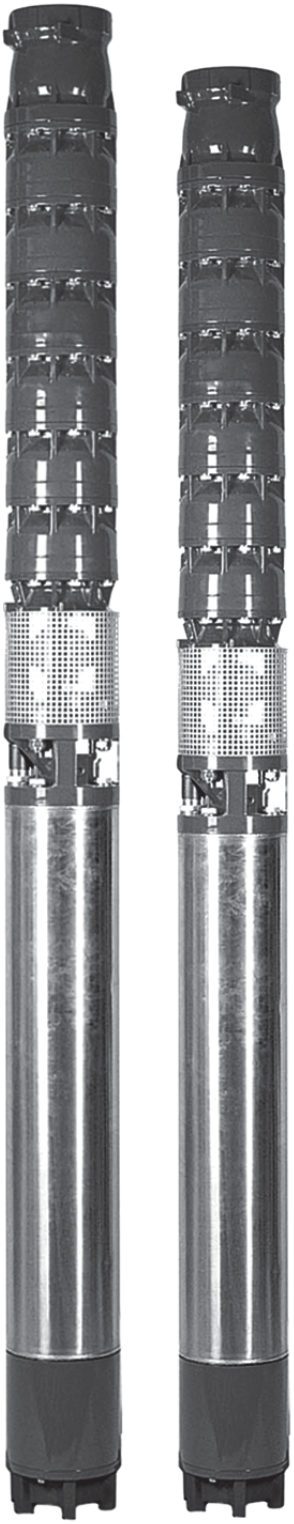
ITT

Lowara

S10, S12 Series

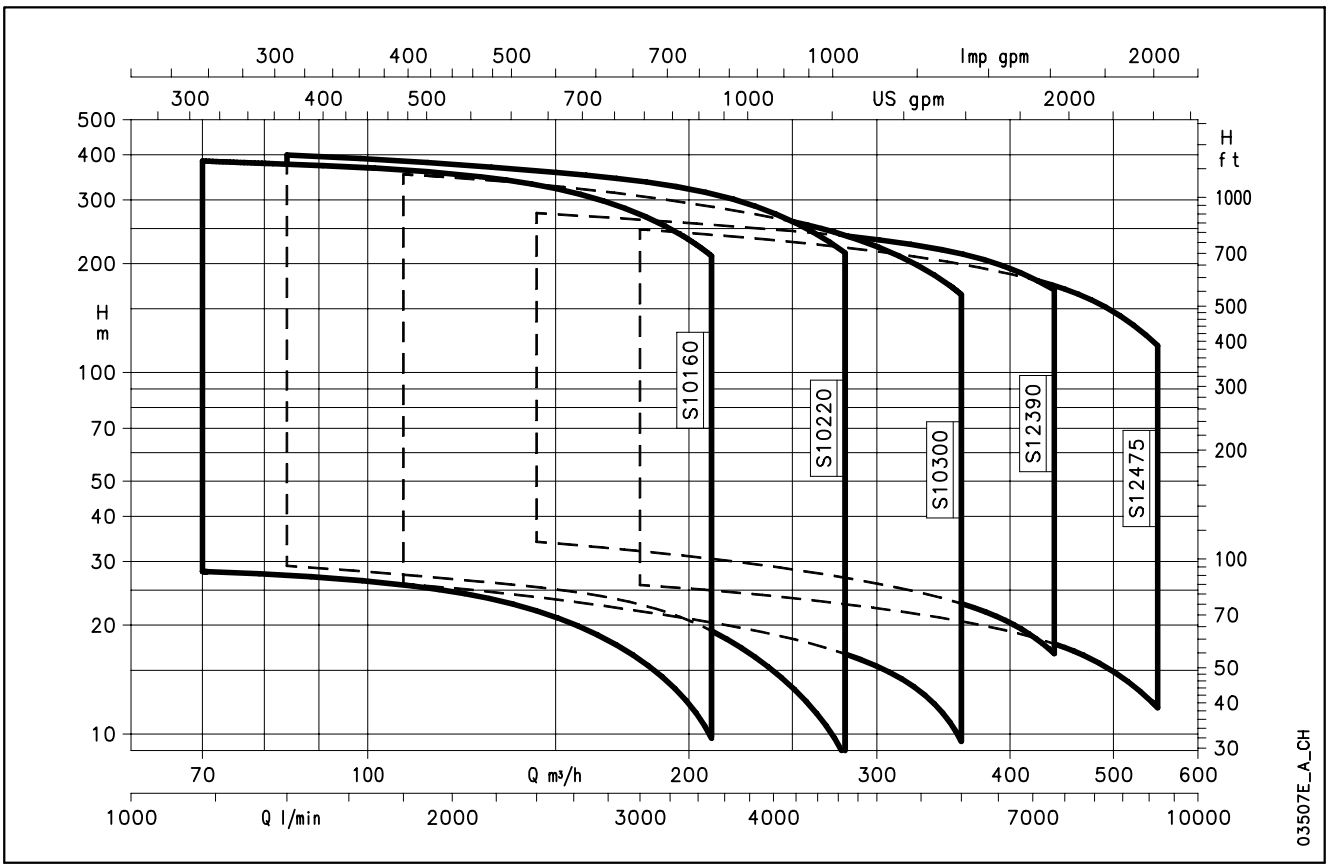
10" - 12" Submersible Electric Pumps

50 Hz



Engineered for life

S10, S12 SERIES
HYDRAULIC PERFORMANCE RANGE AT 50 Hz



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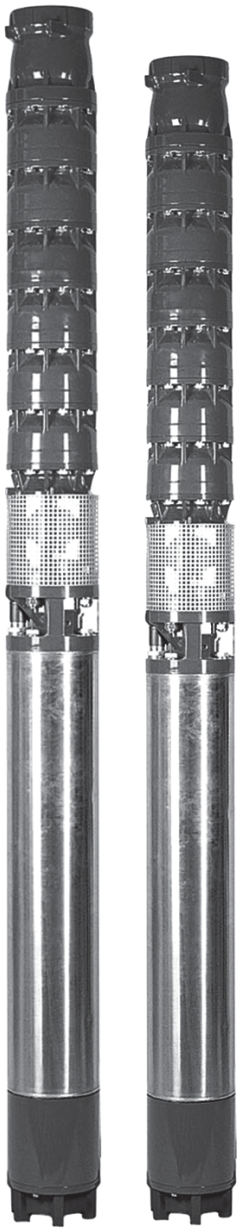
CONTENTS

ITT

Lowara

10” Submersible Electric Pumps

S10160 S10220 S10300 Series



Market sectors

AGRICULTURAL, INDUSTRIAL.

Applications

- Water supply from deep wells.
- Pressure boosting and water distribution in civil and industrial systems.
- Supply of surge tanks and reservoirs.
- Firefighting and washing systems.
- Water table level control.
- Irrigation.

Specifications

PUMP

- **Delivery**: up to 360 m^3/h.
- **Head**: up to 460 m.
- Maximum pump overall diameter (2 cable covers included): 255 mm.
- Maximum electric pump immersion depth: 350 m with L6W, L8W, L10W and L12W motors.
- Maximum permissible quantity of suspended sand: 25 g/m^3.
- Standard delivery outlet: Rp 6” for all versions.

MOTOR

- L6W, L8W, L10W and L12W rewindable three-phase motors with water filled winding.
- Three-phase version:
  L6W: 4 to 37 kW 380-415 V, 50 Hz.
  L8W: 30 to 93 kW 380-415 V, 50 Hz.
  L10W: 93 to 150 kW 380-415 V, 50 Hz.
  L12W: 185 to 300 kW 380-415 V, 50 Hz.
- Maximum supply voltage variations: L6W, L8W, L10W, L12W 400V ±10%.
- PVC windings for L6W, L8W, L10W and L12W motors.
- Horizontal operation:
  L6W, all versions are designed for horizontal installation, provided that the direction of the axial thrust generated by the impellers is always from the pump to the motor.
  L8W, L10W, L12W available on requests for all versions.
- Maximum number of starts per hour: 15 (L6W), 10 (L8W) 8 (L10W) 4 (L12W).
- Maximum temperature of water in contact with motor:
  L6W, L8W, L10W and L12W 25°C.

Construction features

PUMP

- Vertical multistage centrifugal pump with semiaxial impellers.
- Cast iron impellers on all versions.
- Cast iron diffusers on all versions.
- Non-return valve with integrated spring in delivery head (standard feature).
- The guide bearings and wear rings, made of special high nitrile-content rubber, ensure high resistance to wear and guarantee the constant and long-lasting performance of the hydraulic characteristics.
- Coupling and flange designed for coupling to L10W motor;
  versions for L6W and L8W motors with flange and shaft according to **NEMA** standards, are available on request.

Optional features

PUMP

- Bronze or V4460 stainless steel diffusers and impellers.

MOTOR

- Different voltages and frequencies.
- High temperature versions.
- L8W, L10W and L12W for horizontal installation.

Accessories

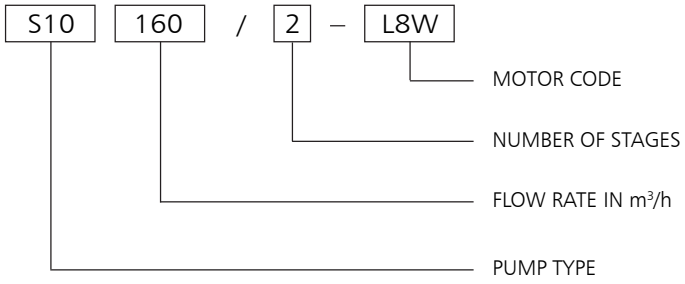
- Coupling flange.
- Panels.
- Drop cables.

TABLE OF MATERIALS S10 SERIES

COMPONENT	MATERIAL	DESIGNATION			NOTES
		EN	EN 10088 Nr.	AISI/ASTM	
Impellers	Grey iron	EN-GJL-250		Class 30	
Lower support	Grey iron	EN-GJL-250		Class 30	
Delivery head	Grey iron	EN-GJL-250		Class 30	
Wear rings	-				
Diffuser	Grey iron	EN-GJL-250		Class 30	
Pump shaft	Stainless steel	X20Cr13	1,4021	AISI 420	
Bushings	EPDM				

s10-2p50-en_a_tm

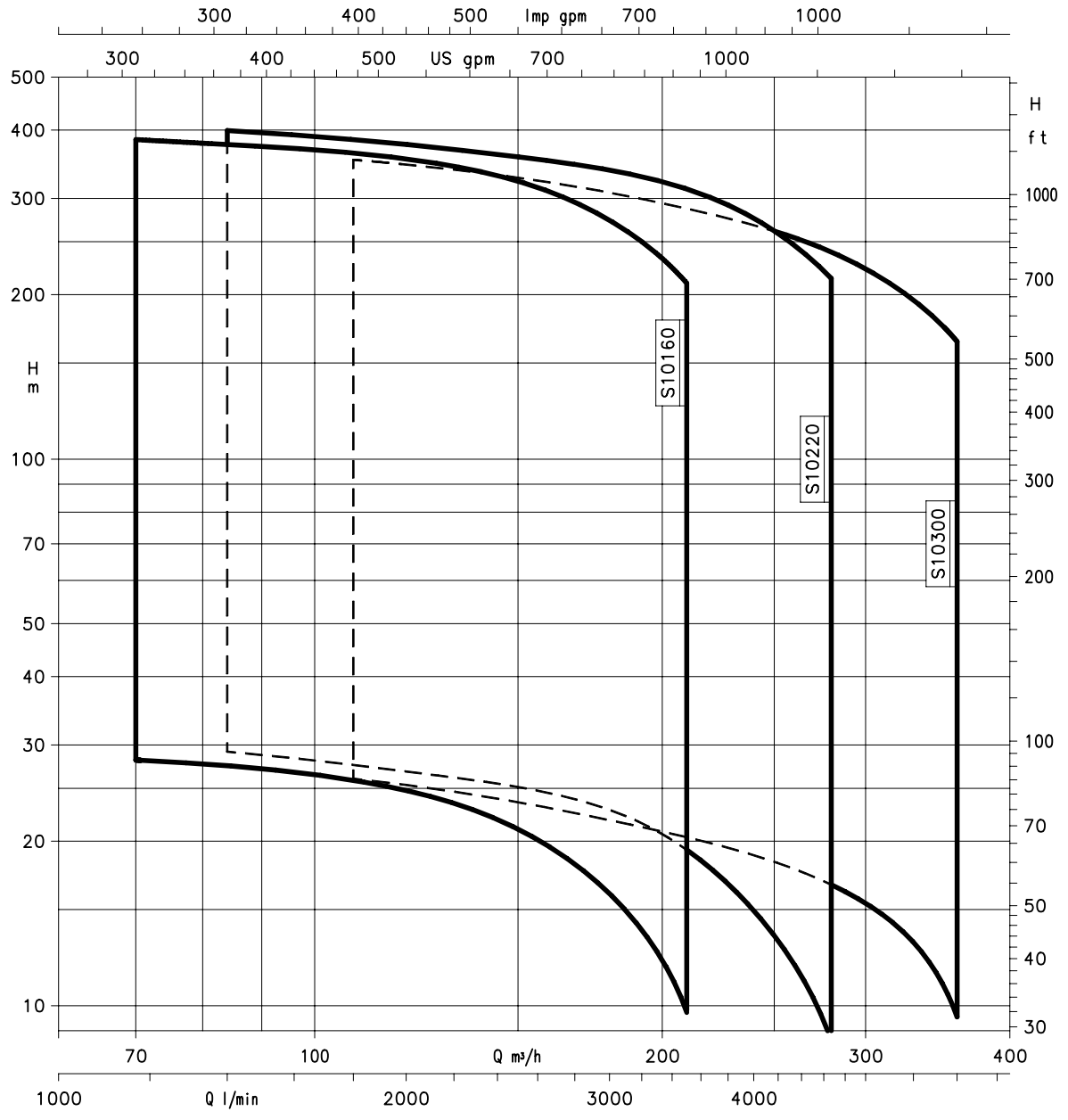
IDENTIFICATION CODES



EXAMPLE : S10160/2 - L8W
10" electric pump 50 Hz, flow rate 160 m^3/h, 2 stages, coupled to an 8" L8W motor.

S10 SERIES
HYDRAULIC PERFORMANCE RANGE AT 50 Hz

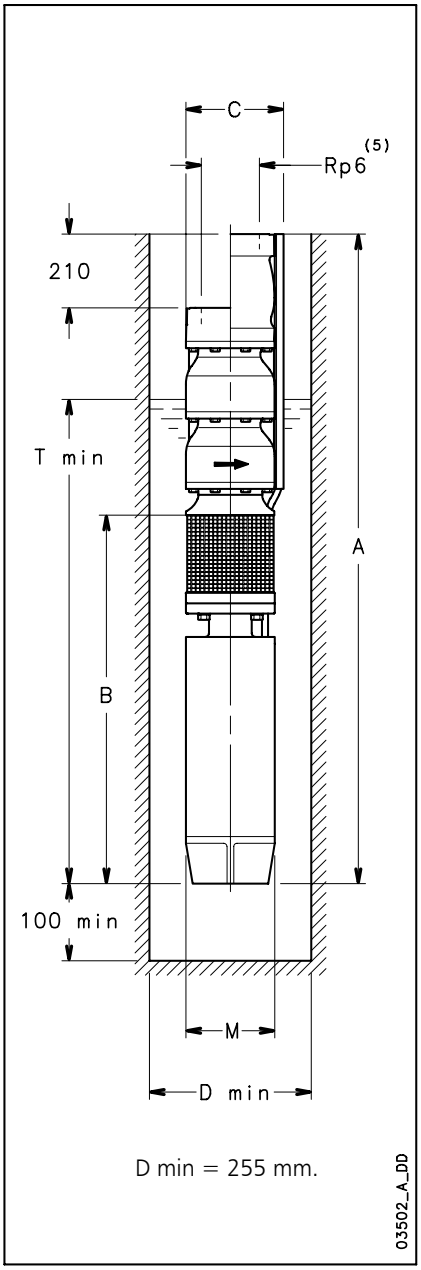
S10	~ 2900 rpm	ISO 9906-Annex A



S10160 SERIES, 1 TO 3 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	RATED POWER	Q = DELIVERY					
		l/min 0	1000	1667	2167	2667	3000
		m^3/h 0	60	100	130	160	180
	kW	H = TOTAL HEAD METRES COLUMN OF WATER					
S10160/1	18,5	43	38	36	33	29	26
S10160/2	37	87	78	73	68	61	54
S10160/3	55	131	117	110	103	92	82
		l/min 0	1000	1500	2000	2333	2833
		m3/h 0	60	90	120	140	170
S10160/1A	15	38	35	33	31	28	24
S10160/2A	30	78	72	67	62	58	49
S10160/3A	45	117	107	102	95	88	76
		l/min 0	1000	1333	1667	2000	2583
		m3/h 0	60	80	100	120	155
S10160/1B	11	31	28	28	26	25	21
S10160/2B	22	61	57	55	52	48	39

s10160-2p50-en_b_th



DIMENSIONS AND WEIGHTS

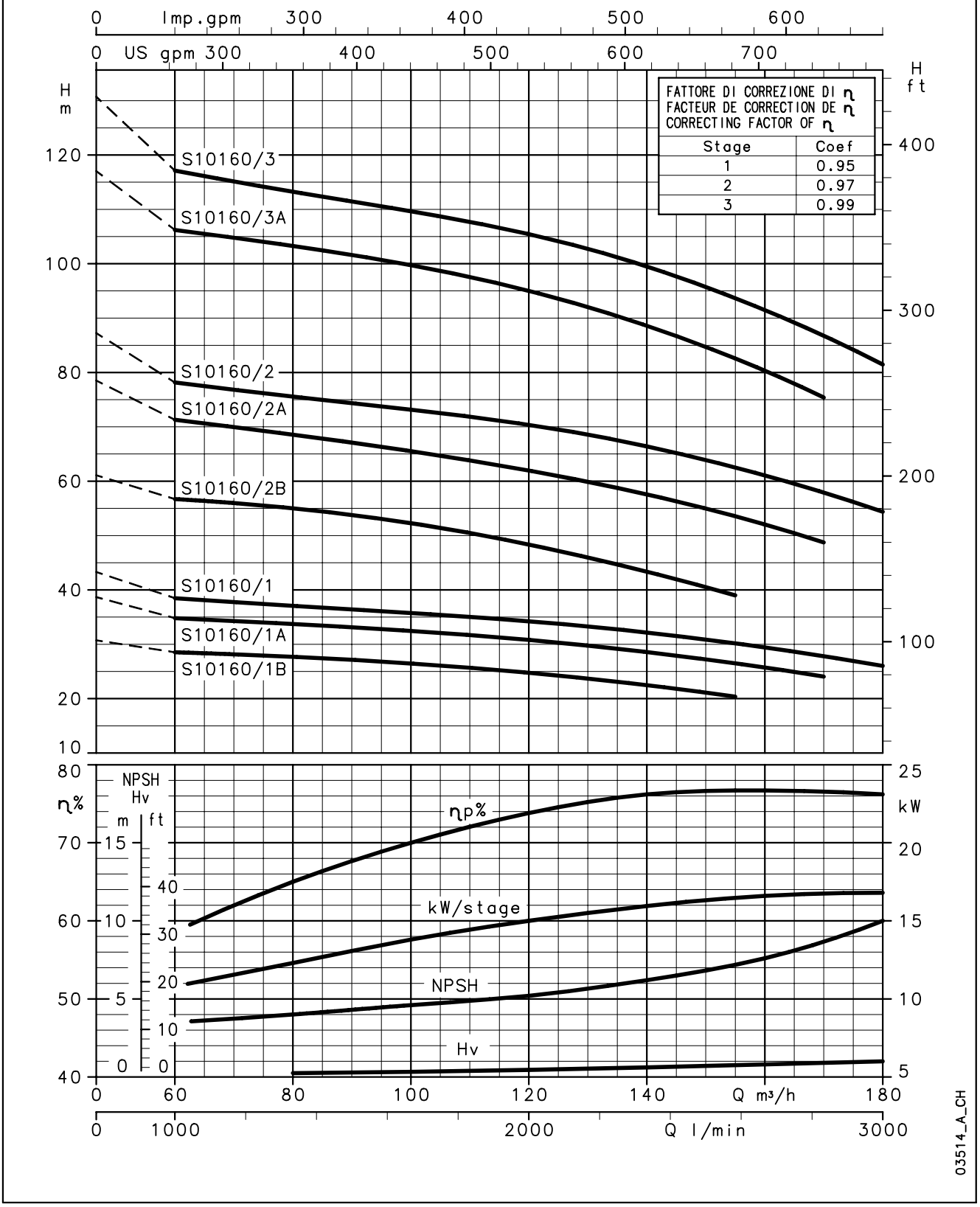
PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S10160/1B-L6W	11	1505	1050	250	144	2323	118
S10160/1A-L6W	15	1615	1160	250	144	2433	130
S10160/1-L6W	18,5	1685	1230	250	144	2503	138
S10160/2B-L6W	22	1895	1270	250	144	2543	163
S10160/2A-L6W	30	2103	1478	250	144	2751	180
S10160/2-L6W	37	2142	1628	250	144	2901	194
S10160/3A-L8W	45	2322	1527	250	192	2795	289
S10160/3-L8W	55	2452	1657	250	192	2925	315

s10160-2p50-en_b_td

1) Max electric pump diameter with 2 motor cables included.
In case of 1 motor cable C = 246 mm with L6W motor.
C = 246 mm with L8W motor.
2) Horizontal version : - Admissible up to Qmax = 170 m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 4.5 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 168.3 x 7.1mm L=143 available on request, API thred available on request.
6) For pumps without non-return valve, reduce by 210 mm.

S10160 SERIES, 1 TO 3 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

S10160	~ 2900 rpm	ISO 9906-Annex A

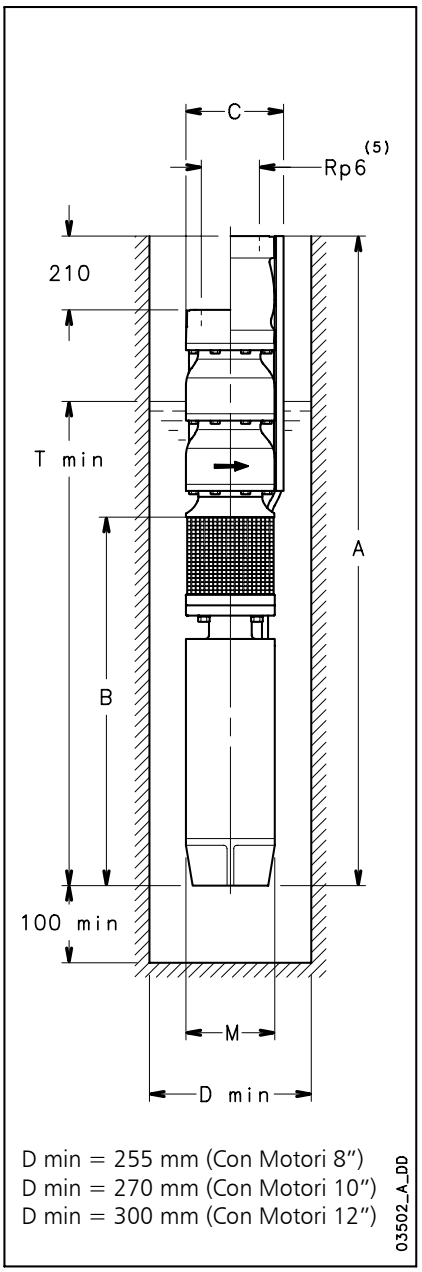


These performances are valid for liquids with density $\rho = 1.0$ Kg/dm^3 and kinematic viscosity $\nu = 1$ mm^2/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

S10160 SERIES, 4 TO 10 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	RATED POWER	Q = DELIVERY					
		l/min 0	1000	1667	2167	2667	3000
		m^3/h 0	60	100	130	160	180
	kW	H = TOTAL HEAD METRES COLUMN OF WATER					
S10160/4	75	174	156	146	137	122	109
S10160/5	93	218	196	184	173	153	137
S10160/6	110	262	235	220	207	184	164
S10160/7	130	305	273	257	241	215	192
S10160/8	150	350	313	294	275	245	217
S10160/9	185	394	353	332	314	280	250
S10160/10	185	335	391	368	347	310	276

s10160a-2p50-en_b_th



D min = 255 mm (Con Motori 8")
D min = 270 mm (Con Motori 10")
D min = 300 mm (Con Motori 12")

03502_A_DD

DIMENSIONS AND WEIGHTS

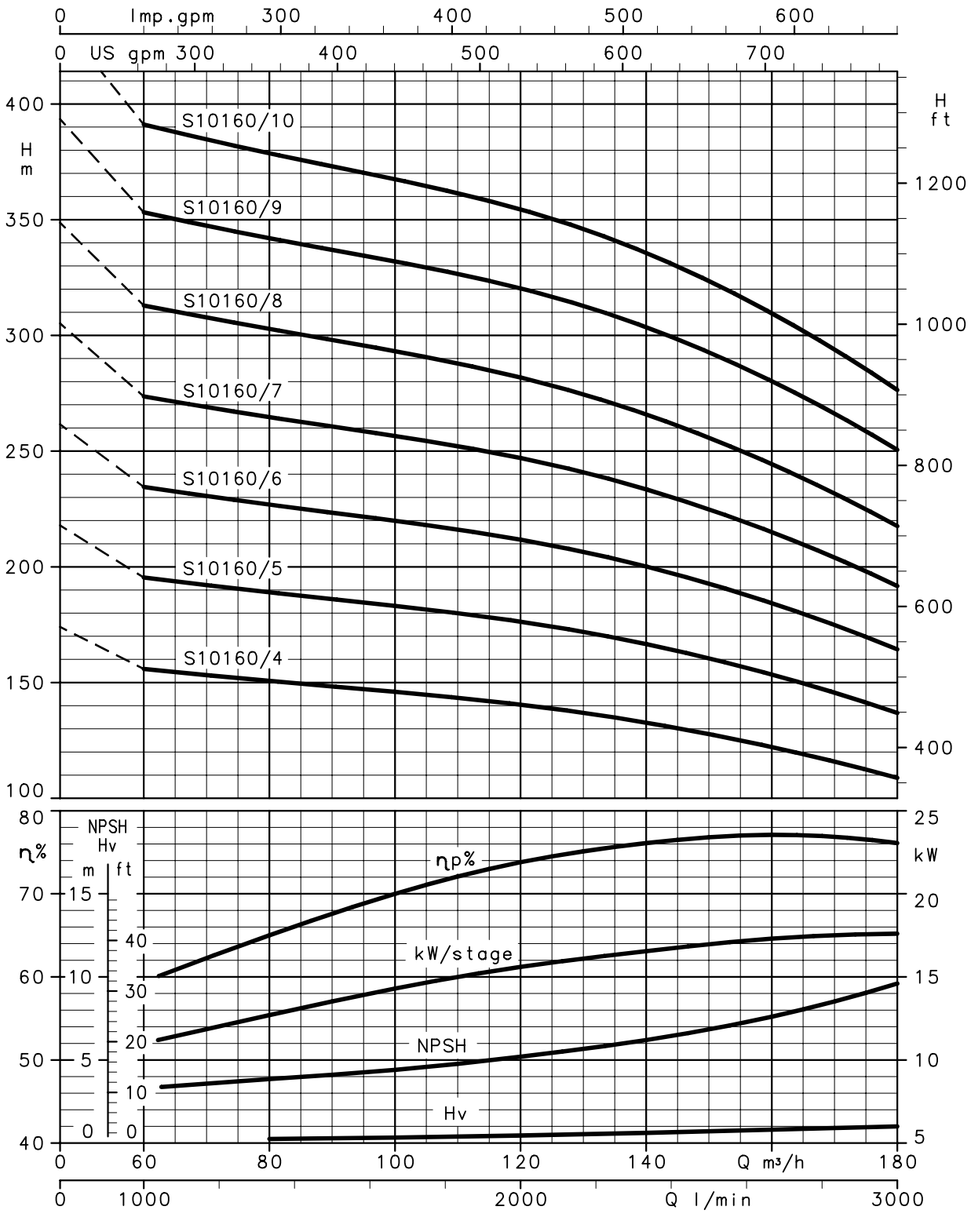
PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S10160/4-L8W	75	2852	1887	250	192	3155	383
S10160/5-L8W	93	3222	2087	250	192	3355	443
S10160/6-L10W	110	3339	2034	258	236	3302	575
S10160/7-L10W	130	3659	2184	258	236	3452	644
S10160/8-L10W	150	3959	2314	258	236	3582	705
S10160/9-L12W	185	3961	2146	283	276	3339	792
S10160/10-L12W	185	4131	2146	283	276	3339	814

s10160a-2p50-en_b_td

1) Max electric pump diameter with 2 motor cables included.
In case of 1 motor cable C = 246 mm with L8W motor.
C = 250 mm with L10W motor and C = 277 mm with L12W motor.
2) Horizontal version : - Admissible up to Qmax = 170 m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 4.5 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 168.3 x 7.1mm L=143 available on request, API thred available on request.
6) For pumps without non-return valve, reduce by 210 mm.

S10160 SERIES, 4 TO 10 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

S10160	~ 2900 rpm	ISO 9906-Annex A



These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

S10220 SERIES, 1 TO 4 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

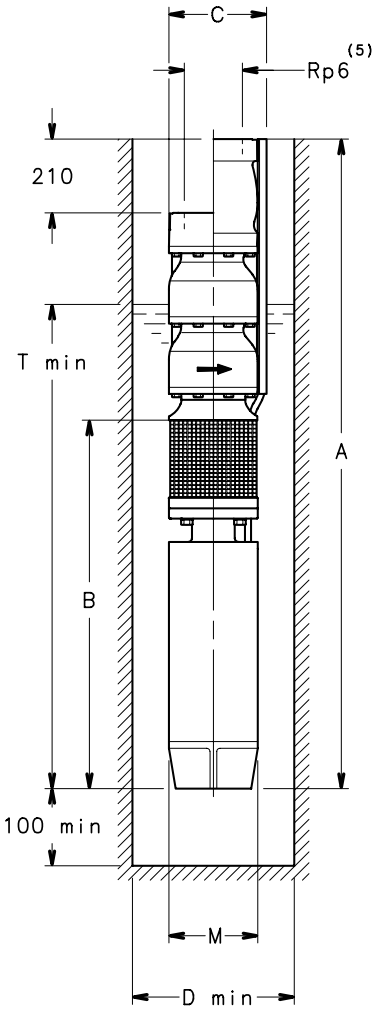
PUMP TYPE	RATED POWER	Q = DELIVERY					
		l/min 0	1333	2167	3000	3667	4667
		m^3/h 0	80	130	180	220	280
	kW	H = TOTAL HEAD METRES COLUMN OF WATER					
S10220/1	22	45	39	35	32	27	18
S10220/2A	45	91	78	71	64	57	39
S10220/2	52	94	80	74	67	59	42
S10220/3	75	139	119	109	99	88	62
S10220/4A	93	179	154	142	128	113	77
S10220/4	110	186	160	147	134	119	84
		l/min 0	1333	2000	2667	3333	4417
		m^3/h 0	80	120	160	200	265
S10220/1B	18,5	40	34	32	29	26	16
S10220/2B	37	78	68	63	58	52	32
S10220/3B	67	117	102	74	87	77	48
		l/min 0	1333	2000	2500	3000	4167
		m^3/h 0	80	120	150	180	250
S10220/1C	15	34	29	27	25	23	13
S10220/2C	30	69	59	54	50	46	27

DIMENSIONS AND WEIGHTS

s10220-2p50-en_b_th

PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S10220/1C-L6W	15	1615	1160	250	144	3733	130
S10220/1B-L6W	18,5	1685	1230	250	144	3803	138
S10220/1-L6W	22	1725	1270	250	144	3843	141
S10220/2C-L6W	30	2103	1478	250	144	4051	180
S10220/2B-L6W	37	2253	1628	250	144	4201	194
S10220/2A-L8W	45	2152	1527	250	192	4095	266
S10220/2-L8W	52	2242	1617	250	192	4185	287
S10220/3B-L8W	67	2592	1797	250	192	4365	344
S10220/3-L8W	75	2682	1887	250	192	4455	361
S10220/4A-L8W	93	3052	2087	250	192	4655	421
S10220/4-L10W	110	2999	2034	258	236	4602	531

s10220-2p50-en_b_td



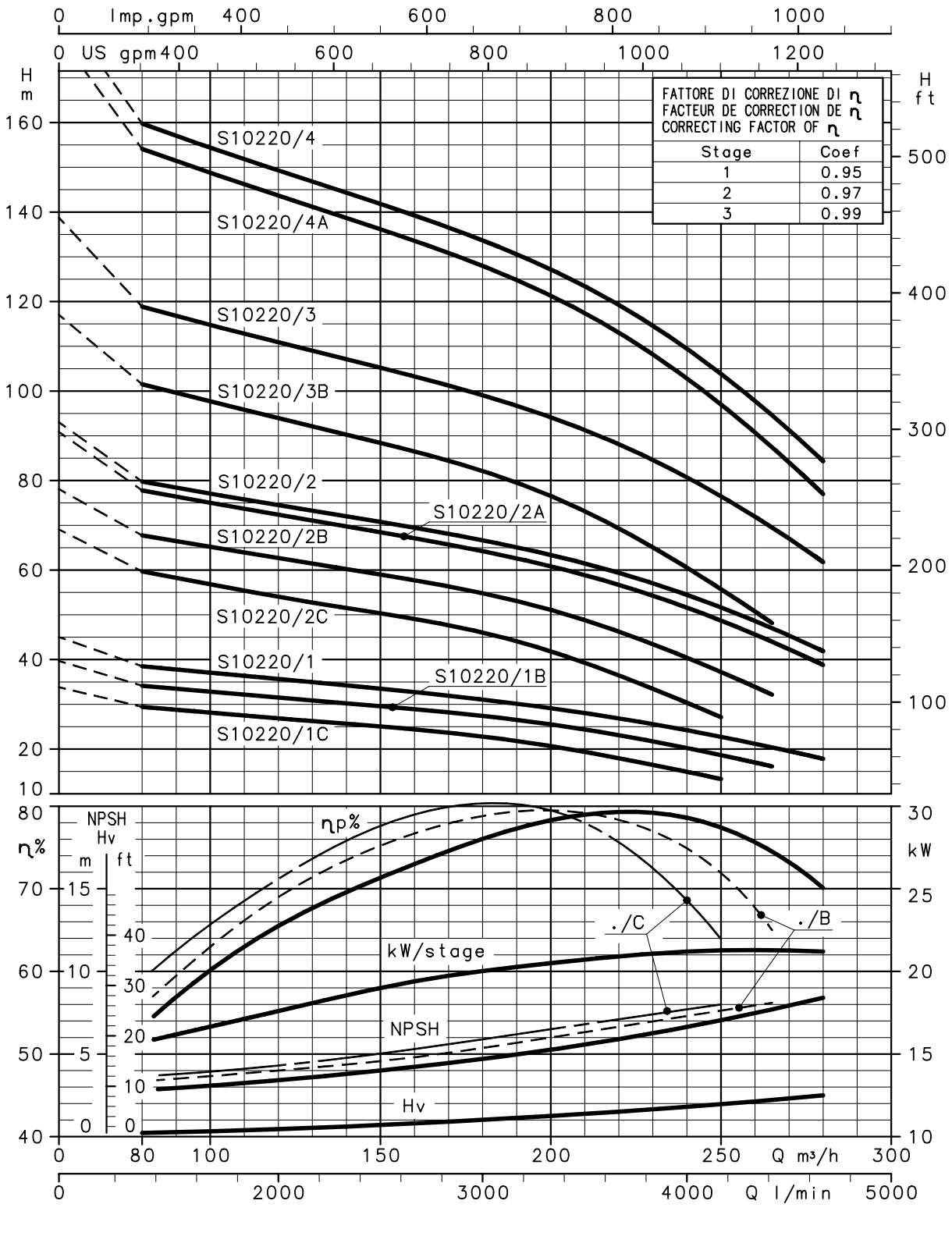
D min = 255 mm (Con Motori 6")
D min = 255 mm (Con Motori 8")
D min = 270 mm (Con Motori 10")

03502_A_DD

1) Max electric pump diameter with 2 motor cables included.
In case of 1 motor cable C = 246 mm with L6W motor.
C = 246 mm with L8W motor and C = 250 mm with L10W motor.
2) Horizontal version : - Admissible up to Qmax = 270 m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 6.8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 168.3 x 7.1mm L=143 available on request, API thred available on request.
6) For pumps without non-return valve, reduce by 210 mm.

