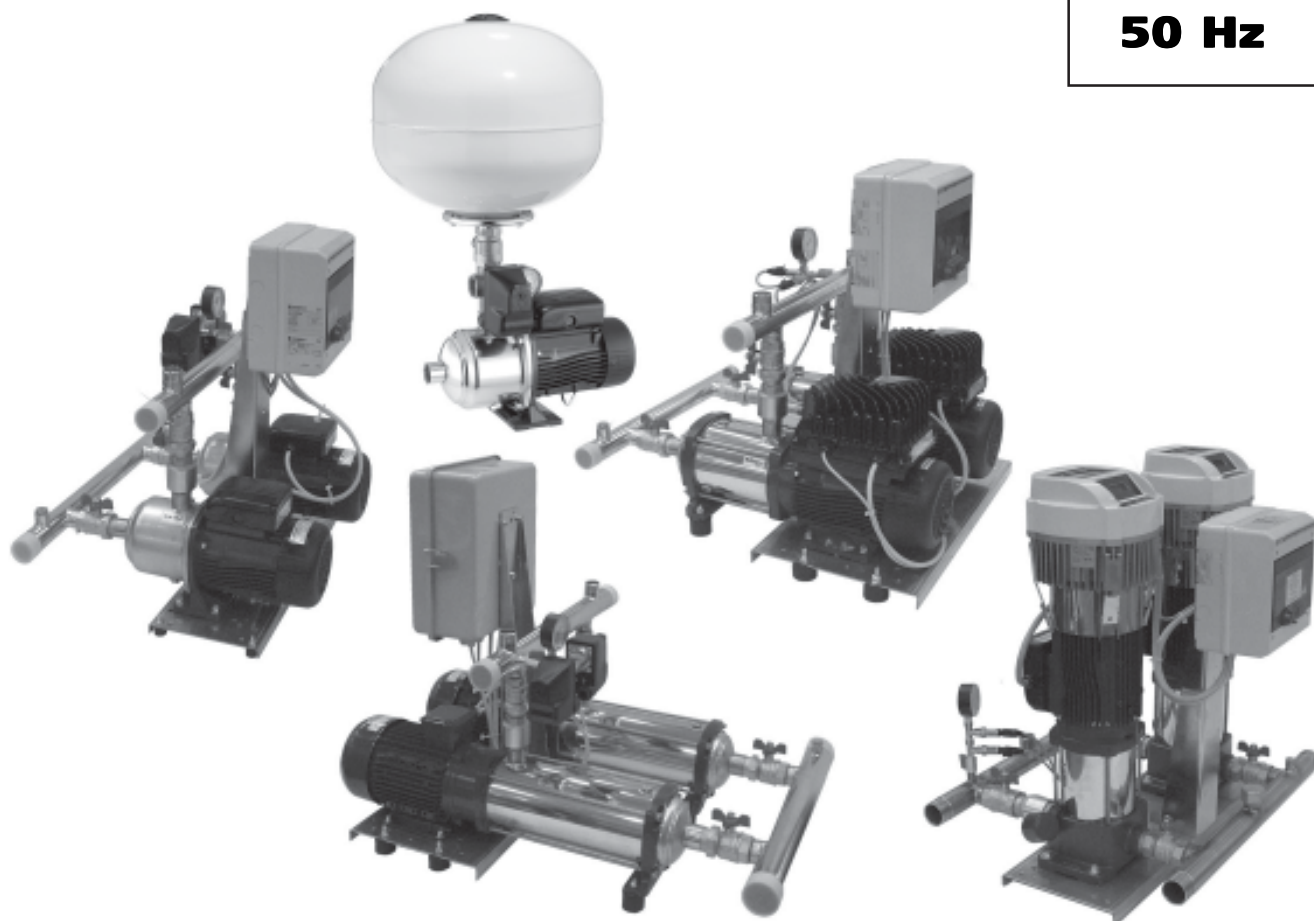


50 Hz



SPHERE UNIT GXS, GMD, GTKS, GHV sets

BOOSTER SETS FOR RESIDENTIAL MARKET

CONTENTS

General introduction	3
Description of operation	5
Choice and selection	6
Characteristics of the electric pumps	8
Hydraulic performance tables	13
Electric data tables	21
Range	26
SPHERE UNIT series	27
GXS20 series	31
GMD20 series	47
GTKS20 series	63
GHV20 series	79
One-pump Sphere unit, operating characteristics at 50 Hz	94
Two-pump Booster sets, operating characteristics at 50 Hz	97
Two-pump Booster sets, operating characteristics at 30..50 Hz	128
Technical Appendix	141

BOOSTER SETS

GENERAL INTRODUCTION - PRODUCT DESCRIPTION

Lowara **SPHERE UNIT**, **GXS**, **GMD**, **GTKS** and **GHV**, series booster sets are designed to transfer and increase the pressure of water, in the following applications:

- Public buildings
- Apartment
- Single house
- Condominiums
- Garden irrigation

The booster sets series described upper, are pumping stations assembled with one or two centrifugal pumps.

BG, **CEA**, **HM** pump series, peripheral pumps **P** series, or vertical multistage block pump **VM** series in relation to booster sets type.

The **SPHERE UNIT** is a small boost unit, fixed speed, with one single phase pump, automatic operation, assembled with pressure switch, pressure gauge, junction, membrane tank 24 litres. Product is available with centrifugal horizontal pumps **BG**, **CEA**, **HM** series, and peripheral pumps **P** series.

The booster sets **GXS**, **GMD**, **GTKS** and **GHV** series are pumping stations, single phase or three phase power supply, according to boosters model, assembled with two pumps automatic operation fixed speed (**GXS**, **GMD**) or variable speed (**GTKS**, **GHV**); 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. Booster sets are available with horizontal centrifugal **BG**, **CEA**, **HM** pump series, or vertical multistage block pump **VM** series in relation to booster sets type.

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 speaking, the water consumption in water distribution systems, such as DHW circuits for villas, detached houses and the like, is defined as "variable" though it is fairly concentrated during the day in what are known as peak consumption periods. Given the type of residential use, these concentrations of water demand mainly occur in the morning and in the evening.

The definition of the flow for these system types is generally based on practical tables giving the value of daily consumption depending on the type of user (number of occupants, number of services, etc..).

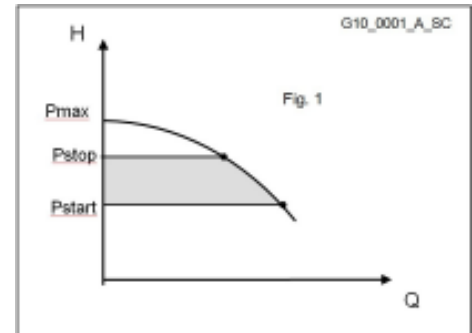
The size of the pressure booster set and, in practice, the performance levels of the pumps and the number of pumps is based on the take-off point and, therefore, on the consumption value which takes the following factors into account:

- The consumption peak
- Yield
- NPSH
- Diaphragm tanks

SPHERE UNIT ONE PUMP SET, WITH FIXED-SPEED MOTORS AND PRESSURE SWITCH CONTROL

The starting and stopping of the pump is determined by the pressure values set on the pressure switch that is connected to the pump. The differential pressure is the difference between starting pressure and switch-off pressure.

Figure 1 shows the operating mode with the pump curve.

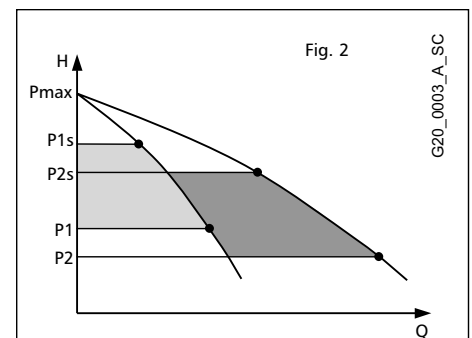


- On demand, water is drawn from the tank.
- When the pressure drops to the P_{start} value the pump starts.
- When consumption reduces and the pressure increases until it reaches the P_{stop} value, the pump is switched off.

TWO-PUMP SETS WITH FIXED-SPEED MOTORS AND PRESSURE SWITCH CONTROL

The starting and stopping of the pumps are determined by the pressure values set on the pressure switches. Each pressure switch is connected to a single pump with a cyclic pump changeover. The differential pressure is the difference between starting pressure and switch-off pressure. It is set at the same value for both pumps.

Figure 2 shows the operating mode with the pumps' curves.

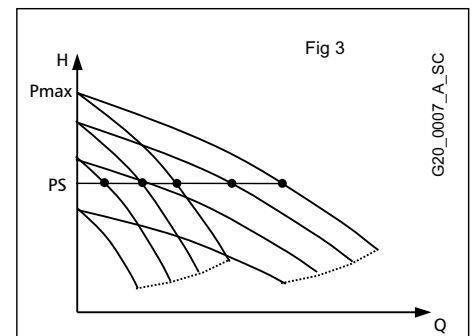


- On demand, water is drawn from the tank.
- When the pressure drops to the P_1 value the first pump starts.
- If the water consumption increases and the pressure drops to the P_2 value, the second pump starts.
- When consumption reduces and the pressure increases until it reaches the P_{2s} value, one of the pumps is switched off.
- If consumption keeps reducing, the pump changes the tank and stops at the P_{1s} value.

TWO-PUMP SETS WITH VARIABLE-SPEED MOTORS AND PRESSURE TRANSDUCER CONTROL

The starting and stopping of the pumps are determined by the pressure values set on the controller. Each frequency converter is connected to a pressure transducer. The converters exchange information with each other and provide for cyclic changeover.

Figure 3 shows the operating mode with the pumps' curves.



- On demand, water is drawn from the tank.
- When the pressure drops below the PS setting the first pump starts and the speed is adjusted to maintain a constant pressure as the demand increases.
- If the water consumption increases and the pump reaches maximum speed, the second pump starts and the speed is adjusted to maintain a constant pressure.
- When consumption reduces the speed is reduced until minimum speed is reached and one of the pumps is switched off.
- If consumption keeps reducing the pump slows down, charges the tank and stops at the PS setting.

DESCRIPTION OF OPERATION

SPHERE UNIT ONE PUMP SET

The **SPHERE UNIT** is a small boost unit, fixed speed, with one pump, automatic operation, assembled with pressure switch, pressure gauge, junction, membrane tank 24 litres included. According to decrease or increase of the value pressure, pressure switch defines the start and stop of the pump.

BOOSTER SET TWO PUMPS

Fixed speed booster sets **GXS, GMD** series, control and protection panel, with electronic board, manages the operation of the pumps, the cyclic changeover, and in case of lack of water, stops the set. The pumps run in cascade through the pressure switches signal.

Variable speed booster sets **GTKS, GHV** series each pump is driven by Teknospeed inverter (**GTKS**) or Hydrovar (**GHV**). Pumps run in cascade through the pressure transducer signal.

Cyclical exchange of pumps

Cyclical exchange of pumps is available for all series (**GXS, GMD, GTKS, GHV**). For the **GHV** series the pumps are equipped each with its own drive alternate the start at every system restart or at a given time set for each pump by means of an internal clock in the drive menu.

In the **GXS** and **GMD** series, the cyclical exchange of pumps is controlled by electrical panel.

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.

The level may be controlled by a float, level probes or minimum pressure switch.

Membrane Tank

Frequent demand or **small system losses** determine pressure variations that may be compensated for by using a **tank**. Correct selection of a diaphragm tank **reduces the number of pump starts** and, if it is installed near the booster set, helps reduce the effect of water hammer.

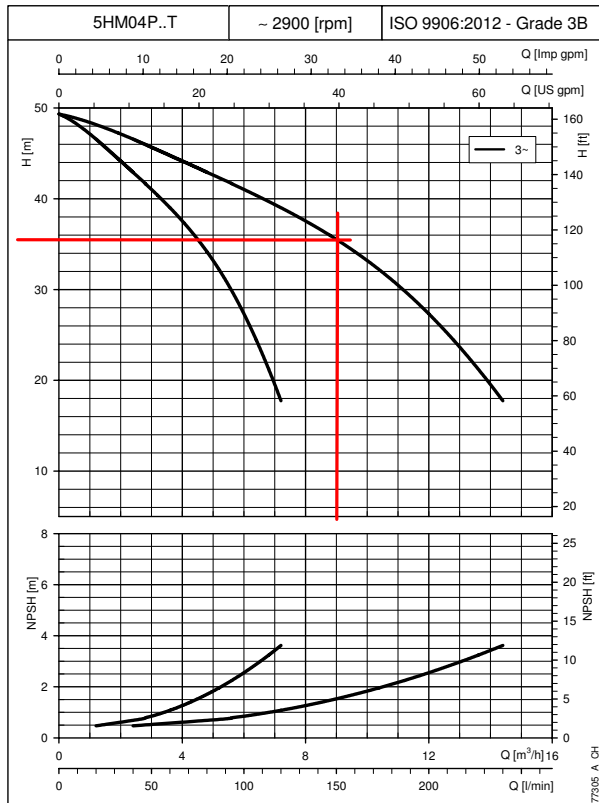
The booster sets are **ready** for installation with diaphragm tanks mounted directly on the delivery manifold, and additional tanks can be connected to the unused end of the manifold.

A **simplified calculation method**, developed from experience, is provided in the Appendix. It supplies useful flow rate and head values for most common requirements, as well as a method for calculating diaphragm tank size.

Variable speed booster sets need **smaller tanks** compared to traditional systems. Generally speaking, a tank with a liter capacity of just 10% of the nominal capacity of a single pump, expressed in liters per minute, is needed.

TWO-PUMP BOOSTER SETS 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 9 m³/h and a pressure of 36 water column.

As may be seen from the selection, the system requires two pumps of the type 5HM04P..T as indicated on the left chart.

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.

BOOSTER SETS SELECTING THE PUMPS

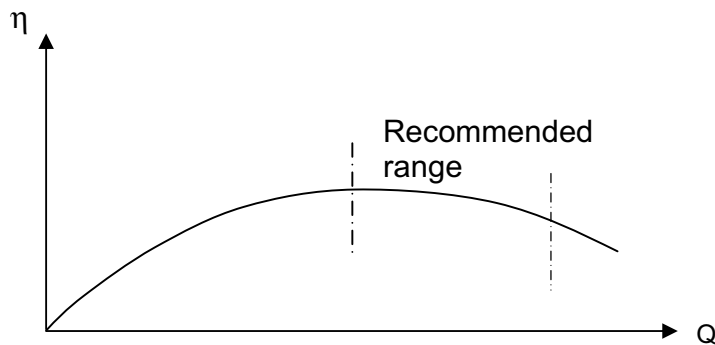
What type of pump to choose?

Generally, the choice of pump is based on the take-off point of the system, which is usually the highest possible. As maximum demand normally lasts a short time, the pump must also be able to satisfy variable requests throughout its time in service.

In this case, if variability is elevated, variable speed booster sets are preferred (**GTKS, GHV**).

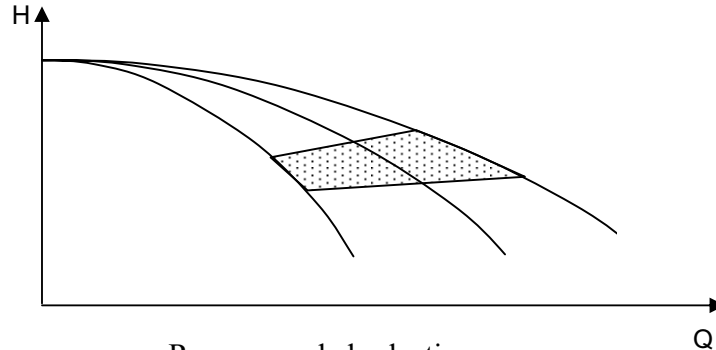
Generally the choice of the pump, based on the performance curve, should fall around the maximum efficiency point. The pump must ensure operation within its rated performance.

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.



Pump performance curve

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:



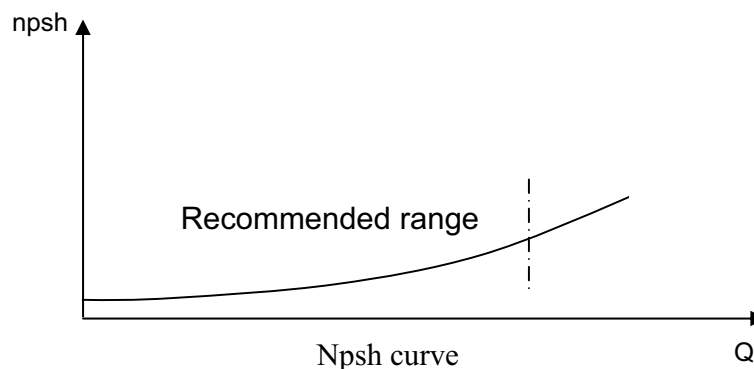
Recommended selection area

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.



Npsh curve

BOOSTER SETS CHARACTERISTICS OF THE ELECTRIC PUMPS

The **BG, BGM** series comprises self-priming, single-impeller, horizontal centrifuge pumps featuring stainless steel bodies and rotors.

Motor: enbloc motor-pump coupling with rotor directly splined onto the motor shaft protrusion.



Technical Information (standard version):

Flow rates: up to 4,2 m³/h.

Head: up to 53 m.

Temperature of pumped liquid:
from -10°C to +40°C.

Maximum ambient temperature: +40°C.

Maximum suction head: 8 m.

Mechanical seal: Ceramic/Carbon/EPDM (standard).

Elastomers: EPDM.

Motor

Standard supplied IE2/IE3 three-phase surface motors $\geq 0,75$ kW are compliant with Regulation (EC) no. 640/2009 and IEC 60034-30.

Electrical performances according to EN 60034-1.

Insulation class 155 (F).

IP55 protection.

Condensate drain plugs on standard version.

Cooling by fan according to EN 60034-6.

Cable gland metric size according to EN 50262.

Standard voltage:

- **Single-phase version:**

220-240 V 50 Hz (incorporated automatic-reset overload protection up to 1,5 kW).

- **Three-phase version:**

220-240/380-415 V 50 Hz for power up to 3 kW (incorporated automatic-reset overload protection included into booster set control panel).

For electrical data of the motors used see Technical Appendix.

BOOSTER SETS CHARACTERISTICS OF THE ELECTRIC PUMPS

The **CEA, CEAM** series comprises centrifuge pumps with single impeller in pressed AISI 304 stainless steel. The enbloc centrifuge pump features axial suction and radial discharge. Compact construction, with pump coupled directly to motor; special motor shaft extension in common with the pump and supported by ball bearings. The rotating part can be removed from the control side without removing the pump body from the system piping. Threaded suction and discharge ports (Rp ISO 7).



Technical Information (standard version):

Flow rates: up to 31 m³/h.
Head: up to 32 m.

Temperature of pumped liquid:
from -10°C to +85°C (standard version).

Special versions on request.

Maximum operating pressure: 8 bar.

Power: from 0,37 to 3 kW.

Mechanical seal: Ceramic/Carbon/NBR (standard).

Elastomers: NBR.

Motor

Standard supplied IE2/IE3 three-phase surface motors $\geq 0,75$ kW are compliant with Regulation (EC) no. 640/2009 and IEC 60034-30.

Electrical performances according to EN 60034-1.
Insulation class 155 (F).
IP55 protection.
Condensate drain plugs on standard version.
Cooling by fan according to EN 60034-6.
Cable gland metric size according to EN 50262.

Standard voltage:

- **Single-phase version:**
220-240 V 50 Hz (incorporated automatic-reset overload protection up to 1,5 kW).
- **Three-phase version:**
220-240/380-415 V 50 Hz for power up to 3 kW (incorporated automatic-reset overload protection included into booster set control panel).

For electrical data of the motors used see Technical Appendix.

BOOSTER SETS CHARACTERISTICS OF THE ELECTRIC PUMPS

The **P** pump series, is an peripheral electric pump that is able to provide high head using low power motors.



Technical Information (standard version):

Flow rates: up to 3,72 m³/h.

Head: up to 82 m.

Temperature of pumped liquid:
from -10°C to +40°C.

Maximum ambient temperature: +40°C.

Materials:

Pump body: Cast iron.

Adapter: Cast iron.

Impeller: Brass.

Mechanical seal: Ceramic/Carbon/NBR (standard).

Elastomers: NBR.

Motor

Standard supplied IE2/IE3 three-phase surface motors $\geq 0,75$ kW are compliant with Regulation (EC) no. 640/2009 and IEC 60034-30.

Electrical performances according to EN 60034-1.

Insulation class 155 (F).

IP55 protection.

Condensate drain plugs on standard version.

Cooling by fan according to EN 60034-6.

Cable gland metric size according to EN 50262.

Standard voltage:

- **Single-phase version:**

220-240 V 50 Hz (incorporated automatic-reset overload protection up to 1,5 kW).

- **Three-phase version:**

220-240/380-415 V 50 Hz for power up to 3 kW (overload protection to be provided by the user).

For electrical data of the motors used see Technical Appendix.

BOOSTER SETS CHARACTERISTICS OF THE ELECTRIC PUMPS

The **e-HM™** is a non-self-priming, end-suction horizontal multistage, high pressure centrifugal pump, with axial threaded inlet and radial threaded outlet. The pumps are close-coupled design and are equipped with non-standard Lowara motors. The **e-HM™** is equipped with mechanical seal.



Technical Information (standard version):

Flow rates: up to 29 m³/h.
Head: up to 159 m.

Temperature of pumped liquid:
from -10 to -30°C according to gasket material.
+90°C for three-phase version and uses according to EN 60335-2-41.
+120°C for three-phase version with stainless steel impellers (HM..S, HM..N) and uses other than EN 60335-2-41.
+60°C for single-phase version.

Maximum operating pressure:
10 bar (PN 10) for pumps with Noryl™ impeller.
16 bar (PN 16) for pumps with stainless steel impeller.

Power: from 0,5 to 4 kW.

Mechanical seal:
Ceramic / Carbon / EPDM (standard).
Silicon Carbide/Carbon/EPDM (PN16).

Elastomers: EPDM.

Motor

Standard three-phase surface motors ≥ 0,75 kW supplied as IE3.

Electrical performances according to EN 60034-1.
Insulation class 155 (F).
IP55 protection.
Condensate drain plugs on standard version.
Cooling by fan according to EN 60034-6.
Cable gland metric size according to EN 50262.

Standard voltage:

- **Single-phase version:**
220-240 V 50 Hz (automatic overload protection included up to 2,2 kW).
- **Three-phase version:**
220-240/380-415 V 50 Hz for powers up to 3 kW.
380-415/660-690 V 50 Hz for powers above 3 kW.
(automatic overload protection included in the control panel).

For electrical data of the motors used see Technical Appendix.

Materials:

All pumps are certified for drinking water use (**WRAS** and **ACS**).

BOOSTER SETS CHARACTERISTICS OF THE ELECTRIC PUMPS

The **VM** is a non-self-priming vertical multistage, high pressure centrifugal pump, with threaded inlet and outlet manifolds. The pumps are close-coupled design and are equipped with non-standard Lowara motors.



Technical Information (standard version):

Flow rates: up to 14 m³/h.

Head: up to 98 m.

Temperature of pumped liquid:

+90°C for versions with three-phase motor uses as
EN 60335-2-41.

+60°C for versions with single-phase motor.

Maximum operating pressure: 10 bar (PN 10).

Power: from 0,5 to 3 kW.

Mechanical seal:

Ceramic / Carbon / EPDM (standard).

Elastomers: EPDM.

Motor

Standard three-phase surface motors $\geq 0,75$ kW supplied as IE3.

Electrical performances according to EN 60034-1.

Insulation class 155 (F).

IP55 protection.

Condensate drain plugs on standard version.

Cooling by fan according to EN 60034-6.

Cable gland metric size according to EN 50262.

Standard voltage:

- **Single-phase version:**

220-240 V 50 Hz (automatic overload protection included up to 2,2 kW).

- **Three-phase version:**

220-240/380-415 V 50 Hz for powers up to 3 kW.

(automatic overload protection included in the control panel).

For electrical data of the motors used see Technical Appendix.

Materials:

All pumps are certified for drinking water use (**WRAS** and **ACS**).

SPHERE UNIT

HYDRAULIC PERFORMANCE AND ELECTRICAL DATA TABLE AT 50 Hz

PUMP TYPE	VERSION	MOTOR	ELECTRIC PUMP		Q = DELIVERY															
		P _N kW	* P ₁ kW	* I 220-240 V A	l/min 0	10,0	20,0	30,0	40,0	50,0	60,0	65,0	70,0							
					m ³ /h 0	0,6	1,2	1,8	2,4	3,0	3,6	3,9	4,2							
H = TOTAL HEAD IN METRES OF COLUMN OF WATER																				
BGM3	1 ~	0,37	0,67	2,96	36,9	30,6	25,6	21,5	17,7	13,8										
BGM5		0,55	0,91	4,33	40,2	35,7	32,0	28,8	25,7	22,4	18,8									
BGM7		0,75	1,11	5,00	45,4		38,1	34,8	31,7	28,6	25,6									
BGM9		0,9	1,24	5,54	49,6		41,1	37,7	34,8	32,2	29,8	28,6								
BGM11		1,1	1,43	6,47	53,2		45,8	42,5	39,5	36,5	33,5	31,9	30,3							

PUMP TYPE	VERSION	MOTORE	ELECTRIC PUMP		Q = DELIVERY																	
			P _N kW	* P ₁ kW	* I 220-240 V A	l/min 0	30,0	40,0	60,0	80,0	100,0	120,0	140,0	160,0	180,0	200,0	250,0	300,0	350,0	400,0	430,0	480,0
		m ³ /h 0	1,8	2,4	3,6	4,8	6,0	7,2	8,4	9,6	10,8	12,0	15,0	18,0	21,0	24,0	25,8	28,8				
H = TOTAL HEAD IN METRES OF COLUMN OF WATER																						
CEAM70/3	1 ~	0,37	0,60	2,72	22,0	20,1	19,1	16,6	12,8													
CEAM70/5		0,55	0,97	4,55	31,1	28,8	27,7	24,7	20,2													
CEAM80/5		0,75	1,07	4,87	32,0	30,0	29,3	27,4	24,7	21,0												
CEAM120/3		0,55	0,91	4,33	22,4			18,9	17,5	15,9	14,0	11,8	9,2									
CEAM120/5		0,9	1,39	6,24	31,8			28,2	26,5	24,6	22,4	20,0	17,3									
CEAM210/2		0,75	1,13	5,10	17,7						16,5	16,1	15,6	15,0	14,4	12,6	10,4					
CEAM210/3		1,1	1,48	6,68	20,8						19,7	19,3	19,0	18,5	18,0	16,5	14,4					
CEAM210/4		1,5	1,91	8,60	25,5						24,8	24,5	24,0	23,6	23,0	21,3	19,0					
CEAM370/1		1,1	1,49	6,75	16,3									15,5	15,2	14,3	13,0	11,4	9,4	8,1		
CEAM370/2		1,5	2,05	9,26	20,4										19,1	18,3	17,2	15,8	14,1	13,0	10,8	

PUMP TYPE	VERSION	MOTORE	ELECTRIC PUMP		Q = DELIVERY															
		P _N kW	* P ₁ kW	* I 220-240 V A	l/min 0	8,0	10,0	15,0	20,0	35,0	37,0	40	45	62						
					m ³ /h 0	0,5	0,6	0,9	1,2	2,1	2,2	2,4	2,7	3,7						
H = TOTAL HEAD IN METRES OF COLUMN OF WATER																				
PM16	1 ~	0,30	0,50	2,20	43,4			33,0	27,8	22,6	7,1	5,0								
PM21		0,37	0,58	2,70	47,4			37,0	31,8	26,7	11,2	9,1	6,0							
PM30		0,50	0,83	4,00	56,2			44,0	38,5	33,3	18,7	16,8	13,9	9,0						
PM40		0,6	1,08	4,82	64,3			47,4	42,2	27,3	25,4	22,6	18,0							
PM60		1,1	1,77	7,95	76,9				60,0	43,8	41,6	38,2	32,8	16,0						

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

g10-CEAM-BGM-P-2p50-en_a_th

* Maximum value in specified range: P₁ = input power; I = input current.

Tables show le performances with 1 pump running

SPHERE UNIT

HYDRAULIC PERFORMANCE AND ELECTRICAL DATA TABLE AT 50 Hz

PUMP TYPE HM..P	VERSION	MOTOR	ELECTRIC PUMP		Q = DELIVERY							
				* I	l/min 0	11,7	16,0	21,0	26,0	31,0	36,0	40,0
		P _N	* P ₁	220-240 V	m ³ /h 0	0,7	1,0	1,3	1,6	1,9	2,2	2,4
		kW	kW	A	H = TOTAL HEAD IN METRES OF COLUMN OF WATER							
1HM03	1 ~	0,50	0,56	2,62	33,6	30,3	28,8	26,7	24,3	21,5	18,5	15,9
1HM04		0,50	0,65	2,90	44,0	39,3	37,2	34,4	31,1	27,4	23,3	19,9
1HM05		0,50	0,74	3,22	54,0	47,8	45,1	41,4	37,2	32,4	27,3	23,1
1HM06		0,75	0,94	4,33	67,1	60,1	57,0	52,8	48,0	42,4	36,3	31,1

PUMP TYPE HM..P	VERSION	MOTOR	ELECTRIC PUMP		Q = DELIVERY							
				* I	l/min 0	20,0	28,0	36,0	44,0	52,0	60,0	70,0
		P _N	* P ₁	220-240 V	m³/h 0	1,2	1,7	2,2	2,6	3,1	3,6	4,2
		kW	kW	A	H = TOTAL HEAD IN METRES OF COLUMN OF WATER							
3HM02	1 ~	0,50	0,53	2,55	23,6	21,5	20,4	18,9	17,1	15,1	12,9	9,9
3HM03		0,50	0,65	2,90	34,8	31,2	29,3	27,0	24,3	21,2	17,9	13,4
3HM04		0,50	0,77	3,34	45,5	40,3	37,5	34,2	30,3	26,2	21,8	15,9
3HM05		0,75	1,01	4,56	58,4	52,5	49,4	45,5	40,9	35,8	30,3	22,8
3HM06		0,95	1,20	5,29	70,2	63,0	59,2	54,4	48,9	42,8	36,2	27,2

PUMP TYPE HM..P	VERSION	MOTOR	ELECTRIC PUMP		Q = DELIVERY							
				* I	l/min 0	40,0	53,0	66,0	79,0	92,0	105	120
		P _N	* P ₁	220-240 V	m ³ /h 0	2,4	3,2	4,0	4,7	5,5	6,3	7,2
		kW	kW	A	H = TOTAL HEAD IN METRES OF COLUMN OF WATER							
5HM02	1 ~	0,50	0,62	2,79	23,8	20,1	18,7	17,2	15,5	13,4	10,7	7,0
5HM03		0,50	0,78	3,38	35,0	28,6	26,3	23,8	21,1	17,8	13,8	8,3
5HM04		0,75	1,07	4,79	47,6	39,7	36,8	33,7	30,2	25,9	20,6	13,2
5HM05		0,95	1,31	5,69	59,4	49,3	45,6	41,7	37,3	31,9	25,2	16,0
5HM06		1,1	1,53	6,84	72,0	60,4	56,1	51,5	46,2	39,8	31,9	20,8

PUMP TYPE HM..P	VERSION	MOTOR P _N kW	ELECTRIC PUMP		Q = DELIVERY							
			* P ₁ kW	* I 220-240 V A	l/min 0	83,3	108	133	158	183	208	233
					m³/h 0	5,0	6,5	8,0	9,5	11,0	12,5	14,0
					H = TOTAL HEAD IN METRES OF COLUMN OF WATER							
10HM02	1 ~	1,1	1,33	6,06	30,6	26,9	25,2	23,4	21,4	19,1	16,2	12,6
10HM03		1,5	1,88	8,29	45,6	39,7	37,2	34,7	31,9	28,4	24,0	18,8

The table refers to performance with 1 pump running.

g10-1-10hmp-2p50-en_a_th

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

Tables show le performances with 1 pump running

TWO-PUMP BOOSTER SETS, HORIZONTAL DESIGN

HYDRAULIC PERFORMANCE TABLE AT 50 Hz

PUMP TYPE	MOTOR P _N kW	ELECTRC PUMP 1 ~ * P1 kW	ELECTRC PUMP 3 ~ * P1 kW	Q = DELIVERY															
				l/min 0	20	40	60	80	100	120	130	140							
				m³/h 0	1,2	2,4	3,6	4,8	6	7,2	7,8	8,4							
				H = TOTAL HEAD METRES COLUMN OF WATER															
BG(M)3	2 x 0,37	2 x 0,67	2 x 0,68	36,9	30,6	25,6	21,5	17,7	13,8										
BG(M)5	2 x 0,55	2 x 0,91	2 x 0,81	40,2	35,7	32,0	28,8	25,7	22,4	18,8									
BG(M)7	2 x 0,75	2 x 1,11	2 x 1,07	45,4		38,1	34,8	31,7	28,6	25,6									
BG(M)9	2 x 0,9	2 x 1,24	2 x 1,15	49,6		41,1	37,7	34,8	32,2	29,8	28,6								
BG(M)11	2 x 1,1	2 x 1,43	2 x 1,34	53,2		45,8	42,5	39,5	36,5	33,5	31,9	30,3							

PUMP TYPE	MOTOR P _N kW	ELECTRC PUMP 1 ~ * P1 kW	ELECTRC PUMP 3 ~ * P1 kW	Q = DELIVERY																	
				l/min 0	60	80	120	160	200	240	280	320	360	400	500	600	700	800	860	960	1040
				m ³ /h 0	3,6	4,8	7,2	9,6	12	14,4	16,8	19,2	21,6	24	30	36	42	48	51,6	57,6	62,4
				H = TOTAL HEAD METRES COLUMN OF WATER																	
CEA(M)70/3	2 x 0,37	kW	kW	22	20,1	19,1	16,6	12,8													
CEA(M)70/5	2 x 0,55	2 x 0,6	2 x 0,61	31,1	28,8	27,7	24,7	20,2													
CEA(M)80/5	2 x 0,75	2 x 0,97	2 x 0,88	32	30	29,3	27,4	24,7	21												
CEA(M)120/3	2 x 0,55	2 x 1,07	2 x 0,98	22,4			18,9	17,5	15,9	14	11,8	9,2									
CEA(M)120/5	2 x 0,9	2 x 0,91	2 x 0,82	31,8			28,2	26,5	24,6	22,4	20	17,3									
CEA(M)210/2	2 x 0,75	2 x 1,39	2 x 1,28	17,7						16,5	16,1	15,6	15	14,4	12,6	10,4					
CEA(M)210/3	2 x 1,1	2 x 1,13	2 x 1,04	20,8						19,7	19,3	19	18,5	18	16,5	14,4					
CEA(M)210/4	2 x 1,5	2 x 1,48	2 x 1,35	25,5						24,8	24,5	24	23,6	23	21,3	19,0					
CEA(M)210/5	2 x 1,85	2 x 1,91	2 x 1,73	29,0						28,2	27,9	28	27,1	27	25,1	23,1					
CEA(M)370/1	2 x 1,1	2 x 2,24	2 x 2,2	16,3									15,5	15	14,3	13,0	11,4	9,4	8,1		
CEA(M)370/2	2 x 1,5	2 x 1,49	2 x 1,40	20,4										19	18,3	17,2	15,8	14,1	13,0		
CEA(M)370/3	2 x 1,85	2 x 2,05	2 x 1,95	24,4										23	22,1	21,1	19,8	18,2	17,1		
CEA370/5	2 x 3	2 x 2,45	2 x 2,45	30										28,3	27,5	26,5	25,3	23,8	22,8		

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

g20o-2p50-en_d_th

* Maximum value in specified range: P1 = input power

Tables show the performances with 2 pump running

TWO-PUMP BOOSTER SETS, HORIZONTAL DESIGN

HYDRAULIC PERFORMANCE TABLE AT 50 Hz

PUMP TYPE HM..P	VERSION	MOTOR P _N kW	ELECTRIC PUMP * P1 kW	Q = DELIVERY							
				l/min 0	40,0	56,0	72,0	88,0	104,0	120,0	140,0
		m ³ /h 0	2,4	3,4	4,3	5,3	6,2	7,2	8,4		
		H = TOTAL HEAD IN METRES OF COLUMN OF WATER									
3HM02	1 ~	2 x 0.5	2 x 0,53	23,6	21,5	20,4	18,9	17,1	15,1	12,9	9,9
3HM03		2 x 0.5	2 x 0,65	34,8	31,2	29,3	27,0	24,3	21,2	17,9	13,4
3HM04		2 x 0.5	2 x 0,77	45,5	40,3	37,5	34,2	30,3	26,2	21,8	15,9
3HM05		2 x 0.75	2 x 1	58,4	52,5	49,4	45,5	40,9	35,8	30,3	22,8
3HM06		2 x 0.95	2 x 1,2	70,2	63,0	59,2	54,4	48,9	42,8	36,2	27,2
3HM02	3 ~	2 x 0.3	2 x 0,44	23,2	20,9	19,6	18,1	16,2	14,2	12,0	9,0
3HM03		2 x 0.4	2 x 0,58	34,9	31,3	29,3	26,9	24,2	21,1	17,8	13,4
3HM04		2 x 0.5	2 x 0,72	45,8	40,6	37,8	34,5	30,7	26,7	22,3	16,3
3HM05		2 x 0.75	2 x 0,92	60,2	55,1	52,3	48,7	44,2	39,2	33,7	26,2
3HM06		2 x 1.1	2 x 1,1	72,7	66,8	63,6	59,3	54,1	48,1	41,5	32,5

PUMP TYPE HM..S	VERSION	NOMINAL POWER P _N kW	ELECTRIC PUMP * P1 kW	Q = DELIVERY							
				l/min 0	40,0	58,0	76,0	94,0	112,0	130,0	146,7
				m³/h 0	2,4	3,5	4,6	5,6	6,7	7,8	8,8
				H = TOTAL HEAD IN METRES OF COLUMN OF WATER							
3HM10	1 ~	2 x 0.75	2 x 1,11	73,0	69,8	66,1	60,9	54,4	46,4	36,7	25,8
3HM11		2 x 0.95	2 x 1,24	80,7	77,5	73,3	67,8	60,8	52,1	41,4	29,4
3HM12		2 x 0.95	2 x 1,31	87,8	83,7	79,1	72,9	65,1	55,5	43,8	30,7
3HM13		2 x 1.1	2 x 1,42	96,4	93,1	88,6	82,2	74,1	64,0	51,4	37,2
3HM14		2 x 1.1	2 x 1,51	103,5	99,6	94,6	87,7	78,8	67,8	54,2	39,0
3HM16		2 x 1.5	2 x 1,77	119,2	115,9	110,6	103,2	93,5	81,1	65,8	48,4
3HM17		2 x 1.5	2 x 1,85	126,4	122,7	116,9	108,9	98,5	85,3	68,8	50,4
3HM19		2 x 1.5	2 x 2,02	140,8	136,0	129,3	120,0	108,0	93,0	74,6	54,0
3HM10	3 ~	2 x 1.1	2 x 1,04	75,9	74,8	71,9	67,7	62,0	54,8	45,5	34,4
3HM11		2 x 1.1	2 x 1,14	83,3	82,0	78,7	74,0	67,8	59,8	49,5	37,3
3HM12		2 x 1.1	2 x 1,23	90,7	89,1	85,5	80,3	73,4	64,6	53,4	40,1
3HM13		2 x 1.1	2 x 1,33	98,1	96,1	92,2	86,5	79,0	69,5	57,3	42,8
3HM14		2 x 1.5	2 x 1,43	106,1	104,5	100,4	94,4	86,5	76,3	63,3	47,8
3HM16		2 x 1.5	2 x 1,61	121,0	118,7	113,9	107,0	97,8	86,1	71,1	53,4
3HM17		2 x 1.5	2 x 1,71	128,3	125,8	120,7	113,2	103,4	90,9	75,0	56,1
3HM19		2 x 2.2	2 x 1,94	144,2	142,2	136,8	128,7	118,0	104,3	86,7	65,6
3HM21		2 x 2.2	2 x 2,12	159,1	156,6	150,5	141,5	129,6	114,3	94,7	71,5

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

g20-3hm-2p50-en_a_th

* Maximum value in specified range: P1 = input power

Tables show le performances with 2 pump running

TWO-PUMP BOOSTER SETS, HORIZONTAL DESIGN HYDRAULIC PERFORMANCE TABLE AT 50 Hz

PUMP TYPE HM..P	VERSION	MOTOR P _N kW	ELECTRIC PUMP * P1 kW	Q = DELIVERY							
				l/min 0	80,0	106,0	132,0	158,0	184,0	210,0	240,0
		m³/h 0	4,8	6,4	7,9	9,5	11,0	12,6	14,4		
		H = TOTAL HEAD IN METRES OF COLUMN OF WATER									
5HM02	1 ~	2 x 0.5	2 x 0,62	23,8	20,1	18,7	17,2	15,5	13,4	10,7	7,0
5HM03		2 x 0.5	2 x 0,78	35,0	28,6	26,3	23,8	21,1	17,8	13,8	8,3
5HM04		2 x 0.75	2 x 1,07	47,6	39,7	36,8	33,7	30,2	25,9	20,6	13,2
5HM05		2 x 0.95	2 x 1,31	59,4	49,3	45,6	41,7	37,3	31,9	25,2	16,0
5HM06		2 x 1.1	2 x 1,53	72,0	60,4	56,1	51,5	46,2	39,8	31,9	20,8
5HM02	3 ~	2 x 0.4	2 x 0,54	23,9	20,1	18,7	17,2	15,4	13,3	10,6	6,9
5HM03		2 x 0.5	2 x 0,74	35,2	28,8	26,5	24,2	21,5	18,2	14,2	8,6
5HM04		2 x 1.1	2 x 1,01	49,3	42,9	40,4	37,7	34,5	30,4	25,2	17,8
5HM05		2 x 1.1	2 x 1,24	61,4	53,1	49,9	46,4	42,3	37,2	30,6	21,3
5HM06		2 x 1.5	2 x 1,47	73,8	64,0	60,2	56,1	51,2	45,0	37,3	26,1

PUMP TYPE HM..S	VERSION	MOTOR	ELECTRIC PUMP	Q = DELIVERY							
				l/min 0	80,0	114,0	148,0	182,0	216,0	250	284
		P _N	* P1	m ³ /h 0	4,8	6,8	8,9	10,9	13,0	15,0	17,0
		kW	kW	H = TOTAL HEAD IN METRES OF COLUMN OF WATER							
5HM09	1 ~	2 x 1.1	2 x 1,54	66,9	63,1	59,5	55,3	50,0	43,2	34,7	24,6
5HM10		2 x 1.5	2 x 1,77	74,7	71,5	67,9	63,6	58,0	50,7	41,3	30,0
5HM11		2 x 1.5	2 x 1,91	82,0	78,2	74,1	69,1	62,9	54,7	44,3	32,0
5HM12		2 x 1.5	2 x 2,04	89,3	84,7	80,1	74,5	67,5	58,5	47,1	33,7
5HM09	3 ~	2 x 1.5	2 x 1,48	68,1	65,9	63,0	59,2	54,4	48,2	40,1	30,0
5HM10		2 x 1.5	2 x 1,63	75,5	72,9	69,6	65,4	60,0	52,9	43,9	32,7
5HM11		2 x 1.5	2 x 1,78	83,0	79,9	76,1	71,4	65,4	57,6	47,7	35,4
5HM12		2 x 2.2	2 x 1,97	91,0	88,3	84,4	79,5	73,1	64,7	54,0	40,6
5HM13		2 x 2.2	2 x 2,12	98,4	95,3	91,1	85,7	78,8	69,7	58,0	43,5
5HM14		2 x 2.2	2 x 2,27	105,9	102,4	97,8	91,9	84,3	74,5	61,9	46,2
5HM15		2 x 2.2	2 x 2,42	113,3	109,3	104,3	97,9	89,8	79,2	65,7	48,9
5HM17		2 x 3	2 x 2,77	128,8	124,8	119,2	112,2	103,1	91,2	75,9	56,9
5HM19		2 x 3	2 x 3,06	143,7	138,8	132,5	124,5	114,2	100,9	83,7	62,5
5HM21		2 x 3	2 x 3,36	158,6	152,7	145,6	136,6	125,2	110,4	91,3	67,8

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

g20-5hm-2p50-en_a_th

* Maximum value in specified range: P1 = input power

Tables show le performances with 2 pump running

TWO-PUMP BOOSTER SETS, HORIZONTAL DESIGN

HYDRAULIC PERFORMANCE TABLE AT 50 Hz

PUMP TYPE HM..P	VERSION	MOTOR P _N kW	ELECTRIC PUMP * P1 kW	Q = DELIVERY							
				l/min 0	166,7	216,0	266,0	316,0	366,0	416,0	466,0
		m³/h 0	10,0	13,0	16,0	19,0	22,0	25,0	28,0		
		H = TOTAL HEAD IN METRES OF COLUMN OF WATER									
10HM02	1 ~	2 x 1.1	2 x 1,33	30,6	26,9	25,2	23,4	21,4	19,1	16,2	12,6
10HM03		2 x 1.5	2 x 1,88	45,6	39,7	37,2	34,7	31,9	28,4	24,0	18,8
10HM02	3 ~	2 x 1.1	2 x 1,23	31,1	27,8	26,3	24,6	22,7	20,4	17,5	14,1
10HM03		2 x 1.5	2 x 1,75	46,2	40,9	38,6	36,2	33,4	30,1	25,8	20,6
10HM04		2 x 2.2	2 x 2,35	61,2	55,7	52,7	49,6	46,2	42,0	36,7	30,3
10HM05		2 x 3	2 x 2,94	76,6	69,8	66,2	62,3	58,0	52,8	46,2	38,2
10HM06		2 x 3	2 x 3,47	91,7	83,0	78,5	73,8	68,5	62,2	54,3	44,6

PUMP TYPE HM..S	VERSION	NOMINAL POWER P _N kW	ELECTRIC PUMP * P1 kW	Q = DELIVERY							
				l/min 0	166,7	216,0	266,0	316,0	366,0	416,0	466,0
				m³/h 0	10,0	13,0	16,0	19,0	22,0	25,0	28,0
				H = TOTAL HEAD IN METRES OF COLUMN OF WATER							
10HM07	3 ~	2 x 3	2 x 2,96	84,8	78,8	75,8	71,7	66,3	59,7	51,7	42,4
10HM08		2 x 3	2 x 3,35	96,6	89,4	85,9	81,1	74,9	67,3	58,1	47,5
10HM09		2 x 4	2 x 3,75	109,2	102,1	98,3	93,1	86,3	77,9	67,7	55,7
10HM10		2 x 4	2 x 4,14	121,1	112,9	108,6	102,8	95,2	85,7	74,4	61,1
10HM11		2 x 4	2 x 4,52	133,0	123,6	118,9	112,4	103,9	93,5	81,0	66,4

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

g20-10hm-2p50-en_a_th

* Maximum value in specified range: P1 = input power

Tables show the performances with 2 pump running

TWO-PUMP BOOSTER SETS, HORIZONTAL DESIGN

HYDRAULIC PERFORMANCE TABLE AT 50 Hz

PUMP TYPE HM..S	VERSION	MOTOR P _N kW	ELECTRIC PUMP * P1 kW	Q = DELIVERY								
				l/min 0	266,0	356,0	446,0	536,0	626,0	716,0	800,0	
		m ³ /h 0	16,0	21,4	26,8	32,2	37,6	43,0	48,0	H = TOTAL HEAD IN METRES OF COLUMN OF WATER		
15HM02	3 ~	2 x 1.5	2 x 1,63	28,8	26,3	25,2	23,8	21,8	19,2	15,7	11,7	
15HM03		2 x 2.2	2 x 2,57	43,6	39,6	37,9	35,8	33,1	29,7	25,4	20,6	
15HM04		2 x 3	2 x 3,4	58,1	52,8	50,6	47,7	44,2	39,6	33,8	27,4	
15HM05		2 x 4	2 x 4,21	72,9	66,7	63,9	60,5	56,1	50,5	43,3	35,3	

PUMP TYPE HM..S	VERSION	MOTOR P _N kW	ELECTRIC PUMP * P1 kW	Q = DELIVERY							
				l/min 0	366,0	466,0	566,0	666,0	766,0	866	966
		m ³ /h 0	22,0	28,0	34,0	40,0	46,0	52,0	58,0	H = TOTAL HEAD IN METRES OF COLUMN OF WATER	
22HM02	3 ~	2 x 2.2	2 x 2,37	30,2	28,0	26,7	25,0	22,7	19,5	15,4	10,4
22HM03		2 x 3	2 x 3,38	45,6	41,9	40,2	38,0	35,1	31,3	26,4	20,4
22HM04		2 x 4	2 x 4,44	61,0	56,3	54,0	51,1	47,3	42,3	35,8	27,9

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

g20-10hm-2p50-en_a_th

* Maximum value in specified range: P1 = input power

Tables show le performances with 2 pump running

TWO-PUMP BOOSTER SETS, VERTICAL DESIGN

HYDRAULIC PERFORMANCE TABLE AT 50 Hz

PUMP TYPE VM..P	VERSION	MOTOR	ELECTRIC PUMP	Q = DELIVERY							
				l/min 0	40,0	56,0	72,0	88,0	104,0	120,0	140,0
		P _N kW	* P1 kW	m³/h 0	2,4	3,4	4,3	5,3	6,2	7,2	8,4
		H = TOTAL HEAD IN METRES OF COLUMN OF WATER									
3VM02	1 ~	2 x 0,5	2 x 0,53	23,6	21,5	20,4	18,9	17,1	15,0	12,8	9,6
3VM03		2 x 0,5	2 x 0,64	34,4	31,2	29,5	27,2	24,6	21,7	18,4	14,0
3VM04		2 x 0,5	2 x 0,76	45,0	40,3	37,7	34,5	30,9	26,8	22,5	16,6
3VM05		2 x 0,75	2 x 0,99	57,8	52,5	49,6	45,9	41,5	36,5	31,1	23,7
3VM06		2 x 0,95	2 x 1,18	69,4	63,1	59,4	54,9	49,6	43,7	37,2	28,3
3VM07		2 x 0,95	2 x 1,31	80,3	72,3	67,9	62,5	56,2	49,2	41,6	31,2
3VM08		2x 1,1	2 x 1,48	93,0	84,6	79,9	73,9	66,8	58,9	50,2	38,3
3VM02	3 ~	2 x 0,3	2 x 0,43	23,2	20,9	19,6	18,1	16,2	14,1	11,9	8,7
3VM03		2 x 0,4	2 x 0,57	34,5	31,3	29,4	27,2	24,5	21,6	18,4	13,9
3VM04		2 x 0,5	2 x 0,71	45,3	40,6	38,0	34,9	31,3	27,3	23,0	17,1
3VM05		2 x 0,75	2 x 0,9	59,5	55,0	52,4	49,0	44,8	39,9	34,5	27,1
3VM06		2 x 1,1	2 x 1,08	71,8	66,7	63,7	59,7	54,7	48,9	42,5	33,5
3VM07		2 x 1,1	2 x 1,24	83,5	77,3	73,7	68,9	63,1	56,3	48,8	38,3
3VM08		2 x 1,5	2 x 1,41	95,8	88,9	84,9	79,5	72,9	65,2	56,6	44,6

PUMP TYPE VM..P	VERSION	MOTOR	ELECTRIC PUMP	Q = DELIVERY							
				l/min 0	80,0	106,0	132,0	158,0	184,0	210	240
		P _N	* P1	m³/h 0	4,8	6,4	7,9	9,5	11,0	12,6	14,4
		kW	kW	H = TOTAL HEAD IN METRES OF COLUMN OF WATER							
5VM02	1 ~	2 x 0,5	2 x 0,61	23,9	20,4	18,9	17,4	15,5	13,3	10,6	6,6
5VM03		2 x 0,5	2 x 0,78	35,0	28,7	26,5	24,2	21,5	18,2	14,0	8,0
5VM04		2 x 0,75	2 x 1,06	47,6	39,8	37,1	34,3	30,8	26,4	20,9	12,9
5VM05		2 x 0,95	2 x 1,29	59,5	49,4	46,0	42,4	38,0	32,5	25,6	15,6
5VM06		2 x 1,1	2 x 1,51	72,1	60,5	56,6	52,3	47,2	40,6	32,3	20,4
5VM07		2 x 1,5	2 x 1,81	84,6	72,1	67,8	63,0	57,2	49,7	40,1	26,1
5VM08		2 x 1,5	2 x 2	96,3	81,4	76,2	70,6	63,7	55,1	44,0	28,1
5VM02	3 ~	2 x 0,4	2 x 0,53	24,1	20,4	18,9	17,3	15,5	13,3	10,5	6,6
5VM03		2 x 0,5	2 x 0,73	35,3	28,9	26,8	24,5	21,9	18,6	14,4	8,4
5VM04		2 x 1,1	2 x 1	49,3	43,0	40,7	38,2	35,1	30,9	25,6	17,6
5VM05		2 x 1,1	2 x 1,22	61,4	53,2	50,3	47,1	43,1	37,9	31,1	21,1
5VM06		2 x 1,5	2 x 1,45	73,8	64,1	60,7	56,9	52,1	45,9	37,8	25,8
5VM07		2 x 1,5	2 x 1,67	85,8	74,2	70,1	65,6	60,0	52,7	43,2	29,2
5VM08		2 x 2,2	2 x 1,94	98,6	85,9	81,4	76,3	70,0	61,8	51,0	35,0

PUMP TYPE VM..P	VERSION	MOTOR	ELECTRIC PUMP	Q = DELIVERY							
				l/min 0	166,7	216	266	316	366	416	466
		P _N kW	* P1 kW	m³/h 0	10,0	13,0	16,0	19,0	22,0	25,0	28,0
		H = TOTAL HEAD IN METRES OF COLUMN OF WATER									
10VM02	1 ~	2 x 1,1	2 x 1,33	30,3	26,4	24,7	22,9	20,8	18,3	15,2	11,6
10VM03		2 x 1,5	2 x 1,87	45,6	40,1	37,8	35,3	32,4	28,9	24,7	19,6
10VM02	3 ~	2 x 1,1	2 x 1,22	30,8	27,3	25,8	24,0	22,0	19,5	16,5	13,0
10VM03		2 x 1,5	2 x 1,75	46,2	41,4	39,2	36,8	34,0	30,7	26,5	21,4
10VM04		2 x 2,2	2 x 2,33	61,8	55,4	52,6	49,4	45,8	41,3	35,8	29,0
10VM05		2 x 3	2 x 2,91	77,3	69,5	66,0	62,1	57,5	51,9	45,0	36,5
10VM06		2 x 3	2 x 3,44	92,5	82,6	78,3	73,5	67,9	61,1	52,8	42,6

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

g20-VM-P-2p50-en_a_th

* Maximum value in specified range: P1 = input power

TWO-PUMP BOOSTER SETS ELECTRICAL DATA TABLE

PUMP		GXS20	GMD20	GTKS20	GHV20../M	GHV20../T
TYPE	NOMINAL POWER P _N kW	CURRENT ABSORBED 1 x 230 V A	CURRENT ABSORBED 3 x 400 V A	CURRENT ABSORBED 1 x 230 V A	CURRENT ABSORBED 1 x 230 V A	CURRENT ABSORBED 3 x 400 V A
BG3	2 x 0,37	5,9	3,0	6,1	-	-
BG5	2 x 0,55	8,7	3,2	7,3	-	-
BG7	2 x 0,75	10,0	3,7	9,7	-	-
BG9	2 x 0,9	11,1	4,4	10,4	-	-
BG11	2 x 1,1	12,9	4,8	12,1	-	-
CEA 70/3	2 x 0,37	5,4	2,9	5,5	-	-
CEA 70/5	2 x 0,55	9,1	3,3	8,0	-	-
CEA 80/5	2 x 0,75	9,7	3,6	8,9	-	-
CEA 120/3	2 x 0,55	8,7	3,2	7,4	-	-
CEA 120/5	2 x 0,9	12,5	4,7	11,6	-	-
CEA 210/2	2 x 0,75	10,2	3,7	9,4	-	-
CEA 210/3	2 x 1,1	13,4	4,9	12,2	-	-
CEA 210/4	2 x 1,5	17,2	6,3	-	-	-
CEA 210/5	2 x 1,85	-	8,5	-	-	-
CEA 370/1	2 x 1,1	13,5	5,0	12,6	-	-
CEA 370/2	2 x 1,5	18,5	6,9	-	-	-
CEA 370/3	2 x 1,85	-	9,1	-	-	-
CEA370/5	2 x 3	-	11,7	-	-	-

The current shown is the nominal current of the set.

q20o-2p50-en b te

TWO-PUMP BOOSTER SETS ELECTRICAL DATA TABLE

PUMP TYPE HM..P	MOTOR VERSION	NOMINAL POWER P _N kW	GXS20 CURRENT ABSORBED 1 x 230 V A	GMD20 CURRENT ABSORBED 3 x 400 V A	GTKS20 CURRENT ABSORBED 1 x 230 V A	GHV20../M CURRENT ABSORBED 1 x 230 V A	GHV20../T CURRENT ABSORBED 3 x 400 V A
3HM02	1 ~	2 x 0.5	5,1	-	-	-	-
3HM03		2 x 0.5	5,8	-	-	-	-
3HM04		2 x 0.5	6,7	-	-	-	-
3HM05		2 x 0.75	9,1	-	-	-	-
3HM06		2 x 0.95	10,6	-	-	-	-
3HM02	3 ~	2 x 0.3	-	2,2	4,0	-	-
3HM03		2 x 0.4	-	2,7	5,2	-	-
3HM04		2 x 0.5	-	3,1	6,5	-	-
3HM05		2 x 0.75	-	3,4	8,3	-	-
3HM06		2 x 1.1	-	4,3	9,9	-	-

PUMP TYPE HM..S	MOTOR VERSION	NOMINAL POWER P _N kW	GXS20 CURRENT ABSORBED 1 x 230 V A	GMD20 CURRENT ABSORBED 3 x 400 V A	GTKS20 CURRENT ABSORBED 1 x 230 V A	GHV20../M CURRENT ABSORBED 1 x 230 V A	GHV20../T CURRENT ABSORBED 3 x 400 V A
3HM10	1 ~	2 x 0.75	9,8	-	-	-	-
3HM11		2 x 0.95	10,9	-	-	-	-
3HM12		2 x 0.95	11,4	-	-	-	-
3HM13		2 x 1.1	12,8	-	-	-	-
3HM14		2 x 1.1	13,5	-	-	-	-
3HM16		2 x 1.5	15,6	-	-	-	-
3HM17		2 x 1.5	16,4	-	-	-	-
3HM19		2 x 1.5	18,0	-	-	-	-
3HM10	3 ~	2 x 1.1	-	4,2	9,4	-	-
3HM11		2 x 1.1	-	4,4	10,3	-	-
3HM12		2 x 1.1	-	4,6	11,1	-	-
3HM13		2 x 1.1	-	4,8	12,0	-	-
3HM14		2 x 1.5	-	5,6	-	-	-
3HM16		2 x 1.5	-	6,0	-	-	-
3HM17		2 x 1.5	-	6,3	-	-	-
3HM19		2 x 2.2	-	7,8	-	-	-
3HM21		2 x 2.2	-	8,3	-	-	-

The current shown is the nominal current of the set.

g20-3hm-2p50-en_a_te

TWO-PUMP BOOSTER SETS ELECTRICAL DATA TABLE

PUMP TYPE HM..P	MOTOR VERSION	NOMINAL POWER P _N kW	GXS20 CURRENT ABSORBED 1 x 230 V A	GMD20 CURRENT ABSORBED 3 x 400 V A	GTKS20 CURRENT ABSORBED 1 x 230 V A	GHV20../M CURRENT ABSORBED 1 x 230 V A	GHV20../T CURRENT ABSORBED 3 x 400 V A
5HM02	1 ~	2 x 0.5	5,6	-	-	-	-
5HM03		2 x 0.5	6,8	-	-	-	-
5HM04		2 x 0.75	9,6	-	-	-	-
5HM05		2 x 0.95	11,4	-	-	-	-
5HM06		2 x 1.1	13,7	-	-	-	-
5HM02	3 ~	2 x 0.4	-	2,7	4,9	-	-
5HM03		2 x 0.5	-	3,1	6,7	-	-
5HM04		2 x 1.1	-	4,2	9,1	-	-
5HM05		2 x 1.1	-	4,6	11,2	-	-
5HM06		2 x 1.5	-	5,7	-	-	-

PUMP TYPE HM..S	MOTOR VERSION	NOMINAL POWER P _N kW	GXS20 CURRENT ABSORBED 1 x 230 V A	GMD20 CURRENT ABSORBED 3 x 400 V A	GTKS20 CURRENT ABSORBED 1 x 230 V A	GHV20../M CURRENT ABSORBED 1 x 230 V A	GHV20../T CURRENT ABSORBED 3 x 400 V A
5HM09	1 ~	2 x 1.1	13,7	-	-	-	-
5HM10		2 x 1.5	15,6	-	-	-	-
5HM11		2 x 1.5	16,8	-	-	-	-
5HM12		2 x 1.5	18,1	-	-	-	-
5HM09	3 ~	2 x 1.5	-	5,7	-	-	-
5HM10		2 x 1.5	-	6,1	-	-	-
5HM11		2 x 1.5	-	6,4	-	-	-
5HM12		2 x 2.2	-	7,9	-	-	-
5HM13		2 x 2.2	-	8,2	-	-	-
5HM14		2 x 2.2	-	8,6	-	-	-
5HM15		2 x 2.2	-	8,9	-	-	-
5HM17		2 x 3	-	11,3	-	-	-
5HM19		2 x 3	-	11,9	-	-	-
5HM21		2 x 3	-	12,6	-	-	-

The current shown is the nominal current of the set.

g20-5hm-2p50-en_a_te

TWO-PUMP BOOSTER SETS ELECTRICAL DATA TABLE

PUMP TYPE HM..P	MOTOR VERSION	NOMINAL POWER P _N kW	GXS20 CURRENT ABSORBED 1 x 230 V A	GMD20 CURRENT ABSORBED 3 x 400 V A	GTKS20 CURRENT ABSORBED 1 x 230 V A	GHV20../M CURRENT ABSORBED 1 x 230 V A	GHV20../T CURRENT ABSORBED 3 x 400 V A
10HM02	1 ~	2 x 1.1	12,1	-	-	-	-
10HM03		2 x 1.5	16,6	-	-	-	-
10HM02	3 ~	2 x 1.1	-	4,6	11,1	-	-
10HM03		2 x 1.5	-	6,3	-	-	-
10HM04		2 x 2.2	-	8,8	-	-	-
10HM05		2 x 3	-	11,7	-	-	-
10HM06		2 x 3	-	12,9	-	-	-

PUMP TYPE HM..S	MOTOR VERSION	NOMINAL POWER P _N kW	GXS20 CURRENT ABSORBED 1 x 230 V A	GMD20 CURRENT ABSORBED 3 x 400 V A	GTKS20 CURRENT ABSORBED 1 x 230 V A	GHV20../M CURRENT ABSORBED 1 x 230 V A	GHV20../T CURRENT ABSORBED 3 x 400 V A
10HM07	3 ~	2 x 3	-	11,7	-	-	-
10HM08		2 x 3	-	12,6	-	-	-
10HM09		2 x 4	-	13,5	-	-	-
10HM10		2 x 4	-	14,4	-	-	-
10HM11		2 x 4	-	15,4	-	-	-
15HM02		2 x 1.5	-	6,3	-	-	-
15HM03		2 x 2.2	-	9,3	-	-	-
15HM04		2 x 3	-	12,8	-	-	-
15HM05		2 x 4	-	14,6	-	-	-
22HM02		2 x 2.2	-	8,6	-	-	-
22HM03		2 x 3	-	12,7	-	-	-
22HM04		2 x 4	-	15,1	-	-	-

The current shown is the nominal current of the set.

g20-10-22hm-2p50-en_a_te

TWO-PUMP BOOSTER SETS ELECTRICAL DATA TABLE

PUMP TYPE HM..P	MOTOR VERSION	NOMINAL POWER P _N kW	GXS20 CURRENT ABSORBED 1 x 230 V A	GMD20 CURRENT ABSORBED 3 x 400 V A	GTKS20 CURRENT ABSORBED 1 x 230 V A	GHV20../M CURRENT ABSORBED 1 x 230 V A	GHV20../T CURRENT ABSORBED 3 x 400 V A
3VM02	1 ~	2 x 0,5	5,1	-	-	-	-
3VM03		2 x 0,5	5,7	-	-	-	-
3VM04		2 x 0,5	6,6	-	-	-	-
3VM05		2 x 0,75	9,0	-	-	-	-
3VM06		2 x 0,95	10,4	-	-	-	-
3VM07		2 x 0,95	11,4	-	-	-	-
3VM08		2 x 1,1	13,2	-	-	-	-
3VM02	3 ~	2 x 0,3	-	2,2	3,9	-	-
3VM03		2 x 0,4	-	2,7	5,1	-	-
3VM04		2 x 0,5	-	3,1	6,4	-	-
3VM05		2 x 0,75	-	3,4	8,1	10,5	-
3VM06		2 x 1,1	-	4,3	9,8	13,4	7,7
3VM07		2 x 1,1	-	4,6	11,2	14,5	8,4
3VM08		2 x 1,5	-	5,6	-	17,4	10,1
PUMP TYPE HM..P	MOTOR VERSION	NOMINAL POWER P _N kW	GXS20 CURRENT ABSORBED 1 x 230 V A	GMD20 CURRENT ABSORBED 3 x 400 V A	GTKS20 CURRENT ABSORBED 1 x 230 V A	GHV20../M CURRENT ABSORBED 1 x 230 V A	GHV20../T CURRENT ABSORBED 3 x 400 V A
5VM02	1 ~	2 x 0,5	5,5	-	-	-	-
5VM03		2 x 0,5	6,7	-	-	-	-
5VM04		2 x 0,75	9,5	-	-	-	-
5VM05		2 x 0,95	11,3	-	-	-	-
5VM06		2 x 1,1	13,5	-	-	-	-
5VM07		2 x 1,5	15,9	-	-	-	-
5VM08		2 x 1,5	17,8	-	-	-	-
5VM02	3 ~	2 x 0,4	-	2,6	4,8	-	-
5VM03		2 x 0,5	-	3,1	6,6	-	-
5VM04		2 x 1,1	-	4,1	9,0	12,9	7,4
5VM05		2 x 1,1	-	4,6	11,0	14,4	8,3
5VM06		2 x 1,5	-	5,7	-	17,7	10,2
5VM07		2 x 1,5	-	6,2	-	19,3	11,1
5VM08		2 x 2,2	-	7,8	-	24,4	14,1
PUMP TYPE HM..P	MOTOR VERSION	NOMINAL POWER P _N kW	GXS20 CURRENT ABSORBED 1 x 230 V A	GMD20 CURRENT ABSORBED 3 x 400 V A	GTKS20 CURRENT ABSORBED 1 x 230 V A	GHV20../M CURRENT ABSORBED 1 x 230 V A	GHV20../T CURRENT ABSORBED 3 x 400 V A
10VM02	1 ~	2 x 1,1	12,1	-	-	-	-
10VM03		2 x 1,5	16,5	-	-	-	-
10VM02	3 ~	2 x 1,1	-	4,6	12,0	14,4	8,3
10VM03		2 x 1,5	-	6,3	-	19,8	11,4
10VM04		2 x 2,2	-	8,7	-	27,2	15,7
10VM05		2 x 3	-	11,6	-	-	20,9
10VM06		2 x 3	-	12,8	-	-	23,1

The current shown is the nominal current of the set.

g20-VM-P-2p50-en_a_te

BOOSTER SETS

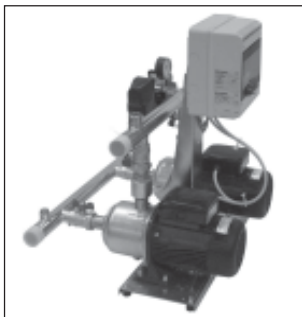
The range includes fixed speed and variable speed systems available in a variety of material configurations to suit the specific requirements of different applications.



SPHERE UNIT

- Single-phase power supply, fixed speed and pressure switch control. For P, BG, CEA, and HM-P series electric pumps.

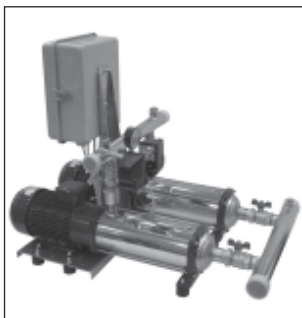
Head up to 77 m.
Flow rate up to 28,8 m³/h.
Power up to 1 x 1,5 kW.



GXS SERIES SETS

- Single-phase power supply, fixed speed and pressure switch control. For BG, CEA, HM, and VM series electric pumps.

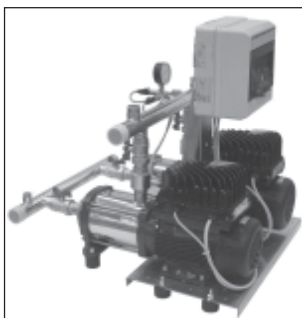
Head up to 140 m.
Flow rate up to 58 m³/h.
Power up to 2 x 1,5 kW.



GMD SERIES SETS

- Three-phase power supply, fixed speed and pressure switch control. For BG, CEA, HM, and VM series electric pumps.

Head up to 160 m.
Flow rate up to 62 m³/h.
Power up to 2 x 4 kW.



GTKS SERIES SETS

- Single-phase power supply, variable speed and control by pressure transducers and Teknospeed electronic speed controllers integrated with the motor. For BG, CEA, HM, and VM series electric pumps.

Head up to 95 m.
Flow rate up to 52 m³/h.
Power up to 2 x 1,1 kW.



GHV SERIES SETS

- Single-phase or three-phase power supply, variable speed and control by pressure transducers and Hydrovar electronic speed controllers mounted on the motor. For VM series electric pumps.

Head up to 100 m.
Flow rate up to 58 m³/h.
Power up to 2 x 3 kW.

REFERENCE STANDARDS

- The Lowara two-pump 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 9906:2012 - Grade 3B, Rotodynamic pumps – hydraulic performance acceptance tests.

Booster sets

MARKET SECTORS RESIDENTIAL

APPLICATIONS

- Water network supply in condominiums, single villa and townhouses.
- Water supply for small irrigation systems.

SPHERE UNIT Series

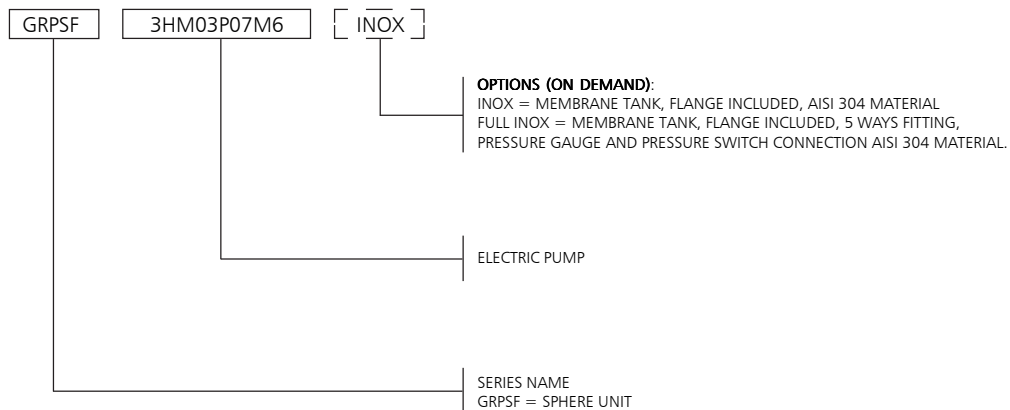


SPHERE
UNIT

SPECIFICATIONS

- **Flow rate** up to 28,8 m³/h.
- **Head** up to 77 m.
- Electrical supply voltage:
1 x 230V $\pm$ 10%.
- Frequency: 50 Hz.
- Maximum electric pump
power 1 x 1,5 kW.
- Direct motor start, by
pressure switch.
- Maximum temperature of pumped
liquid:
from -10 to +40°C (for BGM, PM).
from -10 to +60°C (for CEAM, HM).
- **Horizontal design pump:**
BGM, CEAM, P and HM..P series.
Maximum operating pressure 8 bar.

SPHERE UNIT IDENTIFICATION CODE



OPERATING CHARACTERISTICS AND LIMITS

Liquids handled	Water containing no gas or corrosive and/or aggressive substances.
Fluid temperature(*)	BGM, PM: above -10°C to + 40 °C. CEAM, eHM: above -10°C to + 60 °C.
Ambient temperature (*)	CEAM, BGM, PM: above -15°C to + 40 °C. HM: da -15°C a +45°C (above -15°C to +40 °C for models 3HM03S, 3HM02P, 5HM02S and for all models with motor 0,95kW).
Maximum operating pressure	Max 8 bar depending on the type of pump.
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
Hourly starts (single pump)	Max 60 up to 3 kW depending on the type of pump.
Installation	Indoors, protected from the weather. Away from heat sources. Max elevation 1000 m ASL. Max humidity 50% without condensation.
Sound emission	Sound emission level Lp < 70 dB(A) for pump set with 2900 rpm motor with power up to 4 kW.

(*) Standard configuration

grpsfr-en_2p_a_ti

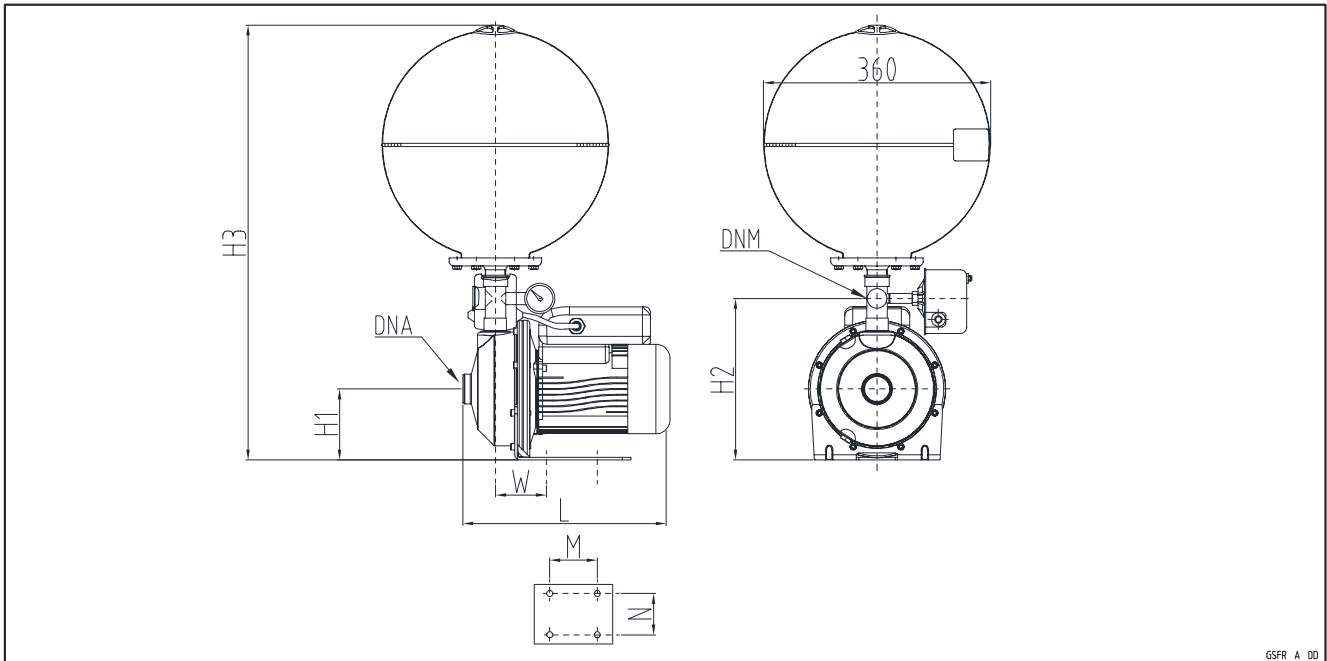
TABLE OF MATERIALS

NAME	MATERIAL		
	(STANDARD)	INOX	FULL INOX
Pressure switch junction	Chrome plated zinc alloy	Chrome plated zinc alloy	A314
5 ways connector	Brass	Nickel-plated brass	A304
Pressure gauge	Brass	Brass	A304
Vessel	Dody: painted steel Flangia: galvanized steel	Dody: AISI 304 Flangia: AISI 304	Dody: AISI 304 Flangia: AISI 304
Pump Body	- AISI 304 - Cast iron for PM pump	- AISI 304 - Cast iron for PM pump	- AISI 304 - Cast iron for PM pump

* Not all models of electric pumps are available in AISI 316. Consult technical catalog of pump.

grpsfr-en_2p_a_tm

SPHERE UNITS, HORIZONTAL DESIGN



GSFR_A_DD

**SPHERE
UNIT**

SPHERE UNIT	DNA	DNM	H1	H2	H3	L	M	N	W
BGM3	Rp1"1/4	Rp1"	168	324	704	366	127	149	101
BGM5	Rp1"1/4	Rp1"	168	324	704	380	127	149	101
BGM7	Rp1"1/4	Rp1"	168	324	704	380	127	149	101
BGM9	Rp1"1/4	Rp1"	168	324	704	380	127	149	101
BGM11	Rp1"1/4	Rp1"	168	324	704	425	127	149	101
CEAM70/3	Rp1"1/4	Rp1"	109	263	643	311	127	149	65
CEAM70/5	Rp1"1/4	Rp1"	109	263	643	325	127	149	65
CEAM80/5	Rp1"1/4	Rp1"	109	263	643	325	127	149	65
CEAM120/3	Rp1"1/4	Rp1"	109	263	643	325	127	149	65
CEAM120/5	Rp1"1/4	Rp1"	109	263	643	325	127	149	65
CEAM210/2	Rp1"1/2	Rp1"	109	273	653	339	127	149	76
CEAM210/3	Rp1"1/2	Rp1"	109	273	653	385	127	149	76
CEAM210/4	Rp1"1/2	Rp1"	109	273	653	385	127	149	76
CEAM370/1	Rp2"	Rp1"	109	273	653	385	127	149	76
CEAM370/2	Rp2"	Rp1"	109	273	653	385	127	149	76
PM16	Rp1"	Rp1"	73	191	571	280	90	112	73
PM21	Rp1"	Rp1"	73	191	571	280	90	112	73
PM30	Rp1"	Rp1"	71	187	582	311	90	112	71
PM40	Rp1"	Rp1"	71	187	582	311	90	112	71
PM60	Rp1"	Rp1"	80	205	600	354	100	124	83
1HM03	Rp1"	Rp1"	90	225	605	336	66	125	25
1HM04	Rp1"	Rp1"	90	225	605	356	66	125	25
1HM05	Rp1"	Rp1"	90	225	605	376	66	125	25
1HM06	Rp1"	Rp1"	90	225	620	396	66	125	25
3HM02	Rp1"	Rp1"	90	225	605	336	66	125	25
3HM03	Rp1"	Rp1"	90	225	605	336	66	125	25
3HM04	Rp1"	Rp1"	90	225	605	356	66	125	25
3HM05	Rp1"	Rp1"	90	225	620	376	66	125	25
3HM06	Rp1"	Rp1"	90	225	620	396	66	125	25
5HM02	Rp1"1/4	Rp1"	90	225	605	353	66	125	25
5HM03	Rp1"1/4	Rp1"	90	225	605	353	66	125	25
5HM04	Rp1"1/4	Rp1"	90	225	620	378	66	125	25
5HM05	Rp1"1/4	Rp1"	90	225	620	462	66	125	25
5HM06	Rp1"1/4	Rp1"	90	225	620	475	66	125	25
10HM02	Rp1"1/2	Rp1"	90	235	630	443	100	125	105
10HM03	Rp1"1/2	Rp1"	90	235	630	443	100	125	105

Dimensions in mm. Tolerance ± 10 mm.

gsfr-en_a_td

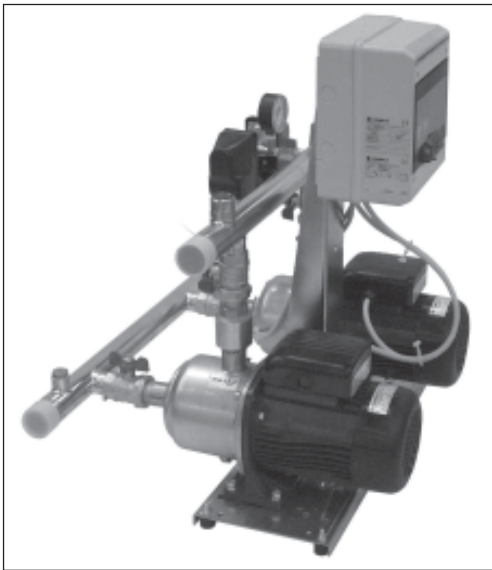
Booster sets

MARKET SECTORS RESIDENTIAL

APPLICATIONS

- Water network supply in condominiums, single villa and townhouses.
- Water supply for irrigation systems.

GXS20 Series

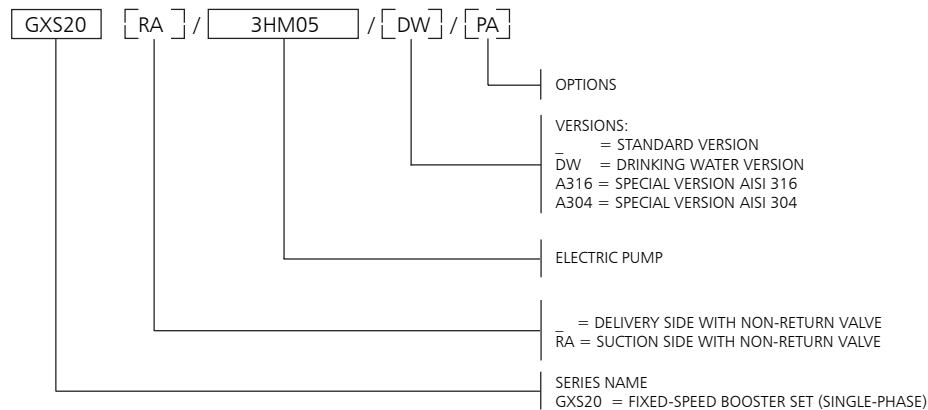


GXS20

SPECIFICATIONS

- **Flow rate** up to 58 m³/h.
- **Head** up to 140 m.
- Electrical panel supply voltage:
1 x 230V $\pm$ 10%.
- Frequency: 50 Hz.
- Protection class
electrical panel IP 55.
- Maximum electric pump
power 2 x 1,5 kW.
- Direct motor start.
- Maximum temperature of pumped liquid:
from -10 to +40° C (for BGM).
from -10 to +60° C (for CEAM, HM and VM series).
- **Horizontal design pump:**
BGM-CEAM and HM...P/S series.
Maximum operating pressure 16 bar.
- **Close-coupled threaded vertical multistage:**
VM series.
Maximum operating pressure 10 bar.

