



**EBARA**

**WINNER 4N**  
**4" BOREHOLE CENTRIFUGAL ELECTRIC PUMPS**

**50 Hz**





# WINNER 4N

## 4" BOREHOLE CENTRIFUGAL ELECTRIC PUMPS

in AISI 304



4" borehole centrifugal electric pumps in AISI 304 with front wear ring and floating impeller.

### APPLICATIONS

- Moving clear water in wells
- Pressure boosting of clean water for agricultural, domestic or industrial use
- Irrigation
- Moving water in general

### TECHNICAL DETAILS

- Front wear ring and floating impellers allow high resistance against abrasion
- Easy to install
- Vertical or horizontal installation

### PUMP TECHNICAL DATA

- Maximum temperature of the liquid: 40°C (depends on maximum motor temperature)
  - Maximum presence of sand: 50 ppm
  - Maximum chlorine ion density: 500 ppm
  - Discharge connection:
    - G1¼ for 4N1 - 4N2 - 4N4 models
    - G2 for 4N7 - 4N10 - 4N15 models
  - MEI > 0,4
- For further information please see our Data Book on the web site [www.ebaraeurope.com](http://www.ebaraeurope.com)

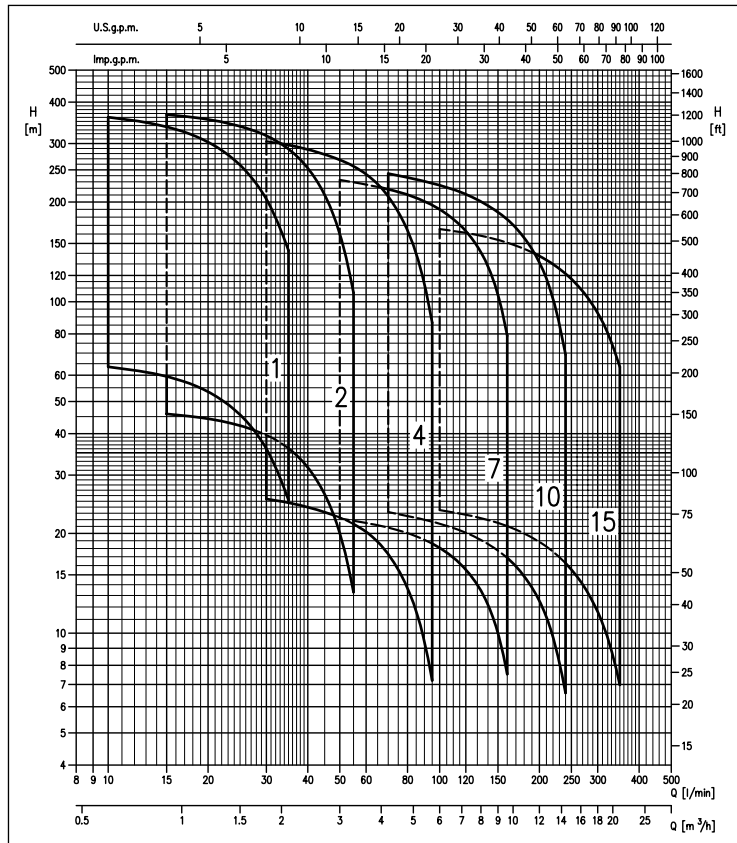
### MOTOR TECHNICAL DATA

- 2 poles oil filled motor (OY) or water filled motor (WY)
- Max start-ups per hour: 30 (OY) - 20 (WY)
- Insulation class: F (OY) - B (WY)
- Protection degree: IP58 (OY) - IP68 (WY)
- 230V (±10%) 50Hz (OYM) single phase voltage, 380-415V (±10%) 50Hz (OY) three phase voltage
- 230V (-10%+6%) 50Hz (WYM) single phase voltage, 380-415V (-10%+6%) 50Hz (WY) three phase voltage
- For cables dimensioning please on the web site [www.ebaraeurope.com](http://www.ebaraeurope.com)

### MATERIALS

- External casing, shaft and valve in EN 1.4301 (AISI 304)
- Discharge in EN 1.4308 (ASTM CF8)
- Impeller in: - Ixef® for 4N1 - 4N2 - 4N4 - 4N7 models  
- Glass fibre reinforced PC 4N10, 4N15 models
- Diffuser in PPE+PS reinforced with fibreglass

### PERFORMANCE RANGE (according to ISO 9906 Attachment A)

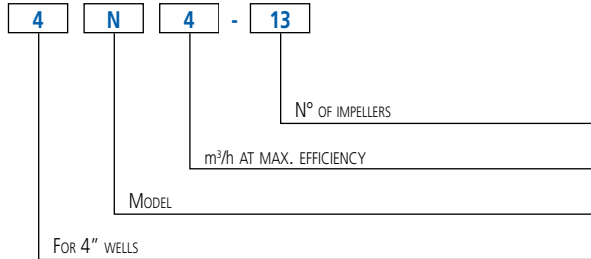




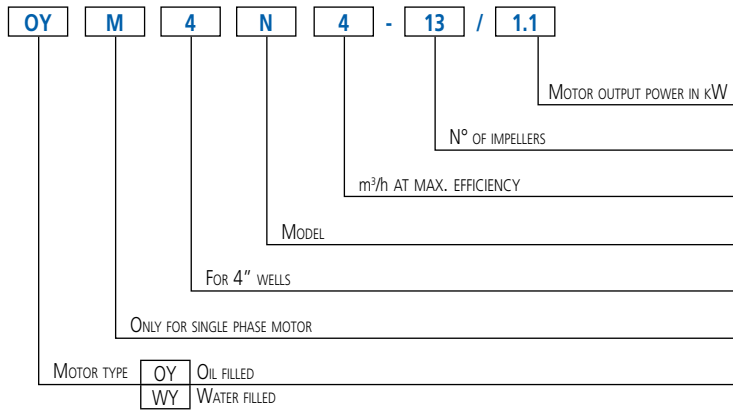
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## 4" BOREHOLE CENTRIFUGAL ELECTRIC PUMPS in AISI 304

### IDENTIFICATION CODE - pump without motor



### IDENTIFICATION CODE - pump with motor



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# WINNER 4N

## 4" BOREHOLE CENTRIFUGAL ELECTRIC PUMPS

in AISI 304

### PERFORMANCE TABLES

Model	P <sub>2</sub>		Q=Flow rate										
	[HP]	[kW]	l/min	10	15	20	25	30	35	45	55	75	95
			m <sup>3</sup> /h	0,6	0,9	1,2	1,5	1,8	2,1	2,7	3,3	4,5	5,7
			H=Head [m]										
WINNER 4N1- 12	0,5	0,37	-	63,5	59,5	53,5	45,5	36,0	25,2	-	-	-	-
WINNER 4N1- 18	0,7	0,55	-	95,5	89,5	80,5	68,5	54,0	37,8	-	-	-	-
WINNER 4N1- 24	1	0,75	-	127,0	119,0	107,0	91,0	72,0	50,5	-	-	-	-
WINNER 4N1- 34	1,5	1,1	-	180,0	169,0	152,0	129,0	102,0	71,5	-	-	-	-
WINNER 4N1- 48	2	1,5	-	254,0	238,0	214,0	182,0	144,0	101,0	-	-	-	-
WINNER 4N1- 68	3	2,2	-	360,0	337,0	303,0	258,0	204,0	142,0	-	-	-	-
WINNER 4N2- 7	0,5	0,37	-	-	46,0	44,5	42,5	39,6	36,1	26,2	13,3	-	-
WINNER 4N2- 10	0,7	0,55	-	-	65,5	63,5	60,5	56,5	51,5	37,5	19	-	-
WINNER 4N2- 14	1	0,75	-	-	91,5	89,0	84,5	79,0	72,0	52,5	26,6	-	-
WINNER 4N2- 20	1,5	1,1	-	-	131,0	127,0	121,0	113,0	103,0	75,0	38	-	-
WINNER 4N2- 28	2	1,5	-	-	183,0	178,0	169,0	158,0	144,0	105,0	53	-	-
WINNER 4N2- 40	3	2,2	-	-	262,0	254,0	242,0	226,0	206,0	150,0	76	-	-
WINNER 4N2- 56	4	3	-	-	367,0	355,0	338,0	317,0	289,0	210,0	106	-	-
WINNER 4N4- 4	0,5	0,37	-	-	-	-	-	25,4	24,8	23,2	21,4	15,5	7,2
WINNER 4N4- 7	0,7	0,55	-	-	-	-	-	44,45	43,33	40,6	37,38	27,23	12,6
WINNER 4N4- 9	1	0,75	-	-	-	-	-	57,0	55,5	52,0	48,0	35,0	16,2
WINNER 4N4- 13	1,5	1,1	-	-	-	-	-	82,5	80,5	75,5	69,5	50,5	23,4
WINNER 4N4- 18	2	1,5	-	-	-	-	-	114,0	111,0	104,0	96,0	70,0	32,4
WINNER 4N4- 27	3	2,2	-	-	-	-	-	171,0	167,0	157,0	144,0	105,0	48,5
WINNER 4N4- 36	4	3	-	-	-	-	-	229,0	223,0	209,0	192,0	140,0	65,0
WINNER 4N4- 48	5,5	4	-	-	-	-	-	305,0	297,0	278,0	256,0	187,0	86,5

