



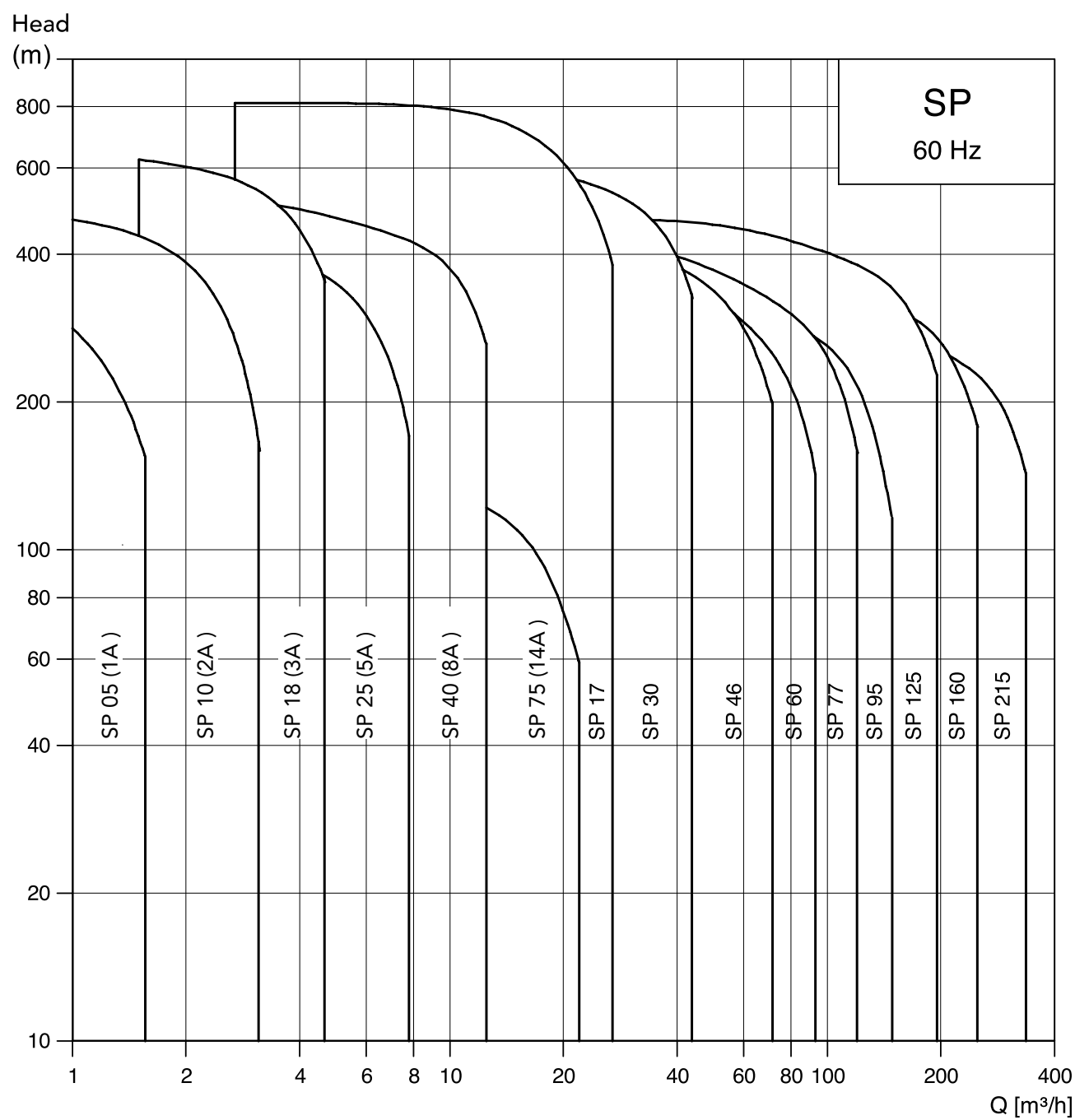
SUBMERSIBLE DEEP WELL
4", 6", 8" & 10" - 60Hz

MCKARLEN

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General Curve



General Description

SP 4", 6", 8" & 10"

McKarlen is one of the main manufacturer of Deep Well Submersible Pumps made of high quality stainless steel for bore holes. Special design on the impeller and diffuser make this pump resistant to sands for up to 1%.

The state of the art design is very energy efficient and offer a high performance pumping therefore easy installation and low maintenance costs.

Technical Data:

- Motor Single Phase, 1x220 ~ 230V, 2850 rpm, 60 Hz
1x380 ~ 460V, 2850 rpm, 60 Hz
- NEMA Standard Dimensions
- Maximum start/stop 30 times in 1 hour
- Equipped with thermal overload protector
- Capacity up to 5500 L/min, 330 m³/hr
- Total Head up to 680 Meter
- Liquid temperature up to 40°C

Application :

- Supply of raw water for households
- Supply of water from the wells to the reservoir
- Irrigation, Plantation and Agriculture
- Industrial and municipal application



Pump range

TYPE	SP 05 (1A)	SP 10 (2A)	SP 18 (3A)	SP 25 (5A)	SP 40 (8A)	SP 75 (14A)	SP 17	SP30	SP 46	SP 60	SP 77	SP 95	SP 125	SP160	SP215
MATERIAL	STAINLESS STEEL 304														
DIMENSION, Inch	4"						6"				8"		10"		
CONNECTION	1"	1 1/4"	1 1/4"	1 1/2"	2"	2"	3"	3"	4"	4"	5"	5"	6"	6"	6"

Type key

	SP	95	5	A	B	N
Submersible Pump Range						
Rated flow rate in m ³ /hr						
Number of Impellers						
First reduced-diameter impeller (A, B or C)						
Second reduced-diameter impeller (A, B or C)						

Stainless steel parts of material

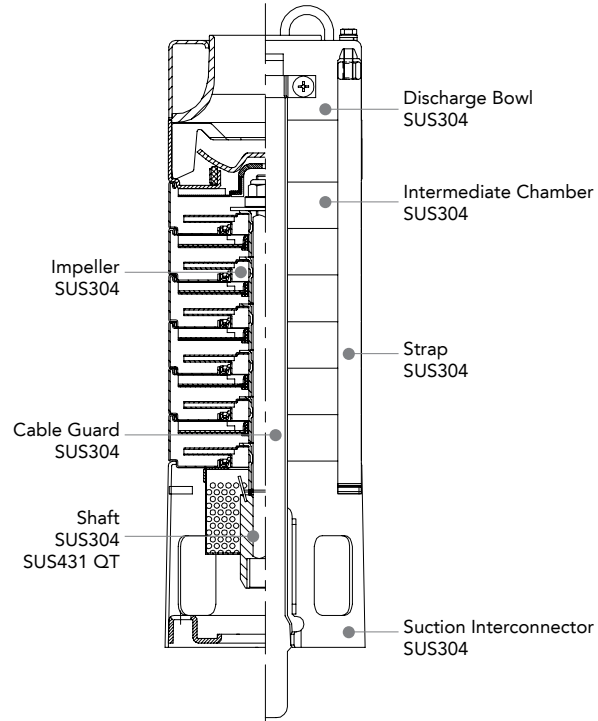
= DIN W.-Nr. 1.4301

N = DIN W.-Nr. 1.4401

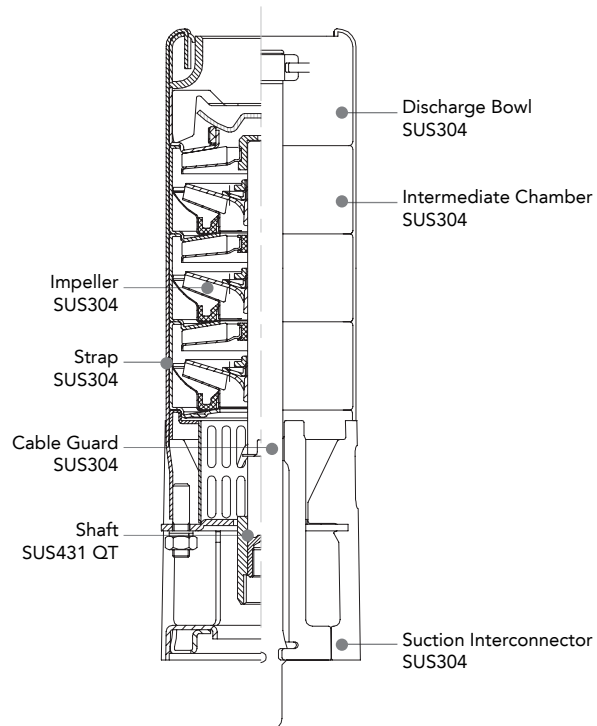
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Material Specification

SP 05(1A)/ 10(2A) / 18(3A)/ 25(5A) Series

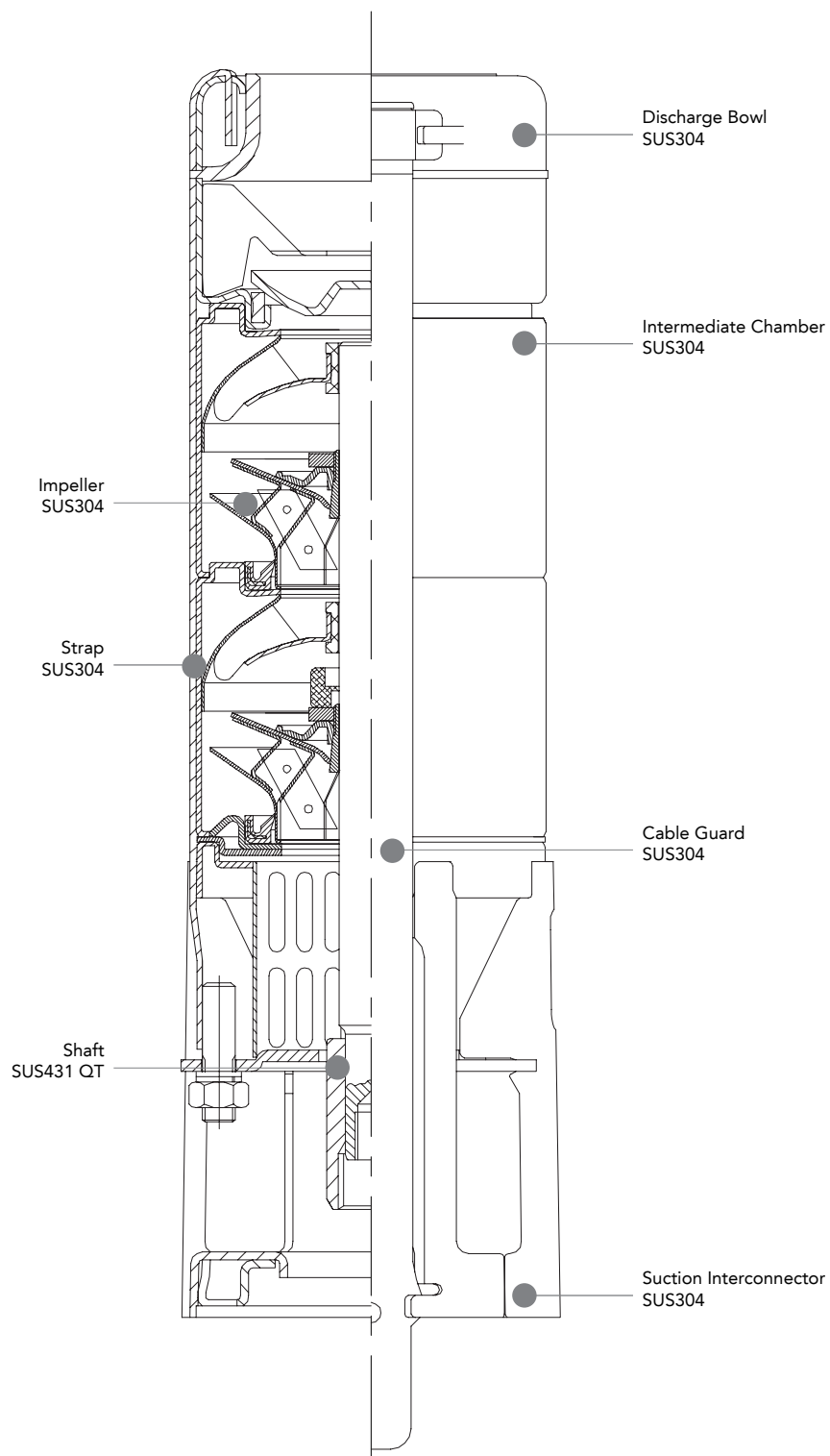


SP 40(8A) Series



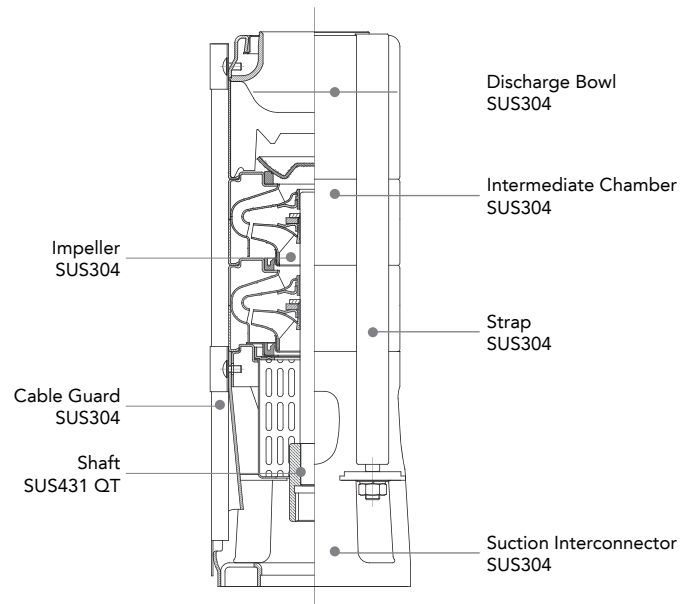
Material Specification

SP 75(14A) Series

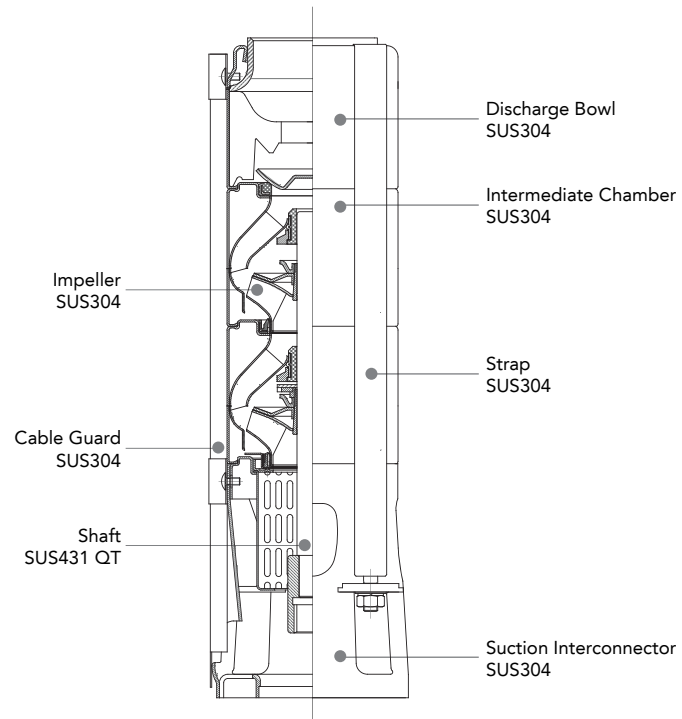


Material Specification

SP 17 Series

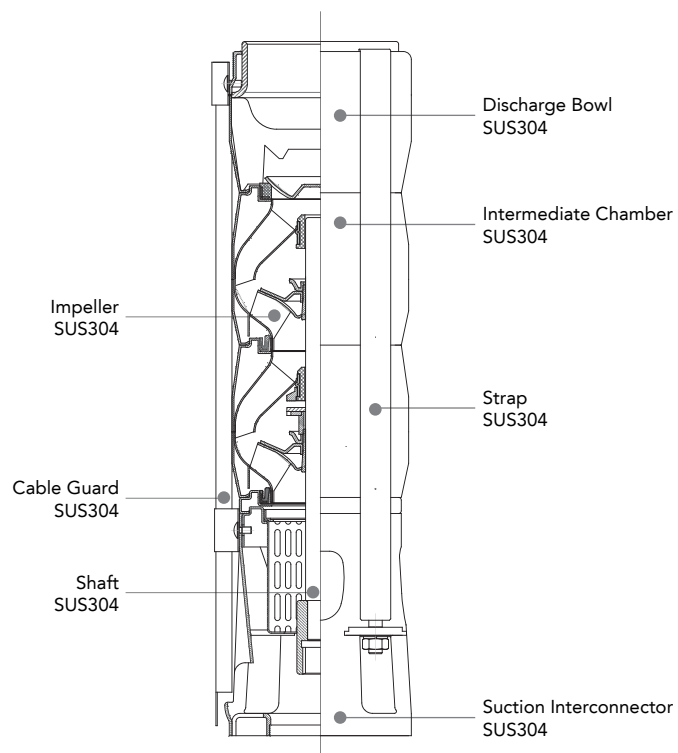


SP 30 Series

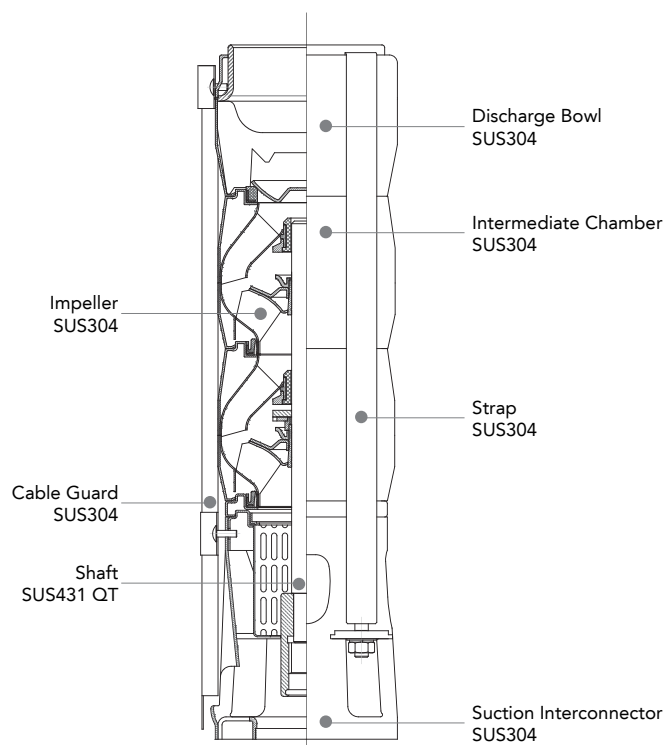


Material Specification

SP 46 Series

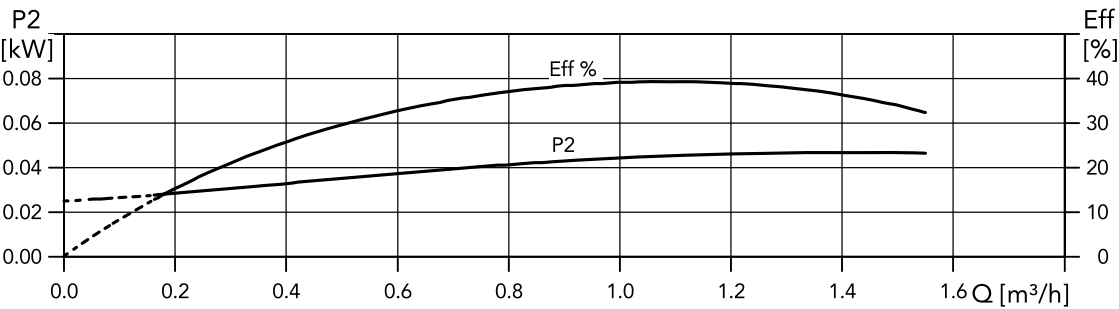
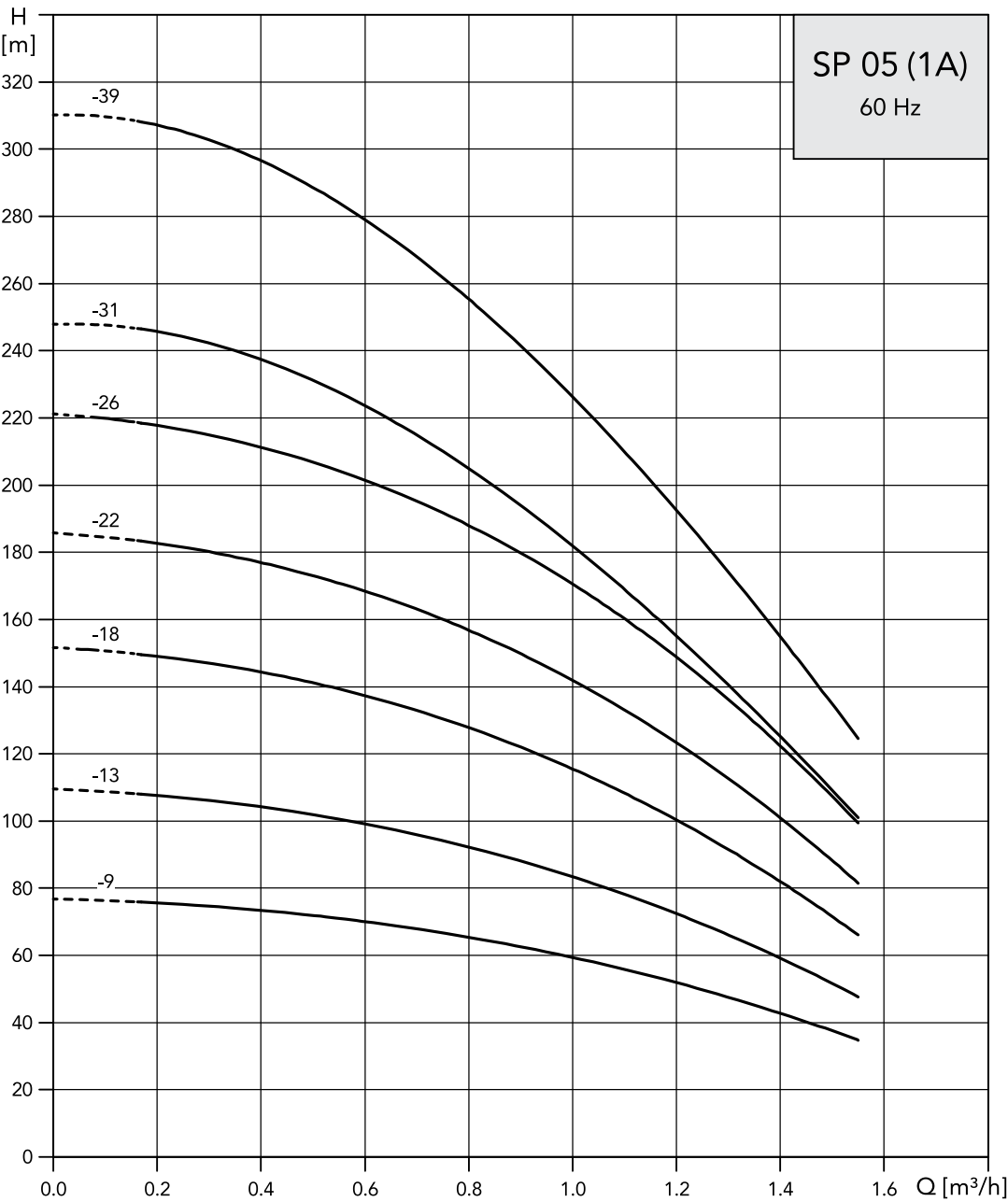


