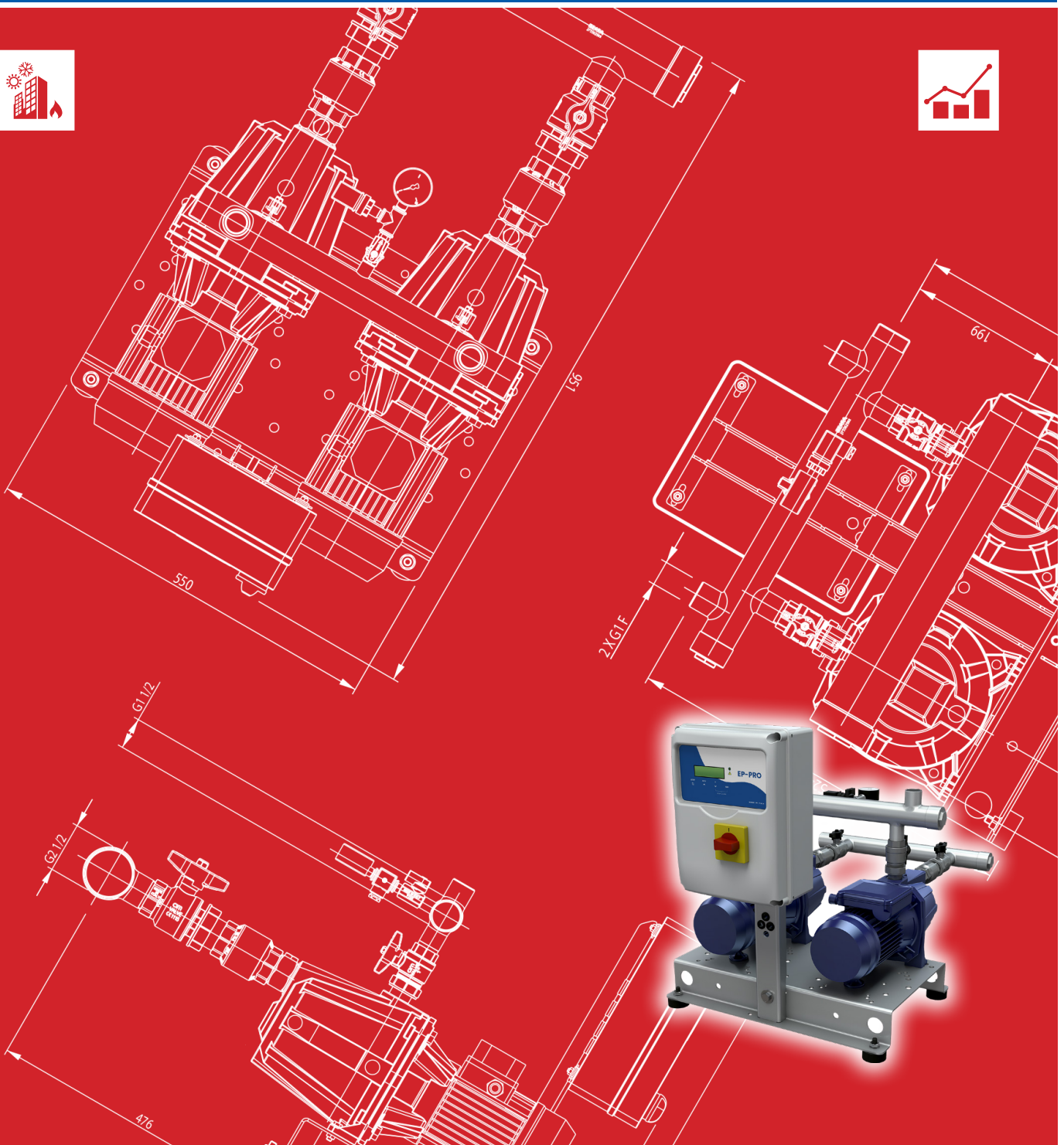


Looking ahead,
going beyond expectations
Ahead > Beyond



GP AGA

Data Book 50Hz



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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 transmitter for EP-E and by pressure switches for EP. GPE units (with INVERTER) are controlled by pressure transmitter.

TYPICAL APPLICATIONS

INDUSTRY	BUILDING SERVICE	WATER SUPPLY
		

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 (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 (only if present)
- 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 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 with E-SPD+

GPE units with E-SPD+ are designed to operate with each pumps controlled by an INVERTER installed on board its motor. 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

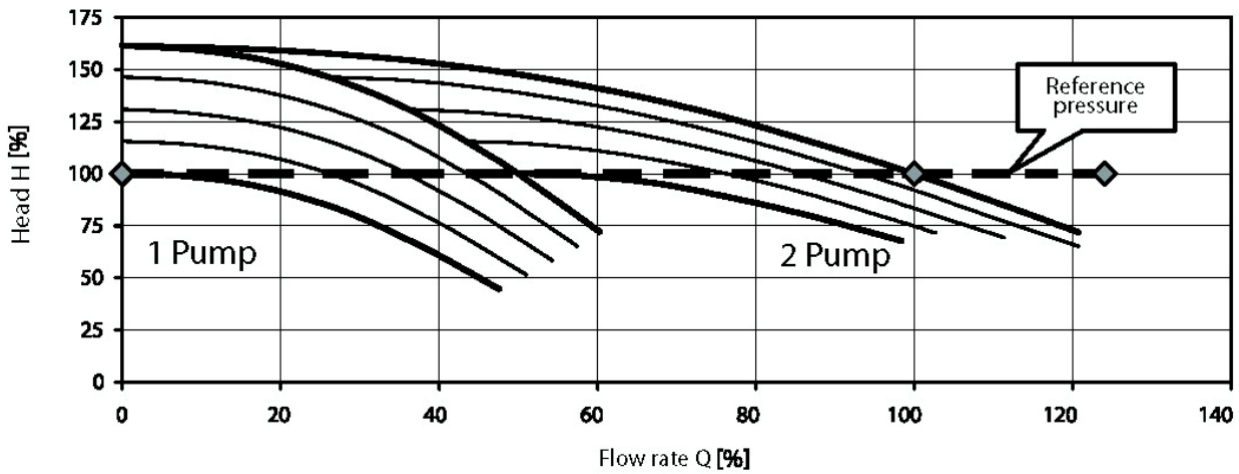
once more the controller will stop pump n. 3 and then pump n. 2. Once the demand for water has completely ceased, the controller reduces the speed of pump n. 1 to its minimum and after a set delay (around 1 minute) stops this pump too. The next time the system is started up, the INVERTER controlled pump 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