S10220 SERIES, 1 TO 4 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

S10220	~ 2900 rpm	ISO 9906-Annex A

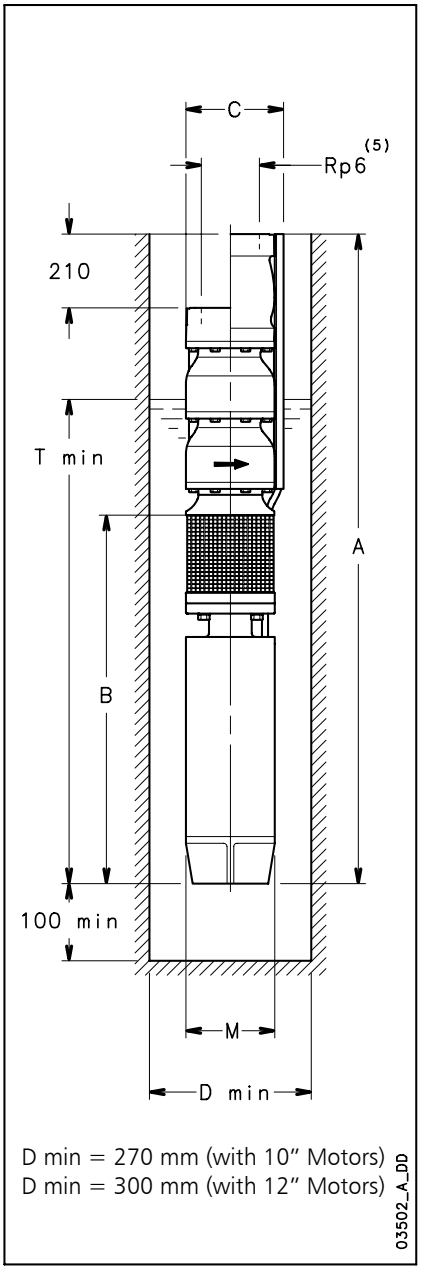


These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

S10220 SERIES, 5 TO 10 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	RATED POWER	Q = DELIVERY					
		l/min 0	1333	2167	3000	3667	4667
		m^3/h 0	80	130	180	220	280
	kW	H = TOTAL HEAD METRES COLUMN OF WATER					
S10220/5A	110	218	188	171	155	135	89
S10220/5	130	233	199	183	167	148	104
S10220/6A	150	260	224	207	185	163	107
S10220/6	150	278	239	219	198	177	125
S10220/7A	185	304	262	238	215	188	123
S10220/7	185	325	280	257	235	209	148
S10220/8	185	370	318	293	267	237	167
S10220/9	220	420	360	333	302	271	193
S10220/10A	220	436	377	347	313	276	184
S10220/10	260	466	402	370	337	302	215

s10220a-2p50-en_b_th



D min = 270 mm (with 10" Motors)
D min = 300 mm (with 12" Motors)

03502_A_DD

DIMENSIONS AND WEIGHTS

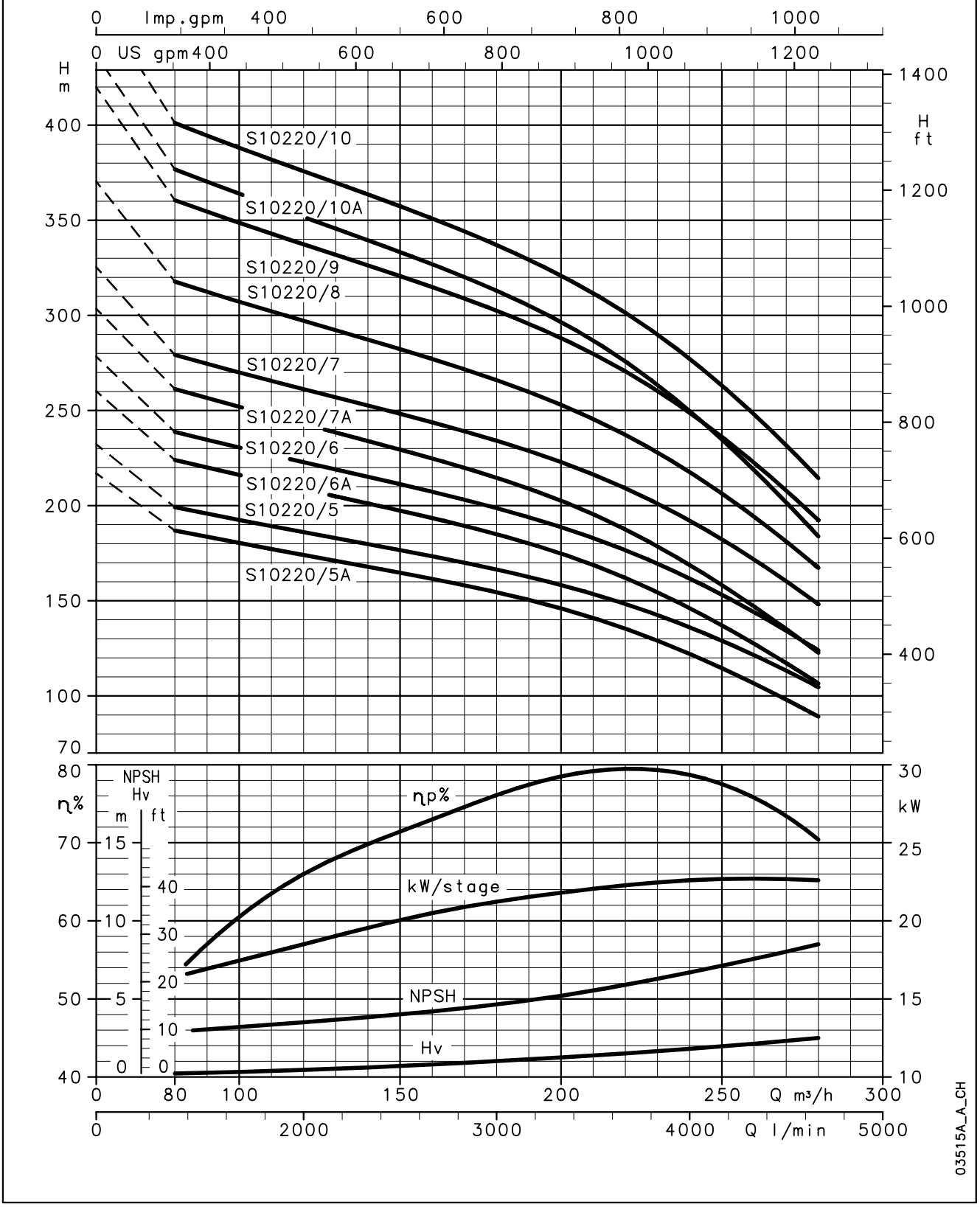
PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S10220/5A-L10W	110	3169	2034	258	236	4602	553
S10220/5-L10W	130	3319	2184	258	236	4752	600
S10220/6A-L10W	150	3619	2314	258	236	4882	661
S10220/6-L10W	150	3619	2314	258	236	4882	661
S10220/7A-L12W	185	3621	2146	283	276	4639	748
S10220/7-L12W	185	3621	2146	283	276	4639	748
S10220/8-L12W	185	3791	2146	283	276	4639	770
S10220/9-L12W	220	4111	2296	283	276	4789	856
S10220/10A-L12W	220	4281	2296	283	276	4789	878
S10220/10-L12W	260	4431	2446	283	276	4939	942

s10220a-2p50-en_b_td

1) Max electric pump diameter with 2 motor cables included.
In case of 1 motor cable C = 250 mm with L10W motor.
C = 277 mm with L12W motor.
2) Horizontal version : - Admissible up to Qmax = 270 m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 6.8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 168.3 x 7.1mm L=143 available on request, API thred available on request.
6) For pumps without non-return valve, reduce by 210 mm.

S10220 SERIES, 5 TO 10 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

S10220	~ 2900 rpm	ISO 9906-Annex A



These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

S10300 SERIES, 1 TO 3 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

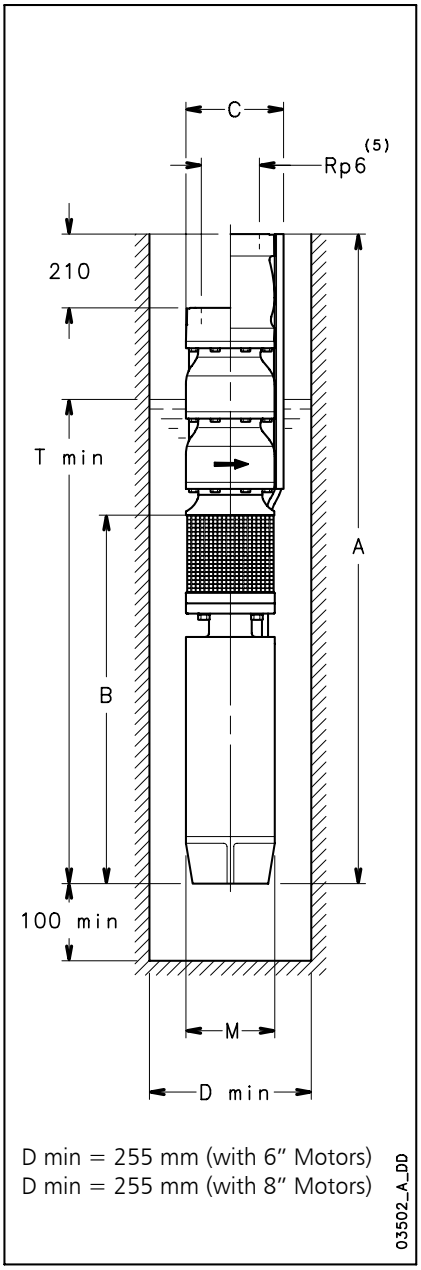
PUMP TYPE	RATED POWER	Q = DELIVERY					
		l/min 0	2000	3000	4000	4833	6000
		m^3/h 0	120	180	240	290	360
	kW	H = TOTAL HEAD METRES COLUMN OF WATER					
S10300/1	26	43	34	30	27	23	16
S10300/2	55	85	68	60	54	48	32
S10300/3	75	127	103	91	82	73	48
		l/min 0	2000	3000	4000	4833	5667
		m^3/h 0	120	180	240	290	340
S10300/1A	22	37	29	25	23	19	14
S10300/2A	45	75	60	52	47	41	31
		l/min 0	2000	3000	3667	4500	5333
		m^3/h 0	120	180	220	270	320
S10300/1B	18,5	32	25	22	20	18	14
S10300/2B	37	65	52	44	42	38	30

s10300-2p50-en_b_th

DIMENSIONS AND WEIGHTS

PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S10300/1B-L6W	18,5	1685	1230	250	144	3803	138
S10300/1A-L6W	22	1725	1270	250	144	3843	141
S10300/1-L6W	26	1853	1398	250	144	3971	150
S10300/2B-L6W	37	2253	1628	250	144	4201	194
S10300/2A-L8W	45	2152	1527	250	192	4095	267
S10300/2-L8W	55	2282	1657	250	192	4225	292
S10300/3-L8W	75	2682	1887	250	192	4455	360

s10300-2p50-en_b_td



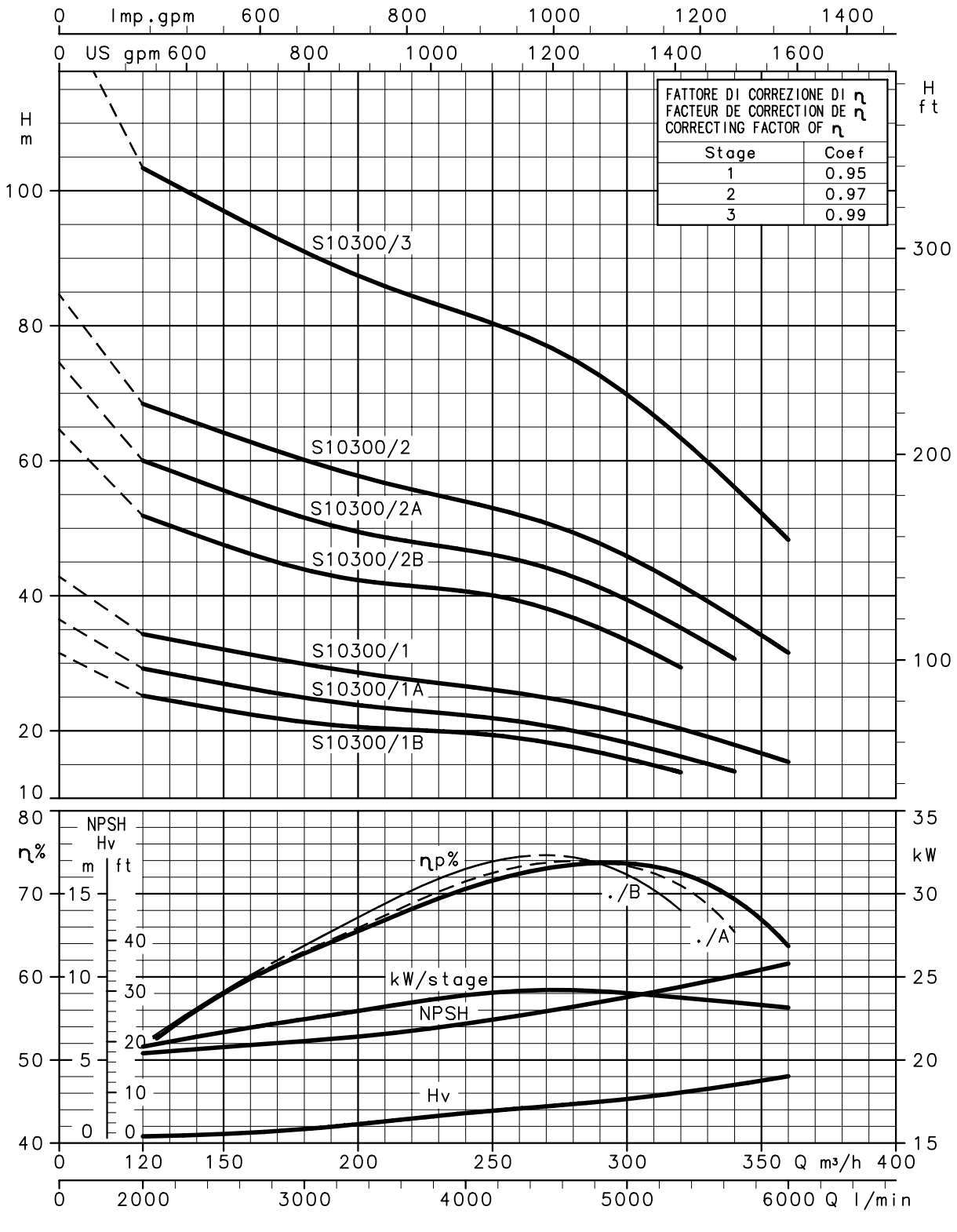
D min = 255 mm (with 6" Motors)
D min = 255 mm (with 8" Motors)

03502_A_DD

1) Max electric pump diameter with 2 motor cables included.
In case of 1 motor cable C = 246 mm with L6W motor.
C = 246 mm with L8W motor.
2) Horizontal version : - Admissible up to Qmax = 340m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 6.8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 168.3 x 7.1mm L=143 available on request, API thred available on request.
6) For pumps without non-return valve, reduce by 210 mm.

S10300 SERIES, 1 TO 3 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

S10300	~ 2900 rpm	ISO 9906-Annex A

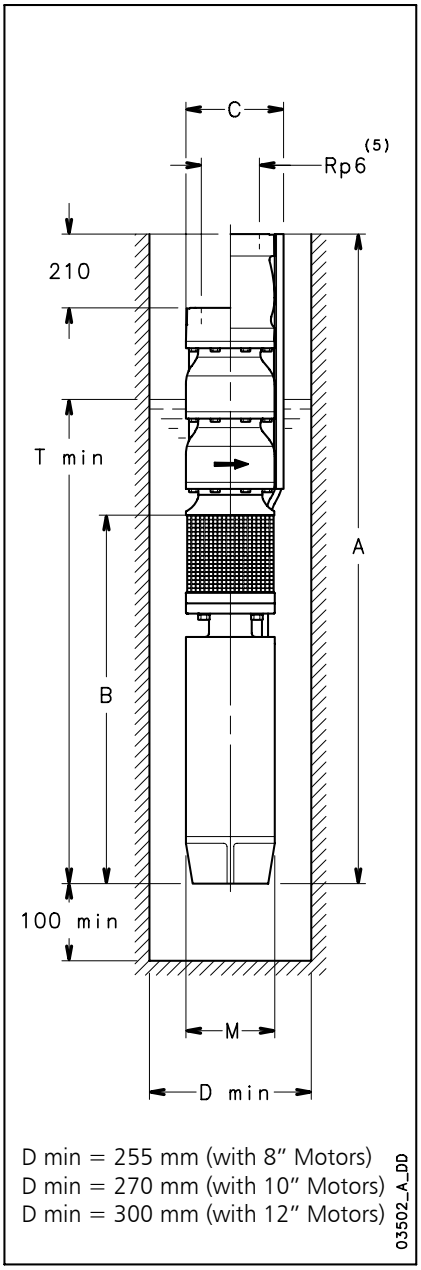


These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

S10300 SERIES, 4 TO 10 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	RATED POWER	Q = DELIVERY					
		l/min 0	2000	3000	4000	4833	6000
		m^3/h 0	120	180	240	290	360
	kW	H = TOTAL HEAD METRES COLUMN OF WATER					
S10300/4	110	169	136	121	108	95	63
S10300/5	130	212	171	151	135	120	79
S10300/6	150	254	204	180	160	141	93
S10300/7	185	296	240	212	190	169	112
S10300/8	220	341	276	244	220	197	130
S10300/9	220	384	312	274	247	222	147
S10300/10	260	426	347	305	269	246	164
		l/min 0	2000	3000	4000	4833	5667
		m^3/h 0	120	180	240	290	340
S10300/4A	93	150	121	104	94	84	62

s10300a-2p50-en_b_th



D min = 255 mm (with 8" Motors)
D min = 270 mm (with 10" Motors)
D min = 300 mm (with 12" Motors)

03502_A_DD

DIMENSIONS AND WEIGHTS

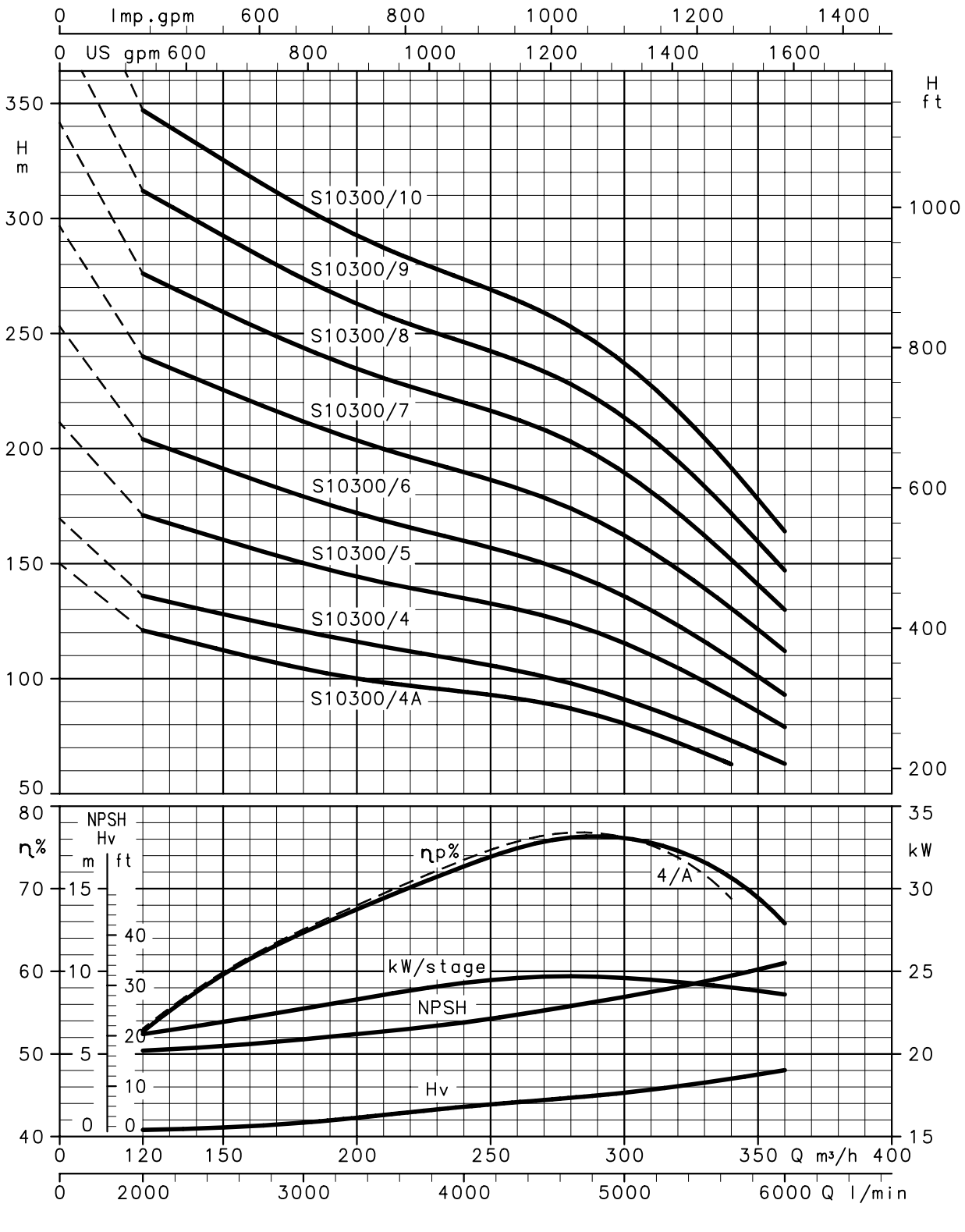
PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S10300/4A-L8W	93	3052	2087	250	192	4655	421
S10300/4-L10W	110	2999	2034	258	236	4602	531
S10300/5-L10W	130	3319	2184	258	236	4752	600
S10300/6-L10W	150	3619	2314	258	236	4882	661
S10300/7-L12W	185	3621	2146	283	276	4639	748
S10300/8-L12W	220	3941	2296	283	276	4789	834
S10300/9-L12W	220	4111	2296	283	276	4789	856
S10300/10-L12W	260	4431	2446	283	276	4939	942

s10300a-2p50-en_b_td

1) Max electric pump diameter with 2 motor cables included.
In case of 1 motor cable C = 246 mm with L8W motor.
C = 250 mm with L10W motor and C = 277 mm with L12W motor.
2) Horizontal version : - Admissible up to Qmax = 340m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 6.8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 168.3 x 7.1mm L=143 available on request, API thred available on request.
6) For pumps without non-return valve, reduce by 210 mm.

S10300 SERIES, 4 TO 10 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

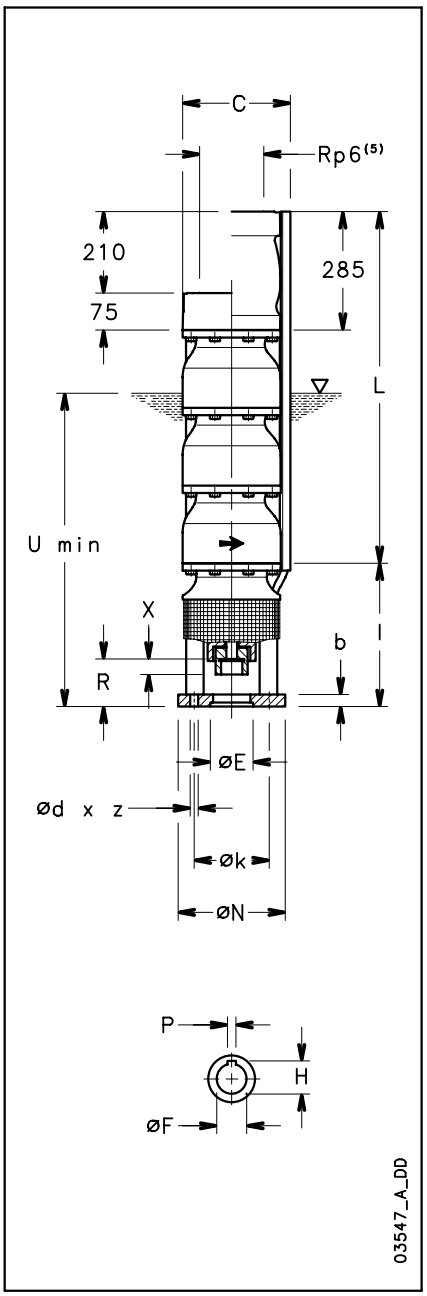
S10300	~ 2900 rpm	ISO 9906-Annex A



These performances are valid for liquids with density $\rho = 1.0$ Kg/dm^3 and kinematic viscosity $\nu = 1$ mm^2/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

S10160 SERIES
DIMENSIONS AND WEIGHTS

PUMP TYPE	MAX POWER ABSORBED BY PUMP kW	NUMBER OF PUMPS BEARINGS	DIMENSIONS (mm) L (6)	C (1)	U (3)	WEIGHT kg	MIN. WELL DIAM. mm
S10160/1B	10,9	2	455	250	1600	64	255
S10160/1A	14,6	2	455	250	1600	64	255
S10160/1	17,6	2	455	250	1600	64	255
S10160/2B	21,6	3	625	250	1600	86	255
S10160/2A	29,5	3	625	250	1600	86	255
S10160/2	34,8	3	625	250	1600	86	255
S10160/3A	45	4	795	250	1600	108	255
S10160/3	55	4	795	250	1600	108	255
S10160/4	74	5	965	250	1600	130	255
S10160/5	90	6	1135	250	1600	152	255
S10160/6	110	7	1305	250	1600	174	255
S10160/7	130	8	1475	250	1600	196	255
S10160/8	147	9	1645	250	1600	218	255
S10160/9	166	10	1815	255	1600	240	300
S10160/10	183	11	1985	255	1600	262	300



MOTOR COUPLING

s10160p-2p50-en_a_td

MOTOR CONNECTION	DIMENSIONS (mm) N	k	d	z	b	E H7	R	l
6" (NEMA)	226	111	13,5	4	20	76,2	73	237
8" (NEMA)	226	152,4	18	4	25	127	101,3	332
10"	226	190,5	18	4	25	127	101,3	332
12"	232	190,5	20	4	20	127	127	407

COUPLING	DIMENSIONS (mm) Profile of gear coupling according to NEMA NUMBER OF TEETH	DIAMETRAL PITCH	PRESSURE ANGLE	X
6" (NEMA)	15	16/32	30°	22
8" (NEMA)	23	16/32	30°	38,5

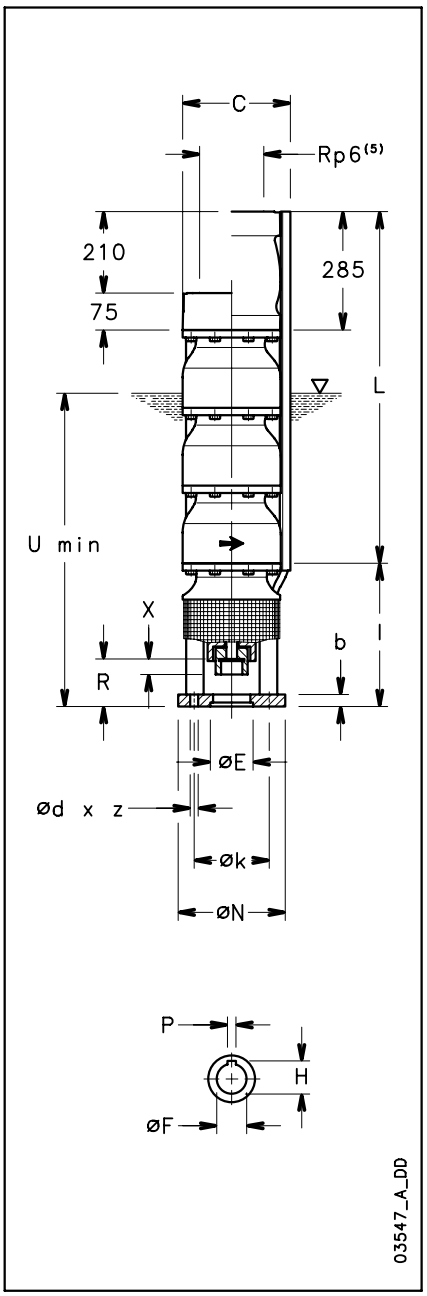
COUPLING	DIMENSIONS (mm) F +0.084 +0.059	H +0.1	P +0.05 +0.02	X
10"	42,8	48,3	9,5	84,5
12"	55	59,3	16	108

s10-mtcn-2p50-en_a_td

1) Max pump diameter with 2 motor cables included.
2) Horizontal version : - Admissible up to Qmax = 170 m³/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) U min valid only for max flow speed of 4,5 m/s between pump and perforation pipe.
4) For coupling with a 12" motor, the min. well diam. = 300 mm.
5) Threaded pipe diam. 168.3 x 7.1mm L=143 available on request, API thred available on request.
6) For pumps without non-return valve, reduce by 210 mm.

S10220 SERIES
DIMENSIONS AND WEIGHTS

PUMP TYPE	MAX POWER ABSORBED BY PUMP kW	NUMBER OF PUMPS BEARINGS	DIMENSIONS (mm) L (6)	C (1)	U (3)	WEIGHT kg	MIN. WELL DIAM. mm
S10220/1C	14,8	2	455	250	2900	64	255
S10220/1B	18,5	2	455	250	2900	64	255
S10220/1	21,8	2	455	250	2900	64	255
S10220/2C	30	3	625	250	2900	86	255
S10220/2B	37	3	625	250	2900	86	255
S10220/2A	43,5	3	625	250	2900	86	255
S10220/2	47,5	3	625	250	2900	86	255
S10220/3B	60,6	4	795	250	2900	108	255
S10220/3	71	4	795	250	2900	108	255
S10220/4A	89	5	965	250	2900	130	255
S10220/4	95,6	5	965	250	2900	130	255
S10220/5A	110	6	1135	250	2900	152	255
S10220/5	119	6	1135	250	2900	152	255
S10220/6A	132	7	1305	250	2900	174	255
S10220/6	141,5	7	1305	250	2900	174	255
S10220/7A	153	8	1475	255	2900	196	300
S10220/7	164	8	1475	255	2900	196	300
S10220/8	185	9	1645	255	2900	218	300
S10220/9	208,5	10	1815	255	2900	240	300
S10220/10A	216	11	1985	255	2900	262	300
S10220/10	230	11	1985	255	2900	262	300



MOTOR COUPLING

s10220p-2p50-en_a_td

MOTOR CONNECTION	DIMENSIONS (mm) N	k	d	z	b	E H7	R	l
6" (NEMA)	226	111	13,5	4	20	76,2	73	237
8" (NEMA)	226	152,4	18	4	25	127	101,3	332
10"	226	190,5	18	4	25	127	101,3	332
12"	232	190,5	20	4	20	127	127	407

COUPLING	DIMENSIONS (mm) Profile of gear coupling according to NEMA NUMBER OF TEETH	DIAMETRAL PITCH	PRESSURE ANGLE	X
6" (NEMA)	15	16/32	30°	22
8" (NEMA)	23	16/32	30°	38,5

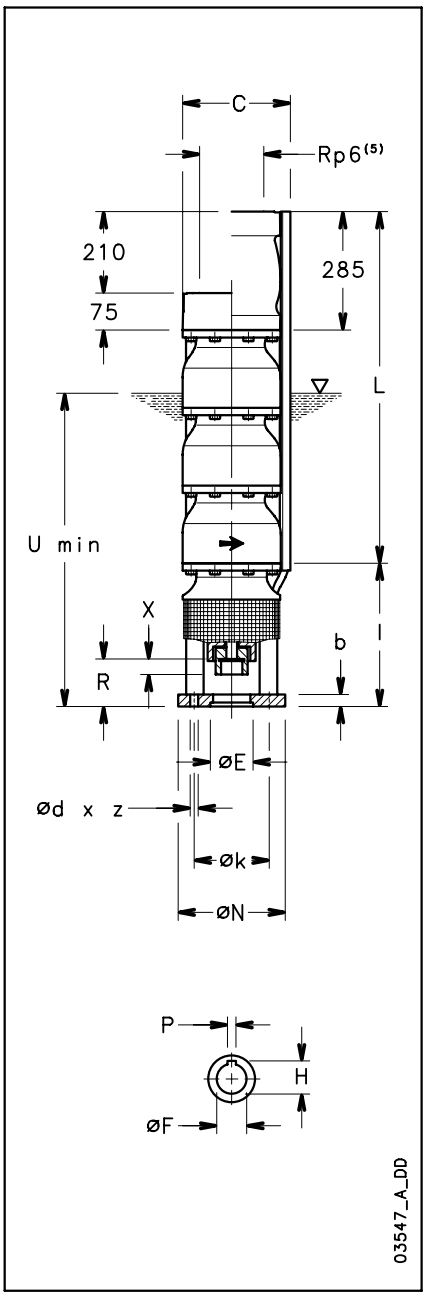
COUPLING	DIMENSIONS (mm) F +0.084 +0.059	H +0.1	P +0.05 +0.02	X
10"	42,8	48,3	9,5	84,5
12"	55	59,3	16	108

s10-mtcn-2p50-en_a_td

1) Max pump diameter with 2 motor cables included.
2) Horizontal version : - Admissible up to Qmax = 270 m³/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) U min valid only for max flow speed of 4,5 m/s between pump and perforation pipe.
4) For coupling with a 12" motor, the min. well diam. = 300 mm.
5) Threaded pipe diam. 168.3 x 7.1mm L=143 available on request, API thred available on request.
6) For pumps without non-return valve, reduce by 210 mm.

S10300 SERIES
DIMENSIONS AND WEIGHTS

PUMP TYPE	MAX POWER ABSORBED BY PUMP kW	NUMBER OF PUMPS BEARINGS	DIMENSIONS (mm) L (6)	C (1)	U (3)	WEIGHT kg	MIN. WELL DIAM. mm
S10300/1B	18,5	2	455	250	2900	64	255
S10300/1A	22	2	455	250	2900	64	255
S10300/1	25	2	455	250	2900	64	255
S10300/2B	37	3	625	250	2900	86	255
S10300/2A	44	3	625	250	2900	86	255
S10300/2	52	3	625	250	2900	86	255
S10300/3	75	4	795	250	2900	108	255
S10300/4A	89	5	965	250	2900	130	255
S10300/4	103	5	965	250	2900	130	255
S10300/5	129	6	1135	250	2900	152	255
S10300/6	150	7	1305	250	2900	174	255
S10300/7	178	8	1475	255	2900	196	300
S10300/8	203	9	1645	255	2900	218	300
S10300/9	220	10	1815	255	2900	240	300
S10300/10	250	11	1985	255	2900	262	300



MOTOR COUPLING

s10300p-2p50-en_a_td

MOTOR CONNECTION	DIMENSIONS (mm) N	k	d	z	b	E H7	R	l
6" (NEMA)	226	111	13,5	4	20	76,2	73	237
8" (NEMA)	226	152,4	18	4	25	127	101,3	332
10"	226	190,5	18	4	25	127	101,3	332
12"	232	190,5	20	4	20	127	127	407

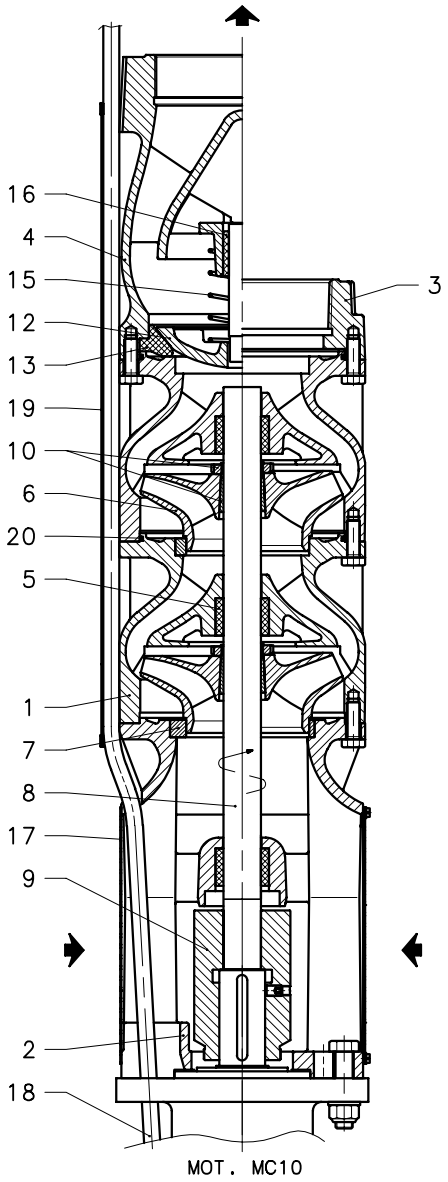
COUPLING	DIMENSIONS (mm) Profile of gear coupling according to NEMA NUMBER OF TEETH	DIAMETRAL PITCH	PRESSURE ANGLE	X
6" (NEMA)	15	16/32	30°	22
8" (NEMA)	23	16/32	30°	38,5

COUPLING	DIMENSIONS (mm) F +0.084 +0.059	H +0.1	P +0.05 +0.02	X
10"	42,8	48,3	9,5	84,5
12"	55	59,3	16	108

s10-mtcn-2p50-en_a_td

1) Max pump diameter with 2 motor cables included.
2) Horizontal version : - Admissible up to Qmax = 340 m³/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) U min valid only for max flow speed of 4,5 m/s between pump and perforation pipe.
4) For coupling with a 12" motor, the min. well diam. = 300 mm.
5) Threaded pipe diam. 168.3 x 7.1mm L=143 available on request, API thred available on request.
6) For pumps without non-return valve, reduce by 210 mm.

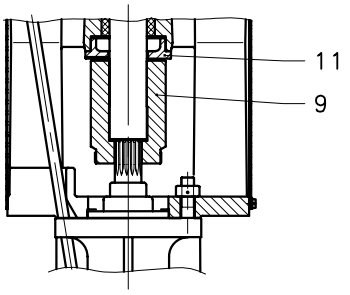
S10 SERIES
PUMP SECTION AND LIST OF COMPONENT



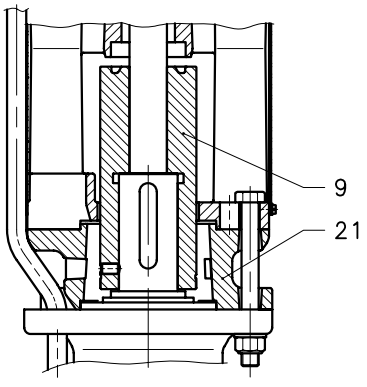
MOT. MC10

REF. N.	DESCRIPTION
1	Stage casing
2	Suction casing
3	Discharge casing
4	Valve body
5	Bearing bush
6	Radial flow impeller
7	Casing wear ring
8	Pump shaft
9	Coupling
10	Locating sleeve with nut
11	Shaft thrust bearing
12	Valve plate with joint
13	Valve seat
15	Valve spring
16	Socket ring
17	Suction strainer
18	Cable
19	Cable protection
20	O-ring
21	Adapter for motor MC12"

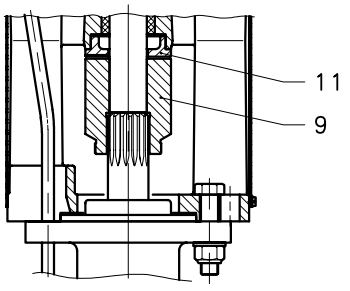
s10-2p50-en_a_tp



MOT. F6
(6" Nema)



MOT. MC12



MOT. MC8
(8" Nema)

03527_A_DS

ITT

Lowara

12" Submersible Electric Pumps

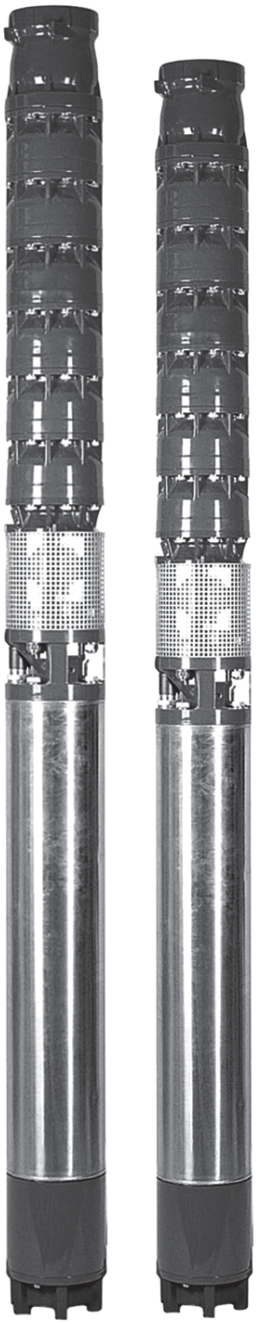
S12390 S12475 Series

Market sectors

AGRICULTURAL, INDUSTRIAL.

