

60 Hz



e-GS Series

4" Submersible electric pumps

ErP 2009/125/EC

Directive 2009/125/EC of the European Union

The **Directive 2005/32/EC** on energy-using products (**EuP**) and the subsequent **Directive 2009/125/EC** on energy-related products (**ErP**) established the ecodesign requirements for products to reduce their energy consumption and consequently their environmental impact.

These requirements apply to products placed and used in the European Economic Area (European Union plus Iceland, Liechtenstein and Norway) as a stand-alone unit or as integrated parts in other products.

The following tables show the Regulations that define the requirements applicable to Lowara products.

- Some types of **pump** used for pumping clean water:

Regulations	From	Target
(EU) N. 547/2012 and subsequent updates	1 January 2015	MEI $\geq 0,4$

- Circulators** with a rated hydraulic output power of between 1 and 2500 W, designed for use in heating systems or in secondary circuits of cooling distribution systems:

Regulations	From	Target
(EC) N. 641/2009 and subsequent updates	1 August 2015	EEI $< 0,23$

- Three-phase motors** with frequency 50 or 60 or 50/60 Hz and voltages between 50 and 1000 V (S1 and D.O.L.):

Regulations	From	Target
(EU) 2019/1781 and subsequent updates	1 July 2023	IE2 : motors with a rated output $\geq 0,12$ and $< 0,75$ kW IE3 : motors with a rated output $\geq 0,75$ and < 75 kW IE4 : motors with a rated output ≥ 75 and < 201 kW IE3 : motors with a rated output ≥ 201 and < 1000 kW

- Single-phase motors** with frequency 50 or 60 or 50/60 Hz and voltages between 50 and 1000 V (S1 and D.O.L.):

Regulations	From	Target
(EU) 2019/1781 and subsequent updates	1 July 2023	IE2 : motors with a rated output $\geq 0,12$

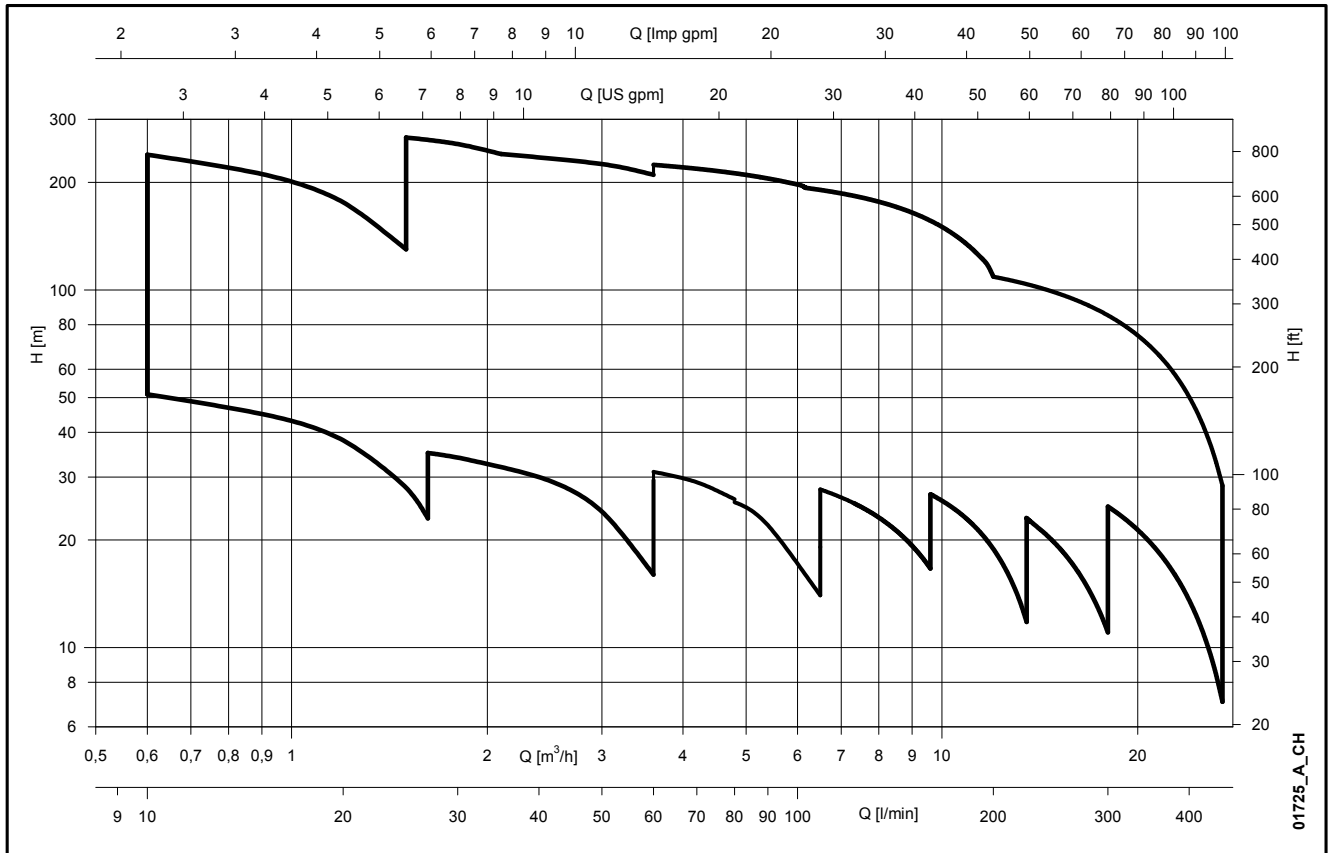
- Variable speed drives (VSD)** with three-phase input and rated output power from 0,12 kW up to 1000 kW, rated for operating with motor included in the same regulations:

Regulations	From	Target
(EU) 2019/1781 and subsequent updates	1 July 2021	IE2

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e-GS SERIES HYDRAULIC PERFORMANCE RANGE AT 60 Hz



4" Submersible Pumps

e-GS Series

MARKET SECTORS

RESIDENTIAL, AGRICULTURE, INDUSTRY.

APPLICATIONS

- Water supply from drilled wells, cisterns
- Sprinkler irrigation
- Pressure boosting
- Fire-fighting

SPECIFICATIONS

PUMP

Delivery:	up to 27 m ³ /h at 3500 rpm
Head:	up to 300 m at 3500 rpm
Maximum pump overall diameter:	99 mm (cable cover included)
Maximum immersion depth:	150 m (with 4OS motor)
Maximum permissible quantity of sand:	150 g/m ³
1GSL - 2GS - 4GS - 6GS versions:	Rp 1 1/4 delivery port
8GS - 12GS - 16GS versions:	Rp 2 delivery port
Motor power:	from 0,37 to 7,5 kW

MOTOR

4OS single-phase version:	from 0,37 to 2,2 kW 220-230 V, 60 Hz
4OS three-phase version:	from 0,37 to 7,5 kW 220-230 V, 60 Hz from 0,37 to 7,5 kW 380 V, 60 Hz
Maximum supply voltage variations:	±10% (4OS)
Maximum number of starts for hour evenly distributed:	30 (4OS)
Horizontal operation:	4OS up to 2,2 kW
Maximum temperature of water in contact with motor:	35°C



CONSTRUCTION CHARACTERISTICS

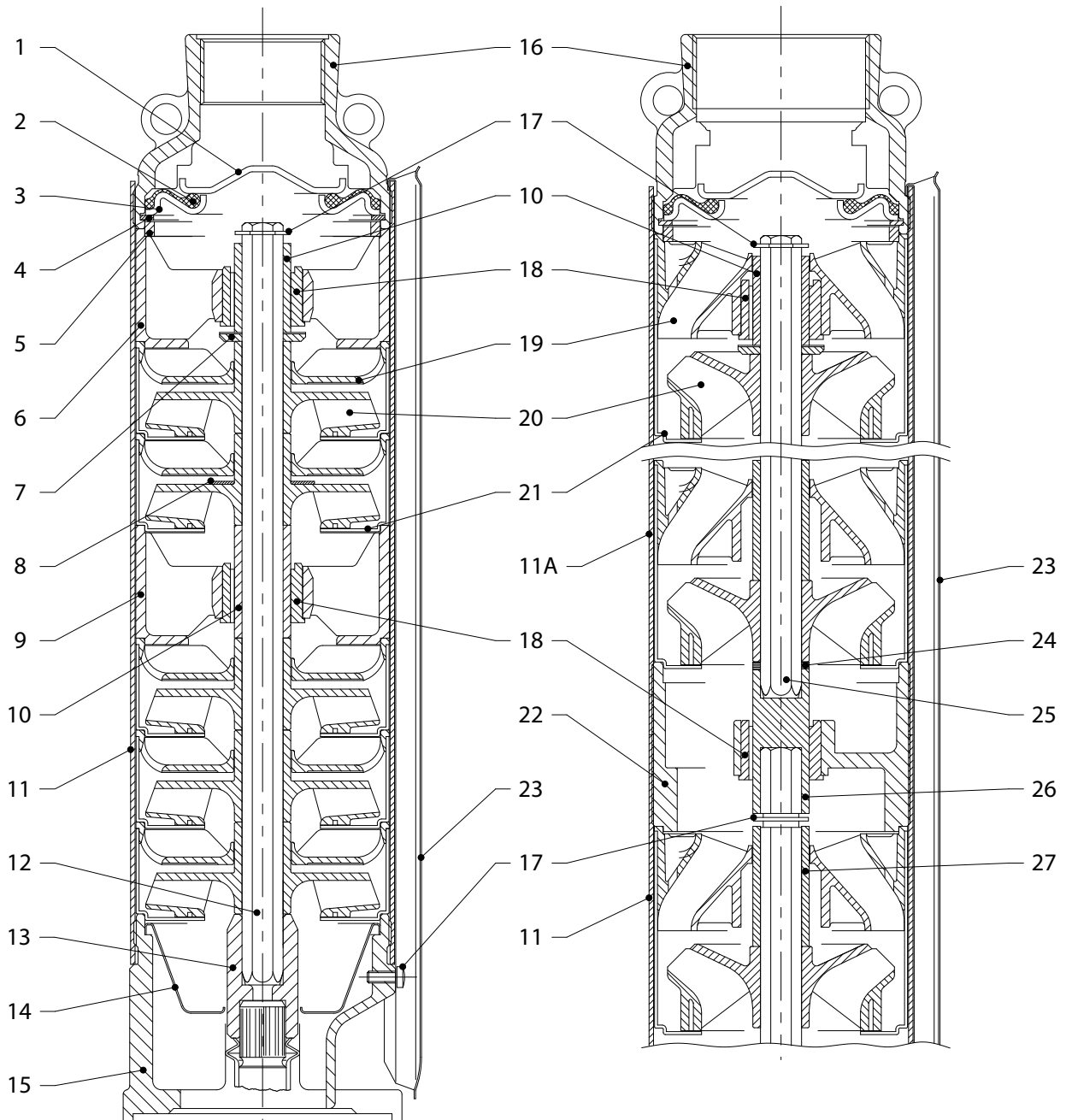
- Abrasion-resistant construction. The front wear ring, combined with the floating impellers, ensures optimum resistance to sand abrasion.
- The upper and lower supports are made of precision-cast stainless steel, ensuring resistance to corrosion, durability and a sturdy coupling to the motor.
- The hexagonal pump shaft guarantees an effective impeller driving.
- Stainless steel non-return valve integrated in the head
- The e-GS series pumps can be coupled to either the 4OS motors.
- For the motor features, please refer to the specific technical brochures.

OPTIONAL FEATURES

- Different voltages and frequencies.
- Motor with built in capacitor (2W = Two Wires)
- Cooling sleeves

The e-GS pumps are available in a version suitable for contact with drinking water

**e-GS SERIES
PUMP SECTION**



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e-GS SERIES

TABLE OF MATERIALS

REF. N°	NAME	MATERIAL	REFERENCE STANDARDS	
			EUROPE	USA
1	Valve cap	Stainless steel	EN 10088-2-X5CrNi18-10 (1.4301)	AISI 304
2	Valve gasket	NBR		
3	Valve flange	Stainless steel	EN 10088-2-X5CrNi18-10 (1.4301)	AISI 304
4	Valve locking ring	Stainless steel	DIN 17006 - X5CrNi18-7 (1.4319)	AISI 302
5	Adapter ring	Technopolymer PPO		
6	Upper bush bracket	Technopolymer PPO		
7	Thrust bearing	Stainless steel	EN 10088-1-X5CrNi18-10 (1.4301)	AISI 304
8	Washer	Stainless steel	EN 10088-2-X5CrNi18-10 (1.4301)	AISI 304
9	Intermediate bush bracket	Technopolymer PPO		
10	Shaft sleeve	Stainless steel	EN 10088-1-X5CrNi18-10 (1.4301)	AISI 304
11	Sleeve	Stainless steel	EN 10088-2-X5CrNi18-10 (1.4301)	AISI 304
11A	Upper sleeve	Stainless steel	EN 10088-2-X5CrNi18-10 (1.4301)	AISI 304
12	Pump shaft	Stainless steel	EN 10088-3-X5CrNi18-10 (1.4301)	AISI 304
13	Coupling	Stainless steel	EN 10088-1-X5CrNi18-10 (1.4301)	AISI 304
14	Strainer	Stainless steel	EN 10088-2-X5CrNi18-10 (1.4301)	AISI 304
15	Motor adapter	Stainless steel	EN 10213-4-GX5CrNi19-10 (1.4308)	CF-8 ASTM A743
16	Discharge head	Stainless steel	EN 10213-4-GX5CrNi19-10 (1.4308)	CF-8 ASTM A743
17	Screws, nuts, washers	Stainless steel	EN 10088-1-X5CrNiMo17-12-2 (1.4401)	AISI 316
18	Bush	Technopolymer PU		
19	Diffuser	Technopolymer PPO		
20	Impeller	Technopolymer PPO		
21	Bowl	Stainless steel	EN 10088-2-X5CrNi18-10 (1.4301)	AISI 304
22	Intermediate bush bracket	Stainless steel	EN 10213-4-GX5CrNi19-10 (1.4308)	CF-8 ASTM A743
23	Cable guard	Stainless steel	EN 10088-2-X5CrNi18-10 (1.4301)	AISI 304
24	Shim	Stainless steel	EN 10088-2-X5CrNi18-10 (1.4301)	AISI 304
25	Upper pump shaft	Stainless steel	EN 10088-1-X5CrNi18-10 (1.4301)	AISI 304
26	Intermediate coupling	Stainless steel	EN 10088-1-X5CrNiMo17-12-2 (1.4401)	AISI 316
27	Spacer	Stainless steel	EN 10088-1-X5CrNi18-10 (1.4301)	AISI 304

Gs4-2p50-en_e_tm

e-GS SERIES IDENTIFICATION CODE PUMP

6 G S 4 0 6 R / B

Flow rate [1 or 2 digits]
[6] = 6 m³/h

Name [2 or 3 digits]
[GS] = e-GS serie
[GSL] = e-GSL series

Motor power [2 digits]
kW x 10

Version [2 digits]
[/_] = Version

Type of stages [1 digit]
[Null] = Standard number of stages
[R] = Number of stages reduced

Frequency [1 digit]
[6] = 60 Hz

EXAMPLE: 6GS406R/B

6 = Nominal flow 6 m³/h
GS = e-GS Series
40 = Motor power 4 kW
6 = 60 Hz
R = Number of stages reduced
/B = Version

ELECTRIC PUMP

8 G S 5 5 6 R T / B - 4 0 S

Flow rate [1 or 2 digits]
[8] = 8 m³/h

Name [2 or 3 digits]
[GS] = e-GS Series
[GSL] = e-GSL Series

Motor power [2 digits]
kW x 10

Frequency [1 digit]
[6] = 60 Hz

Motor type [3 digits]
[40S] = Motor 40S

Version [2 digits]
[/_] = Version

Power supply [1 digit]
[M] = Single-phase
[T] = Three-phase

Type of stages [1 digit]
[Null] = Standard number of stages
[R] = Number of stages reduced