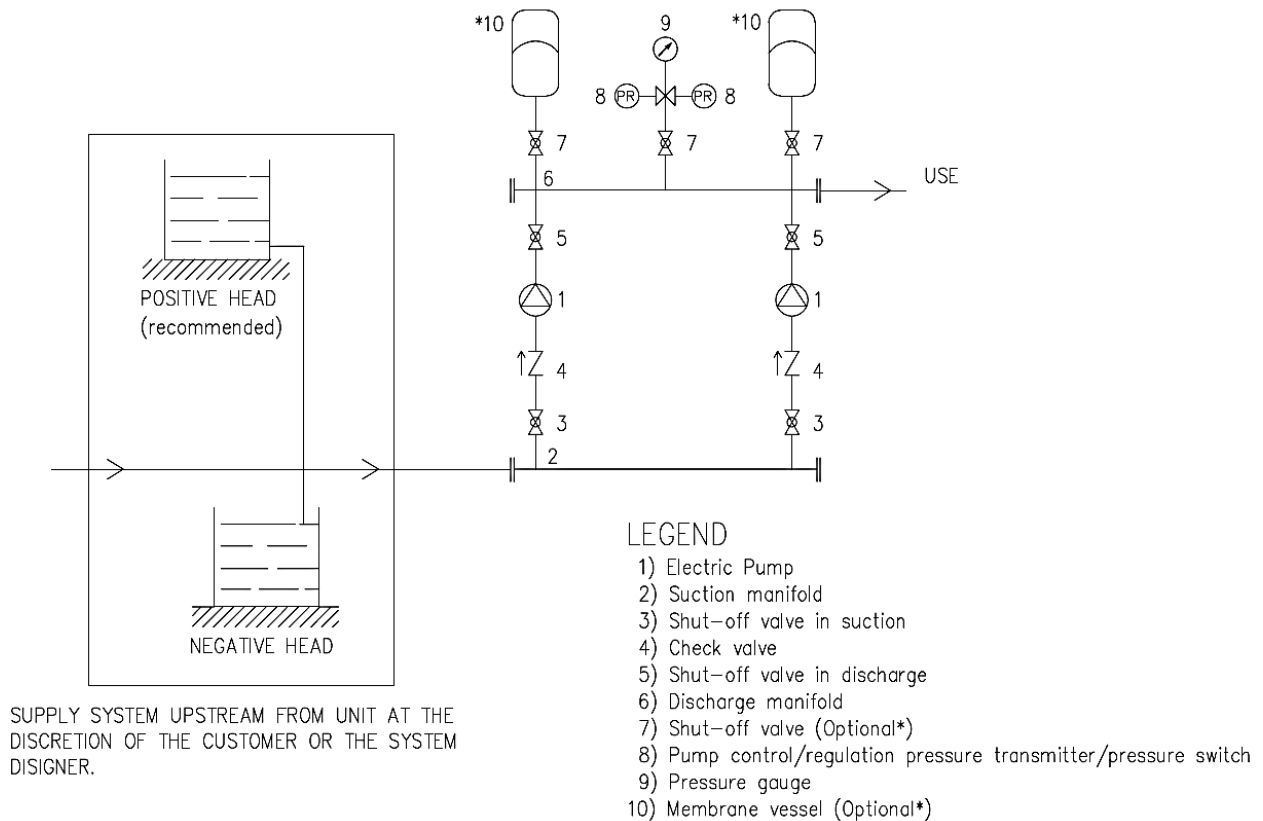
MFC multiple pump control panels power each pump with an INVERTER to modulate system performance in relation to the reference signal. MFC controllers differ from EFC controller from the point of view of their construction, since instead of having a single INVERTER to control all the pumps, each pump 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.

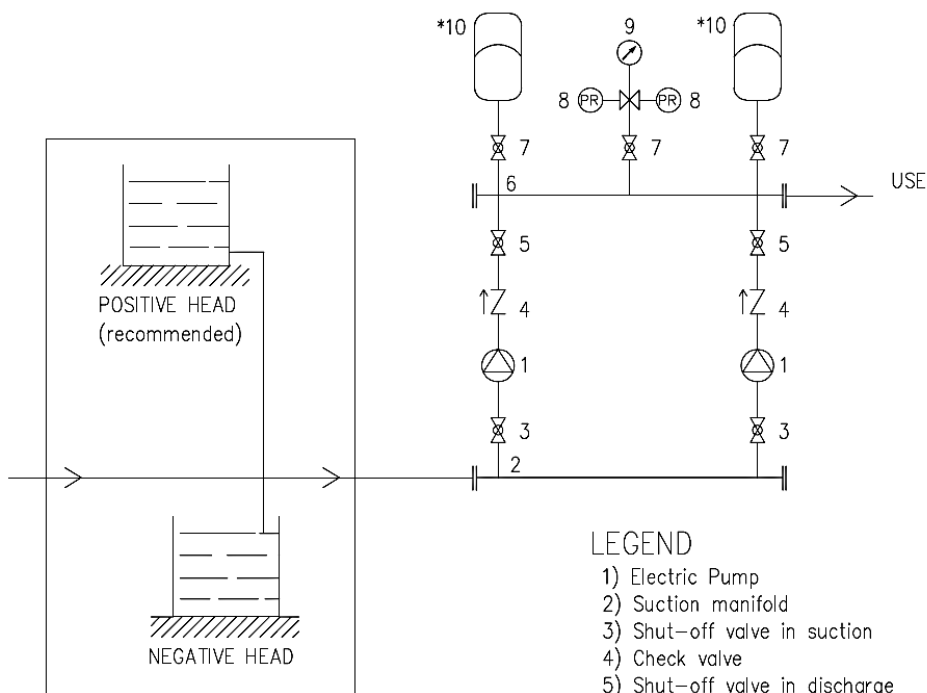
Fig. 1 - TWO PUMP UNIT WITH CONSTANT PRESSURE REGULATION



