Technical Data 50Hz/60Hz DIN/IEC

Vertical centrifugal immersible pumps
series: DPVCI 2 - 4 - 6 - 10 - 15
Design Version B

Table of Contents

1 Pump introduction

1.1 General

The vertical, single or multistage centrifugal immersible pump series is designed for pumping water, filtered cooling fluids or lightly aggressive, watery mediums from a storage tank
The suction side at the bottom of the pump is equipped with a stainless steel strainer. The discharge side is located at the motor stool.

Where the required duty point corresponds with the amount of stages, in some applications the immersible length has to diver from this. Therefor it is possible for the DPVCI range to use empty stages to create the required length. In that case the impellers are mounted in the casings closest to the suction casing.

The hydraulic assembly is driven by an electric motor. All hydraulic parts of the pump are made of stainless steel.

The vertical, multistage centrifugal immersible DPVCI pumps are produced by DP-Pumps.

DPVCI

1.2 Model key

Table 1: Model key Example DPVCI 10/8(18) B

	DP	VCI	10	/8	(18)	B	
Label	DP						Product Label
Material		VCI					Cast Iron pump foot and motor stool, 1.4301 / AISI 304 hydraulics
			10				Appr. capacity in m^3/h at Q_{opt}
				/8			Number of impellers
					(18)		Total number of stages
						B	Design version

1.3 Operation

During centrifugal operation of the pump an negative pressure is created at the inlet of the first impeller. This negative pressure enables the medium to enter the pump at the suction connection at the bottom of the pump. Every impeller is placed in a stage casing. The passage of this stage determines the capacity of the pump. The diameter of the stages is related to the centrifugal forces and its “stage pressure”: the more stages, the more pressure.
This total capacity and raised pressure will be guided to the outside of the pump at the motor stool.

1.4 Measuring and venting

The pump is provided with plugs for measuring and venting, both located at the pump outlet connection. These connections are meant to vent the pump system when the pump is not in operation or to measure the discharge pressure of the pump using a G 1/4 connection. Also on the motor stool two connections are available to vent the storage tank.

1.5 Working range

The working range is depending on the application and the combination of pressure and temperature. For specific and detailed limits please consult the working ranges as described in the chapter 1.8 Modular selection. The overall working range of the pumps can be summarised as follows:

Table 2: Specification of the working range

Pump type	DPV	note
Ambient temperature [°C]	-20 up to 40	1
Minimum inlet pressure	$NPSH_{req.}$ + 1m	
Viscosity [cSt]	1-100	2
Density [kg/m^3]	1000-2500	2
Cooling	forced motor cooling	3
Minimum frequency [Hz]	10	
Maximum frequency [Hz]	60	4
Allowable size of solids pumped	5µm to 1mm	

1. If the ambient temperature exceeds the above value or the motor is located more than 1000 m above sea level, please see 1.5.3
2. Deviation in viscosity and/or density could require an adapted motor power. Please contact your supplier for more detailed advice.
3. The free space above the motor cooling fan must be at least 1/4 of the diameter of the inlet of the cooling fan in order to have a sufficient flow of (cooling) air.
4. Pumps that are intended for 50 Hz operation, may not be connected to 60 Hz power supply.

1.5.1 Minimum capacity

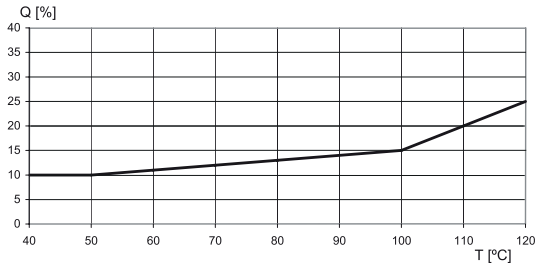
For minimum capacity at medium temperature of 20 °C, see table: 3Appr. minimum capacity (Qmin); for higher temperatures, see table: 4Minimum capacity vs.temperature (in % of Q optimum).

A minimum capacity has to be secured to prevent the pump from overheating, gathering gas, cavitation etc. The minimum capacity corresponds to all percentage of the optimum flow Q_{opt} in relation to the temperature of the liquid pumped. Also a minimum medium level needs to be taken into consideration.

Table 3: Appr. minimum capacity (Q_{min})

size	Q_{min} [m^3/h]	
	50 Hz	60 Hz
	2 pole	2 pole
2	0,2	0,2
4	0,4	0,5
6	0,6	0,8
10	1,1	1,3
15	1,6	2,0

Table 4: Minimum capacity vs.temperature (in % of Q optimum)



1.5.2 Minimum fluid level

For ambient fluid conditions the minimum fluid level for the pumps in the storage tank is mentioned at the dimensions pages. In case of an increased required vapour pressure for fluids at higher operation temperatures, a system analyses is recommended to determine the required NPSH to avoid cavitation and air enclosure inside the pump.

1.5.3 Ambient temperature and higher altitude

If the ambient temperature exceeds the maximum allowed value, or if the motor is located more than 1000 m above sea level, the motor cooling is less effective and could require an adapted motor power. See below table for the change in power output or contact your supplier for more detailed advice.

Table 5: Increase of required motor power

Ambient temperature [°C]	Above sea level [m]	Increase of required power
40	1000	0%
45	1625	2%
50	2250	5%
55	2875	11%
60	3500	18%
65	4125	25%
70	4750	33%

1.6 Basic material variant

Table 6: Basic material variant

Model	Hydraulic	Casing	Sealing
VC	1.4301	JL1040	EPDM

1.7 Pump bearing

Medium lubricated bearing, Tungsten Carbide

against Ceramic

1.8 Modular selection

To suit almost every application the pump is assembled out of modules which can be selected depending on the required working range.

Basic modules are:

- **Basic pump model,** which define the amount of impellers necessary for required capacity and head. The hydraulics is suitable for a temperature range of -20 up to 120 ^{o}C.
- **Total stages,** which defines the length of the pump suitable for the storage tank.
- **Sealing,** which define the elastomers and the mechanical seal. A cartridge seal construction is equipped as default. Temperature and pressure range, see chapter 4.1
- **Electric motor,** which defines all requirements of the motor such as motor size, power, voltage, frequency and all possible motor accessories.

For assembling the total amount of stages to the motor stool an additional upper stage casing is required. Therefor when all visible stage stages are counted from the hydraulics, the sum will be the total amount of stages added by 1.

1.9 Approvals

CE Conformity with European Safety Directive

2 Performance characteristics

2.1 Performance range 50Hz

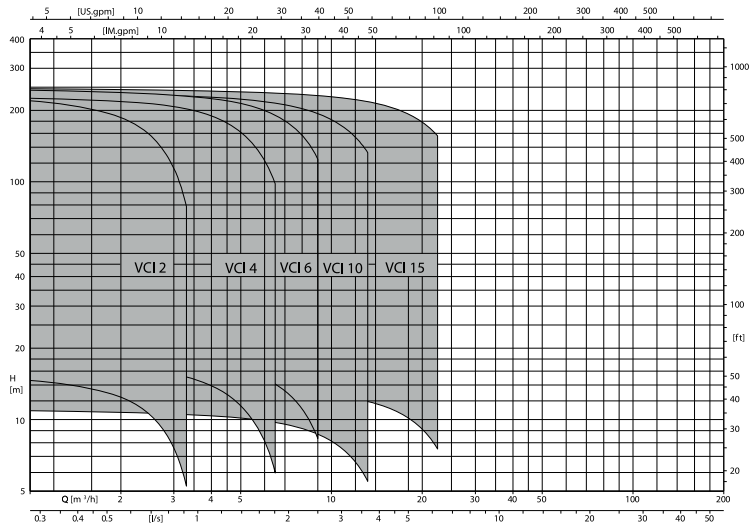


Figure 1: Performance range DPVCI B 50 Hz

2.2 Performance range 60Hz

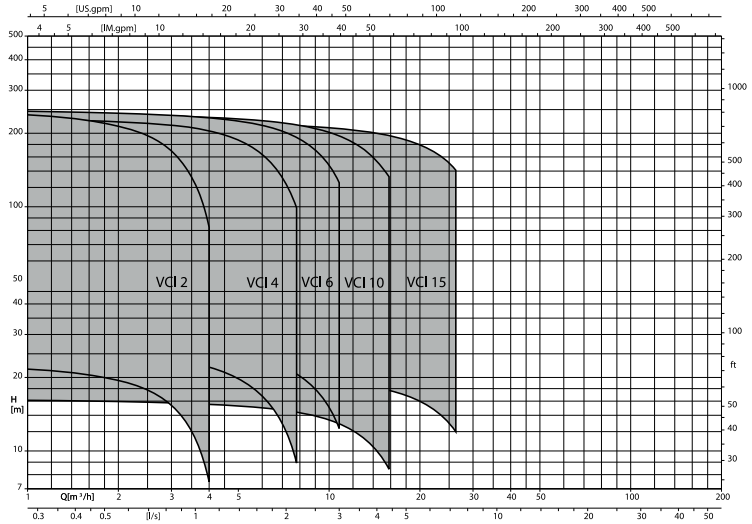


Figure 2: Performance range DPVCI B 60 Hz

2.3 Performance curve details

The performance range diagrams give a global overview of all the pump models. Detailed characteristics are given for each model showing the hydraulic efficiency, $NPSH_{req}$, and shaft power as well.

The performance of the pump depends on the number of stages. As per example:

DPVCI 4/20(18) B:	series 4	20 stages with 18 full head impellers

The detailed performance curves are in accordance with ISO 9906 2012, 3B.

The pumps can be configured with multiple types of motors. Therefore the performance data, like Q/H, efficiency and shaft power used for published curves are converted to the average speed per motor power. To refine this data the published data has to be corrected accordingly.

The published curves and data mentioned on the pump are based on the following rotational speed:

Table 7: Rated motor power and speed in 2 pole

Rated motor power	Rated speed at 50 Hz [rpm] 2P	Rated speed at 60 Hz [rpm] 2P
0,37 and 0,55 kW	2800	3460
to 2,2 kW	2880	3460
to 4 kW	2920	3510
to 7,5 kW	2940	3530
to 22 kW	2950	3550
to 45 kW	2960	3550

The characteristics given are based on:

- De-aerated water at a temperature of 20 °C
- Density of 1,0 kg/dm^3
- Kinematical viscosity of 1 mm^2/s (1 cst)

2.4 Minimum efficiency index

Per January 1st 2013 for multistage pumps in 50Hz and 2 poles a new Commission Regulation (EU) No 547/2012 as part of the Directive 2009/125/EC is mandatory.
According to this the pumps need to apply to a new Minimum Efficiency Index (MEI). This value is set to be >= 0.1

For the design version B pump immersible range the following values are applicable:

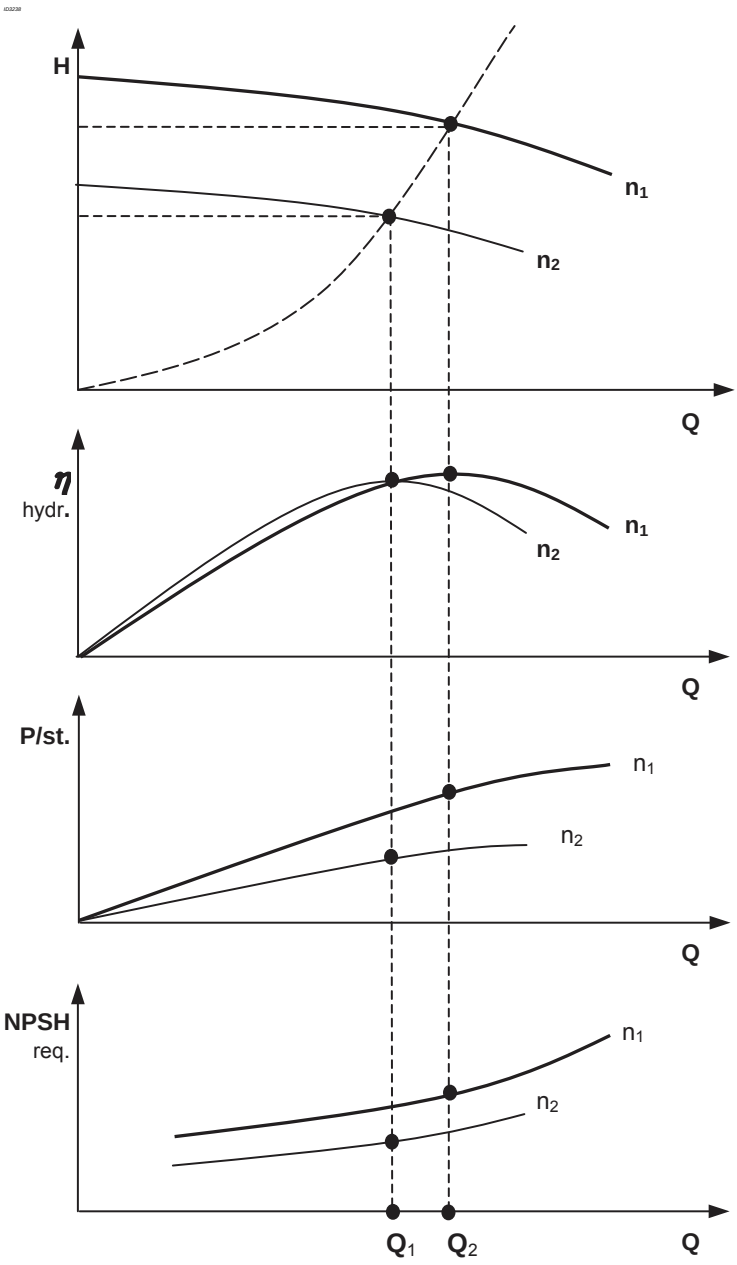
Table 8: Minimum efficiency index

Pump range	Minimum Efficiency index
DPV 2	MEI ≥ 0.8
DPV 4	MEI ≥ 0.8
DPV 6	MEI ≥ 0.8
DPV 10	MEI ≥ 0.8
DPV 15	MEI ≥ 0.4

2.5 Performance with variable frequency drive

The minimum frequency of the DP motor should be limited to 10 Hz to ensure sufficient cooling. When the rotational speed exceeds the nominal speed of the motor, make sure that the power output of the motor is suitable to drive the corresponding pump model.

The performance of the pump differs from the fixed speed performance according to the recalculation scheme.



