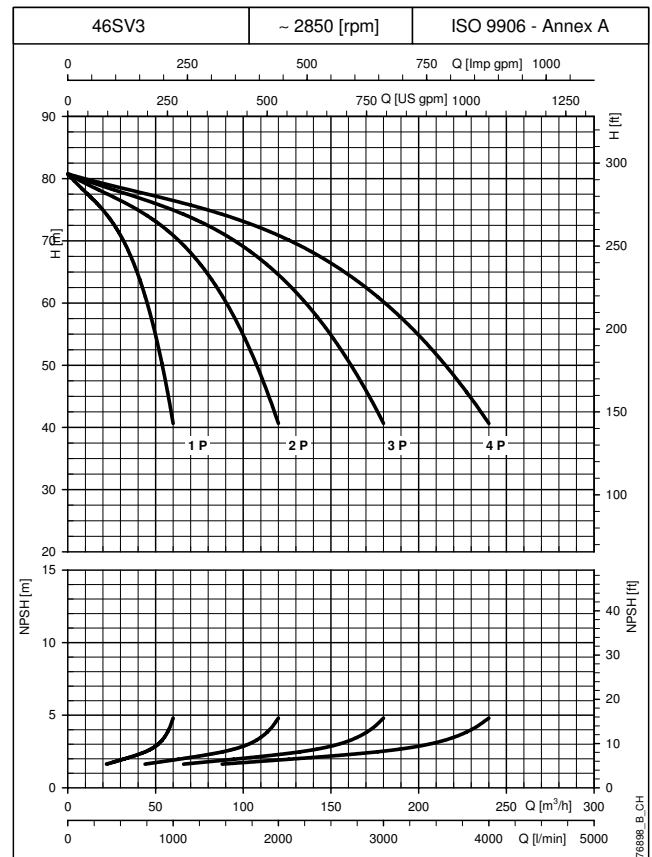
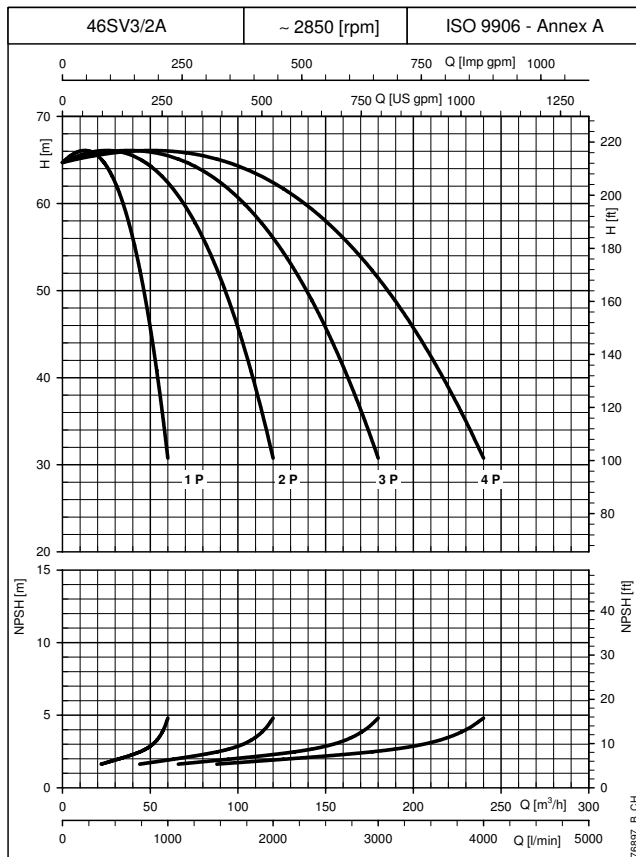
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BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



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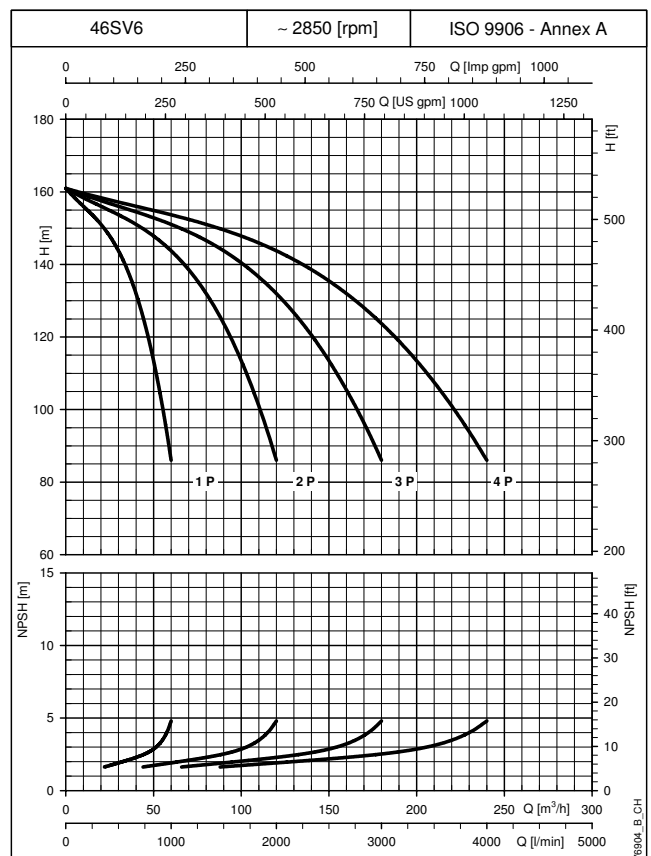
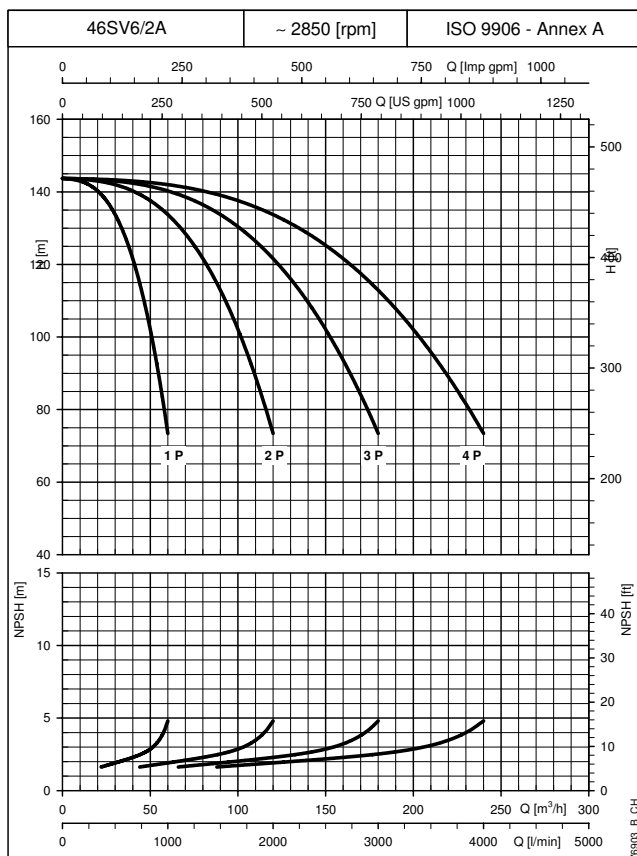
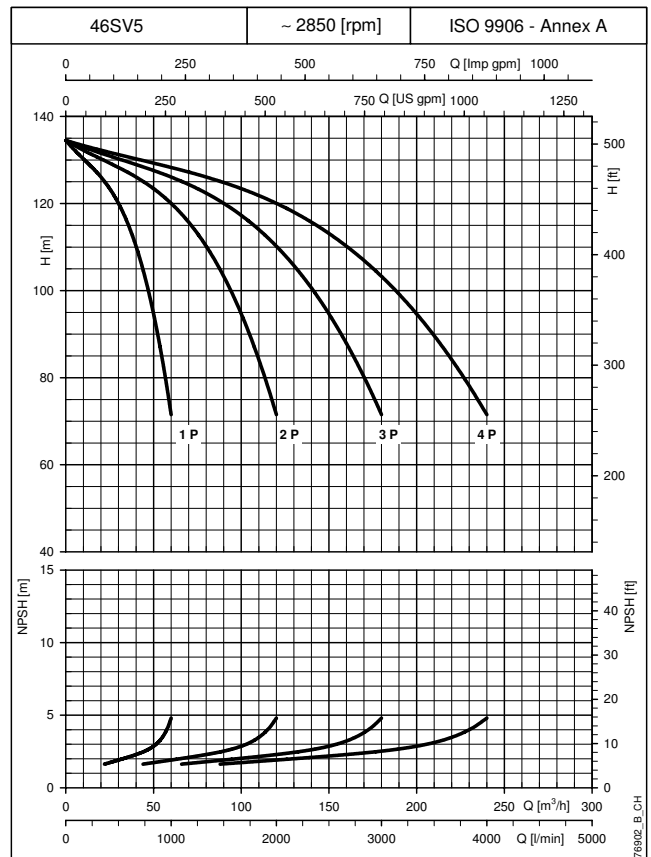
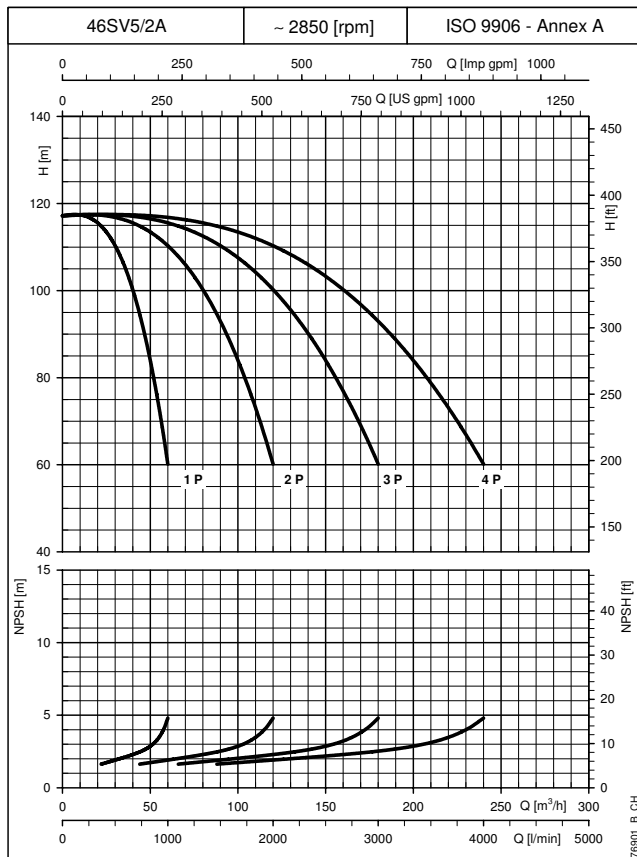
BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