SP 60 Series

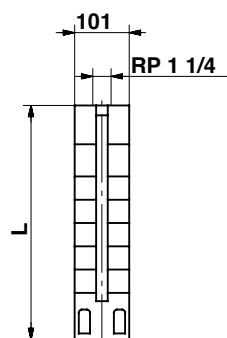


Performance Curve SP 05 (1A)

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Dimensions SP 05 (1A)

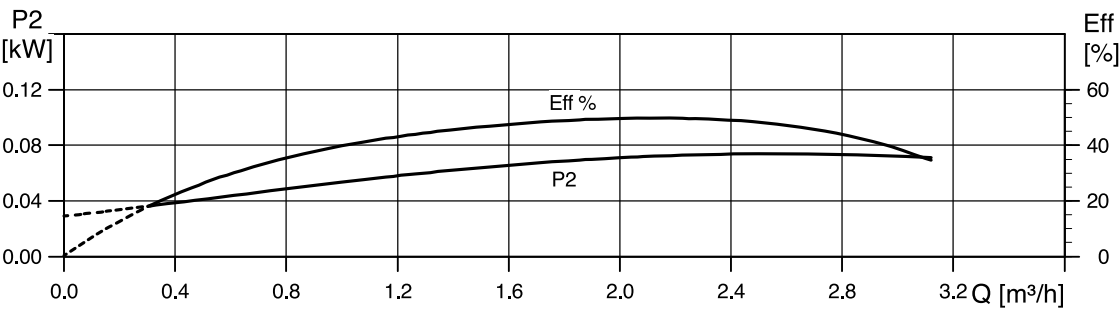
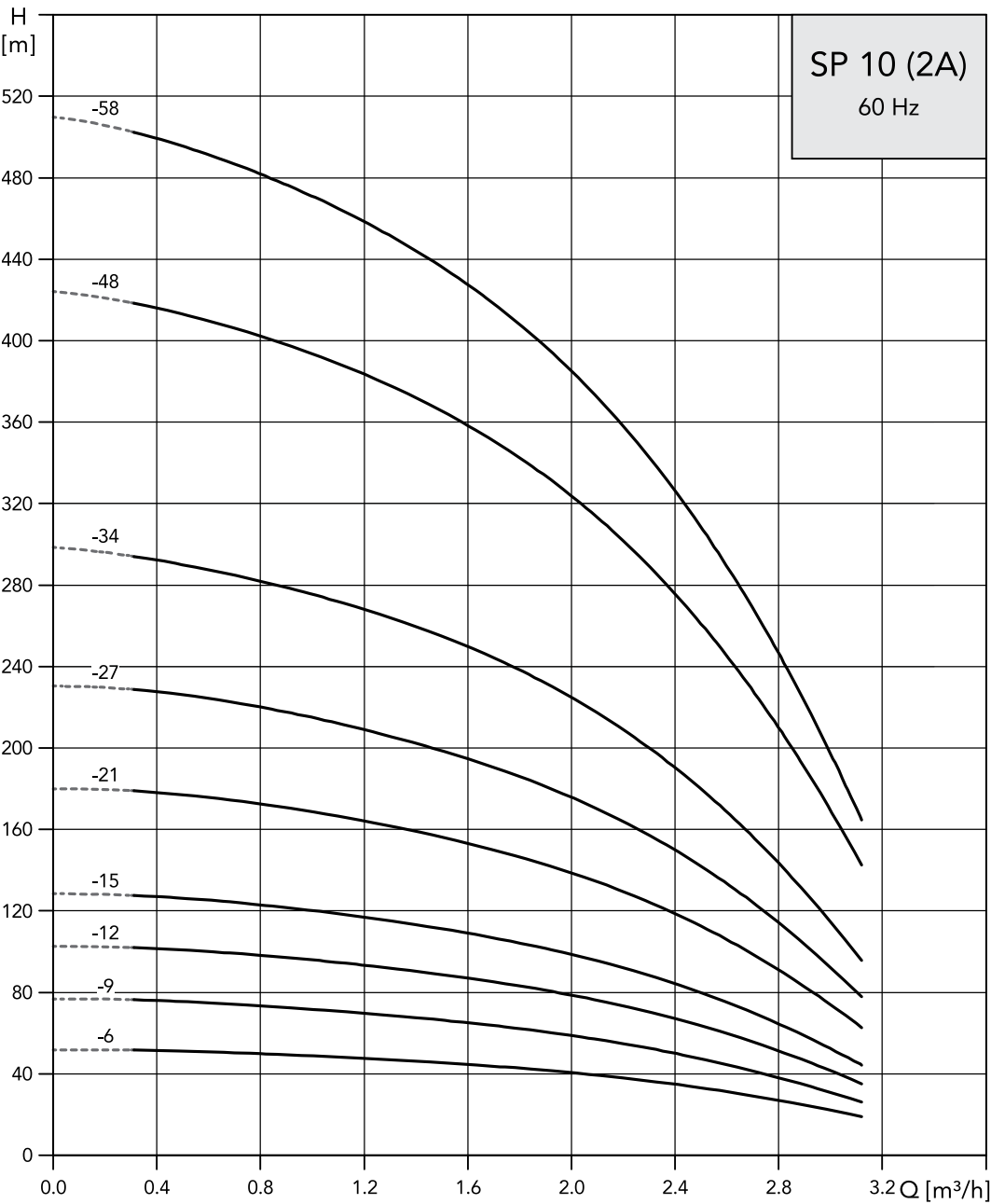


Pump Type	Motor (kW)	Dimension L
SP-05(1A)-9	0.37	344
SP-05(1A)-13	0.37	428
SP-05(1A)-18	0.55	533
SP-05(1A)-22	0.75	617
SP-05(1A)-26	1.1	701
SP-05(1A)-31	1.1	851
SP-05(1A)-39	1.5	1019

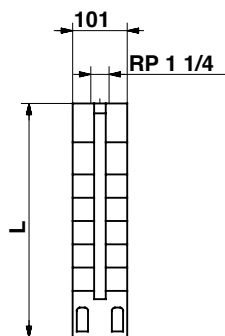
101 mm = Maximum pump diameter including cable guard.

Performance Curve SP 10 (2A)

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Dimensions SP 10 (2A)

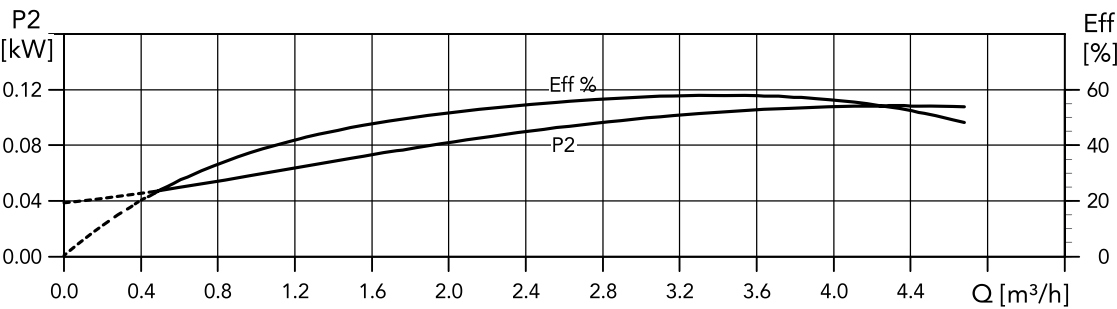
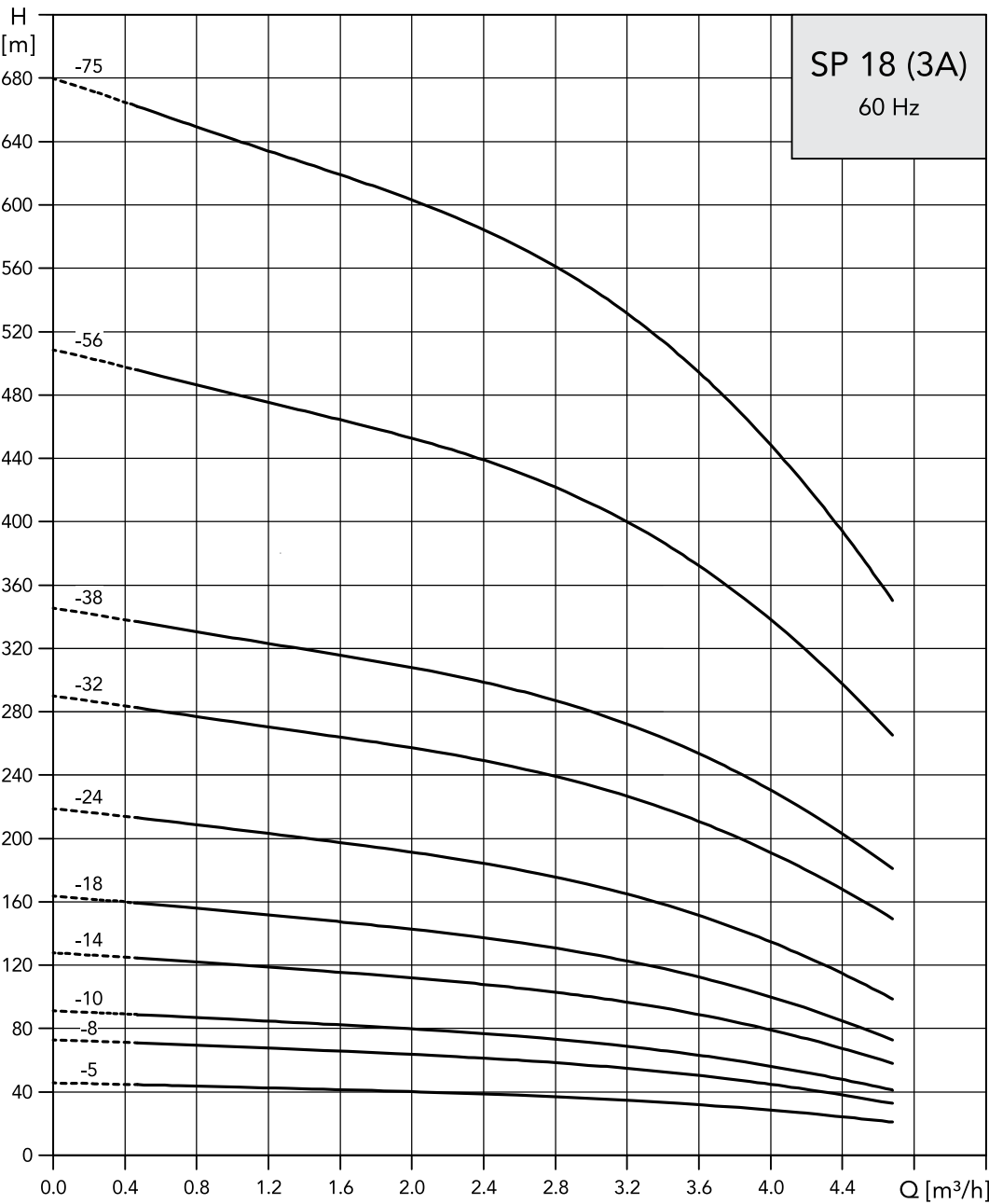


Pump Type	Motor (kW)	Dimension L
SP-10(2A)-6	0.37	281
SP-10(2A)-9	0.37	344
SP-10(2A)-12	0.55	407
SP-10(2A)-15	0.75	470
SP-10(2A)-21	1.1	596
SP-10(2A)-27	1.5	722
SP-10(2A)-34	2.2	914
SP-10(2A)-48	4.0	1208
SP-10(2A)-58	4.0	1597

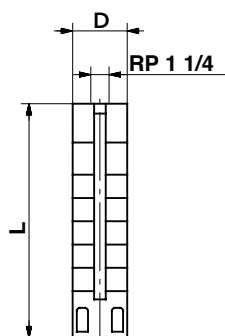
101 mm = Maximum pump diameter including cable guard.

Performance Curve SP 18 (3A)

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Dimensions SP 18 (3A)

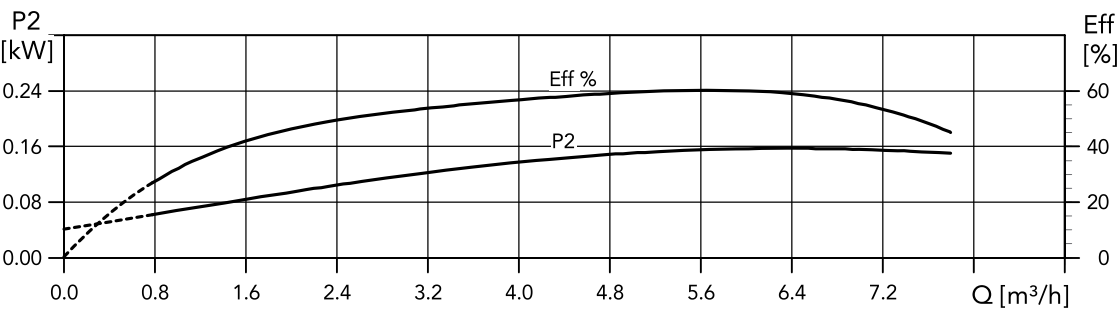
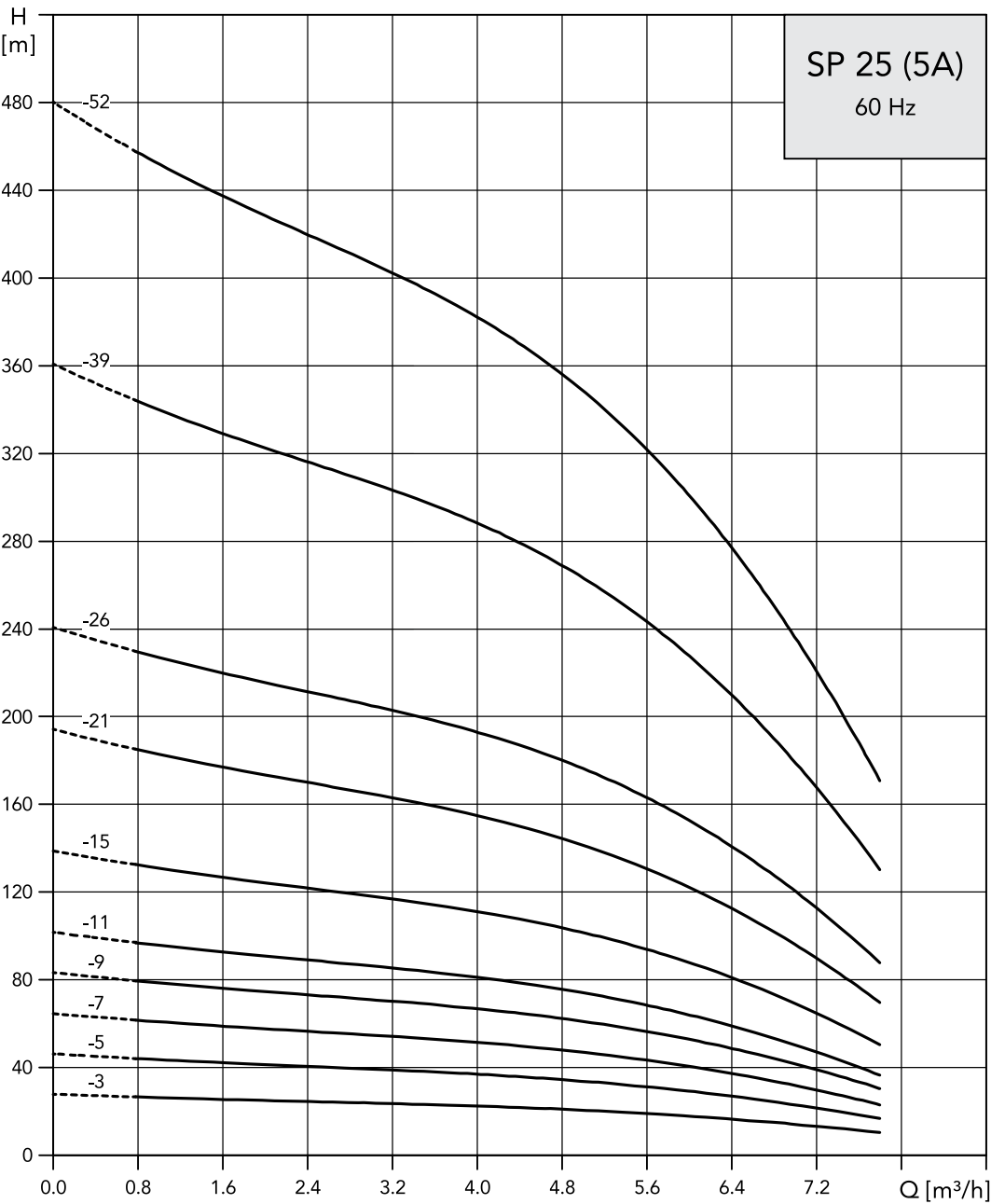


Pump Type	Motor (kW)	Dimension	
		L	D
SP-18(3A)-5	0.37	260	101
SP-18(3A)-8	0.55	323	101
SP-18(3A)-10	0.75	365	101
SP-18(3A)-14	1.1	449	101
SP-18(3A)-18	1.5	533	101
SP-18(3A)-24	2.2	659	101
SP-18(3A)-32	3.0	872	101
SP-18(3A)-38	4.0	998	101
SP-18(3A)-56	5.5	1747	101
SP-18(3A)-75	7.5	2146	140

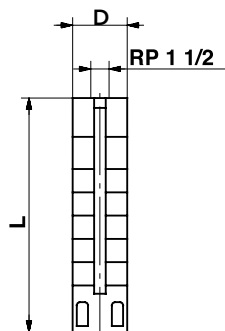
D = Maximum pump diameter including cable guard.