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

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

$$\eta_2 = 1 - \left((1 - \eta_1) \cdot \frac{(n_1)^{0.1}}{(n_2)^{0.1}} \right)$$

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

$$NPSH_2 = \frac{(n_2)^2}{(n_1)^2} \cdot NPSH_1$$

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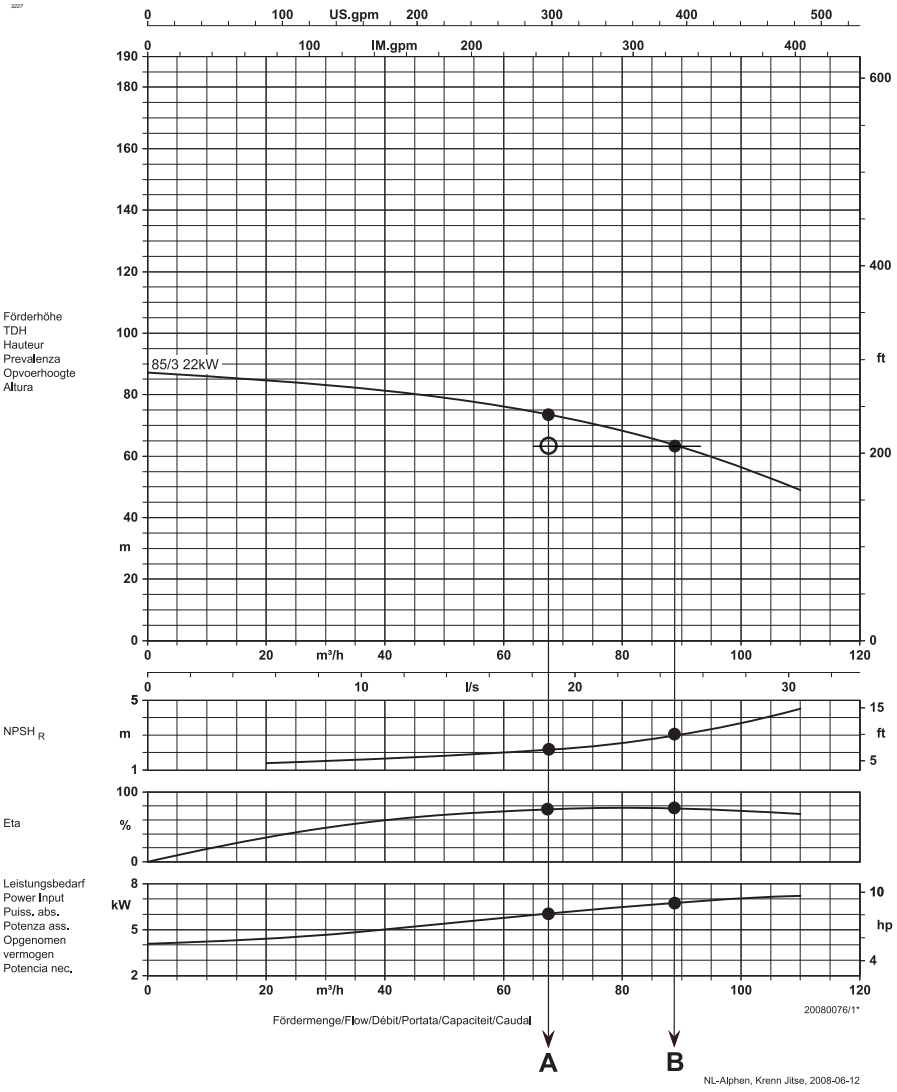
Figure 3: Performance characteristics

2.6 How to read the values from the curves

To find the required hydraulic information from the published curves, it is important to know the application in which the pump has to be installed. There are two main distinction to be made:

A Flow determined (like booster sets and cleaning) → Opening taps

B Pressure determined (like boiler feed and reverse osmosis systems) → Facing counter pressure.



Pump size / no of stages.
Installed motor power

Capacity @ Pressure

NPSH (m)

Hydraulic efficiency (%)

Required power (P2)

Figure 4: How to read the values from the curves

O Calculated duty point
● Actual hydraulic performance
A Flow determined
B Pressure determined

3 Curves and dimensions

3.1 Hydraulic performance curve DPVCI 2 B - 50Hz -2 pole

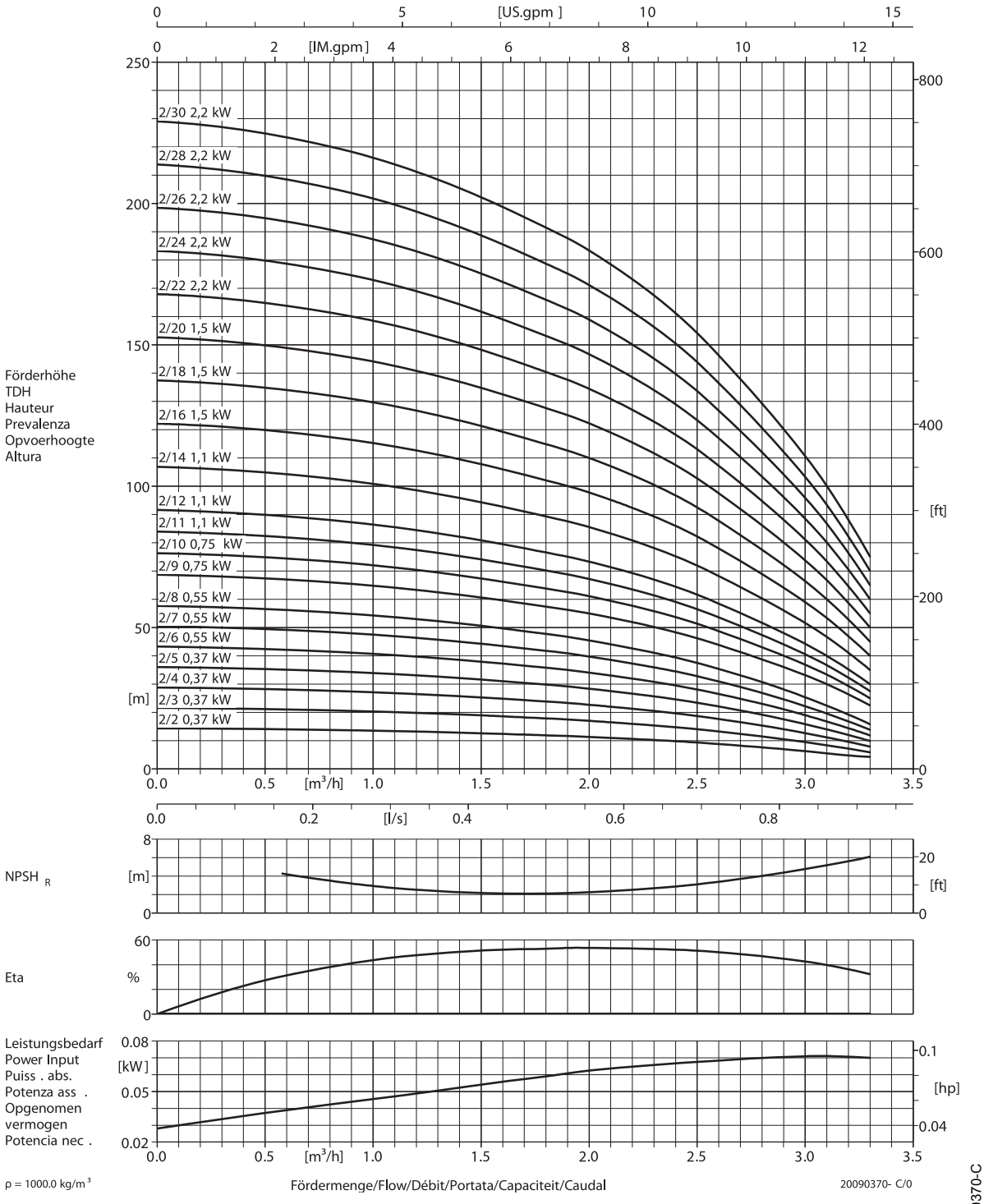


Figure 5: Performance curve DPVCI 2 B - 50Hz - 2 pole

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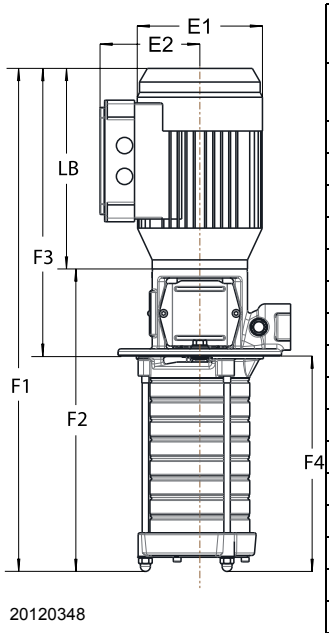
3.2 Dimensions DPVCI 2 B - 50Hz - 2 pole - DIN

To determine the correct length of the pump see both following explanation and table.

	length incl. motor	length excl. motor
Full stage pump	F1	F2
Pump with empty stages	F3 + F4	F3 + F4 -LB

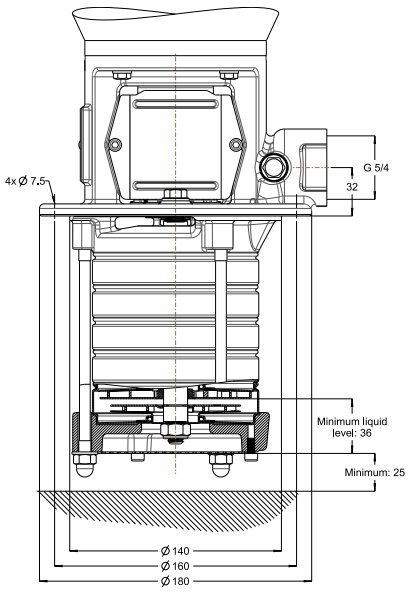
The length F3 corresponds with the length of the applied motor power. F4 corresponds with the total number of stages. Example: 2/16(30) F3=396mm, F4=732mm.

Table 9: General dimensions



Model	Seal pressure	Power	Motor dimensions			DPVCI				
Full stage		[kW]	E1 [mm]	E2 [mm]	LB [mm]	F1 [mm]	F2 [mm]	F3 [mm]	F4 [mm]	Mass [kg]
2/2(2)	PN10	0,37	134	107	219	445	226	315	130	14
2/3(3)		0,37	134	107	219	466	247	315	151	14
2/4(4)		0,37	134	107	219	488	269	315	173	14
2/5(5)		0,37	134	107	219	509	290	315	194	15
2/6(6)		0,55	134	107	243	555	312	339	216	17
2/7(7)		0,55	134	107	243	576	333	339	237	17
2/8(8)		0,55	134	107	243	598	355	339	259	18
2/9(9)		0,75	150	115	234	620	386	340	280	20
2/10(10)		0,75	150	115	234	642	408	340	302	20
2/11(11)		1,1	150	115	264	693	429	370	323	23
2/12(12)		1,1	150	115	264	715	451	370	345	23
2/14(14)	PN25	1,1	150	115	264	758	494	370	388	24
2/16(16)		1,5	176	141	280	827	547	396	431	29
2/18(18)		1,5	176	141	280	870	590	396	474	29
2/20(20)		1,5	176	141	280	913	633	396	517	30
2/22(22)		2,2	176	141	280	956	676	396	560	35
2/24(24)		2,2	176	141	280	999	719	396	603	36
2/26(26)		2,2	176	141	280	1042	762	396	646	36
2/28(28)		2,2	176	141	280	1085	805	396	689	37
2/30(30)		2,2	176	141	280	1128	848	396	732	38

Table 10: Connection dimensions



3.3 Hydraulic performance curve DPVCI 4 B - 50Hz - 2 pole

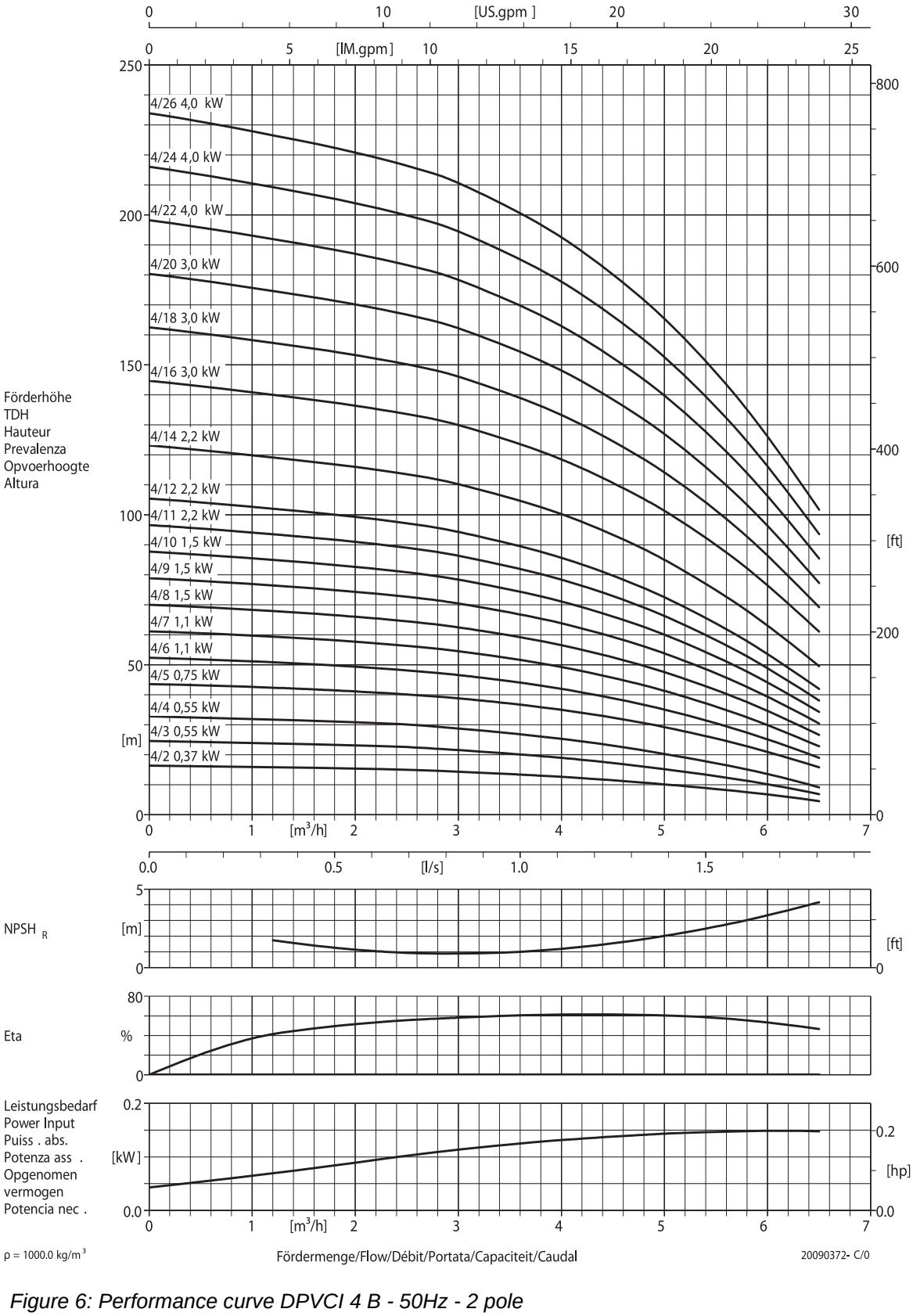


Figure 6: Performance curve DPVCI 4 B - 50Hz - 2 pole

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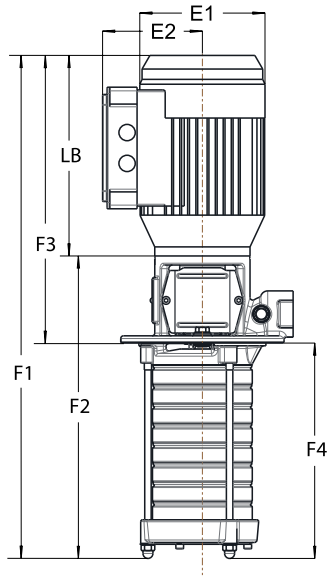
3.4 Dimensions DPVCI 4 B - 50Hz - 2 pole - DIN