TWO-PUMP BOOSTER SETS, GXS20 SERIES 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 tanks can not be installed directly on the manifold, only for e-SV™ and VM sets.
- CM Suction or delivery manifold larger than standard size.
- CP Dry contact version: power line, Automatic/Manual mode, Run/Stop for each pump, thermal block.
- PA Minimum pressure gauge installed on the suction manifold for dry-running protection.
- PMA Minimum pressure switch for dry-running protection and pressure gauge installed on suction manifold.
- PQ Booster set with high suction pressure (pressure gauge/pressure switches increased of one range).
- RA Non return valves mounted on suction side (I.e: GXS20RA/5SV...).
- 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).
- SCM Without delivery manifold (no pressure transmitters and pressure gauge, with delivery valves).
- SM Without delivery: without valves on delivery and without delivery manifold.
- TS Booster set with pumps equipped with special mechanical seals.
- UK UK market version.
- WM Wall-mounted electrical panel with fixing tabs. Cables L= 5m

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.

TWO-PUMP BOOSTER SETS, GXS20 SERIES OPERATING CHARACTERISTICS AND LIMITS

Liquids handled	Water containing no gas or corrosive and/or aggressive substances.
Fluid temperature(*)	BGM: above -10°C to + 40 °C. CEAM, eHM, eVM: above -10°C to + 60 °C.
Ambient temperature (*)	CEAM, BGM: above -15°C to + 40 °C. VM: above -15°C to +45°C (above -15°C to +40 °C for models 3VM02P and for all models with motor 0,95kW). HM: da -15°C a +45°C (above -15°C to +40 °C for models 3HM03S, 3HM02P, 5HM02S and for all models with motor 0,95kW).
Maximum operating pressure	Max 8 bar, 10 bar, 16 bar Depending on the type of pump.
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
Hourly starts (single pump)	Max 60 up to 3 kW, above 3 kW and up to 4 kW max 40.
Installation	Indoors, protected from the weather. Away from heat sources. Max elevation 1000 m ASL. Max humidity 50% without condensation.
Sound emission	Sound emission level Lp < 70 dB(A) for two-pump set with 2900 rpm motor with power up to 2 x 4 kW.

(*) Standard configuration

gxs20-en_2p_b_ti

GXS20

TABLE OF MATERIALS

NAME	MATERIAL			
	(STANDARD)	DW	A304	A316
Manifolds	AISI 304	AISI 304	AISI 304	AISI 316
On-off valves	Nickel-plated brass	Nickel-plated brass	AISI 316	AISI 316
Non-return valves	Brass	Brass	AISI 304	AISI 316
Pressure switches	Chrome plated zinc alloy	AISI 304	AISI 304	AISI 304
Pressure trasmitter	AISI 316	AISI 316	AISI 316	AISI 316
Caps/plugs/flanges	Galvanized steel	AISI 304	AISI 304	AISI 316
Bracket	Galvanized steel	Galvanized steel	Galvanized steel	Galvanized steel
Base	Galvanized steel	Galvanized steel	Galvanized steel	Galvanized steel
Pump Body	- AISI 304 - Cast iron for VM pump	- AISI 304 - Cast iron for VM pump	- AISI 304 - Cast iron for VM pump	- AISI 316(*) - Cast iron for VM pump

* Not all models of electric pumps are available in AISI 316. Consult technical catalog of pump.

gxs20_2p-en_b_tm

TWO-PUMP BOOSTER SETS, GXS20 SERIES MAIN COMPONENTS

GXS20

- **Main On-off valves** on suction and discharge side of each pump, ball type with threaded coupling.
- **Check valve** on discharge side of each pump, spring-loaded type, with threaded coupling. 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 (GXS20RA.. series).
- **Suction manifold** made of galvanized or AISI 304 stainless steel with threaded ends. Threaded coupling for water charging.
- **Delivery manifold** made of galvanized or AISI 304 stainless steel with threaded ends. Fitted with R1" threaded couplings with caps to allow connection of 24 or 20-litre diaphragm pressure vessels. Only one connection R1" threaded for **VM** sets.
- **Pressure gauge and 2 control transmitters** located on the delivery side of the unit.
- **Various couplings** in nickel-plated brass, galvanised steel or stainless steel depending on the version.
- **Mounting base**, for pumpset and panel mounting brackets in galvanised steel.
- **Electric control panel**, IP55 protection class.

STANDARD VERSIONS AVAILABLE

See table of materials.

STANDARD VERSION For general applications

Valves in brass or nickel plated brass, galvanized steel or brass fittings.

DW VERSION (GXS20../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.

AISI304 Version (GXS20../A304), AISI 316 (GXS20../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** 24 or 20-litres **diaphragm expansion vessel** with 1" ball valve, 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 10 bar cylinder water vessel kit, Aisi 304
 - 24-litre 10 bar cylinder water vessel kit
 - 20-litre 25 bar cylinder water vessel kit
- **Alarm kit;**
- **Air feeder** for **RA** version.

SPECIAL VERSIONS AVAILABLE ON REQUEST

(Contact the Sales and technical Assistance Service)

- Support base in AISI 304, AISI 316 stainless steel.
- Units with stainless steel expansion vessels.
- Units with special valves.
- Sets with jockey pump.

TWO-PUMP BOOSTER SETS, GXS20 SERIES CONTROL PANEL

Electrical panel (fig. 1), single-phase power input, for controlling and protecting up to two single-phase electric pumps, made from polycarbonate and protected to IP55.

Main characteristics:

- Automatic switch with general overload protection.
- Standard supply voltage: 1x230Vac +/-10%, 50/60Hz.
- Lowara SX20 digital control unit (fig 2), with microprocessors, offers the following functions:
 - Indicator LED's: power on (ref. 1), general fault and no water level alarm (ref. 2), pump running (ref. 3).
 - Automatic, manual or disabled mode switches for each pump (ref. 4).
 - Automatic cascade control of electric pumps via two pressure switches.
 - Cycle reversal function (can be disabled). Automatically switches pumps after every start/stop cycle.
 - No-water protection system alternatives: float, minimum pressure switch, external contact or electrode probes with sensitivity adjustment.
 - Adjustable timer delaying tripping the no-water protection system (inside board).
 - Adjustable timer extending the operation of each pump (inside board).
 - A relay board (optional) can be connected to boost the following signals: pump 1,2 running, aut-man mode, overload alarm, no-water alarm, power on.
- External enable connection or pressure switch for maximum pressure protection.



Fig.1 - Electrical panel

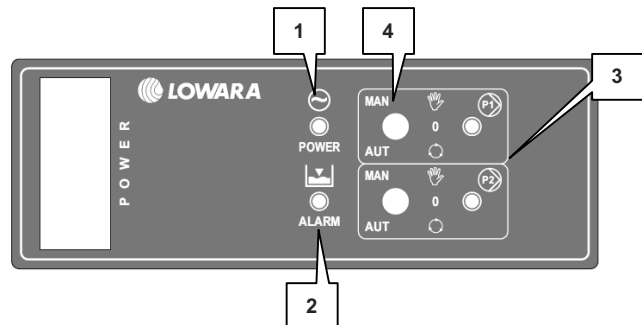
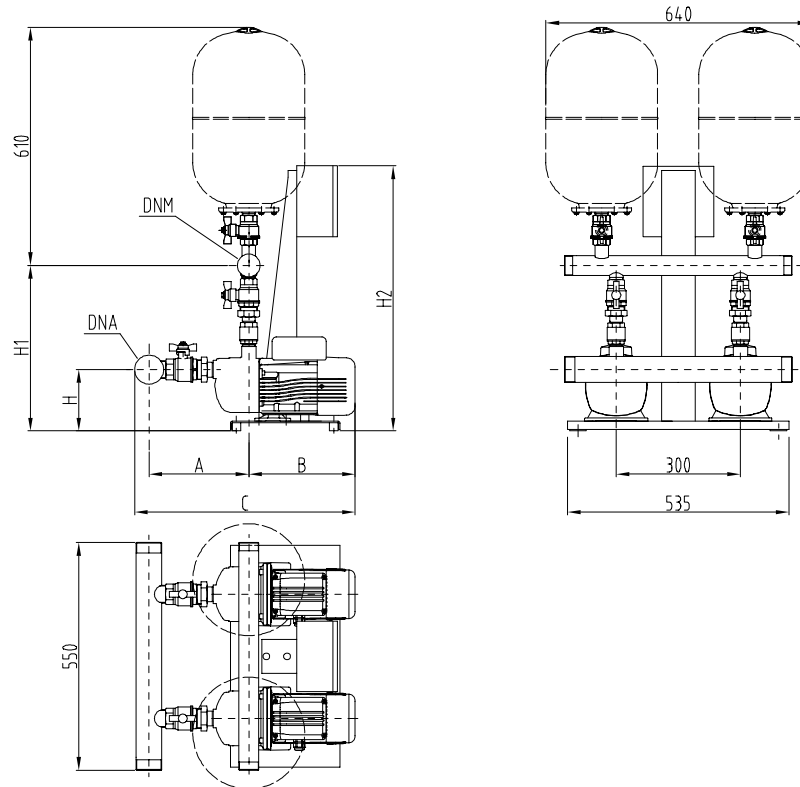


Fig. 2 - SX20 control board

TWO-PUMP BOOSTER SETS, GXS20 SERIES **HORIZONTAL ELECTRIC PUMPS** **WITH NON-RETURN VALVE ON DELIVERY SIDE**

GXS20



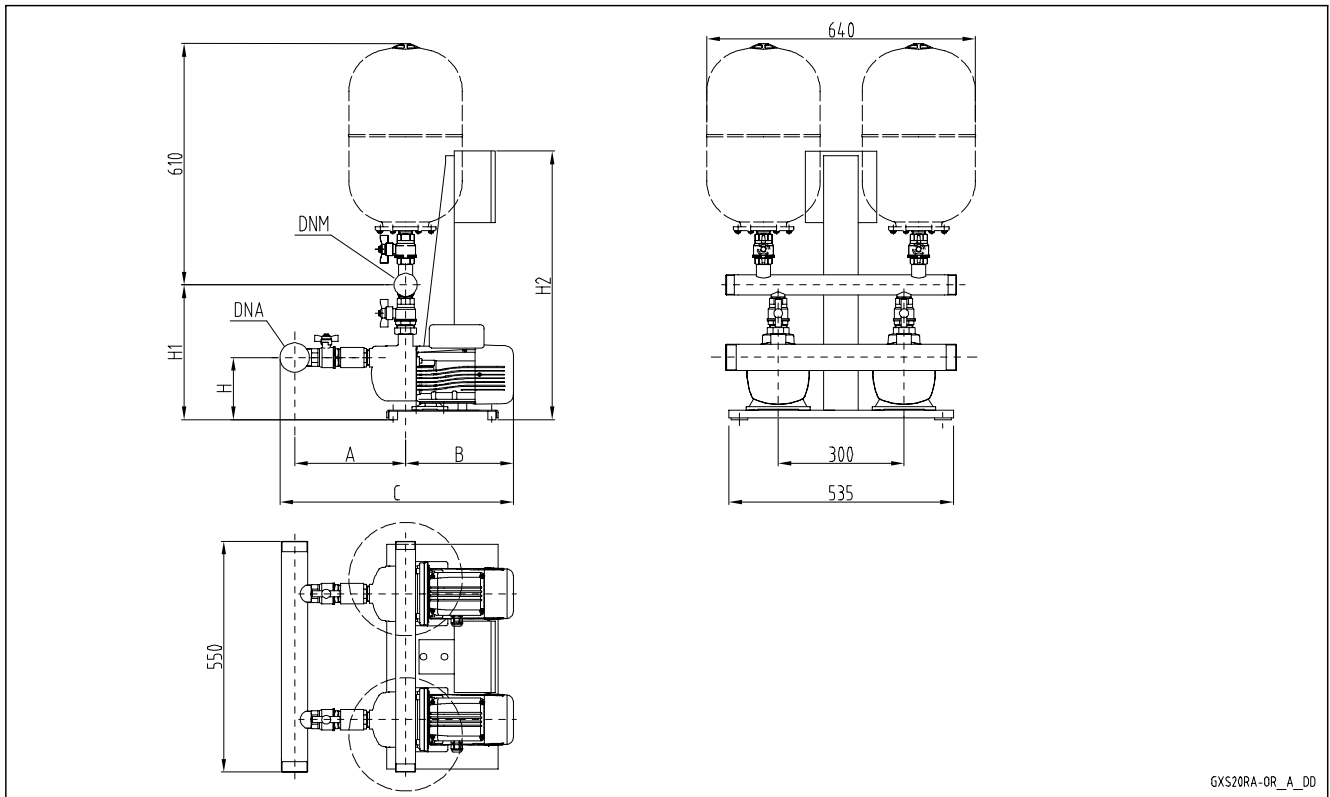
GXS20-OR_A_DD

GXS 20	DNA	DNM	A		B	C		H	H1		H2
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI	
BGM3	R 2"	R 1 "1/2	214	299	297	541	626	189	423	501	640
BGM5	R 2"	R 1 "1/2	214	299	311	555	640	189	423	501	640
BGM7	R 2"	R 1 "1/2	214	299	356	600	685	189	423	501	640
BGM9	R 2"	R 1 "1/2	214	299	356	600	685	189	423	501	640
BGM11	R 2"	R 1 "1/2	214	299	356	600	685	189	423	501	640
CEAM70/3	R 2"	R 1 "1/2	196	281	260	486	571	134	421	499	640
CEAM70/5	R 2"	R 1 "1/2	196	281	274	500	585	134	421	499	640
CEAM80/5	R 2"	R 1 "1/2	196	281	320	546	631	134	421	499	640
CEAM120/3	R 2"	R 2"	196	281	274	500	585	134	476	505	640
CEAM120/5	R 2"	R 2"	196	281	320	546	631	134	476	505	640
CEAM210/2	R 2" 1/2	R 2 "1/2	207	318	331	576	687	134	460	602	640
CEAM210/3	R 2" 1/2	R 2 "1/2	207	318	331	576	687	134	460	602	640
CEAM210/4	R 2" 1/2	R 2 "1/2	207	318	375	620	731	134	460	602	640
CEAM370/1	R 2" 1/2	R 2 "1/2	207	318	331	576	687	134	460	602	640
CEAM370/2	R 2" 1/2	R 2 "1/2	207	318	375	620	731	134	460	602	640

Dimensions in mm. Tolerance ± 10 mm.

gxs20_or-en_e_td

**TWO-PUMP BOOSTER SETS, GXS20 RA SERIES
HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**



GXS20

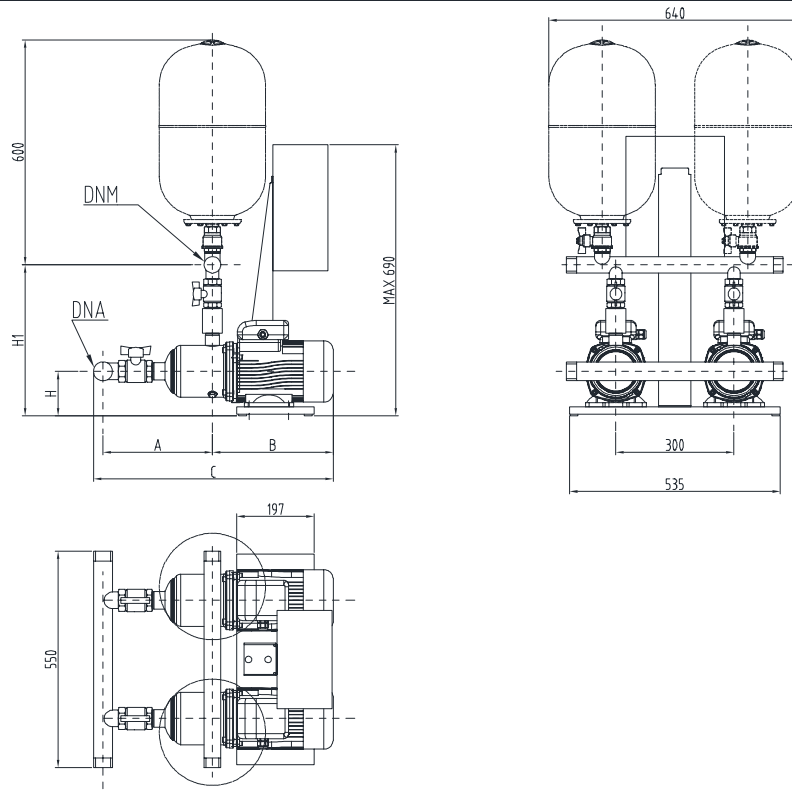
GXS 20RA	DNA	DNM	A		B	C		H	H1		H2
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI	
BGM3	R 2"	R 1 "1/2	267	445	297	594	772	189	371	454	640
BGM5	R 2"	R 1 "1/2	267	445	311	608	786	189	371	454	640
BGM7	R 2"	R 1 "1/2	267	445	356	653	831	189	371	454	640
BGM9	R 2"	R 1 "1/2	267	445	356	653	831	189	371	454	640
BGM11	R 2"	R 1 "1/2	267	445	356	653	831	189	371	454	640
CEAM70/3	R 2"	R 1 "1/2	249	427	260	539	717	134	369	452	640
CEAM70/5	R 2"	R 1 "1/2	249	427	274	553	731	134	369	452	640
CEAM80/5	R 2"	R 1 "1/2	249	427	320	599	777	134	369	452	640
CEAM120/3	R 2"	R 2"	249	427	274	553	731	134	375	458	640
CEAM120/5	R 2"	R 2"	249	427	320	599	777	134	375	458	640
CEAM210/2	R 2" 1/2	R 2 "1/2	287	493	331	656	862	134	398	483	640
CEAM210/3	R 2" 1/2	R 2 "1/2	287	493	331	656	862	134	398	483	640
CEAM210/4	R 2" 1/2	R 2 "1/2	287	493	375	700	906	134	398	483	640
CEAM370/1	R 2" 1/2	R 2 "1/2	287	493	331	656	862	134	398	483	640
CEAM370/2	R 2" 1/2	R 2 "1/2	287	493	375	700	906	134	398	483	640

Dimensions in mm. Tolerance ± 10 mm.

gxs20ra_or-en_e_td

**TWO-PUMP BOOSTER SETS, GXS20 SERIES
HM..P HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON DELIVERY SIDE**

GXS20



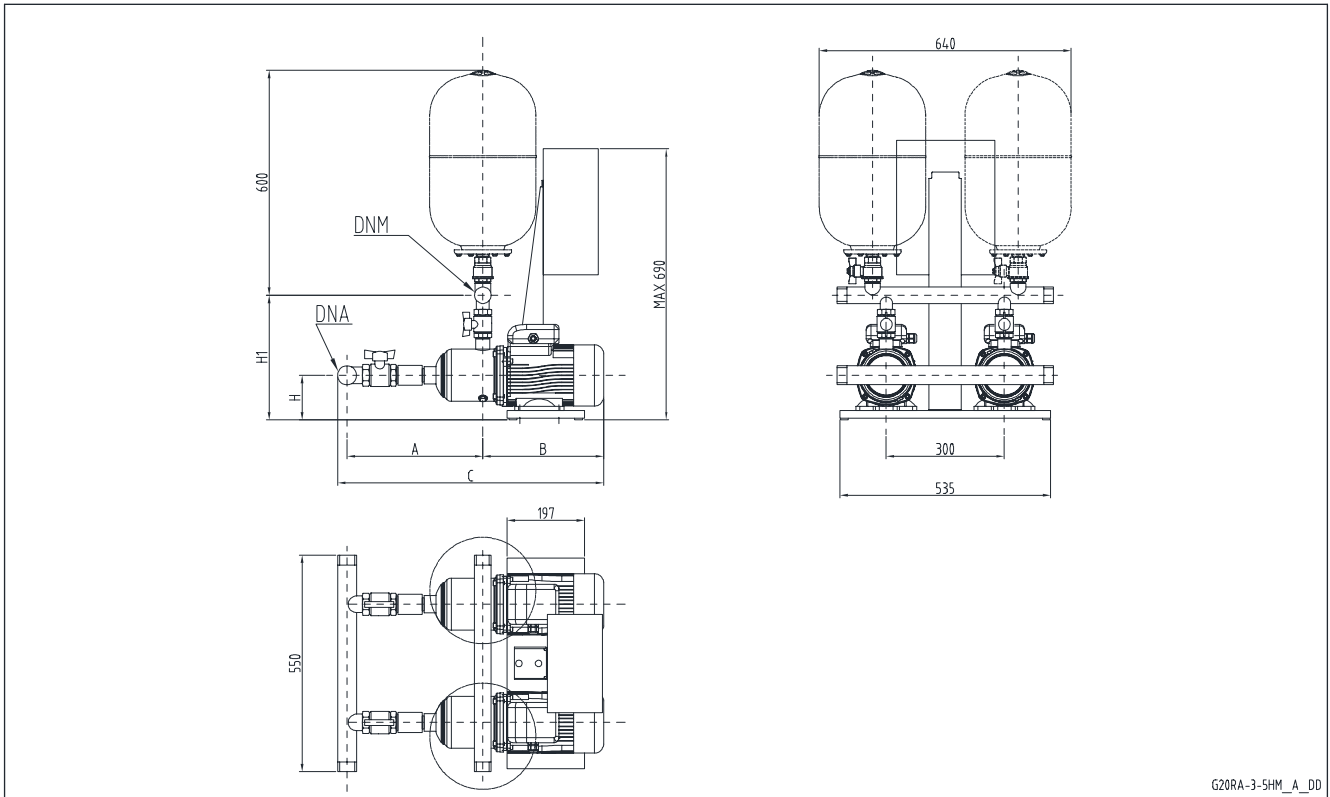
G20-3-5HM_A_DD

GXS 20	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM02	R 1"1/4	R 1"1/4	198	227	249	468	497	113	383	521
3HM03	R 1"1/4	R 1"1/4	198	227	249	468	497	113	383	521
3HM04	R 1"1/4	R 1"1/4	218	247	249	488	517	113	383	521
3HM05	R 1"1/4	R 1"1/4	238	267	263	522	551	113	383	521
3HM06	R 1"1/4	R 1"1/4	258	287	263	542	571	113	383	521
5HM02	R 2"	R 1"1/2	224	248	249	503	527	113	386	524
5HM03	R 2"	R 1"1/2	224	248	249	503	527	113	386	524
5HM04	R 2"	R 1"1/2	244	268	263	537	561	113	386	524
5HM05	R 2"	R 1"1/2	264	288	263	557	581	113	386	524
5HM06	R 2"	R 1"1/2	284	308	308	622	646	113	386	524

Dimensions in mm. Tolerance ± 10 mm.

gxs20_3-5hm-en_a_td

**TWO-PUMP BOOSTER SETS, GXS20 RA SERIES
HM..P HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**



GXS20

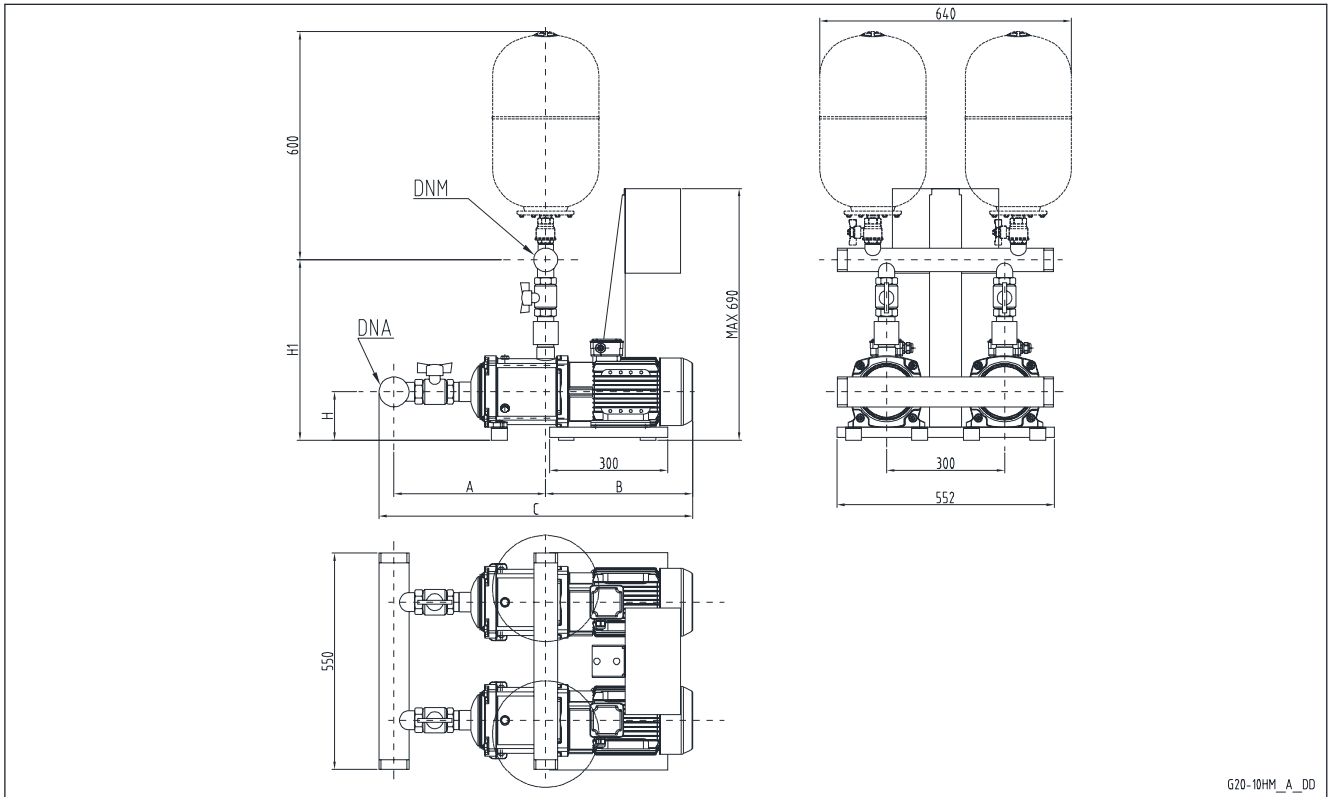
GXS 20RA	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM02	R 1"1/4	R 1"1/4	243	430	249	513	700	113	317	346
3HM03	R 1"1/4	R 1"1/4	243	430	249	513	700	113	317	346
3HM04	R 1"1/4	R 1"1/4	263	450	249	533	720	113	317	346
3HM05	R 1"1/4	R 1"1/4	283	470	263	567	754	113	317	346
3HM06	R 1"1/4	R 1"1/4	303	490	263	587	774	113	317	346
5HM02	R 2"	R 1"1/2	277	470	249	556	749	113	320	349
5HM03	R 2"	R 1"1/2	277	470	249	556	749	113	320	349
5HM04	R 2"	R 1"1/2	297	490	263	590	783	113	320	349
5HM05	R 2"	R 1"1/2	317	510	263	610	803	113	320	349
5HM06	R 2"	R 1"1/2	337	530	308	675	868	113	320	349

Dimensions in mm. Tolerance ± 10 mm.

gxs20ra_3-5hm-en_a_td

**TWO-PUMP BOOSTER SETS, GXS20 SERIES
HM..S HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON DELIVERY SIDE**

GXS20



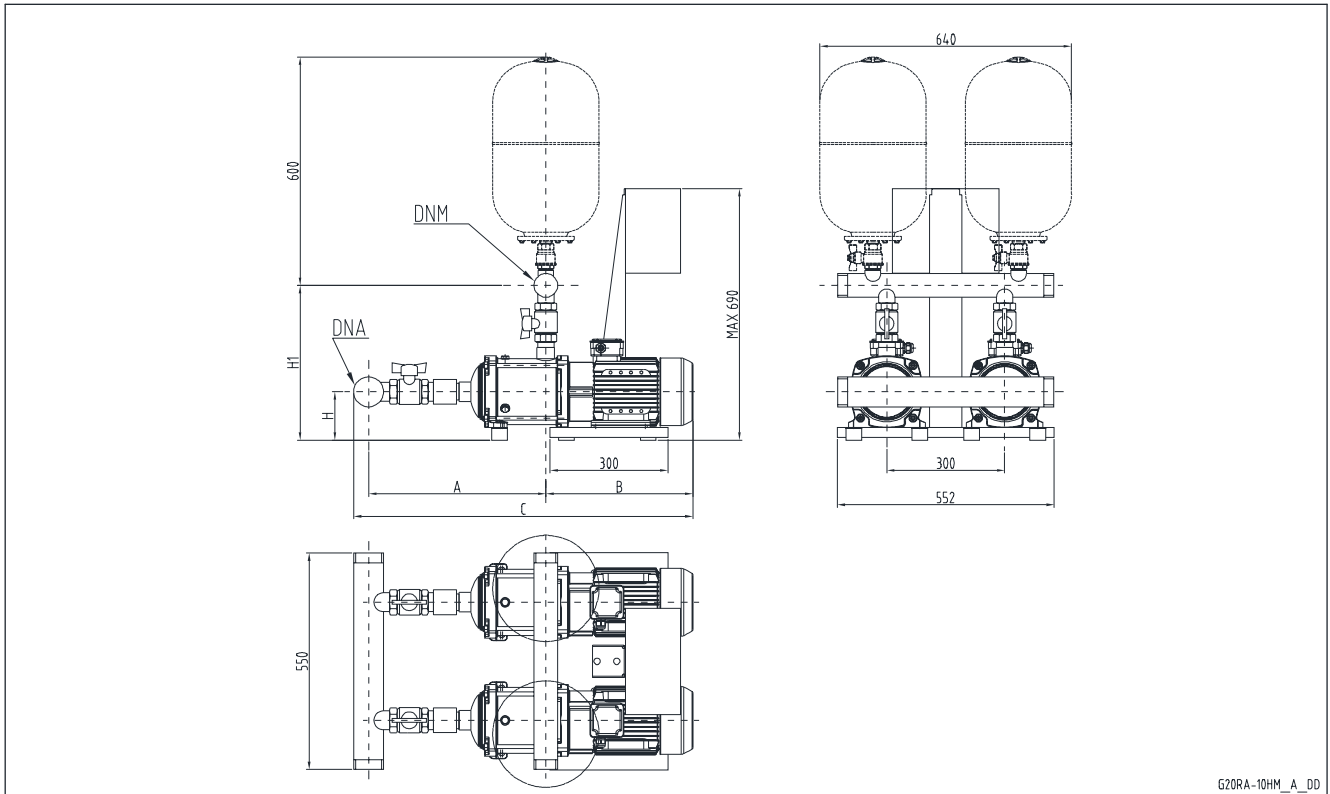
G20-10HM_A_DD

GXS 20	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM10	R 1"1/4	R 1"1/4	322	351	273	616	645	123	393	531
3HM11	R 1"1/4	R 1"1/4	342	371	273	636	665	123	393	531
3HM12	R 1"1/4	R 1"1/4	362	391	273	656	685	123	393	531
3HM13	R 1"1/4	R 1"1/4	382	411	317	720	749	123	393	531
3HM14	R 1"1/4	R 1"1/4	402	431	317	740	769	123	393	531
3HM16	R 1"1/4	R 1"1/4	442	471	317	780	809	123	393	531
3HM17	R 1"1/4	R 1"1/4	462	491	317	800	829	123	393	531
3HM19	R 1"1/4	R 1"1/4	502	531	317	840	869	123	393	531
5HM09	R 2"	R 1"1/2	368	392	317	715	739	123	396	534
5HM10	R 2"	R 1"1/2	393	417	317	740	764	123	396	534
5HM11	R 2"	R 1"1/2	418	442	317	765	789	123	396	534
5HM12	R 2"	R 1"1/2	443	467	317	790	814	123	396	534

Dimensions in mm. Tolerance ± 10 mm.

gxs20_3-5hms-en_a_td

**TWO-PUMP BOOSTER SETS, GXS20 RA SERIES
HM..S HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**



GXS20

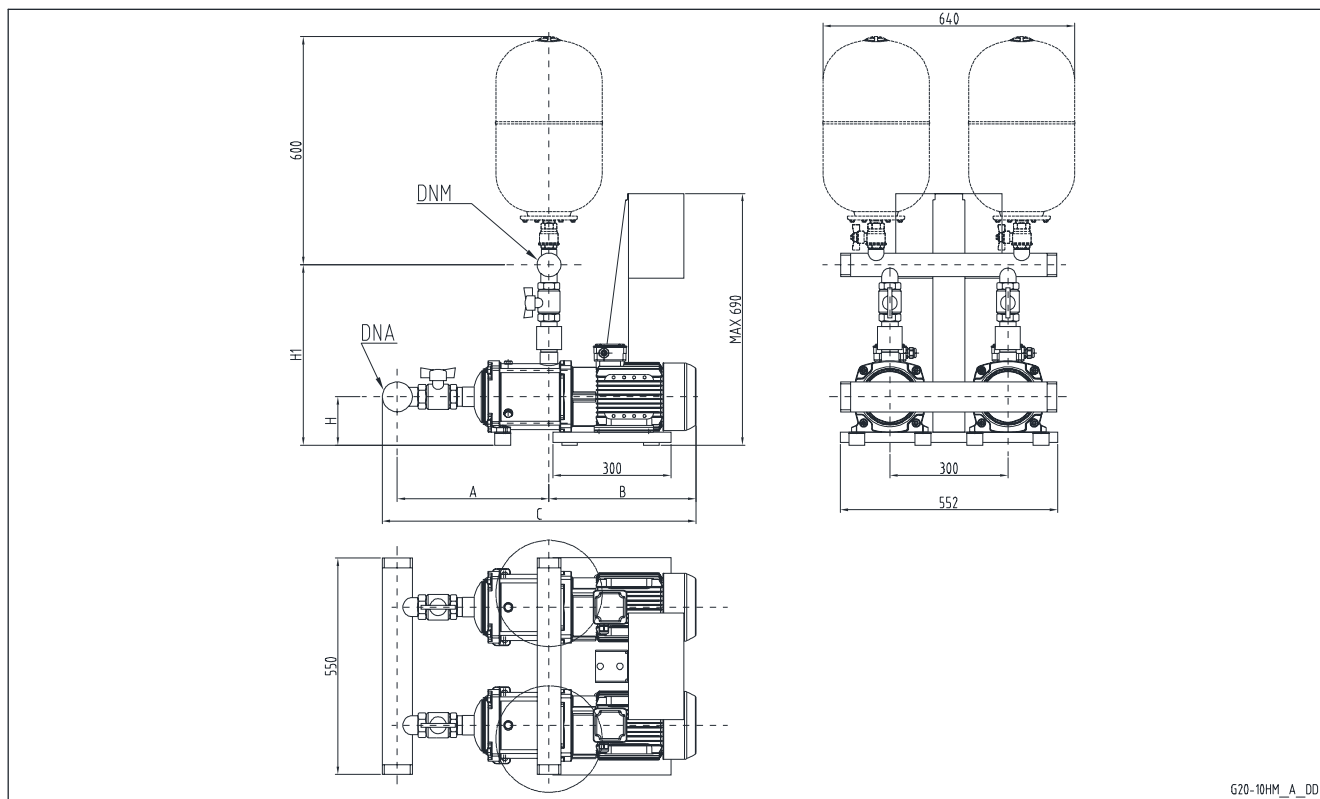
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			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM10	R 1"1/4	R 1"1/4	367	554	273	661	848	123	327	356
3HM11	R 1"1/4	R 1"1/4	387	574	273	681	868	123	327	356
3HM12	R 1"1/4	R 1"1/4	407	594	273	701	888	123	327	356
3HM13	R 1"1/4	R 1"1/4	427	614	317	765	952	123	327	356
3HM14	R 1"1/4	R 1"1/4	447	634	317	785	972	123	327	356
3HM16	R 1"1/4	R 1"1/4	487	674	317	825	1012	123	327	356
3HM17	R 1"1/4	R 1"1/4	507	694	317	845	1032	123	327	356
3HM19	R 1"1/4	R 1"1/4	547	734	317	885	1072	123	327	356
5HM09	R 2"	R 1"1/2	421	614	317	768	961	123	330	359
5HM10	R 2"	R 1"1/2	446	639	317	793	986	123	330	359
5HM11	R 2"	R 1"1/2	471	664	317	818	1011	123	330	359
5HM12	R 2"	R 1"1/2	496	689	317	843	1036	123	330	359

Dimensions in mm. Tolerances: +10 mm.

GXS20RA 3 HM on a standard

TWO-PUMP BOOSTER SETS, GXS20 SERIES **HM..P HORIZONTAL ELECTRIC PUMPS** **WITH NON-RETURN VALVE ON DELIVERY SIDE**

GXS20



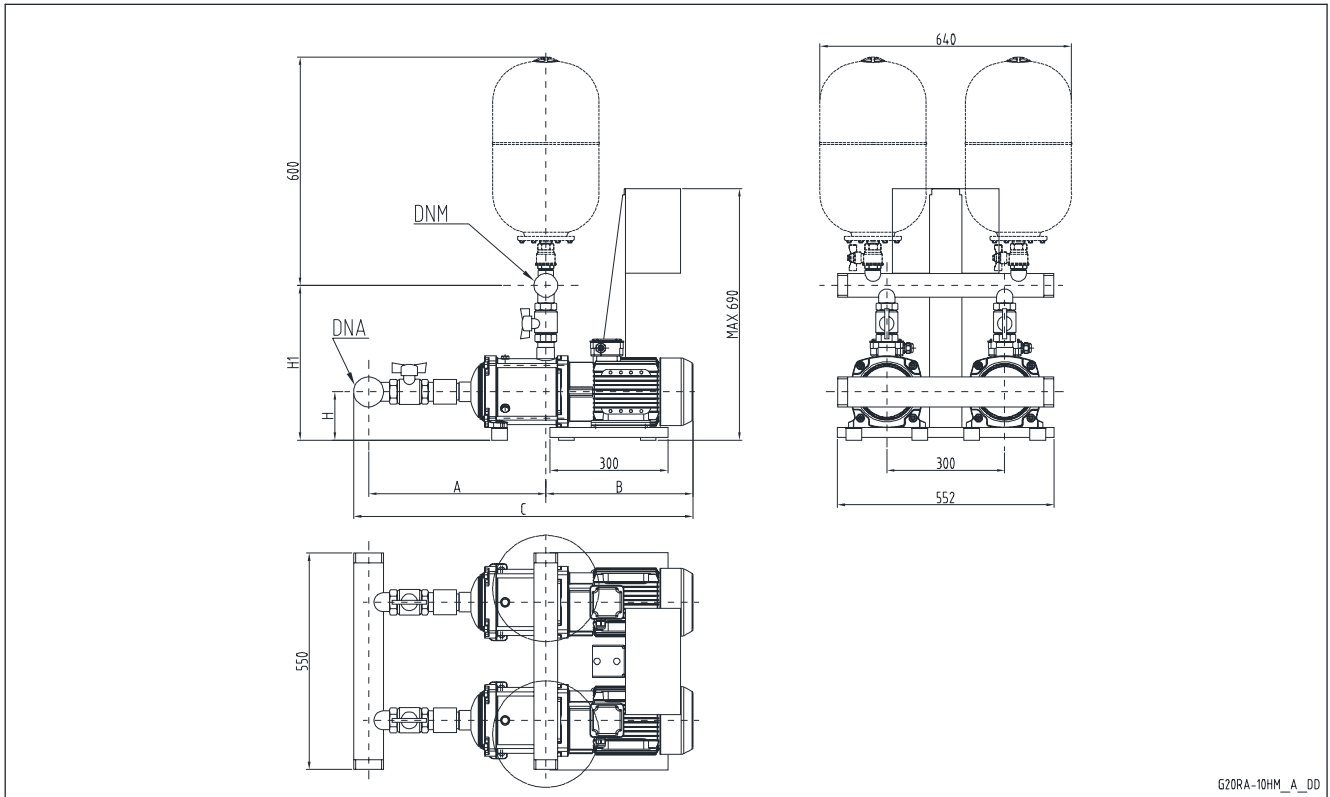
G20-10HM_A_DD

GXS 20	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
10HM02	R 2"1/2	R 2"	290	309	318	646	665	123	441	590
10HM03	R 2"1/2	R 2"	290	309	318	646	665	123	441	590

Dimensions in mm. Tolerance ± 10 mm.

gxs20_10hm-en_a_td

**TWO-PUMP BOOSTER SETS, GXS20 RA SERIES
HM..P HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**



G20RA-10HM_A_DD

GXS 20RA	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
10HM02	R 2"1/2	R 2"	361	554	318	717	910	123	371	395
10HM03	R 2"1/2	R 2"	361	554	318	717	910	123	371	395

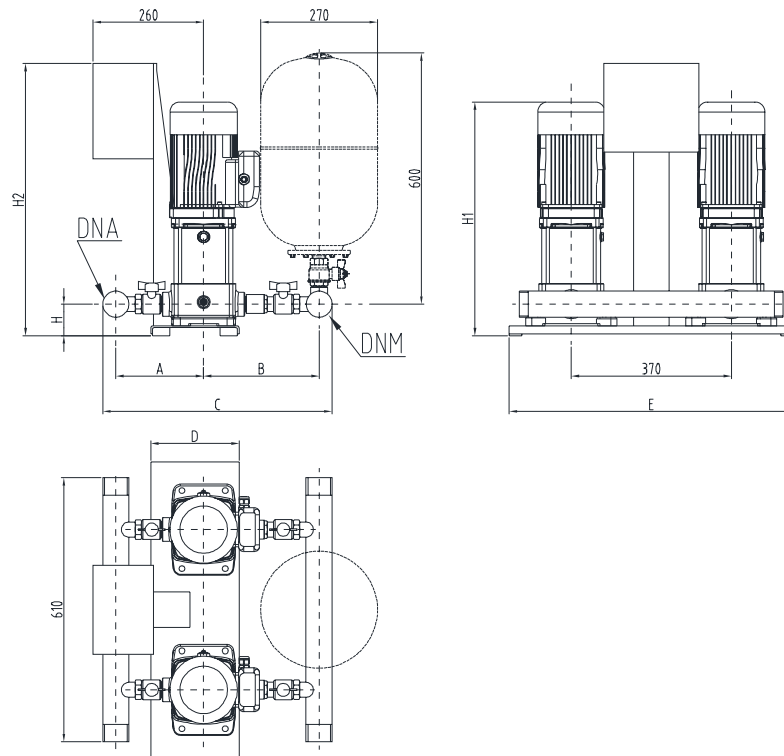
Dimensions in mm. Tolerance ± 10 mm.

gxs20ra_10hm-en_a_td

GXS20

**TWO-PUMP BOOSTER SETS, GXS20 SERIES
VM VERTICAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON DELIVERY SIDE**

GXS20



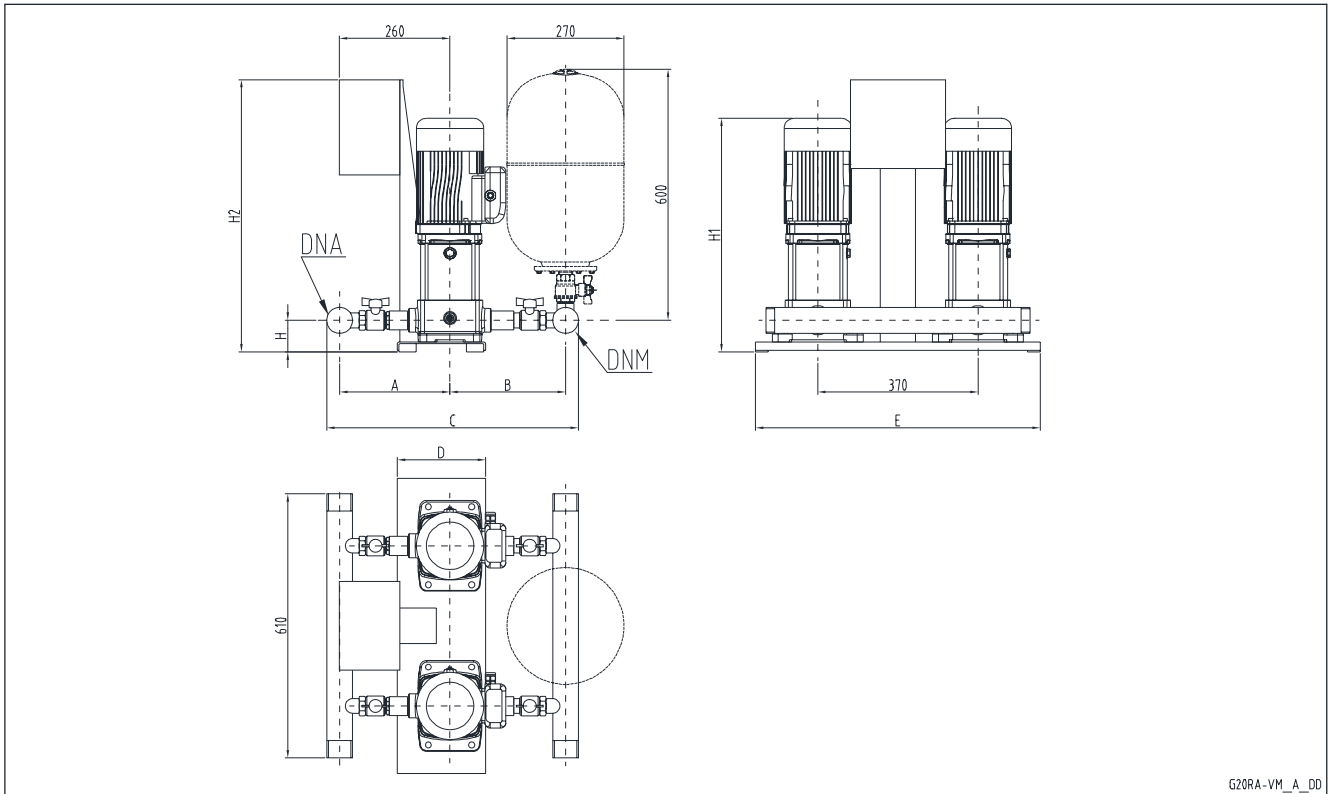
G20-VM_A_DD

GXS 20	DNA	DNM	A		B		C		D	E	H	H1	H2
			STD / DW	AISI	STD / DW	AISI	STD / DW	AISI					
3VM02	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	402	629
3VM03	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	402	629
3VM04	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	422	629
3VM05	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	456	629
3VM06	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	476	629
3VM07	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	496	629
3VM08	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	560	629
5VM02	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	402	629
5VM03	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	402	629
5VM04	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	436	629
5VM05	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	456	629
5VM06	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	520	629
5VM07	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	540	629
5VM08	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	560	629
10VM02	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	535	640
10VM03	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	567	640

Dimensions in mm. Tolerance ± 10 mm.

gxs20_vm-en_a_td

**TWO-PUMP BOOSTER SETS, GXS20 RA SERIES
VM VERTICAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**



G20RA-VM_A_DD

GXS20

GXS 20RA	DNA	DNM	A		B		C		D	E	H	H1	H2
			STD / DW	AISI	STD / DW	AISI	STD / DW	AISI					
3VM02	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	402	629
3VM03	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	402	629
3VM04	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	422	629
3VM05	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	456	629
3VM06	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	476	629
3VM07	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	496	629
3VM08	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	560	629
5VM02	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	402	629
5VM03	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	402	629
5VM04	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	436	629
5VM05	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	456	629
5VM06	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	520	629
5VM07	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	540	629
5VM08	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	560	629
10VM02	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	535	640
10VM03	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	567	640

Dimensions in mm. Tolerance ± 10 mm.

gxs20ra_vm-en_a_td

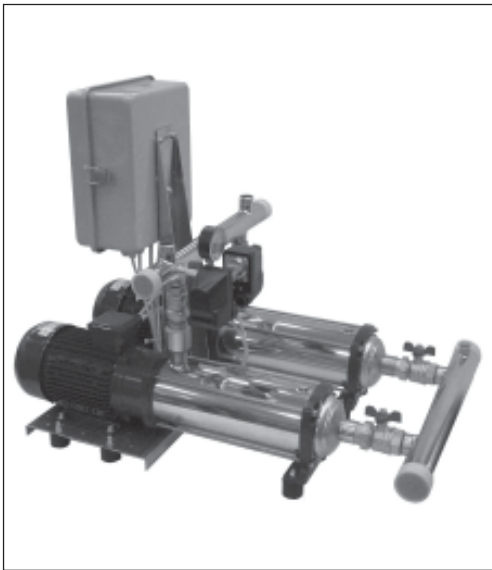
Booster sets

MARKET SECTORS RESIDENTIAL

APPLICATIONS

- Water network supply in condominiums, single villa and townhouses.
- Water supply for irrigation systems.

GMD20 Series

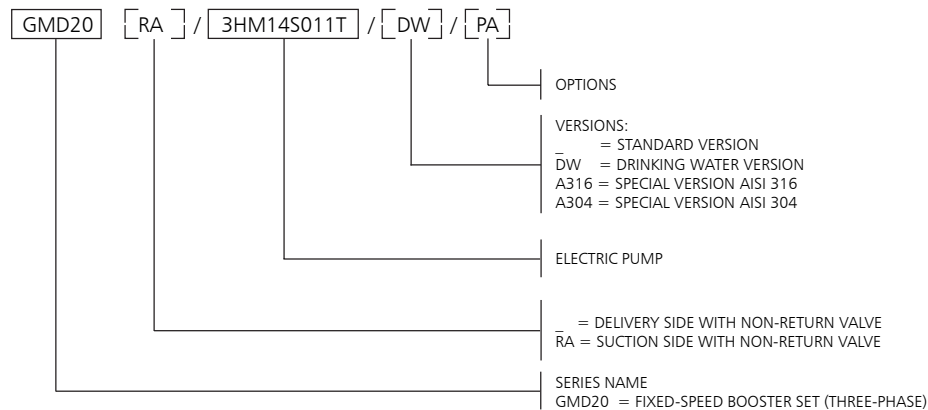


GMD20

SPECIFICATIONS

- **Flow rate** up to 62 m³/h.
- **Head** up to 160 m.
- Electrical panel supply voltage:
3 x 400V $\pm$ 10%.
- Frequency: 50 Hz.
- Protection class
electrical panel IP 54.
- Maximum electric pump
power 2 x 4 kW.
- Direct motor start.
- Maximum temperature of pumped liquid:
from -10 to +40° C (for BG).
from -10 to +60° C (for CEA, HM and VM series).
- **Horizontal design pump:**
BG, CEA and HM..P/S series.
Maximum operating pressure 16 bar.
- **Close-coupled threaded vertical multistage:**
VM series.
Maximum operating pressure 10 bar.

TWO-PUMP BOOSTER SETS, GMD20 SERIES IDENTIFICATION CODE



OPTIONS (ON DEMAND)

230	Power supply of control panel 3 x 230V. For different voltage supply, see control panel section.
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 tanks can not be installed directly on the manifold, only for e-SV™ and VM sets.
CM	Suction or delivery manifold larger than standard size.
CP	Dry contact version: power line, Automatic/Manual mode, Run/Stop for each pump, thermal block.
IP55	Control panel IP55.
IP65	IP65 version control panel.
KV	Kit voltmeter.
ORG	With Real time clock inside the panel.
PA	Minimum pressure gauge installed on the suction manifold for dry-running protection.
PMA	Minimum pressure switch for dry-running protection and pressure gauge installed on suction manifold.
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 (I.e GMD20RA/SV...).
RE	Heaters inside the control panel, with thermostat.
RV	Electric panel with phase sequence, phase loss, over- and undervoltage and phase unbalance.
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).
SCM	Without delivery manifold (no pressure transmitters and pressure gauge, with delivery valves).
SM	Without delivery: without valves on delivery and without delivery manifold.
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

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.

TWO-PUMP BOOSTER SETS, GMD20 SERIES OPERATING CHARACTERISTICS AND LIMITS

Liquids handled	Water containing no gas or corrosive and/or aggressive substances.
Fluid temperature (*)	BG: above -10°C to + 40 °C. CEA, eHM, eVM: above -10°C to + 60 °C.
Ambient temperature (*)	CEA, BG: above -15°C to + 40 °C. HM, VM: above -15°C to + 50°C
Maximum operating pressure	Max 8 bar, 10 bar, 16 bar Depending on the type of pump.
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
Hourly starts (single pump)	Max 60 up to 3 kW, above 3 kW and up to 4 kW max 40.
Installation	Indoors, protected from the weather. Away from heat sources. Max elevation 1000 m ASL. Max humidity 50% without condensation.
Sound emission	Sound emission level $L_p < 70$ dB(A) for two-pump set with 2900 rpm motor with power up to 2 x 4 kW.

(*) standard configuration

gmd20_2p-en_b_ti

TABLE OF MATERIALS

NAME	MATERIAL			
	(STANDARD)	DW	A304	A316
Manifolds	AISI 304	AISI 304	AISI 304	AISI 316
On-off valves	Nickel-plated brass	Nickel-plated brass	AISI 316	AISI 316
Non-return valves	Brass	Brass	AISI 304	AISI 316
Pressure switches	Chrome plated zinc alloy	AISI 304	AISI 304	AISI 304
Pressure trasmitter	AISI 316	AISI 316	AISI 316	AISI 316
Caps/plugs/flanges	Galvanized steel	AISI 304	AISI 304	AISI 316
Bracket	Galvanized steel	Galvanized steel	Galvanized steel	Galvanized steel
Base	Galvanized steel	Galvanized steel	Galvanized steel	Galvanized steel
Pump Body	- AISI 304 - Cast iron for VM pump	- AISI 304 - Cast iron for VM pump	- AISI 304 - Cast iron for VM pump	- AISI 316(*) - Cast iron for VM pump

* Not all models of electric pumps are available in AISI 316. Consult technical catalog of pump.

gmd20_2p-en_b_tm

TWO-PUMP BOOSTER SETS, GMD20 SERIES MAIN COMPONENTS

GMD20

- **Main On-off valves** on suction and discharge side of each pump, ball type with threaded coupling.
- **Check valve** on discharge side of each pump, spring-loaded type, with threaded coupling. 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 (GMD20RA.. series).
- **Suction manifold** made of galvanized or AISI 304 stainless steel with threaded ends. Threaded coupling for water charging.
- **Delivery manifold** made of galvanized or AISI 304 stainless steel with threaded ends. Fitted with R1" threaded couplings with caps to allow connection of 24 or 20-litre diaphragm pressure vessels. Only one connection R1" threaded for **VM** sets.
- **Pressure gauge and 2 control transmitters** located on the delivery side of the unit.
- **Various couplings** in nickel-plated brass, galvanised steel or stainless steel depending on the version.
- **Mounting base**, for pumpset and panel mounting brackets in galvanised steel.
- **Electric control panel**, IP54 protection class.

STANDARD VERSIONS AVAILABLE

See table of materials.

STANDARD VERSION For general applications

Valves in brass or nickel plated brass, galvanized steel or brass fittings.

DW VERSION (GMD20../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.

AISI304 Version (GMD20../A304), AISI 316 (GMD20../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** 24 or 20-litres **diaphragm expansion vessel** with 1" ball valve, 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 10 bar cylinder water vessel kit, Aisi 304
 - 24-litre 10 bar cylinder water vessel kit
 - 20-litre 25 bar cylinder water vessel kit
- **Alarm kit;**
- **Air feeder** for **RA** version.

SPECIAL VERSIONS AVAILABLE ON REQUEST

(Contact the Sales and technical Assistance Service)

- Support base in AISI 304, AISI 316 stainless steel.
- Units with stainless steel expansion vessels.
- Units with special valves.
- Sets with jockey pump.
- Booster sets with NO-standard voltage supply, for instance: 3 x 440 V.

TWO-PUMP BOOSTER SETS, GMD20 SERIES CONTROL PANEL

Electric panel, three-phase power supply, for controlling and protecting up to two three-phase electric pumps, with case made from sheet steel (fig. 1) and protected to IP54.

Main characteristics:

- Main door-lock switch, fuse holders and fuses, starting contactors and thermal protection such as overload protectors for each motor.
- Standard supply voltage: 3x400Vac +/-10%, 50/60Hz. Non standard voltages on request, 3x230Vac +/-10%, 3x440Vac +/-10%, 3x460Vac +/-10%, 3x480Vac +/-10%, 50/60Hz.
- Transformer for low voltage auxiliary circuit; auxiliary voltage 24 Vac.
- Lowara SM20 digital control unit (see fig. 2), offers the following functions:
 - Indicator LED's: power on (ref. 1), thermal protection cut-in (ref. 2), no-water level alarm (ref. 3), pump running (ref. 4).
 - Automatic / manual operation buttons (ref. 5) and indicator LED's (ref. 6).
 - Manual pump stop/start (one button for each pump) (ref. 7).
 - Automatic cascade pump control with two pressure switches (one for each pump).
 - Jockey pump management by disabling cycle reversal.
 - Cycle reversal function (can be disabled). Automatically switches pumps after every start/stop cycle.
 - Automatic, manual or disabled mode switches for each pump (inside board). Only to be used if a board fault develops in order to assure pump operation.
 - No-water protection system alternatives: float, minimum pressure switch, external contact or electrode probes with sensitivity adjustment.
 - Adjustable timer delaying tripping of the no-water protection system (inside board); can be adjusted from 0 to 30 seconds.
 - Adjustable timer extending the operation of each pump (inside board); can be adjusted from 0 to 100 sec.
 - A relay board (optional) can be installed on the board to boost the following signals: pump 1,2 running, manual mode, overload alarm, no-water alarm, power on.
- External enable connection or pressure switch for maximum pressure protection.



Fig.1 - QMD electrical panel

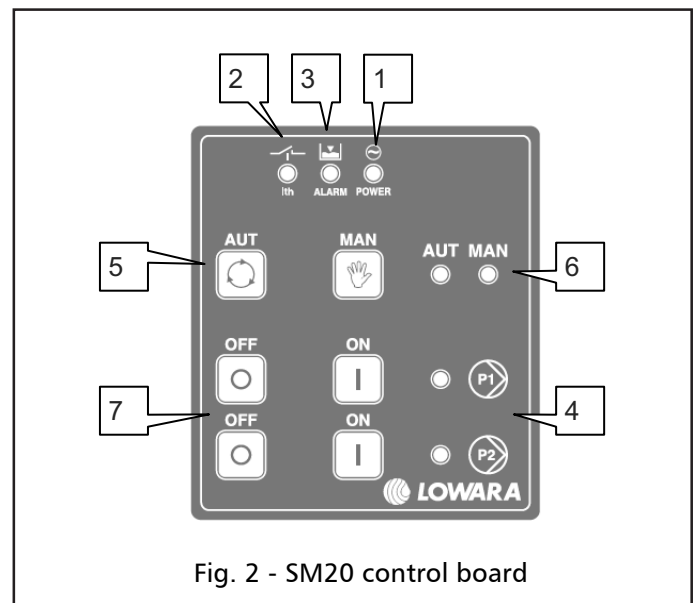
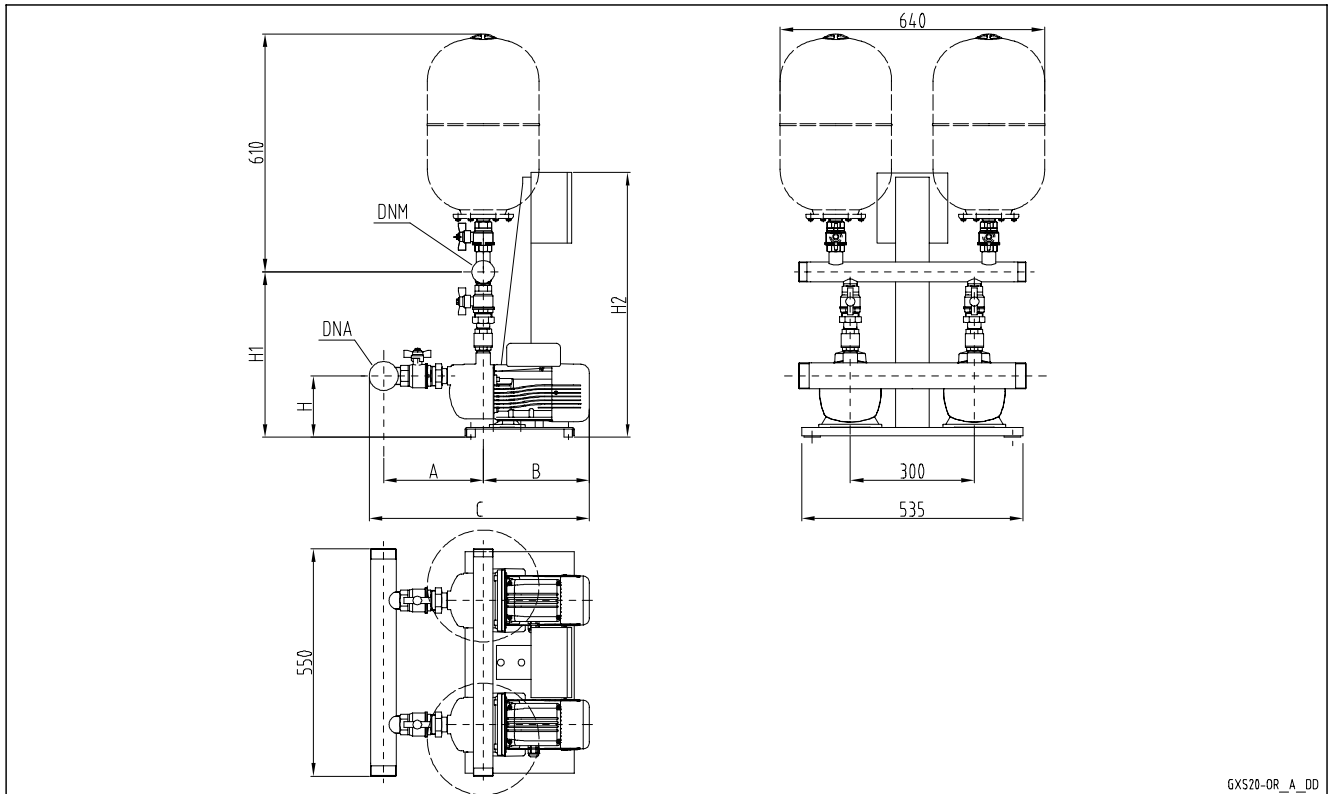


Fig. 2 - SM20 control board

**TWO-PUMP BOOSTER SETS, GMD20 SERIES
HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON DELIVERY SIDE**

GMD20



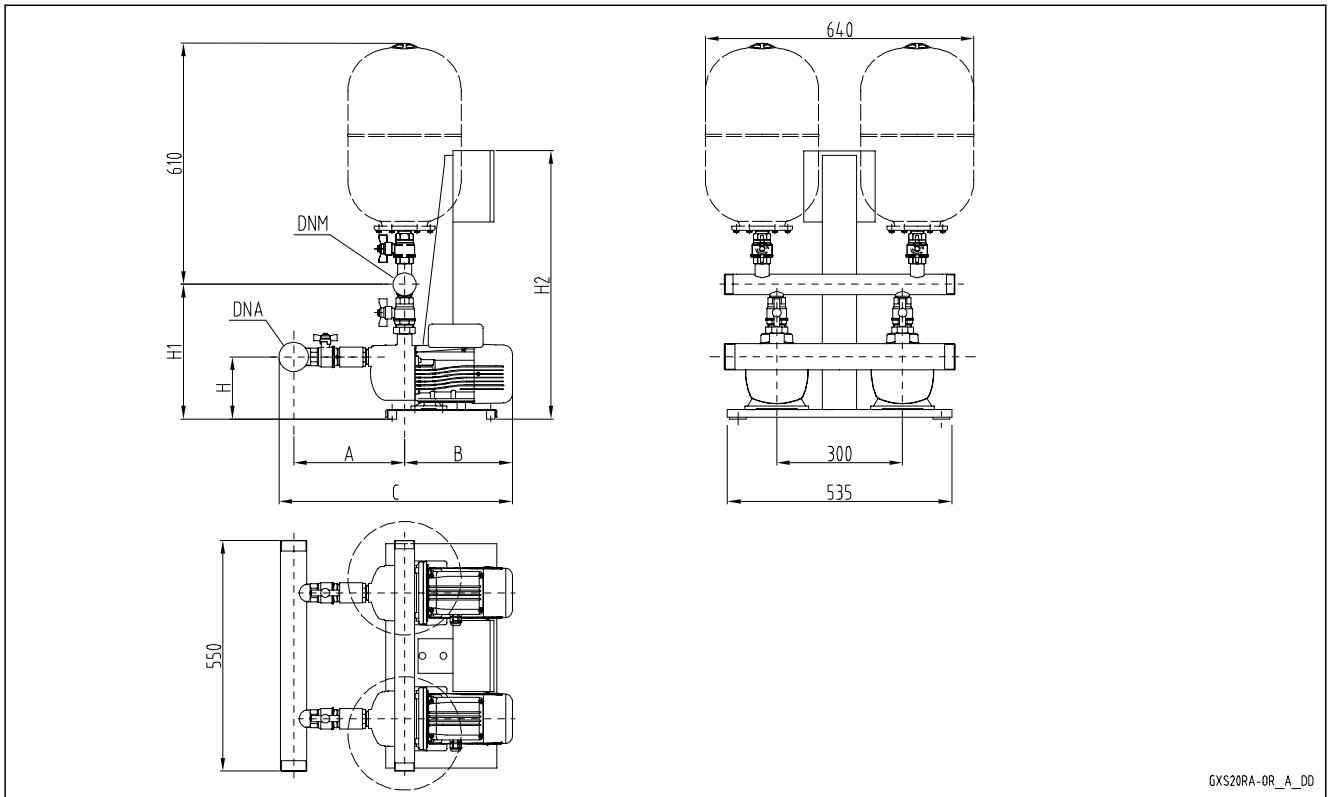
GXS20-OR_A_DD

GMD 20	DNA	DNM	A		B	C		H	H1		H2
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI	
BG3	R 2"	R 1 "1/2	214	299	297	541	626	189	423	501	640
BG5	R 2"	R 1 "1/2	214	299	311	555	640	189	423	501	640
BG7	R 2"	R 1 "1/2	214	299	356	600	685	189	423	501	640
BG9	R 2"	R 1 "1/2	214	299	356	600	685	189	423	501	640
BG11	R 2"	R 1 "1/2	214	299	356	600	685	189	423	501	640
CEA70/3	R 2"	R 1 "1/2	196	281	260	486	571	134	421	499	640
CEA70/5	R 2"	R 1 "1/2	196	281	274	500	585	134	421	499	640
CEA80/5	R 2"	R 1 "1/2	196	281	320	546	631	134	421	499	640
CEA120/3	R 2"	R 2"	196	281	274	500	585	134	476	505	640
CEA120/5	R 2"	R 2"	196	281	320	546	631	134	476	505	640
CEA210/2	R 2" 1/2	R 2 "1/2	207	318	331	576	687	134	460	602	640
CEA210/3	R 2" 1/2	R 2 "1/2	207	318	331	576	687	134	460	602	640
CEA210/4	R 2" 1/2	R 2 "1/2	207	318	375	620	731	134	460	602	640
CEA210/5	R 2" 1/2	R 2 "1/2	207	318	375	620	731	134	460	602	640
CEA370/1	R 2" 1/2	R 2 "1/2	207	318	331	576	687	134	460	602	640
CEA370/2	R 2" 1/2	R 2 "1/2	207	318	375	620	731	134	460	602	640
CEA370/3	R 2" 1/2	R 2 "1/2	207	318	375	620	731	134	460	602	640
CEA370/5	R 2" 1/2	R 2 "1/2	207	318	375	620	731	134	460	602	640

Dimensions in mm. Tolerance ± 10 mm.

gmd20_or-en_e_td

TWO-PUMP BOOSTER SETS, GMD20 RA SERIES **HORIZONTAL ELECTRIC PUMPS** **WITH NON-RETURN VALVE ON SUCTION SIDE**



GXS20RA-OR_A_DD

GMD20

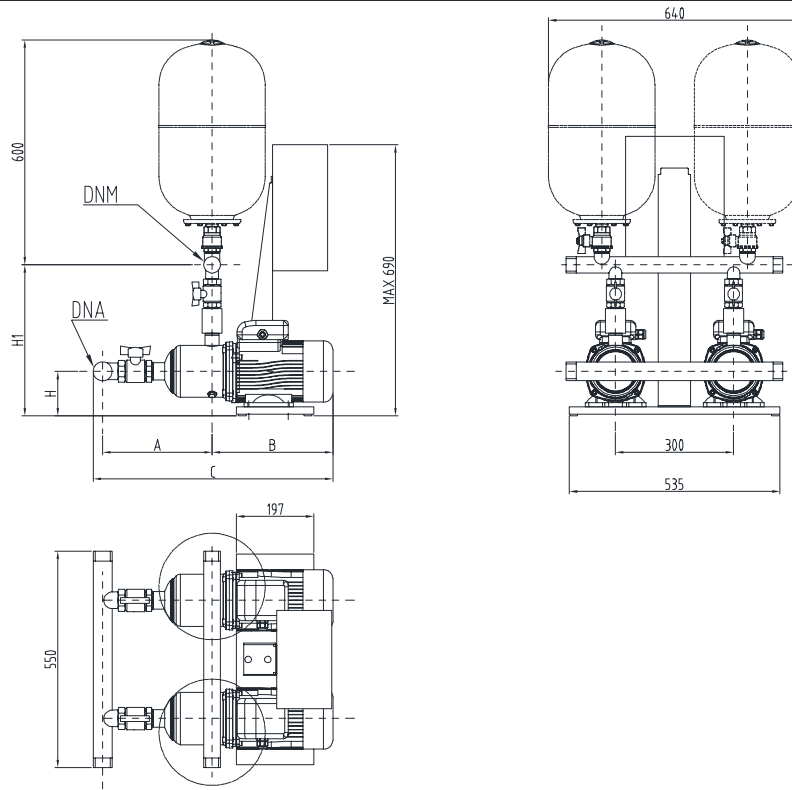
GMD 20RA	DNA	DNM	A		B	C		H	H1		H2
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI	
BG3	R 2"	R 1 1/2"	267	445	297	594	772	189	371	454	640
BG5	R 2"	R 1 1/2"	267	445	311	608	786	189	371	454	640
BG7	R 2"	R 1 1/2"	267	445	356	653	831	189	371	454	640
BG9	R 2"	R 1 1/2"	267	445	356	653	831	189	371	454	640
BG11	R 2"	R 1 1/2"	267	445	356	653	831	189	371	454	640
CEA70/3	R 2"	R 1 1/2"	249	427	260	539	717	134	369	452	640
CEA70/5	R 2"	R 1 1/2"	249	427	274	553	731	134	369	452	640
CEA80/5	R 2"	R 1 1/2"	249	427	320	599	777	134	369	452	640
CEA120/3	R 2"	R 2"	249	427	274	553	731	134	375	458	640
CEA120/5	R 2"	R 2"	249	427	320	599	777	134	375	458	640
CEA210/2	R 2" 1/2	R 2" 1/2	287	493	331	656	862	134	398	483	640
CEA210/3	R 2" 1/2	R 2" 1/2	287	493	331	656	862	134	398	483	640
CEA210/4	R 2" 1/2	R 2" 1/2	287	493	375	700	906	134	398	483	640
CEA210/5	R 2" 1/2	R 2" 1/2	287	493	375	700	906	134	398	483	640
CEA370/1	R 2" 1/2	R 2" 1/2	287	493	331	656	862	134	398	483	640
CEA370/2	R 2" 1/2	R 2" 1/2	287	493	375	700	906	134	398	483	640
CEA370/3	R 2" 1/2	R 2" 1/2	287	493	375	700	906	134	398	483	640
CEA370/5	R 2" 1/2	R 2" 1/2	287	493	375	700	906	134	398	483	640

Dimensions in mm. Tolerance ± 10 mm.

gmd20ra_or-en_f_td

**TWO-PUMP BOOSTER SETS, GMD20 SERIES
HM..P HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON DELIVERY SIDE**

GMD20



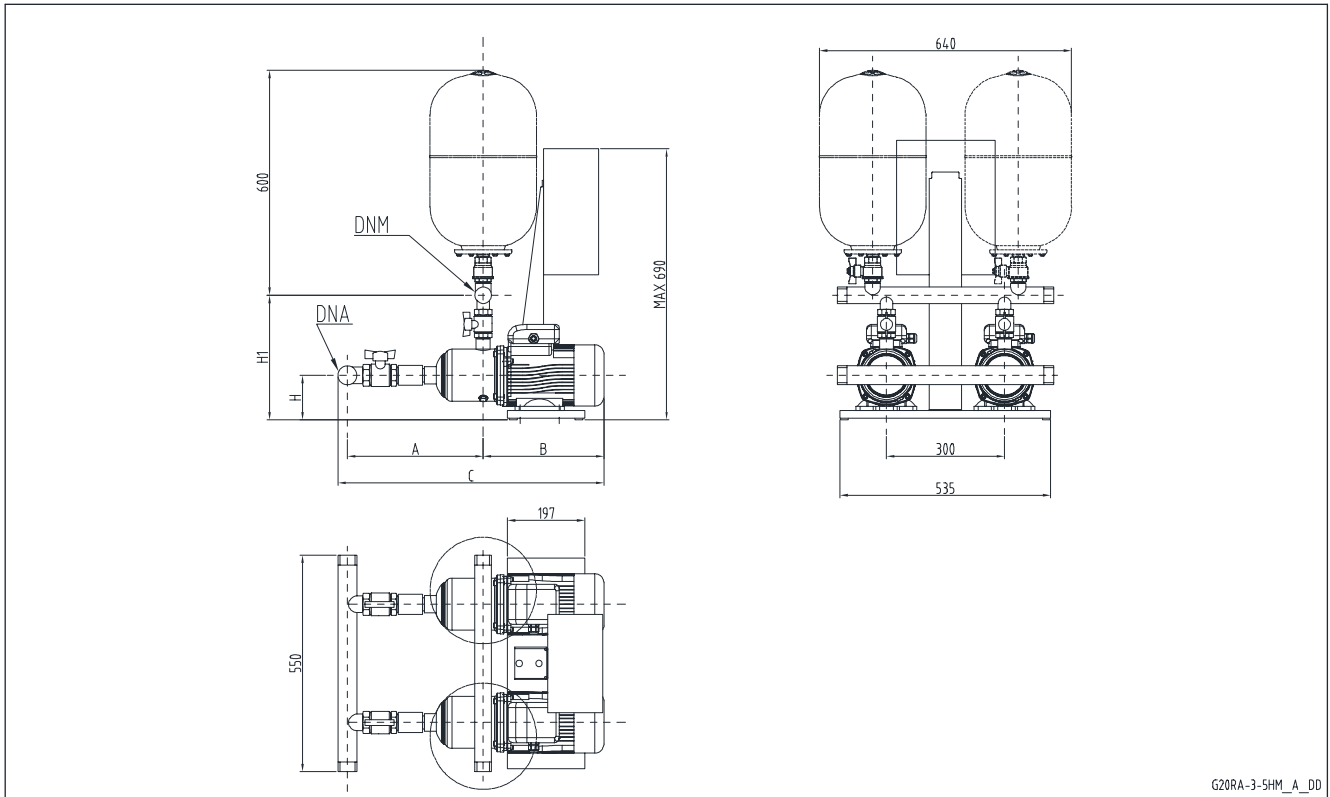
G20-3-5HM_A_DD

GMD 20	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM02	R 1"1/4	R 1"1/4	198	227	249	468	497	113	383	521
3HM03	R 1"1/4	R 1"1/4	198	227	249	468	497	113	383	521
3HM04	R 1"1/4	R 1"1/4	218	247	249	488	517	113	383	521
3HM05	R 1"1/4	R 1"1/4	238	267	308	567	596	113	383	521
3HM06	R 1"1/4	R 1"1/4	258	287	308	587	616	113	383	521
5HM02	R 2"	R 1"1/2	224	248	249	503	527	113	386	524
5HM03	R 2"	R 1"1/2	224	248	249	503	527	113	386	524
5HM04	R 2"	R 1"1/2	244	268	308	582	606	113	386	524
5HM05	R 2"	R 1"1/2	264	288	308	602	626	113	386	524
5HM06	R 2"	R 1"1/2	284	308	308	622	646	113	386	524

Dimensions in mm. Tolerance ± 10 mm.

gmd20_3-5hm-en_a_td

TWO-PUMP BOOSTER SETS, GMD20 RA SERIES **HM..P HORIZONTAL ELECTRIC PUMPS** **WITH NON-RETURN VALVE ON SUCTION SIDE**



G20RA-3-5HM_A_DD

GMD20

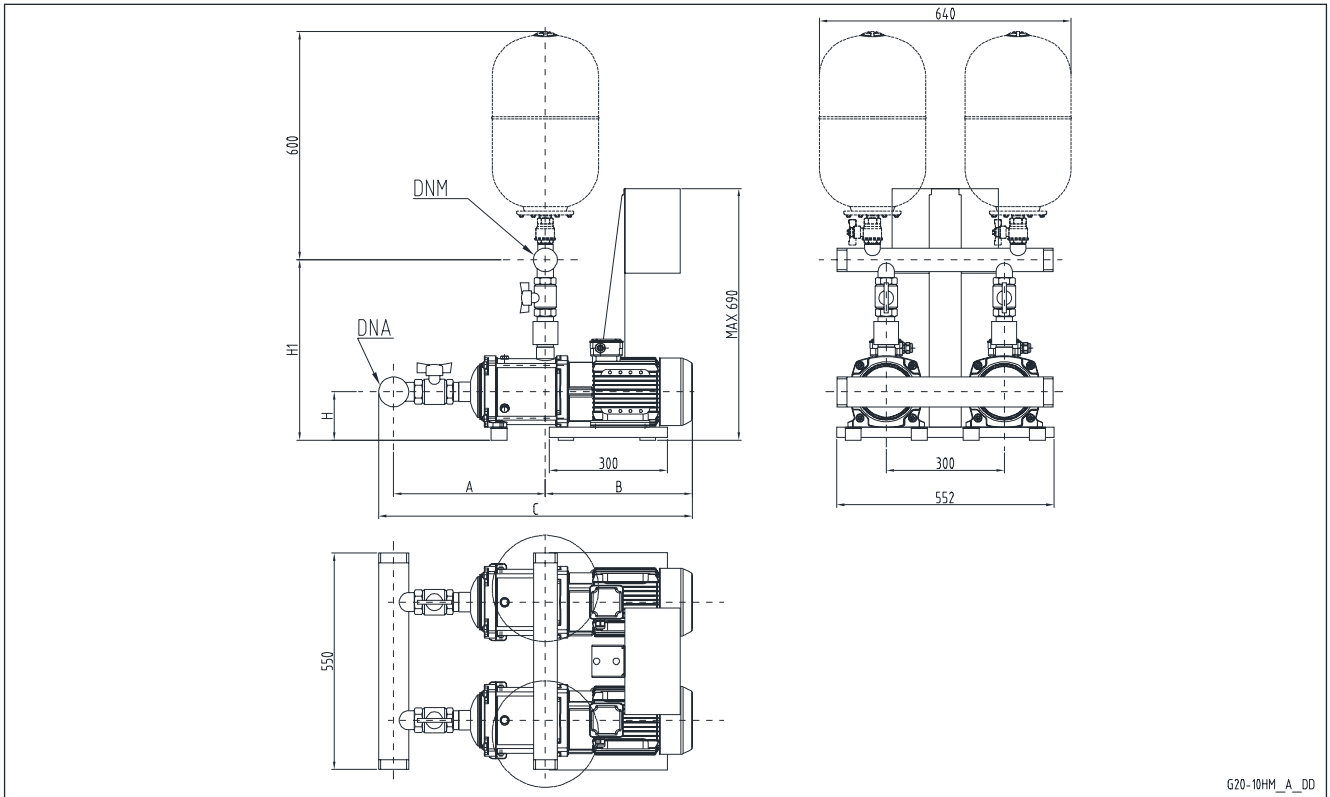
GMD 20RA	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM02	R 1"1/4	R 1"1/4	243	430	249	513	700	113	317	346
3HM03	R 1"1/4	R 1"1/4	243	430	249	513	700	113	317	346
3HM04	R 1"1/4	R 1"1/4	263	450	249	533	720	113	317	346
3HM05	R 1"1/4	R 1"1/4	283	470	308	612	799	113	317	346
3HM06	R 1"1/4	R 1"1/4	303	490	308	632	819	113	317	346
5HM02	R 2"	R 1"1/2	277	470	249	556	749	113	320	349
5HM03	R 2"	R 1"1/2	277	470	249	556	749	113	320	349
5HM04	R 2"	R 1"1/2	297	490	308	635	828	113	320	349
5HM05	R 2"	R 1"1/2	317	510	308	655	848	113	320	349
5HM06	R 2"	R 1"1/2	337	530	308	675	868	113	320	349

Dimensions in mm. Tolerance ± 10 mm.

gmd20ra_3-5hm-en_a_td

**TWO-PUMP BOOSTER SETS, GMD20 SERIES
HM..P HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON DELIVERY SIDE**

GMD20



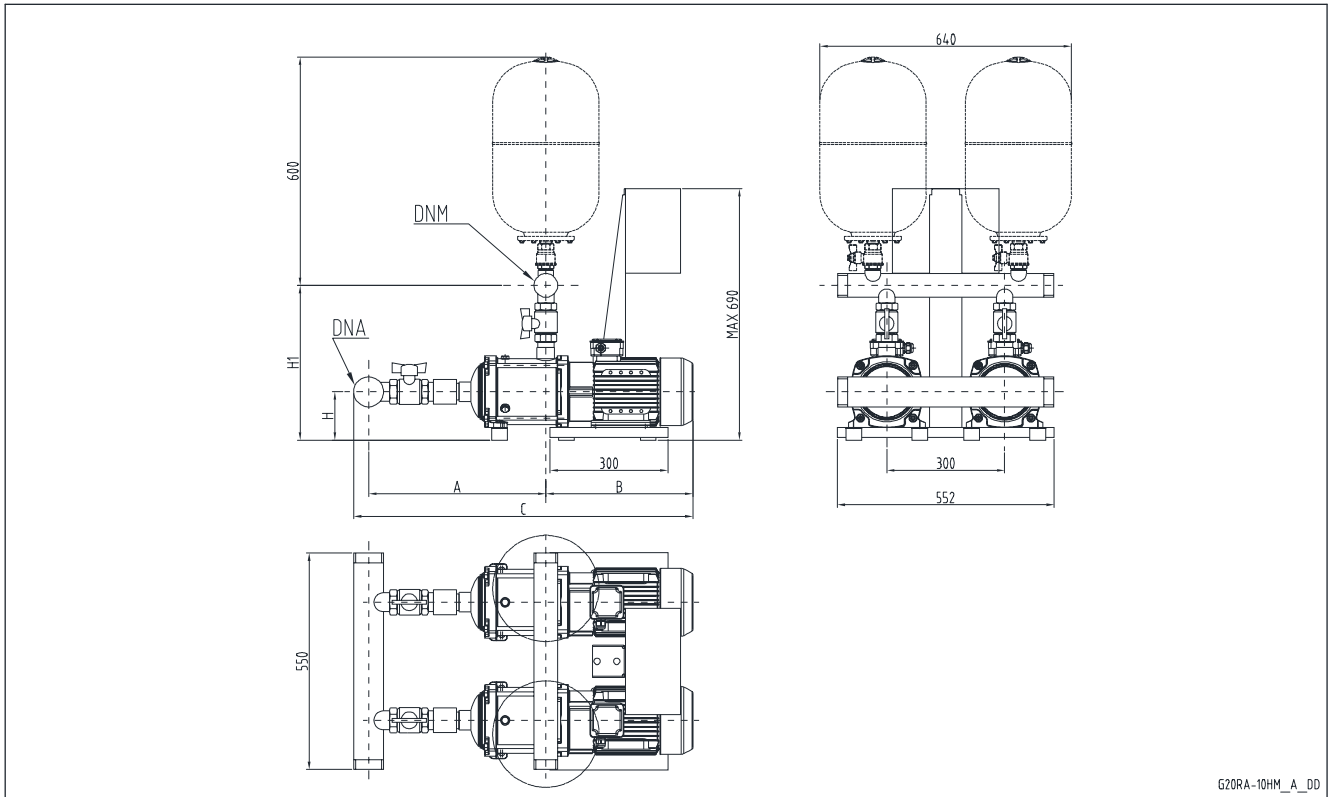
G20-10HM_A_DD

GMD 20	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
10HM02	R 2"1/2	R 2"	290	309	318	646	665	123	441	590
10HM03	R 2"1/2	R 2"	290	309	318	646	665	123	441	590
10HM04	R 2"1/2	R 2"	322	341	374	734	753	123	441	590
10HM05	R 2"1/2	R 2"	354	373	374	766	785	123	441	590
10HM06	R 2"1/2	R 2"	386	405	374	798	817	123	441	590