Applications

- Water supply from deep wells.
- Pressure boosting and water distribution in civil and industrial systems.
- Supply of surge tanks and reservoirs.
- Firefighting and washing systems.
- Water table level control.
- Irrigation.



Specifications

PUMP

- **Delivery**: up to 550 m^3/h.
- **Head**: up to 340 m.
- Maximum pump overall diameter (2 cable covers included): 298 mm.
- Maximum electric pump immersion depth: 350 m with L8W, L10W and L12W motors.
- Maximum permissible quantity of suspended sand: 25 g/m^3.
- Standard delivery outlet: 8" API for all versions.

MOTOR

- L8W, L10W and L12W rewindable three-phase motors with water filled winding.
- Three-phase version:
  L8W: 30 to 93 kW 380-415 V, 50 Hz.
  L10W: 93 to 150 kW 380-415 V, 50 Hz.
  L12W: 185 to 300 kW 380-415 V, 50 Hz.
- Maximum supply voltage variations: L8W, L10W and L12W 400V ±10%.
- PVC windings for L8W, L10W and L12W motors.
- Horizontal operation on request for all versions.
- Maximum number of starts per hour: 10 (L8W) 8 (L10W) 4 (L12W).
- Maximum temperature of water in contact with motor: L8W, L10W and L12W 25°C.

Construction features

PUMP

- Vertical multistage centrifugal pump with semiaxial impellers.
- Cast iron impellers on all versions.
- Cast iron diffusers on all versions.
- Non-return valve with integrated spring in delivery head (standard feature).
- The guide bearings and wear rings, made of special high nitrile-content rubber, ensure high resistance to wear and guarantee the constant and long-lasting performance of the hydraulic characteristics.
- Coupling and flange designed for coupling to L10W and L12W motors; versions for L8W motor with flange and shaft according to **NEMA** standards, are available on request.

Optional features

PUMP

- Bronze or V4460 stainless steel diffusers and impellers.

MOTOR

- Different voltages and frequencies.
- High temperature versions.
- Versions for horizontal installation.

Accessories

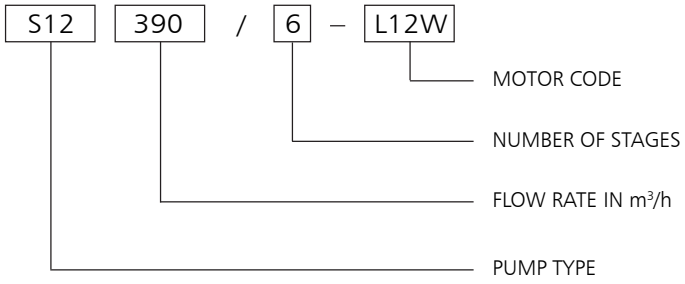
- Coupling flange.
- Panels.
- Drop cables.

TABLE OF MATERIALS S12 SERIES

COMPONENT	MATERIAL	DESIGNATION			NOTES
		EN	EN 10088 Nr.	AISI/ASTM	
Impellers	Grey iron	EN-GJL-250		Class 30	
Lower support	Grey iron	EN-GJL-250		Class 30	
Delivery head	Grey iron	EN-GJL-250		Class 30	
Wear rings	-				
Diffuser	Grey iron	EN-GJL-250		Class 30	
Pump shaft	Stainless steel	X20Cr13	1,4021	AISI 420	
Bushings	EPDM				

s12-2p50-en_a_tm

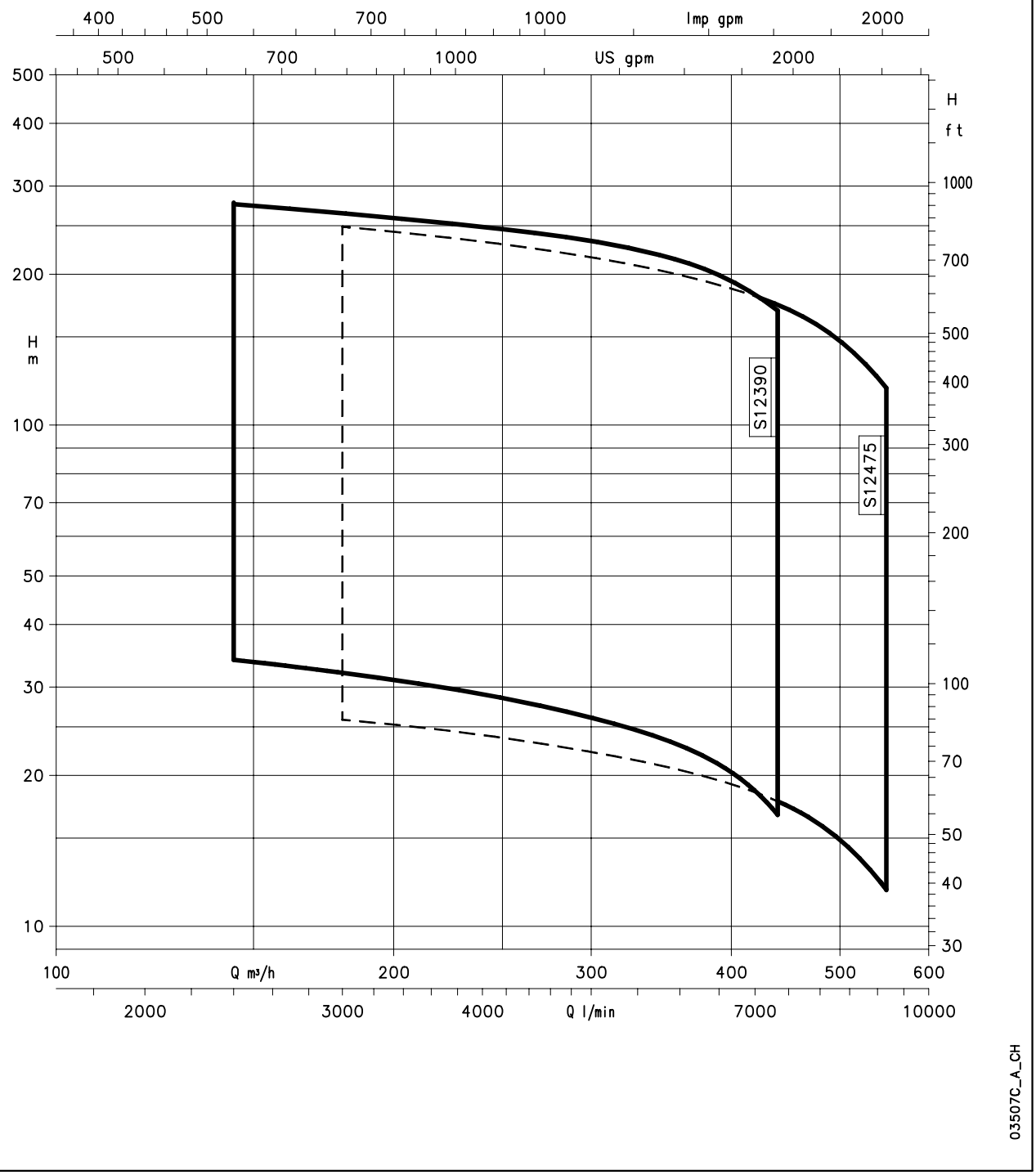
IDENTIFICATION CODE



EXAMPLE : S12390/6 - L8W
12" electric pump 50 Hz, flow rate 390 m³/h, 6 stages, coupled to an 12" L12W motor.

S12 SERIES
HYDRAULIC PERFORMANCE RANGE AT 50 Hz

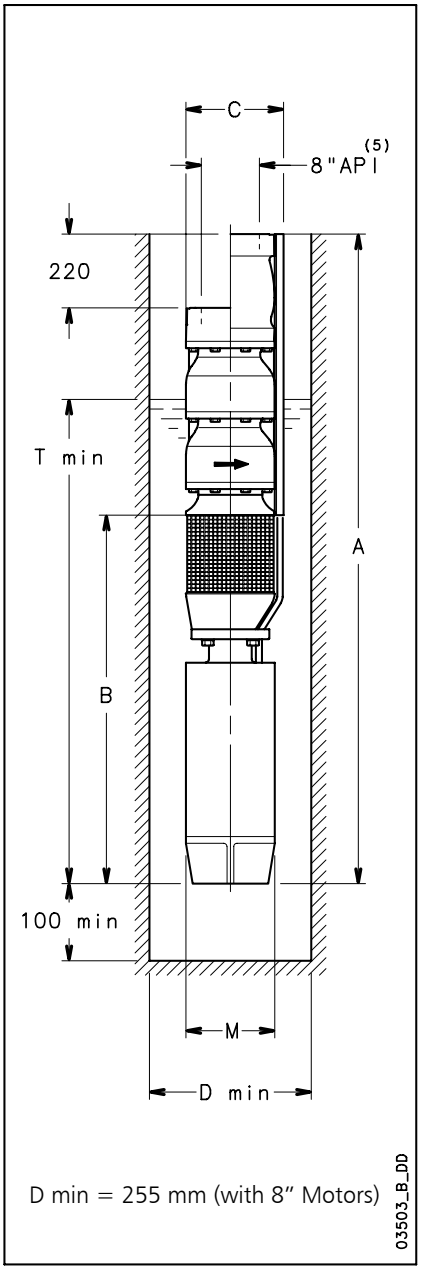
S12	~ 2900 rpm	ISO 9906-Annex A



S12390 SERIES, 1 TO 2 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	RATED POWER	Q = DELIVERY					
		l/min 0	4000	4667	5500	6333	7333
		m^3/h 0	240	280	330	380	440
	kW	H = TOTAL HEAD METRES COLUMN OF WATER					
S12390/1	45	56	39	37	36	33	27
S12390/2	93	112	80	76	73	67	55
		l/min 0	4000	4667	5500	6000	6917
		m^3/h 0	240	280	330	360	415
S12390/1A	37	48	34	32	31	29	24
		l/min 0	4000	4667	5167	5667	6500
		m^3/h 0	240	280	310	340	390
S12390/1B	30	42	28	27	26	25	21
S12390/2C	55	77	55	51	49	46	/
S12390/2B	75	99	70	66	64	63	55

s12390-2p50-en_b_th



DIMENSIONS AND WEIGHTS

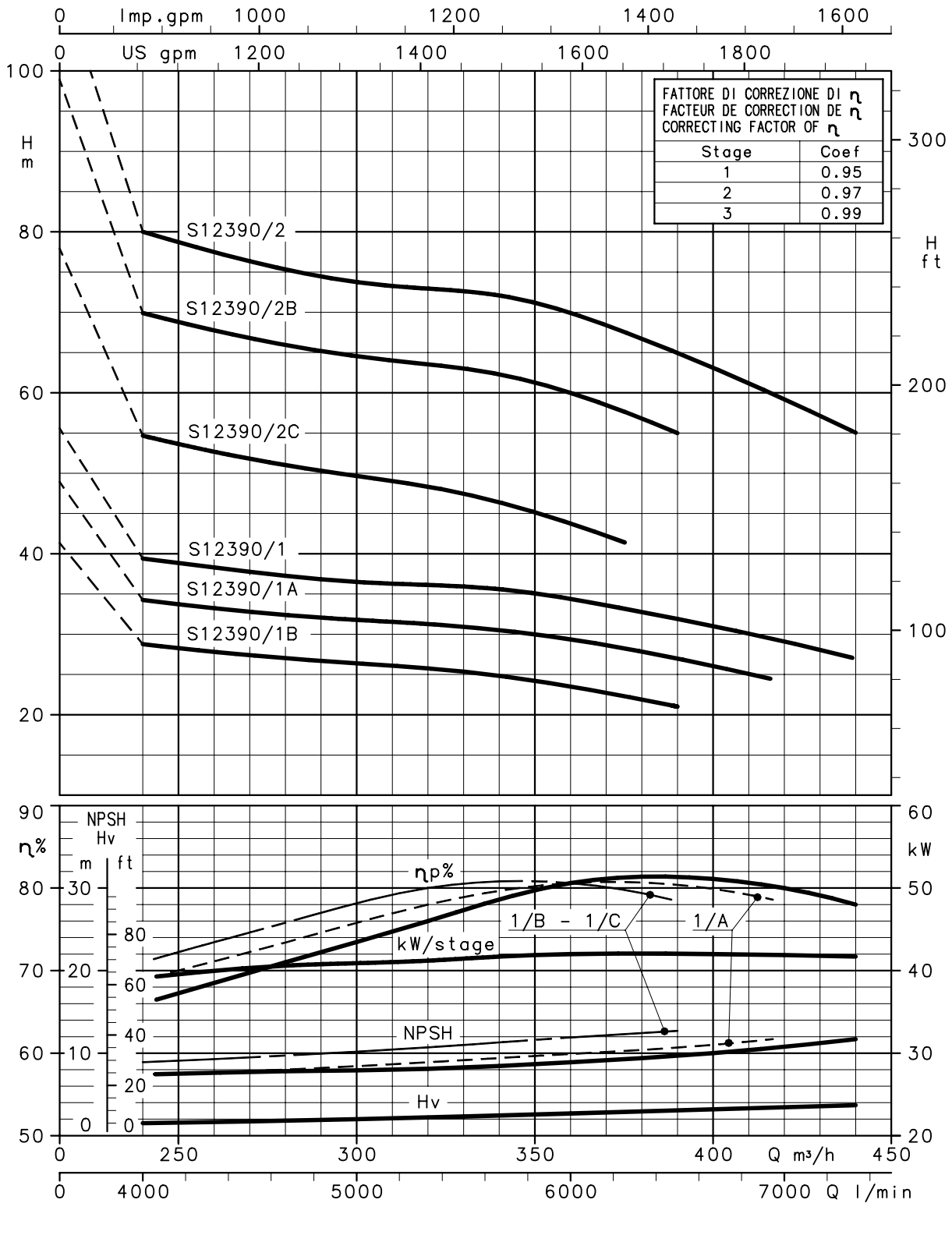
PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S12390/1B-L8W	30	1975	1445	298	192	3915	263
S12390/1A-L8W	37	2065	1535	298	192	4005	280
S12390/1-L8W	45	2155	1625	298	192	4095	298
S12390/2C-L8W	55	2495	1755	298	192	4225	361
S12390/2B-L8W	75	2725	1985	298	192	4455	407
S12390/2-L8W	93	2925	2185	298	192	4655	445

s12390-2p50-en_b_td

1) Max electric pump diameter with 2 motor cables included.
   In case of 1 motor cable C = 290 mm with L8W motor.
2) Horizontal version : - Admissible up to Qmax = 420m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
   - Without non-return valve.
   - Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 6.8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 219.1 x 6.3mm L=143 available on request.
6) For pumps without non-return valve, reduce by 220 mm.

S12390 SERIES, 1 TO 2 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

S12390	~ 2900 rpm	ISO 9906-Annex A

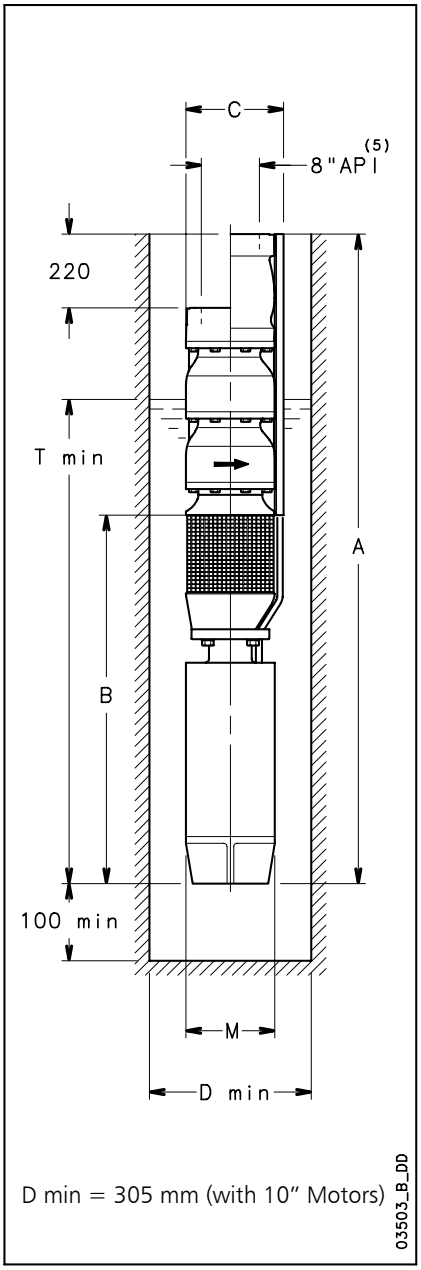


These performances are valid for liquids with density $\rho = 1.0$ Kg/dm^3 and kinematic viscosity $\nu = 1$ mm^2/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

S12390 SERIES, 3 TO 4 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	RATED POWER	Q = DELIVERY					
		l/min 0	4000	4667	5667	6333	7333
		m^3/h 0	240	280	340	380	440
	kW	H = TOTAL HEAD METRES COLUMN OF WATER					
S12390/3	130	167	119	112	108	100	82
S12390/4	185	224	161	152	145	135	111
		l/min 0	4000	4667	5333	6000	6917
		m^3/h 0	240	280	320	360	415
S12390/3A	110	144	101	96	92	87	/
S12390/4A	150	199	139	132	127	120	100

s12390a-2p50-en_b_th



D min = 305 mm (with 10" Motors)

DIMENSIONS AND WEIGHTS

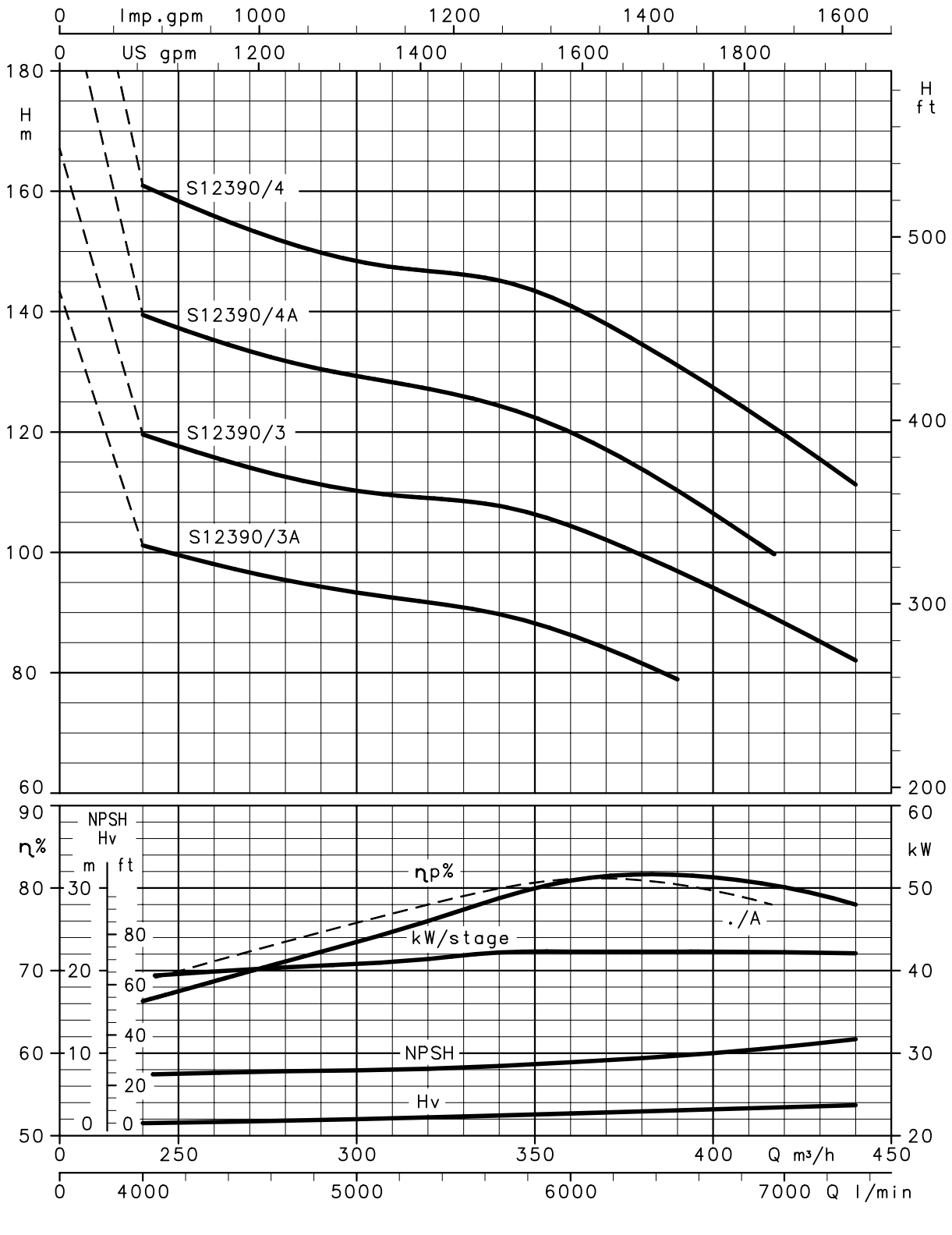
PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S12390/3A-L10W	110	3082	2132	298	236	4602	593
S12390/3-L10W	130	3232	2282	298	236	4752	640
S12390/4A-L10W	150	3572	2412	298	236	4882	716
S12390/4-L10W	185	3404	2244	298	276	4639	781

s12390a-2p50-en_b_td

1) Max electric pump diameter with 2 motor cables included.
   In case of 1 motor cable C = 290 mm with L10W motor.
2) Horizontal version : - Admissible up to Qmax = 420m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
   - Without non-return valve.
   - Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 6.8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 219.1 x 6.3mm L=143 available on request.
6) For pumps without non-return valve, reduce by 220 mm.

S12390 SERIES, 3 TO 4 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

S12390	~ 2900 rpm	ISO 9906-Annex A

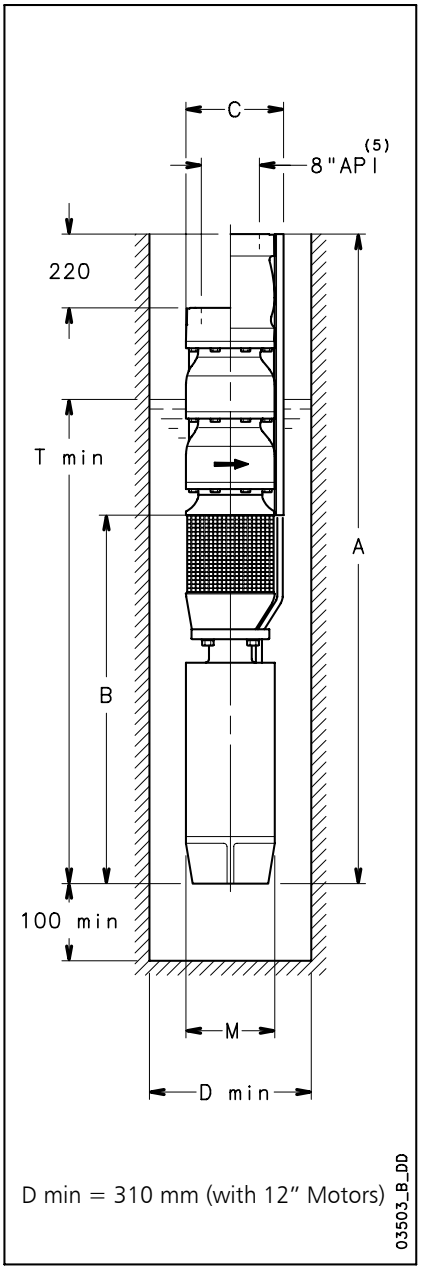


These performances are valid for liquids with density $\rho = 1.0$ Kg/dm^3 and kinematic viscosity $\nu = 1$ mm^2/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

S12390 SERIES, 5 TO 6 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	RATED POWER	Q = DELIVERY l/min	0	4000	4667	5667	6333	7333
		m^3/h	0	240	280	340	380	440
	kW	H = TOTAL HEAD METRES COLUMN OF WATER						
S12390/5	260	283		204	192	184	171	143
S12390/6	300	338		244	229	220	204	169

s12390b-2p50-en_b_th



D min = 310 mm (with 12" Motors)

DIMENSIONS AND WEIGHTS

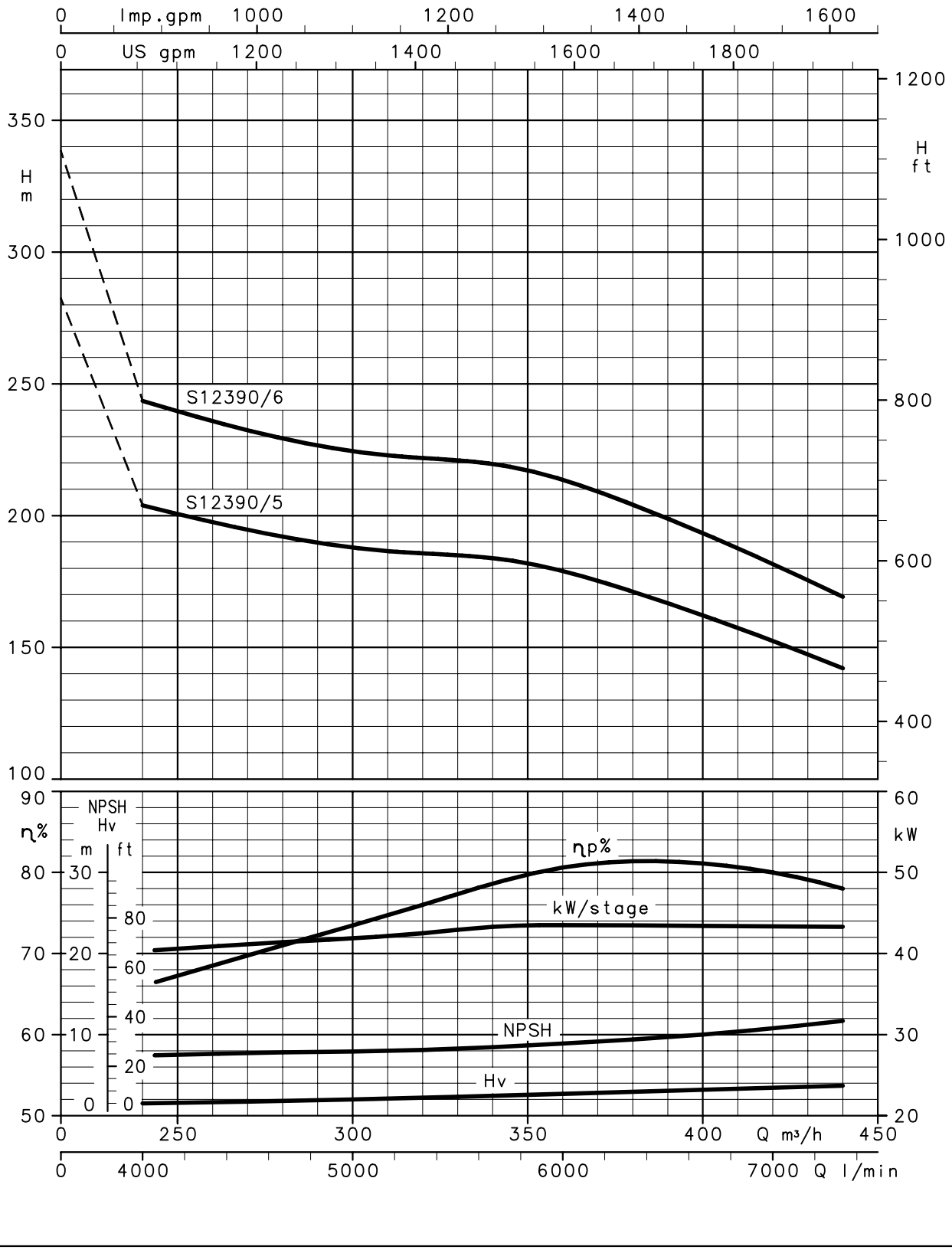
PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S12390/5-L12W	260	3914	2544	304	276	4939	946
S12390/6-L12W	300	4274	2694	304	276	5089	1048

s12390b-2p50-en_b_td

1) Max electric pump diameter with 2 motor cables included.
   In case of 1 motor cable C = 295 mm with L12W motor.
2) Horizontal version : - Admissible up to Qmax = 420m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
   - Without non-return valve.
   - Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 6.8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 219.1 x 6.3mm L=143 available on request.
6) For pumps without non-return valve, reduce by 220 mm.

S12390 SERIES, 5 TO 6 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

S12390	~ 2900 rpm	ISO 9906-Annex A



These performances are valid for liquids with density $\rho = 1.0$ Kg/dm^3 and kinematic viscosity $\nu = 1$ mm^2/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

SS12475 SERIES, 1 TO 2 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

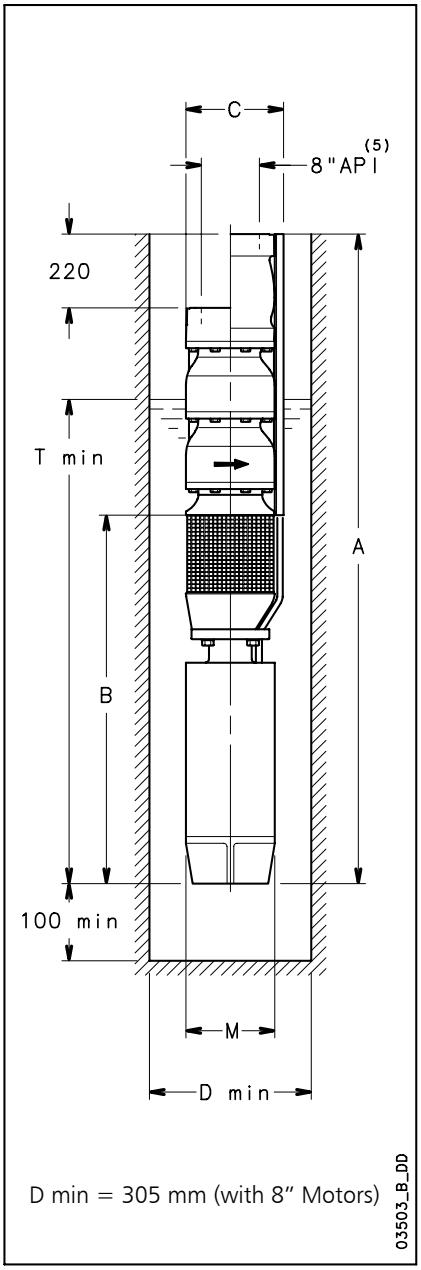
PUMP TYPE	RATED POWER	Q = DELIVERY					
		l/min 0	4167	5500	6667	7917	9167
		m^3/h 0	250	330	400	475	550
	kW	H = TOTAL HEAD METRES COLUMN OF WATER					
S12475/1	45	51	37	34	30	26	18
S12475/2	93	102	75	67	61	52	38
		l/min 0	4167	5167	6167	7083	8917
		m^3/h 0	250	310	370	425	535
S12475/1B	37	41	29	26	24	21	12
		l/min 0	4167	5000	5833	6500	8167
		m^3/h 0	250	300	350	390	490
S12475/1C	30	32	23	20	18	17	9
		l/min 0	4167	5167	6167	6917	8083
		m^3/h 0	250	310	370	415	485
S12475/2C	75	84	61	54	50	45	34

s12475-2p50-en_b_th

DIMENSIONS AND WEIGHTS

PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S12475/1C-L8W	30	1985	1445	298	192	3915	264
S12475/1B-L8W	37	2075	1535	298	192	4005	281
S12475/1-L8W	45	2165	1625	298	192	4095	299
S12475/2C-L8W	75	2745	1985	298	192	4455	409
S12475/2-L8W	93	2945	2185	298	192	4655	447

s12475-2p50-en_b_td

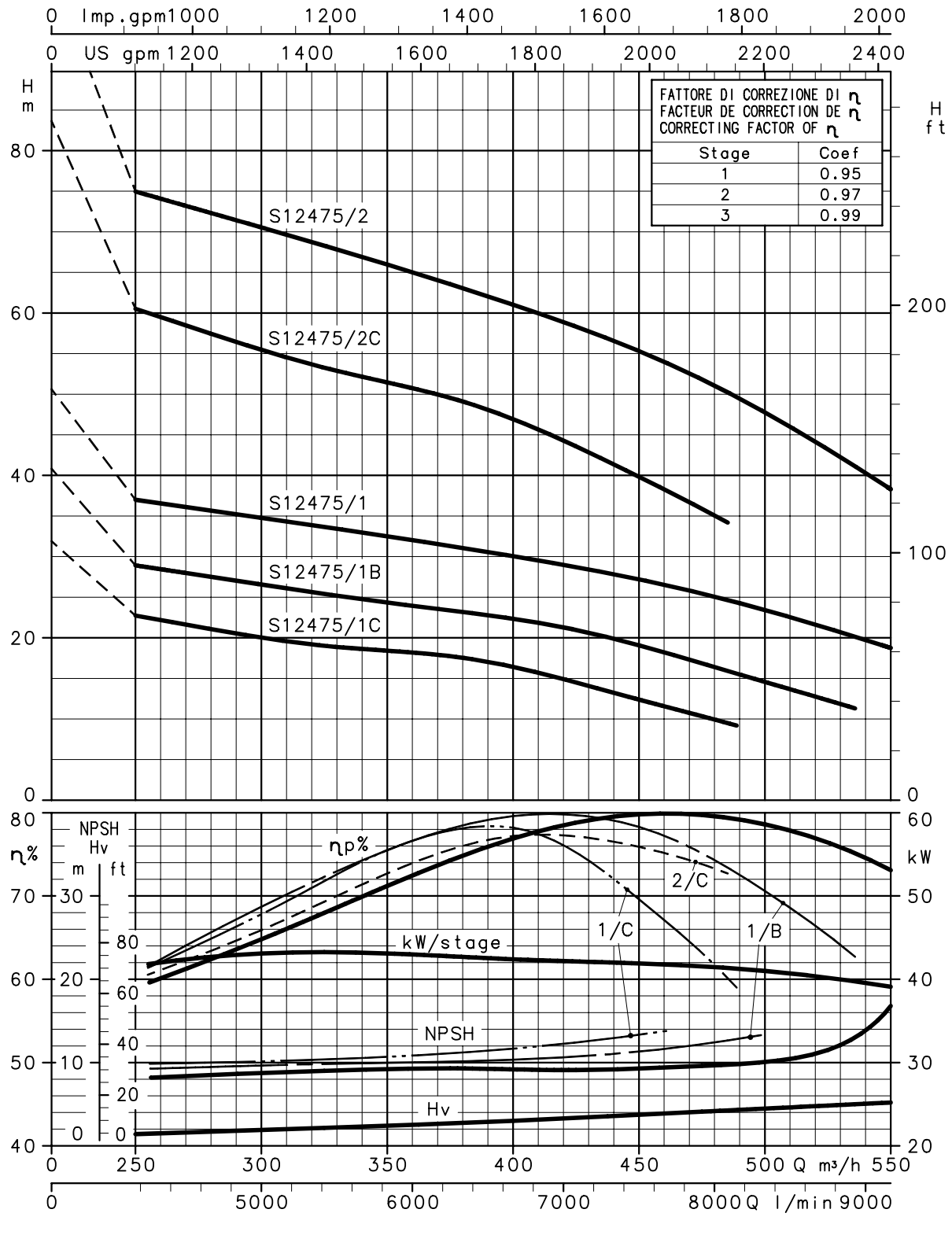


D min = 305 mm (with 8" Motors)

1) Max electric pump diameter with 2 motor cables included.
In case of 1 motor cable C = 290 mm with L8W motor.
2) Horizontal version : - Admissible up to Qmax = 530m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 6.8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 219.1 x 6.3mm L=143 available on request.
6) For pumps without non-return valve, reduce by 220 mm.

