

The Calpeda 4", 6", 8" and 10" submersible motors are built using advanced technology and components of superior quality that they ensure good mechanical strength and excellent electrical reliability. The good performances are guaranteed thanks to strict tests of all the different components during the various production phases.

### Rewindable motor CS-R series

The **CS-R** 6/8/10" motors are in a water bath with the wire being coated with polyvinyl chloride, while the **CS-R** 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 special design of all our motors allows easy access to the various components, simplifying maintenance and repair.

**CS-R:** Standard construction.

**I-CS, I-CS-R:** AISI 316 construction.

### Operation data

2-pole induction motor, 50 Hz (n ≈ 2900 rpm).

Sized for connection to the pumps according to NEMA Standards (10" excluded).

Standard voltages:

- single-phase 230 V - up to 2,2 kW for 4" motors.
- three-phase 230 V; 400 V for 4" motors.
- three-phase 400 V; 400/690 V for 6-8-10" motors.

Voltage tolerance : ± 10%.

In order to limit both current and torque at each starting, for rated motor powers equal to or higher than 7.5 kW, one of the following types of starting is necessary: star/delta, soft starter, stator impedance or autotransformer.

Insulation class:

- class F for 4" motors,
- class E for 6" motors, PVC for I-6" (I-6" 45 kW A (PE2+PA)).
- PVC for 8"
- PVC for 10" (10" 170kW and 190 kW A (PE2+PA))

Protection IP 68.

Installation below water level: 200 m for 4", 150 m for 6", 500 m for 8,10"  
Motor suitable operation with frequency converter (with suitable filter dv/dt).

Horizontal installation (6" 37-45kW, 8" 92kW, 10" 170-190 kW excluded)

### Operating conditions

Motor	P2	Max. Liquid temperature	Cooling minimum flow velocity	Max. starts per hou
4CS-R	tutti	35 °C	0,1 m/s	30
6CS-R	4÷15 kW	40 °C	0,5 m/s	20
	18,5÷30 kW	35 °C	0,5 m/s	20
	37 kW	30 °C	0,5 m/s	20
8CS-R	30÷45 kW	30 °C	0,2 m/s	10
	51 kW	30 °C	0,2 m/s	8
	59÷75 kW	30 °C	0,5 m/s	8
	92÷110 kW	30 °C	0,5 m/s	6
10CS-R	tutti	25 °C	0,15 m/s	6

Continuous duty.

### Special features on request

- Other voltage.
- Frequency 60 Hz.
- Higher liquid temperature.
- PT100 temperature sensor
- PE2 / PA class Y (90°C) winding insulation
- Cooling jackets
- Special coupling flange



kW	4" 1~		4" 3~		6" 3~		8" 3~		10" 3~	
	CS-R	CS-R	CS-R	I-CS-R 316	CS-R	I-CS-R 316	CS-R	I-CS-R 316	CS-R	I-CS-R 316
0,37	•	•								
0,55	•	•								
0,75	•	•								
1,1	•	•								
1,5	•	•								
2,2	•	•								
3		•								
4		•	•	•						
5,5		•	•	•						
7,5			•	•						
9,2			•	•						
11			•	•						
13			•	•						
15			•	•						
18,5			•	•						
22			•	•						
26			•	•						
30			•	•	•	•				
37			•	•	•	•				
45					•	•				
51					•	•				
59					•	•				
66					•	•				
75					•	•	•	•		
92					•	•	•	•	•	•
110							•	•	•	•
130							•	•	•	•
150							•	•	•	•
165							•	•	•	•
185							•	•	•	•

### Materialies

Components	4"	
External frame	Cr-Ni steel AISI 304L	
Motor flange	Cast iron with cataphoresis treatment and protected with a Cr-Ni steel AISI 304 cover.	
Shaft end	Cr-Ni steel AISI 304	
Thrust bearing	Oil wetted	
Components	6", 8", 10" standard	6", 8", 10" AISI 316
External frame	Cr-Ni steel AISI 304 (Steel AISI 316 for 6")	Cr-Ni-Mo steel AISI 316
Motor flange	Cast iron GJL 250 EN 1561 (Cast iron G 25 EN 1561 for 8,10")	Cr-Ni-Mo steel AISI 316
Shaft end	Cr-Ni steel AISI 431 (Steel AISI 630 for 10")	Duplex 1.4462 (Steel AISI 630 for 8,10")
Thrust bearing	Brass pads	Brass pads

### Cable

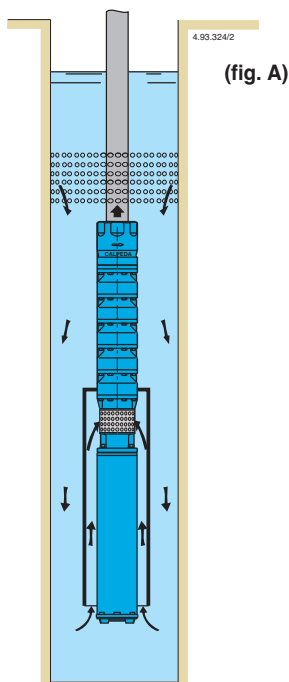
Motor 230V - 50Hz - 1~	Sezione	Lunghezza
4CS-R 0,37 ÷ 2,2 kW	4 x 1,5 mm <sup>2</sup>	1,7 m