Model	P <sub>2</sub>		Q=Flow rate										
	[HP]	[kW]	l/min	50	70	100	130	160	200	240	280	320	350
			m <sup>3</sup> /h	3	4,2	6	7,8	9,6	12	14,4	16,8	19,2	21
			H=Head [m]										
WINNER 4N7- 4	0,7	0,55	-	22,2	20,8	18,1	14	7,5	-	-	-	-	-
WINNER 4N7- 6	1	0,75	-	33,3	31,2	27,1	21	11,3	-	-	-	-	-
WINNER 4N7- 8	1,5	1,1	-	44,5	41,5	36,2	28	15	-	-	-	-	-
WINNER 4N7- 12	2	1,5	-	66,5	62,5	54,5	42	22,6	-	-	-	-	-
WINNER 4N7- 17	3	2,2	-	94,5	88,5	77	59,5	32	-	-	-	-	-
WINNER 4N7- 23	4	3	-	128	120	104	80,5	43,5	-	-	-	-	-
WINNER 4N7- 30	5,5	4	-	166	156	136	105	56,5	-	-	-	-	-
WINNER 4N7- 42	7,5	5,5	-	233	219	190	147	79	-	-	-	-	-
WINNER 4N10- 4	1	0,75	-	-	23,1	21,2	18,8	16	11,5	6,2	-	-	-
WINNER 4N10- 6	1,5	1,1	-	-	34,6	31,8	28,2	24	17,3	9,4	-	-	-
WINNER 4N10- 8	2	1,5	-	-	46,2	42,5	37,7	32	23,1	12,5	-	-	-
WINNER 4N10- 13	3	2,2	-	-	75	69	61	52	37,5	20,3	-	-	-
WINNER 4N10- 17	4	3	-	-	98	90	80	68	49	26,5	-	-	-
WINNER 4N10- 23	5,5	4	-	-	133	122	108	92	66,5	35,8	-	-	-
WINNER 4N10- 32	7,5	5,5	-	-	185	170	151	128	92	50	-	-	-
WINNER 4N10- 44	10	7,5	-	-	254	233	207	176	127	68,5	-	-	-
WINNER 4N15- 4	1,5	1,1	-	-	-	23,5	22,4	21	18,9	16,3	13,3	9,8	7
WINNER 4N15- 6	2	1,5	-	-	-	35,3	33,6	31,5	28,3	24,4	19,9	14,7	10,5
WINNER 4N15- 8	3	2,2	-	-	-	47	45	42	37,7	32,5	26,5	19,6	14
WINNER 4N15- 11	4	3	-	-	-	67,5	65	61,5	56	49,5	41,9	33,2	25,9
WINNER 4N15- 14	5,5	4	-	-	-	86	82,5	78	71,5	63	53,5	42	33
WINNER 4N15- 20	7,5	5,5	-	-	-	123	118	112	102	90	76	60,5	47
WINNER 4N15- 27	10	7,5	-	-	-	166	159	151	137	121	103	81,5	63,5

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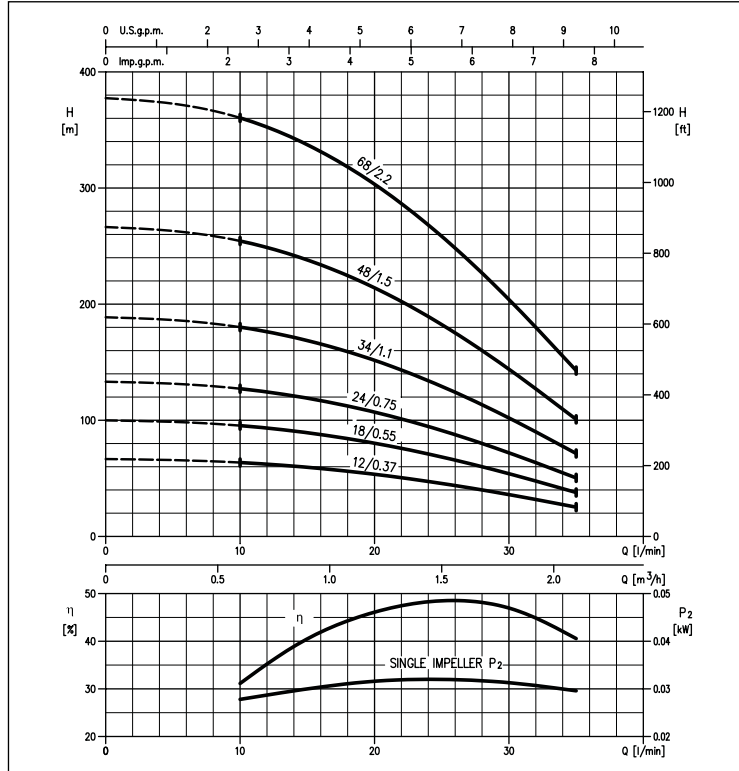
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in AISI 304