S12475 SERIES, 1 TO 2 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

S12475	~ 2900 rpm	ISO 9906-Annex A

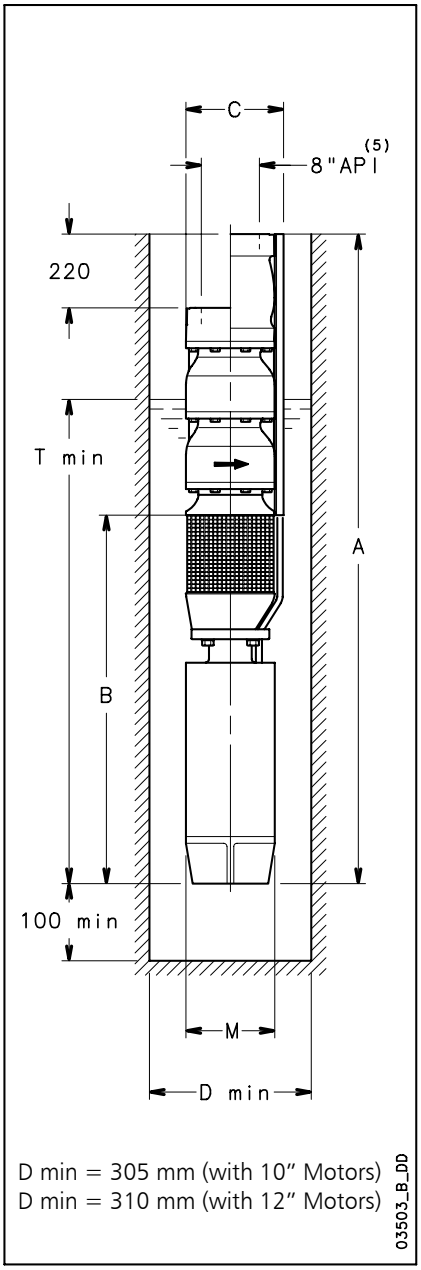


These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

S12475 SERIES, 3 TO 4 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	RATED POWER	Q = DELIVERY					
		l/min 0	4167	5500	7500	7917	9167
		m^3/h 0	250	330	450	475	550
	kW	H = TOTAL HEAD METRES COLUMN OF WATER					
S12475/3A	130	147	107	96	78	72	52
S12475/3	150	154	113	102	83	78	58
S12475/4	185	205	151	137	112	105	78
		l/min 0	4167	5500	6167	7083	8917
		m^3/h 0	250	330	370	425	535
S12475/4B	150	173	124	108	102	92	55
		l/min 0	4167	5000	5833	6667	8167
		m^3/h 0	250	300	350	400	490
S12475/3C	110	118	85	77	71	64	44

s12475a-2p50-en_b_th



DIMENSIONS AND WEIGHTS

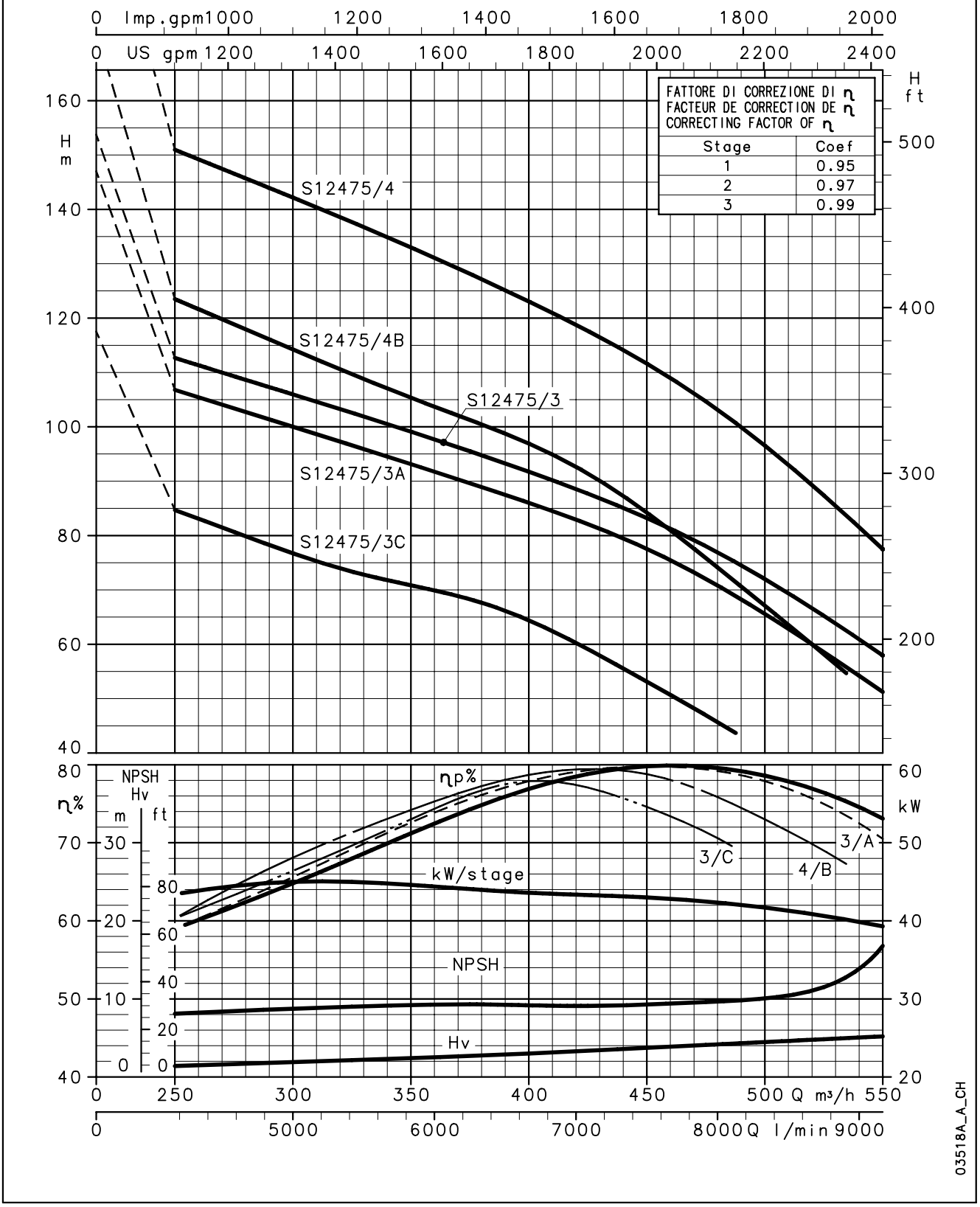
PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S12475/3C-L10W	110	3112	2132	298	236	4602	596
S12475/3A-L10W	130	3262	2282	298	236	4752	643
S12475/3-L10W	150	3392	2412	298	236	4882	682
S12475/4B-L10W	150	3612	2412	298	236	4882	720
S12475/4-L12W	185	3444	2244	304	276	4639	785

s12475a-2p50-en_b_td

1) Max electric pump diameter with 2 motor cables included.
   In case of 1 motor cable C = 290 mm with L10W motor and C = 295 mm with L12W motor.
2) Horizontal version : - Admissible up to Qmax = 530m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
   - Without non-return valve.
   - Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 6.8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 219.1 x 6.3mm L=143 available on request.
6) For pumps without non-return valve, reduce by 220 mm.

S12475 SERIES, 3 TO 4 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

S12475	~ 2900 rpm	ISO 9906-Annex A

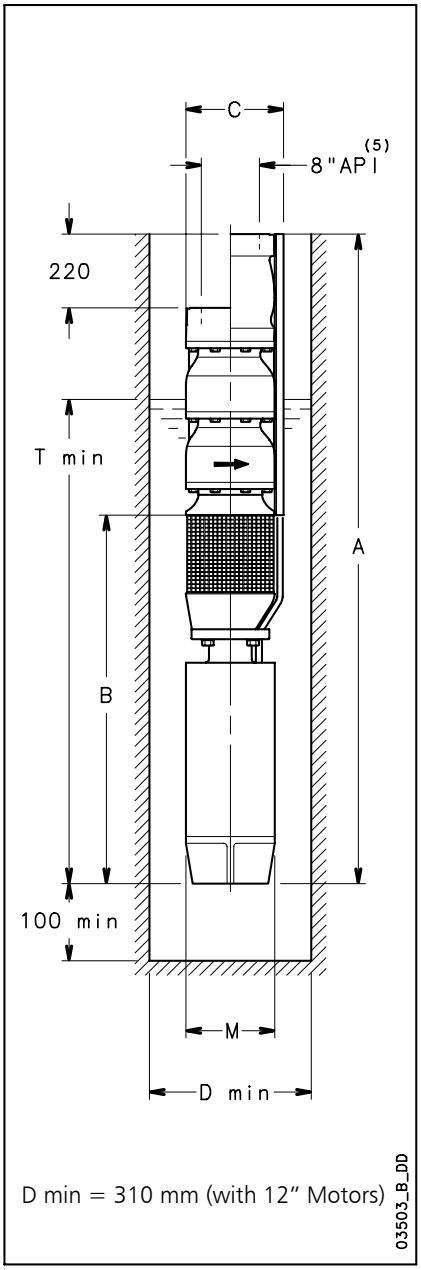


These performances are valid for liquids with density $\rho = 1.0$ Kg/dm^3 and kinematic viscosity $\nu = 1$ mm^2/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

S12475 SERIES, 5 TO 6 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	RATED POWER	Q = DELIVERY					
		l/min 0	4167	5500	6667	7917	9167
		m^3/h 0	250	330	400	475	550
	kW	H = TOTAL HEAD METRES COLUMN OF WATER					
S12475/5	260	260	190	173	157	134	100
S12475/6	300	312	230	208	188	160	120
		l/min 0	4167	5500	6667	7500	9167
		m^3/h 0	250	330	400	450	550
S12475/5A	220	245	179	161	144	130	86
S12475/6A	300	305	222	201	181	164	113

s12475b-2p50-en_b_th



D min = 310 mm (with 12" Motors)

DIMENSIONS AND WEIGHTS

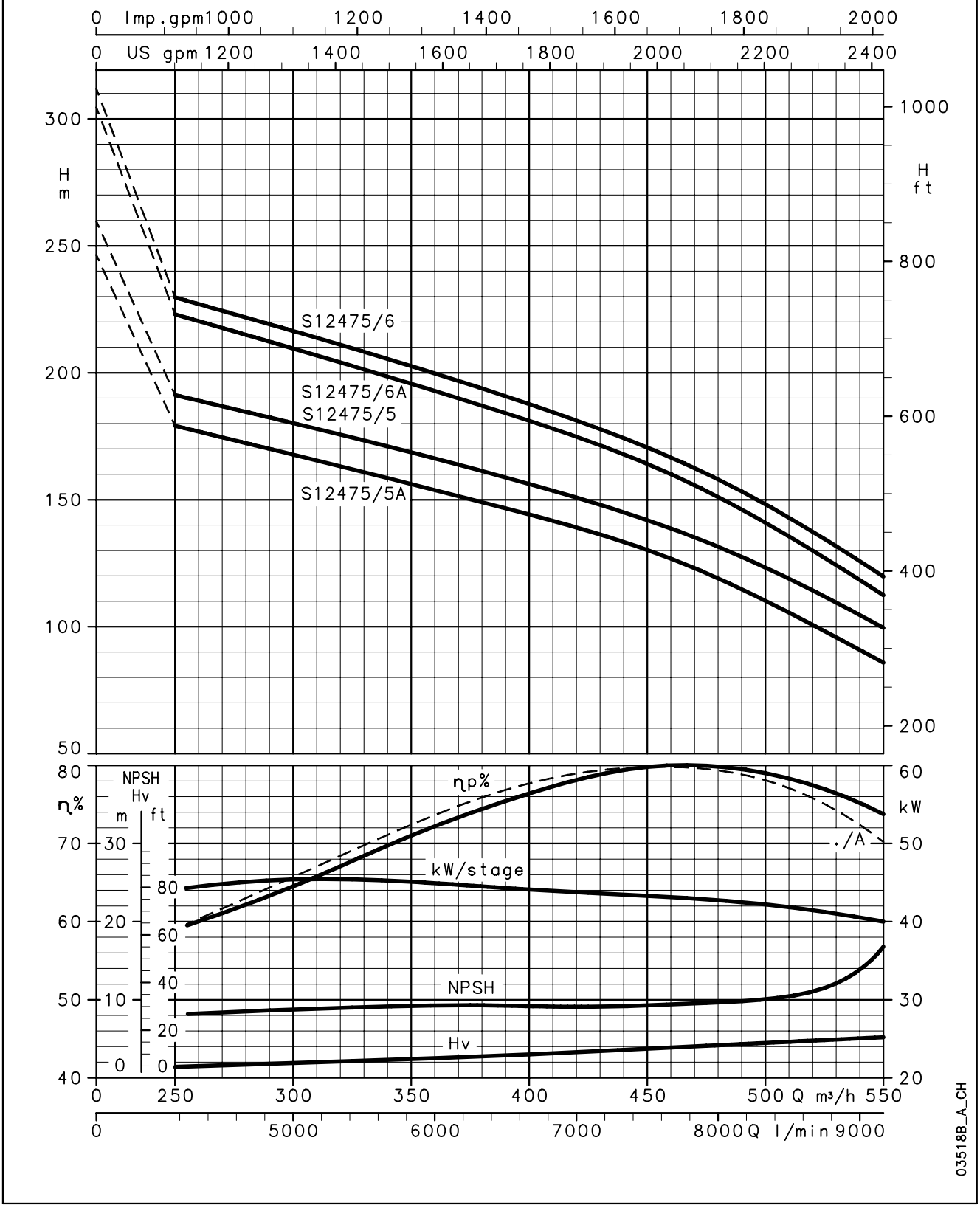
PUMP TYPE	RATED POWER	DIMENSIONS (mm)					WEIGHT
	kW	A (6)	B	C (1)	M	T (3)	kg (4)
S12475/5A-L12W	220	3814	2394	304	276	4789	887
S12475/5-L12W	260	3964	2544	304	276	4939	951
S12475/6A-L12W	300	4334	2694	304	276	5089	1054
S12475/6-L12W	300	4334	2694	304	276	5089	1054

s12475b-2p50-en_b_td

1) Max electric pump diameter with 2 motor cables included.
   In case of 1 motor cable C = 295 mm with L12W motor.
2) Horizontal version : - Admissible up to Qmax = 530m^3/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
   - Without non-return valve.
   - Check whether motor may be installed horizontally.
3) T min valid only for max flow speed of 6.8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 219.1 x 6.3mm L=143 available on request.
6) For pumps without non-return valve, reduce by 220 mm.

S12475 SERIES, 5 TO 6 STAGES
OPERATING CHARACTERISTICS AT 50 Hz

S12475	~ 2900 rpm	ISO 9906-Annex A

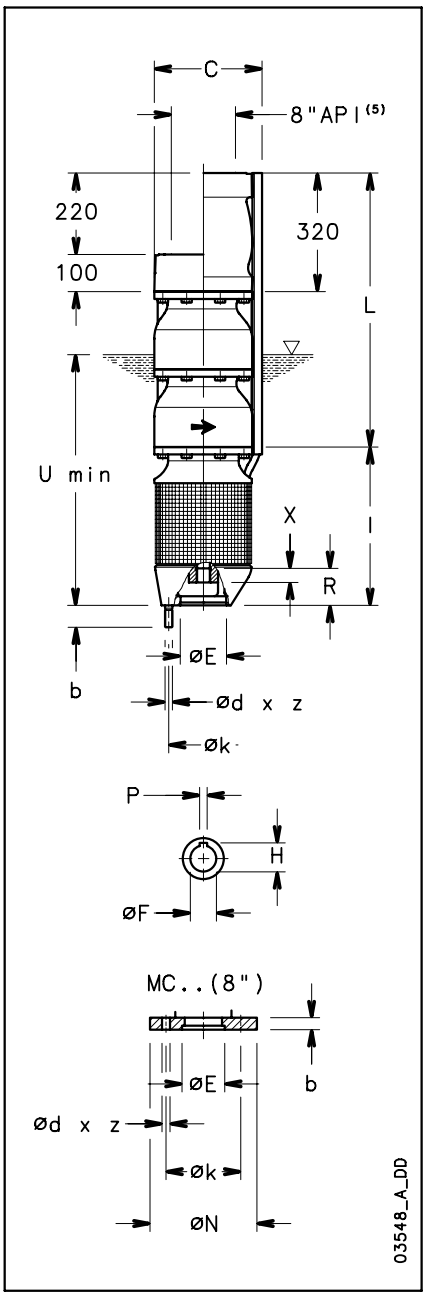


These performances are valid for liquids with density $\rho = 1.0$ Kg/dm^3 and kinematic viscosity $\nu = 1$ mm^2/sec.
These performances refer to pumps without non return-valve. For pumps with incorporated valve use the Hv curve to compensate for valve leaks.

S12390 SERIES
DIMENSIONS AND WEIGHTS

PUMP TYPE	MAX POWER ABSORBED BY PUMP kW	NUMBER OF PUMPS BEARINGS	DIMENSIONS (mm) L (6)	C (1)	U (3)	WEIGHT kg	MIN. WELL DIAM. mm
S12390/1B	27	2	530	298	2900	118	300
S12390/1A	36,5	2	530	298	2900	118	300
S12390/1	43	2	530	298	2900	118	300
S12390/2C	54,8	3	740	298	2900	155	300
S12390/2B	74,7	3	740	298	2900	155	300
S12390/2	88	3	740	298	2900	155	300
S12390/3A	109	4	950	298	2900	192	300
S12390/3	131	4	950	298	2900	192	300
S12390/4A	148,9	5	1160	298	2900	229	300
S12390/4	176,9	5	1160	298	2900	229	300
S12390/5	224,7	6	1370	298	2900	266	300
S12390/6	267,9	7	1580	298	2900	303	300

s12390p-2p50-en_a_td



MOTOR COUPLING

MOTOR CONNECTION	DIMENSIONS (mm) N	k	d	z	b	E H7	R	l
8" (NEMA)	186	152,4	18	4	25	127	101,3	430
10"		190,5	18	4	50	127	101,3	430
12"		190,5	20	4	60	127	127	505

COUPLING	DIMENSIONS (mm) Profile of gear coupling according to NEMA NUMBER OF TEETH	DIAMETRAL PITCH	PRESSURE ANGLE	X
8" (NEMA)	23	16/32	30°	38,5

COUPLING	DIMENSIONS (mm) F +0.084 +0.059	H +0.1	P +0.05 +0.02	X
10"	42,8	48,3	9,5	84,5
12"	55	59,3	16	108

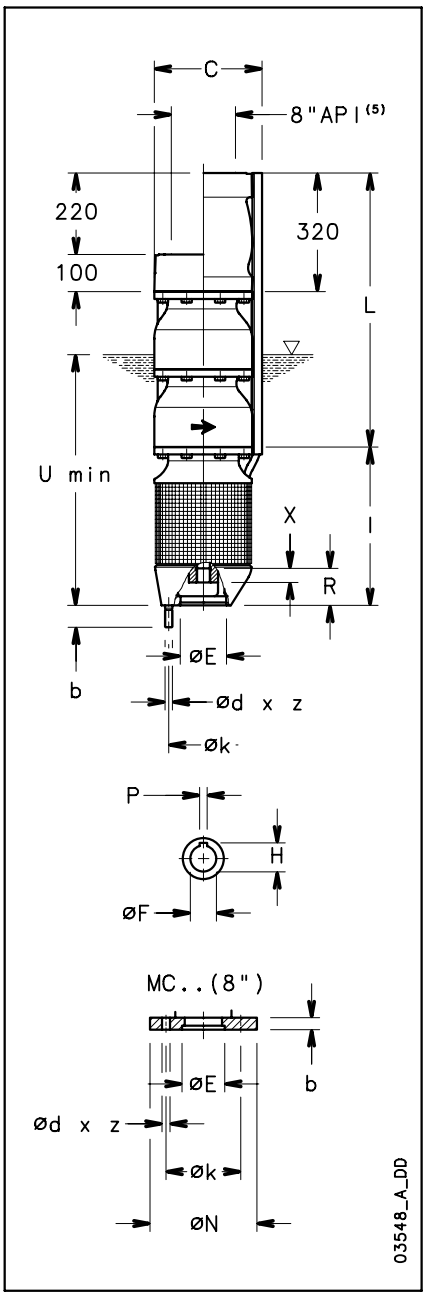
s12-mtcn-2p50-en_a_td

1) Max pump diameter with 2 motor cables included.
2) Horizontal version : - Admissible up to Qmax = 420 m³/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) U min valid only for max flow speed of 6,8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 219.1 x 6.3mm L=143 available on request.
6) For pumps without non-return valve, reduce by 220 mm.

S12475 SERIES
DIMENSIONS AND WEIGHTS

PUMP TYPE	MAX POWER ABSORBED BY PUMP kW	NUMBER OF PUMPS BEARINGS	DIMENSIONS (mm) L (6)	C (1)	U (3)	WEIGHT kg	MIN. WELL DIAM. mm
S12475/1C	29,2	2	540	298	2900	119	300
S12475/1B	37	2	540	298	2900	119	300
S12475/1	44,8	2	540	298	2900	119	300
S12475/2C	74,2	3	760	298	2900	157	300
S12475/2	88,7	3	760	298	2900	157	300
S12475/3C	110	4	980	298	2900	195	300
S12475/3A	130	4	980	298	2900	195	300
S12475/3	137,5	4	980	298	2900	195	300
S12475/4B	150	5	1200	298	2900	233	300
S12475/4	184,8	5	1200	298	2900	233	300
S12475/5A	220	6	1420	298	2900	271	300
S12475/5	235,1	6	1420	298	2900	271	300
S12475/6A	270	7	1640	298	2900	309	300
S12475/6	282,5	7	1640	298	2900	309	300

s12475p-2p50_a_td



MOTOR COUPLING

MOTOR CONNECTION	DIMENSIONS (mm) N	k	d	z	b	E H7	R	l
8" (NEMA)	186	152,4	18	4	25	127	101,3	430
10"		190,5	18	4	50	127	101,3	430
12"		190,5	20	4	60	127	127	505

COUPLING	DIMENSIONS (mm) Profile of gear coupling according to NEMA NUMBER OF TEETH	DIAMETRAL PITCH	PRESSURE ANGLE	X
8" (NEMA)	23	16/32	30°	38,5

COUPLING	DIMENSIONS (mm) F +0.084 +0.059	H +0.1	P +0.05 +0.02	X
10"	42,8	48,3	9,5	84,5
12"	55	59,3	16	108

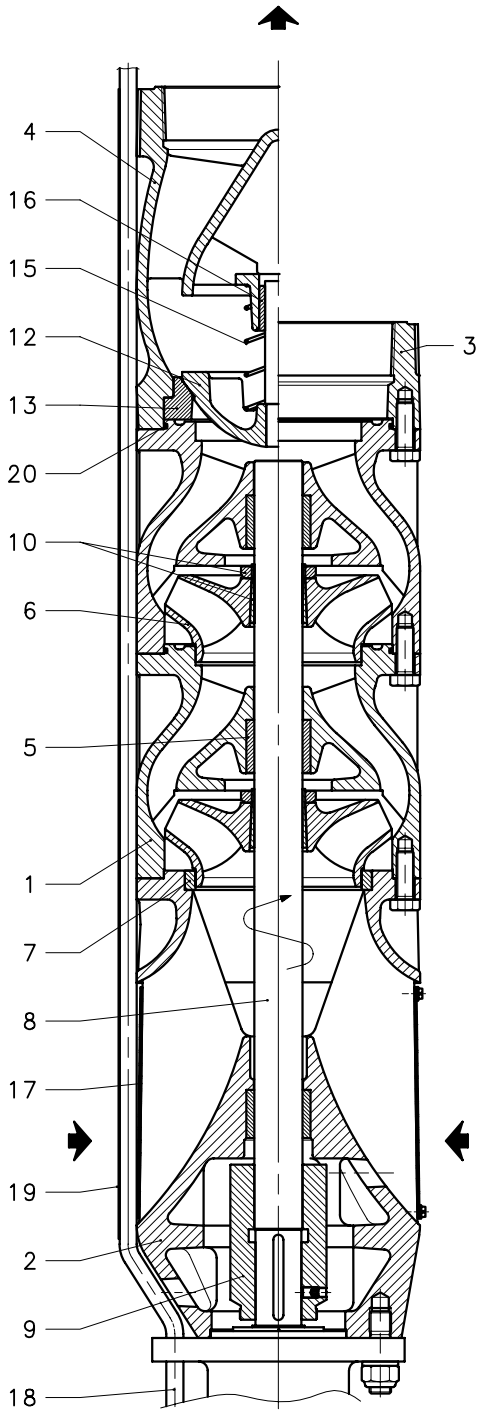
s12-mtcn-2p50-en_a_td

1) Max pump diameter with 2 motor cables included.
2) Horizontal version : - Admissible up to Qmax = 530 m³/h. (Only for full impeller diameter); for reduced impeller, please contact our sales network.
- Without non-return valve.
- Check whether motor may be installed horizontally.
3) U min valid only for max flow speed of 6,8 m/s between pump and perforation pipe.
4) Without cables.
5) Threaded pipe diam. 219.1 x 6.3mm L=143 available on request.
6) For pumps without non-return valve, reduce by 220 mm.

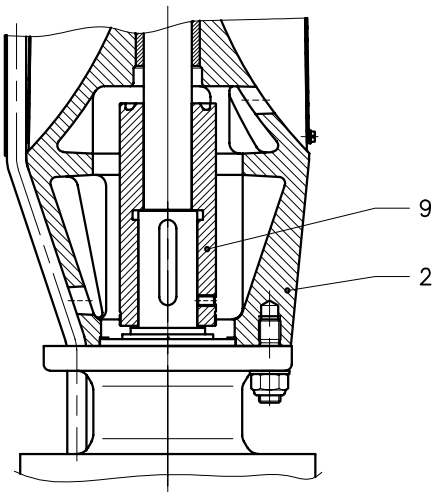
S12 SERIES
PUMP SECTION AND LIST OF COMPONENT

REF. N.	DESCRIPTION
1	Stage casing
2	Suction casing
3	Discharge casing
4	Valve body
5	Bearing bush
6	Radial flow impeller
7	Casing wear ring
8	Pump shaft
9	Coupling
10	Locating sleeve with nut
11	Shaft thrust bearing
12	Valve plate with joint
13	Valve seat
15	Valve spring
16	Socket ring
17	Suction strainer
18	Cable
19	Cable protection
20	O-ring

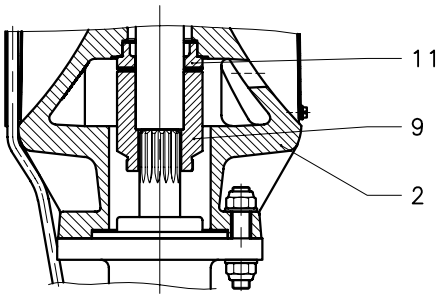
s12-2p50-en_a_tp



MOT. MC10



MOT. MC12



MOT. MC8
(8" Nema)

03528_A_DS

ITT

Lowara

6" Submersible motors

Submersible canned motors.
The choice of component materials ensures optimum operating performances, superior quality, reliability and ease of installation.

L6C Series

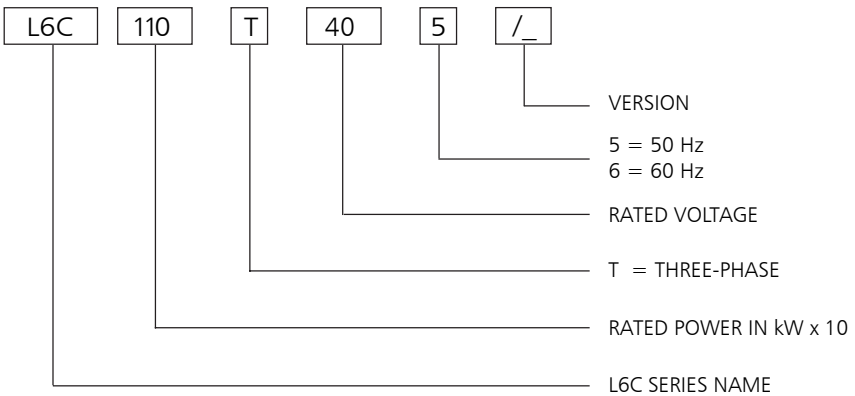
SPECIFICATIONS

- **Stainless steel** outer sleeve.
- Shaft extension and coupling dimensions to **NEMA** standards.
- Class **F insulation**.
- Protection class: **IP68**.
- Compensating bellows for internal liquid expansion.
- Axial load supported by Kingsbury type thrust bearing.
- **Mechanical seal** protected by sand guard.
- Maximum **immersion depth**: 250 m.
- Maximum **number of starts per hour** at regular intervals: 25 for direct start.
- Maximum supply **voltage variations** allowed: ±10%.
- Maximum water **temperature**: 35°C.
  Max. temperature applies to motors working in an installation capable of delivering a flow of water around the motor jacket of at least 0,2 m/s.
- **Axial thrust**:
  16000 N from 4 to 22 kW;
  27000 N from 30 to 37 kW.
- **Extractable supply cable** fitted with watertight connector.
- **Versions**:
  - Three-phase:
    4 to 22 kW 220-240 V, 50 Hz.
    4 to 37 kW 380-415 V, 50 Hz.
- Motors with double cable outlet for star/delta start can be supplied upon request.
- Can also operate in horizontal position, provided that the associated pump can apply an axial thrust of at least 250 N on the entire operating field.
- Screws included.

OPTIONAL FEATURES

- Silicon Carbide mechanical seal.
- Special voltages.
- Inverter applications.
- PT100 temperature sensor.

IDENTIFICATION CODE

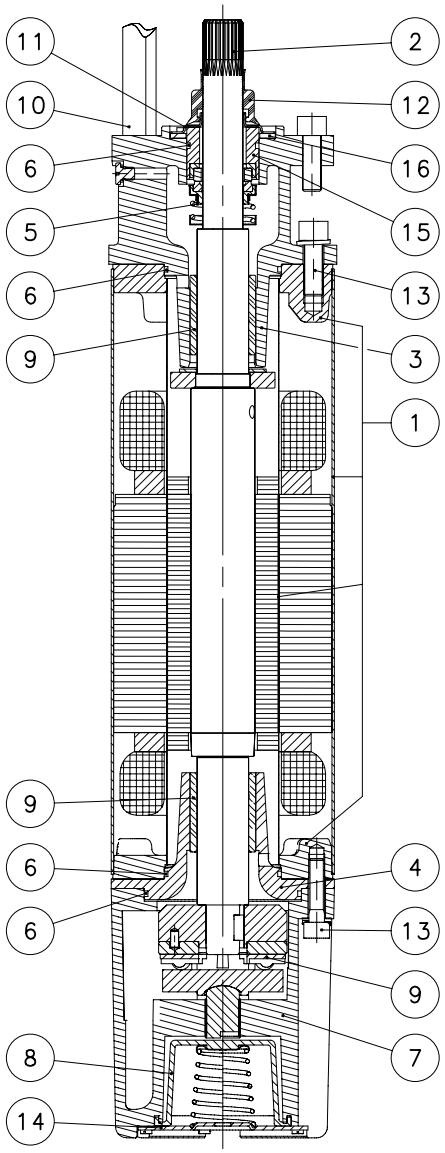


EXAMPLE : L6C110T405

L6C MOTOR :
RATED POWER 11 kW; THREE-PHASE;
RATED VOLTAGE 400 V; 50 Hz

- ❑ **High starting torque**
- ❑ **Power supply cable with extractable connector**

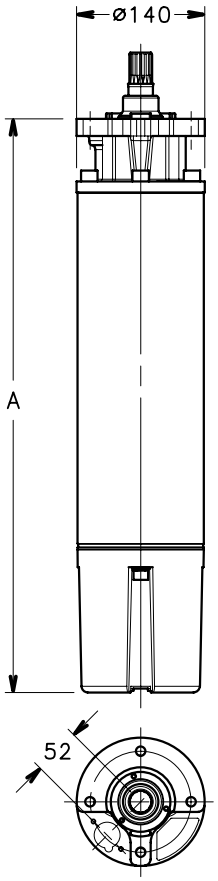
L6C SERIES MOTORS
MOTOR CROSS SECTION AND TABLE OF MATERIALS

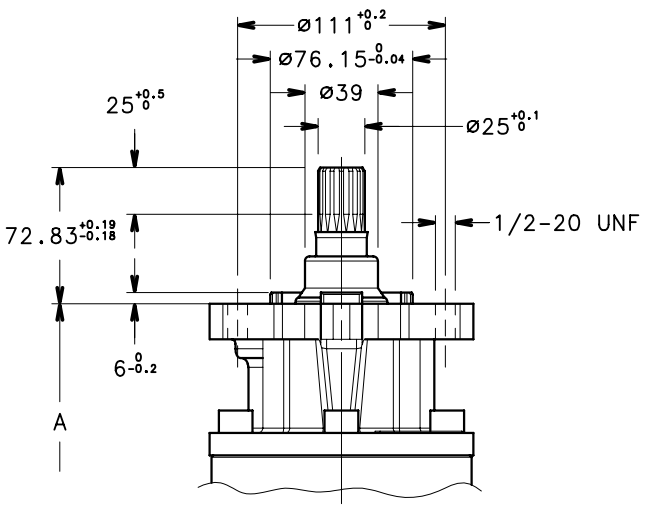


02026_B_DS

REF. N°	PART	MATERIAL	DESIGNATION	
			EUROPE	USA
1	Inner and outer sleeve	Stainless steel	EN 10088-1-X2CrNi18-9 (1.4307)	AISI304L
	Flange	Carbon steel	EN 10025 - S355JR (Fe 510-B)	ASTM A105
2	Shaft extension	Stainless steel (Duplex)	EN 10095 X3CrNiMoN27-5-2 (1.4460)	AISI329
3	Upper bracket	Cast iron	EN-GJL-200	Class 25 B
4	Intermediate bracket	Cast iron	EN-GJL-200	Class 25 B
5	Mechanical seal	Carbon graphite / Aluminium oxide		
6	Elastomers	NBR		
7	Lower bracket	Cast iron	EN-GJL-200	Class 25 B
8	Compensating bellows	NBR		
9	Bearings	Carbon-graphite		
10	Cable	EPDM		
11	Fixed sand guard	Stainless steel	EN 10088-1-X5CrNi18-10 (1.4301)	AISI304
12	Removable sand guard	NBR		
13	Bolts and screws	Stainless steel	EN 10088-1-X5CrNi18-10 (1.4301)	AISI304
14	Lower cover	Stainless steel	EN 10088-1-X5CrNi18-10 (1.4301)	AISI304
15	Mechanical seal spacer	A105 nichel plated		
16	Sand guard gasket	CR neoprene		
	Cooling liquid	Demineralized water + antifreeze		

L6C SERIES MOTORS
DIMENSIONS AND WEIGHTS AT 50 Hz





MOTOR	RATED POWER		DIMENSIONS mm	WEIGHT
TYPE	kW	HP	A	kg
L6C40T235-405	4	5,5	600	39,4
L6C55T235-405	5,5	7,5	631	43,2
L6C75T235-405	7,5	10	660	45,2
L6C93T235-405	9,3	12,5	685	48,8
L6C110T235-405	11	15	730	52,8
L6C150T235-405	15	20	785	59
L6C185T235-405	18,5	25	860	66,4
L6C220T235-405	22	30	920	72,4
L6C300T405	30	40	1050	85
L6C370T405	37	50	1180	98

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L6C SERIES MOTORS
THREE-PHASE OPERATING CHARACTERISTICS AT 50 Hz

MOTOR TYPE	RATED POWER		RATED VOLTAGE	OPERATING CHARACTERISTICS AT RATED POWER				DIRECT START		MAX WATER	CABLE TYPE	
				RATED CURRENT						TEMPERATURE	Nc x sec	L
THREE-PHASE	kW	HP	V	A	rpm	η %	cosφ	Ts/Tn*	Is/In	°C	mm^2	m
L6C40T235	4	5,5	220	17,8	2825	75	0,8	1,7	3,9	35	4x4	4
			230	18,4	2845	74	0,75	1,7	3,9			
			240	19,1	2860	74	0,7	1,7	3,8			
L6C55T235	5,5	7,5	220	24,1	2820	77	0,8	1,8	3,8	35	4x4	4
			230	24,2	2845	76	0,75	1,8	3,8			
			240	25,3	2860	76	0,71	1,8	3,6			
L6C75T235	7,5	10	220	30,5	2820	78	0,82	2	3,9	35	4x4	4
			230	31,2	2840	77	0,78	2	3,9			
			240	31,7	2850	77	0,73	2	4			
L6C93T235	9,3	12,5	220	37,6	2820	78	0,82	2,1	3,8	35	4x6	4
			230	38,1	2840	79	0,8	2,1	3,9			
			240	39,5	2850	78	0,79	2,15	3,9			
L6C110T235	11	15	220	43,3	2815	77	0,87	2,1	4,5	35	4x6	4
			230	44,2	2840	78	0,82	2,1	4,5			
			240	45,0	2845	77	0,79	2,15	4,5			
L6C150T235	15	20	220	58,0	2810	80	0,84	2,2	4,1	35	4x8	4
			230	57,9	2840	81	0,8	2,2	4,1			
			240	59,2	2850	81	0,76	2,25	4,1			
L6C185T235	18,5	25	220	70,1	2820	81	0,83	2,3	4,3	35	4x8	4
			230	71,0	2845	82	0,8	2,3	4,3			
			240	72,7	2855	82	0,73	2,35	4,3			
L6C220T235	22	30	220	82,3	2810	81	0,88	2,3	4	35	4x8	4
			230	81,4	2825	82	0,84	2,3	4,1			
			240	82,3	2835	82	0,8	2,35	4,2			
L6C40T405	4	5,5	380	10,3	2825	75	0,8	1,7	3,9	35	4x4	4
			400	10,6	2845	74	0,75	1,7	3,9			
			415	11	2860	74	0,7	1,7	3,8			
L6C55T405	5,5	7,5	380	13,9	2820	77	0,8	1,8	3,8	35	4x4	4
			400	14	2845	76	0,75	1,8	3,8			
			415	14,6	2860	76	0,71	1,8	3,6			
L6C75T405	7,5	10	380	17,6	2820	78	0,82	2	3,9	35	4x4	4
			400	18	2840	77	0,78	2	3,9			
			415	18,3	2850	77	0,73	2	4			
L6C93T405	9,3	12,5	380	21,7	2820	78	0,82	2,1	3,8	35	4x4	4
			400	22	2840	79	0,8	2,1	3,9			
			415	22,8	2850	78	0,79	2,15	3,9			
L6C110T405	11	15	380	25	2815	77	0,87	2,1	4,5	35	4x4	4
			400	25,5	2840	78	0,82	2,1	4,5			
			415	26	2845	77	0,79	2,15	4,5			
L6C150T405	15	20	380	33,5	2810	80	0,84	2,2	4,1	35	4x4	4
			400	33,4	2840	81	0,8	2,2	4,1			
			415	34,2	2850	81	0,76	2,25	4,1			
L6C185T405	18,5	25	380	40,5	2820	81	0,83	2,3	4,3	35	4x6	4
			400	41	2845	82	0,8	2,3	4,3			
			415	42	2855	82	0,73	2,35	4,3			
L6C220T405	22	30	380	47,5	2810	81	0,88	2,3	4	35	4x6	4
			400	47	2825	82	0,84	2,3	4,1			
			415	47,5	2835	82	0,8	2,35	4,2			
L6C300T405	30	40	380	63	2810	82	0,89	2,4	4	35	4x8	4
			400	61,5	2830	82	0,85	2,4	4,1			
			415	63,5	2840	81	0,8	2,45	3,9			
L6C370T405	37	50	380	79,5	2820	82	0,87	2	3,7	35	4x8	4
			400	79,3	2830	81	0,84	2,2	3,9			
			415	80	2840	81	0,8	2,3	4			

* Ts/Tn = ratio between starting torque and nominal torque.

l6c-2p50-en_f_te

6" Submersible motors

Water filled submersible motors.
The choice of component materials ensures optimum operating performances, superior quality, reliability and ease of installation.