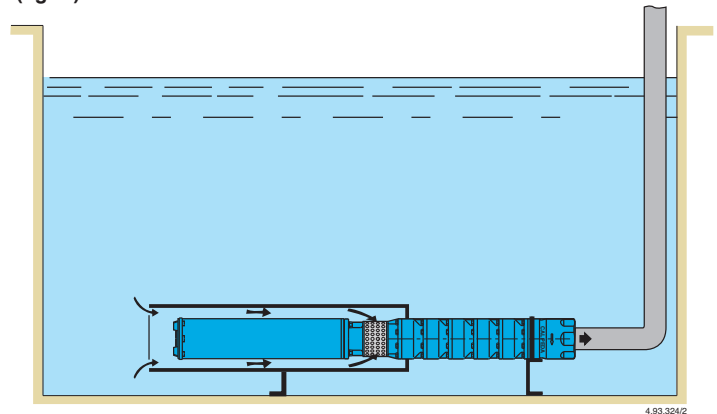
Motor 400V - 50Hz - 3 ~	Sezione	Lunghezza
4CS-R 0,37 ÷ 3 kW	4 x 1,5 mm <sup>2</sup>	1,7 m
4CS-R 4 ÷ 5,5 kW	4 x 2 mm <sup>2</sup>	2,7 m
6CS-R 4 ÷ 11 kW	3 x (1x2,5) mm <sup>2</sup>	3,5 m
6CS-R 13 ÷ 22 kW	3 x (1x4) mm <sup>2</sup>	3,5 m
6CS-R 26 - 30 kW	3 x (1x6) mm <sup>2</sup>	3,5 m
6CS-R 37 - 45 kW	3 x (1x10) mm <sup>2</sup>	4,5 m
8CS-R 30 ÷ 45 kW	3 x (1x16) mm <sup>2</sup>	4 m
8CS-R 51 ÷ 92 kW	3 x (1x25) mm <sup>2</sup>	4 m
8CS-R 110 kW	3 x (1x35) mm <sup>2</sup>	4 m
10CS 75 ÷ 92 kW	3x(1x25) mm <sup>2</sup>	4 m
10CS 110 ÷ 150 kW	3x(1x50) mm <sup>2</sup>	4 m
10CS 165 ÷ 185 kW	3x(1x70) mm <sup>2</sup>	4 m

### Cooling jacket

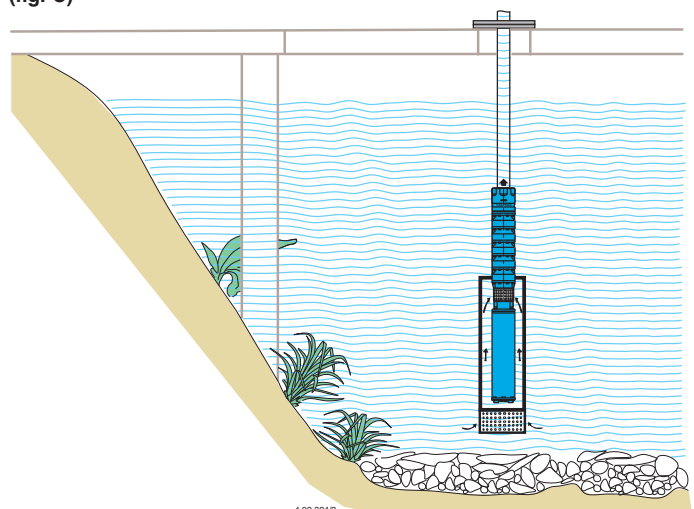
When the submersible motor is installed :  
 - below the well inlet points (**picture A**);  
 - in tanks, lakes, basins, etc... (**pictures B and C**)  
 an external jacket must be installed to create a cooling flow around the motor. Only in this way a safe operation can be assured avoiding any overheating which can damage the motor.



(fig. B)



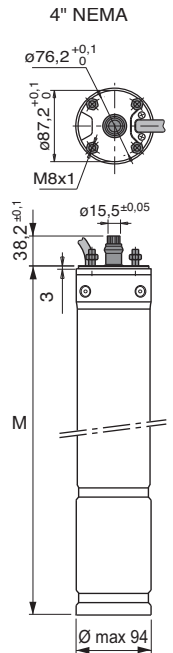
(fig. C)



### Performance, dimensions and weights

#### 4"CS-R - 1 ~

Type	PN		IN 230 V A	Power factor cos φ		Efficiency η %	R.P.M.	Direct start		Capacitor 450 Vc μF	Axial thrust N	M mm	Weight kg
	kW	HP		4/4	3/4			I <sub>A</sub>	I <sub>CA</sub>				
4CS-R 0,37MC	0,37	0,5	3,6	0,93	50	2805	10,5	20	2000	311,3	6,45		
4CS-R 0,55MC	0,55	0,75	4,7	0,92	56	2790	14,5	25		331,4	7,2		
4CS-R 0,75MC	0,75	1	5,6	0,97	61	2830	16,5	35		356,4	8,45		
4CS-R 1,1MC	1,1	1,5	7,6	0,94	68	2845	22	40		396,4	10,2		
4CS-R 1,5MC	1,5	2	10,7	0,92	66	2840	32	60		436,5	11,65		
4CS-R 2,2MC	2,2	3	14,6	0,93	69	2810	43	80		491,5	14,9		

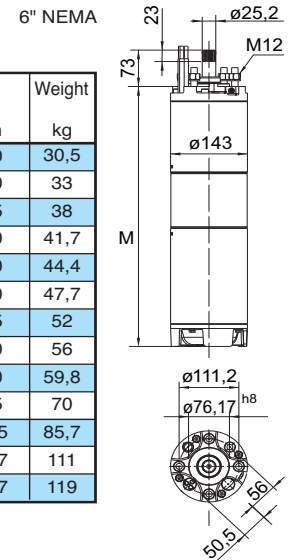


#### 4"CS-R - 3 ~

Type	PN		IN 400 V A	Power factor cos φ		Efficiency η %	R.P.M.	Direct start		Axial thrust N	M mm	Weight kg
	kW	HP		4/4	3/4			I <sub>A</sub>	I <sub>CA</sub>			
4CS-R 0,37TC	0,37	0,5	1,7	0,61	52	2830	6	2000	311,3	6,45		
4CS-R 0,55TC	0,55	0,75	2	0,66	60	2815	7		331,4	7,2		
4CS-R 0,75TC	0,75	1	2,5	0,69	62	2820	8,5		356,4	8,45		
4CS-R 1,1TC	1,1	1,5	3,3	0,76	67	2810	11,5		371,4	9,35		
4CS-R 1,5TC	1,5	2	4,4	0,71	69	2815	15,5		396,4	10,2		
4CS-R 2,2TC	2,2	3	6,1	0,73	71	2815	21		436,5	11,65		
4CS-R 3TC	3	4	6,9	0,85	74	2820	24	3000	450	12,1		
4CS-R 4TC	4	5,5	9,4	0,84	75	2820	33		505	15,1		
4CS-R 5,5TC	5,5	7,5	13,4	0,77	77	2820	47		589	19,8		