GP PRESSURISATION UNIT WATER CIRCUIT DIAGRAM



GPE PRESSURISATION UNIT WATER CIRCUIT DIAGRAM

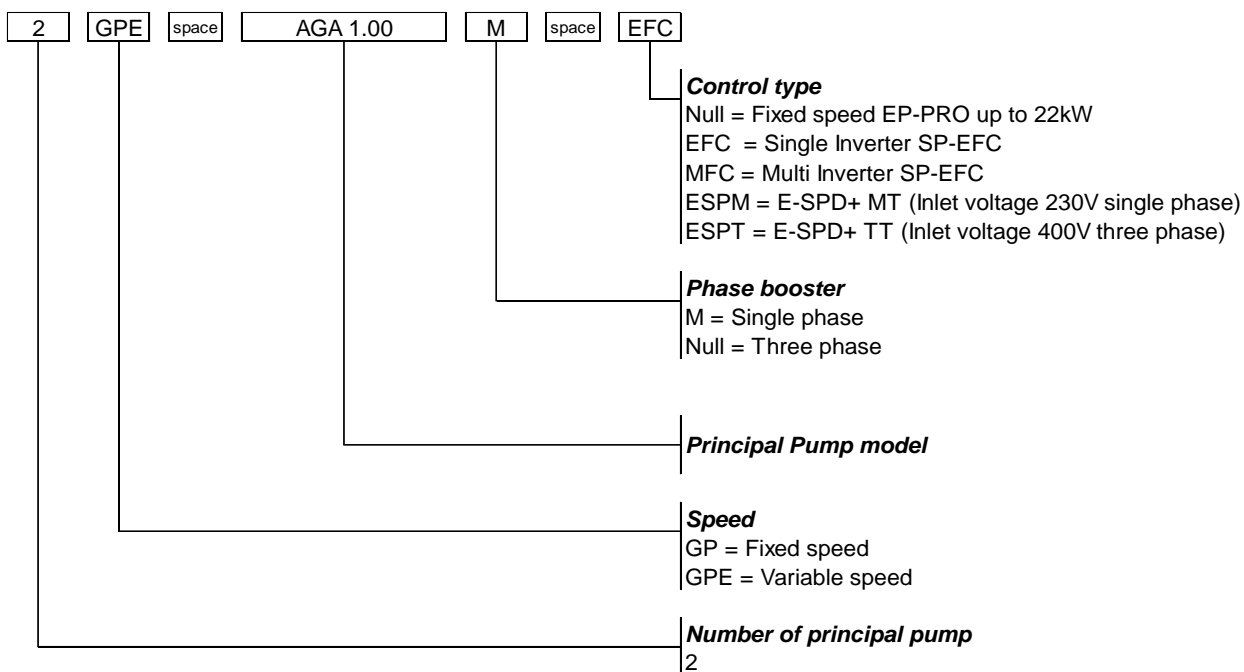


SUPPLY SYSTEM UPSTREAM FROM UNIT AT THE DISCRETION OF THE CUSTOMER OR THE SYSTEM DESIGNER.

LEGEND

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

TYPE KEY 2GP(.) AGA



NAME PLATE

 EBARA Pumps Europe S.p.A. Via Campo Sportivo, 30 38023 Cles (TN), ITALY Phone +39 0444 706811 V.A.T.: 01234660221		   MADE IN ITALY
GRUPPO DI PRESSURIZZAZIONE IDRICA		
TYPE	①	
P/N	②	
S/N	③	

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

PRODUCT SPECIFICATIONS HYDRAULIC COMPONENTS AND CONTROL

BOOSTER SET							
AGA							
Operating range	Model		1.00	1.50	2.00	3.00	
	Nominal flow rate (m ³ /h)	Single pump		3.6	6.0		
		2GP		7.2	12.0		
	Maximum working pressure			6 bar	10 bar		
	Liquid temperature range			5÷45°C			
	Ambient operating temperature (no higher than 1000 m above sea level)			0÷40°C			
Hydraulic components	Frame		Omega sheet Galvanized steel				
	Closing manifold		Threaded female cap AISI 304				
	Check valve		Threaded check valve Brass / NBR				
	Ball valve		Threaded ball valve Brass / PTFE				
	Socket for air feeders		Threaded socket Brass				
Control	Pressure gauge		M3A-ABS 50/FR / plastic-copper alloy				
	Pressure transmitter		EN 10088-1.4301 (AISI 304) / 1.4404 (AISI 316L)				
	Pressure switches		GPE version with SP EFC / MFC panel with inverter XMP				

ELECTRIC PANEL

BOOSTER SET						
AGA						
Operating range	Model		1.00	1.50	2.00	3.00
	Nominal flow rate (m3/h)	Single pump	3.6	6.0		
		2GP(E)	7.2	12.0		
	Maximum working pressure		10 bar			
Control panel	Principal Electric panel	EP-PRO fixed speed (only for GP)	●	●	●	●
		SP EFC/MFC variable speed (only for GPE)	○	○	○	○
	E-SPD+ [1]	single-phase supply inverter (only for GPE)	○	○	○	○
		three-phase supply inverter (only for GPE)	○	○	○	○

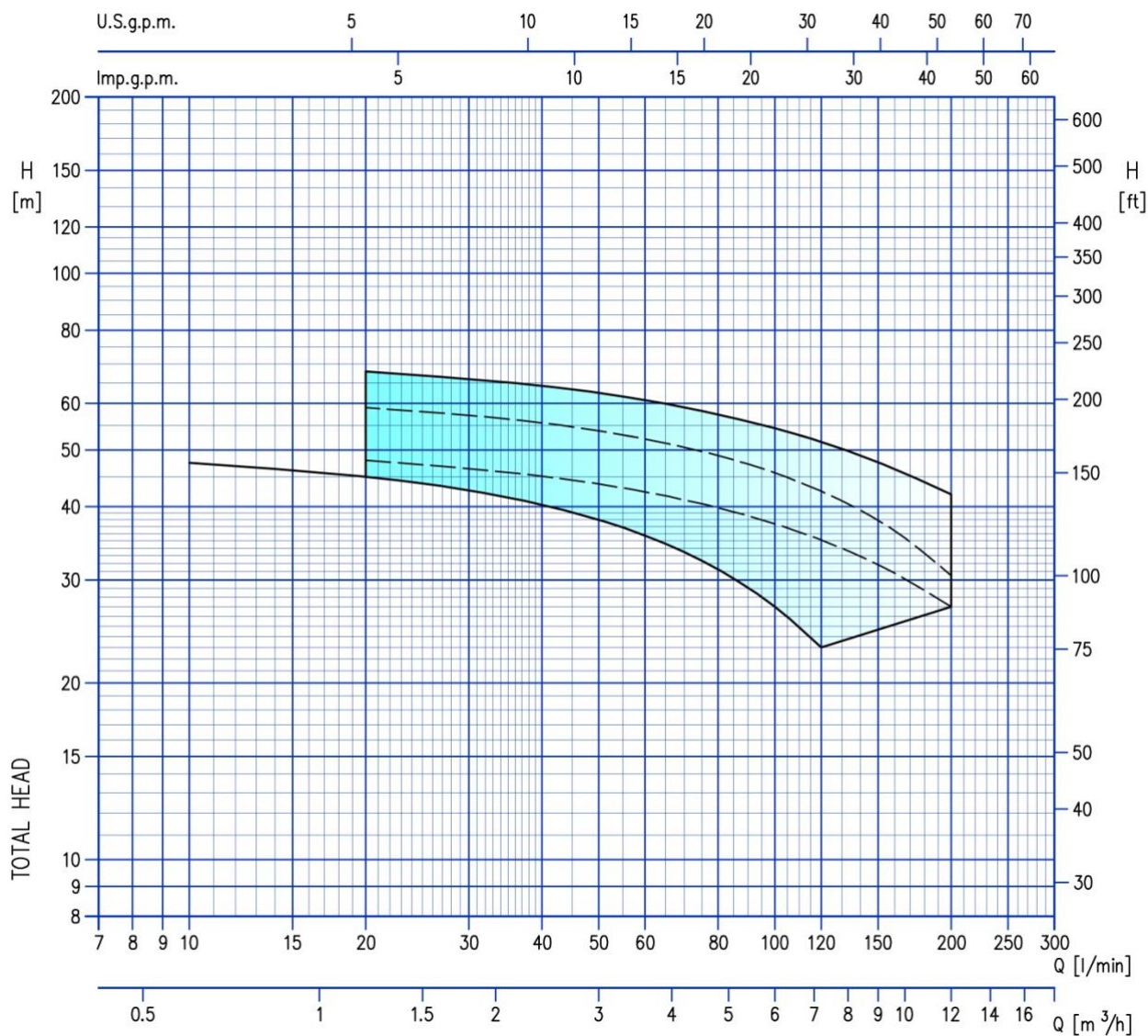
● : Standard ○ : Optional

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

TECHNICAL PUMP DATA

PUMP					
AGA					
Operating range	Model	1.00	1.50	2.00	3.00
	Maximum working pressure	1 MPa (10 bar)			
	Liquid temperature range	+5°C to +45°C			
Liquid handled	Liquid type	Clean water			
Key components material	Casing	Cast iron			
	Impeller	PPE+PS glass fibre reinforced	Brass		
	Casing cover	AISI 304	Cast iron built-in on the motor bracket		
	Shaft seal	Ceramic/Carbon/NBR			
	Shaft	AISI 303 (wet extension)			
	Bracket	Aluminum	Cast iron		
	Diffuser	PPE+PS glass fibre reinforced			
Pipe connection	Suction	G 1"	G 1" ½		
		UNI ISO 228			
	Discharge	G 1" UNI ISO 228			

PERFORMANCE RANGE RESEAU BOOSTER SET 2GP(.) AGA



CURVE SPECIFICATION 2GP(E)

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

Tolerances according to ISO 9906:2012 – Grade 3B.

