ESP Service

PRODUCT CATALOG

Contents

About the Company

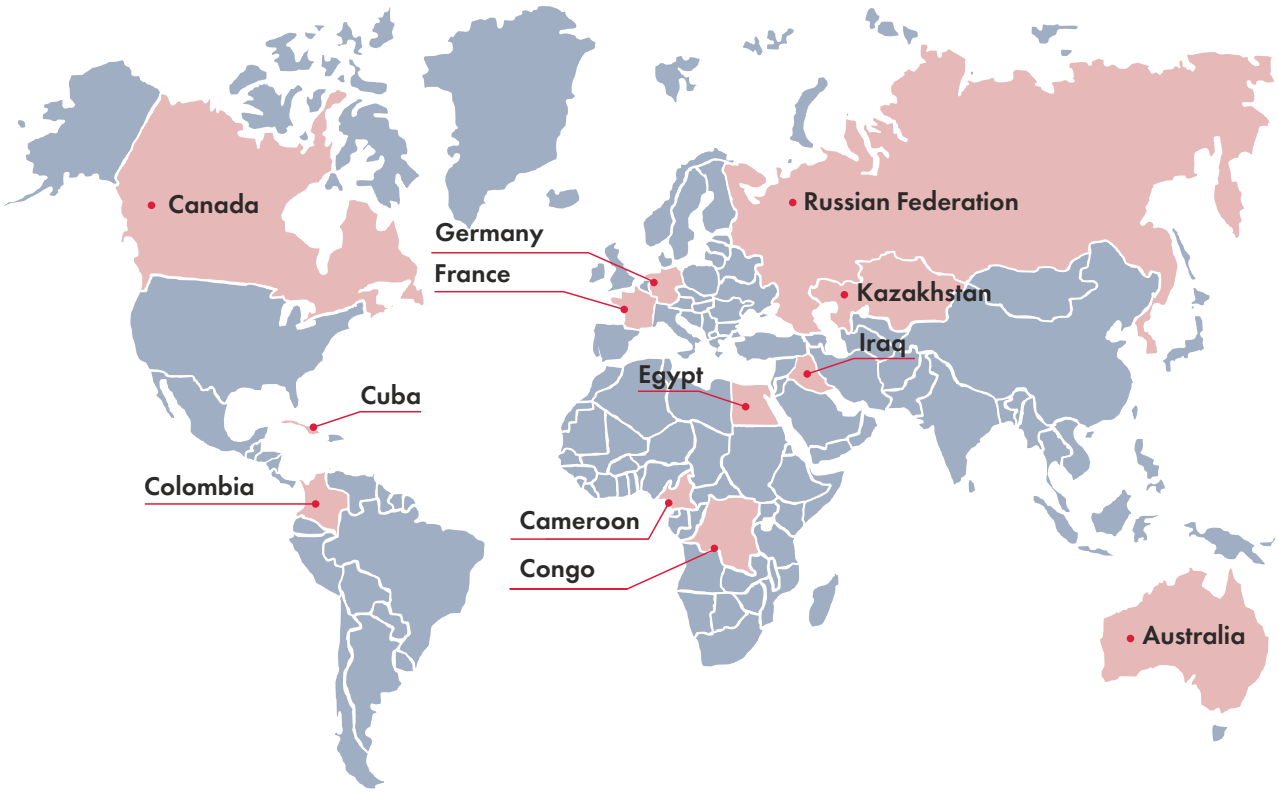
"ESP Service" LLC is a company focused on designing, development and manufacturing of submersible and surface energy efficient equipment of electric submersible and electric progressive cavity pumps as well as in providing a full range of services for oil and gas producers. Long-term experience let us function at maximum capacity, offering solutions to our clients from the simple tasks to challenges

- "ESP Service" LLC was established in **1983**
- **We were the first in the world** to develop and manufacture high efficiency variable speed permanent magnet motors for the oil industry
- There are structural subdivisions of the Company in the territory of **11** constituent entities of the Russian Federation
- Quality management system **ISO 9001:2015**
- A number of serviced wells **> 23,000**
- Number of employees **> 3,000**

Productive capability of the Company allows to produce as follows:

- Up to **10,000** PMM a year
- Up to **10,000** ESP a year
- Electric submersible pumps' components
- Motor lead extension
- Variable speed drives

Geography of deliveries



"ESP Service" LLC supplies to its foreign and domestic customers a high-energy efficient equipment and integrated service all over the operating cycle. A complex approach and knowledge of all operating pecularities allow us confidently solve both typical and non-routine problems of customers.

R&D and innovations

One of the principal businesses of "ESP Service" LLC is Research and Development as follows:

- Development, research and manufacturing of prototype models of drives based on PMMs for oil equipment and their controls.
- Development of proprietary product line of submersible equipment and electric submersible pumps' and electric progressive cavity pumps' components.
- Bench tests of components and separate units of the equipment
- Mathematical modelling, research and analysis of data collected
- Programming and computer-aided design
- Development and adjustment of installation and machinery operations management
- Maintenance of the equipment prototype models prior to introduction into standard production

The service unit of "ESP Service" LLC consists of a network of structural subdivisions developing, manufacturing the equipment and components, selection, comprehensive service 24/7, ESP repairs and rental both as one complete set and one at a time.

Subdivisions in RF

- Innovation and Technology Center
- Production site
- Service centers in the towns of Perm, Langepas, Pokachi and Uray
- Affiliates in the towns of Usinsk and Nurlat

Centrifugal well pumps of the ESP type, including those with a compression and batch assembly scheme, manufactured by "ESP Service" LLC, are designed to pump out formation fluid (a mixture of oil, solids, associated water, and petroleum gas) from oil wells.

All pumps are equipped with:

- intermediate supports (bearings) of the shaft;
- upper section with fishing Dimensions, check and drain valves;
- backup fasteners with strength class 10.9 as per GOST 1759.4-87;
- a key made of stainless alloys;
- sludge catchers (availability and delivered quantity as per Supply Agreements).

Characteristic of formation fluid pumped out using ESP pumps

Characteristic	Value
Maximum liquid density, kg/m^3	1,400
Maximum kinematic viscosity of single-phase liquid, at which the pump operation is ensured without change in head or efficiency, mm^2/s	1
Hydrogen ion exponent (pH) of the associated water, unit: – with pump versions:	up 5 to 8.5
Maximum concentration of abrasive suspended particles with hardness up to 7 points as per Mohs scale, g/l: – with pump versions:	0.5
Maximum volumetric content of non-associated gas at the pump suction (without gas separator), %:	35
Maximum content of hydrogen sulfide, g/l: – with pump versions:	0.01
Liquid temperature at the pump suction, °C (°F), as maximum	150°C (302°F)

Notes:
Upon the customer's request, the requirements to the formation fluid characteristic can vary.

Symbol structure

Designation elements	E	X	XXXX	-	XXX	-	XX
Designation numbers	1	2	3		4		5

Designation numbers	Options	Decoding
1	E	Manufacturer ("ESP Service" LLC)
	Pump series (Overall diameter of the case, inch)	
2	A	272 series (2.72 inch)
	F	362 series (3.62 inch)
	H	406 series (4.06 inch)
	J	449 series (4.49 inch)
	P	535 series (5.35 inch)
3		Capacity, bbl/d
4		Number of stages in a pump
5	**Type of the pump stages assembly**	
	0	"floating"
	1	"package"
	2	"compression"

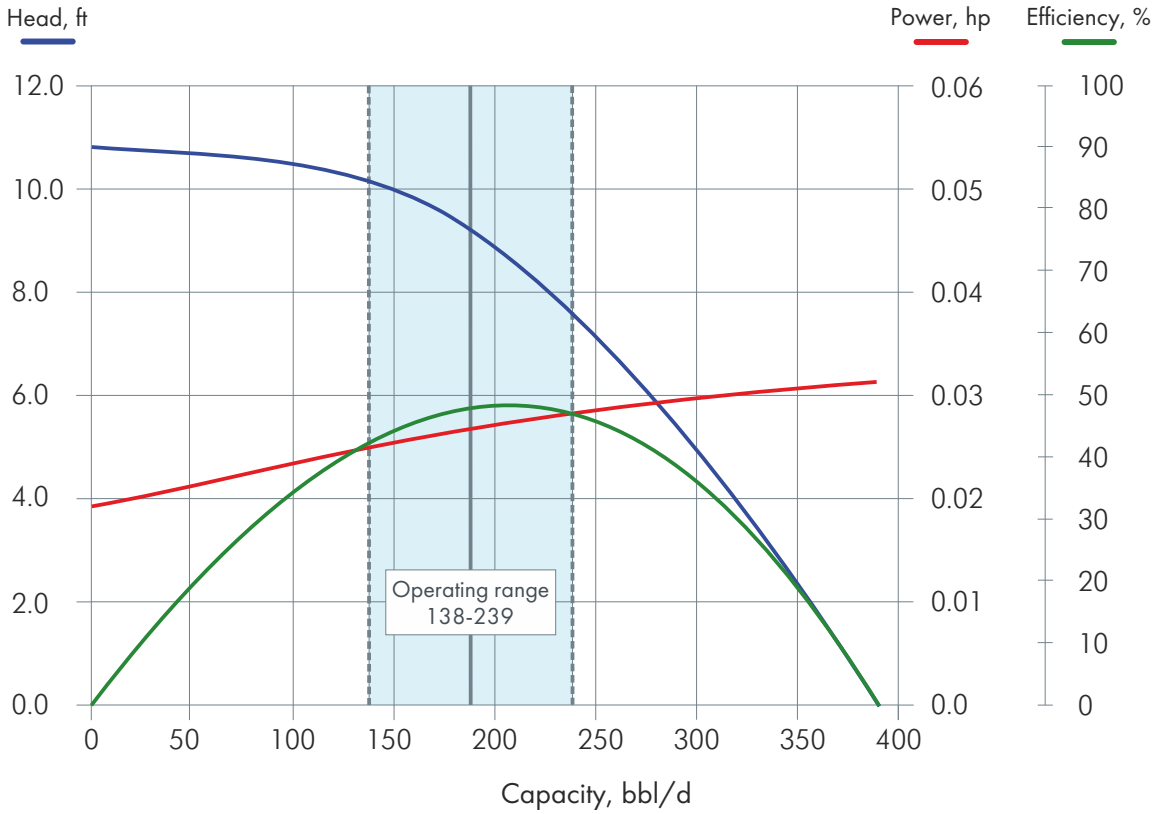
Examples of conventional designation of the pumps manufactured

EF160-280–0 – Electric submersible pump manufactured by "ESP Service" LLC, (E), 362 series (F), rated capacity of 160 bbl/d, number of stages 280, floating type assembly of stages (0).

Electric submersible pumps 272 series/OD 69 mm

If it is impossible to operate the 362 and 406 series equipment in sidetracks, small-diameter wells or with technical restrictions (displacement of the production string, repair plasters, etc.), the 272 series equipment. The use of this equipment makes it possible to operate a previously inactive well stock.

Electric submersible pump EA190/2,910 rpm Perfomance Curve
Curve computed for one stage in fluid of 1.00 sg.

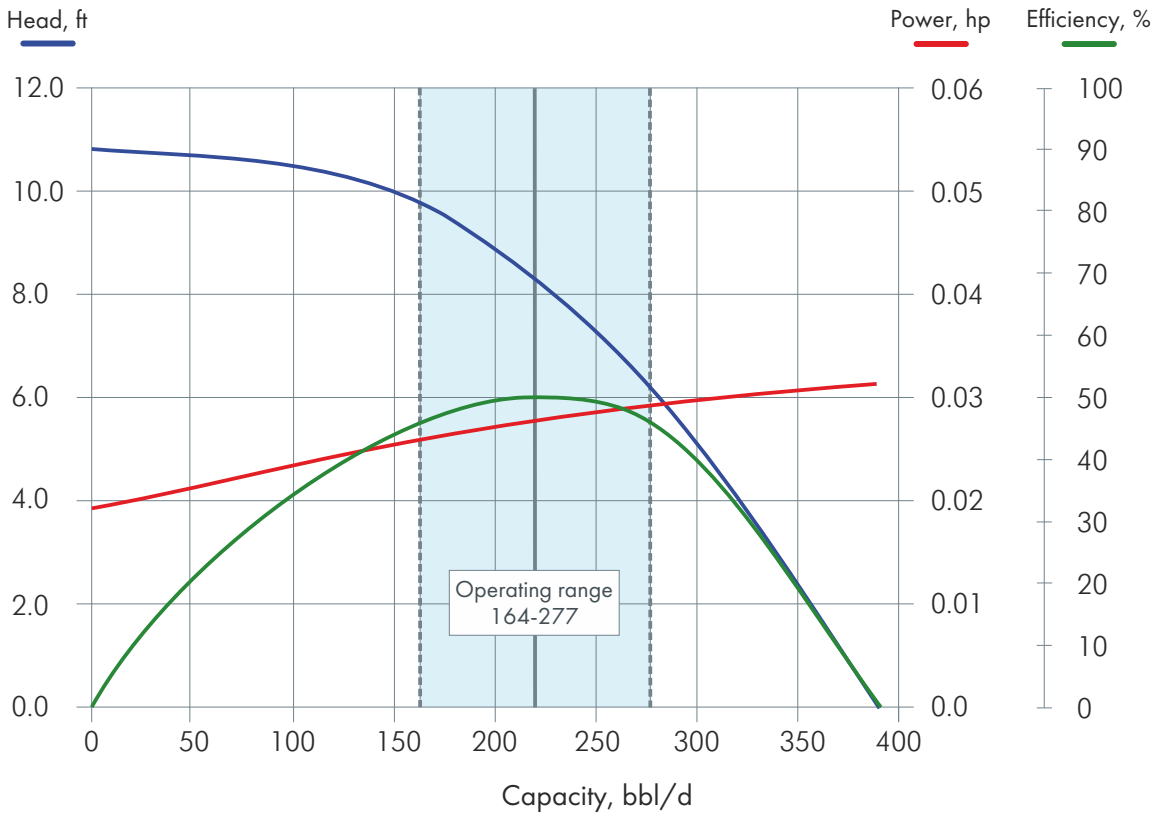


EA190 Electric submersible pump characteristics

Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	10.8	0.019	0
94	10.5	0.0231	32
157	9.8	0.0258	45
190	**9.2**	**0.0268**	**49**
220	8.2	0.0272	50
283	5.9	0.0292	43
314	4.3	0.0299	34
390	0.0	0.0313	0

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
4	13.1	350	1,148	125	2.5	3.4
5	16.4	440	1,444	158	3.1	4.2

Electric submersible pump EA220/2,910 rpm Perfomance Curve
Curve computed for one stage in fluid of 1.00 sg.

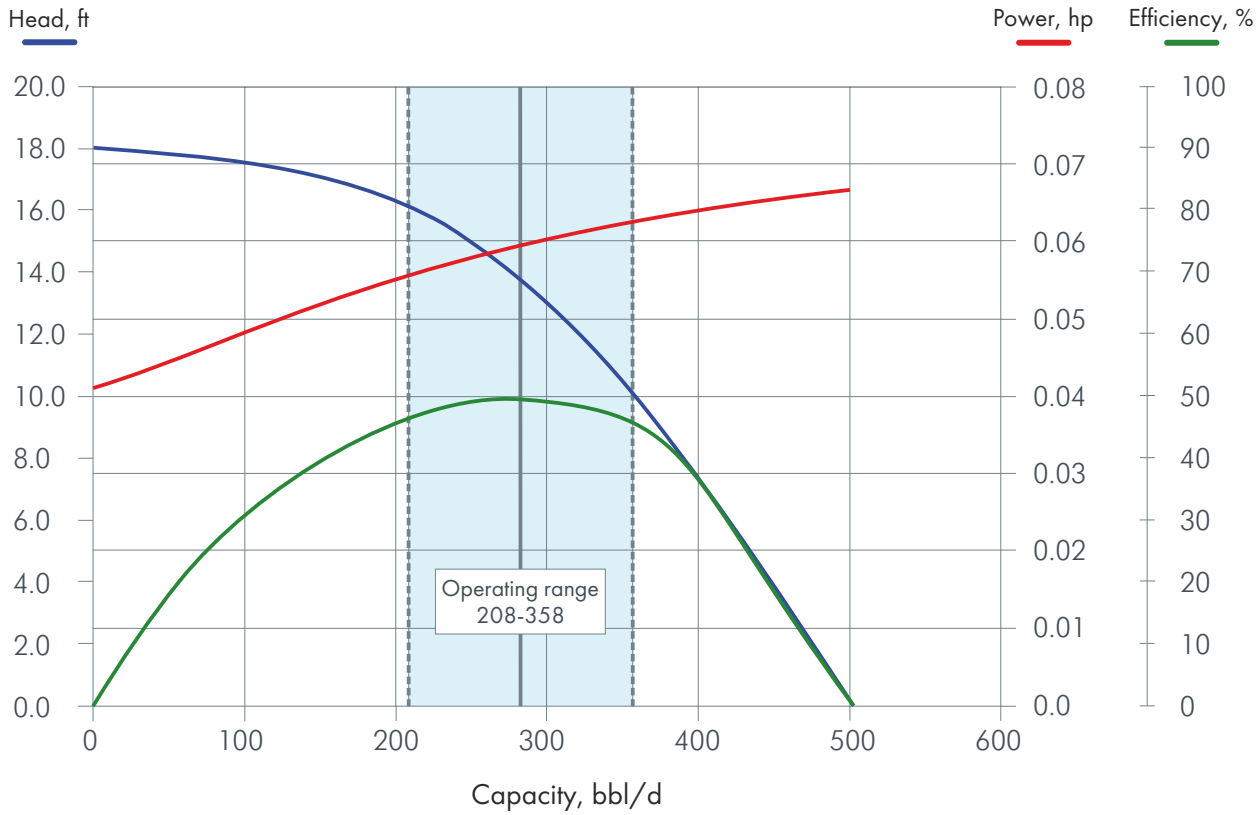


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	10.8	0.019	0
94	10.5	0.0231	32
157	9.8	0.0258	45
189	9.2	0.0268	49
220	**8.2**	**0.0272**	**50**
283	5.9	0.0292	43
314	4.3	0.0299	34
390	0.0	0.0313	0

EA220 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
4	13.1	310	1,017	125	2.5	3.4
5	16.4	390	1,280	156	3.1	4.2

Electric submersible pump EA280/3,750 rpm Perfomance Curve
Curve computed for one stage in fluid of 1.00 sg.

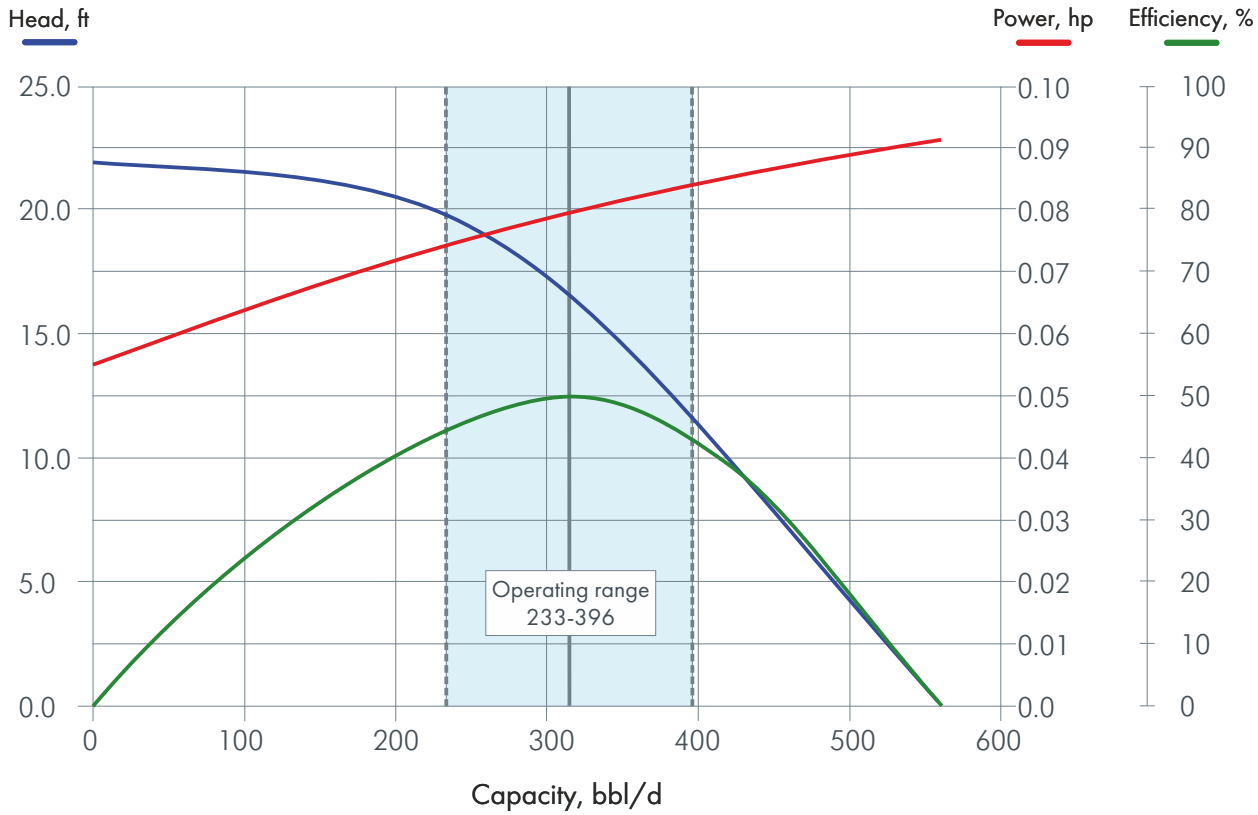


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	18.0	0.0408	0
119	17.4	0.0495	32
201	16.4	0.0554	45
280	**13.8**	**0.0582**	**50**
365	9.8	0.0626	43
402	7.2	0.0641	34
503	0.0	0.0669	0

EA280 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	380	1,247	91	3.9	5.3
4	13.1	530	1,739	125	5.4	7.3
5	16.4	660	2,165	156	6.7	9.1

Electric submersible pump EA310/4,160 rpm Perfomance Curve
Curve computed for one stage in fluid of 1.00 sg.

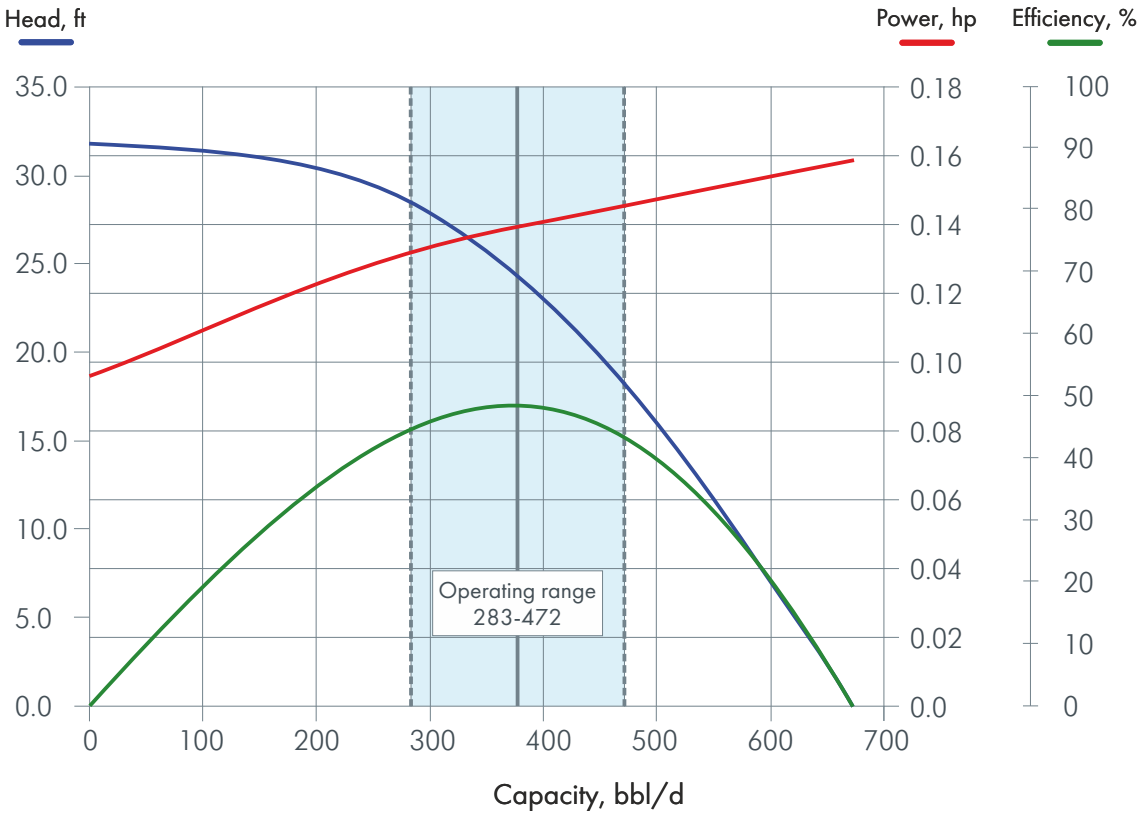


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	22.0	0.0556	0
132	21.3	0.0676	32
226	20.0	0.0755	45
310	**16.7**	**0.0794**	**50**
402	12.1	0.0854	43
447	7.2	0.0874	34
560	0.0	0.0914	0

EA310 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	460	1,509	91	5.3	7.2
4	13.1	640	2,100	125	7.3	9.9
5	16.4	800	2,625	156	9.1	12.4

Electric submersible pump EA380/5,000 rpm Perfomance Curve
Curve computed for one stage in fluid of 1.00 sg.