CURVES

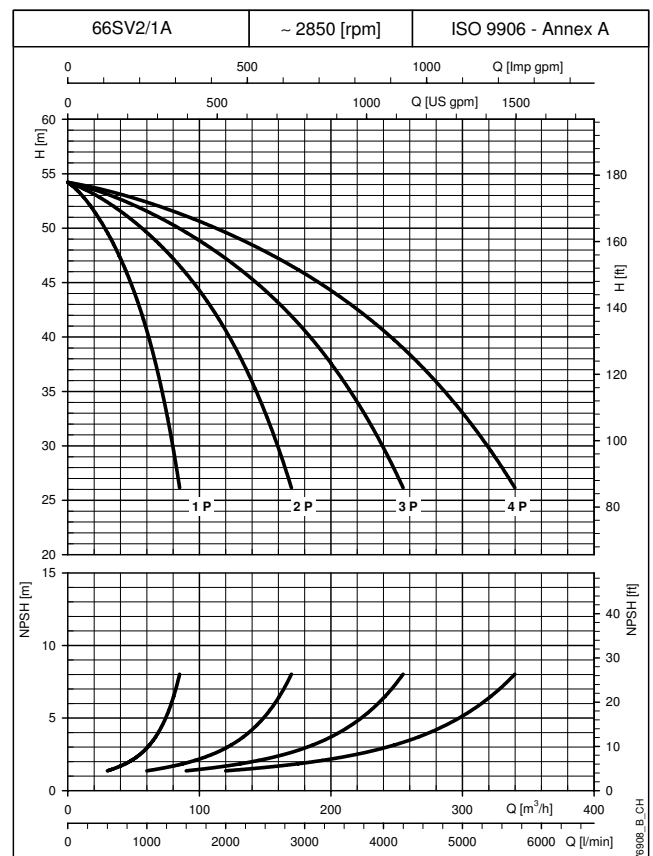
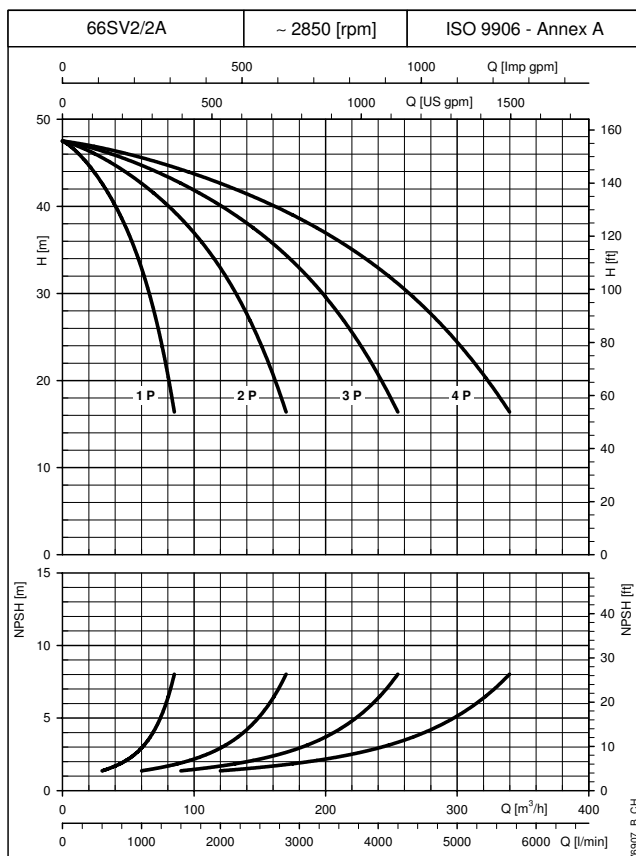
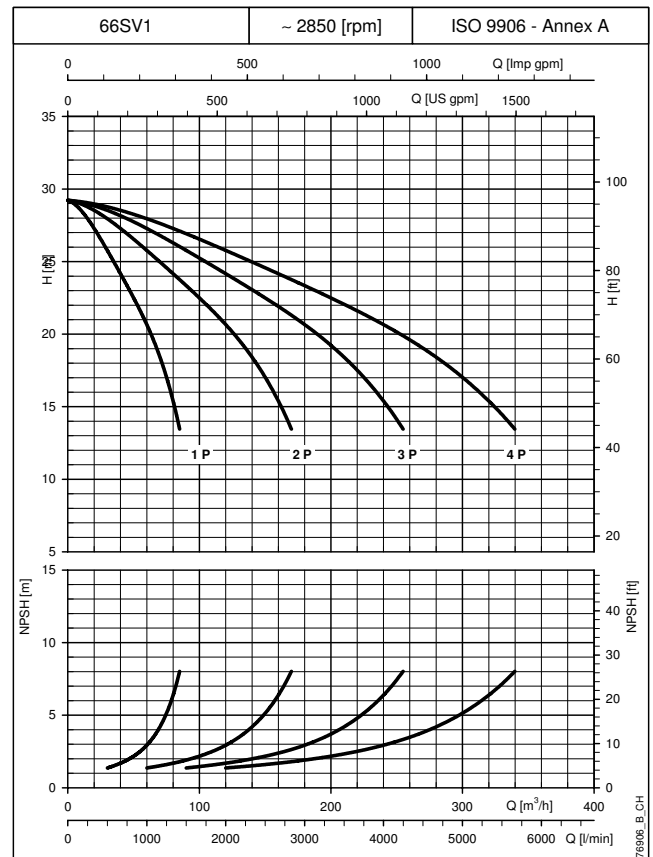
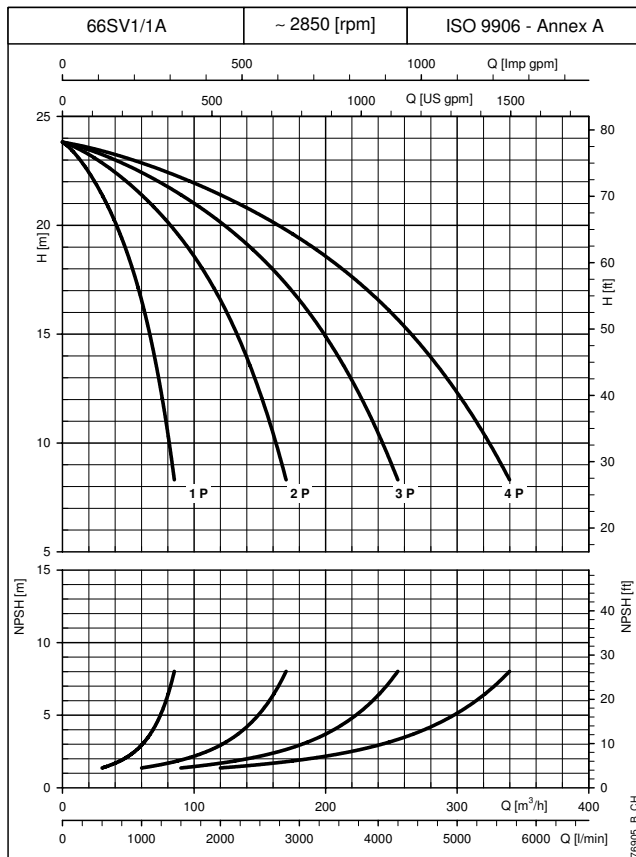
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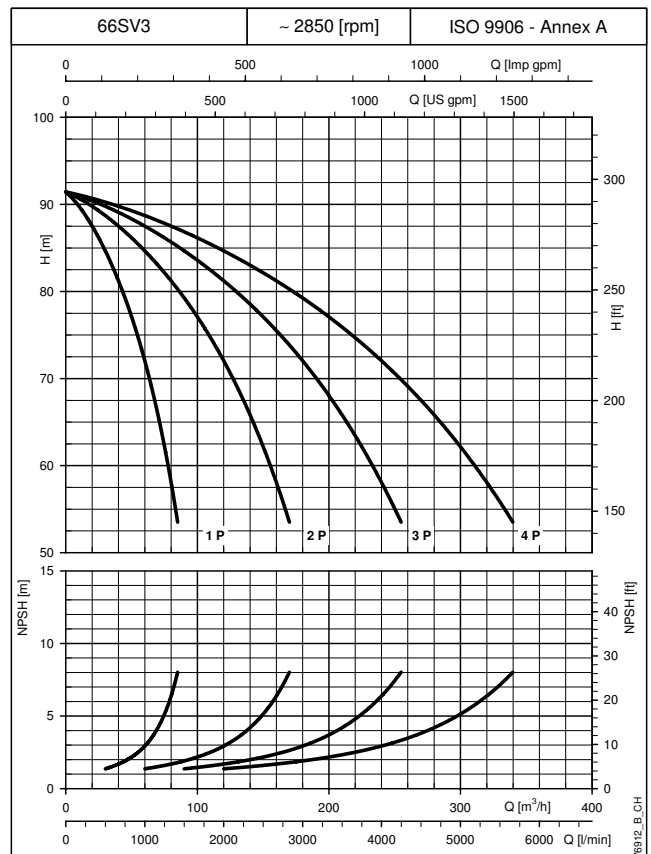
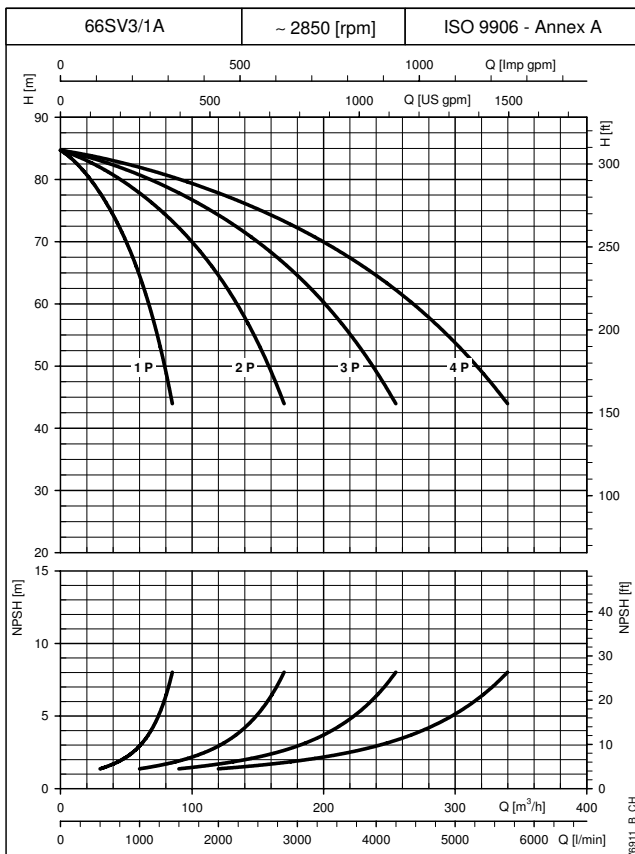
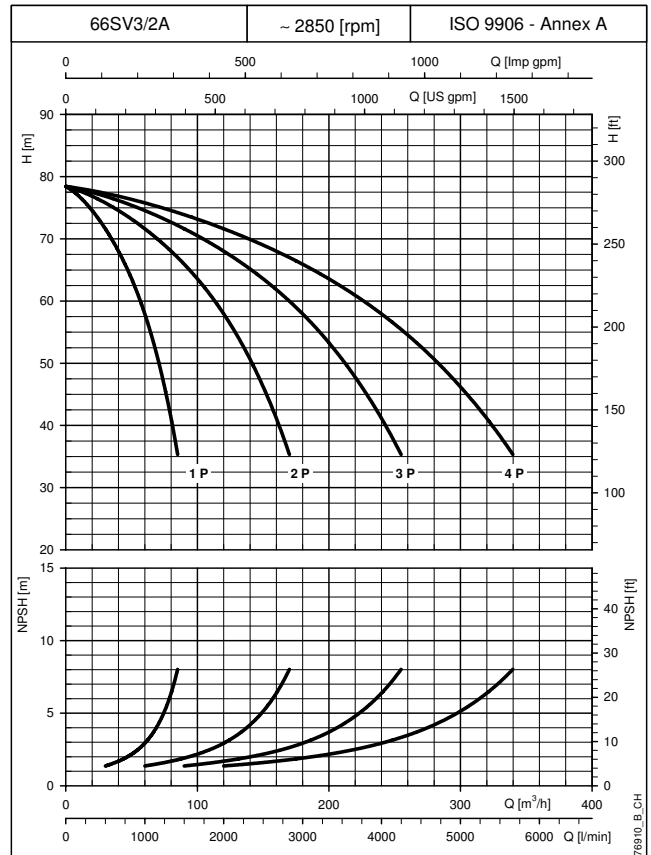
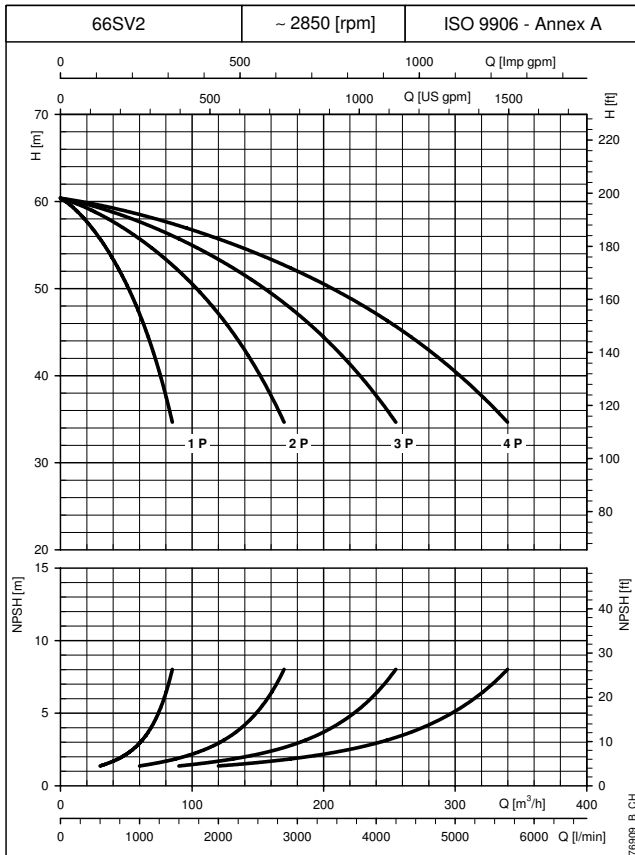
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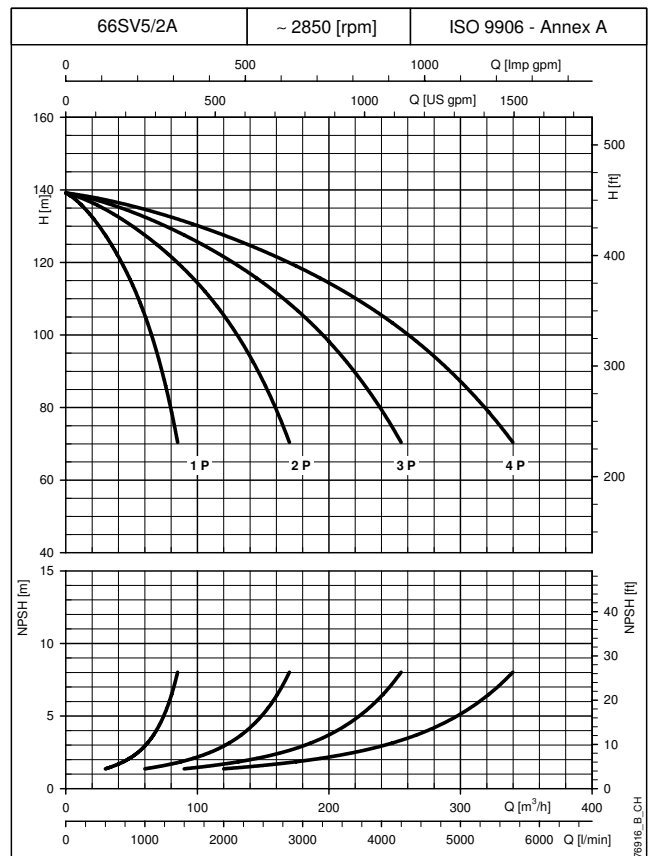
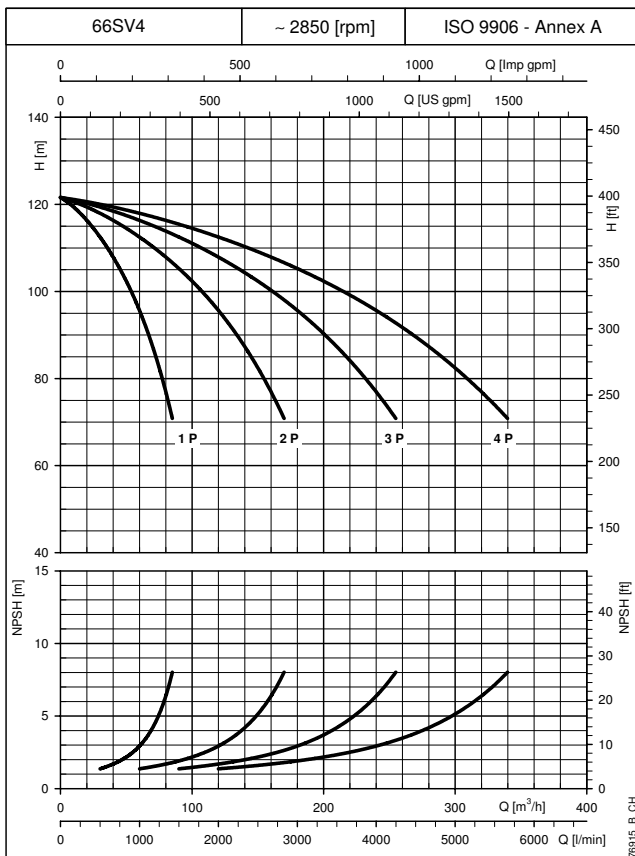
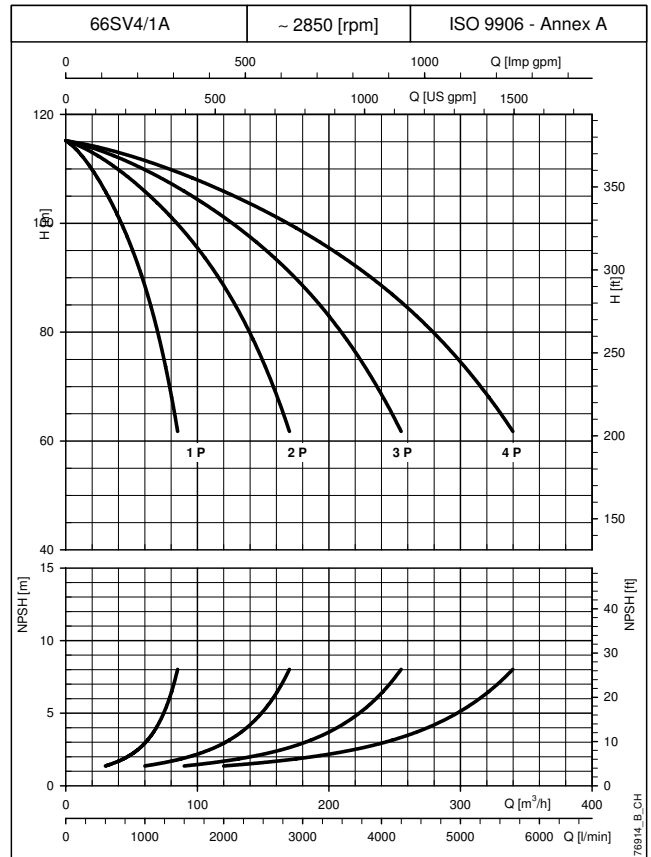
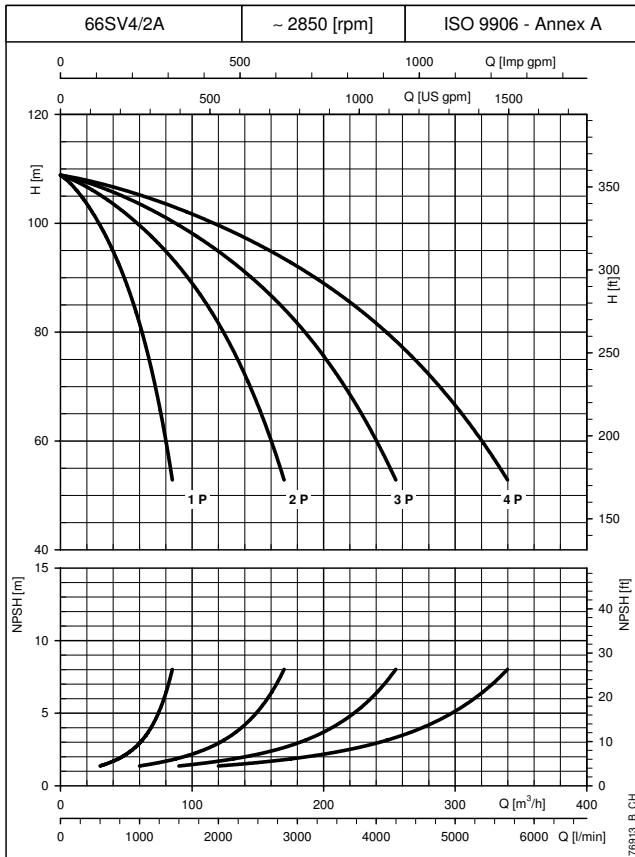
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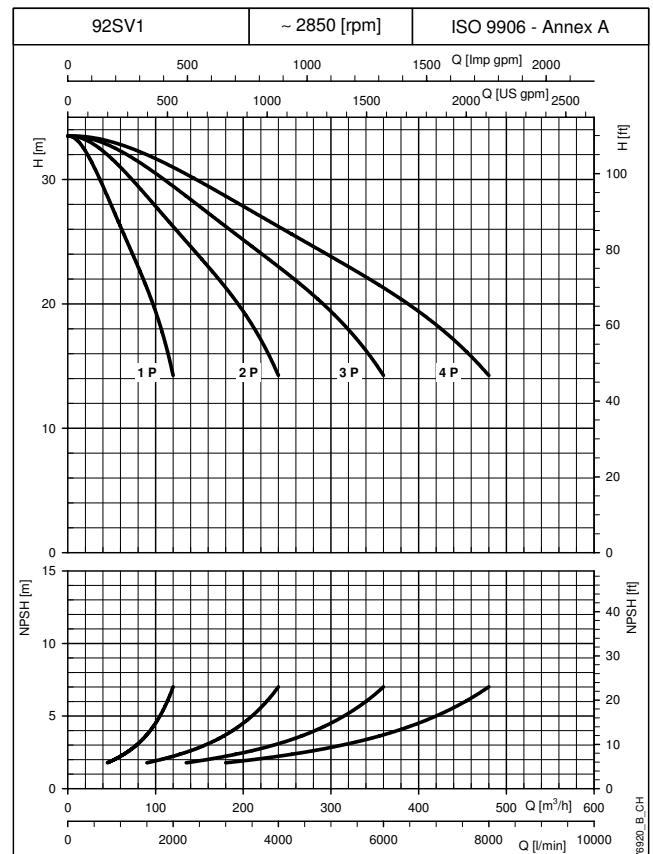
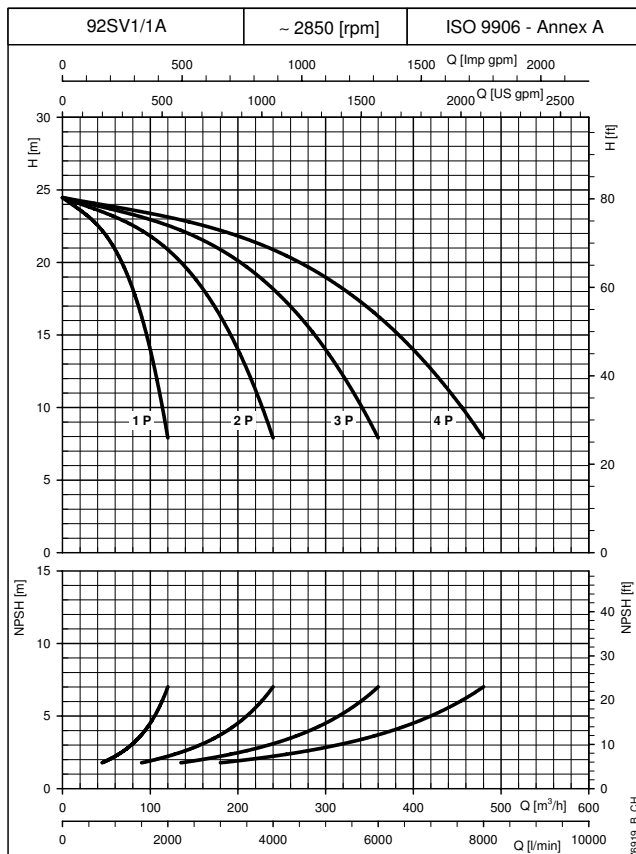
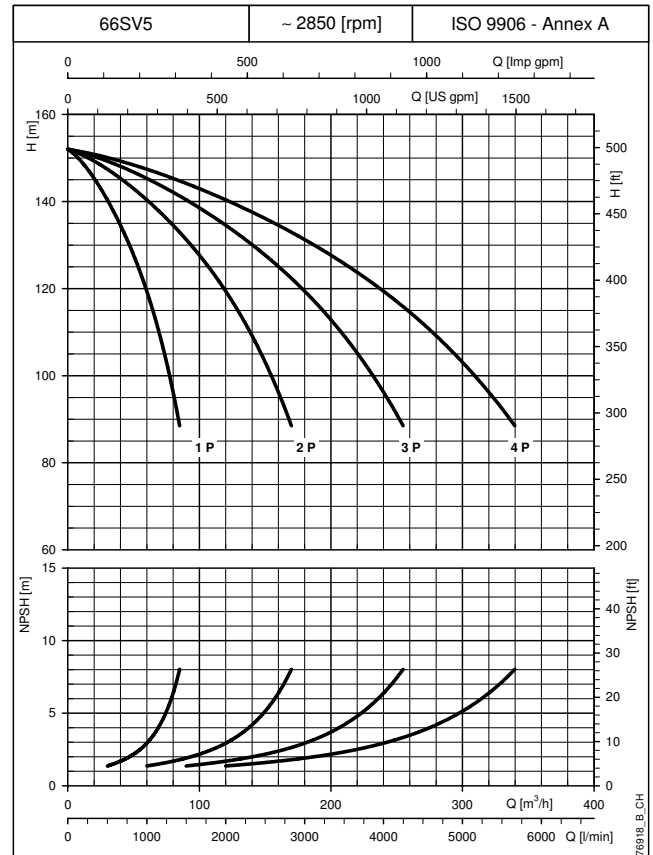
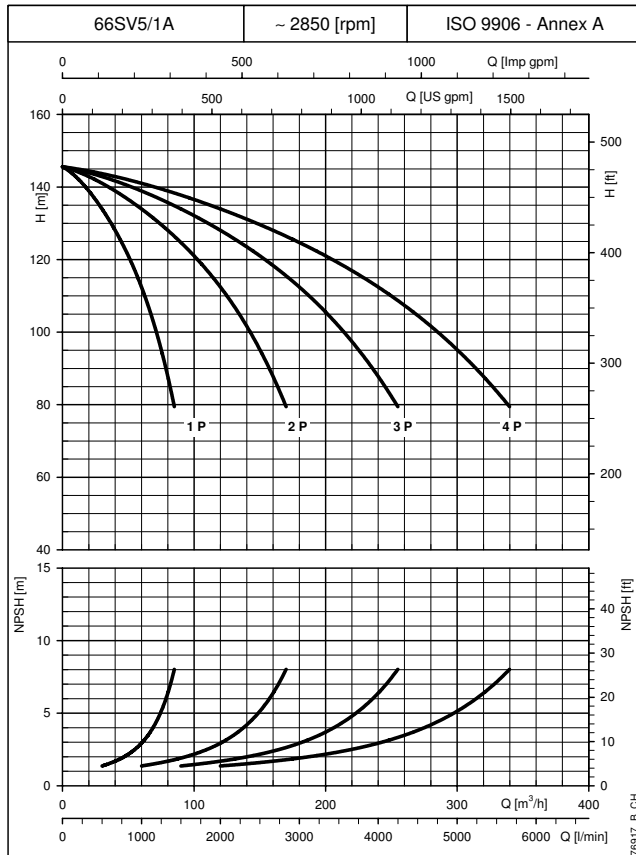
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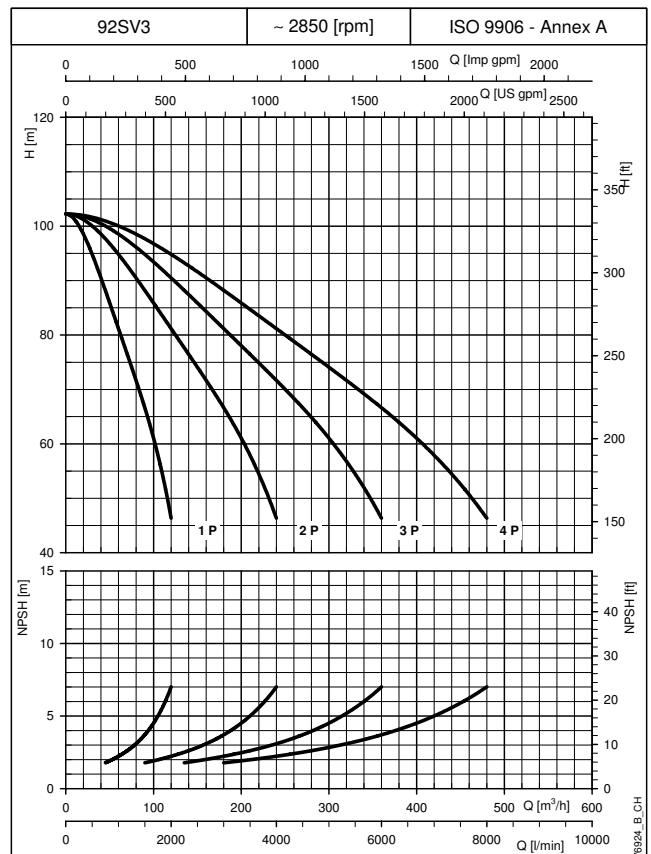
