



Construction

The Calpeda 4", 6" and 8" submersible motors are built using advanced technology and components of superior quality that they ensure good mechanical strength and excellent electrical reliability.

The 4" motors have a special food grade dielectric fluid that gives a better lubricant effect, increasing the life of all moving parts and the copper wires.

The 6", 8" motors are in a water bath with the wire being coated with polyvinyl chloride.

All the Calpeda motors can be rewound and they are NEMA STANDARD.

Operating conditions

Motor	Max. Liquid temperature	Cooling minimum flow velocity	Max. starts per hour
4"	35 °C	0,08 m/s	20
6"	25 °C	0,20 m/s for 4 ÷ 15 kW 0,50 m/s for 18,5 ÷ 30 kW	15
8"	25 °C	0,20 m/s for 30 ÷ 51 kW 0,50 m/s for 55 ÷ 75 kW	15

Continuous duty.

Operation data

2-pole induction motor, 60 Hz (n = 3450 1/min).

Sized for connection to the pumps according to NEMA Standards.

Standard voltages:

- single-phase 220 V - up to 2,2 kW for 4" motors.
- three-phase 220 V; 380 V for 4" motors.
- three-phase 380 V; 380/660 V for 6-8" motors.

Voltage tolerance : ±5%.

Recommended type of starting for powers from 7.5 kW:

star/delta, soft start, impedance starting, autotransformer.

Insulation class F for 4" motors, PVC coated wire for 6-8" motors.

Protection IP 68.

Cable

Motor 220V - 60Hz - 1~	Section	Length
4CS 0,37 ÷ 2,2 kW	4 G 2 mm ²	2 m

Motor 380V - 60Hz - 3~	Section	Length
4CS 0,37 ÷ 2,2 kW	4 G 2 mm ²	2 m
4CS 3 ÷ 5,5 kW	4 G 2 mm ²	3,5 m
6CS 4 ÷ 26 kW	3 + 1 x 6 mm ²	3,5 m
6CS 30 kW	3 + 1 x 16 mm ²	3,5 m
8CS 30 ÷ 51 kW	3 + 1 x 16 mm ²	4 m
8CS 55 ÷ 66 kW	3 + 1 x 25 mm ²	4 m
8CS 75 kW	3 + 1 x 35 mm ²	4 m

kW	4" CS 1 ~	4" CS 3 ~	6" CS 3 ~	8" CS 3 ~	kW
0,37	0,37	0,37			0,37
0,55	0,55	0,55			0,55
0,75	0,75	0,75			0,75
1,1	1,1	1,1			1,1
1,5	1,5	1,5			1,5
2,2	2,2	2,2			2,2
3		3			3
4		4	4		4
5,5		5,5	5,5		5,5
7,5			7,5		7,5
9,2			9,2		9,2
11			11		11
13			13		13
15			15		15
18,5			18,5		18,5
22			22		22
26			26		26
30			30	30	30
37				37	37
45				45	45
51				51	51
55				55	55
59				59	59
66				66	66
75				75	75

4.93.325-60Hz

Materialies

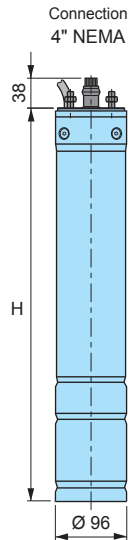
Components	4"
External frame	Cr-Ni steel AISI 304
Motor flange	Brass or Cast iron
Shaft	Cr-Ni-Mo steel AISI 316
Thrust bearing	Oil wetted
Components	6", 8"
External frame	Cr-Ni steel AISI 304
Supports	Cast iron GJL 200 EN 1561
Shaft	Hardened and tempered Cr steel AISI 420
Thrust bearing	Oscillation pads
Bushings	Graphite (Bronze for 8" motor of 51-59-66 kW)

Special features on request

- Other voltage.
- Special mechanical seal for 6", 8", 10" motors.
- Cr-Ni-Mo steel AISI 316 shaft for 6", 8" motors.
- Operation with frequency converter.
- Higher liquid temperature.