The curves refer to effective speed of asynchronous motors at 50 Hz 2 poles

Measurements were carried out with clean water at 20°C of temperature and with a kinematic viscosity of $\nu = 1 \text{ mm}^2/\text{s}$ (1 cSt).

The NPSH curve is an average curve obtained in the same conditions of performance curves.

During the pump selection, consider to get a safety margin of at least 0.5 m.

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. The performance curves refer to 2-pumps booster sets.

Symbols explanation:

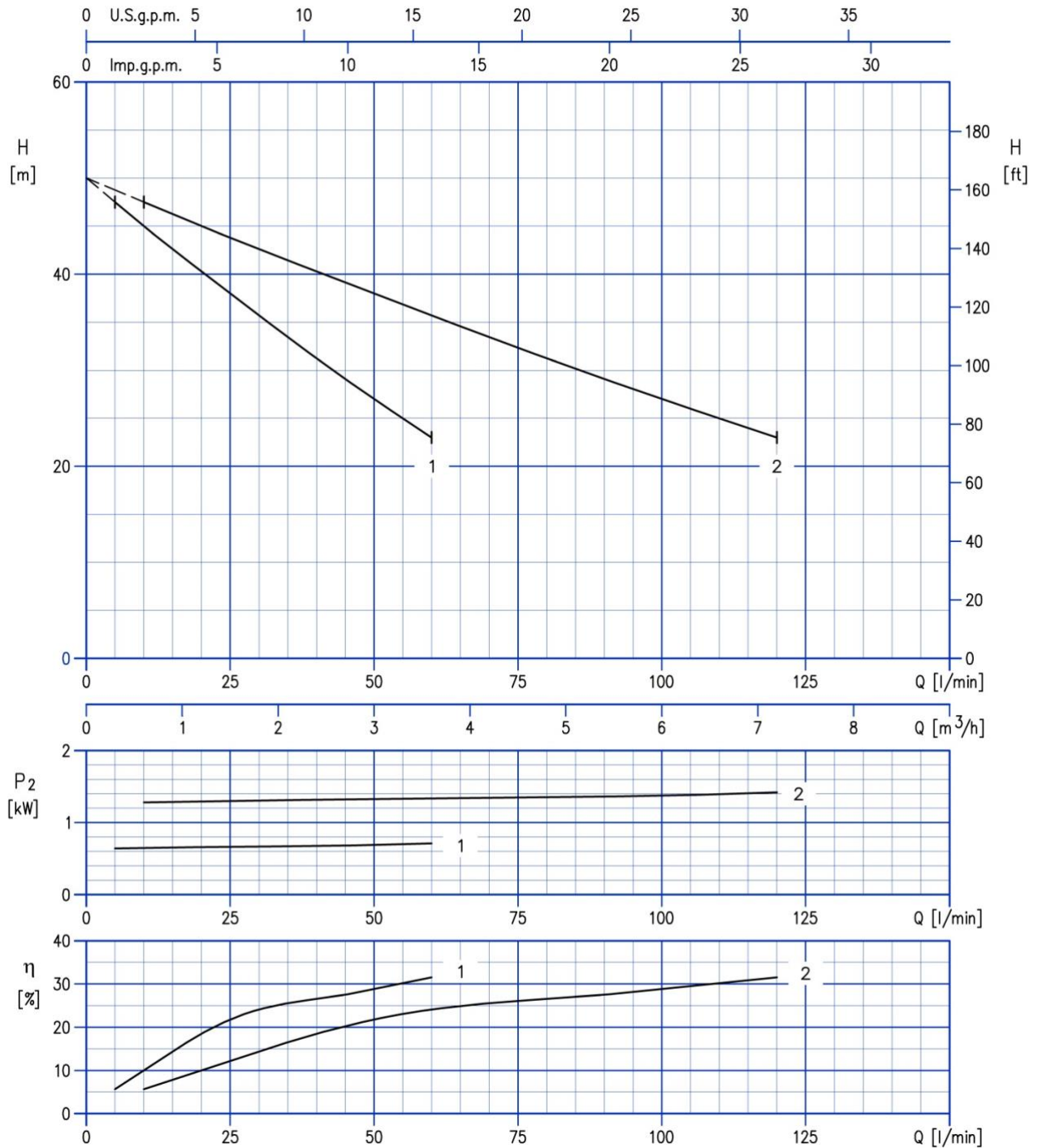
- Q = volume flow rate
- H = total head
- P2 = pump power input (shaft power)
- η = pump efficiency
- NPSH = net positive suction head required by the pump
- 1 = one pump on work performance curve
- 2 = two pumps on work performance curve