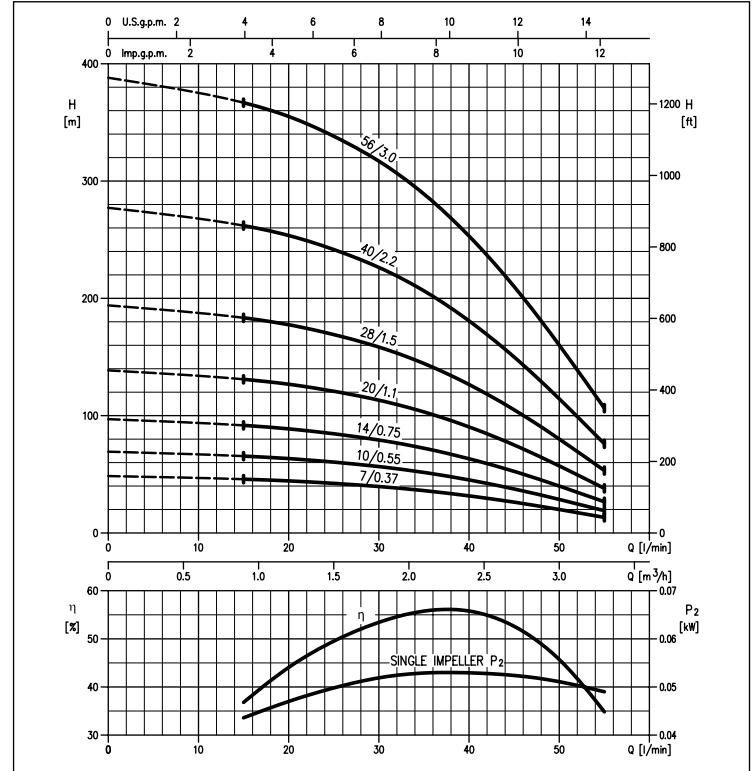
### PERFORMANCE CURVES WINNER 4N1

(according to ISO 9906 Attachment A) - impeller diameter: 67,6 mm



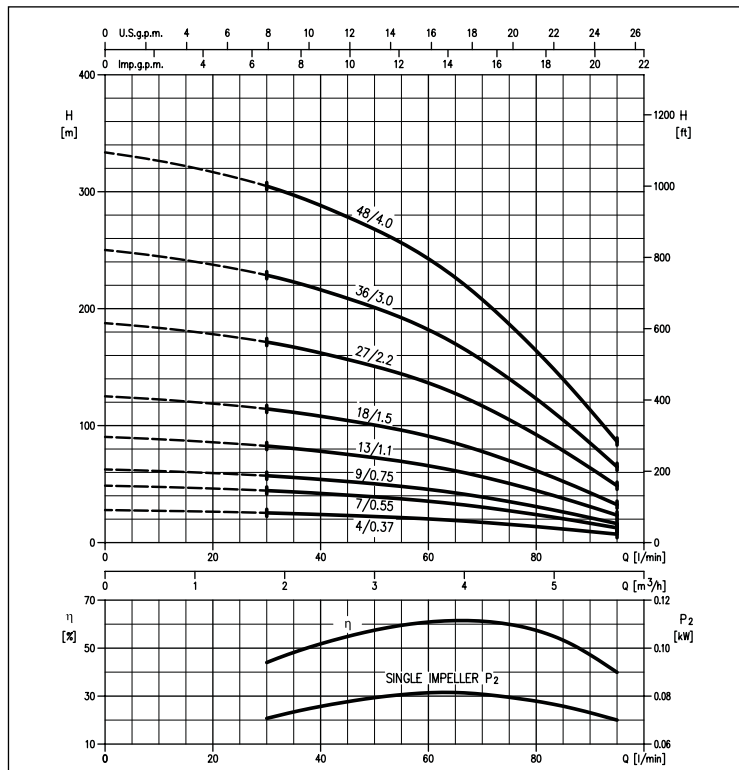
### PERFORMANCE CURVES WINNER 4N2

(according to ISO 9906 Attachment A) - impeller diameter: 76 mm



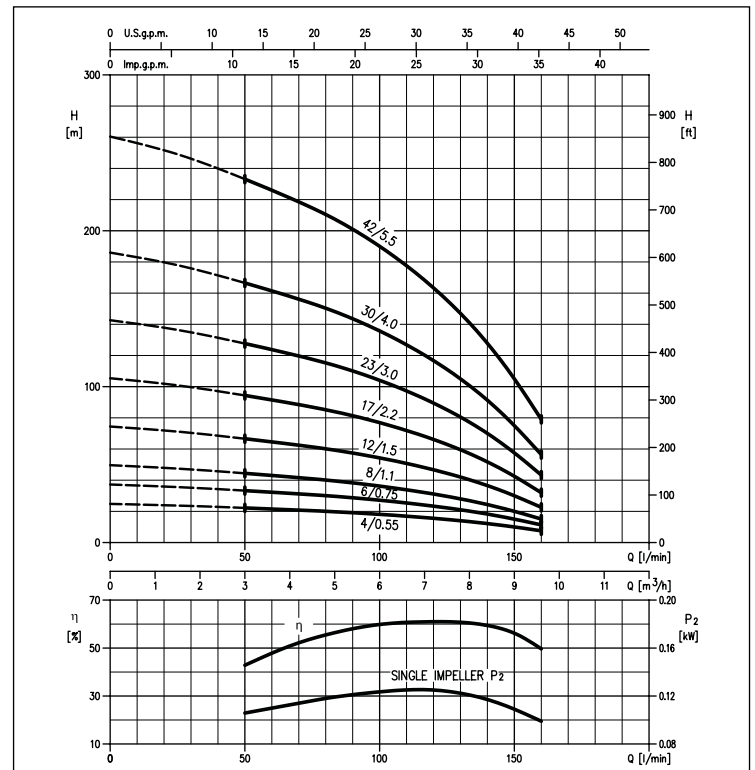
### PERFORMANCE CURVES WINNER 4N4

(according to ISO 9906 Attachment A) - impeller diameter: 76 mm



### PERFORMANCE CURVES WINNER 4N7

(according to ISO 9906 Attachment A) - impeller diameter: 74,2 mm



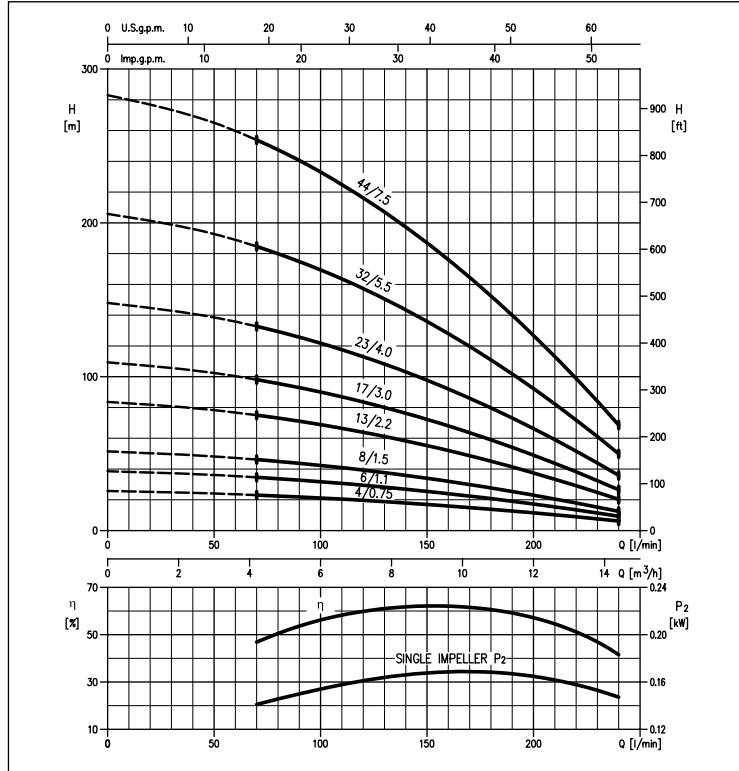
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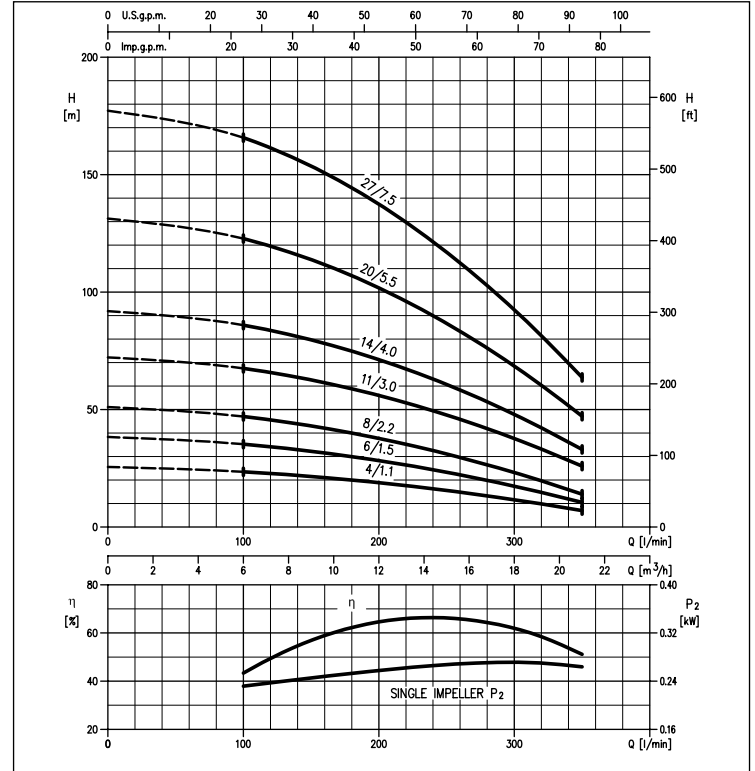
### PERFORMANCE CURVES WINNER 4N10