EXAMPLE: 8GS556RT/B-40S

8 = Nominal flow 8 m³/h
GS = e-GS Series
55 = Motor power 5,5 kW
6 = 60 Hz
R = Number of stages reduced
T = Power supply three-phase
/B = Version
40S = Motor type

e-GS SERIES RATING PLATE PUMP

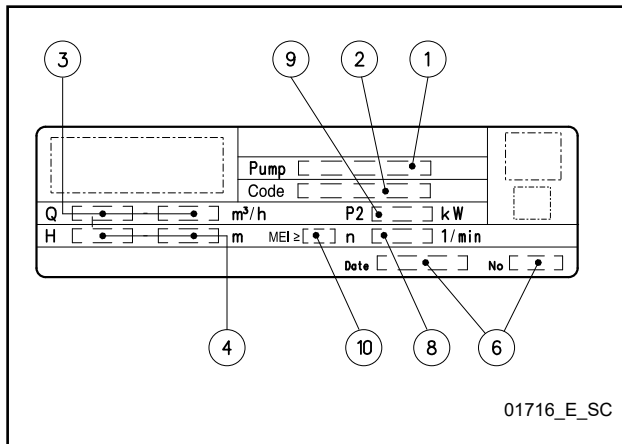


Diagram of the e-GS SERIES PUMP rating plate. Callouts point to the following fields:

- 1: Pump / electric pump type
- 2: Code
- 3: Delivery range
- 4: Head range
- 5: Characteristics motor
- 6: Manufacturing data and serial number
- 7: Maximum immersion depth
- 8: Speed
- 9: Rated output
- 10: Minimum efficiency index MEI, Regulation (EU) No 547/2012 (50 Hz only)

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ELECTRIC PUMP

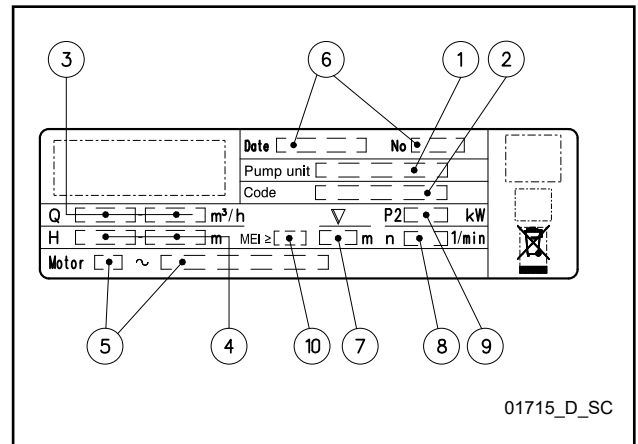


Diagram of the ELECTRIC PUMP rating plate. Callouts point to the following fields:

- 1: Pump / electric pump type
- 2: Code
- 3: Delivery range
- 4: Head range
- 5: Characteristics motor
- 6: Manufacturing data and serial number
- 7: Maximum immersion depth
- 8: Speed
- 9: Rated output
- 10: Minimum efficiency index MEI, Regulation (EU) No 547/2012 (50 Hz only)

01715_D_SC

LEGEND

- 1 - Pump / electric pump type
- 2 - Code
- 3 - Delivery range
- 4 - Head range
- 5 - Characteristics motor
- 6 - Manufacturing data and serial number

- 7 - Maximum immersion depth
- 8 - Speed
- 9 - Rated output
- 10 - Minimum efficiency index MEI, Regulation (EU) No 547/2012 (50 Hz only)

MOTOR

SINGLE-PHASE

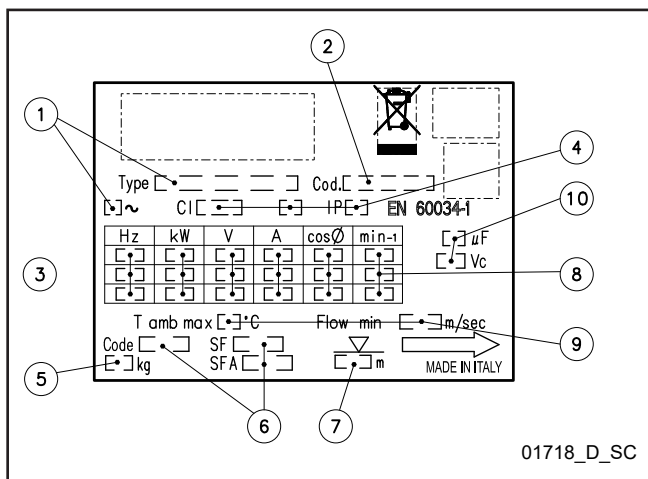


Diagram of the SINGLE-PHASE MOTOR rating plate. Callouts point to the following fields:

- 1: Motor type
- 2: Code
- 3: Electrical data
- 4: Characteristics motor
- 5: Motor weight
- 6: Service factors
- 7: Maximum immersion depth
- 8: Speed
- 9: Temperature and speed water
- 10: Capacitor data

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THREE-PHASE

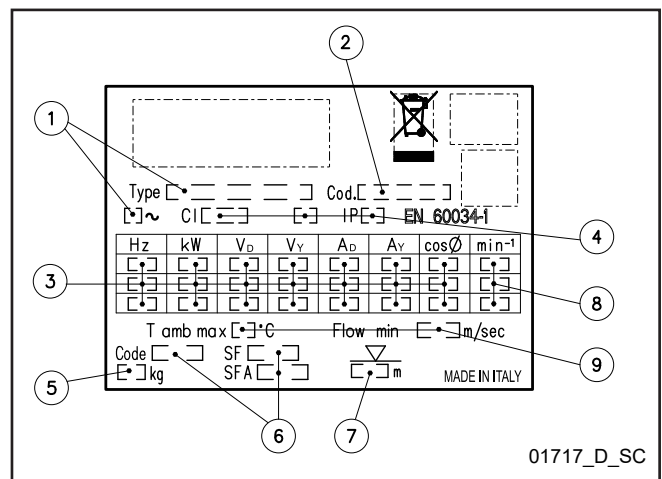


Diagram of the THREE-PHASE MOTOR rating plate. Callouts point to the following fields:

- 1: Motor type
- 2: Code
- 3: Electrical data
- 4: Characteristics motor
- 5: Motor weight
- 6: Service factors
- 7: Maximum immersion depth
- 8: Speed
- 9: Temperature and speed water
- 10: Capacitor data

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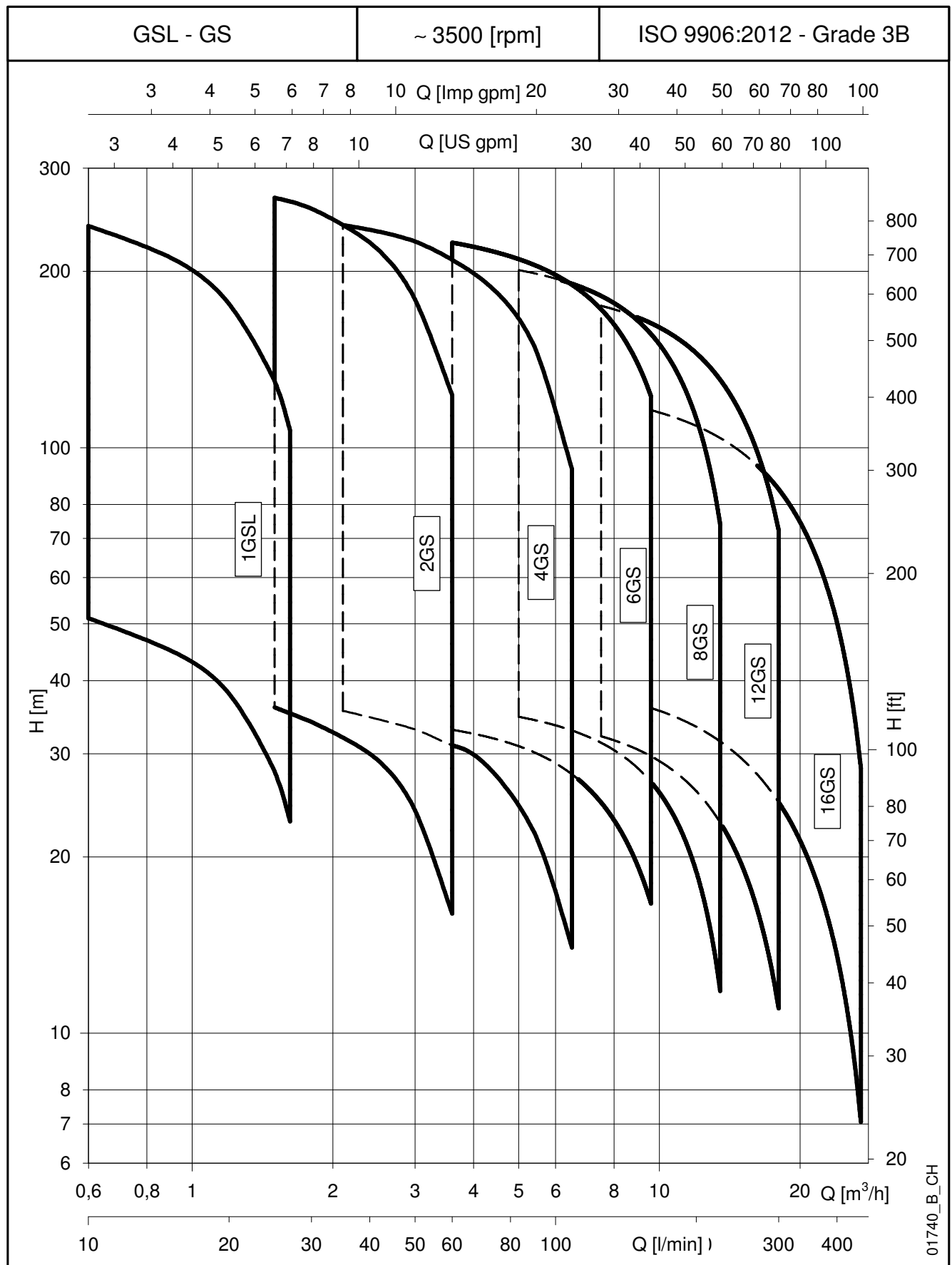
LEGEND

- 1 - Motor type
- 2 - Code
- 3 - Electrical data
- 4 - Characteristics motor
- 5 - Motor weight

- 6 - Service factors
- 7 - Maximum immersion depth
- 8 - Speed
- 9 - Temperature and speed water
- 10 - Capacitor data

e-GS SERIES

HYDRAULIC PERFORMANCE RANGE AT 60 Hz



OPERATING CHARACTERISTICS, DIMENSIONS AND WEIGHTS

1GSL SERIES OPERATING CHARACTERISTICS AT 60 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		Q = DELIVERY					
				l/min	0	10	15	20	25
		m³/h	0	0,6	0,9	1,2	1,5	1,62	
		kW		HP	H = TOTAL HEAD METRES COLUMN OF WATER				
1GSL036	6	0,37	0,5	58	51,1	45	38	28	23
1GSL056	10	0,55	0,75	96	85,2	75	63	46	38,3
1GSL076	14	0,75	1	135	119	105	88	65	53,6
1GSL116	20	1,1	1,5	192	171	151	126	93	76,6
1GSL156	28	1,5	2	269	239	211	176	130	107

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)

1gsl-2p60-en_c_th

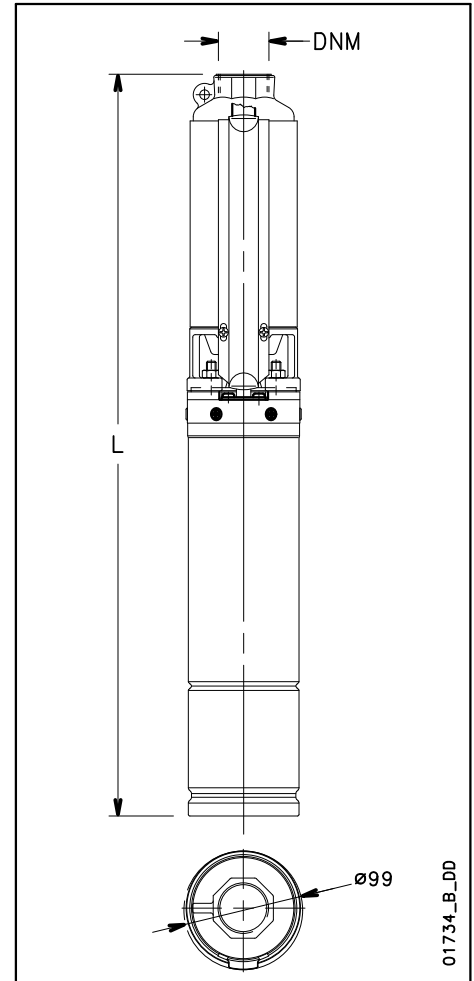
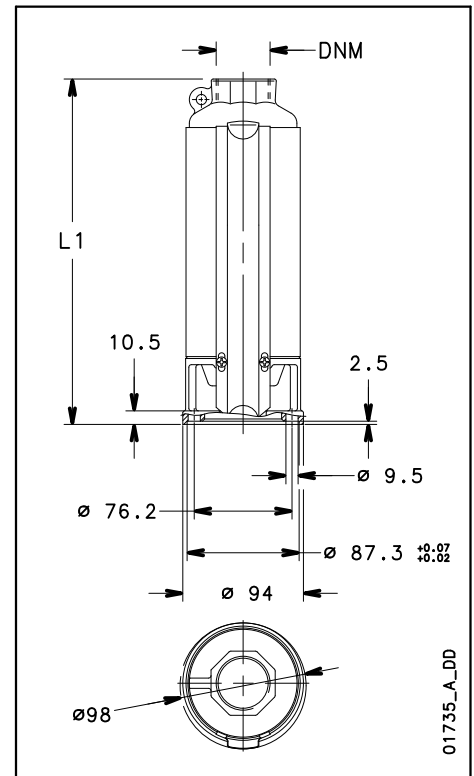
1GSL..40S SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT kg	ELECTRIC PUMP WEIGHT kg
			L1	L		
1GSL036M-40S	6	Rp 1 1/4	263	616	2,6	10
1GSL056M-40S	10	Rp 1 1/4	332	685	3,4	11,5
1GSL076M-40S	14	Rp 1 1/4	402	780	4,2	13,5
1GSL116M-40S	20	Rp 1 1/4	507	920	5,2	16,5
1GSL156M-40S	28	Rp 1 1/4	677	1125	6,7	19,5
1GSL036T-40S	6	Rp 1 1/4	263	595	2,6	9,5
1GSL056T-40S	10	Rp 1 1/4	332	685	3,4	11
1GSL076T-40S	14	Rp 1 1/4	402	755	4,2	12,5
1GSL116T-40S	20	Rp 1 1/4	507	885	5,2	14,5
1GSL156T-40S	28	Rp 1 1/4	677	1090	6,7	18

* Pump and motor are supplied uncoupled

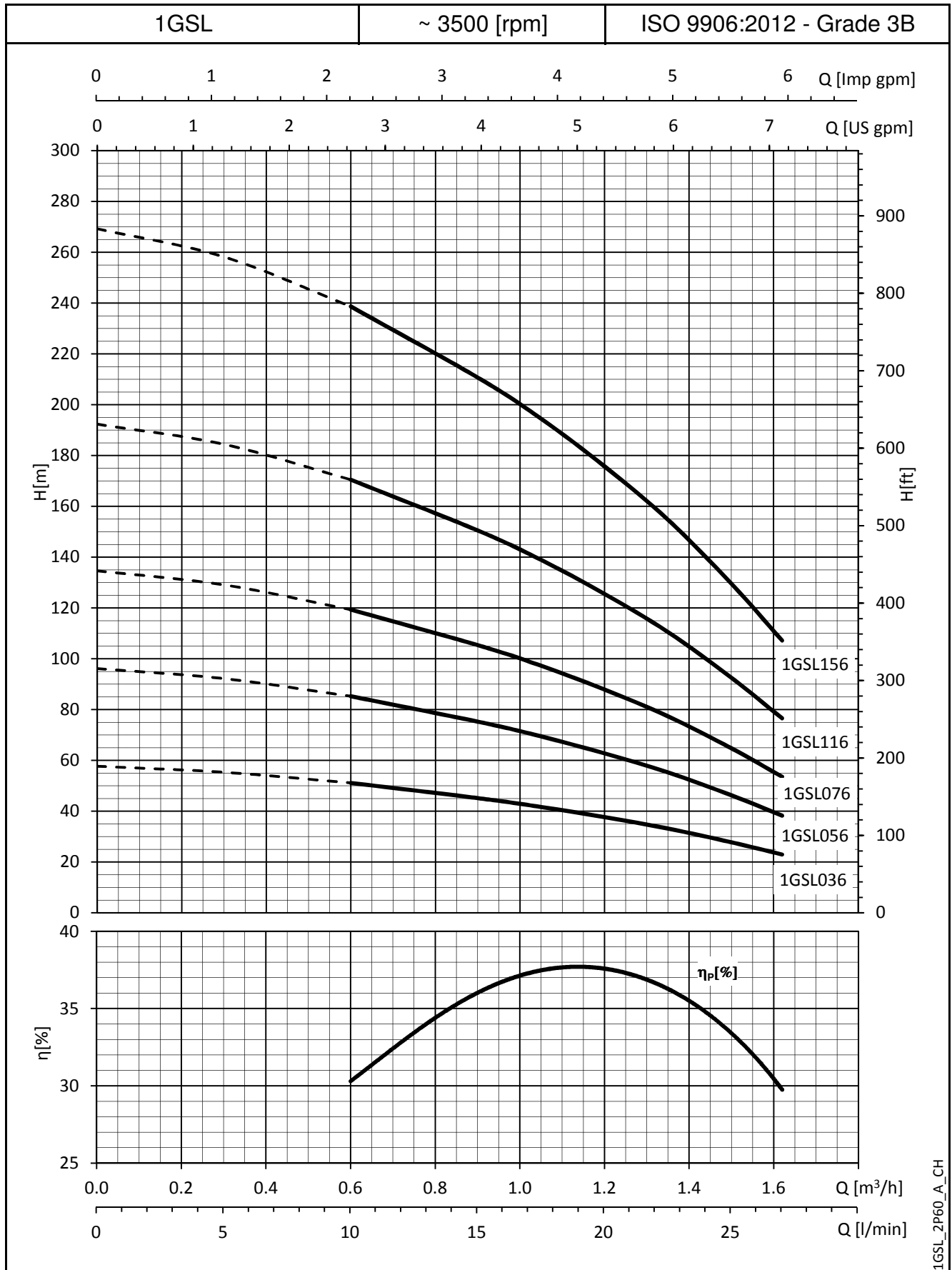
- the motor is single-phase $\geq 2,2$ kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