Dimensions in mm. Tolerance ± 10 mm.

gmd20_10hm-en_a_td

**TWO-PUMP BOOSTER SETS, GMD20 RA SERIES
HM..P HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**



GMD20

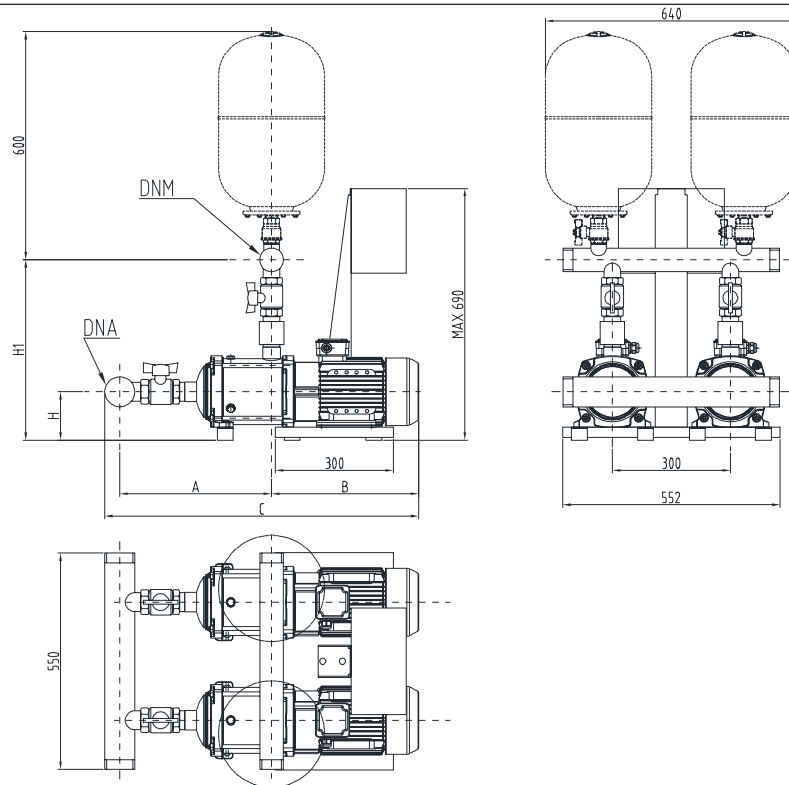
GMD 20RA	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
10HM02	R 2"1/2	R 2"	361	554	318	717	910	123	371	395
10HM03	R 2"1/2	R 2"	361	554	318	717	910	123	371	395
10HM04	R 2"1/2	R 2"	393	586	374	805	998	123	371	395
10HM05	R 2"1/2	R 2"	425	618	374	837	1030	123	371	395
10HM06	R 2"1/2	R 2"	457	650	374	869	1062	123	371	395

Dimensions in mm. Tolerance ± 10 mm.

gmd20ra_10hm-en_a_td

**TWO-PUMP BOOSTER SETS, GMD20 SERIES
HM..S HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON DELIVERY SIDE**

GMD20



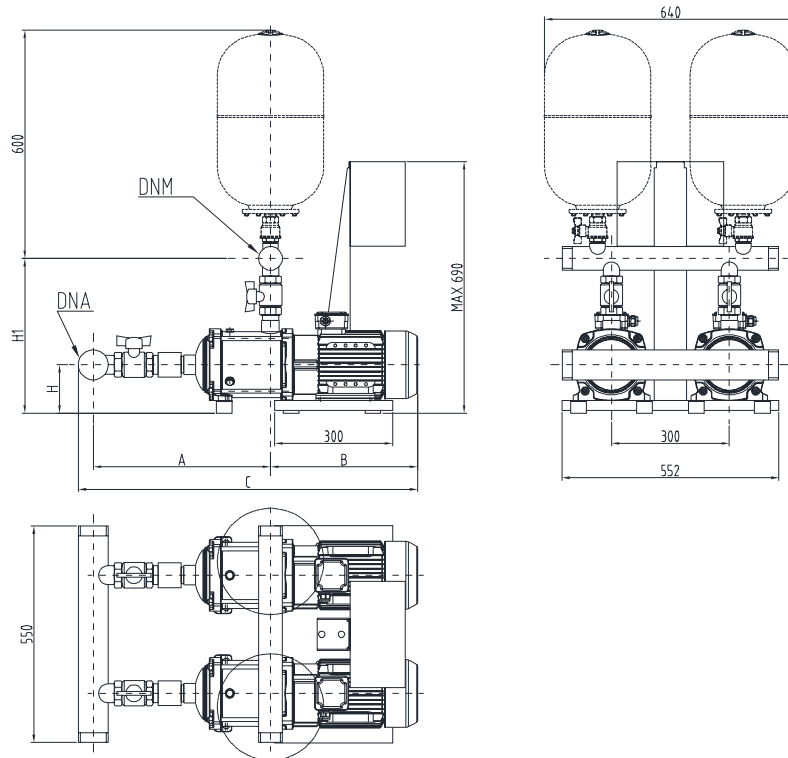
G20-10HM_A_DD

GMD 20	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM10	R 1"1/4	R 1"1/4	322	351	317	660	689	123	393	531
3HM11	R 1"1/4	R 1"1/4	342	371	317	680	709	123	393	531
3HM12	R 1"1/4	R 1"1/4	362	391	317	700	729	123	393	531
3HM13	R 1"1/4	R 1"1/4	382	411	317	720	749	123	393	531
3HM14	R 1"1/4	R 1"1/4	402	431	317	740	769	123	393	531
3HM16	R 1"1/4	R 1"1/4	442	471	317	780	809	123	393	531
3HM17	R 1"1/4	R 1"1/4	462	491	317	800	829	123	393	531
3HM19	R 1"1/4	R 1"1/4	502	531	373	896	925	123	393	531
3HM21	R 1"1/4	R 1"1/4	542	571	373	936	965	123	393	531
5HM09	R 2"	R 1"1/2	368	392	317	715	739	123	396	534
5HM10	R 2"	R 1"1/2	393	417	317	740	764	123	396	534
5HM11	R 2"	R 1"1/2	418	442	317	765	789	123	396	534
5HM12	R 2"	R 1"1/2	443	467	373	846	870	123	396	534
5HM13	R 2"	R 1"1/2	468	492	373	871	895	123	396	534
5HM14	R 2"	R 1"1/2	493	517	373	896	920	123	396	534
5HM15	R 2"	R 1"1/2	518	542	373	921	945	123	396	534
5HM17	R 2"	R 1"1/2	568	592	373	971	995	123	396	534
5HM19	R 2"	R 1"1/2	618	642	373	1021	1045	123	396	534
5HM21	R 2"	R 1"1/2	668	692	373	1071	1095	123	396	534
10HM07	R 2"1/2	R 2"	418	437	374	830	849	123	441	590
10HM08	R 2"1/2	R 2"	450	469	374	862	881	123	441	590
10HM09	R 2"1/2	R 2"	482	501	403	923	942	133	451	600
10HM10	R 2"1/2	R 2"	514	533	403	955	974	133	451	600
10HM11	R 2"1/2	R 2"	546	565	403	987	1006	133	451	600
15HM02	R3"	R 2"1/2	399	444	334	777	822	123	499	646
15HM03	R3"	R 2"1/2	399	444	390	833	878	123	499	646
15HM04	R3"	R 2"1/2	447	492	390	881	926	123	499	646
15HM05	R3"	R 2"1/2	495	540	419	958	1003	133	509	656
22HM02	R3"	R 2"1/2	399	444	390	833	878	123	499	646
22HM03	R3"	R 2"1/2	399	444	390	833	878	123	499	646
22HM04	R3"	R 2"1/2	447	492	419	910	955	133	509	656

Dimensions in mm. Tolerance ± 10 mm.

gmd20_3-22hms-en_a_td

TWO-PUMP BOOSTER SETS, GMD20 RA SERIES **HM..S HORIZONTAL ELECTRIC PUMPS** **WITH NON-RETURN VALVE ON SUCTION SIDE**



G20RA-10HM_A_DD

GMD20

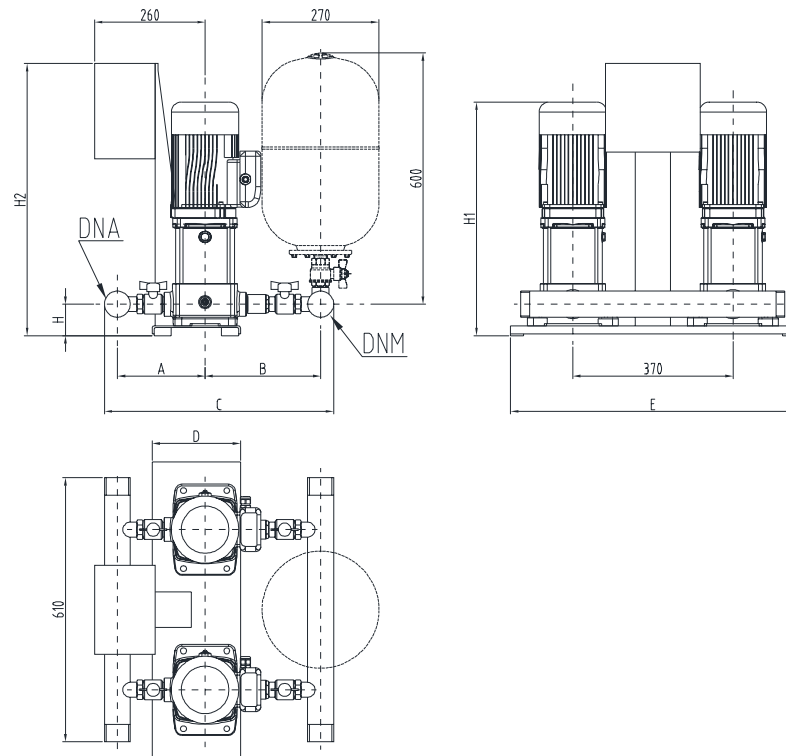
GMD 20RA	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM10	R 1"1/4	R 1"1/4	367	554	317	705	892	123	327	356
3HM11	R 1"1/4	R 1"1/4	387	574	317	725	912	123	327	356
3HM12	R 1"1/4	R 1"1/4	407	594	317	745	932	123	327	356
3HM13	R 1"1/4	R 1"1/4	427	614	317	765	952	123	327	356
3HM14	R 1"1/4	R 1"1/4	447	634	317	785	972	123	327	356
3HM16	R 1"1/4	R 1"1/4	487	674	317	825	1012	123	327	356
3HM17	R 1"1/4	R 1"1/4	507	694	317	845	1032	123	327	356
3HM19	R 1"1/4	R 1"1/4	547	734	373	941	1128	123	327	356
3HM21	R 1"1/4	R 1"1/4	587	774	373	981	1168	123	327	356
5HM09	R 2"	R 1"1/2	421	614	317	768	961	123	330	359
5HM10	R 2"	R 1"1/2	446	639	317	793	986	123	330	359
5HM11	R 2"	R 1"1/2	471	664	317	818	1011	123	330	359
5HM12	R 2"	R 1"1/2	496	689	373	899	1092	123	330	359
5HM13	R 2"	R 1"1/2	521	714	373	924	1117	123	330	359
5HM14	R 2"	R 1"1/2	546	739	373	949	1142	123	330	359
5HM15	R 2"	R 1"1/2	571	764	373	974	1167	123	330	359
5HM17	R 2"	R 1"1/2	621	814	373	1024	1217	123	330	359
5HM19	R 2"	R 1"1/2	671	864	373	1074	1267	123	330	359
5HM21	R 2"	R 1"1/2	721	914	373	1124	1317	123	330	359
10HM07	R 2"1/2	R 2"	489	682	374	901	1094	123	371	395
10HM08	R 2"1/2	R 2"	521	714	374	933	1126	123	371	395
10HM09	R 2"1/2	R 2"	553	746	403	994	1187	133	381	405
10HM10	R 2"1/2	R 2"	585	778	403	1026	1219	133	381	405
10HM11	R 2"1/2	R 2"	617	810	403	1058	1251	133	381	405
15HM02	R3"	R 2"1/2	499	604	334	877	982	123	404	500
15HM03	R3"	R 2"1/2	499	604	390	933	1038	123	404	500
15HM04	R3"	R 2"1/2	547	652	390	981	1086	123	404	500
15HM05	R3"	R 2"1/2	595	700	419	1058	1163	133	414	510
22HM02	R3"	R 2"1/2	499	604	390	933	1038	123	404	500
22HM03	R3"	R 2"1/2	499	604	390	933	1038	123	404	500
22HM04	R3"	R 2"1/2	547	652	419	1010	1115	133	414	510

Dimensions in mm. Tolerance ± 10 mm.

gmd20ra_3-22hms-en_a_td

TWO-PUMP BOOSTER SETS, GMD20 SERIES **VM VERTICAL ELECTRIC PUMPS** **WITH NON-RETURN VALVE ON DELIVERY SIDE**

GMD20



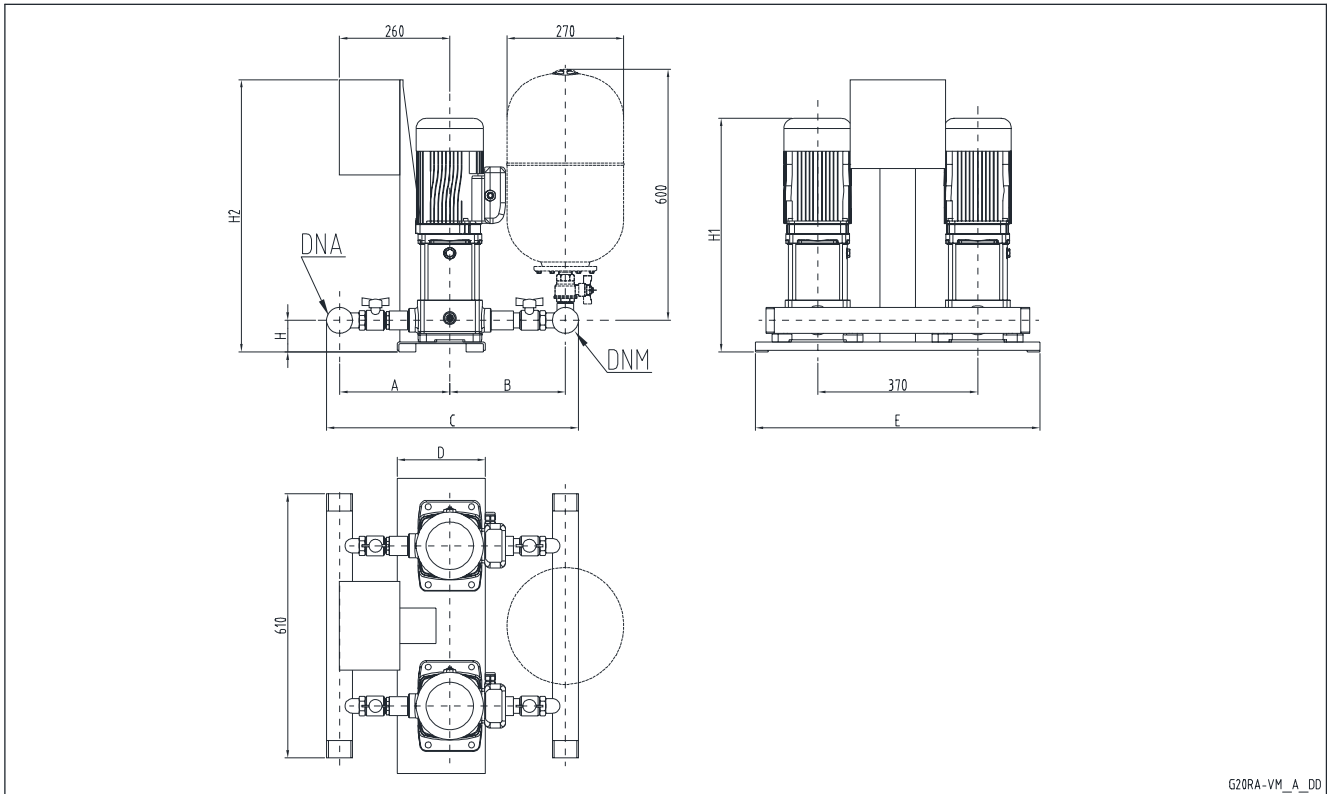
G20-VM_A_DD

GMD 20	DNA	DNM	A		B		C		D	E	H	H1	H2
			STD / DW	AISI	STD / DW	AISI	STD / DW	AISI					
3VM02	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	402	709
3VM03	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	402	709
3VM04	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	422	709
3VM05	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	500	709
3VM06	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	520	709
3VM07	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	540	709
3VM08	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	560	709
5VM02	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	402	709
5VM03	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	402	709
5VM04	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	480	709
5VM05	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	500	709
5VM06	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	520	709
5VM07	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	540	709
5VM08	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	616	709
10VM02	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	535	720
10VM03	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	567	720
10VM04	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	655	720
10VM05	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	687	720
10VM06	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	719	720

Dimensions in mm. Tolerance ± 10 mm.

gmd20_vm-en_b_td

**TWO-PUMP BOOSTER SETS, GMD20 RA SERIES
VM VERTICAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**



G20RA-VM_A_DD

GMD20

GMD 20RA	DNA	DNM	A		B		C		D	E	H	H1	H2
			STD / DW	AISI	STD / DW	AISI	STD / DW	AISI					
3VM02	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	402	709
3VM03	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	402	709
3VM04	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	422	709
3VM05	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	500	709
3VM06	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	520	709
3VM07	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	540	709
3VM08	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	560	709
5VM02	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	402	709
5VM03	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	402	709
5VM04	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	480	709
5VM05	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	500	709
5VM06	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	520	709
5VM07	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	540	709
5VM08	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	616	709
10VM02	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	535	720
10VM03	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	567	720
10VM04	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	655	720
10VM05	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	687	720
10VM06	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	719	720

Dimensions in mm. Tolerance ± 10 mm.

gmd20ra_vm-en_b_td

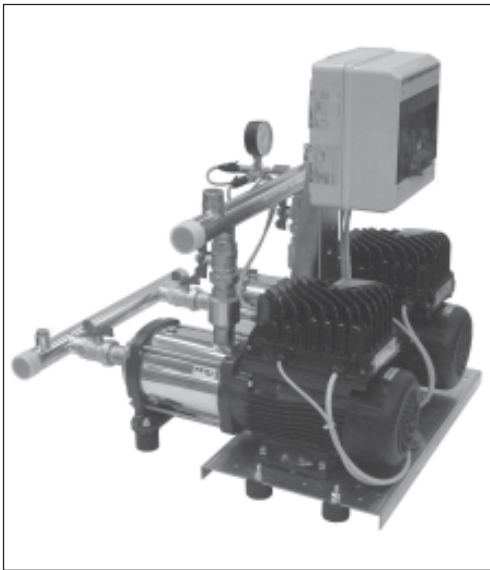
Booster sets

MARKET SECTORS RESIDENTIAL

APPLICATIONS

- Water network supply in condominiums, single villa and townhouses.
- Water supply for irrigation systems.

GTKS20 Series

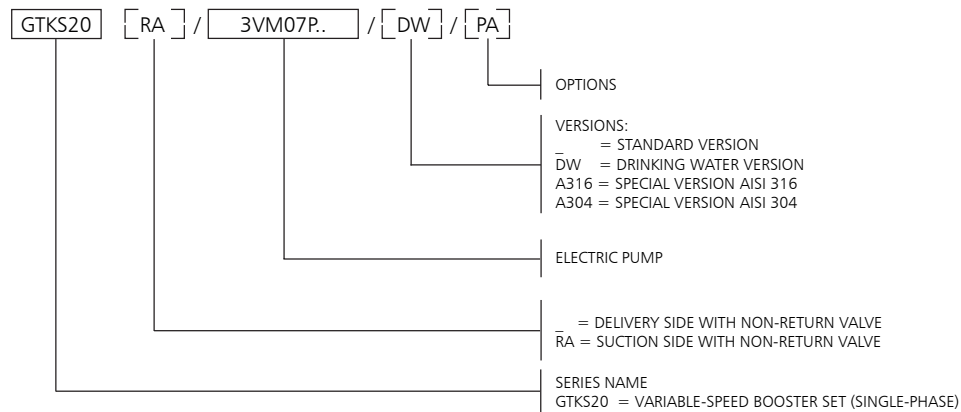


GTKS20

SPECIFICATIONS

- **Flow rate** up to 52 m³/h.
- **Head** up to 95 m.
- Electrical panel supply voltage:
1 x 230V $\pm$ 10%.
- Frequency: 50 Hz.
- Protection class
electrical panel IP 55.
- Protection class
converter IP 55.
- Maximum electric pump
power 2 x 1,1 kW.
- **Motor start** with **TKS** converter.
- Maximum temperature of pumped liquid:
from -10 to +40° C (for BG).
from -10 to +60° C (for CEA,
HM and VM series).
- **Horizontal design pump:**
BG, CEA and HM..P/S series.
Maximum operating pressure 10 bar.
- **Close-coupled threaded vertical multistage:**
VM series.
Maximum operating pressure 10 bar.

TWO-PUMP BOOSTER SETS, GTKS20 SERIES 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 tanks can not be installed directly on the manifold, only for e-SV™ and VM sets.
- CM Suction or delivery manifold larger than standard size.
- CP Dry contact version: power line, Automatic/Manual mode, Run/Stop for each pump, thermal block
- IP65 IP65 version control panel.
- PA Minimum pressure gauge installed on the suction manifold for dry-running protection.
- PMA Minimum pressure switch for dry-running protection and pressure gauge installed on suction manifold.
- PQ Booster set with high suction pressure (pressure gauge/pressure switches increased of one range).
- RA Non return valves mounted on suction side (i.e: GTKS20RA/3SV...).
- 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).
- SCM Without delivery manifold (no pressure transmitters and pressure gauge, with delivery valves).
- SM Without delivery: without valves on delivery and without delivery manifold.
- TS Booster set with pumps equipped with special mechanical seals.
- UK UK market version.
- WM Wall-mounted electrical panel with fixing tabs. Cables L= 5m

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 drinking water. 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.

TWO-PUMP BOOSTER SETS, GTKS20 SERIES OPERATING CHARACTERISTICS AND LIMITS

Liquids handled	Water containing no gas or corrosive and/or aggressive substances.
Fluid temperature (*)	BG: above -10°C to + 40 °C. CEA, eHM, eVM: above -10°C to + 60 °C.
Ambient temperature (*)	CEA, BG, HM, VM: above 0°C to + 40 °C.
Maximum operating pressure	Max 8 bar, 10 bar, 16 bar Depending on the type of pump.
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
Hourly starts (single pump)	Max 60 up to 3 kW, above 3 kW and up to 4 kW max 40.
Installation	Indoors, protected from the weather. Away from heat sources. Max elevation 1000 m ASL. Max humidity 50% without condensation.
Sound emission	Sound emission level $L_p < 70$ dB(A) for two-pump set with 2900 rpm motor with power up to 2 x 4 kW.

(*) in standard configuration

gths20_2p-en_b_ti

TABLE OF MATERIALS

NAME	MATERIAL			
	(STANDARD)	DW	A304	A316
Manifolds	AISI 304	AISI 304	AISI 304	AISI 316
On-off valves	Nickel-plated brass	Nickel-plated brass	AISI 316	AISI 316
Non-return valves	Brass	Brass	AISI 304	AISI 316
Pressure switches	Chrome plated zinc alloy	AISI 304	AISI 304	AISI 304
Pressure trasmitter	AISI 316	AISI 316	AISI 316	AISI 316
Caps/plugs/flanges	Galvanized steel	AISI 304	AISI 304	AISI 316
Bracket	Galvanized steel	Galvanized steel	Galvanized steel	Galvanized steel
Base	Galvanized steel	Galvanized steel	Galvanized steel	Galvanized steel
Pump Body	- AISI 304 - Cast iron for VM pump	- AISI 304 - Cast iron for VM pump	- AISI 304 - Cast iron for VM pump	- AISI 316(*) - Cast iron for VM pump

* Not all models of electric pumps are available in AISI 316. Consult technical catalog of pump.

gths20_2p-en_b_tm

TWO-PUMP BOOSTER SETS, GTKS20 SERIES MAIN COMPONENTS

- **Main On-off valves** on suction and discharge side of each pump, ball type with threaded coupling.
- **Check valve** on discharge side of each pump, spring-loaded type, with threaded coupling. 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 (GTKS20RA.. series).
- **Suction manifold** made of galvanized or AISI 304 stainless steel with threaded ends. Threaded coupling for water charging.
- **Delivery manifold** made of galvanized or AISI 304 stainless steel with threaded ends. Fitted with R1" threaded couplings with caps to allow connection of 24 or 20-litre diaphragm pressure vessels. Only one connection R1" threaded for **VM** sets.
- **Pressure gauge and 2 control transmitters** located on the delivery side of the unit.
- **Various couplings** in nickel-plated brass, galvanised steel or stainless steel depending on the version.
- **Mounting base**, for pumpset and panel mounting brackets in galvanised steel.
- **Electric control panel**, IP55 protection class.

STANDARD VERSIONS AVAILABLE

See table of materials.

STANDARD VERSION For general applications

Valves in brass or nickel plated brass, galvanized steel or brass fittings.

DW VERSION (GTKS20../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.

AISI304 Version (GTKS20../A304), AISI 316 (GTKS20../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** 24 or 20-litres **diaphragm expansion vessel** with 1" ball valve, 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 10 bar cylinder water vessel kit, Aisi 304
 - 24-litre 10 bar cylinder water vessel kit
 - 20-litre 25 bar cylinder water vessel kit
- **Alarm kit;**
- **Air feeder** for **RA** version.

SPECIAL VERSIONS AVAILABLE ON REQUEST

(Contact the Sales and technical Assistance Service)

- Support base in AISI 304, AISI 316 stainless steel.
- Units with stainless steel expansion vessels.
- Units with special valves.

TWO-PUMP BOOSTER SETS, GTKS20 SERIES CONTROL PANEL

Single-phase electrical power supply panel for protecting up to two three-phase electric pumps (3x230Vac), with Teknospeed frequency converter, made from polycarbonate, featuring a transparent door and protected to IP55.

Main characteristics:

- Automatic switch with overload protection for each converter.
- Standard supply voltage: 1x230Vac +/-10%, 50/60Hz.
- No-water protection system device alternatives:
float switch, minimum pressure switch, external contact. By using one optional module, to insert inside the board, electrode probes with sensitivity adjustment can be installed.
- A special version with "clean" potential-free contacts for signalling faults in each converter is available in request.



Electric panel

TEKNOSPEED FREQUENCY CONVERTER

Each pump is controlled via the Teknospeed frequency converter which modulates the speed of rotation in order to keep system pressure constant. It is supplied complete with power-on, pump running and fault LED's, and a remote booster relay for converter overload, no-water, overheating alarms.

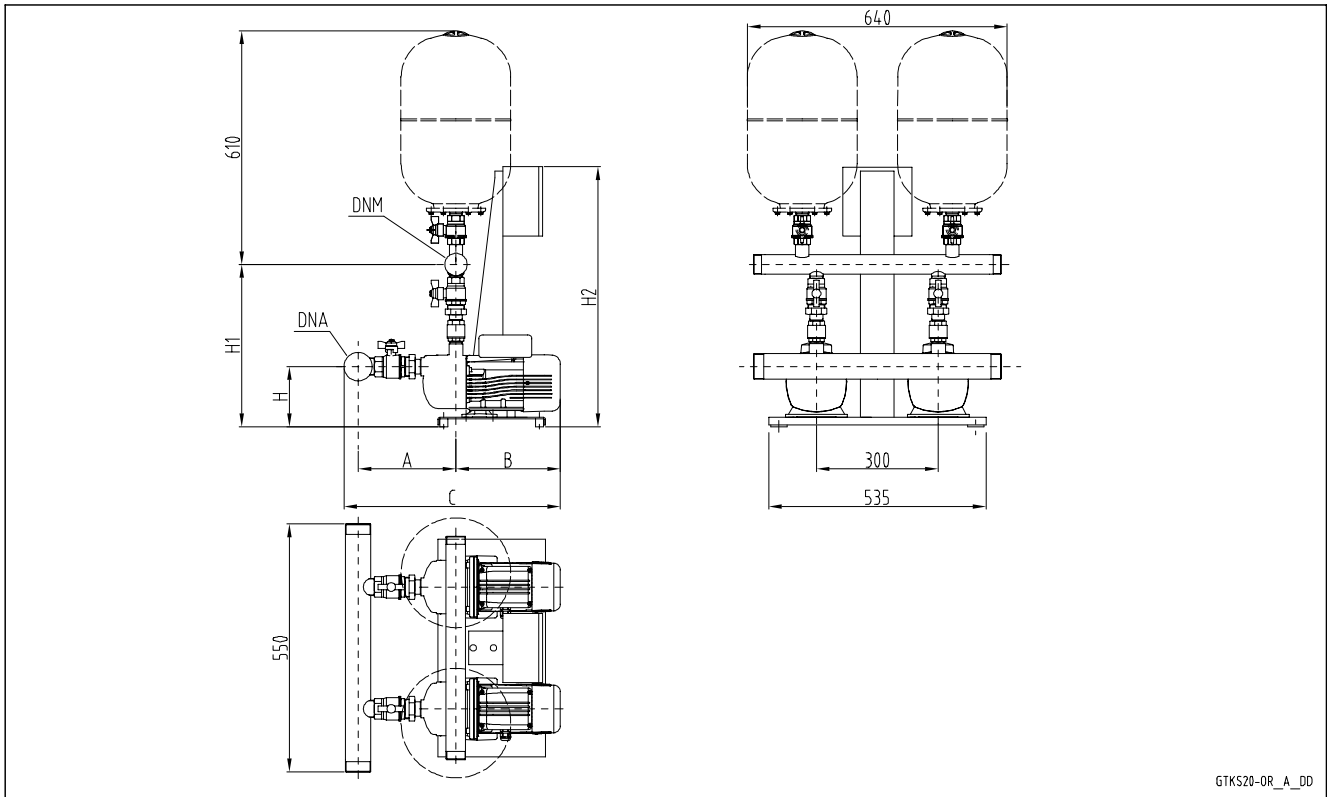
A float switch or an ON/OFF device protecting against dry running can also be installed. A serial line for transmitting information between the two units in order to assure cycle exchange, simultaneous operation in case of maximum demand and service continuity in case one pump is disabled.

Visual indications:
Green led: power on
Yellow led: converter operating and operating mode.
 Flashing: speed adjustment
 Constant: pressure control. Converter in stand-by
Red led: alarm active



Converter

**TWO-PUMP BOOSTER SETS, GTKS20 SERIES
HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON DELIVERY SIDE**



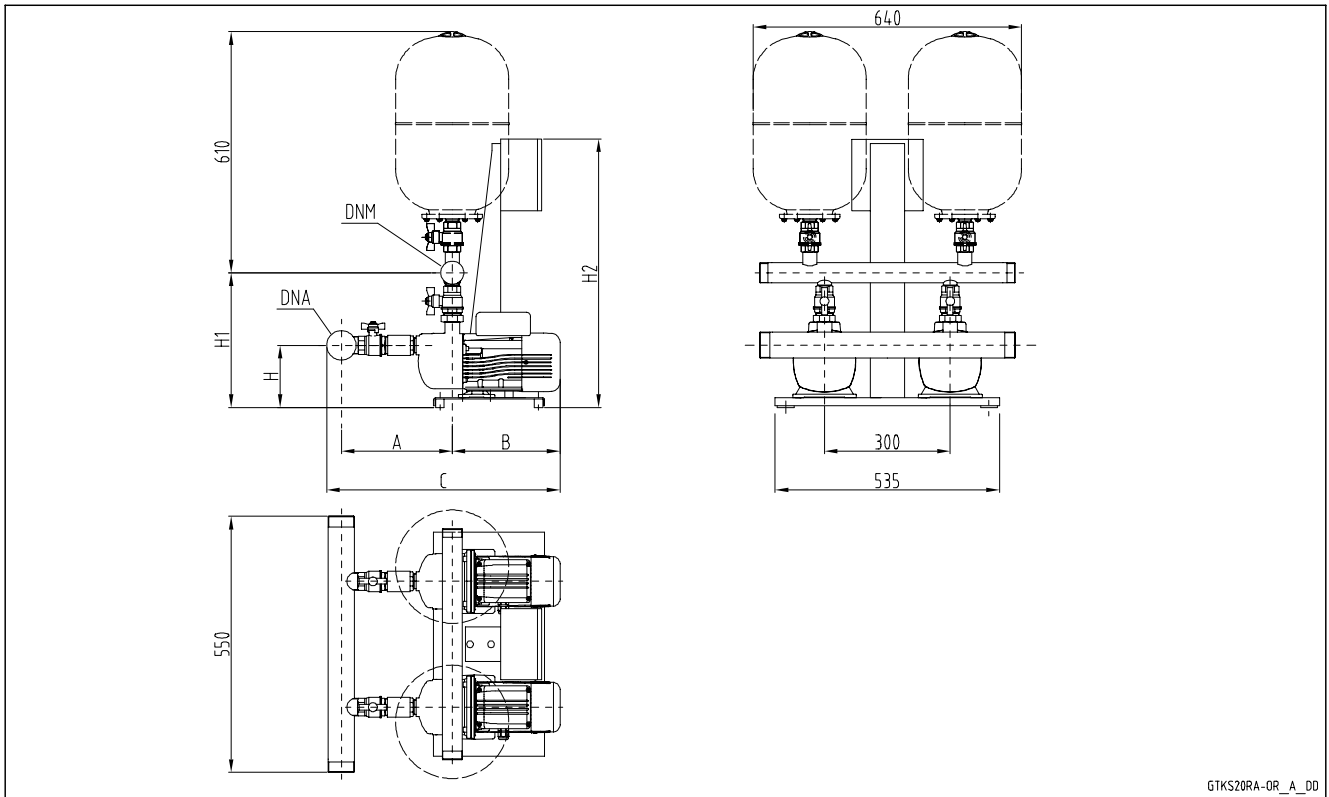
GTKS20

GTKS 20	DNA	DNM	A		B	C		H	H1		H2
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI	
BG3	R 2"	R 1 1/2"	214	299	297	541	626	189	423	501	640
BG5	R 2"	R 1 1/2"	214	299	311	555	640	189	423	501	640
BG7	R 2"	R 1 1/2"	214	299	356	600	685	189	423	501	640
BG9	R 2"	R 1 1/2"	214	299	356	600	685	189	423	501	640
BG11	R 2"	R 1 1/2"	214	299	356	600	685	189	423	501	640
CEA70/3	R 2"	R 1 1/2"	196	281	260	486	571	134	421	499	640
CEA70/5	R 2"	R 1 1/2"	196	281	274	500	585	134	421	499	640
CEA80/5	R 2"	R 1 1/2"	196	281	320	546	631	134	421	499	640
CEA120/3	R 2"	R 2"	196	281	274	500	585	134	476	505	640
CEA120/5	R 2"	R 2"	196	281	320	546	631	134	476	505	640
CEA210/2	R 2 1/2"	R 2 1/2"	207	318	331	576	687	134	460	602	640
CEA210/3	R 2 1/2"	R 2 1/2"	207	318	331	576	687	134	460	602	640
CEA370/1	R 2 1/2"	R 2 1/2"	207	318	331	576	687	134	460	602	640

Dimensions in mm. Tolerance ± 10 mm.

gtks20_or-en_f_td

**TWO-PUMP BOOSTER SETS, GTKS20 RA SERIES
HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**



GTKS20RA-OR_A_DD

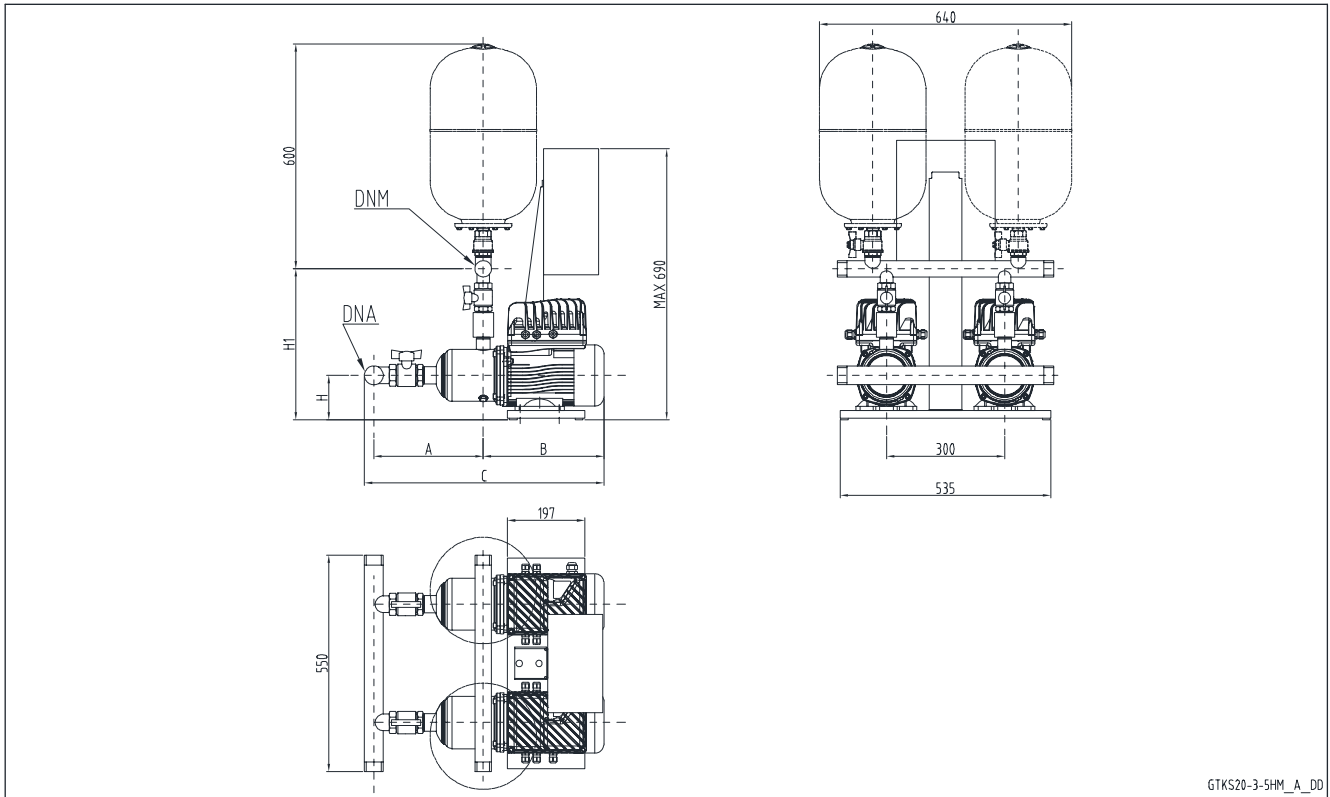
GTKS20

GTKS 20RA	DNA	DNM	A		B	C		H	H1		H2
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI	
BG3	R 2"	R 1 1/2"	267	429	297	653	815	189	371	454	640
BG5	R 2"	R 1 1/2"	267	429	311	653	815	189	371	454	640
BG7	R 2"	R 1 1/2"	267	429	356	653	815	189	371	454	640
BG9	R 2"	R 1 1/2"	267	429	356	653	815	189	371	454	640
BG11	R 2"	R 1 1/2"	267	429	356	653	815	189	371	454	640
CEA70/3	R 2"	R 1 1/2"	249	411	260	539	701	134	369	452	640
CEA70/5	R 2"	R 1 1/2"	249	411	274	553	715	134	369	452	640
CEA80/5	R 2"	R 1 1/2"	249	411	320	599	761	134	369	452	640
CEA120/3	R 2"	R 2"	249	411	274	553	715	134	375	458	640
CEA120/5	R 2"	R 2"	249	411	320	599	761	134	375	458	640
CEA210/2	R 2 1/2"	R 2 1/2"	287	422	331	656	791	134	398	483	640
CEA210/3	R 2 1/2"	R 2 1/2"	287	467	331	656	836	134	398	483	640
CEA370/1	R 2 1/2"	R 2 1/2"	287	467	331	656	836	134	398	483	640

Dimensions in mm. Tolerance ± 10 mm.

gts20ra_or-en_f_td

**TWO-PUMP BOOSTER SETS, GTKS20 SERIES
HM..P HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON DELIVERY SIDE**



GTKS20-3-5HM_A_DD

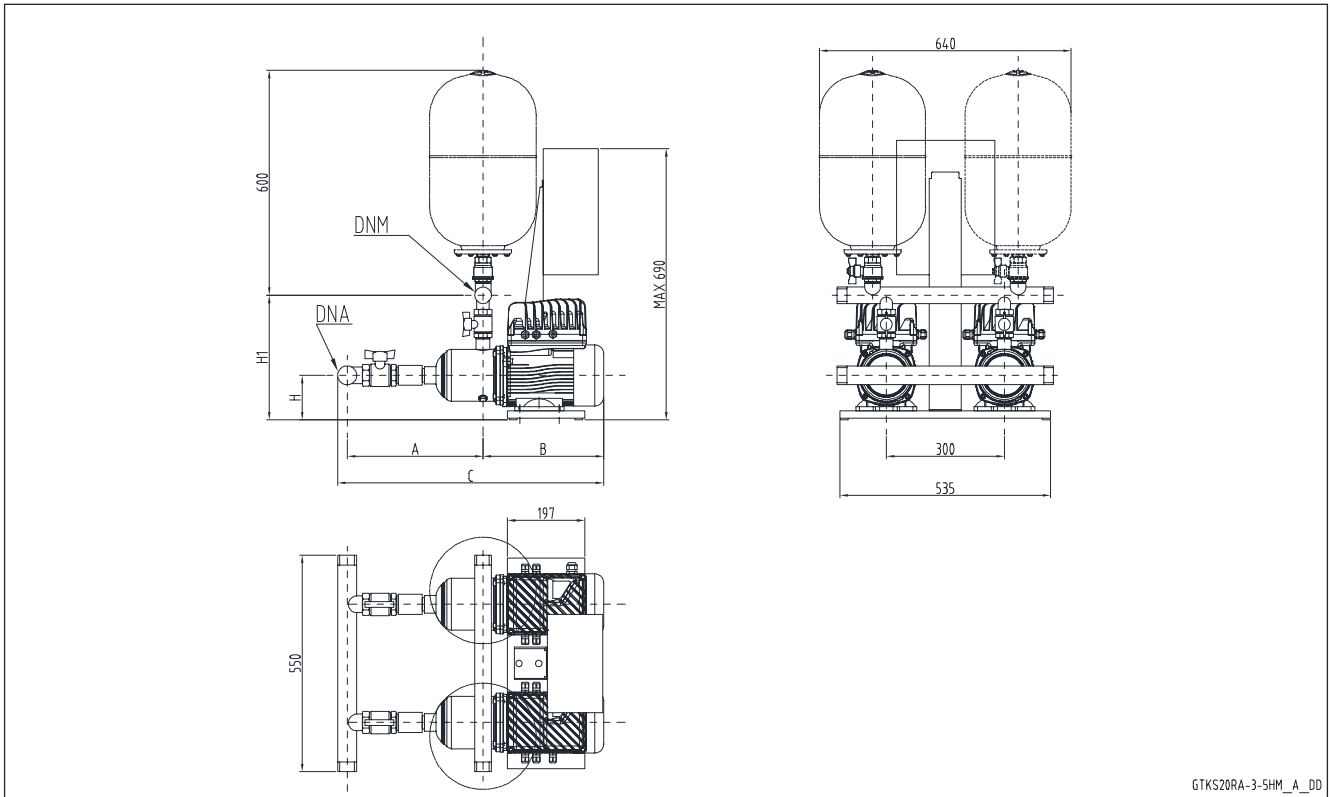
GTKS20

GTKS 20	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM02	R 1"1/4	R 1"1/4	198	227	249	468	497	113	383	521
3HM03	R 1"1/4	R 1"1/4	198	227	249	468	497	113	383	521
3HM04	R 1"1/4	R 1"1/4	218	247	249	488	517	113	383	521
3HM05	R 1"1/4	R 1"1/4	238	267	308	567	596	113	383	521
3HM06	R 1"1/4	R 1"1/4	258	287	308	587	616	113	383	521
5HM02	R 2"	R 1"1/2	224	248	249	503	527	113	386	524
5HM03	R 2"	R 1"1/2	224	248	249	503	527	113	386	524
5HM04	R 2"	R 1"1/2	244	268	308	582	606	113	386	524
5HM05	R 2"	R 1"1/2	264	288	308	602	626	113	386	524

Dimensions in mm. Tolerance ± 10 mm.

gtps20_3-5hm-en_a_td

**TWO-PUMP BOOSTER SETS, GTKS20 RA SERIES
HM..P HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**

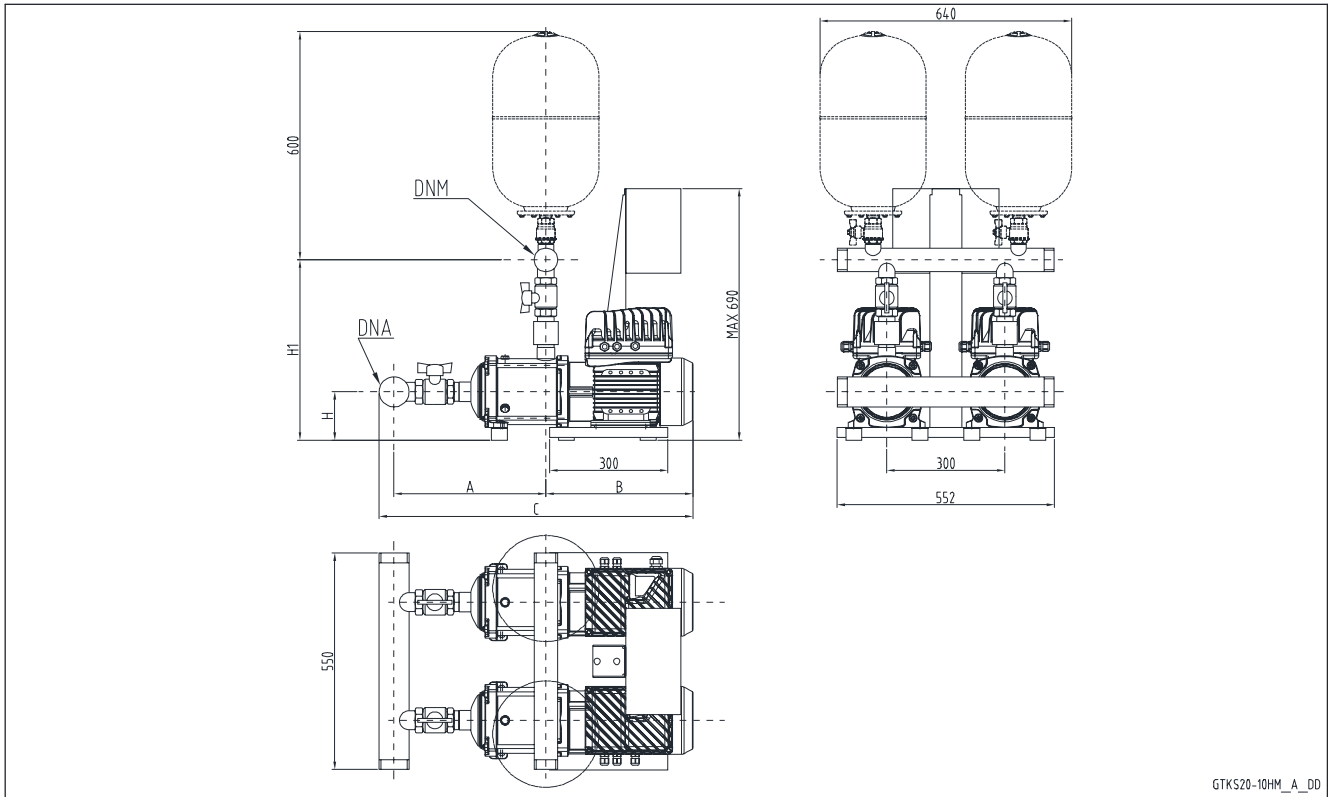


GTKS 20RA	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM02	R 1"1/4	R 1"1/4	243	430	249	513	700	113	317	346
3HM03	R 1"1/4	R 1"1/4	243	430	249	513	700	113	317	346
3HM04	R 1"1/4	R 1"1/4	263	450	249	533	720	113	317	346
3HM05	R 1"1/4	R 1"1/4	283	470	308	612	799	113	317	346
3HM06	R 1"1/4	R 1"1/4	303	490	308	632	819	113	317	346
5HM02	R 2"	R 1"1/2	277	470	249	556	749	113	320	349
5HM03	R 2"	R 1"1/2	277	470	249	556	749	113	320	349
5HM04	R 2"	R 1"1/2	297	490	308	635	828	113	320	349
5HM05	R 2"	R 1"1/2	317	510	308	655	848	113	320	349

Dimensions in mm. Tolerance ± 10 mm.

gtks20ra_3-5hm-en_a_td

**TWO-PUMP BOOSTER SETS, GTKS20 SERIES
HM..P HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON DELIVERY SIDE**



GTKS20-10HM_A_DD

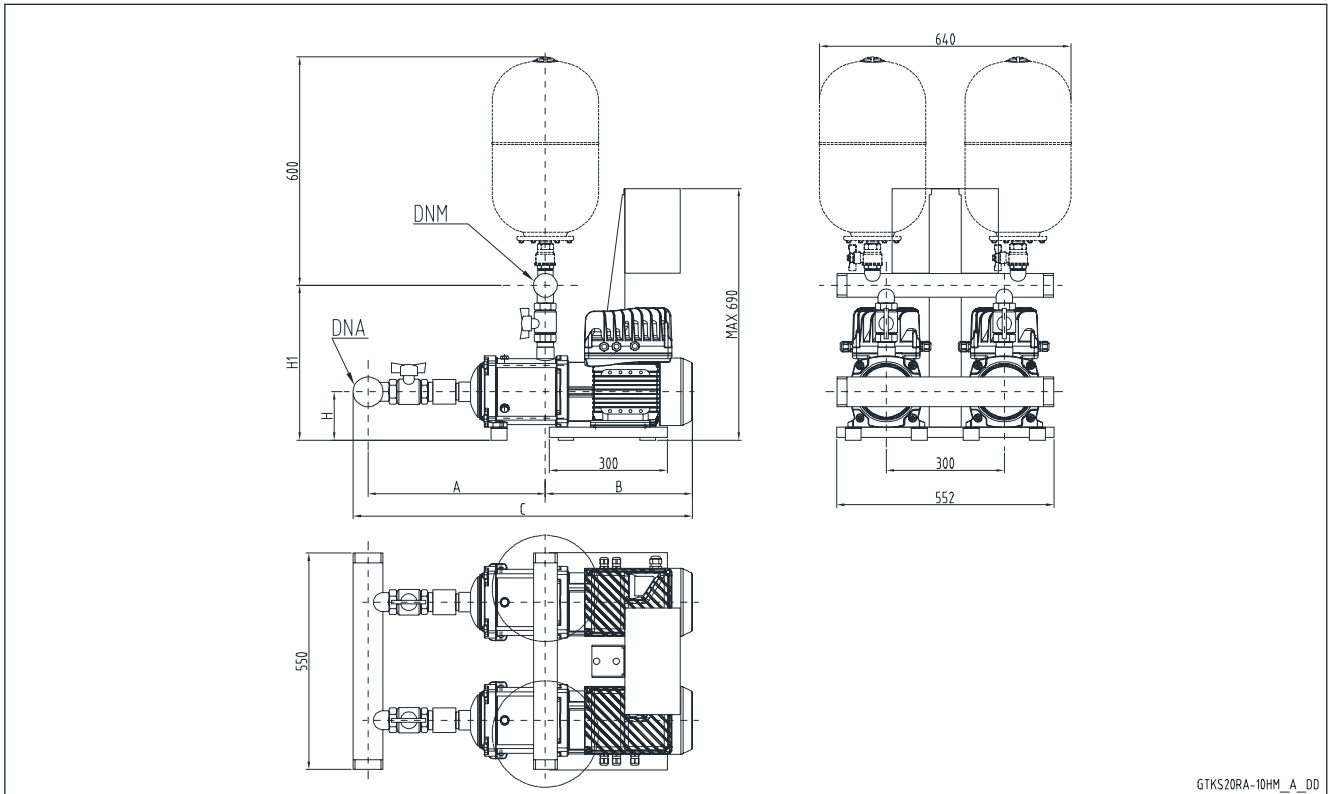
GTKS20

GTKS 20	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
10HM02	R 2"1/2	R 2"	290	309	318	646	665	123	441	590

Dimensions in mm. Tolerance ± 10 mm.

gths20_10hm-en_a_td

**TWO-PUMP BOOSTER SETS, GTKS20 RA SERIES
HM..P HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**

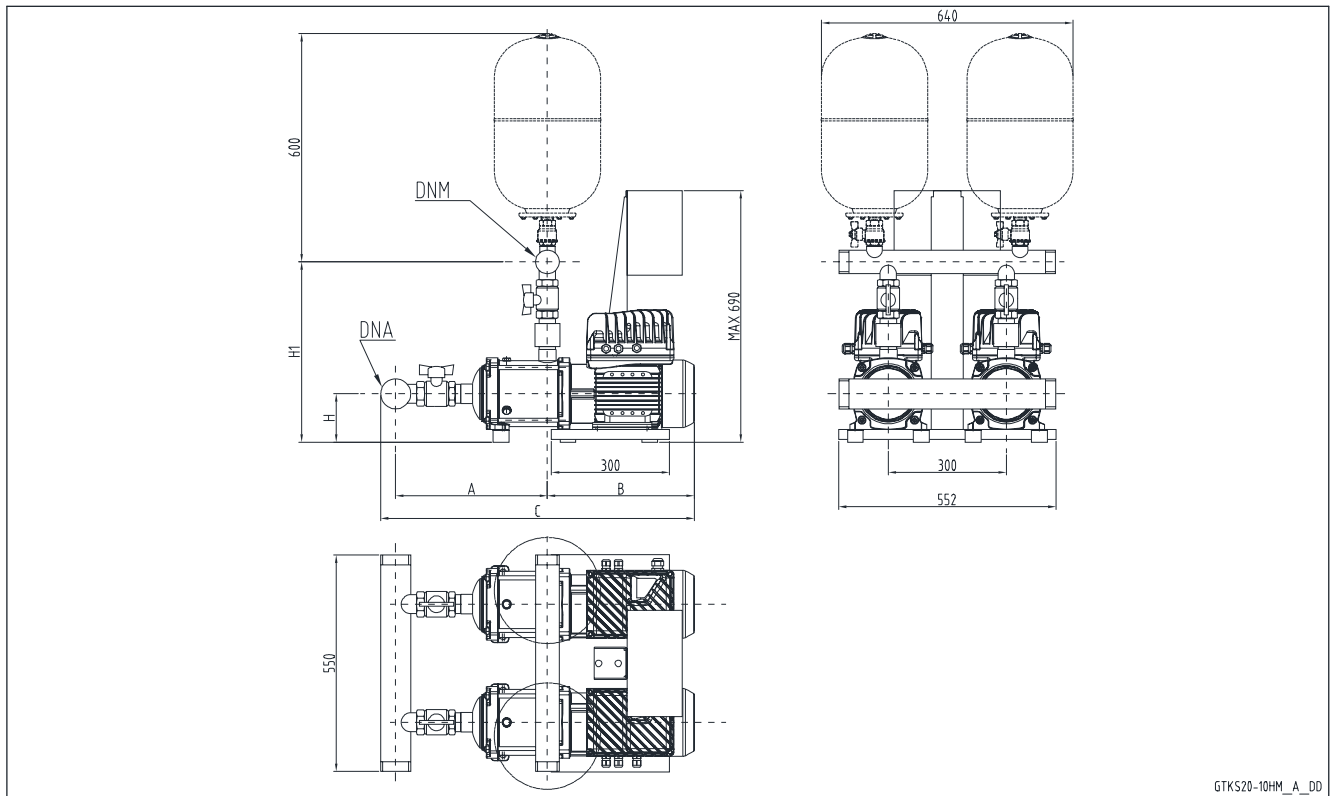


GTKS 20RA	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
10HM02	R 2"1/2	R 2"	361	554	318	717	910	123	371	395

Dimensions in mm. Tolerance ± 10 mm.

gts20ra_10hm-en_a_td

**TWO-PUMP BOOSTER SETS, GTKS20 SERIES
HM..S HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON DELIVERY SIDE**



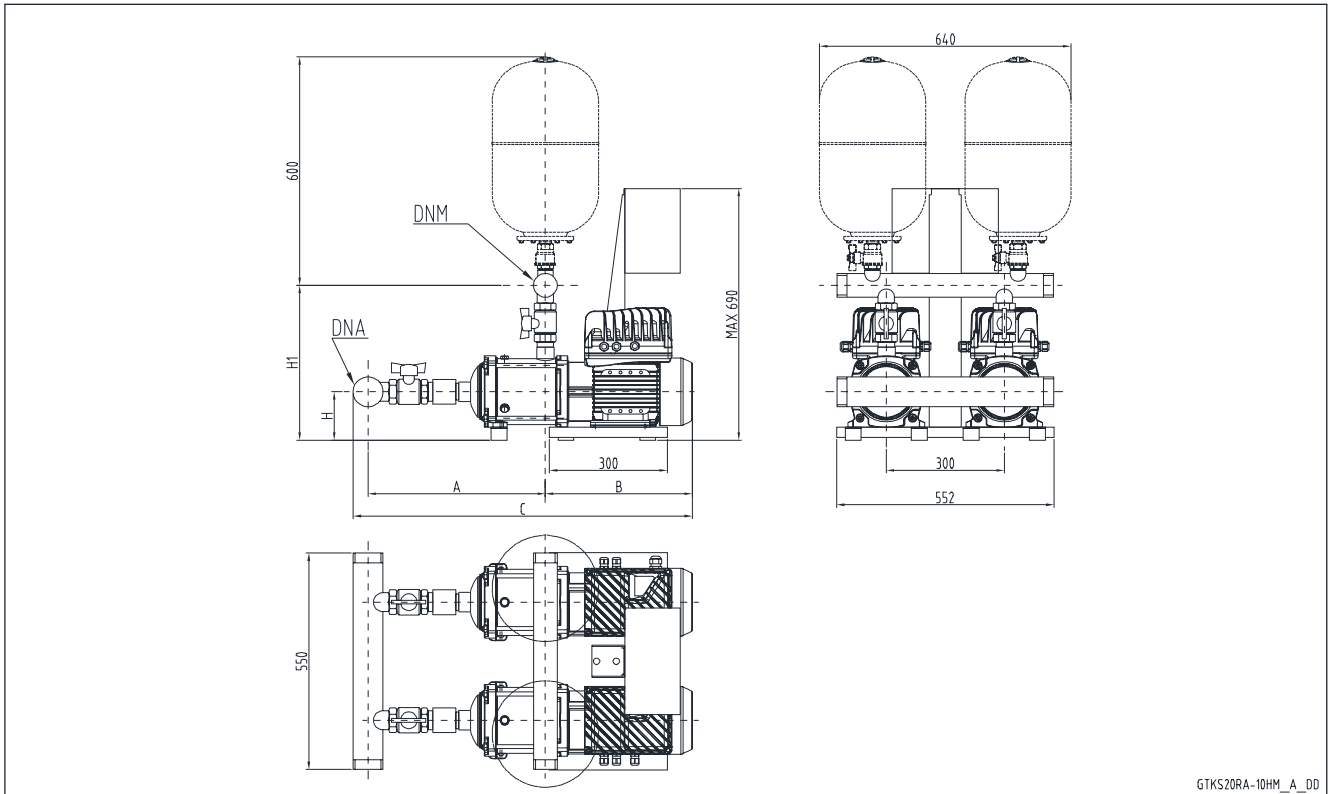
GTKS20

GTKS 20	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM10	R 1"1/4	R 1"1/4	322	351	317	660	689	123	393	531
3HM11	R 1"1/4	R 1"1/4	342	371	317	680	709	123	393	531
3HM12	R 1"1/4	R 1"1/4	362	391	317	700	729	123	393	531
3HM13	R 1"1/4	R 1"1/4	382	411	317	720	749	123	393	531

Dimensions in mm. Tolerance ± 10 mm.

gts20_3-22hms-en_a_td

**TWO-PUMP BOOSTER SETS, GTKS20 RA SERIES
HM..S HORIZONTAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**



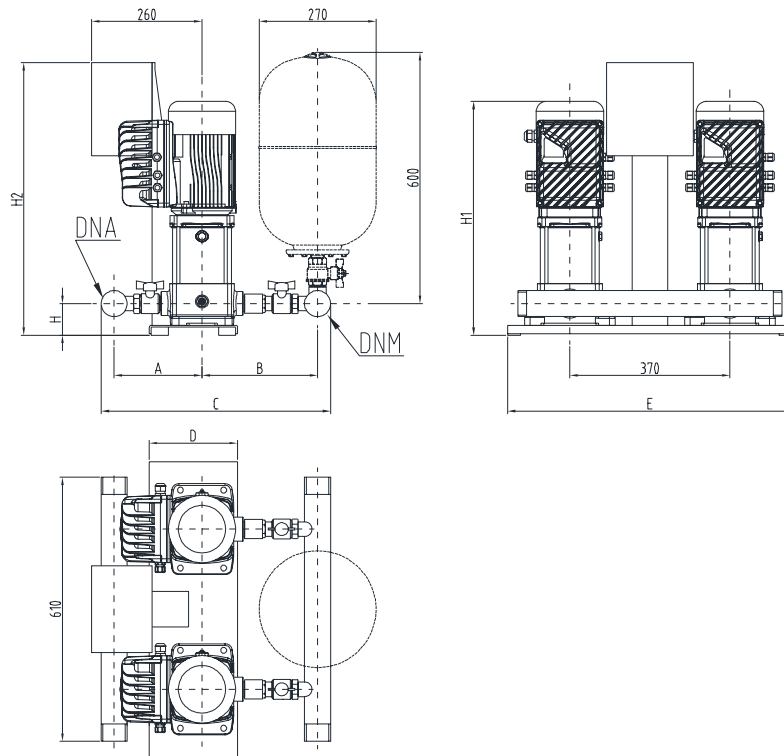
GTKS20RA-10HM_A_DD

GTKS 20RA	DNA	DNM	A		B	C		H	H1	
			STD / DW	AISI		STD / DW	AISI		STD / DW	AISI
3HM10	R 1"1/4	R 1"1/4	367	554	317	705	892	123	327	356
3HM11	R 1"1/4	R 1"1/4	387	574	317	725	912	123	327	356
3HM12	R 1"1/4	R 1"1/4	407	594	317	745	932	123	327	356
3HM13	R 1"1/4	R 1"1/4	427	614	317	765	952	123	327	356

Dimensions in mm. Tolerance ± 10 mm.

gths20ra_3-22hms-en_a_td

TWO-PUMP BOOSTER SETS, GTKS20 SERIES **VM VERTICAL ELECTRIC PUMPS** **WITH NON-RETURN VALVE ON DELIVERY SIDE**



GTKS20-VM_A_DD

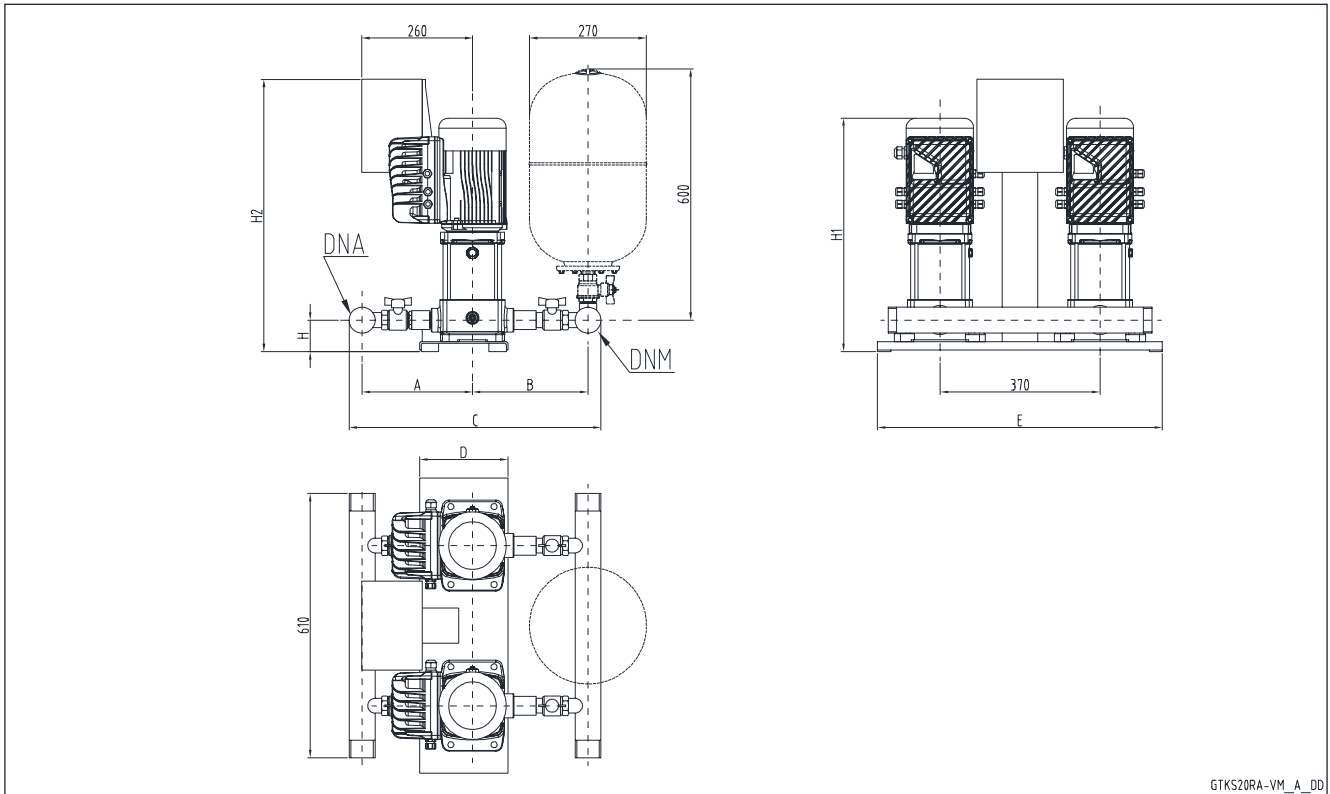
GTKS20

GTKS 20	DNA	DNM	A		B		C		D	E	H	H1	H2
			STD / DW	AISI	STD / DW	AISI	STD / DW	AISI					
3VM02	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	402	629
3VM03	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	402	629
3VM04	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	422	629
3VM05	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	500	629
3VM06	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	520	629
3VM07	R1"1/4	R1"1/4	206	305	258	410	506	757	204	658	73	540	629
5VM02	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	402	629
5VM03	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	402	629
5VM04	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	480	629
5VM05	R1"1/2	R1"1/2	224	323	286	443	558	814	204	658	73	500	629
10VM02	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	535	640

Dimensions in mm. Tolerance ± 10 mm.

gts20_vm-en_a_td

**TWO-PUMP BOOSTER SETS, GTKS20 RA SERIES
VM VERTICAL ELECTRIC PUMPS
WITH NON-RETURN VALVE ON SUCTION SIDE**



GTKS20RA-VM_A_DD

GTKS20

GTKS 20RA	DNA	DNM	A		B		C		D	E	H	H1	H2
			STD / DW	AISI	STD / DW	AISI	STD / DW	AISI					
3VM02	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	402	629
3VM03	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	402	629
3VM04	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	422	629
3VM05	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	500	629
3VM06	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	520	629
3VM07	R1"1/4	R1"1/4	251	355	256	305	549	702	204	658	73	540	629
5VM02	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	402	629
5VM03	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	402	629
5VM04	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	480	629
5VM05	R1"1/2	R1"1/2	277	373	286	323	611	744	204	658	73	500	629
10VM02	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	535	640

Dimensions in mm. Tolerance ± 10 mm.

gts20ra_vm-en_a_td

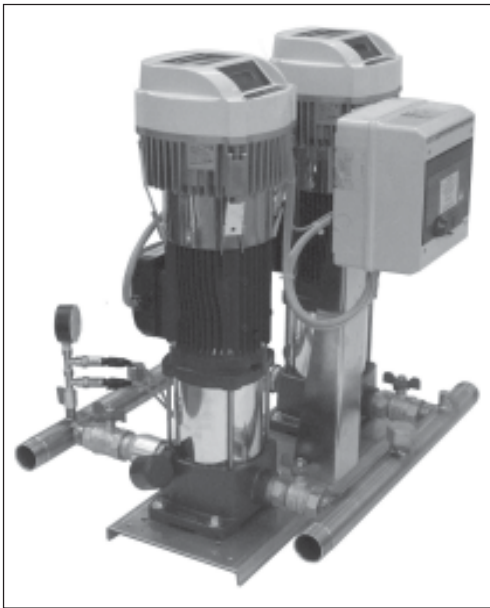
Booster sets

MARKET SECTORS RESIDENTIAL

APPLICATIONS

- Water network supply in condominiums, single villa and townhouses.
- Water supply for irrigation systems.

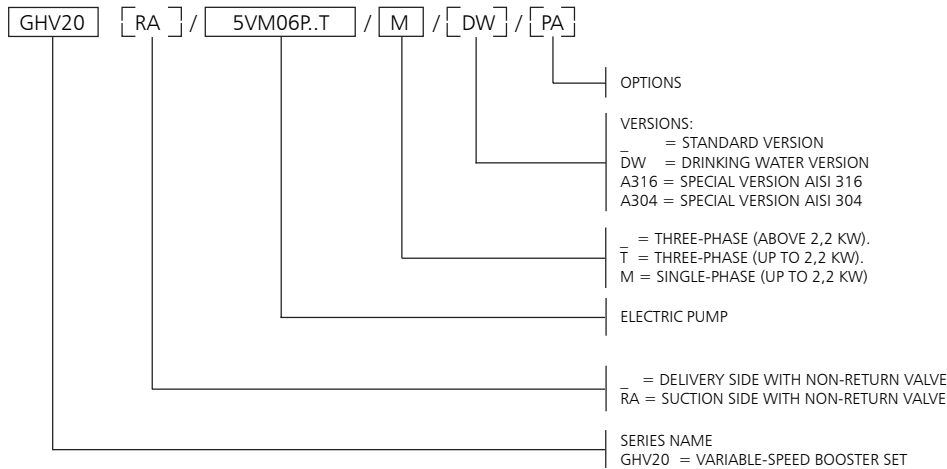
GHV20 Series



SPECIFICATIONS

- **Flow rate** up to 28 m³/h.
- **Head** up to 100 m.
- Electrical panel supply voltage:
1 x 230V $\pm$ 10% for power up to 2,2 kW.
- Electrical panel supply voltage:
3 x 400V $\pm$ 10% for power from 1,1 kW to 3 kW.
- Protection class
electrical panel IP 55.
- Protection class
converter IP 55.
- Maximum electric pump power 2 x 3 kW.
- Frequency: 50 Hz.
- **Motor start** with Hydrovar converter.
- Maximum temperature of pumped liquid:
from -10 to +60° C.
- **Close-coupled threaded vertical multistage:**
VM series.
Maximum operating pressure 10 bar.

TWO-PUMP BOOSTER SETS, GHV20 SERIES IDENTIFICATION CODE



OPTIONS (ON DEMAND)

2S	Hydrovar® equipped with double sensor.
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.
BF	Hydrovar® equipped with "B" filter for three-phase supply; domestic environment.
C9	Delivery manifold at 90° with bend. The expansion vessels cannot be installed directly on the manifold, only for e-SV™ and VM sets.
CM	Suction or delivery manifold larger than standard size.
CP	Clean contacts version: converter faulty, start/stop for each pump.
HFD	Hydrovar® and panel mounted delivery side (for wall mounted version Hydrovar®), available only up to 22kw power.
HFS	Hydrovar® and panel mounted suction side (for wall mounted version hydrovar).
HWM	Wall mounted hydrovar , cables lenght = 5 m.
IP65	IP65 version control panel.
KV	Kit voltmeter.
PA	Minimum pressure switch installed on the suction manifold for dry-running protection.
PMA	Minimum pressure switch for dry-running protection and pressure gauge installed on suction manifold.
PQ	Booster set with higt suction pressure (pressure gauge/pressure switches/pressure transmitter increased of one range).
RA	Non return valves mounted on suction side (Es. GHV20RA/5VM...).
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).
SCM	Without delivery manifold (no pressure transmitters and pressure gauge, with delivery valves).
SM	Without delivery: without valves on delivery and without delivery manifold.
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

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.

TWO-PUMP BOOSTER SETS, GHV20 SERIES OPERATING CHARACTERISTICS AND LIMITS

Liquids handled	Water containing no gas or corrosive and/or aggressive substances.
Fluid temperature (*)	above -10°C to + 60 °C.
Ambient temperature (*)	above 0 °C to +40 °C
Maximum operating pressure	Max 8 bar, 10 bar, 16 bar Depending on the type of pump.
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
Hourly starts (single pump)	Max 60 up to 3 kW
Installation	Indoors, protected from the weather. Away from heat sources. Max elevation 1000 m ASL. Max humidity 50% without condensation.
Sound emission	Sound emission level $L_p < 70$ dB(A) for two-pump set with 2900 rpm motor with power up to 2 x 3 kW.

(*) standard configuration

ghv20-VM_2p-en_a_ti

TABLE OF MATERIALS FOR SETS WITH 3-5-10VM PUMPS UP TO 3 kW

NAME	MATERIAL			
	(STANDARD)	DW	A304	A316
Manifolds	AISI 304	AISI 304	AISI 304	AISI 316
On-off valves	Nickel-plated brass	Nickel-plated brass	AISI 316	AISI 316
Non-return valves	Brass	Brass	AISI 304	AISI 316
Pressure switches	Chrome plated zinc alloy	AISI 304	AISI 304	AISI 304
Pressure trasmitter	AISI 316	AISI 316	AISI 316	AISI 316
Caps/plugs/flanges	Galvanized steel	AISI 304	AISI 304	AISI 316
Bracket	Galvanized steel	Galvanized steel	Galvanized steel	Galvanized steel
Base	Galvanized steel	Galvanized steel	Galvanized steel	Galvanized steel
Pump Body	Cast iron	Cast iron	Cast iron	Cast iron

ghv20-VM_2p-en_a_tm

TWO-PUMP BOOSTER SETS, GHV20 SERIES MAIN COMPONENTS

- **Main On-off valves** on suction and discharge side of each pump, ball type with threaded coupling up to 1"1/2 size included.
- **Check valve** on discharge side of each pump, spring-loaded type, with threaded coupling up to 1"1/2 size.
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 (serie GHV20RA..).
- **Suction manifold** made of 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 AISI 304 stainless steel depending on the version, with threaded or flanged ends depending on the type of pump (see drawings). Fitted with R1" threaded coupling with cap 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, galvanised steel or stainless steel depending on the version.
- **Mounting base**, for pumpset and panel mounting brackets in galvanised steel.
- **Electric control panel**, IP55 protection class.

STANDARD VERSIONS AVAILABLE

See table of materials.

STANDARD VERSION For general applications

Sets with 3-5-10 VM pumps:

Nickel-plated brass valves, non return valves with brass or technical plastic discs.

DW VERSION (GHV20../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.

Nickel-plated brass valves, non return valves with brass or technical plastic discs.

AISI304 Version (GHV20../A304), AISI 316 (GHV20../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 24 or 20-litres diaphragm expansion vessel** with 1" ball valve, 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 10 bar cylinder water vessel kit, Aisi 304
 - 24-litre 10 bar cylinder water vessel kit
 - 20-litre 25 bar cylinder water vessel kit
- **Alarm kit;**
- **Air feeder** for RA version.

SPECIAL VERSIONS AVAILABLE ON REQUEST

(Contact the Sales and technical Assistance Service)

- 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.

TWO-PUMP BOOSTER SETS, GHV20 SERIES VARIABLE-SPEED PUMP SYSTEMS

AVAILABLE SERIES

- GHV Multi-Master series. One Hydrovar® Master-type frequency converter for each electric pump.
- GHV Master + Basic series. One Hydrovar® frequency converter for each electric pump.
Hydrovar® Master and/or Basic type.
- GHC GHC Cascade control series. Single Hydrovar® Master type frequency converter per set;
the other electric pumps run at fixed speed, without a converter.

From a mechanical standpoint, the **Module concept** related to **HYDROVAR®** is divided in two parts, the **motor assembly** power unit (power unit) and the **control board**. In the basic configuration, that is with a single motor assembly, HYDROVAR® may be used as **"Basic Unit (BASIC)"** without having to use a control board. In this configuration HYDROVAR® may be used as a sequential pump in a multi-pump system with at least one master inverter.

By expanding the "Basic inverter" with the additional control board and the LCD screen, the HYDROVAR® **"Master Unit"** becomes suitable to operate in different modes and may be expanded by implementing several modules.

GHV VERSION, MASTER + BASIC SERIES

This mode provides several different combinations of different HYDROVAR® versions.

In general, each pump is equipped with a HYDROVAR® unit. Each pump in the system (which may count up to 8 pumps), is fitted with a HYDROVAR® unit (at least one as **"Master unit"** and the others as **"Basic units"**, to guarantee adequate system control); the units are connected one another by means of a serial interface.

Minimum requirements: one "Master unit" and the others equipped with "Basic unit".

The entire control process takes always place by means of the "Master unit", though it is also possible to alternate the standby pump sequence in order to distribute wear and allow for the same number of operating hours of the pumps controlled by basic inverters.

Following versions are available:

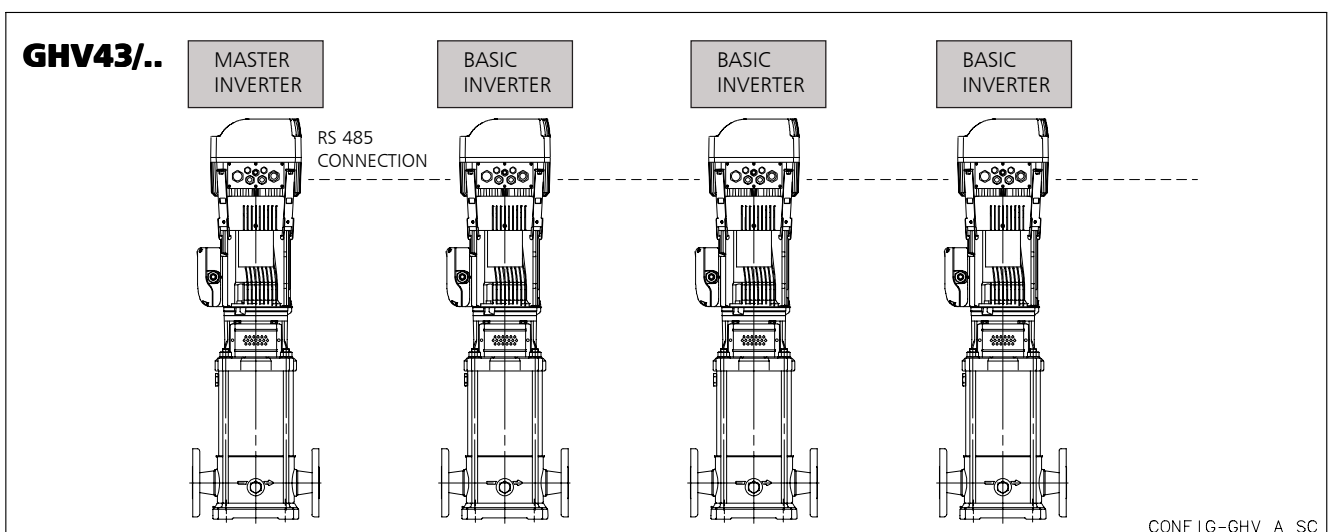
- **Power size from 1,5kW to 11 kW, motor mounted.**

General description of booster name:

GHV [] [] : First digit: total number of pump, Second digit: number of Basic units.

Example:

- **GHV21**: two pumps booster set, one "Master Inverter" and one "Basic Inverter" configuration.
- **GHV31**: three pumps booster set, two "Master Inverter" and one "Basic Inverter" configuration.
- **GHV32**: three pumps booster set, one "Master Inverter" and two "Basic Inverter" configuration.