#### 6"CS-R

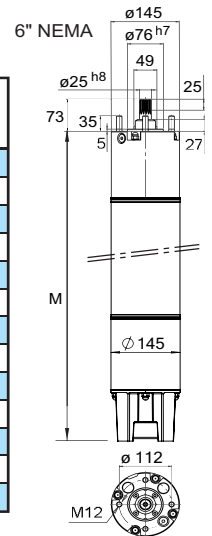
Type Standard	PN		IN 400 V A	Power factor cos φ		Efficiency η %		R.P.M.	Direct start		Axial thrust N	M mm	Weight kg
	kW	HP		4/4	3/4	4/4	3/4		I <sub>A</sub> I <sub>N</sub>	I <sub>CA</sub> I <sub>CN</sub>			
6CS-R 4	4	5,5	11	0,80	0,70	70	68	2825	3	1,5	30000	530	30,5
6CS-R 5,5	5,5	7,5	14,5	0,81	0,72	72	72	2815	3,2	1,5	30000	550	33
6CS-R 7,5	7,5	10	18,5	0,80	0,72	76	76	2830	4,1	2	30000	595	38
6CS-R 9,2	9,2	12,5	22	0,80	0,71	78	78	2840	4	1,7	30000	640	41,7
6CS-R 11	11	15	26	0,83	0,76	78	79	2835	5,2	2,5	30000	670	44,4
6CS-R 13	13	17,5	31	0,80	0,69	79	78	2840	5	2,6	30000	700	47,7
6CS-R 15	15	20	35	0,80	0,72	81	81	2855	5	1,95	30000	715	52
6CS-R 18,5	18,5	25	42	0,82	0,74	81	82	2840	5,4	2,5	30000	750	56
6CS-R 22	22	30	49,5	0,83	0,76	81	83	2820	4,5	1,7	30000	790	59,8
6CS-R 26	26	35	57,5	0,82	0,74	83	84	2850	5,3	2	30000	875	70
6CS-R 30	30	40	64,6	0,80	0,74	85	87	2845	5,3	2	30000	1025	85,7
6CS-R 37	37	50	82,5	0,80	0,72	86	87	2870	6	2,4	30000	1227	111
6CS-R 45	45	60	98,9	0,80	0,73	85	85	2860	5,1	2	30000	1287	119



### Performance, dimensions and weights

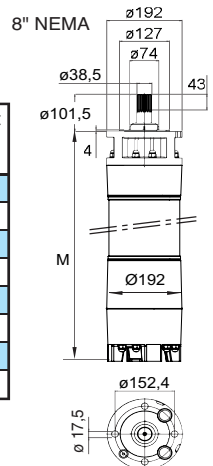
#### I-6"CS-R

Type AISI 316	PN		IN 400 V A	Power factor cos φ			Efficiency η %			R.P.M.	Direct start		Axial thrust N	M mm	Weight kg
	kW	HP		4/4	3/4	2/4	4/4	3/4	2/4		I <sub>A</sub> I <sub>N</sub>	C <sub>A</sub> C <sub>N</sub>			
I-6CS-R 4	4	5,5	9,9	0,80	0,73	0,64	74,8	74,4	67,4	2852	6,8	1,2	25000	597	44
I-6CS-R 5,5	5,5	7,5	13	0,80	0,75	0,67	76,7	75,2	65,2	2839	7,2	1,2	25000	627	47
I-6CS-R 7,5	7,5	10	17	0,81	0,76	0,68	78,4	76,9	73,1	2837	7	1,3	25000	667	51
I-6CS-R 9,2	9,2	12,5	20	0,82	0,77	0,68	79,1	79,4	74,3	2862	7,2	1,2	25000	697	54
I-6CS-R 11	11	15	24	0,84	0,80	0,72	80,8	81,9	78,6	2841	6,9	1,2	25000	767	61
I-6CS-R 13	13	17,5	30	0,82	0,77	0,67	80	79,3	76,7	2863	7,2	1,2	25000	767	62
I-6CS-R 15	15	20	33	0,83	0,77	0,68	81,6	82,8	81,0	2836	7,3	1,4	25000	827	69
I-6CS-R 18,5	18,5	25	40	0,83	0,78	0,69	81,9	82,6	80,3	2853	7,4	1,3	35000	897	74
I-6CS-R 22	22	30	47	0,82	0,75	0,64	83,5	84	82,1	2868	8,4	1,5	35000	967	81
I-6CS-R 26	26	35	54	0,82	0,77	0,66	84,5	86,1	85,2	2864	6,9	1	35000	1027	90
I-6CS-R 30	30	40	62	0,82	0,77	0,66	85	85,7	84,9	2860	8,5	1,6	45000	1167	103
I-6CS-R 37	37	50	79	0,81	0,75	0,63	83,5	84,6	84,1	2856	8,6	2	45000	1297	117
I-6CS-R 45	45	60	98	0,83	0,76	0,63	80,5	83,4	83,8	2827	9,9	2,9	45000	1327	119