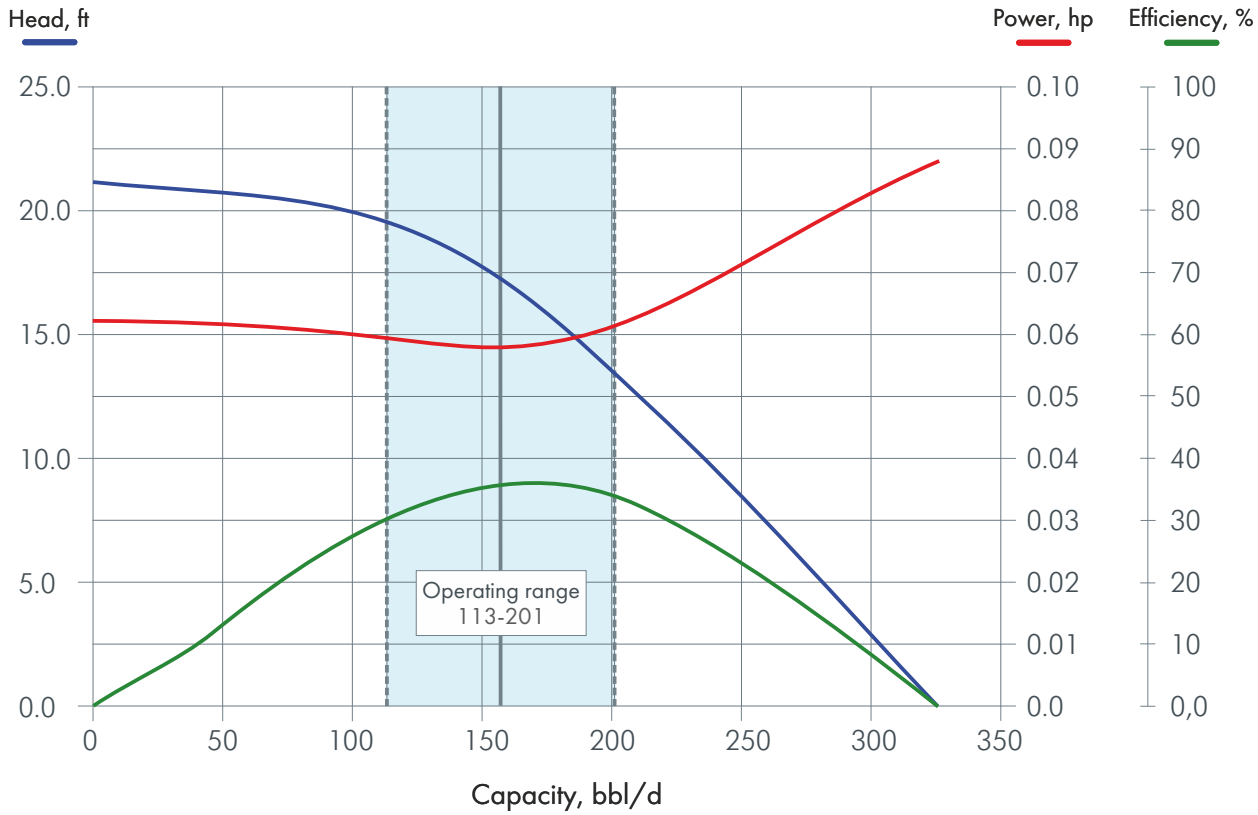


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	31.8	0.0966	0
164	30.8	0.1172	32
283	28.5	0.1306	46
380	**24.3**	**0.138**	**50**
472	18.0	0.146	43
541	12.5	0.1518	34
673	0.0	0.1587	0

EA380 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	670	2,198	91	9.2	12.5
4	13.1	930	3,051	125	12.7	17.3
5	16.4	1,150	3,773	156	15.8	21.5

EF160/2,910 rpm Pump Performance Curve
Curve computed for one stage in fluid of 1.00 sg.

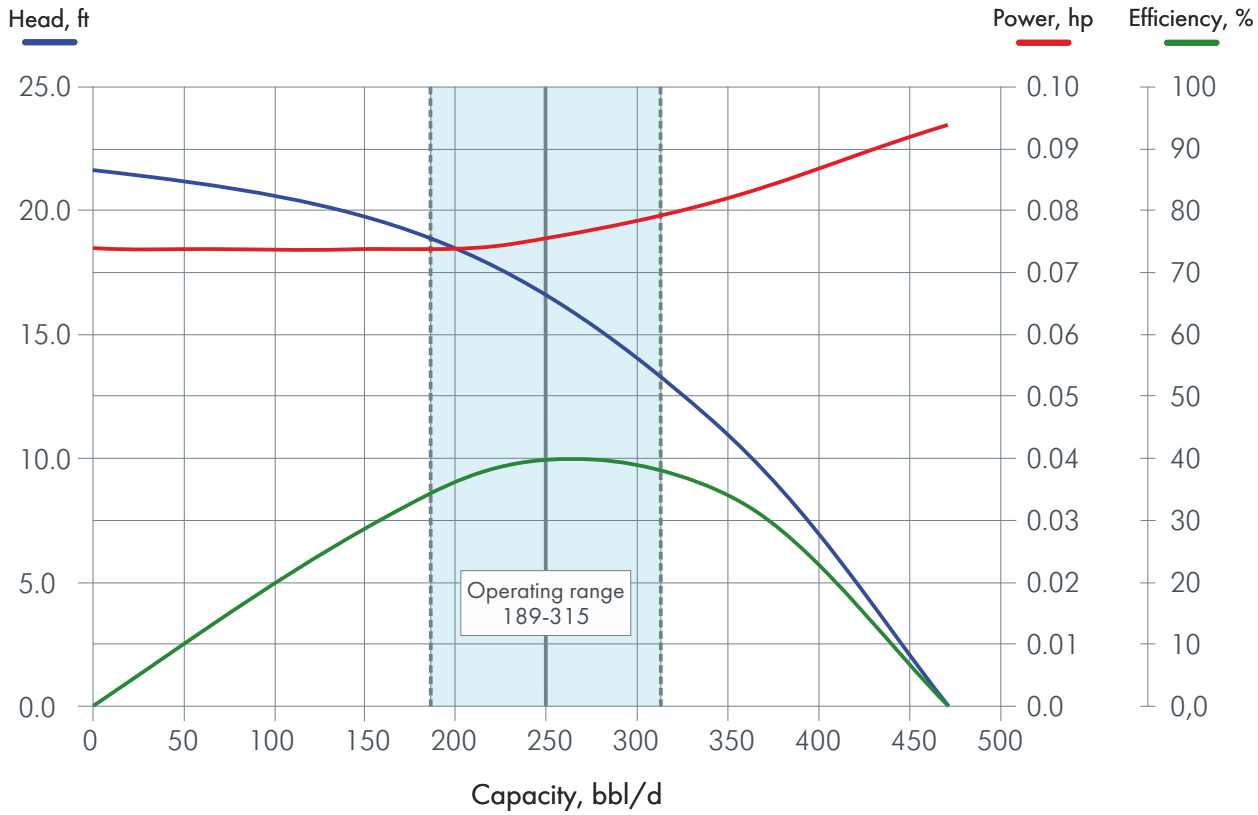


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	21.2	0.063	0
63	20.5	0.061	16
113	19.6	0.060	28
160	**17.3**	**0.058**	**36**
201	13.5	0.061	34
252	8.3	0.071	23
327	0.0	0.088	0

EF160 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	675	2,215	126	5.4	7.3
3.5	11.5	800	2,625	147	5.9	8.02
4	13.1	900	2,953	170	7.3	9.93
4.5	14.8	1,080	3,544	201	8.6	11.7
5	16.4	1,150	3,773	214	9.2	12.5
5.5	18.0	1,330	4,364	248	10.6	14.4
6	19.7	1,460	4,790	271	11.6	15.8

Electric submersible pump EF250/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg.

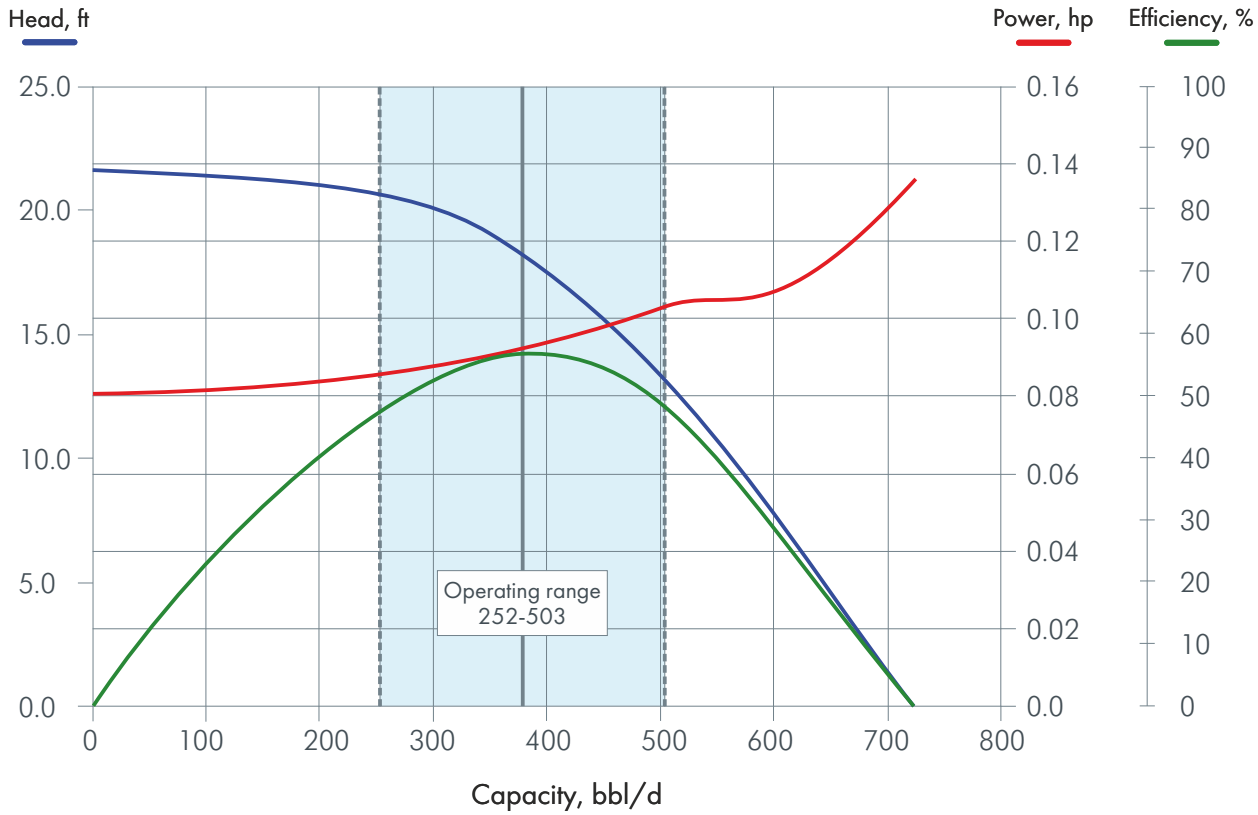


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	21.6	0.0738	0
94	20.7	0.0738	19
189	18.7	0.0738	35
250	**16.1**	**0.0751**	**40**
315	13.1	0.0791	38
377	8.9	0.0845	29
472	0.0	0.0939	0

EF250 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	550	1,805	112	6.3	8.6
3,5	11.5	642	2,106	131	7.3	9.9
4	13.1	745	2,444	152	8.5	11.6
4,5	14.8	838	2,749	171	9.6	13.1
5	16.4	936	3,071	191	10.7	14.6
5,5	18.0	1,083	3,553	221	12.4	16.9
6	19.7	1,186	3,891	242	13.6	18.5

Electric submersible pump EF380/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg.

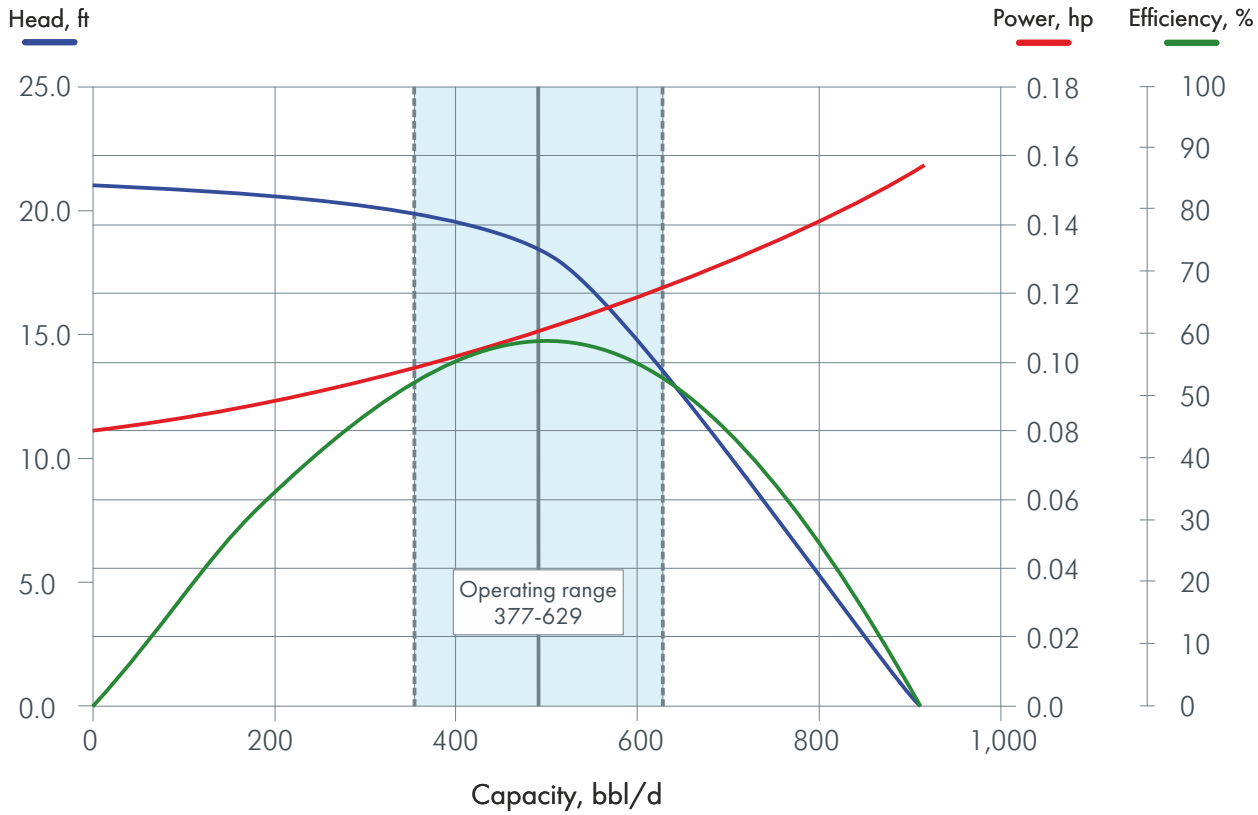


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	21.6	0.0791	0
126	21.3	0.0805	25
252	20.7	0.0845	45
380	**18.4**	**0.0898**	**57**
503	13.1	0.1019	48
629	5.9	0.1180	23
723	0.0	0.1341	0

EF380 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	625	2,051	112	7.5	10.2
3.5	11.5	734	2,408	131	8.8	12.0
4	13.1	875	2,871	159	10.6	14.4
4.5	14.8	958	3,143	171	11.5	15.6
5	16.4	1,050	3,445	191	12.8	17.4
5.5	18.0	1,238	4,062	221	14.8	20.1

Electric submersible pump EF500/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg

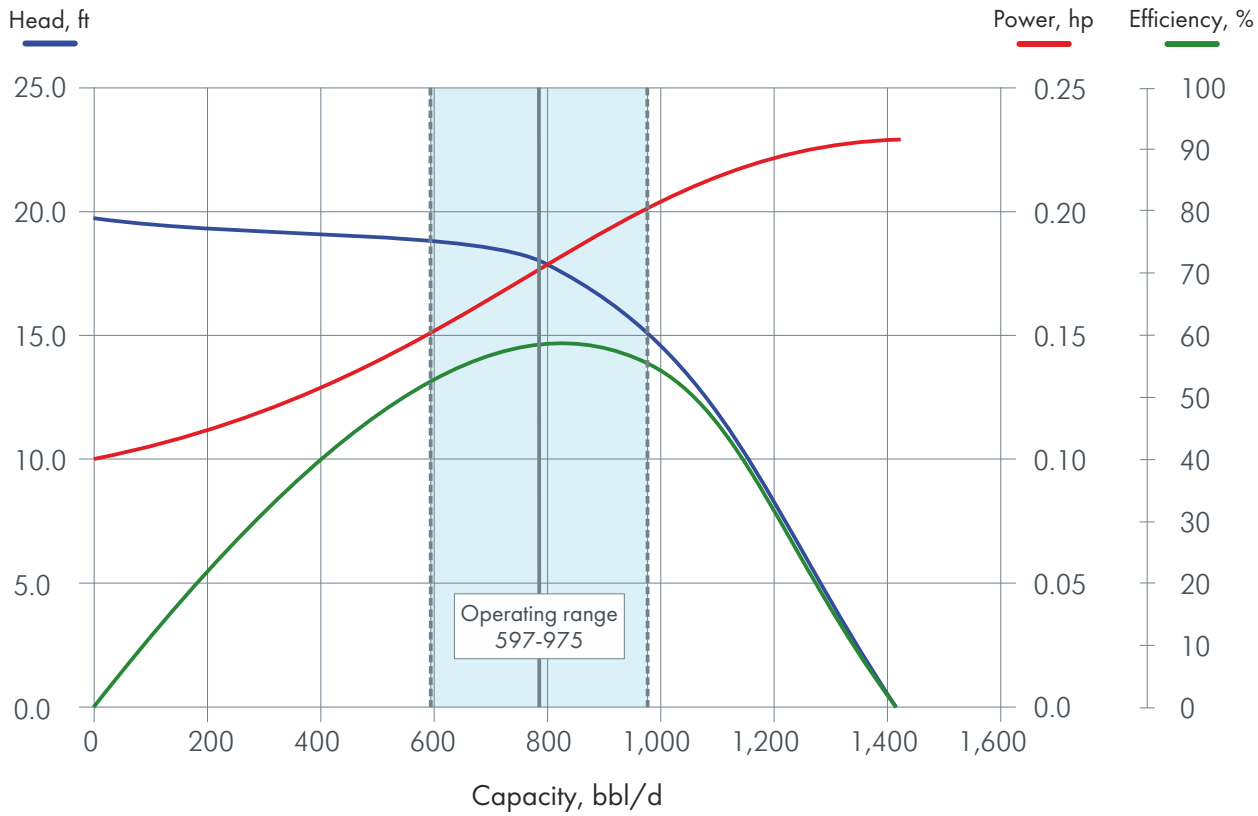


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	21.0	0.0805	0
189	20.7	0.0872	33
377	19.4	0.1019	53
500	**18.4**	**0.1153**	**59**
629	14.1	0.1234	53
818	4.9	0.1435	21
912	0.0	0.1569	0

EF500 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	575	1,887	112	9.1	12.4
3.5	11.5	689	2,261	131	10.6	14.4
4	13.1	800	2,625	159	12.3	16.7
4.5	14.8	896	2,940	171	13.8	18.8
5	16.4	1,008	3,307	191	15.5	21.1
5.5	18.0	1,165	3,822	221	17.9	24.3

Electric submersible pump EF780/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg.

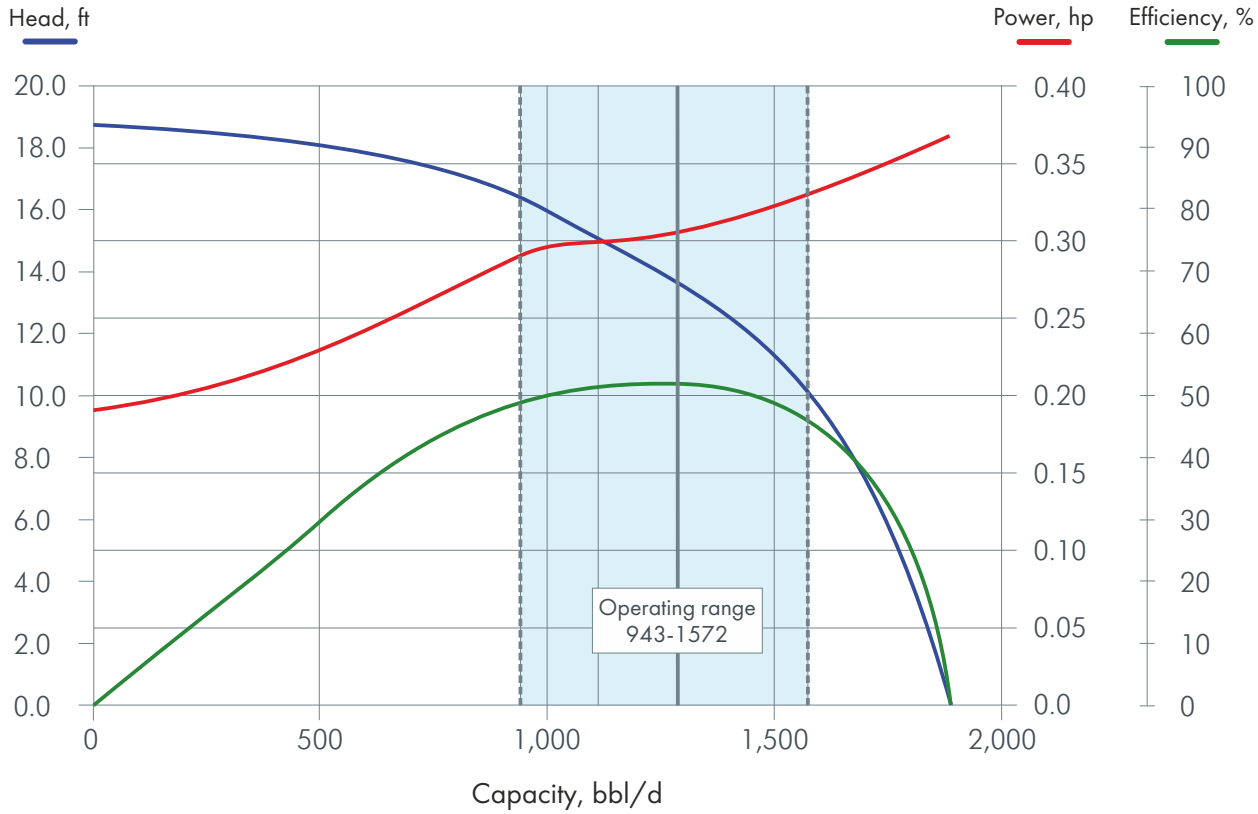


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	19.7	0.1034	0
189	19.4	0.1170	23
377	19.0	0.1306	41
597	18.7	0.1537	54
780	**18.0**	**0.1795**	**59**
975	15.1	0.2026	54
1,132	10.8	0.2176	42
1,415	0.0	0.2285	0

EF780 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9,8	506	1,660	92	12.2	16.6
3.5	11.5	594	1,949	108	14.3	19.4
4	13.1	675	2,215	125	16.5	22.4
4.5	14.8	770	2,526	140	18.5	25.2
5	16.4	850	2,789	158	20.9	28.4
5.5	18.0	1,007	3,304	183	24.2	32.9
6	19.7	1,100	3,609	200	26.4	35.9

Electric submersible pump EF1250/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg.

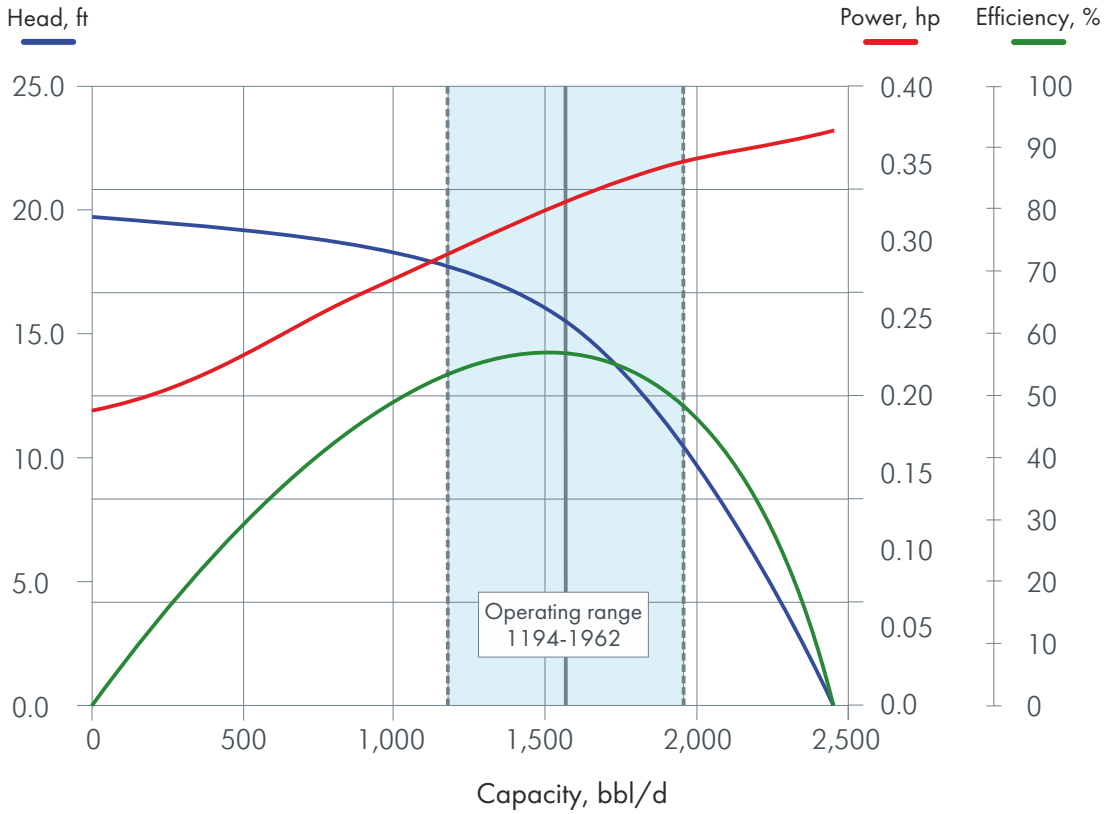


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	18.7	0.1904	0
314	18.4	0.2081	24
629	18.0	0.2380	40
943	16.4	0.2788	48
1,250	**13.9**	**0.2992**	**52**
1,572	10.2	0.3264	46
1,729	6.7	0.3509	35
1,887	0.0	0.3672	0

EF1250 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	259	850	61	13.4	18.2
3.5	11.5	302	991	71	15.6	21.2
4	13.1	349	1,145	82	18	24.5
4.5	14.8	395	1,296	93	20.5	27.9
5	16.4	438	1,437	103	22.7	30.9
5.5	18.0	485	1,591	114	25.1	34.1
6	19.7	531	1,742	125	27.5	37.4

Electric submersible pump EH1600/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg.