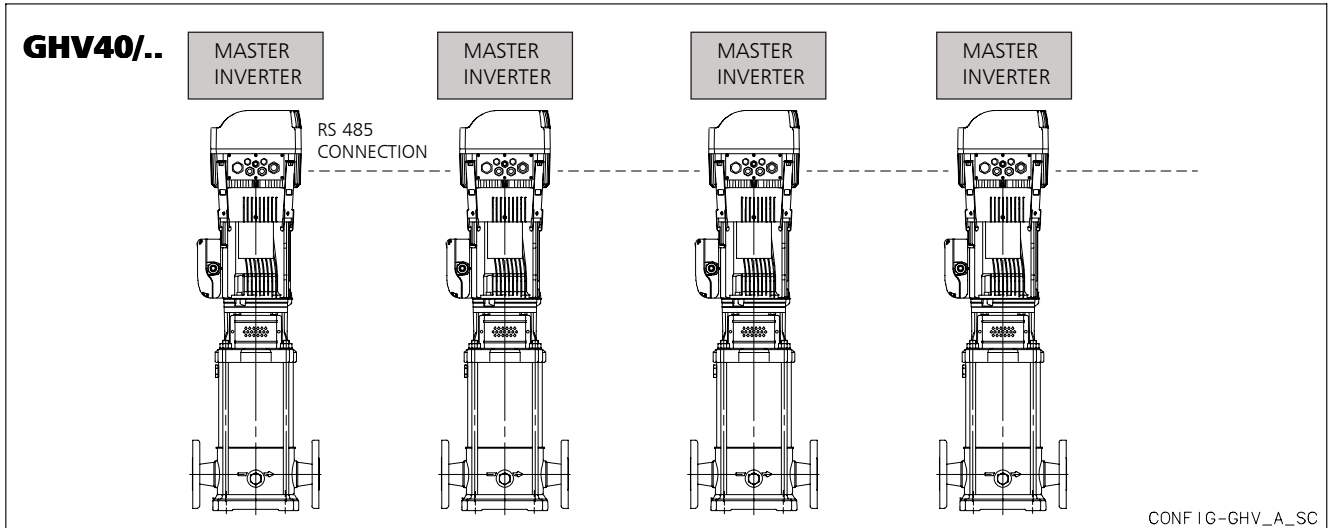


TWO-PUMP BOOSTER SETS, GHV20 SERIES MULTI MASTER SERIES

Each electric pump is fitted with a HYDROVAR® type **"Master Unit"**.

Automatic alternation of the electric pumps is guaranteed in order to distribute wear and optimize the operating hours. The following power levels are available:

- **Power from 1,5kW to 22 kW, motor assembly (maximum 8 units).**



GHC VERSION, CASCADE CONTROL SERIES

One pump is equipped with a HYDROVAR® "Master unit", while up to five fixed-speed pumps may be operated on request with the ON and OFF signal.

For this purpose an additional 5-relay board is fitted on to the "Master unit". It is necessary to resort to an external electric panel, in that the HYDROVAR® relays are not capable of directly commutating the pumps, since they are used exclusively as signal terminals.

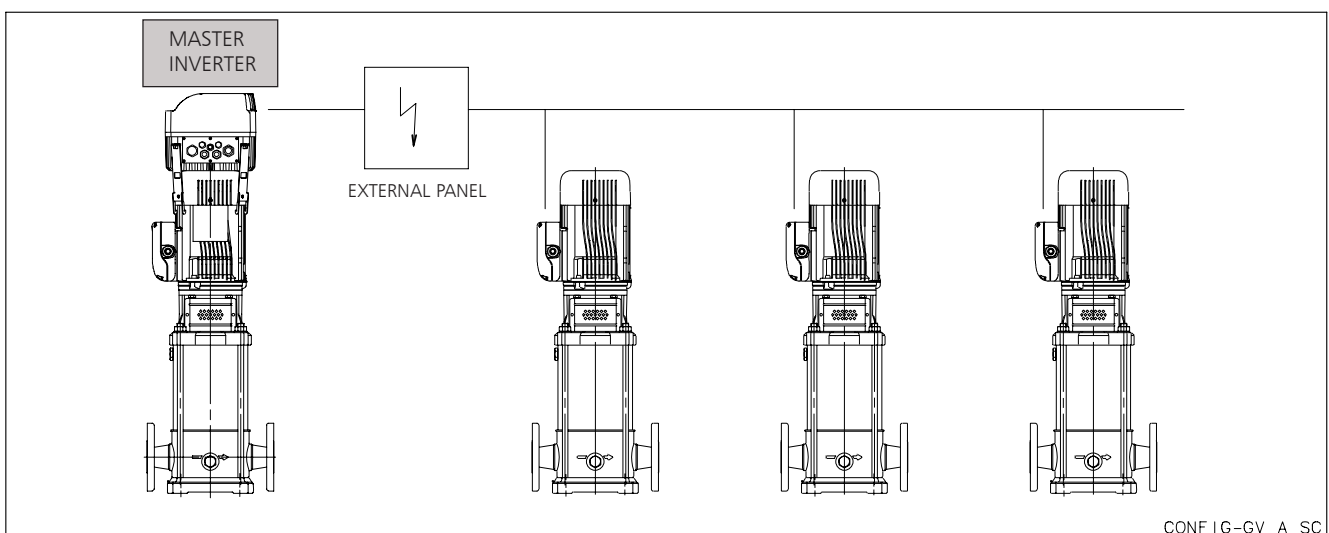
In this operating mode it is also possible to automatically alternate the fixed-speed pumps in order to distribute wear and allow the pumps to operate for the same number of hours. The inverter always feeds the same electric pump.

The following power levels are available:

- **Power from 1,5kW to 22 kW, motor assembly (maximum 6 electric pumps)**

Example:

- **GHC20:** pressure booster assembly made up of two pumps, a "Master inverter" and an electric pump running at fixed speed.
- **GHC30:** pressure booster assembly made up of three pumps, a "Master inverter" and two electric pumps running at fixed speed.



MAIN CHARACTERISTICS OF FREQUENCY CONVERTERS USED IN THE BOOSTER SETS GHV, GHC SERIES

The GHV, GHC series booster sets use a **Hydrovar®** frequency converter, an automatic device that adjusts the speed of the electric pump in order to maintain **constant pressure** in the system.

Converters with power up to 22 kW can be **mounted directly on to the motor**. Models up to 22 kW can be mounted alternatively on the wall if equipped with the optional **fan kit**. Models with over 22 kW power, up to 45 kW, are designed for wall mounting only. The pressure is measured by a **pressure transmitter** which uses a standard **4..20 mA** signal. The system pressure value can be read on the converter's display. A simple user interface allows you to set the desired pressure value for optimal adjustment, as well as to **view the operating data**, such as the hours of operation and any alarms triggered.

Included diagnostic menu to view temperature, current and voltage values of Hydrovar® facilitates diagnostics and failure analysis.

Indicator lights signal power status, pump running and malfunctions.

A **password** is required to access sensitive settings that allow you to **configure the converter** in order to adapt it to any control requirements, such as **flow resistance compensation, external control**, periodic testing and so on.

When more than one pump is used, the converters exchange information with each other through an **RS485 serial line** which can connect up to 8 Hydrovar® devices plus one external unit for remote control. Up to 4 Hydrovar® for power ratings from 30 to 45kW. The Pump-link and Pump-watcher dedicated systems, connected to Hydrovar®, allow remote control with a mobile or landline telephone system.

RS485 serial interface available as standard up to 22 kW, which allows to control the Hydrovar® converters from a Modbus® field serial bus line.

The converter is equipped with two **potential-free relays** which can be used for **remote signalling** of pump running and malfunction status, plus a programmable voltage **analogue output** for signalling the frequency or pressure.

Standard version with two sensors inputs for implementing of two actual values signals within one system (min/max, difference) or for a second sensor for safety reasons.

Specific digital **inputs** are used for protection against **water failure, motor overtemperature**, as well as for external enable signal and remote control.

The converter also incorporates a dry running protection function via an adjustable **minimum pressure** threshold.



Hydrovar® HV2.015 - HV4.110



Hydrovar® Wall mounted version



Hydrovar® HV4.150 - HV4.220

GHV20

Class A filter standard for Hydrovar® three-phase power supply. E.g. Industrial areas, technical areas of any building fed from a dedicated transformer are examples of environment locations.

Class B filter standard for Hydrovar® single-phase power supply. E.g. Houses, apartments, commercial premises or offices in a residential building are examples of environment locations.

Further information are available into Hydrovar® manual.

TWO-PUMP BOOSTER SETS, GHV20 SERIES SPECIFICATIONS

Converter				Motor	
Model *	Power supply (V)	IP Class	Install.	Power supply (V)	Power (kW)
HV 2.015	1x230	IP 55	Motor	3x230	0,75-1,5
HV 2.022	1x230	IP 55	Motor	3x230	2,2
HV 4.022	3x400	IP 55	Motor	3x400	1,1-2,2
HV 4.030	3x400	IP 55	Motor	3x400	3
HV 4.040	3x400	IP 55	Motor	3x400	4
HV 4.055	3x400	IP 55	Motor	3x400	5,5
HV 4.075	3x400	IP 55	Motor	3x400	7,5
HV 4.110	3x400	IP 55	Motor	3x400	11
HV 4.150	3x400	IP 55	Motor	3x400	15
HV 4.185	3x400	IP 55	Motor	3x400	18,5
HV 4.220	3x400	IP 55	Motor	3x400	22
(HV 3.30)	3x400	IP 54	Wall	3x400	30
(HV 3.37)	3x400	IP 54	Wall	3x400	37
(HV 3.45)	3x400	IP 54	Wall	3x400	45

* The Hydrovar Modular is available single-phase up to 2,2kW and above 2,2kW up to 22kW three-phase power supply only.

gcom_hv-2p-en_d_te

CONTROL PANELS

Single-phase (GHV../M) or three-phase (GHV../T) electrical power supply panel for protecting up to two three-phase electric pumps (3x230Vac or 3x400Vac), with Hydrovar® frequency converter, made from polycarbonate, featuring a transparent door and protected to IP55 for power ratings up to 4kW. A metal case protected to IP55 is available on request.

Main characteristics:

- Automatic switch with overload protection for each Hydrovar® frequency converter.
- Standard supply voltage: 1x230Vac (GHV../M) or 3x400Vac (GHV../T) +/-10%, 50/60Hz.
- No-water protection system alternatives: float, minimum pressure switch, external contact or electrode probes via the electronic module with sensitivity adjustment.
- A special version with "clean" potential-free contacts for signalling: pump running, converter faulty. Configured for enable from external contact.

A Hydrovar® frequency converter, integrated to the motor of each pump, which controls the number of revs required to keep pressure constant and complete with: power-on, pump running and fault indicator LED's, control buttons. Complete with two relays for remote pump running and alarm signalling.

A serial line for transmitting information between the two units in order to assure cycle exchange, simultaneous operation in case of maximum demand and service continuity in case one of the two converters develops a fault. The standard external serial line can be used to connect a control system.



Control panel 2 pumps single-phase up to 2,2kW, or three-phase power supply up to 4kW



Control panel 2 pumps three-phase power supply with dry contacts up to 4kW

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.

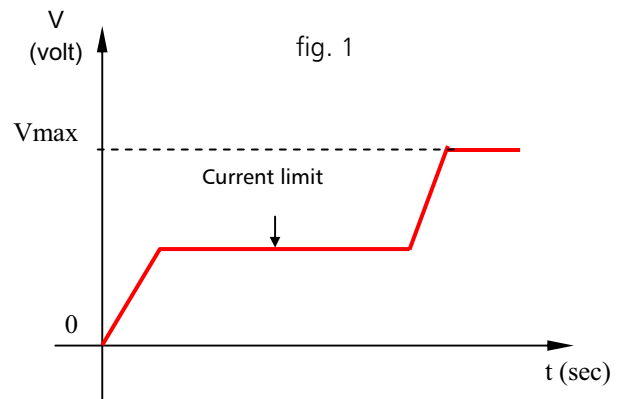
Drives for Electric Motors

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:

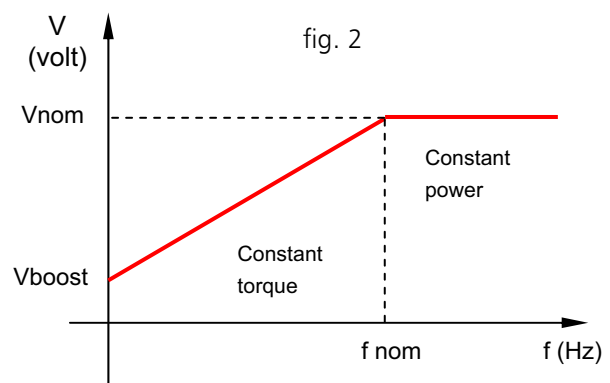
- Drives with variable voltage
- Drives with variable frequency

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. Typical example, fig.2:



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.

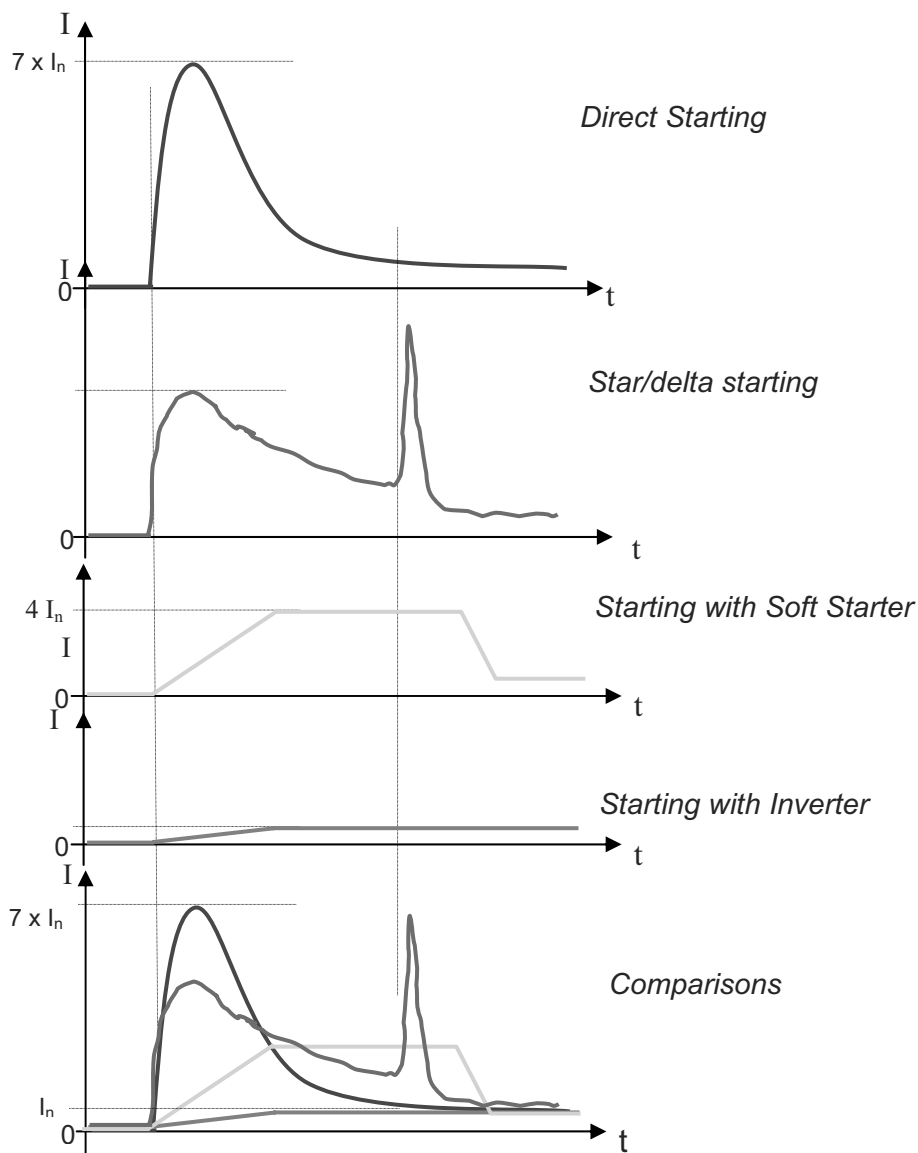
In short, using a pumping system with one or more variable-speed pumps means:

- ✓ 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;

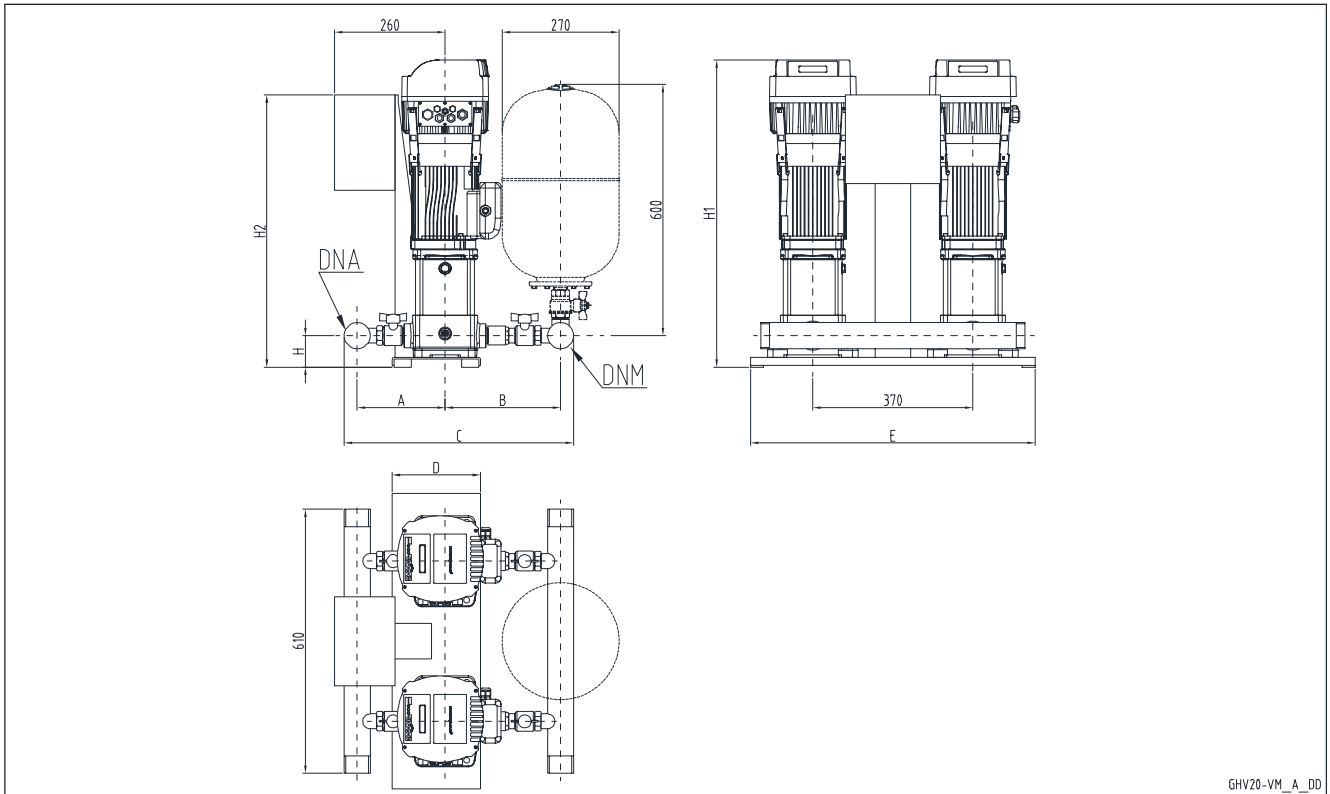
Increasing the productivity and efficiency of an installation.

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)



**TWO-PUMP BOOSTER SETS, GHV20 SERIES
VM VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE
ON DELIVERY SIDE. SINGLE-PHASE POWER SUPPLY**



GHV20-VM_A_DD

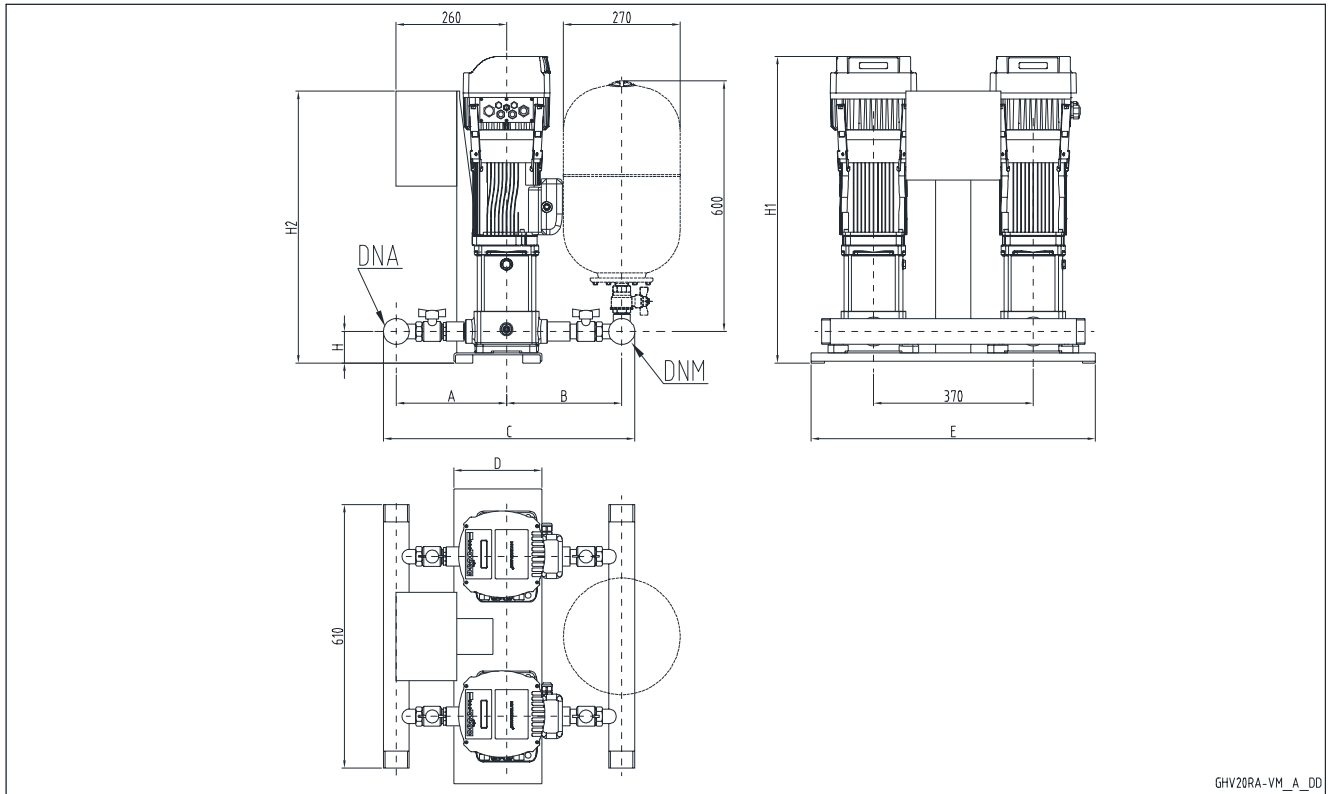
GHV20

GHV 20	DNA	DNM	A		B		C		D	E	H	H1	H2
			STD / DW	AISI	STD / DW	AISI	STD / DW	AISI					
3VM05	R1"1/4	R1"1/4	206	305	258	410	506	757	235	658	84	511	640
3VM06	R1"1/4	R1"1/4	206	305	258	410	506	757	235	658	84	531	640
3VM07	R1"1/4	R1"1/4	206	305	258	410	506	757	235	658	84	551	640
3VM08	R1"1/4	R1"1/4	206	305	258	410	506	757	235	658	84	571	640
5VM04	R1"1/2	R1"1/2	224	323	286	443	558	814	235	658	84	491	640
5VM05	R1"1/2	R1"1/2	224	323	286	443	558	814	235	658	84	511	640
5VM06	R1"1/2	R1"1/2	224	323	286	443	558	814	235	658	84	531	640
5VM07	R1"1/2	R1"1/2	224	323	286	443	558	814	235	658	84	551	640
5VM08	R1"1/2	R1"1/2	224	323	286	443	558	814	235	658	84	627	640
10VM02	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	535	640
10VM03	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	567	640
10VM04	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	655	640

Dimensions in mm. Tolerance ± 10 mm.

ghv20-m_vm-en_a_td

**TWO-PUMP BOOSTER SETS, GHV20 RA SERIES
VM VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE
ON SUCTION SIDE. SINGLE-PHASE POWER SUPPLY**

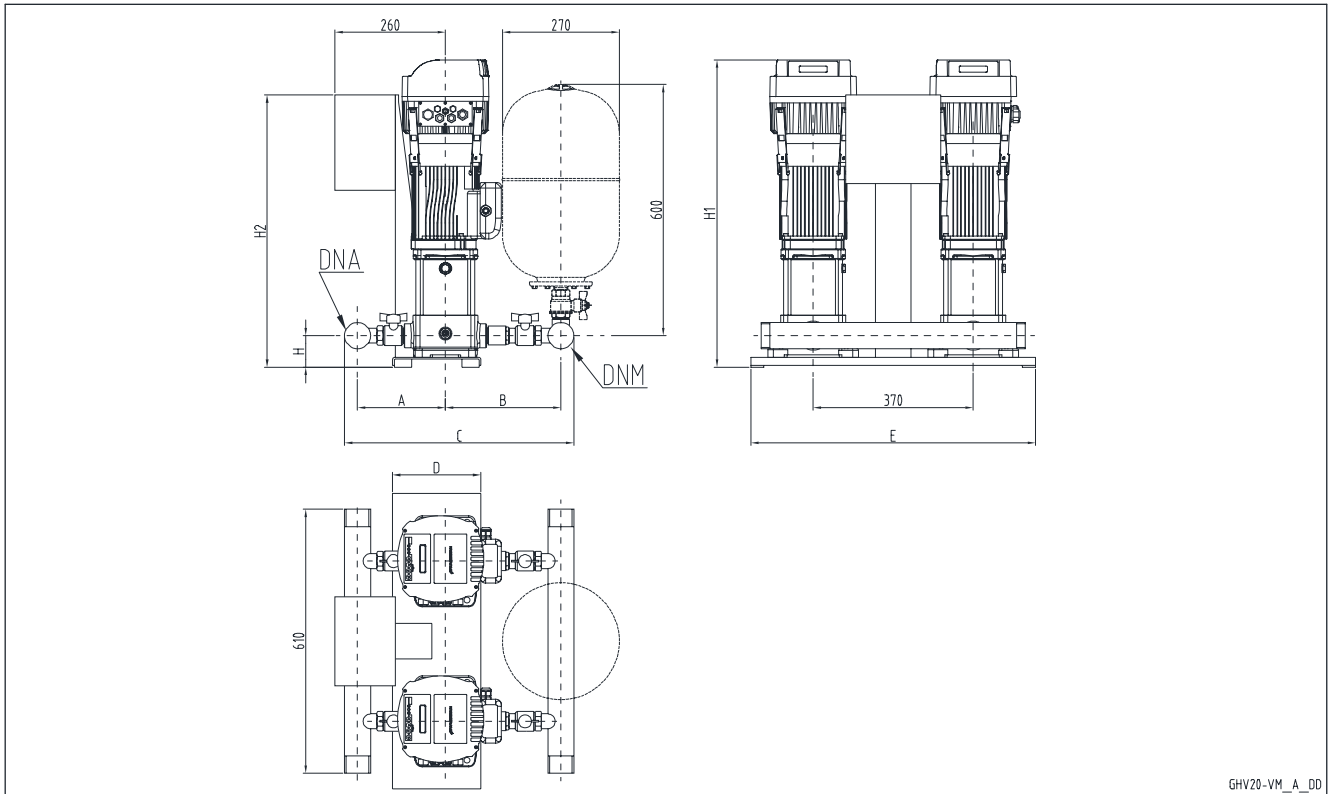


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3VM06	R1"1/4	R1"1/4	251	355	256	305	549	702	235	658	84	531	640
3VM07	R1"1/4	R1"1/4	251	355	256	305	549	702	235	658	84	551	640
3VM08	R1"1/4	R1"1/4	251	355	256	305	549	702	235	658	84	571	640
5VM04	R1"1/2	R1"1/2	277	373	286	323	611	744	235	658	84	491	640
5VM05	R1"1/2	R1"1/2	277	373	286	323	611	744	235	658	84	511	640
5VM06	R1"1/2	R1"1/2	277	373	286	323	611	744	235	658	84	531	640
5VM07	R1"1/2	R1"1/2	277	373	286	323	611	744	235	658	84	551	640
5VM08	R1"1/2	R1"1/2	277	373	286	323	611	744	235	658	84	627	640
10VM02	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	535	640
10VM03	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	567	640
10VM04	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	655	640

Dimensions in mm. Tolerance ± 10 mm.

ghv20ra-m_vm-en_a_td

**TWO-PUMP BOOSTER SETS, GHV20 SERIES
VM VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE
ON DELIVERY SIDE. THREE-PHASE POWER SUPPLY**



GHV20-VM_A_DD

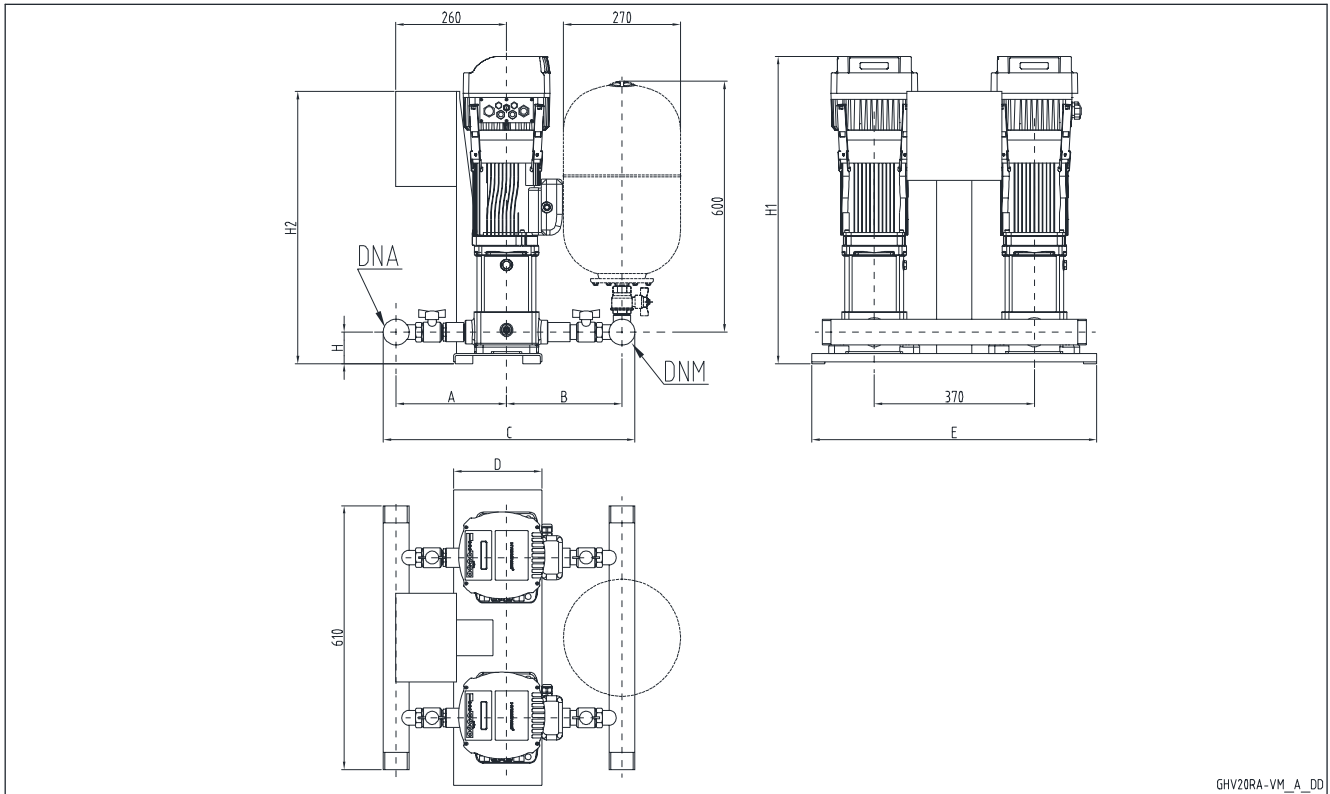
GHV20

GHV 20	DNA	DNM	A		B		C		D	E	H	H1	H2
			STD / DW	AISI	STD / DW	AISI	STD / DW	AISI					
3VM06	R1"1/4	R1"1/4	206	305	258	410	506	757	235	658	84	531	640
3VM07	R1"1/4	R1"1/4	206	305	258	410	506	757	235	658	84	551	640
3VM08	R1"1/4	R1"1/4	206	305	258	410	506	757	235	658	84	571	640
5VM04	R1"1/2	R1"1/2	224	323	286	443	558	814	235	658	84	491	640
5VM05	R1"1/2	R1"1/2	224	323	286	443	558	814	235	658	84	511	640
5VM06	R1"1/2	R1"1/2	224	323	286	443	558	814	235	658	84	531	640
5VM07	R1"1/2	R1"1/2	224	323	286	443	558	814	235	658	84	551	640
5VM08	R1"1/2	R1"1/2	224	323	286	443	558	814	235	658	84	627	640
10VM02	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	535	640
10VM03	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	567	640
10VM04	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	655	640
10VM05	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	687	640
10VM06	R2"1/2	R2"1/2	273	374	338	517	687	967	235	682	114	719	640

Dimensions in mm. Tolerance ± 10 mm.

ghv20-t_vm-en_a_td

**TWO-PUMP BOOSTER SETS, GHV20 RA SERIES
VM VERTICAL ELECTRIC PUMPS WITH NON-RETURN VALVE
ON SUCTION SIDE. THREE-PHASE POWER SUPPLY**



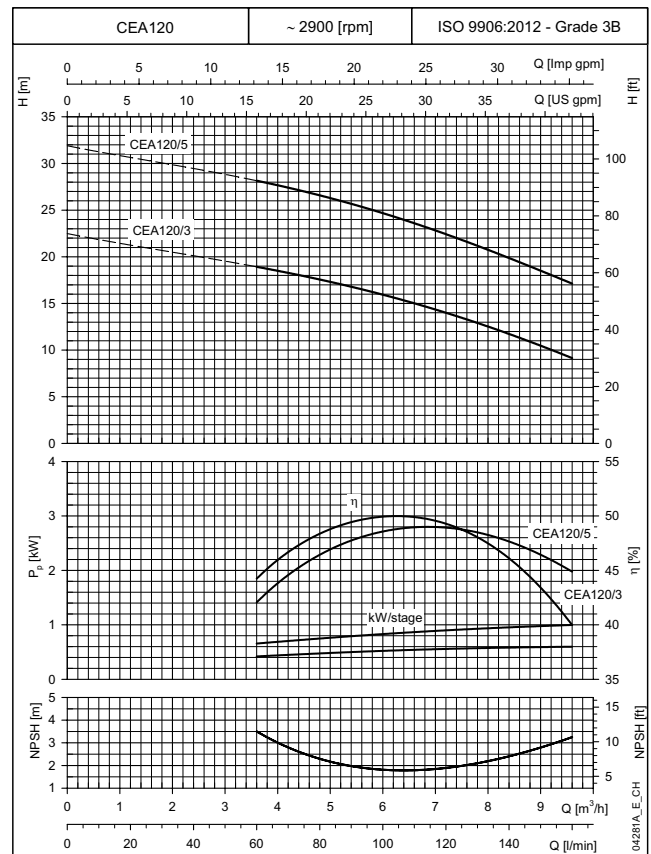
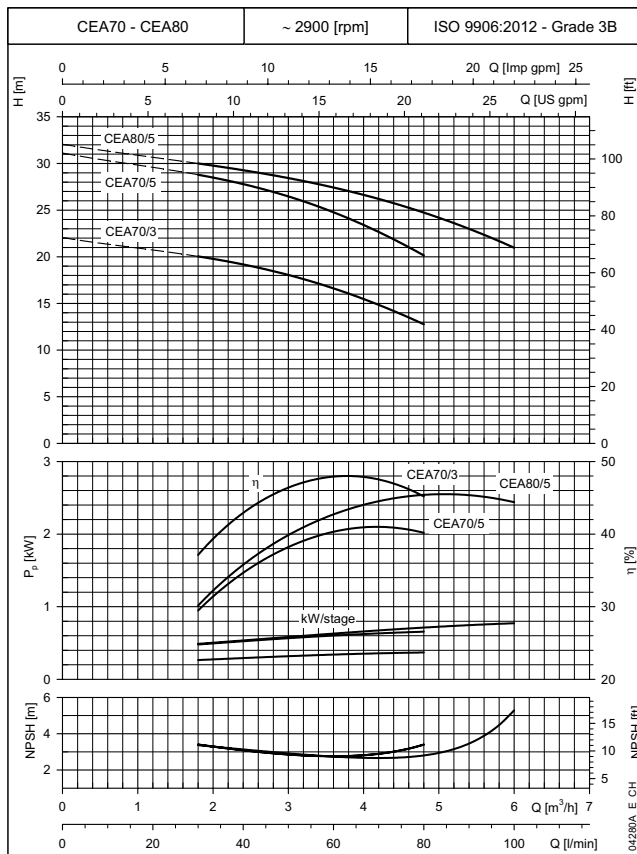
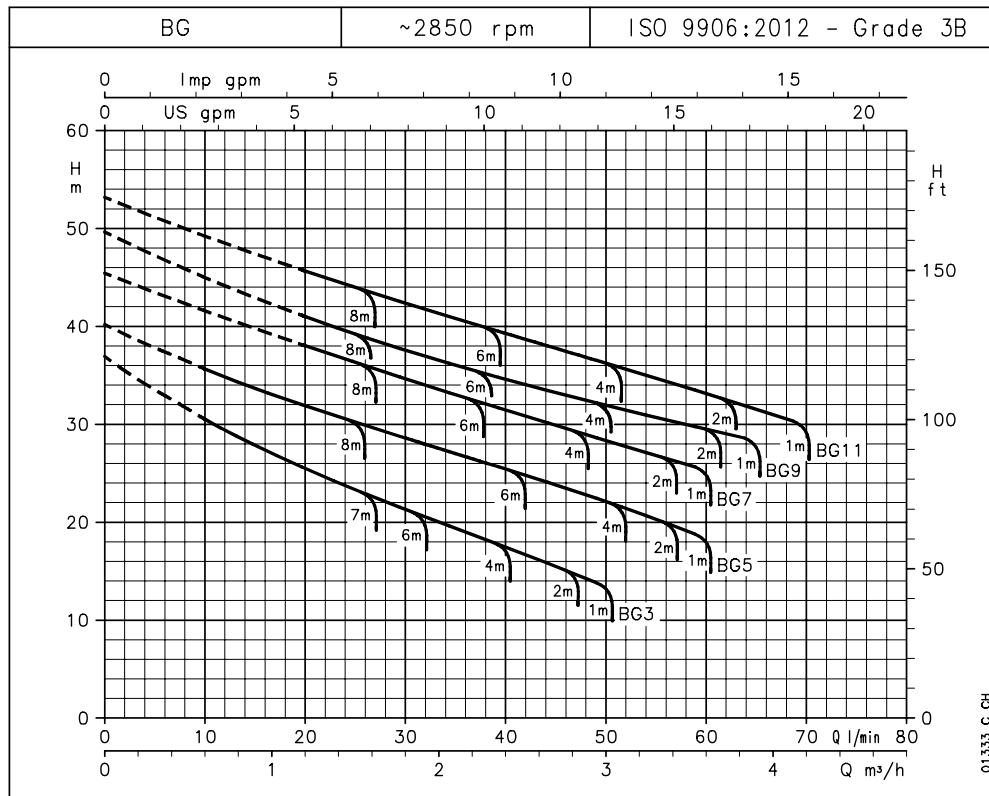
GHV20RA-VM_A_DD

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			STD / DW	AISI	STD / DW	AISI	STD / DW	AISI					
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3VM07	R1"1/4	R1"1/4	251	355	256	305	549	702	235	658	84	551	640
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5VM08	R1"1/2	R1"1/2	277	373	286	323	611	744	235	658	84	627	640
10VM02	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	535	640
10VM03	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	567	640
10VM04	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	655	640
10VM05	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	687	640
10VM06	R2"1/2	R2"1/2	343	424	335	374	754	874	235	682	114	719	640

Dimensions in mm. Tolerance ± 10 mm.

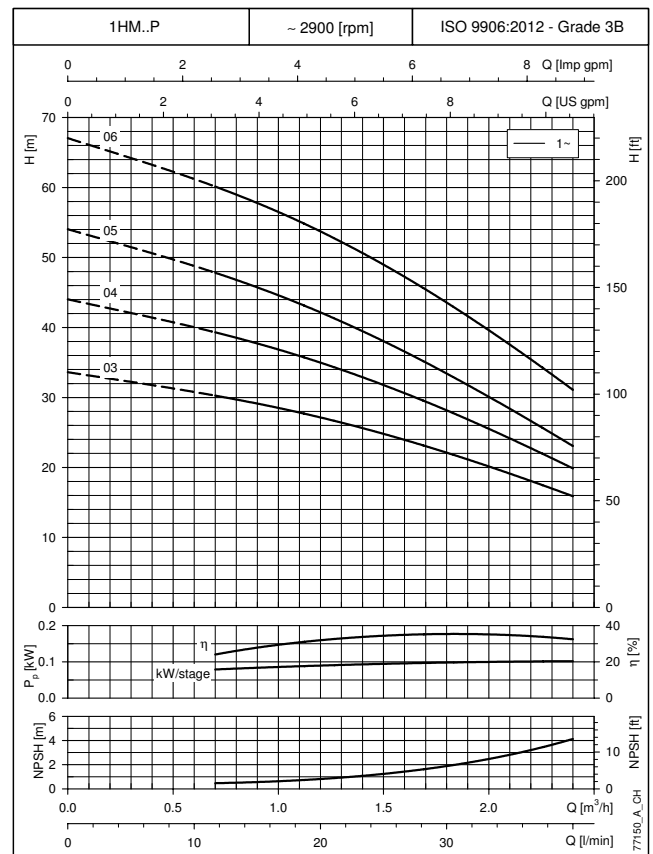
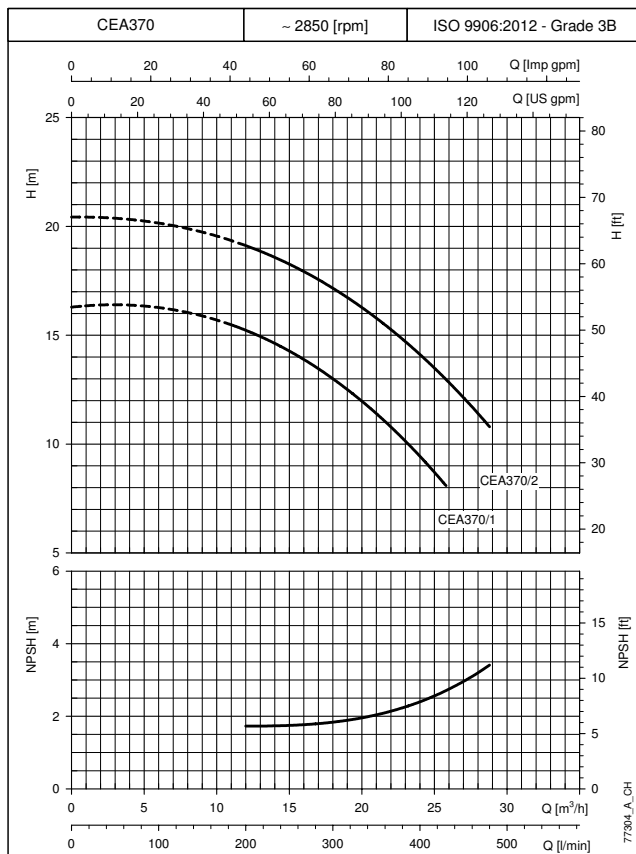
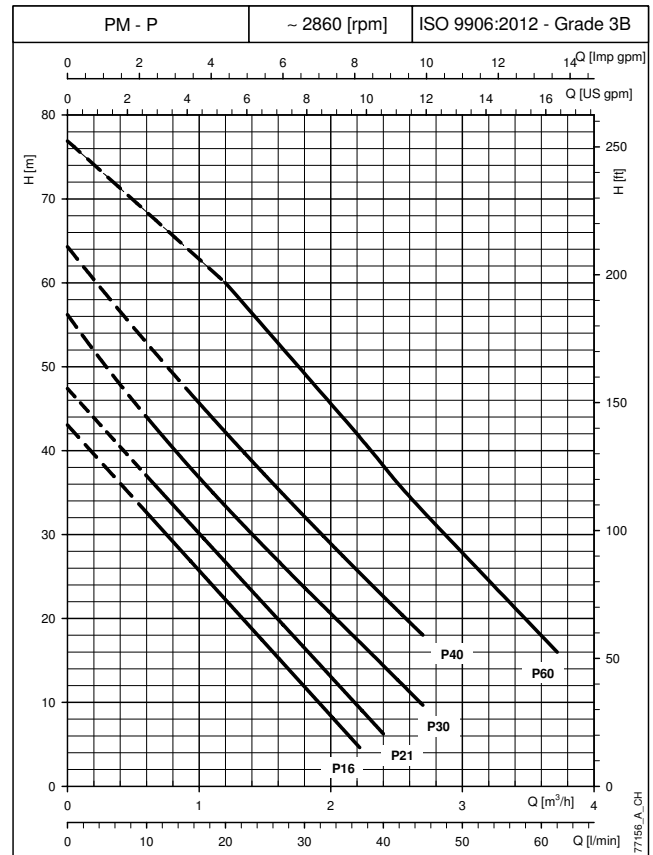
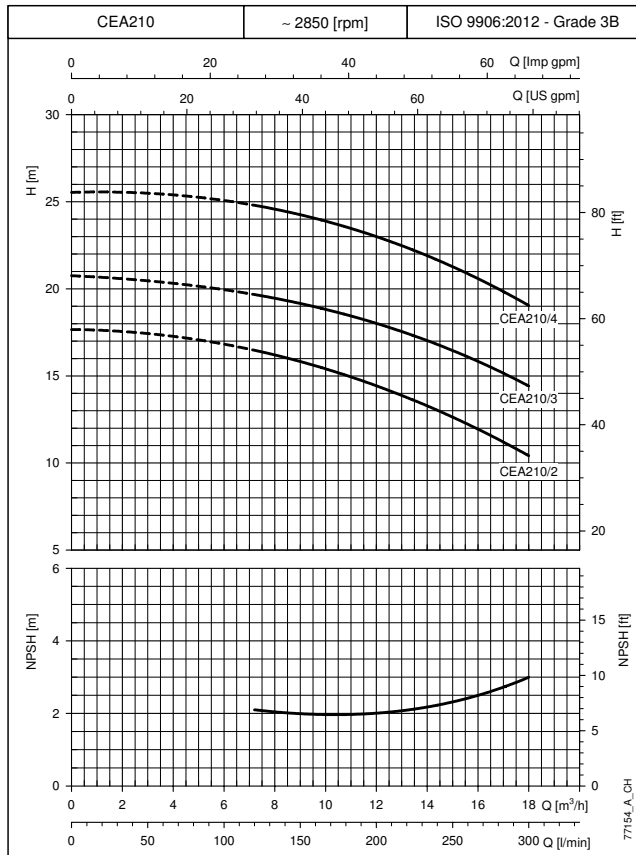
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ONE-PUMP SPHERE UNITS OPERATING CHARACTERISTICS AT 50 Hz



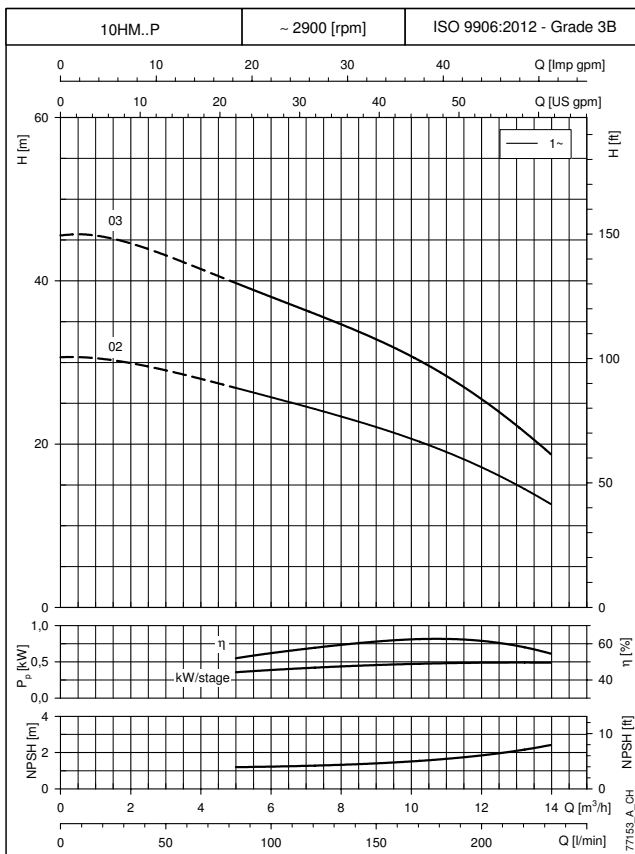
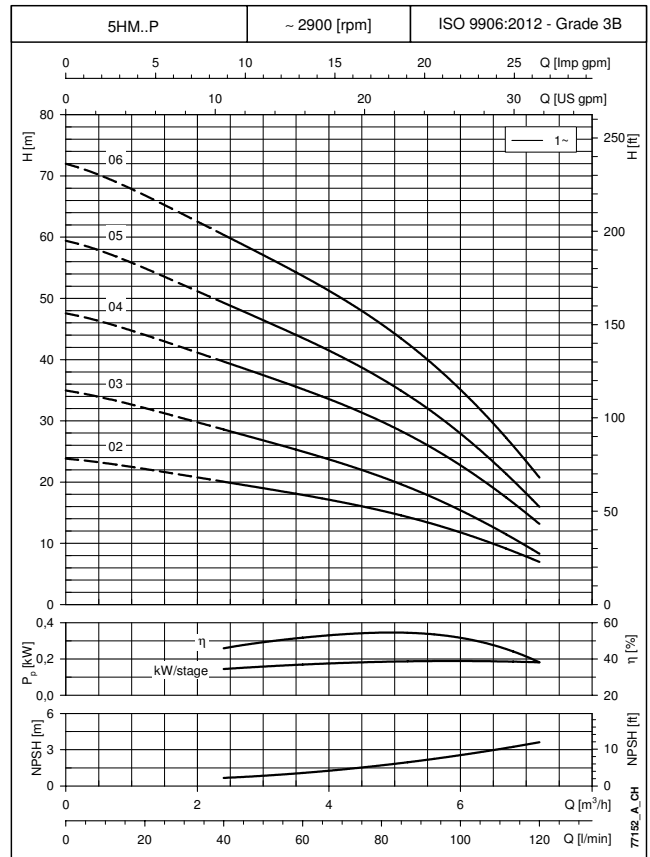
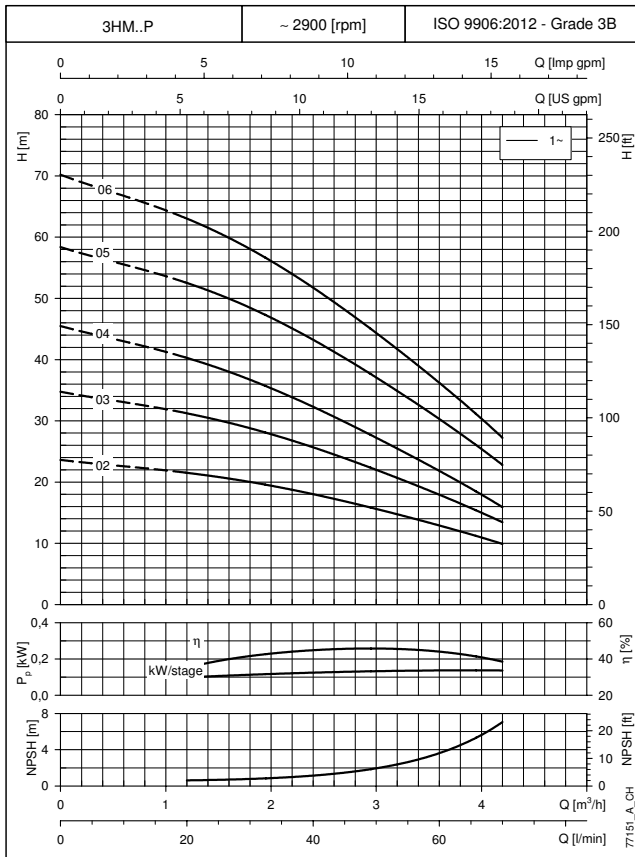
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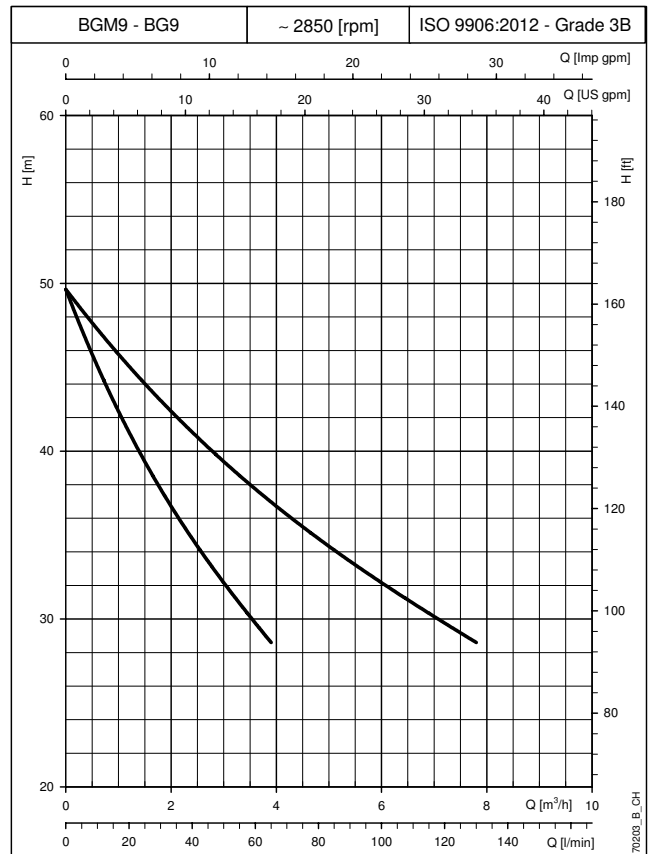
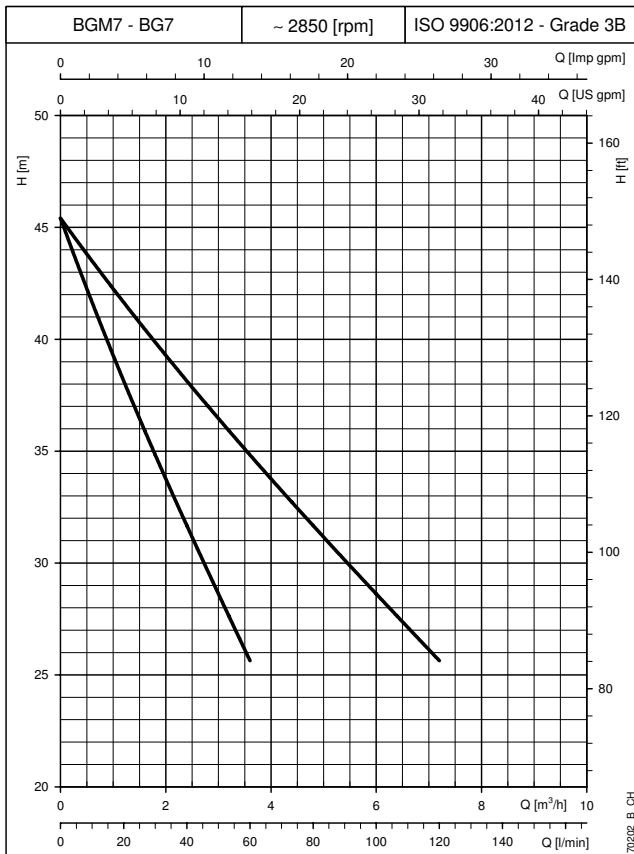
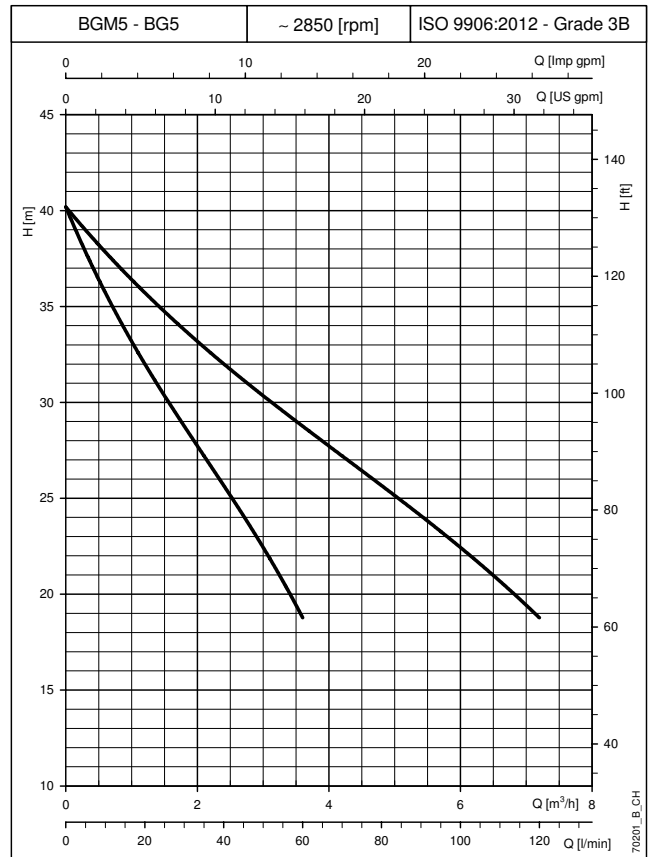
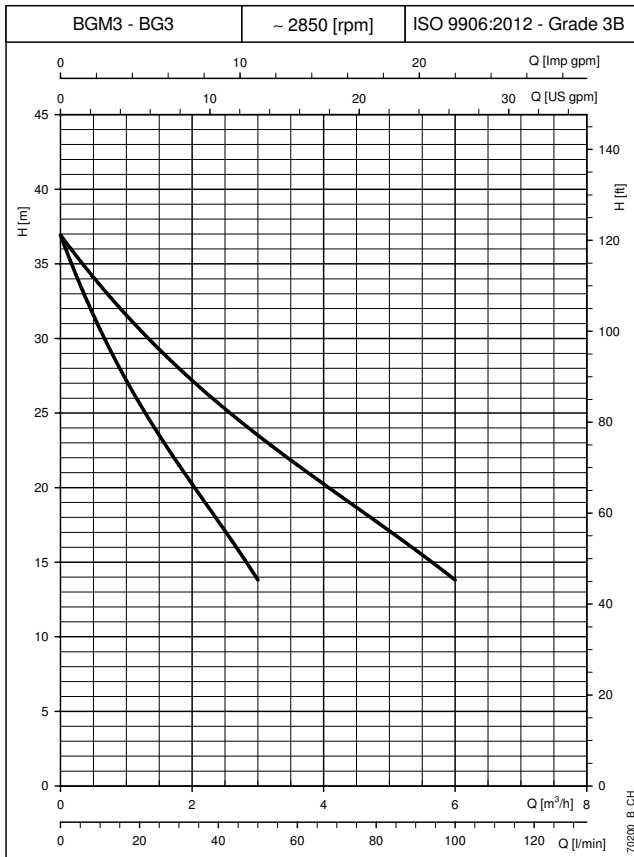
ONE-PUMP SPHERE UNITS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

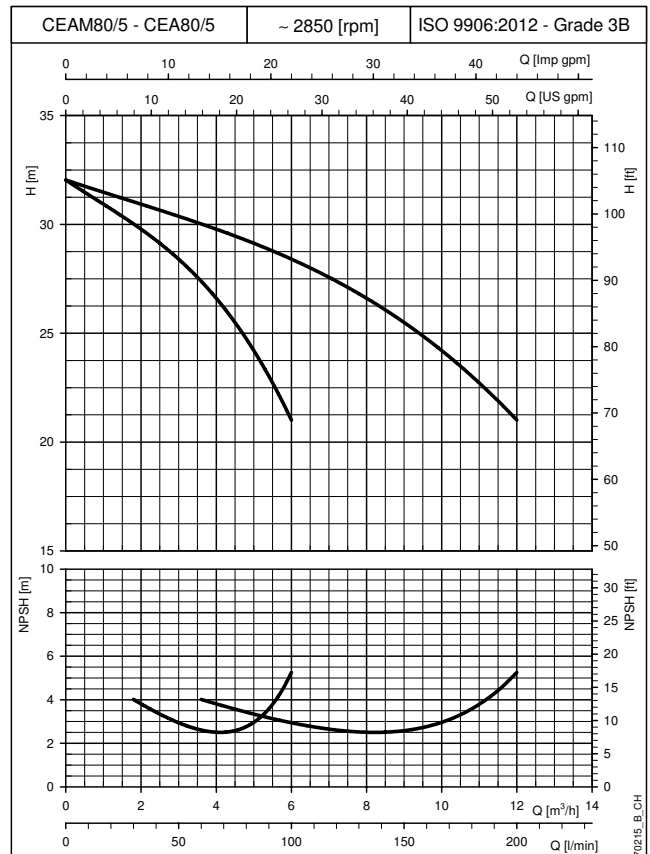
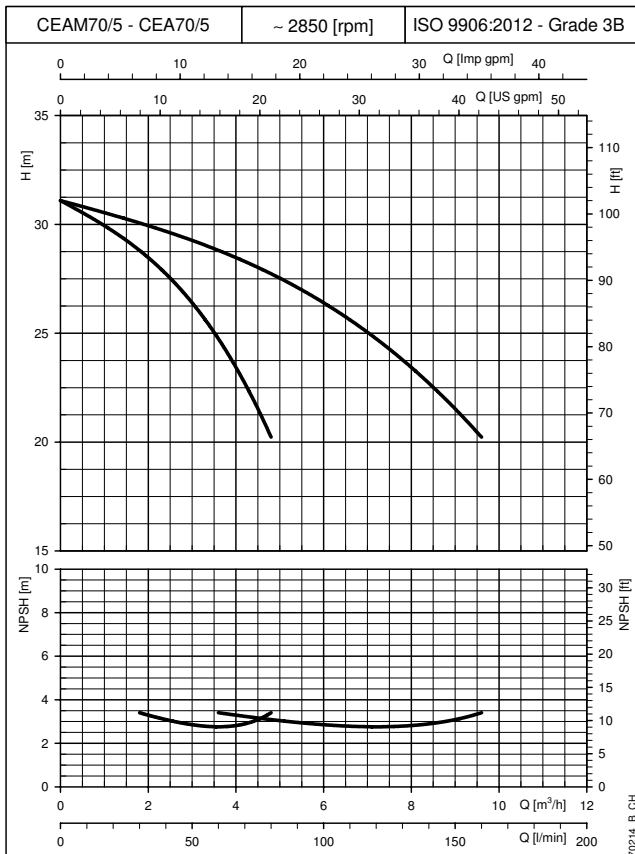
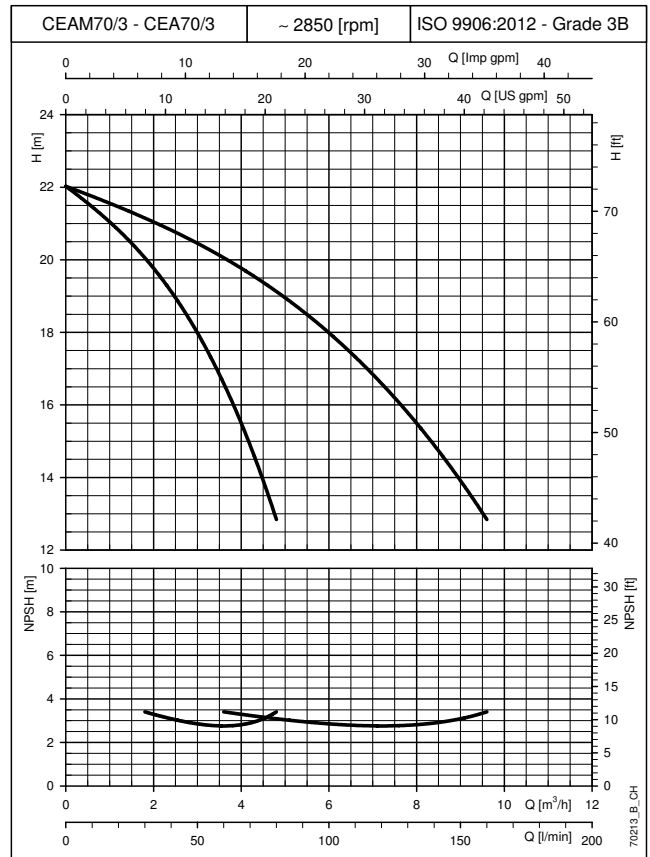
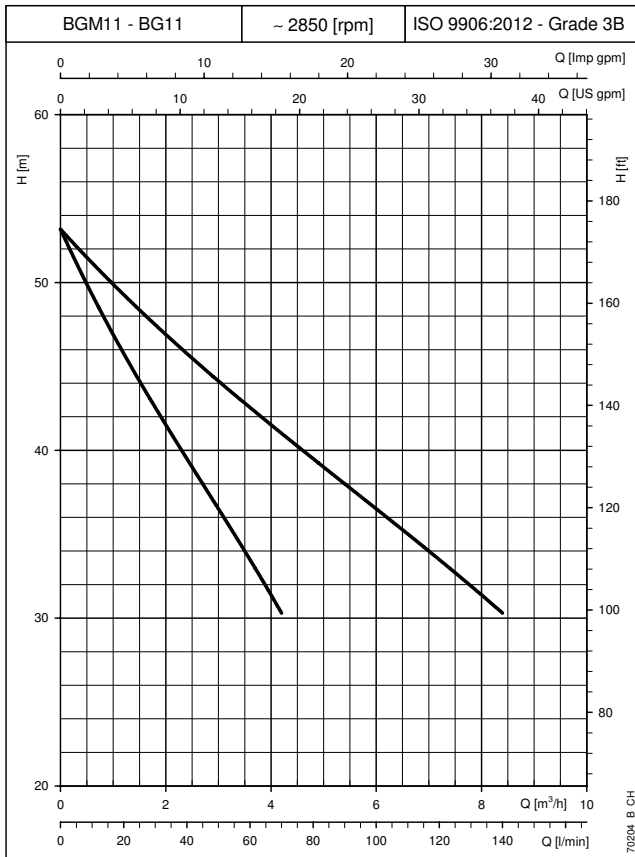
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TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



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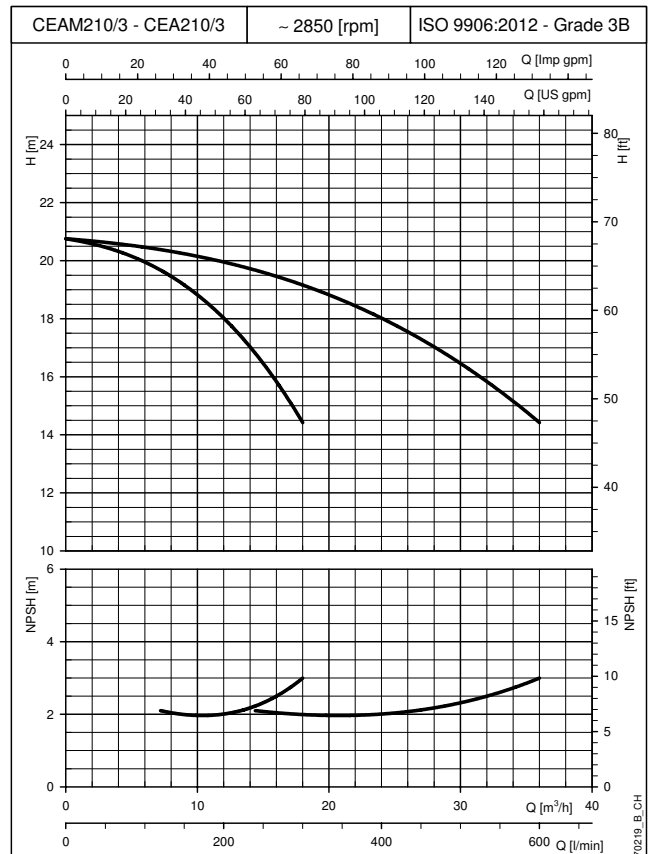
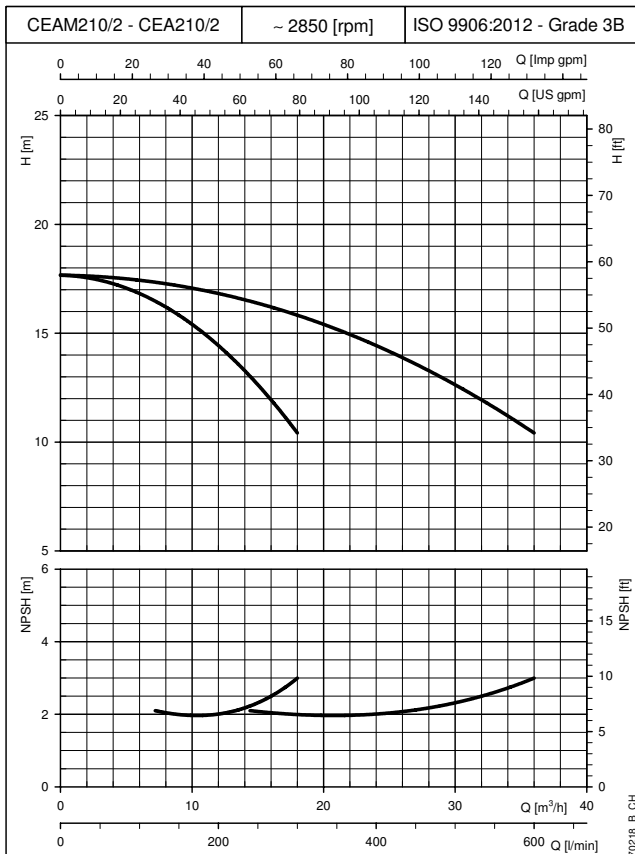
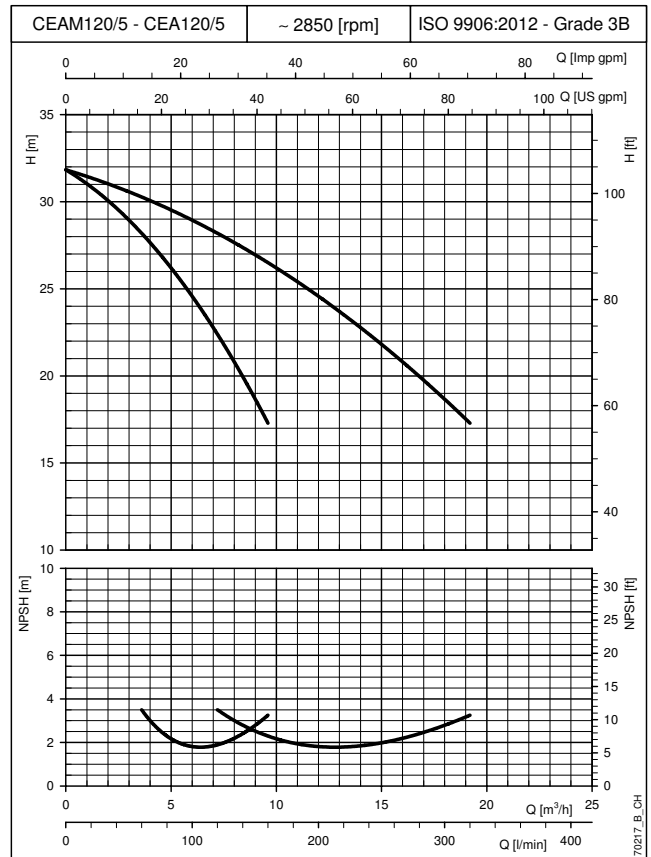
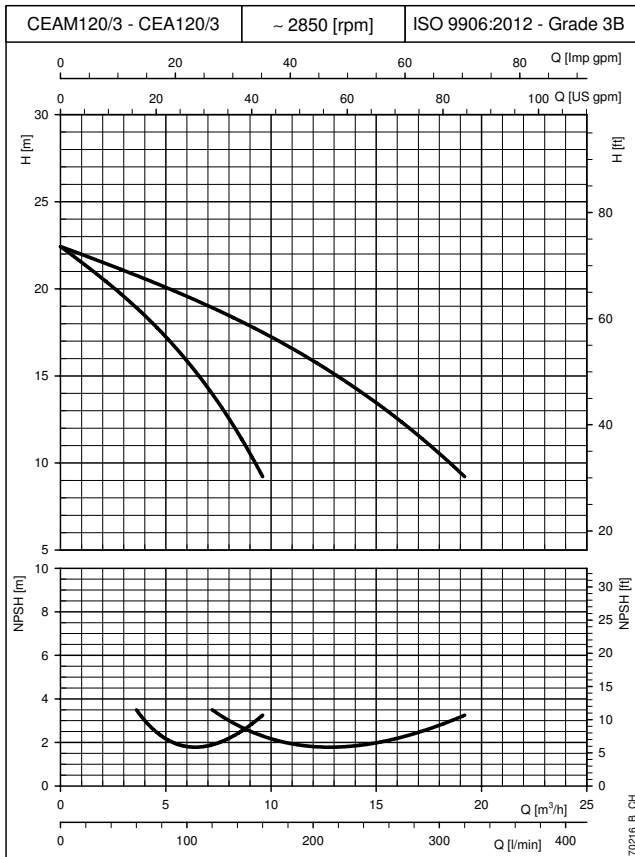
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

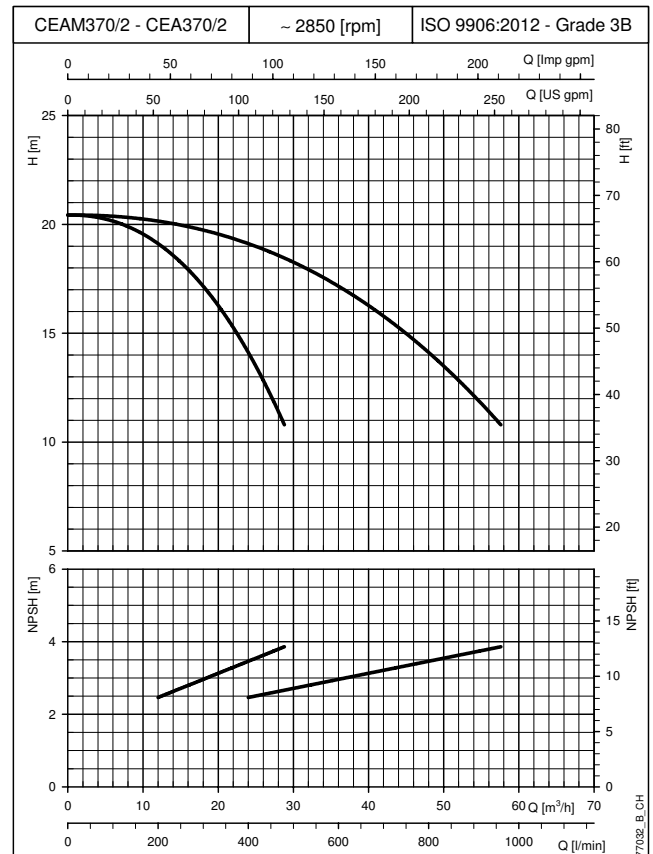
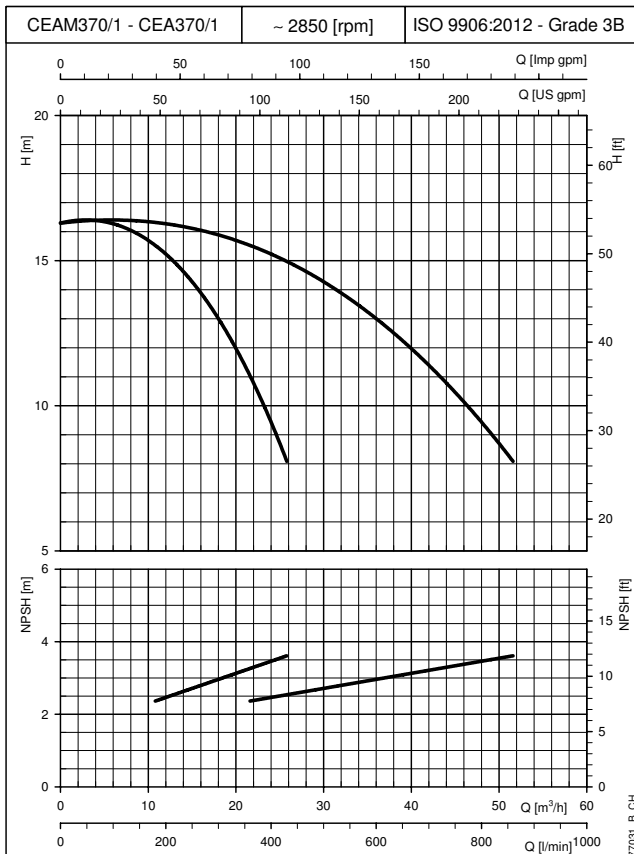
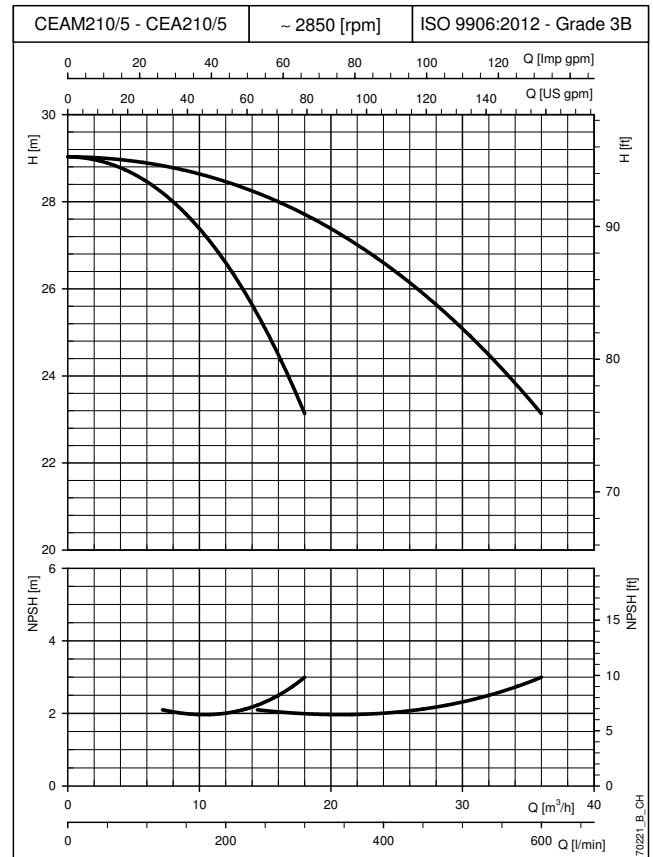
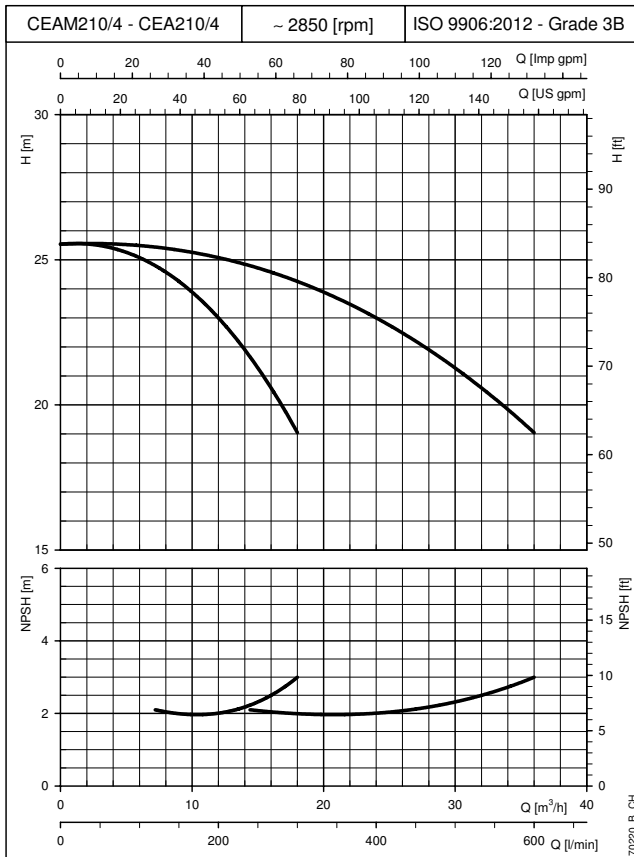
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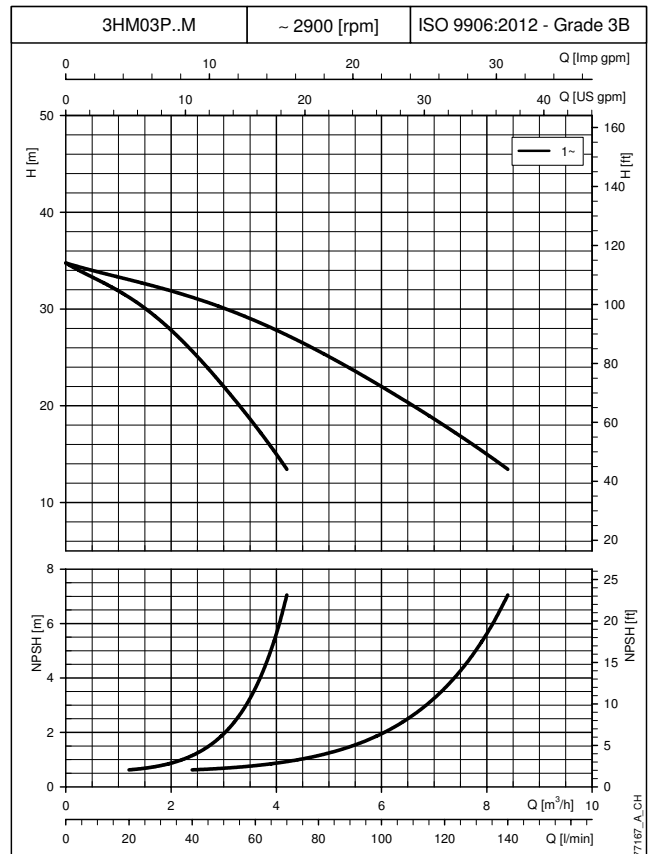
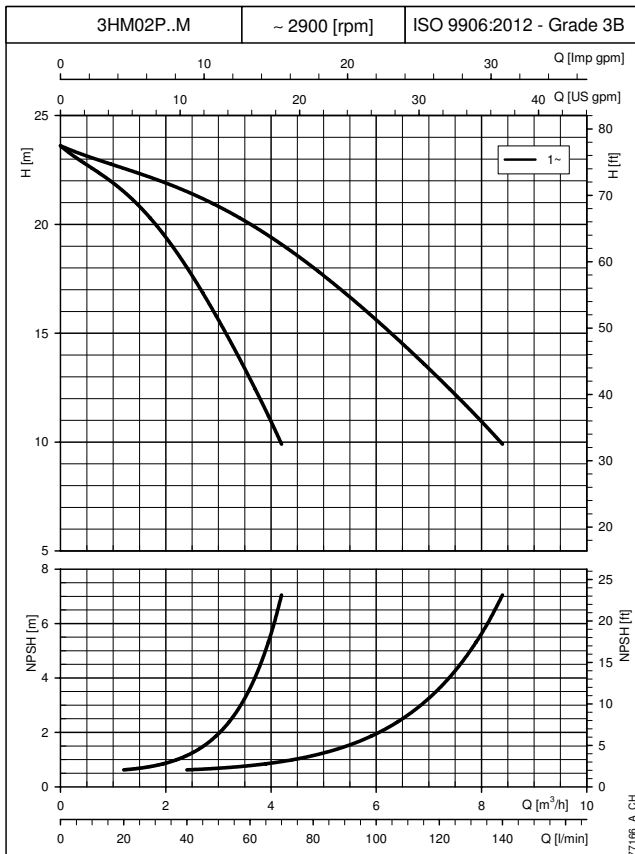
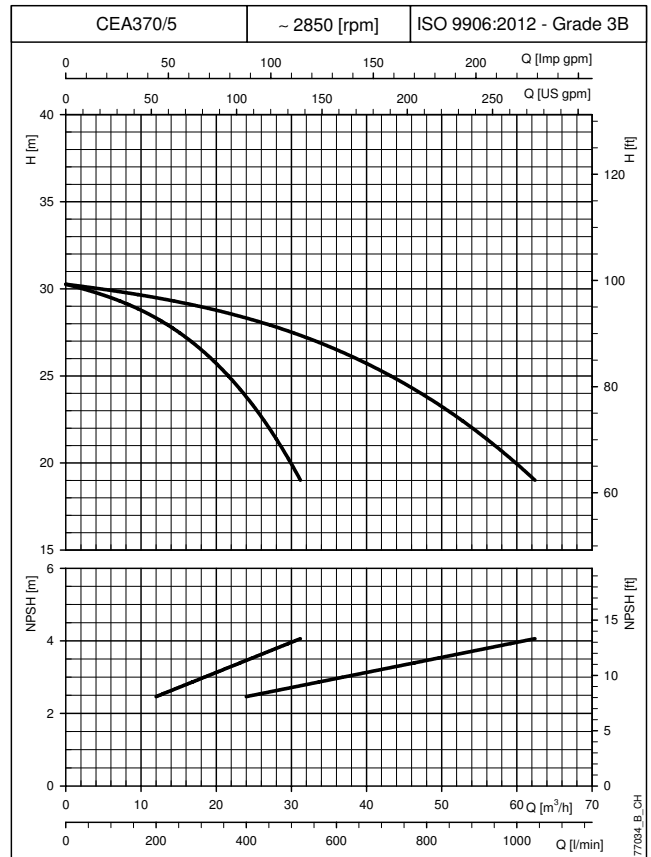
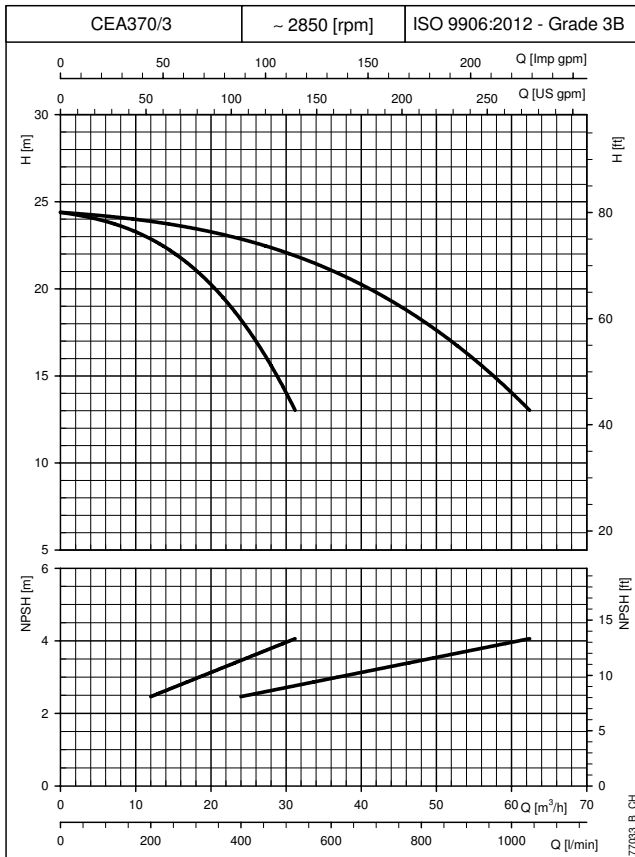
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