L6W Series

- ❑ **Rewindable stator**
- ❑ **Thrust bearing Kingsbury type**
- ❑ **Mechanical seal**

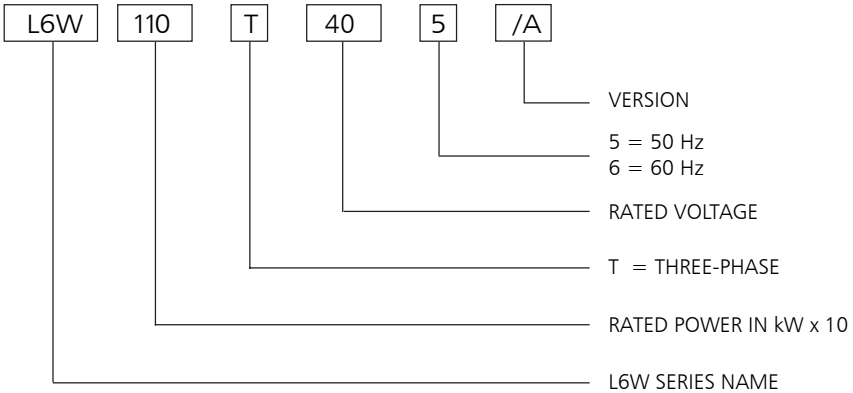
SPECIFICATIONS

- **Stainless steel** outer sleeve.
- Shaft extension and coupling dimensions to **NEMA** standards.
- **Rewindable stator** with insulated PVC winding.
- Class **Y insulation**.
- Protection class: **IP68**.
- Compensating bellows for internal liquid expansion.
- Axial load supported by Kingsbury type thrust bearing.
- **Mechanical seal** protected by sand guard.
- Maximum **immersion depth**: 350 m.
- Maximum **number of starts per hour** at regular intervals: 15.
- Maximum supply **voltage variations** allowed : ±10%.
- Maximum water **temperature**: 25°C.
  Max. temperature applies to motors working in a installation capable of delivering a flow of water around the motor jacket of at least 0,2 m/s (0,5 m/s for 37 kW).
- **Axial thrust**:
  16000 N from 4 to 22 kW;
  30000 N from 26 to 37 kW.
- **Power supply** cable suitable for drinkable water.
- **Versions**:
  - Three-phase:
    4 to 37 kW 380-415 V, 50 Hz.
- Motors with double cable outlet for star/delta start can be supplied upon request.
- All versions can operate in horizontal position, provided the impeller axial thrust is from the pump to the motor.
- Screws included.

OPTIONAL FEATURES

- Silicon Carbide mechanical seal.
- Special voltages.
- High temperature windings.
- Inverter applications.
- PT 100 temperature sensor.

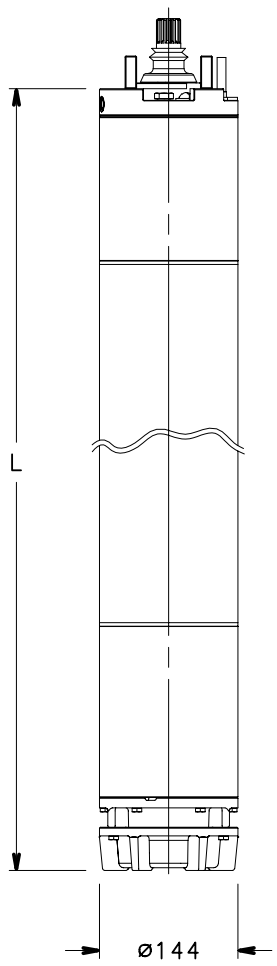
IDENTIFICATION CODE

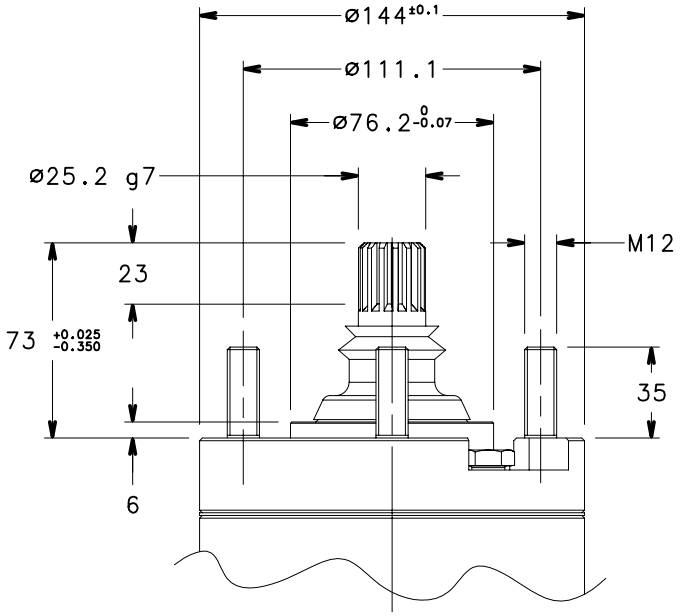


EXAMPLE : L6W110T405/A

L6W MOTOR :
RATED POWER 11 kW; THREE-PHASE;
RATED VOLTAGE 400 V; 50 Hz; /A VERSION

L6W SERIES MOTORS
DIMENSIONS AND WEIGHTS AT 50 Hz





MOTOR TYPE	RATED POWER		DIMENSIONS (mm)	WEIGHT
	kW	HP	L	kg
L6W40T405	4	5,5	583	38
L6W55T405	5,5	7,5	613	42
L6W75T405	7,5	10	653	46
L6W93T405	9,3	12,5	683	50
L6W110T405	11	15	723	54
L6W130T405	13	17,5	763	58
L6W150T405	15	20	833	66
L6W185T405	18,5	25	903	74
L6W220T405	22	30	943	77
L6W260T405	26	35	1071	86
L6W300T405	30	40	1151	94
L6W370T405	37	50	1301	108

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L6W SERIES MOTORS
THREE-PHASE OPERATING CHARACTERISTICS AT 50 Hz

MOTOR TYPE THREE-PHASE	RATED POWER		RATED VOLTAGE	OPERATING CHARACTERISTICS AT RATED POWER				DIRECT START		MAX WATER TEMPERATURE	CABLE TYPE Sec. (mm^2)		
				RATED CURRENT									
	kW	HP	V	A	rpm	η %	cosφ	Ts/Tn*	Is/In	°C	DOL	Y/D	L (m)
L6W40T405	4	5,5	380	9,62	2845	69,5	0,91	0,96	3,64	25	4	-	4
			415	8,94	2880	72,2	0,86	1,15	4,27				
L6W55T405	5,5	7,5	380	12,7	2850	74,0	0,89	1,28	4,27	25	4	4	4
			415	12,3	2885	74,7	0,83	1,54	4,82				
L6W75T405	7,5	10	380	17,1	2830	74,4	0,9	1,18	4,07	25	4	4	4
			415	16,4	2865	75,7	0,84	1,43	4,65				
L6W93T405	9,3	12,5	380	20,5	2835	76,6	0,89	1,51	4,57	25	4	4	4
			415	19,8	2870	77,6	0,83	1,82	5,16				
L6W110T405	11	15	380	24,8	2825	76,3	0,89	1,36	4,27	25	4	4	4
			415	24,0	2860	77,4	0,82	1,64	4,81				
L6W130T405	13	17,5	380	28,7	2820	76,6	0,9	1,37	4,38	25	4	4	4
			415	27,5	2860	77,9	0,84	1,66	4,99				
L6W150T405	15	20	380	32,4	2830	76,1	0,89	1,62	4,83	25	4	4	4
			415	31,1	2865	80,3	0,84	1,96	5,48				
L6W185T405	18,5	25	380	40,0	2835	80,3	0,87	1,80	5,10	25	6	4	4
			415	39,6	2865	80,4	0,81	2,17	5,63				
L6W220T405	22	30	380	48,5	2835	78,7	0,88	1,05	4,59	25	6	4	4
			415	45,4	2875	81,8	0,82	1,26	5,30				
L6W260T405	26	35	380	56,2	2865	80,2	0,88	1,03	4,57	25	6	4	4
			415	53,4	2890	81,9	0,83	1,24	5,25				
L6W300T405	30	40	380	64,7	2855	80,5	0,88	1,08	4,59	25	10	4	4
			415	61,4	2885	82,1	0,83	1,30	5,28				
L6W370T405	37	50	380	81,7	2840	78,6	0,88	1,00	4,24	20	10	4	4
			415	78,8	2875	79,8	0,82	1,20	4,81				

* Ts/Tn = ratio between starting torque and nominal torque.

l6w-2p50-en_c_te

8" Submersible motors

Water filled submersible motors.
The choice of component materials ensures optimum operating performances, superior quality, reliability and ease of installation.

L8W Series

- ❑ **Rewindable stator**
- ❑ **Thrust bearing Kingsbury type**
- ❑ **Mechanical seal**

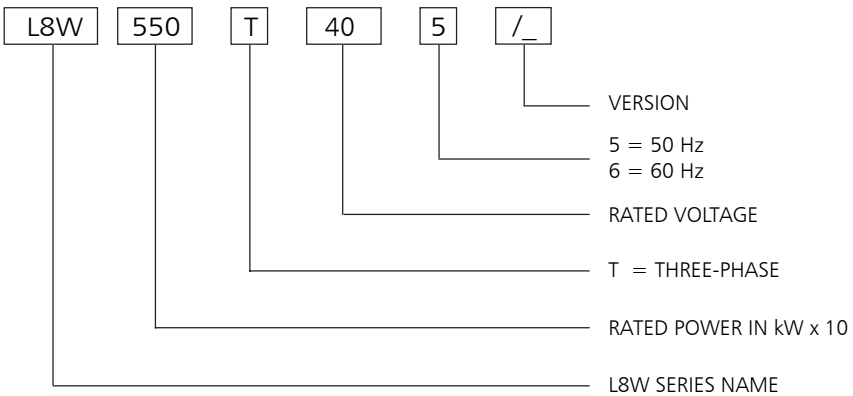
SPECIFICATIONS

- **Stainless steel** outer sleeve.
- Shaft extension and coupling dimensions to **NEMA** standards.
- **Rewindable stator** with insulated PVC winding.
- Class **Y insulation**.
- Protection class: **IP68**.
- Compensating bellows for internal liquid expansion.
- Axial load supported by Kingsbury type thrust bearing.
- **Mechanical seal** protected by sand guard.
- Maximum **immersion depth**: 350 m.
- Maximum **number of starts per hour** at regular intervals: 10.
- Maximum supply **voltage variations** allowed : ±10%.
- Maximum water **temperature**: 25°C.
  Max. temperature applies to motors working in a installation capable of delivering a flow of water around the motor jacket of at least 0,5 m/s.
- **Axial thrust**:
  50000 N from 30 to 93 kW.
- **Power supply** cable suitable for drinkable water.
- **Versions**:
  - Three-phase:
    30 to 93 kW 380-415 V, 50 Hz.
- Motors with double cable outlet for star/delta start can be supplied upon request.

OPTIONAL FEATURES

- Silicon Carbide mechanical seal.
- Special voltages.
- Horizontal installation.
- High temperature windings.
- Inverter applications.
- PT 100 temperature sensor.

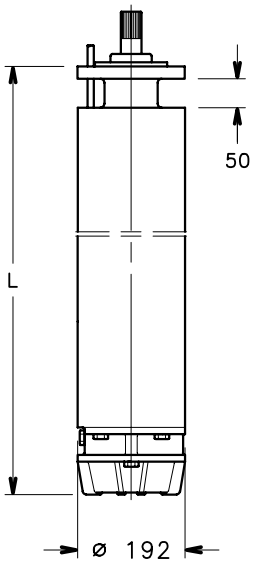
IDENTIFICATION CODE

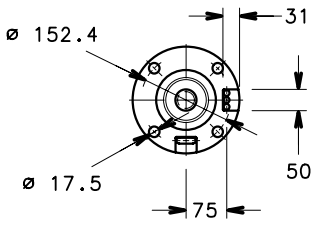


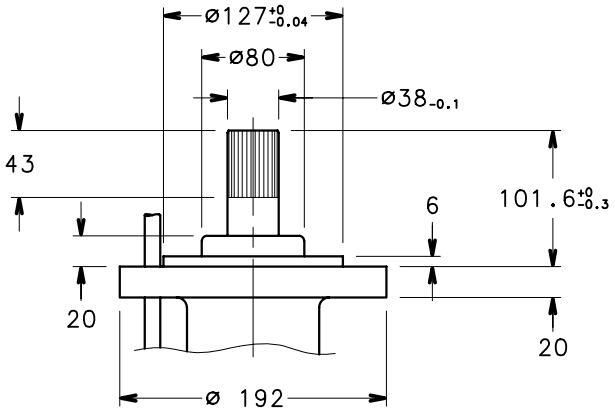
EXAMPLE : L8W550T405

L8W MOTOR :
RATED POWER 55 kW; THREE-PHASE;
RATED VOLTAGE 400 V; 50 Hz

L8W SERIES MOTORS
DIMENSIONS AND WEIGHTS AT 50 Hz







MOTOR TYPE	RATED POWER		DIMENSIONS (mm)	WEIGHT
	kW	HP	L	kg
L8W300T405	30	40	1015	145
L8W370T405	37	50	1105	162
L8W450T405	45	60	1195	180
L8W520T405	52	70	1285	200
L8W550T405	55	75	1325	206
L8W600T405	60	80	1375	217
L8W670T405	67	90	1465	235
L8W750T405	75	100	1555	252
L8W830T405	83	110	1615	265
L8W930T405	93	125	1755	290

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OPERATING CHARACTERISTICS AT 50 Hz

MOTOR TYPE THREE-PHASE	RATED POWER		RATED VOLTAGE	OPERATING CHARACTERISTICS AT RATED POWER				DIRECT START		MAX WATER TEMPERATURE	CABLE TYPE Sec. (mm^2)		
				RATED CURRENT									
	kW	HP	V	A	rpm	η %	cosφ	Ts/Tn*	Is/In	°C	DOL	Y/D	L (m)
L8W300T405	30	40	380	65	2905	83,0	0,85	1,20	4,67	25	10	6	5,5
			415	59	2900	83,0	0,84	1,09	4,70				
L8W370T405	37	50	380	81	2840	80,5	0,87	1,04	4,19	25	10	6	5,5
			415	76	2870	81,5	0,83	1,23	4,88				
L8W450T405	45	60	380	92	2850	82,0	0,87	0,92	3,72	25	16	6	5,5
			415	88,5	2880	83,5	0,83	1,09	4,23				
L8W520T405	52	70	380	110	2840	82,0	0,86	1,14	3,90	25	16	6	5,5
			415	104	2885	82,5	0,82	1,16	4,50				
L8W550T405	55	75	380	118	2840	82,0	0,87	1,26	3,57	25	16	10	5,5
			415	110	2885	82,5	0,83	1,27	4,19				
L8W600T405	60	80	380	124	2855	82,0	0,87	1,12	4,18	25	16	10	5,5
			415	118	2885	83,5	0,83	1,33	4,80				
L8W670T405	67	90	380	138	2850	82,5	0,88	0,98	4,22	25	16	10	5,5
			415	132	2885	83,5	0,83	1,16	4,82				
L8W750T405	75	100	380	156	2860	82,0	0,87	0,92	4,10	25	25	16	5,5
			415	148	2885	83,0	0,82	1,10	4,72				
L8W830T405	83	110	380	172	2860	83,0	0,87	0,91	4,12	25	35	16	5,5
			415	163	2880	84,0	0,82	1,08	4,66				
L8W930T405	93	125	380	192	2850	83,0	0,87	0,84	3,38	25	35	16	5,5
			415	180	2885	84,0	0,83	1,00	4,30				

* Ts/Tn = ratio between starting torque and nominal torque.

l8w-2p50-en_b_te

10" Submersible motors

Water filled submersible motors.
The choice of component materials ensures optimum operating performances, superior quality, reliability and ease of installation.

L10W Series

- ❑ **Rewindable stator**
- ❑ **Thrust bearing Kingsbury type**
- ❑ **Mechanical seal**

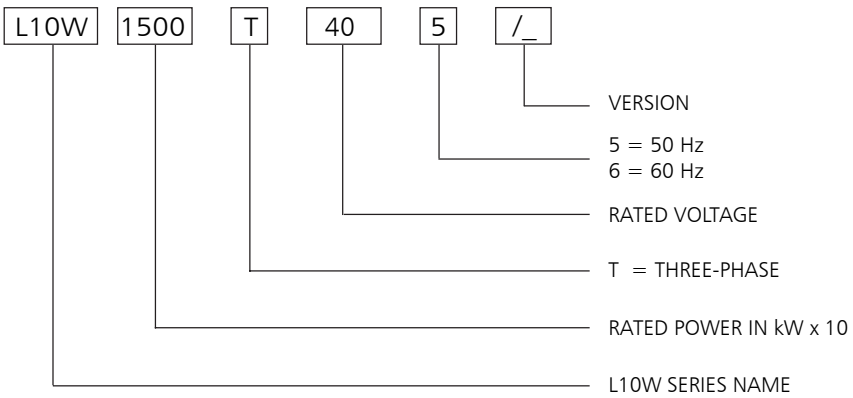
SPECIFICATIONS

- **Stainless steel** outer sleeve.
- **Rewindable stator** with insulated PVC winding.
- Class **Y insulation**.
- Protection class: **IP68**.
- Compensating bellows for internal liquid expansion.
- Axial load supported by Kingsbury type thrust bearing.
- **Mechanical seal** protected by sand guard.
- Maximum **immersion depth**: 350 m.
- Maximum **number of starts per hour** at regular intervals: 8.
- Maximum supply **voltage variations** allowed : ±10%.
- Maximum water **temperature**: 25°C.
  Max. temperature applies to motors working in a installation capable of delivering a flow of water around the motor jacket of at least 0,5 m/s.
- **Axial thrust**:
  65000 N from 93 to 150 kW.
- **Power supply** cable suitable for drinkable water.
- **Versions**:
  - Three-phase:
    93 to 150 kW 380-415 V, 50 Hz.
- Motors with double cable outlet for star/delta start can be supplied upon request.

OPTIONAL FEATURES

- Silicon Carbide mechanical seal.
- Special voltages.
- Horizontal installation.
- High temperature windings.
- Inverter applications.
- PT 100 temperature sensor.

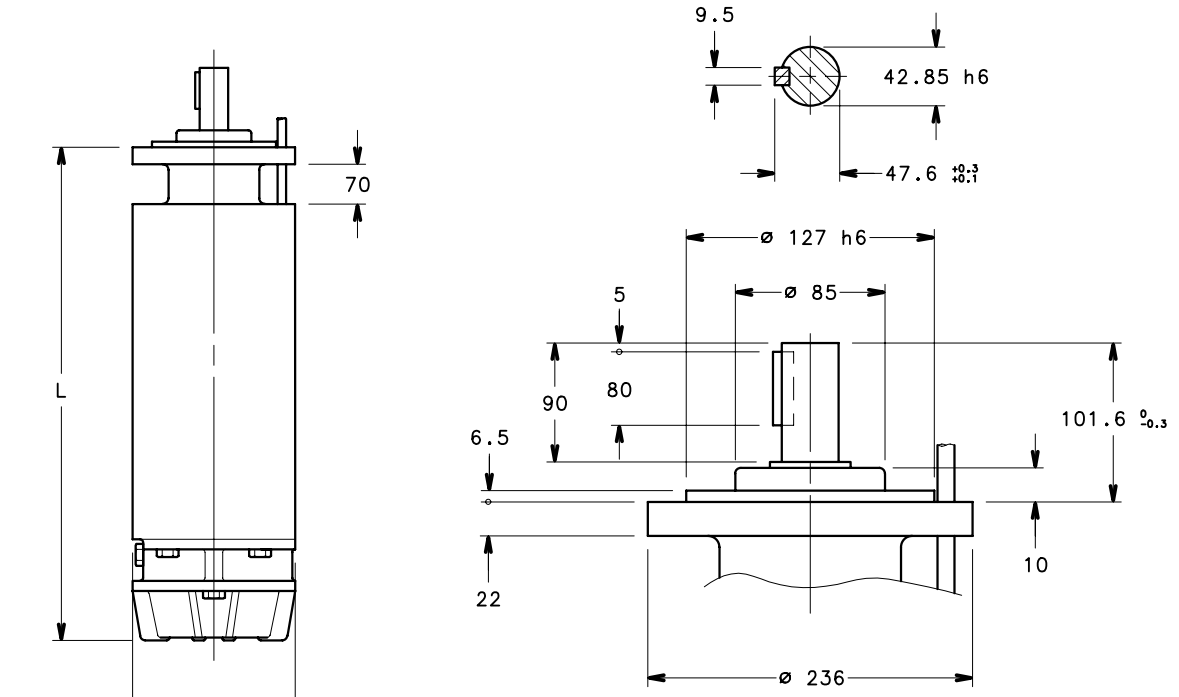
IDENTIFICATION CODE

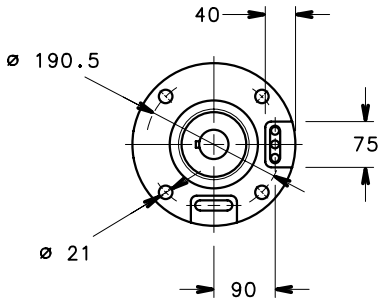


EXAMPLE : L10W1500T405

L10W MOTOR :
RATED POWER 150 kW; THREE-PHASE;
RATED VOLTAGE 400 V; 50 Hz

L10W SERIES MOTORS
DIMENSIONS AND WEIGHTS AT 50 Hz





MOTOR TYPE	RATED POWER		DIMENSIONS (mm)	WEIGHT
	kW	HP	L	kg
L10W930T405	93	125	1562	360
L10W1100T405	110	150	1702	401
L10W1300T405	130	175	1852	448
L10W1500T405	150	200	1982	487

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OPERATING CHARACTERISTICS AT 50 Hz

MOTOR TYPE THREE-PHASE	RATED POWER		RATED VOLTAGE	OPERATING CHARACTERISTICS AT RATED POWER				DIRECT START		MAX WATER TEMPERATURE	CABLE TYPE Sec. (mm^2)		
	kW	HP	V	RATED CURRENT A	rpm	η %	cosφ	Ts/Tn*	Is/In	°C	DOL	Y/D	L (m)
L10W930T405	93	125	380	191	2895	83,0	0,87	1,02	5,14	25	35	25	5
			415	180	2915	84,0	0,84	1,21	5,95				
L10W1100T405	110	150	380	235	2900	83,5	0,86	1,20	4,77	25	50	25	5
			415	220	2920	84,5	0,82	1,43	5,57				
L10W1300T405	130	175	380	270	2895	84,0	0,86	1,29	4,84	25	50	25	5
			415	255	2915	85,5	0,83	1,54	5,60				
L10W1500T405	150	200	380	308	2905	83,0	0,86	1,26	4,77	25	70	25	5
			415	285	2925	84,0	0,84	1,50	5,63				

* Ts/Tn = ratio between starting torque and nominal torque.

l10w-2p50-en_a_te

12" Submersible motors

Water filled submersible motors.
The choice of component materials ensures optimum operating performances, superior quality, reliability and ease of installation.

L12W Series

- ❑ **Rewindable stator**
- ❑ **Thrust bearing Kingsbury type**
- ❑ **Mechanical seal**

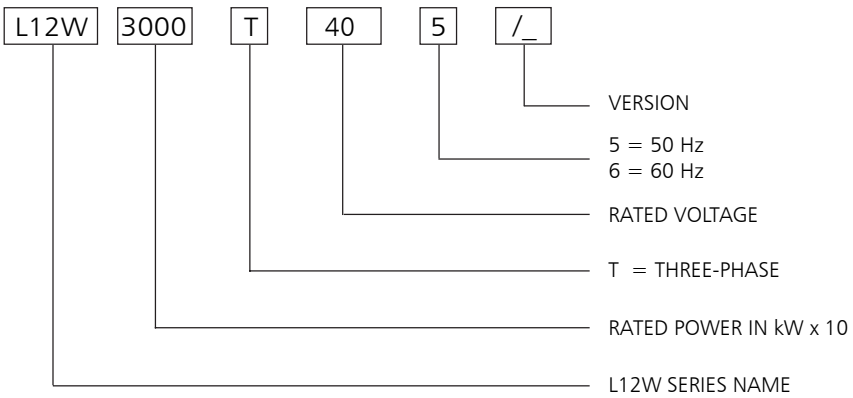
SPECIFICATIONS

- **Stainless steel** outer sleeve.
- **Rewindable stator** with insulated PVC winding.
- Class **Y insulation**.
- Protection class: **IP68**.
- Compensating bellows for internal liquid expansion.
- Axial load supported by Kingsbury type thrust bearing.
- **Mechanical seal** protected by sand guard.
- Maximum **immersion depth**: 350 m.
- Maximum **number of starts per hour** at regular intervals: 4.
- Maximum supply **voltage variations** allowed : ±10%.
- Maximum water **temperature**: 25°C.
  Max. temperature applies to motors working in a installation capable of delivering a flow of water around the motor jacket of at least 0,5 m/s.
- **Axial thrust**:
  65000 N from 185 to 300 kW.
- **Power supply** cable suitable for drinkable water.
- **Versions**:
  - Three-phase:
    185 to 300 kW 380-415 V, 50 Hz.
- Motors with double cable outlet for star/delta start can be supplied upon request.

OPTIONAL FEATURES

- Silicon Carbide mechanical seal.
- Special voltages.
- Horizontal installation.
- High temperature windings.
- Inverter applications.
- PT 100 temperature sensor.

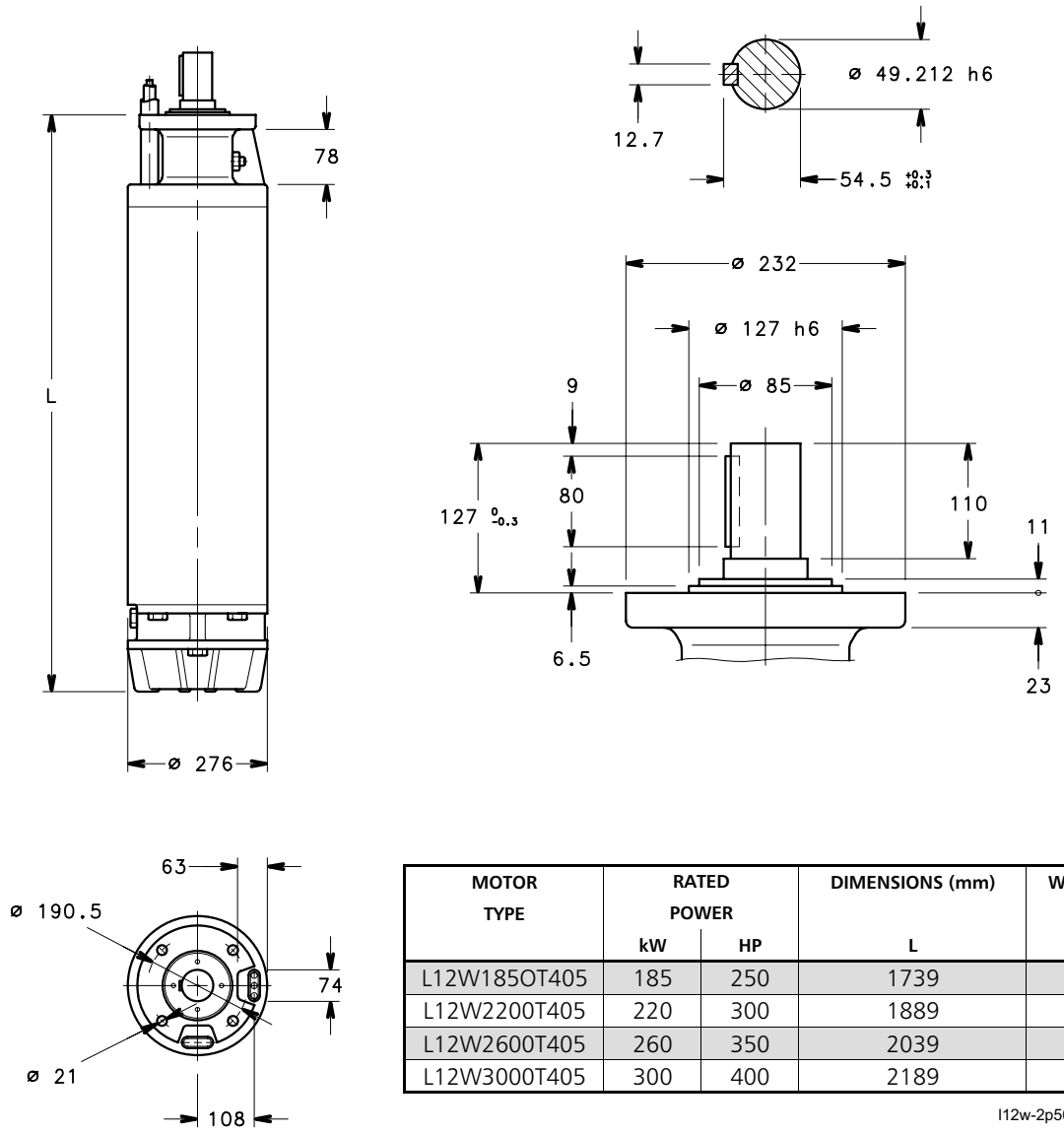
IDENTIFICATION CODE



EXAMPLE : L12W3000T405

L12W MOTOR :
RATED POWER 300 kW; THREE-PHASE;
RATED VOLTAGE 400 V; 50 Hz

L12W SERIES MOTORS
DIMENSIONS AND WEIGHTS AT 50 Hz



MOTOR TYPE	RATED POWER		DIMENSIONS (mm)	WEIGHT
	kW	HP	L	kg
L12W185OT405	185	250	1739	552
L12W2200T405	220	300	1889	616
L12W2600T405	260	350	2039	680
L12W3000T405	300	400	2189	745

l12w-2p50-en_a_td

03553_A_DD

OPERATING CHARACTERISTICS AT 50 Hz

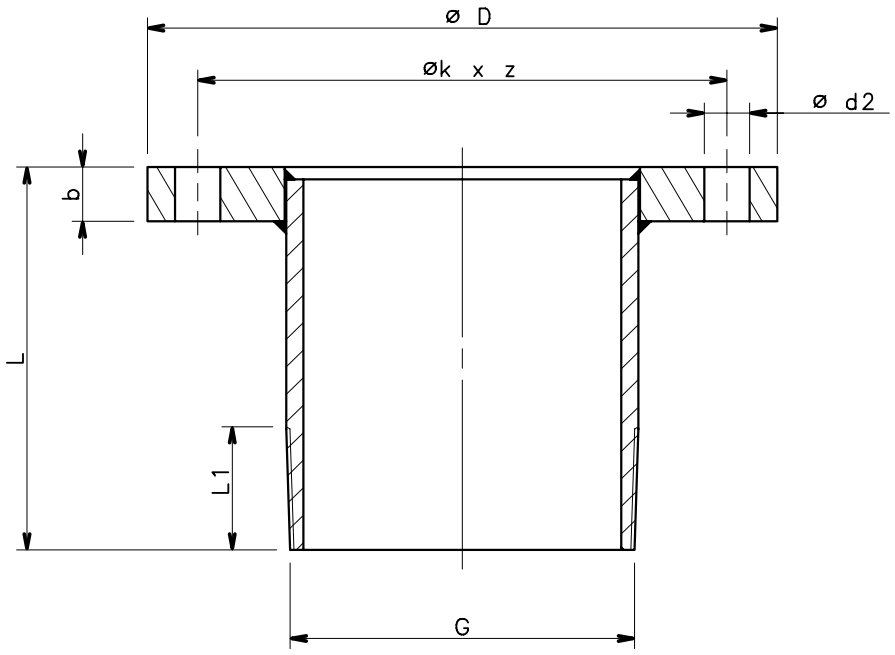
MOTOR TYPE THREE-PHASE	RATED POWER		RATED VOLTAGE	OPERATING CHARACTERISTICS AT RATED POWER				DIRECT START		MAX WATER TEMPERATURE	CABLE TYPE Sec. (mm^2)		
				RATED CURRENT									
	kW	HP	V	A	rpm	η %	cosφ	Ts/Tn*	Is/In	°C	DOL	Y/D	L (m)
L12W1850T405	185	250	380	380	2895	84,0	0,87	1,28	5,57	25	70	50	5
			415	360	2915	84,5	0,86	1,53	6,40				
L12W2200T405	220	300	380	470	2910	84,5	0,86	1,04	4,60	25	95	50	5
			415	435	2930	85,5	0,83	1,24	5,42				
L12W2600T405	260	350	380	525	2875	85,0	0,87	0,96	4,10	25	120	50	5
			415	498	2910	86,0	0,83	1,15	4,67				
L12W3000T405	300	400	380	620	2880	85,0	0,87	0,90	4,10	25	2x70	70	5
			415	570	2910	86,0	0,84	1,08	4,90				

* Ts/Tn = ratio between starting torque and nominal torque.

l12w-2p50_a_te

ACCESSORIES

ISO-THREADED FLANGE



PUMP TYPE	THREADING ISO 7-1 G	Dimensions (mm)								
		Flange according to EN 1092-1								
		DN	PN	Ø D	Ø k	b	Ø d2	Z	L	L1
S825 S833	R 3	80	10 ÷ 16	200	160	20	18	8	150	30
		80	25 ÷ 40	200	160	24	18	8	158	30
		100	10 ÷ 16	220	180	20	18	8	158	30
		100	25 ÷ 40	235	190	24	22	8	158	30
S880 S8100	R 5	100	10 ÷ 16	220	180	20	18	8	105	40
		125	10 ÷ 16	250	210	22	18	8	155	40
		125	25 ÷ 40	270	220	26	26	8	168	40
		150	10 ÷ 16	285	240	22	22	8	168	40
		150	25 ÷ 40	300	250	28	26	8	168	40
S10160 S10220	R 6	150	6	265	225	20	18	8	160	40
		150	10 ÷ 16	285	240	22	22	8	160	40
		150	25 ÷ 40	300	250	28	26	8	160	40
		150	63	345	280	36	33	8	160	40
		200	6	320	280	22	18	8	160	40
		200	10	340	295	26	22	8	160	40
		200	16	340	295	30	22	12	160	40
		200	25	360	310	34	26	12	160	40
		200	40	375	320	40	30	12	160	40
		200	63	415	345	42	36	12	160	40

For models S12390 and S12475, see ANSI (API) threaded flange.

