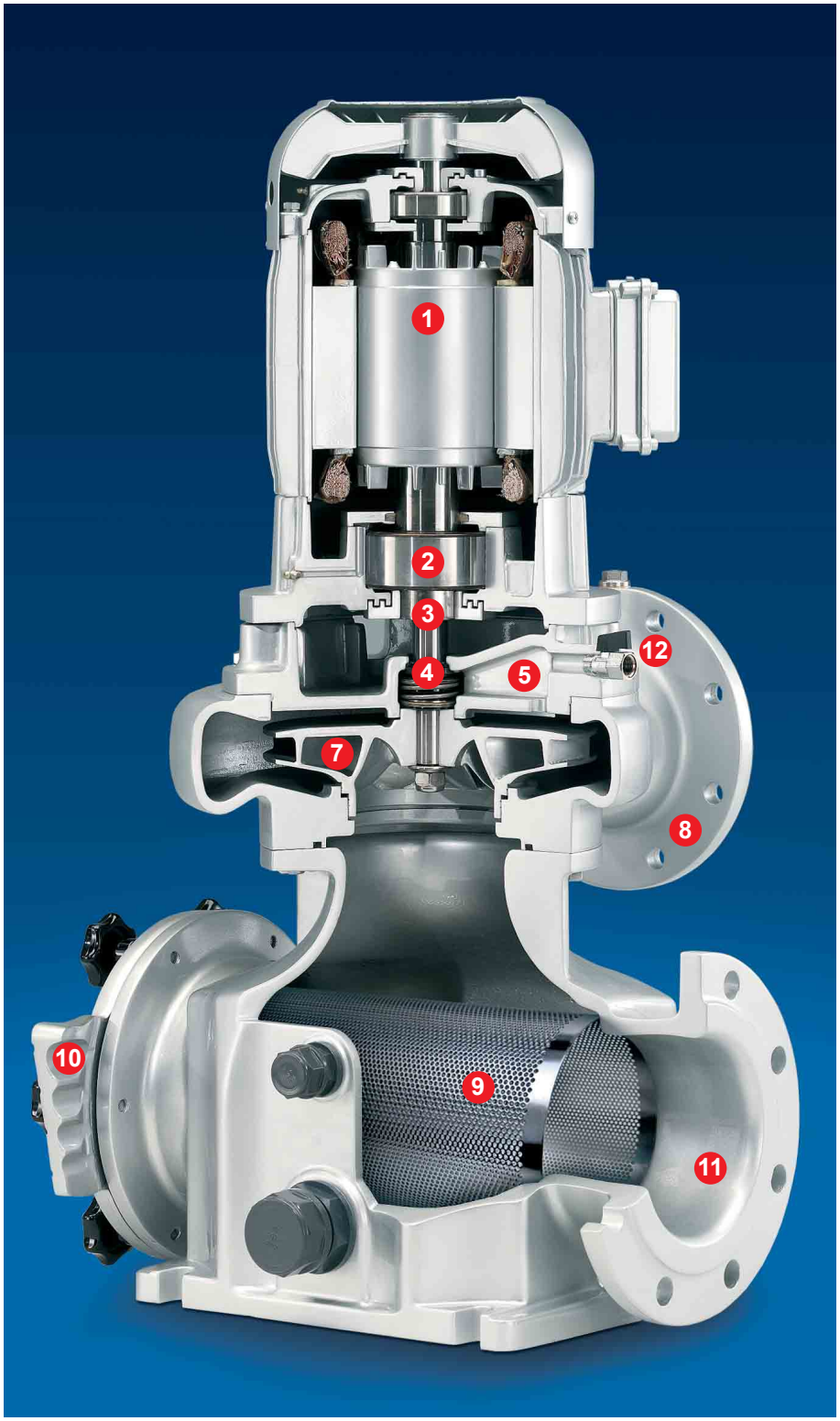
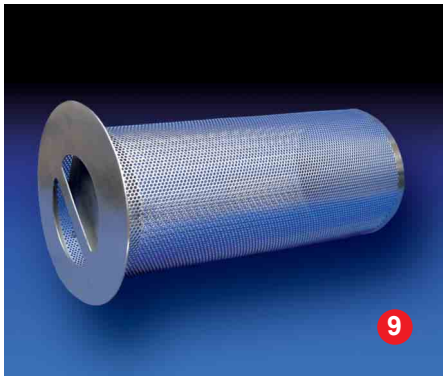
HERBORNER PUMPENTECHNIK

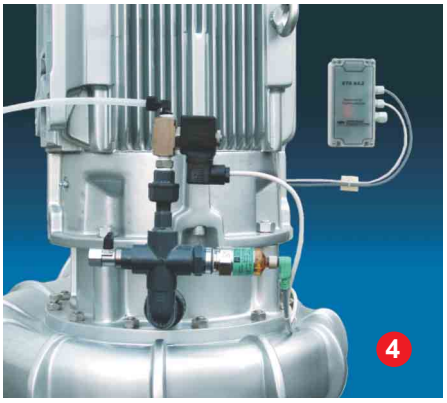
UNIBAD

Bath water circulating pump

GB







UNIBAD benefits that ensure operational safety and cost-effectiveness in continuous operation.

1 Motor

Overload-safe motors designed for continuous operation

Comes with a frequency converter for direct installation (up to 30/36 kW) or wall installation.

2 Cost-effectiveness

An extended lifetime is achieved through liberally dimensioned shafts and bearings.

3 Motor shaft

Rigid motor shafts made from high-alloy stainless steel for minimal deflection.

4 Shaft sealing

Bellows-type mechanical seal with wear-resistant silicon carbide.

Monitoring of mechanical seal possible using an ETS X4 to protect against dry running.

5 By-pass channel

For optimal flushing of mechanical seal by means of the pumped medium.

6 Pressure sensor

Digital capture of filter strainer contamination possible.

7 Pump power output

Steep characteristic curves for treatment plants with efficiency-optimised impellers.

8 Construction

Low height for optimal use of the splash water container.

Rotation of the pressure flange possible in 45° steps.

9 Filter strainer

High degree of filtration thanks to large filtration area with small mesh size of ø 3 mm.

10 Filter cover

Long-life filter cover thanks to medium-side rubber lining.

11 Filter casing

Flow-optimised filter casing with large drain plug.

Resistant inner rubber lining with W3 material.

12 Venting

Simple ventilation of pump by means of a ball valve.

Table of contents

Use

The bath water circulating pump UNIBAD with integrated hair and fibre filter is the core piece of modern circulating systems for the delivery and filtering of bath water, fresh water, thermal salt baths, sea water, service water, and other liquids contaminated by coarse materials.

It is used in indoor, outdoor, and adventure swimming baths, water parks, and ice sports, recreation, and hotel facilities for water slides, attractions, water treatment systems, fountains, heat recovery systems, and industrial facilities.

Construction

High circulation rates are achieved thanks to minimum space requirements and an easy-to-install and readily serviceable compact design. Variable flange positions offer specialist consultants and construction firms optimal design possibilities. It is possible to disassemble the interchangeable module of the pump without loosening the intake connection and pressure flange from the pipework. The interchangeable module consists of a block motor, intermediate casing, impeller and mechanical seal.

The filter strainer with mesh size of ø 3 mm specially designed for hair and fibre enables a high degree of filtration. It can be removed easily without the need for any tools. The filter surface is optimised with respect to long cleaning intervals and reduced flow loss. The pressure-and-vacuum gauge provided as an accessory indicates the filter's degree of contamination. A digital pressure sensor can also be used for this.

Installation

The pumps can be delivered in vertical installation with the motor at the top:

Vertical installation of the pump

Impellers

Dynamically balanced impellers ensure vibration-free running and contribute significantly to the long lifetime of the pump. All multi vane impellers can reach every duty point within the set of performance curves by correcting the diameter.

Open and closed multi vane impellers and screw propellers (SP) for clean to slightly soiled pumped media are used.

Range of performance

A consistent range of performance with steep pump characteristic curves guarantees a uniform pump power output, even when the filter is dirty. In parallel operation, they ensure a minimum change in delivery rate with high filter resistance and friction loss.

	Q [m3/h]	H [m]
1500 min^{-1} (50 Hz)	620	40
1800 min^{-1} (60 Hz)	620	44

Shaft sealing

The shaft sealing on the pump side is effected in all models via a maintenance-free mechanical seal, which is independent of the direction of rotation and made from wear-resistant silicon carbide (SiC). All motors are equipped with a special seal for splash-proofing on the pump side. Monitoring of mechanical seal possible using an ETS X4 to protect against dry running.

Bearing

The pump and motor have a common shaft, which is taken up in a strengthened bearing. The 4-pole drives are also equipped with a relubrication unit from 1.1 kW. In contrast to the standard motor, the pump-side rigid bearing is designed as a reinforced bearing for long life under extreme operating conditions. The high level of running accuracy of the motor shaft is achieved through the high flexural rigidity and short shaft length. This ensures vibration-free running of the mechanical shaft sealing.

Noise

The noise emission is determined by complex influencing factors such as size, materials, operating and installation conditions. Noise emission was contained using hydraulic measures and solid construction methods as early as in the development stage. The maximum sound pressure level is generally determined by the drive motors, being caused by air, magnetic and bearing noises. Noise levels are below the permissible limit curves specified for electrical motors as defined by DIN EN 60034-9. Minimum noise emission when operated in the region of $Q_{optimal}$ (best efficiency).

Motor data

Surface-cooled three-phase motor with squirrel-cage.

Design	IM B5
Motor connection	Manufacturer-specific
Protection type	IP 55
Speed	1500 (1800) min^{-1}
Frequency	50 (60) Hz
Connection ≤ 2.2 kW	230 △ / 400 ⅄ (460 ⅄) V
Connection ≥ 3.0 kW	400 △ / 690 ⅄ (460 △) V
Insulation class VDE 0530	F

Motors from 5.5 kW have a PTC thermistor as standard.

General data

- Pump colour RAL 5010 (standard)
- Media temperature range from - 5 to + 60 °C
- Ambient temperature range from - 5 to + 40 °C
- Density of the pumped medium max. 1000 kg/m³
- Viscosity of the pumped medium max. 1 mm²/s (1 cST)
- Frequency regulation of pumps depending on the operating conditions
  - from 30 to 50 Hz (400 V) and from 30 to 60 Hz (460 V)
- Performance verification according to DIN EN ISO 9906, Class 2.

