EBARA

Japanese Technology since 1912

GP -GPE MATRIX

Data Book 50Hz

INDEX

DEFINITION AND USE OF PRESSURISATION UNITS

In situations in which a municipal water mains is lacking or insufficient for the proper operation of the services, one must install a pressurization unit to provide acceptable pressure and flow rates to even in the most unfavourable services. Pressurisation units are used wherever there is a need to increase the pressure, or to pressurise a water circuit. **EBARA GP pressurisation units** are automatic systems with 2 or more pumps operating in parallel, designed to provide a simple and reliable solution to the most common requirements for maintenance of water supply pressure for apartment buildings, hotels, centres, offices and schools as well as providing auxiliary service in industrial and agricultural applications. They stand out for their robust construction, compact size, excellent efficiency and silent operation. GP units are equipped for connection to membrane and air cushion autoclaves. They are controlled by pressure switches or, for units with INVERTER control, by the signal from a pressure transmitter.

TYPICAL APPLICATIONS

INDUSTRY	BUILDING SERVICE	WATER SUPPLY
		

PRINCIPLE OF OPERATION OF GP PRESSURISATION UNITS

When water is demanded, it is first drawn from the autoclave tank (if present). This demand for water, with the pumps stopped, lowers the pressure until the pressure transmitter starts the first electropump. If the output flow is greater than the delivery capacity of a single pump, the pressure continues falling until the pressure transmitter, thus starting the second pump. This happens for all pumps in the unit. When the water demand stops or reduces, the system pressure rises, the pressure transmitter shutting off the pumps one by one. This is done in inverse order to that in which the motors were started up, the number of hourly starts per pump is reduced and they are all used to the same extent.

NB: By connecting a float switch or minimum pressure switch to the control panel (both for demand from the first accumulation tank and from the water circuit itself) one can prevent the most frequent cause of pump failure: dry running

PRINCIPLE OF OPERATION OF GPE PRESSURISATION UNITS

GPE units are designed to operate with a pump controlled by an **INVERTER** in the control panel, on board the motor, or in-line. The unit thus maintains constant pressure in the water circuit.
There are various versions of GPE unit:

- With INVERTER in the control panel (Standard **EFC** version)
  With a single INVERTER controlling a single pump which is alternated with the others at each start up (MFC version, on request, in which each pump is INVERTER controlled).
- With multiple INVERTERS, each pump controlled by its own INVERTER (**MFC versions**, versions with INVERTER on board motor or in-line INVERTER)

Note: Not all control options shown in the introduction are available with Matrix pumps

OPERATING CONDITIONS

EBARA GP-GPE pressurisation units can be used, in their standard versions, for civil, industrial and agricultural applications, as follows:
• building service
• water lifting and handling
• A/C
• heating
• irrigation
• washing systems
The conveyed fluid must be: clean, potable, ground or mixed water, free of solid or fibrous suspensions and aggressive chemical substances.
The units must be installed under cover, protected from the weather and freezing.
• Conveyed water temperature 0 - 50°C (depending on pumps).
• Ambient operating temperature 0 - 40°C, no higher than 1000 m above sea level.
• Max relative humidity 50% at +40°C.
NB: The system available NPSH must be greater than the NPSH demanded from the pump. For applications with different technical specifications, uses and climatic conditions (type of vector fluid, marine and aggressive industrial conditions), please contact our sales network.

TESTS AND TRIALS

Before shipping, all EBARA pressurisation units are subject to hydraulic, mechanical and electrical testing.

MECHANICAL AND HYDRAULIC TESTS

• Pressure switch calibration
• Pump direction of rotation
• Mechanical testing of moving parts and running noise (on each pump)
• Tightness test with delivery port closed and nameplate rating tests
• MANUAL trials (using button on control panel) for each pump
• AUTOMATIC trials (using switch on control panel) for unit

ELECTRICAL TESTS

• Earthing system continuity
• Applied voltage (dielectric rigidity)
• Insulation resistance

Principle of Operation of GPE Pressurisation UNITS with E-drive and E-SPD

GPE units with E-drive and E-SPD are designed to operate with each pumps controlled by an INVERTER installed on board its motor, E-drive up the fan cover, E-SPD on the terminal box. The system is controlled by an MASTER INVERTER in relation to the reference signal supply by a pressure transmitters (4 - 20 mA passive). As the system pressure varies, the MASTER pump varies its rotary speed to restore it to the setpoint. If the water demand exceeds the capacity of the pump, the second variable speed pump cuts in and, pump goes into regulation mode to maintain the pressure setpoint; this happens for all the pumps in the unit. If the water demand drops off, the pressure tends to increase and the latest pump gradually reduces its speed to restore the correct operating pressure. This results in the regulation of the speed of the other pumps, until they gradually turn off. Once the system pressure has been restored and the water demand is 0, the MASTER pump switches off automatically.

Principle of Operation of GPE Pressurisation UNITS with an EFC control panel

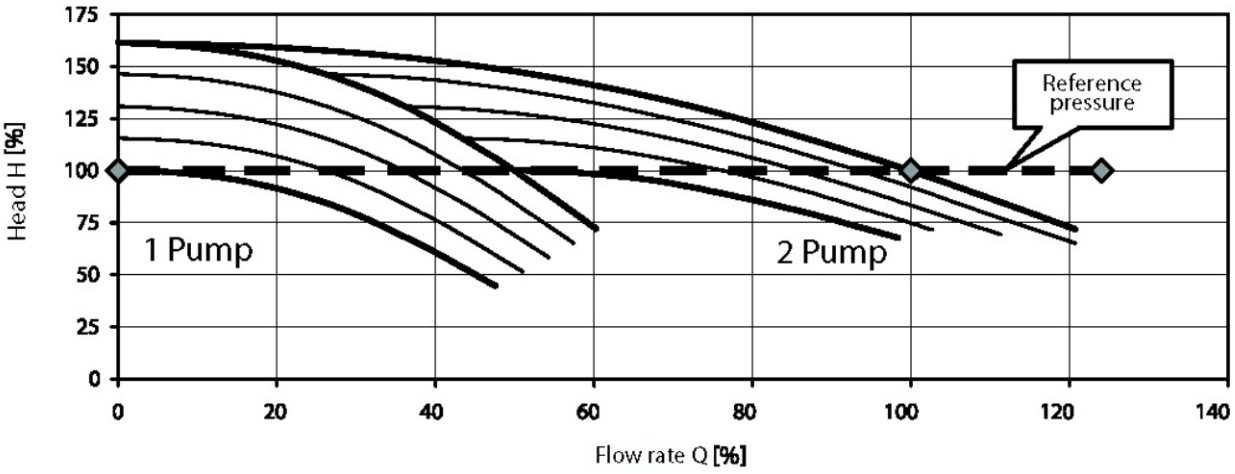
EFC multiple pump control units power pump n. 1 with the INVERTER to modulate system performance in relation to the reference signal while the other pumps are run at maximum nominal speed (around 2900 rpm) and started and stopped in relation to demand. These means there are two distinct primary electrical circuits:
n. 1 - INVERTER startup/control of a single pump,
n. 2 - contactor startup (direct or star/delta) of the other pumps.

The system is controlled by an electronic controller in relation to the reference signal supply by a pressure transmitter, flow meter or other unified control signal (4 - 20 mA passive).
If the electronic controller or pressure transmitter fails, a system of pressure switches controls the pumps directly (if present).

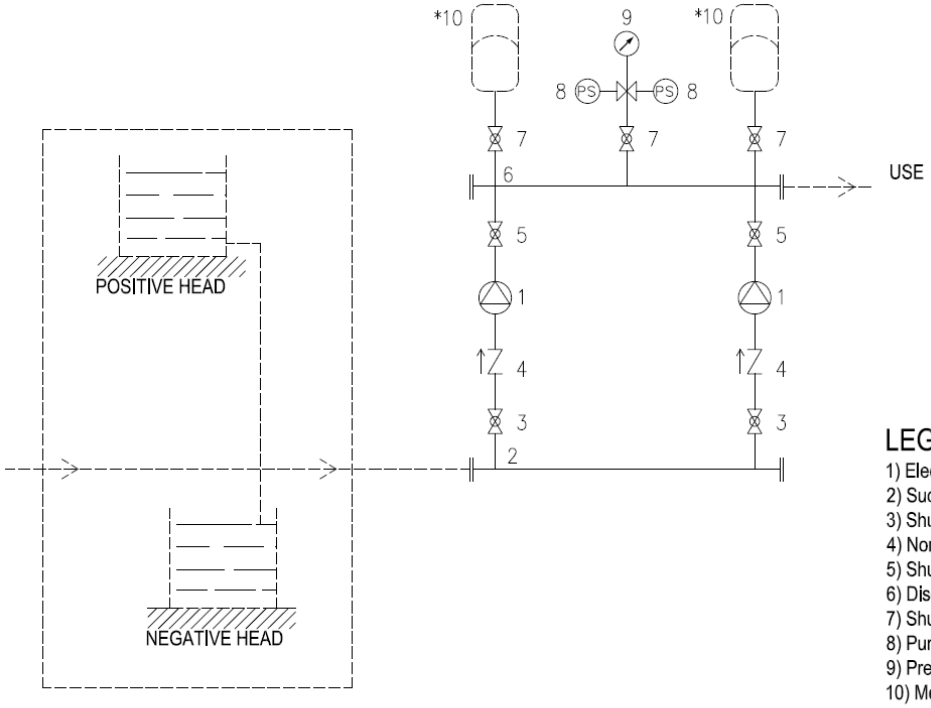
• In case of water distribution at constant pressure (Fig.1), the electronic controller is connected to the pressure transmitter on the units' delivery manifold, which outputs a signal proportional to the circuit pressure. When the pressure drops due to water demand, the pressure transmitter signal also drops and the controller starts and controls the speed of the first pump with the INVERTER to restore the reference/ operating pressure. If the pump's flow rate is lower than demand, the circuit pressure will continue to drop and the system responds by increasing the pump's speed. Once pump n. 1 reaches its maximum speed and demand is still in excess of its delivery, the controller will start pump n. 2 at maximum speed. The speed of pump n. 1 is immediately modulated so as to establish the operating pressure. If the pressure drops even further and pump n. 1 is once again running at maximum speed, the controller starts up pump n. 3, and so on for all pumps in the unit. If the water demand drops off, the pressure tends to increase and the controller reduces the speed of pump n. 1 to restore the correct operating pressure. At this point, the controller will stop one of the pumps running at maximum speed, while the speed of pump n. 1 is modulated to maintain the reference pressure. As the pressure continues to increase due to reduced demand, once the minimum speed of pump n. 1 is reached once more the controller will stop pump n. 3 and then pump n. 2. Once the demand for water has completely ceased, the controller reduces the speed of pump n. 1 to its minimum and after a set delay (around 1 minute) stops this pump too. The next time the system is started up, the INVERTER controlled pump will no longer be pump n. 1, but n. 2. The INVERTER controlled pump thus rotates through all pumps in sequence.

Principle of Operation of GPE Pressurisation UNITS with an MFC control panel
MFC multiple pump control panels power each pump with an INVERTER to modulate system performance in relation to the reference signal. MFC controllers differ from EFC controller from the point of view of their construction, since instead of having a single INVERTER to control all the pumps, each pump has its own INVERTER. The two types of control panel differ in construction, but they have the same type of operation by the controller, which responds to the reference signal output by a pressure transmitter or other unified control (4 - 20 mA passive). If the electronic controller or pressure transmitter fails, a system of pressure switches controls the INVERTERS directly.
• In case of water distribution at constant starting pressure (Fig.1), the electronic controller is connected to the pressure transmitter on the units' delivery manifold, which outputs a signal proportional to the circuit pressure. When the pressure drops due to water demand, the pressure transmitter signal also drops and the controller starts and controls the speed of the first pump with the INVERTER to restore the reference/ operating pressure. If the pump's flow rate is lower than demand, the circuit pressure will continue to drop and the system responds by increasing the pump's speed. Once pump n. 1 reaches its maximum speed and demand is still in excess of its delivery, the controller will start pump n. 2, also at variable synchronous speed. The controller will modulate the speed of the two pumps to restore the operating pressure; the modulating frequency is the same for both pumps. If the pressure drops even further and pumps n. 1 and 2 are once again running at maximum speed, the controller starts up pump n. 3, and then pump n. 4, if present. When the water demand is reduced the pressure will end to increase, as does the pressure transmitter output value. The controller thus reduces the speed of pumps n. 1, 2, 3 and 4 (they are all controlled at the same speed) to restore the reference/ operating pressure. If the pumps' flow rate is greater than demand, the circuit pressure will continue to increase and the system responds by decreasing the speed of the pumps until it reaches the minimum speed setting. At this point, the controller will stop pump n. 4, while the speed of pumps n. 1, 2 and 3 is modulated to maintain the reference pressure. As the pressure continues to increase due to reduced demand, once the minimum speed setting is reached again, the controller will stop pump n. 3 and modulate the speed of pumps n. 1 and 2. This continues in sequence as the demand continues to fall, until the unit is completely stopped.

Fig. 1 - TWO PUMP UNIT WITH CONSTANT PRESSURE REGULATION



PRESSURISATION UNIT WATER CIRCUIT DIAGRAM

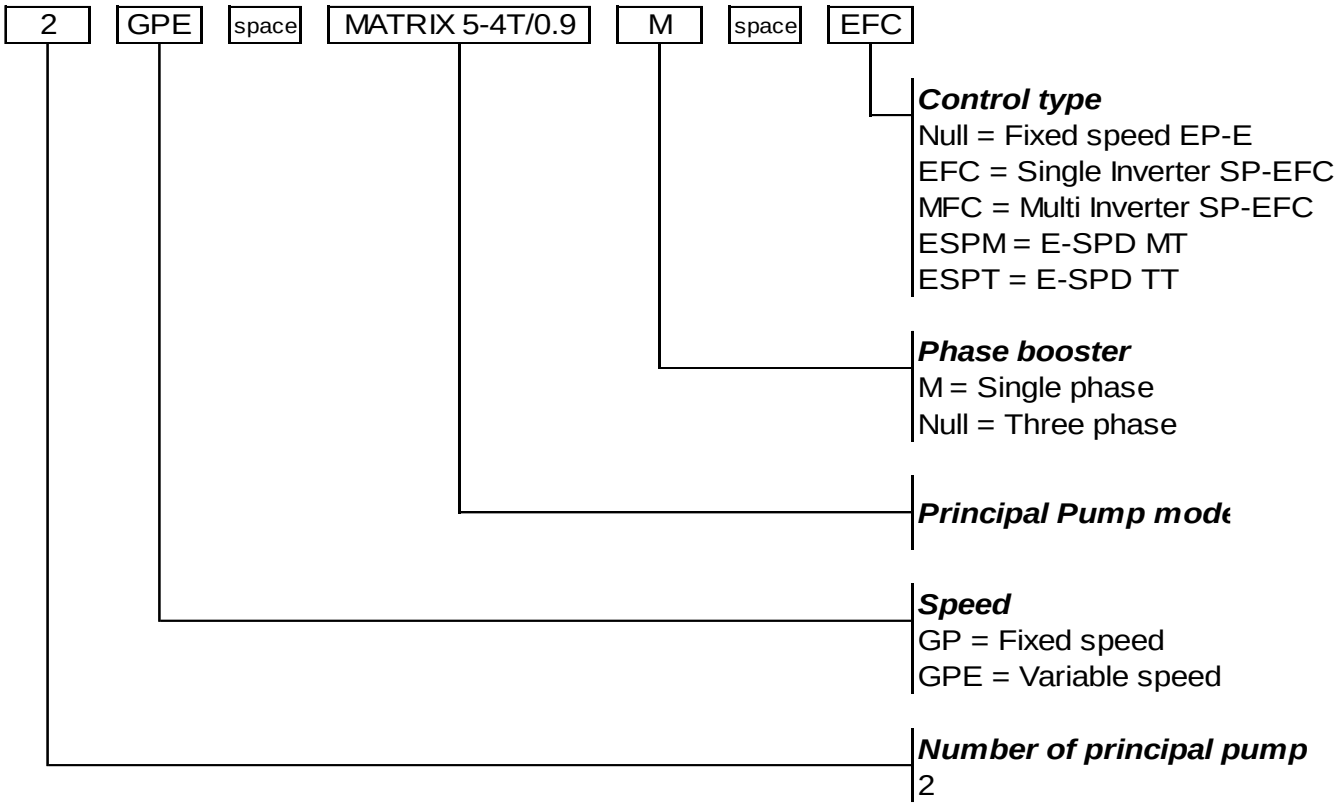


SUPPLY SYSTEM UPSTREAM FROM UNIT AT THE DISCRETION OF THE CUSTOMER OF THE SYSTEM DESIGNER

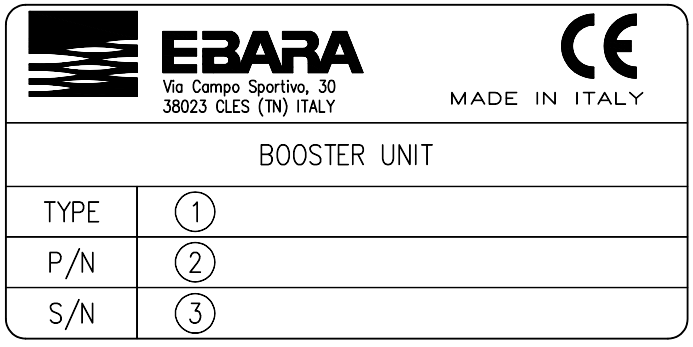
LEGEND
1) Electric Pump
2) Suction manifold
3) Shut-off valve in suction
4) Non-return valve
5) Shut-off valve in discharge
6) Discharge manifold
7) Shut-off valve
8) Pump control/regulation pressure switches
9) Pressure gauge
10) Membrane vessel (Optional*)

TYPE KEY

2GP(E) MATRIX



NAME PLATE



1) "TYPE" booster model
2) "P/N" booster item number
3) "S/N" booster serial number

PRODUCT SPECIFICATIONS

HYDRAULIC COMPONENTS AND CONTROL

BOOSTER SET						
MATRIX						
Operating range	Version		3	5	10	18
	Nominal flow rate (m3/h)	Single pump	4.8	7.8	15.0	27.0
		2GP(E)	9.6	15.6	30.0	54.0
	Maximum working pressure		10 bar			
	Liquid temperature range		0÷50°C			
	Ambient operating temperature (no higher than 1000 m above sea level)		0÷40°C			
Hydraulic components	Frame		Omega sheet Galvanized steel			
	Manifold suction / discharge		Threaded manifold AISI 304			
	Closing manifold		Threaded female cap Brass (up to 2”1/2 manifold) Galvanized steel (3” manifold)			
	Check valve		Threaded check valve Brass / NBR			
	Ball valve		Threaded ball valve Brass / PTFE			
	Socket for air feeders (only for "GP" version)		Threaded socket Brass			
Control	Pressure gauge		M3A-ABS 50/FR / plastic-copper alloy			
	Pressure switches		Only for GPE version with SP EFC / MFC panel with inverter XMP / -25°C…+70°C			
	Pressure transmitter		GP version with EP-E panel fixed speed GPE version with SP EFC / MFC panel GPE version with E-SPD EN 10088-1.4301 (AISI 304) / 1.4404 (AISI 316L)			

ELECTRIC PANEL

BOOSTER SET						
MATRIX						
Operating range	Version		3	5	10	18
	Nominal flow rate (m3/h)	Single pump	4.8	7.8	15.0	27.0
		2GP (E)	9.6	15.6	30.0	54.0
Control panel	Principal Electric panel	EP-E fixed speed (only for GP)	●	●	●	●
		SP EFC/MFC variable speed (only for GPE)	○	○	○	●
	E-SPD [1]	ESPDM single-phase supply inverter (only for GPE up to 1.3 kW)	●	●	●	○
		ESPDT three-phase supply inverter (only for GPE up to 2.2 kW)	●	●	●	○

● : Standard ○ : Optional

[1] To be assemble with protection panel (to see “PROTECTION PANEL” section)

TECHNICAL PUMP DATA

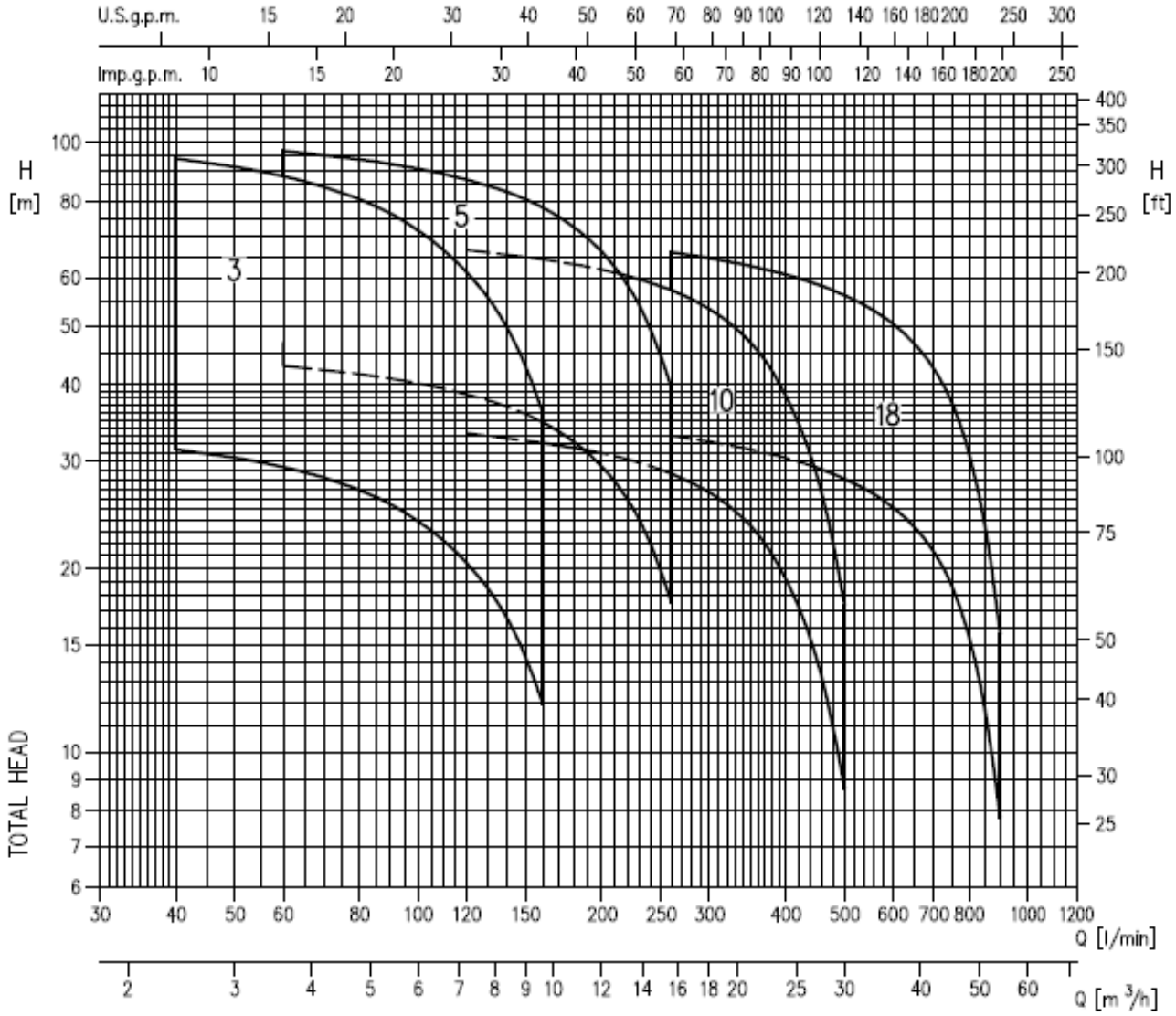
PUMP					
MATRIX					
Operating range	Version	3	5	10	18
	Maximum working pressure	1 MPa (10 bar)			
	Liquid temperature range	-15°C to +85°C			
Liquid handled	Liquid type	Water, moderate aggressive solutions, glycol solutions, moderate viscous fluids			
Key components material	Casing	EN 1.4301 (AISI 304)			
	Impeller				
	Casing cover				
	Shaft seal	Ceramic/Carbon/EPDM			
	Shaft	EN 1.4301 (AISI 304) wet extension			
	Bracket	EN AB-AISi11Cu2(Fe) (Die cast Aluminium)			
Pipe connection	Suction	G 1”	G 1” ¼	G 1” ½	G 2”
		UNI ISO 228			
	Discharge	G 1”		G 1” ¼	G 1” ½
		UNI ISO 228			

TECHNICAL MOTOR DATA

MOTOR			
MATRIX			
Power source	Frequency	50 Hz	
	Phase	Single-phase	Three-phase
	Rotation speed	2850 min-1	
	Power rating	0.65 ÷ 2.2 kW	0.65 ÷ 4.0 kW
		0.9 ÷ 3.0 HP	0.9 ÷ 5.5 HP
	Voltage	230 ± 10% V	230/400 ± 10%
Type	Type	Electric - TEFC	
	Efficiency level	-	0.65 kW IE3 from 0.75 kW up to 4.0 kW
	N° of poles	2	
	Protection degree	IP 55	
	Insulation class	F	
Others	Capacitor	Built in	-
	Overload protection	Built in	Provided by the user
	Casing Material	Aluminium	
	Motor support	Aluminium	

PERFORMANCE RANGE

RESEAU BOOSTER SET 2GP(E) MATRIX



CURVE SPECIFICATION 2GP(E)

The specifications below qualify the curves shown on the following pages.