To determine the correct length of the pump see both following explanation and table.

	length incl. motor	length excl. motor
Full stage pump	F1	F2
Pump with empty stages	F3 + F4	F3 + F4 -LB

The length F3 corresponds with the length of the applied motor power. F4 corresponds with the total number of stages. Example: 4/16(22) F3=442mm, F4=560mm.

Table 11: General dimensions



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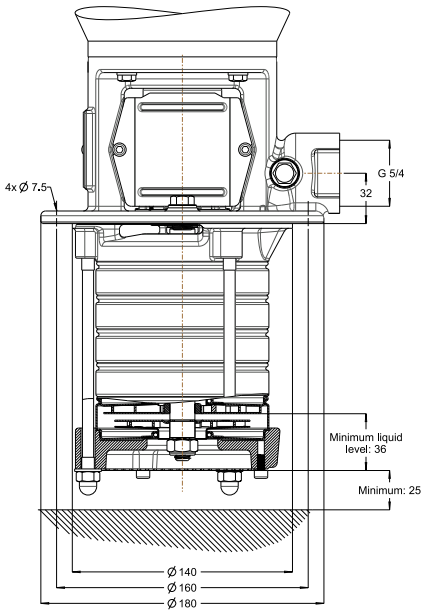
Model	Seal pressure	Power	Motor dimensions			DPVCI				
Full stage		[kW]	**E1** [mm]	**E2** [mm]	LB [mm]	**F1** [mm]	**F2** [mm]	**F3** [mm]	**F4** [mm]	Mass [kg]
4/2(2)	PN10	0,37	134	107	219	445	226	316	130	14
4/3(3)		0,55	134	107	243	490	247	339	151	16
4/4(4)		0,55	134	107	243	512	269	339	173	16
4/5(5)		0,75	150	115	234	534	300	340	194	19
4/6(6)		1,1	150	115	264	586	322	370	216	21
4/7(7)		1,1	150	115	264	607	343	370	237	22
4/8(8)		1,5	176	141	280	655	375	396	259	26
4/9(9)		1,5	176	141	280	676	396	396	280	26
4/10(10)		1,5	176	141	280	698	418	396	302	26
4/11(11)		2,2	176	141	280	719	439	396	323	30
4/12(12)	PN25	2,2	176	141	280	741	461	396	345	30
4/14(14)		2,2	176	141	280	784	504	396	388	31
4/16(16)		3	195	145	316	873	557	442	431	43
4/18(18)		3	195	145	316	916	600	442	474	43
4/20(20)		3	195	145	316	959	643	442	517	44
4/22(22)		4	223	167	324	1010	686	450	560	54
4/24(24)		4	223	167	324	1053	729	450	603	55
4/26(26)		4	223	167	324	1096	772	450	646	72

Table 12: Connection dimensions



3.5 Hydraulic performance curve DPVCI 6 B - 50Hz - 2 pole

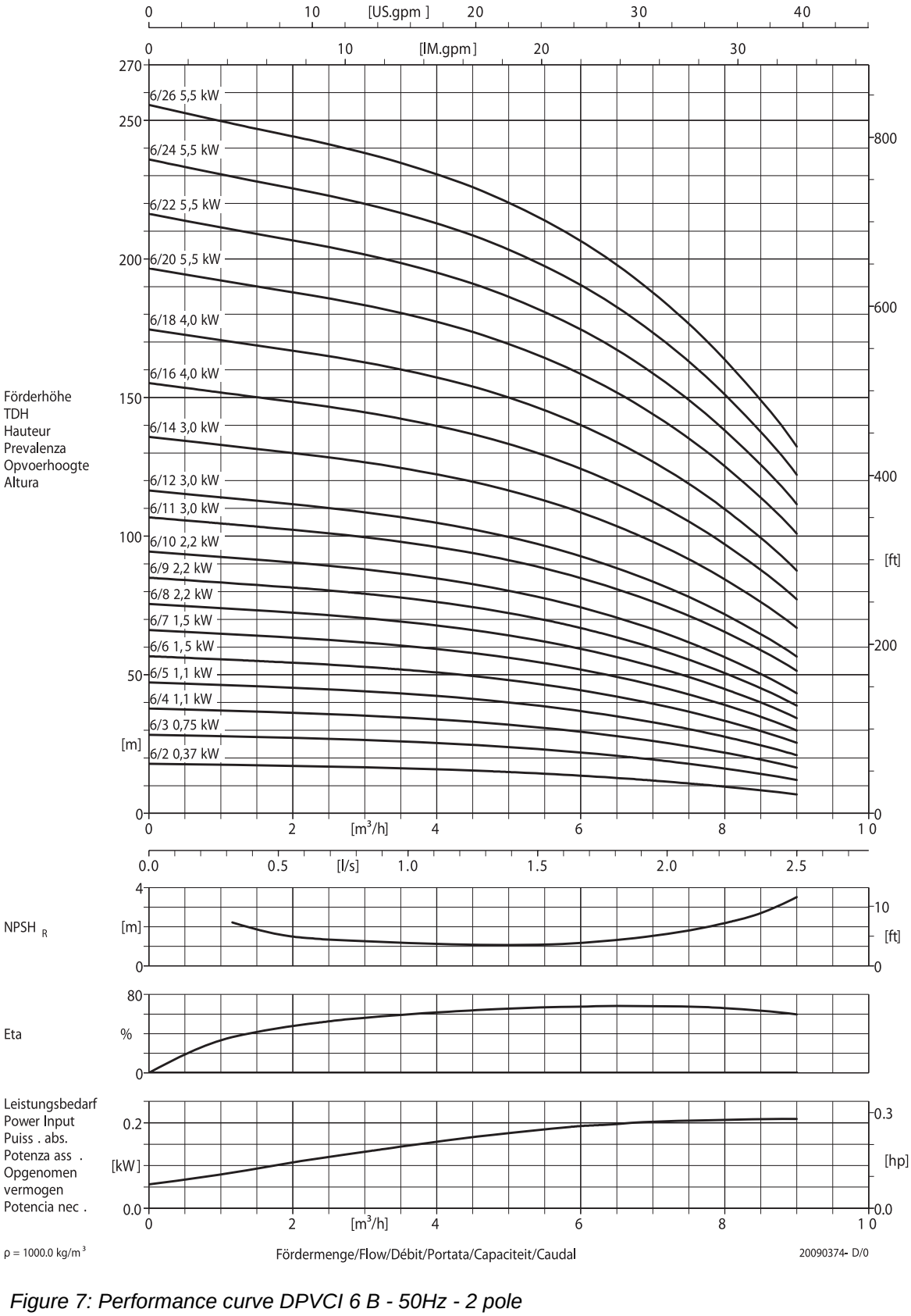


Figure 7: Performance curve DPVCI 6 B - 50Hz - 2 pole

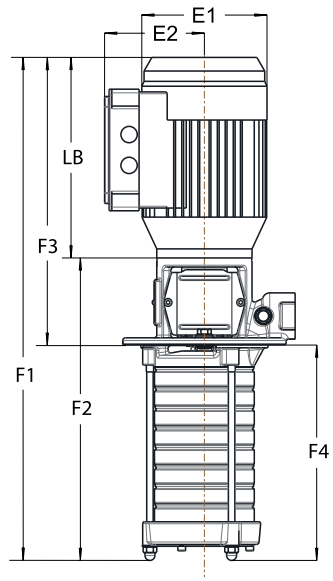
3.6 Dimensions DPVCI 6 B - 50Hz - 2 pole - DIN

To determine the correct length of the pump see both following explanation and table.

	length incl. motor	length excl. motor
Full stage pump	F1	F2
Pump with empty stages	F3 + F4	F3 + F4 -LB

The length F3 corresponds with the length of the applied motor power. F4 corresponds with the total number of stages. Example: 6/12(26) F3=442mm, F4=740mm.

Table 13: General dimensions



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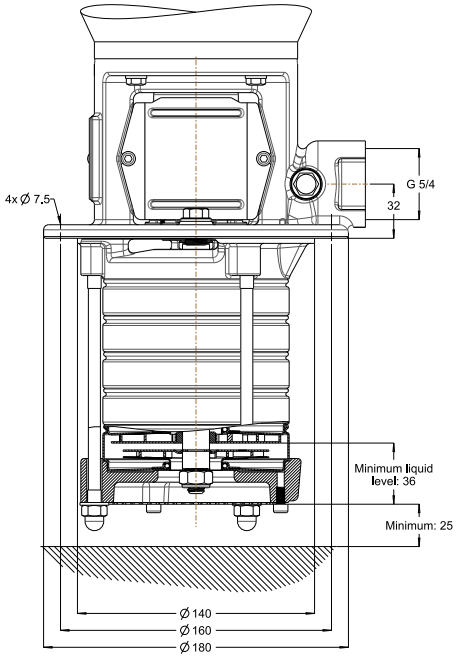
Model	Seal pressure	Power	Motor dimensions			DPVCI				
		[kW]	E1 [mm]	E2 [mm]	LB [mm]	F1 [mm]	F2 [mm]	F3 [mm]	F4 [mm]	Mass [kg]
6/2(2)	PN10	0,37	134	107	219	455	236	316	140	14
6/3(3)		0,75	150	115	234	505	271	340	165	18
6/4(4)		1,1	150	115	264	560	296	370	190	21
6/5(5)		1,1	150	115	264	585	321	370	215	21
6/6(6)		1,5	176	141	280	636	356	396	240	25
6/7(7)		1,5	176	141	280	661	381	396	265	26
6/8(8)		2,2	176	141	280	686	406	396	290	29
6/9(9)		2,2	176	141	280	711	431	396	315	29
6/10(10)		2,2	176	141	280	736	456	396	340	30
6/11(11)	PN25	3	195	145	316	807	491	442	365	41
6/12(12)		3	195	145	316	832	516	442	390	42
6/14(14)		3	195	145	316	882	566	442	440	42
6/16(16)		4	223	167	324	940	616	450	490	52
6/18(18)		4	223	167	324	990	666	450	540	53
6/20(20)		5.5	266	178	329	1121	792	531	590	88
6/22(22)		5.5	266	178	329	1171	842	531	640	89
6/24(24)		5.5	266	178	329	1221	892	531	690	90
6/26(26)		5.5	266	178	329	1271	942	531	740	91