1gsl-40s-2p60-en_a_td



1GSL SERIES

OPERATING CHARACTERISTICS AT 60 Hz



These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

2GS SERIES OPERATING CHARACTERISTICS AT 60 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		Q = DELIVERY						
				l/min	0	25	30	40	50	60
				m³/h	0	1,5	1,8	2,4	3	3,6
		kW		HP	H = TOTAL HEAD METRES COLUMN OF WATER					
2GS036	4	0,37	0,5	39	36	34	30	24	16	
2GS056	6	0,55	0,75	59	53	51	45	36	25	
2GS076	8	0,75	1	79	71	68	60	48	33	
2GS116	12	1,1	1,5	118	107	102	90	72	49	
2GS156	16	1,5	2	158	142	137	119	96	66	
2GS226	22	2,2	3	217	196	188	164	132	90	
2GS306	30	3	4	296	267	256	224	179	123	

Prestazioni idrauliche conformi ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)

2gs-2p60-en_c_th

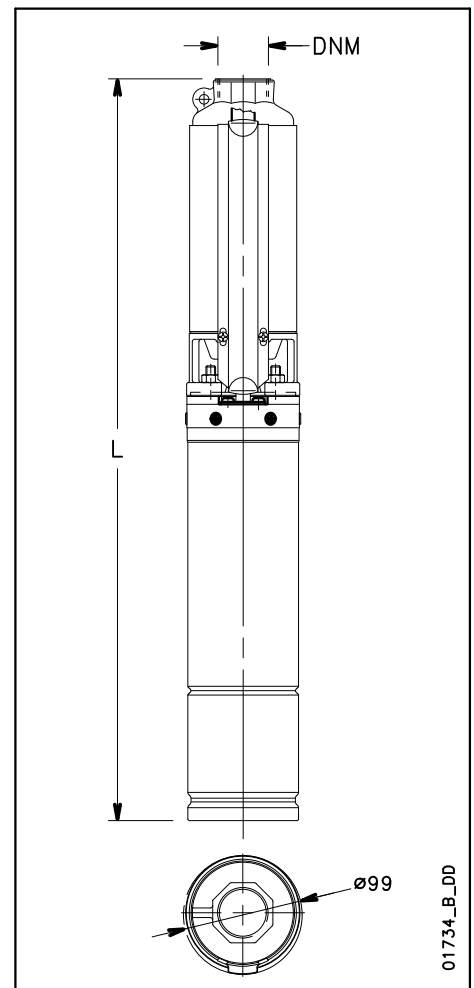
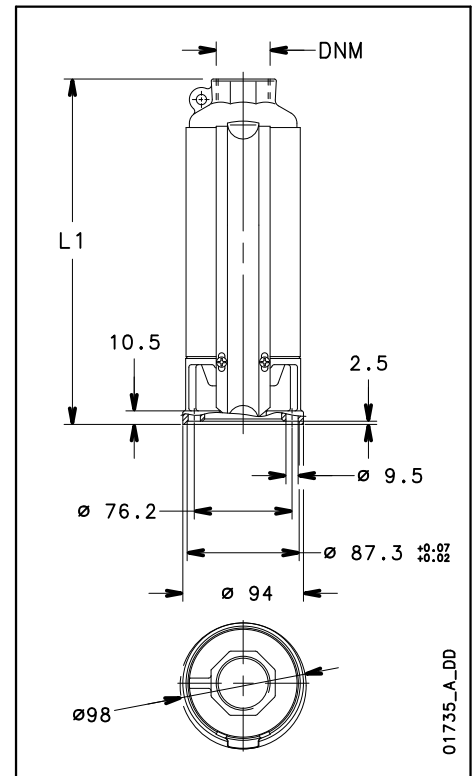
2GS..4OS SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT kg	ELECTRIC PUMP WEIGHT kg
			L1	L		
2GS036M-4OS	4	Rp 1 1/4	228	581	2,4	10
2GS056M-4OS	6	Rp 1 1/4	263	616	2,8	11
2GS076M-4OS	8	Rp 1 1/4	298	676	3,1	12,5
2GS116M-4OS	12	Rp 1 1/4	367	780	3,9	15
2GS156M-4OS	16	Rp 1 1/4	437	885	4,6	17,5
2GS226M-4OS	22	Rp 1 1/4	542	1040	5,8	21
2GS036T-4OS	4	Rp 1 1/4	228	560	2,4	9,5
2GS056T-4OS	6	Rp 1 1/4	263	616	2,8	10,5
2GS076T-4OS	8	Rp 1 1/4	298	651	3,1	11
2GS116T-4OS	12	Rp 1 1/4	367	745	3,9	13
2GS156T-4OS	16	Rp 1 1/4	437	850	4,6	16
2GS226T-4OS	22	Rp 1 1/4	542	990	5,8	18,5
2GS306T-4OS	30	Rp 1 1/4	712	1160	7,6	26,5

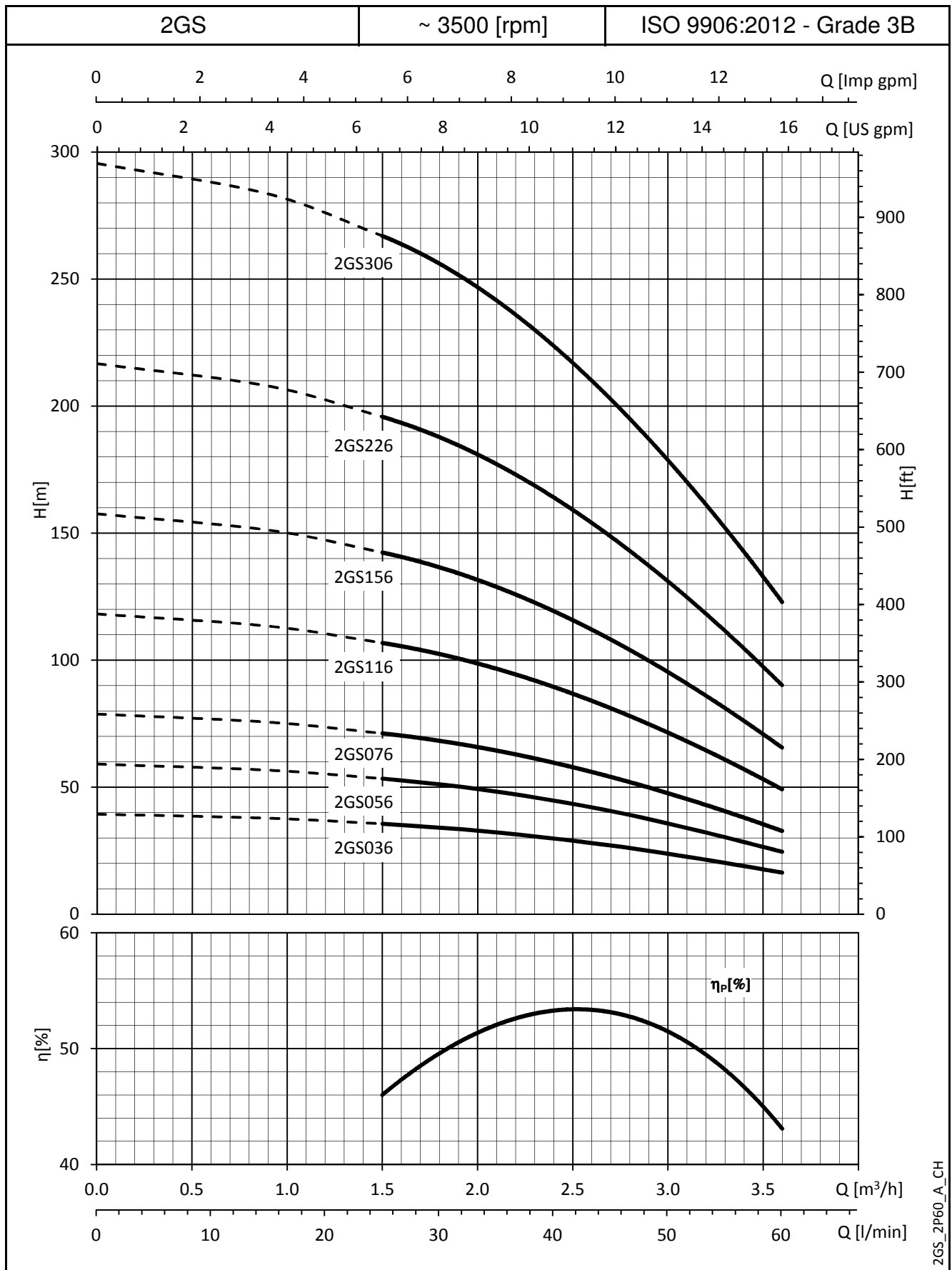
* Pump and motor are supplied uncoupled in two separated packages if:

- the motor is single-phase $\geq 2,2$ kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

2gs-4os-2p60-en_a_td



2GS SERIES OPERATING CHARACTERISTICS AT 60 Hz



These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

4GS SERIES

OPERATING CHARACTERISTICS AT 60 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		Q = DELIVERY						
				l/min	0	35	50	70	90	108
		m³/h	0	2,1	3	4,2	5,4	6,5		
		kW		HP	H = TOTAL HEAD METRES COLUMN OF WATER					
4GS056	4	0,55	0,75	39	35,5	33	29	22	14	
4GS076	5	0,75	1	49	44,5	42	36	28	17	
4GS116	8	1,1	1,5	79	71	67	58	43	27	
4GS156	10	1,5	2	99	89	83	72	55	34	
4GS226	15	2,2	3	148	133	125	108	82	51	
4GS306	19	3	4	187	169	158	137	105	65	
4GS406	27	4	5,5	266	240	225	193	149	92	

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)

4gs-2p60-en_c_th

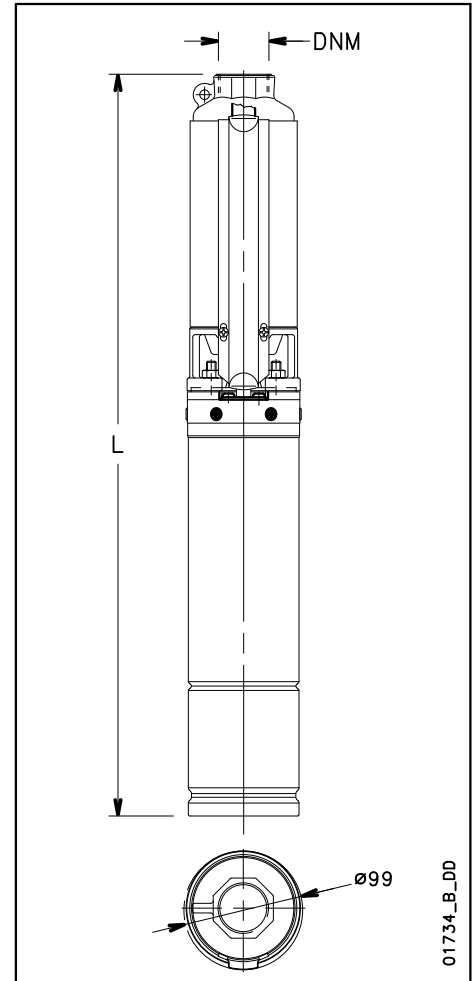
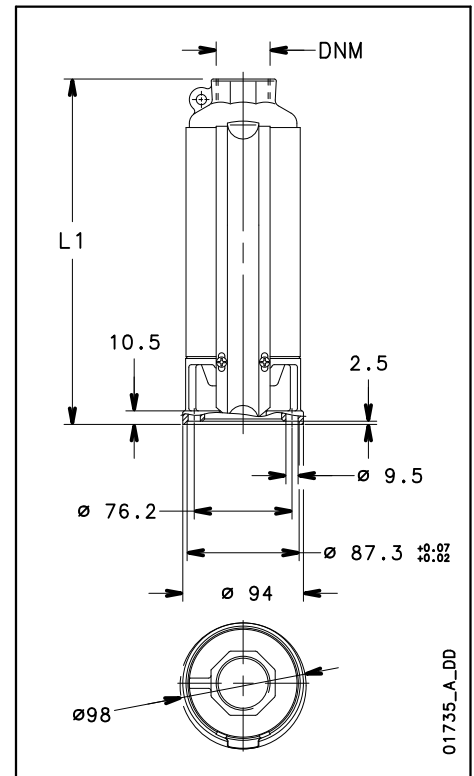
4GS..40S SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT kg	ELECTRIC PUMP WEIGHT kg
			L1	L		
4GS056M-4OS	4	Rp 1 1/4	244	597	2,5	10,5
4GS076M-4OS	5	Rp 1 1/4	266	644	2,7	12
4GS116M-4OS	8	Rp 1 1/4	330	743	3,3	14,5
4GS156M-4OS	10	Rp 1 1/4	374	822	3,8	16,5
4GS226M-4OS	15	Rp 1 1/4	481	979	4,8	20
4GS056T-4OS	4	Rp 1 1/4	244	597	2,5	10
4GS076T-4OS	5	Rp 1 1/4	266	619	2,7	11
4GS116T-4OS	8	Rp 1 1/4	330	708	3,3	12,5
4GS156T-4OS	10	Rp 1 1/4	374	787	3,8	15
4GS226T-4OS	15	Rp 1 1/4	481	929	4,8	17,5
4GS306T-4OS	19	Rp 1 1/4	568	1016	5,7	19,5
4GS406T-4OS	27	Rp 1 1/4	770	1338	7,6	25,5

