

PRESSURISATION UNITS

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 pressurisation 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 small 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 transducer.



GP PRESSURISATION UNIT

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 switch with the highest setpoint trips and starts the first electropump. If the output flow is greater than the delivery capacity of a single pump, the pressure continues falling until it trips the second pressure switch, thus starting the second pump. This happens for all pumps in the unit. When the water demand stops or reduces, the system pressure rises, thus opening the pressure switches sequentially and shutting off the pumps one by one. If 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 electrical enclosure (both for demand from the first accumulation tank and from the water circuit itself) one can prevent the most frequent cause of pump malfunction: dry running.

PRINCIPLE OF OPERATION OF GPE PRESSURISATION UNITS

GPE units are designed to operate with a pump controlled by an **INVERTER** in the electrical enclosure, 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 electrical enclosure (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)

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 electrical enclosure) for each pump
- AUTOMATIC trials (using switch on electrical enclosure) for unit

ELECTRICAL TESTS

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

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.

Controlling a unit 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 transducer 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.

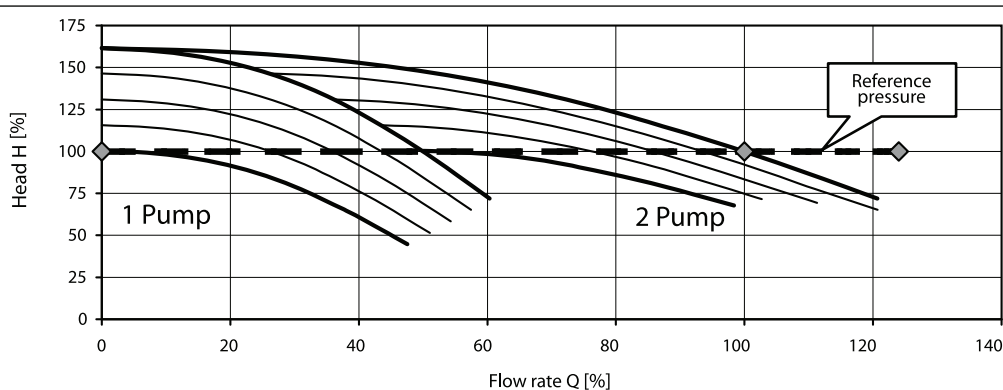
The controller thus reduces the speed of pumps n. 1, 2, 3 and 4 (they are all controlled at the same speed) to restore the reference/operating pressure.