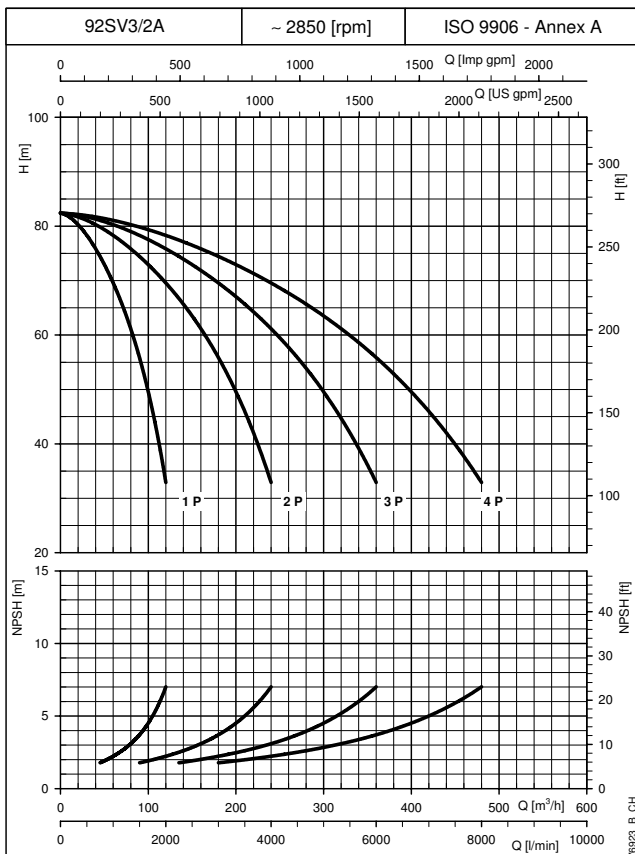
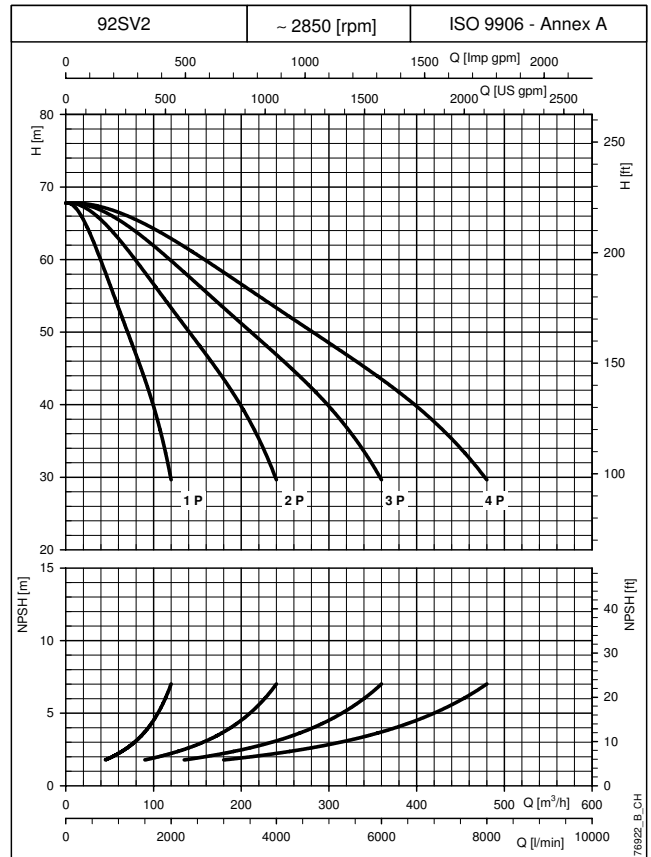
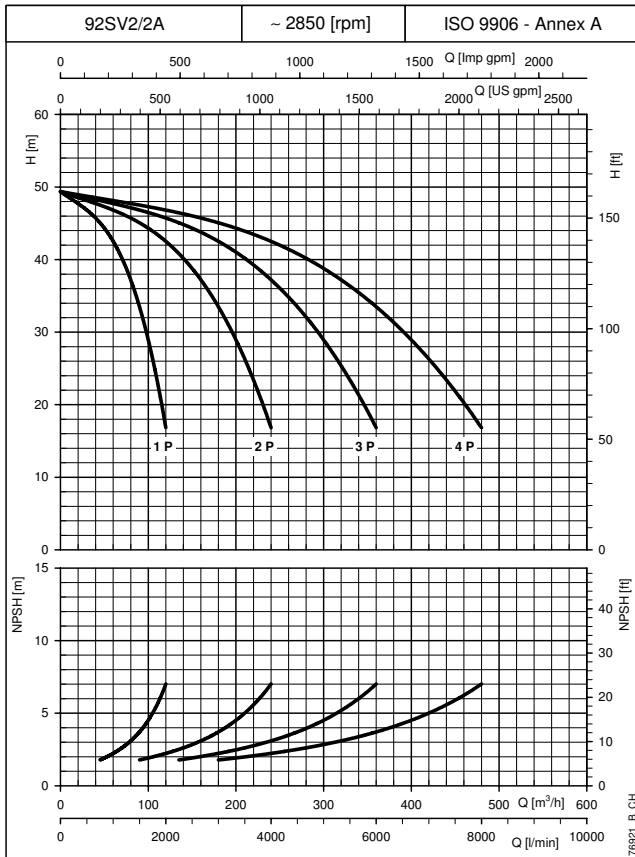
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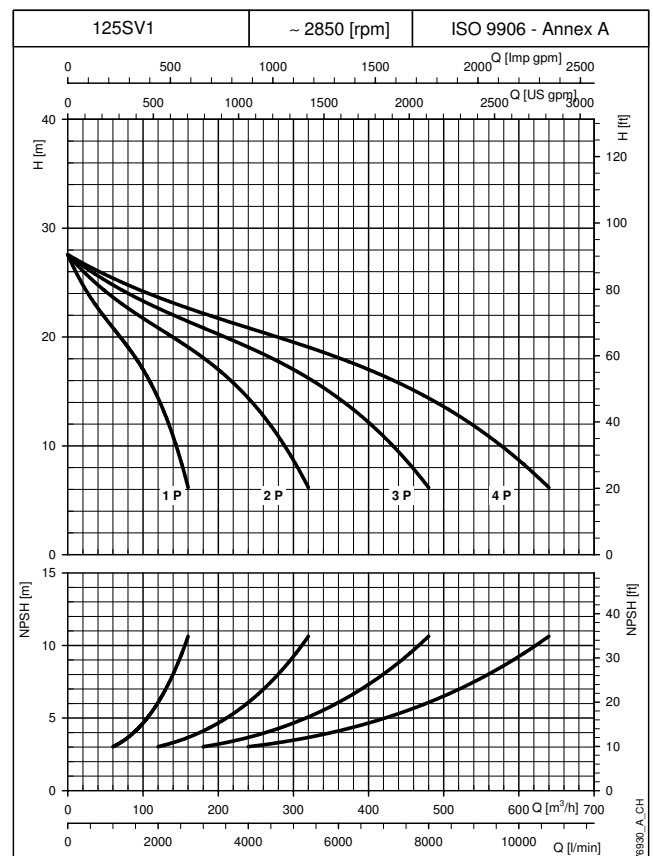
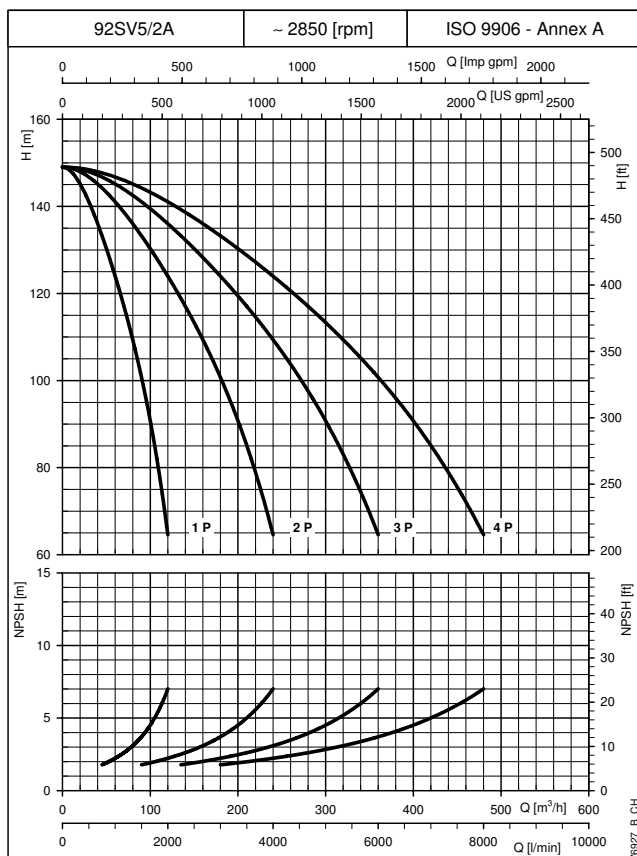
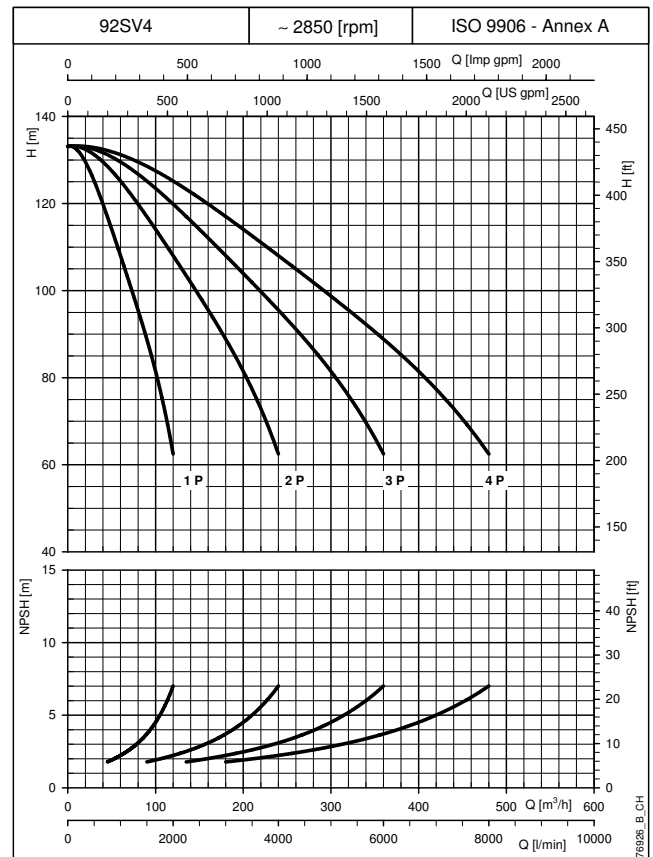
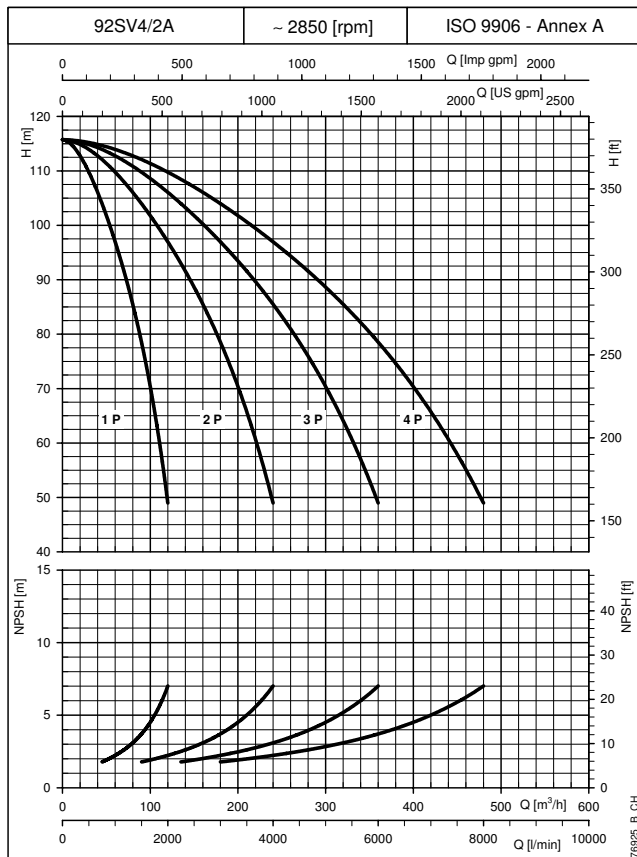
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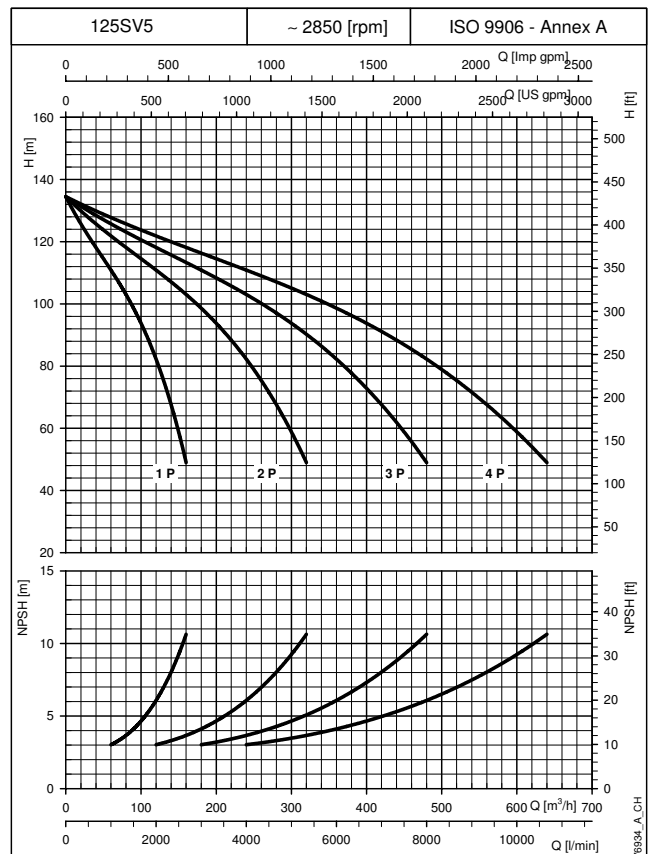
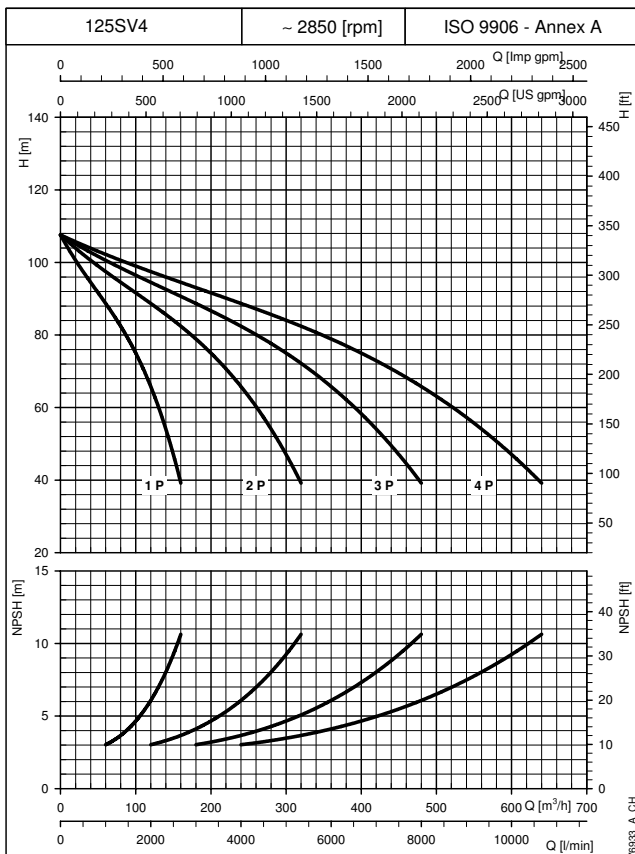
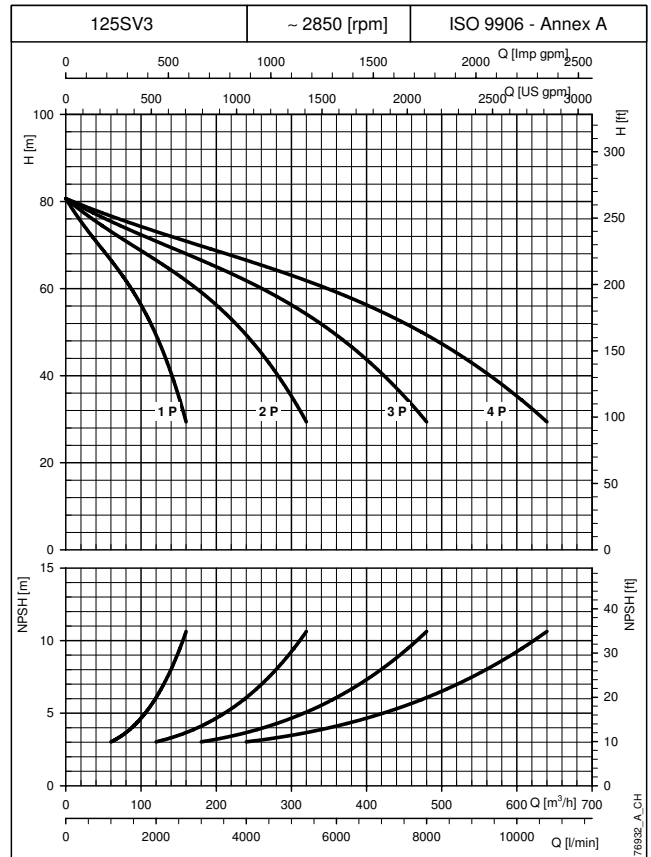
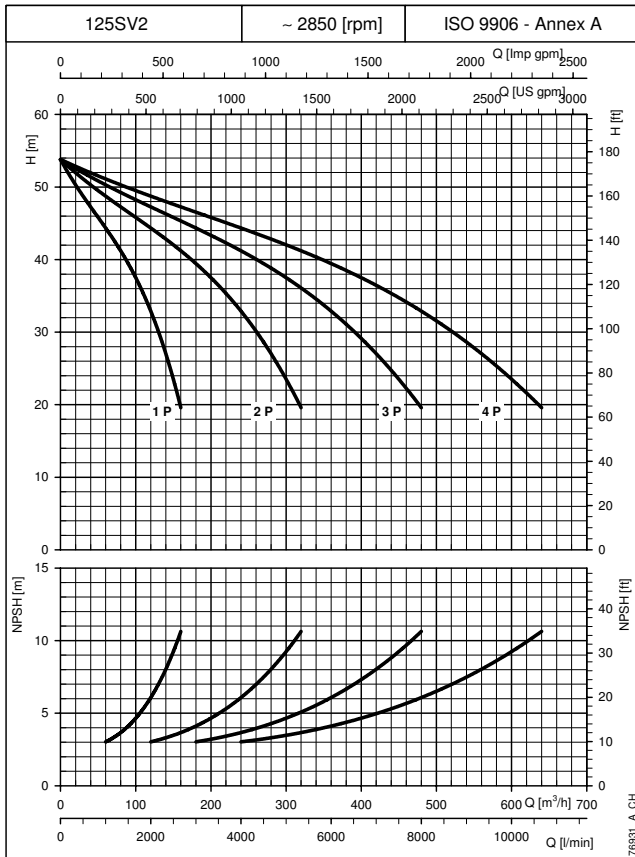
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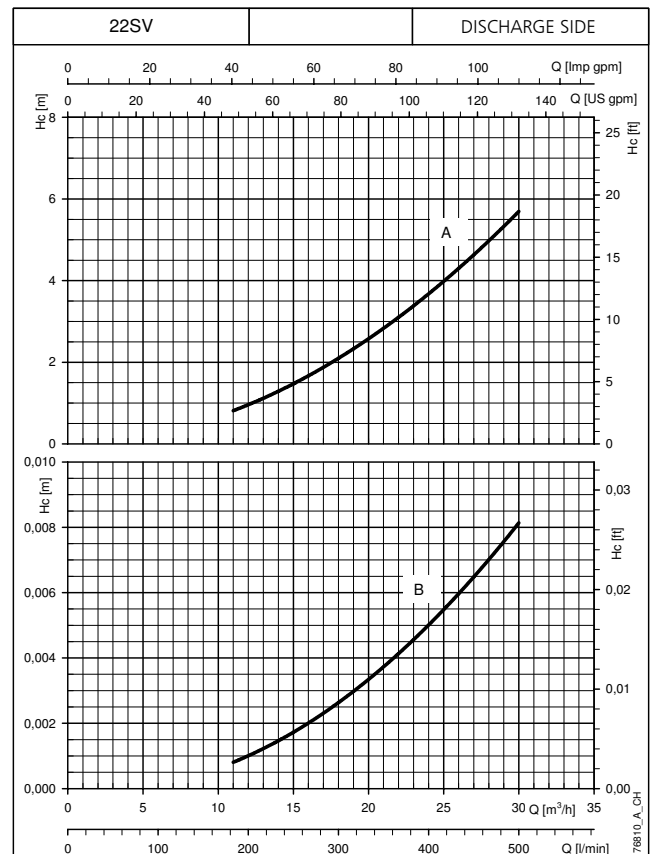
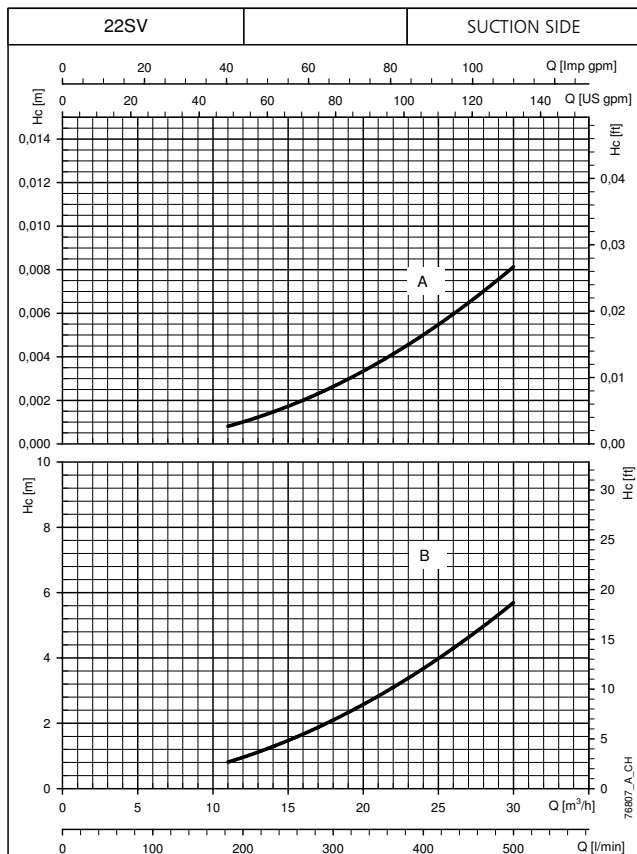
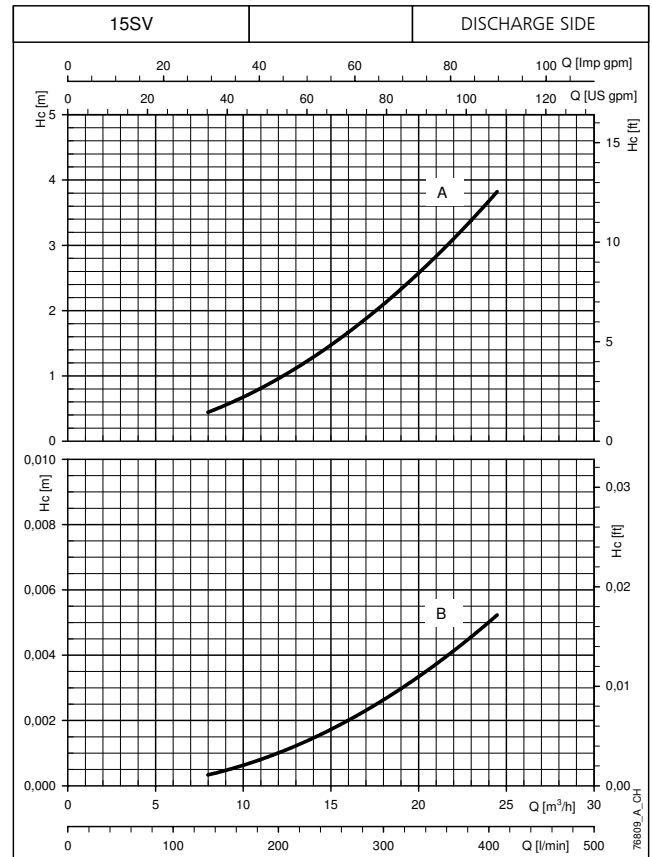
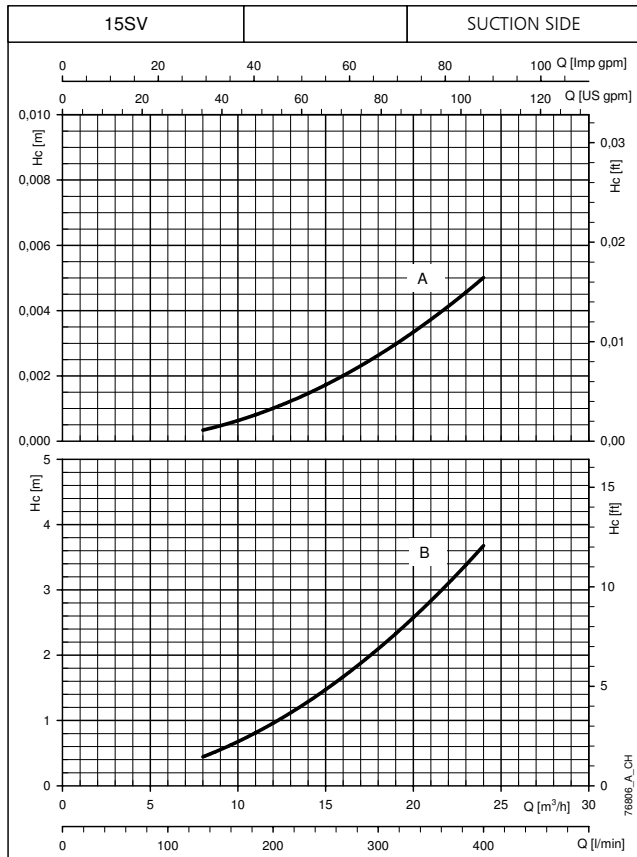
BOOSTER SETS, GV.../SV SERIES OPERATING CHARACTERISTICS AT 50 Hz (SERVICE PUMP)