Table 14: Connection dimensions



3.7 Hydraulic performance curve DPVCI 10 B - 50Hz - 2 pole

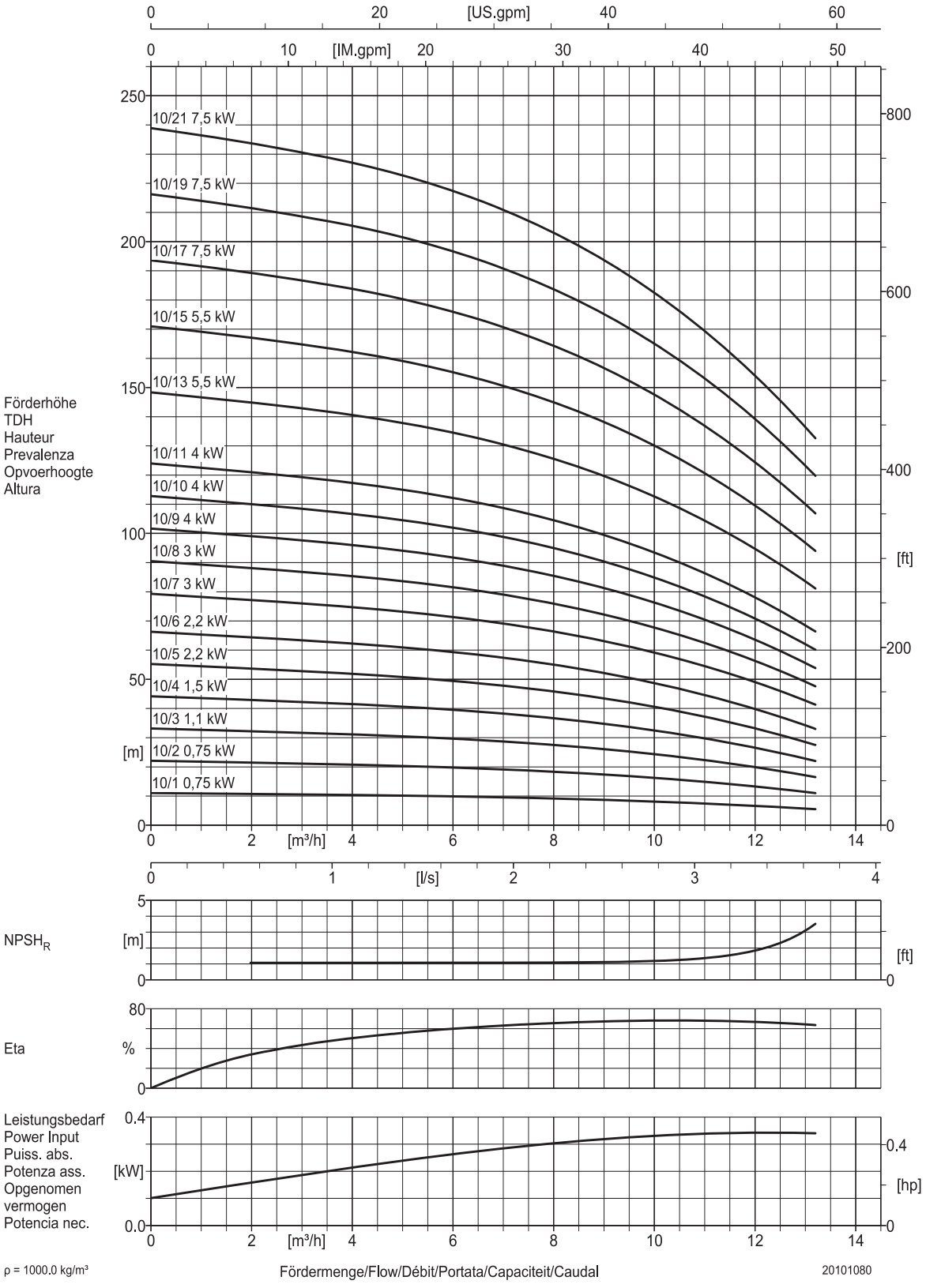


Figure 8: Performance curve DPVCI 10 B - 50Hz- 2 pole

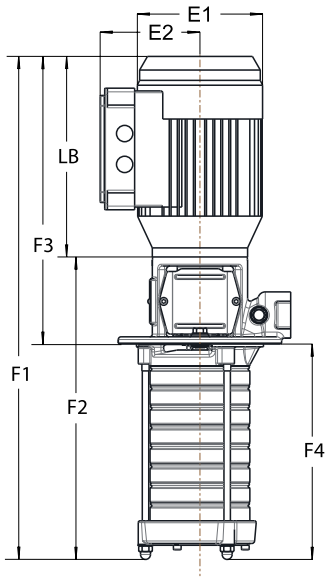
3.8 Dimensions DPVCI 10 B - 50Hz - 2 pole - DIN

To determine the correct length of the pump see both following explanation and table.

	length incl. motor	length excl. motor
Full stage pump	F1	F2
Pump with empty stages	F3 + F4	F3 + F4 -LB

The length F3 corresponds with the length of the applied motor power. F4 corresponds with the total number of stages. Example: 10/8(13) F3=455mm, F4=445mm.

Table 15: General dimensions



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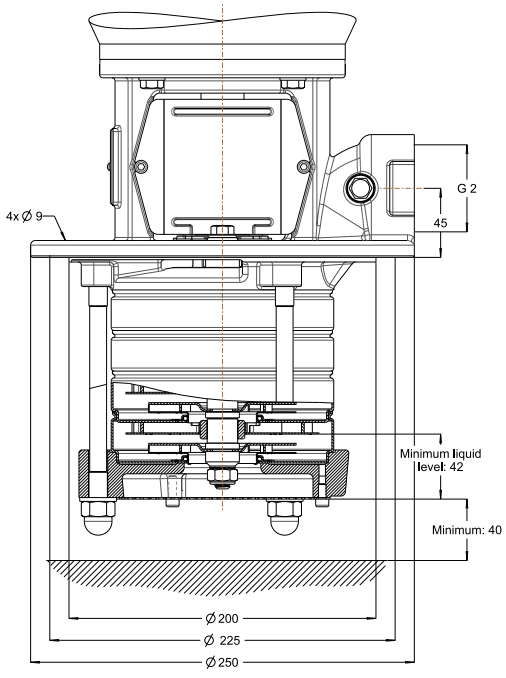
Model	Seal pressure	Power	Motor dimensions			DPVCI				
Full stage		[kW]	E1 [mm]	E2 [mm]	LB [mm]	F1 [mm]	F2 [mm]	F3 [mm]	F4 [mm]	Mass [kg]
10/1(2)	PN10	0,75	150	115	234	497	263	343	154	17
10/2(2)		0,75	150	115	234	497	263	343	154	17
10/3(3)		1,1	150	115	264	554	290	373	181	20
10/4(4)		1,5	176	141	280	606	326	399	207	32
10/5(5)		2,2	176	141	280	633	353	399	236	36
10/6(6)		2,2	176	141	280	686	406	399	287	37
10/7(7)		3	195	145	316	732	416	455	313	47
10/8(8)		3	195	145	316	758	442	445	313	48
10/9(9)	PN25	4	223	167	324	792	468	453	339	58
10/10(10)		4	223	167	324	819	495	453	366	58
10/11(11)		4	223	167	324	845	521	453	392	59
10/13(13)		5,5	266	178	329	984	655	539	445	93
10/15(15)		5,5	266	178	329	1037	708	539	498	94
10/17(17)		7,5	266	178	377	1138	761	587	551	127
10/19(19)		7,5	266	178	377	1191	814	587	604	129
10/21(21)		7,5	266	178	377	1244	867	587	657	130

Table 16: Connection dimensions



3.9 Hydraulic performance curve DPVCI 15 B - 50Hz - 2 pole

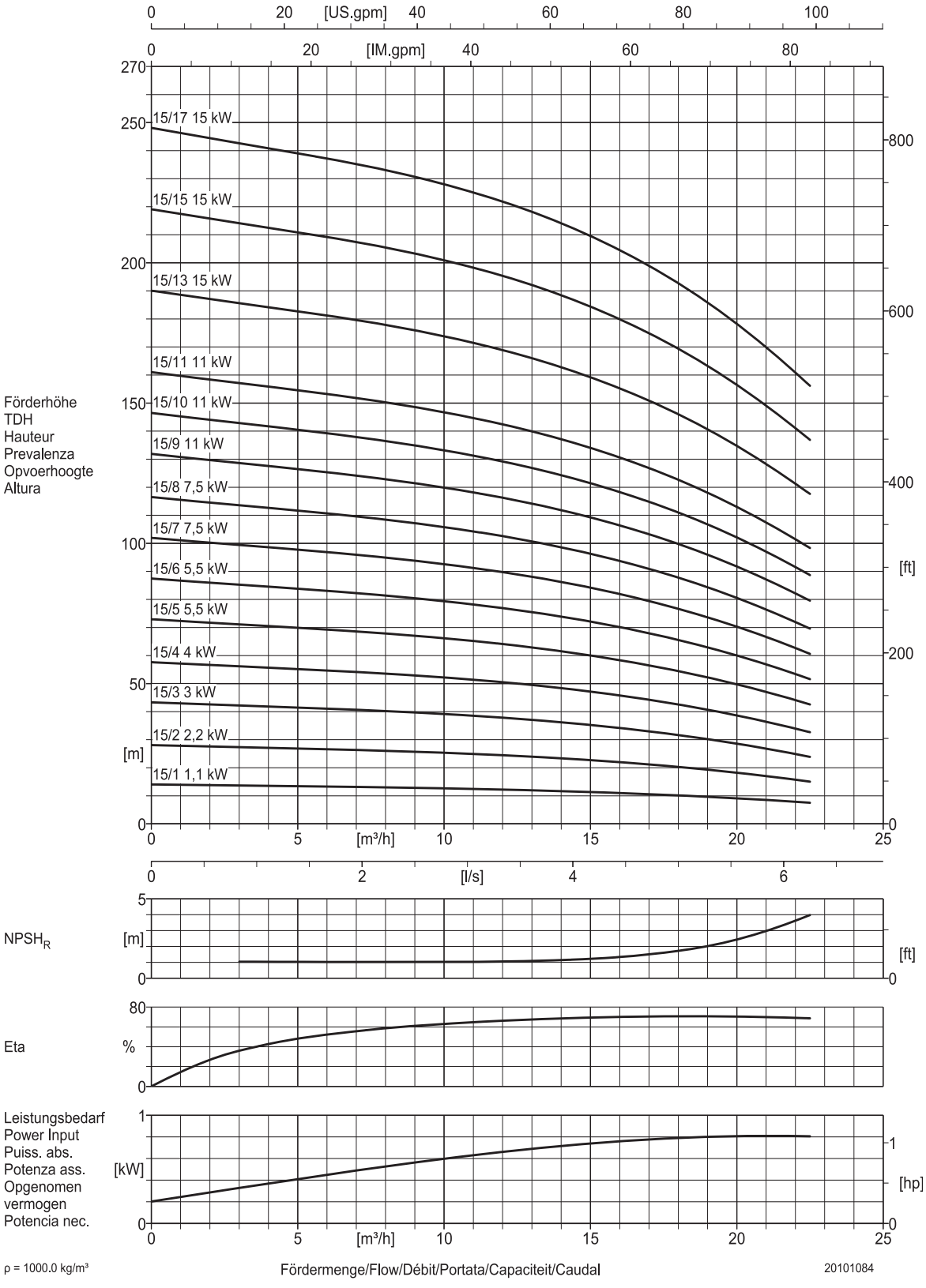


Figure 9: Performance curve DPVCI 15 B - 50Hz - 2 pole

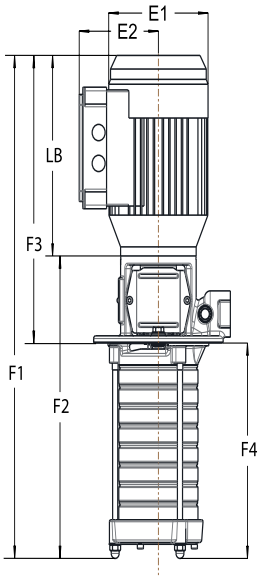
3.10 Dimensions DPVCI 15 B - 50Hz - 2 pole - DIN

To determine the correct length of the pump see both following explanation and table.

	length incl. motor	length excl. motor
Full stage pump	F1	F2
Pump with empty stages	F3 + F4	F3 + F4 -LB

The length F3 corresponds with the length of the applied motor power. F4 corresponds with the total number of stages. Example: 15/3(15) F3=445mm, F4=498mm.

Table 17: General dimensions



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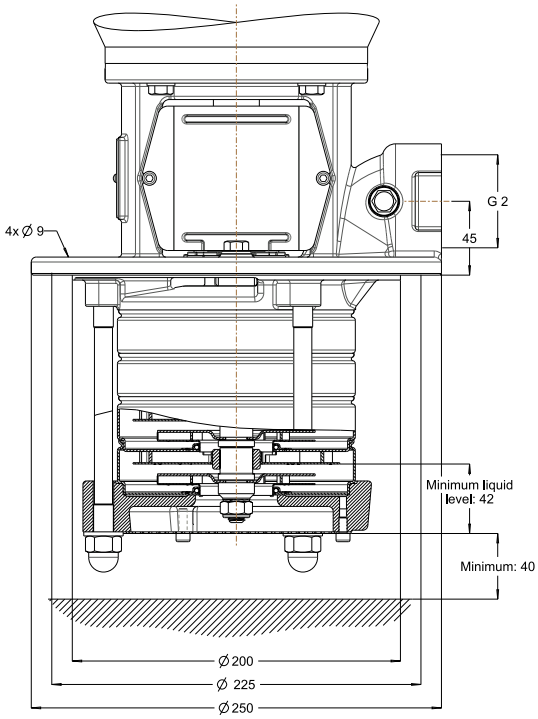
Model	Seal pressure	Power	Motor dimensions			DPVCI				
Full stage		[kW]	E1 [mm]	E2 [mm]	LB [mm]	F1 [mm]	F2 [mm]	F3 [mm]	F4 [mm]	Mass [kg]
15/1(2)	PN10	1,1	150	115	264	527	263	373	154	20
15/2(2)		2,2	176	141	280	553	273	399	154	33
15/3(3)		3	195	145	316	626	310	445	181	44
15/4(4)		4	223	167	324	660	336	453	207	54
15/5(5)		5,5	266	178	329	773	444	539	234	70
15/6(6)		5,5	266	178	329	799	470	539	260	71
15/7(7)	PN25	7,5	266	178	377	874	497	587	287	118
15/8(8)		7,5	266	178	377	900	523	587	313	119
15/9(9)		11	315	204	498	1077	579	738	339	176
15/10(10)		11	315	204	498	1104	606	738	366	177
15/11(11)		11	315	204	498	1130	632	738	392	177
15/13(13)		15	315	204	498	1183	685	738	445	189
15/15(15)		15	315	204	498	1236	738	738	498	190
15/17(17)		15	315	204	498	1289	791	738	551	195