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

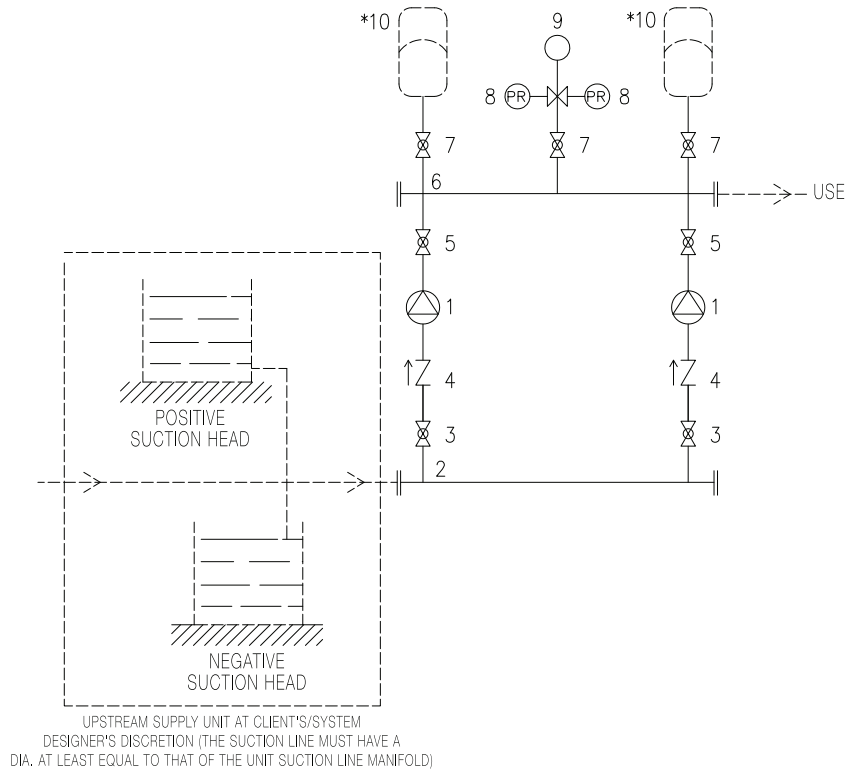


PRESSURISATION UNITS

PRESSURISATION UNIT WATER CIRCUIT DIAGRAM

LEGEND

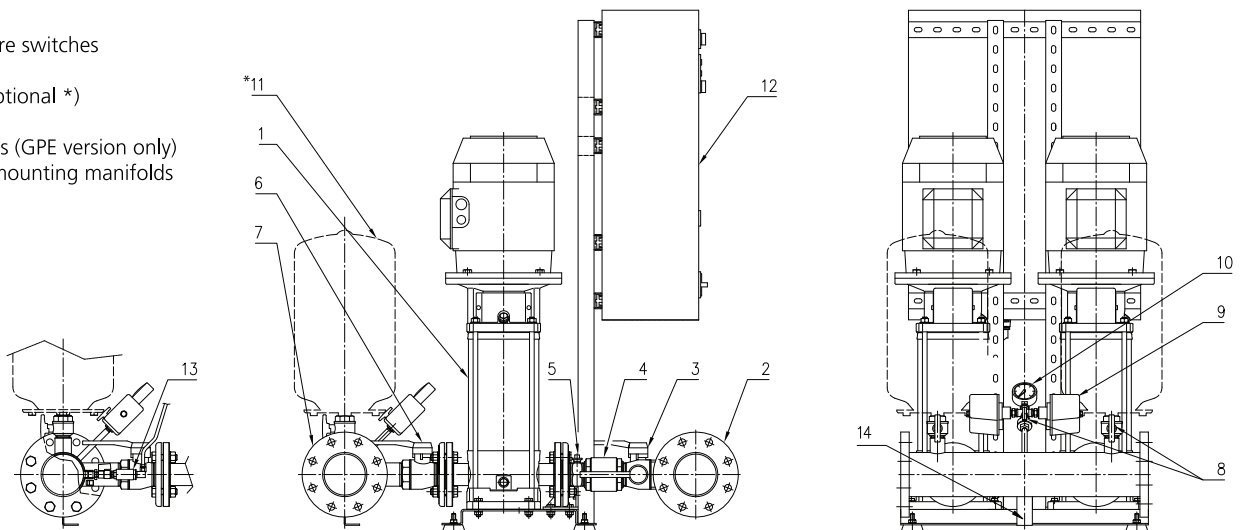
- 1 Electric pump
- 2 Intake manifold
- 3 Intake shut off valve
- 4 One-way valve
- 5 Delivery shut off valve
- 6 Delivery manifold
- 7 Check valve
- 8 Pump control pressure switches
- 9 Pressure gauge
- 10 Membrane tank (optional *)



PRESSURISATION UNIT DIAGRAM AND COMPONENTS

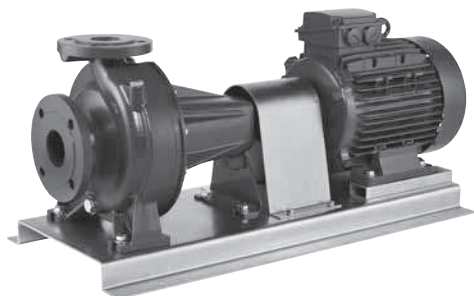
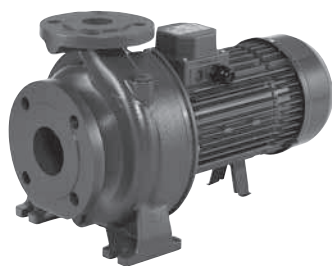
LEGEND