Special configurations

- Different voltages and/or frequencies
- Different insulation class
- Elevated ambient temperature
- Elevated protection type
- Enhanced tropical and moisture protection
- Special materials (high-alloy cast steel, bronze) for parts coming into contact with the product
- Special paint finish
- Energy-saving pump with water-cooled motor (UNIBAD-XC)
- Energy-saving motor IE2 (eff1)
- Customer-specific solutions

Accessories

- Frequency converter for direct installation (up to 30/36 kW) or wall installation
- Pressure-and-vacuum gauge
- Digital pressure sensor
- Dry running protection for mechanical seal (ETS X4)

Model designation

Example:

150-270/0304SPX-W2-V

Nominal diameter pressure flange DN [mm]
Design dimensions
Hydraulic version
Motor rating [kW]
E.g.: 030 = 3.0 kW
Number of poles of the motor
4-pole = 1500 (60 Hz: 1800) min^{-1}
Impeller version
Model
Materials
Flange position

V = front
VL = centred between the front and left
L = left
HL = centred between the rear and left
H = rear
HR = centred between the rear and right
R = right
VR = centred between the front and right

Flange position [1)]

Figure V

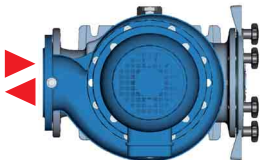


Figure VL

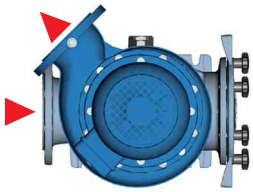


Figure L

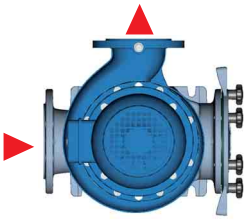


Figure HL

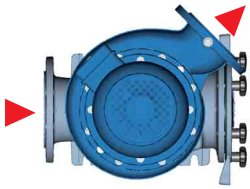
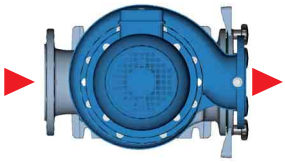


Figure H



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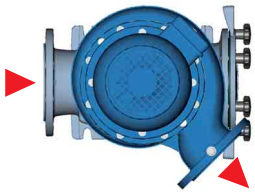
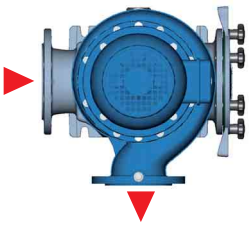


Figure R



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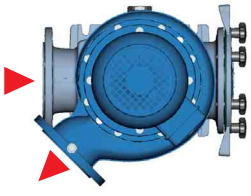


[1)] The terminal box alignment may vary in the case of the design with frequency converter for direct installation.

Materials [4]

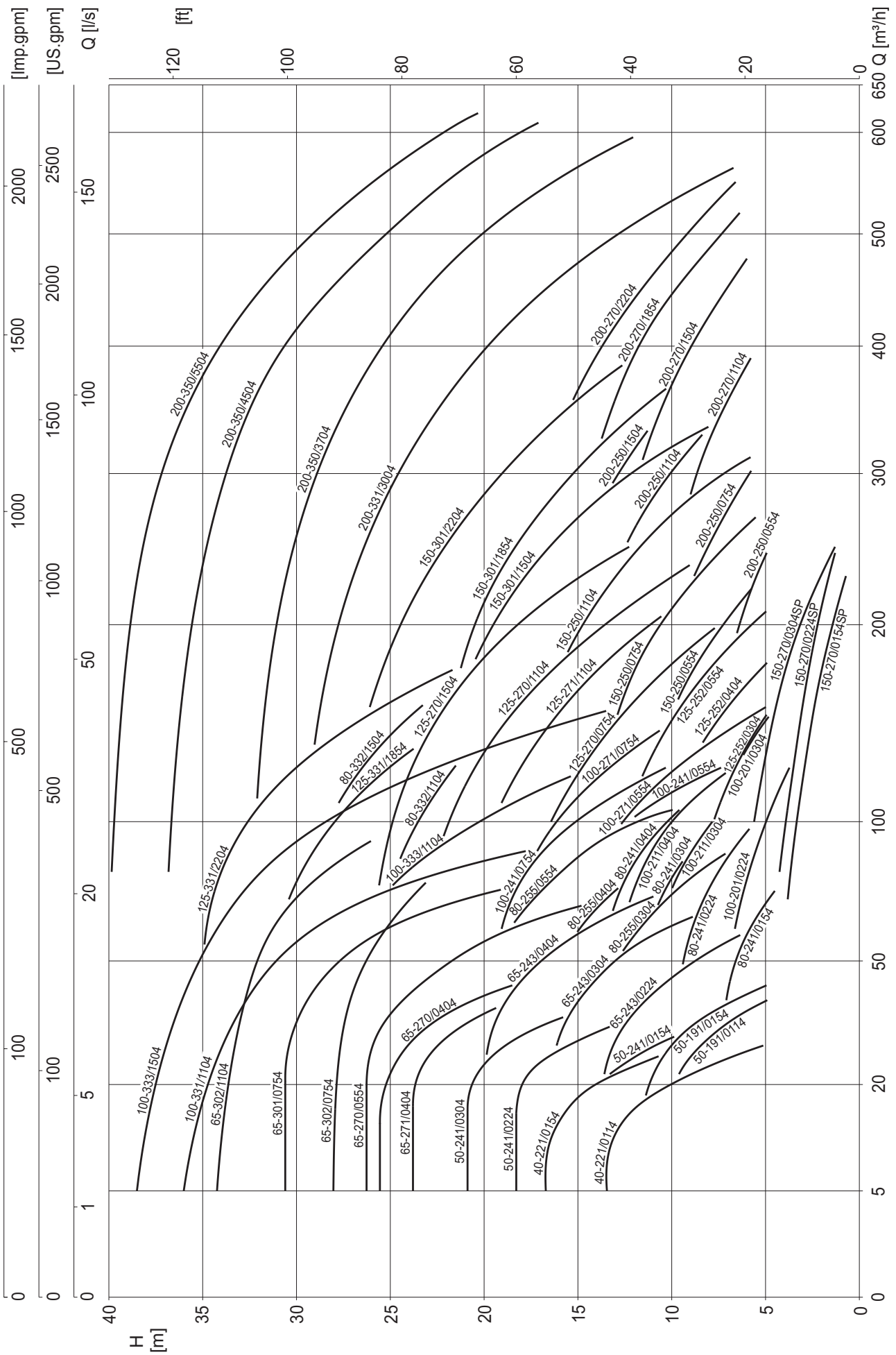
[1]	Individual components	W2	W3
001	Filter casing	EN-GJL-250 [2] (EN-JL1040)	EN-GJL-250 [3] (EN-JL1040)
002	Filter strainer	X6CrNiMoTi17-12-2 (1.4571)	X6CrNiMoTi17-12-2 (1.4571)
003	Filter cover	EN-GJL-250 [3] (EN-JL1040)	EN-GJL-250 [3] (EN-JL1040)
101	Pump casing	EN-GJL-250 (EN-JL1040)	CuSn10-C (CC480K)
113	Intermediate casing	EN-GJL-250 (EN-JL1040)	CuSn10-C (CC480K)
230	Impeller	CuAl10Fe5Ni5-C (CC333G)	CuAl10Fe5Ni5-C (CC333G)
433	Mechanical seal	SiC/SiC	SiC/SiC
502	Casing wear ring	–	CuSn7Pb15-C (CC496K)
819	Motor shaft	X6CrNiMoTi17-12-2 (1.4571)	X6CrNiMoTi17-12-2 (1.4571)

1) See exploded view (page 18)

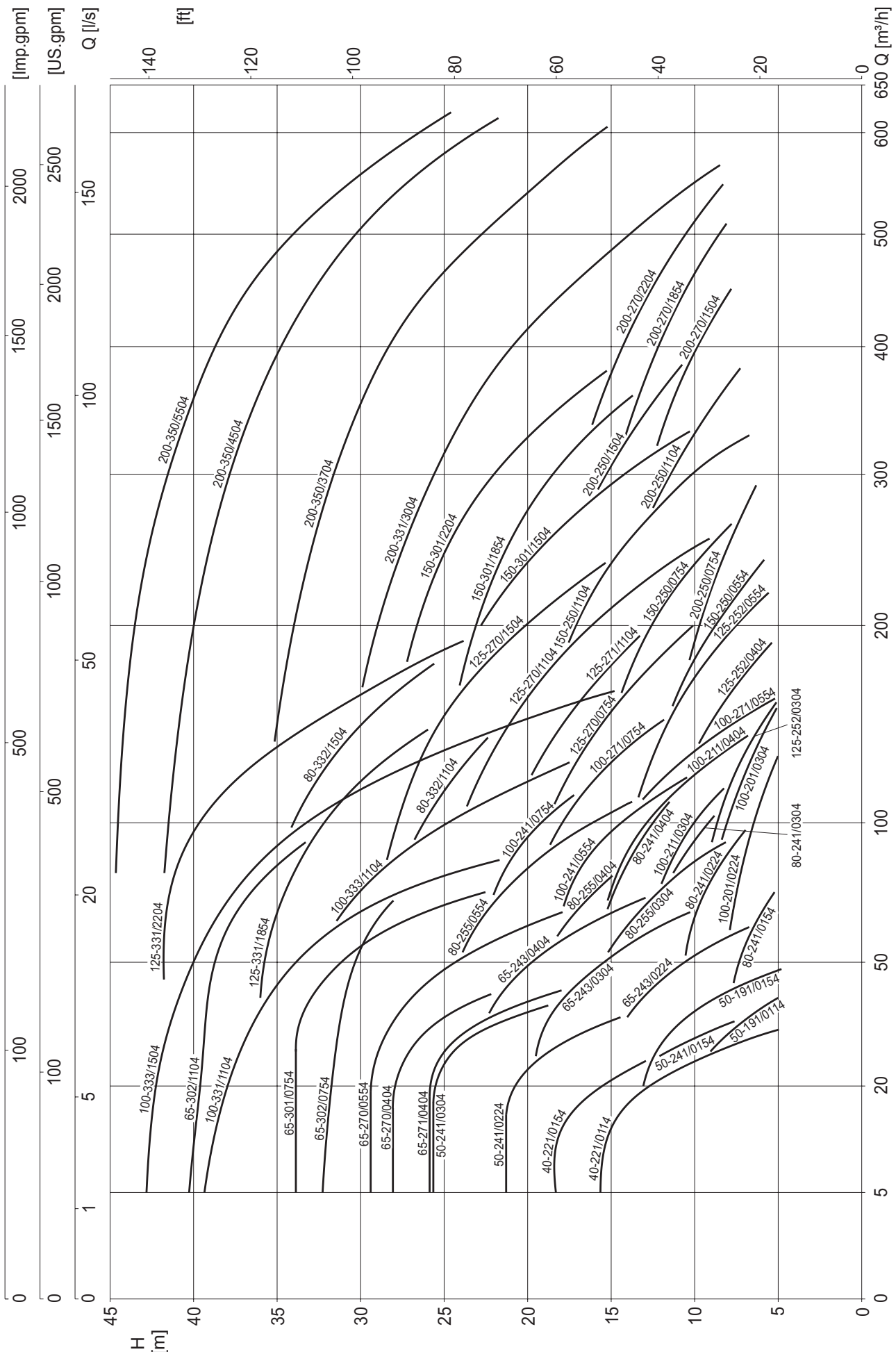
2) Interior epoxy resin hot powder coating

3) Medium-side rubber lining

4) Other material combinations depending on operating conditions, e.g. special bronzes and stainless steels.