Table 18: Connection dimensions



3.11 Hydraulic performance curve DPVCI 2 B - 60Hz - 2 pole

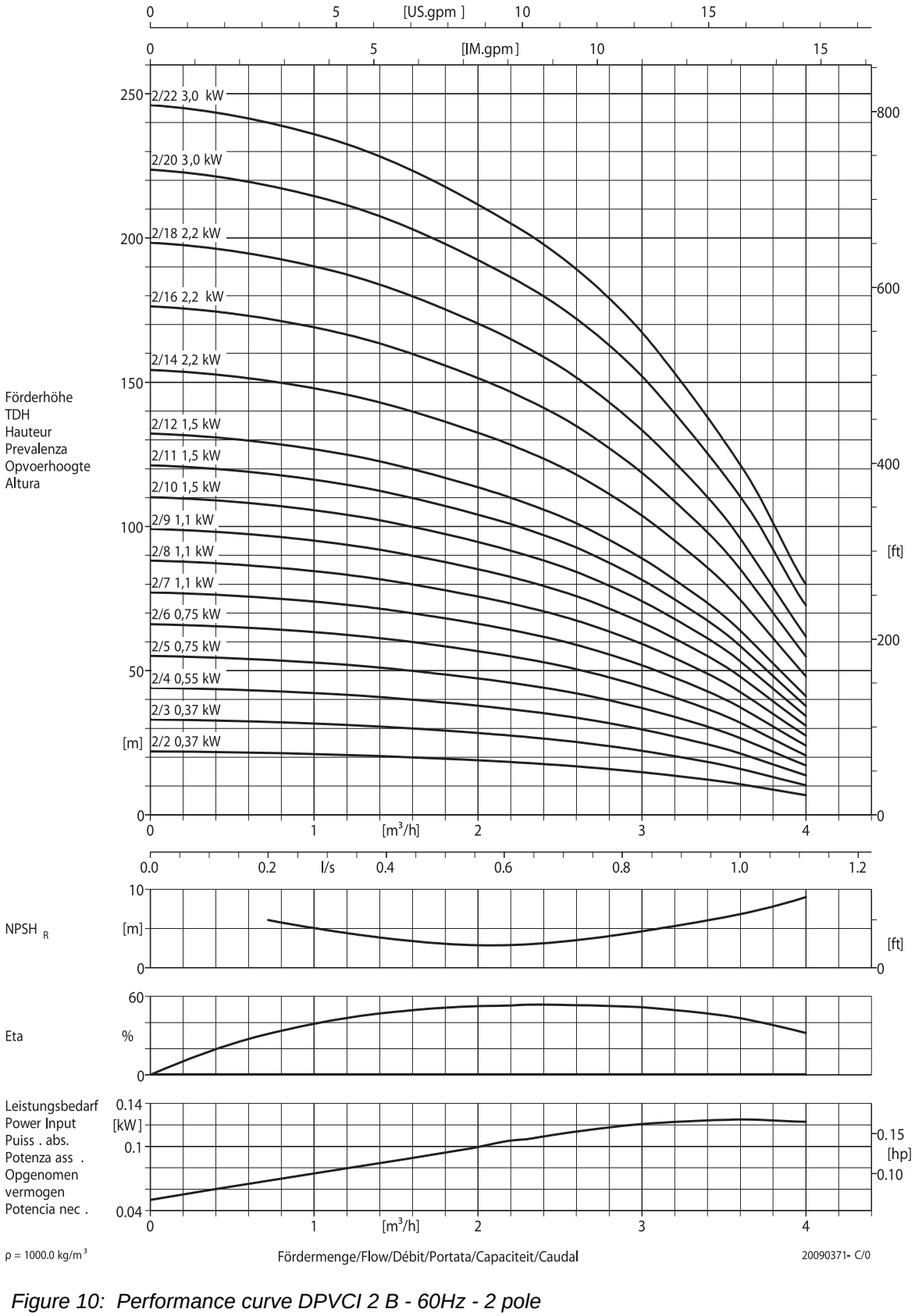


Figure 10: Performance curve DPVCI 2 B - 60Hz - 2 pole

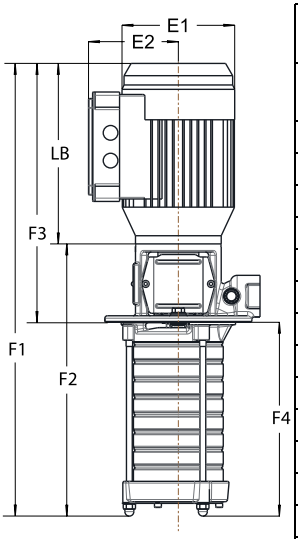
3.12 Dimensions DPVCI 2 B - 60Hz - 2 pole - DIN

To determine the correct length of the pump see both following explanation and table.

	length incl. motor	length excl. motor
Full stage pump	F1	F2
Pump with empty stages	F3 + F4	F3 + F4 -LB

The length F3 corresponds with the length of the applied motor power. F4 corresponds with the total number of stages. Example: 2/3(22) F3=315mm, F4=560mm.

Table 19: General dimensions



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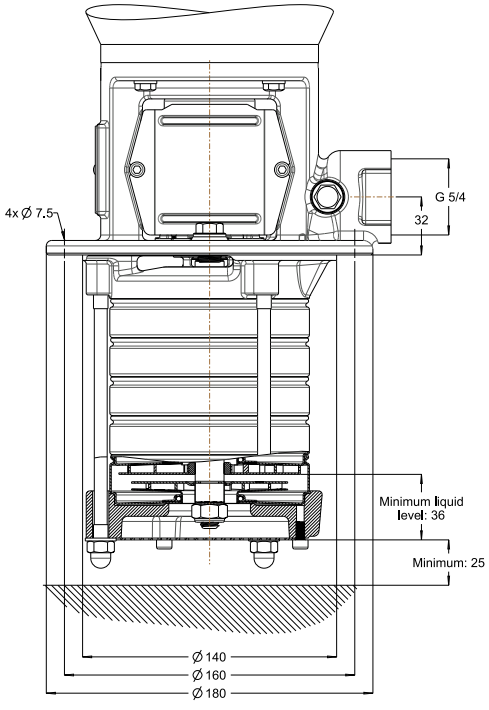
Model	Seal pressure	Power	Motor dimensions			DPVCI				
Full stage		[kW]	E1 [mm]	E2 [mm]	LB [mm]	F1 [mm]	F2 [mm]	F3 [mm]	F4 [mm]	Mass [kg]
2/2(2)	PN10	0,37	134	107	219	445	226	315	130	14
2/3(3)		0,37	134	107	219	466	247	315	151	14
2/4(4)		0,55	134	107	243	512	269	339	173	16
2/5(5)		0,75	150	115	234	534	300	340	194	18
2/6(6)		0,75	150	115	234	556	322	340	216	19
2/7(7)		1,1	150	115	264	607	343	370	237	22
2/8(8)		1,1	150	115	264	629	365	370	259	22
2/9(9)		1,1	150	115	264	650	386	370	280	22
2/10(10)	PN25	1,5	176	141	280	698	418	396	302	26
2/11(11)		1,5	176	141	280	719	439	396	323	27
2/12(12)		1,5	176	141	280	741	461	396	345	27
2/14(14)		2,2	176	141	280	784	504	396	388	31
2/16(16)		2,2	176	141	280	827	547	396	431	32
2/18(18)		2,2	176	141	280	870	590	396	474	32
2/20(20)		3	195	145	316	959	643	442	517	44
2/22(22)		3	195	145	316	1002	686	442	560	45

Table 20: Connection dimensions



3.13 Hydraulic performance curve DPVCI 4 B - 60Hz - 2 pole

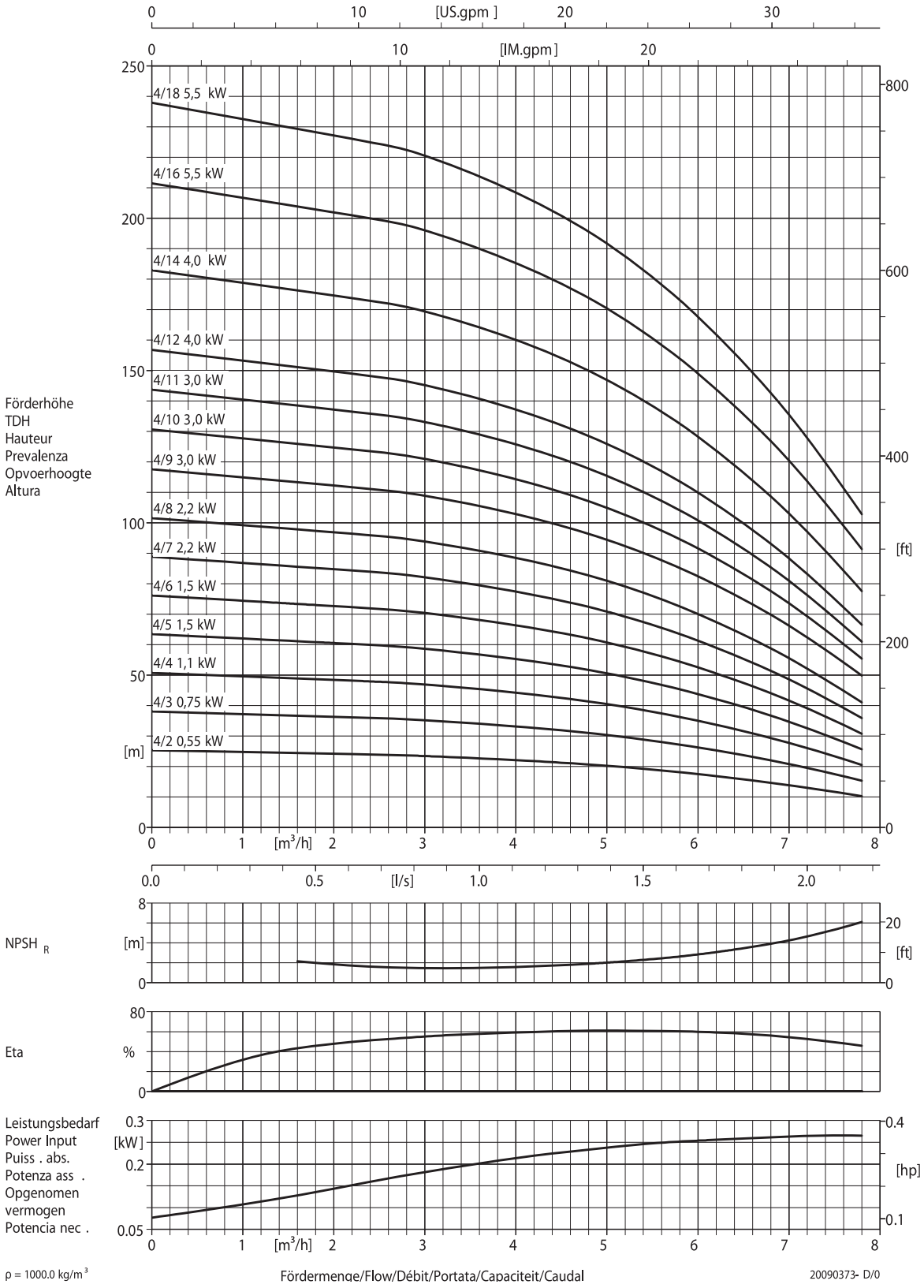


Figure 11: Performance curve DPVCI 4 B - 60Hz - 2 pole

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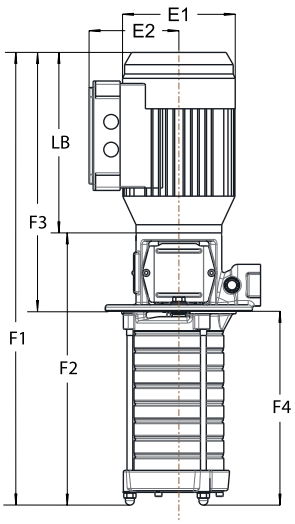
3.14 Dimensions DPVCI 4 B - 60Hz - 2 pole - DIN

To determine the correct length of the pump see both following explanation and table.

	length incl. motor	length excl. motor
Full stage pump	F1	F2
Pump with empty stages	F3 + F4	F3 + F4 -LB

The length F3 corresponds with the length of the applied motor power. F4 corresponds with the total number of stages. Example: 4/7(16) F3=396mm, F4=431mm.

Table 21: General dimensions



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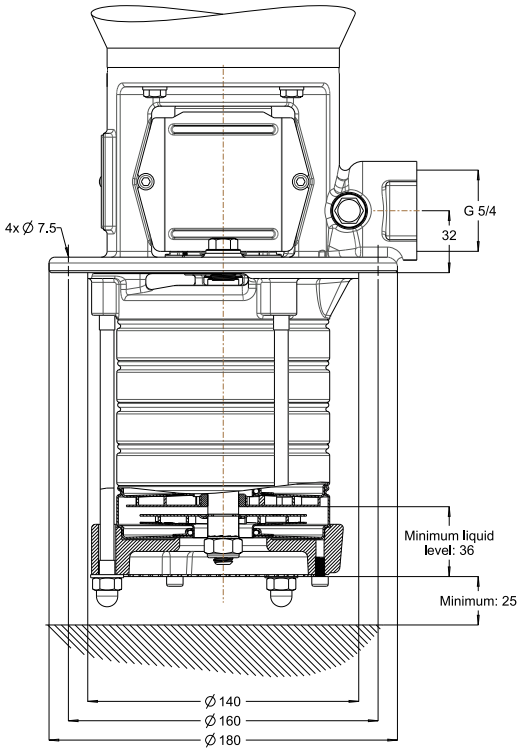
Model	Seal pressure	Power	Motor dimensions			DPVCI				
Full stage		[kW]	**E1** [mm]	**E2** [mm]	LB [mm]	**F1** [mm]	**F2** [mm]	**F3** [mm]	**F4** [mm]	Mass [kg]
4/2(2)	PN10	0,55	134	107	243	469	226	339	130	16
4/3(3)		0,75	150	115	234	491	257	340	151	18
4/4(4)		1,1	150	115	243	543	279	370	173	21
4/5(5)		1,5	176	141	264	590	310	396	194	25
4/6(6)		1,5	176	141	280	612	332	396	216	25
4/7(7)		2,2	176	141	280	633	353	396	237	28
4/8(8)		2,2	176	141	280	655	375	396	259	29
4/9(9)	PN25	3	195	145	316	722	406	442	280	40
4/10(10)		3	195	145	316	744	428	442	302	41
4/11(11)		3	195	145	316	765	449	442	323	41
4/12(12)		4	223	167	324	795	471	450	345	50
4/14(14)		4	223	167	324	838	514	450	388	51
4/16(16)		5,5	266	178	329	962	633	531	431	84
4/18(18)		5,5	266	178	329	1005	676	531	474	85