- 1 Electric pump
- 2 Intake manifold
- 3 Check valve
- 4 One-way valve
- 5 Nipple for air feed (GP version only)
- 6 Check valve
- 7 Delivery manifold
- 8 Check valve
- 9 Pump control pressure switches
- 10 Pressure gauge
- 11 Membrane tank (optional *)
- 12 Control panel
- 13 Pressure transducers (GPE version only)
- 14 Bracket/sleeve for mounting manifolds

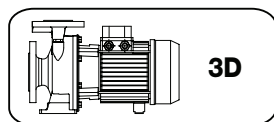


3D SERIES

CENTRIFUGAL PUMPS CLOSE COUPLED AND STANDARDIZED EN 733

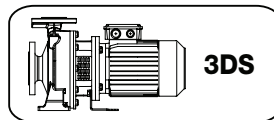


Available in 3 different versions with 2 and 4 pole motors



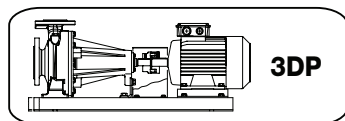
3D

Monobloc with extended motor shaft



3DS

Monobloc with standard motor and rigid joint



3DP

On base, with standard motor and flexible coupling

Centrifugal pumps close coupled (3D) and standardized EN 733 (3DS-3DP) in cast iron.

APPLICATIONS

- Water and clean liquids not chemically aggressive handling
- Water supply
- Pressure boosting
- Washing and industrial plants
- Water circulation in air-conditioning systems
- Irrigation and agriculture

TECHNICAL DETAILS

- Highly resistant construction
- Impeller in stainless steel
- High efficiency

PUMP TECHNICAL DATA

- Maximum working pressure: 10 bar
 - Temperature of the liquid:
 - 5°C ÷ +90°C
 - 5°C ÷ +110°C (H-HS-HW-HSW versions)
 - 5°C ÷ +120°C (E version)
 - MEI > 0,4 for 3D(.) SERIES 2 poles, MEI > 0,1 for 3D(.) SERIES 4 poles
- For further information please see our Data Book on the web site www.ebara.com

MOTOR TECHNICAL DATA

- High efficiency IE2 motors starting from 0,75kW
- High efficiency IE3 motors starting from 7,5kW up to 22kW
- Self-ventilated 2 and 4 poles asynchronous motor
- Insulation class F (B for high temperatures)
- Protection degree IP 55
- 230V ±10% single phase voltage 50Hz,
- 230/400 ±10% (up to 4kW included) three phase 50Hz,
- 400/690V ±10% (from 5,5 kW and above) three phase 50Hz
- Protection is user's responsibility

MATERIALS

- Pump casing in cast iron EN-GJL-250-EN 1561
- Impeller in:
 - AISI 304 for 3D(.) SERIES 32, 40, 50
 - AISI 316 microcasted for 3D(.) SERIES 65
- Shaft in AISI 304 (part in contact with the liquid)
- Mechanical seal in:
 - Ceramic/Carbon/NBR (standard)
 - Ceramic/Carbon/FPM (H version)
 - SiC/SiC/FPM (HS version)
 - Tungsten Carbide/Tungsten Carbide/FPM (HW version)
 - SiC/Tungsten Carbide/FPM (HSW version)
 - Ceramic/Carbon/EPDM (E version)