Tolerances according to ISO 9906 Annex A
The curves refer to effective speed of asynchronous motors at 50 Hz
Measurements were carried out with clean water at 20°C of temperature and with a kinematic viscosity of ν = 1 mm2/s (1 cSt)
The NPSH curve is an average curve obtained in the same conditions of performance curves.
The continuous curves indicate the recommended working range. The dotted curve is only a guide.
In order to avoid the risk of over-heating, the pumps should not be used at a flow rate below 10% of best efficiency point.

Symbols explanation:

Q = volume flow rate
H = total head
P2 = pump power input (shaft power)
η = pump efficiency
NPSH = net positive suction head required by the pump

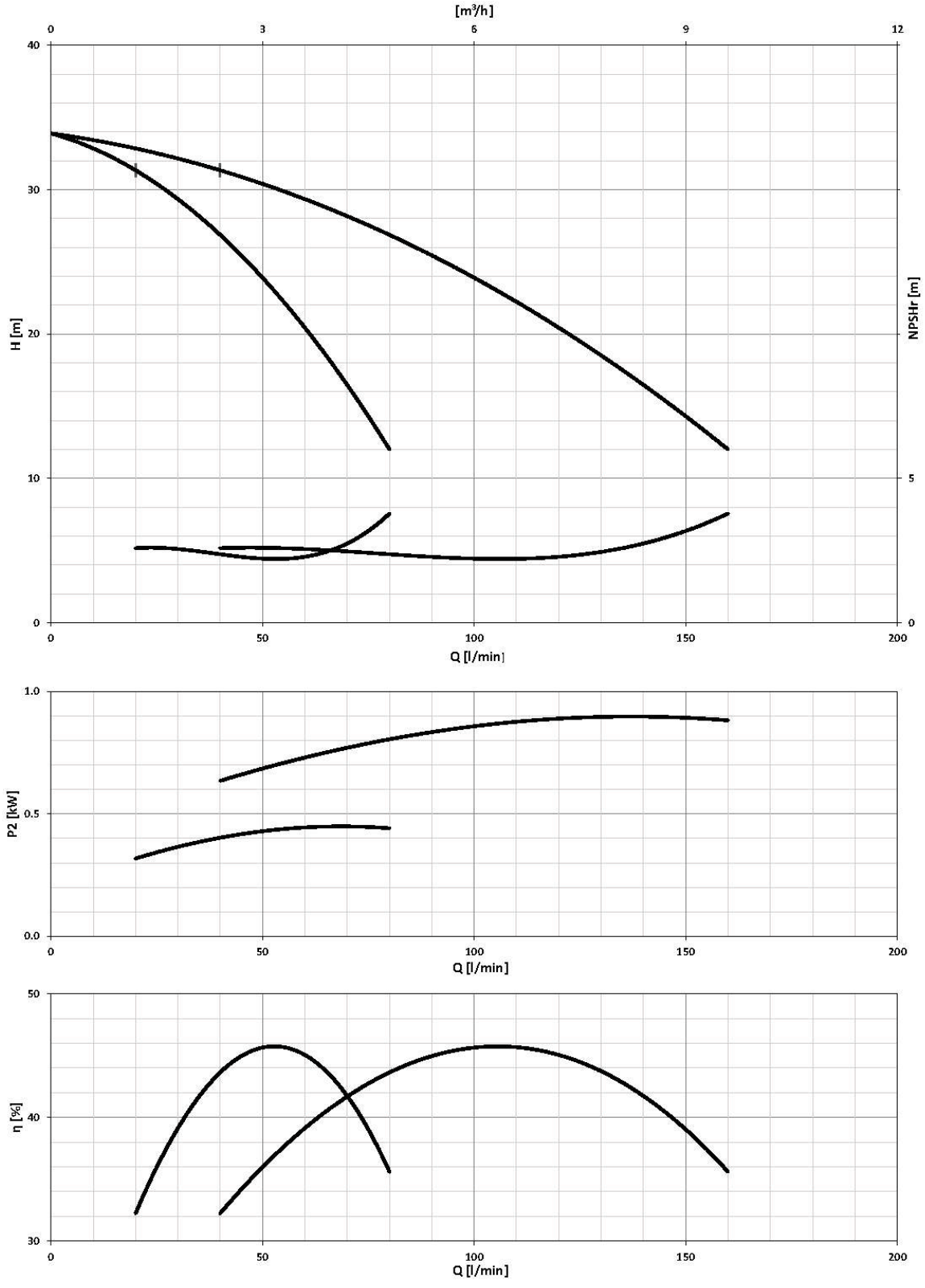
SELECTION CHART 2GP(E) MATRIX

Model	Supply		Motor		Maximum working pressure (MPa)	Q=Capacity														
	Single phase	Three phase	kW	HP		l/min 0	40	60	90	120	160	200	260	320	400	500	600	700	800	900
						m³/h 0	2.4	3.6	5.4	7.2	9.6	12.0	15.6	19.2	24.0	30.0	36.0	42.0	48.0	54.0
						H=Total manometric head in meters														
2GP(E) MATRIX 3-3/0.65 (M)	●	●	0.65+0.65	0.9+0.9	1.0	33.9	31.4	29.3	25.5	20.4	12.0	-	-	-	-	-	-	-	-	-
2GP(E) MATRIX 3-4/0.65 (M)	●	●	0.65+0.65	0.9+0.9		45.0	42.0	39.1	34.0	27.2	16.0	-	-	-	-	-	-	-	-	-
2GP(E) MATRIX 3-5/0.75 (M)	●	●	0.75+0.75	1.0+1.0		56.5	52.5	49.0	42.5	34.0	20.0	-	-	-	-	-	-	-	-	-
2GP(E) MATRIX 3-6/0.9 (M)	●	●	0.9+0.9	1.2+1.2		68.0	62.5	58.5	51.0	41.0	24.0	-	-	-	-	-	-	-	-	-
2GP(E) MATRIX 3-7/1.3 (M)	●	●	1.3+1.3	1.8+1.8		79.0	73.0	68.5	59.5	47.5	28.0	-	-	-	-	-	-	-	-	-
2GP(E) MATRIX 3-8/1.3 (M)	●	●	1.3+1.3	1.8+1.8		90.5	83.5	78.0	68.0	54.5	32.0	-	-	-	-	-	-	-	-	-
2GP(E) MATRIX 3-9/1.5 (M)	●	●	1.5+1.5	2+2		102.0	94.0	88.0	76.5	61.0	36.0	-	-	-	-	-	-	-	-	-
2GP(E) MATRIX 5-3/0.65 (M)	●	●	0.65+0.65	0.9+0.9		34.5	-	32.3	30.7	29.0	26.0	22.0	13.2	-	-	-	-	-	-	-
2GP(E) MATRIX 5-4/0.9 (M)	●	●	0.9+0.9	1.2+1.2		46.0	-	43.0	41.0	38.6	34.7	29.4	17.6	-	-	-	-	-	-	-
2GP(E) MATRIX 5-5/1.3 (M)	●	●	1.3+1.3	1.8+1.8		57.5	-	54.0	51.0	48.5	43.5	36.7	22.0	-	-	-	-	-	-	-
2GP(E) MATRIX 5-6/1.3 (M)	●	●	1.3+1.3	1.8+1.8		69.0	-	64.5	61.5	58.0	52.0	44.0	26.4	-	-	-	-	-	-	-
2GP(E) MATRIX 5-7/1.5 (M)	●	●	1.5+1.5	2+2		80.5	-	75.5	72.0	67.5	61.0	51.5	30.8	-	-	-	-	-	-	-
2GP(E) MATRIX 5-81/2.2 (M)	●	●	2.2+2.2	3+3		92.0	-	86.0	82.0	77.0	69.5	58.5	35.2	-	-	-	-	-	-	-
2GP(E) MATRIX 5-9/2.2 (M)	●	●	2.2+2.2	3+3		104.0	-	97.0	92.0	87.0	78.0	66.0	39.6	-	-	-	-	-	-	-
2GP(E) MATRIX 10-3/1.3 (M)	●	●	1.3+1.3	1.8+1.8	0.8	36.0	-	-	-	33.3	32.1	30.9	28.6	25.5	19.3	8.7	-	-	-	-
2GP(E) MATRIX 10-4/1.5 (M)	●	●	1.5+1.5	2.0+2.0		48.0	-	-	-	44.5	43.0	41.0	38.1	34.0	25.7	11.6	-	-	-	-
2GP(E) MATRIX 10-5/2.2 (M)	●	●	2.2+2.2	3.0+3.0		60.0	-	-	-	55.5	53.5	51.5	47.5	42.5	32.1	14.5	-	-	-	-
2GP(E) MATRIX 10-6/2.2 (M)	●	●	2.2+2.2	3.0+3.0		72.0	-	-	-	66.5	64.5	62.0	57.0	51.0	38.5	17.4	-	-	-	-
2GP(E) MATRIX 18-3/2.2 (M)	●	●	2.2+2.2	3.0+3.0		36.3	-	-	-	-	-	-	33.0	31.9	30.4	28.1	25.2	21.3	15.5	7.8
2GP(E) MATRIX 18-4/3	-	●	3.0+3.0	4.0+4.0		48.5	-	-	-	-	-	-	44.0	42.5	40.5	37.4	33.6	28.4	20.6	10.4
2GP(E) MATRIX 18-51/4	-	●	4+4	5.5+5.5		60.5	-	-	-	-	-	-	55.0	53.0	50.5	47.0	42.0	35.5	25.8	13.0
2GP(E) MATRIX 18-6/4	-	●	4+4	5.5+5.5		72.5	-	-	-	-	-	-	66.0	64.0	60.5	56.0	50.5	42.5	30.9	15.6

● : Standard ○ : On request

PERFORMANCE CURVE 2GP(E)

2GP(E) MATRIX 3-3T/0.65(M)



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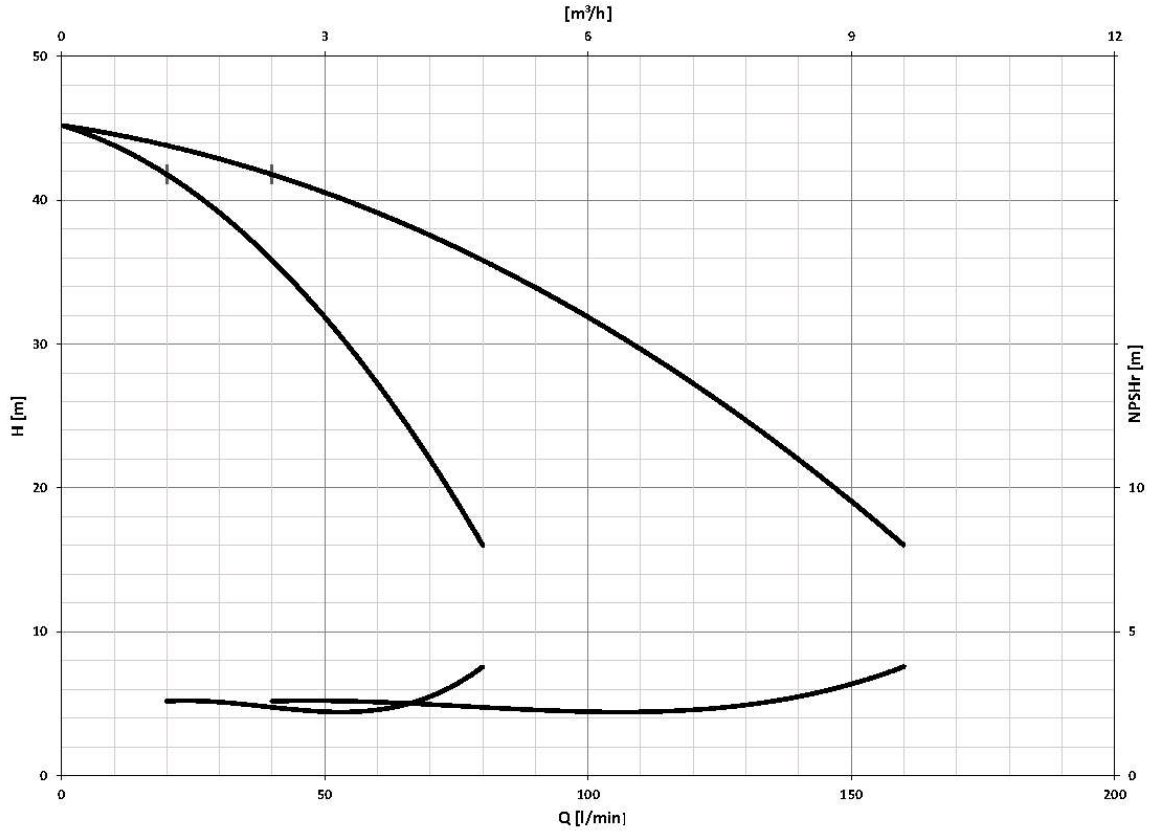

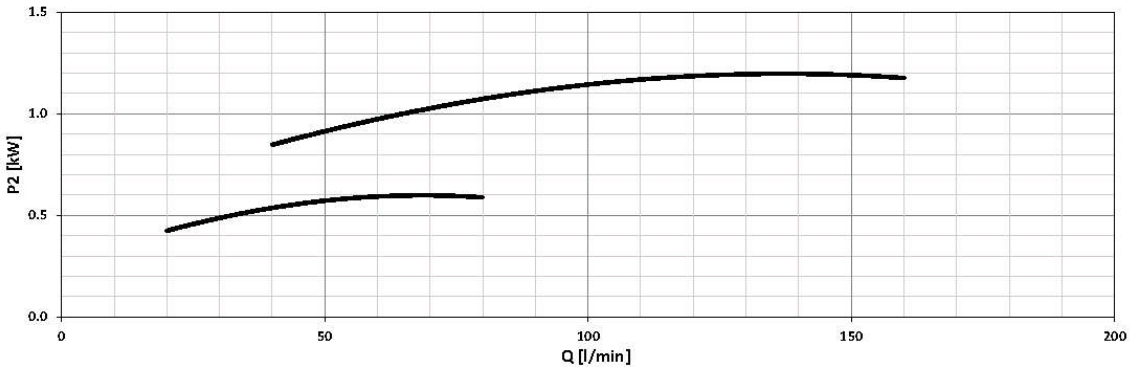

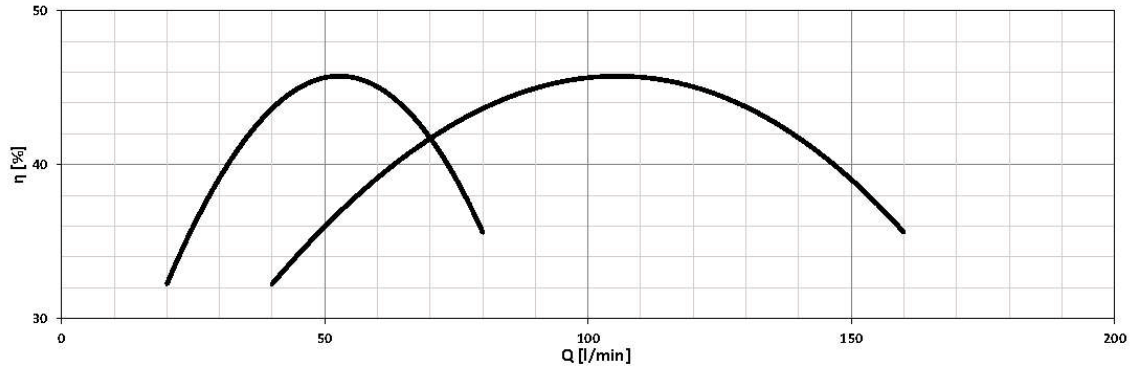

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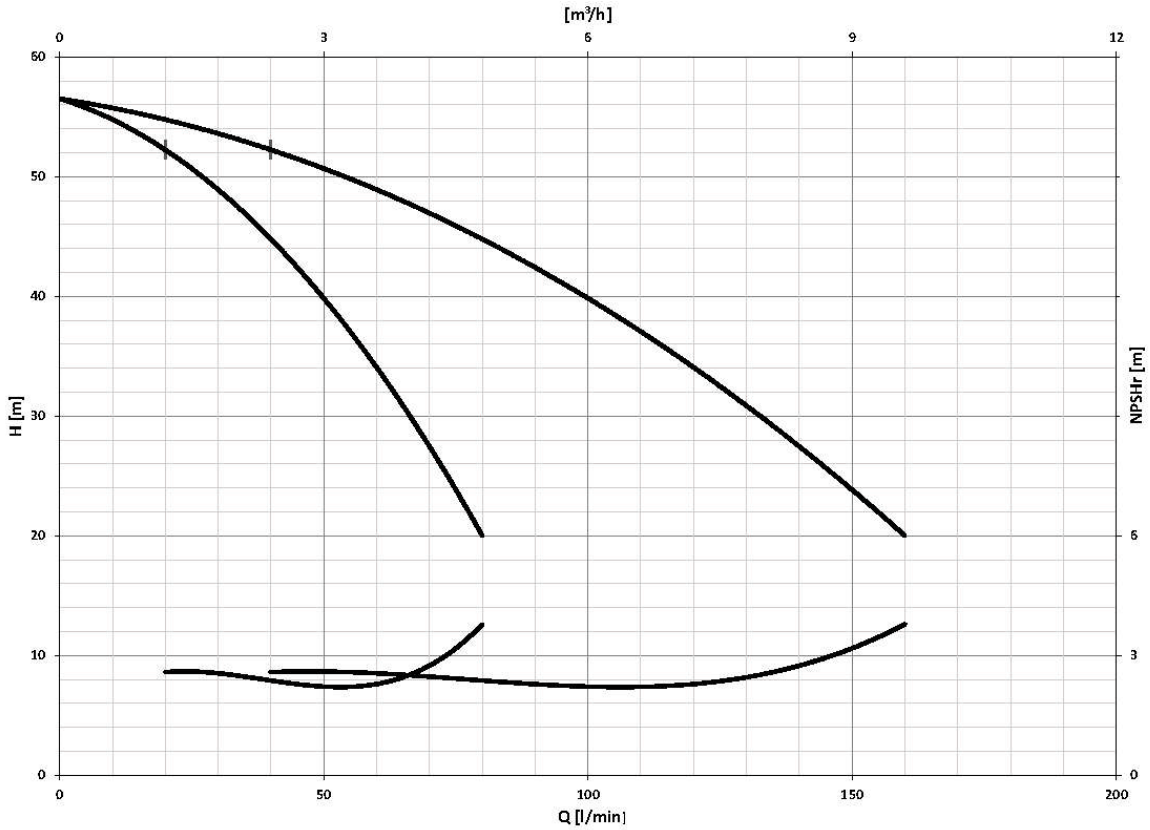
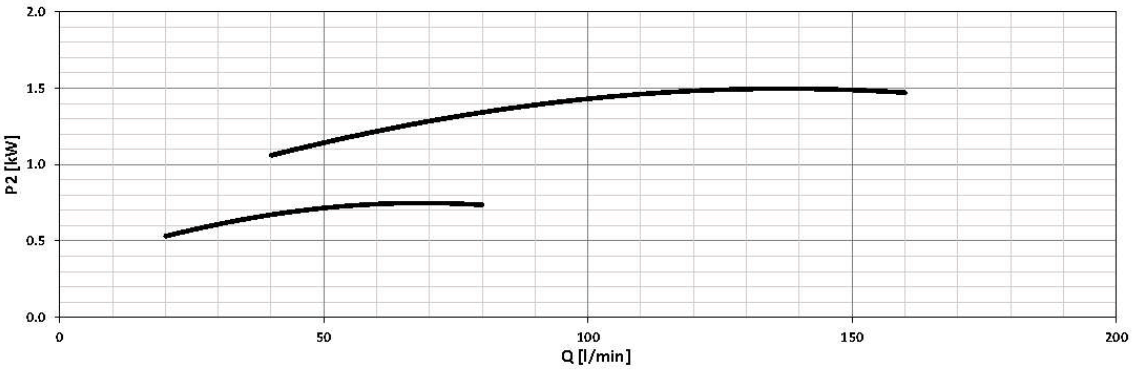
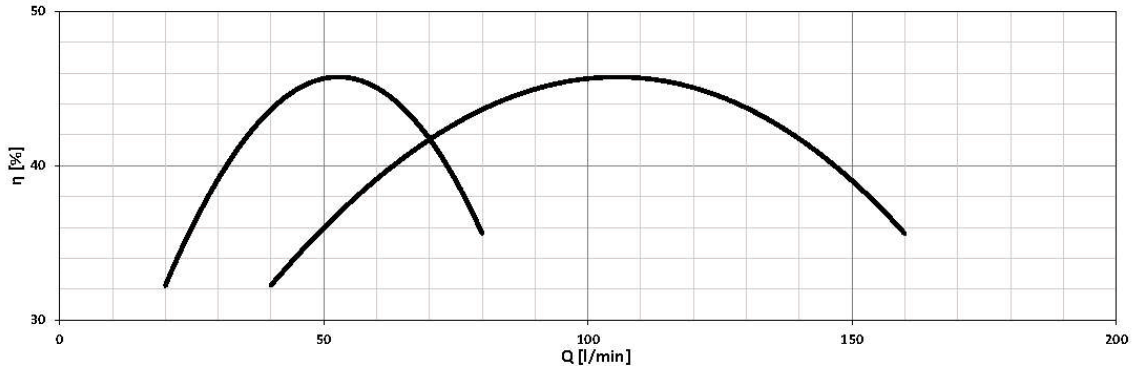
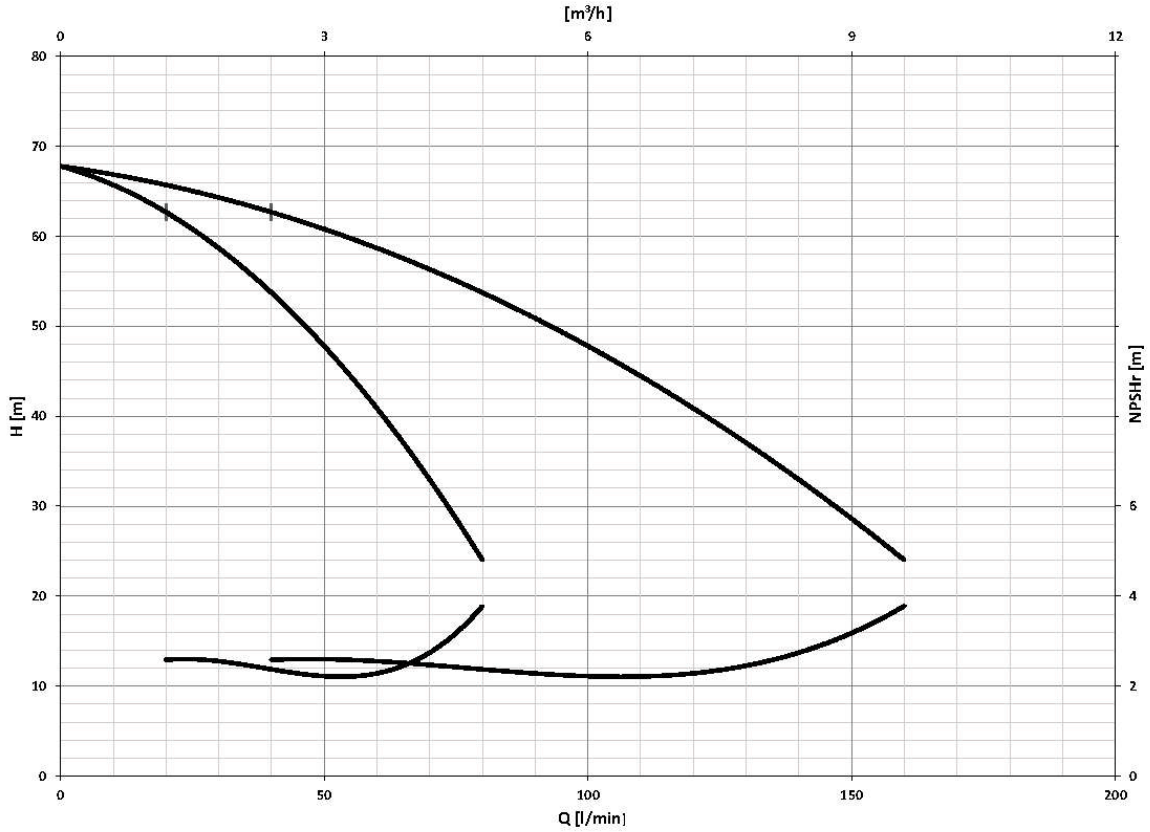
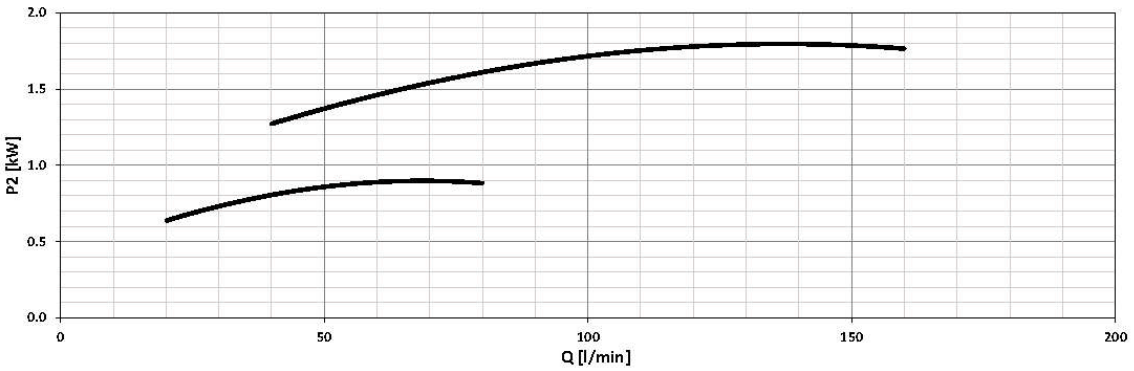