Table 22: Connection dimensions



3.15 Hydraulic performance curve DPVCI 6 B - 60Hz - 2 pole

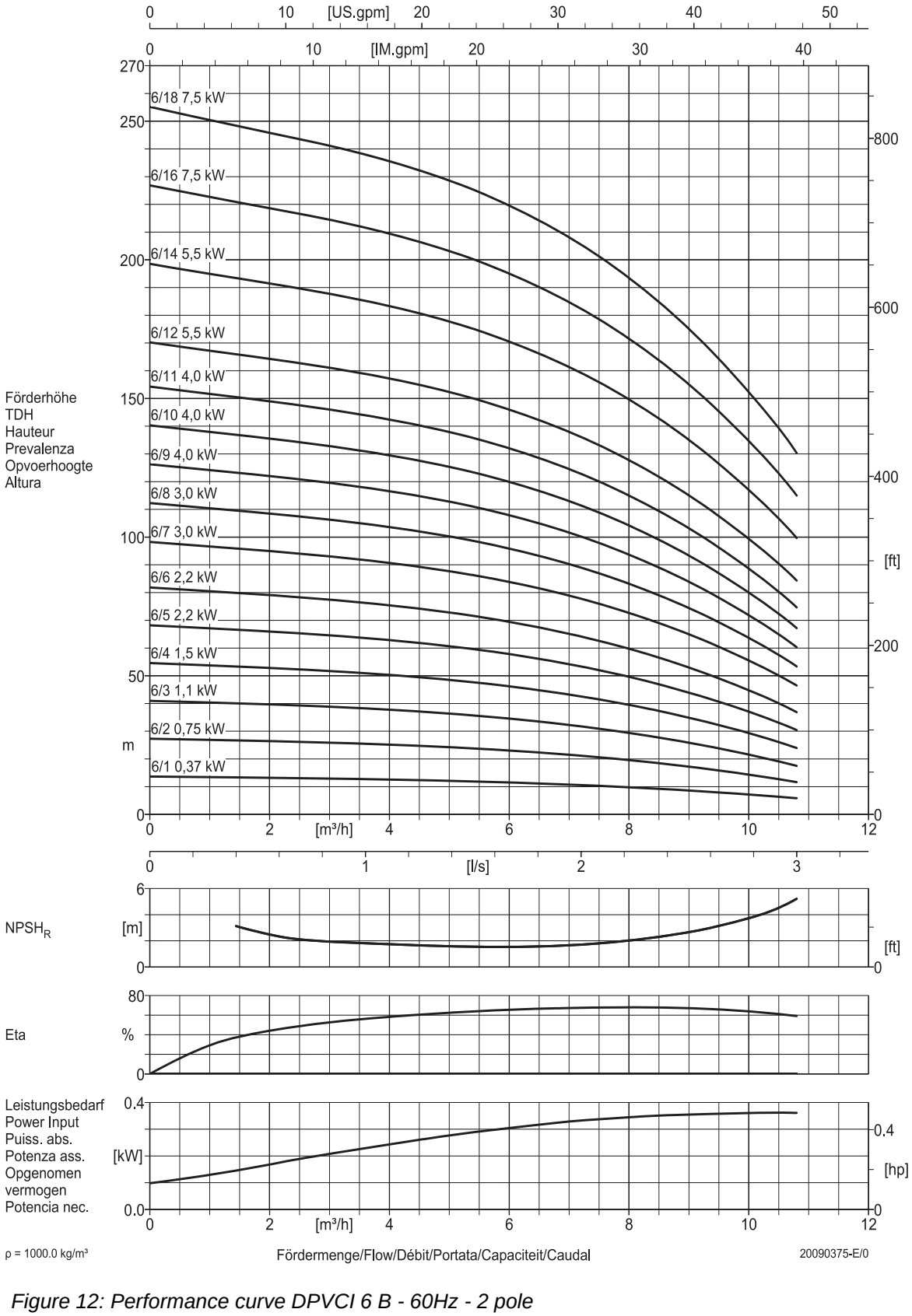


Figure 12: Performance curve DPVCI 6 B - 60Hz - 2 pole

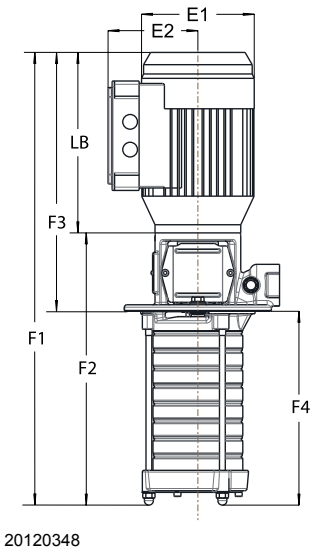
3.16 Dimensions DPVCI 6 B - 60Hz - 2 pole - DIN

To determine the correct length of the pump see both following explanation and table.

	length incl. motor	length excl. motor
Full stage pump	F1	F2
Pump with empty stages	F3 + F4	F3 + F4 -LB

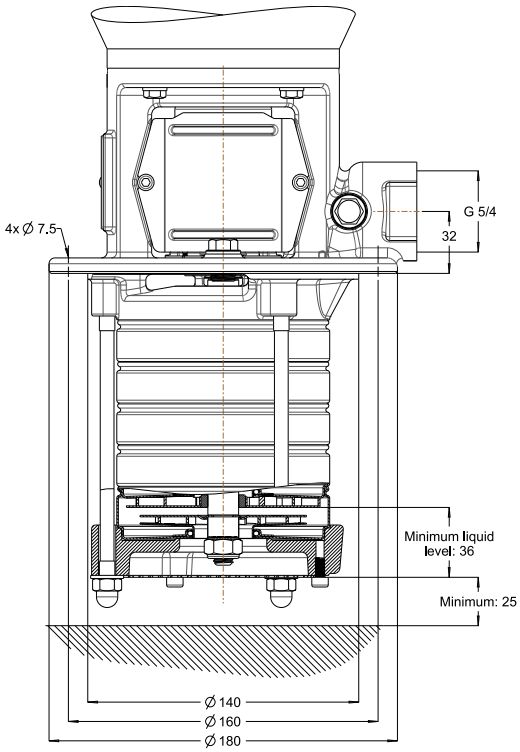
The length F3 corresponds with the length of the applied motor power. F4 corresponds with the total number of stages. Example: 6/2(18) F3=340mm, F4=540mm.

Table 23: General dimensions



Model	Seal pressure	Power	Motor dimensions			DPVCI				
Full stage		[kW]	**E1** [mm]	**E2** [mm]	LB [mm]	**F1** [mm]	**F2** [mm]	**F3** [mm]	**F4** [mm]	Mass [kg]
6/2(2)	PN10	0,75	150	115	234	480	246	340	140	17
6/3(3)		1,1	150	115	264	535	271	370	165	20
6/4(4)		1,5	176	141	280	586	306	396	190	24
6/5(5)		2,2	176	141	280	611	331	396	215	28
6/6(6)		2,2	176	141	280	636	356	396	240	28
6/7(7)		3	195	145	316	707	391	442	265	39
6/8(8)	PN25	3	195	145	316	732	416	442	290	40
6/9(9)		4	223	167	324	765	441	450	315	49
6/10(10)		4	223	167	324	790	466	450	340	50
6/11(11)		4	223	167	324	815	491	450	365	50
6/12(12)		5,5	266	178	329	921	592	531	390	83
6/14(14)		5,5	266	178	329	971	642	531	440	84
6/16(16)		7,5	266	178	377	1069	692	579	490	116
6/18(18)		7,5	266	178	377	1119	742	579	540	117

Table 24: Connection dimensions



3.17 Hydraulic performance curve DPVCI 10 B - 60Hz - 2 pole

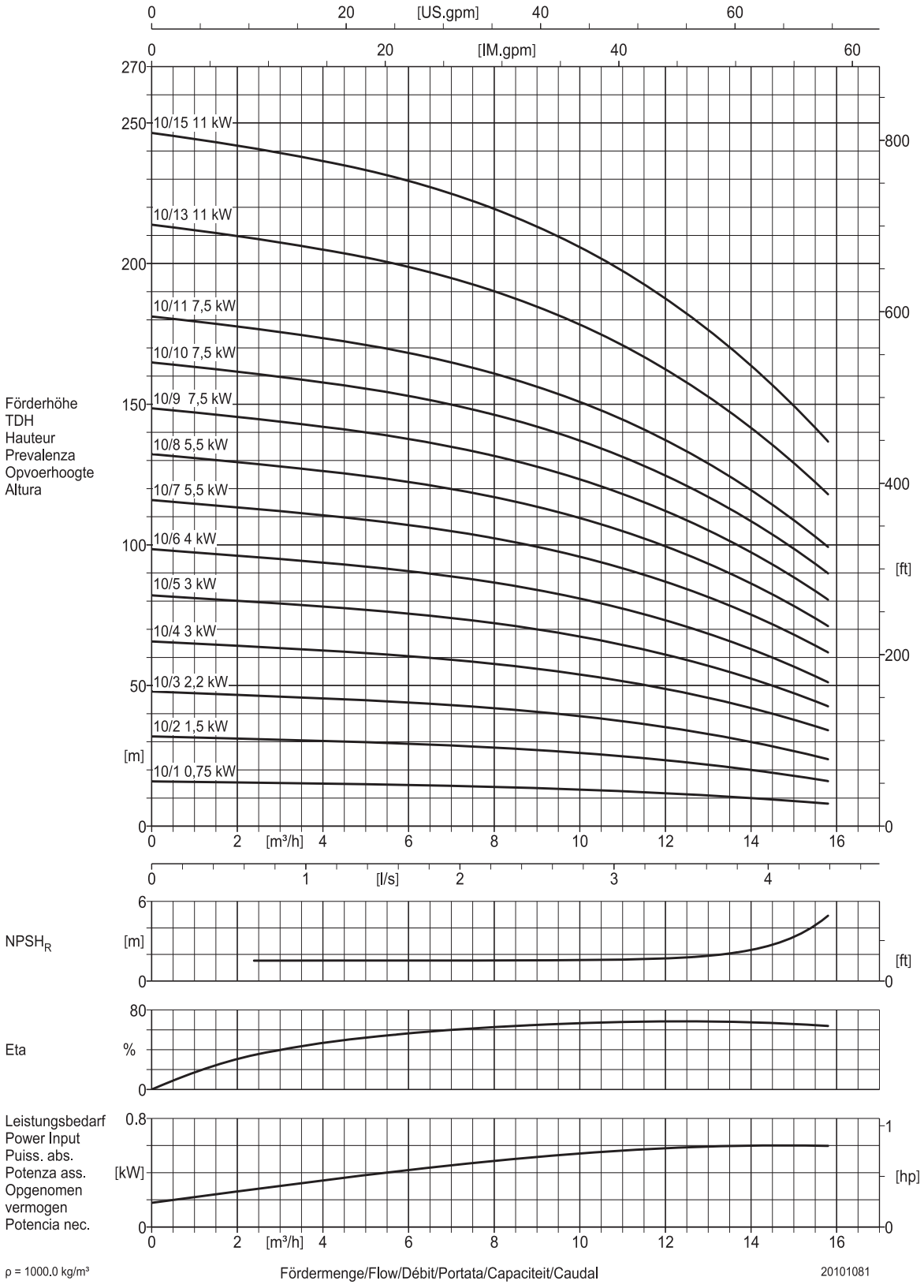


Figure 13: Performance curve DPVCI 10 B - 60Hz - 2 Pole

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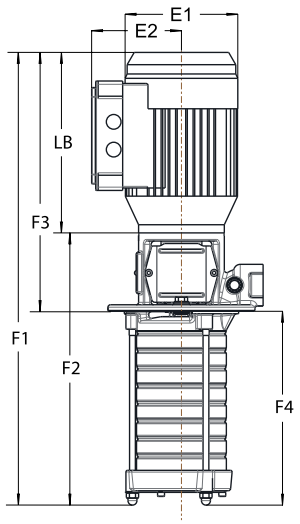
3.18 Dimensions DPVCI 10 B - 60Hz - 2 pole - DIN

To determine the correct length of the pump see both following explanation and table.

	length incl. motor	length excl. motor
Full stage pump	F1	F2
Pump with empty stages	F3 + F4	F3 + F4 -LB

The length F3 corresponds with the length of the applied motor power. F4 corresponds with the total number of stages. Example: 10/1(6) F3=343mm, F4=287mm.

Table 25: General dimensions



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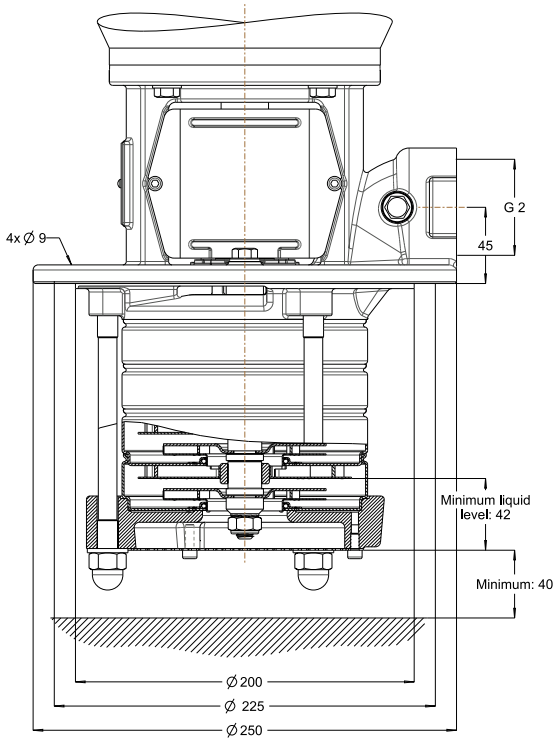
Model	Seal pressure	Power	Motor dimensions			DPVCI				
Full stage		[kW]	E1 [mm]	E2 [mm]	LB [mm]	F1 [mm]	F2 [mm]	F3 [mm]	F4 [mm]	Mass [kg]
10/1(2)	PN10	0,75	150	115	234	497	263	343	154	17
10/2(2)		1,5	176	115	280	553	273	399	154	30
10/3(3)		2,2	176	115	280	580	300	399	181	34
10/4(4)		3	195	141	316	652	336	445	207	45
10/5(5)		4	223	141	324	687	363	453	234	55
10/6(6)		4	223	141	324	740	416	453	287	56
10/7(7)	PN25	5,5	266	178	329	826	497	539	287	71
10/8(8)		5,5	266	178	329	852	523	539	313	72
10/9(9)		7,5	266	178	377	926	549	587	339	119
10/10(10)		7,5	266	178	377	953	576	587	366	120
10/11(11)		7,5	266	178	377	979	602	587	392	121
10/13(13)		11	315	204	498	1183	685	738	445	178
10/15(15)		11	315	204	498	1236	738	738	498	179