SPECIAL VERSIONS

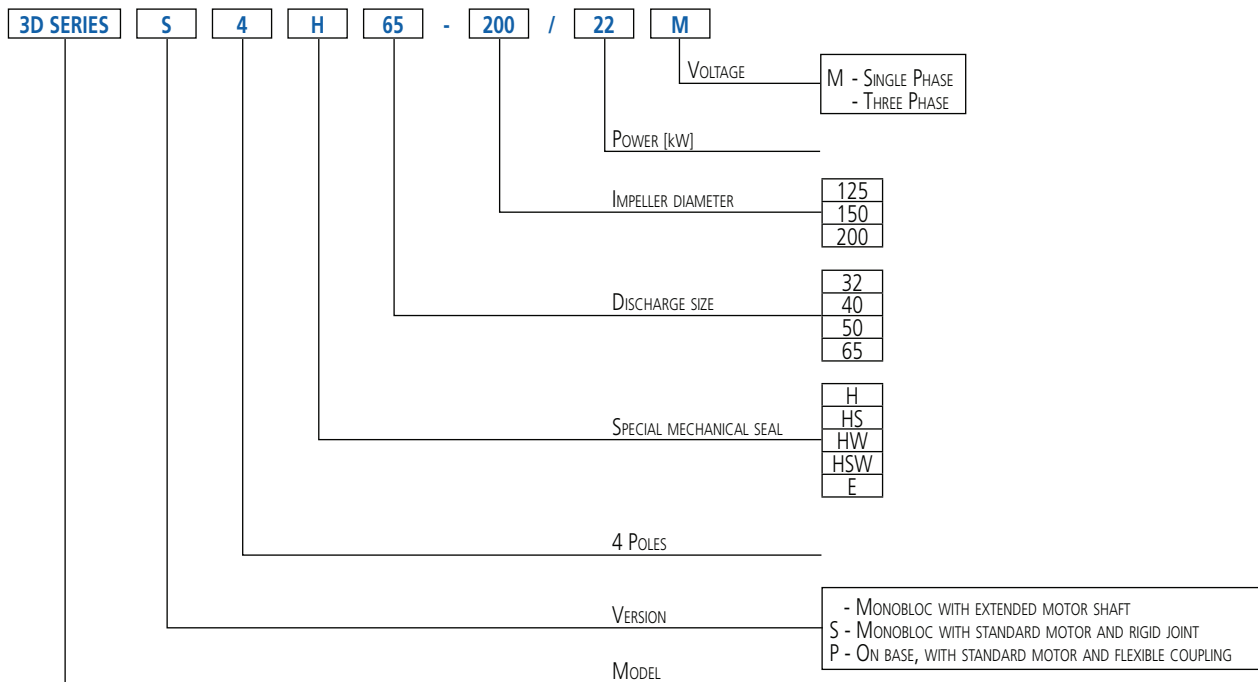
- Special voltages
- Special mechanical seals



3D SERIES

CENTRIFUGAL PUMPS CLOSE COUPLED AND STANDARDIZED EN 733

IDENTIFICATION CODE



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3D SERIES

CENTRIFUGAL PUMPS CLOSE COUPLED AND STANDARDIZED EN 733

PERFORMANCE TABLE 3D(.) SERIES 32

2 Poles

Model	P ₂		Q=Flow rate									
	[HP]	[kW]	l/min	100	150	200	250	300	333	360	400	450
			m ³ /h	6	9	12	15	18	20	21,6	24	27
			H=Head [m]									
3D(.) 32-125/1.1 (M)	1,5	1,1	22,4	21,2	19,3	17,1	14,4	12,5	-	-	-	-
3D(.) 32-160/1.5 (M)	2	1,5	27,5	25,9	23,7	21,3	18,5	16,4	-	-	-	-
3D(.) 32-160/2.2 (M)	3	2,2	35,4	34,1	32,2	29,8	27,3	25,5	-	-	-	-
3D(.) 32-200/3.0	4	3	43,0	41,0	39,0	36,5	33,0	31,0	-	-	-	-
3D(.) 32-200/4.0	5,5	4	52,5	51,0	49,0	46,0	43,0	41,0	39,0	-	-	-
3D(.) 32-200/7.5	10	7,5	67,0	65,0	63,0	61,0	57,0	55,0	53,0	50,0	46,0	-