Pressure drops of the booster's fittings are not considered

SELECTION CHART 2GP(.) AGA

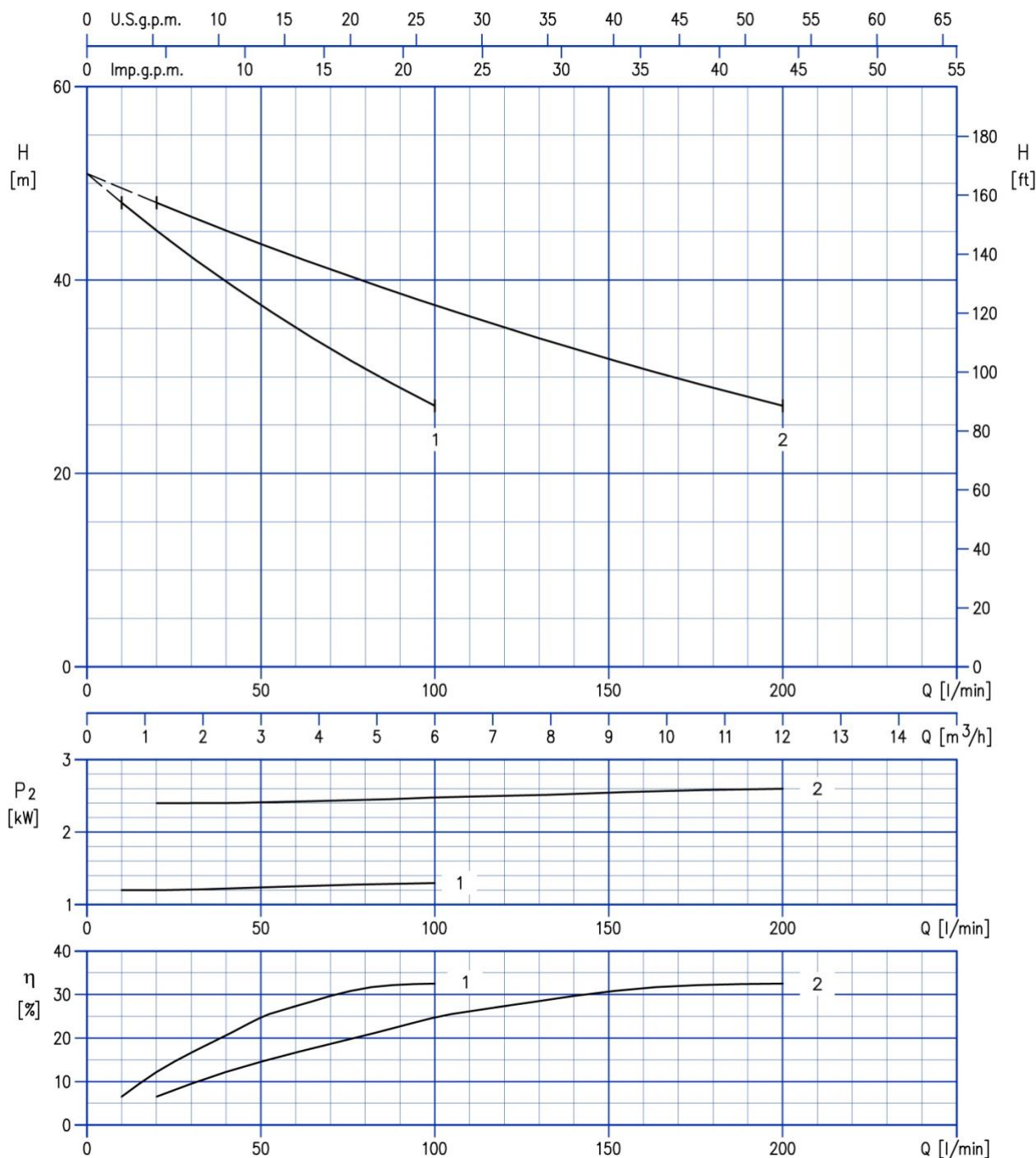
Model	Motor		Maximum working pressure (MPa)	Q=Capacity									
	kW	HP		l/min	10	20	40	60	90	100	120	160	200
				m ³ /h	0.6	1.2	2.4	3.6	5.4	6.0	7.2	9.6	12.0
H=Total manometric head in meters													
2GP(.) AGA 1.00	0.75+0.75	1+1	0.8	50.0	47.5	45.0	40.3	35.7	29.1	27.0	23.0	-	-
2GP(.) AGA 1.50	1.1+1.1	1.5+1.5		51.0	-	48.0	45.1	42.4	38.6	37.4	35.1	30.8	27.0
2GP(.) AGA 2.00	1.5+1.5	2+2		62.5	-	59.0	55.6	52.2	47.3	45.7	42.5	36.4	30.5
2GP(.) AGA 3.00	2.2+2.2	3+3		72.0	-	68.0	64.3	60.8	55.9	54.4	51.6	46.4	42.0

PERFORMANCE CURVE 2GP(.) 2GP(.) AGA 1.00



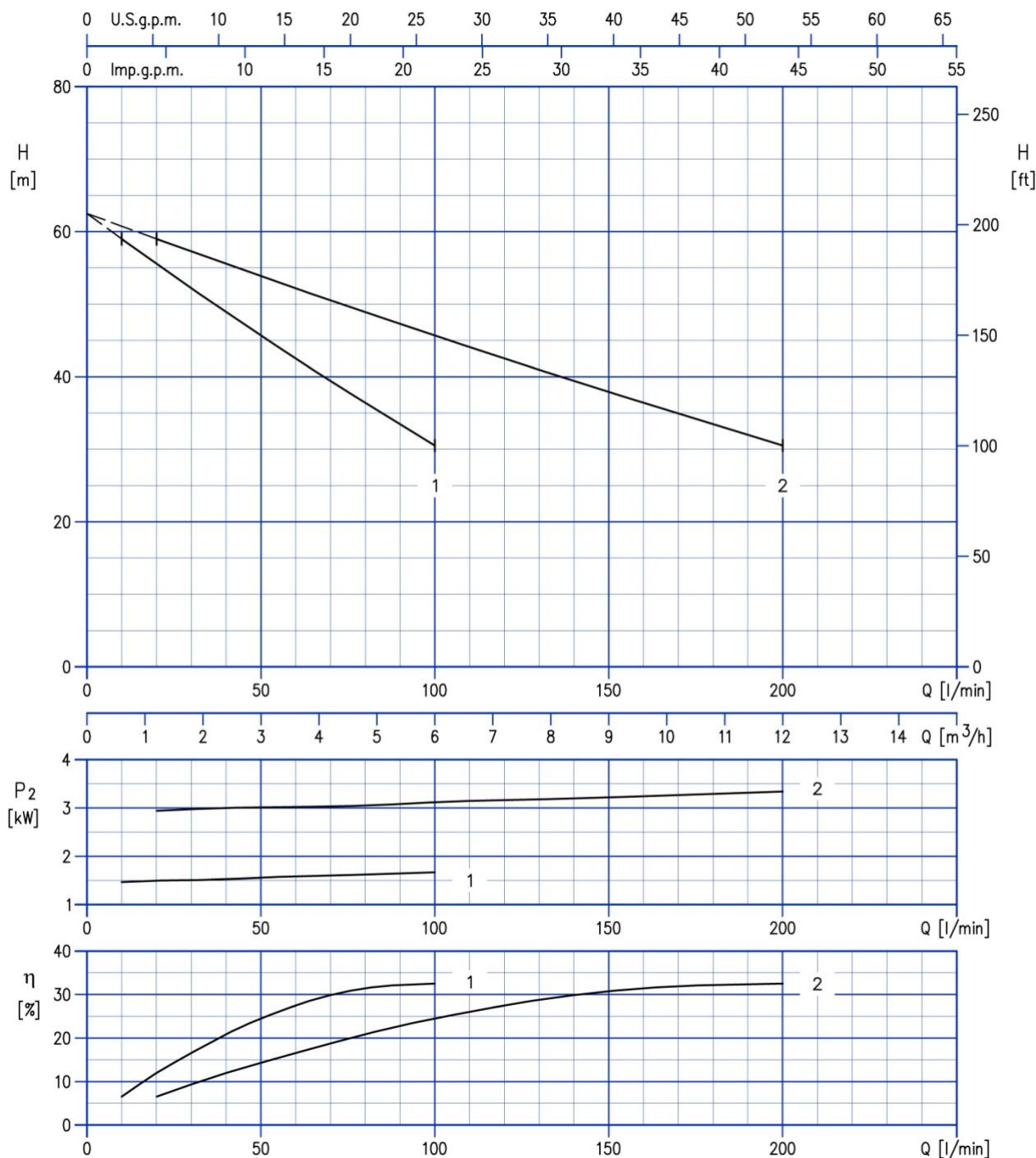
Test standard: ISO 9906: 2012 - Grade 3B