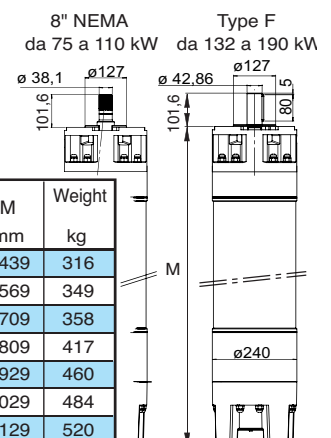
#### 8"CS-R, I-8"CS-R

Type		PN		IN 400 V A	Power factor cos φ			Efficiency η %			R.P.M.	Direct start		Axial thrust N	M mm	Weight kg
Standard	AISI 316	kW	HP		4/4	3/4	2/4	4/4	3/4	2/4		I <sub>A</sub> I <sub>N</sub>	C <sub>A</sub> C <sub>N</sub>			
8CS-R 30	I-8CS-R 30	30	40	61	0,85	0,82	0,75	83,9	84,9	82,3	2886	6,3	1	50000	1049	137
8CS-R 37	I-8CS-R 37	37	50	76	0,84	0,8	0,71	84,8	84,7	82,7	2890	6,9	1,2	50000	1119	157
8CS-R 45	I-8CS-R 45	45	60	91	0,84	0,79	0,71	86	86	83,4	2900	7,1	1,1	50000	1229	169
8CS-R 51	I-8CS-R 51	51	70	103	0,85	0,81	0,73	84,9	86,5	85,1	2879	8,1	1,9	60000	1229	170
8CS-R 59	I-8CS-R 59	59	80	116	0,83	0,79	0,69	87,5	88,6	87,4	2898	7,7	1,4	60000	1349	194
8CS-R 66	I-8CS-R 66	66	90	129	0,84	0,81	0,72	87,1	88	87	2883	7,4	2,4	70000	1419	210
8CS-R 75	I-8CS-R 75	75	100	146	0,85	0,81	0,73	86,9	87,7	86,5	2890	7,9	1,5	70000	1609	241
8CS-R 92	I-8CS-R 92	92	125	181	0,83	0,77	0,66	88,5	88,4	87,9	2900	8,6	1,8	70000	1679	251



#### 10"CS-R, I-10"CS-R

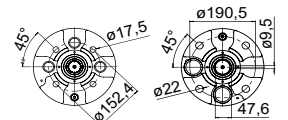
Type		PN		IN 400 V A	Power factor cos φ			Efficiency η %			R.P.M.	Direct start		Axial thrust N	M mm	Weight kg
Standard	AISI 316	kW	HP		4/4	3/4	2/4	4/4	3/4	2/4		I <sub>A</sub> I <sub>N</sub>	C <sub>A</sub> C <sub>N</sub>			
10CS-R 75	I-10CS-R 75	75	100	154	0,83	0,81	0,75	84,8	83,7	81,3	2900	5,2	0,6	80000	1439	316
10CS-R 92	I-10CS-R 92	92	125	184	0,84	0,82	0,78	85,7	84	82	2891	5,2	0,6	80000	1569	349
10CS-R 110	I-10CS-R 110	110	150	217	0,84	0,82	0,76	87,1	87,6	86,5	2907	5,7	0,7	80000	1709	358
10CS-R 132	I-10CS-R 132	132	180	262	0,85	0,83	0,78	87	87,3	85,6	2892	5,6	0,7	80000	1809	417
10CS-R 150	I-10CS-R 150	150	200	294	0,83	0,8	0,73	88,1	88,7	87,1	2907	5,9	0,6	80000	1929	460
10CS-R 170	I-10CS-R 170	170	230	334	0,83	0,79	0,71	87,5	88,4	87,2	2900	6,6	1	80000	2029	484
10CS-R 190	I-10CS-R 190	190	260	374	0,83	0,79	0,7	88,3	89,5	89,2	2904	5,9	0,7	80000	2129	520