CURVES

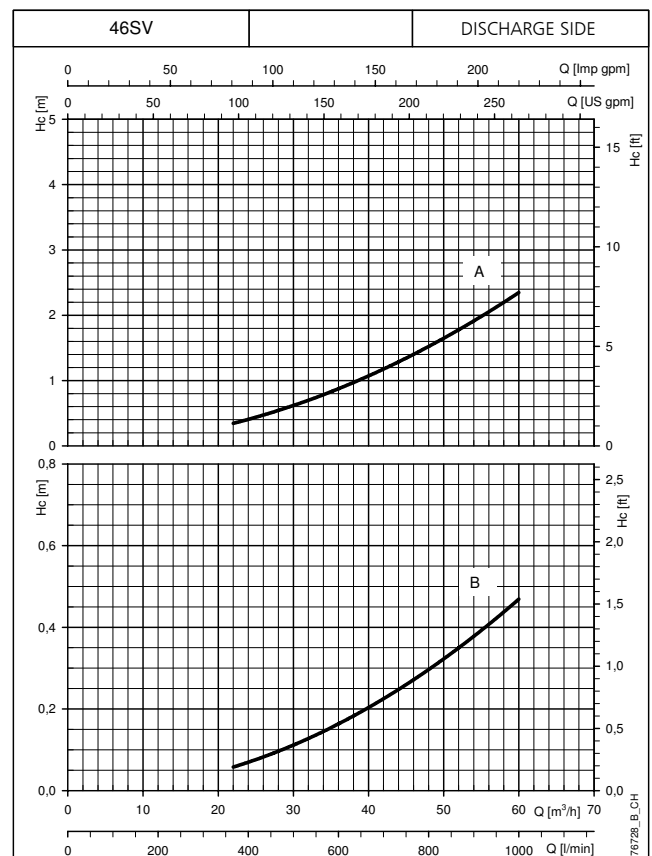
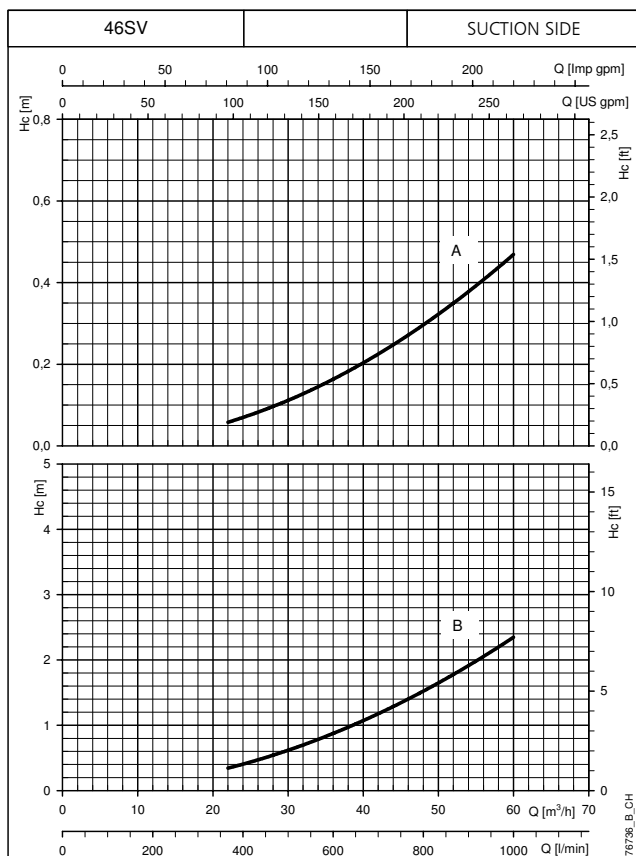
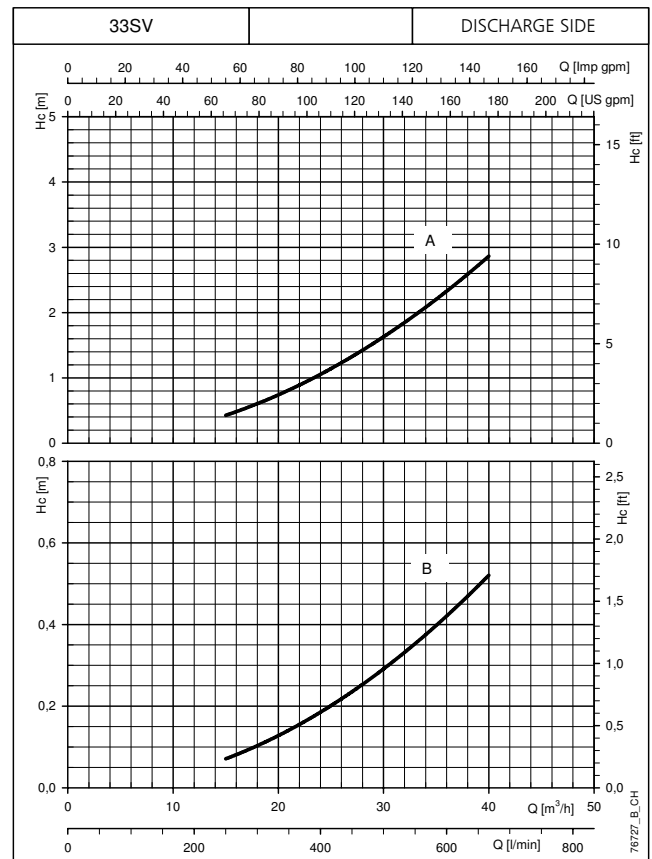
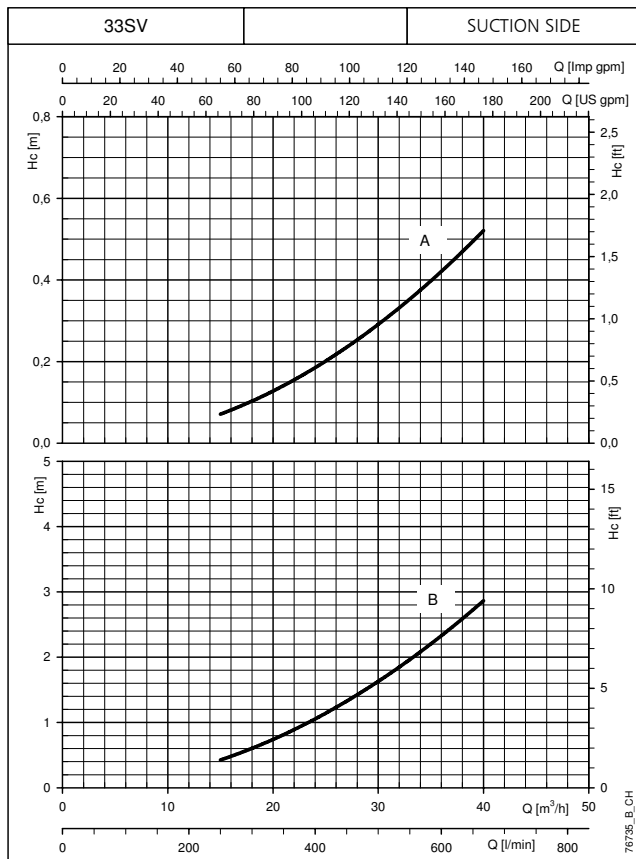
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BOOSTER SETS, GV.../SV SERIES H_c PRESSURE DROP CURVE



The declared curves are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.
H_c (A): Pressure drop curve with check valve installed on the delivery side of the pump.
H_c (B): Pressure drop curve with check valve installed on the suction side of the pump.
The pressure drops do not consider the pressure drops distributed in the manifold.