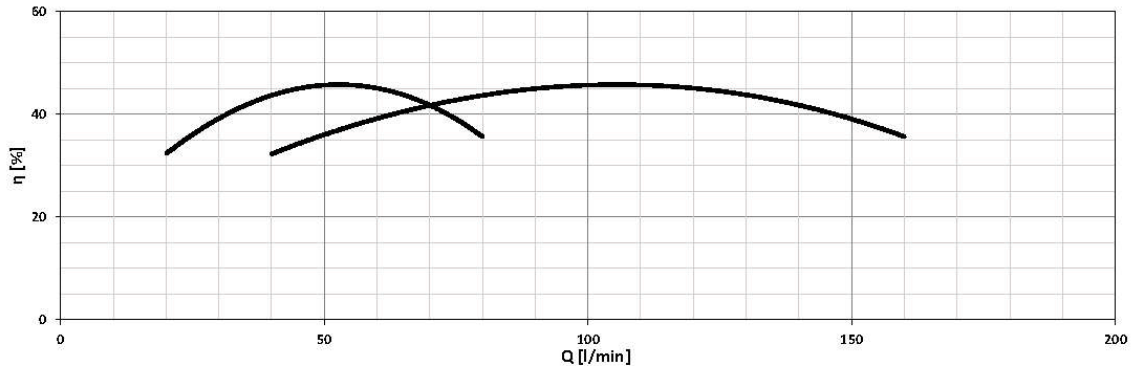




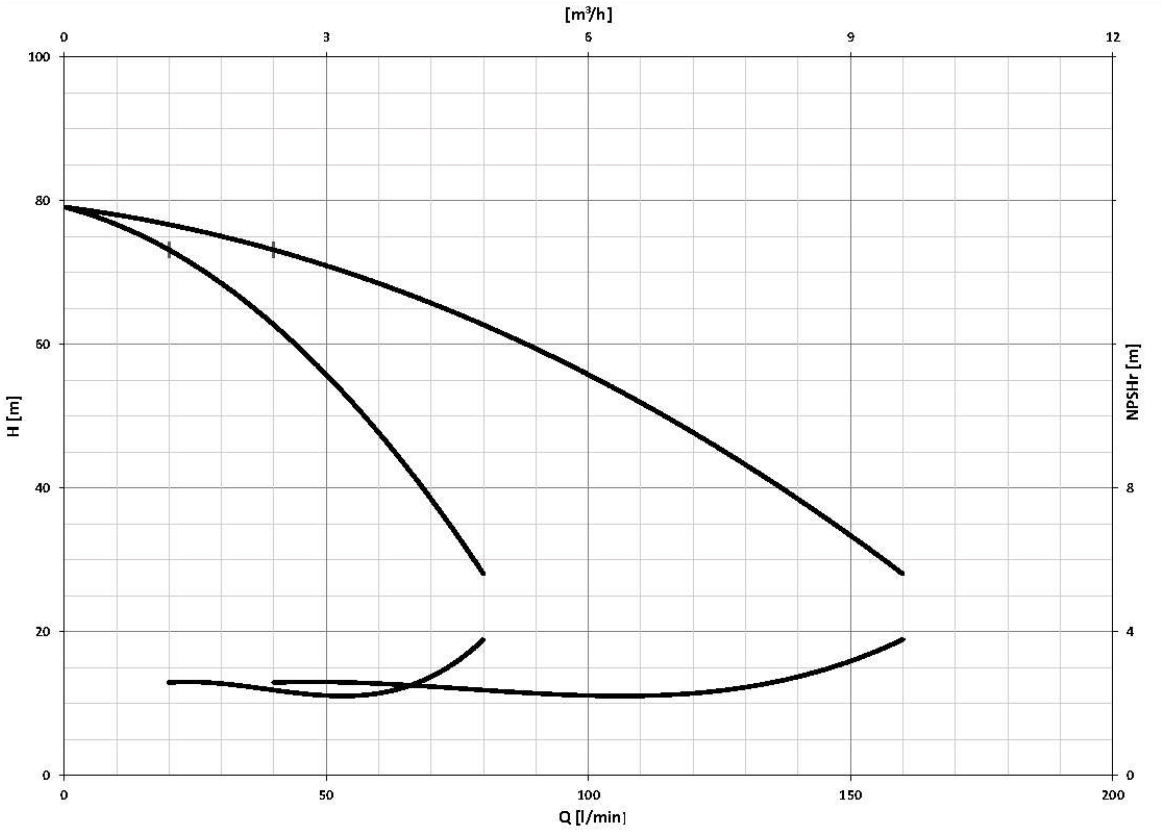
2GP(E) MATRIX 3-6T/0.9(M)

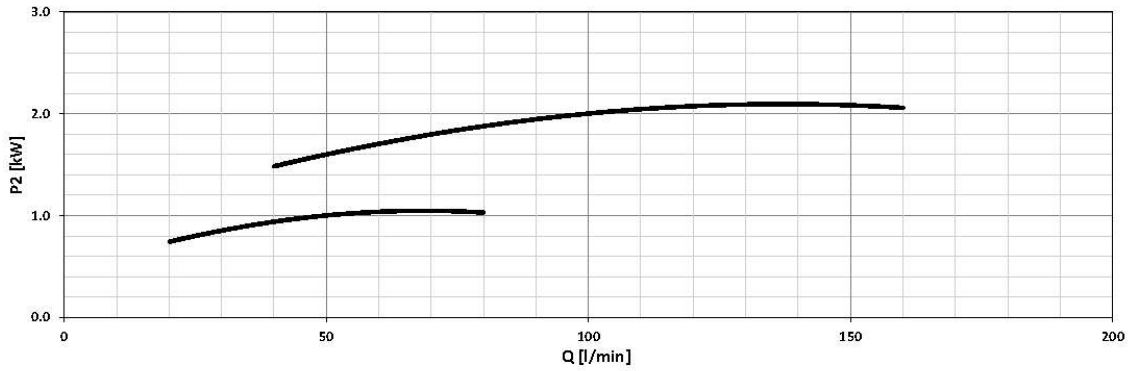


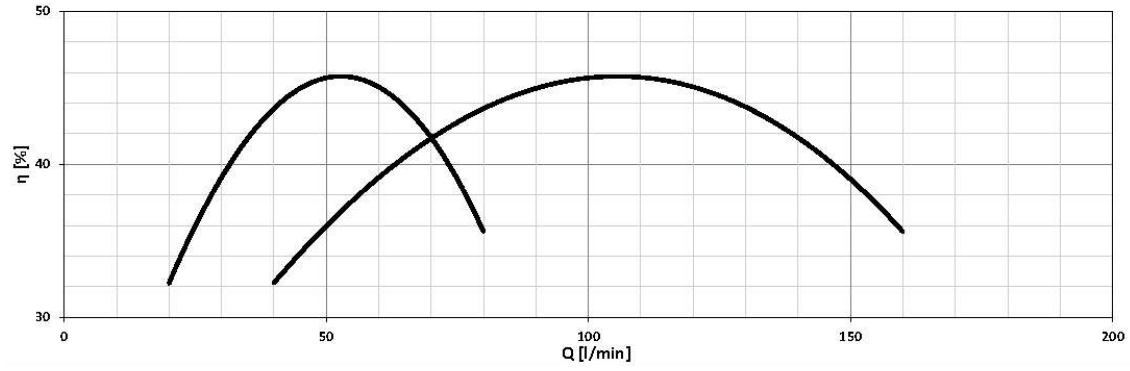




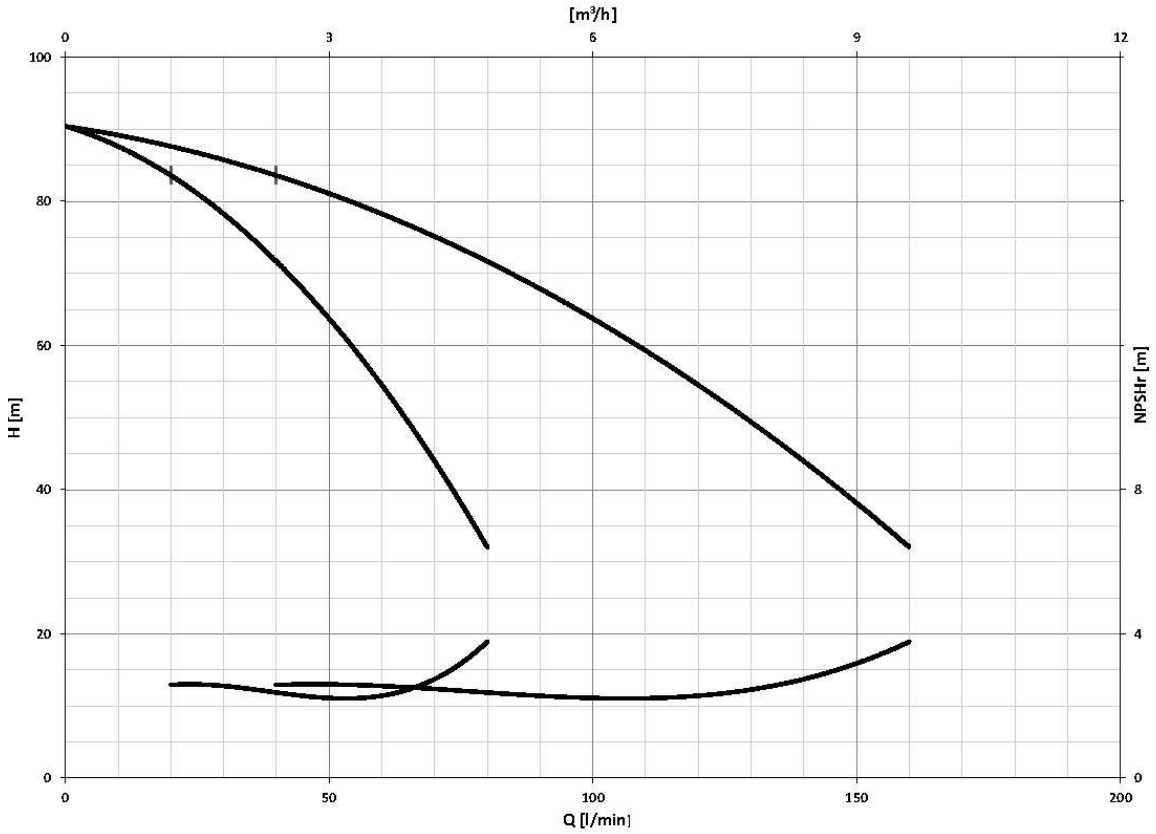
2GP(E) MATRIX 3-7T/1.3(M)

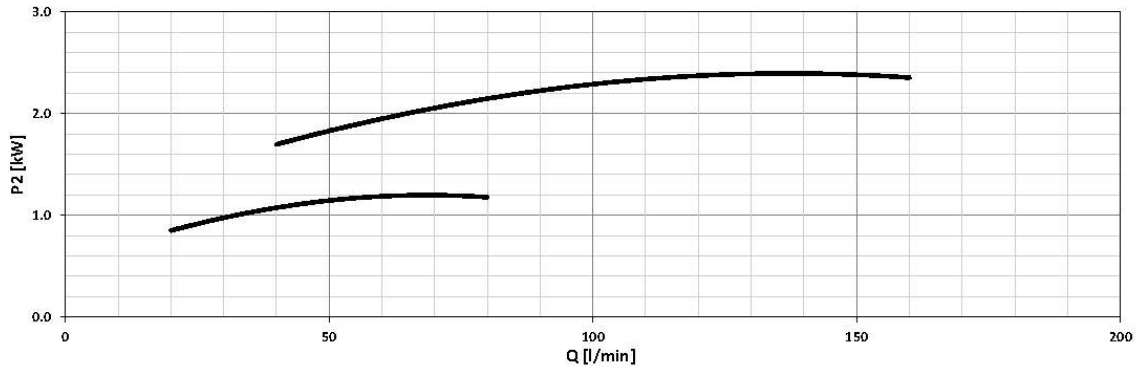


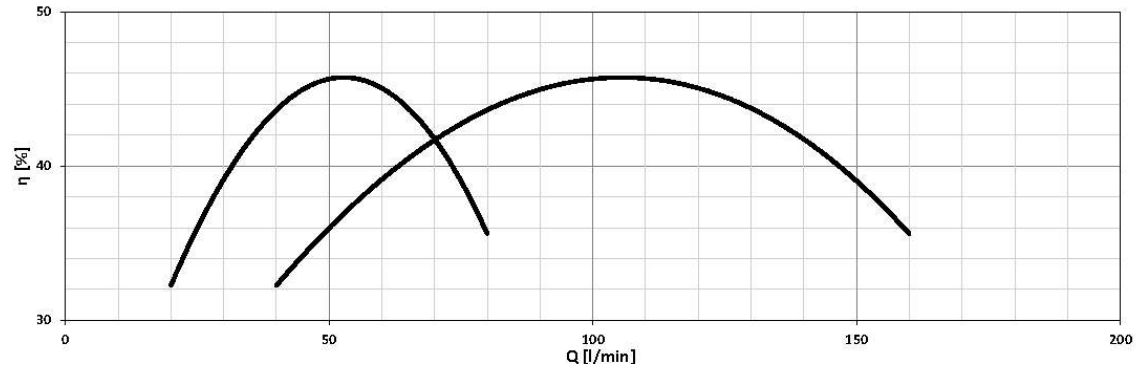




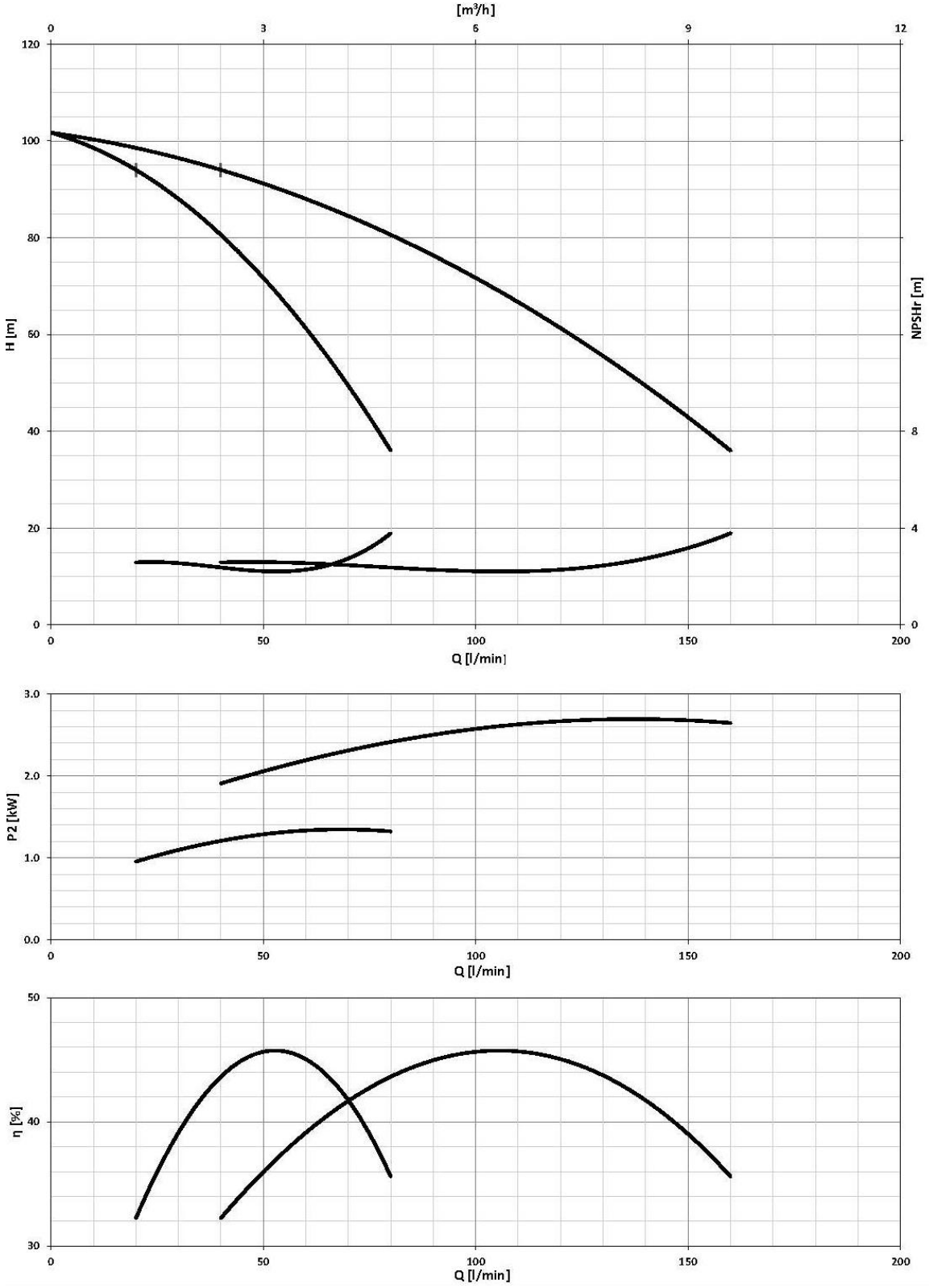
2GP(E) MATRIX 3-8T/1.3(M)



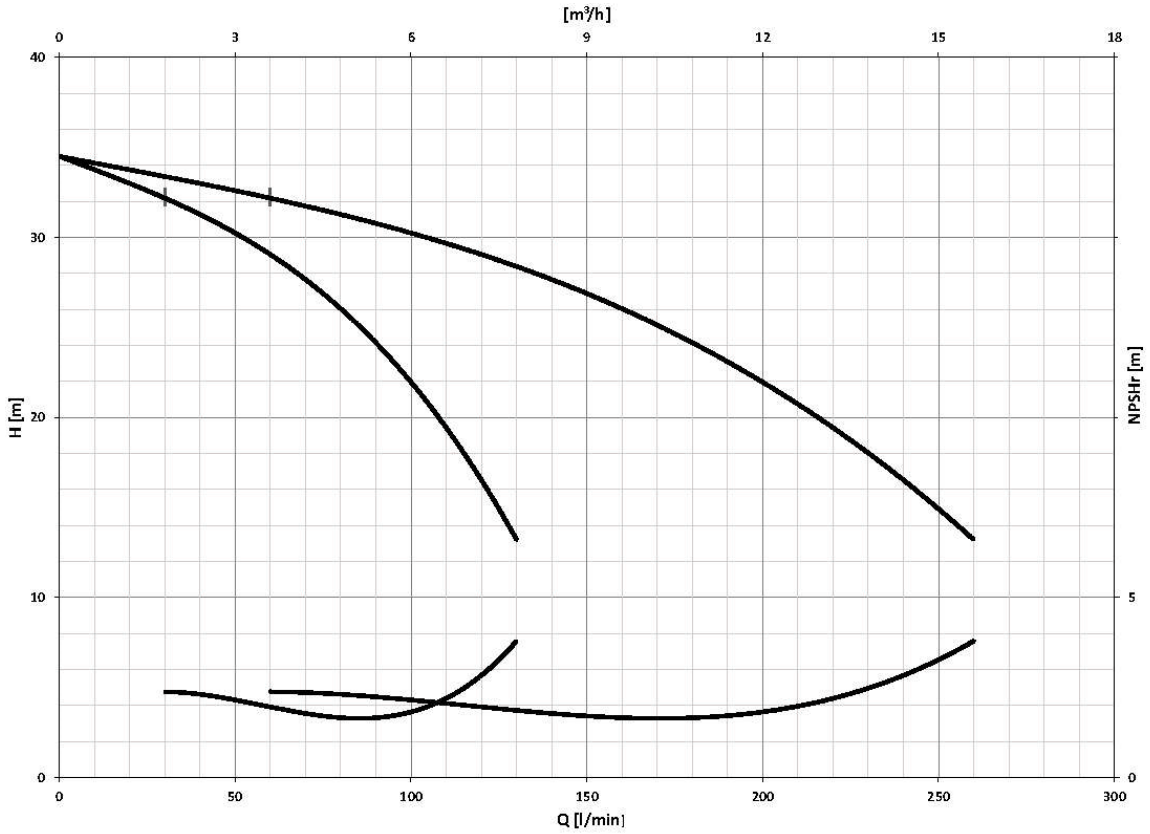


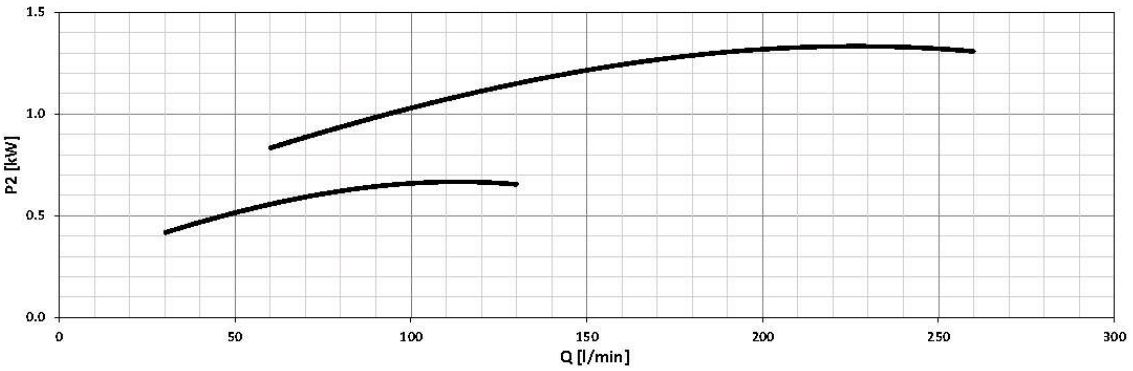


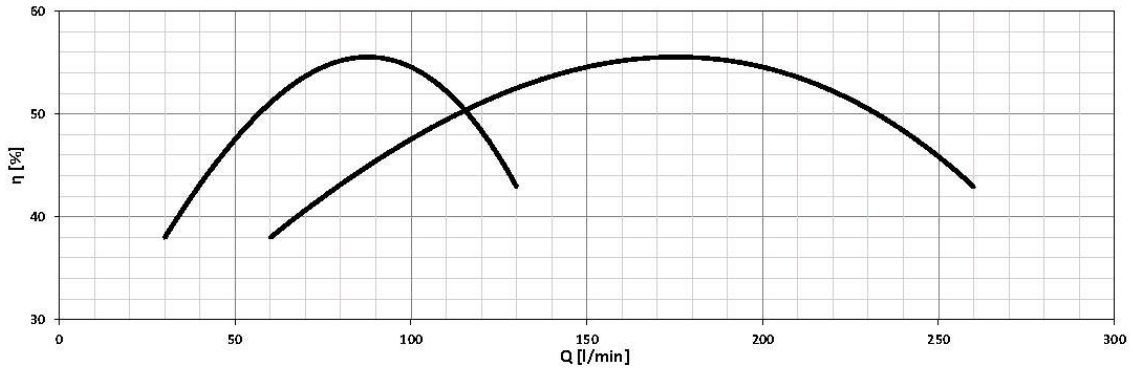
2GP(E) MATRIX 3-9T/1.5(M)



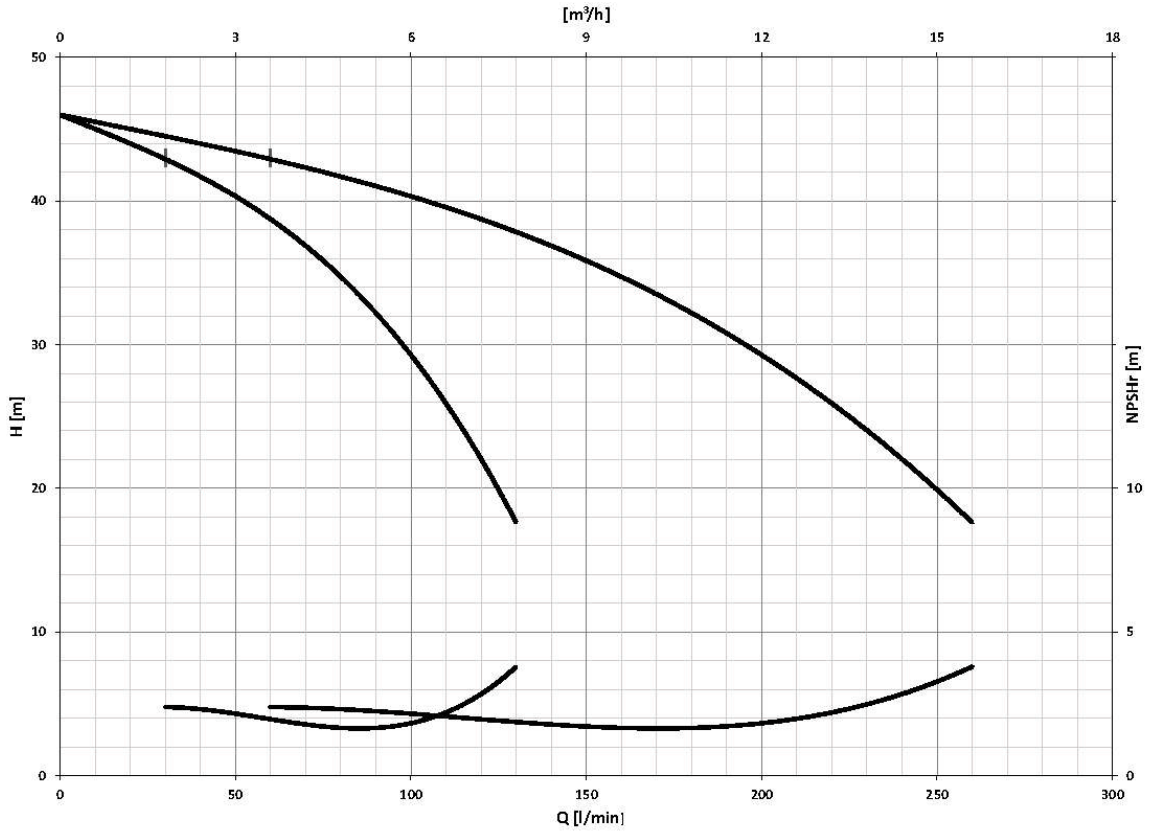
2GP(E) MATRIX 5-3T/0.65(M)