Performance Curve SP 25 (5A)

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Dimensions SP 25 (5A)

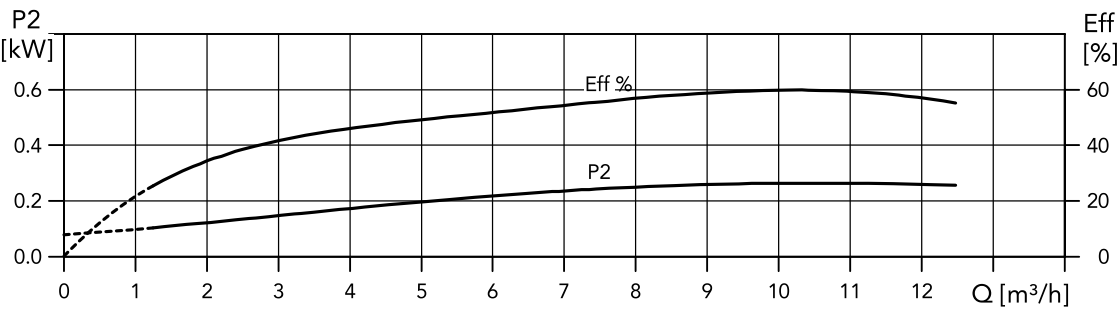
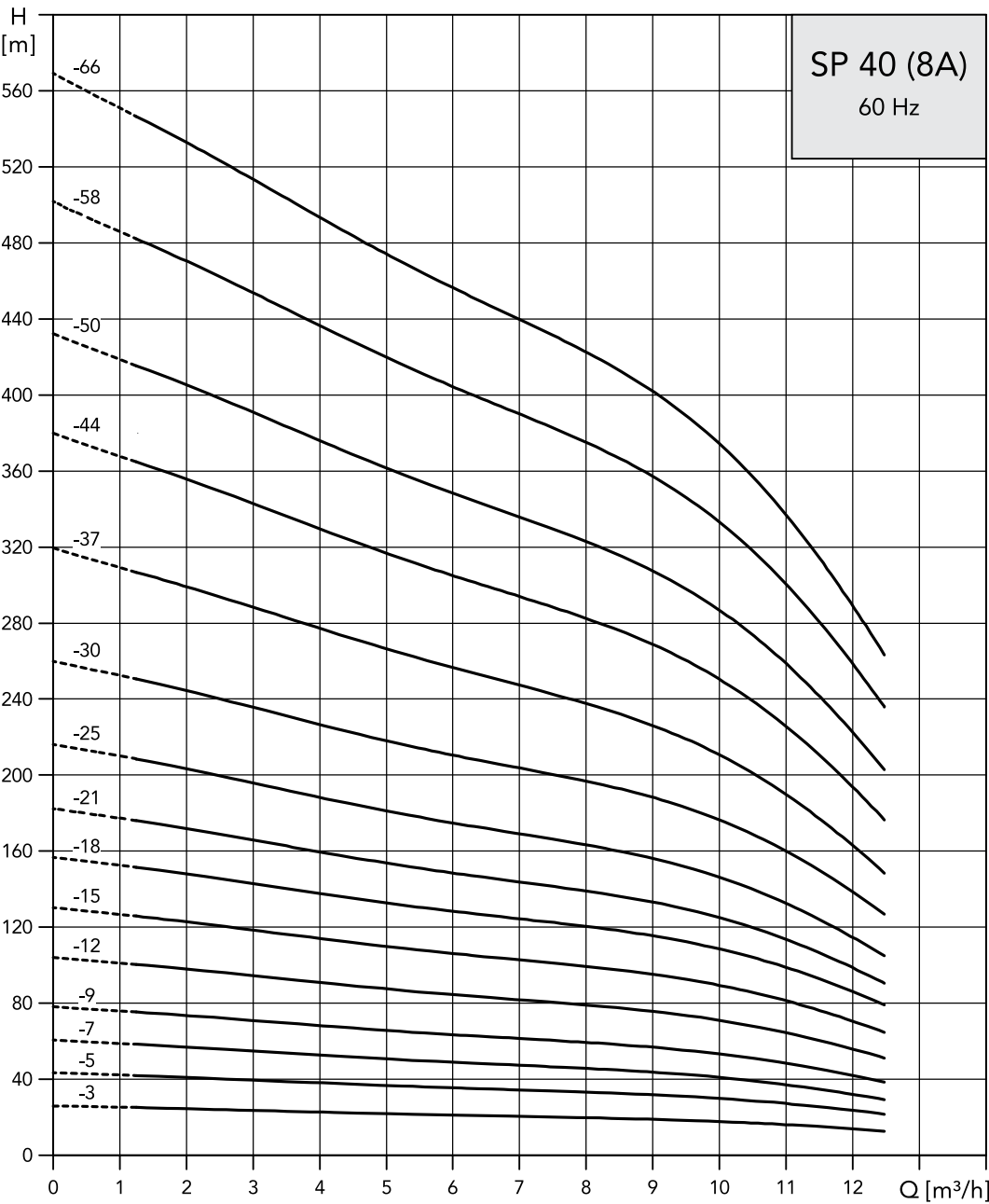


Pump Type	Motor (kW)	Dimension	
		L	D
SP-25(5A)-3	0.37	219	101
SP-25(5A)-5	0.55	261	101
SP-25(5A)-7	0.75	303	101
SP-25(5A)-9	1.1	345	101
SP-25(5A)-11	1.5	387	101
SP-25(5A)-15	2.2	471	101
SP-25(5A)-21	3.0	597	101
SP-25(5A)-26	4.0	702	101
SP-25(5A)-39	5.5	1019	101
SP-25(5A)-39	5.5	1081	138
SP-25(5A)-52	7.5	1663	140

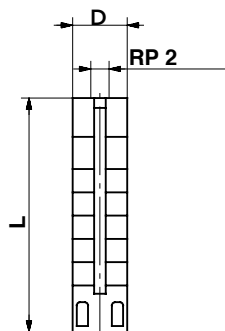
D = Maximum pump diameter including cable guard.

Performance Curve SP 40 (8A)

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Dimensions SP 40 (8A)

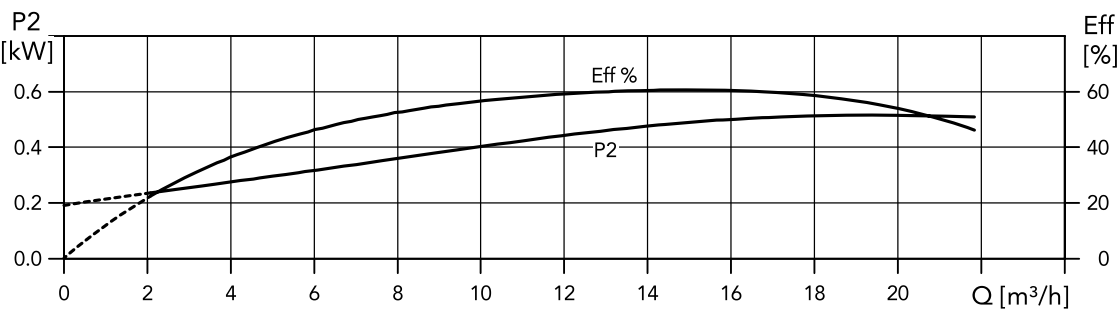
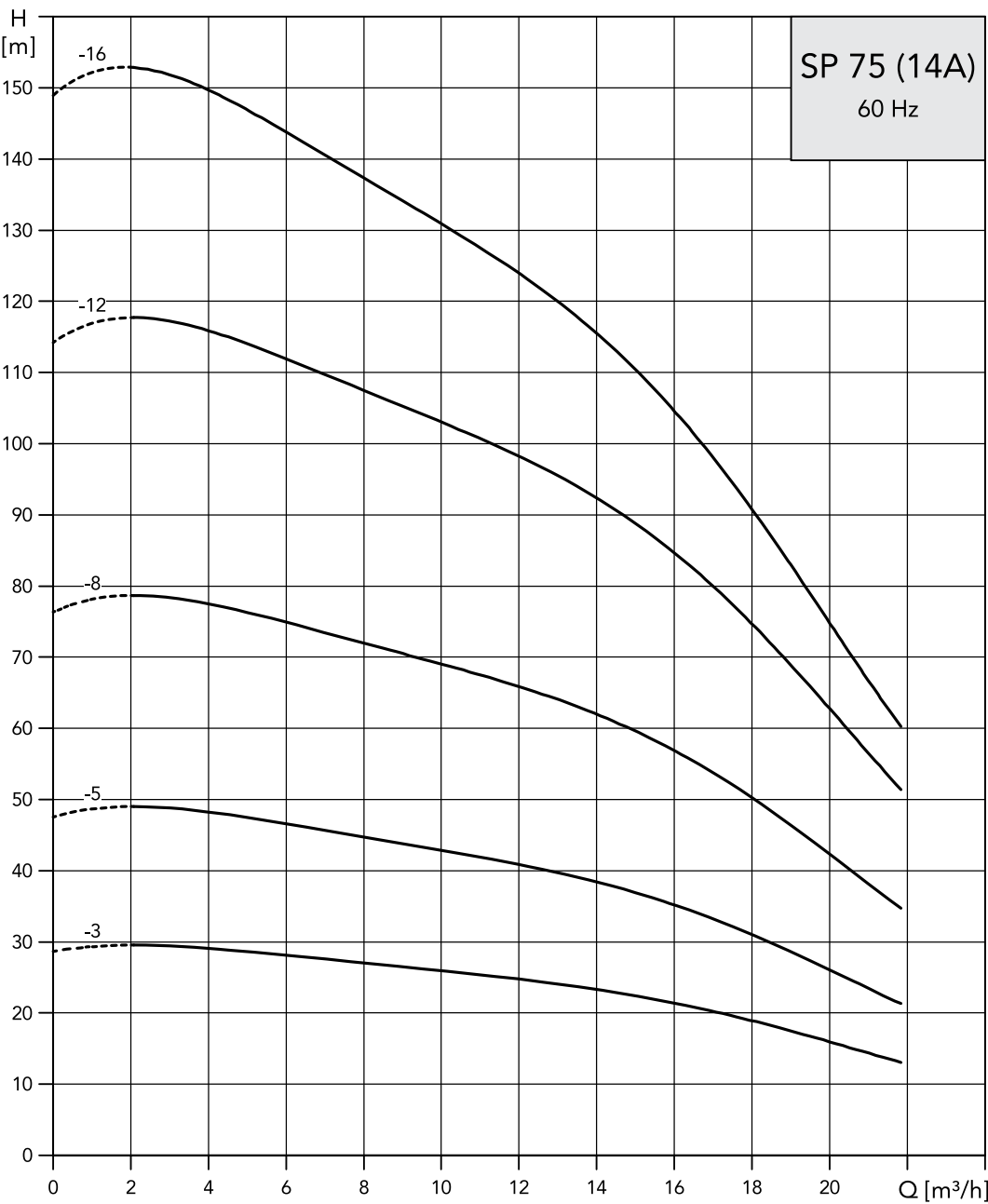


Pump Type	Motor (kW)	Dimension	
		L	D
SP-40(8A)-3	0.55	325	101
SP-40(8A)-5	1.1	409	101
SP-40(8A)-7	1.5	493	101
SP-40(8A)-9	2.2	577	101
SP-40(8A)-12	3.0	703	101
SP-40(8A)-15	4.0	829	101
SP-40(8A)-18	5.5	955	101
SP-40(8A)-21	5.5	1081	101
SP-40(8A)-25	5.5	1249	101
SP-40(8A)-30	7.5	1459	101
SP-40(8A)-18	5.5	1017	138
SP-40(8A)-21	5.5	1143	138
SP-40(8A)-25	5.5	1311	138
SP-40(8A)-30	7.5	1521	138
SP-40(8A)-37	9.2	1815	138
SP-40(8A)-44	11.0	2109	138
SP-40(8A)-50	13.0	2677	140
SP-40(8A)-58	15.0	3013	140
SP-40(8A)-66	15.0	3349	140

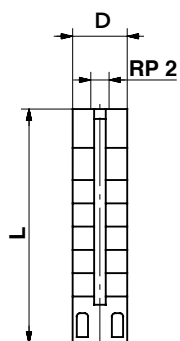
D = Maximum pump diameter including cable guard.

Performance Curve SP 75 (14A)

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Dimensions SP 75 (14A)

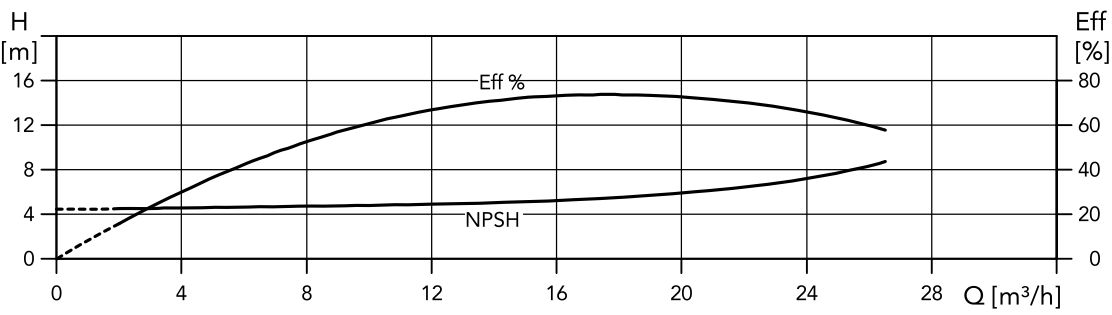
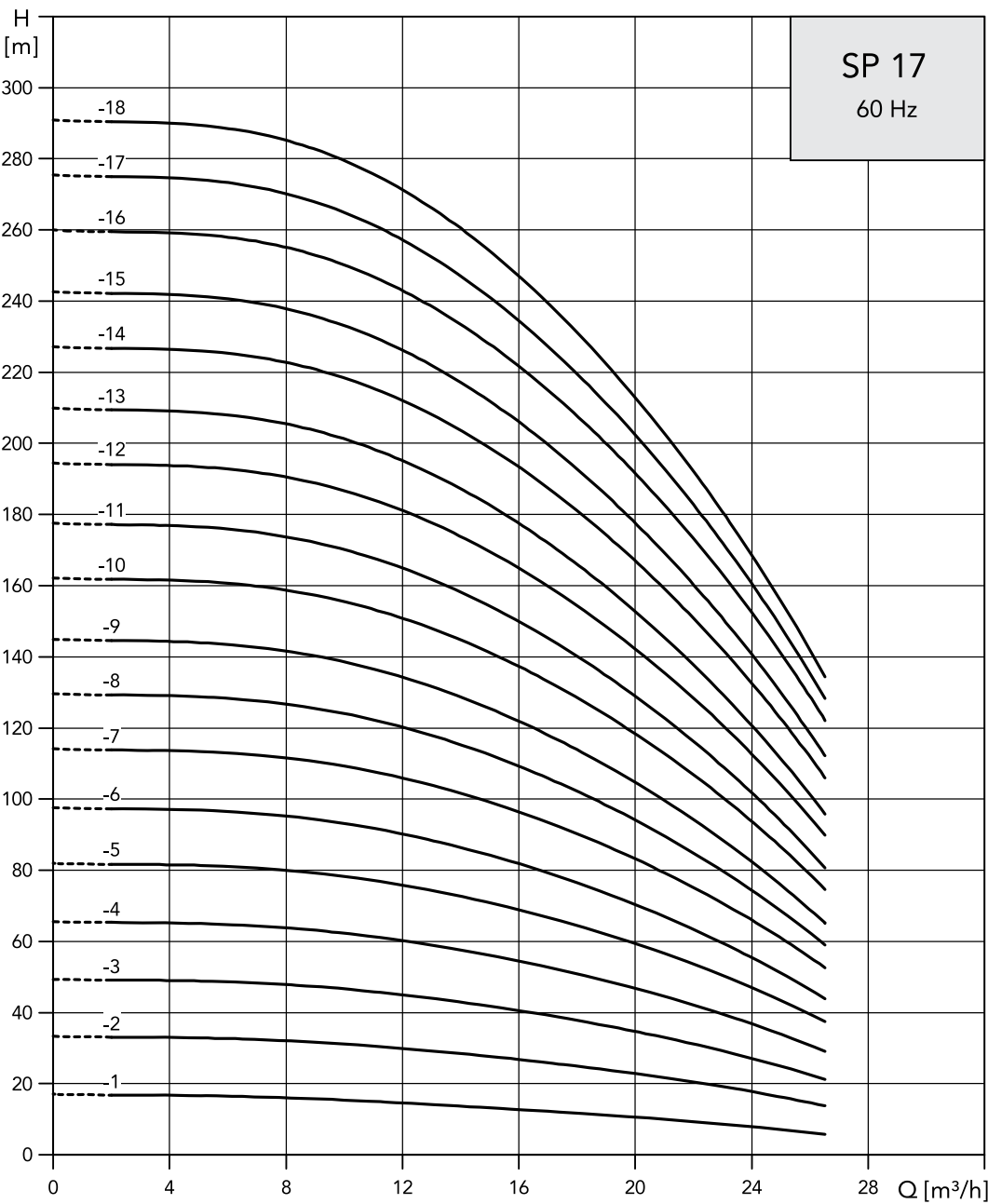


Pump Type	Motor (kW)	Dimension	
		L	D
SP-75(14A)-3	1.5	380	101
SP-75(14A)-5	2.2	510	101
SP-75(14A)-8	4.0	705	101
SP-75(14A)-12	5.5	965	101
SP-75(14A)-16	7.5	1225	101

D = Maximum pump diameter including cable guard.

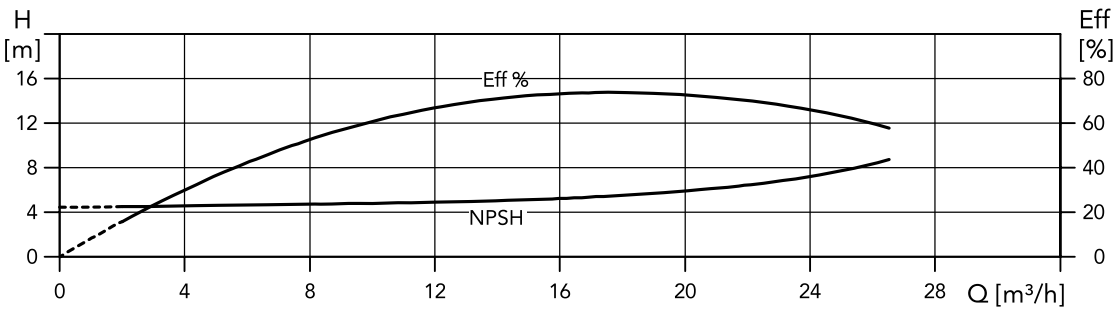
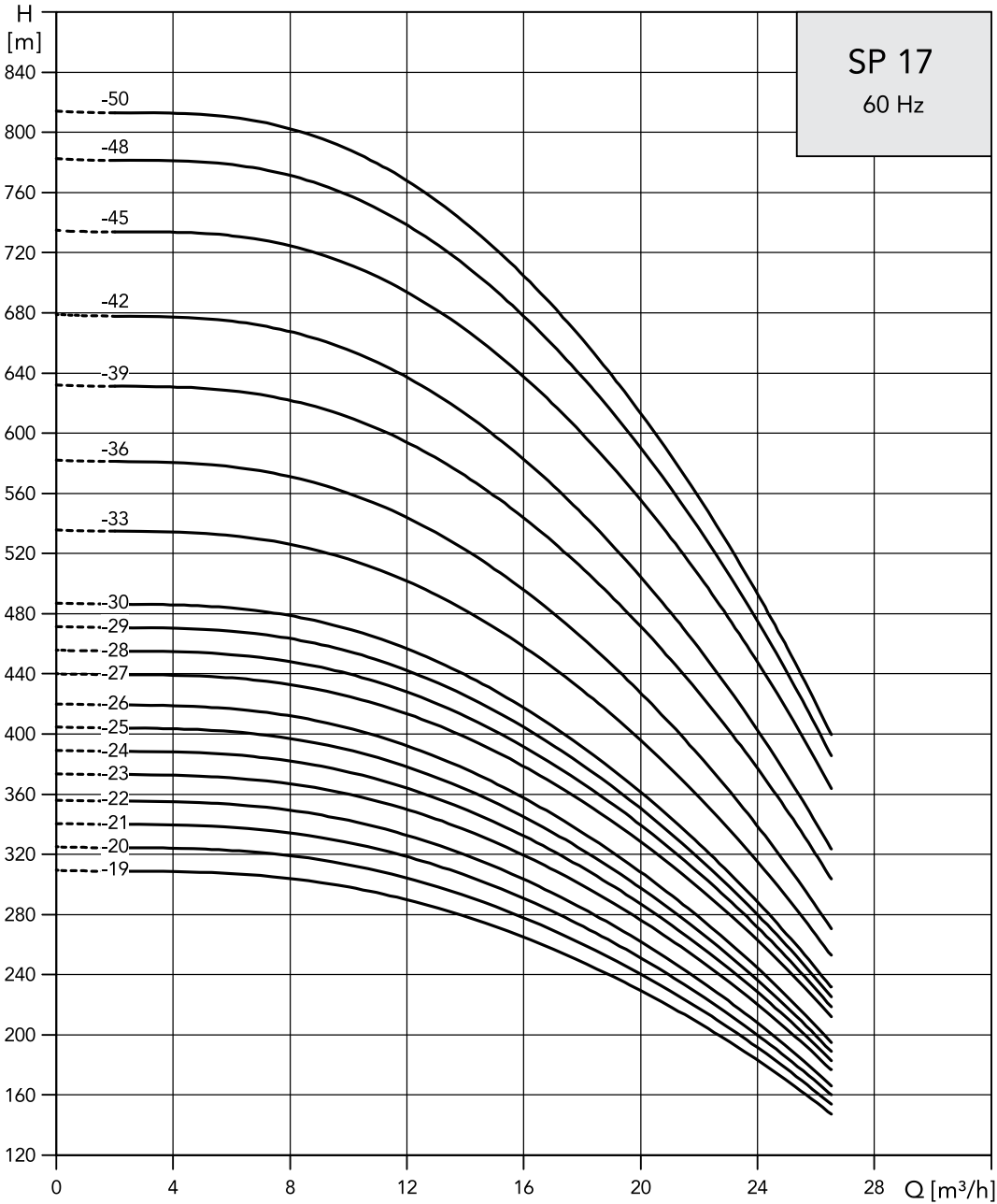
Performance Curve SP 17

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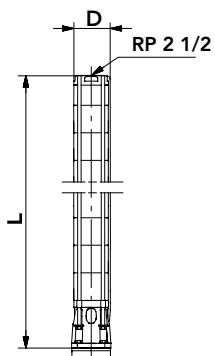
Performance Curve SP 17