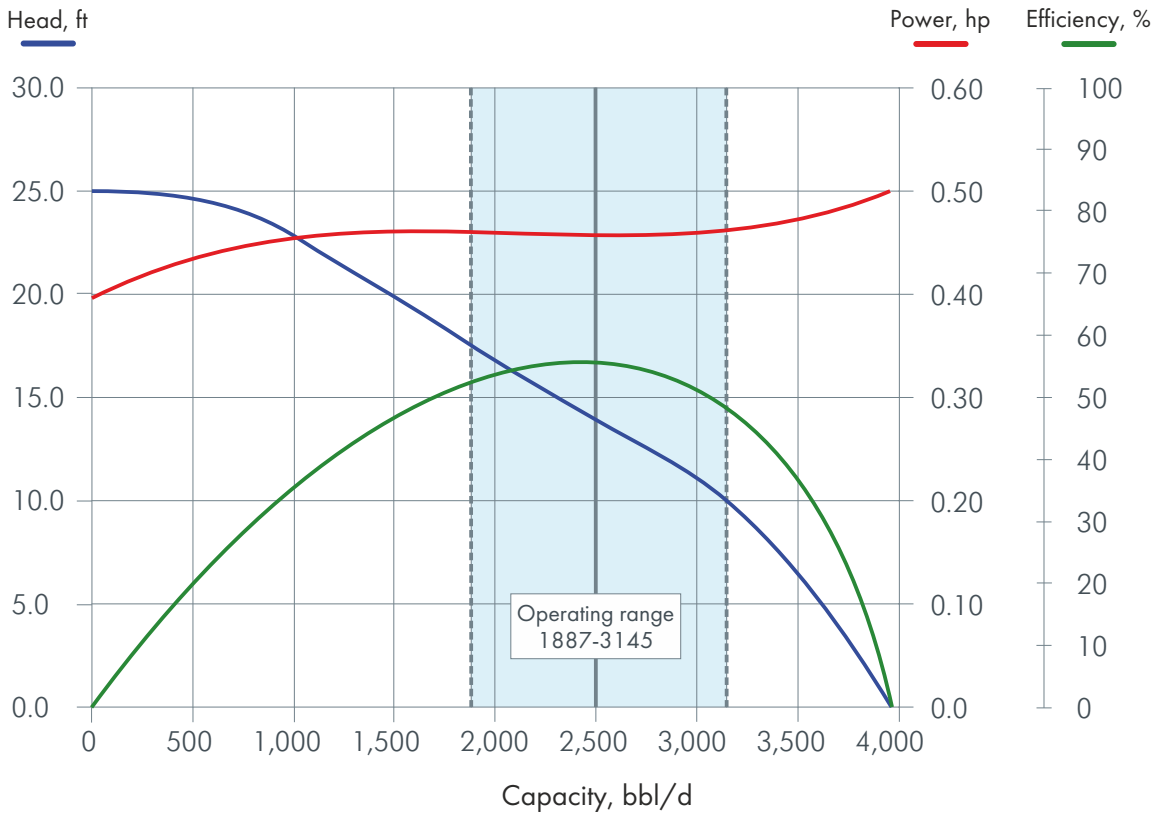


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	19.7	0.1904	0
308	19.0	0.2067	21
641	18.7	0.2380	38
868	18.0	0.2652	44
1,201	17.1	0.2883	53
1,600	**15.7**	**0.3237**	**57**
1,906	12.1	0.3522	49
2,044	8.2	0.3550	35
2,151	6.6	0.3577	29
2,453	0.0	0.3699	0

EH1600 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	288	945	60	14.3	19.4
3.5	11.5	341	1,119	71	16.9	23.0
4	13.1	394	1,293	82	19.5	26.5
4.5	14.8	442	1,450	92	21.9	29.8
5	16.4	494	1,621	103	24.5	33.3
5.5	18.0	547	1,795	114	27.1	36.9
6	19.7	595	1,952	124	29.5	40.1

Electric submersible pump EH2500/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg.

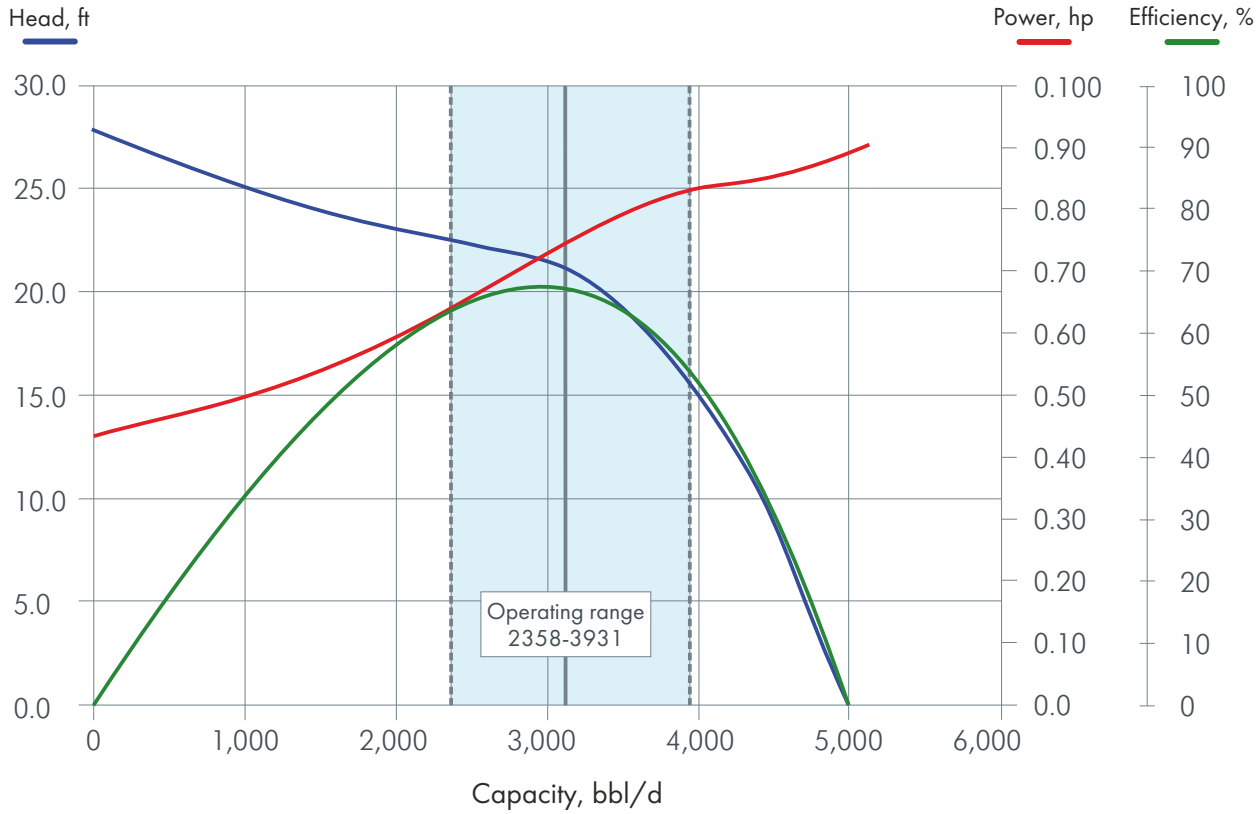


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	24.6	0.3971	0
629	24.6	0.4488	26
1,258	21.0	0.4583	43
1,572	19.0	0.4624	48
1,887	17.4	0.4624	53
2,500	**13.8**	**0.4651**	**56**
3,145	9.8	0.4733	49
3,396	8.2	0.4706	44
3,773	3.1	0.4828	18
3,962	0.0	0.5032	0

EH2500 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	214	702	51	17.4	23.7
3.5	11.5	252	827	60	20.5	27.9
4	13.1	294	965	70	23.9	32.5
4.5	14.8	332	1,089	79	27	36.7
5	16.4	370	1,214	88	30.1	40.9
5.5	18.0	407	1,335	97	33.2	45.2
6	19.7	441	1,447	106	36.3	49.4

Electric submersible pump EH3100/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg.

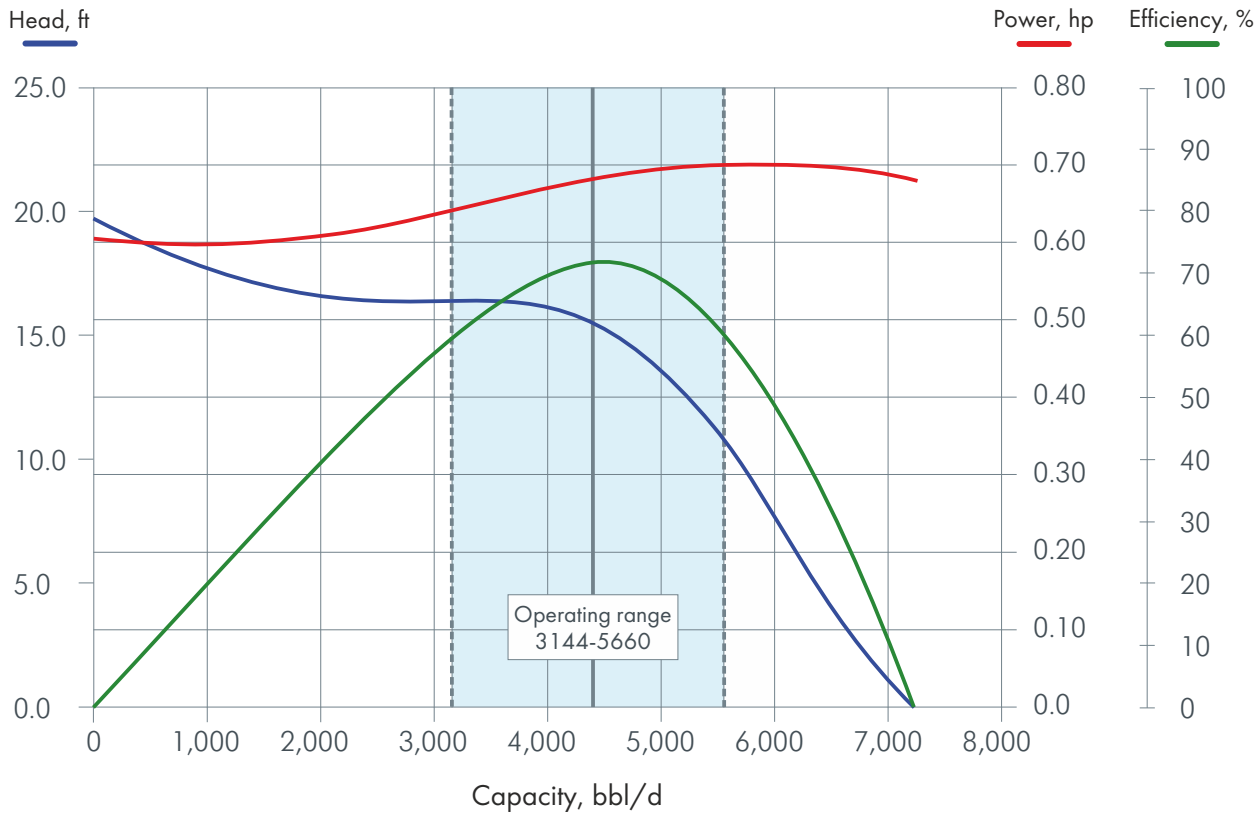


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	27.9	0.435	0
1,258	24.6	0.517	45
2,358	22.6	0.639	62
2,830	22.0	0.707	66
3,100	**21.3**	**0.741**	**68**
3,459	19.7	0.789	65
3,931	15.7	0.830	56
4,402	10.2	0.843	40
5,031	0.0	0.898	0

EH3100 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	195	640	30	16.4	22.2
3.5	11.5	228	746	35	19.1	25.9
4	13.1	260	853	40	21.8	29.6
4.5	14.8	299	981	46	25.1	34.1
5	16.4	332	1,088	51	27.8	37.8
5.5	18.0	364	1,194	56	30.5	41.5
6	19.7	403	1,322	62	33.8	46.0

Electric submersible pump EH4400/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg.

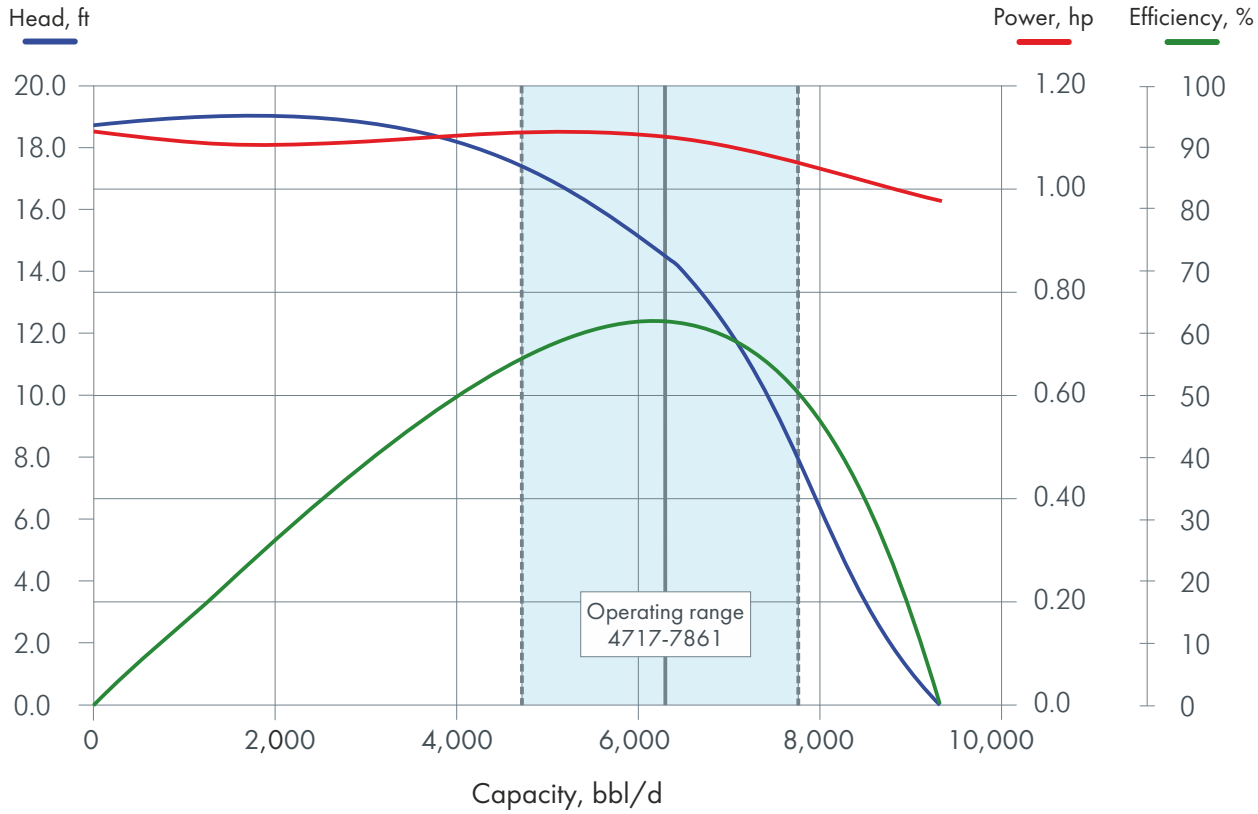


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	19.7	0.607	0
1,258	17.4	0.530	32
1,887	16.7	0.623	45
3,145	16.4	0.628	52
3,773	16.1	0.683	67
4,400	**14.8**	**0.706**	**72**
5,660	10.8	0.737	62
6,289	5.2	0.694	35
7,232	0.0	0.680	0

EH4400 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	135	443	30	15.6	21.2
3.5	11.5	158	517	35	18	24.5
4	13.1	180	591	40	20.8	28.2
4.5	14.8	207	679	46	24.9	33.9
5	16.4	229	751	51	26.0	35.4
5.5	18.0	252	827	56	28.5	38.8
6	19.7	279	915	62	31.5	42.8

Electric submersible pump EJ6300/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg.

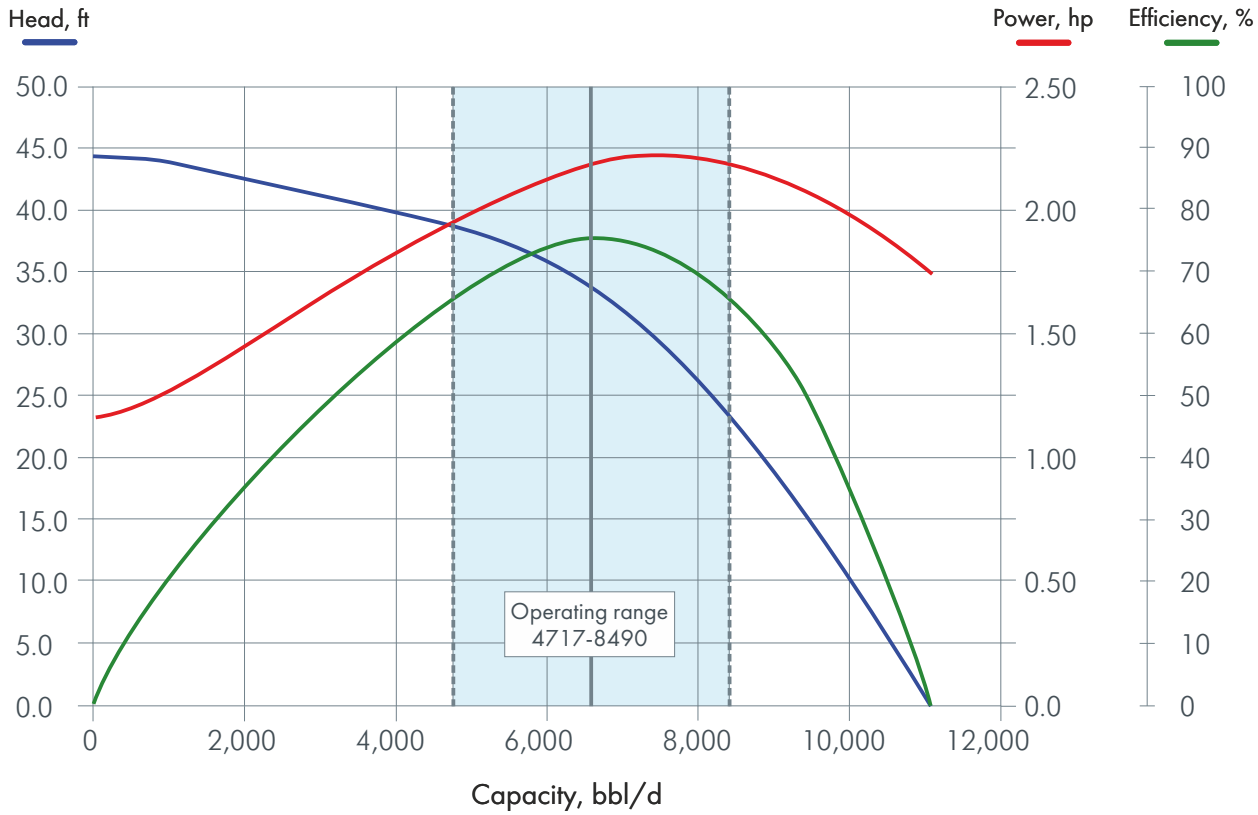


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	18.7	1.100	0
1,415	18.0	1.080	18
2,673	18.0	1.111	33
3,773	18.4	1.088	49
4,717	17.4	1.062	59
6,300	**14.4**	**1.110**	**62**
7,547	9.8	1.050	54
8,805	5.6	1.012	37
9,308	0.0	0.979	0

EJ6300 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9,8	118	387	27	22.0	29.9
3.5	11.5	140	459	32	26.0	35.4
4	13.1	162	532	37	30.0	40.8
4.5	14.8	184	604	42	35.0	47.6
5	16.4	207	679	47	38.0	51.7
5.5	18.0	224	735	51	41.0	55.8
6	19.7	246	807	56	45.3	61.5

Electric submersible pump EP6600/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg

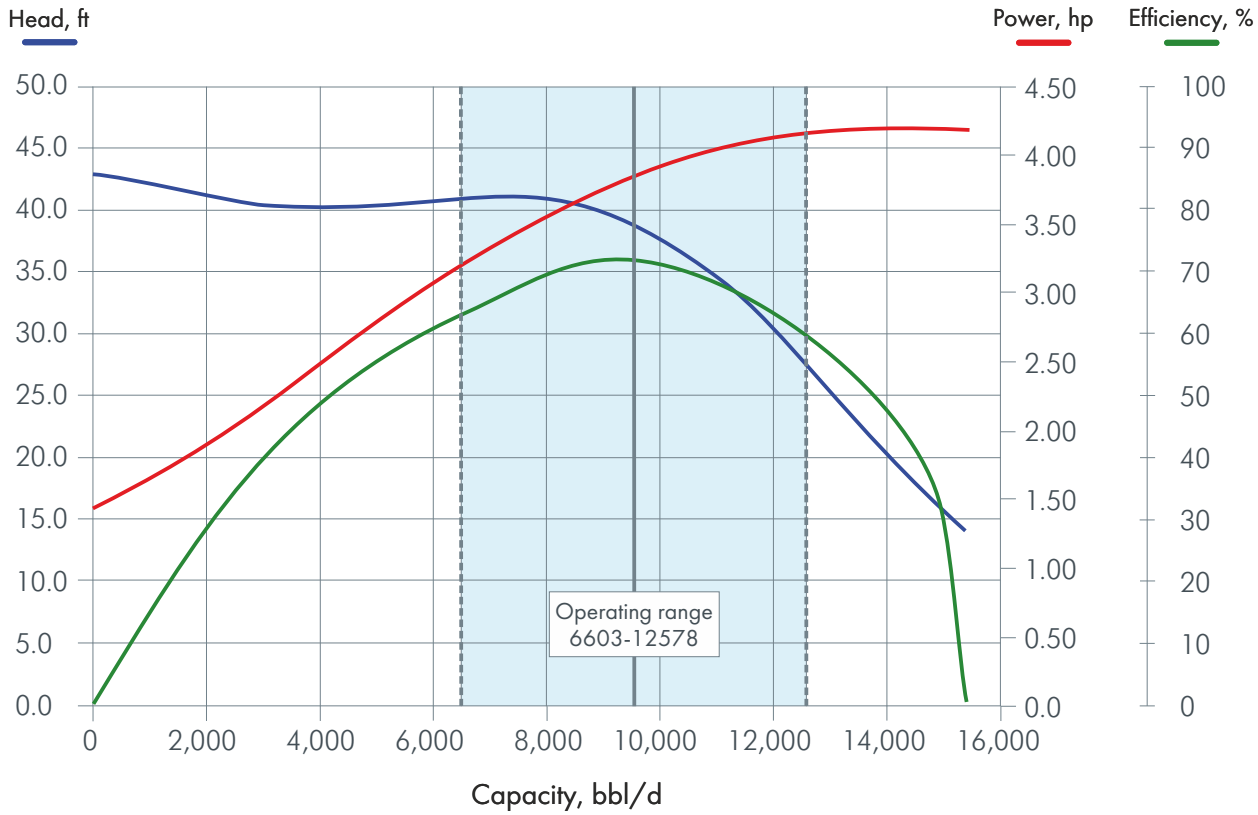


Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	44.3	1.15	0
0,943	44.0	1.26	25
1,887	42.7	1.42	42
2,830	41.3	1.61	54
3,773	40.0	1.78	63
4,717	38.7	1.94	70
5,660	36.7	2.09	74
6,603	**33.8**	**2.18**	**76**
7,547	29.2	2.21	74
8,490	23.0	2.18	67
9,434	15.4	2.07	52
10,377	6.6	1.90	27
11,100	0.0	1.74	0

EP6600 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	361	1,184	35	56.4	76.7
3.5	11.5	443	1,453	42	67.6	91.9
4	13.1	494	1,621	48	77.3	105.1
4.5	14.8	556	1,824	54	86.9	118.2
5	16.4	628	2,060	61	98.2	133.6

Electric submersible pump EP9800/2,910 rpm Performance Curve
Curve computed for one stage in fluid of 1.00 sg



Rate, bpd	Head, ft	Power, hp	Efficiency, %
0	43.0	1.45	0
1,572	41.7	1.80	27
3,145	40.4	2.24	42
4,717	40.4	2.71	53
6,603	41.0	3.24	63
8,176	40.7	3.61	69
9,748	**38.4**	**3.90**	**72**
11,320	33.5	4.10	70
12,578	27.6	4.16	62
14,150	19.7	4.19	50
15,408	14.4	4.19	40

EP9800 Electric submersible pump characteristics

Section length		Head		Stg	Power, hp	
m	ft	m	ft		kW	hp
3	9.8	374	1,227	32	91.6	124.6
3.5	11.5	445	1,460	38	108.7	147.8
4	13.1	515	1,690	44	125.9	171.2
4.5	14.8	585	1,919	50	143.1	194.6
5	16.4	655	2,149	56	160.2	217.9

Downhole electric motors for drive ESP (PCP)

Downhole electric motors are designed to work as part of an adjustable drive of submersible and progressing cavity pumps for pumping formation fluid from oil wells.