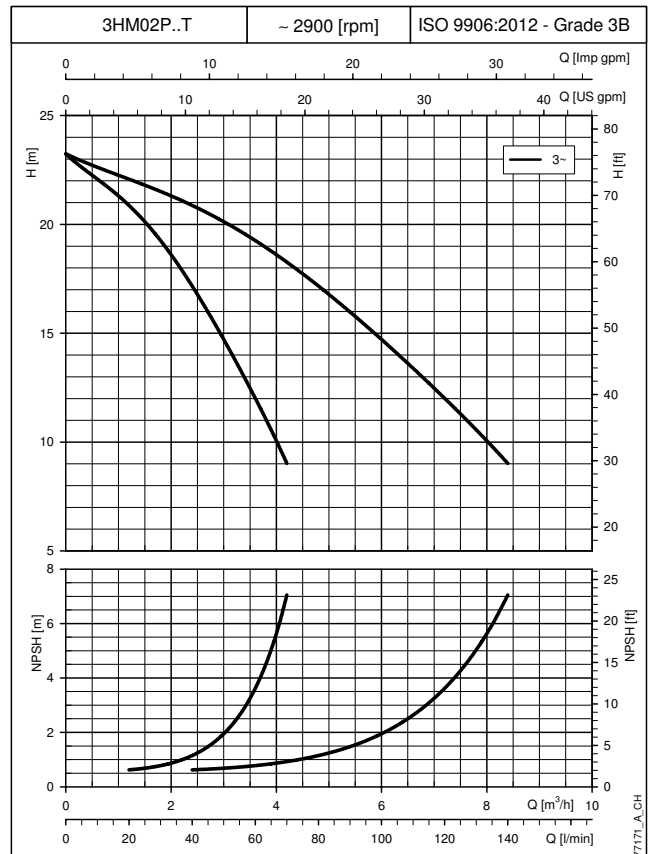
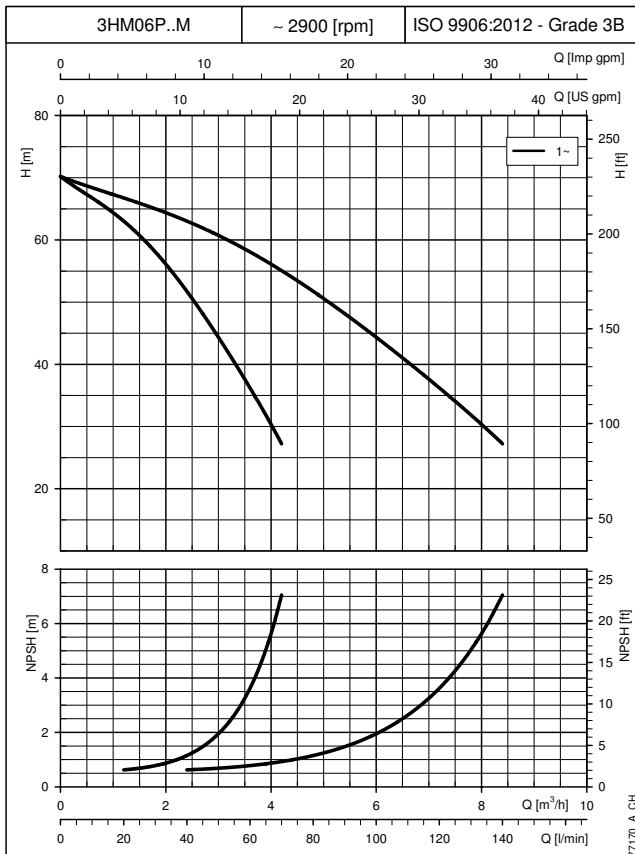
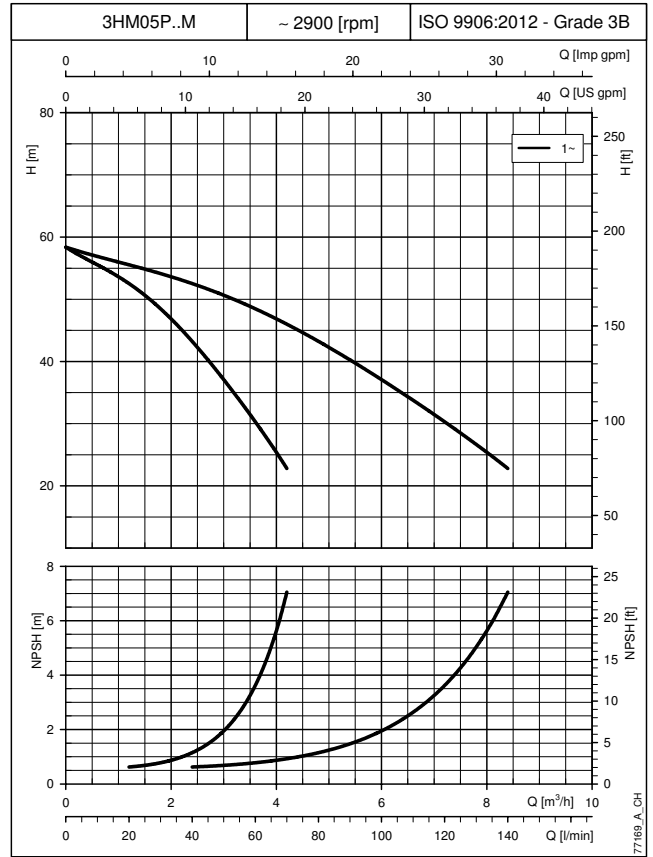
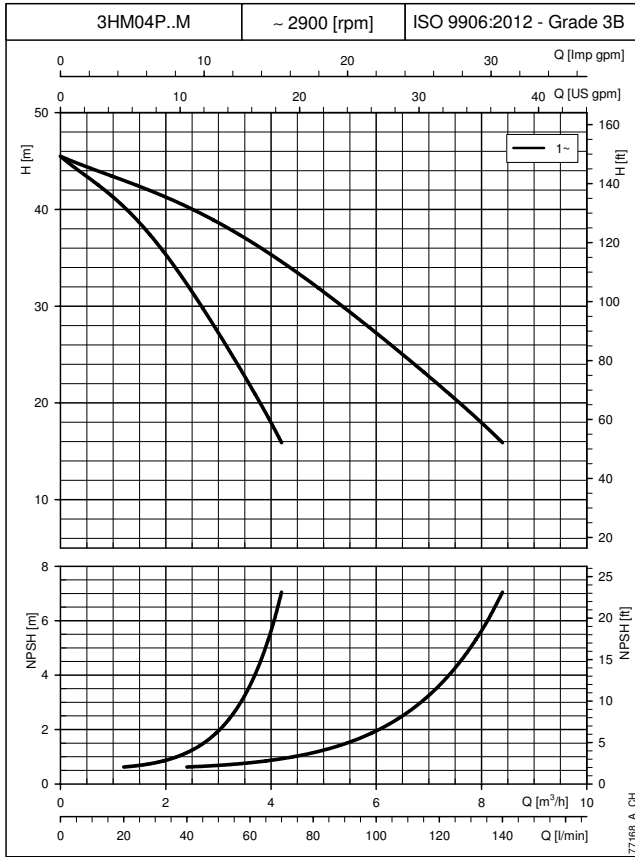
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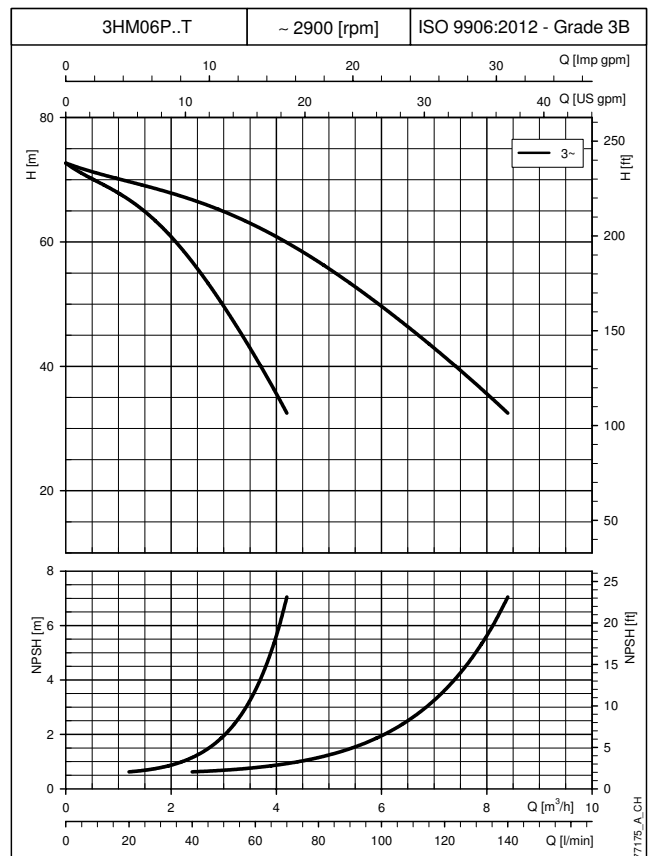
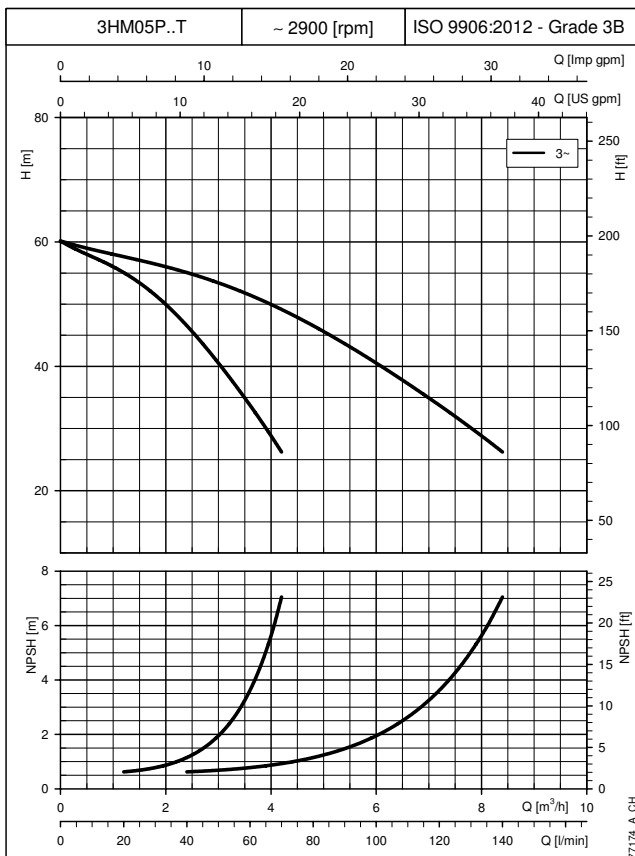
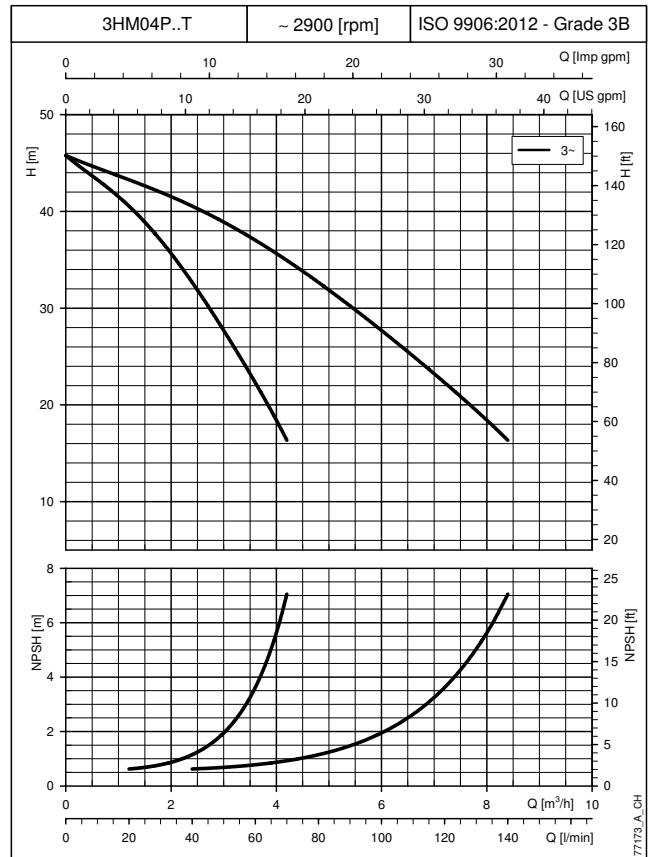
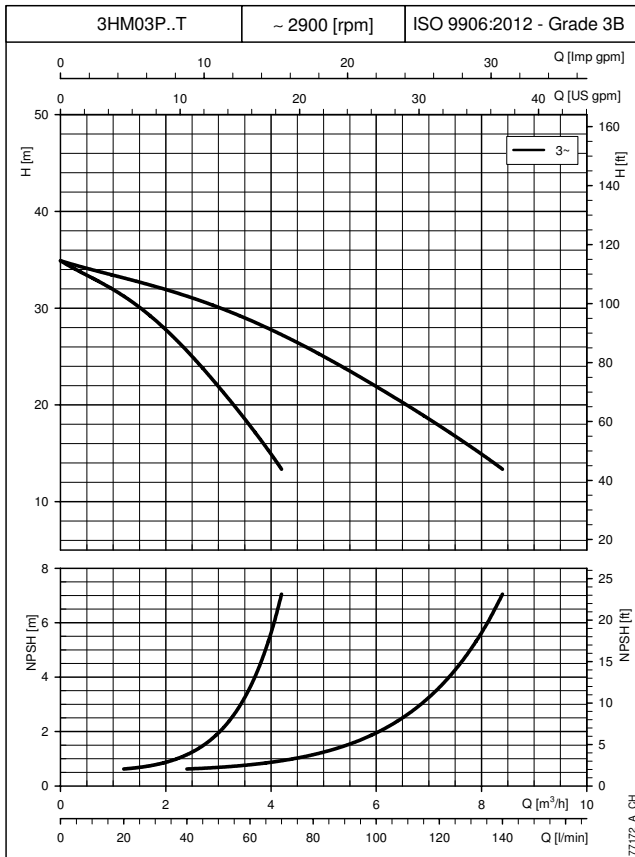
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

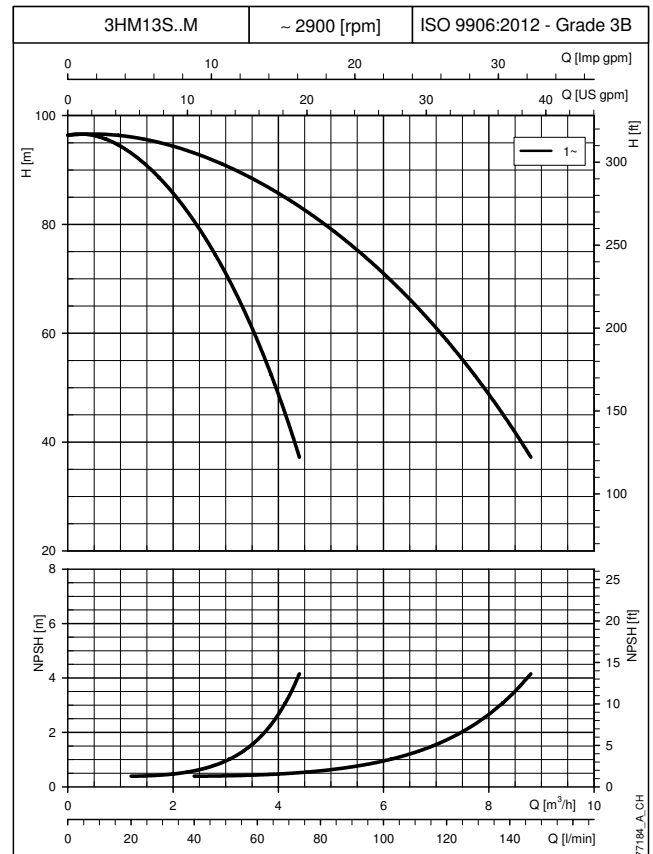
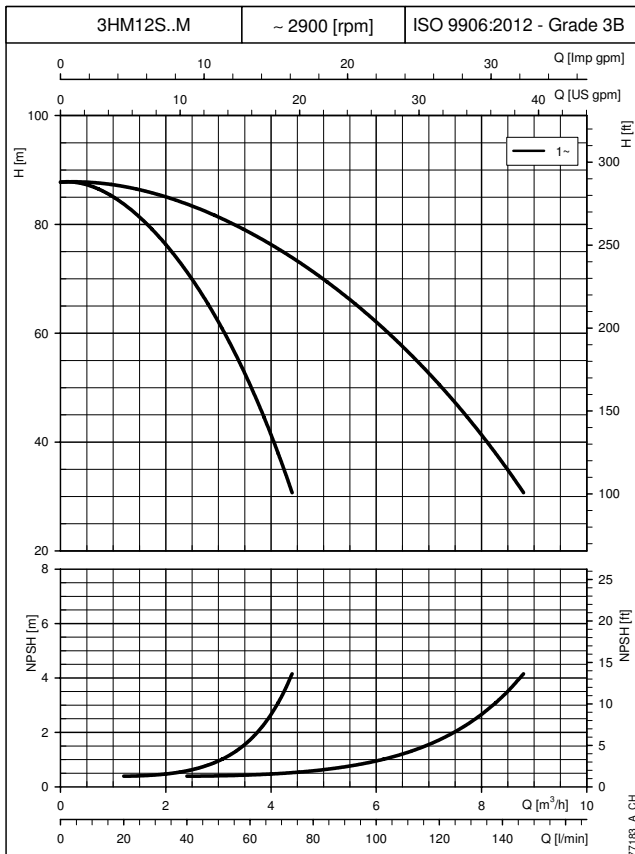
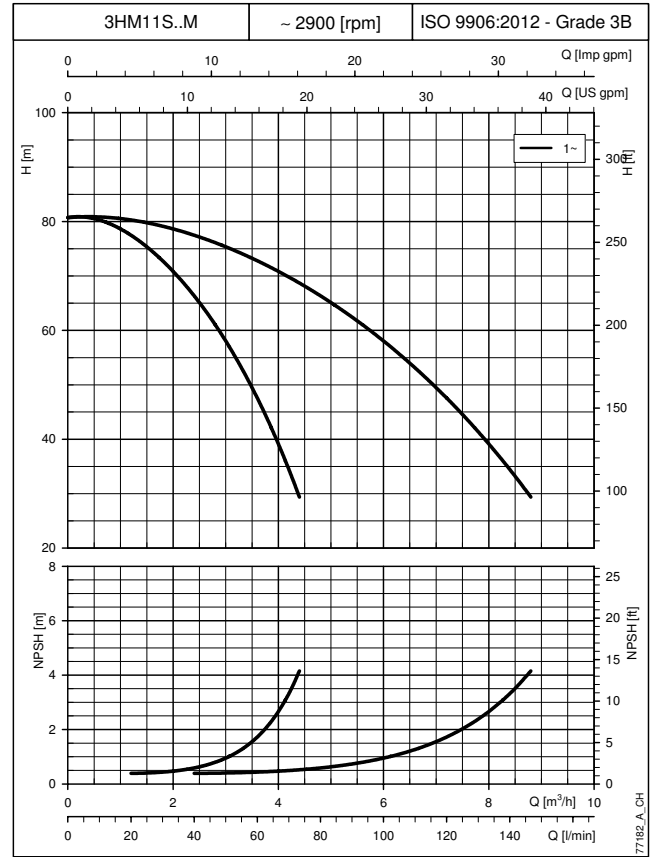
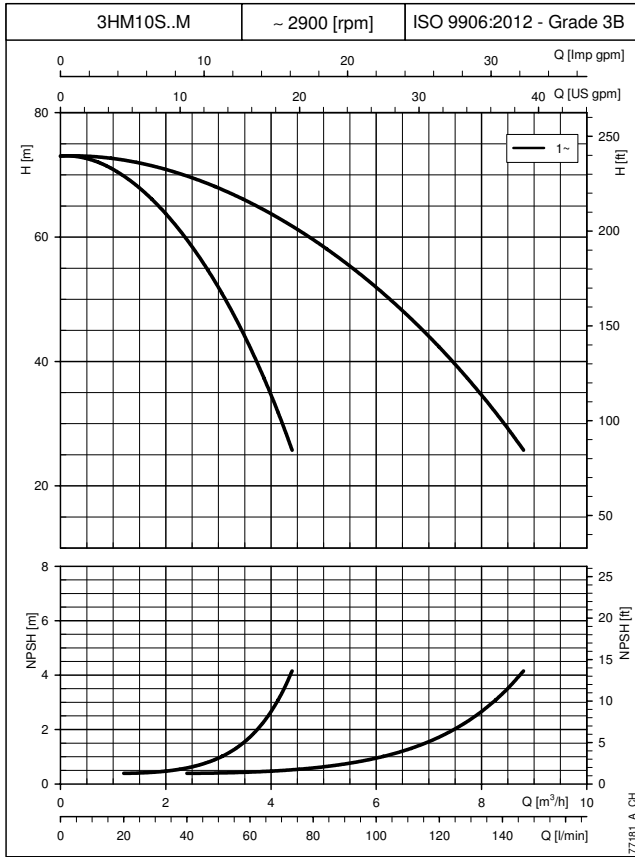
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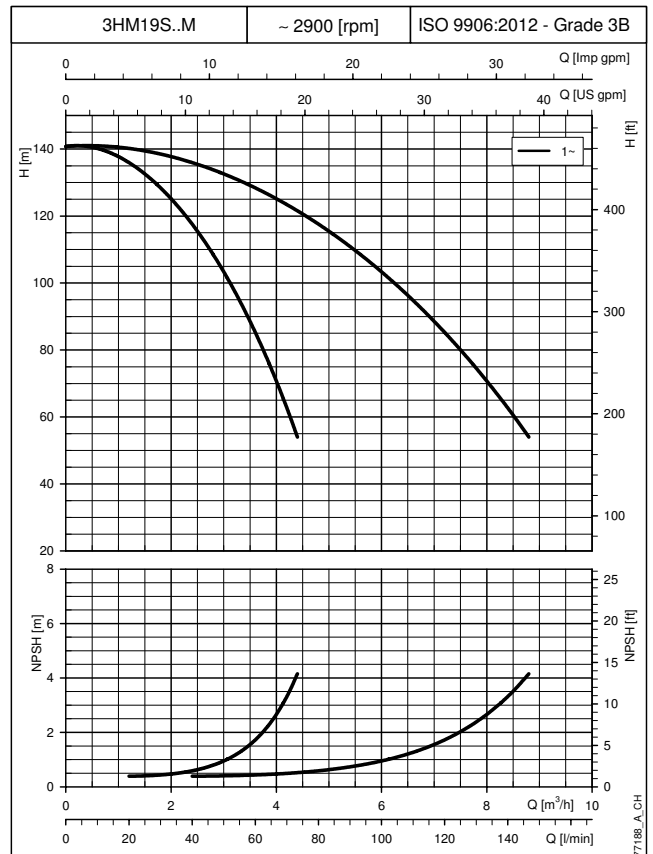
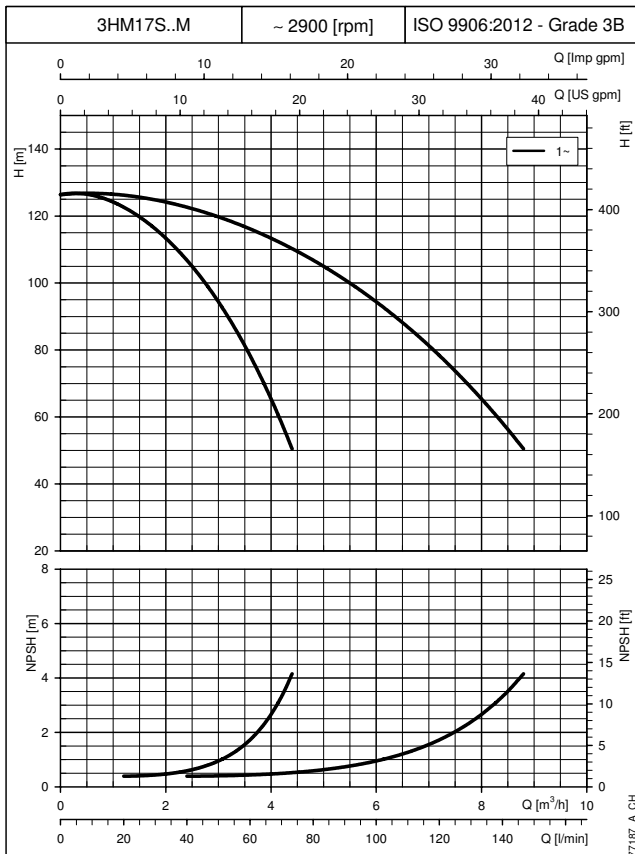
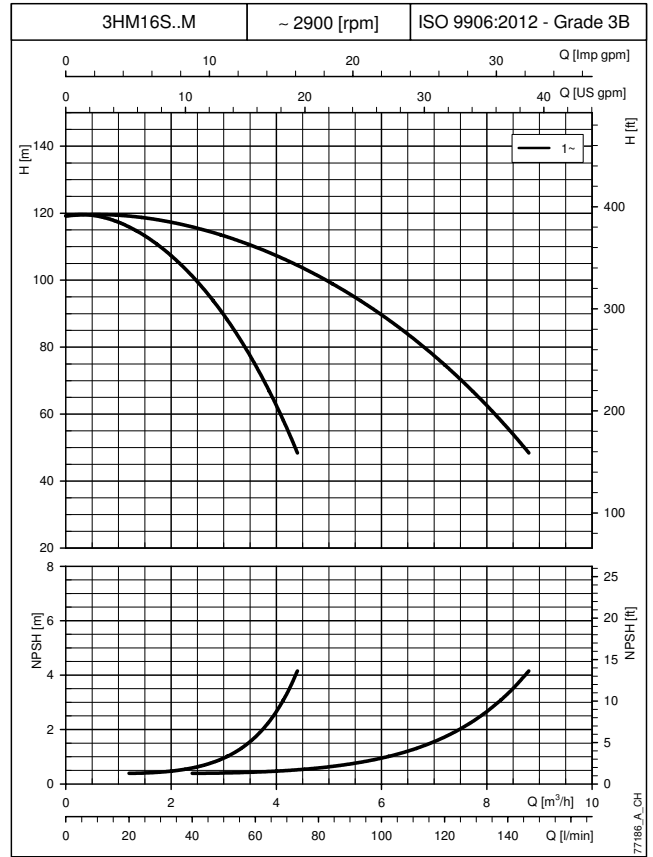
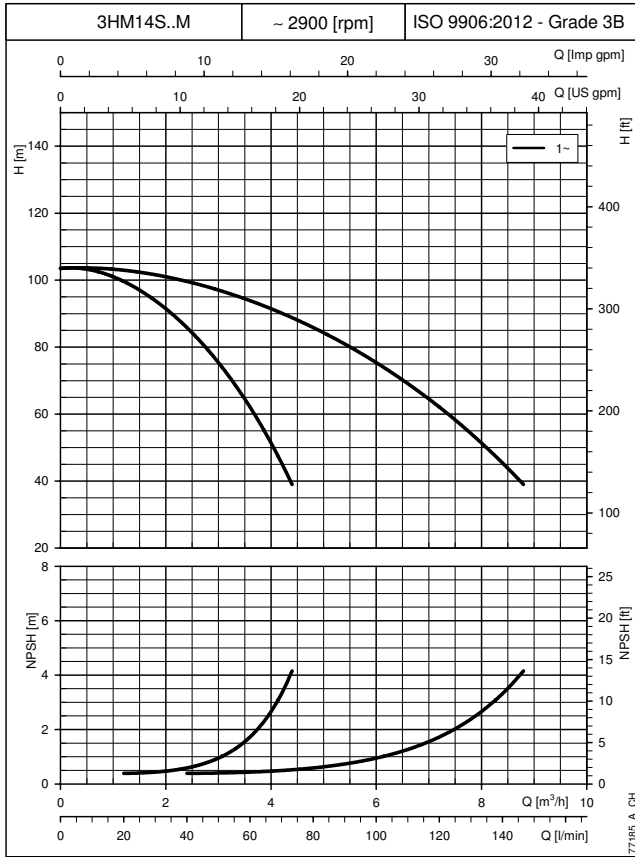
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

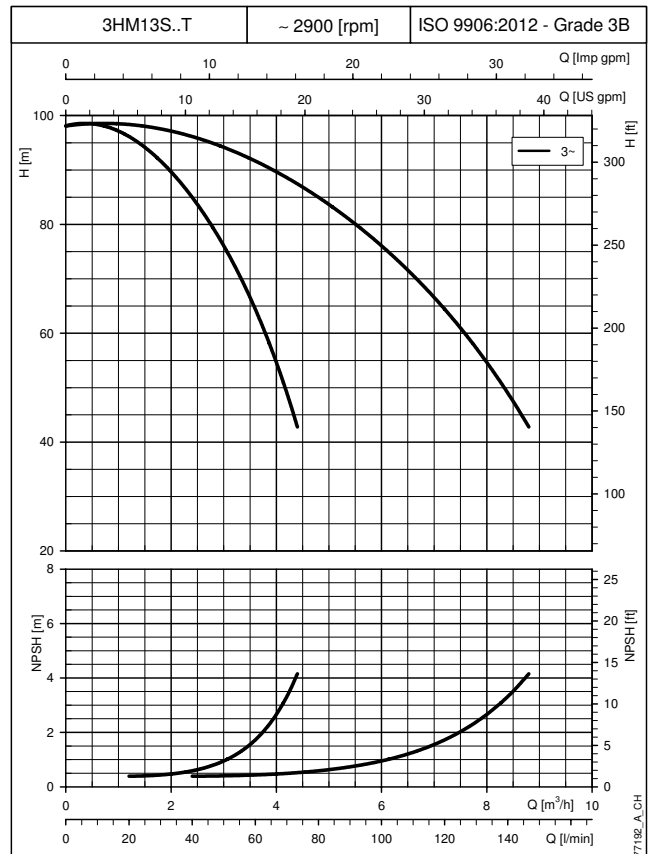
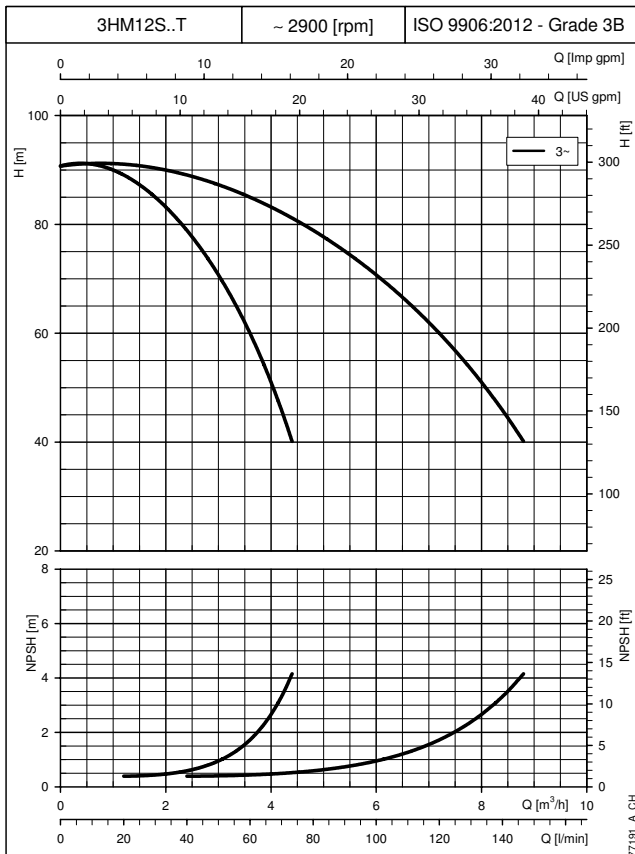
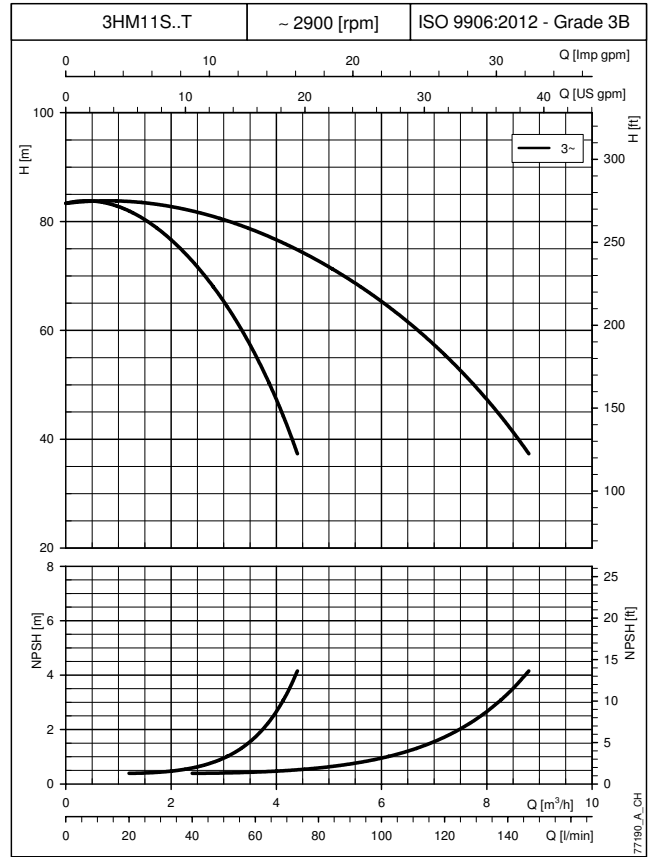
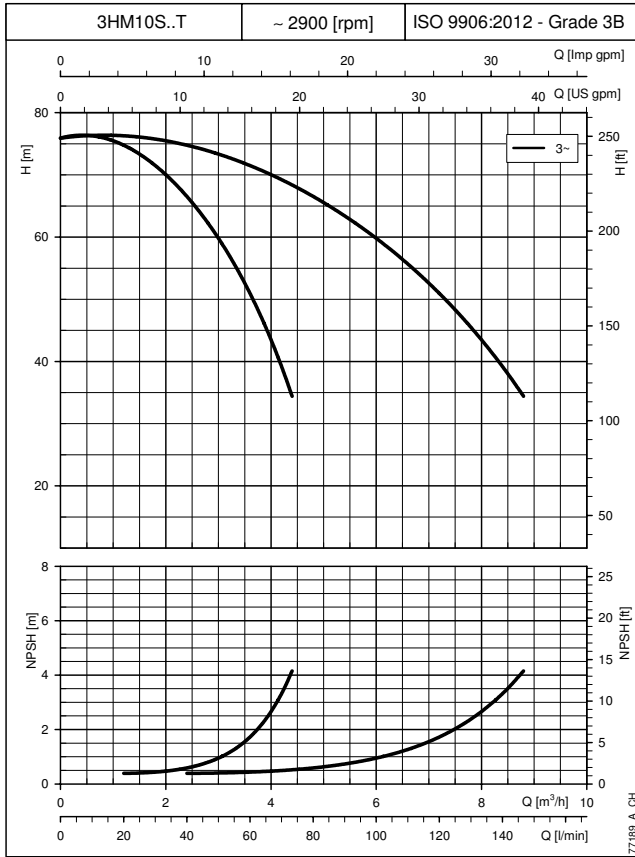
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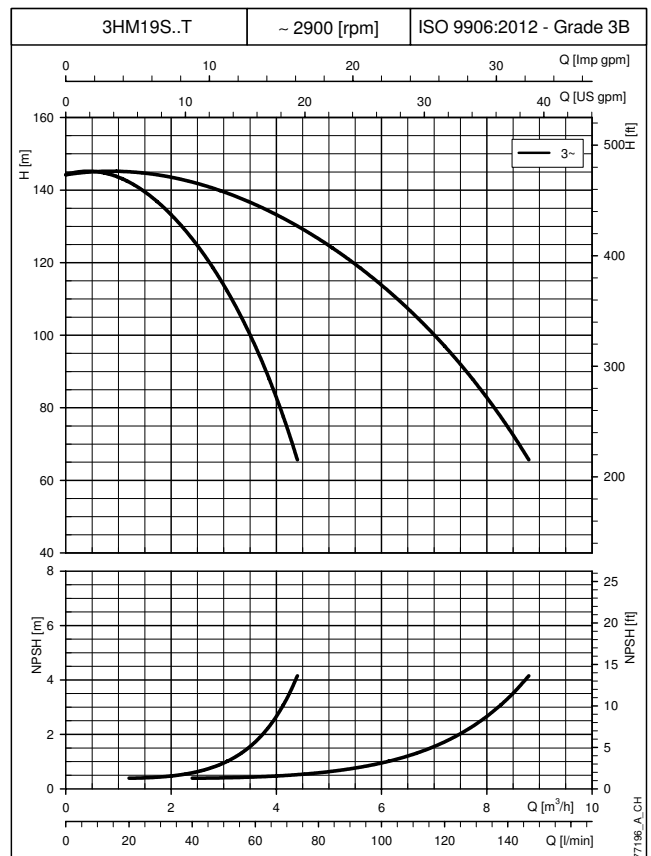
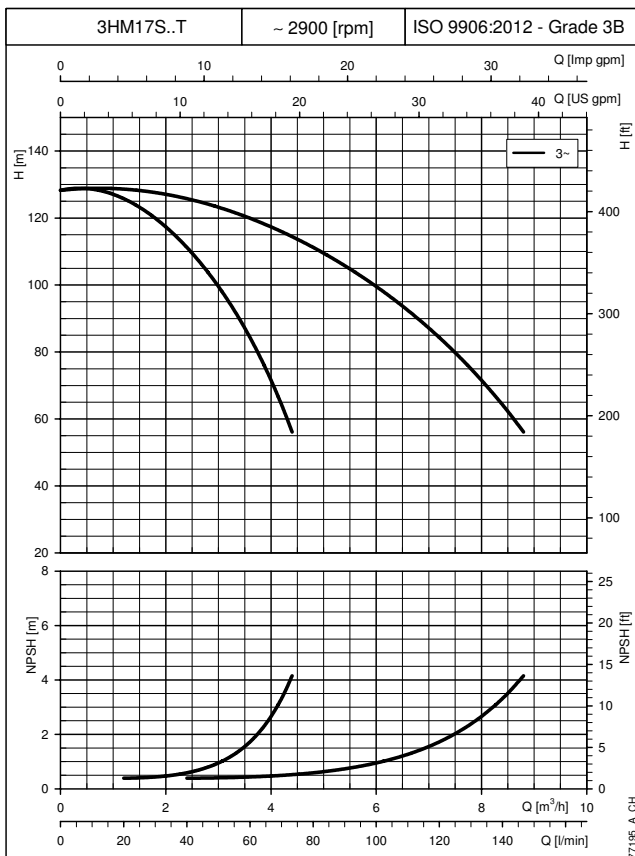
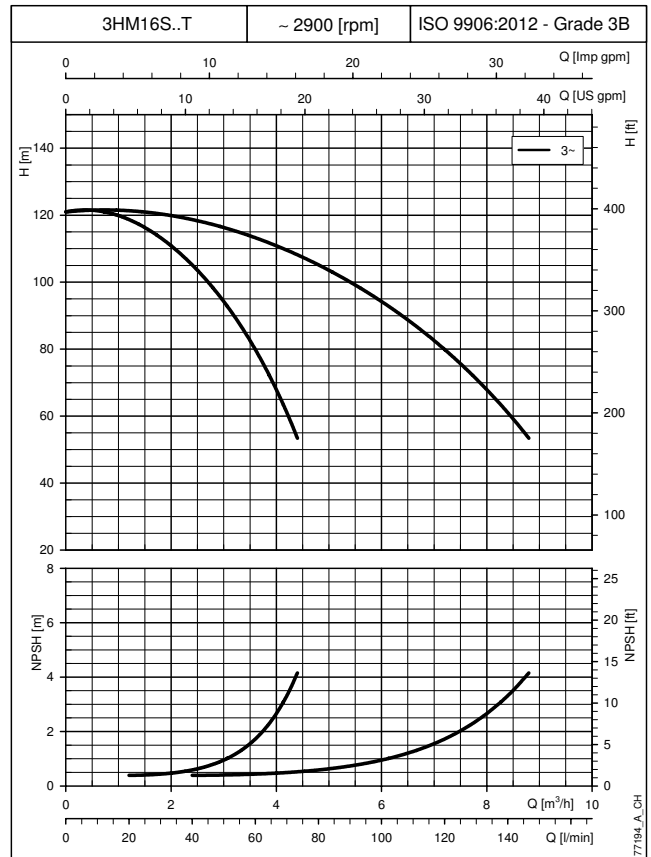
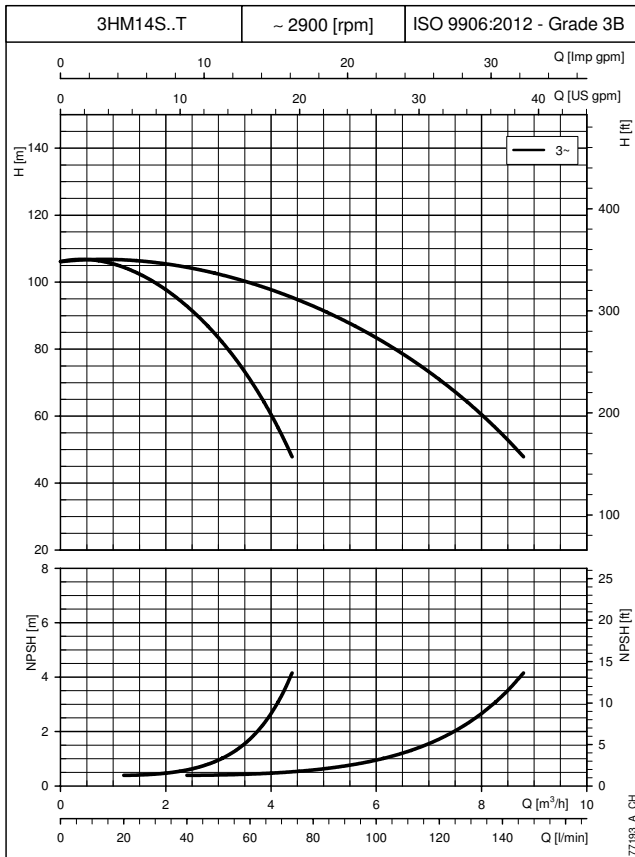
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

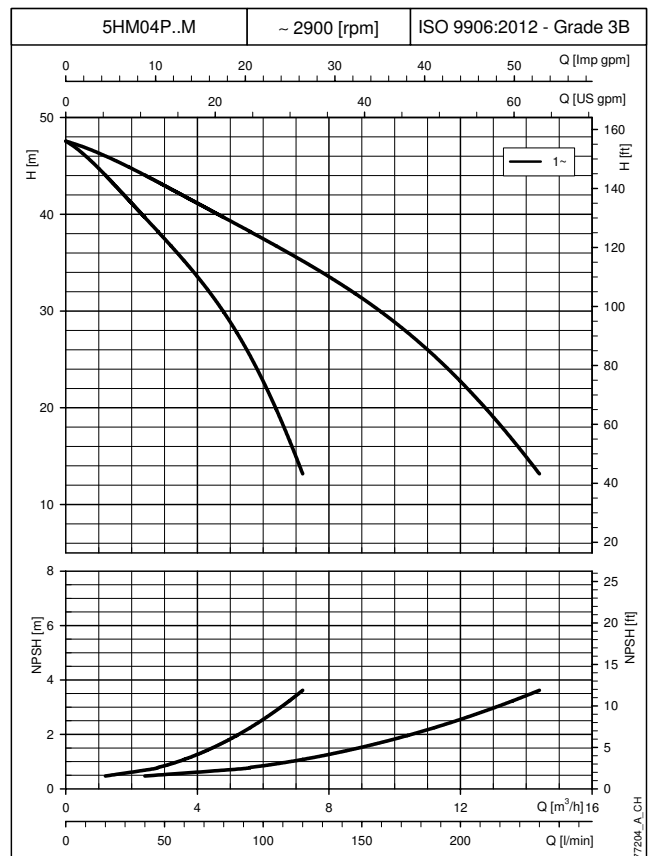
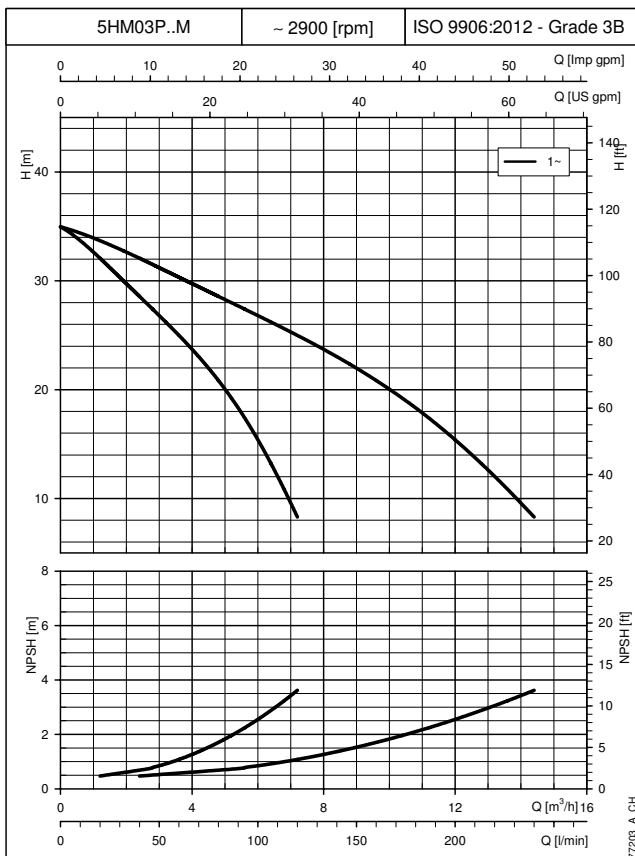
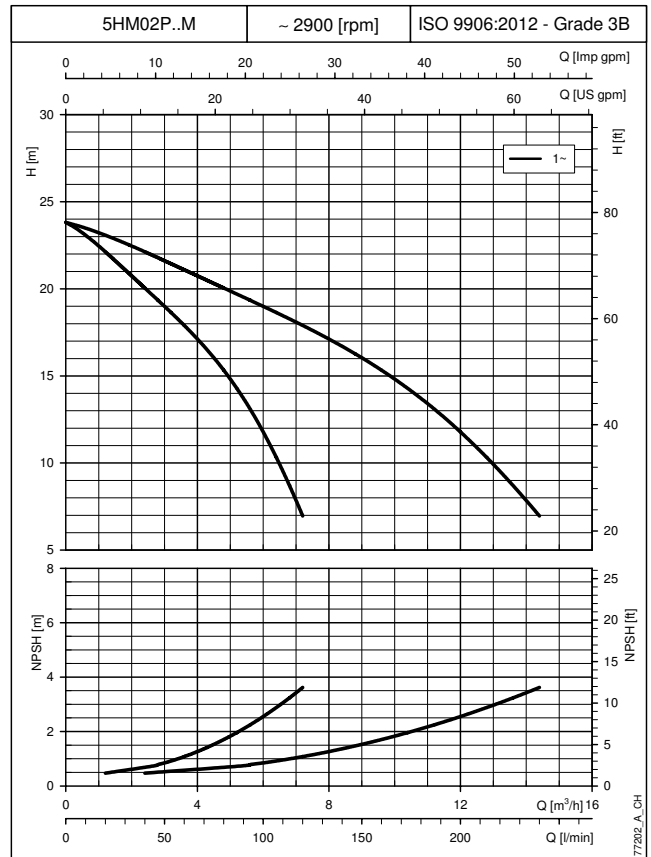
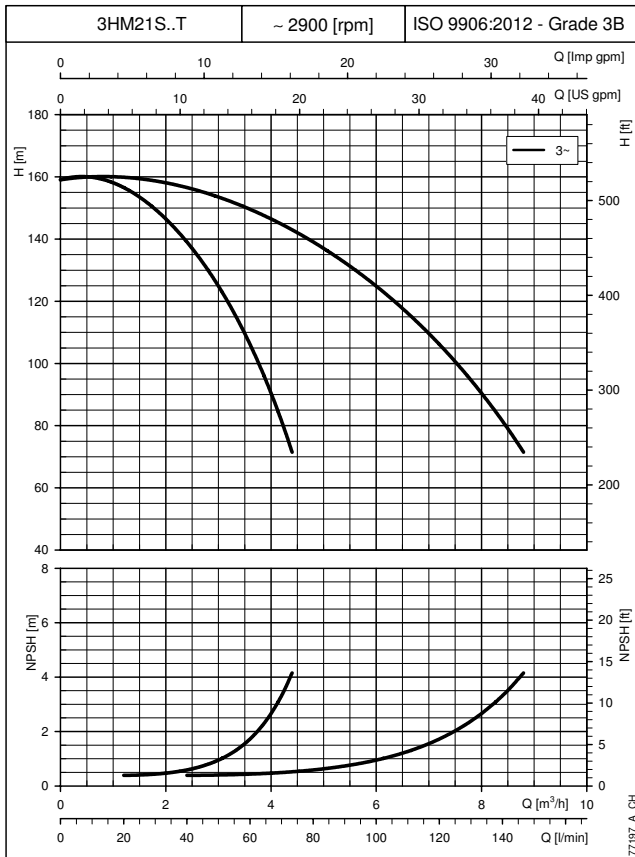
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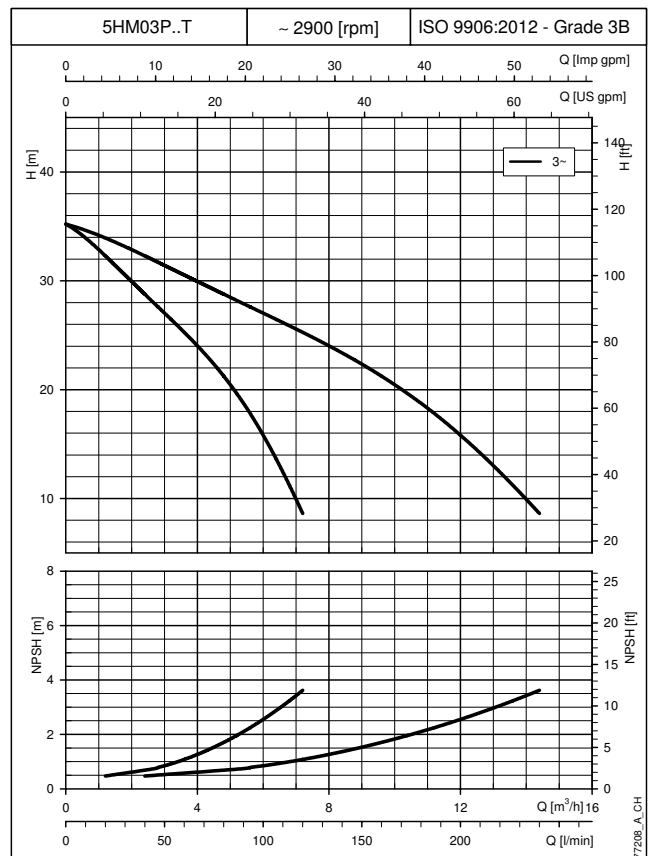
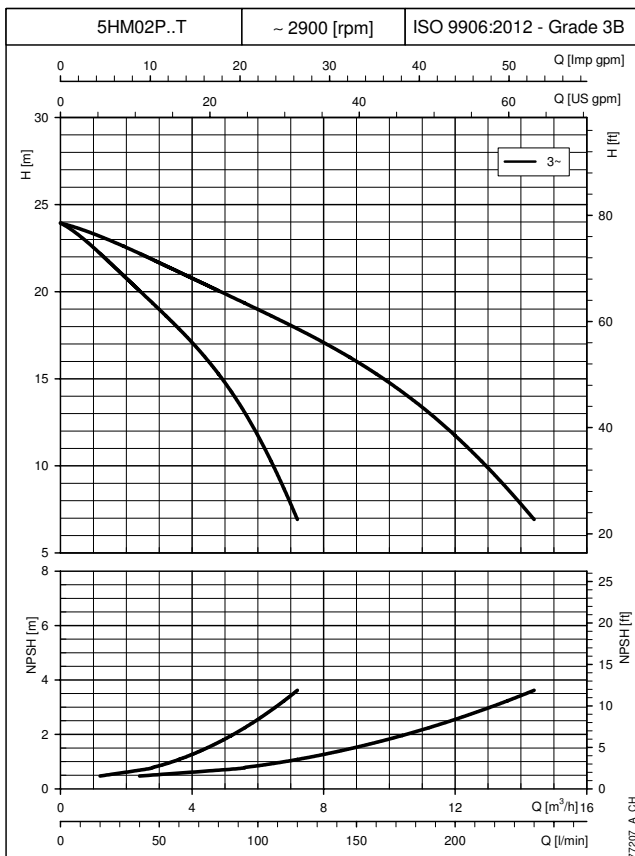
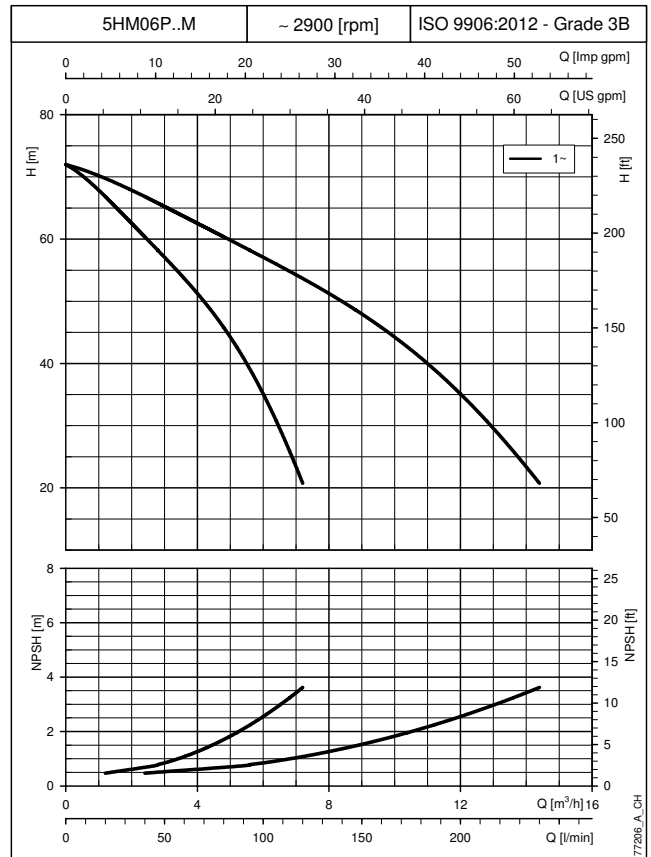
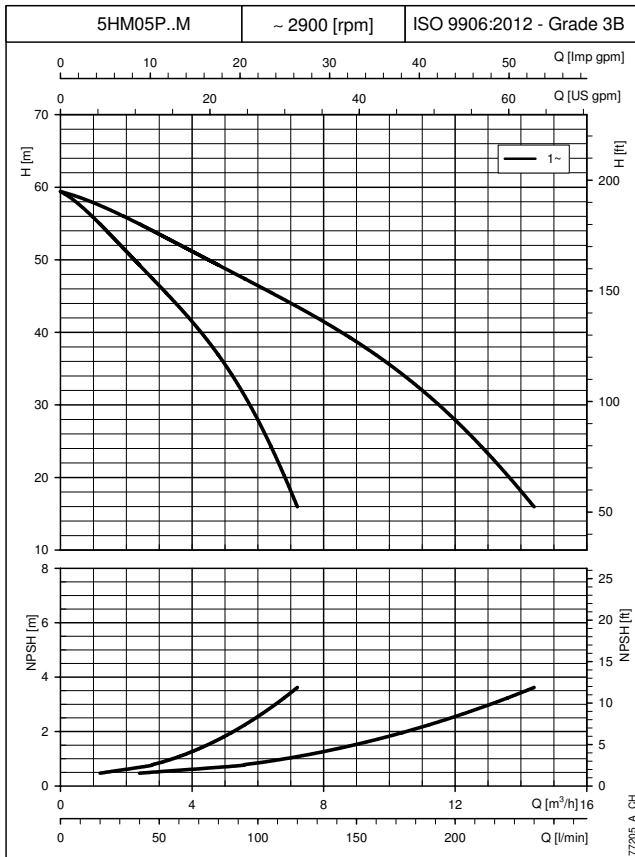
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TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



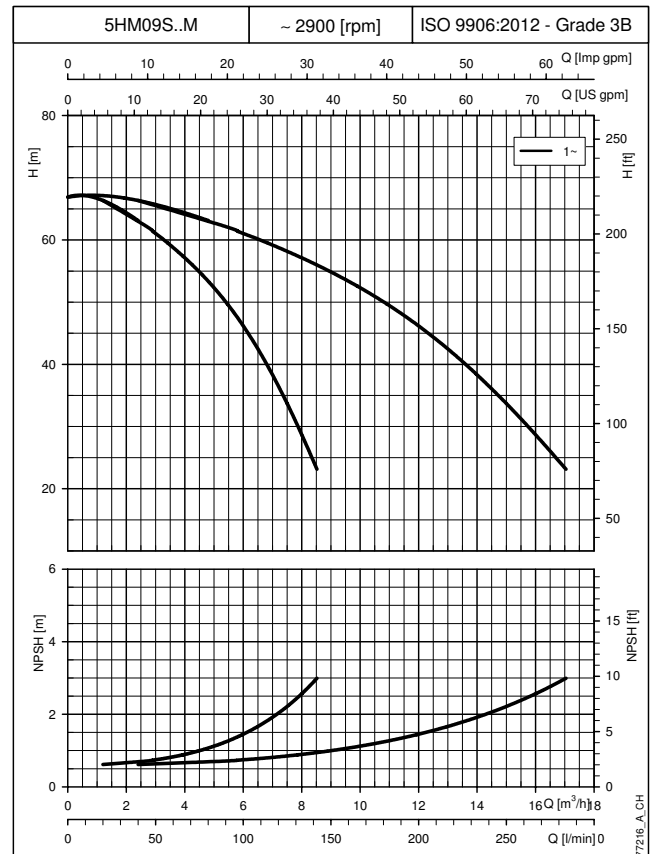
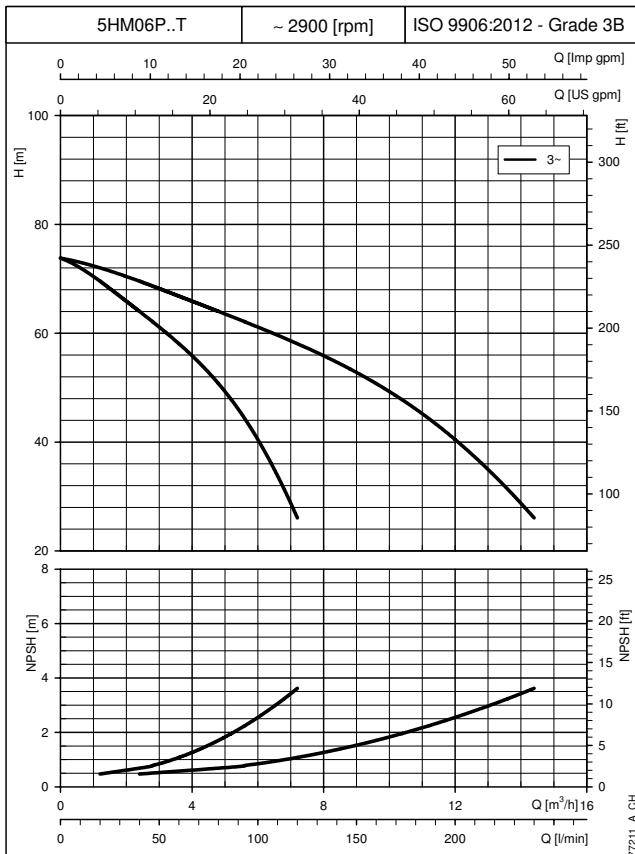
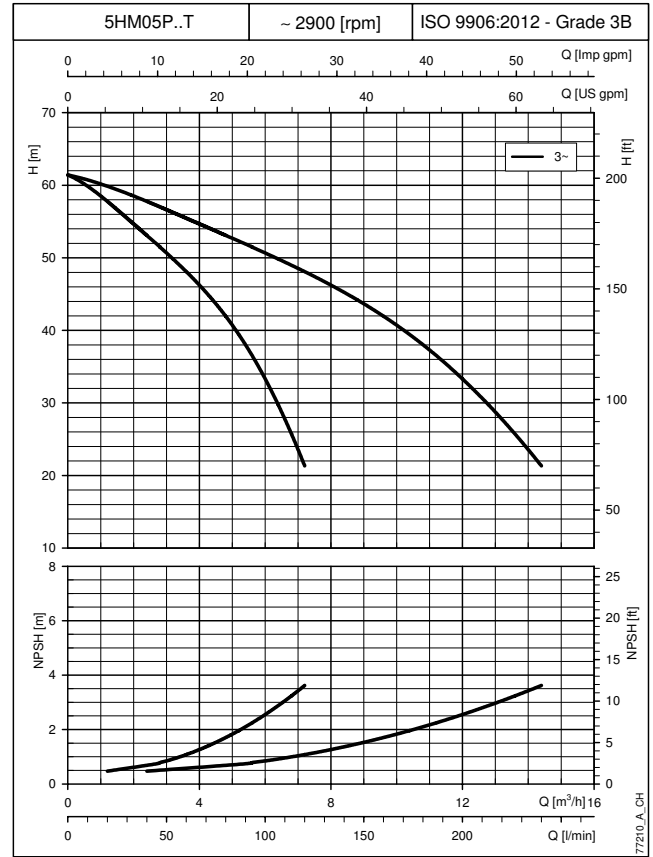
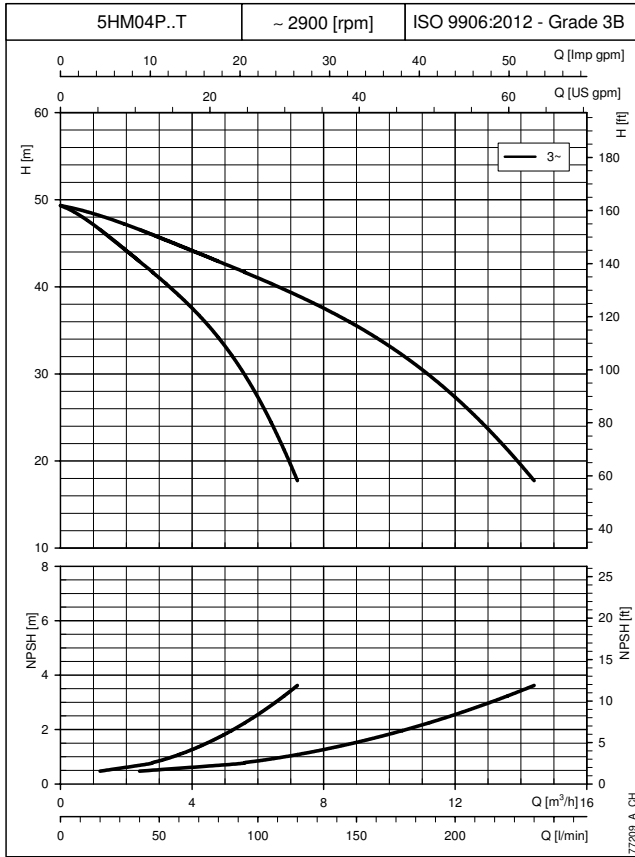
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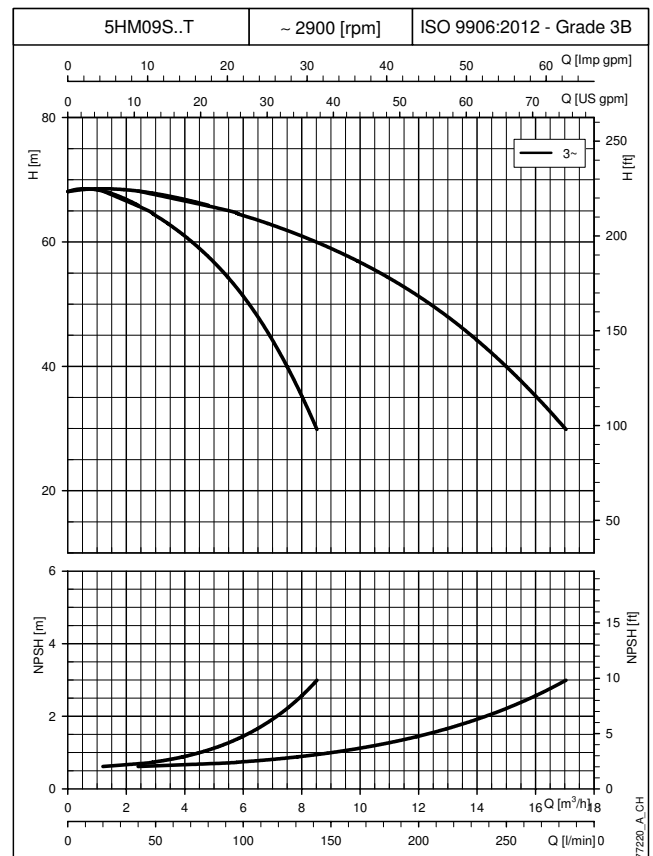
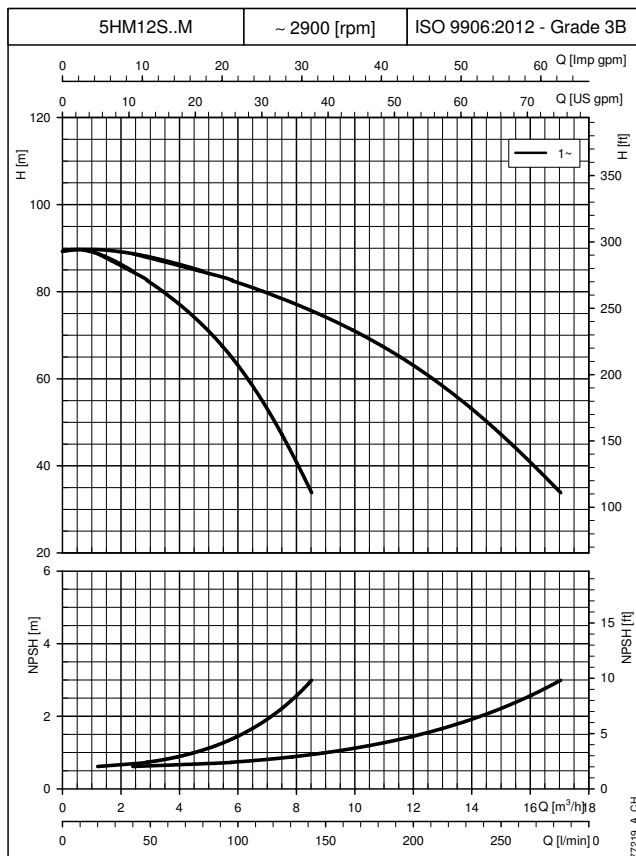
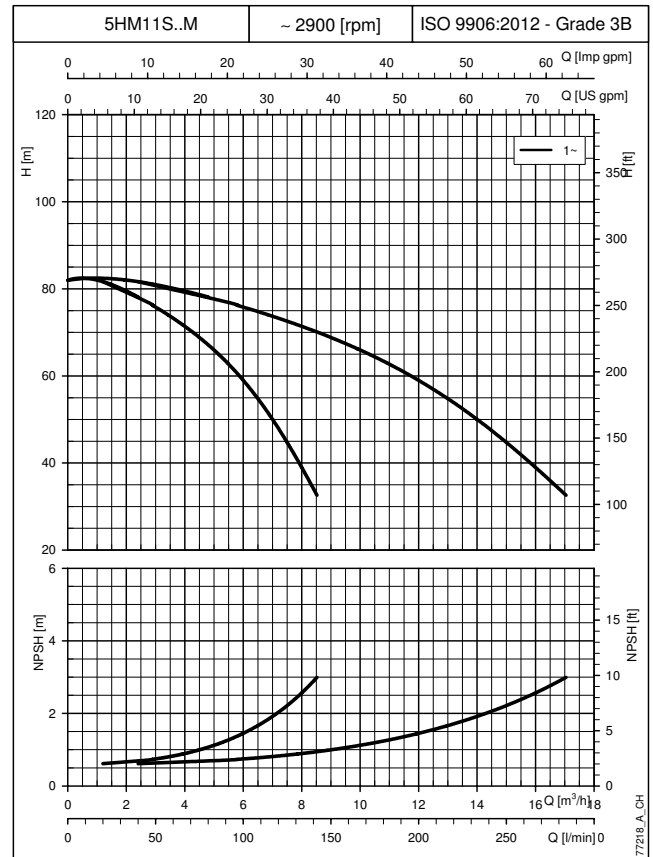
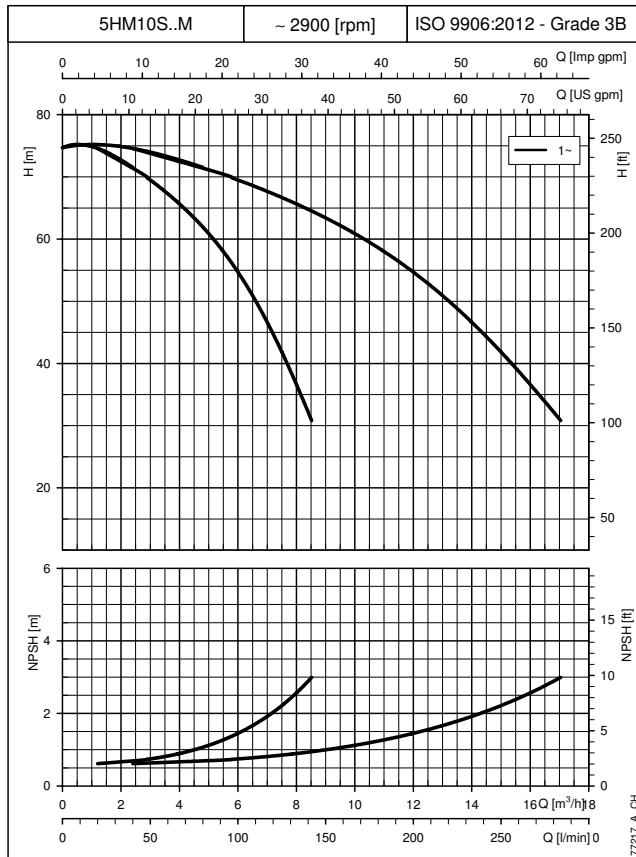
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

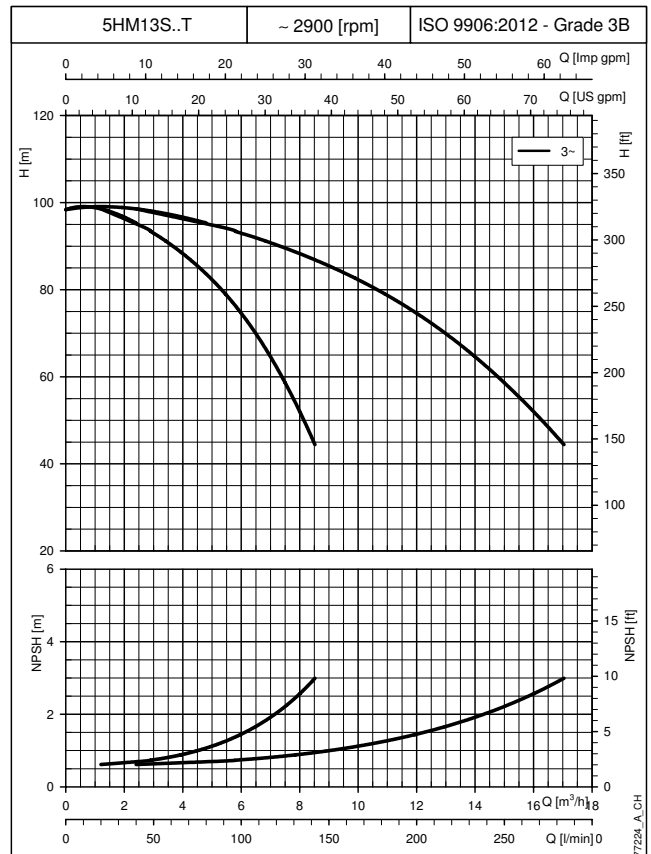
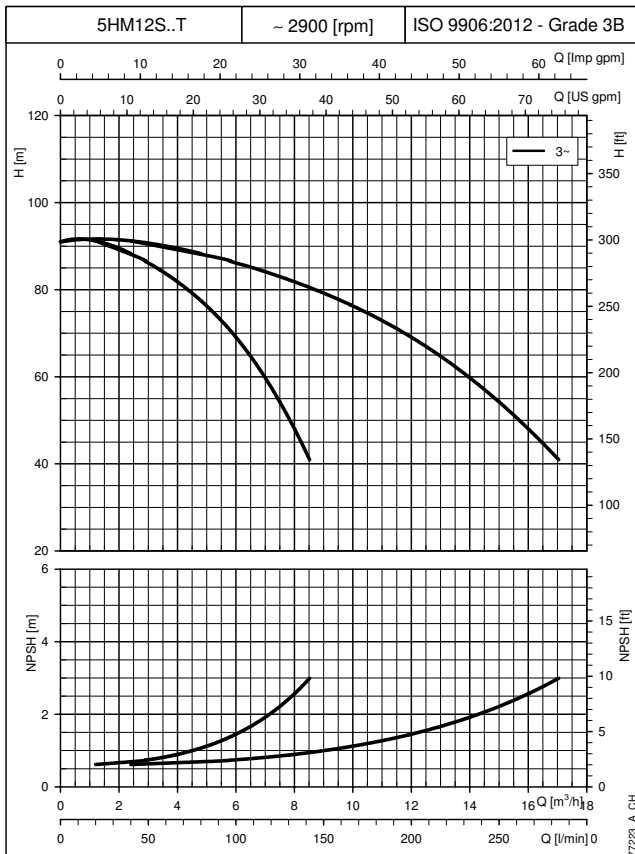
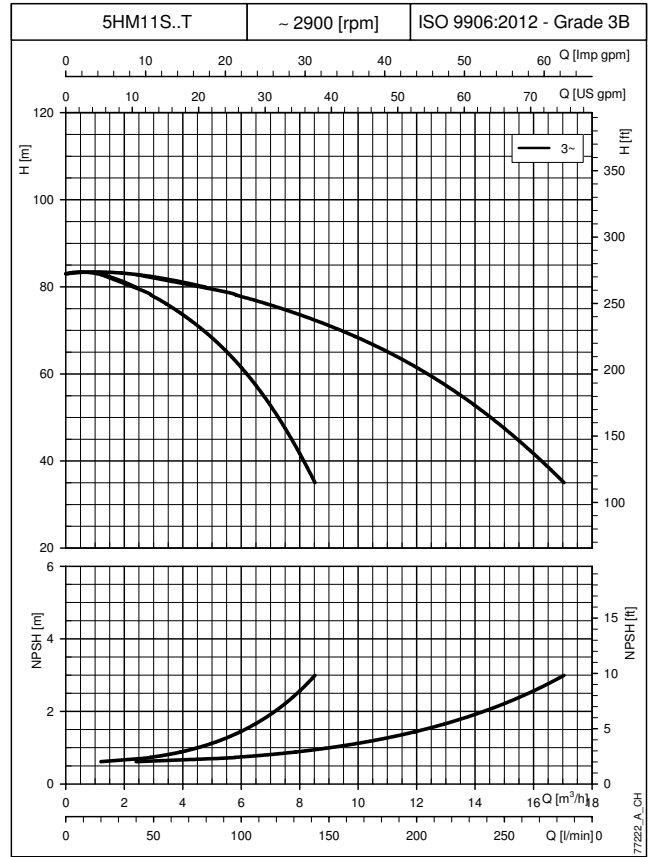
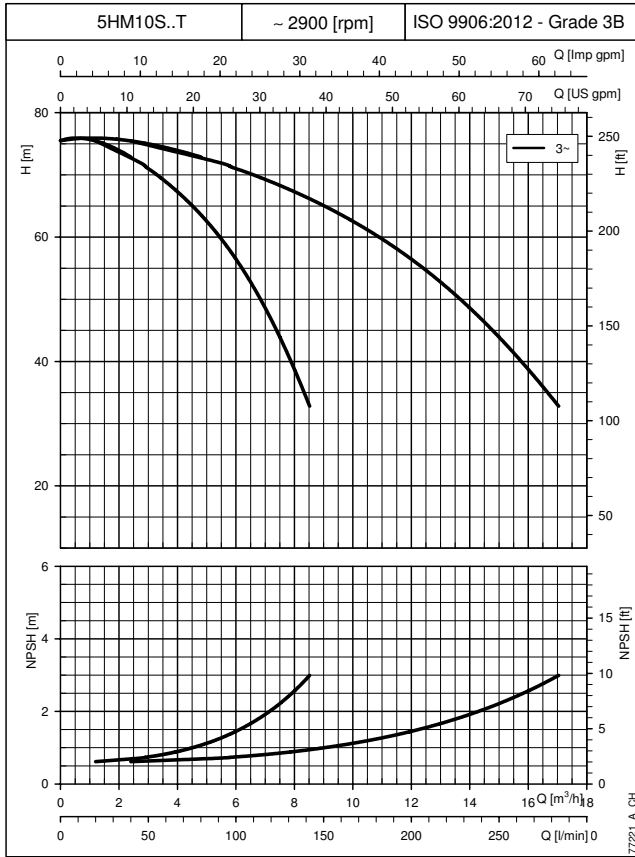
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TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