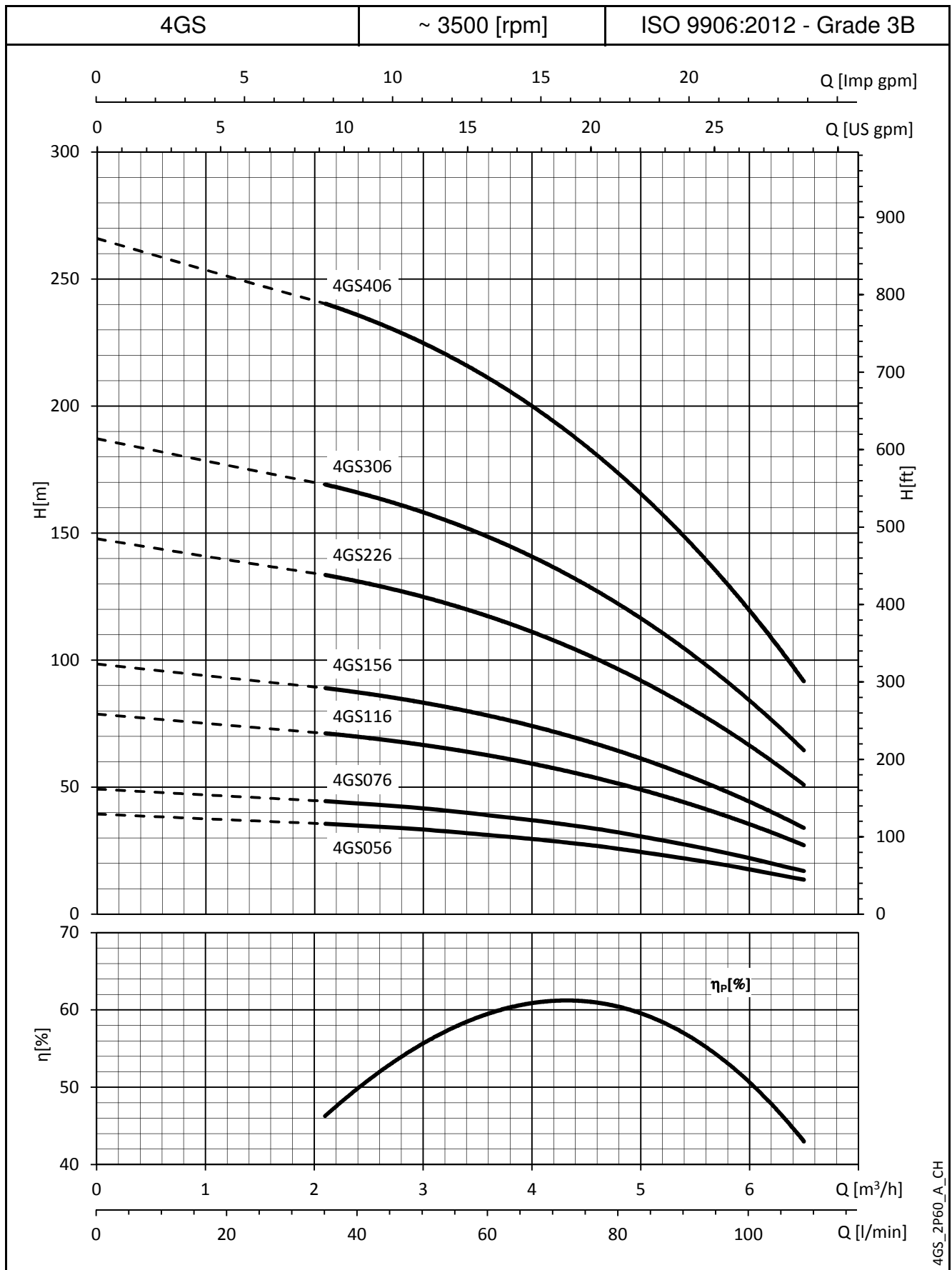
* Pump and motor are supplied uncoupled in two separated packages if:

- the motor is single-phase $\geq 2,2$ kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

4gs-4os-2p60-en_a_td



4GS SERIES OPERATING CHARACTERISTICS AT 60 Hz



These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

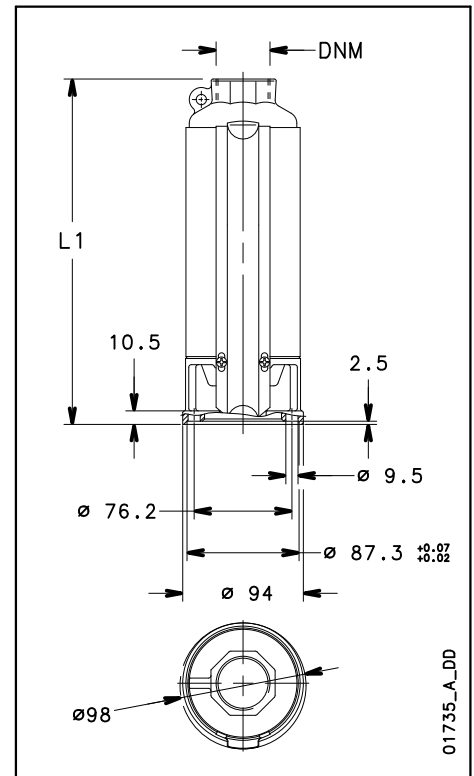
6GS SERIES

OPERATING CHARACTERISTICS AT 60 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		Q = DELIVERY						
				l/min	0	60,0	80,0	120,0	140,0	160,0
		m³/h	0	3,6	4,8	7,2	8,4	9,6		
		kW		HP	H = TOTAL HEAD METRES COLUMN OF WATER					
6GS076	4	0,75	1	37	33	31	26	22	17	
6GS116	6	1,1	1,5	55	49	47	39	32	25	
6GS156	8	1,5	2	74	66	62	51	43	33	
6GS226	11	2,2	3	101	91	86	71	60	46	
6GS306	15	3	4	142	127	121	99	84	64	
6GS406	19	4	5,5	175	158	149	125	108	86	
6GS556R	23	5,5	7,5	211	191	181	152	131	104	
6GS556	27	5,5	7,5	248	224	212	178	153	122	

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)

6gs-2p60-en_d_th



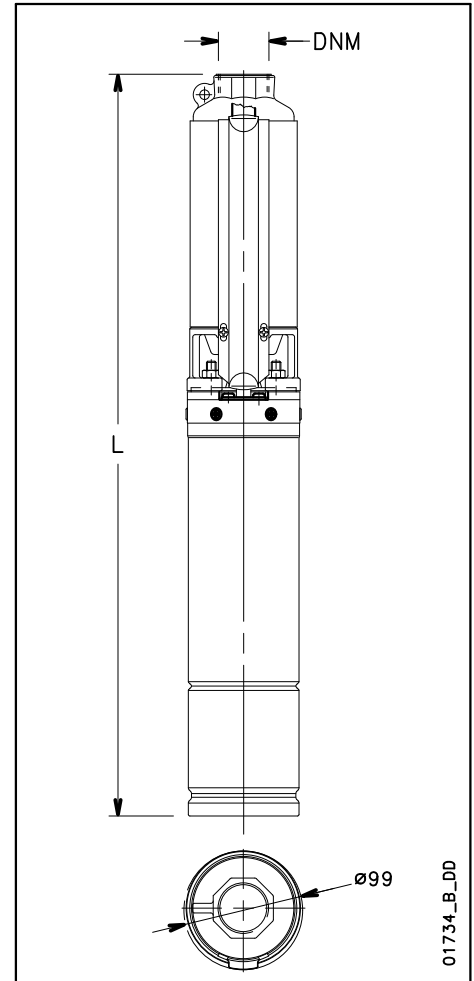
6GS..40S SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE *	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT kg	ELECTRIC PUMP WEIGHT kg
			L1	L		
6GS076M-4OS	4	Rp 1 1/4	297	677	3,0	12,0
6GS116M-4OS	6	Rp 1 1/4	359	774	3,6	14,5
6GS156M-4OS	8	Rp 1 1/4	421	871	4,1	16,6
6GS226M-4OS	11	Rp 1 1/4	514	1014	5,0	19,8
6GS076T-4OS	4	Rp 1 1/4	297	652	3,0	10,9
6GS116T-4OS	6	Rp 1 1/4	359	739	3,6	12,6
6GS156T-4OS	8	Rp 1 1/4	421	836	4,1	15,2
6GS226T-4OS	11	Rp 1 1/4	514	964	5,0	17,6
6GS306T-4OS	15	Rp 1 1/4	676	1126	6,4	20,0
6GS406T-4OS	19	Rp 1 1/4	800	1370	7,5	25,0
6GS556RT-4OS	23	Rp 1 1/4	924	1554	8,7	29,7
6GS556T-4OS	27	Rp 1 1/4	1066	1696	10,7	31,7

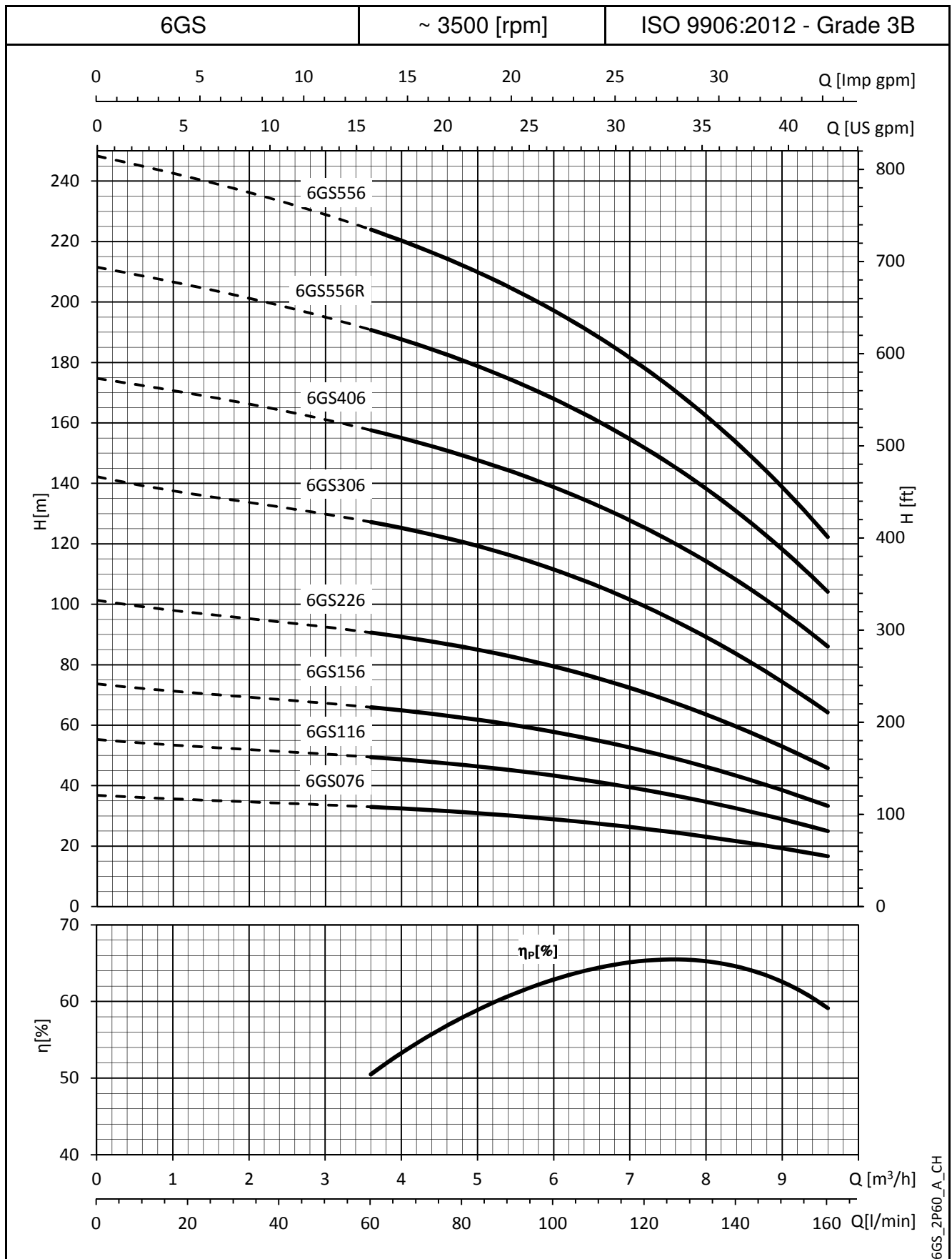
* Pump and motor are supplied uncoupled in two separated packages if:

- the motor is single-phase $\geq 2,2$ kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

6gs-4os-2p60-en_b_td



6GS SERIES OPERATING CHARACTERISTICS AT 60 Hz



These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

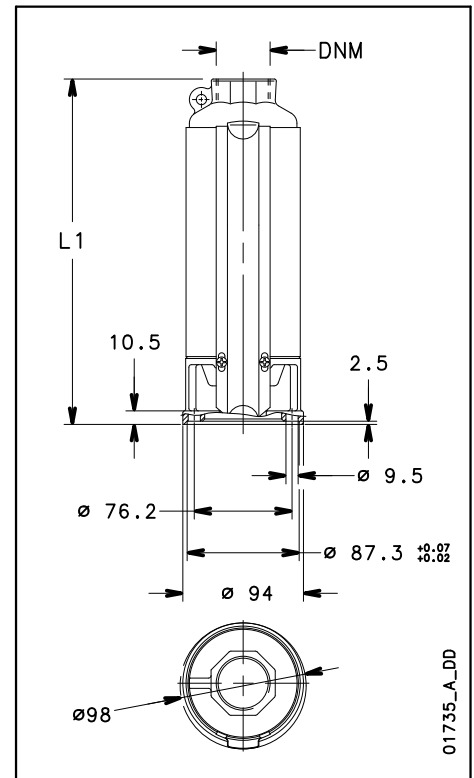
8GS SERIES

OPERATING CHARACTERISTICS AT 60 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		Q = DELIVERY						
				l/min	0	83	120	160	200	225
		m³/h	0	5	7,2	9,6	12	13,5		
		kW		HP	H = TOTAL HEAD METRES COLUMN OF WATER					
8GS116	4	1,1	1,5	39	35	32	27	19	12	
8GS156	6	1,5	2	59	52	48	40	28	18	
8GS226	8	2,2	3	79	69	64	54	38	24	
8GS306	11	3	4	108	95	88	74	52	32	
8GS406	14	4	5,5	138	122	112	95	68	45	
8GS556R	17	5,5	7,5	167	149	136	116	83	55	
8GS556	20	5,5	7,5	197	175	160	136	97	64	
8GS756R	23	7,5	11	226	201	185	156	112	74	

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)

8gs-2p60-en_d_th



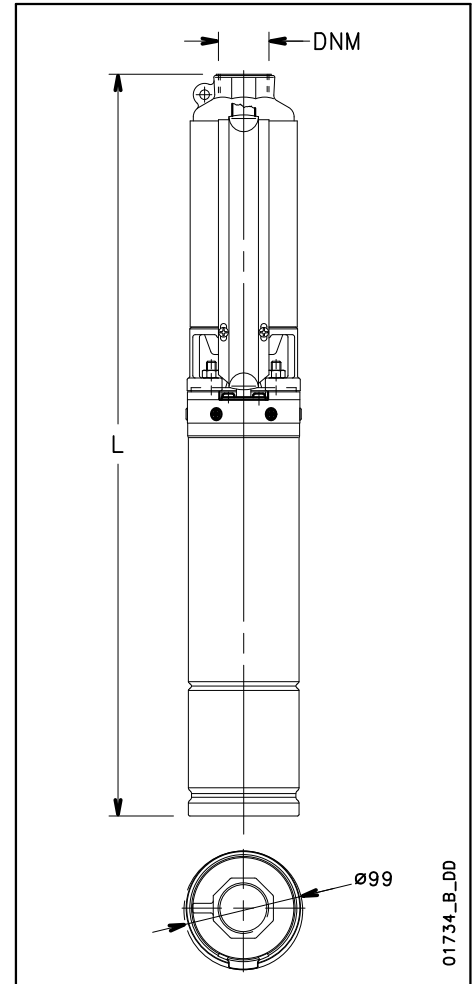
8GS..4OS SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE *	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT kg	ELECTRIC PUMP WEIGHT kg
			L1	L		
8GS116M-4OS	4	Rp 2	299	714	3,0	13,9
8GS156M-4OS	6	Rp 2	361	811	3,6	16,1
8GS226M-4OS	8	Rp 2	423	923	4,2	19,0
8GS116T-4OS	4	Rp 2	299	679	3,0	12,0
8GS156T-4OS	6	Rp 2	361	776	3,6	14,7
8GS226T-4OS	8	Rp 2	423	873	4,2	16,8
8GS306T-4OS	11	Rp 2	516	966	5,1	18,7
8GS406T-4OS	14	Rp 2	647	1217	6,2	23,7
8GS556RT-4OS	17	Rp 2	740	1370	7,0	28,0
8GS556T-4OS	20	Rp 2	833	1463	7,9	28,9
8GS756RT-4OS	23	Rp 2	926	1762	8,7	37,2