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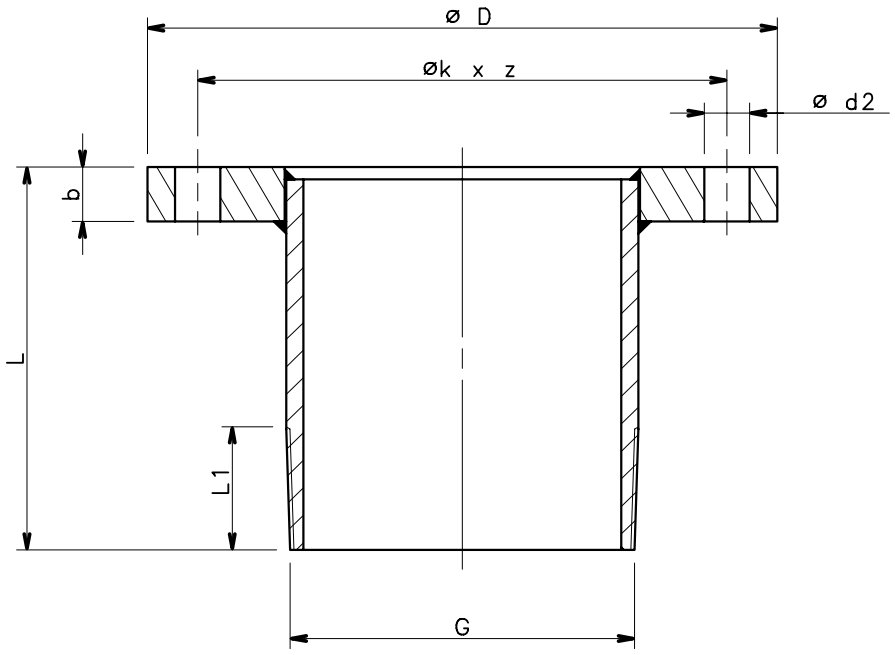
03541_A_SC

ANSI (API) THREADED FLANGE



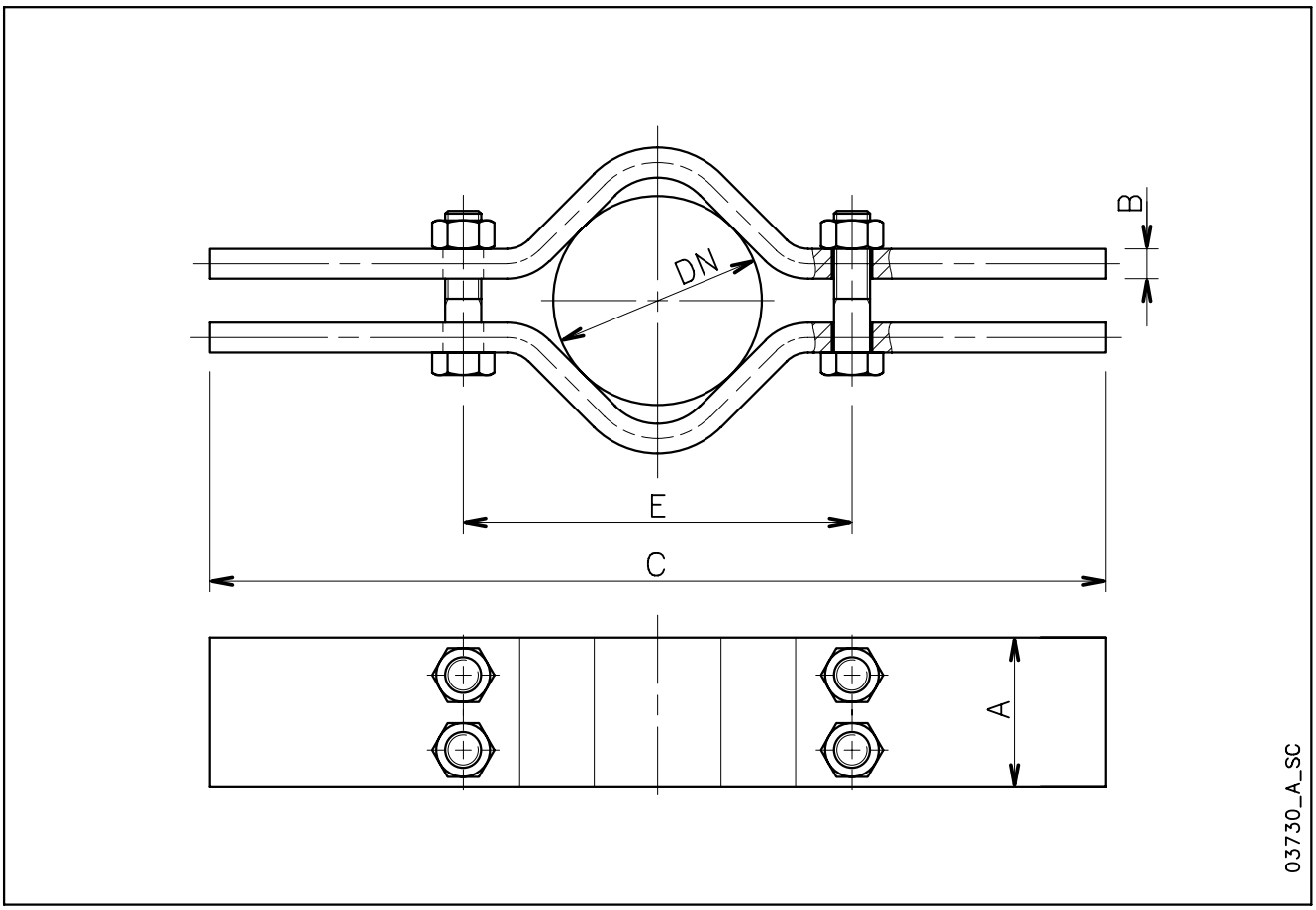
PUMP TYPE	THREADING ANSI B1.20.1 G	Dimensions (mm)								
		Flange according to EN 1092-1								
		DN	PN	Ø D	Ø k	b	Ø d2	Z	L	L1
S825 S833	3 - 8 NPT *)	80	10 ÷ 16	200	160	20	18	8	105	42
		80	25 ÷ 40	200	160	24	18	8	105	42
		100	10 ÷ 16	220	180	20	18	8	105	42
		100	25 ÷ 40	235	190	24	22	8	105	42
S880 S8100	5 - 8 NPT *)	100	10 ÷ 16	220	180	20	18	8	105	46
		125	10 ÷ 16	250	210	22	18	8	105	46
		125	25 ÷ 40	270	220	26	26	8	105	46
		150	10 ÷ 16	285	240	22	22	8	105	46
		150	25 ÷ 40	300	250	28	26	8	105	46
S10160 S10220	6 - 8 NPT *)	150	6	265	225	20	18	8	160	50
		150	10 ÷ 16	285	240	22	22	8	160	50
		150	25 ÷ 40	300	250	28	26	8	160	50
		150	63	345	280	36	33	8	160	50
		200	6	320	280	22	18	8	160	50
		200	10	340	295	26	22	8	160	50
		200	16	340	295	30	22	12	160	50
		200	25	360	310	34	26	12	160	50
		200	40	375	320	40	30	12	160	50
		200	63	415	345	42	36	12	160	50
S12390 S12475	8 - 8 NPT	200	6	320	280	22	18	8	150	55
		200	10	340	295	26	22	8	150	55
		200	16	340	295	30	22	12	150	55
		200	25	360	310	34	26	12	150	55
		200	40	375	320	40	30	12	150	55
		200	63	415	345	42	36	12	150	55

***)** On request for pumps with ANSI (API) threaded ports.

s-flange-api-en_a_td

03541_A_SC

CARRYNG CLAMPS



NOMINAL PIPE DIAMETER DN		CARRYING CLAMPS						PIPE WEIGHT		
		Dimensions (mm)					Pmax (1)	Flanged	Threaded	Water
		A	B	C	E	SCREW	kg	kg/m	kg/m	kg/m
65	R 2 1/2"	50	15	600	130	M16x90	1300	6,7	8,0	3,3
80	R 3"	80	15	600	180	M20x70	3400	8,4	10,5	5,0
100	R 4"	80	15	600	180	M20x110	3400	20,5	15,0	7,9
125	R 5"	100	20	600	260	M24x90	7250	27,5	18,5	12,3
150	R 6"	100	20	600	260	M24x130	7250	33,0	22,0	17,6
175	R 7"	120	25	800	360	M30x110	9750	27,0	25,5	24,0
200	R 8"	120	25	800	360	M30x150	9750	33,0	34,0	31,5
250	R 10"	120	25	800	360	M30x220	9750	48,0	48,0	49,0

1) Max admissible weight.

clamp-en_a_td

NOTE. Two sets of supporting collars are necessary for installation.

L6C - L6W - L8W SERIES MOTORS
MOTOR - CONTROL PANEL COMBINATION TABLE

MOTOR TYPE L6C - 6" THREE-PHASE	RATED POWER		RATED CURRENT 380-415 V	PANEL TYPE					
	kW	HP	A	QTD/...	Q3D/...	Q3I/...	Q3A/...	Q3Y/...	Q3SF/...
	4	5,5	11,0	...40-75	...40-75	...40-75	...40-75	...40-75	...75
	5,5	7,5	14,6	...40-75	...40-75	...40-75	...40-75	...40-75	...75
	7,5	10	18,3	...75-92	...75-92	...75-92	...75-92	...75-92	...150
	9,3	12,5	22,8	-	...92-110	...92-110	...92-110	...92-110	...150
	11	15	26,0	-	...110-150	...110-150	...110-150	...110-150	...150
	15	20	34,2	-	...150-185	...150-185	...150-185	...150-185	...220
	18,5	25	42,0	-	...185-220	...185-220	...185-220	...185-220	...220
	22	30	47,5	-	...185-220	...185-220	...185-220	...185-220	...300
	30	40	63,5	-	...300-370	...300-370	...300-370	...300-370	...370
	37	50	80,0	-	-	...370-450	...370-450	...370-450	...450

For different voltages, please contact our sales network.

L6c-2p50-en_e_tc

MOTOR TYPE L6W - 6" THREE-PHASE	RATED POWER		RATED CURRENT 380-415 V	PANEL TYPE					
	kW	HP	A	QTD/...	Q3D/...	Q3I/...	Q3A/...	Q3Y/...	Q3SF/...
	4	5,5	9,6	...40-75	...40-75	...40-75	...40-75	...40-75	...75
	5,5	7,5	12,7	...40-75	...40-75	...40-75	...40-75	...40-75	...75
	7,5	10	17,1	...75-92	...75-92	...75-92	...75-92	...75-92	...150
	9,3	12,5	20,5	-	...92-110	...92-110	...92-110	...92-110	...150
	11	15	24,8	-	...110-150	...110-150	...110-150	...110-150	...150
	13	17,5	28,7	-	...110-150	...110-150	...110-150	...110-150	...150
	15	20	32,4	-	...150-185	...150-185	...150-185	...150-185	...220
	18,5	25	40,0	-	...185-220	...185-220	...185-220	...185-220	...220
	22	30	48,5	-	...220-300	...220-300	...220-300	...220-300	...300
	26	35	56,2	-	...220-300	...220-300	...220-300	...220-300	...300
	30	40	64,7	-	...300-370	...300-370	...300-370	...300-370	...370
	37	50	81,7	-	-	...370-450	...370-450	...370-450	...450

For different voltages, please contact our sales network.

L6w-2p50-en_a_tc

MOTOR TYPE L8W - 8" THREE-PHASE	RATED POWER		RATED CURRENT 380-415 V	PANEL TYPE					
	kW	HP	A	Q3D/...	Q3I/...	Q3A/...	Q3SF/...		
	30	40	65	...300-370	...300-370	...300-370	...370		
	37	50	81	(1)	...370-450	...370-450	...450		
	45	60	92	(1)	...450-550	...450-550	...550		
	52	70	110	(1)	...550-750	...550-750	...590		
	55	75	118	(1)	...550-750	...550-750	...590		
	60	80	124	-	...550-750	...550-750	...750		
	67	90	138	-	...750-900	...750-900	...900		
	75	100	156	-	...750-900	...750-900	...900		
	83	110	172	-	...750-900	...750-900	...900		
	93	125	192	-	...900-1100	...900-1100	...1100		

(1) On request.

L8w-2p50-en_b_tc

For different voltages, please contact our sales network.

L10W - L12W SERIES MOTORS
MOTOR - CONTROL PANEL COMBINATION TABLE

MOTOR TYPE L10W - 10" THREE-PHASE	RATED POWER		RATED CURRENT 380-415 V	PANEL TYPE					
	kW	HP	A	Q3I/...	Q3A/...	Q3SF/...			
	93	125	191	...900-1100	...900-1100	...1100			
	110	150	235	...1100-1320	...1100-1320	...1100			
	130	175	270	...1320-1600	...1320-1600	(1)			
	150	200	308	...1600-2000	...1600-2000	(1)			

(1) On request.

L10w-2p50-en_b_tc

For different voltages, please contact our sales network.

MOTOR TYPE L12W - 12" THREE-PHASE	RATED POWER		RATED CURRENT 380-415 V	PANEL TYPE					
	kW	HP	A	Q3I/...	Q3A/...	Q3SF/...			
	185	250	380	...1600-200	...1600-200	(1)			
	220	300	470	...2500-3150	...2500-3150	(1)			
	260	350	525	...2500-3150	...2500-3150	(1)			
	300	400	620	(1)	(1)	(1)			

(1) On request.

L12w-2p50-en_b_tc

For different voltages, please contact our sales network.

ITT

Lowara

Three-phase Electric Panel

APPLICATIONS

- Protection and control of a three-phase surface or submersible electric pump.

QTD Series

SPECIFICATIONS

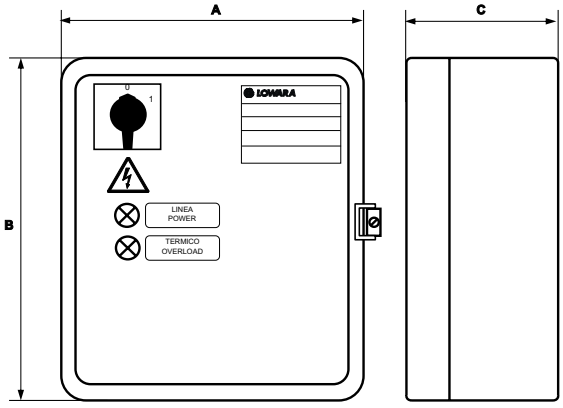
- Control through an external enable contact.
- Supply voltage: 3 x 400 V ±10%.
- Frequency: 50/60 Hz.
- Power: 0,25 to 9,2 kW.
- Direct motor start.
- Short-circuit and overload protection.
- Protection class: IP54.
- Ambient temperature: -5 to +40 °C (according to EN 60439-1).
- Maximum relative humidity: 50% at +40°C, provided that no condensation occurs (according to EN 60439-1).
- Wall mounted.
- Metal enclosure.
- Ready for installation of dry running control float or pressure switch (to be ordered separately).
- Power and thermal overload indicator lights.

OPTIONAL ACCESSORIES

- VR3 three-phase module for overvoltage protection (lightning protector).
- SLD series 24 V level kit. Probe module for protection against dry running (set of three electrodes included in the supply).

SELECTION

- For a suitable choice of control panel, be sure the electrical input of the motor (Ampere) is included in the rated current value mentioned in the table below.



MODEL	RATED VOLTAGE	RATED POWER		RATED CURRENT	DIMENSIONS			WEIGHT
					A	B	C	
	V	kW	HP	A	mm	mm	mm	Kg
QTD/02-03	3 x 400 V ± 10 %	0,25-0,37	0,33-0,50	0,63 ÷ 1	235	265	150	5,8
QTD/03-05	3 x 400 V ± 10 %	0,37-0,55	0,55-0,75	1 ÷ 1,6	235	265	150	5,8
QTD/05-07	3 x 400 V ± 10 %	0,55-0,75	0,75-1	1,6 ÷ 2,5	235	265	150	5,8
QTD/07-15	3 x 400 V ± 10 %	0,75-1,5	1-2	2,5 ÷ 4	235	265	150	5,8
QTD/15-22	3 x 400 V ± 10 %	1,5-2,2	2-3	4 ÷ 6,3	235	265	150	5,8
QTD/22-40	3 x 400 V ± 10 %	2,2-4	3-5,5	6,3 ÷ 10	235	265	150	5,8
QTD/40-75	3 x 400 V ± 10 %	4-7,5	5,5-10	10 ÷ 16	235	265	150	5,8
QTD/75-92	3 x 400 V ± 10 %	7,5-9,2	10-12,5	16 ÷ 20	235	265	150	5,8

CB-QTD-en_c_te

ITT

Lowara

Three-phase Electric Panel

APPLICATIONS

• Protection and control of a three-phase surface or submersible electric pump.

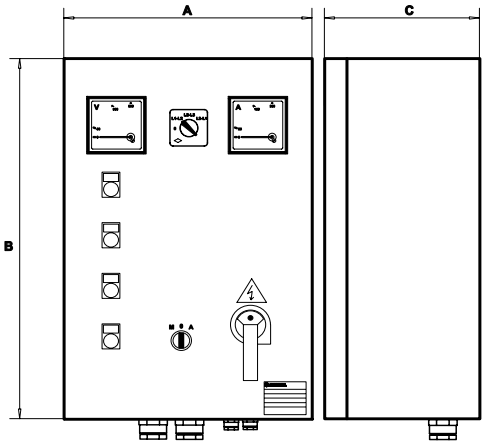
Q3D Series

SPECIFICATIONS

- Manual control through an Auto/Man selector switch.
- Automatic control through an external enable contact.
- Supply voltage: 3 x 400 V ±10%.
- Frequency: 50/60 Hz.
- 24 V AC low voltage auxiliary circuit.
- Power: 0,25 to 37 kW.
- Direct motor start.
- Short-circuit and overload protection.
- Protection class: IP54.
- Ambient temperature: -5 to +40 °C (according to EN 60439-1).
- Maximum relative humidity: 50% at +40°C, provided that no condensation occurs (according to EN 60439-1).
- Wall mounted.
- Metal enclosure.
- Power, pump running, thermal overload and dry running indicator lights.
- Ready for installation of dry running control float or pressure switch (to be ordered separately). Can be equipped with electronic protection module with electrodes.

OPTIONAL ACCESSORIES

- SLD series 24 V level kit. Probe module for protection against dry running (set of three electrodes included in the supply).
- Float.
- Pressure switch.
- VR3/SCA3 three-phase module for overvoltage protection (lightning protector).



MODEL	RATED VOLTAGE	RATED POWER		RATED CURRENT	DIMENSIONS			WEIGHT
					A	B	C	
	V	kW	HP	A	mm	mm	mm	Kg
Q3D/02-03	3 x 400 V ± 10 %	0,25-0,37	0,33-0,50	0,63 ÷ 1	300	400	200	15
Q3D/03-05	3 x 400 V ± 10 %	0,37-0,55	0,5-0,75	1 ÷ 1,6	300	400	200	15
Q3D/05-07	3 x 400 V ± 10 %	0,55-0,75	0,75-1	1,6 ÷ 2,5	300	400	200	15
Q3D/07-15	3 x 400 V ± 10 %	0,75-1,5	1-2	2,5 ÷ 4	300	400	200	15
Q3D/15-22	3 x 400 V ± 10 %	1,5-2,2	2-3	4 ÷ 6,3	300	400	200	15
Q3D/22-40	3 x 400 V ± 10 %	2,2-4	3-5,5	6,3 ÷ 10	300	400	200	15
Q3D/40-75	3 x 400 V ± 10 %	4-7,5	5,5-10	10 ÷ 16	300	400	200	15
Q3D/75-92	3 x 400 V ± 10 %	7,5-9,2	10-12,5	16 ÷ 20	300	400	200	15
Q3D/92-110	3 x 400 V ± 10 %	9,2-11	12,5-15	20 ÷ 25	300	400	200	20
Q3D/110-150	3 x 400 V ± 10 %	11-15	15-20	22 ÷ 32	400	500	200	20
Q3D/150-185	3 x 400 V ± 10 %	15-18,5	20-25	28 ÷ 40	400	500	200	20
Q3D/185-220	3 x 400 V ± 10 %	18,5-22	25-30	36 ÷ 50	400	600	200	27
Q3D/220-300	3 x 400 V ± 10 %	22-30	30-40	45 ÷ 63	400	600	200	27
Q3D/300-370	3 x 400 V ± 10 %	30-37	40-50	57 ÷ 75	400	600	200	27

CB-Q3D-en_a_te

ITT

Lowara

Three-phase Electric Panel

Q3Y Series

APPLICATIONS

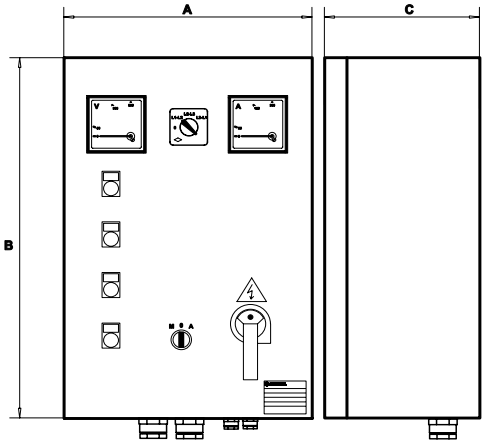
- Protection and control of a three-phase surface or submersible electric pump.

SPECIFICATIONS

- Manual control through an Auto/Man selector switch.
- Automatic control through an external enable contact.
- Supply voltage: 3 x 400 V ±10%.
- Frequency: 50/60 Hz.
- 24 V AC low voltage auxiliary circuit.
- Power: 4 to 315 kW.
- Star-delta starting.
- Short-circuit and overload protection.
- Protection class: IP54.
- Ambient temperature: -5 to +40 °C (according to EN 60439-1).
- Maximum relative humidity: 50% at +40°C, provided that no condensation occurs (according to EN 60439-1).
- Wall mounted.
- Metal enclosure.
- Power, pump running, thermal overload and dry running indicator lights.
- Ready for installation of dry running control float or pressure switch (to be ordered separately). Can be equipped with electronic protection module with electrodes.

OPTIONAL ACCESSORIES

- SLD series 24 V level kit. Probe module for protection against dry running (set of three electrodes included in the supply).
- Float.
- Pressure switch.
- VR3/SCA3 three-phase module for overvoltage protection (lightning protector).



MODEL	RATED VOLTAGE	RATED POWER		RATED CURRENT	DIMENSIONS			WEIGHT
					A	B	C	
	V	kW	HP	A	mm	mm	mm	Kg
Q3Y/40-75	3 x 400 V ± 10 %	4-7,5	5,5-10	10 ÷ 16	400	600	200	23
Q3Y/75-92	3 x 400 V ± 10 %	7,5-9,2	10-12,5	16 ÷ 20	400	600	200	23
Q3Y/92-110	3 x 400 V ± 10 %	9,2-11	12,5-15	20 ÷ 25	400	600	200	23
Q3Y/110-150	3 x 400 V ± 10 %	11-15	15-20	22 ÷ 32	400	600	200	23
Q3Y/150-185	3 x 400 V ± 10 %	15-18,5	20-25	28 ÷ 40	400	600	200	23
Q3Y/185-220	3 x 400 V ± 10 %	18,5-22	25-30	36 ÷ 50	500	700	200	32
Q3Y/220-300	3 x 400 V ± 10 %	22-30	30-40	45 ÷ 63	500	700	200	32
Q3Y/300-370	3 x 400 V ± 10 %	30-37	40-50	57 ÷ 75	600	800	250	68
Q3Y/370-450	3 x 400 V ± 10 %	37-45	50-60	70 ÷ 90	600	800	250	80
Q3Y/450-550	3 x 400 V ± 10 %	45-55	60-75	80 ÷ 108	600	800	250	80
Q3Y/550-750	3 x 400 V ± 10 %	55-75	75-100	105 ÷ 138	600	800	250	109
Q3Y/750-900	3 x 400 V ± 10 %	75-90	100-125	138 ÷ 185	600p	1300p	300p	109
Q3Y/900-1100	3 x 400 V ± 10 %	90-110	125-150	175 ÷ 210	600p	1500p	300p	120
Q3Y/1100-1320	3 x 400 V ± 10 %	110-132	150-180	210 ÷ 260	800p	1700p	400p	130
Q3Y/1320-1600	3 x 400 V ± 10 %	132-160	180-218	250 ÷ 305	800p	1700p	400p	130
Q3Y/1600-2000	3 x 400 V ± 10 %	160-200	218-273	290 ÷ 400	800p	1900p	400p	140
Q3Y/2000-2500	3 x 400 V ± 10 %	200-250	273-340	400 ÷ 460	1000p	1900p	400p	180
Q3Y/2500-3150	3 x 400 V ± 10 %	250-315	340-430	450 ÷ 580	1000p	1900p	400p	180

Dimensions note : P indicates floor mounted control panel.

CB-Q3Y-en_b_te

ITT

Lowara

Three-phase Electric Panel

Q3I Series

APPLICATIONS

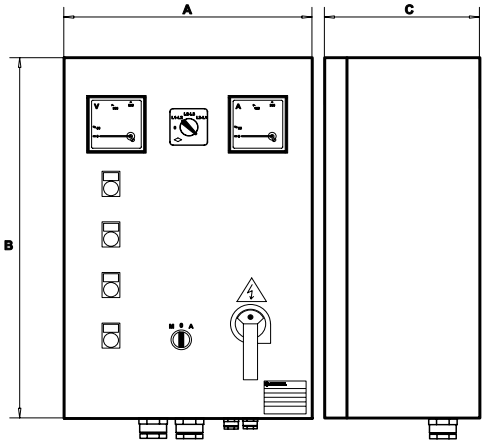
- Protection and control of a three-phase surface or submersible electric pump.

SPECIFICATIONS

- Manual control through an Auto/Man selector switch.
- Automatic control through an external enable contact.
- Supply voltage: 3 x 400 V ±10%.
- Frequency: 50/60 Hz.
- 24 V AC low voltage auxiliary circuit.
- Power: 4 to 315 kW.
- Impedance start.
- Short-circuit and overload protection.
- Protection class: IP54.
- Ambient temperature: -5 to +40 °C (according to EN 60439-1).
- Maximum relative humidity: 50% at +40°C, provided that no condensation occurs (according to EN 60439-1).
- Wall mounted.
- Metal enclosure.
- Power, pump running, thermal overload and dry running indicator lights.
- Ready for installation of dry running control float or pressure switch (to be ordered separately). Can be equipped with electronic protection module with electrodes.

OPTIONAL ACCESSORIES

- SLD series 24 V level kit. Probe module for protection against dry running (set of three electrodes included in the supply).
- Float.
- Pressure switch.
- VR3/SCA3 three-phase module for overvoltage protection (lightning protector).



MODEL	RATED VOLTAGE	RATED POWER		RATED CURRENT	DIMENSIONS			WEIGHT
					A	B	C	
	V	kW	HP	A	mm	mm	mm	Kg
Q3I/40-75	3 x 400 V ± 10 %	4-7,5	5,5-10	10 ÷ 16	400	600	250	35
Q3I/75-92	3 x 400 V ± 10 %	7,5-9,2	10-12,5	16 ÷ 20	400	600	250	35
Q3I/92-110	3 x 400 V ± 10 %	9,2-11	12,5-15	20 ÷ 25	400	600	250	35
Q3I/110-150	3 x 400 V ± 10 %	11-15	15-20	22 ÷ 32	500	700	250	50
Q3I/150-185	3 x 400 V ± 10 %	15-18,5	20-25	28 ÷ 40	500	700	250	50
Q3I/185-220	3 x 400 V ± 10 %	18,5-22	25-30	36 ÷ 50	500	700	250	50
Q3I/220-300	3 x 400 V ± 10 %	22-30	30-40	45 ÷ 63	500	700	250	65
Q3I/300-370	3 x 400 V ± 10 %	30-37	40-50	57 ÷ 75	500	700	250	65
Q3I/370-450	3 x 400 V ± 10 %	37-45	50-60	70 ÷ 90	600	900	250	65
Q3I/450-550	3 x 400 V ± 10 %	45-55	60-75	80 ÷ 108	600p	1300p	300p	100
Q3I/550-750	3 x 400 V ± 10 %	55-75	75-100	105 ÷ 138	600p	1300p	300p	100
Q3I/750-900	3 x 400 V ± 10 %	75-90	100-125	138 ÷ 185	600p	1500p	300p	100
Q3I/900-1100	3 x 400 V ± 10 %	90-110	125-150	175 ÷ 210	600p	1500p	300p	100
Q3I/1100-1320	3 x 400 V ± 10 %	110-132	150-180	210 ÷ 260	800p	1700p	400p	150
Q3I/1320-1600	3 x 400 V ± 10 %	132-160	180-218	250 ÷ 305	800p	1700p	400p	150
Q3I/1600-2000	3 x 400 V ± 10 %	160-200	218-273	290 ÷ 400	800p	1900p	400p	160
Q3I/2000-2500	3 x 400 V ± 10 %	200-250	273-340	400 ÷ 460	1000p	1900p	400p	180
Q3I/2500-3150	3 x 400 V ± 10 %	250-315	340-430	450 ÷ 580	1000p	1900p	400p	200

Dimensions note : P indicates floor mounted control panel.

CB-Q3I-en_b_te

ITT

Lowara

Three-phase Electric Panel

Q3A Series

APPLICATIONS

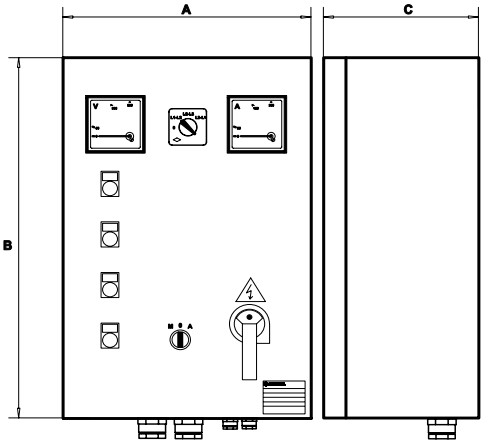
- Protection and control of a three-phase surface or submersible electric pump.

SPECIFICATIONS

- Manual control through an Auto/Man selector switch.
- Automatic control through an external enable contact.
- Supply voltage: 3 x 400 V ±10%.
- Frequency: 50/60 Hz.
- 24 V AC low voltage auxiliary circuit.
- Power: 4 to 315 kW.
- Starting autotransformer.
- Short-circuit and overload protection.
- Protection class: IP54.
- Ambient temperature: -5 to +40 °C (according to EN 60439-1).
- Maximum relative humidity: 50% at +40°C, provided that no condensation occurs (according to EN 60439-1).
- Wall mounted.
- Metal enclosure.
- Power, pump running, thermal overload and dry running indicator lights.
- Ready for installation of dry running control float or pressure switch (to be ordered separately). Can be equipped with electronic protection module with electrodes.

OPTIONAL ACCESSORIES

- SLD series 24 V level kit. Probe module for protection against dry running (set of three electrodes included in the supply).
- Float.
- Pressure switch.
- VR3/SCA3 three-phase module for overvoltage protection (lightning protector).



MODEL	RATED VOLTAGE	RATED POWER		RATED CURRENT	DIMENSIONS			WEUGHT
					A	B	C	
	V	kW	HP	A	mm	mm	mm	Kg
Q3A/40-75	3 x 400 V ± 10 %	4-7,5	5,5-10	10 ÷ 16	500	700	250	50
Q3A/75-92	3 x 400 V ± 10 %	7,5-9,2	10-12,5	16 ÷ 20	500	700	250	50
Q3A/92-110	3 x 400 V ± 10 %	9,2-11	12,5-15	20 ÷ 25	500	700	250	50
Q3A/110-150	3 x 400 V ± 10 %	11-15	15-20	22 ÷ 32	500	700	250	50
Q3A/150-185	3 x 400 V ± 10 %	15-18,5	20-25	28 ÷ 40	500	700	250	50
Q3A/185-220	3 x 400 V ± 10 %	18,5-22	25-30	36 ÷ 50	500	700	250	50
Q3A/220-300	3 x 400 V ± 10 %	22-30	30-40	45 ÷ 63	600	900	300	80
Q3A/300-370	3 x 400 V ± 10 %	30-37	40-50	57 ÷ 75	600	900	300	80
Q3A/370-450	3 x 400 V ± 10 %	37-45	50-60	70 ÷ 90	600p	1300p	300p	90
Q3A/450-550	3 x 400 V ± 10 %	45-55	60-75	80 ÷ 108	600p	1500p	300p	120
Q3A/550-750	3 x 400 V ± 10 %	55-75	75-100	105 ÷ 138	600p	1500p	300p	120
Q3A/750-900	3 x 400 V ± 10 %	75-90	100-125	138 ÷ 185	600p	1700p	400p	150
Q3A/900-1100	3 x 400 V ± 10 %	90-110	125-150	175 ÷ 210	600p	1700p	400p	150
Q3A/1100-1320	3 x 400 V ± 10 %	110-132	150-180	210 ÷ 260	800p	1900p	400p	200
Q3A/1320-1600	3 x 400 V ± 10 %	132-160	180-218	250 ÷ 305	800p	1900p	400p	200
Q3A/1600-2000	3 x 400 V ± 10 %	160-200	218-273	290 ÷ 400	800p	1900p	400p	230
Q3A/2000-2500	3 x 400 V ± 10 %	200-250	273-340	400 ÷ 460	1000p	1900p	400p	230
Q3A/2500-3150	3 x 400 V ± 10 %	250-315	340-430	450 ÷ 580	1000p	1900p	400p	250

Dimensions note : P indicates floor mounted control panel.

CB-Q3A-en_b_te

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Lowara

Three-phase Electric Panel

Q3SF Series

APPLICATIONS

- Protection and control of a three-phase surface or submersible electric pump.

SPECIFICATIONS

- Manual control through an Auto/Man selector switch.
- Automatic control through an external enable contact.
- Supply voltage: 3 x 400 V ±10%.
- Frequency: 50/60 Hz.
- 24 V AC low voltage auxiliary circuit.
- Power: 5,5 to 110 kW.
- Softstart with torque control.
- Protection class: IP54.
- Ambient temperature: -5 to +40 °C (according to EN 60439-1).
- Maximum relative humidity: 50% at +40°C, provided that no condensation occurs (according to EN 60439-1).
- Wall mounted.
- Metal enclosure.
- Dry running indicator light.
- Power - pump running - malfunction LEDs on starter keypanel.
- ON/OFF selector switch for activation of by-pass contactor.
- Ready for installation of dry running control float or pressure switch (to be ordered separately). Can be equipped with electronic protection module with electrodes.

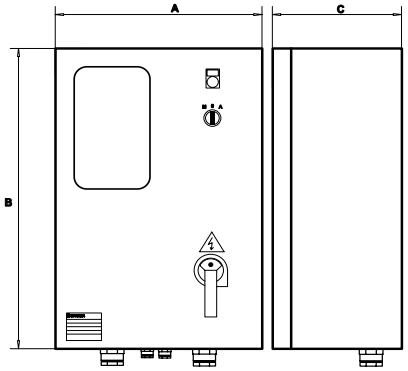
STATIC STARTER CHARACTERISTICS

- Static starter for gradual start-up/ shutdown, featuring: keypanel with liquid crystal display showing voltage, absorbed current, cos φ, operating hours, number of starts, last twenty messages on system status (events / alarms).

Protections against phase failure / phase sequence / frequency out of limits on power supply line.
Low-voltage protection on auxiliary circuits.
Protection against starter overtemperature / overload / malfunction.
Protection against overload / locked rotor / current asymmetry on motor side.
Short-circuit protection on inputs and outputs.
RS232 interface for remote control and RS485 for use of remote keypanel.
Incorporated by-pass contactor.

OPTIONAL ACCESSORIES

- SLD series 24 V level kit. Probe module for protection against dry running (set of three electrodes included in the supply).
- Float.
- Pressure switch.
- VR3/SCA3 three-phase module for overvoltage protection (lightning protector).



MODEL	RATED VOLTAGE	RATED POWER		RATED CURRENT	DIMENSIONS			WEIGHT
					A	B	C	
	V	kW	HP	A	mm	mm	mm	Kg
Q3SF 75	3 x 400 V ± 10 %	5,5 - 7,5	7,5 -10	8,5 ÷ 17	400	600	250	35
Q3SF 150	3 x 400 V ± 10 %	9,2 - 15	12,5 - 20	15 ÷ 30	500	700	250	40
Q3SF 220	3 x 400 V ± 10 %	18,5 - 22	25 - 30	28 ÷ 45	500	700	250	40
Q3SF 300	3 x 400 V ± 10 %	30	40	42 ÷ 60	600	900	300	90
Q3SF 370	3 x 400 V ± 10 %	37	50	55 ÷ 75	600	900	300	90
Q3SF 450	3 x 400 V ± 10 %	45	60	70 ÷ 85	600	900	300	90
Q3SF 550	3 x 400 V ± 10 %	55	75	80 ÷ 110	600	900	300	90
Q3SF 590	3 x 400 V ± 10 %	59	80	105 ÷ 125	600	900	300	90
Q3SF 750	3 x 400 V ± 10 %	75	100	120 ÷ 142	600p	1700p	400p	120
Q3SF 900	3 x 400 V ± 10 %	90	125	135 ÷ 190	600p	1700p	400p	120
Q3SF 1100	3 x 400 V ± 10 %	110	150	185 ÷ 245	600p	1700p	400p	120

Dimensions note : P indicates floor mounted control panel.

CB-Q3SF-en_b_te

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Lowara

Level Control Panel

APPLICATIONS

- Accessory for electric pump control panels, suitable for tank filling or drainage applications or for activation of audible or visual alarms.

QCL5 Series

SPECIFICATIONS

- Automatic control through probes.
- Supply voltage:
  1 x 230 V ±10% or 1 x 24 V ±10%.
- Frequency: 50/60 Hz.
- Voltage to probes:
  15 V AC at 0,5 mA max.
- Switch contact 48 V AC at 3 A max (250 W max).
- Protection class: IP55.
- Ambient temperature: -5 to +40 °C (according to EN 60439-1).
- Maximum relative humidity: 50% at +40°C, provided that no condensation occurs (according to EN 60439-1).
- Wall mounted.
- Plastic enclosure.
- Electrodes suitable for water at a maximum temperature of 40°C.
- Set of three electrodes included in the supply.

OPTIONAL ACCESSORIES

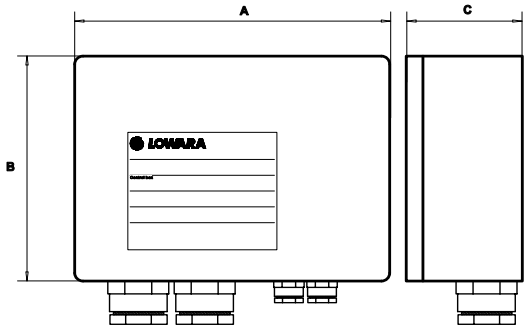
- Drop cable with circular cross section.

For connection of the electrodes to the panel we recommend the following cross sections:

LENGHT m		CABLE CROSS SECTION mm^2
0	50	0,5
50	100	0,8
100	200	1,0
200	400	2,5
400	>	4,0

CB-CASEL-en_a_te

Three-pole cables can be used for short lenghts.
Otherwise we recommend the use of unipolar cables placed at suitable distance from each other to prevent the capacitive effect of the cable from interfering with the proper operation of the electronic module.



TYPE	POWER SUPPLY			CONTACT			DIMENSIONS	WEIGHT
	VOLTAGE	FREQUENCY	POWER	TYPE	RANGE		A x B x C	
	V	Hz	W		V	A	mm	Kg
QCL5/24	1 x 24	50/60	2	NO-C-NC	48	3	90 x 130 x 60	0,5
QCL5/230	1 x 230	50/60	2					

CB-QCL5-en_a_te

Level Probe Module

APPLICATIONS

• Accessory for electric panels.

SLD Series

SPECIFICATIONS

- Electronic module forr use of probes as protection against dry running.
- Supply voltage: 1 x 24 V ±10% for model SLD/24.
- Frequency: 50/60 Hz.
- Absorbed power: 2 VA.
- Voltage to probes: 15 V AC at 0,5 mA max.
- Switch contact 24 V AC at 5 A max (250 W max).
- Designed for installation on Lowara electric panels featuring DIN bar.
- Electrodes suitable for water at a maximum temperature of 40°C.

CONSTRUCTION CHARACTERISTICS

- Module made of plastic material with DIN bar attachment.
- Cables with quick plug-in connectors.
- Set of three electrodes included in the supply.
- Electrodes with nylon 6 body, stainless steel sensitive element brass washer and nitrile rubber seal.

OPTIONAL ACCESSORIES

• Drop cable with circular cross section.

For connection of the electrodes to the panel we recommend the following cross sections:

LENGHT m		CABLE CROSS SECTION mm^2
0	50	0,5
50	100	0,8
100	200	1,0
200	400	2,5
400	>	4,0

CB-CASEL-en_a_te

Three-pole cables can be used for short lenghts.
Otherwise we recommend the use of unipolar cables placed at suitable distance from each other to prevent the capacitive effect of the cable from interfering with the proper operation of the electronic module.

TYPE	POWER SUPPLY		CONTACT			DIMENSIONS	WEIGHT	PANELS
	MAIN V	POWER W	TYPE	RANGE V	RANGE A	A x B x C mm	Kg	
KIT SLD/24	1x24 50/60 Hz	2	N0-C-NC	24	5	90 x 35 x 60	0,5	QMCS-QM-QTD-Q3D-Q3Y-Q3A-Q3I-Q3SF

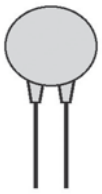
CB-SLD-en_a_te

Lightning Protection

APPLICATIONS

- Accessory for electric panels.

DPF Series



SPECIFICATIONS

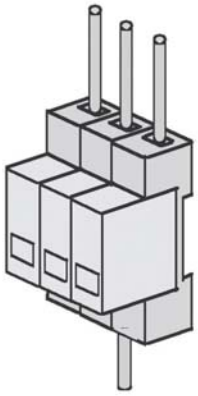
- Varistor for overvoltage protection of single-phase lines. To be connected between the phase and neutral conductor.
- Operating voltage: 460 V AC.
- Maximum varistor voltage: 750 V with 100 A peak current.