"ESP Service" LLC serially produces permanent magnet and asynchronous electric motors of the following series:

Motor type	Series	Power, hp (Torque, N·м)	Rated speed, rpm
Permanent magnet motors	319	27-136	3,000-6,000
	362	22-122	500-4,200
	460	14-340	500-4,200
	460 (for PCP)	2-50 (35-700)	100-1,500
	728	68-612	500-3,600
	728 (for PCP)	21-214 (300-3,000)	100-1,500
Asynchronous motors	460	16-170	2,100-4,200
Maximum temperature of formation fluid, as maximum, °C (°F)			120°C (248°F) 150°C (302°F) 200°C (392°F)
Hydrostatic pressure in the motor area, as maximum, psi			5,800

Asynchronous submersible motor is a two-pole electric machine that has a rotor of a short-closed structure.
Permanent magnet submersible motor is a synchronous electric machine that has a rotor constructed using permanent magnets.

Advantages of permanent magnet motors

- High efficiency with lower energy consumption allows to reduce electricity costs.
- The use of permanent magnets in the rotor allows to avoid electricity consumption for creating an electromotive force in the rotor.
- Smaller dimensions with equal power compared to asynchronous motors.
- Pump flow control - wide range of variation of ESP system rotation speed.

Electric motors can be equipped with a submersible unit of a telemetry system. The type of the submersible unit is determined by the supply contract.

Permanent magnet motors 319 series

Downhole permanent magnet motors 319 series designed for as operation part of an adjustable drive of electrical submersible pump installation 272 series for pumping formation fluid from oil wells.
The motor has a body diameter of 3.19 inch and is designed for wells with minimal inner diameter of the casing string of at least 3.5 inch (side rat hole with diameter of 4.02 inch), and a angle hole up to 90° at the suspension point.
Rotation speed operating range is within 3,000-6,000 rpm.
The working direction of shaft rotation, when looking at the motor from the side of head, is right-hand (clockwise). The motor is allowed to be operated with reverse rotation as part of ESP with left-hand direction of pump shaft rotation.

Formation fluid parameters

Formation fluid parameters		Motor version			
		1	2	3	4
Ambient temperature, °C (°F) , not more		120°C (248°F)		150°C (302°F)	
Hydrogen ion exponent of the associated water, pH		5.0-8.5	3.0-9.0	5.0-8.5	3.0-9.0
Amount of aggressive components, g/l, not more:	H_2S	0.01	1.25	0.01	1.25
	CO_2	-	1.15	-	1.15
	Cl	-	75	-	75
	HCO_3	-	1.00	-	1.00
	Ca^{2+}	-	9	-	9
	$(Na^{+}+K^{+})$	-	40	-	40

Type designations of downhole motors consist of two parts

- the first part – designation of the downhole motor;
- the second part – designation of the installed Surface panel of the telemetering system according to the Specifications of the supplier/manufacturer (may be omitted if no Surface panel is installed).

Motor designation

Designation elements	E	PMM	XXX	-	XXX	-	6.0	-	319	/X	V5	-	X	-	E
Designation numbers	1	2	3		4		5		6	7	8		9		10

Designation numbers	Options	Decoding
1	E	Manufacturer (“ESP Service” LLC)
2	PMM	Permanent magnet motor M series for electrical submersible pumps
3	Table 1	Rated power, hp
4	Table 1	Rated voltage, V
5	6.0	Rated speed, thous. rpm
6	319	Series
7	1	With winding wire brand 1
	2	With winding wire brand 2
8	V5	Climatic category V and environmental class 5 according to GOST 15150
9	**Design version based on operating conditions**	
	1	ambient temperature is 120°C (248°F)
	2	ambient temperature is 120°C (248°F) corrosion-resistant design version
	3	ambient temperature is 150°C (302°F)
	4	ambient temperature is 150°C (302°F) corrosion-resistant design version
10	**Type of spline joint of the motor shaft**	
	E	involute spline joint

Examples of motor designation record for ordering and in the documentation of another product:

Permanent magnet motor with a power of 41 hp, rated voltage of 760 V, with winding wire brand 1, with involute splines of the shaft, designed to operate under the following downhole conditions: ambient temperature of 120°C (248°F):

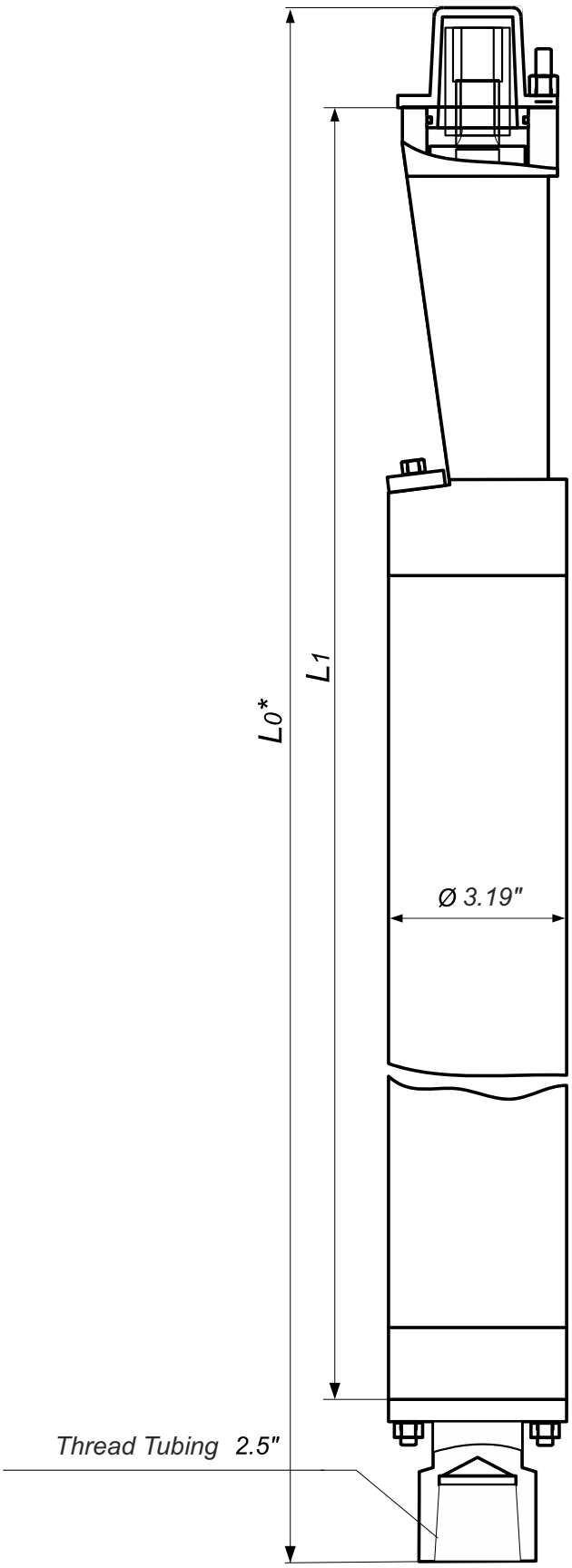
Motor EPMM41-760-6.0-319/2V5-1-E

Main technical data of motors EPMM-319V5

Table 1

Motor type	Rated parameters				No-load parameters		Mean phase resistance at 20 °C, Ω, ±4%	Coolant speed, ft/s, as minimum	Weights and overall dimensions		
	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %	Phase-to-phase voltage, V,	Current, A, as maximum			L1, ft	L0, ft	Weight, lb not more
EPMM27-460-6.0-319/XV5	27	460	31.6	87.0	370-460	2.6	0.260	0.2	5.5	6.0	88.2
EPMM41-760-6.0-319/XV5	41	760	28.7	87.1	620-760	2.6	0.406	0.2	7.7	8.1	176.4
EPMM54-930-6.0-319/XV5	54	930	31.6	87.3	760-930	2.6	0.479	0.2	8.7	9.2	209.5
EPMM68-1220-6.0-319/XV5	68	1,220	29.8	87.3	1,000-1,220	2.6	0.625	0.26	10.9	11.4	275.6
EPMM82-1520-6.0-319/XV5	82	1,520	28.7	87.2	1,250-1,520	2.6	0.772	0.26	13.1	13.5	34.8
EPMM95-1820-6.0-319/XV5	95	1,820	27.9	87.2	1,500-1,820	2.6	0.918	0.33	15.2	15.7	407.9
EPMM109-2120-6.0-319/XV5	109	2,120	27.4	87.2	1,750-2,120	2.6	1.064	0.33	17.4	17.9	474.0
EPMM122-2410-6.0-319/XV5	122	2,410	27.0	87.1	1,980-2,410	2.6	1.210	0.49	19.6	20.0	540.2
EPMM136-2580-6.0-319/XV5	136	2,580	28.2	87.3	2,130-2,580	2.6	1.283	0.49	20.7	21.1	573.3

Dimensions



Permanent magnet motors 362 series

Downhole permanent magnet motors 362 series designed for an operation as part of an adjustable drive of electrical submersible pump for pumping formation fluid from oil wells.
The motor has a body diameter of 3.62 inch and is designed for wells with minimal inner diameter of the casing string of at least 4.41 inch.
At the motor suspension points an angle hole is 60° as maximum, maximum intensity of increase in curvature of the well string is 3 minutes per 33 ft.
Rotation speed operating range is within 500-4,200 rpm. When operating at a speed over 3,000 rpm, the motor power shall not exceed the rated power.
The working direction of shaft rotation, when looking at the motor from the side of head, is right-hand (clockwise). The motor is allowed to be operated with reverse rotation as part of Electric Submersible Pump System with left-hand direction of pump shaft rotation, therefore it is required to ensure a smooth start of the motor.

Formation fluid parameters

Formation fluid parameters		Motor version			
		1	2	3	4
Ambient temperature, °C (°F) , not more		120°C (248°F)		150°C (302°F)	
Hydrogen ion exponent of the associated water, pH		5.0-8.5	3.0-9.0	5.0-8.5	3.0-9.0
Amount of aggressive components, g/l, not more:	H_2S	0.01	1.25	0.01	1.25
	CO_2	-	1.15	-	1.15
	Cl	-	75	-	75
	HCO_3	-	1.00	-	1.00
	Ca^{2+}	-	9	-	9
	$(Na^{+}+K^{+})$	-	40	-	40

Type designations of downhole motors consist of two parts

- the first part – designation of the downhole motor;
- the second part – designation of the installed Surface panel of the telemetering system according to the Specifications of the supplier/manufacturer (may be omitted if no Surface panel is installed).

Motor designation

Designation elements	E	PMM	XX	-	XXX	-	3.0	-	362	/X	V5	-	X	-	X
Designation numbers	1	2	3		4		5		6	7	8		9		10

Designation numbers	Options	Decoding
1	E	Manufacturer ("ESP Service" LLC)
2	PMM	Permanent magnet motor M series for electrical submersible pumps
3	Tables 1, 2, 3	Rated power, hp
4	Tables 1, 2, 3	Rated voltage, V
5	3.0	Rated speed, thous. rpm
6	362	Series
7	1	With winding wire brand 1
	2	With winding wire brand 2
	Omitted designation	With winding wire brand 3
8	V5	Climatic category V and environmental class 5 according to GOST 15150
9	**Design version based on operating conditions**	
	1	ambient temperature is 120°C (248°F)
	2	ambient temperature is 120°C (248°F) corrosion-resistant housing and end parts with coating
	2n	ambient temperature is 120°C (248°F) corrosion-resistant housing and end parts made of stainless steel
	3	ambient temperature is 150°C (302°F)
	4	ambient temperature is 150°C (302°F) corrosion-resistant housing and end parts with coating
	4n	ambient temperature is 150°C (302°F) corrosion-resistant housing and end parts made of stainless steel
10	**Type of spline joint of the motor shaft**	
	No letter	straight spline joint (basic version)
	E	involute spline joint

Example of the designation record for a motor with power 44 hp, rated voltage 910 V, design version as per operating conditions 1 upon its order and in documentation of another product:

Motor **EPMM44-910-3.0-362V5-1**

Motor with power 41 hp with winding wire brand 1:

Motor **EPMM41-970-3.0-362/1V5-1**

The same motor with involute splines on the shaft and installed Surface panel unit DU-92M3L:

Motor **EPMM41-970-3.0-362/1V5-1-E**

Surface panel **DU-92M3L**

Motor of the same power with winding wire brand 2 and of design version as per operating conditions 2n:

Motor **EPMM41-890-3.0-362/2V5-2n-E**

Surface panel **DU-92M3L**

Main technical data of motors EPMM-362V5

Table 1

Motor type	Rated parameters				No-load parameters		Mean phase resistance at 20 °C, Ω, ±4%	Coolant speed, ft/s, as minimum	Weights and overall dimensions		
	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %	Phase-to-phase voltage, V, as minimum	Current, A, as maximum			L0, ft	L1, ft	Weight, lb not more
EPMM22-450-3.0-362V5	22	450	25.1	89.1	340	2.0	0.486	0.07	7.1	6.5	222.7
EPMM33-680-3.0-362V5	33	680	25.3	89.4	515	2.0	0.705	0.07	9.4	8.8	286.7
EPMM44-910-3.0-362V5	44	910	25.5	89.5	690	2.0	0.925	0.13	11.7	11.1	350.6
EPMM54-1140-3.0-362V5	54	1,140	25.7	89.6	860	2.0	1.145	0.13	14.0	13.4	414.5
EPMM65-1360-3.0-362V5	65	1,360	25.9	89.6	1,030	2.0	1.364	0.20	16.3	15.7	478.5
EPMM76-1590-3.0-362V5	76	1,590	26.1	89.6	1,200	2.0	1.584	0.20	18.6	18.0	542.4

Main technical data of motors EPMM-362/1V5

Table 2

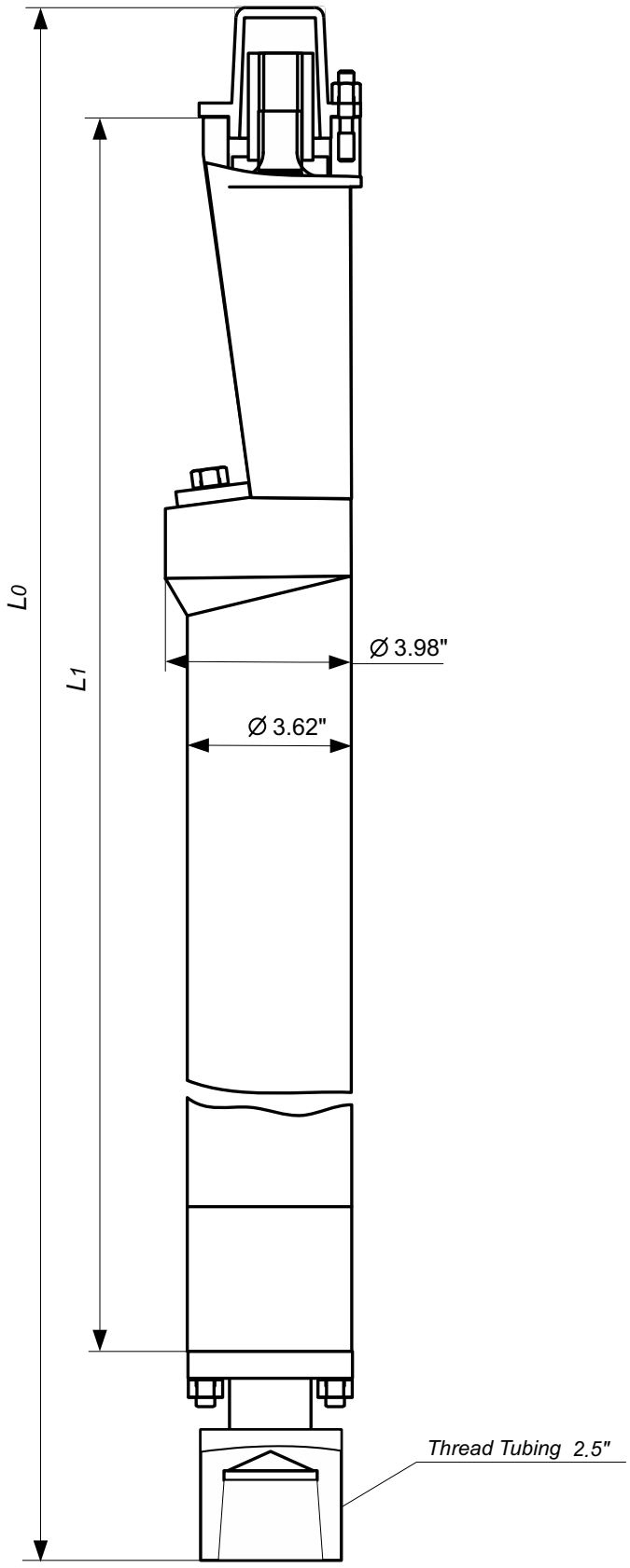
Motor type	Rated parameters				No-load parameters		Mean phase resistance at 20 °C, Ω, ±4%	Coolant speed, ft/s, as minimum	Weights and overall dimensions		
	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %	Phase-to-phase voltage, V, as minimum	Current, A, as maximum			L0, ft	L1, ft	Weight, lb not more
EPMM14-330-3.0-362/1V5	14	330	22.7	89.8	240	1.8	0.370	0.07	4.8	4.2	158.8
EPMM27-650-3.0-362/1V5	27	650	22.7	90.3	480	1.8	0.674	0.07	7.1	6.5	222.7
EPMM41-970-3.0-362/1V5	41	970	22.7	90.5	720	1.8	0.978	0.07	9.4	8.8	286.7
EPMM54-1300-3.0-362/1V5	54	1,300	22.7	90.6	960	1.8	1.281	0.07	11.7	11.1	350.6
EPMM68-1500-3.0-362/1V5	68	1,500	25.2	90.4	1,080	1.8	1.433	0.13	12.9	12.3	383.7
EPMM82-1820-3.0-362/1V5	82	1,820	24.7	90.5	1,330	1.8	1.737	0.13	15.2	14.6	447.6
EPMM95-2150-3.0-362/1V5	95	2,150	24.5	90.6	1,570	1.8	2.041	0.20	17.5	16.9	511.6
EPMM109-2340-3.0-362/1V5	109	2,340	25.9	90.4	1,690	1.8	2.193	0.20	18.6	18.0	542.4
EPMM122-2660-3.0-362/1V5	122	2,660	25.5	90.5	1,930	1.8	2.497	0.20	20.9	20.3	606.4

Main technical data of motors EPMM-362/2V5

Table 3

Motor type	Rated parameters				No-load parameters		Mean phase resistance at 20 °C, Ω, ±4%	Coolant speed, ft/s, as minimum	Weights and overall dimensions		
	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %	Phase-to-phase voltage, V, as minimum	Current, A, as maximum			L0, ft	L1, ft	Weight, lb not more
EPMM14-300-3.0-362/2V5	14	300	25.1	89.2	200	1.8	0.335	0.07	4.8	4.2	158.8
EPMM27-600-3.0-362/2V5	27	600	25.1	89.8	430	1.8	0.611	0.07	7.1	6.5	222.7
EPMM41-890-3.0-362/2V5	41	890	25.1	90.0	660	1.8	0.887	0.07	9.4	8.8	286.7
EPMM54-1180-3.0-362/2V5	54	1,180	25.1	90.1	890	1.8	1.162	0.07	11.7	11.1	350.6
EPMM61-1330-3.0-362/2V5	61	1,330	25.1	90.1	1,000	1.8	1.300	0.13	12.9	12.3	383.7
EPMM75-1620-3.0-362/2V5	75	1,620	25.1	90.2	1,240	1.8	1.576	0.13	15.2	14.6	447.6
EPMM86-1900-3.0-362/2V5	86	1,900	24.3	90.3	1,470	1.8	1.852	0.20	17.5	16.9	511.6
EPMM95-2070-3.0-362/2V5	95	2,070	25.1	90.2	1,580	1.8	1.990	0.20	18.6	18.0	542.4
EPMM109-2360-3.0-362/2V5	109	2,360	25.1	90.2	1,810	1.8	2.265	0.20	20.9	20.3	606.4

Dimensions



Permanent magnet motors 460 series

Downhole permanent magnet motors 460 series designed for as operation part of an adjustable drive of electrical submersible pump for pumping formation fluid from oil wells.
The motor has a body diameter of 4.60 inch and is designed for wells with minimal inner diameter of the casing string of at least 4.87 inch.
At the motor suspension point a hole angle is 60° as maximum, maximum intensity of increase in curvature of the well string is 3 minutes per 33 ft.
Rotation speed operating range is within 500-4,200 rpm. When operating at a speed over 3,000 rpm, the motor power shall not exceed the rated power.
The working direction of shaft rotation, when looking at the motor from the side of head, is right-hand (clockwise). The motor is allowed to be operated with reverse rotation as part of Electric Submersible Pump System with left-hand direction of pump shaft rotation, therewith it is required to ensure a smooth start of the motor.

Formation fluid parameters

Formation fluid parameters		Motor version					
		1	2	3	4	5	6
Ambient temperature, °C (°F) , not more		120°C (248°F)		150°C (302°F)		200°C (392°F)	
Hydrogen ion exponent of the associated water, pH		5.0-8.5	3.0-9.0	5.0-8.5	3.0-9.0	5.0-8.5	3.0-9.0
Amount of aggressive components, g/l, not more:	H_2S	0.01	1.25	0.01	1.25	0.01	1.25
	CO_2	-	1.15	-	1.15	-	1.15
	Cl	-	75	-	75	-	75
	HCO_3	-	1.00	-	1.00	-	1.00
	Ca^{2+}	-	9	-	9	-	9
	$(Na^{+}+K^{+})$	-	40	-	40	-	40

Type designations of downhole motors consist of two parts

- the first part – designation of the downhole motor;
- the second part – designation of the installed downhole unit of the telemetering system according to the Specifications of the supplier/manufacturer (may be omitted if no downhole unit is installed).

Motor designation

Designation elements	E	PMM	XX	-	XXX	-	XXX	-	3.0	-	460	/X	B5	-	X	-	X
Designation numbers	1	2	3		4		5		6		7	8	9		10		11

Designation numbers	Options	Decoding
1	E	Manufacturer ("ESP Service" LLC)
2	PMM	Permanent magnet motor M series for electrical submersible pumps
3	Missing numbers	Basic version
	2	With two-side shaft outlet
4	Tables 1, 2, 3	Rated power, hp
5	Tables 1, 2, 3	Rated voltage, V
6	3.0	Rated speed, thous. rpm
7	460	Series
8	1	With winding wire brand 1
	2	With winding wire brand 2
	Omitted designation	With winding wire brand 3
9	V5	Climatic category V and environmental class 5 according to GOST 15150
10		**Design version based on operating conditions**
	1	ambient temperature is 120°C (248°F)
	2	ambient temperature is 120°C (248°F) corrosion-resistant design version
	3	ambient temperature is 150°C (302°F)
	4	ambient temperature is 150°C (302°F) corrosion-resistant design version
	5	ambient temperature is 200°C (392°F)
	6	ambient temperature is 200°C (392°F) corrosion-resistant design version
11		**Type of spline joint of the motor shaft**
	No letter	straight spline joint (basic version)
	E	involute spline joint

Examples of motor designation record for ordering and in the documentation of another product.
Permanent magnet motor with a rated power of 41 hp and rated voltage of 1,000 V, with straight splines of the shaft (basic version), designed to operate under the following downhole conditions: ambient temperature of 120°C (248°F), corrosion-resistant version:

Motor **EPMM41-1000-3.0-460V5-2**

The motor with the same power with involute splines on the shaft and winding wire brand 1:

Motor **EPMM41-800-3.0-460/1V5-2-E**

TThe motor with power of 54 hp with two-side shaft outlet and with winding wire brand 2:

Motor **EPMM2.54-1100-3.0-460/2V5-2**

The motor with power 54 hp with installed Surface panel DU-117M3L, with involute splines on the shaft and winding wire brand 2:

Motor **EPMM54-1100-3.0-460/2V5-2-E**

Surface panel **DU-117M3L**

Main technical data of motors EPMM-460V5

Table 1

Motor type	Rated parameters				No-load parameters		Mean phase resistance at 20 °C, Ω, ±4%	Coolant speed, ft/s, as minimum
	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %	Phase-to-phase voltage, V, as minimum	Current, A, as maximum		
EPMM14-420-3.0-460V5	14	420	17.2	89.4	370-420	1.0	0.544	0.13
EPMM14-330-3.0-460V5		330	21.7	90.1	280-330	1.3	0.294	
EPMM27-840-3.0-460V5	27	840	17.0	90.4	740-840	1.2	0.951	0.20
EPMM27-660-3.0-460V5		660	21.5	91.0	570-660	1.5	0.515	
EPMM41-1250-3.0-460V5	41	1,250	16.9	90.8	1,100-1,250	1.1	1.358	0.20
EPMM41-1000-3.0-460V5		1,000	21.4	91.3	860-1,000	1.4	0.736	
EPMM54-1700-3.0-460V5	54	1,700	16.9	90.9	1,470-1,700	1.1	1.764	0.26
EPMM54-1300-3.0-460V5		1,300	21.4	91.5	1,150-1,300	1.4	0.956	
EPMM68-2100-3.0-460V5	68	2,100	16.8	91.0	1,840-2,100	1.1	2.171	0.26
EPMM68-1650-3.0-460V5		1,650	21.4	91.6	1,440-1,650	1.4	1.177	
EPMM82-2500-3.0-460V5	82	2,500	16.8	91.1	2,210-2,500	1.2	2.578	0.33
EPMM82-2000-3.0-460V5		2,000	21.4	91.6	1,730-2,000	1.4	1.398	
EPMM95-2300-3.0-460V5	95	2,300	21.4	91.7	2,020-2,300	1.4	1.619	0.33
EPMM95-1900-3.0-460V5		1,900	26.3	91.7	1,650-1,900	1.6	1.068	
EPMM109-2400-3.0-460V5	109	2,400	23.7	91.3	2,100-2,400	1.9	1.669	0.66
EPMM109-1900-3.0-460V5		1,900	29.5	91.7	1,670-1,900	1.9	0.957	
EPMM122-2100-3.0-460V5	122	2,100	28.8	91.8	1,800-2,100	1.9	1.072	0.66
EPMM122-1600-3.0-460V5		1,600	38.6	91.8	1,350-1,600	2.5	0.573	
EPMM136-2400-3.0-460V5	136	2,400	29.6	91.7	2,100-2,400	1.9	1.187	0.66
EPMM136-1800-3.0-460V5		1,800	39.7	91.6	1,560-1,800	2.5	0.635	
EPMM150-2500-3.0-460V5	150	2,500	29.1	91.6	2,100-2,500	1.9	1.352	0.66
EPMM150-1900-3.0-460V5		1,900	39.2	91.9	1,660-1,900	2.5	0.696	
EPMM163-2100-3.0-460V5	163	2,100	39.0	91.7	1,800-2,100	2.5	0.758	1.31
EPMM177-2300-3.0-460V5	177	2,300	39.0	91.9	1,950-2,300	2.5	0.820	1.31
EPMM204-2450-3.0-460V5	204	2,450	43.3	91.7	2,180-2,450	2.5	0.881	1.31
EPMM204-2000-3.0-460V5		2,000	52.0	91.9	1,800-2,000	3.0	0.582	
EPMM238-2300-3.0-460V5	238	2,300	52.2	91.9	2,000-2,300	3.0	0.663	1.64
EPMM272-2500-3.0-460V5	272	2,500	54.2	92.0	2,250-2,500	3.0	0.745	1.64