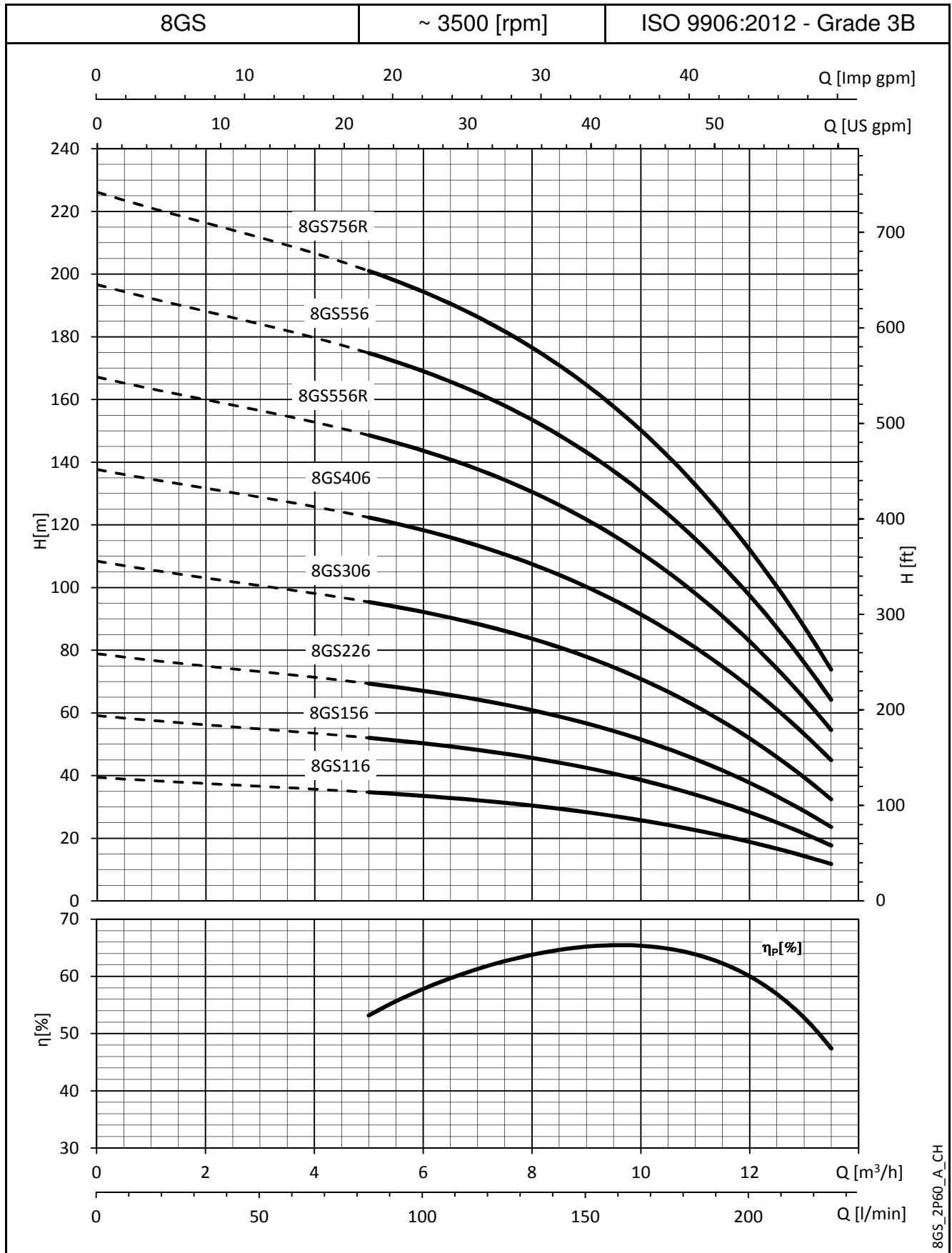
* Pump and motor are supplied uncoupled in two separated packages if:

- the motor is single-phase $\geq 2,2$ kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

8gs-4os-2p60-en_b_td



8GS SERIES OPERATING CHARACTERISTICS AT 60 Hz

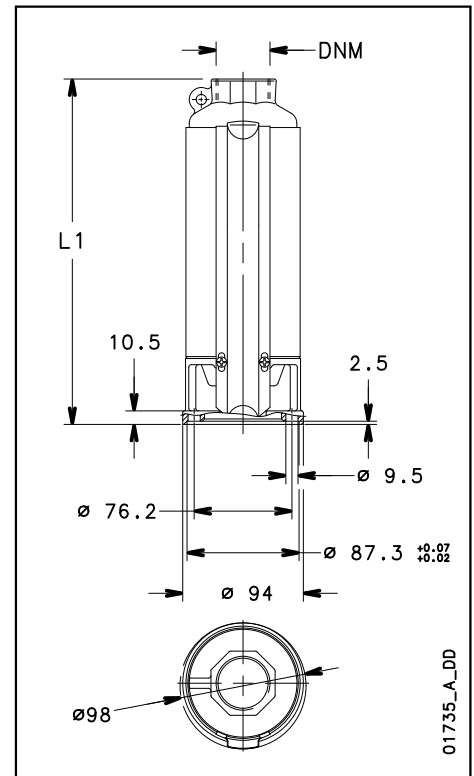


These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

12GS SERIES OPERATING CHARACTERISTICS AT 60 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		Q = DELIVERY					
				l/min	0	125	160	200	250
		m³/h	0	7,5	9,6	12	15	18	
		H = TOTAL HEAD METRES COLUMN OF WATER							
12GS156	5	1,5	2	37	32	30	26	19	11
12GS226	8	2,2	3	60	51	48	41	31	18
12GS306	11	3	4	82	71	65	57	43	24
12GS406	14	4	5,5	104	90	83	72	54	31
12GS556	19	5,5	7,5	145	128	119	106	83	53
12GS756	26	7,5	11	198	175	163	145	114	72

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A) 12gs-2p60-en_d_th



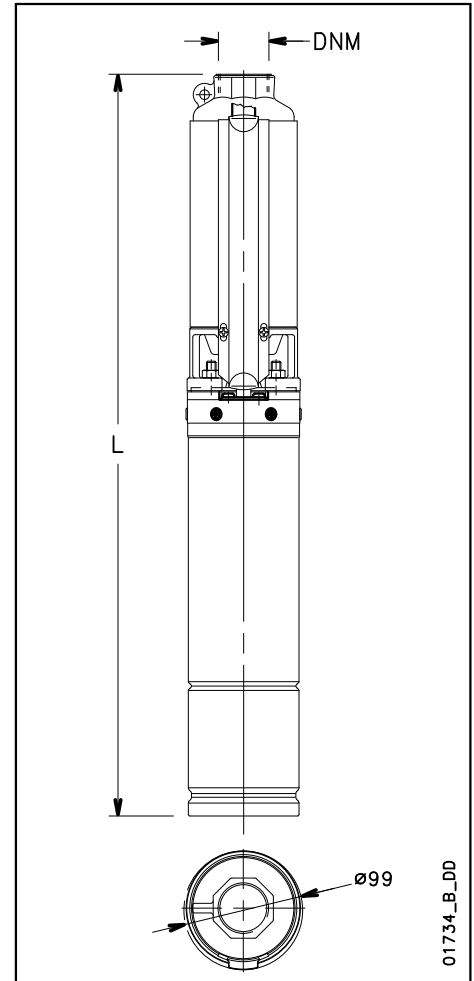
12GS..4OS SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE *	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT kg	ELECTRIC PUMP WEIGHT kg
			L1	L		
12GS156M-4OS	5	Rp 2	435	885	4,3	16,8
12GS226M-4OS	8	Rp 2	591	1091	5,8	20,6
12GS156T-4OS	5	Rp 2	435	850	4,3	15,4
12GS226T-4OS	8	Rp 2	591	1041	5,8	18,4
12GS306T-4OS	11	Rp 2	785	1235	7,5	21,1
12GS406T-4OS	14	Rp 2	940	1510	8,9	26,4
12GS556T-4OS	19	Rp 2	1200	1830	11,3	32,3
12GS756T-4OS	26	Rp 2	1581	2417	15,5	44,0

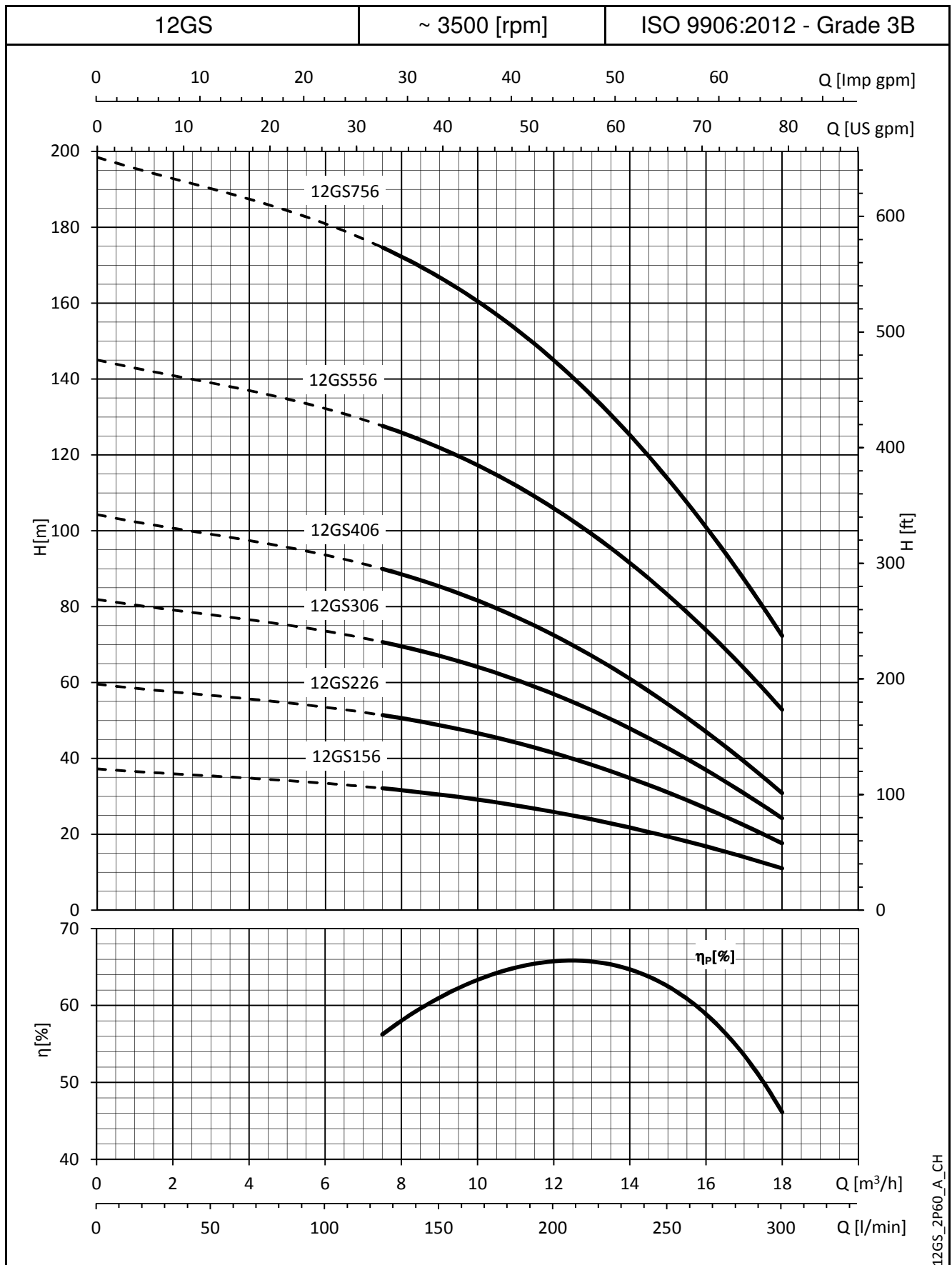
* Pump and motor are supplied uncoupled in two separated packages if:

- the motor is single-phase $\geq 2,2$ kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

12gs-4os-2p60-en_b_td



12GS SERIES OPERATING CHARACTERISTICS AT 60 Hz

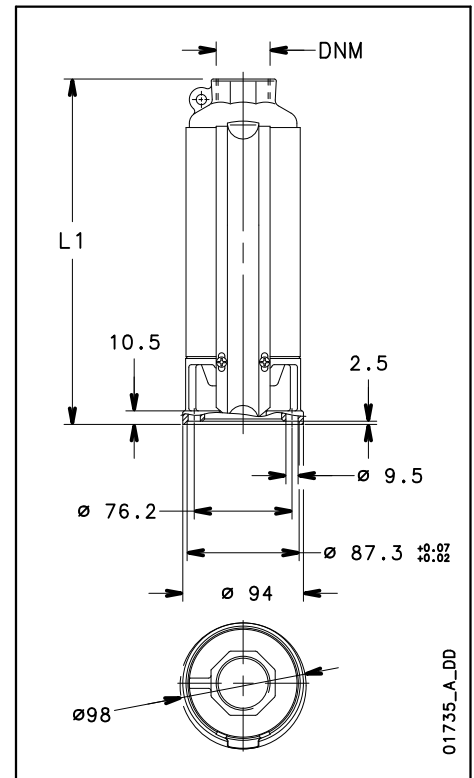


These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

16GS SERIES OPERATING CHARACTERISTICS AT 60 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		Q = DELIVERY					
				l/min	0	160	200	300	350
		m³/h	0	9,6	12	18	21	27	
		kW		HP	H = TOTAL HEAD METRES COLUMN OF WATER				
16GS226	6	2,2	3	41	36	33	25	20	7
16GS306	9	3	4	61	54	50	37	29	11
16GS406	12	4	5,5	79	70	65	51	41	17
16GS556R	14	5,5	7,5	92	81	76	59	48	20
16GS556	16	5,5	7,5	105	93	87	68	55	23
16GS756R	19	7,5	11	131	116	109	85	69	28

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A) 16gs-2p60-en_d_th



16GS..4OS SERIES DIMENSIONS AND WEIGHTS

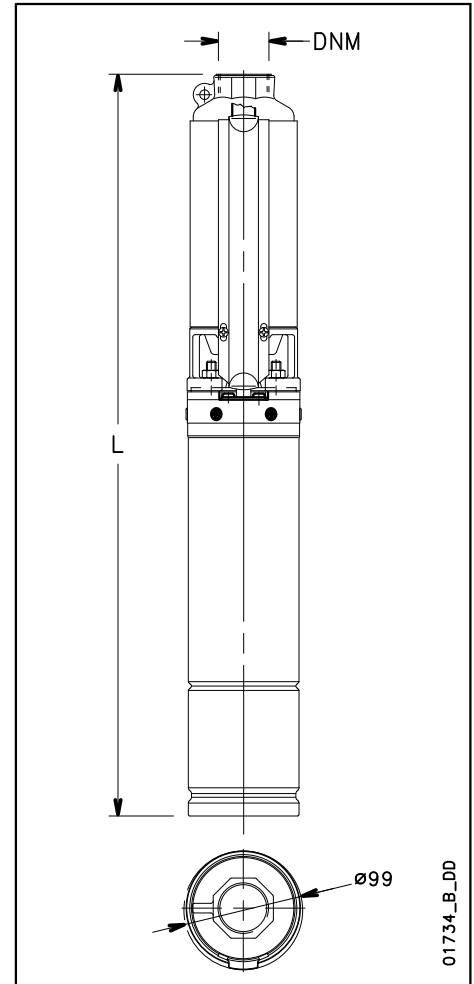
ELECTRIC PUMP TYPE *	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT kg	ELECTRIC PUMP WEIGHT kg
			L1	L		
16GS226M-4OS	6	Rp 2	545	1045	5,1	19,9
16GS226T-4OS	6	Rp 2	545	995	5,1	17,7
16GS306T-4OS	9	Rp 2	749	1199	6,8	20,4
16GS406T-4OS	12	Rp 2	953	1523	8,5	26,0
16GS556RT-4OS	14	Rp 2	1088	1718	9,6	30,6
16GS556T-4OS	16	Rp 2	1224	1854	10,8	31,8
16GS756RT-4OS	19	Rp 2	1484	2320	13,5	42,0

* Pump and motor are supplied uncoupled in two separated packages if:

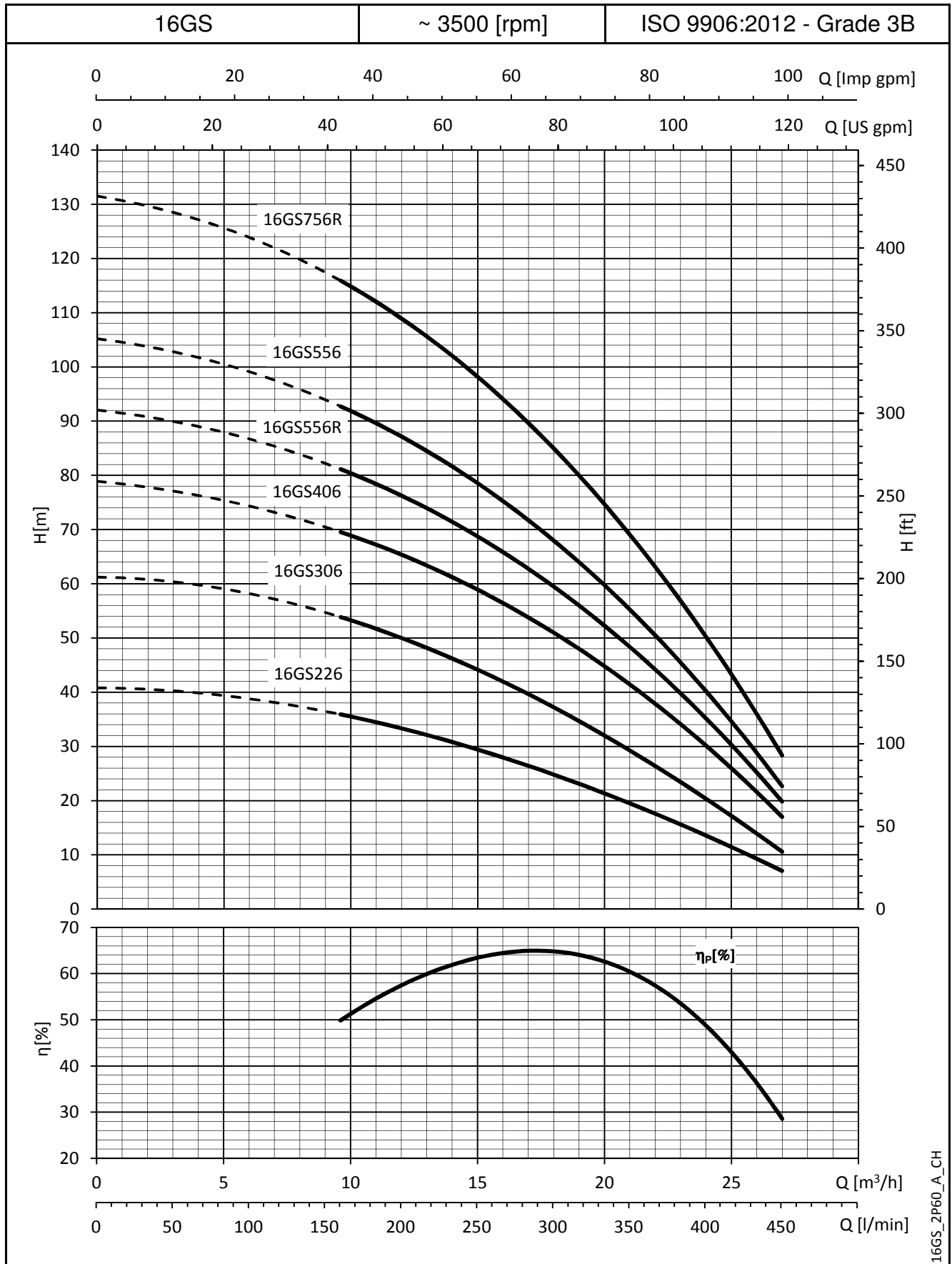
- the motor is single-phase $\geq 2,2$ kW or three-phase ≥ 3 kW

- or the total length is > 1500 mm

16gs-4os-2p60-en_b_td



16GS SERIES OPERATING CHARACTERISTICS AT 60 Hz



These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

MOTOR - CONTROL PANEL COMBINATION TABLE 40S SERIES MOTORS

MOTOR TYPE 40S - 4" SINGLE-PHASE	RATED POWER		CURRENT AT S.F. 220-230 V	CAPACITOR	PANEL TYPE				
	kW	HP	A	μF / 450 V	QSC...	QSCS...			
	0,37	0,5	3,45	20	...036	...036			
	0,55	0,75	4,73	25	...056	...056			
	0,75	1	6,09	35	...076	...076			
	1,1	1,5	7,61	40	...116	...116			
	1,5	2	10,1	50	...156	...156			
	2,2	3	15,7	50	...226	...226			

For different voltages, please contact our sales network.

40SM-2p60-en_c_tc

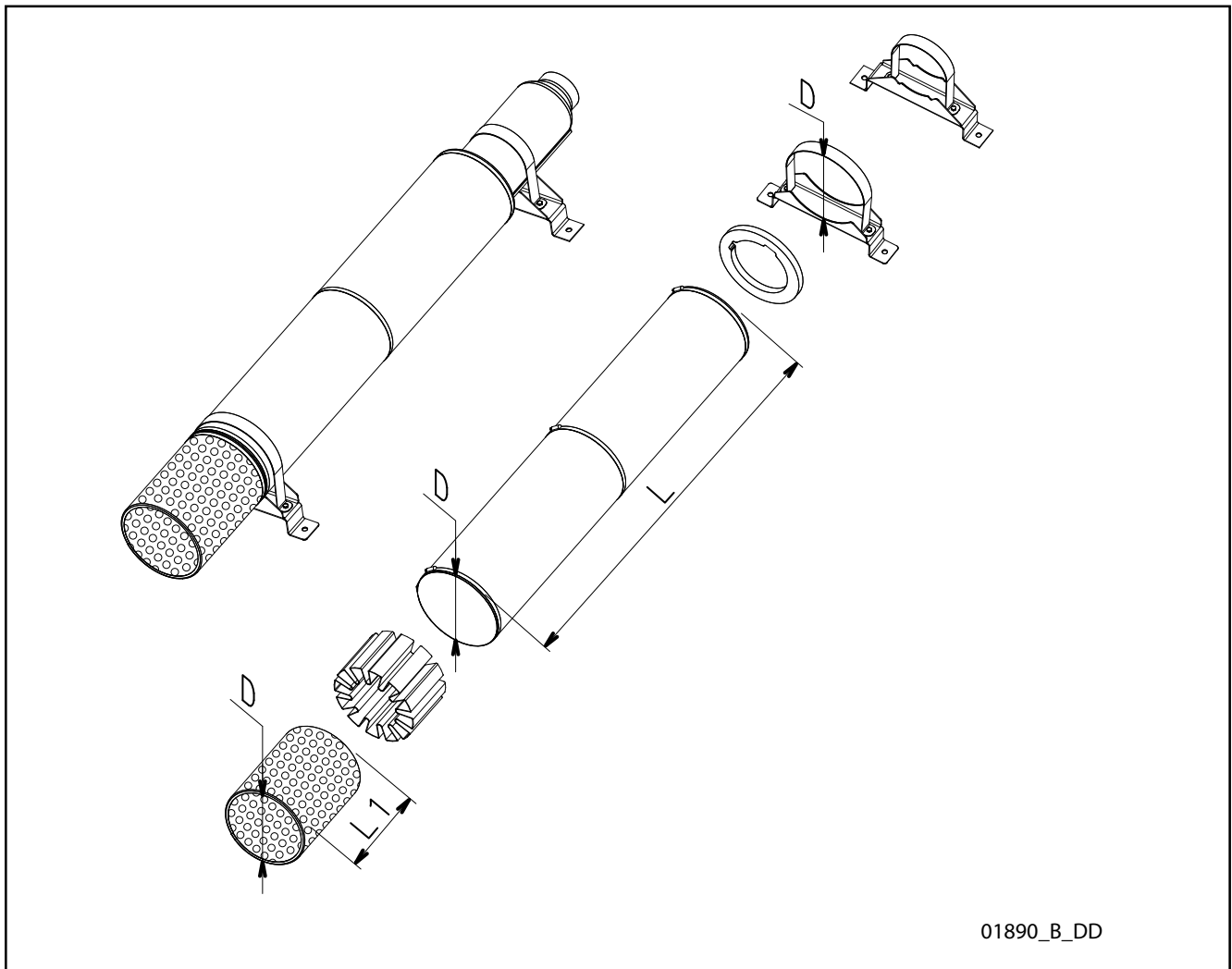
MOTOR TYPE 40S - 4" THREE-PHASE	RATED POWER		CURRENT AT S.F. 380 V		PANEL TYPE					
	kW	HP	A		QTD/...	Q3D/...	Q3I/...	Q3A/...	*Q3Y/...	Q3SF/...
	0,37	0,5	1,55		...05-07	...05-07	-	-	-	-
	0,55	0,75	1,88		...05-07	...05-07	-	-	-	-
	0,75	1	2,62		...07-15	...07-15	-	-	-	-
	1,1	1,5	3,27		...07-15	...07-15	-	-	-	-
	1,5	2	4,30		...15-22	...15-22	-	-	-	-
	2,2	3	6,25		...22-40	...22-40	-	-	-	-
	3	4	7,61		...22-40	...22-40	-	-	-	-
	4	5,5	9,05		...40-75	...40-75	...40-75	...40-75	...40-75	...75
	5,5	7,5	12,3		...40-75	...40-75	...40-75	...40-75	...40-75	...75
	7,5	10	19,4		-	...92-110	...92-110	...92-110	...92-110	...150

For different voltages, please contact our sales network.

40ST-2p60-en_c_tc

* require 6-wire suitable motor

COOLING SLEEVE

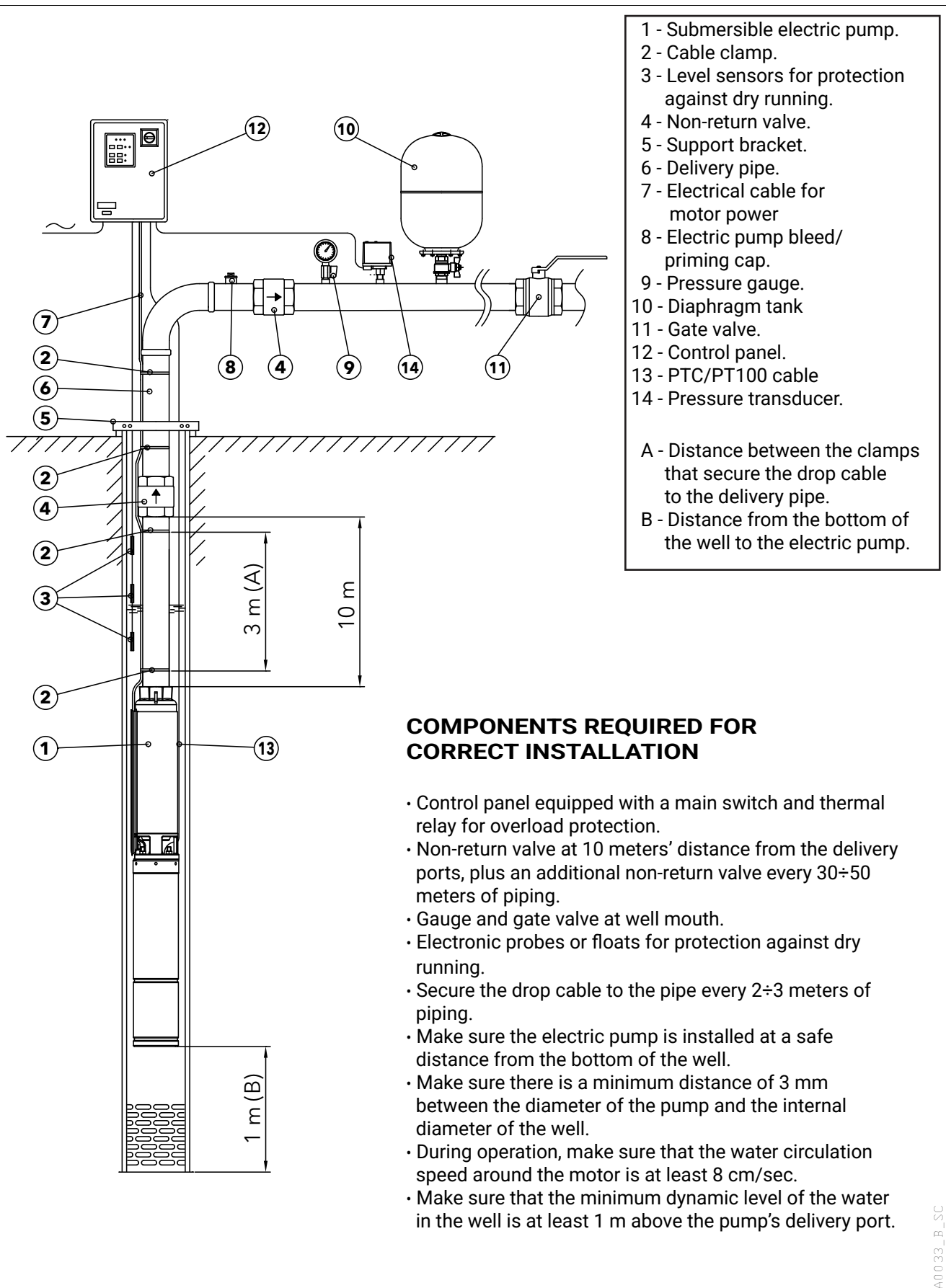


PUMP TYPE	MOTOR TYPE 40S	COOLING SET SHROUD (D x L)	COOLING SET FILTER (D x L1)	COOLING SET BRACKETS (D)
1GSL 2GS 4GS 6GS 8GS 12GS	0,37	D115 x 500	D115 x 117	D115 - 2PZ
	0,55			
	0,75			
	1,1	D115 x 800	D115 x 117	D115 - 2PZ
	1,5			
	2,2			
	3			
	4	D115 x 1000	D115 x 117	D115 - 2PZ
	5,5			
16GS	7,5	D145 x 800	D145 x 158	D145 - 2PZ
	1,5			
	2,2			
	3	D145 x 1000	D145 x 158	D145 - 2PZ
	4			
	5,5			
	7,5			