VR Series

SPECIFICATIONS

- Varistors for overvoltage protection of three-phase lines.
- To be connected between the phases (VR3 model).
- Operating voltage: 460 V AC.
- Maximum varistor voltage: 750 V with 100 A peak current.
- Designed for installation on Lowara electric panels featuring DIN bar.

SCA3 Series



SPECIFICATIONS

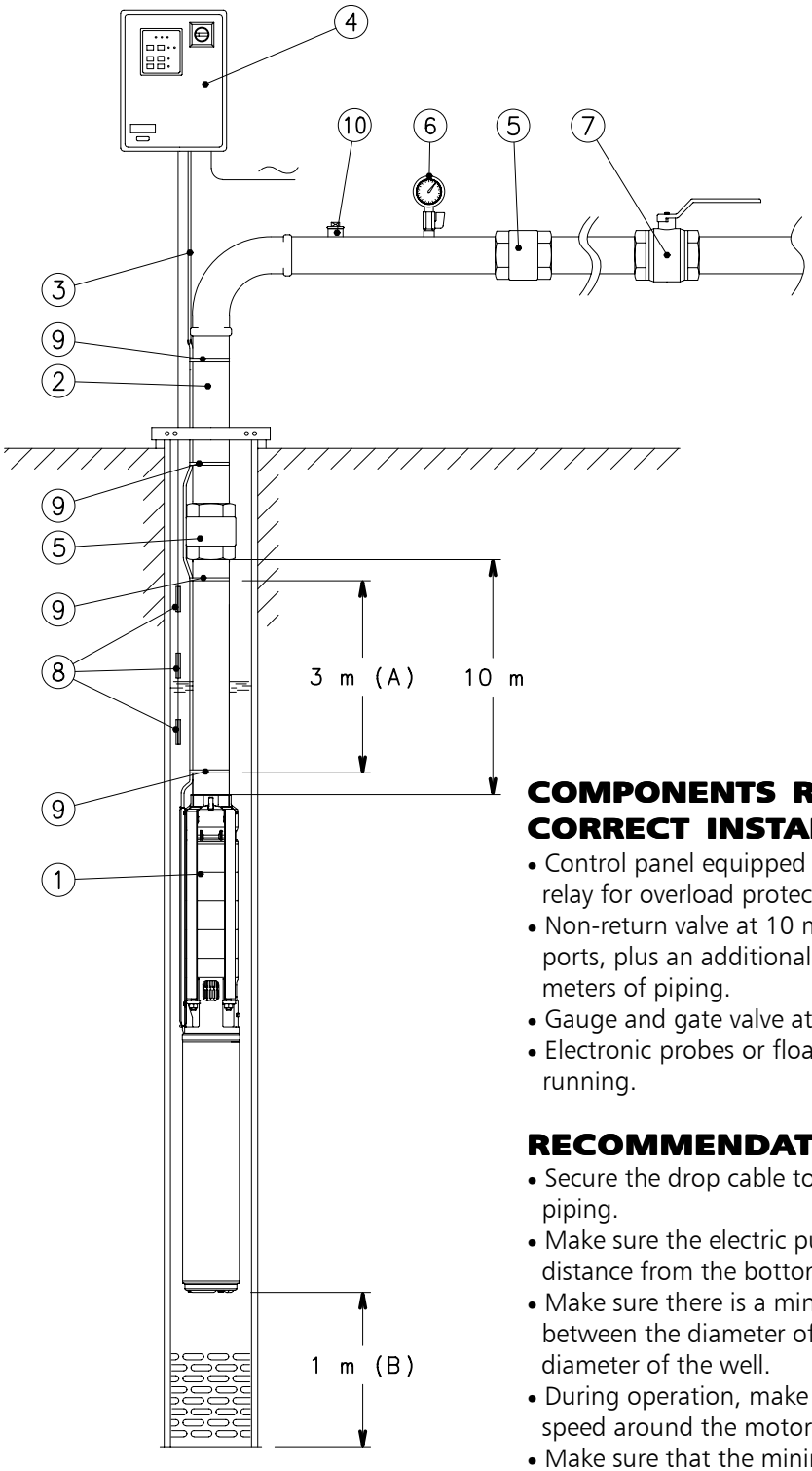
- Lightning arresters for overvoltage protection of three-phase lines. To be connected between the phases and the heart conductor,
- Operating voltage: 500 V AC.
- Maximum varistor voltage: 2,5 kW with 40 kA peak current.
- Designed for installation on Lowara electric panels featuring DIN bar.

TYPE	VOLTAGE V	PANELS
DPF	1 x 220-240 50/60 Hz	QSM - QMC - QMCS - QPC
KIT VR1	1 x 220-230 50/60 Hz	QM - QDRM - QDRM2
KIT VR3	3 x 400 50/60 Hz	QTD - QDR - QDR2 - Q3D
KIT SCA 3	3 x 400 50/60 Hz	Q3Y-Q3A-Q3I-Q3SF-Q3D

CB-VR-en_b_te

TECHNICAL APPENDIX

SUBMERSIBLE ELECTRIC PUMP INSTALLATION DIAGRAM



1 - Submersible electric pump.
2 - Delivery pipe.
3 - Drop cable.
4 - Control panel.
5 - Non-return valve.
6 - Gauge.
7 - On/off valve.
8 - Level sensors for protection against dry running.
9 - Cable clamp.
10 - Electric pump bleed/priming cap.

A - Distance between the clamps that secure the drop cable to the delivery pipe.
B - Distance from the bottom of the well to the electric pump.

COMPONENTS REQUIRED FOR CORRECT INSTALLATION

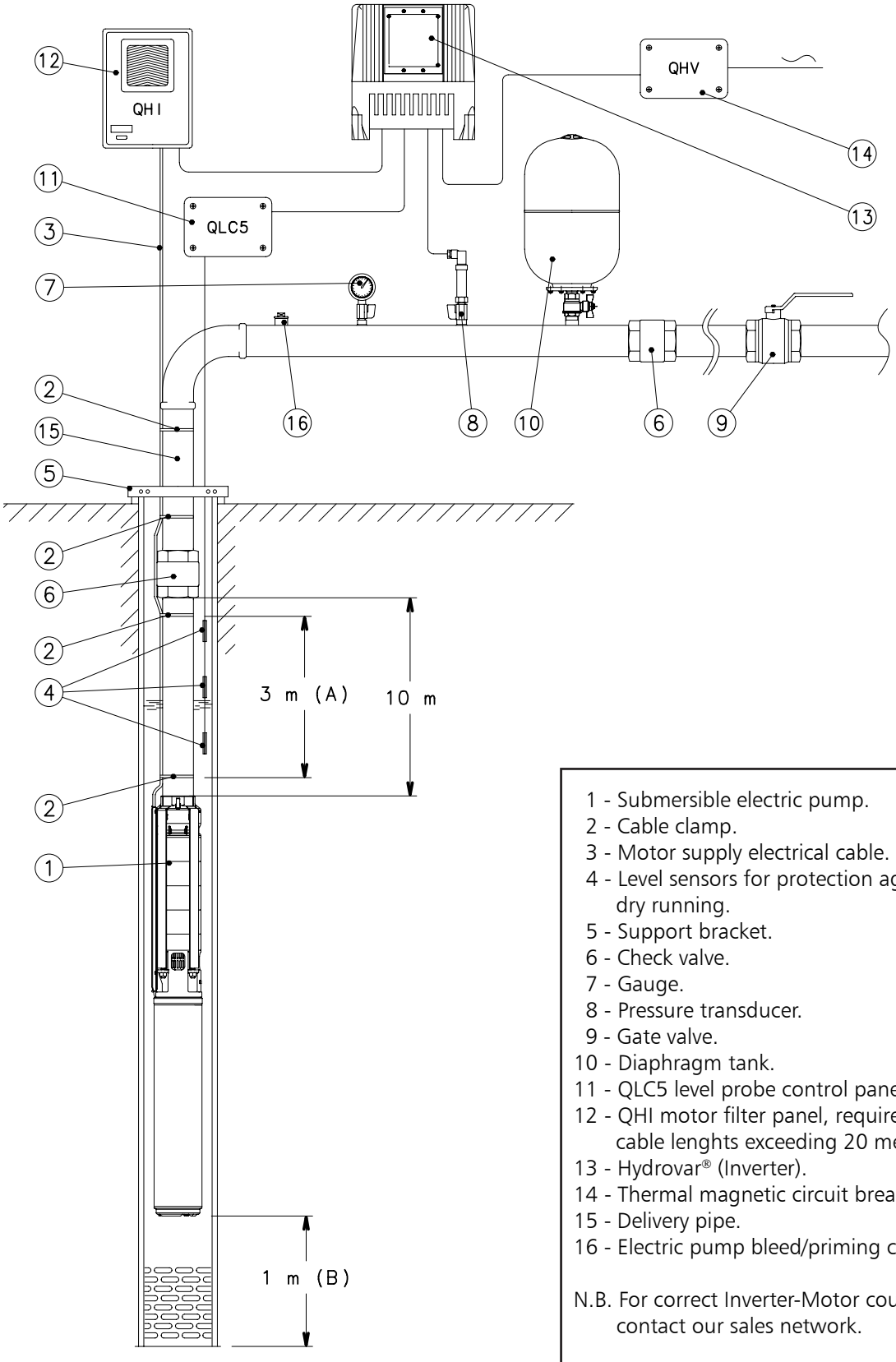
- Control panel equipped with a main switch and thermal relay for overload protection.
- Non-return valve at 10 meters' distance from the delivery ports, plus an additional non-return valve every 30÷50 meters of piping.
- Gauge and gate valve at well mouth.
- Electronic probes or floats for protection against dry running.

RECOMMENDATIONS

- Secure the drop cable to the pipe every 2÷3 meters of piping.
- Make sure the electric pump is installed at a safe distance from the bottom of the well.
- Make sure there is a minimum distance of 3 mm between the diameter of the pump and the internal diameter of the well.
- During operation, make sure that the water circulation speed around the motor is at least 8 cm/sec.
- Make sure that the minimum dynamic level of the water in the well is at least 1 m above the pump's delivery port.

01904_B_SC

EXAMPLE OF INSTALLATION OF A SUBMERSIBLE ELECTRIC PUMP CONTROLLED BY AN INVERTER (HYDROVAR®)



1 - Submersible electric pump.
2 - Cable clamp.
3 - Motor supply electrical cable.
4 - Level sensors for protection against dry running.
5 - Support bracket.
6 - Check valve.
7 - Gauge.
8 - Pressure transducer.
9 - Gate valve.
10 - Diaphragm tank.
11 - QLC5 level probe control panel.
12 - QHI motor filter panel, required for cable lenghts exceeding 20 meters.
13 - Hydrovar® (Inverter).
14 - Thermal magnetic circuit breaker (QHV).
15 - Delivery pipe.
16 - Electric pump bleed/priming cap.

N.B. For correct Inverter-Motor coupling, contact our sales network.

01905_B_SC

L6C SERIES MOTORS

TABLE OF POWER REDUCTION COEFFICIENTS WITH INCREASED WATER TEMPERATURE

MOTOR TYPE	RATED POWER	TEMPERATURE °C					
	kW	35	40	45	50	55	60
L6C	all models	1	0,95	0,8	0,75	0,7	0,6

L6c-derating-50-en_b_te

EXAMPLE:
A 7,5 kW L6C motor is to be used in 45°C water.
Motor power at 50 °C = 7,5 x 0,8 = 6 kW

L6W SERIES MOTORS

TABLE OF POWER REDUCTION COEFFICIENTS WITH INCREASED WATER TEMPERATURE

MOTOR TYPE	RATED POWER	TEMPERATURE °C							
	kW	25	30	35	40	45	50	55	60
L6W (1)	all models	1	0,85	0,74	-	-	-	-	-
L6W (2)	all models	1	1	1	1	1	0,85	0,75	0,67

(1) Standard winding for water temperature up to 35 °C. l6w-derating-en_a_te

(2) Special winding for water temperature from 35 °C to 60 °C.

EXAMPLE:
A 15 kW L6W motor is to be used in 35°C water.
Motor power at 35 °C = 15 x 0,74 = 11,1 kW

L8W SERIES MOTORS

TABLE OF POWER REDUCTION COEFFICIENTS WITH INCREASED WATER TEMPERATURE

MOTOR TYPE	RATED POWER	TEMPERATURE °C							
	kW	25	30	35	40	45	50	55	60
L8W (1)	all models	1	0,85	0,74	-	-	-	-	-
L8W (2)	all models	1	1	1	1	1	0,85	0,75	0,67

(1) Standard winding for water temperature up to 35 °C. l8w-derating-en_a_te

(2) Special winding for water temperature from 35 °C to 60 °C.

EXAMPLE:
A 55 kW L8W motor is to be used in 35°C water.
Motor power at 35 °C = 55 x 0,74 = 40,7 kW

L10W SERIES MOTORS

TABLE OF POWER REDUCTION COEFFICIENTS WITH INCREASED WATER TEMPERATURE

MOTOR TYPE	RATED POWER	TEMPERATURE °C							
	kW	25	30	35	40	45	50	55	60
L10W (1)	all models	1	0,85	0,74	-	-	-	-	-
L10W (2)	all models	1	1	1	1	1	0,85	0,75	0,67

(1) Standard winding for water temperature up to 35 °C. l10w-derating-en_a_te

(2) Special winding for water temperature from 35 °C to 60 °C.

EXAMPLE:
A 110 kW L10W motor is to be used in 35°C water.
Motor power at 35 °C = 110 x 0,74 = 81,4 kW

L12W SERIES MOTORS

TABLE OF POWER REDUCTION COEFFICIENTS WITH INCREASED WATER TEMPERATURE

MOTOR TYPE	RATED POWER	TEMPERATURE °C							
	kW	25	30	35	40	45	50	55	60
L12W (1)	all models	1	0,85	0,74	-	-	-	-	-
L12W (2)	all models	1	1	1	1	1	0,85	0,75	0,67

(1) Standard winding for water temperature up to 35 °C. l12w-derating-en_a_te

(2) Special winding for water temperature from 35 °C to 60 °C.

EXAMPLE:
A 220 kW L12W motor is to used in 35°C water.
Motor power at 35 °C = 220 x 0,74 = 162,8 kW

DETERMINING THE CABLE SECTION REQUIRED FOR LOW-VOLTAGE SUBMERSIBLE MOTORS

The section required depends on the maximum admissible load current - which determines the heating factor - on the ambient temperature and how the cable is laid.
Voltage loss, and therefore loss of cable efficiency, constitutes the decisive selection criterium for long cables.

The required cable section is calculated based on the following formulas:

Direct start: $q = \frac{\sqrt{3} \cdot I \cdot l \cdot \cos\varphi \cdot 100}{x \cdot \Delta u \cdot U}$

Star – Delta start $q = \frac{2 \cdot I \cdot l \cdot \cos\varphi \cdot 100}{\sqrt{3} \cdot x \cdot \Delta u \cdot U}$

q... cable section in mm2
I... rated motor current in A
X... Electrical conductivity (53 for copper)
Δu Voltage drop in %
l... Cable length in mm
cosφ... Power factor of submersible motor
U... Rated voltage

When sizing the cable section, keep in mind that higher voltage drops mean increased power losses and consequently higher operating costs.

The diagrams show how the required cable section is calculated based on a voltage rating of **400V** and a power factor **cosφ=0,85** and **3% voltage drop**, , at an ambient temperature of **30°C**. If the temperature is higher than 30°C, the maximum admissible current carrying capacity of the cable at the actual ambient temperature must be taken into account (see table next to diagrams).
The inductive voltage drop is negligible and has not been taken into account, therefore these diagrams can be adopted **regardless of the frequency**.
The current carrying capacity can be established from the horizontal lines above the length of the cable (vertical lines). The bend point indicates the limit length for 3% voltage drops.

Examples:

1.) Star-Delta start:
Calculate the cable section
Rated motor current: 85 A
Waterproof cable
Length of cable: 35 m

On the horizontal axis, follow the 85 A rated current until you reach a conductivity section with which the length of the cable is greater than or equal to 35m. In this case, 6 mm². The maximum length for a 3% voltage drop is 43 m. Therefore, in this case the voltage drop is 3x35/46=2.3%

2.) the same data, but with 50°C ambient temperature:
The table next to the diagram shows that the maximum current carrying capacity of a 6 mm² cable at 50°C is 78 A, therefore a section of 10 mm² must be selected. The maximum length for a 3% voltage drop is 76 m. Therefore, in this case the voltage drop is 3x35/76=1.4%

3.) the same data, but with 500V voltage:
In order to use the diagrams, the rated current of the motor must be converted in proportion to the voltage:

Current reading $= \frac{400V}{\text{rated voltage}} \times \text{rated current}$

Current reading $= \frac{400V}{500V} \times 85 = 68\ A$

The maximum length for a 3% voltage drop is 38 m. Therefore, the voltage drop is: 3x35/38=2.75%

SIZING OF CHLOROPRENE RUBBER (CR) H07RN-F CABLES DIRECT-ON-LINE START

Temperature	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
Section (mm²)	Max current - (A)										
1,5	21	20	19	18	17	16	15	13	12	-	-
2,5	29	28	26	25	24	22	20	19	17	-	-
4	39	37	35	34	32	29	27	25	22	-	-
6	50	48	46	43	41	38	35	32	29	-	-
10	69	66	63	61	57	53	49	45	40	-	-
16	92	89	85	81	76	70	66	60	54	-	-
25	123	118	113	108	101	94	88	80	71	-	-
35	152	146	140	133	125	116	108	98	88	-	-
50	184	176	169	161	151	140	131	119	107	-	-
70	234	224	215	205	192	178	167	151	136	-	-
95	283	271	259	248	232	215	201	183	164	-	-
120	328	314	301	287	269	250	234	212	191	-	-

400 V - 3 % voltage drop - 30 °C ambient temperature - cos φ = 0,85

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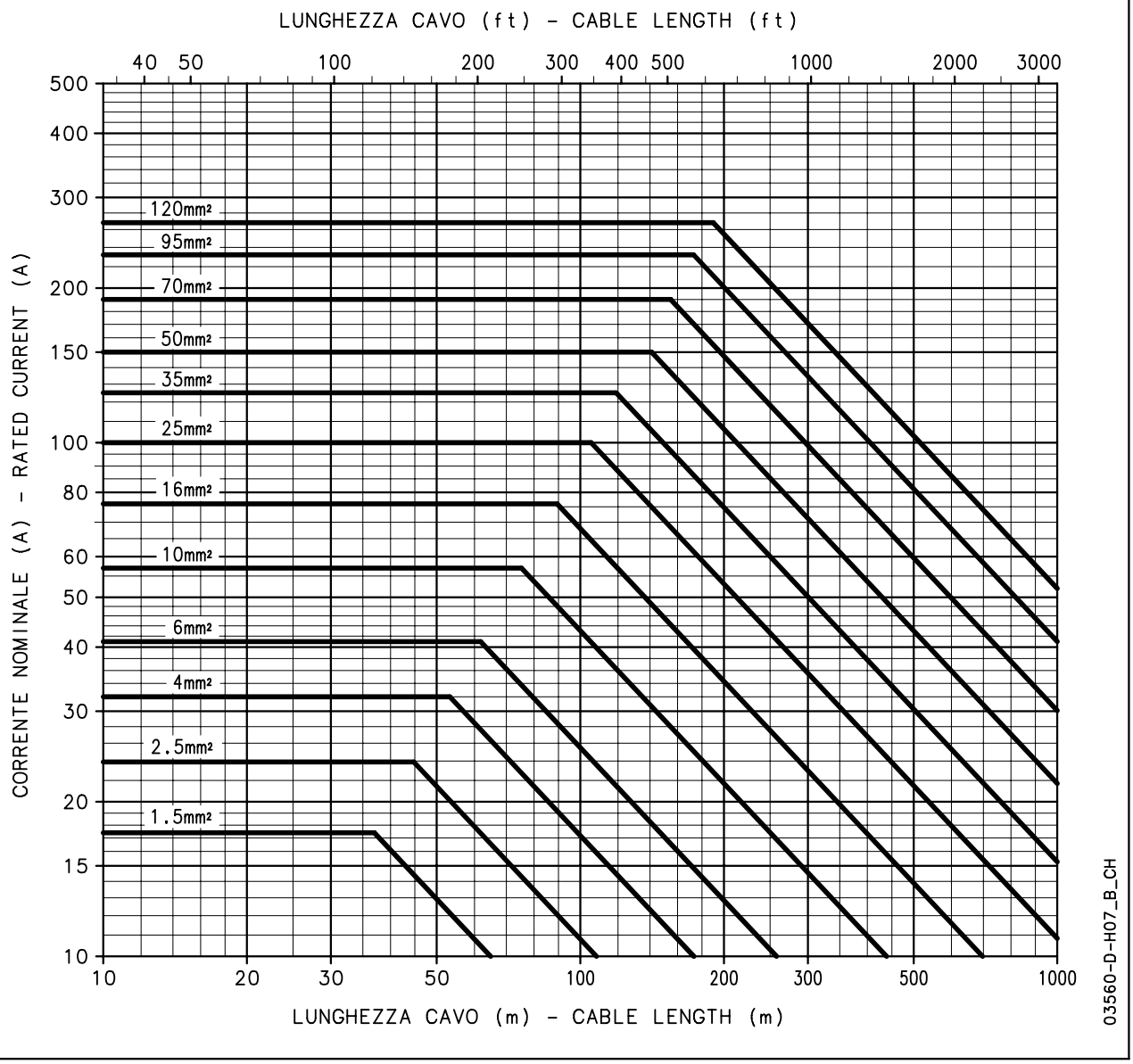

SIZING OF CHLOROPRENE RUBBER (CR) H07RN-F CABLES STAR-DELTA START

Temperature	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
Section (mm²)	Max current - (A)										
1,5	37	35	34	32	30	28	26	24	21	-	-
2,5	50	48	46	44	41	38	36	32	29	-	-
4	67	64	62	59	55	51	48	43	39	-	-
6	86	83	79	76	71	66	61	56	50	-	-
10	120	115	110	105	98	91	86	78	70	-	-
16	160	154	147	140	131	122	114	104	93	-	-
25	213	204	195	187	175	162	152	138	124	-	-
35	264	253	242	231	216	201	188	171	153	-	-
50	319	306	293	279	261	243	227	206	185	-	-
70	405	389	372	355	332	309	289	262	263	-	-
95	490	470	450	429	401	373	349	317	285	-	-
120	568	545	521	498	465	433	405	368	330	-	-

400 V - 3 % voltage drop - 30 °C ambient temperature - cos φ = 0,85

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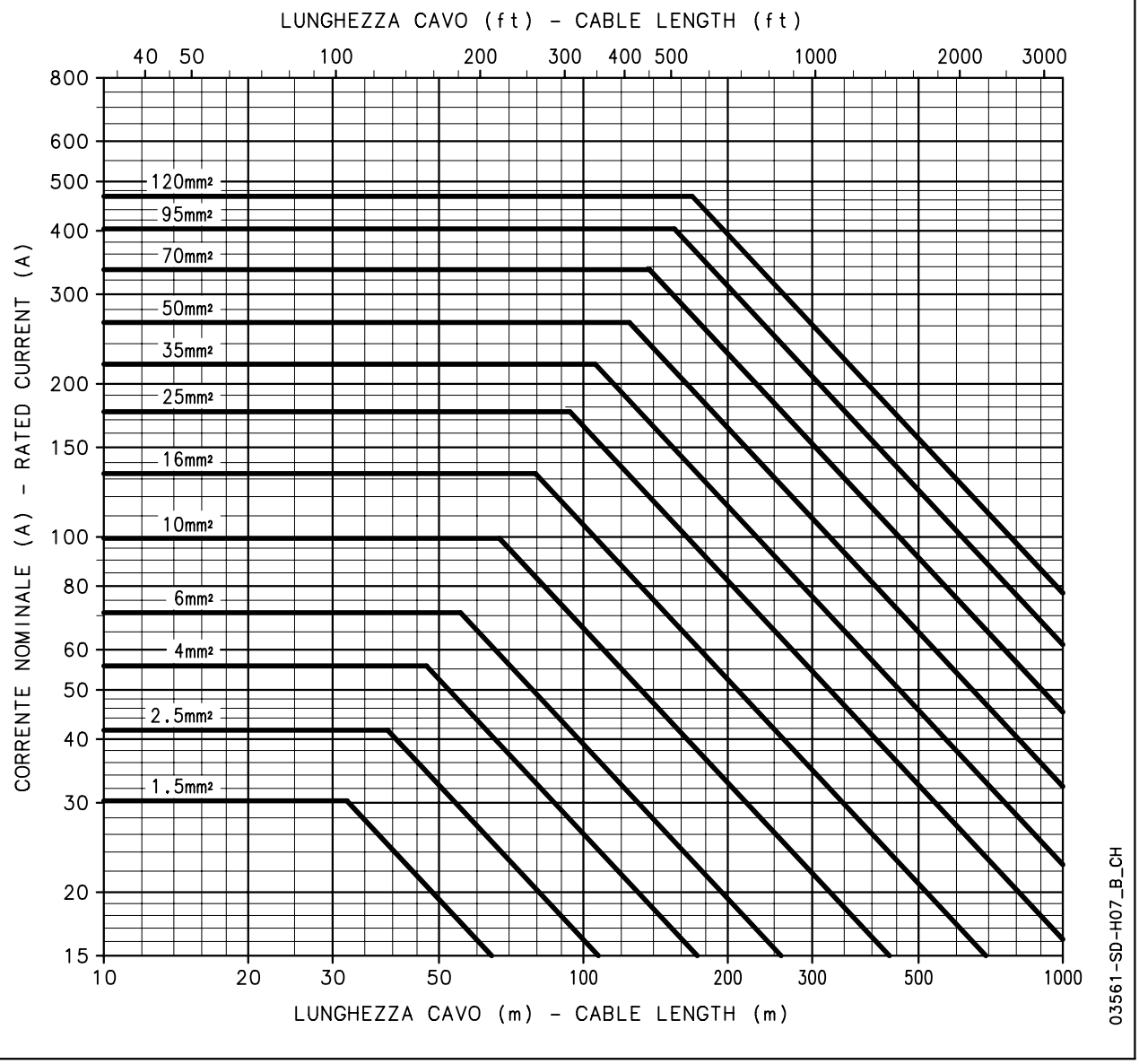
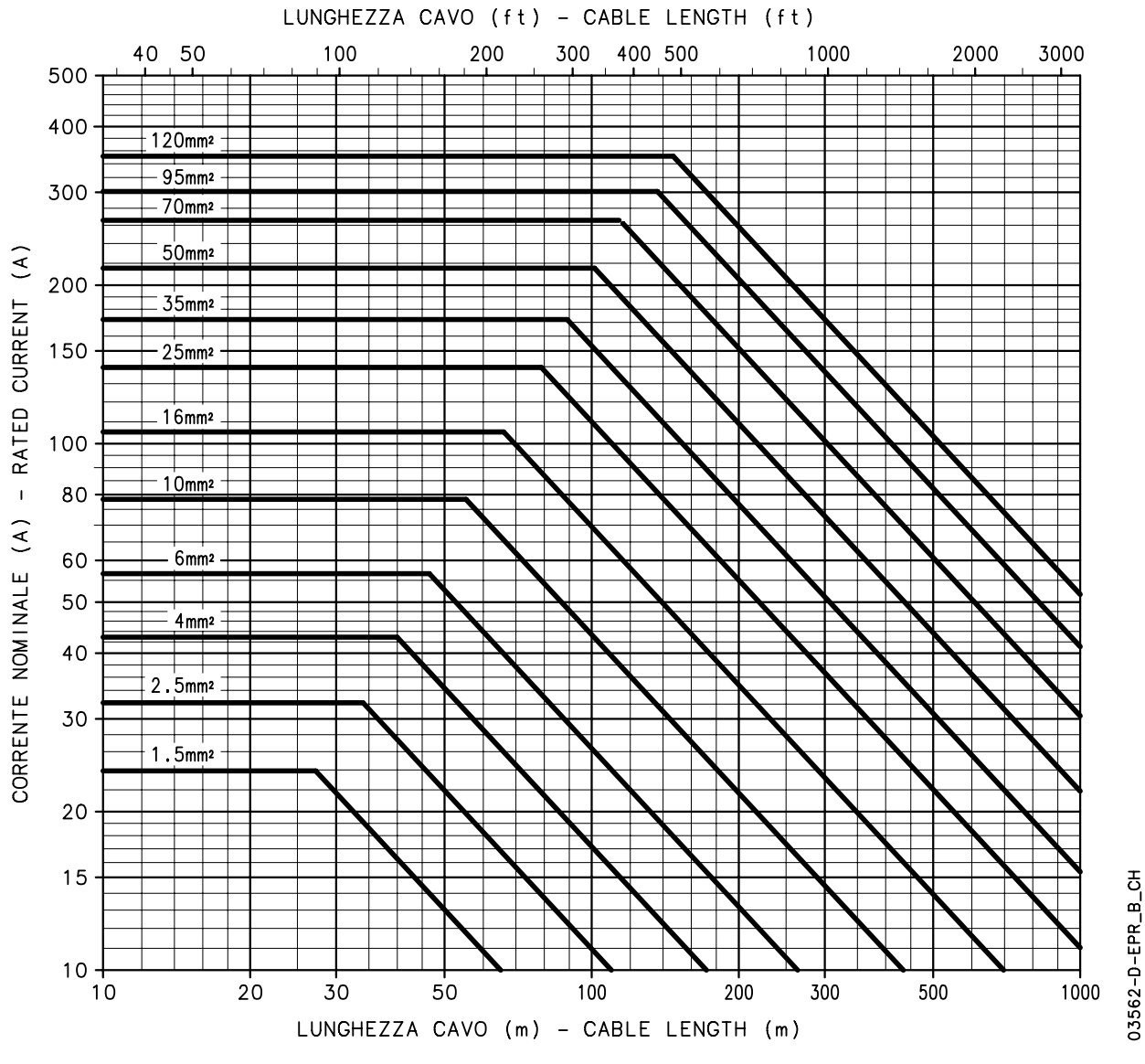


SIZING OF ETHYLENE-PROPYLENE RUBBER (EPR) CABLES DIRECT-ON-LINE START

Temperature	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
Section (mm²)	Max current - (A)										
1,5	27	26	25	24	24	23	21	20	19	18	15
2,5	36	35	33	33	32	30	29	27	26	24	20
4	49	48	45	44	43	41	39	37	35	32	27
6	64	62	59	58	56	53	50	48	45	42	36
10	89	87	82	81	78	74	70	67	63	59	50
16	119	116	110	108	104	99	94	90	85	79	67
25	158	154	146	143	138	132	125	120	113	104	89
35	196	191	181	177	171	164	155	148	140	129	111
50	244	238	225	221	213	204	193	185	174	164	138
70	302	294	278	273	263	252	239	228	215	199	170
95	346	337	319	313	301	288	273	261	246	228	195
120	404	394	373	366	352	337	320	306	288	267	228

400 V - 3 % voltage drop - 30 °C ambient temperature - cos φ = 0,85

dim-cavi_d-epr-en_b_te



SIZING OF ETHYLENE-PROPYLENE RUBBER (EPR) CABLES STAR-DELTA START

Temperature	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
Section (mm²)	Max current - (A)										
1,5	47	45	43	42	41	39	37	35	33	31	36
2,5	63	61	58	57	55	52	50	47	45	41	35
4	85	82	78	76	74	71	67	64	60	56	48
6	110	107	101	99	96	92	87	83	78	72	62
10	155	151	143	140	135	129	122	117	110	102	87
16	207	201	190	187	180	172	163	156	147	136	117
25	274	267	253	248	239	229	217	207	195	181	155
35	340	331	313	307	296	284	269	257	242	224	192
50	423	412	390	382	368	353	334	320	301	279	239
70	523	509	482	473	455	436	414	395	373	345	295
95	599	583	522	541	521	500	474	453	427	395	338
120	700	682	645	633	609	584	554	529	499	462	395

400 V - 3 % voltage drop - 30 °C ambient temperature - cos φ = 0,85

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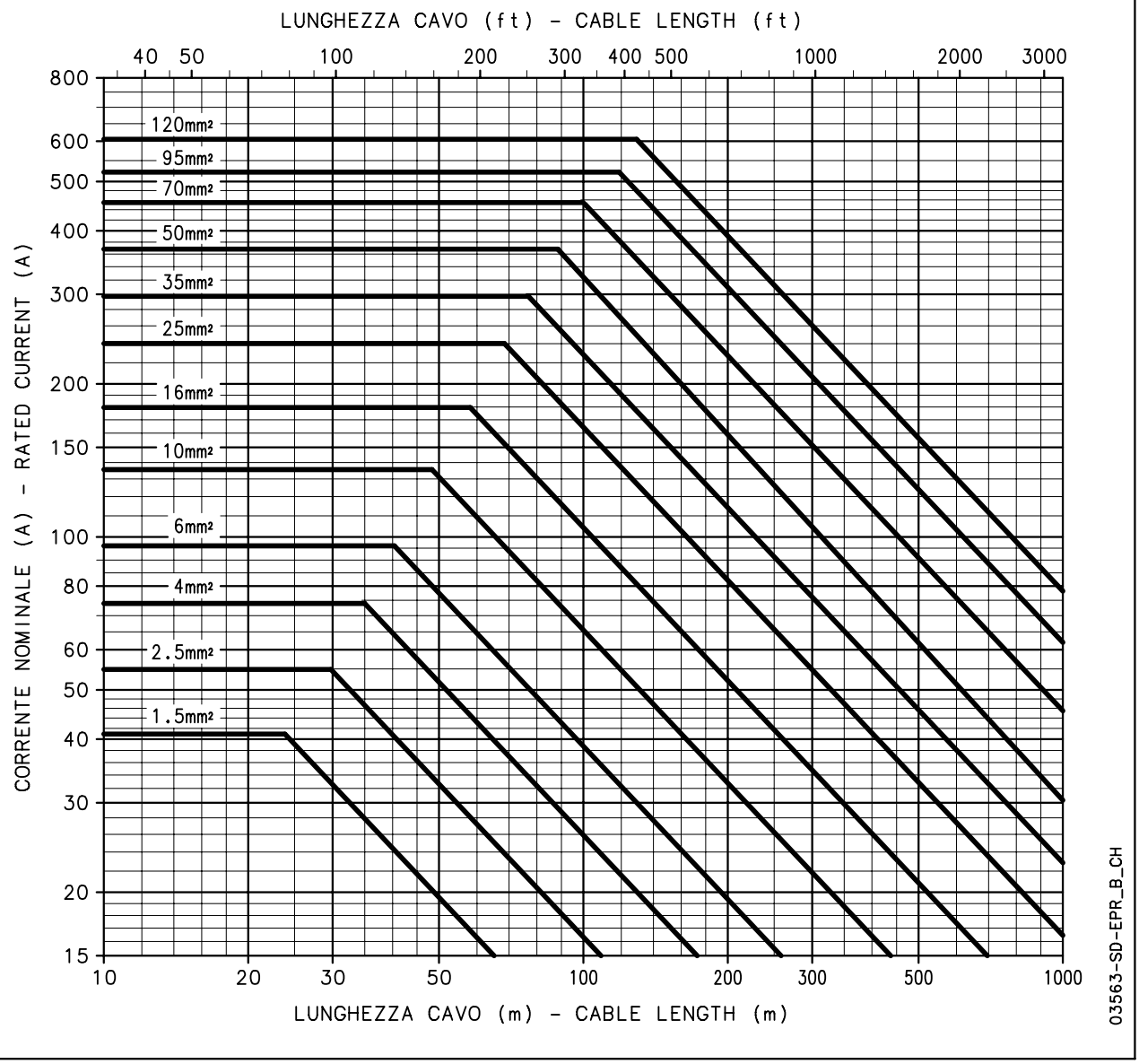
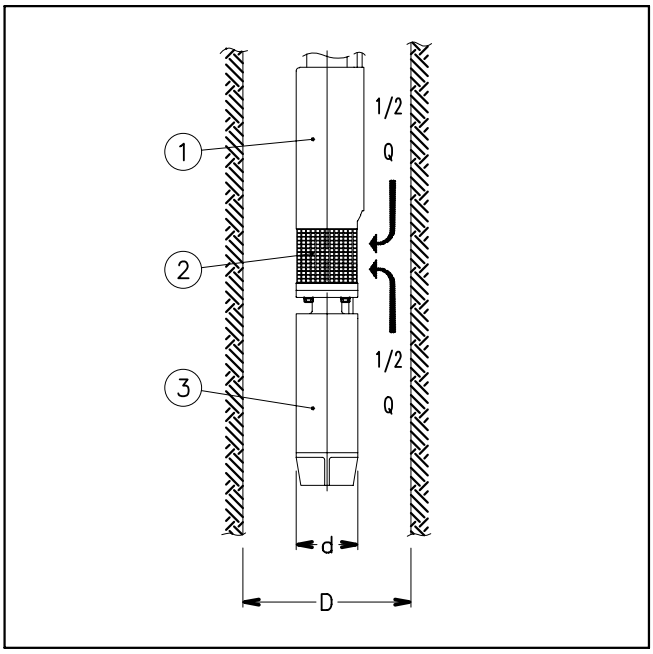
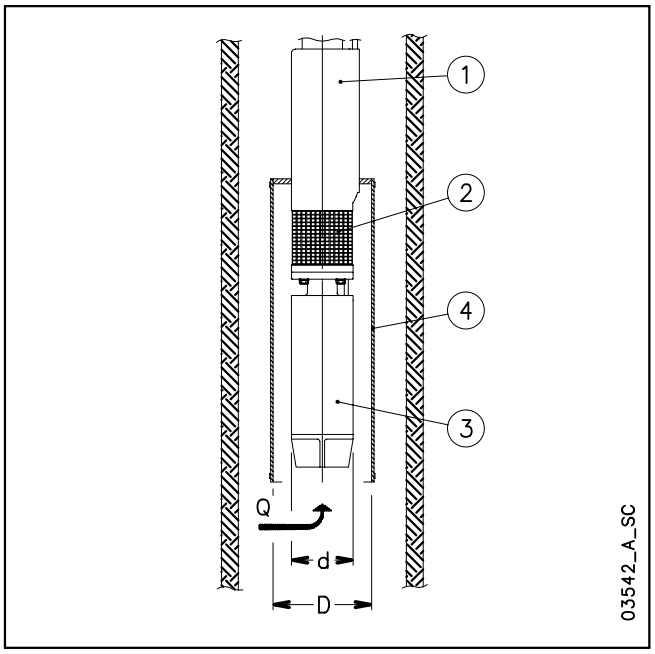


CALCULATING THE SPEED OF THE FLUID THAT FLOWS AROUND A SUBMERGED MOTOR AND SIZING OF THE COOLING SLEEVE





The following formula is used to verify whether the speed of the fluid that flows around the motor of a submersible pump is high enough to guarantee the proper cooling of the motor:

$$v = \frac{\frac{Q}{2}}{\pi \cdot (\frac{D^2}{4} - \frac{d^2}{4})}$$

Where: Q in [m^3/s] is the operating flow rate of the electric pump; only half of this flow is taken into account, because the fluid which is sucked into the area of the filter (2), comes from the motor side (3) as well as from the pump side (1);
D in [m] corresponds to the diameter of the well;
d in [m] corresponds to the diameter of the motor (3);
v in [m/s] is the calculated speed of the fluid that flows around the motor.