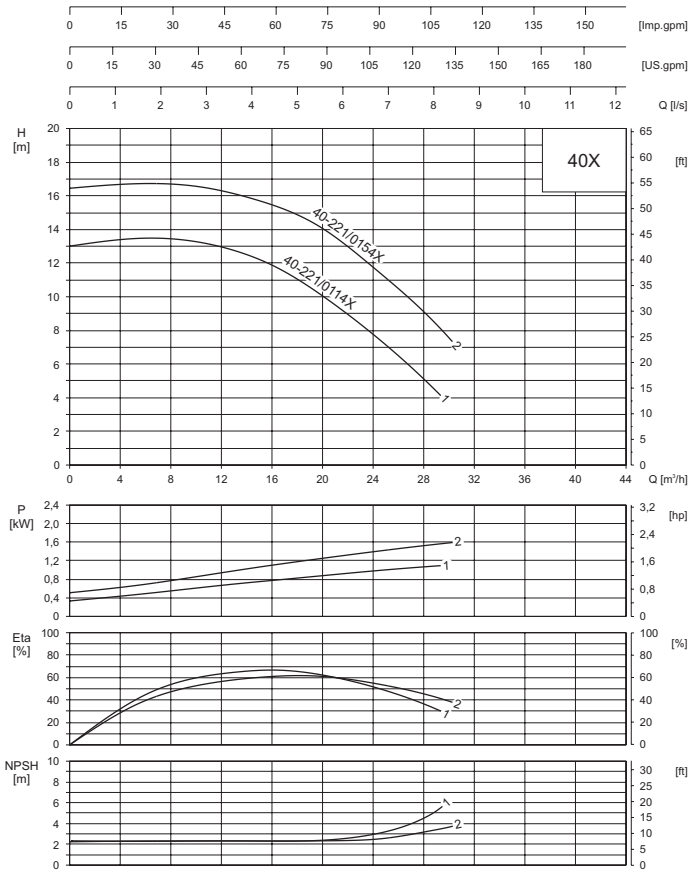


Technical information on the parallel connection of centrifugal pumps on request.



Technical information on the parallel connection of centrifugal pumps on request.

1500 min^{-1} (400 V - 50 Hz)



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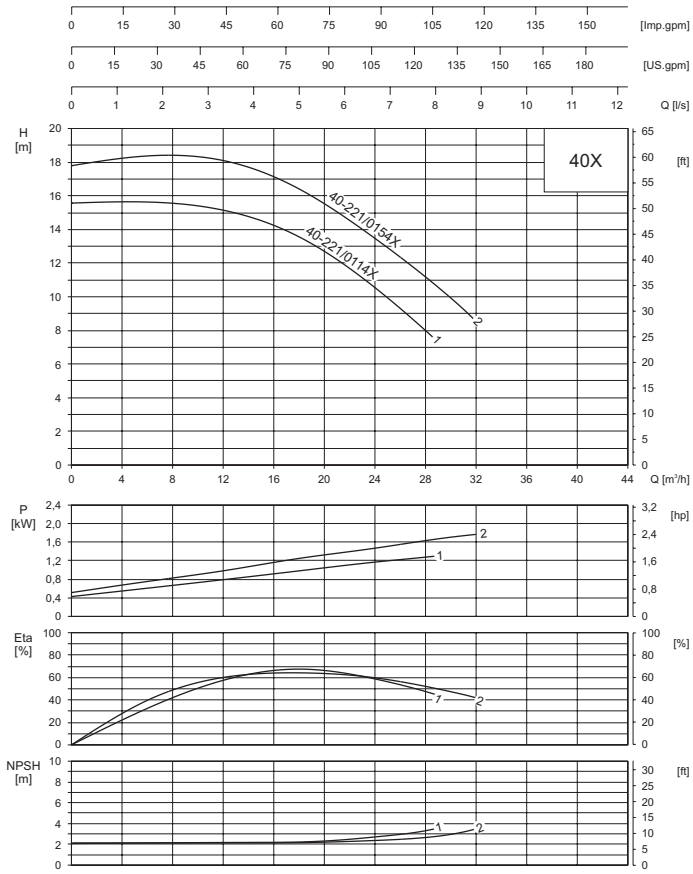

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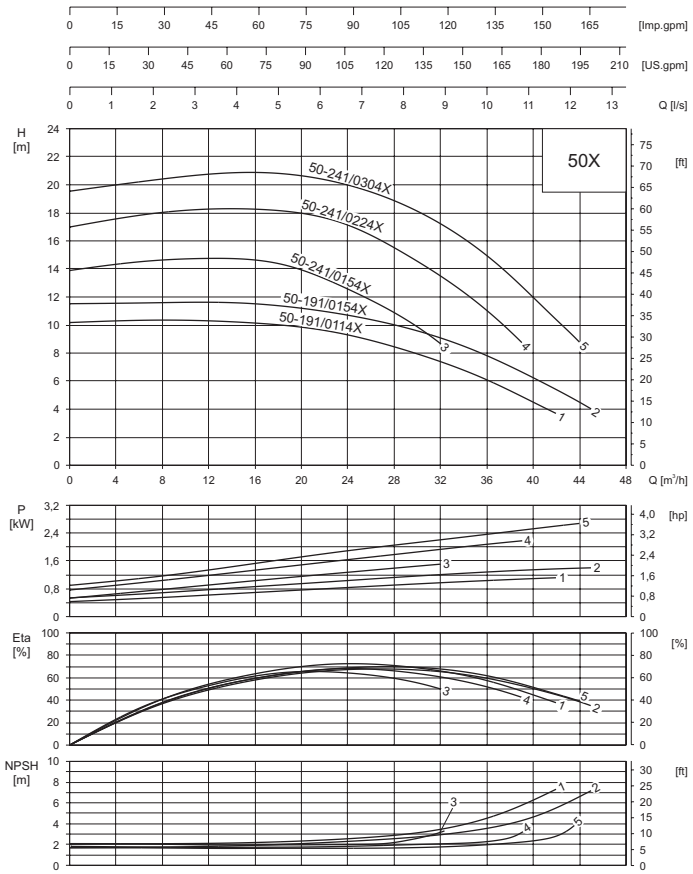

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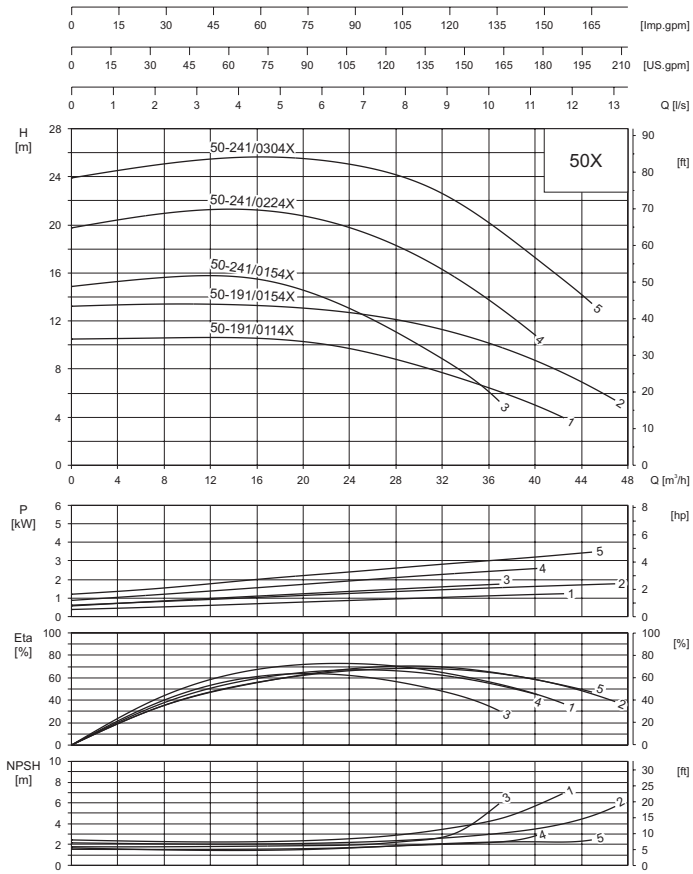

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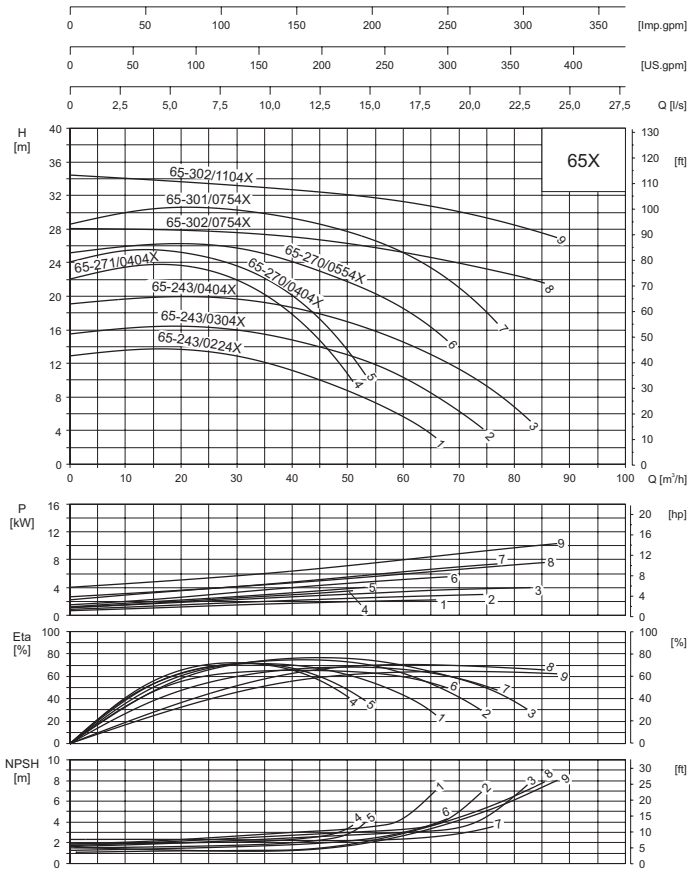

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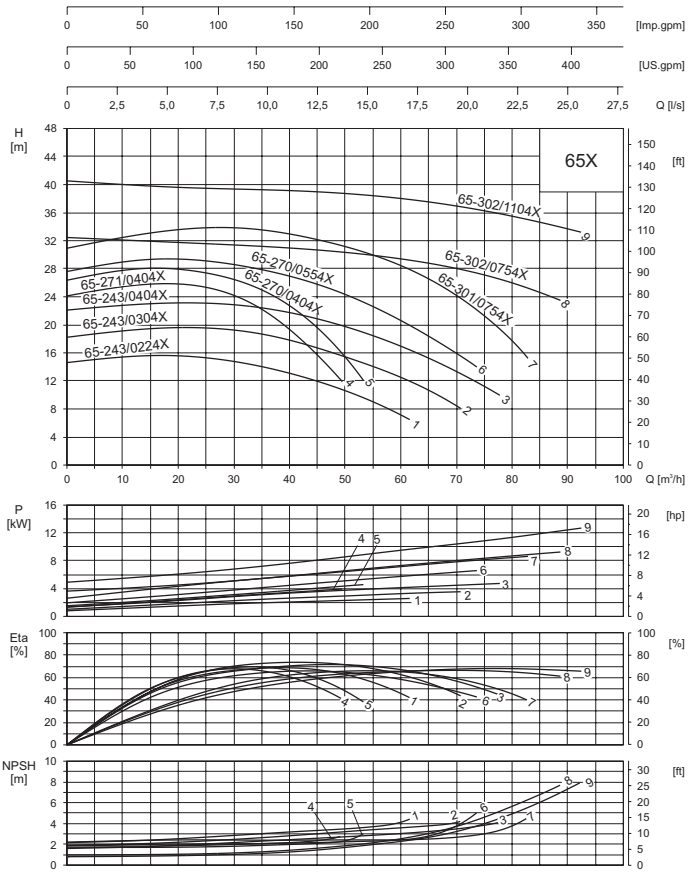