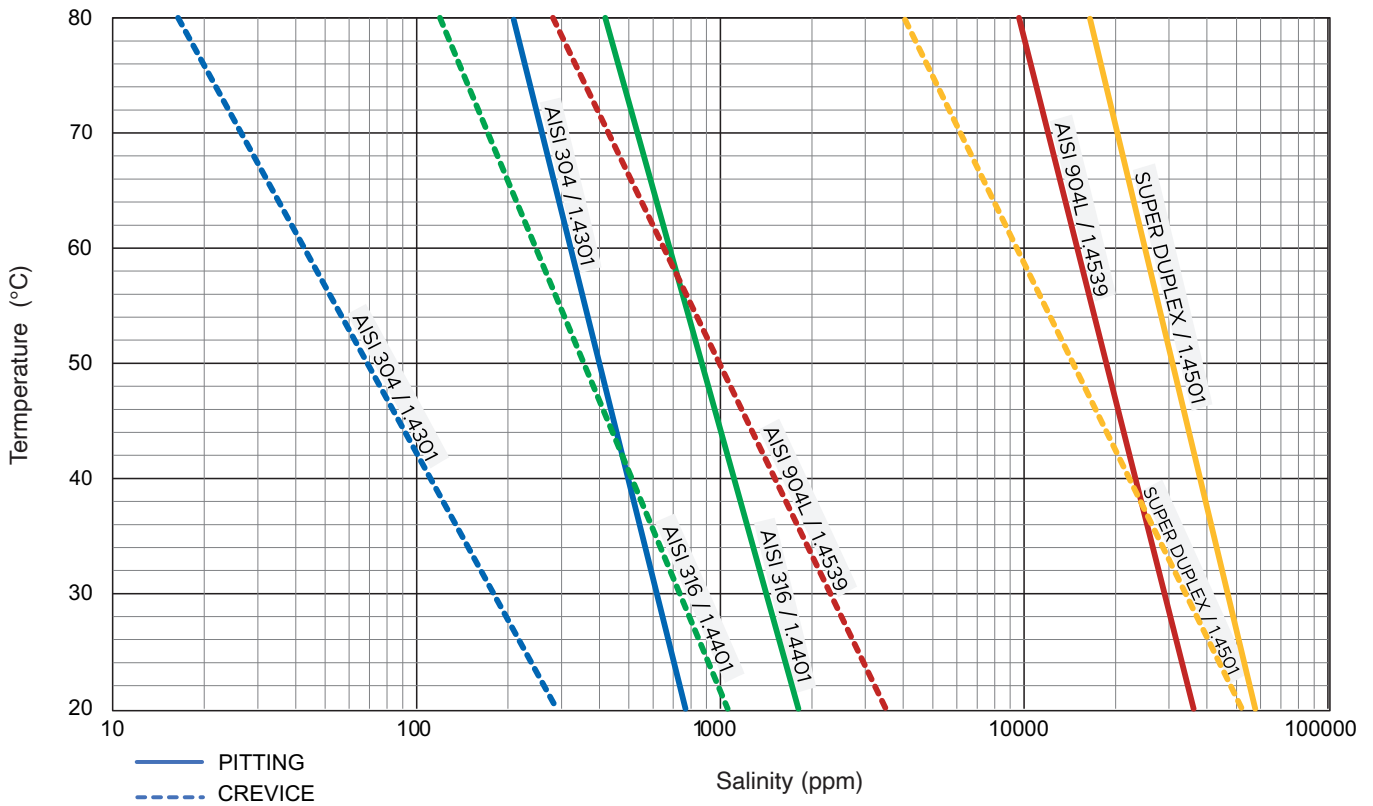
PN Rated power output IN Rated current

I<sub>A</sub>/I<sub>N</sub> Starting current / Nominal current

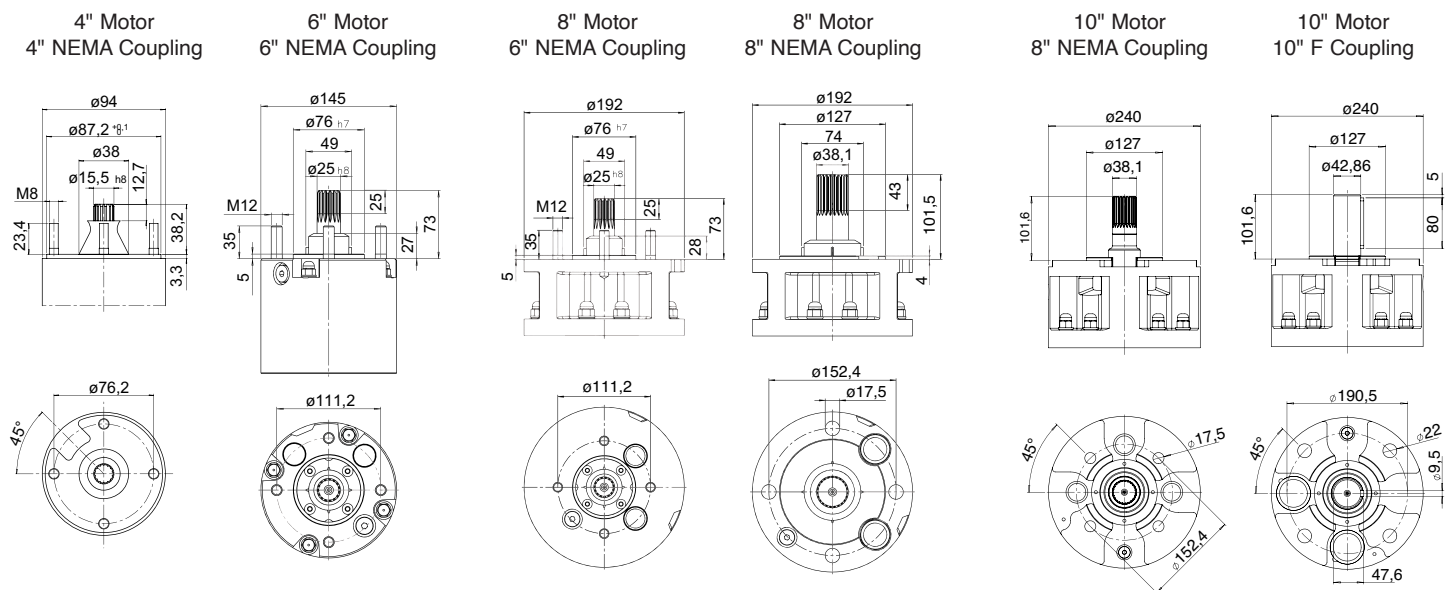
C<sub>A</sub>/C<sub>N</sub> Starting torque/Nominal torque



### Relationship between temperature and salinity



### Coupling flange



### Maximum length of electric cables

IN A	230 Volt - 50 Hz - 1 ~				
	1 four-wires cable 4 x ....mm <sup>2</sup>				
	1,5	2,5	4	6	10
cables max m					
2	142	235			
4	71	118	189		
6	47	78	126	189	
8	35	59	94	142	231
10	28	47	76	113	185
12	24	39	63	95	154
14	20	34	54	81	132
16	18	29	47	71	115
18		26	42	63	103
20		24	38	57	92
25			30	45	74
30			25	38	62

Voltage drop 3%.  
Maximum ambient temperature + 30 °C.

### Direct-starting

IN A	230 Volt - 50 Hz - 3 ~														
	1 four-wires cable 4 x ....mm <sup>2</sup>							4 cables 1 x ....mm <sup>2</sup>							
	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150		
cables max m															
2	164	272													
4	82	136	218												
6	55	91	145	218											
8	41	68	109	164	267										
10	33	54	87	131	213										
12	27	45	73	109	178										
14	23	39	62	94	152	239									
16	20	34	55	82	133	209									
18		30	48	73	118	186									
20		27	44	65	107	167	257								
25			35	52	85	134	206								
30			29	44	71	111	171	233							
35				37	61	95	147	200							
40				33	53	83	129	175	227						
45					47	74	114	155	202						
50					43	67	103	140	181	249					
60						56	86	116	151	207					
70						48	73	100	130	178	230				
80							64	87	113	155	201	241			
90							57	78	101	138	179	214			
100							51	70	91	124	161	193	224		
110								64	82	113	146	175	203		
120								58	76	104	134	161	186		
130									70	96	124	148	172		
140									65	89	115	138	160		
150									60	83	107	128	149		
160									57	78	101	120	140		
170									53	73	95	113	132		
180									50	69	89	107	124		
190									48	65	85	101	118		
200									45	62	81	96	112		
220										57	73	88	102		
240										52	67	80	93		
260											62	74	86		
280											58	69	80		
300											54	64	75		

IN A	400 Volt - 50 Hz - 3 ~																	
	1 four-wires cable 4 x ....mm <sup>2</sup>									4 cables 1 x ....mm <sup>2</sup>								
	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150	185	240			
cables max m																		
2	285	473																
4	143	236	379															
6	95	158	253															
8	71	118	190	285														
10	57	95	152	228														
12	48	79	126	190	309													
14	41	68	108	163	265													
16	36	59	95	142	232													
18		53	84	127	206	323												
20		47	76	114	185	290												
25			61	91	148	232	358											
30			51	76	124	194	298											
35				65	106	166	256	347										
40				57	93	145	224	304										
45					82	129	199	270										
50					74	116	179	243	316									
60						97	149	203	263									
70						83	128	174	225	309								
80							112	152	197	270								
90							99	135	175	240	311							
100							89	122	158	216	280							
110								110	143	197	255	305						
120									101	132	180	233	279					
130										121	166	216	258	299				
140										113	155	200	239	278				
150										105	144	187	223	259	302			
160										99	135	175	209	243	283			
170										93	127	165	197	229	267			
180										88	120	156	186	216	252	297		
190										83	114	147	176	205	239	281		
200										79	108	140	168	195	227	267		
220											98	127	152	177	206	243		
240											90	117	140	162	189	223		
260												108	129	150	174	206		
280												100	120	139	162	191		
300												93	112	130	151	178		