4"CS - 1 ~

Type	P ₂		I _N 220 V A	Power factor cos			Efficiency η %			R.P.M.	Direct start		Axial thrust N	Service Factor	I with S.F. 220V A	Capacitor 450 Vc f	H mm	Weight kg
	kW	HP		4/4	3/4	2/4	4/4	3/4	2/4		I _A IN	C _A CN						
4CS 0,37M	0,37	0,5	3,8	0,94	0,91	0,87	49	41	31	≈ 3450	4,1	0,94	1500	1,60	4,9	16	327	7,6
4CS 0,55M	0,55	0,75	4,6	0,98	0,95	0,90	57	49	38		5,4	0,97		1,50	5,8	25	362	9,4
4CS 0,75M	0,75	1	6,5	0,99	0,98	0,97	58	50	39		3,8	0,71		1,40	7,9	35	402	10,7
4CS 1,1M	1,1	1,5	9,4	0,95	0,90	0,84	57	50	39		4,5	0,95		1,30	10,6	40	447	12,4
4CS 1,5M	1,5	2	11,0	0,98	0,95	0,90	61	54	42		5,1	0,90		1,25	13,1	60	467	13,5
4CS 2,2M	2,2	3	15,6	0,95	0,90	0,82	66	59	48		5,2	0,62		1,15	17,4	70	517	15,7

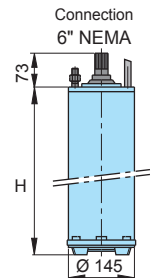


4"CS - 3 ~

Type	P ₂		I _N 380 V A	Power factor cos			Efficiency η %			R.P.M.	Direct start		Axial thrust N	Service factor	I with S.F. 380V A	H mm	Weight kg
	kW	HP		4/4	3/4	2/4	4/4	3/4	2/4		I _A IN	C _A CN					
4CS 0,37T	0,37	0,5	1,5	0,67	0,59	0,50	60	55	46	≈ 3450	5,6	5,14	1500	1,6	1,8	327	7,7
4CS 0,55T	0,55	0,75	1,8	0,74	0,66	0,56	67	63	54		6,3	5,01		1,5	2,3	347	8,7
4CS 0,75T	0,75	1	2,1	0,86	0,79	0,67	66	66	60		6,6	4,84		1,4	2,9	362	9,9
4CS 1,1T	1,1	1,5	3,2	0,75	0,65	0,52	73	72	65		6,2	4,77		1,3	3,9	402	10,8
4CS 1,5T	1,5	2	4,3	0,74	0,64	0,51	76	74	67		7,0	5,51		1,25	4,9	447	12,6
4CS 2,2T	2,2	3	6,0	0,81	0,71	0,47	72	73	62		5,4	2,20		1,15	7,8	402	11,7
4CS 3T	3	4	7,9	0,75	0,68	0,56	77	75	70	≈ 3450	6,6	3,7	4500	1,15	8,7	473	15,1
4CS 4T	4	5,5	10	0,76	0,68	0,55	79	79	76		7,2	2,5		1,15	11,3	538	18,1
4CS 5,5T	5,5	7,5	13,3	0,79	0,71	0,59	80	80	77		7,6	4,4		1,15	15,1	638	22,5