(according to ISO 9906 Attachment A) - impeller diameter: 76.4 mm

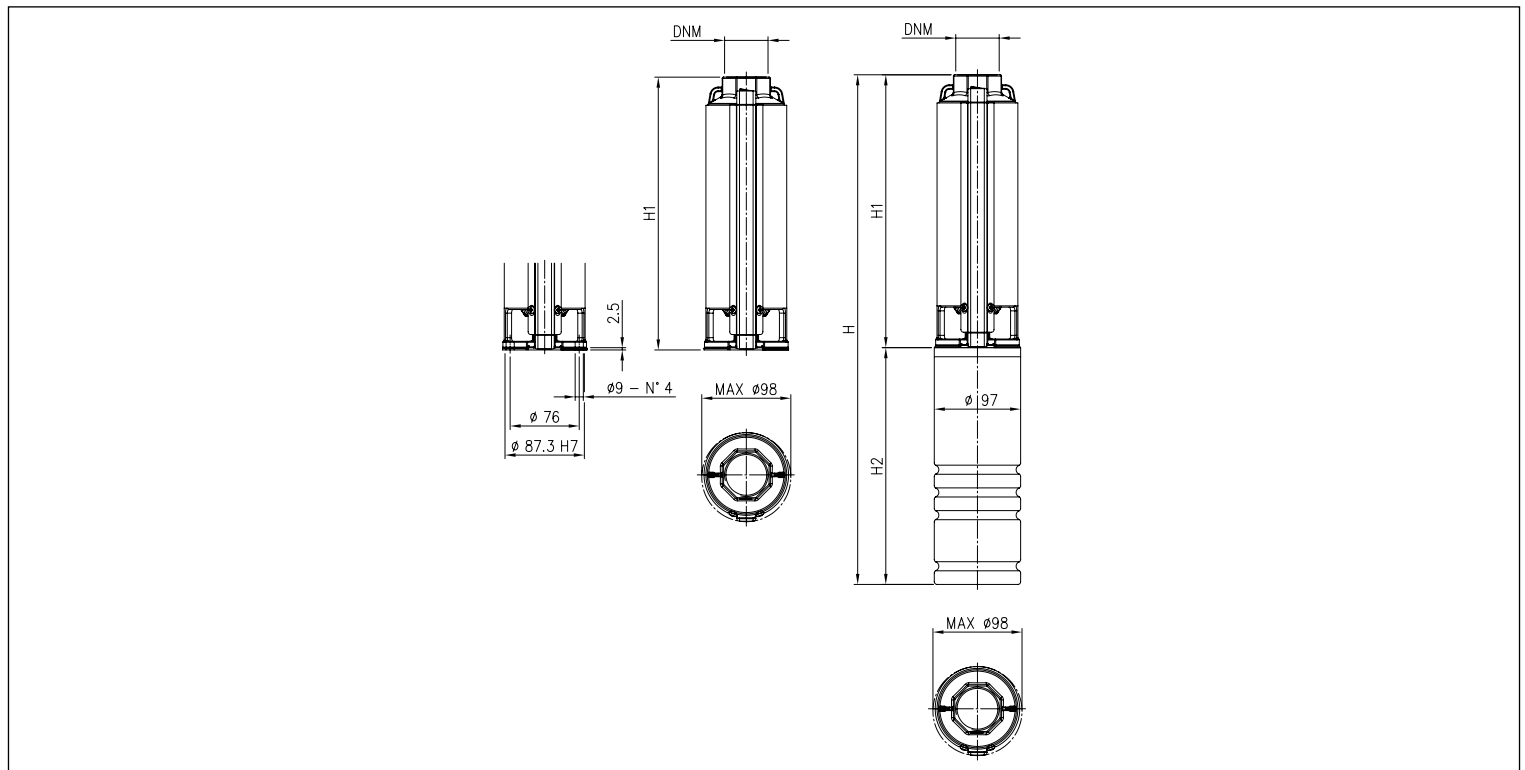


### PERFORMANCE CURVES WINNER 4N15

(according to ISO 9906 Attachment A) - impeller diameter: 78 mm



### DIMENSIONS



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## 4" BOREHOLE CENTRIFUGAL ELECTRIC PUMPS

in AISI 304

### DIMENSIONAL TABLE

Model	P <sub>2</sub>		Pump without motor		Pump with oil filled motor				Pump with water filled motor			
	[HP]	[kW]	H1 [mm]	DNM	single phase		three phase		single phase		three phase	
					H2 [mm]	H [mm]	H2 [mm]	H [mm]	H2 [mm]	H [mm]	H2 [mm]	H [mm]
WINNER 4N1- 12	0,37	0,5	353	G 1 ¼	325	678	304	657	228	581	214	567
WINNER 4N1- 18	0,55	0,75	458	G 1 ¼	325	783	325	783	253	711	228	686
WINNER 4N1- 24	0,75	1	563	G 1 ¼	350	913	325	888	283	846	248	811
WINNER 4N1- 34	1,1	1,5	738	G 1 ¼	385	1123	350	1088	307	1045	283	1021
WINNER 4N1- 48	1,5	2	1049	G 1 ¼	420	1469	385	1434	339	1388	307	1356
WINNER 4N1- 68	2,2	3	1399	G 1 ¼	470	1869	420	1819	437	1836	339	1738
WINNER 4N2- 7	0,37	0,5	265	G 1 ¼	325	590	304	569	228	493	214	479
WINNER 4N2- 10	0,55	0,75	318	G 1 ¼	325	643	325	643	253	571	228	546
WINNER 4N2- 14	0,75	1	388	G 1 ¼	350	738	325	713	283	671	248	636
WINNER 4N2- 20	1,1	1,5	493	G 1 ¼	385	878	350	843	307	800	283	776
WINNER 4N2- 28	1,5	2	633	G 1 ¼	420	1053	385	1018	339	972	307	940
WINNER 4N2- 40	2,2	3	909	G 1 ¼	470	1379	420	1329	437	1346	339	1248
WINNER 4N2- 56	3	4	1189	G 1 ¼	-	-	544	1733	-	-	394	1583
WINNER 4N4- 4	0,37	0,5	229	G 1 ¼	325	554	304	533	228	457	214	443
WINNER 4N4- 7	0,55	0,75	293	G 1 ¼	325	618	325	618	253	546	228	521
WINNER 4N4- 9	0,75	1	336	G 1 ¼	350	686	325	661	283	619	248	584
WINNER 4N4- 13	1,1	1,5	422	G 1 ¼	385	807	350	772	307	729	283	705
WINNER 4N4- 18	1,5	2	530	G 1 ¼	420	950	385	915	339	869	307	837
WINNER 4N4- 27	2,2	3	723	G 1 ¼	470	1193	420	1143	437	1160	339	1062
WINNER 4N4- 36	3	4	983	G 1 ¼	-	-	544	1527	-	-	394	1377
WINNER 4N4- 48	4	5,5	1241	G 1 ¼	-	-	574	1815	-	-	543	1784
WINNER 4N7- 4	0,55	0,75	285	G 2	325	610	325	610	253	538	228	513
WINNER 4N7- 6	0,75	1	356	G 2	350	706	325	681	283	639	248	604
WINNER 4N7- 8	1,1	1,5	427	G 2	385	812	350	777	307	734	283	710
WINNER 4N7- 12	1,5	2	569	G 2	420	989	385	954	339	908	307	876
WINNER 4N7- 17	2,2	3	746	G 2	470	1216	420	1166	437	1183	339	1085
WINNER 4N7- 23	3	4	959	G 2	-	-	544	1503	-	-	477	1436
WINNER 4N7- 30	4	5,5	1274	G 2	-	-	574	1848	-	-	543	1817
WINNER 4N7- 42	5,5	7,5	1700	G 2	-	-	644	2344	-	-	653	2353
WINNER 4N10- 4	0,75	1	325	G 2	350	675	325	650	283	608	248	573
WINNER 4N10- 6	1,1	1,5	412	G 2	385	797	350	762	307	719	283	695
WINNER 4N10- 8	1,5	2	500	G 2	420	920	385	885	339	839	307	807
WINNER 4N10- 12	2,2	3	722	G 2	470	1192	420	1142	437	1159	339	1060
WINNER 4N10- 17	3	4	900	G 2	-	-	544	1444	-	-	477	1377
WINNER 4N10- 23	4	5,5	1165	G 2	-	-	574	1739	-	-	543	1708
WINNER 4N10- 30	5,5	7,5	1675	G 2	-	-	644	2319	-	-	653	2328
WINNER 4N10- 42	7,5	10	2250	G 2	-	-	805	3055	-	-	731	2981
WINNER 4N15- 4	1,1	1,5	425	G 2	385	810	350	775	307	732	283	708
WINNER 4N15- 6	1,5	2	562	G 2	420	982	385	947	339	901	307	869
WINNER 4N15- 8	2,2	3	702	G 2	470	1172	420	1122	437	1139	339	1041
WINNER 4N15- 11	3	4	908	G 2	-	-	544	1452	-	-	477	1385
WINNER 4N15- 14	4	5,5	1120	G 2	-	-	574	1694	-	-	543	1663
WINNER 4N15- 20	5,5	7,5	1600	G 2	-	-	644	2244	-	-	653	2253
WINNER 4N15- 27	7,5	10	2158	G 2	-	-	805	2963	-	-	731	2889

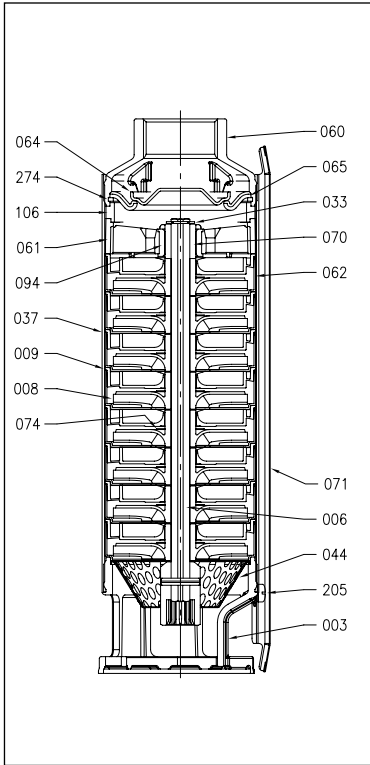
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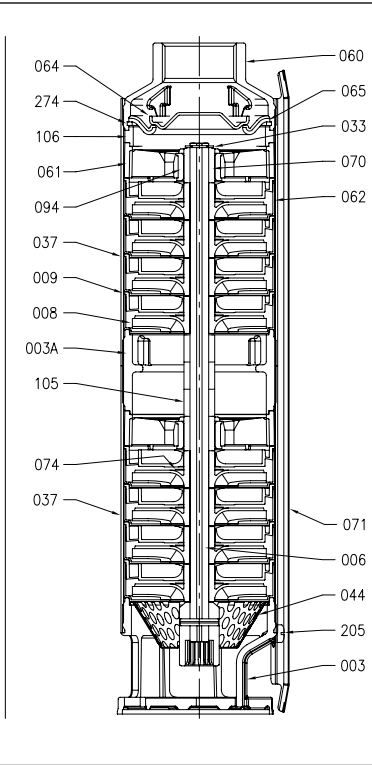
# WINNER 4N