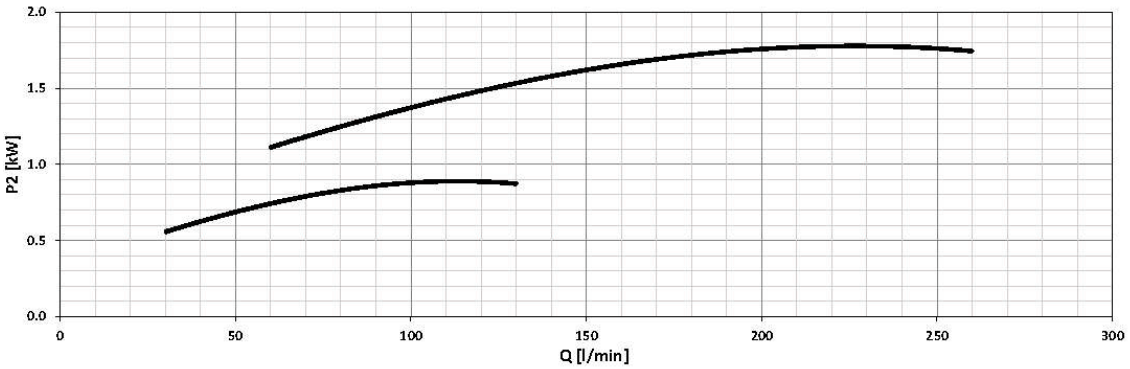


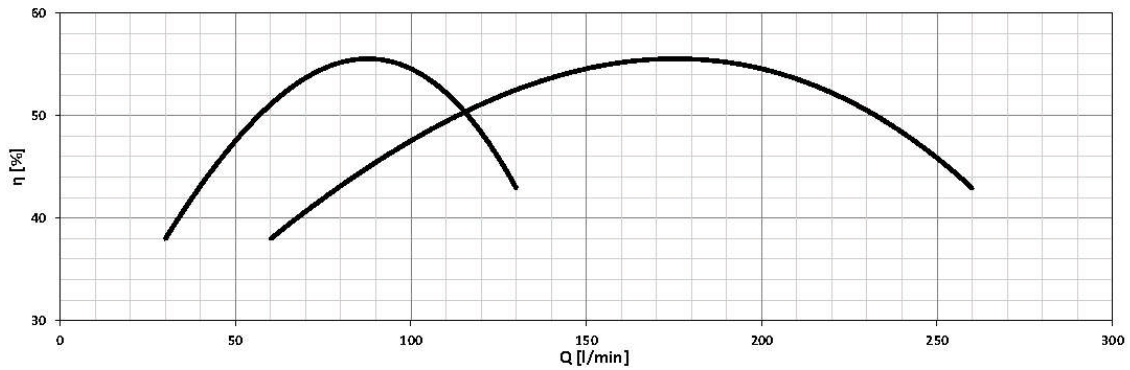




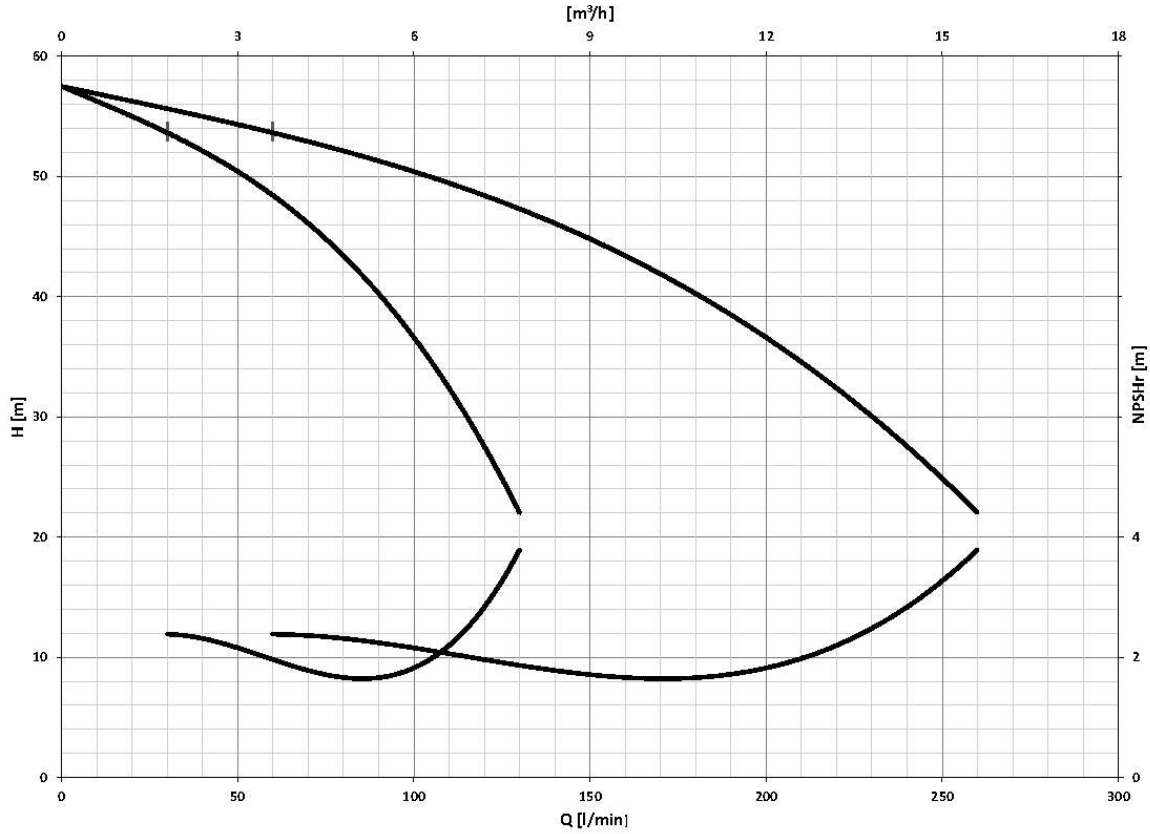
2GP(E) MATRIX 5-4T/0.9(M)

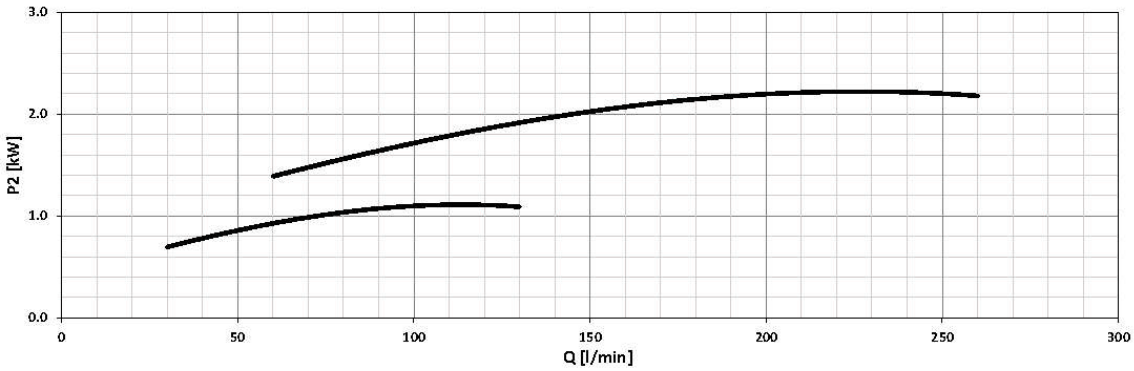


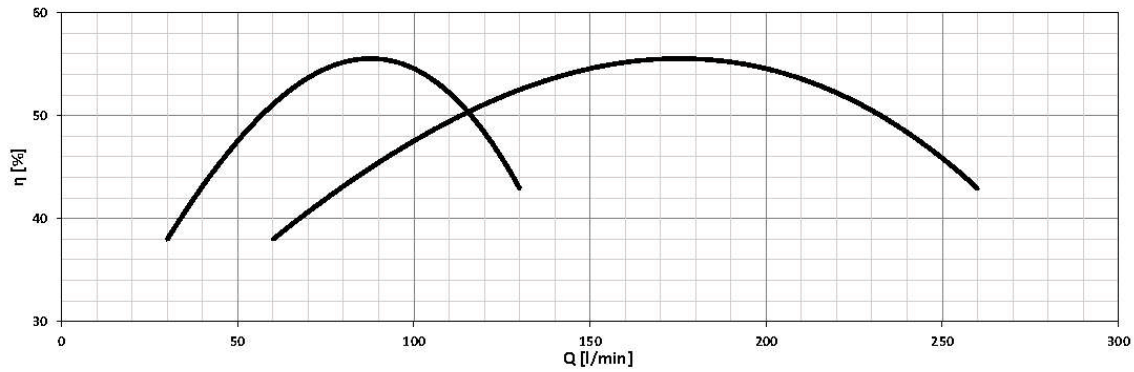




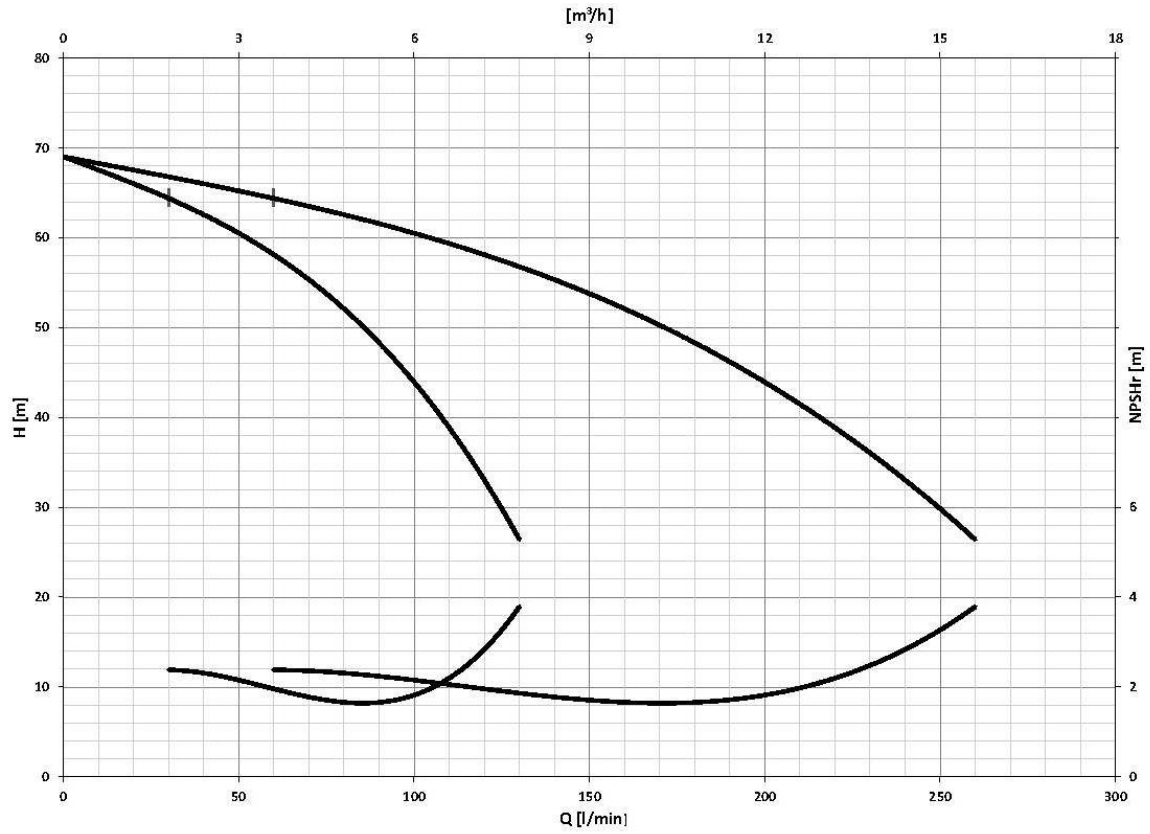
2GP(E) MATRIX 5-5T/1.3(M)

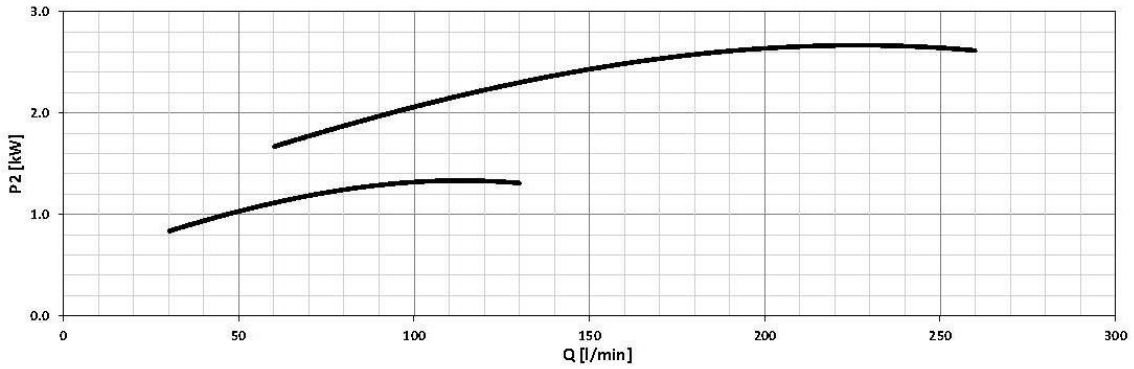


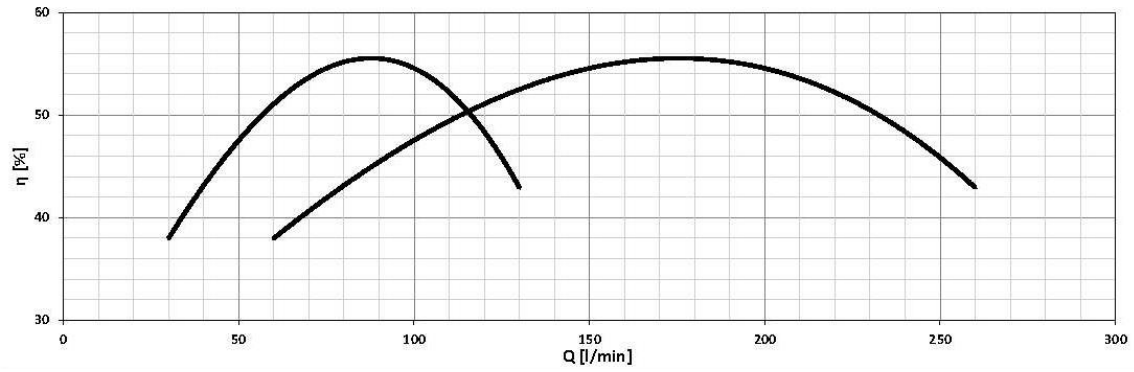




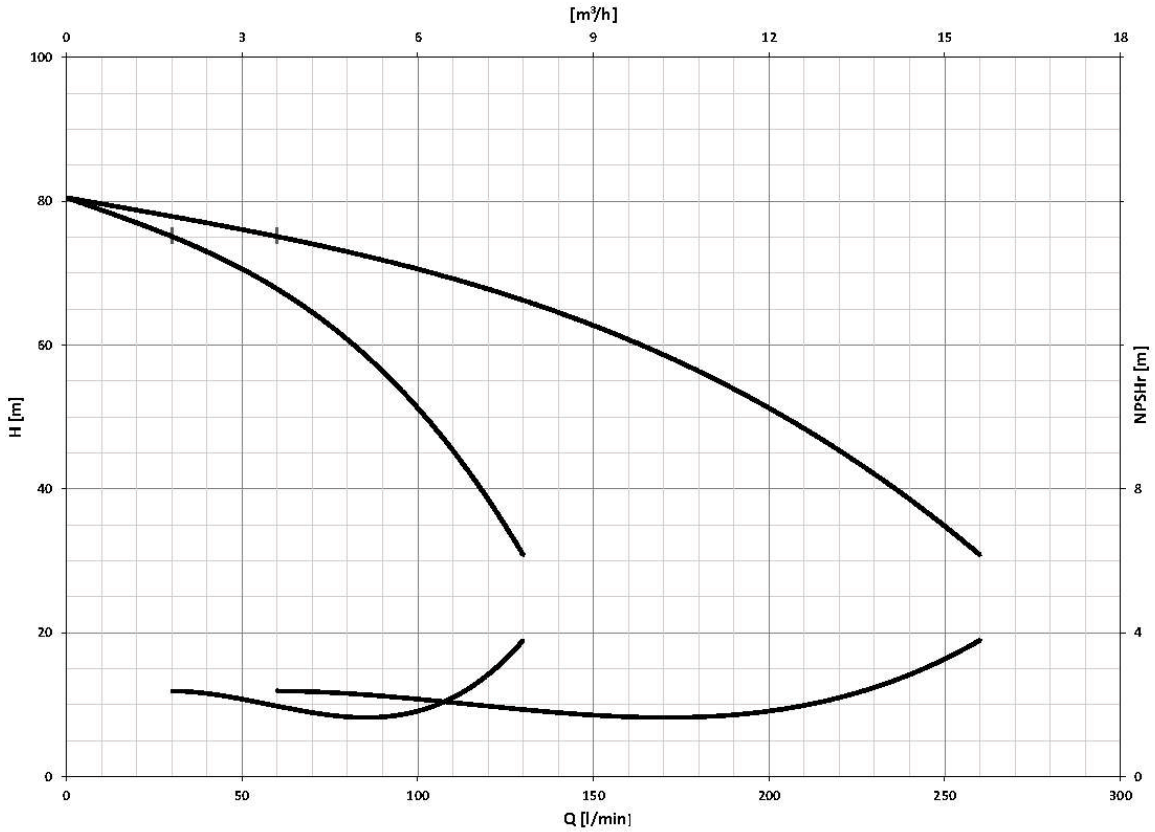
2GP(E) MATRIX 5-6T/1.3(M)

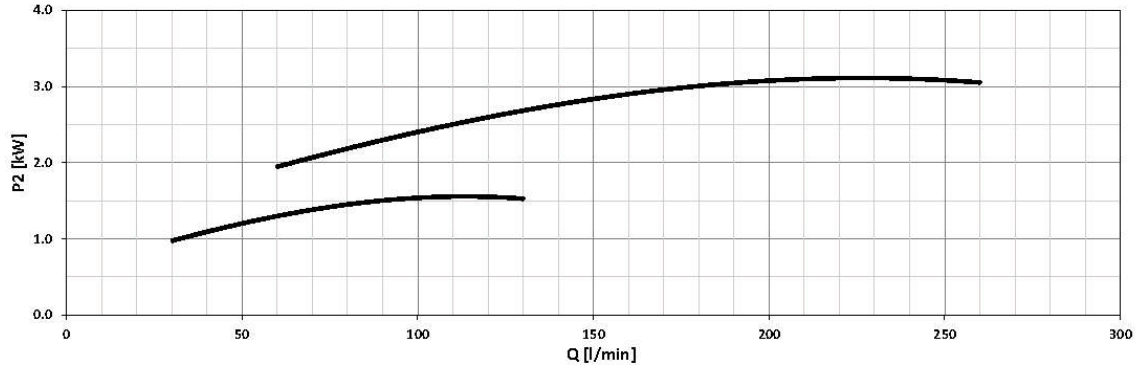


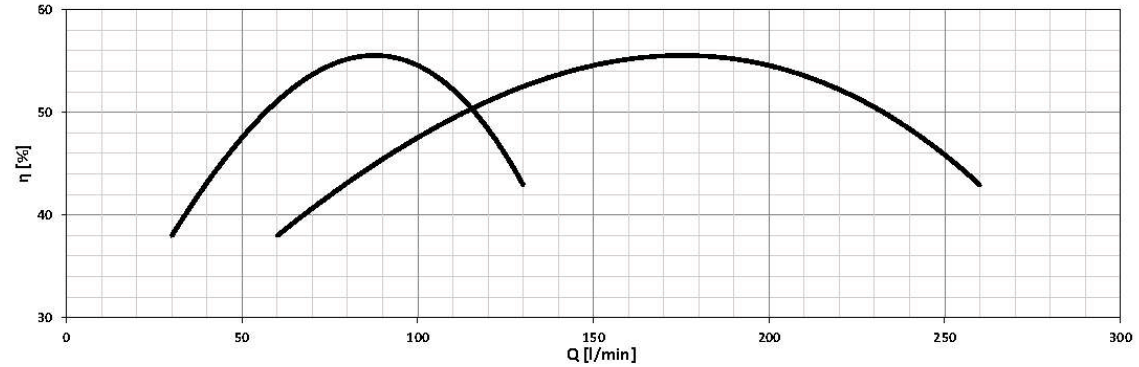




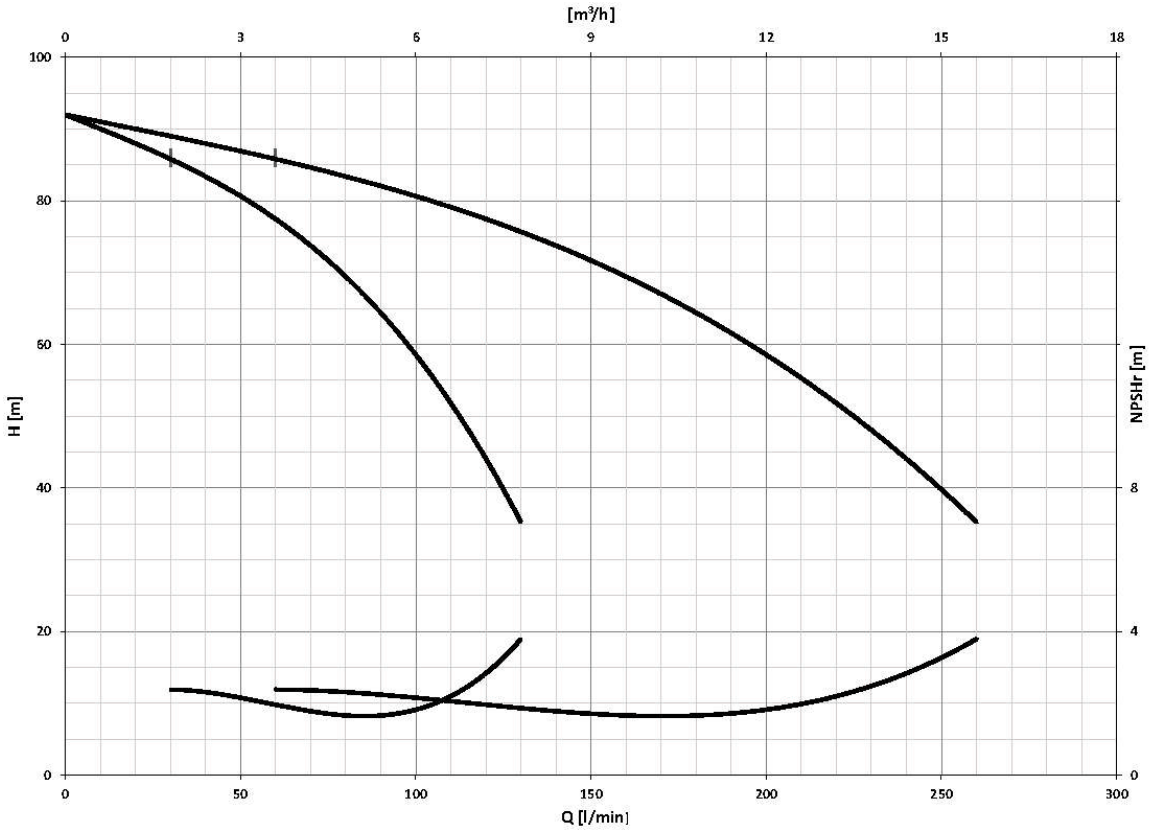
2GP(E) MATRIX 5-7T/1.5(M)