PERFORMANCE TABLE 3D(.) SERIES 40

2 Poles

Model	P ₂		Q=Flow rate									
	[HP]	[kW]	l/min	200	250	300	350	400	450	500	600	700
			m ³ /h	12	15	18	21	24	27	30	36	42
			H=Head [m]									
3D(.) 40-125/1.5 (M)	2	1,5	18,2	17,6	16,8	15,9	14,8	13,7	12,4	9,6	6,3	-
3D(.) 40-125/2.2 (M)	3	2,2	24,4	23,9	23,2	22,4	21,4	20,4	19,2	16,5	13,7	-
3D(.) 40-160/3.0	4	3	29,4	28,7	27,8	26,8	25,8	24,8	23,7	21,4	18,7	-
3D(.) 40-160/4.0	5,5	4	37,2	36,5	35,7	34,8	33,8	32,8	31,8	29,5	27,0	-
3D(.) 40-200/5.5	7,5	5,5	44,5	44,0	43,0	42,0	41,0	40,0	39,0	36,3	33,0	-
3D(.) 40-200/7.5	10	7,5	53,5	53,0	52,0	51,5	50,5	49,5	48,5	46,0	43,0	-
3D(.) 40-200/11	15	11	70,0	69,0	68,5	67,5	67,0	66,0	65,0	63,0	60,0	-

PERFORMANCE TABLE 3D(.) SERIES 50

2 Poles

Model	P ₂		Q=Flow rate									
	[HP]	[kW]	l/min	400	500	600	700	800	900	1000	1100	1200
			m ³ /h	24	30	36	42	48	54	60	66	72
			H=Head [m]									
3D(.) 50-125/2.2 (M)	3	2,2	18,0	17,0	15,7	14,2	12,6	10,9	9,0	-	-	-
3D(.) 50-125/3.0	4	3	21,5	20,8	19,8	18,5	17,1	15,5	13,8	12,0	10,0	-
3D(.) 50-125/4.0	5,5	4	25,8	25,3	24,5	23,5	22,2	20,7	19,0	17,2	15,3	-
3D(.) 50-160/5.5	7,5	5,5	32,0	31,5	30,5	29,3	27,9	26,2	24,4	22,4	20,0	-
3D(.) 50-160/7.5	10	7,5	38,2	37,6	36,9	35,8	34,5	32,9	30,9	28,9	26,7	-
3D(.) 50-200/9.2	12,5	9,2	-	49,5	48,0	46,5	44,5	42,5	40,0	37,6	34,4	-
3D(.) 50-200/11	15	11	-	55,5	54,5	52,5	51,0	49,0	47,0	44,5	42,0	-
3D(.) 50-200/15	20	15	-	69,5	68,5	67,0	65,5	63,5	61,5	59,0	56,0	-

PERFORMANCE TABLE 3D(.) SERIES 65

2 Poles

Model	P ₂		Q=Flow rate									
	[HP]	[kW]	l/min	600	700	1000	1300	1600	1900	2100	2200	2300
			m ³ /h	36	42	60	78	96	114	126	132	138
			H=Head [m]									
3D(.) 65-125/4.0	5,5	4	20,4	19,8	17,2	14,0	10,4	6,0	-	-	-	-
3D(.) 65-125/5.5	7,5	5,5	-	25,0	22,5	19,4	15,5	11,0	8,0	-	-	-
3D(.) 65-125/7.5	10	7,5	-	29,6	27,5	24,7	21,5	17,8	14,7	13,0	-	-
3D(.) 65-160/7.5	10	7,5	-	29,0	26,6	23,5	19,8	15,5	12,3	-	-	-
3D(.) 65-160/9.2	12,5	9,2	-	34,7	32,4	29,6	26,3	22,2	18,8	17,0	-	-
3D(.) 65-160/11	15	11	-	39,0	37,0	34,0	31,0	27,0	23,0	22,0	20,0	-
3D(.) 65-160/15	20	15	-	46,0	44,0	41,5	38,4	34,6	31,9	30,5	29,0v	-
3D(.) 65-200/15	20	15	-	51,0	47,0	43,0	38,6	33,3	29,2	27,0	-	-
3D(.) 65-200/18.5	25	18,5	-	58,0	55,0	51,0	47,0	41,5	37,9	35,9	33,6	-
3D(.) 65-200/22	30	22	-	65,5	62,5	58,5	54,5	49,5	46,0	44,5	42,5	-