BOOSTER SETS, GV.../SV SERIES H_c PRESSURE DROP CURVE



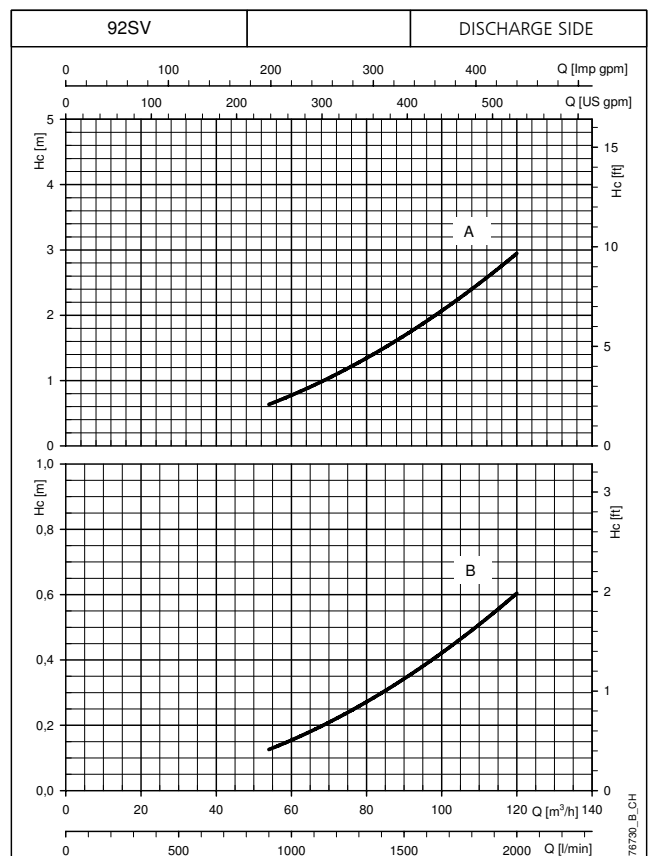
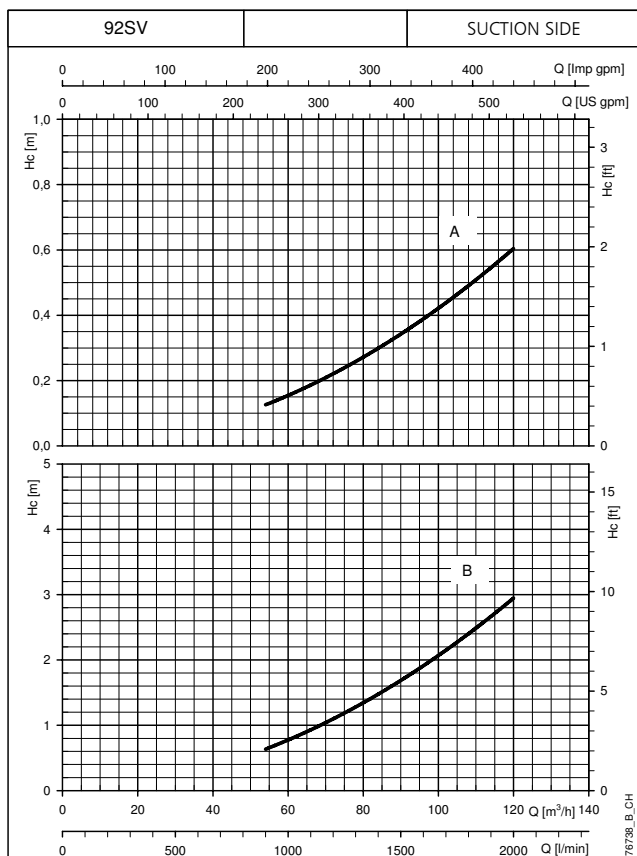
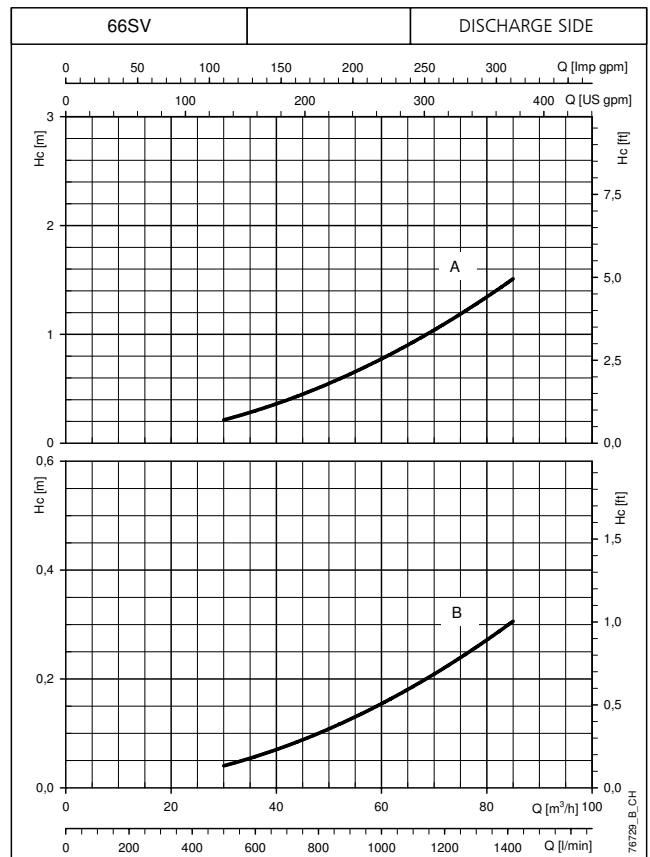
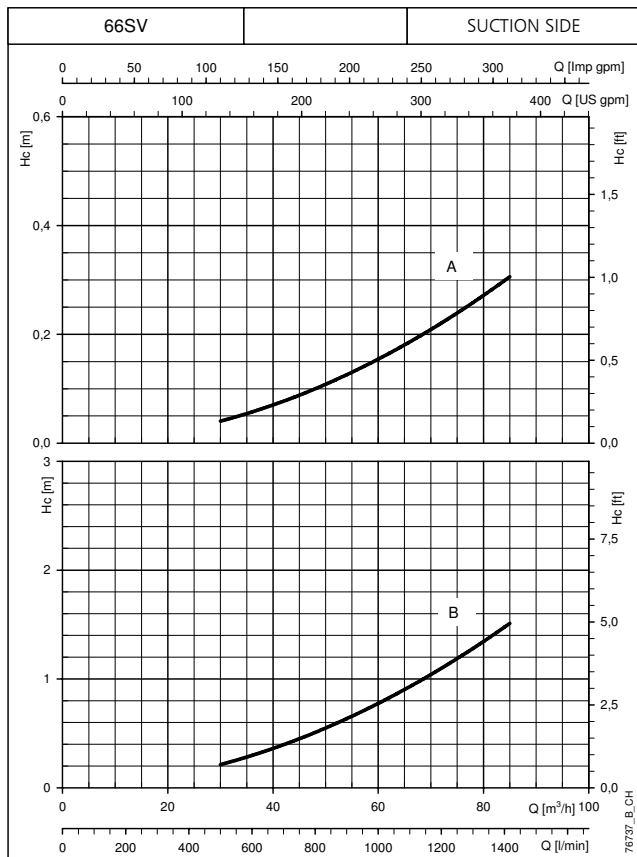
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H_c (A): Pressure drop curve with check valve installed on the delivery side of the pump.

H_c (B): Pressure drop curve with check valve installed on the suction side of the pump.

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

BOOSTER SETS, GV.../SV SERIES H_c PRESSURE DROP CURVE



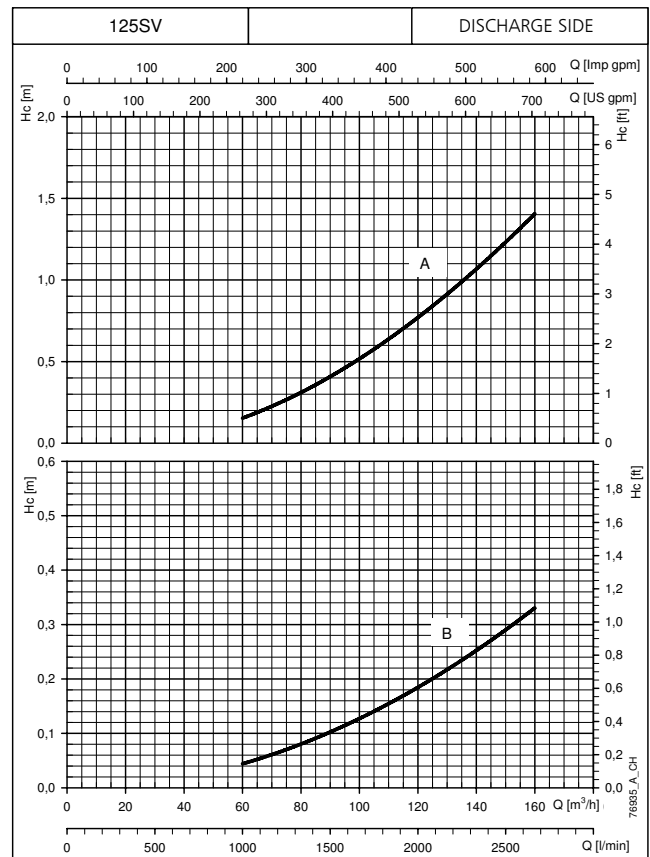
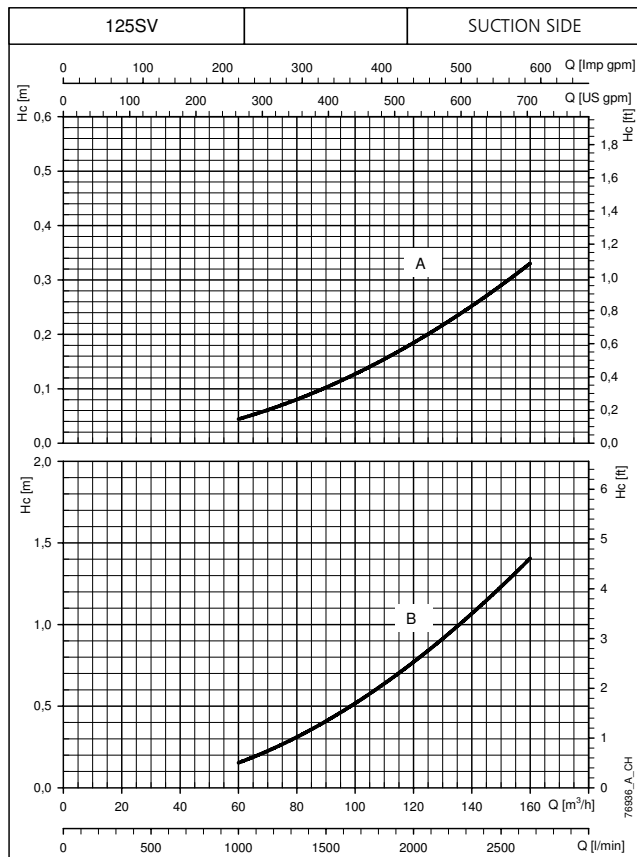
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BOOSTER SETS, GV.../SV SERIES H_c PRESSURE DROP CURVE



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ACCESSORIES

DIAPHRAGM TANKS

The booster sets are ready for installation, directly on the manifold, of 24-litre diaphragm tanks, one for each pump. The sets are also equipped with caps to close off the unused couplings. Larger tanks can also be connected to the unused end of the discharge manifold. For proper sizing of the tank please refer to the technical appendix.

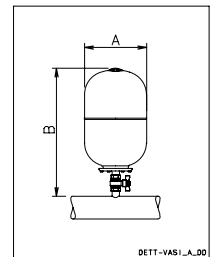
Kits featuring the following accessories are **available on request**:

- diaphragm tank;
- on-off ball valve;
- operating instructions;
- packaging.

DIAPHRAGM TANK KIT

Volume Litres	PN bar	DIMENSIONS (mm)			Materials		
		ø A	B	Valve	Diaphragm	Vessel	Valve
8	8	205	390	1" FF	EPDM	Painted steel	Nickel-plated brass
24	8	270	555	1" FF	EPDM	Painted steel	Nickel-plated brass
24	10	270	555	1" FF	EPDM	Painted steel	Nickel-plated brass
24	16	270	555	1" FF	EPDM	Painted steel	Nickel-plated brass
24	10	270	575	1" FF	Butyl	Stainless steel	AISI 316 Stainless steel

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COUNTERFLANGE KIT

Manifolds up to 3" in diameter are usually supplied with threaded couplings and caps on unused end.

Counterflange coupling kits made of zinc-plated or stainless steel are available on request.

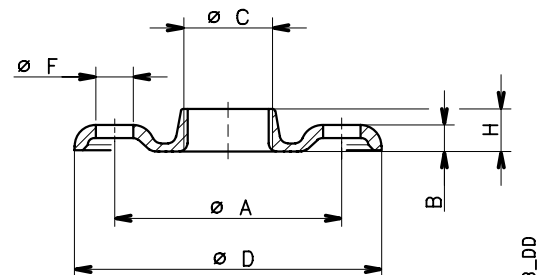
The counterflange kits are equipped with:

- threaded flange.
- gasket and bolts/screws.
- threaded counterflange (weld-on type for 3" diameter).

THREADED COUNTERFLANGES

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

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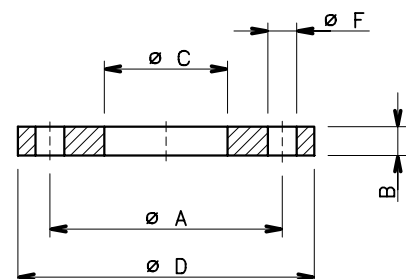


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WELD-ON COUNTERFLANGES

KIT TYPE	DN	ø C	DIMENSIONS (mm)			HOLES		PN
			ø A	B	ø D	ø F	Nº	
2"	50	61	125	19	165	18	4	16
2 1/2"	65	77	145	20	185	18	4	16
3"	80	90	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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RUBBER EXPANSION JOINT KIT

The anti-vibrating joints or compensation joints can be used in order to absorb deformations, expansions, noises in the piping and to reduced ram blows. Moreover they can resist a high degree of empty that allows the absorption of negative expansions for depression.

Being of elastic material it can be become deformed and be dilated facilitating therefore the installation, that it becomes simpler and fast, also in which the piping they are not aligned. It does not need assembly joints.

TABELLA 1 TABLE 1		A-B-C-D non possono essere sommati A-B-C-D can not be cumulative				
GIUNTI ELASTICI RUBBER EXPANSION JOINT		L	A	B	C	D
DN		mm	mm	mm	mm	(°)
32	1"1/4	95	8	4	8	15
40	1"1/2	95	8	4	8	15
50	2"	105	8	5	8	15
65	2"1/2	115	12	6	10	15
80	3"	130	12	6	10	15
100	4"	135	18	10	12	15
125	5"	170	18	10	12	15
150	6"	180	18	10	12	15
200	8"	205	25	14	22	15
250	10"	240	25	14	22	15
300	12"	260	25	14	22	15
350	14"	265	25	16	22	15
400	16"	265	25	16	22	15
450	18"	265	25	16	22	15
500	20"	265	25	16	22	15

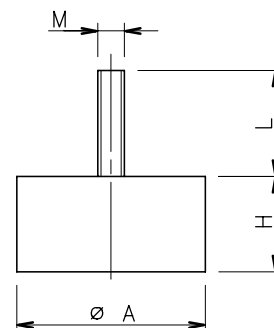
GD_JOINT_A_TD

VIBRATION DAMPERS

TYPE	SHORE	DIMENSIONS (mm)			
		ø A	H	L	M
VIBRATION DAMPER P20X20	60	20	20	18	6
VIBRATION DAMPER P40X30	60	40	30	23	8
VIBRATION DAMPER P100X50	60	100	50	50	16

Note: Available versions M/F and F/F

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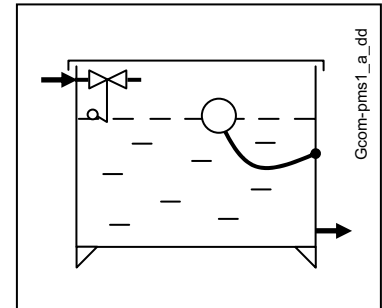
DRY RUNNING PROTECTION SYSTEMS

Dry run shutdown systems should be installed to protect the pumps in case of insufficient water supply.

FLOAT SWITCH PROTECTION METHOD

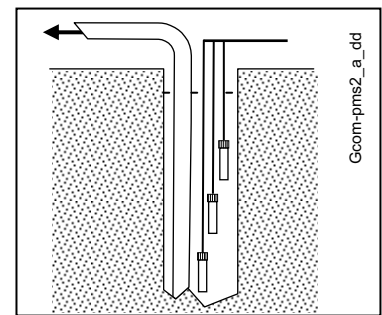
The float switch protection system is used when the water supply comes from open tanks. A float switch immersed in the tank is connected to the electrical panel.

If the water supply is insufficient, the float switch opens the electric contact and the pumps stop running.



ELECTRODE PROBE PROTECTION METHOD

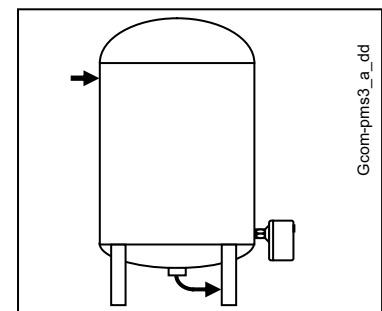
The electrode probe protection system is used when the water supply comes from open tanks or wells. A set of three probes is connected directly to the electronic board in the electrical panel. With the three electrodes immersed in the water, the relay on the electronic board closes the contact, enabling the starting of the pumps. If the water supply is insufficient, the control circuit opens the electric contact and the pumps stop running.



MINIMUM PRESSURE SWITCH PROTECTION METHOD

The minimum pressure switch protection system is used when the water supply comes from water networks or pressurized tanks. The pressure switch is connected to the electronic board in the electrical panel.

If the water supply is insufficient, the pressure switch opens the electric contact and the pumps stop running.

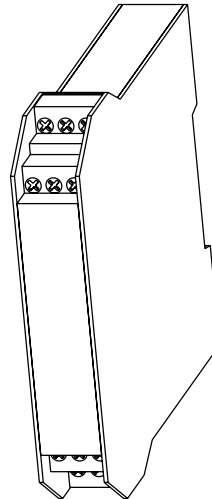


ELECTRONIC MODULE

Depending on the type and version of the installation (GVE, GVF, GVM, GVS) and on the total number of pumps, it is sometimes necessary to connect an additional external relay output module to the MASTER serial port of the SD60 unit. This module is necessary to control starting of the pumps if the relay outputs of the SD60 control unit are exhausted.