2GP(.) AGA 1.50



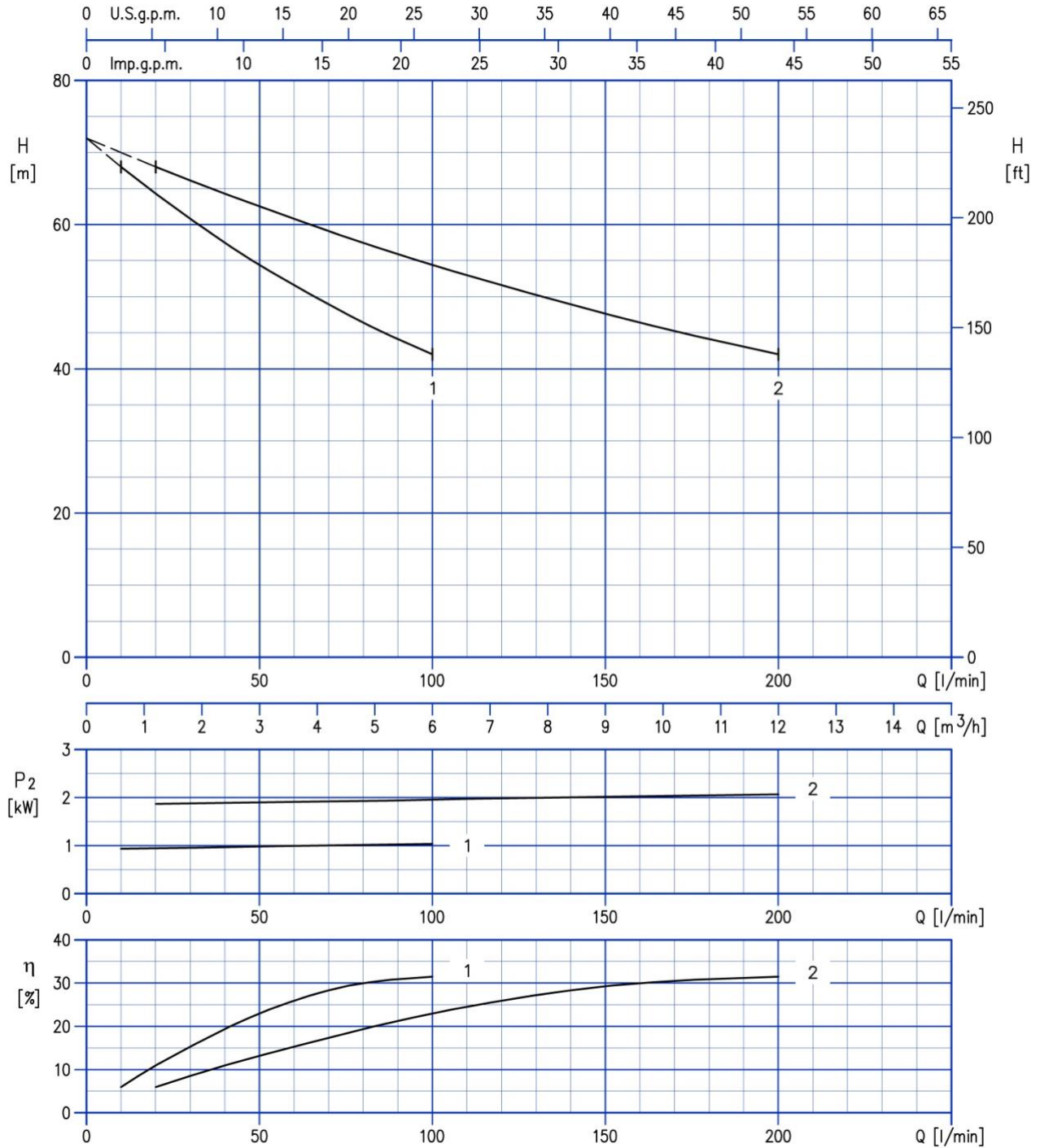
Test standard: ISO 9906: 2012 - Grade 3B

2GP(E) AGA 2.00



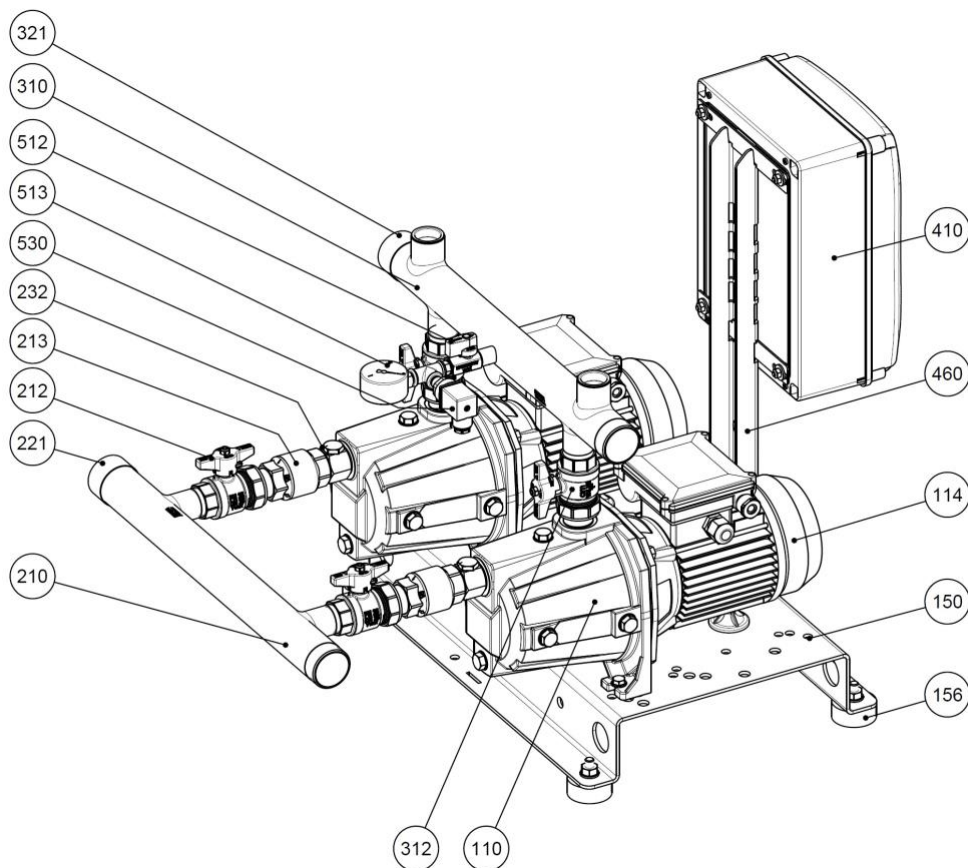
Test standard: ISO 9906: 2012 - Grade 3B