Weights and overall dimensions of the motors EPMM-460V5

Motor type	Power, hp	Rated parameters EPPM-460V5			EPMM2.-460V5		
		Li , ft	Lo, ft	Weight, lb not more	Li , ft	Lo, ft	Weight, lb not more
EPMM14-460V5	14	3.42	4.07	158.76	3.42	3.78	158.76
EPMM27-460V5	27	4.66	5.31	220.50	4.66	5.02	220.50
EPMM41-460V5	41	5.91	6.56	271.22	5.91	6.27	271.22
EPMM54-460V5	54	7.16	7.81	330.75	7.16	7.52	330.75
EPMM68-460V5	68	8.40	9.05	388.08	8.40	8.76	388.08
EPMM82-460V5	82	9.65	10.30	445.41	9.65	10.01	445.41
EPMM95-460V5	95	10.90	11.55	504.95	10.90	11.26	504.95
EPMM109-460V5	109	12.14	12.79	562.28	12.14	12.50	562.28
EPMM122-460V5	122	13.39	14.04	632.84	13.39	13.75	632.84
EPMM136-460V5	136	14.64	15.29	694.58	14.64	15.00	694.58
EPMM150-460V5	150	15.88	16.53	754.11	15.88	16.24	754.11
EPMM163-460V5	163	17.13	17.78	813.65	17.13	17.49	813.65
EPMM177-460V5	177	18.38	19.03	870.98	18.38	18.74	870.98
EPMM204-460V5	204	19.62	20.27	928.31	19.62	19.98	928.31
EPMM238-460V5	238	22.12	22.77	1,056.20	22.12	22.48	1,056.20
EPMM272-460V5	272	24.61	25.26	1,177.47	24.61	24.97	1,177.47

Main technical data of motors EPMM-460/1V5

Table 2

Motor type	Rated parameters				No-load parameters		Mean phase resistance at 20 °C, Ω, ±4%	Coolant speed, ft/s, as minimum
	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %	Phase-to-phase voltage, V, as minimum	Current, A, as maximum		
EPMM16-400-3.0-460/1V5	16	400	21.1	90.6	340–400	1.6	0.351	0.13
EPMM22-400-3.0-460/1V5	22		28.3					
EPMM27-800-3.0-460/1V5	27	800	17.4	91.5	680–800	1.6	0.612	0.2
EPMM30-800-3.0-460/1V5	30		19.1					
EPMM33-800-3.0-460/1V5	33		20.8					
EPMM38-800-3.0-460/1V5	38		24.3					
EPMM41-800-3.0-460/1V5	41		26.1					
EPMM44-800-3.0-460/1V5	44		27.9					
EPMM54-1200-3.0-460/1V5	54	1,200	23.0	91.9	1,010–1,200	1.6	0.873	0.2
EPMM61-1200-3.0-460/1V5	61		26.0					
EPMM68-1600-3.0-460/1V5	68	1600	21.6	92.0	1,350–1,600	1.6	1.135	0.26
EPMM76-1600-3.0-460/1V5	76		24.2					
EPMM82-1600-3.0-460/1V5	82		26.0					
EPMM86-1600-3.0-460/1V5	86		27.3					
EPMM95-2000-3.0-460/1V5	95	2,000	24.2	92.1	1,690–2,000	1.6	1.396	0.26
EPMM109-2400-3.0-460/1V5	109	2,400	23.0	92.2	2,030–2,400	1.6	1.657	0.33
EPMM122-2400-3.0-460/1V5	122		26.0					
EPMM136-2400-3.0-460/1V5	136	2,400	29.2	92.4	2,000–2,400	1.9	1.310	0.66
EPMM150-2400-3.0-460/1V5	150		32.2					
EPMM170-2500-3.0-460/1V5	170	2,500	35.2	92.4	2,080–2,500	2.2	1.202	0.66
EPMM174-2500-3.0-460/1V5	174	2,500	35.7	92.4	2,100–2,500	2.4	1.082	0.66
EPMM190-2500-3.0-460/1V5	190		39.2					
EPMM204-2500-3.0-460/1V5	204	2,500	42.7	92.4	2,070–2,500	2.5	0.957	0.66
EPMM218-2300-3.0-460/1V5	218	2,300	47.7	92.3	1,990–2,300	2.7	0.885	0.66
EPMM231-2500-3.0-460/1V5	231	2,500	46.7	92.3	2,170–2,500	2.7	0.963	1.31
EPMM245-2700-3.0-460/1V5	245	2,700	45.9	92.2	2,350–2,700	2.7	1.042	1.31
EPMM258-2700-3.0-460/1V5	258		48.6					
EPMM272-2500-3.0-460/1V5	272	2,500	56.2	92.4	2,100–2,500	3.2	0.755	1.31
EPMM286-2500-3.0-460/1V5	286		59.0					
EPMM299-2600-3.0-460/1V5	299	2,600	58.4	92.1	2,250–2,600	3.2	0.808	1.64
EPMM313-2800-3.0-460/1V5	313	2,800	57.1	92.4	2,470–2,800	3.2	0.860	1.64
EPMM340-3100-3.0-460/1V5	340	3,100	57.0	92.1	2,780–3,100	3.2	0.966	1.64

Weights and overall dimensions of the motors EPMM-460/1V5

Motor type	Power, hp	EPMM-460/1V5			EPMM2.-460/1V5		
		L1 , ft	Lo, ft	Weight, lb not more	L1 , ft	Lo, ft	Weight, lb not more
EPMM16-400-3.0-460/1V5	16	3.42	4.07	158.76	3.42	3.78	158.76
EPMM22-400-3.0-460/1V5	22						
EPMM27-800-3.0-460/1V5	27	4.66	5.31	220.50	4.66	5.02	220.50
EPMM30-800-3.0-460/1V5	30						
EPMM33-800-3.0-460/1V5	33						
EPMM38-800-3.0-460/1V5	38						
EPMM41-800-3.0-460/1V5	41						
EPMM44-800-3.0-460/1V5	44						
EPMM54-1200-3.0-460/1V5	54	5.91	6.56	271.22	5.91	6.27	271.22
EPMM61-1200-3.0-460/1V5	61						
EPMM68-1600-3.0-460/1V5	68	7.16	7.81	330.75	7.16	7.52	330.75
EPMM76-1600-3.0-460/1V5	76						
EPMM82-1600-3.0-460/1V5	82						
EPMM86-1600-3.0-460/1V5	86						
EPMM95-2000-3.0-460/1V5	95	8.40	9.05	388.08	8.40	8.76	388.08
EPMM109-2400-3.0-460/1V5	109	9.65	10.30	445.41	9.65	10.01	445.41
EPMM122-2400-3.0-460/1V5	122						
EPMM136-2400-3.0-460/1V5	136	10.90	11.55	504.95	10.90	11.26	504.95
EPMM150-2400-3.0-460/1V5	150						
EPMM170-2500-3.0-460/1V5	170	12.14	12.79	562.28	12.14	12.50	562.28
EPMM174-2500-3.0-460/1V5	174	13.39	14.04	632.84	13.39	13.75	632.84
EPMM190-2500-3.0-460/1V5	190						
EPMM204-2500-3.0-460/1V5	204	14.64	15.29	694.58	14.64	15.00	694.58
EPMM218-2300-3.0-460/1V5	218	15.88	16.53	754.11	15.88	16.24	754.11
EPMM231-2500-3.0-460/1V5	231	17.13	17.78	813.65	17.13	17.49	813.65
EPMM245-2700-3.0-460/1V5	245	18.38	19.03	870.98	18.38	18.74	870.98
EPMM258-2700-3.0-460/1V5	258						
EPMM272-2500-3.0-460/1V5	272	19.62	20.27	928.31	19.62	19.98	928.31
EPMM286-2500-3.0-460/1V5	286						
EPMM299-2600-3.0-460/1V5	299	20.87	21.52	992.25	20.87	21.23	992.25
EPMM313-2800-3.0-460/1V5	313	22.12	22.77	1,056.20	22.12	22.48	1,056.20
EPMM340-3100-3.0-460/1V5	340	24.61	25.26	1,177.47	24.61	24.97	1,177.47

Main technical data of motors EPMM-460/2V5

Table 3

Motor type	Rated parameters				No-load parameters		Mean phase resistance at 20 °C, Ω, ±4%	Coolant speed, ft/s, as minimum
	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %	Phase-to-phase voltage, V, as minimum	Current, A, as maximum		
EPMM16-360-3.0-460/2V5	16	360	23.0	90.4	310–360	1.6	0.322	0.13
EPMM19 -360-3.0-460/2V5	19		26.9					
EPMM27-720-3.0-460/2V5	27	720	18.9	91.4	620–720	1.6	0.563	0.2
EPMM30-720-3.0-460/2V5	30		20.8					
EPMM33-720-3.0-460/2V5	33		22.7					
EPMM38-720-3.0-460/2V5	38		26.6					
EPMM44-1100-3.0-460/2V5	44	1,100	20.2	91.7	940–1,100	1.6	0.805	0.2
EPMM48-1100-3.0-460/2V5	48		22.0					
EPMM54-1100-3.0-460/2V5	54		25.2					
EPMM61-1450-3.0-460/2V5	61	1,450	21.2	91.8	1,250–1,450	1.6	1.046	0.26
EPMM68-1450-3.0-460/2V5	68		23.5					
EPMM76-1450-3.0-460/2V5	76		26.4					
EPMM86-1800-3.0-460/2V5	86	1,800	23.7	91.8	1,560–1,800	1.6	1.287	0.26
EPMM95-1800-3.0-460/2V5	95		26.4					
EPMM109-2200-3.0-460/2V5	109	2,200	25.2	91.8	1,870–2,200	1.6	1.528	0.33
EPMM122-2150-3.0-460/2V5	122	2,150	29.1	92.0	1,820–2,150	1.9	1.189	0.33
EPMM136-2150-3.0-460/2V5	136		32.4					
EPMM150-2200-3.0-460/2V5	150	2,200	34.7	92.0	1,860–2,200	2.2	1.079	0.66
EPMM156-2200-3.0-460/2V5	156		36.2					
EPMM163-2200-3.0-460/2V5	163	2,200	38.0	92.0	1,860–2,200	2.4	0.960	0.66
EPMM170-2200-3.0-460/2V5	170		39.6					
EPMM174-2200-3.0-460/2V5	174		40.6					
EPMM184-2150-3.0-460/2V5	184	2,150	44.3	91.9	1,800–2,150	2.7	0.835	0.66
EPMM190-2150-3.0-460/2V5	190		45.9					
EPMM204-2300-3.0-460/2V5	204	2,300	44.9	91.8	1,990–2,300	2.7	0.916	0.66
EPMM218-2500-3.0-460/2V5	218	2,500	44.2	91.8	2,170–2,500	2.7	0.996	1.31
EPMM231-2700-3.0-460/2V5	231	2,700	43.7	91.8	2,350–2,700	2.7	1.077	1.31
EPMM245-2450-3.0-460/2V5	245	2,450	50.8	92.0	2,160–2,450	3.0	0.784	1.31
EPMM258-2450-3.0-460/2V5	258		53.7					
EPMM272-2650-3.0-460/2V5	272	2,650	52.8	92.0	2,320–2,650	3.2	0.838	1.64
EPMM286-2650-3.0-460/2V5	286		55.4					
EPMM299-2800-3.0-460/2V5	299	2,800	54.9	91.9	2,470–2,800	3.2	0.893	1.64
EPMM313-3050-3.0-460/2V5	313	3,050	52.8	91.7	2,780–3,050	3.2	1.003	1.64
EPMM326-3050-3.0-460/2V5	326		55.2					
EPMM340-3050-3.0-460/2V5	340		57.5					

Weights and overall dimensions of the motors EPMM-460/2V5

Motor type	Power, hp	EPMM-460/2V5			EPMM2.-460/2V5		
		L1 , ft	L0, ft	Weight, lb not more	L1 , ft	L0, ft	Weight, lb not more
EPMM16-460/2V5	16	3.42	4.07	158.76	3.42	3.78	158.76
EPMM19 -460/2V5	19						
EPMM27-460/2V5	27	4.66	5.31	220.50	4.66	5.02	220.50
EPMM30-460/2V5	30						
EPMM33-460/2V5	33						
EPMM38-460/2V5	38						
EPMM44-460/2V5	44	5.91	6.56	271.22	5.91	6.27	271.22
EPMM48-460/2V5	48						
EPMM54-460/2V5	54						
EPMM61-460/2V5	61	7.16	7.81	330.75	7.16	7.52	330.75
EPMM68-460/2V5	68						
EPMM76-460/2V5	76						
EPMM86-460/2V5	86	8.40	9.05	388.08	8.40	8.76	388.08
EPMM95-460/2V5	95						
EPMM109-460/2V5	109	9.65	10.30	445.41	9.65	10.01	445.41
EPMM122-460/2V5	122	10.90	11.55	504.95	10.90	11.26	504.95
EPMM136-460/2V5	136						
EPMM150-460/2V5	150	12.14	12.79	562.28	12.14	12.50	562.28
EPMM156-460/2V5	156						
EPMM163-460/2V5	163	13.39	14.04	632.84	13.39	13.75	632.84
EPMM170-460/2V5	170						
EPMM174-460/2V5	174						
EPMM184-460/2V5	184	14.64	15.29	694.58	14.64	15.00	694.58
EPMM190-460/2V5	190						
EPMM204-460/2V5	204	15.88	16.53	754.11	15.88	16.24	754.11
EPMM218-460/2V5	218	17.13	17.78	813.65	17.13	17.49	813.65
EPMM231-460/2V5	231	18.38	19.03	870.98	18.38	18.74	870.98
EPMM245-460/2V5	245	19.62	20.27	928.31	19.62	19.98	928.31
EPMM258-460/2V5	258						
EPMM272-460/2V5	272	20.87	21.52	992.25	20.87	21.23	992.25
EPMM286-460/2V5	286						
EPMM299-460/2V5	299	22.12	22.77	1,056.20	22.12	22.48	1,056.20
EPMM313-460/2V5	313	24.61	25.26	1,177.47	24.61	24.97	1,177.47
EPMM326-460/2V5	326						
EPMM340-460/2V5	340						

Dimensions

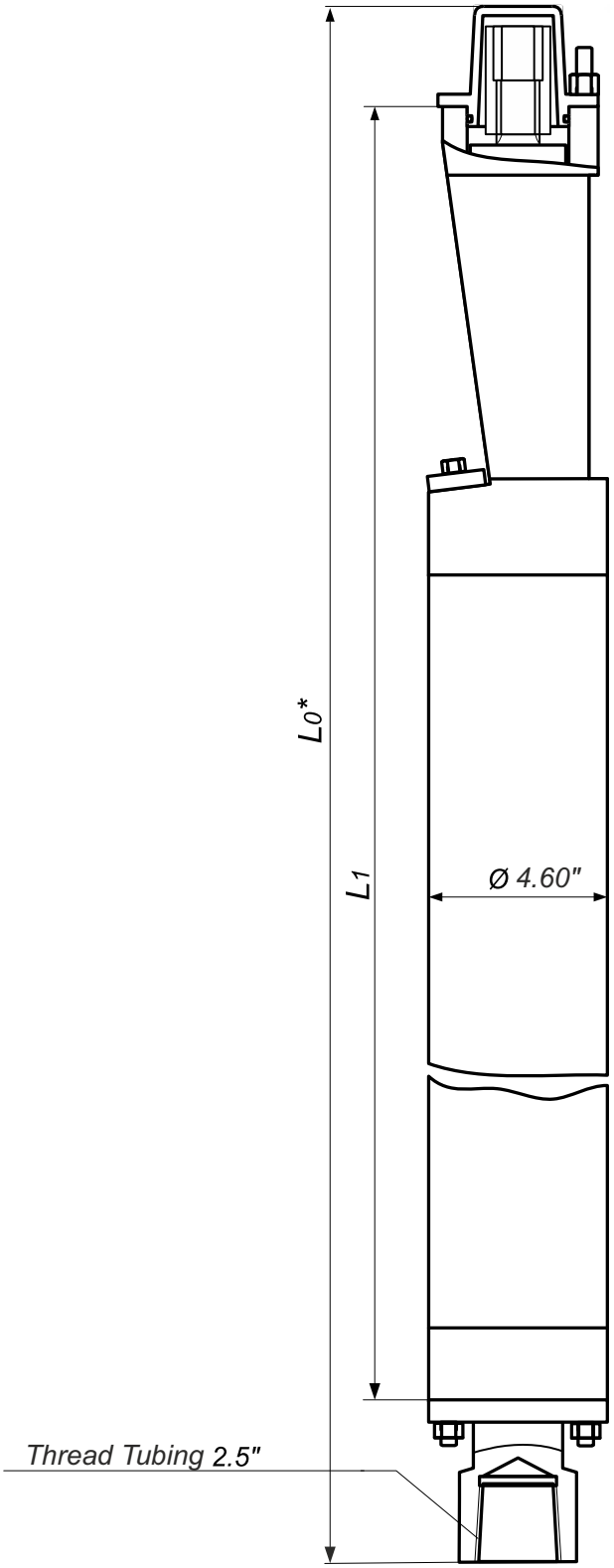


Fig. 1

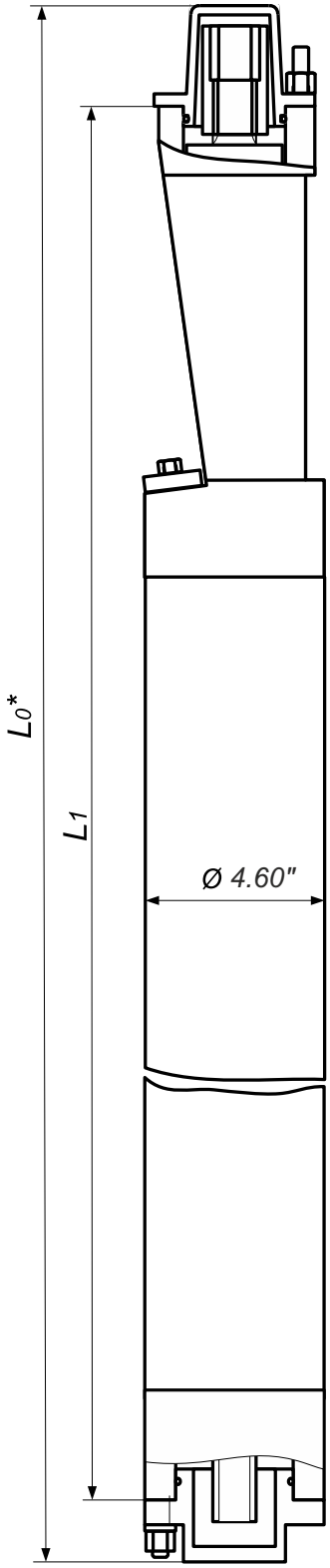


Fig. 2

* Reference dimensions

Fig. 1. Motors without downhole unit.
Fig. 2. Motors with two-side shaft outlet.

Low speed Permanent magnet motors 460 series

Downhole low speed permanent magnet motors 460 series designed for as operation part of an adjustable drive of electrical progressing cavity pump for pumping formation fluid from oil wells.
The motor has a body diameter of 4.60 inch and is designed for wells with minimal inner diameter of the casing string of at least 4.87 inch.
At the motor suspension point a hole angle is 60° as maximum.
Rotation speed operating range is within 100-1,500 rpm.
The working direction of shaft rotation, when looking at the motor from the side of head, is right-hand (clockwise).

Formation fluid parameters

Formation fluid parameters		Motor version					
		1	2	3	4	5	6
Ambient temperature, °C (°F) , not more		120°C (248°F)		150°C (302°F)		150°C (392°F)	
Hydrogen ion exponent of the associated water, pH		5.0-8.5	3.0-9.0	5.0-8.5	3.0-9.0	5.0-8.5	3.0-9.0
Amount of aggressive components, g/l, not more:	H_2S	0.01	1.25	0.01	1.25	0.01	1.25
	CO_2	-	1.15	-	1.15	-	1.15
	Cl	-	75	-	75	-	75
	HCO_3	-	1.00	-	1.00	-	1.00
	Ca^{2+}	-	9	-	9	-	9
	$(Na^{+}+K^{+})$	-	40	-	40	-	40

Type designations of downhole motors consist of two parts

- the first part – designation of the downhole motor;
- the second part – designation of the installed Surface panel of the telemetering system according to the Specifications of the supplier/manufacturer (may be omitted if no Surface panel is installed).

Motor designation

Designation elements	E	L	PMM	XX	-	XXX	-	0.5	-	460	/X	V5	-	X	-	X
Designation numbers	1	2	3	4		5		6		7	8	9		10		11

Designation numbers	Options	Decoding
1	E	Manufacturer ("ESP Service" LLC)
2	L	Low speed
3	PMM	Permanent magnet motor to drive submersible pumps
4	Tables 1, 2, 3	Rated torque, N·m
5	Tables 1, 2, 3	Rated voltage, V
6	0.5	Rated speed, thous. rpm
7	460	Series
8	1	With winding wire brand 1
	2	With winding wire brand 2
	Omitted designation	With winding wire brand 3
9	V5	Climatic category V and environmental class 5 according to GOST 15150
10	**Design version based on operating conditions**	
	1	ambient temperature is 120°C (248°F)
	2	ambient temperature is 120°C (248°F) corrosion-resistant design version
	3	ambient temperature is 150°C (302°F)
	4	ambient temperature is 150°C (302°F) corrosion-resistant design version
	5	ambient temperature is 200°C (392°F)
	6	ambient temperature is 200°C (392°F) corrosion-resistant design version
11	**Type of spline joint of the motor shaft**	
	No letter	straight spline joint (basic version)
	E	involute spline joint

Examples of motor designation record for ordering and in the documentation of another product.
Permanent magnet motor with a rated torque of 210 N·m and a rated voltage of 385 V, with straight splines of the shaft (basic version), designed to operate under the following downhole conditions: ambient temperature of 120°C (248°F), corrosion-resistant version:

Motor **ELPMM210-385-0.5-460V5-2**

The motor with the same torque with involute splines on the shaft and winding wire brand 2:

Motor **ELPMM210-370-0.5-460/2V5-2-E**

The same motor with installed Surface panel DU-92M3L :

Motor **ELPMM 210-370-0.5-460/2V5-2-E**

Surface panel **DU-117M3L**

Parameters of the motors ELPMM-0.5-460V5

Table 1

Motor type	Rated parameters					Coolant speed,ft/s, as minimum	Design modification by downhole unit availability					
							Basic version			With downhole unit availability		
	Torque, N·m, as minimum	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %		L1 , ft	L0, ft	Weight, lb not more	L1 , ft	L0, ft	Weight, lb not more
ELPMM35-70-0.5-460V5	35	2	70	22.5	75.5	0.07	3.42	4.07	158.76	3.42	5.59	189.63
ELPMM70-130-0.5-460V5	70	5	130	22.5	77.7	0.07	4.66	5.31	220.50	4.66	6.83	242.55
ELPMM105-195-0.5-460V5	105	7	195	22.5	78.5	0.16	5.91	6.56	271.22	5.91	8.08	299.88
ELPMM140-260-0.5-460V5	140	10	260	22.3	78.9	0.16	7.16	7.81	330.75	7.16	9.33	359.42
ELPMM175-320-0.5-460V5	175	13	320	22.3	79.1	0.2	8.40	9.05	388.08	8.4	10.57	418.95
ELPMM210-385-0.5-460V5	210	15	385	22.3	79.2	0.2	9.65	10.30	445.41	9.65	11.82	474.08
ELPMM245-450-0.5-460V5	245	17	450	22.3	79.3	0.26	10.90	11.55	504.95	10.90	13.07	533.61
ELPMM280-510-0.5-460V5	280	20	510	22.3	79.4	0.26	12.14	12.79	562.28	12.14	14.32	590.94
ELPMM315-580-0.5-460V5	315	22	580	22.4	79.4	0.33	13.39	14.04	632.84	13.39	15.56	661.50
ELPMM350-640-0.5-460V5	350	25	640	22.4	79.4	0.33	14.64	15.29	694.58	14.64	16.81	723.24
ELPMM400-710-0.5-460V5	400	28	710	23.3	78.9	0.39	15.88	16.53	754.11	15.88	18.06	782.78
ELPMM450-780-0.5-460V5	450	32	780	24.2	78.3	0.39	17.13	17.78	813.65	17.13	19.30	842.31
ELPMM500-840-0.5-460V5	500	36	840	25.0	77.7	0.66	18.38	19.03	870.98	18.38	20.55	899.64
ELPMM550-910-0.5-460V5	550	39	910	25.7	77.1	0.66	19.62	20.27	928.31	19.62	21.80	959.18
ELPMM600-970-0.5-460V5	600	43	970	26.6	76.4	0.98	20.87	21.52	992.25	20.87	23.04	1,020.92
ELPMM650-1030-0.5-460V5	650	46	1,030	27.3	75.7	0.98	22.12	22.77	1,056.20	22.12	24.29	1,084.86