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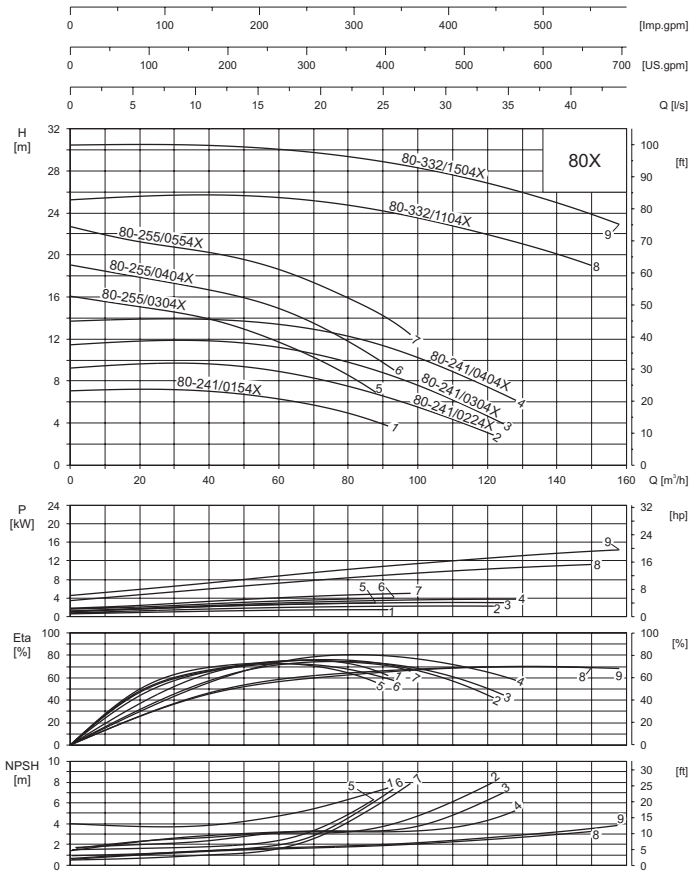

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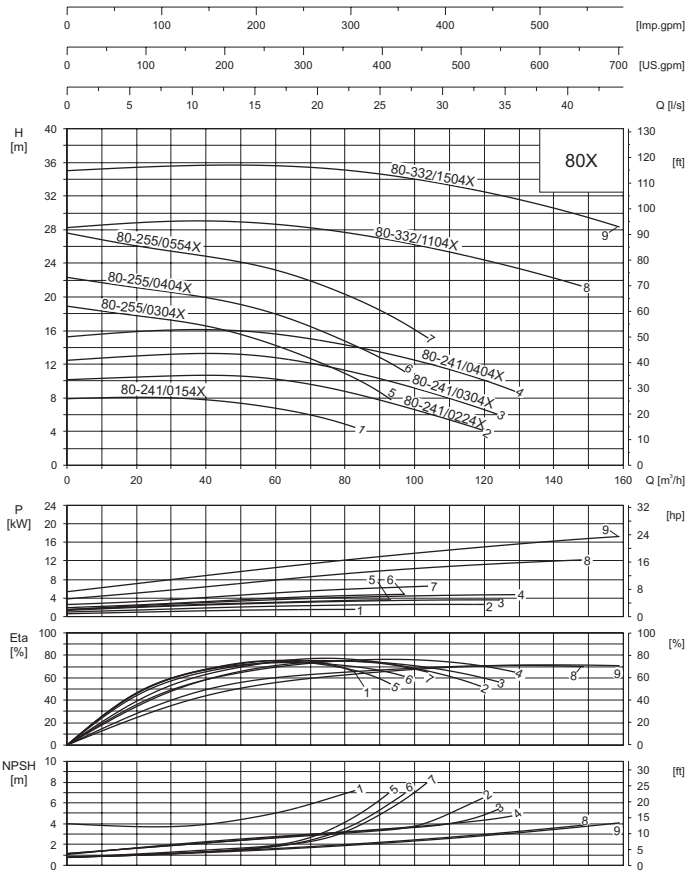

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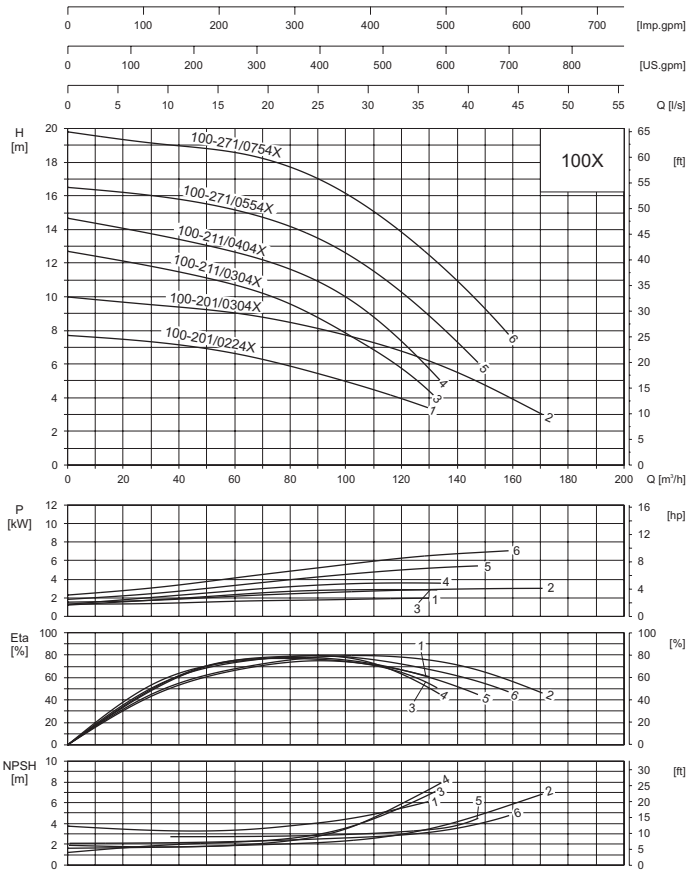

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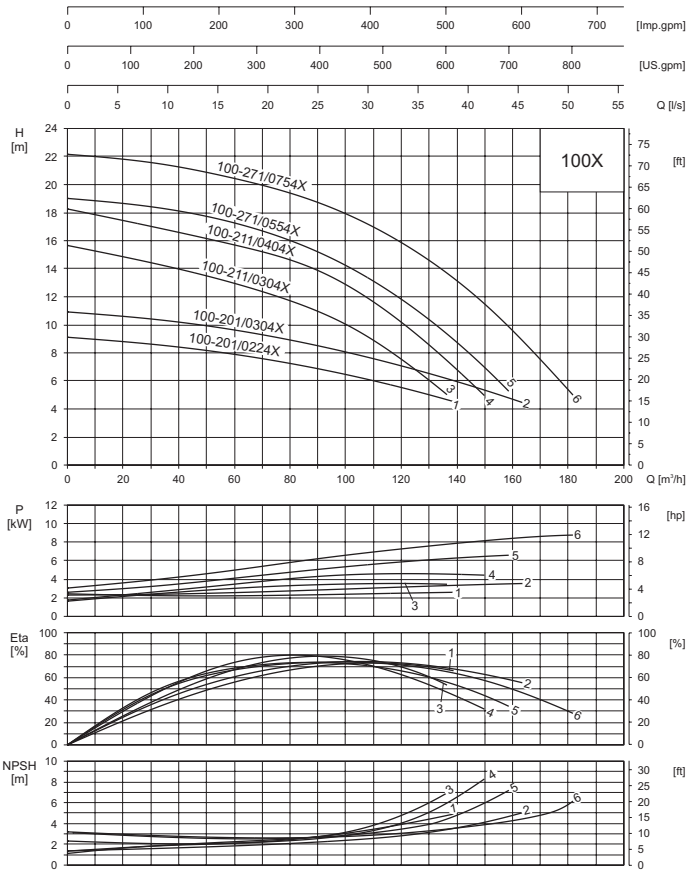

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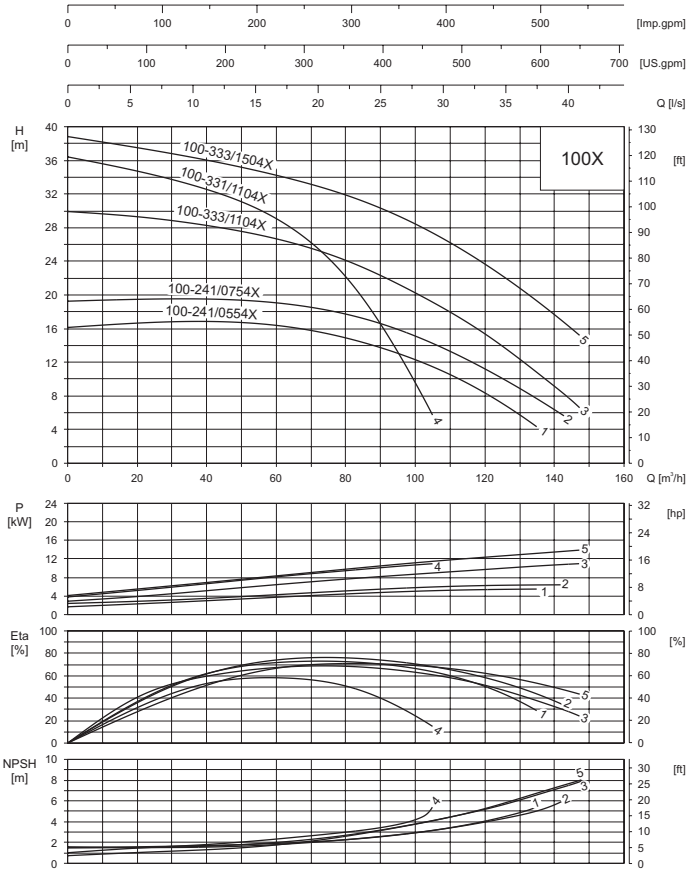

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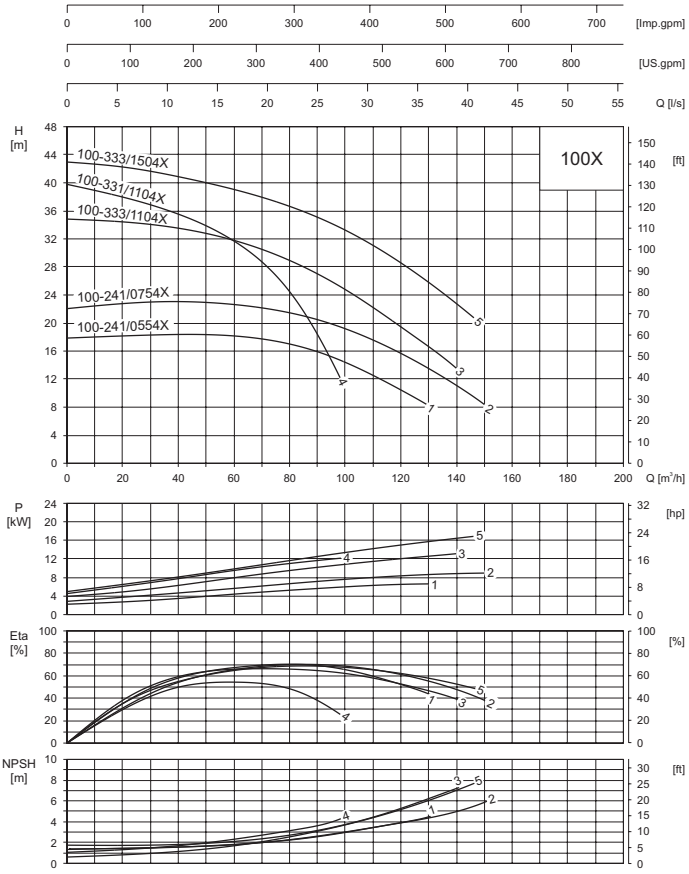