(M) Single phase version only for 3D SERIES

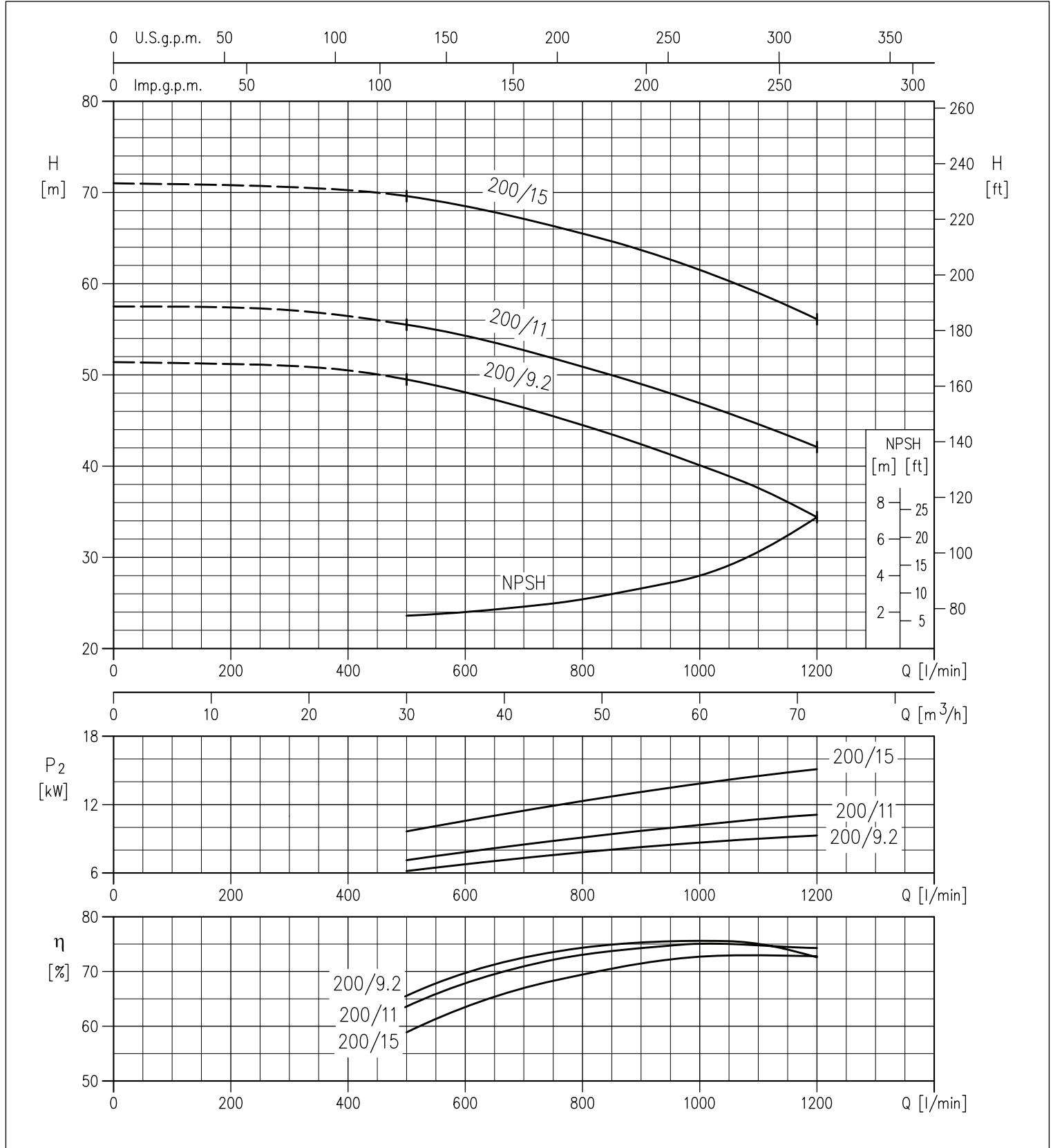


3D SERIES

CENTRIFUGAL PUMPS CLOSE COUPLED AND STANDARDIZED EN 733

PERFORMANCE CURVES 3D(.) SERIES 50-200 at 2900 min⁻¹ (according to ISO 9906 Attachment A)

2 Poles



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