Parameters of the motors ELPMM-0.5-460/1V5

Table 2

Motor type	Rated parameters					Coolant speed,ft/s, as minimum	Design modification by downhole unit availability					
							Basic version			With downhole unit availability		
	Torque, N·m, as minimum	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %		L1, ft	L0, ft	Weight, lb not more	L1, ft	L0, ft	Weight, lb not more
ELPMM45-80-0.5-460/1V5	45	3	80	23.9	74.5	0.07	3.42	4.07	158.76	3.42	5.59	189.63
ELPMM90-160-0.5-460/1V5	90	6	160	24.0	76.7	0.07	4.66	5.31	220.50	4.66	6.83	242.55
ELPMM140-240-0.5-460/1V5	140	10	240	25.1	76.8	0.16	5.91	6.56	271.22	5.91	8.08	299.88
ELPMM185-310-0.5-460/1V5	185	13	310	24.8	77.4	0.16	7.16	7.81	330.75	7.16	9.33	359.42
ELPMM230-390-0.5-460/1V5	230	16	390	24.7	77.7	0.20	8.40	9.05	388.08	8.40	10.57	418.95
ELPMM280-470-0.5-460/1V5	280	20	470	25.1	77.7	0.20	9.65	10.30	445.41	9.65	11.82	474.08
ELPMM330-540-0.5-460/1V5	330	24	540	25.3	77.6	0.26	10.90	11.55	504.95	10.90	13.07	533.61
ELPMM370-610-0.5-460/1V5	370	26	610	24.9	77.9	0.26	12.14	12.79	562.28	12.14	14.32	590.94
ELPMM420-690-0.5-460/1V5	420	30	690	25.2	77.8	0.33	13.39	14.04	632.84	13.39	15.56	661.50
ELPMM460-760-0.5-460/1V5	460	33	760	24.9	78.0	0.33	14.64	15.29	694.58	14.64	16.81	723.24
ELPMM500-830-0.5-460/1V5	500	36	830	24.7	78.0	0.39	15.88	16.53	754.11	15.88	18.06	782.78
ELPMM550-900-0.5-460/1V5	550	39	900	25.1	77.8	0.39	17.13	17.78	813.65	17.13	19.30	842.31
ELPMM590-960-0.5-460/1V5	590	42	960	25.0	77.7	0.66	18.38	19.03	870.98	18.32	20.55	899.64
ELPMM630-1030-0.5-460/1V5	630	45	1,030	25.0	77.6	0.66	19.62	20.27	928.31	19.62	21.80	959.18
ELPMM670-1090-0.5-460/1V5	670	48	1,090	24.8	77.7	0.98	20.87	21.52	992.25	20.87	23.04	1,020.92
ELPMM700-1150-0.5-460/1V5	700	50	1,150	24.6	77.7	0.98	22.12	22.77	1,056.20	22.12	24.29	1,084.86

Parameters of the motors ELPMM-0.5-460/2V5

Table 3

Motor type	Rated parameters					Coolant speed,ft/s, as minimum	Design modification by downhole unit availability					
							Basic version			With downhole unit availability		
	Torque, N·m, as minimum	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %		L1, ft	L0, ft	Weight, lb not more	L1, ft	L0, ft	Weight, lb not more
ELPMM40-75-0.5-460/2V5	40	3	75	23.4	74.8	0.07	3.42	4.07	158.76	3.42	5.59	189.63
ELPMM85-150-0.5-460/2V5	85	6	150	24.6	76.3	0.07	4.66	5.31	220.50	4.66	6.83	242.55
ELPMM130-230-0.5-460/2V5	130	9	230	25.1	76.8	0.16	5.91	6.56	271.22	5.91	8.08	299.88
ELPMM170-300-0.5-460/2V5	170	12	300	24.7	77.4	0.16	7.16	7.81	330.75	7.16	9.33	359.42
ELPMM210-370-0.5-460/2V5	210	15	370	24.4	77.9	0.20	8.40	9.05	388.08	8.40	10.57	418.95
ELPMM260-450-0.5-460/2V5	260	18	450	25.2	77.6	0.20	9.65	10.30	445.41	6.65	11.82	474.08
ELPMM300-520-0.5-460/2V5	300	21	520	24.9	77.8	0.26	10.90	11.55	504.95	10.90	13.07	533.61
ELPMM340-580-0.5-460/2V5	340	24	580	24.8	78.0	0.26	12.14	12.79	562.28	12.14	14.32	590.94
ELPMM380-650-0.5-460/2V5	380	27	650	24.7	78.1	0.33	13.39	14.04	632.84	13.39	15.56	661.50
ELPMM430-720-0.5-460/2V5	430	31	720	25.2	77.8	0.33	14.64	15.29	694.58	14.64	16.81	723.24
ELPMM460-780-0.5-460/2V5	460	33	780	24.6	78.1	0.39	15.88	16.53	754.11	15.88	18.06	782.78
ELPMM500-850-0.5-460/2V5	500	36	850	24.7	78.0	0.39	17.13	17.78	813.65	17.13	19.30	842.31
ELPMM540-910-0.5-460/2V5	540	38	910	24.7	77.7	0.66	18.38	19.03	870.98	18.32	20.55	899.64
ELPMM590-970-0.5-460/2V5	590	42	970	25.3	77.1	0.66	19.62	20.27	928.31	19.62	21.80	959.18
ELPMM630-1050-0.5-460/2V5	630	45	1,050	25.3	76.4	0.98	20.87	21.52	992.25	20.87	23.04	1,020.92
ELPMM670-1100-0.5-460/2V5	670	48	1,100	25.4	75.7	0.98	22.12	22.77	1,056.20	22.12	24.29	1,084.86

Dimensions

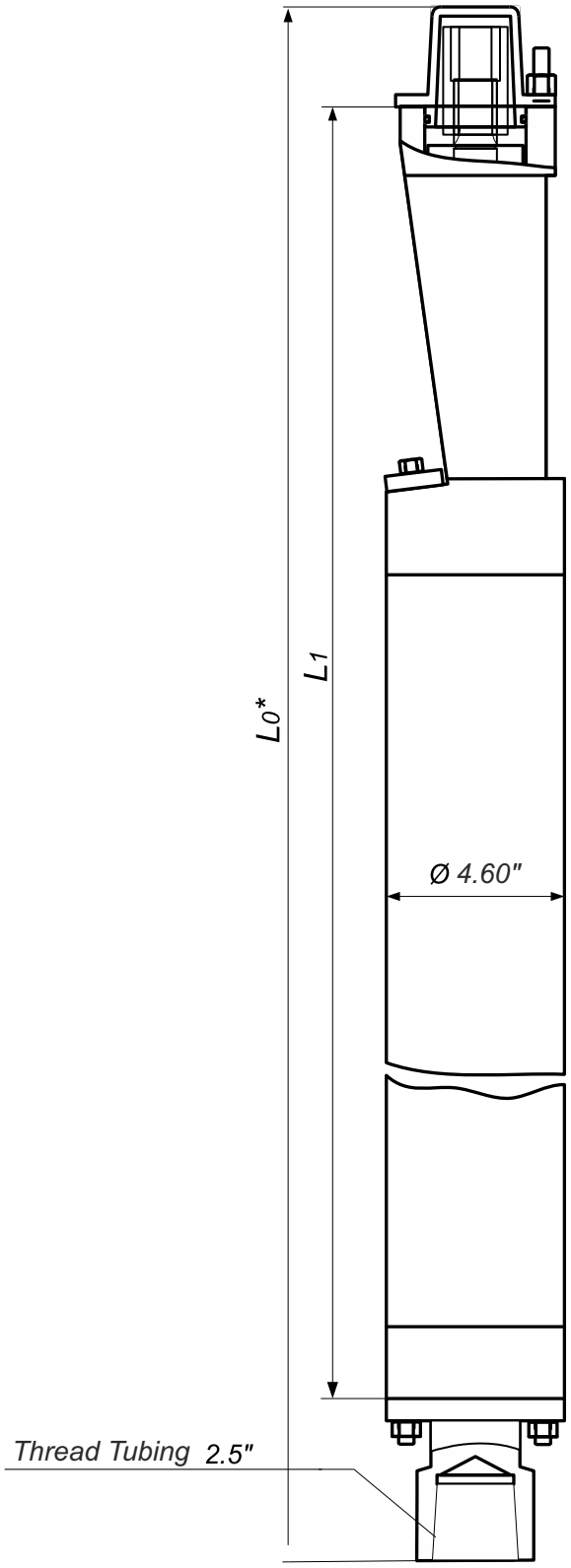


Fig. 1

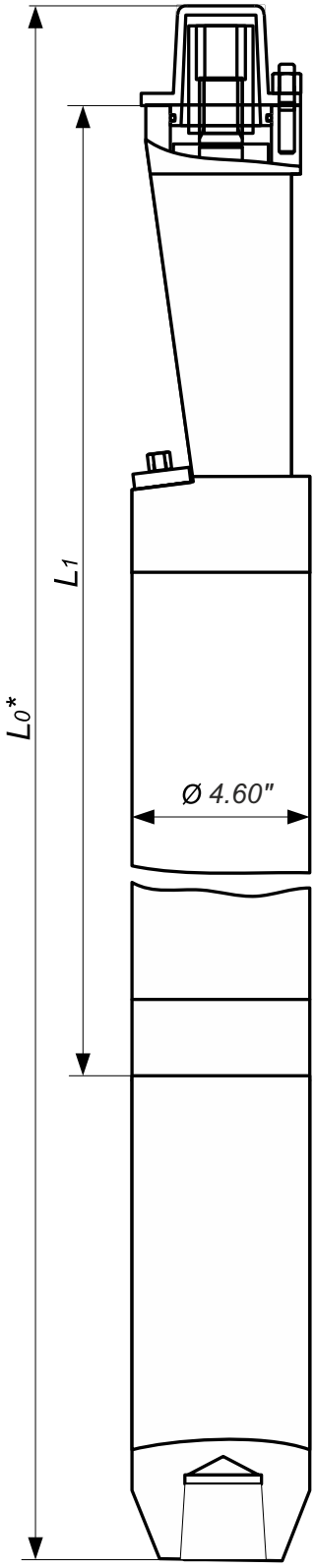


Fig. 2

* Reference dimensions

Fig. 1. For the motors without downhole unit
Fig. 2. For the motors with integrated downhole unit

Permanent magnet motors 562 series

Downhole permanent magnet motors 562 series designed for as operation part of an adjustable drive of electrical submersible pump for pumping formation fluid from oil wells.
The motor has a body diameter of 5.62 inch. At the motor suspension point a hole angle is 90° as maximum
Rotation speed operating range is within 1,500-4,200 rpm. When operating at a speed over 3,000 rpm, the motor power shall not exceed the rated power.
The working direction of shaft rotation, when looking at the motor from the side of head, is left-hand (counterclock-wise). The motor is allowed to be operated with reverse rotation as part of Electric Submersible Pump System with right-hand direction of pump shaft rotation, therewith it is required to ensure a smooth start of the motor.

Formation fluid parameters

Formation fluid parameters		Motor version	
		1	2
Ambient temperature, °C (°F) , not more		150°C (302°F)	
Hydrogen ion exponent of the associated water, pH		5.0-8.5	3.0-9.0
Amount of aggressive components, g/l, not more:	H_2S	0.01	1.25
	CO_2	-	1.15
	Cl	-	75
	HCO_3	-	1.00
	Ca^{2+}	-	9

Motor designation

Designation elements	E	PMM	XX	-	XXX	-	3.0	-	562	V5	-	X	-	X	Э
Designation numbers	1	2	3		4		5		6	7		8		9	9

Designation numbers	Options	Decoding
1	E	Manufacturer (“ESP Service” LLC)
2	PMM	Permanent magnet motor to drive submersible pumps
3	Table 1	Rated power, hp
4	Table 1	Rated voltage, V
5	3.0	Rated speed, thous. rpm
6	562	Series
7	V5	Climatic category V and environmental class 5 according to GOST 15150
8	**Design version based on operating conditions**	
	3	ambient temperature is 150°C (302°F)
	4	ambient temperature is 150°C (302°F) corrosion-resistant design version
9	**Type of spline joint of the motor shaft**	
	E	involute spline joint

Example of the designation record for a motor with power 44 hp, rated voltage 700 V, design version as per operating conditions 3 upon its order and in documentation of another product:

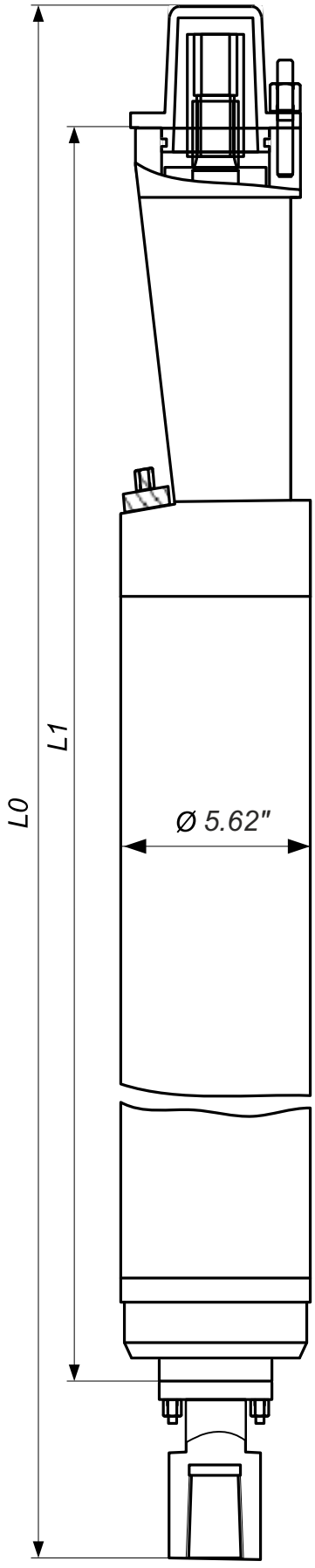
Motor EPMM44-700-3.0-562V5-3

Main technical data of motors EPMM-562V5

Table 1

Motor type	Rate parameters				No-load parameters		Mean phase resistance at 20 °C, Ω, ±4%	Coolant speed, ft/s, as minimum	Basic version		
	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %	Phase-to-phase voltage, V	Current, A, as maximum			L0 , ft	L1, ft	Weight, lb not more
EPMM44-700-3.0-562V5	44	700	33.0	88.5	600	2.0	0.583	0.66	5.38	5.04	352.8
EPMM87-1400-3.0-562V5	87	1,400	33.0	90.0	1,250	2.0	0.926	0.82	6.70	6.37	441.0
EPMM131-2150-3.0-562V5	131	2,150	33.0	90.4	1,850	2.0	1.270	0.98	8.03	7.69	529.2
EPMM174-2850-3.0-562V5	174	2,850	33.0	90.6	2,490	2.0	1.614	0.98	9.35	9.01	617.4
EPMM218-3200-3.0-562V5	218	3,200	36.6	90.8	2,800	2.5	1.565	0.98	10.67	10.33	705.6
EPMM272-3200-3.0-562V5	272	3,200	45.8	91.0	2,800	3.0	0.231	1.31	11.99	11.65	793.8
EPMM340-3100-3.0-562V5	340	3,100	58.5	91.3	2,720	3.5	0.840	1.31	14.64	14.30	970.2
EPMM408-3500-3.0-562V5	408	3,500	68.7	91.0	2,770	4.5	0.754	1.31	17.28	16.94	1,146.6
EPMM476-3450-3.0-562V5	476	3,450	81.9	91.0	2,700	5.0	0.657	1.31	18.60	18.27	1,234.8
EPMM544-3550-3.0-562V5	544	3,550	91.3	91.2	2,770	5.5	0.603	1.31	19.93	19.59	1,323.0
EPMM612-3300-3.0-562V5	612	3,300	110.2	91.2	2,570	7.0	0.442	1.64	22.57	22.23	1,499.4
EPMM680-3550-3.0-562V5	680	3,550	114.1	91.2	2,750	7.5	0.474	1.64	23.89	23.55	1,587.6
EPMM748-3650-3.0-562V5	748	3,650	120.9	91.3	2,850	8.0	0.438	1.64	26.54	26.20	1,764.0
EPMM816-3900-3.0-562V5	816	3,900	124.3	91.4	3,020	8.0	0.464	1.64	27.86	27.52	1,852.2

Dimensions



Permanent magnet motors 728 series

Downhole permanent magnet motors 728 series designed for as operation part of an adjustable drive of electrical submersible pump for pumping formation fluid from oil wells.
The motor has a body diameter of 7.28 inch. At the motor suspension point a hole angle is 60° as maximum.
Rotation speed operating range is within 500-3,600 rpm. When operating at a speed over 3,000 rpm, the motor power shall not exceed the rated power.
The working direction of shaft rotation, when looking at the motor from the side of head, is right-hand (clockwise). The motor is allowed to be operated with reverse rotation as part of Electric Submersible Pump System with left-hand direction of pump shaft rotation, therewith it is required to ensure a smooth start of the motor.

Formation fluid parameters

Formation fluid parameters		Motor version			
		1	2	3	4
Ambient temperature, °C (°F) , not more		120°C (248°F)		150°C (302°F)	
Hydrogen ion exponent of the associated water, pH		5.0-8.5	3.0-9.0	5.0-8.5	3.0-9.0
Amount of aggressive components, g/l, not more:	H_2S	0.01	1.25	0.01	1.25
	CO_2	-	1.15	-	1.15
	Cl	-	75	-	75
	HCO_3	-	1.00	-	1.00
	Ca^{2+}	-	9	-	9
	$(Na^{+}+K^{+})$	-	40	-	40

Type designations of downhole motors consist of two parts

- the first part – designation of the downhole motor;
- the second part – designation of the installed Surface panel of the telemetering system according to the Specifications of the supplier/manufacturer (may be omitted if no any Surface panel is installed).

Motor designation

Designation elements	E	PMM	XX	-	XXX	-	0.5	-	728	V5	-	X	-	X
Designation numbers	1	2	3		4		5		6	7		8		9

Designation numbers	Options	Decoding
1	E	Manufacturer (“ESP Service” LLC)
2	PMM	Permanent magnet motor to drive submersible pumps
3	Table 1	Rated power, hp
4	Table 1	Rated voltage, V
5	3.0	Rated speed, thous. rpm
6	728	Series
7	V5	Climatic category V and environmental class 5 according to GOST 15150
8	**Design version based on operating conditions**	
	1	ambient temperature is 120°C (248°F)
	2	ambient temperature is 120°C (248°F) corrosion-resistant design version
	3	ambient temperature is 150°C (302°F)
	4	ambient temperature is 150°C (302°F) corrosion-resistant design version
9	**Type of spline joint of the motor shaft**	
	No letter	straight spline joint (basic version)

Examples of motor designation record for ordering and in the documentation of another product.
Permanent magnet motor with a power of 204 hp, rated voltage of 3,200 V, with straight splines of the shaft, designed to operate under the following downhole conditions: ambient temperature of 120°C (248°F):

Motor **EPMM204-3200-3.0-728V5-1**

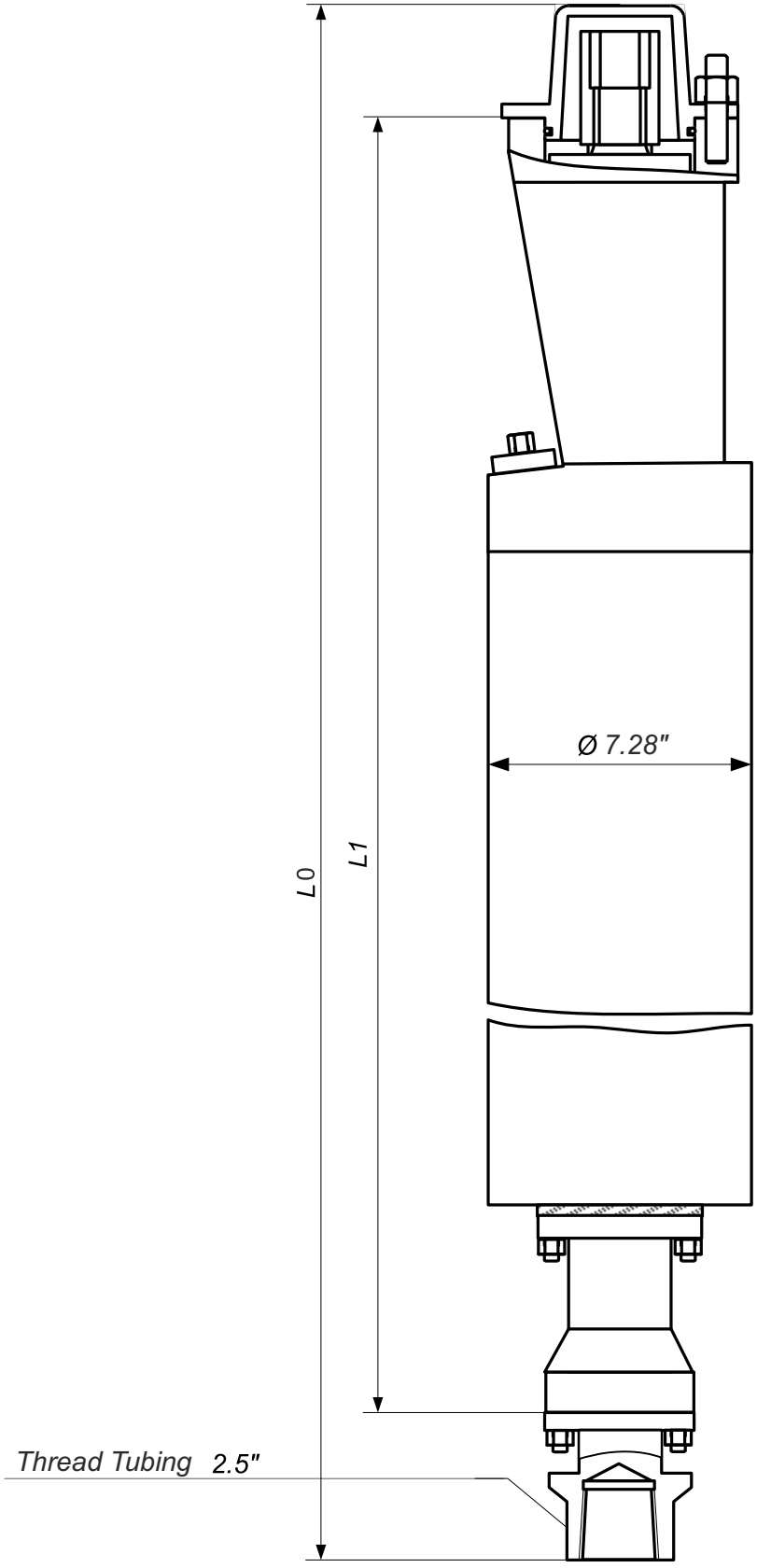
Parameters of the motors EPMM-3.0-728V5

Table 1

Motor type	Rated parameters				Coolant speed, ft/s, as minimum	Design modification by downhole unit availability							
						Basic version				With downhole unit availability			
	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %		L1, ft	L0, ft	L2, ft	Weight, lb not more	L1, ft	L0, ft	L2, ft	Weight, lb not more
EPMM68-1300-3.0-728V5	68	1,300	29.6	91.9	0.27	4.97	5.61	0*	496.13	4.97	7.05	1.844*	533.61
EPMM136-2550-3.0-728V5	136	2,550	29.6	92.7	0.27	6.39	7.03		650.48	6.39	8.47		687.96
EPMM204-3200-3.0-728V5	204	3,200	35.5	93.1	0.34	7.82	8.45		804.83	7.82	9.89		842.31
EPMM272-3400-3.0-728V5	272	3,400	44.6	93.3	0.34	9.24	9.87		959.18	9.24	11.31		996.66
EPMM340-3200-3.0-728V5	340	3,200	59.5	93.9	0.34	10.66	11.29		1,113.53	10.66	12.73		1,151.01
EPMM408-3200-3.0-728V5	408	3,200	71.7	93.8	0.41	12.08	12.71		1,267.88	12.08	14.15		1,305.36
EPMM476-3000-3.0-728V5	476	3,000	89.9	93.4	0.41	13.50	14.13		1,422.23	13.50	15.57		1,459.71
EPMM544-3400-3.0-728V5	544	3,400	89.9	93.4	0.41	14.92	15.55		1,576.58	14.92	16.99		1,614.06
EPMM612-3800-3.0-728V5	612	3,800	89.9	93.5	0.48	16.34	16.97		1,730.93	16.34	18.41		1,768.41
EPMM1156-5030-3.0-728V5	1156	5,030	140	93,2	1.97	23.01	23.69		2,756.25	23.01	25.14		2,793.74

Note:
1. Parameters of various motor versions with equal power are similar;
2. * – Reference dimensions;
3. L2 – installation length of the downhole unit.

Dimensions



Low speed Permanent magnet motors 728 series

Downhole low speed permanent magnet motors 728 series designed for as operation part of an adjustable drive of electrical progressing cavity pump for pumping formation fluid from oil wells.
The motor has a body diameter of 7.28 inch.
At the motor suspension point a hole angle is 60° as maximum.
Rotation speed operating range is within 100-1,500 rpm.
The working direction of shaft rotation, when looking at the motor from the side of head, is right-hand (clockwise).