2GP(E) AGA 3.00



Test standard: ISO 9906: 2012 - Grade 3B

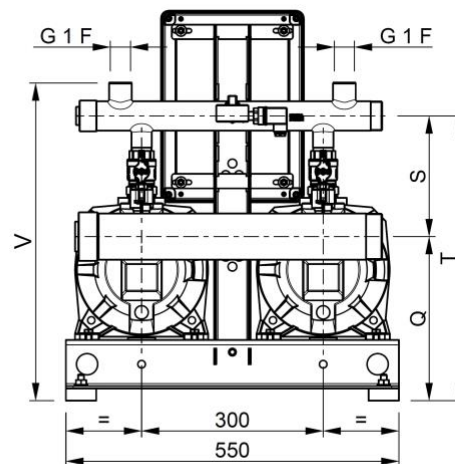
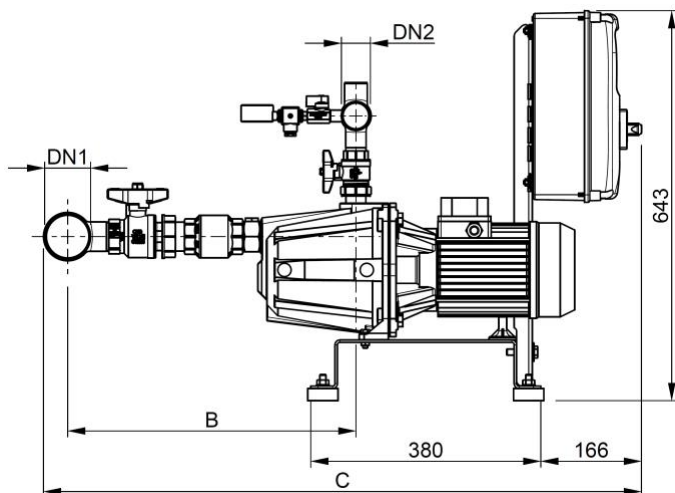
2GP CONSTRUCTION EXTERNAL VIEW 2GP AGA



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

601

OVERALL DIMENSIONS 2GP BOOSTER SET 2GP AGA

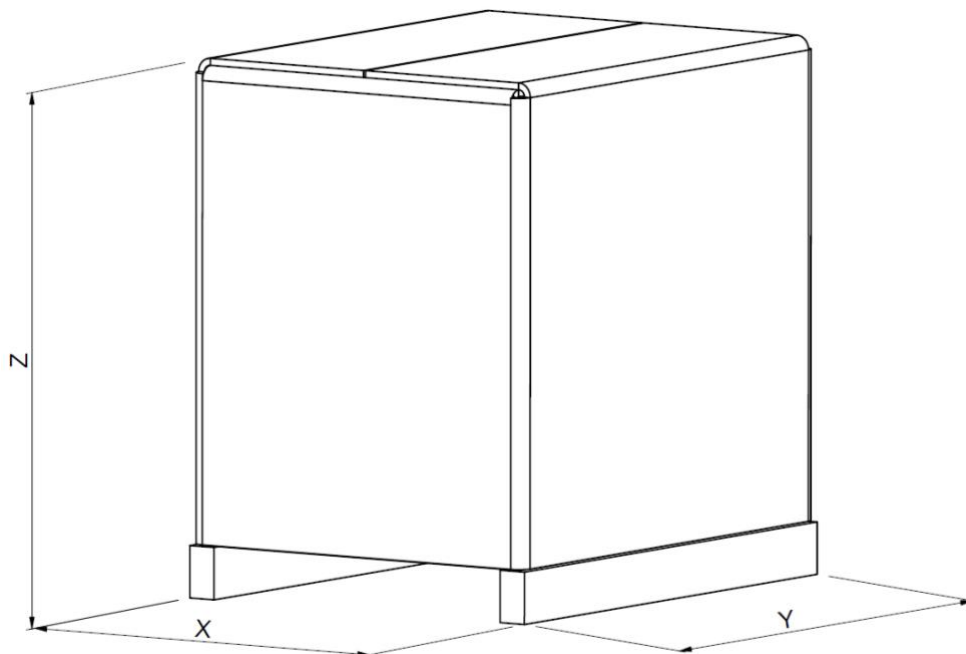


DIMENSIONS AND WEIGHT

Booster Type	Dimensions [mm]								Weight [kg]	
	DN1	DN2	B	C	Q	S	T	V	1~	3~
2GP AGA 1.00(M)	G 1 1/2	G 1 1/2	375	881	250	180	430	485	58	62
2GP AGA 1.50(M)	G 2 1/2	G 1 1/2	475	988	270	200	470	525	85	89
2GP AGA 2.00(M)	G 2 1/2	G 1 1/2	475	988	270	200	470	525	87	93
2GP AGA 3.00	G 2 1/2	G 1 1/2	475	988	270	200	470	525	-	96

Approximate dimensions ± 20 mm.
The dimensions may change without notice.

PACKING



	Booster type	Overall dimensions packing			Booster+packing Weight [kg]
		X	Y	Z	
2GP	2GP AGA 1.00(M)	830	1230	1365	87
	2GP AGA 1.50(M)				114
	2GP AGA 2.00(M)				118
	2GP AGA 3.00				121

The dimensions may change without notice.

CONTROL PANEL FIXED SPEED

EP-PRO SPECIFICATION

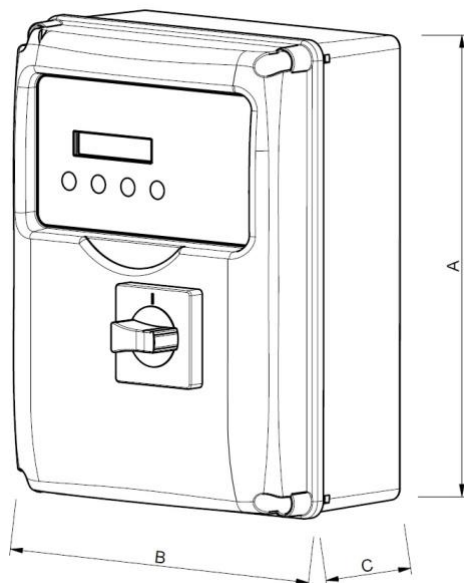
- **SERIES EP-PRO M (single-phase power output)**
- **SERIES EP-PRO T (three-phase power output)**

Electrical panel (protection and control) for two electropumps. Manual or automatic operation through pressure transmitter. The panel is configured to start the two pumps alternately in stand-by to pressure transmitter. The electrical panel protects the motors against overload and phase failure. Any protection devices that intervene are signaled on the panel itself and remotely through free voltage contacts.

TECHNICAL FEATURES

- MIN. CURRENT= Operation against dry running by minimum current consumption. Up to 4 auto resets, time and cycles are settable;
- MIN. COSPHI= Operation against dry running by power factor detection. Up to 4 auto resets, time and cycles are settable (*The min. cosphi protection delay and change the min current protection and opposite*);
- 4-20mA= control by pressure transmitter;
- T1= Pump 1 Klixon or thermal protection;
- T2= Pump 2 Klixon or thermal protection;
- Automatic start sequence alternation;
- Motor protection against overload or missing phases;
- Motor line protection against short-circuits;
- Overvoltage protection;
- Low voltage protection;
- Remote signalling, through NC-NO free voltage contact.