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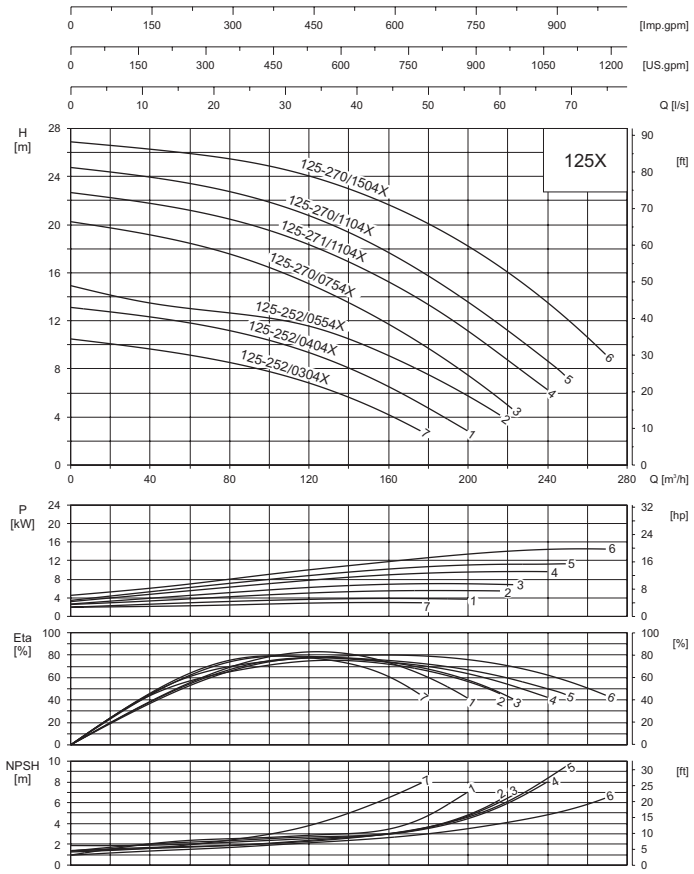

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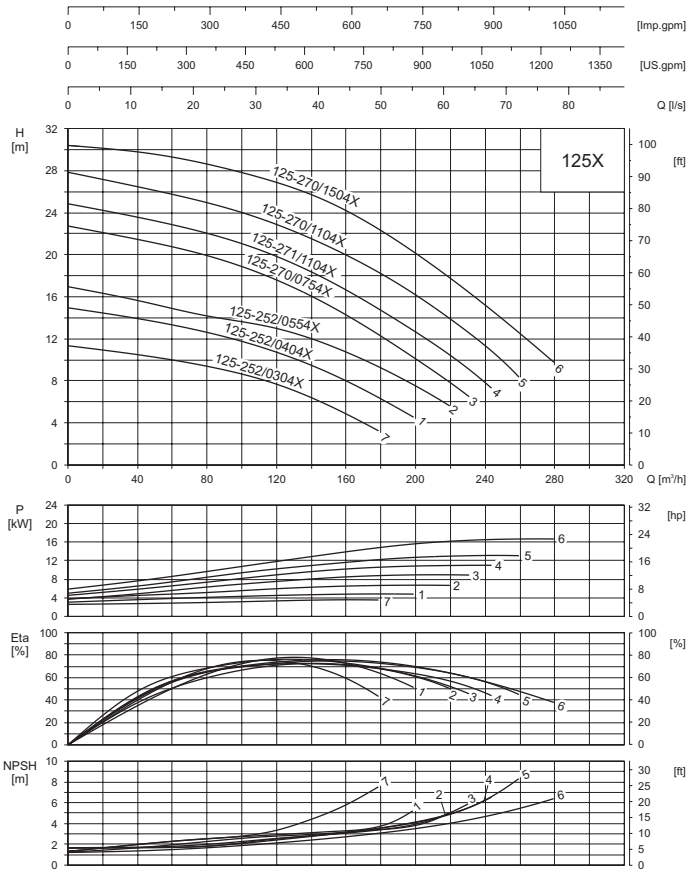

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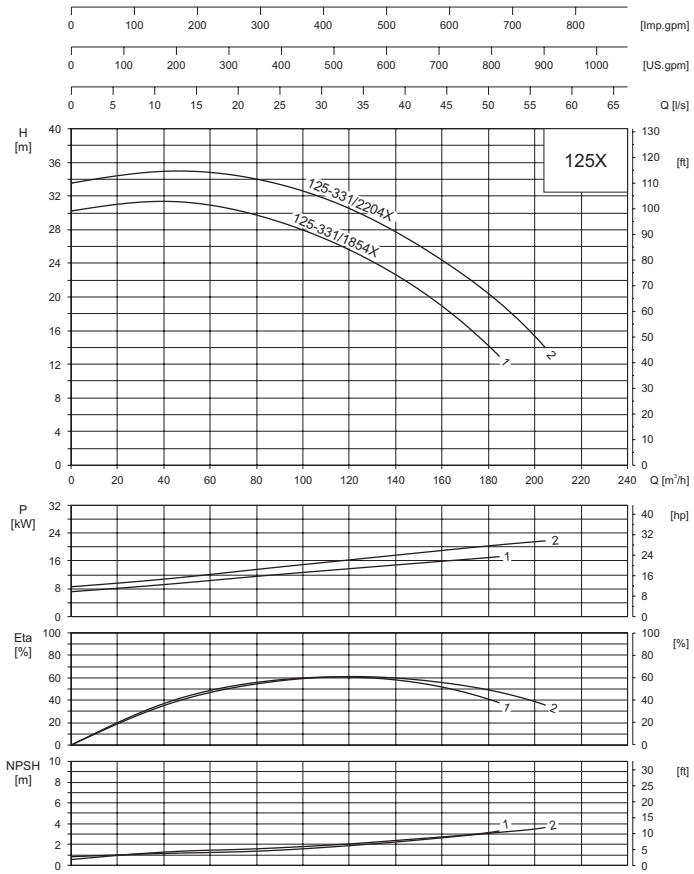

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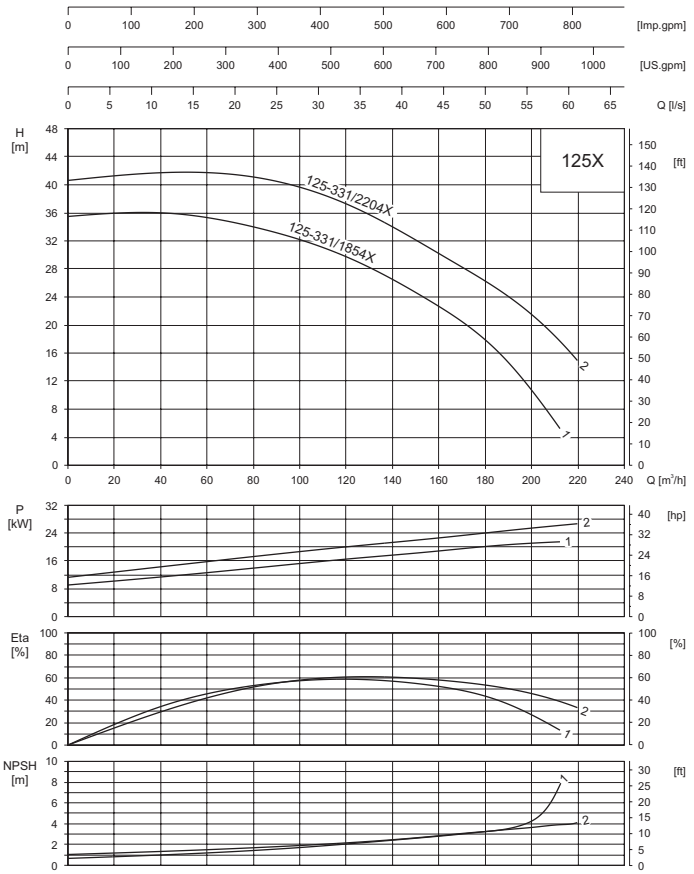

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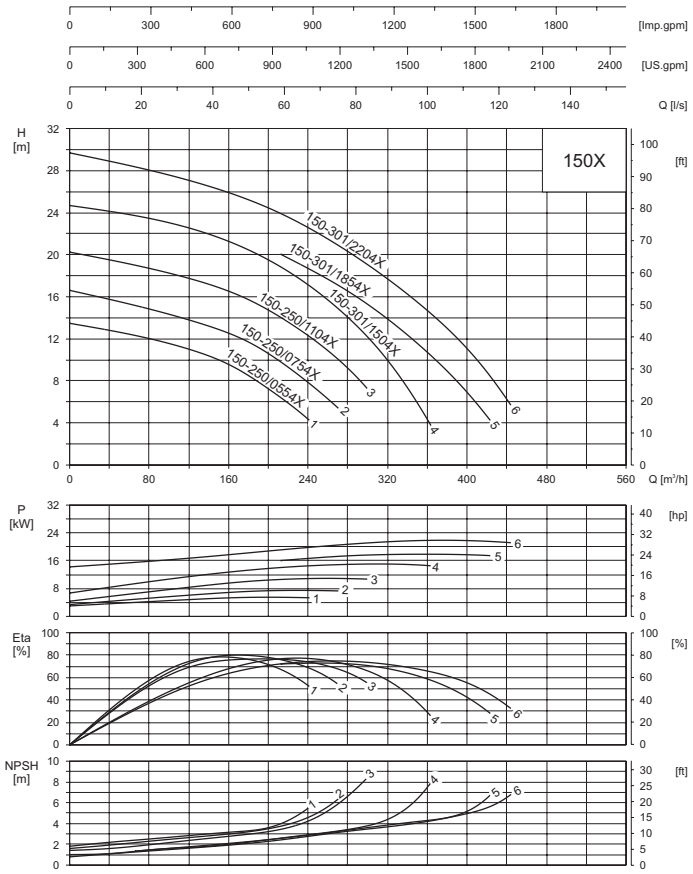