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Dimensions

SP 17

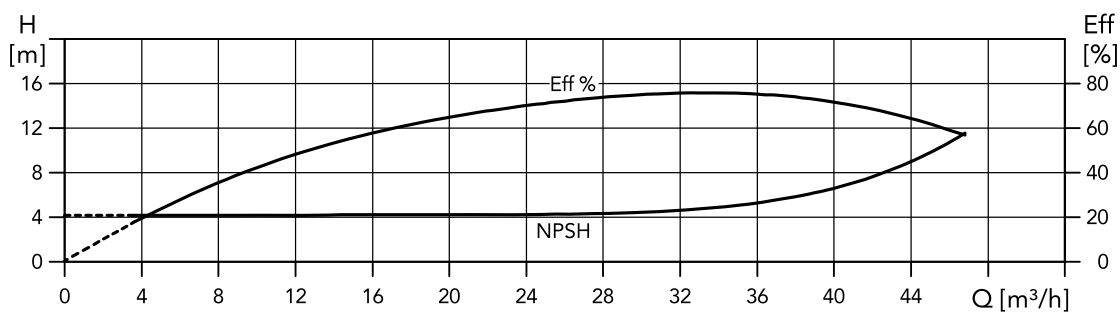
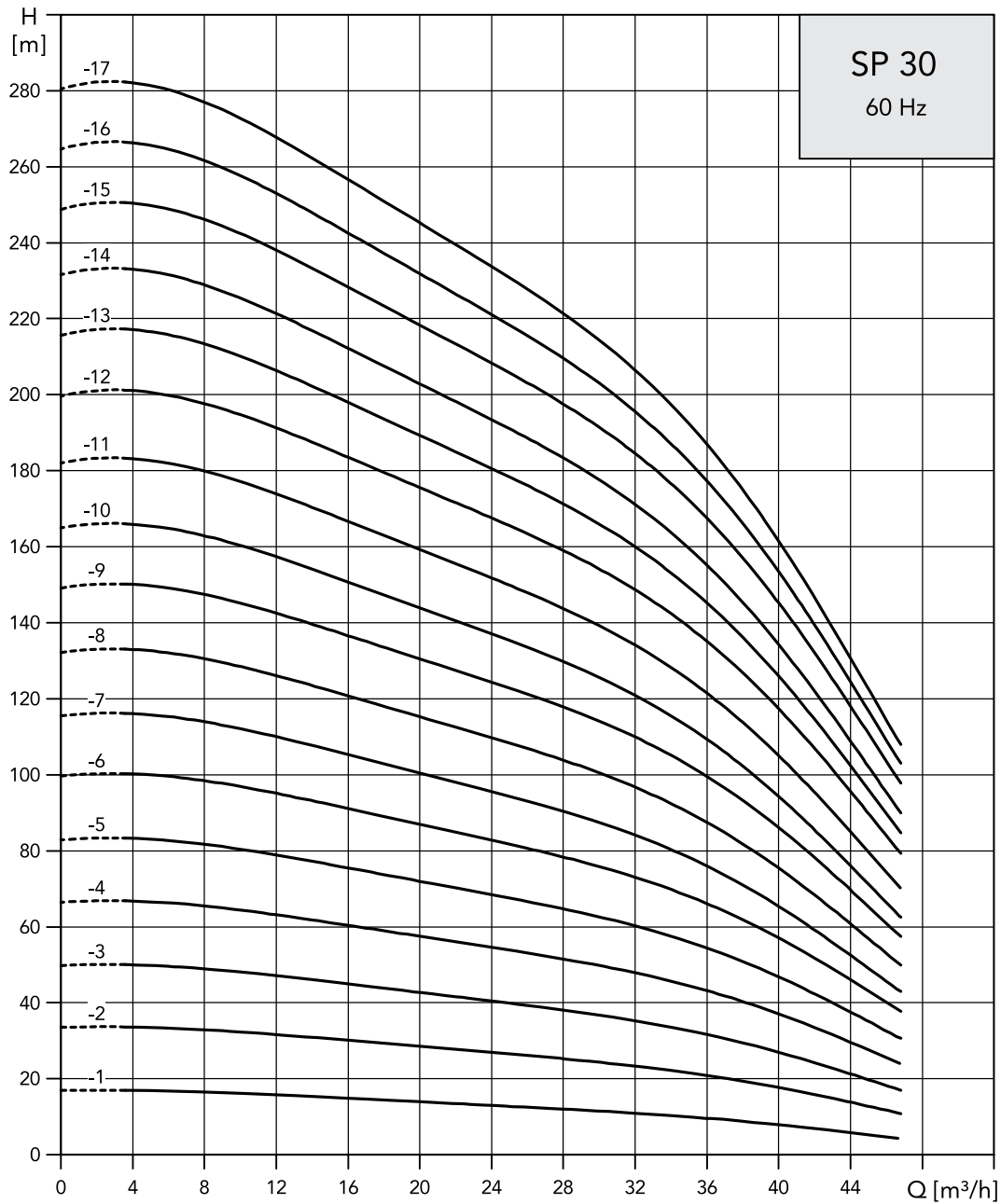


Pump Type	Motor (kW)	Dimension	
		L	D
SP-17-1	1.1	314	131
SP-17-2	2.2	374	131
SP-17-3	3.0	435	131
SP-17-4	4.0	495	131
SP-17-5	5.5	556	131
SP-17-6	5.5	616	131
SP-17-7	7.5	677	131
SP-17-8	7.5	737	131
SP-17-9	7.5	798	131
SP-17-5	5.5	572	142
SP-17-6	5.5	632	142
SP-17-7	7.5	693	142
SP-17-8	7.5	753	142
SP-17-9	7.5	814	142
SP-17-10	9.2	874	142
SP-17-11	9.2	935	142
SP-17-12	11	995	142
SP-17-13	11	1056	142
SP-17-14	13	1116	142
SP-17-15	13	1177	142
SP-17-16	15	1237	142
SP-17-17	15	1298	142
SP-17-18	15	1358	142
SP-17-19	18.5	1419	142
SP-17-20	18.5	1479	142
SP-17-21	18.5	1540	142
SP-17-22	18.5	1600	142
SP-17-23	22	1661	142
SP-17-24	22	1721	142
SP-17-25	22	1782	142
SP-17-26	22	1842	142
SP-17-27	26	1903	142
SP-17-28	26	1963	142
SP-17-29	26	2024	142
SP-17-30	26	2084	142
SP-17-33	30	2513	192
SP-17-36	30	2694	192
SP-17-39	37	2876	192
SP-17-42	37	3057	192
SP-17-45	45	3188	192
SP-17-48	45	3369	192
SP-17-50	45	3490	192

D = Maximum pump diameter including cable guard with 4" 6" or 8" motors.

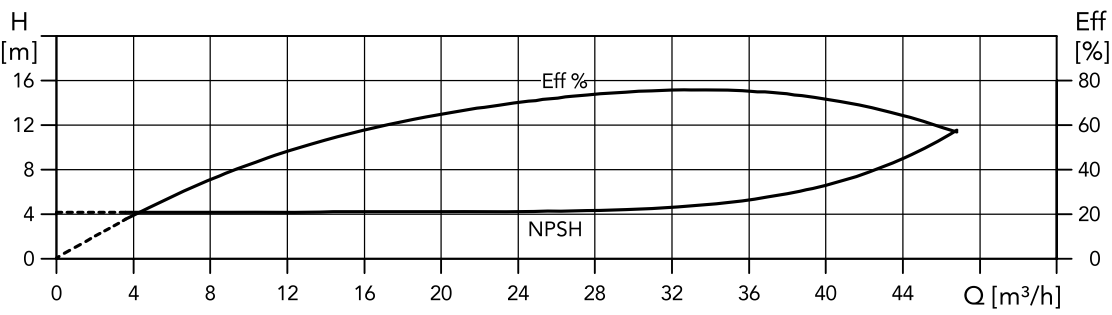
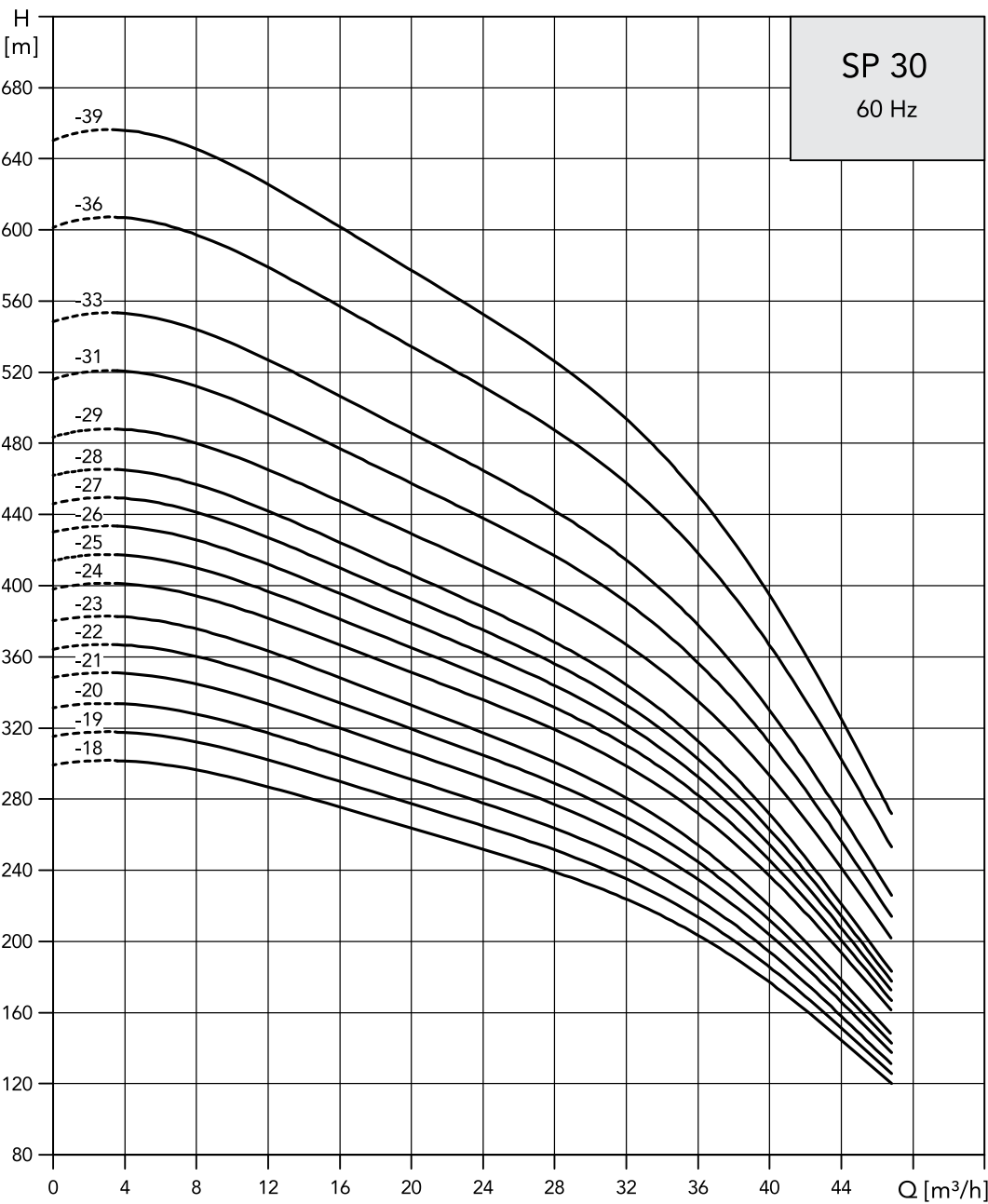
Performance Curve SP 30

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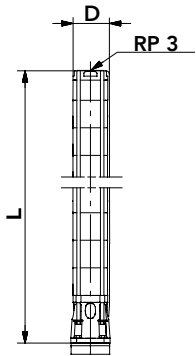


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Dimensions SP 30

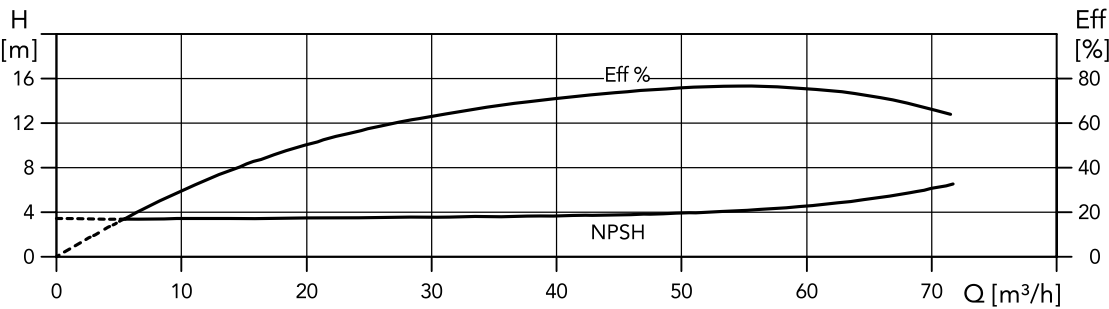
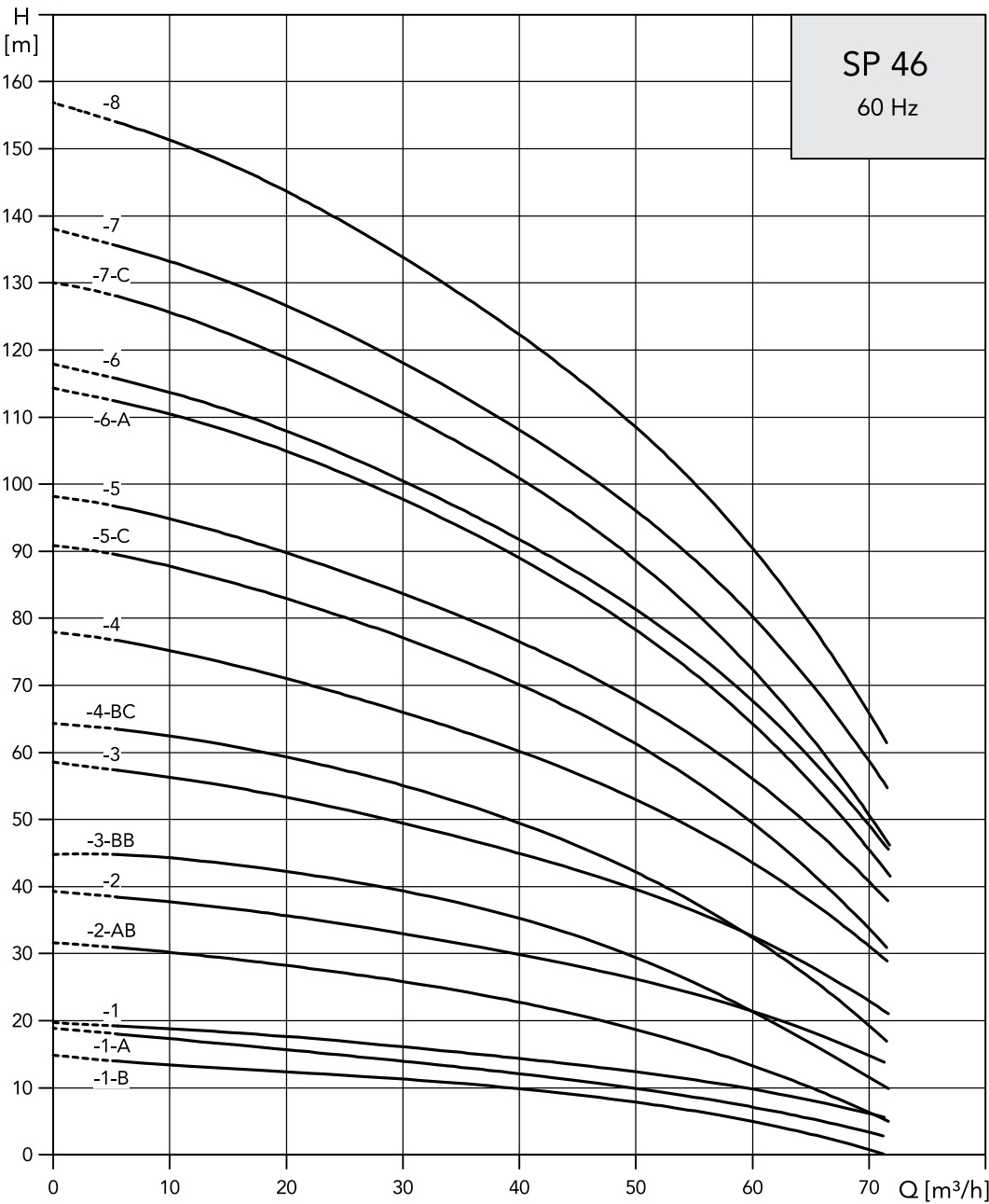


Pump Type	Motor (kW)	Dimension	
		L	D
SP-30-1	1.5	349	131
SP-30-2	3	445	131
SP-30-3	4	541	131
SP-30-4	5.5	637	131
SP-30-5	7.5	733	131
SP-30-4	5.5	653	142
SP-30-5	7.5	749	142
SP-30-6	9.2	845	142
SP-30-7	9.2	941	142
SP-30-8	11	1037	142
SP-30-9	13	1133	142
SP-30-10	13	1229	142
SP-30-11	15	1325	142
SP-30-12	18.5	1421	142
SP-30-13	18.5	1517	142
SP-30-14	18.5	1613	142
SP-30-15	22	1709	142
SP-30-16	22	1805	142
SP-30-17	22	1901	142
SP-30-18	26	1997	142
SP-30-19	26	2093	142
SP-30-20	26	2189	142
SP-30-21	30	2285	144
SP-30-22	30	2381	144
SP-30-23	30	2477	144
SP-30-24	37	2573	192
SP-30-25	37	2669	192
SP-30-26	37	2765	192
SP-30-27	37	2861	192
SP-30-28	37	2957	192
SP-30-29	45	3249	192
SP-30-31	45	3441	192
SP-30-33	45	3633	192
SP-30-36	55	3921	192
SP-30-39	55	4209	192

D = Maximum pump diameter including cable guard with 4" 6" or 8" motors.

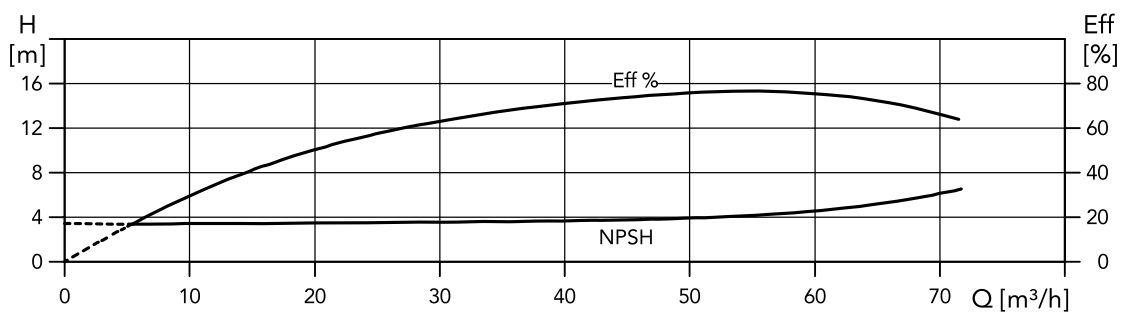
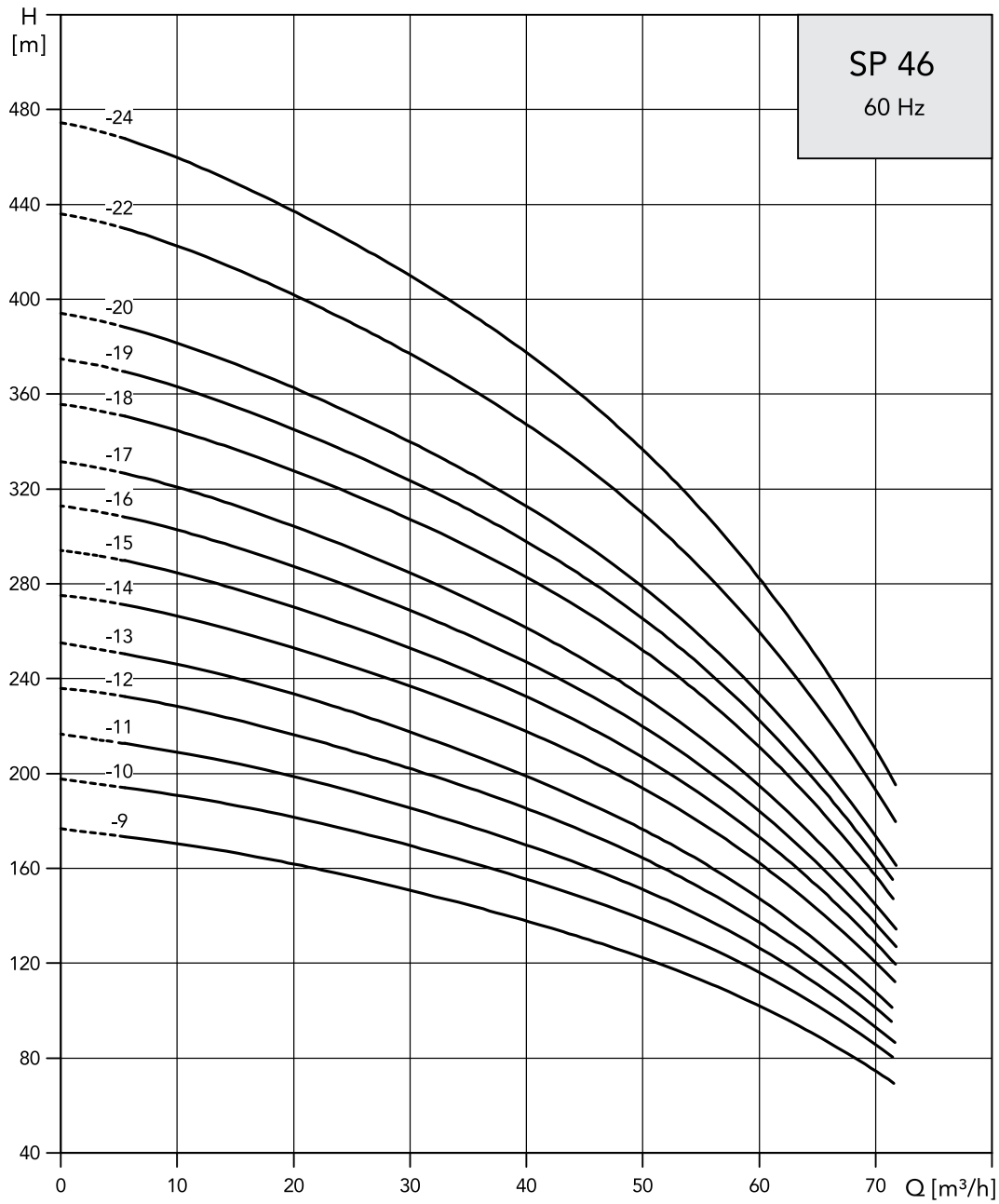
Performance Curve SP 46