**4" BOREHOLE CENTRIFUGAL ELECTRIC PUMPS**  
in AISI 304

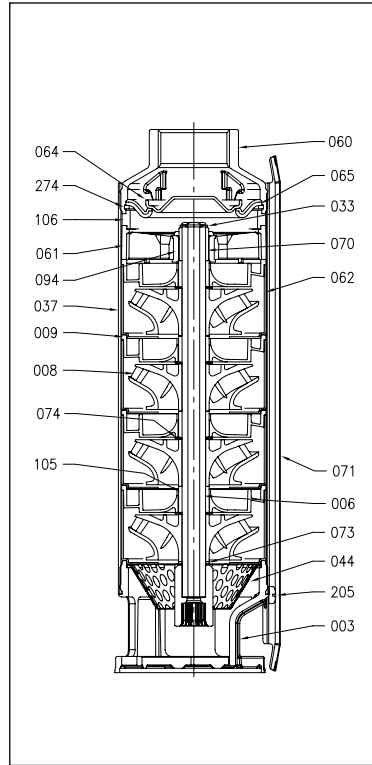
**SECTIONAL VIEW WINNER 4N1-4N2-4N4**  
Single pump casing



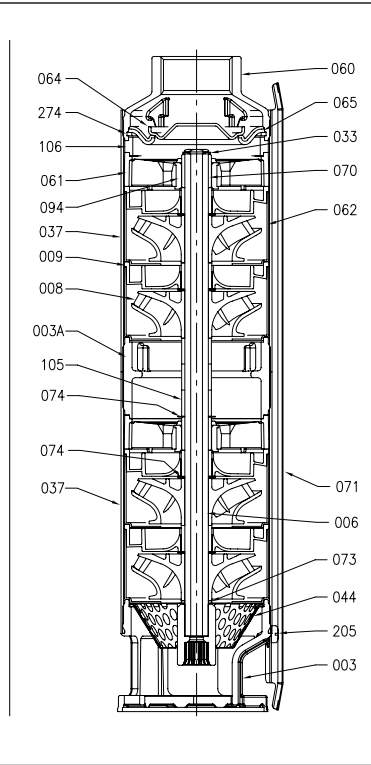
**Double pump casing**



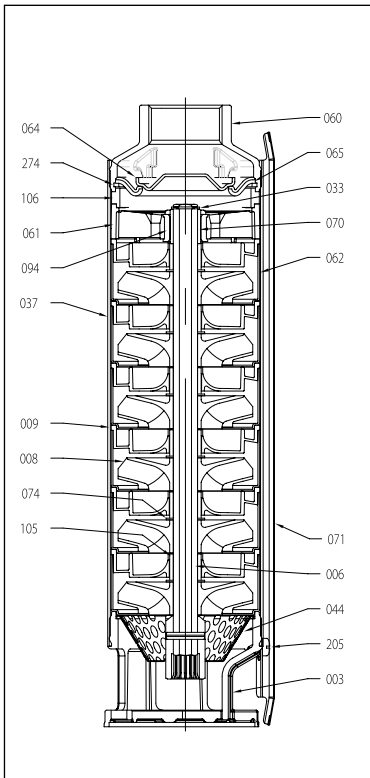
**SECTIONAL VIEW WINNER 4N10**  
Single pump casing



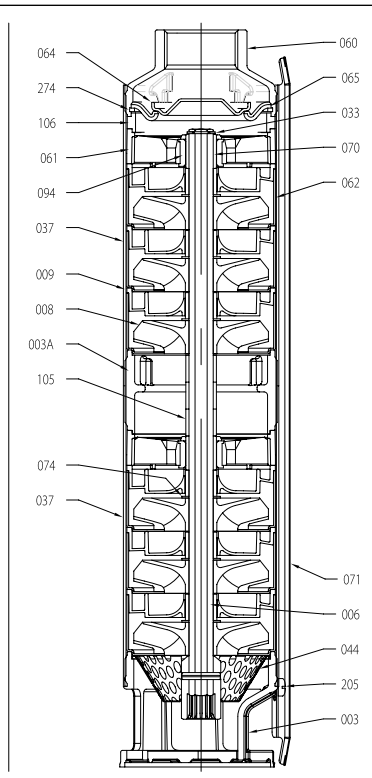
**Double pump casing**



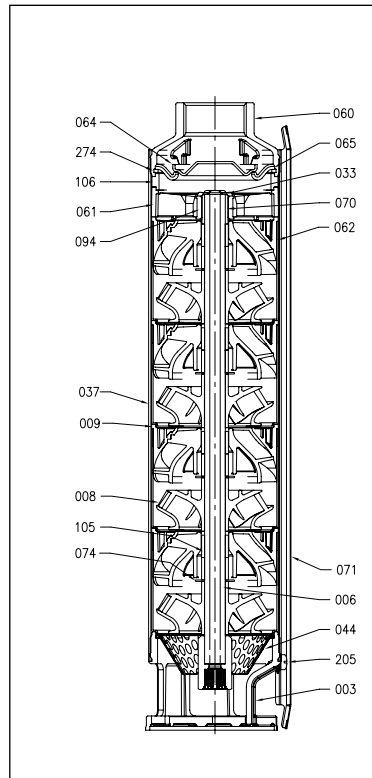
**SECTIONAL VIEW WINNER 4N7**  
Single pump casing



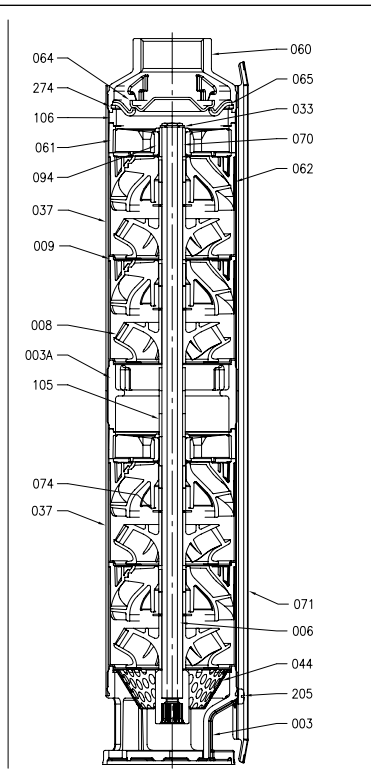
**Double pump casing**



**SECTIONAL VIEW WINNER 4N15**  
Single pump casing



**Double pump casing**



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# WINNER 4N

## 4" BOREHOLE CENTRIFUGAL ELECTRIC PUMPS

in AISI 304

### MATERIALS TABLE

Rif.	Name	Material
003	Bracket	EN 1.4308 (ASTM CF8)
003A	Join ring	EN 1.4308 (ASTM CF8)
006	Pump shaft with coupling	EN 1.4301 (AISI 304)
008	Impeller	Ixef® (model 4N1, 4N2, 4N4, 4N7) Glass fibre reinforced PC (model 4N10, 4N15)
009	Diffuser	PPE+PS Glass fibre reinforced
033	Elastic Ring	EN 1.4301 (AISI 304)
037	Outer casing	EN 1.4301 (AISI 304)
044	Strainer	EN 1.4301 (AISI 304)
060	Discharge casing	EN 1.4308 (ASTM CF8)
061	Upper / Intermediate bracket	PPE+PS Glass fibre reinforced
062	Stage housing	EN 1.4301 (AISI 304)
064	Valve	EN 1.4301 (AISI 304)
065	Valve seat	1.4301 (AISI 304) + EPDM Rubber
070	Shaft sleeve bearing	Alumina (Ceramic)
071	Cable guard	EN 1.4301 (AISI 304)
073	Thrust washer first impeller	EN 1.4301 (AISI 304)
074	Thrust washer	EN 1.4301 (AISI 304)
094	Bearing	EPDM Rubber
105	Spacer	PPE+PS Glass fibre reinforced
106	Spacer	NORYL+GF20%
205	Screw (M4 x 6 UNI 7687)	EN 1.4301 (AISI 304)
274	Elastic Ring	EN 1.4310 (AISI 302)