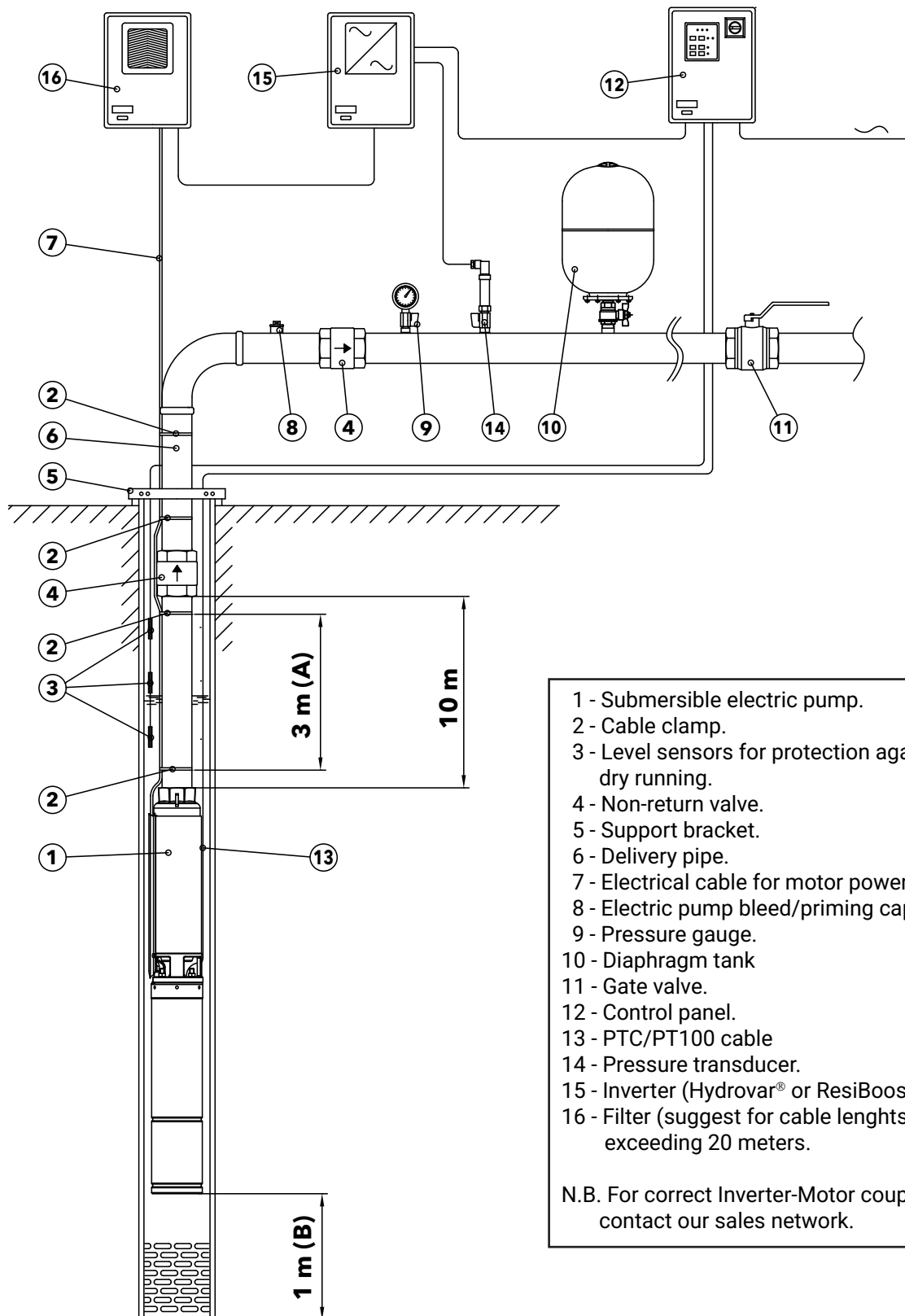
gs_kit-raf60_40S-en_a_ta

TECHNICAL APPENDIX

SUBMERSIBLE ELECTRIC PUMP INSTALLATION DIAGRAM



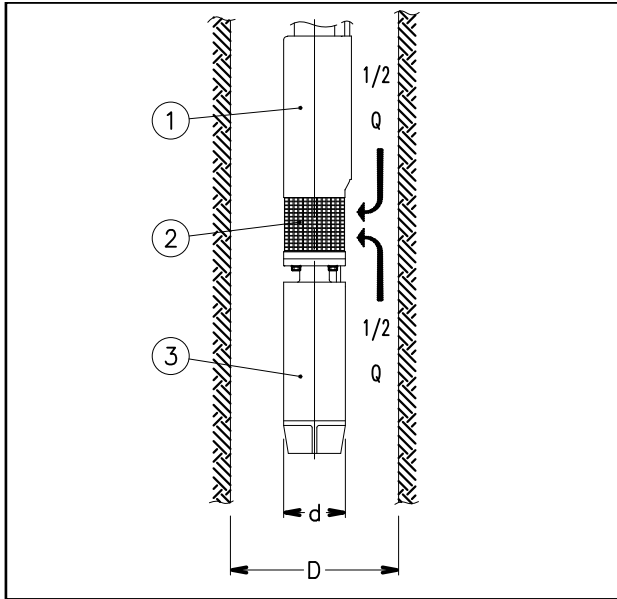
EXAMPLE OF INSTALLATION OF A SUBMERSIBLE ELECTRIC PUMP CONTROLLED BY AN INVERTER



- 1 - Submersible electric pump.
- 2 - Cable clamp.
- 3 - Level sensors for protection against dry running.
- 4 - Non-return valve.
- 5 - Support bracket.
- 6 - Delivery pipe.
- 7 - Electrical cable for motor power
- 8 - Electric pump bleed/priming cap.
- 9 - Pressure gauge.
- 10 - Diaphragm tank
- 11 - Gate valve.
- 12 - Control panel.
- 13 - PTC/PT100 cable
- 14 - Pressure transducer.
- 15 - Inverter (Hydrovar® or ResiBoost).
- 16 - Filter (suggest for cable lengths exceeding 20 meters).

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

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:

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

Where:

Q in [m³/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] is the diameter of the well;

d in [m] is 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:

$v \geq v_m$ the motor is properly cooled

$v < v_m$ it will be necessary to mount a cooling sleeve (4)

Example:

An electric pump with motor diameter $d = 0.144$ m operates in an 8" well (well diameter $D = 0.203$ m) with flow rate:

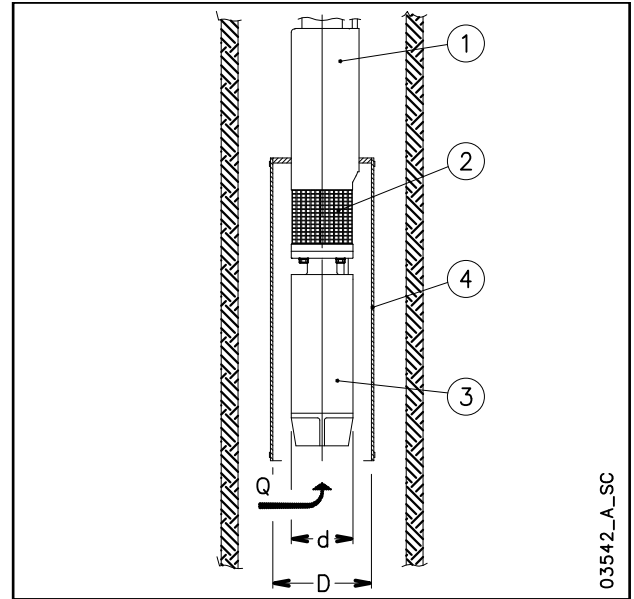
$Q = 20$ m³/h = 0.0055 m³/s

and speed of the 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.

As $v < v_m$ 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 [m³/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 an electric pump with motor diameter $d = 0.144$ m, which operates with flow rate: $Q = 15$ m³/h = 0.0042 m³/s

requires a minimum speed of the fluid:

$v_m = 0.20$ m/s.

cooling sleeve diameter:

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

ASYNCHRONOUS MOTOR STARTING SYSTEMS

Direct

Suitable for low-power motors.

The starting current (I_s) is much higher than the rated current (I_n).

Starting current $I_s = I_n \times 4 \div 8$

Starting torque $T_s = T_n \times 2 \div 3$

Indirect

• Star/Delta

The starting current (I_s) is three times less than the direct starting current.

Starting current $I_s = I_n \times 1.3 \div 2.7$

Starting torque $T_s = T_n \times 0.7 \div 1$

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 $U_n = 400 \text{ V}$

Starting voltage $U_s = U_n \times 0.7 = 280 \text{ V}$

Starting current

$$I_s = I_n \times 4 \div 8 \times \left(\frac{U_s}{U_n} \right) = I_n \times 3 \div 6$$

Starting torque

$$T_s = T_n \times 2 \div 3 \times \left(\frac{U_s}{U_n} \right)^2 = T_n \times 1 \div 1.5$$

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.

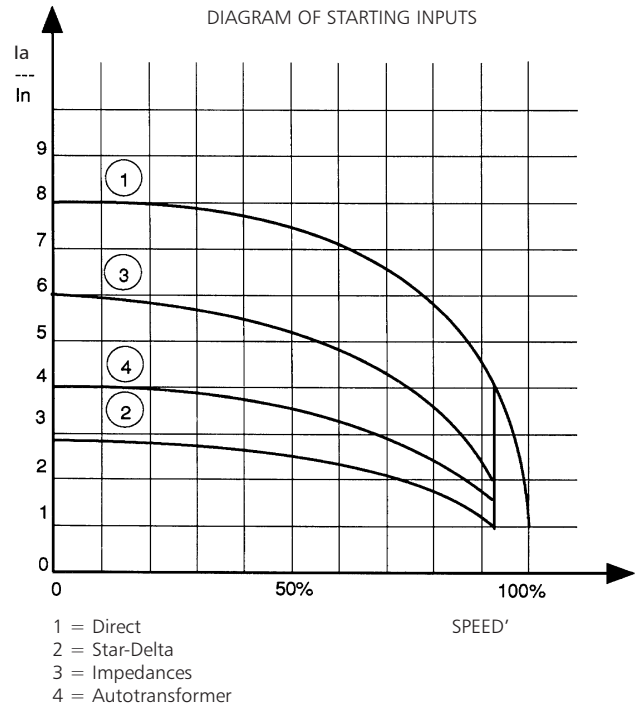
Rated voltage $U_n = 400 \text{ V}$

Starting current

$$I_s = I_n \times 4 \div 8 \times \left(\frac{U_s}{U_n} \right) = I_n \times 3 \div 6$$

Starting torque

$$T_s = T_n \times 2 \div 3 \times \left(\frac{U_s}{U_n} \right)^2 = T_n \times 1 \div 1.5$$



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

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.

$f = \frac{1}{\sqrt{(0,857 \times N_r \times N_a)}}$	Coefficient for apartments with one bathroom and flush tank WC
$f = \frac{1}{\sqrt{(0,857 \times N_r \times N_a)}}$	Coefficient for apartments with one bathroom and controlled flushing system WC
$f = \frac{1,03}{\sqrt{(0,545 \times N_r \times N_a)}}$	Coefficient for apartments with two bathrooms and flush tank WC
$f = \frac{0,8}{\sqrt{(0,727 \times N_r \times N_a)}}$	Coefficient for apartments with two bathrooms and controlled flushing system WC
f= coefficient; N _r = number of delivery points; N _a = 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.

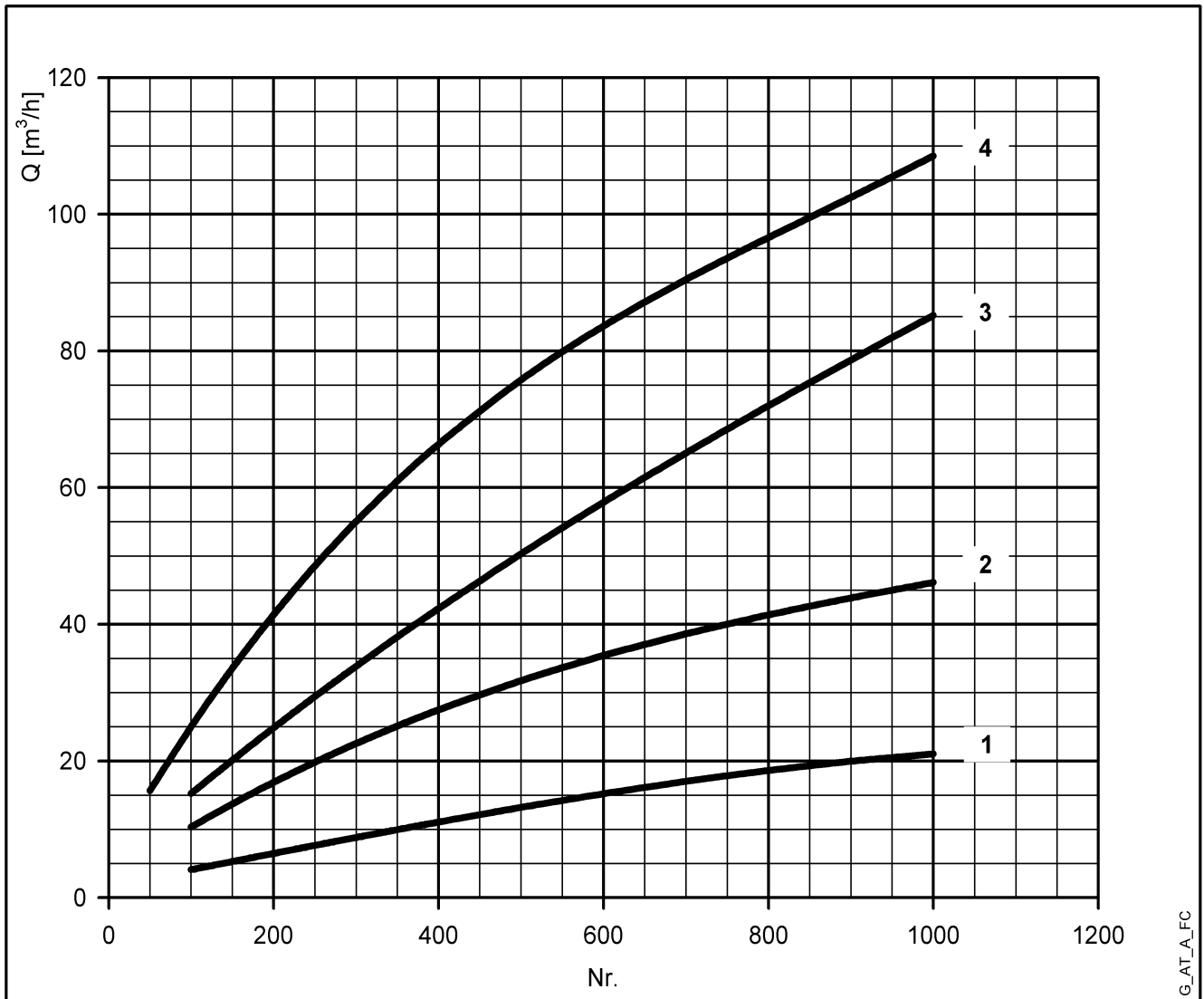
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WATER REQUIREMENTS FOR COMMUNITY BUILDINGS

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 h_z at which to install the machine under safe conditions, the following formula must be verified:

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

where:

h_p is the absolute pressure applied to the free liquid surface in the suction tank, expressed in m. of liquid; h_p 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.; h_z 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. h_{pv} 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

Friction loss is shown in the tables at pages 39-40. 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 $\gamma = 1 \text{ kg/dm}^3$

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, di 2,5 m.

For water at 15 °C

$$h_p = P_a / \gamma = 10,33\text{m}, h_{pv} = P_v / \gamma = 0,174\text{m} (0,01701 \text{ bar})$$

The H_f 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 **VAPOUR PRESSURE p_s AND ρ DENSITY OF WATER TABLE**

t °C	T K	p_s bar	ρ kg/dm ³	t °C	T K	p_s bar	ρ kg/dm ³	t °C	T K	p_s bar	ρ kg/dm ³
0	273,15	0,00611	0,9998	55	328,15	0,15741	0,9857	120	393,15	1,9854	0,9429
1	274,15	0,00657	0,9999	56	329,15	0,16511	0,9852	122	395,15	2,1145	0,9412
2	275,15	0,00706	0,9999	57	330,15	0,17313	0,9846	124	397,15	2,2504	0,9396
3	276,15	0,00758	0,9999	58	331,15	0,18147	0,9842	126	399,15	2,3933	0,9379
4	277,15	0,00813	1,0000	59	332,15	0,19016	0,9837	128	401,15	2,5435	0,9362
5	278,15	0,00872	1,0000	60	333,15	0,1992	0,9832	130	403,15	2,7013	0,9346
6	279,15	0,00935	1,0000	61	334,15	0,2086	0,9826	132	405,15	2,867	0,9328
7	280,15	0,01001	0,9999	62	335,15	0,2184	0,9821	134	407,15	3,041	0,9311
8	281,15	0,01072	0,9999	63	336,15	0,2286	0,9816	136	409,15	3,223	0,9294
9	282,15	0,01147	0,9998	64	337,15	0,2391	0,9811	138	411,15	3,414	0,9276
10	283,15	0,01227	0,9997	65	338,15	0,2501	0,9805	140	413,15	3,614	0,9258
11	284,15	0,01312	0,9997	66	339,15	0,2615	0,9799	145	418,15	4,155	0,9214
12	285,15	0,01401	0,9996	67	340,15	0,2733	0,9793	155	428,15	5,433	0,9121
13	286,15	0,01497	0,9994	68	341,15	0,2856	0,9788	160	433,15	6,181	0,9073
14	287,15	0,01597	0,9993	69	342,15	0,2984	0,9782	165	438,15	7,008	0,9024
15	288,15	0,01704	0,9992	70	343,15	0,3116	0,9777	170	433,15	7,920	0,8973
16	289,15	0,01817	0,9990	71	344,15	0,3253	0,9770	175	448,15	8,924	0,8921
17	290,15	0,01936	0,9988	72	345,15	0,3396	0,9765	180	453,15	10,027	0,8869
18	291,15	0,02062	0,9987	73	346,15	0,3543	0,9760	185	458,15	11,233	0,8815
19	292,15	0,02196	0,9985	74	347,15	0,3696	0,9753	190	463,15	12,551	0,8760
20	293,15	0,02337	0,9983	75	348,15	0,3855	0,9748	195	468,15	13,987	0,8704
21	294,15	0,24850	0,9981	76	349,15	0,4019	0,9741	200	473,15	15,550	0,8647
22	295,15	0,02642	0,9978	77	350,15	0,4189	0,9735	205	478,15	17,243	0,8588
23	296,15	0,02808	0,9976	78	351,15	0,4365	0,9729	210	483,15	19,077	0,8528
24	297,15	0,02982	0,9974	79	352,15	0,4547	0,9723	215	488,15	21,060	0,8467
25	298,15	0,03166	0,9971	80	353,15	0,4736	0,9716	220	493,15	23,198	0,8403
26	299,15	0,03360	0,9968	81	354,15	0,4931	0,9710	225	498,15	25,501	0,8339
27	300,15	0,03564	0,9966	82	355,15	0,5133	0,9704	230	503,15	27,976	0,8273
28	301,15	0,03778	0,9963	83	356,15	0,5342	0,9697	235	508,15	30,632	0,8205
29	302,15	0,04004	0,9960	84	357,15	0,5557	0,9691	240	513,15	33,478	0,8136
30	303,15	0,04241	0,9957	85	358,15	0,5780	0,9684	245	518,15	36,523	0,8065
31	304,15	0,04491	0,9954	86	359,15	0,6011	0,9678	250	523,15	39,776	0,7992
32	305,15	0,04753	0,9951	87	360,15	0,6249	0,9671	255	528,15	43,246	0,7916
33	306,15	0,05029	0,9947	88	361,15	0,6495	0,9665	260	533,15	46,943	0,7839
34	307,15	0,05318	0,9944	89	362,15	0,6749	0,9658	265	538,15	50,877	0,7759
35	308,15	0,05622	0,9940	90	363,15	0,7011	0,9652	270	543,15	55,058	0,7678
36	309,15	0,05940	0,9937	91	364,15	0,7281	0,9644	275	548,15	59,496	0,7593
37	310,15	0,06274	0,9933	92	365,15	0,7561	0,9638	280	553,15	64,202	0,7505
38	311,15	0,06624	0,9930	93	366,15	0,7849	0,9630	285	558,15	69,186	0,7415
39	312,15	0,06991	0,9927	94	367,15	0,8146	0,9624	290	563,15	74,461	0,7321
40	313,15	0,07375	0,9923	95	368,15	0,8453	0,9616	295	568,15	80,037	0,7223
41	314,15	0,07777	0,9919	96	369,15	0,8769	0,9610	300	573,15	85,927	0,7122
42	315,15	0,08198	0,9915	97	370,15	0,9094	0,9602	305	578,15	92,144	0,7017
43	316,15	0,09639	0,9911	98	371,15	0,9430	0,9596	310	583,15	98,70	0,6906
44	317,15	0,09100	0,9907	99	372,15	0,9776	0,9586	315	588,15	105,61	0,6791
45	318,15	0,09582	0,9902	100	373,15	1,0133	0,9581	320	593,15	112,89	0,6669
46	319,15	0,10086	0,9898	102	375,15	1,0878	0,9567	325	598,15	120,56	0,6541
47	320,15	0,10612	0,9894	104	377,15	1,1668	0,9552	330	603,15	128,63	0,6404
48	321,15	0,11162	0,9889	106	379,15	1,2504	0,9537	340	613,15	146,05	0,6102
49	322,15	0,11736	0,9884	108	381,15	1,3390	0,9522	350	623,15	165,35	0,5743
50	323,15	0,12335	0,9880	110	383,15	1,4327	0,9507	360	633,15	186,75	0,5275
51	324,15	0,12961	0,9876	112	385,15	1,5316	0,9491	370	643,15	210,54	0,4518
52	325,15	0,13613	0,9871	114	387,15	1,6362	0,9476	374,15	647,30	221,20	0,3154
53	326,15	0,14293	0,9862	116	389,15	1,7465	0,9460				
54	327,15	0,15002	0,9862	118	391,15	1,8628	0,9445				