Key:

- A= Module of 5 relay outputs
- J = Presence of jockey pump
- R= Presence of standby pump
- B= 10 digital inputs module
pump run status



GV	Booster with only duty pumps				
	2P	3P	4P	5P	6P
E	-	-	-	-	-
F	-	-	A+B	A+B	2A+B
M	-	-	-	-	-
S	-	-	-	-	-

GV	Booster with duty pumps and jockey (fixed speed)				
	J + 1P	J + 2P	J + 3P	J + 4P	J + 5P
E	-	-	-	-	-
F	A	A	A+B	A+B	A+B
M	-	-	-	-	-
S	-	-	-	-	-

GV	Booster with duty pumps, jockey (variable speed) and pump reserve				
	J + R + 1P	J + R + 2P	J + R + 3P	J + R + 4P	
E	-	-	-	-	-
F	A	A+B	A+B	A+B	-
M	-	-	-	-	-
S	-	-	-	-	-

GV_mod_agg-en_b_td

TECHNICAL APPENDIX

WATER REQUIREMENTS IN CIVIL USERS

Determination of the water requirement depends on the type of users and contemporaneity factor. The calculation may be subject to regulations, standards or customs that may vary from country to country. The calculation method shown below is an example based on practical experience, designed to provide a reference value and not a substitute for detailed analytical calculation.

Water requirements in condominiums

The **consumption table** shows the maximum values for each delivery point, depending on the plumbing amenities.

MAXIMUM CONSUMPTION FOR EACH DELIVERY POINT

TYPE	CONSUMPTION (l/min)
Sink	9
Dishwasher	10
Washing machine	12
Shower	12
Bathtub	15
Washbasin	6
Bidet	6
Flush tank WC	6
Controlled flushing system WC	90

G-at-cm_a_th

The **sum of the water consumption values** of each delivery point determines the maximum theoretical requirement, which must be reduced according to the **contemporaneity coefficient**, because in actual fact the delivery points are never used all together.

$f = \frac{1}{\sqrt{(0,857 \times Nr \times Na)}}$	Coefficient for apartments with one bathroom and flush tank WC
$f = \frac{1}{\sqrt{(0,857 \times Nr \times Na)}}$	Coefficient for apartments with one bathroom and controlled flushing system WC
$f = \frac{1,03}{\sqrt{(0,545 \times Nr \times Na)}}$	Coefficient for apartments with two bathrooms and flush tank WC
$f = \frac{0,8}{\sqrt{(0,727 \times Nr \times Na)}}$	Coefficient for apartments with two bathrooms and controlled flushing system WC
f= coefficient; Nr= number of delivery points; Na= number of apartments	

The **table of water requirements in civil users** shows the maximum contemporaneity flow-rate values based on the **number of apartments** and the type of WC for apartments with one bathroom and two bathrooms. As regards apartments with one bathroom, 7 drawing points have been taken into consideration, while 11 points have been considered for apartments with two bathrooms. If the number of drawing points or apartments is different, use the formulas to **calculate** the requirement.

TABLE OF WATER REQUIREMENTS IN CIVIL USERS

NUMBER OF APARTMENTS	WITH FLUSH TANK WC		WITH CONTROLLED FLUSHING SYSTEM WC	
	1	2	1	2
	FLOW RATE (l/min)			
1	32	40	60	79
2	45	56	85	111
3	55	68	105	136
4	63	79	121	157
5	71	88	135	176
6	78	97	148	193
7	84	105	160	208
8	90	112	171	223
9	95	119	181	236
10	100	125	191	249
11	105	131	200	261
12	110	137	209	273
13	114	143	218	284
14	119	148	226	295
15	123	153	234	305
16	127	158	242	315
17	131	163	249	325
18	134	168	256	334
19	138	172	263	343
20	142	177	270	352
21	145	181	277	361
22	149	185	283	369
23	152	190	290	378
24	155	194	296	386
25	158	198	302	394
26	162	202	308	401
27	165	205	314	409
28	168	209	320	417
29	171	213	325	424
30	174	217	331	431
35	187	234	357	466
40	200	250	382	498
45	213	265	405	528
50	224	280	427	557
55	235	293	448	584
60	245	306	468	610
65	255	319	487	635
70	265	331	506	659
75	274	342	523	682
80	283	354	540	704
85	292	364	557	726
90	301	375	573	747
95	309	385	589	767
100	317	395	604	787
120	347	433	662	863
140	375	468	715	932
160	401	500	764	996
180	425	530	811	1056
200	448	559	854	1114

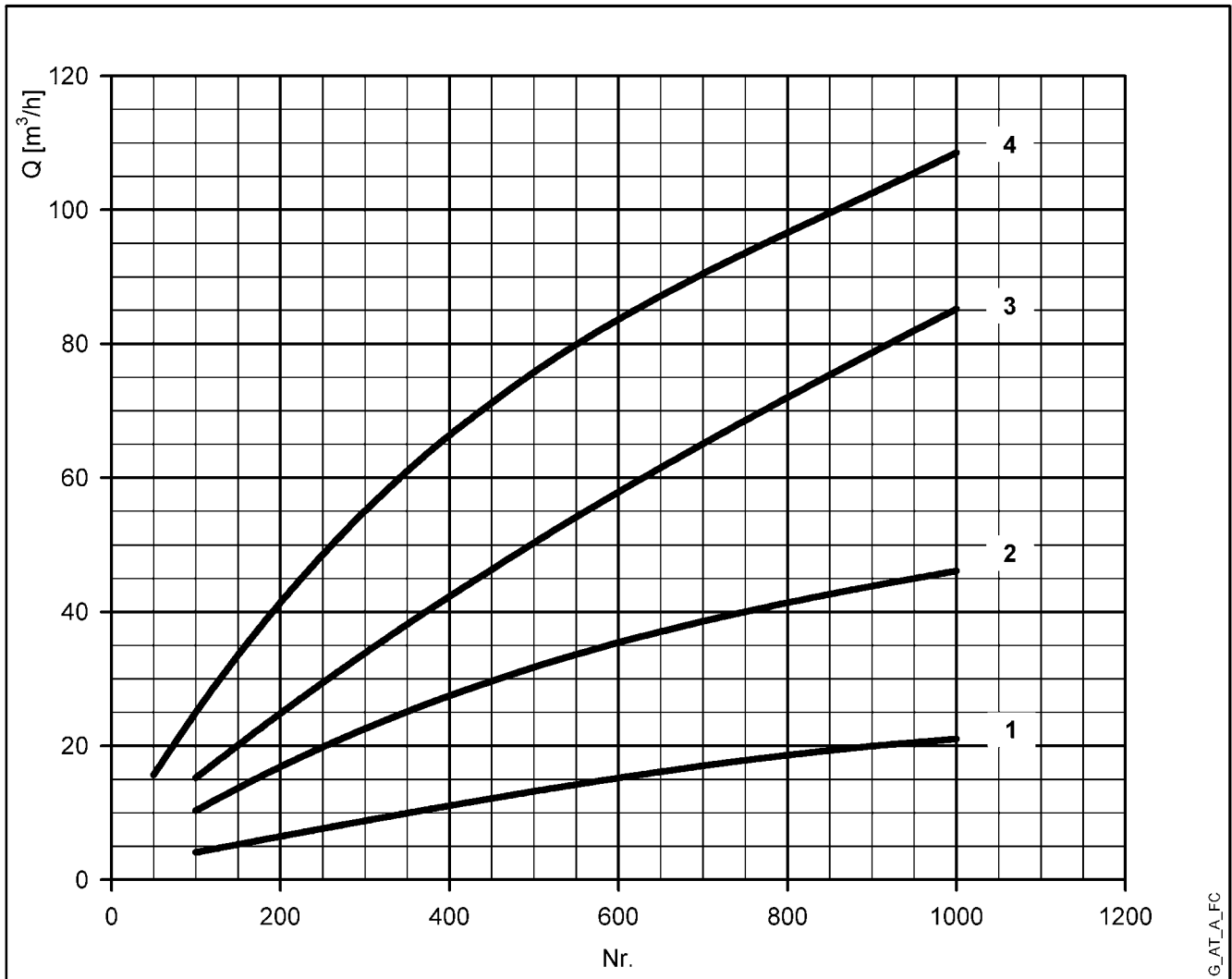
For seaside resorts, a flow rate increased by at least 20% must be considered.

G-at-fi_a_th

WATER REQUIREMENTS FOR COMMUNITY BUILDINGS

The requirements of buildings intended for specific uses, such as **offices, residential units, hotels, department stores, nursing homes** and so on, are different from those of condominiums, and both their global daily water consumption and the maximum contemporaneity flow rate are usually greater. The **diagram of water requirements for community buildings** shows the maximum contemporaneity flow rate of some types of communities, for guidance.

These requirements must be determined case by case with the utmost accuracy, using analytical calculation methods, according to particular needs and local provisions.



For seaside resorts, the flow rate must be increased by at least 20%.

- 1 = Offices (N. of people)
- 2 = Department stores (N. of people)
- 3 = Nursing homes (N. of beds)
- 4 = Hotels, residences (N. of beds)

USE OF BOOSTER SET

Water is usually delivered by public supply systems and the pressure is generally sufficient for the proper operation of the users' water and sanitary equipment.

When this pressure is not sufficient, booster sets are employed to increase water pressure and ensure an acceptable minimum value at the furthest points. Therefore, the water supply to a building, group of buildings or to a system in general can be considered satisfactory when all the user points can deliver the required quantity of water.

Set connection methods (intake side)

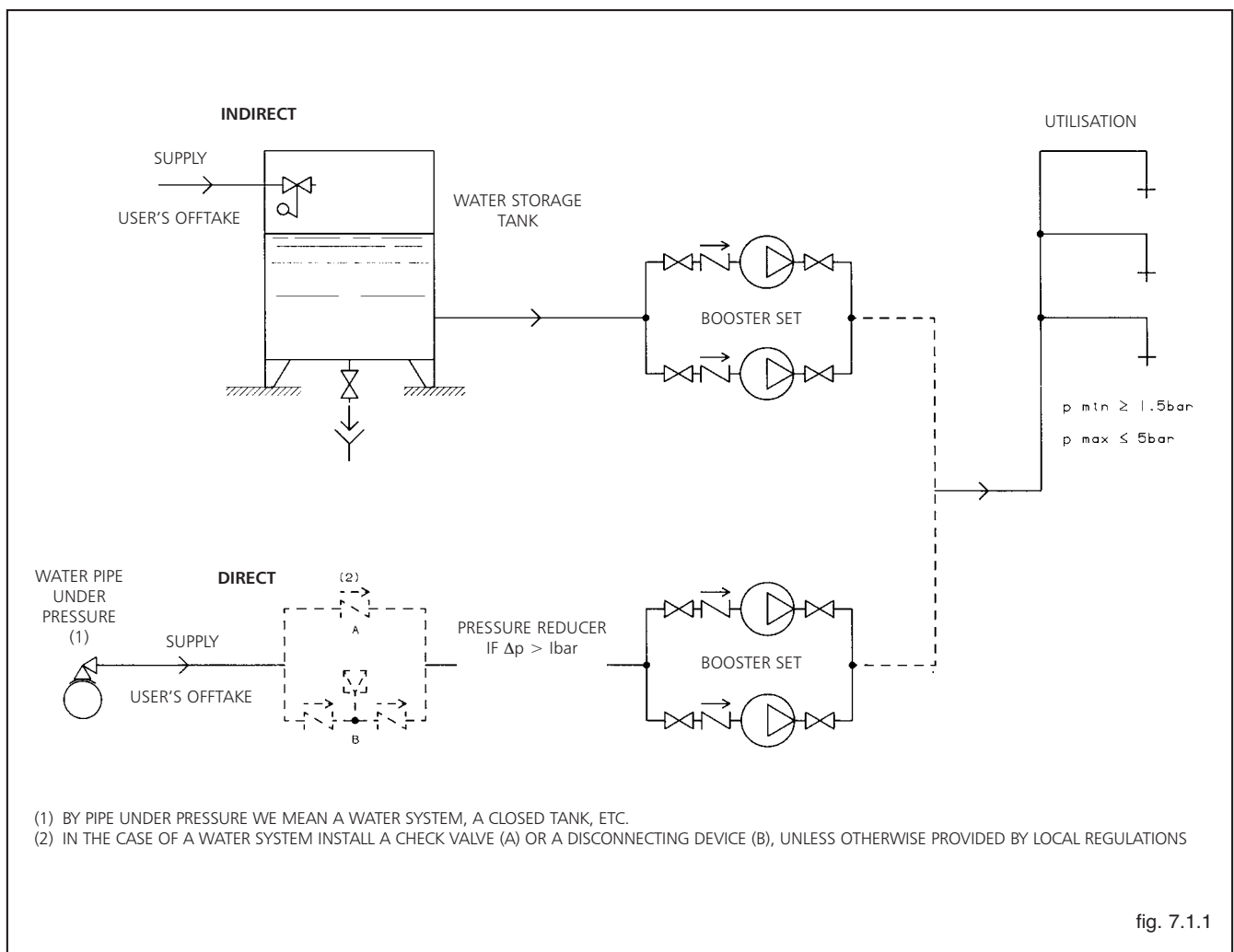
Water can be supplied to a booster set in two ways:

- 1 - By installing a water storage tank between the user's offtake and the booster set (indirect connection, fig. 7.1.1).
- 2 - By connecting the booster set directly between the user's offtake and the system (direct connection, fig. 7.1.1).

The indirect connection does not allow the water system pressure to be utilized. Therefore, it requires pumps with greater head.

The direct connection allows the water system pressure to be utilized, provided the pressure fluctuation (Δp) does not exceed 1 bar.

If it does, a pressure reducer must be installed for proper operation of the booster set.

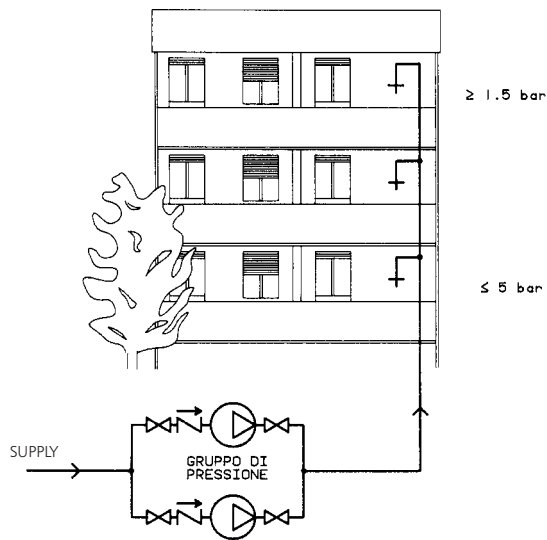


Water supply systems in civil buildings

The configuration of the supply system must comply with the following conditions:

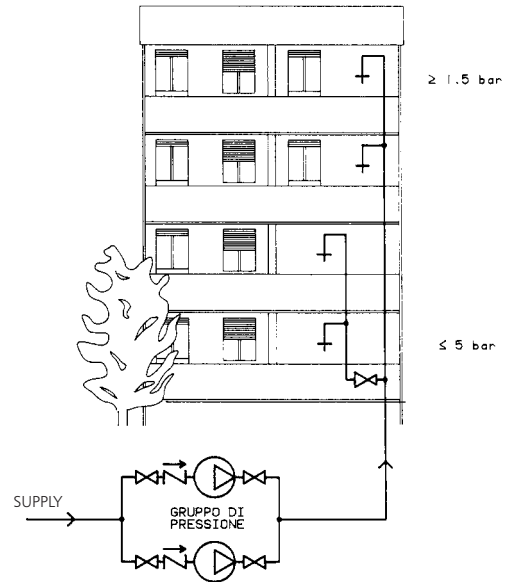
- The minimum pressure ensuring the proper operation of the equipment must be guaranteed at the most unfavourable drawing point (1.5 bar for valves and flush tank WC, and 2 bar for controlled flushing system WC).
- At the most favourable drawing point, pressure must not exceed 5 bar.

Once these parameters have been satisfied, in relation to the height of the building and to the set intake conditions, the water supply system can have one of the following configurations:



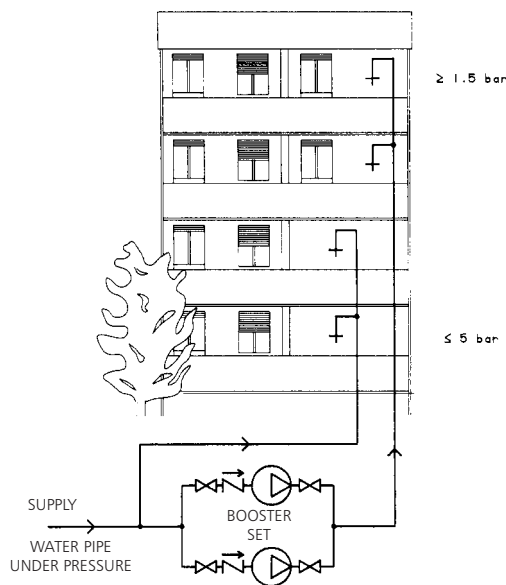
A) THE SET SERVES THE ENTIRE BUILDING

fig. 7.1.2



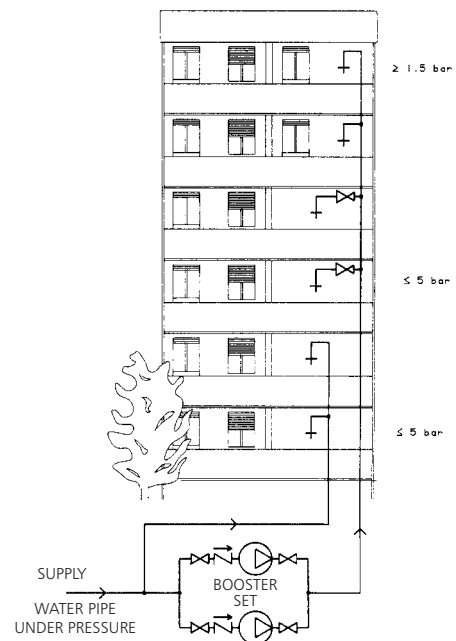
B) THE SET SERVES THE ENTIRE BUILDING, BUT THE LOWER FLOORS ARE CONNECTED THROUGH A PRESSURE REDUCER SINCE THE PRESSURE TO THE NEAREST UTILIZATION POINTS IS TOO HIGH

fig. 7.1.3



C) THE SET SERVES THE UPPER FLOORS, WHEREAS THE LOWER FLOORS ARE SUPPLIED BY THE WATER PIPE UNDER PRESSURE

fig. 7.1.4



D) THIS CASE RESEMBLES THE PREVIOUS ONE EXCEPT THAT PRESSURE REDUCERS NEED TO BE INSTALLED ON SOME OF THE LOWER FLOORS

fig. 7.1.5

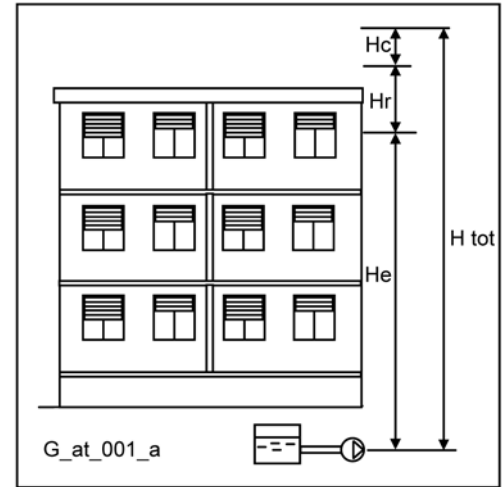
DETERMINING THE HEAD OF THE SET AND INTAKE CONDITIONS

Level intake

The delivery head of the set (H tot) is the sum of:

- He : geodetic difference in level between the set and the furthest delivery point.
- Hc : flow resistance along all the pipes and through other system components, such as valves, filters, etc..
- Hr : pressure required at the most unfavourable point.