# WINNER 4N

## 4" BOREHOLE CENTRIFUGAL ELECTRIC PUMPS

in AISI 304

**ELECTRIC DATA TABLE** WINNER 4N WITH OIL FILLED MOTOR (SUMOTO MOTORS)

P <sub>i</sub>		Thrust [N]	Single phase 230V				Three phase 380V				Three phase 415V			
[HP]	[kW]		P <sub>i</sub> [kW]	I <sub>n</sub> [A]	I <sub>A</sub> [A]	Power factor	P <sub>i</sub> [kW]	I <sub>n</sub> [A]	I <sub>A</sub> [A]	Power factor	P <sub>i</sub> [kW]	I <sub>n</sub> [A]	I <sub>A</sub> [A]	Power factor
0,5	0,37	1500	0,78	3,6	10,2	0,94	0,66	1,4	5,0	0,72	0,83	1,6	5,0	0,72
0,75	0,55	1500	0,97	4,5	13,6	0,94	0,94	1,9	7,0	0,75	1,08	2,0	7,0	0,75
1	0,75	1500	1,32	6,0	18,5	0,96	1,17	2,4	10,0	0,74	1,38	2,6	10,0	0,74
1,5	1,1	1500	1,83	8,2	26,0	0,97	1,56	3,2	14,0	0,74	1,81	3,4	14,0	0,74
2	1,5	1500	2,48	11,0	34,0	0,98	2,09	4,4	17,0	0,72	2,38	4,6	17,0	0,72
3	2,2	4400	3,27	14,8	48,0	0,96	-	-	-	-	-	-	-	-
3	2,2	1500	-	-	-	-	3,00	6,0	24,0	0,76	3,39	6,2	24,0	0,76
3	2,2	5000	-	-	-	-	3,02	5,6	23,0	0,82	3,42	5,8	23,0	0,82
4	3	5000	-	-	-	-	4,05	7,7	30,0	0,80	4,49	7,8	30,0	0,80
5,5	4	5000	-	-	-	-	5,24	9,7	45,0	0,82	5,78	9,8	45,0	0,82
7,5	5,5	5000	-	-	-	-	7,37	13,5	55,0	0,83	8,23	13,8	55,0	0,83
10	7,5	4400	-	-	-	-	9,75	19,0	72,0	0,78	10,93	19,5	72,0	0,78

**ELECTRIC DATA TABLE** WINNER 4N WITH WATER FILLED MOTOR (FRANKLIN MOTORS)

P <sub>i</sub>		Thrust [N]	Single phase 230V				Three phase 380V				Three phase 415V			
[HP]	[kW]		P <sub>i</sub> [kW]	I <sub>n</sub> [A]	I <sub>A</sub> [A]	Power factor	P <sub>i</sub> [kW]	I <sub>n</sub> [A]	I <sub>A</sub> [A]	Power factor	P <sub>i</sub> [kW]	I <sub>n</sub> [A]	I <sub>A</sub> [A]	Power factor
0,5	0,37	3000	0,69	3,3	12,6	0,91	0,57	1,1	5,1	0,79	0,58	1,14	5,61	0,71
0,75	0,55	3000	0,93	4,3	17,7	0,94	0,83	1,6	7,0	0,79	0,86	1,7	7,70	0,70
1	0,75	3000	1,28	5,7	22,7	0,98	1,07	2,0	10,1	0,81	1,10	2,1	10,9	0,73
1,5	1,1	3000	1,78	8,4	33,9	0,92	1,51	2,8	15,3	0,82	1,54	2,9	16,7	0,74
2	1,5	3000	2,34	10,7	41,7	0,95	2,13	3,9	19,7	0,83	2,10	4,0	21,5	0,73
3	2,2	4000	3,28	14,7	61,8	0,97	2,91	5,4	28,3	0,82	3,00	5,8	30,9	0,72
4	3	4000	-	-	-	-	3,99	7,4	39,9	0,82	4,09	7,9	43,6	0,72
5,5	4	6500	-	-	-	-	5,24	9,7	54,1	0,82	5,38	10,4	59,10	0,72
7,5	5,5	6500	-	-	-	-	7,05	12,6	73,3	0,85	7,08	12,8	80,10	0,77
10	7,5	6500	-	-	-	-	9,74	17,2	94,3	0,86	9,74	17,6	103,00	0,77

# WINNER 4N

## 4" BOREHOLE CENTRIFUGAL ELECTRIC PUMPS

in AISI 304

### CABLES DIMENSIONING (OIL FILLED) - single phase

#### CABLE SELECTION

example: Motor 0.75 kW 230V single phase, cable length 75 m - 4x2,5 mm<sup>2</sup>

HP	kW	Type of cable *							
		4x1	4x1,5	4x2	4x2,5	4x4	4x6	4x10	4x16
0,5	0,37	50	75	100	125	-	-	-	-
0,75	0,55	38	57	76	95	152	-	-	-
1	0,75	30	45	60	75	120	174	-	-
1,5	1,1	22	33	43	53	85	127	210	-
2	1,5	-	23	31	38	63	92	154	246
3	2,2	-	-	22	28	45	67	112	180

### CABLES DIMENSIONING (OIL FILLED) - three phase

#### CABLE SELECTION

HP	kW	Type of cable *							
		4x1	4x1,5	4x2	4x2,5	4x4	4x6	4x10	4x16
0,37	0,5	240	-	-	-	-	-	-	-
0,55	0,75	164	246	328	-	-	-	-	-
0,75	1	133	200	266	333	-	-	-	-
1,1	1,5	97	146	195	244	390	-	-	-
1,5	2	72	109	145	180	290	435	-	-
2,2	3	51	78	103	130	207	310	516	-
3	4	41	62	83	104	167	250	416	-
4	5,5	31	46	62	77	124	186	310	496
5,5	7,5	-	33	45	56	90	135	225	360
7,5	10	-	-	-	-	66	100	165	270

(\*) Maximum cable length with a voltage drop of 3% at 30°C ambient temperature.

### CABLES DIMENSIONING (WATER FILLED) - single phase

#### CABLE SELECTION

example: Motor 0.75 kW 230V single phase, cable length 75 m - 4x2,5 mm<sup>2</sup>

HP	kW	Type of cable *							
		4x1	4x1,5	4x2	4x2,5	4x4	4x6	4x10	4x16
0,5	0,37	50	76	101	126	155	-	-	-
0,75	0,55	39	58	77	97	117	-	-	-
1	0,75	29	44	58	73	79	175	-	-
1,5	1,1	20	30	40	50	62	119	198	-
2	1,5	-	23	31	39	45	93	156	249
3	2,2	-	-	23	28	45	68	113	181

### CABLES DIMENSIONING (WATER FILLED) - three phase

#### CABLE SELECTION

HP	kW	Type of cable *							
		4x1	4x1,5	4x2	4x2,5	4x4	4x6	4x10	4x16
0,37	0,5	325	-	-	-	-	-	-	-
0,55	0,75	223	335	446	66	-	-	-	-
0,75	1	167	251	335	418	-	-	-	-
1,1	1,5	120	179	239	299	478	-	-	-
1,5	2	86	129	172	215	343	515	-	-
2,2	3	61	91	122	152	243	365	609	-
3	4	45	67	89	112	179	268	446	-
4	5,5	34	51	68	85	135	203	338	541
5,5	7,5	-	40	53	66	106	159	266	425
7,5	10	-	-	-	-	78	117	196	313

(\*) Maximum cable length with a voltage drop of 3% at 30°C ambient temperature.

The contents of this publication must not be regarded as binding. EBARA Pumps Europe S.p.A. reserves the right to effect any modification it deems necessary, without prior notice.

### SPECIFIC PERFORMANCE

The specifications below qualify the curves shown in our catalogues and Data Book (see [www.ebaraeurope.com](http://www.ebaraeurope.com)). All the performance curves are calculated according to ISO 9906 Attachment A.

Tolerance according to ISO 9906 Attachment A. The curves refer to an effective speed of the 50 Hz asynchronous motors. The measurements are made with water temperature of 20°C and cinematic viscosity of  $\nu = 1 \text{ mm}^2/\text{s}$  (1 cSt). During the pump selection, consider to get a safety margin of at least 0.5 m. The continuous curves indicate the recommended working range. The dotted curve is only a guide. In order to prevent the risk of overheating, the pumps must not be used at a flow rate below 10% of the maximum efficiency flow rate.

During selection of the pumps, there is a safety margin of at least 1 m.

- Symbols:
- Q = Volume flow rate [ $\text{m}^3/\text{h}$ ]
  - H = Total head [m]
  - P<sup>1</sup> = Power absorbed by the electric line
  - P<sup>2</sup> = Pump power input (shaft power)
  - $\eta$  = Pump efficiency
  - NPSH = Net positive suction head required by the pump
  - MEI = Minimum Efficiency Index

The minimum efficiency index (MEI) is a measure of the quality of a pump size in respect to its mean efficiency. The minimum efficiency index is based on the hydraulic efficiency and on the head at the best efficiency point.

The efficiency of a pump with trimmed impeller is usually lower than that of a pump with the full impeller diameter. The trimming of the impeller will adapt the pump to a fixed duty point, leading to reduced energy consumption. The minimum efficiency index (MEI) is based on the full impeller diameter.

The operation of these water pumps with variable duty points may be more efficient and economic when controlled, for example, by the use of a variable speed drive that matches the pump duty to the system.