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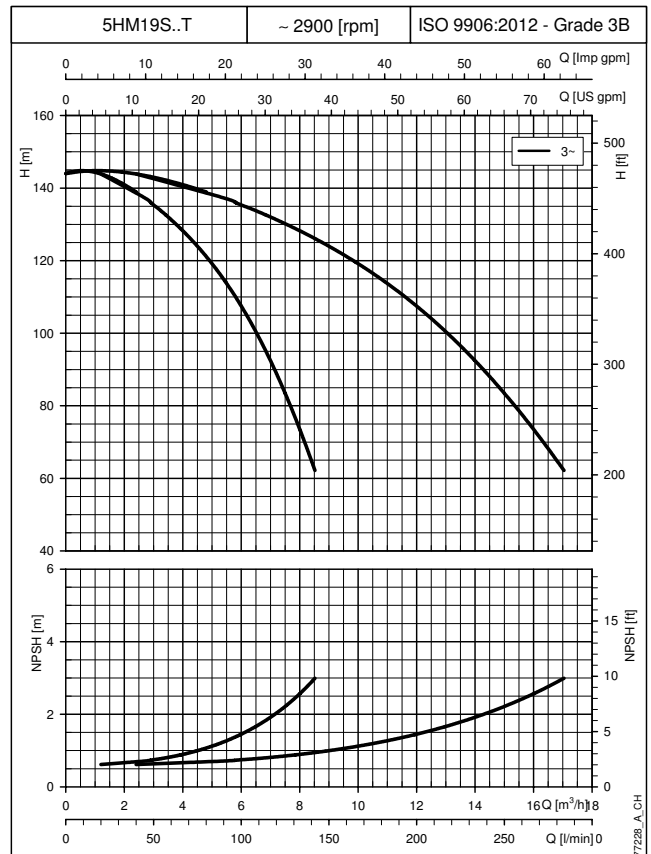
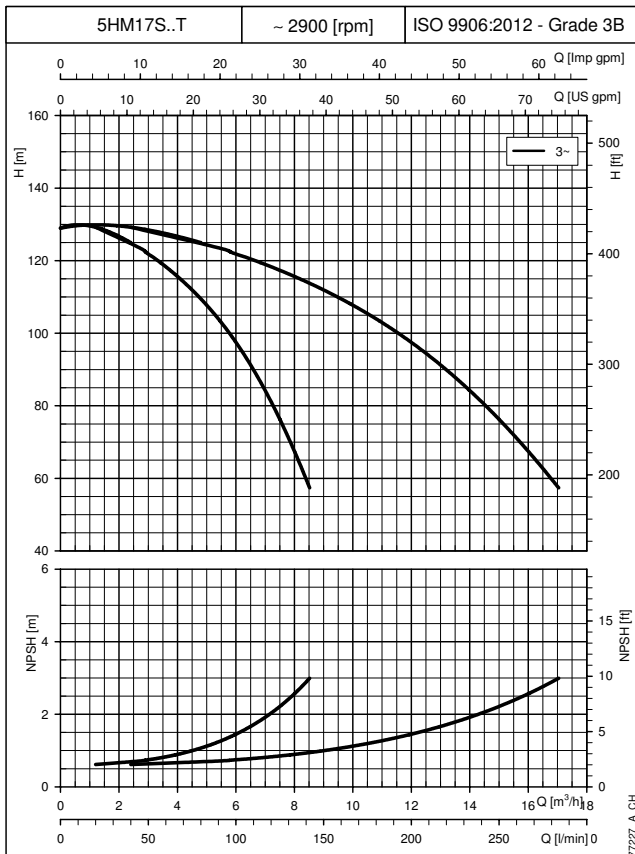
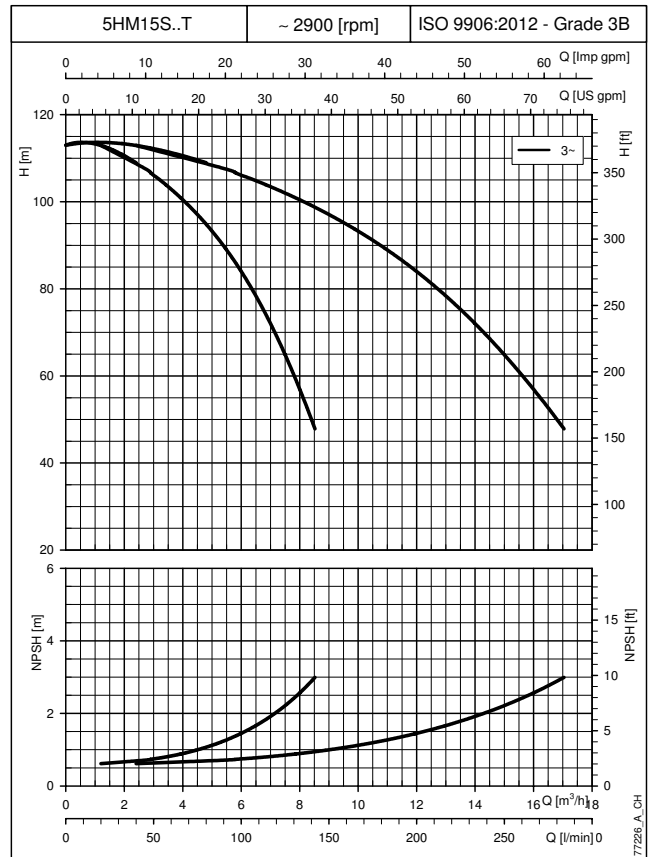
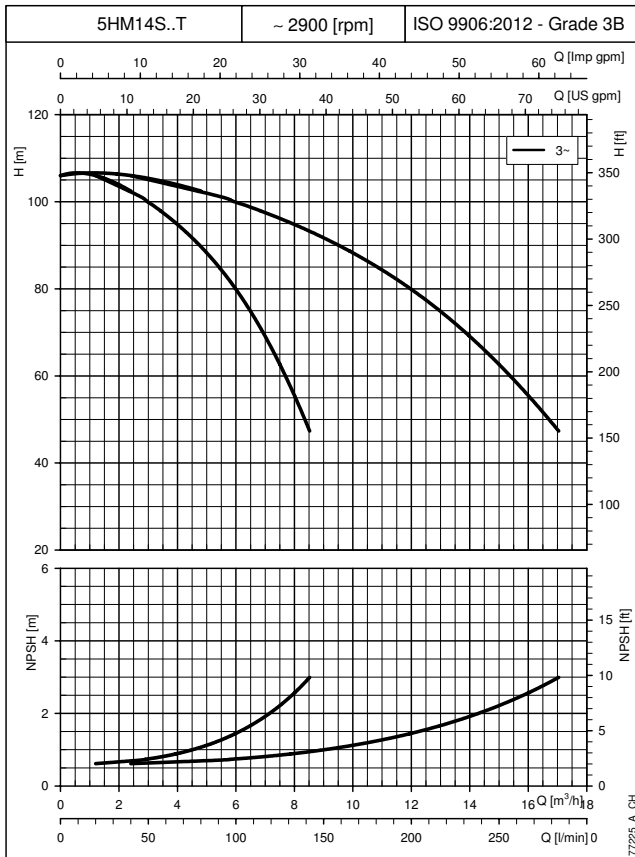
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

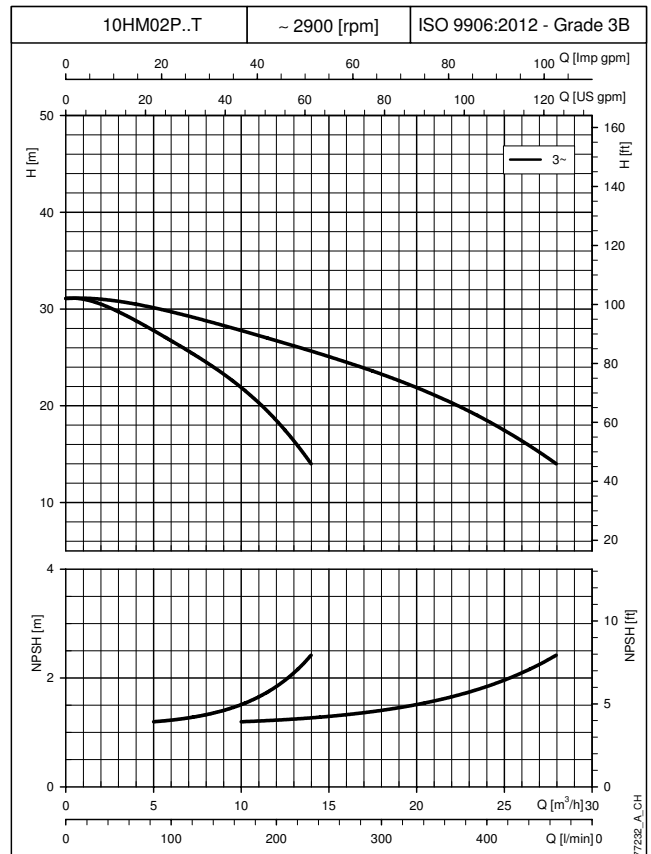
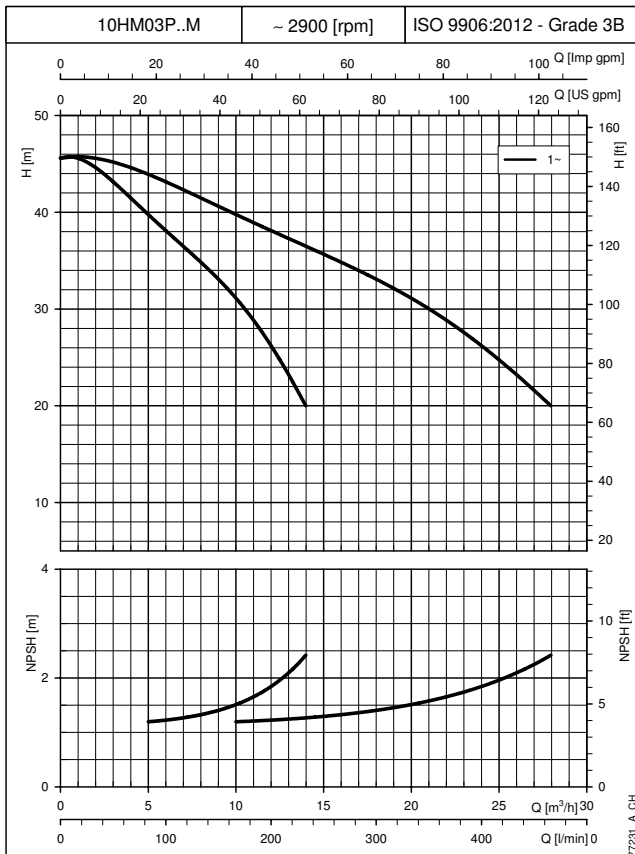
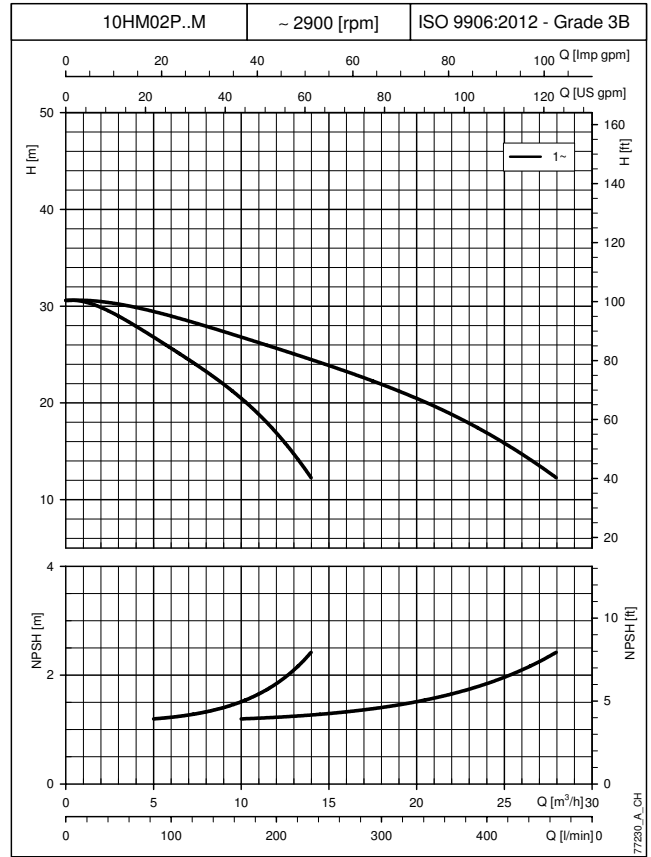
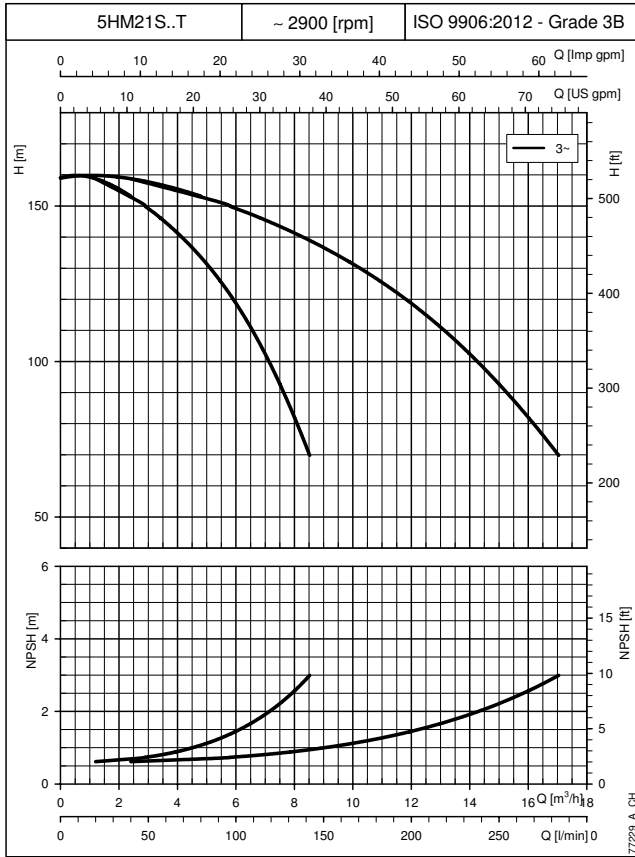
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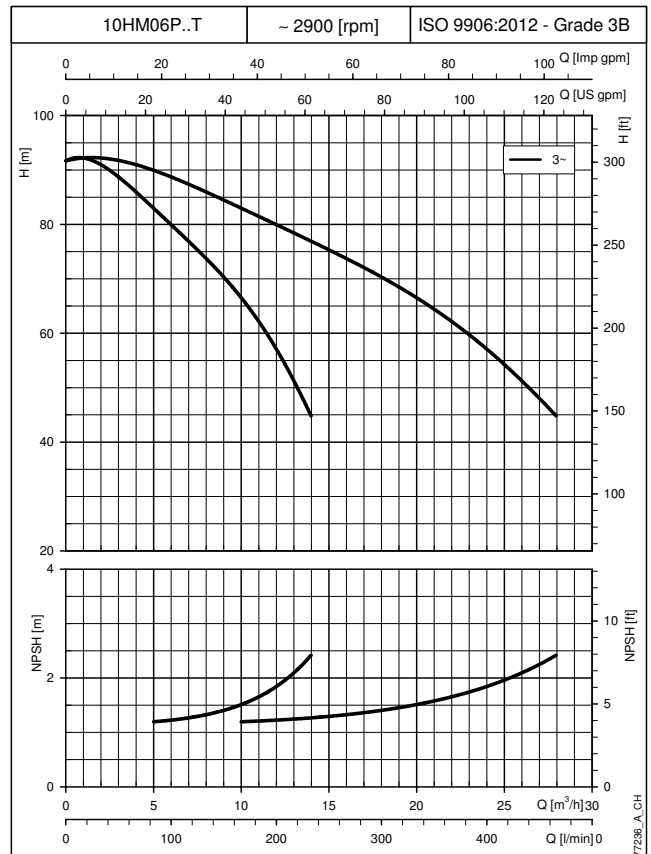
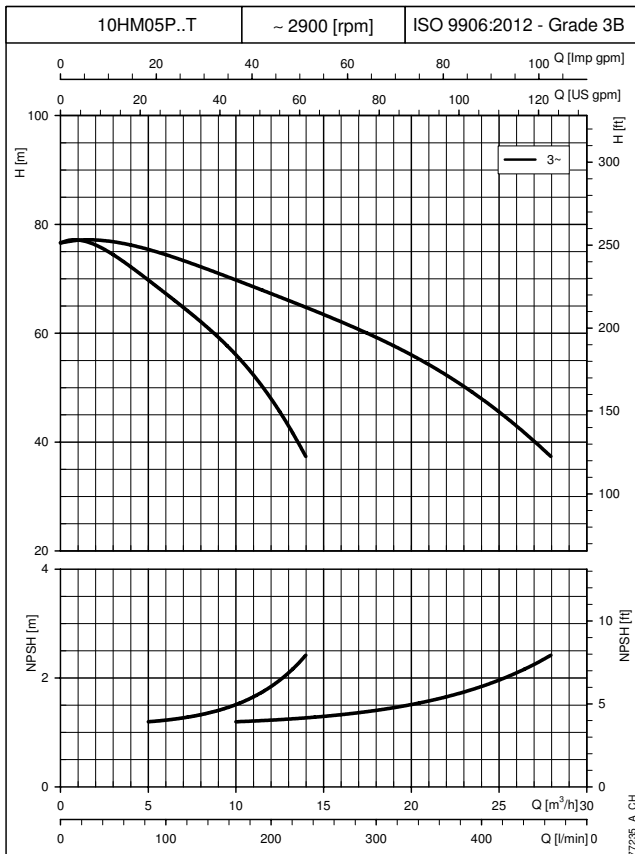
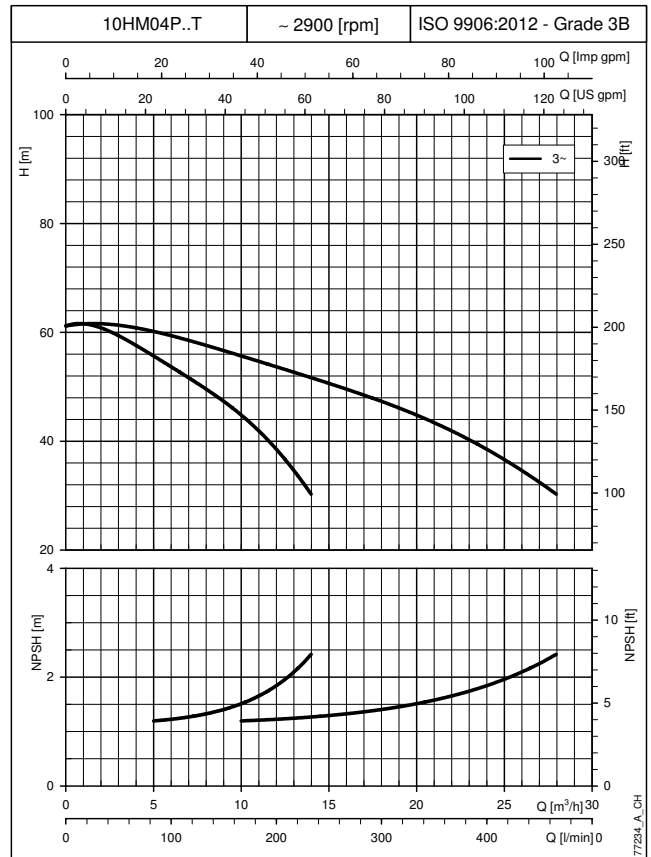
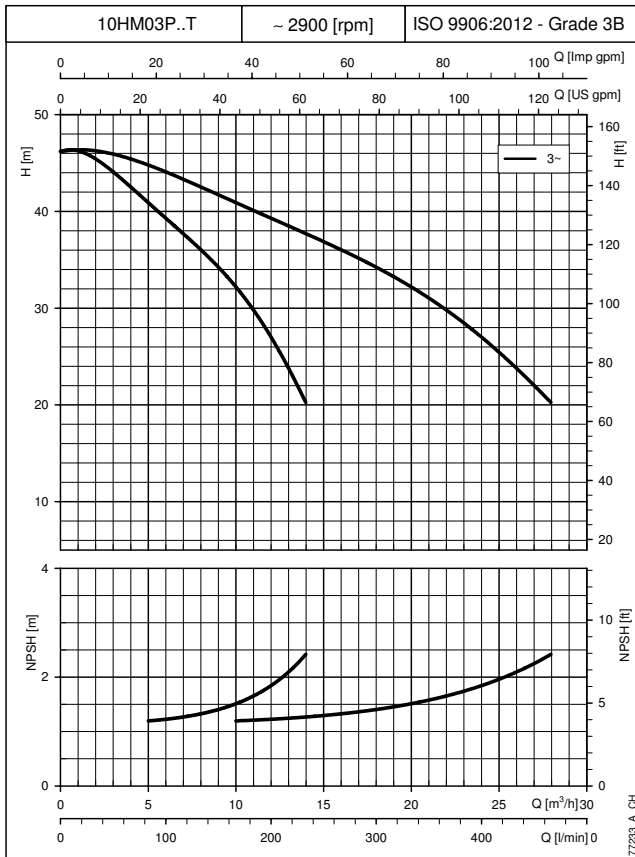
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

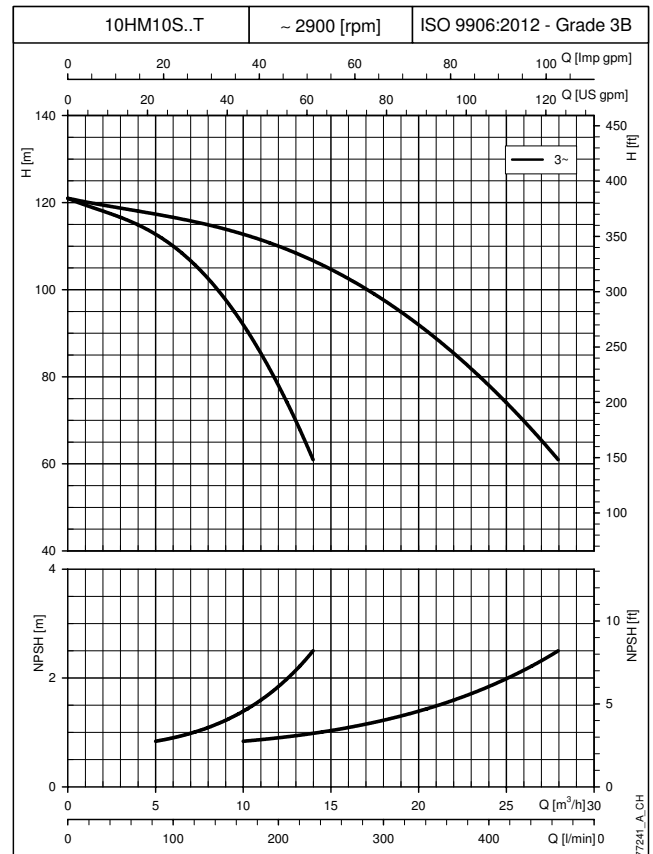
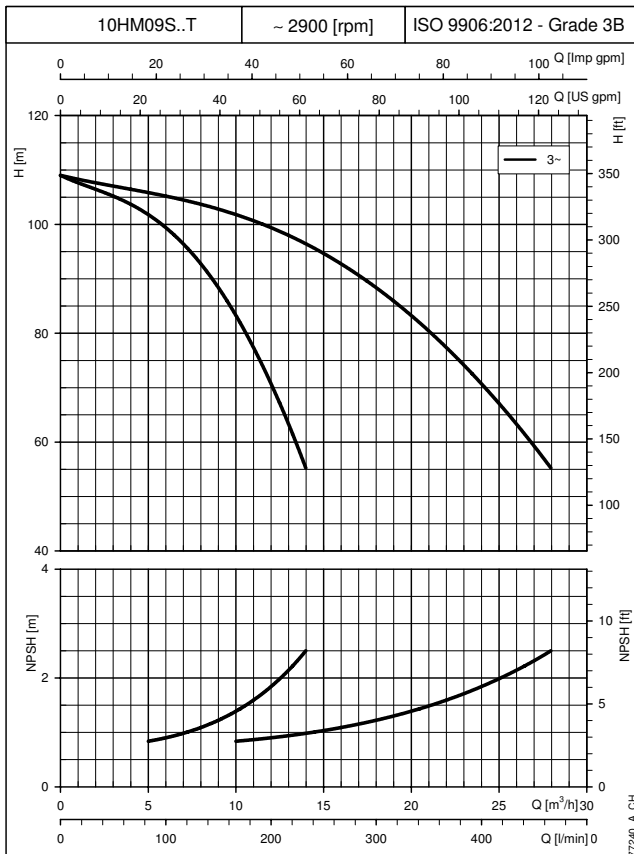
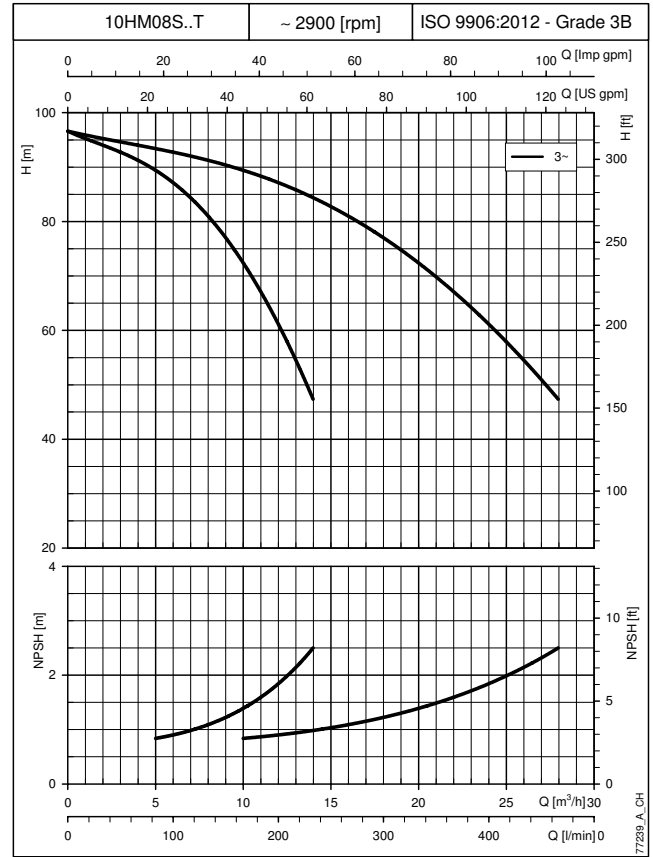
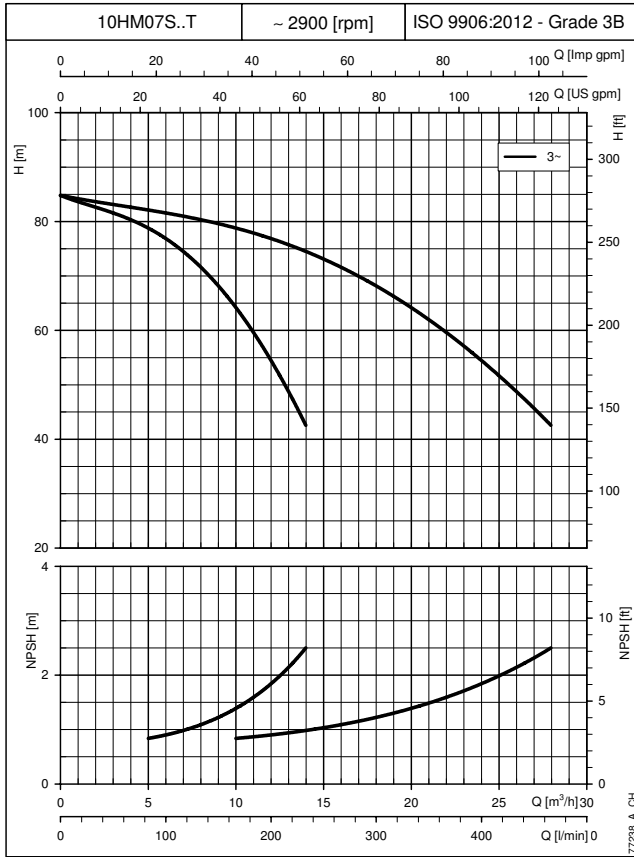
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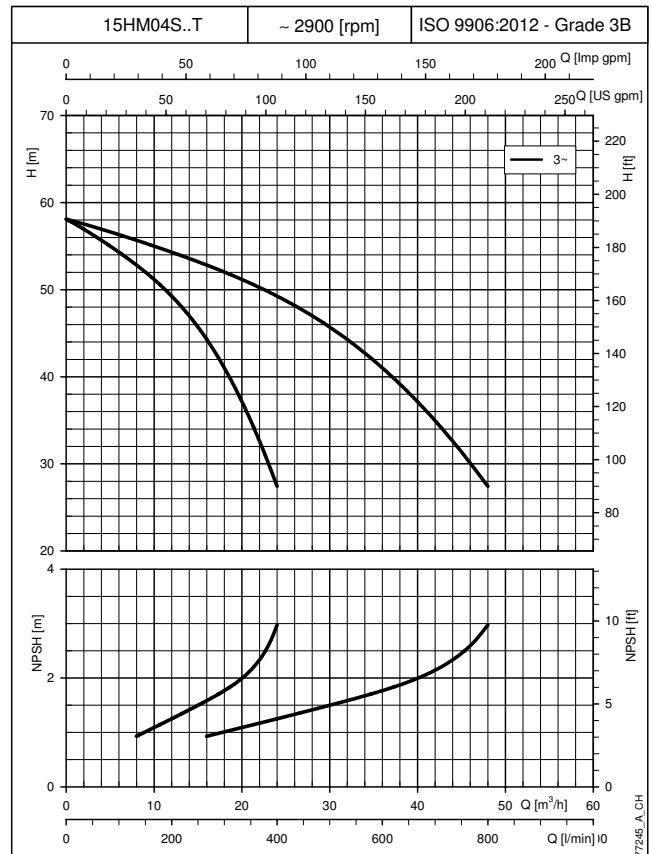
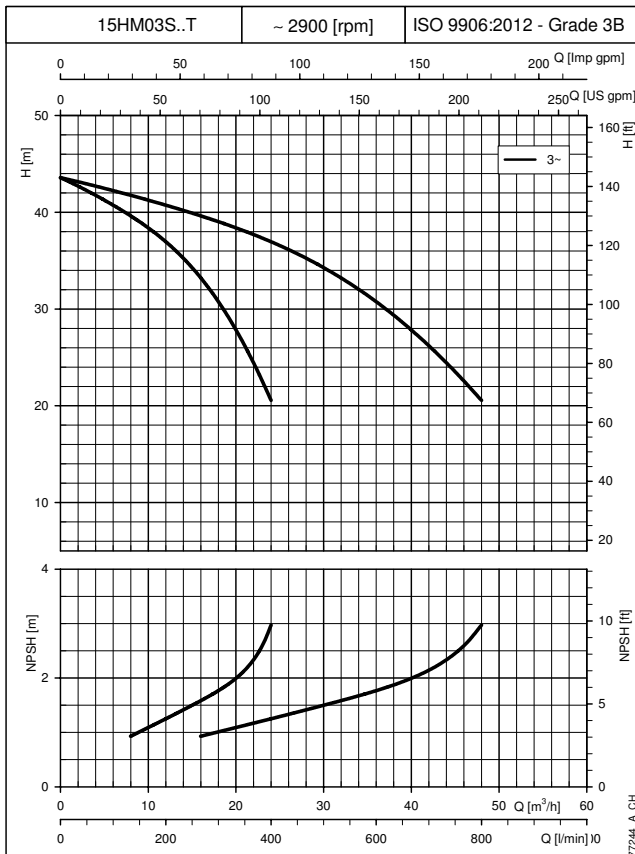
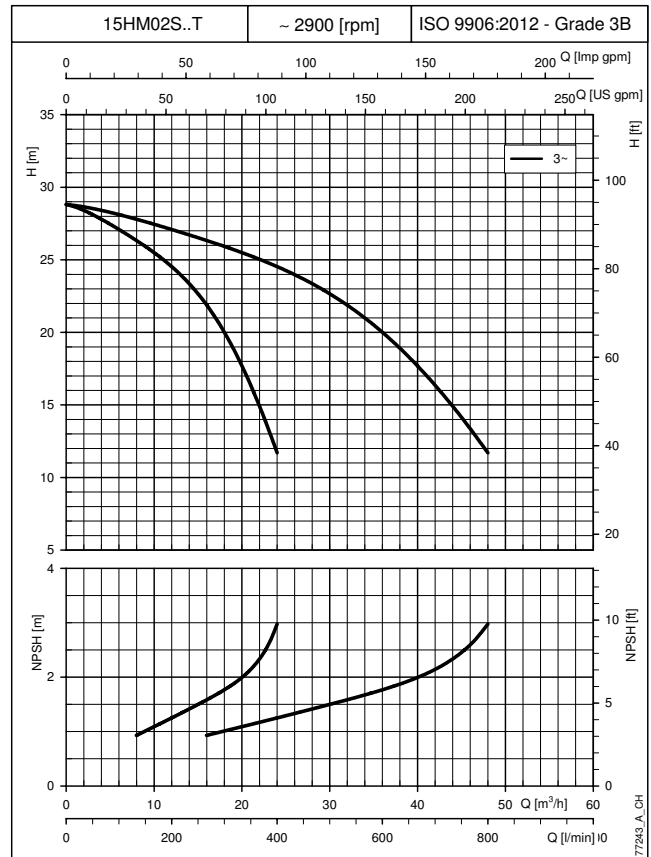
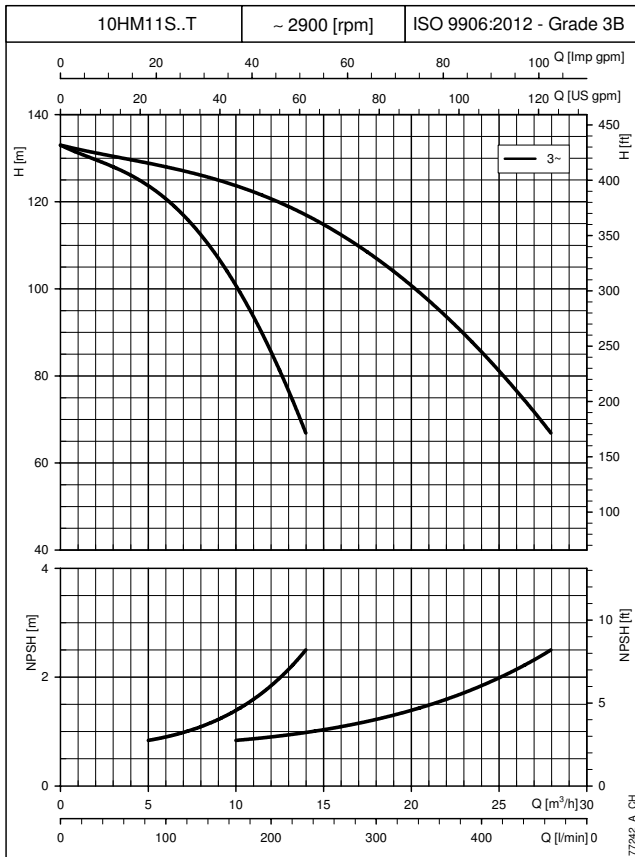
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

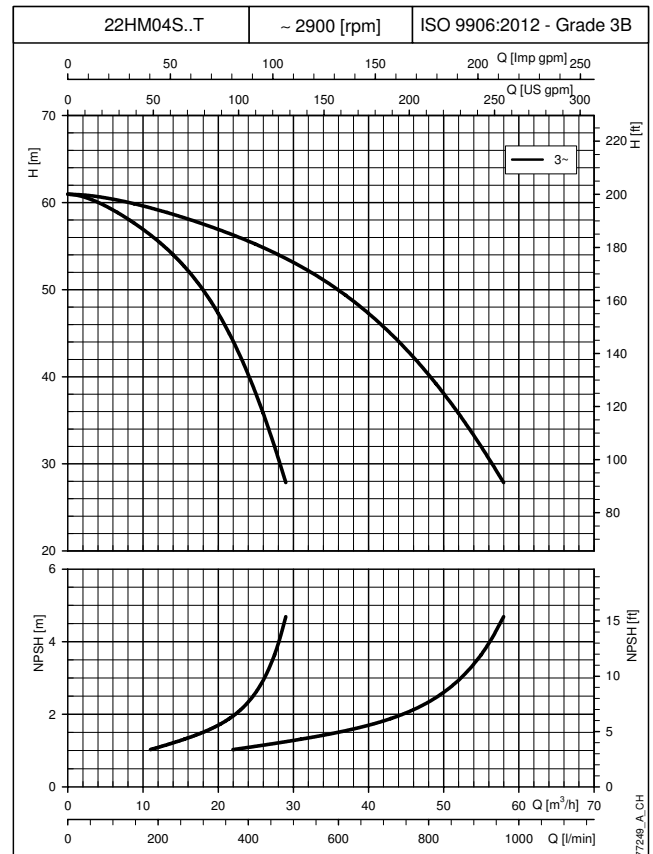
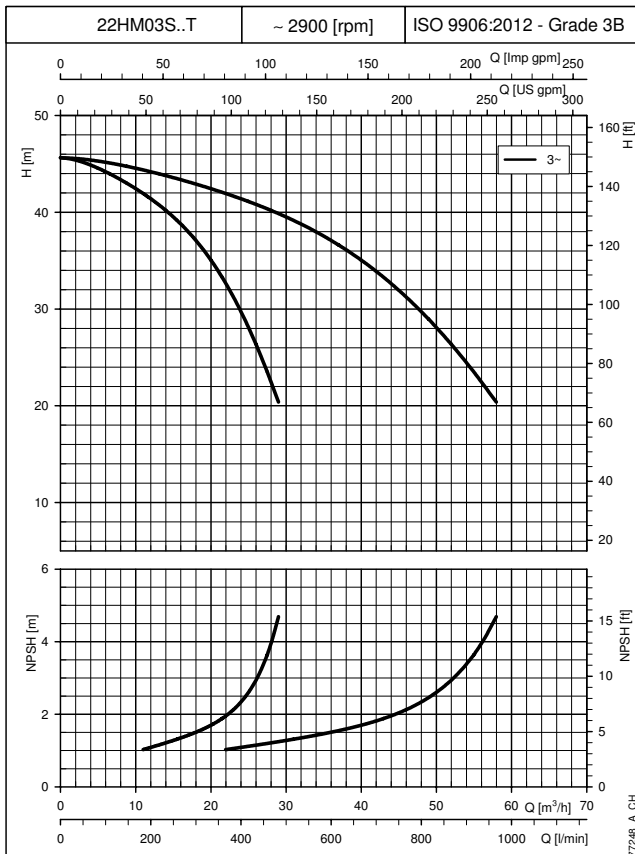
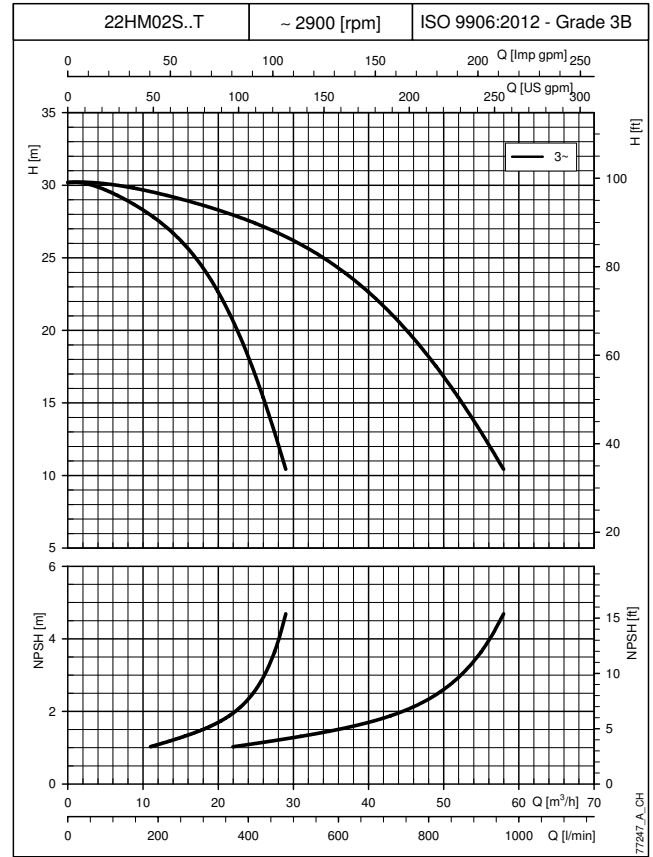
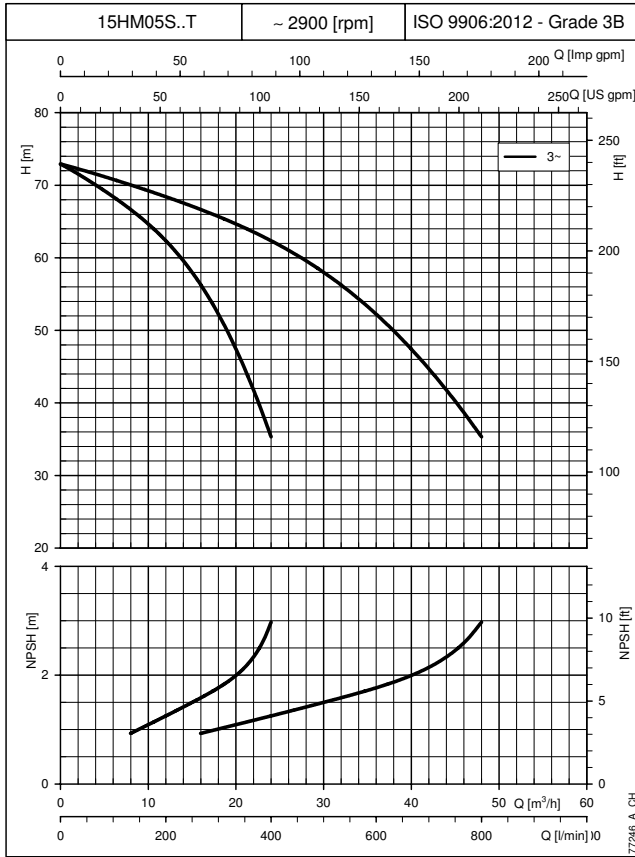
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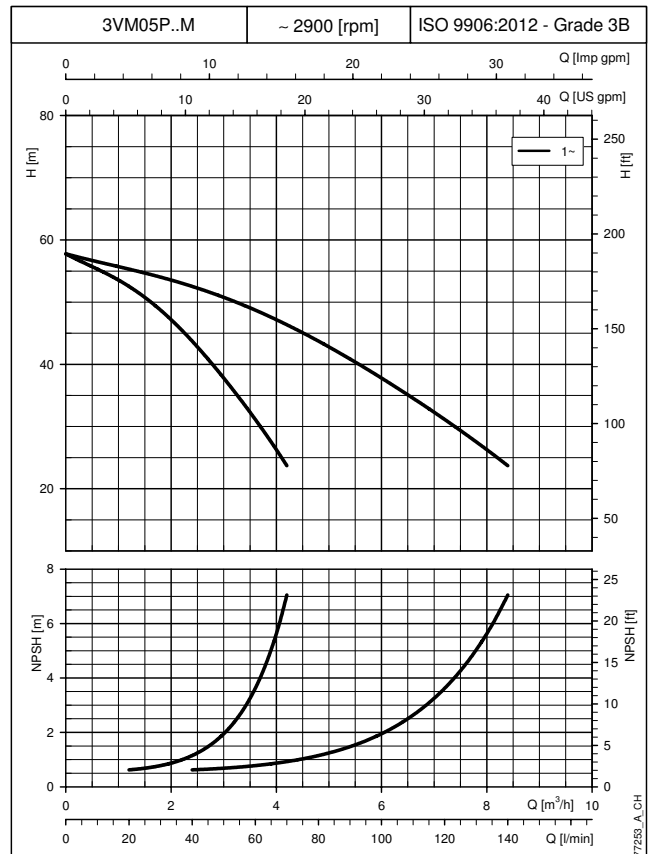
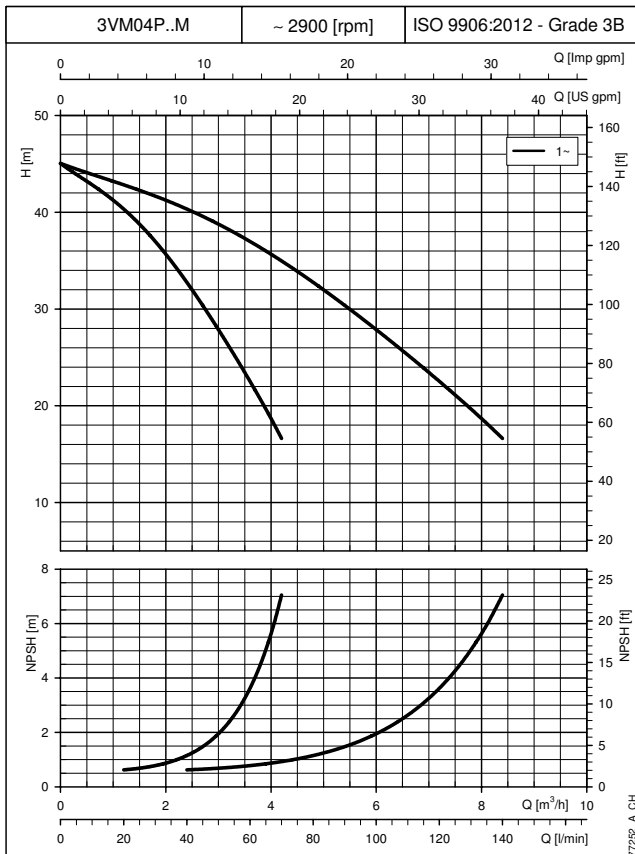
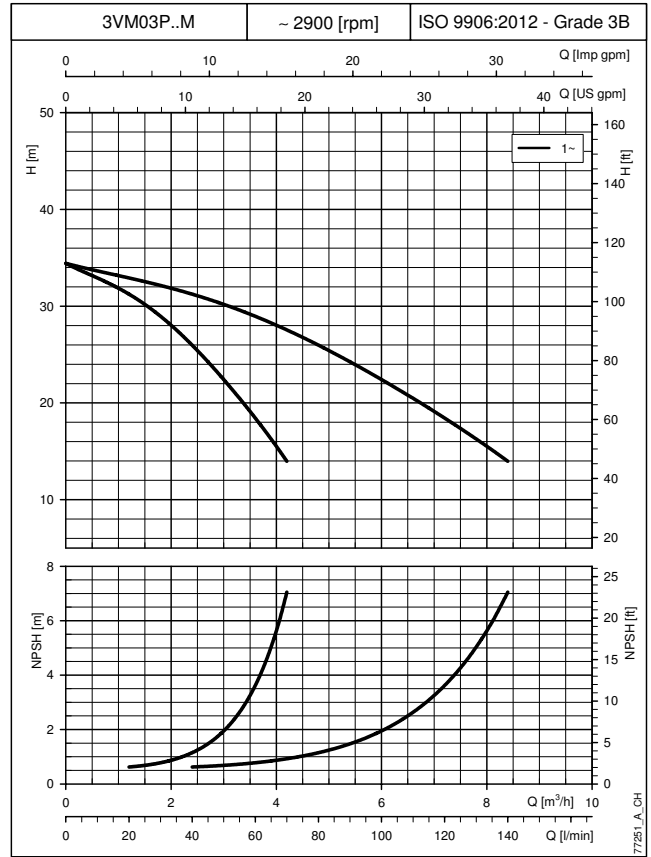
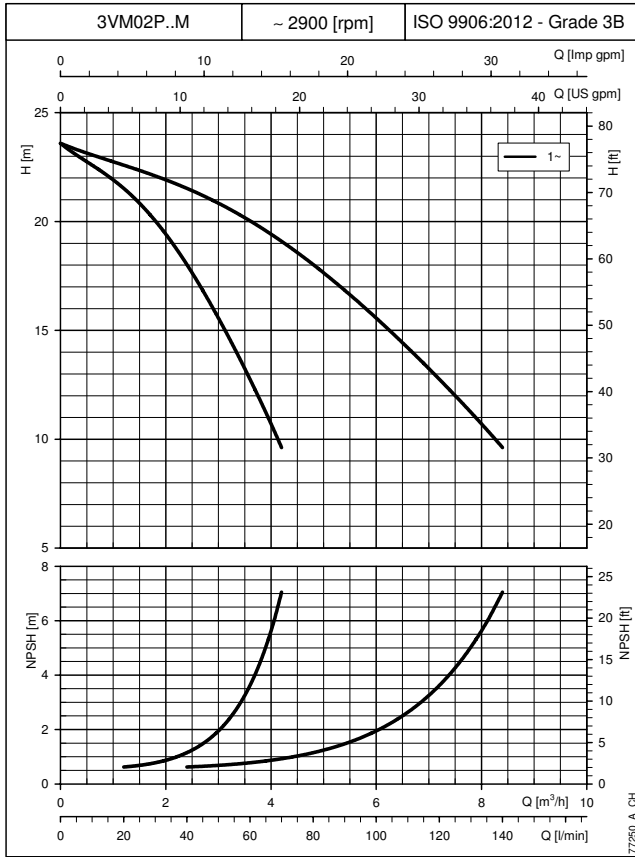
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

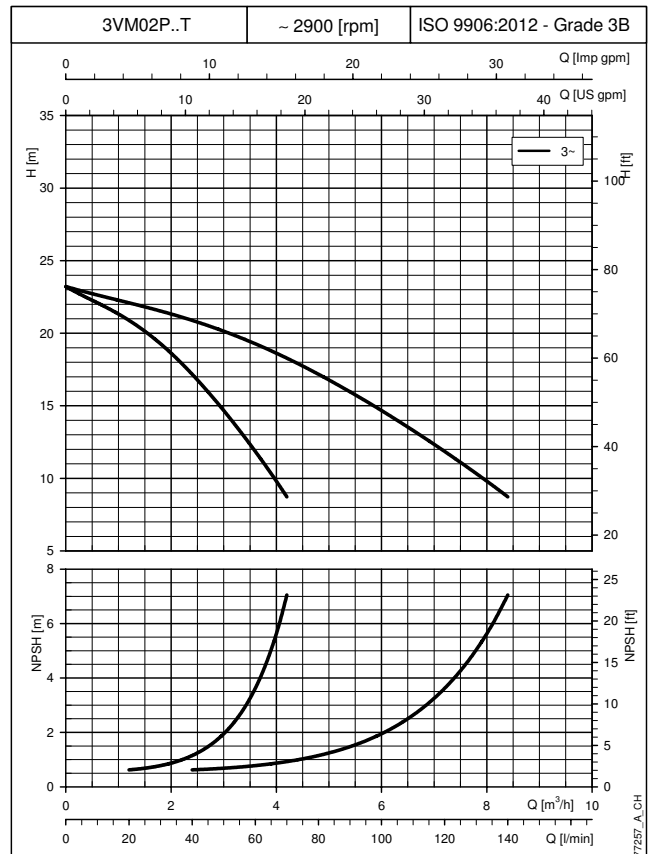
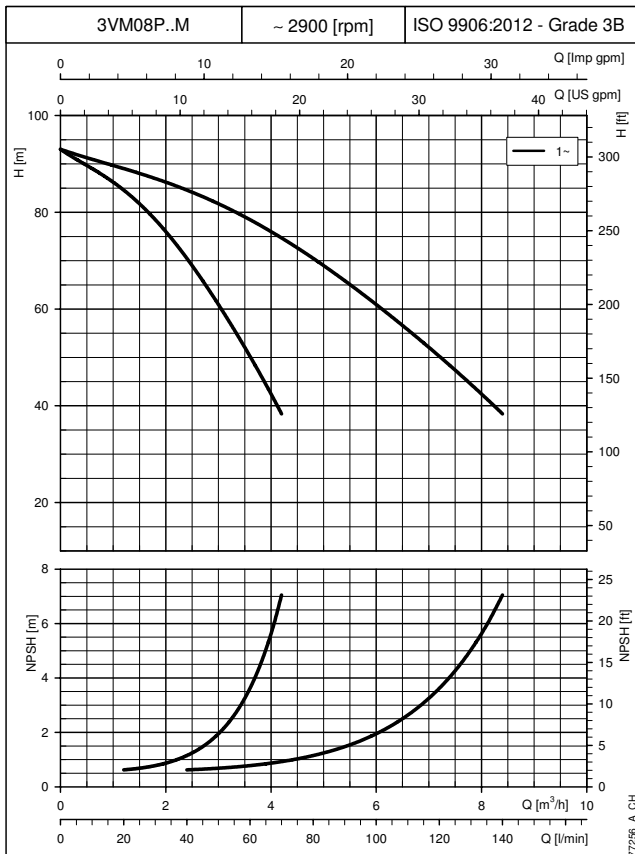
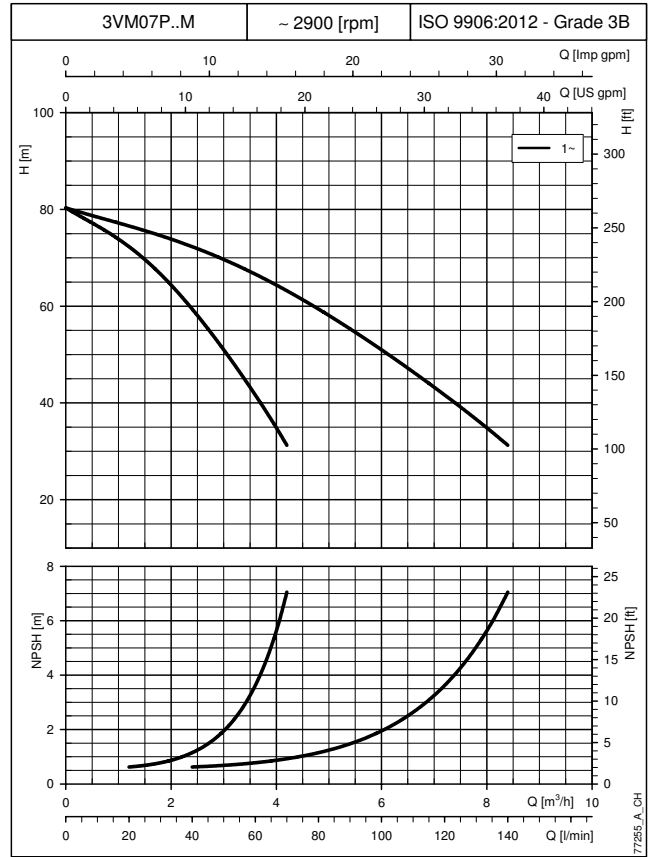
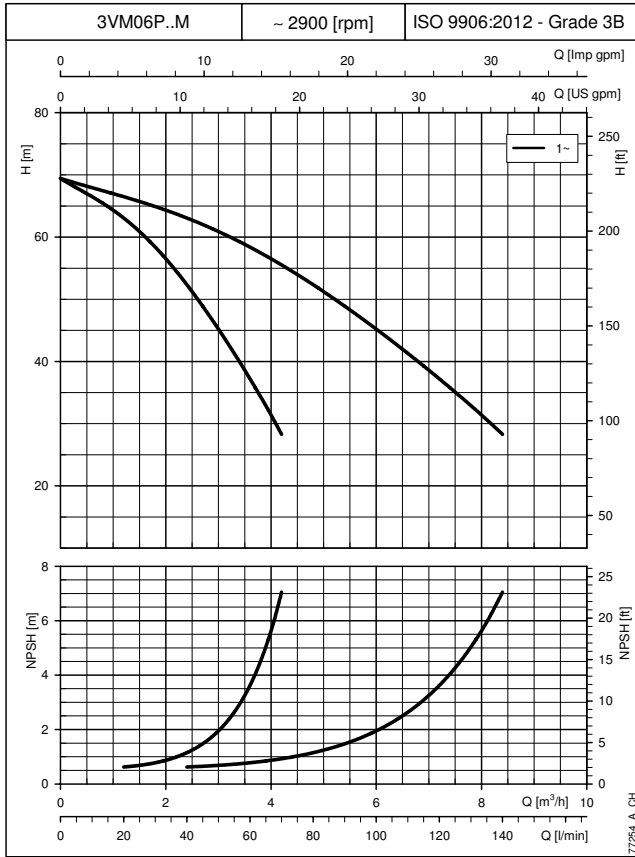
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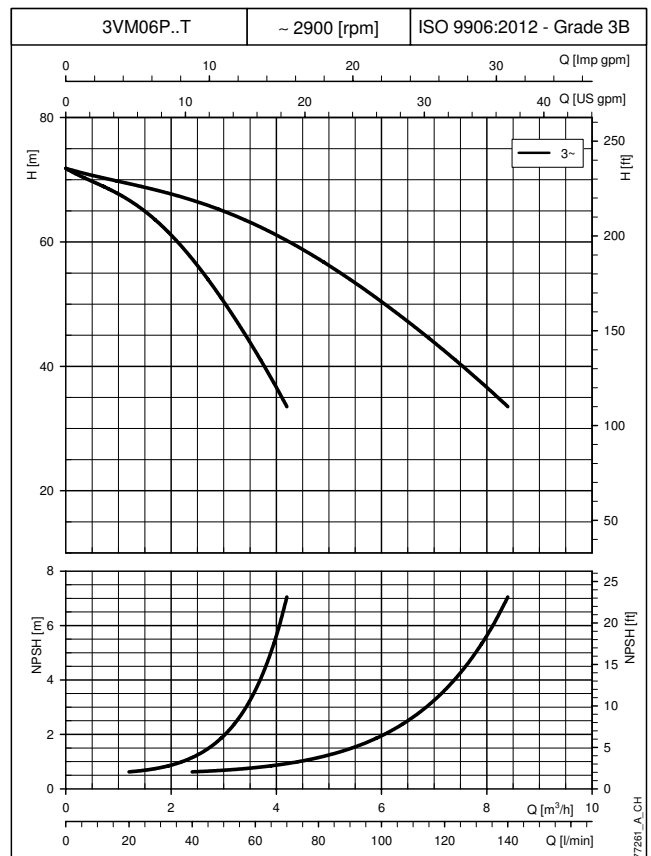
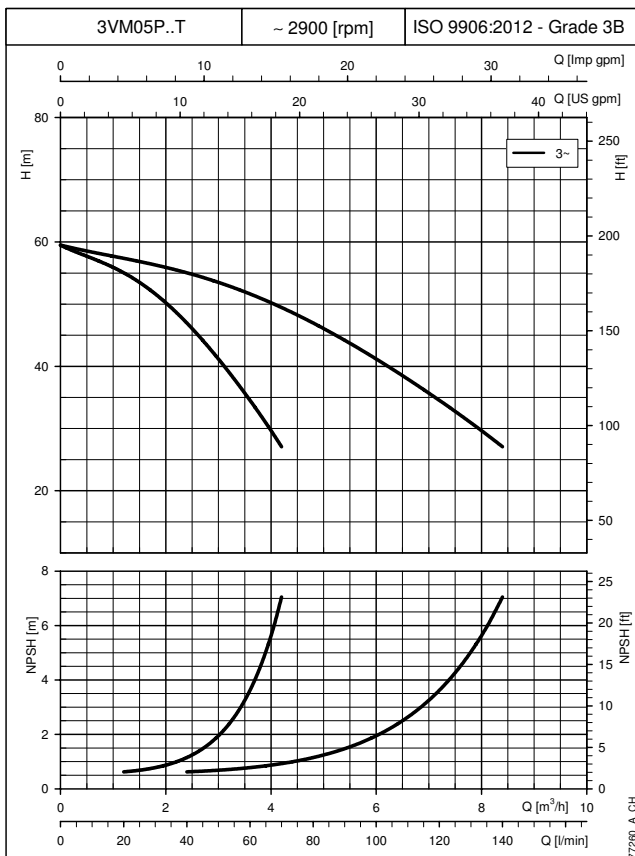
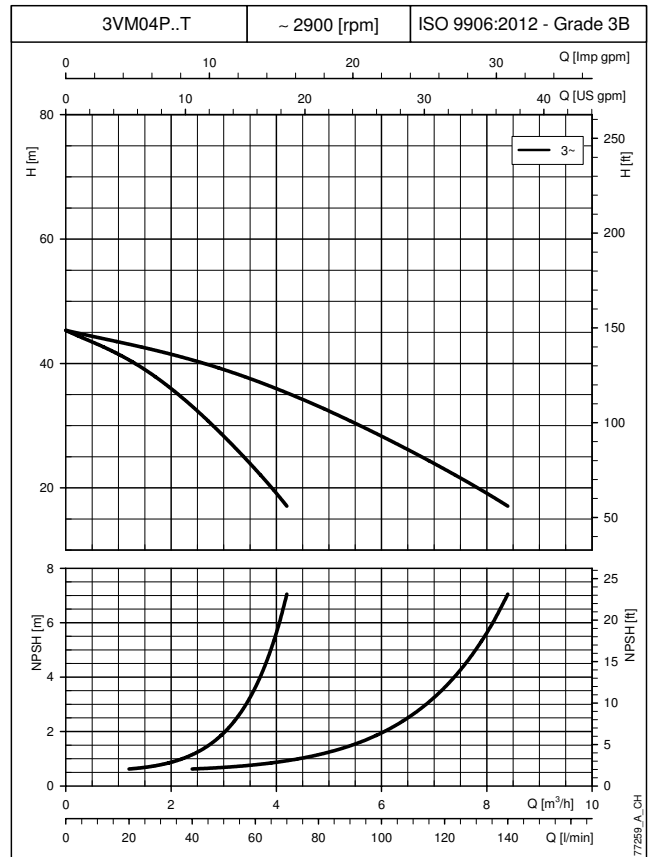
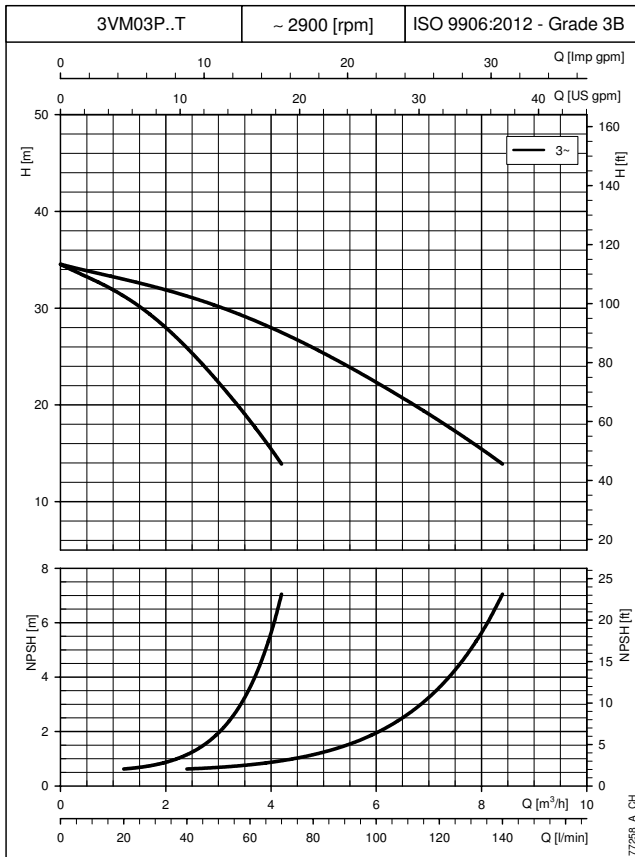
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

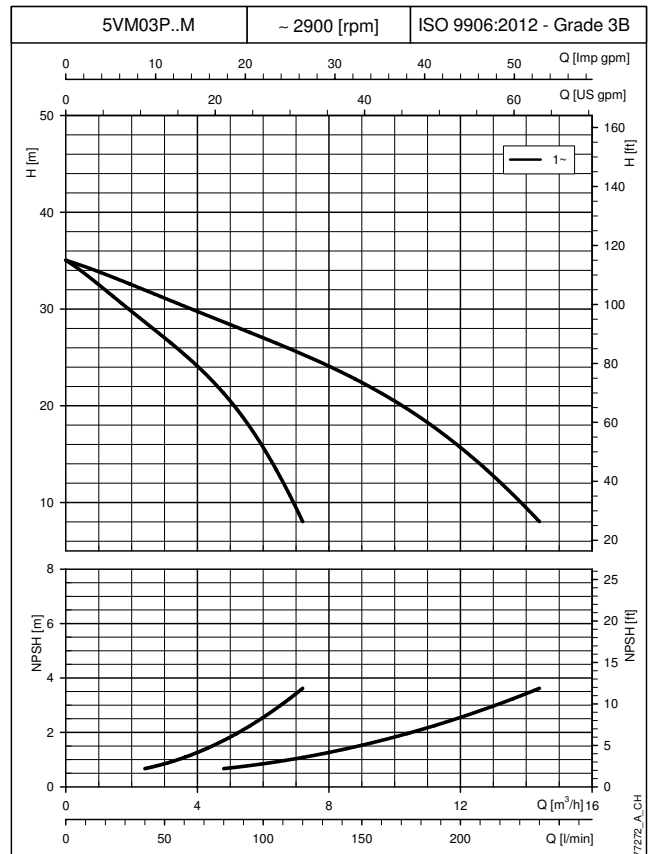
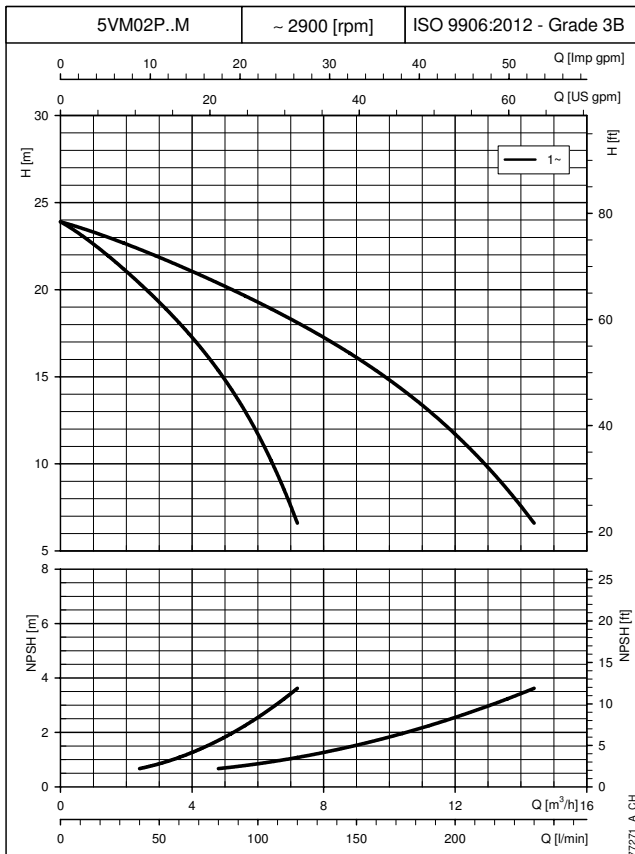
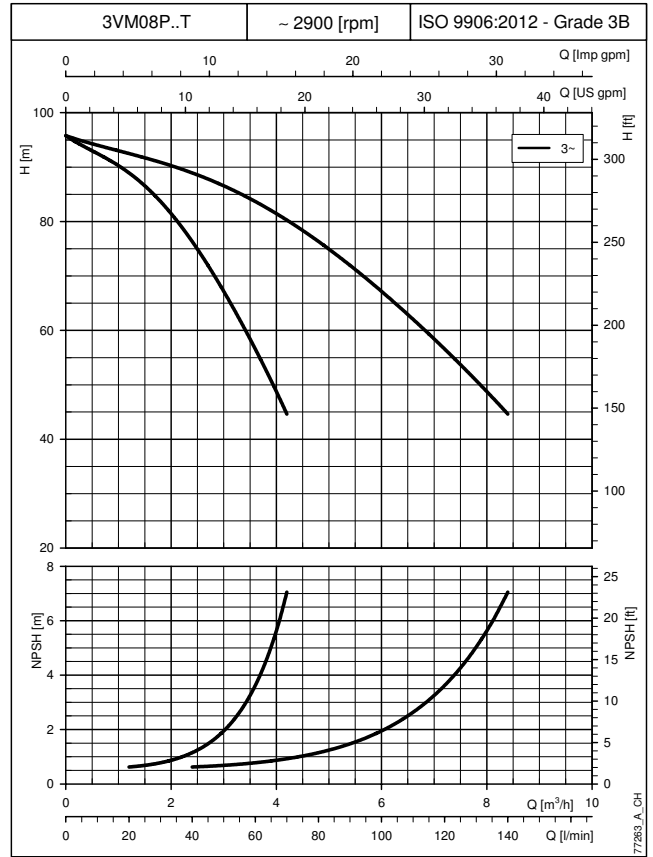
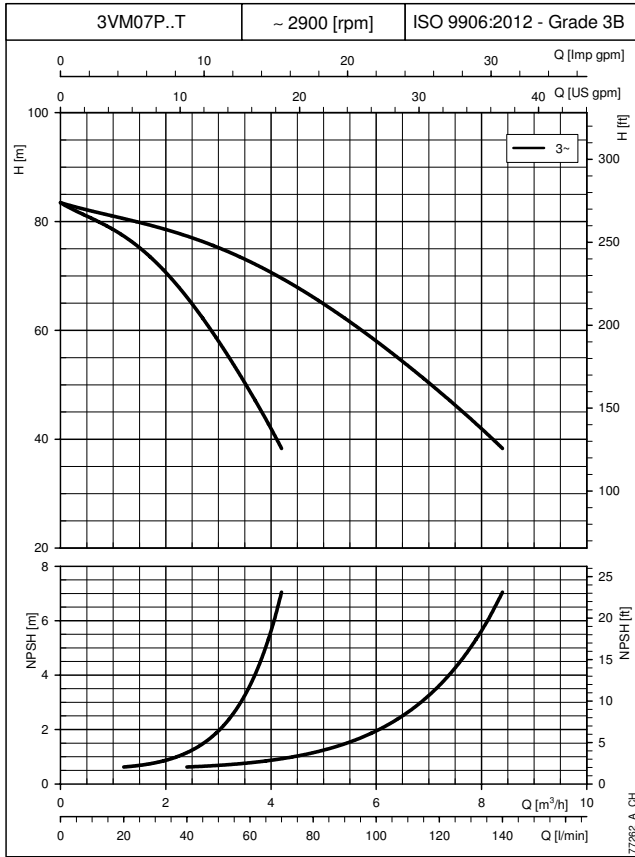
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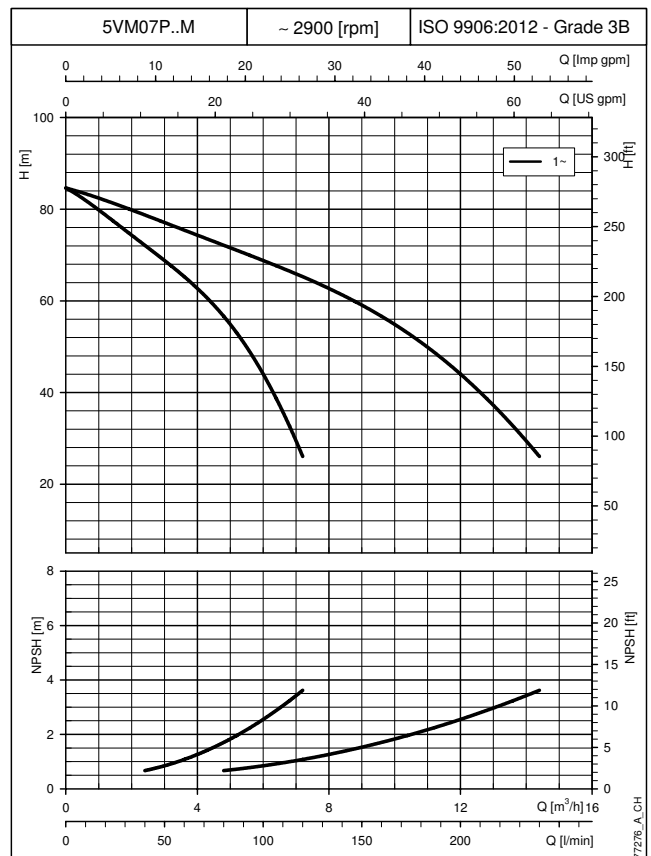
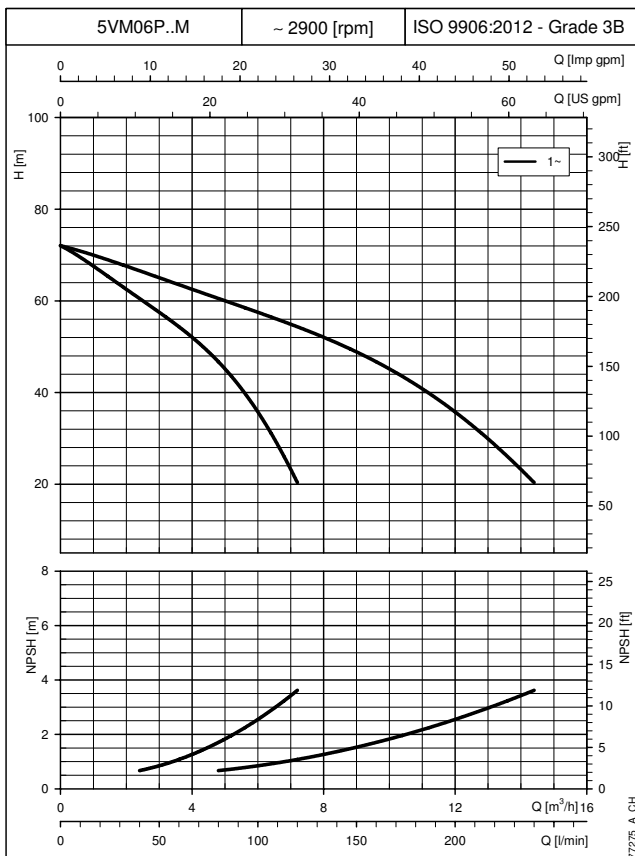
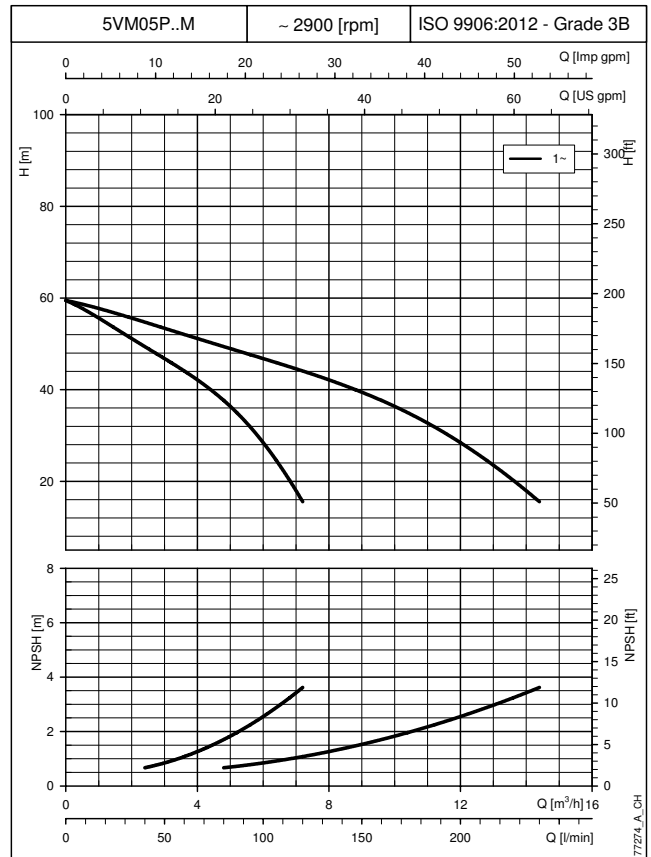
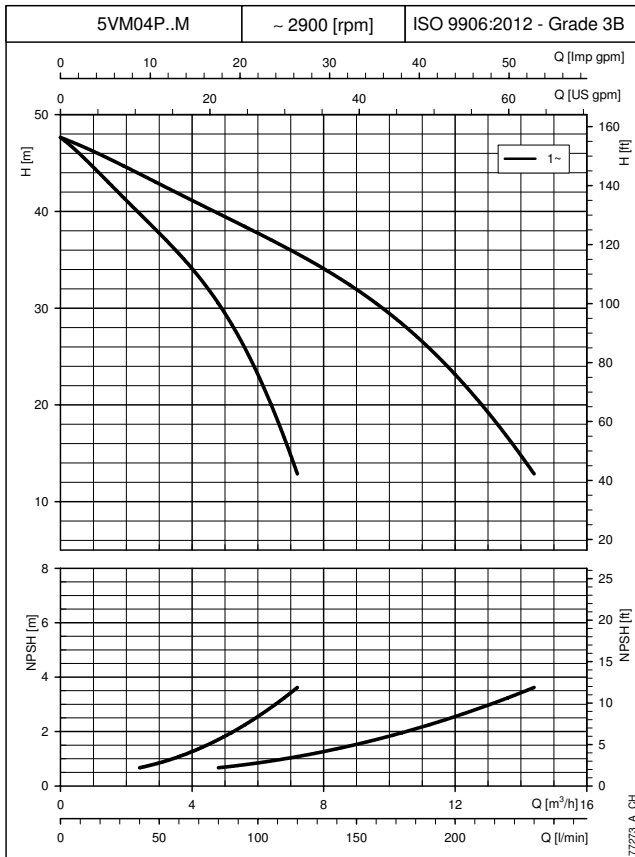
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