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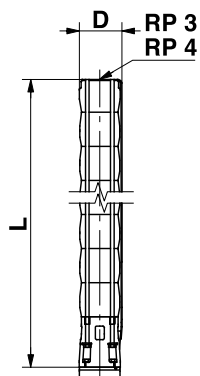


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Dimensions SP 46



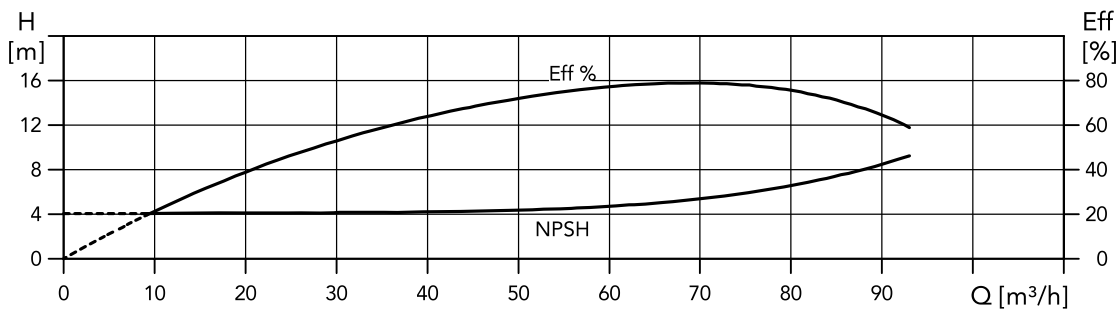
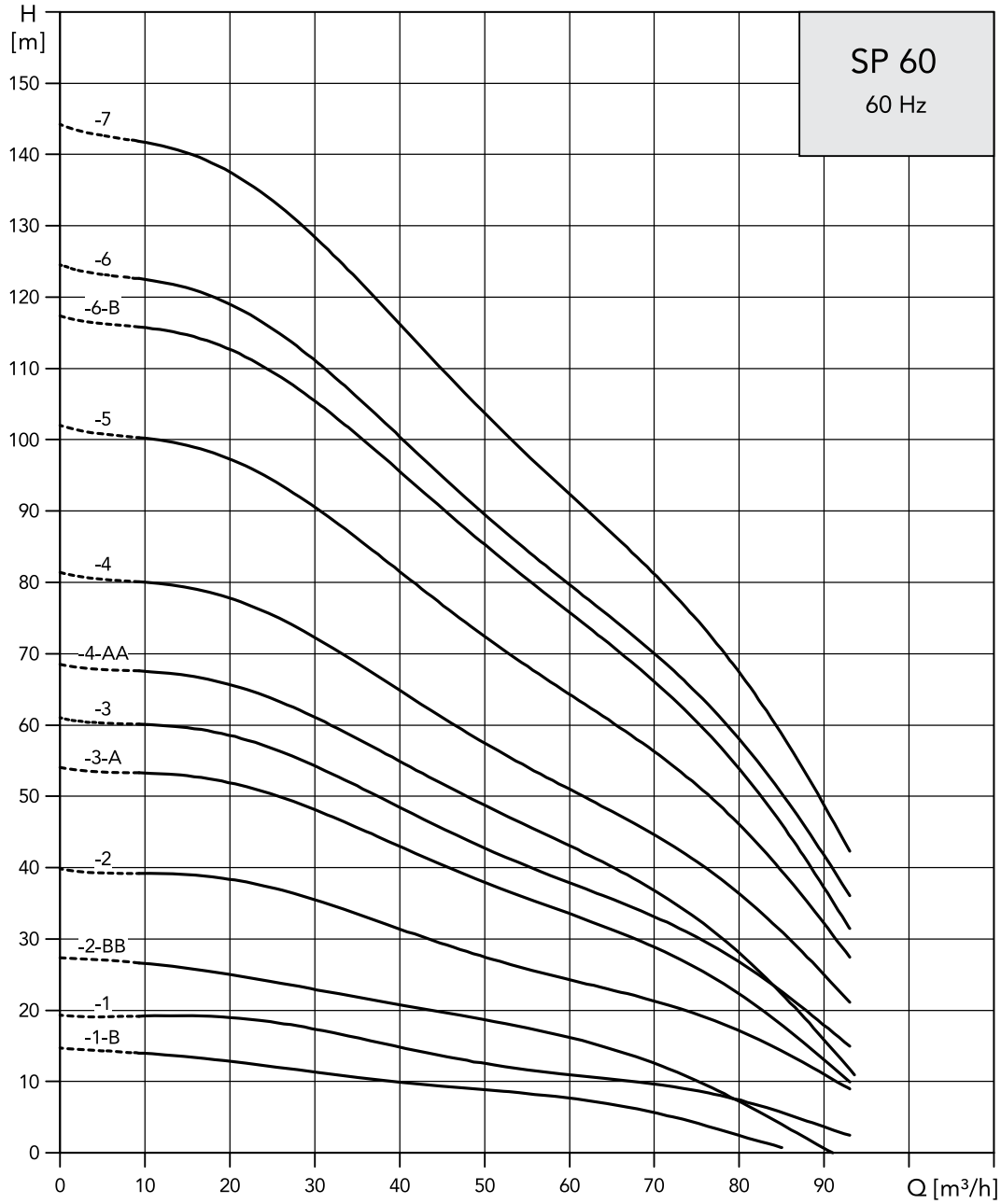
Pump Type	Motor (kW)	Dimension					
		RP 3 Connection			RP 4 Connection		
		L	D*	D**	L	D*	D**
SP-46-1-B	1.5	367	146	148	370	146	148
SP-46-1-B	1.5	367	146	148	370	146	148
SP-46-1-A	2.2	367	146	148	370	146	148
SP-46-1	3	367	146	148	370	146	148
SP-46-2-AB	4.0	480	146	148	483	146	148
SP-46-2	5.5	480	146	148	483	146	148
SP-46-3-BB	5.5	593	146	148	593	146	148
SP-46-3	7.5	593	149	152	596	149	152
SP-46-3	7.5	609	149	152	612	149	152
SP-46-4-BC	7.5	722	149	152	725	149	152
SP-46-4	9.2	722	149	152	725	149	152
SP-46-5-C	11	835	149	152	838	149	152
SP-46-5	13	835	149	152	838	149	152
SP-46-6-A	13	948	149	152	951	149	152
SP-46-6	15	948	149	152	951	149	152
SP-46-7-C	15	1061	149	152	1064	149	152
SP-46-7	18.5	1061	149	152	1064	149	152
SP-46-8	18.5	1174	149	152	1177	149	152
SP-46-9	22	1287	149	152	1290	149	152
SP-46-10	22	1400	149	152	1403	149	152
SP-46-11	26	1513	149	152	1516	149	152
SP-46-12	30	1626	149	152	1629	149	152
SP-46-13	30	1739	149	152	1742	149	152
SP-46-14	37	1932	149	152	1935	149	152
SP-46-15	37	2045	149	152	2048	149	152
SP-46-16	37	2158	149	152	2161	149	152
SP-46-17	37	2271	149	152	2274	149	152
SP-46-18	45	2333	192	192	2336	192	192
SP-46-19	45	2446	192	192	2449	192	192
SP-46-20	45	2559	192	192	2562	192	192
SP-46-22	55	2948	193	195	2951	195	195
SP-46-24	55				3177	195	195

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

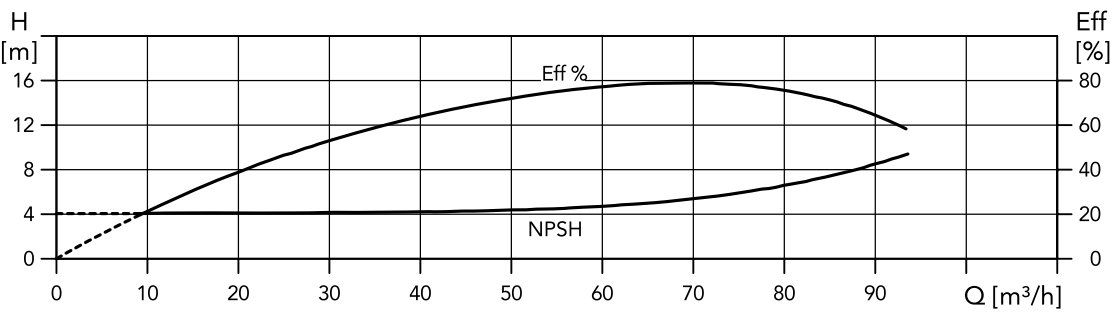
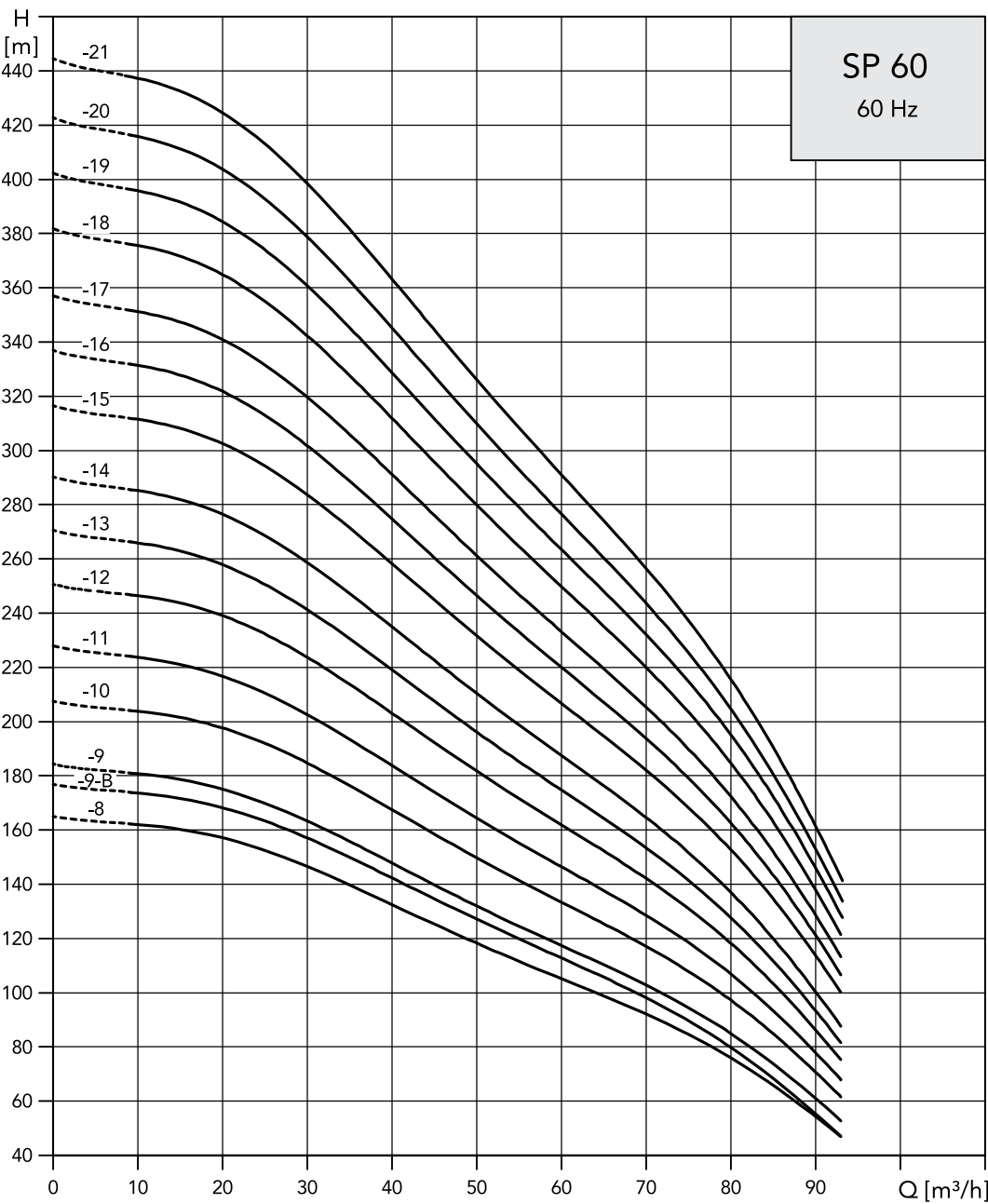
Performance Curve SP 60

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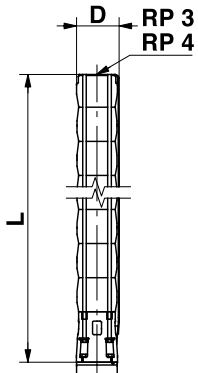


Performance Curve SP 60

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Dimensions SP 60



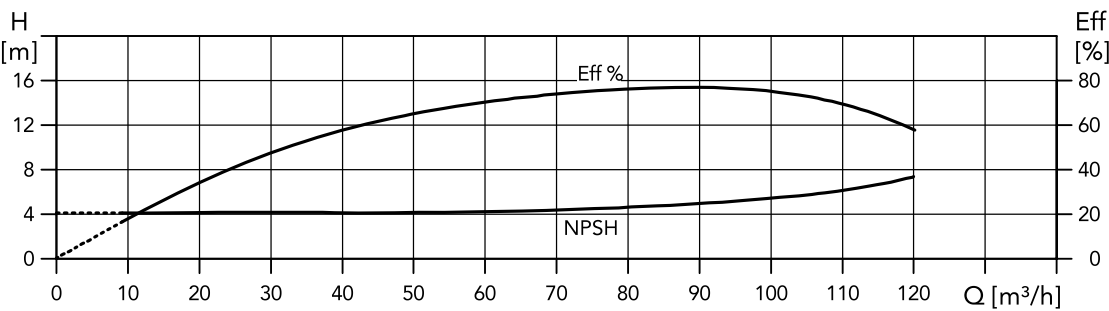
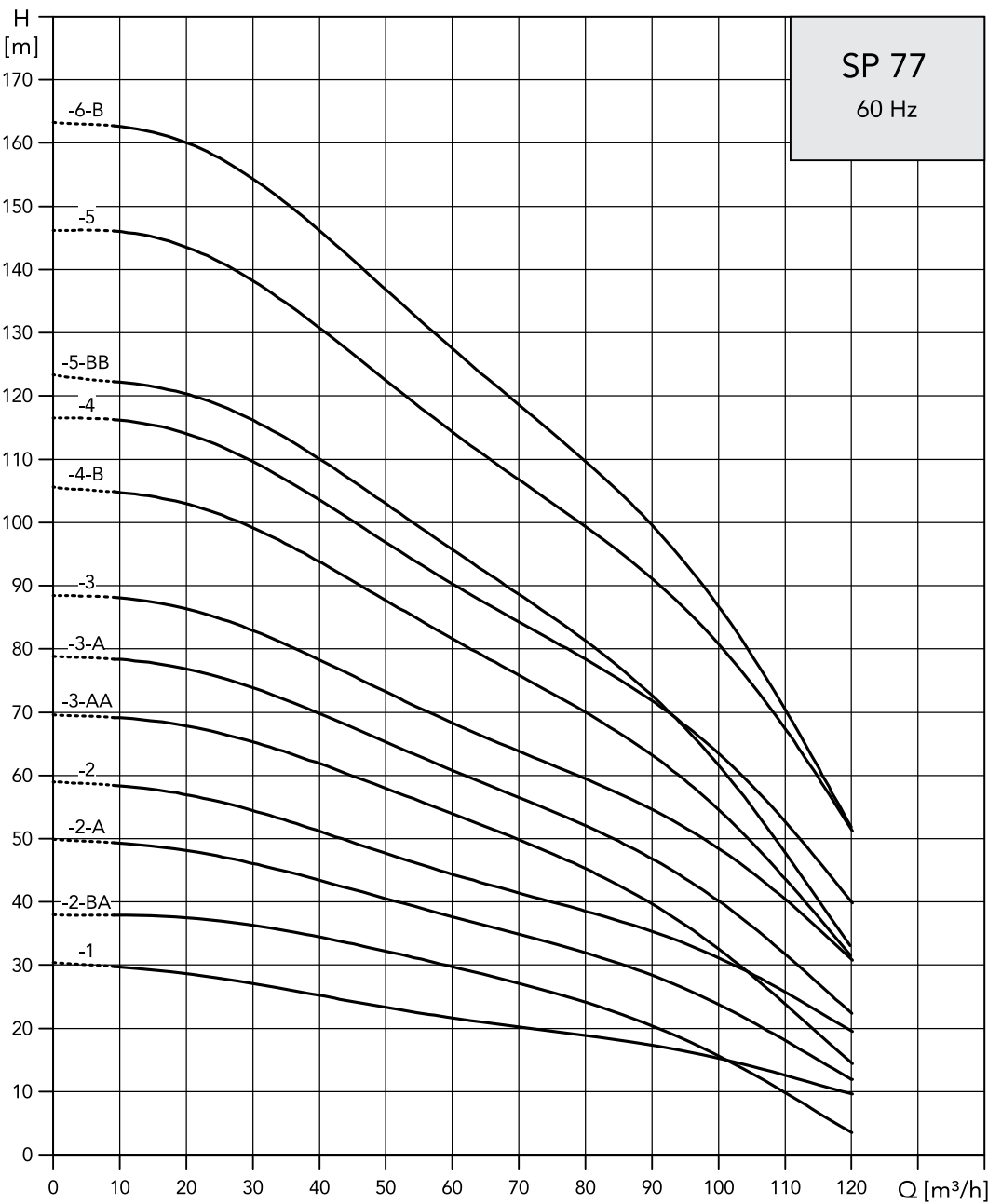
Pump Type	Motor (kW)	Dimension					
		RP 3 Connection			RP 4 Connection		
		L	D*	D**	L	D*	D**
SP-60-1-B	2.2	367	146	148	370	146	148
SP-60-1-A	3.7				370	146	148
SP-60-1	4.0	367	146	148	370	146	148
SP-60-2-BB	4.0	480	146	148	483	146	148
SP-60-2	5.5	480	146	148	483	146	148
SP-60-3-A	7.5	593	146	148	596	146	148
SP-60-3-A	7.5	609	152	156	612	152	156
SP-60-3	9.2	609	152	156	612	152	156
SP-60-4-AA	9.2	722	152	156	725	152	156
SP-60-4	11	722	152	156	725	152	156
SP-60-5	13	835	152	156	838	152	156
SP-60-6-B	15	948	152	156	951	152	156
SP-60-6	18.5	948	152	156	951	152	156
SP-60-7	18.5	1061	152	156	1064	152	156
SP-60-8	22	1174	152	156	1177	152	156
SP-60-9-B	22	1287	152	156	1290	152	156
SP-60-9	26	1287	152	156	1290	152	156
SP-60-10	26	1400	152	156	1403	152	156
SP-60-11	30	1513	152	156	1516	152	156
SP-60-12	37	1706	152	156	1709	152	156
SP-60-13	37	1819	152	156	1822	152	156
SP-60-14	37				1935	152	156
SP-60-15	45				1997	192	192
SP-60-16	45				2110	192	192
SP-60-17	45				2223	192	192
SP-60-18	55				2336	192	192
SP-60-19	55				2612	193	195
SP-60-20	55				2725	193	195
SP-60-21	63				2838	193	195