## DNV BUSINESS ASSURANCE

# MANAGEMENT SYSTEM CERTIFICATE

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Certificato No. / Certificate No. **CERT-17819-2006-AQ-VEN-SINCERT**

Si attesta che / This is to certify that

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*Stabilimento di Cles: Via Campo Sportivo, 30 - 38023 Cles (TN) - Italy*  
*Filiale di Palermo: Via Don Luigi Sturzo, 181/183 - Z. I. - 90040 Carini (PA) - Italy*  
*Filiale di Cagliari: Via del Fangario, 29 - 09122 Cagliari (CA) - Italy*

*è conforme ai requisiti della norma per i sistemi di gestione:*  
*has been found to conform to the management system standard:*

**UNI EN ISO 9001:2008 (ISO 9001:2008)**

*Questa Certificazione è valida per il seguente campo applicativo:*  
*This Certificate is valid for the following product or service ranges:*

**Progettazione, produzione, vendita e commercializzazione di pompe e sistemi di pompaggio**  
**(Settore EA : 18 - 17)**  
*Design, manufacture, sales and trade of pumps and pumping systems*  
*(Sector EA : 18 - 17)*

<p><i>Data Prima Emissione/Initial Certification Date:</i></p> <p><b>2006-10-13</b></p> <p><i>Il Certificato è valido fino al:</i> <i>This Certificate is valid until:</i></p> <p><b>2015-10-10</b></p> <p><i>L'audit è stato eseguito sotto la supervisione di/</i> <i>The audit has been performed under the supervision of</i></p> <p><b>Michele Gaiba</b> <i>Lead Auditor</i></p>	<p><i>Luogo e Data/Place and Date:</i></p> <p><b>Agrate Brianza (MB), 2012-10-02</b></p> <p><i>Per l'Organismo di Certificazione:</i> <i>For the Accredited Unit:</i></p>  <p><b>Zeno Beltrami</b> <i>Management Representative</i></p>
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ISO 9001 A ISO 9001 B ISO 9001 C ISO 9001 D ISO 9001 E ISO 9001 F ISO 9001 G ISO 9001 H ISO 9001 I ISO 9001 J ISO 9001 K ISO 9001 L ISO 9001 M ISO 9001 N ISO 9001 O ISO 9001 P ISO 9001 Q ISO 9001 R ISO 9001 S ISO 9001 T ISO 9001 U ISO 9001 V ISO 9001 W ISO 9001 X ISO 9001 Y ISO 9001 Z ISO 9001 AA ISO 9001 AB ISO 9001 AC ISO 9001 AD ISO 9001 AE ISO 9001 AF ISO 9001 AG ISO 9001 AH ISO 9001 AI ISO 9001 AJ ISO 9001 AK ISO 9001 AL ISO 9001 AM ISO 9001 AN ISO 9001 AO ISO 9001 AP ISO 9001 AQ ISO 9001 AR ISO 9001 AS ISO 9001 AT ISO 9001 AU ISO 9001 AV ISO 9001 AW ISO 9001 AX ISO 9001 AY ISO 9001 AZ ISO 9001 BA ISO 9001 BB ISO 9001 BC ISO 9001 BD ISO 9001 BE ISO 9001 BF ISO 9001 BG ISO 9001 BH ISO 9001 BI ISO 9001 BJ ISO 9001 BK ISO 9001 BL ISO 9001 BM ISO 9001 BN ISO 9001 BO ISO 9001 BP ISO 9001 BQ ISO 9001 BR ISO 9001 BS ISO 9001 BT ISO 9001 BU ISO 9001 BV ISO 9001 BW ISO 9001 BX ISO 9001 BY ISO 9001 BZ ISO 9001 CA ISO 9001 CB ISO 9001 CC ISO 9001 CD ISO 9001 CE ISO 9001 CF ISO 9001 CG ISO 9001 CH ISO 9001 CI ISO 9001 CJ ISO 9001 CK ISO 9001 CL ISO 9001 CM ISO 9001 CN ISO 9001 CO ISO 9001 CP ISO 9001 CQ ISO 9001 CR ISO 9001 CS ISO 9001 CT ISO 9001 CU ISO 9001 CV ISO 9001 CW ISO 9001 CX ISO 9001 CY ISO 9001 CZ ISO 9001 DA ISO 9001 DB ISO 9001 DC ISO 9001 DD ISO 9001 DE ISO 9001 DF ISO 9001 DG ISO 9001 DH ISO 9001 DI ISO 9001 DJ ISO 9001 DK ISO 9001 DL ISO 9001 DM ISO 9001 DN ISO 9001 DO ISO 9001 DP ISO 9001 DQ ISO 9001 DR ISO 9001 DS ISO 9001 DT ISO 9001 DU ISO 9001 DV ISO 9001 DW ISO 9001 DX ISO 9001 DY ISO 9001 DZ ISO 9001 EA ISO 9001 EB ISO 9001 EC ISO 9001 ED ISO 9001 EE ISO 9001 EF ISO 9001 EG ISO 9001 EH ISO 9001 EI ISO 9001 EJ ISO 9001 EK ISO 9001 EL ISO 9001 EM ISO 9001 EN ISO 9001 EO ISO 9001 EP ISO 9001 EQ ISO 9001 ER ISO 9001 ES ISO 9001 ET ISO 9001 EU ISO 9001 EV ISO 9001 EW ISO 9001 EX ISO 9001 EY ISO 9001 EZ ISO 9001 FA ISO 9001 FB ISO 9001 FC ISO 9001 FD ISO 9001 FE ISO 9001 FF ISO 9001 FG ISO 9001 FH ISO 9001 FI ISO 9001 FJ ISO 9001 FK ISO 9001 FL ISO 9001 FM ISO 9001 FN ISO 9001 FO ISO 9001 FP ISO 9001 FQ ISO 9001 FR ISO 9001 FS ISO 9001 FT ISO 9001 FU ISO 9001 FV ISO 9001 FW ISO 9001 FX ISO 9001 FY ISO 9001 FZ ISO 9001 GA ISO 9001 GB ISO 9001 GC ISO 9001 GD ISO 9001 GE ISO 9001 GF ISO 9001 GG ISO 9001 GH ISO 9001 GI ISO 9001 GJ ISO 9001 GK ISO 9001 GL ISO 9001 GM ISO 9001 GN ISO 9001 GO ISO 9001 GP ISO 9001 GQ ISO 9001 GR ISO 9001 GS ISO 9001 GT ISO 9001 GU ISO 9001 GV ISO 9001 GW ISO 9001 GX ISO 9001 GY ISO 9001 GZ ISO 9001 HA ISO 9001 HB ISO 9001 HC ISO 9001 HD ISO 9001 HE ISO 9001 HF ISO 9001 HG ISO 9001 HH ISO 9001 HI ISO 9001 HJ ISO 9001 HK ISO 9001 HL ISO 9001 HM ISO 9001 HN ISO 9001 HO ISO 9001 HP ISO 9001 HQ ISO 9001 HR ISO 9001 HS ISO 9001 HT ISO 9001 HU ISO 9001 HV ISO 9001 HW ISO 9001 HX ISO 9001 HY ISO 9001 HZ ISO 9001 IA ISO 9001 IB ISO 9001 IC ISO 9001 ID ISO 9001 IE ISO 9001 IF ISO 9001 IG ISO 9001 IH ISO 9001 II ISO 9001 IJ ISO 9001 IK ISO 9001 IL ISO 9001 IM ISO 9001 IN ISO 9001 IO ISO 9001 IP ISO 9001 IQ ISO 9001 IR ISO 9001 IS ISO 9001 IT ISO 9001 IA ISO 9001 IB ISO 9001 IC ISO 9001 ID ISO 9001 IE ISO 9001 IF ISO 9001 IG ISO 9001 IH ISO 9001 II ISO 9001 IJ ISO 9001 IK ISO 9001 IL ISO 9001 IM ISO 9001 IN ISO 9001 IO ISO 9001 IP ISO 9001 IQ ISO 9001 IR ISO 9001 IS ISO 9001 IT ISO 9001 JA ISO 9001 JB ISO 9001 JC ISO 9001 JD ISO 9001 JE ISO 9001 JF ISO 9001 JG ISO 9001 JH ISO 9001 JI ISO 9001 JJ ISO 9001 JK ISO 9001 JL ISO 9001 JM ISO 9001 JN ISO 9001 JO