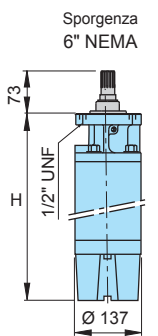
6"CS - 3 ~

Type	P ₂		I _N 380 V A	Power factor cos			Efficiency η %			R.P.M.	Direct start		Axial thrust N	Service factor	I with S.F. 380V A	H mm	Weight kg
	kW	HP		4/4	3/4	2/4	4/4	3/4	2/4		I _A IN	C _A CN					
6CS 4	4	5,5	12,3	0,73	0,65	0,57	68	65	56	≈ 3450	5,9	2,38	20000	1,15	13,3	530	40
6CS 5,5	5,5	7,5	14,6	0,81	0,74	0,63	71	69	62		5,0	1,73		1,15	16,2	530	40
6CS 7,5	7,5	10	19,2	0,84	0,77	0,65	71	68	63		5,2	1,80		1,15	21,7	580	45
6CS 9,2	9,2	12,5	23,7	0,79	0,71	0,62	75	73	66		6,1	2,00		1,15	26,4	630	50
6CS 11	11	15	28,3	0,78	0,71	0,63	76	75	68		6,8	2,40		1,15	31,8	680	55
6CS 13	13	17,5	30,5	0,80	0,71	0,58	81	80	76		7,5	2,80		1,15	34	780	65
6CS 15	15	20	34	0,82	0,74	0,60	82	81	78	≈ 3500	6,8	2,50	20000	1,15	37,8	780	65
6CS 18,5	18,5	25	41	0,84	0,76	0,63	82	81	78		6,8	2,50		1,15	46	830	70
6CS 22	22	30	52,7	0,71	0,62	0,48	85	87	82		7,1	3,00		1,15	57,4	930	80
6CS 26	26	35	67,5	0,67	0,58	0,45	85	84	81		7,4	3,00		1,15	72	1130	100
6CS 30	30	40	72	0,71	0,62	0,48	85	85	82		7,0	2,60		1,15	78,5	1130	100



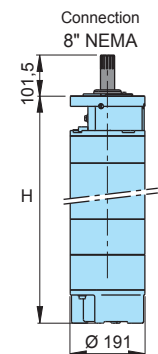
6"FK - 3 ~

Type	P ₂		I _N 380 V A	Power factor cos			Efficiency η %			R.P.M.	Direct start		Axial thrust N	Service factor	H mm	Weight kg	
	kW	HP		4/4	3/4	2/4	4/4	3/4	2/4		I _A IN	C _A CN					
6FK 37	42,8 kW (50HP S.F. 1,15)		93,2	0,85	0,81	0,73	82	83	81	≈ 3500	5,4	2,40	27500	---		1332	135
6FK 45	51,4 kW (60HP S.F. 1,15)		110,2	0,85	0,81	0,72	84	84	82		5,7	2,35		---			1484



8"CS - 3 ~

Type	P ₂		I _N 380 V A	Power factor cos			Efficiency η %			R.P.M.	Direct start		Axial thrust N	Service factor	I with S.F. 380V A	H mm	Weight kg
	kW	HP		4/4	3/4	2/4	4/4	3/4	2/4		I _A IN	C _A CN					
8CS 30	30	40	66,5	0,81	0,71	0,56	85	84	82	≈ 3500	6,3	1,63	30000	1,15	72,5	1056	141
8CS 37	37	50	77	0,85	0,78	0,67	85	84	81		6,2	1,43		1,15	89	1156	161
8CS 45	45	60	97	0,81	0,75	0,61	87	86	83		6,9	1,90		1,15	109	1236	177
8CS 51	51	70	118	0,76	0,66	0,54	88	87	84		9,5	2,30		1,15	132	1376	205
8CS 55	55	75	125	0,76	0,68	0,55	88	87	84		9,0	2,20		1,15	139	1376	205
8CS 59	59	80	131	0,78	0,70	0,58	88	88	85		8,6	2,10		1,15	147	1376	205
8CS 66	66	90	151	0,76	0,67	0,58	87	85	81		8,7	2,20		1,15	167	1576	245
8CS 75	75	100	160	0,81	0,72	0,60	88	87	83		8,3	2,00		1,15	180	1576	245



P₂ Rated power output I_N Rated current I_A Starting current / Rated current C_A Starting torque/Nominal torque
IN CN

Motor Cooling

To ensure a suitable cooling, water must be in touch with the motor casing with a minimum velocity according to the following table

Motor	Water temperature	Water passage velocity	
		Minimum	Recommended
4"	35 °C	0,08 m/s	1 m/s
6"	25 °C	0,20 m/s for 4 ÷ 15 kW 0,50 m/s for 18,5 ÷ 30 kW	1 m/s
8"	25 °C	0,20 m/s for 30 ÷ 51 kW 0,50 m/s for 55 ÷ 75 kW	1 m/s