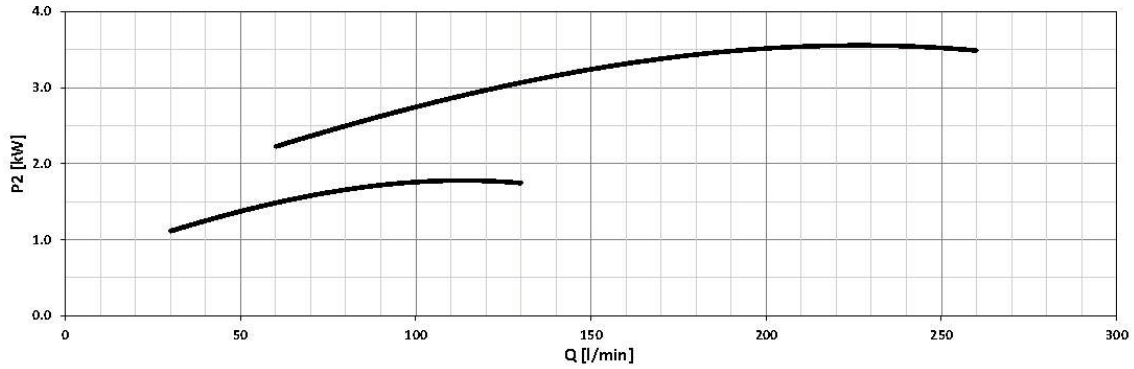


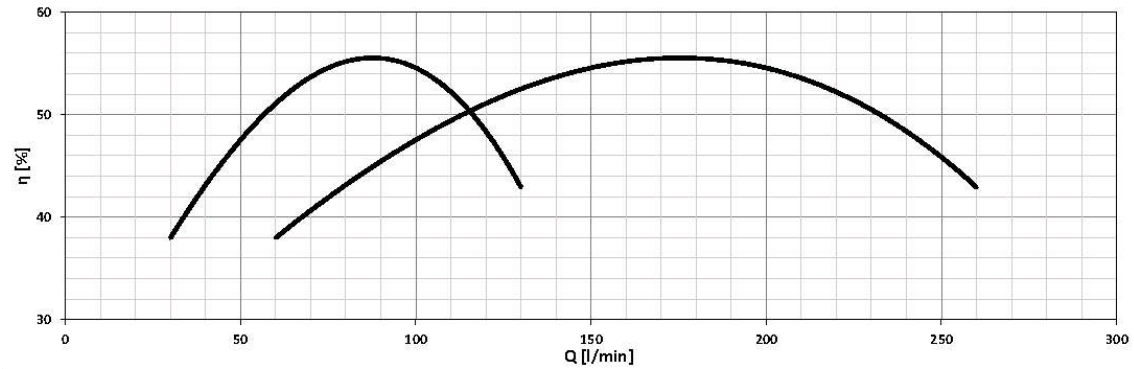




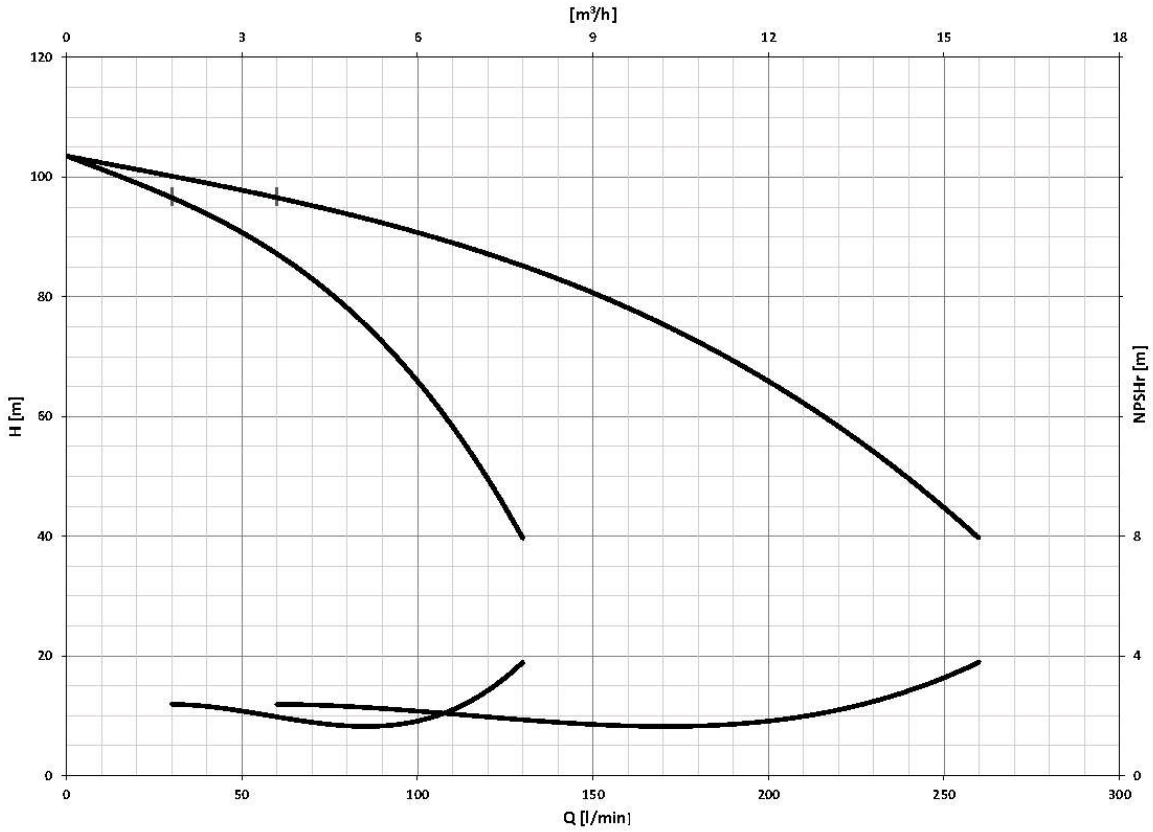
2GP(E) MATRIX 5-8T/2.2(M)

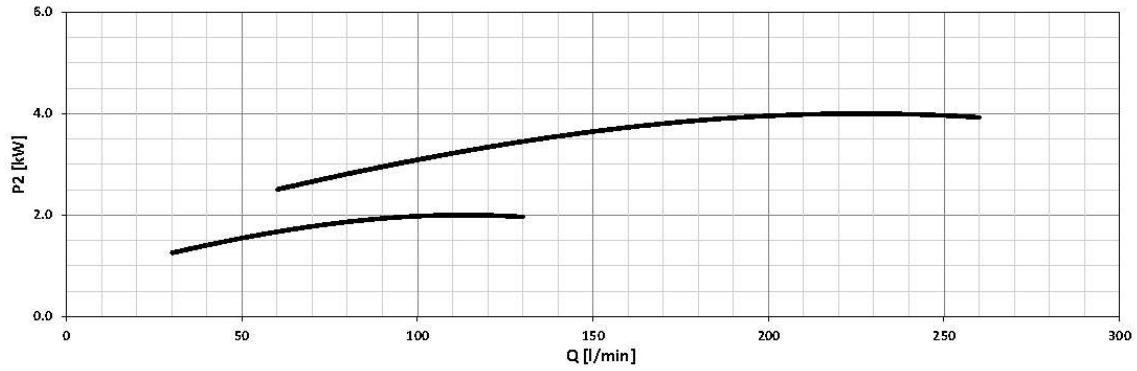


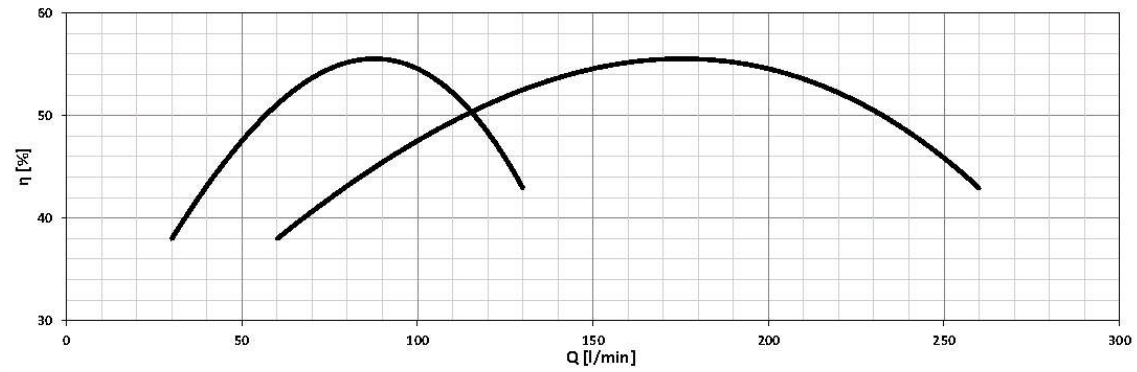




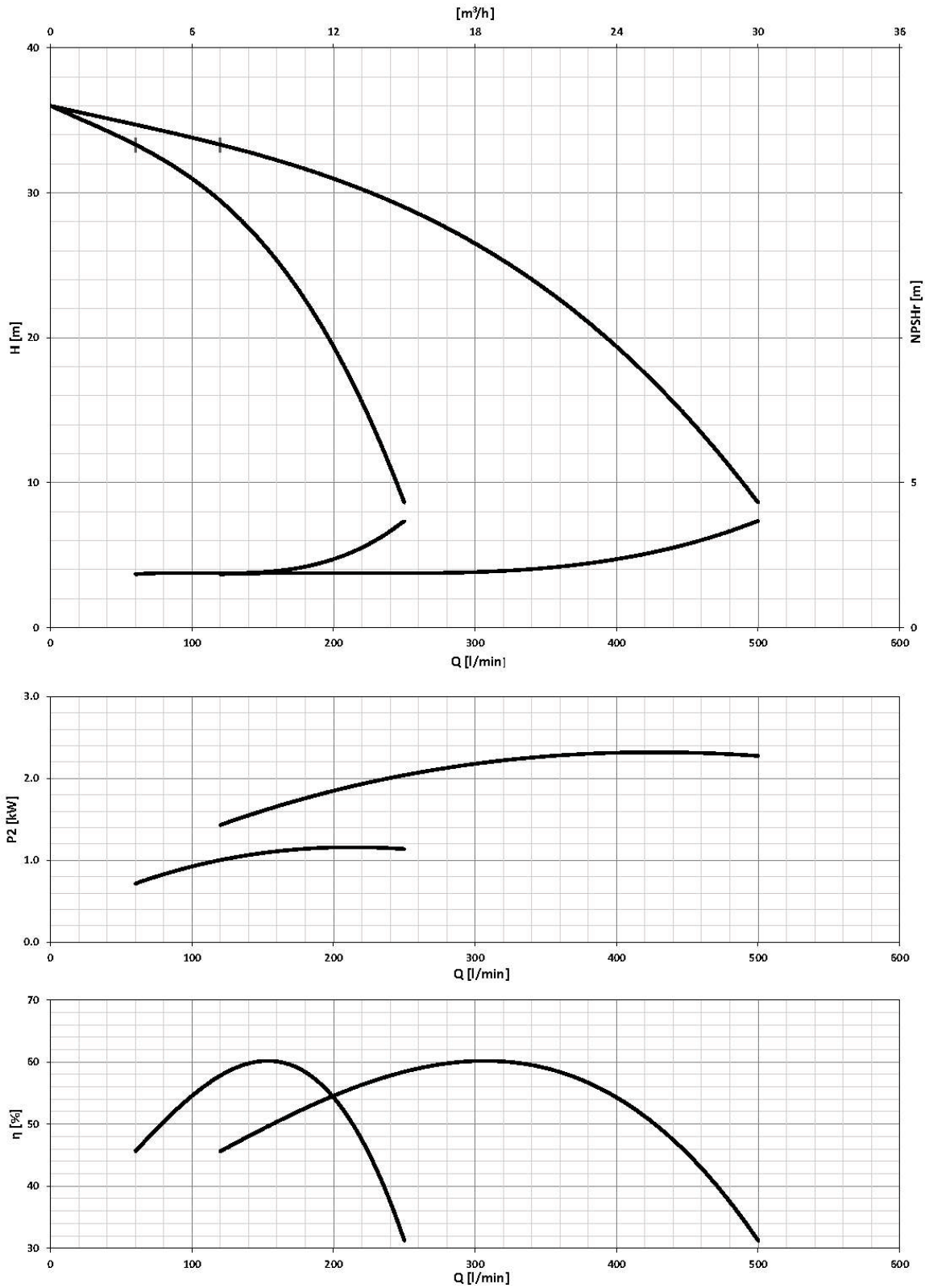
2GP(E) MATRIX 5-9T/2.2(M)



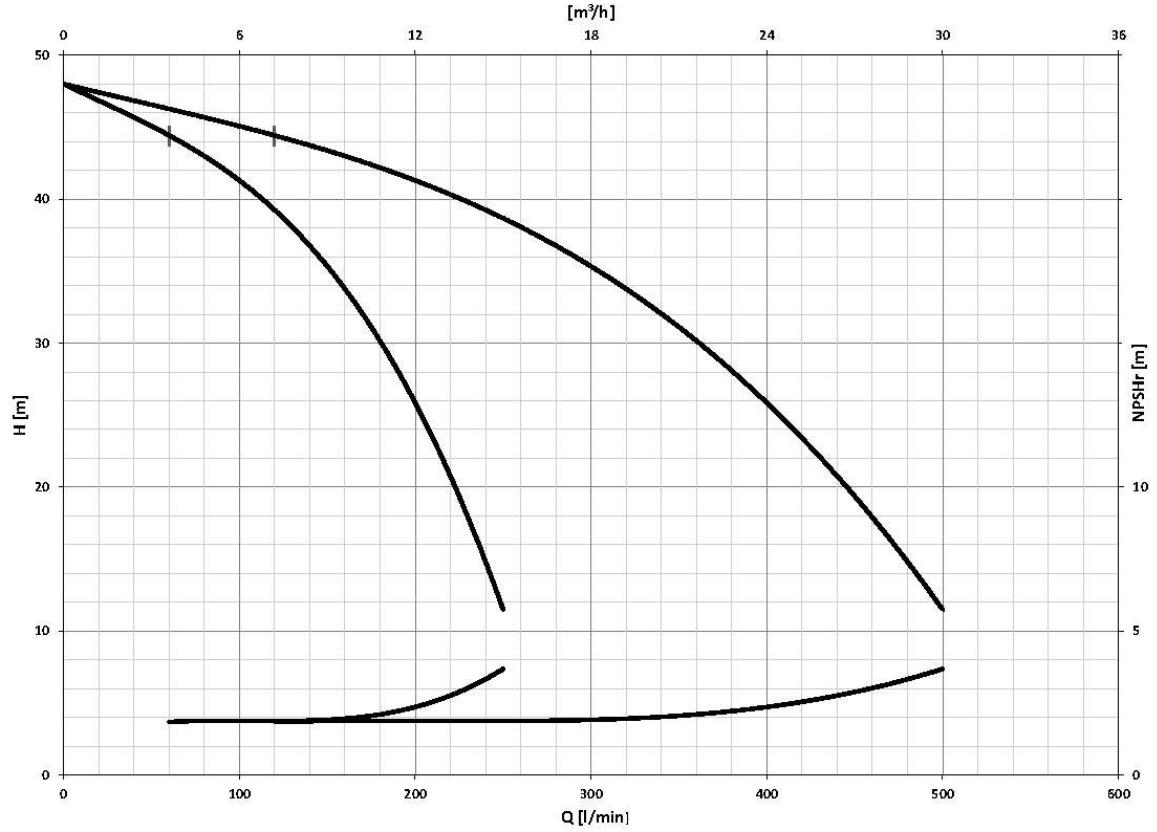


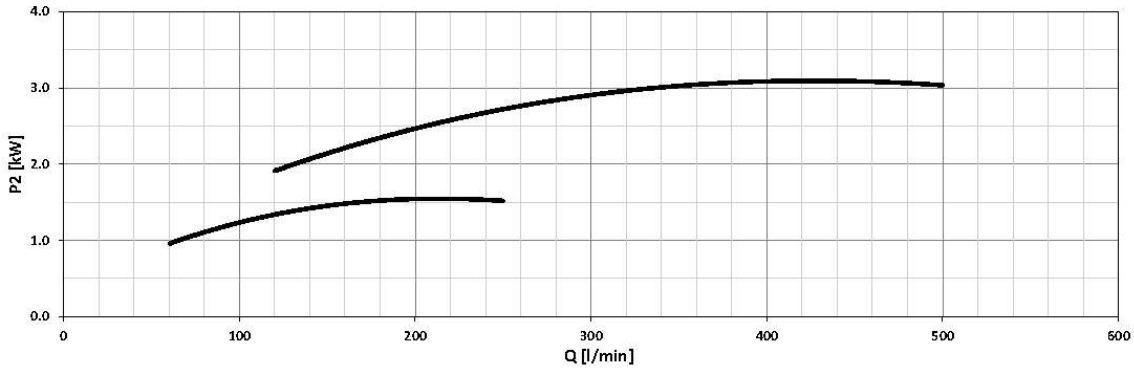


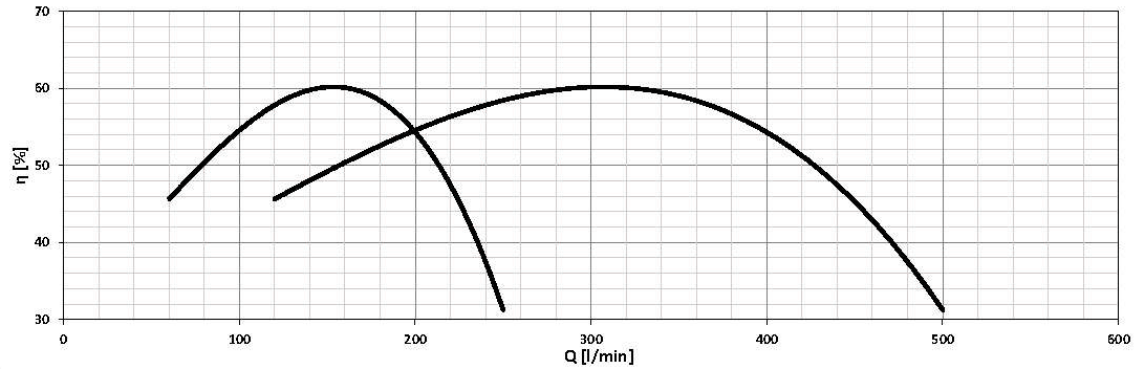
2GP(E) MATRIX 10-3T/1.3(M)



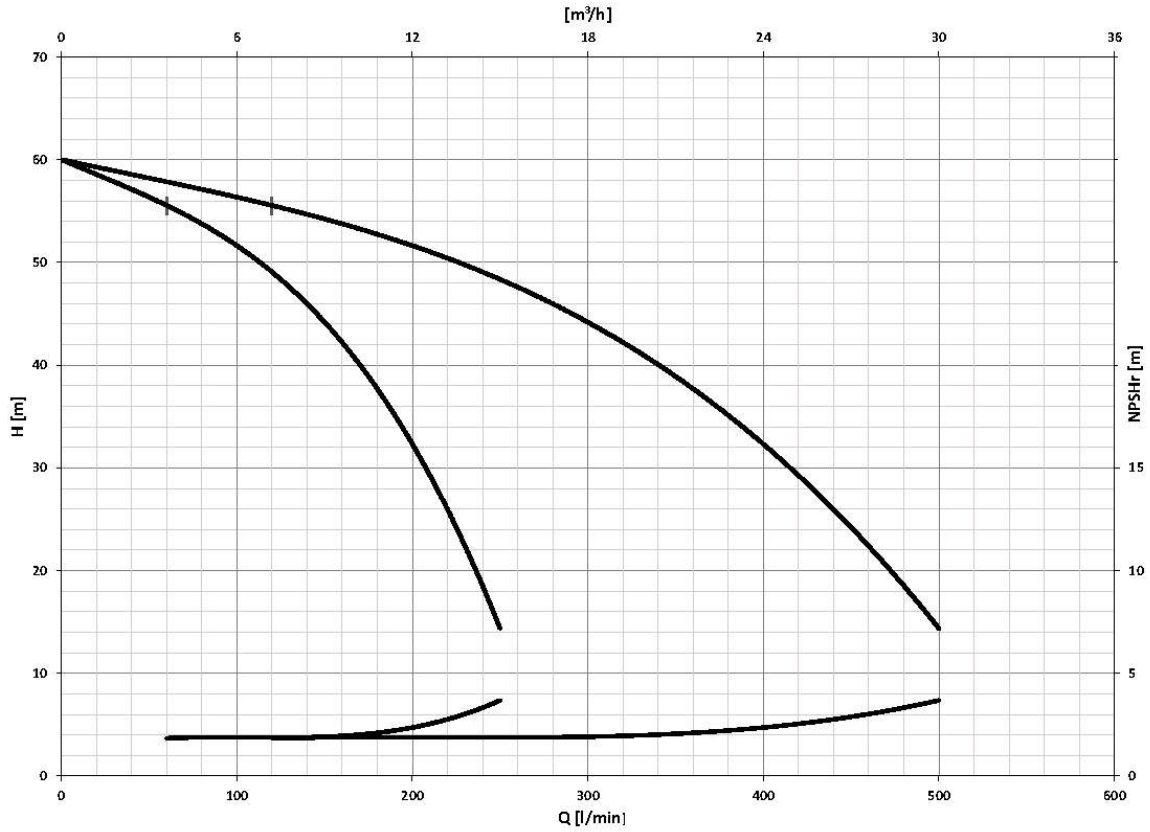
2GP(E) MATRIX 10-4T/1.5(M)

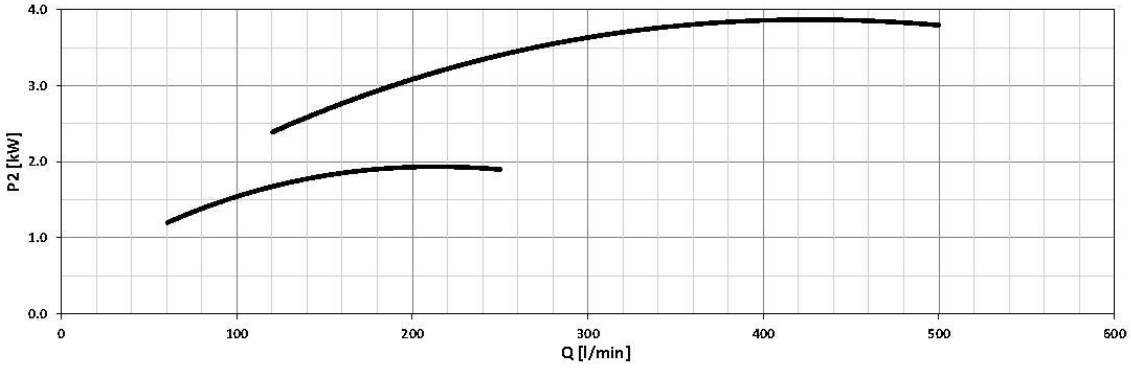


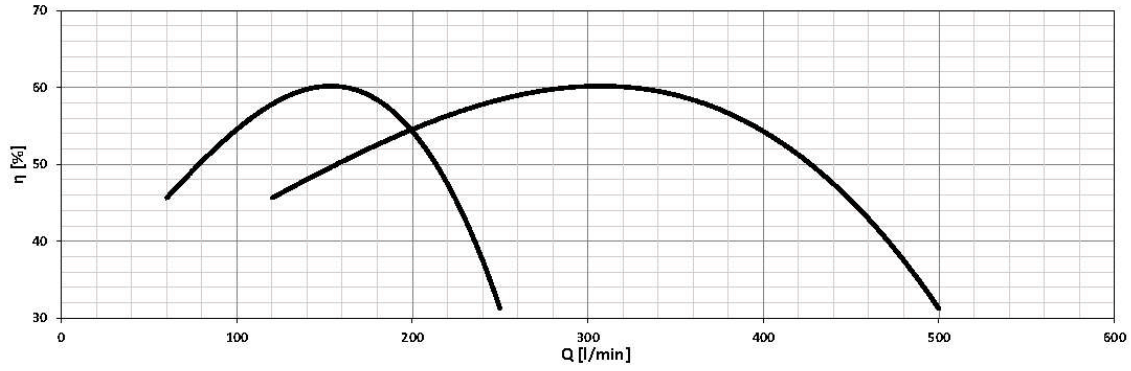




2GP(E) MATRIX 10-5T/2.2(M)