Formation fluid parameters

Formation fluid parameters		Motor version					
		1	2	3	4	5	6
Ambient temperature, °C (°F) , not more		120°C (248°F)		150°C (302°F)		200°C (392°F)	
Hydrogen ion exponent of the associated water, pH		5.0-8.5	3.0-9.0	5.0-8.5	3.0-9.0	5.0-8.5	3.0-9.0
Amount of aggressive components, g/l, not more:	H_2S	0.01	1.25	0.01	1.25	0.01	1.25
	CO_2	-	1.15	-	1.15	-	1.15
	Cl	-	75	-	75	-	75
	HCO_3	-	1.00	-	1.00	-	1.00
	Ca^{2+}	-	9	-	9	-	9
	$(Na^{+}+K^{+})$	-	40	-	40	-	40

Type designations of downhole motors consist of two parts

- the first part – designation of the downhole motor;
- the second part – designation of the installed Surface panel of the telemetering system according to the Specifications of the supplier/manufacturer (may be omitted if no any Surface panel is installed).

Motor designation

Designation elements	E	L	PMM	XX	-	XXX	-	0.5	-	728	/X	V5	-	X	-	X
Designation numbers	1	2	3	4		5		6		7	8	9		10		11

Designation numbers	Options	Decoding
1	E	Manufacturer ("ESP Service" LLC)
2	L	Low speed
3	PMM	Permanent magnet motor to drive submersible pumps
4	Table 1	Rated torque, N·m
5	Table 1	Rated voltage, V
6	0.5	Rated speed, thous. rpm
7	487	Series
8	1	With winding wire brand 1
	2	With winding wire brand 2
	Omitted designation	With winding wire brand 3
9	V5	Climatic category V and environmental class 5 according to GOST 15150
10	**Design version based on operating conditions**	
	1	ambient temperature is 120°C (248°F)
	2	ambient temperature is 120°C (248°F) corrosion-resistant design version
	3	ambient temperature is 150°C (302°F)
	4	ambient temperature is 150°C (302°F) corrosion-resistant design version
	5	ambient temperature is 200°C (392°F)
	6	ambient temperature is 200°C (392°F) corrosion-resistant design version
11	**Type of spline joint of the motor shaft**	
	No letter	straight spline joint (basic version)
	E	involute spline joint

Examples of motor designation record for ordering and in the documentation of another product.
Permanent magnet motor with a rated torque of 600 N·m and a rated voltage of 600 V, with straight splines of the shaft (basic version), designed to operate under the following downhole conditions: ambient temperature of 120°C (248°F), corrosion-resistant version:

Motor **ELPMM600-650-0.5-728/2V5-2**

The motor with the same torque with involute splines on the shaft and winding wire brand 2:

Motor **ELPMM210-370-0.5-460/2V5-2-E**

The same motor with installed Surface panel DU-92M3L :

Motor **ELPMM600-650-0.5-728/2V5-2-E**

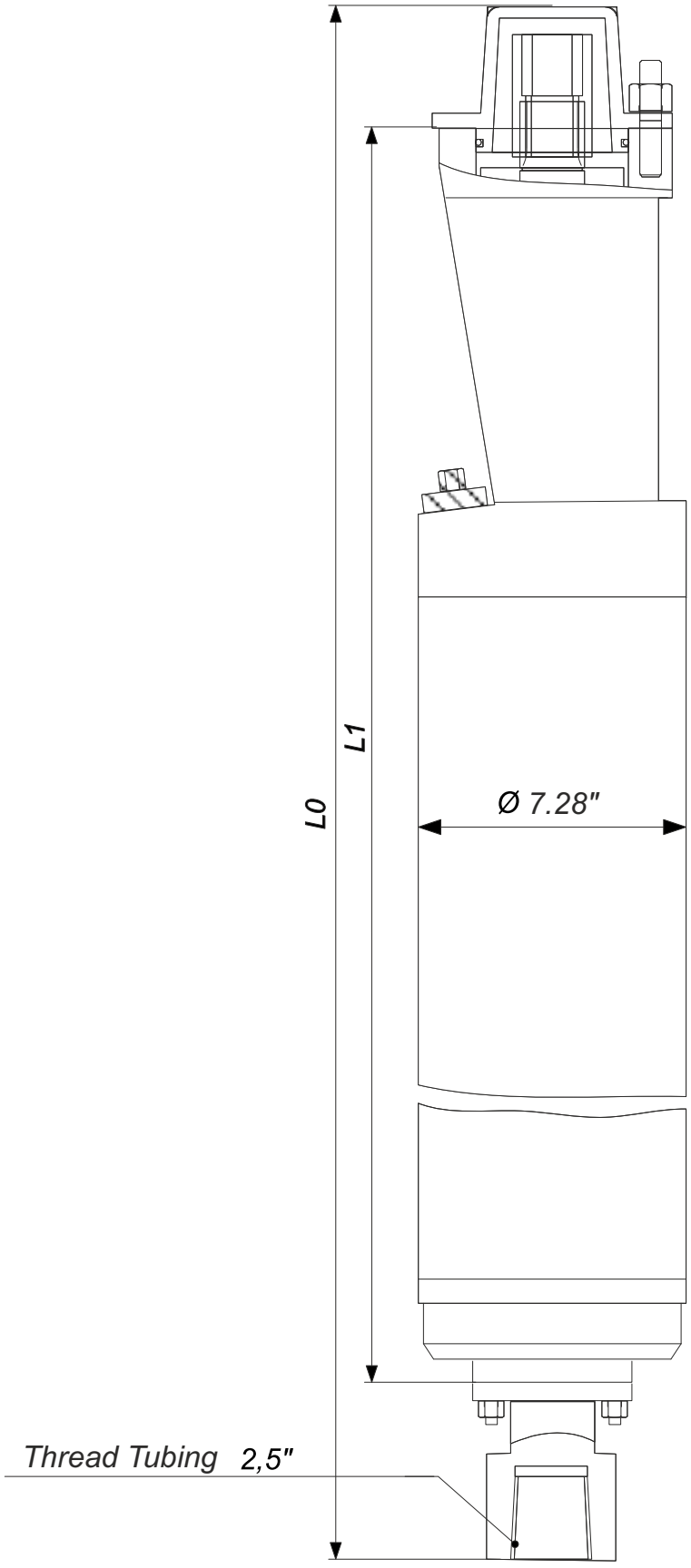
Surface panel **DU-117M3L**

Parameters of the motors ELPMM-0.5-728V5

Table 1

Motor type	Rated parameters					Coolant speed, ft/s, as minimum	Basic version		
	Torque, N·m, as minimum	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %		L_1, ft	L_0, ft	Weight, lb not more
ELPMM300-350-0.5-728/2V5	300	21	350	40.2	82.8	0.98	5.26	5.93	529.20
ELPMM600-650-0.5-728/2V5	600	43	650	40.1	84.8	0.98	7.38	8.05	760.73
ELPMM900-1000-0.5-728/2V5	900	64	1,000	40.1	85.5	0.98	9.50	10.16	992.25
ELPMM1200-1300-0.5-728/VB5	1,200	86	1,300	40.1	85.8	1.31	11.61	12.28	1,223.78
ELPMM1500-1650-0.5-728/2V5	1,500	107	1,650	40.1	86.0	1.31	13.73	14.39	1,455.30
ELPMM1800-1950-0.5-728/2V5	1,800	128	1,950	40.1	86.1	1.31	15.84	16.51	1,686.83
ELPMM2100-2300-0.5-728/2V5	2,100	150	2,300	40.1	86.2	1.31	17.96	18.63	1,918.35
ELPMM2400-2600-0.5-728/2V5	2,400	171	2,600	40.1	86.3	1.31	20.08	20.74	2,149.88
ELPMM2700-2950-0.5-728/2V5	2,700	193	2,700	40.1	86.4	1.31	22.19	22.86	2,381.40
ELPMM3000-3300-0.5-728/2V5	3,000	214	3,300	40.1	86.4	1.31	24.31	24.97	2,612.93

Dimensions



Asynchronous motors 460 series

Downhole asynchronous motors 460 series designed for as operation part of an adjustable drive of electrical submersible pump for pumping formation fluid from oil wells.
The motor has a body diameter of 4.60 inch and is designed for wells with minimal inner diameter of the casing string of at least 4.87 inch.
At the motor suspension point a hole angle is 60° as maximum.
Synchronous speed of the motor shaft is 3,000 rpm. Motors must be capable of operating in the range of shaft speeds from 2,100 to 4,200 rpm (with power supply frequency from 35 to 70 Hz).
The working direction of shaft rotation, when looking at the motor from the side of head, is right-hand (clockwise).

Formation fluid parameters

Formation fluid parameters		Motor version					
		1	2	3	4	5	6
Ambient temperature, °C (°F) , not more		120°C (248°F)		150°C (302°F)		170°C (338°F)	
Hydrogen ion exponent of the associated water, pH		5.0-8.5	3.0-9.0	5.0-8.5	3.0-9.0	5.0-8.5	3.0-9.0
Amount of aggressive components, g/l, not more:	H_2S	0.01	1.25	0.01	1.25	0.01	1.25
	CO_2	-	1.15	-	1.15	-	1.15
	Cl	-	75	-	75	-	75
	HCO_3	-	1.00	-	1.00	-	1.00
	Ca^{2+}	-	9	-	9	-	9
	$(Na^{+}+K^{+})$	-	40	-	40	-	40

Type designations of downhole motors consist of two parts

- the first part – designation of the downhole motor;
- the second part – designation of the installed Surface panel of the telemetering system according to the Specifications of the supplier/manufacturer (may be omitted if no Surface panel is installed).

Motor designation

Designation elements	E	X	AM	XX	-	460	/X	V5	-	X	-	X
Designation numbers	1	2	3	4		5	6	7		8		9

Designation numbers	Options	Decoding
1	E	Manufacturer ("ESP Service" LLC)
2	No letter	Basic voltage version
	H	Version with increased voltage
3	AM	Asynchronous motors
4		Rated power, hp
5	460	Series
6	1	With winding wire brand 1
	2	With winding wire brand 2
	No designation	With winding wire brand 3
7	V5	Climatic category V and environmental class 5 according to GOST 15150
8	**Design version based on operating conditions**	
	1	ambient temperature is 120°C (248°F)
	2	ambient temperature is 120°C (248°F) corrosion-resistant design version
	3	ambient temperature is 150°C (302°F)
	4	ambient temperature is 150°C (302°F) corrosion-resistant design version
	5	ambient temperature is 170°C (338°F)
	6	ambient temperature is 170°C (338°F) corrosion-resistant design version
9	**Type of spline joint of the motor shaft**	
	No letter	straight spline joint (basic version)
	E	involute spline joint

Examples of motor designation record for ordering and in the documentation of another product.
Asynchronous motor, 22 hp, with winding wire brand 3, with straight splines on the shaft (basic version), designed for operation in the following downhole conditions: ambient temperature of 120°C (248°F), corrosion-resistant version:

Motor **EAM22-460V5-2**

The same motor with involute splines on the shaft:

Motor **EAM22-460V5-2-E**

The same motor with involute splines on the shaft, brand 1 winding wire and increased voltage:

Motor **EHAM22-460/1V5-2-E**

The same motor with installed Surface panel DU-117M3L:

Motor **EHAM22-460/1V5-2-E**

Surface panel **DU-117M3L**

Main technical data of motors EAM-460/XV5

Table 1

Motor type	Rated parameters						Coolant speed, ft/s, as minimum	No-load current, A, not more	Basic version		
	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %	Power factor	Rated slip,%			L1, ft	L0, ft	Weight, lb not more
EAM16-460/1V5	16	700	13.5	84.5	0.86	5.2	0.07	10.4	6.35	6.90	277.83
EAM22-460/1V5	22	750	17.0	84.5	0.86	5.2	0.07	15.3	7.59	8.15	337.37
EHAM22-460/1V5		1,500	8.5								
EAM30-460/1V5	30	750	23.5	84.5	0.86	5.2	0.16	16.2	8.84	9.40	396.90
EHAM30-460/1V5		1,900	9.5								
EAM34-460/1V5	34	800	25.0	84.5	0.86	5.2	0.16	13.3	10.09	10.64	456.44
EHAM34-460/1V5		2,300	9.0								
EAM38-460V5	38	900	25.5	84.5	0.86	5.2	0.20	12.0	11.33	11.89	515.97
EHAM38-460/1V5		2,000	11.0								
EAM44-460V5	44	1,000	25.5	84.5	0.86	5.2	0.20	12.5	12.58	13.14	575.51
EHAM44-460/1V5		2,100	12.0								
EAM54-460V5	54	1,250	25.5	84.5	0.86	5.2	0.23	12.7	15.07	15.63	694.58
EHAM54-460/1V5		2,400	13.5								
EAM61-460V5	61	1,400	25.5	84.5	0.86	5.2	0.26	14.5	16.32	16.88	754.11
EHAM61-460/1V5		2,100	15.5								
EAM68-460V5	68	1,500	26.5	84.5	0.86	5.2	0.33	14.0	17.57	18.12	813.65
EHAM68-460/1V5		2,300	17.5								
EAM76-460V5	76	1,650	27.0	84.5	0.86	5.2	0.39	21.2	18.81	19.37	873.18
EHAM76-460/1V5		2,500	18.5								
EAM86-460V5	86	1,900	26.5	84.5	0.86	5.2	0.39	14.5	21.31	21.86	992.25
EHAM86-460/1V5		2,850	18.0								
EAM95-460V5	95	2,000	27.5	84.5	0.86	5.2	0.98	14.0	22.55	23.11	1,051.79
EHAM95-460/1V5		2,800	20.0								
EAM109-460V5	109	2,150	29.5	84.5	0.86	5.2	0.98	13.5	23.80	24.36	1,111.32
EHAM109-460/1V5		3,000	21.5								
EAM122-460V5	122	2,250	31.5	84.5	0.86	5.2	0.98	17.7	25.05	25.60	1,170.86
EHAM122-460/1V5		3,000	24.5								
EAM136-460/1V5	136	2,300	35.0	84.5	0.86	5.2	0.98	17.9	25.05	25.60	1,170.86
EHAM136-460/1V5		2,700	30.5								
EAM150-460/1V5	150	2,150	40.5	84.5	0.86	5.2	0.98	21.9	26.29	26.85	1,230.39
EAM170-460/1V5	170	2,300	43.5	84.5	0.86	5.2	0.98	21.9	27.54	28.10	1,289.93

Main technical data of motors EAM-460/2V

Table 2

Motor type	Rated parameters						Coolant speed, ft/s, as minimum	No-load current, A, not more	Basic version		
	Power, hp	Phase-to-phase voltage, V	Current, A	Efficiency, %	Power factor	Rated slip,%			L1, ft	L0, ft	Weight, lb not more
EAM16-460/2V5	16	700	13.5	84.5	0.86	5.2	0.07	10.0	6.35	6.90	277.83
EAM22-460/2V5	22	750	17.0	84.5	0.86	5.2	0.07	15.0	7.79	8.15	337.37
EHAM22-460/2V5		1,350	9.5								
EAM30-460/2V5	30	750	23.0	84.5	0.86	5.2	0.16	16.0	8.84	9.40	396.90
EHAM30-460/2V5		1,700	10.5								
EAM34-460/2V5	34	900	22.0	84.5	0.86	5.2	0.16	12.0	10.09	10.64	456.44
EHAM34-460/2V5		2,050	10.0								
EAM38-460/2V5	38	900	24.5	84.5	0.86	5.2	0.20	12.0	10.09	10.64	456.44
EHAM38-460/2V5		2,050	11.0								
EAM44-460/2V5	44	1,050	24.0	84.5	0.86	5.2	0.20	12.5	11.33	11.89	515.97
EHAM44-460/2V5		1,950	13.0								
EAM54-460V/2V5	54	1,200	26.0	84.5	0.86	5.2	0.23	13.0	12.58	13.14	575.51
EHAM54-460/2V5		2,250	14.5								
EAM61-460/2V5	61	1,500	23.5	84.5	0.86	5.2	0.26	14.5	15.07	15.36	694.58
EHAM61-46021V5		2,800	13.0								
EAM68-460/2V5	68	1,650	24.0	84.5	0.86	5.2	0.33	14.0	16.32	16.88	754.11
EHAM68-460/1V5		2,800	14.5								
EAM76-460/2V5	76	1,800	24.5	84.5	0.86	5.2	0.39	21.0	17.57	18.12	813.65
EHAM76-460/2V5		2,300	19.5								
EAM86-460/2V5	86	2,000	25.5	84.5	0.86	5.2	0.39	14.5	18.81	19.37	873.18
EHAM86-460/2V5		2,500	20.0								
EAM95-460/2V5	95	2,150	26.0	84.5	0.86	5.2	0.98	14.0	20.06	20.62	932.72
EHAM95-460/2V5		2,750	21.0								
EAM109-460/2V5	109	2,300	28.0	84.5	0.86	5.2	0.98	13.5	21.31	21.86	992.25
EHAM109-460/2V5		2,900	22.5								
EAM122-460/2V5	122	2,200	33.5	84.5	0.86	5.2	0.98	17.5	23.80	24.36	1,111.32
EHAM122-460/2V5		2,600	28.0								
EAM136-460/2V5	136	2,300	35.0	84.5	0.86	5.2	0.98	18.0	25.05	25.60	1,170.86
EHAM136-460/2V5		2,800	29.0								
EAM150-460/2V5	150	2,150	40.5	84.5	0.86	5.2	0.98	22.0	26.29	26.85	1,230.39
EAM170-460/2V5	170	2,300	43.5	84.5	0.86	5.2	0.98	22.0	27.54	28.10	1,289.93

Dimensions

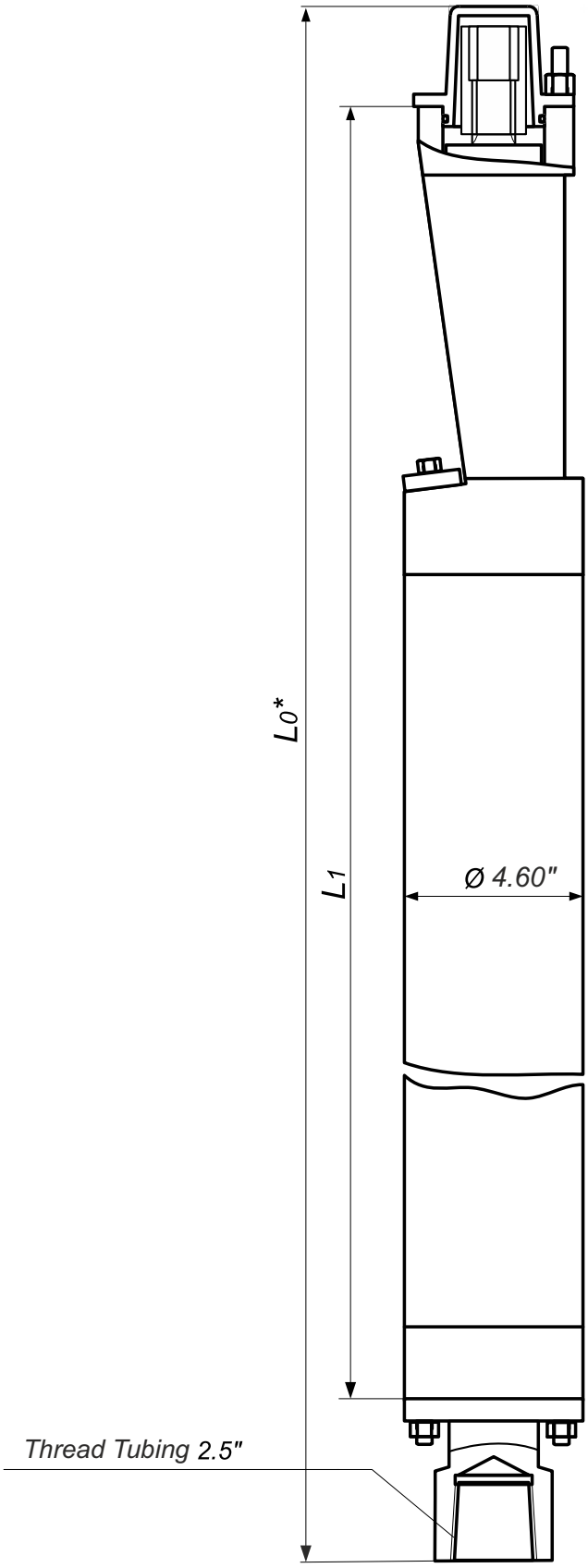


Fig. 1

Protectors

Protectors is are designed to transfer torque from the electric motor to the pump, as well as to protect submersible oil-filled electric motors from the penetration of formation fluid into their internal cavity during operation.

Protectors of EHP92 UP type is designed for completion of a downhole motor with case series 406, 460 and other motors with corresponding size, attachment dimensions and technical characteristics, used as a drive taking the axial load of the drive of electric submersible pumps of 362 and 406 series.

Protectors of EHP92 OREP type is designed for completion of a downhole motor with series 406, 460 and other motors with corresponding size, attachment dimensions and technical characteristics, used as a drive for electric submersible pumps of 362 and 406 series as part of a unit of formation dual completion.

Protector of EHP136 (S)HC 535 series is designed for completion of downhole motor with 562 series and other motors with corresponding size, connecting dimensions and technical characteristics, used as an axial load receiving drive of ESP of 406 and 728 series with downhole fluid temperature up to 302 F
Protectors are designed for continuous mode of operation at frequency from 35 to 70 Hz, therefore, the rated frequency is 50 Hz.
The working direction of shaft rotation, when looking at the protector from the top is right-hand – clockwise. If necessary, rotation to an opposite side (from that working) is allowed (without time restriction).

Reference characteristics of well conditions

Characteristic	Indicator	
	EHP92	EHP136 (S)HC
Hydrogen ion indicator of associated water, pH	5.0–8.5	5.0–8.5
Maximum mass concentration of solid particles, % (g/l)	0.02 (0.2)	0.1 (1.0)
Microhardness of particles (as per Mohs scale), as maximum, points	7	7
Maximum content of associated water, %	99	99
Gas oil rating, scf/scf	8828	8828
Hydrostatic pressure in the motor area, as maximum psi	5,800	5,800
Maximum hydrogen sulfide concentration, %	0.001	0.16
Maximum temperature of formation fluid, as maximum, C (F)	120°C (248°F)	150°C (302°F)

Symbol structure

Designation elements	E	HP	XX	XXX
Designation numbers	1	2	3	4

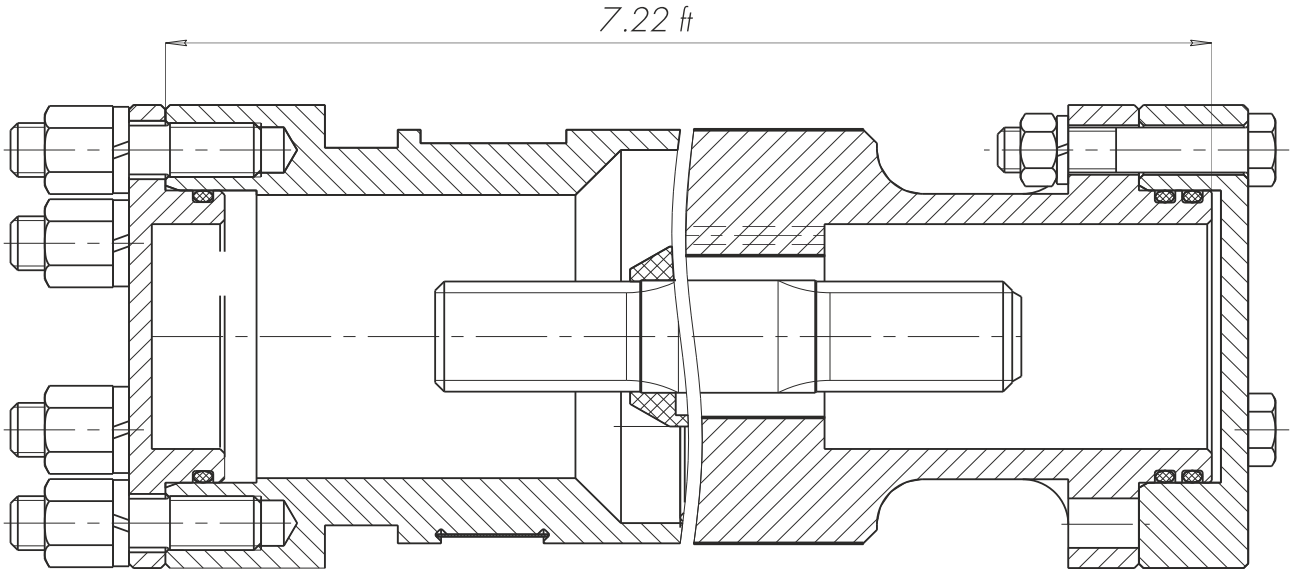
Designation numbers	Options	Decoding
1	E	Manufacturer ("ESP Service" LLC)
2	HP	Protector
3	92	Case diameter, mm (362 series)
	136	Case diameter, mm (535 series)
4	**Design version based on operating conditions**	
	UP	with reinforced heel unit, with increased axial load
	OREP	for connection of double-side motor with the lower section of the pump of the unit for formation dual completion
	S	sectional
	H	heat-resistant
	C	corrosion-resistant