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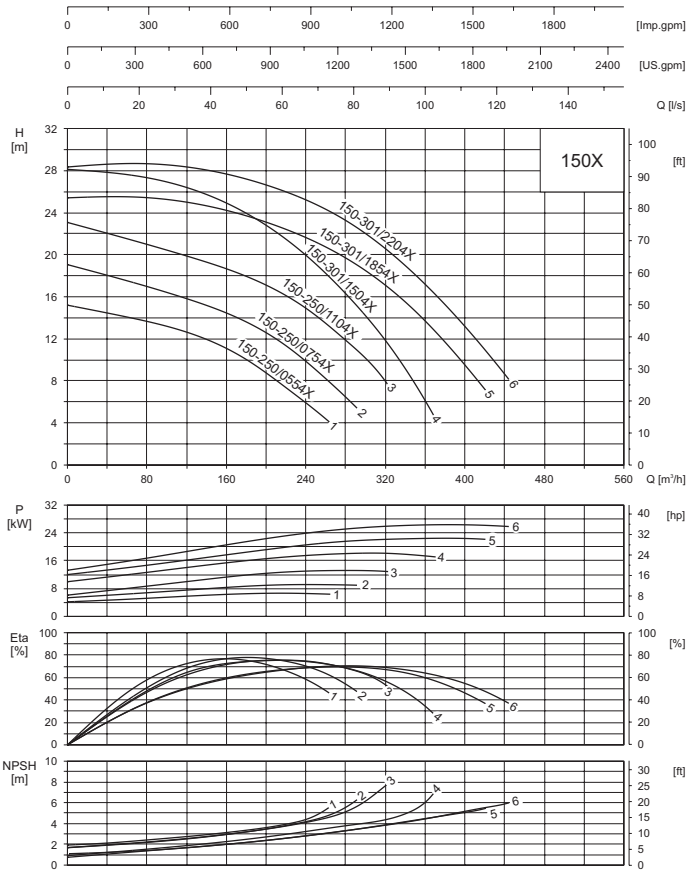

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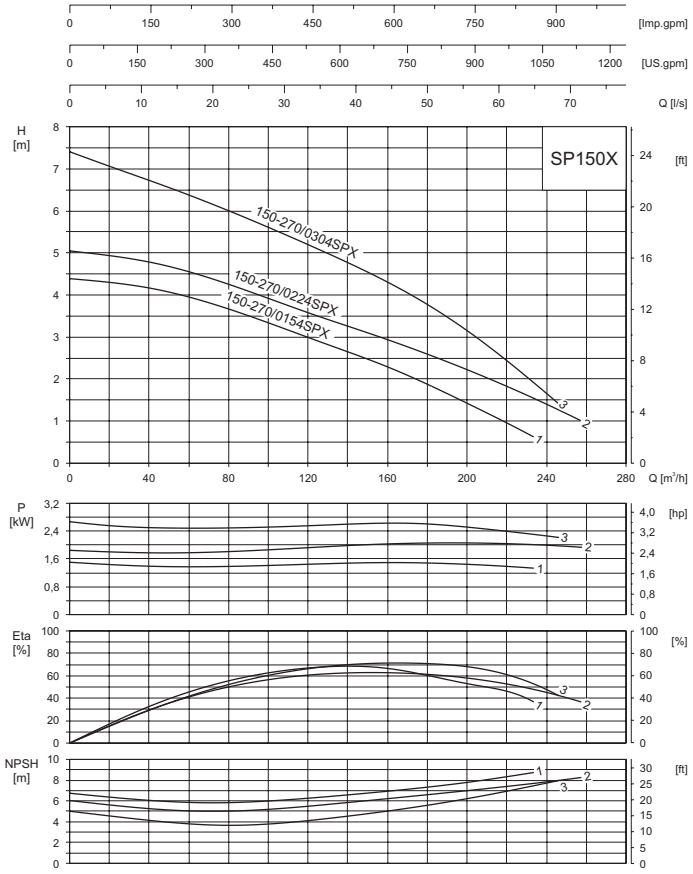

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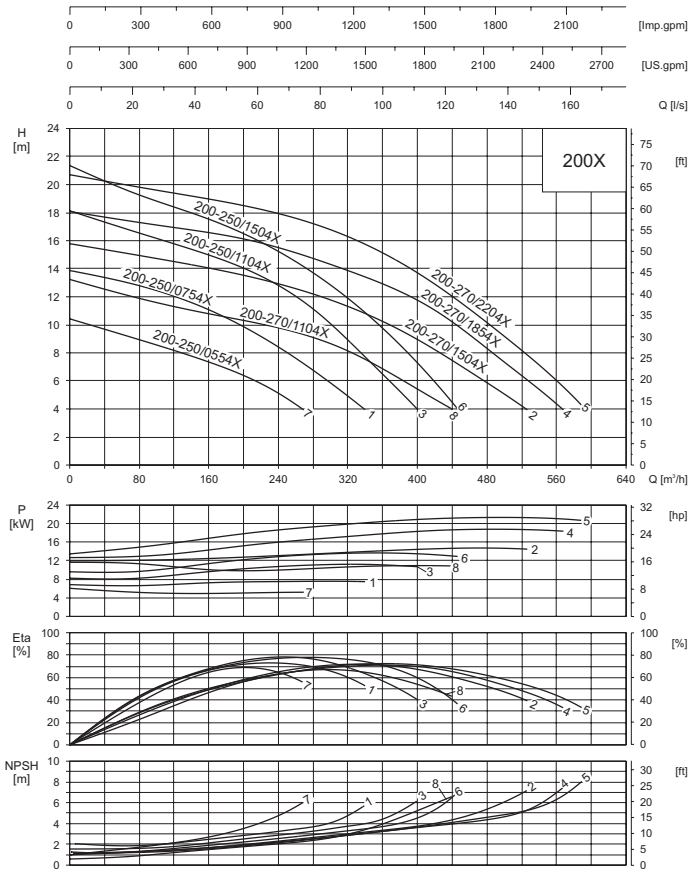

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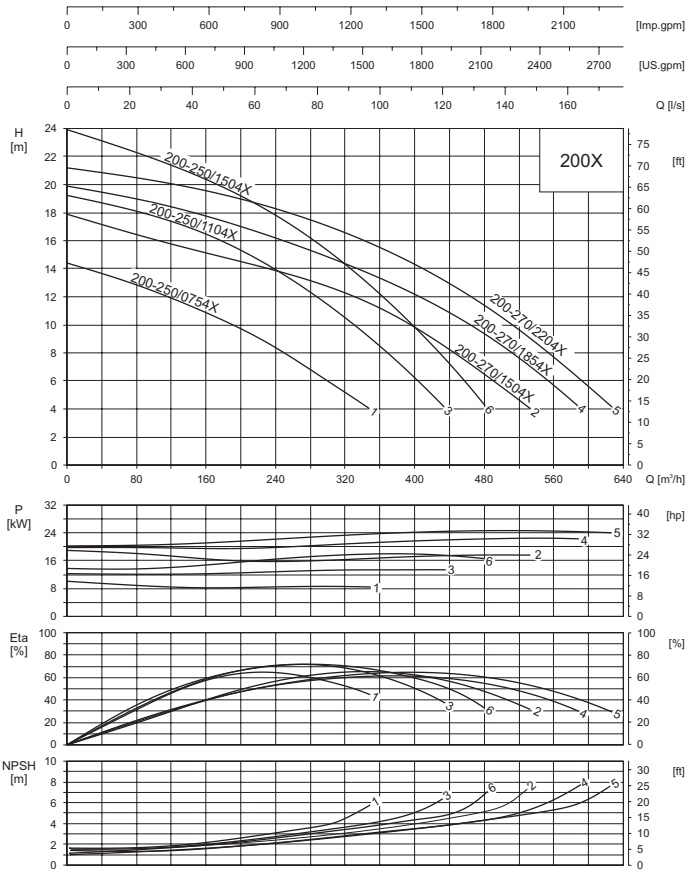

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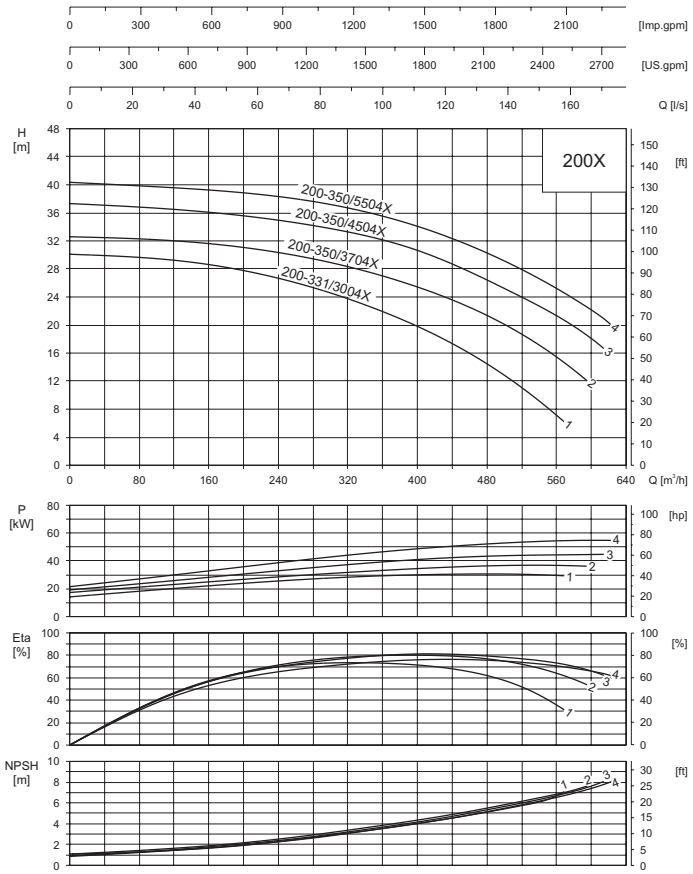