### Maximum length of electric cables

#### Star-delta starting

IN A	230 Volt - 50 Hz - 3 ~ Y/Δ													
	2 four-wires cables 4 G ....mm <sup>2</sup>							7 cables 1 x ....mm <sup>2</sup>						
	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150	
cables max m														
30	19	31	50	76	123	193								
35		27	43	65	105	165								
40		24	38	57	92	144								
45		21	34	50	82	128	198							
50			30	45	74	116	178							
60				38	62	96	148	201						
70				32	53	83	127	173	224					
80					46	72	111	151	196					
90					41	64	99	134	174					
100						58	89	121	157	215				
110						53	81	110	143	196				
120						48	74	101	131	179				
130						44	68	93	121	166	214			
140							64	86	112	154	199			
150							59	81	105	143	186			
160							56	76	98	134	174	208		
170							52	71	92	127	164	196		
180								67	87	120	155	185		
190								64	83	113	147	175	204	
200									78	108	139	167	194	
220										98	127	152	176	
240										90	116	139	161	
260										83	107	128	149	
280										77	100	119	138	
300										72	93	111	129	

IN A	400 Volt - 50 Hz - 3 ~ Y/Δ													
	2 four-wires cables 4 G ....mm <sup>2</sup>							7 cables 1 x ....mm <sup>2</sup>						
	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150	
cables max m														
30	33	55	88	131	214	335								
35		47	75	113	183	287								
40		41	66	99	160	251								
45			58	88	143	223	344							
50			53	79	128	201	310							
60				66	107	167	258	350						
70				56	92	144	221	300						
80					80	126	193	263	341					
90					71	112	172	234	303					
100					64	100	155	210	273	374				
110					58	91	141	191	248	340				
120						84	129	175	228	312				
130						77	119	162	210	288	373			
140							111	150	195	267	346			
150							103	140	182	249	323			
160							97	131	171	234	303	362		
170								124	161	220	285	341		
180								117	152	208	269	322		
190								111	144	197	255	305	354	
200									137	187	242	290	337	
220										170	220	264	306	
240										156	202	242	280	
260											186	223	259	
280											173	207	240	
300											162	193	224	

- 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 grops 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 <sup>2</sup>	Maximum cable current		Resistance R at 80°C ohm/km <sup>4)</sup>	Reactance X at 50Hz ohm/km <sup>4)</sup>	
		1 Ader A <sup>1)</sup>	2 Ader A <sup>2)</sup>			
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

<sup>1)</sup> IEC 60364-5-52:2009 Tab.B52.4 / C

<sup>2)</sup> IEC 60364-5-52:2009 Tab.B52.6

<sup>3)</sup> 1)x0,85 IEC 60364-5-52:2009 Tab.B52.17 ITEM2

<sup>4)</sup> UNEL 35023-70

\* Up to 35 mm<sup>2</sup> sections four-wire cable are used, from 50 mm<sup>2</sup> 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 (IEC 60364-5-52:2009 Tab.B.52.14)

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)

$$\sin \varphi = \sqrt{1 - (\cos \varphi)^2}$$

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 (CEI 64-8:2007 Tab.54F)

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



### Electric control panels

#### M COMP Control panel for 1 single-phase submersible pump




Type	Protector max A	Capacitor 450Vc	Motor 230V - 1~ kW	Dimensions HxBxP mm
M COMP 4-16	4,5	16 µF	0,37	220x210x110
M COMP 4-20	4,5	20 µF	0,55	220x210x110
M COMP 5-20	5	20 µF	0,55	220x210x110
M COMP 5-25	5	25 µF	0,55	220x210x110
M COMP 6-20	6	20 µF	0,75	220x210x110
M COMP 6-35	6	35 µF	0,9	220x210x110
M COMP 7-25	7	25 µF	0,9	220x210x110
M COMP 7-30	7	30 µF	0,9	220x210x110
M COMP 8-25	8	25 µF	1,1	220x210x110
M COMP 8-30	8	30 µF	1,1	220x210x110
M COMP 10-35	10	35 µF	1,1	220x210x110
M COMP 10-40	10	40 µF	1,1	220x210x110
M COMP 12-35	12	35 µF	1,5	220x210x110
M COMP 12-50	12	50 µF	1,5	220x210x110
M COMP 12-60	12	60 µF	1,5	220x210x110
M COMP 16-70	16	70 µF	2,2	220x210x110

#### Construction

Control panel with ON-OFF switch and capacitor for 1 submersible pump with single-phase motor. Suitable for use with LVBT board for level control.

Protection is provided by means of a main bipolar switch with a phase protected against overload by means of a thermal element.

#### PFC-M Control panel for 1 submersible pump with single-phase motor, PF control



Type	Setting A	Capacitor 450Vc	Motor 50/60Hz 220V-240V - 1~ kW	Dimensions HxBxP mm
PFC-M 18-16	1 - 18	16 µF	0,37	220x210x110
PFC-M 18-20	1 - 18	20 µF	0,55	220x210x110
PFC-M 18-25	1 - 18	25 µF	0,55	220x210x110
PFC-M 18-30	1 - 18	30 µF	0,75	220x210x110
PFC-M 18-35	1 - 18	35 µF	0,75	220x210x110
PFC-M 18-40	1 - 18	40 µF	1,1	220x210x110
PFC-M 18-50	1 - 18	50 µF	1,5	220x210x110
PFC-M 18-60	1 - 18	60 µF	1,5	220x210x110
PFC-M 18-70	1 - 18	70 µF	2,2	220x210x110

#### Construction

Control panel for controlling one submersible pump with single-phase motor.