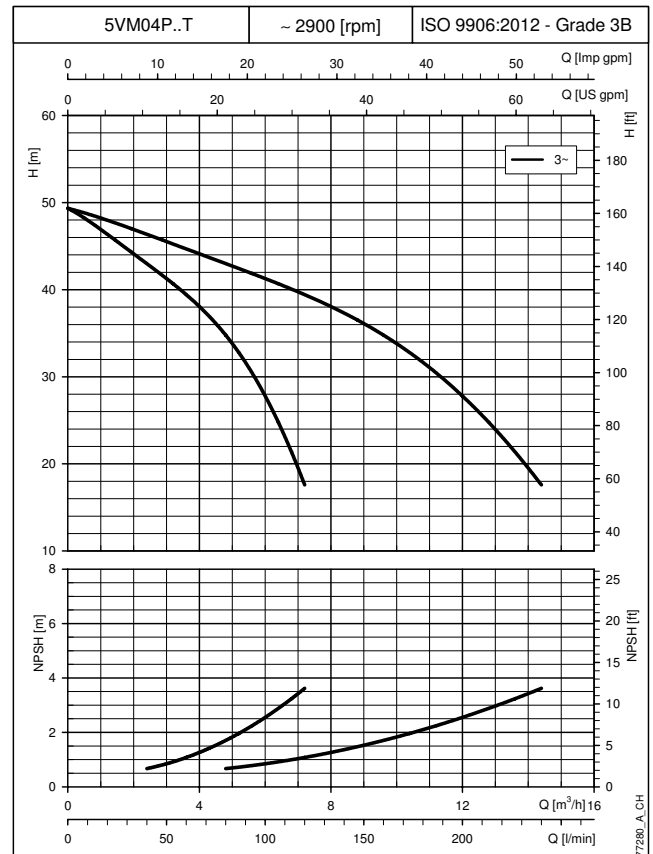
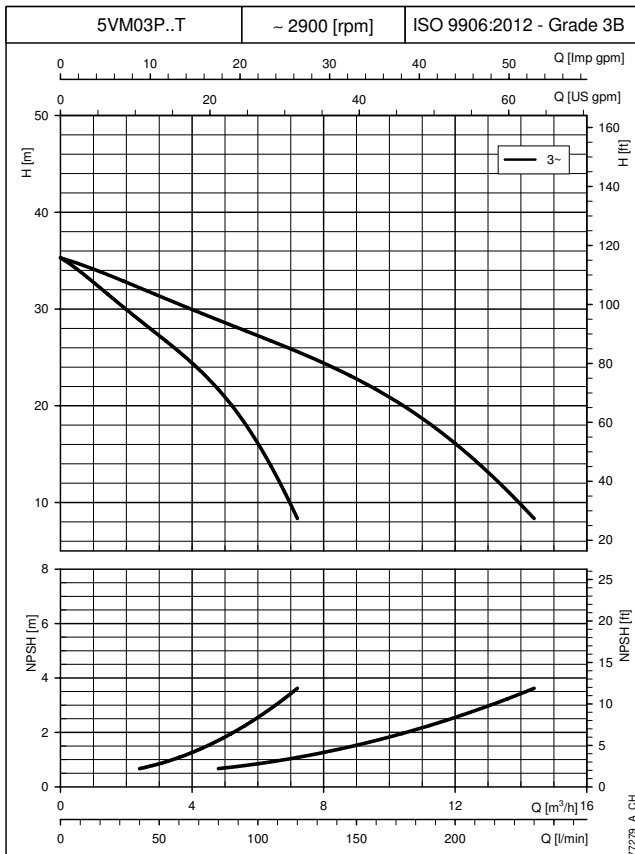
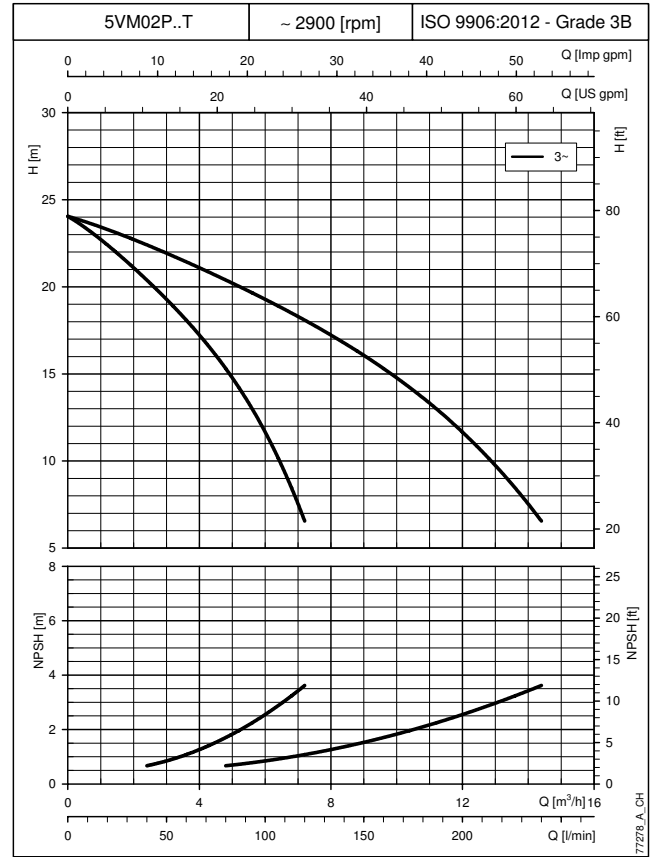
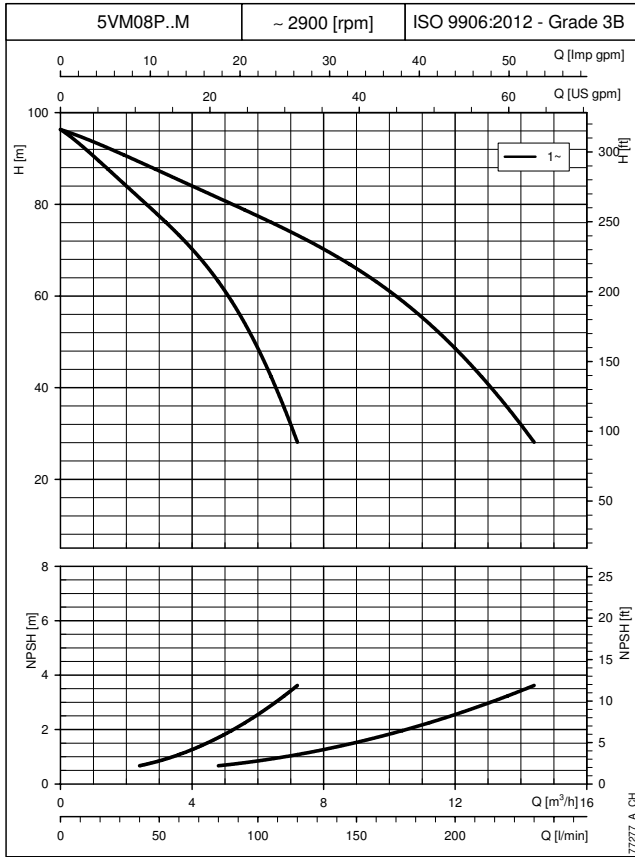
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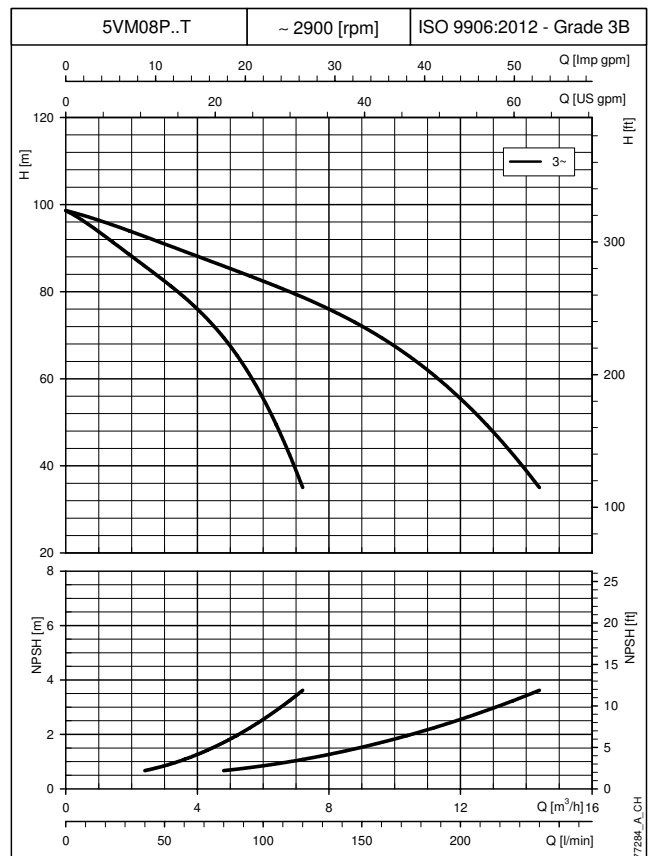
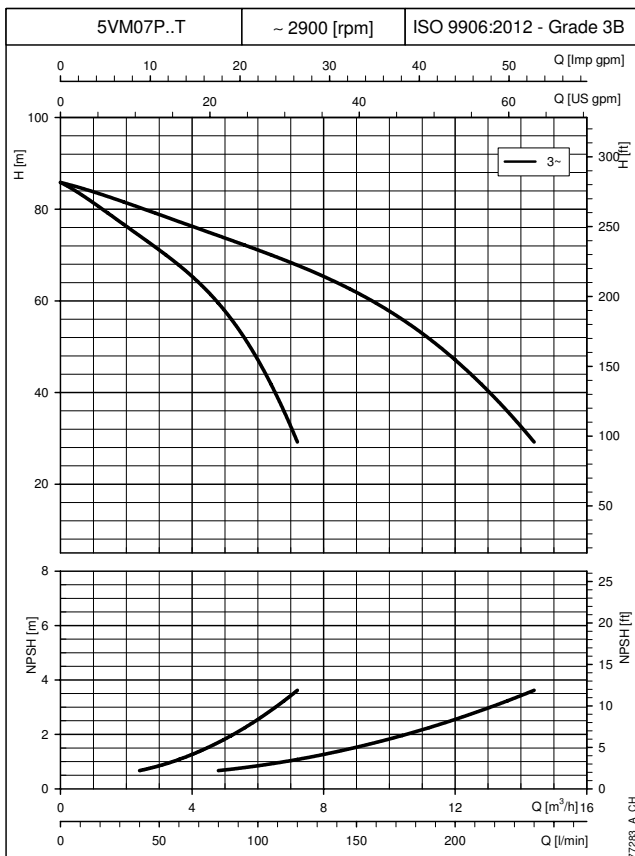
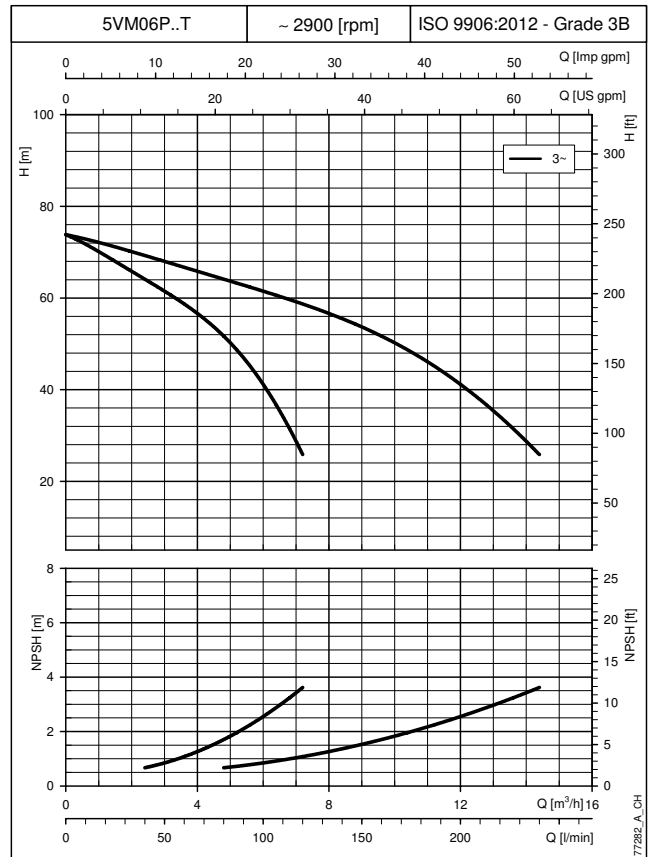
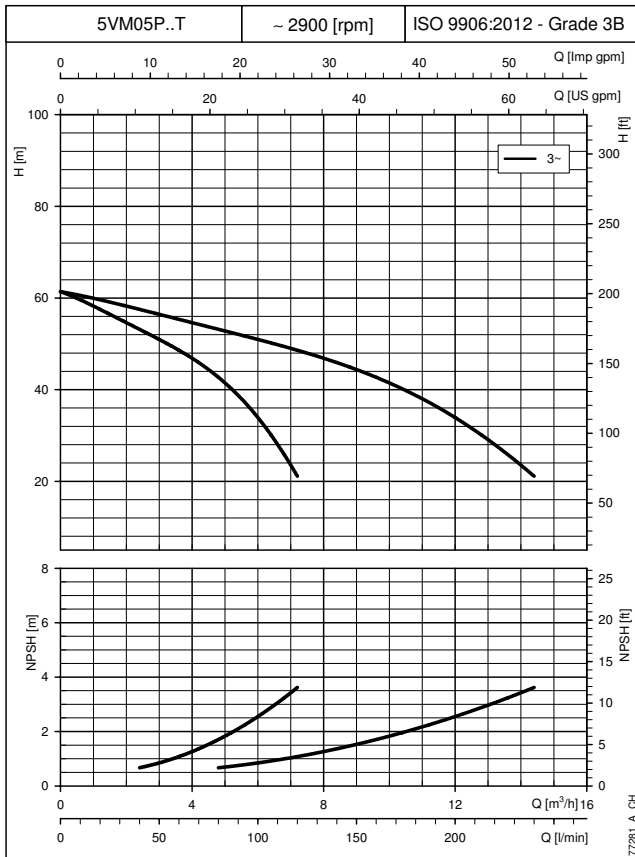
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

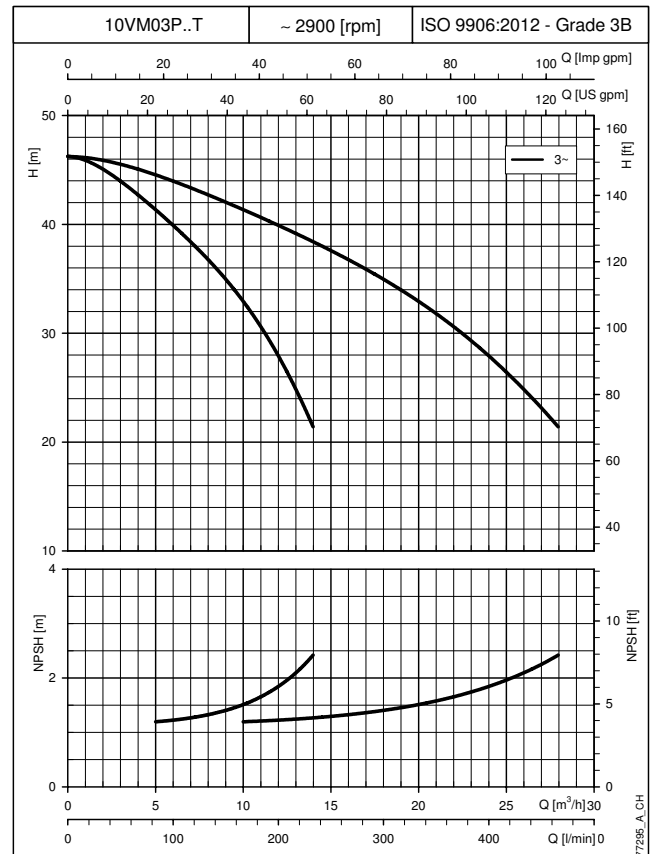
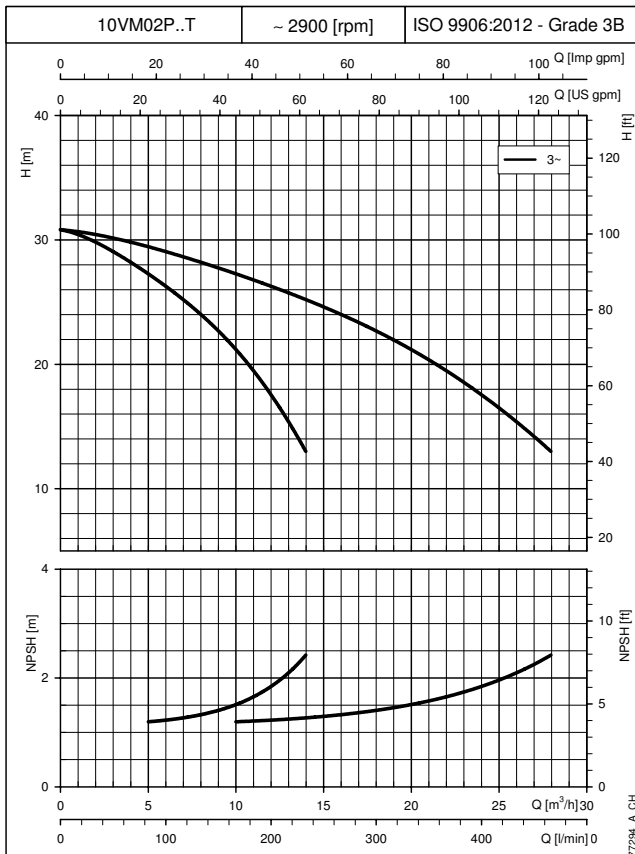
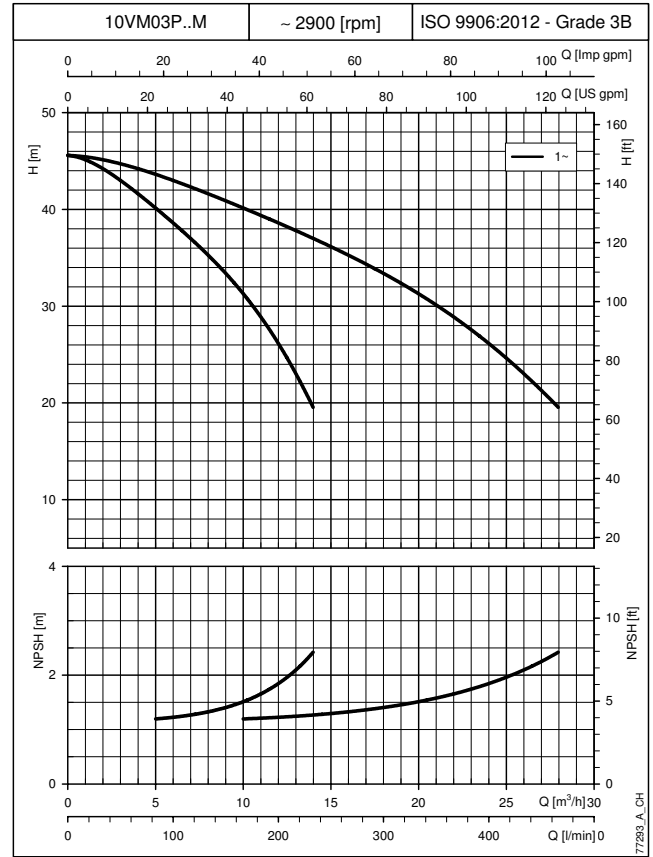
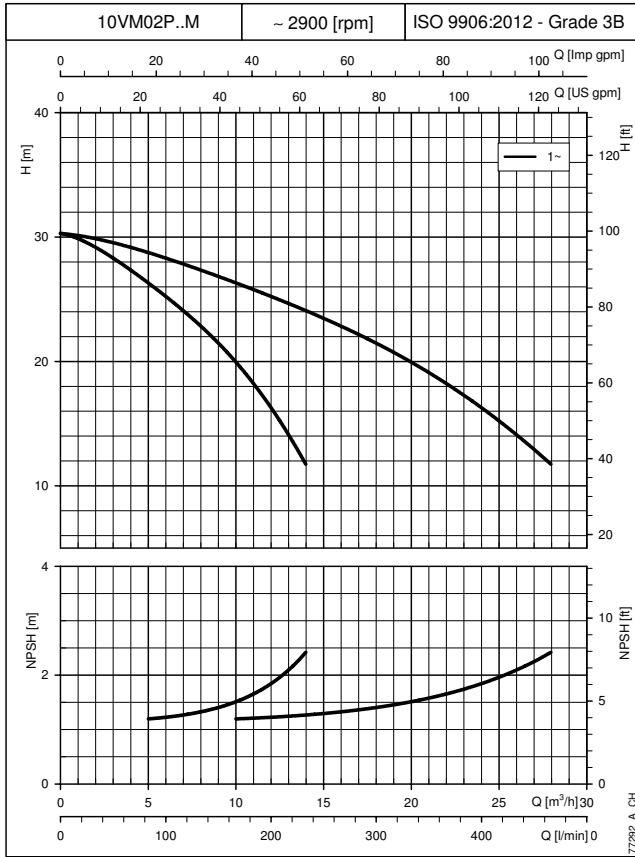
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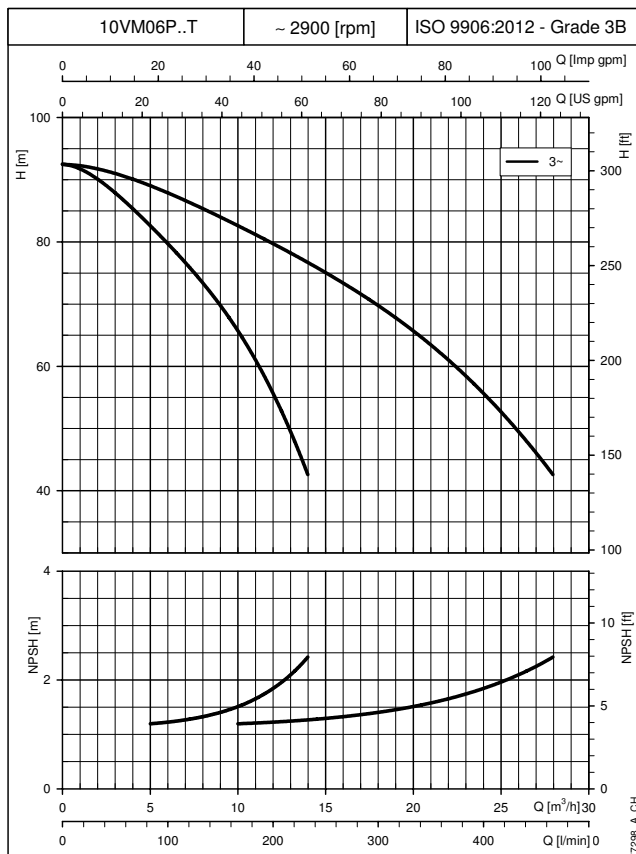
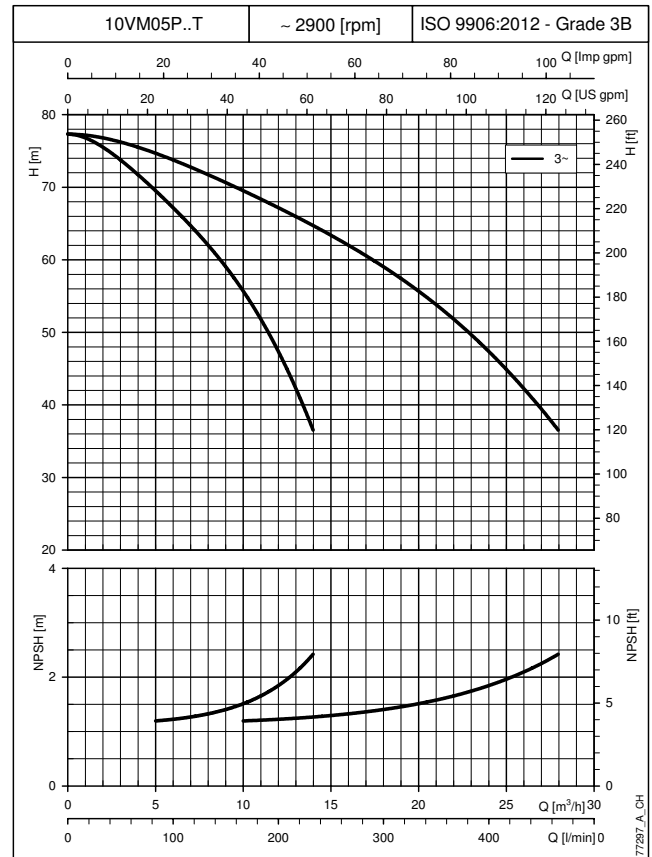
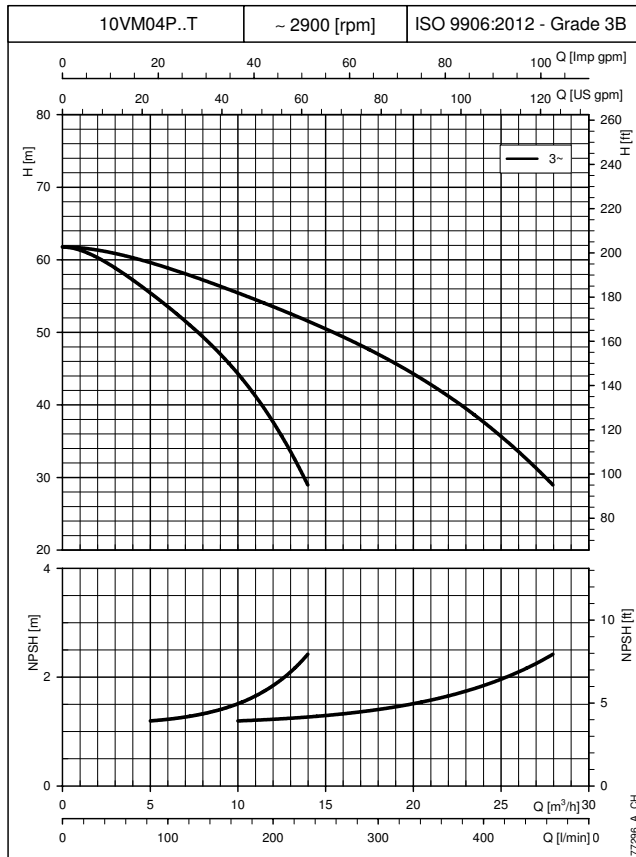
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



CURVES

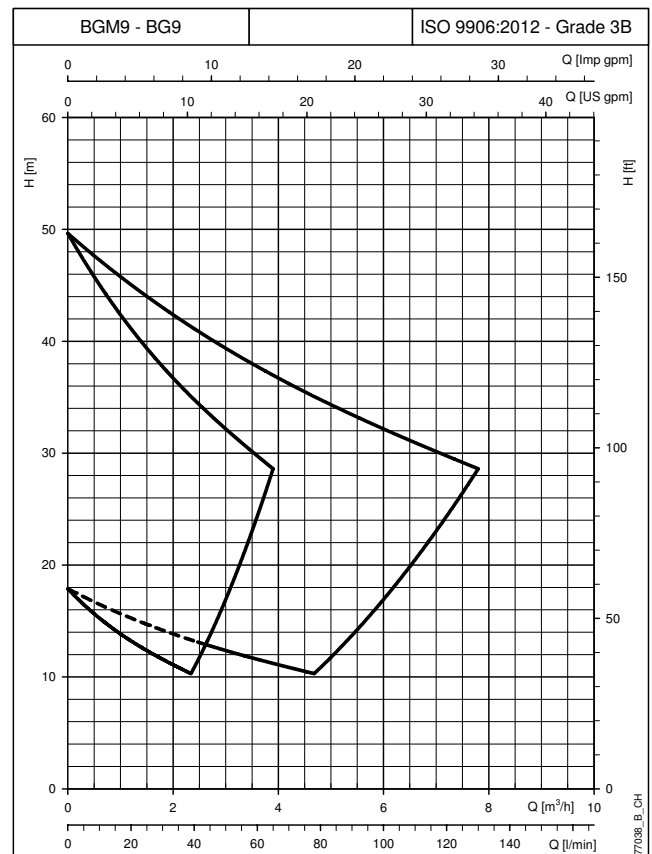
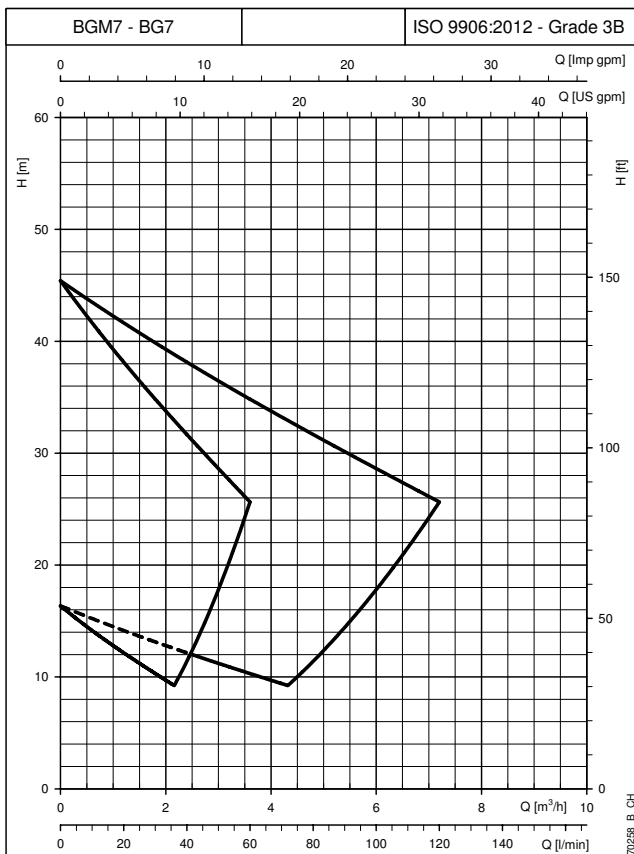
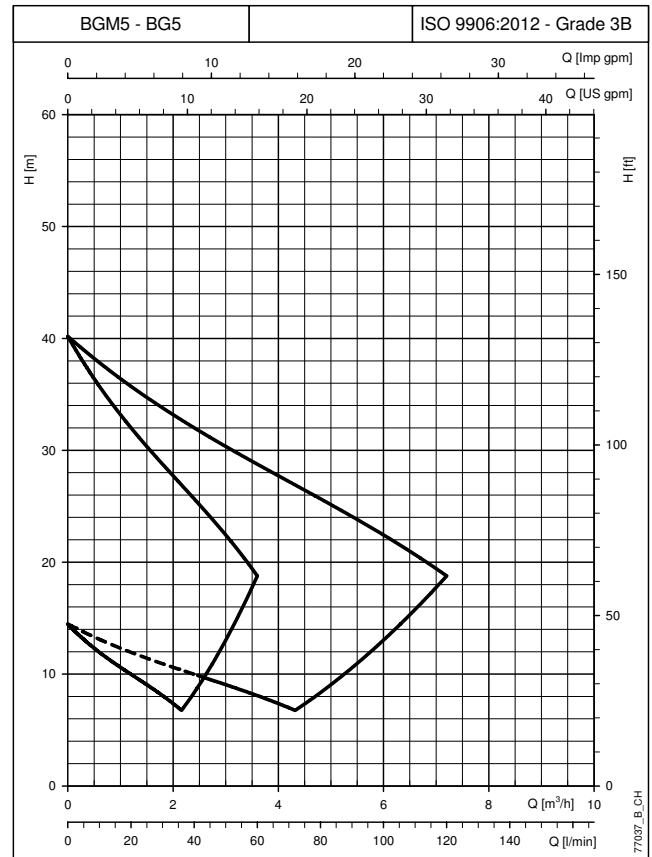
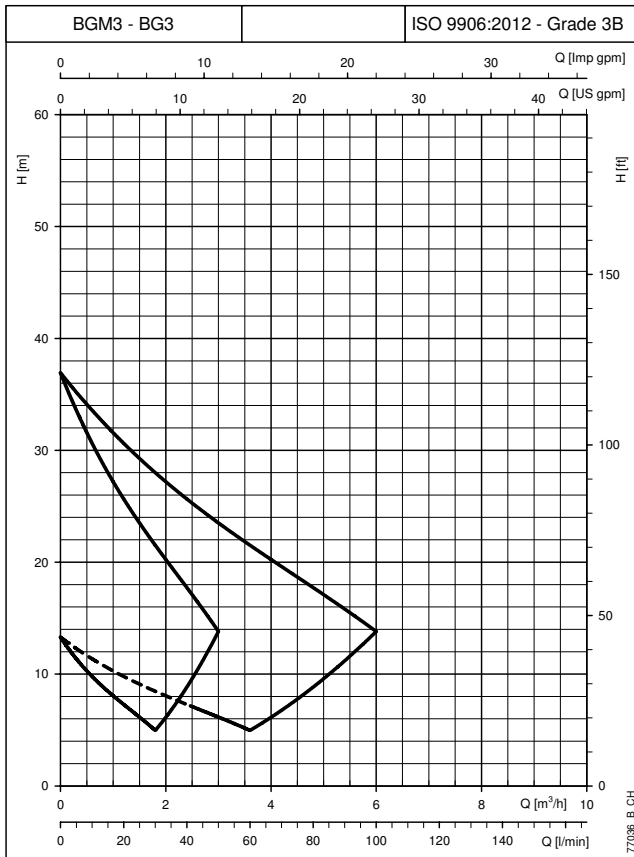
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TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 50 Hz



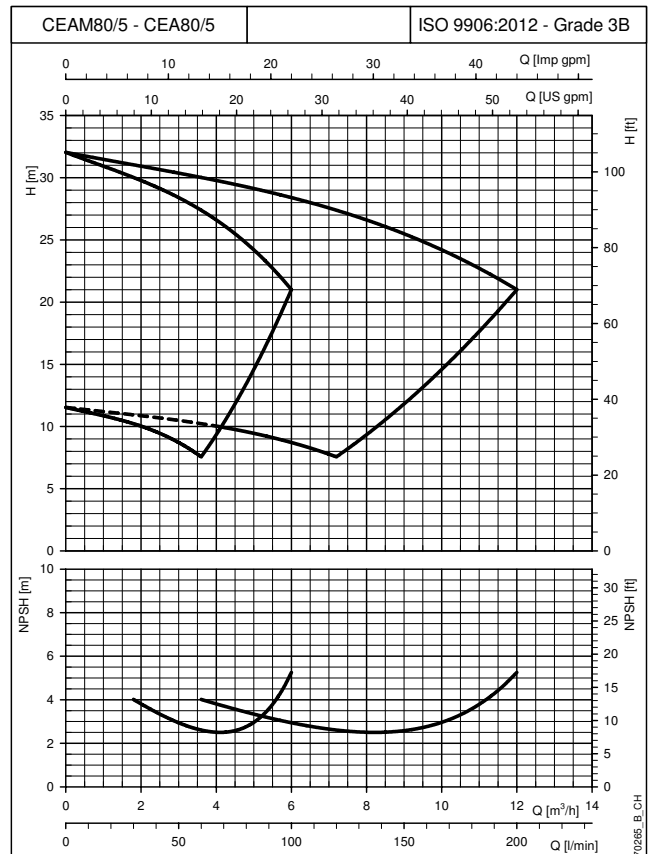
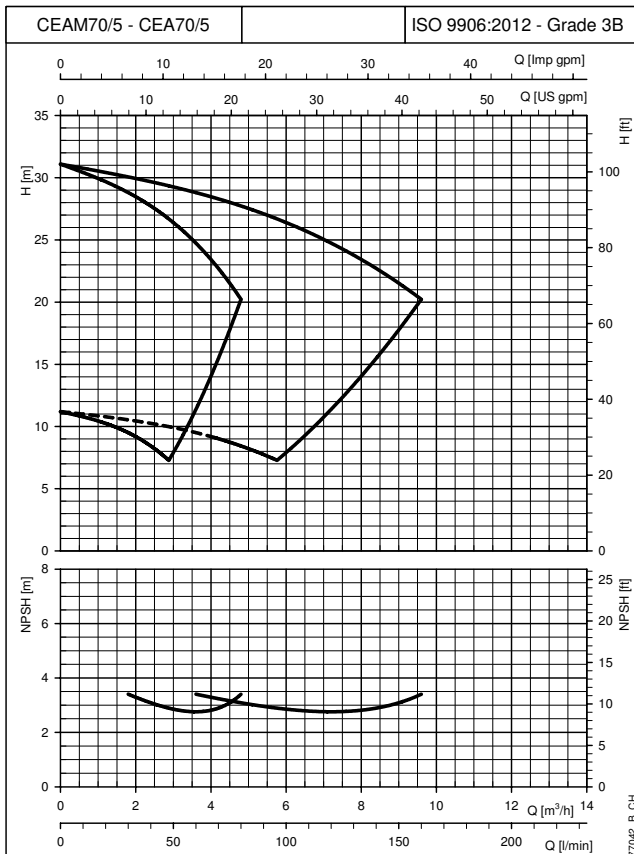
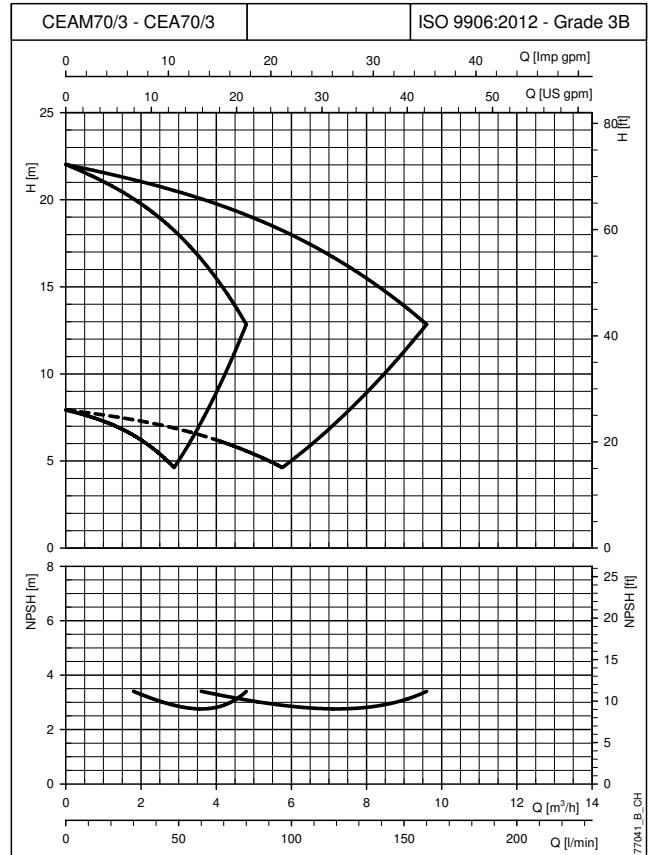
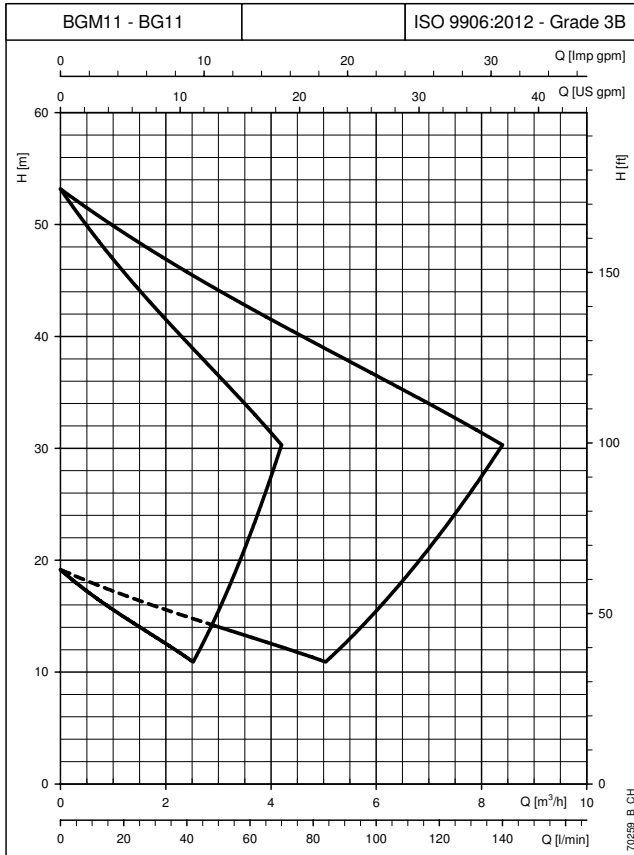
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TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 30..50 Hz



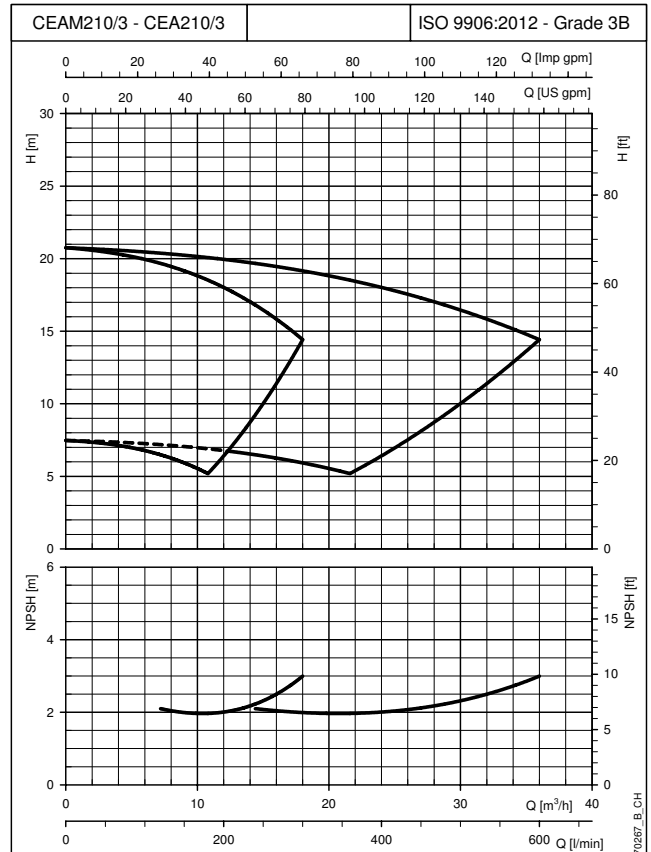
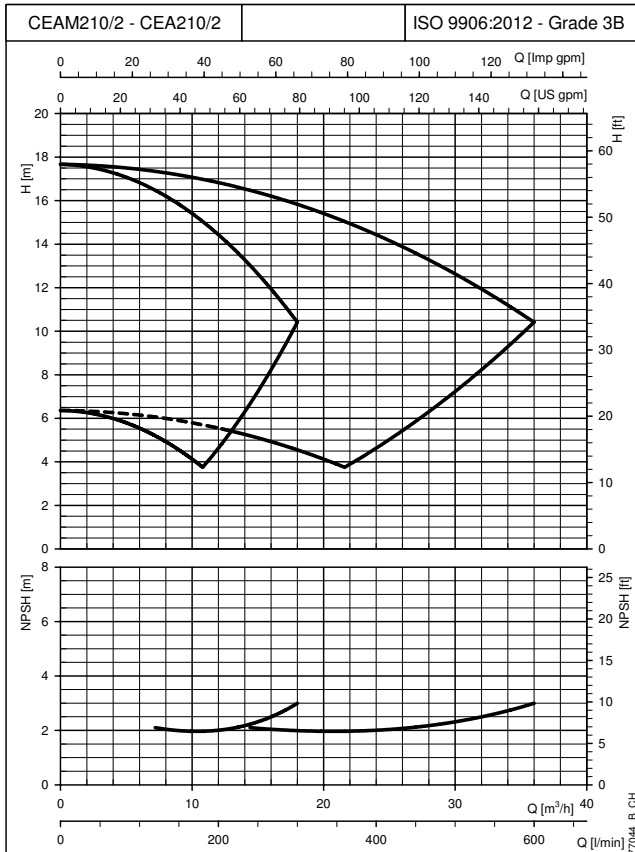
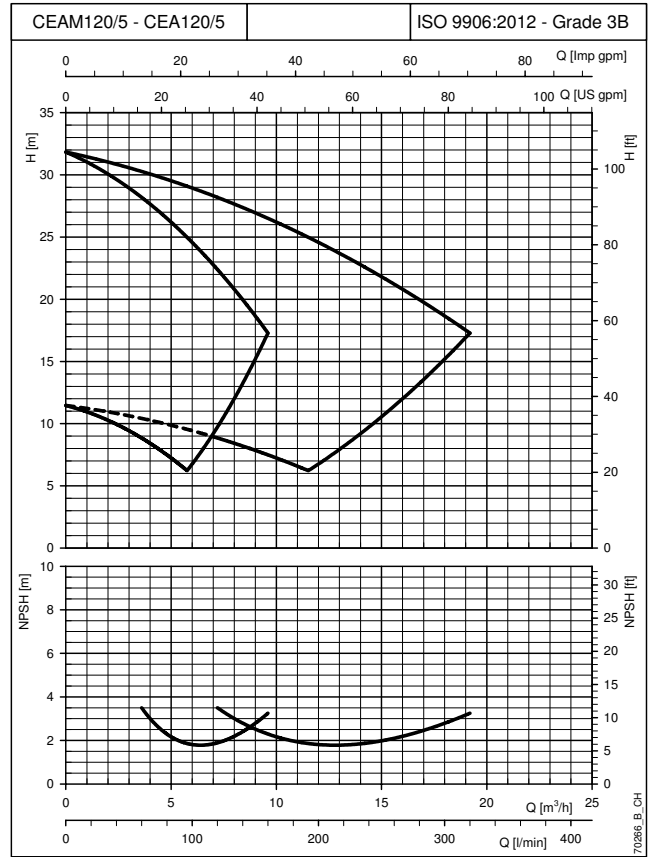
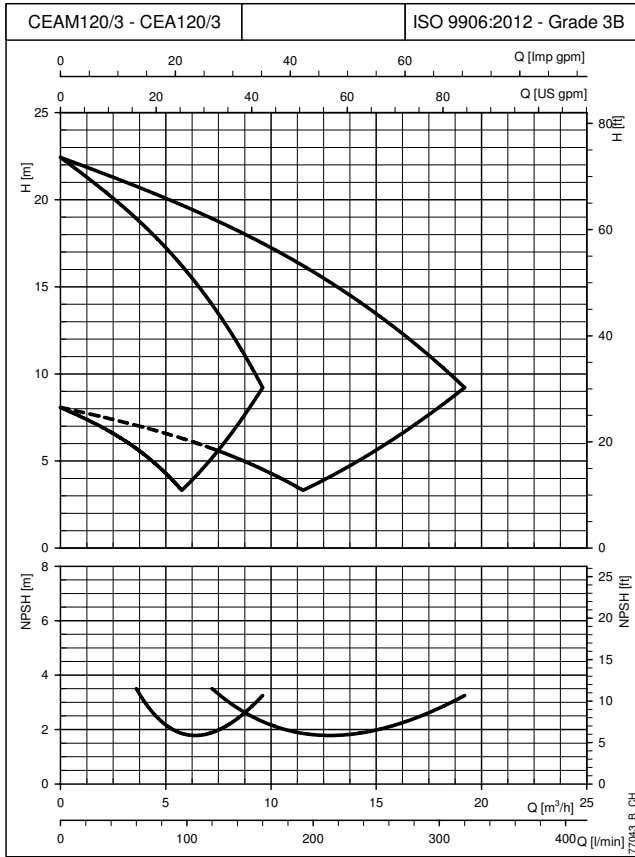
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TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 30..50 Hz



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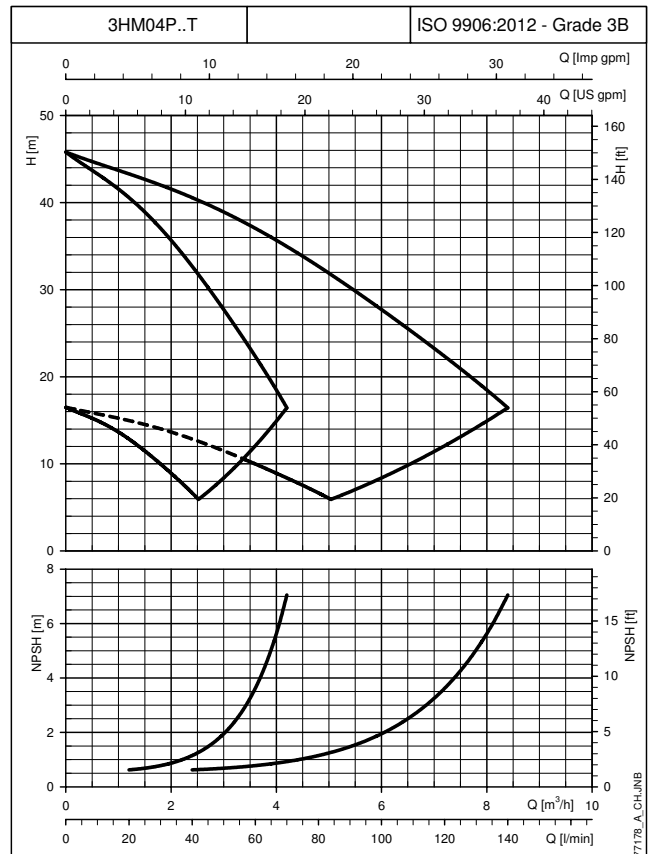
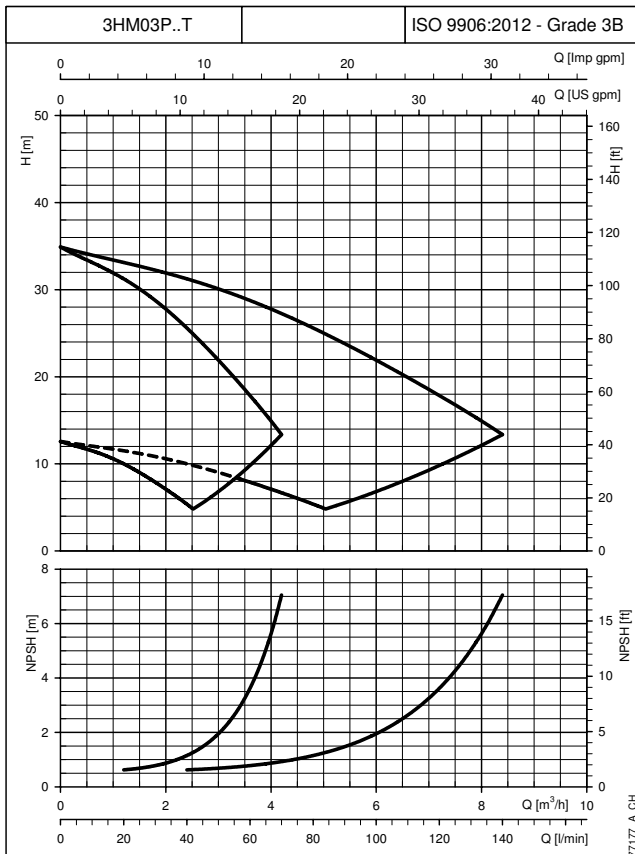
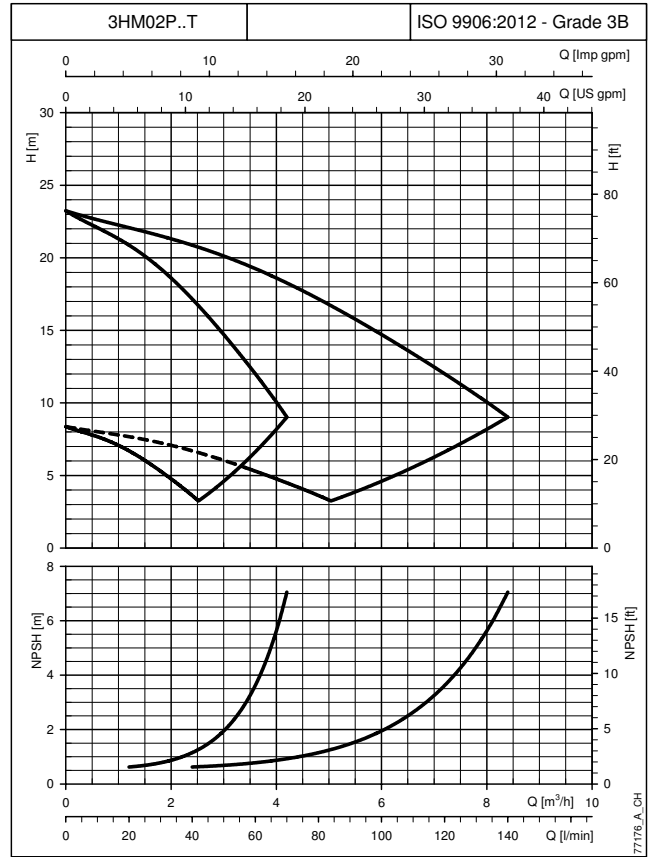
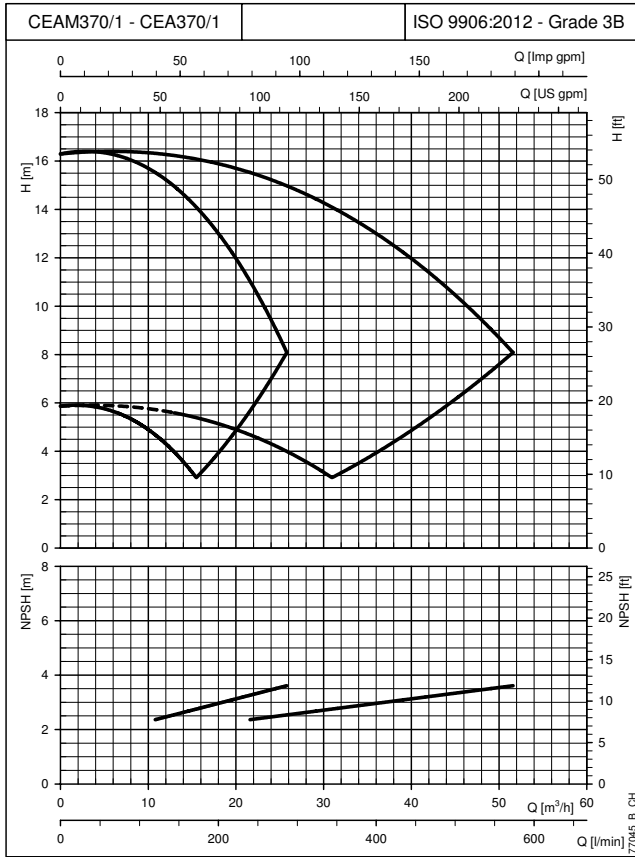
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 30..50 Hz



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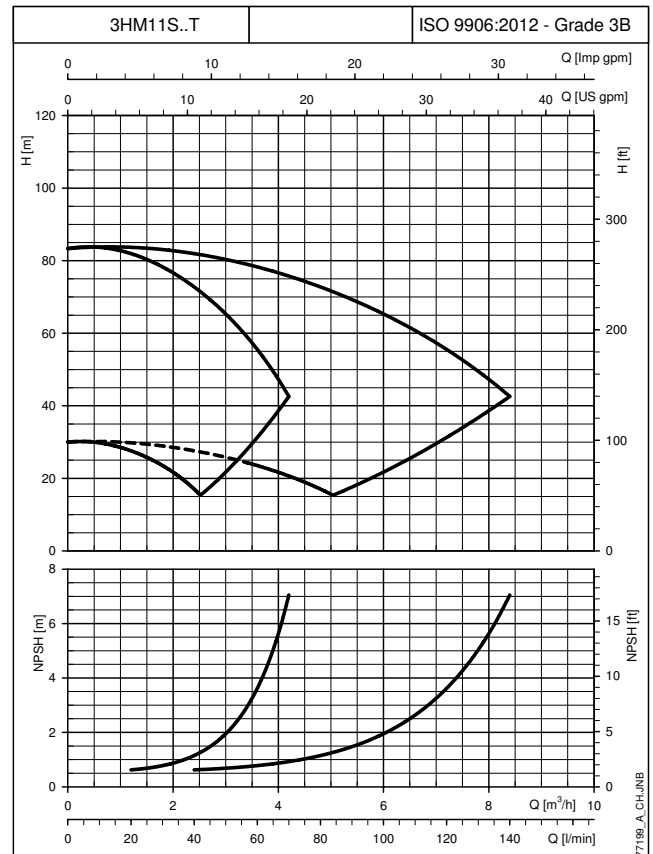
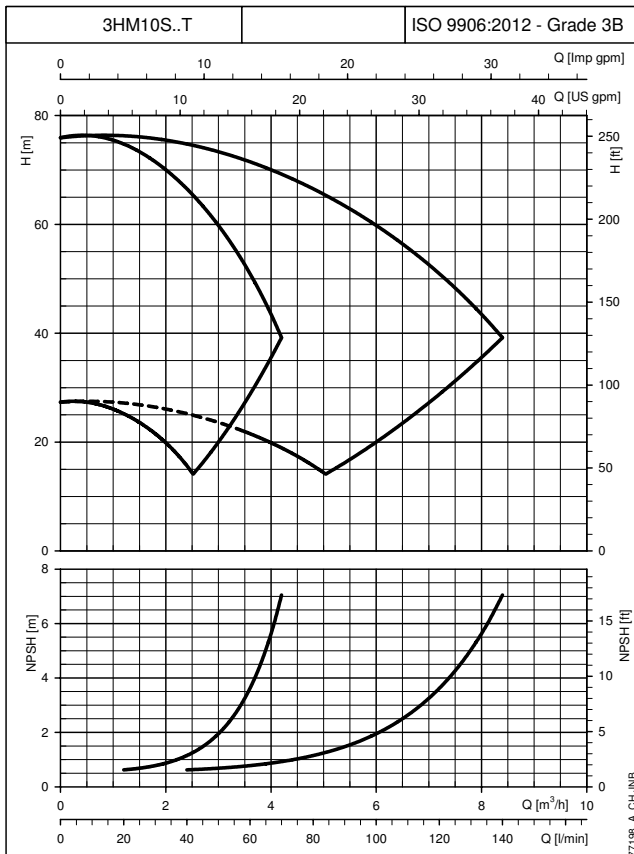
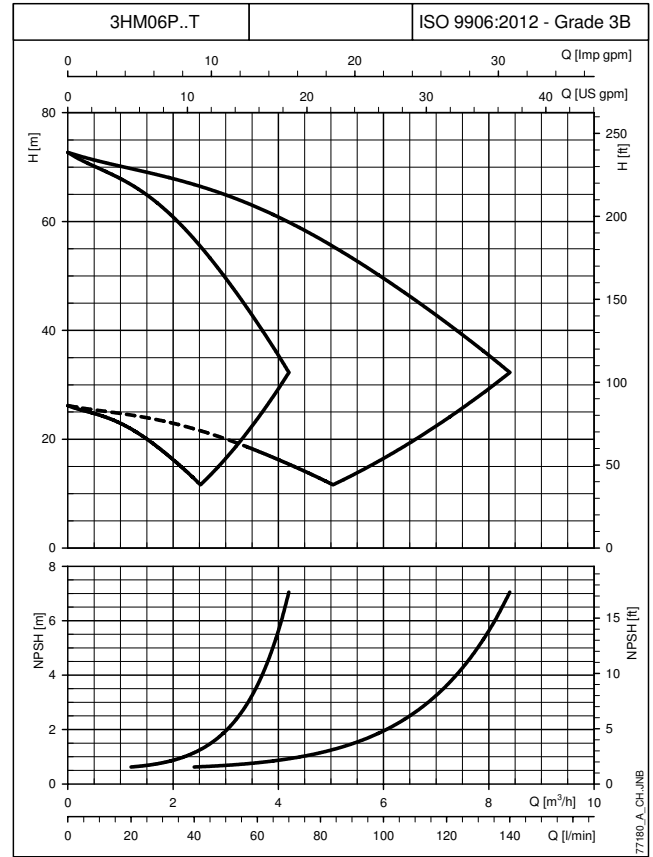
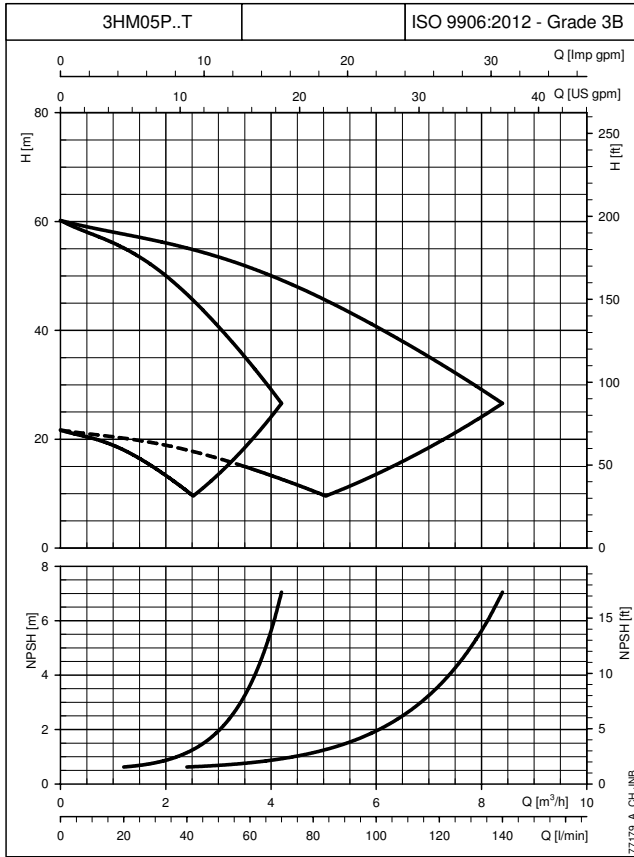
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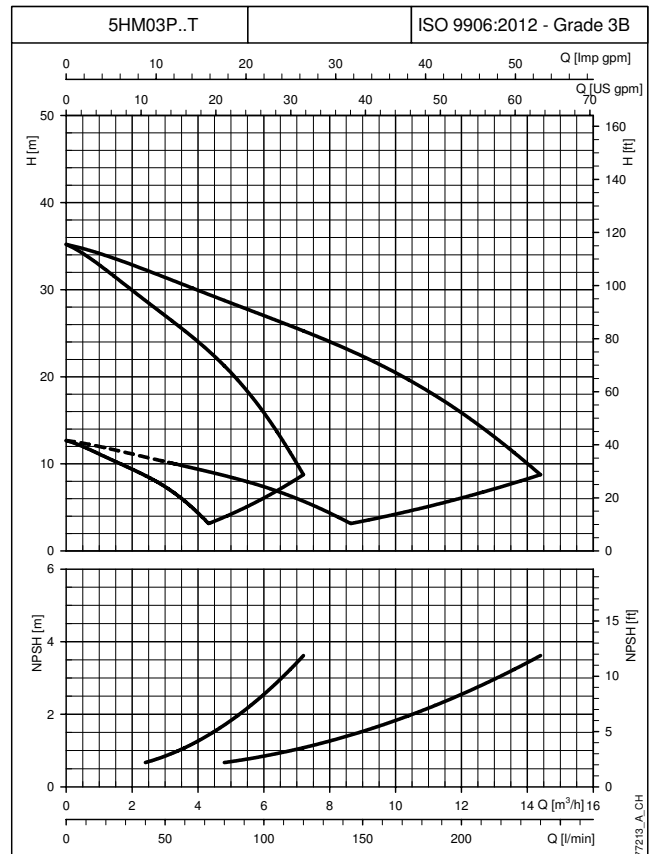
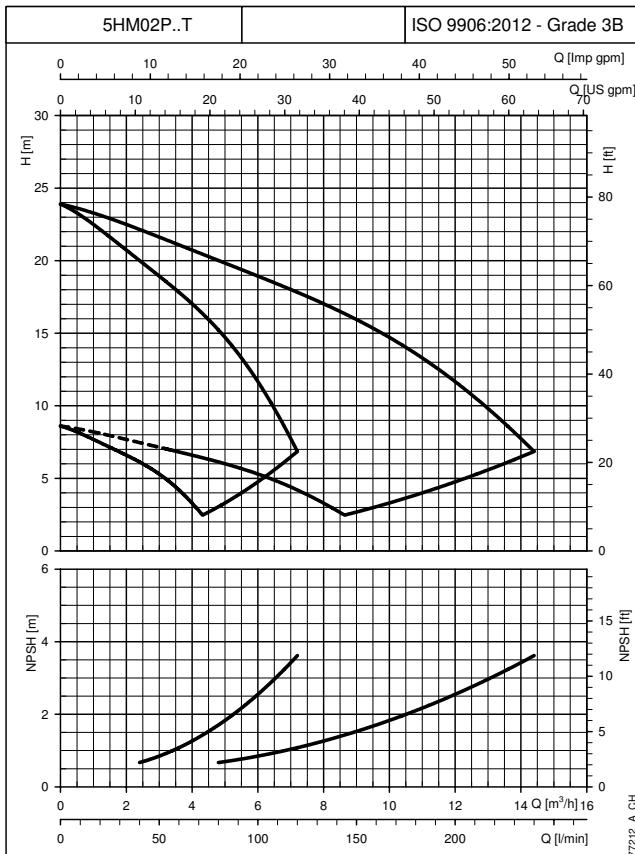
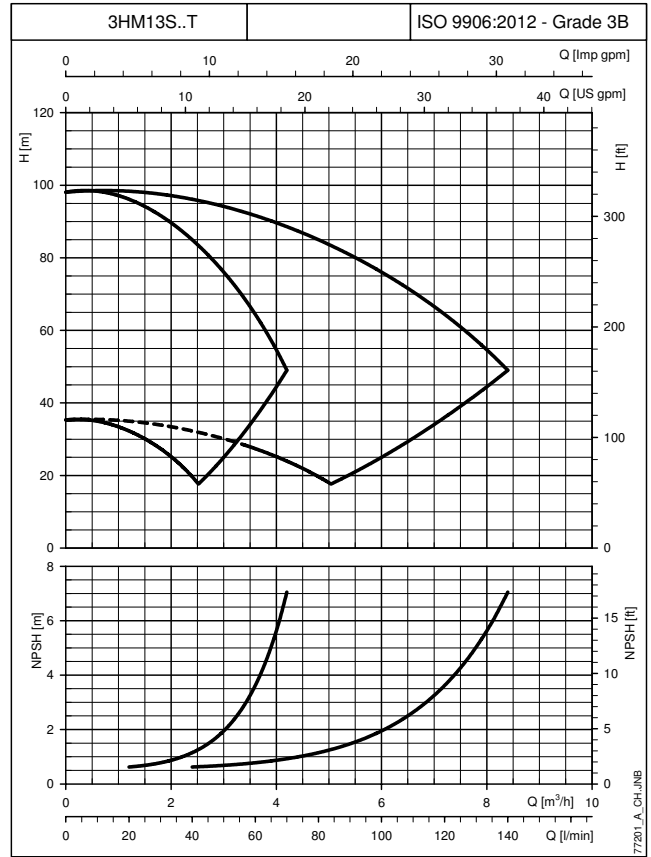
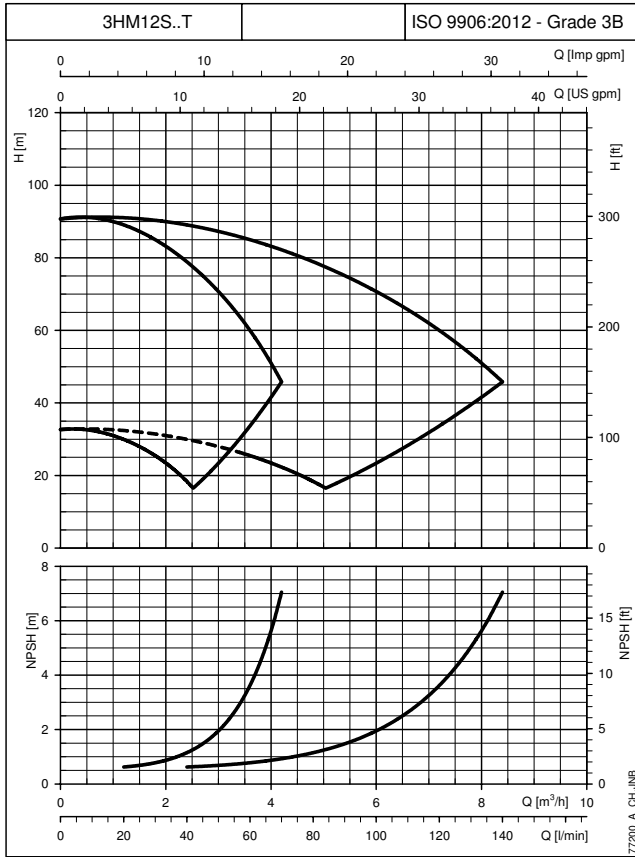
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 30..50 Hz



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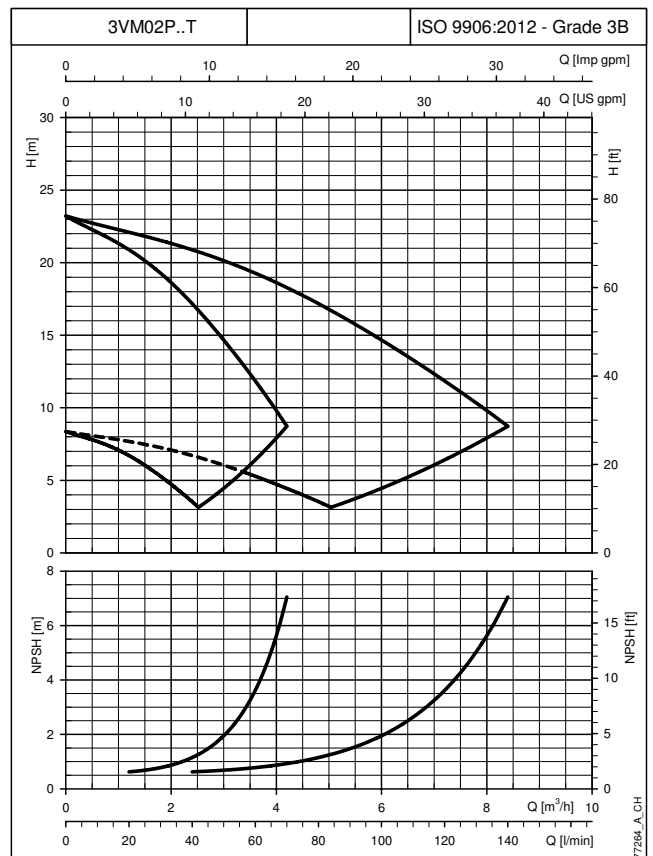
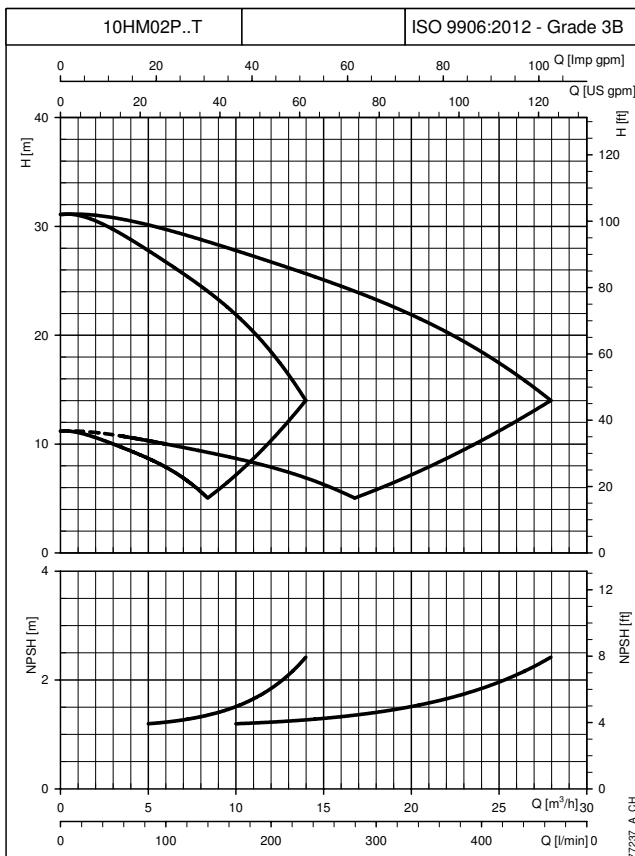
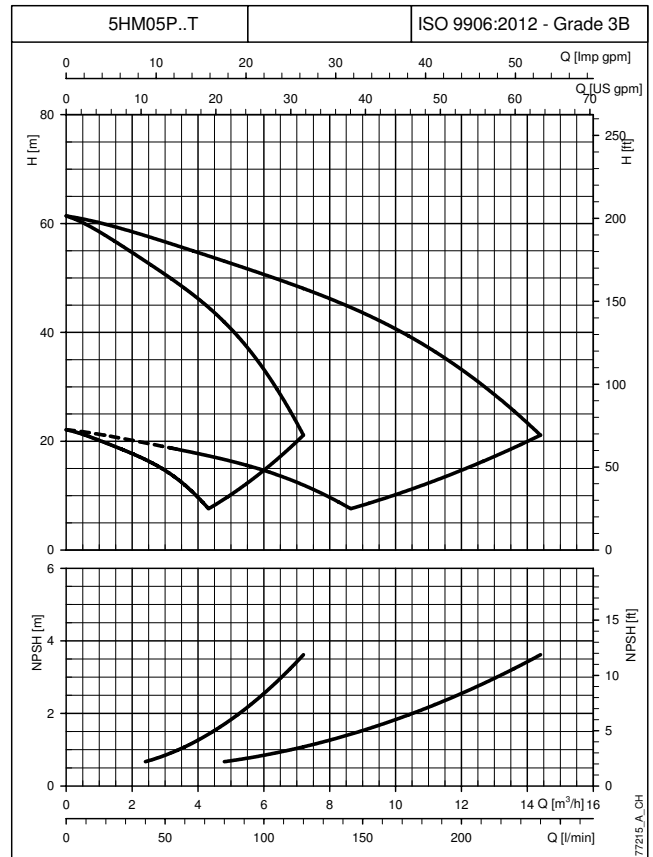
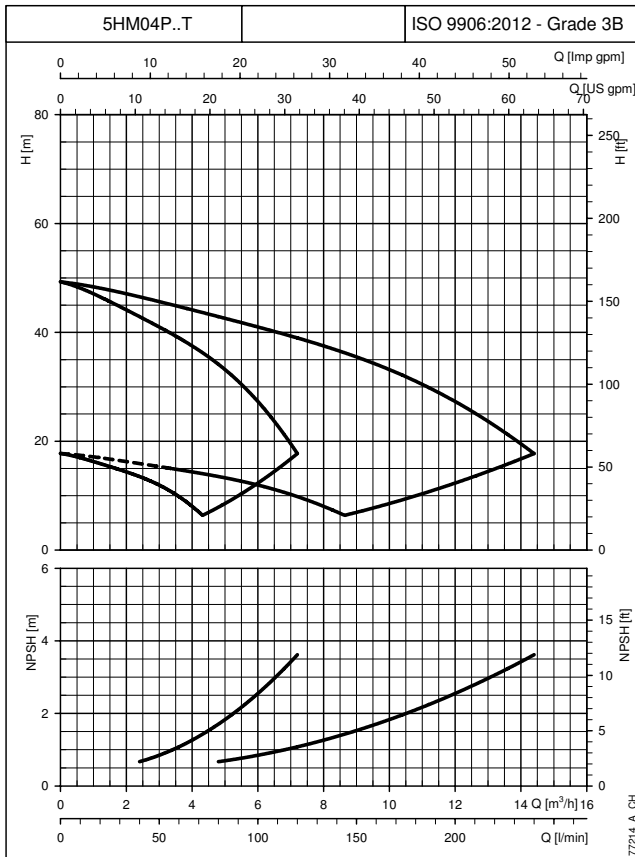
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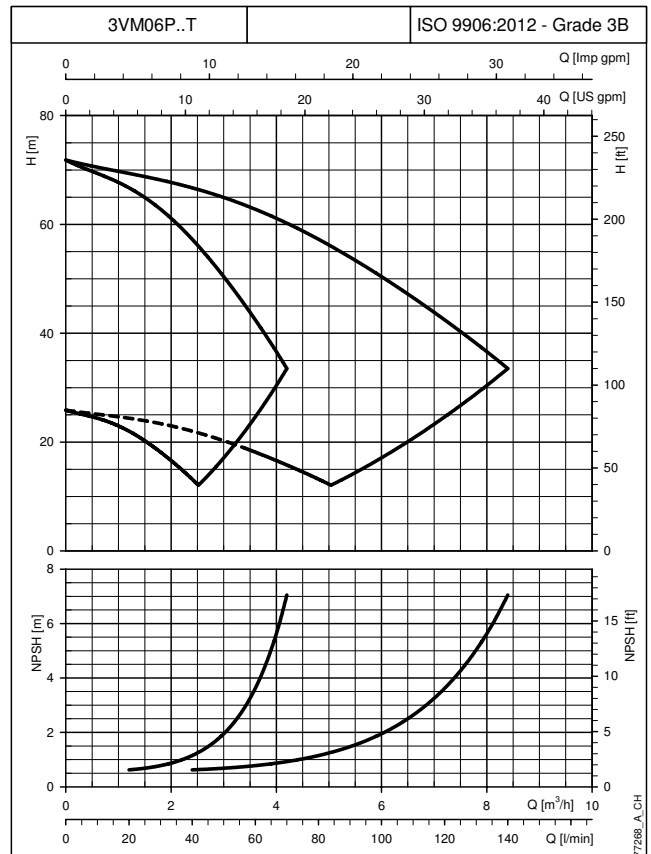
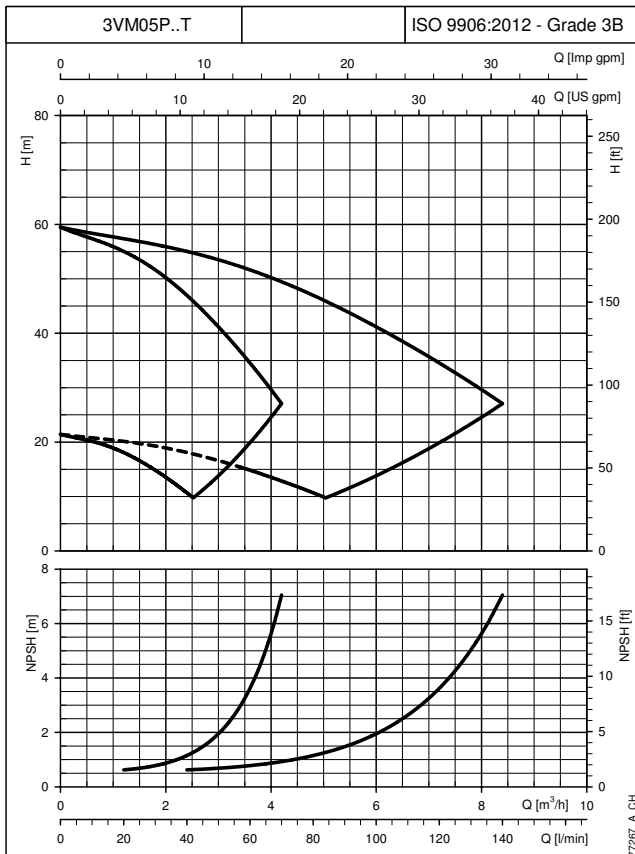
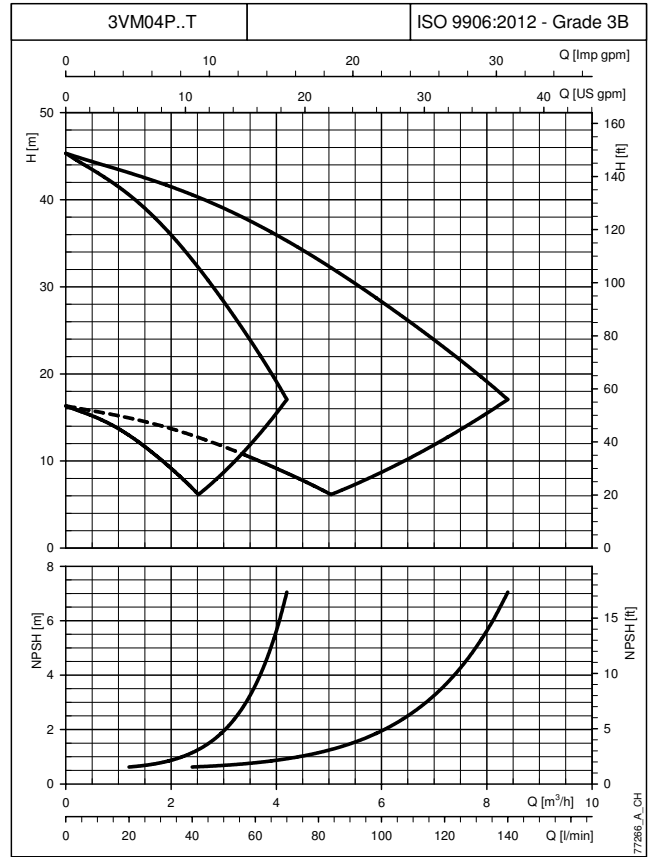
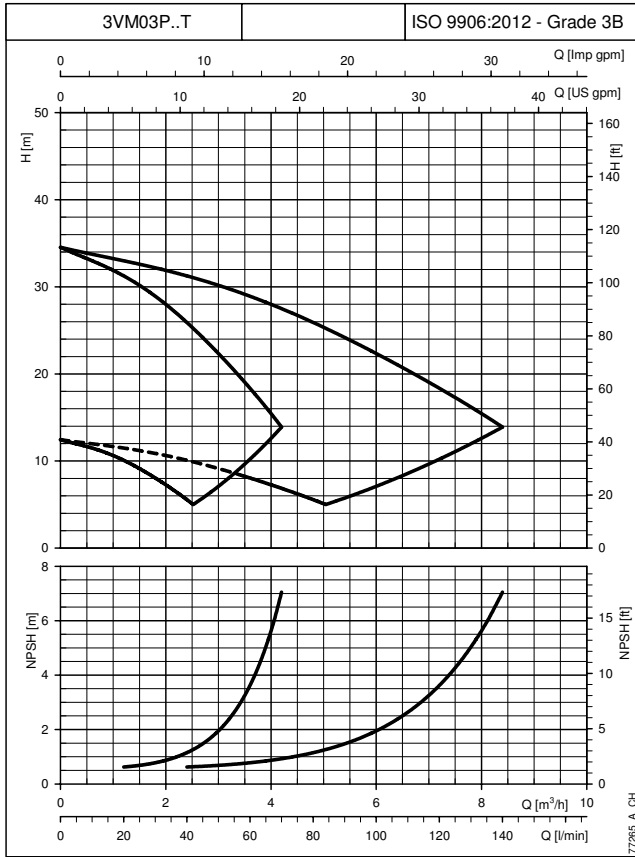
TWO-PUMP BOOSTER SETS OPERATING CHARACTERISTICS AT 30..50 Hz