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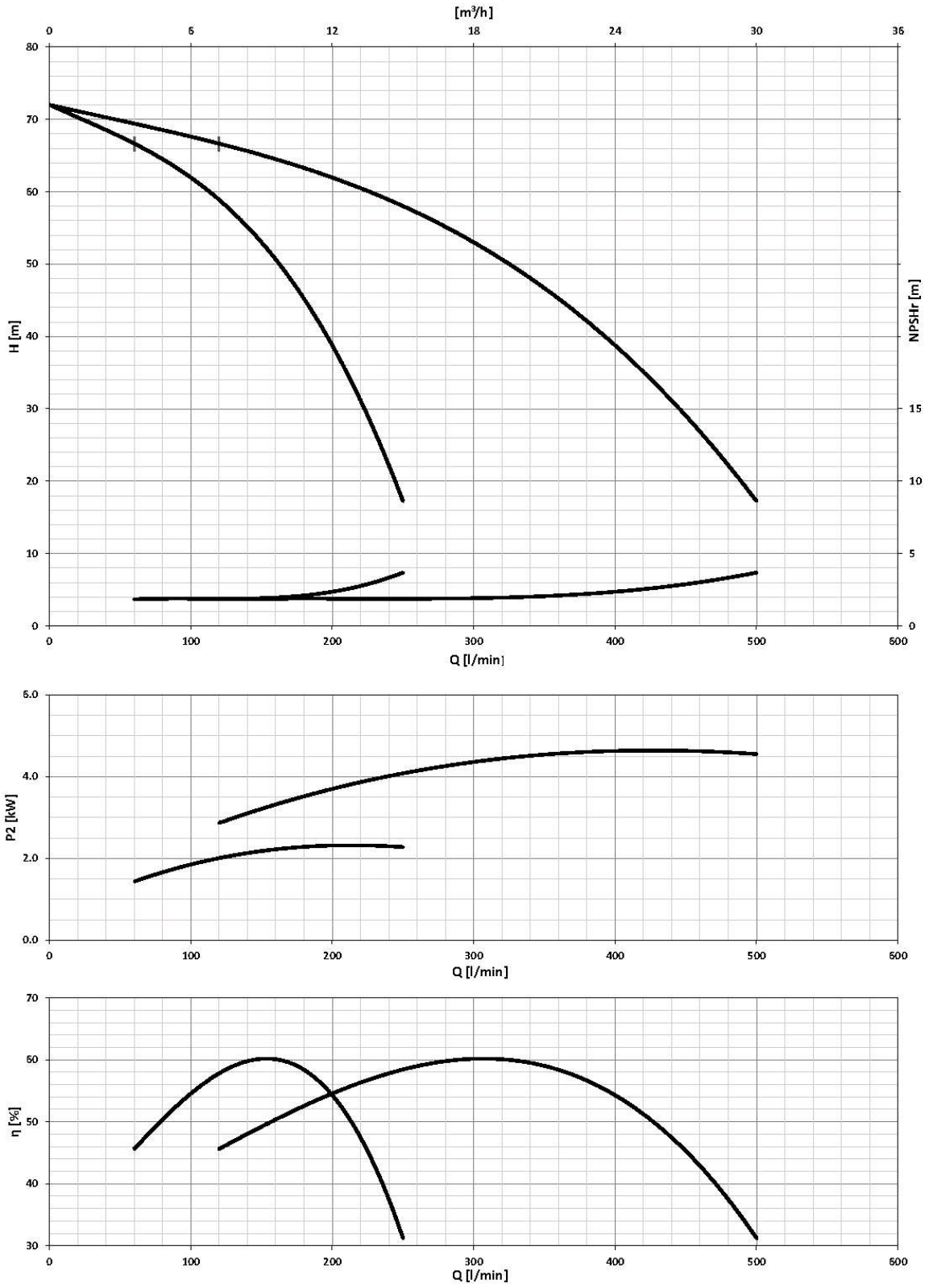
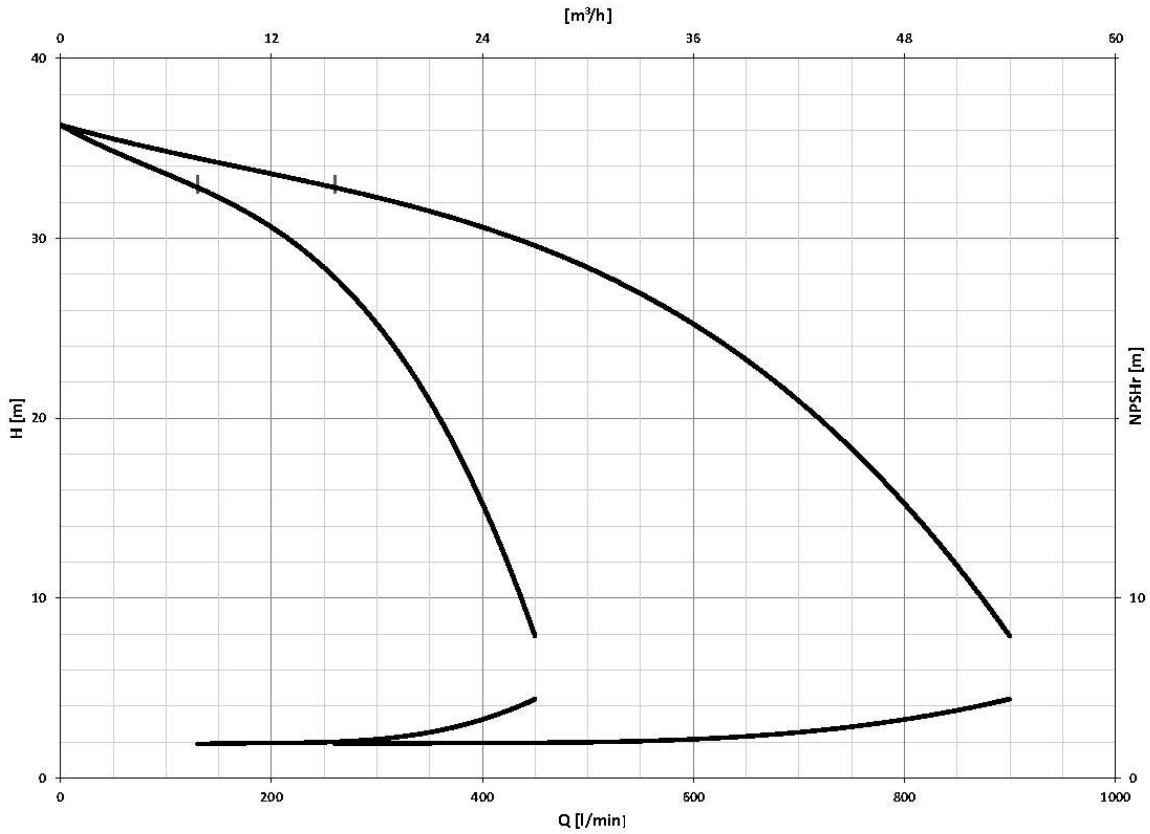
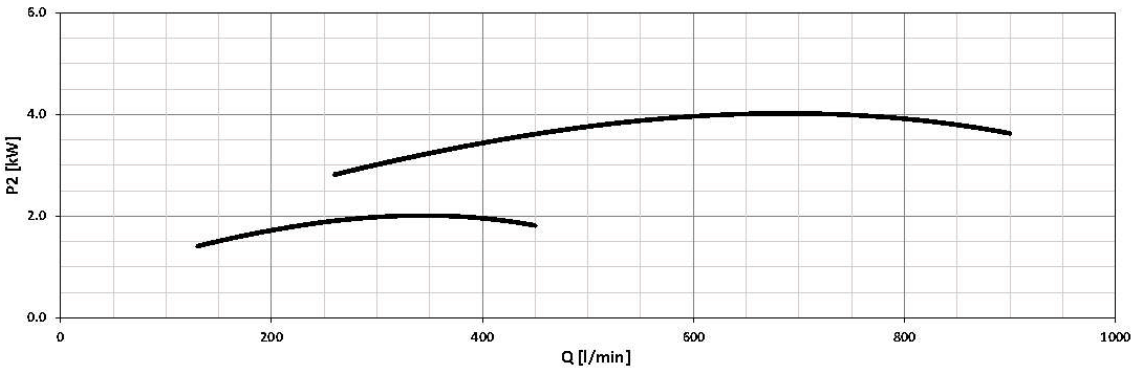
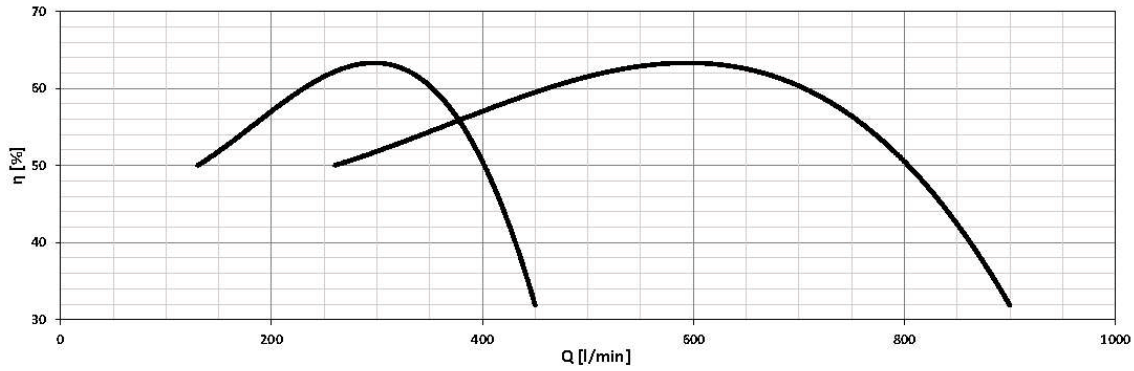


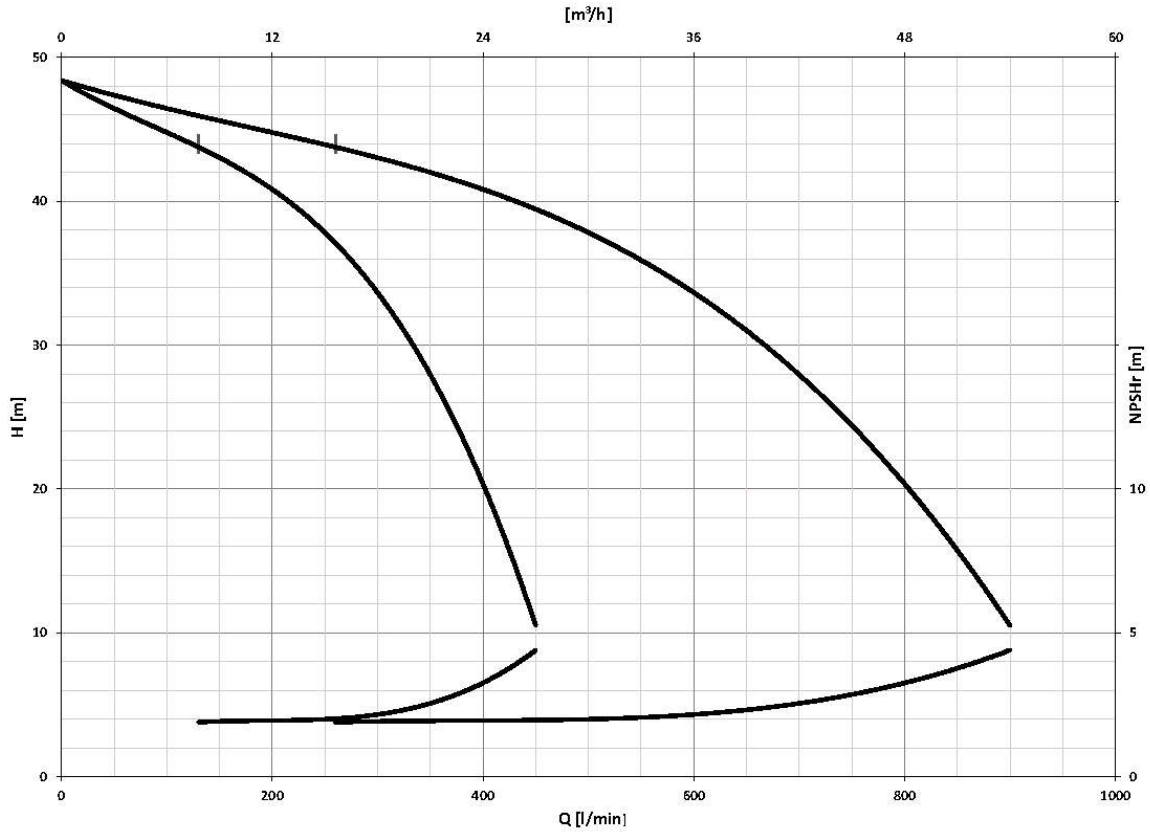
2GP(E) MATRIX 18-3T/2.2(M)