Table 26: Connection dimensions



3.19 Hydraulic performance curve DPVCI 15 B - 60Hz - 2 pole

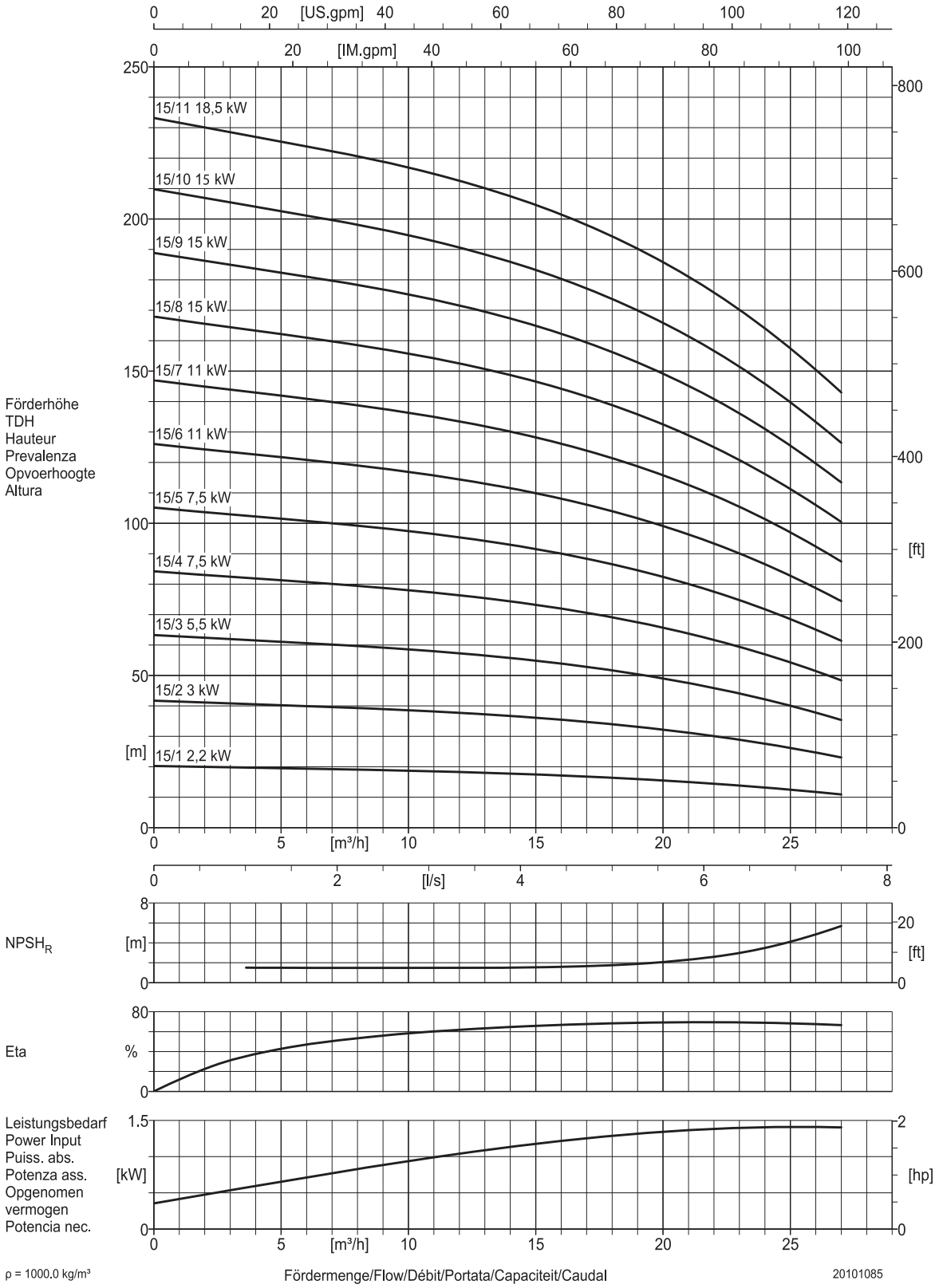


Figure 14: Performance curve DPVCI 15 B - 60Hz - 2 pole

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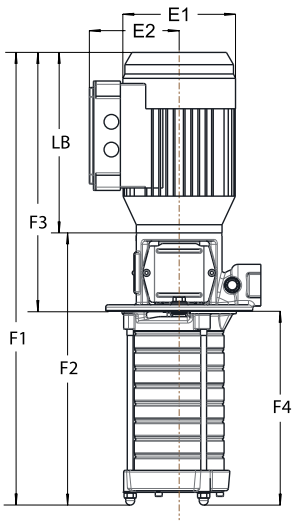
3.20 Dimensions DPVCI 15 B - 60Hz - 2 pole - DIN

To determine the correct length of the pump see both following explanation and table.

	length incl. motor	length excl. motor
Full stage pump	F1	F2
Pump with empty stages	F3 + F4	F3 + F4 -LB

The length F3 corresponds with the length of the applied motor power. F4 corresponds with the total number of stages. Example: 15/4(11) F3=587mm, F4=392mm.

Table 27: General dimensions



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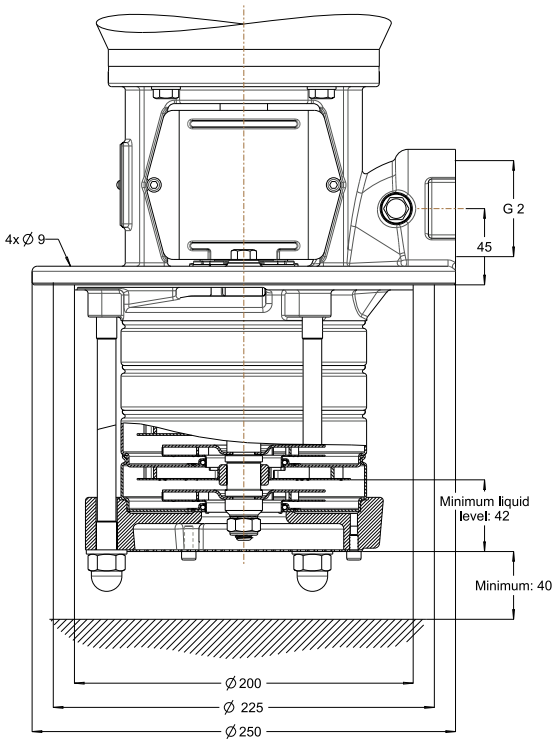
Model	Seal pressure	Power	Motor dimensions			DPVCI				
Full stage		[kW]	E1 [mm]	E2 [mm]	LB [mm]	F1 [mm]	F2 [mm]	F3 [mm]	F4 [mm]	Mass [kg]
15/1(2)	PN10	2,2	176	141	280	553	273	399	154	33
15/2(2)		3	195	145	316	599	283	445	154	43
15/3(3)		5,5	266	178	329	720	391	539	181	69
15/4(4)		7,5	266	178	377	794	417	587	207	99
15/5(5)	PN25	7,5	266	178	377	821	444	587	234	99
15/6(6)		11	315	204	498	998	500	738	260	174
15/7(7)		11	315	204	498	1025	527	738	287	174
15/8(8)		15	315	204	498	1051	553	738	313	185
15/9(9)		15	315	204	498	1077	579	738	339	186
15/10(10)		15	315	204	498	1104	606	738	366	187
15/11(11)		18,5	315	204	580	1212	632	820	392	204

Table 28: Connection dimensions



4 Seals

4.1 Mechanical seal option specifications

Table 29: Seal code

Shaft seal Type	Material mechanical seal	Seal code	Material shaft seal	Material pump elastomer	Temperature range shaft seal[°C]	Max. pressure [bar]	Cartridge
MG-G60	B Q1 E GG	11	Ca / SiC / EPDM	EPDM	-20 - 100	10	●
MG-G60	B Q1 V GG	12	Ca / SiC / Viton	Viton	-20 - 120	10	●
RMG-G606	Q1 B E GG	13	SiC / Ca / EPDM	EPDM WRAS / ACS	-20 - 100	25	●
RMG-G606	Q1 B V GG	14	SiC / Ca / Viton	Viton	-20 - 120	25	●
RMG-G606	U3 U3 X4 GG	15	TuC / TuC / HNBR	HNBR	-20 - 120	25	●
RMG-G606	U3 U3 V GG	16	TuC / TuC / Viton	Viton	-20 - 120	25	●
RMG-G606	U3 B E GG	18	TuC / Ca / EPDM	EPDM 559236	-20 - 120	25	●
RMG-G606	Q1 B E GG	23	SiC / Ca / EPDM	EPDM	-20 - 100	25	●
MG-G60	Q1 Q1 V GG	24	SiC / SiC /Viton	Viton	-20 - 120	10	●
MG-G60	Q1 Q1 X4 GG	28	SiC / SiC/ HNBR	HNBR	-20 - 120	10	●
MG-G60	Q1 Q1 E GG	29	SiC / SiC / EPDM	EPDM	-20 - 100	10	●

ATTENTION
Seal dimensions according to EN24960

5 Motors and motor options

5.1 General

The standard DP motors are produced conform the latest technical design, and comply with the international standards and EU directives regarding safety measures and efficiency.

The motors can be specified as:

- Standard IE2 >= 0,75kW
- T.E.F.C. (totally enclosed fan cooled) Squirrel cage.
- AC induction motor.
- Protection IP55.
- Insulation class F.
- Temperature rise class B.
- Duty class S3 (50%) or S4 (40%), maximum starts per hour, see table.
- Noise levels conform IEC 60034-9.
- >= 3,0 kW default 3xPTC.

The motors come in 2 different configurations depending on power rate. Up to 4kW a V18 mounting type is used. For power 5,5kW and up a flanged motor type V1 is default. Mounting in acc. with IEC60034-7 and dimensions in acc. with IEC 60072-1

5.2 Options

- Standard motors as per above, in **single phase** (1x230V).
- Provided with 10 pole **industrial connector** “Harting stecker” HAN 10, mounted in stead of the motor connection box, <= 7,5kW.
- Provided with **Rain cover** on top of the fan hood.
- For motors < 3kW provided with **3 x PTC** and/or **anti condensation heater (1x230V)**.
- Motors from other manufacturers like Siemens and VEM.

5.3 Standard motor data, 2 pole 50Hz

Table 30: Motor data 1 and 3 phase, 2p 50 Hz

Part number	Rated power output [kW]	Rated Voltage [V]	Rated current [A]	Starting current Ia/In	Cos Phi	Tolerance rated voltage	Rated speed [rpm]	Motor efficiency	Sound pressure [dB(A)]	Cable gland	Max. starts per hour (S3 50% or S4 40%)
3700000003	0,37	1x230	2,6	3,7	0,92	10%	2750	67	58	1xM18x1,5	20
3700000005	0,55	1x230	3,69	3,9	0,92	10%	2760	70	56	1xM18x1,5	20
3700000007	0,75	1x230	5,0	3,9	0,92	10%	2780	70	56	1xM20x1,5	20
3700000011	1,1	1x230	6,68	4,3	0,95	10%	2790	75	58	1xM20x1,5	20
3700000015	1,5	1x230	8,99	4,8	0,95	10%	2800	76	58	1xM20x1,5	20
3700000022	2,2	1x230	13,04	4,8	0,95	10%	2800	77	58	1xM20x1,5	20
3710021003	0,37	230/400	1,6/0,95	4,5	0,76	10%	2865	76	60	1xM20x1,5	300
3710021005	0,55	230/400	2,1/1,2	5,3	0,8	10%	2880	82	60	1xM20x1,5	300
3710011007	0,75	230/400	3,1/1,8	6,0	0,77	10%	2865	80	60	1xM20x1,5	300
3710011011	1,1	230/400	4,21/2,4	6,8	0,79	10%	2870	81	60	1xM20x1,5	300
3710011015	1,5	230/400	5,7/3,3	7,6	0,81	10%	2900	81,8	56	1xM20x1,5	300
3710011022	2,2	230/400	8,2/4,7	7,3	0,81	10%	2870	83,5	56	1xM20x1,5	300
3710111030	3	230/400	10,2/6,2	8,3	0,83	10%	2900	84,6	58	2xM20x1,5	300
3710112030	3	400/690	6,2/3,7	8,3	0,83	10%	2900	84,6	58	2xM20x1,5	300
3710111040	4	230/400	13,4/7,7	8,5	0,87	10%	2915	86,3	59	2xM20x1,5	300
3710112040	4	400/690	7,7/4,5	8,5	0,87	10%	2915	86,3	59	2xM20x1,5	300
3710111055	5,5	230/400	17,5/10,1	8,8	0,9	10%	2930	87,5	64	2xM25x1,5	300
3710112055	5,5	400/690	10,1/5,9	8,8	0,9	10%	2930	87,5	64	2xM25x1,5	300

Part number	Rated power output [kW]	Rated Voltage [V]	Rated current [A]	Starting current Ia/In	Cos Phi	Tolerance rated voltage	Rated speed [rpm]	Motor efficiency	Sound pressure [dB(A)]	Cable gland	Max. starts per hour (S3 50% or S4 40%)
3710111075	7,5	230/400	22,9/13,2	8,5	0,92	10%	2920	88,6	64	2xM25x1,5	300
3710112075	7,5	400/690	13,2/7,7	8,5	0,92	10%	2920	88,6	64	2xM25x1,5	300
3710111110	11	230/400	36,5/21,0	7,8	0,84	10%	2950	90	71	2xM32x1,5	300
3710112110	11	400/690	21,0/12,2	7,8	0,84	10%	2950	90	71	2xM32x1,5	300
3710111150	15	230/400	49,0/28,2	7,6	0,85	10%	2945	90,3	70	2xM32x1,5	300
3710112150	15	400/690	28,2/16,3	7,6	0,85	10%	2945	90,3	70	2xM32x1,5	300
3710111185	18,5	230/400	55,7/32,0	8,0	0,91	10%	3540	91,6	77	2xM32x1,5	300
3710112185	18,5	400/690	32,0/18,6	8,0	0,91	10%	3540	91,6	77	2xM32x1,5	300
3710111220	22	230/400	67,1/38,8	6,5	0,9	10%	3530	91,5	80	2xM32x1,5	300
3710112220	22	400/690	38,8/22,4	6,5	0,9	10%	3530	91,5	80	2xM32x1,5	300