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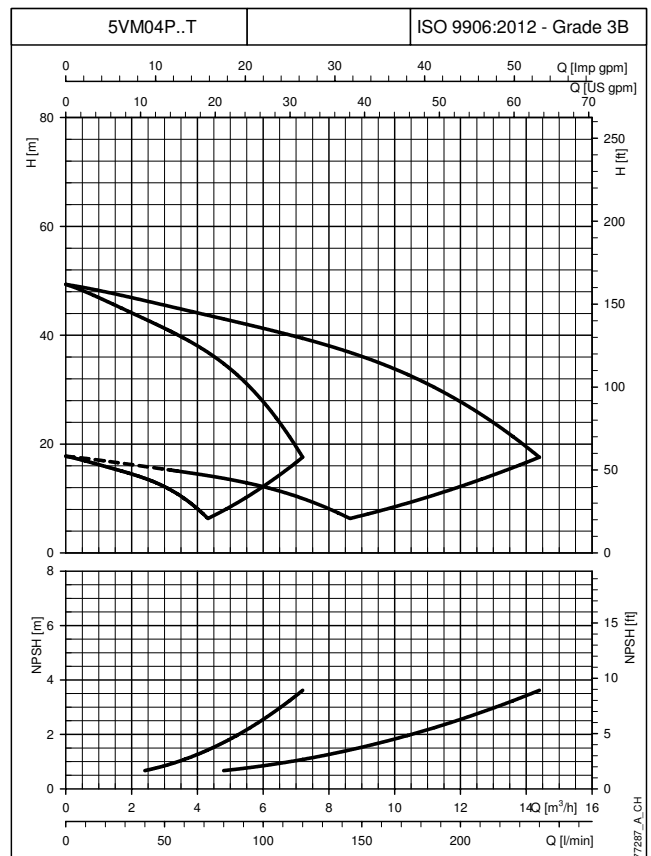
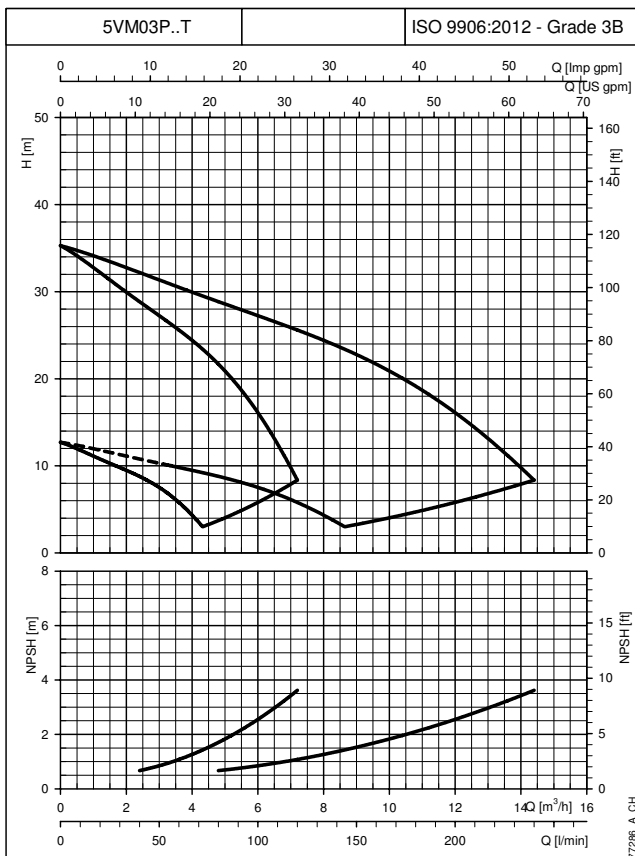
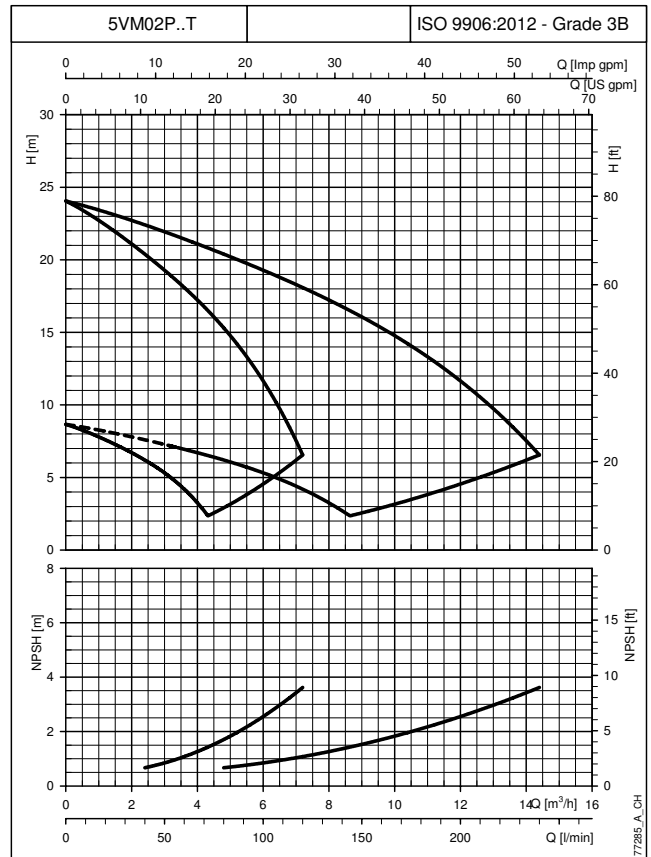
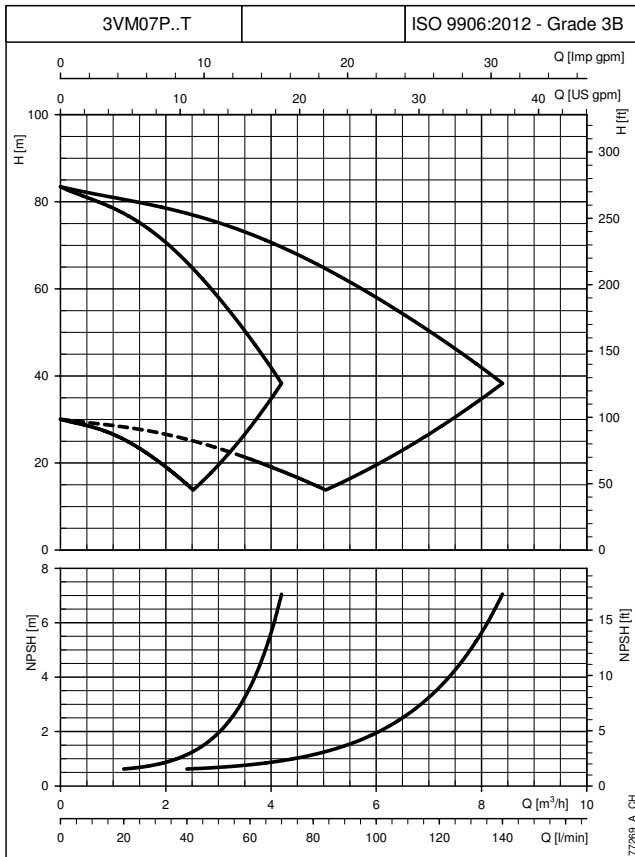
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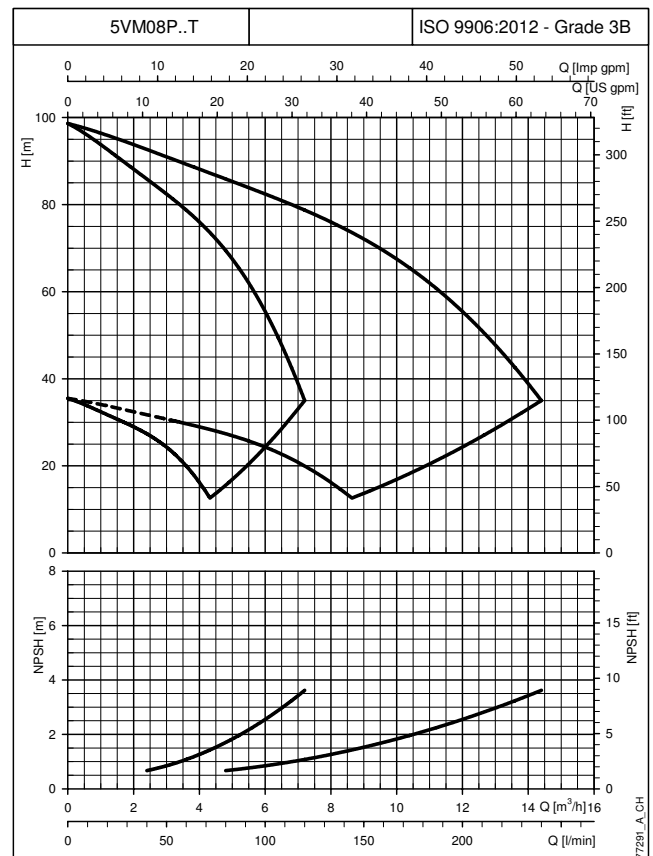
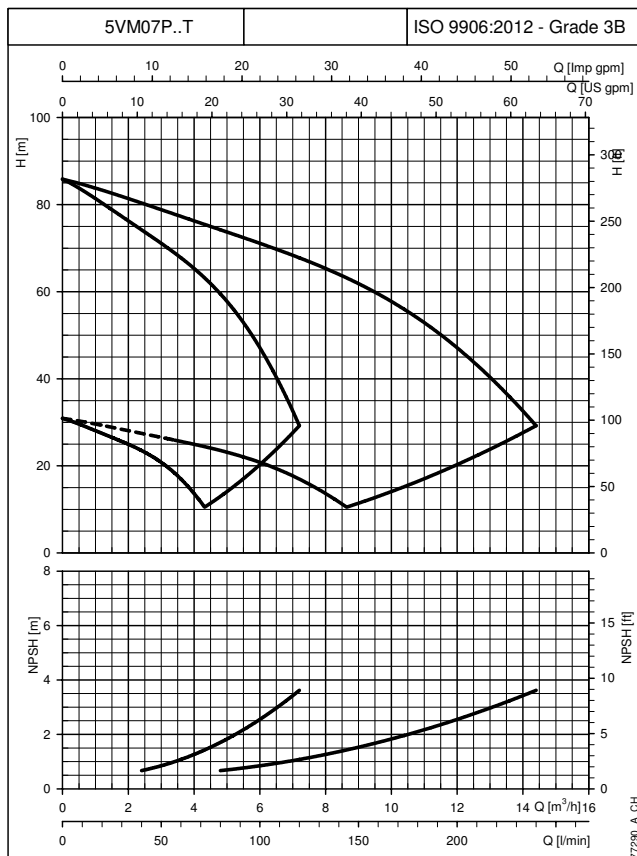
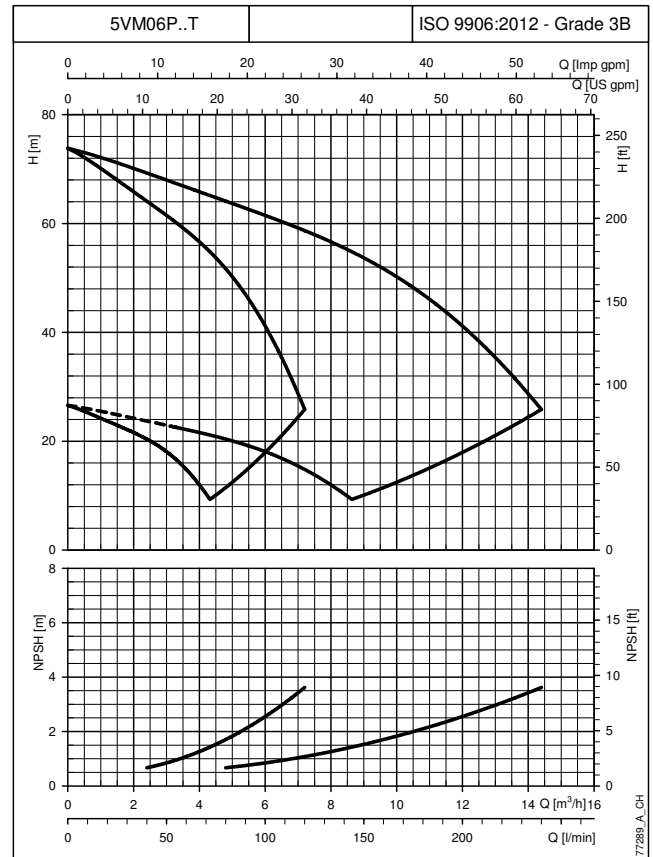
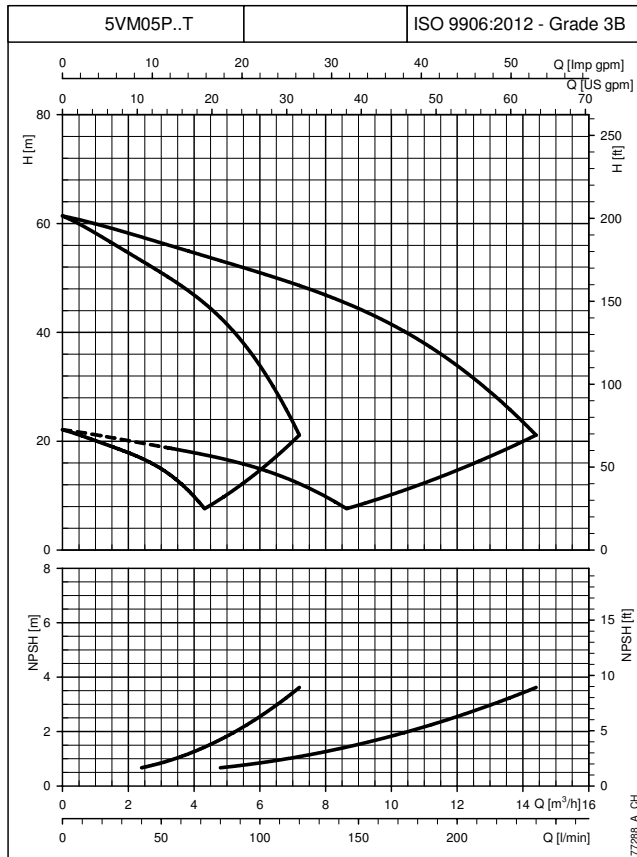
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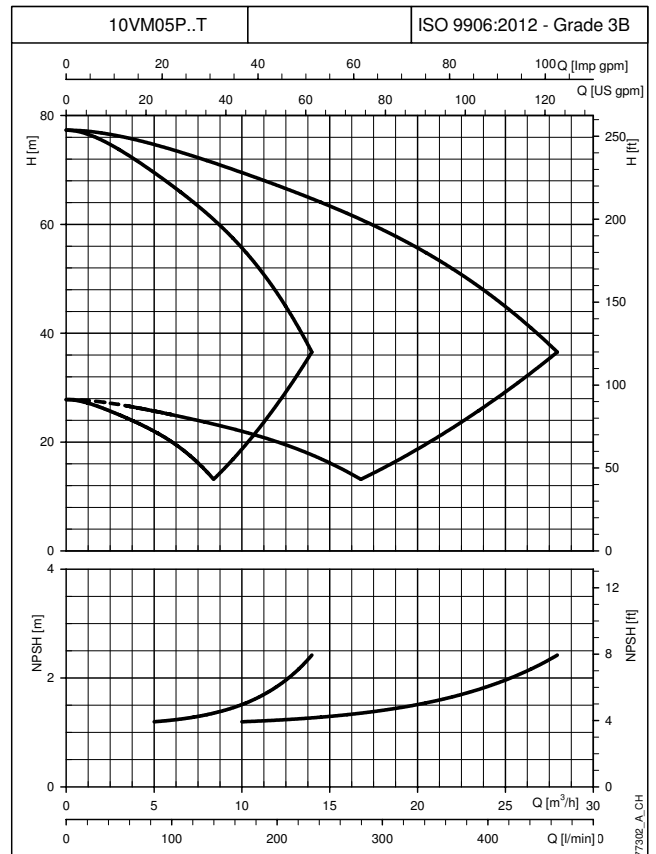
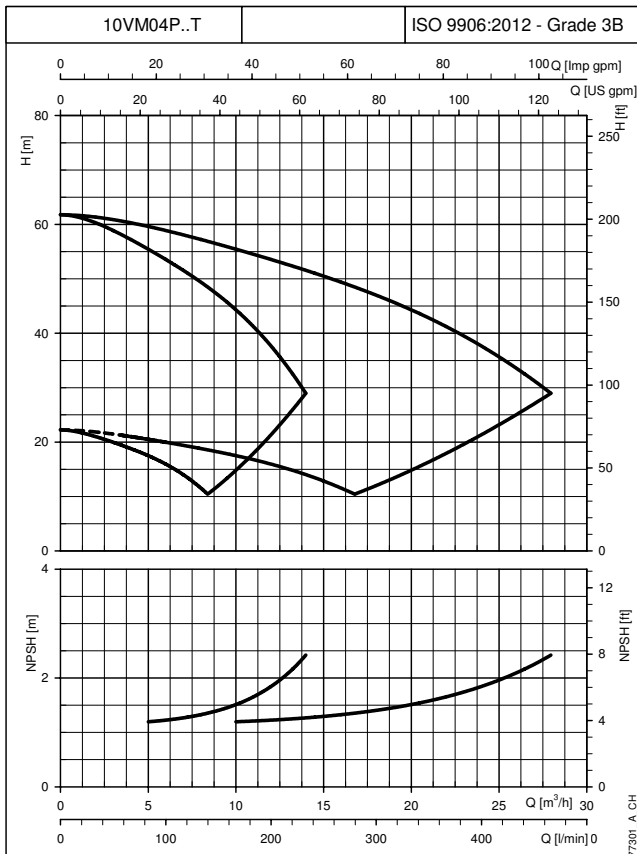
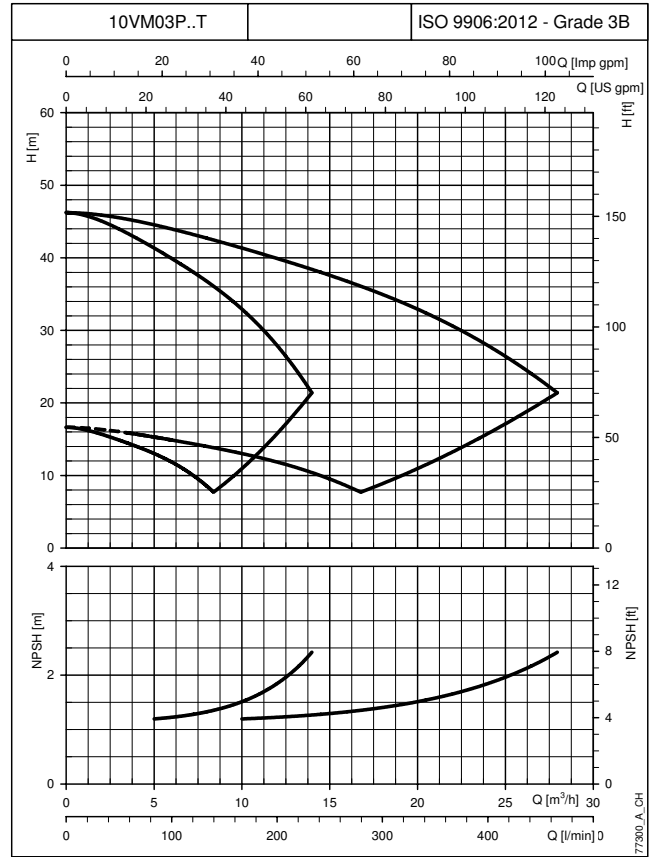
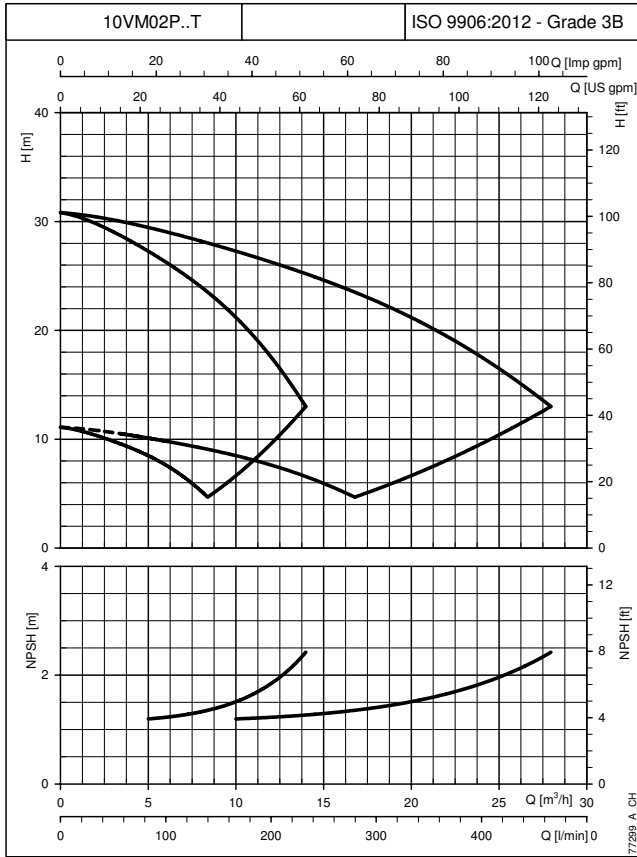
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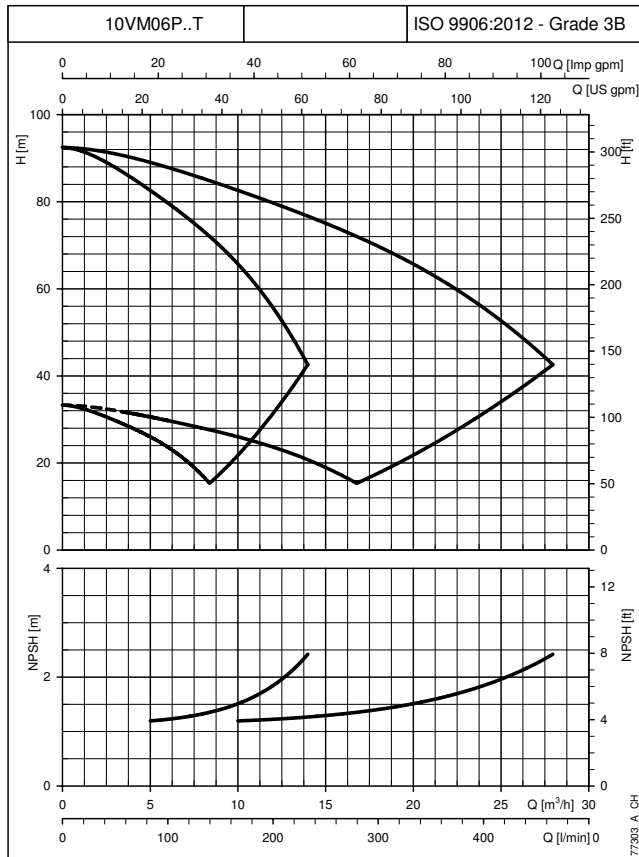
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TECHNICAL APPENDIX

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.

$$f = \frac{1}{\sqrt{(0,857 \times N_r \times N_a)}} \quad \text{Coefficient for apartments with one bathroom and flush tank WC}$$

$$f = \frac{1}{\sqrt{(0,857 \times N_r \times N_a)}} \quad \text{Coefficient for apartments with one bathroom and controlled flushing system WC}$$

$$f = \frac{1,03}{\sqrt{(0,545 \times N_r \times N_a)}} \quad \text{Coefficient for apartments with two bathrooms and flush tank WC}$$

$$f = \frac{0,8}{\sqrt{(0,727 \times N_r \times N_a)}} \quad \text{Coefficient for apartments with two bathrooms and controlled flushing system WC}$$

f = coefficient; N_r = number of delivery points; N_a = 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

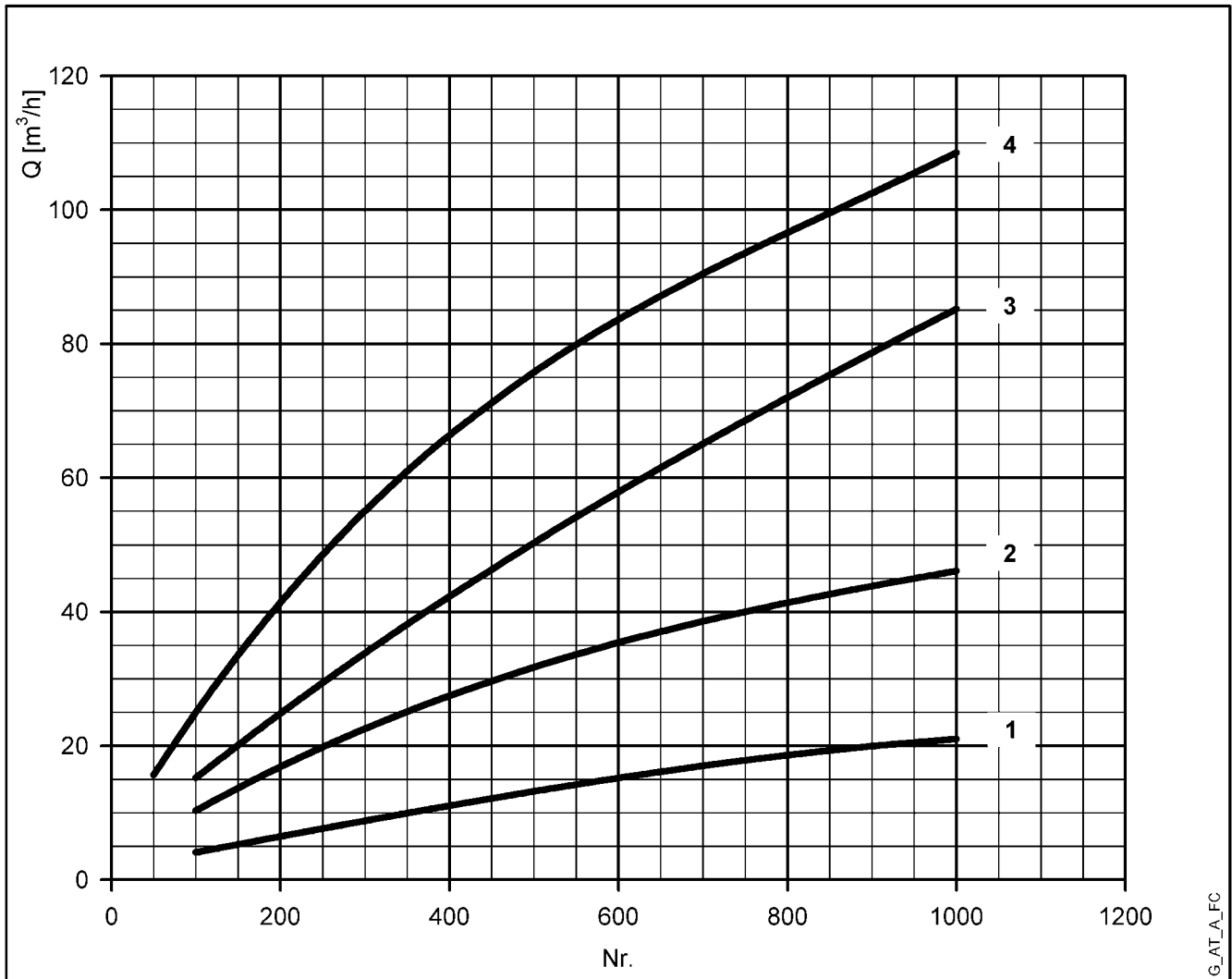
For seaside resorts, a flow rate increased by at least 20% must be considered.

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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.

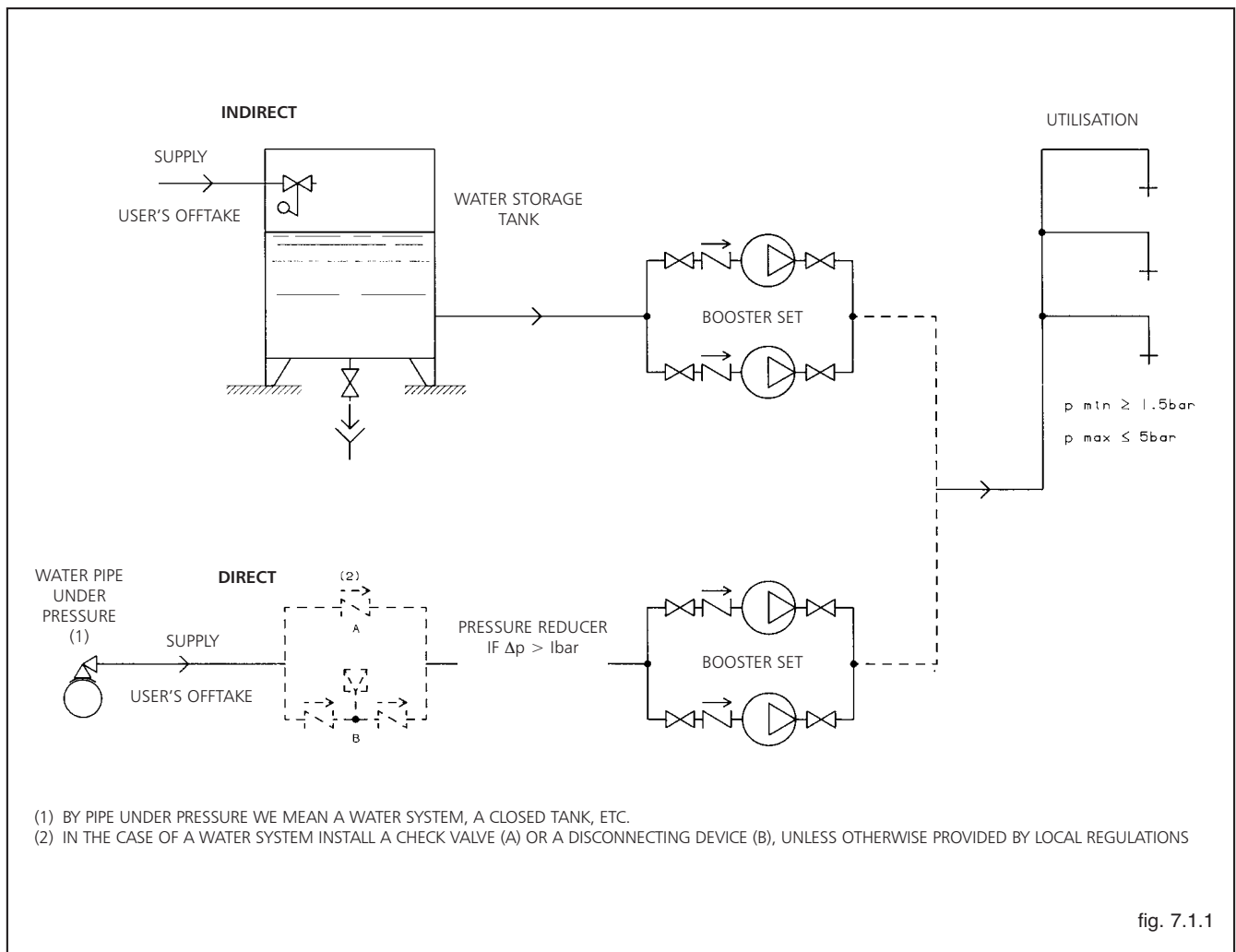


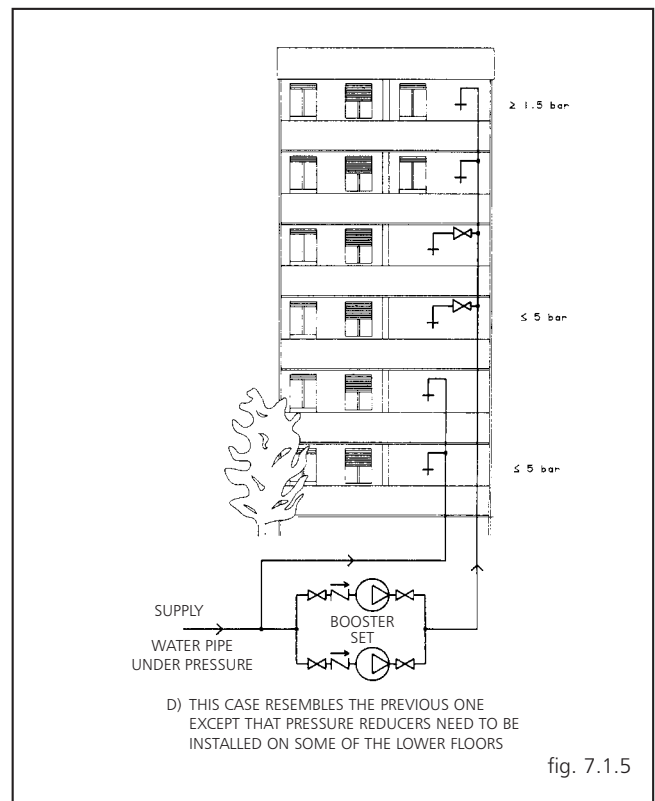
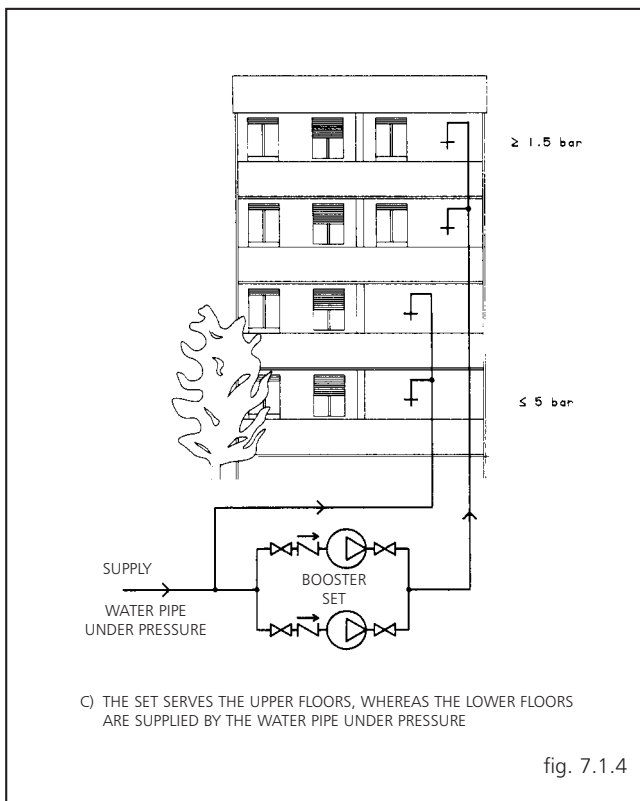
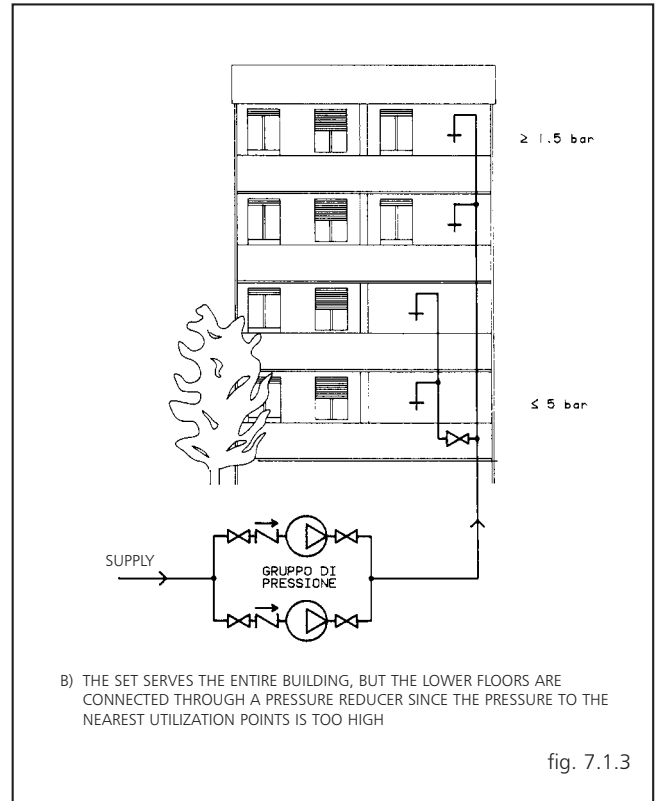
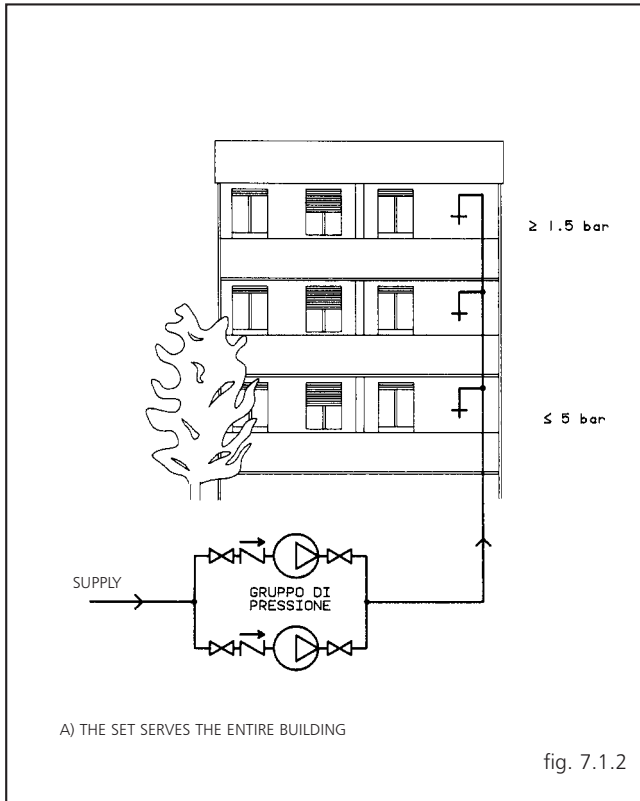
fig. 7.1.1

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:



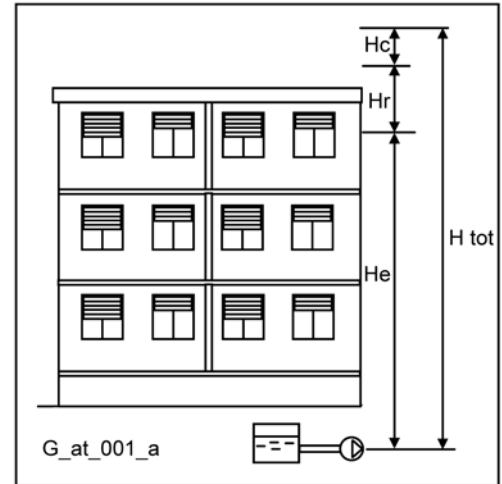
DETERMINING THE HEAD OF THE SET AND INTAKE CONDITIONS

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.

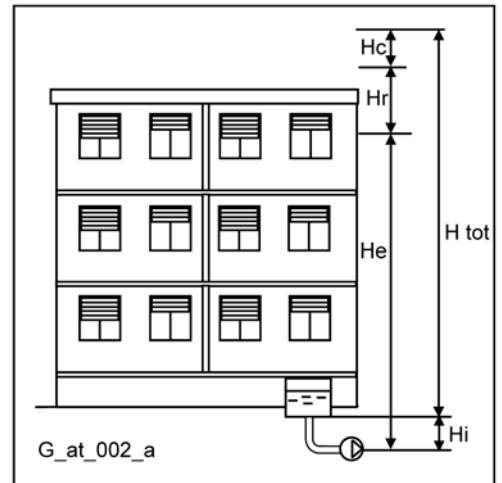
$$H_{tot} = H_e + H_c + H_r$$



Intake with positive head

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

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

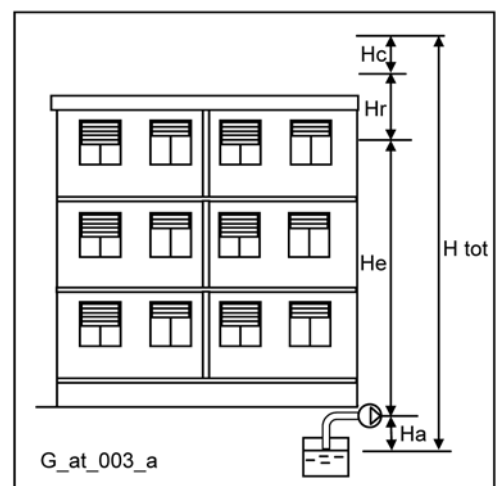


Intake with negative head

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

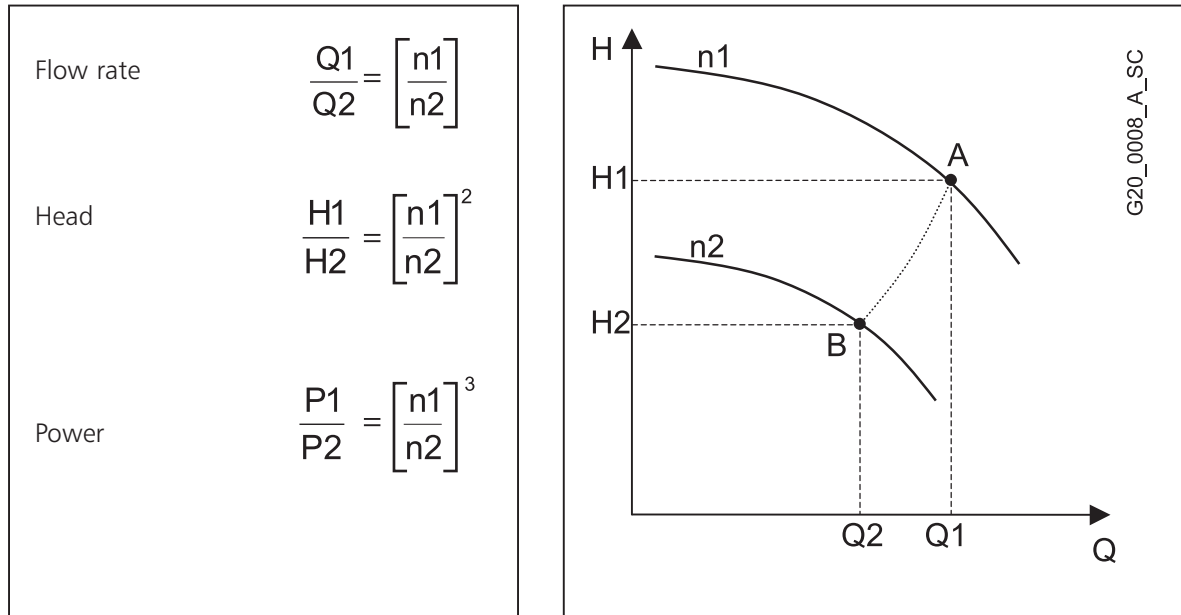
$$H_{tot} = H_e + H_c + H_r + H_a$$

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.



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.

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:

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

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 152-153 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.

VAPOUR PRESSURE

VAPOUR PRESSURE p_s AND ρ DENSITY OF WATER TABLE

t °C	T K	p_s bar	ρ kg/dm ³	t °C	T K	p_s bar	ρ kg/dm ³	t °C	T K	p_s 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	433,15	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.

AIR-CUSHION SURGE TANK

It is determined in relation to flow rate, pump pressure, and number of starts per hour allowed by the motor.

$$V_a = \frac{1,25 \times Q_p \times (P_{\max} + 10)}{4 \times Z \times (P_{\max} - P_{\min})}$$

where:

V_a = 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

Warning! By pump flow rate we mean the average between the flow rate at the maximum pressure switch setting ($Q_{\max}$) and the flow rate at the minimum pressure switch setting ($Q_{\min}$), i.e.:

$$Q_p = \frac{Q_{\max} + Q_{\min}}{2} \quad (m^3/h)$$

Example:

CN 32 - 160/22 pump
 $P_{\max}$ = 32 mca
 $P_{\min}$ = 22 mca
 Q_p = 18 m^3/h
 Z = 30

$$V_a = \frac{1,25 \times 18 \times (32 + 10)}{4 \times 30 \times (32 - 22)} = 0,788 m^3$$

A 750-litre surge tank is therefore required.

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

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

A 500-litre surge tank is therefore required.

Approximate comparison between Lowara air-cushion tanks and diaphragm tanks, as regards some pressure switch setting values

NOMINAL CAPACITY OF AIR CUSHION TANK (litres)	PRESSURE SWITCH SETTING (bar) min/max									
	1,5/2,5	2/3	2,5/3,5	3/4	3,5/4,5	4/5	4,5/5,5	5/6	5,5/6,5	6/7
	NOMINAL CAPACITY OF DIAPHRAGM VESSEL (litres)									
100	N°2 ball type vessels/cylinder type vessels or 60l Export tank or 100-litre vessels (ISPESL tested)									
200	100									
300	200									
500	300									
1000	500									
1500	500 + 200		500 + 300							
2000	500 + 500									
2500	500 + 500	500 + 500 + 300								500 + 500 + 500

s_swp-en_a_th

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																	
m³/h	l/min		15 1/2"	20 3/4"	25 1"	32 1 1/4"	40 1 1/2"	50 2"	65 2 1/2"	80 3"	100 4"	125 5"	150 6"	175 7"	200 8"	250 10"	300 12"	350 14"	400 16"	
0,6	10	v hr	0,94 16	0,53 3,94	0,34 1,33	0,21 0,40	0,13 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											
0,9	15	v hr	1,42 33,9	0,80 8,35	0,51 2,82	0,31 0,85	0,20 0,29													
1,2	20	v hr	1,89 57,7	1,06 14,21	0,68 4,79	0,41 1,44	0,27 0,49	0,17 0,16												
1,5	25	v hr	2,36 87,2	1,33 21,5	0,85 7,24	0,52 2,18	0,33 0,73	0,21 0,25												
1,8	30	v hr	2,83 122	1,59 30,1	1,02 10,1	0,62 3,05	0,40 1,03	0,25 0,35												
2,1	35	v hr	3,30 162	1,86 40,0	1,19 13,5	0,73 4,06	0,46 1,37	0,30 0,46												
2,4	40	v hr		2,12 51,2	1,36 17,3	0,83 5,19	0,53 1,75	0,34 0,59		0,20 0,16										
3	50	v hr		2,65 77,4	1,70 26,1	1,04 7,85	0,66 2,65	0,42 0,89		0,25 0,25										
3,6	60	v hr		3,18 108	2,04 36,6	1,24 11,0	0,80 3,71	0,51 1,25		0,30 0,35										
4,2	70	v hr		3,72 144	2,38 48,7	1,45 14,6	0,93 4,93	0,59 1,66		0,35 0,46										
4,8	80	v hr		4,25 185	2,72 62,3	1,66 18,7	1,06 6,32	0,68 2,13		0,40 0,59										
5,4	90	v hr			3,06 77,5	1,87 23,3	1,19 7,85	0,76 2,65		0,45 0,74	0,30 0,27									
6	100	v hr			3,40 94,1	2,07 28,3	1,33 9,54	0,85 3,22		0,50 0,90	0,33 0,33									
7,5	125	v hr			4,25 142	2,59 42,8	1,66 14,4	1,06 4,86		0,63 1,36	0,41 0,49									
9	150	v hr				3,11 59,9	1,99 20,2	1,27 6,82		0,75 1,90	0,50 0,69	0,32 0,23								
10,5	175	v hr				3,63 79,7	2,32 26,9	1,49 9,07		0,88 2,53	0,58 0,92	0,37 0,31								
12	200	v hr				4,15 102	2,65 34,4	1,70 11,6		1,01 3,23	0,66 1,18	0,42 0,40								
15	250	v hr				5,18 154	3,32 52,0	2,12 17,5		1,26 4,89	0,83 1,78	0,53 0,60	0,34 0,20							
18	300	v hr					3,98 72,8	2,55 24,6		1,51 6,85	1,00 2,49	0,64 0,84	0,41 0,28							
24	400	v hr					5,31 124	3,40 41,8		2,01 11,66	1,33 4,24	0,85 1,43	0,54 0,48	0,38 0,20						
30	500	v hr					6,63 63,2	4,25 17,6		2,51 6,41	1,66 2,16	1,06 2,16	0,68 0,73	0,47 0,30						
36	600	v hr						5,10 88,6		3,02 24,7	1,99 8,98	1,27 3,03	0,82 1,02	0,57 0,42	0,42 0,20					
42	700	v hr						5,94 118	3,52 32,8	2,32 11,9	1,49 4,03	0,95 1,36	0,66 0,56	0,49 0,26						
48	800	v hr						6,79 151	4,02 42,0	2,65 15,3	1,70 5,16	1,09 1,74	0,75 0,72	0,55 0,34						
54	900	v hr						7,64 188	4,52 52,3	2,99 19,0	1,91 6,41	1,22 2,16	0,85 0,89	0,62 0,42						
60	1000	v hr						5,03 63,5	3,32 23,1	2,12 7,79	1,36 2,63	0,94 1,08	0,69 0,51	0,53 0,27						
75	1250	v hr						6,28 96,0	4,15 34,9	2,65 11,8	1,70 3,97	1,18 1,63	0,87 0,77	0,66 0,40						
90	1500	v hr						7,54 134	4,98 48,9	3,18 16,5	2,04 5,57	1,42 2,29	1,04 1,08	0,80 0,56						
105	1750	v hr						8,79 179	5,81 65,1	3,72 21,9	2,38 7,40	1,65 3,05	1,21 1,44	0,93 0,75						
120	2000	v hr							6,63 83,3	4,25 28,1	2,72 9,48	1,89 3,90	1,39 1,84	1,06 0,96	0,68 0,32					
150	2500	v hr							8,29 126	5,31 42,5	3,40 14,3	2,36 5,89	1,73 2,78	1,33 1,45	0,85 0,49					
180	3000	v hr								6,37 59,5	4,08 20,1	2,83 8,26	2,08 3,90	1,59 2,03	1,02 0,69	0,71 0,28				
210	3500	v hr								7,43 79,1	4,76 26,7	3,30 11,0	2,43 5,18	1,86 2,71	1,19 0,91	0,83 0,38				
240	4000	v hr								8,49 101	5,44 34,2	3,77 14,1	2,77 6,64	2,12 3,46	1,36 1,17	0,94 0,48				
300	5000	v hr									6,79 51,6	4,72 21,2	3,47 10,0	2,65 5,23	1,70 1,77	1,18 0,73				
360	6000	v hr									8,15 72,3	5,66 29,8	4,16 14,1	3,18 7,33	2,04 2,47	1,42 1,02				
420	7000	v hr										6,61 39,6	4,85 18,7	3,72 9,75	2,38 3,29	1,65 1,35	1,21 0,64			
480	8000	v hr										7,55 50,7	5,55 23,9	4,25 12,49	2,72 4,21	1,89 1,73	1,39 0,82			
540	9000	v hr										8,49 63,0	6,24 29,8	4,78 15,5	3,06 5,24	2,12 2,16	1,56 1,02	1,19 0,53		
600	10000	v hr											6,93 36,2	5,31 18,9	3,40 6,36	2,36 2,62	1,73 1,24	1,33 0,65		

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 manufacturers.

Air supply unit

The most commonly used air supply unit model is the "depression" type, which uses the depression produced by the pump suction.

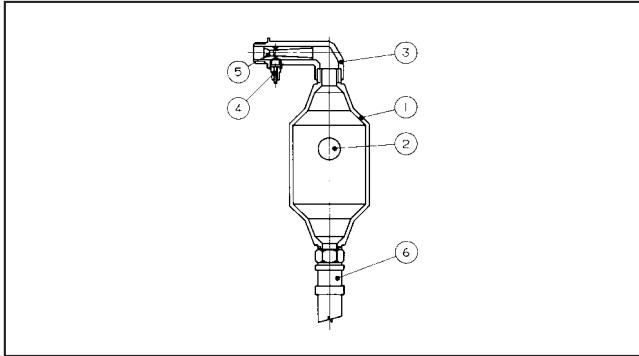


fig. 7.2.2 - The air supply unit consists of a body made of plastic material suitable for foodstuffs (1), a spherical rubber shutter (2), an upper brass union (3) with an air valve (4), a Venturi tube (5), and a flexible pipe (6) to be connected to the pump intake.

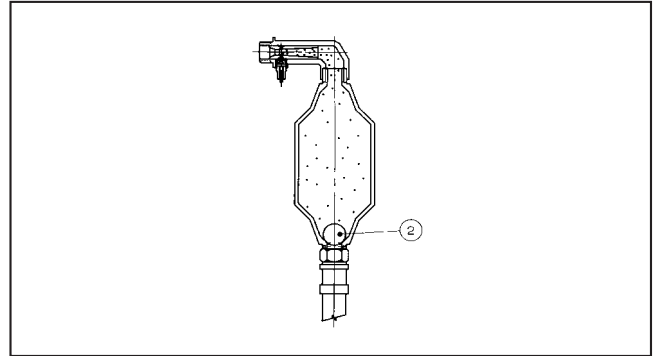


fig. 7.2.5 - The air accumulated inside the body pushes the rubber ball (2) to the bottom, thus blocking the passage. At this point the valve closes and the rubber ball prevents the air accumulated inside the body of the air supply unit from reaching the pump intake.

Air supply unit operation

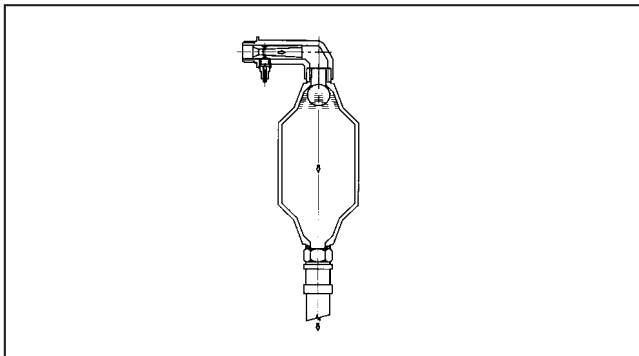


fig. 7.2.3 - When the pump starts up, the intake pressure is lower than the pressure in the surge tank. This difference causes water to flow from the surge tank to the pump intake, through the air supply unit.

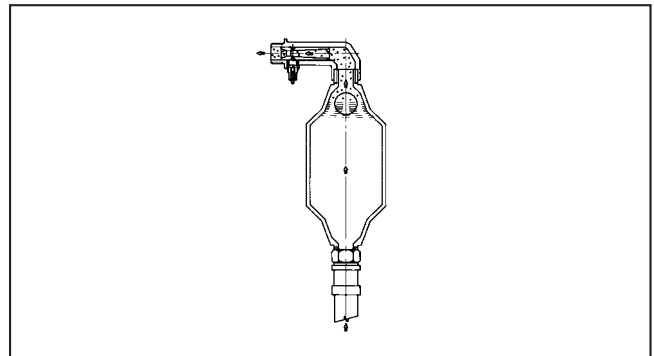


fig. 7.2.6 - When the pump stops the depression ceases and a flow of water is produced, which lifts the ball and pushes the air in the body of the supply unit into the tank.

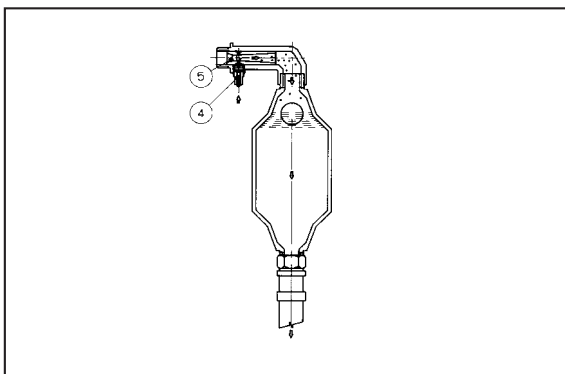


fig. 7.2.4 - The flow of water that passes through the Venturi tube (5) generates a depression and allows the opening of the air valve (4). As a consequence, air enters the body of the supply unit.

Air supply unit selection tank

TANK CAPACITY L	AVERAGE PRESSURE SETTING bar					
	2.5	3.5	4.5	5.5	6.5	7.5
100	LOW 5					
200						
300						
500						
700	LOW 10					
1000						
1500						
2000						
2500	LOW 25					
3000						
4000						
5000						
6000	LOW 40					

g_air-en_a_th

This cycle is repeated each time the pump starts up until the required quantity of air has accumulated. To ensure proper system operation, no check valve must be mounted between the pump delivery outlet and the surge tank, as it would impede the return flow of water through the pump.

ACCESSORIES/SPARE PARTS



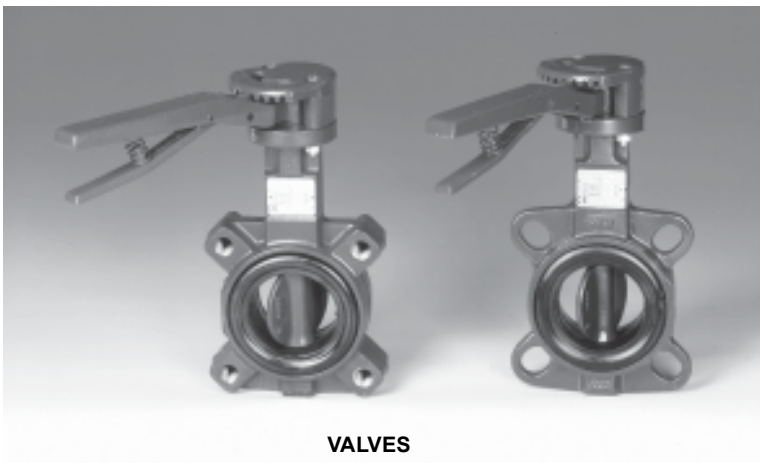
HYDRO TUBE



PRESSURE SWITCH



FLOAT SWITCHES



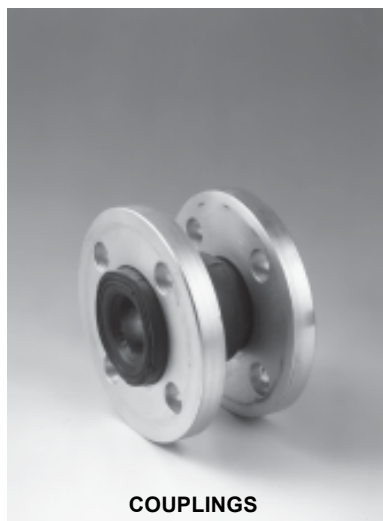
VALVES



OPTICAL SENSORS



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

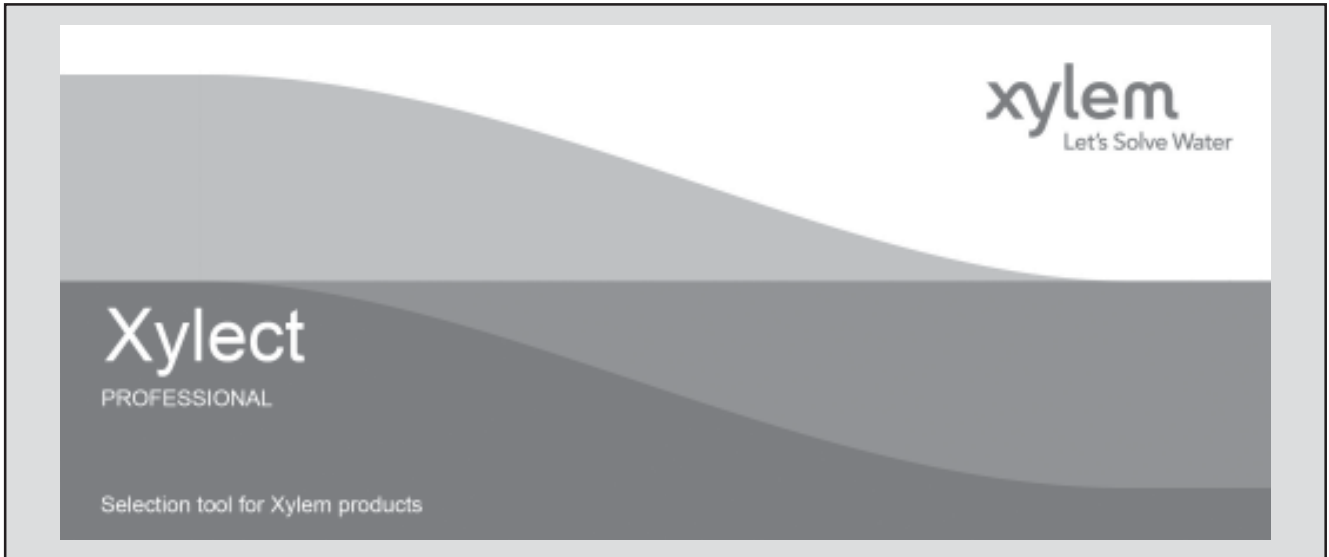
VOLUME

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

G-at_pp-en_a_sc

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.

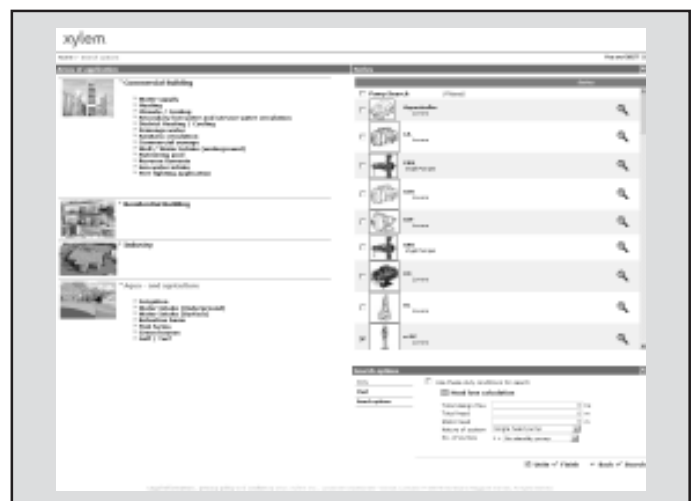
The possibility to search by applications and the detailed information output given makes it easy to make the optimal selection without having detailed knowledge about the Lowara and Vogel products.

The search can be made by:

- Application
- Product type
- Duty point

Xylect™ gives a detailed output:

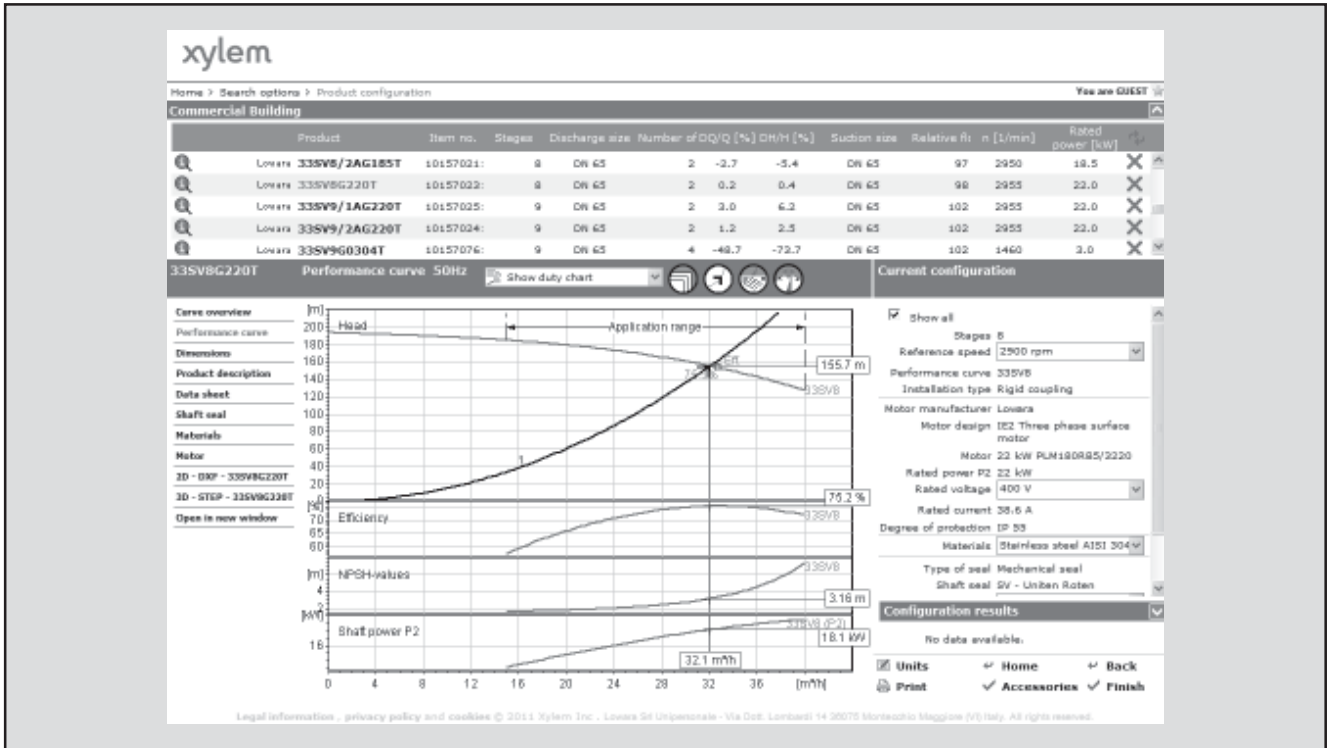
- List with search results
- Performance curves (flow, head, power, efficiency, NPSH)
- Motor data
- Dimensional drawings
- Options
- Data sheet printouts
- Document downloads incl dxf files



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

FURTHER PRODUCT SELECTION AND DOCUMENTATION

Xylect™



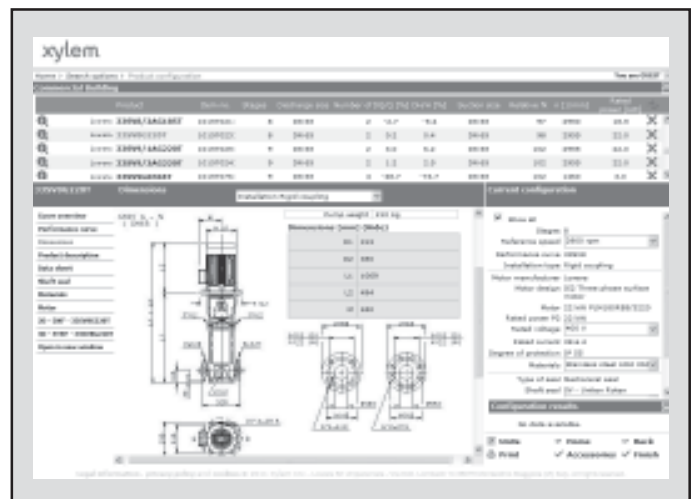
The detailed output makes it easy to select the optimal pump from the given alternatives.

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 WITH BG PUMPS ELECTRICAL DATA AT 50 Hz, 2 POLES

PUMP TYPE 1 ~	MOTOR TYPE	INPUT POWER* kW	INPUT CURRENT* 220-240 V A	CAPACITOR μF / 450 V	PUMP TYPE 3 ~	MOTOR TYPE	INPUT POWER* kW	INPUT CURRENT* 220-240 V A	INPUT CURRENT* 380-415 V A
BGM3	SM63BG/1045	0,67	2,96	14	BG3	SM63BG/304	0,68	2,56	1,48
BGM5	SM71BG/1055	0,91	4,33	16	BG5	SM71BG/305	0,81	2,74	1,58
BGM7	SM71BG/1075	1,11	5,00	20	BG7	SM80BG/307PE	1,02	3,17	1,83
BGM9	SM71BG/1095	1,24	5,54	25	BG9	SM80BG/311PE	1,11	3,78	2,18
BGM11	SM80BG/1115	1,43	6,47	30	BG11	SM80BG/311PE	1,30	4,16	2,40

*Maximum value in specified range.

bg-2p50-en_c_te

SINGLE-PHASE MOTORS AT 50 Hz, 2 POLES

P _N kW	MOTOR TYPE	IEC SIZE	Construction Design	INPUT CURRENT	CAPACITOR		DATA FOR 230 V 50 Hz VOLTAGE						
				I _n (A)							T _n		
				220-240 V	μF	V	min ⁻¹	I _s / I _n	η %	cosφ	Nm	T _s /T _n	T _m /T _n
0,4	SM63BG/1045	63	SPECIAL	2,79-2,85	14	450	2745	2,64	65,1	0,96	1,39	0,68	1,63
0,55	SM71BG/1055	71		3,76-3,99	16	450	2820	3,72	68,9	0,91	1,86	0,61	2,00
0,75	SM71BG/1075	71		4,90-4,85	20	450	2765	3,42	70,1	0,96	2,59	0,58	1,75
0,95	SM71BG/1095	71		6,25-5,89	25	450	2740	3,39	71,1	0,98	3,31	0,58	1,66
1,1	SM80BG/1115	80		6,88-6,65	30	450	2800	3,89	74,7	0,96	3,75	0,46	1,72

bg-motm-2p50-en_a_te

THREE-PHASE MOTORS AT 50 Hz, 2 POLES

P _N kW	Efficiency η_N %																		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				IE
	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		
0,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
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	
0,9	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		
1.1	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		
By June 2011																				

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									
0,4	SM63BG/304	63	SPECIAL	2	50	0,66	4,32	1,38	4,14	3,13
0,55	SM71BG/305	71				0,74	5,97	1,85	3,74	3,56
0,75	SM80BG/307PE	80				0,78	7,38	2,48	3,57	3,75
0,9	SM80BG/311PE	80				0,79	8,31	3,63	3,95	3,95
1,1	SM80BG/311PE	80				0,79	8,31	3,63	3,95	3,95

P _N kW	Voltage U _N V											n _N min ⁻¹	See note.	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)															
0,4	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				
0,9	4,19	4,14	4,16	2,42	2,39	2,40	2,41	2,38	2,38	1,39	1,37	2870 ÷ 2900				
1.1	4,19	4,14	4,16	2,42	2,39	2,40	2,41	2,38	2,38	1,39	1,37	2870 ÷ 2900				

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

bg-ie2-mott-2p50-en_b_te

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

BOOSTER SETS WITH CEA PUMPS ELECTRICAL DATA AT 50 Hz, 2 POLES

PUMP TYPE 1 ~	MOTOR TYPE	INPUT POWER* kW	INPUT CURRENT* 220-240 V A	CAPACIT. μF / 450 V	PUMP TYPE 3 ~	MOTOR TYPE	INPUT POWER* kW	INPUT CURRENT* 220-240 V A	INPUT CURRENT* 380-415 V A
CEAM70/3	SM63BG/1045	0,60	2,72	14	CEA70/3	SM63BG/304	0,61	2,51	1,45
CEAM70/5	SM71BG/1055	0,97	4,55	16	CEA70/5	SM71BG/305	0,88	2,86	1,65
CEAM80/5	SM71BG/1075	1,07	4,87	20	CEA80/5	SM80BG/307PE	0,98	3,08	1,78
CEAM120/3	SM71BG/1055	0,91	4,33	16	CEA120/3	SM71BG/305	0,82	2,74	1,58
CEAM120/5	SM71BG/1095	1,39	6,24	25	CEA120/5	SM80BG/311PE	1,28	4,10	2,37
CEAM210/2	SM71BG/1075	1,13	5,10	20	CEA210/2	SM80BG/307PE	1,04	3,22	1,86
CEAM210/3	SM80BG/1115	1,48	6,68	30	CEA210/3	SM80BG/311PE	1,35	4,24	2,45
CEAM210/4	SM80BG/1155	1,91	8,60	40	CEA210/4	SM80BG/315PE	1,73	5,46	3,15
CEAM210/5	PLM90BG/1225	2,24	10,2	70	CEA210/5	PLM90BG/322	2,20	7,35	4,24
CEAM370/1	SM80BG/1115	1,49	6,75	30	CEA370/1	SM80BG/311PE	1,40	4,35	2,51
CEAM370/2	SM80BG/1155	2,05	9,26	40	CEA370/2	SM80BG/315PE	1,95	5,94	3,43
CEAM370/3	PLM90BG/1225	2,45	11,1	70	CEA370/3	PLM90BG/322	2,45	7,84	4,53
					CEA370/5	PLM90BG/330	3,26	10,1	5,86

*Maximum value in specified range.

cea-2p50-en_f_te

SINGLE-PHASE MOTORS AT 50 Hz, 2 POLES

P _N kW	MOTOR TYPE	IEC SIZE	Construction Design	INPUT CURRENT I _n (A) 220-240 V	CAPACITOR		DATA FOR 230 V 50 Hz VOLTAGE						
					μF	V	min ⁻¹	Is / I _n	η %	cosφ	T _n Nm	T _s /T _n	T _m /T _n
0,40	SM63BG/1045	63	SPECIAL	2,79-2,85	14	450	2745	2,64	65,1	0,96	1,39	0,68	1,63
0,55	SM71BG/1055	71		3,76-3,99	16	450	2820	3,72	68,9	0,91	1,86	0,61	2,00
0,75	SM71BG/1075	71		4,90-4,85	20	450	2765	3,42	70,1	0,96	2,59	0,58	1,75
0,95	SM71BG/1095	71		6,25-5,89	25	450	2740	3,39	71,1	0,98	3,31	0,58	1,66
1,1	SM80BG/1115	80		6,88-6,65	30	450	2800	3,89	74,7	0,96	3,75	0,46	1,72
1,5	SM80BG/1155	80		9,21-8,58	40	450	2810	4,00	76,1	0,98	5,09	0,39	1,74
1,85	PLM90BG/1225	90		12,5-11,6	70	450	2825	4,47	82,4	0,97	7,43	0,53	1,87

cea-motm-2p50-en_a_te

BOOSTER SETS WITH CEA PUMPS THREE-PHASE MOTORS AT 50 Hz, 2 POLES

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		
0,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	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	
0,9	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		
1,1	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		
1,85	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	
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		
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		

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. 03471820260 Montecchio Maggiore Vicenza - Italia						cosφ	Is / I _N	T _N Nm	Ts/T _N	Tm/T _N
	Model										
0,4	SM63BG/304		63	SPECIAL	2	50	0,66	4,32	1,38	4,14	3,13
0,55	SM71BG/305		71				0,74	5,97	1,85	3,74	3,56
0,75	SM80BG/307PE		80				0,78	7,38	2,48	3,57	3,75
0,9	SM80BG/311PE		80				0,79	8,31	3,63	3,95	3,95
1,1	SM80BG/311PE		80				0,79	8,31	3,63	3,95	3,95
1,5	SM80BG/315PE		80				0,80	8,80	4,96	4,31	4,10
1,85	PLM90BG/322		90				0,80	8,63	7,25	3,74	3,71
2,2	PLM90BG/322		90				0,80	8,63	7,25	3,74	3,71
3	PLM90BG/330		90				0,82	8,39	9,96	3,50	3,32

P _N kW	Voltage U _N V											n _N min ⁻¹	See note.	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)															
	0,4	2,20	2,34	2,51	1,27	1,35	1,45	-	-	-	-			-	2740 ÷ 2790	
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				
0,9	4,19	4,14	4,16	2,42	2,39	2,40	2,41	2,38	2,38	1,39	1,37	2870 ÷ 2900				
1,1	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				
1,85	8,05	8,04	8,09	4,65	4,64	4,67	4,62	4,61	4,63	2,67	2,66	2885 ÷ 2900				
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				

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

cea-ie2-mott-2p50-en_b_te

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

BOOSTER SETS WITH P PUMPS ELECTRICAL DATA AT 50 Hz, 2 POLES

PUMP TYPE 1 ~	MOTOR TYPE	INPUT POWER* kW	INPUT CURRENT* 220-240 V A	CAPACITOR μF / 450 V	PUMP TYPE 3 ~	MOTOR TYPE	INPUT POWER* kW	INPUT CURRENT* 220-240 V A	INPUT CURRENT* 380-415 V A
PM16	30M712	0,50	2,2	10	P16	30T712	0,48	1,55	0,90
PM21	37M712	0,58	2,7	14	P21	37T712	0,55	1,90	1,10
PM30	SM71PA/105	0,83	4	16	P30	SM71PA/305	0,72	2,60	1,50
PM40	SM71PA/107	1,08	4,82	20	P40	SM80PA/307PE	0,95	3,01	1,74
PM60	SM80PA/111	1,77	7,95	30	P60	SM80PA/311PE	1,64	4,92	2,84
PM70	SM71PA/109	1,32	5,89	25	P70	SM80PA/311PE	1,20	3,95	2,28

*Maximum value in specified range.

p-2p50-en_d_te

SINGLE-PHASE MOTORS AT 50 Hz, 2 POLES

P _N kW	MOTOR TYPE	IEC SIZE	Construction Design	INPUT CURRENT	CAPACITOR		DATA FOR 230 V 50 Hz VOLTAGE						
				I _n (A)									
				220-240 V	μF	V	min ⁻¹	Is / I _n	η %	cosφ	T _n Nm	Ts/T _n	Tm/T _n
0,3	30M712	-	SPECIAL	-	10	450	-	-	-	-	-	-	-
0,37	30M632	-		-	10	450	-	-	-	-	-	-	-
0,37	37M712	-		-	14	450	-	-	-	-	-	-	-
0,37	SM63PA/105	63		3.46-3.30	16	450	2705	2,90	66,9	0,98	1,76	0,56	1,61
0,55	SM71PA/105	71		3,76-3,99	16	450	2820	3,72	68,9	0,91	1,86	0,61	2,00
0,75	SM71PA/107	71		4,90-4,85	20	450	2765	3,42	70,1	0,96	2,59	0,58	1,75
0,95	SM71PA/109	71		6,25-5,89	25	450	2740	3,39	71,1	0,98	3,31	0,58	1,66
1,1	SM80PA/111	80		6,88-6,65	30	450	2800	3,89	74,7	0,96	3,75	0,46	1,72

p-motm-2p50-en_a_te

THREE-PHASE MOTORS AT 50 Hz, 2 POLES

P _N kW	Efficiency η_N %																			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			IE	
	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		
	0,3	0,37	0,5	0,55	0,75	1,1	0,3	0,37	0,5	0,55	0,75	1,1	0,3	0,37	0,5	0,55	0,75	1,1		
	0,3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
0,37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
0,5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
0,55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
0,75	77,4	77,4	74,0	77,4	77,4	74,0	77,4	77,4	74,0	77,4	77,4	74,0	77,4	77,4	74,0	77,4	77,4	74,0	2	
1,1	80,1	80,1	78,9	80,1	80,1	78,9	80,1	80,1	78,9	80,1	80,1	78,9	80,1	80,1	78,9	80,1	80,1	78,9		
																				By June 2011

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										
	0,3	30M712									
0,37	37M712	-	-	-	-	-	-	-			
0,5	SM63PA/305	63	SPECIAL	2	50	0,71	4,41	1,73	3,70	2,62	
0,55	SM71PA/305	71				0,74	5,97	1,85	3,74	3,56	
0,75	SM80PA/307HE	80				0,79	8,70	2,47	4,71	4,09	
1,1	SM80PA/311HE	80				0,82	8,98	3,63	4,62	4,00	

P _N kW	Voltage U _N V										η _N min ⁻¹	See note.	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)															
	0,3	-	-	-	-	-	-	-	-	-						-
0,37	-	-	-	-	-	-	-	-	-	-	-	-				
0,5	2,53	2,63	2,81	1,46	1,52	1,62	-	-	-	-	-	2715 ÷ 2770	≤ 1000	-15 / 40	No	
0,55	2,56	2,56	2,62	1,48	1,48	1,51	-	-	-	-	-	2825 ÷ 2850				
0,75	3,10	3,05	3,03	1,79	1,76	1,75	1,78	1,76	1,74	1,03	1,01	2885 ÷ 2905				
1.1	4.17	4.09	4.07	2.41	2.36	2.35	2.40	2.36	2.34	1.39	1.36	2880 ÷ 2900				

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

p-ie2-mott-2p50-en_a_te

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

BOOSTER SETS WITH e-HM™ PUMPS SINGLE-PHASE MOTORS AT 50 Hz, 2 POLES

P _N kW	MOTOR TYPE	IEC SIZE	Construction Design	INPUT CURRENT	CAPACITOR		DATA FOR 230 V 50 Hz VOLTAGE						
				I _n (A) 220-240 V	μF	V	min ⁻¹	I _s / I _n	η %	cosφ	T _n Nm	T _s /T _n	T _m /T _n
0,50	SM63HM../1055	63	SPECIAL	3,46-3,30	16	450	2705	2,90	66,9	0,98	1,76	0,56	1,61
0,55	SM71HM../1055	71		3,76-3,99	16	450	2820	3,72	68,9	0,91	1,86	0,61	2,00
0,75	SM71HM../1075	71		4,90-4,85	20	450	2765	3,42	70,1	0,96	2,59	0,58	1,75
0,95	SM71HM../1095	71		6,25-5,89	25	450	2740	3,39	71,1	0,98	3,31	0,58	1,66
1,1	SM80HM../1115	80		6,88-6,65	30	450	2800	3,89	74,7	0,96	3,75	0,46	1,72
1,5	SM80HM../1155	80		9,21-8,58	40	450	2810	4,00	76,1	0,98	5,09	0,39	1,74
2,2	PLM90HM../1225	90		12,5-11,6	70	450	2825	4,47	82,4	0,97	7,43	0,53	1,87

1-22hm-motm-2p50-en_a_te

BOOSTER SETS WITH e-HM™ PUMPS THREE-PHASE MOTORS AT 50 Hz, 2 POLES

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		
0,30	65,1	64,4	59,3	65,2	62,1	54,7	62,8	58,5	50,1	-	-	-	-	-	-	-	-	-	-	
0,40	72,7	72,3	67,9	71,4	69,5	63,5	68,7	65,9	58,8	-	-	-	-	-	-	-	-	-	-	
0,50	72,9	73,5	70,3	72,3	71,5	66,7	71,1	69,1	63,0	-	-	-	-	-	-	-	-	-	-	
0,55	77,3	76,9	73,3	77,1	75,8	71,3	76,1	74,3	69,1	-	-	-	-	-	-	-	-	-	-	
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	86,5	87,4	86,8	86,4	86,9	85,7	86,6	86,7	85,0	86,4	86,7	85,0	86,4	86,7	85,0	86,4	86,7	85,0		
3	87,2	88,5	88,3	87,5	88,2	87,5	87,5	87,8	86,4	87,2	87,8	86,4	87,2	87,8	86,4	87,2	87,8	86,4		
4	89,1	90,1	89,2	89,1	90,1	89,2	89,1	90,1	89,2	89,1	90,3	90,4	89,6	90,4	89,9	89,6	90,1	89,2		
5,5	89,5	89,6	88,0	89,5	89,6	88,0	89,5	89,6	88,0	89,5	90,3	89,9	89,7	90,0	89,0	89,6	89,6	88,0		

P _N kW	Manufacturer		IEC SIZE	Construction Design	N. of Poles	f _N Hz	Data for 400 V / 50 Hz Voltage				
	Xylem Service Italia Srl Reg. No. 07520560967 Montecchio Maggiore Vicenza - Italia						cosφ	I _s / I _N	T _N Nm	Ts/T _N	Tm/Tn
	Model										
0,30	SM63HM../303		63	SPECIAL	2	50	0,63	4,20	1,05	4,18	4,12
0,40	SM63HM../304		63				0,64	4,35	1,37	4,14	4,10
0,50	SM63HM../305		63				0,69	4,72	1,75	4,08	4,00
0,55	SM71HM../305		71				0,71	6,25	1,84	3,96	3,97
0,75	SM80HM../307 E3		80				0,78	7,38	2,48	3,57	3,75
1,1	SM80HM../311 E3		80				0,79	8,31	3,63	3,95	3,95
1,5	SM80HM../315 E3		80				0,80	8,80	4,96	4,31	4,10
2,2	PLM90HM../322 E3		90				0,80	8,77	7,28	3,72	3,70
3	PLM90HM../330 E3		90				0,79	7,81	9,93	4,26	3,94
4	PLM100HM../340 E3		100				0,85	9,13	13,2	3,82	4,32
5,5	PLM112HM../355 E3		112				0,85	10,5	18,1	4,74	5,11

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)															
0,30	1,66	1,82	1,96	0,96	1,05	1,13	-	-	-	-	-	2715 ÷ 2775		≤ 1000	-15 / 40	No
0,40	2,03	2,18	2,32	1,17	1,26	1,34	-	-	-	-	-	2745 ÷ 2800				
0,50	2,42	2,51	2,65	1,40	1,45	1,53	-	-	-	-	-	2690 ÷ 2765				
0,55	2,46	2,49	2,56	1,42	1,44	1,48	-	-	-	-	-	2835 ÷ 2865				
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	7,97	7,90	7,98	4,60	4,56	4,61	4,57	4,54	4,57	2,64	2,62	2880 ÷ 2900				
3	11,0	11,0	11,2	6,35	6,33	6,44	6,29	6,27	6,34	3,63	3,62	2865 ÷ 2895				
4	13,6	13,4	13,4	7,87	7,75	7,74	7,80	7,62	7,61	4,50	4,40	2885 ÷ 2910				
5.5	18.1	17.9	18.1	10.4	10.4	10.4	10.6	10.5	10.7	6.10	6.05	2880 ÷ 2910				

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

1-22hm-ie3-mott-2p50-en_b_te

BOOSTER SETS WITH VM PUMPS SINGLE-PHASE MOTORS AT 50 Hz, 2 POLES

P _N kW	MOTOR TYPE	IEC SIZE	Construction Design	INPUT CURRENT	CAPACITOR		DATA FOR 230 V 50 Hz VOLTAGE						
				I _n (A) 220-240 V	μF	V	min ⁻¹	I _s / I _n	η %	cosφ	T _n Nm	T _s /T _n	T _m /T _n
0,50	SM63HM../1055	63	SPECIAL	3,46-3,30	16	450	2705	2,90	66,9	0,98	1,76	0,56	1,61
0,55	SM71HM../1055	71		3,76-3,99	16	450	2820	3,72	68,9	0,91	1,86	0,61	2,00
0,75	SM71HM../1075	71		4,90-4,85	20	450	2765	3,42	70,1	0,96	2,59	0,58	1,75
0,95	SM71HM../1095	71		6,25-5,89	25	450	2740	3,39	71,1	0,98	3,31	0,58	1,66
1,1	SM80HM../1115	80		6,88-6,65	30	450	2800	3,89	74,7	0,96	3,75	0,46	1,72
1,5	SM80HM../1155	80		9,21-8,58	40	450	2810	4,00	76,1	0,98	5,09	0,39	1,74
2,2	PLM90HM../1225	90		12,5-11,6	70	450	2825	4,47	82,4	0,97	7,43	0,53	1,87

1-22hm-motm-2p50-en_a_te

BOOSTER SETS WITH VM PUMPS THREE-PHASE MOTORS AT 50 Hz, 2 POLES

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			
0,30	65,1	64,4	59,3	65,2	62,1	54,7	62,8	58,5	50,1	-	-	-	-	-	-	-	-	-	-	3	By June 2013
0,40	72,7	72,3	67,9	71,4	69,5	63,5	68,7	65,9	58,8	-	-	-	-	-	-	-	-	-	-		
0,50	72,9	73,5	70,3	72,3	71,5	66,7	71,1	69,1	63,0	-	-	-	-	-	-	-	-	-	-		
0,55	77,3	76,9	73,3	77,1	75,8	71,3	76,1	74,3	69,1	-	-	-	-	-	-	-	-	-	-		
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	-		
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	86,5	87,4	86,8	86,4	86,9	85,7	86,6	86,7	85,0	86,4	86,7	85,0	86,4	86,7	85,0	86,4	86,7	85,0	-		
3	87,2	88,5	88,3	87,5	88,2	87,5	87,5	87,8	86,4	87,2	87,8	86,4	87,2	87,8	86,4	87,2	87,8	86,4	-		

P _N kW	Manufacturer		IEC SIZE	Construction Design	N. of Poles	f _N Hz	Data for 400 V / 50 Hz Voltage				
	Xylem Service Italia srl Reg. No. 07520560967 Montecchio Maggiore Vicenza - Italia						cosφ	Is / I _N	T _N Nm	Ts/T _N	Tm/Tn
	Model										
0,30	SM63HM../303		63	SPECIAL	2	50	0,63	4,20	1,05	4,18	4,12
0,40	SM63HM../304		63				0,64	4,35	1,37	4,14	4,10
0,50	SM63HM../305		63				0,69	4,72	1,75	4,08	4,00
0,55	SM71HM../305		71				0,71	6,25	1,84	3,96	3,97
0,75	SM80HM../307 E3		80				0,78	7,38	2,48	3,57	3,75
1,1	SM80HM../311 E3		80				0,79	8,31	3,63	3,95	3,95
1,5	SM80HM../315 E3		80				0,80	8,80	4,96	4,31	4,10
2,2	PLM90HM../322 E3		90				0,80	8,77	7,28	3,72	3,70
3	PLM90HM../330 E3		90				0,79	7,81	9,93	4,26	3,94

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)																
0,30	1,66	1,82	1,96	0,96	1,05	1,13	-	-	-	-	-	2715 ÷ 2775	≤ 1000		-15 / 40	No	
0,40	2,03	2,18	2,32	1,17	1,26	1,34	-	-	-	-	-	2745 ÷ 2800					
0,50	2,42	2,51	2,65	1,40	1,45	1,53	-	-	-	-	-	2690 ÷ 2765					
0,55	2,46	2,49	2,56	1,42	1,44	1,48	-	-	-	-	-	2835 ÷ 2865					
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	7,97	7,90	7,98	4,60	4,56	4,61	4,57	4,54	4,57	2,64	2,62	2880 ÷ 2900					
3	11,0	11,0	11,2	6,35	6,33	6,44	6,29	6,27	6,34	3,63	3,62	2865 ÷ 2895					

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

1-10vm-ie3-mott-2p50-en_a_te

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