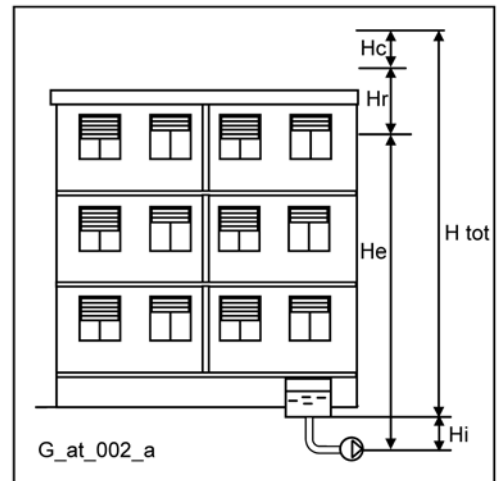
$$H_{tot} = H_e + H_c + H_r$$



Intake with positive head

In this case, the necessary delivery head (H tot) will be reduced by the inlet pressure value (Hi).

$$H_{tot} = H_e + H_c + H_r - H_i$$

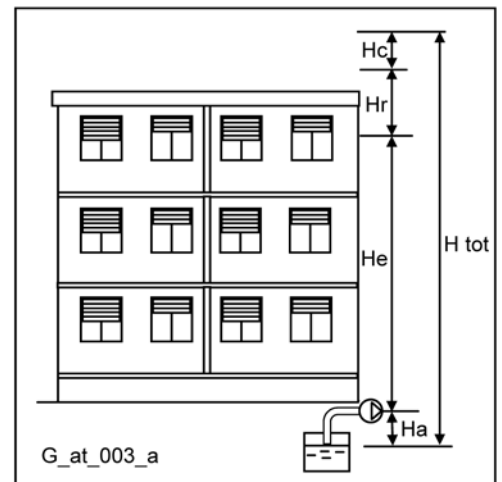


Intake with negative head

When the pumps suck from an underground tank or well, the necessary head will be increased by the value of the intake height (Ha):.

$$H_{tot} = H_e + H_c + H_r + H_a$$

In this case the intake height must be considered very carefully, bearing in mind that an excessive difference in level between the water storage tank and the set, or the wrong sizing of the intake pipe, can have adverse effects on pump operation, such as cavitation and unpriming.



NPSH

The minimum operating values that can be reached at the pump suction end are limited by the onset of cavitation.

Cavitation is the formation of vapour-filled cavities within liquids where the pressure is locally reduced to a critical value, or where the local pressure is equal to, or just below the vapour pressure of the liquid.

The vapour-filled cavities flow with the current and when they reach a higher pressure area the vapour contained in the cavities condenses. The cavities collide, generating pressure waves that are transmitted to the walls. These, being subjected to stress cycles, gradually become deformed and yield due to fatigue. This phenomenon, characterized by a metallic noise produced by the hammering on the pipe walls, is called incipient cavitation.

The damage caused by cavitation may be magnified by electrochemical corrosion and a local rise in temperature due to the plastic deformation of the walls. The materials that offer the highest resistance to heat and corrosion are alloy steels, especially austenitic steel. The conditions that trigger cavitation may be assessed by calculating the total net suction head, referred to in technical literature with the acronym NPSH (Net Positive Suction Head).

The NPSH represents the total energy (expressed in m.) of the liquid measured at suction under conditions of incipient cavitation, excluding the vapour pressure (expressed in m.) that the liquid has at the pump inlet.

To find the static height h_z at which to install the machine under safe conditions, the following formula must be verified:

$$h_p + h_z \geq (\text{NPSH}_r + 0.5) + h_f + h_{pv} \quad ①$$

where:

- h_p** is the absolute pressure applied to the free liquid surface in the suction tank, expressed in m. of liquid; h_p is the quotient between the barometric pressure and the specific weight of the liquid.
- h_z** is the suction lift between the pump axis and the free liquid surface in the suction tank, expressed in m.; h_z is negative when the liquid level is lower than the pump axis.
- h_f** is the flow resistance in the suction line and its accessories, such as: fittings, foot valve, gate valve, elbows, etc.
- h_{pv}** is the vapour pressure of the liquid at the operating temperature, expressed in m. of liquid. h_{pv} is the quotient between the P_v vapour pressure and the liquid's specific weight.
- 0,5** is the safety factor.

The maximum possible suction head for installation depends on the value of the atmospheric pressure (i.e. the elevation above sea level at which the pump is installed) and the temperature of the liquid.

To help the user, with reference to water temperature (4° C) and to the elevation above sea level, the following tables show the drop in hydraulic pressure head in relation to the elevation above sea level, and the suction loss in relation to temperature.

Water temperature (°C)	20	40	60	80	90	110	120
Suction loss (m)	0,2	0,7	2,0	5,0	7,4	15,4	21,5

Elevation above sea level (m)	500	1000	1500	2000	2500	3000
Suction loss (m)	0,55	1,1	1,65	2,2	2,75	3,3

Friction loss is shown in the tables at pages 135-136 of this catalogue. To reduce it to a minimum, especially in cases of high suction head (over 4-5 m.) or within the operating limits with high flow rates, we recommend using a suction line having a larger diameter than that of the pump's suction port. It is always a good idea to position the pump as close as possible to the liquid to be pumped.

Make the following calculation:

Liquid: water at ~15°C $\gamma = 1 \text{ kg/dm}^3$

Flow rate required: 30 m³/h

Head for required delivery: 43 m.

Suction lift: 3,5 m.

The selection is an FHE 40-200/75 pump whose NPSH required value is, at 30 m³/h, di 2,5 m.

For water at 15 °C

$$h_p = P_a / \gamma = 10,33\text{m}, h_{pv} = P_v / \gamma = 0,174\text{m} (0,01701 \text{ bar})$$

The H_f flow resistance in the suction line with foot valves is ~ 1,2 m.

By substituting the parameters in formula ① with the numeric values above, we have:

$$10,33 + (-3,5) \geq (2,5 + 0,5) + 1,2 + 0,17$$

from which we have: 6,8 > 4,4

The relation is therefore verified.

TECHNICAL APPENDIX VAPOUR PRESSURE PS VAPOUR PRESSURE AND ρ DENSITY OF WATER TABLE

t °C	T K	ps bar	ρ kg/dm ³	t °C	T K	ps bar	ρ kg/dm ³	t °C	T K	ps bar	ρ kg/dm ³
0	273,15	0,00611	0,9998	55	328,15	0,15741	0,9857	120	393,15	1,9854	0,9429
1	274,15	0,00657	0,9999	56	329,15	0,16511	0,9852	122	395,15	2,1145	0,9412
2	275,15	0,00706	0,9999	57	330,15	0,17313	0,9846	124	397,15	2,2504	0,9396
3	276,15	0,00758	0,9999	58	331,15	0,18147	0,9842	126	399,15	2,3933	0,9379
4	277,15	0,00813	1,0000	59	332,15	0,19016	0,9837	128	401,15	2,5435	0,9362
5	278,15	0,00872	1,0000	60	333,15	0,1992	0,9832	130	403,15	2,7013	0,9346
6	279,15	0,00935	1,0000	61	334,15	0,2086	0,9826	132	405,15	2,867	0,9328
7	280,15	0,01001	0,9999	62	335,15	0,2184	0,9821	134	407,15	3,041	0,9311
8	281,15	0,01072	0,9999	63	336,15	0,2286	0,9816	136	409,15	3,223	0,9294
9	282,15	0,01147	0,9998	64	337,15	0,2391	0,9811	138	411,15	3,414	0,9276
10	283,15	0,01227	0,9997	65	338,15	0,2501	0,9805	140	413,15	3,614	0,9258
11	284,15	0,01312	0,9997	66	339,15	0,2615	0,9799	145	418,15	4,155	0,9214
12	285,15	0,01401	0,9996	67	340,15	0,2733	0,9793	155	428,15	5,433	0,9121
13	286,15	0,01497	0,9994	68	341,15	0,2856	0,9788	160	433,15	6,181	0,9073
14	287,15	0,01597	0,9993	69	342,15	0,2984	0,9782	165	438,15	7,008	0,9024
15	288,15	0,01704	0,9992	70	343,15	0,3116	0,9777	170	443,15	7,920	0,8973
16	289,15	0,01817	0,9990	71	344,15	0,3253	0,9770	175	448,15	8,924	0,8921
17	290,15	0,01936	0,9988	72	345,15	0,3396	0,9765	180	453,15	10,027	0,8869
18	291,15	0,02062	0,9987	73	346,15	0,3543	0,9760	185	458,15	11,233	0,8815
19	292,15	0,02196	0,9985	74	347,15	0,3696	0,9753	190	463,15	12,551	0,8760
20	293,15	0,02337	0,9983	75	348,15	0,3855	0,9748	195	468,15	13,987	0,8704
21	294,15	0,24850	0,9981	76	349,15	0,4019	0,9741	200	473,15	15,550	0,8647
22	295,15	0,02642	0,9978	77	350,15	0,4189	0,9735	205	478,15	17,243	0,8588
23	296,15	0,02808	0,9976	78	351,15	0,4365	0,9729	210	483,15	19,077	0,8528
24	297,15	0,02982	0,9974	79	352,15	0,4547	0,9723	215	488,15	21,060	0,8467
25	298,15	0,03166	0,9971	80	353,15	0,4736	0,9716	220	493,15	23,198	0,8403
26	299,15	0,03360	0,9968	81	354,15	0,4931	0,9710	225	498,15	25,501	0,8339
27	300,15	0,03564	0,9966	82	355,15	0,5133	0,9704	230	503,15	27,976	0,8273
28	301,15	0,03778	0,9963	83	356,15	0,5342	0,9697	235	508,15	30,632	0,8205
29	302,15	0,04004	0,9960	84	357,15	0,5557	0,9691	240	513,15	33,478	0,8136
30	303,15	0,04241	0,9957	85	358,15	0,5780	0,9684	245	518,15	36,523	0,8065
31	304,15	0,04491	0,9954	86	359,15	0,6011	0,9678	250	523,15	39,776	0,7992
32	305,15	0,04753	0,9951	87	360,15	0,6249	0,9671	255	528,15	43,246	0,7916
33	306,15	0,05029	0,9947	88	361,15	0,6495	0,9665	260	533,15	46,943	0,7839
34	307,15	0,05318	0,9944	89	362,15	0,6749	0,9658	265	538,15	50,877	0,7759
35	308,15	0,05622	0,9940	90	363,15	0,7011	0,9652	270	543,15	55,058	0,7678
36	309,15	0,05940	0,9937	91	364,15	0,7281	0,9644	275	548,15	59,496	0,7593
37	310,15	0,06274	0,9933	92	365,15	0,7561	0,9638	280	553,15	64,202	0,7505
38	311,15	0,06624	0,9930	93	366,15	0,7849	0,9630	285	558,15	69,186	0,7415
39	312,15	0,06991	0,9927	94	367,15	0,8146	0,9624	290	563,15	74,461	0,7321
40	313,15	0,07375	0,9923	95	368,15	0,8453	0,9616	295	568,15	80,037	0,7223
41	314,15	0,07777	0,9919	96	369,15	0,8769	0,9610	300	573,15	85,927	0,7122
42	315,15	0,08198	0,9915	97	370,15	0,9094	0,9602	305	578,15	92,144	0,7017
43	316,15	0,09639	0,9911	98	371,15	0,9430	0,9596	310	583,15	98,70	0,6906
44	317,15	0,09100	0,9907	99	372,15	0,9776	0,9586	315	588,15	105,61	0,6791
45	318,15	0,09582	0,9902	100	373,15	1,0133	0,9581	320	593,15	112,89	0,6669
46	319,15	0,10086	0,9898	102	375,15	1,0878	0,9567	325	598,15	120,56	0,6541
47	320,15	0,10612	0,9894	104	377,15	1,1668	0,9552	330	603,15	128,63	0,6404
48	321,15	0,11162	0,9889	106	379,15	1,2504	0,9537	340	613,15	146,05	0,6102
49	322,15	0,11736	0,9884	108	381,15	1,3390	0,9522	350	623,15	165,35	0,5743
50	323,15	0,12335	0,9880	110	383,15	1,4327	0,9507	360	633,15	186,75	0,5275
51	324,15	0,12961	0,9876	112	385,15	1,5316	0,9491	370	643,15	210,54	0,4518
52	325,15	0,13613	0,9871	114	387,15	1,6362	0,9476	374,15	647,30	221,20	0,3154
53	326,15	0,14293	0,9862	116	389,15	1,7465	0,9460				
54	327,15	0,15002	0,9862	118	391,15	1,8628	0,9445				

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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 diaphragm 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 diaphragm version, neither air supply units nor compressor are needed, as contact between air and water is prevented by a flexible diaphragm 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.

DIAPHRAGM TANK

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

$$V_m = \frac{Q_p}{4 \times Z} \times \frac{1}{1 - \frac{(P_{min} - 2)}{P_{max}}}$$

where:

- V_m = Total volume of the air-cushion surge tank in m^3
- Q_p = Average pump flow rate in m^3/h
- P_{max} = Maximum pressure setting (wcm)
- P_{min} = Minimum pressure setting (wcm)
- Z = Maximum number of starts per hour allowed by the motor

Example:

CN 32 - 160/22 pump

P_{max} = 32 mca

P_{min} = 22 mca

Q_p = 18 m^3/h

Z = 30

$$V_m = \frac{Q_p}{4 \times Z} \times \frac{1}{1 - \frac{(P_{min} - 2)}{P_{max}}} = 0,4 \text{ m}^3$$

A 500-litre surge tank is therefore required.

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			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	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

G-at-pct_a_th

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

V = water speed (m/s)

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	-	-	-	0,2	0,2	0,2	0,4	0,4	0,6	0,9	1,1	1,3
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

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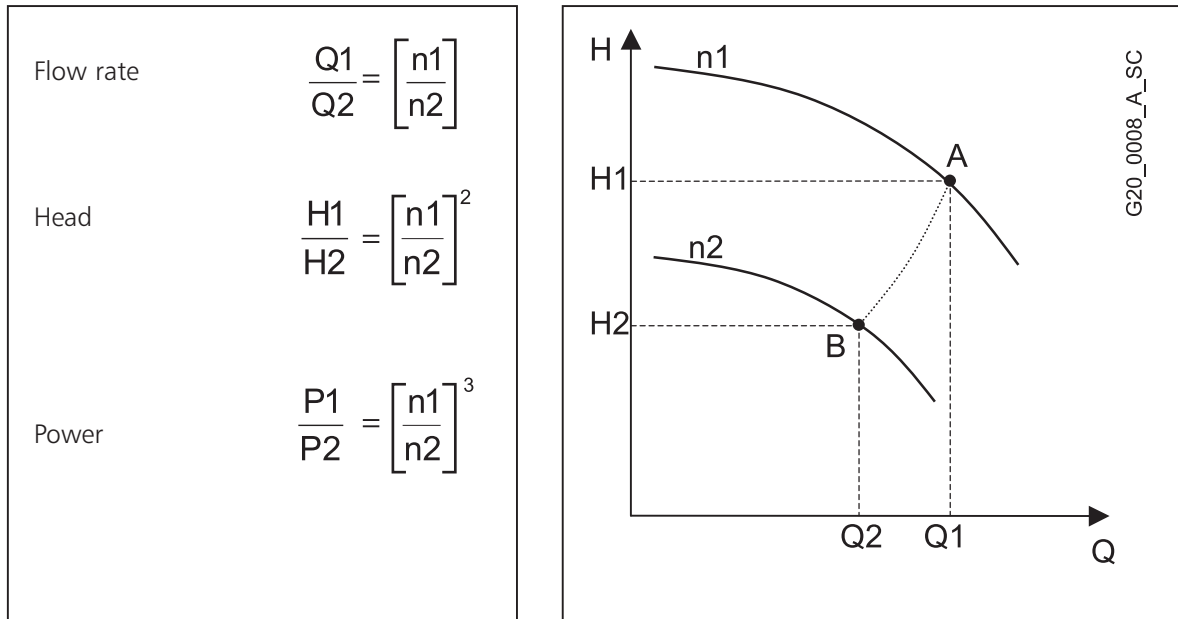
The table is valid for the Hazen Williams coefficient $C = 100$ (cast iron pipework). For steel pipework, multiply the values by 1.41. For stainless steel, copper and coated cast iron pipework, multiply the values by 1.85.

When the **equivalent pipeline length** has been determined, the flow resistance is obtained from the table of flow resistance.

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 the manufacturers.

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.



$n1$ = 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 $n1 = 2900$ (point A)

Flow rate (A) = 100 l/min; Head (A) = 50m

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 DIAPHRAGM TANK IN SYSTEMS WITH SPEED VARIATION

Variable speed booster sets need **smaller tanks** compared to traditional systems. Generally speaking, a tank with a litre capacity of just 10% of the nominal capacity of a single pump, expressed in litres 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 tank 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 tank is 40 litres. This size can be obtained by using two 24-litre tanks mounted directly onto the set's manifold.

The calculation establishes the minimum value needed for proper operation.