Now, compare the speed thus calculated (v) with the minimum speed required for correct cooling of the motor (v_m): if $v \geq v_m$ it means that the motor is properly cooled, if $v < v_m$ will be necessary to mount a cooling sleeve (4).

Example:

An electric pump OZ630/12 (motor diameter d = 0.144 m) operates in an 8" well (well diameter D = 0.203 m) with flow rate Q = 20 m^3/h = 0.0055 m^3/s.

Speed of fluid $v = (0.0055/2) / \{\pi \cdot [(0.203)^2/4 - (0.144)^2/4]\} = 0.17$ m/s.

The minimum speed required for proper motor cooling is $v_m = 0.20$ m/s.

Because $v < v_m$, it will be necessary to mount a cooling sleeve.

The following formula is used to determine the maximum diameter of a cooling sleeve to be mounted on a submersible motor:

$$D = \sqrt{4 \cdot \left(\frac{Q}{v \cdot \pi} + \frac{d^2}{4} \right)}$$

Where: Q in [m^3/s] is the operating flow rate of the electric pump; the entire flow is taken into account because the fluid comes from the motor side (3) only;
D in [m] corresponds to the diameter of the cooling sleeve (4);
d in [m] corresponds to the diameter of the motors(3);
v_m in [m/s] is the minimum speed of the fluid that flows around the motor.

If the electric pump operates at different flow rate, the minimum flow rate must be taken into account for calculating the diameter of the cooling sleeve.

Example:

A motor coupled to the electric pump OZ615/24 (motor diameter d = 0.144 m), which operates with flow rate Q = 15 m^3/h = 0.0042 m^3/s, requires a minimum speed of the fluid of $v_m = 0.20$ m/s.

Cooling sleeve diameter $D = \{4 \cdot [(0.0042/(0.2 \cdot \pi) + (0.144)^2/4]\}^{0.5} = 0.217$ m.

INSTALLATION EXAMPLES FOR SLEEVES

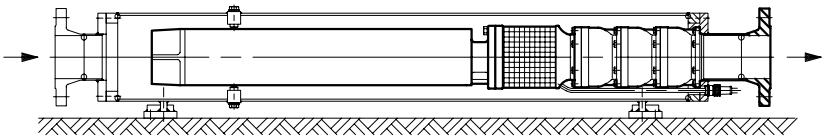


Fig.1: Horizontal dry installation (pressure sleeve).

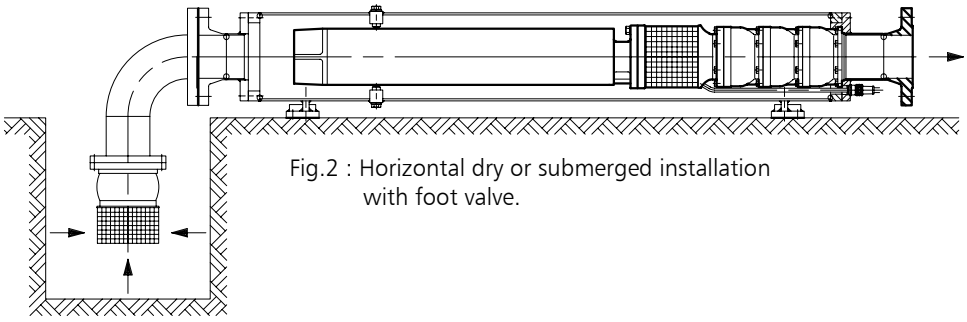


Fig.2 : Horizontal dry or submerged installation with foot valve.

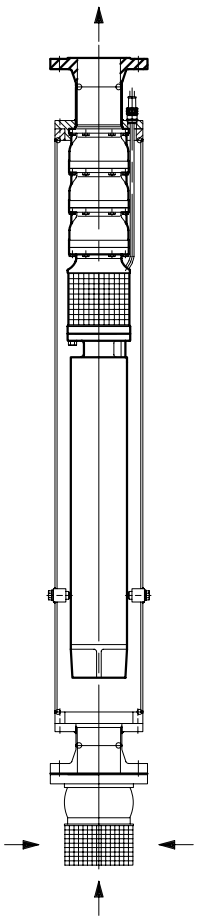


Fig.3 : Vertical submerged installation, with foot valve.

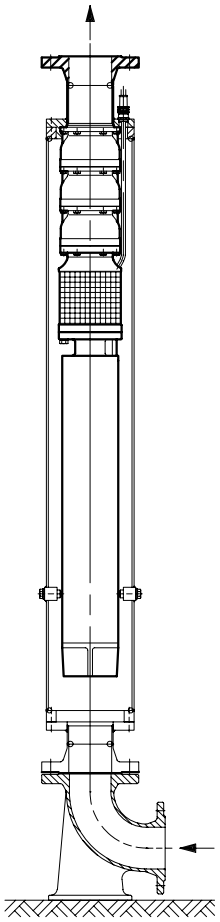


Fig.4 : Vertical dry installation with support bend.

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ASYNCHRONOUS MOTOR STARTING SYSTEMS

Direct

Suitable for low-power motors.
The starting current (Is) is much higher than the rated current (In).
Starting current Is = In x 4 ÷ 8
Starting torque Ts = Tn x 2 ÷ 3

Indirect

• Star/Delta

The starting current (Is) is three times less than the direct starting current.
Starting current Is = In x 1.3 ÷ 2.7
Starting torque Ts = Tn x 0.7 ÷ 1
In the star to delta changeover phase (approx. 70 ms) the motor is not supplied and tends to reduce its rotation speed.
In the case of submersible electric pumps with power above 10 HP, the modest mass of the rotor causes a slowdown at changeover, so that the initial Star supply phase is rendered partially useless.
In such cases we recommend using impedance panels or an autotransformer.

• Impedances

The motor is started with a voltage which is lower than the rated one, and which is obtained by means of impedances.

The Lowara panels use impedances which cut down to 70% the starting voltage.

The switch to the rated voltage takes place without any interruptions of the power supply.

Rated voltage Un = 400 V
Starting voltage Us = Un x 0,7 = 280 V

Starting current

$$Is = In \times 4 \div 8 \times \left(\frac{Us}{Un}\right) = In \times 3 \div 6$$

Starting torque

$$Ts = Tn \times 2 \div 3 \times \left(\frac{Us}{Un}\right)^2 = Tn \times 1 \div 1{,}5$$

Autotransformer

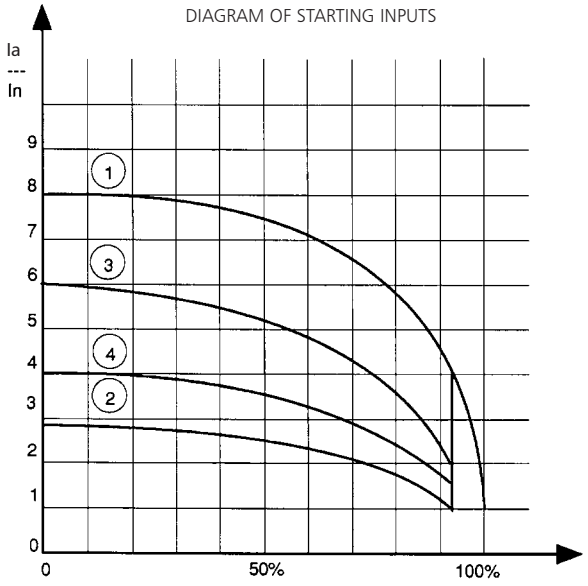
The pump is started with a voltage which is lower than the rated one.
The Lowara panels use an autotransformer with a voltage that is 70% the value of the line voltage.
The switch to the rated voltage occurs without any interruptions of the power supply.
Rated voltage Un = 400 V

Starting current

$$Is = In \times 4 \div 8 \times \left(\frac{Us}{Un}\right) = In \times 3 \div 6$$

Starting torque

$$Ts = Tn \times 2 \div 3 \times \left(\frac{Us}{Un}\right)^2 = Tn \times 1 \div 1{,}5$$



1 = Direct
2 = Star-Delta
3 = Impedances
4 = Autotransformer

WATER REQUIREMENTS IN CIVIL USERS

Determination of the water requirement depends on the type of users and contemporaneity factor. The calculation may be subject to regulations, standards or customs that may vary from country to country. The calculation method shown below is an example based on practical experience, designed to provide a reference value and not a substitute for detailed analytical calculation.

Water requirements in condominiums

The **consumption table** shows the maximum values for each delivery point, depending on the plumbing amenities.

MAXIMUM CONSUMPTION FOR EACH DELIVERY POINT

TYPE	CONSUMPTION (l/min)
Sink	9
Dishwasher	10
Washing machine	12
Shower	12
Bathtub	15
Washbasin	6
Bidet	6
Flush tank WC	6
Controlled flushing system WC	90

G-at-cm_a_th

The **sum of the water consumption values** of each delivery point determines the maximum theoretical requirement, which must be reduced according to the **contemporaneity coefficient**, because in actual fact the delivery points are never used all together.

$$f = \frac{1}{\sqrt{(0{,}857 \times Nr \times Na)}}$$ Coefficient for apartments with one bathroom and flush tank WC

$$f = \frac{1}{\sqrt{(0{,}857 \times Nr \times Na)}}$$ Coefficient for apartments with one bathroom and controlled flushing system WC

$$f = \frac{1{,}03}{\sqrt{(0{,}545 \times Nr \times Na)}}$$ Coefficient for apartments with two bathrooms and flush tank WC

$$f = \frac{0{,}8}{\sqrt{(0{,}727 \times Nr \times Na)}}$$ Coefficient for apartments with two bathrooms and controlled flushing system WC

f= coefficient; Nr= number of delivery points; Na= number of apartments

The **table of water requirements in civil users** shows the maximum contemporaneity flow-rate values based on the **number of apartments** and the type of WC for apartments with one bathroom and two bathrooms. As regards apartments with one bathroom, 7 drawing points have been taken into consideration, while 11 points have been considered for apartments with two bathrooms. If the number of drawing points or apartments is different, use the formulas to **calculate** the requirement.

TABLE OF WATER REQUIREMENTS IN CIVIL USERS

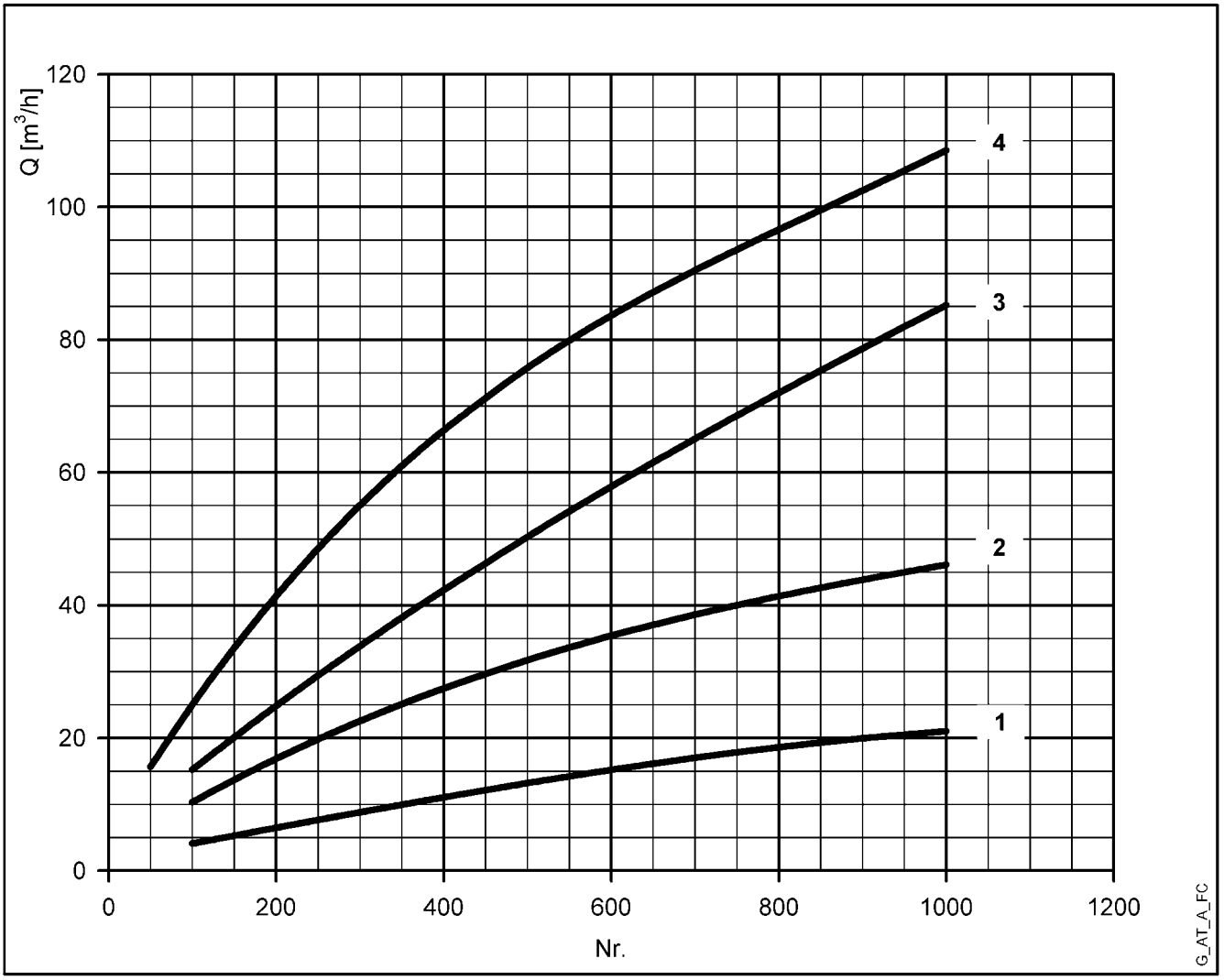
NUMBER OF APARTMENTS	WITH FLUSH TANK WC		WITH CONTROLLED FLUSHING SYSTEM WC	
	1	2	1	2
	FLOW RATE (l/min)			
1	32	40	60	79
2	45	56	85	111
3	55	68	105	136
4	63	79	121	157
5	71	88	135	176
6	78	97	148	193
7	84	105	160	208
8	90	112	171	223
9	95	119	181	236
10	100	125	191	249
11	105	131	200	261
12	110	137	209	273
13	114	143	218	284
14	119	148	226	295
15	123	153	234	305
16	127	158	242	315
17	131	163	249	325
18	134	168	256	334
19	138	172	263	343
20	142	177	270	352
21	145	181	277	361
22	149	185	283	369
23	152	190	290	378
24	155	194	296	386
25	158	198	302	394
26	162	202	308	401
27	165	205	314	409
28	168	209	320	417
29	171	213	325	424
30	174	217	331	431
35	187	234	357	466
40	200	250	382	498
45	213	265	405	528
50	224	280	427	557
55	235	293	448	584
60	245	306	468	610
65	255	319	487	635
70	265	331	506	659
75	274	342	523	682
80	283	354	540	704
85	292	364	557	726
90	301	375	573	747
95	309	385	589	767
100	317	395	604	787
120	347	433	662	863
140	375	468	715	932
160	401	500	764	996
180	425	530	811	1056
200	448	559	854	1114

For seaside resorts, a flow rate increased by at least 20% must be considered.

G-at-fi_a_th

WATER REQUIREMENTS FOR COMMUNITY BUILDINGS

The requirements of buildings intended for specific uses, such as **offices, residential units, hotels, department stores, nursing homes** and so on, are different from those of condominiums, and both their global daily water consumption and the maximum contemporaneity flow rate are usually greater. The **diagram of water requirements for community buildings** shows the maximum contemporaneity flow rate of some types of communities, for guidance.
These requirements must be determined case by case with the utmost accuracy, using analytical calculation methods, according to particular needs and local provisions.



For seaside resorts, the flow rate must be increased by at least 20%.

1= Offices (N. of people)
2= Department stores (N. of people)
3= Nursing homes (N. of beds)
4= Hotels, residences (N. of beds)

NPSH

The minimum operating values that can be reached at the pump suction end are limited by the onset of cavitation.

Cavitation is the formation of vapour-filled cavities within liquids where the pressure is locally reduced to a critical value, or where the local pressure is equal to, or just below the vapour pressure of the liquid.

The vapour-filled cavities flow with the current and when they reach a higher pressure area the vapour contained in the cavities condenses. The cavities collide, generating pressure waves that are transmitted to the walls. These, being subjected to stress cycles, gradually become deformed and yield due to fatigue. This phenomenon, characterized by a metallic noise produced by the hammering on the pipe walls, is called incipient cavitation.

The damage caused by cavitation may be magnified by electrochemical corrosion and a local rise in temperature due to the plastic deformation of the walls. The materials that offer the highest resistance to heat and corrosion are alloy steels, especially austenitic steel. The conditions that trigger cavitation may be assessed by calculating the total net suction head, referred to in technical literature with the acronym NPSH (Net Positive Suction Head).

The NPSH represents the total energy (expressed in m.) of the liquid measured at suction under conditions of incipient cavitation, excluding the vapour pressure (expressed in m.) that the liquid has at the pump inlet.

To find the static height hz at which to install the machine under safe conditions, the following formula must be verified:

$$h_p + h_z \geq (NPSHr + 0.5) + h_f + h_{pv} \quad ①$$

where:

- **h_p** is the absolute pressure applied to the free liquid surface in the suction tank, expressed in m. of liquid; hp is the quotient between the barometric pressure and the specific weight of the liquid.
- **h_z** is the suction lift between the pump axis and the free liquid surface in the suction tank, expressed in m.; hz is negative when the liquid level is lower than the pump axis.
- **h_f** is the flow resistance in the suction line and its accessories, such as: fittings, foot valve, gate valve, elbows, etc.
- **h_{pv}** is the vapour pressure of the liquid at the operating temperature, expressed in m. of liquid. hpv is the quotient between the Pv vapour pressure and the liquid's specific weight.
- **0.5** is the safety factor.

The maximum possible suction head for installation depends on the value of the atmospheric pressure (i.e. the elevation above sea level at which the pump is installed) and the temperature of the liquid.

To help the user, with reference to water temperature (4°C) and to the elevation above sea level, the following tables show the drop in hydraulic pressure head in relation to the elevation above sea level, and the suction loss in relation to temperature.

Water temperature (°C)	20	40	60	80	90	110	120
Suction loss (m)	0,2	0,7	2,0	5,0	7,4	15,4	21,5

Elevation above sea level (m)	500	1000	1500	2000	2500	3000
Suction loss (m)	0,55	1,1	1,65	2,2	2,75	3,3

Flow resistance is shown in the tables at pages 91-92 of this catalogue. To reduce it to a minimum, especially in cases of high suction head (over 4-5 m.) or within the operating limits with high flow rates, we recommend using a suction line having a larger diameter than that of the pump's suction port.
It is always a good idea to position the pump as close as possible to the liquid to be pumped.

Make the following calculation:

Liquid: water at ~ 15°C y = 1 kg/dm³
Flow rate required: 30 m³/h
Head for required delivery: 43 m.
Suction lift: 3.5 m.
The selection is an FHE 40-200/75 pump whose NPSH required value is, at 30 m³/h, 2.5 m.

For water at 15°C the hpv term is $\frac{Pv}{\gamma} = 0{,}174$ m (0.01701 bar)

and $hp = \frac{Pa}{\gamma} = 10{,}33$m

The Hf flow resistance in the suction line with foot valves is ~1.2 m.
By substituting the parameters in formula ① with the numeric values above, we have:

$$10.33 + (-3.5) \geq (2.5 + 0.5) + 1.2 + 0.17$$

from which we have: $6.8 > 4.4$

The relation is therefore verified.

TECHNICAL APPENDIX VAPOUR PRESSURE PS VAPOUR PRESSURE AND ρ DENSITY OF WATER TABLE

t	T	ps	ρ
°C	K	bar	kg/dm³
0	273,15	0,00611	0,9998
1	274,15	0,00657	0,9999
2	275,15	0,00706	0,9999
3	276,15	0,00758	0,9999
4	277,15	0,00813	1,0000
5	278,15	0,00872	1,0000
6	279,15	0,00935	1,0000
7	280,15	0,01001	0,9999
8	281,15	0,01072	0,9999
9	282,15	0,01147	0,9998
10	283,15	0,01227	0,9997
11	284,15	0,01312	0,9997
12	285,15	0,01401	0,9996
13	286,15	0,01497	0,9994
14	287,15	0,01597	0,9993
15	288,15	0,01704	0,9992
16	289,15	0,01817	0,9990
17	290,15	0,01936	0,9988
18	291,15	0,02062	0,9987
19	292,15	0,02196	0,9985
20	293,15	0,02337	0,9983
21	294,15	0,24850	0,9981
22	295,15	0,02642	0,9978
23	296,15	0,02808	0,9976
24	297,15	0,02982	0,9974
25	298,15	0,03166	0,9971
26	299,15	0,03360	0,9968
27	300,15	0,03564	0,9966
28	301,15	0,03778	0,9963
29	302,15	0,04004	0,9960
30	303,15	0,04241	0,9957
31	304,15	0,04491	0,9954
32	305,15	0,04753	0,9951
33	306,15	0,05029	0,9947
34	307,15	0,05318	0,9944
35	308,15	0,05622	0,9940
36	309,15	0,05940	0,9937
37	310,15	0,06274	0,9933
38	311,15	0,06624	0,9930
39	312,15	0,06991	0,9927
40	313,15	0,07375	0,9923
41	314,15	0,07777	0,9919
42	315,15	0,08198	0,9915
43	316,15	0,09639	0,9911
44	317,15	0,09100	0,9907
45	318,15	0,09582	0,9902
46	319,15	0,10086	0,9898
47	320,15	0,10612	0,9894
48	321,15	0,11162	0,9889
49	322,15	0,11736	0,9884
50	323,15	0,12335	0,9880
51	324,15	0,12961	0,9876
52	325,15	0,13613	0,9871
53	326,15	0,14293	0,9862
54	327,15	0,15002	0,9862

t	T	ps	ρ
°C	K	bar	kg/dm³
55	328,15	0,15741	0,9857
56	329,15	0,16511	0,9852
57	330,15	0,17313	0,9846
58	331,15	0,18147	0,9842
59	332,15	0,19016	0,9837
60	333,15	0,1992	0,9832
61	334,15	0,2086	0,9826
62	335,15	0,2184	0,9821
63	336,15	0,2286	0,9816
64	337,15	0,2391	0,9811
65	338,15	0,2501	0,9805
66	339,15	0,2615	0,9799
67	340,15	0,2733	0,9793
68	341,15	0,2856	0,9788
69	342,15	0,2984	0,9782
70	343,15	0,3116	0,9777
71	344,15	0,3253	0,9770
72	345,15	0,3396	0,9765
73	346,15	0,3543	0,9760
74	347,15	0,3696	0,9753
75	348,15	0,3855	0,9748
76	349,15	0,4019	0,9741
77	350,15	0,4189	0,9735
78	351,15	0,4365	0,9729
79	352,15	0,4547	0,9723
80	353,15	0,4736	0,9716
81	354,15	0,4931	0,9710
82	355,15	0,5133	0,9704
83	356,15	0,5342	0,9697
84	357,15	0,5557	0,9691
85	358,15	0,5780	0,9684
86	359,15	0,6011	0,9678
87	360,15	0,6249	0,9671
88	361,15	0,6495	0,9665
89	362,15	0,6749	0,9658
90	363,15	0,7011	0,9652
91	364,15	0,7281	0,9644
92	365,15	0,7561	0,9638
93	366,15	0,7849	0,9630
94	367,15	0,8146	0,9624
95	368,15	0,8453	0,9616
96	369,15	0,8769	0,9610
97	370,15	0,9094	0,9602
98	371,15	0,9430	0,9596
99	372,15	0,9776	0,9586
100	373,15	1,0133	0,9581
102	375,15	1,0878	0,9567
104	377,15	1,1668	0,9552
106	379,15	1,2504	0,9537
108	381,15	1,3390	0,9522
110	383,15	1,4327	0,9507
112	385,15	1,5316	0,9491
114	387,15	1,6362	0,9476
116	389,15	1,7465	0,9460
118	391,15	1,8628	0,9445

t	T	ps	ρ
°C	K	bar	kg/dm³
120	393,15	1,9854	0,9429
122	395,15	2,1145	0,9412
124	397,15	2,2504	0,9396
126	399,15	2,3933	0,9379
128	401,15	2,5435	0,9362
130	403,15	2,7013	0,9346
132	405,15	2,867	0,9328
134	407,15	3,041	0,9311
136	409,15	3,223	0,9294
138	411,15	3,414	0,9276
140	413,15	3,614	0,9258
145	418,15	4,155	0,9214
155	428,15	5,433	0,9121
160	433,15	6,181	0,9073
165	438,15	7,008	0,9024
170	433,15	7,920	0,8973
175	448,15	8,924	0,8921
180	453,15	10,027	0,8869
185	458,15	11,233	0,8815
190	463,15	12,551	0,8760
195	468,15	13,987	0,8704
200	473,15	15,550	0,8647
205	478,15	17,243	0,8588
210	483,15	19,077	0,8528
215	488,15	21,060	0,8467
220	493,15	23,198	0,8403
225	498,15	25,501	0,8339
230	503,15	27,976	0,8273
235	508,15	30,632	0,8205
240	513,15	33,478	0,8136
245	518,15	36,523	0,8065
250	523,15	39,776	0,7992
255	528,15	43,246	0,7916
260	533,15	46,943	0,7839
265	538,15	50,877	0,7759
270	543,15	55,058	0,7678
275	548,15	59,496	0,7593
280	553,15	64,202	0,7505
285	558,15	69,186	0,7415
290	563,15	74,461	0,7321
295	568,15	80,037	0,7223
300	573,15	85,927	0,7122
305	578,15	92,144	0,7017
310	583,15	98,70	0,6906
315	588,15	105,61	0,6791
320	593,15	112,89	0,6669
325	598,15	120,56	0,6541
330	603,15	128,63	0,6404
340	613,15	146,05	0,6102
350	623,15	165,35	0,5743
360	633,15	186,75	0,5275
370	643,15	210,54	0,4518
374,15	647,30	221,20	0,3154

G-at_npsh_a_sc

TABLE OF FLOW RESISTANCE IN 100 m OF STRAIGHT CAST IRON PIPELINE (HAZEN-WILLIAMS FORMULA C=100)

FLOW RATE			NOMINAL DIAMETER in mm and INCHES																
m^3/h	l/min		15 1/2"	20 3/4"	25 1"	32 1 1/4"	40 1 1/2"	50 2	65 2 1/2"	80 3"	100 4"	125 5"	150 6"	175 7"	200 8"	250 10"	300 12"	350 14"	400 16"
0,6	10	v	0,94	0,53	0,34	0,21	0,13												
		hr	16	3,94	1,33	0,40	0,13												
0,9	15	v	1,42	0,80	0,51	0,31	0,20												
		hr	33,9	8,35	2,82	0,85	0,29												
1,2	20	v	1,89	1,06	0,68	0,41	0,27	0,17											
		hr	57,7	14,21	4,79	1,44	0,49	0,16											
1,5	25	v	2,36	1,33	0,85	0,52	0,33	0,21											
		hr	87,2	21,5	7,24	2,18	0,73	0,25											
1,8	30	v	2,83	1,59	1,02	0,62	0,40	0,25											
		hr	122	30,1	10,1	3,05	1,03	0,35											
2,1	35	v	3,30	1,86	1,19	0,73	0,46	0,30											
		hr	162	40,0	13,5	4,06	1,37	0,46											
2,4	40	v		2,12	1,36	0,83	0,53	0,34	0,20										
		hr		51,2	17,3	5,19	1,75	0,59	0,16										
3	50	v		2,65	1,70	1,04	0,66	0,42	0,25										
		hr		77,4	26,1	7,85	2,65	0,89	0,25										
3,6	60	v		3,18	2,04	1,24	0,80	0,51	0,30										
		hr		108	36,6	11,0	3,71	1,25	0,35										
4,2	70	v		3,72	2,38	1,45	0,93	0,59	0,35										
		hr		144	48,7	14,6	4,93	1,66	0,46										
4,8	80	v		4,25	2,72	1,66	1,06	0,68	0,40										
		hr		185	62,3	18,7	6,32	2,13	0,59										
5,4	90	v			3,06	1,87	1,19	0,76	0,45	0,30									
		hr			77,5	23,3	7,85	2,65	0,74	0,27									
6	100	v			3,40	2,07	1,33	0,85	0,50	0,33									
		hr			94,1	28,3	9,54	3,22	0,90	0,33									
7,5	125	v			4,25	2,59	1,66	1,06	0,63	0,41									
		hr			142	42,8	14,4	4,86	1,36	0,49									
9	150	v				3,11	1,99	1,27	0,75	0,50	0,32								
		hr				59,9	20,2	6,82	1,90	0,69	0,23								
10,5	175	v				3,63	2,32	1,49	0,88	0,58	0,37								
		hr				79,7	26,9	9,07	2,53	0,92	0,31								
12	200	v				4,15	2,65	1,70	1,01	0,66	0,42								
		hr				102	34,4	11,6	3,23	1,18	0,40								
15	250	v				5,18	3,32	2,12	1,26	0,83	0,53	0,34							
		hr				154	52,0	17,5	4,89	1,78	0,60	0,20							
18	300	v					3,98	2,55	1,51	1,00	0,64	0,41							
		hr					72,8	24,6	6,85	2,49	0,84	0,28							
24	400	v					5,31	3,40	2,01	1,33	0,85	0,54	0,38						
		hr					124	41,8	11,66	4,24	1,43	0,48	0,20						
30	500	v					6,63	4,25	2,51	1,66	1,06	0,68	0,47						
		hr					187	63,2	17,6	6,41	2,16	0,73	0,30						
36	600	v						5,10	3,02	1,99	1,27	0,82	0,57	0,42					
		hr						88,6	24,7	8,98	3,03	1,02	0,42	0,20					
42	700	v						5,94	3,52	2,32	1,49	0,95	0,66	0,49					
		hr						118	32,8	11,9	4,03	1,36	0,56	0,26					
48	800	v						6,79	4,02	2,65	1,70	1,09	0,75	0,55					
		hr						151	42,0	15,3	5,16	1,74	0,72	0,34					
54	900	v						7,64	4,52	2,99	1,91	1,22	0,85	0,62					
		hr						188	52,3	19,0	6,41	2,16	0,89	0,42					
60	1000	v							5,03	3,32	2,12	1,36	0,94	0,69	0,53				
		hr							63,5	23,1	7,79	2,63	1,08	0,51	0,27				
75	1250	v							6,28	4,15	2,65	1,70	1,18	0,87	0,66				
		hr							96,0	34,9	11,8	3,97	1,63	0,77	0,40				
90	1500	v							7,54	4,98	3,18	2,04	1,42	1,04	0,80				
		hr							134	48,9	16,5	5,57	2,29	1,08	0,56				
105	1750	v							8,79	5,81	3,72	2,38	1,65	1,21	0,93				
		hr							179	65,1	21,9	7,40	3,05	1,44	0,75				
120	2000	v								6,63	4,25	2,72	1,89	1,39	1,06	0,68			
		hr								83,3	28,1	9,48	3,90	1,84	0,96	0,32			
150	2500	v								8,29	5,31	3,40	2,36	1,73	1,33	0,85			
		hr								126	42,5	14,3	5,89	2,78	1,45	0,49			
180	3000	v									6,37	4,08	2,83	2,08	1,59	1,02	0,71		
		hr									59,5	20,1	8,26	3,90	2,03	0,69	0,28		
210	3500	v									7,43	4,76	3,30	2,43	1,86	1,19	0,83		
		hr									79,1	26,7	11,0	5,18	2,71	0,91	0,38		
240	4000	v									8,49	5,44	3,77	2,77	2,12	1,36	0,94		
		hr									101	34,2	14,1	6,64	3,46	1,17	0,48		
300	5000	v										6,79	4,72	3,47	2,65	1,70	1,18		
		hr										51,6	21,2	10,0	5,23	1,77	0,73		
360	6000	v										8,15	5,66	4,16	3,18	2,04	1,42		
		hr										72,3	29,8	14,1	7,33	2,47	1,02		
420	7000	v											6,61	4,85	3,72	2,38	1,65	1,21	
		hr											39,6	18,7	9,75	3,29	1,35	0,64	
480	8000	v											7,55	5,55	4,25	2,72	1,89	1,39	
		hr											50,7	23,9	12,49	4,21	1,73	0,82	
540	9000	v											8,49	6,24	4,78	3,06	2,12	1,56	1,19
		hr											63,0	29,8	15,5	5,24	2,16	1,02	0,53
600	10000	v												6,93	5,31	3,40	2,36	1,73	1,33
		hr												36,2	18,9	6,36	2,62	1,24	0,65

The hr values must be multiplied by:
0.71 for galvanized or painted steel pipes
0.54 for stainless steel or copper pipes
0.47 for PVC or PE pipes

G-at-pct_a_th

hr = flow resistance for 100m of straight pipeline (m)
V = water speed (m/s)

TABLE OF FLOW RESISTANCE IN BENDS, VALVES AND GATES

The flow resistance is calculated using the equivalent pipeline length method according to the table below:

ACCESSORY TYPE	DN											
	25	32	40	50	65	80	100	125	150	200	250	300
	Equivalent pipeline length (m)											
45° bend	0,2	0,2	0,4	0,4	0,6	0,6	0,9	1,1	1,5	1,9	2,4	2,8
90° bend	0,4	0,6	0,9	1,1	1,3	1,5	2,1	2,6	3,0	3,9	4,7	5,8
90° smooth bend	0,4	0,4	0,4	0,6	0,9	1,1	1,3	1,7	1,9	2,8	3,4	3,9
Union tee or cross	1,1	1,3	1,7	2,1	2,6	3,2	4,3	5,3	6,4	7,5	10,7	12,8
Gate	-	-	-	0,2	0,2	0,2	0,4	0,4	0,6	0,9	1,1	1,3
Non return valve	1,1	1,5	1,9	2,4	3,0	3,4	4,7	5,9	7,4	9,6	11,8	13,9

G-a-pcv_a_th

The table is valid for the Hazen Williams coefficient C = 100 (cast iron pipework). For steel pipework, multiply the values by 1.41. For stainless steel, copper and coated cast iron pipework, multiply the values by 1.85.
When the **equivalent pipeline length** has been determined, the flow resistance is obtained from the table of flow resistance.
The values given are guideline values which are bound to vary slightly according to the model, especially for gate valves and non-return valves, for which it is a good idea to check the values supplied by the manufacturers.

VOLUMETRIC CAPACITY

Litres per minute l/min	Cubic metres per hour m^3/h	Cubic feet per hour ft^3/h	Cubic feet per minute ft^3/min	Imp. gal. per minute Imp. gal/min	US gal. per minute Us gal./min
1,0000	0,0600	2,1189	0,0353	0,2200	**0,2640**
16,6667	**1,0000**	35,3147	0,5886	3,6660	4,4030
0,4720	0,0283	**1,0000**	0,0167	0,1040	**0,1250**
28,3170	1,6990	60,0000	**1,0000**	6,2290	7,4800
4,5460	0,2728	9,6326	0,1605	**1,0000**	1,2010
3,7850	0,2271	8,0209	0,1337	0,8330	**1,0000**

PRESSURE AND HEAD

Newton per square metre N/m^2	kilo Pascal kPa	bar bar	Pound force per square inch psi	metre of water m H_2O	millimetre di mercury mm Hg
1,0000	0,0010	1×10^{-5}	$1,45 \times 10^{-4}$	$1,02 \times 10^{-4}$	**0,0075**
1000,0000	**1,0000**	0,0100	0,1450	0,1020	7,5000
1×10^{5}	100,0000	**1,0000**	14,5000	10,2000	**750,1000**
6895,0000	6,8950	0,0690	**1,0000**	0,7030	**51,7200**
9789,0000	9,7890	0,0980	1,4200	**1,0000**	**73,4200**
133,3000	0,1333	0,0013	0,0190	0,0140	**1,0000**

LENGHT

millimetre mm	centimetre cm	metre m	inch in	foot ft	yard yd
1,0000	0,1000	0,0010	0,0394	0,0033	**0,0011**
10,0000	**1,0000**	0,0100	0,3937	0,0328	0,0109
1000,0000	100,0000	**1,0000**	39,3701	3,2808	**1,0936**
25,4000	2,5400	0,0254	**1,0000**	0,0833	0,0278
304,8000	30,4800	0,3048	12,0000	**1,0000**	**0,3333**
914,4000	91,4400	0,9144	36,0000	3,0000	**1,0000**

VOLUME

cubic metre m^3	litre litro	millilitre ml	imp. gallon imp. gal.	US gallon US gal.	cubic foot ft^3
1,0000	1000,0000	1×10^{6}	220,0000	264,2000	**35,3147**
0,0010	**1,0000**	1000,0000	0,2200	0,2642	0,0353
1×10^{-6}	0,0010	**1,0000**	$2,2 \times 10^{-4}$	$2,642 \times 10^{-4}$	$\mathbf{3,53 \times 10^{-5}}$
0,0045	4,5460	4546,0000	**1,0000**	1,2010	0,1605
0,0038	3,7850	3785,0000	0,8327	**1,0000**	**0,1337**
0,0283	28,3170	28317,0000	6,2288	7,4805	**1,0000**

G-at_pp-en_a_sc

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