5.4 Standard motor data, 2 pole 60Hz

Table 31: Motor data 3 phase, 2p 60 Hz

Article number	Rated power output [kW]	Rated Voltage [V]	Rated current [A]	Starting current Ia/In	Cos Phi	Tolerance rated voltage	Rated speed [rpm]	Motor efficiency	Sound pressure [dB(A)]	Cable gland	Max. starts per hour (S3 50% or S4 40%)
3710021003	0,37	230/400	1,6/0,95	4,5	0,76	+20%,-5%	3430	0,76	60	1xM20x1,5	300
3710021005	0,55	230/400	2,1/1,2	5,3	0,8	+20%,-5%	3460	82	60	1xM20x1,5	300
3710011007	0,75	230/400	3,1/1,8	6,0	0,77	+20%,-5%	3430	80	60	1xM20x1,5	300
3710011011	1,1	230/400	4,2/2,4	6,8	0,81	+20%,-5%	3440	82,5	60	1xM20x1,5	300
3710011015	1,5	230/400	5,2/3,0	7,2	0,88	+20%,-10%	3450	81,9	59	1xM20x1,5	300
3710011022	2,2	230/400	7,5/4,3	6,6	0,89	+20%,-10%	3420	83,3	59	1xM20x1,5	300
3710111030	3	230/400	10,5/6,1	7,2	0,84	+20%,-10%	3460	85	62	2xM20x1,5	300
3710112030	3	400/690	61/3,5	7,2	0,84	+20%,-10%	3460	85	62	2xM20x1,5	300
3710111040	4	230/400	12,6/7,3	7,3	0,91	+20%,-10%	3495	87,5	62	2xM20x1,5	300
3710112040	4	400/690	7,3/4,2	7,3	0,91	+20%,-10%	3495	87,5	62	2xM20x1,5	300
3710111055	5,5	230/400	16,7/9,6	7,7	0,93	+20%,-10%	3520	89	68	2xM25x1,5	300
3710112055	5,5	400/690	9,6/5,6	7,7	0,93	+20%,-10%	3520	89	68	2xM25x1,5	300
3710111075	7,5	230/400	22,9/13,2	7,3	0,94	+20%,-10%	3500	87,4	68	2xM25x1,5	300
3710112075	7,5	400/690	13,2/7,7	7,3	0,94	+20%,-10%	3500	87,4	68	2xM25x1,5	300
3710111110	11	230/400	34,5/19,8	6,7	0,89	+20%,-10%	3530	90	75	2xM32x1,5	300
3710112110	11	400/690	19,8/11,5	6,7	0,89	+20%,-10%	3530	90	75	2xM32x1,5	300
3710111150	15	230/400	46,6/26,8	6,6	0,9	+20%,-10%	3530	89,8	74	2xM32x1,5	300
3710112150	15	400/690	26,8/15,5	6,6	0,9	+20%,-10%	3530	89,8	74	2xM32x1,5	300
3710111185	18,5	230/400	55,7/32,0	8,0	0,91	+20%,-10%	3540	91,6	77	2xM32x1,5	300
3710112185	18,5	400/690	32,0/18,6	8,0	0,91	+20%,-10%	3540	91,6	77	2xM32x1,5	300
3710111220	22	230/400	67,1/38,8	6,5	0,9	+20%,-10%	3530	91,5	80	2xM32x1,5	300
3710112220	22	400/690	38,8/22,4	6,5	0,9	+20%,-10%	3530	91,5	80	2xM32x1,5	300

6 Frequency drive, single phase

6.1 General

For the motor range up to 2,2kW DP-Pumps has an 1x230Volts frequency inverter range of the brand Lenze available. The inverter series SMVector are mounted on a support bracket at the side of the motor.

6.2 Working range

In addition to the working range of the pumps in case of using a frequency inverter the following needs to considered:

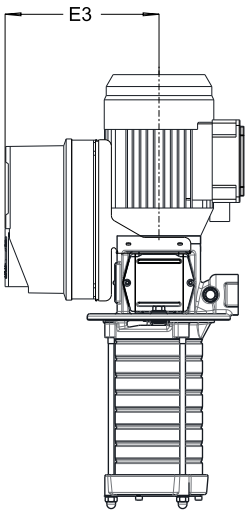
Ambient temperature: -10 up to 55°C
Maximum altitude: 2000m

6.3 General specifications

Table 32: General specifications 1-phase VDFD

Voltage range (net) [VAC] (input)	1 x 170 - 264
Voltage range motor [VAC] (output)	3 x 170 - 264
I (max) [%] (output)	200
Dimensions 0,37-0,75kW HxWxD [mm]	203x160x114
Dimensions 1,1-1,5kW HxWxD [mm]	203x160x160
Dimensions 2,2kW HxWxD [mm]	203x181x172
Integrated EMC filter	yes
Cooling	convection

6.4 Detailed specifications



Type	371NO2FSFC	751NO2FSFC	112NO2FSFC	152NOSFSFC	222NO2FSFC
Power [kW]	0,37	0,75	1,1	1,5	2,2
I (mains) [A]	5,1	8,8	12,0	13,5	17,1
I (motor) [A]	2,4	4,2	6,0	7,0	9,6
Fuse [A]	10	16	20	25	32
E3 [mm]	194	194	204	260	272
Mass [kg]*	2,9	2,9‘	4	4	4,5

* Mass is in including support bracket and cable

7 Materials

7.1 Parts overview

7.1.1 Sectional drawing DPVCI

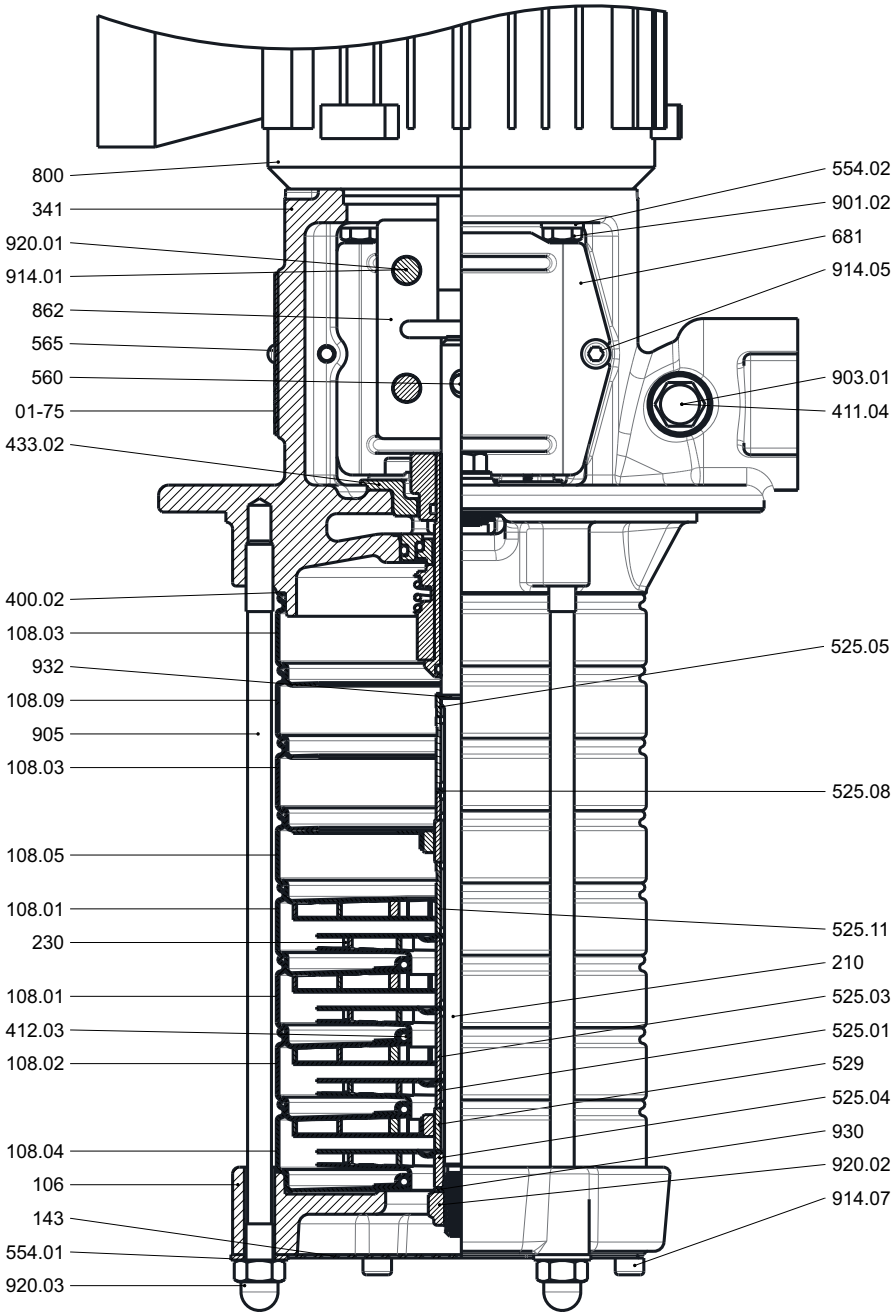


Figure 15: Sectional drawing DPVCI

20080767-E

7.1.2 Part list

Part. no.	Part description	Material code	Wetted part
106	Suction casing	JL1040	X
108.01/.02/.03/.04/.05/.09	Stage casing	1.4301	X
143	Suction strainer	1.4301	X
210	Shaft	1.4057	X
230	Impeller	1.4301	X
341	Motor stool	JL1040	X
400.02	Gasket		X
411.04	Joint ring		X
412.03	O-ring	see seal table 30	
433.02	Shaft seal	see seal table 30	X
525.01/.03/.04/.05/.08	Spacer sleeve	1.4301	X
529	Bearing sleeve	Tungsten Carbide	X
Part of 108	Bearing	Aluminium Oxide	X
554.01/.02	Washer		X
681	Coupling guard	1.4308	X
862	Coupling from 5.5 kW	JS1030	
	Coupling up to 4 kW	Aluminium	
901.02	Hexagon head bolt		
903.01	Screw plug		
905	Tie bolt	1.4057	X
914.01/.05/.07	Hexagon socket head cap screw		
920.01/.03	Nut	1.4301	X
930.02	Safety device	1.4404	X
932	Circlip	1.4571	X

7.1.3 Materials conversion

Material	Description	Code and material nr.	Standard	ASTM / AISI[1]
JL 1040	Cast iron	GJL-250	EN 1561	A48:40B
JS1030	Cast iron	GJS-400	EN 1563	
1.4057	Chromium-nickel steel	X17CrNi16-2--QT800	EN 10088-3	A276:431
1.4301	Chromium-nickel steel	X5CrNi 18-10	EN 10088	A276:304
1.4401	Chromium-nickel-molybdenum steel	X2CrNiMo 17-12-2	EN 10088	A276:316L
1.4571	Chromium-nickel-molybdenum steel	X6CrNiMoTi 17-12-2	EN 10088	A276:316Ti

1. Note: The indication of the material designations to ASTM / AISI is not binding

8 Medium handled

8.1 Medium handled

Media description	Media group	Chemical formula	Cons. max. [%]	PH max.	Temp max. {C]	Material shaft seal			Material pump
						rotor	stator	elastomer	elastomer
Acetone	Ketone	$(CH_3)_2CO$				SiC	Ca	EPDM	EPDM
Alcaline (bottle rinse)	Rinsing		2	< 9.5	40	TuC	TuC	HNBR	HNBR
Alcohol (Ethanol)	Hydrocarbon	C_2H_5OH	100		60	SiC	Ca	EPDM	EPDM
Ammonia	Strong base	NH_3				SiC	Ca	EPDM	EPDM
Antifreeze (glycol base, salt-free)	Alcohol		45		110	SiC	Ca	EPDM	EPDM
Butyl alcohol (butanol)	Hydrocarbon	$CH_3(CH_2)_3OH$				SiC	Ca	EPDM	EPDM
Diethylene glycol (salt-free)	Alcohol	$C_4H_{10}O_3$	100		100	SiC	Ca	EPDM	EPDM
Ethanol (alcohol)	Hydrocarbon	C_2H_5OH	100		60	SiC	Ca	EPDM	EPDM
Ethylene glycol (salt-free)	Alcohol	$(CH_2OH)_2$	100		100	SiC	Ca	EPDM	EPDM
Ferric-II-sulphate	Salt	$FeCl_3$	5		80	TuC	TuC	Viton	Viton
Fuel oil (light)	Hydrocarbon				80	SiC	Ca	Viton	Viton
Glycerin (glycerol)	Alcohol	$C_3H_8O_3$	40		80	SiC	Ca	EPDM	EPDM
Kerosene	Hydrocarbon		100		80	SiC	Ca	Viton	Viton
Linseed oil	Vegetable oil		100		60	SiC	Ca	Viton	Viton
Linseed oil + 3% sulphur acid	Vegetable oil		100		60	SiC	Ca	Viton	Viton
Malic acid	Acid	$C_4H_2O_3$				SiC	Ca	Viton	Viton
Methyl glycol (propylene glycol)	Alcohol	$C_3H_6(OH)_2$	100		20	SiC	Ca	EPDM	EPDM
Olive oil	Vegetable oil					SiC	Ca	Viton	Viton
Peanut oil	Vegetable oil		100		90	SiC	Ca	Viton	Viton
Petroleum	Hydrocarbon	Hydrocarbon	100		80	SiC	Ca	Viton	Viton
Potassium chloride	Salt	KCl				SiC	Ca	EPDM	EPDM
Rape-seed oil	Vegetable oil	mixture			100	SiC	Ca	Viton	Viton
Sodium carbonate	Salt	Na_2CO_3	6		60	SiC	Ca	EPDM	EPDM
Sodium hydroxide (soda lye)	Salt	NaOH	5		40	TuC	TuC	HNBR	HNBR
Sodium nitrate (non acidic)	Salt	$NaNO_3$	10		60	SiC	Ca	EPDM	EPDM
Sodium phosphate	Salt	Na_3PO_4				SiC	Ca	EPDM	EPDM
Sodium sulphate (non acicdic)	Salt	Na_2SO_4	5		60	SiC	Ca	EPDM	EPDM
Soybean oil	Vegetable oil		100		100	SiC	Ca	Viton	Viton
Spirits	Alcohol	H_2O + sucrose + alcohol	40		60	SiC	Ca	EPDM	EPDM
Tannic acid	Acid	$C_{76}H_{52}O_{46}$	20		80	SiC	Ca	Viton	Viton
Water, untreated / suspended solids <20 ppm	Water	H_2O + ...	100		60	TuC	Ca	EPDM	EPDM
Water, boiler feed water (conform. Vd TÜV 1466	Water	H_2O + ...	100		120	TuC	Ca	EPDM	EPDM E425
Water, fire fighting	Water	H_2O + ...	100		60	TuC	TuC	HNBR	HNBR
Water, heating (conform Vd TÜV 1466)	Water	H_2O + ...	100		120	SiC	Ca	EPDM	EPDM
Water, (conform VDI 2035)	Water	H_2O + ...	100		100	TuC	Ca	EPDM	EPDM
Water, oil water mixture	Water		5		80	SiC	Ca	Viton	Viton

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Original instructions

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