Electronic control of the operation and dry-running protection through the power factor (PF) control.

The installation of level probes into the well is not required.

It stops the pump in case of lack of air cushion in the pressure vessel (patented system).

Displayed operating data and alarms available in four languages.

#### QML/A 1 D Control panel for 1 pump with single-phase motor, direct starting



Type	Motor 230V - 1~ kW	Setting A	Dimensions HxBxP mm
QML/A 1 D 12A-FA	0,25 - 1,5	1 - 12	250x205x105
QML/A 1 D 12A-FA 20	0,25 - 1,5	1 - 12	250x205x105
QML/A 1 D 12A-FA 25	0,25 - 1,5	1 - 12	250x205x105
QML/A 1 D 3 FT	2,2 - 3	13 - 18	400x300x160


#### Construction

Control panel for 1 pump with single-phase motor, direct starting for pressure booster sets, with a patented working time-measuring system that stops the pump in case of lack of air cushion in the pressure vessel.

Arranged for the capacitor internal connection (for pumps without built-in capacitor).

Pump operation controlled by an electronic board type MPS 3000 with microprocessor which allows three different modes of operation of the pump: standard, emergency and timed.

#### T COMP Control panel for 1 submersible pump with three-phase motor



Type	Protector A	Motor 230V - 3~ kW	Motor 400V - 3~ kW	Dimensions HxBxP HxBxP mm
T COMP 8	1 ÷ 8	0,37 ÷ 1,5	0,5 ÷ 2,2	170x145x85
T COMP 10	7 ÷ 10	---	3 ÷ 3,7	230x180x155
T COMP 12	9 ÷ 12	2,2	4	230x180x155
T COMP 16	11 ÷ 16	3	5,5	230x180x155
T COMP 20	14 ÷ 20	3,7 - 4	7,5	230x180x155

#### Construction

Control panel and protection for 1 submersible pump with three-phase motor.

Arranged for the LVBT level control internal connection against dry running (T COMP8 model has the level control as a standard).

Control pumps with pressure switch and float-type switch.

## Electric control panels

### PFC-T Control panel for 1 submersible pump with three-phase motor, PF control



Type	Motor 400V - 3~ kW	Setting A	Dimensions HxBxP mm
PFC-T 16/A	0,37 - 5,5	1 - 16	250x205x105

#### Construction

Control panel for controlling 1 submersible pump with three-phase motor. Electronic control of the operation and dry-running protection through the power factor (PF) control.

The installation of level probes into the well is not required.

It stops the pump in case of lack of air cushion in the pressure vessel (patented system) Displayed operating data and alarms, available in four languages.

### QTL/A 1 D Control panel for 1 pump with three-phase motor, direct starting



Type	Motor 400V - 3~ kW	Setting A	Dimensions HxBxP mm
QTL/A 1 D 12A-FA	0,25 - 5,5	1 - 12	250x205x105
QTL/A 1 D 7,5 FT	7,5	13 - 18	400x300x160
QTL/A 1 D 9,2 FT	9,2	17 - 23	400x300x160
QTL/A 1 D 11 FT	11	20 - 25	400x300x160

#### Construction

Control panel for 1 pump with three-phase motor, direct starting for pressure booster sets, with a patented working time-measuring system that stops the pump in case of lack of air cushion in the pressure vessel.

Pump operation controlled by an electronic card type MPS 3000 with microprocessor which allows three different modes of operation of the pump: standard, emergency and timed.

Dry-running protection with float switch.

### QTL 1 D FTE Control panel for 1 pump with three-phase motor, direct starting



Type	Motor 400V - 3~ kW	Setting A	Dimensions HxBxP mm
QTL 1 D 4 FTE	4	6,3 - 10	400x300x160
QTL 1 D 5,5 FTE	5,5	9 - 12	400x300x160
QTL 1 D 7,5 FTE	7,5	13 - 18	400x300x160
QTL 1 D 9,2 FTE	9,2	17 - 23	400x300x160
QTL 1 D 11 FTE	11	20 - 25	400x300x160
QTL 1 D 15 FTE	15	24 - 32	500x350x200
QTL 1 D 18,5 FTE	18,5	32 - 38	500x350x200
QTL 1 D 22 FTE	22	35 - 50	500x350x200
QTL 1 D 30 FTE	30	46 - 65	500x350x200

#### Construction

Electromechanical control panel for 1 pump with three-phase motor, direct starting.

Operating signals by E 1000 led card.

Dry-running protection with float switch.

Construction with SRLE level control for probes connection against dry-running on request .

### QTL/A 1 ST FT Control panel for 1 pump with three-phase motor, Y/Δ starting



Type	Motor Power kW	400V - 3~ Current A	Dimensions HxBxP mm
QTL/A 1 ST 5,5 FT	5,5	11 - 15	600x400x200
QTL/A 1 ST 7,5 FT	7,5	12 - 17	600x400x200
QTL/A 1 ST 11 FT	9,2 - 11	16 - 24	600x400x200
QTL/A 1 ST 15 FT	15	23 - 31	600x400x200
QTL/A 1 ST 18,5 FT	18,5	30 - 39	600x400x200
QTL/A 1 ST 22 FT	22	35 - 43	700x500x200
QTL/A 1 ST 30B FT	30	42 - 55	700x500x200
QTL/A 1 ST 30A FT	30	55 - 65	700x500x200
QTL/A 1 ST 37 FT	37	61 - 84	800x600x250
QTL/A 1 ST 45 FT	45	80 - 105	800x600x250

#### Construction


Control panel for 1 pump with three-phase motor, Y/Δ starting for pressure booster sets, with a patented working time-measuring system that stops the pump in case of lack of air cushion in the pressure vessel.

Pump operation controlled by an electronic card type MPS 3000 with microprocessor with different pump operating modes.

Dry-running protection with float switch or level control probes.