For operation with higher temperatures, contact our Technical Sales Department

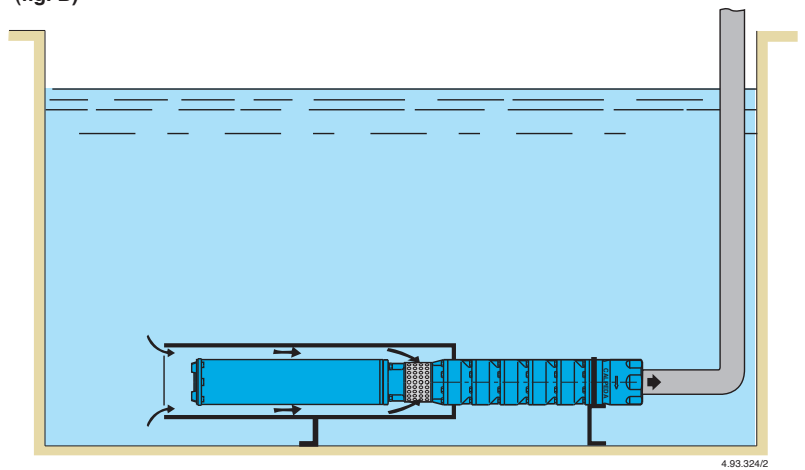
Cooling jacket

When the submersible motor is installed :

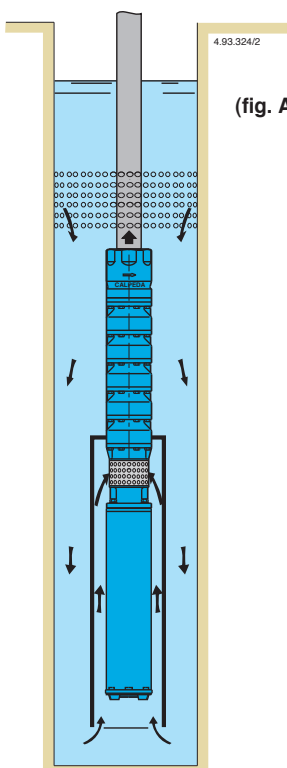
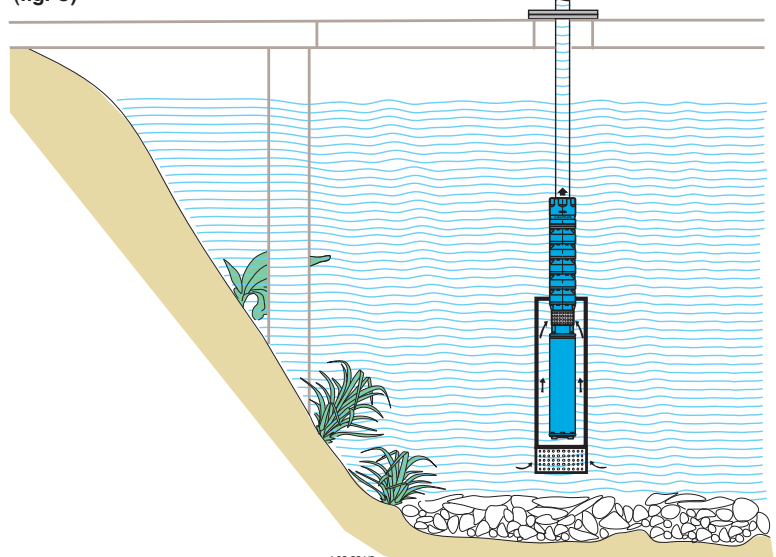
- below the well inlet points (**picture A**);
- in tanks, lakes, basins, etc... (**pictures B and C**)

an external jacket must be installed to create a cooling flow around the motor. Only in this way a safe operation can be assured avoiding any overheating which can damage the motor.