	Version	EP-PRO M	EP-PRO T
Power source	Frequency	50/60 Hz	
	Phase	1 ~	3 ~
	Voltage	100 - 240 Vac	310 - 450 Vac
	Power	0,25 ÷ 2.2 kW	0,25 ÷ 15 kW
Others	Protection degree	IP 55	
	Ambient Temperature	-5°C + 50°C	
	Pressurisation units	2 pumps	
	Relative humidity	50% a 40°C (condensate free)	
	Max altitude	2000 m (a.s.l.)	
Directives	2014/35/EU (LVD), 2014/30/EU (EMC), 2011/65/EU (RoHS II)		



EP-PRO M MODEL TABLE

Model	Single pump power [kW]	In range [A]	Dimensions AxBxC [mm]	Weight [kg]
EP-PRO 2 M (0-18A)	0,25 - 2,2	0 - 18	320x240x185	1,5

The dimensions may change without notice.

EP-PRO T MODEL TABLE

Model	Single pump power [kW]	In range [A]	Dimensions AxBxC [mm]	Weight [kg]
EP-PRO 2 T/7,5 (0-18A)	0,25 - 7,5	0 - 18	310x230x185	2,5

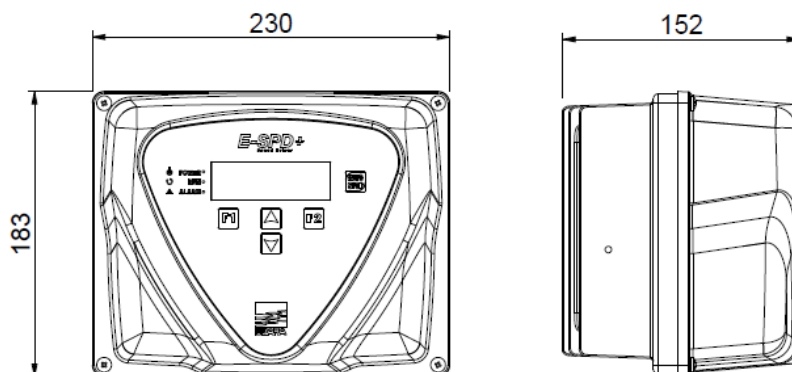
The dimensions may change without notice.

Notes: Standard Control panels EP-PRO are available for 1, 2, 3 pumps; 4 pumps version are available on request;

CONTROL PANEL VARIABLE SPEED E-SPD+ SPECIFICATION

On board 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 frequency	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 ÷ 40 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				
Pressure sensor fault				
Directives	2014/35/EU (LVD), 2014/30/EU (EMC), 2011/65/EU (RoHS II)			



The dimensions may change without notice.

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

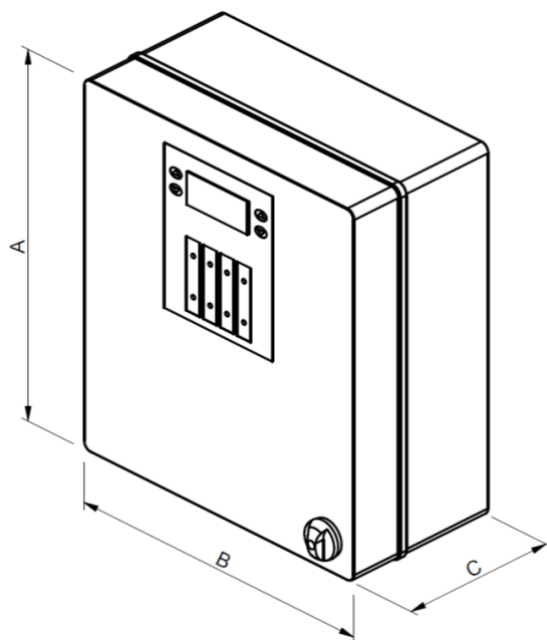
EFC / MFC		
Power	Power Voltage	Three-phase 400 V
	N° phases	Three phase without the use of neutral
	Frequence	50/60Hz
	Pump power	From 1.5kW up to 30kW
	Protection degree	IP55 up to 2.2kW IP44 3kW and above
	Ambient Temperature	-10°C + 40°C
	Pressurisation units	2 or 3 pumps
Directives	2014/35/EU (LVD),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

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-3	2x1.5	2x3,7	500x500x250	29
2SP EFC 2,2T-3	2x2.2	2x5,3	500x500x250	29

The dimensions may change without notice.

2SP MFC MODELS TABLE

Model	Motor power [kW]	Current [A]	Dimensions A-B-C [mm]	Weight [Kg]
2SP MFC 1,5T-3	2x1.5	2x3.7	600x400x250	34
2SP MFC 2,2T-3	2x2.2	2x5.3	600x500x250	36

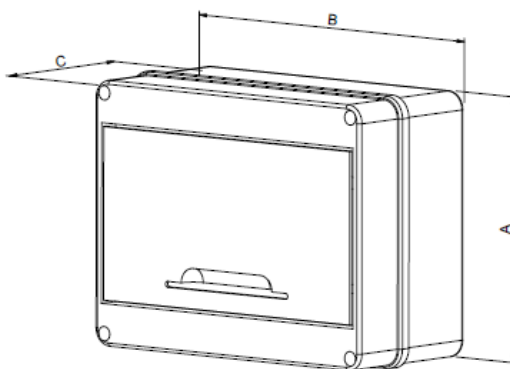
The dimensions may change without notice.

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.IP65 2P. 3M 20A NJ	2	2x3	160x200x90	2x20
PROT.IP65 2P. 4T 16A J		2x4	200x250x110	2x16

The dimensions may change without notice.



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

EBARA Pumps Europe S.p.A. GERMANY
Elisabeth-Selbert-Straße 2
63110 Rodgau, Germany
Phone +49 (0) 6106-660 99-0
info.epde@ebaracom

EBARA Pumps South Africa (PTY) LTD
26 Kyalami Boulevard,
Kyalami Business Park, 1684, Midrand,
Gauteng, South Africa
Phone +27 11 466 1844
ebaraeurope@ebaracom

EBARA Pumps Europe S.p.A. UK
Unit A, Park 34
Collett Way - Didcot
Oxfordshire - OX11 7WB, United Kingdom
Phone +44 1895 439027
marketing.epuk@ebaracom

EBARA Pumps Europe S.p.A. FRANCE
122, Rue Pasteur
69780 Toussieu, France
Phone: +33 04 72 76 94 82
mktg.epr@ebaracom

EBARA Pumps East Africa
Delta Corner Tower 2, 13th Floor, Office 1308,
Chiromo Road, Westlands
P.O. Box 13796-00800, Nairobi
Phone: +254(0)722913119
info.epea@ebaracom

EBARA POMPY POLSKA Sp. z o.o.
ul. Działkowa 115 A
02-234 Warszawa, Poland
Phone +48 22 3909920
marketing.epl@ebaracom

EBARA Pumps RUS Ltd.
Prospekt Andropov 18, building 7, floor 11
115432 Moscow
Phone +7 499 6830133
mktg.epr@ebaracom