ACCESSORIES/SPARE PARTS



PRESSURE SWITCH



FLOAT SWITCHES



VALVES



CYLINDER WATER TANK



NON-RETURN VALVES



COUPLINGS



PRESSURE TRANSMITTER

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	Imp. gal. per minute Imp. gal./min	US gal. 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 ₂ O	millimetre of mercury mm Hg
1,0000	0,0010	1 x 10 ⁻⁵	1.45 x 10 ⁻⁴	1.02 x 10 ⁻⁴	0,0075
1000,0000	1,0000	0,0100	0,1450	0,1020	7,5006
1 x 10 ⁵	100,0000	1,0000	14,5038	10,1972	750,0638
6894,7570	6,8948	0,0689	1,0000	0,7031	51,7151
9806,6500	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
1000,0000	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

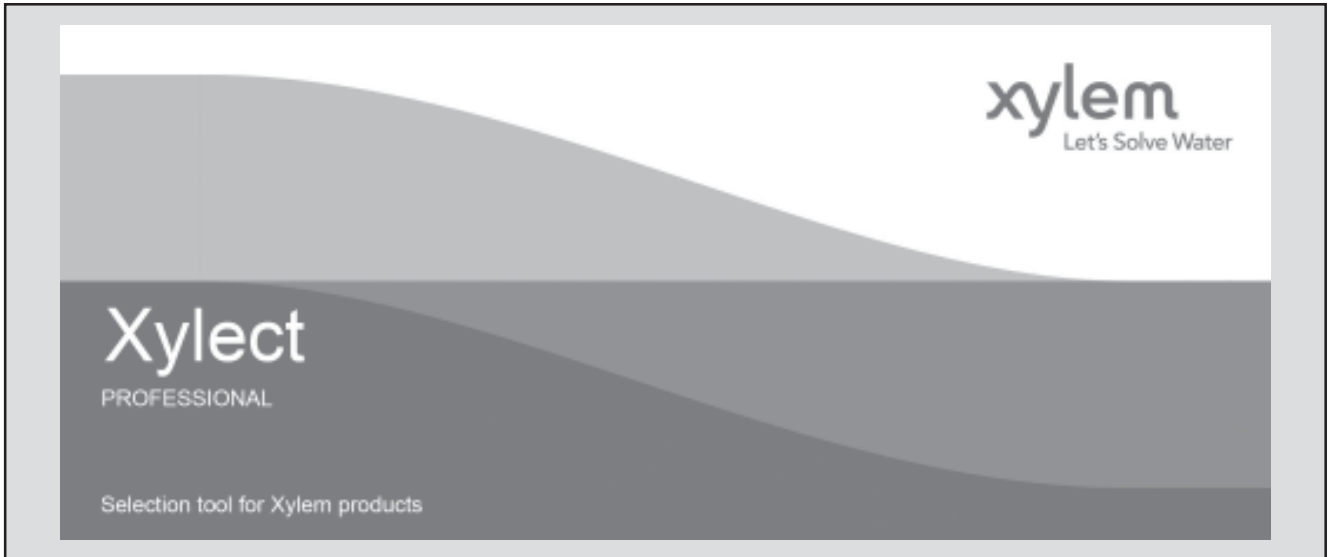
VOLUME

cubic metre m ³	litre litro	millilitre ml	imp. Gallon imp. gal.	US gallon US gal.	cubic foot ft ³
1,0000	1000,0000	1 x 10 ⁶	219,9694	264,1720	35,3147
0,0010	1,0000	1000,0000	0,2200	0,2642	0,0353
1 x 10 ⁻⁶	0,0010	1,0000	2.2 x 10 ⁻⁴	2.642 x 10 ⁻⁴	3.53 x 10 ⁻⁵
0,0045	4,5461	4546,0870	1,0000	1,2009	0,1605
0,0038	3,7854	3785,4120	0,8327	1,0000	0,1337
0,0283	28,3168	28316,8466	6,2288	7,4805	1,0000

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FURTHER PRODUCT SELECTION AND DOCUMENTATION

Xylect



Xylect is pump solution selection software with an extensive online database of product information across the entire Lowara, and Vogel 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.

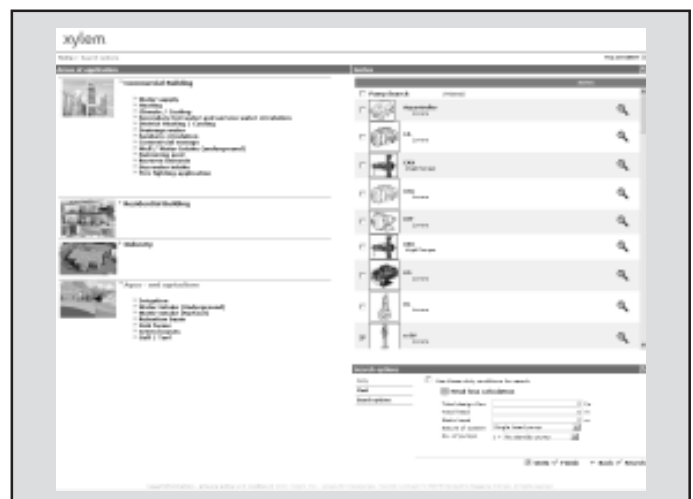
The possibility to search by applications and the detailed information output given makes it easy to make the optimal selection without having detailed knowledge about the Lowara and Vogel products.

The search can be made by:

- Application
- Product type
- Duty point

Xylect gives a detailed output:

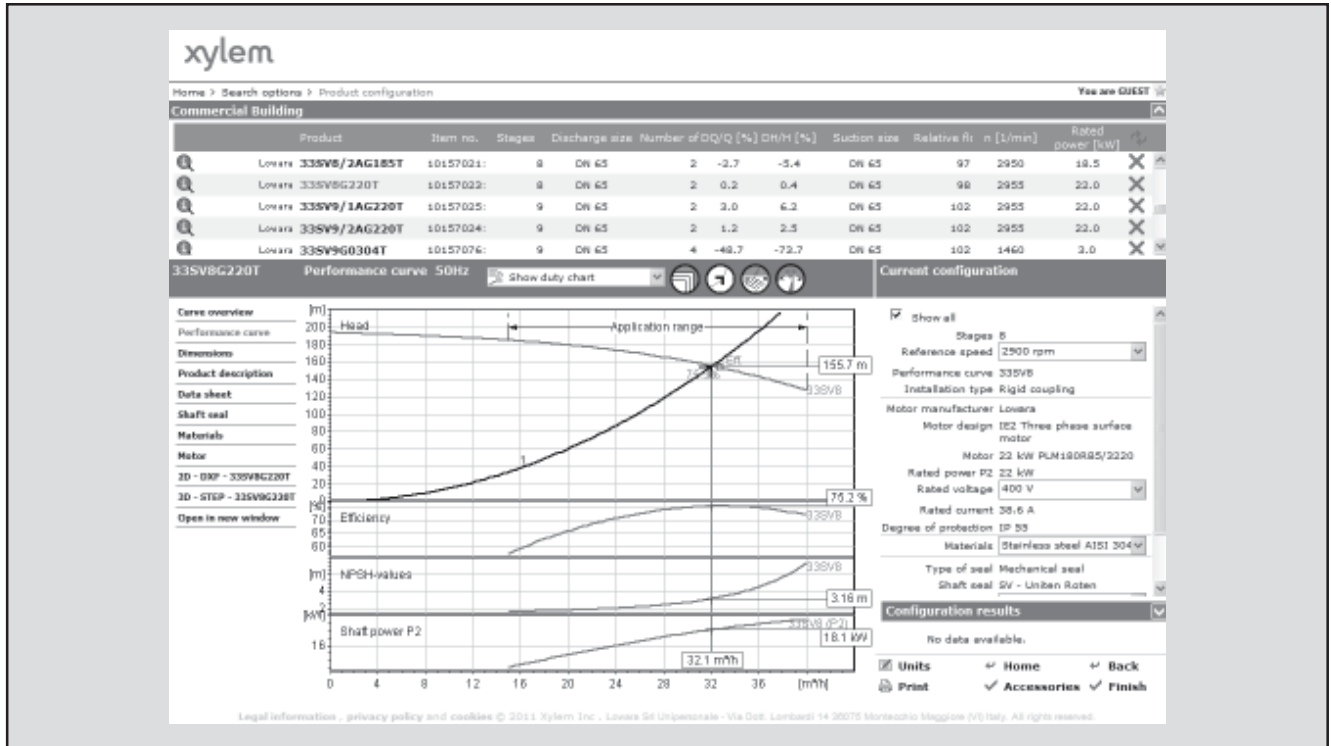
- List with search results
- Performance curves (flow, head, power, efficiency, NPSH)
- Motor data
- Dimensional drawings
- Options
- Data sheet printouts
- Document downloads incl dxf files



The search by application guides users not familiar with the product range to the right choice.

FURTHER PRODUCT SELECTION AND DOCUMENTATION

Xylect



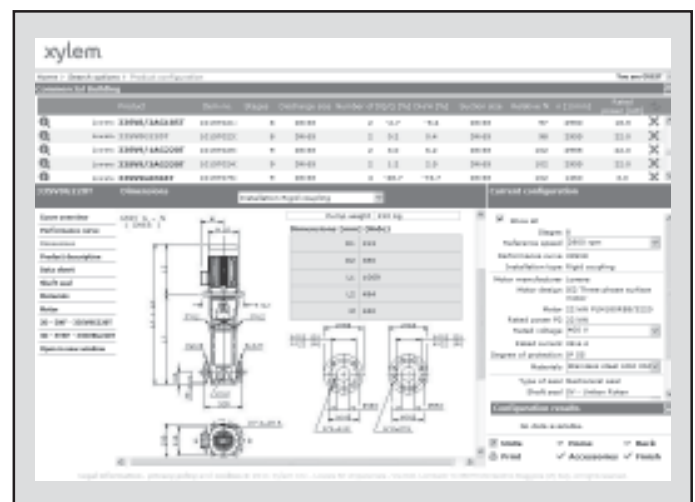
The detailed output makes it easy to select the optimal pump from the given alternatives.

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

- Set own standard units
- Create and save projects
- Share projects with other Xylect users

Every user has a My Xylect space, where all projects are saved.

For more information about Xylect please contact our sales network or visit www.xylect.com.



Dimensional drawings appear on the screen and can be downloaded in dxf format.

BOOSTER SETS, GVF SERIES WITH ELECTRIC PUMPS e-SV™ THREE-PHASE MOTORS AT 50 Hz, 2-POLE (up to 22 kW)

P _N kW	Efficiency η_N %																		IE	Year of manufacture
	Δ 220 V Y 380 V			Δ 230 V Y 400 V			Δ 240 V Y 415 V			Δ 380 V Y 660 V			Δ 400 V Y 690 V			Δ 415 V				
	4/4	3/4	2/4	4/4	3/4	2/4	4/4	3/4	2/4	4/4	3/4	2/4	4/4	3/4	2/4	4/4	3/4	2/4		
0,37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	By June 2011
0,55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
0,75	82,5	83,1	81,3	82,8	82,7	80,1	82,6	82,0	78,9	82,5	82,0	78,9	82,5	82,0	78,9	82,5	82,0	78,9	3	
1,1	84,0	84,7	83,4	84,4	84,5	82,5	84,3	84,0	81,4	84,0	84,0	81,4	84,0	84,0	81,4	84,0	84,0	81,4		
1,5	85,6	86,5	85,8	85,9	86,4	84,9	86,0	86,0	84,0	85,6	86,0	84,0	85,6	86,0	84,0	85,6	86,0	84,0		
2,2	83,7	83,7	83,7	83,7	83,7	83,7	83,7	83,7	83,7	83,7	83,7	83,7	83,7	83,7	83,7	83,7	83,7	83,7	2	
3	85,5	86,8	85,6	86,1	86,8	85,6	86,3	86,8	85,6	85,5	86,8	85,6	85,5	86,8	85,6	85,5	86,8	85,6		
4	86,3	86,3	86,3	86,3	86,3	86,3	86,3	86,3	86,3	86,3	86,3	86,3	86,3	86,3	86,3	86,3	86,3	86,3		
5,5	87,6	87,6	87,6	87,6	87,6	87,6	87,6	87,6	87,6	87,6	87,6	87,6	87,6	87,6	87,6	87,6	87,6	87,6	2	
7,5	88,6	88,1	88,1	88,6	88,1	88,1	88,6	88,1	88,1	88,6	88,1	88,1	88,6	88,1	88,1	88,6	88,1	88,1		
11	90,3	91,1	90,3	90,3	91,1	90,3	90,3	91,1	90,3	90,3	91,1	90,3	90,8	91,1	90,3	91,0	91,1	90,3		
15	90,3	90,3	90,3	90,3	90,3	90,3	90,3	90,3	90,3	90,3	90,3	90,3	90,3	90,3	90,3	90,3	90,3	90,3		
18,5	91,2	91,2	91,2	91,2	91,2	91,2	91,2	91,2	91,2	91,2	91,2	91,2	91,2	91,2	91,2	91,2	91,2	91,2		
22	91,3	91,3	91,3	91,3	91,3	91,3	91,3	91,3	91,3	91,3	91,3	91,3	91,3	91,3	91,3	91,3	91,3	91,3		

P _N kW	Manufacturer	IEC SIZE*	Construction Design	N. of Poles	f _N Hz	Data for 400 V / 50 Hz Voltage				
	Lowara srl Unipersonale Reg. No. 341820260 Montecchio Maggiore Vicenza - Italia					cosφ	Is / I _N	T _N Nm	Ts/T _N	Tm/Tn
	Model									
0,37	SM71RB14/304	71R	V1/B14	2	50	0,66	4,32	1,38	4,14	3,13
0,55	SM71B14/305	71				0,74	5,97	1,85	3,74	3,56
0,75	SM80B14/307PE	80				0,78	7,38	2,48	3,57	3,75
1,1	SM80B14/311PE	80				0,79	8,31	3,63	3,95	3,95
1,5	SM90RB14/315PE	90R				0,80	8,80	4,96	4,31	4,10
2,2	PLM90B14/322	90				0,80	8,63	7,25	3,74	3,71
3	PLM100RB14/330	100R				0,82	8,39	9,96	3,50	3,32
4	PLM112RB14/340	112R				0,85	9,52	13,1	3,04	4,40
5,5	PLM132RB5/355	132R	V1/B5			0,87	10,3	18,1	4,43	5,80
7,5	PLM132B5/375	132				0,87	9,21	24,5	3,26	4,55
11	PLM160RB5/3110	160R				0,87	9,72	36,0	3,46	4,56
15	PLM160B5/3150	160				0,91	8,45	48,6	2,26	3,81
18,5	PLM160B5/3185	160				0,88	9,75	59,8	2,82	4,53
22	PLM180RB5/3220	180R				0,89	9,50	71,1	2,74	4,26

P _N kW	Voltage U _N V											n _N min ⁻¹	Observe the regulations and codes locally in force regarding sorted waste disposal.	Operating conditions **		
	Δ			Y			Δ			Y				Altitude Above Sea Level (m)	T. amb min/max °C	ATEX
	220 V	230 V	240 V	380 V	400 V	415 V	380 V	400 V	415 V	660 V	690 V					
	I _N (A)															
0,37	2,20	2,34	2,51	1,27	1,35	1,45	-	-	-	-	-	2740 ÷ 2790	≤ 1000	-15 / 40	No	
0,55	2,56	2,56	2,62	1,48	1,48	1,51	-	-	-	-	-	2825 ÷ 2850				
0,75	2,96	2,94	2,96	1,71	1,70	1,71	1,70	1,69	1,70	0,98	0,98	2875 ÷ 2895				
1,1	4,19	4,14	4,16	2,42	2,39	2,40	2,41	2,38	2,38	1,39	1,37	2870 ÷ 2900				
1,5	5,56	5,49	5,51	3,21	3,17	3,18	3,21	3,18	3,19	1,85	1,84	2870 ÷ 2895				
2,2	8,05	8,04	8,09	4,65	4,64	4,67	4,62	4,61	4,63	2,67	2,66	2885 ÷ 2900				
3	10,8	10,6	10,6	6,23	6,14	6,12	6,18	6,10	6,06	3,57	3,52	2850 ÷ 2885				
4	13,6	13,5	13,5	7,88	7,77	7,79	7,80	7,63	7,65	4,51	4,41	2895 ÷ 2920				
5,5	18,3	18,0	17,9	10,6	10,4	10,3	10,6	10,4	10,5	6,14	6,02	2885 ÷ 2905				
7,5	25,4	24,8	24,4	14,7	14,3	14,1	14,5	14,0	13,9	8,35	8,11	2920 ÷ 2935				
11	36,0	35,1	34,7	20,8	20,3	20,0	20,8	20,3	20,1	12,0	11,7	2910 ÷ 2925				
15	47,2	45,3	44,0	27,2	26,2	25,4	27,2	26,0	25,3	15,7	15,0	2940 ÷ 2950				
18,5	58,3	56,9	55,9	33,7	32,9	32,3	34,1	33,2	32,8	19,7	19,1	2945 ÷ 2955				
22	68,3	66,2	64,3	39,4	38,2	37,1	40,0	38,6	37,8	23,1	22,3	2945 ÷ 2955				

* R = Reduced size of motor casing as compared to shaft extension and flange.

sv-ie2-mott22-2p50-en_c_te

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

BOOSTER SETS, GVF SERIES WITH ELECTRIC PUMPS e-SV™ THREE-PHASE MOTORS AT 50 Hz, 2-POLE (from 30 to 55 kW)

P _N kW	Efficiency η_N %									IE	Year of manufacture
	Δ 380 V Y 660 V			Δ 400 V Y 690 V			Δ 415 V				
	4/4	3/4	2/4	4/4	3/4	2/4	4/4	3/4	2/4		
	30	92,6	92,9	92,7	92,5	93,0	92,9	93,0	93,0	92,3	
37	93,0	93,3	93,2	93,0	93,4	93,3	93,5	93,4	92,8	2	By June 2011
45	93,2	93,5	93,4	93,3	93,6	93,6	93,8	93,6	93,1		
55	93,6	93,8	93,8	93,6	93,9	93,9	94,0	93,8	93,3		

P _N kW	Manufacturer	IEC SIZE	Construction Design	N. of Poles	f _N Hz	Data for 400 V / 50 Hz Voltage				
	WEG Equipamentos Eletricos S.A. Reg. No. 07.175.725/0010-50 Jaragua do Sul - SC (Brazil)					cos ϕ	I _s / I _N	T _N Nm	Ts/T _N	Tm/T _N
	Model									
30	W22 200L2-B5 30kW	200	V1/B5	2	50	0,87	6,50	97,00	2,40	2,70
37	W22 200L2-B5 37kW	200				0,87	6,80	120,0	2,40	2,60
45	W22 225S/M2-B5 45kW	225				0,89	7,00	145,0	2,20	2,80
55	W22 250S/M2-B5 55kW	250				0,89	7,00	178,0	2,20	2,80

P _N kW	Voltage U _N V					n _N min ⁻¹	See note.	Operating conditions **		
	Δ			Y				Altitude Above Sea Level (m)	T. amb min/max °C	ATEX
	380 V	400 V	415 V	660 V	690 V					
	I _N (A)									
30	55,90	53,60	52,20	32,18	31,07	2950 ÷ 2960	≤ 1000	-15 / 40	No	
37	68,70	65,80	64,00	39,55	38,14	2945 ÷ 2955				
45	81,50	78,00	75,80	46,92	45,22	2955 ÷ 2960				
55	99,20	95,00	92,50	57,12	55,07	2955 ÷ 2960				

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

sv-ie2-mott55-2p50-en_a_te

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

Xylem |'zīləm|

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- 2) a leading global water technology company.

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