(fig. B)



(fig. C)



(fig. A)

Maximum length of electric cables

AMP.	220 V - 60 Hz single-phase				
	1 four-wires cable 4 x ...mm ²				
	1,5	2,5	4	6	10
	cables max m				
2	142	235			
4	71	117	188		
6	47	78	126	188	
8	35	59	94	141	230
10	28	47	75	113	184
12	24	39	63	94	153
14	20	34	54	81	131
16	18	29	47	71	115
18		26	42	63	102
20		23	38	57	92
25			30	45	73
30			25	38	61

Direct on-line or statoric starting

AMP.	380 V - 60 Hz three-phase															
	1 three-wires cable 3 x ... mm ²								3 single-wires cable 1 x ... mm ²							
	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150	185	240	
	cables max m															
2	271	448														
4	135	224	360													
6	90	149	240	359												
8	68	112	180	270												
10	54	90	144	216												
12	45	75	120	180	292											
14	39	64	103	154	250											
16	34	56	90	135	219											
18		50	80	120	195	304										
20		45	72	108	175	274										
25			58	86	140	219	336									
30			48	72	117	182	280									
35				62	100	156	240	324								
40				54	88	137	210	284								
45					78	122	187	252								
50					70	109	168	227	292							
60						91	140	189	243							
70						78	120	162	208	283						
80							105	142	182	248						
90							93	126	162	220	282					
100							84	114	146	198	254					
110								103	133	180	231	274				
120								95	122	165	212	252	290			
130									112	153	195	232	268			
140									104	142	182	216	248	287		
150									97	132	169	201	232	268		
160									91	124	159	189	217	251	293	
170									86	117	149	178	205	236	276	
180									81	110	141	168	193	223	260	
190									77	104	134	159	183	212	247	
200									73	99	127	151	174	201	234	
220										90	116	137	158	183	213	
240										83	106	126	145	167	195	
260											98	116	134	155	180	
280											91	108	124	144	167	
300											85	101	116	134	156	

AMP.	220 V - 60 Hz three-phase																														
	1 three-wires cable 3 x ... mm ²							3 single-wires cable 1 x ... mm ²																							
	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150																		
	cables max m																														
12	157	259																													
4	78	130	208																												
6	52	86	139	208																											
8	39	65	104	156	254																										
10	31	52	83	125	203																										
12	26	43	69	104	169																										
14	22	37	59	89	145	226																									
16	20	32	52	78	127	198																									
18		29	46	69	113	176																									
20			26	42	62	101	158	243																							
25				33	50	81	127	194																							
30					28	42	68	106	162	219																					
35						36	58	91	139	188																					
40							31	51	79	121	164	211																			
45								45	70	108	146	188																			
50									41	63	97	131	169	230																	
60										53	81	110	141	191																	
70											45	69	94	121	164	210															
80												61	82	106	144	184	218														
90													54	73	94	128	163	194													
100														49	66	84	115	147	175	201											
110															60	77	104	134	159	183											
120																55	70	96	123	146	168										
130																	65	88	113	134	155										
140																		60	82	105	125	144									
150																			56	77	98	117	134								
160																				53	72	92	109	126							
170																					50	68	87	103	118						
180																						47	64	82	97	112					
190																							44	60	77	92	106				
200																								42	57	74	87	101			
220																									52	67	79	92			
240																										48	61	73	84		
260																											57	67	77		
280																												53	62	72	
300																													49	58	67

Maximum length of electric cables
Star-delta starting

AMP.	220/380 V - 60 Hz three-phase													
	2 three-wires cable 3 x ... mm ²							6 single-wires cable 1 x ... mm ²						
	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150	
cavi - cables - câbles - cables max m														
30	18	30	48	72	117	183								
35		26	41	62	100	157								
40		22	36	54	88	137								
45		20	32	48	78	122	187							
50			29	43	70	110	168							
60				36	59	91	140	190						
70				31	50	78	120	162	209					
80					44	69	105	142	183					
90					39	61	93	126	162					
100						55	84	114	146	199				
110						50	76	103	133	181				
120						46	70	95	122	166				
130						42	65	87	112	153	196			
140							60	81	104	142	182			
150							56	76	97	132	170			
160							53	71	91	124	159	189		
170							49	67	86	117	150	178		
180								63	81	110	141	168		
190								60	77	105	134	159	183	
200									73	99	127	151	174	
220										90	116	137	158	
240										83	106	126	145	
260										76	98	116	134	
280										71	91	108	124	
300										66	85	101	116	