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

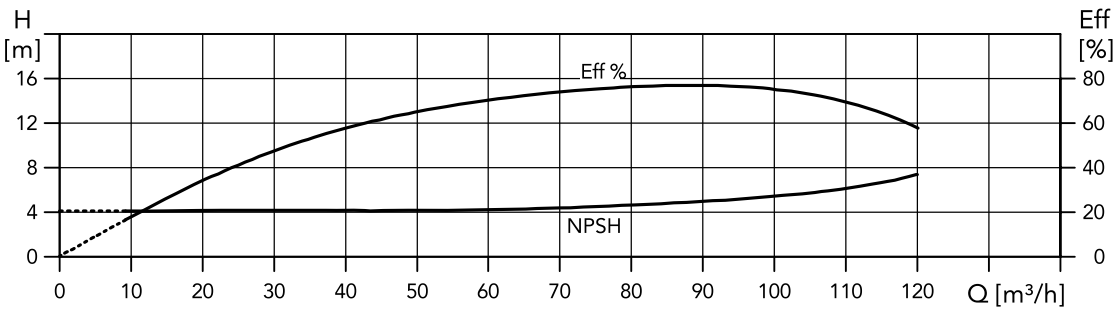
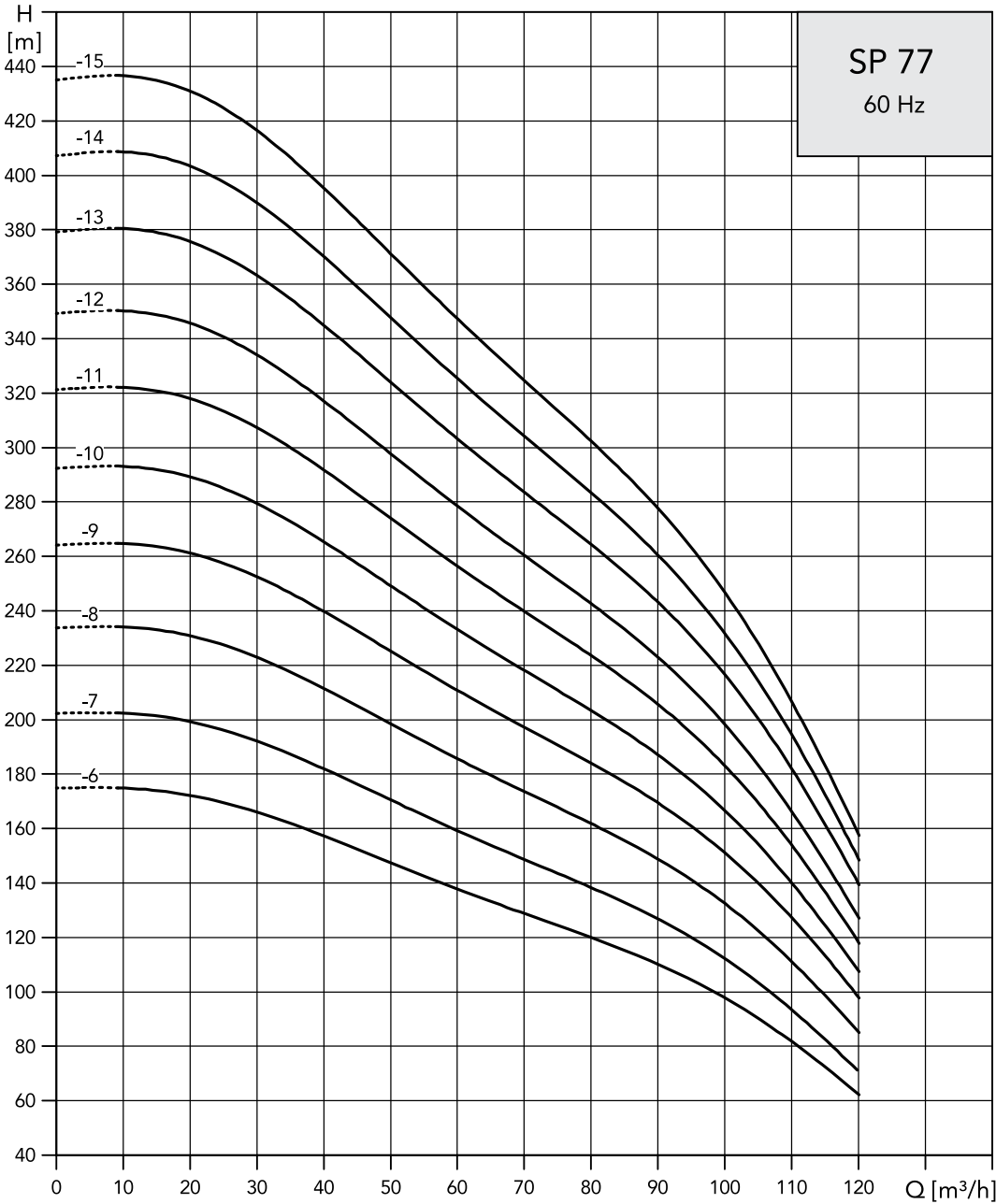
Performance Curve SP 77

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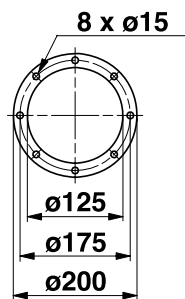
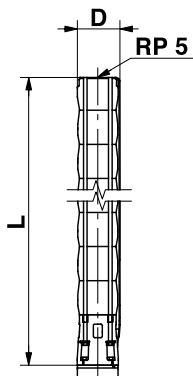


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Dimension SP 77



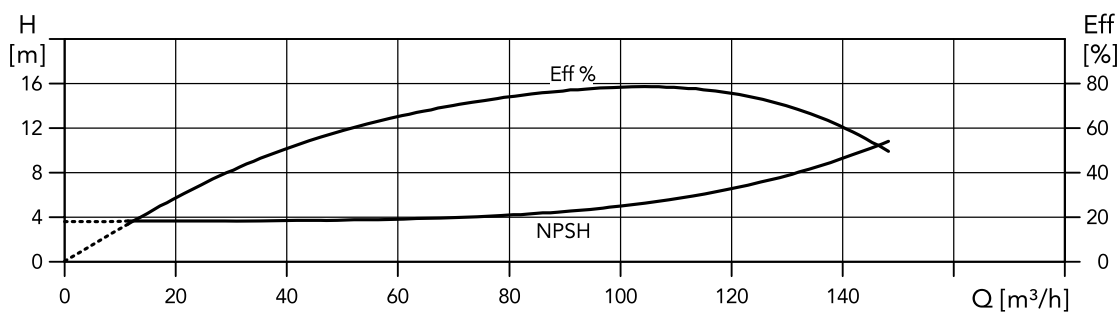
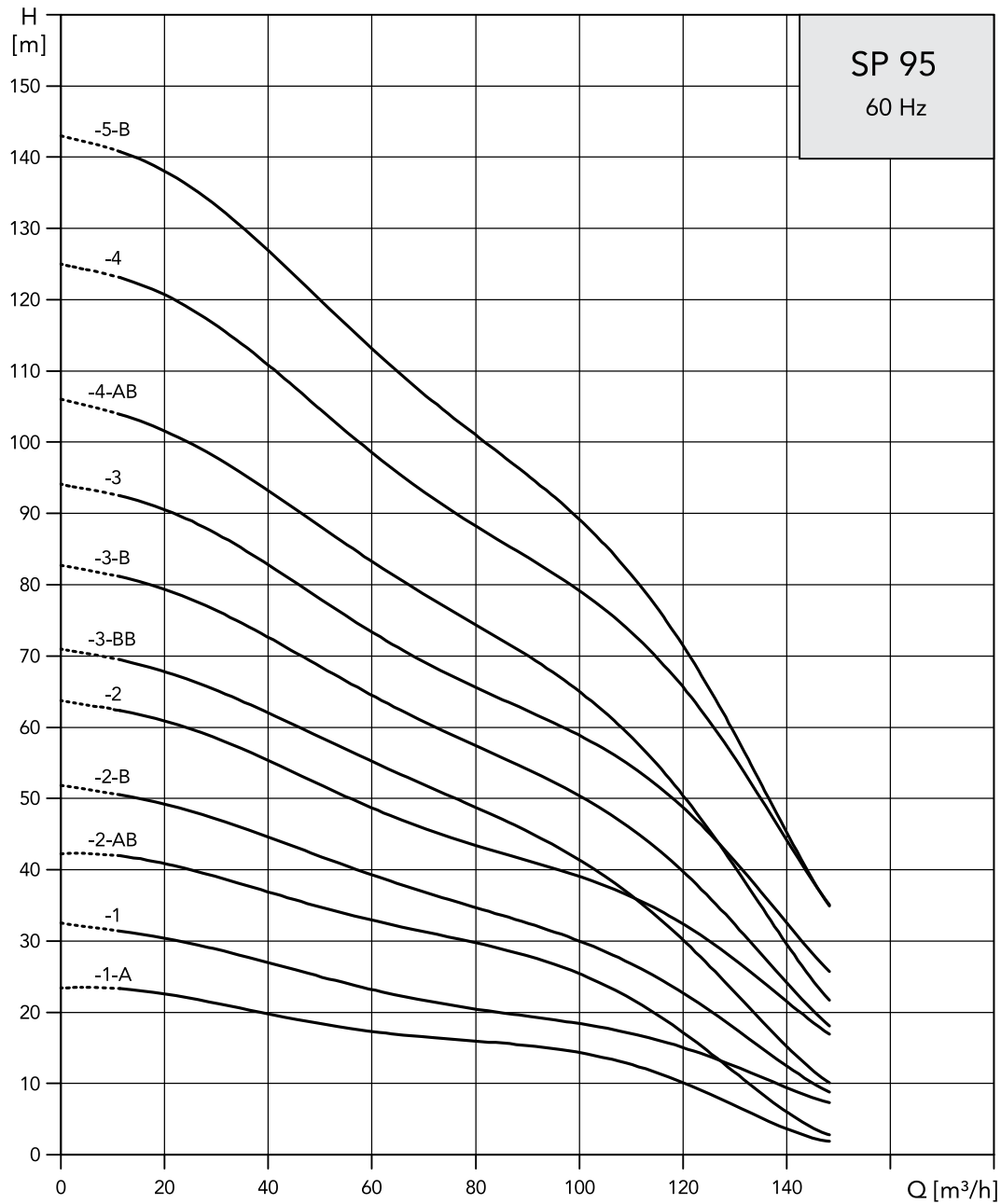
Pump Type	Motor (kW)	Dimension		
		RP 5 Connection		
		L	D*	D**
SP-77-1	5.5	618	178	186
SP-77-2-BA	7.5	746	178	186
SP-77-2-A	9.2	746	178	186
SP-77-2	11	746	178	186
SP-77-3-AA	13	874	178	186
SP-77-3-A	15	874	178	186
SP-77-3	18.5	874	178	186
SP-77-4-B	18.5	1002	178	186
SP-77-4	22	1002	178	186
SP-77-5-BB	22	1130	178	186
SP-77-5	26	1130	178	186
SP-77-6-B	30	1258	178	186
SP-77-6	37	1258	178	186
SP-77-7	37	1386	178	186
SP-77-8	45	1528	200	204
SP-77-9	55	1656	200	204
SP-77-10	55	1784	200	204
SP-77-11	63	1912	200	204
SP-77-12	63	2040	200	204
SP-77-13	75	2168	200	204
SP-77-14	92	2596	200	204
SP-77-15	92	2724	200	204

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

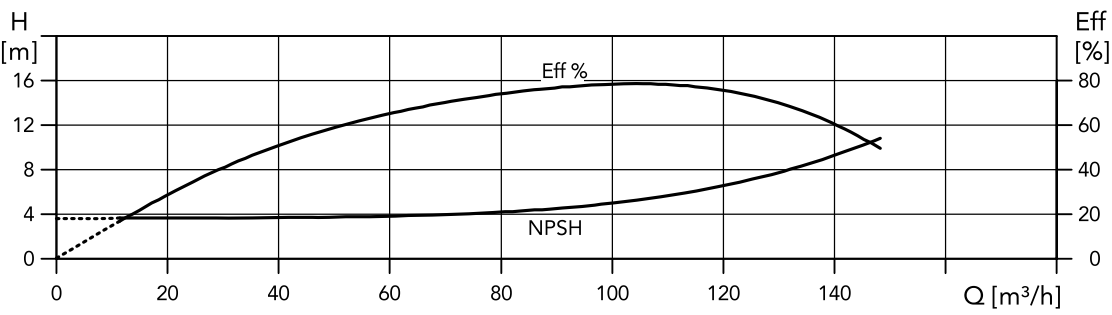
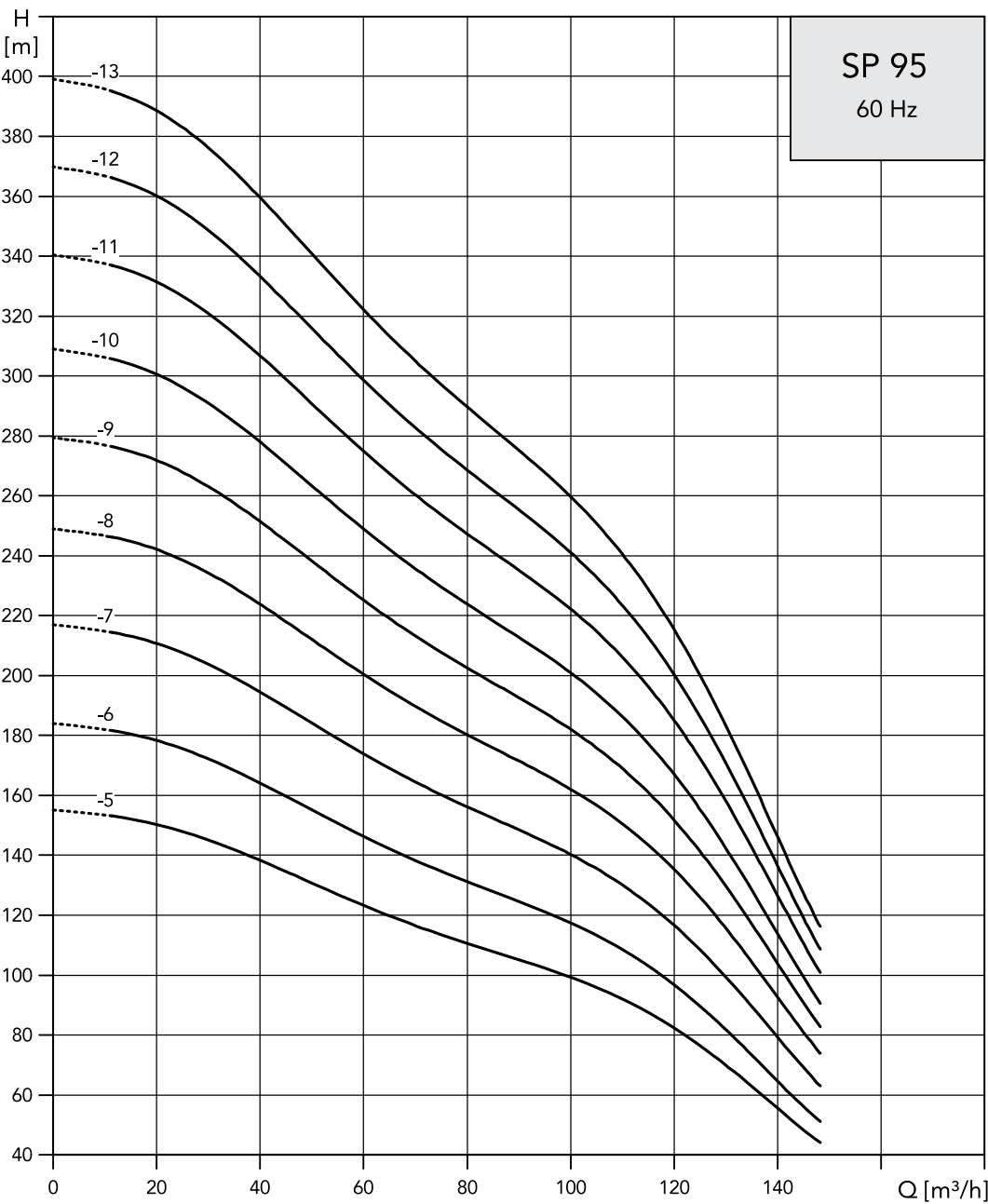
Performance Curve SP 95

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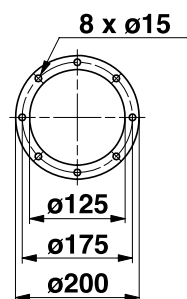
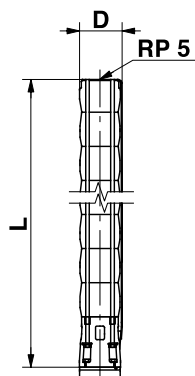


Performance Curve SP 95

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Dimension SP 95



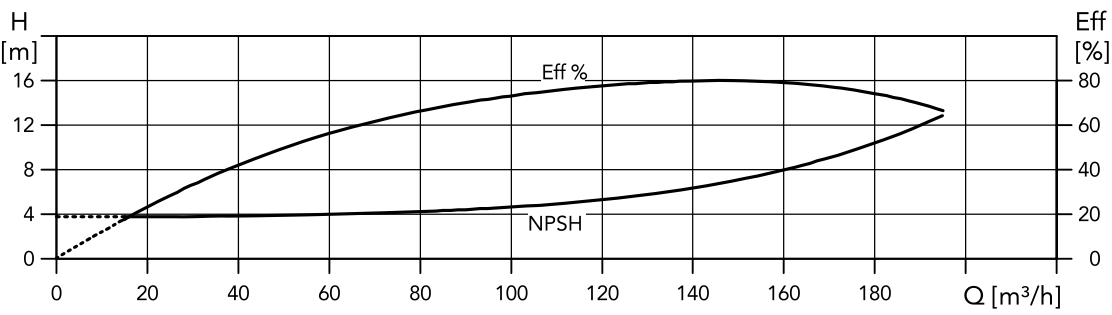
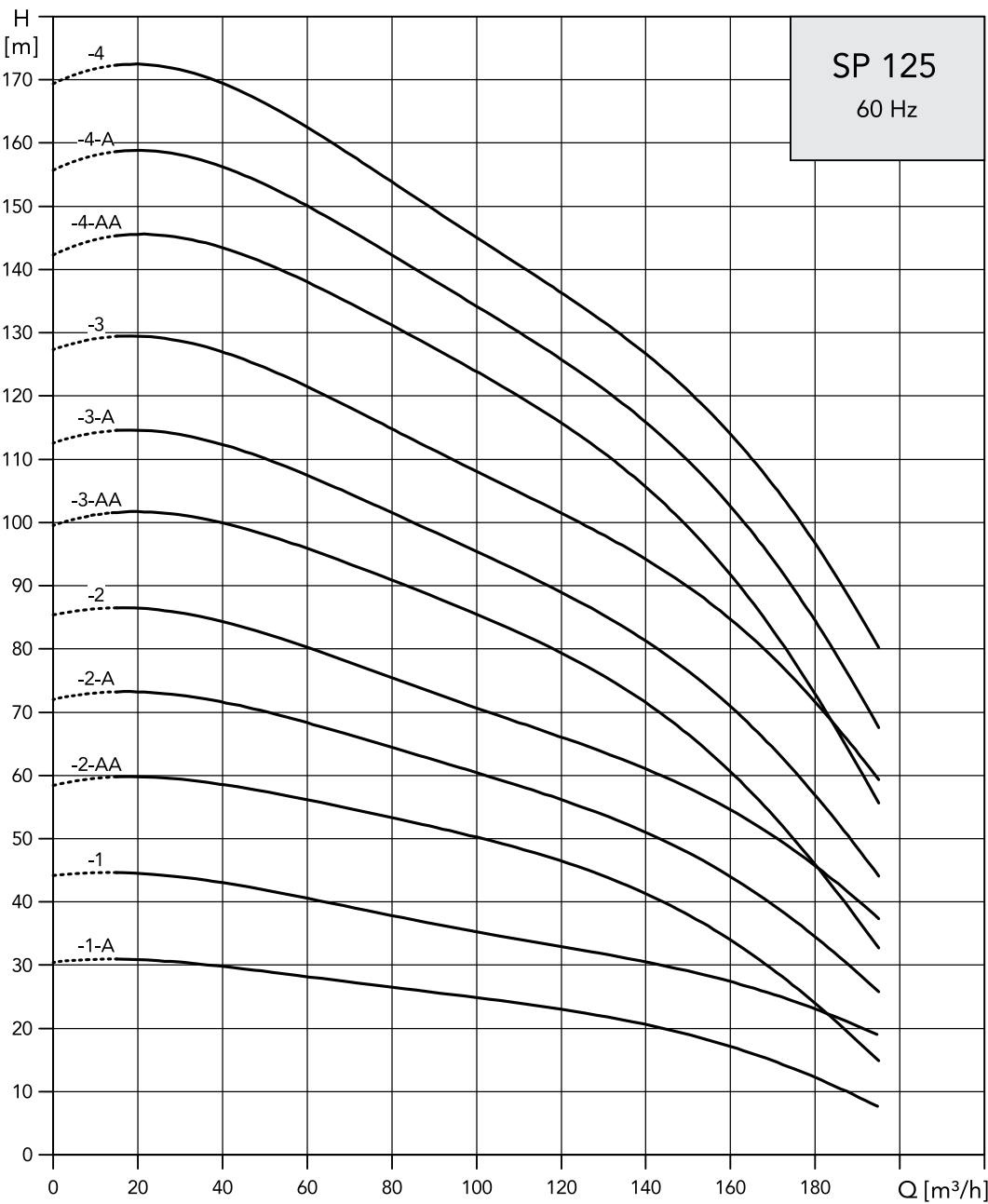
Pump Type	Motor (kW)	Dimension		
		RP 5 Connection		
		L	D*	D**
SP-95-1-A	5.5	618	179	183
SP-95-1	7.5	618	179	183
SP-95-2-AB	9.2	746	179	183
SP-95-2-B	11	746	179	183
SP-95-2	13	746	179	183
SP-95-3-BB	15	874	179	183
SP-95-3-B	18.5	874	179	183
SP-95-3	22	874	179	183
SP-95-4-AB	22	1002	179	183
SP-95-4	26	1002	179	183
SP-95-5-B	30	1130	179	183
SP-95-5	37	1130	179	183
SP-95-6	37	1258	179	183
SP-95-7	45	1400	205	205
SP-95-8	55	1528	205	205
SP-95-9	63	1656	205	205
SP-95-10	63	1784	205	205
SP-95-11	75	1912	205	205
SP-95-12	92	2040	205	205
SP-95-13	92	2168	205	205