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																			
m³/h	l/min			15	20	25	32	40	50	65	80	100	125	150	175	200	250	300	350	400	
				1/2"	3/4"	1"	1 1/4"	1 1/2"	2	2 1/2"	3"	4"	5"	6"	7"	8"	10"	12"	14"	16"	
0,6	10	v	0,94	0,53	0,34	0,21	0,13			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											
		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	8,85	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	

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	Imperial gallon per minute Imp. gal/min	U.S. gallon per minute US gal/min
1,0000	0,0600	2,1189	0,0353	0,2200	0,2642
16,6667	1,0000	35,3147	0,5886	3,6662	4,4029
0,4719	0,0283	1,0000	0,0167	0,1038	0,1247
28,3168	1,6990	60,0000	1,0000	6,2288	7,4805
4,5461	0,2728	9,6326	0,1605	1,0000	1,2009
3,7854	0,2271	8,0208	0,1337	0,8327	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 ₂ O	Millimetre of mercury mm Hg
1,0000	0,0010	1×10^{-5}	$1,45 \times 10^{-4}$	$1,02 \times 10^{-4}$	0,0075
1 000,0000	1,0000	0,0100	0,1450	0,1020	7,5006
1×10^5	100,0000	1,0000	14,5038	10,1972	750,0638
6 894,7570	6,8948	0,0689	1,0000	0,7031	51,7151
9 806,6500	9,8067	0,0981	1,4223	1,0000	73,5561
133,3220	0,1333	0,0013	0,0193	0,0136	1,0000

LENGTH

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
1 000,0000	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

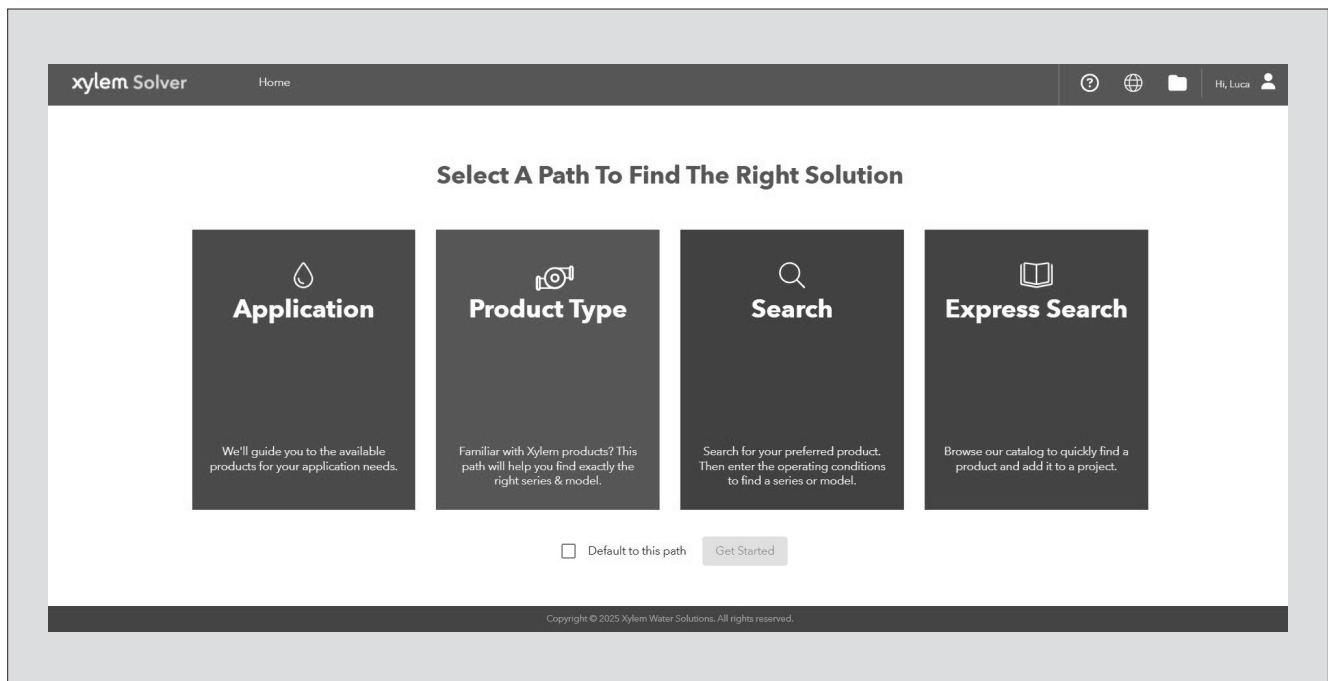
Cubic metre m ³	Litre L	Millilitre ml	Imperial gallon imp. gal.	U.S. gallon US gal.	Cubic foot ft ³
1,0000	1 000,0000	1×10^6	219,9694	264,1720	35,3147
0,0010	1,0000	1 000,0000	0,2200	0,2642	0,0353
1×10^{-6}	0,0010	1,0000	$2,2 \times 10^{-4}$	$2,642 \times 10^{-4}$	$3,53 \times 10^{-5}$
0,0045	4,5461	4 546,0870	1,0000	1,2009	0,1605
0,0038	3,7854	3 785,4120	0,8327	1,0000	0,1337
0,0283	28,3168	28 316,8466	6,2288	7,4805	1,0000

TEMPERATURE

Water	Kelvin K	Celsius °C	Fahrenheit °F	$^{\circ}\text{F} = ^{\circ}\text{C} \times \frac{9}{5} + 32$ $^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times \frac{5}{9}$
icing	273,1500	0,0000	32,0000	
boiling	373,1500	100,0000	212,0000	

G-at_pp-en_b_sc

FURTHER PRODUCT SELECTION AND DOCUMENTATION Xylem Solver



Xylem Solver is pump solution selection software with an extensive online database of product information across the entire Xylem range of pumps and related products, with multiple search options and helpful project management facilities. The system holds up-to-date product information on thousands of products and accessories.

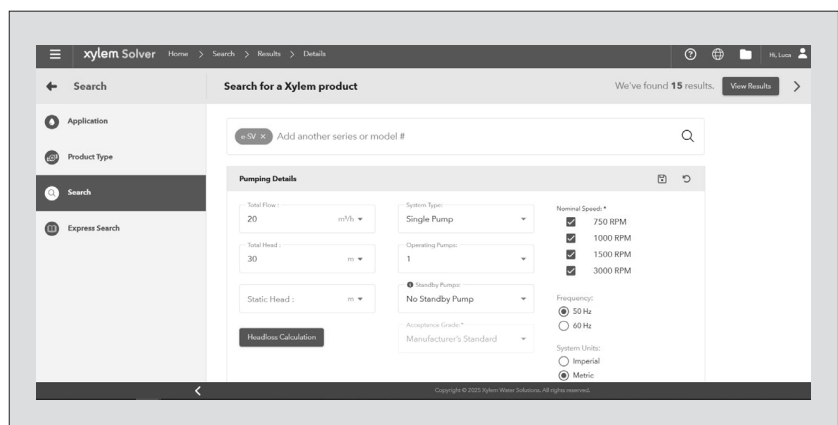
The possibility to search by applications and the detailed information output given makes it easy to make the optimal selection without having detailed knowledge about the Xylem products.

The search can be made by:

- Application
- Product type
- Duty point

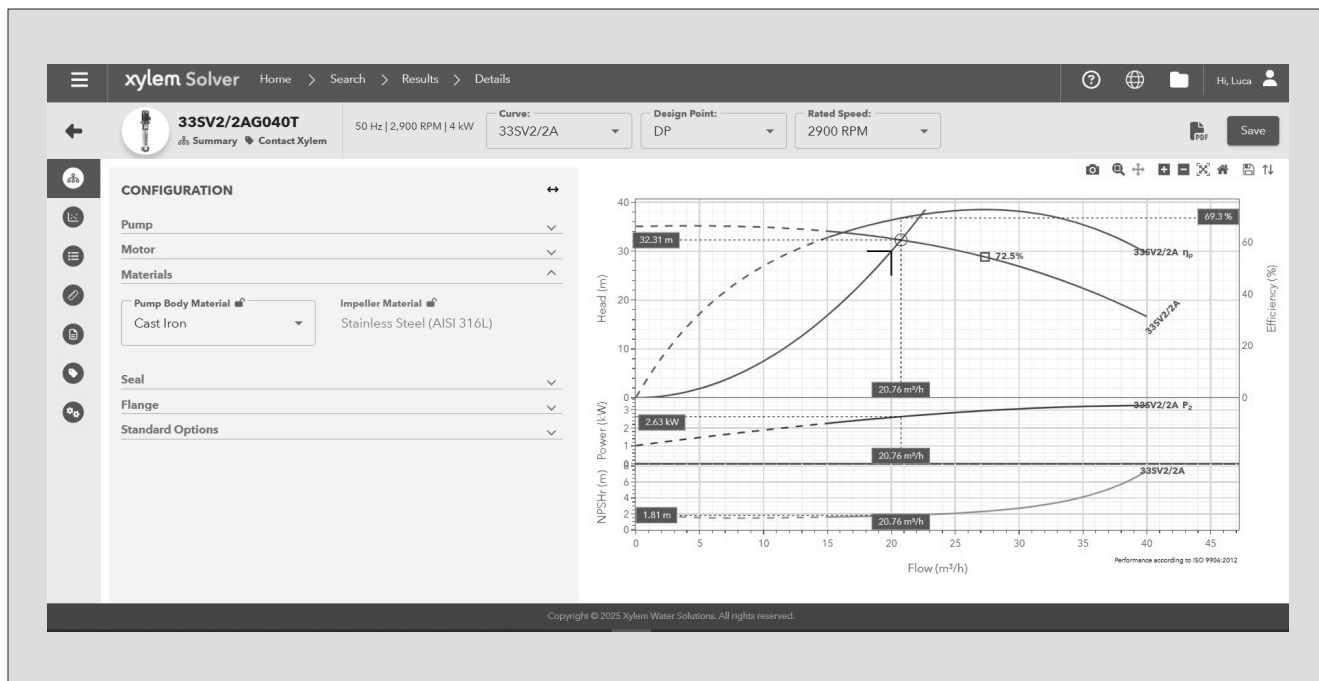
Xylem Solver gives a detailed output:

- List with search results in which you can compare up to four products
- Performance curves (flow, head, power, efficiency, NPSH)
- Motor data
- Dimensional drawings
- Options
- Data sheet printouts
- Document downloads incl dxf, stp and BIM files



Once a product series has been selected, input design criteria to select pumps that meet the design requirements.

FURTHER PRODUCT SELECTION AND DOCUMENTATION Xylem Solver



The detailed output makes it easy to select the optimal pump from the given alternatives.

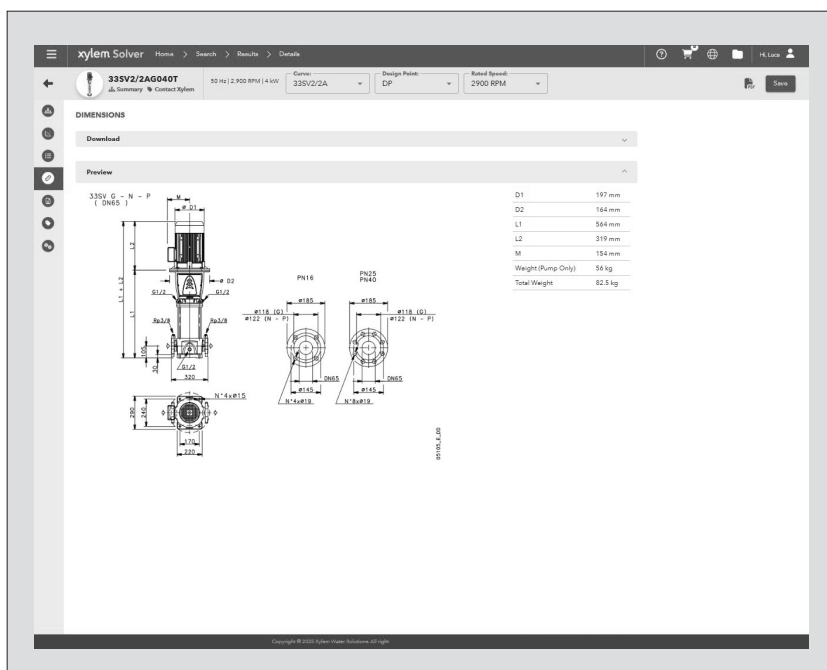
The best way to work with Xylem Solver is to create a personal count.

This makes it possible to:

- Set own standard units
- Create and save projects

Every registered user has a proper space, where all projects are saved.

For more information about Xylem Solver please contact our sales network or visit <https://solver.xylem.com>.



The dimensions tab shows technical drawings, dimensions, and CAD files when available.

Xylem l'zīlām!

- 1) the tissue in plants that brings water and nutrients upward from the roots.
- 2) a leading global water solutions company.

Xylem is the connective tissue and system in plants which cleanses and transports water from the root to where it is needed most to sustain life.

And this is the essence of Xylem as a company. We are committed to driving sustainable impact by ensuring our connected technologies and solutions support our customers and the communities they serve, to tackle the water challenges that matter most to them.

For more information on how Xylem can help you, visit xylem.com.

Xylem Service Italia Srl
Via Dottor Vittorio Lombardi 14
36075 - Montecchio Maggiore (VI)
Italy

Tel. (+39) 0444 707111
Fax (+39) 0444 491043
www.xylem.com/it-it