ISO 9001 JP ISO 9001 JQ ISO 9001 JR ISO 9001 JS ISO 9001 JT ISO 9001 JU ISO 9001 JV ISO 9001 JW ISO 9001 JX ISO 9001 JY ISO 9001 JZ ISO 9001 KA ISO 9001 KB ISO 9001 KC ISO 9001 KD ISO 9001 KE ISO 9001 KF ISO 9001 KG ISO 9001 KH ISO 9001 KI ISO 9001 KJ ISO 9001 KK ISO 9001 KL ISO 9001 KM ISO 9001 KN ISO 9001 KO ISO 9001 KP ISO 9001 KQ ISO 9001 KR ISO 9001 KS ISO 9001 KT ISO 9001 KU ISO 9001 KV ISO 9001 KW ISO 9001 KX ISO 9001 KY ISO 9001 KZ ISO 9001 LA ISO 9001 LB ISO 9001 LC ISO 9001 LD ISO 9001 LE ISO 9001 LF ISO 9001 LG ISO 9001 LH ISO 9001 LI ISO 9001 LJ ISO 9001 LK ISO 9001 LL ISO 9001 LM ISO 9001 LN ISO 9001 LO ISO 9001 LP ISO 9001 LQ ISO 9001 LR ISO 9001 LS ISO 9001 LT ISO 9001 LU ISO 9001 LV ISO 9001 LW ISO 9001 LX ISO 9001 LY ISO 9001 LZ ISO 9001 MA ISO 9001 MB ISO 9001 MC ISO 9001 MD ISO 9001 ME ISO 9001 MF ISO 9001 MG ISO 9001 MH ISO 9001 MI ISO 9001 MJ ISO 9001 MK ISO 9001 ML ISO 9001 MM ISO 9001 MN ISO 9001 MO ISO 9001 MP ISO 9001 MQ ISO 9001 MR ISO 9001 MS ISO 9001 MT ISO 9001 MU ISO 9001 MV ISO 9001 MW ISO 9001 MX ISO 9001 MY ISO 9001 MZ ISO 9001 NA ISO 9001 NB ISO 9001 NC ISO 9001 ND ISO 9001 NE ISO 9001 NF ISO 9001 NG ISO 9001 NH ISO 9001 NI ISO 9001 NJ ISO 9001 NK ISO 9001 NL ISO 9001 NM ISO 9001 NO ISO 9001 NP ISO 9001 NQ ISO 9001 NR ISO 9001 NS ISO 9001 NT ISO 9001 NU ISO 9001 NV ISO 9001 NW ISO 9001 NX ISO 9001 NY ISO 9001 NZ ISO 9001 OA ISO 9001 OB ISO 9001 OC ISO 9001 OD ISO 9001 OE ISO 9001 OF ISO 9001 OG ISO 9001 OH ISO 9001 OI ISO 9001 OJ ISO 9001 OK ISO 9001 OL ISO 9001 OM ISO 9001 ON ISO 9001 OO ISO 9001 OP ISO 9001 OQ ISO 9001 OR ISO 9001 OS ISO 9001 OT ISO 9001 OU ISO 9001 OV ISO 9001 OW ISO 9001 OX ISO 9001 OY ISO 9001 OZ ISO 9001 PA ISO 9001 PB ISO 9001 PC ISO 9001 PD ISO 9001 PE ISO 9001 PF ISO 9001 PG ISO 9001 PH ISO 9001 PI ISO 9001 PJ ISO 9001 PK ISO 9001 PL ISO 9001 PM ISO 9001 PN ISO 9001 PO ISO 9001 PP ISO 9001 PQ ISO 9001 PR ISO 9001 PS ISO 9001 PT ISO 9001 PU ISO 9001 PV ISO 9001 PW ISO 9001 PX ISO 9001 PY ISO 9001 PZ ISO 9001 QA ISO 9001 QB ISO 9001 QC ISO 9001 QD ISO 9001 QE ISO 9001 QF ISO 9001 QG ISO 9001 QH ISO 9001 QI ISO 9001 QJ ISO 9001 QK ISO 9001 QL ISO 9001 QM ISO 9001 QN ISO 9001 QO ISO 9001 QP ISO 9001 QQ ISO 9001 QR ISO 9001 QS ISO 9001 QT ISO 9001 QU ISO 9001 QV ISO 9001 QW ISO 9001 QX ISO 9001 QY ISO 9001 QZ ISO 9001 RA ISO 9001 RB ISO 9001 RC ISO 9001 RD ISO 9001 RE ISO 9001 RF ISO 9001 RG ISO 9001 RH ISO 9001 RI ISO 9001 RJ ISO 9001 RK ISO 9001 RL ISO 9001 RM ISO 9001 RN ISO 9001 RO ISO 9001 RP ISO 9001 RQ ISO 9001 RR ISO 9001 RS ISO 9001 RT ISO 9001 RU ISO 9001 RV ISO 9001 RW ISO 9001 RX ISO 9001 RY ISO 9001 RZ ISO 9001 SA ISO 9001 SB ISO 9001 SC ISO 9001 SD ISO 9001 SE ISO 9001 SF ISO 9001 SG ISO 9001 SH ISO 9001 SI ISO 9001 SJ ISO 9001 SK ISO 9001 SL ISO 9001 SM ISO 9001 SN ISO 9001 SO ISO 9001 SP ISO 9001 SQ ISO 9001 SR ISO 9001 SS ISO 9001 ST ISO 9001 SU ISO 9001 SV ISO 9001 SW ISO 9001 SX ISO 9001 SY ISO 9001 SZ ISO 9001 TA ISO 9001 TB ISO 9001 TC ISO 9001 TD ISO 9001 TE ISO 9001 TF ISO 9001 TG ISO 9001 TH ISO 9001 TI ISO 9001 TJ ISO 9001 TK ISO 9001 TL ISO 9001 TM ISO 9001 TN ISO 9001 TO ISO 9001 TP ISO 9001 TQ ISO 9001 TR ISO 9001 TS ISO 9001 TT ISO 9001 TU ISO 9001 TV ISO 9001 TW ISO 9001 TX ISO 9001 TY ISO 9001 TZ ISO 9001 UA ISO 9001 UB ISO 9001 UC ISO 9001 UD ISO 9001 UE ISO 9001 UF ISO 9001 UG ISO 9001 UH ISO 9001 UI ISO 9001 UJ ISO 9001 UK ISO 9001 UL ISO 9001 UM ISO 9001 UN ISO 9001 UO ISO 9001 UP ISO 9001 UQ ISO 9001 UR ISO 9001 US ISO 9001 UT ISO 9001 UV ISO 9001 UW ISO 9001 UX ISO 9001 UY ISO 9001 UZ ISO 9001 VA ISO 9001 VB ISO 9001 VC ISO 9001 VD ISO 9001 VE ISO 9001 VF ISO 9001 VG ISO 9001 VH ISO 9001 VI ISO 9001 VJ ISO 9001 VK ISO 9001 VL ISO 9001 VM ISO 9001 VN ISO 9001 VO ISO 9001 VP ISO 9001 VQ ISO 9001 VR ISO 9001 VS ISO 9001 VT ISO 9001 VU ISO 9001 VV ISO 9001 VW ISO 9001 VX ISO 9001 VY ISO 9001 VZ ISO 9001 WA ISO 9001 WB ISO 9001 WC ISO 9001 WD ISO 9001 WE ISO 9001 WF ISO 9001 WG ISO 9001 WH ISO 9001 WI ISO 9001 WJ ISO 9001 WK ISO 9001 WL ISO 9001 WM ISO 9001 WN ISO 9001 WO ISO 9001 WP ISO 9001 WQ ISO 9001 WR ISO 9001 WS ISO 9001 WT ISO 9001 WU ISO 9001 WV ISO 9001 WW ISO 9001 WX ISO 9001 WY ISO 9001 WZ ISO 9001 XA ISO 9001 XB ISO 9001 XC ISO 9001 XD ISO 9001 XE ISO 9001 XF ISO 9001 XG ISO 9001 XH ISO 9001 XI ISO 9001 XJ ISO 9001 XK ISO 9001 XL ISO 9001 XM ISO 9001 XN ISO 9001 XO ISO 9001 XP ISO 9001 XQ ISO 9001 XR ISO 9001 XS ISO 9001 XT ISO 9001 XU ISO 9001 XV ISO 9001 XW ISO 9001 XX ISO 9001 XY ISO 9001 XZ ISO 9001 YA ISO 9001 YB ISO 9001 YC ISO 9001 YD ISO 9001 YE ISO 9001 YF ISO 9001 YG ISO 9001 YH ISO 9001 YI ISO 9001 YJ ISO 9001 YK ISO 9001 YL ISO 9001 YM ISO 9001 YN ISO 9001 YO ISO 9001 YP ISO 9001 YQ ISO 9001 YR ISO 9001 YS ISO 9001 YT ISO 9001 YU ISO 9001 YV ISO 9001 YW ISO 9001 YX ISO 9001 YY ISO 9001 YZ ISO 9001 ZA ISO 9001 ZB ISO 9001 ZC ISO 9001 ZD ISO 9001 ZE ISO 9001 ZF ISO 9001 ZG ISO 9001 ZH ISO 9001 ZI ISO 9001 ZJ ISO 9001 ZK ISO 9001 ZL ISO 9001 ZM ISO 9001 ZN ISO 9001 ZO ISO 9001 ZP ISO 9001 ZQ ISO 9001 ZR ISO 9001 ZS ISO 9001 ZT ISO 9001 ZU ISO 9001 ZV ISO 9001 ZW ISO 9001 ZX ISO 9001 ZY ISO 9001 ZZ

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