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

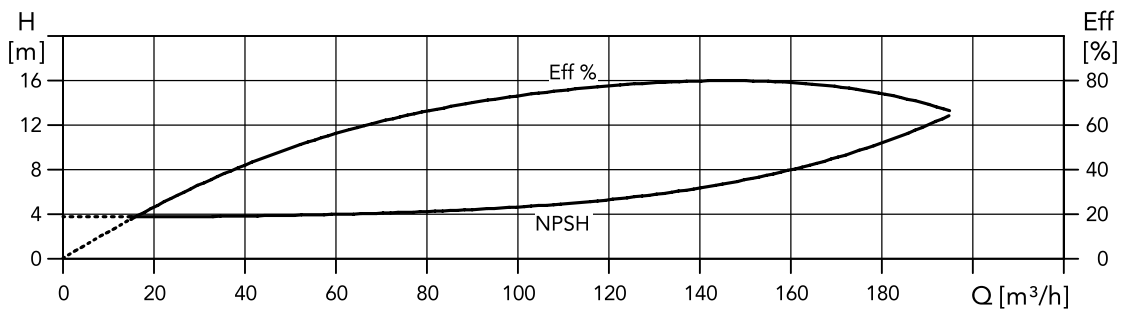
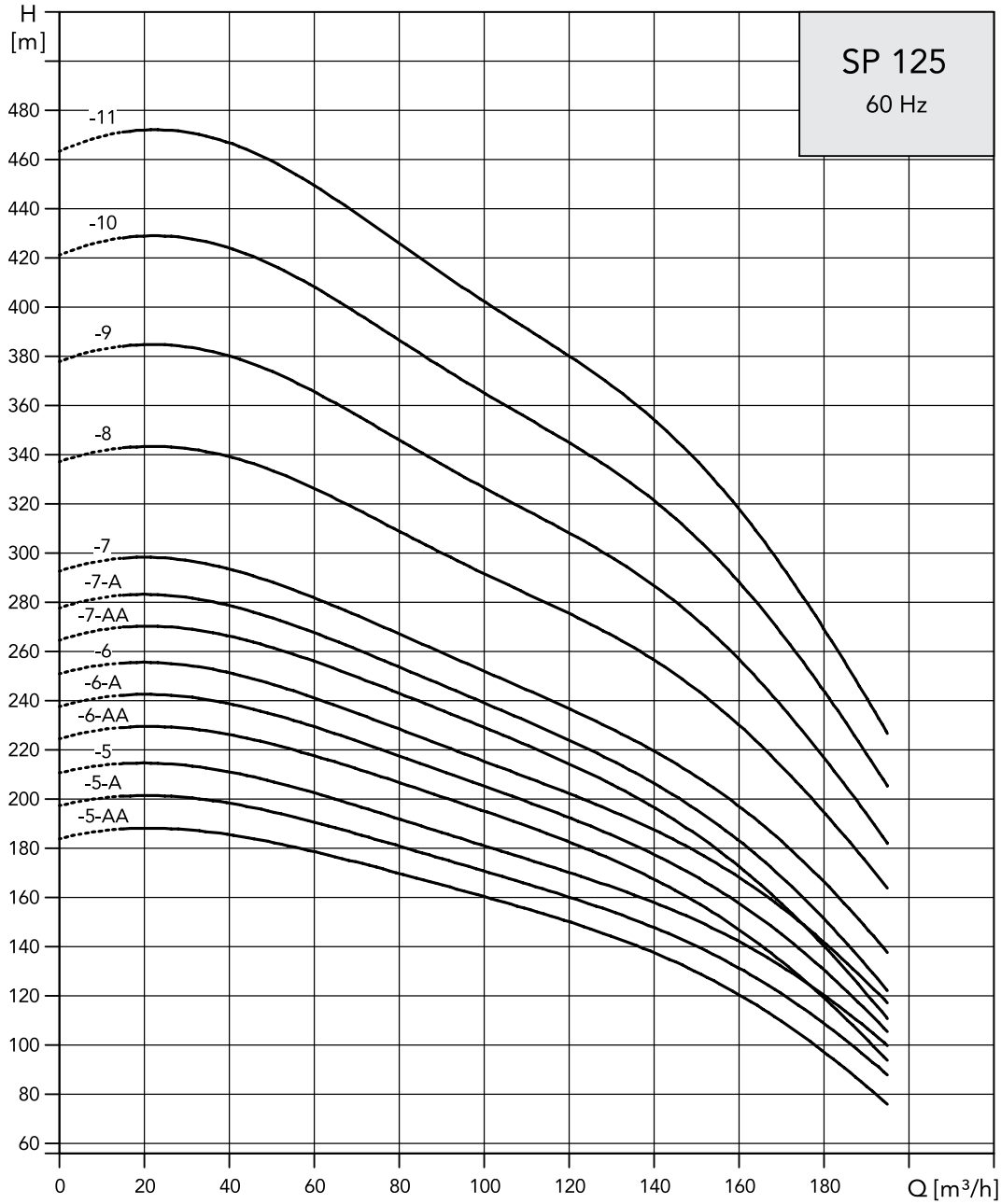
Performance Curve SP 125

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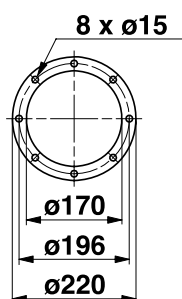
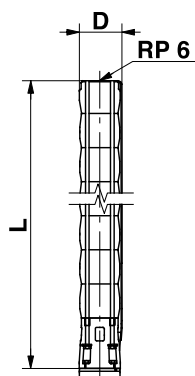


Performance Curve SP 125

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Dimension SP 125



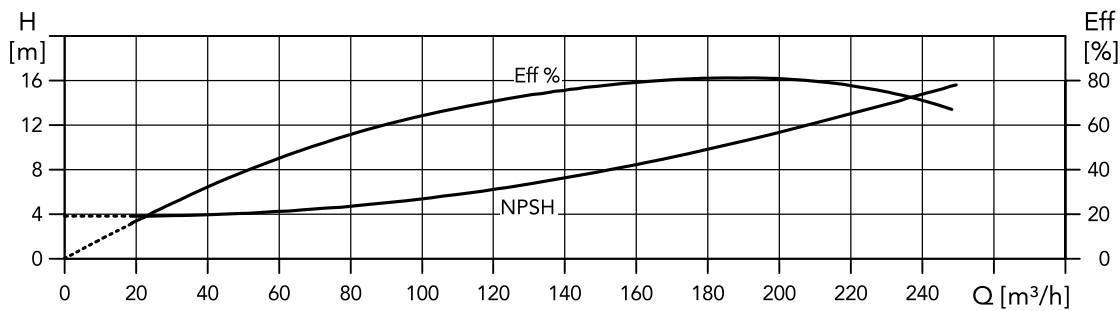
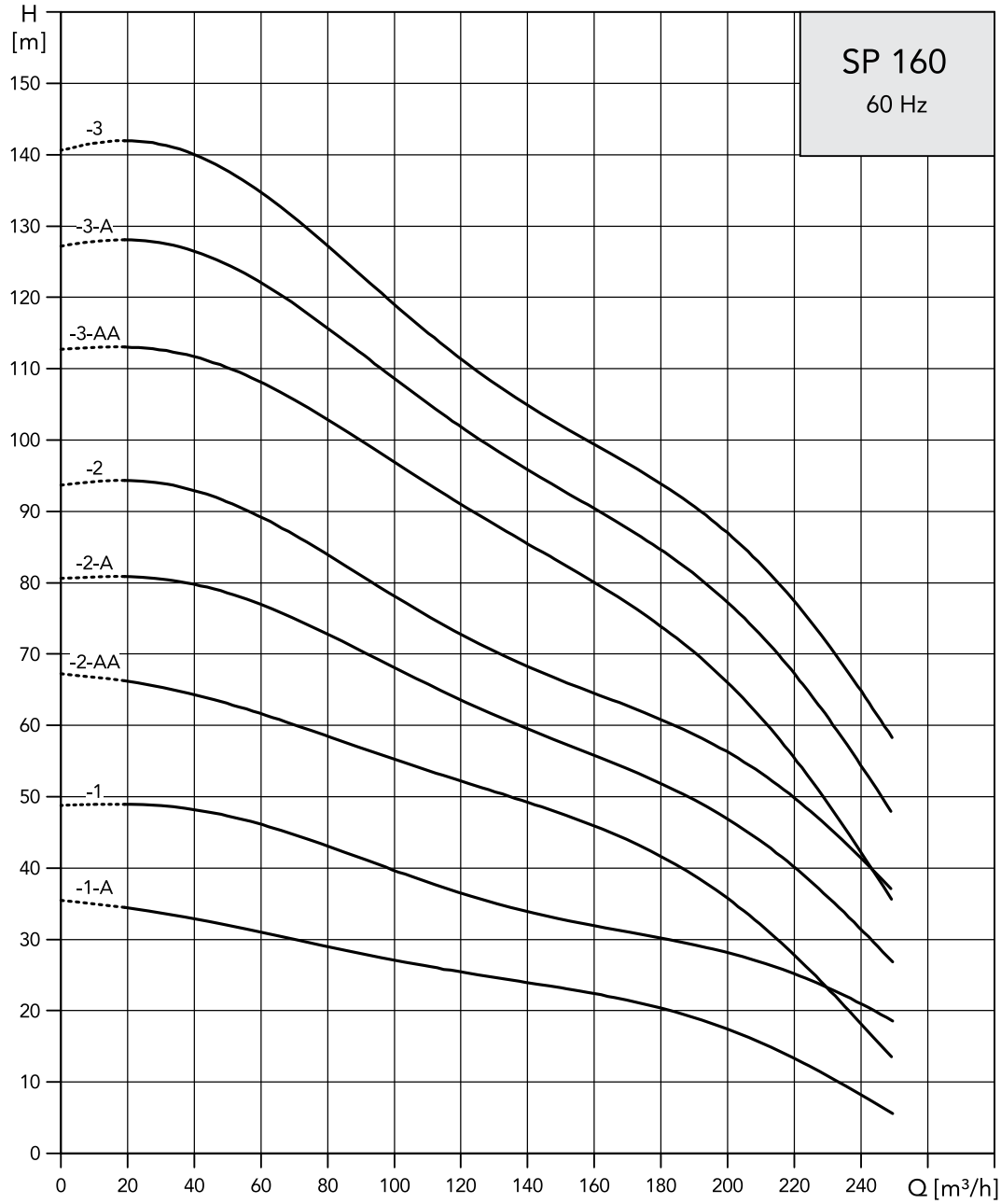
Pump Type	Motor (kW)	Dimension		
		RP 6 Connection		
		L	D*	D**
SP-125-1-A	11	652	211	215
SP-125-1	18.5	652	211	215
SP-125-2-AA	22	807	211	215
SP-125-2-A	26	807	211	215
SP-125-2	30	807	211	215
SP-125-3-AA	37	963	211	215
SP-125-3-A	37	963	211	215
SP-125-3	45	963	213	219
SP-125-4-AA	55	1118	213	219
SP-125-4-A	55	1118	213	219
SP-125-4	63	1118	213	219
SP-125-5-AA	75	1274	213	219
SP-125-5-A	75	1274	213	219
SP-125-5	75	1274	213	219
SP-125-6-AA	75	1429	213	219
SP-125-6-A	92	1429	213	219
SP-125-6	92	1429	213	219
SP-125-7-AA	92	1585	213	219
SP-125-7-A	92	1585	213	219
SP-125-7	110	1585	213	219
SP-125-8	132	2092	237	237
SP-125-9	132	2248	237	237
SP-125-10	147	2403	237	237
SP-125-11	170	2559	237	237

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

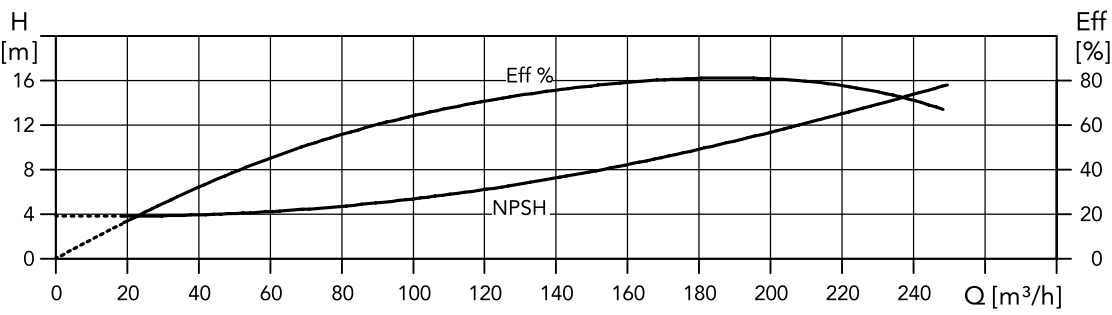
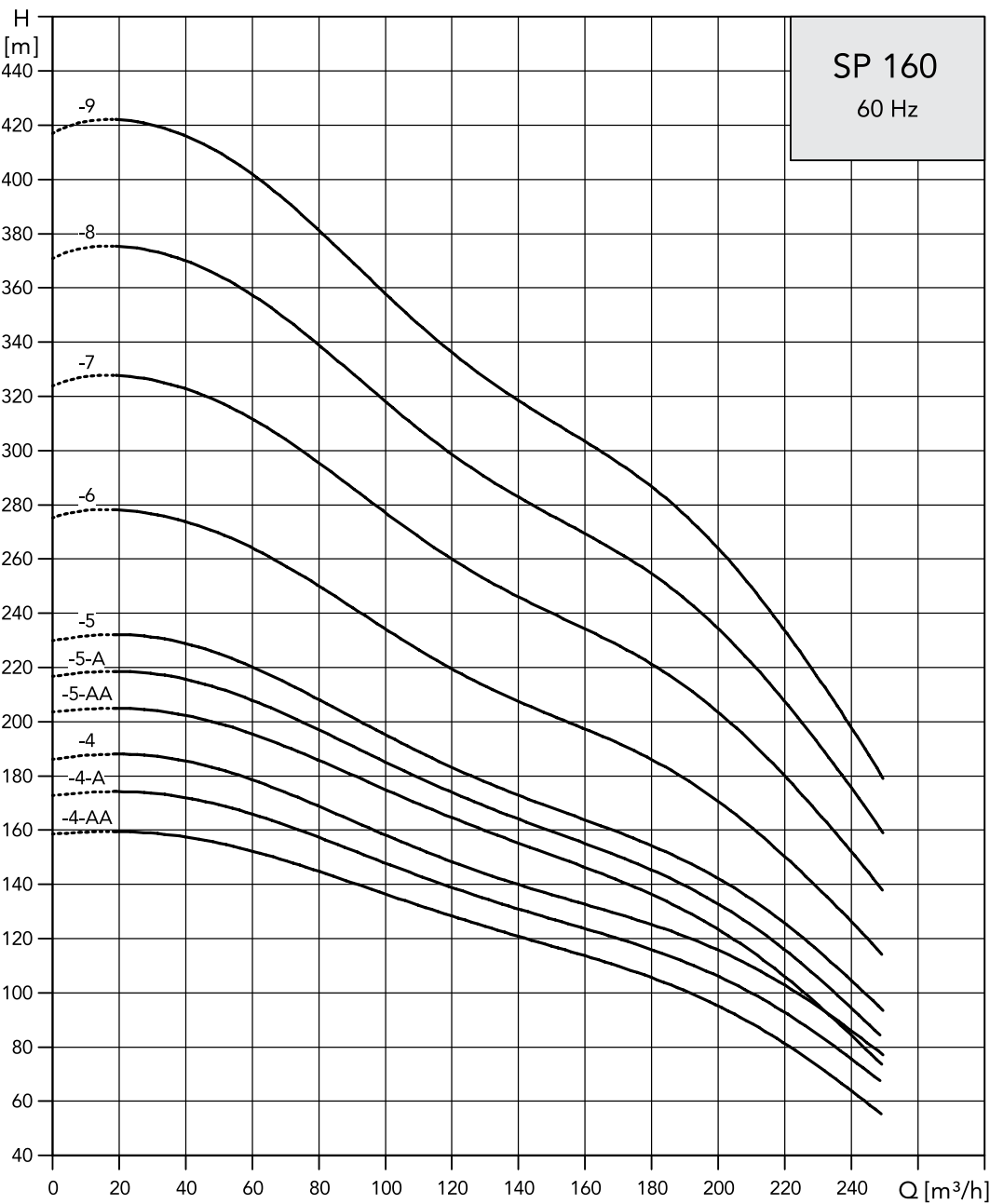
Performance Curve SP 160

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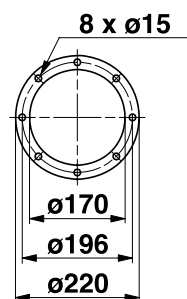
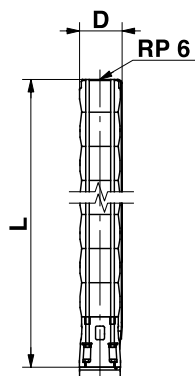


Performance Curve SP 160

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Dimension SP 160



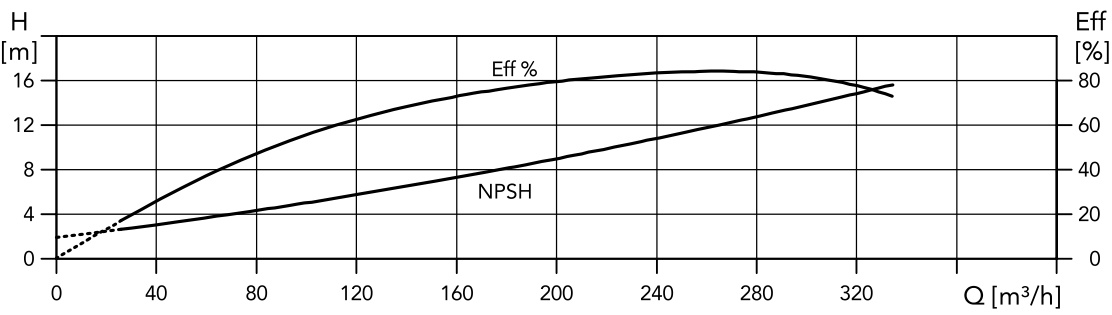
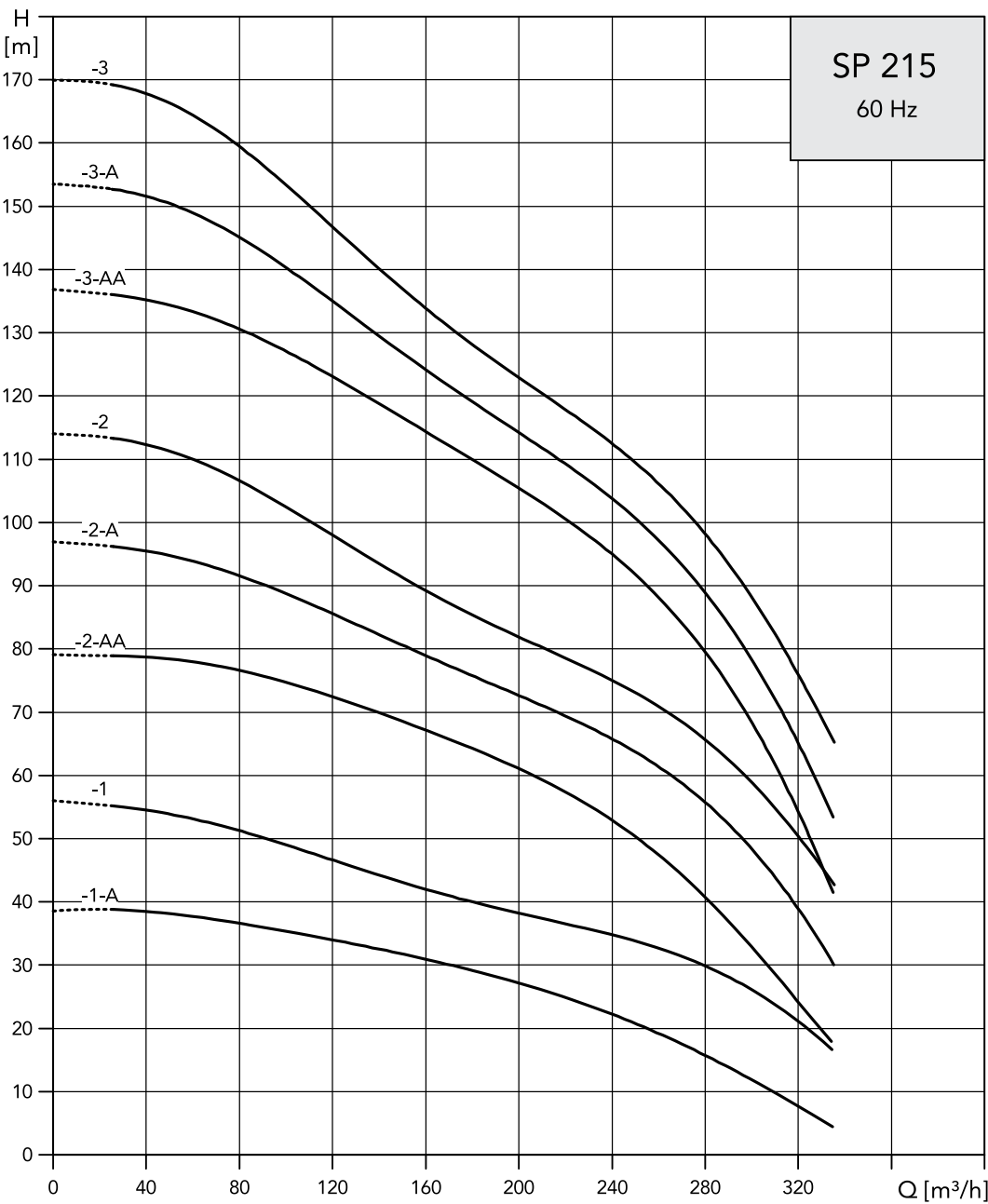
Pump Type	Motor (kW)	Dimension		
		RP 6 Connection		
		L	D*	D**
SP-160-1-A	15	652	211	215
SP-160-1	22	652	211	215
SP-160-2-AA	26	807	211	215
SP-160-2-A	37	807	211	215
SP-160-2	37	807	211	215
SP-160-3-AA	45	963	213	219
SP-160-3-A	55	963	213	219
SP-160-3	55	963	213	219
SP-160-4-AA	63	1118	213	219
SP-160-4-A	75	1118	213	219
SP-160-4	75	1118	213	219
SP-160-5-AA	92	1274	213	219
SP-160-5-A	92	1274	213	219
SP-160-5	92	1274	213	219
SP-160-6	110	1729	213	219
SP-160-7	132	1937	237	237
SP-160-8	147	2092	237	237
SP-160-9	170	2248	237	237