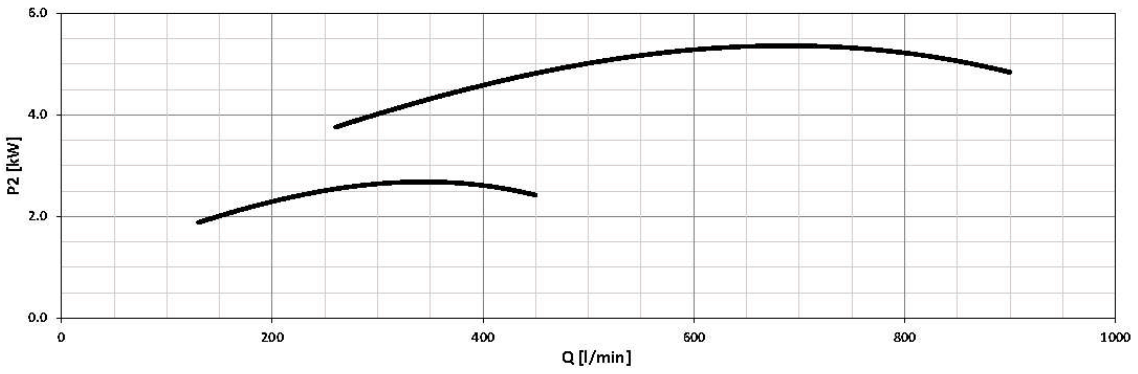


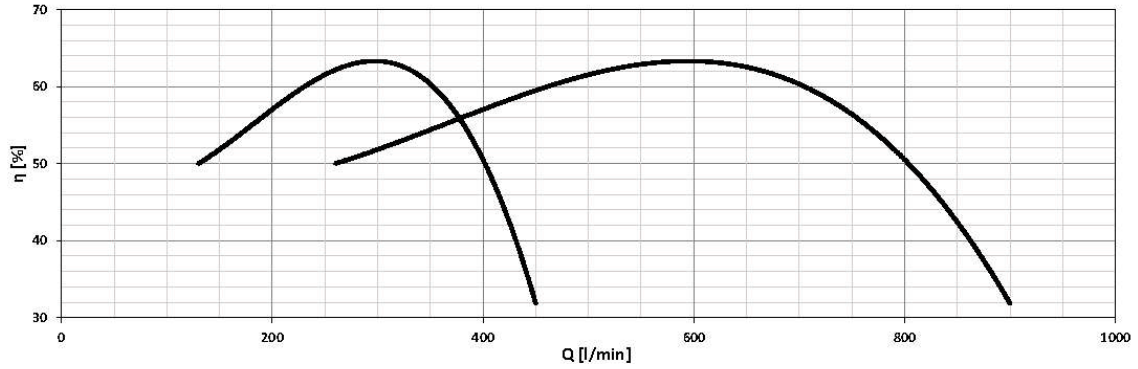




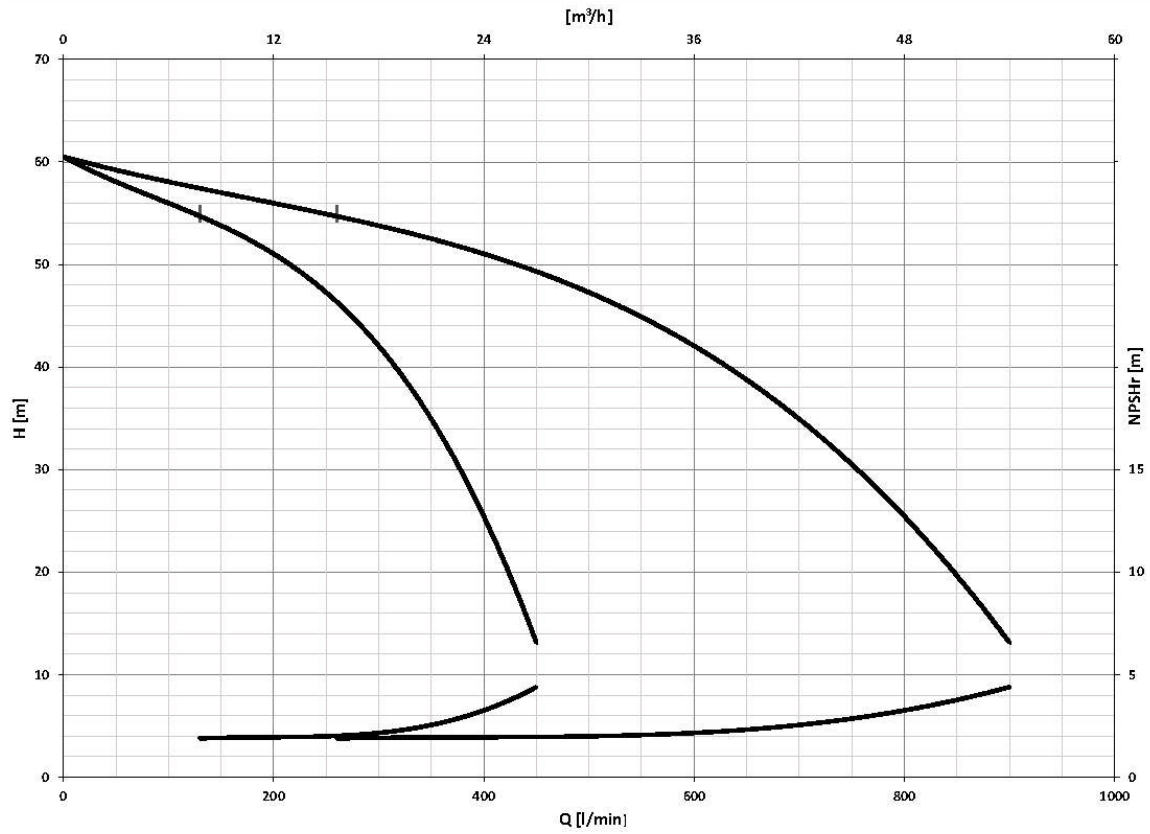
2GP(E) MATRIX 18-4T/3

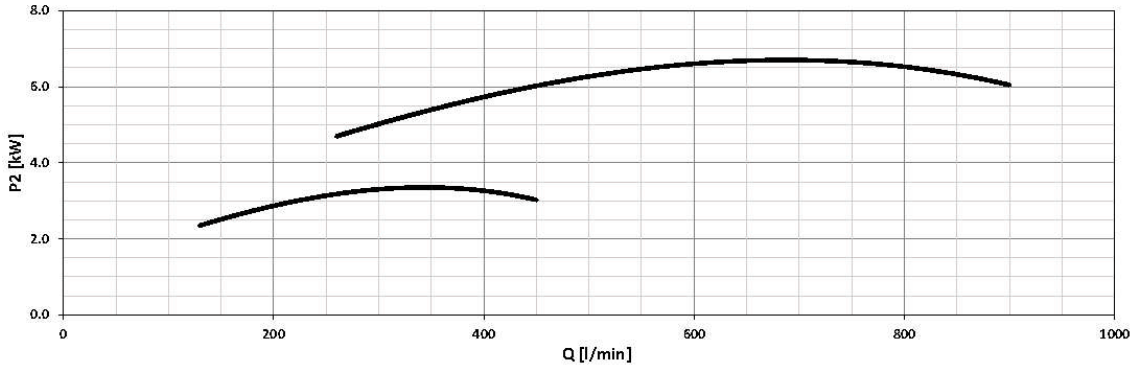


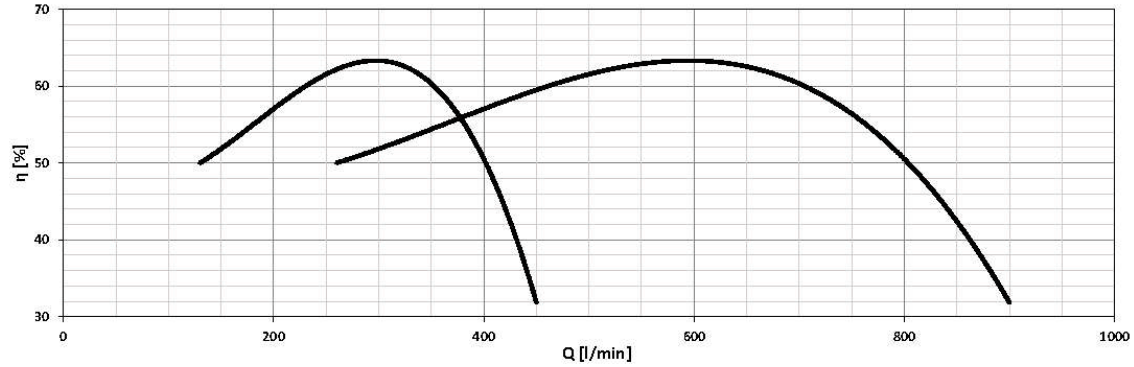




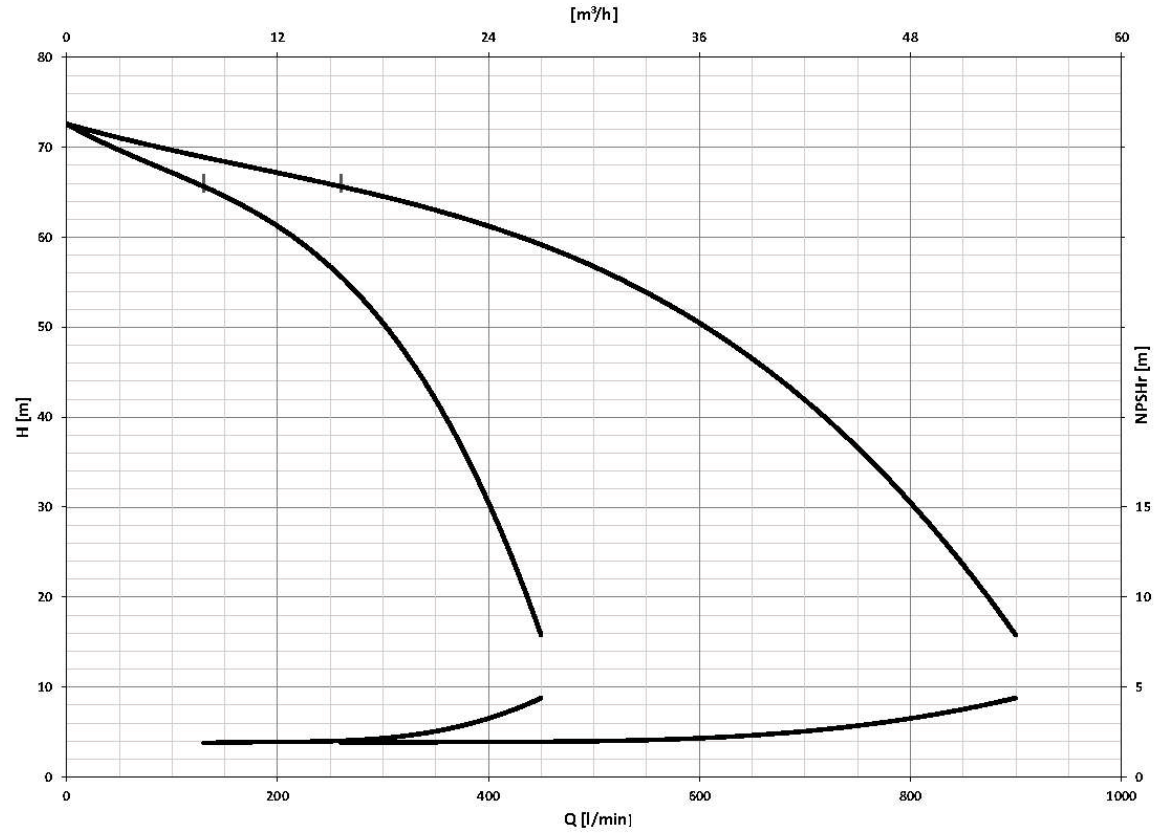
2GP(E) MATRIX 18-5T/4

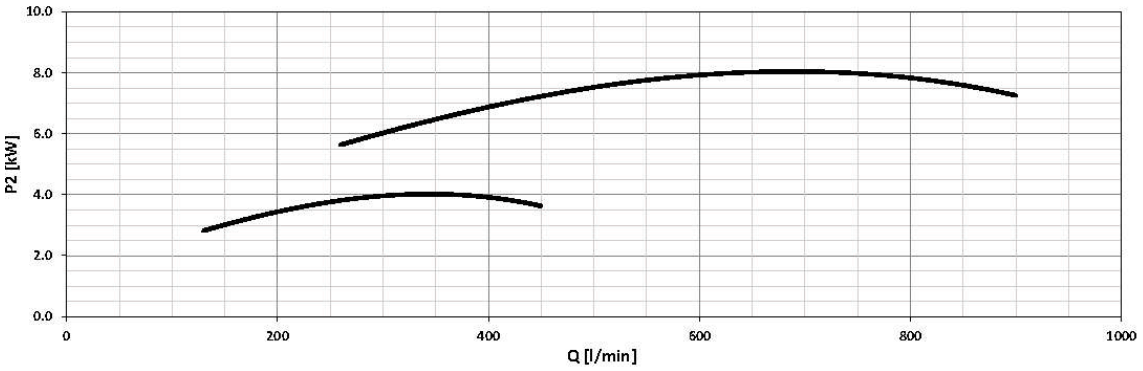


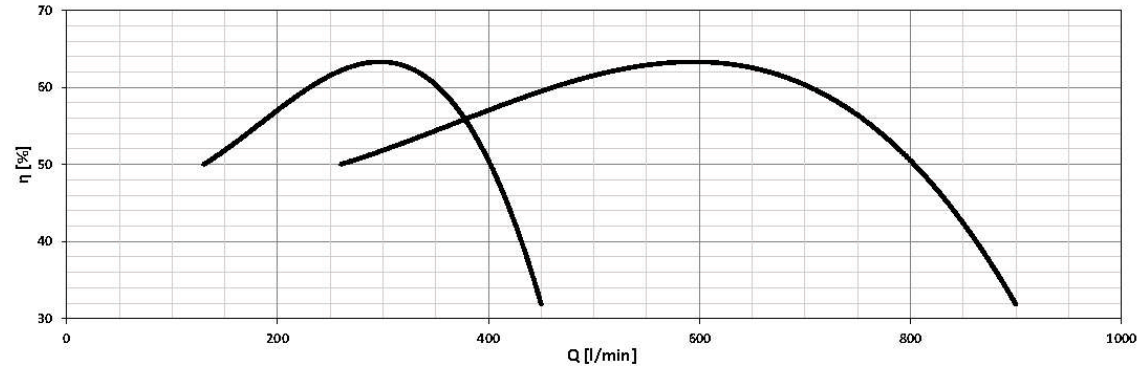




2GP(E) MATRIX 18-6T/4

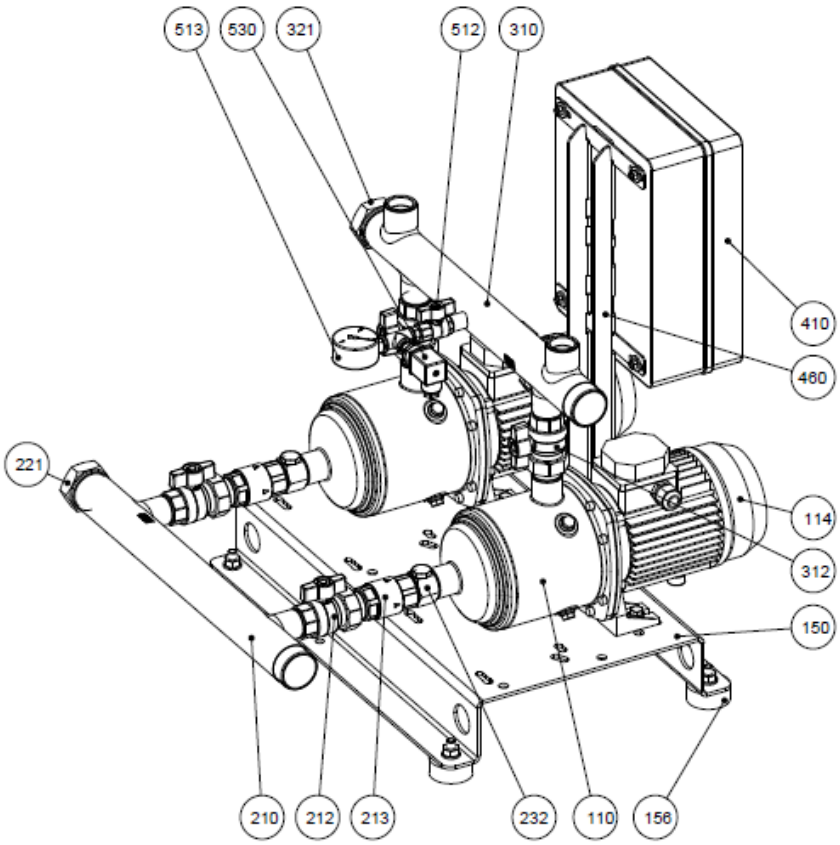






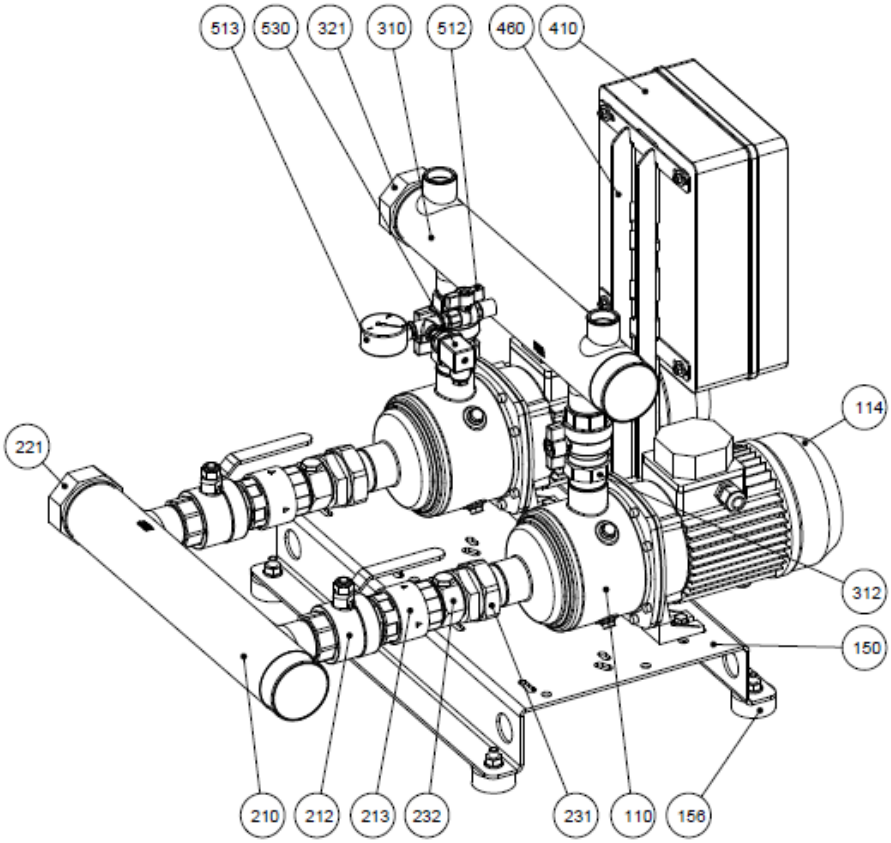
2GP CONSTRUCTION

EXTERNAL VIEW 2GP MATRIX 3-5



N°	PART NAME	MATERIAL	Quantity
110	Principal pump	-	2
114	Electric motor	-	2
150	Basement	Galvanized steel	1
156	Basement foot	SBR	4
210	Suction manifold	AISI 304	1
212	Union ball valve	CW617N / CW614N	2
213	Check valve	Brass / NBR	2
221	Threaded female cap	Galvanized steel [1]	1
232	Nipple for air feeders	Yellow brass	2
310	Discharge manifold	AISI 304	1
312	Union ball valve	CW617N / CW614N	2
321	Threaded female cap	Galvanized steel [1]	1
410	Control panel	-	1
460	Control panel frame	Galvanized steel	1
512	Ball valve	CW617N / CW614N	1
513	Pressure gauge	Copper alloy / plastic	1
530	Pressure transmitter	-	1

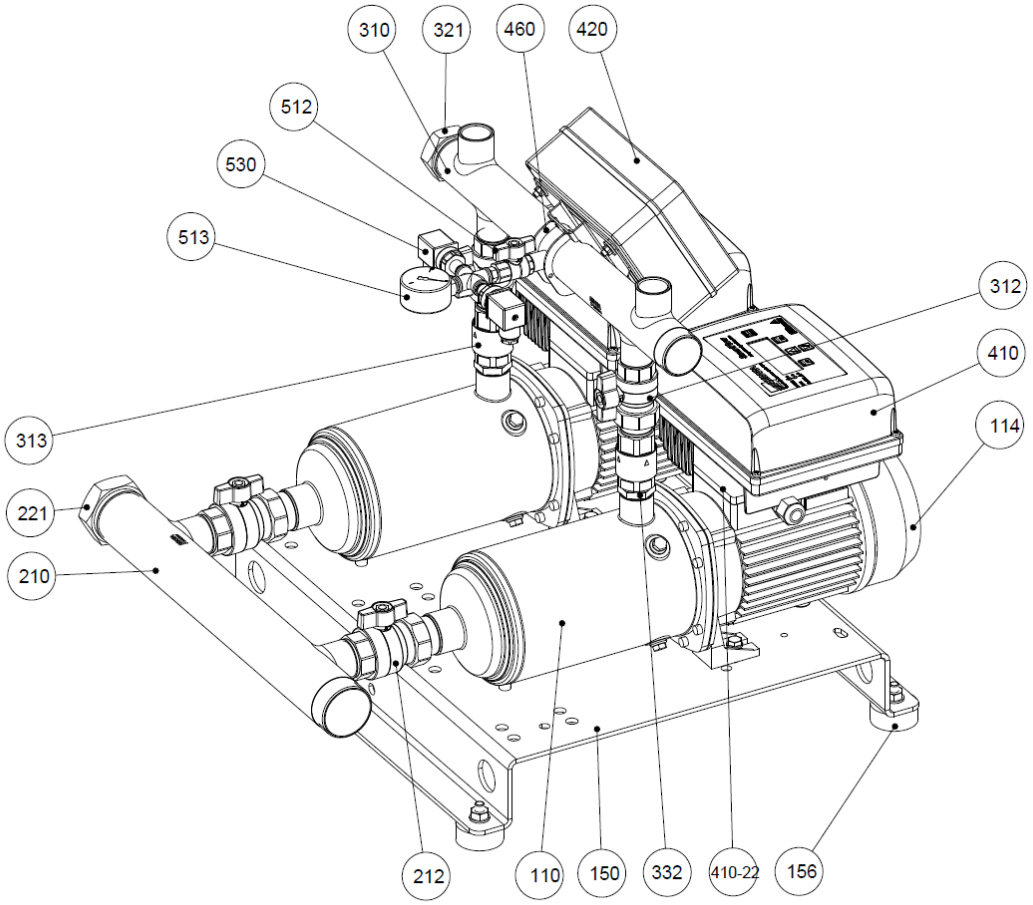
EXTERNAL VIEW 2GP MATRIX 10-18



N°	PART NAME	MATERIAL	Quantity
110	Principal pump	-	2
114	Electric motor	-	2
150	Basement	Galvanized steel	1
156	Basement foot	SBR	4
210	Suction manifold	AISI 304	1
212	Ball valve	CW617N / CW614N	2
213	Check valve	Brass / NBR	2
221	Threaded female cap	Galvanized steel [1]	1
231	Union 3 pcs.	Yellow brass	2
232	Nipple for air feeders	Yellow brass	2
310	Discharge manifold	AISI 304	1
312	Union ball valve	CW617N / CW614N	2
321	Threaded female cap	Galvanized steel [1]	1
410	Control panel	-	1
460	Control panel frame	Galvanized steel	1
512	Ball valve	CW617N / CW614N	1
513	Pressure gauge	Copper alloy / plastic	1
530	Pressure transmitter	-	1

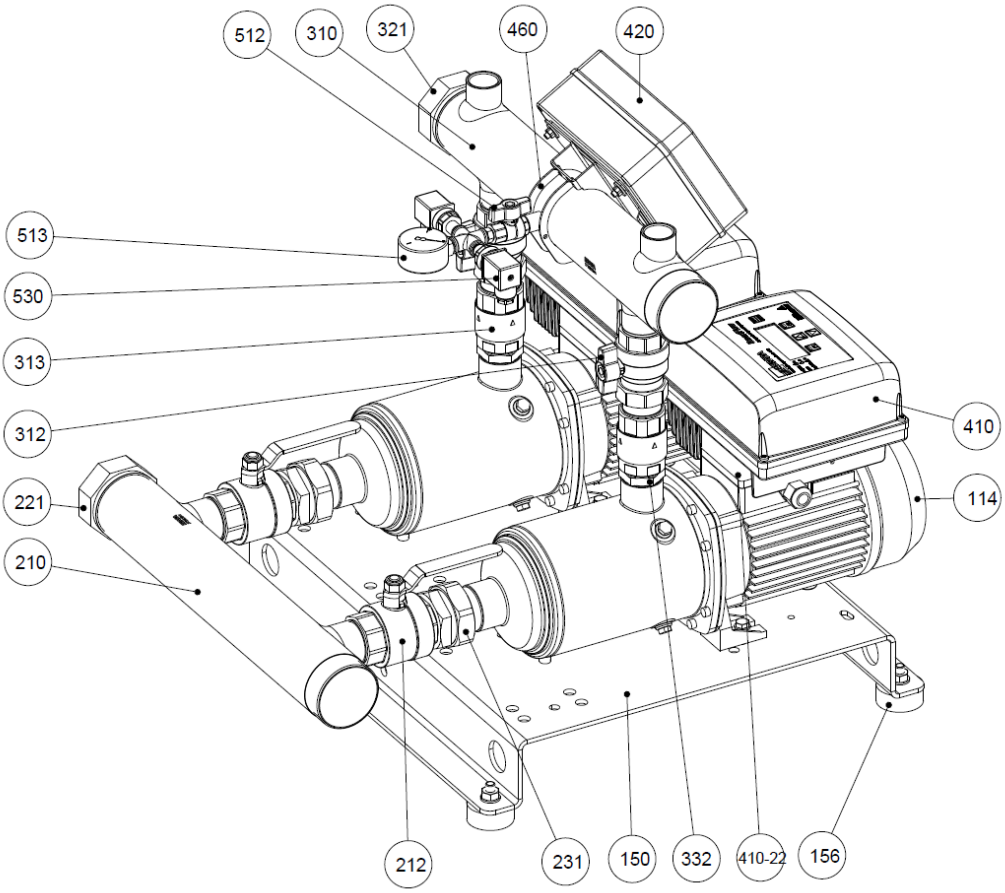
[1] Stainless steel only for Matrix 18

EXTERNAL VIEW 2GPE MATRIX 3-5 E-SPD



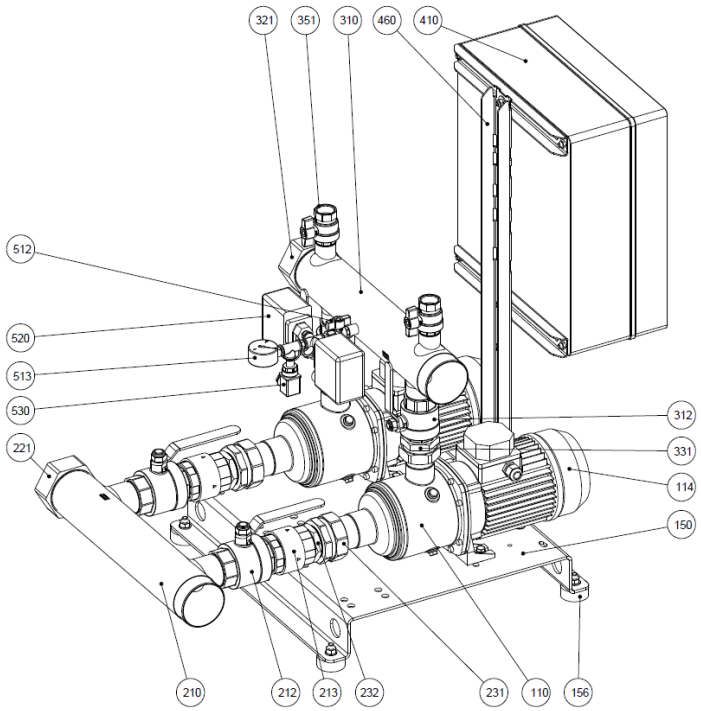
N°	PART NAME	MATERIAL	Quantity
110	Principal pump	-	2
114	Electric motor	-	2
150	Basement	Galvanized steel	1
156	Basement foot	SBR	4
210	Suction manifold	AISI 304	1
212	Union ball valve	CW617N / CW614N	2
221	Threaded female cap	Galvanized steel	1
310	Discharge manifold	AISI 304	1
312	Union ball valve	CW617N / CW614N	2
313	Check valve	Brass / NBR	2
321	Threaded female cap	Galvanized steel	1
332	Nipple	Yellow brass	2
410	E-SPD	-	2
410-22	E-SPD adaptor	-	2
420	Protection panel	-	1
460	Protection panel frame	Galvanized steel	1
512	Ball valve	CW617N / CW614N	1
513	Pressure gauge	Copper alloy / plastic	1
530	Pressure transmitter	-	2

EXTERNAL VIEW 2GPE MATRIX 10 E-SPD



N°	PART NAME	MATERIAL	Quantity
110	Principal pump	-	2
114	Electric motor	-	2
150	Basement	Galvanized steel	1
156	Basement foot	SBR	4
210	Suction manifold	AISI 304	1
212	Ball valve	CW617N / CW614N	2
221	Threaded female cap	Galvanized steel	1
231	Union 3 pcs.	Yellow brass	2
310	Discharge manifold	AISI 304	1
312	Union ball valve	CW617N / CW614N	2
313	Check valve	Brass / NBR	2
321	Threaded female cap	Galvanized steel	1
332	Nipple	Yellow brass	2
410	E-SPD	-	2
410-22	E-SPD adaptor	-	2
420	Protection panel	-	1
460	Protection panel frame	Galvanized steel	1
512	Ball valve	CW617N / CW614N	1
513	Pressure gauge	Copper alloy / plastic	1
530	Pressure transmitter	-	2

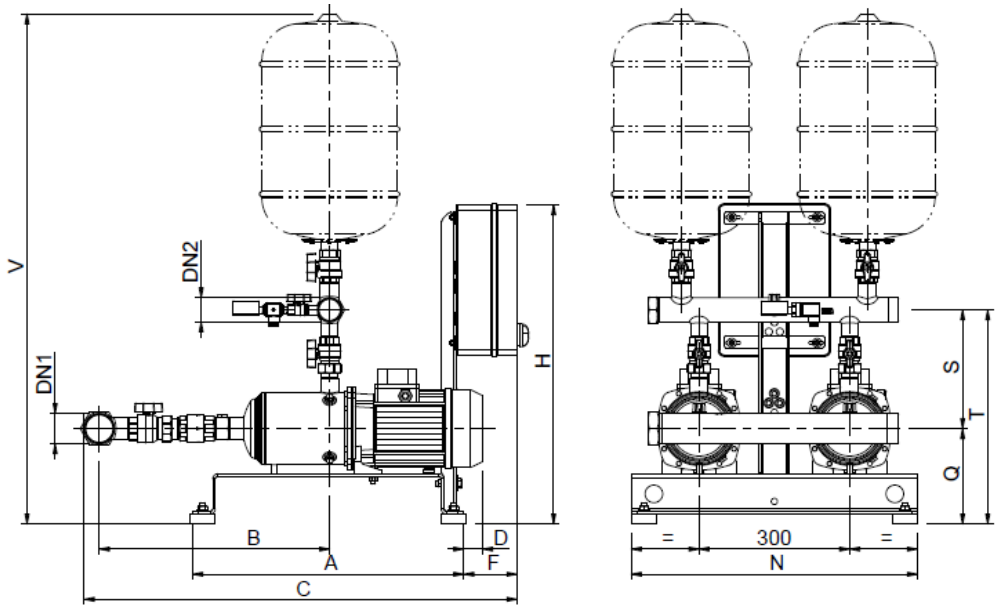
EXTERNAL VIEW 2GPE MATRIX EFC/MFC



N°	PART NAME	MATERIAL	Quantity
110	Principal pump	-	2
114	Electric motor	-	2
150	Basement	Galvanized steel	1
156	Basement foot	SBR	4
210	Suction manifold	AISI 304	1
212	Ball valve	CW617N / CW614N	2
213	Check valve	Brass / NBR	2
221	Threaded female cap	Galvanized steel	1
231	Union 3 pcs.	Yellow brass	2
232	Nipple	Yellow brass	2
310	Discharge manifold	AISI 304	1
312	Ball valve	CW617N / CW614N	2
321	Threaded female cap	Galvanized steel [1]	1
331	Union 3 pcs.	Yellow brass	2
351	Ball valve	CW617N / CW614N	2
410	Control panel	-	1
460	Control panel frame	Galvanized steel	1
512	Ball valve	CW617N / CW614N	1
513	Pressure gauge	Copper alloy / plastic	1
520	Pressure switches	-	2
530	Pressure transmitter	-	1

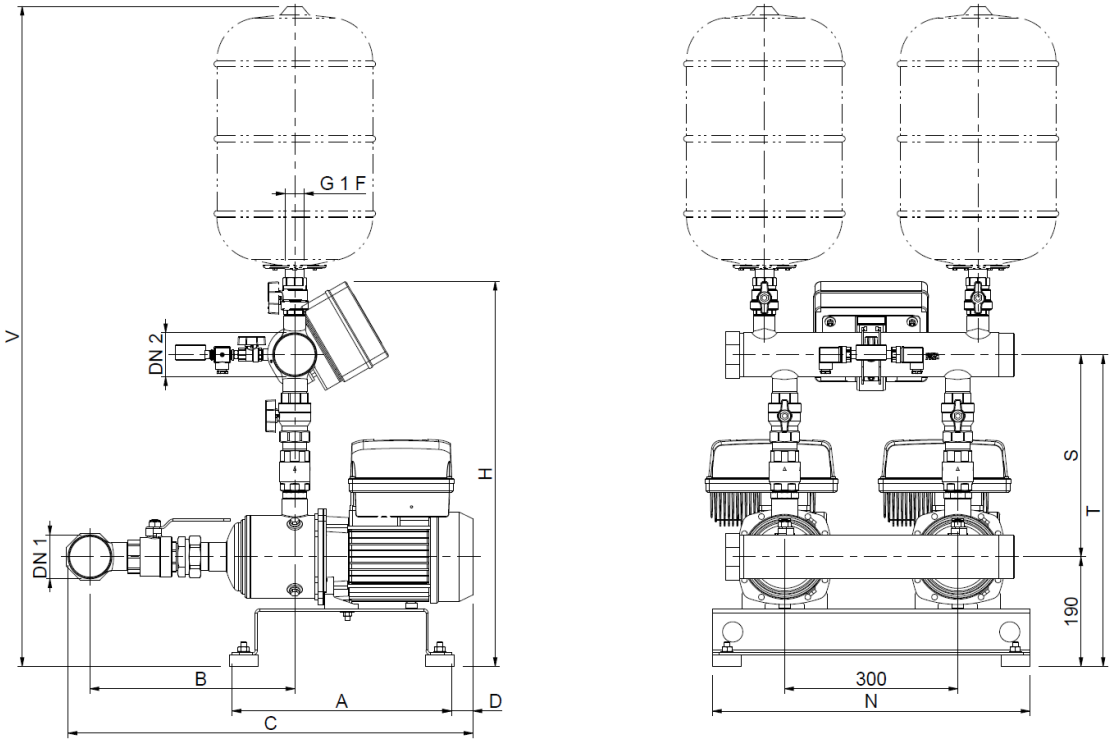
OVERALL DIMENSIONS 2GP BOOSTER SET

2GP MATRIX



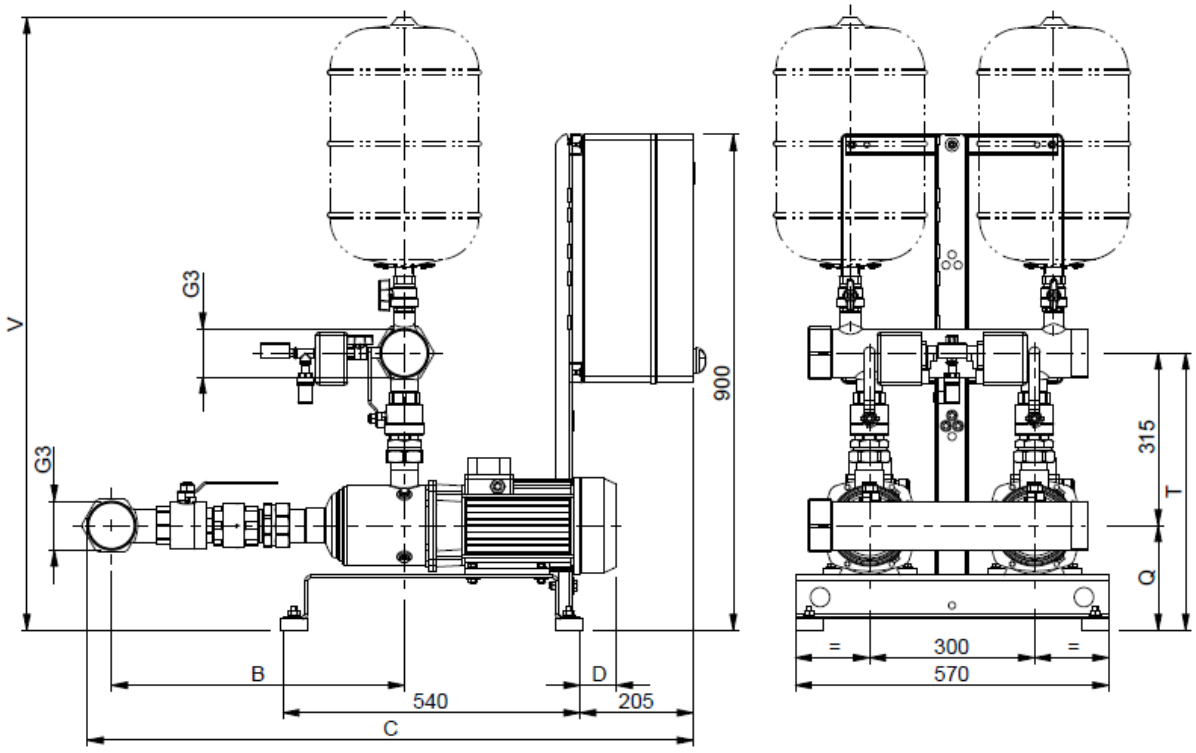
Booster Type	Dimensions [mm]																				Weight [kg]	
	DN1	DN2	1~ A	3~ A	B	1~ C	3~ C	1~ D	3~ D	1~ F	3~ F	1~ H	3~ H	1~ N	3~ N	Q	S	T	V		1~	3~
2GP MATRIX 3-4T/0.65(M)	G 1 1/2	G 1 1/2	380	380	360	640	665	80	80	75	105	630	635	550	550	190	235	425	1015		52	53
2GP MATRIX 3-5T/0.75(M)	G 1 1/2	G 1 1/2	380	380	385	665	690	80	80	75	105	630	635	550	550	190	235	425	1015		55	57
2GP MATRIX 3-6T/0.9(M)	G 1 1/2	G 1 1/2	380	380	405	700	715	95	95	75	105	630	635	550	550	190	235	425	1015		58	60
2GP MATRIX 3-7T/1.3(M)	G 1 1/2	G 1 1/2	380	540	430	745	830	115	50	75	105	630	635	550	570	190	235	425	1015		63	74
2GP MATRIX 3-8T/1.3(M)	G 1 1/2	G 1 1/2	380	540	455	770	855	115	50	75	105	630	635	550	570	190	235	425	1015		63	76
2GP MATRIX 3-9T/1.5(M)	G 1 1/2	G 1 1/2	380	540	480	810	875	130	55	75	105	630	635	550	570	190	235	425	1015		67	80
2GP MATRIX 5-4T/0.9(M)	G 2	G 1 1/2	380	380	385	685	700	95	95	75	105	630	635	550	550	190	235	425	1015		57	59
2GP MATRIX 5-5T/1.3(M)	G 2	G 1 1/2	380	540	410	735	815	115	50	75	105	630	635	550	570	190	235	425	1015		64	74
2GP MATRIX 5-6T/1.3(M)	G 2	G 1 1/2	380	540	435	755	840	115	50	75	105	630	635	550	570	190	235	425	1015		63	74
2GP MATRIX 5-7T/1.5(M)	G 2	G 1 1/2	380	540	460	795	860	130	55	75	105	630	635	550	570	190	235	425	1015		69	79
2GP MATRIX 5-8T/2.2(M)	G 2	G 1 1/2	540	540	485	895	885	35	55	75	105	635	635	570	570	190	235	425	1015		82	79
2GP MATRIX 5-9T/2.2(M)	G 2	G 1 1/2	540	540	505	905	910	35	55	75	105	635	635	570	570	190	235	425	1015		84	80
2GP MATRIX 10-3T/1.3(M)	G 2 1/2	G 2 1/2	380	540	445	780	845	115	50	75	105	630	635	550	570	190	265	455	1060		66	74
2GP MATRIX 10-4T/1.5(M)	G 2 1/2	G 2 1/2	380	540	475	820	875	130	55	75	105	630	635	550	570	190	265	455	1060		68	81
2GP MATRIX 10-5T/2.2(M)	G 2 1/2	G 2 1/2	540	540	490	925	905	25	55	75	105	635	635	570	570	190	265	455	1060		86	83
2GP MATRIX 10-6T/2.2(M)	G 2 1/2	G 2 1/2	540	540	520	950	935	25	55	75	105	635	635	570	570	190	265	455	1060		87	83
2GP MATRIX 18-3T/2.2(M)	G 3	G 3	540	540	515	955	940	25	40	75	105	635	635	570	570	190	315	505	1125		94	91
2GP MATRIX 18-4T/3	G 3	G 3	-	540	555	-	1020	-	60	-	105	-	635	-	570	190	315	505	1130		-	102
2GP MATRIX 18-5T/4	G 3	G 3	-	540	590	-	1060	-	70	-	205	-	635	-	570	200	315	515	1140		-	121
2GP MATRIX 18-6T/4	G 3	G 3	-	540	630	-	1095	-	70	-	205	-	635	-	570	200	315	515	1140		-	123