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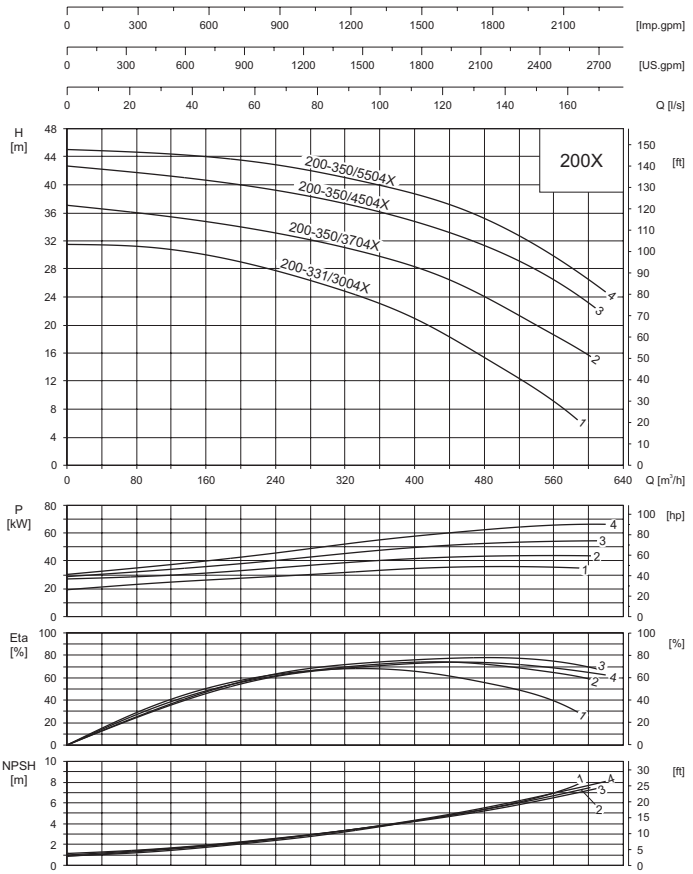
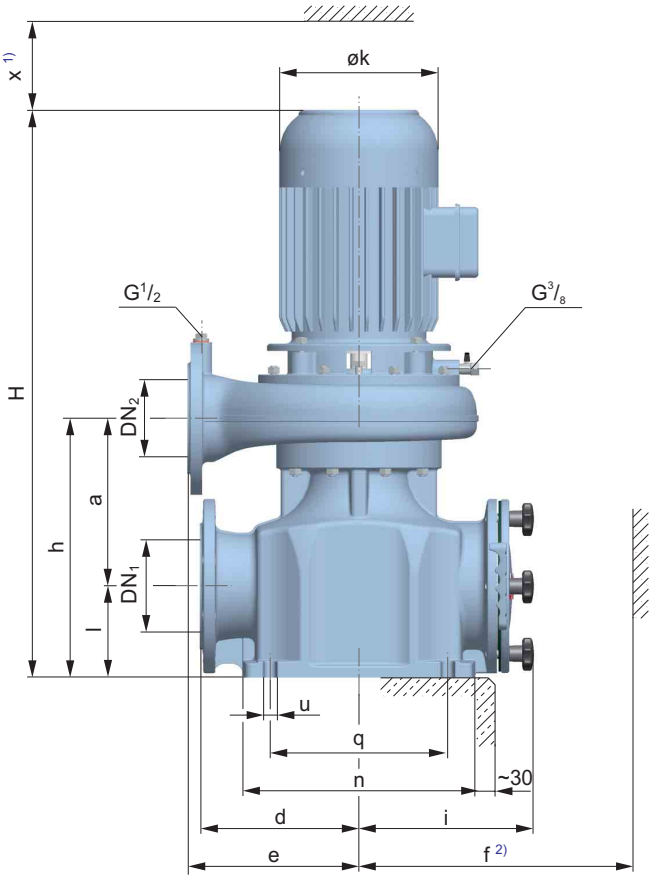
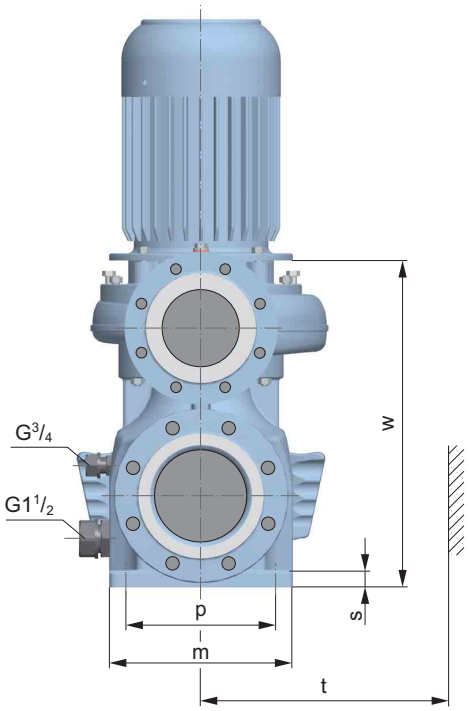






50 Hz: 1500 min^{-1} (400V)

P_2 [kW]	I [A]	I_A/I_N	⅄/△	dB(A)
1.1	2.8	5.2	⅄	55
1.5	3.8	5.6	⅄	55
2.2	5.3	5.9	⅄	59
3.0	7.0	6.2	△	59
4.0	9.0	6.8	△	59
5.5	11.4	6.6	△	63
7.5	15.4	6.8	△	63
11.0	22.0	6.9	△	65
15.0	30.0	7.3	△	65
18.5	37.0	7.0	△	65
22.0	44.0	6.9	△	67
30.0	54.5	7.0	△	68
37.0	66.0	6.8	△	70
45.0	82.0	7.0	△	70
55.0	95.0	7.0	△	71

60 Hz: 1800 min^{-1} (460V)

P_2 [kW]	I [A]	I_A/I_N	⅄/△	dB(A)
1.3	2.9	5.3	⅄	59
1.8	3.7	5.4	⅄	59
2.6	5.5	6.1	⅄	63
3.6	7.2	6.6	△	63
4.8	9.1	7.0	△	63
6.6	11.9	6.3	△	67
9.0	16.1	6.5	△	67
13.2	23.0	6.6	△	69
18.0	30.3	7.3	△	69
22.2	38.6	6.7	△	69
26.4	44.9	6.6	△	71
36.0	58.4	6.7	△	72
44.4	68.9	6.5	△	74
54.0	85.6	6.7	△	74
66.0	99.1	6.7	△	75

Legend:

P_2: Nominal output
I_N: Nominal current
I_A: Starting current
dB(A): Sound pressure level (complete pump)

1) When dismounting the motor ensure there is sufficient room for the lifting device.

2) Main controlling dimensions of filter strainer

Flange connection dimensions according to DIN 2501 PN 10

Dimensions with frequency converter for direct installation on request.

Model	DN_2	DN_1	H	a	d	e	f	h	i	ø k	l	m	n	p	q	s	$t_{min.}$	u	w	$x_{min.}$	[kg] [2]
40-221/0114X	40	100	715	225	200	200	660	345	240	176	120	234	297	205	225	21	260	17	439	300	88
40-221/0154X	40	100	740	225	200	200	660	345	240	176	120	234	297	205	225	21	260	17	439	300	91
50-191/0114X	50	100	720	225	200	200	660	345	240	176	120	234	297	205	225	21	260	17	445	300	86
50-191/0154X	50	100	745	225	200	200	660	345	240	176	120	234	297	205	225	21	260	17	445	300	89
50-241/0154X	50	100	735	225	200	220	660	345	240	176	120	234	297	205	225	21	260	17	433	300	94
50-241/0224X	50	100	745	225	200	220	660	345	240	198	120	234	297	205	225	21	260	17	433	300	101
50-241/0304X	50	100	785	225	200	220	660	345	240	198	120	234	297	205	225	21	260	17	443	300	111
65-243/0224X	65	100	750	225	200	230	660	345	240	198	120	234	297	205	225	21	260	17	435	300	104
65-243/0304X	65	100	790	225	200	230	660	345	240	198	120	234	297	205	225	21	260	17	445	300	113
65-243/0404X	65	100	825	225	200	230	660	345	240	220	120	234	297	205	225	21	260	17	445	300	120
65-270/0404X	65	100	820	225	200	240	660	345	240	220	120	234	297	205	225	21	260	17	443	300	121
65-271/0404X	65	100	820	225	200	240	660	345	240	220	120	234	297	205	225	21	260	17	443	300	121
65-270/0554X	65	100	875	225	200	230	660	345	240	260	120	234	297	205	225	21	260	17	443	300	147
65-301/0754X	65	100	895	245	200	270	660	365	240	260	120	234	297	205	225	21	260	17	446	300	174
65-302/0754X	65	100	915	230	200	270	660	350	240	260	120	234	297	205	225	21	260	17	466	300	186
65-302/1104X	65	100	975	230	200	270	660	350	240	315	120	234	297	205	225	21	260	17	462	300	232
80-241/0154X	80	150	815	270	260	250	800	420	291	176	150	300	380	260	290	27	340	18	512	300	136
80-241/0224X	80	150	825	270	260	250	800	420	291	198	150	300	380	260	290	27	340	18	511	300	143
80-241/0304X	80	150	860	270	260	250	800	420	291	198	150	300	380	260	290	27	340	18	516	300	150
80-241/0404X	80	150	895	270	260	250	800	420	291	220	150	300	380	260	290	27	340	18	516	300	157
80-255/0304X	80	150	870	276	260	271	800	426	291	198	150	300	380	260	290	27	340	18	524	300	156
80-255/0404X	80	150	900	276	260	271	800	426	291	220	150	300	380	260	290	27	340	18	524	300	163
80-255/0554X	80	150	955	276	260	271	800	426	291	260	150	300	380	260	290	27	340	18	524	300	188
80-332/1104X	80	150	1060	275	260	315	800	425	291	315	150	300	380	260	290	27	340	18	547	[1]	266
80-332/1504X	80	150	1095	275	260	315	800	425	291	315	150	300	380	260	290	27	340	18	547	[1]	287
100-201/0224X	100	150	850	300	260	280	800	450	291	198	150	300	380	260	290	27	340	18	536	300	133
100-201/0304X	100	150	885	300	260	280	800	450	291	198	150	300	380	260	290	27	340	18	541	300	143
100-211/0304X	100	150	860	270	260	270	800	420	291	198	150	300	380	260	290	27	340	18	515	300	154
100-211/0404X	100	150	895	270	260	270	800	420	291	220	150	300	380	260	290	27	340	18	515	300	162
100-241/0554X	100	150	975	270	260	270	800	420	291	260	150	300	380	260	290	27	340	18	543	300	195
100-241/0754X	100	150	990	270	260	270	800	420	291	260	150	300	380	260	290	27	340	18	543	300	213
100-271/0554X	100	150	950	275	260	270	800	425	291	260	150	300	380	260	290	27	340	18	519	300	188
100-271/0754X	100	150	965	275	260	270	800	425	291	260	150	300	380	260	290	27	340	18	519	300	207
100-331/1104X	100	150	1060	290	260	270	800	440	291	315	150	300	380	260	290	27	340	18	550	[1]	275
100-333/1104X	100	150	1060	290	260	290	800	440	291	315	150	300	380	260	290	27	340	18	550	[1]	275
100-333/1504X	100	150	1100	290	260	290	800	440	291	315	150	300	380	260	290	27	340	18	550	[1]	295
125-252/0304X	125	150	880	290	260	300	800	440	291	198	150	300	380	260	290	27	340	18	538	300	167
125-252/0404X	125	150	915	290	260	300	800	440	291	220	150	300	380	260	290	27	340	18	538	300	174
125-252/0554X	125	150	970	290	260	300	800	440	291	260	150	300	380	260	290	27	340	18	538	300	202
125-270/0754X	125	150	985	275	260	280	800	425	291	260	150	300	380	260	290	27	340	18	536	300	211
125-270/1104X	125	150	1060	275	260	280	800	425	291	315	150	300	380	260	290	27	340	18	549	[1]	260
125-271/1104X	125	150	1060	275	260	280	800	425	291	315	150	300	380	260	290	27	340	18	549	[1]	260
125-270/1504X	125	150	1100	275	260	280	800	425	291	315	150	300	380	260	290	27	340	18	549	[1]	281
125-331/1854X	125	150	1215	325	260	370	800	475	291	350	150	300	380	260	290	27	340	18	625	[1]	351
125-331/2204X	125	150	1250	325	260	370	800	475	291	350	150	300	380	260	290	27	340	18	625	[1]	354
150-250/0554X	150	200	1045	335	310	330	920	515	340	260	180	360	457	320	350	32	340	20	615	300	249
150-250/0754X	150	200	1065	335	310	330	920	515	340	260	180	360	457	320	350	32	340	20	615	300	268
150-250/1104X	150	200	1140	335	310	330	920	515	340	315	180	360	457	320	350	32	340	20	628	[1]	322
150-270/0154SPX	150	200	1015	426	310	300	920	606	340	176	180	360	457	320	350	32	340	20	711	300	198
150-270/0224SPX	150	200	1025	426	310	300	920	606	340	198	180	360	457	320	350	32	340	20	711	300	203
150-270/0304SPX	150	200	1060	426	310	300	920	606	340	198	180	360	457	320	350	32	340	20	716	300	213
150-301/1504X	150	200	1185	350	310	330	920	530	340	315	180	360	457	320	350	32	340	20	637	[1]	345
150-301/1854X	150	200	1275	350	310	370	920	530	340	350	180	360	457	320	350	32	340	20	685	[1]	392
150-301/2204X	150	200	1310	350	310	370	920	530	340	350	180	360	457	320	350	32	340	20	685	[1]	404
200-250/0554X	200	250	1155	394	350	350	1030	609	383	260	215	430	535	380	410	32	360	20	724	300	321
200-250/0754X	200	250	1170	394	350	350	1030	609	383	260	215	430	535	380	410	32	360	20	724	300	340
200-250/1104X	200	250	1250	394	350	350	1030	609	383	315	215	430	535	380	410	32	360	20	737	[1]	392
200-250/1504X	200	250	1285	394	350	350	1030	609	383	315	215	430	535	380	410	32	360	20	737	[1]	413
200-270/1104X	200	250	1265	398	350	370	1030	613	383	315	215	430	535	380	410	32	360	20	755	[1]	410
200-270/1504X	200	250	1305	398	350	370	1030	613	383	315	215	430	535	380	410	32	360	20	755	[1]	429
200-270/1854X	200	250	1375	398	350	370	1030	613	383	350	215	430	535	380	410	32	360	20	785	[1]	468
200-270/2204X	200	250	1410	398	350	370	1030	613	383	350	215	430	535	380	410	32	360	20	785	[1]	472
200-331/3004X	200	250	1430	402	350	400	1030	617	383	400	215	430	535	380	410	32	360	20	782	[1]	566
200-350/3704X	200	250	1515	407	350	410	1030	622	383	433	215	430	535	380	410	32	360	20	796	[1]	666
200-350/4504X	200	250	1515	407	350	410	1030	622	383	433	215	430	535	380	410	32	360	20	796	[1]	716
200-350/5504X	200	250	1580	407	350	410	1030	622	383	480	215	430	535	380	410	32	360	20	796	[1]	786