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

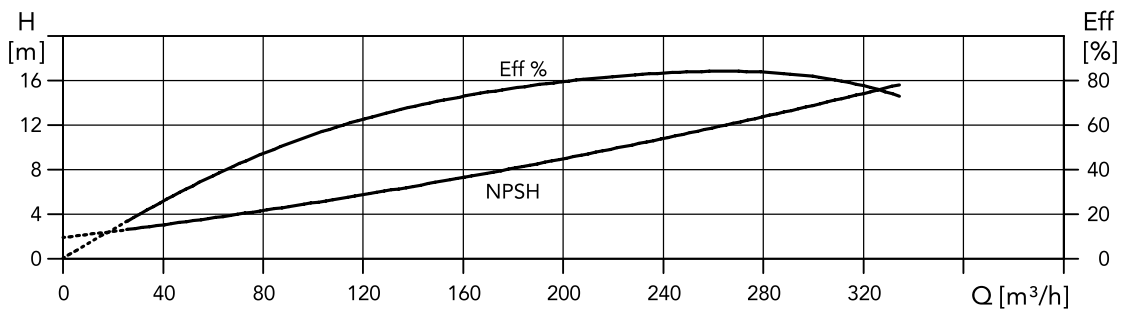
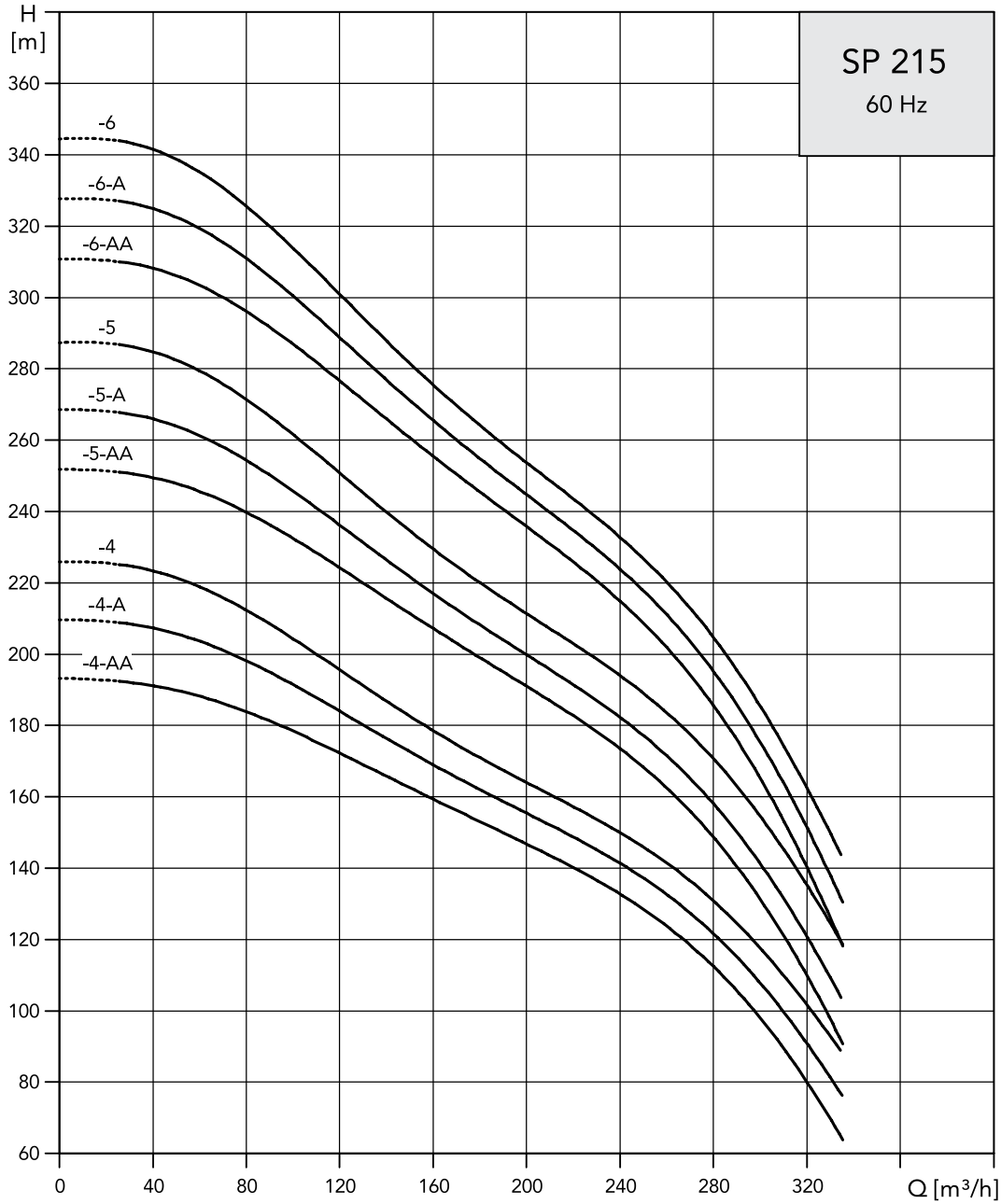
Performance Curve SP 215

ISO 9906 Annex A

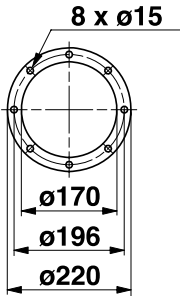
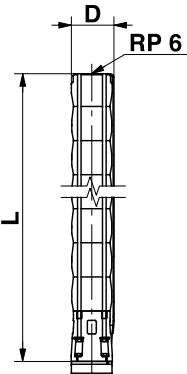


Performance Curve SP 215

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Dimension
SP 215

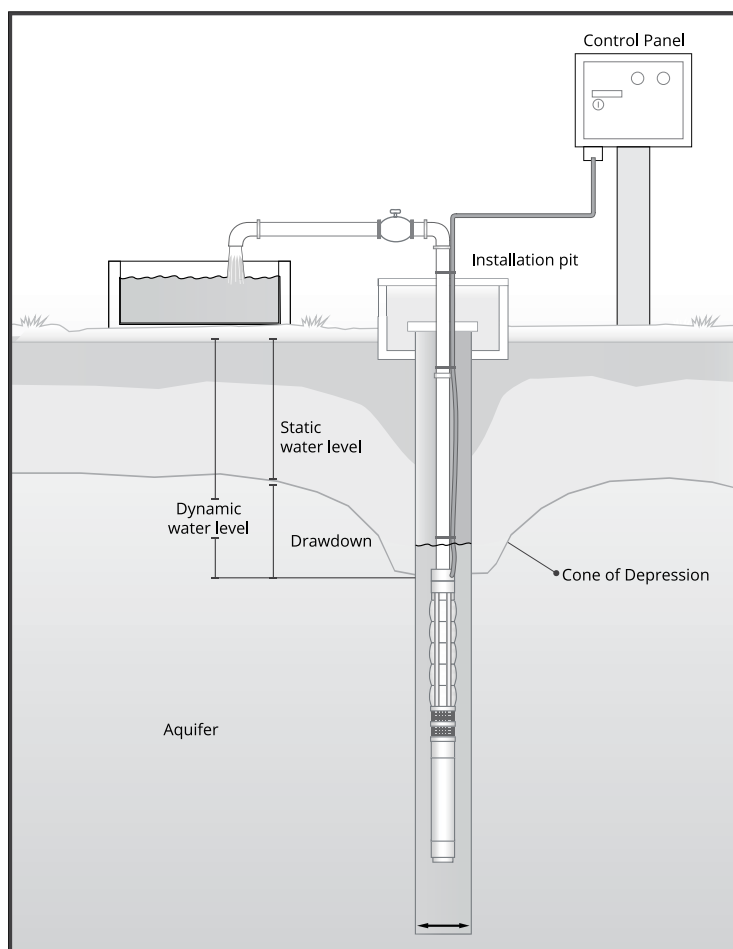


Pump Type	Motor (kW)	Dimension		
		RP 6 Connection		
		L	D*	D**
SP-215-1-A	22	790	236	239
SP-215-1	30	790	236	239
SP-215-2-AA	45	966	239	244
SP-215-2-A	55	966	239	244
SP-215-2	63	966	239	244
SP-215-3-AA	75	1142	239	244
SP-215-3-A	92	1142	239	244
SP-215-3	92	1142	239	244
SP-215-4-AA	110	1318	239	244
SP-215-4-A	110	1318	239	244
SP-215-4	110	1318	239	244
SP-215-5-AA	132	1494	250	254
SP-215-5-A	132	1494	250	254
SP-215-5	147	1494	250	254
SP-215-6-AA	170	1670	250	254
SP-215-6-A	170	1670	250	254
SP-215-6	170	1670	250	254

* Maximum diameter of pump with one motor cable.
** Maximum diameter of pump with two motor cables.

Setting Up The Pump

The setting of the pump is the depth at where the pump is installed in the bore hole. It must have the capacity to pump the water from the aquifer to the water surface and gives the required minimum pressure. Once the pump has been installed, the drawdown and the dynamic water level should be known. During operation, the water must never fall below the inlet of the pump. Submersible pumps normally have very small risk of cavitation. But it is important to check the NPSH of the pump in its duty point. Minimum pump inlet to be submerge = $\text{NPSH (m)} - 10 \text{ (m)}$.



Accessories

Pressure Gauge



A Pressure Gauge is needed to monitor a pump's discharge or inlet pressure. They are filled with glycerine for consistent pressure readings.

Well Cover



Well Cover provides robust protection against impact and is configured for easy installation. The casing with pump and rising mains locates readily into the wellhead tube which bolts down to the well chamber. This means that loads from the pump and rising main are supported by the wellhead assembly and not by the casing.

Check Valve



Check valves are designed to prevent backflow, minimizing hydraulic shocks and give years of trouble-free operation without maintenance when installed properly and sized to the pumping application with regards to flow and maximum system pressures. The valve can be installed vertically or horizontally.

The check valve body should be constructed to handle the rated system flow and pressures as stated, and in addition support the weight of the submersible pump, pipe and the water in the riser pipe.

Gate Valve

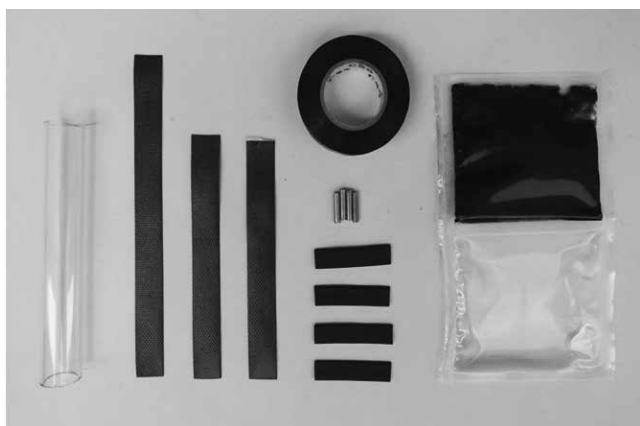


A Gate Valve is a valve that opens by lifting a round or rectangular gate/wedge out of the path of the fluid. They are so-named because the part that either stops or allows flow through the valve acts somewhat like a gate. Gate valves are used for regulating flow.

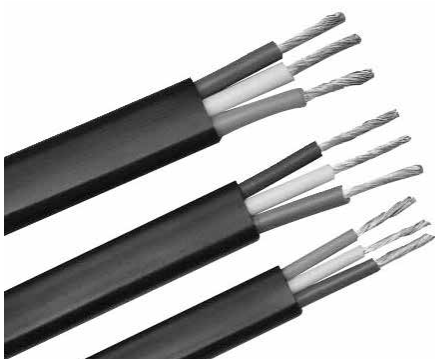
Accessories

Cable Termination Kit

Use only a good quality submersible cable joints designed for borehole pump. This is a very crucial aspect of submersible pump installation.



Submersible Drop Cable



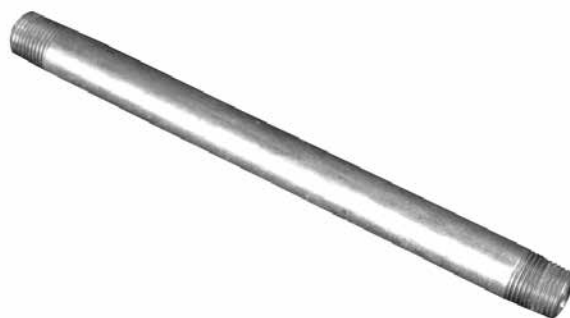
Use only tough & flexible submersible pump cables specially designed to supply power to submersible borehole pumps in a deep borewell. Tested for toughness and performance, the insulation & jacket will stand up to even the most aggressive wet conditions with excellent moisture, abrasion & weather resistance.

Control Panel



A wide range of borehole pump starter panels is available in a number of configurations for single or three phase supply - all are offered with dry-running protection. As well as fixed-speed units, inverter or soft-start panels are also available

Riser Pipe



Riser pipe for installation of submersible pumps in water wells utilises an innovative pipe work mating arrangement. This makes the installation of borehole pumps much simpler, with less effort for the drilling contractor installing borehole pumps.

Cable Dimension for 3 x 400 V, 50 Hz

Motor	kW	I _n (A)	Cos 100%	DIMENSION (mm ²)															
				1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300
4"	0.37	1.4	0.64	192	318	506	752												
	0.55	2.2	0.64	222	203	322	479	783											
	0.75	2.3	0.72	104	173	275	409	672											
	1.1	3.4	0.72	70	117	186	277	455	712										
	1.5	4.2	0.75	55	91	145	215	354	556	844									
	2.2	5.5	0.82	38	64	101	151	249	393	599	818								
	3	7.85	0.77	29	47	75	112	185	291	442	601	822							
	4	9.6	0.8	22	37	59	89	146	230	350	477	656	874						
	5.5	13	0.81	16	27	43	65	107	168	256	349	480	641	821	983				
	7.5	18.8	0.78		20	31	46	76	120	183	248	340	452	577	687	804	923		
6"	5.5	13.6	0.77	16	27	44	65	107	168	255	347	475	629	801	953				
	7.5	17.6	0.8	12	20	32	48	80	125	191	260	358	477	610	728	855	984		
	9.2	21.8	0.81		16	26	39	64	100	153	208	287	382	490	586	689	795	935	
	11	24.8	0.83		14	22	33	55	86	132	180	248	332	427	512	604	699	826	942
	13	30	0.81			19	28	46	73	111	151	208	278	356	426	501	577	680	772
	15	34	0.82				24	40	64	97	132	182	244	313	375	441	510	601	684
	18.5	42	0.81				20	33	52	79	108	149	198	254	304	358	412	486	551
	22	48	0.84					28	44	67	92	127	170	220	264	312	361	428	489
	26	57	0.84					24	37	57	78	107	144	185	222	263	304	361	412
	30	66.5	0.83						32	49	67	92	124	159	191	225	261	308	351
	37	85.5	0.79							40	54	74	99	126	150	176	203	238	269
	22	48	0.84					28	44	67	92	127	170	220	264	312	361	428	489
	26	56.5	0.85					23	37	57	78	107	144	186	223	265	307	365	418
8"	30	64	0.85						33	50	68	95	127	164	197	234	271	322	369
	37	78.5	0.85						27	41	56	77	104	134	161	191	221	263	301
	45	96.5	0.82							34	47	64	86	110	132	155	180	212	241
	55	114	0.85								38	53	71	92	111	131	152	181	207
	63	132	0.83									47	62	80	96	113	131	155	177
	75	152	0.86									40	53	69	83	98	114	136	156
	92	186	0.86										43	56	68	80	94	111	128
	110	224	0.87											47	56	67	78	93	107

Head Losses on Iron Pipe (galvanized)
Pressure Loss in meters for every 100 meters of horizontal pipe.

Water Volume			Lost pressure for every 100 meters											
			Pipe Diameter size (Inch)											
m ³ /hr	L/Min	L/S	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"
0.6	10	0.17	9.91	2.41	0.78									
0.9	15	0.25	20.11	4.86	1.57	0.42								
1.2	20	0.33	33.53	8.04	2.59	0.68	0.35							
1.5	25	0.42	49.93	11.91	3.83	1.00	0.51							
1.8	30	0.50	69.34	16.50	5.28	1.38	0.70	0.22						
2.1	35	0.58	91.54	21.75	6.95	1.81	0.91	0.29						
2.4	40	0.67		27.66	8.82	2.29	1.16	0.37						
3	50	0.83		41.40	13.14	3.40	1.72	0.54	0.16					
3.6	60	1.00		57.74	18.28	4.72	2.38	0.75	0.22					
4.2	70	1.17		76.49	24.18	6.23	3.13	0.99	0.29	0.13				
4.8	80	1.33			30.87	7.94	3.99	1.25	0.36	0.16				
5.4	90	1.50			38.30	9.83	4.93	1.55	0.45	0.20				
6	100	1.67			46.49	11.90	5.97	1.88	0.54	0.24	0.12			
7.5	125	2.08			70.41	17.93	8.97	2.80	0.81	0.37	0.19	0.10		
9	150	2.50				25.11	12.53	3.90	1.12	0.51	0.26	0.14		
10.5	175	2.92				33.32	16.66	5.18	1.49	0.67	0.34	0.18		
12	200	3.33				42.75	21.36	6.62	1.90	0.86	0.43	0.23	0.08	
15	250	4.17				64.86	32.32	10.03	2.86	1.28	0.65	0.35	0.13	
18	300	5.00					45.52	14.04	4.01	1.79	0.90	0.49	0.18	0.07
24	400	6.67					78.17	24.04	6.83	3.05	1.53	0.83	0.29	0.12
30	500	8.33						36.71	10.40	4.62	2.32	1.25	0.45	0.19
36	600	10.00						51.84	14.62	6.51	3.26	1.76	0.62	0.26
42	700	11.67							19.52	8.69	4.36	2.35	0.83	0.35
48	800	13.33							25.20	11.18	5.58	3.01	1.07	0.45
54	900	15.00							31.51	13.97	6.98	3.76	1.33	0.56
60	1000	16.67							38.43	17.06	8.52	4.60	1.62	0.67
75	1250	20.83								26.10	13.00	7.01	2.46	1.03
90	1500	25.00								36.97	18.42	9.89	3.47	1.44
105	1750	29.17									24.76	13.30	4.67	1.93
120	2000	33.33									31.94	17.16	6.00	2.50
150	2500	41.67										26.26	9.22	3.81
180	3000	50.00											13.05	5.42
240	4000	66.67											22.72	8.93
300	5000	83.33												14.42
90° Elbow & Slide Valve			1.00	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.60	1.70	2.00	2.50
T, Non Return Valve			4.00	4.00	4.00	5.00	5.00	5.00	6.00	6.00	6.00	7.00	8.00	9.00

Head Losses on PVC pipe
Pressure Loss in meters for every 100 meters of horizontal pipe.

Water Volume			Lost pressure for every 100 meters											
			Pipe Diameter size (Inch)											
m ³ /hr	L/Min	L/S	1"	1¼"	1½"	2"	2½"	3"	3½"	4"	5"	5½"	6"	7"
0.6	10	0.17	1.80	0.66	0.77	0.09								
0.9	15	0.25	4.00	1.14	0.60	0.18	0.03							
1.2	20	0.33	6.40	2.20	0.90	0.28	0.11							
1.5	25	0.42	10.00	3.50	1.40	0.43	0.17	0.07						
1.8	30	0.50	13.00	4.60	1.90	0.57	0.22	0.09						
2.1	35	0.58	16.00	6.00	2.00	0.70	0.27	0.12						
2.4	40	0.67	22.00	7.50	3.20	0.93	0.35	0.16	0.06					
3	50	0.83	37.00	11.00	4.80	1.40	0.50	0.22	0.09					
3.6	60	1.00	43.00	15.00	6.50	1.90	0.70	0.32	0.13	0.05				
4.2	70	1.17	50.00	18.00	8.00	2.50	0.83	0.38	0.17	0.07				
4.8	80	1.33		25.00	10.50	3.00	1.20	0.50	0.22	0.08				
5.4	90	1.50		30.00	12.00	3.50	1.30	0.57	0.26	0.09	0.05			
6	100	1.67		39.00	16.00	4.60	1.80	0.73	0.30	0.12	0.07			
7.5	125	2.08		50.00	24.00	6.60	2.50	1.10	0.50	0.18	0.10	0.06		
9	150	2.50			33.00	8.60	3.50	1.40	0.63	0.24	0.13	0.08		
10.5	175	2.92			38.00	11.00	4.30	1.80	0.78	0.30	0.18	0.09		
12	200	3.33			50.00	14.00	5.50	2.40	1.00	0.40	0.22	0.12	0.07	
15	250	4.17				21.00	8.00	3.70	1.50	0.57	0.34	0.18	0.11	0.06
18	300	5.00				28.00	10.50	4.60	1.95	0.77	0.45	0.25	0.13	0.09
24	400	6.67					19.00	8.00	3.60	1.40	0.78	0.44	0.23	0.15
30	500	8.33					28.00	11.50	5.00	2.00	1.20	0.63	0.33	0.21
36	600	10.00					37.00	15.00	6.60	2.60	1.50	0.82	0.45	0.28
42	700	11.67					47.00	24.00	8.00	3.50	1.90	1.10	0.60	0.40
48	800	13.33						26.00	11.00	4.50	2.60	1.40	0.81	0.48
54	900	15.00						33.00	13.50	5.50	3.20	1.70	0.95	0.58
60	1000	16.67						44.00	16.00	6.70	3.90	2.20	1.20	0.75
75	1250	20.83							25.00	9.00	5.00	3.00	1.60	0.95
90	1500	25.00							33.00	13.00	8.00	4.10	2.30	1.40
105	1750	29.17							44.00	17.50	9.70	5.70	3.20	1.90
120	2000	33.33								23.00	13.00	7.00	4.00	2.40
150	2500	41.67								34.00	18.00	10.50	6.00	3.50
180	3000	50.00								45.00	27.00	14.00	7.60	4.40
240	4000	66.67									43.00	24.00	13.00	7.50
300	5000	83.33										33.00	18.00	11.00

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