EXTERNAL VIEW 2GPE MATRIX 3-5-10 E-SPD



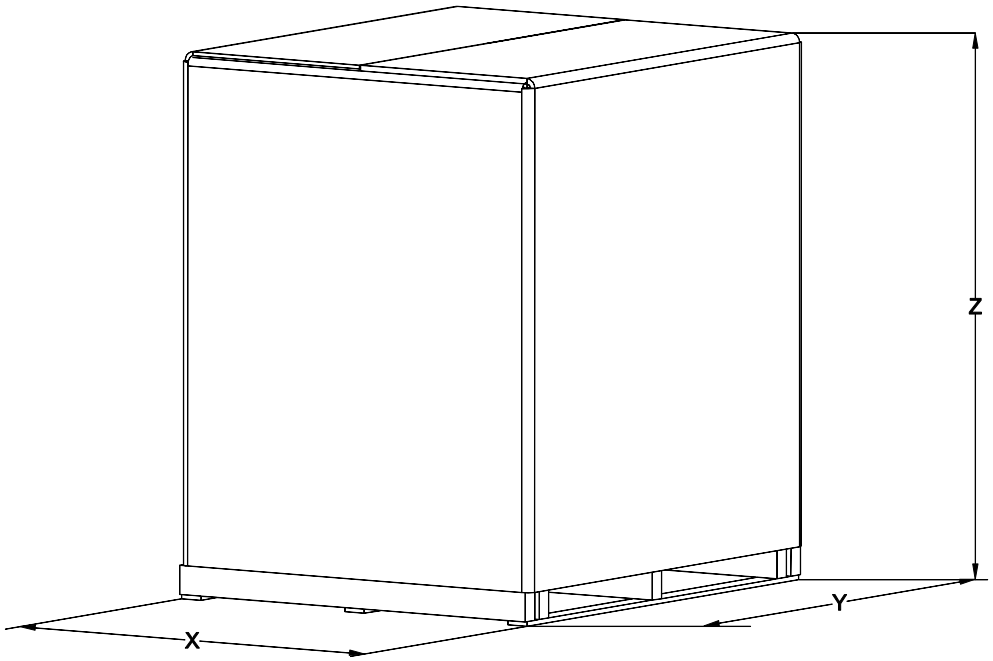
Booster Type	Dimensions [mm]												Weight [kg]
							ESPM	ESPT					
	DN1	DN2	A	B	C	D	H		N	S	T	V	
2GPE MATRIX 3-3T/0.65 ESPM	40	40	380	240	531	-	606	-	550	313	503	1093	45
2GPE MATRIX 3-4T/0.65 ESPT(ESPM)	40	40	380	264	555	-	606	612	550	313	503	1093	46
2GPE MATRIX 3-5T/0.75 ESPT(ESPM)	40	40	380	288	579	-	606	612	550	313	503	1093	50
2GPE MATRIX 3-6T/0.9 ESPT(ESPM)	40	40	380	312	603	-	606	612	550	313	503	1093	52
2GPE MATRIX 3-7T/1.3 ESPT(ESPM)	40	40	540	336	680	47	606	612	570	313	503	1093	67
2GPE MATRIX 3-8T/1.3 ESPT	40	40	540	360	707	47	-	612	570	313	503	1093	69
2GPE MATRIX 3-9T/1.5 ESPT	40	40	540	384	728	47	-	612	570	313	503	1093	73
2GPE MATRIX 5-3T/0.65 ESPM	50	40	380	261	558	-	606	-	550	313	503	1093	46
2GPE MATRIX 5-4T/0.9 ESPT(ESPM)	50	40	380	285	582	2	606	612	550	313	503	1093	51
2GPE MATRIX 5-5T/1.3 ESPT(ESPM)	50	40	540	309	658	52	606	612	570	313	503	1093	66
2GPE MATRIX 5-6T/1.3 ESPT(ESPM)	50	40	540	333	682	52	606	612	570	313	503	1093	67
2GPE MATRIX 5-7T/1.5 ESPT	50	40	540	357	707	53	-	612	570	313	503	1093	72
2GPE MATRIX 5-8T/2.2 ESPT	50	40	540	381	731	53	-	612	570	313	503	1093	72
2GPE MATRIX 5-9T/2.2 ESPT	50	40	540	405	755	53	-	612	570	313	503	1093	72
2GPE MATRIX 10-4T/1.5 ESPT	65	65	380	355	717	53	-	667	550	350	540	1143	74
2GPE MATRIX 10-5T/2.2 ESPT	65	65	540	385	747	53	-	667	570	350	540	1143	75
2GPE MATRIX 10-6T/2.2 ESPT	65	65	540	415	777	53	-	667	570	350	540	1143	76

2GPE MATRIX EFC/MFC



Booster Type	Dimensions [mm]						Weight [kg]
	B	C	D	Q	T	V	
2GPE MATRIX 18-3T/2.2 EFC	500	1025	55	190	505	1125	110
2GPE MATRIX 18-4T/3 EFC	540	1110	65	190	505	1125	122
2GPE MATRIX 18-5T/4 EFC	575	1150	75	200	515	1135	140
2GPE MATRIX 18-6T/4 EFC	615	1185	75	200	515	1135	142

2GP(E) MATRIX PACKING



2GP MATRIX

	Booster type	Overall dimensions packing X	Y	Z	Booster+packing Weight [kg]
2GP	2GP MATRIX 3-4T/0.65(M)	690	890	780	78
	2GP MATRIX 3-5T/0.75(M)				82
	2GP MATRIX 3-6T/0.9(M)				85
	2GP MATRIX 3-7T/1.3(M)				93
	2GP MATRIX 3-8T/1.3(M)				95
	2GP MATRIX 3-9T/1.5(M)				99
	2GP MATRIX 5-4T/0.9(M)				84
	2GP MATRIX 5-5T/1.3(M)				93
	2GP MATRIX 5-6T/1.3(M)				93
	2GP MATRIX 5-7T/1.5(M)				98
	2GP MATRIX 5-8T/2.2(M)				107
	2GP MATRIX 5-9T/2.2(M)				109
	2GP MATRIX 10-3T/1.3(M)				93
	2GP MATRIX 10-4T/1.5(M)				100
	2GP MATRIX 10-5T/2.2(M)				111
	2GP MATRIX 10-6T/2.2(M)				112
	2GP MATRIX 18-3T/2.2(M)				119
	2GP MATRIX 18-4T/3	690	790	780	127
	2GP MATRIX 18-5T/4				146
	2GP MATRIX 18-6T/4				148

2GPE MATRIX

	Booster type	Overall dimensions packing			Booster+packing Weight [kg]
		X	Y	Z	
2GPE E-SPD	2GPE MATRIX 3-3T/0.65 ESPM	690	890	780	70
	2GPE MATRIX 3-4T/0.65 ESPT(ESPM)				71
	2GPE MATRIX 3-5T/0.75 ESPT(ESPM)				75
	2GPE MATRIX 3-6T/0.9 ESPT(ESPM)				77
	2GPE MATRIX 3-7T/1.3 ESPT(ESPM)				86
	2GPE MATRIX 3-8T/1.3 ESPT				88
	2GPE MATRIX 3-9T/1.5 ESPT				92
	2GPE MATRIX 5-3T/0.65 ESPM				71
	2GPE MATRIX 5-4T/0.9 ESPT(ESPM)				76
	2GPE MATRIX 5-5T/1.3 ESPT(ESPM)				85
	2GPE MATRIX 5-6T/1.3 ESPT(ESPM)				86
	2GPE MATRIX 5-7T/1.5 ESPT				91
	2GPE MATRIX 5-8T/2.2 ESPT				91
	2GPE MATRIX 5-9T/2.2 ESPT				91
	2GPE MATRIX 10-4T/1.5 ESPT				93
	2GPE MATRIX 10-5T/2.2 ESPT				94
	2GPE MATRIX 10-6T/2.2 ESPT				95
2GPE (EFC)	2GPE MATRIX 18-3T/2.2 EFC	830	1230	1365	129
	2GPE MATRIX 18-4T/3 EFC				147
	2GPE MATRIX 18-5T/4 EFC				165
	2GPE MATRIX 18-6T/4 EFC				167

CONTROL PANEL FIXED SPEED

2 EP-E SPECIFICATION

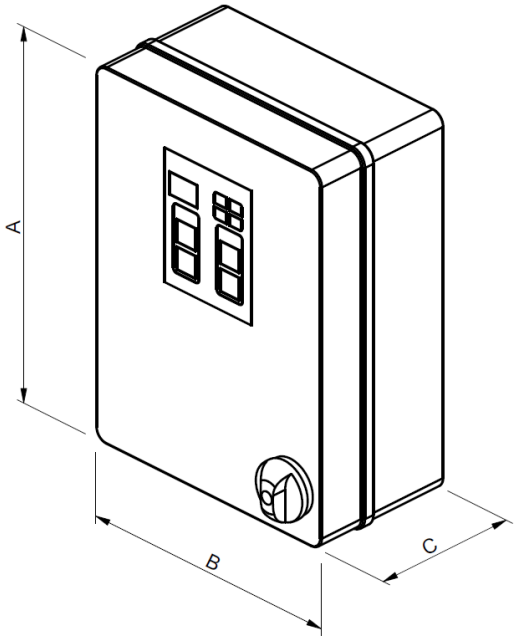
- **SERIES 2EP-E M UA (single-phase power output)**
- **SERIES 2EP-E T UA (three-phase power output)**

Electrical panel (protection and control) for two electropumps. Manual or automatic operation through pressure transmitter or/and pressure switches. The panel is configured to start the two pumps alternately in stand-by to pressure transmitter or/and pressure switch. The electrical panel protects the motors against overload and phase failure. Any protection devices that intervene are signalled on the panel itself and remotely through no voltage contacts. The protection device against overload and phase failure resets automatically three times, and manually after the fourth intervention.

TECHNICAL FEATURES

- P.MIN= Operation against dry running (tripped by a level float or minimum pressure switch) with automatic reset once water supply is restored, with warning lamp.
- TRP= control by pressure transmitter
- PR1= Pump n. 1 start/stop (not included in the pressure set)
- PR2= Pump n. 2 start/stop (not included in the pressure set)
- Automatic start sequence alternation
- Motor protection against overload with automatic reset for three times and manual reset the fourth time
- Motor line protection against short-circuits with fuses for motor startup
- Transformer and auxiliary circuit protection with fuses
- Remote signalling, through NC-NO no voltage contact, of the protection devices that intervene

Version		2EP-E M UA	2EP-E T UA
Power source	Frequency	50/60 Hz	
	Phase	Single-phase	Three-phase
	Voltage	230 V ± 10%	400 V ± 10%
	Power	0.55 ÷ 2.2 kW	1.1 ÷ 7.5 kW
Others	Protection degree	IP 56	
	Ambient Temperature	-10°C + 50°C up to 7.5 kW	
	Pressurisation units	2 pumps	
	Relative humidity	50% a 40°C MAX (90% a 20°C)	
	Max altitude	1000 m (a.s.l.)	
Directives	2014/35/EU (LVD), 2014/30/EU (EMC), 2011/65/EU (RoHS II)		



2EP-E M UA MODELS TABLE

Model	Single pump Power [kW]	I Calibration [A]	Motor fuse	Dimensions AxBxC [mm]	Weight [kg]
2EP-E 0,55 M	0,55	2x4,5	6A aM (10x38)	240 x 190 x 90	1,5
2EP-E 1,1 M	1,1	2x9	10A aM (10x38)	240 x 190 x 90	1,5
2EP-E 1,5 M	1,5	2x12	12A aM (10x38)	240 x 190 x 90	1,5
2EP-E 2,2 M	2,2	2x15	20A aM (10x38)	300 x 220 x 120	2,2

2EP-E T UA MODELS TABLE

Model	Single pump Power [kW]	I Calibration [A]	Motor fuse	Dimensions AxBxC [mm]	Weight [kg]
2EP-E 1,1 T	1,1	2x3.5	4A am (10x38)	300 x 220 x 120	3,5
2EP-E 2,2 T	2,2	2x5	8A am (10x38)	300 x 220 x 120	3,5
2EP-E 4 T	4	2x9	12A am (10x38)	300 x 220 x 120	3,5
2EP-E 7,5 T	7,5	2x15	20A am (10x38)	300 x 220 x 120	3,5

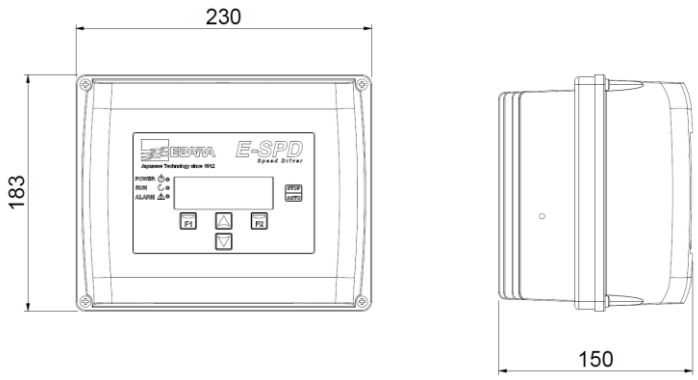
Notes: 4 pumps version are available with EP control panel on request

CONTROL PANEL VARIABLE SPEED

E-SPD SPECIFICATION

In-line electronic device for controlling electropumps, employing inverter technology. Starts and stops the pump and modulates the speed of the motor in relation to the water demand on the system, to maintain the operating pressure setting. Provides excellent comfort for the end user, significant energy savings and increased service life, the typical advantages of inverter controlled autoclave systems. E-SPD is an inverter that could be installed on the terminal box. It can be adapted on horizontal and vertical pumps. E-SPD can protect the system against overpressure, overcurrent, voltage fluctuation, dry run and water leak. The connection for this mode is made by communication line ON/OFF.

E-SPD			
Power	Version	MT	TT
	Power Voltage	Single-phase 230 V	Three-phase 400 V
	Output Voltage (pump)	Three-phase 230 V	Three-phase 400 V
	Output frequence	50 ÷ 60Hz	
	Maximum pump power	2.2 kW	4 kW
	Max I in	20 A	12 A
	Max I out	11 A	11 A
Others	Pressure setpoint	0.5 ÷ 25 bar	
	Protection degree	IP 55	
	Ambient Temperature	-10 ÷ 40°C	
	Pressurisation units	2-3 pumps	
	Weight	2,7 Kg	
	Protection	Dry-running	
		Over/under voltage	
		Short-circuit	
		Overload	
		Overtemperature	
		Low pressure	
		Pressure sensor fault	
Directives	2014/35/EU (LVD), 2014/30/EU (EMC), 2011/65/EU (RoHS II)		



SP (EFC and MFC) SPECIFICATION

The control panels SP EFC/MFC series inverters modulate the operation of electropumps in response to control by the pressure transmitter (transducer measuring flow or other external signal 4-20 mA), regulating the speed of the electropumps to keep system demand constant. If the electronic controller or pressure transmitter fails, a system of pressure switches controls the pumps directly (if present).

VERSION
- "EFC": Control panel for two or more electric pumps, with a single inverter with pump exchange
- "MFC": Control panel for two or more electric pumps, with an inverter for each individual electropump

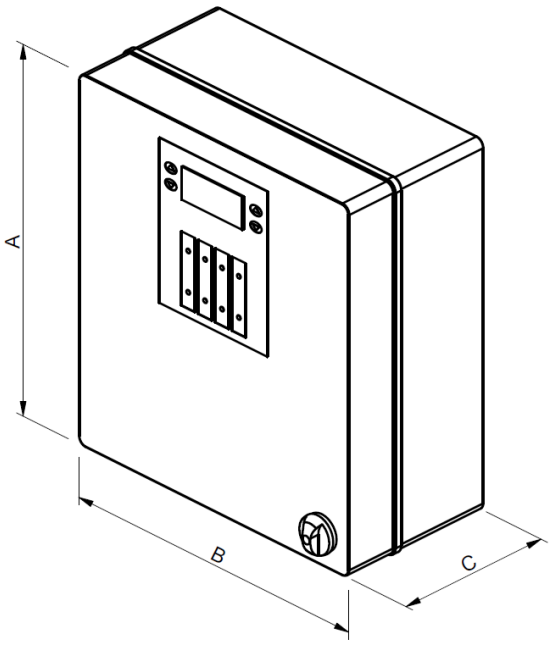
EFC / MFC		
Power	Power Voltage	Three-phase 400 V
	N° phases	Three phase without the use of neutral
	Frequence	50/60Hz
	Pump power	From 1.5kW up to 30kW
	Protection degree	IP55 up to 2.2kW IP44 3kW and above
	Ambient Temperature	-10°C + 40°C
	Pressurisation units	2 or 3 pumps
Directives	2014/35/EU (LVD), 2014/30/EU (EMC), 2011/65/EU (RoHS II)	

Single inverter with exchange pump (SP EFC)

Panel type	Pump motor power (Three-phase)	Starting (Emergency / fixed speed pumps)	Option
2/3 pumps	1.5÷7.5 kW	Direct	Inverter pump Exchange
	11÷30kW	Star-Delta	

Multi-inverter: one inverter for each pump (SP MFC)

Panel type	Pump motor power (Three-phase)	Starting (Emergency / fixed speed pumps)
2/3 pumps	1.5 - 7,5 kW	Inverter ramp
	11 - 30 KW	Inverter ramp



2SP EFC MODELS TABLE

Model	Motor power [kW]	Current [A]	Dimensions A-B-C [mm]	Weight [Kg]
2SP EFC 1,5T-2	2x1.5	2x3,7	450x400x200	25
2SP EFC 2,2T-2	2x2.2	2x5,3	450x400x200	25
2SP EFC 3T-2	2x3	2x7,2	450x400x250	25
2SP EFC 4T-2	2x4	2x9	450x400x250	25
2SP EFC 5,5T-2	2x5.5	2x12	450x400x250	27
2SP EFC 7,5T-2	2x7.5	2x15,5	450x400x250	27
2SP EFC 11SD-2	2x11	2x23	800x800x300	32
2SP EFC 15SD-2	2x15	2x31	800x800x300	32
2SP EFC 18,5SD-2	2x18.5	2x37	1000x800x300	32
2SP EFC 22SD-2	2x22	2x43	1000x800x300	36
2SP EFC 30SD-2	2x30	2x61	1200x800x300	36

3SP EFC MODELS TABLE

Model	Motor power [kW]	Current [A]	Dimensions A-B-C [mm]	Weight [Kg]
3SP EFC 1,5T-2	3x1.5	3x3,7	450x400x200	25
3SP EFC 2,2T-2	3x2.2	3x5,3	450x400x200	25
3SP EFC 3T-2	3x3	3x7,2	450x400x250	25
3SP EFC 4T-2	3x4	3x9	450x400x250	25
3SP EFC 5,5T-2	3x5.5	3x12	450x400x250	33
3SP EFC 7,5T-2	3x7.5	3x15,5	450x400x250	33
3SP EFC 11SD-2	3x11	3x23	800x800x300	38
3SP EFC 15SD-2	3x15	3x31	800x800x300	38
3SP EFC 18,5SD-2	3x18.5	3x37	1000x800x300	38
3SP EFC 22SD-2	3x22	3x43	1000x800x300	42
3SP EFC 30SD-2	3x30	3x61	1200x800x300	42

2SP MFC MODELS TABLE

Model	Motor power [kW]	Current [A]	Dimensions A-B-C [mm]	Weight [Kg]
2SP EFC 1,5T-2	2x1.5	2x3.7	500x400x200	28
2SP EFC 2,2T-2	2x2.2	2x5.3	500x400x200	28
2SP EFC 3T-2	2x3	2x7.2	500x400x250	28
2SP EFC 4T-2	2x4	2x9	600x400x250	28
2SP MFC 5,5T-2	2x5.5	2x12	600x400x250	28
2SP MFC 7,5T-2	2x7.5	2x15,5	600x600x250	28
2SP MFC 11T-2	2x11	2x23	800x600x300	60
2SP MFC 15T-2	2x15	2x31	800x600x300	60
2SP MFC 18,5T-2	2x18.5	2x37	800x600x300	60
2SP MFC 22T-2	2x22	2x43	800x800x300	65
2SP MFC 30T-2	2x30	2x61	1600x800x400	65

3SP MFC MODELS TABLE

Model	Motor power [kW]	Current [A]	Dimensions A-B-C [mm]	Weight [Kg]
3SP MFC 1,5T-2	3x1.5	3x3.7	800x600x250	33
3SP MFC 2,2T-2	3x2.2	3x5.3	800x600x250	33
3SP MFC 3T-2	3x3	3x7.2	800x600x250	33
3SP MFC 4T-2	3x4	3x9	800x600x250	33
3SP MFC 5,5T-2	3x5.5	3x12	800x600x250	33
3SP MFC 7,5T-2	3x7.5	3x15,5	800x600x250	33
3SP MFC 11T-2	3x11	3x23	800x800x300	75
3SP MFC 15T-2	3x15	3x31	1000x800x300	75
3SP MFC 18,5T-2	3x18.5	3x37	1200x800x300	75
3SP MFC 22T-2	3x22	3x43	1200x800x400	83
3SP MFC 30T-2	3x30	3x61	1600x1000x400	83

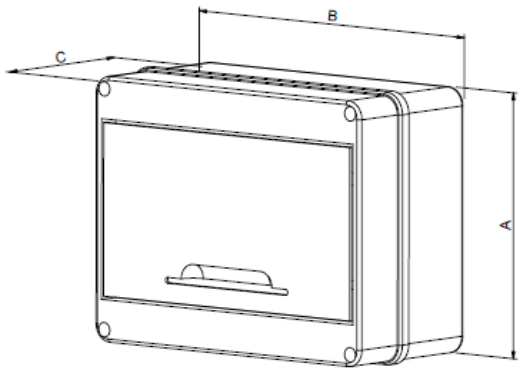
Notes: Standard Control panels EP SD three-phase are available for 1, 2, 3 pumps until 30kW power; 4 pumps version or power from 37kW and above are available on request

PROTECTION PANEL SPECIFICATION

Connection box for inverter :

- Connects the inverters with the power supply point.
- Equipped with circuit breakers on individual lines

Power source	Frequency	50/60 Hz	
	Phase	Single-phase	Three-phase
	Voltage	230 V ± 10%	400 V ± 10%
	Power	0.37 ÷ 3 kW	0.37 ÷ 15 kW
Others	Protection degree	IP 55	
	Ambient Temperature	-5°C + 40°C	
	Pressurisation units	2 pumps	
	Relative humidity	50% a 40°C MAX (90% a 20°C)	
	Max altitude	1000 m (a.s.l.)	
Directives	2014/35/EU (LVD), 2014/30/EU (EMC), 2011/65/EU (RoHS II)		



Model	N° Pumps	Power [kW]	Dimensions A-B-C [mm]	Max Current [A]
PROT 2E-DR 1.5-3M	2	2x3	160x120x90	2x20
PROT 2E-DR 4T		2x4	160x200x90	2x16
PROT 2E-DR 5.5T		2x5.5	160x200x90	2x20
PROT 2E-DR 7.5T		2x7.5	160x200x90	2x25
PROT 2E-DR 15T		2x15	160x200x90	2x32
PROT 3E-DR 1.5-3M	3	3x3	160x120x90	3x20
PROT 3E-DR 4T		3x4	200x250x110	3x16
PROT 3E-DR 5.5T		3x5.5	200x250x110	3x20
PROT 3E-DR 7.5T		3x7.5	200x250x110	3x25
PROT 3E-DR 15T		3x15	200x250x110	3x32

EBARA Pumps Europe S.p.A.
Via Torri di Confine 2/1 int. C
36053 Gambellara (Vicenza), Italy
Phone +39 0444 706811
Fax +39 0444 405811
ebara_pumps@ebaraeurope.com
www.ebaraeurope.com

EBARA Corporation
11-1, Haneda Asahi-cho, Ohta-ku,
Tokyo 144-8510
Japan
Phone +81 3 6275 7598
Fax +81 3 5736 3193
www.ebara.com

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