Example (table page 16)

P_2 [kW]	I [A]	I_A/I_N	⅄/△	dB(A)
7.5	15.4	6.8	△	63

P_2 [kW]	I [A]	I_A/I_N	⅄/△	dB(A)
9.0	16.1	6.5	△	67

[1] When dismounting the motor ensure there is sufficient room for the lifting device.

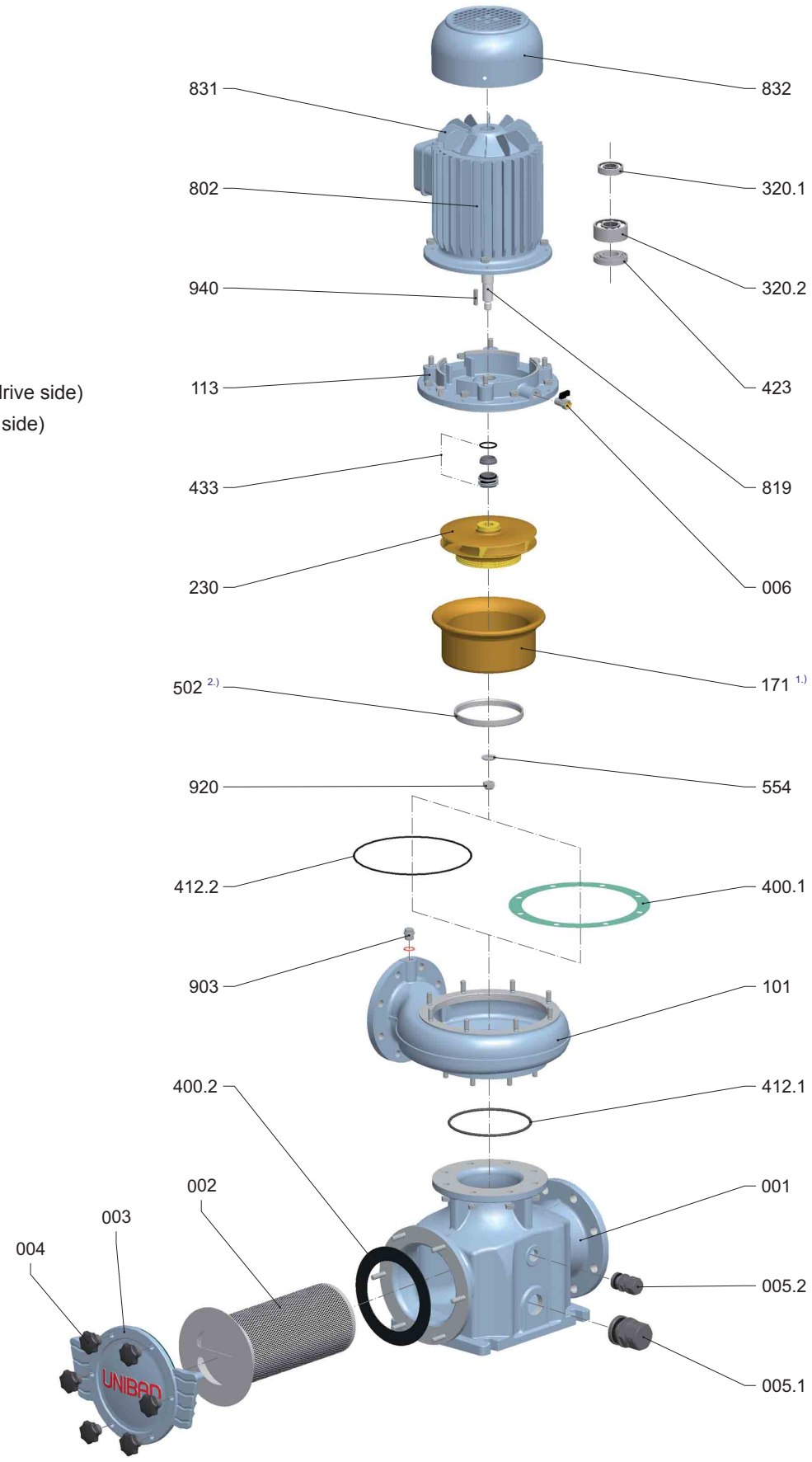
[2] Total weight of the pump

Flange connection dimensions according to DIN 2501 PN 10

Dimensions with frequency converter for direct installation on request.

Individual components

001	Filter casing
002	Filter strainer
003	Filter cover
004	Star handle
005.1	Screwed connection
005.2	Screwed connection
006	Ball valve
101	Pump casing
113	Intermediate casing
171 [1)]	Guiding ring
230	Impeller
320.1	Anti-friction bearing (non drive side)
320.2	Anti-friction bearing (drive side)
400.1	Gasket
400.2	Gasket
412.1	O-ring
412.2	O-ring
423	Labyrinth ring
433	Mechanical seal
502 [2)]	Casing wear ring
554	Washer
802	Block motor
819	Motor shaft
831	Fan
832	Fan hood
903	Screwed plug
920	Nut
940	Key



[1)] Only exists in case of design with screw propeller.

[2)] Only exists in case of design with closed multi vane impeller in material design W3, but not for 200-250/... and 200-270/... .

The basic concept behind the frequency regulation of pumps is speed adjustment. This gives rise to:

1. energy savings if there is a change in duty points and / or
2. a reduction of flow rate and/or adjustment to the system requirements.

Point 2 is an alternative to the possibility of adapting pumps to meet changing operating conditions. Choke regulation has mainly been used up until now for this, which exerts an influence on the resistance parabola of the system by means of slide valves or diaphragms. In this case, the resistance parabola 1, for example, changes into the altered resistance parabola 2 (see diagram). The energy loss associated with this is accepted.

By way of comparison, when actuating the pumps by frequency converters, the duty point of the pump under frequency regulation migrates along the original resistance parabola 1. The resulting energy savings are shown in the performance diagram (Q-P set of performance curves) in the difference between Point II and Point III.

Frequency regulation is used predominantly, however, for saving energy with changing duty points (generally two). By applying the example mentioned earlier, the power input for the pump is reduced from Point I to Point III in the Q-P- set of performance curves.

If the speed falls below a value at which no acceptable establishment of the flow can take place, the laws can no longer be applied. While it is true that the values Q, H, P and Eta are in line with one another, turbulence and air in the medium lead to imprecise measurement. For this reason, there are limits imposed on frequency regulation.

It is ultimately important when looking at system optimisation to take optimal efficiency into account also (Eta $_{optimal}$). This also has an influence on matching the best possible pump to the system.

The energy savings generated from frequency regulation can be calculated using the similarity rules for centrifugal pumps.

$$\frac{Q_1}{Q_2} = \frac{n_1}{n_2}$$

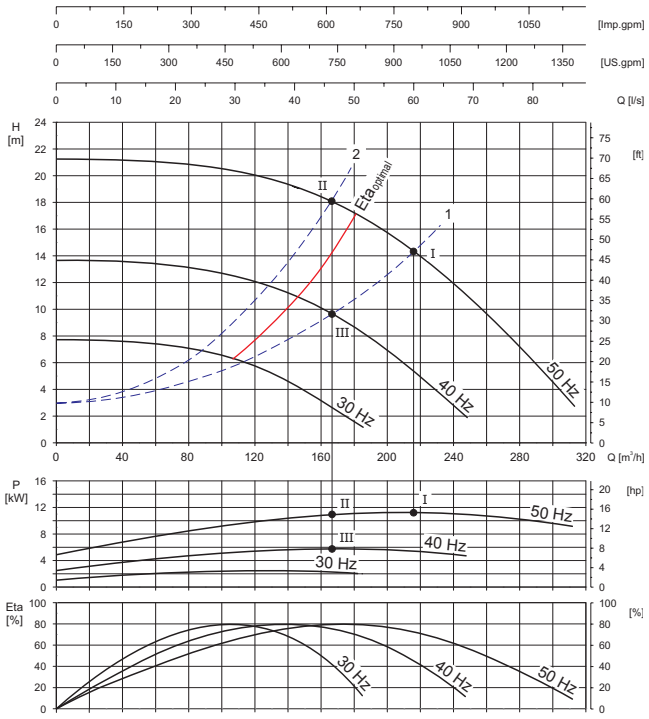
The flow rate (Q) changes in a linear manner in relation to the speed:

$$\frac{H_1}{H_2} = \left(\frac{n_1}{n_2}\right)^2$$

The head (H) changes with the 2nd power of the speed:

$$\frac{P_1}{P_2} = \left(\frac{n_1}{n_2}\right)^3$$

The drive output (P) changes with the 3rd power of the speed:



Typical example of the use of the frequency converter:

Night-time energy reduction

Duty point:	Q=215 m³/h H=14 m P=11.5 kW
Night-time reduction by switching off one pump:	Q=170 m³/h H=11 m P=5.5 kW
Frequency regulation of two pumps:	Q=107.5 m³/h H=6 m P=4.5 kW
Energy savings by night-time energy reduction:	ΔP=1.0 kW
Operating hours per year in night-time reduction:	3000 h

Savings: 3000 kWh

We reserve the right to make changes in line with technical further developments!

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