### Electric control panels

#### QTL 1 ST FTE Control panel for 1 pump with three-phase motor, Y/Δ starting




Type	Motor 400V - 3~		Dimensions HxBxP mm
	Power kW	Current A	
QTL 1 ST 5,5 FTE	5,5	11 - 15	500x350x200
QTL 1 ST 7,5 FTE	7,5	12 - 17	500x350x200
QTL 1 ST 11 FTE	9,2 - 11	16 - 24	500x350x200
QTL 1 ST 15 FTE	15	23 - 31	500x350x200
QTL 1 ST 18,5 FTE	18,5	30 - 39	500x350x200
QTL 1 ST 22 FTE	22	35 - 43	600x400x200
QTL 1 ST 30B FTE	30	42 - 55	600x400x200
QTL 1 ST 30A FTE	30	55 - 65	600x400x200
QTL 1 ST 37 FTE	37	61 - 84	700x500x200
QTL 1 ST 45 FTE	45	80 - 105	700x500x200
QTL 1 ST 55 FTE	55	100 - 125	700x500x200
QTL 1 ST 75 FTE	75	120 - 160	800x600x250
QTL 1 ST 92 FTE	92	140 - 198	800x600x250
QTL 1 ST 110 FTE	110	180 - 250	800x600x250

#### Construction

Electromechanical control panel for 1 pump with three-phase motor, Y/Δ starting.  
 Operating signals by E 1000 led board.  
 Dry-running protection with float switch.  
 Construction with SRLE level control for probes connection against dry-running on request .

#### QTL 1 SS E Control panel for 1 pump with three-phase motor, start/stop with soft starter




Type	Motor 400V - 3~ kW	Max current output max A	Dimensions HxBxP mm
QTL 1 SS 15 E	9,2 - 11 - 15	30	700x500x250
QTL 1 SS 22 E	18,5 - 22	45	700x500x250
QTL 1 SS 30 E	26 - 30	60	900x600x300
QTL 1 SS 37 E	37	75	900x600x300
QTL 1 SS 45 E	45	85	900x600x300
QTL 1 SS 55 E	55	110	900x600x300
QTL 1 SS 63 E	63	125	1100x700x300
QTL 1 SS 75 E	75	142	1100x700x300
QTL 1 SS 90 E	90	190	1200x800x400
QTL 1 SS 132 E	110 - 132	245	1200x800x400

#### Construction

Control panel for 1 pump with three-phase motor, start/stop with soft starter.  
 Operating signals on E 1000 led board.  
 Application: control of submersible motor with great cable length and surface motors.  
 Dry-running protection with float switch.  
 Construction with SRLE level control for probes connection against dry-running on request .

#### QTL 1 IS FTE Control panel for 1 pump with three-phase motor, with Stator Impedance starter




Type	Motor 400V - 3~		Dimensions HxBxP mm
	Power kW	Current A	
QTL 1 IS 5,5 FTE-2RL	5,5	11 - 15	
QTL 1 IS 7,5 FTE-2RL	7,5	12 - 17	
QTL 1 IS 11 FTE-2RL	9,2 - 11	16 - 24	
QTL 1 IS 15 FTE-2RL	15	23 - 31	
QTL 1 IS 18,5 FTE-2RL	18,5	30 - 39	
QTL 1 IS 22 FTE-2RL	22	35 - 43	
QTL 1 IS 30 FTE-2RL	30	42 - 65	
QTL 1 IS 37 FTE-2RL	37	61 - 84	
QTL 1 IS 45 FTE-2RL	45	80 - 105	
QTL 1 IS 55 FTE-2RL	55	100 - 125	
QTL 1 IS 75 FTE-2RL	75	120 - 160	
QTL 1 IS 92 FTE-2RL	92	140 - 198	
QTL 1 IS 110 FTE-2RL	110	180 - 250	

#### Construction

Electromechanical control panel for 1 submersible pump with three-phase motor, with Stator Impedance starter.  
 Operating signals on led board type E 1000.  
 Application : submersible motors control with great cable length.  
 Construction with SRLE level control for probes connection against dry-running .

## Electric control panels

### QML 1 VFT Control panel for 1 pump with variable speed three-phase motor

	Type	Motor 230V - 3~ kW	Max current output max A	Dimensions HxBxP mm
	QML 1 VFT 0,4	0,37 - 0,45	2,4	500x350x200
	QML 1 VFT 0,75	0,55 - 0,75	4,2	500x350x200
	QML 1 VFT 1,5	1,1 - 1,5	7,5	500x350x200
	QML 1 VFT 2,2	2,2	10	500x350x200


#### Construction

**Single-phase mains supply** control panel with frequency converter for 1 pump with three-phase variable speed motor, for constant pressure booster sets.

Arranged for SRL 3 level control application for probes connection against dry-running.

Pump operation controlled by an electronic board type MPS 4000 with microprocessor.

### QTL 1 VFT Control panel for 1 pump with variable speed three-phase motor

	Type	Motor 400V - 3~ kW	Max current output max A	Dimensions HxBxP mm
	QTL 1 VFT 0,4	0,4	1,5	500x350x200
	QTL 1 VFT 0,75	0,55 - 0,75	2,3	500x350x200
	QTL 1 VFT 1,5	1,1 - 1,5	4,1	500x350x200
	QTL 1 VFT 2,2	2,2	5,5	500x350x200
	QTL 1 VFT 4	3 - 4	9,5	500x350x200
	QTL 1 VFT 5,5	5,5	14,3	600x400x250
	QTL 1 VFT 7,5	7,5	17	600x400x250
	QTL 1 VFT 11	9,2 - 11	27,7	700x500x250
	QTL 1 VFT 15	15	33	700x500x250
	QTL 1 VFT 18,5	18,5	46,3	800x600x250
	QTL 1 VFT 22	22	61,5	800x600x250
	QTL 1 VFT 30	30	74,5	900x600x250
	QTL 1 VFT 37	37	88	1100x700x300
	QTL 1 VFT 45	45	106	1200x800x300
QTL 1 VFT 55	55	145	1200x800x300	
QTL 1 VFT 75	75	173	1200x800x300	

#### Construction

Control panel with frequency converter for 1 pump with three-phase variable speed motor, for constant pressure booster sets.

Arranged for SRL 3 level control application for probes connection against dry-running.

Pump operation controlled by an electronic board type MPS 4000 with microprocessor.