Main parameters and characteristics of protectors

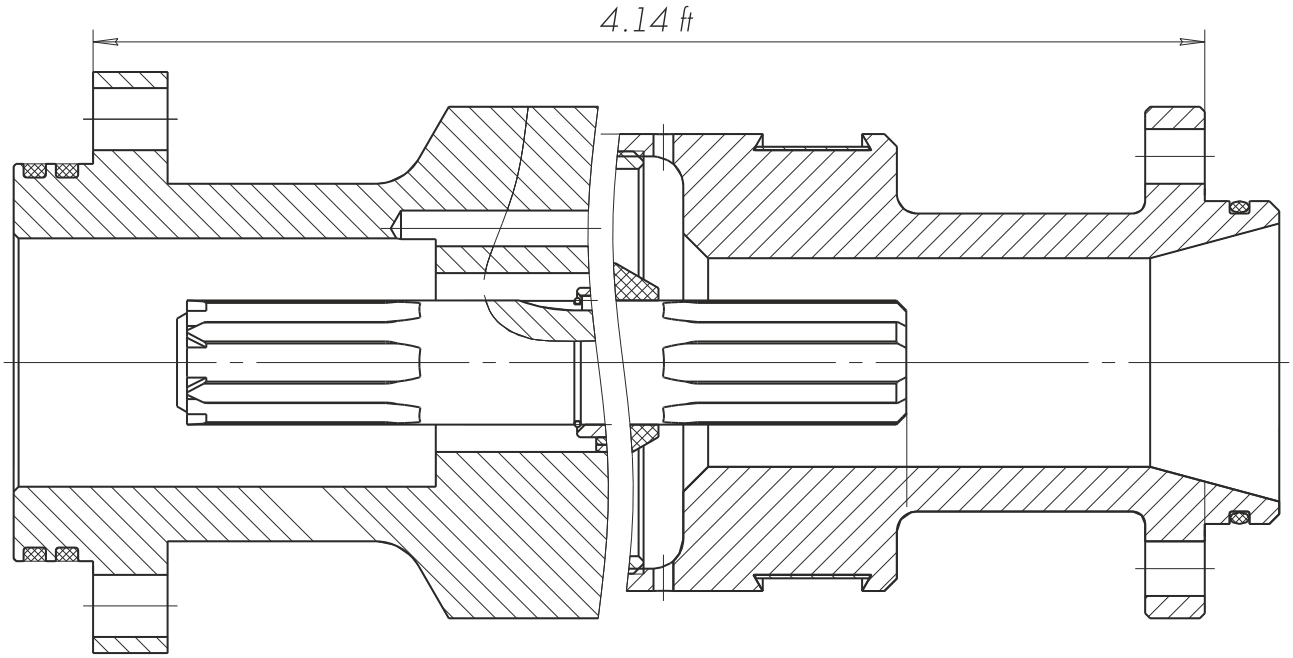
Parameter	Indicator			
	EHP92 UP	**EHP92 OREP**	**EHP136 HC**	**EHP136 SHC**
Completed with DM: Power, hp	490	490	1156	1156
Maximum allowable axial shaft load, lb	1,764	220	3,528	3,528
Power consumption without axial load, as maximum, hp	0.54	0.54	2.85	2.85
Power consumption with axial load, as maximum, hp	1.224	1.36	4.48	4.48
Maximum transferred power, hp	340	272	1156	1156
Shaft rotation speed, rpm	3,000	3,000	3,000	3,000
Number of end seals, pcs	3	2	3	6
Volume of oil injected, l	7.5	4.5	12	24
Diameter, inch	3.62	3.62	5.35	5.35
Weight, lb	143.3	88.2	326	664

Hydraulic scheme	
EHP92 UP	SBSB*
EHP92 OREP	SB*
EHP136 HC	SLSBSB*
EHP136 SHC	SLSBSB-SBSBSL*
*S - Series connections B - Bag chamber L - Labyrinth chamber	

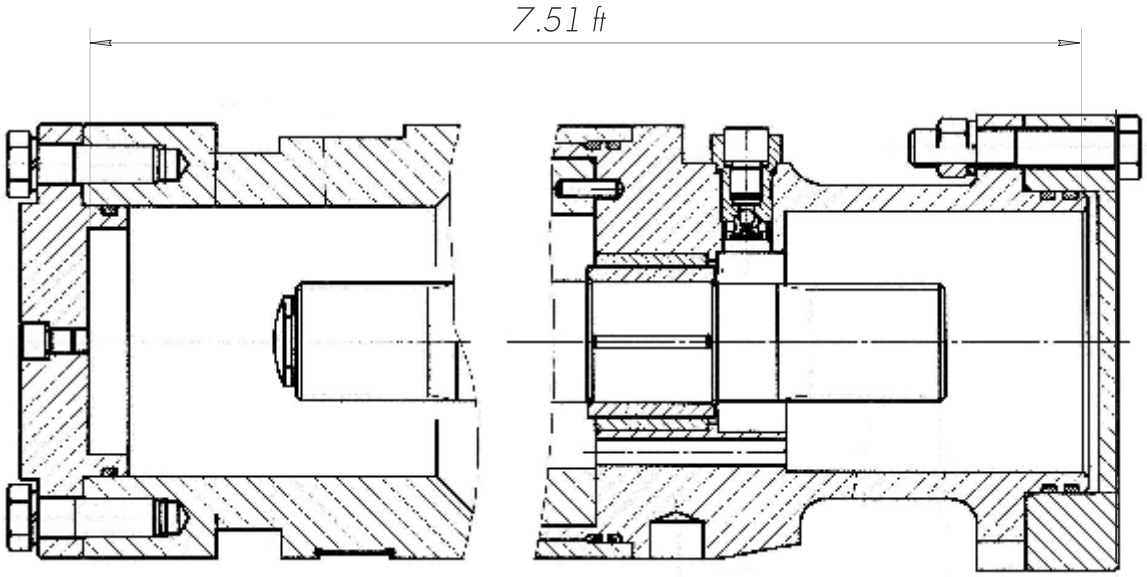
Overall and attachment dimensions of the EHP92 UP protector



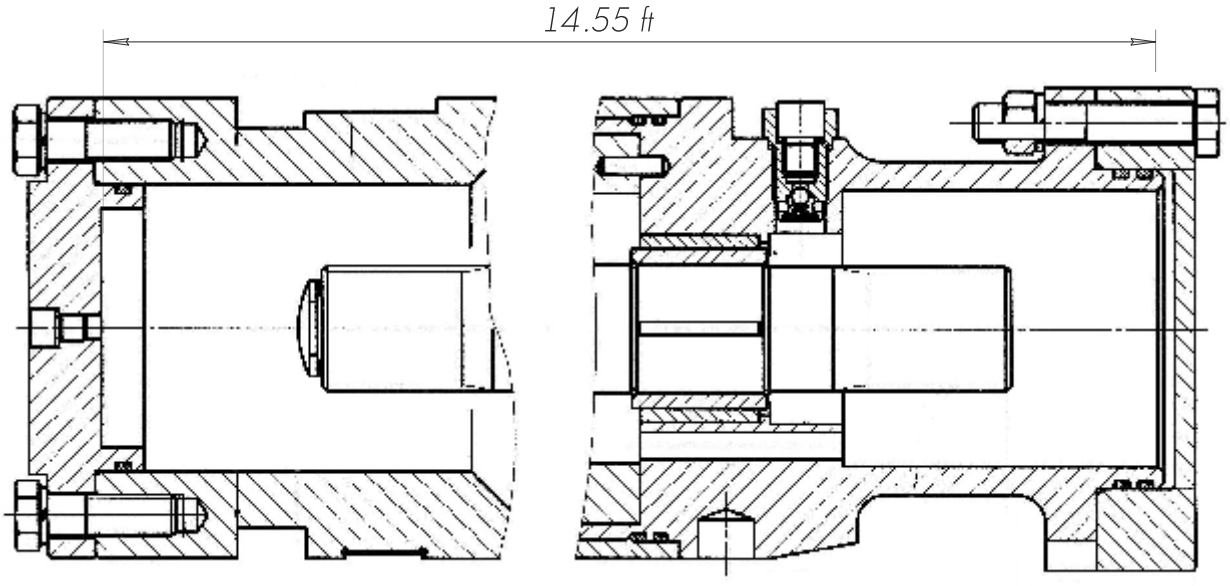
Overall and attachment dimensions of the EHP92 OREP protector



Overall and attachment dimensions of the EHP136 HC protector



Overall and attachment dimensions of the EHP136 SHC protector



Thrust Unit

The thrust unit is designed for compensation of axial and radial forces occurring during the operation of a screw single-entry pump, and for transfer of torque from the motor via protector to the progressing cavity pump. The thrust unit shall be installed between the screw pump and protector of downhole motor.

Reference characteristics of well conditions

Characteristics		Indicator
Hydrogen ion exponent of the associated water, pH		3.0–9.0
Mechanical impurities in pumped fluid (with maximum relative hardness of particles 5 points as per Mohs scale), g/l; as maximum		0.8
Hydrostatic pressure in the motor area, psi, as maximum		5,800
Ambient temperature, °C (°F), as maximum		248
Non-associated gas (by volume), %, as maximum		55
Amount of aggressive components, g/l, as maximum:	H_2S	1.25
	CO_2	1.15
	Cl	75.00
	HCO_3	1.00
	Ca^{2+}	2.00

Symbol structure

Designation elements	E	TU	-	96	V5	-	XX
Designation numbers	1	2		3	4		5

Designation numbers	Options	Decoding
1	E	Manufacturer ("ESP Service" LLC)
2	TU	Thrust Unit
3	96	Overall diameter of the case, mm (378 series)
4	B5	Climatic version and placement category as per GOST 15150
5	XX	Scope of supply

Main parameters and characteristics

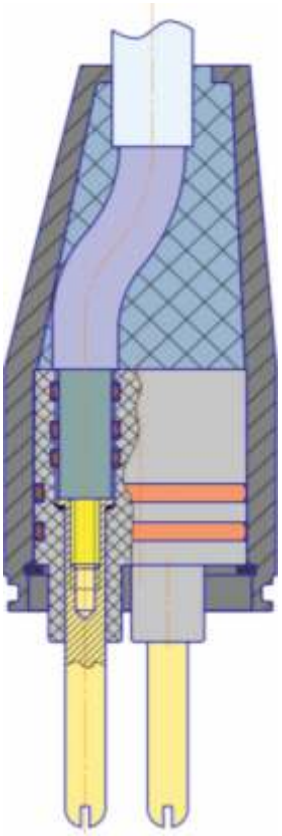
Characteristics		Indicator
Axial load (as maximum), lb		13,230
Rated torque is, N·m		1,000
Maximum torque is for short term, 10 min as maximum		1,500
Rotation speed range is within, rpm		0 - 1,500
Shaft rotation torque is 5 N·m		5.0
Valve opening pressure is , psi		11.6-27.75
Weight and overall dimensions:	Length as assembled, ft	11.483
	Diameter, inch	3.78
	Weight as maximum, lb	276

Motor lead extension

Motor lead extension are used as part of cable lines for feeding three-phase electrical current to downhole motors of electric submersible and progressing cavity pumps sets (ESP; PCP) under conditions of oil wells.

Motor lead extension are manufactured in accordance with TC 3542-001-39356150-2019.
Motor lead extension (hereinafter referred to as – EC) consists of a cable coupling (hereinafter referred to as – CC) and section of flat downhole oil cable of the set length connected to it (mechanically and electrically) with armor made of profiled galvanized steel tape. On request, the extension cable can be made with armor of corrosion-resistant steel tape (stainless steel).

Rubber sealing rings ensure the tightness of the cable gland. The fixation of the cable in the cable box is provided by a compound that is poured into the tail of the box.



Extension cable manufacturing options

Cable type	Cable cross-section, mm^2	AWG#
Cable with rubber insulation of cores in lead shell	3x8	8
	3x10	7
	3x13	6
	3x16	5
	3x21	4
Cable with insulation made of polyethylene	3x10	7
	3x16	5
	3x21	4

Motor lead extension operating conditions

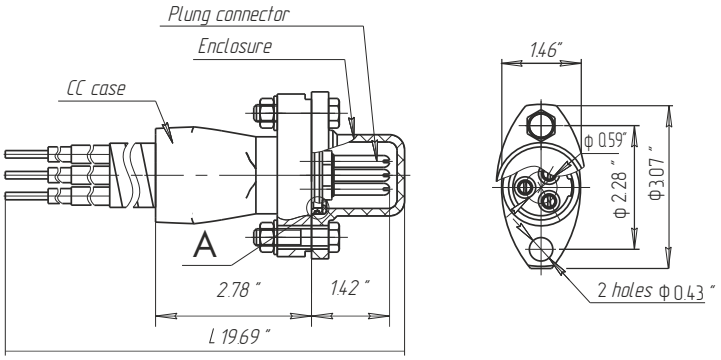
Characteristics	Value by EC versions	
Cable version by insulation type	polyethylene	rubber
Long-term allowable temperature of EC, °C (°F)	120°C (248°F)	232°C (450°F)
Temperature of formation fluid, °C (°F)	90°C (194°F)	180°C (356°F)
Hydrogen sulfide concentration, g/l	0.01	
Hydrostatic pressure, MPa (kg/cm^2)	5,800	
Mass fraction of associated water, %	100	
Hydrogen ion exponent of associated water, pH	5.0-8.5	

Symbol structure

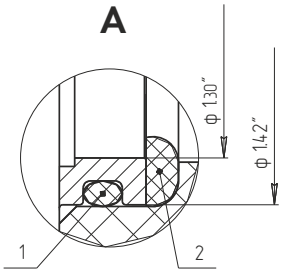
Designation elements	E	EC	-	XXX	-	XXX	-	XX	-	XX	-	X
Designation numbers	1	2		3		4		5		6		7

Designation numbers	Options	Decoding
1	E	Manufacturer (“ESP Service” LLC)
2	EC	Motor Lead Extension
3	XXX	Cable grade (as per manufacturer's specifications)
	Cable temperature index, °C (°F)	
4	120	long-term allowable temperature 120°C, (248°F)
	130	long-term allowable temperature 130°C, (266°F)
	130	long-term allowable temperature 130°C, (446°F)
	232	long-term allowable temperature 232°C, (450°F)
5	**Cross-section of cores, mm2 (AWG#)**	
	8	cross-section of cores, mm^2 (AWG#8)
	10	cross-section of cores, mm^2 (AWG#7)
	13	cross-section of cores, mm^2 (AWG#6)
	16	cross-section of cores, mm^2 (AWG#5)
	21	cross-section of cores, mm^2 (AWG#4)
6	XX	length, ft
7	**Execution**	
	Without designation	type 1
	2	type 2

Configuration and Attachment Dimensions of EC type 1

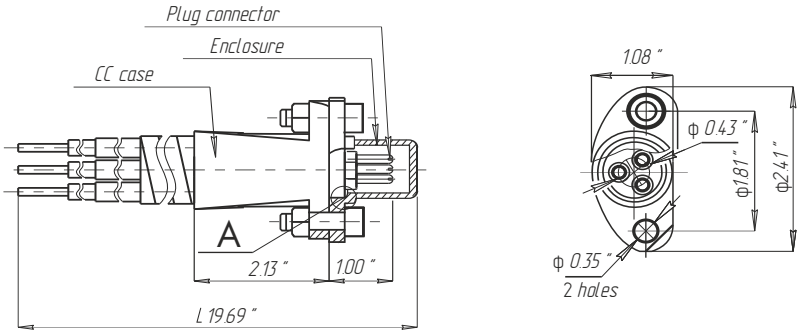


Version of the Sealing Collar of CC Case

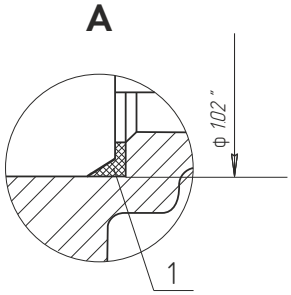


1. Ring 033-036-19
2. Ring 030-035-30

Appearance and Attachment Dimensions of EC type 2



Version of the Sealing Collar of CC Case



1. Ring 022-026-25

VSDs based on Permanent Magnet Motor (PMM)

Designeds for operation in packaged drives of downhole electric submersible and progressing cavity pumps based on permanent magnet motor (PD of ESP-PMM, ESP-AM), used for oil production. Control parameters and protection of Asynchronous and Permanent Magnet Motors with a capacity from 5 to 400 kW with the possibility of smooth acceleration, braking and speed control. Ability to operate ESP with voltage dips of up to 0 V for 100 ms.

Main parameters and characteristics

VSDs ensure:

- LPMM motor rotor speed variation within the range 200-1,500 rpm with maintaining accuracy ±50 rpm and 80–750 rpm, with DPOT operating with accuracy ±10 rpm.
- PMM motor rotor speed variation within the range 500-7,000 rpm with maintaining accuracy ±50 rpm.
- Variation of rotation direction (right-hand/left-hand).
- Time of output to the rated speed for 3 min as maximum.
- Possibility to operate with portable process control panel (PCP), distanced up to 50 m, for which a Registration Certificate is used as per Product Certificate of PCP.
- Possibility to operate with USB flash memory.

VSD ensures the following additional functions

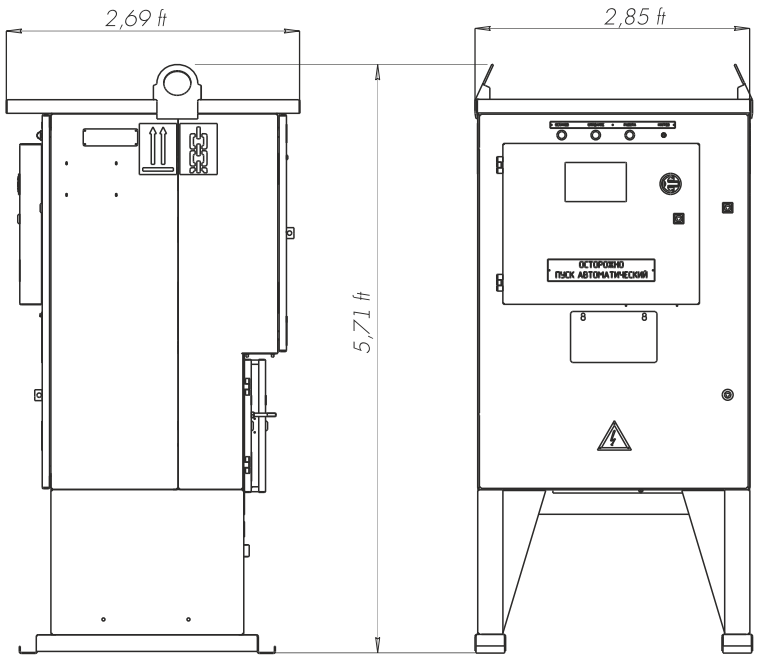
- Protection of equipment from emergency conditions caused by disturbances electrical network and ESP.
- Program for calculation of DPOT tap voltage integrated to terminal separation unit -3.
- Possibility to connect geophysical devices for supplying voltage 220 V 50 Hz and load current 6 A as maximum.
- TMS surface units of various manufacturers can be installed to the CP.
- VSDs can be completed with GSM modem.
- VSDs ensure wire communication with dispatcher console with transmission of analog data, including via MODBUS RTU protocol.
- Automatic maintains the required level of formation pressure by changing motor speed.
- VSDs can be equipped with a power metering device.

Symbol structure

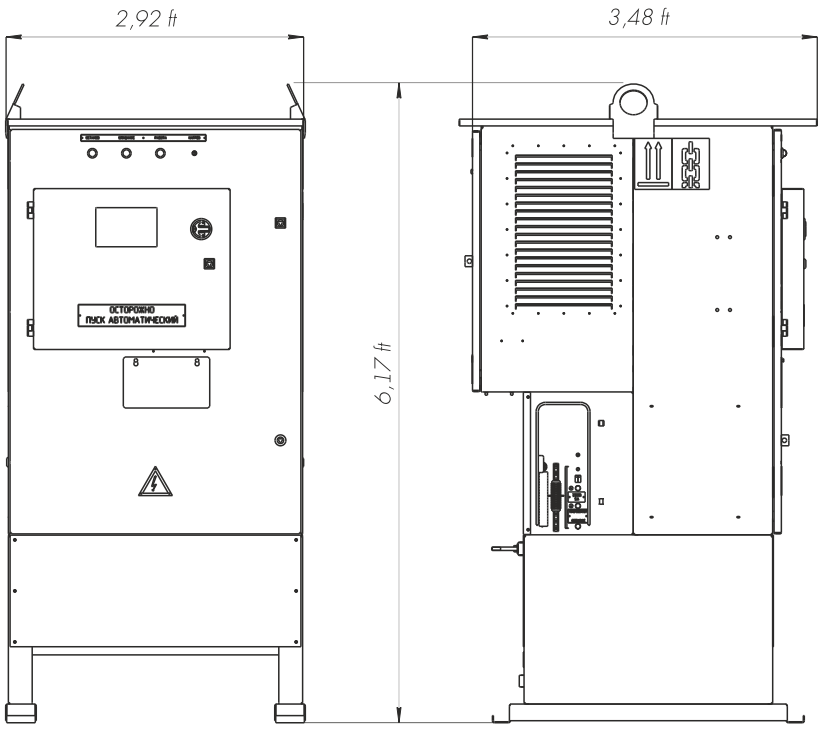
Designation elements	E	VSD	-	XX	-	XXX	-	X	X	X
Designation numbers	1	2		3		4		5	6	7

Designation numbers	Options	Decoding		
1	E	Manufacturer (“ESP Service” LLC)		
2	VSD	Drive Control Panels based on Permanent Magnet Motor		
3	**Software**			
	None	basic software		
	SS	smart software		
4	**Rated current of the primary power circuit, A**			
	80	rated current of the primary power circuit 80 A	800	rated current of the primary power circuit 800 A
	160	rated current of the primary power circuit 160 A	1200	rated current of the primary power circuit 1200 A
	315	rated current of the primary power circuit 315 A	1800	rated current of the primary power circuit 1800 A
5	**drive type of pump**			
	S	drive of ESP		
	C	drive of PCP		
6	**Data analog input unit from the cluster sensors**			
	A	if the unit is installed		
7	**Power energy metering device:**			
	E	if the device is installed		

Overall Dimensions
VSD based on PMM -080 and 160 (as maximum)



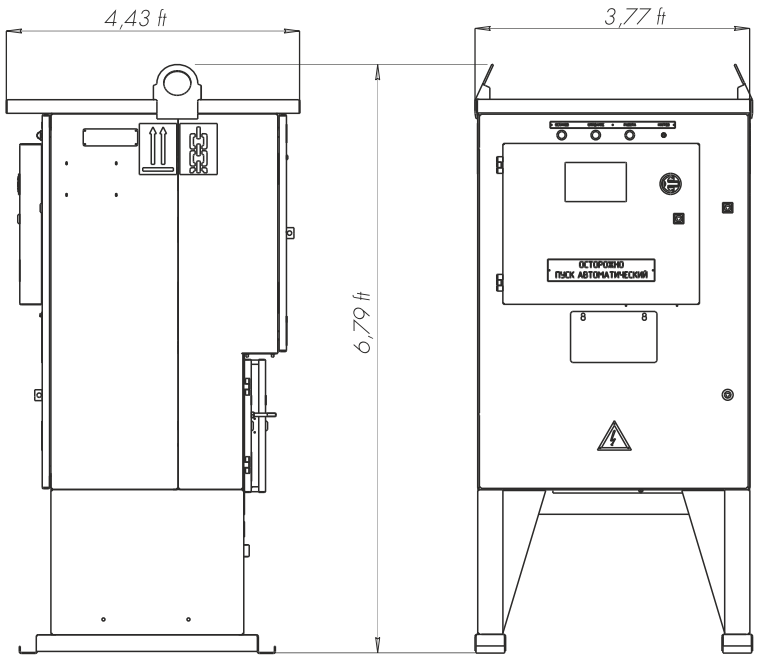
VSD based on PMM -315 (as maximum)



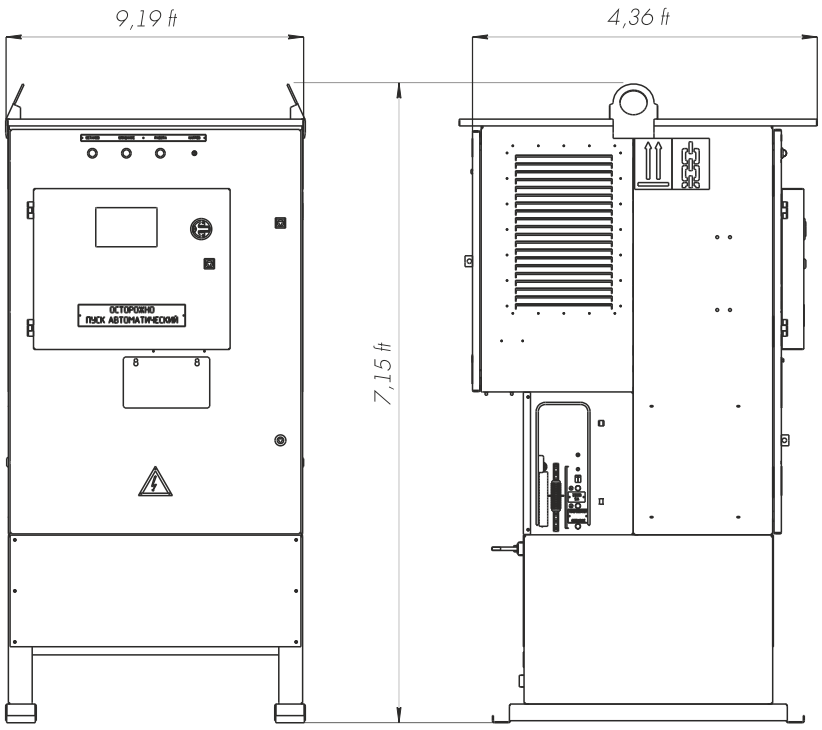
Weight of the CP in basic version does not exceed:

- VSD based on PMM -080 and 160 – 618 lb
- VSD based on PMM – 315–1059 lb

Overall Dimensions
VSD based on PMM -800 (as maximum)



VSD based on PMM -1200 and 1800 (as maximum)



Weight of the CP in basic version does not exceed:

- VSD based on PMM -800 – 1,543 lb
- VSD based on PMM – 1200 and 1800–3,087 lb

"ESP Service" LLC

10, Oktyabrskaya Street, Kogalym city,
Khanty-Mansiysk Autonomous Okrug-Ugra,
628483, Russia
Telephone: +7 34667 48910
Fax: +7 34667 49746
e-mail: epupriemnaya@lukoil.com
www.lukoil-epu.ru