AMP.	380/660 V - 60 Hz three-phase														
	2 three-wires cable 3 x ... mm ²							6 single-wires cable 1 x ... mm ²							
	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150		
cavi - cables - câbles - cables max m															
30	31	52	83	124	202	316									
35		44	71	107	173	270									
40		39	62	93	152	237									
45			55	83	135	210	323								
50			50	75	121	189	290								
60				62	101	158	242	327							
70				53	87	135	207	281							
80					76	118	182	246	316						
90					67	105	161	218	280						
100					61	95	145	196	252	343					
110					55	86	132	179	229	312					
120					79	121	164	210	286						
130					73	112	151	194	264	338					
140						104	140	180	245	314					
150						97	131	168	229	293					
160						91	123	158	214	275	326				
170							116	148	202	259	307				
180							109	140	191	244	290				
190							103	133	181	231	275	317			
200								126	172	220	261	301			
220									156	200	237	274			
240									143	183	218	251			
260										169	201	231			
280										157	187	215			
300										147	174	201			

- Against short-circuits and overloads to the electric pumps system we advise to follow the usually applied normative.
- To avoid a possible dry working of the electric pump in is better to install a level control.
- In order to avoid overheatings, tension drops above 3%, we advise to use suitable starting motors systems.
- All the cable wave to respect the usually applied normative and to present excellent insulation characteristics.

The tables show the maximum length of the cable depending on the current absorbed by the motor and the cross section area of the cable, at different voltages. The maximum voltage drop equal to 3%, cable temperature of 80°C, water installation similar to air installation at a temperature of 30°C.

Choice of electric cable by calculation

For dimensioning the phase cross section area for the submersible motor need the following information:

- V: Rated voltage (V)
- I: Motor current (A)
- L: Length of cable (km)
- cos φ: power factor
- Ambient temperature (°C)

The choice of the minimum cross section area of the phase conductor is determined by the rated motor current and the values reported in Table 1.

Table 1

Type of cable*	Cable cross section mm ²	Maximum cable current		Resistance	Reactance
		1 line A	2 lines A	R at 80°C ohm/km	X at 60Hz ohm/km
four-wires cable	1.5	18	15	15.1	0,142
four-wires cable	2.5	24	20	9.08	0,131
four-wires cable	4	32	27	5.63	0,121
four-wires cable	6	41	35	3.73	0,115
four-wires cable	10	57	48	2.27	0,103
four-wires cable	16	76	65	1.43	0,098
four-wires cable	25	96	82	0.91	0,097
four-wires cable	35	119	101	0.65	0,094
single-wire cable	50	167	142	0.473	0,121
single-wire cable	70	216	184	0.328	0,116
single-wire cable	95	264	224	0.236	0,118
single-wire cable	120	308	262	0.188	0,113
single-wire cable	150	356	303	0.153	0,112
single-wire cable	185	409	348	0.123	0,109
single-wire cable	240	485	412	0.094	0,110

* Up to 35 mm² sections four-wire cable are used, from 50 mm² single core cables are recommended as well.Tab.1

The maximum current of the cables listed in Table 1 are for ambient temperature of 30 ° C.
When the temperature is different, the maximum current of the cables should be corrected by a factor given in Table 2.

Table 2

Ambient Temperature °C	10	15	20	25	30	35	40	45	50	55	60
Correction factor	1,22	1,17	1,12	1,06	1	0,94	0,87	0,79	0,71	0,61	0,5

The cross section area of the phase conductor is chosen by checking the voltage drop along the line , through the following equation:

$$DU\% = 1,73 \cdot I \cdot L \cdot (R \cdot \cos \varphi + X \cdot \sin \varphi) / (V \cdot 1000)$$

DU% the voltage drop should not be greater than 3%
R, X = cable resistance and reactance in ohms/km (indicated in Table 1)
 $\sin \varphi = \sqrt{1 - \cos^2 \varphi}$

In case of star / delta starting the rated current of the motor should be divided by 1.73.

Determination of minimal sections of the protective conductor PE.

Table 3

Phase cross section area S mm ²	PE cross section area SPE mm ²
S ≤ 16	S
16 < S ≤ 25	16
S > 25	S/2